

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

- ◆ $+105^{\circ}\text{C}$, Up to 5000 Hour Load Life
- ◆ Capacitance Range: $3.3\ \mu\text{F}$ to $6800\ \mu\text{F}$
- ◆ Voltage Range: 6.3 Vdc to 100 Vdc

Specifications

Operating Temperature:	-55°C to $+105^{\circ}\text{C}$
Rated Voltage:	6.3, 10, 16, 25, 35, 50, 63, 80 & 100 Vdc
Capacitance:	$3.3\ \mu\text{F}$ to $6800\ \mu\text{F}$
Capacitance Tolerance:	$\pm 20\%$ @ 120 Hz and $+20^{\circ}\text{C}$
Leakage Current:	0.01 CV or $3\ \mu\text{A}$ @ $+20^{\circ}\text{C}$, 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:

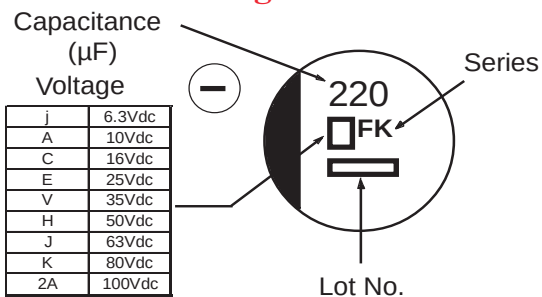
6.3V	10 V	16 V	25 V	35 V	50 V	63 V	80 V	100 V
0.26	0.19	0.16	0.14	0.12	0.1	0.08	0.08	0.07

Add 0.02 per 1000 μF for values greater than 1000 μF

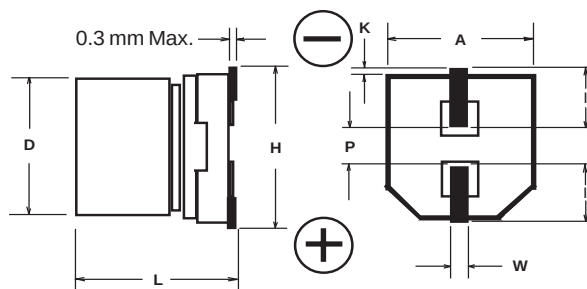
Life Test: 2000 h @ 105°C , 4.0 — 10.0 mm dia.
5000 h @ 105°C , 12.5 — 18.0 mm dia.
 Δ Capacitance $\pm 30\%$
DF: $\leq 200\%$ of limit
DCL: $\leq 100\%$ of limit

Shelf Test: 1000 h @ 105°C
 Δ Capacitance $\pm 30\%$
DF: $\leq 200\%$ of limit
DCL: $\leq 100\%$ of limit

AFK Series Marking



Outline Drawing



Case Dimensions

Case Code	D $\pm .05$	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	2.4	0.65 ± 0.1	1.8	$0.35 + 0.15/-0.20$
X	6.3	7.7 ± 0.3	6.6	7.8	2.4	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 ± 0.3	3.1	0.70 ± 0.20
G	10.0	10.2 ± 0.3	10.3	13.0	3.5	0.90 ± 0.3	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

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

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	1.35	1.35	90	B	4 x 5.8	2000
47	AFK476M06B12T	3.0	0.26	1.35	1.35	90	B	4 x 5.8	2000
47	AFK476M06C12T	3.0	0.26	0.70	0.70	160	C	5 x 5.8	1000
100	AFK107M06C12T	6.3	0.26	0.70	0.70	160	C	5 x 5.8	1000
100	AFK107M06D16T	6.3	0.26	0.36	0.36	240	D	6.3 x 5.8	1000
220	AFK227M06D16T	13.9	0.26	0.36	0.36	240	D	6.3 x 5.8	1000
330	AFK337M06X16T	20.8	0.26	0.34	0.34	280	X	6.3 x 7.7	900
330	AFK337M06E16T	20.8	0.26	0.26	0.26	300	E	8 x 6.2	1000
470	AFK477M06F24T	29.6	0.26	0.16	0.16	600	F	8 x 10.2	500
1000	AFK108M06F24T	63.0	0.26	0.16	0.16	600	F	8 x 10.2	500
1500	AFK158M06G24T	94.5	0.26	0.08	0.08	850	G	10 x 10.2	500
3300	AFK338M06H32T	207.9	0.30	0.06	0.06	1100	H	12.5 x 13.5	200
6800	AFK688M06P44T	428.4	0.36	0.04	0.04	1800	P	16 x 16.5	125
10 Vdc (13 Vdc Surge)									
22	AFK226M10B12T	3.0	0.19	1.35	1.35	90	B	4 x 5.8	2000
33	AFK336M10B12T	3.3	0.19	1.35	1.35	90	B	4 x 5.8	2000
33	AFK336M10C12T	3.3	0.19	0.70	0.70	160	C	5 x 5.8	1000
150	AFK157M10D16T	15.0	0.19	0.36	0.36	240	D	6.3 x 5.8	1000
220	AFK227M10X16T	22.0	0.19	0.34	0.34	280	X	6.3 x 7.7	900
220	AFK227M10E16T	22.0	0.19	0.26	0.26	300	E	8 x 6.2	1000
330	AFK337M10F24T	33.0	0.19	0.16	0.16	600	F	8 x 10.2	500
470	AFK477M10F24T	47.0	0.19	0.16	0.16	600	F	8 x 10.2	500
680	AFK687M10F24T	68.0	0.19	0.16	0.16	600	F	8 x 10.2	500
1000	AFK108M10G24T	100.0	0.19	0.08	0.08	850	G	10 x 10.2	500
2200	AFK228M10H32T	220.0	0.21	0.06	0.06	1100	H	12.5 x 13.5	200
4700	AFK478M10P44T	470.0	0.25	0.04	0.04	1800	P	16 x 16.5	125
6800	AFK688M10R44T	680.0	0.29	0.03	0.03	2060	R	18 x 16.5	125
16 Vdc (20 Vdc Surge)									
10	AFK106M16B12T	3.0	0.16	1.35	1.35	90	B	4 x 5.8	2000
22	AFK226M16B12T	3.5	0.16	1.35	1.35	90	B	4 x 5.8	2000
22	AFK226M16C12T	3.5	0.16	0.70	0.70	160	C	5 x 5.8	1000
47	AFK476M16C12T	7.5	0.16	0.70	0.70	160	C	5 x 5.8	1000
47	AFK476M16D16T	7.5	0.16	0.36	0.36	240	D	6.3 x 5.8	1000
68	AFK686M16D16T	10.9	0.19	0.36	0.36	240	D	6.3 x 5.8	1000
100	AFK107M16D16T	16.0	0.16	0.36	0.36	240	D	6.3 x 5.8	1000
150	AFK157M16X16T	24.0	0.16	0.34	0.34	280	X	6.3 x 7.7	900
220	AFK227M16X16T	35.2	0.16	0.34	0.34	280	X	6.3 x 7.7	900
220	AFK227M16E16T	35.2	0.16	0.26	0.26	300	E	8 x 6.2	1000
330	AFK337M16F24T	52.8	0.16	0.16	0.16	600	F	8 x 10.2	500
470	AFK477M16F24T	75.2	0.16	0.16	0.16	600	F	8 x 10.2	500
680	AFK687M16G24T	108.8	0.16	0.08	0.08	850	G	10 x 10.2	500
1500	AFK158M16H32T	240.0	0.16	0.06	0.06	1100	H	12.5 x 13.5	200
3300	AFK338M16P44T	528.0	0.20	0.04	0.04	1800	P	16 x 16.5	125
4700	AFK478M16R44T	752.0	0.22	0.03	0.03	2060	R	18 x 16.5	125
25 Vdc (31 Vdc Surge)									
10	AFK106M25B12T	3.0	0.14	1.35	1.35	90	B	4 x 5.8	2000
22	AFK226M25C12T	5.5	0.14	0.70	0.70	160	C	5 x 5.8	1000
33	AFK336M25C12T	8.3	0.14	0.70	0.70	160	C	5 x 5.8	1000
33	AFK336M25D16T	8.3	0.14	0.36	0.36	240	D	6.3 x 5.8	1000
47	AFK476M25D16T	11.8	0.14	0.36	0.36	240	D	6.3 x 5.8	1000
68	AFK686M25D16T	17.0	0.14	0.36	0.36	240	D	6.3 x 5.8	1000
100	AFK107M25X16T	25.0	0.14	0.34	0.34	280	X	6.3 x 7.7	900
100	AFK107M25E16T	25.0	0.14	0.26	0.26	300	E	8 x 6.2	1000
150	AFK157M25F24T	37.5	0.14	0.16	0.16	600	F	8 x 10.2	500
220	AFK227M25F24T	55.0	0.14	0.16	0.16	600	F	8 x 10.2	500
330	AFK337M25F24T	82.5	0.14	0.16	0.16	600	F	8 x 10.2	500
470	AFK477M25G24T	117.5	0.14	0.08	0.08	850	G	10 x 10.2	500
1000	AFK108M25H32T	250.0	0.14	0.06	0.06	1100	H	12.5 x 13.5	200
2200	AFK228M25P44T	550.0	0.16	0.04	0.04	1800	P	16 x 16.5	125
3300	AFK338M25R44T	825.0	0.18	0.03	0.03	2060	R	18 x 16.5	125
35 Vdc (44 Vdc Surge)									
4.7	AFK475M35B12T	3.0	0.12	1.35	1.35	90	B	4 x 5.8	2000
10.0	AFK106M35B12T	3.5	0.12	1.35	1.35	90	B	4 x 5.8	2000
10.0	AFK106M35C12T	3.5	0.12	0.70	0.70	160	C	5 x 5.8	1000
22.0	AFK226M35C12T	7.7	0.12	0.70	0.70	160	C	5 x 5.8	1000
33.0	AFK336M35D16T	11.6	0.12	0.36	0.36	240	D	6.3 x 5.8	1000

Type AFK -55 °C to 105 °C

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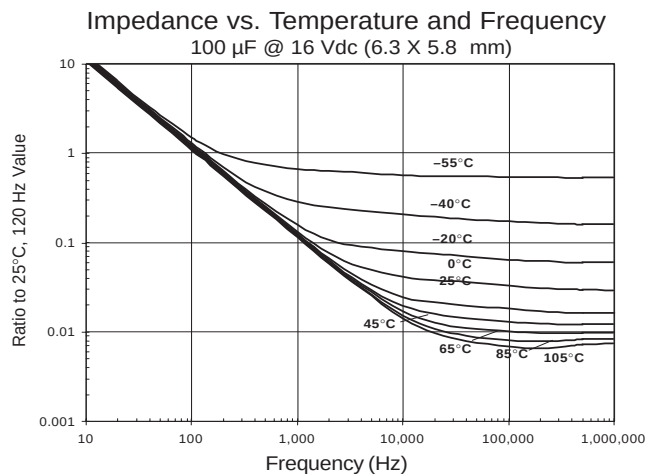
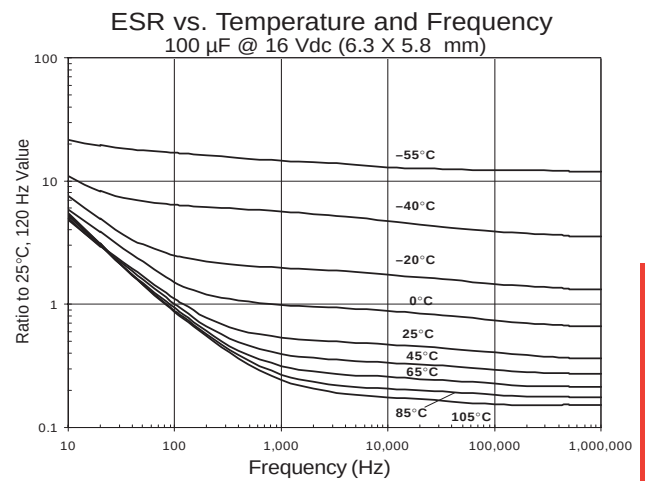
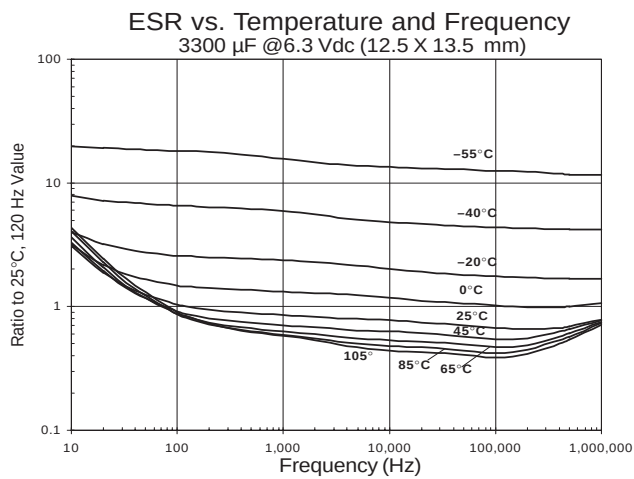
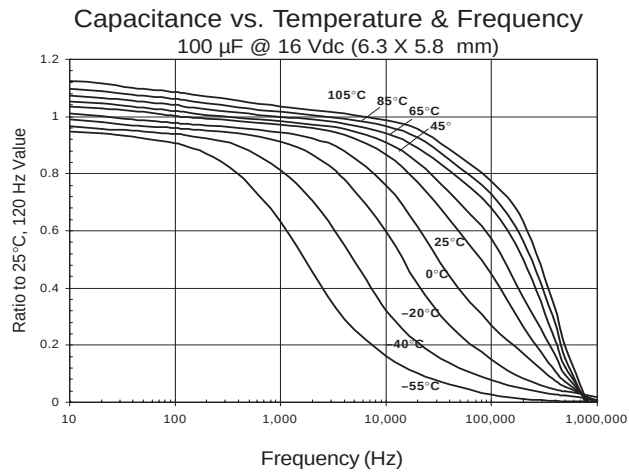
Cap (µF)	Catalog Part Number	Max. DCL 2 min (µA)	Max. Dissipation Factor @120 Hz/20 °C	Max. ESR @100 kHz/20 °C (Ω)	Impedance @100 kHz/20 °C (Ω)	Max. Ripple Current @100 kHz/105 °C (mA)	Case Code	Size D x L (mm)	Quantity per Reel
35 Vdc (44 Vdc Surge) Continued									
47.0	AFK476M35D16T	16.5	0.12	0.36	0.36	240	D	6.3 x 5.8	1000
68.0	AFK686M35X16T	23.8	0.12	0.34	0.34	280	X	6.3 x 7.7	900
100.0	AFK107M35X16T	35.0	0.12	0.34	0.34	280	X	6.3 x 7.7	900
100.0	AFK107M35F24T	35.0	0.12	0.16	0.16	600	F	8 x 10.2	500
150.0	AFK157M35F24T	52.5	0.12	0.16	0.16	600	F	8 x 10.2	500
220.0	AFK227M35F24T	77.0	0.12	0.16	0.16	600	F	8 x 10.2	500
330.0	AFK337M35G24T	115.5	0.12	0.08	0.08	850	G	10 x 10.2	500
470.0	AFK477M35H32T	164.5	0.12	0.06	0.06	1100	H	12.5 x 13.5	200
680.0	AFK687M35H32T	238.0	0.12	0.06	0.06	1100	H	12.5 x 13.5	200
1500.0	AFK158M35P44T	525.0	0.12	0.04	0.04	1800	P	16 x 16.5	125
50 Vdc (63 Vdc Surge)									
4.7	AFK475M50B12T	3.0	0.1	2.90	2.90	60	B	4 x 5.8	2000
10.0	AFK106M50C12T	5.0	0.1	1.52	1.52	85	C	5 x 5.8	1000
10.0	AFK106M50D16T	5.0	0.1	0.88	0.88	165	D	6.3 x 5.8	1000
22.0	AFK226M50D16T	11.0	0.1	0.88	0.88	165	D	6.3 x 5.8	1000
33.0	AFK336M50X16T	16.5	0.1	0.68	0.68	195	X	6.3 x 7.7	900
33.0	AFK336M50E16T	16.5	0.1	0.68	0.68	195	E	8 x 6.2	1000
47.0	AFK476M50X16T	23.5	0.1	0.68	0.68	195	X	6.3 x 7.7	900
47.0	AFK476M50E16T	23.5	0.1	0.68	0.68	195	E	8 x 6.2	1000
100.0	AFK107M50F24T	50.0	0.1	0.34	0.34	350	F	8 x 10.2	500
150.0	AFK157M50G24T	75.0	0.1	0.18	0.18	670	G	10 x 10.2	500
220.0	AFK227M50G24T	110.0	0.1	0.18	0.18	670	G	10 x 10.2	500
330.0	AFK337M50H32T	165.0	0.1	0.12	0.12	900	H	12.5 x 13.5	200
680.0	AFK687M50P44T	340.0	0.1	0.07	0.07	1610	P	16 x 16.5	125
1000.0	AFK108M50P44T	500.0	0.1	0.07	0.07	1610	P	16 x 16.5	125
63 Vdc (75 Vdc Surge)									
4.7	AFK475M63C12T	3.0	0.08	3.00	3.00	50	C	5 x 5.8	1000
10.0	AFK106M63D16T	6.3	0.08	1.50	1.50	80	D	6.3 x 5.8	1000
22.0	AFK226M63X16T	13.9	0.08	1.20	1.20	120	X	6.3 x 7.7	900
22.0	AFK226M63E16T	13.9	0.08	1.20	1.20	120	E	8 x 6.2	1000
33.0	AFK336M63F24T	20.8	0.08	0.65	0.65	250	F	8 x 10.2	500
47.0	AFK476M63F24T	29.6	0.08	0.65	0.65	250	F	8 x 10.2	500
68.0	AFK686M63G24T	42.8	0.08	0.35	0.35	400	G	10 x 10.2	500
100.0	AFK107M63G24T	63.0	0.08	0.35	0.35	400	G	10 x 10.2	500
150.0	AFK157M63H32T	94.5	0.08	0.16	0.16	800	H	12.5 x 13.5	200
220.0	AFK227M63H32T	138.6	0.08	0.16	0.16	800	H	12.5 x 13.5	200
470.0	AFK477M63P44T	296.1	0.08	0.08	0.08	1410	P	16 x 16.5	125
680.0	AFK687M63R44T	428.4	0.08	0.08	0.08	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

Part Numbering System

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

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Typical Performance Curves



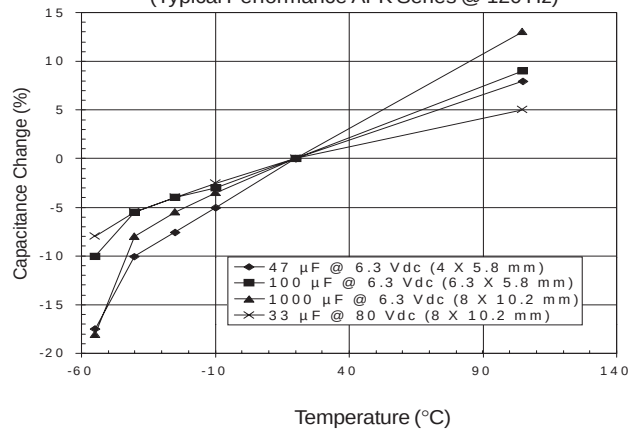
SMT & Chip
Capacitors

Type AFK -55 °C to 105 °C

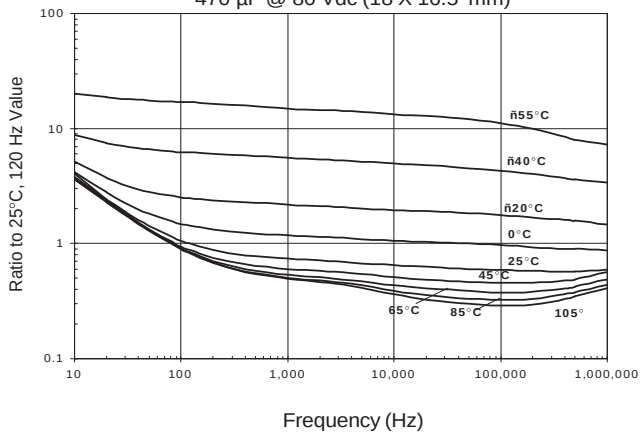
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Typical Performance Curves

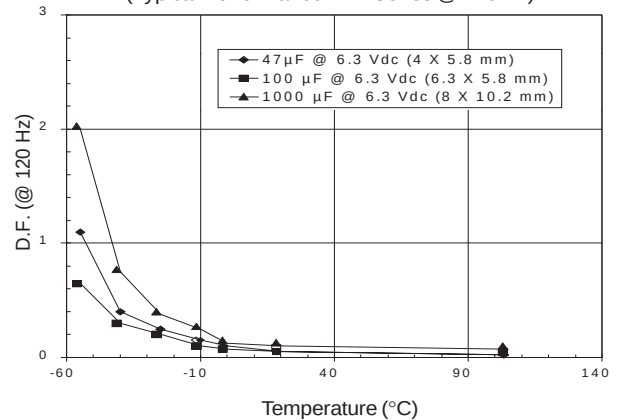
Capacitance Change vs. Temperature
(Typical Performance AFK Series @ 120 Hz)



ESR vs. Temperature and Frequency
470 µF @ 80 Vdc (18 X 16.5 mm)



Dissipation Factor vs. Temperature
(Typical Performance AFK Series @ 120 Hz)



Capacitance Change vs. Time
(Typical Performance for AFK Series)

