

# Type HHT 175 °C, Aluminum Electrolytic Capacitor



Type HHT has long life and rugged construction for high temperature environments. HHT capacitors are rated for full operating voltage at 175 °C and tested to 2000 hrs at rated voltage and temperature. 5000 hours of life at 150 °C with ripple current ratings up to 10 Arms.

## Highlights.

- Rated for +175 °C without voltage derating
- High capacitance retention @ -40 °C
- Up to 20g vibration

## Specifications

|                                                 |                                                                                                                                                                                                                                  |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------|--|----------------|-----|-----|------|------|---------|----------------------------------|------|------|-----|---|------|
| Temperature Range                               | -40 °C to +175 °C                                                                                                                                                                                                                |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Rated Voltage Range                             | 16 Vdc to 40 Vdc                                                                                                                                                                                                                 |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Capacitance Range                               | 470 μF to 4700 μF                                                                                                                                                                                                                |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Capacitance Tolerance                           | -10 / +30%                                                                                                                                                                                                                       |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Leakage Current (at 20 °C)                      | I = 0.003 CV +4.0 μA; after 5 minutes at rated voltage<br>I = leakage current in μAmps<br>C = rated capacitance in μF<br>V = rated DC Working voltage in Volts                                                                   |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Ripple Current vs. Frequency Correction Factors | <table><tr><td>Frequency (Hz)</td><td>100</td><td>300</td><td>1000</td><td>5000</td><td>100 kHz</td></tr><tr><td>Ripple Current Correction Factor</td><td>0.35</td><td>0.57</td><td>0.8</td><td>1</td><td>1.04</td></tr></table> |      |      |      |         |  | Frequency (Hz) | 100 | 300 | 1000 | 5000 | 100 kHz | Ripple Current Correction Factor | 0.35 | 0.57 | 0.8 | 1 | 1.04 |
| Frequency (Hz)                                  | 100                                                                                                                                                                                                                              | 300  | 1000 | 5000 | 100 kHz |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Ripple Current Correction Factor                | 0.35                                                                                                                                                                                                                             | 0.57 | 0.8  | 1    | 1.04    |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Low Temperature Characteristics                 | Impedance ratio: $Z_{-40^{\circ}C} / Z_{+25^{\circ}C}$ @120 Hz ≤3                                                                                                                                                                |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| DC Life Test                                    | 2000 h @ rated voltage at 175 °C<br>Δ Capacitance 30V and 40V ±20% , 16V ±25%<br>ESR 200% of limit<br>DCL 100% of limit                                                                                                          |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Shelf Life Test                                 | (+105 °C/0 Vdc): 1000 hours<br>(+40 °C/0 Vdc): 10 years                                                                                                                                                                          |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |
| Case Material                                   | Stainless Steel                                                                                                                                                                                                                  |      |      |      |         |  |                |     |     |      |      |         |                                  |      |      |     |   |      |

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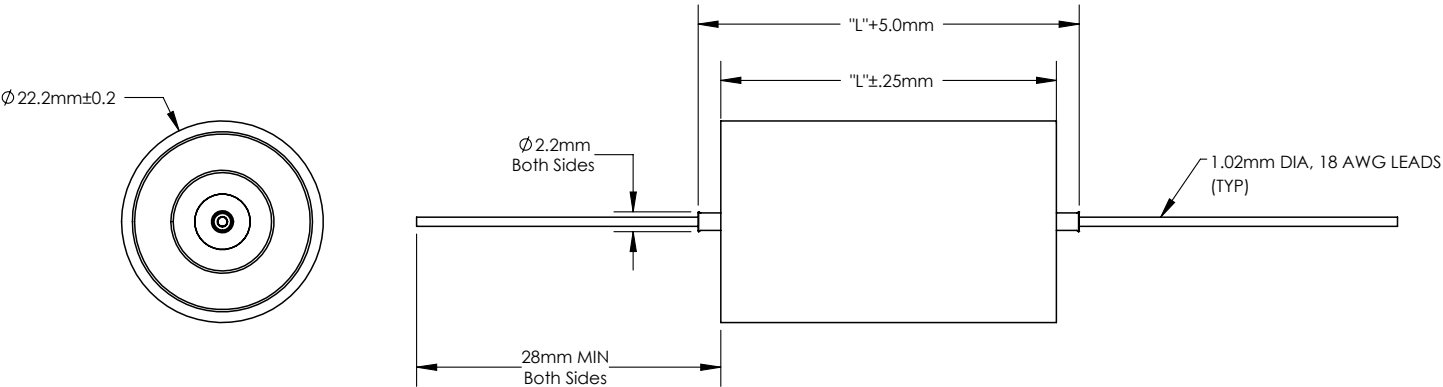
|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vibration Test                  | Mil standard 202, method 204, high frequency 20g's                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Surge Voltage Test              | Subject the capacitors to their rated surge voltage at normal room temperature and through a $1000\ \Omega \pm 10\%$ resistor (except for capacitances of $2500\ \mu\text{F}$ and up, use a higher value resistor calculated as $2,500,000/C\ \Omega \pm 10\%$ where C is the capacitance in $\mu\text{F}$ ). Cycle the voltage $\frac{1}{2}$ minute on followed by $4\frac{1}{2}$ minutes off during which each capacitor is discharged through the charging resistor or equal resistor. Repeat the cycles for 120 h. Post test requirements are for DCL, ESR and DF to meet initial requirements and for there to be no evidence of mechanical damage or electrolyte leakage. |
| Storage at Low Temperature Test | <b>Test</b><br>Subject the capacitor to 72 hours at $-55^\circ\text{C}$ . After 16 hours at room temperature, measure the capacitance and DCL.<br><b><math>\Delta C</math></b><br>Capacitance change from the initial measurement must not exceed 10%.<br><b>DCL</b><br>Leakage current will meet the initial specification.<br><b>Appearance</b><br>No electrolyte leakage or other visible damage. The markings are to be legible.                                                                                                                                                                                                                                            |

## Part Numbering System

|      |                                                       |                 |                                              |               |                                  |                         |
|------|-------------------------------------------------------|-----------------|----------------------------------------------|---------------|----------------------------------|-------------------------|
| HHT  | 332                                                   | P               | 016                                          | H             | J                                | 0                       |
| Type | Capacitance                                           | Tolerance       | Rated Voltage                                | Case Diameter | Case Length Code                 | Sleeve/Label            |
| HHT  | 332 = $3300\ \mu\text{F}$<br>471 = $470\ \mu\text{F}$ | P = $-10/+30\%$ | 016 = 16 Vdc<br>030 = 30 Vdc<br>040 = 40 Vdc | H = 22mm      | E = 37mm<br>J = 45mm<br>L = 53mm | 0 = Label<br>1 = Sleeve |

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## Outline Drawing



## Ratings

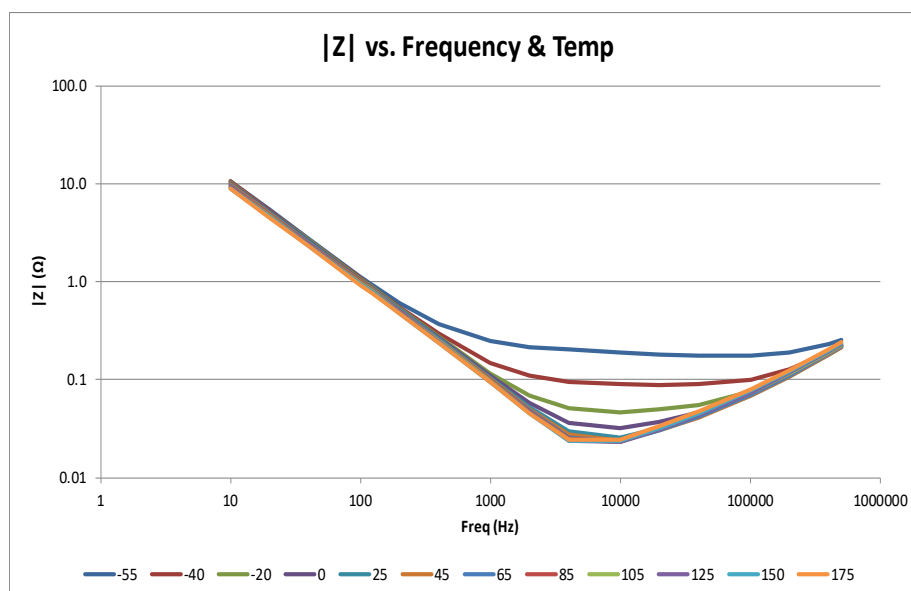
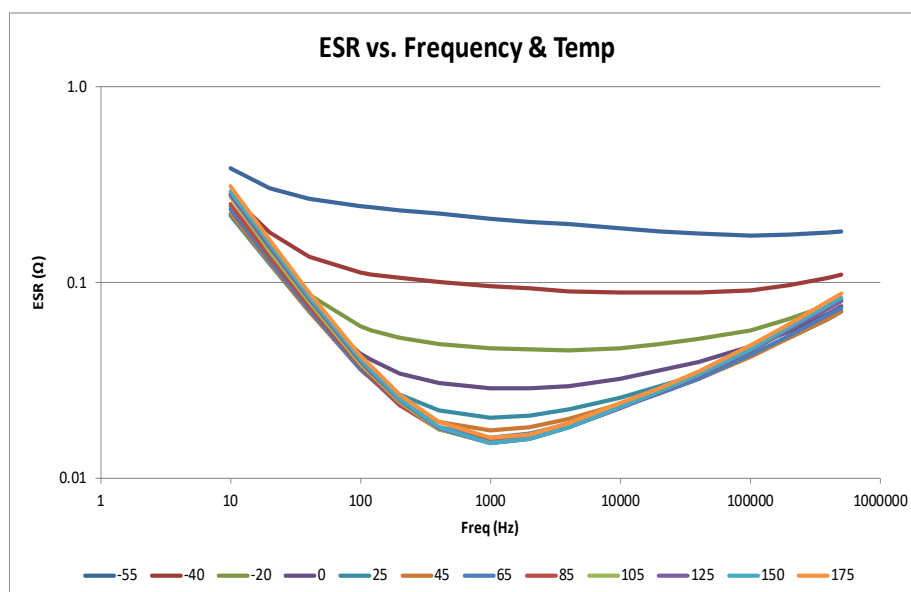
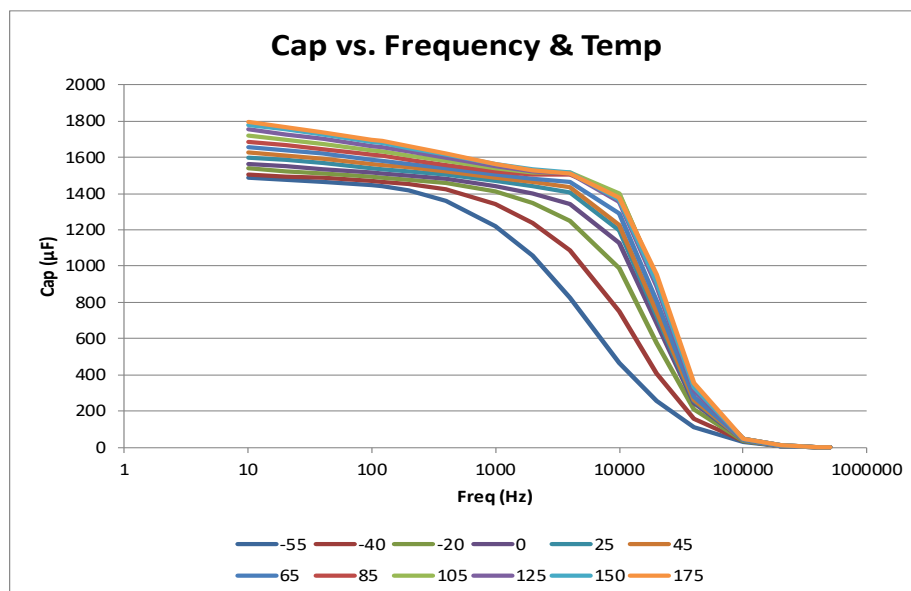
| Typical Weight |
|----------------|
| HE = 43 g      |
| HJ = 50 g      |
| HL = 56 g      |

| Voltage                                | Cap (μF)<br>120Hz<br>25 °C | Catalog Part Number | Case Size<br>D x L mm | ESR max<br>25 °C (mΩ)<br>120 Hz | Ripple (A)<br>150 °C Ambient<br>5 Khz |
|----------------------------------------|----------------------------|---------------------|-----------------------|---------------------------------|---------------------------------------|
| 16 Vdc @ 175 °C<br>25 Vdc Surge @25 °C | 2200                       | HHT222P016HE0       | 22 x 37               | 90                              | 7.1                                   |
|                                        | 3300                       | HHT332P016HJ0       | 22 x 45               | 60                              | 8.9                                   |
|                                        | 4700                       | HHT472P016HL0       | 22 x 53               | 42                              | 10.3                                  |
| 30 Vdc @ 175 °C<br>40 Vdc Surge @25 °C | 1500                       | HHT152P030HE0       | 22 x 37               | 133                             | 7.3                                   |
|                                        | 2200                       | HHT222P030HJ0       | 22 x 45               | 90                              | 8.9                                   |
|                                        | 2700                       | HHT272P030HL0       | 22 x 53               | 74                              | 10.1                                  |
| 40 Vdc @ 175 °C<br>63 Vdc Surge @25 °C | 470                        | HHT471P040HE0       | 22 x 37               | 423                             | 5.5                                   |
|                                        | 680                        | HHT681P040HJ0       | 22 x 45               | 293                             | 6.9                                   |
|                                        | 900                        | HHT901P040HL0       | 22 x 53               | 221                             | 8.1                                   |

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## Typical Performance Curves

Part Number: HHT152PO30HE



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