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

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

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

<table>
<thead>
<tr>
<th>TYPE</th>
<th>C</th>
<th>CASE CODE</th>
<th>543</th>
<th>K</th>
<th>025</th>
<th>B</th>
<th>Z</th>
<th>S</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>See Ratings and Case Codes table</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This is expressed in microfarads. The first two digits are the significant figures. The third is the number of zeros to follow.</td>
<td>K = 10 % (1)</td>
<td></td>
<td></td>
<td>M = 20 %</td>
<td>DC VOLTAGE RATING AT +85 °C</td>
<td>TERMINATION</td>
<td>RELIABILITY LEVEL</td>
<td>TEMPERATURE</td>
<td>ESR</td>
</tr>
<tr>
<td>A = 100 % tin (RoHS-compliant)</td>
<td>B = tin / lead</td>
<td>Z = non-ER</td>
<td>S = standard (-55 °C to +85 °C)</td>
<td>S = standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note
(1) Contact marketing for availability of 10 % tolerance
DIMENSIONS in inches [millimeters]

HE3

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

D

L2

H

L1

T

WEIGHT
(g)
(TYPICAL)

CASE CODE

HEIGHT

L2
(MIN.)

L1
(MIN.)

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

STANDARD RATINGS

CAPACITANCE
(μF)

CASE CODE

PART NUMBER

MAX. ESR
AT +25 °C, 1 kHz
(Ω)

MAX. DCL
AT +25 °C
(μA)

25 VDC AT +85 °C; 15 VDC AT +125 °C

18 000
A
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
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

50 VDC AT +85 °C; 30 VDC AT +125 °C

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

63 VDC AT +85 °C; 40 VDC AT +125 °C

4000
A
HE3A402(1)063(2)(3)(4)(5)
0.100
170

8000
B
HE3B602(1)063(2)(3)(4)(5)
0.055
270

12 000
C
HE3C123(1)063(2)(3)(4)(5)
0.035
400

80 VDC AT +85 °C; 50 VDC AT +125 °C

3000
A
HE3A302(1)080(2)(3)(4)(5)
0.100
200

6000
B
HE3B602(1)080(2)(3)(4)(5)
0.065
350

9000
C
HE3C902(1)080(2)(3)(4)(5)
0.040
500

100 VDC AT +85 °C; 65 VDC AT +125 °C

1900
A
HE3A192(1)100(2)(3)(4)(5)
0.085
200

3800
B
HE3B382(1)100(2)(3)(4)(5)
0.065
350

5700
C
HE3C572(1)100(2)(3)(4)(5)
0.050
500

125 VDC AT +85 °C; 85 VDC AT +125 °C

1100
A
HE3A112(1)125(2)(3)(4)(5)
0.100
200

2200
B
HE3B222(1)125(2)(3)(4)(5)
0.085
350

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

**ELECTRICAL PERFORMANCE CHARACTERISTICS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PERFORMANCE CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-55 °C to +85 °C (to +125 °C with voltage derating)</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-62 °C to +130 °C</td>
</tr>
<tr>
<td>Capacitor tolerance</td>
<td>± 20 % ± 10 % at 120 Hz</td>
</tr>
<tr>
<td>ESR</td>
<td>Limits per Standard Ratings table</td>
</tr>
<tr>
<td>DC leakage current (DCL max.)</td>
<td>At 25 °C the leakage current shall not exceed values listed in the Standard Rating table.</td>
</tr>
<tr>
<td>Reverse voltage</td>
<td>No continuous reverse voltage permitted</td>
</tr>
<tr>
<td>Surge voltage</td>
<td>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 Ω resistor.</td>
</tr>
<tr>
<td>Life test</td>
<td>2000 h at +85 °C</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TEST AND CONDITIONS</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hermeticity</td>
<td>MIL-STD-202, method 112 C/IIa</td>
<td>The capacitor shall be hermetically sealed such that the case does not leak electrolyte or vent any gas when exposed to a vacuum.</td>
</tr>
<tr>
<td>Moisture resistance</td>
<td>MIL-STD-202, method 106</td>
<td>6 V polarity</td>
</tr>
<tr>
<td>Altitude</td>
<td>MIL-STD-202, method 105 C, test condition D</td>
<td>100 000 feet test</td>
</tr>
</tbody>
</table>

**MECHANICAL PERFORMANCE CHARACTERISTICS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TEST AND CONDITIONS</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal shock</td>
<td>MIL-STD-202, method 107 G</td>
<td>Test condition A</td>
</tr>
<tr>
<td>Shock</td>
<td>MIL-STD-202, method 213 B test condition G</td>
<td>11 ms, 50 g</td>
</tr>
<tr>
<td>Vibration - high frequency</td>
<td>MIL-STD-202, method 204 D test condition D</td>
<td>12 sweeps/axis, 20 g peak</td>
</tr>
<tr>
<td>Vibration - random</td>
<td>MIL-STD-202, method 214 A test condition I, letter D</td>
<td>1.5 h/axis, 12 g</td>
</tr>
<tr>
<td>Resistance to solder heat</td>
<td>MIL-STD-202, method 210 F</td>
<td>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.</td>
</tr>
<tr>
<td>Solderability</td>
<td>MIL-STD-202, method 208</td>
<td></td>
</tr>
<tr>
<td>Terminal strength</td>
<td>MIL-STD-202, method 211 A</td>
<td>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.</td>
</tr>
<tr>
<td>Part markings</td>
<td>MIL-STD-202, method 215 J</td>
<td>The capacitor shall be permanently and legibly marked on the circumference of the case. The markings shall be resistant to solvents.</td>
</tr>
<tr>
<td>Weight (mass)</td>
<td>MIL-PRF-39006</td>
<td>See dimensions table</td>
</tr>
<tr>
<td>Seal</td>
<td>MIL-PRF-39006</td>
<td></td>
</tr>
<tr>
<td>MSL</td>
<td>J-STD-033</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Packaging</td>
<td>MIL-PRF-39006</td>
<td>All units are shipped in individual bulk packages</td>
</tr>
</tbody>
</table>

For technical questions, contact: tantalum@vishay.com

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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

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

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.
### PART NUMBER

| HE3SPC001 |

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**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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### HE3 PC BOARD MOUNTED
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