Wet Tantalum Capacitors, High Energy, Ultra High Capacitance, -55 °C to +125 °C Operation

FEATURES

- High energy, very high capacitance design
- All tantalum, hermetically sealed case
- Utilizes Vishay proven SuperTan® technology
- 2 terminations options: SMD and radial
- PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

RoHS* 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

LINKS TO ADDITIONAL RESOURCES

3D Models

APPLICATIONS

- Industrial
- Avionics / military / space
- Ideal for capacitor banks

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 % available as special

Contact marketing for availability of 10 % tolerance

DC Leakage Current (DCL Max.):
at +25 °C: 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 at the applicable rated DC working voltage.

ORDERING INFORMATION

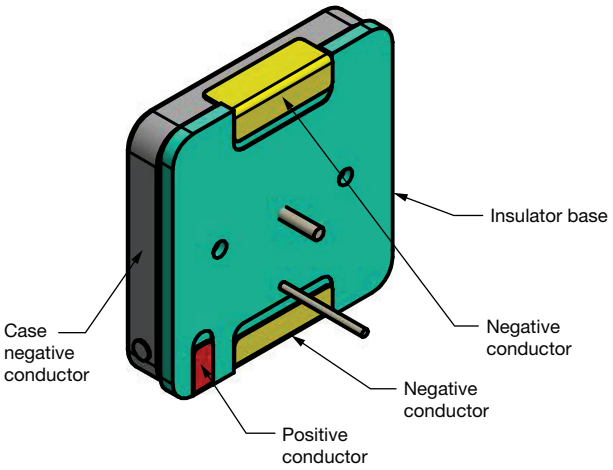
EP1	C	543	K	025	B	Z	S	S	
TYPE	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT +85 °C	TERMINATION CODE	RELIABILITY LEVEL	TEMPERATURE	ESR	MOUNTING STUD LENGTH
	See Dimensions sheets	This is expressed in microfarads. The first two digits are the significant figures. The third is the number of zeros to follow.	K = 10 % (1) M = 20 %	This is expressed in V. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See termination / mounting options in the Dimensions sheets.	Z = non-ER	S = standard (-55 °C to +85 °C)	S = standard	Blank = not applicable A = 0.21" B = 0.27" C = 0.40" D = 0.15" E = 0.18" F = 0.35"

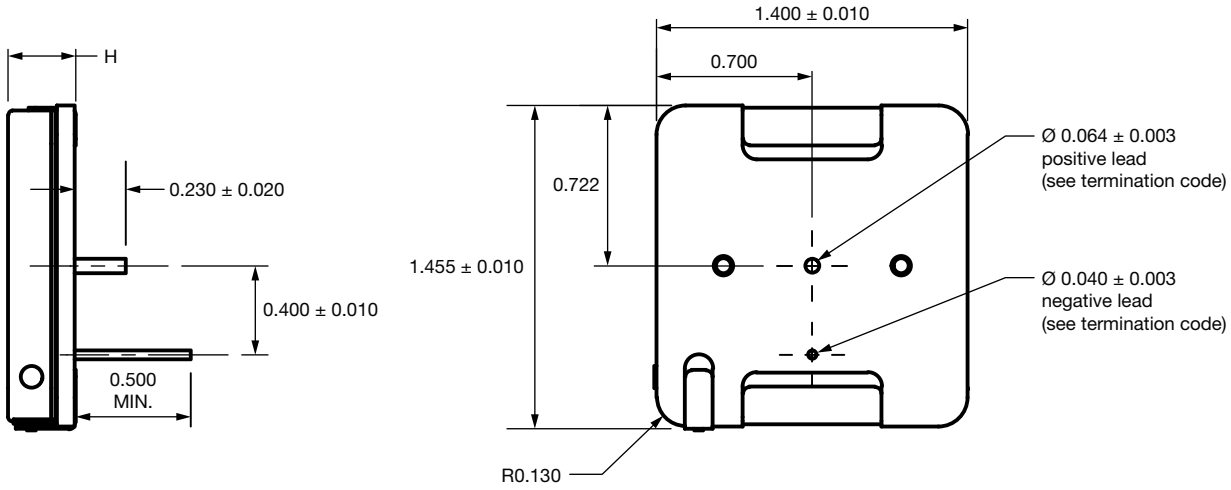
Note

(1) Contact marketing for availability of 10 % tolerance

PATENT(S): www.vishay.com/patents
This Vishay product is protected by one or more United States and international patents.

DIMENSIONS - RADIAL TERMINATION in inches

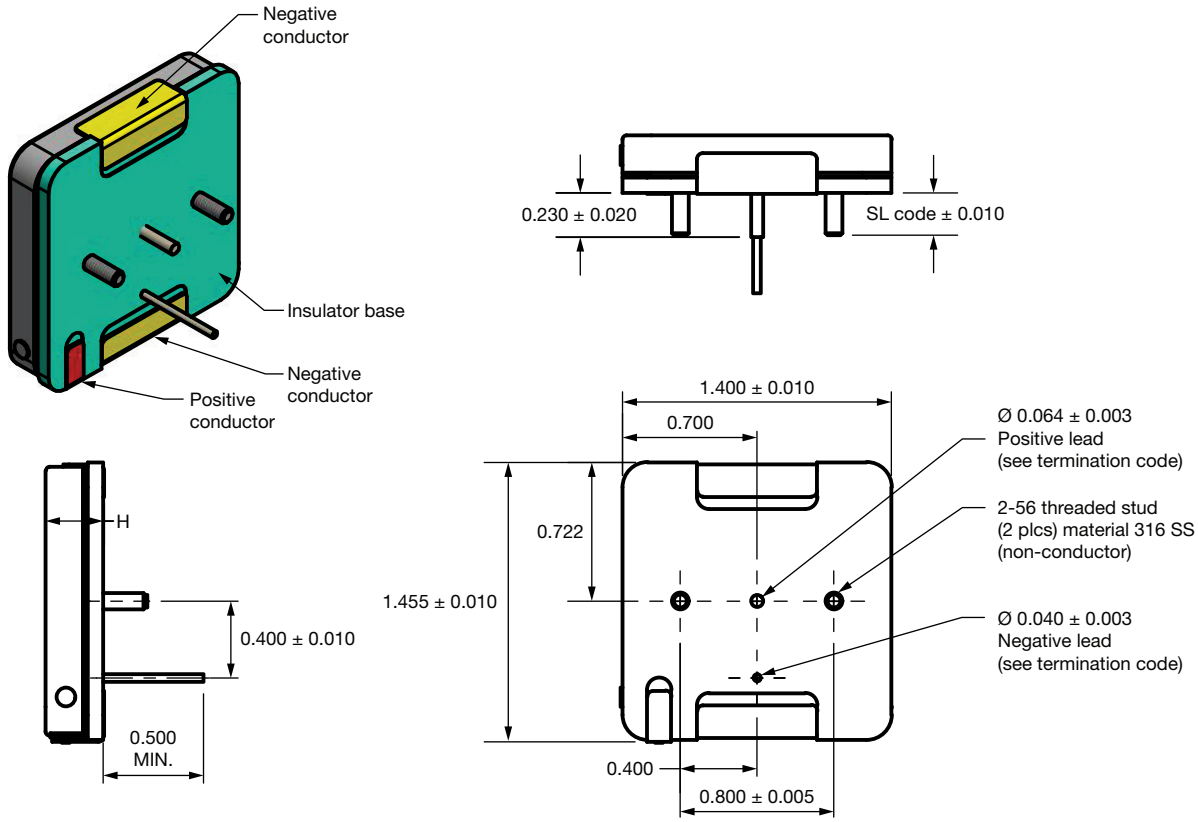




CASE SIZE	H
A	0.312
B	0.450
C	0.596

TERMINATION CODE	TERMINATION / MOUNTING OPTION
A	100 % tin (RoHS compliant) radial
B	Tin / lead radial

DIMENSIONS - RADIAL TERMINATION WITH STUDS in inches

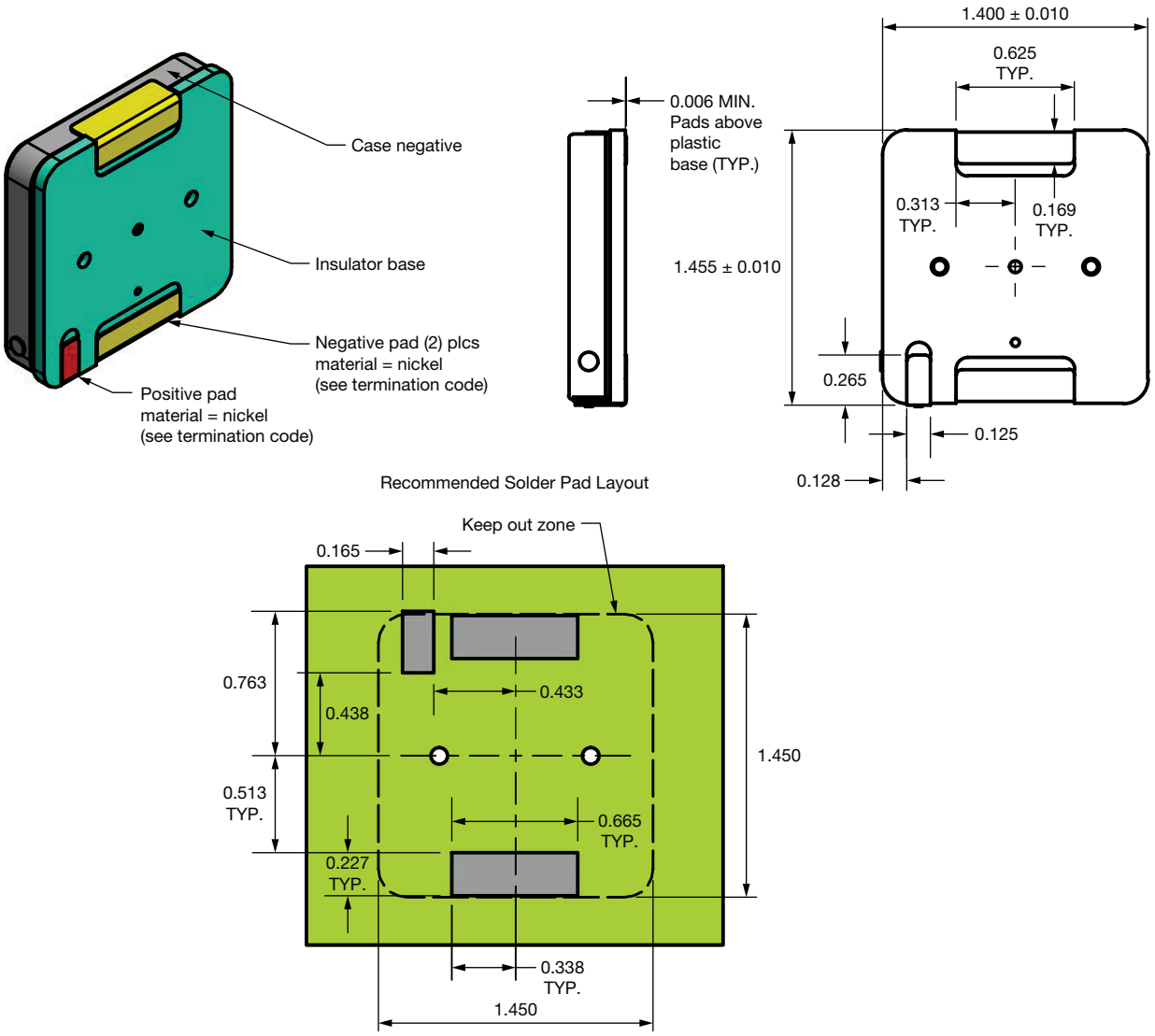


CASE SIZE	H
A	0.312
B	0.450
C	0.596

TERMINATION CODE	TERMINATION / MOUNTING OPTION
C	100 % tin (RoHS compliant) radial w/stud mount
D	Tin / lead radial w/stud mount

SL STUD LENGTH CODE	SL DIM
A	0.21
B	0.27
C	0.40
D	0.15
E	0.18
F	0.35

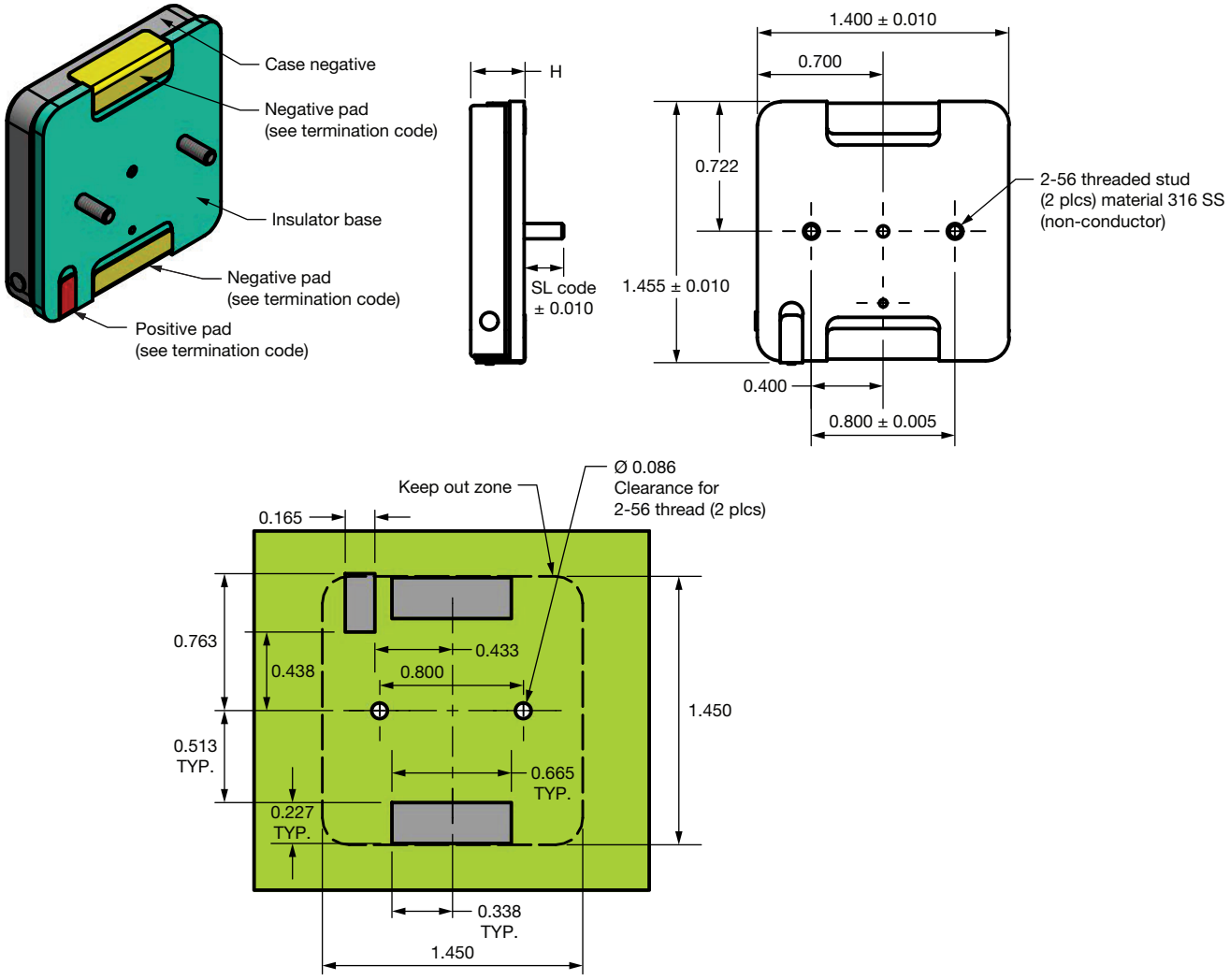
DIMENSIONS - SMD TERMINATION in inches



CASE SIZE	H
A	0.312
B	0.450
C	0.596

TERMINATION CODE	TERMINATION / MOUNTING OPTION
E	100 % tin (RoHS compliant) SMD
F	Tin / lead SMD

DIMENSIONS - SMD TERMINATION WITH STUDS in inches



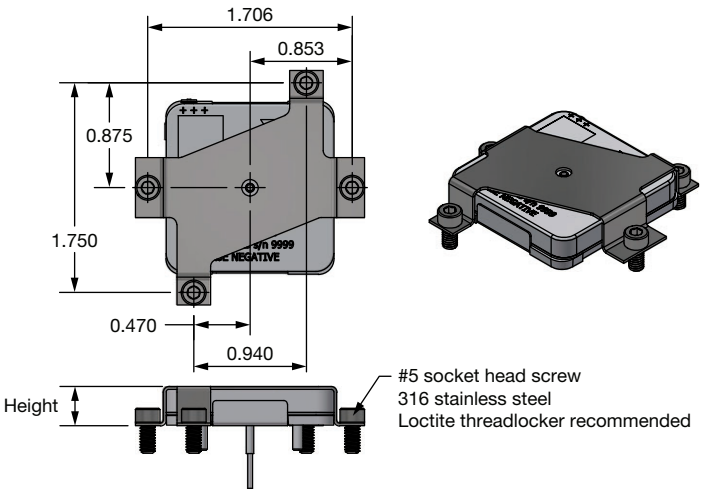
CASE SIZE	H
A	0.312
B	0.450
C	0.596

TERMINATION CODE	TERMINATION / MOUNTING OPTION
G	100 % tin (RoHS compliant) SMD w/stud mount
H	Tin / lead SMD w/stud mount

SL STUD LENGTH CODE	SL DIM
A	0.21
B	0.27
C	0.40
D	0.15
E	0.18
F	0.35

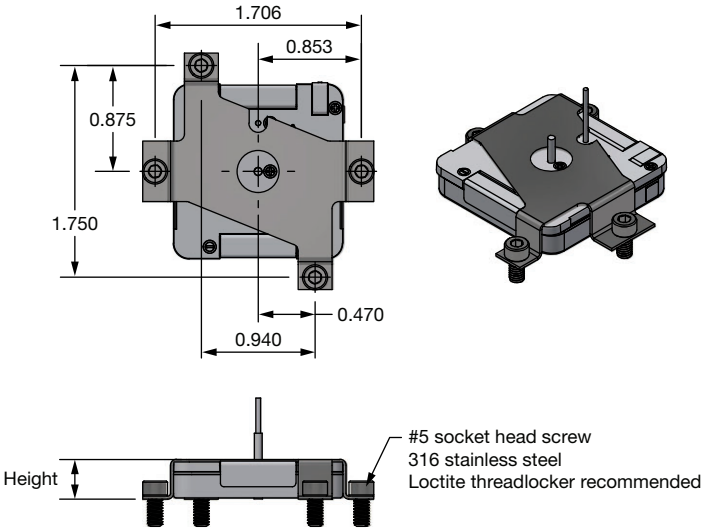
OPTIONAL HOLD-DOWN BRACKETS

STANDARD BRACKET



CASE SIZE	HEIGHT	BRACKET CODE	BRACKET WEIGHT WITHOUT FASTENER (g)
A	0.328	EP1BKT001	6.2
B	0.468	EP1BKT002	7.0
C	0.618	EP1BKT003	7.7

DEAD-BUG BRACKET



CASE SIZE	HEIGHT	BRACKET CODE	BRACKET WEIGHT WITHOUT FASTENER (g)
A	0.328	EP1BKT004	6.0
B	0.468	EP1BKT005	6.7
C	0.618	EP1BKT006	7.3

Note

- For additional instructions, engineering drawings, and 3D models please see section “Links to Additional Resources”. The bracket 3D PDF files contain within them all additional CAD documents and CAD models for mounting layout

STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. ESR AT +25 °C, 1 kHz (Ω)	MAX. DCL AT +25 °C (µA)	MAX. DCL AT +85 °C (mA)	WEIGHT (g)
25 V_{DC} AT +85 °C; 15 V_{DC} AT +125 °C, SURGE VOLTAGE = 27.5 V_{DC}						
30 000	A	EP1A303(1)025(2)(3)(4)(5)	0.030	150	1.5	63
35 V_{DC} AT +85 °C; 21 V_{DC} AT +125 °C, SURGE VOLTAGE = 38.5 V_{DC}						
22 000	A	EP1A223(1)035(2)(3)(4)(5)	0.040	150	1.5	63
36 000	B (1)	EP1B363(1)035(2)(3)(4)(5)	0.021	250	2	100
40 000	B (2)	EP1B403(1)035(2)(3)(4)(5)	0.022	250	2	100
47 800	C (1)	EP1C473(1)035(2)(3)(4)(5)	0.015	350	3	120
58 000	C (2)	EP1C583(1)035(2)(3)(4)(5)	0.017	350	3	120
50 V_{DC} AT +85 °C; 30 V_{DC} AT +125 °C, SURGE VOLTAGE = 55 V_{DC}						
12 000	A	EP1A123(1)050(2)(3)(4)(5)	0.050	100	1.0	63
13 000	A (2)	EP1A133(1)050(2)(3)(4)(5)	0.050	100	1.0	63
15 000	A (2)	EP1A153(1)050(2)(3)(4)(5)	0.060	100	1.0	67
17 500	B (1)	EP1B173(1)050(2)(3)(4)(5)	0.025	100	1.5	100
24 000	B (2)	EP1B243(1)050(2)(3)(4)(5)	0.026	100	1.5	100
26 000	B (2)	EP1B263(1)050(2)(3)(4)(5)	0.030	100	1.5	103
23 400	C (1)	EP1C233(1)050(2)(3)(4)(5)	0.017	200	2.5	120
34 000	C (2)	EP1C343(1)050(2)(3)(4)(5)	0.018	200	2.5	120
37 000	C (2)	EP1C373(1)050(2)(3)(4)(5)	0.025	200	2.5	123
63 V_{DC} AT +85 °C; 38 V_{DC} AT +125 °C, SURGE VOLTAGE = 69 V_{DC}						
6000	A	EP1A602(1)063(2)(3)(4)(5)	0.050	100	1.0	63
6600	A (1)	EP1A662(1)063(2)(3)(4)(5)	0.060	100	1.0	66
9400	B	EP1B942(1)063(2)(3)(4)(5)	0.025	100	1.5	86
11 000	B	EP1B113(1)063(2)(3)(4)(5)	0.025	150	1.5	100
12 000	B (2)	EP1B123(1)063(2)(3)(4)(5)	0.025	150	1.5	100
13 000	B (2)	EP1B133(1)063(2)(3)(4)(5)	0.030	100	1.5	106
14 500	C	EP1C143(1)063(2)(3)(4)(5)	0.017	250	2.5	120
18 000	C (2)	EP1C183(1)063(2)(3)(4)(5)	0.017	250	2.5	120
20 000	C (2)	EP1C203(1)063(2)(3)(4)(5)	0.025	250	2.5	124
80 V_{DC} AT +85 °C; 48 V_{DC} AT +125 °C, SURGE VOLTAGE = 88 V_{DC}						
4000	A	EP1A402(1)080(2)(3)(4)(5)	0.055	100	1.0	63
4400	A (1)	EP1A442(1)080(2)(3)(4)(5)	0.060	100	1.0	66
7000	B (1)	EP1B702(1)080(2)(3)(4)(5)	0.030	150	1.5	100
8000	B (2)	EP1B802(1)080(2)(3)(4)(5)	0.030	150	1.5	100
9000	B (2)	EP1B902(1)080(2)(3)(4)(5)	0.040	150	1.5	106
9000	C	EP1C902(1)080(2)(3)(4)(5)	0.025	250	2.5	120
12 000	C (2)	EP1C123(1)080(2)(3)(4)(5)	0.025	250	2.5	120
14 000	C (2)	EP1C143(1)080(2)(3)(4)(5)	0.030	250	2.5	124

Notes

- Part number definitions:
  (1) Standard capacitance tolerance is 20 % or “M“. Contact marketing for availability of 10 % or “K“
  (2) Standard termination is radial tin / lead, available as “B”, “D”, “F”, or “H”.
  RoHS-compliant or radial 100 % tin is available as “A”, “C”, “E”, or “G”
  (3) Standard reliability is “Z” or non-established reliability
  (4) Standard temperature range is “S” or -55 °C to +85 °C or +125 °C with voltage derating
  (5) Standard ESR is “S“

(1) Preliminary rating, specification subject to change. Contact marketing for availability

(2) Requires export license for shipments outside the US. Contact marketing for availability

STANDARD RATINGS						
CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. ESR AT +25 °C, 1 kHz (Ω)	MAX. DCL AT +25 °C (µA)	MAX. DCL AT +85 °C (mA)	WEIGHT (g)
100 V_{DC} AT +85 °C; 60 V_{DC} AT +125 °C, SURGE VOLTAGE = 110 V_{DC}						
3000	A	EP1A302(1)100(2)(3)(4)(5)	0.065	100	1.0	63
3300	A (2)	EP1A332(1)100(2)(3)(4)(5)	0.070	100	1.0	66
4400	B	EP1B442(1)100(2)(3)(4)(5)	0.035	150	1.5	100
5800	B (2)	EP1B582(1)100(2)(3)(4)(5)	0.035	150	1.5	100
6000	B (2)	EP1B602(1)100(2)(3)(4)(5)	0.040	150	1.5	105
5800	C (1)	EP1C582(1)100(2)(3)(4)(5)	0.025	150	2.5	120
7900	C (2)	EP1C792(1)100(2)(3)(4)(5)	0.025	250	2.5	130
9000	C (2)	EP1C902(1)100(2)(3)(4)(5)	0.035	250	2.5	123
125 V_{DC} AT +85 °C; 75 V_{DC} AT +125 °C, SURGE VOLTAGE = 137.5 V_{DC}						
1900	A	EP1A192(1)125(2)(3)(4)(5)	0.100	100	1.0	63
2000	A (2)	EP1A202(1)125(2)(3)(4)(5)	0.100	100	1.0	63
2200	A (2)	EP1A222(1)125(2)(3)(4)(5)	0.110	100	1.0	66
2800	B (1)	EP1B282(1)125(2)(3)(4)(5)	0.050	150	1.5	100
3600	B (2)	EP1B362(1)125(2)(3)(4)(5)	0.050	150	1.5	100
3800	B (2)	EP1B382(1)125(2)(3)(4)(5)	0.060	150	1.5	105
3700	C (1)	EP1C372(1)125(2)(3)(4)(5)	0.035	250	2.5	120
5300	C (2)	EP1C532(1)125(2)(3)(4)(5)	0.035	250	2.5	130
5600	C (2)	EP1C562(1)125(2)(3)(4)(5)	0.040	250	2.5	123

Notes

- Part number definitions:
  (1) Standard capacitance tolerance is 20 % or “M“. Contact marketing for availability of 10 % or “K“
  (2) Standard termination is radial tin / lead, available as “B”, “D”, “F”, or “H”.
  RoHS-compliant or radial 100 % tin is available as “A”, “C”, “E”, or “G”
  (3) Standard reliability is “Z” or non-established reliability
  (4) Standard temperature range is “S” or -55 °C to +85 °C or +125 °C with voltage derating
  (5) Standard ESR is “S“

(1) Preliminary rating, specification subject to change. Contact marketing for availability

(2) Requires export license for shipments outside the US. Contact marketing for availability

PERFORMANCE CHARACTERISTICS OF HIGH ENERGY CAPACITORS

ELECTRICAL PERFORMANCE CHARACTERISTICS	
ITEM	PERFORMANCE CHARACTERISTICS
Operating temperature range	Per MIL-PRF-39006. -55 °C to +85 °C or +125 °C with voltage derating (see Standard Ratings table)
Storage temperature range	Per MIL-PRF-39006. -62 °C to +130 °C
Capacitor tolerance	± 20 % ± 10 % at 120 Hz
ESR	Limits per Standard Ratings table
DC leakage current (DCL max.)	At 25 °C the leakage current shall not exceed values listed in the Standard Rating table.
Reverse voltage	There shall be no continuous reverse voltage. Transient reverse voltage surges are acceptable under the following conditions: a) The peak reverse voltage is equal to or less than 1.0 V and the product of the peak current times the duration of the reverse transient is 0.05 A or less b) The repetition rate of the reverse voltage surges is less than 10 Hz
Surge voltage	The test shall be at 1000 cycles at 110 % of rated voltage at 85 °C. A cycle consists of a 30 s charge and a 330 s discharge through 1000 Ω resistor.
Life test	2000 h at +85 °C

ENVIRONMENTAL CHARACTERISTICS		
ITEM	**TEST AND CONDITIONS**	**COMMENTS**
Hermeticity	MIL-STD-202, method 112 C/IIIa	The capacitor shall be hermetically sealed such that the case does not leak electrolyte or vent any gas when exposed to a vacuum.
Moisture resistance	MIL-STD-202, method 106	6 V polarity
Altitude	MIL-STD-202, method 105 C, test condition D	100 000 feet test
Fungus	MIL-PRF-39006	The capacitor materials shall not support fungus growth and shall not be a nutrient to fungus.

MECHANICAL PERFORMANCE CHARACTERISTICS		
ITEM	**TEST AND CONDITIONS**	**COMMENTS**
Thermal shock	MIL-STD-202, method 107 G	Test condition A
Shock	MIL-STD-202, method 213 B test condition G	11 ms, 50 *g*
Vibration - high frequency	MIL-STD-202, method 204 D test condition D	12 sweeps/axis, 20 *g* peak
Vibration - random	MIL-STD-202, method 214 A test condition II, letter E	1.5 h/axis, 19.64 *g*
Resistance to solder heat	MIL-STD-202, method 210 F, test conditions A and B	
Solderability	MIL-STD-202, method 208	
Terminal strength	MIL-STD-202, method 211 A	The capacitor terminals must withstand a 5 pound pull test for 5 s to 10 s. The capacitor must not be visibly damaged and the electrical characteristics must not be affected.
Part markings	MIL-STD-202, method 215 J	The capacitor shall be permanently and legibly marked on the circumference of the case. The markings shall be resistant to solvents.
Weight (mass)		See Standard Ratings table
Seal	MIL-PRF-39006	
MSL	J-STD-033	Not applicable
Packaging	MIL-PRF-39006	All units are shipped in individual bulk packages.
Stud mounting		Tighten nuts only ½ to ¾ turn beyond point of initial contact, equivalent to 24 to 28 maximum inch-ounces torque. Maximum pre-load tension ~ 15 pounds. Lock washers are not recommended; use an adhesive lock nut conforming to MIL-S-22473E, grade A - red

Note

- For surface-mount solder attachment refer to application note 42110: www.vishay.com/doc?42110

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