

SMT Aluminum Electrolytic Capacitors –55 °C to 105 °C — Long Life

Long Life Filtering, Bypassing, Power Supply Decoupling



Type AHA Capacitors deliver twice the life of many SMT aluminum capacitor types, and they handle high levels of ripple current. The AHA can handle the ripple current of Type AVS at 20 °C higher temperature. The vertical cylindrical cases facilitate automatic mounting and reflow soldering and Type AHA offers a significant cost savings over tantalum capacitors.

Highlights

- ◆ +105 °C, Up to 2000 Hour Load Life
- ◆ Capacitance Range: 0.1 μ F to 1500 μ F
- ◆ Voltage Range: 6.3 Vdc to 100 Vdc

Specifications

Operating Temperature:	–55 °C to +105 °C
Rated Voltage:	6.3, 10, 16, 25, 35, 50, 63 & 100 Vdc
Capacitance:	0.1 μ F to 1500 μ F
D.F. (@ 20 °C):	See Ratings Table
Capacitance Tolerance:	20% @ 120Hz and +20 °C
Leakage Current:	0.01 CV or 3 μ A @ +20 °C after two minutes (whichever is greater)
Ripple Current Multipliers:	Frequency

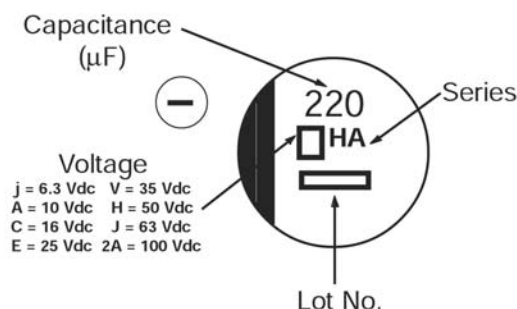
50/60 Hz	120 Hz	1 kHz	10 kHz & up
0.7	1	1.3	1.7

Load Life: 1000 h @ +105 °C, 4.0 - 6.3 mm dia.
 2000 h @ +105 °C, 8.0 - 10.0 mm dia.
 Δ Capacitance $\pm$ 20%
 DF: $\leq$ 200% of limit
 DCL: $\leq$ 100% of limit

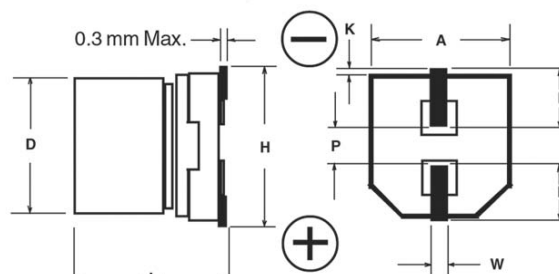
Shelf Life: 1000 h @ +105 °C, 4.0 - 6.3 mm dia.
 Δ Capacitance $\pm$ 20%
 DF: $\leq$ 200% of limit
 DCL: $\leq$ 100% of limit

Maximum Impedance Ratio								
W.V. Vdc	6.3	10	16	25	35	50	63	100
–25 °C +20 °C	4	3	2	2	2	2	3	3
–40 °C +20 °C	8	6	4	4	3	3	4	4

AHA Series Marking



Outline Drawing



Case Dimensions

Case Code	D $\pm$ 0.5	L	A $\pm$ 0.2	H (max)	I (ref)	W	P (ref)	K
B	4	5.4 +1.1, -1.2	4.3	5.5	1.8	0.65 $\pm$ 0.1	1	0.35 + 0.15/-0.20
C	5	5.4 +1.1, -1.2	5.3	6.5	2.2	0.65 $\pm$ 0.1	1.5	0.35 + 0.15/-0.20
D	6.3	5.4 +1.1, -1.2	6.6	7.8	2.4	0.65 $\pm$ 0.1	1.8	0.35 + 0.15/-0.20
X	6.3	7.9 $\pm$ 3	6.6	7.8	2.6	0.65 $\pm$ 0.1	1.8	0.35 + 0.15/-0.20
E	8	6.2 $\pm$ 3	8.3	9.5	3.4	0.65 $\pm$ 0.1	2.2	0.35 + 0.15/-0.20
F	8	10.2 $\pm$ 3	8.3	10	3.4	0.90 $\pm$ 0.2	3.1	0.70 $\pm$ 0.20
G	10	10.2 $\pm$ 3	10.3	12	3.5	0.90 $\pm$ 0.2	4.6	0.70 $\pm$ 0.20

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Ratings

Cap (µF)	Catalog Part Number	Max DCL 2 min. (µA)	Max DF 120 Hz 20 °C	Max ESR 120 Hz 20 °C (Ω)	Max Ripple Current 120 Hz 105 °C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
6.3 Vdc (8 Vdc Surge)								
22.0	AHA226M06B12T	3.0	0.30	22.6	29	B	4 x 5.4	2000
33.0	AHA336M06B12T	3.0	0.35	17.6	29	B	4 x 5.4	2000
47.0	AHA476M06B12T	3.0	0.35	12.3	36	B	4 x 5.4	2000
47.0	AHA476M06C12T	3.0	0.30	10.6	46	C	5 x 5.4	1000
100.0	AHA107M06C12T	6.3	0.35	5.8	47	C	5 x 5.4	1000
100.0	AHA107M06D16T	6.3	0.30	5.0	71	D	6.3 x 5.4	1000
220.0	AHA227M06D16T	13.9	0.35	2.6	74	D	6.3 x 5.4	1000
330.0	AHA337M06X16T	20.8	0.30	1.5	105	X	6.3 x 7.9	900
330.0	AHA337M06F24T	20.8	0.35	1.8	230	F	8 x 10.2	500
470.0	AHA477M06F24T	29.6	0.35	1.2	300	F	8 x 10.2	500
1000.0	AHA108M06F24T	63.0	0.35	0.6	300	F	8 x 10.2	500
1000.0	AHA108M06G24T	63.0	0.35	0.6	400	G	10 x 10.2	500
1500.0	AHA158M06G24T	94.5	0.35	0.4	480	G	10 x 10.2	500
10 Vdc (13 Vdc Surge)								
22.0	AHA226M10B12T	3.0	0.30	22.6	28	B	4 x 5.4	2000
33.0	AHA336M10B12T	3.3	0.30	15.1	29	B	4 x 5.4	2000
33.0	AHA336M10C12T	3.3	0.22	11.1	43	C	5 x 5.4	1000
47.0	AHA476M10C12T	4.7	0.30	10.6	43	C	5 x 5.4	1000
100.0	AHA107M10D16T	10.0	0.30	5.0	70	D	6.3 x 5.4	1000
100.0	AHA107M10E16T	10.0	0.26	4.3	110	E	8 x 6.2	1000
220.0	AHA227M10X16T	22.0	0.22	1.7	105	X	6.3 x 7.9	900
220.0	AHA227M10F24T	22.0	0.26	2.0	160	F	8 x 10.2	500
470.0	AHA477M10F24T	47.0	0.26	0.9	200	F	8 x 10.2	500
470.0	AHA477M10G24T	47.0	0.26	0.9	270	G	10 x 10.2	500
1000.0	AHA108M10G24T	100.0	0.26	0.4	580	G	10 x 10.2	500
16 Vdc (20 Vdc Surge)								
10.0	AHA106M16B12T	3.0	0.16	26.5	28	B	4 x 5.4	2000
22.0	AHA226M16B12T	3.5	0.26	19.6	28	B	4 x 5.4	2000
22.0	AHA226M16C12T	3.5	0.16	12.1	39	C	5 x 5.4	1000
33.0	AHA336M16C12T	5.3	0.26	13.1	35	C	5 x 5.4	1000
47.0	AHA476M16C12T	7.5	0.26	9.2	39	C	5 x 5.4	1000
47.0	AHA476M16D16T	7.5	0.16	5.6	70	D	6.3 x 5.4	1000
100.0	AHA107M16D16T	16.0	0.26	4.3	70	D	6.3 x 5.4	1000
220.0	AHA227M16X16T	35.2	0.16	1.2	105	X	6.3 x 7.9	900
220.0	AHA227M16F24T	35.2	0.20	1.5	150	F	8 x 10.2	500
220.0	AHA227M16G24T	35.2	0.20	1.5	210	G	10 x 10.2	500
330.0	AHA337M16F24T	52.8	0.20	1.0	170	F	8 x 10.2	500
330.0	AHA337M16G24T	52.8	0.20	1.0	230	G	10 x 10.2	500
470.0	AHA477M16F24T	75.2	0.20	0.7	190	F	8 x 10.2	500
470.0	AHA477M16G24T	75.2	0.20	0.7	340	G	10 x 10.2	500
25 Vdc (31 Vdc Surge)								
4.7	AHA475M25B12T	3.0	0.14	49.4	22	B	4 x 5.4	2000
10.0	AHA106M25B12T	3.0	0.20	33.2	22	B	4 x 5.4	2000
10.0	AHA106M25C12T	3.0	0.14	23.2	28	C	5 x 5.4	1000
22.0	AHA226M25C12T	5.5	0.20	15.1	35	C	5 x 5.4	1000
22.0	AHA226M25D16T	5.5	0.14	10.6	55	D	6.3 x 5.4	1000
33.0	AHA336M25C12T	8.3	0.20	10.0	42	C	5 x 5.4	1000
33.0	AHA336M25D16T	8.3	0.14	7.0	65	D	6.3 x 5.4	1000
47.0	AHA476M25D16T	11.8	0.20	7.1	70	D	6.3 x 5.4	1000
47.0	AHA476M25E16T	11.8	0.16	5.6	91	E	8 x 6.2	1000
100.0	AHA107M25E16T	25.0	0.16	2.7	91	E	8 x 6.2	1000
100.0	AHA107M25F24T	25.0	0.16	2.7	130	F	8 x 10.2	500
220.0	AHA227M25F24T	55.0	0.16	1.2	160	F	8 x 10.2	500
220.0	AHA227M25G24T	55.0	0.16	1.2	190	G	10 x 10.2	500
330.0	AHA337M25F24T	82.5	0.16	0.8	180	F	8 x 10.2	500
330.0	AHA337M25G24T	82.5	0.16	0.8	340	G	10 x 10.2	500
470.0	AHA477M25G24T	117.5	0.16	0.6	360	G	10 x 10.2	500

SMT & Chip
Capacitors

Type AHA

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Cap (µF)	Catalog Part Number	Max DCL 2 min. (µA)	Max DF 120 Hz 20 °C	Max ESR 120 Hz 20 °C (Ω)	Max Ripple Current 120 Hz 105 °C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
35 Vdc (44 Vdc Surge)								
4.7	AHA475M35B12T	3.0	0.12	42.3	22	B	4 x 5.4	2000
10.0	AHA106M35B12T	3.6	0.16	26.5	22	B	4 x 5.4	2000
10.0	AHA106M35C12T	3.6	0.12	19.9	30	C	5 x 5.4	1000
22.0	AHA226M35C12T	7.7	0.16	12.1	35	C	5 x 5.4	1000
22.0	AHA226M35D16T	7.7	0.12	9.0	60	D	6.3 x 5.4	1000
33.0	AHA336M35D16T	11.6	0.16	8.0	42	D	6.3 x 5.4	1000
33.0	AHA336M35E16T	11.6	0.14	7.0	84	E	8 x 6.2	1000
47.0	AHA476M35E16T	16.5	0.14	4.9	84	E	8 x 6.2	1000
47.0	AHA476M35F24T	16.5	0.14	4.9	98	F	8 x 10.2	500
100.0	AHA107M35X16T	35.0	0.12	2.0	84	X	6.3 x 7.9	900
100.0	AHA107M35F24T	35.0	0.14	2.3	120	F	8 x 10.2	500
100.0	AHA107M35G24T	35.0	0.14	2.3	160	G	10 x 10.2	500
220.0	AHA227M35F24T	77.0	0.14	1.1	170	F	8 x 10.2	500
220.0	AHA227M35G24T	77.0	0.14	1.1	210	G	10 x 10.2	500
330.0	AHA337M35G24T	115.5	0.14	0.7	250	G	10 x 10.2	500
50 Vdc (63 Vdc Surge)								
0.1	AHA104M50B12T	3.0	0.12	1990.0	1	B	4 x 5.4	2000
0.2	AHA224M50B12T	3.0	0.12	905.0	2	B	4 x 5.4	2000
0.3	AHA334M50B12T	3.0	0.12	603.0	3	B	4 x 5.4	2000
0.5	AHA474M50B12T	3.0	0.12	424.0	5	B	4 x 5.4	2000
1.0	AHA105M50B12T	3.0	0.12	199.0	10	B	4 x 5.4	2000
2.2	AHA225M50B12T	3.0	0.12	90.5	16	B	4 x 5.4	2000
3.3	AHA335M50B12T	3.0	0.12	60.3	16	B	4 x 5.4	2000
4.7	AHA475M50C12T	3.0	0.12	42.4	23	C	5 x 5.4	1000
10.0	AHA106M50D16T	5.0	0.12	19.9	35	D	6.3 x 5.4	1000
22.0	AHA226M50E16T	11.0	0.12	9.0	70	E	8 x 6.2	1000
33.0	AHA336M50X16T	16.5	0.12	6.0	60	X	6.3 x 7.9	900
33.0	AHA336M50E16T	16.5	0.12	6.0	70	E	8 x 6.2	1000
33.0	AHA336M50F24T	16.5	0.12	6.0	91	F	8 x 10.2	500
47.0	AHA476M50X16T	23.5	0.12	4.2	63	X	6.3 x 7.9	900
47.0	AHA476M50F24T	23.5	0.12	4.2	95	F	8 x 10.2	500
47.0	AHA476M50G24T	23.5	0.12	4.2	100	G	10 x 10.2	500
100.0	AHA107M50F24T	50.0	0.12	2.0	110	F	8 x 10.2	500
100.0	AHA107M50G24T	50.0	0.12	2.0	120	G	10 x 10.2	500
220.0	AHA227M50G24T	110.0	0.12	0.9	150	G	10 x 10.2	500
63 Vdc (75 Vdc Surge)								
10.0	AHA106M63E16T	6.3	0.18	29.9	25	E	8 x 6.2	1000
22.0	AHA226M63E16T	13.9	0.18	13.6	30	E	8 x 6.2	1000
22.0	AHA226M63F24T	13.9	0.18	13.6	30	F	8 x 10.2	500
33.0	AHA336M63G24T	20.8	0.18	9.0	45	G	10 x 10.2	500
47.0	AHA476M63F24T	29.6	0.18	6.3	50	F	8 x 10.2	500
47.0	AHA476M63G24T	29.6	0.18	6.3	50	G	10 x 10.2	500
100 Vdc (125 Vdc Surge)								
3.3	AHA335M2AE16T	3.3	0.18	90.5	30	E	8 x 6.2	1000
4.7	AHA475M2AE16T	4.7	0.18	63.5	30	E	8 x 6.2	1000
4.7	AHA475M2AF24T	4.7	0.18	63.5	50	F	8 x 10.2	500
10.0	AHA106M2AF24T	10.0	0.18	29.8	55	F	8 x 10.2	500
22.0	AHA226M2AF24T	22.0	0.18	13.6	55	F	8 x 10.2	500
22.0	AHA226M2AG24T	22.0	0.18	13.6	60	G	10 x 10.2	500
33.0	AHA336M2AG24T	33.0	0.18	9.0	65	G	10 x 10.2	500

SMT & Chip
Capacitors

Part Numbering System

AHA Series	106 Capacitance	M Capacitance Tolerance	16 Voltage	B Case Code	12T Packaging Information
	104 = 0.1 µF 105 = 1.0 µF 106 = 10.0 µF 107 = 100.0 µF 108 = 1000.0 µF	M = ±20%	06 = 6.3 Vdc 35 = 35 Vdc 10 = 10 Vdc 50 = 50 Vdc 16 = 16 Vdc 63 = 63 Vdc 25 = 25 Vdc 2A = 100 Vdc		12 = Carrier Tape Width (mm) T = Tape & Reel B = Bulk

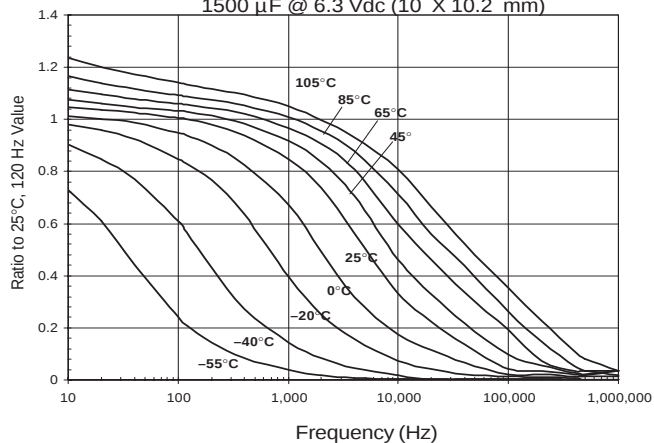
Type AHA

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Typical Performance Curves

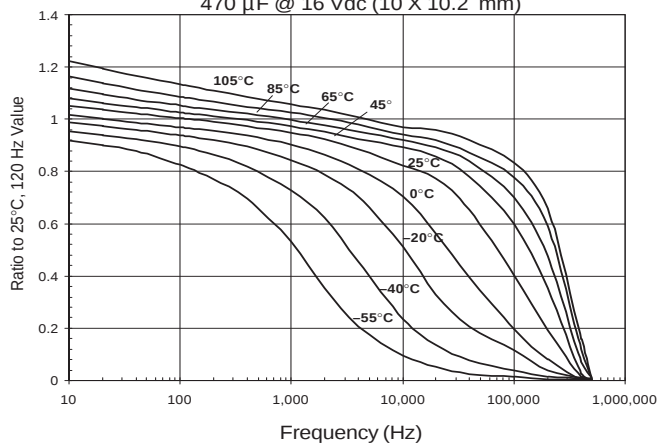
Capacitance vs. Temperature & Frequency

1500 μ F @ 6.3 Vdc (10 X 10.2 mm)



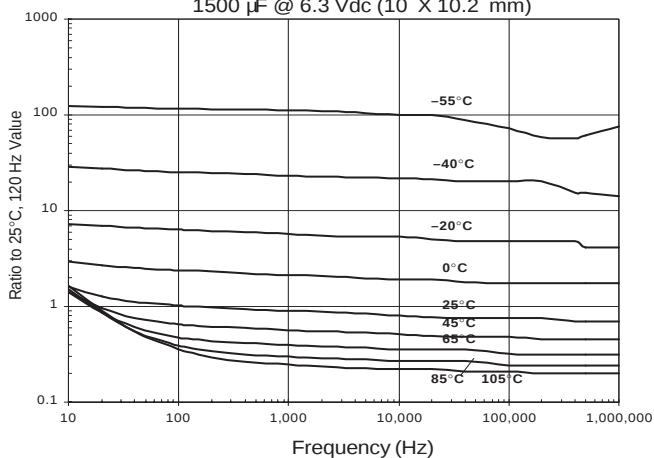
Capacitance vs. Temperature & Frequency

470 μ F @ 16 Vdc (10 X 10.2 mm)



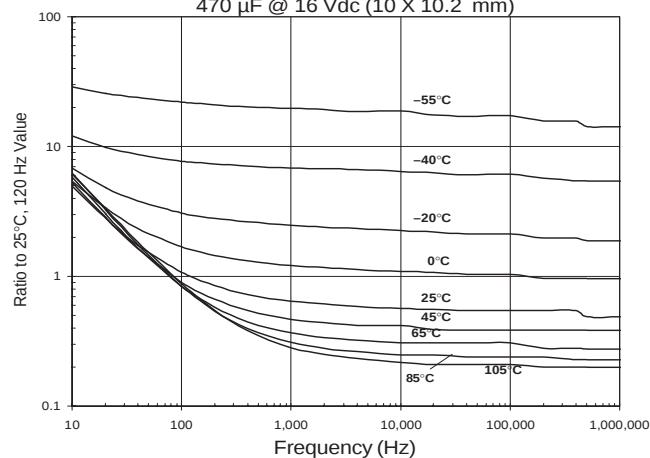
ESR vs. Temperature and Frequency

1500 μ F @ 6.3 Vdc (10 X 10.2 mm)



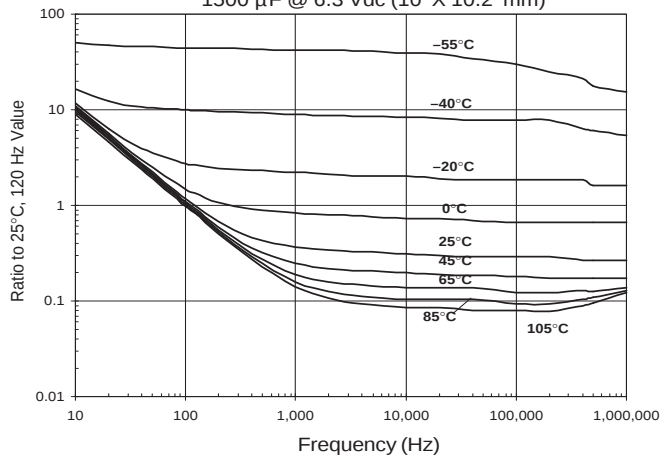
ESR vs. Temperature and Frequency

470 μ F @ 16 Vdc (10 X 10.2 mm)



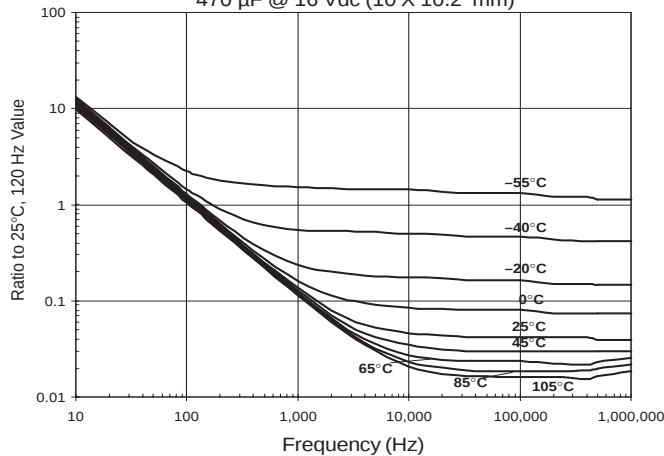
Impedance vs. Temperature and Frequency

1500 μ F @ 6.3 Vdc (10 X 10.2 mm)



Impedance vs. Temperature and Frequency

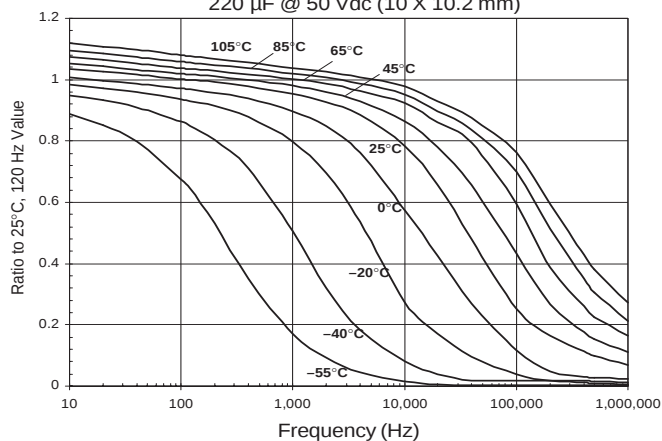
470 μ F @ 16 Vdc (10 X 10.2 mm)



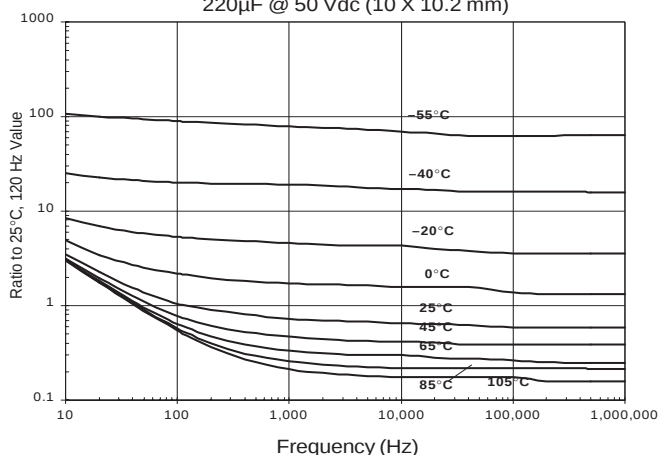
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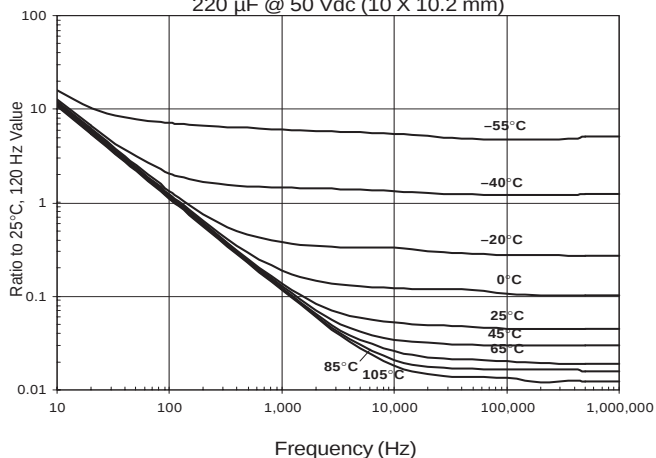
Capacitance vs. Temperature & Frequency
220 μ F @ 50 Vdc (10 X 10.2 mm)



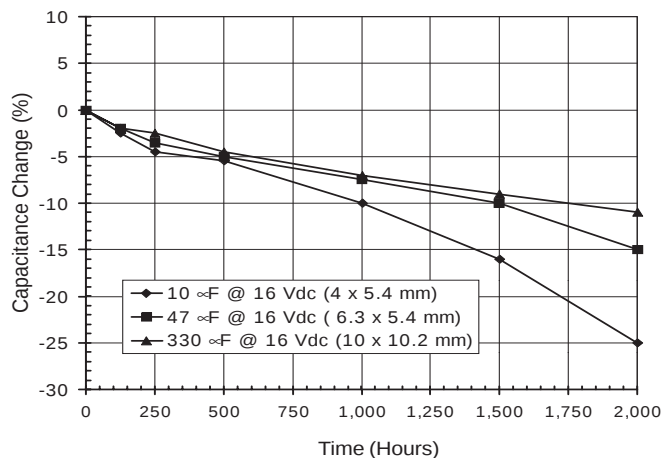
ESR vs. Temperature and Frequency
220 μ F @ 50 Vdc (10 X 10.2 mm)



Impedance vs. Temperature and Frequency
220 μ F @ 50 Vdc (10 X 10.2 mm)



Capacitance Change vs Time



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Capacitors**