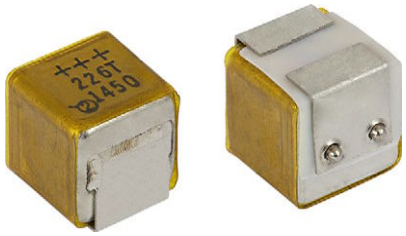
Solid Tantalum SMD Capacitors TANTAMOUNT™, Hi-Rel COTS, Low ESR, Metal Case



FEATURES

- High reliability; burn-in at a minimum of rated DC voltage for a minimum of 40 h
- Surge current testing per MIL-PRF-55365 option available
- Low ESR
- Lead (Pb)-free terminations available (tin / lead terminations are under development)
- Mounting: surface mount
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

RoHS* Available

HALOGEN FREE GREEN (5-2008) Available

PERFORMANCE CHARACTERISTICS

Operating Temperature: -55 °C to +125 °C (above 85 °C, voltage derating is required)

Capacitance Range: 22 µF to 330 µF

Capacitance Tolerance: ± 10 %, ± 20 %

Voltage Rating: 16 V_{DC} to 50 V_{DC}

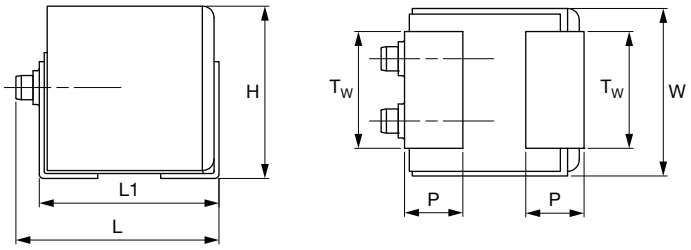
Note

* 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

ORDERING INFORMATION

T25	D	226	K	050	E	S	A
TYPE	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT +85 °C	TERMINATION / PACKAGING (available options are series dependent)	RELIABILITY GRADE	SURGE CURRENT OPTION
	See Ratings and Case Codes table	This is expressed in pF. 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).	C = 100 % tin / 7" (178 mm), reel H = 100 % tin / 7" (178 mm), 1/2 reel E = Sn / Pb solder / 7" (178 mm) reel L = Sn / Pb solder / 7" (178 mm), 1/2 reel	S = 40 h burn-in Z = non ER	A = 10 cycles at +25 °C B = 10 cycles at -55 °C / +85 °C C = 10 cycles at -55 °C / +85 °C (before burn-in) S = 3 cycles at 25 °C Z = no surge current

DIMENSIONS in inches [millimeters]



CASE CODE	L (MAX.)	L1	W	H	P	T_W
D	0.326 [8.5]	0.283 ± 0.008 [7.2 ± 0.2]	0.275 ± 0.008 [7.0 ± 0.2]	0.291 ± 0.008 [7.4 ± 0.2]	0.098 ± 0.008 [2.5 ± 0.2]	0.197 ± 0.008 [5.0 ± 0.2]

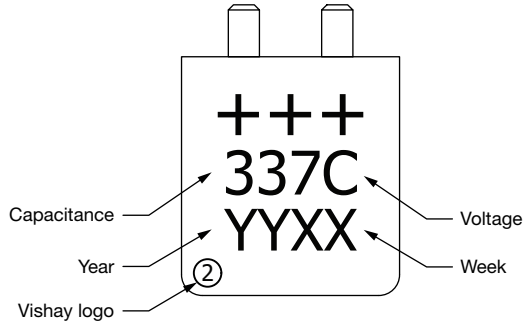
RATINGS AND CASE CODES

µF	16 V	20 V	25 V	35 V	50 V
22					D
33					
47					
68				D (1)	
100			D (1)		
150					
220		D (1)			
330	D				

Note

(1) Preliminary values, contact factory for availability.

MARKING



VOLTAGE CODE	
V	CODE
16	C
20	D
25	E
35	V
50	T

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C (µA)	MAX. DF AT +25 °C (%)	MAX. ESR AT +25 °C 100 kHz (mΩ)	MAX. RIPPLE 100 kHz I_{RMS} (A)
		16 V_{DC} AT +85 °C; 10 V_{DC} AT +125 °C				
330	D	T25D337(1)016(2)(3)(4)	52.8	14	180	1.5
		20 V_{DC} AT +85 °C; 13 V_{DC} AT +125 °C				
220	D (1)	T25D227(1)020(2)(3)(4)		In development		
		25 V_{DC} AT +85 °C; 17 V_{DC} AT +125 °C				
100	D (1)	T25D107(1)025(2)(3)(4)		In development		
		35 V_{DC} AT +85 °C; 23 V_{DC} AT +125 °C				
68	D (1)	T25D686(1)035(2)(3)(4)		In development		
		50 V_{DC} AT +85 °C; 33 V_{DC} AT +125 °C				
22	D	T25D226(1)050(2)(3)(4)	11	6	500	0.9

Notes

- Part number definitions:
  (1) Capacitance tolerance: K, M
  (2) Termination and packaging: C, H, E, L
  (3) Reliability level: S, Z
  (4) Surge current: A, B, S, C, Z

(1) Rating in development, contact factory for availability

RECOMMENDED VOLTAGE DERATING GUIDELINES (for temperatures below +85 °C)	
STANDARD CONDITIONS. FOR EXAMPLE: OUTPUT FILTERS	
Capacitor Voltage Rating	**Operating Voltage**
16	10
20	12
25	15
35	24
50	28
SEVERE CONDITIONS. FOR EXAMPLE: INPUT FILTERS	
Capacitor Voltage Rating	**Operating Voltage**
16	8.0
20	10
25	12
35	15
50	24

CARRIER TAPE DIMENSIONS in inches [millimeters]					
TYPE	**CASE CODE**	**TAPE WIDTH W (mm)**	**P_1**	**K_0 MAX.**	**B_1 MAX.**
T25	D	16	0.476 ± 0.004 [12.0 ± 0.1]	0.3 [7.86]	0.45 [11.3]

POWER DISSIPATION	
CASE CODE	**MAXIMUM PERMISSIBLE POWER DISSIPATION AT +25 °C (W) IN FREE AIR**
D	0.408

STANDARD PACKAGING QUANTITY		
CASE CODE	**UNITS PER REEL**	
	7" FULL REEL	**7" HALF REEL**
D	100	50

CAPACITOR ELECTRICAL PERFORMANCE CHARACTERISTICS

ITEM	PERFORMANCE CHARACTERISTICS	
Category temperature range	-55 °C to +85 °C (to +125 °C with voltage derating)	
Capacitance tolerance	± 20 %, ± 10 %, tested via bridge method, at +25 °C, 120 Hz	
Dissipation factor	Limit per Standard Ratings table. Tested via bridge method, at 25 °C, 120 Hz.	
ESR	Limit per Standard Ratings table. Tested via bridge method, at 25 °C, 100 kHz.	
Leakage current	After application of rated voltage applied to capacitors for 5 min using a steady source of power with 1 kΩ resistor in series with the capacitor under test, leakage current at 25 °C is not more than described in Standard Ratings table. *Note that the leakage current varies with temperature and applied voltage. See graph below for the appropriate adjustment factor.*	
Capacitance change by temperature	+12 % max. (at +125 °C) +10 % max. (at +85 °C) -10 % max. (at -55 °C)	For capacitance value > 300 µF +20 % max. (at +125 °C) +15 % max. (at +85 °C) -15 % max. (at -55 °C)
Reverse voltage	Capacitors are capable of withstanding peak voltages in the reverse direction equal to: 10 % of the DC rating at +25 °C 5 % of the DC rating at +85 °C Vishay does not recommend intentional or repetitive application of reverse voltage.	
Ripple current and temperature derating	For maximum permissible ripple current (I_{RMS}) or / and voltage (V_{RMS}) please refer to product datasheet and Guide to Application. If capacitors are to be used at temperatures above +25 °C, the permissible RMS ripple current or voltage shall be calculated using the derating factors: 1.0 at +25 °C 0.9 at +85 °C 0.4 at +125 °C	

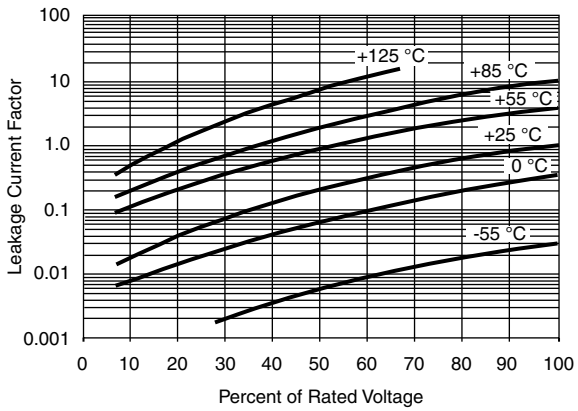
Maximum operating voltage

OPERATING TEMPERATURE			
+85 °C		+125 °C	
RATED VOLTAGE (V)	SURGE VOLTAGE (V)	RATED VOLTAGE (V)	SURGE VOLTAGE (V)
16	20	10	12
20	26	13	16
25	32	17	20
35	46	23	28
50	65	33	40

Note

- All information presented in this document reflects typical performance characteristics.

TYPICAL LEAKAGE CURRENT FACTOR RANGE



Notes

- **At +25 °C**, the leakage current shall not exceed the value listed in the Standard Ratings table.
- **At +85 °C**, the leakage current shall not exceed 10 times the value listed in the Standard Ratings table.
- **At +125 °C**, the leakage current shall not exceed 12 times the value listed in the Standard Ratings table.

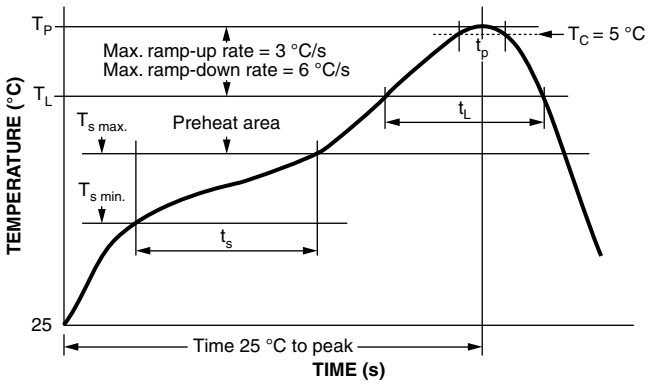
CAPACITOR PERFORMANCE CHARACTERISTICS			
ITEM	**CONDITION**	**POST TEST PERFORMANCE**	
Surge voltage	85 °C, 1000 successive test cycles at 1.3 of rated voltage in series with a 1 kΩ resistor at the rate of 30 s ON, 30 s OFF, MIL-PRF-55365	Capacitance change Dissipation factor Leakage current	Within ± 10 % of initial Not to exceed initial Not to exceed initial
Life test at +85 °C	2000 h application of rated voltage at 85 °C, MIL-STD-202 method 108	Capacitance change Leakage current	Within ± 10 % of initial Not to exceed 125 % of initial
Life test at +125 °C	1000 h application of 2/3 rated voltage at 125 °C, MIL-STD-202 method 108	Capacitance change Leakage current	Within ± 20 % of initial Not to exceed 125 % of initial

CAPACITOR ENVIRONMENTAL CHARACTERISTICS			
ITEM	**CONDITION**	**POST TEST PERFORMANCE**	
Moisture resistance	MIL-STD-202, method 106, at rated voltage.	Capacitance change Cap. ≤ 600 µF Cap. > 600 µF Dissipation factor Leakage current	 Within ± 10 % of initial value Within ± 20 % of initial value Initial specified value or less Initial specified value or less
Thermal shock	Capacitors are subjected to 6 cycles per MIL-STD-202 method 107 of the following: -55 °C (+0 °C, -6 °C) for 30 min, then +25 °C (+3 °C, -3 °C) for 5 min, then +85 °C (+4 °C, -5 °C) for 40 min, then +125 °C (+4 °C, -0 °C) for 30 min, then +25 °C (+3 °C, -3 °C) for 5 min	Capacitance change Cap. Dissipation factor Leakage current	 Within ± 15 % of initial Initial specified value or less Initial specified value multiplied by 12 or less
Salt atmosphere (corrosion)	Test per MIL-202, method 101, condition B (48 h). 5 % salt solution applying.	No harmful or extensive corrosion, = 90 % protection of exposed metallic surfaces by finish, markings legible, = 10 % corrosion of the terminal hardware or mounting.	

MECHANICAL PERFORMANCE CHARACTERISTICS			
TEST CONDITION	**CONDITION**	**POST TEST PERFORMANCE**	
Shear test	Apply a pressure load of 5 N for 10 s ± 1 s horizontally to the center of capacitor side body. AEC-Q200-006	There shall be no visual damage when viewed at 20 x magnification and the component shall meet the original electrical requirements.	
Vibration	MIL-STD-202, method 204, condition D, 10 Hz to 2000 Hz, 20 *g* peak	There shall be no mechanical or visual damage to capacitors post-conditioning.	
Shock (specified pulse)	MIL-STD-202, method 213, condition I, 100 *g* peak	Capacitance change Dissipation factor Leakage current There shall be no mechanical or visual damage to capacitors post-conditioning.	Within ± 10 % of initial Initial specified value or less Initial specified value or less
Resistance to soldering heat	MIL-STD-202, method 210, condition J, except with only one heat cycle.	Capacitance change Dissipation factor Leakage current There shall be no mechanical or visual damage to capacitors post-conditioning.	Within ± 10 % of initial Initial specified value or less Initial specified value or less
Solderability	MIL-STD-202, method 208, ANSI/J-STD-002, test B. Applies only to solder and tin plated terminations. Does not apply to gold terminations.	All terminations shall exhibit a continuous solder coating free from defects for a minimum of 95 % of the critical area of any individual lead.	
Resistance to solvent	MIL-STD-202, method 215	Marking has to remain legible, no degradation of the can material.	
Sleeving	MIL-PRF-39003, paragraph 3.22: apply a DC potential of 2000 V.	Maximum leakage of 20 µA is allowed between the capacitor case and the fixture.	
Seal	MIL-STD-202, method 112, condition A or D	There shall be no visual leakage.	

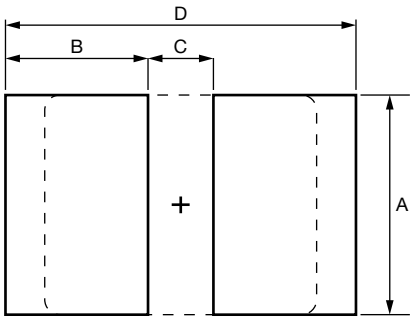
RECOMMENDED REFLOW PROFILES

Capacitors should withstand reflow profile as per J-STD-020 standard



PROFILE FEATURE	SnPb EUTECTIC ASSEMBLY	LEAD (Pb)-FREE ASSEMBLY
Preheat / soak		
Temperature min. ($T_{s\ min.}$)	100 °C	150 °C
Temperature max. ($T_{s\ max.}$)	150 °C	200 °C
Time (t_s) from ($T_{s\ min.}$ to $T_{s\ max.}$)	60 s to 120 s	60 s to 120 s
Ramp-up		
Ramp-up rate (T_L to T_P)	3 °C/s max.	3 °C/s max.
Liquidus temperature (T_L)	183 °C	217 °C
Time (t_L) maintained above T_L	60 s to 150 s	60 s to 150 s
Peak package body temperature (T_p)	220	250
Time (t_p) within 5 °C of the specified classification temperature (T_C)	20 s	30 s
Time 25 °C to peak temperature	6 min max.	8 min max.
Ramp-down		
Ramp-down rate (T_P to T_L)	6 °C/s max.	6 °C/s max.
Time 25 °C to peak temperature	6 min max.	8 min max.

PAD DIMENSIONS in inches [millimeters]



CASE CODE	A (MIN.)	B (NOM.)	C (NOM.)	D (NOM.)
D	0.276 [7]	0.178 [4.5]	0.079 [2]	0.433 [11]

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