# Wet Tantalum Capacitors Surface Mount, Molded Case




## FEATURES

- Molded surface mountable design
- Terminations: standard tin/lead (SnPb), 100 % tin (RoHS compliant) available
- Industry standard ratings
- Model M35 wet tantalum electrolytic chip capacitors incorporate the advantages of all the varieties of electrolytic capacitors and eliminate most of the disadvantages. These units have a 3 V reverse voltage capability at + 85 °C and a higher ripple current capability than any other electrolytic type with similar combinations of capacitance and case size.
- Compliant to RoHS Directive 2002/95/EC

Pb-free Available

RoHS* COMPLIANT

**Note**

* Pb containing terminations are not RoHS compliant, exemptions may apply

## PERFORMANCE CHARACTERISTICS

**Operating Temperature:** - 55 °C to + 85 °C (to + 125 °C with voltage derating)

**Capacitance Tolerance:** At 120 Hz, + 25 °C. ± 20 % standard. ± 10 %, ± 5 % available as special.

**DC Leakage Current (DCL Max.):** At + 25 °C and above: Leakage current shall not exceed the values listed in the Standard Ratings Tables.

**Life Test:** Capacitors are capable of withstanding a 2000 h life test at a temperature of + 85 °C or + 125 °C at the applicable rated DC working voltage.

Following life test:

1. DCL, measured at + 85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

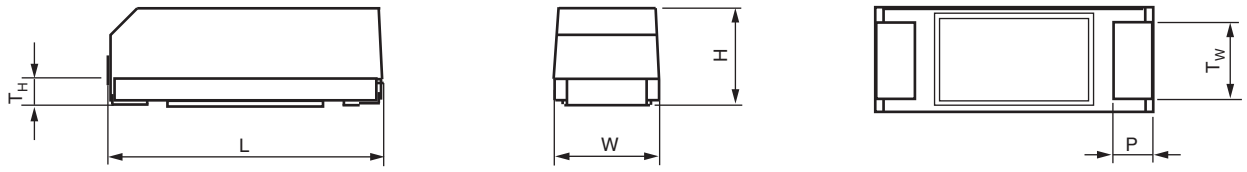
## ORDERING INFORMATION

| M35 | C | 826 | M | 125 | B | Z | S | L |
|---|---|---|---|---|---|---|---|---|
| MODEL | CASE CODE | CAPACITANCE | CAPACITANCE TOLERANCE | DC VOLTAGE RATING AT + 85 °C | TERMINATION AND PACKAGING | RELIABILITY LEVEL | TEMP | ESR |
| | See Ratings and Case Codes table | This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow. | K = ± 10 %<br>M = ± 20 % | This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V) | A = 100 % tin (RoHS compliant), bulk<br>B = Std, tin/lead, bulk | Z = Non-ER | S = Std | **S = Std.**<br>L = Low |

**Note**

- Packaging: The use of formed plastic tubes for packing bulk components is standard

## DIMENSIONS in inches [millimeters]



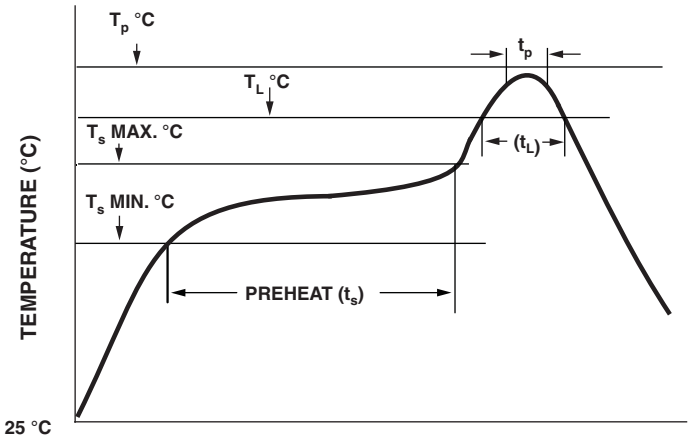

| CASE CODE | L (MAX.) | W | H | P (MIN.) | $T_W$ | $T_H$ (MIN.) |
|---|---|---|---|---|---|---|
| C | 0.835<br>[21.2] | 0.315 ± 0.012<br>[8 ± 0.3] | 0.295 ± 0.012<br>[7.5 ± 0.3] | 0.118<br>[3.0] | 0.236 ± 0.012<br>[6.0 ± 0.3] | 0.075<br>[1.9] |



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## RECOMMENDED REFLOW PROFILES




| $T_p$ Lead (Pb)-free | $T_p$ Sn/Pb | $t_p$ | $T_L$ Lead (Pb)-free | $T_L$ Sn/Pb | $T_s$ MIN. Lead (Pb)-free | $T_s$ MIN. Sn/Pb | $T_s$ MAX. Lead (Pb)-free | $T_s$ MAX. Sn/Pb | $t_s$ Lead (Pb)-free | $t_s$ Sn/Pb | $t_L$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 260 °C | 240 °C | 10 | 217 °C | 183 °C | 150 °C | 100 °C | 200 °C | 150 °C | 60 to 150 | 60 to 90 | 60 |

## MOUNTING

Due to the size and weight of these capacitors, we recommend that a supplemental mounting restraint to be used in printed circuit board attachment in addition to the reflowed solder.

One recommendation is to use an adhesive such as defined in the J-STD-001DS.

This is the Space Application Electronic Hardware Addendum to J-STD-001 (Requirements for Solder Electrical and Electronic Assemblies).

## STANDARD RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER | MAX. ESR AT + 25 °C | MAX. ESR AT - 55 °C | MAX. DCL (µA) AT | | MAX. CAPACITANCE CHANGE (%) AT | | | MAX. RIPPLE 40 kHz RMS (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | + 25 °C | + 85 °C + 125 °C | - 55 °C | + 85 °C | + 125 °C | |
| **6 $V_{DC}$ AT + 85 °C; 4 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 30 | C | M35C306(1)006(2)ZS(3) | 4.0 | 100 | 1.0 | 2.0 | - 40 | + 10.5 | + 12 | 820 |
| 68 | C | M35C686(1)006(2)ZS(3) | 3.2 | 60 | 1.0 | 2.0 | - 40 | + 14 | + 16 | 960 |
| 220 | C | M35C227(1)006(2)ZS(3) | 3.0 | 36 | 2.0 | 9.0 | - 64 | + 13 | + 16 | 1000 |
| **8 $V_{DC}$ AT + 85 °C; 5 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 25 | C | M35C256(1)008(2)ZS(3) | 4.0 | 100 | 1.0 | 2.0 | - 40 | + 10.5 | + 12 | 820 |
| 56 | C | M35C566(1)008(2)ZS(3) | 3.3 | 59 | 1.0 | 2.0 | - 40 | + 14 | + 16 | 900 |
| 180 | C | M35C187(1)008(2)ZS(3) | 3.0 | 45 | 2.0 | 9.0 | - 60 | + 13 | + 16 | 1000 |
| **10 $V_{DC}$ AT + 85 °C; 7 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 20 | C | M35C206(1)010(2)ZS(3) | 4.0 | 120 | 1.0 | 2.0 | - 32 | + 10.5 | + 12 | 820 |
| 47 | C | M35C476(1)010(2)ZS(3) | 3.7 | 90 | 1.0 | 2.0 | - 36 | + 14 | + 16 | 855 |
| 120 | C | M35C127(1)010(2)ZS(3) | 3.2 | 54 | 2.0 | 6.0 | - 40 | + 14 | + 16 | 900 |
| 150 | C | M35C157(1)010(2)ZS(3) | 3.0 | 54 | 2.0 | 9.0 | - 55 | + 13 | + 16 | 900 |

**Note**

- Part number definitions:
  (1) Capacitance tolerance: K, M
  (2) Termination/packaging: (see Ordering Information)
  Reliability level: Z = Non-ER
  Temperature: S = STD
  (3) ESR: S = STD, L = Low (1/2 standard ESR value)



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## STANDARD RATINGS

| CAPACITANCE (µF) | CASE CODE | PART NUMBER | MAX. ESR AT + 25 °C | MAX. ESR AT - 55 °C | MAX. DCL (µA) AT | | MAX. CAPACITANCE CHANGE (%) AT | | | MAX. RIPPLE 40 kHz RMS (mA) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | + 25 °C | + 85 °C + 125 °C | - 55 °C | + 85 °C | + 125 °C | |
| **15 $V_{DC}$ AT + 85 °C; 10 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 15 | C | M35C156(1)015(2)ZS(3) | 4.4 | 155 | 1.0 | 2.0 | - 24 | + 10.5 | + 12 | 780 |
| 33 | C | M35C336(1)015(2)ZS(3) | 4.0 | 90 | 1.0 | 2.0 | - 28 | + 14 | + 16 | 820 |
| 82 | C | M35C826(1)015(2)ZS(3) | 3.9 | 72 | 2.0 | 6.0 | - 35 | + 12 | + 16 | 900 |
| 100 | C | M35C107(1)015(2)ZS(3) | 3.9 | 72 | 2.0 | 9.0 | - 44 | + 13 | + 16 | 900 |
| **25 $V_{DC}$ AT + 85 °C; 15 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 10 | C | M35C106(1)025(2)ZS(3) | 5.3 | 220 | 1.0 | 2.0 | - 16 | + 8 | + 9 | 715 |
| 22 | C | M35C226(1)025(2)ZS(3) | 4.2 | 140 | 1.0 | 2.0 | - 20 | + 10.5 | + 12 | 800 |
| 56 | C | M35C566(1)025(2)ZS(5) | 4.3 | 90 | 2.0 | 6.0 | - 25 | + 12 | + 15 | 850 |
| 68 | C | M35C686(1)025(2)ZS(5) | 4.3 | 90 | 2.0 | 9.0 | - 40 | + 12 | + 15 | 850 |
| **30 $V_{DC}$ AT + 85 °C; 20 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 8 | C | M35C805(1)030(2)ZS(3) | 6.6 | 275 | 1.0 | 2.0 | - 16 | + 8 | + 12 | 640 |
| 15 | C | M35C156(1)030(2)ZS(3) | 6.2 | 175 | 1.0 | 2.0 | - 20 | + 10.5 | + 12 | 780 |
| 47 | C | M35C476(1)030(2)ZS(3) | 5.2 | 100 | 2.0 | 6.0 | - 23 | + 12 | + 15 | 800 |
| 56 | C | M35C566(1)030(2)ZS(3) | 5.2 | 100 | 2.0 | 9.0 | - 38 | + 12 | + 15 | 800 |
| **35 $V_{DC}$ AT + 85 °C; 22 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 15 | C | M35C156(1)035(2)ZS(3) | 6.2 | 175 | 0.75 | 1.5 | - 20 | + 10.5 | + 12 | 660 |
| 39 | C | M35C396(1)035(2)ZS(3) | 4.1 | 61 | 2.0 | 6.0 | - 22 | + 12 | + 14 | 820 |
| **50 $V_{DC}$ AT + 85 °C; 30 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 5 | C | M35C505(1)050(2)ZS(3) | 8.0 | 400 | 1.0 | 2.0 | - 16 | + 5 | + 6 | 580 |
| 10 | C | M35C106(1)050(2)ZS(3) | 6.4 | 250 | 1.0 | 2.0 | - 24 | + 8 | + 9 | 715 |
| 33 | C | M35C336(1)050(2)ZS(3) | 5.0 | 135 | 2.0 | 9.0 | - 29 | + 10 | + 12 | 700 |
| **60 $V_{DC}$ AT + 85 °C; 40 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 4 | C | M35C405(1)060(2)ZS(3) | 9.3 | 550 | 1.0 | 2.0 | - 16 | + 5 | + 6 | 525 |
| 8.2 | C | M35C825(1)060(2)ZS(3) | 6.6 | 275 | 1.0 | 2.0 | - 24 | + 8 | + 9 | 625 |
| 27 | C | M35C276(1)060(2)ZS(3) | 5.0 | 144 | 3.0 | 12 | - 24 | + 10 | + 12 | 700 |
| **75 $V_{DC}$ AT + 85 °C; 50 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 3.5 | C | M35C355(1)075(2)ZS(3) | 9.5 | 650 | 1.0 | 2.0 | - 16 | + 5 | + 6 | 525 |
| 6.8 | C | M35C685(1)075(2)ZS(3) | 6.8 | 300 | 1.0 | 2.0 | - 20 | + 8 | + 9 | 610 |
| 22 | C | M35C226(1)075(2)ZS(3) | 5.1 | 157 | 3.0 | 12 | - 19 | + 10 | + 12 | 600 |
| **100 $V_{DC}$ AT + 85 °C; 65 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 2.5 | C | M35C255(1)100(2)ZS(3) | 10.6 | 950 | 1.0 | 2.0 | - 16 | + 7 | + 8 | 505 |
| 4.7 | C | M35C475(1)100(2)ZS(3) | 8.5 | 500 | 1.0 | 2.0 | - 16 | + 7 | + 8 | 565 |
| 10 | C | M35C106(1)100(2)ZS(3) | 5.9 | 200 | 3.0 | 12 | - 17 | + 10 | + 12 | 800 |
| **125 $V_{DC}$ AT + 85 °C; 85 $V_{DC}$ AT + 125 °C** | | | | | | | | | | |
| 1.7 | C | M35C175(1)125(2)ZS(3) | 15.6 | 1250 | 1.0 | 2.0 | - 16 | + 7 | + 8 | 415 |
| 3.6 | C | M35C365(1)125(2)ZS(3) | 10.0 | 600 | 1.0 | 2.0 | - 16 | + 7 | + 8 | 520 |
| 6.8 | C | M35C685(1)125(2)ZS(3) | 11.7 | 300 | 3.0 | 12 | - 14 | + 10 | + 12 | 700 |

**Note**

- Part number definitions:
  (1) Capacitance tolerance: K, M
  (2) Termination/packaging: (see Ordering Information)
  Reliability level: Z = Non-ER
  Temperature: S = STD
  (3) ESR: S = STD, L = Low (1/2 standard ESR value)


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## PERFORMANCE CHARACTERISTICS OF M35 CAPACITORS

### ELECTRICAL CHARACTERISTICS

| ITEM | PERFORMANCE CHARACTERISTICS |
|---|---|
| Operating temperature range | - 55 °C to + 125 °C |
| Capacitor tolerance | ± 20 %, ± 10 % at 120 Hz |
| Capacitance change (maximum) | Limits per Standard Ratings table. Measured per requirements of MIL-PRF-39006. |
| ESR | |
| AC ripple current | |
| DCL (maximum leakage current) | |
| Impedance (maximum) | |
| Reverse voltage | Reverse voltage shall be in accordance with MIL-PRF-39006/22.<br>Units are capable of withstanding 3 V in reverse at + 85 °C for 125 h. |
| Surge voltage | Surge voltage shall be in accordance with MIL-PRF-39006.<br>The DC rated surge voltage is the maximum voltage to which the capacitors should be subjected under any conditions. This includes transients and peak ripple at the highest line voltage. The surge voltage is 115 % of rated DC working voltage. |
| Life test | The capacitors shall be capable of withstanding a 2000 h life test at 85 °C at rated voltage. |

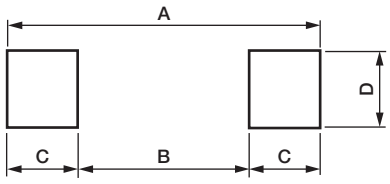
### ENVIRONMENTAL CHARACTERISTICS

| ITEM | CONDITION | COMMENTS |
|---|---|---|
| Hermeticity | MIL-PRF-39006 | The internal component has been tested to be compliant to the hermeticity requirements of MIL-PRF-39006/22.<br>The internal component has been tested to be compliant to the moisture resistance requirements of MIL-PRF-39006/22.<br>The internal component has been tested to be compliant to the altitude or reduced barometric pressure requirements of MIL-PRF-39006/22 (150 000 feet). |
| Moisture resistance | MIL-PRF-39006 | |
| Altitude/barometric pressure (reduced) | MIL-PRF-39006 | |

### MECHANICAL CHARACTERISTICS

| ITEM | CONDITION | COMMENTS |
|---|---|---|
| Thermal shock | MIL-STD-202, Method 107, A | Per MIL-PRF-39006, 30 cycles |
| Shock | MIL-STD-202, Method 213 | Per MIL-PRF-39006, 500 g |
| Vibration (high frequency) | MIL-STD-202, Method 204 | Per MIL-PRF-39006, 80 g |
| Vibration (random) | MIL-STD-202, Method 214 | Per MIL-PRF-39006, 53.79 g |
| Resistance to solder heat | MIL-STD-202, Method 210 | The capacitor must withstand solder dipping of the terminals at 260 °C for 10 s. The capacitor must not be visibly damaged and the electrical characteristics must not be affected. |
| Solderability | ANSI J-STD-002 | The terminations must be solderable per the requirements of MIL-PRF-55365 para. 4.10 |
| Part markings | MIL-STD-1285 | The part marking shall include Vishay name, trademark, capacitance, voltage, date code and lot symbol. |
| Weight (typical) in g | 3.5 | |

### PAD DIMENSIONS in millimeters




| CASE CODE | A (MIN.) | B (NOM.) | C (NOM.) | D (NOM.) |
|---|---|---|---|---|
| C | 22.7 | 14.7 | 4.0 | 6.4 |

### STANDARD PACKAGING QUANTITY

| SERIES | CASE CODE | BULK/TUBE |
|---|---|---|
| M35 | C | 10 pcs |


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