# THH 230°C HERMETIC SERIES

## SMD 230°C High Temperature Tantalum Capacitor in Hermetic Package, COTS-Plus


## FEATURES

- High temperature applications
- Operational condition 230°C / 0.5UR / 1000hrs (2000hrs for selected codes) or 200°C / 0.5UR / 10.000hrs
- 100% surge current tested
- Ceramic case hermetic packaging
- Large case sizes including CTC-21D provide high capacitance values
- Manufacturing and screening utilizing KYOCERA AVX patented Q-Process to effectively remove components that may experience excessive parametric shifts or instability in operation life

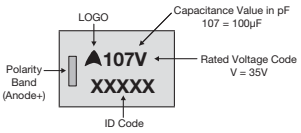
## APPLICATIONS

- Oil drilling, and Extreme temperature applications

For additional information on Q-process please consult the KYOCERA AVX technical publication: "*Reaching the Highest Reliability for Tantalum Capacitors*"

## MARKING

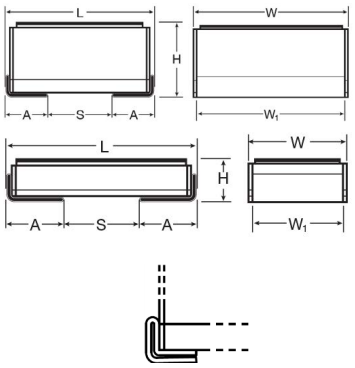
### 9, I CASE



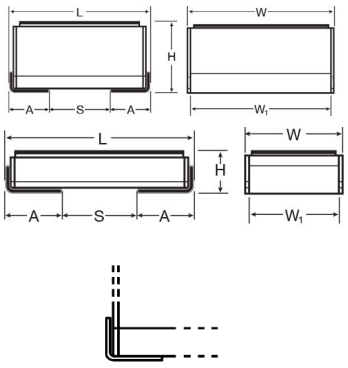

## CASE DIMENSIONS: millimeters (inches)

| Code | Type | L±0.50 (0.020) | W±0.50 (0.020) | H Max. | W1±0.50 (0.020) | A±0.50 (0.020) | S Min. |
|---|---|---|---|---|---|---|---|
| 9 (CTC-21D) | J-lead (L-shape) | 11.50 (0.453) | 12.50 (0.492) | 6.15 (0.242) | 12.50 (0.492) | 1.90 (0.075) | 7.00 (0.276) |
| 9 (CTC-21D) | J-lead (flex) | 12.10 (0.476) | 12.50 (0.492) | 6.50 (0.256) | 12.00 (0.472) | 2.00 (0.079) | 7.20 (0.283) |
| 9 (CTC-21D) | Undertab | 11.00 ± 0.20 (0.433 ± 0.008) | 12.50 ± 0.20 (0.492 ± 0.008) | 5.95 (0.234) | 10.50 ± 0.20 (0.413 ± 0.008) | 1.50 ± 0.20 (0.059 ± 0.008) | 7.80 (0.307) |
| I | J-lead (L-shape) | 11.50 (0.453) | 6.00 (0.236) | 2.70 (0.106) | 6.00 (0.236) | 3.50 (0.138) | 4.00 (0.157) |
| I | J-lead (flex) | 11.90 (0.469) | 6.00 (0.236) | 3.00 (0.118) | 5.50 (0.217) | 3.60 (0.142) | 4.20 (0.165) |
| I | Undertab | 11.00 ± 0.20 (0.433 ± 0.008) | 6.00 ± 0.20 (0.236 ± 0.008) | 2.50 (0.098) | 4.00 ± 0.20 (0.157 ± 0.008) | 3.20 ± 0.20 (0.126 ± 0.008) | 4.40 (0.173) |

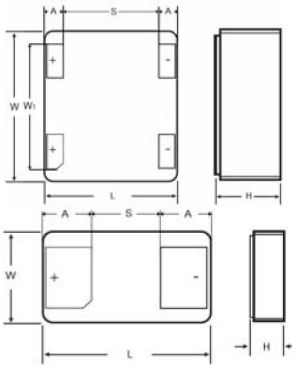
### 'J' Lead Termination (flex)




### 'J' Lead Termination (L-shape)




### Undertab Termination




## TECHNICAL SPECIFICATIONS

| | | | | | |
|---|---|---|---|---|---|
| Technical Data: | | All technical data relate to an ambient temperature of +25°C | | | |
| Capacitance Range: | | 6.8 µF to 100 µF (for extended range under development, contact manufacturer) | | | |
| Capacitance Tolerance: | | ±20% | | | |
| Leakage Current DCL: | | 0.01CV | | | |
| Rated Voltage ($V_R$) | ≤ +85°C: | 16 | 35 | 50 | |
| Category Voltage ($V_C$) | ≤ +230°C: | 8 | 17 | 25 | |
| Temperature Range: | | -55°C to +230°C | | | |
| Reliability: | | 1% per 1000 hours at 85°C, Vr with 0.1Ω/V series impedance, 60% confidence level | | | |
| Termination Finish: | | Gold Plating (Undertab), Gold Plating (J-lead L shape), Nickel Plating (J-lead flex) | | | |

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# THH 230°C HERMETIC SERIES

## SMD 230°C High Temperature Tantalum Capacitor in Hermetic Package, COTS-Plus

## HOW TO ORDER

## PART NUMBER

| THH | 9 | 107 | M | 035 | W | 0250 | # |
|---|---|---|---|---|---|---|---|
| Type | Case Size<br>See table above | Capacitance Code<br>pF code: 1st two digits represent significant figures 3rd digit represents multiplier (number of zeros to follow) | Tolerance<br>M = ±20% | Rated DC Voltage<br>016 = 16Vdc<br>035 = 35Vdc<br>050 = 50Vdc | Packaging<br>W = Waffle | ESR in mΩ | Termination<br>J = 'J' lead (L-shape)<br>W = 'J' lead (flex)<br>U = Undertab |

LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

*For RoHS compliant products, please select correct termination style.*

## CAPACITANCE AND VOLTAGE RANGE (CODE DENOTES THE CASE SIZE)

| Capacitance | | Rated Voltage DC ($V_R$) at 85°C | | |
|---|---|---|---|---|
| µF | Code | 16V (C) | 35V (V) | 50V (T) |
| 6.8 | 685 | | I | I |
| 10 | 106 | | I | |
| 15 | 156 | | | |
| 22 | 226 | I | | |
| 33 | 336 | | | |
| 47 | 476 | I | | |
| 68 | 686 | | | |
| 100 | 107 | | 9 | |

Released ratings
Engineering samples - please contact KYOCERA AVX

## VOLTAGE VS TEMPERATURE RATING

| Part No. | Case Size | Capacitance (µF) | Rated Voltage @ 85°C (V) | Category Voltage @ 230°C (V) | DCL Max. (µA) | DF Max. (%) | ESR Max. @100kHz (mΩ) | 100kHz RMS Current (A) | | | Lifetime at 230°C (hrs) | MSL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 25°C | 85°C | 125°C | | |
| **16 Volt** | | | | | | | | | | | | |
| THHI226M016W0500# | I | 22 | 16 | 8 | 3.6 | 8 | 500 | 0.81 | 0.73 | 0.73 | 2,000 | 1 |
| THHI476M016W0500# | I | 47 | 16 | 8 | 7.5 | 8 | 500 | 0.81 | 0.73 | 0.73 | 1,000 | 1 |
| **35 Volt** | | | | | | | | | | | | |
| THHI685M035W0500# | I | 6.8 | 35 | 17 | 2.4 | 8 | 500 | 0.81 | 0.73 | 0.73 | 2,000 | 1 |
| THHI106M035W0500# | I | 10 | 35 | 17 | 3.5 | 8 | 500 | 0.81 | 0.73 | 0.73 | 2,000 | 1 |
| THH9107M035W0250# | 9 | 100 | 35 | 17 | 35 | 8 | 250 | 1.26 | 1.13 | 1.13 | 2,000 | 1 |
| **50 Volt** | | | | | | | | | | | | |
| THHI685M050W0500# | I | 6.8 | 50 | 25 | 3.4 | 8 | 500 | 0.81 | 0.73 | 0.73 | 1,000 | 1 |

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5V RMS with a maximum DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes.
**ESR change post 1000hrs allowed up to 3 times catalog limit.**

Moisture Sensitivity Level (MSL) is defined according to J-STD-020.



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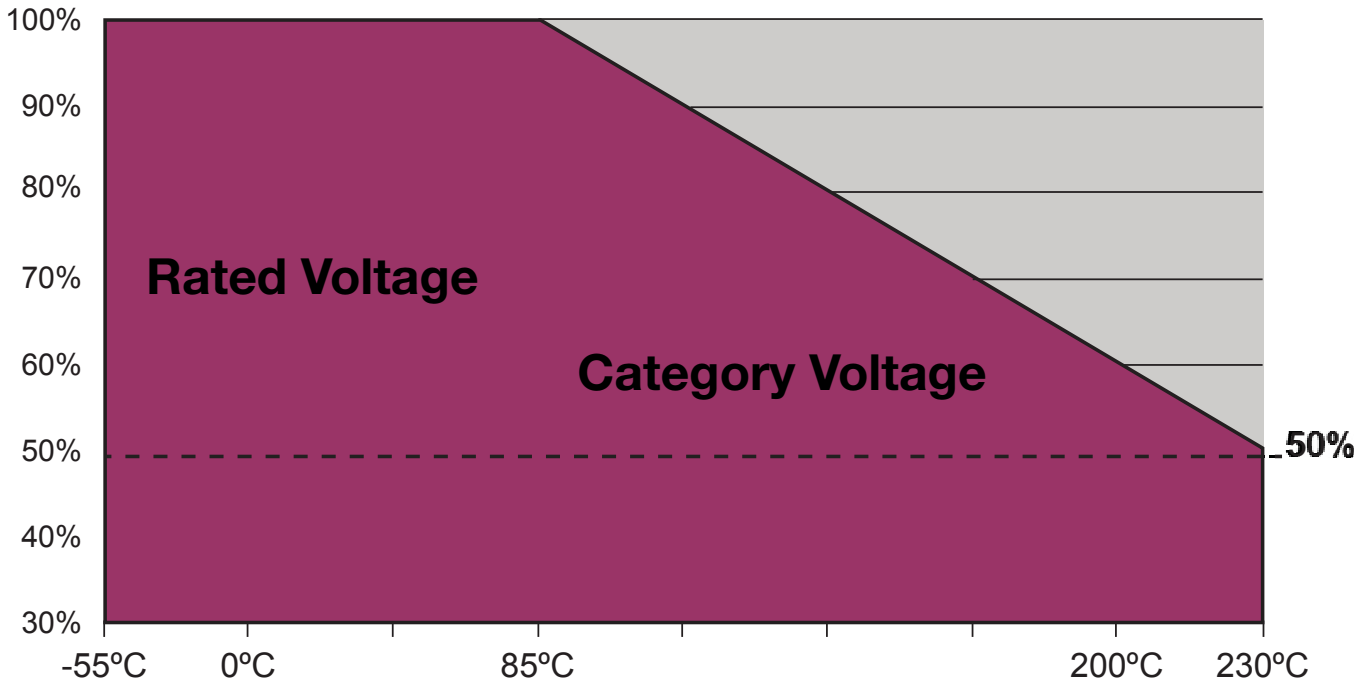
## VOLTAGE VS TEMPERATURE RATING

**THH 230°C Voltage vs Temperature Rating for 1000 (or 2000) hrs service life**





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## QUALIFICATION TABLE

| TEST | THH 230°C hermetic series (Temperature range -55°C to +230°C) | |
|---|---|---|
| | **Condition** | **Characteristics** |
| **Endurance** | Determine after application of 230°C temperature, category voltage for 1000+48/-0 hours or 2000+48/-0hrs and then leaving min. 2 hours at room temperature. Power supply impedance to be <3Ω. | Visual examination: no visible damage<br>DCL: 1.25 x initial limit<br>ΔC/C: within ±20% of initial value<br>DF: 1.5 x initial limit<br>ESR: 3 x initial limit |
| **Endurance** | Determine after application of 0.5UR for 10000+48/-0 hours at 200°C temperature and then leaving min. 2 hours at room temperature. Power supply impedance to be <3Ω. | Visual examination: no visible damage<br>DCL: 1.25 x initial limit<br>ΔC/C: within ±20% of initial value<br>DF: 1.5 x initial limit<br>ESR: 3 x initial limit |
| **Storage Life** | 230°C, 0V, 1000h + 48/-0 hours | Visual examination: no visible damage<br>DCL: initial limit<br>ΔC/C: within ±5% of initial value<br>DF: initial limit<br>ESR: 1.25 x initial limit |
| **Biased Humidity** | Determine after leaving for 1000 hours at 85±2°C, 85% relative humidity and rated voltage and then recovery min. 2 hours at room temperature. | Visual examination: no visible damage<br>DCL: initial limit<br>ΔC/C: within ±10% of initial value<br>DF: initial limit<br>ESR: 1.25 x initial limit |
| **Temperature Stability** | Step 1: +20, 15 min<br>Step 2: -55, 15 min<br>Step 3: +20, 15 min<br>Step 4: +85, 15 min<br>Step 5: +125, 15 min<br>Step 6: +175, 15 min<br>Step 7: +200, 15 min<br>Step 8: +230, 15 min<br>Step 9: +20, 15 min | DCL: IL* / n/a / IL* / 10 x IL* / 12.5 x IL* / n/a / n/a / n/a / IL*<br>ΔC/C: n/a / +0/-20% / ±5% / +20/-0% / +30/-0% / +30/-0% / +30/-0% / +30/-0% / ±5%<br>DF: IL* / 1.5 x IL* / IL* / 1.5 x IL* / 2 x IL* / 2 x IL* / 2 x IL* / 2 x IL* / IL*<br>ESR: 1.25 x IL* / 1.25 x IL* / 1.25 x IL* / 1.25 x IL* / 1.25 x IL* / 1.25 x IL* / 1.25 x IL* / 1.25 x IL* / 1.25 x IL* |
| **Surge Voltage** | Test temperature: 85°C+3/0°C<br>Surge voltage: 1.3 x rated voltage<br>Series protection resistance: 33Ω<br>Discharge resistance: 33Ω<br>Number of cycles: 1000x<br>Cycle duration: 5 min; 30 sec charge, 5 min 30 sec discharge | Visual examination: no visible damage<br>DCL: initial limit<br>ΔC/C: within ±20% of initial value<br>DF: initial limit<br>ESR: 1.25 x initial limit |
| **Mechanical Shock/Vibration** | MIL-STD-202, Method 213, Condition I, 100 G peak<br>MIL-STD-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak | Visual examination: no visible damage<br>DCL: initial limit<br>ΔC/C: within ±10% of initial value<br>DF: initial limit<br>ESR: 1.25 x initial limit |
| **Vibration 230°C** | Determine after application of 230°C temperature and vibration frequency:<br>10 ~ 2000 ~ 10Hz in 20 min<br>Full amplitude: 3 mm/20g<br>Vibration directions time<br>X, Y Z directions: 4 hours<br>each direction: total 12 hrs. | Visual examination: no visible damage<br>DCL: initial limit<br>ΔC/C: within ±5% of initial value<br>DF: initial limit<br>ESR: 1.25 x initial limit |

*Initial Limit




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