

## 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
- Terminations: Radial leaded
- Approved to DSCC drawing 10011
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS\***  
COMPLIANT

### Note

\* Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.

### APPLICATIONS

- Industrial
- Avionics/military/space

### 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 1000 h life test at a temperature of + 85 °C at the applicable rated DC working voltage.

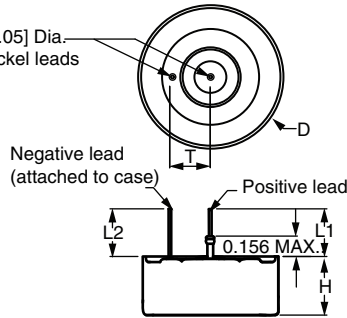
| ORDERING INFORMATION |                                  |   |                                     |  |   |                   |                                   |              |
|----------------------|----------------------------------|---|-------------------------------------|--|---|-------------------|-----------------------------------|--------------|
| HE3                  | C                                | 543   | K                                   | 025  | B   | Z                 | S                                 | S            |
| TYPE                 | CASE CODE                        | CAPACITANCE   | CAPACITANCE TOLERANCE               | DC VOLTAGE RATING AT + 85 °C   | TERMINATION AND PACKAGING                               | 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><br>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"<br>(6R3 = 6.3 V) | A = 100 % tin (RoHS compliant)<br>B = Tin/lead and bulk | Z = Non-ER        | S = Standard (- 55 °C to + 85 °C) | S = Standard |

### Note

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

**DIMENSIONS** in inches [millimeters]

0.0253 ± 0.002 [0.64 ± 0.05] Dia.  
(No. 22 AWG) Tinned Nickel leads  
solderable and weldable



| CASE CODE | D                                | HEIGHT                            | L2 (MIN.)        | L1 (MIN.)        | T                             | WEIGHT (g) (TYPICAL) |
|-----------|----------------------------------|-----------------------------------|------------------|------------------|-------------------------------|----------------------|
| TYPE HE3  |                                  |                                   |                  |                  |                               |                      |
| A         | 1.400 ± 0.005<br>[35.56 ± 0.127] | 0.350 ± 0.015<br>[8.89 ± 0.381]   | 0.500<br>[12.70] | 0.500<br>[12.70] | 0.40 ± 0.015<br>[10.2 ± 0.38] | 48.0                 |
| B         | 1.400 ± 0.005<br>[35.56 ± 0.127] | 0.488 ± 0.015<br>[12.395 ± 0.381] | 0.500<br>[12.70] | 0.500<br>[12.70] | 0.40 ± 0.015<br>[10.2 ± 0.38] | 73.0                 |
| C         | 1.400 ± 0.005<br>[35.56 ± 0.127] | 0.615 ± 0.015<br>[15.6 ± 0.4]     | 0.500<br>[12.70] | 0.500<br>[12.70] | 0.40 ± 0.015<br>[10.2 ± 0.38] | 95.0                 |

**STANDARD RATINGS**

| CAPACITANCE (μF)  | CASE CODE | PART NUMBER               | MAX. ESR AT + 25 °C, 1 kHz (Ω) | MAX. DCL AT + 25 °C (μA) |
|---|-----------|---------------------------|--------------------------------|--------------------------|
| <b>25 V<sub>DC</sub> AT + 85 °C; 15 V<sub>DC</sub> AT + 125 °C</b>  |           |                           |                                |                          |
| 18 000  | A         | HE3A183(1)025(2)(3)(4)(5) | 0.060                          | 150                      |
| 24 000  | A         | HE3A243(1)025(2)(3)(4)(5) | 0.060                          | 150                      |
| 36 000  | B         | HE3B363(1)025(2)(3)(4)(5) | 0.045                          | 200                      |
| 48 000  | B         | HE3B483(1)025(2)(3)(4)(5) | 0.045                          | 200                      |
| 54 000  | C         | HE3C543(1)025(2)(3)(4)(5) | 0.035                          | 300                      |
| 72 000  | C         | HE3C723(1)025(2)(3)(4)(5) | 0.035                          | 350                      |
| <b>50 V<sub>DC</sub> AT + 85 °C; 30 V<sub>DC</sub> AT + 125 °C</b>  |           |                           |                                |                          |
| 8000  | A         | HE3A802(1)050(2)(3)(4)(5) | 0.075                          | 170                      |
| 16 000  | B         | HE3B163(1)050(2)(3)(4)(5) | 0.045                          | 270                      |
| 24 000  | C         | HE3C243(1)050(2)(3)(4)(5) | 0.035                          | 400                      |
| <b>63 V<sub>DC</sub> AT + 85 °C; 40 V<sub>DC</sub> AT + 125 °C</b>  |           |                           |                                |                          |
| 4000  | A         | HE3A402(1)063(2)(3)(4)(5) | 0.100                          | 170                      |
| 8000  | B         | HE3B802(1)063(2)(3)(4)(5) | 0.055                          | 270                      |
| 12 000  | C         | HE3C123(1)063(2)(3)(4)(5) | 0.035                          | 400                      |
| <b>80 V<sub>DC</sub> AT + 85 °C; 50 V<sub>DC</sub> AT + 125 °C</b>  |           |                           |                                |                          |
| 3000  | A         | HE3A302(1)080(2)(3)(4)(5) | 0.100                          | 300                      |
| 6000  | B         | HE3B602(1)080(2)(3)(4)(5) | 0.065                          | 400                      |
| 9000  | C         | HE3C902(1)080(2)(3)(4)(5) | 0.040                          | 500                      |
| <b>100 V<sub>DC</sub> AT + 85 °C; 65 V<sub>DC</sub> AT + 125 °C</b> |           |                           |                                |                          |
| 1900  | A         | HE3A192(1)100(2)(3)(4)(5) | 0.085                          | 300                      |
| 3800  | B         | HE3B382(1)100(2)(3)(4)(5) | 0.065                          | 400                      |
| 5700  | C         | HE3C572(1)100(2)(3)(4)(5) | 0.050                          | 500                      |
| <b>125 V<sub>DC</sub> AT + 85 °C; 85 V<sub>DC</sub> AT + 125 °C</b> |           |                           |                                |                          |
| 1100  | A         | HE3A112(1)125(2)(3)(4)(5) | 0.100                          | 300                      |
| 2200  | B         | HE3B222(1)125(2)(3)(4)(5) | 0.085                          | 400                      |
| 3300  | C         | HE3C332(1)125(2)(3)(4)(5) | 0.075                          | 500                      |

**Note**

- 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".

**PERFORMANCE CHARACTERISTICS OF HIGH ENERGY CAPACITORS**

| <b>ELECTRICAL PERFORMANCE CHARACTERISTICS</b> |  |
|---|--|
| 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 one and one half (1.5) min charge and a four and one half (4.5) min discharge through 100 Ω resistor. |
| Life test at + 85 °C                          | 1000 h at + 85 °C  |

| <b>ENVIRONMENTAL CHARACTERISTICS</b> |   |   |
|--------------------------------------|---|---|
| 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                     |   |
| Altitude                             | MIL-STD-202, method 105 C, test condition D | 100 000 feet test   |

| <b>MECHANICAL PERFORMANCE CHARACTERISTICS</b> |  |   |
|---|--|---|
| ITEM  | TEST AND CONDITIONS                                  | COMMENTS  |
| Thermal shock                                 | MIL-STD-202, method 107 G                            |   |
| 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 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                                 | ANSI J-STD-002                                       |   |
| 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  |

## HE3 MOUNTING OPTIONS

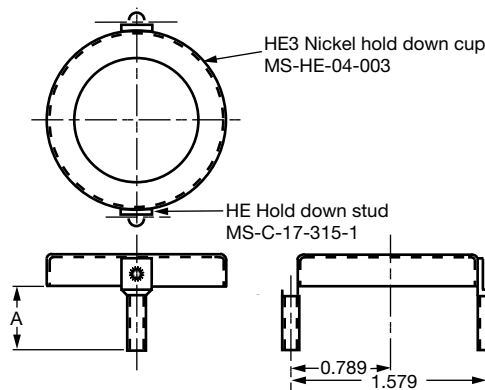
The HE3 capacitor can be mounted with many commercially available methods. Vishay offers the optional mounting hardware outlined below.

### 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 reverse with terminations facing upward through the center of the HE3BKT00\* bracket, which is then mounted through the PCB.



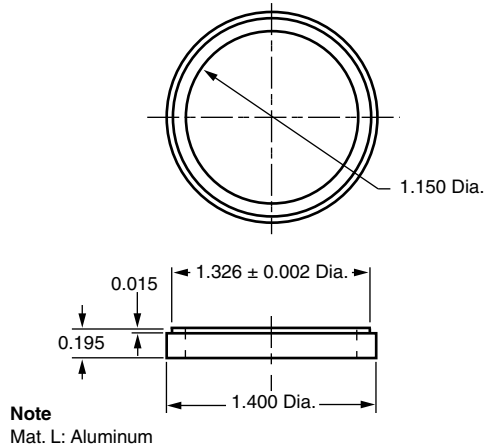
#### Notes

- Spot weld, 2 places
- Mounting bolt:
  1. Material - Stainless steel
  2. Thread - 6-32 NC-2A

| 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

<sup>(1)</sup> 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.

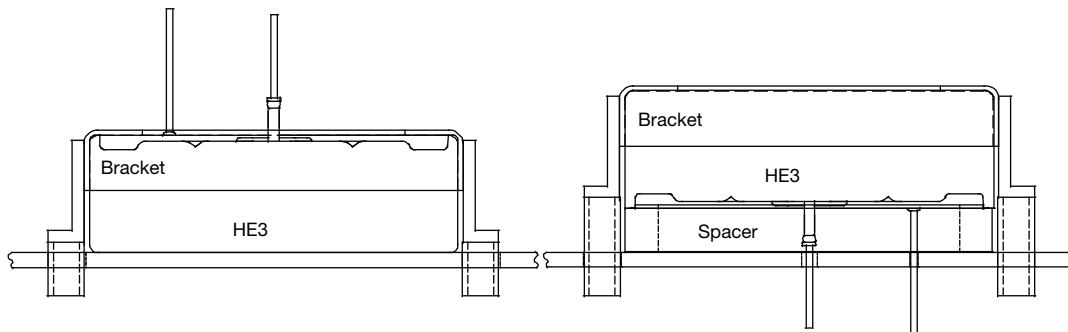


|                                   |
|-----------------------------------|
| <b>PART NUMBER <sup>(1)</sup></b> |
| HE3SPC001                         |

**Note**

<sup>(1)</sup> 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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