

# Type AVRF -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 AVRF 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 AVRF 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
- Ultra-low Impedance
- Voltage Range: 6.3 Vdc to 35 Vdc

#### Specifications

- Operating Temperature:** -55 °C to +105 °C  
**Rated Voltage:** 6.3, 10, 16, 25, 35 Vdc  
**Capacitance:** 4.7 µF to 1500 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)



Complies with the EU Directive 2002/95/EC requirement restricting the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr(VI)), PolyBrominated Biphenyls (PBB) and PolyBrominated Diphenyl Ethers (PBDE).

#### Low Temperature Characteristics @ 120 Hz:

Rated Voltage (Vdc)		6.3	10	16	25	35
Impedance Ratio	Z(-25°C)/Z(+20°C)	2	2	2	2	2
	Z(-40°C)/Z(+20°C)	3	3	3	3	3
	Z(-55°C)/Z(+20°C)	4	4	4	3	3

#### Dissipation Factor:

6.3V	10 V	16 V	25 V	35 V
0.26	0.19	0.16	0.14	0.12

- Life Test:** 2000 h @ 105 °C, 4.0 — 6.3 mm dia.  
 5000 h @ 105 °C, 8.0 — 10.0 mm dia.  
 Δ Capacitance ±30% (10 mm Dia.: ±35%)  
 DF: ≤ 200% of limit (10 mm Dia.: ≤300%)  
 DCL: ≤ 100% of limit

- Shelf Test:** 1000 h @ 105 °C  
 Δ Capacitance ±30% (10 mm Dia.: ±35%)  
 DF: ≤ 200% of limit (10 mm Dia.: ≤300%)  
 DCL: ≤ 100% of limit

#### Part Numbering System

AVRF	106	M	16	B	12T	-F
Type	Capacitance	Capacitance Tolerance	Voltage Code	Case Code	Packaging Code	RoHS Compliant
AVRF	475 = 4.7 µF	M = ±20%	06 = 6.3 Vdc	25 = 25 Vdc	12 = Carrier tape	
	106 = 10.0 µF		10 = 10 Vdc	35 = 35 Vdc	Width (mm)	
	107 = 100.0 µF		16 = 16 Vdc		T = Tape & Reel	
	108 = 1000.0 µF					

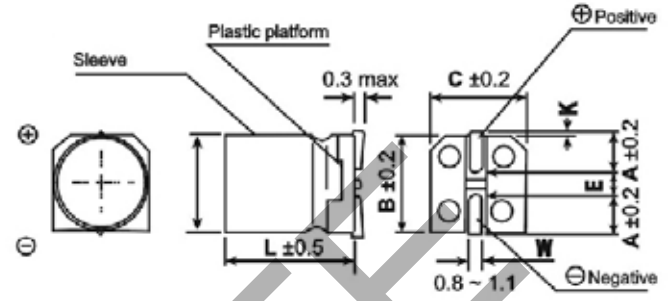
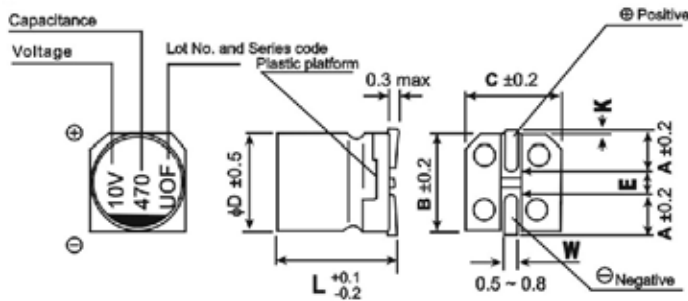
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### Outline Drawing & Marking

(4.0 - 6.3 mm Dia.)

(8.0 - 10.0 mm Dia.)



### Case Dimensions

Case Code	D ± 0.5 (mm)	L (mm)	B, C (mm)	A (ref)	W (mm)	E (ref)	K (mm)
B	4.0	5.4 ± 0.2	4.3	1.8	0.65 ± 0.1	1.0	0.35 +0.15/-0.20
C	5.0	5.4 ± 0.3	5.3	2.2	0.65 ± 0.1	1.5	0.35 +0.15/-0.20
D	6.3	5.4 ± 0.2	6.6	2.6	0.65 ± 0.1	1.8	0.35 +0.15/-0.20
F	8.0	10.2 ± 0.5	8.3	3.4	0.90 ± 0.2	3.1	0.70 ± 0.20
G	10.0	10.2 ± 0.5	10.3	3.5	0.90 ± 0.2	4.6	0.70 ± 0.20

### Ratings

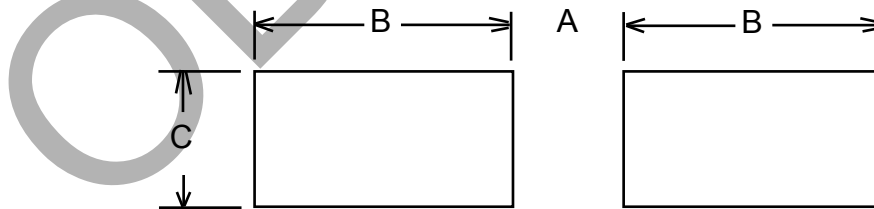
Cap. (µF)	Catalog Part Number	Max. DCL 2 min. (µA)	Max. DF @ 120Hz/20°C	Max. E.S.R. @ 100kHz/20°C (Ω)	Max. Impedance @ 100kHz/20°C (Ω)	Max. Ripple Current @ 100kHz/105°C (mA)	Case Code	Size DxL (mm)	Quantity /Reel (Ea)
<b>6.3 Vdc</b>									
22	AVRF226M06B12T-F	3.0	0.26	1.65	1.65	70	B	4x5.4	2000
47	AVRF476M06B12T-F	3.0	0.26	1.65	1.65	70	B	4x5.4	2000
100	AVRF107M06C12T-F	6.3	0.26	0.90	0.90	100	C	5x5.4	1000
220	AVRF227M06D16T-F	13.9	0.26	0.50	0.50	160	D	6.3x5.4	1000
470	AVRF477M06F24T-F	29.6	0.26	0.16	0.16	600	F	8x10.2	500
1000	AVRF108M06F24T-F	63.0	0.26	0.16	0.16	600	F	8x10.2	500
1500	AVRF158M06G24T-F	94.5	0.26	0.08	0.08	850	G	10x10.2	500
<b>10 Vdc</b>									
22	AVRF226M10B12T-F	3.0	0.19	1.65	1.65	70	B	4x5.4	2000
33	AVRF336M10B12T-F	3.3	0.19	1.65	1.65	70	B	4x5.4	2000
150	AVRF157M10D16T-F	15.0	0.19	0.50	0.50	160	D	6.3x5.4	1000
330	AVRF337M10F24T-F	33.0	0.19	0.16	0.16	600	F	8x10.2	500
470	AVRF477M10F24T-F	47.0	0.19	0.16	0.16	600	F	8x10.2	500
1000	AVRF108M10G24T-F	100.0	0.19	0.08	0.08	850	G	10x10.2	500

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Cap. (µF)	Catalog Part Number	Max. DCL 2 min. (µA)	Max. DF @ 120Hz/20°C	Max. E.S.R. @ 100kHz/20°C (Ω)	Max. Impedance @ 100kHz/20°C (Ω)	Max. Ripple		Case Code	Size DxL (mm)	Quantity /Reel (Ea)
						Current @ 100kHz/105°C (mA)				
<b>16 Vdc</b>										
10	AVRF106M16B12T-F	3.0	0.16	1.65	1.65	70		B	4x5.4	2000
22	AVRF226M16B12T-F	3.5	0.16	1.65	1.65	70		B	4x5.4	2000
47	AVRF476M16C12T-F	7.5	0.16	0.90	0.90	100		C	5x5.4	1000
68	AVRF686M16D16T-F	10.9	0.16	0.50	0.50	160		D	6.3x5.4	1000
330	AVRF337M16F24T-F	52.8	0.16	0.16	0.16	600		F	8x10.2	500
470	AVRF477M16F24T-F	75.2	0.16	0.16	0.16	600		F	8x10.2	500
<b>25 Vdc</b>										
10	AVRF106M25B12T-F	3.0	0.14	1.65	1.65	70		B	4x5.4	2000
22	AVRF226M25C12T-F	5.5	0.14	0.90	0.90	100		C	5x5.4	1000
33	AVRF336M25D16T-F	8.3	0.14	0.50	0.50	160		D	6.3x5.4	1000
47	AVRF476M25D16T-F	11.8	0.14	0.50	0.50	160		D	6.3x5.4	1000
68	AVRF686M25D16T-F	17.0	0.14	0.50	0.50	160		D	6.3x5.4	1000
150	AVRF157M25F24T-F	37.5	0.14	0.16	0.16	600		F	8x10.2	500
220	AVRF227M25F24T-F	55.0	0.14	0.16	0.16	600		F	8x10.2	500
330	AVRF337M25F24T-F	82.5	0.14	0.16	0.16	600		F	8x10.2	500
470	AVRF477M25G24T-F	117.5	0.14	0.08	0.08	850		G	10x10.2	500
<b>35 Vdc</b>										
4.7	AVRF475M35B12T-F	3.0	0.12	1.65	1.65	70		B	4x5.4	2000
10	AVRF106M35C12T-F	3.5	0.12	0.90	0.90	100		C	5x5.4	1000
22	AVRF226M35D16T-F	7.7	0.12	0.50	0.50	160		D	6.3x5.4	1000
33	AVRF336M35D16T-F	11.6	0.12	0.50	0.50	160		D	6.3x5.4	1000
47	AVRF476M35F24T-F	16.5	0.12	0.16	0.16	600		F	8x10.2	500
100	AVRF107M35F24T-F	35.0	0.12	0.16	0.16	600		F	8x10.2	500
150	AVRF157M35F24T-F	52.5	0.12	0.16	0.16	600		F	8x10.2	500
220	AVRF227M35F24T-F	77.0	0.12	0.16	0.16	600		F	8x10.2	500
330	AVRF337M35G24T-F	115.5	0.12	0.08	0.08	850		G	10x10.2	500

### Recommended Land Patterns by case size for AVRF series



Case Code	Case Size	Land Dimensions (mm)		
		C	B	A
B	4x5.4	1.6	2.6	1.0
C	5x5.4	1.6	3.0	1.4
D	6.3x5.4	1.6	3.5	1.9
F	8x10.2	2.5	3.5	3.0
G	10x10.2	2.5	4.0	4.0

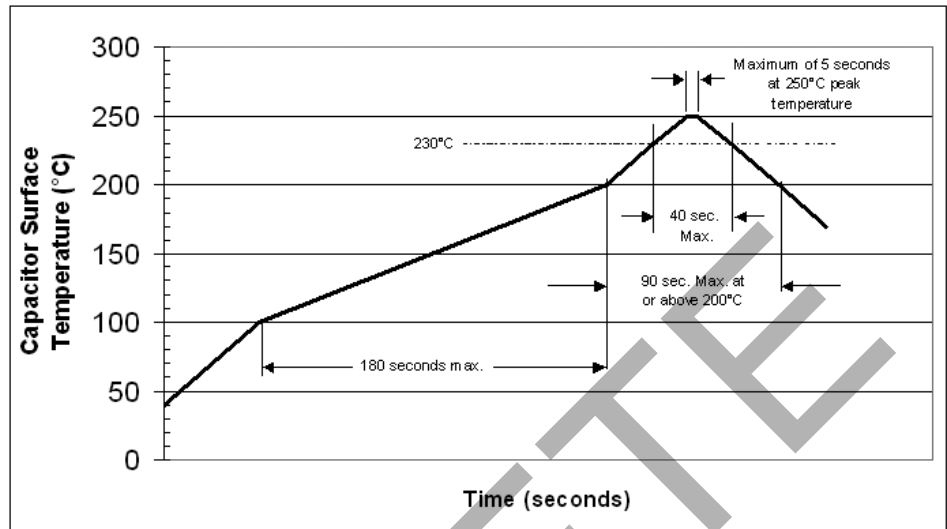
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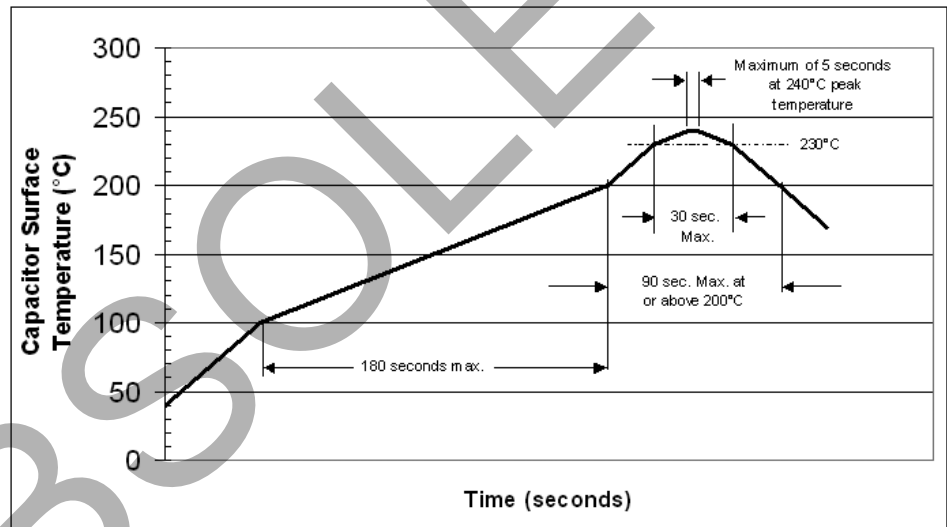
### Recommended Soldering methods

Recommended Reflow Soldering Profiles:

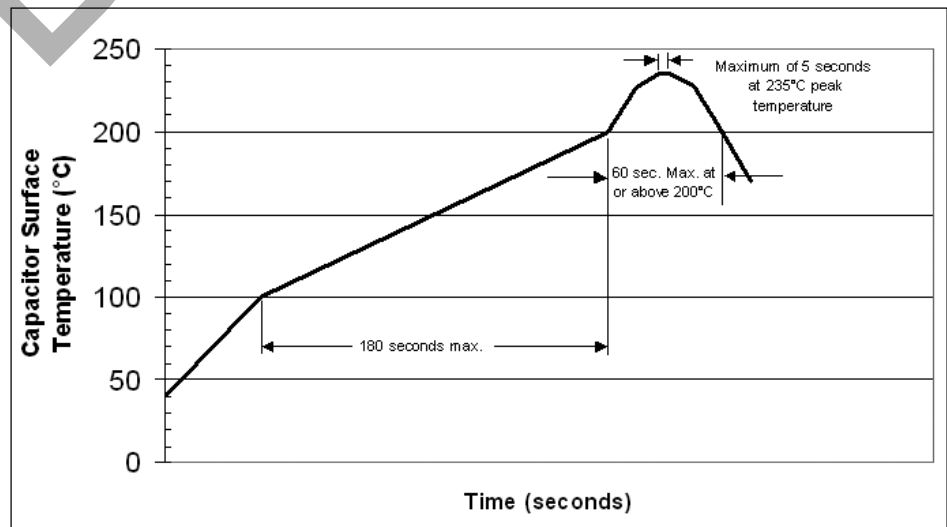
For case diameters  
4 thru 6.3 mm



For 8 mm  
case diameter



For 10 mm  
case diameter



Soldering with a solder iron should be performed with a maximum soldering iron tip temperature of  $350 \pm 5^\circ\text{C}$  for 3 to 4 seconds.

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