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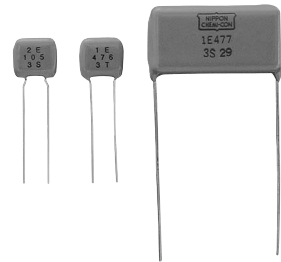
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DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

THD Series



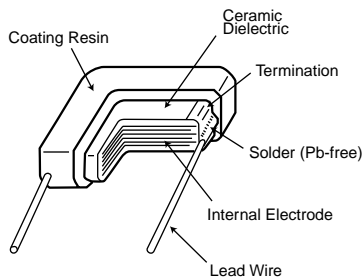
◆FEATURES

1. Small size and large capacitance, high ripple current.
2. Temperature characteristic is Y5U in EIA code.
3. Superior humidity characteristic and long life.
4. Excellent noise absorption.
5. Resin(UL94 V-0) used for coating.

◆APPLICATIONS

1. Automotive equipments.
2. Smoothing circuit of switching mode AC-DC or DC-DC converter.
3. Noise suppressor for various kinds of equipments.
4. By-pass or decoupling circuits.

◆CONSTRUCTION



◆RATINGS

| | |
|--------------------------------|--------------------------------------|
| 1. Category Temperature Range | -55 to +125°C |
| 2. Rated Voltage Range | 16, 25, 50, 100, 250 V _{dc} |
| 3. Rated Capacitance Range | 0.1 to 680μF |
| 4. Rated Capacitance Tolerance | M(±20%), Z(±20%) |
| 5. Temperature Characteristics | E(JIS) ≒ Y5U(EIA) |
| 6. Rated Ripple Current | See No.5 on the following table |

◆SPECIFICATIONS

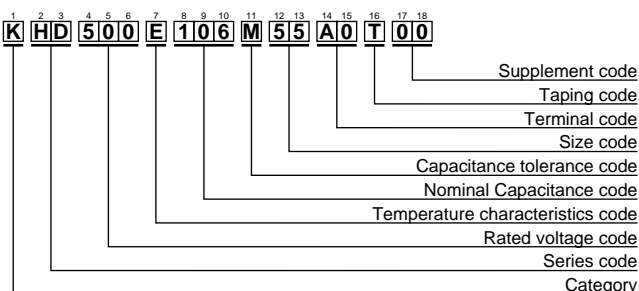
| No. | Items | | Specification | Test Condition |
|-----|-----------------------|----------------------------|--|--|
| 1 | Withstand Voltage | Between Terminals | No abnormality. | 250% of rated voltage shall be applied for 5 seconds. |
| | | Terminals to Coating Resin | | |
| 2 | Insulation Resistance | | 1000/C _R (MΩ) or 10000(MΩ) whichever is less. | Rated voltage shall be applied for 60±5 seconds at temperature 20±2°C. |
| 3 | Rated Capacitance | | Within specified tolerance. | Temperature : 20±2°C Frequency : 1±0.1kHz(≥100μF, 120Hz) Voltage : 1±0.2V _{rms} |
| 4 | Dissipation Factor | | 5.0% maximum. | Temperature : 20±2°C Frequency : 1±0.1kHz(≥100μF, 120Hz) Voltage : 1±0.2V _{rms} |

◆SPECIFICATIONS

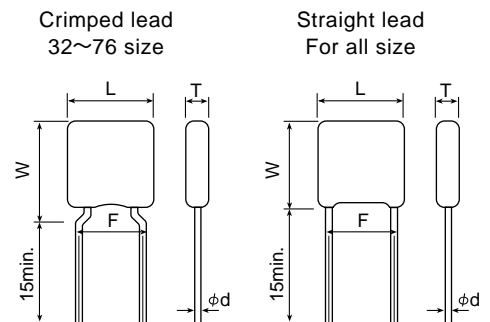
| No. | Items | Specification | Test Condition | | | | | | | | | | | | | | | | | | |
|--------------------|------------------------------|---|--|------------------|------------------|----------|--------------------|------------------------------|---------|-----------------|------------------|--------|------------------|------------------------------|------|----------|------------------|--------|--|---|------|
| 5 | Rated Ripple Current | <table border="1"> <tr> <td>Size code</td> <td>32</td> <td>43</td> <td>55</td> <td>76</td> <td>80</td> <td>90</td> <td>99</td> </tr> <tr> <td>Arms</td> <td>0.3</td> <td>0.8</td> <td>1.0</td> <td>1.5</td> <td>2.0</td> <td>3.0</td> <td>4.0</td> </tr> </table> | Size code | 32 | 43 | 55 | 76 | 80 | 90 | 99 | Arms | 0.3 | 0.8 | 1.0 | 1.5 | 2.0 | 3.0 | 4.0 | 10kHz to 1MHz (sine curve) Ripple voltage V_p shall be less than the rated voltage. | | |
| Size code | 32 | 43 | 55 | 76 | 80 | 90 | 99 | | | | | | | | | | | | | | |
| Arms | 0.3 | 0.8 | 1.0 | 1.5 | 2.0 | 3.0 | 4.0 | | | | | | | | | | | | | | |
| 6 | Robustness of Terminations | No visible damage. | The force applied shall be : <table border="1"> <tr> <td>Lead ϕ (mm)</td> <td>Tensile(N)</td> <td>(sec.)</td> </tr> <tr> <td>0.5 max.</td> <td>5</td> <td>10±1</td> </tr> <tr> <td>0.6 to 0.8 max.</td> <td>10</td> <td>10±1</td> </tr> </table> <table border="1"> <tr> <td>Lead ϕ (mm)</td> <td>Bending(N)</td> <td>(kg)</td> </tr> <tr> <td>0.5 max.</td> <td>2.5</td> <td>0.25</td> </tr> <tr> <td>0.6 to 0.8 max.</td> <td>5</td> <td>0.51</td> </tr> </table> Time : 2times. | Lead ϕ (mm) | Tensile(N) | (sec.) | 0.5 max. | 5 | 10±1 | 0.6 to 0.8 max. | 10 | 10±1 | Lead ϕ (mm) | Bending(N) | (kg) | 0.5 max. | 2.5 | 0.25 | 0.6 to 0.8 max. | 5 | 0.51 |
| Lead ϕ (mm) | Tensile(N) | (sec.) | | | | | | | | | | | | | | | | | | | |
| 0.5 max. | 5 | 10±1 | | | | | | | | | | | | | | | | | | | |
| 0.6 to 0.8 max. | 10 | 10±1 | | | | | | | | | | | | | | | | | | | |
| Lead ϕ (mm) | Bending(N) | (kg) | | | | | | | | | | | | | | | | | | | |
| 0.5 max. | 2.5 | 0.25 | | | | | | | | | | | | | | | | | | | |
| 0.6 to 0.8 max. | 5 | 0.51 | | | | | | | | | | | | | | | | | | | |
| 7 | Vibration | Appearance : No abnormality. Capacitance : To meet the initial specification. D.F. : To meet the initial specifications. | Amplitude : 1.5mm Frequency range : 10-55-10Hz (1 min) Direction and time : 2 hours each to X, Y, Z axis. Total 6 hours. | | | | | | | | | | | | | | | | | | |
| 8 | Solderability | Min. 75% of surface of the termination shall be covered with new solder. | <table border="1"> <tr> <td>Solder</td> <td>Pb Free</td> <td>Eutectic</td> </tr> <tr> <td>Solder Temperature</td> <td>245±5°C</td> <td>235±5°C</td> </tr> <tr> <td>Dipping Time</td> <td colspan="2">2±0.5sec.</td> </tr> </table> | Solder | Pb Free | Eutectic | Solder Temperature | 245±5°C | 235±5°C | Dipping Time | 2±0.5sec. | | | | | | | | | | |
| Solder | Pb Free | Eutectic | | | | | | | | | | | | | | | | | | | |
| Solder Temperature | 245±5°C | 235±5°C | | | | | | | | | | | | | | | | | | | |
| Dipping Time | 2±0.5sec. | | | | | | | | | | | | | | | | | | | | |
| 9 | Resistance to Soldering Heat | Appearance : No abnormality. $\Delta C/C$: ±15% D.F. : Satisfy the initial spec. | Solder Temperature : 350±10°C Dipping Time : 3±0.5 sec. Depth : 1.5 to 2mm | | | | | | | | | | | | | | | | | | |
| 10 | Temperature Cycle | Appearance : No abnormality. $\Delta C/C$: ±15% D.F. : To meet the initial specification I.R. : To meet the initial specification | <table border="1"> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>(min.)</th> </tr> <tr> <td>1</td> <td>Min. Category temperature ±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>3 max.</td> </tr> <tr> <td>3</td> <td>Max. Category temperature ±3</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>3 max.</td> </tr> </table> For 5 cycles for above temperature cycle. | Step | Temperature (°C) | (min.) | 1 | Min. Category temperature ±3 | 30±3 | 2 | Room temperature | 3 max. | 3 | Max. Category temperature ±3 | 30±3 | 4 | Room temperature | 3 max. | | | |
| Step | Temperature (°C) | (min.) | | | | | | | | | | | | | | | | | | | |
| 1 | Min. Category temperature ±3 | 30±3 | | | | | | | | | | | | | | | | | | | |
| 2 | Room temperature | 3 max. | | | | | | | | | | | | | | | | | | | |
| 3 | Max. Category temperature ±3 | 30±3 | | | | | | | | | | | | | | | | | | | |
| 4 | Room temperature | 3 max. | | | | | | | | | | | | | | | | | | | |
| 11 | Humidity Load Life | Appearance : No abnormality. $\Delta C/C$: ±20% D.F. : 7% maximum I.R. : 50/ C_R (M Ω) or 1000(M Ω) whichever is less. | Temperature : 40±2°C Humidity : 90 to 95%RH Voltage : Rated voltage Time : 500± ²⁴ ₀ hours | | | | | | | | | | | | | | | | | | |
| 12 | Endurance | Appearance : No abnormality. $\Delta C/C$: ±20% D.F. : 7% maximum I.R. : 100/ C_R (M Ω) or 1000(M Ω) whichever is less. | Temperature : 85±2°C Voltage : 200% of rated voltage. Time : 1000± ⁴⁸ ₀ hours Temperature : 125±3°C Voltage : Rated voltage Time : 1000± ⁴⁸ ₀ hours | | | | | | | | | | | | | | | | | | |

* C_R : Rated Capacitance(μ F)

◆PART NUMBERING SYSTEM



◆DIMENSIONS





DIPPED RADIAL LEAD MULTILAYER CERAMIC CAPACITORS

THD Series

◆THD SERIES STANDARD RATINGS

| Rated voltage (Vdc) | Rated Capacitance (μF) | Dimensions (mm) | | | | | Maximum ripple current (Arms) | Part Number | Previous Part Number (Just for your reference) | |
|---------------------|------------------------|--------------------|--------------------|-------|--------------------|---------|-------------------------------|--------------------|--|---------------|
| | | Lmax. | Wmax. | Tmax. | F±0.8 | φd±0.05 | | | | |
| 16 | 6.8 | 5.0 | 6.5 | 3.5 | 5.0 | 0.5 | 0.3 | KHD160E685M32A0T00 | THD21E1C685MT | |
| | 10 | | | | | | | KHD160E106M32A0T00 | THD21E1C106MT | |
| | 15 | | | | | | | KHD160E156M43A0T00 | THD30E1C156MT | |
| | 22 | 6.5 | 7.5 | 4.0 | 5.0 | 0.5 | 0.8 | KHD160E226M43A0T00 | THD30E1C226MT | |
| | 33 | | | | | | | KHD160E336M55A0T00 | THD31E1C336MT | |
| | 47 | | | | | | | KHD160E476M55A0T00 | THD31E1C476MT | |
| | 68 | 8.0 | 9.0 | 4.5 | 5.0 | 0.5 | 1.0 | KHD160E686M76A0T00 | THD41E1C686MT | |
| | 100 | | | | | | | KHD160E107M76A0T00 | THD41E1C107MT | |
| | 150 | | | | | | | 10.0 | 11.5 | 4.5 |
| | 220 | KHD160E227M80A0B00 | THD51E1C227M | | | | | | | |
| | 330 | KHD160E337M90C0B00 | THD60E1C337M | | | | | | | |
| | 470 | 22.5 | 20.0 | 6 | 20.0 | 0.8 | 3.0 | KHD160E477M90C0B00 | THD60E1C477M | |
| 680 | KHD160E687M99C0B00 | | | | | | | THD61E1C687M | | |
| | | | | | | | | | | |
| 25 | 3.3 | 5.0 | 6.5 | 3.0 | 5.0 | 0.5 | 0.3 | KHD250E335M32A0T00 | THD21E1E335MT | |
| | 4.7 | | | 3.5 | | | | KHD250E475M32A0T00 | THD21E1E475MT | |
| | 6.8 | | | 6.5 | | | | 7.0 | 3.5 | 5.0 |
| | 10 | 4.0 | KHD250E106M43A0T00 | | THD30E1E106MT | | | | | |
| | 15 | 4.0 | KHD250E156M43A0T00 | | THD30E1E156MT | | | | | |
| | 22 | 7.5 | 9.0 | 4.0 | 5.0 | 0.5 | 1.0 | KHD250E226M55A0T00 | THD31E1E226MT | |
| | 33 | | | 4.5 | | | | KHD250E336M55A0T00 | THD31E1E336MT | |
| | 47 | | | 4.5 | | | | KHD250E476M76A0T00 | THD41E1E476MT | |
| | 68 | 10.0 | 11.5 | 4.5 | 5.0 | 0.5 | 1.5 | KHD250E686M80A0B00 | THD51E1E686M | |
| | 100 | | | 5.0 | | | | KHD250E107M80A0B00 | THD51E1E107M | |
| | 150 | | | 5.5 | | | | KHD250E157M90C0B00 | THD60E1E157M | |
| | 220 | 22.5 | 20.0 | 6.0 | 20.0 | 0.8 | 3.0 | KHD250E227M90C0B00 | THD60E1E227M | |
| | 330 | | | | | | | KHD250E337M99C0B00 | THD61E1E337M | |
| | 470 | | | | | | | KHD250E477M99C0B00 | THD61E1E477M | |
| | 50 | 1.0 | 5.0 | 6.5 | 3.0 | 5.0 | 0.5 | 0.3 | KHD500E105M32A0T00 | THD21E1H105MT |
| | | 1.5 | | | 3.5 | | | | KHD500E155M32A0T00 | THD21E1H155MT |
| 2.2 | | 3.5 | | | KHD500E225M32A0T00 | | | | THD21E1H225MT | |
| 3.3 | | 6.5 | 7.0 | 3.5 | 5.0 | 0.5 | 0.8 | KHD500E335M43A0T00 | THD30E1H335MT | |
| 4.7 | | | | 4.0 | | | | KHD500E475M43A0T00 | THD30E1H475MT | |
| 6.8 | | | | 4.0 | | | | KHD500E685M55A0T00 | THD31E1H685MT | |
| 10 | | 7.5 | 9.0 | 4.5 | 5.0 | 0.5 | 1.0 | KHD500E106M55A0T00 | THD31E1H106MT | |
| 15 | | | | 4.5 | | | | KHD500E156M55A0T00 | THD31E1H156MT | |
| 22 | | | | 4.5 | | | | KHD500E226M76A0T00 | THD41E1H226MT | |
| 33 | | 10.0 | 11.5 | 5.0 | 5.0 | 0.5 | 1.5 | KHD500E336M80A0B00 | THD51E1H336M | |
| 47 | | | | 5.0 | | | | KHD500E476M90C0B00 | THD60E1H476M | |
| 68 | | | | 5.0 | | | | KHD500E686M90C0B00 | THD60E1H686M | |
| 100 | | 22.5 | 20.0 | 6.0 | 20.0 | 0.8 | 3.0 | KHD500E107M90C0B00 | THD60E1H107M | |
| 150 | | | | | | | | KHD500E157M99C0B00 | THD61E1H157M | |
| 220 | | | | | | | | KHD500E227M99C0B00 | THD61E1H227M | |
| 100 | | 0.33 | 5.0 | 6.5 | 3.0 | 5.0 | 0.5 | 0.3 | KHD101E334M32A0T00 | THD21E2A334MT |
| | 0.47 | 3.5 | | | KHD101E474M32A0T00 | | | | THD21E2A474MT | |
| | 0.68 | 3.5 | | | KHD101E684M32A0T00 | | | | THD21E2A684MT | |
| | 1.0 | 6.5 | 7.0 | 3.5 | 5.0 | 0.5 | 0.8 | KHD101E105M43A0T00 | THD30E2A105MT | |
| | 1.5 | | | 4.0 | | | | KHD101E155M43A0T00 | THD30E2A155MT | |
| | 2.2 | | | 4.0 | | | | KHD101E225M43A0T00 | THD30E2A225MT | |
| | 3.3 | 7.5 | 9.0 | 4.0 | 5.0 | 0.5 | 1.0 | KHD101E335M55A0T00 | THD31E2A335MT | |
| | 4.7 | | | 4.5 | | | | KHD101E475M55A0T00 | THD31E2A475MT | |
| | 6.8 | | | 4.5 | | | | KHD101E685M76A0T00 | THD41E2A685MT | |
| | 10 | 10.0 | 11.5 | 4.5 | 5.0 | 0.5 | 1.5 | KHD101E106M80A0B00 | THD51E2A106M | |
| | 15 | | | 5.0 | | | | KHD101E156M80A0B00 | THD51E2A156M | |
| | 22 | | | 5.0 | | | | KHD101E226M90C0B00 | THD60E2A226M | |
| | 33 | 22.5 | 20.0 | 6.0 | 20.0 | 0.8 | 3.0 | KHD101E336M90C0B00 | THD60E2A336M | |
| | 47 | | | | | | | KHD101E476M99C0B00 | THD61E2A476M | |
| | 68 | | | | | | | KHD101E686M99C0B00 | THD61E2A686M | |
| | 100 | 28.5 | 20.0 | 7.5 | 25.0 | 0.8 | 4.0 | KHD101E107M99C0B00 | THD61E2A107M | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 250 | 0.1 | 6.5 | 7.0 | 3.5 | 5.0 | 0.5 | 0.8 | KHD251E104M43A0T00 | THD30E2E104MT | |
| | 0.15 | | | 4.0 | | | | KHD251E154M43A0T00 | THD30E2E154MT | |
| | 0.22 | | | 4.0 | | | | KHD251E224M43A0T00 | THD30E2E224MT | |
| | 0.33 | 7.5 | 9.0 | 4.0 | 5.0 | 0.5 | 1.0 | KHD251E334M43A0T00 | THD30E2E334MT | |
| | 0.47 | | | 4.0 | | | | KHD251E474M55A0T00 | THD31E2E474MT | |
| | 0.68 | | | 4.5 | | | | KHD251E684M55A0T00 | THD31E2E684MT | |
| | 1.0 | 10.0 | 11.5 | 4.5 | 5.0 | 0.5 | 1.5 | KHD251E105M76A0T00 | THD41E2E105MT | |
| | 1.5 | | | 5.0 | | | | KHD251E155M76A0T00 | THD41E2E155MT | |
| | 2.2 | | | 5.0 | | | | KHD251E225M80A0B00 | THD51E2E225M | |
| | 3.3 | 22.5 | 20.0 | 6.0 | 20.0 | 0.8 | 3.0 | KHD251E335M90C0B00 | THD60E2E335M | |
| | 4.7 | | | | | | | KHD251E475M90C0B00 | THD60E2E475M | |
| | 6.8 | | | | | | | KHD251E685M99C0B00 | THD61E2E685M | |
| | 10 | 28.5 | 20.0 | 7.5 | 25.0 | 0.8 | 4.0 | KHD251E106M99C0B00 | THD61E2E106M | |
| | 15 | | | | | | | KHD251E156M99C0B00 | THD61E2E156M | |
| | | | | | | | | | | |