

# 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



**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:

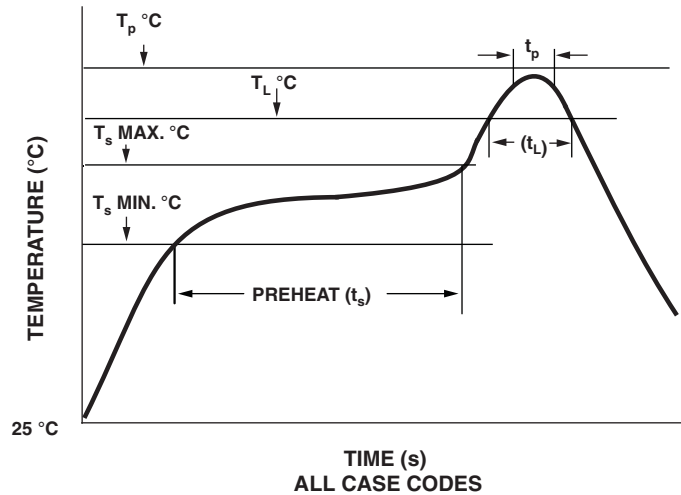
1. DCL, measured at + 85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

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 % 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 B = Std, tin/lead, bulk	Z = Non-ER	S = Std	S = Std. 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.)	TW	TH (MIN.)
C	0.835 [21.2]	0.315 ± 0.012 [8 ± 0.3]	0.295 ± 0.012 [7.5 ± 0.3]	0.118 [3.0]	0.236 ± 0.012 [6.0 ± 0.3]	0.075 [1.9]

**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 ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. ESR AT + 25 °C	MAX. ESR AT - 55 °C	MAX. DCL ( $\mu$ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE 40 kHz RMS (mA)
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C	
<b>6 V<sub>DC</sub> AT + 85 °C; 4 V<sub>DC</sub> AT + 125 °C</b>										
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
<b>8 V<sub>DC</sub> AT + 85 °C; 5 V<sub>DC</sub> AT + 125 °C</b>										
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
<b>10 V<sub>DC</sub> AT + 85 °C; 7 V<sub>DC</sub> AT + 125 °C</b>										
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:
  - Capacitance tolerance: K, M
  - Termination/packaging: (see Ordering Information)
  - Reliability level: Z = Non-ER
  - Temperature: S = STD
  - ESR: S = STD, L = Low (1/2 standard ESR value)



STANDARD RATINGS											
CAPACITANCE ( $\mu$ F)	CASE CODE	PART NUMBER	MAX. ESR AT + 25 °C	MAX. ESR AT - 55 °C	MAX. DCL ( $\mu$ A) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE 40 kHz RMS (mA)	
					+ 25 °C	+ 85 °C + 125 °C	- 55 °C	+ 85 °C	+ 125 °C		
<b>15 V<sub>DC</sub> AT + 85 °C; 10 V<sub>DC</sub> AT + 125 °C</b>											
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	
<b>25 V<sub>DC</sub> AT + 85 °C; 15 V<sub>DC</sub> AT + 125 °C</b>											
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	
<b>30 V<sub>DC</sub> AT + 85 °C; 20 V<sub>DC</sub> AT + 125 °C</b>											
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	
<b>35 V<sub>DC</sub> AT + 85 °C; 22 V<sub>DC</sub> AT + 125 °C</b>											
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	
<b>50 V<sub>DC</sub> AT + 85 °C; 30 V<sub>DC</sub> AT + 125 °C</b>											
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	
<b>60 V<sub>DC</sub> AT + 85 °C; 40 V<sub>DC</sub> AT + 125 °C</b>											
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	
<b>75 V<sub>DC</sub> AT + 85 °C; 50 V<sub>DC</sub> AT + 125 °C</b>											
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	
<b>100 V<sub>DC</sub> AT + 85 °C; 65 V<sub>DC</sub> AT + 125 °C</b>											
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	
<b>125 V<sub>DC</sub> AT + 85 °C; 85 V<sub>DC</sub> AT + 125 °C</b>											
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**

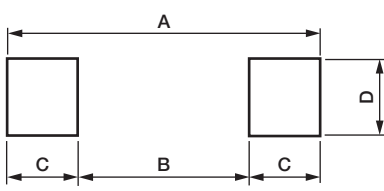
- Part number definitions:
  - (1) Capacitance tolerance: K, M
  - (2) Termination/packaging: (see Ordering Information)
  - Reliability level: Z = Non-ER
  - Temperature: S = STD
  - (3) ESR: S = STD, L = Low (1/2 standard ESR value)

**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. 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. 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. The internal component has been tested to be compliant to the moisture resistance requirements of MIL-PRF-39006/22. 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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