

# Type AVES $-55\text{ }^{\circ}\text{C}$ to $+105\text{ }^{\circ}\text{C}$

## Low Profile SMT Aluminum Electrolytic Capacitors

For Filtering, Bypassing and Power Supply Decoupling



Type AVES Capacitors are rated for 1000 hours at  $105\text{ }^{\circ}\text{C}$  with low impedance characteristics. They are ideal for high density PC board packaging. The Type AVES offers a low in-place-cost for a high quality performer. 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. Type AVES is RoHS compliant.

### Highlights

- $+105\text{ }^{\circ}\text{C}$ , Up to 1000 Hours Load Life
- Capacitance Range:  $0.1\text{ }\mu\text{F}$  to  $100\text{ }\mu\text{F}$
- Voltage Range: 6.3 Vdc to 50 Vdc

### Specifications

**Operating Temperature:**  $-55\text{ }^{\circ}\text{C}$  to  $+105\text{ }^{\circ}\text{C}$

**Rated Voltage:** 6.3, 10, 16, 25, 35, 50 Vdc

**Capacitance:**  $0.1\text{ }\mu\text{F}$  to  $100\text{ }\mu\text{F}$

**Capacitance Tolerance:**  $\pm 20\%$  @ 120 Hz and  $+20\text{ }^{\circ}\text{C}$

**Leakage Current:**  $I = 0.01\text{ CV}$  or 3 ( $\mu\text{A}$ ) whichever is greater after 2 minutes

$C$  = rated capacitance in  $\mu\text{F}$ ,  $V$  = rated DC working voltage

**Ripple Current Multiplier:**

Freq. (Hz)	50, 60	120	1 k	10 k up
Under 16	0.8	1.00	1.15	1.25
25 ~ 35	0.8	1.00	1.25	1.40
50	0.8	1.00	1.35	1.50

**Dissipation Factor:**  
( $\text{Tan } \delta$  at 120 Hz,  $20\text{ }^{\circ}\text{C}$ )

Rated Voltage	6.3	10	16	25	35	50
Tan $\delta$ Max	0.30	0.26	0.22	0.16	0.13	0.12

**Low Temperature Characteristic (at 120 Hz):**

Rated Voltage		6.3	10	16	25	35	50
Impedance Ratio	$Z(-25\text{ }^{\circ}\text{C}) / Z(+20\text{ }^{\circ}\text{C})$	4	3	2	2	2	2
	$Z(-40\text{ }^{\circ}\text{C}) / Z(+20\text{ }^{\circ}\text{C})$	8	5	4	3	3	3



**Load Life Test:**

Test Time	1,000 Hours
Capacitance Change	Within $\pm 20\%$ of initial value
Dissipation Factor	Less than 200% of specified value
Leakage Current	Within specified value

\* The above specifications shall be satisfied when the capacitors are restored to  $20\text{ }^{\circ}\text{C}$  after the rated voltage is applied for 1,000 hrs at  $105\text{ }^{\circ}\text{C}$

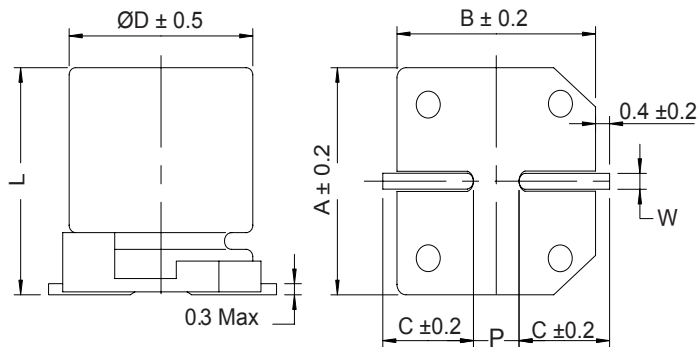
Complies with the EU Directive 2002/95/EC requirement restricting the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr(VI)), PolyBrominated Biphenyls (PBB) and PolyBrominated Diphenyl Ethers (PBDE).

**Shelf Life Test:** Test time: 1000 hours; other items are the same as those for life test.

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### Outline Drawing, Case Code & Dimensions Table



Case Code	$\text{Ø D}$ (mm)	L (mm)	A (mm)	B (mm)	C (mm)	W (mm)	$P \pm 0.2$ (mm)
B	4.0	$5.3 \pm 0.2$	4.3	4.3	2.0	0.5 to 0.8	1.0
C	5.0	$5.3 \pm 0.2$	5.3	5.3	2.3	0.5 to 0.8	1.5
D	6.3	$5.3 \pm 0.2$	6.6	6.6	2.7	0.5 to 0.8	2.0

### Part Numbering System

<b>AVES</b>	<b>106</b>	<b>M</b>	<b>16</b>	<b>B</b>	<b>12T</b>	<b>- F</b>
<b>Series</b>	<b>Capacitance</b>	<b>Capacitance Tolerance</b>	<b>Voltage</b>	<b>Case Code</b>	<b>Packaging Information</b>	<b>RoHS Compliant</b>
AVES	104 = 0.1 $\mu\text{F}$ 105 = 1.0 $\mu\text{F}$ 106 = 10.0 $\mu\text{F}$ 107 = 100.0 $\mu\text{F}$ 108 = 1000.0 $\mu\text{F}$	M = $\pm 20\%$	06 = 6.3 Vdc 10 = 10 Vdc 16 = 16 Vdc 25 = 25 Vdc 50 = 50 Vdc	B = B	12 = Carrier Tape Width (mm) T = Tape & Reel	

### Ratings

Cap ( $\mu\text{F}$ )	Catalog Part Number	Max DCL 2 min. ( $\mu\text{A}$ )	Max DF 120 Hz 20 $^{\circ}\text{C}$	Max ESR 120 Hz 20 $^{\circ}\text{C}$ (ohms)	Max Ripple Current 120 Hz 105 $^{\circ}\text{C}$ (mA)	Case Code	Size D x L (mm)	Quantity per Reel (each)
<b>6.3 Vdc ( 8 Vdc Surge)</b>								
22	AVES226M06B12T-F	3.0	0.30	22.6	21	B	4 x 5.3	2000
33	AVES336M06C12T-F	3.0	0.30	15.1	30	C	5 x 5.3	1000
47	AVES476M06C12T-F	3.0	0.30	10.6	46	C	5 x 5.3	1000
100	AVES107M06D16T-F	6.3	0.30	5.0	61	D	6.3 x 5.3	1000
<b>10 Vdc ( 13 Vdc Surge)</b>								
10	AVES106M10B12T-F	3.0	0.26	43.1	15	B	4 x 5.3	2000
22	AVES226M10C12T-F	3.0	0.26	19.6	25	C	5 x 5.3	1000
33	AVES336M10C12T-F	3.3	0.26	13.1	31	C	5 x 5.3	1000
47	AVES476M10D16T-F	4.7	0.26	9.2	43	D	6.3 x 5.3	1000
100	AVES107M10D16T-F	10.0	0.26	4.3	65	D	6.3 x 5.3	1000

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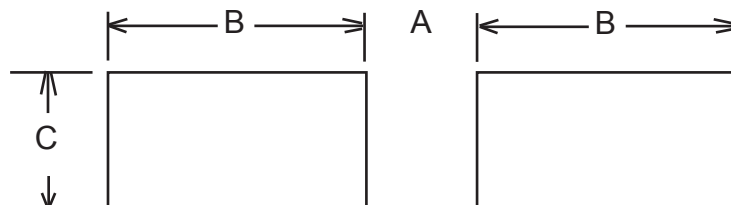
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Cap ( $\mu\text{F}$ )	Catalog Part Number	Max DCL 2 min. ( $\mu\text{A}$ )	Max DF 120 Hz 20 $^{\circ}\text{C}$	Max ESR 120 Hz 20 $^{\circ}\text{C}$ (ohms)	Max Ripple Current 120 Hz 105 $^{\circ}\text{C}$ (mA)	Size D x L (mm)	Quantity per Reel (each)
<b>16 Vdc ( 20 Vdc Surge)</b>							
10	AVES106M16B12T-F	3.0	0.22	36.5	16	4 x 5.3	2000
22	AVES226M16C12T-F	3.5	0.22	16.6	28	5 x 5.3	1000
33	AVES336M16D16T-F	5.3	0.22	11.1	40	6.3 x 5.3	1000
47	AVES476M16D16T-F	7.5	0.22	7.8	47	6.3 x 5.3	1000
100	AVES107M16D16T-F	16.0	0.22	3.6	70	6.3 x 5.3	1000
<b>25 Vdc (31 Vdc Surge)</b>							
4.7	AVES475M25B12T-F	3.0	0.16	56.4	12	4 x 5.3	2000
10	AVES106M25C12T-F	3.0	0.16	26.5	21	5 x 5.3	1000
22	AVES226M25D16T-F	5.5	0.16	12.1	36	6.3 x 5.3	1000
33	AVES336M25D16T-F	8.3	0.16	8.0	44	6.3 x 5.3	1000
47	AVES476M25D16T-F	11.8	0.16	5.6	60	6.3 x 5.3	1000
<b>35 Vdc (44 Vdc Surge)</b>							
4.7	AVES475M35B12T-F	3.0	0.13	45.9	14	4 x 5.3	2000
10.0	AVES106M35C12T-F	3.5	0.13	21.6	23	5 x 5.3	1000
22.0	AVES226M35D16T-F	7.7	0.13	9.8	50	6.3 x 5.3	1000
<b>50 Vdc (63 Vdc Surge)</b>							
.10	AVES104M50B12T-F	3.0	0.12	1989.4	2	4 x 5.3	2000
.22	AVES224M50B12T-F	3.0	0.12	904.3	3	4 x 5.3	2000
.33	AVES334M50B12T-F	3.0	0.12	602.8	4	4 x 5.3	2000
.47	AVES474M50B12T-F	3.0	0.12	423.3	5	4 x 5.3	2000
1.0	AVES105M50B12T-F	3.0	0.12	198.9	7	4 x 5.3	2000
2.2	AVES225M50B12T-F	3.0	0.12	90.4	10	4 x 5.3	2000
3.3	AVES335M50B12T-F	3.0	0.12	60.3	12	4 x 5.3	2000
4.7	AVES475M50C12T-F	3.0	0.12	42.3	17	5 x 5.3	1000
10.0	AVES106M50D16T-F	5.0	0.12	19.9	26	6.3 x 5.3	1000
22.0	AVES226M50D16T-F	11.0	0.12	9.0	51	6.3 x 5.3	1000

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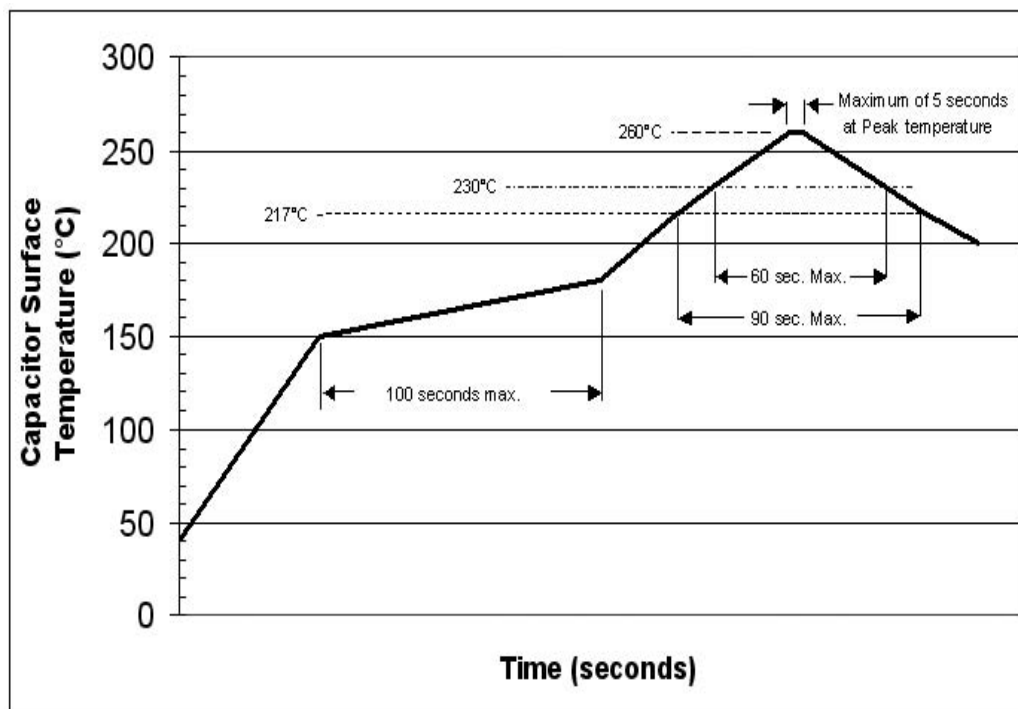
### Recommended Land Patterns by case size for AVES series



Case Code	Case Size	Land Dimensions (mm)		
		C	B	A
B	4x5.3	1.6	2.6	1
C	5x5.3	1.6	3	1.4
D	6.3x5.3	1.6	3.5	1.9

### Recommended Soldering Methods

Recommended Reflow Soldering Profile:



Parts should be subjected to just one reflow soldering process.

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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