Type AFK –55 °C to 105 °C

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

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

Type AFK Capacitors are the best and by a wide margin. With 40% to 60% lower impedance, 30% to 50% smaller case size and more than twice the life compared to low-ESR type AFC, the Type AFK also excels at cold performance down to –55 °C. In addition, this terrific low-impedance performance, approaching low-ESR tantalum capacitors, is at a significant cost savings compared to tantalum. The vertical cylindrical cases facilitate automatic mounting and reflow soldering into the same footprint of like-rated tantalum capacitors except without the need for voltage derating.

Highlights

- +105 °C, Up to 5000 Hour Load Life
- Capacitance Range: 3.3 µF to 6800 µF
- 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, 80 & 100 Vdc

Capacitance: 3.3 µF to 6800 µF

Capacitance Tolerance: ±20% @ 120 Hz and +20 °C

Leakage Current: 0.01 CV or 3 µA @ +20 °C, after two minutes (whichever is greater)

Ripple Current Multiplier:

Frequency	50/60 Hz	120 Hz	1 kHz	10 kHz	100 kHz
	0.70	.0.75	0.90	0.95	1.00

Dissipation Factor:

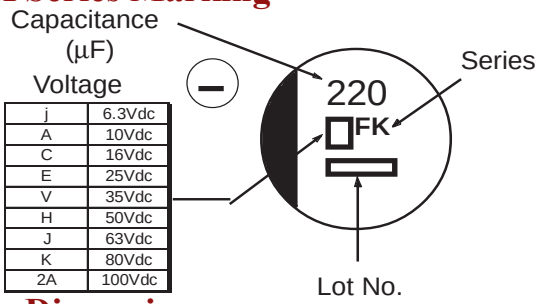
6.3V	10 V	16 V	25 V	35 V	50 V	63 V	80 V	100 V
0.26	0.19	0.16	0.14	0.12	0.1	0.08	0.08	0.07

Add 0.02 per 1000 µF for values greater that 1000

Life Test: 2000 h @ 105 °C, 4.0 — 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

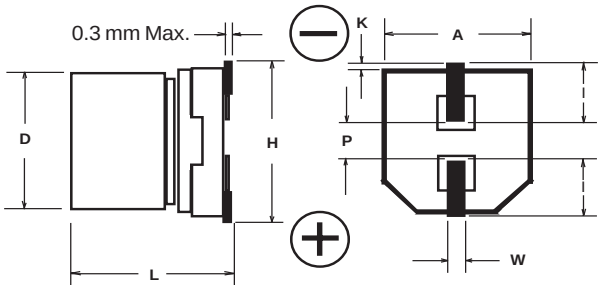
Shelf Test: 1000 h @ 105 °C
Δ Capacitance ±30%
DF: ≤ 200% of limit
DCL: ≤ 100% of limit

AFK Series Marking



j	6.3Vdc
A	10Vdc
C	16Vdc
E	25Vdc
V	35Vdc
H	50Vdc
J	63Vdc
K	80Vdc
2A	100Vdc

Outline Drawing



Case Dimensions

Case Code	D ± 0.5	L	A ± 0.2	H (max)	I (ref)	W	P (ref)	K (mm)
B	4.0	5.8 ± 0.3	4.3	5.5	1.8	0.65 ±0.1	1.0	0.35 +0.15/–0.20
C	5.0	5.8 ± 0.3	5.3	6.5	2.2	0.65 ±0.1	1.5	0.35 +0.15/–0.20
D	6.3	5.8 ± 0.3	6.6	7.8	2.6	0.65 ±0.1	1.8	0.35 +0.15/–0.20
X	6.3	7.9 ± 0.3	6.6	7.8	2.6	0.65 ±0.1	1.8	0.35 +0.15/–0.20
E	8.0	6.2 ± 0.3	8.3	9.5	3.4	0.65 ±0.1	2.2	0.35 +0.15/–0.20
F	8.0	10.2 ± 0.3	8.3	10.0	3.4	0.90 ±0.2	3.1	0.70 ±0.20
G	10.0	10.2 ± 0.3	10.3	12.0	3.5	0.90 ±0.2	4.6	0.70 ±0.20
H	12.5	13.5 ± 0.5	13.5	15.0	4.7	0.90 ±0.3	4.4	0.70 ±0.30
P	16.0	16.5 ± 0.5	17.0	19.0	5.5	1.2 ±0.3	6.7	0.70 ±0.30
R	18.0	16.5 ± 0.5	19.0	21.0	6.7	1.2 ±0.3	6.7	0.70 ±0.30

Type AFK –55 °C to 105 °C

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

Ratings Table

Cap (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
6.3 Vdc (8 Vdc Surge)									
22	AFK226M06B12T	3.0	0.26	1.350	1.350	90	B	4 x 5.8	2000
47	AFK476M06B12T	3.0	0.26	1.350	1.350	90	B	4 x 5.8	2000
47	AFK476M06C12T	3.0	0.26	0.700	0.700	160	C	5 x 5.8	1000
100	AFK107M06C12T	6.3	0.26	0.700	0.700	160	C	5 x 5.8	1000
100	AFK107M06D16T	6.3	0.26	0.360	0.360	240	D	6.3 x 5.8	1000
220	AFK227M06D16T	13.9	0.26	0.360	0.360	240	D	6.3 x 5.8	1000
330	AFK337M06X16T	20.8	0.26	0.340	0.340	280	X	6.3 x 7.7	900
330	AFK337M06E16T	20.8	0.26	0.260	0.260	300	E	8 x 6.2	1000
470	AFK477M06F24T	29.6	0.26	0.160	0.160	600	F	8 x 10.2	500
1000	AFK108M06F24T	63.0	0.26	0.160	0.160	600	F	8 x 10.2	500
1500	AFK158M06G24T	94.5	0.26	0.080	0.080	850	G	10 x 10.2	500
3300	AFK338M06H32T	207.9	0.30	0.060	0.060	1100	H	12.5 x 13.5	200
6800	AFK688M06P44T	428.4	0.36	0.035	0.035	1800	P	16 x 16.5	125
10 Vdc (13 Vdc Surge)									
22	AFK226M10B12T	3.0	0.19	1.350	1.350	90	B	4 x 5.8	2000
33	AFK336M10B12T	3.3	0.19	1.350	1.350	90	B	4 x 5.8	2000
33	AFK336M10C12T	3.3	0.19	0.700	0.700	160	C	5 x 5.8	1000
150	AFK157M10D16T	15.0	0.19	0.360	0.360	240	D	6.3 x 5.8	1000
220	AFK227M10X16T	22.0	0.19	0.340	0.340	280	X	6.3 x 7.7	900
220	AFK227M10E16T	22.0	0.19	0.260	0.260	300	E	8 x 6.2	1000
330	AFK337M10F24T	33.0	0.19	0.160	0.160	600	F	8 x 10.2	500
470	AFK477M10F24T	47.0	0.19	0.160	0.160	600	F	8 x 10.2	500
680	AFK687M10F24T	68.0	0.19	0.160	0.160	600	F	8 x 10.2	500
1000	AFK108M10G24T	100.0	0.19	0.080	0.080	850	G	10 x 10.2	500
2200	AFK228M10H32T	220.0	0.21	0.060	0.060	1100	H	12.5 x 13.5	200
4700	AFK478M10P44T	470.0	0.25	0.035	0.035	1800	P	16 x 16.5	125
6800	AFK688M10R44T	680.0	0.29	0.033	0.033	2060	R	18 x 16.5	125
16 Vdc (20 Vdc Surge)									
10	AFK106M16B12T	3.0	0.16	1.350	1.350	90	B	4 x 5.8	2000
22	AFK226M16B12T	3.5	0.16	1.350	1.350	90	B	4 x 5.8	2000
22	AFK226M16C12T	3.5	0.16	0.700	0.700	160	C	5 x 5.8	1000
47	AFK476M16C12T	7.5	0.16	0.700	0.700	160	C	5 x 5.8	1000
47	AFK476M16D16T	7.5	0.16	0.360	0.360	240	D	6.3 x 5.8	1000
68	AFK686M16D16T	10.9	0.19	0.360	0.360	240	D	6.3 x 5.8	1000
100	AFK107M16D16T	16.0	0.16	0.360	0.360	240	D	6.3 x 5.8	1000
150	AFK157M16X16T	24.0	0.16	0.340	0.340	280	X	6.3 x 7.7	900
220	AFK227M16X16T	35.2	0.16	0.340	0.340	280	X	6.3 x 7.7	900
220	AFK227M16E16T	35.2	0.16	0.260	0.260	300	E	8 x 6.2	1000
330	AFK337M16F24T	52.8	0.16	0.160	0.160	600	F	8 x 10.2	500
470	AFK477M16F24T	75.2	0.16	0.160	0.160	600	F	8 x 10.2	500
680	AFK687M16G24T	108.8	0.16	0.080	0.080	850	G	10 x 10.2	500
1500	AFK158M16H32T	240.0	0.16	0.060	0.060	1100	H	12.5 x 13.5	200
3300	AFK338M16P44T	528.0	0.20	0.035	0.035	1800	P	16 x 16.5	125
4700	AFK478M16R44T	752.0	0.22	0.033	0.033	2060	R	18 x 16.5	125

Type AFK –55 °C to 105 °C

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

Cap (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)									
10	AFK106M25B12T	3.0	0.14	1.350	1.350	90	B	4 x 5.8	2000
22	AFK226M25C12T	5.5	0.14	0.700	0.700	160	C	5 x 5.8	1000
33	AFK336M25C12T	8.3	0.14	0.700	0.700	160	C	5 x 5.8	1000
33	AFK336M25D16T	8.3	0.14	0.360	0.360	240	D	6.3 x 5.8	1000
47	AFK476M25D16T	11.8	0.14	0.360	0.360	240	D	6.3 x 5.8	1000
68	AFK686M25D16T	17.0	0.14	0.360	0.360	240	D	6.3 x 5.8	1000
100	AFK107M25X16T	25.0	0.14	0.340	0.340	280	X	6.3 x 7.7	900
100	AFK107M25E16T	25.0	0.14	0.260	0.260	300	E	8 x 6.2	1000
150	AFK157M25F24T	37.5	0.14	0.160	0.160	600	F	8 x 10.2	500
220	AFK227M25F24T	55.0	0.14	0.160	0.160	600	F	8 x 10.2	500
330	AFK337M25F24T	82.5	0.14	0.160	0.160	600	F	8 x 10.2	500
470	AFK477M25G24T	117.5	0.14	0.080	0.080	850	G	10 x 10.2	500
1000	AFK108M25H32T	250.0	0.14	0.060	0.060	1100	H	12.5 x 13.5	200
1500	AFK158M25P44T	375.0	0.14	0.035	0.035	1800	P	16 x 16.5	125
2200	AFK228M25P44T	550.0	0.16	0.035	0.035	1800	P	16 x 16.5	125
3300	AFK338M25R44T	825.0	0.18	0.033	0.033	2060	R	18 x 16.5	125
35 Vdc (44 Vdc Surge)									
4.7	AFK475M35B12T	3.0	0.12	1.350	1.350	90	B	4 x 5.8	2000
10	AFK106M35B12T	3.5	0.12	1.350	1.350	90	B	4 x 5.8	2000
10	AFK106M35C12T	3.5	0.12	0.700	0.700	160	C	5 x 5.8	1000
22	AFK226M35C12T	7.7	0.12	0.700	0.700	160	C	5 x 5.8	1000
33	AFK336M35D16T	11.6	0.12	0.360	0.360	240	D	6.3 x 5.8	1000
47	AFK476M35D16T	16.5	0.12	0.360	0.360	240	D	6.3 x 5.8	1000
68	AFK686M35X16T	23.8	0.12	0.340	0.340	280	X	6.3 x 7.7	900
100	AFK107M35X16T	35.0	0.12	0.340	0.340	280	X	6.3 x 7.7	900
100	AFK107M35F24T	35.0	0.12	0.160	0.160	600	F	8 x 10.2	500
150	AFK157M35F24T	52.5	0.12	0.160	0.160	600	F	8 x 10.2	500
220	AFK227M35F24T	77.0	0.12	0.160	0.160	600	F	8 x 10.2	500
330	AFK337M35G24T	115.5	0.12	0.080	0.080	850	G	10 x 10.2	500
470	AFK477M35H32T	164.5	0.12	0.060	0.060	1100	H	12.5 x 13.5	200
680	AFK687M35H32T	238.0	0.12	0.060	0.060	1100	H	12.5 x 13.5	200
1000	AFK108M35P44T	350.0	0.12	0.035	0.035	1800	P	16 x 16.5	125
1500	AFK158M35P44T	525.0	0.12	0.035	0.035	1800	P	16 x 16.5	125
50 Vdc (63 Vdc Surge)									
4.7	AFK475M50B12T	3.0	0.10	2.900	2.900	60	B	4 x 5.8	2000
10	AFK106M50C12T	5.0	0.10	1.520	1.520	85	C	5 x 5.8	1000
10	AFK106M50D16T	5.0	0.10	0.880	0.880	165	D	6.3 x 5.8	1000
22	AFK226M50D16T	11.0	0.10	0.880	0.880	165	D	6.3 x 5.8	1000
33	AFK336M50X16T	16.5	0.10	0.680	0.680	195	X	6.3 x 7.7	900
33	AFK336M50E16T	16.5	0.10	0.680	0.680	195	E	8 x 6.2	1000
47	AFK476M50X16T	23.5	0.10	0.680	0.680	195	X	6.3 x 7.7	900
47	AFK476M50E16T	23.5	0.10	0.680	0.680	195	E	8 x 6.2	1000
100	AFK107M50F24T	50.0	0.10	0.340	0.340	350	F	8 x 10.2	500

Type AFK –55 °C to 105 °C
SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

Cap (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
				50 Vdc (63 Vdc Surge)					
150	AFK157M50G24T	75.0	0.10	0.180	0.180	670	G	10 x 10.2	500
220	AFK227M50G24T	110.0	0.10	0.180	0.180	670	G	10 x 10.2	500
330	AFK337M50H32T	165.0	0.10	0.120	0.120	900	H	12.5 x 13.5	200
390	AFK397M50H32T	195.0	0.10	0.120	0.120	900	H	12.5 x 13.6	200
470	AFK477M50P44T	235.0	0.10	0.073	0.073	1610	P	16 x 16.5	125
560	AFK567M50P44T	280.0	0.10	0.073	0.073	1610	P	16 x 16.5	125
680	AFK687M50P44T	340.0	0.10	0.073	0.073	1610	P	16 x 16.5	125
1000	AFK108M50P44T	500.0	0.10	0.073	0.073	1610	P	16 x 16.5	125
				63 Vdc (75 Vdc Surge)					
4.7	AFK475M63C12T	3.0	0.08	3.000	3.000	50	C	5 x 5.8	1000
10	AFK106M63D16T	6.3	0.08	1.500	1.500	80	D	6.3 x 5.8	1000
22	AFK226M63X16T	13.9	0.08	1.200	1.200	120	X	6.3 x 7.7	900
22	AFK226M63E16T	13.9	0.08	1.200	1.200	120	E	8 x 6.2	1000
33	AFK336M63F24T	20.8	0.08	0.650	0.650	250	F	8 x 10.2	500
47	AFK476M63F24T	29.6	0.08	0.650	0.650	250	F	8 x 10.2	500
68	AFK686M63G24T	42.8	0.08	0.350	0.350	400	G	10 x 10.2	500
100	AFK107M63G24T	63.0	0.08	0.350	0.350	400	G	10 x 10.2	500
150	AFK157M63H32T	94.5	0.08	0.160	0.160	800	H	12.5 x 13.5	200
220	AFK227M63H32T	138.6	0.08	0.160	0.160	800	H	12.5 x 13.5	200
470	AFK477M63P44T	296.1	0.08	0.082	0.082	1410	P	16 x 16.5	125
680	AFK687M63R44T	428.4	0.08	0.080	0.080	1690	R	18 x 16.5	125
				80 Vdc (100 Vdc Surge)					
3.3	AFK335M80C12T	3.0	0.08	5.00	5.00	25	C	5 x 5.8	1000
4.7	AFK475M80D16T	3.8	0.08	3.00	3.00	40	D	6.3 x 5.8	1000
10.0	AFK106M80X16T	8.0	0.08	2.40	2.40	60	X	6.3 x 7.7	900
10.0	AFK106M80E16T	8.0	0.08	2.40	2.40	60	E	8 x 6.2	1000
22.0	AFK226M80F24T	17.6	0.08	1.30	1.30	130	F	8 x 10.2	500
33.0	AFK336M80F24T	26.4	0.08	1.30	1.30	130	F	8 x 10.2	500
47.0	AFK476M80G24T	37.6	0.08	0.70	0.70	200	G	10 x 10.2	500
68.0	AFK686M80H32T	54.4	0.08	0.32	0.32	500	H	12.5 x 13.5	200
100.0	AFK107M80H32T	80.0	0.08	0.32	0.32	500	H	12.5 x 13.5	200
150.0	AFK157M80H32T	120.0	0.08	0.32	0.32	500	H	12.5 x 13.5	200
330.0	AFK337M80P44T	264.0	0.08	0.17	0.17	793	P	16 x 16.5	125
470.0	AFK477M80R44T	376.0	0.08	0.15	0.15	917	R	18 x 16.5	125
				100 Vdc (125 Vdc Surge)					
22.0	AFK226M2AF24T	22.0	0.07	1.30	1.30	130	F	8 x 10.2	500
33.0	AFK336M2AG24T	33.0	0.07	0.70	0.70	200	G	10 x 10.2	500
47.0	AFK476M2AH32T	47.0	0.07	0.32	0.32	500	H	12.5 x 13.5	200
68.0	AFK686M2AH32T	68.0	0.07	0.32	0.32	500	H	12.5 x 13.5	200
100.0	AFK107M2AP44T	100.0	0.07	0.17	0.17	793	P	16 x 16.5	125
150.0	AFK157M2AP44T	150.0	0.07	0.17	0.17	793	P	16 x 16.5	125
220.0	AFK227M2AR44T	220.0	0.07	0.15	0.15	917	R	18 x 16.5	125
330.0	AFK337M2AR44T	330.0	0.07	0.15	0.15	917	R	18 x 16.5	125

Type AFK –55 °C to 105 °C

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

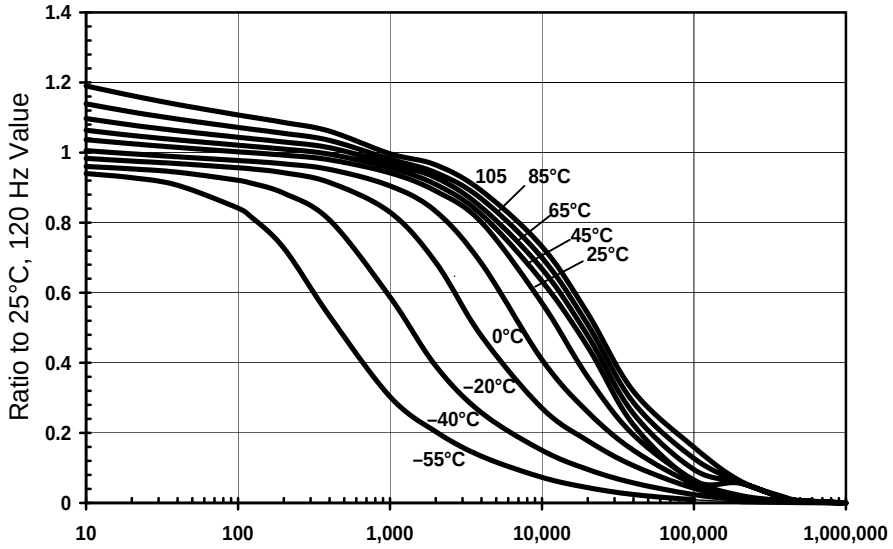
Part Numbering System

AFK	106	M	16	B	12T	–F
Type	**Capacitance**	**Capacitance Tolerance**	**Voltage Code**	**Case Code**	**Packaging Code**	**RoHS Compliant**
	105 = 1.0 µF		06 = 6.3 Vdc 35 = 35 Vdc		12 = Carrier tape	
	106 = 10.0 µF	M = ±20%	10 = 10 Vdc 50 = 50 Vdc		Width (mm)	
	107 = 100.0 µF		16 = 16 Vdc 63 = 63 Vdc		T = Tape & Reel	
	108 = 1000.0 µF		25 = 25 Vdc 80 = 80 Vdc		B = Bulk	
			2A = 100 Vdc			

Typical Performance Curves

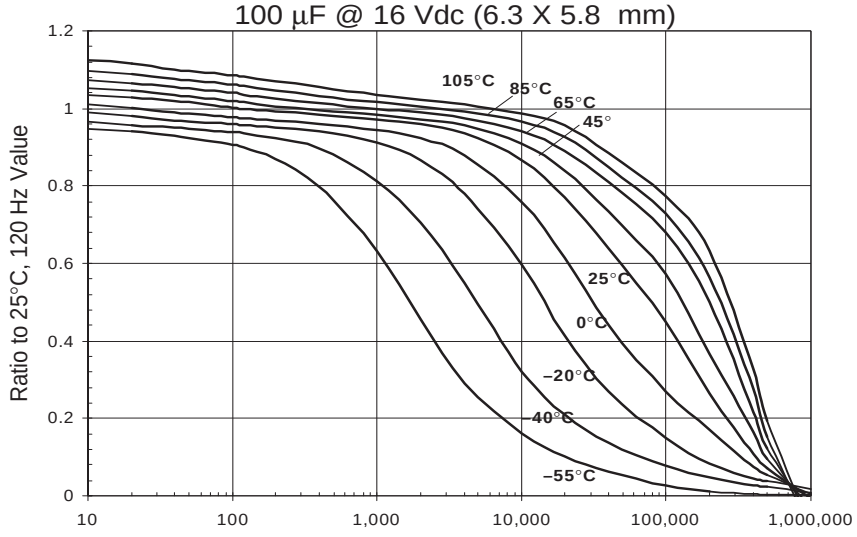
Capacitance vs. Temperature and Frequency

3300µF/6.3Vdc (12.5 x 13.5 mm)



Capacitance vs. Temperature & Frequency

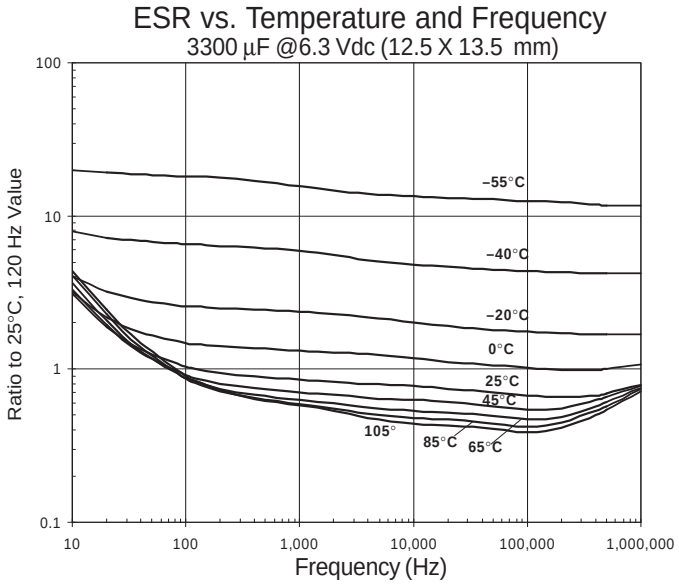
100 µF @ 16 Vdc (6.3 X 5.8 mm)

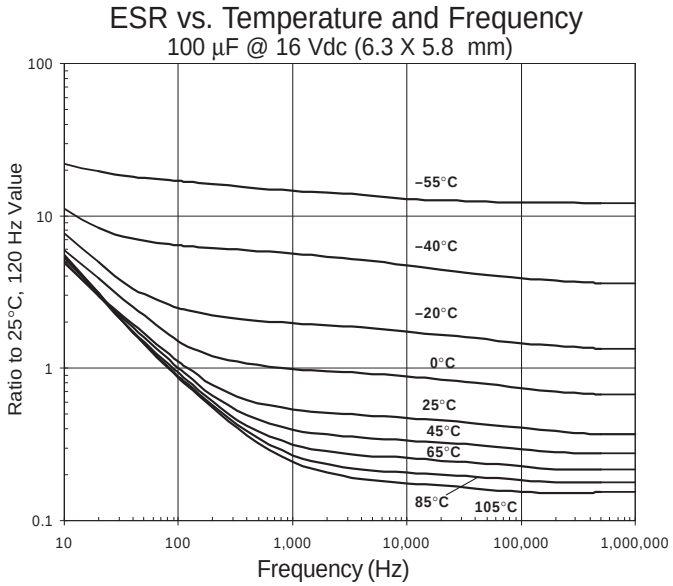


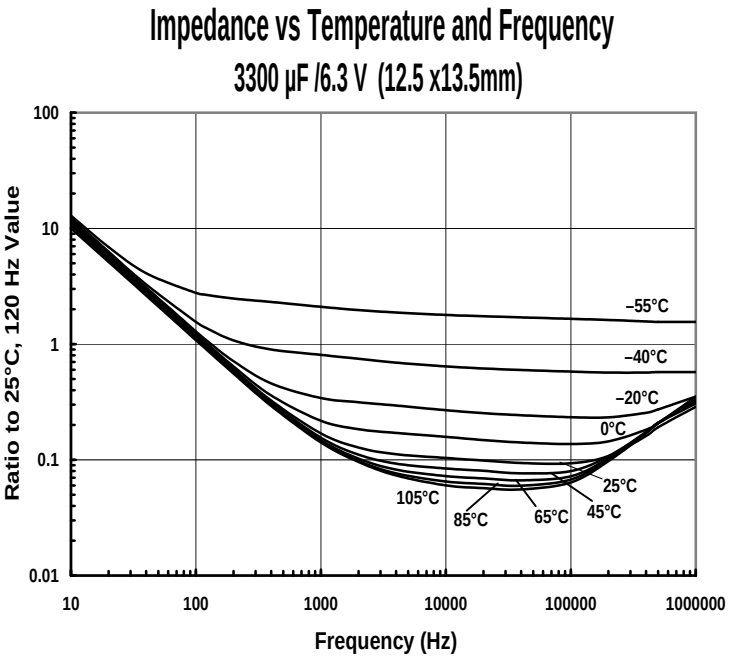
Type AFK –55 °C to 105 °C

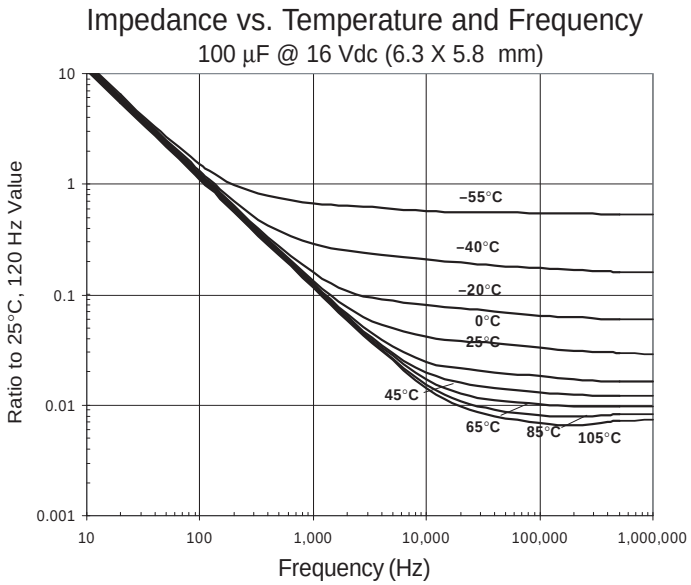
SMT Aluminum Electrolytic Capacitors - Lowest E.S.R., 105 °C

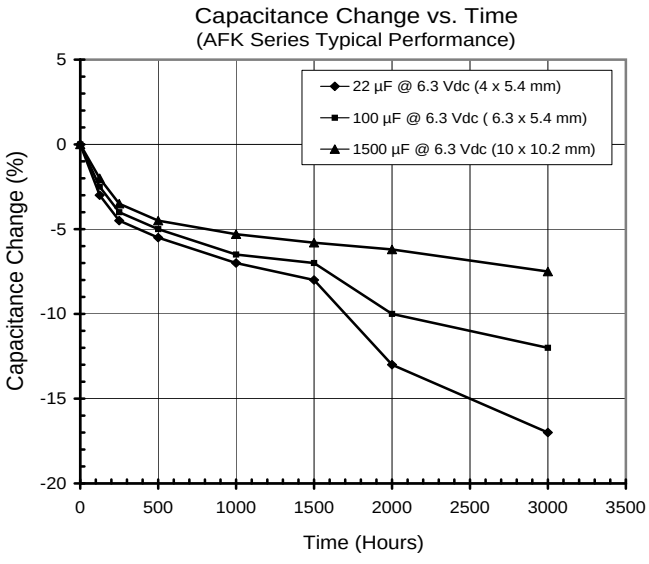
Typical Performance Curves

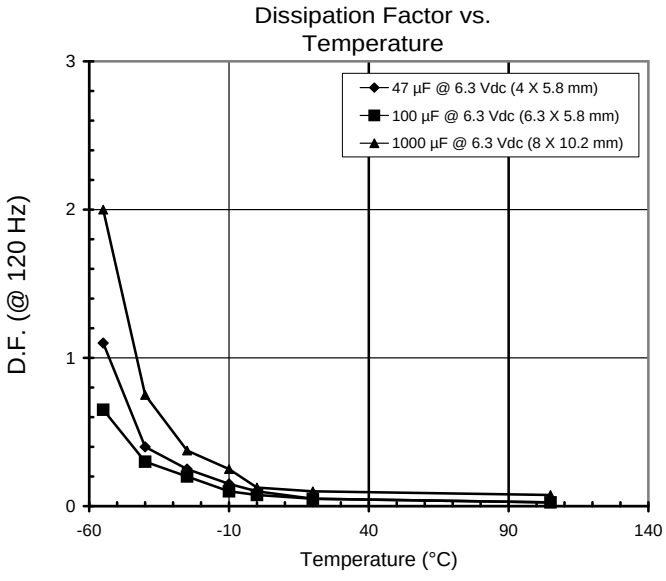












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