



CAPACITORS FOR POWER ELECTRONICS



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ENERGIZING IDEAS

CORNELL
DUBILIER

MILITARY/AEROSPACE

TABLE OF CONTENTS

SERIES	DESCRIPTION
300-301	300/301: +105°C, 4,000 Hrs., ow ESR
AFK-V	AFK_V: +105°C, 5,000 Hrs., High Vibration withstands 30 G
MLP	MLP: +85°C, 2,000 Hrs., Flatpack(TM)/Low Profile
MLS	MLS: +125°C, 2,000 Hrs., Flatpack(TM)/Low Profile (for new designs see the MLSG series)
MLSG	MLSG: +125°C, 5,000 Hrs., Flatpack(TM)/ Low Profile/High Temperature
MLSG-S	MLSG-S: +125°C, 5,000 Hrs., Slimpack(TM)/High Temperature
MLSH	MLSH: +125°C, 5,000 Hrs., Slimpack(TM)/Hermetic/High Temperature
NHR	NHR: +150°C, 3,000 Hrs., Slimpack(TM)/Highest Temperature
PPC	PPC: +125°C, 2,000 Hrs., Ultra-Thin Polymer Aluminum Electrolytic Capacitor
THA	THA: +85°C, 5,000 Hrs., Thinpack(TM)/Lower Profile
THAS	THAS: +105°C, 3,000 Hrs., Thinpack(TM)/Lower Profile/High Temperature
ULP	ULP: +85°C, 3,000 Hrs., Ultra Low Profile
101C	101C: +105°C, 5,000 Hrs., Low ESR, Wide Temperature Grade
125	125: +125°C, 5,000 Hrs., Ultra High Temperature, Military Grade
HZA-V	HZA_V: +105°C, High Vibration, Very Low ESR
HZC-V	HZC_V: +125°C, High Vibration, Very Low ESR
PPC	PPC: +125°C, 2,000 Hrs., Ultra-Thin Polymer Aluminum Electrolytic Capacitor
CD4	CD: Ultra-High-Frequency Capacitor CATV and RF Applications 0.1" Lead Spacing
MINI-DIPPED	Types CD5, CD6, CD7, CDS5, CDS10, D7, CDS15, CDS19, CDS30
STD-DIPPED	Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30
CD-CDV16	CD16, CDV1: Snubber and RF Applications
CMR	CMR03, CMR04, CMR05, CMR06, CMR07, CMR08: MIL-PRF-39001
MCM-MIN	MCM01/MIN02: 200°C, Metal Clad, RF Mica
MC	MC(N)08, MC(N)12, MC(N)18, MC(N)22: High RF Current
DGH	DGH: +85°C Low ESR Supercapacitor
DCN	DCN: +60°C, Radial Lead Supercapacitors
DCR	DCR: +70°C, Radial Lead Supercapacitors
DER	DER: +70°C, Radial Lead Supercapacitors
DSF	DSF: +85°C, High Voltage
VMF	VMF: Hybrid LIC
VPF	VPF: Hybrid LIC
EDC	EDC: +70°C, Long Life
EDS	EDS: +85°C, Long Life

[Please click here to see notice regarding "Longer life non RoHS parts"](#)

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial High Capacitance and Ultra-Low ESR



The Types 300 and 301 are the wide-temperature, low-ESR capacitors for power-supply outputs and UPS battery stiffening. The exceptionally low ESRs enable high ripple-current capability. With series inductance of 12 to 16 nH and ripple currents to 16 amps one of these capacitors can save by replacing three or four of the 12.5 mm diameter capacitors routinely at the output of switching power supplies. Type 300 has three leads for rugged, reverse-proof mounting, and Type 301 has two leads. Types 300R and 301R deliver even lower ESR and higher ripple.

Highlights

- 4000 hour load life
- Ripple Current to 16 amps
- ESRs to 6 mΩ
- > 90% capacitance at –40 °C
- Replaces multiple capacitors

Specifications

Temperature Range	–55 °C to +105 °C							
Rated Voltage Range	6.3 to 250 Vdc							
Capacitance Range	8.2 μF to 33,000 μF							
Capacitance Tolerance	6.3 to 100 Vdc; –10 + 75%, 160 to 250 Vdc; –10 +50%							
Leakage Current	≤0.5 \sqrt{CV} μA, 4 mA max, 5 minutes							
Ripple Current Multipliers	Ambient Temperature							
	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	
	1.66	1.52	1.37	1.20	1.00	0.75	0.36	
	Frequency							
		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up
	Less than .77" Diameter							
	6.3 & 7.5 V	0.76	0.81	1.00	1.23	1.35	1.41	1.43
	10 to 40 V	0.74	0.79	1.00	1.29	1.46	1.55	1.57
	50V	0.72	0.78	1.00	1.33	1.54	1.67	1.69
	63 & 75 V	0.71	0.76	1.00	1.38	1.64	1.82	1.86
100 to 250 V	0.68	0.74	1.00	1.51	2.00	2.51	2.67	
.77" Diameter								
6.3 & 7.5 V	0.82	0.86	1.00	1.15	1.21	1.24	1.25	
10 to 40 V	0.78	0.83	1.00	1.20	1.30	1.35	1.36	
50V	0.76	0.81	1.00	1.25	1.38	1.45	1.47	
63 & 75 V	0.74	0.80	1.00	1.28	1.43	1.52	1.54	
100 to 250 V	0.76	0.81	1.00	1.24	1.37	1.44	1.46	
.895" Diameter								
6.3 & 7.5 V	0.82	0.86	1.00	1.14	1.20	1.23	1.24	
10 to 40 V	0.80	0.84	1.00	1.17	1.25	1.29	1.30	
50V	0.75	0.80	1.00	1.27	1.42	1.50	1.52	
63 & 75 V	0.75	0.80	1.00	1.26	1.40	1.48	1.50	
100 to 250 V	0.76	0.81	1.00	1.25	1.38	1.46	1.48	
1.02" Diameter								
6.3 & 7.5 V	0.84	0.88	1.00	1.12	1.17	1.19	1.20	
10 to 40 V	0.81	0.86	1.00	1.15	1.22	1.25	1.26	
50V	0.76	0.81	1.00	1.23	1.35	1.42	1.44	
63 & 75 V	0.77	0.81	1.00	1.23	1.35	1.42	1.44	
100 to 250 V	0.76	0.81	1.00	1.24	1.37	1.44	1.46	

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial

High Capacitance and Ultra-Low ESR

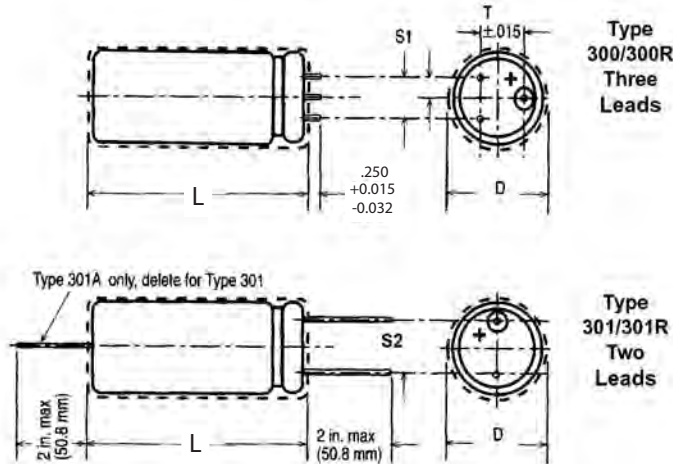
Load Life RoHS, ≥ .77" RoHS, < .77" Non-RoHS, < .77"	4000 h at full load at 85 °C 2000 h at full load at 85 °C 4000 h at full load at 85 °C Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit
Shelf Life Test	500 h at 105 °C, capacitance, ESR and DCL, initial requirements
Vibration	10 to 55 Hz, 0.06" and 10 g max, 2 h each plane

Part Numbering System

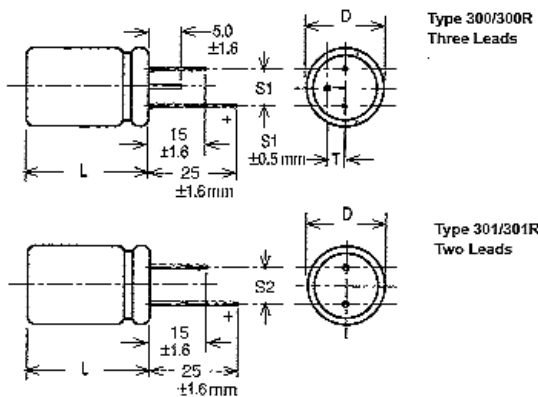
NR	301R	333	U	6R3	JS	2	E
RoHS	Type	Capacitance	Tolerance	Voltage	Case Code	Insulation	Epoxy
Blank = Compliant NR = Non Compliant (exceeds Pb)	300 - 3 leads 300R- 3 leads, low ESR 301 - 2 leads 301R- 2 leads, low ESR 301A- Laydown 3 leads	152 = 1500 μF 102 = 1000 μF	M = ±20 T = 10% +50% U = -10 +75%	6R3 = 6.3 V 063 = 63 Vdc 100 = 100 Vdc		0 = bare can 1 = Polyester 2 = PVC w/standoffs* 9 = Polyester w/standoffs* *Not available in .77" diameter	E = epoxy Blank = no epoxy

Outline Drawing

0.77", 0.895" and 1.02" Diameters



0.51", 0.65" and .73" Diameters



Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial

High Capacitance and Ultra-Low ESR

Case Dimensions

Case Code	Insulated D ± 0.015 (0.4 mm) L ± 0.062 (1.6 mm) D x L	Epoxy endseal L Max	Bare Can D ± 0.015 (0.4 mm) L ± 0.030 (0.8 mm) D x L	Lead Spacing		Lead Diameter dia.	AWG
				Type 300 S1 T ±0.020(0.5 mm)	Type 301 S2 ±0.020(0.5 mm)		
Case Dimensions in Inches							
EG	.512 x 0.846	0.906	0.492 x 0.787	0.197	0.098	0.197	0.032 20
EK	.512 x 1.043	1.142	0.492 x 0.984	0.197	0.098	0.197	0.032 20
EM	.512 x 1.102	1.161	0.492 x 1.043	0.197	0.098	0.197	0.032 20
EN	.512 x 1.378	1.417	0.492 x 1.319	0.197	0.098	0.197	0.032 20
ER	.512 x 1.732	1.791	0.492 x 1.673	0.197	0.098	0.197	0.032 20
FK	.650 x 1.043	1.098	0.630 x 0.984	0.295	0.148	0.295	0.032 20
FF	.650 x 1.319	1.417	0.630 x 1.260	0.295	0.148	0.295	0.032 20
FQ	.650 x 1.476	1.575	0.630 x 1.417	0.295	0.148	0.295	0.032 20
FV	.650 x 1.634	1.669	0.630 x 1.575	0.295	0.148	0.295	0.032 20
LQ	.728 x 1.476	1.575	0.709 x 1.417	0.295	0.148	0.295	0.032 20
LV	.728 x 1.634	1.693	0.709 x 1.575	0.295	0.148	0.295	0.032 20
GE	.765 x 1.150	1.212	0.750 x 1.125	0.200	0.300	0.300	0.040 18
GJ	.765 x 1.650	1.712	0.750 x 1.625	0.200	0.300	0.300	0.040 18
GL	.765 x 2.150	2.212	0.750 x 2.125	0.200	0.300	0.300	0.040 18
GP	.765 x 2.650	2.712	0.750 x 2.625	0.200	0.300	0.300	0.040 18
GS	.765 x 3.150	3.212	0.750 x 3.125	0.200	0.300	0.300	0.040 18
GT	.765 x 3.650	3.712	0.750 x 3.625	0.200	0.300	0.300	0.040 18
HE	.890 x 1.150	1.212	0.875 x 1.125	0.300	0.400	0.300	0.040 18
HJ	.890 x 1.650	1.712	0.875 x 1.625	0.300	0.400	0.300	0.040 18
HL	.890 x 2.150	2.212	0.875 x 2.125	0.300	0.400	0.300	0.040 18
HP	.890 x 2.650	2.712	0.875 x 2.625	0.300	0.400	0.300	0.040 18
HS	.890 x 3.150	3.212	0.875 x 3.125	0.300	0.400	0.300	0.040 18
HT	.890 x 3.650	3.712	0.875 x 3.625	0.300	0.400	0.300	0.040 18
JE	1.015 x 1.150	1.212	1.000 x 1.125	0.300	0.400	0.400	0.040 18
JJ	1.015 x 1.650	1.712	1.000 x 1.625	0.300	0.400	0.400	0.040 18
JL	1.015 x 2.150	2.212	1.000 x 2.125	0.300	0.400	0.400	0.040 18
JP	1.015 x 2.650	2.712	1.000 x 2.625	0.300	0.400	0.400	0.040 18
JS	1.015 x 3.150	3.212	1.000 x 3.125	0.300	0.400	0.400	0.040 18
JT	1.015 x 3.650	3.712	1.000 x 3.625	0.300	0.400	0.400	0.040 18
Case Dimensions in Millimeters							
EG	13.0 x 21.5	23	12.5 x 20.0	5.00	2.50	5.00	0.81 20
EK	13.0 x 26.5	29.0	12.5 x 25.0	5.00	2.50	5.00	0.81 20
EM	13.0 x 28.0	29.5	12.5 x 26.5	5.00	2.50	5.00	0.81 20
EN	13.0 x 35.0	36.0	12.5 x 33.5	5.00	2.50	5.00	0.81 20
ER	13.0 x 44.0	45.5	12.5 x 42.5	5.00	2.50	5.00	0.81 20
FK	16.5 x 26.5	27.9	16.0 x 25.0	7.50	3.75	7.50	0.81 20
FF	16.5 x 33.5	36.0	16.0 x 32.0	7.50	3.75	7.50	0.81 20
FQ	16.5 x 37.5	40.0	16.0 x 36.0	7.50	3.75	7.50	0.81 20
FV	16.5 x 41.5	42.4	16.0 x 40.0	7.50	3.75	7.50	0.81 20
LQ	18.5 x 37.5	40.0	18.0 x 36.0	7.50	3.75	7.50	0.81 20
LV	18.5 x 41.5	43.0	18.0 x 40.0	7.50	3.75	7.50	0.81 20
GE	19.4 x 29.2	30.8	19.1 x 28.6	5.08	7.62	7.62	1.02 18
GJ	19.4 x 41.9	43.5	19.1 x 41.3	5.08	7.62	7.62	1.02 18
GL	19.4 x 54.6	56.2	19.1 x 54.0	5.08	7.62	7.62	1.02 18
GP	19.4 x 67.3	68.9	19.1 x 66.7	5.08	7.62	7.62	1.02 18
GS	19.4 x 80.0	81.6	19.1 x 79.4	5.08	7.62	7.62	1.02 18
GT	19.4 x 92.7	94.3	19.1 x 92.1	5.08	7.62	7.62	1.02 18
HE	22.6 x 29.2	30.8	22.2 x 28.6	7.62	10.16	7.62	1.02 18
HJ	22.6 x 41.9	43.5	22.2 x 41.3	7.62	10.16	7.62	1.02 18
HL	22.6 x 54.6	56.2	22.2 x 54.0	7.62	10.16	7.62	1.02 18
HP	22.6 x 67.3	68.9	22.2 x 66.7	7.62	10.16	7.62	1.02 18
HS	22.6 x 80.0	81.6	22.2 x 79.4	7.62	10.16	7.62	1.02 18
HT	22.6 x 92.7	94.3	22.2 x 92.1	7.62	10.16	7.62	1.02 18
JE	25.8 x 29.2	30.8	25.4 x 28.6	7.62	10.16	10.16	1.02 18
JJ	25.8 x 41.9	43.5	25.4 x 41.3	7.62	10.16	10.16	1.02 18
HL	25.8 x 54.6	56.2	25.4 x 54.0	7.62	10.16	10.16	1.02 18
JP	25.8 x 67.3	68.9	25.4 x 66.7	7.62	10.16	10.16	1.02 18
JS	25.8 x 80.0	81.6	25.4 x 79.4	7.62	10.16	10.16	1.02 18
JT	25.8 x 92.7	94.3	25.4 x 92.1	7.62	10.16	10.16	1.02 18

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial

High Capacitance and Ultra-Low ESR Ratings

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz 20 kHz		120 Hz 20 kHz		
		(mΩ)		(A)		
6.3 Vdc (9 Vdc Surge)						
680	301681U6R3EM2	231.0	150.0	1.16	1.44	.51 x 1.10
1000	301102U6R3FK2	160.0	90.0	1.54	2.05	.65 x 1.04
1200	301122U6R3ER2	134.0	70.0	1.78	2.46	.51 x 1.73
1500	301R152M6R3EG2	201.0	71.0	1.09	1.84	.51 x .85
1500	301152U6R3FN2	105.0	50.0	2.00	2.90	.65 x 1.32
2200	301R222M6R3EM2	110.0	60.0	1.20	1.63	.51 x 1.10
2700	301272U6R3GE2	143.0	81.5	1.71	2.13	.77 x 1.15
2700	301R272U6R3GE2	124.0	70.6	1.84	2.29	.77 x 1.15
3300	301R332M6R3EN2	93.0	57.0	1.78	2.28	.51 x 1.38
3300	301332U6R3LV2	76.0	45.0	2.61	3.39	.73 x 1.63
3900	301R392M6R3FK2	111.0	41.0	1.84	3.03	.65 x 1.04
3900	301392U6R3HE2	100.0	61.1	2.24	2.71	.895 x 1.15
3900	301R392U6R3HE2	86.8	50.3	2.41	2.98	.895 x 1.15
4700	301R472M6R3ER2	68.0	31.0	2.52	3.73	.51 x 1.73
4700	301472U6R3GJ2	72.5	41.3	2.65	3.30	.77 x 1.65
4700	301R472U6R3GJ2	62.8	35.8	2.84	3.55	.77 x 1.65
5600	301R562M6R3FF2	78.0	37.0	2.43	3.53	.65 x 1.32
5600	301562U6R3JE2	83.8	57.0	2.56	2.92	1.02 x 1.15
5600	301R562U6R3JE2	72.7	41.4	2.75	3.43	1.02 x 1.15
6800	301R682M6R3FQ2	71.0	34.0	2.53	3.65	.65 x 1.48
8200	301R822M6R3FV2	59.0	31.0	3.03	4.18	.65 x 1.65
8200	301R822M6R3LQ2	67.0	29.0	2.97	4.51	.73 x 1.48
8200	301822U6R3GL2	49.2	28.1	4.02	5.02	.77 x 2.15
8200	301R822U6R3GL2	42.7	24.3	4.32	5.40	.77 x 2.15
8200	301822U6R3HJ2	51.1	31.2	3.71	4.48	.895 x 1.65
8200	301R822U6R3HJ2	44.3	25.7	3.99	4.93	.895 x 1.65
10000	301R103M6R3LV2	54.0	24.0	3.47	5.21	.73 x 1.63
10000	301103U6R3GP2	37.8	21.5	5.12	6.39	.77 x 2.65
10000	301R103U6R3GP2	32.7	18.7	5.50	6.86	.77 x 2.65
12000	301123U6R3GS2	31.0	17.7	6.17	7.70	.77 x 3.15
12000	301R123U6R3GS2	26.8	15.3	6.62	8.27	.77 x 3.15
12000	301123U6R3HL2	35.0	21.3	5.20	6.27	.895 x 2.15
12000	301R123U6R3HL2	25.5	14.8	6.09	7.54	.895 x 2.15
12000	301123U6R3JJ2	43.0	29.2	4.39	5.02	1.02 x 1.65
12000	301R123U6R3JJ2	37.2	21.2	4.72	5.89	1.02 x 1.65
15000	301153U6R3GT2	26.6	15.1	7.10	8.86	.77 x 3.65
15000	301R153U6R3GT2	23.0	13.1	7.62	9.52	.77 x 3.65
15000	301153U6R3HP2	27.1	16.5	6.57	7.93	.895 x 2.65
15000	301R153U6R3HP2	19.5	11.3	7.75	9.60	.895 x 2.65
18000	301183U6R3JL2	29.6	20.1	6.08	6.95	1.02 x 2.15
18000	301R183U6R3JL2	19.1	10.9	7.57	9.45	1.02 x 2.15
22000	301223U6R3HS2	22.4	13.7	7.88	9.51	.895 x 3.15
22000	301R223U6R3HS2	15.9	9.2	9.35	11.60	.895 x 3.15

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz 20 kHz		120 Hz 20 kHz		
		(mΩ)		(A)		
22000	301223U6R3JP2	23.0	15.6	7.66	8.75	1.02 x 2.65
22000	301R223U6R3JP2	14.7	8.4	9.59	12.00	1.02 x 2.65
27000	301273U6R3HT2	19.4	11.9	9.04	10.90	.895 x 3.65
27000	301R273U6R3HT2	13.6	7.9	10.80	13.40	.895 x 3.65
27000	301273U6R3JS2	19.2	13.0	9.11	10.40	1.02 x 3.15
27000	301R273U6R3JS2	15.1	8.6	10.30	12.80	1.02 x 3.15
33000	301333U6R3JT2	16.7	11.4	10.50	12.00	1.02 x 3.65
33000	301R333U6R3JT2	10.4	5.9	13.30	16.60	1.02 x 3.65
7.5 Vdc (10 Vdc Surge)						
2200	301222U7R5GE2	147.0	80.8	1.69	2.14	.77 x 1.15
2200	301R222U7R5GE2	127.0	70.0	1.81	2.30	.77 x 1.15
3900	301392U7R5HE2	103.0	61.6	2.21	2.69	.895 x 1.15
3900	301R392U7R5HE2	88.9	48.9	2.38	3.02	.895 x 1.15
4700	301472U7R5GJ2	74.5	41.0	2.61	3.32	.77 x 1.65
4700	301R472U7R5GJ2	64.5	35.5	2.80	3.56	.77 x 1.65
5600	301562U7R5JE2	85.5	56.5	2.53	2.94	1.02 x 1.15
5600	301R562U7R5JE2	74.1	41.5	2.72	3.42	1.02 x 1.15
6800	301682U7R5GL2	50.6	27.8	3.97	5.05	.77 x 2.15
6800	301R682U7R5GL2	43.8	24.1	4.26	5.42	.77 x 2.15
6800	301682U7R5HJ2	52.4	31.4	3.67	4.46	.895 x 1.65
6800	301R682U7R5HJ2	45.4	25.0	3.94	5.01	.895 x 1.65
8200	301822U7R5GP2	38.7	21.3	5.05	6.42	.77 x 2.65
8200	301R822U7R5GP2	33.6	18.5	5.43	6.90	.77 x 2.65
10000	301103U7R5HL2	35.8	21.5	5.14	6.25	.895 x 2.15
10000	301R103U7R5HL2	26.2	14.4	6.01	7.64	.895 x 2.15
10000	301103U7R5JJ2	43.8	28.9	4.35	5.05	1.02 x 1.65
10000	301R103U7R5JJ2	38.0	21.3	4.67	5.89	1.02 x 1.65
12000	301123U7R5GS2	31.8	17.5	6.09	7.74	.77 x 3.15
12000	301R123U7R5GS2	27.5	15.1	6.54	8.31	.77 x 3.15
12000	301123U7R5GT2	27.2	15.0	7.01	8.91	.77 x 3.65
12000	301R123U7R5GT2	23.6	13.0	7.53	9.57	.77 x 3.65
15000	301153U7R5HP2	27.7	16.6	6.50	7.91	.895 x 2.65
15000	301R153U7R5HP2	20.0	11.0	7.65	9.73	.895 x 2.65
15000	301153U7R5JL2	30.1	19.9	6.02	6.99	1.02 x 2.15
15000	301R153U7R5JL2	19.6	10.9	7.47	9.41	1.02 x 2.15
18000	301183U7R5HS2	22.9	13.8	7.79	9.48	.895 x 3.15
18000	301R183U7R5HS2	16.3	9.0	9.23	11.70	.895 x 3.15
22000	301223U7R5HT2	19.8	11.9	8.95	10.90	.895 x 3.65
22000	301R223U7R5HT2	13.9	7.7	10.70	13.60	.895 x 3.65
22000	301223U7R5JP2	23.4	15.5	7.59	8.80	1.02 x 2.65
22000	301R223U7R5JP2	15.0	8.4	9.47	11.90	1.02 x 2.65
27000	301273U7R5JS2	19.5	12.9	9.03	10.50	1.02 x 3.15
27000	301R273U7R5JS2	15.5	8.7	10.10	12.80	1.02 x 3.15
33000	301333U7R5JT2	17.0	11.2	10.40	12.10	1.02 x 3.65

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial High Capacitance and Ultra-Low ESR

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz	20 kHz	120 Hz	20 kHz	
7.5 Vdc (10 Vdc Surge)						
33000	301R333U7R5JT2	10.6	5.9	13.10	16.60	1.02 x 3.65
10 Vdc (15 Vdc Surge)						
1000	301R102M010EG2	216.0	77.0	1.07	1.80	.51 x .85
1500	301R152M010EK2	200.0	64.0	1.07	1.90	.51 x 1.04
1800	301R182M010EM2	122.0	62.0	1.58	2.21	.51 x 1.10
1800	301182U010GE2	153.0	81.2	1.65	2.14	.77 x 1.15
1800	301R182U010GE2	133.0	70.3	1.77	2.30	.77 x 1.15
2700	301R272M010EN2	111.0	59.0	1.66	2.28	.51 x 1.38
2700	301R272M010FK2	116.0	42.0	2.04	3.39	.65 x 1.04
3300	301R332M010ER2	75.0	32.0	2.41	3.69	.51 x 1.73
3300	301R332U010HE2	106.0	61.8	2.17	2.69	.895 x 1.15
3300	301332U010HE2	92.3	50.8	2.33	2.97	.895 x 1.15
3900	301392U010GJ2	77.6	41.1	2.56	3.31	.77 x 1.65
3900	301R392U010GJ2	67.3	35.7	2.75	3.56	.77 x 1.65
4700	301R472M010FF2	87.0	38.0	2.29	3.47	.65 x 1.32
4700	301472U010JE2	88.3	56.5	2.49	2.94	1.02 x 1.15
4700	301R472U010JE2	76.5	42.8	2.68	3.37	1.02 x 1.15
5600	301R562M010FQ2	78.0	33.0	2.35	3.62	.65 x 1.48
5600	301562U010GL2	52.7	27.9	3.89	5.04	.77 x 2.15
5600	301R562U010GL2	45.6	24.2	4.18	5.41	.77 x 2.15
6800	301R682M010LQ2	71.0	31.0	2.92	4.42	.73 x 1.48
6800	301682U010HJ2	54.3	31.5	3.60	4.46	.895 x 1.65
6800	301R682U010HJ2	47.1	25.9	3.87	4.92	.895 x 1.65
8200	301R882M010LV2	60.0	26.0	3.30	5.01	.73 x 1.63
8200	301822U010GP2	40.3	21.4	4.95	6.41	.77 x 2.65
8200	301R822U010GP2	34.9	18.5	5.32	6.89	.77 x 2.65
8200	301822U010JJ2	45.2	28.9	4.28	5.05	1.02 x 1.65
8200	301R822U010JJ2	39.2	21.9	4.60	5.80	1.02 x 1.65
10000	301103U010GS2	33.0	17.5	5.97	7.73	.77 x 3.15
10000	301R103U010GS2	28.6	15.2	6.41	8.31	.77 x 3.15
10000	301103U010HL2	37.1	21.5	5.05	6.25	.895 x 2.15
10000	301R103U010HL2	27.3	15.0	5.88	7.48	.895 x 2.15
12000	301123U010GT2	28.3	15.0	6.88	8.91	.77 x 3.65
12000	301R123U010GT2	24.5	13.0	7.39	9.57	.77 x 3.65
12000	301123U010HP2	28.7	16.6	6.39	7.91	.895 x 2.65
12000	301R123U010HP2	20.8	11.5	7.49	9.53	.895 x 2.65
12000	301123U010JL2	31.0	19.9	5.93	6.99	1.02 x 2.15
12000	301R123U010JL2	20.3	11.4	7.33	9.23	1.02 x 2.15
15000	301153U010HS2	23.7	13.7	7.66	9.49	.895 x 3.15
15000	301R153U010HS2	17.0	9.3	9.05	11.50	.895 x 3.15
18000	301183U010HT2	20.5	11.9	8.81	10.90	.895 x 3.65
18000	301R183U010HT2	14.5	8.0	10.50	13.30	.895 x 3.65
18000	301183U010JP2	24.1	15.4	7.48	8.81	1.02 x 2.65

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz	20 kHz	120 Hz	20 kHz	
16 Vdc (25 Vdc Surge)						
18000	301R183U010JP2	15.6	8.7	9.29	11.70	1.02 x 2.65
22000	301223U010JS2	20.1	12.8	8.90	10.50	1.02 x 3.15
22000	301R223U010JS2	16.1	9.0	9.94	12.50	1.02 x 3.15
27000	301273U010JT2	17.5	11.2	10.30	12.10	1.02 x 3.65
27000	301R273U010JT2	11.0	6.2	12.90	16.30	1.02 x 3.65
16 Vdc (25 Vdc Surge)						
820	301R821M016EG2	216.0	85.0	1.12	1.78	.51 x .85
1200	301R122M016EM2	130.0	66.0	1.60	2.24	.51 x 1.10
1500	301152U016GE2	159.0	80.9	1.62	2.14	.77 x 1.15
1500	301R152U016GE2	138.0	70.1	1.74	2.30	.77 x 1.15
1800	301R182M016EN2	122.0	55.0	1.85	2.76	.51 x 1.38
2200	301R222M016FK2	120.0	42.0	1.79	3.02	.65 x 1.04
2700	301R272M016ER2	82.0	32.0	1.66	2.65	.51 x 1.73
2700	301272U016HE2	110.0	63.7	2.14	2.65	.895 x 1.15
2700	301R272U016HE2	95.2	52.4	2.30	2.92	.895 x 1.15
3300	301R332M016FF2	78.0	32.0	2.42	3.78	.65 x 1.32
3300	301332U016GJ2	80.4	41.0	2.51	3.32	.77 x 1.65
3300	301R332U016GJ2	69.7	35.5	2.70	3.56	.77 x 1.65
3300	301332U016JE2	90.7	56.2	2.46	2.94	1.02 x 1.15
3300	301R332U016JE2	78.6	41.6	2.64	3.42	1.02 x 1.15
3900	301R392M016FQ2	75.0	32.0	2.59	3.97	.65 x 1.48
4700	301R472M016LQ2	74.0	32.0	2.85	4.34	.73 x 1.48
4700	301472U016GL2	54.5	27.8	3.82	5.05	.77 x 2.15
4700	301R472U016GL2	47.2	24.1	4.11	5.42	.77 x 2.15
4700	301472U016HJ2	56.0	32.5	3.55	4.39	.895 x 1.65
4700	301R472U016HJ2	48.5	26.7	3.81	4.84	.895 x 1.65
5600	301R562M016LV2	62.0	26.0	3.22	4.98	.73 x 1.63
5600	301562U016GP2	41.7	21.3	4.87	6.43	.77 x 2.65
5600	301R562U016GP2	36.1	18.4	5.23	6.90	.77 x 2.65
6800	301682U016HL2	38.2	22.2	4.97	6.15	.895 x 2.15
6800	301R682U016HL2	28.3	15.6	5.78	7.35	.895 x 2.15
6800	301682U016JJ2	46.4	28.8	4.23	5.06	1.02 x 1.65
6800	301R682U016JJ2	40.2	21.3	4.54	5.88	1.02 x 1.65
8200	301822U016GS2	34.1	17.4	5.87	7.75	.77 x 3.15
8200	301R822U016GS2	29.6	15.1	6.31	8.33	.77 x 3.15
10000	301103U016GT2	29.2	14.9	6.77	8.94	.77 x 3.65
10000	301R103U016GT2	25.3	12.9	7.27	9.60	.77 x 3.65
10000	301103U016HP2	29.5	17.1	6.30	7.79	.895 x 2.65
10000	301R103U016HP2	21.6	11.9	7.36	9.36	.895 x 2.65
10000	301103U016JL2	31.8	19.7	5.86	7.01	1.02 x 2.15
10000	301R103U016JL2	21.0	11.1	7.21	9.33	1.02 x 2.15
12000	301123U016HS2	24.4	14.1	7.55	9.35	.895 x 3.15
12000	301R123U016HS2	17.6	9.7	8.89	11.30	.895 x 3.15
15000	301153U016HT2	21.1	12.2	8.69	10.80	.895 x 3.65

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial

High Capacitance and Ultra-Low ESR

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	
16 Vdc (25 Vdc Surge)						
15000	301R153U016HT2	15.0	8.2	10.30	13.10	.895 x 3.65
15000	301153U016JP2	24.7	15.3	7.39	8.85	1.02 x 2.65
15000	301R153U016JP2	16.1	8.5	9.14	11.80	1.02 x 2.65
18000	301183U016JS2	20.5	12.7	8.80	10.50	1.02 x 3.15
18000	301R183U016JS2	16.6	8.8	9.79	12.70	1.02 x 3.15
22000	301223U016JT2	17.9	11.1	10.10	12.10	1.02 x 3.65
22000	301R223U016JT2	11.4	6.0	12.70	16.50	1.02 x 3.65
20 Vdc (30 Vdc Surge)						
330	301331U020EM2	360.0	160.0	0.89	1.34	.51 x 1.10
470	301R471M020EG2	250.0	77.0	0.55	0.99	.51 x .85
470	301471U020FK2	240.0	90.0	1.22	2.00	.65 x 1.04
560	301561U020ER2	220.0	80.0	1.41	2.34	.51 x 1.73
680	301R681M020EM2	140.0	67.0	1.46	2.11	.51 x 1.10
680	301681U020FF2	170.0	60.0	1.72	2.90	.65 x 1.32
1000	301R102M020EN2	114.0	48.0	1.10	1.69	.51 x 1.38
1200	301122U020GE2	159.0	80.9	1.62	2.14	.77 x 1.15
1200	301R122U020GE2	138.0	70.1	1.74	2.30	.77 x 1.15
1500	301R152M020ER2	85.0	33.0	2.23	3.58	.51 x 1.73
1500	301152U020LV2	90.0	50.0	2.42	3.25	.73 x 1.63
2200	301R222M020FQ2	77.0	32.0	2.55	3.96	.65 x 1.48
2200	301222U020HE2	110.0	61.5	2.14	2.70	.895 x 1.15
2200	301R222U020HE2	95.2	53.3	2.30	2.90	.895 x 1.15
2700	301272U020GJ2	80.4	41.0	2.51	3.32	.77 x 1.65
2700	301R272U020GJ2	69.7	35.5	2.70	3.56	.77 x 1.65
2700	301272U020JE2	90.7	57.1	2.46	2.92	1.02 x 1.15
2700	301R272U020JE2	78.6	49.5	2.64	3.14	1.02 x 1.15
3300	301R332M020LV2	62.0	26.0	3.19	4.92	.73 x 1.63
3900	301392U020GL2	54.5	27.8	3.82	5.05	.77 x 2.15
3900	301R392U020GL2	47.2	24.1	4.11	5.42	.77 x 2.15
3900	301392U020HJ2	56.0	31.4	3.55	4.47	.895 x 1.65
3900	301R392U020HJ2	48.5	27.2	3.81	4.80	.895 x 1.65
4700	301472U020GP2	41.7	21.3	4.87	6.43	.77 x 2.65
4700	301R472U020GP2	36.1	18.4	5.23	6.90	.77 x 2.65
5600	301562U020JJ2	46.4	29.2	4.23	5.02	1.02 x 1.65
5600	301R562U020JJ2	40.2	21.3	4.54	5.88	1.02 x 1.65
6800	301682U020GS2	34.1	17.4	5.87	7.75	.77 x 3.15
6800	301R682U020GS2	29.6	15.1	6.31	8.33	.77 x 3.15
6800	301682U020HL2	38.2	21.4	4.97	6.26	.895 x 2.15
6800	301R682U020HL2	28.3	15.8	5.78	7.28	.895 x 2.15
8200	301822U020GT2	29.2	14.9	6.77	8.94	.77 x 3.65
8200	301R822U020GT2	25.3	12.9	7.27	9.60	.77 x 3.65
8200	301822U020HP2	29.5	16.5	6.30	7.93	.895 x 2.65
8200	301R822U020HP2	21.6	12.1	7.36	9.28	.895 x 2.65

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	
8200	301822U020JL2	31.8	20.1	5.86	6.96	1.02 x 2.15
8200	301R822U020JL2	21.0	11.1	7.21	9.33	1.02 x 2.15
10000	301103U020HS2	24.4	13.7	7.55	9.52	.895 x 3.15
10000	301R103U020HS2	17.6	9.8	8.89	11.20	.895 x 3.15
12000	301123U020HT2	21.1	11.8	8.69	10.90	.895 x 3.65
12000	301R123U020HT2	15.0	8.4	10.30	13.00	.895 x 3.65
12000	301123U020JP2	24.7	15.6	7.39	8.77	1.02 x 2.65
12000	301R123U020JP2	16.1	8.5	9.14	11.80	1.02 x 2.65
15000	301153U020JS2	20.5	12.9	8.80	10.50	1.02 x 3.15
15000	301R153U020JS2	13.2	7.0	11.00	14.20	1.02 x 3.15
18000	301183U020JT2	17.9	11.2	10.10	12.00	1.02 x 3.65
18000	301R183U020JT2	11.4	6.0	12.70	16.50	1.02 x 3.65
25 Vdc (35 Vdc Surge)						
330	301331U025EN2	290.0	120.0	1.13	1.75	.51 x 1.38
390	301R391M025EG2	267.0	92.0	0.89	1.52	.51 x .85
470	301471U025ER2	220.0	80.0	1.42	2.35	.51 x 1.73
560	301R561M025EK2	193.0	75.0	1.12	1.79	.51 x 1.04
680	301R681M025EM2	160.0	67.0	1.40	2.17	.51 x 1.10
680	301681U025FQ2	190.0	75.0	1.53	2.44	.65 x 1.48
1000	301R102M025EN2	152.0	56.0	1.62	2.67	.51 x 1.38
1000	301102U025GE2	170.0	81.8	1.57	2.13	.77 x 1.15
1000	301R102U025GE2	148.0	70.9	1.68	2.29	.77 x 1.15
1200	301R122M025ER2	90.0	34.0	2.20	3.58	.51 x 1.73
1200	301R122M025FK2	132.0	45.0	1.71	2.93	.65 x 1.04
1200	301122U025LV2	100.0	50.0	2.26	3.20	.73 x 1.63
1500	301R152M025FF2	95.0	39.0	2.20	3.44	.65 x 1.32
1800	301R182M025FQ2	75.0	32.0	2.59	3.97	.65 x 1.48
1800	301182U025HE2	117.0	62.1	2.07	2.68	.895 x 1.15
1800	301R182U025HE2	102.0	47.7	2.23	3.06	.895 x 1.15
2200	301R222M025FV2	73.0	31.0	2.69	4.13	.65 x 1.65
2200	301R222M025LQ2	70.0	30.0	2.84	4.34	.73 x 1.48
2200	301222U025GJ2	86.3	41.4	2.42	3.30	.77 x 1.65
2200	301R222U025GJ2	74.8	35.9	2.60	3.54	.77 x 1.65
2700	301R272M025LV2	62.0	26.0	3.22	4.97	.73 x 1.63
2700	301272U025JE2	95.8	57.5	2.39	2.91	1.02 x 1.15
2700	301R272U025JE2	83.0	41.5	2.57	3.42	1.02 x 1.15
3300	301332U025GL2	58.4	28.1	3.69	5.02	.77 x 2.15
3300	301R332U025GL2	50.6	24.3	3.97	5.40	.77 x 2.15
3300	301332U025HJ2	59.7	31.6	3.44	4.45	.895 x 1.65
3300	301R332U025HJ2	51.7	24.3	3.69	5.07	.895 x 1.65
4700	301472U025GP2	44.7	21.4	4.71	6.40	.77 x 2.65
4700	301R472U025GP2	38.7	18.6	5.05	6.88	.77 x 2.65
4700	301472U025JJ2	48.9	29.4	4.12	5.01	1.02 x 1.65
4700	301R472U025JJ2	42.4	21.2	4.42	5.90	1.02 x 1.65

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial High Capacitance and Ultra-Low ESR

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated	
		120 Hz	20 kHz	120 Hz	20 kHz	D x L	(in)
25 Vdc (35 Vdc Surge)							
5600	301562U025GS2	36.5	17.5	5.68	7.73	.77	x 3.15
5600	301R562U025GS2	31.6	15.2	6.10	8.30	.77	x 3.15
5600	301562U025HL2	42.0	22.3	4.74	6.14	.895	x 2.15
5600	301R562U025HL2	30.4	14.3	5.58	7.67	.895	x 2.15
6800	301682U025GT2	31.2	15.0	6.55	8.91	.77	x 3.65
6800	301R682U025GT2	27.0	13.0	7.04	9.58	.77	x 3.65
6800	301682U025HP2	31.3	16.6	6.11	7.91	.895	x 2.65
6800	301R682U025HP2	23.1	10.9	7.11	9.77	.895	x 2.65
6800	301682U025JL2	33.5	20.1	5.71	6.94	1.02	x 2.15
6800	301R682U025JL2	22.5	11.3	6.96	9.29	1.02	x 2.15
8200	301822U025HS2	25.8	13.7	7.34	9.50	.895	x 3.15
8200	301R822U025HS2	18.9	8.9	8.59	11.81	.895	x 3.15
10000	301103U025HT2	22.3	11.8	8.45	10.94	.895	x 3.65
10000	301R103U025HT2	16.0	7.5	9.96	13.69	.895	x 3.65
10000	301103U025JP2	26.0	15.6	7.20	8.77	1.02	x 2.65
10000	301R103U025JP2	17.2	8.6	8.84	11.80	1.02	x 2.65
12000	301123U025JS2	21.6	12.9	8.59	10.50	1.02	x 3.15
12000	301R123U025JS2	14.1	7.1	10.60	14.10	1.02	x 3.15
15000	301153U025JT2	18.7	11.2	9.90	12.10	1.02	x 3.65
15000	301R153U025JT2	12.1	6.0	12.30	16.40	1.02	x 3.65
40 Vdc (60 Vdc Surge)							
220	301221U040FK2	480.0	140.0	0.89	1.65	.65	x 1.04
330	301R331M040EM2	202.0	68.0	1.19	2.05	.51	x 1.10
330	301331U040FN2	330.0	120.0	1.35	2.24	.65	x 1.32
390	301391U040ER2	270.0	150.0	1.42	1.90	.51	x 1.73
470	301R471M040FK2	133.0	46.0	1.66	2.82	.65	x 1.04
680	301R681M040ER2	95.0	35.0	2.07	3.41	.51	x 1.73
820	301821U040LV2	160.0	75.0	1.78	2.60	.73	x 1.63
1000	301R102M040FQ2	80.0	33.0	2.49	3.87	.65	x 1.48
1200	301122U040HE2	137.0	65.6	1.92	2.61	.895	x 1.15
1200	301R122U040HE2	118.0	52.1	2.06	2.93	.895	x 1.15
1500	301R152M040LV2	63.0	27.0	3.16	4.82	.73	x 1.63
1500	301152U040JE2	109.0	60.2	2.24	2.84	1.02	x 1.15
1500	301R152U040JE2	94.8	43.6	2.40	3.34	1.02	x 1.15
2200	301222U040HJ2	69.4	33.3	3.18	4.33	.895	x 1.65
2200	301R222U040HJ2	60.2	26.5	3.42	4.86	.895	x 1.65
3300	301332U040HL2	47.2	22.6	4.48	6.09	.895	x 2.15
3300	301R332U040HL2	36.0	15.8	5.12	7.28	.895	x 2.15
3300	301332U040JJ2	55.8	30.7	3.86	4.90	1.02	x 1.65
3300	301R332U040JJ2	48.3	22.2	4.14	5.76	1.02	x 1.65
3900	301R392U040GS2	37.1	16.7	5.63	7.92	.77	x 3.15
4700	301472U040GT2	36.4	16.4	6.06	8.52	.77	x 3.65
4700	301R472U040GT2	31.6	14.2	6.51	9.15	.77	x 3.65

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated	
		120 Hz	20 kHz	120 Hz	20 kHz	D x L	(in)
4700	301472U040HP2	36.2	17.4	5.68	7.73	.895	x 2.65
4700	301R472U040HP2	27.4	12.0	6.54	9.29	.895	x 2.65
4700	301472U040JL2	38.1	20.9	5.35	6.81	1.02	x 2.15
4700	301R472U040JL2	26.5	12.2	6.42	8.93	1.02	x 2.15
5600	301562U040HS2	29.7	14.3	6.84	9.31	.895	x 3.15
5600	301R562U040HS2	22.2	9.8	7.91	11.20	.895	x 3.15
6800	301682U040HT2	25.5	12.3	7.89	10.70	.895	x 3.65
6800	301R682U040HT2	18.9	8.3	9.18	13.10	.895	x 3.65
6800	301682U040JP2	29.4	16.2	6.77	8.61	1.02	x 2.65
6800	301R682U040JP2	20.2	9.3	8.17	11.40	1.02	x 2.65
8200	301822U040JS2	24.3	13.4	8.09	10.30	1.02	x 3.15
8200	301R822U040JS2	16.5	7.6	9.82	13.60	1.02	x 3.15
10000	301103U040JT2	21.0	11.5	9.35	11.90	1.02	x 3.65
10000	301R103U040JT2	14.1	6.5	11.40	15.90	1.02	x 3.65
50 Vdc (75 Vdc Surge)							
100	301101U050EN2	810.0	260.0	0.65	1.14	.51	x 1.38
120	301R121M050EG2	391.0	139.0	0.79	1.33	.51	x .85
150	301151U050FK2	550.0	220.0	0.82	1.30	.65	x 1.04
180	301R181M050EK2	261.0	90.0	0.95	1.61	.51	x 1.04
180	301181U050ER2	500.0	180.0	0.93	1.55	.51	x 1.73
220	301R221M050EM2	240.0	69.0	1.12	2.08	.51	x 1.04
220	301221U050FN2	420.0	150.0	1.09	1.83	.65	x 1.32
330	301R331M050EN2	221.0	63.0	1.19	2.22	.51	x 1.38
390	301R391M050FK2	150.0	48.0	1.60	2.82	.65	x 1.04
470	301R471M050ER2	111.0	36.0	1.97	3.46	.51	x 1.73
470	301471U050LV2	250.0	90.0	1.44	2.40	.73	x 1.63
560	301R561M050FF2	118.0	41.0	1.98	3.36	.65	x 1.32
560	301R561U050GE2	216.0	88.6	1.39	2.05	.77	x 1.15
560	301561U050GE2	249.0	102.0	1.29	1.91	.77	x 1.15
680	301R681M050FQ2	102.0	40.0	2.31	3.69	.65	x 1.48
820	301R821M050FV2	95.0	38.0	2.40	3.79	.65	x 1.63
820	301R821M050LQ2	89.0	36.0	2.59	4.07	.73	x 1.48
1000	301R102M050LV2	77.0	28.0	2.90	4.81	.73	x 1.63
1200	301R122U050GJ2	109.0	44.7	2.16	3.18	.77	x 1.65
1200	301122U050GJ2	126.0	51.6	2.01	2.96	.77	x 1.65
1200	301122U050JE2	130.0	62.4	2.05	2.79	1.02	x 1.15
1200	301R122U050JE2	113.0	43.9	2.21	3.33	1.02	x 1.15
1500	301R152U050GL2	73.4	30.1	3.29	4.85	.77	x 2.15
1500	301152U050GL2	84.7	34.7	3.07	4.52	.77	x 2.15
1800	301182U050HJ2	84.0	34.5	2.89	4.26	.895	x 1.65
1800	301R182U050HJ2	72.8	26.2	3.11	4.89	.895	x 1.65
2200	301R222U050GP2	55.8	22.9	4.21	6.20	.77	x 2.65
2200	301222U050GP2	64.4	26.4	3.92	5.77	.77	x 2.65
2700	301R272U050GS2	45.3	18.6	5.10	7.51	.77	x 3.15

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial High Capacitance and Ultra-Low ESR

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated	
		120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	120 Hz 20 kHz (A)	120 Hz 20 kHz (A)	D x L (in)	D x L (in)
2700	301272U050GS2	52.3	21.4	4.75	6.99	.77 x 3.15	
2700	301272U050HL2	56.9	23.3	4.07	6.00	.895 x 2.15	
2700	301R272U050HL2	44.5	16.0	4.61	7.24	.895 x 2.15	
2700	301272U050JJ2	66.0	31.7	3.54	4.82	1.02 x 1.65	
2700	301R272U050JJ2	57.2	22.3	3.81	5.75	1.02 x 1.65	
3300	301R332U050GT2	38.4	15.7	5.90	8.69	.77 x 3.65	
3300	301332U050GT2	44.3	18.2	5.49	8.09	.77 x 3.65	
3300	301332U050HP2	43.5	17.8	5.18	7.63	.895 x 2.65	
3300	301R332U050HP2	33.7	12.1	5.89	9.26	.895 x 2.65	
3900	301392U050JL2	44.9	21.6	4.93	6.71	1.02 x 2.15	
3900	301R392U050JL2	32.4	12.6	5.81	8.77	1.02 x 2.15	
4700	301472U050HS2	35.6	14.6	6.25	9.21	.895 x 3.15	
4700	301R472U050HS2	27.3	9.8	7.14	11.20	.895 x 3.15	
5600	301562U050HT2	30.4	12.5	7.23	10.60	.895 x 3.65	
5600	301R562U050HT2	23.1	8.3	8.30	13.00	.895 x 3.65	
5600	301562U050JP2	34.5	16.6	6.25	8.50	1.02 x 2.65	
5600	301R562U050JP2	24.6	9.6	7.40	11.20	1.02 x 2.65	
6800	301682U050JS2	28.4	13.6	7.48	10.20	1.02 x 3.15	
6800	301R682U050JS2	20.0	7.8	8.91	13.40	1.02 x 3.15	
8200	301822U050JT2	24.4	11.7	8.67	11.80	1.02 x 3.65	
8200	301R822U050JT2	17.0	6.6	10.40	15.70	1.02 x 3.65	
63 Vdc (90 Vdc Surge)							
120	301R121M063EG2	451.0	93.0	0.73	1.60	.51 x .85	
180	301R181M063EK2	298.0	90.0	1.01	1.83	.51 x 1.04	
270	301R271M063EN2	160.0	55.0	1.44	2.46	.51 x 1.38	
330	301R331M063FK2	171.0	50.0	1.48	2.74	.65 x 1.04	
390	301R391M063ER2	130.0	38.0	1.83	3.38	.51 x 1.73	
390	301391U063GE2	281.0	92.7	1.22	2.00	.77 x 1.15	
390	301R391U063GE2	243.0	80.3	1.31	2.15	.77 x 1.15	
470	301R471M063FF2	142.0	43.0	1.80	3.27	.65 x 1.32	
560	301R561M063FQ2	120.0	35.0	2.05	3.80	.65 x 1.48	
680	301R681M063FV2	113.0	32.0	2.06	3.87	.65 x 1.65	
680	301R681M063LQ2	103.0	29.0	2.21	4.17	.73 x 1.48	
680	301681U063HE2	185.0	70.5	1.65	2.52	.895 x 1.15	
680	301R681U063HE2	161.0	53.0	1.77	2.90	.895 x 1.15	
820	301R821M063LV2	90.0	29.0	2.69	4.74	.73 x 1.63	
820	301821U063GJ2	142.0	46.7	1.89	3.11	.77 x 1.65	
820	301R821U063GJ2	123.0	40.5	2.03	3.34	.77 x 1.65	
1000	301102U063JE2	144.0	63.2	1.95	2.78	1.02 x 1.15	
1000	301R102U063JE2	124.0	43.5	2.10	3.34	1.02 x 1.15	
1200	301122U063GL2	95.2	31.4	2.89	4.75	.77 x 2.15	
1200	301R122U063GL2	82.5	27.2	3.11	5.10	.77 x 2.15	
1200	301122U063HJ2	93.8	35.6	2.74	4.19	.895 x 1.65	
1200	301R122U063HJ2	81.3	26.8	2.94	4.83	.895 x 1.65	

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated	
		120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	120 Hz 20 kHz (A)	120 Hz 20 kHz (A)	D x L (in)	D x L (in)
1500	301152U063GP2	72.3	23.8	3.70	6.07	.77 x 2.65	
1500	301R152U063GP2	62.6	20.7	3.97	6.52	.77 x 2.65	
1800	301182U063HL2	63.4	24.1	3.86	5.90	.895 x 2.15	
1800	301R182U063HL2	50.1	16.5	4.34	7.13	.895 x 2.15	
1800	301182U063JJ2	72.8	32.0	3.37	4.80	1.02 x 1.65	
1800	301R182U063JJ2	63.1	22.1	3.62	5.78	1.02 x 1.65	
2200	301222U063GS2	58.6	19.3	4.48	7.36	.77 x 3.15	
2200	301R222U063GS2	50.8	16.8	4.82	7.90	.77 x 3.15	
2200	301222U063GT2	49.6	16.4	5.19	8.53	.77 x 3.65	
2200	301R222U063GT2	43.0	14.2	5.58	9.16	.77 x 3.65	
2700	301272U063HP2	48.4	18.4	4.92	7.52	.895 x 2.65	
2700	301R272U063HP2	37.9	12.5	5.55	9.11	.895 x 2.65	
2700	301272U063JL2	49.5	21.8	4.70	6.68	1.02 x 2.15	
2700	301R272U063JL2	36.3	12.7	5.48	8.74	1.02 x 2.15	
3300	301332U063HS2	39.5	15.0	5.94	9.08	.895 x 3.15	
3300	301R332U063HS2	30.7	10.1	6.73	11.10	.895 x 3.15	
3900	301392U063HT2	33.7	12.8	6.87	10.50	.895 x 3.65	
3900	301R392U063HT2	25.9	8.5	7.84	12.90	.895 x 3.65	
3900	301392U063JP2	37.9	16.7	5.96	8.47	1.02 x 2.65	
3900	301R392U063JP2	27.6	9.7	6.99	11.10	1.02 x 2.65	
4700	301472U063JS2	31.1	13.7	7.15	10.20	1.02 x 3.15	
4700	301R472U063JS2	22.4	7.8	8.42	13.40	1.02 x 3.15	
5600	301562U063JT2	26.7	11.7	8.30	11.80	1.02 x 3.65	
5600	301R562U063JT2	19.0	6.6	9.83	15.70	1.02 x 3.65	
75 Vdc (100 Vdc Surge)							
330	301331U075GE2	360.0	155.0	1.08	1.55	.77 x 1.15	
330	301R331U075GE2	312.0	134.0	1.16	1.66	.77 x 1.15	
470	301471U075HE2	234.0	108.0	1.47	2.04	.895 x 1.15	
470	301R471U075HE2	203.0	87.3	1.57	2.26	.895 x 1.15	
560	301561U075GJ2	181.0	77.8	1.67	2.41	.77 x 1.65	
560	301R561U075GJ2	157.0	67.4	1.80	2.59	.77 x 1.65	
680	301681U075JE2	178.0	88.8	1.76	2.34	1.02 x 1.15	
680	301R681U075JE2	154.0	67.7	1.89	2.68	1.02 x 1.15	
1000	301102U075GL2	122.0	52.3	2.56	3.68	.77 x 2.15	
1000	301R102U075GL2	105.0	45.3	2.75	3.95	.77 x 2.15	
1000	301102U075HJ2	118.0	54.3	2.44	3.39	.895 x 1.65	
1000	301R102U075HJ2	102.0	44.0	2.62	3.77	.895 x 1.65	
1200	301122U075GP2	92.0	39.5	3.28	4.71	.77 x 2.65	
1200	301R122U075GP2	79.7	34.3	3.52	5.06	.77 x 2.65	
1500	301152U075GS2	74.4	32.0	3.98	5.72	.77 x 3.15	
1500	301R152U075GS2	64.4	27.7	4.27	6.15	.77 x 3.15	
1500	301152U075HL2	79.7	36.6	3.44	4.79	.895 x 2.15	
1500	301R152U075HL2	64.2	27.6	3.84	5.52	.895 x 2.15	
1500	301152U075JJ2	89.9	44.9	3.04	4.05	1.02 x 1.65	

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial High Capacitance and Ultra-Low ESR

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	
1500	301R152U075JJ2	77.9	34.3	3.26	4.64	1.02 x 1.65
1800	301182U075GT2	62.7	27.0	4.62	6.64	.77 x 3.65
1800	301R182U075GT2	54.3	23.4	4.96	7.13	.77 x 3.65
2200	301222U075HP2	60.6	27.9	4.39	6.11	.895 x 2.65
2200	301R222U075HP2	48.5	20.9	4.91	7.06	.895 x 2.65
2200	301222U075JL2	60.8	30.4	4.24	5.65	1.02 x 2.15
2200	301R222U075JL2	46.2	20.3	4.86	6.91	1.02 x 2.15
2700	301272U075HS2	49.2	22.6	5.32	7.39	.895 x 3.15
2700	301R272U075HS2	39.1	16.8	5.96	8.57	.895 x 3.15
2700	301272U075HT2	41.8	19.2	6.17	8.58	.895 x 3.65
2700	301R272U075HT2	32.9	14.2	6.95	9.99	.895 x 3.65
2700	301272U075JP2	46.4	23.2	5.39	7.18	1.02 x 2.65
2700	301R272U075JP2	35.0	15.4	6.21	8.82	1.02 x 2.65
3300	301332U075JS2	37.9	19.0	6.47	8.63	1.02 x 3.15
3300	301R332U075JS2	28.3	12.5	7.49	10.60	1.02 x 3.15
3900	301392U075JT2	32.4	16.2	7.53	10.00	1.02 x 3.65
3900	301R392U075JT2	23.9	10.5	8.76	12.40	1.02 x 3.65
100 Vdc (140 Vdc Surge)						
47	301470U100EG2	1770.0	345.0	0.38	0.74	.51 x .85
68	301680U100EM2	1160.0	183.0	0.42	1.10	.51 x 1.10
100	301101U100EN2	756.0	149.0	0.52	1.37	.51 x 1.38
120	301121U100FK2	686.0	139.0	0.55	1.48	.65 x 1.04
150	301151U100ER2	519.0	104.0	0.61	1.83	.51 x 1.73
150	301151U100GE2	581.0	221.0	0.85	1.30	.77 x 1.15
150	301R151U100GE2	503.0	191.0	0.91	1.39	.77 x 1.15
180	301181U100FF2	450.0	93.0	0.64	2.00	.65 x 1.32
220	301221U100FQ2	365.0	76.0	0.69	2.31	.65 x 1.48
220	301221U100HE2	371.0	141.0	1.16	1.78	.895 x 1.15
220	301R221U100HE2	321.0	122.0	1.25	1.91	.895 x 1.15
270	301271U100FV2	298.0	63.0	0.75	2.64	.65 x 1.65
270	301271U100GJ2	291.0	111.0	1.32	2.02	.77 x 1.65
270	301R271U100GJ2	252.0	95.9	1.42	2.17	.77 x 1.65
330	301331U100LQ2	249.0	55.0	0.81	2.94	.73 x 1.48
330	301331U100JE2	273.0	109.0	1.42	2.11	1.02 x 1.15
330	301R331U100JE2	237.0	92.3	1.52	2.30	1.02 x 1.15
390	301391U100LV2	210.0	47.0	0.87	3.35	.73 x 1.63
470	301471U100GL2	195.0	74.1	2.02	3.09	.77 x 2.15
470	301R471U100GL2	169.0	64.3	2.17	3.32	.77 x 2.15
470	301471U100HJ2	186.0	70.8	1.94	2.97	.895 x 1.65
470	301R471U100HJ2	162.0	61.4	2.09	3.19	.895 x 1.65
560	301561U100GP2	147.0	55.9	2.59	3.96	.77 x 2.65
560	301R561U100GP2	128.0	48.5	2.78	4.26	.77 x 2.65
680	301681U100GS2	119.0	45.0	3.15	4.82	.77 x 3.15
680	301R681U100GS2	103.0	39.0	3.39	5.18	.77 x 3.15

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	
680	301681U100HL2	125.0	47.6	2.75	4.20	.895 x 2.15
680	301R681U100HL2	104.0	39.4	3.02	4.62	.895 x 2.15
680	301681U100JJ2	138.0	55.1	2.45	3.66	1.02 x 1.65
680	301R681U100JJ2	119.0	46.5	2.64	3.98	1.02 x 1.65
820	301821U100GT2	99.5	37.8	3.67	5.61	.77 x 3.65
820	301R821U100GT2	86.2	32.8	3.94	6.02	.77 x 3.65
1000	301102U100HP2	94.7	36.0	3.51	5.38	.895 x 2.65
1000	301R102U100HP2	78.1	29.7	3.87	5.92	.895 x 2.65
1000	301102U100JL2	92.7	37.1	3.43	5.12	1.02 x 2.15
1000	301R102U100JL2	73.8	28.8	3.85	5.81	1.02 x 2.15
1200	301122U100HS2	76.5	29.1	4.26	6.52	.895 x 3.15
1200	301R122U100HS2	62.8	23.9	4.71	7.20	.895 x 3.15
1200	301122U100HT2	64.5	24.5	4.96	7.59	.895 x 3.65
1200	301R122U100HT2	52.6	20.0	5.50	8.41	.895 x 3.65
1200	301122U100JP2	70.3	28.1	4.38	6.53	1.02 x 2.65
1200	301R122U100JP2	55.7	21.7	4.92	7.43	1.02 x 2.65
1500	301152U100JS2	57.0	22.8	5.28	7.87	1.02 x 3.15
1500	301R152U100JS2	44.9	17.5	5.95	8.99	1.02 x 3.15
2200	301222U100JT2	48.3	19.3	6.17	9.19	1.02 x 3.65
2200	301R222U100JT2	37.7	14.7	6.97	10.50	1.02 x 3.65
160 Vdc (200 Vdc Surge)						
15	301150U160EG2	17500.0	1450.0	0.12	0.40	.51 x .85
22	301220U160EK2	12800.0	960.0	0.14	0.52	.51 x 1.04
27	301270U160EM2	9700.0	720.0	0.18	0.66	.51 x 1.10
39	301390U160EN2	6210.0	600.0	0.23	0.74	.51 x 1.38
47	301470U160FK2	6000.0	620.0	0.23	0.70	.65 x 1.04
56	301560U160ER2	5110.0	500.0	0.28	0.89	.51 x 1.73
56	301560T160GE2	1817.0	690.0	0.48	0.73	.77 x 1.15
68	301680U160FF2	3500.0	350.0	0.36	1.15	.65 x 1.32
82	301820U160FQ2	2950.0	320.0	0.50	1.53	.65 x 1.48
82	301820T160HE2	1169.0	444.0	0.66	1.00	.895 x 1.15
100	301101U160LQ2	2540.0	210.0	0.47	1.65	.73 x 1.48
100	301101T160GJ2	1019.0	387.0	0.71	1.08	.77 x 1.65
120	301121U160LV2	2010.0	190.0	0.55	1.79	.73 x 1.63
120	301121T160JE2	904.0	362.0	0.78	1.16	1.02 x 1.15
150	301151T160GL2	608.0	231.0	1.15	1.75	.77 x 2.15
180	301181T160HJ2	586.0	222.0	1.10	1.68	.895 x 1.65
220	301221T160GP2	457.0	174.0	1.47	2.25	.77 x 2.65
270	301271T160GS2	366.0	139.0	1.79	2.74	.77 x 3.15
270	301271T160HL2	391.0	149.0	1.55	2.38	.895 x 2.15
270	301271T160JJ2	415.0	166.0	1.41	2.11	1.02 x 1.65
330	301331T160GT2	306.0	116.0	2.09	3.20	.77 x 3.65
390	301391T160HP2	268.0	102.0	2.09	3.19	.895 x 2.65
390	301391T160JL2	278.0	111.0	1.98	2.95	1.02 x 2.15

Type 300/301 –55 °C to 105 °C Long-Life, Switching Power Grade Radial High Capacitance and Ultra-Low ESR

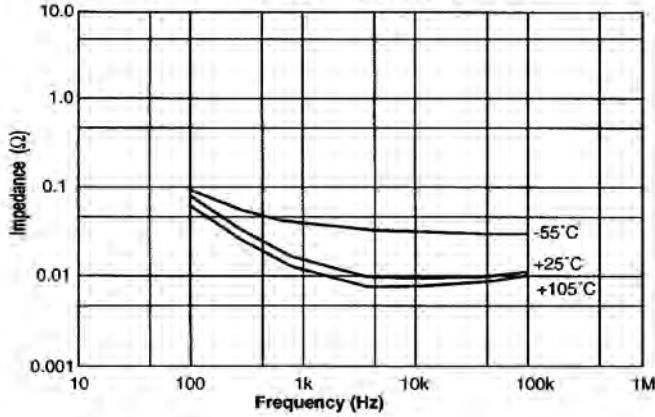
Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	120 Hz 20 kHz (A)	
160 Vdc (200 Vdc Surge)						
470	301471T160HS2	226.0	85.7	2.48	3.80	.895 x 3.15
470	301471T160JP2	228.0	91.4	2.43	3.62	1.02 x 2.65
560	301561T160HT2	189.0	71.8	2.90	4.44	.895 x 3.65
560	301561T160JS2	184.0	73.5	2.94	4.39	1.02 x 3.15
680	301681T160JT2	154.0	61.6	3.45	5.15	1.02 x 3.65
200 Vdc (250 Vdc Surge)						
10	301100U200EG2	19900.0	1780.0	0.12	0.39	.51 x .85
15	301150U200EK2	15200.0	1270.0	0.14	0.49	.51 x 1.04
18	301180U200EM2	10600.0	960.0	0.19	0.63	.51 x 1.10
22	301220U200EN2	7010.0	580.0	0.22	0.75	.51 x 1.38
27	301270U200FK2	6500.0	650.0	0.22	0.68	.65 x 1.04
33	301330U200ER2	5990.0	550.0	0.26	0.87	.51 x 1.73
39	301390U200FF2	3910.0	340.0	0.34	1.15	.65 x 1.32
47	301470U200FQ2	3730.0	330.0	0.45	1.50	.65 x 1.48
56	301560U200FV2	3250.0	290.0	0.47	1.58	.65 x 1.65
56	301560T200GE2	2285.0	1051.0	0.43	0.59	.77 x 1.15
68	301680U200LQ2	2840.0	260.0	0.53	1.74	.73 x 1.48
82	301820U200LV2	2310.0	180.0	0.53	1.89	.73 x 1.63
82	301820T200HE2	1423.0	655.0	0.59	0.83	.895 x 1.15
100	301101T200GJ2	1144.0	526.0	0.67	0.93	.77 x 1.65
120	301121T200JE2	1012.0	465.0	0.74	1.02	1.02 x 1.15
150	301151T200GL2	763.0	351.0	1.02	1.42	.77 x 2.15
180	301181T200HJ2	713.0	328.0	0.99	1.38	.895 x 1.65
220	301221T200GP2	574.0	264.0	1.31	1.82	.77 x 2.65
220	301221T200JJ2	507.0	233.0	1.28	1.78	1.02 x 1.65
270	301271T200GS2	460.0	212.0	1.60	2.22	.77 x 3.15
270	301271T200HL2	476.0	219.0	1.41	1.96	.895 x 2.15
330	301331T200GT2	384.0	177.0	1.87	2.59	.77 x 3.65
330	301331T200HP2	358.0	165.0	1.81	2.51	.895 x 2.65
390	301391T200HS2	288.0	132.0	2.20	3.06	.895 x 3.15
390	301391T200JL2	339.0	156.0	1.79	2.49	1.02 x 2.15
470	301471T200HT2	240.0	111.0	2.57	3.57	.895 x 3.65

Cap. (µF)	Catalog Part Number	ESR MAX @ 25°C		Ripple MAX @ 85°C		Nom Size Insulated D x L (in)
		120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (mΩ)	120 Hz 20 kHz (A)	120 Hz 20 kHz (A)	
470	301471T200JP2	255.0	117.0	2.30	3.19	1.02 x 2.65
560	301561T200JS2	205.0	94.4	2.78	3.87	1.02 x 3.15
680	301681T200JT2	172.0	79.1	3.27	4.54	1.02 x 3.65
250 Vdc (300 Vdc Surge)						
8.2	3018R2U250EG2	29900.0	3050.0	0.07	0.23	.51 x .85
12	301120U250EK2	23300.0	2500.0	0.09	0.27	.51 x 1.04
15	301150U250EM2	15000.0	1900.0	0.14	0.38	.51 x 1.10
18	301180U250EN2	12100.0	1500.0	0.17	0.47	.51 x 1.38
27	301270U250FK2	10800.0	1610.0	0.20	0.53	.65 x 1.04
27	301270U250ER2	7820.0	1390.0	0.28	0.67	.51 x 1.73
33	301330U250FF2	5500.0	720.0	0.29	0.80	.65 x 1.32
39	301390U250FQ2	5260.0	700.0	0.32	0.89	.65 x 1.48
39	301390T250GE2	2708.0	1137.0	0.39	0.57	.77 x 1.15
47	301470U250FV2	4680.0	670.0	0.38	1.00	.65 x 1.65
56	301560U250LQ2	3750.0	550.0	0.42	1.10	.73 x 1.48
68	301680U250LV2	3110.0	360.0	0.44	1.29	.73 x 1.63
68	301680T250HE2	1684.0	707.0	0.55	0.79	.895 x 1.15
82	301820T250GJ2	1355.0	569.0	0.61	0.89	.77 x 1.65
100	301101T250JE2	1194.0	502.0	0.68	0.99	1.02 x 1.15
120	301121T250GL2	905.0	380.0	0.94	1.37	.77 x 2.15
120	301121T250HJ2	843.0	354.0	0.91	1.33	.895 x 1.65
150	301151T250GP2	679.0	285.0	1.21	1.75	.77 x 2.65
180	301181T250JJ2	598.0	251.0	1.18	1.71	1.02 x 1.65
220	301221T250GS2	544.0	229.0	1.47	2.14	.77 x 3.15
220	301221T250HL2	563.0	237.0	1.30	1.88	.895 x 2.15
270	301271T250GT2	455.0	191.0	1.72	2.50	.77 x 3.65
270	301271T250HP2	423.0	178.0	1.66	2.42	.895 x 2.65
270	301271T250JL2	400.0	168.0	1.65	2.40	1.02 x 2.15
330	301331T250HS2	340.0	143.0	2.02	2.94	.895 x 3.15
390	301391T250HT2	284.0	119.0	2.37	3.44	.895 x 3.65
390	301391T250JP2	301.0	126.0	2.12	3.08	1.02 x 2.65
470	301471T250JS2	242.0	102.0	2.56	3.73	1.02 x 3.15
560	301561T250JT2	202.0	85.0	3.01	4.38	1.02 x 3.65

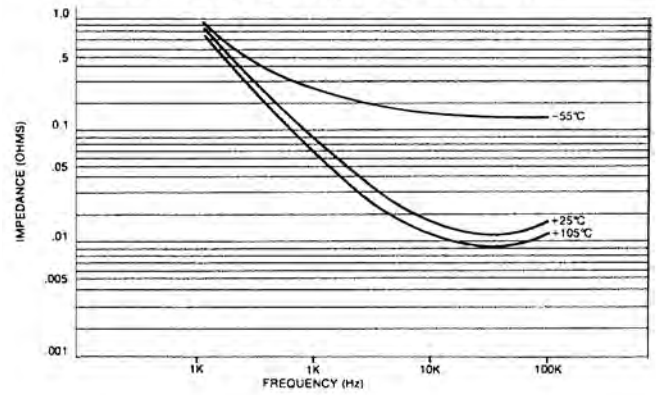
Type 300/301 -55 °C to 105 °C Long-Life, Switching Power Grade Radial High Capacitance and Ultra-Low ESR

Typical Performance Curves

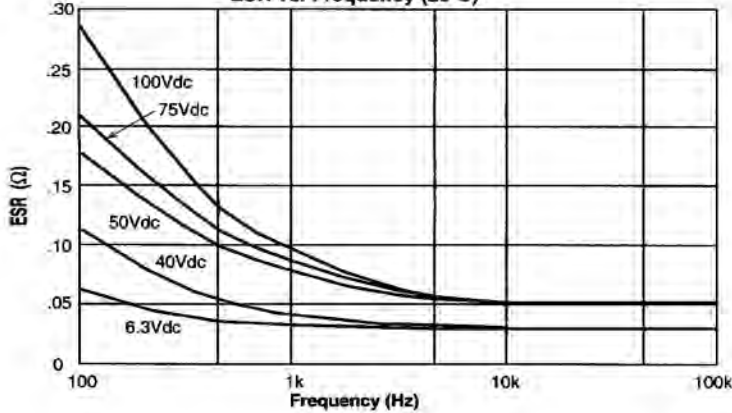
Type 301/301R Impedance vs Frequency
18,000 μ F, 6.3V, 1x3 $\frac{5}{8}$ "



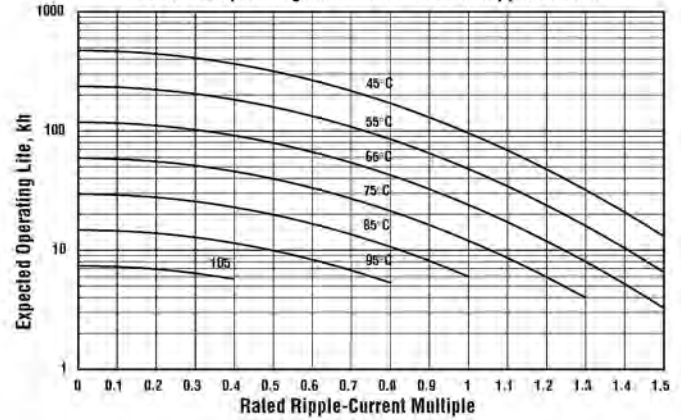
1500 μ F 75V, 1" x 3 $\frac{5}{8}$ "
Impedance-Frequency Characteristics



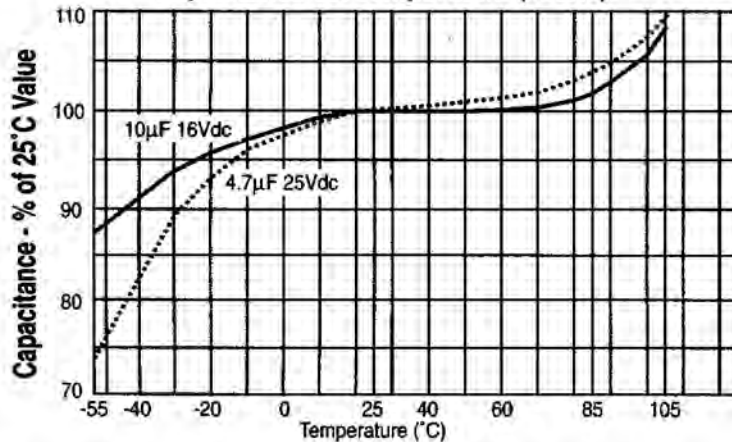
Type 301/301R ESR vs Frequency
ESR vs. Frequency (25°C)



300/301 Operating Life in Kilohours vs Ripple Current



Capacitance vs. Temperature (120Hz)



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Type AFK_V, -55 °C to 105 °C, High Vibration

SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

Low Impedance and Long-Life for Filtering, Bypassing and Power Supply Decoupling



Using a ruggedized construction, type AFK_V withstands a 30 G vibration test and has 40% to 60% lower impedance, 30% to 50% smaller case size and more than twice the life compared to general purpose types. As the main countermeasure to vibration, the metal case is inserted into a molded plastic retaining wall that surrounds the part, keeping it firmly in place. Larger diameter leads provide additional mechanical stability of the internal winding and a larger soldering surface keeps the part firmly affixed to the PCB. Type AFK_V is an excellent choice for power systems subjected to frequent motion and vibration.

Highlights

- Withstands 30 G vibration test
- +105 °C, Up to 5000 Hour Load Life
- Capacitance Range: 10 µF to 6800 µF
- Voltage Range: 6.3 Vdc to 100 Vdc
- AEC-Q200 Compliant

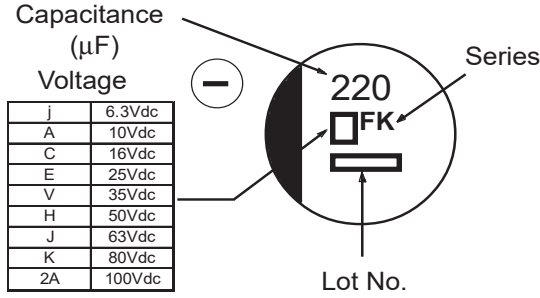
Specifications

Capacitance Range	10 µF to 6800 µF																											
Capacitance Tolerance	±20% @ 120 Hz and +20 °C																											
Rated Voltage	6.3, 10, 16, 25, 35, 50, 63, 80 & 100 Vdc																											
Operating Temperature Range	-55 °C to +105 °C																											
Leakage Current	0.01 CV or 3 µA @ +20 °C, after two minutes (whichever is greater)																											
Ripple Current Multiplier	<table border="1"> <thead> <tr> <th>Frequency</th> <th>50/60 Hz</th> <th>120 Hz</th> <th>1 kHz</th> <th>10 kHz</th> <th>100 kHz</th> </tr> </thead> <tbody> <tr> <td></td> <td>0.70</td> <td>.0.75</td> <td>0.90</td> <td>0.95</td> <td>1.00</td> </tr> </tbody> </table>								Frequency	50/60 Hz	120 Hz	1 kHz	10 kHz	100 kHz		0.70	.0.75	0.90	0.95	1.00								
Frequency	50/60 Hz	120 Hz	1 kHz	10 kHz	100 kHz																							
	0.70	.0.75	0.90	0.95	1.00																							
Dissipation Factor	<table border="1"> <thead> <tr> <th>6.3V</th> <th>10V</th> <th>16V</th> <th>25V</th> <th>35V</th> <th>50V</th> <th>63V</th> <th>80V</th> <th>100V</th> </tr> </thead> <tbody> <tr> <td>0.26</td> <td>0.19</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.1</td> <td>0.08</td> <td>0.08</td> <td>0.07</td> </tr> </tbody> </table> <p>Add 0.02 per 1000 µF for values greater than 1000 µF</p>								6.3V	10V	16V	25V	35V	50V	63V	80V	100V	0.26	0.19	0.16	0.14	0.12	0.1	0.08	0.08	0.07		
6.3V	10V	16V	25V	35V	50V	63V	80V	100V																				
0.26	0.19	0.16	0.14	0.12	0.1	0.08	0.08	0.07																				
Low Temperature Impedance Ratio Characteristics at 120 Hz	<table border="1"> <thead> <tr> <th rowspan="2">Rated Voltage (Vdc)</th> <th colspan="2">6.3, 10, 16</th> <th colspan="2">25, 35, 50, 63, 80, 100</th> </tr> </thead> <tbody> <tr> <td>Z (-25°C)/Z(+20°C)</td> <td colspan="2">2</td> <td colspan="2">2</td> </tr> <tr> <td>Z (-40°C)/Z(+20°C)</td> <td colspan="2">3</td> <td colspan="2">3</td> </tr> <tr> <td>Z (-55°C)/Z(+20°C)</td> <td colspan="2">4</td> <td colspan="2">3</td> </tr> </tbody> </table>								Rated Voltage (Vdc)	6.3, 10, 16		25, 35, 50, 63, 80, 100		Z (-25°C)/Z(+20°C)	2		2		Z (-40°C)/Z(+20°C)	3		3		Z (-55°C)/Z(+20°C)	4		3	
Rated Voltage (Vdc)	6.3, 10, 16		25, 35, 50, 63, 80, 100																									
	Z (-25°C)/Z(+20°C)	2		2																								
Z (-40°C)/Z(+20°C)	3		3																									
Z (-55°C)/Z(+20°C)	4		3																									
Life Test	2000 h @ 105 °C, 8.0 — 10.0 mm dia. 5000 h @ 105 °C, 12.5 — 18.0 mm dia. Δ Capacitance ±30% DF: ≤ 200% of limit DCL: ≤ 100% of limit																											
Shelf Test	1000 h @ 105 °C Δ Capacitance ±30% DF: ≤ 200% of limit DCL: ≤ 100% of limit																											
High Vibration Test	Capacitors with the high vibration base will pass a 30 G acceleration test from 5 Hz to 2000 Hz with a max. amplitude of 5 mm (peak to peak) for 2 hours each in the X,Y and Z directions for a total of 6 hours. During the last 30 minutes of the test, the measured capacitance shall be stable. After the test the capacitor shall meet the following: ΔC at 120 Hz - Capacitance value will be within 5% of the initial value. There will be no significant change in appearance.																											
RoHS Compliant																												

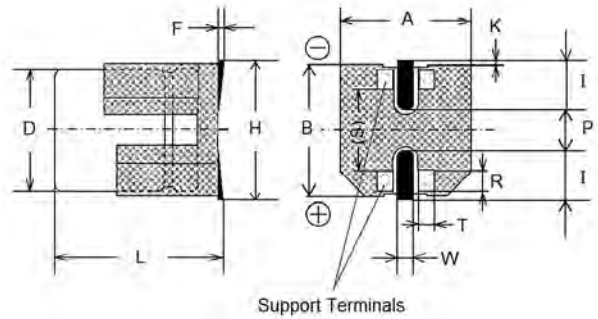
Type AFK_V, -55 °C to 105 °C, High Vibration

SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

AFK Series Marking



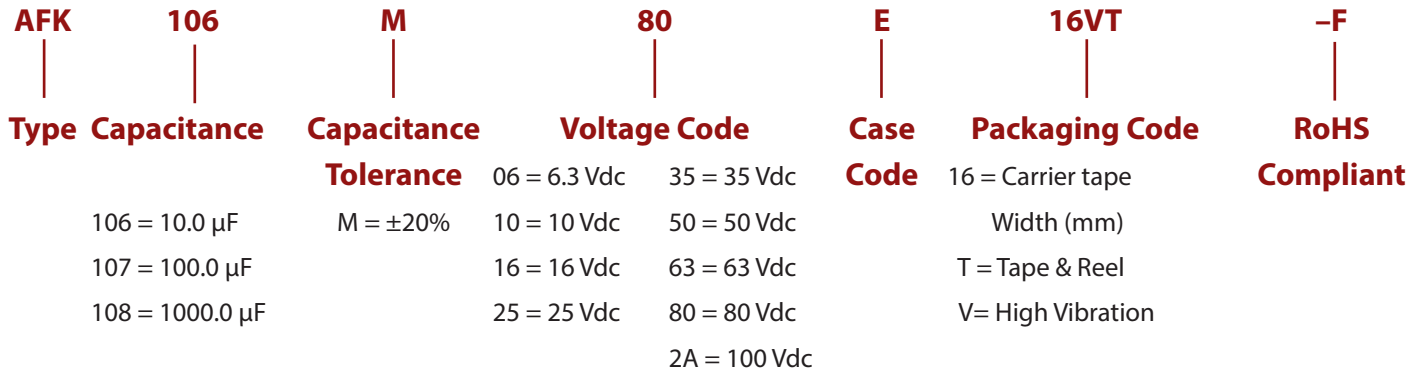
Outline Drawing



Case Dimensions

Size Code	D ± 0.5	L	A ± 0.2	B ± 0.2	H max.	F	I	w	P	K	R ± 0.2	S ± 0.2	T ± 0.2
E	8	6.5 ± 0.3	8.3	8.3	9.5	-1 to +0.15	3.4	0.7 ± 0.1	2.2	.35 ± 0.2	0.70	5.3	1.7
F	8	10.5 ± 0.3	8.3	8.3	10	-1 to +0.15	3.4	1.2 ± 0.2	3.1	.70 ± 0.2	0.70	5.3	1.3
G	10	10.5 ± 0.3	10.3	10.3	12	-1 to +0.15	3.5	1.2 ± 0.2	4.6	.70 ± 0.2	0.70	6.9	1.3
H	12.5	13.8 ± 0.5	13.5	13.5	15	-1 to +0.15	4.7	1.2 ± 0.3	4.4	.70 ± 0.3	2.2	7.1	2.4
P	16	16.8 ± 0.5	17	17	19	-1 to +0.15	5.5	1.4 ± 0.2	6.7	.70 ± 0.3	3.0	9.0	1.9
R	18	16.8 ± 0.5	19	19	21	-1 to +0.15	6.7	1.4 ± 0.2	6.7	.70 ± 0.3	3.0	11.0	1.9

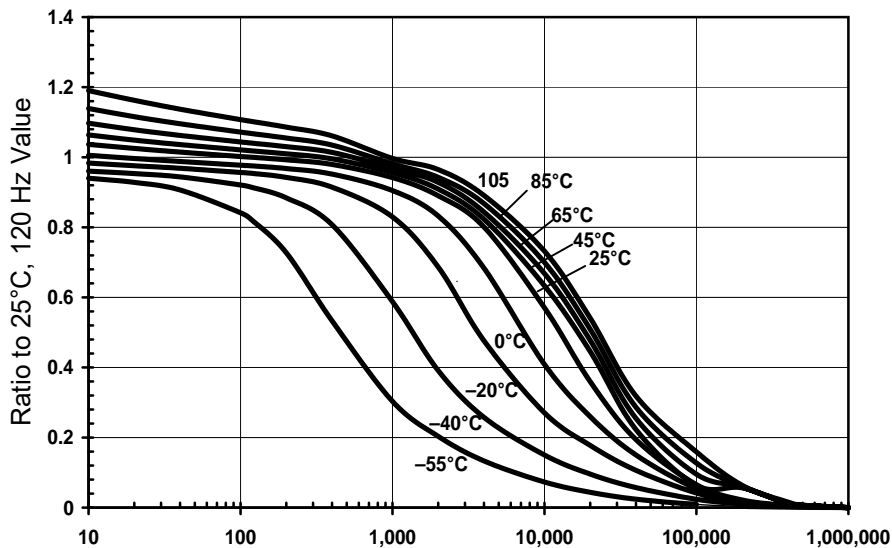
Part Numbering System



Typical Performance Curves

Capacitance vs. Temperature and Frequency

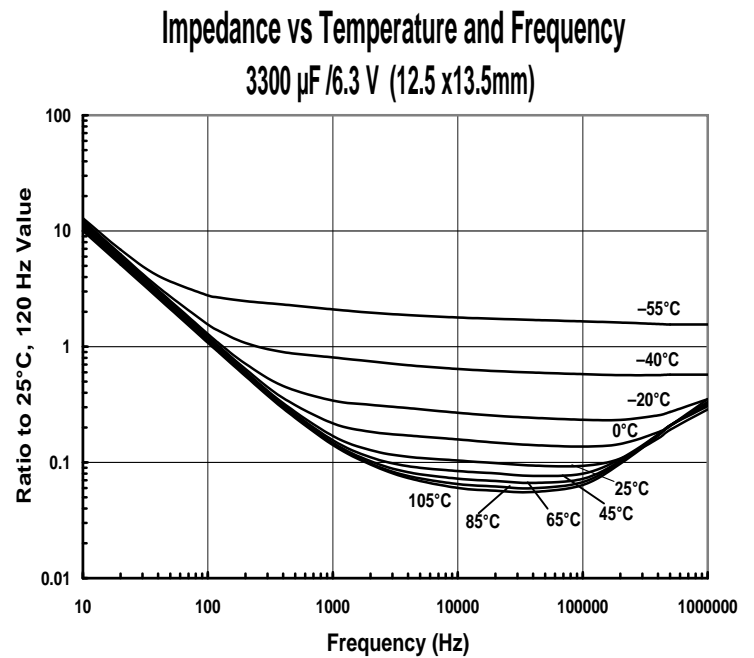
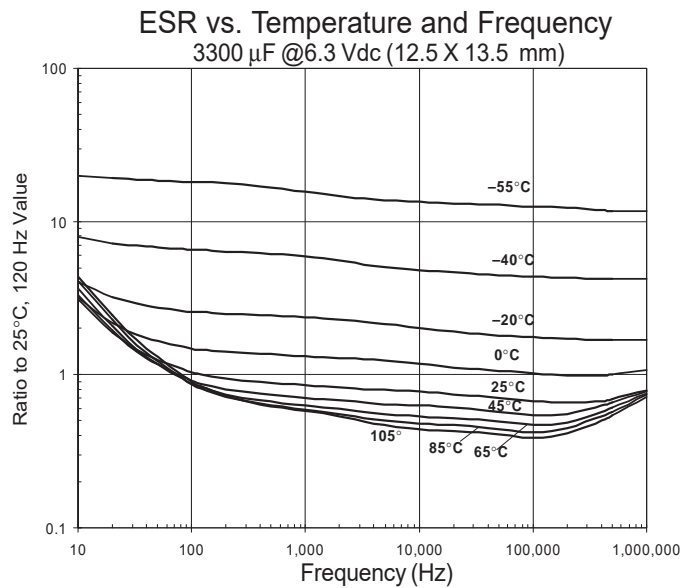
3300μF/6.3Vdc (12.5 x 13.5 mm)



Type AFK_V, -55 °C to 105 °C, High Vibration

SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

Typical Performance Curves



Ratings Table

Capacitance (μ F)	Catalog Part Number	Max. DCL 2 min. (μ A)	Max. Dissipation Factor @120 Hz/20°C	Max. ESR @100 kHz/20°C (Ω)	Impedance @100 kHz/20°C (Ω)	Max. Ripple Current @100 kHz/105°C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
6.3 Vdc (8 Vdc Surge)									
330	AFK337M06E16VT-F	20.8	0.26	0.26	0.26	300	E	8 x 6.5	1000
470	AFK477M06F24VT-F	29.6	0.26	0.16	0.16	600	F	8 x 10.5	500
1000	AFK108M06F24VT-F	63	0.26	0.16	0.16	600	F	8 x 10.5	500
1500	AFK158M06G24VT-F	94.8	0.26	0.08	0.08	850	G	10 x 10.5	500
3300	AFK338M06H32VT-F	207.9	0.30	0.06	0.06	1100	H	12.5 x 13.8	200
6800	AFK688M06P44VT-F	428.4	0.36	0.035	0.035	1800	P	16 x 16.8	125
10 Vdc (13 Vdc Surge)									
220	AFK227M10E16VT-F	22	0.19	0.26	0.26	300	E	8 x 6.5	1000
330	AFK337M10F24VT-F	33	0.19	0.16	0.16	600	F	8 x 10.5	500
470	AFK477M10F24VT-F	47	0.19	0.16	0.16	600	F	8 x 10.5	500
680	AFK687M10F24VT-F	68	0.19	0.16	0.16	600	F	8 x 10.5	500
1000	AFK108M10G24VT-F	100	0.19	0.08	0.08	850	G	10 x 10.5	500
2200	AFK228M10H32VT-F	220	0.21	0.06	0.06	1100	H	12.5 x 13.8	200
4700	AFK478M10P44VT-F	470	0.25	0.035	0.035	1800	P	16 x 16.8	125
6800	AFK688M10R44VT-F	680	0.29	0.033	0.033	2060	R	18 x 16.8	125
16 Vdc (20 Vdc Surge)									
220	AFK227M16E16VT-F	35.2	0.16	0.26	0.26	300	E	8 x 6.5	1000
330	AFK337M16F24VT-F	52.8	0.16	0.16	0.16	600	F	8 x 10.5	500
470	AFK477M16F24VT-F	75.2	0.16	0.16	0.16	600	F	8 x 10.5	500
680	AFK687M16G24VT-F	108.8	0.16	0.08	0.08	850	G	10 x 10.5	500
1500	AFK158M16H32VT-F	240	0.16	0.06	0.06	1100	H	12.5 x 13.8	200
3300	AFK338M16P44VT-F	528	0.2	0.035	0.035	1800	P	16 x 16.8	125
4700	AFK478M16R44VT-F	752	0.22	0.033	0.033	2060	R	18 x 16.8	125

Type AFK_V, -55 °C to 105 °C, High Vibration

SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

Capacitance (µF)	Catalog Part Number	Max. DCL 2 min. (µA)	Max. Dissipation Factor @120 Hz/20°C	Max. ESR @100 kHz/20°C (Ω)	Impedance @100 kHz/20°C (Ω)	Max. Ripple Current @100 kHz/105°C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
25 Vdc (31 Vdc Surge)									
100	AFK107M25E16VT-F	25	0.14	0.26	0.26	300	E	8 x 6.5	1000
150	AFK157M25F24VT-F	37.5	0.14	0.16	0.16	600	F	8 x 10.5	500
220	AFK227M25F24VT-F	55	0.14	0.16	0.16	600	F	8 x 10.5	500
330	AFK337M25F24VT-F	82.5	0.14	0.16	0.16	600	F	8 x 10.5	500
470	AFK477M25G24VT-F	117.5	0.14	0.08	0.08	850	G	10 x 10.5	500
1000	AFK108M25H32VT-F	250	0.14	0.06	0.06	1100	H	12.5 x 13.8	200
1500	AFK158M25P44VT-F	375	0.14	0.035	0.035	1800	P	16 x 16.8	125
2200	AFK228M25P44VT-F	550	0.16	0.035	0.035	1800	P	16 x 16.8	125
3300	AFK338M25R44VT-F	825	0.18	0.033	0.033	2060	R	18 x 16.8	125
35 Vdc (44 Vdc Surge)									
100	AFK107M35F24VT-F	35	0.12	0.16	0.16	600	F	8 x 10.5	500
150	AFK157M35F24VT-F	52.5	0.12	0.16	0.16	600	F	8 x 10.5	500
220	AFK227M35F24VT-F	77	0.12	0.16	0.16	600	F	8 x 10.5	500
330	AFK337M35G24VT-F	115.5	0.12	0.08	0.08	850	G	10 x 10.5	500
470	AFK477M35H32VT-F	164.5	0.12	0.06	0.06	1100	H	12.5 x 13.8	200
680	AFK687M35H32VT-F	238	0.12	0.06	0.06	1100	H	12.5 x 13.8	200
1000	AFK108M35P44VT-F	350	0.12	0.035	0.035	1800	P	16 x 16.8	125
1500	AFK158M35P44VT-F	525	0.12	0.035	0.035	1800	P	16 x 16.8	125
50 Vdc (63 Vdc Surge)									
33	AFK336M50E16VT-F	16.5	0.1	0.68	0.68	195	E	8 x 6.5	1000
47	AFK476M50E16VT-F	23.5	0.1	0.68	0.68	195	E	8 x 6.5	1000
100	AFK107M50F24VT-F	50	0.1	0.34	0.34	350	F	8 x 10.5	500
150	AFK157M50G24VT-F	75	0.1	0.18	0.18	670	G	10 x 10.5	500
220	AFK227M50G24VT-F	110	0.1	0.18	0.18	670	G	10 x 10.5	500
330	AFK337M50H32VT-F	165	0.1	0.12	0.12	900	H	12.5 x 13.8	200
390	AFK397M50H32VT-F	195	0.1	0.12	0.12	900	H	12.5 x 13.8	200
470	AFK477M50P44VT-F	235	0.1	0.073	0.073	1610	P	16 x 16.8	125
560	AFK567M50P44VT-F	280	0.1	0.073	0.073	1610	P	16 x 16.8	125
680	AFK687M50P44VT-F	340	0.1	0.073	0.073	1610	P	16 x 16.8	125
1000	AFK108M50P44VT-F	500	0.1	0.073	0.073	1610	P	16 x 16.8	125
63 Vdc (75 Vdc Surge)									
22	AFK226M63E16VT-F	13.9	0.08	1.2	1.2	120	E	8 x 6.5	1000
33	AFK336M63F24VT-F	20.8	0.08	0.65	0.65	250	F	8 x 10.5	500
47	AFK476M63F24VT-F	29.6	0.08	0.65	0.65	250	F	8 x 10.5	500
68	AFK686M63G24VT-F	42.8	0.08	0.35	0.35	400	G	10 x 10.5	500
100	AFK107M63G24VT-F	63	0.08	0.35	0.35	400	G	10 x 10.5	500
150	AFK157M63H32VT-F	94.5	0.08	0.16	0.16	800	H	12.5 x 13.8	200
220	AFK227M63H32VT-F	138.6	0.08	0.16	0.16	800	H	12.5 x 13.8	200
470	AFK477M63P44VT-F	296.1	0.08	0.082	0.082	1410	P	16 x 16.8	125
680	AFK687M63R44VT-F	428.4	0.08	0.08	0.08	1690	R	18 x 16.8	125

Note: ≥50V, 8 and 10 mm Dia.; 235°C peak solder temperature

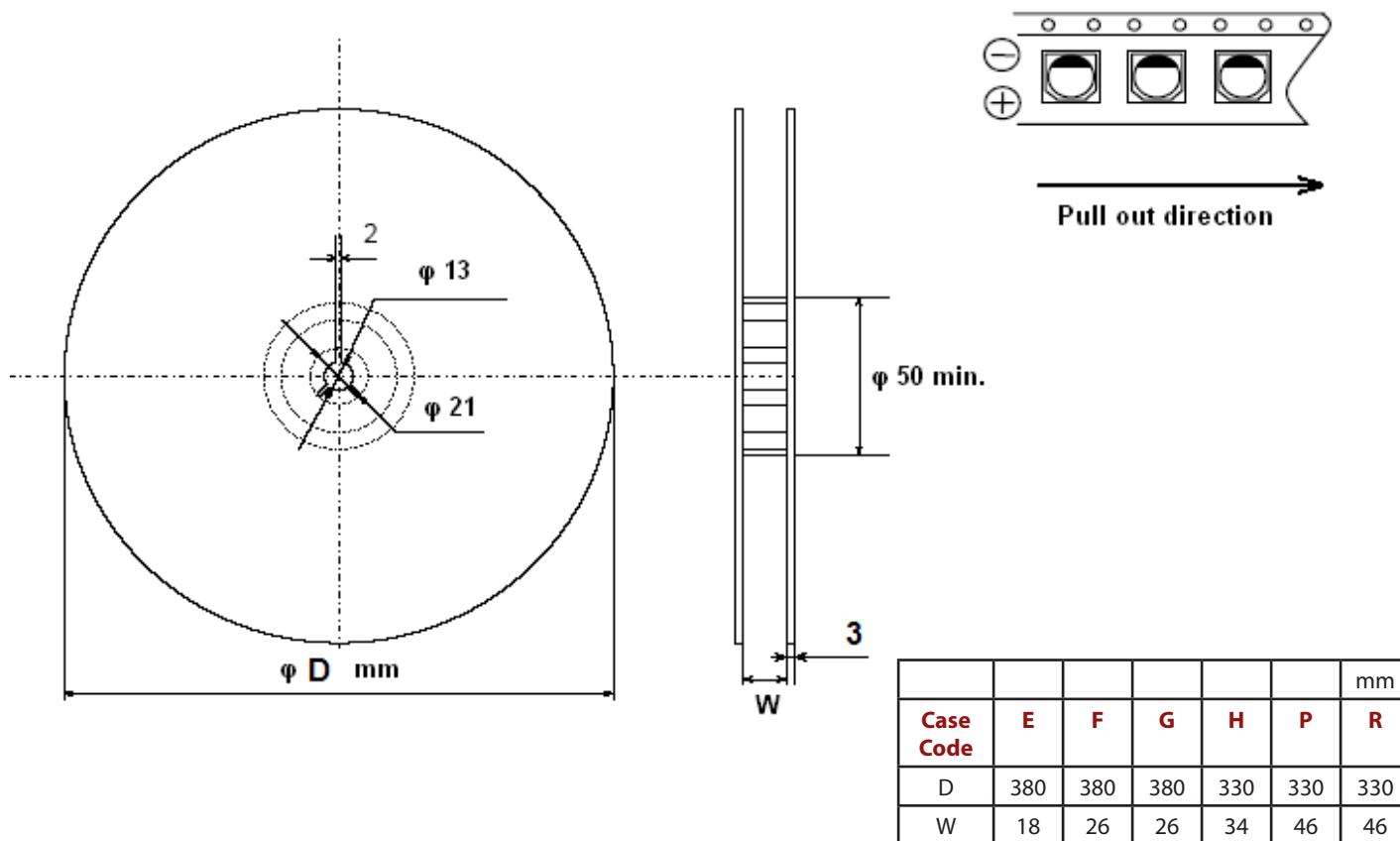
Type AFK_V, -55 °C to 105 °C, High Vibration

SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

Capacitance (μF)	Catalog Part Number	Max. DCL 2 min. (μA)	Max. Dissipation Factor @120 Hz/20°C	Max. ESR @100 kHz/20°C (Ω)	Impedance @100 kHz/20°C (Ω)	Max. Ripple Current @100 kHz/105°C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
80 Vdc (100 Vdc Surge)									
10	AFK106M80E16VT-F	8	0.08	2.4	2.4	60	E	8 x 6.5	1000
22	AFK226M80F24VT-F	17.6	0.08	1.3	1.3	130	F	8 x 10.5	500
33	AFK336M80F24VT-F	26.4	0.08	1.3	1.3	130	F	8 x 10.5	500
47	AFK476M80G24VT-F	37.6	0.08	0.7	0.7	200	G	10 x 10.5	500
68	AFK686M80H32VT-F	54.4	0.08	0.32	0.32	500	H	12.5 x 13.8	200
100	AFK107M80H32VT-F	80	0.08	0.32	0.32	500	H	12.5 x 13.8	200
150	AFK157M80H32VT-F	120	0.08	0.32	0.32	500	H	12.5 x 13.8	200
330	AFK337M80P44VT-F	264	0.08	0.17	0.17	793	P	16 x 16.8	125
470	AFK477M80R44VT-F	376	0.08	0.15	0.15	917	R	18 x 16.8	125
100 Vdc (125 Vdc Surge)									
22	AFK226M2AF24VT-F	22	0.07	1.3	1.3	130	F	8 x 10.5	500
33	AFK336M2AG24VT-F	33	0.07	0.7	0.7	200	G	10 x 10.5	500
47	AFK476M2AH32VT-F	47	0.07	0.32	0.32	500	H	12.5 x 13.8	200
68	AFK686M2AH32VT-F	68	0.07	0.32	0.32	500	H	12.5 x 13.8	200
100	AFK107M2AP44VT-F	100	0.07	0.17	0.17	793	P	16 x 16.8	125
150	AFK157M2AP44VT-F	150	0.07	0.17	0.17	793	P	16 x 16.8	125
220	AFK227M2AR44VT-F	220	0.07	0.15	0.15	917	R	18 x 16.8	125
330	AFK337M2AR44VT-F	330	0.07	0.15	0.15	917	R	18 x 16.8	125

Note: ≥50V, 8 and 10 mm Dia.; 235°C peak solder temperature

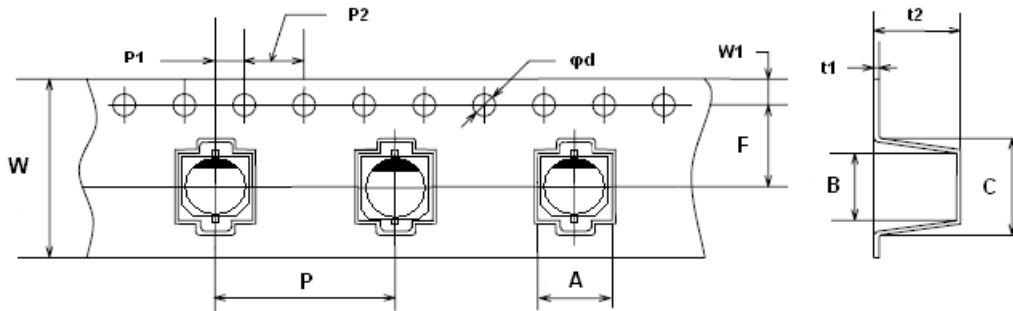
Reel Dimensions



Type AFK_V, -55 °C to 105 °C, High Vibration

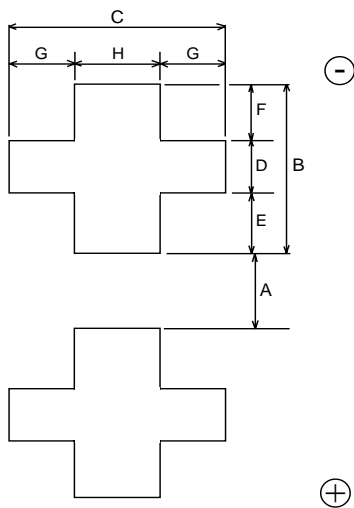
SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

Case Code E, F and G Tape Dimensions



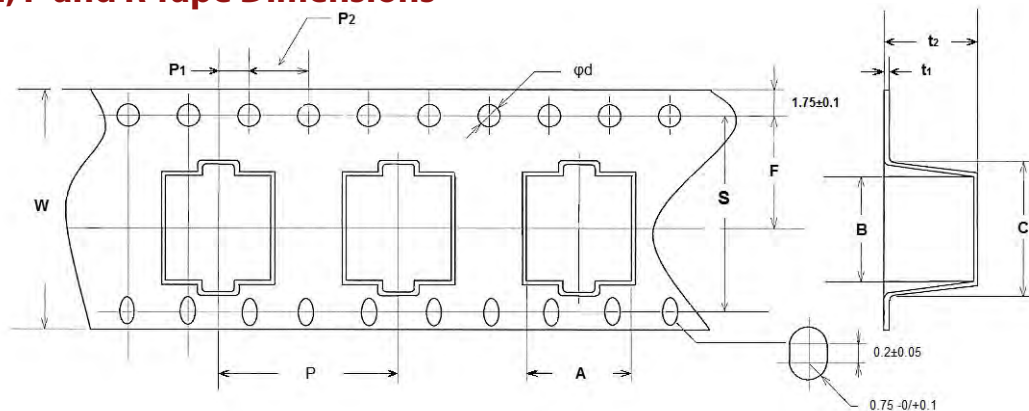
Case Size	Case Code	W ± 0.3	A ± 0.2	B +0.3/-0.2	C ± 0.2	F ± 0.1	P ± 0.1	t1	t2 ± 0.2	φd +0.1/-0	P1 ± 0.1	P2 ± 0.1	W1 ± 0.1
8 x 6.2	E	16	8.7	8.7	11.4	7.5	12	0.4	6.8	1.5	2	4	1.75
8 x 10.2	F	24	8.7	8.7	12.5	11.5	16		11				
10 x 10.2	G		10.7	10.7	14.5								

Recommended Land Dimensions



Case Code	Case Dia.	A	B	C	D	E	F	G	H
E	8	1.8	4.1	5.0	1.3	1.5	1.4	1.5	2.0
F	8	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
G	10	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5
H	12.5	3.9	6.0	6.9	2.8	1.3	1.9	2.2	2.5
P	16	5.8	6.8	6.2	3.6	1.3	1.9	1.7	2.8
R	18	5.8	7.3	6.2	3.6	1.8	1.9	1.7	2.8

Case Code H, P and R Tape Dimensions

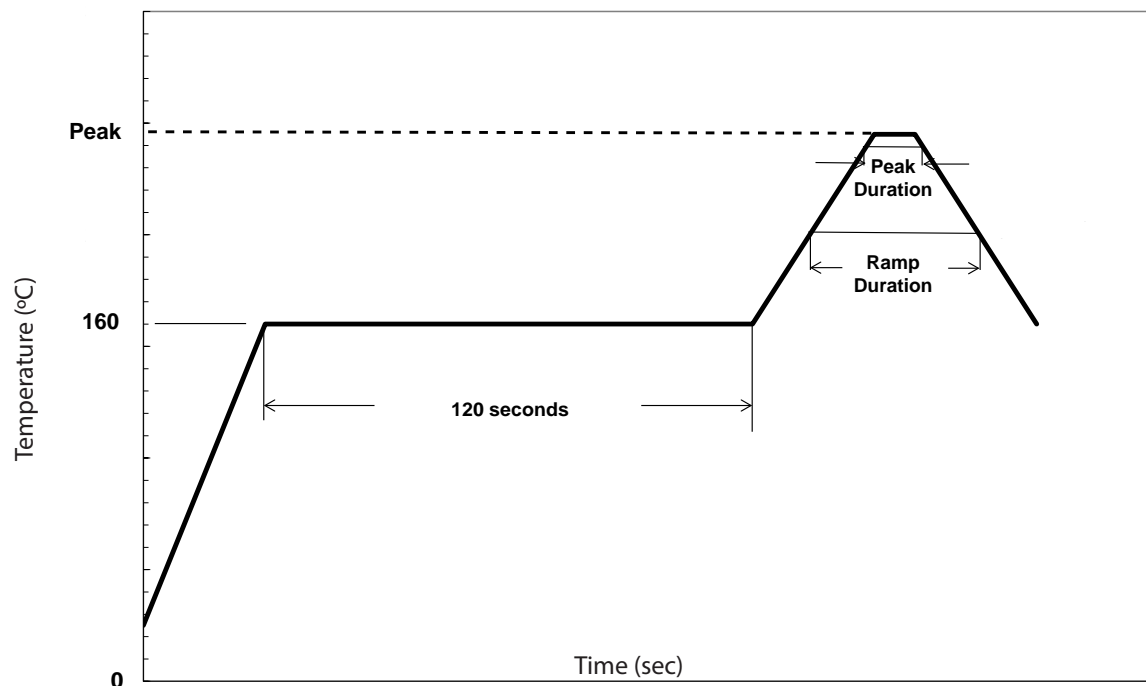


Case Size	Case Code	W ± 0.3	A ± 0.5	B ± 0.5	C ± 0.5	F ± 0.1	S ± 0.1	P ± 0.1	t1	t2 ± 0.2	φd +0.1/-0	P1 ± 0.1	P2 ± 0.1
12.5 x 13.5	H	32	14.0	14.0	18.0	14.2	28.4	24	0.5	14.5	1.5	2	4
16 x 16.5	P	44	17.5	17.5	23.00	20.2	40.4	28		17.5			
18 x 16.5	R		19.5	19.5	26.00			32					

Type AFK_V, -55 °C to 105 °C, High Vibration

SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

Recommended Reflow Soldering



Case Code	Diameter (mm)	Voltage (Vdc)	Peak Temp	Peak Temp Duration	Ramp Temp Duration	Number of Reflows
E, F, G	8 - 10	6.3 - 35	260°C	≥250°C, 5 s	≥230°C, 30 s ≥200°C, 70 s	1
		50 - 100	235°C	5 s	≥200°C, 60 s	1
H, P, R	12.5 - 18	6.3 - 35	245°C	≥240°C, 30 s	≥217°C, 90 s	2
		50 - 63	245°C	≥240°C, 5 s	≥217°C, 30 s	2
		80 - 100	245°C	≥240°C, 5 s	≥217°C, 30 s	1

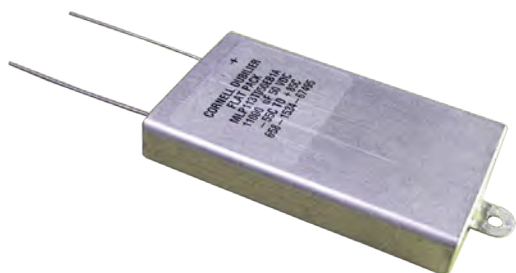
Type AFK_V, -55 °C to 105 °C, High Vibration

SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

Notice and Disclaimer: All product drawings, descriptions, specifications, statements, information and data (collectively, the "Information") in this datasheet or other publication are subject to change. The customer is responsible for checking, confirming and verifying the extent to which the Information contained in this datasheet or other publication is applicable to an order at the time the order is placed. All Information given herein is believed to be accurate and reliable, but it is presented without any guarantee, warranty, representation or responsibility of any kind, expressed or implied. Statements of suitability for certain applications are based on the knowledge that the Cornell Dubilier company providing such statements ("Cornell Dubilier") has of operating conditions that such Cornell Dubilier company regards as typical for such applications, but are not intended to constitute any guarantee, warranty or representation regarding any such matter – and Cornell Dubilier specifically and expressly disclaims any guarantee, warranty or representation concerning the suitability for a specific customer application, use, storage, transportation, or operating environment. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by Cornell Dubilier with reference to the use of any Cornell Dubilier products is given gratis (unless otherwise specified by Cornell Dubilier), and Cornell Dubilier assumes no obligation or liability for the advice given or results obtained. Although Cornell Dubilier strives to apply the most stringent quality and safety standards regarding the design and manufacturing of its products, in light of the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies or other appropriate protective measures) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage. Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated in such warnings, cautions and notes, or that other safety measures may not be required.

Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Very Low Profile



The MLP's high-energy storage and box-shape make it perfect for voltage holdup or filtering in military SEM-E modules, telecom circuit packs and computer cards. The MLP delivers up to 20 joules of energy storage in a 1/2" height with 50 year's life at +45 °C. You can readily heatsink it to double the ripple-current capability. The MLP is the square-peg component that fits the square-holes in electronic assemblies.

Highlights

- Low-profile replacement for snap-ins
- Double the ripple capability with a heatsink
- Nearly hermetic welded seal assures 50-year life
- Withstands more than 80,000 feet altitude

Specifications

Temperature Range	-55°C to +85°C ≤250 Vdc -40°C to +85°C ≥300 Vdc																																												
Rated Voltage Range	7.5 Vdc to 450 Vdc																																												
Capacitance Range	110 µF to 47,000 µF																																												
Capacitance Tolerance	±20%																																												
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 min.																																												
Ripple Current Multipliers	<p>Ambient Temperature, No Heatsink</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> </tr> </thead> <tbody> <tr> <td>1.00</td> <td>0.90</td> <td>0.75</td> <td>0.56</td> <td>0.27</td> </tr> </tbody> </table> <p>Case Temperature</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> </tr> </thead> <tbody> <tr> <td>3.79</td> <td>3.32</td> <td>2.77</td> <td>2.08</td> <td>1.00</td> </tr> </tbody> </table> <p>Frequency</p> <table border="1"> <thead> <tr> <th></th> <th>50 Hz</th> <th>60 Hz</th> <th>120 Hz</th> <th>360 Hz</th> <th>1 kHz</th> <th>5 kHz</th> <th>10 kHz & up</th> </tr> </thead> <tbody> <tr> <th>7.5 to 63 V</th> <td>0.94</td> <td>0.95</td> <td>1.00</td> <td>1.04</td> <td>1.05</td> <td>1.06</td> <td>1.06</td> </tr> <tr> <th>80 to 450 V</th> <td>0.80</td> <td>0.85</td> <td>1.00</td> <td>1.17</td> <td>1.24</td> <td>1.28</td> <td>1.29</td> </tr> </tbody> </table>	45 °C	55 °C	65 °C	75 °C	85 °C	1.00	0.90	0.75	0.56	0.27	45 °C	55 °C	65 °C	75 °C	85 °C	3.79	3.32	2.77	2.08	1.00		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	7.5 to 63 V	0.94	0.95	1.00	1.04	1.05	1.06	1.06	80 to 450 V	0.80	0.85	1.00	1.17	1.24	1.28	1.29
45 °C	55 °C	65 °C	75 °C	85 °C																																									
1.00	0.90	0.75	0.56	0.27																																									
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80 to 450 V	0.80	0.85	1.00	1.17	1.24	1.28	1.29																																						
Low Temperature Characteristics	Impedance ratio: $Z_{-55°C} / Z_{+25°C}$ ≤ 10 (7.5 - 20 Vdc) ≤ 2 (25 - 250 Vdc) Impedance ratio: $Z_{-20°C} / Z_{+25°C}$ ≤ 4 (300-450Vdc)																																												
Endurance Life Test	2000 h @ full load at +85 °C Δ Capacitance ±10% ESR 200% of limit DCL 100% of limit																																												
Shelf Life Test	500 h at 85 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit																																												
Vibration	All case sizes: 10g. MIL-STD-202, Meth. 204, Sine Swept, EIEC 60068-2-6																																												

Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Very Low Profile

Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above (XXg peak), whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>																											
Thermal Resistance	<table border="1"> <thead> <tr> <th rowspan="2">Large Sides Heatsinked</th> <th rowspan="2">Case Length</th> <th>1.5"</th> <th>2.0"</th> <th>3.0"</th> </tr> <tr> <th>Insulation</th> <th>°C/W</th> <th>°C/W</th> <th>°C/W</th> </tr> </thead> <tbody> <tr> <td rowspan="2">one</td> <td>None</td> <td>2.9</td> <td>2.1</td> <td>1.4</td> </tr> <tr> <td>Polyester</td> <td>3.3</td> <td>2.4</td> <td>1.6</td> </tr> <tr> <td rowspan="2">both</td> <td>None</td> <td>2.7</td> <td>1.9</td> <td>1.2</td> </tr> <tr> <td>Polyester</td> <td>2.9</td> <td>2.1</td> <td>1.3</td> </tr> </tbody> </table>	Large Sides Heatsinked	Case Length	1.5"	2.0"	3.0"	Insulation	°C/W	°C/W	°C/W	one	None	2.9	2.1	1.4	Polyester	3.3	2.4	1.6	both	None	2.7	1.9	1.2	Polyester	2.9	2.1	1.3
Large Sides Heatsinked	Case Length			1.5"	2.0"	3.0"																						
		Insulation	°C/W	°C/W	°C/W																							
one	None	2.9	2.1	1.4																								
	Polyester	3.3	2.4	1.6																								
both	None	2.7	1.9	1.2																								
	Polyester	2.9	2.1	1.3																								
ESL	<30 nH measured 1/4" from case at 1 MHz																											
Weight	Case EK 30 g typical Case EA 42 g typical Case EB 66 g typical																											
Terminals	18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max																											
Case Material	Aluminum																											
Double the Ripple Current	Attach the MLP to an external heatsink and you can easily double the ripple current capability and assure long life through cooler operation. The broad, flat top and bottom on the MLP are ideal for cooling the capacitor and removing the heat caused by ripple current.																											
Ripple Current Capability	The ripple current capability is set by the maximum permissible internal core temperature, 88 °C. This assures that the case does not inflate beyond 0.5 inch height.																											
Air Cooled	The ripple currents in the ratings tables are for 85 °C case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.																											
Heatsink Cooled	Temperature rise from the internal hottest spot, the core, to ambient air is $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca})$ where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the MLP attached to a heatsink use the maximum core temperature and the values for θ_{cc} .																											
Example	As an illustration, suppose you operate an insulated MLP332M080EB1C in 65 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the MLP and the heatsink, and the total thermal resistance is 2.7 + 1.7 or 4.4 °C/W. The power which would heat the core to 88 °C is (88-65)/4.4 or 5.2 W. For an ESR of 31 mΩ, 5.2 W equates to a ripple current of 13 A.																											

Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

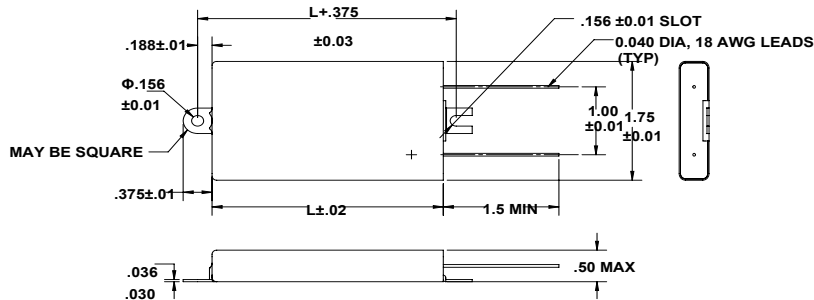
Part Numbering System

MLP	102	M	200	EB	0	A
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
MLP	821=820 μ F 102 = 1000 μ F	M= \pm 20%	Vdc	EK, L=1.5 in. EA, L=2.0 in. EB, L=3.0 in.	0 = bare can 1 = polyester	A = mounting tabs B = four leads C = two leads/no tabs D = hook leads/tabs E = hook leads/no tabs

Outline Drawings

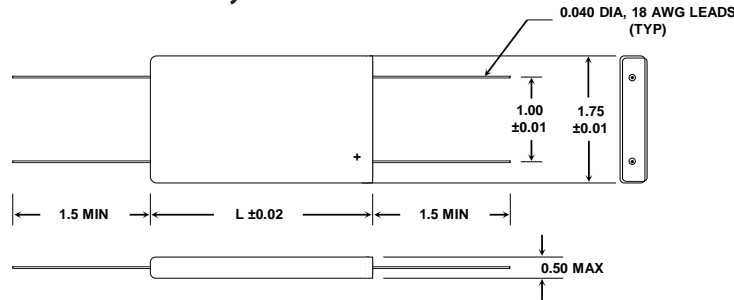
Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.

Style A: Mounting Tabs



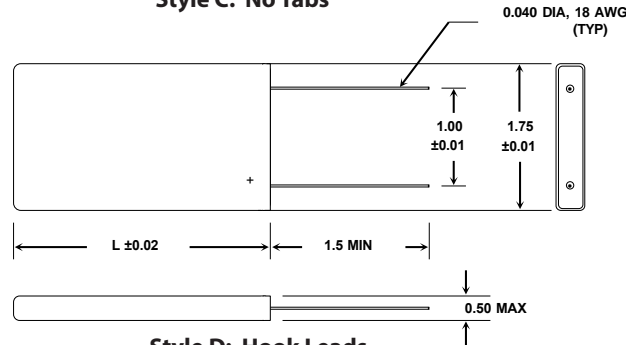
Mounting tabs and negative lead are welded to the case.

Style B: Four Leads



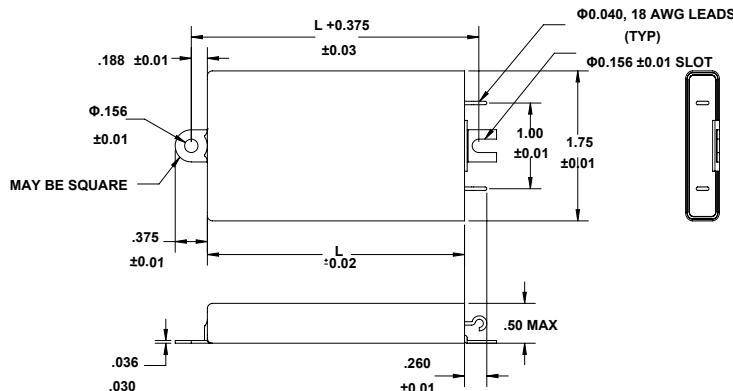
Three negative leads are welded to the case.

Style C: No Tabs



The negative lead is welded to the case.

Style D: Hook Leads



Mounting tabs and negative lead are welded to the case.

Case Code	Length L (in)	Weight (g)
EK	1.5	30
EA	2.0	42
EB	3.0	66

Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

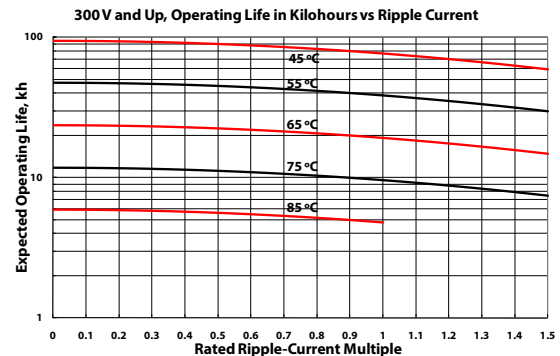
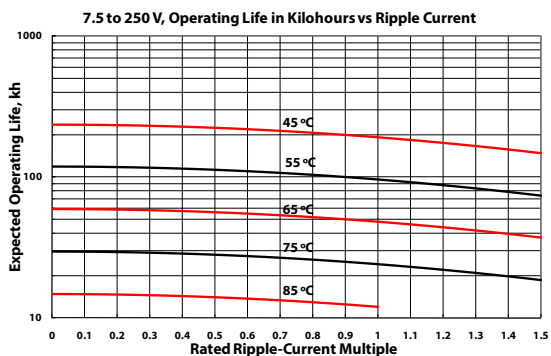
Very Low Profile

Ratings

Cap. (µF)	Catalog Part Number	ESR max 25 °C (mΩ)		Ripple (A) Case @ 85 °C		Length (Inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
7.5 Vdc (10 Vdc Surge)						
19,000	MLP193M7R5EK0A	76	66	4.2	4.5	1.5
28,000	MLP283M7R5EA0A	50	44	5.8	6.2	2.0
47,000	MLP473M7R5EB0A	30	26	9.1	9.8	3.0
10 Vdc (13 Vdc Surge)						
17000	MLP173M010EK0A	77	67	4.2	4.5	1.5
26000	MLP263M010EA0A	51	45	5.8	6.1	2.0
43000	MLP433M010EB0A	30	27	9.0	9.6	3.0
16 Vdc (20 Vdc Surge)						
13000	MLP133M016EK0A	81	69	4.1	4.4	1.5
21000	MLP213M016EA0A	53	46	5.7	6.1	2.0
38000	MLP383M016EB0A	31	27	9.0	9.6	3.0
20 Vdc (25 Vdc Surge)						
9600	MLP962M020EK0A	84	69	4.0	4.4	1.5
14000	MLP143M020EA0A	56	46	5.5	6.1	2.0
24000	MLP243M020EB0A	33	27	8.7	9.6	3.0
25 Vdc (30 Vdc Surge)						
8000	MLP802M025EK0A	87	69	3.9	4.4	1.5
12000	MLP123M025EA0A	57	46	5.5	6.1	2.0
20000	MLP203M025EB0A	34	27	8.6	9.6	3.0
35 Vdc (50 Vdc Surge)						
5600	MLP562M035EK0A	90	70	3.4	4.4	1.5
8400	MLP842M035EA0A	59	46	5.4	6.1	2.0
14000	MLP143M035EB0A	35	27	8.4	9.6	3.0
50 Vdc (63 Vdc Surge)						
4400	MLP442M050EK0A	97	70	3.7	4.4	1.5
6600	MLP662M050EA0A	62	46	5.2	6.1	2.0
11000	MLP113M050EB0A	36	27	8.3	9.6	3.0
63 Vdc (75 Vdc Surge)						
2200	MLP222M063EK0A	101	76	3.7	4.2	1.5
3300	MLP332M063EA0A	64	50	5.2	5.8	2.0
5600	MLP562M063EB0A	36	29	8.3	9.3	3.0
80 Vdc (100 Vdc Surge)						
1500	MLP152M080EK0A	106	77	3.6	4.2	1.5
2100	MLP212M080EA0A	72	52	4.9	5.7	2.0
3300	MLP332M080EB0A	44	31	7.5	9.0	3.0

Cap. (µF)	Catalog Part Number	ESR max 25 °C (mΩ)		Ripple (A) Case @ 85 °C		Length (Inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
100 Vdc (125 Vdc Surge)						
1100	MLP112M100EK0A	112	78	3.5	4.2	1.5
1600	MLP162M100EA0A	76	54	4.7	5.6	2.0
2700	MLP272M100EB0A	46	33	7.4	8.7	3.0
150 Vdc (180 Vdc Surge)						
500	MLP501M150EK0A	355	248	1.9	2.3	1.5
770	MLP771M150EA0A	238	166	2.7	3.2	2.0
1300	MLP132M150EB0A	143	100	4.2	5.0	3.0
200 Vdc (250 Vdc Surge)						
400	MLP401M200EK0A	388	253	1.9	2.3	1.5
600	MLP601M200EA0A	261	168	2.6	3.2	2.0
1000	MLP102M200EB0A	158	100	3.8	5.0	3.0
250 Vdc (300 Vdc Surge)						
330	MLP331M250EK0A	426	258	1.8	2.3	1.5
490	MLP491M250EA0A	285	172	2.4	3.1	2.0
820	MLP821M250EB0A	172	103	3.8	4.9	3.0
300 Vdc (350 Vdc Surge)						
220	MLP221M300EK0A	597	393	1.5	1.9	1.5
330	MLP331M300EA0A	399	262	2.1	2.5	2.0
560	MLP561M300EB0A	240	157	3.2	4.0	3.0
350 Vdc (400 Vdc Surge)						
150	MLP151M350EK0A	1000	734	1.2	1.4	1.5
220	MLP221M350EA0A	683	503	1.6	1.8	2.0
370	MLP371M350EB0A	420	310	2.3	2.8	3.0
400 Vdc (450 Vdc Surge)						
130	MLP131M400EK0A	1320	970	1.0	1.2	1.5
200	MLP201M400EA0A	882	648	1.4	1.6	2.0
330	MLP331M400EB0A	530	390	2.1	2.5	3.0
420 Vdc (475 Vdc Surge)						
130	MLP131M420EK0A	1320	970	1.0	1.2	1.5
200	MLP201M420EA0A	882	648	1.4	1.6	2.0
330	MLP331M420EB0A	530	390	2.1	2.5	3.0
450 Vdc (500 Vdc Surge)						
110	MLP111M450EK0A	1456	1190	0.96	1.1	1.5
170	MLP171M450EA0A	973	797	1.3	1.5	2.0
280	MLP281M450EB0A	585	480	2.0	2.3	3.0

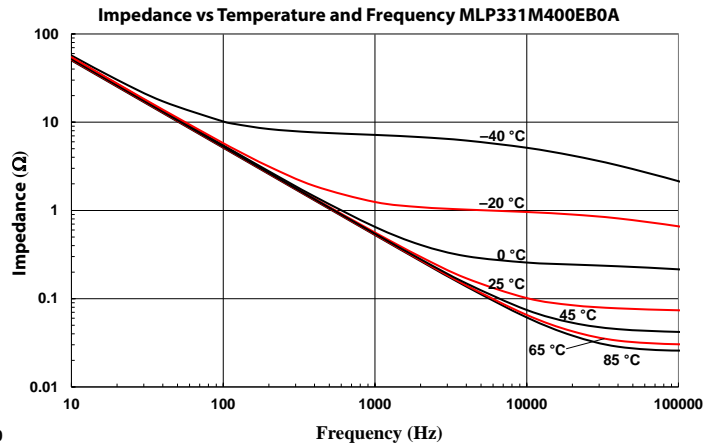
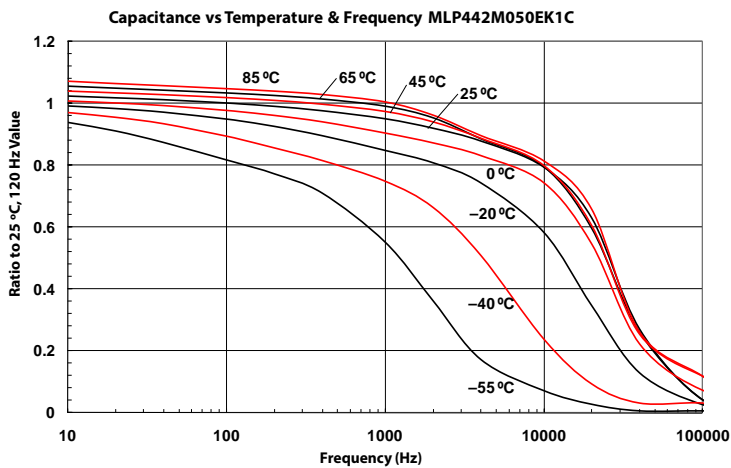
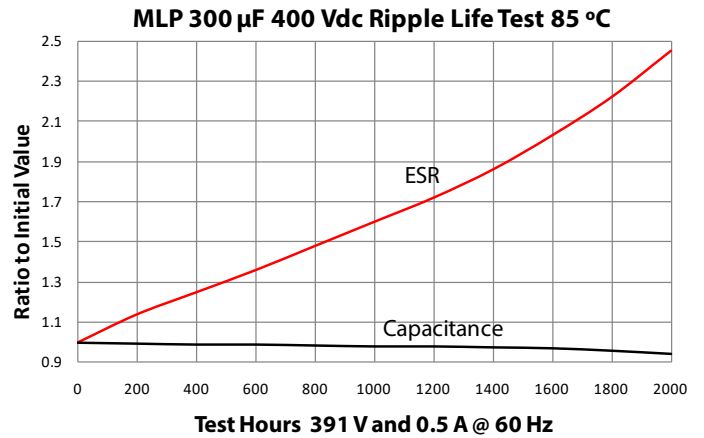
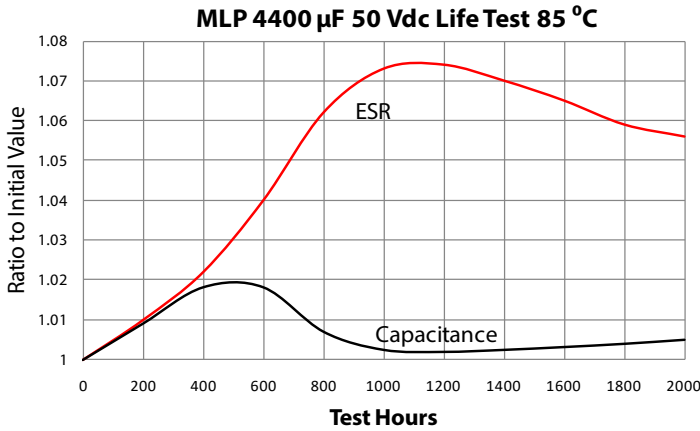
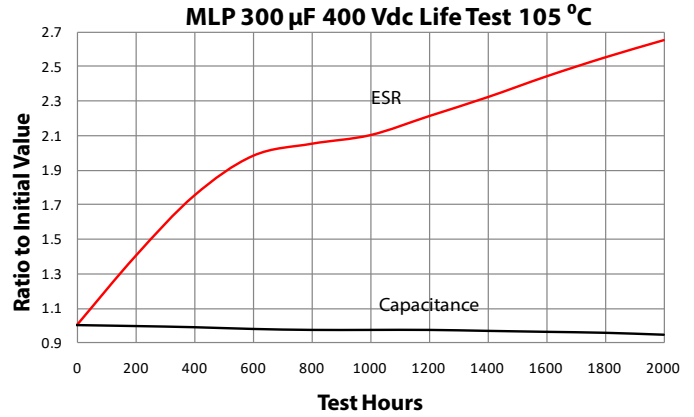
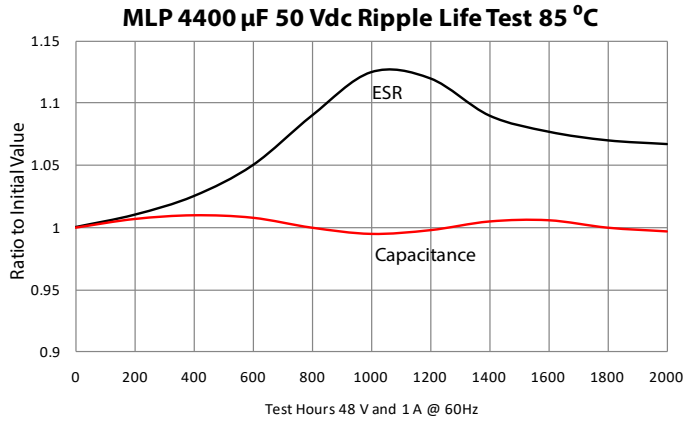
Typical Performance Curves



Type MLP 85 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Very Low Profile

Typical Performance Curves



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Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Now Available with High Vibration and High Reliability Options



Encased in rugged stainless steel, the MLS is perfect for high reliability military systems and applications operating above 85 °C. For our highest performing 125 °C Flatpacks, choose type HVMLS available in a special stainless steel case for high vibration applications up to 50g. Specify type HRMLS for high reliability Flatpacks which are subjected to MIL level burn-in processes to ensure established reliability.

Highlights

- Near-hermetic welded seal
- Stainless-steel case
- 100 years expected operating life
- Withstands more than 80,000 feet altitude
- Type HV up to 50g
- Type HR, High Reliability

Specifications

Temperature Range	-55 °C to +125 °C																																																												
Rated Voltage Range	5.0 Vdc to 250 Vdc																																																												
Capacitance Range	220 µF to 47,000 µF																																																												
Capacitance Tolerance	±20%																																																												
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 mins.																																																												
Ripple Current Multipliers	<p>Case Temperature</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> <th>95 °C</th> <th>105 °C</th> <th>115 °C</th> <th>125 °C</th> </tr> </thead> <tbody> <tr> <td>1.41</td> <td>1.32</td> <td>1.22</td> <td>1.12</td> <td>1.00</td> <td>0.87</td> <td>0.71</td> <td>0.50</td> <td>0.00</td> </tr> </tbody> </table> <p>Ambient Temperature, No Heatsink</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> <th>95 °C</th> <th>105 °C</th> <th>115 °C</th> <th>125 °C</th> </tr> </thead> <tbody> <tr> <td>0.63</td> <td>0.58</td> <td>0.54</td> <td>0.49</td> <td>0.44</td> <td>0.38</td> <td>0.31</td> <td>0.22</td> <td>0.00</td> </tr> </tbody> </table> <p>Frequency</p> <table border="1"> <thead> <tr> <th></th> <th>50 Hz</th> <th>60 Hz</th> <th>120 Hz</th> <th>360 Hz</th> <th>1 kHz</th> <th>5 kHz</th> <th>10 kHz & up</th> </tr> </thead> <tbody> <tr> <td>5 to 40 V</td> <td>0.95</td> <td>0.96</td> <td>1.00</td> <td>1.03</td> <td>1.04</td> <td>1.04</td> <td>1.04</td> </tr> <tr> <td>60 to 250 V</td> <td>0.80</td> <td>0.84</td> <td>1.00</td> <td>1.18</td> <td>1.25</td> <td>1.30</td> <td>1.30</td> </tr> </tbody> </table>	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C	1.41	1.32	1.22	1.12	1.00	0.87	0.71	0.50	0.00	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C	0.63	0.58	0.54	0.49	0.44	0.38	0.31	0.22	0.00		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	5 to 40 V	0.95	0.96	1.00	1.03	1.04	1.04	1.04	60 to 250 V	0.80	0.84	1.00	1.18	1.25	1.30	1.30
45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C																																																					
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Low Temperature Characteristics	Impedance ratio: $Z_{-55^{\circ}\text{C}}/Z_{+25^{\circ}\text{C}}$ ≤ 10 (5 - 20 Vdc) ≤ 2 (25 - 250 Vdc)																																																												
Endurance Life Test	10,000 h @ full load at 85 °C Δ Capacitance ±10% ESR 200% of limit DCL 100% of limit																																																												
DC Life Test	2000 h at rated voltage & 125 °C Δ Capacitance ±10% ESR 200% of limit DCL 100% of limit																																																												
Shelf Life Test	500 h at 125 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit																																																												
Vibration	Standard MLS Flatpack: 10g 10 Hz to 2 kHz Sine Swept, 0.06" pp max and 10g. Type HVMLS Flatpack 1.5" and 2.0" case length, 50g Type HVMLS Flatpack 2.5" and 3.0" case length, 30g MIL-STD-202, Meth. 204, Sine Swept, IEC 60068-2-6																																																												

Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Available with High Vibration and High Reliability Options

Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above (XXg peak), whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>																										
High Reliability Test/Burn-in	Established Reliability capacitors shall be subjected to a minimum of 100 percent of the dc rated voltage at 85 °C for 48 hours minimum but not to exceed 96 hours. During this test, capacitors shall be adequately protected against temporary voltage surges of 10 percent or more of the test voltage. After burn-in, the capacitors shall be returned to room ambient conditions and the dc leakage, capacitance, and ESR shall be measured with respect to specified limits.																										
Thermal Resistance	<table border="1" data-bbox="773 940 1511 1178"> <thead> <tr> <th rowspan="2">Large Sides Heatsinked</th> <th rowspan="2">Case Length Insulation</th> <th>1.5"</th> <th>2.0"</th> <th>3.0"</th> </tr> <tr> <th>°C/W</th> <th>°C/W</th> <th>°C/W</th> </tr> </thead> <tbody> <tr> <td rowspan="2">one</td> <td>None</td> <td>4.3</td> <td>3.1</td> <td>2.0</td> </tr> <tr> <td>Polyester</td> <td>4.7</td> <td>3.4</td> <td>2.2</td> </tr> <tr> <td rowspan="2">both</td> <td>None</td> <td>2.8</td> <td>2.0</td> <td>1.3</td> </tr> <tr> <td>Polyester</td> <td>3.0</td> <td>2.2</td> <td>1.4</td> </tr> </tbody> </table>	Large Sides Heatsinked	Case Length Insulation	1.5"	2.0"	3.0"	°C/W	°C/W	°C/W	one	None	4.3	3.1	2.0	Polyester	4.7	3.4	2.2	both	None	2.8	2.0	1.3	Polyester	3.0	2.2	1.4
Large Sides Heatsinked	Case Length Insulation			1.5"	2.0"	3.0"																					
		°C/W	°C/W	°C/W																							
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	Polyester	4.7	3.4	2.2																							
both	None	2.8	2.0	1.3																							
	Polyester	3.0	2.2	1.4																							
ESL	≤30 nH measured 1/4" from case at 1 MHz																										
Weight	Case EK 43 g typical Case EA 76 g typical Case EB 92 g typical																										
Terminals	18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max																										
Case Material	Stainless Steel																										
Ripple Current Capability	The ripple current capability is set by the maximum permissible internal core temperature, 125 °C.																										
Air Cooled	The ripple currents in the ratings tables are for 85 °C case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.																										
Heatsink Cooled	<p>Temperature rise from the internal hottest spot, the core, to ambient air is</p> $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca})$ <p>where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the MLS attached to a heatsink use the maximum core temperature and the values for θ_{cc}.</p>																										
Example	As an illustration, suppose you operate an insulated MLS332M060EB1C in 65 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the MLS and the heatsink, and the total thermal resistance is 2.7 +1.8 or 4.5 °C/W. The power which would heat the core to 125 °C is (125 - 65)/4.5 or 13.3 W. For an ESR of 31 mΩ, 13.3 W equates to a ripple current of 20.7 A, however, the wire leads are rated for only 20 A.																										

Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Available with High Vibration and High Reliability Options

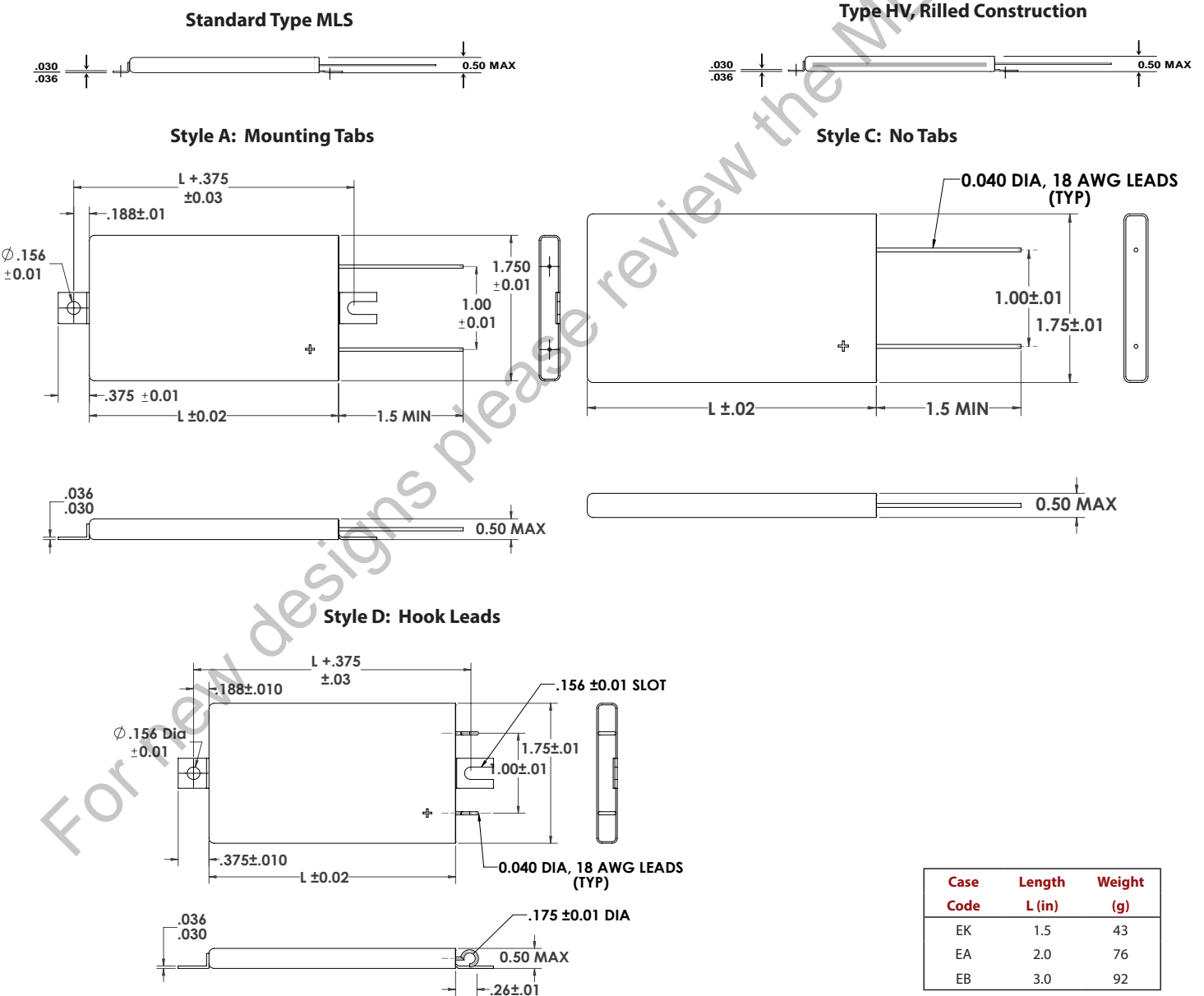
Part Numbering System

HV	HR	MLS	821	M	200	EB	0	A
Optional High Vibration	Optional High Reliability	Type MLS	Capacitance 821=820 µF 102 = 1000 µF	Tolerance M=±20%	Rated Voltage Vdc	Case Code EK, L=1.5 in. EA, L=2.0 in. EB, L=3.0 in. * other sizes available	Insulation 0 = bare can 1 = polyester	Mounting Style A = mounting tabs C = two leads/no tabs D = hook leads/tabs * other mounting tab options available

Examples:
 Standard MLS: MLS821M200EB0C
 High Reliability: HRMLS821M200EB0C
 High Vibration: HVMLS821M200EB0C
 High Reliability, High Vibration: HVHRMLS821M200EB0C

Outline Drawings

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.



Mounting tabs are welded to the case.

Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

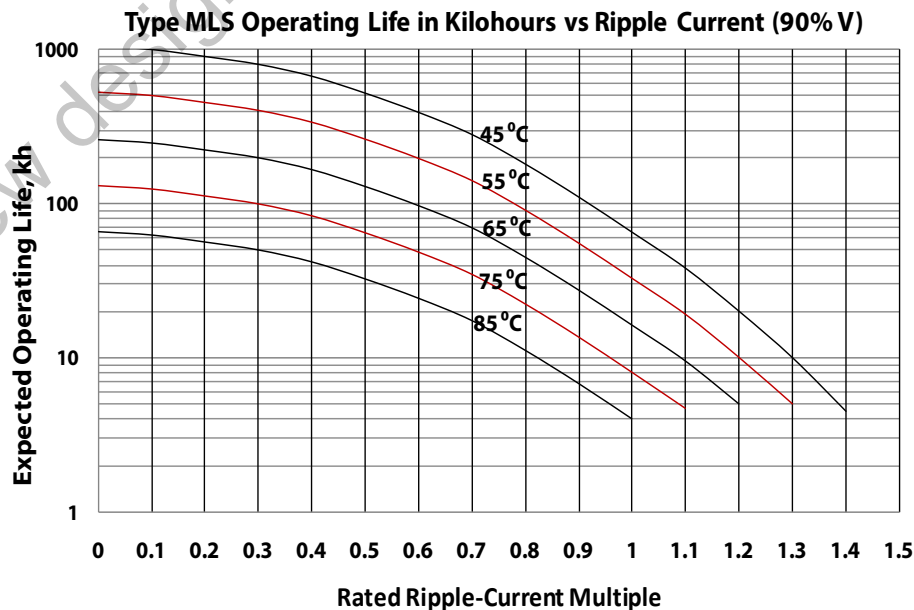
Available with High Vibration and High Reliability Options

Ratings

Cap (μ F)	Catalog Part Number	ESR max 25 °C (m Ω)		Ripple (A) Case @ 85°C		Length (inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
125 °C: 5 Vdc, 105 °C: 7.5 Vdc, 25 °C Surge: 10 Vdc						
19,000	MLS193M5R0EK0C	76	66	11.6	12.5	1.5
28,000	MLS283M5R0EA0C	50	44	14.3	15.4	2.0
47,000	MLS473M5R0EB0C	30	26	18.5	19.9	3.0
125 °C: 7.5 Vdc, 105 °C: 10 V, 25 °C Surge: 13 Vdc						
17,000	MLS173M7R5EK0C	77	67	11.5	12.4	1.5
26,000	MLS263M7R5EA0C	51	45	14.1	15.1	2.0
43,000	MLS433M7R5EB0C	31	27	18.2	19.5	3.0
125 °C: 10 Vdc, 105 °C: 16 V, 25 °C Surge: 20 Vdc						
13,000	MLS133M010EK0C	81	69	11.3	12.2	1.5
23,000	MLS233M010EA0C	51	45	14.0	15.0	2.0
38,000	MLS383M010EB0C	31	27	18.2	19.5	3.0
125 °C: 20 Vdc, 105 °C: 30 V, 25 °C Surge: 40 Vdc]						
6,800	MLS682M020EK0C	84	69	11.0	12.2	1.5
10,000	MLS103M020EA0C	56	46	13.6	15.0	2.0
17,000	MLS173M020EB0C	33	27	17.6	19.5	3.0
125 °C: 40 Vdc, 105 °C: 50 V, 25 °C Surge: 63 Vdc						
4,400	MLS442M040EK0C	97	70	10.3	12.1	1.5
6,600	MLS662M040EA0C	62	46	12.9	15.0	2.0
11,000	MLS113M040EB0C	36	27	16.9	19.5	3.0
125 °C: 60 Vdc, 105 °C: 80 V, 25 °C Surge: 100 Vdc						
1,500	MLS152M060EK0C	106	77	9.8	11.5	1.5

Cap (μ F)	Catalog Part Number	ESR max 25 °C (m Ω)		Ripple (A) Case @ 85°C		Length (inches)
		120 Hz	20 kHz	120 Hz	20 kHz	
2,100	MLS212M060EA0C	72	52	11.9	14.1	2.0
3,300	MLS332M060EB0C	44	31	15.3	18.2	3.0
125 °C: 75 Vdc, 105 °C: 100 V, 25 °C Surge: 125 Vdc						
1,100	MLS112M075EK0C	112	78	9.6	11.5	1.5
1,600	MLS162M075EA0C	76	54	11.6	13.8	2.0
2,700	MLS272M075EB0C	46	33	14.9	17.6	3.0
125 °C: 100 Vdc, 105 °C: 150 V, 25 °C Surge: 180 Vdc						
500	MLS501M100EK0C	355	248	5.4	6.4	1.5
770	MLS771M100EA0C	238	166	6.6	7.8	2.0
1,300	MLS132M100EB0C	143	100	8.5	10.1	3.0
125 °C: 150 Vdc, 105 °C: 200 V, 25 °C Surge: 250 Vdc						
400	MLS401M150EK0C	388	253	5.1	6.4	1.5
600	MLS601M150EA0C	261	168	6.3	7.8	2.0
1,000	MLS102M150EB0C	158	100	8.1	10.1	3.0
125 °C: 200 Vdc, 105 °C: 250 Vdc, 25 °C Surge: 300 Vdc						
330	MLS331M200EK0C	426	258	4.9	6.2	1.5
490	MLS491M200EA0C	285	172	6.0	7.7	2.0
820	MLS821M200EB0C	172	103	7.7	10.0	3.0
125 °C: 250 Vdc, 105 °C: 250 Vdc, 25 °C Surge: 300 Vdc						
220	MLS221M250EK0C	597	393	4.1	5.1	1.5
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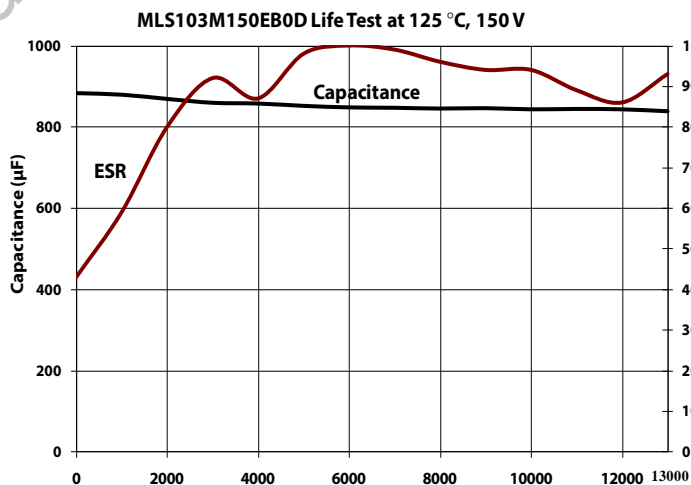
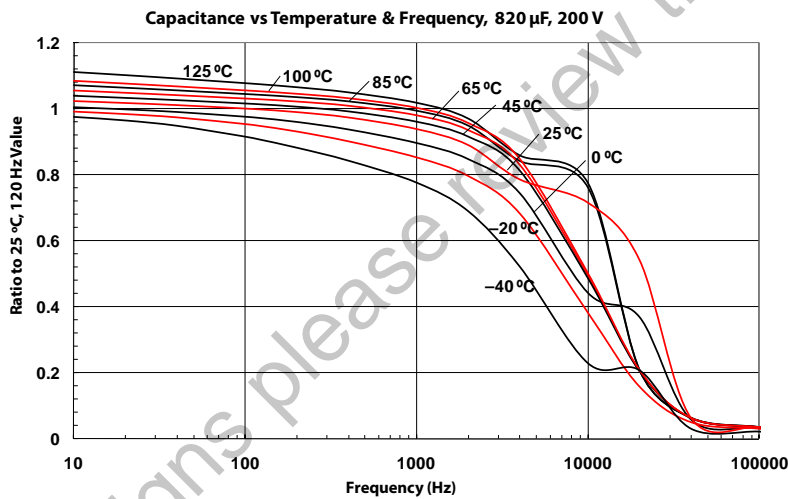
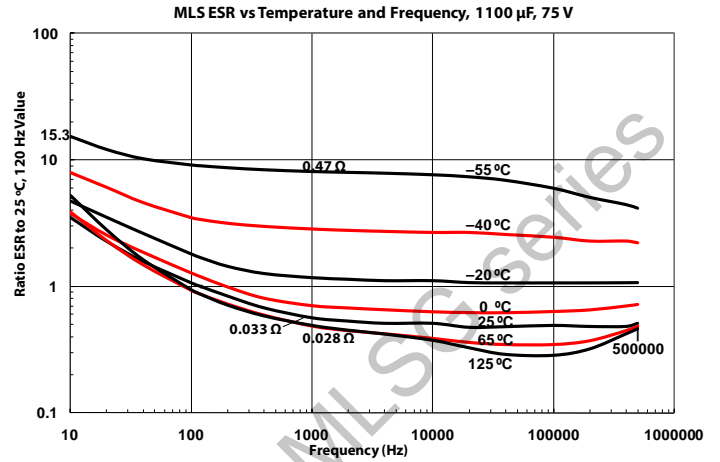
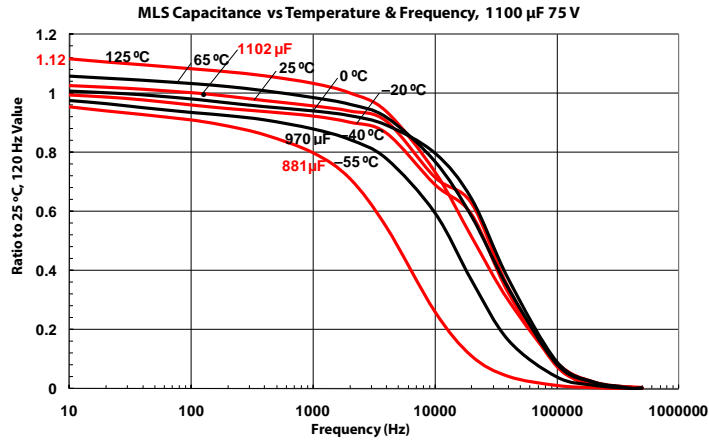
Typical Performance Curves



Type MLS 125 °C Flatpack, Ultra Long Life, Aluminum Electrolytic

Available with High Vibration and High Reliability Options

Typical Performance Curves



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For new designs please refer to the datasheet

Type MLSG – Flatpack, 5000 hr@125 °C, Aluminum Electrolytic

Available with High Vibration and High Reliability Options



With over 5000 hrs of DC life at rated voltage, 125°C, type MLSG is our longest life steel-cased Flatpack capacitor. For systems requiring the highest life expectancy, type MLSG is the best choice. Enhance the reliability of your system even further by specifying type HRMLSG for a MIL-level burn-in. This series is also available in a high vibration package up to 50g's by specifying type HVMLSG.

Highlights

- Longest Life
- Stainless-steel case
- Withstands more than 80,000 feet altitude
- Type HV up to 50g
- Type HR, High Reliability

Specifications

Temperature Range	-55 °C to +125 °C																																																												
Rated Voltage Range	20 Vdc to 250 Vdc																																																												
Capacitance Range	220 µF to 17,000 µF																																																												
Capacitance Tolerance	±20%																																																												
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 mins.																																																												
Ripple Current Multipliers	<p>Case Temperature</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> <th>95 °C</th> <th>105 °C</th> <th>115 °C</th> <th>125 °C</th> </tr> </thead> <tbody> <tr> <td>1.41</td> <td>1.32</td> <td>1.22</td> <td>1.12</td> <td>1.00</td> <td>0.87</td> <td>0.71</td> <td>0.50</td> <td>0.00</td> </tr> </tbody> </table> <p>Ambient Temperature, No Heatsink</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> <th>95 °C</th> <th>105 °C</th> <th>115 °C</th> <th>125 °C</th> </tr> </thead> <tbody> <tr> <td>0.63</td> <td>0.58</td> <td>0.54</td> <td>0.49</td> <td>0.44</td> <td>0.38</td> <td>0.31</td> <td>0.22</td> <td>0.00</td> </tr> </tbody> </table> <p>Frequency</p> <table border="1"> <thead> <tr> <th></th> <th>50 Hz</th> <th>60 Hz</th> <th>120 Hz</th> <th>360 Hz</th> <th>1 kHz</th> <th>5 kHz</th> <th>10 kHz & up</th> </tr> </thead> <tbody> <tr> <th>5 to 40 V</th> <td>0.95</td> <td>0.96</td> <td>1.00</td> <td>1.03</td> <td>1.04</td> <td>1.04</td> <td>1.04</td> </tr> <tr> <th>60 to 250 V</th> <td>0.80</td> <td>0.84</td> <td>1.00</td> <td>1.18</td> <td>1.25</td> <td>1.30</td> <td>1.30</td> </tr> </tbody> </table>	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C	1.41	1.32	1.22	1.12	1.00	0.87	0.71	0.50	0.00	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C	0.63	0.58	0.54	0.49	0.44	0.38	0.31	0.22	0.00		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	5 to 40 V	0.95	0.96	1.00	1.03	1.04	1.04	1.04	60 to 250 V	0.80	0.84	1.00	1.18	1.25	1.30	1.30
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Vibration	<p>MIL-STD-202, Meth. 204, Sine Swept, IEC 60068-2-6</p> <p>Standard MLSG Flatpack: 10g</p> <p>Type HVMLSG Flatpack 1.5" and 2.0" case length, 50g</p> <p>Type HVMLSG Flatpack 2.5" and 3.0" case length, 30g</p>																																																												

Vibration
Mounting: Vibration capability is dependent upon mounting restraint. The optional welded mounting tabs, alone, are not capable of sustaining the high vibration levels. To achieve the high vibration levels as published on right, additional mounting restraint is required.

Type MLSG – Flatpack, 5000 hr@125 °C, Aluminum Electrolytic

Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above (XXg peak), whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>																										
High Reliability Test/Burn-in	<p>Established Reliability capacitors shall be subjected to a minimum of 100 percent of the dc rated voltage at 85 °C for 48 hours minimum but not to exceed 96 hours. During this test, capacitors shall be adequately protected against temporary voltage surges of 10 percent or more of the test voltage. After burn-in, the capacitors shall be returned to room ambient conditions and the dc leakage, capacitance, and ESR shall be measured with respect to specified limits.</p>																										
Thermal Resistance	<table border="1" data-bbox="773 951 1511 1192"> <thead> <tr> <th rowspan="2">Large Sides Heatsinked</th> <th rowspan="2">Case Length Insulation</th> <th>1.5"</th> <th>2.0"</th> <th>3.0"</th> </tr> <tr> <th>°C/W</th> <th>°C/W</th> <th>°C/W</th> </tr> </thead> <tbody> <tr> <td rowspan="2">one</td> <td>None</td> <td>4.3</td> <td>3.1</td> <td>2.0</td> </tr> <tr> <td>Polyester</td> <td>4.7</td> <td>3.4</td> <td>2.2</td> </tr> <tr> <td rowspan="2">both</td> <td>None</td> <td>2.8</td> <td>2.0</td> <td>1.3</td> </tr> <tr> <td>Polyester</td> <td>3.0</td> <td>2.2</td> <td>1.4</td> </tr> </tbody> </table>	Large Sides Heatsinked	Case Length Insulation	1.5"	2.0"	3.0"	°C/W	°C/W	°C/W	one	None	4.3	3.1	2.0	Polyester	4.7	3.4	2.2	both	None	2.8	2.0	1.3	Polyester	3.0	2.2	1.4
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ESL																											
Weight	<p>Case EK 48g typical Case EA 63g typical Case EH 78g typical Case EB 93g typical</p>																										
Terminals	18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max																										
Case Material	Stainless Steel																										
Ripple Current Capability	The ripple current capability is set by the maximum permissible internal core temperature, 125 °C.																										
Air Cooled	The ripple currents in the ratings tables are for 85 °C case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.																										
Heatsink Cooled	<p>Temperature rise from the internal hottest spot, the core, to ambient air is</p> $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca}), \text{ recommended max } \Delta T \text{ of } 30 \text{ }^\circ\text{C}$ <p>where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the MLS attached to a heatsink use the maximum core temperature and the values for θ_{cc}.</p>																										
Example	<p>As an illustration, suppose you operate an insulated MLSG332M060EB1C in 65 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the MLS and the heatsink, and the total thermal resistance is 2.7 + 2.2 or 4.9 °C/W. The power which would heat the core to 125 °C is (125 - 65)/4.9 or 12.24 W. For an ESR of 31 mΩ, 12.24 W equates to a ripple current of 19.87 A.</p>																										

Type MLSG – Flatpack, 5000 hr@125 °C, Aluminum Electrolytic

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Part Numbering System

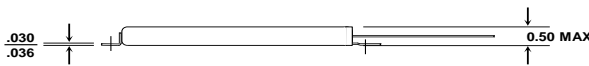
HV	HR	MLSG	821	M	200	EB	0	A
Optional High Vibration	Optional High Reliability	Type MLSG	Capacitance 821=820 μ F 102 = 1000 μ F	Tolerance M= \pm 20%	Rated Voltage Vdc	Case Code EK, L=1.5 in. EA, L=2.0 in. EH, L=2.5 in. EB, L=3.0 in. * other sizes available	Insulation 0 = bare can 1 = polyester	Mounting Style A = mounting tabs C = two leads/no tabs D = hook leads/tabs * other mounting tab options available

Examples:
 Standard MLSG: MLSG821M200EB0C
 High Reliability: HRMLSG821M200EB0C
 High Vibration: HVMLSG821M200EB0C
 High Reliability, High Vibration: HVHRMLSG821M200EB0C

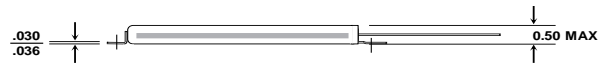
Outline Drawings

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.

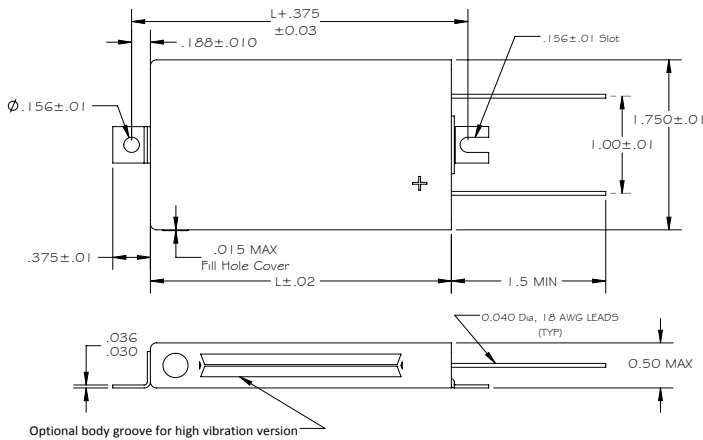
Standard Type MLSG



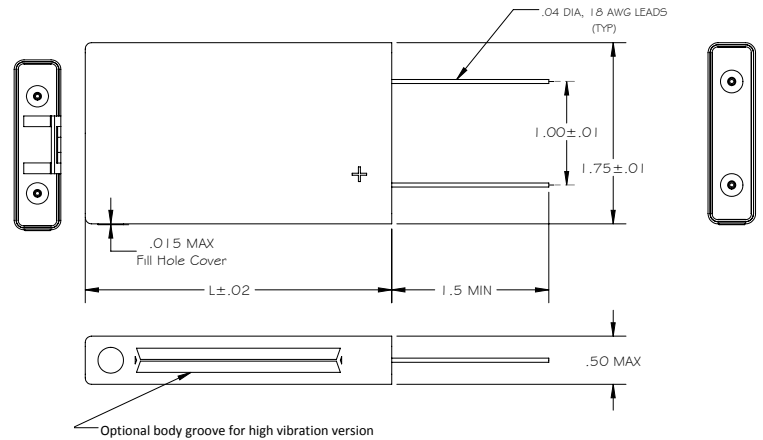
Type HV, Rilled Construction



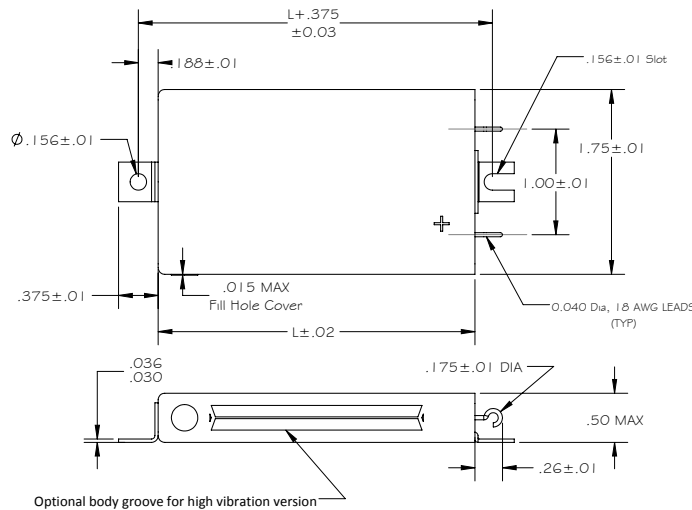
Style A: Mounting Tabs



Style C: No Tabs



Style D: Hook Leads



Mounting tabs are welded to the case.

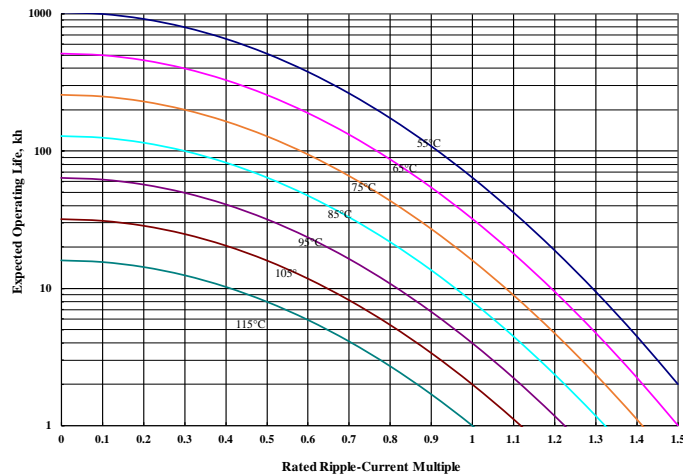
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Ratings

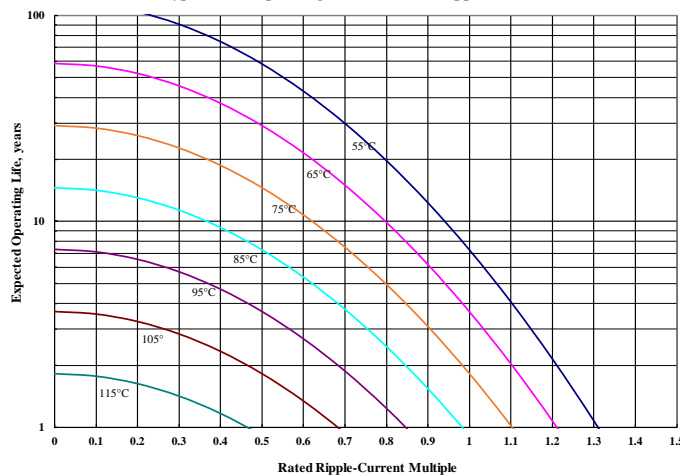
Voltage	Cap (μF)	Catalog Part Number	ESR max		Ripple (A)		Length (inches)
			25 °C (mΩ)	20 kHz	Case @ 85°C	20 kHz	
20 Vdc @ 125 °C 24 Vdc @ 105 °C 30 Vdc Surge @ 25 °C	6,800	MLSG682M020EK0C	84	69	11	12.2	1.5
	17,000	MLSG173M020EB0A	33	27	17.6	19.5	3.0
40 Vdc @ 125 °C 48 Vdc @ 105 °C 60 Vdc Surge @ 25 °C	4,400	MLSG442M040EK0C	97	70	10.3	12.1	1.5
	6,300	MLSG632M040EA0A	62	46	12.9	15	2.0
	10,000	MLSG103M040EB0C	36	27	16.9	19.5	3.0
60 Vdc @ 125 °C 65 Vdc @ 105 °C 90 Vdc Surge @ 25 °C	1,500	MLSG152M060EK0A	106	77	9.8	11.5	1.5
	2,100	MLSG212M060EA0A	72	52	11.9	14.1	2.0
	3,300	MLSG332M060EB0C	44	31	15.3	18.2	3.0
100 Vdc @ 125 °C 120 Vdc @ 105 °C 150 Vdc Surge @ 25 °C	500	MLSG501M100EK0A	355	248	5.4	6.4	1.5
	770	MLSG771M100EA0C	238	166	6.6	7.8	2.0
	1,300	MLSG132M100EB0D	143	100	8.5	10.1	3.0
150 Vdc @ 125 °C 180 Vdc @ 105 °C 225 Vdc Surge @ 25 °C	360	MLSG361M150EK1A	388	253	5.1	6.4	1.5
	540	MLSG541M150EA1A	261	168	6.3	7.8	2.0
	900	MLSG901M150EB0C	158	100	8.1	10.1	3.0
200 Vdc @ 125 °C 250 Vdc @ 105 °C 300 Vdc Surge @ 25 °C	280	MLSG281M200EK1A	426	258	4.9	6.2	1.5
	400	MLSG401M200EA0A	285	172	6	7.7	2.0
	720	MLSG721M200EB0C	172	103	7.7	10	3.0
250 Vdc @ 125 °C 275 Vdc @ 105 °C 300 Vdc Surge @ 25 °C	220	MLSG221M250EK0C	597	393	4.1	5.1	1.5
	560	MLSG561M250EB0C	240	157	6.5	8.1	3.0

Typical Performance Curves

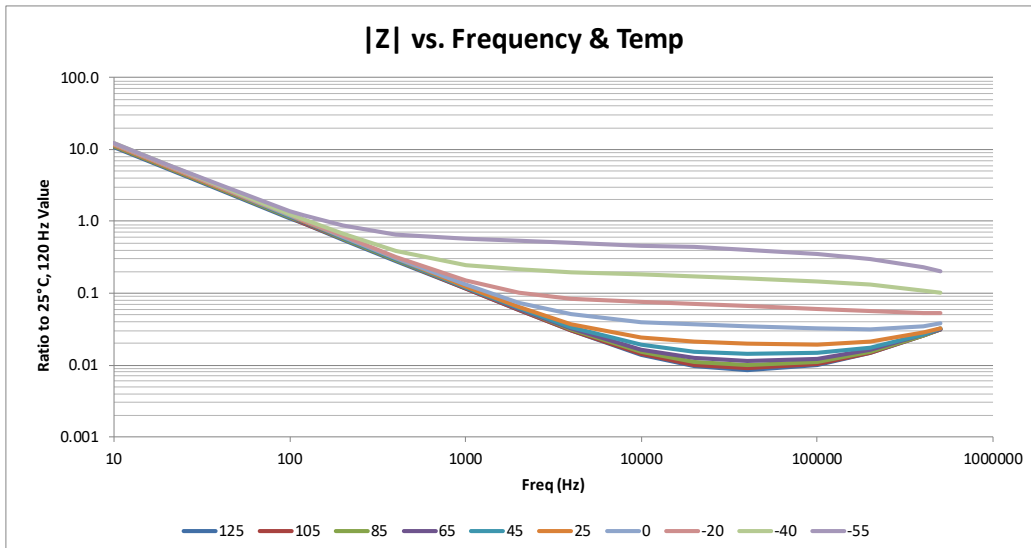
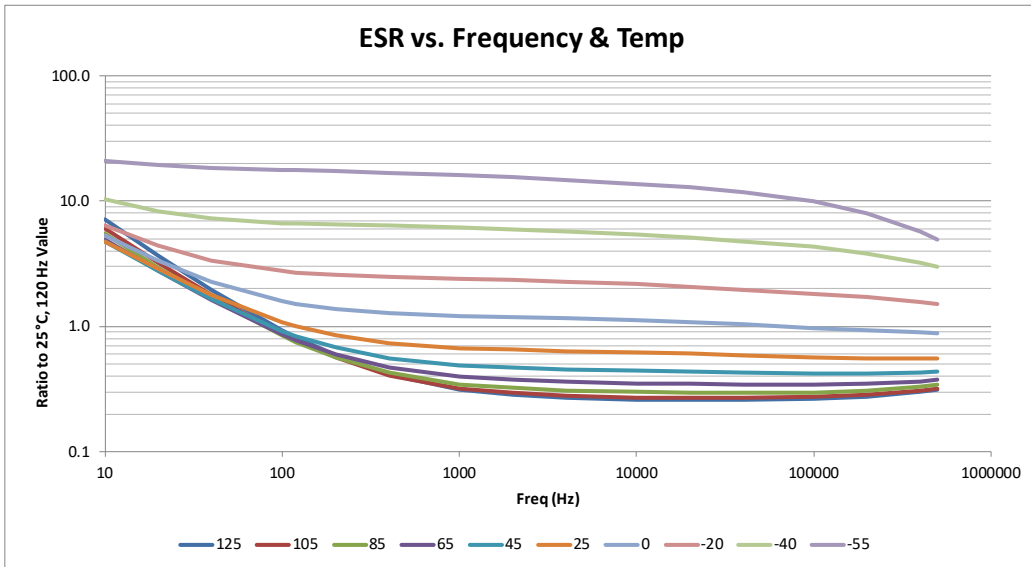
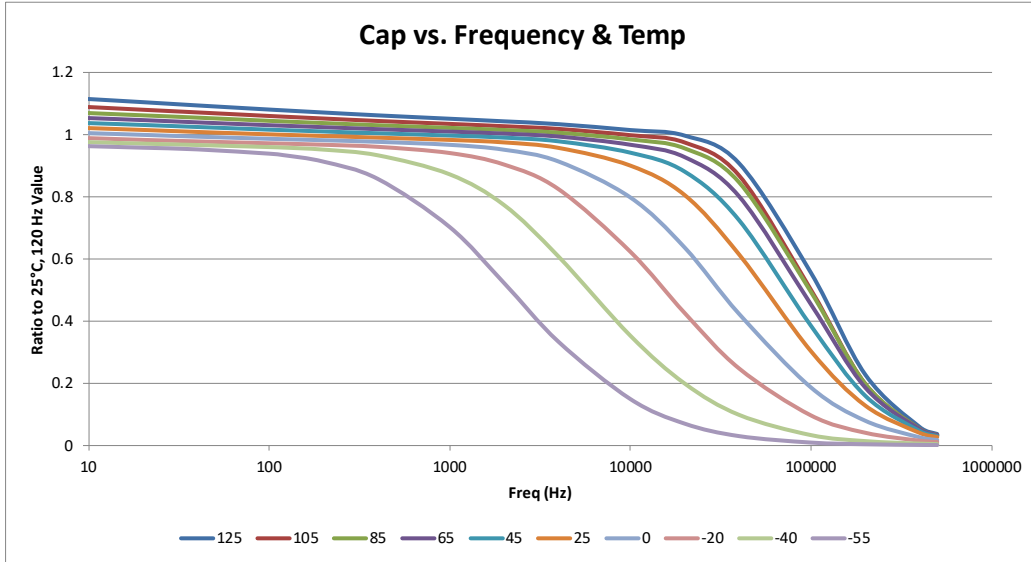
Type MLSG Operating Life in Kilohours vs Ripple Current



Type MLSG Operating Life in Years vs Ripple Current



Typical Performance Curves



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Type MLSG – Slimpack, 5000 hr@125 °C, Aluminum Electrolytic



With a profile of 1.0" by 0.5" type MLSG Slimpack capacitors fit into the tightest of spaces and meets a DC test of 5000 hrs at rated voltage, 125 °C. MLSG Slimpack is a perfect fit for military and aerospace applications requiring a low profile, rugged design and long-life. Specify type HRMLSG for high reliability burn-in.

Highlights

- 5000 hrs @ rated voltage, 125 °C
- Stainless steel case
- Withstands more than 80,000 feet altitude
- 80 g vibration
- Type HR, high reliability burn-in

Specifications

Temperature Range	-55 °C to +125 °C																																																												
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Vibration <i>Mounting: Vibration capability is dependent upon mounting restraint.</i>	MIL-STD-202, Meth. 204, Sine Swept. IEC 60068-2-6 JK Case = 80g All Others = 50g																																																												

Type MLSG – Slimpack, 5000 hr@125 °C, Aluminum Electrolytic

Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above (XXg peak), whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>																																	
High Reliability Test/Burn-in	<p>Established Reliability capacitors shall be subjected to a minimum of 100 percent of the dc rated voltage at 85 °C for 48 hours minimum but not to exceed 96 hours. During this test, capacitors shall be adequately protected against temporary voltage surges of 10 percent or more of the test voltage. After burn-in, the capacitors shall be returned to room ambient conditions and the dc leakage, capacitance, and ESR shall be measured with respect to specified limits.</p>																																	
Thermal Resistance	<table border="1" data-bbox="773 953 1490 1192"> <thead> <tr> <th rowspan="2">Large Sides Heatsinked</th> <th rowspan="2">Case Length</th> <th>1.5"</th> <th>2.0"</th> <th>2.5"</th> <th>3.0"</th> </tr> <tr> <th>Insulation</th> <th>°C/W</th> <th>°C/W</th> <th>°C/W</th> <th>°C/W</th> </tr> </thead> <tbody> <tr> <td rowspan="2">one</td> <td>None</td> <td>6.6</td> <td>4.8</td> <td>3.8</td> <td>3.1</td> </tr> <tr> <td>Polyester</td> <td>7.2</td> <td>5.3</td> <td>4.2</td> <td>3.4</td> </tr> <tr> <td rowspan="2">both</td> <td>None</td> <td>4.4</td> <td>3.1</td> <td>2.4</td> <td>2</td> </tr> <tr> <td>Polyester</td> <td>4.7</td> <td>3.3</td> <td>2.6</td> <td>2.2</td> </tr> </tbody> </table>	Large Sides Heatsinked	Case Length	1.5"	2.0"	2.5"	3.0"	Insulation	°C/W	°C/W	°C/W	°C/W	one	None	6.6	4.8	3.8	3.1	Polyester	7.2	5.3	4.2	3.4	both	None	4.4	3.1	2.4	2	Polyester	4.7	3.3	2.6	2.2
Large Sides Heatsinked	Case Length			1.5"	2.0"	2.5"	3.0"																											
		Insulation	°C/W	°C/W	°C/W	°C/W																												
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	Polyester	7.2	5.3	4.2	3.4																													
both	None	4.4	3.1	2.4	2																													
	Polyester	4.7	3.3	2.6	2.2																													
ESL																																		
Typical Weight	<p>Case JK = 30 Case JA = 39 Case JH = 48 Case JB = 57</p>																																	
Terminals	<p>18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max</p>																																	
Case Material	<p>Stainless Steel</p>																																	
Ripple Current Capability	<p>The ripple current capability is set by the maximum permissible internal core temperature, 125 °C.</p>																																	
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Heatsink Cooled	<p>Temperature rise from the internal hottest spot, the core, to ambient air is</p> $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca}), \text{ recommended max } \Delta T \text{ of } 30 \text{ } ^\circ\text{C}$ <p>where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the MLS attached to a heatsink use the maximum core temperature and the values for θ_{cc}.</p>																																	
Example	<p>As an illustration, suppose you operate an insulated MLSG262M060JB0C in 95 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the MLS and the heatsink, and the total thermal resistance is 2.7 +3. 4 or 6.1° C/W. The power which would heat the core to 125 °C is (125 - 95)/6. 1 or 4.9 W. For an ESR of 47 mΩ, 4.9 W equates to a ripple current of 10.2 A.</p>																																	

Type MLSG – Slimpack, 5000 hr@125 °C, Aluminum Electrolytic

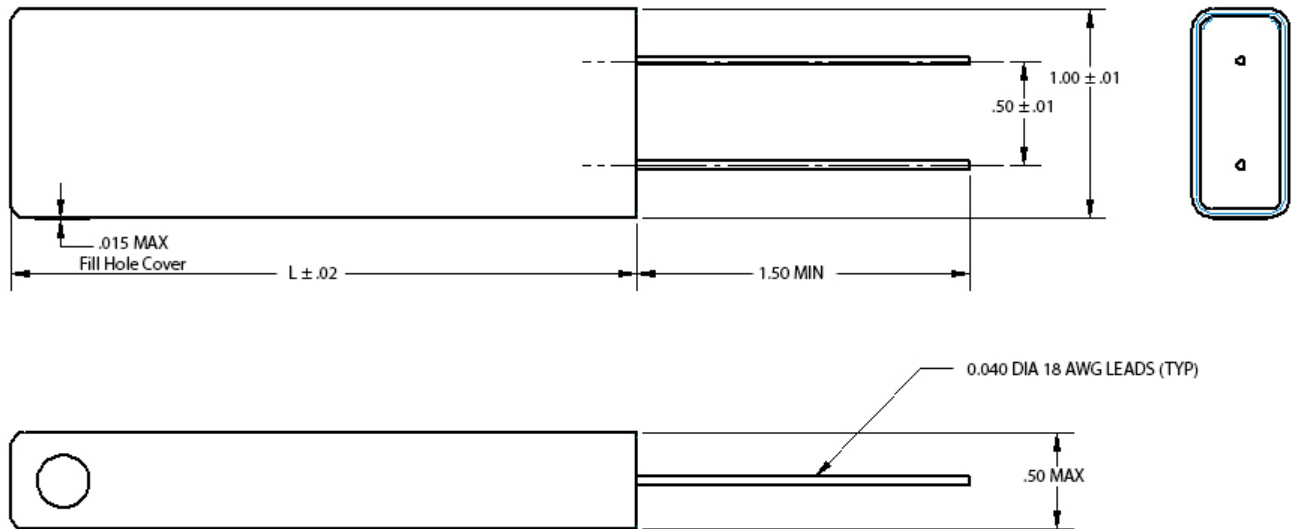
Part Numbering System

HR	MLSG	821	M	200	JB	0	A
Optional High Reliability	Type MLSG	Capacitance 191 = 190 μ F 102 = 1000 μ F	Tolerance M = $\pm 20\%$	Rated Voltage 005 = 5 Vdc 7R5 = 7.5 Vdc 200 = 200 Vdc	Case Code JK, L=1.5 in. JA, L=2.0 in. JH, L=2.5 in. JB, L=3.0 in. * other sizes available	Insulation 0 = bare can 1 = polyester	Mounting Style C = two leads

Examples:
 Standard MLSG: MLSG191M200JK0C
 High Reliability: HRMLSG191M200JK0C

Outline Drawing

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.



Type MLSG – Slimpack, 5000 hr@125 °C, Aluminum Electrolytic

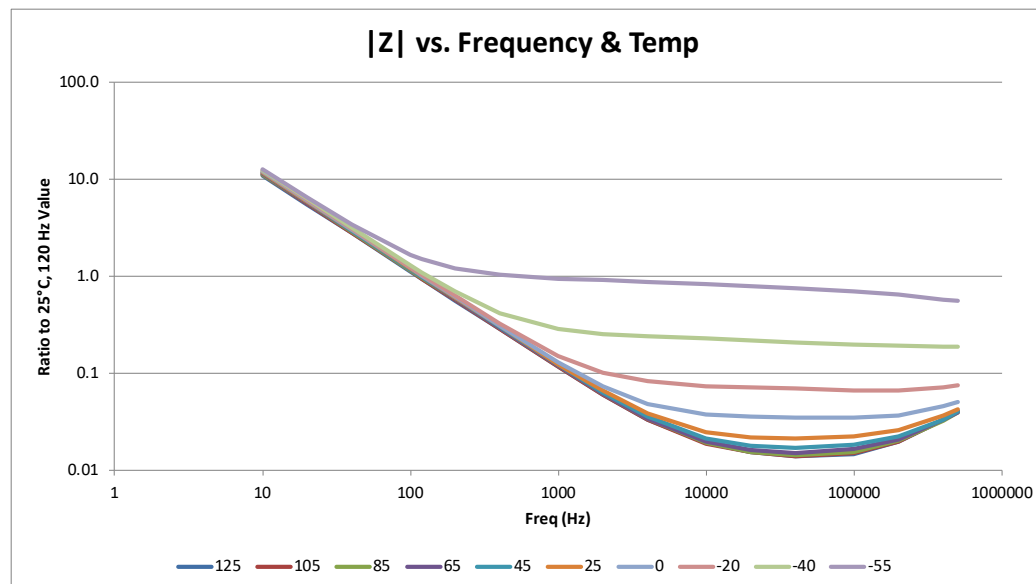
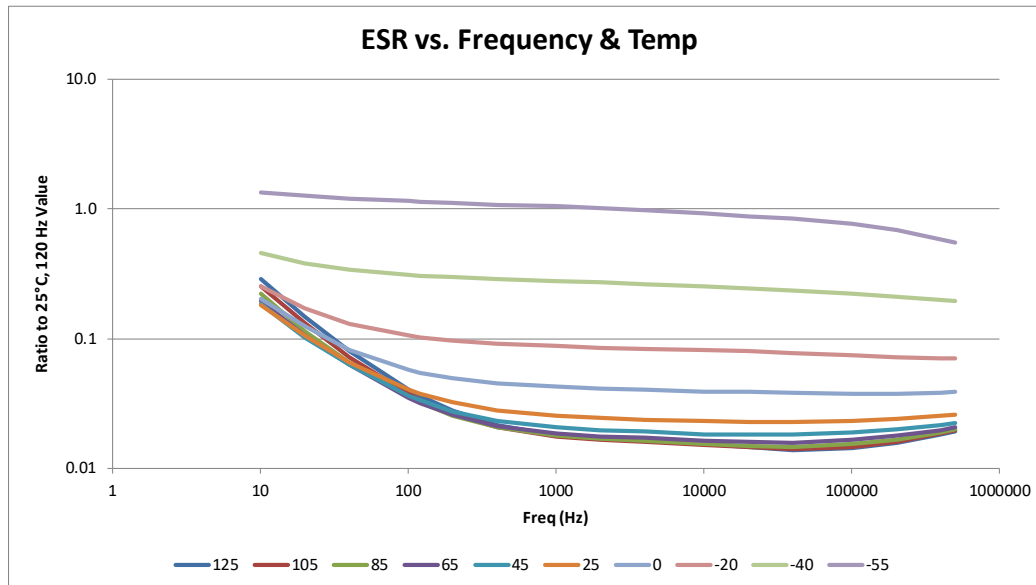
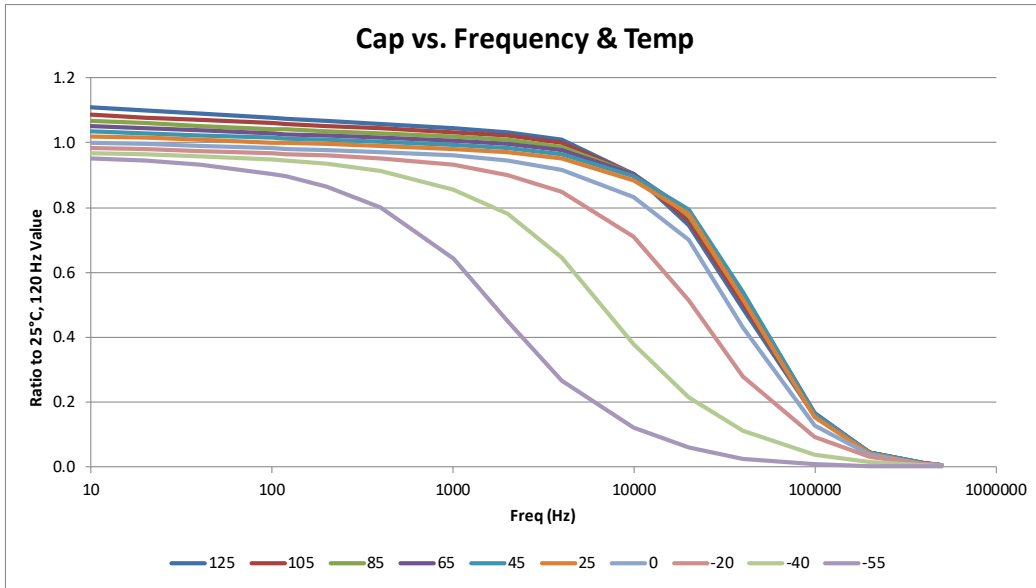
Ratings

	Cap	Part Number	Ω 120 Hz 25 °C Cat. ESR	Ω 10 KHz 25 °C Cat. ESR	Ripple (A) Case @ 85°C 120Hz	Ripple (A) Case @ 85°C 10kHz	Surge 25 °C Vdc	Case Length	105 °C Vdc
10 Vdc @ 125 °C 12 Vdc @ 105 °C 15 Vdc Surge @ 25 °C	9500	MLSG952M010JK0C	0.096	0.091	6.9	7.1	15	1.5	12
	14000	MLSG143M010JA0C	0.068	0.064	9.8	10	15	2	12
	19000	MLSG193M010JH0C	0.053	0.050	12.6	12.9	15	2.5	12
	24000	MLSG243M010JB0C	0.042	0.040	15.4	15.8	15	3	12
20 Vdc @ 125 °C 24 Vdc @ 105 °C 30 Vdc Surge @ 25 °C	4600	MLSG462M020JK0C	0.102	0.097	6.6	6.8	30	1.5	24
	6800	MLSG682M020JA0C	0.072	0.068	9.4	9.7	30	2	24
	9300	MLSG932M020JH0C	0.054	0.052	12.3	12.6	30	2.5	24
	11000	MLSG113M020JB0C	0.042	0.040	15.2	15.6	30	3	24
30 Vdc @ 125 °C 36 Vdc @ 105 °C 45 Vdc Surge @ 25 °C	3300	MLSG332M030JK0C	0.103	0.098	6.6	6.8	45	1.5	36
	4900	MLSG492M030JA0C	0.072	0.069	9.5	9.7	45	2	36
	6700	MLSG672M030JH0C	0.055	0.053	12.3	12.6	45	2.5	36
	8500	MLSG852M030JB0C	0.043	0.041	14.9	15.3	45	3	36
40 Vdc @ 125 °C 48 Vdc @ 105 °C 60 Vdc Surge @ 25 °C	2300	MLSG232M040JK0C	0.105	0.100	6.6	6.8	60	1.5	48
	3400	MLSG342M040JA0C	0.072	0.068	9.5	9.7	60	2	48
	4600	MLSG462M040JH0C	0.056	0.053	12.3	12.6	60	2.5	48
	5900	MLSG592M040JB0C	0.045	0.043	14.9	15.3	60	3	48
50 Vdc @ 125 °C 60 Vdc @ 105 °C 75 Vdc Surge @ 25 °C	1600	MLSG162M050JK0C	0.108	0.101	6.6	6.8	75	1.5	60
	2500	MLSG252M050JA0C	0.073	0.700	9.5	9.7	75	2	60
	3400	MLSG342M050JH0C	0.056	0.053	12.3	12.6	75	2.5	60
	4300	MLSG432M050JB0C	0.046	0.043	14.9	15.3	75	3	60
60 Vdc @ 125 °C 60 Vdc @ 105 °C 90 Vdc Surge @ 25 °C	1000	MLSG102M060JK0C	0.109	0.103	6.5	6.6	90	1.5	72
	1500	MLSG152M060JA0C	0.074	0.071	9.3	9.6	90	2	72
	2100	MLSG212M060JH0C	0.057	0.054	12.1	12.4	90	2.5	72
	2600	MLSG262M060JB0C	0.047	0.044	14.7	15	90	3	72
75 Vdc @ 125 °C 90 Vdc @ 105 °C 112 Vdc Surge @ 25 °C	790	MLSG791M075JK0C	0.246	0.234	4.0	4.2	112.5	1.5	90
	1100	MLSG112M075JA0C	0.200	0.190	5.0	5.2	112.5	2	90
	1500	MLSG152M075JH0C	0.148	0.141	6.2	6.5	112.5	2.5	90
	2000	MLSG202M075JB0C	0.096	0.091	8.2	8.5	112.5	3	90
100 Vdc @ 125 °C 120 Vdc @ 105 °C 150 Vdc Surge @ 25 °C	400	MLSG401M100JK0C	0.960	0.768	2	2.4	150	1.5	120
	600	MLSG601M100JA0C	0.634	0.507	2.8	3.6	150	2	120
	800	MLSG801M100JH0C	0.484	0.387	3.6	4.6	150	2.5	120
	1000	MLSG102M100JB0C	0.387	0.310	4.4	5.7	150	3	120
150 Vdc @ 125 °C 180 Vdc @ 105 °C 225 Vdc Surge @ 25 °C	200	MLSG201M150JK0C	0.960	0.768	2	2.4	225	1.5	180
	300	MLSG301M150JA0C	0.634	0.507	2.8	3.6	225	2	180
	400	MLSG401M150JH0C	0.484	0.387	3.6	4.6	225	2.5	180
	500	MLSG501M150JB0C	0.387	0.310	4.4	5.7	225	3	180
200 Vdc @ 125 °C 250 Vdc @ 105 °C 300 Vdc Surge @ 25 °C	190	MLSG191M200JK0C	1.274	1.019	1.9	2.1	300	1.5	250
	280	MLSG281M200JA0C	0.845	0.676	2.8	3.1	300	2	250
	380	MLSG381M200JH0C	0.634	0.508	3.6	4.1	300	2.5	250
	490	MLSG491M200JB0C	0.507	0.406	4.4	5	300	3	250
250 Vdc @ 125 °C 275 Vdc @ 105 °C 350 Vdc Surge @ 25 °C	140	MLSG141M250JK0C	1.200	0.960	1.9	2.2	350	1.5	300
	220	MLSG221M250JA0C	0.792	0.634	2.9	3.2	350	2	300
	300	MLSG301M250JH0C	0.605	0.484	3.7	4.2	350	2.5	300
	380	MLSG381M250JB0C	0.484	0.387	4.5	5.1	350	3	300

Type MLSG – Slimpack, 5000 hr@125 °C, Aluminum Electrolytic

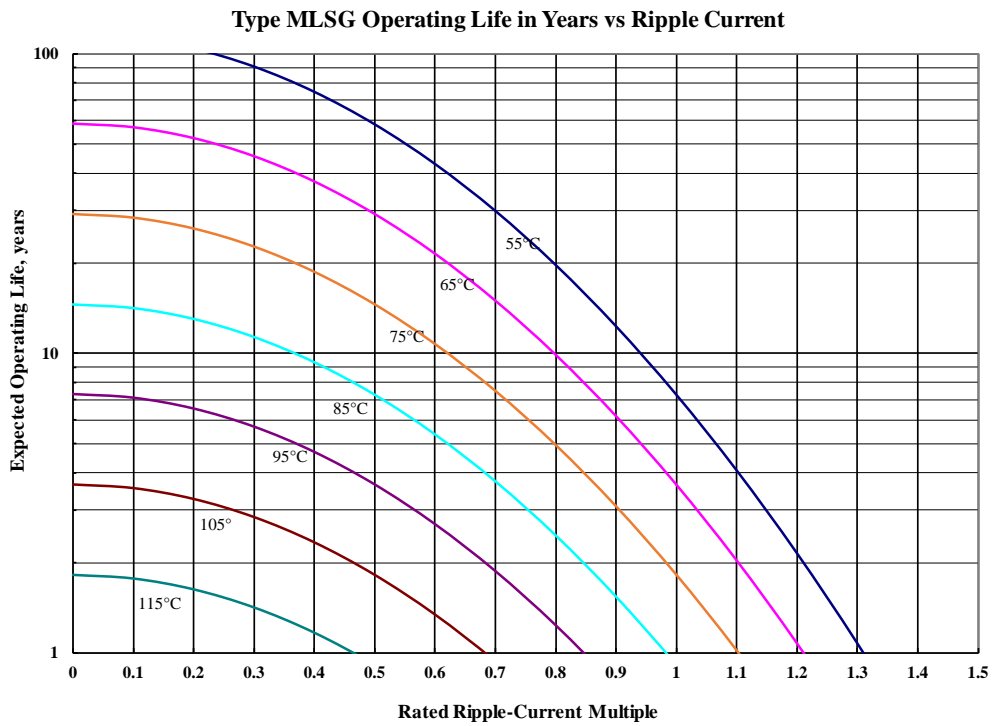
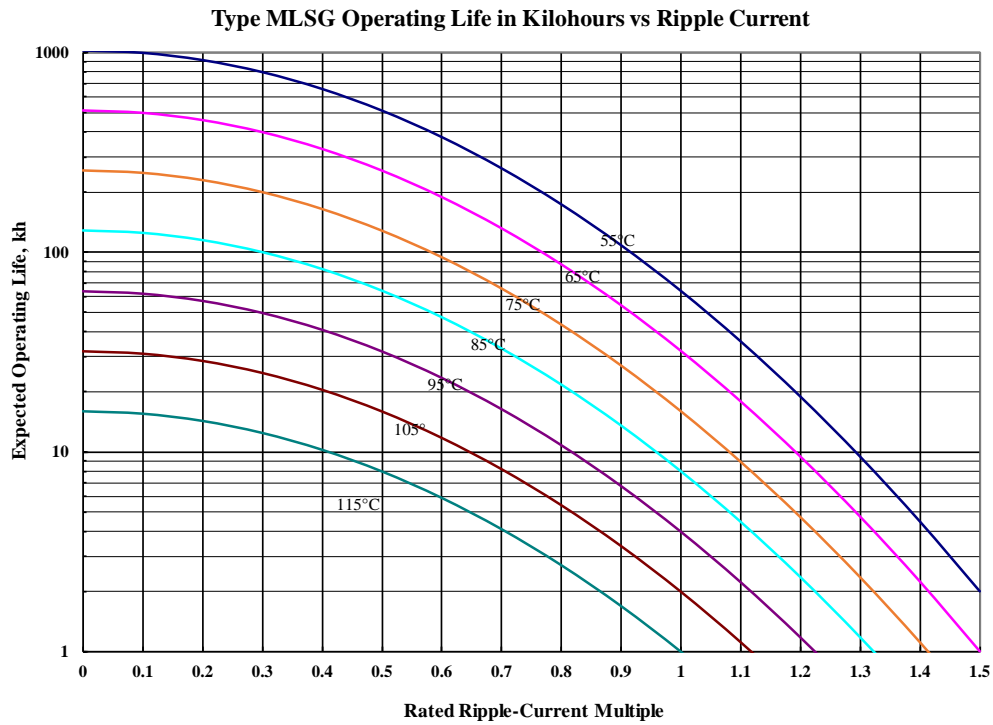
Typical Performance Curves

Part # MLSG122M060JKOC



Type MLSG – Slimpack, 5000 hr@125 °C, Aluminum Electrolytic

Typical Performance Curves



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Type MLSH 125 °C Hermetic Slimpack, Aluminum Electrolytic Capacitor



The world's only hermetically sealed aluminum electrolytic capacitor with glass-to-metal seal, type MLSH has extraordinary long life and rugged construction for the most demanding power electronics applications.

Type MLSH has superior capacitance retention compared to axial wet tantalum capacitors at -55 °C. Packaged in a robust stainless steel case capable of withstanding 80g's, it replaces 3 or more axial wet tantalum capacitors in parallel. Unlike wet tantalums that require voltage derating at temperatures above 85 °C, type MLSH capacitors are rated for full operating voltage at 125 °C and tested to 5000 hrs at rated voltage and temperature.

Highlights

- Hermetically sealed with no dry out
- Alternative to axial wet tantalum
- High capacitance retention @ -55 °C
- 5000 Hr DC life test
- Up to 80g vibration

Specifications

Temperature Range	-55 °C to +125 °C																																																												
Rated Voltage Range	30 Vdc to 250 Vdc																																																												
Capacitance Range	120 µF to 3200 µF																																																												
Capacitance Tolerance	±20%																																																												
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 mins.																																																												
Ripple Current Multipliers	<p>Case Temperature</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> <th>95 °C</th> <th>105 °C</th> <th>115 °C</th> <th>125 °C</th> </tr> </thead> <tbody> <tr> <td>1.41</td> <td>1.32</td> <td>1.22</td> <td>1.12</td> <td>1.00</td> <td>0.87</td> <td>0.71</td> <td>0.50</td> <td>0.00</td> </tr> </tbody> </table> <p>Ambient Temperature, No Heatsink</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> <th>95 °C</th> <th>105 °C</th> <th>115 °C</th> <th>125 °C</th> </tr> </thead> <tbody> <tr> <td>0.63</td> <td>0.58</td> <td>0.54</td> <td>0.49</td> <td>0.44</td> <td>0.38</td> <td>0.31</td> <td>0.22</td> <td>0.00</td> </tr> </tbody> </table> <p>Frequency</p> <table border="1"> <thead> <tr> <th></th> <th>50 Hz</th> <th>60 Hz</th> <th>120 Hz</th> <th>360 Hz</th> <th>1 kHz</th> <th>5 kHz</th> <th>10 kHz & up</th> </tr> </thead> <tbody> <tr> <th>5 to 40 V</th> <td>0.95</td> <td>0.96</td> <td>1.00</td> <td>1.03</td> <td>1.04</td> <td>1.04</td> <td>1.04</td> </tr> <tr> <th>60 to 250 V</th> <td>0.80</td> <td>0.84</td> <td>1.00</td> <td>1.18</td> <td>1.25</td> <td>1.30</td> <td>1.30</td> </tr> </tbody> </table>	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C	1.41	1.32	1.22	1.12	1.00	0.87	0.71	0.50	0.00	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C	0.63	0.58	0.54	0.49	0.44	0.38	0.31	0.22	0.00		50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	5 to 40 V	0.95	0.96	1.00	1.03	1.04	1.04	1.04	60 to 250 V	0.80	0.84	1.00	1.18	1.25	1.30	1.30
45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	115 °C	125 °C																																																					
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Low Temperature Characteristics	Impedance ratio: $Z_{-55°C} / Z_{+25°C}$ @ 120 Hz ≤10 (5 - 20 Vdc), ≤3 (25 - 250 Vdc)																																																												
DC Life Test	5000 h @ rated voltage at 125 °C Δ Capacitance ±20% (<50 Vdc) Δ Capacitance ±10% (>50 Vdc) ESR 200% of limit DCL 100% of limit																																																												
Shelf Life Test	5 years @ ≤40 °C, for HRMLSH 10 years @ ≤40 °C Capacitance 100% of limit ESR 100% of limit DCL ≤ 0.004 CV µA 500 h @ 125 °C Capacitance 100% of limit ESR 100% of limit DCL ≤ 0.002 CV µA																																																												
Vibration <i>Mounting: Vibration capability is dependent upon mounting restraint.</i>	Standard MLSH Flatpack: 80g MIL-STD-202, Meth. 204, Condition H																																																												

Type MLSH 125 °C Hermetic Slimpack, Aluminum Electrolytic Capacitor

<p>Vibration Test</p>	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above, whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>															
<p>High Reliability Test/Burn-in</p>	<p>Established Reliability capacitors shall be subjected to a minimum of 100 percent of the DC rated voltage at 85 °C for 48 hours minimum but not to exceed 96 hours. During this test, capacitors shall be adequately protected against temporary voltage surges of 10 percent or more of the test voltage. After burn-in, the capacitors shall be returned to room ambient conditions and the DC leakage, capacitance, and ESR shall be measured with respect to specified limits.</p>															
<p>Thermal Resistance</p>	<table border="1" data-bbox="915 926 1286 1167"> <thead> <tr> <th rowspan="2">Large Sides Heatsinked</th> <th>Case Length</th> <th>1.5"</th> </tr> <tr> <th>Insulation</th> <th>°C/W</th> </tr> </thead> <tbody> <tr> <td rowspan="2">one</td> <td>None</td> <td>6.6</td> </tr> <tr> <td>Polyester</td> <td>7.2</td> </tr> <tr> <td rowspan="2">both</td> <td>None</td> <td>4.4</td> </tr> <tr> <td>Polyester</td> <td>4.7</td> </tr> </tbody> </table>	Large Sides Heatsinked	Case Length	1.5"	Insulation	°C/W	one	None	6.6	Polyester	7.2	both	None	4.4	Polyester	4.7
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<p>Typical Weight</p>	<p>Case JK - 32g</p>															
<p>Terminals</p>	<p>18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max</p>															
<p>Case Material</p>	<p>Stainless Steel</p>															
<p>Ripple Current Capability</p>	<p>The ripple current capability is set by the maximum permissible internal core temperature, 125 °C.</p>															
<p>Air Cooled</p>	<p>The ripple currents in the ratings tables are for 85 °C case temperatures. For air temperatures without a heatsink use the multipliers for Ambient Temperature, No Heatsink.</p>															
<p>Heatsink Cooled</p>	<p>Temperature rise from the hottest internal spot, the core, to ambient air is</p> $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca}), \text{ recommended max } \Delta T \text{ of } 30 \text{ }^\circ\text{C}$ <p>where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the MLSH attached to a heatsink use the maximum core temperature and the values for θ_{cc}.</p>															
<p>Example</p>	<p>As an illustration, suppose you operate a noninsulated MLSH172M050JK0C in 95 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the MLSH and the heatsink, and the total thermal resistance is 2.7 + 6.6 or 9.3° C/W. The power which would heat the core to 125 °C is (125 - 95)/9.3 or 3.2 W. For an ESR of 108 mΩ, 3.2 W equates to a ripple current of 5.45 A.</p>															

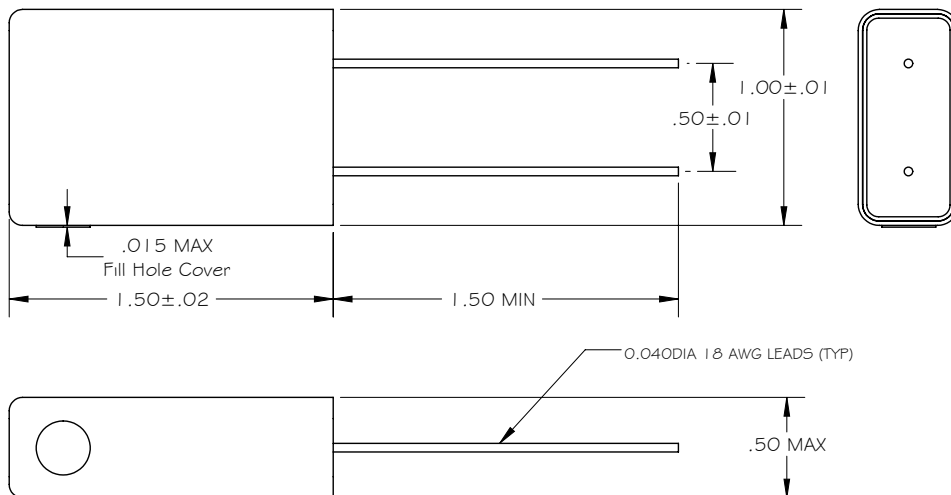
Type MLSH 125 °C Hermetic Slimpack, Aluminum Electrolytic Capacitor

Part Numbering System

MLSH	322	M	200	JK	0	A
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
MLSH	322 = 3200 μ F 222 = 2200 μ F 172 = 1700 μ F	M = \pm 20%	030 = 30 Vdc 075 = 75 Vdc 150 = 150 Vdc 200 = 200 Vdc	JK , L=1.5 in.	0 = bare can 1 = polyester	C = two leads/no tabs

Outline Drawing

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.



- Stainless steel case
- All dimensions are in inches
- Dimensions are for bare can, non-insulated

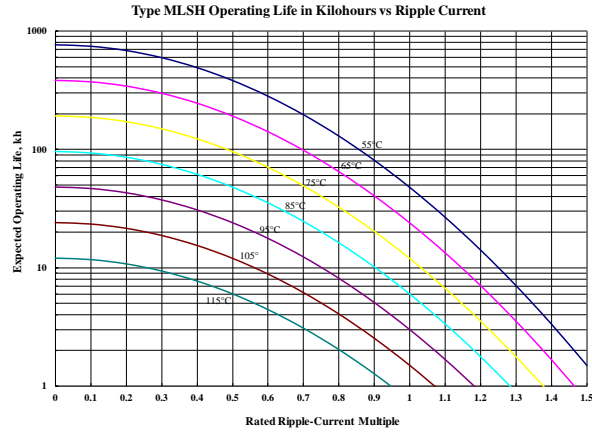
Type MLSH 125 °C Hermetic Slimpack, Aluminum Electrolytic Capacitor

Ratings

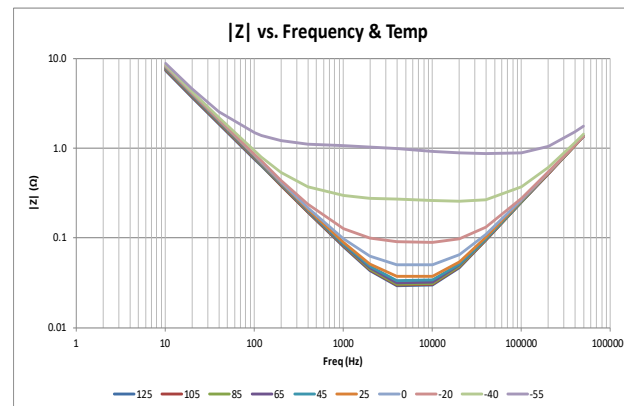
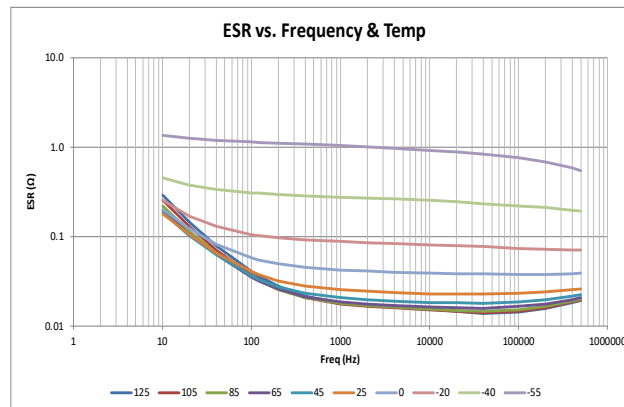
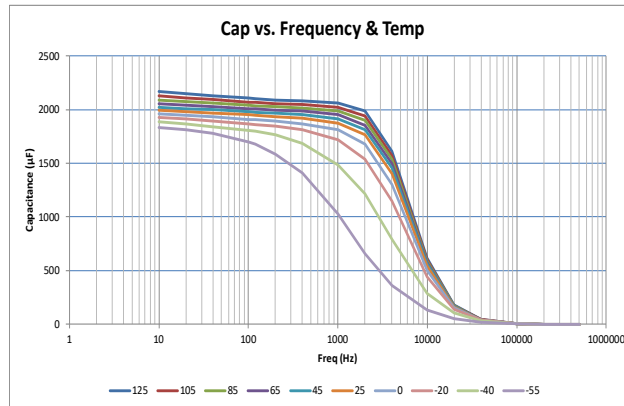
Voltage	Cap (μ F)	Catalog Part Number	Length	ESR max		Ripple (A)	
				25 °C (Ω)		Case @ 85°C	
				120 Hz	10 kHz	120 Hz	10 kHz
30 Vdc @ 125 °C 36 Vdc @ 105 °C 50 Vdc Surge @25 °C	3200	MLSH322M030JK0C	1.5	0.103	0.098	6.6	6.8
40 Vdc @ 125 °C 48 Vdc @ 105 °C 63 Vdc Surge @25 °C	2200	MLSH222M040JK0C	1.5	0.105	0.1	6.6	6.8
50 Vdc @ 125°C 60 Vdc @ 105°C 75 Vdc Surge @25°C	1700	MLSH172M050JK0C	1.5	0.108	0.101	6.6	6.8
60 Vdc @ 125°C 72 Vdc @ 105°C 90 Vdc Surge @25°C	1100	MLSH112M060JK0C	1.5	0.109	0.103	6.5	6.8
75 Vdc @ 125°C 90 Vdc @ 105°C 112 Vdc Surge @25°C	700	MLSH701M075JK0C	1.5	0.246	0.234	4.0	4.2
100 Vdc @ 125°C 120 Vdc @ 105°C 150 Vdc Surge @25°C	400	MLSH401M100JK0C	1.5	0.960	0.768	2.1	2.4
150 Vdc @ 125°C 180 Vdc @ 105°C 225 Vdc Surge @25°C	210	MLSH211M150JK0C	1.5	1.019	0.815	2.2	2.4
200 Vdc @ 125°C 250 Vdc @ 105°C 300 Vdc Surge @25°C	160	MLSH161M200JK0C	1.5	1.274	1.019	1.9	2.1
250 Vdc @ 125°C 275 Vdc @ 105°C 350 Vdc Surge @25°C	120	MLSH121M250JK0C	1.5	1.200	0.96	1.9	2.2

Type MLSH 125 °C Hermetic Slimpack, Aluminum Electrolytic Capacitor

Typical Performance Curves



MLSH222M640JK0C



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Type NHR – Slimpack™, 3000 hr@150 °C, Aluminum Electrolytic



Featuring high capacitance at high voltage and temperature, Type NHR-Slimpack™ offers considerable size and cost advantages over series-parallel banks of wet tantalum capacitors. Their applications in down-hole tools, military, and aerospace allow for solutions that use fewer components, lower weight, lower cost and improved reliability compared with banks of wet tantalum capacitors. Their rugged construction withstands vibration up to 80g.

Highlights

- Alternative to banks of wet tantalum capacitors
- No voltage derating required at 150 °C
- Rugged, stainless steel case
- Near hermetic seal, prevents dry-out
- Just 0.5" in height, by 1.0" wide (available in 4 lengths)
- High capacitance retention at low voltage, -55 °C

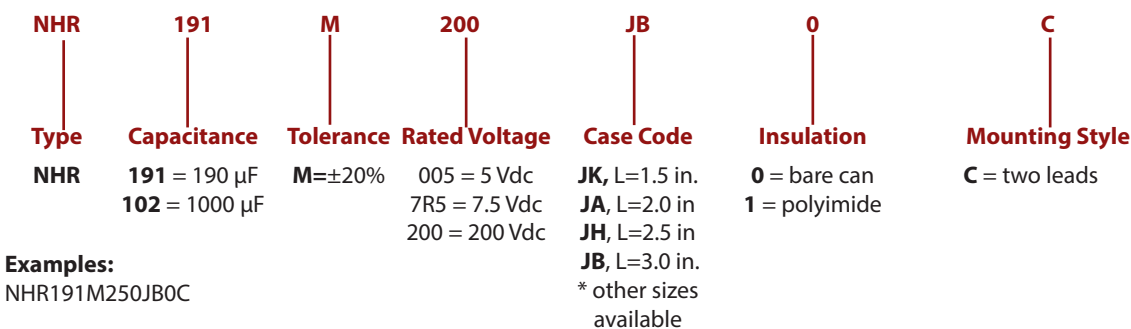
Specifications

Temperature Range	-55 °C to +150 °C																																																									
Rated Voltage Range	75 Vdc to 300 Vdc																																																									
Capacitance Range	60 µF to 960 µF																																																									
Capacitance Tolerance	20%																																																									
Leakage Current	≤ 0.006 CV µA, @ 25 °C and 5 mins.																																																									
Ripple Current Multipliers	<p>Case Temperature</p> <table border="1"> <thead> <tr> <th></th> <th>65</th> <th>85</th> <th>105</th> <th>125</th> <th>150</th> </tr> </thead> <tbody> <tr> <td>0-250 Vdc</td> <td>5.448</td> <td>5.221</td> <td>4.767</td> <td>4.313</td> <td>2.27</td> </tr> <tr> <td>300 Vdc</td> <td>4.767</td> <td>4.54</td> <td>4.313</td> <td>3.859</td> <td>2.27</td> </tr> </tbody> </table> <p>Ambient Temperature, No Heatsink</p> <table border="1"> <thead> <tr> <th></th> <th>65</th> <th>85</th> <th>105</th> <th>125</th> <th>150</th> </tr> </thead> <tbody> <tr> <td>0-250 Vdc</td> <td>2.4</td> <td>2.3</td> <td>2.1</td> <td>1.9</td> <td>1</td> </tr> <tr> <td>300 Vdc</td> <td>2.1</td> <td>2</td> <td>1.9</td> <td>1.7</td> <td>1</td> </tr> </tbody> </table> <p>Frequency</p> <table border="1"> <thead> <tr> <th></th> <th>50 Hz</th> <th>60 Hz</th> <th>120 Hz</th> <th>500Hz</th> <th>1 KHz</th> <th>20 KHz</th> </tr> </thead> <tbody> <tr> <td>0-250 Vdc</td> <td>0.65</td> <td>0.75</td> <td>1</td> <td>1.5</td> <td>1.8</td> <td>2.1</td> </tr> <tr> <td>300 Vdc</td> <td>0.65</td> <td>0.7</td> <td>1</td> <td>1.3</td> <td>1.4</td> <td>1.6</td> </tr> </tbody> </table>		65	85	105	125	150	0-250 Vdc	5.448	5.221	4.767	4.313	2.27	300 Vdc	4.767	4.54	4.313	3.859	2.27		65	85	105	125	150	0-250 Vdc	2.4	2.3	2.1	1.9	1	300 Vdc	2.1	2	1.9	1.7	1		50 Hz	60 Hz	120 Hz	500Hz	1 KHz	20 KHz	0-250 Vdc	0.65	0.75	1	1.5	1.8	2.1	300 Vdc	0.65	0.7	1	1.3	1.4	1.6
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Low Temperature Characteristics	Impedance ratio: Z-55 °C/Z+25 °C @ 120 Hz ≤ 3 (75 - 300 Vdc)																																																									
Load Life Test	3000 h at rated voltage @ 150 °C Δ Capacitance +/- 10% ESR 200% of limit ≤ 0.004 CV µA, @ 25 °C and 5 mins.																																																									
Shelf Life Test	500 h @ 150 °C Capacitance 100% of limit ESR 100% of limit ≤ 0.006 CV µA, @ 25 °C and 5 mins.																																																									
Vibration <i>Mounting: Vibration capability is dependent upon mounting</i>	MIL-STD-202, Meth. 204, Sine Swept. IEC 60068-2-6 JK Case = 80g All Others = 50g																																																									
Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above (XXg peak), whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>																																																									

Type NHR – Slimpack™, 3000 hr@150 °C, Aluminum Electrolytic

Higher Reliability	All NHR capacitors are subjected to a minimum of 100 percent of the dc rated voltage at 150 °C for 48 hours minimum but not to exceed 96 hours. During this test, capacitors shall be adequately protected against temporary voltage surges of 10 percent or more of the test voltage. After burn-in, the capacitors shall be returned to room ambient conditions and the dc leakage, capacitance, and ESR shall be measured with respect to specified limits.																																
Thermal Resistance	<table border="1"> <thead> <tr> <th rowspan="2">Large Sides Heatsinked</th> <th rowspan="2">Case Length Insulation</th> <th>1.5"</th> <th>2.0"</th> <th>2.5"</th> <th>3.0"</th> </tr> <tr> <th>°C/W</th> <th>°C/W</th> <th>°C/W</th> <th>°C/W</th> </tr> </thead> <tbody> <tr> <td rowspan="2">one</td> <td>None</td> <td>6.6</td> <td>4.8</td> <td>3.8</td> <td>3.1</td> </tr> <tr> <td>Polyester</td> <td>7.2</td> <td>5.3</td> <td>4.2</td> <td>3.4</td> </tr> <tr> <td rowspan="2">both</td> <td>None</td> <td>4.4</td> <td>3.1</td> <td>2.4</td> <td>2</td> </tr> <tr> <td>Polyester</td> <td>4.7</td> <td>3.3</td> <td>2.6</td> <td>2.2</td> </tr> </tbody> </table>	Large Sides Heatsinked	Case Length Insulation	1.5"	2.0"	2.5"	3.0"	°C/W	°C/W	°C/W	°C/W	one	None	6.6	4.8	3.8	3.1	Polyester	7.2	5.3	4.2	3.4	both	None	4.4	3.1	2.4	2	Polyester	4.7	3.3	2.6	2.2
Large Sides Heatsinked	Case Length Insulation			1.5"	2.0"	2.5"	3.0"																										
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one	None	6.6	4.8	3.8	3.1																												
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both	None	4.4	3.1	2.4	2																												
	Polyester	4.7	3.3	2.6	2.2																												
ESL	≤30 nH measured 1/4" from case at 1 MHz																																
Typical Weight	Case JK = 30 Case JA = 39 Case JH = 48 Case JB = 57																																
Terminals	18 AWG copper wire with 60/40 tin-lead electroplate, 20 amps max																																
Case Material	Stainless Steel																																
Ripple Current Capability	The ripple current capability is set by the maximum permissible internal core temperature, 153 °C and a max ΔT of 30°C.																																
Air Cooled	The ripple currents in the ratings tables are for 150 °C case temperatures. For air temperatures without a heatsink use the multipliers Ambient Temperature, No Heatsink.																																
Heatsink Cooled	Temperature rise from the internal hottest spot, the core, to ambient air is $\Delta T = I^2(ESR)(\theta_{cc} + \theta_{ca})$, recommended max ΔT of 30 °C where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the NHR attached to a heatsink use the maximum core temperature and the values for θ_{cc} .																																
Example	As an illustration, suppose you operate an insulated NHR961M075JB0C in 135 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the NHR and the heatsink, and the total thermal resistance is 2.7 + 3. 4 or 6.1° C/W. The power which would heat the core to 150 °C is (150 - 135)/6. 1 or 2.46 W. For an ESR of 211 mΩ, 2.46 W equates to a ripple current of 3.42 A.																																

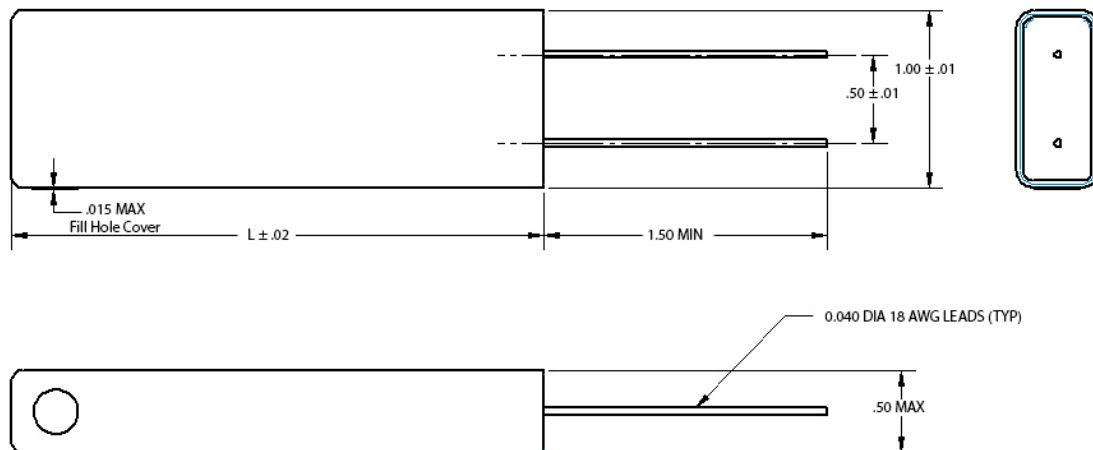
Part Numbering System



Type NHR – Slimpack™, 3000 hr@150 °C, Aluminum Electrolytic

Outline Drawing

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.

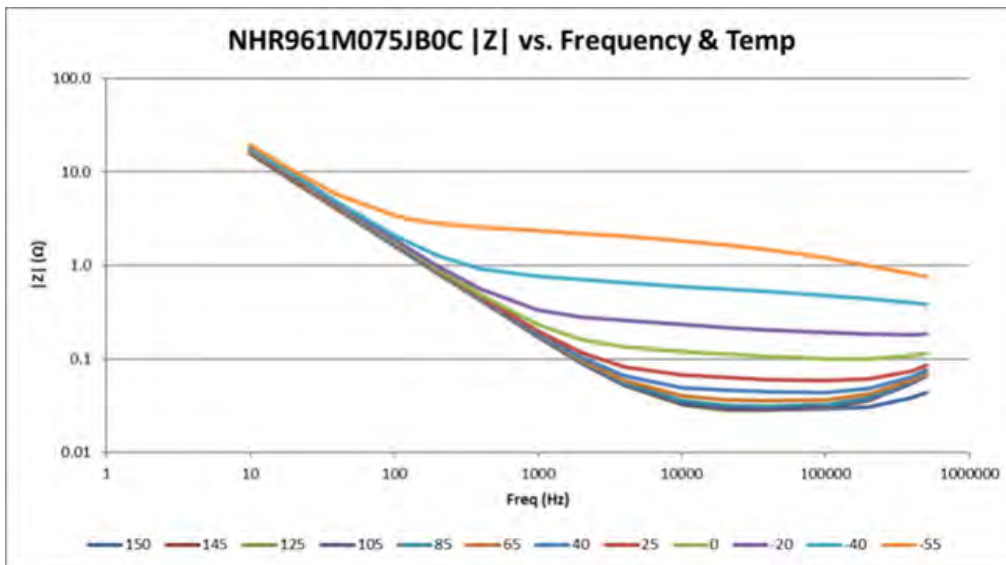
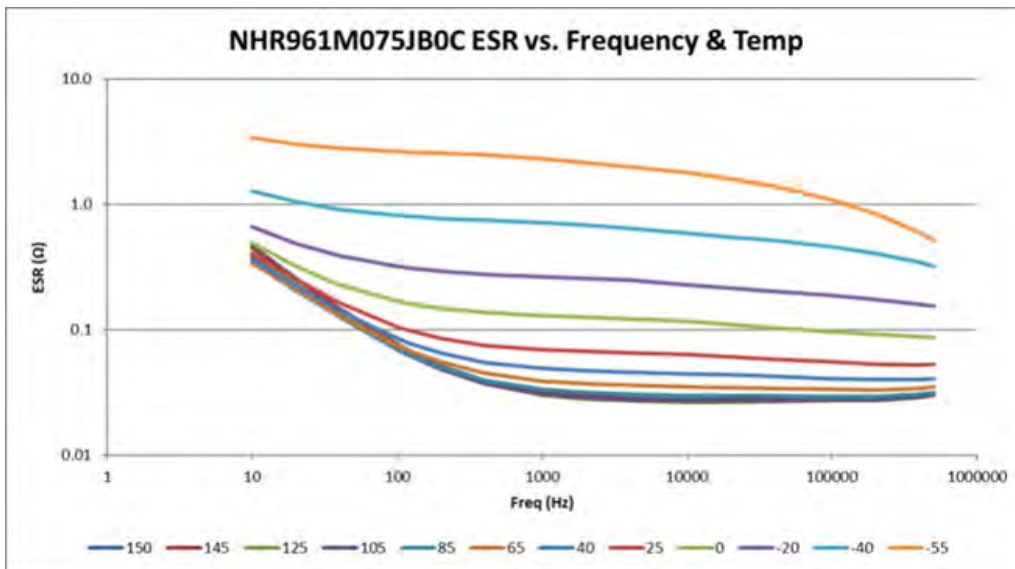
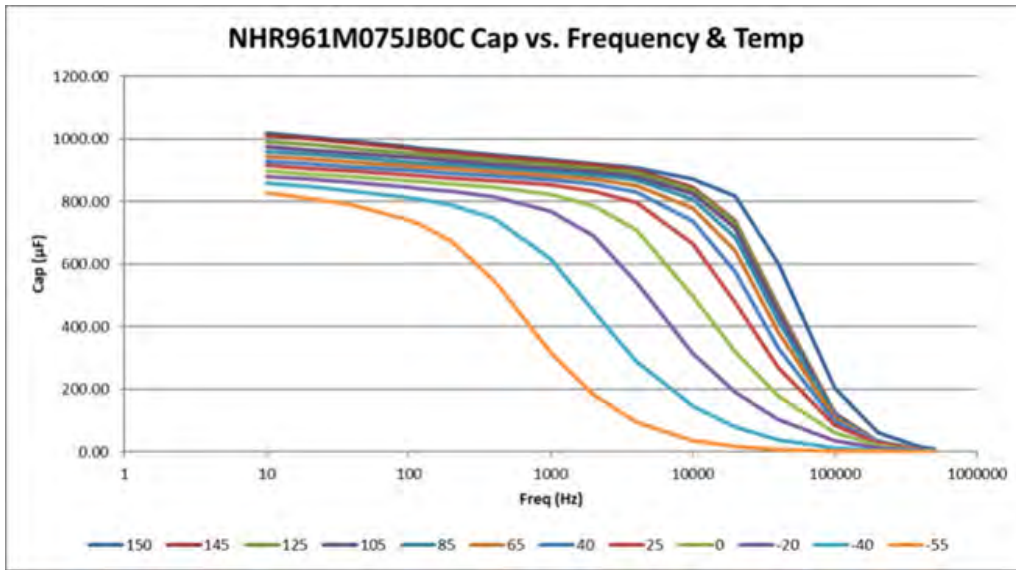


Ratings

Voltage Vdc	Cap µF	P/N	120Hz 25 °C Cat. ESR	20KHz 25 °C Cat. ESR	150 °C Ripple 120Hz	150 °C Ripple 20KHz	Case	Width (in)	Length (in)	Surge 25 °C Vdc
75	390	NHR391M075JK0C	0.538	0.206	0.75	1.58	1X1.5	1	1.5	110
75	550	NHR551M075JA0C	0.366	0.140	0.95	2.01	1X2	1	2.0	110
75	750	NHR751M075JH0C	0.268	0.103	1.15	2.44	1X2.5	1	2.5	110
75	960	NHR961M075JB0C	0.211	0.081	1.34	2.84	1X3	1	3.0	110
100	310	NHR311M100JK0C	1.048	0.402	0.54	1.13	1X1.5	1	1.5	150
100	430	NHR431M100JA0C	0.712	0.273	0.68	1.44	1X2	1	2.0	150
100	590	NHR591M100JH0C	0.521	0.200	0.83	1.75	1X2.5	1	2.5	150
100	750	NHR751M100JB0C	0.411	0.158	0.96	2.03	1X3	1	3.0	150
150	180	NHR181M150JK0C	1.088	0.417	0.53	1.11	1X1.5	1	1.5	220
150	260	NHR261M150JA0C	0.738	0.283	0.67	1.41	1X2	1	2.0	220
150	360	NHR361M150JH0C	0.541	0.207	0.81	1.71	1X2.5	1	2.5	220
150	450	NHR451M150JB0C	0.427	0.164	0.94	2.00	1X3	1	3.0	220
200	120	NHR121M200JK0C	1.107	0.424	0.52	1.10	1X1.5	1	1.5	300
200	170	NHR171M200JA0C	0.752	0.288	0.66	1.40	1X2	1	2.0	300
200	230	NHR231M200JH0C	0.551	0.211	0.80	1.70	1X2.5	1	2.5	300
200	290	NHR291M200JB0C	0.434	0.166	0.94	1.98	1X3	1	3.0	300
250	80	NHR800M250JK0C	1.500	0.575	0.45	0.95	1X1.5	1	1.5	350
250	110	NHR111M250JA0C	1.018	0.390	0.57	1.20	1X2	1	2.0	350
250	150	NHR151M250JH0C	0.746	0.286	0.69	1.46	1X2.5	1	2.5	350
250	190	NHR191M250JB0C	0.589	0.226	0.80	1.70	1X3	1	3.0	350
300	60	NHR600M300JK0C	2.547	1.273	0.37	0.64	1X1.5	1	1.5	400
300	90	NHR900M300JA0C	1.729	0.864	0.47	0.82	1X2	1	2.0	400
300	130	NHR131M300JH0C	1.267	0.633	0.57	0.99	1X2.5	1	2.5	400
300	160	NHR161M300JB0C	1.000	0.500	0.66	1.16	1X3	1	3.0	400

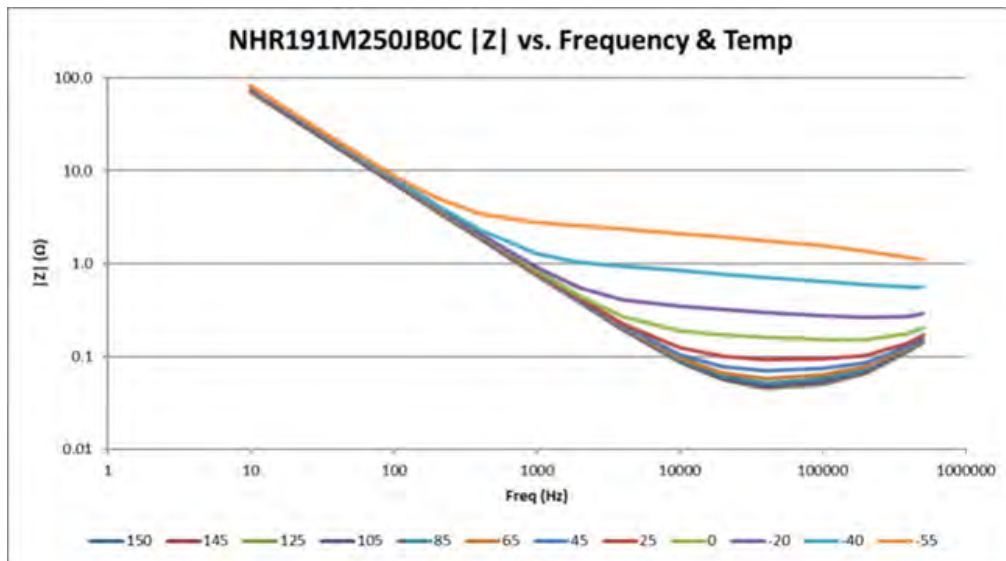
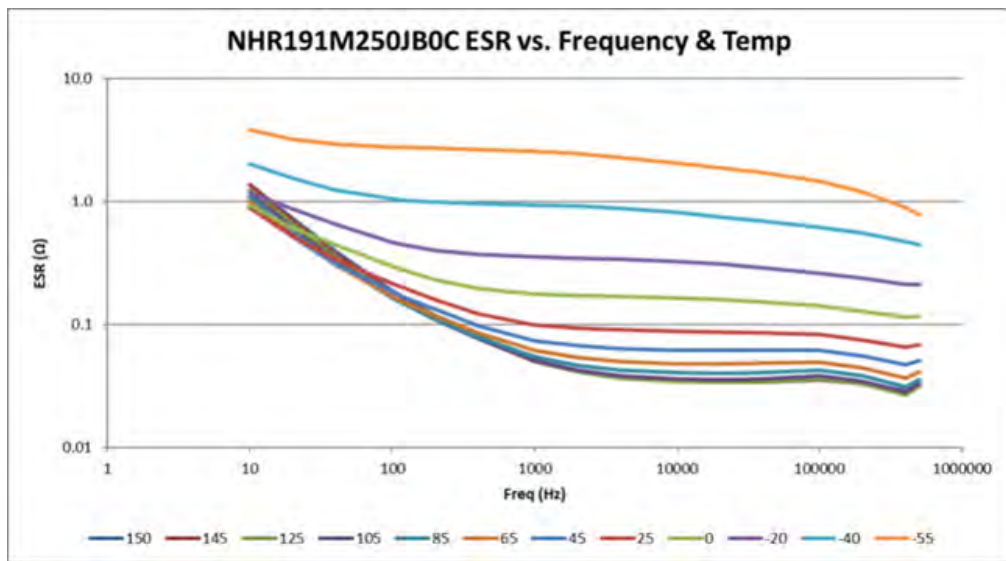
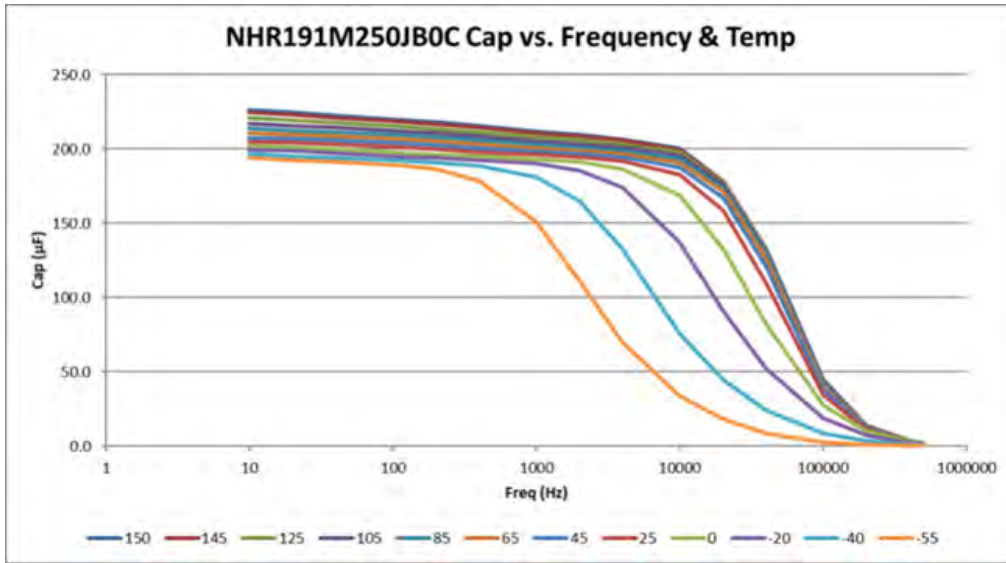
Type NHR – Slimpack™, 3000 hr@150 °C, Aluminum Electrolytic

Typical Performance Curves



Type NHR – Slimpack™, 3000 hr@150 °C, Aluminum Electrolytic

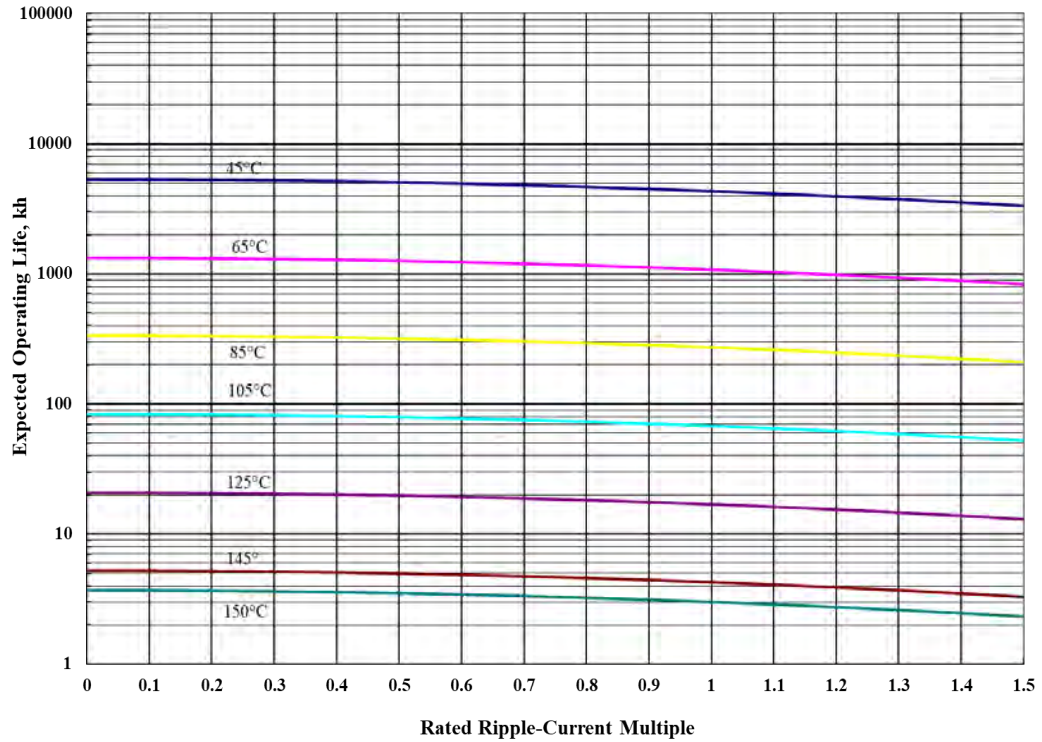
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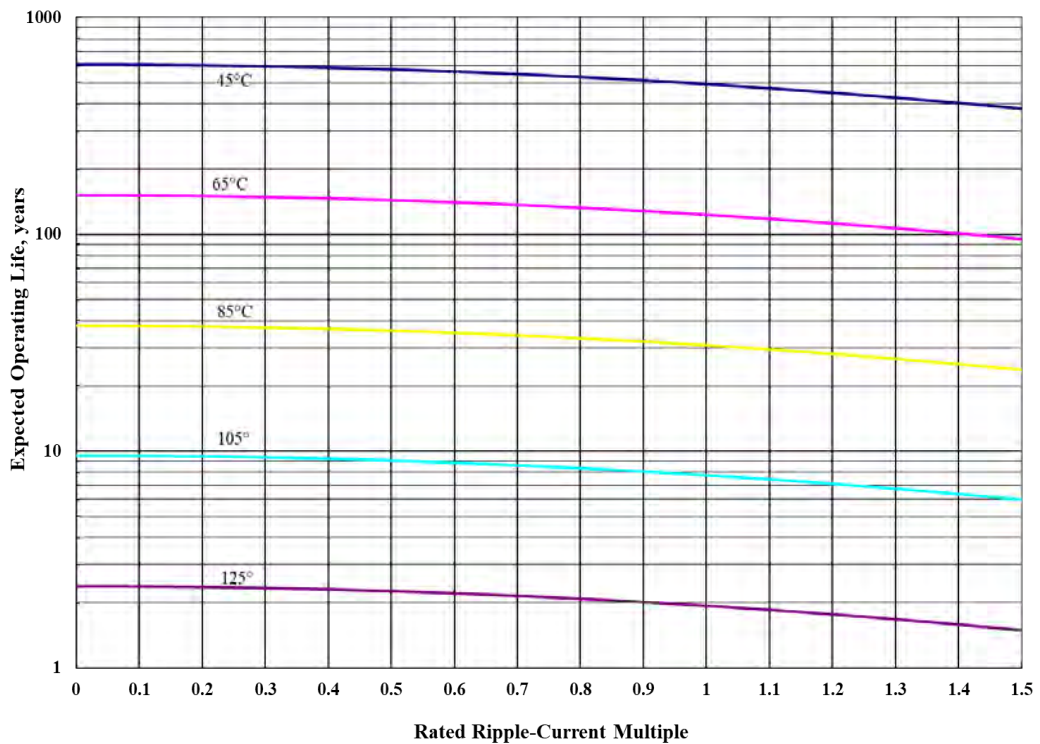
Type NHR – Slimpack™, 3000 hr@150 °C, Aluminum Electrolytic

Typical Performance Curves

Type NHR Operating Life in Kilohours vs Ripple Current



Type NHR Operating Life in Years vs Ripple Current



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Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

High Ripple and DC Holdup



Rated for 125 °C, PPC combines the advantages of aluminum electrolytic and aluminum polymer technology. These capacitors have the ultra-low ESR characteristics of conductive aluminum polymer capacitors in a 1mm thin package. With high capacitance and high ripple current per volume, applications for 125 °C polymer capacitors include DC/DC converters, tablets, telecommunications, thin displays, and variety of industrial power conversion.

Highlights

- +125 °C, Up to 2,000 Hours Load Life
- Low Leakage Current
- Very Low ESR and High Ripple Current
- Just 1mm thin

Specifications

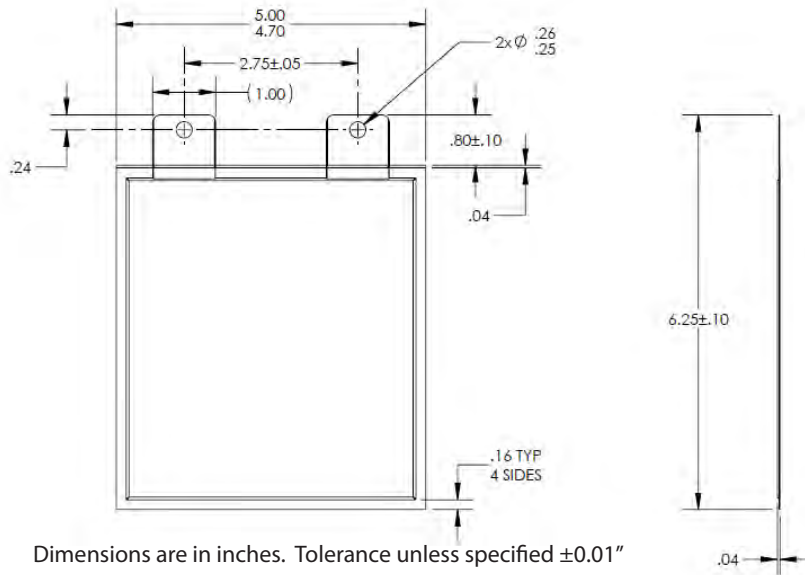
Temperature Range	-55 °C to + 125 °C																																																																																															
Rated Voltage	6.3 Vdc – 24 Vdc (see table for derating)																																																																																															
Capacitance	8000 µF - 20,000 µF																																																																																															
Capacitance Tolerance	±20% at 120 Hz and 25 °C																																																																																															
Leakage Current (at 25°C)	I Max = 0.005CV after 2 minute charge I = leakage current in µAmps C = rated capacitance in µF V = rated DC Working voltage in Volts																																																																																															
Low Temperature Characteristics (at 120 Hz)	Z(-55 °C)/Z(+25 °C): ≤ 3.0																																																																																															
Insulation	Nylon																																																																																															
Operating Temperature	-55 °C to + 125 °C																																																																																															
Terminal Material	Tin plated copper (0.010")																																																																																															
Precautions	Do not bend or strike capacitor body																																																																																															
Ripple Current Frequency Multiplier	<table border="1"> <thead> <tr> <th colspan="8">Ripple Multipliers for Ambient Temperature (No Heatsink)</th> </tr> <tr> <th>Ta (°C)</th> <td>45</td> <td>55</td> <td>65</td> <td>75</td> <td>85</td> <td>95</td> <td>105</td> </tr> <tr> <th>Ripple Current Multiplier</th> <td>2.22</td> <td>1.96</td> <td>1.68</td> <td>1.37</td> <td>1.00</td> <td>0.73</td> <td>0.48</td> </tr> </thead> </table> <table border="1"> <thead> <tr> <th colspan="5">Ripple Multipliers for Air Velocity (No Heatsink)</th> </tr> <tr> <th>Air Velocity (m/s)</th> <td>0.25</td> <td>1</td> <td>2.5</td> <td>5</td> </tr> <tr> <th>Ripple Current Multiplier</th> <td>1.00</td> <td>1.36</td> <td>1.52</td> <td>1.66</td> </tr> </thead> </table> <table border="1"> <thead> <tr> <th colspan="8">Ripple Multipliers for Frequency</th> </tr> <tr> <th>Frequency (Hz)</th> <td>50</td> <td>60</td> <td>120</td> <td>360</td> <td>1000</td> <td>5000</td> <td>20000</td> </tr> <tr> <th>Ripple Current Multiplier</th> <td>0.77</td> <td>0.81</td> <td>1.00</td> <td>1.16</td> <td>1.24</td> <td>1.20</td> <td>1.12</td> </tr> </thead> </table> <table border="1"> <thead> <tr> <th colspan="8">Ripple Multipliers for Case Ambient Temperature (Heatsinked to Bus)</th> </tr> <tr> <th>Ta (°C)</th> <td>45</td> <td>55</td> <td>65</td> <td>75</td> <td>85</td> <td>95</td> <td>105</td> </tr> <tr> <th>One Side</th> <td>2.96</td> <td>2.66</td> <td>2.32</td> <td>1.96</td> <td>1.58</td> <td>1.08</td> <td>0.60</td> </tr> <tr> <th>Both Sides</th> <td>3.00</td> <td>3.00</td> <td>3.00</td> <td>2.77</td> <td>2.24</td> <td>1.52</td> <td>0.85</td> </tr> </thead> </table>	Ripple Multipliers for Ambient Temperature (No Heatsink)								Ta (°C)	45	55	65	75	85	95	105	Ripple Current Multiplier	2.22	1.96	1.68	1.37	1.00	0.73	0.48	Ripple Multipliers for Air Velocity (No Heatsink)					Air Velocity (m/s)	0.25	1	2.5	5	Ripple Current Multiplier	1.00	1.36	1.52	1.66	Ripple Multipliers for Frequency								Frequency (Hz)	50	60	120	360	1000	5000	20000	Ripple Current Multiplier	0.77	0.81	1.00	1.16	1.24	1.20	1.12	Ripple Multipliers for Case Ambient Temperature (Heatsinked to Bus)								Ta (°C)	45	55	65	75	85	95	105	One Side	2.96	2.66	2.32	1.96	1.58	1.08	0.60	Both Sides	3.00	3.00	3.00	2.77	2.24	1.52	0.85
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Mechanical Shock	MIL-STD-202, Method 213, Condition I, 100 G peak, 6mS, Sawtooth, 18 Shocks																																																																																															

Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size. Level = 10g</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above, whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p> <p>Mounting Recommended mounting with 3M double sided VHB tape appropriate for mounting surfaces and to ensure the entire capacitor surface is held rigid.</p>
Altitude	10,000 Feet
Endurance Life Test	<p>Apply the maximum rated voltage for 2,000 hrs at +85 °C with full rated ripple current. After the test, return the capacitor to room temperature for 24 hours and then test.</p> <p>ΔC at 120Hz/+25 °C: ±20% of the initial</p> <p>ESR at 120Hz/+25 °C: ESR ≤ 200% of the initial</p> <p>DCL after 2 minute charge/+25 °C: ≤ 0.005CV</p>
Shelf Life Test	<p>Subject the capacitor to 1000 hrs at +125 °C without voltage. After the test, return the capacitor to room temperature for 24 hours and then test.</p> <p>ΔC at 120Hz/+25 °C: ±20% of the initial</p> <p>ESR at 120Hz/+25 °C: ESR ≤ 200% of the initial</p> <p>DCL after 2 minute charge/+25 °C: ≤ 0.005CV</p>
Moisture Resistance Test	<p>MIL-STD-202, method 106. After the test, return the capacitor to room temperature for 24 hours and then test.</p> <p>ΔC at 120Hz/+25 °C: ±20% of the initial</p> <p>ESR at 120Hz/+25 °C: ESR ≤ 200% of the initial</p> <p>DCL after 2 minute charge/+25 °C: ≤ 0.005CV</p>
Charge/Discharge Test	<p>Charge to rated Vdc and discharge to 0 Vdc, 100,000 cycles at 0.1 Hz, through a 0.22Ω resistor @ 25C. After the test, return the capacitor to room temperature or 24 hours and then test.</p> <p>ΔC at 120Hz/+25 °C: ±20% of the initial</p> <p>ESR at 120Hz/+25 °C: ESR ≤ 200% of the initial</p> <p>DCL after 2 minute charge/+25 °C: ≤ 0.005CV</p>
Regulatory Information	

Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

Outline Drawing



Examples of Ripple Current Capability Calculations

Application	Application Frequency	Catalog Frequency Multiplier	Application Temperature T_A °C	Catalog Temperature Multiplier	Rated Ripple Arms 120Hz	Ripple Capability Arms
No heat sink	120Hz	1	85	1	16	16.0
No heat sink	120Hz	1	45	2.22	16	35.5
One side heat sinked	120Hz	1	85	1.58	16	25.3
Both sides heat sinked	120Hz	1	65	3	16	48.0
No heat sink	1KHz	1.24	85	1	16	19.8
No heat sink	1KHz	1.24	45	2.22	16	44.0
One side heat sinked	1KHz	1.24	85	1.58	16	31.3
Both sides heat sinked	1KHz	1.24	65	3	16	59.5
No heat sink	20KHz	1.12	85	1	16	17.9
No heat sink	20KHz	1.12	45	2.22	16	39.8
One side heat sinked	20KHz	1.12	85	1.58	16	28.3
Both sides heat sinked	20KHz	1.12	65	3	16	53.8

Ratings

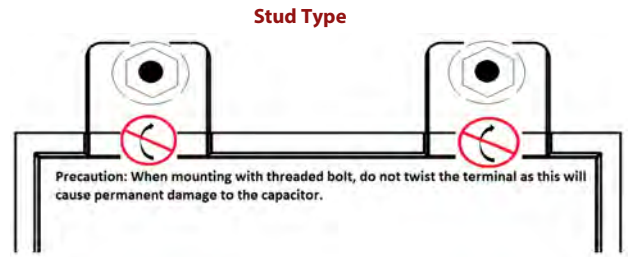
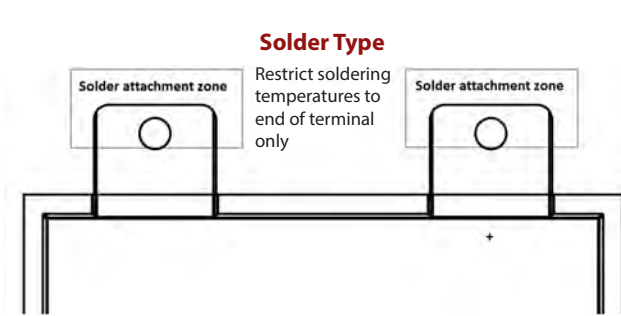
Rated Voltage			Cap μF	P/N	120 Hz 25 °C Max ESR (Ω)	20 KHz 25 °C Max ESR (234)	Max Ripple 120 Hz (Arms)	Max Ripple 20 kHz (Arms)	Surge 25 °C Vdc
125 °C Vdc	105 °C Vdc	85 °C Vdc							
6.3	8	9	20000	PPC203M6R3FG2SAA	0.01	0.006	16	18	11
10	12	15	12000	PPC123M010FG2SAA	0.01	0.006	16	18	18
16	20	24	8000	PPC802M016FG2SAA	0.01	0.006	16	18	28

Part Numbering System

TYPE	CAP	CAP TOL	VDC	WIDTH	LENGTH	TERM STYLE	SPEC CH1	SPEC CH2
PPC	802	M	016	F	G	2S	A	A
PPC	320 = 32 μF	$\pm 20\%$	6R3 = 6.3 Vdc	See Outline Drawing		2S - TWO SOLDER-ABLE/BOLT / STUD	ASSIGNED BY MFG	ASSIGNED BY MFG
	222 = 2200 μF		010 = 10 Vdc					
	163 = 16000 μF		016 = 16 Vdc					

Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

Recommended Mounting



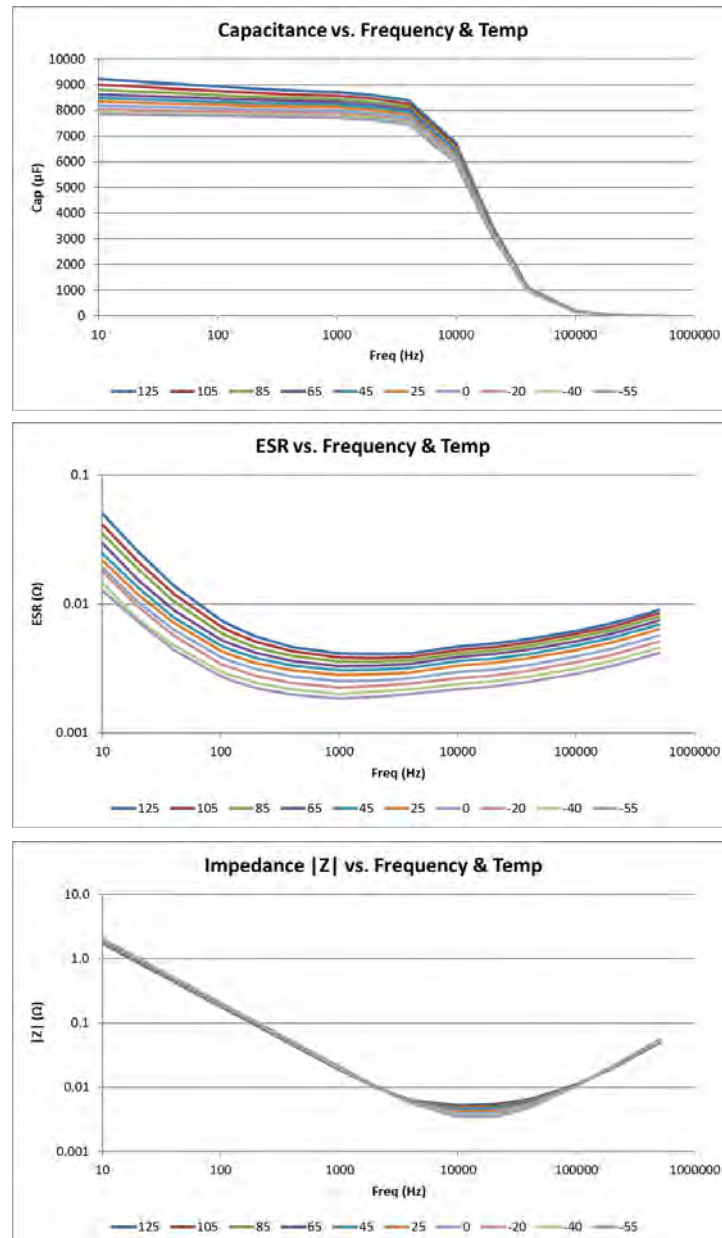
Hardware:

M5 =#10 stud / bolt

Copper flat washer, #10 or M5 washer with (~.500") OD

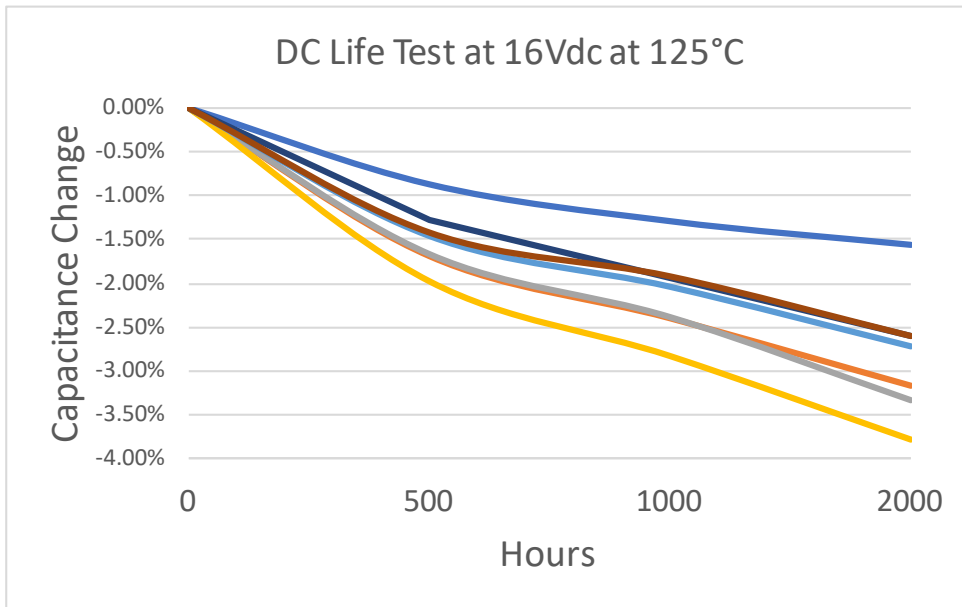
Precaution: Ensure proper terminal spacing and stud / bolt size.

Capacitor Temperature Characteristics

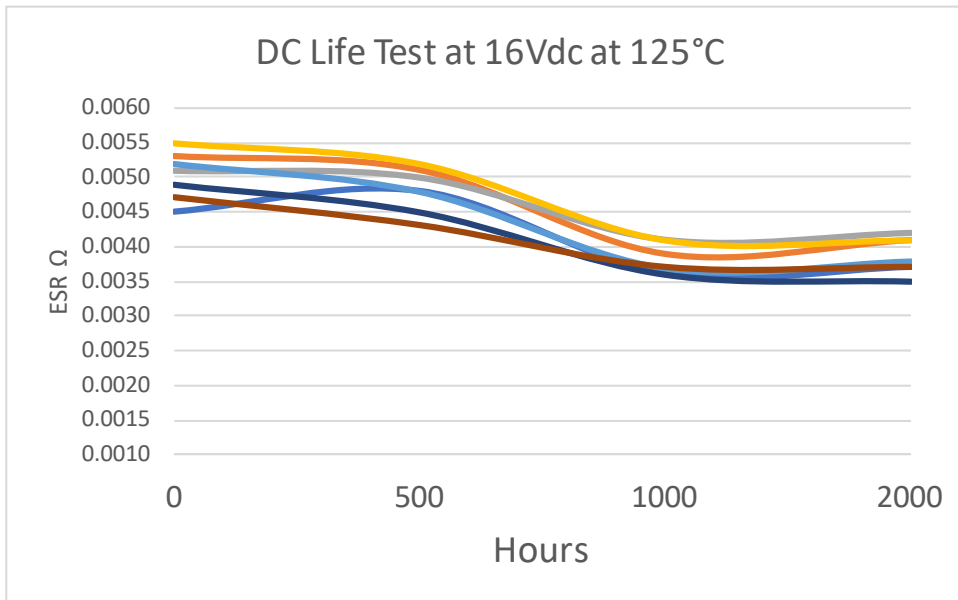


Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

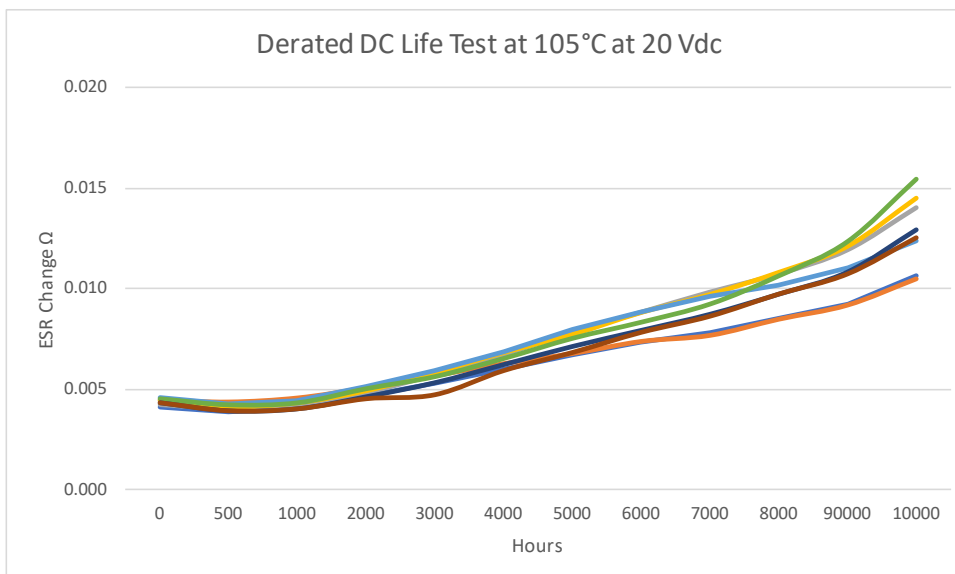
Test Results



This graph represents 8 units on test for 2,000 hours

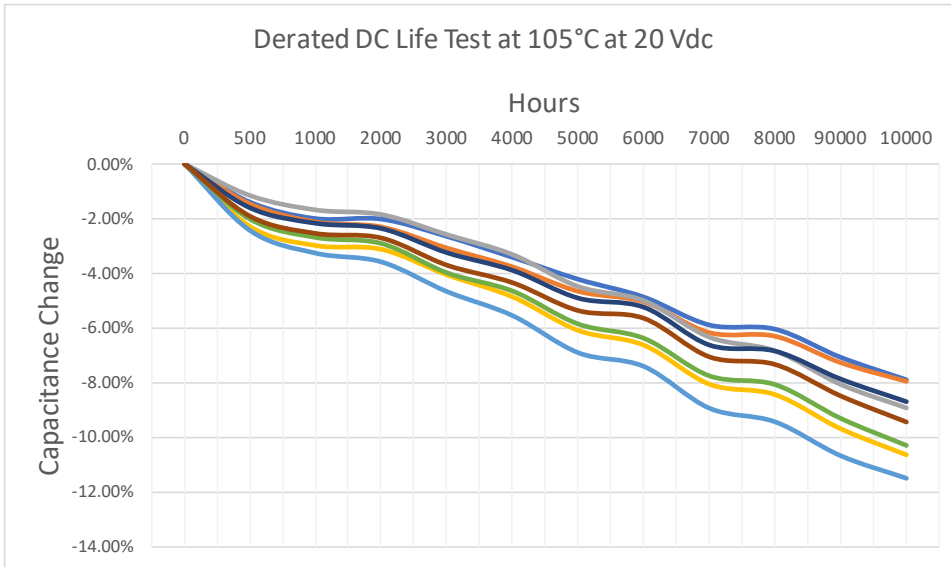


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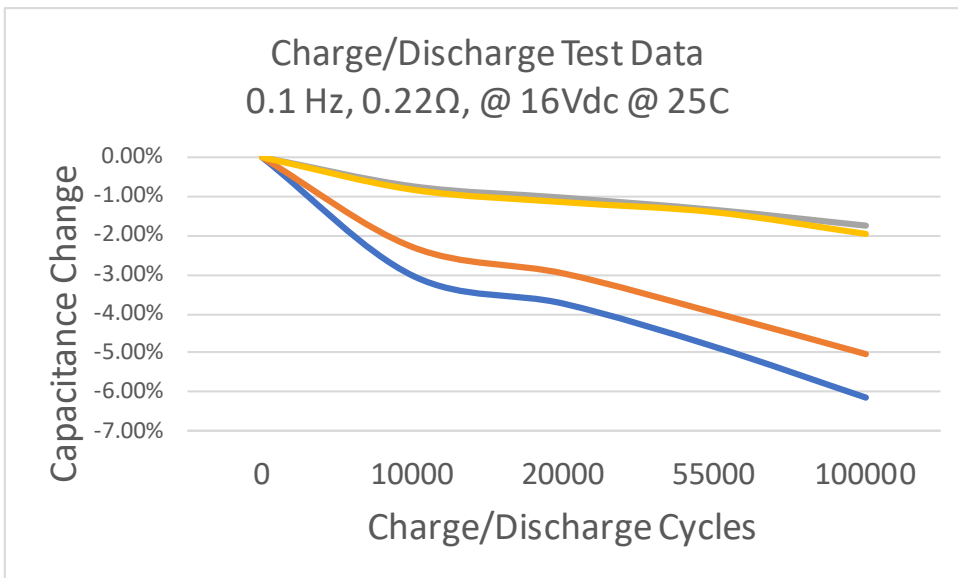


This graph represents 8 units on test for 10,000 hours

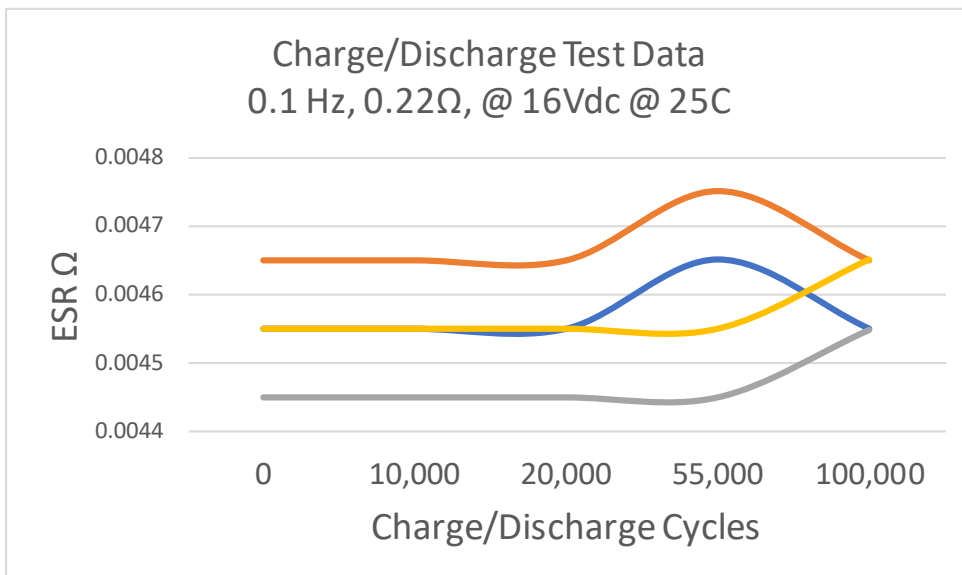
Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor



This graph represents 8 units on test for 10,000 hours

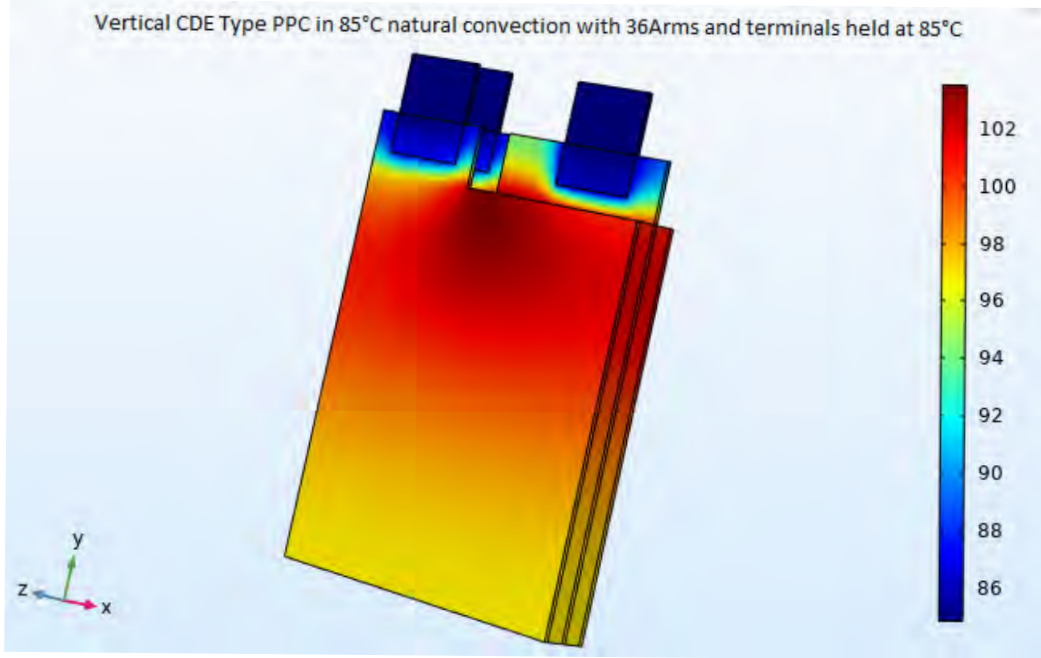


This graph represents 4 units on test for 100,000 cycles

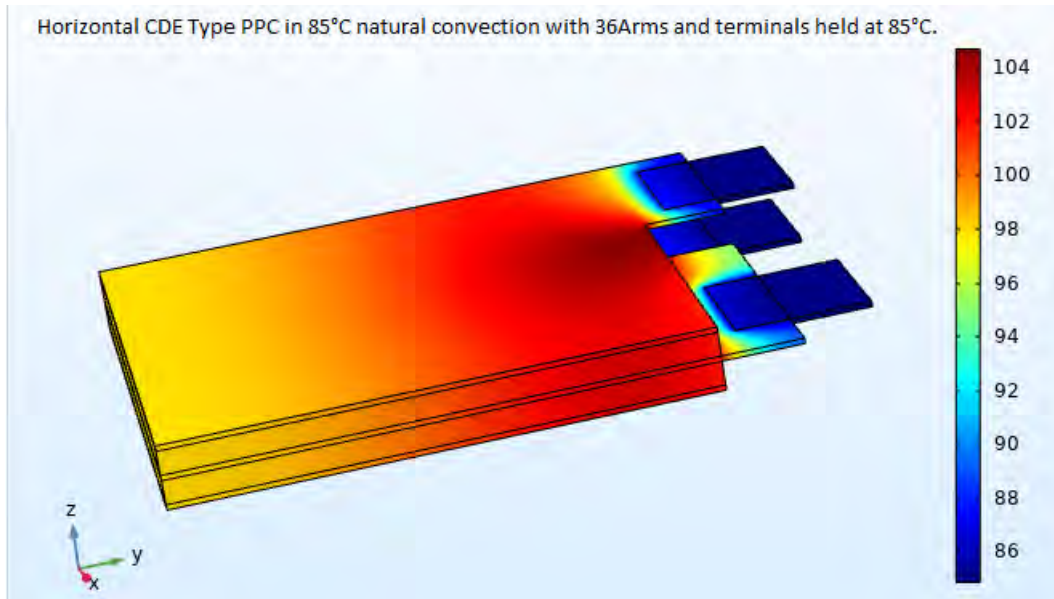


This graph represents 4 units on test for 100,000 cycles

Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor Thermal Model



Z dimension is not to scale



Z dimension is not to scale

Notice and Disclaimer: All product drawings, descriptions, specifications, statements, information and data (collectively, the "Information") in this datasheet or other publication are subject to change. The customer is responsible for checking, confirming and verifying the extent to which the Information contained in this datasheet or other publication is applicable to an order at the time the order is placed. All Information given herein is believed to be accurate and reliable, but it is presented without any guarantee, warranty, representation or responsibility of any kind, expressed or implied. Statements of suitability for certain applications are based on the knowledge that the Cornell Dubilier company providing such statements ("Cornell Dubilier") has of operating conditions that such Cornell Dubilier company regards as typical for such applications, but are not intended to constitute any guarantee, warranty or representation regarding any such matter – and Cornell Dubilier specifically and expressly disclaims any guarantee, warranty or representation concerning the suitability for a specific customer application, use, storage, transportation, or operating environment. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by Cornell Dubilier with reference to the use of any Cornell Dubilier products is given gratis (unless otherwise specified by Cornell Dubilier), and Cornell Dubilier assumes no obligation or liability for the advice given or results obtained. Although Cornell Dubilier strives to apply the most stringent quality and safety standards regarding the design and manufacturing of its products, in light of the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies or other appropriate protective measures) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage. Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated in such warnings, cautions and notes, or that other safety measures may not be required.

Type THA, ThinPack, Aluminum Electrolytic Capacitor, 85 °C

High Energy Density, REACH and RoHS Compliant



At 8.2 mm thin, type THA Thinpack offers the highest energy density available in a low profile aluminum electrolytic. It's ideal for the lowest profile circuits where high capacitance is needed for bulk storage. Look to type THA to replace arrays of SMT solid tantalum or aluminum electrolytic capacitors.

Highlights

- 8.2 mm profile
- Very high energy density (up to 1.1 J/cc)
- 3000 hr life @ 85 °C
- REACH and RoHS Compliant

Specifications

Temperature Range	-55 °C to +85 °C ≤300 Vdc; -40 °C to 85 °C ≥350 Vdc																																																																																															
Rated Voltage Range	10 Vdc to 450 Vdc																																																																																															
Capacitance Range	60 µF to 18000 µF																																																																																															
Capacitance Tolerance	±20%																																																																																															
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 mins. at rated voltage																																																																																															
Ripple Current Multipliers	<table border="1"> <thead> <tr> <th colspan="6">Ambient Temperature Multipliers</th> </tr> <tr> <th>Temp</th> <th>45</th> <th>55</th> <th>65</th> <th>75</th> <th>85</th> </tr> </thead> <tbody> <tr> <td>0-300 VDC</td> <td>1.30</td> <td>1.25</td> <td>1.00</td> <td>0.70</td> <td>0.20</td> </tr> <tr> <td>301-450 VDC</td> <td>1.15</td> <td>1.10</td> <td>1.00</td> <td>0.60</td> <td>0.20</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="5">Ambient Air Temperature Multipliers (No heat sink)</th> </tr> <tr> <th>Air Velocity m/sec</th> <th>0.25</th> <th>1.00</th> <th>2.50</th> <th>5.00</th> </tr> </thead> <tbody> <tr> <td>Ripple Current Multiplier</td> <td>1.00</td> <td>1.20</td> <td>1.40</td> <td>1.50</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="8">Frequency Multipliers</th> </tr> <tr> <th>Rated Vdc/Freq</th> <th>50</th> <th>60</th> <th>120</th> <th>360</th> <th>1000</th> <th>5000</th> <th>20000</th> </tr> </thead> <tbody> <tr> <td>10-35</td> <td>0.72</td> <td>0.77</td> <td>1.00</td> <td>1.06</td> <td>1.06</td> <td>1.10</td> <td>1.10</td> </tr> <tr> <td>36-60</td> <td>0.70</td> <td>0.75</td> <td>1.00</td> <td>1.06</td> <td>1.10</td> <td>1.20</td> <td>1.20</td> </tr> <tr> <td>61-100</td> <td>0.70</td> <td>0.75</td> <td>1.00</td> <td>1.06</td> <td>1.10</td> <td>1.30</td> <td>1.30</td> </tr> <tr> <td>101-300</td> <td>0.70</td> <td>0.75</td> <td>1.00</td> <td>1.20</td> <td>1.45</td> <td>1.70</td> <td>1.70</td> </tr> <tr> <td>301-450</td> <td>0.70</td> <td>0.75</td> <td>1.00</td> <td>1.20</td> <td>1.45</td> <td>1.80</td> <td>1.80</td> </tr> </tbody> </table>	Ambient Temperature Multipliers						Temp	45	55	65	75	85	0-300 VDC	1.30	1.25	1.00	0.70	0.20	301-450 VDC	1.15	1.10	1.00	0.60	0.20	Ambient Air Temperature Multipliers (No heat sink)					Air Velocity m/sec	0.25	1.00	2.50	5.00	Ripple Current Multiplier	1.00	1.20	1.40	1.50	Frequency Multipliers								Rated Vdc/Freq	50	60	120	360	1000	5000	20000	10-35	0.72	0.77	1.00	1.06	1.06	1.10	1.10	36-60	0.70	0.75	1.00	1.06	1.10	1.20	1.20	61-100	0.70	0.75	1.00	1.06	1.10	1.30	1.30	101-300	0.70	0.75	1.00	1.20	1.45	1.70	1.70	301-450	0.70	0.75	1.00	1.20	1.45	1.80	1.80
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Low Temperature Characteristics	Impedance ratio: $Z_{-55\text{ }^\circ\text{C}}/Z_{+25\text{ }^\circ\text{C}}$ @120 Hz ≤10 (5 - 20 Vdc), ≤3 (25 - 300 Vdc) $Z_{-40\text{ }^\circ\text{C}}/Z_{+25\text{ }^\circ\text{C}}$ @120 Hz ≤10 (≥350 Vdc)																																																																																															
DC Life Test	3000 h @ rated voltage at 85 °C Δ Capacitance ±20% (<50 Vdc) Δ Capacitance ±10% (≥50 Vdc) ESR 200% of limit DCL 100% of limit																																																																																															
Shelf Life Test	5 yrs @ 40 °C Capacitance 100% of limit ESR 100% of limit DCL ≤ 0.004 CV µA																																																																																															

Type THA, ThinPack, Aluminum Electrolytic Capacitor, 85 °C

Vibration <i>Mounting: Vibration capability is dependent upon mounting restraint.</i>	MIL-STD-202, Meth. 204, Sine Swept, IEC 60068-2-6 All Sizes = 10g MIL-STD-202, Meth. 204, Condition H																																		
Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above, whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>																																		
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Typical Weight	Case AA - 14g, Case AB - 16g, Case AC - 18g, Case AD - 20g																																		
Terminals	20 AWG copper wire with tin electroplate, 15 amps max																																		
Case Material	Aluminum																																		
Ripple Current Capability	The max ripple current capability is set by the target core temperature of 85 °C. The Peak to Peak ac must be less than Vr/5.																																		
Air Cooled	The ripple currents in the ratings tables are for 65 °C ambient temperatures.																																		
Heatsink Cooled	Temperature rise from the hottest internal spot, the core, to ambient air is $\Delta T = I^2(\text{Max ESR})(\theta_{cc} + \theta_{ca})$, recommended max ΔT of 20 °C where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the THA attached to a heatsink use the maximum core temperature and the values for θ_{cc} .																																		
Example	As an illustration, suppose you operate a noninsulated THA132M060AAOC in 65 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the capacitor and the heatsink, and the total thermal resistance is 2.7 + 5.42 or 8.12 °C/W. The power which would heat the core to 85 °C is (85 - 65)/8.12 or 2.46 W. For an ESR of 117 mΩ, 2.46 W equates to a ripple current of 4.58 A.																																		

Type THA, ThinPack, Aluminum Electrolytic Capacitor, 85 °C

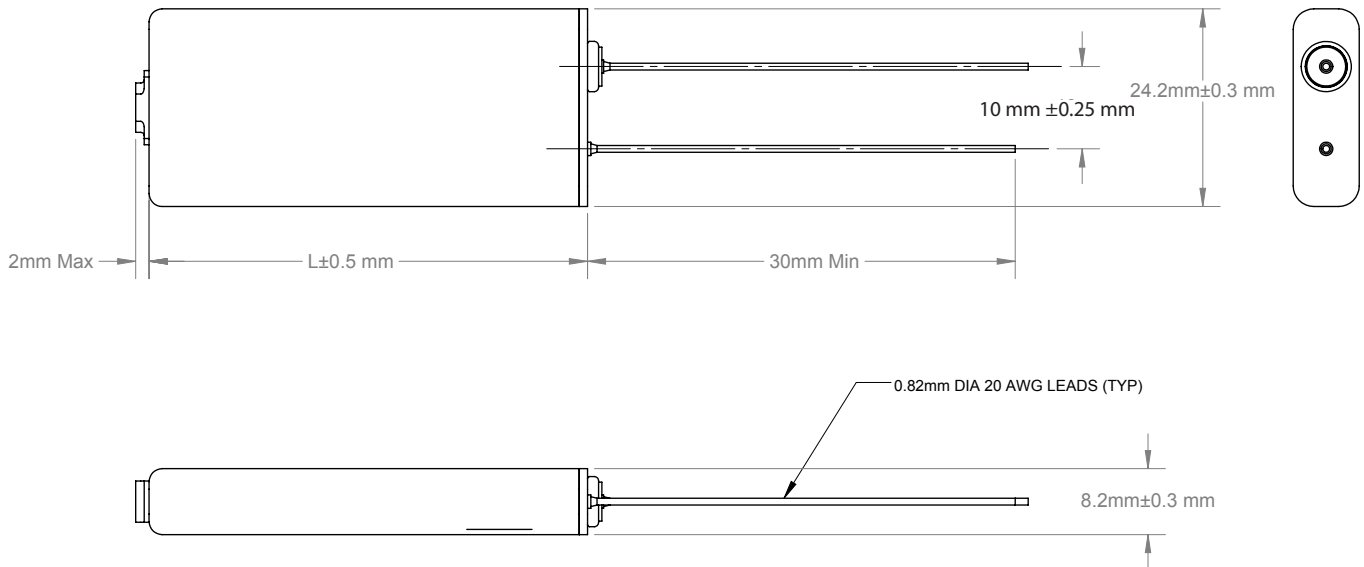
Part Numbering System

THA	412	M	025	AA	0	C
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
THA	322 = 3200 μ F 222 = 2200 μ F 162 = 1600 μ F	M = \pm 20%	025 = 25 Vdc 075 = 75 Vdc 150 = 150 Vdc 200 = 200 Vdc	AA = 36.4 mm AB = 45.9 mm AC = 53.8 mm AD = 66.5 mm	0 = bare can 1 = polywrap	C = two leads

Outline Drawing

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.

Style C: No Tabs



Type THA, ThinPack, Aluminum Electrolytic Capacitor, 85 °C

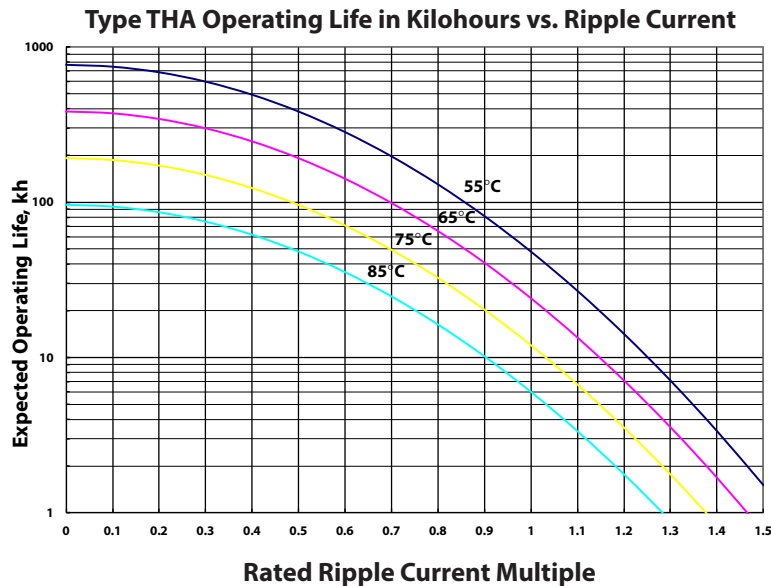
Ratings

Voltage	Cap (µF)	Catalog Part Number	Length	ESR max 25 °C (Ω)		Ripple (A) Ambient @ 65°C	
				120 Hz	20 kHz	120 Hz	20 kHz
10 Vdc @ 85 °C 12 Vdc Surge @ 25 °C	8500	THA852M010AA0C	36.4	0.12	0.09	1.90	2.09
	11000	THA113M010AB0C	45.9	0.08	0.07	1.90	2.09
	14000	THA143M010AC0C	53.8	0.07	0.06	2.50	2.75
	18000	THA183M010AD0C	66.5	0.05	0.04	3.30	3.63
16 Vdc @ 85 °C 19.2 Vdc Surge @ 25 °C	6300	THA632M016AA0C	36.4	0.12	0.09	1.90	2.09
	8700	THA872M016AB0C	45.9	0.08	0.07	2.10	2.31
	10000	THA103M016AC0C	53.8	0.07	0.06	2.50	2.75
	13000	THA133M016AD0C	66.5	0.05	0.04	3.30	3.63
20 Vdc @ 85 °C 24 Vdc Surge @ 25 °C	5000	THA502M020AA0C	36.4	0.12	0.09	1.90	2.09
	7000	THA702M020AB0C	45.9	0.08	0.07	2.10	2.31
	8600	THA862M020AC0C	53.8	0.07	0.06	2.50	2.75
	11000	THA113M020AD0C	66.5	0.05	0.04	3.30	3.63
25 Vdc @ 85 °C 30 Vdc Surge @ 25 °C	4100	THA412M025AA0C	36.4	0.12	0.09	1.90	2.09
	5700	THA572M025AB0C	45.9	0.08	0.07	2.40	2.64
	7000	THA702M025AC0C	53.8	0.07	0.06	2.50	2.75
	9000	THA902M025AD0C	66.5	0.05	0.04	3.30	3.30
30 Vdc @ 85 °C 36 Vdc Surge @ 25 °C	3300	THA332M030AA0C	36.4	0.12	0.09	1.90	2.09
	4600	THA462M030AB0C	45.9	0.08	0.07	2.40	2.64
	5700	THA572M030AC0C	53.8	0.07	0.06	2.80	3.08
	7400	THA742M030AD0C	66.5	0.05	0.04	3.30	3.63
35 Vdc @ 85 °C 42 Vdc Surge @ 25 °C	2600	THA262M035AA0C	36.4	0.12	0.09	1.90	2.09
	3600	THA362M035AB0C	45.9	0.08	0.07	2.40	2.64
	4400	THA442M035AC0C	53.8	0.07	0.06	2.80	3.08
	5800	THA582M035AD0C	66.5	0.05	0.04	3.50	3.85
40 Vdc @ 85 °C 48 Vdc Surge @ 25 °C	2300	THA232M040AA0C	36.4	0.12	0.09	1.70	2.04
	3200	THA322M040AB0C	45.9	0.08	0.07	2.20	2.64
	4000	THA402M040AC0C	53.8	0.07	0.06	2.50	3.00
	5200	THA522M040AD0C	66.5	0.05	0.04	3.00	3.60
50 Vdc @ 85 °C 60 Vdc Surge @ 25 °C	1600	THA162M050AA0C	36.4	0.12	0.09	1.70	2.04
	2200	THA222M050AB0C	45.9	0.08	0.07	2.20	2.64
	2700	THA272M050AC0C	53.8	0.07	0.06	2.50	3.00
	3500	THA352M050AD0C	66.5	0.05	0.04	2.90	3.48
60 Vdc @ 85 °C 72 Vdc Surge @ 25 °C	1300	THA132M060AA0C	36.4	0.12	0.09	1.70	2.04
	1800	THA182M060AB0C	45.9	0.08	0.07	2.20	2.64
	2300	THA232M060AC0C	53.8	0.07	0.06	2.50	3.00
	3000	THA302M060AD0C	66.5	0.05	0.04	3.30	3.96
75 Vdc @ 85 °C 90 Vdc Surge @ 25 °C	730	THA731M075AA0C	36.4	0.29	0.19	1.10	1.43
	1000	THA102M075AB0C	45.9	0.21	0.14	1.40	1.82
	1200	THA122M075AC0C	53.8	0.17	0.11	1.60	2.08
	1600	THA162M075AD0C	66.5	0.13	0.09	2.00	2.60
100 Vdc @ 85 °C 120 Vdc Surge @ 25 °C	580	THA581M100AA0C	36.4	0.29	0.19	1.10	1.43
	800	THA801M100AB0C	45.9	0.21	0.14	1.40	1.82
	980	THA981M100AC0C	53.8	0.17	0.11	1.60	2.08
	1200	THA122M100AD0C	66.5	0.13	0.09	2.00	2.60

Type THA, ThinPack, Aluminum Electrolytic Capacitor, 85 °C

Voltage	Cap (µF)	Catalog Part Number	Length	ESR max 25 °C (Ω)		Ripple (A) Ambient @ 65°C	
				120 Hz	20 kHz	120 Hz	20 kHz
150 Vdc @ 85 °C 180 Vdc Surge @ 25 °C	330	THA331M150AA0C	36.4	0.80	0.40	0.60	1.02
	450	THA451M150AB0C	45.9	0.58	0.29	0.80	1.36
	560	THA561M150AC0C	53.8	0.47	0.24	0.90	1.53
	730	THA731M150AD0C	66.5	0.37	0.18	1.20	2.04
200 Vdc @ 85 °C 240 Vdc Surge @ 25 °C	170	THA171M200AA0C	36.4	0.90	0.45	0.60	1.02
	230	THA231M200AB0C	45.9	0.65	0.33	0.80	1.36
	280	THA281M200AC0C	53.8	0.53	0.27	0.90	1.53
	370	THA371M200AD0C	66.5	0.41	0.21	1.10	1.87
250 Vdc @ 85 °C 300 Vdc Surge @ 25 °C	140	THA141M250AA0C	36.4	0.90	0.45	0.60	1.02
	190	THA191M250AB0C	45.9	0.65	0.33	0.80	1.36
	240	THA241M250AC0C	53.8	0.53	0.27	0.90	1.53
	310	THA311M250AD0C	66.5	0.41	0.21	1.10	1.87
300 Vdc @ 85 °C 350 Vdc Surge @ 25 °C	110	THA111M300AA0C	36.4	0.90	0.45	0.60	1.02
	160	THA161M300AB0C	45.9	0.65	0.33	0.80	1.36
	190	THA191M300AC0C	53.8	0.53	0.27	0.90	1.53
	250	THA251M300AD0C	66.5	0.41	0.21	1.10	1.87
350 Vdc @ 85 °C 400 Vdc Surge @ 25 °C	90	THA900M350AA0C	36.4	2.45	1.18	0.40	0.72
	130	THA131M350AB0C	45.9	1.78	0.85	0.50	0.90
	160	THA161M350AC0C	53.8	1.45	0.70	0.60	1.08
	210	THA211M350AD0C	66.5	1.12	0.54	0.80	1.44
400 Vdc @ 85 °C 450 Vdc Surge @ 25 °C	80	THA800M400AA0C	36.4	2.45	1.18	0.40	0.72
	110	THA111M400AB0C	45.9	1.78	0.85	0.50	0.90
	140	THA141M400AC0C	53.8	1.45	0.70	0.60	1.08
	180	THA181M400AD0C	66.5	1.12	0.54	0.80	1.44
450 Vdc @ 85 °C 500 Vdc Surge @ 25 °C	60	THA600M450AA0C	36.4	2.45	1.18	0.40	0.72
	90	THA900M450AB0C	45.9	1.78	0.85	0.50	0.90
	110	THA111M450AC0C	53.8	1.45	0.70	0.60	1.08
	140	THA141M450AD0C	66.5	1.12	0.54	0.80	1.44

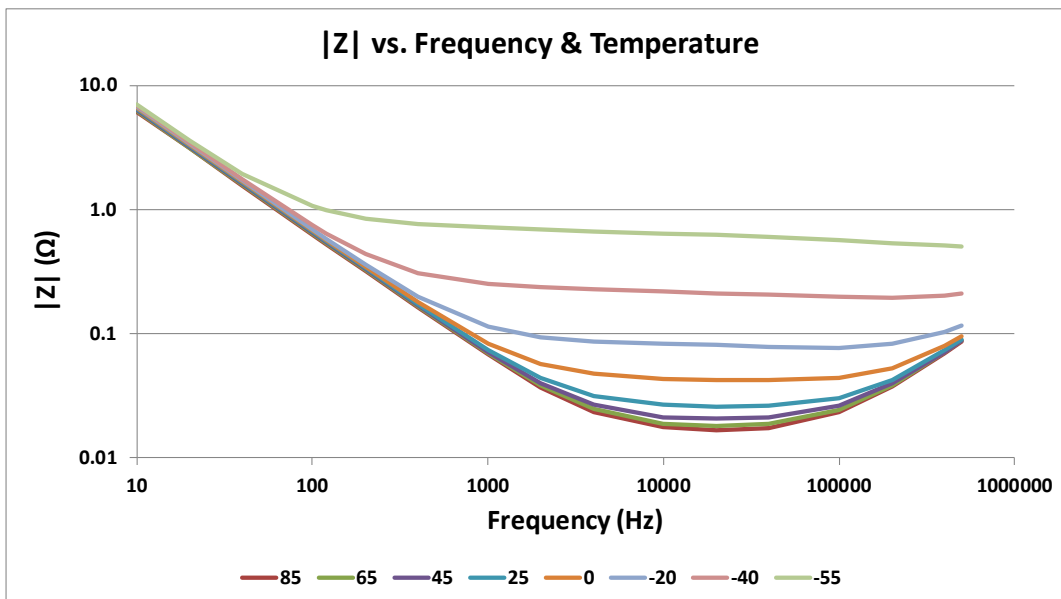
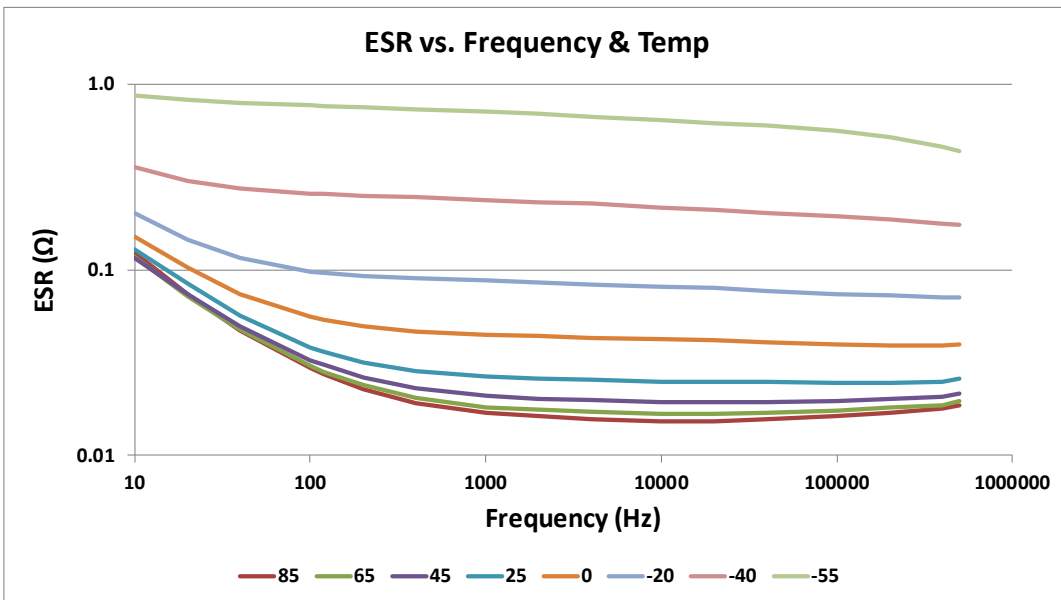
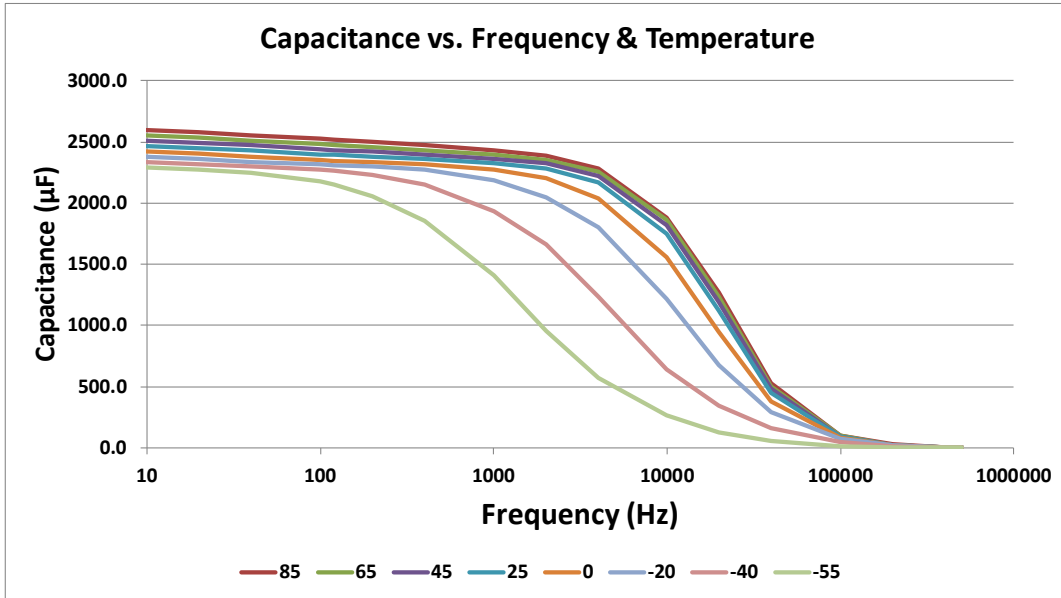
Typical Performance Curves



Type THA, ThinPack, Aluminum Electrolytic Capacitor, 85 °C

Typical Performance Curves

THA272M060AC0C



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Type THAS, ThinPack, Aluminum Electrolytic Capacitor, 105 °C

High Energy Density, REACH and RoHS Compliant



At 9 mm thin, type THAS Thinpack offers the highest energy density available in a low profile aluminum electrolytic. It's ideal for the lowest profile circuits where high capacitance is needed for bulk storage. Look to type THAS to replace arrays of SMT solid tantalum or aluminum electrolytic capacitors.

Highlights

- 9 mm thin
- Very high energy density (up to .9 J/cc)
- 3000 hr life @ 105 °C
- REACH and RoHS Compliant

Specifications

Temperature Range	-55 °C to +105 °C ≤300 Vdc; -40 °C to 105 °C ≥350 Vdc																																																																																															
Rated Voltage Range	10 Vdc to 450 Vdc																																																																																															
Capacitance Range	60 µF to 18000 µF																																																																																															
Capacitance Tolerance	±20%																																																																																															
Leakage Current	≤ 0.002 CV µA, @ 25 °C and 5 mins. at rated voltage																																																																																															
Ripple Current Multipliers	<table border="1"> <thead> <tr> <th colspan="8">Temperature Multipliers</th> </tr> <tr> <th>Temp</th> <th>45</th> <th>55</th> <th>65</th> <th>75</th> <th>85</th> <th>95</th> <th>105</th> </tr> </thead> <tbody> <tr> <td>0-300 VDC</td> <td>1.40</td> <td>1.30</td> <td>1.20</td> <td>1.10</td> <td>1.00</td> <td>0.60</td> <td>0.20</td> </tr> <tr> <td>301-450 VDC</td> <td>1.30</td> <td>1.25</td> <td>1.15</td> <td>1.10</td> <td>1.00</td> <td>0.60</td> <td>0.20</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="5">Ambient Air Temperature Multipliers (No heat sink)</th> </tr> </thead> <tbody> <tr> <td>Air Velocity m/sec</td> <td>0.25</td> <td>1.00</td> <td>2.50</td> <td>5.00</td> </tr> <tr> <td>Ripple Current Multiplier</td> <td>1.00</td> <td>1.20</td> <td>1.50</td> <td>1.70</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="8">Frequency Multipliers</th> </tr> <tr> <th>Rated Vdc/Freq</th> <th>50</th> <th>60</th> <th>120</th> <th>360</th> <th>1000</th> <th>5000</th> <th>20000</th> </tr> </thead> <tbody> <tr> <td>10-35</td> <td>0.72</td> <td>0.77</td> <td>1.00</td> <td>1.06</td> <td>1.06</td> <td>1.10</td> <td>1.10</td> </tr> <tr> <td>36-60</td> <td>0.70</td> <td>0.75</td> <td>1.00</td> <td>1.06</td> <td>1.10</td> <td>1.20</td> <td>1.20</td> </tr> <tr> <td>61-100</td> <td>0.70</td> <td>0.75</td> <td>1.00</td> <td>1.06</td> <td>1.10</td> <td>1.30</td> <td>1.30</td> </tr> <tr> <td>101-450</td> <td>0.70</td> <td>0.75</td> <td>1.00</td> <td>1.20</td> <td>1.45</td> <td>1.70</td> <td>1.70</td> </tr> </tbody> </table>	Temperature Multipliers								Temp	45	55	65	75	85	95	105	0-300 VDC	1.40	1.30	1.20	1.10	1.00	0.60	0.20	301-450 VDC	1.30	1.25	1.15	1.10	1.00	0.60	0.20	Ambient Air Temperature Multipliers (No heat sink)					Air Velocity m/sec	0.25	1.00	2.50	5.00	Ripple Current Multiplier	1.00	1.20	1.50	1.70	Frequency Multipliers								Rated Vdc/Freq	50	60	120	360	1000	5000	20000	10-35	0.72	0.77	1.00	1.06	1.06	1.10	1.10	36-60	0.70	0.75	1.00	1.06	1.10	1.20	1.20	61-100	0.70	0.75	1.00	1.06	1.10	1.30	1.30	101-450	0.70	0.75	1.00	1.20	1.45	1.70	1.70
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Low Temperature Characteristics	Impedance ratio: $Z_{-55\text{ }^\circ\text{C}}/Z_{+25\text{ }^\circ\text{C}}$ @120 Hz ≤10 (5 - 20 Vdc), ≤3 (25 - 300 Vdc) $Z_{-40\text{ }^\circ\text{C}}/Z_{+25\text{ }^\circ\text{C}}$ @120 Hz ≤10 (≥350 Vdc)																																																																																															
DC Life Test	3000 h @ rated voltage at 105 °C Δ Capacitance ±20% (<50 Vdc) Δ Capacitance ±10% (≥50 Vdc) ESR 200% of limit DCL 100% of limit																																																																																															
Shelf Life Test	5 yrs @ 40 °C Capacitance 100% of limit ESR 100% of limit DCL ≤ 0.004 CV µA																																																																																															

Type THAS, ThinPack, Aluminum Electrolytic Capacitor, 105 °C

Vibration <i>Mounting: Vibration capability is dependent upon mounting restraint.</i>	MIL-STD-202, Meth. 204, Sine Swept, IEC 60068-2-6 All Sizes = 10g MIL-STD-202, Meth. 204, Condition H																																		
Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size.</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above, whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p>																																		
Thermal Resistance	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2"></th> <th colspan="4" style="text-align: center;">Thermal Resistance (°C/W) by Case Length</th> </tr> <tr> <th style="text-align: center;"># of Sides heatsinked</th> <th style="text-align: center;">Insulation</th> <th style="text-align: center;">36.4 (mm)</th> <th style="text-align: center;">45.9 (mm)</th> <th style="text-align: center;">53.8 (mm)</th> <th style="text-align: center;">66.5 (mm)</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center;">One Side</td> <td style="text-align: center;">Bare can</td> <td style="text-align: center;">6.60</td> <td style="text-align: center;">5.20</td> <td style="text-align: center;">4.44</td> <td style="text-align: center;">3.60</td> </tr> <tr> <td style="text-align: center;">Polyester</td> <td style="text-align: center;">7.78</td> <td style="text-align: center;">6.13</td> <td style="text-align: center;">5.24</td> <td style="text-align: center;">4.24</td> </tr> <tr> <td rowspan="2" style="text-align: center;">Both Sides</td> <td style="text-align: center;">Bare can</td> <td style="text-align: center;">4.95</td> <td style="text-align: center;">3.87</td> <td style="text-align: center;">3.30</td> <td style="text-align: center;">2.66</td> </tr> <tr> <td style="text-align: center;">Polyester</td> <td style="text-align: center;">5.54</td> <td style="text-align: center;">4.34</td> <td style="text-align: center;">3.70</td> <td style="text-align: center;">2.98</td> </tr> </tbody> </table>			Thermal Resistance (°C/W) by Case Length				# of Sides heatsinked	Insulation	36.4 (mm)	45.9 (mm)	53.8 (mm)	66.5 (mm)	One Side	Bare can	6.60	5.20	4.44	3.60	Polyester	7.78	6.13	5.24	4.24	Both Sides	Bare can	4.95	3.87	3.30	2.66	Polyester	5.54	4.34	3.70	2.98
		Thermal Resistance (°C/W) by Case Length																																	
# of Sides heatsinked	Insulation	36.4 (mm)	45.9 (mm)	53.8 (mm)	66.5 (mm)																														
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Both Sides	Bare can	4.95	3.87	3.30	2.66																														
	Polyester	5.54	4.34	3.70	2.98																														
Typical Weight	Case AA - 19g, Case AB - 22g, Case AC - 26g, Case AD - 34g																																		
Terminals	20 AWG copper wire with tin electroplate, 15 amps max																																		
Case Material	Aluminum with a Stainless Steel Sleeve																																		
Ripple Current Capability	The max ripple current capability is set by the target core temperature of 105 °C. The Peak to Peak ac must be less than Vr/5 max.																																		
Air Cooled	The ripple currents in the ratings tables are for 85 °C ambient temperatures.																																		
Heatsink Cooled	Temperature rise from the hottest internal spot, the core, to ambient air is $\Delta T = I^2(\text{Max ESR})(\theta_{cc} + \theta_{ca})$, recommended max ΔT of 20 °C where θ_{cc} is the thermal resistance from core to case and θ_{ca} from case to ambient. To calculate maximum ripple capability with the THAS attached to a heatsink use the maximum core temperature and the values for θ_{cc} .																																		
Example	As an illustration, suppose you operate an noninsulated THAS112M060AA0C in 85 °C air and attach it to a commercial heatsink with a free-air thermal resistance of 2.7 °C/W. Use a good thermal grease between the capacitor and the heatsink, and the total thermal resistance is 2.7 + 6.6 or 9.3 °C/W. The power which would heat the core to 105 °C is (105 - 85)/9.3 or 2.15 W. For an ESR of 117 mΩ, 2.15 W equates to a ripple current of 4.28 A.																																		

Type THAS, ThinPack, Aluminum Electrolytic Capacitor, 105 °C

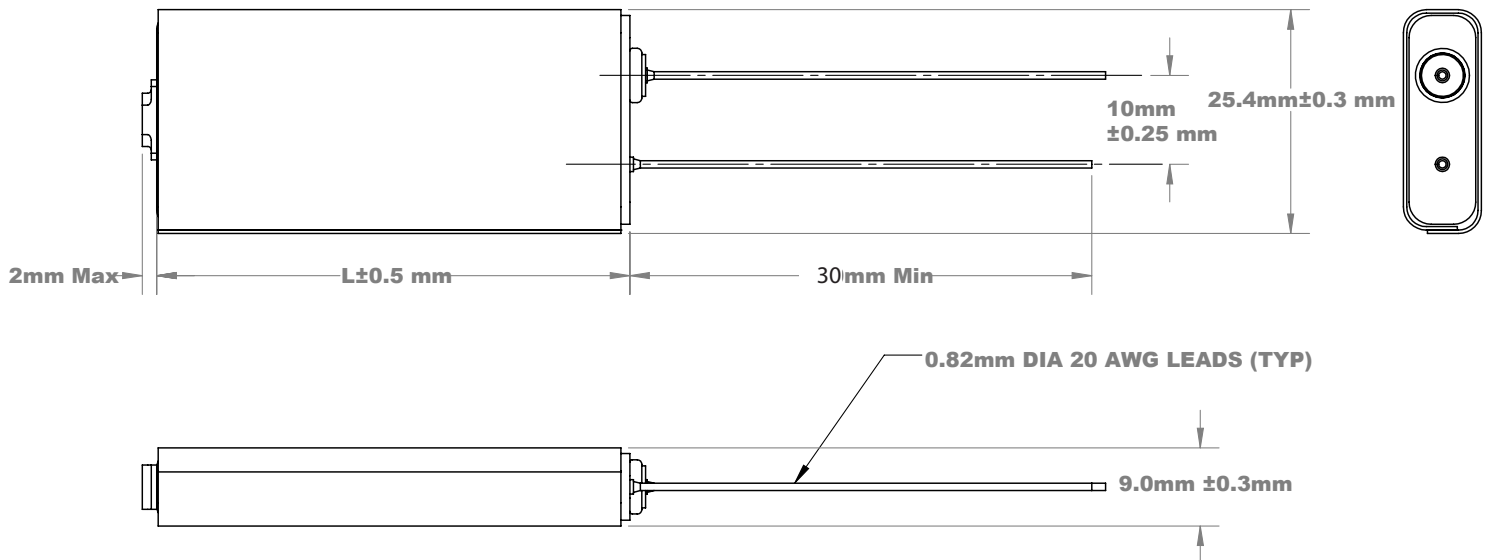
Part Numbering System

THAS	412	M	025	AA	0	C
Type	Capacitance	Tolerance	Rated Voltage	Case Code	Insulation	Mounting Style
THAS	322 = 3200 μ F 222 = 2200 μ F 162 = 1600 μ F	M = \pm 20%	025 = 25 Vdc 075 = 75 Vdc 150 = 150 Vdc 200 = 200 Vdc	AA = 36.4 mm AB = 45.9 mm AC = 53.8 mm AD = 66.5 mm	0 = bare can 1 = polywrap	C = two leads

Outline Drawing

Note: The polyester tape wrap may add up to 0.020 inches to the thickness and width of the capacitor.

Style C: No Tabs



Type THAS, ThinPack, Aluminum Electrolytic Capacitor, 105 °C

Ratings

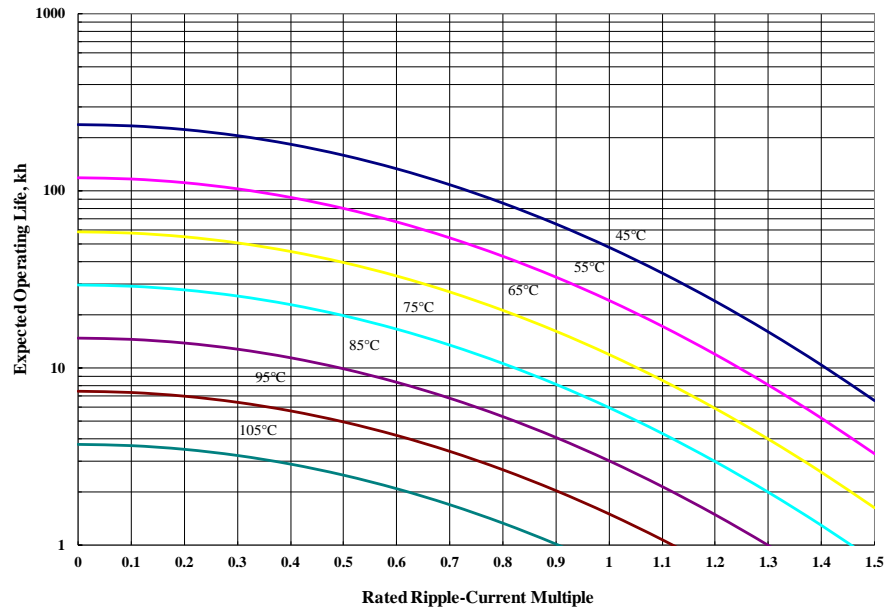
Voltage	Cap (µF)	Catalog Part Number	Length (L)	ESR max 25 °C (Ω)		Ripple (A) Case @ 85°C	
				120 Hz	20 kHz	120 Hz	20 kHz
10 Vdc @ 105 °C 12 Vdc Surge @ 25 °C	8500	THAS852M010AA0C	36.4	0.12	0.09	2.00	2.20
	11000	THAS113M010AB0C	45.9	0.08	0.07	2.00	2.20
	14000	THAS143M010AC0C	53.8	0.07	0.06	2.60	2.86
	18000	THAS183M010AD0C	66.5	0.05	0.04	3.50	3.85
16 Vdc @ 105 °C 19.2 Vdc Surge @ 25 °C	5900	THAS592M016AA0C	36.4	0.12	0.09	2.00	2.20
	8200	THAS822M016AB0C	45.9	0.08	0.07	2.20	2.42
	10000	THAS103M016AC0C	53.8	0.07	0.06	2.60	2.86
	13000	THAS133M016AD0C	66.5	0.05	0.04	3.50	3.85
20 Vdc @ 105 °C 24 Vdc Surge @ 25 °C	5000	THAS502M020AA0C	36.4	0.12	0.09	2.00	2.20
	7000	THAS702M020AB0C	45.9	0.08	0.07	2.20	2.42
	8200	THAS822M020AC0C	53.8	0.07	0.06	2.60	2.86
	10000	THAS103M020AD0C	66.5	0.05	0.04	3.50	3.85
25 Vdc @ 105 °C 30 Vdc Surge @ 25 °C	3500	THAS352M025AA0C	36.4	0.12	0.09	2.00	2.20
	4900	THAS492M025AB0C	45.9	0.08	0.07	2.60	2.86
	6000	THAS602M025AC0C	53.8	0.07	0.06	2.50	2.75
	7800	THAS782M025AD0C	66.5	0.05	0.04	3.10	3.41
30 Vdc @ 105 °C 36 Vdc Surge @ 25 °C	2900	THAS292M030AA0C	36.4	0.12	0.09	2.00	2.20
	4100	THAS412M030AB0C	45.9	0.08	0.07	2.60	2.86
	5000	THAS502M030AC0C	53.8	0.07	0.06	3.00	3.30
	6500	THAS652M030AD0C	66.5	0.05	0.04	3.50	3.85
35 Vdc @ 105 °C 42 Vdc Surge @ 25 °C	2500	THAS252M035AA0C	36.4	0.12	0.09	2.00	2.20
	3500	THAS352M035AB0C	45.9	0.08	0.07	2.60	2.86
	4300	THAS432M035AC0C	53.8	0.07	0.06	3.00	3.30
	5600	THAS562M035AD0C	66.5	0.05	0.04	3.60	3.96
40 Vdc @ 105 °C 48 Vdc Surge @ 25 °C	2100	THAS212M040AA0C	36.4	0.12	0.09	1.70	2.04
	3000	THAS302M040AB0C	45.9	0.08	0.07	2.20	2.64
	3700	THAS372M040AC0C	53.8	0.07	0.06	2.50	3.00
	4800	THAS482M040AD0C	66.5	0.05	0.04	3.10	3.72
50 Vdc @ 105 °C 60 Vdc Surge @ 25 °C	1400	THAS142M050AA0C	36.4	0.12	0.09	1.70	2.04
	2000	THAS202M050AB0C	45.9	0.08	0.07	2.20	2.64
	2500	THAS252M050AC0C	53.8	0.07	0.06	2.50	3.00
	3200	THAS322M050AD0C	66.5	0.05	0.04	2.90	3.48
60 Vdc @ 105 °C 72 Vdc Surge @ 25 °C	1100	THAS112M060AA0C	36.4	0.12	0.09	1.70	2.04
	1600	THAS162M060AB0C	45.9	0.08	0.07	2.20	2.64
	2000	THAS202M060AC0C	53.8	0.07	0.06	2.50	3.00
	2600	THAS262M060AD0C	66.5	0.05	0.04	3.10	3.72
75 Vdc @ 105 °C 90 Vdc Surge @ 25 °C	680	THAS681M075AA0C	36.4	0.29	0.19	1.10	1.43
	940	THAS941M075AB0C	45.9	0.21	0.14	1.40	1.82
	1100	THAS112M075AC0C	53.8	0.17	0.11	1.60	2.08
	1500	THAS152M075AD0C	66.5	0.13	0.09	2.00	2.60
100 Vdc @ 105 °C 120 Vdc Surge @ 25 °C	310	THAS311M100AA0C	36.4	0.29	0.19	1.10	1.43
	430	THAS431M100AB0C	45.9	0.21	0.14	1.40	1.82
	530	THAS531M100AC0C	53.8	0.17	0.11	1.60	2.08
	690	THAS691M100AD0C	66.5	0.13	0.09	2.00	2.60

Type THAS, ThinPack, Aluminum Electrolytic Capacitor, 105 °C

Voltage	Cap (µF)	Catalog Part Number	Length (L)	ESR max 25 °C (Ω)		Ripple (A) Case @ 85 °C	
				120 Hz	20 kHz	120 Hz	20 kHz
150 Vdc @ 105 °C 180 Vdc Surge @ 25 °C	230	THAS231M150AA0C	36.4	0.80	0.40	0.60	1.02
	320	THAS321M150AB0C	45.9	0.58	0.29	0.80	1.36
	400	THAS401M150AC0C	53.8	0.47	0.24	1.00	1.70
	520	THAS521M150AD0C	66.5	0.37	0.18	1.20	2.04
200 Vdc @ 105 °C 240 Vdc Surge @ 25 °C	120	THAS121M200AA0C	36.4	0.90	0.45	0.60	1.02
	170	THAS171M200AB0C	45.9	0.65	0.33	0.80	1.36
	210	THAS211M200AC0C	53.8	0.53	0.27	0.90	1.53
	270	THAS271M200AD0C	66.5	0.41	0.21	1.10	1.87
250 Vdc @ 105 °C 300 Vdc Surge @ 25 °C	110	THAS111M250AA0C	36.4	0.90	0.45	0.60	1.02
	150	THAS151M250AB0C	45.9	0.65	0.33	0.80	1.36
	190	THAS191M250AC0C	53.8	0.53	0.27	0.90	1.53
	250	THAS251M250AD0C	66.5	0.41	0.21	1.10	1.87
300 Vdc @ 105 °C 350 Vdc Surge @ 25 °C	90	THAS900M300AA0C	36.4	0.90	0.45	0.60	1.02
	130	THAS131M300AB0C	45.9	0.65	0.33	0.80	1.36
	160	THAS161M300AC0C	53.8	0.53	0.27	0.90	1.53
	200	THAS201M300AD0C	66.5	0.41	0.21	1.10	1.87
350 Vdc @ 105 °C 400 Vdc Surge @ 25 °C	80	THAS800M350AA0C	36.4	2.45	1.18	0.60	1.02
	110	THAS111M350AB0C	45.9	1.78	0.85	0.60	1.02
	130	THAS131M350AC0C	53.8	1.45	0.70	0.70	1.19
	170	THAS171M350AD0C	66.5	1.12	0.54	0.80	1.36
400 Vdc @ 105 °C 450 Vdc Surge @ 25 °C	70	THAS700M400AA0C	36.4	2.45	1.18	0.60	1.02
	90	THAS900M400AB0C	45.9	1.78	0.85	0.60	1.02
	110	THAS111M400AC0C	53.8	1.45	0.70	0.70	1.19
	140	THAS141M400AD0C	66.5	1.12	0.54	0.80	1.36
450 Vdc @ 105 °C 500 Vdc Surge @ 25 °C	60	THAS600M450AA0C	36.4	2.45	1.18	0.60	1.02
	80	THAS800M450AB0C	45.9	1.78	0.85	0.60	1.02
	100	THAS101M450AC0C	53.8	1.45	0.70	0.70	1.19
	130	THAS131M450AD0C	66.5	1.12	0.54	0.80	1.36

Typical Performance Curves

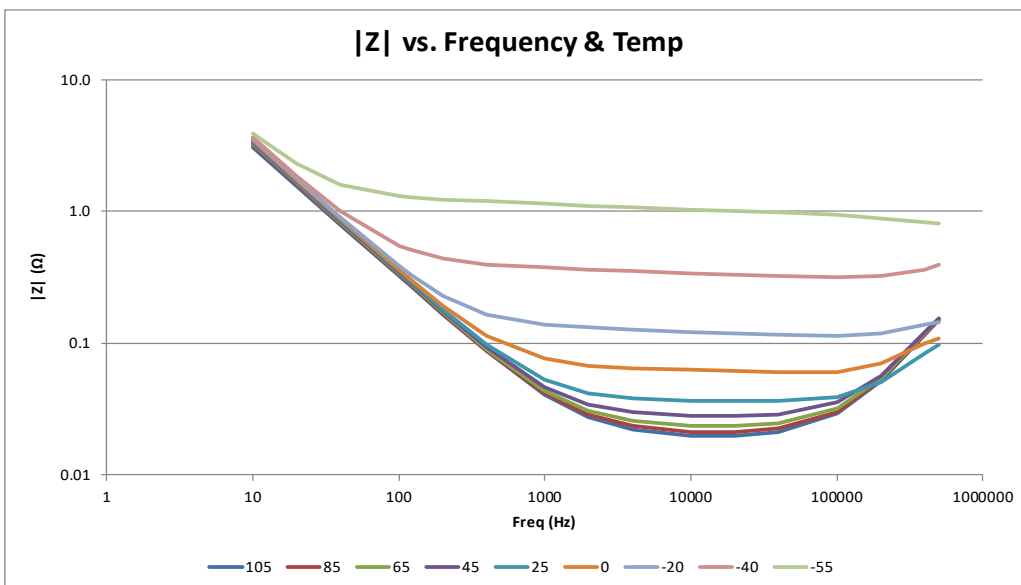
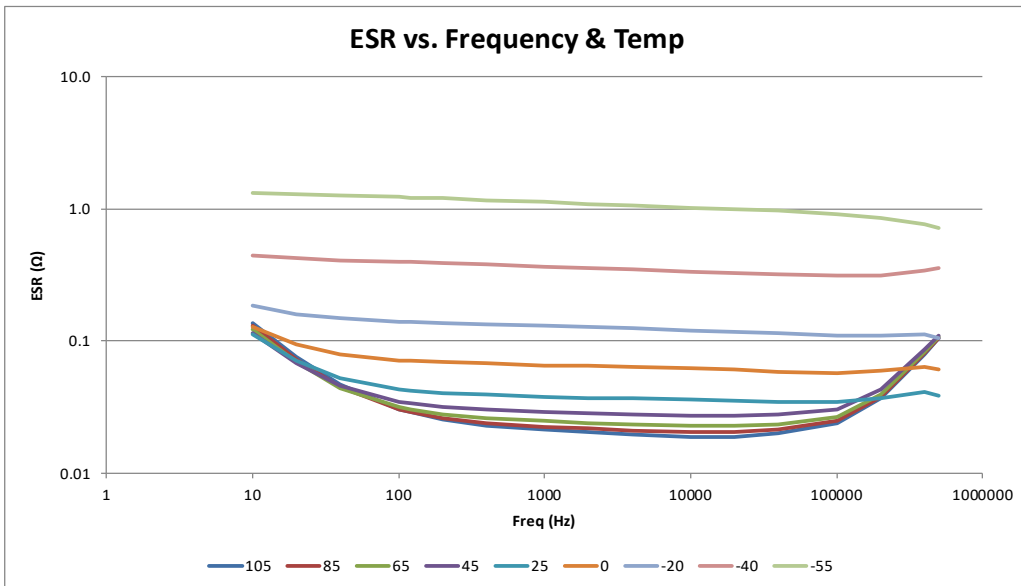
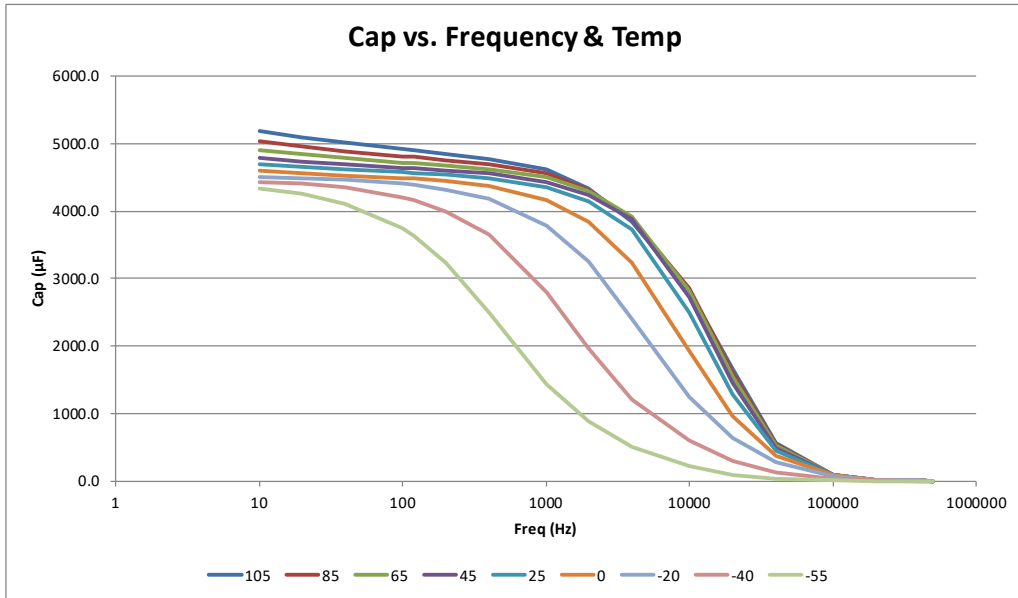
Type THAS Operating Life in Kilohours vs Ripple Current



Type THAS, ThinPack, Aluminum Electrolytic Capacitor, 105 °C

Typical Performance Curves

THAS502M020AA0C



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Type ULP, Ultra Low Profile Aluminum Electrolytic Capacitor, 85 °C

High Energy Density, REACH and RoHS Compliant



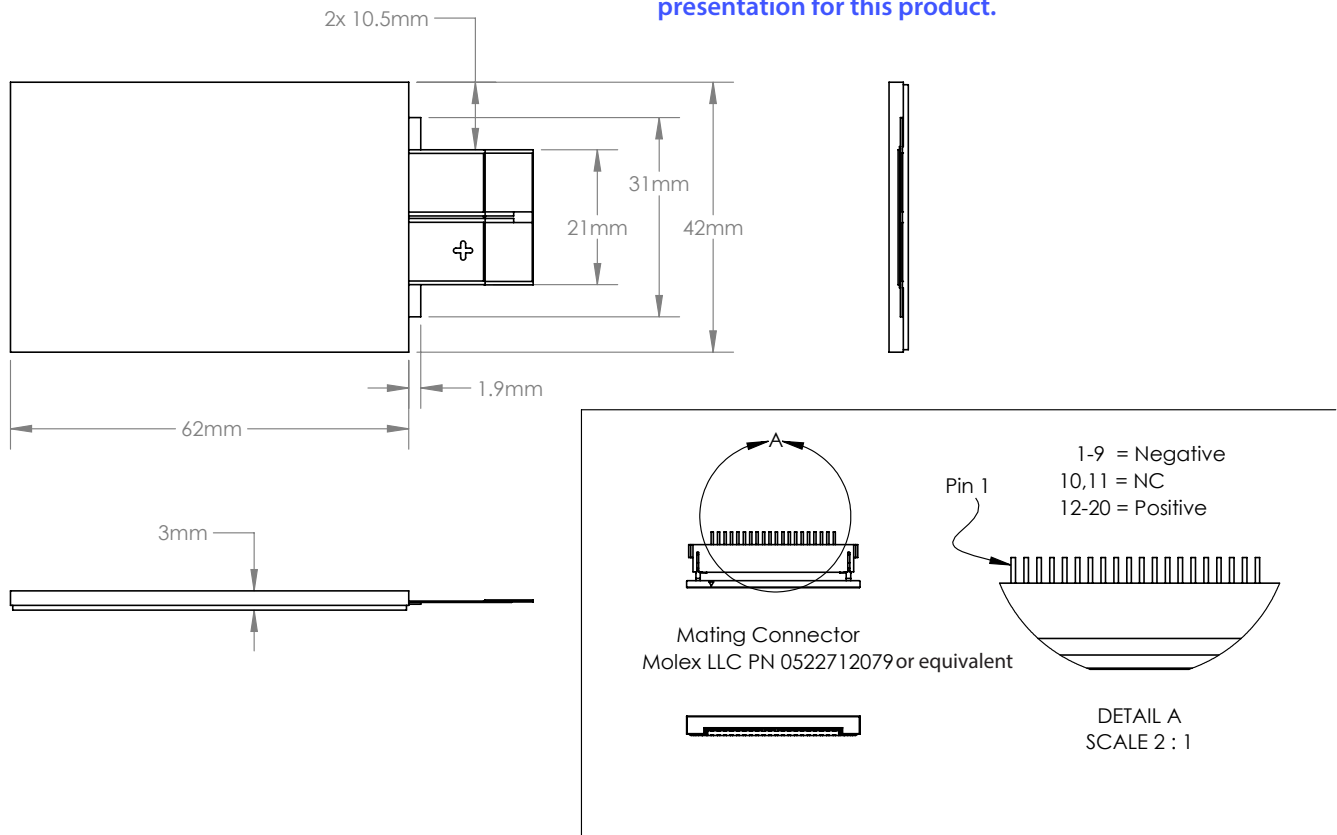
Available in a 2 mm and 3 mm thin package, type ULP offers the highest energy density available in an ultra-low profile aluminum electrolytic. It's ideal for the lowest profile circuits where high capacitance is needed for bulk storage. Save up to 70% board space compared to banks of SMT solid tantalum capacitors.

Highlights

- 2 mm or 3 mm thin package
- High energy density .4 J/cc
- 3000 hr life @ 85 °C with extensive testing
- 2000 hr life @ 105 °C pending completion of test
- REACH and RoHS compliant

[Click here for more information on the ULP and the Power Point presentation for this product.](#)

Outline Drawing


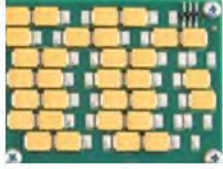




Ratings

Vdc	ULP (2mm)		ULP (3mm)	
	Cap (µF)	ESR @ 120Hz (mΩ)	Cap (µF)	ESR @ 120Hz (mΩ)
4	7,800	80	24,000	45
6.3	6,600	105	20,000	65
10	5,200	105	15,000	65
16	3,600	105	11,000	65
25	2,300	105	6,900	65
35	1,400	105	4,400	65
50	700	105	2,200	65
63	500	105	1,500	65

Type ULP, Ultra Low Profile Aluminum Electrolytic Capacitor, 85 °C
High Energy Density, REACH and RoHS Compliant

ULP vs. Ta Chips, V-Chips & Snap-in Comparisons

							
ULP (62 x 42 x 3)		Solid Tantalum Equivalent (D case) *		V Chip Equivalent		Snap-in Equivalent	
Capacitance	Rated Voltage	# of Solid Ta Chips	Cost Factor	# of (4 x 5.8)mm V-Chips	Cost Factor	# of (21 x 25)mm Snap-ins	Cost Factor
(μ F)	(Vdc)						
24,000	4	34	4X ULP	--		--	
20,000	6.3	60	7X ULP	468	7.5X ULP	2	0.5X ULP
15,000	10	64	7.5X ULP	515	8.5X ULP	2	1.2X ULP
11,000	16	104	12X ULP	545	9X ULP	1	0.3X ULP
6,900	25	145	16X ULP	760	12.5X ULP	2	0.5X ULP
4,400	35	186	22X ULP	480	8X ULP	1	0.2X ULP
2,200	50	208	24X ULP	510	8X ULP	1	0.3X ULP
1,500	63	--		--		1	0.25X ULP

* Factors for derating at max rated temperature

[Click here for more information on the ULP and the Power Point presentation for this product.](#)

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade



The Ultimate in Cold Performance and ESR

The Type 101C is the wide-temperature, low voltage version of the Type 550C. It is ideal for high-ripple current military and industrial applications that need full performance to -40 °C and solid performance to -55 °C. It also excels as a power-supply output capacitor because of its exceptionally low ESR. The extended cathode foil of the 101C assures heat flow from the capacitor element to the can in all mounting orientations.

Highlights

- 5,000 hour load life
- Ripple Current to > 100 amps @ 55 °C
- ESRs to 2.5 mΩ
- > 90% capacitance at -40 °C
- Thermal-Pak™ extended cathode construction

Specifications

Temperature Range	-55 °C to +105 °C																																																																																																
Rated Voltage Range	7.5 to 250 Vdc																																																																																																
Capacitance Range	290 µF to 1.5 F																																																																																																
Capacitance Tolerance	7.5 to 150 Vdc: -10% +75%, 200 & 250 Vdc: -10% +50%																																																																																																
Leakage Current	≤1.5 \sqrt{CV} µA, 4 mA max, 5 minutes																																																																																																
Ripple Current Multipliers	<p>Ambient Temperature</p> <table border="1"> <thead> <tr> <th></th> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> <th>95 °C</th> <th>105 °C</th> </tr> </thead> <tbody> <tr> <td></td> <td>1.66</td> <td>1.52</td> <td>1.37</td> <td>1.20</td> <td>1.00</td> <td>0.75</td> <td>0.36</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th rowspan="2">Frequency</th> <th>50 Hz</th> <th>60 Hz</th> <th>120 Hz</th> <th>360 Hz</th> <th>1 kHz</th> <th>5 kHz</th> <th>10 kHz & up</th> </tr> </thead> <tbody> <tr> <td colspan="8" style="text-align:center;">1 3/8" & 1 3/4" Diameters</td> </tr> <tr> <td>7.5 to 150 V</td> <td>0.91</td> <td>0.93</td> <td>1.00</td> <td>1.06</td> <td>1.08</td> <td>1.09</td> <td>1.09</td> </tr> <tr> <td>200 & 250 V</td> <td>0.82</td> <td>0.86</td> <td>1.00</td> <td>1.14</td> <td>1.20</td> <td>1.23</td> <td>1.23</td> </tr> <tr> <td colspan="8" style="text-align:center;">2" & 2 1/2" Diameters</td> </tr> <tr> <td>7.5 to 150 V</td> <td>0.92</td> <td>0.94</td> <td>1.00</td> <td>1.05</td> <td>1.07</td> <td>1.08</td> <td>1.08</td> </tr> <tr> <td>200 & 250 V</td> <td>0.82</td> <td>0.86</td> <td>1.00</td> <td>1.14</td> <td>1.20</td> <td>1.23</td> <td>1.27</td> </tr> <tr> <td colspan="8" style="text-align:center;">3" Diameters</td> </tr> <tr> <td>7.5 to 150 V</td> <td>0.95</td> <td>0.96</td> <td>1.00</td> <td>1.03</td> <td>1.04</td> <td>1.05</td> <td>1.05</td> </tr> <tr> <td>200 & 250 V</td> <td>0.85</td> <td>0.88</td> <td>1.00</td> <td>1.11</td> <td>1.15</td> <td>1.18</td> <td>1.18</td> </tr> </tbody> </table>		45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C		1.66	1.52	1.37	1.20	1.00	0.75	0.36	Frequency	50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & up	1 3/8" & 1 3/4" Diameters								7.5 to 150 V	0.91	0.93	1.00	1.06	1.08	1.09	1.09	200 & 250 V	0.82	0.86	1.00	1.14	1.20	1.23	1.23	2" & 2 1/2" Diameters								7.5 to 150 V	0.92	0.94	1.00	1.05	1.07	1.08	1.08	200 & 250 V	0.82	0.86	1.00	1.14	1.20	1.23	1.27	3" Diameters								7.5 to 150 V	0.95	0.96	1.00	1.03	1.04	1.05	1.05	200 & 250 V	0.85	0.88	1.00	1.11	1.15	1.18	1.18
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Low Temperature Characteristics	Impedance ratio: $Z_{-55°C} / Z_{+25°C} \leq 3$																																																																																																
Endurance Life Test	5,000 h at 105 °C and full load ΔCapacitance ±20% ESR 200% of limit DCL 100% of limit																																																																																																
Shelf Life Test	500 h at 105 °C Capacitance 100% of limit ESR 100% of limit DCL 100% of limit																																																																																																
Vibration	10 to 55 Hz, 0.06" and 10 g max, 1.5 h each of two axis																																																																																																
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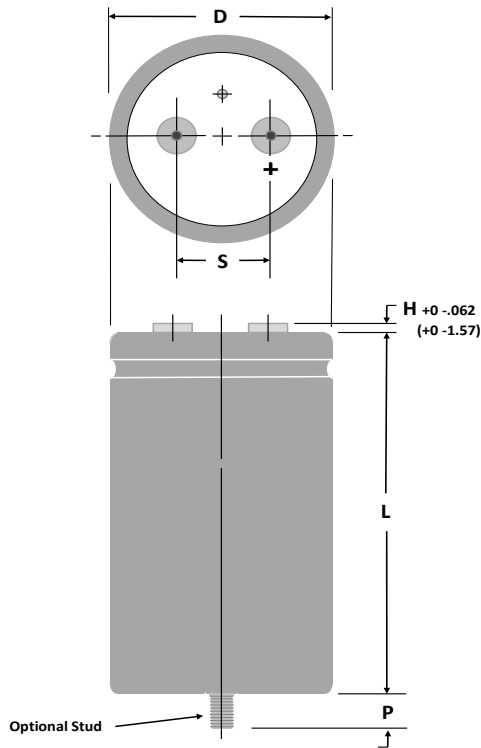
Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Part Numbering System

101C	183	T	250	DG	2	D	S
Type	Capacitance	Tolerance	Voltage	Case Code	Insulation	Terminal	Can Style
	100 = 10 μ F 101 = 100 μ F 183 = 18,000 μ F	M = \pm 20% U = -10%+75% T = -10%+50%	250 = 250 Vdc		0= None 1= Polyester 2= PVC	A = Low Post B = High Post D = High Current	Blank= Standard Can S= Stud Bottom P= Stud with Thermal Pad

Standard insulation is 0.008-in PVC sleeve with 0.01-in polypropylene end disk.

Outline Drawing



Stud Dimensions

Case Diam.	Stud Thread	P \pm 0.039" (\pm 1.0 mm)
1.375	M8	0.470" (12.0)
1.750	M8	0.470" (12.0)
2.000	M12	0.630" (16.0)
2.500	M12	0.630" (16.0)
3.000	M12	0.630" (16.0)

NOTE: With the stud-mount feature, a thermally-conductive disk can be inserted in the bottom flush with the outer insulating sleeve. This reduces the thermal resistance through the can bottom by 0.3 °C/W. Can Style P.

Terminal Dimensions

Terminal Style	For Case		Post Diameter		H max		min Full Thread Thread	min Full Thread		Torque	
	Diameters	Code	in	mm	in	mm		in	mm	in-lb	N-m
Low Post	1 $\frac{3}{8}$ to 3	A	0.314	8.0	0.094	2.4	10-32	0.218	5.5	25	2.82
High Post	1 $\frac{3}{8}$ to 3	B	0.314	8.0	0.281	7.1	10-32	0.375	9.5	25	2.82
High Current, Med	2 $\frac{1}{2}$ to 3	D	0.434	11.0	0.190	4.8	$\frac{1}{4}$ -28	0.312	7.9	50	5.65

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Uninsulated Case Dimensions

For insulated case, add 0.024"(0.610 mm) to "D" and 0.030"(0.762 mm) to length.

Case Code	Diam. (D)		Length (L)		Terminals (S)		Typical Weight	
	±.031	±.78	±.062	±1.57	±0.015	±.38		
	Inches	mm	Inches	mm	Inches	mm	oz	g
AK	1.375	34.93	1.625	41.28	0.50	12.70	1.9	54
AA	1.375	34.93	2.125	53.98	0.50	12.70	2.0	57
AH	1.375	34.93	2.625	66.68	0.50	12.70	2.7	77
AB	1.375	34.93	3.125	79.38	0.50	12.70	3.3	94
AJ	1.375	34.93	3.625	92.08	0.50	12.70	3.8	108
AC	1.375	34.93	4.125	104.78	0.50	12.70	4.4	125
AD	1.375	34.93	4.625	117.48	0.50	12.70	5.1	145
AE	1.375	34.93	5.125	130.18	0.50	12.70	6.8	193
AF	1.375	34.93	5.625	142.88	0.50	12.70	8.1	230
EA	1.750	44.45	2.125	53.98	0.75	19.05	2.7	76
EH	1.750	44.45	2.625	66.68	0.75	19.05	3.8	108
EB	1.750	44.45	3.125	79.38	0.75	19.05	5.1	145
EJ	1.750	44.45	3.625	92.08	0.75	19.05	6.8	193
EC	1.750	44.45	4.125	104.78	0.75	19.05	8.1	230
ED	1.750	44.45	4.625	117.48	0.75	19.05	9.0	255
EE	1.750	44.45	5.125	130.18	0.75	19.05	9.5	269
EF	1.750	44.45	5.625	142.88	0.75	19.05	10.5	298
BA	2.000	50.80	2.125	53.98	0.875	22.23	5.4	153
BH	2.000	50.80	2.625	66.68	0.875	22.23	6.1	173
BB	2.000	50.80	3.125	79.38	0.875	22.23	6.8	193
BJ	2.000	50.80	3.625	92.08	0.875	22.23	8.2	232
BC	2.000	50.80	4.125	104.78	0.875	22.23	9.5	269
BD	2.000	50.80	4.625	117.48	0.875	22.23	10.3	292
BE	2.000	50.80	5.125	130.18	0.875	22.23	10.7	303
BF	2.000	50.80	5.625	142.88	0.875	22.23	13.0	369
CH	2.500	63.50	2.625	66.68	1.125	28.58	9.2	261
CB	2.500	63.50	3.125	79.38	1.125	28.58	10.4	295
CJ	2.500	63.50	3.625	92.08	1.125	28.58	12.7	361
CC	2.500	63.50	4.125	104.78	1.125	28.58	15.0	425
CD	2.500	63.50	4.625	117.48	1.125	28.58	17.2	488
CE	2.500	63.50	5.125	130.18	1.125	28.58	19.3	547
CF	2.500	63.50	5.625	142.88	1.125	28.58	21.4	607
DB	3.000	76.20	3.125	79.38	1.25	31.75	16.7	473
DJ	3.000	76.20	3.625	92.08	1.25	31.75	20.0	567
DC	3.000	76.20	4.125	104.78	1.25	31.75	22.2	629
DD	3.000	76.20	4.625	117.48	1.25	31.75	25.5	723
DE	3.000	76.20	5.125	130.18	1.25	31.75	30.0	850
DF	3.000	76.20	5.625	142.88	1.25	31.75	31.9	904
DP	3.000	76.20	5.875	149.23	1.25	31.75	32.8	931
DN	3.000	76.20	7.625	193.68	1.25	31.75	39.5	1119
DG	3.000	76.20	8.625	219.08	1.25	31.75	43.3	1227

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Ratings

Cap. (µF)	Catalog Part Number	ESR Max		Ripple Max	Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	@ 85 °C Ripple (A)	
7.5 Vdc (10 Vdc Surge)					
28,000	101C283U7R5AK2B	38.2	6.1		1 3/8 x 1 5/8
47,000	101C473U7R5AA2B	25.0	8.7		1 3/8 x 2 1/8
66,000	101C663U7R5AH2B	19.0	11.4		1 3/8 x 2 5/8
79,000	101C793U7R5BA2B	18.3	14.0		2 x 2 1/8
84,000	101C843U7R5EA2B	22.6	11.6		1 3/4 x 2 1/8
84,000	101C843U7R5AB2B	15.4	13.8		1 3/8 x 3 1/8
100,000	101C104U7R5AJ2B	13.2	15.9		1 3/8 x 3 5/8
120,000	101C124U7R5EH2B	16.5	14.7		1 3/4 x 2 5/8
120,000	101C124U7R5BH2B	12.4	18.3		2 x 2 5/8
120,000	101C124U7R5AC2B	12.1	17.4		1 3/8 x 4 1/8
140,000	101C144U7R5AD2B	10.8	19.2		1 3/8 x 4 5/8
160,000	101C164U7R5EB2B	13.2	17.5		1 3/4 x 3 1/8
160,000	101C164U7R5AE2B	9.9	20.9		1 3/8 x 5 1/8
170,000	101C174U7R5BB2B	8.5	23.6		2 x 3 1/8
180,000	101C184U7R5AF2B	9.1	22.6		1 3/8 x 5 5/8
200,000	101C204U7R5EJ2B	11.1	20.1		1 3/4 x 3 5/8
210,000	101C214U7R5CH2B	9.4	24.2		2 1/2 x 2 5/8
220,000	101C224U7R5EC2B	8.2	24.4		1 3/4 x 4 1/8
220,000	101C224U7R5BJ2B	7.6	26.2		2 x 3 5/8
260,000	101C264U7R5BC2B	6.0	31.0		2 x 4 1/8
270,000	101C274U7R5ED2B	8.7	24.7		1 3/4 x 4 5/8
280,000	101C284U7R5CB2B	7.2	29.4		2 1/2 x 3 1/8
300,000	101C304U7R5BD2B	5.7	32.9		2 x 4 5/8
310,000	101C314U7R5EE2B	7.9	26.8		1 3/4 x 5 1/8
350,000	101C354U7R5EF2B	7.4	28.8		1 3/4 x 5 5/8
350,000	101C354U7R5BE2B	5.2	35.9		2 x 5 1/8
360,000	101C364U7R5CJ2D	5.9	34.2		2 1/2 x 3 5/8
390,000	101C394U7R5DB2D	7.1	33.1		3 x 3 1/8
390,000	101C394U7R5BF2B	4.9	38.2		2 x 5 5/8
430,000	101C434U7R5CC2D	4.2	42.4		2 1/2 x 4 1/8
490,000	101C494U7R5DJ2D	5.8	38.5		3 x 3 5/8
490,000	101C494U7R5CD2D	4.4	42.8		2 1/2 x 4 5/8
570,000	101C574U7R5CE2D	4.0	46.7		2 1/2 x 5 1/8
610,000	101C614U7R5DC2D	4.6	45.2		3 x 4 1/8
640,000	101C644U7R5CF2D	3.4	52.1		2 1/2 x 5 5/8
700,000	101C704U7R5DD2D	4.0	50.0		3 x 4 5/8
810,000	101C814U7R5DE2D	3.7	53.6		3 x 5 1/8
910,000	101C914U7R5DF2D	3.4	57.8		3 x 5 5/8
960,000	101C964U7R5DP2D	3.4	58.8		3 x 5 7/8
1,300,000	101C135U7R5DN2D	2.8	70.2		3 x 7 5/8
1,500,000	101C155U7R5DG2D	2.5	76.4		3 x 8 5/8

Cap. (µF)	Catalog Part Number	ESR Max		Ripple Max	Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	@ 85 °C Ripple (A)	
10 Vdc (15 Vdc Surge)					
25,000	101C253U010AK2B	36.0	6.2		1 3/8 x 1 5/8
41,000	101C413U010AA2B	23.9	8.9		1 3/8 x 2 1/8
58,000	101C583U010AH2B	18.1	11.7		1 3/8 x 2 5/8
68,000	101C683U010BA2B	17.8	14.2		2 x 2 1/8
69,000	101C693U010EA2B	22.8	11.6		1 3/4 x 2 1/8
74,000	101C743U010AB2B	14.6	14.2		1 3/8 x 3 1/8
89,000	101C893U010AJ2B	12.5	16.4		1 3/8 x 3 5/8
99,000	101C993U010EH2B	16.6	14.6		1 3/4 x 2 5/8
110,000	101C114U010BH2B	12.1	18.6		2 x 2 5/8
110,000	101C114U010AC2B	11.3	18.1		1 3/8 x 4 1/8
120,000	101C124U010AD2B	10.3	19.7		1 3/8 x 4 5/8
130,000	101C134U010EB2B	13.2	17.4		1 3/4 x 3 1/8
140,000	101C144U010AE2B	9.4	21.4		1 3/8 x 5 1/8
150,000	101C154U010BB2B	8.1	24.2		2 x 3 1/8
160,000	101C164U010EJ2B	11.1	20.0		1 3/4 x 3 5/8
160,000	101C164U010AF2B	8.7	23.1		1 3/8 x 5 5/8
180,000	101C184U010CH2B	9.2	24.5		2 1/2 x 2 5/8
180,000	101C184U010BJ2B	7.4	26.5		2 x 3 5/8
190,000	101C194U010EC2B	8.2	24.4		1 3/4 x 4 1/8
220,000	101C224U010ED2B	8.7	24.7		1 3/4 x 4 5/8
230,000	101C234U010BC2B	5.7	31.7		2 x 4 1/8
240,000	101C244U010CB2B	7.0	29.7		2 1/2 x 3 1/8
250,000	101C254U010EE2B	8.0	26.7		1 3/4 x 5 1/8
260,000	101C264U010BD2B	5.5	33.5		2 x 4 5/8
280,000	101C284U010EF2B	7.4	28.7		1 3/4 x 5 5/8
300,000	101C304U010CJ2D	5.7	34.6		2 1/2 x 3 5/8
300,000	101C304U010BE2B	5.0	36.5		2 x 5 1/8
340,000	101C344U010BF2B	4.7	38.9		2 x 5 5/8
360,000	101C364U010DB2D	7.0	33.4		3 x 3 1/8
370,000	101C374U010CC2D	4.0	43.0		2 1/2 x 4 1/8
430,000	101C434U010CD2D	4.3	43.5		2 1/2 x 4 5/8
450,000	101C454U010DJ2D	5.7	38.8		3 x 3 5/8
500,000	101C504U010CE2D	3.8	47.5		2 1/2 x 5 1/8
550,000	101C554U010DC2D	4.5	45.5		3 x 4 1/8
560,000	101C564U010CF2D	3.3	53.0		2 1/2 x 5 5/8
640,000	101C644U010DD2D	4.0	50.4		3 x 4 5/8
740,000	101C744U010DE2D	3.7	54.0		3 x 5 1/8
840,000	101C844U010DF2D	3.3	58.2		3 x 5 5/8
880,000	101C884U010DP2D	3.3	59.2		3 x 5 7/8
1,200,000	101C125U010DN2D	2.8	70.7		3 x 7 5/8
1,400,000	101C145U010DG2D	2.5	76.9		3 x 8 5/8

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Cap. (µF)	Catalog Part Number	ESR Max		Ripple Max		Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	
16 Vdc (25 Vdc Surge)						
16,000	101C163U016AK2B	39.2	6.0	1 3/8 x 1 5/8		
27,000	101C273U016AA2B	26.0	8.5	1 3/8 x 2 1/8		
38,000	101C383U016AH2B	20.0	11.1	1 3/8 x 2 5/8		
45,000	101C453U016BA2B	19.1	13.7	2 x 2 1/8		
46,000	101C463U016EA2B	24.3	11.2	1 3/4 x 2 1/8		
49,000	101C493U016AB2B	15.9	13.6	1 3/8 x 3 1/8		
59,000	101C593U016AJ2B	13.5	15.7	1 3/8 x 3 5/8		
66,000	101C663U016EH2B	17.7	14.2	1 3/4 x 2 5/8		
71,000	101C713U016BH2B	13.0	18.0	2 x 2 5/8		
73,000	101C733U016AC2B	12.2	17.4	1 3/8 x 4 1/8		
82,000	101C823U016AD2B	11.1	19.0	1 3/8 x 4 5/8		
86,000	101C863U016EB2B	14.1	16.9	1 3/4 x 3 1/8		
93,000	101C933U016AE2B	10.1	20.6	1 3/8 x 5 1/8		
100,000	101C104U016BB2B	8.6	23.4	2 x 3 1/8		
110,000	101C114U016EJ2B	11.8	19.4	1 3/4 x 3 5/8		
110,000	101C114U016AF2B	9.3	22.3	1 3/8 x 5 5/8		
120,000	101C124U016CH2B	9.8	23.7	2 1/2 x 2 5/8		
120,000	101C124U016BJ2B	8.0	25.7	2 x 3 5/8		
130,000	101C134U016EC2B	8.6	23.8	1 3/4 x 4 1/8		
150,000	101C154U016ED2B	9.2	24.0	1 3/4 x 4 5/8		
160,000	101C164U016CB2B	7.5	28.9	2 1/2 x 3 1/8		
160,000	101C164U016BC2B	6.0	30.9	2 x 4 1/8		
170,000	101C174U016EE2B	8.4	26.0	1 3/4 x 5 1/8		
170,000	101C174U016BD2B	5.9	32.5	2 x 4 5/8		
190,000	101C194U016EF2B	7.8	28.0	1 3/4 x 5 5/8		
200,000	101C204U016CJ2D	6.1	33.6	2 1/2 x 3 5/8		
200,000	101C204U016BE2B	5.3	35.4	2 x 5 1/8		
230,000	101C234U016BF2B	4.9	38.0	2 x 5 5/8		
240,000	101C244U016DB2D	7.3	32.7	3 x 3 1/8		
250,000	101C254U016CC2D	4.3	41.9	2 1/2 x 4 1/8		
290,000	101C294U016CD2D	4.5	42.3	2 1/2 x 4 5/8		
300,000	101C304U016DJ2D	5.9	38.1	3 x 3 5/8		
330,000	101C334U016CE2D	4.0	46.2	2 1/2 x 5 1/8		
360,000	101C364U016DC2D	4.7	44.6	3 x 4 1/8		
370,000	101C374U016CF2D	3.4	51.6	2 1/2 x 5 5/8		
430,000	101C434U016DD2D	4.1	49.5	3 x 4 5/8		
490,000	101C494U016DE2D	3.8	53.0	3 x 5 1/8		
560,000	101C564U016DF2D	3.5	57.2	3 x 5 5/8		
590,000	101C594U016DP2D	3.4	58.2	3 x 5 7/8		
800,000	101C804U016DN2D	2.9	69.6	3 x 7 5/8		
920,000	101C924U016DG2D	2.6	75.8	3 x 8 5/8		

Cap. (µF)	Catalog Part Number	ESR Max		Ripple Max		Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	
20 Vdc (30 Vdc Surge)						
13,000	101C133U020AK2B	39.2	6.0	1 3/8 x 1 5/8		
21,000	101C213U020AA2B	26.0	8.5	1 3/8 x 2 1/8		
29,000	101C293U020AH2B	20.0	11.1	1 3/8 x 2 5/8		
34,000	101C343U020BA2B	19.1	13.7	2 x 2 1/8		
35,000	101C353U020EA2B	24.3	11.2	1 3/4 x 2 1/8		
38,000	101C383U020AB2B	15.9	13.6	1 3/8 x 3 1/8		
45,000	101C453U020AJ2B	13.5	15.7	1 3/8 x 3 5/8		
50,000	101C503U020EH2B	17.7	14.2	1 3/4 x 2 5/8		
54,000	101C543U020BH2B	13.0	18.0	2 x 2 5/8		
55,000	101C553U020AC2B	12.2	17.4	1 3/8 x 4 1/8		
62,000	101C623U020AD2B	11.1	19.0	1 3/8 x 4 5/8		
66,000	101C663U020EB2B	14.1	16.9	1 3/4 x 3 1/8		
71,000	101C713U020AE2B	10.1	20.6	1 3/8 x 5 1/8		
77,000	101C773U020BB2B	8.6	23.4	2 x 3 1/8		
80,000	101C803U020AF2B	9.3	22.3	1 3/8 x 5 5/8		
81,000	101C813U020EJ2B	11.8	19.4	1 3/4 x 3 5/8		
89,000	101C893U020CH2B	9.8	23.7	2 1/2 x 2 5/8		
94,000	101C943U020BJ2B	8.0	25.7	2 x 3 5/8		
98,000	101C983U020EC2B	8.6	23.8	1 3/4 x 4 1/8		
110,000	101C114U020ED2B	9.2	24.0	1 3/4 x 4 5/8		
120,000	101C124U020CB2B	7.5	28.9	2 1/2 x 3 1/8		
120,000	101C124U020BC2B	6.0	30.9	2 x 4 1/8		
130,000	101C134U020EE2B	8.4	26.0	1 3/4 x 5 1/8		
130,000	101C134U020BD2B	5.9	32.5	2 x 4 5/8		
140,000	101C144U020EF2B	7.8	28.0	1 3/4 x 5 5/8		
150,000	101C154U020CJ2D	6.1	33.6	2 1/2 x 3 5/8		
150,000	101C154U020BE2B	5.3	35.4	2 x 5 1/8		
180,000	101C184U020DB2D	7.3	32.7	3 x 3 1/8		
180,000	101C184U020BF2B	4.9	38.0	2 x 5 5/8		
190,000	101C194U020CC2D	4.3	41.9	2 1/2 x 4 1/8		
220,000	101C224U020CD2D	4.5	42.3	2 1/2 x 4 5/8		
230,000	101C234U020DJ2D	5.9	38.1	3 x 3 5/8		
250,000	101C254U020CE2D	4.0	46.2	2 1/2 x 5 1/8		
280,000	101C284U020DC2D	4.7	44.6	3 x 4 1/8		
280,000	101C284U020CF2D	3.4	51.6	2 1/2 x 5 5/8		
330,000	101C334U020DD2D	4.1	49.5	3 x 4 5/8		
380,000	101C384U020DE2D	3.8	53.0	3 x 5 1/8		
420,000	101C424U020DF2D	3.5	57.2	3 x 5 5/8		
450,000	101C454U020DP2D	3.4	58.2	3 x 5 7/8		
610,000	101C614U020DN2D	2.9	69.6	3 x 7 5/8		
710,000	101C714U020DG2D	2.6	75.5	3 x 8 5/8		

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Cap. (µF)	Catalog Part Number	ESR Max	Ripple Max	Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	
25 Vdc (40 Vdc Surge)				
9,900	101C992U025AK2B	42.6	5.7	1 3/8 x 1 5/8
16,000	101C163U025AA2B	28.2	8.2	1 3/8 x 2 1/8
23,000	101C233U025AH2B	20.9	10.8	1 3/8 x 2 5/8
27,000	101C273U025EA2B	25.1	11.0	1 3/4 x 2 1/8
27,000	101C273U025BA2B	19.9	13.5	2 x 2 1/8
30,000	101C303U025AB2B	16.6	13.3	1 3/8 x 3 1/8
35,000	101C353U025AJ2B	14.2	15.4	1 3/8 x 3 5/8
39,000	101C393U025EH2B	18.3	13.9	1 3/4 x 2 5/8
42,000	101C423U025BH2B	13.5	17.6	2 x 2 5/8
43,000	101C433U025AC2B	12.7	17.0	1 3/8 x 4 1/8
49,000	101C493U025AD2B	11.6	18.6	1 3/8 x 4 5/8
52,000	101C523U025EB2B	14.5	16.6	1 3/4 x 3 1/8
56,000	101C563U025AE2B	10.6	20.2	1 3/8 x 5 1/8
60,000	101C603U025BB2B	9.0	22.9	2 x 3 1/8
63,000	101C633U025AF2B	9.7	21.9	1 3/8 x 5 5/8
64,000	101C643U025EJ2B	12.2	19.1	1 3/4 x 3 5/8
70,000	101C703U025CH2B	10.1	23.3	2 1/2 x 2 5/8
73,000	101C733U025BJ2B	8.3	25.2	2 x 3 5/8
77,000	101C773U025EC2B	9.9	22.2	1 3/4 x 4 1/8
88,000	101C883U025ED2B	9.5	23.6	1 3/4 x 4 5/8
90,000	101C903U025BC2B	6.4	30.0	2 x 4 1/8
95,000	101C953U025CB2B	7.7	28.4	2 1/2 x 3 1/8
100,000	101C104U025EE2B	8.6	25.7	1 3/4 x 5 1/8
100,000	101C104U025BD2B	6.1	31.9	2 x 4 5/8
110,000	101C114U025EF2B	8.0	27.6	1 3/4 x 5 5/8
120,000	101C124U025CJ2D	6.3	33.1	2 1/2 x 3 5/8
120,000	101C124U025BE2B	5.5	34.8	2 x 5 1/8
140,000	101C144U025DB2D	7.4	32.4	3 x 3 1/8
140,000	101C144U025BF2B	5.1	37.4	2 x 5 5/8
150,000	101C154U025CC2D	4.5	40.6	2 1/2 x 4 1/8
170,000	101C174U025CD2D	4.7	41.6	2 1/2 x 4 5/8
180,000	101C184U025DJ2D	6.0	37.7	3 x 3 5/8
200,000	101C204U025CE2D	4.2	45.5	2 1/2 x 5 1/8
220,000	101C224U025DC2D	4.8	44.1	3 x 4 1/8
220,000	101C224U025CF2D	3.6	50.3	2 1/2 x 5 5/8
260,000	101C264U025DD2D	4.5	47.3	3 x 4 5/8
290,000	101C294U025DE2D	4.0	51.6	3 x 5 1/8
330,000	101C334U025DF2D	3.5	56.7	3 x 5 5/8
350,000	101C354U025DP2D	3.5	57.7	3 x 5 7/8
480,000	101C484U025DN2D	2.9	69.0	3 x 7 5/8
550,000	101C554U025DG2D	2.6	75.2	3 x 8 5/8

Cap. (µF)	Catalog Part Number	ESR Max	Ripple Max	Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	
30 Vdc (45 Vdc Surge)				
5,400	101C542U030AK2B	43.9	5.6	1 3/8 x 1 5/8
13,000	101C133U030AA2B	29.8	8.0	1 3/8 x 2 1/8
19,000	101C193U030AH2B	21.4	10.7	1 3/8 x 2 5/8
23,000	101C233U030EA2B	23.1	11.5	1 3/4 x 2 1/8
23,000	101C233U030BA2B	18.8	13.8	2 x 2 1/8
24,000	101C243U030AB2B	16.0	13.6	1 3/8 x 3 1/8
30,000	101C303U030AJ2B	14.1	15.4	1 3/8 x 3 5/8
33,000	101C333U030EH2B	16.9	14.5	1 3/4 x 2 5/8
36,000	101C363U030AC2B	13.0	16.8	1 3/8 x 4 1/8
36,000	101C363U030BH2B	12.8	18.1	2 x 2 5/8
41,000	101C413U030AD2B	11.6	18.6	1 3/8 x 4 5/8
44,000	101C443U030EB2B	13.4	17.3	1 3/4 x 3 1/8
47,000	101C473U030AE2B	10.6	20.2	1 3/8 x 5 1/8
49,000	101C493U030BB2B	8.7	23.3	2 x 3 1/8
53,000	101C533U030AF2B	9.8	21.8	1 3/8 x 5 5/8
54,000	101C543U030EJ2B	11.3	19.9	1 3/4 x 3 5/8
59,000	101C593U030CH2B	9.3	24.4	2 1/2 x 2 5/8
62,000	101C623U030BJ2B	7.8	25.8	2 x 3 5/8
64,000	101C643U030EC2B	9.2	23.0	1 3/4 x 4 1/8
75,000	101C753U030ED2B	8.4	25.1	1 3/4 x 4 5/8
75,000	101C753U030BC2B	6.3	30.1	2 x 4 1/8
81,000	101C813U030CB2B	7.1	29.7	2 1/2 x 3 1/8
85,000	101C853U030EE2B	7.9	26.9	1 3/4 x 5 1/8
88,000	101C883U030BD2B	5.8	32.7	2 x 4 5/8
95,000	101C953U030EF2B	7.5	28.5	1 3/4 x 5 5/8
100,000	101C104U030CJ2D	5.7	34.6	2 1/2 x 3 5/8
100,000	101C104U030BE2B	5.2	35.6	2 x 5 1/8
110,000	101C114U030BF2B	4.8	38.4	2 x 5 5/8
120,000	101C124U030DB2D	7.0	33.3	3 x 3 1/8
120,000	101C124U030CC2D	4.7	40.0	2 1/2 x 4 1/8
150,000	101C154U030DJ2D	5.7	38.7	3 x 3 5/8
150,000	101C154U030CD2D	4.3	43.4	2 1/2 x 4 5/8
170,000	101C174U030CE2D	3.8	47.4	2 1/2 x 5 1/8
180,000	101C184U030DC2D	4.8	43.9	3 x 4 1/8
190,000	101C194U030CF2D	3.5	51.2	2 1/2 x 5 5/8
220,000	101C224U030DD2D	4.3	48.5	3 x 4 5/8
250,000	101C254U030DE2D	3.8	52.8	3 x 5 1/8
280,000	101C284U030DF2D	3.5	56.9	3 x 5 5/8
300,000	101C304U030DP2D	3.4	58.8	3 x 5 7/8
410,000	101C414U030DN2D	2.9	69.5	3 x 7 5/8
470,000	101C474U030DG2D	2.6	75.8	3 x 8 5/8

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Cap. (µF)	Catalog Part Number	ESR Max	Ripple Max	Nominal Size D x L (in)
		@ 25 °C	@ 85 °C	
		120 Hz (mΩ)	120 Hz (A)	
40 Vdc (55 Vdc Surge)				
5,400	101C542U040AK2B	47.6	5.4	1 3/8 x 1 5/8
9,000	101C902U040AA2B	32.3	7.6	1 3/8 x 2 1/8
13,000	101C133U040AH2B	23.1	10.3	1 3/8 x 2 5/8
16,000	101C163U040EA2B	26.6	10.7	1 3/4 x 2 1/8
16,000	101C163U040BA2B	21.2	13.0	2 x 2 1/8
17,000	101C173U040AB2B	17.3	13.1	1 3/8 x 3 1/8
21,000	101C213U040AJ2B	15.2	14.8	1 3/8 x 3 5/8
23,000	101C233U040EH2B	19.3	13.5	1 3/4 x 2 5/8
25,000	101C253U040BH2B	14.3	17.1	2 x 2 5/8
25,000	101C253U040AC2B	14.0	16.2	1 3/8 x 4 1/8
29,000	101C293U040AD2B	12.4	17.9	1 3/8 x 4 5/8
30,000	101C303U040EB2B	15.4	16.2	1 3/4 x 3 1/8
33,000	101C333U040AE2B	11.3	19.6	1 3/8 x 5 1/8
34,000	101C343U040BB2B	9.8	22.0	2 x 3 1/8
37,000	101C373U040EJ2B	12.9	18.6	1 3/4 x 3 5/8
37,000	101C373U040AF2B	10.4	21.1	1 3/8 x 5 5/8
41,000	101C413U040CH2B	10.7	22.7	2 1/2 x 2 5/8
43,000	101C433U040BJ2B	8.8	24.4	2 x 3 5/8
45,000	101C453U040EC2B	10.5	21.6	1 3/4 x 4 1/8
52,000	101C523U040ED2B	9.5	23.6	1 3/4 x 4 5/8
52,000	101C523U040BC2B	7.1	28.5	2 x 4 1/8
56,000	101C563U040CB2B	8.1	27.6	2 1/2 x 3 1/8
59,000	101C593U040EE2B	8.9	25.4	1 3/4 x 5 1/8
61,000	101C613U040BD2B	6.5	31.0	2 x 4 5/8
66,000	101C663U040EF2B	8.4	26.9	1 3/4 x 5 5/8
70,000	101C703U040BE2B	5.8	33.8	2 x 5 1/8
71,000	101C713U040CJ2D	6.6	32.2	2 1/2 x 3 5/8
79,000	101C793U040BF2B	5.3	36.5	2 x 5 5/8
83,000	101C833U040DB2D	8.6	30.1	3 x 3 1/8
86,000	101C863U040CC2D	5.4	37.3	2 1/2 x 4 1/8
100,000	101C104U040CD2D	4.9	40.6	2 1/2 x 4 5/8
110,000	101C114U040DJ2D	7.0	35.1	3 x 3 5/8
120,000	101C124U040CE2D	4.4	44.4	2 1/2 x 5 1/8
130,000	101C134U040DC2D	5.3	41.9	3 x 4 1/8
130,000	101C134U040CF2D	4.0	48.0	2 1/2 x 5 5/8
150,000	101C154U040DD2D	5.2	44.0	3 x 4 5/8
170,000	101C174U040DE2D	4.6	48.1	3 x 5 1/8
190,000	101C194U040DF2D	4.2	51.9	3 x 5 5/8
210,000	101C214U040DP2D	4.0	53.8	3 x 5 7/8
280,000	101C284U040DN2D	3.4	63.9	3 x 7 5/8
330,000	101C334U040DG2D	3.0	69.9	3 x 8 5/8

Cap. (µF)	Catalog Part Number	ESR Max	Ripple Max	Nominal Size D x L (in)
		@ 25 °C	@ 85 °C	
		120 Hz (mΩ)	120 Hz (A)	
50 Vdc (75 Vdc Surge)				
3,800	101C382U050AK2B	48.4	5.4	1 3/8 x 1 5/8
7,000	101C702U050AA2B	30.8	7.8	1 3/8 x 2 1/8
10,000	101C103U050AH2B	22.0	10.5	1 3/8 x 2 5/8
12,000	101C123U050EA2B	26.5	10.7	1 3/4 x 2 1/8
12,000	101C123U050BA2B	20.8	13.2	2 x 2 1/8
13,000	101C133U050AB2B	17.5	13.0	1 3/8 x 3 1/8
16,000	101C163U050AJ2B	14.6	15.2	1 3/8 x 3 5/8
18,000	101C183U050EH2B	19.3	13.6	1 3/4 x 2 5/8
19,000	101C193U050BH2B	14.1	17.2	2 x 2 5/8
19,000	101C193U050AC2B	13.4	16.6	1 3/8 x 4 1/8
22,000	101C223U050AD2B	11.9	18.3	1 3/8 x 4 5/8
24,000	101C243U050EB2B	15.3	16.2	1 3/4 x 3 1/8
25,000	101C253U050AE2B	10.8	20.0	1 3/8 x 5 1/8
27,000	101C273U050BB2B	9.6	22.2	2 x 3 1/8
29,000	101C293U050EJ2B	12.8	18.6	1 3/4 x 3 5/8
29,000	101C293U050AF2B	10.0	21.5	1 3/8 x 5 5/8
32,000	101C323U050CH2B	9.6	24.0	2 1/2 x 2 5/8
34,000	101C343U050BJ2B	8.6	24.6	2 x 3 5/8
35,000	101C353U050EC2B	10.5	21.6	1 3/4 x 4 1/8
40,000	101C403U050ED2B	9.5	23.6	1 3/4 x 4 5/8
41,000	101C413U050BC2B	7.2	28.2	2 x 4 1/8
44,000	101C443U050CB2B	8.2	27.6	2 1/2 x 3 1/8
46,000	101C463U050EE2B	8.8	25.4	1 3/4 x 5 1/8
48,000	101C483U050BD2B	6.3	31.2	2 x 4 5/8
52,000	101C523U050EF2B	8.4	27.0	1 3/4 x 5 5/8
55,000	101C553U050CJ2D	6.6	32.2	2 1/2 x 3 5/8
55,000	101C553U050BE2B	5.7	34.1	2 x 5 1/8
62,000	101C623U050BF2B	5.2	36.8	2 x 5 5/8
65,000	101C653U050DB2B	8.9	29.5	3 x 3 1/8
67,000	101C673U050CC2D	5.4	37.3	2 1/2 x 4 1/8
79,000	101C793U050CD2D	4.9	40.5	2 1/2 x 4 5/8
83,000	101C833U050DJ2D	7.3	34.4	3 x 3 5/8
90,000	101C903U050CE2D	4.4	44.3	2 1/2 x 5 1/8
100,000	101C104U050DC2D	5.5	41.1	3 x 4 1/8
100,000	101C104U050CF2D	4.0	47.9	2 1/2 x 5 5/8
120,000	101C124U050DD2D	5.4	43.2	3 x 4 5/8
130,000	101C134U050DE2D	4.8	47.2	3 x 5 1/8
150,000	101C154U050DF2D	4.4	51.0	3 x 5 5/8
160,000	101C164U050DP2D	4.2	52.9	3 x 5 7/8
220,000	101C224U050DN2D	3.5	63.0	3 x 7 5/8
260,000	101C264U050DG2D	3.1	69.0	3 x 8 5/8

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Cap. (µF)	Catalog Part Number	ESR Max		Ripple Max		Nominal Size D x L (in)
		@ 25 °C	@ 85 °C	@ 25 °C	@ 85 °C	
		120 Hz (mΩ)	120 Hz (A)	120 Hz (mΩ)	120 Hz (A)	
63 Vdc (85 Vdc Surge)						
2,800	101C282U063AK2B	57.9	4.9	1 3/8 x 1 5/8		
5,000	101C502U063AA2B	35.5	7.3	1 3/8 x 2 1/8		
7,200	101C722U063AH2B	25.8	9.8	1 3/8 x 2 5/8		
8,800	101C882U063BA2B	22.8	12.6	2 x 2 1/8		
8,900	101C892U063EA2B	28.0	10.4	1 3/4 x 2 1/8		
9,400	101C942U063AB2B	20.4	12.0	1 3/8 x 3 1/8		
12,000	101C123U063AJ2B	17.1	14.0	1 3/8 x 3 5/8		
13,000	101C133U063EH2B	20.4	13.2	1 3/4 x 2 5/8		
14,000	101C143U063BH2B	15.4	16.5	2 x 2 5/8		
14,000	101C143U063AC2B	14.8	15.8	1 3/8 x 4 1/8		
16,000	101C163U063AD2B	13.2	17.4	1 3/8 x 4 5/8		
17,000	101C173U063EB2B	16.1	15.8	1 3/4 x 3 1/8		
18,000	101C183U063AE2B	12.0	19.0	1 3/8 x 5 1/8		
19,000	101C193U063BB2B	10.2	21.5	2 x 3 1/8		
20,000	101C203U063AF2B	11.0	20.5	1 3/8 x 5 5/8		
21,000	101C213U063EJ2B	13.5	18.2	1 3/4 x 3 5/8		
23,000	101C233U063CH2B	11.3	22.1	2 1/2 x 2 5/8		
24,000	101C243U063BJ2B	9.6	23.4	2 x 3 5/8		
25,000	101C253U063EC2B	11.0	21.1	1 3/4 x 4 1/8		
29,000	101C293U063ED2B	10.0	23.0	1 3/4 x 4 5/8		
29,000	101C293U063BC2B	8.2	26.4	2 x 4 1/8		
31,000	101C313U063CB2B	8.6	26.9	2 1/2 x 3 1/8		
33,000	101C333U063EE2B	9.3	24.8	1 3/4 x 5 1/8		
34,000	101C343U063BD2B	7.2	29.3	2 x 4 5/8		
37,000	101C373U063EF2B	8.8	26.3	1 3/4 x 5 5/8		
39,000	101C393U063BE2B	6.5	32.0	2 x 5 1/8		
40,000	101C403U063CJ2D	7.0	31.4	2 1/2 x 3 5/8		
44,000	101C443U063BF2B	5.9	34.6	2 x 5 5/8		
47,000	101C473U063DB2B	9.3	29.0	3 x 3 1/8		
48,000	101C483U063CC2D	5.6	36.4	2 1/2 x 4 1/8		
56,000	101C563U063CD2D	5.2	39.5	2 1/2 x 4 5/8		
59,000	101C593U063DJ2D	7.5	33.8	3 x 3 5/8		
65,000	101C653U063CE2D	4.6	43.3	2 1/2 x 5 1/8		
72,000	101C723U063DC2D	6.0	39.5	3 x 4 1/8		
73,000	101C733U063CF2D	4.2	46.8	2 1/2 x 5 5/8		
84,000	101C843U063DD2D	5.6	42.5	3 x 4 5/8		
97,000	101C973U063DE2D	5.0	46.5	3 x 5 1/8		
110,000	101C114U063DF2D	4.5	50.2	3 x 5 5/8		
120,000	101C124U063DP2D	4.3	52.0	3 x 5 7/8		
160,000	101C164U063DN2D	3.6	62.2	3 x 7 5/8		
180,000	101C184U063DG2D	3.2	68.2	3 x 8 5/8		

Cap. (µF)	Catalog Part Number	ESR Max		Ripple Max		Nominal Size D x L (in)
		@ 25 °C	@ 85 °C	@ 25 °C	@ 85 °C	
		120 Hz (mΩ)	120 Hz (A)	120 Hz (mΩ)	120 Hz (A)	
75 Vdc (100 Vdc Surge)						
2,100	101C212U075AK2B	97.3	3.8	1 3/8 x 1 5/8		
3,600	101C362U075AA2B	67.2	5.3	1 3/8 x 2 1/8		
5,200	101C522U075AH2B	50.0	7.0	1 3/8 x 2 5/8		
6,400	101C642U075BA2B	40.7	9.4	2 x 2 1/8		
6,500	101C652U075EA2B	47.5	8.0	1 3/4 x 2 1/8		
6,800	101C682U075AB2B	39.3	8.7	1 3/8 x 3 1/8		
8,400	101C842U075AJ2B	32.5	10.1	1 3/8 x 3 5/8		
9,400	101C942U075EH2B	34.2	10.2	1 3/4 x 2 5/8		
10,000	101C103U075AC2B	27.9	11.5	1 3/8 x 4 1/8		
10,000	101C103U075BH2B	27.4	12.4	2 x 2 5/8		
12,000	101C123U075EB2B	27.0	12.2	1 3/4 x 3 1/8		
12,000	101C123U075AD2B	24.5	12.8	1 3/8 x 4 5/8		
13,000	101C133U075AE2B	22.0	14.0	1 3/8 x 5 1/8		
14,000	101C143U075BB2B	18.0	16.2	2 x 3 1/8		
15,000	101C153U075EJ2B	22.4	14.1	1 3/4 x 3 5/8		
15,000	101C153U075AF2B	20.0	15.2	1 3/8 x 5 5/8		
17,000	101C173U075CH2B	18.9	17.1	2 1/2 x 2 5/8		
17,000	101C173U075BJ2B	16.8	17.7	2 x 3 5/8		
18,000	101C183U075EC2B	18.0	16.5	1 3/4 x 4 1/8		
21,000	101C213U075ED2B	16.2	18.1	1 3/4 x 4 5/8		
21,000	101C213U075BC2B	12.7	21.2	2 x 4 1/8		
23,000	101C233U075CB2B	14.3	20.8	2 1/2 x 3 1/8		
24,000	101C243U075EE2B	14.8	19.6	1 3/4 x 5 1/8		
25,000	101C253U075BD2B	12.3	22.4	2 x 4 5/8		
27,000	101C273U075EF2B	13.9	20.9	1 3/4 x 5 5/8		
28,000	101C283U075BE2B	11.0	24.6	2 x 5 1/8		
29,000	101C293U075CJ2B	11.5	24.4	2 1/2 x 3 5/8		
32,000	101C323U075BF2B	9.9	26.7	2 x 5 5/8		
34,000	101C343U075DB2B	13.3	24.2	3 x 3 1/8		
35,000	101C353U075CC2B	8.7	29.4	2 1/2 x 4 1/8		
41,000	101C413U075CD2D	8.4	30.9	2 1/2 x 4 5/8		
43,000	101C433U075DJ2B	10.8	28.2	3 x 3 5/8		
47,000	101C473U075CE2D	7.5	34.0	2 1/2 x 5 1/8		
52,000	101C523U075DC2D	7.6	35.0	3 x 4 1/8		
53,000	101C533U075CF2D	6.7	36.9	2 1/2 x 5 5/8		
61,000	101C613U075DD2D	7.9	35.7	3 x 4 5/8		
70,000	101C703U075DE2D	6.1	42.0	3 x 5 1/8		
79,000	101C793U075DF2D	6.0	43.5	3 x 5 5/8		
83,000	101C833U075DP2D	5.7	45.1	3 x 5 7/8		
110,000	101C114U075DN2D	4.7	54.7	3 x 7 5/8		
130,000	101C134U075DG2D	4.1	60.3	3 x 8 5/8		

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Cap. (µF)	Catalog Part Number	ESR Max Ripple Max		Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	
100 Vdc (150 Vdc Surge)				
1,300	101C132U100AK2B	115.6	3.5	1 3/8 x 1 5/8
2,300	101C232U100AA2B	79.9	4.9	1 3/8 x 2 1/8
3,400	101C342U100AH2B	59.4	6.4	1 3/8 x 2 5/8
4,100	101C412U100BA2B	47.6	8.7	2 x 2 1/8
4,200	101C422U100EA2B	55.0	7.4	1 3/4 x 2 1/8
4,400	101C442U100AB2B	46.6	8.0	1 3/8 x 3 1/8
5,400	101C542U100AJ2B	38.5	9.3	1 3/8 x 3 5/8
6,100	101C612U100EH2B	39.6	9.5	1 3/4 x 2 5/8
6,500	101C652U100AC2B	32.9	10.6	1 3/8 x 4 1/8
6,500	101C652U100BH2B	32.0	11.4	2 x 2 5/8
7,500	101C752U100AD2B	28.9	11.8	1 3/8 x 4 5/8
7,900	101C792U100EB2B	31.1	11.4	1 3/4 x 3 1/8
8,500	101C852U100AE2B	25.8	12.9	1 3/8 x 5 1/8
8,900	101C892U100BB2B	21.0	15.0	2 x 3 1/8
9,600	101C962U100AF2B	23.4	14.1	1 3/8 x 5 5/8
9,800	101C982U100EJ2B	25.8	13.2	1 3/4 x 3 5/8
11,000	101C113U100CH2B	20.7	16.3	2 1/2 x 2 5/8
11,000	101C113U100BJ2B	19.5	16.4	2 x 3 5/8
12,000	101C123U100EC2B	20.7	15.4	1 3/4 x 4 1/8
14,000	101C143U100ED2B	18.6	16.9	1 3/4 x 4 5/8
14,000	101C143U100BC2B	14.8	19.7	2 x 4 1/8
15,000	101C153U100EE2B	17.0	18.3	1 3/4 x 5 1/8
15,000	101C153U100CB2B	16.5	19.4	2 1/2 x 3 1/8
16,000	101C163U100BD2B	14.3	20.8	2 x 4 5/8
17,000	101C173U100EF2B	15.9	19.6	1 3/4 x 5 5/8
18,000	101C183U100BE2B	12.7	22.9	2 x 5 1/8
19,000	101C193U100CJ2B	13.3	22.7	2 1/2 x 3 5/8
21,000	101C213U100BF2B	11.4	24.9	2 x 5 5/8
22,000	101C223U100DB2B	13.8	23.8	3 x 3 1/8
22,000	101C223U100CC2B	10.0	27.4	2 1/2 x 4 1/8
26,000	101C263U100CD2B	9.7	28.9	2 1/2 x 4 5/8
28,000	101C283U100DJ2B	11.2	27.7	3 x 3 5/8
30,000	101C303U100CE2D	8.6	31.7	2 1/2 x 5 1/8
34,000	101C343U100DC2D	8.5	33.2	3 x 4 1/8
34,000	101C343U100CF2D	7.7	34.5	2 1/2 x 5 5/8
39,000	101C393U100DD2D	7.9	35.7	3 x 4 5/8
45,000	101C453U100DE2D	6.5	40.5	3 x 5 1/8
51,000	101C513U100DF2D	6.0	43.5	3 x 5 5/8
54,000	101C543U100DP2D	6.0	44.1	3 x 5 7/8
74,000	101C743U100DN2D	4.8	54.0	3 x 7 5/8
85,000	101C853U100DG2D	4.2	59.2	3 x 8 5/8

Cap. (µF)	Catalog Part Number	ESR Max Ripple Max		Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	
150 Vdc (200 Vdc Surge)				
490	101C491U150AK2B	433.1	2.1	1 3/8 x 1 5/8
880	101C881U150AA2B	241.1	3.1	1 3/8 x 2 1/8
1,200	101C122U150EA2B	198.9	3.9	1 3/4 x 2 1/8
1,300	101C132U150AH2B	163.2	4.0	1 3/8 x 2 5/8
1,500	101C152U150BA2B	159.2	4.8	2 x 2 1/8
1,700	101C172U150AB2B	124.8	4.9	1 3/8 x 3 1/8
1,800	101C182U150EH2B	132.6	5.2	1 3/4 x 2 5/8
1,900	101C192U150AJ2B	111.7	5.5	1 3/8 x 3 5/8
2,300	101C232U150BH2B	103.8	6.3	2 x 2 5/8
2,500	101C252U150EB2B	95.5	6.5	1 3/4 x 3 1/8
2,500	101C252U150AC2B	84.9	6.6	1 3/8 x 4 1/8
2,700	101C272U150AD2B	80.1	7.1	1 3/8 x 4 5/8
3,100	101C312U150AE2B	74.0	7.6	1 3/8 x 5 1/8
3,200	101C322U150EJ2B	74.6	7.7	1 3/4 x 3 5/8
3,400	101C342U150BB2B	54.6	9.3	2 x 3 1/8
3,600	101C362U150AF2B	66.3	8.4	1 3/8 x 5 5/8
3,800	101C382U150CH2B	62.8	9.4	2 1/2 x 2 5/8
4,000	101C402U150BJ2B	59.7	9.4	2 x 3 5/8
4,400	101C442U150EC2B	54.3	9.5	1 3/4 x 4 1/8
4,500	101C452U150ED2B	53.1	10.0	1 3/4 x 4 5/8
5,200	101C522U150EE2B	45.9	11.1	1 3/4 x 5 1/8
5,200	101C522U150CB2B	45.9	11.6	2 1/2 x 3 1/8
5,200	101C522U150BC2B	45.0	11.3	2 x 4 1/8
5,700	101C572U150BD2B	41.9	12.2	2 x 4 5/8
5,800	101C582U150EF2B	41.2	12.2	1 3/4 x 5 5/8
6,600	101C662U150BE2B	36.2	13.6	2 x 5 1/8
6,600	101C662U150CJ2B	36.2	13.8	2 1/2 x 3 5/8
7,800	101C782U150DB2B	35.7	14.8	3 x 3 1/8
7,900	101C792U150BF2B	30.2	15.3	2 x 5 5/8
8,500	101C852U150CC2B	28.1	16.3	2 1/2 x 4 1/8
9,400	101C942U150CD2B	25.4	17.8	2 1/2 x 4 5/8
9,900	101C992U150DJ2B	28.1	17.5	3 x 3 5/8
11,000	101C113U150CE2B	21.7	19.9	2 1/2 x 5 1/8
12,000	101C123U150DC2B	23.2	20.1	3 x 4 1/8
13,000	101C133U150CF2B	18.4	22.3	2 1/2 x 5 5/8
14,000	101C143U150DD2B	19.9	22.5	3 x 4 5/8
16,000	101C163U150DE2B	17.4	24.8	3 x 5 1/8
18,000	101C183U150DF2B	15.5	27.1	3 x 5 5/8
19,000	101C193U150DP2B	14.7	28.2	3 x 5 7/8
26,000	101C263U150DN2D	11.3	35.7	3 x 7 5/8
30,000	101C303U150DG2D	9.3	40.0	3 x 8 5/8

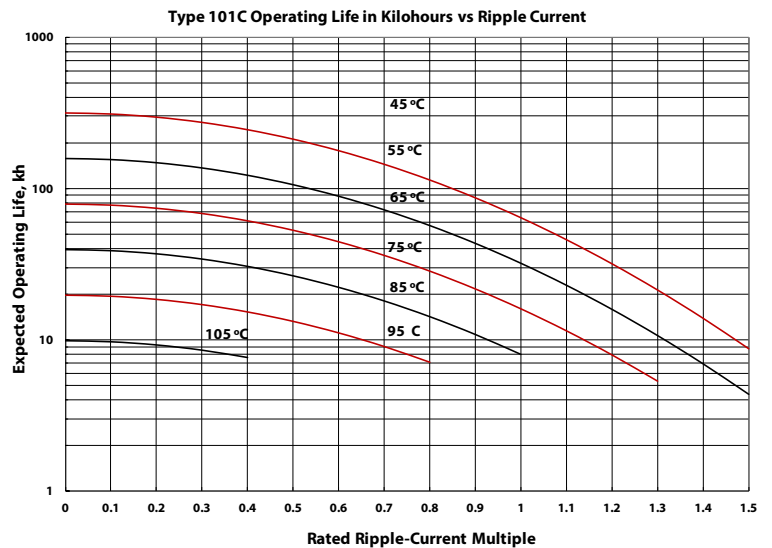
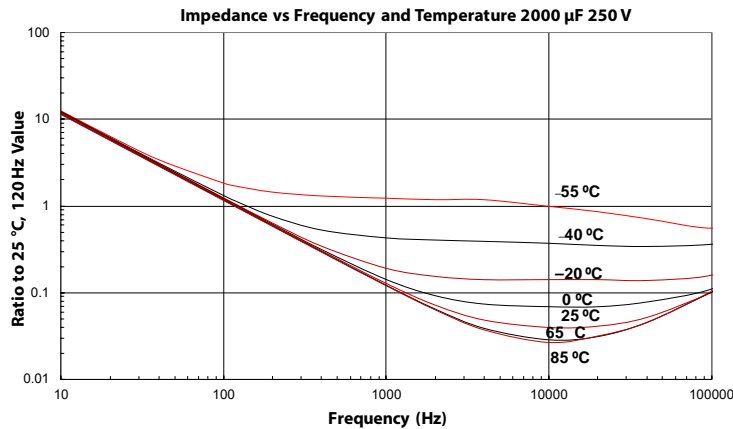
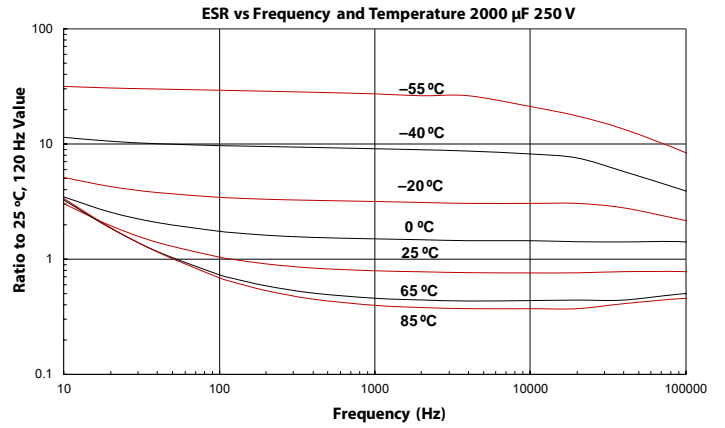
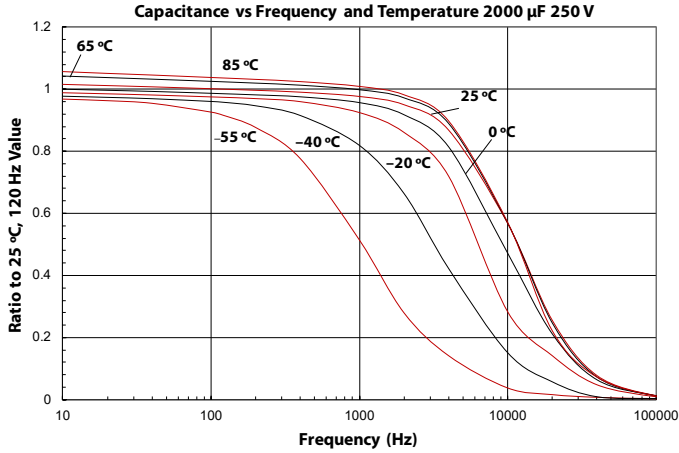
Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Cap. (µF)	Catalog Part Number	ESR Max Ripple Max		Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	
200 Vdc (275 Vdc Surge)				
380	101C381T200AK2B	453.7	2.0	1 3/8 x 1 5/8
680	101C681T200AA2B	253.5	3.0	1 3/8 x 2 1/8
890	101C891T200EA2B	223.5	3.7	1 3/4 x 2 1/8
980	101C981T200AH2B	175.9	3.9	1 3/8 x 2 5/8
1,100	101C112T200BA2B	180.9	4.5	2 x 2 1/8
1,300	101C132T200AB2B	132.6	4.8	1 3/8 x 3 1/8
1,400	101C142T200EH2B	142.1	5.0	1 3/4 x 2 5/8
1,600	101C162T200AJ2B	107.8	5.6	1 3/8 x 3 5/8
1,800	101C182T200BH2B	110.5	6.1	2 x 2 5/8
1,900	101C192T200EB2B	104.7	6.2	1 3/4 x 3 1/8
1,900	101C192T200AC2B	88.9	6.4	1 3/8 x 4 1/8
2,200	101C222T200AD2B	90.4	6.7	1 3/8 x 4 5/8
2,400	101C242T200EJ2B	82.9	7.3	1 3/4 x 3 5/8
2,400	101C242T200BB2B	82.9	7.5	2 x 3 1/8
2,500	101C252T200AE2B	79.6	7.4	1 3/8 x 5 1/8
2,800	101C282T200AF2B	71.0	8.1	1 3/8 x 5 5/8
3,100	101C312T200BJ2B	64.2	9.0	2 x 3 5/8
3,400	101C342T200EC2B	58.5	9.1	1 3/4 x 4 1/8
3,500	101C352T200ED2B	56.8	9.7	1 3/4 x 4 5/8
4,000	101C402T200EE2B	49.7	10.7	1 3/4 x 5 1/8
4,000	101C402T200CB2B	49.7	11.2	2 1/2 x 3 1/8
4,000	101C402T200BC2B	43.1	11.5	2 x 4 1/8
4,400	101C442T200BD2B	45.2	11.7	2 x 4 5/8
4,500	101C452T200EF2B	44.2	11.7	1 3/4 x 5 5/8
5,000	101C502T200BE2B	39.8	12.9	2 x 5 1/8
5,100	101C512T200CJ2B	39.0	13.3	2 1/2 x 3 5/8
6,100	101C612T200BF2B	32.6	14.7	2 x 5 5/8
6,500	101C652T200CC2B	26.3	16.9	2 1/2 x 4 1/8
7,200	101C722T200CH2B	27.6	14.1	2 1/2 x 2 5/8
7,200	101C722T200CD2B	27.6	17.1	2 1/2 x 4 5/8
7,600	101C762T200DJ2B	29.7	17.0	3 x 3 5/8
8,300	101C832T200CE2B	24.0	19.0	2 1/2 x 5 1/8
9,300	101C932T200DC2B	21.4	20.9	3 x 4 1/8
10,000	101C103T200CF2B	21.2	20.8	2 1/2 x 5 5/8
11,000	101C113T200DD2B	20.5	22.1	3 x 4 5/8
13,000	101C133T200DB2B	17.8	20.9	3 x 3 1/8
13,000	101C133T200DE2B	17.8	24.5	3 x 5 1/8
14,000	101C143T200DF2B	16.9	25.9	3 x 5 5/8
15,000	101C153T200DP2B	15.9	27.1	3 x 5 7/8
20,000	101C203T200DN2D	12.5	33.9	3 x 7 5/8
23,000	101C233T200DG2D	10.4	37.8	3 x 8 5/8

Cap. (µF)	Catalog Part Number	ESR Max Ripple Max		Nominal Size D x L (in)
		@ 25 °C 120 Hz (mΩ)	@ 85 °C 120 Hz (A)	
250 Vdc (350 Vdc Surge)				
290	101C291T250AK2B	548.8	1.8	1 3/8 x 1 5/8
530	101C531T250AA2B	300.3	2.7	1 3/8 x 2 1/8
700	101C701T250EA2B	227.4	3.7	1 3/4 x 2 1/8
760	101C761T250AH2B	209.4	3.5	1 3/8 x 2 5/8
890	101C891T250BA2B	163.9	4.7	2 x 2 1/8
990	101C991T250AB2B	160.8	4.3	1 3/8 x 3 1/8
1,100	101C112T250EH2B	144.7	5.0	1 3/4 x 2 5/8
1,200	101C122T250AJ2B	132.6	5.0	1 3/8 x 3 5/8
1,400	101C142T250BH2B	104.2	6.3	2 x 2 5/8
1,500	101C152T250AC2B	106.1	5.9	1 3/8 x 4 1/8
1,500	101C152T250EB2B	106.1	6.2	1 3/4 x 3 1/8
1,700	101C172T250AD2B	101.4	6.3	1 3/8 x 4 5/8
1,900	101C192T250AE2B	90.7	6.9	1 3/8 x 5 1/8
1,900	101C192T250EJ2B	83.8	7.3	1 3/4 x 3 5/8
1,900	101C192T250BB2B	69.8	8.2	2 x 3 1/8
2,200	101C222T250AF2B	84.4	7.4	1 3/8 x 5 5/8
2,300	101C232T250CH2B	75.0	8.6	2 1/2 x 2 5/8
2,300	101C232T250EC2B	69.2	8.4	1 3/4 x 4 1/8
2,400	101C242T250BJ2B	58.0	9.5	2 x 3 5/8
2,700	101C272T250ED2B	58.9	9.5	1 3/4 x 4 5/8
2,900	101C292T250BC2B	50.3	10.7	2 x 4 1/8
3,100	101C312T250CB2B	55.6	10.6	2 1/2 x 3 1/8
3,100	101C312T250EE2B	51.3	10.5	1 3/4 x 5 1/8
3,400	101C342T250BD2B	45.6	11.7	2 x 4 5/8
3,500	101C352T250EF2B	45.5	11.6	1 3/4 x 5 5/8
3,900	101C392T250BE2B	42.0	12.6	2 x 5 1/8
4,000	101C402T250CJ2B	43.1	12.6	2 1/2 x 3 5/8
4,500	101C452T250BF2B	38.3	13.6	2 x 5 5/8
4,700	101C472T250DB2B	42.3	13.6	3 x 3 1/8
5,100	101C512T250CC2B	30.6	15.6	2 1/2 x 4 1/8
5,700	101C572T250CD2B	28.9	16.7	2 1/2 x 4 5/8
5,900	101C592T250DJ2B	33.7	16.0	3 x 3 5/8
6,500	101C652T250CE2B	26.6	18.0	2 1/2 x 5 1/8
7,200	101C722T250DC2B	27.6	18.4	3 x 4 1/8
7,700	101C772T250CF2B	24.1	19.5	2 1/2 x 5 5/8
8,500	101C852T250DD2B	23.4	20.7	3 x 4 5/8
9,700	101C972T250DE2B	20.5	22.8	3 x 5 1/8
11,000	101C113T250DF2B	18.1	25.0	3 x 5 5/8
12,000	101C123T250DP2B	16.6	26.5	3 x 5 7/8
16,000	101C163T250DN2D	13.4	32.8	3 x 7 5/8
18,000	101C183T250DG2D	11.1	36.7	3 x 8 5/8

Type 101C -55 °C to 105 °C Low-ESR, Wide-Temperature Grade

Typical Performance Curves



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[click here to see hardware and mounting options](#)

Type 125 -55 °C to +125 °C, Ultra-High Temperature, Military Grade

The Pace-Setter for Long Life and High Temperature



Exceeding the requirements of military aluminum electrolytic large can capacitors, the Type 125 performs in the most demanding filter applications delivering the longest life and the lowest leakage in low-voltage, aluminum-electrolytic capacitors. It's the choice for output capacitors in high temperature and military power supplies.

Highlights

- 5000 hour load life
- Ripple Current to 50 amps
- ESRs to 4mΩ
- >90% capacitance at -40 °C
- Operates at +125 °C

Specifications

Temperature Range	-55 °C to +125 °C																												
Rated Voltage Range	5 to 40 Vdc																												
Capacitance Range	2600 µF to 190,000 µF																												
Capacitance Tolerance	-10 +75%																												
Leakage Current	≤0.003 CV µA @ +25 °C; ≤0.009 CV @ +125 °C																												
Ripple Current Multipliers	<p>Ambient Temperature</p> <table border="1"> <thead> <tr> <th>45 °C</th> <th>55 °C</th> <th>65 °C</th> <th>75 °C</th> <th>85 °C</th> <th>95 °C</th> <th>105 °C</th> </tr> </thead> <tbody> <tr> <td>1.80</td> <td>1.63</td> <td>1.45</td> <td>1.25</td> <td>1.00</td> <td>0.87</td> <td>0.71</td> </tr> </tbody> </table> <p>Frequency</p> <table border="1"> <thead> <tr> <th>50 Hz</th> <th>60 Hz</th> <th>120 Hz</th> <th>360 Hz</th> <th>1 kHz</th> <th>5 kHz</th> <th>10 kHz & Up</th> </tr> </thead> <tbody> <tr> <td>0.85</td> <td>0.87</td> <td>1.00</td> <td>1.10</td> <td>1.22</td> <td>1.32</td> <td>1.33</td> </tr> </tbody> </table>	45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C	1.80	1.63	1.45	1.25	1.00	0.87	0.71	50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & Up	0.85	0.87	1.00	1.10	1.22	1.32	1.33
45 °C	55 °C	65 °C	75 °C	85 °C	95 °C	105 °C																							
1.80	1.63	1.45	1.25	1.00	0.87	0.71																							
50 Hz	60 Hz	120 Hz	360 Hz	1 kHz	5 kHz	10 kHz & Up																							
0.85	0.87	1.00	1.10	1.22	1.32	1.33																							
EIA Ripple Life	5,000 h at full load @ 85 °C per EIA IS-749 Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit																												
Endurance Life Test	5,000 h at +125 °C and rated voltage Δ Capacitance ±20% ESR 200% of limit DCL 100% of limit																												
Shelf Life Test	500 h @ 105 VC, capacitance, ESR and DCL, initial requirements																												
Vibration	10 to 55 Hz, 0.06" and 10 g max, 1.5 h each of 2 axis																												
RoHS Compliant																													

Type 125 -55 °C to +125 °C, Ultra-High Temperature, Military Grade

The Pace-Setter for Long Life and High Temperature

Part Numbering System

125
Type

333
Capacitance
100 = 10 μF
101 = 100 μF

U
Tolerance
U = -10% +75%

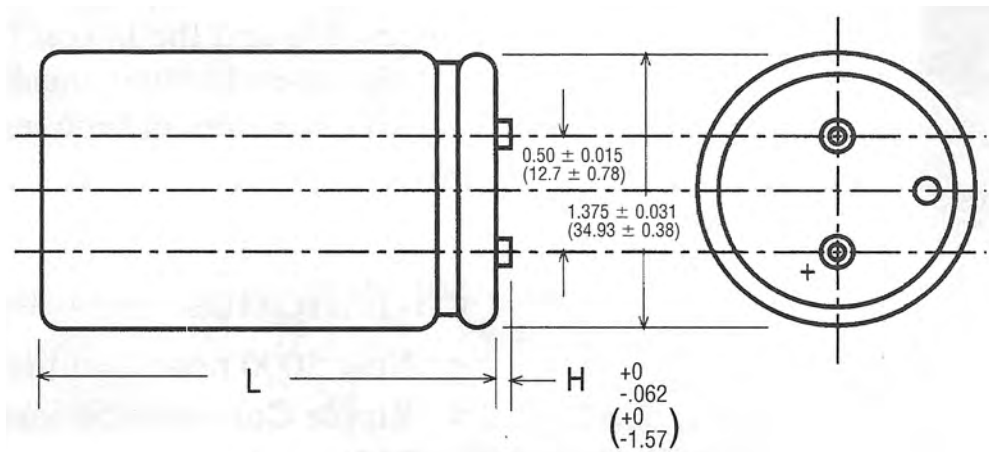
7R5
Voltage
6R3 = 6.3 Vdc
063 = 63 Vdc
100 = 100 Vdc

AA
Case Code
See Ratings
Table

1
Insulation
0 = None
1 = Polyester

B
Terminal
A = Low Post
B = High Post

Outline Drawing



Terminal Dimensions

Terminal Style	Code	Post Diameter		H max		Thread	min Full Thread		Torque	
		in	mm	in	mm		in	mm	in-lb	N-m
Low Post	A	0.314	8.0	0.094	2.4	10-32	0.218	5.5	25	2.82
High Post	B	0.314	8.0	0.281	7.1	10-32	0.375	9.5	25	2.82

Uninsulated Case Dimensions

For insulated case, add 0.024"(0.610 mm) to "D" and 0.030"(0.762 mm) to height.

Case Code	Diam. (D)		Length (L)		Terminals (S)		Typical Weight	
	±.031	±.78	±.062	±1.57	±0.015	±.78		
	Inches	mm	Inches	mm	Inches	mm	oz	g
AK	1.375	34.93	1.625	41.28	0.5	12.7	1.9	54
AA	1.375	34.93	2.125	53.98	0.5	12.7	2.0	57
AH	1.375	34.93	2.625	66.68	0.5	12.7	2.7	77
AB	1.375	34.93	3.125	79.38	0.5	12.7	3.3	94
AJ	1.375	34.93	3.625	92.08	0.5	12.7	3.8	108
AC	1.375	34.93	4.125	104.78	0.5	12.7	4.4	125
AD	1.375	34.93	4.625	117.48	0.5	12.7	5.1	145
AE	1.375	34.93	5.125	130.18	0.5	12.7	5.7	193
AF	1.375	34.93	5.625	142.88	0.5	12.7	6.4	230

Type 125 -55 °C to +125 °C, Ultra-High Temperature, Military Grade

The Pace-Setter for Long Life and High Temperature

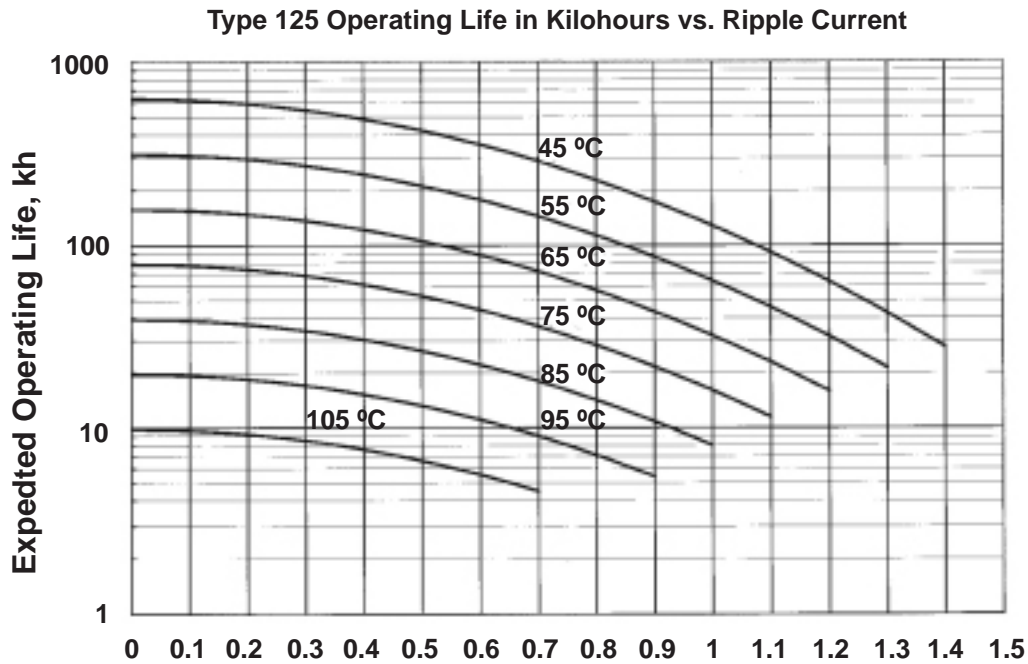
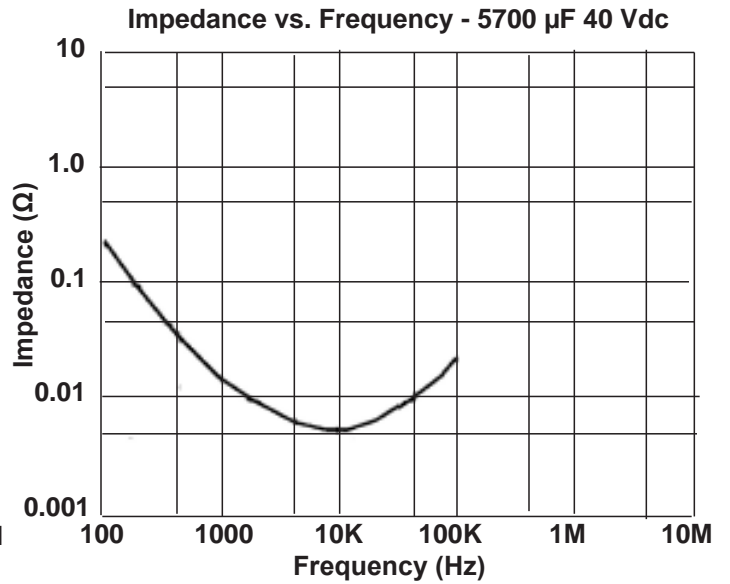
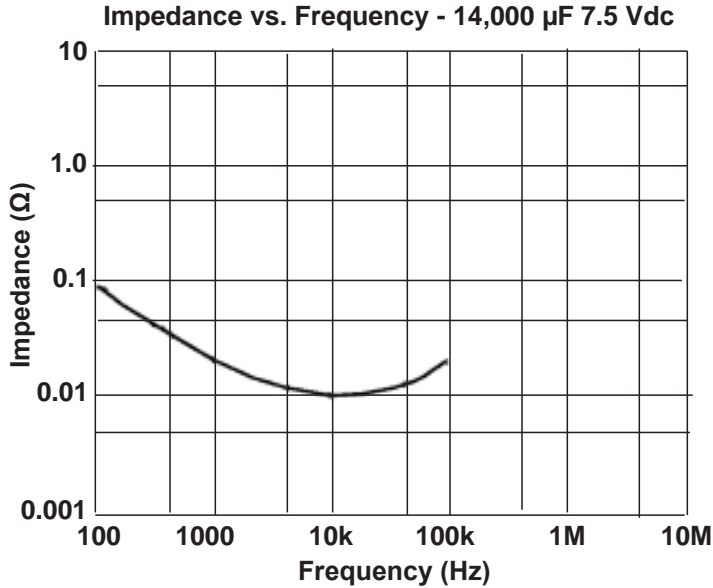
Cap µF	Catalog Part Number	ESR Max		Ripple Max		Nominal Size D x L (Inches)
		@ +25 °C		@ +85 °C		
		120 Hz (Ω)	20 kHz	120 Hz (Arms)	20 kHz	
5Vdc (8 Vdc Surge)						
25000	125253U005AK1B	0.028	0.022	10.3	15.5	1 3/8 x 1 5/8
49000	125493U005AA1B	0.017	0.013	17.2	21.0	1 3/8 x 2 1/8
65000	125653U005AH1B	0.012	0.010	21.0	25.4	1 3/8 x 2 5/8
89000	125893U005AB1B	0.010	0.008	24.0	28.5	1 3/8 x 3 1/8
110000	125114U005AJ1B	0.008	0.006	26.1	31.0	1 3/8 x 3 5/8
130000	125134U005AC1B	0.007	0.006	28.2	32.9	1 3/8 x 4 1/8
150000	125154U005AD1B	0.006	0.005	29.3	34.1	1 3/8 x 4 5/8
170000	125174U005AE1B	0.006	0.005	30.6	35.3	1 3/8 x 5 1/8
190000	125194U005AF1B	0.005	0.004	30.7	35.1	1 3/8 x 5 5/8
6.3Vdc (10 Vdc Surge)						
23000	125233U6R3AK1B	0.028	0.022	11.3	15.5	1 3/8 x 1 5/8
38000	125383U6R3AA1B	0.047	0.013	17.2	21.0	1 3/8 x 2 1/8
58000	125583U6R3AH1B	0.012	0.009	21.0	25.4	1 3/8 x 2 5/8
72000	125723U6R3AB1B	0.009	0.008	24.0	28.5	1 3/8 x 3 1/8
89000	125893U6R3AJ1B	0.008	0.006	26.1	31.0	1 3/8 x 3 5/8
110000	125114U6R3AC1B	0.007	0.006	28.2	32.9	1 3/8 x 4 1/8
120000	125124U6R3AD1B	0.006	0.005	29.6	34.0	1 3/8 x 4 5/8
140000	125144U6R3AE1B	0.006	0.005	30.6	35.3	1 3/8 x 5 1/8
160000	125164U6R3AF1B	0.005	0.004	30.7	35.1	1 3/8 x 5 5/8
7.5Vdc (12 Vdc Surge)						
20000	125203U7R5AK1B	0.029	0.022	11.8	15.5	1 3/8 x 1 5/8
33000	125333U7R5AA1B	0.017	0.013	16.8	20.9	1 3/8 x 2 1/8
48000	125483U7R5AH1B	0.013	0.010	20.4	25.2	1 3/8 x 2 5/8
63000	125633U7R5AB1B	0.010	0.008	23.4	28.5	1 3/8 x 3 1/8
78000	125783U7R5AJ1B	0.008	0.006	25.7	30.9	1 3/8 x 3 5/8
93000	125933U7R5AC1B	0.007	0.006	27.5	32.9	1 3/8 x 4 1/8
110000	125114U7R5AD1B	0.006	0.005	28.8	34.0	1 3/8 x 4 5/8
120000	125124U7R5AE1B	0.006	0.005	30.2	35.3	1 3/8 x 5 1/8
140000	125144U7R5AF1B	0.005	0.004	30.2	35.3	1 3/8 x 5 5/8
12.5Vdc (20 Vdc Surge)						
13000	125133U12R5AK1B	0.032	0.022	11.6	15.2	1 3/8 x 1 5/8
22000	125223U12R5AA1B	0.019	0.014	15.7	20.6	1 3/8 x 2 1/8
32000	125323U12R5AH1B	0.014	0.010	19.2	25.0	1 3/8 x 2 5/8
41000	125413U12R5AB1B	0.011	0.008	21.9	28.2	1 3/8 x 3 1/8
51000	125513U12R5AJ1B	0.009	0.007	24.1	30.6	1 3/8 x 3 5/8
61000	125613U12R5AC1B	0.008	0.006	25.9	32.4	1 3/8 x 4 1/8
71000	125713U12R5AD1B	0.007	0.005	27.2	33.7	1 3/8 x 4 5/8
81000	125813U12R5AE1B	0.006	0.005	28.5	35.0	1 3/8 x 5 1/8
90000	125903U12R5AF1B	0.006	0.004	28.8	34.7	1 3/8 x 5 5/8
15Vdc (25 Vdc Surge)						
10000	125103U015AK1B	0.031	0.021	11.1	14.4	1 3/8 x 1 5/8
17000	125173U015AA1B	0.019	0.013	15.2	19.5	1 3/8 x 2 1/8
24000	125243U015AH1B	0.013	0.01	18.6	23.7	1 3/8 x 2 5/8
32000	125323U015AB1B	0.011	0.008	21.2	26.8	1 3/8 x 3 1/8
40000	125403U015AJ1B	0.009	0.006	23.4	29.2	1 3/8 x 3 5/8

Cap µF	Catalog Part Number	ESR Max		Ripple Max		Nominal Size D x L (Inches)
		@ +25 °C		@ +85 °C		
		120 Hz (Ω)	20 kHz	120 Hz (Arms)	20 kHz	
15Vdc (25 Vdc Surge)						
47000	125473U015AC1B	0.008	0.005	25.1	31.0	1 3/8 x 4 1/8
55000	125553U015AD1B	0.007	0.005	26.5	32.3	1 3/8 x 4 5/8
62000	125623U015AE1B	0.006	0.005	27.8	33.6	1 3/8 x 5 1/8
70000	125703U015AF1B	0.006	0.004	28.1	33.4	1 3/8 x 5 5/8
20Vdc (25 Vdc Surge)						
7000	125702U020AK1B	0.034	0.022	10.4	10.4	1 3/8 x 1 5/8
12000	125123U020AA1B	0.020	0.013	14.4	14.4	1 3/8 x 2 1/8
18000	125183U020AH1B	0.015	0.010	17.5	17.5	1 3/8 x 2 5/8
24000	125243U020AB1B	0.012	0.008	20.0	20.0	1 3/8 x 3 1/8
29000	125293U020AJ1B	0.010	0.006	22.1	22.1	1 3/8 x 3 5/8
35000	125353U020AC1B	0.008	0.006	23.8	23.8	1 3/8 x 4 1/8
40000	125403U020AD1B	0.007	0.005	25.1	25.1	1 3/8 x 4 5/8
46000	125463U020AE1B	0.007	0.005	26.5	26.5	1 3/8 x 5 1/8
51000	125513U020AF1B	0.006	0.004	26.8	26.8	1 3/8 x 5 5/8
25Vdc (40 Vdc Surge)						
5600	125562U025AK1B	0.035	0.022	10.3	14.2	1 3/8 x 1 5/8
9300	125932U025AA1B	0.021	0.013	14.5	19.2	1 3/8 x 2 1/8
14000	125143U025AH1B	0.015	0.010	17.2	23.3	1 3/8 x 2 5/8
18000	125183U025AB1B	0.012	0.008	19.7	26.4	1 3/8 x 3 1/8
22000	125223U025AJ1B	0.010	0.006	21.7	28.8	1 3/8 x 3 5/8
26000	125263U025AC1B	0.009	0.006	23.5	30.7	1 3/8 x 4 1/8
30000	125303U025AD1B	0.008	0.005	24.8	32.0	1 3/8 x 4 5/8
34000	125343U025AE1B	0.007	0.005	26.1	33.3	1 3/8 x 5 1/8
39000	125393U025AF1B	0.006	0.004	26.4	33.1	1 3/8 x 5 5/8
30Vdc (50 Vdc Surge)						
4000	125402U030AK1B	0.037	0.022	9.9	14.1	1 3/8 x 1 5/8
7300	125732U030AA1B	0.022	0.013	13.5	19	1 3/8 x 2 1/8
11000	125113U030AH1B	0.016	0.010	16.5	23.1	1 3/8 x 2 5/8
14000	125143U030AB1B	0.013	0.008	18.9	26.2	1 3/8 x 3 1/8
17000	125173U030AJ1B	0.011	0.007	20.9	28.6	1 3/8 x 3 5/8
20000	125203U030AC1B	0.009	0.006	22.6	30.5	1 3/8 x 4 1/8
24000	125243U030AD1B	0.008	0.005	23.8	31.7	1 3/8 x 4 5/8
27000	125273U030AE1B	0.007	0.005	25.2	33	1 3/8 x 5 1/8
30000	125303U030AF1B	0.007	0.004	25.5	33	1 3/8 x 5 5/8
40Vdc (60 Vdc Surge)						
2600	125262U040AK1B	0.040	0.022	9.4	14.0	1 3/8 x 1 5/8
4600	125462U040AA1B	0.024	0.014	12.8	18.9	1 3/8 x 2 1/8
6700	125672U040AH1B	0.017	0.010	15.8	22.8	1 3/8 x 2 5/8
8800	125882U040AB1B	0.014	0.008	18.0	25.9	1 3/8 x 3 1/8
11000	125113U040AJ1B	0.011	0.007	20.0	28.3	1 3/8 x 3 5/8
13000	125133U040AC1B	0.010	0.006	21.7	30.2	1 3/8 x 4 1/8
15000	125153U040AD1B	0.009	0.005	22.8	31.4	1 3/8 x 4 5/8
17000	125173U040AE1B	0.008	0.005	24.3	32.7	1 3/8 x 5 1/8
19000	125193U040AF1B	0.007	0.004	24.5	32.7	1 3/8 x 5 5/8

Type 125 $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$, Ultra-High Temperature, Military Grade

The Pace-Setter for Long Life and High Temperature

Performance Curves



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High Vibration

Type HZA_V -55 °C to +105 °C

SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

For filtering, Bypassing and Power Supply Decoupling with Long Life Requirements

Using a ruggedized construction, type HZA_V withstands a 30 G vibration test. As the main countermeasure to vibration, the metal case is inserted into a molded plastic retaining wall that surrounds the part, keeping it firmly in place. Larger diameter leads provide additional mechanical stability of the internal winding and a larger soldering surface keeps the part firmly affixed to the PCB. Rated for 105°C, type HZA combines the advantages of aluminum electrolytic and aluminum polymer technology. These hybrid capacitors have the ultra-low ESR characteristics of conductive aluminum polymer capacitors packaged in a V-chip, SMT case with high capacitance and voltage ratings.



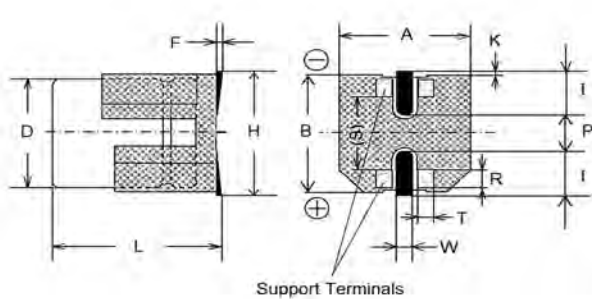
Highlights

- +105 °C, Up to 10,000 Hours Load Life
- Low Leakage Current
- Very Low ESR and High Ripple Current
- 260 °C reflow soldering
- AEC-Q200 Compliant

Specifications

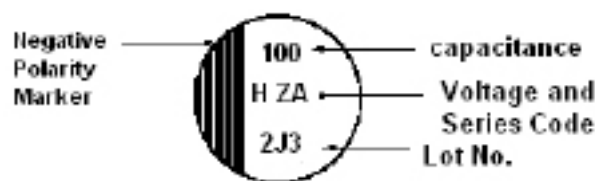
Capacitance Range	22 to 330 µF										
Capacitance Tolerance	±20% @ 120 Hz/+20 °C										
Rated Voltage	25, 35, 50, 63, 80 Vdc										
Leakage Current (at 20°C)	I = .01CV or 3 µA max., whichever is greater after 2 minutes I = leakage current in µAmps C = rated capacitance in µF V = rated DC Working voltage in Volts										
Low Temperature Characteristics (at 120 Hz)	Z(-25 °C)/Z(+20 °C): 2 Z(-55 °C)/Z(+20 °C): 2.5										
Ripple Current Frequency Multiplier	<table border="1"> <thead> <tr> <th>Frequency</th> <th>120 Hz</th> <th>1000 Hz</th> <th>10,000 Hz</th> <th>100 KHz</th> </tr> </thead> <tbody> <tr> <td>Correction Factor</td> <td>0.1</td> <td>0.3</td> <td>0.6</td> <td>1</td> </tr> </tbody> </table>	Frequency	120 Hz	1000 Hz	10,000 Hz	100 KHz	Correction Factor	0.1	0.3	0.6	1
Frequency	120 Hz	1000 Hz	10,000 Hz	100 KHz							
Correction Factor	0.1	0.3	0.6	1							
RoHS Compliant											

Outline Drawing



Size Code	mm												
	D ± 0.5	L ± 0.3	A ± 0.2	B ± 0.2	H max.	F	I (ref.)	W ± 0.2	P (ref.)	K ± 0.2	R ± 0.2	S ± 0.2	T ± 0.2
F	8	10.5	8.3	8.3	10	-1 to +0.15	3.4	1.2	3.1	0.70	0.70	5.3	1.3
G	10	10.5	10.3	10.3	12	-1 to +0.15	3.5	1.2	4.6	0.70	0.70	6.9	1.3

Capacitor Markings



Lot, Number: Year, Line, Month

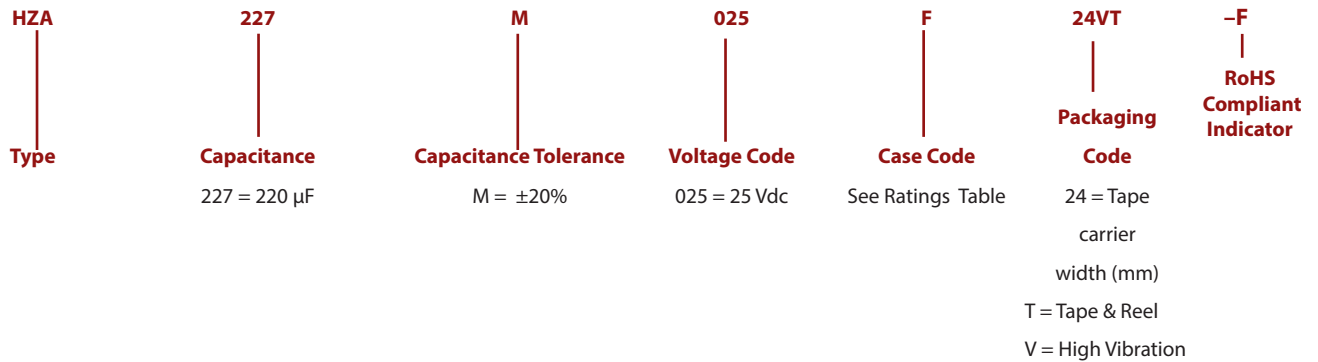
Voltage Code	Voltage Vdc
E	25
V	35
H	50
J	63
K	80

High Vibration

Type HZA_V -55 °C to +105 °C

SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

Part Numbering System



Ratings

Capacitance (µF)	Voltage Rating (Vdc)	CDE Part Number	Max. DCL (µA)	Max. DF @120 Hz/20°C	Max. E.S.R. @ 100kHz/+20°C (ohms)	Max. Ripple Current @ 100kHz/+105°C (A rms)	D (mm)	L (mm)	Case Code	QTY/ reel
25Vdc (32 Vdc Surge)										
220	25	HZA227M025F24VT-F	55.0	0.14	0.027	2.3	8	10.5	F	500
330	25	HZA337M025G24VT-F	82.5	0.14	0.020	2.5	10	10.5	G	500
35Vdc (44 Vdc Surge)										
150	35	HZA157M035F24VT-F	52.5	0.12	0.027	2.3	8	10.5	F	500
270	35	HZA277M035G24VT-F	94.5	0.12	0.020	2.5	10	10.5	G	500
50Vdc (63 Vdc Surge)										
68	50	HZA686M050F24VT-F	34.0	0.10	0.030	1.8	8	10.5	F	500
100	50	HZA107M050G24VT-F	50.0	0.10	0.028	2.0	10	10.5	G	500
63Vdc (79 Vdc Surge)										
33	63	HZA336M063F24VT-F	20.7	0.08	0.040	1.7	8	10.5	F	500
56	63	HZA566M063G24VT-F	35.2	0.08	0.030	1.8	10	10.5	G	500
80Vdc (100 Vdc Surge)										
22	80	HZA226M080F24VT-F	17.6	0.08	0.045	1.55	8	10.5	F	500
33	80	HZA336M080G24VT-F	26.4	0.08	0.036	1.70	10	10.5	G	500

High Vibration

Type HZA_V -55 °C to +105 °C

SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

Load Life Test

Test	Apply the maximum rated voltage for 10,000 hrs at +105 °C with full rated ripple current. After the test measure the capacitance, DF, DCL and ESR at +20 °C. Also measure the ESR at -40 °C and 100kHz.
ΔC at 120Hz	Capacitance will be within ±30% of the initial measured value
DF at 120 Hz	DF will be ≤ 200% of the initial specified value
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value
ESR at 100kHz/+20 °C	ESR will be ≤ 200% of the initial specified value
Max. ESR at 100kHz/-40 °C after Load Life test	Case Code C : 2.0 Ω; Case Code D : 1.4 Ω; Case Code X : 0.8 Ω; Case Code F : 0.4 Ω; Case Code G : 0.3 Ω

Shelf Life Test

Test	Subject the capacitor to 1000 hrs at +105 °C without voltage. After the test, return the capacitor to room temperature for two hours and then apply rated voltage for 30 minutes. The after test measurements for capacitance, DF, DCL and ESR at +20 °C will meet the following.
ΔC at 120 Hz	Capacitance will be within ±30% of the initial measured value
DF at 120 Hz	DF will be ≤ 200% of the initial specified value
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value
ESR at 100Khz/+20 °C	ESR will be ≤ 200% of the initial specified value

Moisture Resistance Test

Test	Subject the capacitor to 2000 hrs at +85 °C/85%RH with rated voltage. After the test, return the capacitor to room temperature and humidity for two hours. The after test measurements for capacitance, DF, DCL and ESR at +20 °C will meet the following.
ΔC at 120 Hz	Capacitance will be within ±30% of the initial measured value
DF at 120 Hz	DF will be ≤ 200% of the initial specified value
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value
ESR at 100Khz/+20 °C	ESR will be ≤ 200% of the initial specified value

Temperature Cycle Test

Test	Subject the capacitor to 1000 cycles of temperature change from -55 °C to +105 °C using the following sequence and durations.															
	<table border="1"><thead><tr><th>Step</th><th>Temperature</th><th>Time at Temperature</th></tr></thead><tbody><tr><td>1</td><td>-55 °C</td><td>30 minutes</td></tr><tr><td>2</td><td>+20 °C</td><td>3 minutes max</td></tr><tr><td>3</td><td>+105 °C</td><td>30 minutes</td></tr><tr><td>4</td><td>+20 °C</td><td>3 minutes max</td></tr></tbody></table>	Step	Temperature	Time at Temperature	1	-55 °C	30 minutes	2	+20 °C	3 minutes max	3	+105 °C	30 minutes	4	+20 °C	3 minutes max
	Step	Temperature	Time at Temperature													
	1	-55 °C	30 minutes													
	2	+20 °C	3 minutes max													
3	+105 °C	30 minutes														
4	+20 °C	3 minutes max														
After the test, return the capacitor to +20°C for one to two hours before measurement. The after test measurements for capacitance, DF, and DCL at +20 °C will meet the following;																
ΔC at 120 Hz	Capacitance will be within ±20% of the initial measured value															
DF at 120 Hz	DF will be ≤ 200% of the initial specified value															
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value															
Appearance	No significant change in appearance															

High Vibration Test

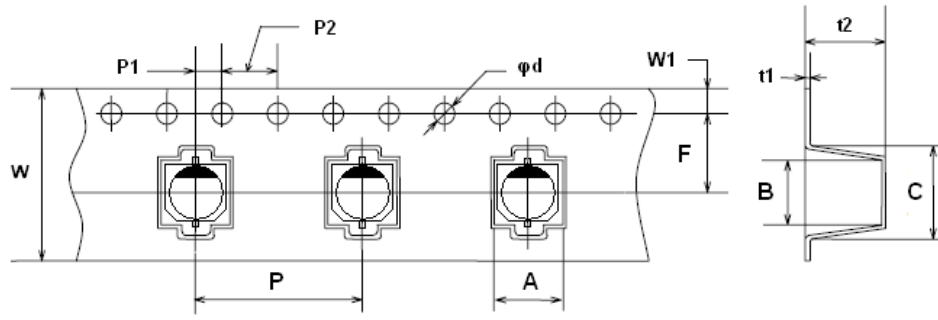
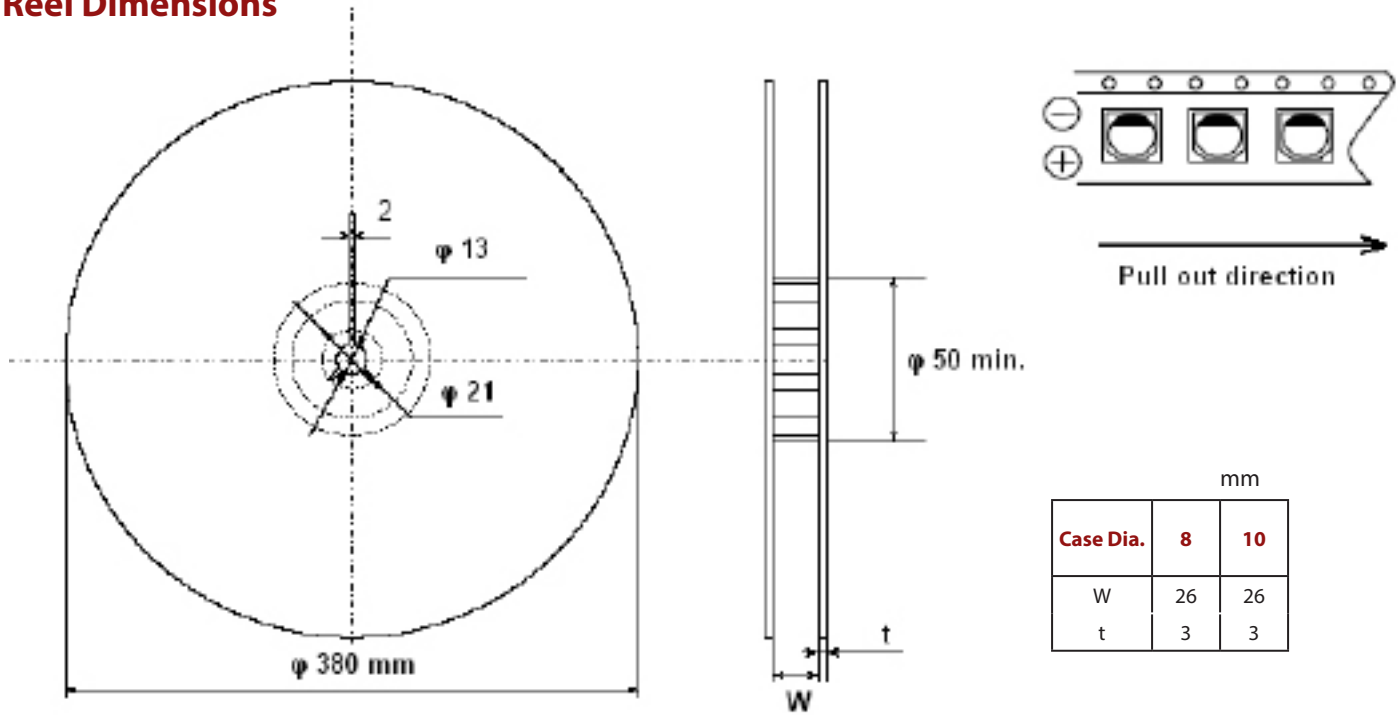
Test	Capacitors with the high vibration base will pass a 30 G acceleration test from 5 Hz to 2000 Hz with a max. amplitude of 5 mm (peak to peak) for 2 hours each in the X,Y and Z directions for a total of 6 hours. During the last 30 minutes of the test, the measured capacitance shall be stable. After the test the capacitor shall meet the following:
ΔC at 120 Hz	Capacitance value will be within 5% of the initial value
Appearance	No significant change in appearance

High Vibration

Type HZA_V -55 °C to +105 °C

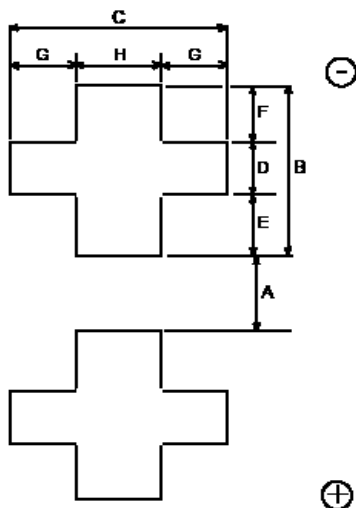
SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

Reel Dimensions



Case Size (mm)	Case Code	W ± 0.3	A ± 0.2	B +0.3/-0.2	C ± 0.5	F ± 0.1	P ± 0.1	t1	t2 ± 0.2	φd +0.1/-0	P1 ± 0.1	P2 ± 0.1	W1 ± 0.1
8 x 10.2	F	24	8.7	8.7	12.5	11.5	16	0.4	11	1.5	2	4	1.75
10 x 10.2	G		10.7	10.7	14.5								

Recommended Land Dimensions



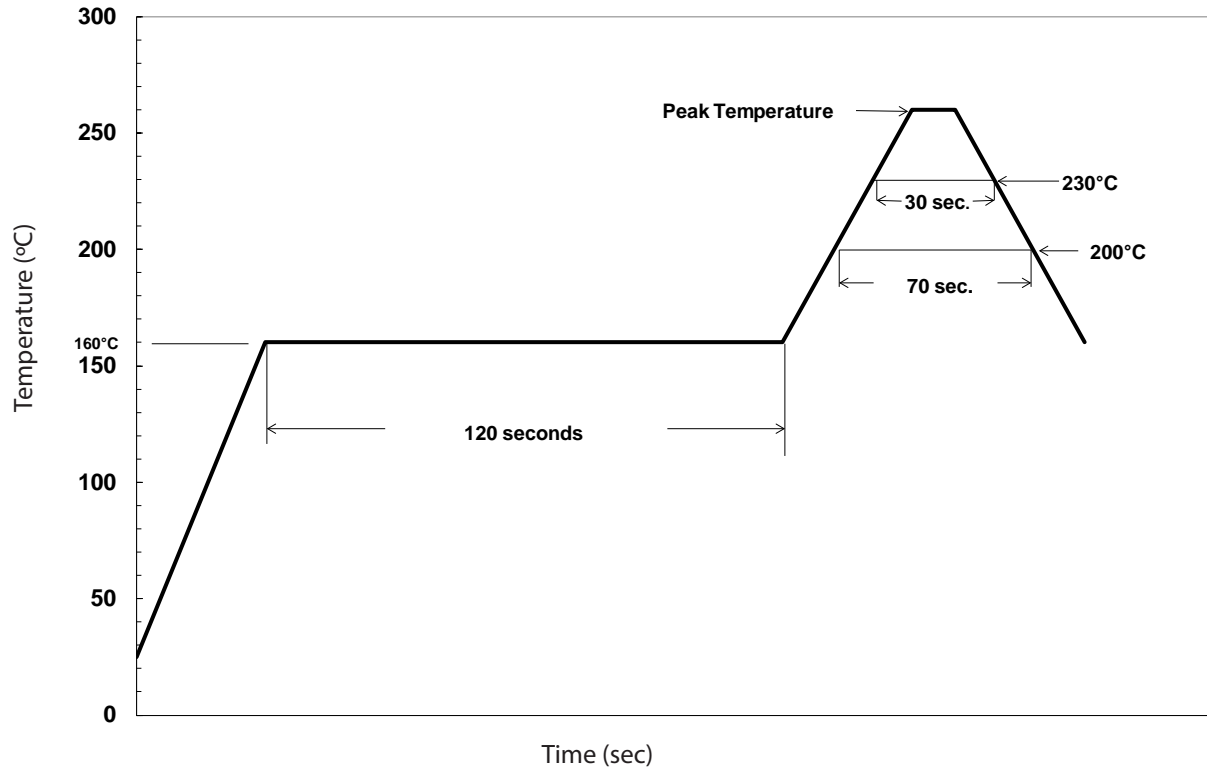
Case Code	Case Dia.	A	B	C	D	E	F	G	H
F	8	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
G	10	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5

High Vibration

Type HZA_V -55 °C to +105 °C

SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

Recommended Reflow Soldering



Case Code	Case Dia. (mm)	Peak Temperature	Time at or above 250 °C	Time at or above 230 °C	Time at or above 217 °C	Time at or above 200 °C	Number of Reflow Processes
F	8	260°C	5 seconds	30 seconds	40 seconds	70 seconds	1
G	10	260°C	5 seconds	30 seconds	40 seconds	70 seconds	1

Notes:

1. The capacitors in the 8mm and 10 mm case dia. can withstand 2 reflow processes, if the peak temperature does not exceed 245 °C and the time at or above 240 °C does not exceed 10 seconds.
2. The 2nd reflow process should be performed after the capacitors have returned to room temperature.
3. Temperature should be measured with a thermal couple placed on the top surface of the capacitor.
4. After reflow soldering, the leakage current, D.F., and e.s.r., will meet the initial specifications, and the capacitance will be within $\pm 10\%$ of the initial measured value when measured at room conditions.

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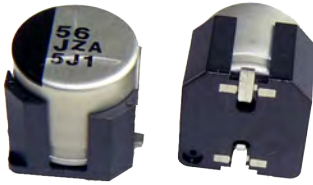
High Vibration

Type HZC_V -55 °C to +125 °C

SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

For filtering, Bypassing and Power Supply Decoupling with Long Life Requirements

Using a ruggedized construction, type HZC_V withstands a 30 G vibration test. As the main countermeasure to vibration, the metal case is inserted into a molded plastic retaining wall that surrounds the part, keeping it firmly in place. Larger diameter leads provide additional mechanical stability of the internal winding and a larger soldering surface keeps the part firmly affixed to the PCB. Rated for 125°C, type HZC combines the advantages of aluminum electrolytic and aluminum polymer technology. These hybrid capacitors have the ultra-low ESR characteristics of conductive aluminum polymer capacitors packaged in a V-chip, SMT case with high capacitance and voltage ratings.



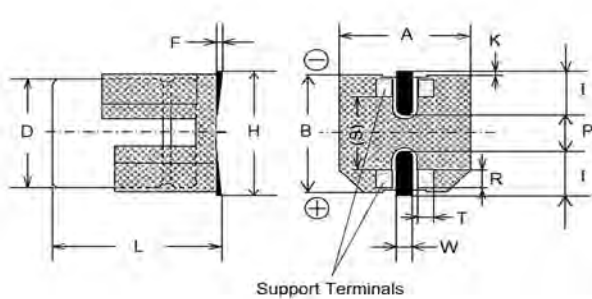
Highlights

- +125 °C, Up to 4,000 Hours Load Life
- Low Leakage Current
- Very Low ESR and High Ripple Current
- 260 °C reflow soldering
- AEC-Q200 Compliant

Specifications

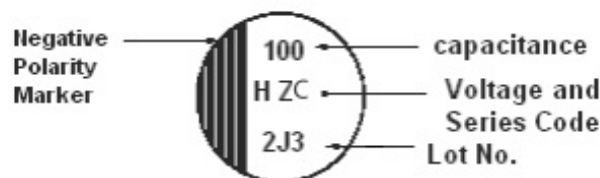
Capacitance Range	33 to 330 µF										
Capacitance Tolerance	±20% @ 120 Hz/+20 °C										
Rated Voltage	25, 35, 50, 63 Vdc										
Leakage Current (at 20°C)	I = .01CV or 3 µA max., whichever is greater after 2 minutes I = leakage current in µAmps C = rated capacitance in µF V = rated DC Working voltage in Volts										
Low Temperature Characteristics (at 120 Hz)	Z(-25 °C)/Z(+20 °C): 2 Z(-55 °C)/Z(+20 °C): 2.5										
Ripple Current Frequency Multiplier	<table border="1"> <tr> <th>Frequency</th> <th>120 Hz</th> <th>1000 Hz</th> <th>10,000 Hz</th> <th>100 KHz</th> </tr> <tr> <td>Correction Factor</td> <td>0.1</td> <td>0.3</td> <td>0.6</td> <td>1</td> </tr> </table>	Frequency	120 Hz	1000 Hz	10,000 Hz	100 KHz	Correction Factor	0.1	0.3	0.6	1
Frequency	120 Hz	1000 Hz	10,000 Hz	100 KHz							
Correction Factor	0.1	0.3	0.6	1							
RoHS Compliant											

Outline Drawing



Size Code	mm												
	D ± 0.5	L ± 0.3	A ± 0.2	B ± 0.2	H max.	F	I (ref.)	W ± 0.2	P (ref.)	K ± 0.2	R ± 0.2	S ± 0.2	T ± 0.2
F	8	10.5	8.3	8.3	10	-1 to +0.15	3.4	1.2	3.1	0.70	0.70	5.3	1.3
G	10	10.5	10.3	10.3	12	-1 to +0.15	3.5	1.2	4.6	0.70	0.70	6.9	1.3

Capacitor Markings



Voltage Code	Voltage Vdc
E	25
V	35
H	50
J	63

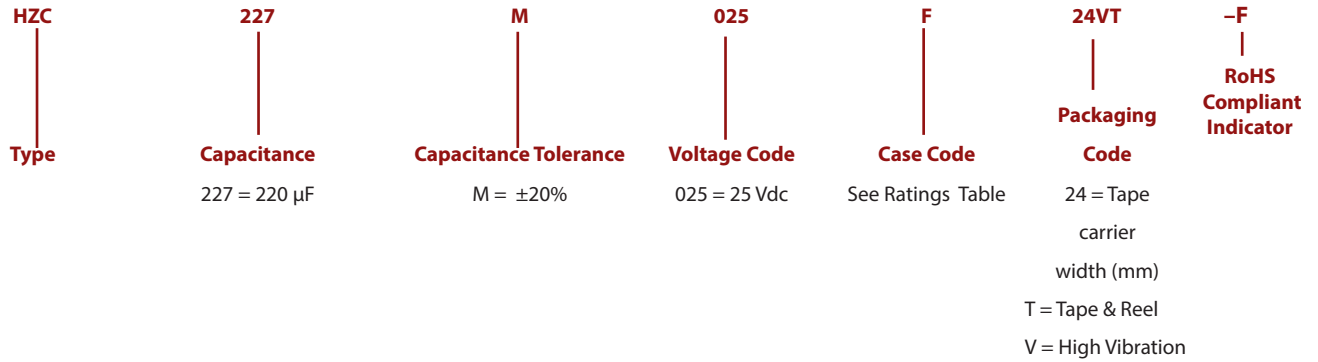
Lot, Number: Year, Line, Month

High Vibration

Type HZC_V -55 °C to +125 °C

SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

Part Numbering System



Ratings

Capacitance (µF)	Voltage Rating (Vdc)	CDE Part Number	Max. DCL (µA)	Max. DF @ 120 Hz/20°C	Max. E.S.R. @ 100kHz/+20°C (ohms)	Max. Ripple Current @ 100kHz/+125 °C (A rms)	D (mm)	L (mm)	Case Code	QTY/ reel
25Vdc (32 Vdc Surge)										
220	25	HZC227M025F24VT-F	55.0	0.14	0.027	1.6	8	10.5	F	500
330	25	HZC337M025G24VT-F	82.5	0.14	0.020	2.0	10	10.5	G	500
35Vdc (44 Vdc Surge)										
150	35	HZC157M035F24VT-F	52.5	0.12	0.027	1.6	8	10.5	F	500
270	35	HZC277M035G24VT-F	94.5	0.12	0.020	2.0	10	10.5	G	500
50Vdc (63 Vdc Surge)										
68	50	HZC686M050F24VT-F	34.0	0.10	0.030	1.25	8	10.5	F	500
100	50	HZC107M050G24VT-F	50.0	0.10	0.028	1.60	10	10.5	G	500
63Vdc (79 Vdc Surge)										
33	63	HZC336M063F24VT-F	20.7	0.08	0.040	1.10	8	10.5	F	500
56	63	HZC566M063G24VT-F	35.2	0.08	0.030	1.40	10	10.5	G	500

High Vibration

Type HZC_V -55 °C to +125 °C

SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

Load Life Test

Test	Apply the maximum rated voltage for 4,000 hrs at +125 °C with full rated ripple current. After the test measure the capacitance, DF, DCL and ESR at +20 °C. Also measure the ESR at -40 °C and 100kHz.
ΔC at 120Hz	Capacitance will be within ±30% of the initial measured value
DF at 120 Hz	DF will be ≤ 200% of the initial specified value
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value
ESR at 100kHz/+20 °C	ESR will be ≤ 200% of the initial specified value
Max. ESR at 100kHz/-40 °C after Load Life test	Case Code C : 2.0 Ω; Case Code D : 1.4 Ω; Case Code X : 0.8 Ω; Case Code F : 0.4 Ω; Case Code G : 0.3 Ω

Shelf Life Test

Test	Subject the capacitor to 1000 hrs at +125 °C without voltage. After the test, return the capacitor to room temperature for two hours and then apply rated voltage for 30 minutes. The after test measurements for capacitance, DF, DCL and ESR at +20 °C will meet the following.
ΔC at 120 Hz	Capacitance will be within ±30% of the initial measured value
DF at 120 Hz	DF will be ≤ 200% of the initial specified value
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value
ESR at 100Khz/+20 °C	ESR will be ≤ 200% of the initial specified value

Moisture Resistance Test

Test	Subject the capacitor to 2000 hrs at +85 °C/85%RH with rated voltage. After the test, return the capacitor to room temperature and humidity for two hours. The after test measurements for capacitance, DF, DCL and ESR at +20 °C will meet the following.
ΔC at 120 Hz	Capacitance will be within ±30% of the initial measured value
DF at 120 Hz	DF will be ≤ 200% of the initial specified value
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value
ESR at 100Khz/+20 °C	ESR will be ≤ 200% of the initial specified value

Temperature Cycle Test

Test	Subject the capacitor to 1000 cycles of temperature change from -55 °C to +125 °C using the following sequence and durations.		
	Step	Temperature	Time at Temperature
	1	-55 °C	30 minutes
	2	+20 °C	3 minutes max
	3	+125 °C	30 minutes
4	+20 °C	3 minutes max	
	After the test, return the capacitor to +20°C for one to two hours before measurement. The after test measurements for capacitance, DF, and DCL at +20 °C will meet the following;		
ΔC at 120 Hz	Capacitance will be within ±20% of the initial measured value		
DF at 120 Hz	DF will be ≤ 200% of the initial specified value		
DCL after 2 minute charge	Leakage current will be ≤ the initial specified value		
Appearance	No significant change in appearance		

High Vibration Test

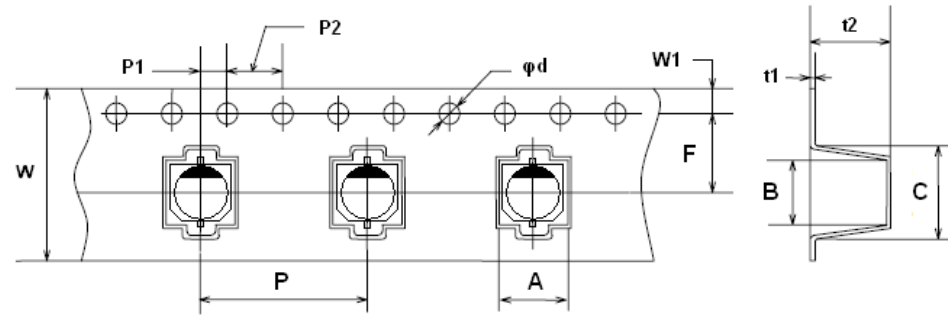
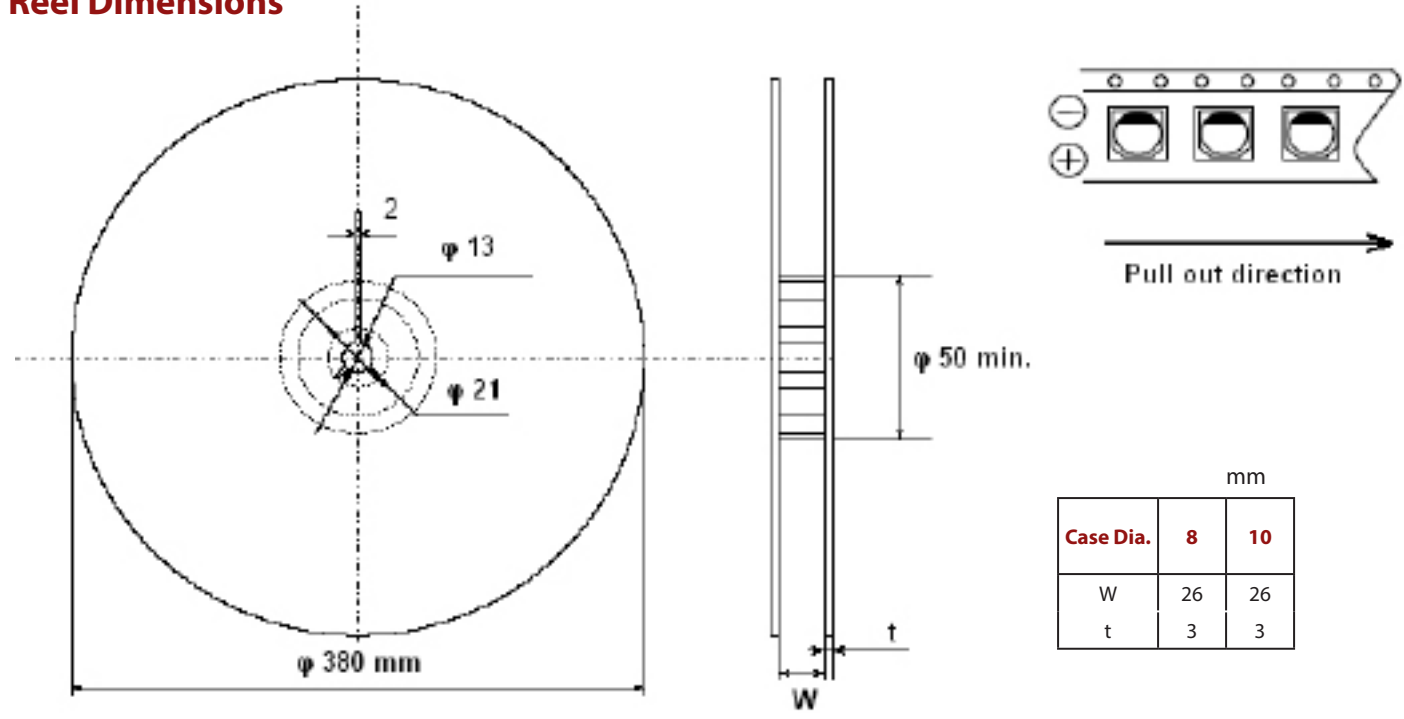
Test	Capacitors with the high vibration base will pass a 30 G acceleration test from 5 Hz to 2000 Hz with a max. amplitude of 5 mm (peak to peak) for 2 hours each in the X,Y and Z directions for a total of 6 hours. During the last 30 minutes of the test, the measured capacitance shall be stable. After the test the capacitor shall meet the following:
ΔC at 120 Hz	Capacitance value will be within 5% of the initial value
Appearance	No significant change in appearance

High Vibration

Type HZC_V -55 °C to +125 °C

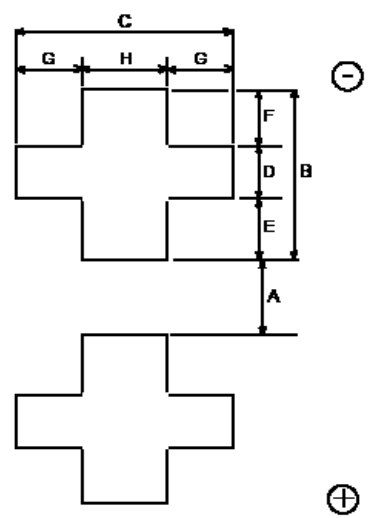
SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

Reel Dimensions



Case Size (mm)	Case Code	$W \pm 0.3$	$A \pm 0.2$	$B^{+0.3/-0.2}$	$C \pm 0.5$	$F \pm 0.1$	$P \pm 0.1$	$t1$	$t2 \pm 0.2$	$\phi d^{+0.1/-0}$	$P1 \pm 0.1$	$P2 \pm 0.1$	$W1 \pm 0.1$
8 x 10.2	F	24	8.7	8.7	12.5	11.5	16	0.4	11	1.5	2	4	1.75
10 x 10.2	G		10.7	10.7	14.5								

Recommended Land Dimensions



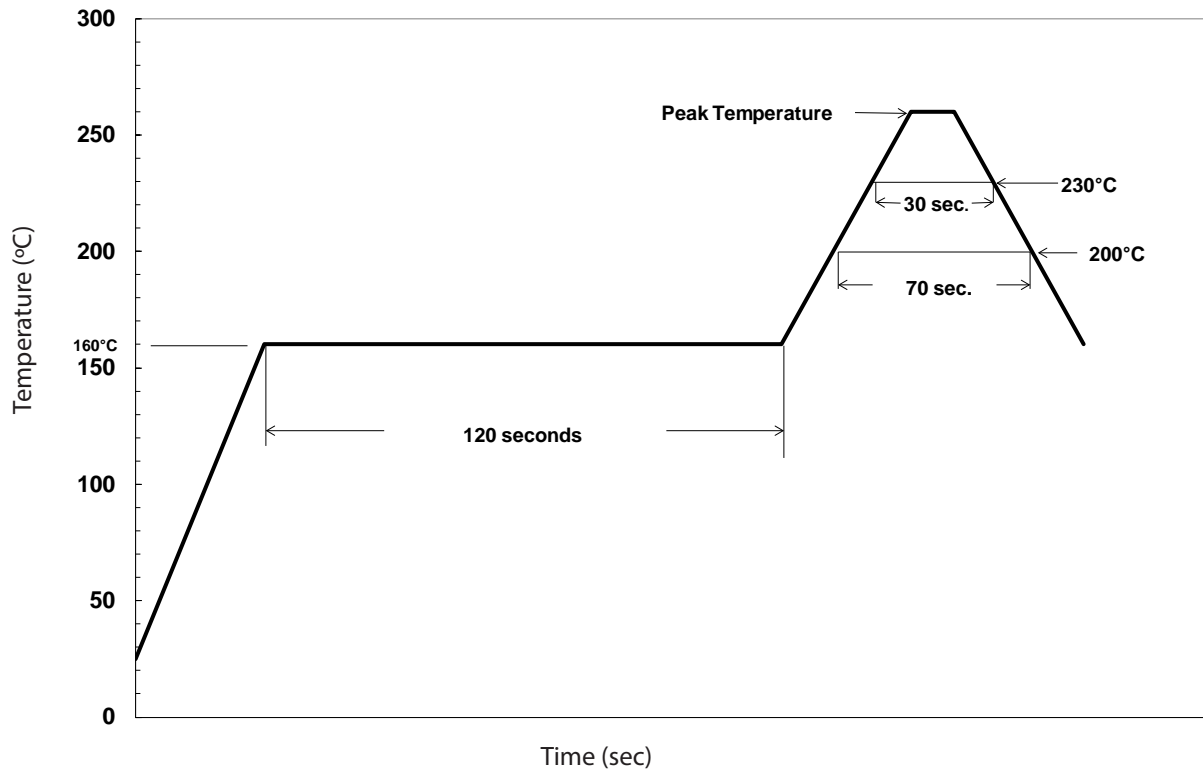
Case Code	Case Dia.	A	B	C	D	E	F	G	H
F	8	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
G	10	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5

High Vibration

Type HZC_V -55 °C to +125 °C

SMT Hybrid Polymer-Aluminum Electrolytic Capacitors

Recommended Reflow Soldering



Case Code	Case Dia. (mm)	Peak Temperature	Time at or above 250 °C	Time at or above 230 °C	Time at or above 217 °C	Time at or above 200 °C	Number of Reflow Processes
F	8	260°C	5 seconds	30 seconds	40 seconds	70 seconds	1
G	10	260°C	5 seconds	30 seconds	40 seconds	70 seconds	1

Notes:

1. The capacitors in the 8mm and 10 mm case dia. can withstand 2 reflow processes, if the peak temperature does not exceed 245 °C and the time at or above 240 °C does not exceed 10 seconds.
2. The 2nd reflow process should be performed after the capacitors have returned to room temperature.
3. Temperature should be measured with a thermal couple placed on the top surface of the capacitor.
4. After reflow soldering, the leakage current, D.F., and e.s.r., will meet the initial specifications, and the capacitance will be within $\pm 10\%$ of the initial measured value when measured at room conditions.

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Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

High Ripple and DC Holdup



Rated for 125 °C, PPC combines the advantages of aluminum electrolytic and aluminum polymer technology. These capacitors have the ultra-low ESR characteristics of conductive aluminum polymer capacitors in a 1mm thin package. With high capacitance and high ripple current per volume, applications for 125 °C polymer capacitors include DC/DC converters, tablets, telecommunications, thin displays, and variety of industrial power conversion.

Highlights

- +125 °C, Up to 2,000 Hours Load Life
- Low Leakage Current
- Very Low ESR and High Ripple Current
- Just 1mm thin

Specifications

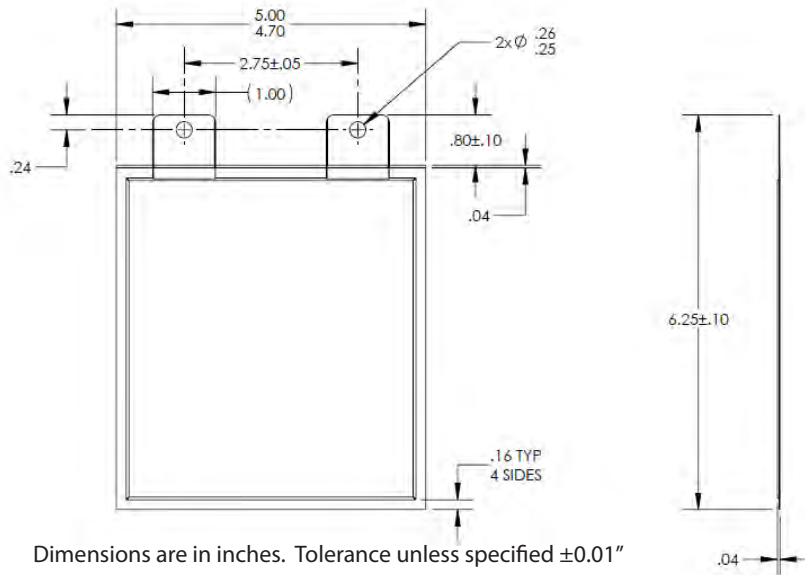
Temperature Range	-55 °C to + 125 °C																																																																																															
Rated Voltage	6.3 Vdc – 24 Vdc (see table for derating)																																																																																															
Capacitance	8000 µF - 20,000 µF																																																																																															
Capacitance Tolerance	±20% at 120 Hz and 25 °C																																																																																															
Leakage Current (at 25°C)	I Max = 0.005CV after 2 minute charge I = leakage current in µAmps C = rated capacitance in µF V = rated DC Working voltage in Volts																																																																																															
Low Temperature Characteristics (at 120 Hz)	Z(-55 °C)/Z(+25 °C): ≤ 3.0																																																																																															
Insulation	Nylon																																																																																															
Operating Temperature	-55 °C to + 125 °C																																																																																															
Terminal Material	Tin plated copper (0.010")																																																																																															
Precautions	Do not bend or strike capacitor body																																																																																															
Ripple Current Frequency Multiplier	<table border="1"> <thead> <tr> <th colspan="8">Ripple Multipliers for Ambient Temperature (No Heatsink)</th> </tr> <tr> <th>Ta (°C)</th> <td>45</td> <td>55</td> <td>65</td> <td>75</td> <td>85</td> <td>95</td> <td>105</td> </tr> <tr> <th>Ripple Current Multiplier</th> <td>2.22</td> <td>1.96</td> <td>1.68</td> <td>1.37</td> <td>1.00</td> <td>0.73</td> <td>0.48</td> </tr> </thead> </table> <table border="1"> <thead> <tr> <th colspan="5">Ripple Multipliers for Air Velocity (No Heatsink)</th> </tr> <tr> <th>Air Velocity (m/s)</th> <td>0.25</td> <td>1</td> <td>2.5</td> <td>5</td> </tr> <tr> <th>Ripple Current Multiplier</th> <td>1.00</td> <td>1.36</td> <td>1.52</td> <td>1.66</td> </tr> </thead> </table> <table border="1"> <thead> <tr> <th colspan="8">Ripple Multipliers for Frequency</th> </tr> <tr> <th>Frequency (Hz)</th> <td>50</td> <td>60</td> <td>120</td> <td>360</td> <td>1000</td> <td>5000</td> <td>20000</td> </tr> <tr> <th>Ripple Current Multiplier</th> <td>0.77</td> <td>0.81</td> <td>1.00</td> <td>1.16</td> <td>1.24</td> <td>1.20</td> <td>1.12</td> </tr> </thead> </table> <table border="1"> <thead> <tr> <th colspan="8">Ripple Multipliers for Case Ambient Temperature (Heatsinked to Bus)</th> </tr> <tr> <th>Ta (°C)</th> <td>45</td> <td>55</td> <td>65</td> <td>75</td> <td>85</td> <td>95</td> <td>105</td> </tr> <tr> <th>One Side</th> <td>2.96</td> <td>2.66</td> <td>2.32</td> <td>1.96</td> <td>1.58</td> <td>1.08</td> <td>0.60</td> </tr> <tr> <th>Both Sides</th> <td>3.00</td> <td>3.00</td> <td>3.00</td> <td>2.77</td> <td>2.24</td> <td>1.52</td> <td>0.85</td> </tr> </thead> </table>	Ripple Multipliers for Ambient Temperature (No Heatsink)								Ta (°C)	45	55	65	75	85	95	105	Ripple Current Multiplier	2.22	1.96	1.68	1.37	1.00	0.73	0.48	Ripple Multipliers for Air Velocity (No Heatsink)					Air Velocity (m/s)	0.25	1	2.5	5	Ripple Current Multiplier	1.00	1.36	1.52	1.66	Ripple Multipliers for Frequency								Frequency (Hz)	50	60	120	360	1000	5000	20000	Ripple Current Multiplier	0.77	0.81	1.00	1.16	1.24	1.20	1.12	Ripple Multipliers for Case Ambient Temperature (Heatsinked to Bus)								Ta (°C)	45	55	65	75	85	95	105	One Side	2.96	2.66	2.32	1.96	1.58	1.08	0.60	Both Sides	3.00	3.00	3.00	2.77	2.24	1.52	0.85
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Mechanical Shock	MIL-STD-202, Method 213, Condition I, 100 G peak, 6mS, Sawtooth, 18 Shocks																																																																																															

Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

Vibration Test	<p>Level The specimens, while deenergized or operating under the load conditions specified, shall be subjected to the vibration amplitude, frequency range, and duration specified for each case size. Level = 10g</p> <p>Amplitude The specimens shall be subjected to a simple harmonic motion having an amplitude of either 0.06-inch double amplitude (maximum total excursion) or peak level specified above, whichever is less. The tolerance on vibration amplitude shall be ±10 percent.</p> <p>Frequency Range The vibration frequency shall be varied logarithmically between the approximate limits of 10 to 2,000 Hz.</p> <p>Sweep Time and Duration The entire frequency range of 10 to 2,000 Hz and return to 10 Hz shall be traversed in 20 minutes. This cycle shall be performed 12 times in each of three mutually perpendicular directions (total of 36 times), so that the motion shall be applied for a total period of approximately 12 hours. Interruptions are permitted provided the requirements for rate of change and test duration are met.</p> <p>Mounting Recommended mounting with 3M double sided VHB tape appropriate for mounting surfaces and to ensure the entire capacitor surface is held rigid.</p>
Altitude	10,000 Feet
Endurance Life Test	<p>Apply the maximum rated voltage for 2,000 hrs at +85 °C with full rated ripple current. After the test, return the capacitor to room temperature for 24 hours and then test.</p> <p>ΔC at 120Hz/+25 °C: ±20% of the initial</p> <p>ESR at 120Hz/+25 °C: ESR ≤ 200% of the initial</p> <p>DCL after 2 minute charge/+25 °C: ≤ 0.005CV</p>
Shelf Life Test	<p>Subject the capacitor to 1000 hrs at +125 °C without voltage. After the test, return the capacitor to room temperature for 24 hours and then test.</p> <p>ΔC at 120Hz/+25 °C: ±20% of the initial</p> <p>ESR at 120Hz/+25 °C: ESR ≤ 200% of the initial</p> <p>DCL after 2 minute charge/+25 °C: ≤ 0.005CV</p>
Moisture Resistance Test	<p>MIL-STD-202, method 106. After the test, return the capacitor to room temperature for 24 hours and then test.</p> <p>ΔC at 120Hz/+25 °C: ±20% of the initial</p> <p>ESR at 120Hz/+25 °C: ESR ≤ 200% of the initial</p> <p>DCL after 2 minute charge/+25 °C: ≤ 0.005CV</p>
Charge/Discharge Test	<p>Charge to rated Vdc and discharge to 0 Vdc, 100,000 cycles at 0.1 Hz, through a 0.22Ω resistor @ 25C. After the test, return the capacitor to room temperature or 24 hours and then test.</p> <p>ΔC at 120Hz/+25 °C: ±20% of the initial</p> <p>ESR at 120Hz/+25 °C: ESR ≤ 200% of the initial</p> <p>DCL after 2 minute charge/+25 °C: ≤ 0.005CV</p>
Regulatory Information	

Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

Outline Drawing



Examples of Ripple Current Capability Calculations

Application	Application Frequency	Catalog Frequency Multiplier	Application Temperature T_A °C	Catalog Temperature Multiplier	Rated Ripple Arms 120Hz	Ripple Capability Arms
No heat sink	120Hz	1	85	1	16	16.0
No heat sink	120Hz	1	45	2.22	16	35.5
One side heat sinked	120Hz	1	85	1.58	16	25.3
Both sides heat sinked	120Hz	1	65	3	16	48.0
No heat sink	1KHz	1.24	85	1	16	19.8
No heat sink	1KHz	1.24	45	2.22	16	44.0
One side heat sinked	1KHz	1.24	85	1.58	16	31.3
Both sides heat sinked	1KHz	1.24	65	3	16	59.5
No heat sink	20KHz	1.12	85	1	16	17.9
No heat sink	20KHz	1.12	45	2.22	16	39.8
One side heat sinked	20KHz	1.12	85	1.58	16	28.3
Both sides heat sinked	20KHz	1.12	65	3	16	53.8

Ratings

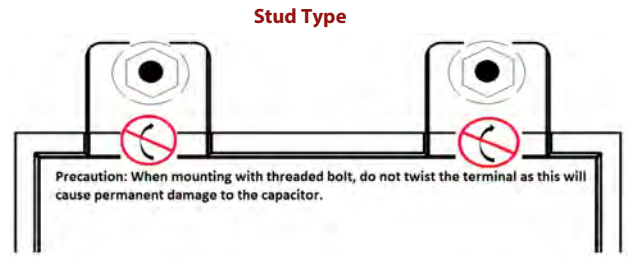
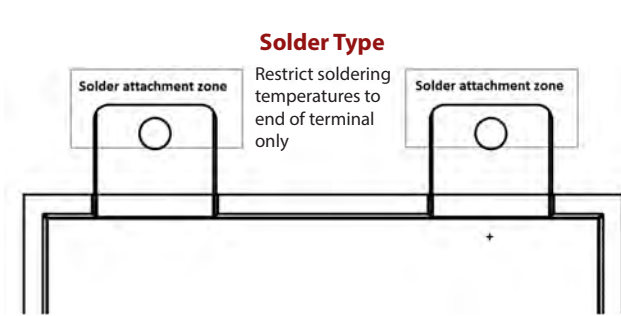
Rated Voltage			Cap μ F	P/N	120 Hz 25 °C Max ESR (Ω)	20 KHz 25 °C Max ESR (234)	Max Ripple 120 Hz (Arms)	Max Ripple 20 kHz (Arms)	Surge 25 °C Vdc
125 °C Vdc	105 °C Vdc	85 °C Vdc							
6.3	8	9	20000	PPC203M6R3FG2SAA	0.01	0.006	16	18	11
10	12	15	12000	PPC123M010FG2SAA	0.01	0.006	16	18	18
16	20	24	8000	PPC802M016FG2SAA	0.01	0.006	16	18	28

Part Numbering System

TYPE	CAP	CAP TOL	VDC	WIDTH	LENGTH	TERM STYLE	SPEC CH1	SPEC CH2
PPC	802	M	016	F	G	2S	A	A
PPC	320 = 32 μ F	$\pm 20\%$	6R3 = 6.3 Vdc	See Outline Drawing		2S - TWO SOLDER-ABLE/BOLT / STUD	ASSIGNED BY MFG	ASSIGNED BY MFG
	222 = 2200 μ F		010 = 10 Vdc					
	163 = 16000 μ F		016 = 16 Vdc					

Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

Recommended Mounting



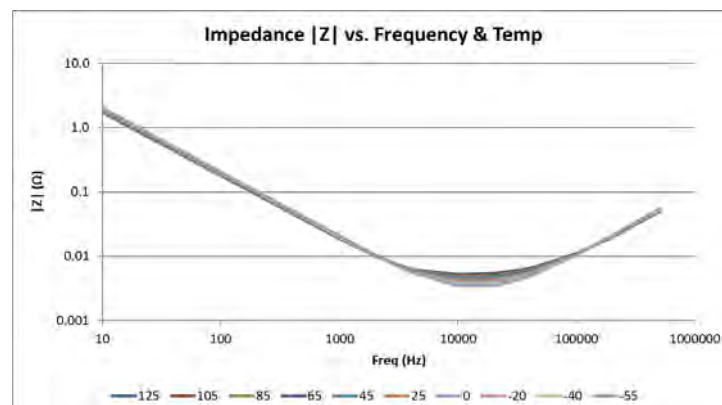
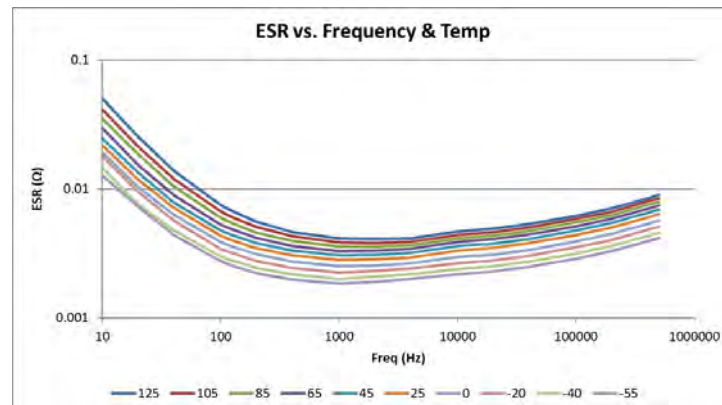
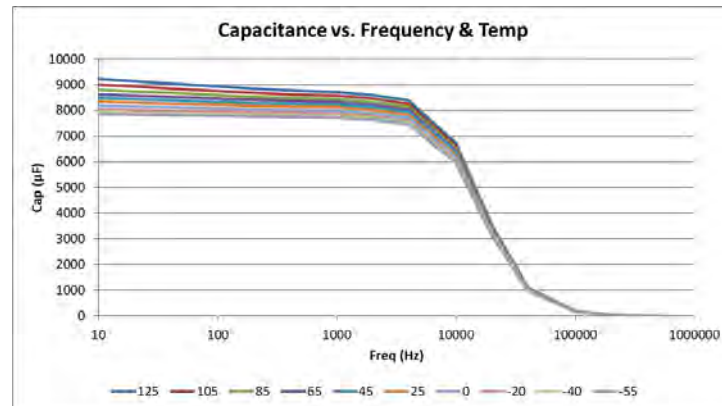
Hardware:

M5 =#10 stud / bolt

Copper flat washer, #10 or M5 washer with (~.500") OD

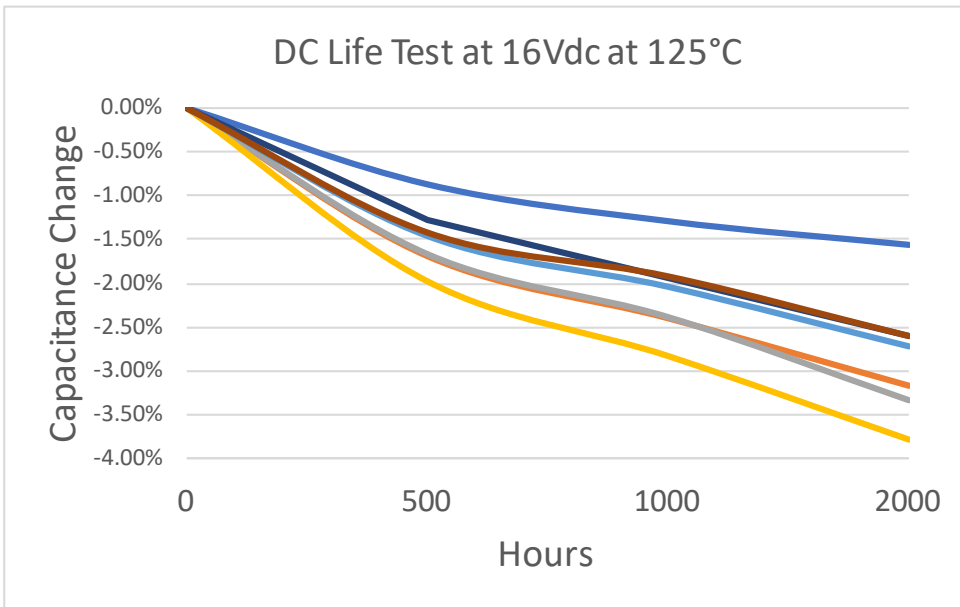
Precaution: Ensure proper terminal spacing and stud / bolt size.

Capacitor Temperature Characteristics

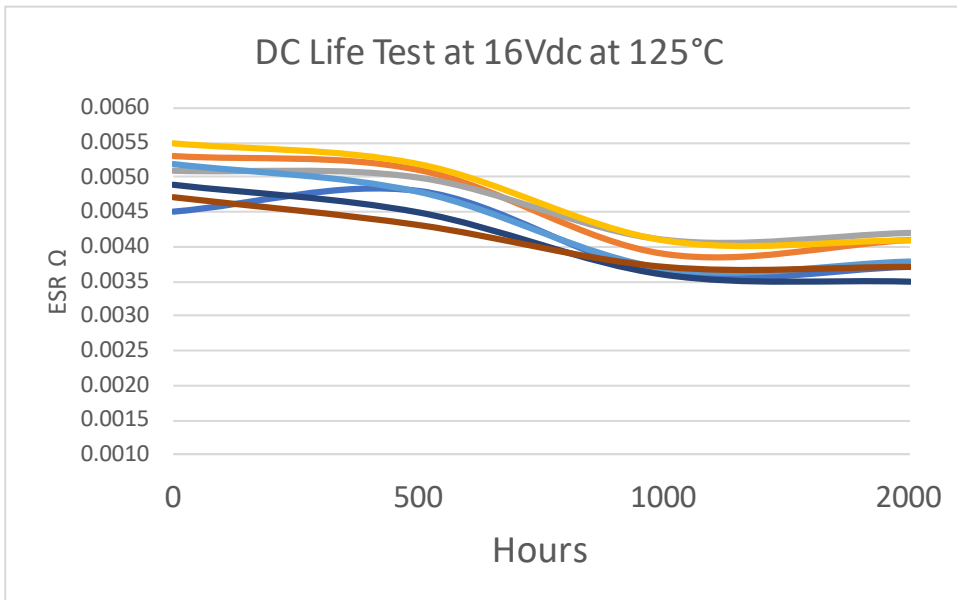


Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor

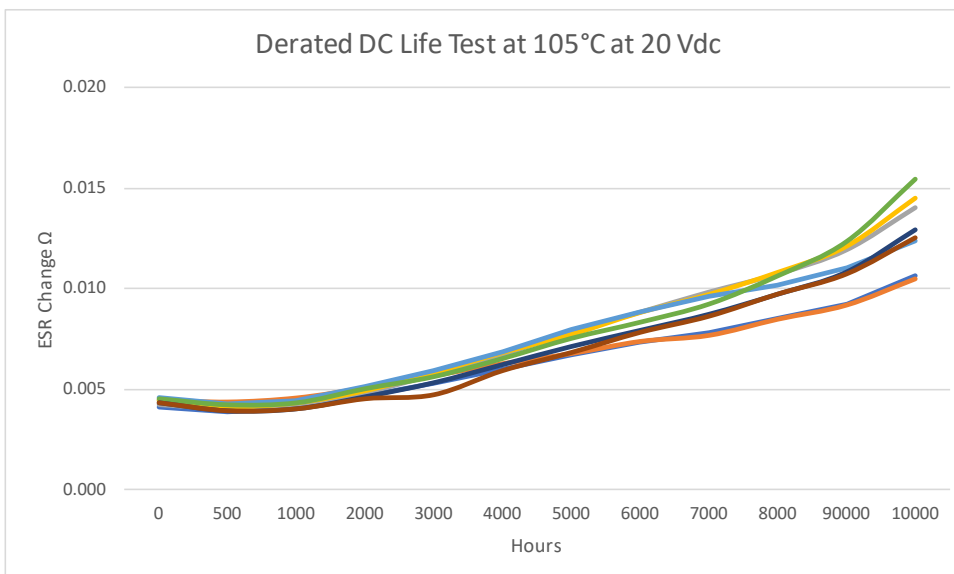
Test Results



This graph represents 8 units on test for 2,000 hours

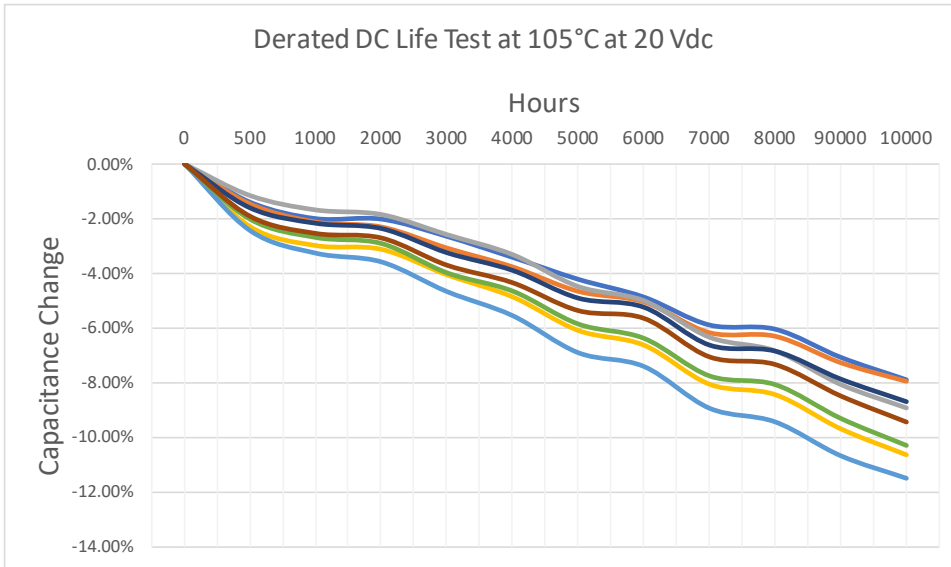


This graph represents 8 units on test for 2,000 hours

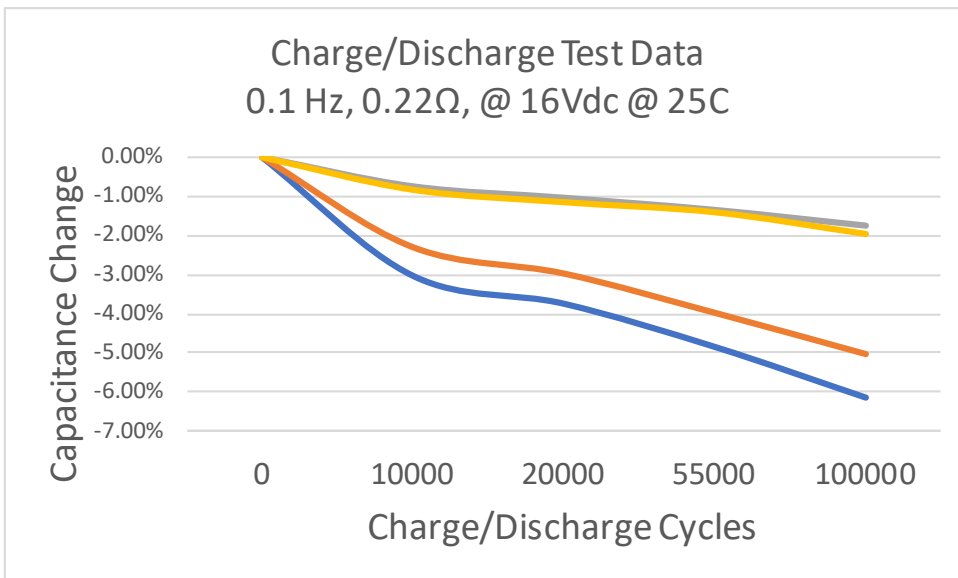


This graph represents 8 units on test for 10,000 hours

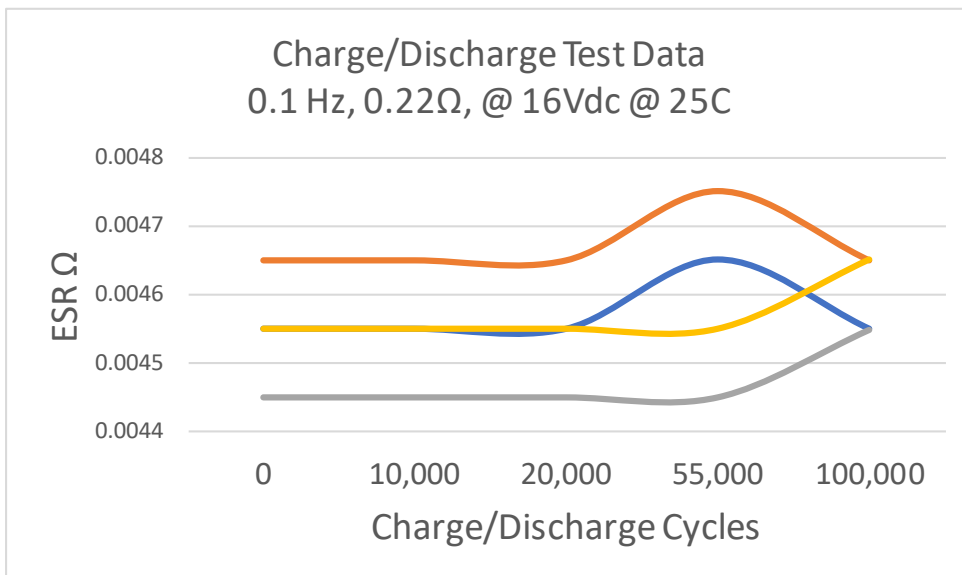
Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor



This graph represents 8 units on test for 10,000 hours

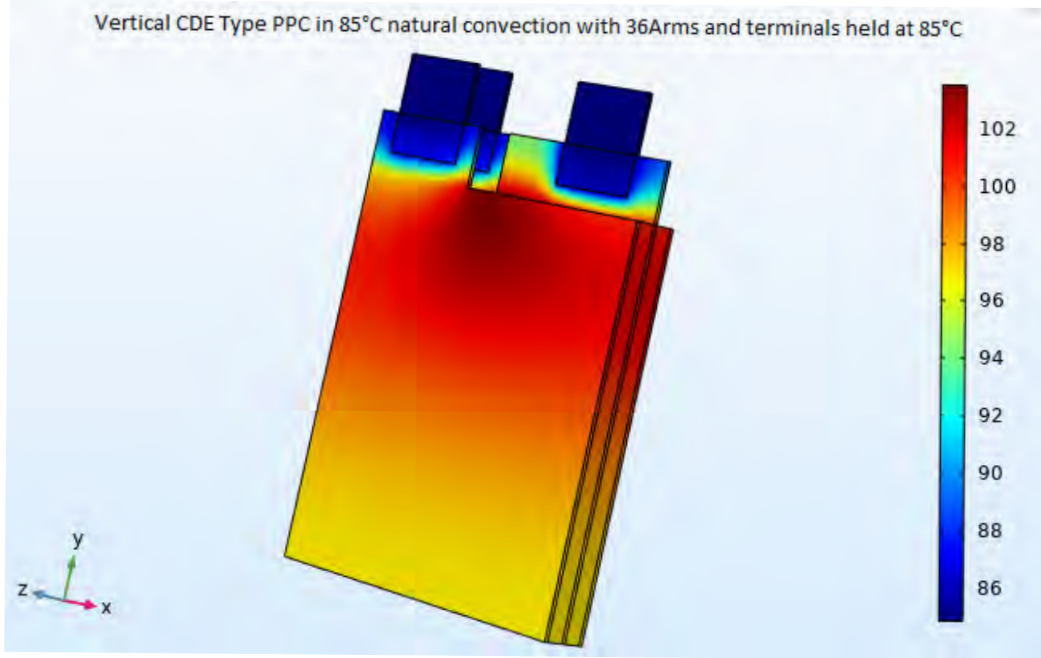


This graph represents 4 units on test for 100,000 cycles

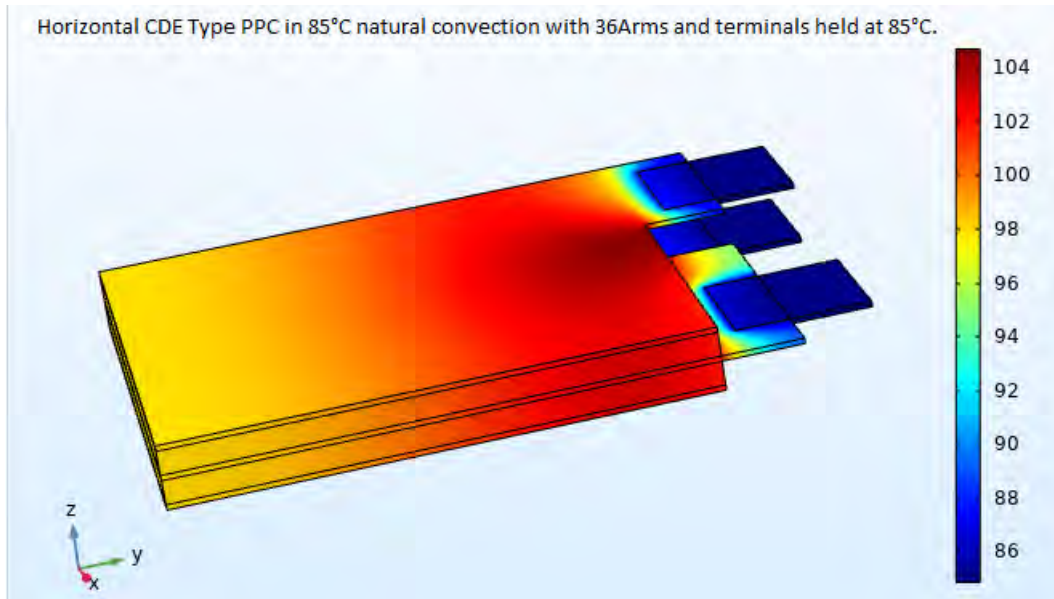


This graph represents 4 units on test for 100,000 cycles

Type PPC, -55 °C to + 125 °C, Ultra-Thin Polymer Aluminum Electrolytic Capacitor Thermal Model



Z dimension is not to scale



Z dimension is not to scale

Notice and Disclaimer: All product drawings, descriptions, specifications, statements, information and data (collectively, the "Information") in this datasheet or other publication are subject to change. The customer is responsible for checking, confirming and verifying the extent to which the Information contained in this datasheet or other publication is applicable to an order at the time the order is placed. All Information given herein is believed to be accurate and reliable, but it is presented without any guarantee, warranty, representation or responsibility of any kind, expressed or implied. Statements of suitability for certain applications are based on the knowledge that the Cornell Dubilier company providing such statements ("Cornell Dubilier") has of operating conditions that such Cornell Dubilier company regards as typical for such applications, but are not intended to constitute any guarantee, warranty or representation regarding any such matter – and Cornell Dubilier specifically and expressly disclaims any guarantee, warranty or representation concerning the suitability for a specific customer application, use, storage, transportation, or operating environment. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by Cornell Dubilier with reference to the use of any Cornell Dubilier products is given gratis (unless otherwise specified by Cornell Dubilier), and Cornell Dubilier assumes no obligation or liability for the advice given or results obtained. Although Cornell Dubilier strives to apply the most stringent quality and safety standards regarding the design and manufacturing of its products, in light of the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies or other appropriate protective measures) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage. Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated in such warnings, cautions and notes, or that other safety measures may not be required.

Type CD4 High-Frequency, Mica Capacitors

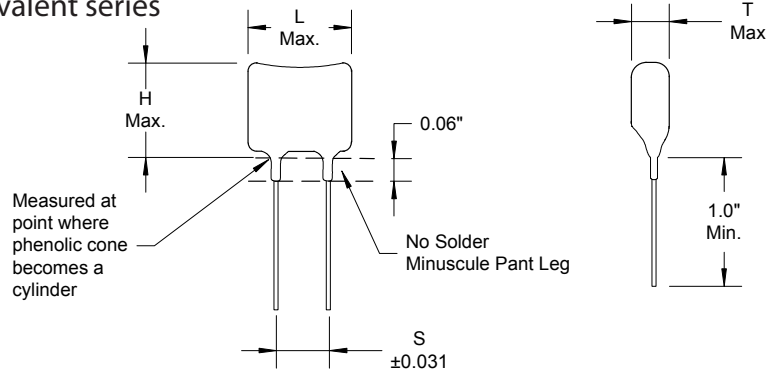
Ultra-High-Frequency Capacitor for CATV and RF Applications 0.1" Lead Spacing



Nearly the textbook ideal capacitor for high-frequency applications, Type CD4 is rock stable over its full temperature and voltage range. Higher self-resonant frequency and lower equivalent series inductance makes CD4 even better than CD17 and CD18 for high-frequency applications. 0.1" lead spacing means CD4 can replace ceramic capacitors on printed circuit boards.

Highlights

- Higher self-resonant frequency and lower equivalent series inductance than CD17 and CD18
- Low impedance to beyond 1 GHz
- Replaces other 0.1" lead-spacing capacitors
- Cool operation—Typical Qs > 2000
- Shockproof and delamination free
- Near zero capacitance change with frequency and temperature
- 100,000 V/μs dV/dt capability minimum
- Zero capacitance change with voltage



Specifications

- Voltage Range:** 100 Vdc to 500 Vdc
- Capacitance Range:** 1 pF to 1,500 pF
- Capacitance Tolerance:** ±½ pF (D), ±1 pF (C), ±1/2% (E), ±1% (F), ±1% (F), ±2% (G), ±5% (J)
- Temperature Range:** -55 °C to +125 °C

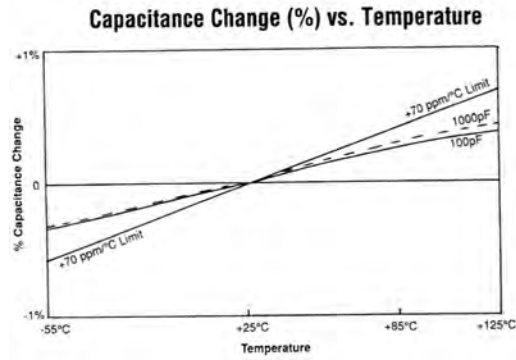
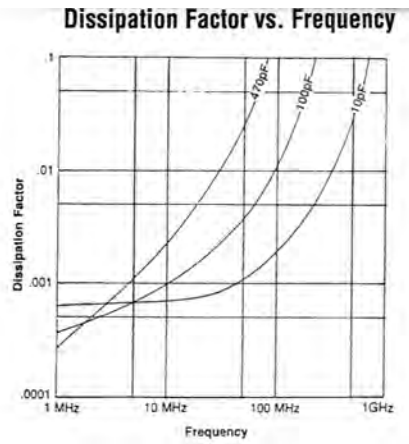
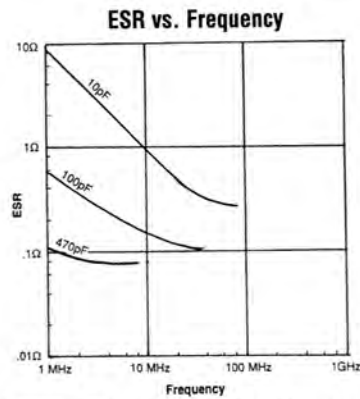
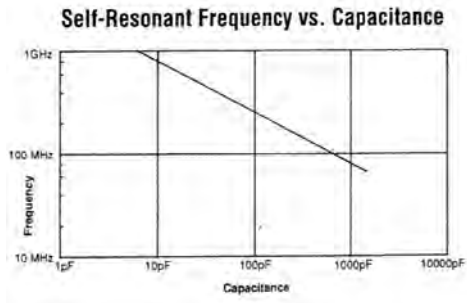
Ratings

For RoHS compliant add the letter F at the end of the part number.

(pF)	Catalog Part Number	L In (mm)	H In (mm)	T In (mm)	S In (mm)	d In (mm)	(pF)	Catalog Part Number	L In (mm)	H In (mm)	T In (mm)	S In (mm)	d In (mm)
100 Vdc							39	CD4ED390J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)
910	CD4FA911J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)	43	CD4ED430J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)
1000	CD4FA102J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)	47	CD4ED470J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)
1100	CD4FA112J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)	50	CD4ED500J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)
1200	CD4FA122J03	.340 (8.6)	.310 (7.9)	.170 (4.3)	.100 (2.5)	.020 (.5)	51	CD4ED510J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)
1500	CD4FA152J03	.340 (8.6)	.310 (7.9)	.180 (4.6)	.100 (2.5)	.020 (.5)	56	CD4ED560J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)
300 Vdc							62	CD4ED620J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)
560	CD4FC561J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)	68	CD4ED680J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)
620	CD4FC621J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)	75	CD4ED750J03	.290 (7.4)	.220 (5.8)	.110 (2.8)	.100 (2.5)	.020 (.5)
680	CD4FC681J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)	82	CD4ED820J03	.290 (7.4)	.220 (5.8)	.110 (2.8)	.100 (2.5)	.020 (.5)
750	CD4FC751J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)	91	CD4FD910J03	.290 (7.4)	.220 (5.8)	.110 (2.8)	.100 (2.5)	.020 (.5)
820	CD4FC821J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)	100	CD4FD101J03	.290 (7.4)	.240 (6.1)	.110 (2.8)	.100 (2.5)	.020 (.5)
500 Vdc							110	CD4FD111J03	.290 (7.4)	.240 (6.1)	.110 (2.8)	.100 (2.5)	.020 (.5)
1	CD4CD010D03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	120	CD4FD121J03	.290 (7.4)	.240 (6.1)	.110 (2.8)	.100 (2.5)	.020 (.5)
2	CD4CD020D03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	130	CD4FD131J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
3	CD4CD030D03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	150	CD4FD151J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
4	CD4CD040D03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	160	CD4FD161J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
5	CD4CD050D03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	180	CD4FD181J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
6	CD4CD060D03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	200	CD4FD201J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
7	CD4CD070D03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	220	CD4FD221J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
8	CD4CD080D03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	240	CD4FD241J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
10	CD4CD100J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	250	CD4FD251J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
12	CD4CD120J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	270	CD4FD271J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
15	CD4CD150J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	300	CD4FD301J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
18	CD4CD180J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	330	CD4FD331J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
20	CD4ED200J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	360	CD4FD361J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
22	CD4ED220J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	390	CD4FD391J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
24	CD4ED240J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	430	CD4FD431J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
27	CD4ED270J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	470	CD4FD471J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
30	CD4ED300J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	500	CD4FD501J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
33	CD4ED330J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)	510	CD4FD511J03	.340 (8.6)	.310 (7.9)	.160 (4.1)	.100 (2.5)	.020 (.5)
36	CD4ED360J03	.290 (7.4)	.220 (5.6)	.110 (2.8)	.100 (2.5)	.020 (.5)							

Type CD4 High-Frequency, Mica Capacitors

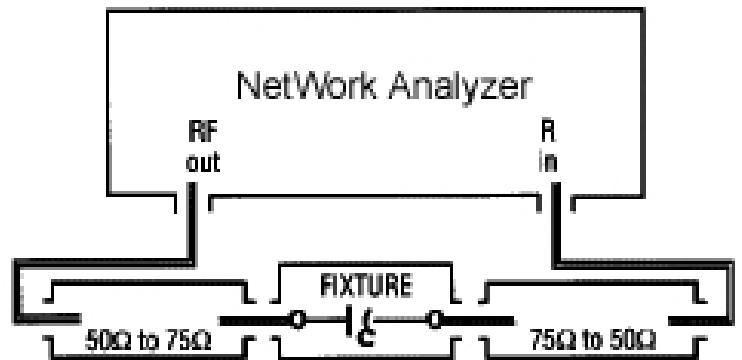
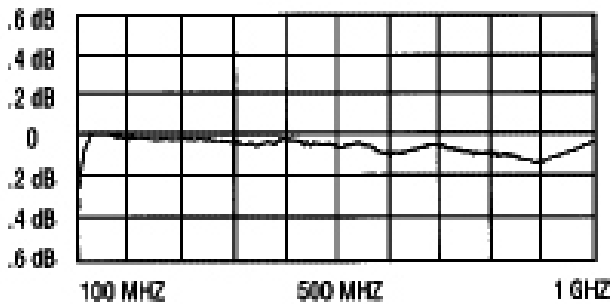
Typical Performance Curves



Insertion Loss

Over the frequency range of 100 MHz to 1 GHz the insertion loss in a balanced 50 Ω or 75 Ω system is flat ± 0.2 dB. A typical test setup is below.

Insertion Loss vs. Frequency for CD17FC621J03, 75 Ω System



Choosing CD4, CD16, CDV16, CD18 or CDV18

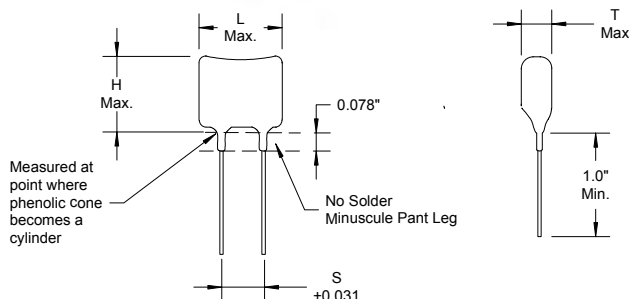
While insertion loss is flat within ± 0.2 dB through 1 GHz, you may be able to avoid the small notch by changing the capacitor type to fit your capacitance. See table at right.

TYPE	Flat to Above 1 GHz
CD17	470 pF max
CD4	620 pF max
CD16	870 pF
CDV16	870 pF
CD18	660 pF max
CDV18	1000 pF max

Type CD4 High-Frequency, Mica Capacitors

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Mica Capacitors **Miniature Dipped** Types CD5, CD6, CD7, CDS5, CDS10, D7, CDS15, CDS19, CDS30



Small cases for tight places is what you get with CDE miniature dipped silver mica capacitors. Like the standard dipped mica capacitor, the miniature dipped product offers the same stability and rugged performance in low and moderate-humidity applications.

Highlights

- ◆ Reel packaging available
- ◆ Dimensions meet EIA RS153B specification
- ◆ 20,000 V/μs dV/dt pulse capability minimum
- ◆ Non-flammable units that meet IEC 695-2-2 are available

[Click here to see ordering information](#)

Specifications

- Capacitance Range:** 1 pF to 40,000 pF
- Voltage Range:** 50 Vdc to 500 Vdc
- Capacitance Tolerance:** ±1/2 pF (D), ±1 pF (C), ±1/2% (E), ±1% (F), ±2% (G), ±5% (J)
- Temperature Range:** -55 °C to +125 °C
- Dielectric Strength Test:** 200% of rated voltage

Ratings

Cap Volts (pF) (Vdc)	Catalog Part Number	L inches (mm)	H inches (mm)	T inches (mm)	S inches (mm)	d inches (mm)
1 300	CD5CC010D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
1 300	CDS5CC010D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
1 500	CD6CD010D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
1 500	CDS10CD010D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
1 500	CDS15CD010D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
2 300	CD5CC020D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
2 300	CDS5CC020D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
2 500	CD6CD020D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
2 500	CDS10CD020D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
2 500	CDS15CD020D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
3 300	CD5CC030D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
3 300	CDS5CC030D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
3 500	CD6CD030D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
3 500	CDS10CD030D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
3 500	CDS15CD030D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
4 300	CD5CC040D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
4 300	CDS5CC040D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
4 500	CD6CD040D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
4 500	CDS10CD040D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
4 500	CDS15CD040D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
5 300	CD5CC050D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
5 300	CDS5CC050D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
5 500	CD6CD050D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
5 500	CDS10CD050D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
5 500	CDS15CD050D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
6 300	CD5CC060D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
6 300	CDS5CC060D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
6 500	CD6CD060D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
6 500	CDS10CD060D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
6 500	CDS15CD060D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
7 300	CD5CC070D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)

Cap Volts (pF) (Vdc)	Catalog Part Number	L inches (mm)	H inches (mm)	T inches (mm)	S inches (mm)	d inches (mm)
7 300	CDS5CC070D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
7 500	CD6CD070D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
7 500	CDS10CD070D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
7 500	CDS15CD070D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
8 300	CD5CC080D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
8 300	CDS5CC080D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
8 500	CD6CD080D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
8 500	CDS10CD080D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
8 500	CDS15CD080D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
9 300	CD5CC090D03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
9 300	CDS5CC090D03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
9 500	CD6CD090D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
9 500	CDS10CD090D03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
9 500	CDS15CD090D03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
10 300	CD5CC100J03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
10 300	CDS5CC100J03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
10 500	CD6CD100D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
10 500	CDS10CD100J03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
10 500	CDS15CD100J03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
11 300	CD5CC110J03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
11 300	CDS5CC110J03F	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
11 500	CD6CD110D03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
11 500	CDS10CD110J03F	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
11 500	CDS15CD110J03F	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
12 300	CD5CC120J03F	0.270 (6.9)	0.190 (4.8)	0.110 (2.8)	0.120 (3.0)	0.016 (4)
12 300	CDS5CC120J03	0.250 (6.4)	0.160 (4.1)	0.090 (2.3)	0.120 (3.0)	0.016 (4)
12 500	CD6CD120J03	0.275 (7.0)	0.175 (4.4)	0.095 (2.4)	0.172 (4.4)	0.016 (4)
12 500	CDS10CD120J03	0.310 (7.9)	0.260 (6.6)	0.120 (3.0)	0.141 (3.6)	0.016 (4)
12 500	CDS15CD120J03	0.430 (10.9)	0.280 (7.1)	0.140 (3.6)	0.234 (5.9)	0.025 (6)
15 300	CD5CC150J03F	0.270 (6.9)	0.190 (4.8)	0.120 (3.0)	0.120 (3.0)	0.016 (4)
15 300	CDS5CC150J03F	0.250 (6.4)	0.170 (4.3)	0.100 (2.5)	0.120 (3.0)	0.016 (4)

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Cap (pF)	Volts (Vdc)	Catalog Part Number	L (inches (mm))	H (inches (mm))	T (inches (mm))	S (inches (mm))	d (inches (mm))	Cap (pF)	Volts (Vdc)	Catalog Part Number	L (inches (mm))	H (inches (mm))	T (inches (mm))	S (inches (mm))	d (inches (mm))
270	300	CD7FC271J03	0.265 (6.7)	0.260 (6.6)	0.110 (2.8)	0.172 (4.4)	0.016 (.4)	1000	100	CD7FA102J03	0.320 (8.1)	0.300 (7.6)	0.155 (3.9)	0.172 (4.4)	0.016 (.4)
270	300	CDS10FC271J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	1000	100	D71F102J03F	0.340 (8.6)	0.310 (7.9)	0.170 (4.3)	0.141 (3.6)	0.016 (.4)
270	500	D75F271J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	1000	100	CDS15FA102J03F	0.450 (11.4)	0.310 (7.9)	0.170 (4.3)	0.234 (5.9)	0.025 (.6)
270	500	CDS15FD271J03F	0.440 (11.2)	0.290 (7.4)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	1000	500	CDS19FD102J03F	0.620 (15.7)	0.460 (11.7)	0.160 (4.1)	0.344 (8.7)	0.032 (.8)
270	500	CDS19FD271J03F	0.610 (15.5)	0.450 (11.4)	0.130 (3.3)	0.344 (8.7)	0.032 (.8)	1100	100	CD7FA112J03	0.320 (8.1)	0.300 (7.6)	0.155 (3.9)	0.172 (4.4)	0.016 (.4)
300	50	CD5FY301J03F	0.270 (6.9)	0.230 (5.8)	0.170 (4.3)	0.120 (3.0)	0.016 (.4)	1100	100	D71F112J03F	0.340 (8.6)	0.310 (7.9)	0.170 (4.3)	0.141 (3.6)	0.016 (.4)
300	50	CDS5FY301J03F	0.250 (6.4)	0.190 (4.8)	0.150 (3.8)	0.120 (3.0)	0.016 (.4)	1100	100	CDS15FA112J03F	0.460 (11.7)	0.310 (7.9)	0.180 (4.6)	0.234 (5.9)	0.025 (.6)
300	300	CD7FC301J03	0.265 (6.7)	0.260 (6.6)	0.110 (2.8)	0.172 (4.4)	0.016 (.4)	1100	500	CDS19FD112J03F	0.620 (15.7)	0.460 (11.7)	0.160 (4.1)	0.344 (8.7)	0.032 (.8)
300	300	CDS10FC301J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	1200	100	CD7FA122J03	0.320 (8.1)	0.300 (7.6)	0.155 (3.9)	0.172 (4.4)	0.016 (.4)
300	500	D75F301J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	1200	100	D71F122J03F	0.340 (8.6)	0.310 (7.9)	0.170 (4.3)	0.141 (3.6)	0.016 (.4)
300	500	CDS15FD301J03F	0.440 (11.2)	0.290 (7.4)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	1200	100	CDS15FA122J03F	0.460 (11.7)	0.310 (7.9)	0.180 (4.6)	0.234 (5.9)	0.025 (.6)
300	500	CDS19FD301J03F	0.610 (15.5)	0.450 (11.4)	0.130 (3.3)	0.344 (8.7)	0.032 (.8)	1200	500	CDS19FD122J03F	0.620 (15.7)	0.460 (11.7)	0.170 (4.3)	0.344 (8.7)	0.032 (.8)
330	50	CD5FY331J03F	0.270 (6.9)	0.240 (6.1)	0.180 (4.6)	0.120 (3.0)	0.016 (.4)	1300	100	CD7FA132J03	0.330 (8.4)	0.310 (7.9)	0.175 (4.4)	0.172 (4.4)	0.016 (.4)
330	50	CDS5FY331J03F	0.250 (6.4)	0.190 (4.8)	0.160 (4.1)	0.120 (3.0)	0.016 (.4)	1300	100	D71F132J03F	0.340 (8.6)	0.310 (7.9)	0.170 (4.3)	0.141 (3.6)	0.016 (.4)
330	100	CD7FA331J03	0.275 (7.0)	0.260 (6.6)	0.125 (3.2)	0.172 (4.4)	0.016 (.4)	1300	500	CDS19FD132J03F	0.620 (15.7)	0.460 (11.7)	0.170 (4.3)	0.344 (8.7)	0.032 (.8)
330	100	CDS10FA331J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	1500	100	CD7FA152J03	0.330 (8.4)	0.310 (7.9)	0.175 (4.4)	0.172 (4.4)	0.016 (.4)
330	500	D75F331J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	1500	100	D71F152J03F	0.340 (8.6)	0.310 (7.9)	0.170 (4.3)	0.141 (3.6)	0.016 (.4)
330	500	CDS15FD331J03F	0.440 (11.2)	0.290 (7.4)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	1500	100	CDS15FA152J03F	0.460 (11.7)	0.310 (7.9)	0.180 (4.6)	0.234 (5.9)	0.025 (.6)
330	500	CDS19FD331J03F	0.610 (15.5)	0.450 (11.4)	0.130 (3.3)	0.334 (8.7)	0.032 (.8)	1500	500	CDS19FD152J03F	0.620 (15.7)	0.460 (11.7)	0.170 (4.3)	0.344 (8.7)	0.032 (.8)
360	50	CD5FY361J03F	0.270 (6.9)	0.240 (6.1)	0.190 (4.8)	0.120 (3.0)	0.016 (.4)	1600	500	CDS19FD162J03F	0.620 (15.7)	0.460 (11.7)	0.180 (4.6)	0.344 (8.7)	0.032 (.8)
360	50	CDS5FY361J03F	0.250 (6.4)	0.190 (4.8)	0.160 (4.1)	0.120 (3.0)	0.016 (.4)	1800	500	CDS19FD182J03F	0.620 (15.7)	0.460 (11.7)	0.180 (4.6)	0.344 (8.7)	0.032 (.8)
360	100	CD7FA361J03	0.275 (7.0)	0.260 (6.6)	0.125 (3.2)	0.172 (4.4)	0.016 (.4)	2000	500	CDS19FD202J03F	0.630 (16.0)	0.460 (11.7)	0.190 (4.8)	0.344 (8.7)	0.032 (.8)
360	100	CDS10FA361J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	2000	500	CDS30FD202J03F	0.720 (18.3)	0.790 (20.1)	0.180 (4.6)	0.438 (11.1)	0.040 (1.0)
360	500	D75F361J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	2200	500	CDS19FD222J03F	0.630 (16.0)	0.460 (11.7)	0.190 (4.8)	0.344 (8.7)	0.032 (.8)
360	500	CDS15FD361J03F	0.440 (11.2)	0.290 (7.4)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	2200	500	CDS30FD222J03F	0.720 (18.3)	0.790 (20.1)	0.180 (4.6)	0.438 (11.1)	0.040 (1.0)
360	500	CDS19FD361J03F	0.610 (15.5)	0.450 (11.4)	0.140 (3.6)	0.344 (8.7)	0.032 (.8)	2400	500	CDS19FD242J03F	0.630 (16.0)	0.470 (11.9)	0.210 (5.3)	0.344 (8.7)	0.032 (.8)
390	50	CD5FY391J03F	0.270 (6.9)	0.250 (6.4)	0.190 (4.8)	0.120 (3.0)	0.016 (.4)	2400	500	CDS30FD242J03F	0.720 (18.3)	0.790 (20.1)	0.180 (4.6)	0.438 (11.1)	0.040 (1.0)
390	50	CDS5FY391J03F	0.250 (6.4)	0.190 (4.8)	0.170 (4.3)	0.120 (3.0)	0.016 (.4)	2500	500	CDS19FD252J03F	0.630 (16.0)	0.470 (11.9)	0.210 (5.3)	0.344 (8.7)	0.032 (.8)
390	100	CD7FA391J03	0.275 (7.0)	0.260 (6.6)	0.125 (3.2)	0.172 (4.4)	0.016 (.4)	2500	500	CDS30FD252J03F	0.720 (18.3)	0.790 (20.1)	0.190 (4.8)	0.438 (11.1)	0.040 (1.0)
390	100	CDS10FA391J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	2700	500	CDS19FD272J03F	0.630 (16.0)	0.470 (11.9)	0.210 (5.3)	0.344 (8.7)	0.032 (.8)
390	500	D75F391J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	2700	500	CDS30FD272J03F	0.720 (18.3)	0.790 (20.1)	0.190 (4.8)	0.438 (11.1)	0.040 (1.0)
390	500	CDS15FD391J03F	0.440 (11.2)	0.290 (7.4)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	3000	500	CDS19FD302J03F	0.630 (16.0)	0.470 (11.9)	0.210 (5.3)	0.344 (8.7)	0.032 (.8)
390	500	CDS19FD391J03F	0.610 (15.5)	0.450 (11.4)	0.140 (3.6)	0.344 (8.7)	0.032 (.8)	3000	500	CDS30FD302J03F	0.720 (18.3)	0.790 (20.1)	0.190 (4.8)	0.438 (11.1)	0.040 (1.0)
400	50	CD5FY401J03F	0.270 (6.9)	0.250 (6.4)	0.190 (4.8)	0.120 (3.0)	0.016 (.4)	3300	500	CDS19FD332J03F	0.630 (16.0)	0.470 (11.9)	0.210 (5.3)	0.344 (8.7)	0.032 (.8)
400	50	CDS5FY401J03F	0.250 (6.4)	0.190 (4.8)	0.170 (4.3)	0.120 (3.0)	0.016 (.4)	3300	500	CDS30FD332J03F	0.720 (18.3)	0.790 (20.1)	0.190 (4.8)	0.438 (11.1)	0.040 (1.0)
400	100	CDS10FA401J03F	0.340 (8.6)	0.270 (6.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	3600	500	CDS19FD362J03F	0.630 (16.0)	0.470 (11.9)	0.210 (5.3)	0.344 (8.7)	0.032 (.8)
430	100	CD7FA431J03	0.275 (7.0)	0.260 (6.6)	0.125 (3.2)	0.172 (4.4)	0.016 (.4)	3600	500	CDS30FD362J03F	0.720 (18.3)	0.790 (20.1)	0.200 (5.1)	0.438 (11.1)	0.040 (1.0)
430	500	D75F431J03F	0.340 (8.6)	0.310 (7.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	3900	500	CDS19FD392J03F	0.630 (16.0)	0.470 (11.9)	0.210 (5.3)	0.344 (8.7)	0.032 (.8)
430	500	CDS15FD431J03F	0.440 (11.2)	0.290 (7.4)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	3900	500	CDS30FD392J03F	0.720 (18.3)	0.790 (20.1)	0.200 (5.1)	0.438 (11.1)	0.040 (1.0)
430	500	CDS19FD431J03F	0.610 (15.5)	0.450 (11.4)	0.140 (3.6)	0.344 (8.7)	0.032 (.8)	4300	500	CDS19FD432J03F	0.630 (16.0)	0.470 (11.9)	0.220 (5.6)	0.344 (8.7)	0.032 (.8)
470	100	CD7FA471J03	0.275 (7.0)	0.260 (6.6)	0.125 (3.2)	0.172 (4.4)	0.016 (.4)	4300	500	CDS30FD432J03F	0.720 (18.3)	0.790 (20.1)	0.200 (5.1)	0.438 (11.1)	0.040 (1.0)
470	500	D75F471J03F	0.340 (8.6)	0.310 (7.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	4700	500	CDS19FD472J03F	0.630 (16.0)	0.470 (11.9)	0.230 (5.8)	0.344 (8.7)	0.032 (.8)
470	500	CDS15FD471J03F	0.440 (11.2)	0.300 (7.6)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	4700	500	CDS30FD472J03F	0.720 (18.3)	0.790 (20.1)	0.210 (5.3)	0.438 (11.1)	0.040 (1.0)
470	500	CDS19FD471J03F	0.610 (15.5)	0.450 (11.4)	0.140 (3.6)	0.344 (8.7)	0.032 (.8)	5000	500	CDS19FD502J03F	0.630 (16.0)	0.480 (12.2)	0.240 (6.1)	0.344 (8.7)	0.032 (.8)
470	500	CDS30FD471J03F	0.720 (18.3)	0.790 (20.1)	0.180 (4.6)	0.438 (11.1)	0.040 (1.0)	5000	500	CDS30FD502J03F	0.720 (18.3)	0.790 (20.1)	0.210 (5.3)	0.438 (11.1)	0.040 (1.0)
500	500	D75F501J03F	0.340 (8.6)	0.310 (7.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	5100	500	CDS19FD512J03F	0.630 (16.0)	0.480 (12.2)	0.240 (6.1)	0.344 (8.7)	0.032 (.8)
500	500	CDS15FD501J03F	0.440 (11.2)	0.300 (7.6)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	5100	500	CDS30FD512J03F	0.720 (18.3)	0.790 (20.1)	0.210 (5.3)	0.438 (11.1)	0.040 (1.0)
500	500	CDS19FD501J03F	0.610 (15.5)	0.450 (11.4)	0.140 (3.6)	0.344 (8.7)	0.032 (.8)	5600	300	CDS19FC562J03F	0.640 (16.3)	0.480 (12.2)	0.250 (6.4)	0.344 (8.7)	0.032 (.8)
510	100	CD7FA511J03	0.275 (7.0)	0.260 (6.6)	0.125 (3.2)	0.172 (4.4)	0.016 (.4)	5600	500	CDS30FD562J03F	0.720 (18.3)	0.790 (20.1)	0.220 (5.6)	0.438 (11.1)	0.040 (1.0)
510	500	D75F511J03F	0.340 (8.6)	0.310 (7.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	6200	300	CDS19FC622J03F	0.640 (16.3)	0.480 (12.2)	0.260 (6.6)	0.344 (8.7)	0.032 (.8)
510	500	CDS15FD511J03F	0.440 (11.2)	0.300 (7.6)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	6200	500	CDS30FD622J03F	0.730 (18.5)	0.800 (20.3)	0.220 (5.6)	0.438 (11.1)	0.040 (1.0)
510	500	CDS19FD511J03F	0.610 (15.5)	0.450 (11.4)	0.140 (3.6)	0.344 (8.7)	0.032 (.8)	6800	300	CDS19FC682J03F	0.640 (16.3)	0.490 (12.4)	0.270 (6.9)	0.344 (8.7)	0.032 (.8)
560	100	CD7FA561J03	0.275 (7.0)	0.260 (6.6)	0.125 (3.2)	0.172 (4.4)	0.016 (.4)	6800	500	CDS30FD682J03F	0.730 (18.5)	0.800 (20.3)	0.230 (5.8)	0.438 (11.1)	0.040 (1.0)
560	300	D73F561J03F	0.340 (8.6)	0.310 (7.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	7500	100	CDS19FA752J03F	0.650 (16.5)	0.490 (12.4)	0.280 (7.1)	0.344 (8.7)	0.032 (.8)
560	300	CDS15FC561J03F	0.450 (11.4)	0.310 (7.9)	0.160 (4.1)	0.234 (5.9)	0.025 (.6)	7500	500	CDS30FD752J03F	0.730 (18.5)	0.800 (20.3)	0.240 (6.1)	0.438 (11.1)	0.040 (1.0)
560	500	CDS19FD561J03F	0.610 (15.5)	0.450 (11.4)	0.150 (3.8)	0.344 (8.7)	0.032 (.8)	8200	100	CDS19FA822J03F	0.650 (16.5)	0.490 (12.4)	0.300 (7.6)	0.344 (8.7)	0.032 (.8)
620	100	CD7FA621J03	0.275 (7.0)	0.260 (6.6)	0.125 (3.2)	0.172 (4.4)	0.016 (.4)	8200	500	CDS30FD822J03F	0.730 (18.5)	0.800 (20.3)	0.250 (6.4)	0.438 (11.1)	0.040 (1.0)
620	300	D73F621J03F	0.340 (8.6)	0.310 (7.9)	0.160 (4.1)	0.141 (3.6)	0.016 (.4)	9100	100	CDS19FA912J03F	0.660 (16.8)	0.500 (12.7)	0.310 (7.9)	0.344 (8.7)	0.032 (.8)
620	300	CDS15FC621J03F	0.450 (1												

Mica Capacitors **Miniature Dipped**

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Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30



Stability and mica go hand-in-hand when you need to count on stable capacitance over a wide temperature range. CDE's standard dipped silvered mica capacitors are the first choice for timing and close tolerance applications. These standard types are widely available through distribution.

Highlights

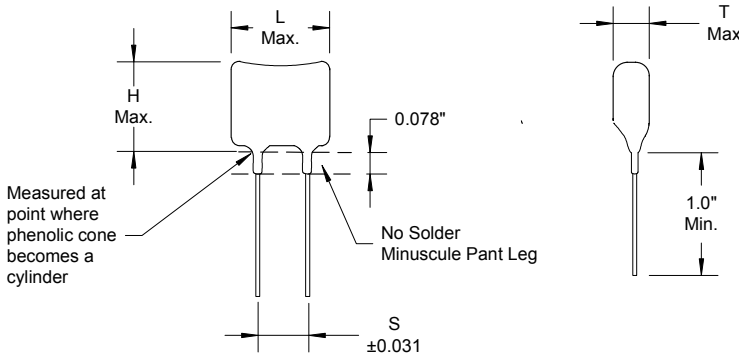
- Reel packaging available
- High temperature – up to +150 °C
- Dimensions meet EIA RS153B specification
- 100,000 V/μs dV/dt pulse capability minimum
- Non-flammable units that meet IEC 695-2-2 are available

Specifications

Capacitance Range	1 pF to 91,000 pF
Capacitance Tolerance	±1/2 pF (D), ±1 pF (C), ±1/2% (E), ±1% (F), ±2% (G), ±5% (J)
Rated Voltage	100 Vdc to 2500 Vdc
Operating Temperature Range	-55 °C to +125 °C (O) -55 °C to +150 °C (P)*
Dielectric Strength Test	200% of rated voltage
RoHS Compliant	

* P temperature range available for types CD10, CD15, CD19, CD30 and CD42

Dimensions



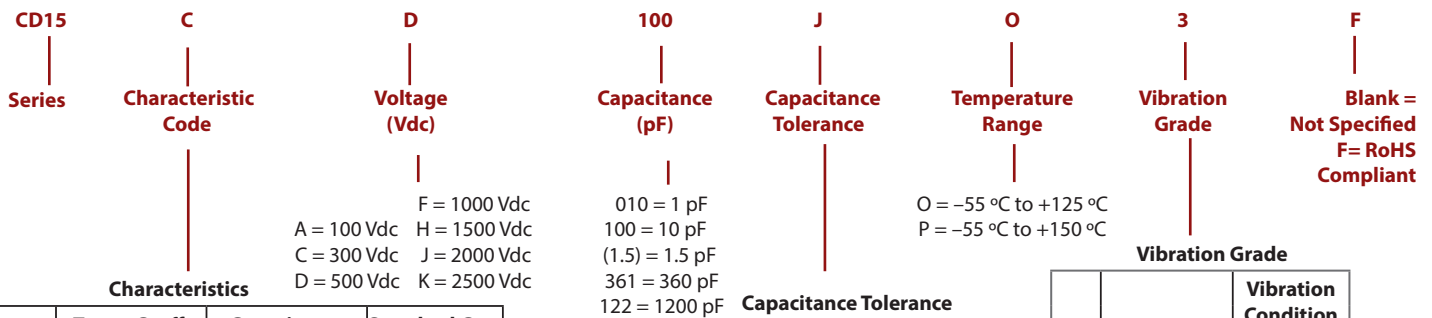
Construction Details

Case Material	Epoxy
Terminal Material	Copper clad steel, nickle undercoat, 100% tin finish

Ordering Information

Order by complete part number as below. For other options, write your requirements on your purchase order or request for quotation.

Part Numbering System (Radial-Leaded Silvered Mica Capacitors, except D10*)



Code	Temp. Coeff. ppm/ °C	Capacitance Drift	Standard Cap. Range
C	-200 to +200	±(0.5% + 0.1 pF)	1–18 pF
E	-20 to +100	±(0.1% + 0.1 pF)	20–82 pF
F	0 to +70	±(0.05% + 0.1 pF)	91 pF and up

Tol. Code	Tolerance	Capacitance Range
C	±1 pF	1–9 pF
D	±1/2 pF	1–99 pF
E	±1/2 %	100 pF and up
F	±1 %	50 pF and up
G	±2 %	25 pF and up
H	±3 %	18 pF and up
J	±5 %	10 pF and up

No.	MIL-STD-202	Vibration Condition (Hz)
3	Method 204 Condition D	10 to 2,000

Options Available

- Non-flammable units per IEC 695-2-2 are available for standard dipped capacitors. Specify IEC 695-2-2 on your order.
- Tape and reeling, specify per application guide.

Standard tolerance is ±1/2 pF for less than 10 pF and ±5% for 10 pF and up

* Order type D10 using the catalog numbers shown in ratings tables.

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Ratings

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
1	500	CD10CD010DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
1	500	CD15CD010DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
2	500	CD10CD020DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
2	500	CD15CD020DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
3	500	CD10CD030DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
3	500	CD15CD030DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
5	500	CD10CD050DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
5	500	CD15CD050DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
5	1000	CDV19CF050DO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
7	500	CD10CD070DO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
7	500	CD15CD070DO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
7	1000	CDV19CF070DO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
10	500	CD10CD100JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
10	500	CD15CD100JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
10	1000	CDV19CF100JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
12	500	CD10CD120JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
12	500	CD15CD120JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
12	1000	CDV19CF120JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
15	500	CD10CD150JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
15	500	CD15CD150JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
15	1000	CDV19CF150JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
18	500	CD10CD180JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
18	500	CD15CD180JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
18	1000	CDV19CF180JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
22	500	CD10ED220JO3F	0.36 (9.1)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
22	500	CD15ED220JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
22	1000	CDV19EF220JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
27	500	CD10ED270JO3F	0.37 (9.4)	0.33 (8.4)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
27	500	CD15ED270JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
27	1000	CDV19EF270JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
27	1500	CDV30EH270JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
27	2000	CDV30EJ270JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
27	2500	CDV30EK270JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
33	500	CD10ED330JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
33	500	CD15ED330JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
33	1000	CDV19EF330JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
33	1500	CDV30EH330JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
33	2000	CDV30EJ330JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
33	2500	CDV30EK330JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
39	500	CD10ED390JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
39	500	CD15ED390JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
39	1000	CDV19EF390JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
39	1500	CDV30EH390JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
39	2000	CDV30EJ390JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
39	2500	CDV30EK390JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
47	500	CD10ED470JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
47	500	CD15ED470JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
47	1000	CDV19EF470JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
47	1500	CDV30EH470JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
47	2000	CDV30EJ470JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
47	2500	CDV30EK470JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
56	500	CD10ED560JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
56	500	CD15ED560JO3F	0.45 (11.4)	0.36 (9.1)	0.17 (4.3)	0.234 (5.9)	0.025 (.6)
56	1000	CDV19EF560JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
56	1500	CDV30EH560JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
56	2500	CDV30EK560JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
68	500	CD10ED680JO3F	0.37 (9.4)	0.34 (8.6)	0.19 (4.8)	0.141 (3.6)	0.016 (.4)
68	500	CD15ED680JO3F	0.45 (11.4)	0.36 (9.1)	0.18 (4.6)	0.234 (5.9)	0.025 (.6)
68	1000	CDV19EF680JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
68	1500	CDV30EH680JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
68	2000	CDV30EJ680JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
68	2500	CDV30EK680JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
82	500	CD10ED820JO3F	0.37 (9.4)	0.35 (8.9)	0.20 (5.1)	0.141 (3.6)	0.016 (.4)
82	500	CD15ED820JO3F	0.45 (11.4)	0.36 (9.1)	0.18 (4.6)	0.234 (5.9)	0.025 (.6)
82	1000	CDV19EF820JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
82	1500	CDV30EH820JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
82	2000	CDV30EJ820JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
82	2500	CDV30EK820JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
100	500	CD10FD101JO3F	0.37 (9.4)	0.35 (8.9)	0.20 (5.1)	0.141 (3.6)	0.016 (.4)
100	500	CD15FD101JO3F	0.46 (11.7)	0.36 (9.1)	0.18 (4.6)	0.234 (5.9)	0.025 (.6)
100	500	CD19FD101JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
100	1000	CDV19FF101JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
100	1500	CDV30FH101JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
100	2000	CDV30FJ101JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
100	2500	CDV30FK101JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
120	500	CD10FD121JO3F	0.38 (9.7)	0.35 (8.9)	0.20 (5.1)	0.141 (3.6)	0.016 (.4)
120	500	CD15FD121JO3F	0.46 (11.7)	0.37 (9.4)	0.18 (4.6)	0.234 (5.9)	0.025 (.6)
120	500	CD19FD121JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
120	1000	CDV19FF121JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
120	1500	CDV30FH121JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
120	2000	CDV30FJ121JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
120	2500	CDV30FK121JO3F	0.78 (19.8)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
150	500	CD10FD151JO3F	0.38 (9.7)	0.36 (9.1)	0.21 (5.3)	0.141 (3.6)	0.016 (.4)
150	500	CD15FD151JO3F	0.46 (11.7)	0.37 (9.4)	0.19 (4.8)	0.234 (5.9)	0.025 (.6)
150	500	CD19FD151JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
150	1000	CDV19FF151JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
150	1500	CDV30FH151JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
150	2000	CDV30FJ151JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
180	500	CD10FD181JO3F	0.39 (9.9)	0.37 (9.4)	0.21 (5.3)	0.141 (3.6)	0.016 (.4)
180	500	CD15FD181JO3F	0.46 (11.7)	0.37 (9.4)	0.19 (4.8)	0.234 (5.9)	0.025 (.6)
180	500	CD19FD181JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
180	1000	CDV19FF181JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
180	1500	CDV30FH181JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
180	2000	CDV30FJ181JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
220	500	CD10FD221JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
220	500	CD15FD221JO3F	0.46 (11.7)	0.38 (9.7)	0.20 (5.1)	0.234 (5.9)	0.025 (.6)
220	500	CD19FD221JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
220	1000	CDV19FF221JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
220	1500	CDV30FH221JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
220	2000	CDV30FJ221JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
270	300	CD10FC271JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
270	500	CD19FD271JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
270	500	D105F271JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
270	500	CD15FD271JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
270	1000	CDV19FF271JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
270	1500	CDV30FH271JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
270	2000	CDV30FJ271JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
330	100	CD10FA331JO3F	0.39 (9.9)	0.37 (9.4)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
330	500	D105F331JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
330	500	CD15FD331JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
330	500	CD19FD331JO3F	0.64 (16.3)	0.50 (12.7)	0.19 (4.8)	0.344 (8.7)	0.032 (.8)
330	2000	CDV30FJ331JO3F	0.77 (19.6)	0.86 (21.8)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
330	2500	CDV30FK331JO3F	0.78 (19.8)	0.87 (22.1)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
390	100	CD10FA391JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
390	500	D105F391JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
390	500	CD15FD391JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
390	500	CD19FD391JO3F	0.64 (16.3)	0.51 (13.0)	0.20 (5.1)	0.344 (8.7)	0.032 (.8)
390	1000	CDV19FF391JO3F	0.65 (16.5)	0.51 (13.0)	0.20 (5.1)	0.344 (8.7)	0.032 (.8)
390	1500	CDV30FH391JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
470	500	D105F471JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
470	500	CD15FD471JO3F	0.47 (11.9)	0.40 (10.2)	0.22 (5.6)	0.234 (5.9)	0.025 (.6)
470	500	CD19FD471JO3F	0.64 (16.3)	0.51 (13.0)	0.20 (5.1)	0.344 (8.7)	0.032 (.8)
470	1500	CDV30FH471JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
470	2000	CDV30FJ471JO3F	0.77 (19.6)	0.87 (22.1)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
470	2500	CDV30FK471JO3F	0.78 (19.8)	0.87 (22.1)	0.27 (6.9)	0.438 (11.1)	0.040 (1.0)
560	300	D103F561JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
560	300	CD15FC561JO3F	0.46 (11.7)	0.38 (9.7)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
560	500	CD19FD561JO3F	0.65 (16.5)	0.51 (13.0)	0.20 (5.1)	0.344 (8.7)	0.032 (.8)
560	1000	CDV19FF561JO3F	0.65 (16.5)	0.51 (13.0)	0.21 (5.3)	0.344 (8.7)	0.032 (.8)
560	1500	CDV30FH561JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
560	2000	CDV30FJ561JO3F	0.77 (19.6)	0.87 (22.1)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
560	2500	CDV30FK561JO3F	0.78 (19.8)	0.87 (22.1)	0.27 (6.9)	0.438 (11.1)	0.040 (1.0)
680	300	D103F681JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)

Mica Capacitors, Standard Dipped

Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
680	300	CD15FC681JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
680	500	CD19FD681JO3F	0.65 (16.5)	0.51 (13.0)	0.21 (5.3)	0.344 (8.7)	0.032 (.8)
680	1000	CDV19FF681JO3F	0.66 (16.8)	0.52 (13.2)	0.22 (5.6)	0.344 (8.7)	0.032 (.8)
680	1500	CDV30FH681JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
680	2000	CDV30FJ681JO3F	0.77 (19.6)	0.87 (22.1)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
680	2500	CDV30FK681JO3F	0.78 (19.8)	0.87 (22.1)	0.27 (6.9)	0.438 (11.1)	0.040 (1.0)
820	300	D103F821JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
820	300	CD15FC821JO3F	0.47 (11.9)	0.39 (9.9)	0.21 (5.3)	0.234 (5.9)	0.025 (.6)
820	500	CD19FD821JO3F	0.65 (16.5)	0.51 (13.0)	0.21 (5.3)	0.344 (8.7)	0.032 (.8)
820	1000	CDV19FF821JO3F	0.66 (16.8)	0.53 (13.5)	0.23 (5.8)	0.344 (8.7)	0.032 (.8)
820	1500	CDV30FH821JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
820	2000	CDV30FJ821JO3F	0.77 (19.6)	0.87 (22.1)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
820	2500	CDV30FK821JO3F	0.78 (19.8)	0.87 (22.1)	0.27 (6.9)	0.438 (11.1)	0.040 (1.0)
1000	100	D101F102JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
1000	100	CD15FA102JO3F	0.48 (12.2)	0.40 (10.2)	0.23 (5.8)	0.234 (5.9)	0.025 (.6)
1000	500	CD19FD102JO3F	0.65 (16.5)	0.52 (13.2)	0.22 (5.6)	0.344 (8.7)	0.032 (.8)
1000	1000	CDV19FF102JO3F	0.67 (17.0)	0.53 (13.5)	0.25 (6.4)	0.344 (97)	0.032 (.8)
1000	1500	CDV30FH102JO3F	0.77 (19.6)	0.86 (21.8)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
1000	2000	CDV30FJ102JO3F	0.78 (19.8)	0.88 (22.4)	0.28 (7.1)	0.438 (11.1)	0.040 (1.0)
1000	2500	CDV30FK102JO3F	0.79 (20.1)	0.88 (22.4)	0.31 (7.9)	0.438 (11.1)	0.040 (1.0)
1200	100	D101F122JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
1200	100	CD15FA122JO3F	0.49 (12.4)	0.42 (10.7)	0.24 (6.1)	0.234 (5.9)	0.025 (.6)
1200	500	CD19FD122JO3F	0.66 (16.8)	0.52 (13.2)	0.22 (5.6)	0.344 (8.7)	0.032 (.8)
1200	1500	CDV30FH122JO3F	0.77 (19.6)	0.86 (21.8)	0.26 (6.6)	0.438 (11.1)	0.040 (1.0)
1200	2000	CDV30FJ122JO3F	0.78 (19.8)	0.88 (22.4)	0.28 (7.1)	0.438 (11.1)	0.040 (1.0)
1200	2500	CDV30FK122JO3F	0.79 (20.1)	0.88 (22.4)	0.31 (7.9)	0.438 (11.1)	0.040 (1.0)
1500	100	D101F152JO3F	0.39 (9.9)	0.38 (9.7)	0.22 (5.6)	0.141 (3.6)	0.016 (.4)
1500	100	CD15FA152JO3F	0.50 (12.7)	0.43 (10.9)	0.25 (6.4)	0.234 (5.9)	0.025 (.6)
1500	500	CD19FD152JO3F	0.66 (16.8)	0.52 (13.2)	0.23 (5.8)	0.344 (8.7)	0.032 (.8)
1500	1000	CDV19FF152JO3F	0.68 (17.3)	0.54 (13.7)	0.27 (6.9)	0.344 (8.7)	0.032 (.8)
1500	1500	CDV30FH152JO3F	0.78 (19.8)	0.87 (22.1)	0.28 (7.1)	0.438 (11.1)	0.040 (1.0)
1500	2000	CDV30FJ152JO3F	0.79 (20.1)	0.89 (22.6)	0.32 (8.1)	0.438 (11.1)	0.040 (1.0)
1500	2500	CDV30FK152JO3F	0.80 (20.3)	0.89 (22.6)	0.35 (8.9)	0.438 (11.1)	0.040 (1.0)
1800	500	CD19FD182JO3F	0.67 (17.0)	0.53 (13.5)	0.24 (6.1)	0.344 (8.7)	0.032 (.8)
1800	1000	CDV19FF182JO3F	0.68 (17.3)	0.55 (14.0)	0.29 (7.4)	0.344 (8.7)	0.032 (.8)
1800	1500	CDV30FH182JO3F	0.78 (19.8)	0.87 (22.1)	0.29 (7.4)	0.438 (11.1)	0.040 (1.0)
1800	2000	CDV30FJ182JO3F	0.79 (20.1)	0.89 (22.6)	0.34 (8.6)	0.438 (11.1)	0.040 (1.0)
1800	2500	CDV30FK182JO3F	0.81 (20.6)	0.90 (22.9)	0.37 (9.4)	0.438 (11.1)	0.040 (1.0)
2200	500	CD19FD222JO3F	0.67 (17.0)	0.53 (13.5)	0.25 (6.4)	0.344 (8.7)	0.032 (.8)
2200	500	CD30FD222JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
2200	1000	CDV19FF222JO3F	0.69 (17.5)	0.56 (14.2)	0.31 (7.9)	0.344 (8.7)	0.032 (.8)
2200	1500	CDV30FH222JO3F	0.79 (20.1)	0.88 (22.4)	0.31 (7.9)	0.438 (11.1)	0.040 (1.0)
2700	500	CD19FD272JO3F	0.68 (17.3)	0.54 (13.7)	0.27 (6.9)	0.344 (8.7)	0.032 (.8)
2700	500	CD30FD272JO3F	0.77 (19.6)	0.85 (21.6)	0.25 (6.4)	0.438 (11.1)	0.040 (1.0)
2700	1000	CDV19FF272JO3F	0.70 (17.8)	0.57 (14.5)	0.34 (8.6)	0.344 (8.7)	0.032 (.8)

Mica Capacitors, Standard Dipped

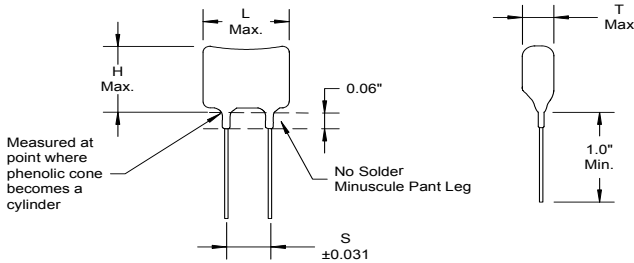
Types CD10, D10, CD15, CD19, CD30, CD42, CDV19, CDV30

Cap (pF)	Volts (Vdc)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
2700	1500	CDV30FH272JO3F	0.79 (20.1)	0.88 (22.4)	0.33(8.4)	0.438 (11.1)	0.040 (1.0)
2700	2000	CDV30FJ272JO3F	0.81 (20.6)	0.91 (23.1)	0.40(10.2)	0.438 (11.1)	0.040 (1.0)
2700	2500	CDV30FK272JO3F	0.83 (21.1)	0.92 (23.4)	0.45(11.4)	0.438 (11.1)	0.040 (1.0)
3300	500	CD19FD332JO3F	0.68 (17.3)	0.55 (14.0)	0.29(7.4)	0.344 (8.7)	0.032 (.8)
3300	500	CD30FD332JO3F	0.77 (19.6)	0.86 (21.8)	0.25(6.4)	0.438 (11.1)	0.040 (1.0)
3300	1000	CDV19FF332JO3F	0.72 (18.3)	0.59 (15.0)	0.38(9.7)	0.344 (8.7)	0.032 (.8)
3300	1500	CDV30FH332JO3F	0.80 (20.3)	0.89 (22.6)	0.35(8.9)	0.438 (11.1)	0.040 (1.0)
3300	2000	CDV30FJ332JO3F	0.82 (20.8)	0.92 (23.4)	0.44(11.2)	0.438 (11.1)	0.040 (1.0)
3900	500	CD19FD392JO3F	0.69 (17.5)	0.56 (14.2)	0.31(7.9)	0.344 (8.7)	0.032 (.8)
3900	500	CD30FD392JO3F	0.77 (19.6)	0.86 (21.8)	0.26(6.6)	0.438 (11.1)	0.040 (1.0)
3900	1000	CDV19FF392JO3F	0.74 (18.8)	0.61 (15.5)	0.42(10.7)	0.344 (8.7)	0.032 (.8)
3900	1500	CDV30FH392JO3F	0.80 (20.3)	0.89 (22.6)	0.36(9.1)	0.438 (11.1)	0.040 (1.0)
3900	2000	CDV30FJ392JO3F	0.83 (21.1)	0.93 (23.6)	0.46(11.7)	0.438 (11.1)	0.040 (1.0)
4700	500	CD19FD472JO3F	0.70 (17.8)	0.58 (14.7)	0.35(8.9)	0.344 (8.7)	0.032 (.8)
4700	500	CD30FD472JO3F	0.78 (19.8)	0.86 (21.8)	0.27(6.9)	0.438 (11.1)	0.040 (1.0)
4700	1000	CDV19FF472JO3F	0.76 (19.3)	0.63 (16.0)	0.46(11.7)	0.344 (8.7)	0.032 (.8)
4700	1500	CDV30FH472JO3F	0.81 (20.6)	0.90 (22.9)	0.38(9.7)	0.438 (11.1)	0.040 (1.0)
5600	300	CD19FC562JO3F	0.68 (17.3)	0.56 (14.2)	0.31(7.9)	0.344 (8.7)	0.032 (.8)
5600	500	CD30FD562JO3F	0.78 (19.8)	0.87 (22.1)	0.29(7.4)	0.438 (11.1)	0.040 (1.0)
5600	1000	CDV30FF562JO3F	0.80 (20.3)	0.89 (22.6)	0.34(8.6)	0.438 (11.1)	0.040 (1.0)
5600	1500	CDV30FH562JO3F	0.82 (20.8)	0.91 (23.1)	0.40(10.2)	0.438 (11.1)	0.040 (1.0)
6800	300	CD19FC682JO3F	0.69 (17.5)	0.57 (14.5)	0.33(8.4)	0.344 (8.7)	0.032 (.8)
6800	500	CD30FD682JO3F	0.78 (19.8)	0.88 (22.4)	0.30(7.6)	0.438 (11.1)	0.040 (1.0)
6800	1000	CDV30FF682JO3F	0.80 (20.3)	0.89 (22.6)	0.36(9.1)	0.438 (11.1)	0.040 (1.0)
6800	1500	CDV30FH682JO3F	0.83 (21.1)	0.92 (23.4)	0.42(10.7)	0.438 (11.1)	0.040 (1.0)
8200	100	CD19FA822JO3F	0.70 (17.8)	0.58 (14.7)	0.35(8.9)	0.344 (8.7)	0.032 (.8)
8200	500	CD30FD822JO3F	0.79 (20.1)	0.88 (22.4)	0.32(8.1)	0.438 (11.1)	0.040 (1.0)
8200	1000	CDV30FF822JO3F	0.81 (20.6)	0.90 (22.9)	0.39(9.9)	0.438 (11.1)	0.040 (1.0)
8200	1500	CDV30FH822JO3F	0.84 (21.3)	0.93 (23.6)	0.46(11.7)	0.438 (11.1)	0.040 (1.0)
10000	100	CD19FA103JO3F	0.72 (18.3)	0.60 (15.2)	0.37(9.4)	0.344 (8.7)	0.032 (.8)
10000	500	CD30FD103JO3F	0.80 (20.3)	0.89 (22.6)	0.34(8.6)	0.438 (11.1)	0.040 (1.0)
10000	1000	CDV30FF103JO3F	0.82 (20.8)	0.91 (23.1)	0.42(10.7)	0.438 (11.1)	0.040 (1.0)
12000	500	CD30FD123JO3F	0.80 (20.3)	0.89 (22.6)	0.36(9.1)	0.438 (11.1)	0.040 (1.0)
12000	1000	CDV30FF123JO3F	0.83 (21.1)	0.92 (23.4)	0.46(11.7)	0.438 (11.1)	0.040 (1.0)
15000	500	CD30FD153JO3F	0.81 (20.6)	0.90 (22.9)	0.39(9.9)	0.438 (11.1)	0.040 (1.0)
18000	500	CD30FD183JO3F	0.82 (20.8)	0.91 (23.1)	0.43(10.9)	0.438 (11.1)	0.040 (1.0)
22000	500	CD30FD223JO3F	0.83 (21.1)	0.93 (23.6)	0.46(11.7)	0.438 (11.1)	0.040 (1.0)
22000	500	CD42FD223JO3F	1.42 (36.1)	0.88 (22.4)	0.31(7.9)	1.063 (27.0)	0.040 (1.0)
33000	100	CD30FA333JO3F	0.83 (21.1)	0.91 (23.1)	0.44(11.2)	0.438 (11.1)	0.040 (1.0)
33000	500	CD42FD333JO3F	1.44 (36.6)	0.89 (22.6)	0.36(9.1)	1.063 (27.0)	0.040 (1.0)
39000	500	CD42FD393JO3F	1.45 (36.8)	0.90 (22.9)	0.40(10.2)	1.063 (27.0)	0.040 (1.0)
47000	500	CD42FD473JO3F	1.47 (37.3)	0.91 (23.1)	0.45(11.4)	1.063 (27.0)	0.040 (1.0)
68000	300	CD42FC683JO3F	1.48 (37.6)	0.92 (23.4)	0.47(11.9)	1.063 (27.0)	0.040 (1.0)
82000	100	CD42FA823JO3F	1.48 (37.6)	0.92 (23.4)	0.46(11.7)	1.063 (27.0)	0.040 (1.0)
91000	100	CD42FA913JO3F	1.50 (38.1)	0.94 (23.9)	0.50(12.7)	1.063 (27.0)	0.040 (1.0)

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Type CD16 & CDV16 Snubber and RF Application, Mica Capacitors

Higher dV/dt Capability and Flatter Insertion Loss



Ideal for snubber and RF applications, CDV16 mica capacitors now handle dV/dts up to 275,000 V/μs and they assure controlled, resonance-free performance through 1 GHz. CDV16/CD16 mica capacitors excel in both snubber applications and high-frequency applications like RF and CATV. Type CDV16's high pulse current capability make them ideal for pulse and snubber applications. CDV16 capacitors withstand an unlimited number of pulses with a dV/dt of 275,000 V/μs. This is a 20% increase in dV/dt capability when compared to our CDV19 mica capacitors and CDV16's are smaller too. CDV16 capacitors handle higher peak currents — up to 825 amps. They also handle high continuous RMS current at 5 MHz and up to 30 MHz. For example, a 3000 pF CDV16 capacitor handles 6.2 A rms continuously at 13.56 MHz and it is 1/4 the cost of a comparable porcelain ceramic capacitor. In addition to being great for snubbers, CDV16 is a fit for your RF applications. Their compact size and closer lead spacing improves insertion loss performance — insertion loss data is flat within ±0.2 dB, typically to beyond a gigahertz.

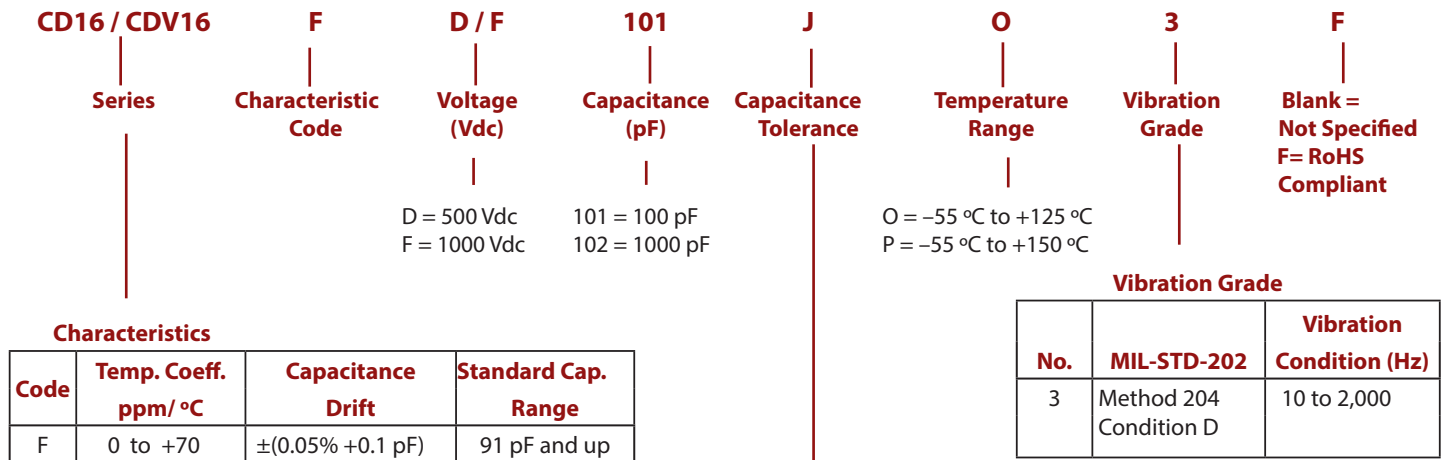
Highlights

- Handles up to 9.0 amps rms continuous current
- Very low ESR from 10 to 100 MHz
- Low, notch-free impedance to 1GHz
- Stable: no capacitance change with (V), (t), and (f)
- Very high Q at UHF/VHF frequencies
- Tape and reeling available
- dV/dt capability up to 275,000 V/μs
- 1,500 amps peak current capability

Specifications

- Capacitance Range:** 100 pF to 7,500 pF
- Capacitance Tolerance:** ±5% (J) standard; ±1% (F) and ±2% (G) available
- Voltage:** 500 Vdc & 1,000 Vdc
- Temperature Range:** -55 °C to +150 °C

Part Numbering System



Capacitance Tolerance

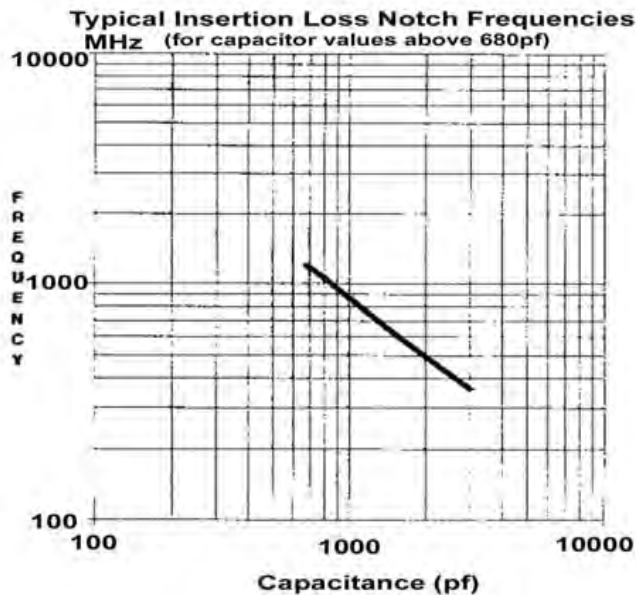
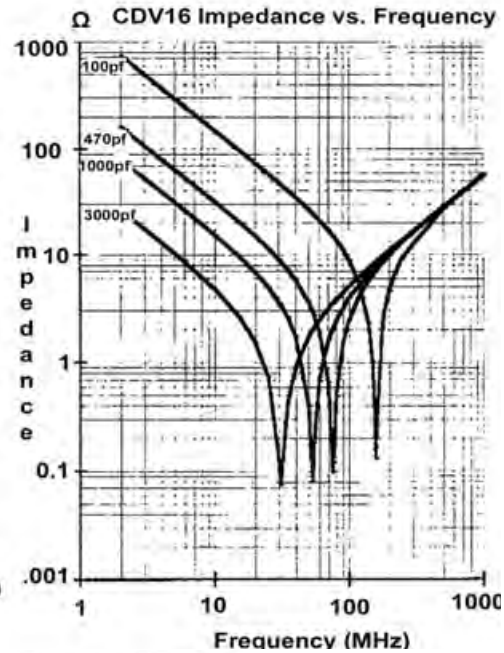
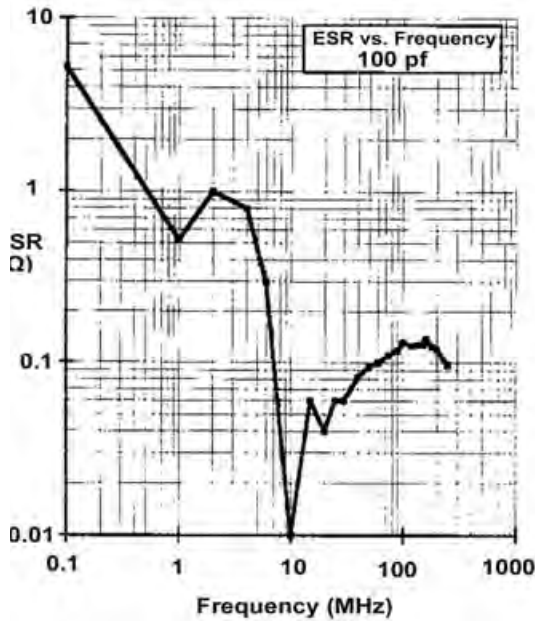
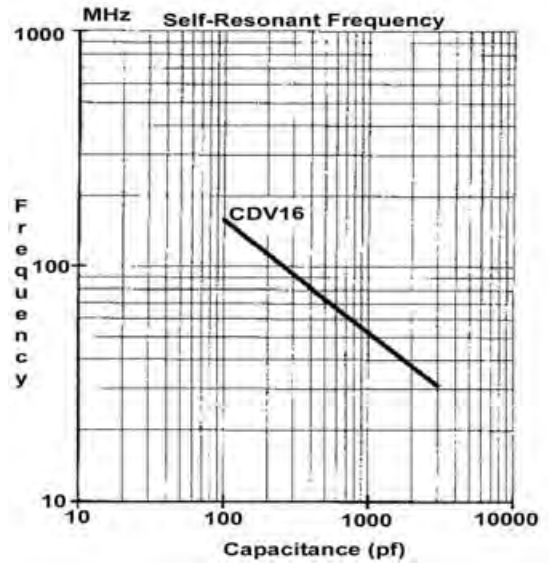
Tol. Code	Tolerance
F	±1 %
G	±2 %
J	±5 %

Standard tolerance is ±5%

For RoHS compliant add the letter F at the end of the part number.

Type CD16 & CDV16 Snubber and RF Application, Mica Capacitors

Typical Performance Curves



Type CD16 & CDV16 Snubber and RF Application, Mica Capacitors

Ratings

Cap. (pF)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	Ipk Amps	Max Continuous Current @ 85°C, Amps					
						100kHz	250 kHz	500 kHz	1MHz	2.5MHz	5MHz
500 Vdc (300 Vac)											
100	CD16FD101JO3	.43 (10.9)	.46 (11.7)	0.15 (3.8)	20	0.019	0.047	0.09	0.19	0.47	0.78
120	CD16FD121JO3	.43 (10.9)	.46 (11.7)	0.15 (3.8)	24	0.023	0.057	0.11	0.23	0.57	0.86
150	CD16FD151JO3	.43 (10.9)	.46 (11.7)	0.15 (3.8)	30	0.028	0.071	0.14	0.28	0.71	0.96
180	CD16FD181JO3	.43 (10.9)	.46 (11.7)	0.15 (3.8)	36	0.034	0.085	0.17	0.34	0.85	1.1
220	CD16FD221JO3	.43 (10.9)	.46 (11.7)	0.15 (3.8)	44	0.041	0.10	0.21	0.41	1.0	1.2
270	CD16FD271JO3	.45 (11.4)	.47 (11.9)	0.16 (4.1)	54	0.051	0.13	0.25	0.51	1.3	1.3
330	CD16FD331JO3	.45 (11.4)	.47 (11.9)	0.16 (4.1)	66	0.062	0.16	0.31	0.62	1.5	1.5
390	CD16FD391JO3	.45 (11.4)	.47 (11.9)	0.16 (4.1)	78	0.074	0.18	0.37	0.74	1.6	1.6
470	CD16FD471JO3	.45 (11.4)	.47 (11.9)	0.16 (4.1)	94	0.089	0.22	0.44	0.89	1.8	1.8
560	CD16FD561JO3	.46 (11.7)	.50 (12.7)	0.18 (4.6)	110	0.11	0.26	0.53	1.1	2.0	2.0
680	CD16FD681JO3	.46 (11.7)	.50 (12.7)	0.18 (4.6)	160	0.15	0.39	0.77	1.5	2.5	2.5
820	CD16FD821JO3	.46 (11.7)	.50 (12.7)	0.18 (4.6)	160	0.15	0.39	0.77	1.5	2.5	2.5
1000	CD16FD102JO3	.46 (11.7)	.50 (12.7)	0.18 (4.6)	200	0.19	0.47	0.94	1.9	2.7	2.7
1200	CD16FD122JO3	.46 (11.7)	.50 (12.7)	0.18 (4.6)	240	0.23	0.57	1.1	2.3	3.0	3.0
1500	CD16FD152JO3	.46 (11.7)	.50 (12.7)	0.18 (4.6)	300	0.28	0.71	1.4	2.7	3.3	3.3
1800*	CD16FD182JO3	.47 (11.9)	.52 (13.2)	0.25 (6.4)	360	0.34	0.85	1.7	3.4	4.1	4.1
2200	CD16FD222JO3	.47 (11.9)	.52 (13.2)	0.25 (6.4)	440	0.41	1.0	2.1	4.1	4.5	4.5
2700	CD16FD272JO3	.47 (11.9)	.52 (13.2)	0.25 (6.4)	540	0.51	1.3	2.5	5.0	5.0	5.0
3000	CD16FD302JO3	.47 (11.9)	.52 (13.2)	0.25 (6.4)	600	0.57	1.4	2.8	5.2	5.2	5.2
3300	CD16FD332JO3	.48 (12.2)	.53 (13.7)	0.28 (7.1)	600	0.57	1.4	2.8	5.7	6.8	6.8
3600	CD16FD362JO3	.48 (12.2)	.53 (13.7)	0.28 (7.1)	720	0.68	1.7	3.4	6.8	7.1	7.1
3900	CD16FD392JO3	.48 (12.2)	.54 (13.7)	0.28 (7.1)	780	0.74	1.8	3.7	7.4	7.4	7.4
4300	CD16FD432JO3	.48 (12.2)	.54 (13.7)	0.28 (7.1)	860	0.81	2.0	4.0	7.0	7.8	7.8
4700	CD16FD472JO3	.49 (12.5)	.56 (14.2)	0.31 (7.9)	940	0.89	2.2	4.4	8.5	8.5	8.5
5600	CD16FD562JO3	.49 (12.5)	.56 (14.2)	0.33 (8.4)	1100	1.1	2.6	5.3	9.0	9.0	9.0
6800	CD16FD682JO3	.50 (12.7)	.57 (14.7)	0.38 (9.7)	1300	1.3	3.2	6.4	9.0	9.0	9.0
7500	CD16FD752JO3	.50 (12.7)	.58 (14.7)	.40 (10.2)	1500	1.4	3.5	7.1	9.0	9.0	9.0
1,000 Vdc (350 Vac)											
100	CDV16FF101JO3	.43 (10.9)	.46 (11.7)	.15 (3.8)	23	0.022	0.055	0.11	0.22	0.55	0.92
120	CDV16FF121JO3	.43 (10.9)	.46 (11.7)	.15 (3.8)	27	0.026	0.066	0.13	0.26	0.66	1
130	CDV16FF131JO3	.43 (10.9)	.46 (11.7)	.15 (3.8)	29	0.029	0.071	0.14	0.29	0.71	1.1
150	CDV16FF151JO3	.43 (10.9)	.46 (11.7)	.15 (3.8)	34	0.033	0.082	0.16	0.33	0.82	1.1
180	CDV16FF181JO3	.43 (10.9)	.46 (11.7)	.15 (3.8)	41	0.04	0.10	0.2	0.4	1.0	1.2
200	CDV16FF201JO3	.43 (10.9)	.46 (11.7)	.15 (3.8)	45	0.044	0.11	0.22	0.44	1.1	1.3
220	CDV16FF221JO3	.43 (10.9)	.46 (11.7)	.15 (3.8)	50	0.048	0.12	0.24	0.48	1.2	1.4
240	CDV16FF241JO3	.43 (10.9)	.46 (11.7)	.15 (3.8)	54	0.053	0.13	0.26	0.53	1.3	1.4
270	CDV16FF271JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	61	0.059	0.15	0.3	0.59	1.5	1.6
300	CDV16FF301JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	68	0.066	0.16	0.33	0.7	1.6	1.7
330	CDV16FF331JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	74	0.073	0.18	0.36	0.73	1.8	1.8
360	CDV16FF361JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	81	0.079	0.2	0.4	0.79	1.8	1.8
390	CDV16FF391JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	88	0.086	0.21	0.43	0.86	1.9	1.9
420	CDV16FF421JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	95	0.092	0.23	0.46	0.92	2	2.0
430	CDV16FF431JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	97	0.095	0.24	0.47	0.95	2.0	2.0
470	CDV16FF471JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	106	0.1	0.26	0.52	1	2.1	2.1
500	CDV16FF501JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	113	0.11	0.27	0.55	1.1	2.2	2.2
510	CDV16FF511JO3	.45 (11.4)	.47 (11.9)	.16 (4.1)	115	0.11	0.28	0.56	1.1	2.2	2.2
560	CDV16FF561JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	126	0.12	0.31	0.62	1.2	2.4	2.4
620	CDV16FF621JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	140	0.14	0.34	0.68	1.4	2.5	2.5
680	CDV16FF681JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	153	0.15	0.37	0.75	1.5	2.7	2.7
750	CDV16FF751JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	169	0.16	0.41	0.82	1.6	2.8	2.8
820	CDV16FF821JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	185	0.18	0.45	0.9	1.8	2.9	2.9
910	CDV16FF911JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	205	0.2	0.5	1	2	3.1	3.1
1000	CDV16FF102JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	225	0.22	0.55	1.1	2.2	3.2	3.2
1200	CDV16FF122JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	270	0.26	0.66	1.3	2.6	3.5	3.5
1300	CDV16FF132JO3	.46 (11.7)	.50 (12.7)	.17 (4.4)	293	0.29	0.71	1.4	2.9	3.7	3.7
1500	CDV16FF152JO3	.46 (11.7)	.50 (12.7)	.18 (4.6)	338	0.33	0.82	1.6	3.3	3.9	3.9
1800*	CDV16FF182JO3	.47 (11.9)	.52 (13.2)	.25 (6.4)	495	0.4	0.99	2	4	4.8	4.8
2000	CDV16FF202JO3	.47 (11.9)	.52 (13.2)	.25 (6.4)	605	0.48	1.2	2.4	4.8	5.3	5.3
2200	CDV16FF222JO3	.47 (11.9)	.52 (13.2)	.25 (6.4)	605	0.48	1.2	2.4	4.8	5.3	5.3
2400	CDV16FF242JO3	.47 (11.9)	.52 (13.2)	.25 (6.4)	660	0.53	1.3	2.6	5.3	5.5	5.5
2700	CDV16FF272JO3	.47 (11.9)	.52 (13.2)	.25 (6.4)	743	0.59	1.5	3	5.8	5.8	5.8
3000	CDV16FF302JO3	.47 (11.9)	.52 (13.2)	.25 (6.4)	825	0.66	1.6	3.3	6.2	6.2	6.2

* Best RF performances is = to or < this cap rating.

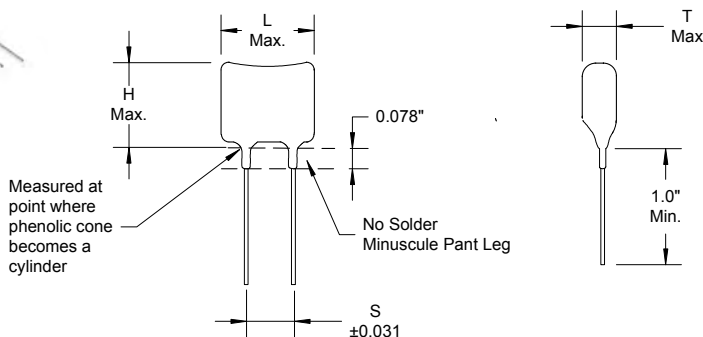
Type CD16 & CDV16 Snubber and RF Application, Mica Capacitors

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Type CMR , High-Reliability, Mica Capacitors

High-Reliability Dipped Capacitors/MIL-PRF-39001

Type CMR meets requirement of MIL-PRF-39001, Type CMR high-reliability dipped silvered mica capacitors are ideal for high-grade ground, airborne, and space-borne devices, such as computers, jetcraft, and missiles.



Specifications

- Voltage Range:** 50 Vdc to 500 Vdc
- Capacitance Range:** 1 pF to 91,000 pF
- Capacitance Tolerance:** $\pm\frac{1}{2}$ pF (D), $\pm 1\%$ (F), $\pm 2\%$ (G), $\pm 5\%$ (J)
- Temperature Range:** $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ (O), $-55\text{ }^{\circ}\text{C}$ to $150\text{ }^{\circ}\text{C}$ (P)
P temperature range available only for CMR04, CMR05, CMR06, CMR07, CMR08
- Reliability:** Meets Requirements of MIL-PRF-39001
Established reliability to .01%/1,000 hours failure rate

Ratings and Dimensions

Cap (pF)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
50 Vdc						
22	CMR03E220DOYR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
24	CMR03E240DOYR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
27	CMR03E270JOYR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
30	CMR03E300JOYR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
33	CMR03E330JOYR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
36	CMR03E360JOYR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
39	CMR03E390JOYR	.270 (6.9)	.190 (4.8)	.120 (3.0)	.120 (3.0)	.016 (.4)
43	CMR03E430JOYR	.270 (6.9)	.190 (4.8)	.120 (3.0)	.120 (3.0)	.016 (.4)
47	CMR03E470JOYR	.270 (6.9)	.190 (4.8)	.120 (3.0)	.120 (3.0)	.016 (.4)
51	CMR03E510JOYR	.270 (6.9)	.190 (4.8)	.120 (3.0)	.120 (3.0)	.016 (.4)
56	CMR03E560JOYR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
62	CMR03E620JOYR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
68	CMR03E680JOYR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
75	CMR03E750JOYR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
82	CMR03E820JOYR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
91	CMR03F910JOYR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
100	CMR03F101JOYR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
110	CMR03F111JOYR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
120	CMR03F121JOYR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
130	CMR03F131JOYR	.270 (6.9)	.210 (5.3)	.130 (3.3)	.120 (3.0)	.016 (.4)

Cap (pF)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
150	CMR03F151JOYR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
160	CMR03F161JOYR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
180	CMR03F181JOYR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
200	CMR03F201JOYR	.270 (6.9)	.220 (5.6)	.150 (3.8)	.120 (3.0)	.016 (.4)
220	CMR03F221JOYR	.270 (6.9)	.220 (5.6)	.150 (3.8)	.120 (3.0)	.016 (.4)
240	CMR03F241JOYR	.270 (6.9)	.220 (5.6)	.160 (4.1)	.120 (3.0)	.016 (.4)
270	CMR03F271JOYR	.270 (6.9)	.230 (5.8)	.160 (4.1)	.120 (3.0)	.016 (.4)
300	CMR03F301JOYR	.270 (6.9)	.230 (5.8)	.170 (4.3)	.120 (3.0)	.016 (.4)
330	CMR03F331JOYR	.270 (6.9)	.240 (6.1)	.180 (4.6)	.120 (3.0)	.016 (.4)
360	CMR03F361JOYR	.270 (6.9)	.240 (6.1)	.180 (4.6)	.120 (3.0)	.016 (.4)
390	CMR03F391JOYR	.270 (6.9)	.250 (6.4)	.190 (4.8)	.120 (3.0)	.016 (.4)
400	CMR03F401JOYR	.270 (6.9)	.250 (6.4)	.190 (4.8)	.120 (3.0)	.016 (.4)
100 Vdc						
15	CMR03C150DOAR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
18	CMR03C180DOAR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
20	CMR03E200DOAR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
22	CMR03E220DOAR	.270 (6.9)	.190 (4.8)	.120 (3.0)	.120 (3.0)	.016 (.4)
24	CMR03E240DOAR	.270 (6.9)	.190 (4.8)	.120 (3.0)	.120 (3.0)	.016 (.4)
27	CMR03E270JOAR	.270 (6.9)	.190 (4.8)	.120 (3.0)	.120 (3.0)	.016 (.4)
30	CMR03E300JOAR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
33	CMR03E330JOAR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)

Type CMR , High-Reliability, Mica Capacitors

Cap (pF)	Catalog Part Number	L (mm)	H (mm)	T (mm)	S (mm)	d (mm)
36	CMR03E360JOAR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
39	CMR03E390JOAR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
43	CMR03E430JOAR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
47	CMR03E470JOAR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
51	CMR03E510JOAR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
56	CMR03E560JOAR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
62	CMR03E620JOAR	.270 (6.9)	.210 (5.3)	.130 (3.3)	.120 (3.0)	.016 (.4)
68	CMR03E680JOAR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
75	CMR03E750JOAR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
82	CMR03E820JOAR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
91	CMR03F910JOAR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
100	CMR03F101JOAR	.270 (6.9)	.220 (5.6)	.150 (3.8)	.120 (3.0)	.016 (.4)
110	CMR03F111JOAR	.270 (6.9)	.220 (5.6)	.150 (3.8)	.120 (3.0)	.016 (.4)
120	CMR03F121JOAR	.270 (6.9)	.220 (5.6)	.160 (4.1)	.120 (3.0)	.016 (.4)
130	CMR03F131JOAR	.270 (6.9)	.230 (5.8)	.160 (4.1)	.120 (3.0)	.016 (.4)
150	CMR03F151JOAR	.270 (6.9)	.230 (5.8)	.170 (4.3)	.120 (3.0)	.016 (.4)
160	CMR03F161JOAR	.270 (6.9)	.240 (6.1)	.170 (4.3)	.120 (3.0)	.016 (.4)
170	CMR03F171JOAR	.270 (6.9)	.240 (6.1)	.180 (4.6)	.120 (3.0)	.016 (.4)
180	CMR03F181JOAR	.270 (6.9)	.240 (6.1)	.180 (4.6)	.120 (3.0)	.016 (.4)
200	CMR03F201JOAR	.270 (6.9)	.250 (6.4)	.190 (4.8)	.120 (3.0)	.016 (.4)
330	CMR04F331JOAR	.390 (9.9)	.380 (9.7)	.220 (5.6)	.150 (3.8)	.016 (.4)
360	CMR04F361JOAR	.390 (9.9)	.380 (9.7)	.220 (5.6)	.150 (3.8)	.016 (.4)
390	CMR04F391JOAR	.390 (9.9)	.380 (9.7)	.220 (5.6)	.150 (3.8)	.016 (.4)
75000	CMR08F753JOAR	1.47 (37.3)	.910 (23.1)	.440 (11.2)	1.05 (26.7)	.040 (1.02)
82000	CMR08F823JOAR	1.48 (37.6)	.920 (23.3)	.460 (11.7)	1.05 (26.7)	.040 (1.02)
91000	CMR08F913JOAR	1.50 (38.1)	.940 (23.9)	.500 (12.7)	1.05 (26.7)	.040 (1.02)
300 Vdc						
1	CMR03C1R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
1.5	CMR03C1R5DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
2	CMR03C2R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
2.5	CMR03C2R5DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
3	CMR03C3R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
3.5	CMR03C3R5DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
4	CMR03C4R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
4.5	CMR03C4R5DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
5	CMR03C5R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
6	CMR03C6R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
7	CMR03C7R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
8	CMR03C8R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
9	CMR03C9R0DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
10	CMR03C100DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
11	CMR03C110DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
12	CMR03C120DOCR	.270 (6.9)	.190 (4.8)	.110 (2.8)	.120 (3.0)	.016 (.4)
15	CMR03C150DOCR	.270 (6.9)	.190 (4.8)	.120 (3.0)	.120 (3.0)	.016 (.4)
18	CMR03C180DOCR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
20	CMR03E200DOCR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
22	CMR03E220DOCR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
24	CMR03E240DOCR	.270 (6.9)	.200 (5.1)	.120 (3.0)	.120 (3.0)	.016 (.4)
27	CMR03E270JOCR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
30	CMR03E300JOCR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
33	CMR03E330JOCR	.270 (6.9)	.200 (5.1)	.130 (3.3)	.120 (3.0)	.016 (.4)
36	CMR03E360JOCR	.270 (6.9)	.210 (5.3)	.130 (3.3)	.120 (3.0)	.016 (.4)
39	CMR03E390JOCR	.270 (6.9)	.210 (5.3)	.130 (3.3)	.120 (3.0)	.016 (.4)
43	CMR03E430JOCR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
47	CMR03E470JOCR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
51	CMR03E510JOCR	.270 (6.9)	.210 (5.3)	.140 (3.6)	.120 (3.0)	.016 (.4)
56	CMR03E560JOCR	.270 (6.9)	.220 (5.6)	.150 (3.8)	.120 (3.0)	.016 (.4)

Cap (pF)	Catalog Part Number	L (mm)	H (mm)	T (mm)	S (mm)	d (mm)
62	CMR03E620JOCR	.270 (6.9)	.220 (5.6)	.150 (3.8)	.120 (3.0)	.016 (.4)
68	CMR03E680JOCR	.270 (6.9)	.220 (5.6)	.150 (3.8)	.120 (3.0)	.016 (.4)
75	CMR03E750JOCR	.270 (6.9)	.230 (5.8)	.160 (4.1)	.120 (3.0)	.016 (.4)
82	CMR03E820JOCR	.270 (6.9)	.230 (5.8)	.160 (4.1)	.120 (3.0)	.016 (.4)
91	CMR03F910JOCR	.270 (6.9)	.230 (5.8)	.170 (4.3)	.120 (3.0)	.016 (.4)
100	CMR03F101JOCR	.270 (6.9)	.240 (6.1)	.180 (4.6)	.120 (3.0)	.016 (.4)
110	CMR03F111JOCR	.270 (6.9)	.240 (6.1)	.180 (4.6)	.120 (3.0)	.016 (.4)
120	CMR03F121JOCR	.270 (6.9)	.250 (6.4)	.190 (4.8)	.120 (3.0)	.016 (.4)
270	CMR04F271JOCR	.390 (9.9)	.380 (9.7)	.220 (5.6)	.150 (3.8)	.016 (.4)
300	CMR04F301JOCR	.390 (9.9)	.380 (9.7)	.220 (5.6)	.150 (3.8)	.016 (.4)
56000	CMR08F563JOCR	1.46 (37.1)	.910 (23.1)	.420 (10.7)	1.05 (26.7)	.040 (1.02)
62000	CMR08F623JOCR	1.47 (37.3)	.920 (23.3)	.450 (11.4)	1.05 (26.7)	.040 (1.02)
68000	CMR08F683JOCR	1.48 (37.6)	.920 (23.3)	.470 (11.9)	1.05 (26.7)	.040 (1.02)
500 Vdc						
1	CMR04C1R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
1	CMR05C1R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
1.5	CMR04C1R5DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
1.5	CMR05C1R5DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
2	CMR04C2R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
2	CMR05C2R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
2.5	CMR04C2R5DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
2.5	CMR05C2R5DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
3	CMR04C3R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
3	CMR05C3R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
3.5	CMR04C3R5DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
3.5	CMR05C3R5DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
4	CMR04C4R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
4	CMR05C4R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
4.5	CMR04C4R5DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
4.5	CMR05C4R5DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
5	CMR04C5R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
5	CMR05C5R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
6	CMR04C6R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
6	CMR05C6R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
7	CMR04C7R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
7	CMR05C7R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
8	CMR04C8R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
8	CMR05C8R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
9	CMR04C9R0DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
9	CMR05C9R0DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
10	CMR04C100DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
10	CMR05C100DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
11	CMR04C110DODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
11	CMR05C110DODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
12	CMR04C120JODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
12	CMR05C120JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
15	CMR04C150JODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
15	CMR05C150JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
18	CMR04C180JODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
18	CMR05C180JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
20	CMR04E200JODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
20	CMR05E200JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
22	CMR04E220JODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
22	CMR05E220JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
24	CMR04E240JODR	.360 (9.1)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)
24	CMR05E240JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
27	CMR04E270JODR	.370 (9.4)	.330 (8.4)	.190 (4.8)	.150 (3.8)	.016 (.4)

Type CMR , High-Reliability, Mica Capacitors

Cap (pF)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
27	CMR05E270JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
30	CMR04E300JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
30	CMR05E300JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
33	CMR04E330JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
33	CMR05E330JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
36	CMR04E360JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
36	CMR05E360JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
39	CMR04E390JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
39	CMR05E390JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
43	CMR04E430JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
43	CMR05E430JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
47	CMR04E470JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
47	CMR05E470JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
51	CMR04E510JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
51	CMR05E510JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
56	CMR04E560JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
56	CMR05E560JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
62	CMR04E620JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
62	CMR05E620JODR	.450 (11.4)	.360 (9.1)	.170 (4.3)	.225 (5.7)	.025 (.6)
68	CMR04E680JODR	.370 (9.4)	.340 (8.6)	.190 (4.8)	.150 (3.8)	.016 (.4)
68	CMR05E680JODR	.450 (11.4)	.360 (9.1)	.180 (4.6)	.225 (5.7)	.025 (.6)
75	CMR04E750JODR	.370 (9.4)	.340 (8.6)	.200 (5.1)	.150 (3.8)	.016 (.4)
75	CMR05E750JODR	.450 (11.4)	.360 (9.1)	.180 (4.6)	.225 (5.7)	.025 (.6)
82	CMR04E820JODR	.370 (9.4)	.350 (8.9)	.200 (5.1)	.150 (3.8)	.016 (.4)
82	CMR05E820JODR	.450 (11.4)	.360 (9.1)	.180 (4.6)	.225 (5.7)	.025 (.6)
91	CMR04F910JODR	.370 (9.4)	.350 (8.9)	.200 (5.1)	.150 (3.8)	.016 (.4)
91	CMR05F910JODR	.460 (11.7)	.360 (9.1)	.180 (4.6)	.225 (5.7)	.025 (.6)
100	CMR04F101JODR	.370 (9.4)	.350 (8.9)	.200 (5.1)	.150 (3.8)	.016 (.4)
100	CMR05F101JODR	.460 (11.7)	.360 (9.1)	.180 (4.6)	.225 (5.7)	.025 (.6)
110	CMR04F111JODR	.380 (9.7)	.350 (8.9)	.200 (5.1)	.150 (3.8)	.016 (.4)
110	CMR05F111JODR	.460 (11.7)	.370 (9.4)	.180 (4.6)	.225 (5.7)	.025 (.6)
120	CMR04F121JODR	.380 (9.7)	.350 (8.9)	.200 (5.1)	.150 (3.8)	.016 (.4)
120	CMR05F121JODR	.460 (11.7)	.370 (9.4)	.180 (4.6)	.225 (5.7)	.025 (.6)
130	CMR04F131JODR	.380 (9.7)	.360 (9.1)	.200 (5.1)	.150 (3.8)	.016 (.4)
130	CMR05F131JODR	.460 (11.7)	.370 (9.4)	.180 (4.6)	.225 (5.7)	.025 (.6)
150	CMR04F151JODR	.380 (9.7)	.360 (9.1)	.210 (5.3)	.150 (3.8)	.016 (.4)
150	CMR05F151JODR	.460 (11.7)	.370 (9.4)	.190 (4.8)	.225 (5.7)	.025 (.6)
160	CMR04F161JODR	.380 (9.7)	.360 (9.1)	.210 (5.3)	.150 (3.8)	.016 (.4)
160	CMR05F161JODR	.460 (11.7)	.370 (9.4)	.190 (4.8)	.225 (5.7)	.025 (.6)
180	CMR04F181JODR	.380 (9.7)	.370 (9.4)	.210 (5.3)	.150 (3.8)	.016 (.4)
180	CMR05F181JODR	.460 (11.7)	.370 (9.4)	.190 (4.8)	.225 (5.7)	.025 (.6)
200	CMR04F201JODR	.390 (9.9)	.380 (9.7)	.220 (5.6)	.150 (3.8)	.016 (.4)
200	CMR05F201JODR	.460 (11.7)	.380 (9.7)	.190 (4.8)	.225 (5.7)	.025 (.6)
220	CMR04F221JODR	.390 (9.9)	.380 (9.7)	.220 (5.6)	.150 (3.8)	.016 (.4)
220	CMR05F221JODR	.460 (11.7)	.380 (9.7)	.200 (5.1)	.225 (5.7)	.025 (.6)
240	CMR04F241JODR	.390 (9.9)	.380 (9.7)	.220 (5.6)	.150 (3.8)	.016 (.4)
240	CMR05F241JODR	.460 (11.7)	.380 (9.7)	.200 (5.1)	.225 (5.7)	.025 (.6)
270	CMR05F271JODR	.470 (11.9)	.390 (9.9)	.210 (5.3)	.225 (5.7)	.025 (.6)
300	CMR05F301JODR	.470 (11.9)	.390 (9.9)	.210 (5.3)	.225 (5.7)	.025 (.6)
330	CMR05F331JODR	.470 (11.9)	.390 (9.9)	.210 (5.3)	.225 (5.7)	.025 (.6)

Cap (pF)	Catalog Part Number	L in (mm)	H in (mm)	T in (mm)	S in (mm)	d in (mm)
360	CMR05F361JODR	.470 (11.9)	.400 (10.2)	.220 (5.6)	.225 (5.7)	.025 (.6)
390	CMR05F391JODR	.470 (11.9)	.400 (10.2)	.220 (5.6)	.225 (5.7)	.025 (.6)
430	CMR06F431JODR	.640 (16.3)	.510 (13.0)	.200 (5.1)	.350 (8.9)	.032 (.8)
470	CMR06F471JODR	.640 (16.3)	.510 (13.0)	.200 (5.1)	.350 (8.9)	.032 (.8)
510	CMR06F511JODR	.650 (16.5)	.510 (13.0)	.200 (5.1)	.350 (8.9)	.032 (.8)
560	CMR06F561JODR	.650 (16.5)	.510 (13.0)	.200 (5.1)	.350 (8.9)	.032 (.8)
620	CMR06F621JODR	.650 (16.5)	.510 (13.0)	.200 (5.1)	.350 (8.9)	.032 (.8)
680	CMR06F681JODR	.650 (16.5)	.510 (13.0)	.210 (5.3)	.350 (8.9)	.032 (.8)
750	CMR06F751JODR	.650 (16.5)	.510 (13.0)	.210 (5.3)	.350 (8.9)	.032 (.8)
820	CMR06F821JODR	.650 (16.5)	.510 (13.0)	.210 (5.3)	.350 (8.9)	.032 (.8)
1000	CMR06F102JODR	.650 (16.5)	.520 (13.2)	.220 (5.6)	.350 (8.9)	.032 (.8)
1100	CMR06F112JODR	.650 (16.5)	.520 (13.2)	.220 (5.6)	.350 (8.9)	.032 (.8)
1200	CMR06F122JODR	.660 (16.8)	.520 (13.2)	.220 (5.6)	.350 (8.9)	.032 (.8)
1300	CMR06F132JODR	.660 (16.8)	.520 (13.2)	.220 (5.6)	.350 (8.9)	.032 (.8)
1500	CMR06F152JODR	.660 (16.8)	.520 (13.2)	.230 (5.8)	.350 (8.9)	.032 (.8)
1600	CMR06F162JODR	.660 (16.8)	.530 (13.5)	.230 (5.8)	.350 (8.9)	.032 (.8)
1800	CMR06F182JODR	.670 (17.0)	.530 (13.5)	.240 (6.1)	.350 (8.9)	.032 (.8)
2000	CMR06F202JODR	.670 (17.0)	.530 (13.5)	.240 (6.1)	.350 (8.9)	.032 (.8)
2200	CMR06F222JODR	.670 (17.0)	.530 (13.5)	.250 (6.4)	.350 (8.9)	.032 (.8)
2400	CMR06F242JODR	.670 (17.0)	.540 (13.7)	.260 (6.6)	.350 (8.9)	.032 (.8)
2700	CMR06F272JODR	.680 (17.3)	.540 (13.7)	.270 (6.9)	.350 (8.9)	.032 (.8)
3000	CMR06F302JODR	.680 (17.3)	.550 (14.0)	.280 (7.1)	.350 (8.9)	.032 (.8)
3300	CMR06F332JODR	.680 (17.3)	.550 (14.0)	.290 (7.4)	.350 (8.9)	.032 (.8)
3600	CMR06F362JODR	.680 (17.3)	.560 (14.2)	.300 (7.6)	.350 (8.9)	.032 (.8)
3900	CMR06F392JODR	.690 (17.5)	.560 (14.2)	.310 (7.9)	.350 (8.9)	.032 (.8)
4300	CMR06F432JODR	.690 (17.5)	.570 (14.5)	.330 (8.4)	.350 (8.9)	.032 (.8)
4700	CMR06F472JODR	.700 (17.8)	.580 (14.7)	.350 (8.9)	.350 (8.9)	.032 (.8)
5100	CMR07F512JODR	.780 (19.8)	.860 (21.8)	.280 (7.1)	.425 (10.8)	.040 (1.0)
5600	CMR07F562JODR	.780 (19.8)	.870 (22.1)	.290 (7.4)	.425 (10.8)	.040 (1.0)
6200	CMR07F622JODR	.780 (19.8)	.870 (22.1)	.290 (7.4)	.425 (10.8)	.040 (1.0)
6800	CMR07F682JODR	.780 (19.8)	.870 (22.1)	.300 (7.6)	.425 (10.8)	.040 (1.0)
7500	CMR07F752JODR	.790 (20.1)	.880 (22.4)	.310 (7.9)	.425 (10.8)	.040 (1.0)
8200	CMR07F822JODR	.790 (20.1)	.880 (22.4)	.320 (8.1)	.425 (10.8)	.040 (1.0)
9100	CMR07F912JODR	.790 (20.1)	.880 (22.4)	.330 (8.4)	.425 (10.8)	.040 (1.0)
10000	CMR07F103JODR	.800 (20.3)	.890 (22.6)	.340 (8.6)	.425 (10.8)	.040 (1.0)
11000	CMR07F113JODR	.800 (20.3)	.890 (22.6)	.350 (8.9)	.425 (10.8)	.040 (1.0)
12000	CMR07F123JODR	.800 (20.3)	.890 (22.6)	.360 (9.1)	.425 (10.8)	.040 (1.0)
13000	CMR07F133JODR	.810 (20.6)	.890 (22.6)	.370 (9.4)	.425 (10.8)	.040 (1.0)
15000	CMR07F153JODR	.810 (20.6)	.900 (22.9)	.390 (9.9)	.425 (10.8)	.040 (1.0)
16000	CMR07F163JODR	.820 (20.8)	.900 (22.9)	.410 (10.4)	.425 (10.8)	.040 (1.0)
18000	CMR07F183JODR	.820 (20.8)	.910 (23.1)	.430 (10.9)	.425 (10.8)	.040 (1.0)
22000	CMR08F223JODR	1.42 (36.1)	.880 (22.4)	.310 (7.9)	1.05 (26.7)	.040 (1.02)
24000	CMR08F243JODR	1.43 (36.3)	.880 (22.4)	.320 (8.1)	1.05 (26.7)	.040 (1.02)
27000	CMR08F273JODR	1.43 (36.3)	.880 (22.4)	.330 (8.4)	1.05 (26.7)	.040 (1.02)
30000	CMR08F303JODR	1.44 (36.6)	.890 (22.6)	.350 (8.9)	1.05 (26.7)	.040 (1.02)
33000	CMR08F333JODR	1.44 (36.6)	.890 (22.6)	.360 (9.1)	1.05 (26.7)	.040 (1.02)
36000	CMR08F363JODR	1.45 (36.8)	.900 (22.9)	.380 (9.7)	1.05 (26.7)	.040 (1.02)
39000	CMR08F393JODR	1.45 (36.8)	.900 (22.9)	.400 (10.2)	1.05 (26.7)	.040 (1.02)
43000	CMR08F433JODR	1.46 (37.1)	.910 (23.1)	.420 (10.7)	1.05 (26.7)	.040 (1.02)
47000	CMR08F473JODR	1.47 (37.3)	.910 (23.1)	.450 (11.4)	1.05 (26.7)	.040 (1.02)
51000	CMR08F513JODR	1.48 (37.6)	.920 (23.3)	.470 (11.9)	1.05 (26.7)	.040 (1.02)

Type CMR , High-Reliability, Mica Capacitors Specifications

Capacitance is within tolerance when measured at these frequencies:
 1 - 1000 pF @ 1 MHz
 > 1000 pF @ 1 Khz

Dissipation Factor limits are below. Measure dissipation factor at 1 MHz when the capacitance is 1 pF to 1000 pF, and at 1 kHz when the capacitance is greater than 1000 pF. Dissipation factor is equal to $DF = 2\pi fRC$, where f is the test frequency, R is the equivalent series resistance, and C is the capacitance. For other capacitance values, see Figure 1.

Capacitance	Dissipation Factor
100-1000 pF	0.00075 max at 1 MHz
1100-3300 pF	0.0014 max at 1 kHz
3600-9100 pF	0.0013 max at 1 kHz
10,000 pF	0.0012 max at 1 kHz

Quality Factor (Q) is the reciprocal of dissipation factor.

Insulation Resistance for capacitance up to 10,000 pF is greater than 100 G. at 25 °C, greater than 10 G. at 125 °C, and greater than 5 G. at 150 °C. For other capacitance values and temperatures, see Figure 2.

Withstanding Voltage is two times the rated voltage, and can be applied up to 5 seconds without damage.

Temperature Coefficient and Capacitance Drift measure the capacitors'

capacitance at 25 °C, -55 °C, 25 °C, 125 °C (or 150 °C) and at 25 °C after stabilizing at each temperature. The capacitance will meet the limits of the Characteristic table shown in Ordering Information.

Failure Rate: Type CMR capacitors have specified failure rate levels ranging from 0.01% to 1.0% per 1000 hours. The failure rate level is established at 90% confidence level and is referred to operational life at full rated voltage at maximum rated temperature.

High Voltage Stabilization: We subject capacitors with Failure Levels M, P, and R to a burn-in at twice rated voltage, at rated temperature, for a minimum of 48 hours. Capacitors that show damage, arcing, breakdown, or low IR are removed. We reject the lot if more than 8% of the capacitors fail.

Solderability: After an 8-hour steam aging, coat leads with a rosin flux (R) and immerse in molten 245 °C ± 5 °C 60/40 tin/lead solder. Solder coverage will be no less than 95% when examined at 10X magnification.

Life Test: Subject the capacitors to maximum operating temperature (+125 °C or +150 °C) with 1.5 times rated voltage applied for 10,000 hours. Take readings and make visual observations every 2000 hours.

There will be no visual damage and the capacitors will meet the after-test limits on the following page.

Resistance to Solvents: Subject the capacitors to three cycles of 3 minute immersion in solvent, 10 strokes with bristle brush and, where applicable, ½ minute in vapor, per MIL-STD-202, Method 215. Repeat the three cycles for three solvent mixtures: Isopropyl alcohol mixture (Solvent 1), azeotrope mixture (Solvent 3), and water/propylene-glycol mixture (Solvent 4). The marking will not rub off or smear and there will be no visible damage to the capacitor body. Refer to MIL-STD-202 for details.

Resistance to Soldering Heat: Capacitors will meet the requirements of MIL-STD-202, Method 210 Test Condition G. Immerse capacitor leads to within .250 inches (6.4 mm) of the body in molten tin/lead solder (260 °C ± 5 °C) for 10 ± 2 seconds. Allow to cool. Capacitors will meet the after-test limits on the following page.

Marking of capacitors conforms to method I of MIL-STD-1285, and includes the type designation, "JAN," brand, trademark, source code, date code, rated voltage, capacitance, capacitance tolerance, and the highest rated temperature. Small capacitors are marked with the letter "J".

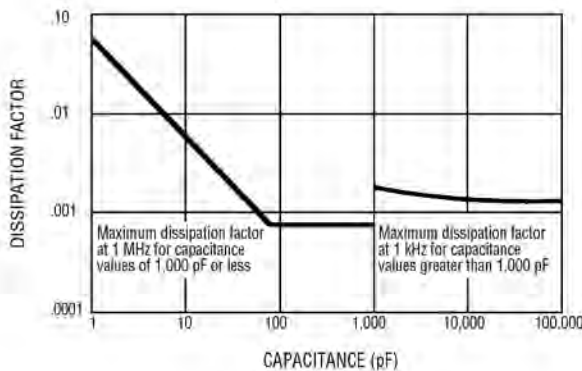


Figure 1. DF vs. Capacitance

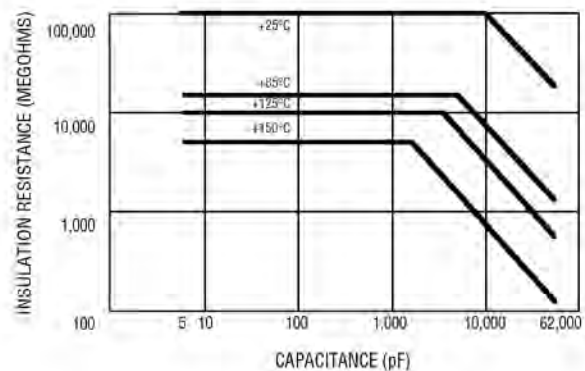
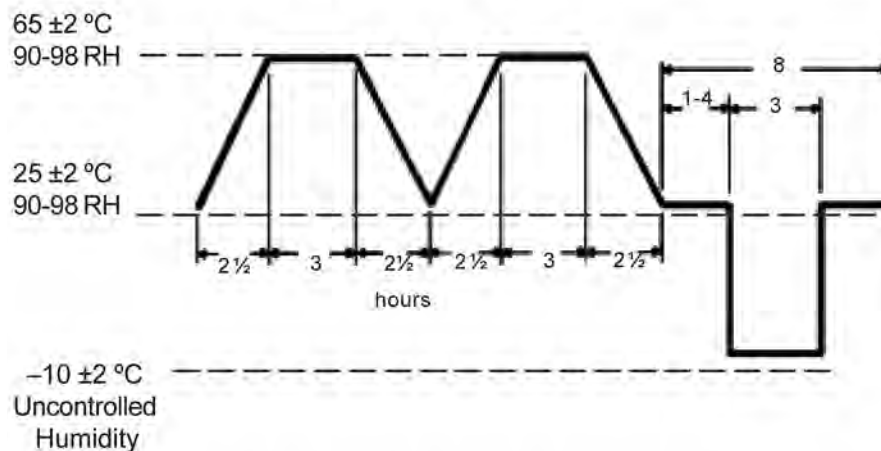


Figure 2. IR vs. Capacitance

Type CMR , High-Reliability, Mica Capacitors

Moisture Resistance: Capacitors will meet the requirements of MIL-STD-202, Method 106F as outlined here and diagrammed on the right. Apply 100 V or the rated voltage (whichever is less) to half of the capacitors. Don't apply voltage to the other half. Refer to MIL-STD-202 for details.

1. Dry capacitors for 24 hours in a 50 ± 2 °C oven and then allow to stabilize at room temperature.
2. Subject the capacitors to 20 24-hour continuous cycles with relative humidity and temperature as shown.
3. 4 to 24 hours after completion of the last cycle the capacitors will show no visual damage and will meet the after-test limits below.



After-Test Limits

Test	Withstand Voltage	Insulation Resistance	Capacitance Change (whichever is greater)	DF	Q
Moisture Resistance	IL	30 GΩ	NV±1% or ±1 pF	150% IL	2/3xIL
Life Test	IL	IL	NV±1% or ±1 pF	150% IL	2/3xIL
Solder Heat	IL	IL	IV±5% or ±5pF	IL	IL

IL=Initial Limit NV=Nominal Value IV=Initial Value

Ordering Information

Order by complete part number, as below.
For other options, write your requirements on your quote request.

Part Numbering System

CMR05	C	100	J	P	D	R
CDE Type	Characteristic	Capacitance 1R0 = 1.0pF 361 = 360pF 122 = 1200pF	Capacitance Tolerance D = ±.5 pf F = ±1% G = ±2% J = ±5%	Temperature Range O = -55 °C to +125 °C P = -55 °C to +150 °C*	Voltage Y = 50 Vdc A = 100 Vdc C = 300 Vdc D = 500 Vdc	Failure Rate M = 1.0%/1000 hrs. P = .1%/1000 hrs. R = .01%/1000 hrs.

	Temp. Coeff. ppm/°C	Capacitance Drift	Standard Cap. Range
C	-200 to +200	±(0.5% +0.1pF)	1 – 18 pF
E	-20 to +100	±(0.1% +0.1pF)	20 – 82 pF
F	0 to + 70	±(0.05% +0.1pF)	91 pF and up

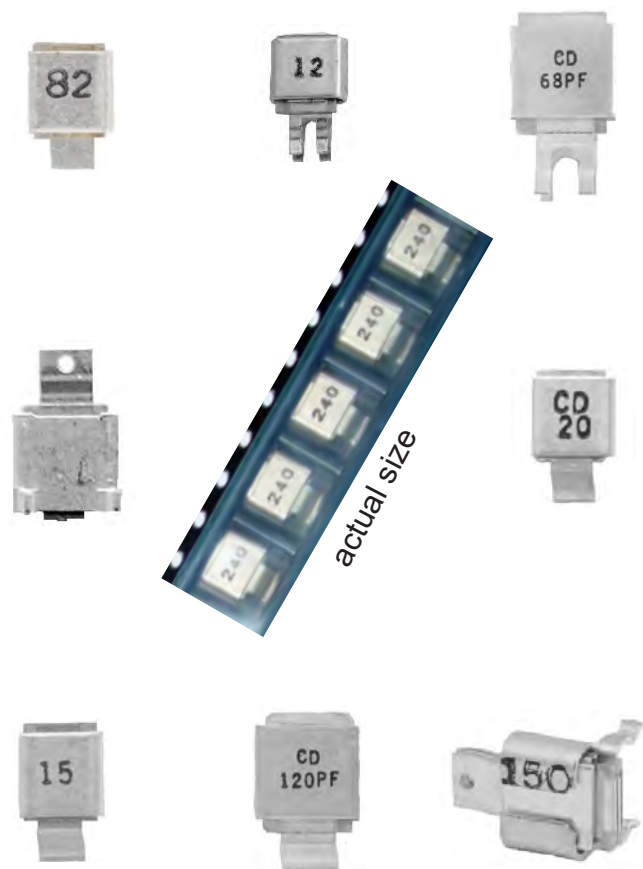
*P temperature range available for CMR04, CMR05, CMR06, CMR07, CMR08

Type CMR , High-Reliability, Mica Capacitors

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Types MCM and MIN SMT Clad RF Capacitors

Multilayer High Power, High Temperature Mica and PTFE Capacitors



Types MCM and MIN SMT clad PTFE and mica capacitors are top performers for high power applications requiring low inductance at high frequencies and can operate at temperatures up to 200 °C and voltages to 1000 Vdc. Choosing from 16 different configurations offers easy mounting with options for surface mount as well as through-hole and mechanical assembly. To assure high current capability in the smallest capacitors, low-capacitance ratings use polytetrafluorethylene (PTFE) that has ultra-low dielectric absorption - better than polypropylene, polystyrene and NPO ceramic.

Highlights

- 200 °C rated with no voltage derating
- Wave solderable
- No cracking or delaminating
- CTE \approx 18 ppm/°C compatible with FR4 PCBs
- Highly thermal conductive package
- Gull-wing terminal minimizes stress
- Typical 100 pF ESR, <11 m Ω @ 100 MHz
- Nonmagnetic for minimal RF loss
- Very low ESL for excellent by-pass action
- Ultra stable: no change with (t), (V) and (f)
- Exact capacitance with tolerances from ± 0.25 pF

RoHS Compliant

Specifications

- Capacitance Range:**
- Voltage Ratings:**
- Temperature Range:**
- Capacitance Tolerance:**
- Dielectric Strength:**
- Insulation Resistance:**
- Aging Rate:**
- Marking:**

MCM	MIN
1 to 1500 pF	1 to 350 pF
300 to 1000 Vdc	300 Vdc
-55 °C to +200 °C with no voltage derating	
± 0.25 pF, ± 0.5 pF, ± 1 pF, $\pm 0.5\%$, $\pm 1\%$, $\pm 2\%$, $\pm 5\%$	
200% of rated voltage for 5 seconds	
1000 M Ω · μ F Need not exceed 100,000 M Ω at 25 °C	
None	

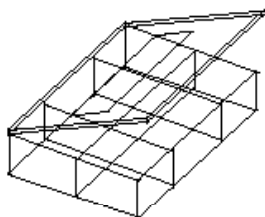
MIN - Capacitance in pF and ID letters CD
MCM - Capacitance, ID letters CD and voltage if other than 500 when space permits
 RoHS Compliant - marked in green ink

Design Kits for Engineers

MIN300VKIT1 300 Vdc
 5 pieces each
 13 ratings 3.3 – 150 pF

MCM500VKIT2
 Nonmagnetic to 500 Vdc
 5 pieces each
 10 ratings 10 – 1000 pF

MCM1000VKIT3 1 kVdc
 5 pieces each
 7 ratings 100 – 750 pF



Applications

- RF Power Amplifiers
- Lasers
- Mobile Radio
- Plasma generators
- MRI Coils
- RF Medical Equipment
- Land Mobile antennas 27 to 900 MHz

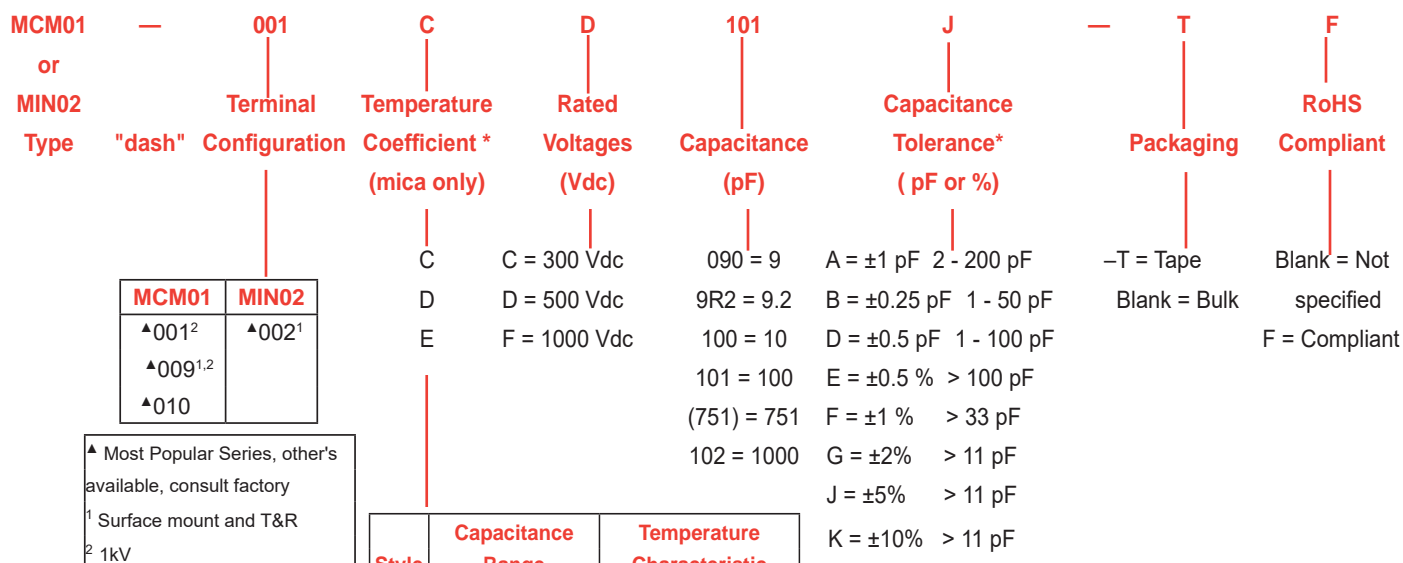
Types MCM and MIN SMT Clad RF Capacitors

Ratings Available

Capacitance (pF)	Voltage Ratings (Vdc)			Dielectric
	300	500	*1000	
MIN02				
1 - 2.9	X			PTFE
3 - 9.9	X			PTFE or Mica
10 - 60	X			Mica
61 - 120	X			Mica
121 - 180	X			Mica
181 - 240	X			Mica
241 - 300	X			Mica
301 - 350	X			Mica
MCM01				
1 - 7		X	X	PTFE
8 - 32		X	X	PTFE or Mica
33 - 250		X	X	Mica
251 - 500		X	X	Mica
501 - 750		X	X	Mica
751 - 1000		X		Mica
1001 - 1280		X		Mica
1281 - 1500	X			Mica

*1000 V available in MCM01-001 and -009 style

Part Numbering System



▲ Most Popular Series, other's available, consult factory
¹ Surface mount and T&R
² 1kV

Measured at 1 MHz for ≤1000 pF and 1 kHz for >1000 pF

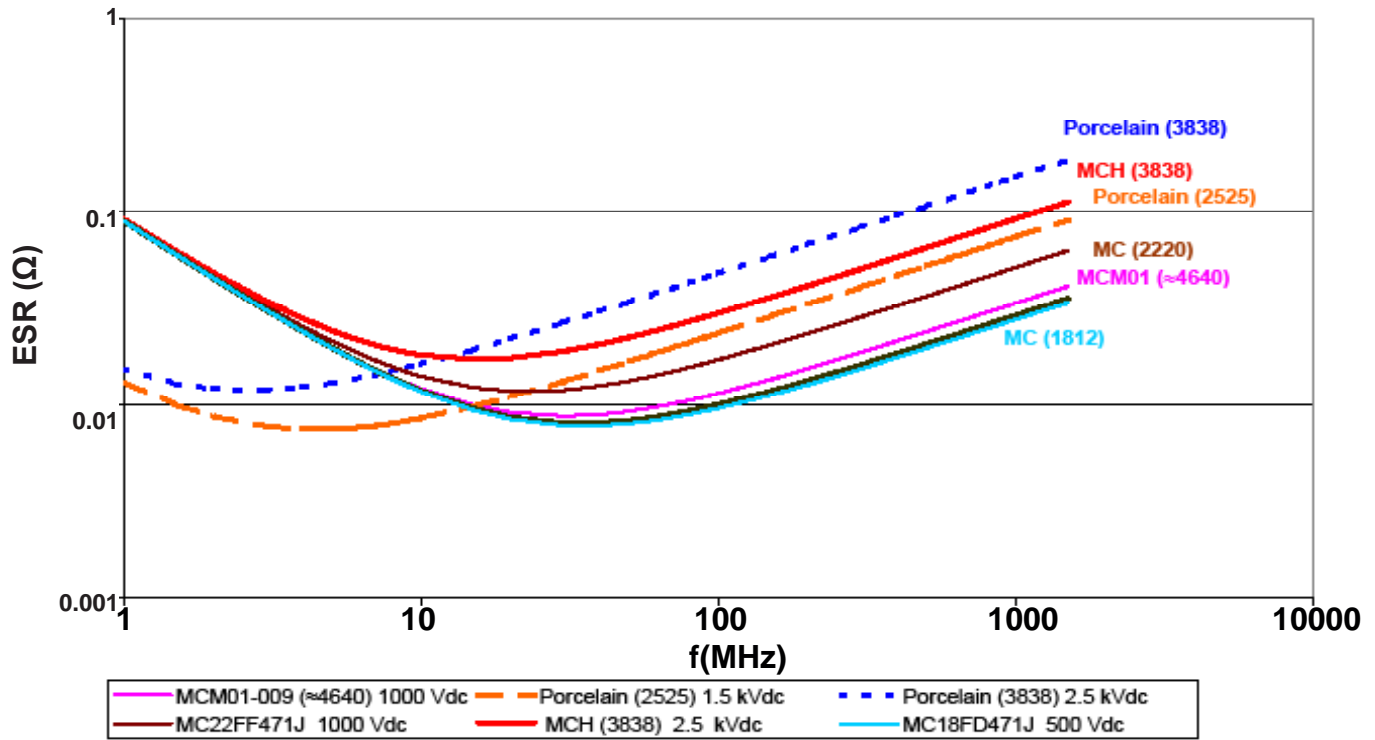
*TC code letter is left blank for PTFE items

Types MCM and MIN SMT Clad RF Capacitors

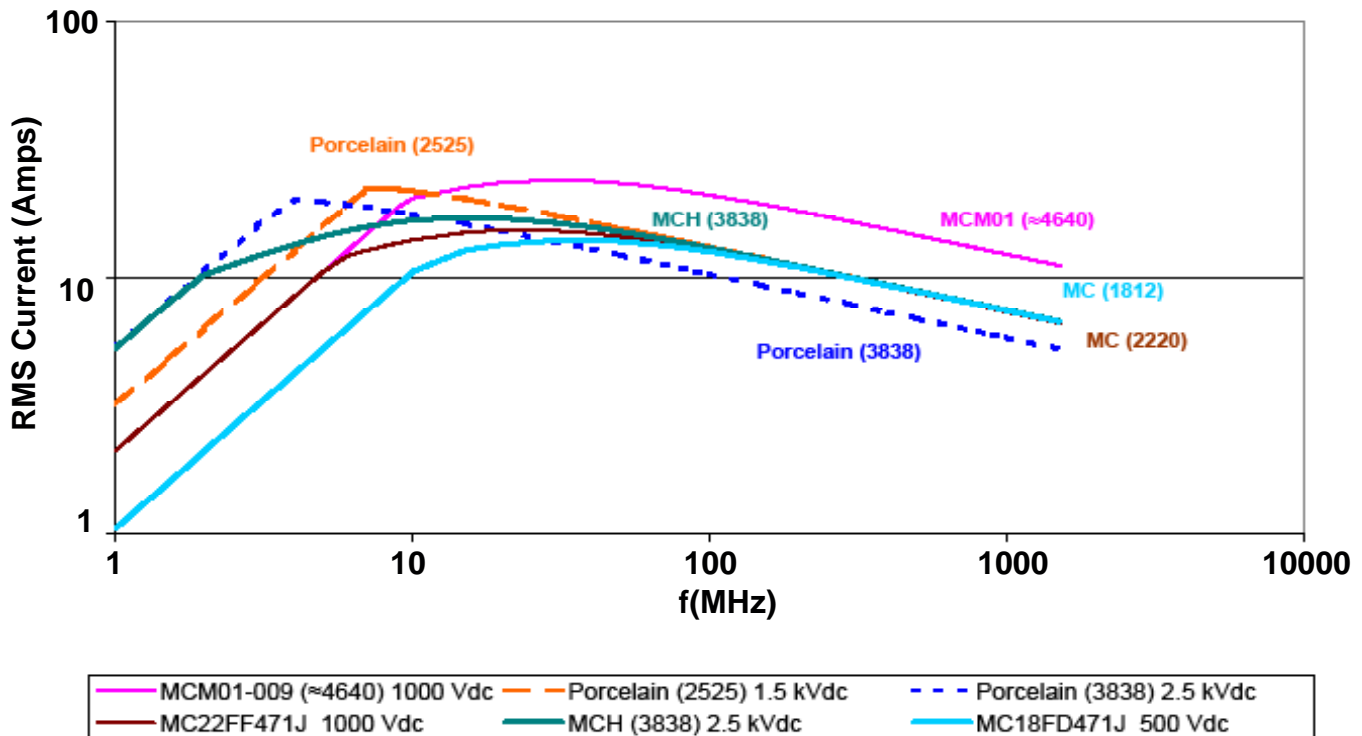
Typical Performance Data

[click here to see additional rating charts](#)

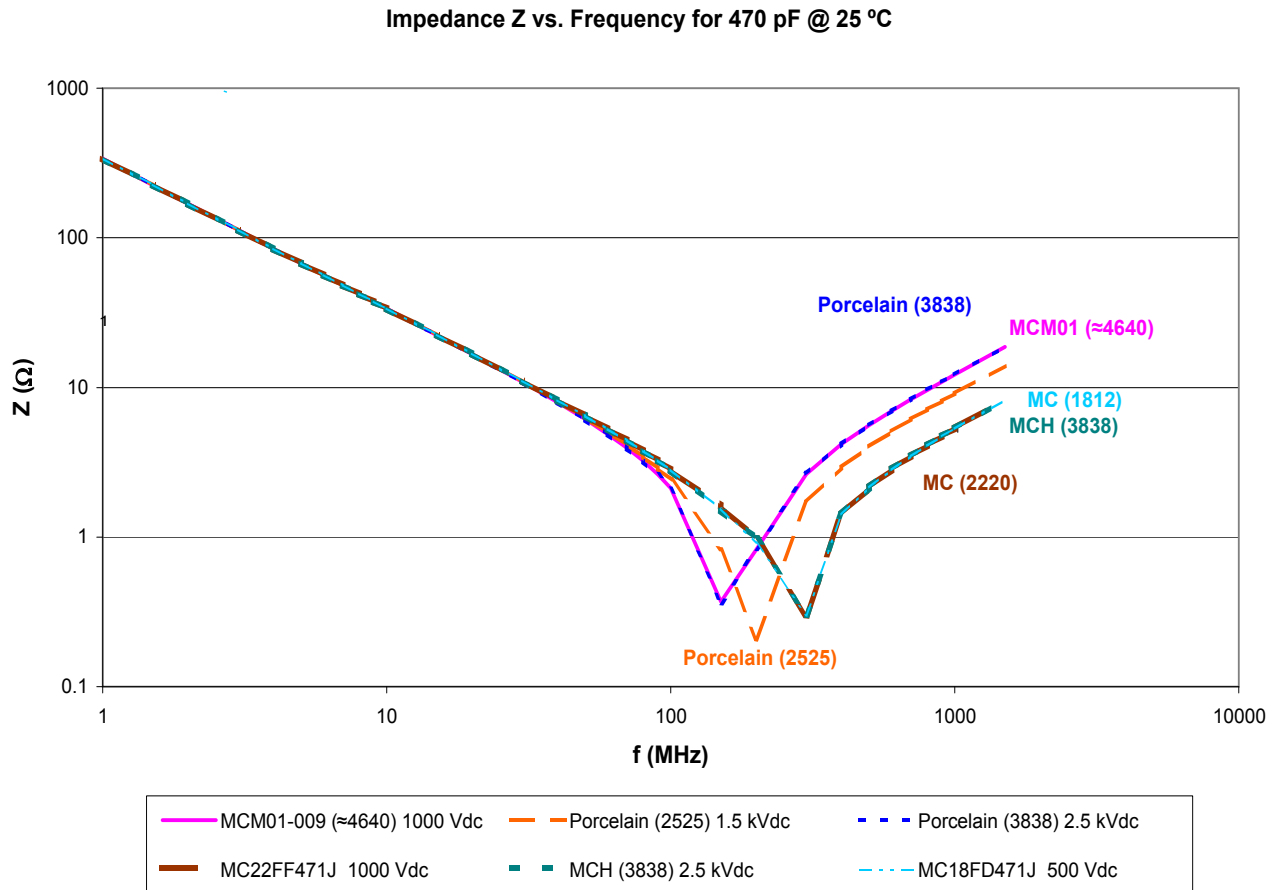
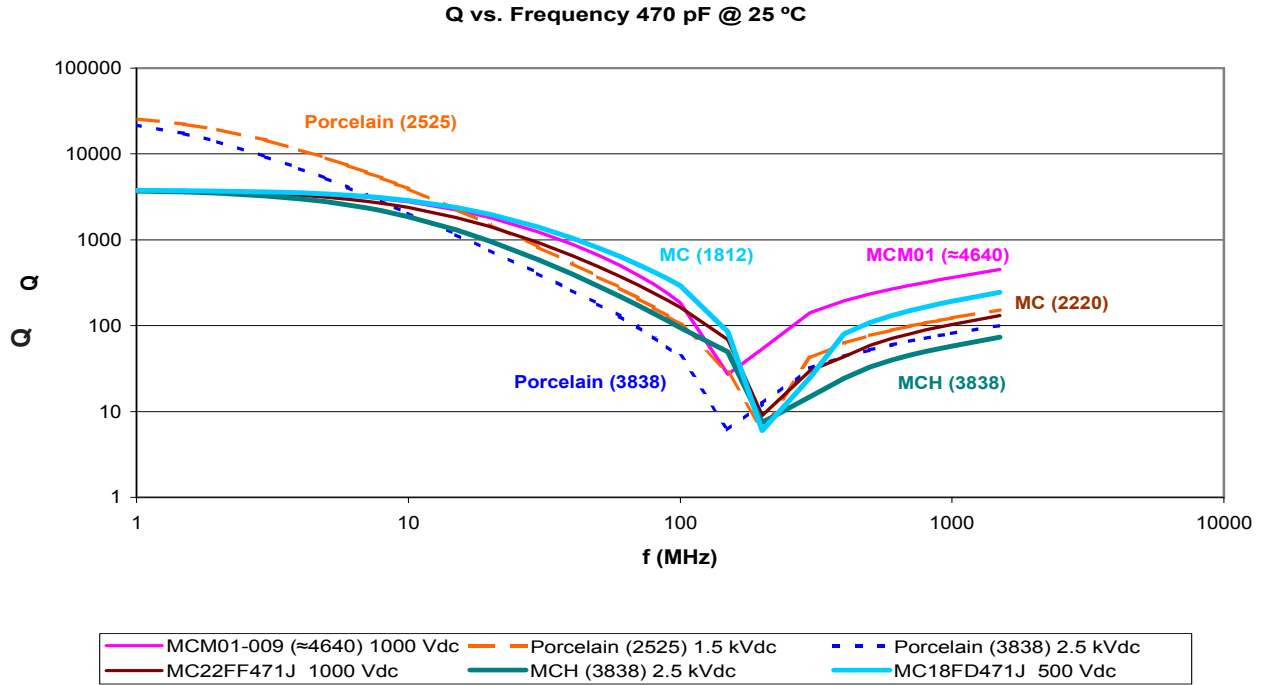
ESR vs. Frequency for 470 pF



Current Rating (IRMS) for 470 pF at 60 °C Rise



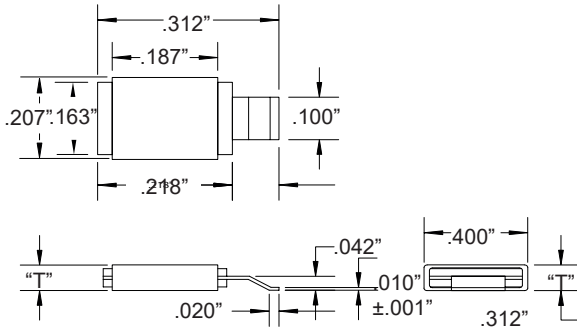
Types MCM and MIN SMT Clad RF Capacitors



Types MCM and MIN SMT Clad RF Capacitors

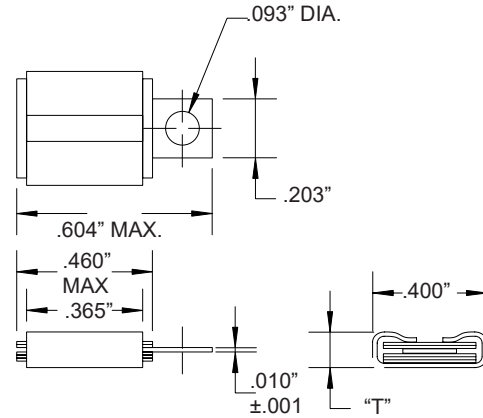
Outline Drawings for Popular Items

MIN02-002



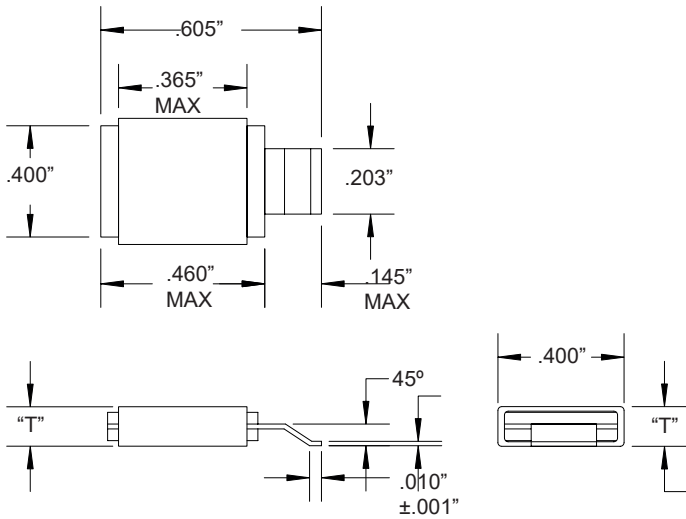
"T" (thickness) depending on capacitance value = .065 to .125 ± .015

MCM01-001



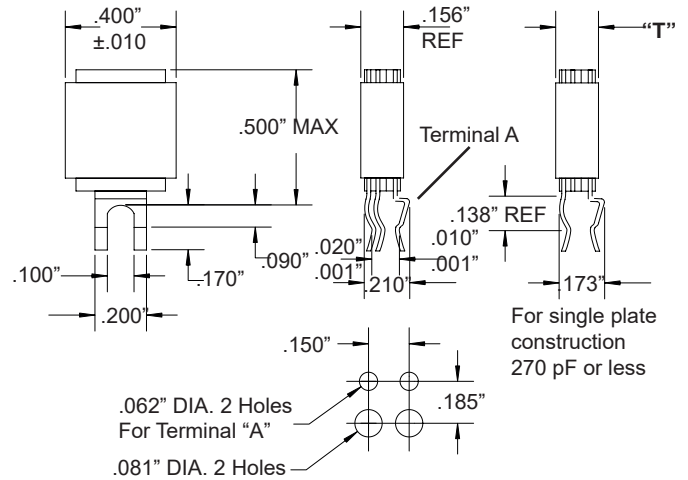
"T" (thickness) depending on capacitance value = .110 to .165 ± .015

MCM01-009



"T" (thickness) depending on capacitance value = .110 to .165 ± .015

MCM01-010



"T" (thickness) depending on capacitance value = .110 to .165 ± .015

"T" varies with capacitance

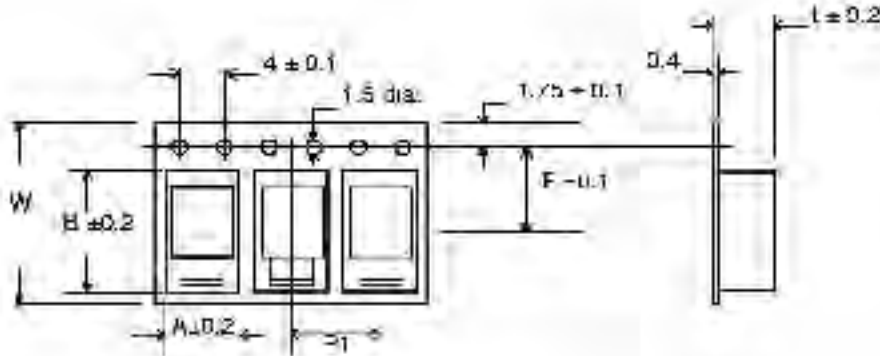
Types MCM and MIN SMT Clad RF Capacitors

Standard Minimum Quantities

Bulk Pack: 100 pieces per bag

Reel Pack: 500 pieces per reel

Tape Specifications



Tape Dimensions (mm)						
Case	W	A	B	P1	F	t
MIN02-002 < 150 pF	16	5.56	8.18	8	7.5	2.16
MIN02-002 ≥ 150 pF	16	5.66	8.10	8	7.5	3.20

Note: 24 mm tape for MCM01-009 and 32 mm tape for MCM01-004 are available upon request.

Solder Profile

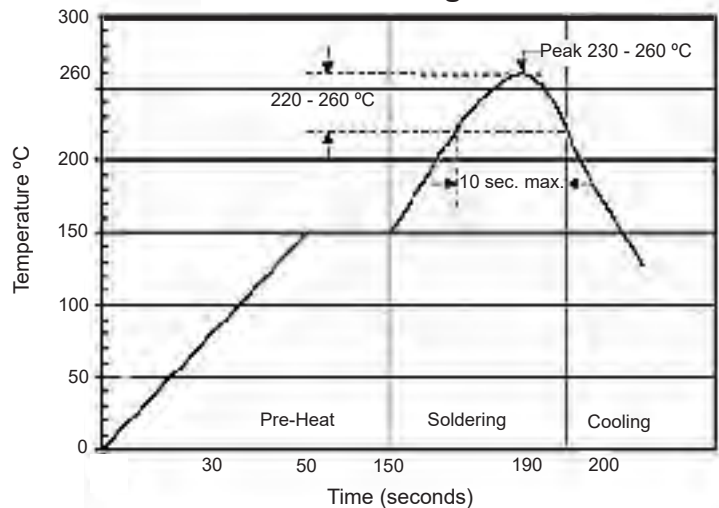
Specifications:

Lead free finish

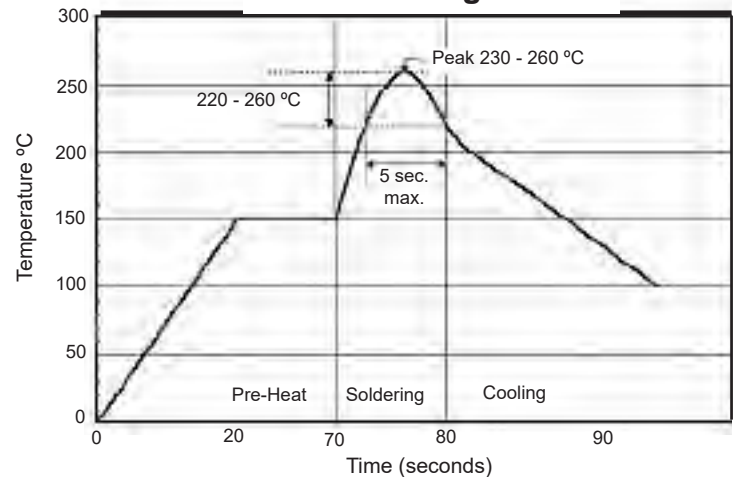
Case and Terminal Material:

Silver plated, copper flashed, brass

Reflow Soldering Method



Wave Soldering Method



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Types MC and MCN Multilayer RF Capacitors

High-Frequency, High-Power, High-Voltage Chips with Nonmagnetic Option



Rugged flexibility and compatibility with FR4 boards make Type MC and MCN capacitors ideal for use where other multilayer caps aren't recommended because of cracking. The natural mica dielectric retains its high-Q to many megahertz, so higher frequency applications are limited by the circuit inductance, not the Type MC capacitor. **Nonmagnetic** Type MCN chips are available for MRI and other high frequency applications that often use more expensive porcelain ceramic chips.

Highlights

- Extremely high Q at UHF/VHF frequencies
- Free from thermal cracking, FR4 compatible
- Wave solderable
- Nonmagnetic option
- Exceed 2 mm bend test
- Better than porcelain
- High RF current — dV/dt 20,000 V/ μ s
- Rock stable: No change with time, V & f

Applications

- MRI Coils and Generators
- RF Instruments
- Power Amplifiers
- Tuned LCR Circuits
- CATV
- Ground and Flight Mobile Radio
- Lasers
- Software - Defined Frequency-Hopping Radio

Specifications

- Voltages:** 100 Vdc, 500 Vdc, and 1000 Vdc
Capacitance Range: 0.5 pF to 2,200 pF
Capacitance Tolerance: ± 0.1 pF to $\pm 5\%$
Temperature Range: -55 °C to $+125$ °C
Case Sizes: 0805, 1210, 1812, and 2220

Ratings

RoHS Compliant

Cap (pF)	Catalog Part Number	Case Type
100 Vdc		
0.5	MC08CA0R5D-F	0805
1.0	MC08CA010D-F	0805
2.0	MC08CA020D-F	0805
3.0	MC08CA030D-F	0805
4.0	MC08CA040D-F	0805
5.0	MC08CA050D-F	0805
6.0	MC08CA060D-F	0805
7.0	MC08CA070D-F	0805
8.0	MC08CA080D-F	0805
9.0	MC08CA090D-F	0805
10.0	MC08CA100D-F	0805
12.0	MC08EA120J-F	0805
15.0	MC08EA150J-F	0805
18.0	MC08EA180J-F	0805
20.0	MC08EA200J-F	0805
22.0	MC08EA220J-F	0805
24.0	MC08EA240J-F	0805
27.0	MC08EA270J-F	0805
30.0	MC08EA300J-F	0805
33.0	MC08FA330J-F	0805
36.0	MC08FA360J-F	0805
39.0	MC08FA390J-F	0805
43.0	MC08FA430J-F	0805
47.0	MC08FA470J-F	0805
50.0	MC08FA500J-F	0805
51.0	MC08FA510J-F	0805
56.0	MC08FA560J-F	0805
62.0	MC08FA620J-F	0805

Cap (pF)	Catalog Part Number	Case Type
100 Vdc		
68	MC08FA680J-F	0805
75	MC08FA750J-F	0805
82	MC08FA820J-F	0805
91	MC08FA910J-F	0805
100	MC08FA101J-F	0805
47	MC12FA470J-F	1210
50	MC12FA500J-F	1210
51	MC12FA510J-F	1210
56	MC12FA560J-F	1210
62	MC12FA620J-F	1210
68	MC12FA680J-F	1210
75	MC12FA750J-F	1210
82	MC12FA820J-F	1210
91	MC12FA910J-F	1210
100	MC12FA101J-F	1210
110	MC12FA111J-F	1210
120	MC12FA121J-F	1210
130	MC12FA131J-F	1210
150	MC12FA151J-F	1210
160	MC12FA161J-F	1210
180	MC12FA181J-F	1210
200	MC12FA201J-F	1210
220	MC12FA221J-F	1210
240	MC12FA241J-F	1210
250	MC12FA251J-F	1210
270	MC12FA271J-F	1210
300	MC12FA301J-F	1210
330	MC12FA331J-F	1210

Cap (pF)	Catalog Part Number	Case Type
100 Vdc		
360	MC12FA361J-F	1210
390	MC12FA391J-F	1210
430	MC12FA431J-F	1210
250	MC18FA251J-F	1812
270	MC18FA271J-F	1812
300	MC18FA301J-F	1812
330	MC18FA331J-F	1812
360	MC18FA361J-F	1812
390	MC18FA391J-F	1812
430	MC18FA431J-F	1812
470	MC18FA471J-F	1812
500	MC18FA501J-F	1812
510	MC18FA511J-F	1812
560	MC18FA561J-F	1812
620	MC18FA621J-F	1812
680	MC18FA681J-F	1812
750	MC18FA751J-F	1812
820	MC18FA821J-F	1812
910	MC22FA911J-F	2220
1000	MC22FA102J-F	2220
1100	MC22FA112J-F	2220
1200	MC22FA122J-F	2220
1500	MC22FA152J-F	2220
1800	MC22FA182J-F	2220
2000	MC22FA202J-F	2220
2200	MC22FA222J-F	2220

Cap (pF)	Catalog Part Number	Case Type	Cap (pF)	Catalog Part Number	Case Type	Cap (pF)	Catalog Part Number	Case Type
500 Vdc			500 Vdc			500 Vdc		
0.5	MC08CD0R5D-F	0805	18	MC12ED180J-F	1210	130	MC18FD131J-F	1812
1	MC08CD010D-F	0805	20	MC12ED200J-F	1210	150	MC18FD151J-F	1812
2	MC08CD020D-F	0805	22	MC12ED220J-F	1210	160	MC18FD161J-F	1812
3	MC08CD030D-F	0805	24	MC12ED240J-F	1210	180	MC18FD181J-F	1812
4	MC08CD040D-F	0805	27	MC12ED270J-F	1210	200	MC18FD201J-F	1812
5	MC08CD050D-F	0805	30	MC12ED300J-F	1210	220	MC18FD221J-F	1812
6	MC08CD060D-F	0805	33	MC12FD330J-F	1210	240	MC18FD241J-F	1812
7	MC08CD070D-F	0805	36	MC12FD360J-F	1210	250	MC18FD251J-F	1812
8	MC08CD080D-F	0805	39	MC12FD390J-F	1210	270	MC18FD271J-F	1812
9	MC08CD090D-F	0805	43	MC12FD430J-F	1210	300	MC18FD301J-F	1812
10	MC08CD100D-F	0805	47	MC12FD470J-F	1210	330	MC18FD331J-F	1812
12	MC08ED120J-F	0805	50	MC12FD500J-F	1210	360	MC18FD361J-F	1812
15	MC08ED150J-F	0805	51	MC12FD510J-F	1210	390	MC18FD391J-F	1812
18	MC08ED180J-F	0805	56	MC12FD560J-F	1210	430	MC18FD431J-F	1812
20	MC08ED200J-F	0805	62	MC12FD620J-F	1210	470	MC18FD471J-F	1812
1	MC12CD010D-F	1210	68	MC12FD680J-F	1210	500	MC22FD501J-F	2220
2	MC12CD020D-F	1210	75	MC12FD750J-F	1210	510	MC22FD511J-F	2220
3	MC12CD030D-F	1210	82	MC12FD820J-F	1210	560	MC22FD561J-F	2220
4	MC12CD040D-F	1210	91	MC12FD910J-F	1210	620	MC22FD621J-F	2220
5	MC12CD050D-F	1210	100	MC12FD101J-F	1210	680	MC22FD681J-F	2220
6	MC12CD060D-F	1210	110	MC12FD111J-F	1210	750	MC22FD751J-F	2220
7	MC12CD070D-F	1210	120	MC12FD121J-F	1210	820	MC22FD821J-F	2220
8	MC12CD080D-F	1210	130	MC12FD131J-F	1210	910	MC22FD911J-F	2220
9	MC12CD090D-F	1210	150	MC12FD151J-F	1210	1000	MC22FD102J-F	2220
10	MC12CD100D-F	1210	100	MC18FD101J-F	1812	1100	MC22FD112J-F	2220
12	MC12ED120J-F	1210	110	MC18FD111J-F	1812	1200	MC22FD122J-F	2220
15	MC12ED150J-F	1210	120	MC18FD121J-F	1812			

Cap (pF)	Catalog Part Number	Case Type	Cap (pF)	Catalog Part Number	Case Type	Cap (pF)	Catalog Part Number	Case Type
1000 Vdc			1000 Vdc			1000 Vdc		
0.5	MC12CF0R5D-F	1210	39	MC12FF390J-F	1210	250	MC22FF251J-F	2220
1.0	MC12CF010D-F	1210	43	MC12FF430J-F	1210	270	MC22FF271J-F	2220
2.0	MC12CF020D-F	1210	47	MC12FF470J-F	1210	300	MC22FF301J-F	2220
3.0	MC12CF030D-F	1210	50	MC12FF500J-F	1210	330	MC22FF331J-F	2220
4.0	MC12CF040D-F	1210	51	MC22FF510J-F	2220	360	MC22FF361J-F	2220
5.0	MC12CF050D-F	1210	56	MC22FF560J-F	2220	390	MC22FF391J-F	2220
6.0	MC12CF060D-F	1210	62	MC22FF620J-F	2220	430	MC22FF431J-F	2220
7.0	MC12CF070D-F	1210	68	MC22FF680J-F	2220	470	MC22FF471J-F	2220
8.0	MC12CF080D-F	1210	75	MC22FF750J-F	2220	500	MC22FF501J-F	2220
9.0	MC12CF090D-F	1210	82	MC22FF820J-F	2220	510	MC22FF511J-F	2220
10.0	MC12CF100D-F	1210	91	MC22FF910J-F	2220	560	MC22FF561J-F	2220
12.0	MC12EF120J-F	1210	100	MC22FF101J-F	2220	620	MC22FF621J-F	2220
15.0	MC12EF150J-F	1210	110	MC22FF111J-F	2220	680	MC22FF681J-F	2220
18.0	MC12EF180J-F	1210	120	MC22FF121J-F	2220	750	MC22FF751J-F	2220
20.0	MC12EF200J-F	1210	130	MC22FF131J-F	2220	820	MC22FF821J-F	2220
22.0	MC12EF220J-F	1210	150	MC22FF151J-F	2220	910	MC22FF911J-F	2220
24.0	MC12EF240J-F	1210	160	MC22FF161J-F	2220	1000	MC22FF102J-F	2220
27.0	MC12EF270J-F	1210	180	MC22FF181J-F	2220	1100	MC22FF112J-F	2220
30.0	MC12EF300J-F	1210	200	MC22FF201J-F	2220	1200	MC22FF122J-F	2220
33.0	MC12FF330J-F	1210	220	MC22FF221J-F	2220	1500	MC22FF152J-F	2220
36.0	MC12FF360J-F	1210	240	MC22FF241J-F	2220			

Types MC and MCN Multilayer RF Capacitors

Part Numbering System and Ordering Information

Order by complete part number, as below. For other options, write your requirement on your RFQ.

MC(N) CDE Type	22 Case Code	F Temperature Coefficient	D Voltage	122 Capacitance	J Capacitor Tolerance	- Package	F RoHS (MC only)
MC = Standard	08 = 0805		A = 100 Vdc	010 = 1 pF		Blank = Bulk	MCN complies (no F required)
MCN = Nonmagnetic	12 = 1210		D = 500 Vdc	1R8 = 1.8 pF		T = Tape & reel	
	18 = 1812		F = 1000 Vdc	(187) = 187 pF		not specific	
	22 = 2220			182 = 1800 pF			

TC Code	Capacitance Range (pF)	Temperature Coefficient ppm/°C	Capacitance Drift
C	0.5 to 10	100 ±100	±(0.5% +0.1 pF)
E	10.5 to 30	50 ±50	±(0.1% +0.1 pF)
F	30.5 & up	25 ±25	±(0.05% +0.1 pF)

Tol. Code	Tolerance	Capacitance Range
B	±0.1 pF	0.5 pF to 5 pF
C	±0.25 pF	0.5 pF to 100 pF
D	±0.5 pF	0.5 pF to 10 pF
D	±0.50%	50.5 pF to 100 pF
F	±1 pF	5.5 pF to 10 pF
F	±1%	25.5 pF and up
G	±2%	13.0 pF and up
J	±5%	10.5 pF and up

Available Capacitance Values

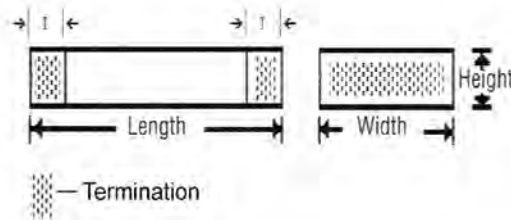
Case Code	Capacitance (pF)			Minimum Cap. Step, pF
	100 Vdc	500 Vdc	1000 Vdc	
08	0.5 to 100	0.5 to 20	N/A	0.5
12	43.5 to 100	0.5 to 100	N/A	0.5
12	101 to 430	101 to 150	N/A	1.0
12			0.5 to 50	1.0
18	241 to 820	91.5 to 470	N/A	1.0
22	821 to 1000	471 to 1000	N/A	1.0
22	1010 to 2200	1010 to 1200	50.5 to 1500	10.0

Standard Minimum Quanti-

Reel Packed
Case Codes 08 & 12: 3,000/reel*
Case Codes 18 & 22: 1,000/reel**
Bulk Packed
100 per bag

*note - MC12, 100 volt units -250 pF and above, and 500 volt units -100 pF and above 2000 pc reels

**note - MC22, 1000 volt units -680 pF and above 500 pc reels



Case Sizes

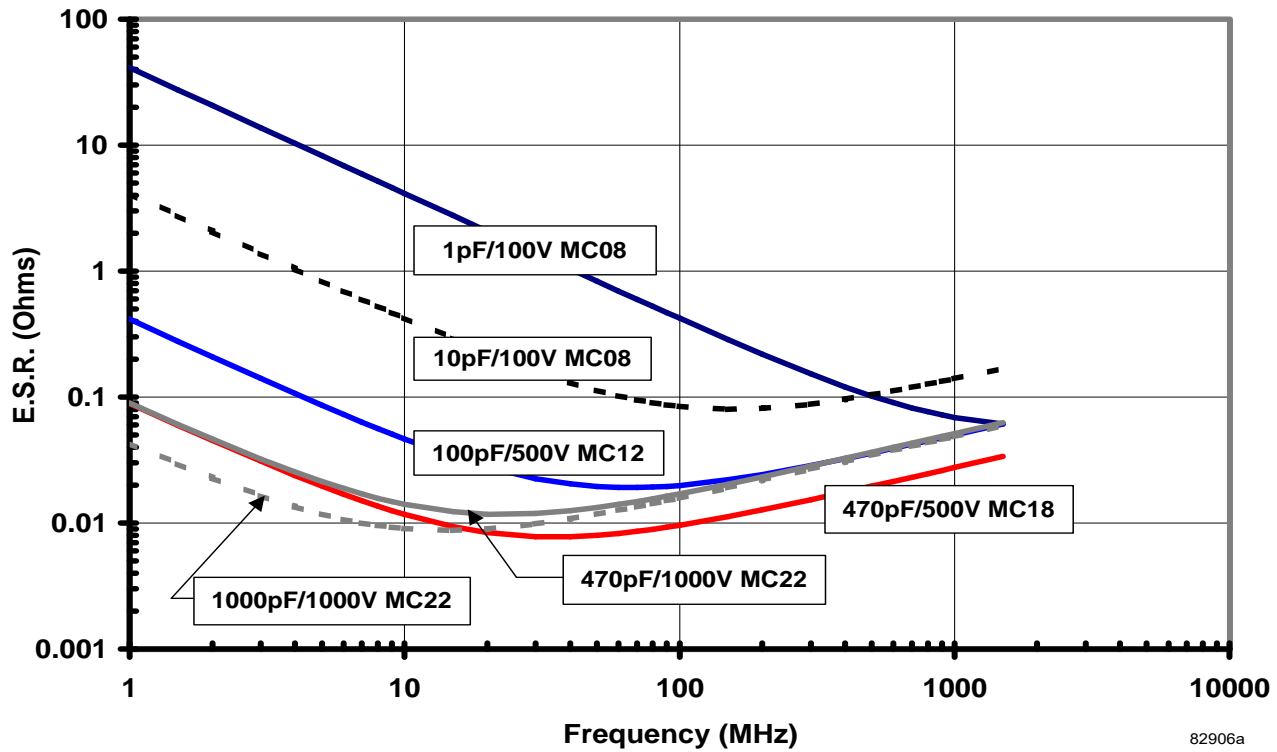
Case Code	Case Type	INCHES				MILLIMETERS			
		L	W	H (Max.)	I Min./Max.	L	W	H (Max.)	I Min./Max.
08	0805	0.079 +0.02 -0	0.049 +0.02 -0	0.055	0.008/0.035	2.0 +0.5 -0	1.25 +0.5 -0	1.4	0.2/0.9
12	1210	0.126 +0.024 -0.004	0.098 +0.024 -0.004	0.079	0.012/0.043	3.2 +0.6 -0.1	2.5 +0.6 -0.1	2.0	0.3/1.1
18	1812	0.177 +0.024 -0.008	0.126 +0.024 -0	0.079	0.012/0.051	4.5 +0.6 -0.2	3.2 +0.6 -0	2.0	0.3/1.3
22	2220	0.224 +0.016 -0.012	0.197 +0.016 -0.012	0.079	0.012/0.051	5.7 +0.4 -0.3	5.0 +0.4 -0.3	2.0*	0.3/1.3

*.157 (4.0 mm) for 1000 V rating

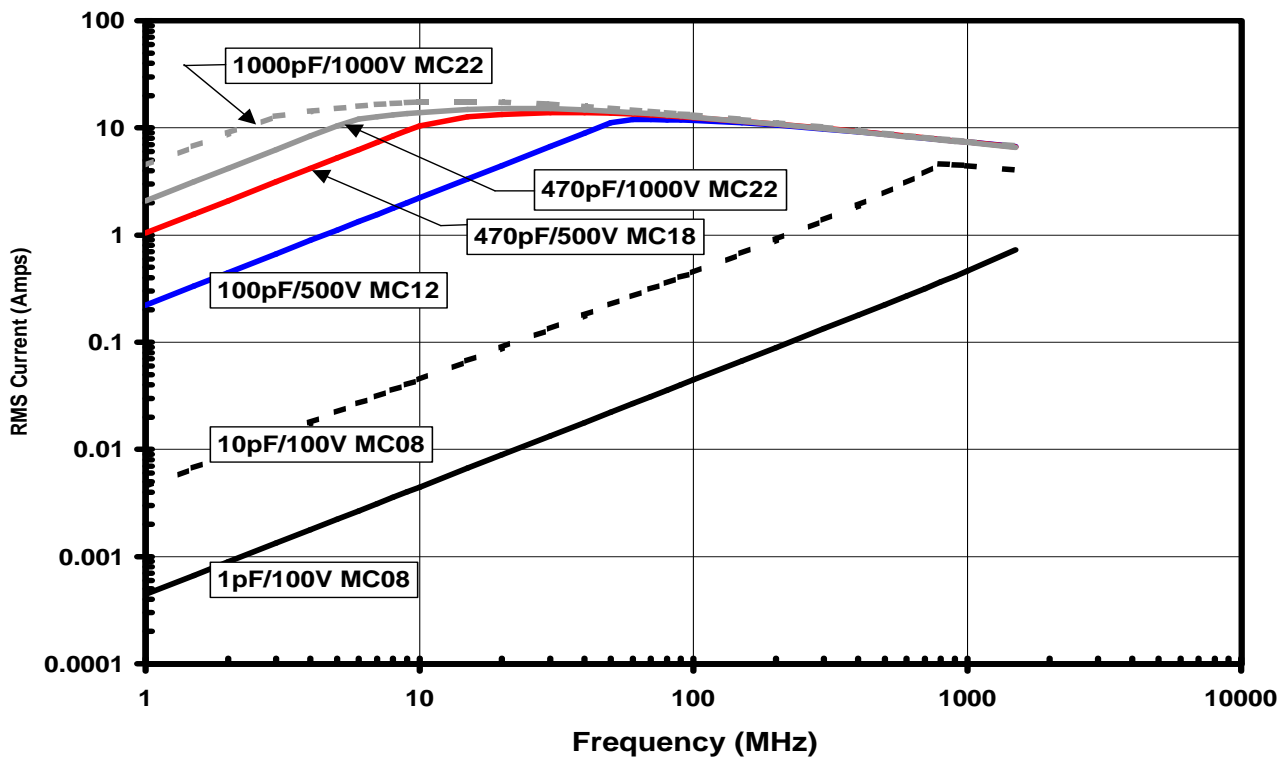
Types MC and MCN Multilayer RF Capacitors

Typical Performance Curves

Type MC Typical ESR vs. Frequency



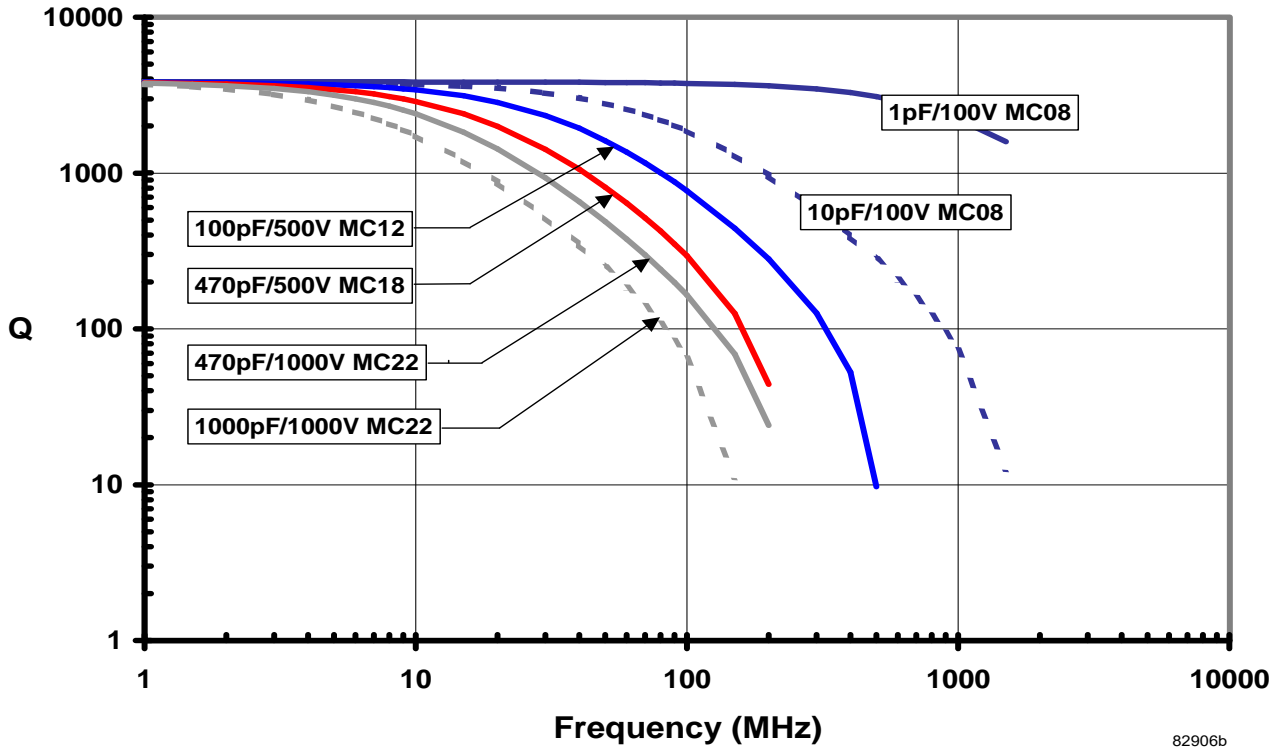
Type MC Maximum RMS Current vs. Frequency



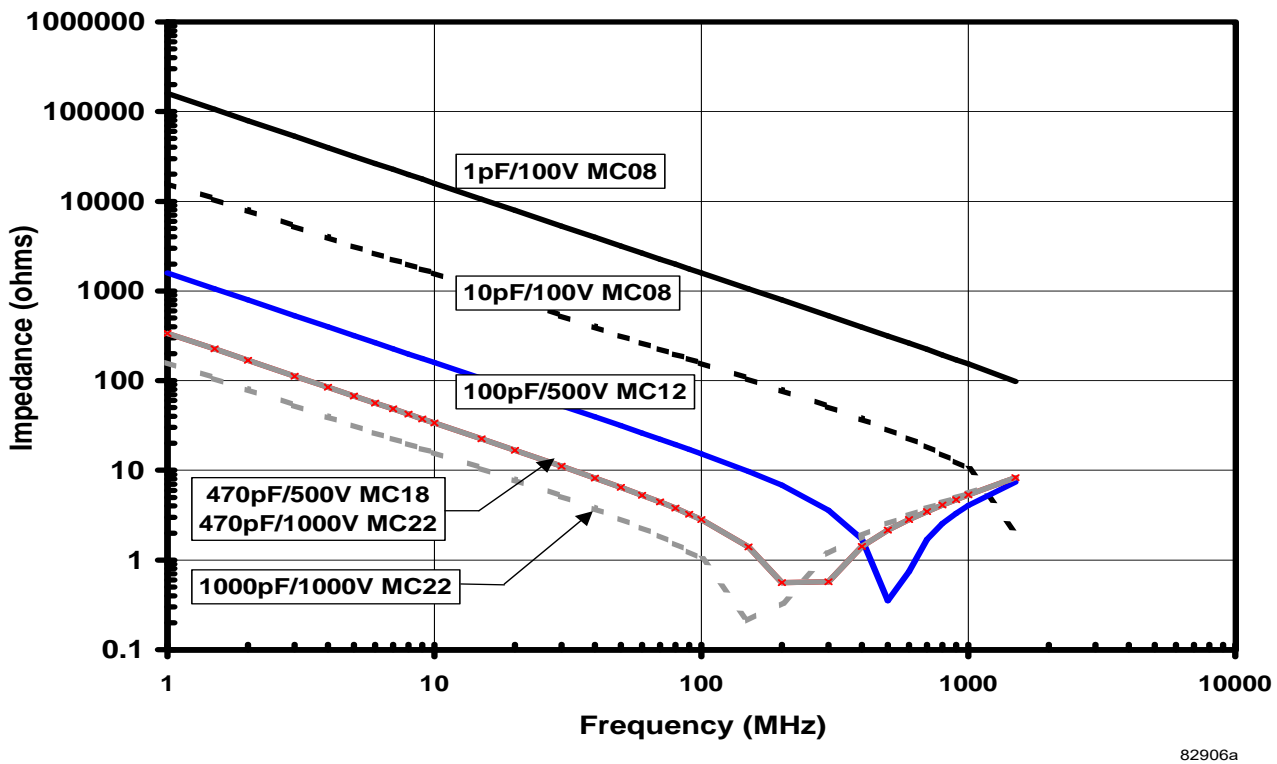
Types MC and MCN Multilayer RF Capacitors

Typical Performance Curves

Type MC Typical Q vs. Frequency

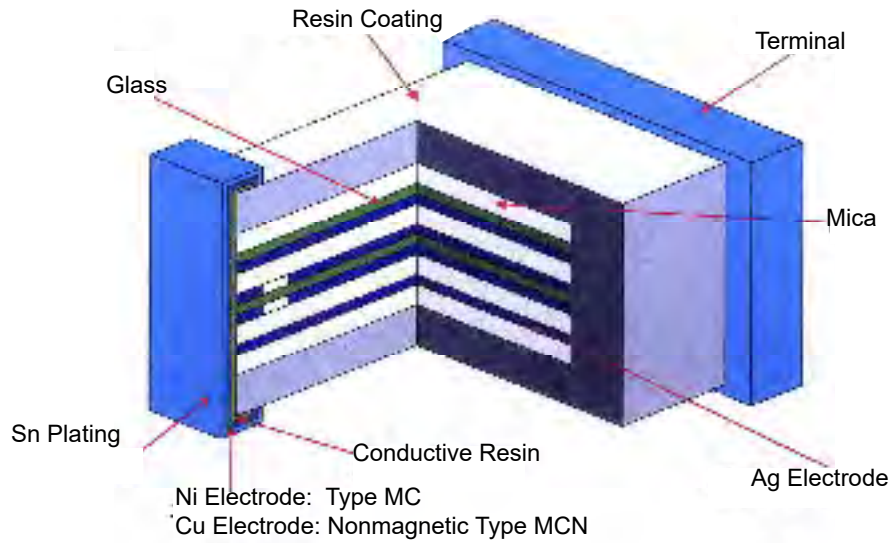


Type MC Typical Impedance vs. Frequency



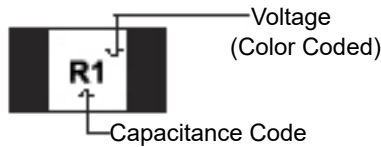
Types MC and MCN **Multilayer RF Capacitors**

High Q, Low ESR Construction for RF Power Applications



Specifications

Marking



Base Value	Code Ltr.	Base Value	Code Ltr.
10	A	40	d
11	B	43	R
12	C	45	e
13	D	47	S
15	E	50	f
16	F	51	T
18	G	56	U
20	H	60	m
22	J	62	V
24	K	68	W
25	a	70	n
27	L	75	X
30	M	80	t
33	N	82	Y
35	b	90	y
36	P	91	Z
39	Q		

Capacitance is within tolerance when measured as follows:

1—1000 pF @ 1 MHz
>1000 pF @ 1 kHz

Dissipation Factor is no more than 0.1% when measured as above at 5 Vrms or less.

Multiplier	Code No.
X 0.1	0
X 1	1
X 10	2
X 100	3
X 0.01	9

Example:
R1 = 43 pF

Types MC and MCN Multilayer RF Capacitors

Specifications

Quality Factor (Q) is as follows when measured at 1 MHz

Capacitance Range	Min. Q
1 to 80 pF	500 to 3000
>80 pF	3000

Insulation Resistance is no less than 100 GΩ when measured at 100 Vdc

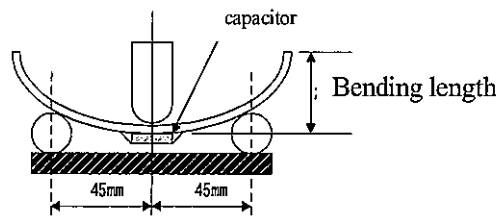
Withstanding voltage is two times the rated voltage between 5 seconds and without damage: with 50 mA or less current.

Life Test: Subject capacitors to 125 °C ±3 °C with 1.5 times rated voltage applied for 2000 (+72, -0) hours. There will be no visual damage and the capacitors will meet the limits of the table below.

Vibration Resistance: Subject the capacitors to simple harmonic motion with an amplitude of 0.06 inches; vary the frequency uniformly from 10 to 55 Hz and return to 10 Hz, all in one minute. Repeat that cycle continuously for two hours in

each of three mutually perpendicular directions. There will be no visual damage and the capacitors will meet the limits of the table below.

Bending Test: Mount the capacitor as shown below and press the ram bar until a 2.0 mm deflection is achieved. There will be no visual damage and the capacitors will meet the limits of methods JIS 5102 8.11 and AEC-Q200-005 without cracking or visual damage.



Moisture Resistance: Subject the capacitors to 40 ±2 °C at 90 to 95% humidity for 500 (+24, -0) hours. Return to room ambient for 24 hours. There will be no visual damage and the capacitors will meet the limits of the table below.

Temperature Coefficient and Drift: Measure the capacitors' capacitance at 25 °C, -55 °C, 25 °C, 125 °C and at 25 °C — all ±3 °C — after stabilizing at each temperature. The capacitor will meet the limits of the Characteristic table in Ordering Information.

Heat Resistance: Subject the capacitors to 125 ±2 °C for 2 (+1, -0) hours. Then the insulation resistance will be no less than 5GΩ.

Solderability: After 2 ±0.5 seconds in molten solder with Sn-PB between molten and solder at 235 ±5 °C, solder coverage will be no less than 75% when examined at 10X magnification for flow soldering.

Solder Heat Resistance: Subject the capacitors to molten solder at 250±5 °C for 5±0.5 seconds after 10 to 30 seconds pre-heating at 80 to 120 °C. There will be no visual damage and the capacitors will meet the limits of the table below.

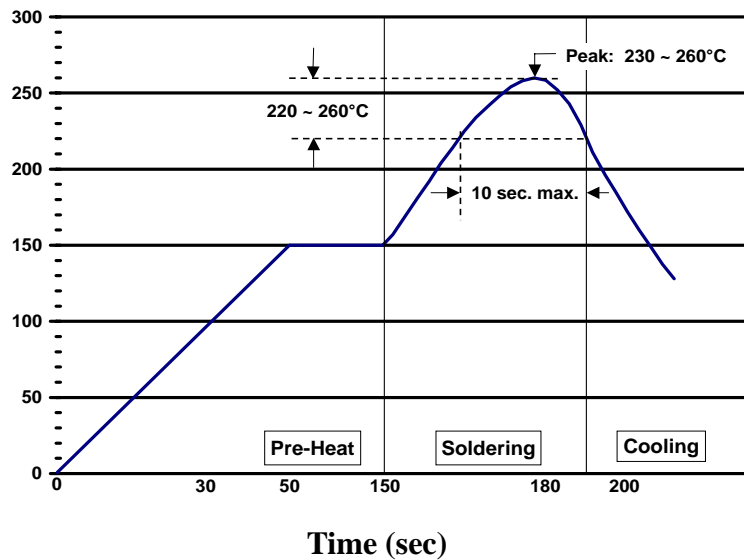
After-Test Limits

Test	Withstand Voltage	Insulation Resistance	Capacitance (whichever >)	DF	Q
Life Test	IL	IL	IV ±2% or ±.5 pF	150% max IL	2/3 x IL
Vibration Resistance	IL	30 GΩ	IV ±1% or ±1 pF	IL	IL
Bending Test	IL		IV ±.5% or ±1 pF	IL	
Moisture Res.	IL	30 GΩ	IV ±3% or ±.5 pF	150% max IL	2/3 x IL
Solderability	IL	IL	IL	IL	IL
Heat Resistance		5 GΩ			
Solder Heat Res.	IL	30 GΩ	IV ±.5% or ±1 pF	IL	IL

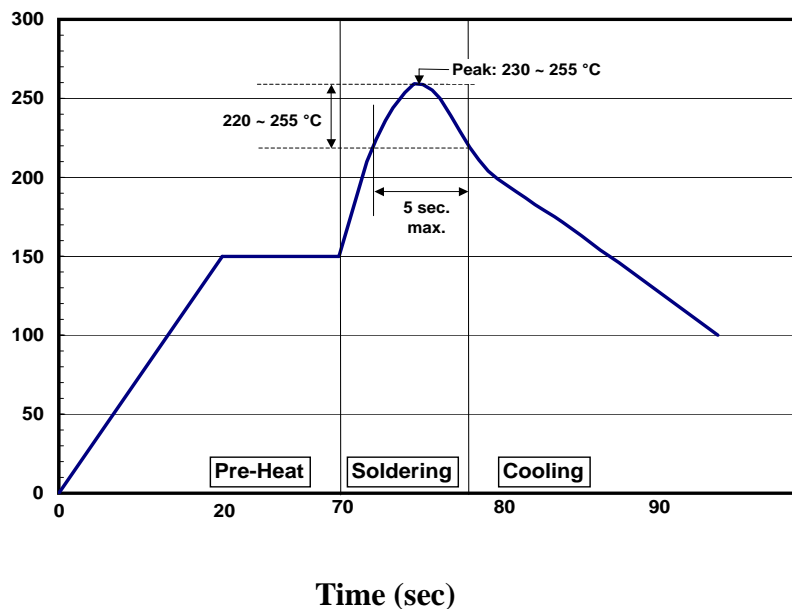
Types MC and MCN Multilayer RF Capacitors

Soldering Profiles

Reflow Solder Profile

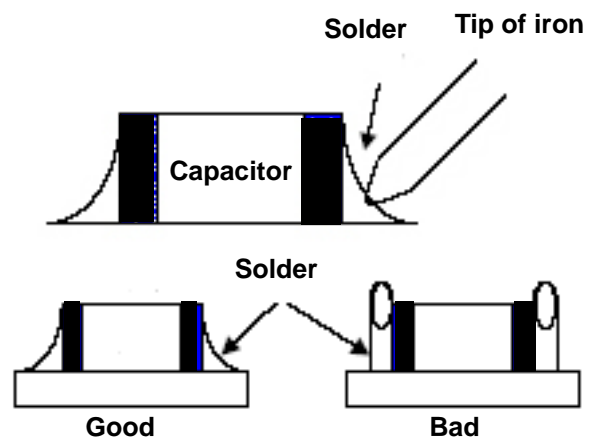


Wave Solder Profile



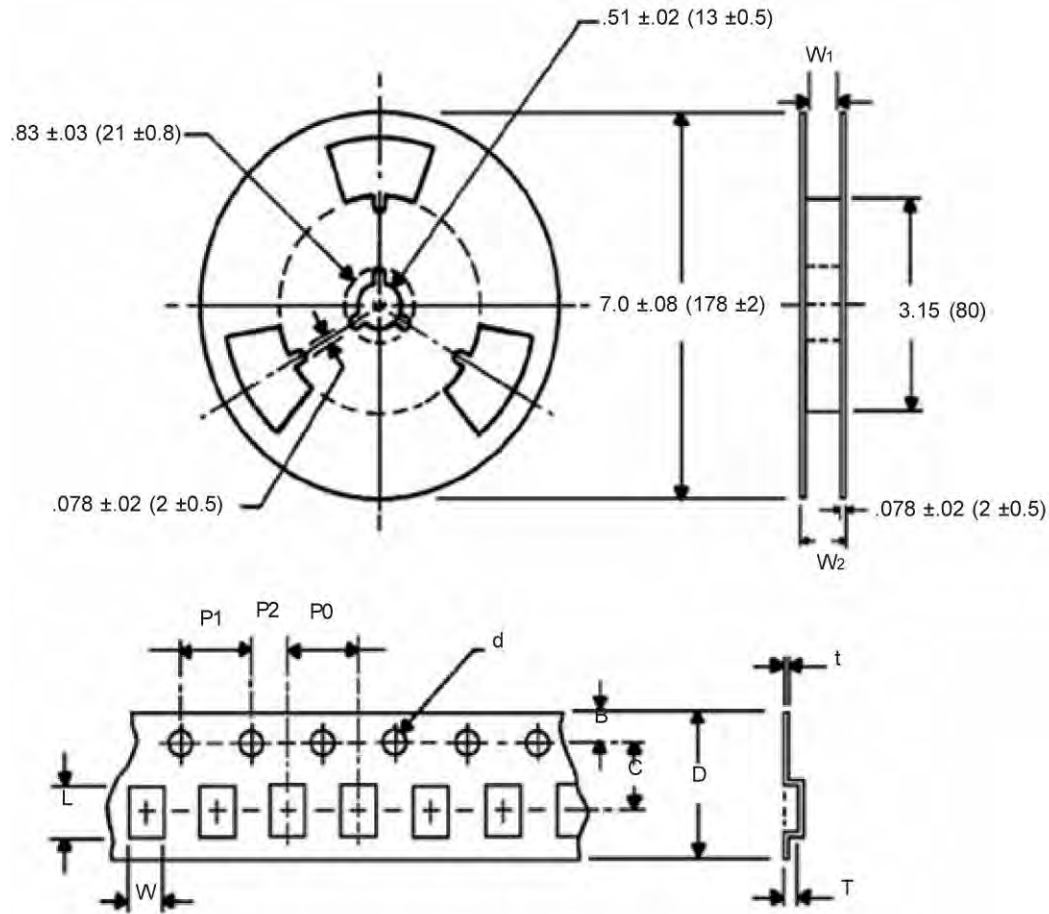
Hand Soldering Method

- SnAgCu recommended solder
- Do not use strong acid type flux with RM or RMA
- Soldering iron tip temperature should be 250 °C to 280 °C ≤ 5 sec.
- 60 Watt iron or less



Types MC and MCN Multilayer RF Capacitors

Surface-Mount Chip Mica Capacitors for Auto Insertion



Carrier Dimensions

Item	Symbol	Case Code			
		08	12	18	22
Sprocket hole pitch	P1	.157 ± .008 (4.0 ± 0.2)			
Sprocket hole location	B	.069 ± .008 (1.75 ± 0.2)			
Hole center to cavity center	C	.138 ± .002 (3.5 ± 0.05)		.217 ± .004 (5.5 ± 0.1)	
Carrier tape width	D	.315 ± .012 (8.0 ± 0.3)		.472 ± .012 (12.0 ± 0.3)	
Sprocket hole diameter	d	.059 (1.5)			
Cavity pitch	P ₀	.157 ± .004 (4.0 ± 0.1)		.315 ± .008 (8.0 ± 0.2)	
Hole center to cavity center	P ₂	.079 ± .004 (2.0 ± 0.1)			
Cavity length	L	.110 (2.8)	.150 (3.8)	.205 (5.2)	.246 (6.25)
Cavity width	W	.075 ± .008 (1.9 ± 0.2)	.118 ± .008 (3.0 ± 0.2)	.161 ± .008 (4.1 ± 0.2)	.217 ± .008 (5.5 ± 0.2)
Cavity depth	T	.051 ± .004 (1.3 ± 0.1)	.059 ± .004 (1.5 ± 0.1)	.071 ± .004 (1.8 ± 0.1)	.087 ± .004 (2.2 ± 0.1)
Carrier tape thickness	t	.012 ± .002 (0.3 ± 0.05)			
Holder distance	W ₁	.354 (9.0)	.512 (13.0)		
Reel thickness	W ₂	about .47 (12)		about .63 (16)	

Types MC and MCN **Multilayer RF Capacitors**

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FEATURES

Very Fast Charge/Discharge – High Power Density – Lower ESR –
RoHS Compliant

APPLICATIONS

Battery Backup/Alternative – Pulse Power – Energy Harvesting – LED
Displays – Mechanical Actuators – Audio Systems

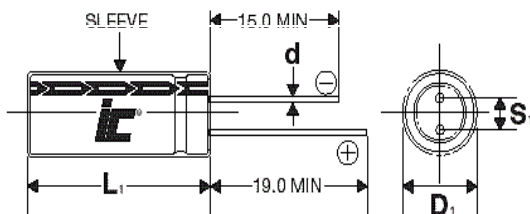
Operating Temperature Range	-40°C to +85°C	
Storage Temperature	-40°C to +70°C	
Capacitance Tolerance @ 20°C	-10% +30% (Q Tolerance) -20% +20% (M Tolerance)	
Voltage (Vdc) (+65°C / +85°C)	2.7V / 2.3V	
Life Time	1500 hours with rated voltage applied at rated temperature	
	Capacitance change	≤30% of initially measured values
	ESR	≤200% of initially specified values*
	Leakage current	≤100% specified maximum value
Shelf Life	1000 hours with no voltage applied at 65°C	
	Capacitance change	≤30% of initially measured values
	ESR	≤200% of initially specified values
Life Cycles (25°C) 1 cycle= Charge to WVDC for 20s, constant voltage charging for 10s, discharge to ½ WVDC for 20s, rest for 10s	500,000 cycles	
	Capacitance change	<30% of initially measured values
	ESR change	<200% of initially specified values

*ESR Change ≤4x at 85°C

[RoHS Compliant](#)

810a Recognized

D = 6.3 to 18mm



Lead spacing VS. Case diameter						
D	6.3	8	10	12.5	16	18
S	2.5	3.5	5.0	5.0	7.5	7.5
d	0.6	0.6	0.6	0.6	0.8	0.8
α	1.5	1.5	2.0	2.0	2.0	2.0

L₁=L+α mm
D₁=D+0.5mm
S₁=S±0.5mm

Americas / EU

Phone: 1-508-996-8561
Email: cdena@cde.com

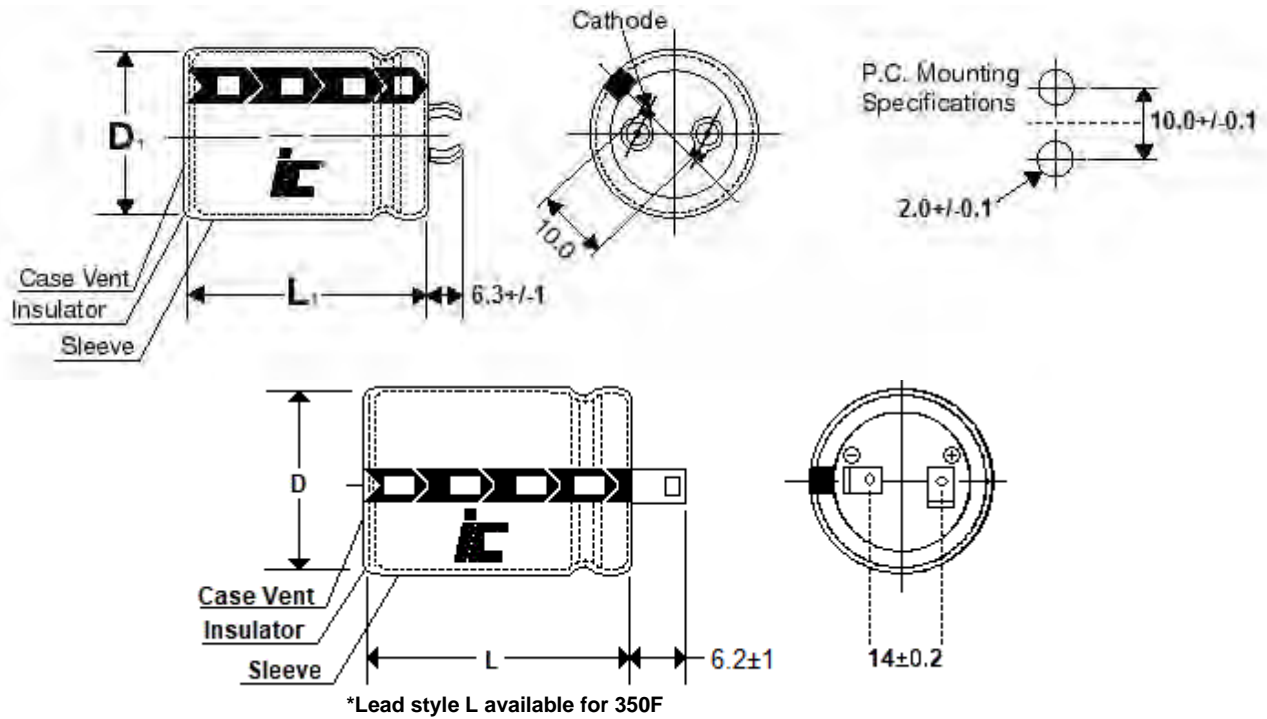


Asia

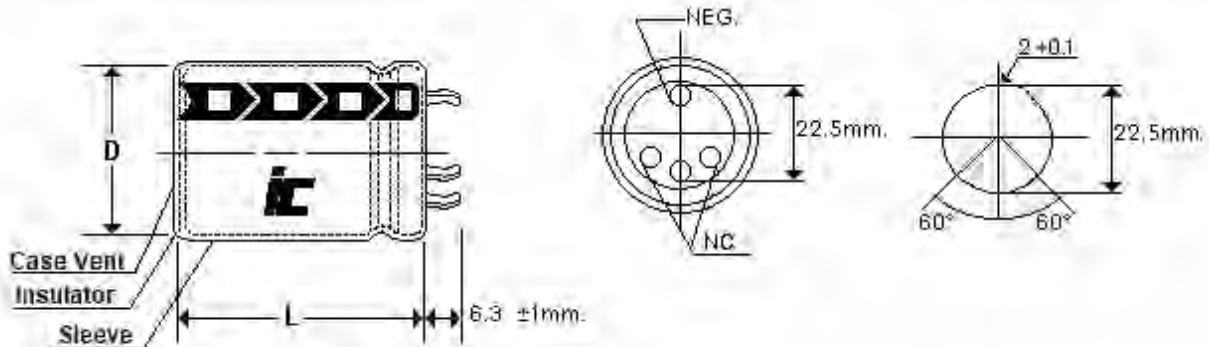
Phone: 852-2793-0931
Email: cdeasia@cde.com



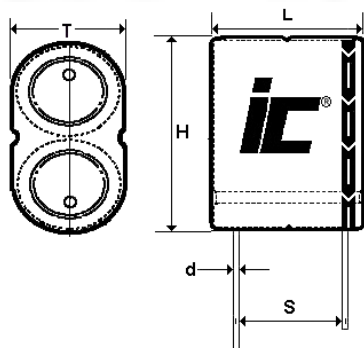
Capacitance 100F to 350F



Capacitance 400F to 600F



5.5 Volt Parts



Capacitance (F)	Dims (LxHxT) (mm) $\pm 2.0 \text{mm}$	Lead spacing (S) (mm) $\pm 0.5 \text{mm}$	Lead diameter (d) (mm)
0.5	17x17x8.5	12	0.6
1	17x17x8.5	12	0.6
1.5	17x23x8.5	12	0.6
2.5	21x23x11	15.5	0.6
3.5	21x27x11	15.5	0.6
5	26x27x13	18	0.6

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DGH

High pulse power, extends battery life

WVDC	Capacitance (F)	IC PART NUMBER	MAX Current (A) (1 Sec.)	Maximum Continuous Current (A) ($\Delta T=15^{\circ}C$)	Short Circuit Current (A)	ESR AC 1 kHz (m Ω)	DC ESR (m Ω) 20°C	Max stored energy (mWh)	LC (mA), (72 hrs)	Energy Density (Wh/kg)	Energy Volumetric Density (Wh/l)	Power Density (kW/kg)	Power Volumetric Density (kW/l)
2.7	1.0	DGH105Q2R7	0.96	0.6	6.8	200	400	1.01	0.008	0.92	1.44	1.988	3.109
2.7	1.2	DGH125M2R7	0.94	0.10	4.5	300	600	1.22	0.008	1.52	2.59	1.82	3.12
2.7	1.5	DGH155M2R7	1.1	0.13	4.8	280	560	1.5	0.008	1.6	2.7	1.64	2.78
2.7	2.0	DGH205Q2R7	1.8	0.7	11	130	250	2.03	0.01	1.688	2.879	2.916	4.975
2.7	3.0	DGH305Q2R7	2.8	1.2	18	80	150	3.04	0.012	2.17	3.023	4.166	5.804
2.7	3.3	DGH335Q2R7	3	1.2	18	80	150	3.34	0.014	2.228	3.325	3.888	5.804
2.7	5.0	DGH505Q2R7	4.1	1.3	21	70	130	5.06	0.016	2.531	3.225	3.365	4.286
2.7	6.0	DGH605Q2R7	4.5	0.51	21	70	130	6.08	0.016	2.89	3.86	3.2	4.28
2.7	7.0	DGH705Q2R7	6.1	1.7	34	55	80	7.09	0.02	2.835	3.611	4.374	5.572
2.7	10.0	DGH106Q2R7	8.4	3.5	45	40	60	10.13	0.03	3.894	5.159	5.608	7.429
2.7	10.0	DGH106Q2R7B	8.4	3.5	45	40	60	10.13	0.03	2.978	4.299	4.288	6.191
2.7	10.0	DGH106Q2R7C	8.4	3.5	45	40	60	10.13	0.03	3.38	5.16	4.86	7.4
2.7	15.0	DGH156Q2R7	11.6	2.4	54	30	50	15.19	0.045	3.375	4.127	3.888	4.755
2.7	20.0	DGH206Q2R7	15	2.6	68	30	40	20.25	0.06	3.11	4.02	3.36	4.3
2.7	25.0	DGH256Q2R7	18	3.1	77	25	35	25.31	0.08	2.978	5.038	2.941	4.975
2.7	30.0	DGH306Q2R7	21.3	4.0	90	22	30	30.38	0.1	3.79	5.03	3.64	4.8
2.7	50.0	DGH506Q2R7	32.1	5.2	123	15	22	50.63	0.14	3.616	4.976	2.84	3.909
2.7	70.0	DGH706Q2R7	39.4	5.8	135	14	20	70.88	0.16	3.938	5.573	2.43	3.439
2.7	100.0	DGH107Q2R7	61.4	8.3	225	8	12	101.25	0.3	4.821	5.922	3.471	4.264
2.7	200.0	DGH207Q2R7	90	10	270	6	10	202.5	0.7	5.192	5.732	2.243	2.476
2.7	350.0	DGH357Q2R7	212	18.9	771	3	3.5	354.38	1	5.452	6.134	3.845	4.329
2.7	350.0	DGH357Q2R7L	212	18.9	771	3	3.5	354.4	1	5.452	6.134	3.845	4.329
2.7	400.0	DGH407Q2R7	225	18.9	771	3	3.5	405	1	5.956	7.016	4.02	4.736
2.7	470.0	DGH477Q2R7	240	18.9	771	3	3.5	475.88	1.3	6.609	8.244	3.471	4.33
2.7	600.0	DGH607Q2R7	261	18	771	3	3.5	608	1.5	7.41	9.02	3.05	3.71
5.5	0.5	DGH504Q5R5	0.96	0.6	6.8	400	800	2.1	0.008	0.955	0.855	2.063	1.847
5.5	1.0	DGH105Q5R5	1.8	0.7	11	280	520	4.2	0.01	1.681	1.71	2.904	2.955
5.5	1.5	DGH155Q5R5	2.8	1.2	18	160	300	6.3	0.012	2.101	1.896	4.033	3.641
5.5	2.5	DGH255Q5R5	4.1	1.3	21	140	260	10.5	0.016	2.02	1.977	2.685	2.628
5.5	3.5	DGH355Q5R5	6.1	1.7	34	110	160	14.71	0.02	2.451	2.358	3.781	3.638
5.5	5.0	DGH505Q5R5	8.4	3.5	45	80	120	21	0.03	2.531	2.302	3.645	3.315

DGH

High pulse power, extends
battery life

WVDC	Capacitance (F)	IC PART NUMBER	Weight (grams)	Volume (mL)	Dims DxL LxHxT (mm)	Lead Spacing S (mm)	Lead Diameter d (mm)
2.7	1.0	DGH105Q2R7	0.8	0.703	8x14	3.5	0.6
2.7	1.2	DGH125M2R7	0.8	0.47	6.3x15	2.5	0.5
2.7	1.5	DGH155M2R7	0.95	0.56	6.3x18	2.6	0.5
2.7	2.0	DGH205Q2R7	1	0.703	8x14	3.5	0.6
2.7	3.0	DGH305Q2R7	1.4	1.01	8x20	3.5	0.6
2.7	3.3	DGH335Q2R7	1.5	1.01	8x20	3.5	0.6
2.7	5.0	DGH505Q2R7	2.1	1.57	10x20	5	0.6
2.7	6.0	DGH605Q2R7	2.1	1.57	10x20	5	0.6
2.7	7.0	DGH705Q2R7	2.3	1.96	10x25	5	0.6
2.7	10.0	DGH106Q2R7	3.2	1.96	10x30	5	0.6
2.7	10.0	DGH106Q2R7B	3.6	2.36	12.5x25	5	0.6
2.7	10.0	DGH106Q2R7C	2.7	1.96	10x25	5	0.6
2.7	15.0	DGH156Q2R7	4.5	3.68	12.5x30	5	0.6
2.7	20.0	DGH206Q2R7	7	5.03	16x25	7.5	0.8
2.7	25.0	DGH256Q2R7	7	5.03	16x25	7.5	0.8
2.7	30.0	DGH306Q2R7	9.7	6.03	16x30	7.5	0.8
2.7	50.0	DGH506Q2R7	12.8	10.17	18x40	7.5	0.8
2.7	70.0	DGH706Q2R7	15	12.72	18x50	7.5	0.8
2.7	100.0	DGH107Q2R7	20	17.1	22x45	10	1.2
2.7	200.0	DGH207Q2R7	36	35.33	30x50	10	1.2
2.7	350.0	DGH357Q2R7	64	57.73	35x60	10	1.2
2.7	350.0	DGH357Q2R7L	64	57.73	35x60	18.4	1.2
2.7	400.0	DGH407Q2R7	70	57.73	35x60	22.5	1.2
2.7	470.0	DGH477Q2R7	75	57.73	35x60	22.5	1.2
2.7	600.0	DGH607Q2R7	82	67.35	35x70	22.5	1.2
5.5	0.5	DGH504Q5R5	2.2	2.46	17x17x8.5	12	0.6
5.5	1.0	DGH105Q5R5	2.5	2.46	17x17x8.5	12	0.6
5.5	1.5	DGH155Q5R5	3	3.32	17x23x8.5	12	0.6
5.5	2.5	DGH255Q5R5	5.2	5.31	21x23x11	15.5	0.6
5.5	3.5	DGH355Q5R5	6	6.24	21x27x11	15.5	0.6
5.5	5.0	DGH505Q5R5	8.3	9.13	26x27x13	18	0.6



FEATURES

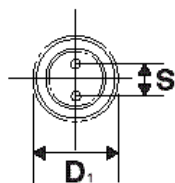
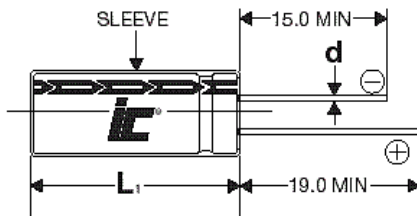
Very fast charge/discharge – High power density – IEC 62391 compliant – Circuit board mountable

APPLICATIONS

Battery backup/ alternative – Pulse power – Energy harvesting – LED Displays – Mechanical actuators – Audio systems

Operating Temperature Range		-40°C to +60°C		
Storage Temperature		-40°C to +70°C		
Capacitance Tolerance @ 20°C		+30%/-10% (Q tolerance), +20%/-20% (M tolerance) +10%/-10% (K tolerance), +50%/-20% (S tolerance)		
Surge Voltage	WVDC	2.7	5.5	
	SVDC	2.8	5.7	
Maximum Current	See standard part listing		1 second discharge to ½ WVDC	
Operating Current	See standard part listing		5 second discharge to ½ WVDC	
Leakage Current	See standard part listing		72 hours, 25°C	
Life Time	1000 hours with rated voltage applied at 60°C			
	Capacitance change	±30% of initially measured values		
	ESR	≤200% of initially specified values		
	Leakage current	≤ specified maximum value		
Shelf Life	1000 hours with no voltage applied at 60°C			
	Capacitance change	±30% of initially measured values		
	ESR	≤200% of initially specified values		
Life Cycles (25°C) 1 cycle= Charge to WVDC for 20s, constant voltage charging for 10s, discharge to ½ WVDC for 20s, rest for 10 s	500,000 cycles			
	Capacitance change	±30% of initially measured values		
	ESR change	≤200% of initially specified values		

$D \leq 18\text{mm}$



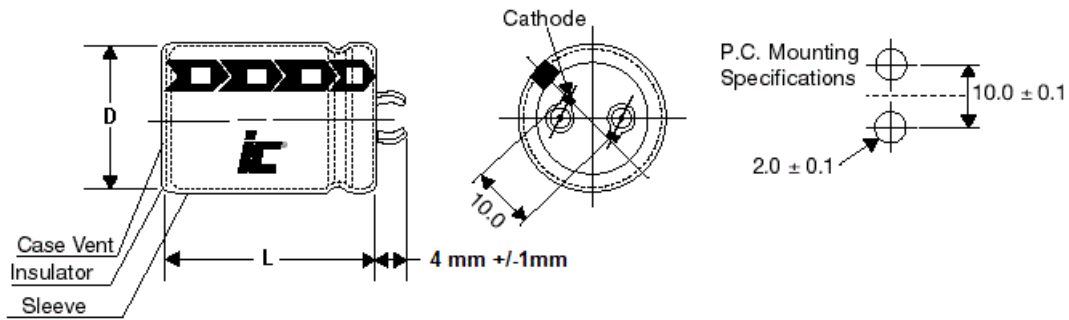
Lead spacing VS. Case diameter						
D	4	8(L<20)	8(L≥20)	10	16	18
S	1.5	3.5	3.5	5.0	7.5	7.5
d	0.45	0.5	0.6	0.6	0.8	0.8

$L_1 = L + 1.5\text{mm}$
 $D_1 = D + 0.5\text{mm}$
 $S_1 = S \pm 0.5\text{mm}$

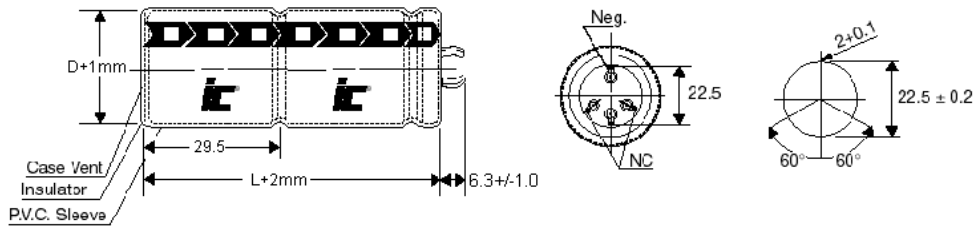


Snap in types

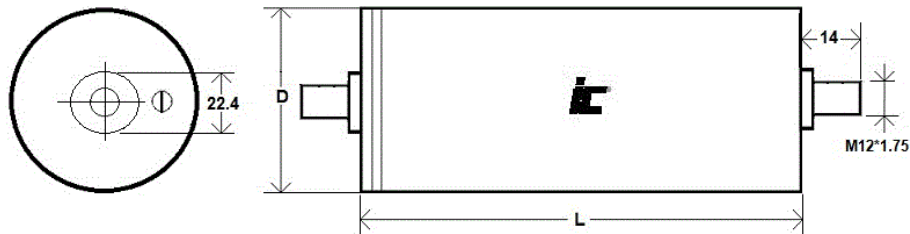
$D \geq 20\text{mm}$



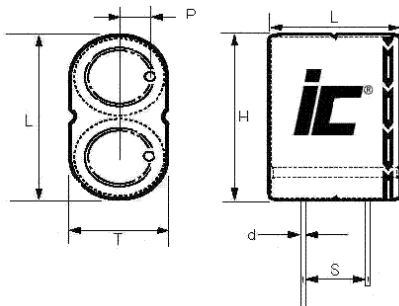
Capacitance = 400F



Capacitance = 500F to 650F



5.5 Volt units



Capacitance (F)	Dims (LxHxT) (mm) +1.0mm	Lead spacing S (mm) +/-0.5mm	Lead diameter d (mm)	P (mm)
1	17x19.5x9	12.3	0.6	1.75
1.5	17.5x23.5x9	10.5	0.6	1.75
2	21.5x23.5x11	10.5	0.6	2.5
2.5	21.5x23.5x11	10.5	0.6	2.5

DCN

High pulse power, extends battery life

Capacitance (F)	WVDC	IC PART NUMBER	MAX Current (A)	Maximum Continuous Current (A) ($\Delta T=15^{\circ}C$)	Short Circuit Current (A)	ESR AC 1 kHz (m Ω)	DC ESR (m Ω) 20°C	Max stored energy (mWh)	LC (mA), (72 hrs)	Energy Density (Wh/kg)	Energy Volumetric Density (Wh/l)	Power Density (kW/kg)	Power Volumetric Density (kW/l)
0.3	2.7	304DCN2R7SCBB	0.5	0.2	1.8	1000	1500	0.30375	0.006	1.2	0.879	2.333	13.18
1.0	2.7	105DCN2R7S	0.73	0.4	3.17	400	850	1.0125	0.008	1.0771	1.6786	1.0949	1.7062
1.0	5.5	105DCN5R5M	1.42	0.36	6.11	600	850	4.2139	0.1	1.1571	1.3187	1.1109	1.2659
1.5	5.5	155DCN5R5M	4.125	0.65	11	320	500	6.3021	0.12	1.40046	1.70269	4.0333	4.9
2.0	2.7	205DCN2R7S	1.39	0.5	5.74	280	470	2.025	0.01	1.7609	2.5179	1.6185	2.3143
2.0	5.5	205DCN5R5M	2.81	0.85	11.74	300	470	8.4028	0.14	2.02	10.0899	11.2	5.96
2.5	5.5	255DCN5R5Q	5.09	1.1	13.75	220	400	10.5035	0.15	2.025	1.8218	5.3834	4.8431
3.0	2.7	305DCN2R7Q	2.31	0.8	10.8	160	250	3.0375	0.012	2.2668	3.0215	2.6113	3.4807
3.3	2.7	335DCN2R7MGJG	2.36	0.8	10	160	270	3.34125	0.014	1.6	2.127	1.58	2.063
4.7	2.7	475DCN2R7SGJG	2.92	0.9	10.8	140	250	4.7588	0.016	2.2134	3.0295	1.6275	2.2277
5.0	2.7	505DCN2R7Q	6.75	0.99	13.5	110	200	5.0625	0.015	2.025	3.2229	1.7496	2.7846
10.0	2.7	106DCN2R7M	5.87	1.4	20.7	80	130	10.125	0.03	3.3638	4.2972	2.2356	2.856
10.0	2.7	106DCN2R7STJD	5.63	1.4	19.3	80	140	10.125	0.03	2.5859	3.3002	1.5981	2.0367
22.0	2.7	226DCN2R7SKJD	10.3	2.1	31.7	40	85	22.275	0.06	2.9542	4.4315	1.365	2.0475
25.0	2.7	256DCN2R7Q	16.46	2.7	45	30	60	25.3125	0.049	7.54	5.0358	3.1654	4.1437
30.0	2.7	306DCN2R7M	14.5	2.7	45	30	60	30.375	0.07	3.7593	5.0358	1.8045	2.4172
50.0	2.7	506DCN2R7Q	22.5	4	675	25	40	50.625	0.16	3.061	4.9736	1.058	2.1486
100.0	2.7	107DCN2R7Q	35.5	5.8	96.4	18	28	101.25	0.3	4.6107	5.919	1.4227	1.8264
100.0	2.7	107DCN2R7SLB	35.5	5.8	96.4	20	28	101.25	0.3	5.0373	6.6315	1.5544	2.0463
150.0	2.7	157DCN2R7M	42.6	7	108	16	25	151.875	0.55	4.8522	5.6254	1.118	1.2961
200.0	2.7	207DCN2R7M	54	8.3	135	15	20	202.5	0.7	4.927	5.7296	1.0642	1.2376
250.0	2.7	257DCN2R7SDP	61.4	9.1	150	13	18	253.125	0.8	5.3289	6.5109	1.0297	1.2628
350.0	2.7	357DCN2R7M	90.9	12.7	225	10	12	354.375	1	5.0053	6.1388	1.0297	1.2628
400.0	2.7	407DCN2R7Q	93.1	12.7	225	10	12	405	1.2	5.7857	7.016	1.0414	1.263
650.0	2.7	657DCN2R7SZZ	577	62	3370	0.65	0.8	658.125	2.3	3.3	3.879	5.468	6.446

DCN

High pulse power, extends battery life

Capacitance (F)	WVDC	IC PART NUMBER	Weight (grams)	Volume (mL)	Dims DxL LxHxT (mm)	Lead Spacing S (mm)	Lead Diameter d (mm)
0.3	2.7	304DCN2R7SCBB	2.012	0.0138	4x11	1.5	0.45
1.0	2.7	105DCN2R7S	0.94	0.603	8x12	3.5	0.5
1.0	5.5	105DCN5R5M	3.5	3.071	17.5x19.5x9	11.8	0.6
1.5	5.5	155DCN5R5M	4.5	3.701	17.5x23.5x9	8.3	0.6
2.0	2.7	205DCN2R7S	1.15	0.804	8x16	3.5	0.5
2.0	5.5	205DCN5R5M	5	5.558	21x24x11	15.5	0.6
2.5	5.5	255DCN5R5Q	5	5.558	22x24x11	10.5	0.6
3.0	2.7	305DCN2R7Q	1.34	1.005	8x20	3.5	0.6
3.3	2.7	335DCN2R7MGJG	2.09	1.005	10x20	5	0.6
4.7	2.7	475DCN2R7SGJG	2.15	1.571	10x20	5	0.6
5.0	2.7	505DCN2R7Q	2.5	1.571	10x20	5	0.6
10.0	2.7	106DCN2R7M	3.01	2.356	10x30	5	0.6
10.0	2.7	106DCN2R7STJD	3.91	3.068	12.5x25	5	0.6
22.0	2.7	226DCN2R7SKJD	7.54	5.027	16x25	7.5	0.8
25.0	2.7	256DCN2R7Q	7.54	5.027	16x25	7.5	0.8
30.0	2.7	306DCN2R7M	8.08	6.032	16x30	7.5	0.8
50.0	2.7	506DCN2R7Q	13.01	10.179	18x40	7.5	0.8
100.0	2.7	107DCN2R7Q	21.96	17.106	22x45	10	1.5
100.0	2.7	107DCN2R7SLB	20.1	15.268	18x60	7.5	0.8
150.0	2.7	157DCN2R7M	31.3	26.998	25x55	10	1.5
200.0	2.7	207DCN2R7M	41.1	35.343	30x50	10	1.5
250.0	2.7	257DCN2R7SDP	47.5	38.877	30x55	10	1.5
350.0	2.7	357DCN2R7M	70.8	57.727	35x60	10	1.5
400.0	2.7	407DCN2R7Q	70	57.7	35x60	22.5	1.5
650.0	2.7	657DCN2R7SZZ	199	170	60x60	10	1.5



FEATURES

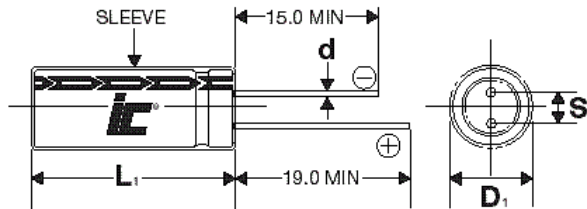
Very fast charge/discharge – High power density – IEC 62391 compliant – Circuit board mountable

APPLICATIONS

Battery backup/ alternative – Pulse power – Energy harvesting – LED Displays – Mechanical actuators – Audio systems

Operating Temperature Range		-25°C to +70°C	
Capacitance Tolerance		-20%/+50% @ 20°C	
Surge Voltage	WVDC	2.3	
	SVDC	2.5	
Maximum Current		See standard part listing	1 second discharge to ½ WVDC
Leakage Current		See standard part listing	72 hours, 25°C
Endurance		1000 hours at rated voltage and 70°C	
		Capacitance Change	±30% of initially measured values
		ESR	≤200% of initially specified values
Life Cycles (25°C) 1 cycle= Charge to WVDC for 20s, constant voltage charging for 10s, discharge to ½ WVDC for 20s, rest for 10 s		25,000 cycles	
		Capacitance Change	±30% of initially measured values
		ESR	≤200% of initially specified values

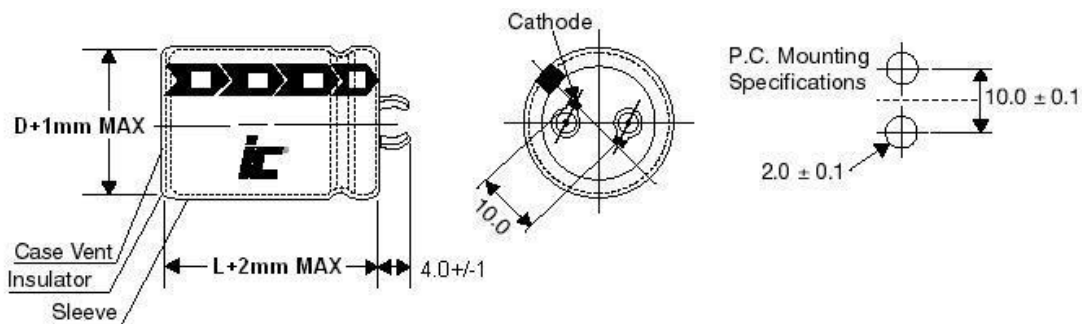
Diameters: ≤22 mm



D	10	16	18	22
S	5.0	7.5	7.5	10
d	0.6	0.8	0.8	1.0

L₁=L+1.5mm
D₁=D+0.5mm
S₁=S±0.5mm

Diameters: >22mm



DCR

Radial lead, high energy

Capacitance (F)	WVDC	IC PART NUMBER	MAX Current (A)	ESR AC 1 kHz (mΩ)	DC ESR (mΩ) 20°C	Max stored energy (mWh)	LC (mA), (72 hrs)	Specific Energy Gravimetric Density (wh/kg)	Specific Energy Volumetric Density (wh/l)	Specific Power Gravimetric Density (kw/kg)	Specific Power Volumetric Density (kw/l)	Weight (grams)	Volume (mL)	Dims DxL (mm)	Lead Spacing (mm)
10.0	2.3	106DCR2R3SGU	2.3	220	400	7.3472	0.05	3.6736	4.6774	0.794	1.0103	2	1.5708	10x20	5
22.0	2.3	226DCR2R3STU	5.34	120	170	16.1639	0.065	4.6852	6.5858	1.082	1.5214	3.45	2.4544	12.5x20	5
30.0	2.3	306DCR2R3STV	5.95	100	160	22.0417	0.085	5.8004	7.1845	1.044	1.2932	3.8	3.068	12.5x25	5
50.0	2.3	506DCR2R3SKV	9.58	60	100	36.7361	0.11	5.248	7.3084	0.9069	1.2629	7	5.0265	16x25	7.5
70.0	2.3	706DCR2R3SKY	11.58	50	85	51.4306	0.15	6.1593	7.3084	0.894	1.0613	8.35	7.0372	16x35	7.5
120.0	2.3	127DCR2R3SLZ	15.68	35	65	88.1667	0.4	6.6291	8.6618	0.734	0.9595	13.3	10.179	18x40	7.5
220.0	2.3	227DCR2R3SNI	23.21	25	45	161.1639	0.9	6.4656	9.0472	0.5643	0.7896	25	17.866	22x47	10
400.0	2.3	407DCR2R3SDG	41.82	20	25	293.8889	2	4.432	9.2393	0.3829	0.7983	66.31	31.809	30x45	10
600.0	2.3	607DCR2R3SDZ	53.08	15	20	440.8333	4	6.5649	10.394	0.473	0.7484	67.15	42.412	30x60	10
800.0	2.3	807DCR2R3SEK	70.77	10	15	587.7778	7.2	7.9926	8.7275	0.5755	0.6284	73.54	67.348	35x70	10



FEATURES

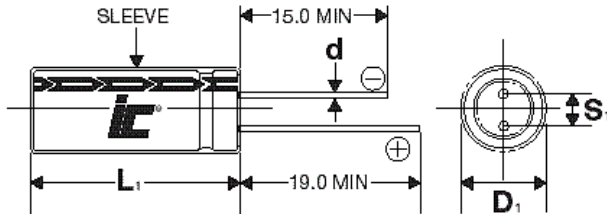
High Capacitance – Very fast charge/discharge – High power density

APPLICATIONS

Battery backup/ alternative – LED Displays – DC/DC converters – Pulse power

Operating Temperature Range		-25°C to +70°C	
Storage Temperature		-40°C to +70°C	
Capacitance Tolerance		+50%/ -20% @ 25°C	
Surge voltage	WVDC	2.5	
	SVDC	2.7	
Maximum Current		See standard part listing	0.5*WVDC/(ESR_{DC}+(1/C))
Leakage Current		See standard part listing	72 hours, 25°C
Life time		1000 hours at rated voltage and 70°C	
		Capacitance change	±30% of initially measured values
		ESR	≤200% of initially specified values
Life cycles (25°C) 1 cycle= Charge to WVDC for 20s, constant voltage charging for 10s, discharge to ½ WVDC for 20s, rest for 10 s		500,000 cycles	
		Capacitance change	±30% of initially measured values
		ESR	≤200% of initially specified values

D= 8 to 18mm



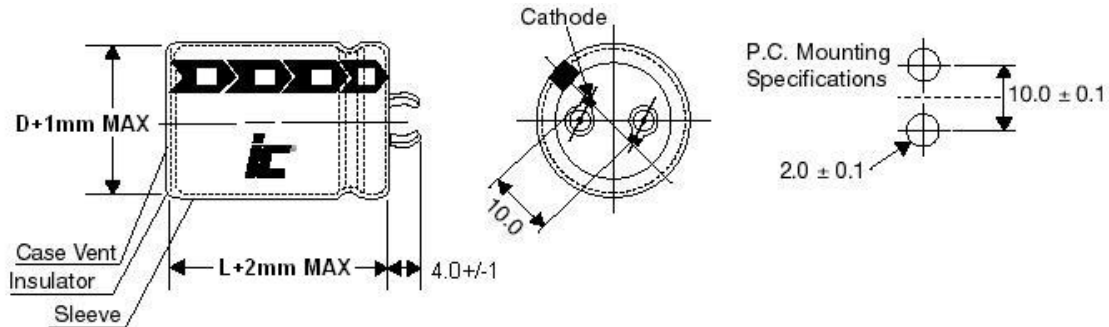
Lead spacing VS. Case diameter					
D	8(L>20)	8(L>20)	10	16	18
S	3.5	3.5	5.0	7.5	7.5
d	0.5	0.6	0.6	0.8	0.8

L₁=L+1.5mm
D₁=D+0.5mm
S₁=S±0.5mm

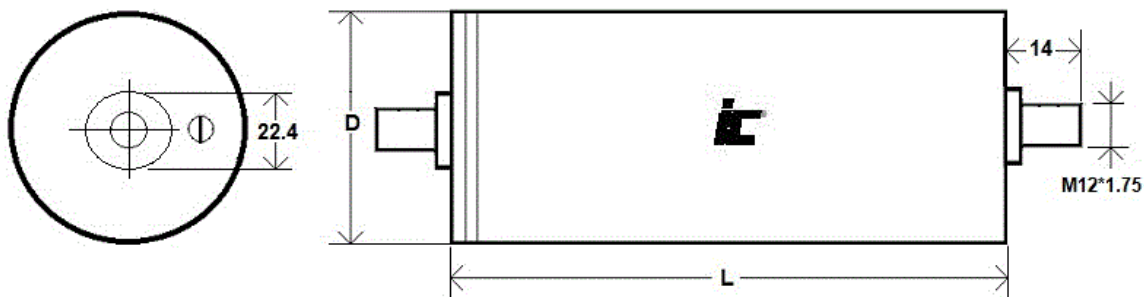


Snap in types

$$20\text{mm} \leq D < 60\text{mm}$$



Capacitance = 500F to 650F



DER

Radial lead, +70°C

Capacitance (F)	WVDC	IC PART NUMBER	MAX Current (A)	ESR AC 1 kHz (mΩ)	DC ESR (mΩ) 20°C	Max stored energy (mWh)	LC (mA), (72 hrs)	Specific Energy Gravimetric Density (wh/kg)	Specific Energy Volumetric Density (wh/l)	Specific Power Gravimetric Density (kw/kg)	Specific Power Volumetric Density (kw/l)	Weight (grams)	Volume (mL)	Dims DxD (mm)	Lead Spacing (mm)
1.0	2.5	105DER2R5SFN	0.63	500	1000	0.868	0.008	1.0117	1.4391	0.8741	1.2434	0.858	0.603	8x12	3.5
2.0	2.5	205DER2R5SFQ	1.19	350	550	1.736	0.01	1.6001	2.1587	1.2568	1.6955	1.085	0.804	8x16	3.5
3.0	2.5	305DER2R5SFU	1.91	200	320	2.604	0.012	2.075	2.5904	1.8675	2.3314	1.255	1.005	8x20	3.5
3.3	2.5	335DER2R5SGU	2.01	200	320	2.865	0.014	1.3641	1.8237	1.1161	1.4921	2.1	1.571	10x20	5
4.7	2.5	475DER2R5SGU	2.49	180	290	4.08	0.016	1.7997	2.5973	1.1408	1.6464	2.267	1.571	10x20	5
7.0	2.5	705DER2R5SGV	3.44	140	220	6.076	0.02	2.3736	3.0947	1.3317	1.7362	2.56	1.963	10x25	5
10.0	2.5	106DER2R5SGW	5	100	150	8.681	0.03	2.7957	3.6841	1.6103	2.1221	3.105	2.356	10x30	5
10.0	2.5	106DER2R5STV	4.81	100	160	8.681	0.03	2.4887	2.8294	1.3439	1.5279	3.488	3.068	12.5x25	5
22.0	2.5	226DER2R5SKV	8.59	60	100	19.097	0.06	2.6639	3.7993	1.0462	1.4921	7.169	5.027	16x25	7.5
30.0	2.5	306DER2R5SKW	12.1	40	70	26.042	0.07	3.1486	4.3174	1.2954	1.7763	8.271	6.032	16x30	7.5
50.0	2.5	506DER2R5SLZ	17.9	30	50	43.403	0.16	3.061	4.2641	1.058	1.4737	13.01	10.179	18x40	7.5
100.0	2.5	107DER2R5SBG	27.8	25	35	86.806	0.3	4.4379	5.0746	1.0955	1.2527	19.56	17.106	22x45	10
100.0	2.5	107DER2R5SLB	27.8	25	35	86.806	0.3	4.1613	5.6854	1.0273	1.4035	20.86	15.268	18x60	7.5
150.0	2.5	157DER2R5SCP	34.1	22	30	130.207	0.55	3.8523	4.8229	0.7396	0.926	33.8	26.998	25x55	10
200.0	2.5	207DER2R5SDH	41.7	20	25	173.611	0.7	4.4075	4.9122	0.7616	0.8488	39.39	35.343	30x50	10
250.0	2.5	257DER2R5SDP	48.1	18	22	217.014	0.8	4.4977	5.582	0.7065	0.8769	48.25	38.877	30x55	10
350.0	2.5	357DER2R5SEZ	70	12	15	303.819	1	4.5818	5.2631	0.754	0.8661	66.31	57.727	35x60	0
500.0	2.5	507DER2R5SEW	89	10	12	434.028	1.3	3.7	4.7486	0.5328	0.6838	117.3	91.4	35x95	0
650.0	2.5	657DER2R5SZZ	502	0.8	0.95	564.236	2.3	2.5	3.326	3.498	4.6537	225.7	169.65	60x60	0



FEATURES

High Voltage – Very Fast Charge/Discharge – High Power Density – Lower ESR
RoHS Compliant

APPLICATIONS

Battery Backup/Alternative – Pulse Power – Energy Harvesting – LED Displays – Mechanical Actuators – Audio Systems

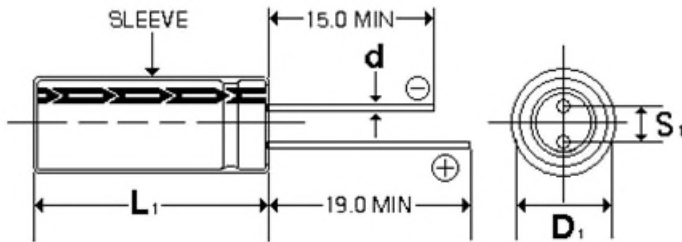
Operating Temperature Range	-40°C to +85°C	
Storage Temperature	-40°C to +70°C	
Capacitance Tolerance @ 20°C	-10% +30% (Q Tolerance) -20% +20% (M Tolerance)	
Voltage (Vdc) (+65°C/+85°C)	3.0V / 2.5V 6.0V / 5.0V 9.0V / 7.5V	
Life Time	1000 hours with rated voltage applied at rated temperature	
	Capacitance change	±30% of initially measured values
	ESR	<400% of initially specified values <200% of initially specified values (100F to 600F)
	Leakage current	≤100% specified maximum value
Shelf Life	1000 hours with no voltage applied at 65°C	
	Capacitance change	±30% of initially measured values
	ESR	<200% of initially specified values
Life Cycles (25°C) 1 cycle= Charge to WVDC for 20s, constant voltage charging for 10s, discharge to ½ WVDC for 20s, rest for 10s	500,000 cycles	
	Capacitance change	±30% of initially measured values
	ESR change	<200% of initially specified values

[RoHS Compliant](#)

810a Recognized



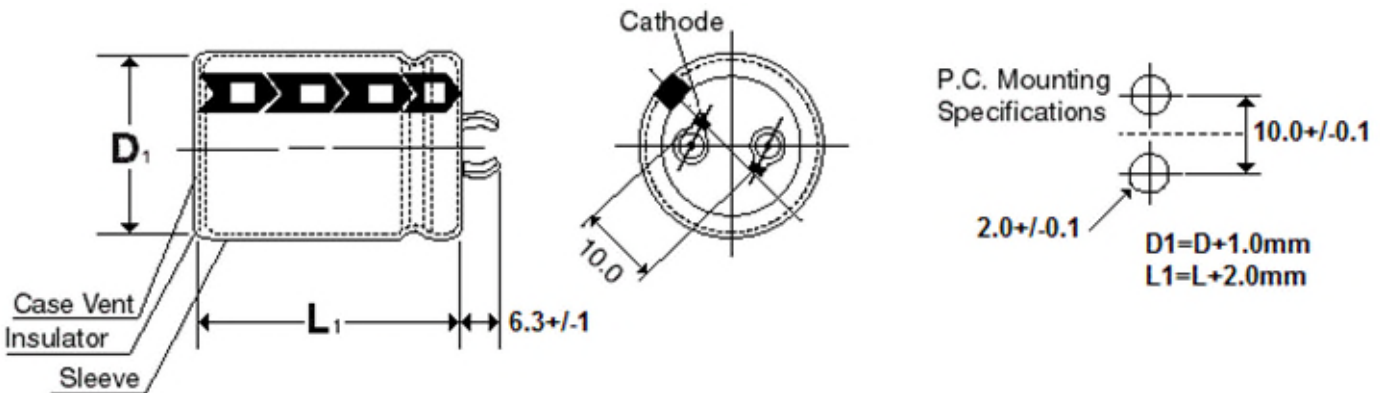
Diameter 6.3 mm to 18 mm



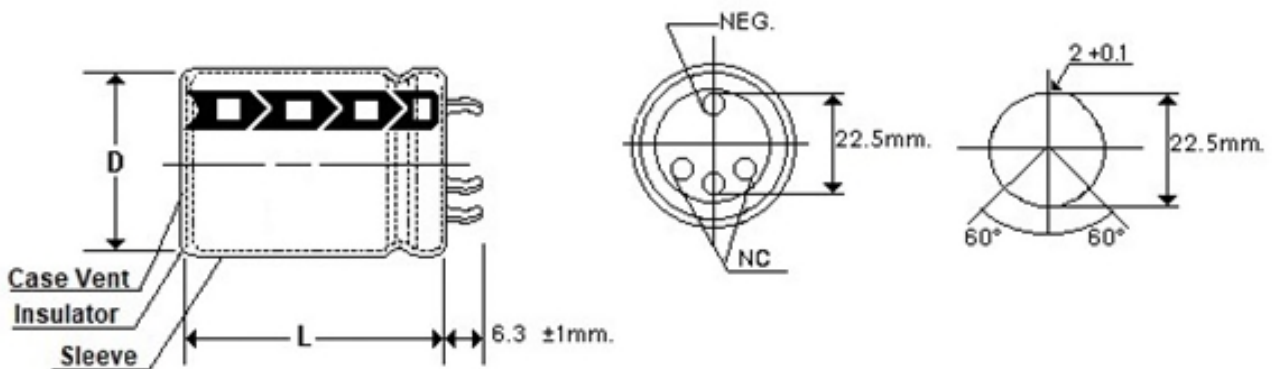
Lead spacing VS. Case diameter						
D	6.3	8	10	12.5	16	18
S	2.5	3.5	5.0	5.0	7.5	7.5
d	0.6	0.6	0.6	0.6	0.8	0.8
α	1.5	1.5	2.0	2.0	2.0	2.0

$L_1 = L + \alpha$ mm
 $D_1 = D + 0.5$ mm
 $S_1 = S \pm 0.5$ mm
 $d = d \pm 0.05$ mm

Diameter > 18 mm to < 35 mm

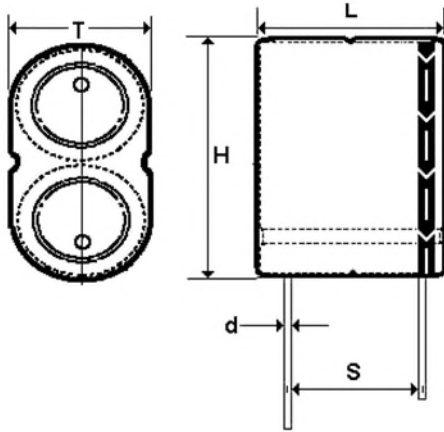


Diameter 35 mm



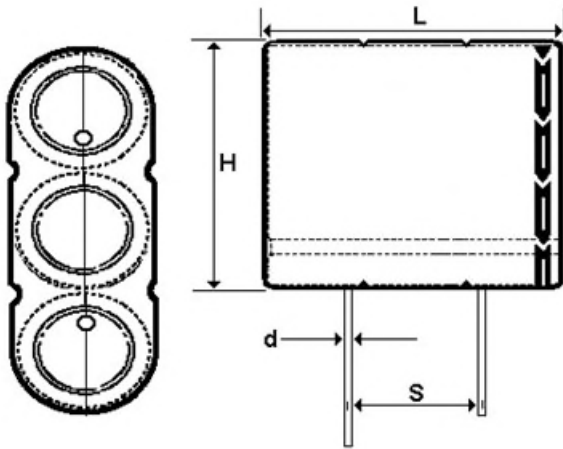


Capacitance 1.5F to 5F 6 Volts



Capacitance (F)	Dims (LxHxT) (mm) +1.0 mm	Lead spacing (S) (mm) ±0.5 mm	Lead diameter (d) (mm) ±0.05mm
1.5	17x22x8.5	12	0.6
2.5	21x22x11	15.5	0.6
3.5	21x27x11	15.5	0.6
5	21x32x11	15.5	0.6

Capacitance 0.33F to 5F 9 Volts



Capacitance (F)	Dims (LxHxT) (mm) ±1.0 mm	Lead spacing (S) (mm) ±1.0 mm	Lead diameter (d) (mm) ±0.05mm
0.33	25x16x8.5	13.5	0.6
0.5	21x20x6.5	11	0.6
0.67	25x16x8.5	13.5	0.6
1	25x22x8.5	13.5	0.6
1.66	31x23x11	16	0.6
3.3	31x27x11	16	0.6
5	39x33x13	21	0.6

DSF

High pulse power, extends battery life

WVDC	Capacitance (F)	IC PART NUMBER	MAX Current (A) (1 Sec.)	Maximum Continuous Current (A) ($\Delta T=15^{\circ}C$)	Short Circuit Current (A)	ESR AC 1 kHz (m Ω)	DC ESR (m Ω) 20 $^{\circ}C$	Max stored energy (mWh)	LC (mA), (72 hrs)	Energy Density (Wh/kg)	Energy Volumetric Density (Wh/l)	Power Density (kW/kg)	Power Volumetric Density (kW/l)
3	1.2	DSF125M3R0	0.98	0.11	4.29	350	700	1.5	0.01	1.88	3.21	1.93	3.3
3	1.5	DSF155M3R0	1.15	0.14	4.6	320	640	1.88	0.008	1.97	3.34	1.78	3.01
3	2.0	DSF205Q3R0	1.9	1.80	9.38	160	320	2.5	0.012	2.5	3.55	3.38	4.8
3	3.0	DSF305Q3R0	3.1	1.4	20	80	150	3.8	0.014	2.67	3.71	5.14	6.6
3	4.0	DSF405M3R0	3.66	0.38	18.75	80	160	5	0.012	3.57	4.97	4.82	6.71
3	5.0	DSF505Q3R0	4.5	2.2	23	70	130	6.3	0.02	2.97	3.98	3.95	5.3
3	7.0	DSF705Q3R0	6.7	2.4	38	55	80	8.8	0.03	3.8	4.46	5.86	6.9
3	10.0	DSF106Q3R0C	5.3	0.89	16.6	90	180	12.5	0.045	4.46	3.36	2.14	3.1
3	10.0	DSF106Q3R0	9.4	3.4	50	40	60	12.5	0.045	3.9	5.3	5.63	7.6
3	11.0	DSF116Q3R0	7.86	1.02	30	50	100	13.75	0.045	4.3	5.83	3.38	4.58
3	15.0	DSF156Q3R0B	10.98	1.40	42	35	70	18.75	0.055	4.57	1.12	3.76	0.9
3	15.0	DSF156Q3R0	10.98	1.40	42.86	35	70	18.75	0.055	3.99	5.09	3.283	4.191
3	25.0	DSF256Q3R0	20	4.4	86	25	35	31.3	0.1	4.46	6.21	4.4	6.1
3	35.0	DSF356Q3R0	19.09	3.13	60	25	50	43.75	0.1	4.97	6.91	2.45	3.41
3	50.0	DSF506Q3R0	35.7	7.10	136	15	22	62.5	0.15	4.88	6.14	3.83	4.8
3	70.0	DSF706Q3R0	27.3	5.9	75	20	40	87.5	0.45	5.18	8.7	1.6	2.7
3	100.0	DSF107Q3R0	68.2	8.3	250	8	12	125	0.3	5.95	7.31	4.3	5.3
3	110.0	DSF117Q3R0	59.8	6.3	188	18	36	137.5	0.21	6.25	9	3.07	4.4
3	200.0	DSF207Q3R0	100	10	300	6	10	250	0.7	6.94	7.07	3	3.1
3	350.0	DSF357Q3R0	236	18.9	857	3	3.5	437.5	1	6.73	7.58	4.75	5.4
3	400.0	DSF407Q3R0	250	18.9	857	3	3.5	500	1	7.35	8.66	4.96	5.9
3	470.0	DSF477Q3R0	267	18.9	857	3	3.5	587.5	1.3	8.05	10.18	4.23	5.4
3	600.0	DSF607Q3R0	290	20	587	3	3.5	750	1.5	9.15	11.1	4.12	5.4
6	1.5	DSF155Q6R0HAE	3.1	1.4	20	180	320	7.5	0.013	2.5	2.52	16.6	16.8
6	2.5	DSF255Q6R0JBE	4.05	2.2	23	160	280	12.5	0.018	3.1	2.51	14.1	11.3
6	3.5	DSF355Q6R0JBF	6.7	2.40	38	130	180	17.5	0.025	3.5	3	13.8	11.9
6	5.0	DSF505Q6R0JBG	9.4	3.4	50	100	140	25	0.04	3.57	3.62	12.9	13
9	0.33	DSF334Q9R0HDL	0.83	0.09	3.75	1200	2400	4	0.2	1.56	2.66	1.56	2.7
9	0.5	DSF504M9R0ZBN	1.14	0.14	4.68	980	1940	5.6	0.2	1.97	3.35	1.97	3.4
9	0.67	DSF674Q9R0HDL	1.82	0.19	9.18	500	980	7.5	0.25	2.5	3.56	2.48	3.6
9	1.0	DSF105Q9R0HDR	3.04	0.29	18.75	320	620	11.2	0.3	2.68	3.71	2.68	3.71
9	1.66	DSF165Q9R0JSE	4.1	0.47	18	260	500	18.7	0.4	2.98	3.98	2.97	4
9	3.3	DSF335Q9R0JSF	5.34	0.88	16.6	290	560	37	0.9	4.46	6.4	4.46	6.4
9	5.0	DSF505Q9R0KZT	10.98	1.4	42.9	125	230	56.2	1.1	3.99	5.1	3.98	5.1

DSF

High pulse power, extends battery life

WVDC	Capacitance (F)	IC PART NUMBER	Weight (grams)	Volume (mL)	Dims DxL LxHxT (mm)	Lead Spacing S (mm)	Lead Diameter d (mm)
3	1.2	DSF125M3R0	0.8	0.47	6.3x15	2.5	0.5
3	1.5	DSF155M3R0	0.95	0.56	6.3x18	2.5	0.5
3	2.0	DSF205Q3R0	1	0.7	8x14	3.5	0.6
3	3.0	DSF305Q3R0	1.4	1.01	8x20	3.5	0.6
3	4.0	DSF405M3R0	1.4	1.01	8x20	3.5	0.6
3	5.0	DSF505Q3R0	2.2	1.57	10x20	5	0.6
3	7.0	DSF705Q3R0	2.3	1.96	10x25	5	0.6
3	10.0	DSF106Q3R0C	2.8	1.96	10x25	5	0.6
3	10.0	DSF106Q3R0	3.2	2.36	10x30	5	0.6
3	11.0	DSF116Q3R0	3.2	2.36	10x30	5	0.6
3	15.0	DSF156Q3R0B	4.1	3.07	12.5x25	5	0.6
3	15.0	DSF156Q3R0	4.7	3.68	12.5x30	5	0.6
3	25.0	DSF256Q3R0	7.4	5.03	16x25	7.5	0.8
3	35.0	DSF356Q3R0	8.8	6.33	16x31.5	7.5	0.8
3	50.0	DSF506Q3R0	13.8	10.18	18x40	7.5	0.8
3	70.0	DSF706Q3R0	16.9	10.05	16x50	7.5	0.8
3	100.0	DSF107Q3R0	20	17.11	22x45	10	1.2
3	110.0	DSF117Q3R0	22	15.27	18x60	7.5	0.8
3	200.0	DSF207Q3R0	36	35.3	30x50	10	1.2
3	350.0	DSF357Q3R0	73	57.73	35x60	22.5	1.2
3	400.0	DSF407Q3R0	73	57.73	35x60	22.5	1.2
3	470.0	DSF477Q3R0	73	57.73	35x60	22.5	1.2
3	600.0	DSF607Q3R0	90	67.35	35x70	22.5	1.2
6	1.5	DSF155Q6R0HAE	3	2.97	17x23x8.5	12	0.6
6	2.5	DSF255Q6R0JBE	5.2	4.97	21x22x11	15.5	0.6
6	3.5	DSF355Q6R0JBF	6	5.83	21x27x11	15.5	0.6
6	5.0	DSF505Q6R0JBG	8.3	6.91	21x32x11	15.5	0.6
9	0.33	DSF334Q9R0HDL	4	3.4	25x16x8.5	13.5	0.6
9	0.5	DSF504M9R0ZBN	5	2.73	21x20x6.5	11	0.6
9	0.67	DSF674Q9R0HDL	4	3.4	25x16x8.5	13.5	0.6
9	1.0	DSF105Q9R0HDR	5.5	4.67	25x22x8.5	13.5	0.6
9	1.66	DSF165Q9R0JSE	7.5	7.84	31x23x11	16	0.6
9	3.3	DSF335Q9R0JSF	11	9.21	31x27x11	16	0.6
9	5.0	DSF505Q9R0KZT	13	16.7	39x33x13	21	0.6



FEATURES

High Voltage – Very Fast Charge/Discharge – High Power Density –
RoHS Compliant

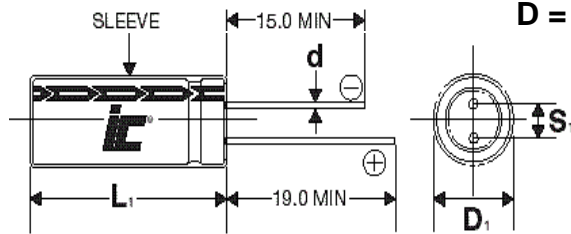
APPLICATIONS

Solar/Wind Energy Storage – Pulse Power – Energy Harvesting –
UPS Systems – Smart Electric Meters

Operating Temperature Range		-15°C to +85°C	
Storage Temperature		-40°C to +70°C	
Capacitance Tolerance @ 25°C		±20%	
Voltage (Vdc) (+70°C/+85°C)	WVDC	3.8	3.8V / 3.5V
	SVDC	4.2	
	Minimum	2.5	
Life Time	1000 hours with rated voltage applied at 70°C		
	Capacitance change	±30% of initially measured values	
	ESR	<200% of initially specified values	
	Leakage current	≤100% specified maximum value	
Shelf Life	1000 hours with no voltage applied at 70°C		
	Capacitance change	±30% of initially measured values	
	ESR	<200% of initially specified values	
Life Cycles (25°C) 1 cycle = Charge / Discharge from 3.8~2.5VDC	500,000 cycles		
	Capacitance change	±30% of initially measured values	
	ESR change	<200% of initially specified values	

[RoHS Compliant](#)

810a Recognized



D = 8 to 16mm

Lead spacing VS. Case diameter				
D	8	10	12.5	16
S	3.5	5.0	5.0	7.5
d	0.6	0.6	0.6	0.8
α	1.5	2.0	2.0	2.0

$L_1 = L + \alpha$ mm
 $D_1 = D + 0.5$ mm
 $S_1 = S \pm 0.5$ mm

Notes

1. Maintain balanced voltages when used in multiple series or parallel connections. (Consult CDE engineering for guidance)
2. When using metal tooling, trim and bend leads separately. Parts store a charge. Avoid shorting leads. (Consult CDE engineering for guidance)
3. Manual soldering temperature should not exceed 350°C and soldering time should not exceed 4 seconds. (Wave and reflow soldering not recommended)

[Full Material Handling Guidelines](#)

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VMF

High pulse power, extends
battery life

WVDC	Capacitance (F)	IC PART NUMBER	Weight (grams)	Volume (mL)	Dims DxL LxHxT (mm)	Lead Spacing S (mm)	Lead Diameter d (mm)
3.8	10.0	VMF106M3R8	1.4	0.703	8x14	3.5	0.6
3.8	25.0	VMF256M3R8	1.8	1.01	8x20	3.5	0.6
3.8	30.0	VMF306M3R8	2.2	1.26	8x25	3.5	0.6
3.8	40.0	VMF406M3R8	2.5	1.26	10x16	5	0.6
3.8	50.0	VMF506M3R8	3.2	1.57	10x20	5	0.6
3.8	70.0	VMF706M3R8	3.8	1.96	10x25	5	0.6
3.8	120.0	VMF127M3R8	5.4	3.07	12.5x25	5	0.6
3.8	220.0	VMF227M3R8	9.4	5.03	16x25	7.5	0.8

WVDC	Capacitance (F)	IC PART NUMBER	MAX Current (A) (1 Sec.)	Maximum Continuous Current (A) ($\Delta T=15^{\circ}C$)	Short Circuit Current (A)	ESR AC 1 kHz (m Ω)	DC ESR (m Ω) 20°C	Max stored energy (mWh)	LC (μA), (72 hrs)
3.8	10.0	VMF106M3R8	0.5	0.05	2.53	500	1500	11	2
3.8	25.0	VMF256M3R8	0.8	0.125	5.85	300	650	28	2.5
3.8	30.0	VMF306M3R8	0.9	0.15	5.43	250	700	34	3
3.8	40.0	VMF406M3R8	1	0.15	6.91	250	550	46	3
3.8	50.0	VMF506M3R8	1.5	0.2	8.44	200	450	57	4
3.8	70.0	VMF706M3R8	3	0.35	15.2	100	250	80	5
3.8	120.0	VMF127M3R8	5	0.6	19	80	200	137	7
3.8	220.0	VMF227M3R8	8	1.1	38	60	100	250	12



FEATURES

High Voltage – Very Fast Charge/Discharge – High Power Density –
RoHS Compliant

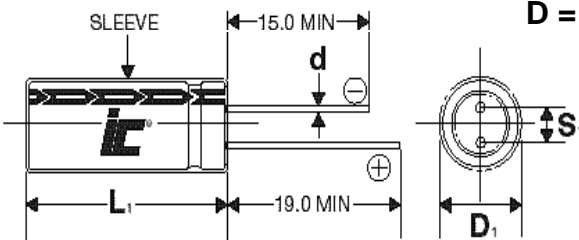
APPLICATIONS

Solar/Wind Energy Storage – Pulse Power – Energy Harvesting –
UPS Systems – Smart Electric Meters

Operating Temperature Range		-25°C to +70°C	
Storage Temperature		-30°C to +70°C	
Capacitance Tolerance @ 25°C		±20%	
Voltage (Vdc)	WVDC	3.8	3.8V
	SVDC	4.2	
	Minimum	2.5	
Life Time	1000 hours with rated voltage applied at 70°C		
	Capacitance change	±30% of initially measured values	
	ESR	<200% of initially specified values	
	Leakage current	≤100% specified maximum value	
Shelf Life	1000 hours with no voltage applied at 60°C		
	Capacitance change	±30% of initially measured values	
	ESR	<200% of initially specified values	
Life Cycles (25°C) 1 cycle = Charge / Discharge from 3.8~2.5VDC	250,000 cycles		
	Capacitance change	±30% of initially measured values	
	ESR change	<200% of initially specified values	

[RoHS Compliant](#)

810a Recognized



D = 10 to 16mm

Lead spacing VS. Case diameter			
D	10	12.5	16
S	5.0	5.0	7.5
d	0.6	0.6	0.8
α	2.0	2.0	2.0

$$L_1 = L + \alpha \text{ mm}$$

$$D_1 = D + 0.5 \text{ mm}$$

$$S_1 = S + 0.5 \text{ mm}$$

Notes:

- Maintain balanced voltages when used in multiple series or parallel connections. (Consult CDE engineering for guidance)
- When using metal tooling, trim and bend leads separately. Parts store a charge. Avoid shorting leads. (Consult CDE engineering for guidance)
- Manual soldering temperature should not exceed 350°C and soldering time should not exceed 4 seconds. (Wave and reflow soldering not recommended)

[Full Material Handling Guidelines](#)

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VPF

High pulse power, extends battery life

WVDC	Capacitance (F)	IC PART NUMBER	Weight (grams)	Volume (mL)	Dims DxL LxHxT (mm)	Lead Spacing S (mm)	Lead Diameter d (mm)
3.8	40.0	VPF406M3R8	2.5	1.26	10x16	5	0.6
3.8	50.0	VPF506M3R8	2.1	1.57	10x20	5	0.6
3.8	70.0	VPF706M3R8	2.3	1.96	10x25	5	0.6
3.8	120.0	VPF127M3R8	3.91	3.07	12.5x25	5	0.6
3.8	220.0	VPF227M3R8	7	5.03	16x25	7.5	0.8

WVDC	Capacitance (F)	IC PART NUMBER	MAX Current (A) (1 Sec.)	Maximum Continuous Current (A) ($\Delta T=15^{\circ}C$)	Short Circuit Current (A)	ESR AC 1 kHz (m Ω)	DC ESR (m Ω) 20°C	Max stored energy (mWh)	LC (μA), (72 hrs)
3.8	40.0	VPF406M3R8	1	0.15	6.9	250	550	46	4
3.8	50.0	VPF506M3R8	2.8	0.5	8.4	200	450	57	6
3.8	70.0	VPF706M3R8	4.9	0.7	15.2	100	250	80	8
3.8	120.0	VPF127M3R8	6.2	1.2	19	80	200	137	12
3.8	220.0	VPF227M3R8	12.4	2.2	38	60	100	250	25

Type EDC, 70 °C Long Life Electric Double Layer Supercapacitor



Type EDC, 70 °C electric double layer supercapacitors offer high capacitance values in a thru hole stacked coin type package. Primarily designed for integrated circuit voltage backup, the capacitors can also be used to deliver the initial power from batteries.

Highlights

- Long life
- High discharge current
- 70 °C Operating temperature

Specifications

Operating Temperature Range	-25 °C to +70 °C
Rated Voltage Range	5.5 Vdc to 6.3 Vdc
Capacitance Range	0.047 F to 1.5 F
Life, Moisture and Temperature Characteristics	After the following procedures have been performed, measure the capacitance and ESR at +20 °C.
Life Test:	Apply the max. operating voltage for 1000 h at +70 °C
Capacitance Change	±30% of the initial measured value
ESR	≤ 4 times the initial specified value
Shelf Life:	Subject the capacitor to 1000 hours without voltage at +70 °C.
Capacitance Change	±30% of the initial measured value
ESR	≤ 4 times the initial specified value
Moisture Resistance:	Subject the capacitor to 240 hours at +40 °C at 90 to 95% RH without voltage.
Capacitance Change	±30% of the initial measured value
ESR	≤ 3 times the initial specified value
Temperature Cycling	Stabilize the capacitor at each of the following temperatures for 1 hour in sequence, and then measure the capacitance and ESR at that temperature.
	1. +20 °C 2. -25 °C 3. +20 °C 4. +70 °C 5. +20 °C
Capacitance Change (at -25 °C)	±30% of the initial measured value
ESR (at -25 °C)	≤ 5 times the initial measured value
Capacitance Change (at +85 °C)	±30% of the initial measured value
ESR (at +85 °C)	≤ 4 times the initial measured value
Capacitance Change (Step 5 at +20 °C)	±10% of the initial measured value
ESR (Step 5 at +20 °C)	meets the initial specified value
RoHS Compliant without Exemptions	

Type EDC, 70 °C Long Life Electric Double Layer Supercapacitor Ratings

5.5 VDC					
CDE Part Number	Cap F	ESR 1 kHz Ω	Case Code		
			V Type	H Type	C Type
EDC473Z5R5*	0.047	120	V1	H1	C1
EDC104Z5R5*	0.1	75	V1	H1	C1
EDC224Z5R5*	0.22	75	V1	H1	C1
EDC334Z5R5*	0.33	75	V1	H1	C1
EDC474Z5R5*	0.47	50	V1	H1	C1
EDC105Z5R5*	1	30	V2	H2	C2
EDC155Z5R5*	1.5	30	V2	H2	C2

*V, H, or C

6.3 VDC			
CDE Part Number	Cap F	ESR 1 kHz Ω	Case Code
EDC104Z6R3C	0.1	120	C3
EDC224Z6R3C	0.22	75	C3
EDC334Z6R3C	0.33	75	C3
EDC474Z6R3C	0.47	50	C4
EDC684Z6R3C	0.68	50	C4
EDC105Z6R3C	1	30	C4

Part Numbering System

EDC
Series

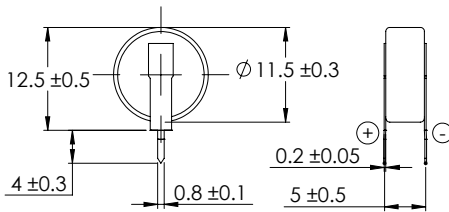
224
Capacitance
224 = 0.22 F
473 = 0.047 F
105 = 1.0 F

Z
Tolerance
-20/+80%

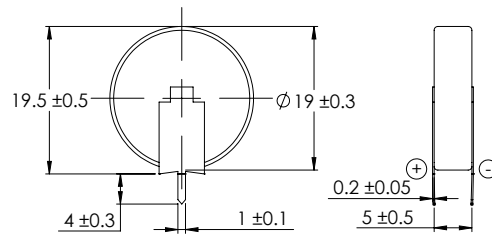
5R5
Voltage
5R5 = 5.5 Vdc

C
Case Style
C = Radial
H = Horizontal Style
V = Vertical Style

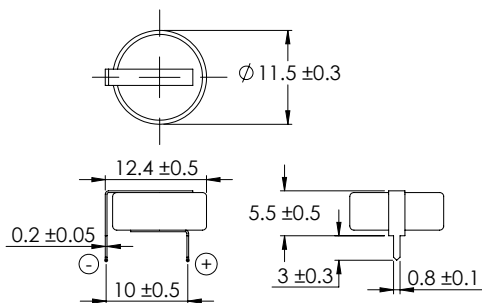
EDC Outline Drawing



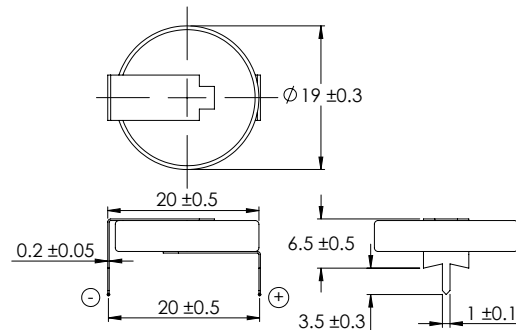
V1



V2



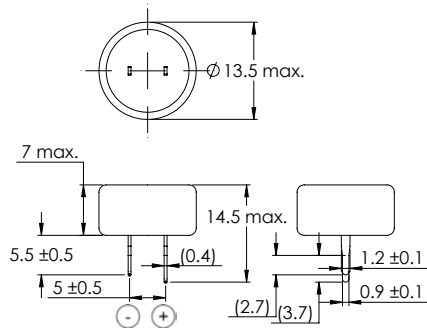
H1



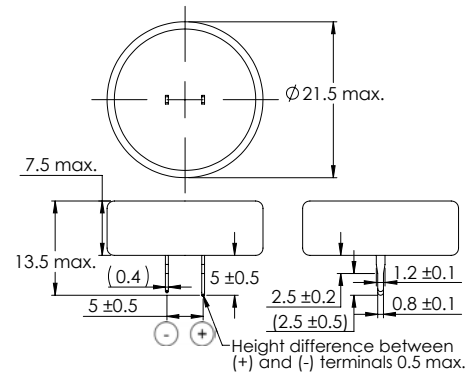
H2

Type EDC, 70 °C Long Life Electric Double Layer Supercapacitor

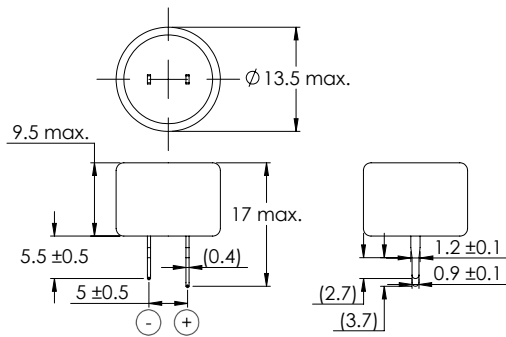
EDC Outline Drawing



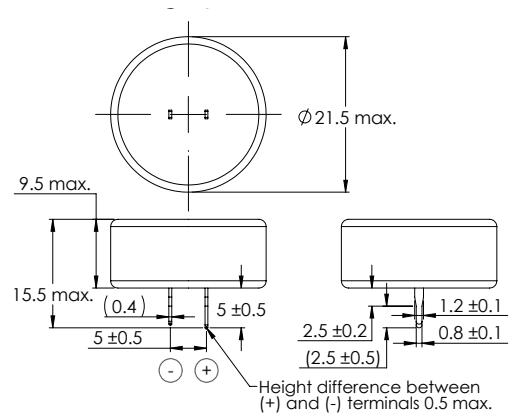
C1



C2



C3



C4

Recommended Soldering Procedures

Hand Soldering	Use a 30W iron with a max. temperature of 350 °C for 3 seconds.
Wave Soldering	Pre-heat circuit board to a surface temp of 110 °C for a max. of 60 seconds, with a max. component temperature of 100 °C. Min. printed circuit board thickness of 0.8 mm. Recommended solder bath temperature of 240 °C with a max. dipping time of 5 seconds.

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Type EDS, 85 °C Long Life Electric Double Layer Supercapacitor



Type EDS, 85 °C electric double layer supercapacitors offer high capacitance values in a thru hole stacked coin type package. Primarily designed for integrated circuit voltage backup, the capacitors can also be used to deliver the initial power from batteries.

Highlights

- Long life
- High discharge current
- 85 °C Operating temperature

Specifications

Operating Temperature Range	-25 °C to +85 °C
Rated Voltage Range	3.6 Vdc to 5.5 Vdc
Capacitance Range	0.047 F to 1.5 F
Life, Moisture and Temperature Characteristics	After the following procedures have been performed, measure the capacitance and ESR at +20 °C.
Life Test:	Apply the max. operating voltage for 1000 h at +85 °C
Capacitance Change	±30% of the initial measured value
ESR	≤ 4 times the initial specified value
Shelf Life:	Subject the capacitor to 1000 hours without voltage at +85 °C.
Capacitance Change	±30% of the initial measured value
ESR	≤ 4 times the initial specified value
Moisture Resistance:	Subject the capacitor to 240 hours at +40 °C at 90 to 95% RH without voltage.
Capacitance Change	±10% of the initial measured value
ESR	meets the initial specified value
Temperature Cycling	Stabilize the capacitor at each of the following temperatures for 1 hour in sequence, and then measure the capacitance and ESR at that temperature.
	1. +20 °C 2. -25 °C 3. +20 °C 4. +85 °C 5. +20 °C
Capacitance Change (at -25 °C)	±30% of the initial measured value
ESR (at -25 °C)	≤ 5 times the initial measured value
Capacitance Change (at +85 °C)	±30% of the initial measured value
ESR (at +85 °C)	≤ 4 times the initial measured value
Capacitance Change (Step 5 at +20 °C)	±10% of the initial measured value
ESR (Step 5 at +20 °C)	meets the initial specified value
RoHS Compliant without Exemptions	

Type EDS, 85 °C Long Life Electric Double Layer Supercapacitor

3.6 VDC					
CDE Part Number	Cap F	ESR 1 kHz Ω	Case Code		
			V Type	H Type	C Type
EDS473Z3R6*	0.047	120	V1	H1	C1
EDS104Z3R6*	0.1	75	V1	H1	C1
EDS224Z3R6*	0.22	75	V1	H1	C1
EDS334Z3R6*	0.33	75	V1	H1	C1
EDS474Z3R6*	0.47	50	V1	H1	C1
EDS105Z3R6*	1	30	V2	H2	C2
EDS155Z3R6*	1.5	30	V2	H2	C2

*V, H, or C

5.5 VDC			
CDE Part Number	Cap F	ESR 1 kHz Ω	Case Code
EDS104Z5R5C	0.1	120	C3
EDS224Z5R5C	0.22	75	C3
EDS334Z5R5C	0.33	75	C3
EDS474Z5R5C	0.47	50	C4
EDS684Z5R5C	0.68	50	C4
EDS105Z5R5C	1	30	C4

Part Numbering System

EDS

Series

224

Capacitance

224 = 0.22 F
473 = 0.047 F
105 = 1.0 F

Z

Tolerance

-20/+80%

5R5

Voltage

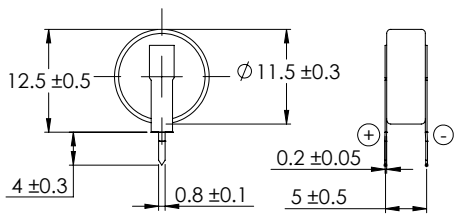
5R5 = 5.5 Vdc

C

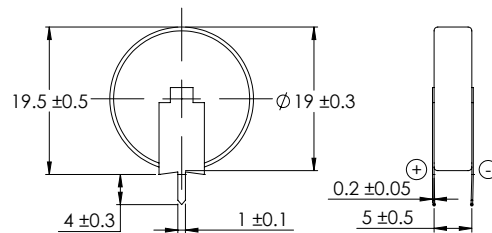
Case Style

C = Radial
H = Horizontal Style
V = Vertical Style

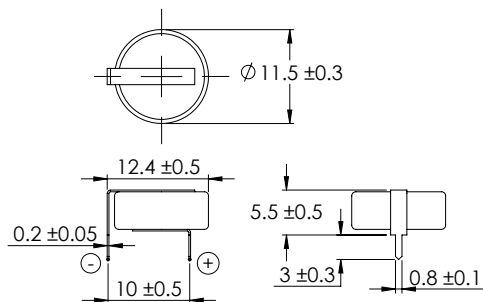
EDS Outline Drawing



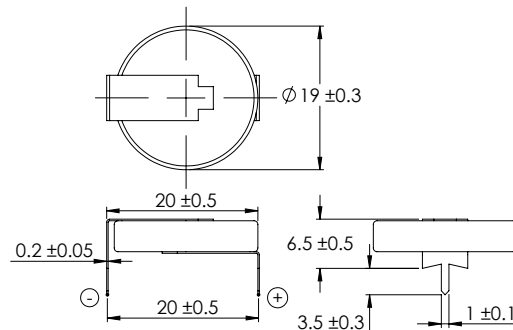
V1



V2



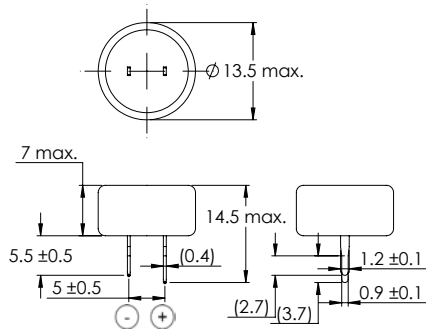
H1



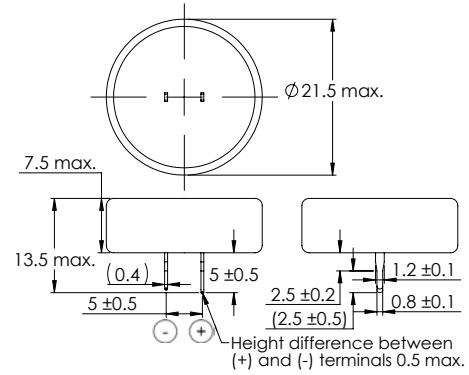
H2

Type EDS, 85 °C Long Life Electric Double Layer Supercapacitor

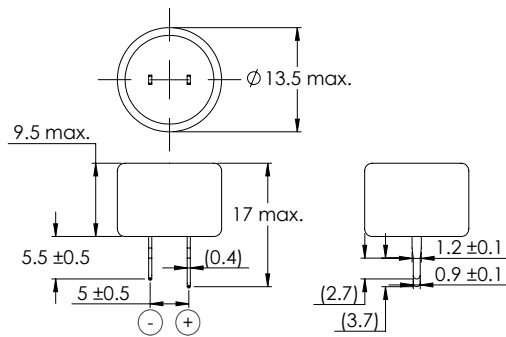
EDS Outline Drawing



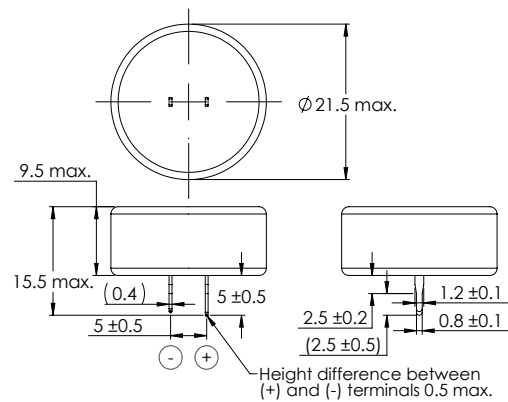
C1



C2



C3



C4

Recommended Soldering Procedures

Hand Soldering	Use a 30W iron with a max. temperature of 350 °C for 3 seconds.
Wave Soldering	Pre-heat circuit board to a surface temp of 110 °C for a max. of 60 seconds, with a max. component temperature of 100 °C. Min. printed circuit board thickness of 0.8 mm. Recommended solder bath temperature of 240 °C with a max. dipping time of 5 seconds.

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