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



## 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

### **FEATURES**

- · High energy, very high capacitance design
- · All tantalum, hermetically sealed case
- Utilizes Vishay proven SuperTan<sup>®</sup> technology
- Terminations: radial leaded
- Approved to DSCC drawing 10011
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

### 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
- Avionics / military / space

### 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.

ORD	ORDERING INFORMATION								
HE3	С	543	К	025	В	Z	S	S	
TYPE	CASE CODE	CAPACITANCE	CAPACITANCE TOLERANCE	DC VOLTAGE RATING AT +85 °C	TERMINATION	RELIABILITY LEVEL	TEMPERATURE	ESR	
	See Ratings and Case Codes table	This is expressed in microfarads. The first two digits are the significant figures. The third is the number of zeros to follow.	K = 10 % <sup>(1)</sup> 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)	A = 100 % tin (RoHS-compliant) B = tin / lead	Z = non-ER	S = standard (-55 °C to +85 °C)	S = standard	

Note

<sup>(1)</sup> Contact marketing for availability of 10 % tolerance

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## **DIMENSIONS** in inches [millimeters]

0.0253 ± 0.002 [0.64 ± 0.05] dia. (No. 22 AWG) tinned nickel leads solderable and weldable Negative lead (attached to case) Positive lead								
CASE CODE			L2	L1	-	WEIGHT		
TYPE HE3	D	HEIGHT	(MIN.)	(MIN.)	I	(g) (TYPICAL)		
А	1.400 ± 0.005 [35.56 ± 0.127]	0.350 ± 0.015 [8.89 ± 0.381]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	48.0		
В	1.400 ± 0.005 [35.56 ± 0.127]	0.488 ± 0.015 [12.395 ± 0.381]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	73.0		
С	$1.400 \pm 0.005$ [35.56 ± 0.127]	0.615 ± 0.015 [15.6 ± 0.4]	0.500 [12.70]	0.500 [12.70]	0.40 ± 0.015 [10.2 ± 0.38]	95.0		

RATINGS AND CASE CODES						
μF	25 V	50 V	63 V	80 V	100 V	125 V
1100						A
1900					А	
2200						В
2900						C <sup>(1)</sup>
3000				A		
3300						С
3600					В	
3800					В	
4000			A			
4500					C <sup>(1)</sup>	
5600				В		
5700					С	
6000				В		
7000				C (1)		
8000		A	В			
9000				С		
11 500			С			
12 000			С			
14 500		В				
16 000		В				
18 000	А	C <sup>(1)</sup>				
24 000	A	С				
36 000	В					
48 000	В					
54 000	С					
72 000	С					

Note

<sup>(1)</sup> Preliminary rating. Contact marketing for availability

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STANDARD RATINGS									
CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. ESR AT +25 °C, 1 kHz (Ω)	MAX. DCL AT +25 °C (μΑ)					
	25 V <sub>DC</sub> AT +85 °C; 15 V <sub>DC</sub> AT +125 °C								
18 000	А	HE3A183(1)025(2)(3)(4)(5)	0.050	150					
24 000	A	HE3A243(1)025(2)(3)(4)(5)	0.060	150					
36 000	В	HE3B363(1)025(2)(3)(4)(5)	0.045	200					
48 000	В	HE3B483(1)025(2)(3)(4)(5)	0.045	200					
54 000	С	HE3C543(1)025(2)(3)(4)(5)	0.035	300					
72 000	С	HE3C723(1)025(2)(3)(4)(5)	0.035	350					
		50 V <sub>DC</sub> AT +85 °C; 30 V <sub>DC</sub> AT	+125 °C						
8000	А	HE3A802(1)050(2)(3)(4)(5)	0.075	170					
14 500	В	HE3B143(1)050(2)(3)(4)(5)	0.045	270					
16 000	В	HE3B163(1)050(2)(3)(4)(5)	0.045	270					
18 000	C <sup>(1)</sup>	HE3C183(1)050(2)(3)(4)(5)	0.035	400					
24 000	С	HE3C243(1)050(2)(3)(4)(5)	0.035	400					
		63 V <sub>DC</sub> AT +85 °C; 40 V <sub>DC</sub> AT	+125 °C						
4000	А	HE3A402(1)063(2)(3)(4)(5)	0.100	170					
8000	В	HE3B802(1)063(2)(3)(4)(5)	0.055	270					
11 500	С	HE3C113(1)063(2)(3)(4)(5)	0.035	400					
12 000	С	HE3C123(1)063(2)(3)(4)(5)	0.035	400					
80 V <sub>DC</sub> AT +85 °C; 50 V <sub>DC</sub> AT +125 °C									
3000	А	HE3A302(1)080(2)(3)(4)(5)	0.100	200					
5600	В	HE3B562(1)080(2)(3)(4)(5)	0.065	350					
6000	В	HE3B602(1)080(2)(3)(4)(5)	0.065	350					
7000	C <sup>(1)</sup>	HE3C702(1)080(2)(3)(4)(5)	0.040	500					
9000	С	HE3C902(1)080(2)(3)(4)(5)	0.040	500					
1000	^	100 V <sub>DC</sub> AI +85 °C; 65 V <sub>DC</sub> AI	+125 °C	200					
1900	A B	HE3B362(1)100(2)(3)(4)(5)	0.085	200					
3800	B	HE3B382(1)100(2)(3)(4)(5)	0.065	350					
4500	C <sup>(1)</sup>	HE3C452(1)100(2)(3)(4)(5)	0.050	500					
5700	C	HE3C572(1)100(2)(3)(4)(5)	0.050	500					
		125 V <sub>DC</sub> AT +85 °C; 85 V <sub>DC</sub> AT	°+125 °C						
1100	А	HE3A112(1)125(2)(3)(4)(5)	0.100	200					
2200	В	HE3B222(1)125(2)(3)(4)(5)	0.085	350					
2900	C <sup>(1)</sup>	HE3C292(1)125(2)(3)(4)(5)	0.075	500					
3300	С	HE3C332(1)125(2)(3)(4)(5)	0.075	500					

Notes

• Part number definitions:

(1) Standard capacitance tolerance is 20 % or "M". Contact marketing for availability of 10 % or "K"

(2) Standard termination is "B" or tin / lead. RoHS-compliant or 100 % tin is available as "A"
(3) Standard reliability is "Z" or non-established reliability
(4) Standard temperature range is "S" or -55 °C to +125 °C

(5) Standard ESR is "S"

<sup>(1)</sup> Preliminary rating, specification subject to change. Contact marketing for availability

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## PERFORMANCE CHARACTERISTICS OF HIGH ENERGY CAPACITORS

ELECTRICAL PERFORMANCE CHARACTERISTICS				
ITEM	PERFORMANCE CHARACTERISTICS			
Operating temperature range	-55 °C to +85 °C (to +125 °C with voltage derating)			
Storage temperature range	-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	No continuous reverse voltage permitted			
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 100 $\Omega$ 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			

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 <i>g</i>				
Vibration - high frequency	MIL-STD-202, method 204 D test condition D	12 sweeps/axis, 20 <i>g</i> peak				
Vibration - random	MIL-STD-202, method 214 A test condition I, letter D	1.5 h/axis, 12 g				
Resistance to solder heat	MIL-STD-202, method 210 F	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	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 dimensions table				
Seal	MIL-PRF-39006					
MSL	J-STD-033	Not applicable				
Packaging	MIL-PRF-39006	All units are shipped in individual bulk packages				



## **HE3 MOUNTING OPTIONS**

The HE3 capacitor can be mounted with many commercially available methods. Vishay offers the optional mounting hardware outlined below.

## THROUGH-HOLE

If mounted through-hole, the glass-to-metal seal must be protected from potential mounting and application stress. The HE3 can be mounted termination down through the HE3SPC001 spacer into the PCB. The proper size bracket HE3BKT00\* can then be utilized to hold the HE3 rigidly to the PCB.

## **TERMINATIONS UP**

If mounted with terminations facing up for attachment to wiring, the spacer is not needed. The HE3 can be reversed with terminations facing upward through the center of the HE3BKT00\* bracket, which is then mounted through the PCB.



### Notes

- Spot weld, 2 places
- Mounting bolt:
  - 1. Material stainless steel
  - 2. Thread 6-32 NC-2A
- Recommended max. tightening torque on nuts is 48 in-oz (0.34 Nm)

PART NUMBER <sup>(1)</sup>	STUD	A ± 0.010
HE3BKT001	HE3A	0.391
HE3BKT002	HE3B	0.518
HE3BKT003	HE3C	0.605
HE3BKT004	HE3A W/spacer	0.572
HE3BKT005	HE3B W/spacer	0.699
HE3BKT006	HE3C W/spacer	0.831

### Note

(1) The part numbers shown are for ordering the mounting bracket and / or spacer. The HE3 capacitor must be ordered separately using the correct part number as outlined in ORDERING INFORMATION and in the STANDARD RATINGS table



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PART NUMBER <sup>(1)</sup>	
HE3SPC001	

### Note

(1) The part numbers shown are for ordering the mounting bracket and / or spacer. The HE3 capacitor must be ordered separately using the correct part number as outlined in ORDERING INFORMATION and in the STANDARD RATINGS table

### **HE3 PC BOARD MOUNTED**





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