

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

## Low Profile SMT Aluminum Electrolytic Capacitors

For Filtering, Bypassing and Power Supply Decoupling



Type AVES Capacitors are rated for 1000 hours at  $105^{\circ}\text{C}$  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

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

### Specifications

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

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

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

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

**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)<br>Vdc | 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:**  
( $\tan \delta$  at 120 Hz,  $20^{\circ}\text{C}$ )

| 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<br>Ratio | $Z(-25^{\circ}\text{C}) / Z(+20^{\circ}\text{C})$ | 4   | 3  | 2  | 2  | 2  | 2  |
|                    | $Z(-40^{\circ}\text{C}) / Z(+20^{\circ}\text{C})$ | 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  $20^{\circ}\text{C}$  after the rated voltage is applied for 1,000 hrs at  $105^{\circ}\text{C}$

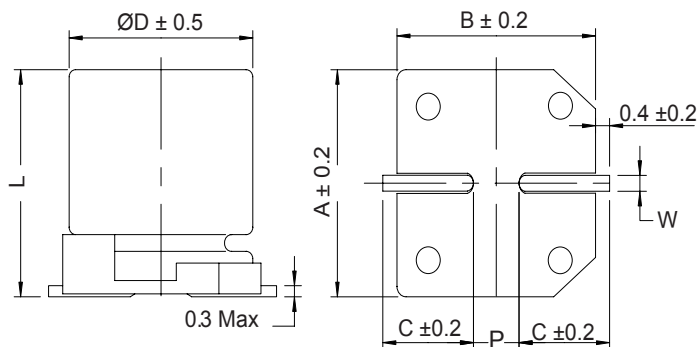
Complies with the EU Directive 2002/95/EC requirement restricting the use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent chromium (Cr(VI)), PolyBrominated Biphenyls (PBB) and PolyBrominated Diphenyl Ethers (PBDE).

**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 | Ø D (mm) | L (mm)        | A (mm) | B (mm) | C (mm) | W (mm)     | P ±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

**AVES**

**Series**  
AVES

**106**

**Capacitance**

**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**

**Capacitance Tolerance**

**M** =  $\pm 20\%$

**16**

**Voltage**

**06** = 6.3 Vdc

**10** = 10 Vdc

**16** = 16 Vdc

**25** = 25 Vdc

**50** = 50 Vdc

**B**

**Case Code**

**B** = B

**12T**

**Packaging Information**

**12** = Carrier Tape

Width (mm)

**T** = Tape & Reel

**- F**

**RoHS Compliant**

### Ratings

| Cap (µF)                      | Catalog Part Number | Max DCL 2 min. (µA) | Max DF 120 Hz 20 °C | Max ESR 120 Hz 20 °C (ohms) | Max Ripple Current 120 Hz 105 °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                     |

# Type AVES –55 °C to +105 °C

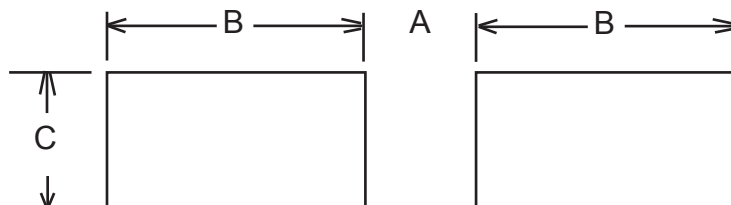
## Low Profile SMT Aluminum Electrolytic Capacitors

| Cap<br>(µF)            | Catalog<br>Part Number | Max<br>DCL<br>2 min.<br>(µA) | Max<br>DF<br>120 Hz 20 °C | Max<br>ESR<br>120 Hz 20 °C<br>( ohms ) | Max<br>Ripple Current<br>120 Hz 105 °C<br>(mA) | Size<br>D x L<br>(mm) | Quantity<br>per Reel<br>(each) |
|------------------------|------------------------|------------------------------|---------------------------|----------------------------------------|------------------------------------------------|-----------------------|--------------------------------|
| 16 Vdc ( 20 Vdc Surge) |                        |                              |                           |                                        |                                                |                       |                                |
| 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                           |
| 25 Vdc (31 Vdc Surge)  |                        |                              |                           |                                        |                                                |                       |                                |
| 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                           |
| 35 Vdc (44 Vdc Surge)  |                        |                              |                           |                                        |                                                |                       |                                |
| 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                           |
| 50 Vdc (63 Vdc Surge)  |                        |                              |                           |                                        |                                                |                       |                                |
| .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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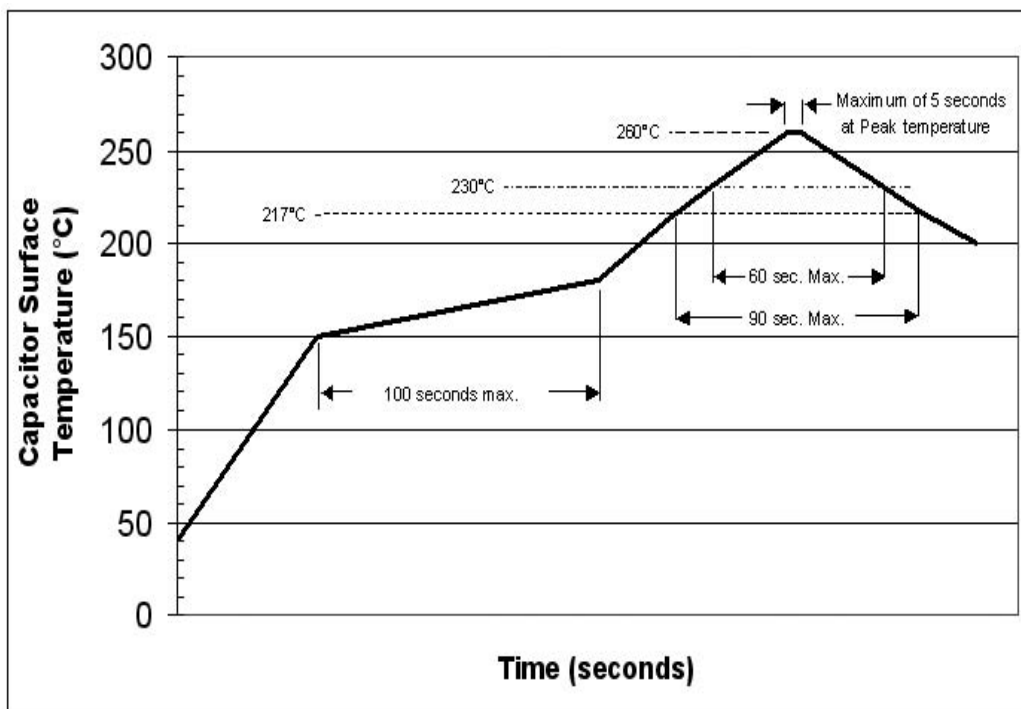
#### Recommended Land Patterns by case size for AVES series



| 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.



**Стандарт  
Электрон  
Связь**

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