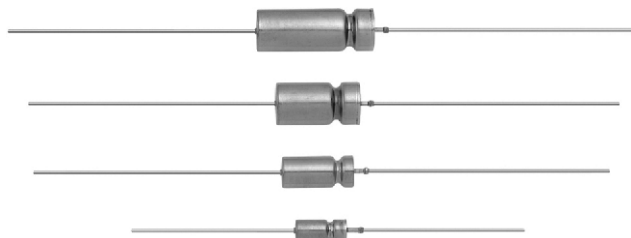


# Wet Tantalum HI-TMP® Capacitors Tantalum Case with Glass-to-Tantalum Hermetic Seal for -55 °C to +200 °C Operation



## PERFORMANCE CHARACTERISTICS

**Operating Temperature:** -55 °C to +85 °C

(to +200 °C with voltage derating)

**Capacitance Tolerance:** at 120 Hz, +25 °C; ± 20 % standard; ± 10 %

**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 500 h life test at a temperature of +200 °C at the applicable derated DC working voltage.

## FEATURES

- High capacitance
- Hermetically sealed, tantalum case
- +200 °C high temperature
- Terminations: axial, standard tin / lead (SnPb)
- 100 % tin (RoHS-compliant) available
- Mounting: through-hole
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS\***  
Available

**HALOGEN  
FREE  
GREEN  
(5-2008)**  
Available

## Note

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

## APPLICATIONS

- Industrial
- Petroleum exploration
- High temperature / high stress environment

## ORDERING INFORMATION

134D	227	X0	100	K	6	E3
TYPE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT +85 °C	CASE CODE	STYLE NUMBER	RoHS COMPLIANT
This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow		X0 = ± 20 % X9 = ± 10 %	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)	See Ratings and Case Codes table	High temperature 8 = no outer insulating sleeve 6 = high temperature film insulation (above +125 °C)	E3 = 100 % tin termination (RoHS compliant design) Blank = SnPb termination (standard design)

## Note

- Packaging: the use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not available due to the unit weight.

## DIMENSIONS in inches [millimeters]

CASE CODE		D	L <sub>1</sub> (1)	L <sub>2</sub> (Max.)	E	WEIGHT (g) (Max.)
TYPE 134D	CLR 79 / 81 EQUIV.					
C	T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 ± 0.031 / - 0.016 [11.51 ± 0.79 / - 0.41]	0.734 [18.64]	1.500 ± 0.250 [38.10 ± 6.35]	2.6
F	T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 ± 0.031 / - 0.016 [16.28 ± 0.79 / - 0.41]	0.922 [23.42]	2.250 ± 0.250 [57.15 ± 6.35]	6.2
T	T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 ± 0.031 / - 0.016 [19.46 ± 0.79 / - 0.41]	1.047 [26.59]	2.250 ± 0.250 [57.15 ± 6.35]	11.6
K	T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 ± 0.031 / - 0.016 [26.97 ± 0.79 / - 0.41]	1.343 [34.11]	2.250 ± 0.250 [57.15 ± 6.35]	17.7

## Note

(1) For insulated parts, add 0.015 inches [0.38 mm] to the diameter. The insulation shall lap over the ends of the capacitor body.

**STANDARD RATINGS**

CAPACITANCE AT 25 °C 120 Hz ( $\mu$ F)	CASE CODE	MAX. 120 Hz ESR ( $\Omega$ )	MAX. DCL ( $\mu$ A) 25 °C	MAX. DCL ( $\mu$ A) 85 °C/ 125 °C	MAX. IMP., Z AT -25 °C ( $\Omega$ )	MAX. $\Delta$ CAP. AT -25 °C (%)	TYP. IMP., Z AT -55 °C ( $\Omega$ )	TYP. $\Delta$ CAP. AT -55 °C (%)	TYP. $\Delta$ CAP. (%) 85 °C	TYP. $\Delta$ CAP. (%) 125 °C	AC RIPPLE 85 °C 40 kHz (mA) RMS	PART NUMBER
<b>50 V<sub>DC</sub> AT 85 °C; 30 V<sub>DC</sub> AT 125 °C; 30 V<sub>DC</sub> AT 200 °C</b>												
68	C	1.50	1	5	22	-6	25	-11	12	55	1400	134D686(1)050C(2)(3)
220	F	0.90	2	10	9	-15	10	-25	13	50	2300	134D227(1)050F(2)(3)
470	T	0.75	3	25	6	-24	8	-50	10	25	2650	134D477(1)050T(2)(3)
680	K	0.70	5	40	4	-22	5	-40	12	40	2900	134D687(1)050K(2)(3)
<b>60 V<sub>DC</sub> AT 85 °C; 40 V<sub>DC</sub> AT 125 °C; 36 V<sub>DC</sub> AT 200 °C</b>												
47	C	2.00	1	5	34	-8	40	-20	8	12	1250	134D476(1)060C(2)(3)
150	F	1.10	2	10	13	-11	15	-25	10	30	2050	134D157(1)060F(2)(3)
390	T	0.90	3	25	7	-27	10	-50	10	25	2450	134D397(1)060T(2)(3)
560	K	0.80	5	40	5	-21	6	-40	12	40	2700	134D567(1)060K(2)(3)
<b>75 V<sub>DC</sub> AT 85 °C; 50 V<sub>DC</sub> AT 125 °C; 45 V<sub>DC</sub> AT 200 °C</b>												
33	C	2.50	1	5	45	-3.5	50	-6	8	25	1100	134D336(1)075C(2)(3)
110	F	1.30	2	10	16	-8	20	-18	8	30	1900	134D117(1)075F(2)(3)
330	T	1.00	3	30	8	-30	12	-50	10	25	2300	134D337(1)075T(2)(3)
470	K	0.90	5	50	6	-20	7	-40	10	40	2550	134D477(1)075K(2)(3)
<b>100 V<sub>DC</sub> AT 85 °C; 65 V<sub>DC</sub> AT 125 °C; 60 V<sub>DC</sub> AT 200 °C</b>												
15	C	3.50	1	5	95	-2.5	100	-4	8	25	950	134D156(1)100C(2)(3)
68	F	2.10	2	10	25	-6	30	-14	8	25	1500	134D686(1)100F(2)(3)
150	T	1.60	3	25	14	-12	18	-30	8	22	1800	134D157(1)100T(2)(3)
220	K	1.20	5	50	13	-44	16	-55	8	15	2200	134D227(1)100K(2)(3)
<b>125 V<sub>DC</sub> AT 85 °C; 85 V<sub>DC</sub> AT 125 °C; 75 V<sub>DC</sub> AT 200 °C</b>												
10	C	5.50	1	5	145	-2.5	150	-4	8	20	750	134D106(1)125C(2)(3)
47	F	2.30	2	10	35	-5	40	-12	7	20	1450	134D476(1)125F(2)(3)
50	F	2.30	3	10	35	-5	40	-12	7	20	1450	134D506(1)125F(2)(3)
100	T	1.80	3	25	24	-20	30	-35	8	20	1700	134D107(1)125T(2)(3)
150	K	1.60	5	50	13	-10	16	-28	6	12	1900	134D157(1)125K(2)(3)

**Note**

- Part number definitions:
  - Capacitance tolerance: X9 = 10 %, X0 = 20 %
  - Style number: 8 = no film insulation, 6 = high temperature film insulation
  - Termination: blank = standard tin/lead, E3 = RoHS compliant 100 % tin



## EXTENDED RATINGS

CAPACITANCE AT 25 °C 120 Hz (μF)	CASE CODE	MAX. 120 Hz ESR (Ω)	MAX. DCL (μA) 25 °C	MAX. DCL (μA) 85 °C/ 125 °C	MAX. IMP., Z AT -25 °C (Ω)	MAX. ΔCAP. AT -25 °C (%)	TYP. IMP., Z AT -55 °C (Ω)	TYP. ΔCAP. AT -55 °C (%)	TYP. ΔCAP. (%) 85 °C	TYP. ΔCAP. (%) 125 °C	AC RIPPLE 85 °C 40 kHz (mA) RMS	PART NUMBER
50 V <sub>DC</sub> AT 85 °C; 30 V <sub>DC</sub> AT 125 °C; 30 V <sub>DC</sub> AT 200 °C												
	C											
	F											
	T											
	K											
60 V <sub>DC</sub> AT 85 °C; 40 V <sub>DC</sub> AT 125 °C; 36 V <sub>DC</sub> AT 200 °C												
	C											
	F											
	T											
1000	K	0.50	20	120	3	-25	< 4.5	< -55	< 12	< 15	3500	134D108(1)060K(2)(3)
75 V <sub>DC</sub> AT 85 °C; 50 V <sub>DC</sub> AT 125 °C; 45 V <sub>DC</sub> AT 200 °C												
	C											
180	F	1.50	5	25			30	-35	15	20	2000	134D187(1)075C(2)(3)
	T											
750	K	0.60	20	120	3	-25	< 6.0	< -60	< 10	< 15	3500	134D757(1)075K(2)(3)
100 V <sub>DC</sub> AT 85 °C; 65 V <sub>DC</sub> AT 125 °C; 60 V <sub>DC</sub> AT 200 °C												
	C											
	F											
220	T	1.60	5	30	15	-40	15	-45	10	15	1800	134D227(1)100T(2)(3)
400	K	0.70	10	120	5	-15	15	-55	10	15	3250	134D407(1)100K(2)(3)
125 V <sub>DC</sub> AT 85 °C; 85 V <sub>DC</sub> AT 125 °C; 75 V <sub>DC</sub> AT 200 °C												
	C											
	F											
	T											
240	K	0.80	10	50	10	-10	20	-35	6	12	2500	134D247(1)125K(2)(3)

## Notes

- In bold and italic: preliminary rating and electrical values. Contact marketing for availability.
- Part number definitions:
  - (1) Capacitance tolerance: X9 = 10 %, X0 = 20 %
  - (2) Style number: 8 = no film insulation, 6 = high temperature film insulation
  - (3) Termination: blank = standard tin/lead, E3 = RoHS compliant 100 % tin

## RIPPLE CURRENT MULTIPLIERS VS. FREQUENCY, TEMPERATURE, AND APPLIED PEAK VOLTAGE

FREQUENCY OF APPLIED RIPPLE CURRENT		120 Hz				800 Hz				1 kHz				10 kHz				40 kHz				100 kHz			
AMBIENT STILL AIR TEMP. IN °C		≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125	≤ 55	85	105	125
% of 85 °C rated peak voltage	100 %	0.60	0.39	-	-	0.71	0.43	-	-	0.72	0.46	-	-	0.88	0.55	-	-	1.0	0.63	-	-	1.1	0.69	-	-
	90 %	0.60	0.46	-	-	0.71	0.55	-	-	0.72	0.55	-	-	0.88	0.67	-	-	1.0	0.77	-	-	1.1	0.85	-	-
	80 %	0.60	0.52	0.35	-	0.71	0.62	0.42	-	0.72	0.62	0.42	-	0.88	0.76	0.52	-	1.0	0.87	0.59	-	1.1	0.96	0.65	-
	70 %	0.60	0.58	0.44	-	0.71	0.69	0.52	-	0.72	0.70	0.52	-	0.88	0.85	0.64	-	1.0	0.97	0.73	-	1.1	1.07	0.80	-
	66 2/3 %	0.60	0.60	0.46	0.27	0.71	0.71	0.55	0.32	0.72	0.72	0.55	0.32	0.88	0.88	0.68	0.40	1.0	1.0	0.77	0.45	1.1	1.1	0.85	0.50

**TYPICAL PERFORMANCE CHARACTERISTICS OF 134D CAPACITORS**

<b>ELECTRICAL CHARACTERISTICS</b>	
ITEM	PERFORMANCE CHARACTERISTICS
Operating temperature range	-55 °C to +85 °C (to +200 °C with voltage derating)
Capacitor tolerance	± 20 %, ± 10 % at 120 Hz, at +25 °C
Capacitor change by temperature	Limit per Standard Ratings table
ESR	Limit per Standard Ratings table, at +25 °C, 120 Hz
Impedance	Limit per Standard Ratings table, at -55 °C, 120 Hz
DCL (leakage current)	Limit per Standard Ratings table
AC ripple current	Limit per Standard Ratings table, at +85 °C and 40 kHz
Reverse voltage	None
Surge voltage	Surge voltage shall be in accordance with MIL-PRF-39006 and Table 2 of DSCC93026. The DC rated surge voltage is the maximum voltage to which the capacitors can be subjected under any conditions including transients and peak ripple at the highest line voltage. The DC surge voltage is 115 % of rated DC voltage.

<b>PERFORMANCE CHARACTERISTICS</b>	
ITEM	PERFORMANCE CHARACTERISTICS
Life testing	Capacitors shall be capable of withstanding a 500 h life test at a temperature +200 °C at derated voltage.

<b>ENVIRONMENTAL CHARACTERISTICS</b>		
ITEM	CONDITION	COMMENTS
Seal	MIL-PRF-39006	When the capacitors are tested as specified in MIL-PRF-39006, there shall be no evidence of leakage.
Moisture resistance	MIL-PRF-39006	Moisture resistance shall be in accordance with MIL-PRF-39006. Number of cycles: 10 continuous cycles
Barometric pressure (reduced)	MIL-STD-202, method 105, condition E	Altitude 150 000 feet

<b>MECHANICAL CHARACTERISTICS</b>		
ITEM	CONDITION	COMMENTS
Shock (specified pulse)	MIL-STD-202, method 213, condition I (100 g)	The capacitors shall meet the requirements of MIL-PRF-39006.
Vibration, high frequency	MIL-STD-202, method 204, condition E (20 g peak)	The capacitors shall meet the requirements of MIL-PRF-39006.
Thermal shock	MIL-STD-202, method 107, condition A	Thermal shock shall be in accordance with MIL-PRF-39006 when tested for 30 cycles.
Solderability	MIL-STD-202, method 208, ANSI/J-STD-002, test A	Solderability shall be in accordance with MIL-PRF-39006.
Terminal strength	MIL-STD-202, method 211	Terminal strength shall be in accordance with MIL-PRF-39006.
Resistance to solder heat	MIL-STD-202, method 210, condition C	The capacitors shall meet the requirements of MIL-PRF-39006.
Terminals	MIL-STD-1276	Terminals shall be as specified in MIL-STD-1276. The length and diameter of the terminals shall be as specified in Dimensions table. All terminals shall be permanently secured internally and externally, as applicable. All external joints shall be welded.
Marking	MIL-STD-1285	Marking of capacitors conforms to method I of MIL-STD-1285 and include capacitance (in $\mu\text{F}$ ), capacitance tolerance letter, rated voltage, date code, lot symbol, and Vishay trademark.

<b>SELECTOR GUIDES</b>	
Tantalum Selector Guide	<a href="http://www.vishay.com/doc?49054">www.vishay.com/doc?49054</a>
Parameter Comparison Guide	<a href="http://www.vishay.com/doc?42088">www.vishay.com/doc?42088</a>



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