

# NTC Thermistor : TTC05 Series



## Φ5mm Lead Type for Temperature Sensing/Compensation

### ■ Features

1. RoHS compliant
2. Halogen-Free (HF) series are available
3. Body size: Φ5mm
4. Radial lead resin coated
5. Operating temperature range: -30°C ~ +125°C
6. Wide resistance range
7. Cost effective
8. Agency recognition: UL / cUL / TUV / CQC



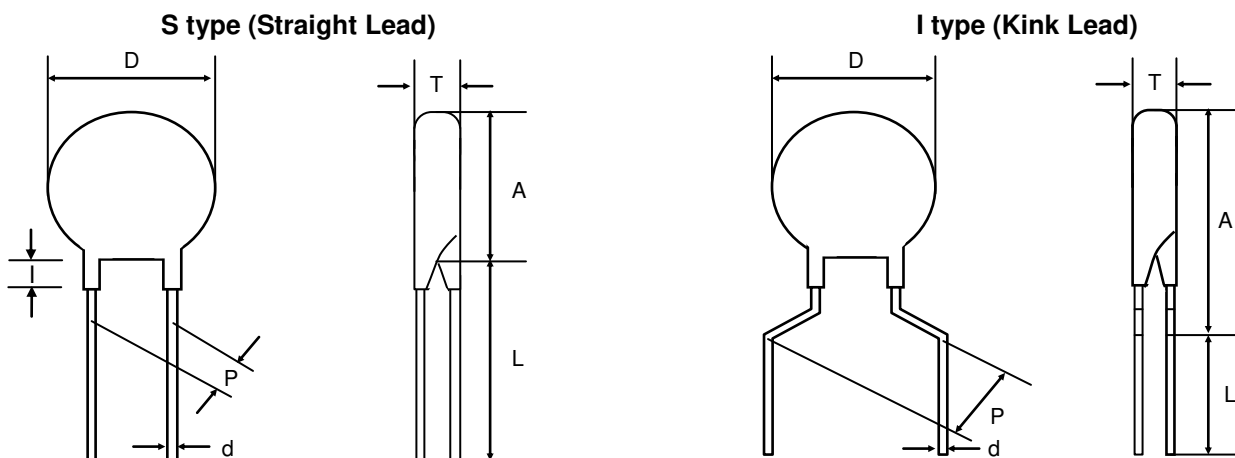
### ■ Recommended Applications

1. Home appliances
2. Automotive electronics
3. Computers
4. Switch mode power supplies
5. Adapters

### ■ Part Number Code

|              |  |   |           |      |  |   |   |                              |        |            |    |                 |    |                        |
|--------------|--|---|-----------|------|--|---|---|------------------------------|--------|------------|----|-----------------|----|------------------------|
| 1            | 2  | 3 | 4         | 5    | 6  | 7 | 8 | 9                            | 10     | 11         | 12 | 13              | 14 |                        |
| Product Type |  |   | Body Size |      | Zero Power Resistance at 25°C (R <sub>25</sub> )   |   |   | Tolerance of R <sub>25</sub> |        | Appearance |    | Optional Suffix |    |                        |
| TTC          | THINKING<br>NTC Thermistor<br>TTC Series |   | 05        | Φ5mm | R <sub>25</sub> < 100Ω<br>005: 5Ω<br>015: 15Ω<br>050: 50Ω<br><br>R <sub>25</sub> ≥ 100Ω<br>101: 100Ω<br>682: 6800Ω<br>474: 470000Ω |   |   | J ±5%                        | K ±10% | L ±15%     | S  | Straight lead   | Y  | RoHS & HF<br>Compliant |
|              |  |   |           |      |  |   |   |                              |        |            | I  | Kink lead       |    |                        |

### ■ Structure and Dimensions



(Unit: mm)

| Type   | D       | P        | d        | I max. | A max. | L min. | T       |
|--------|---------|----------|----------|--------|--------|--------|---------|
| S Type | 4.0~6.5 | 3.5± 0.5 | 0.5±0.02 | 3      | 6.5    | 31     | 2.5~5.0 |
| I Type | 4.0~6.5 | 5± 0.5   | 0.5±0.02 | —      | 10     | 29     | 2.5~5.0 |

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### ■ Electrical Characteristics

| Part No.  | Zero Power Resistance at 25°C | Tolerance of R <sub>25</sub> | B <sub>25/50</sub> Value | Max. Power Dissipation at 25°C | Dissipation Factor | Thermal Time Constant | Operating Temperature Range         | Safety Approvals |     |     |   |
|-----------|-------------------------------|------------------------------|--------------------------|--------------------------------|--------------------|-----------------------|-------------------------------------|------------------|-----|-----|---|
|           | R <sub>25</sub> (Ω)           | ( ±%)                        | (K)                      | P <sub>max</sub> (mW)          | δ(mW/°C)           | τ (Sec.)              | T <sub>L</sub> ~T <sub>U</sub> (°C) | UL/cUL           | TUV | CQC |   |
| TTC05005□ | 5                             | 10, 15                       | 2400                     | 450                            | Approx. 4.5        | Approx. 20            | -30~+125                            |                  | √   | √   |   |
| TTC05010□ | 10                            |                              |                          |                                |                    |                       |                                     | 2800             |     | √   | √ |
| TTC05015□ | 15                            |                              |                          |                                |                    |                       |                                     | 2800             | √   | √   | √ |
| TTC05020□ | 20                            |                              |                          |                                |                    |                       |                                     | 2800             | √   | √   | √ |
| TTC05025□ | 25                            |                              |                          |                                |                    |                       |                                     | 2900             | √   | √   | √ |
| TTC05045□ | 45                            |                              |                          |                                |                    |                       |                                     | 3100             | √   | √   | √ |
| TTC05050□ | 50                            |                              |                          |                                |                    |                       |                                     | 3100             | √   | √   | √ |
| TTC05060□ | 60                            |                              |                          |                                |                    |                       |                                     | 3100             | √   | √   | √ |
| TTC05085□ | 85                            |                              |                          |                                |                    |                       |                                     | 3200             | √   | √   | √ |
| TTC05090□ | 90                            |                              |                          |                                |                    |                       |                                     | 3200             | √   | √   | √ |
| TTC05101□ | 100                           |                              |                          |                                |                    |                       |                                     | 3200             | √   | √   | √ |
| TTC05121□ | 120                           |                              |                          |                                |                    |                       |                                     | 3300             | √   | √   | √ |
| TTC05151□ | 150                           |                              |                          |                                |                    |                       |                                     | 3300             | √   | √   | √ |
| TTC05201□ | 200                           |                              |                          |                                |                    |                       |                                     | 3500             | √   | √   | √ |
| TTC05221□ | 220                           |                              |                          |                                |                    |                       |                                     | 3500             | √   | √   | √ |
| TTC05251□ | 250                           |                              |                          |                                |                    |                       |                                     | 3500             | √   | √   | √ |
| TTC05301□ | 300                           |                              |                          |                                |                    |                       |                                     | 3800             | √   | √   | √ |
| TTC05471□ | 470                           |                              |                          |                                |                    |                       |                                     | 3500             | √   | √   | √ |
| TTC05501□ | 500                           |                              |                          |                                |                    |                       |                                     | 3700             | √   | √   | √ |
| TTC05681□ | 680                           |                              |                          |                                |                    |                       |                                     | 3800             | √   | √   | √ |
| TTC05701□ | 700                           |                              |                          |                                |                    |                       |                                     | 3800             | √   | √   | √ |
| TTC05102□ | 1000                          |                              |                          |                                |                    |                       |                                     | 3800             | √   | √   | √ |
| TTC05152□ | 1500                          |                              |                          |                                |                    |                       |                                     | 3950             | √   | √   | √ |
| TTC05202□ | 2000                          |                              |                          |                                |                    |                       |                                     | 4000             | √   | √   | √ |
| TTC05222□ | 2200                          |                              |                          |                                |                    |                       |                                     | 4000             | √   | √   | √ |
| TTC05252□ | 2500                          |                              |                          |                                |                    |                       |                                     | 4000             | √   | √   | √ |
| TTC05302□ | 3000                          |                              |                          |                                |                    |                       |                                     | 4000             | √   | √   | √ |
| TTC05332□ | 3300                          |                              |                          |                                |                    |                       |                                     | 4000             | √   | √   | √ |
| TTC05402□ | 4000                          |                              |                          |                                |                    |                       |                                     | 4000             | √   | √   | √ |
| TTC05472□ | 4700                          |                              |                          |                                |                    |                       |                                     | 4050             | √   | √   | √ |
| TTC05502□ | 5000                          |                              | 3950                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05602□ | 6000                          |                              | 4050                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05682□ | 6800                          |                              | 4050                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05802□ | 8000                          |                              | 4050                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05103□ | 10000                         | 5, 10, 15                    | 4050                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05123□ | 12000                         |                              | 4050                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05153□ | 15000                         |                              | 4150                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05203□ | 20000                         |                              | 4250                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05303□ | 30000                         |                              | 4250                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05473□ | 47000                         |                              | 4300                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05503□ | 50000                         |                              | 4300                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05104□ | 100000                        |                              | 4400                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05154□ | 150000                        |                              | 4500                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05204□ | 200000                        |                              | 4600                     | √                              | √                  | √                     |                                     |                  |     |     |   |
| TTC05224□ | 220000                        | 4600                         | √                        | √                              | √                  |                       |                                     |                  |     |     |   |
| TTC05474□ | 470000                        | 4750                         | √                        | √                              | √                  |                       |                                     |                  |     |     |   |

Note 1: □ = Tolerance of R<sub>25</sub>

Note 2: UL/cUL File No: E138827

CSA File No: 97495

TUV File No: R 50050155

CQC File No: CQC05001011991 ; CQC05001011994

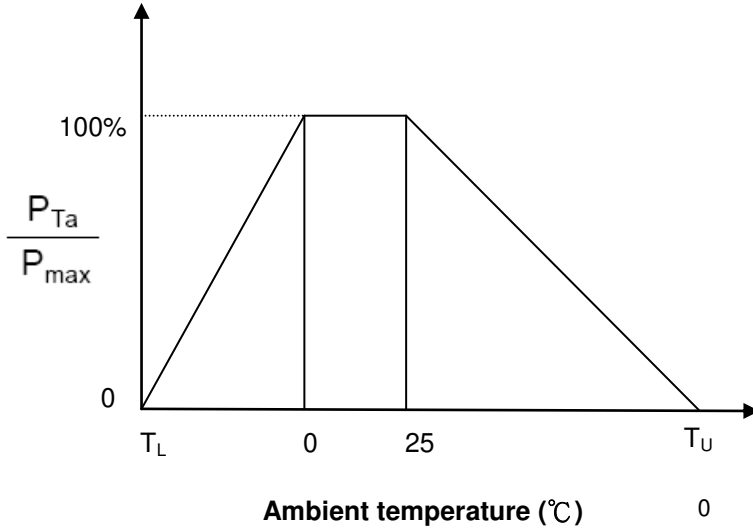
Note 3: Special specifications are available upon request.

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### Max. Power Dissipation Derating Curve



$T_U$  : Maximum operating temperature (°C)

$T_L$  : Minimum operating temperature (°C)

For example:

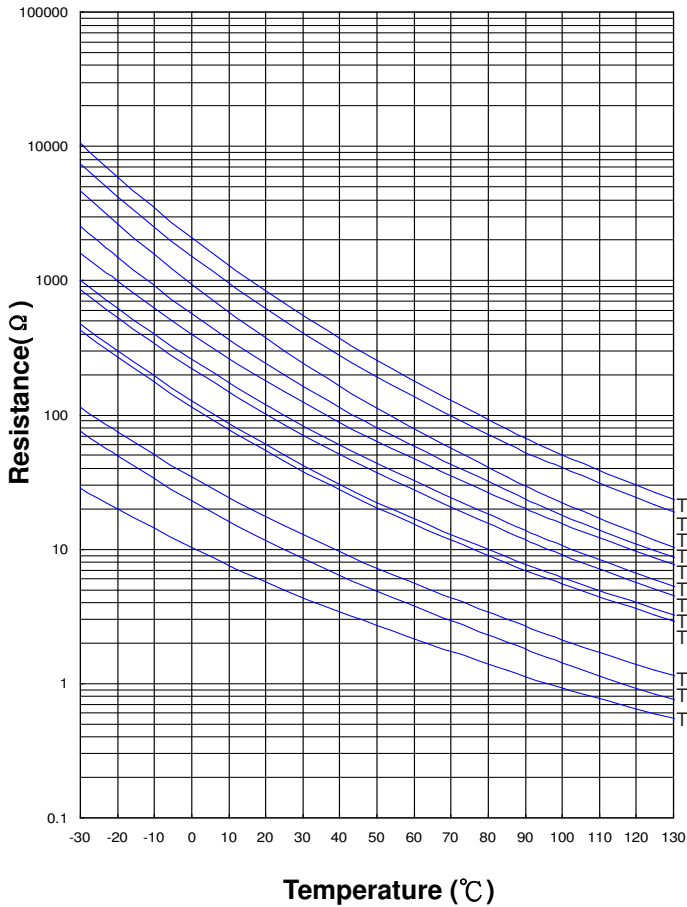
Ambient temperature ( $T_a$ ) = 55°C

Maximum operating temperature ( $T_U$ ) = 125°C

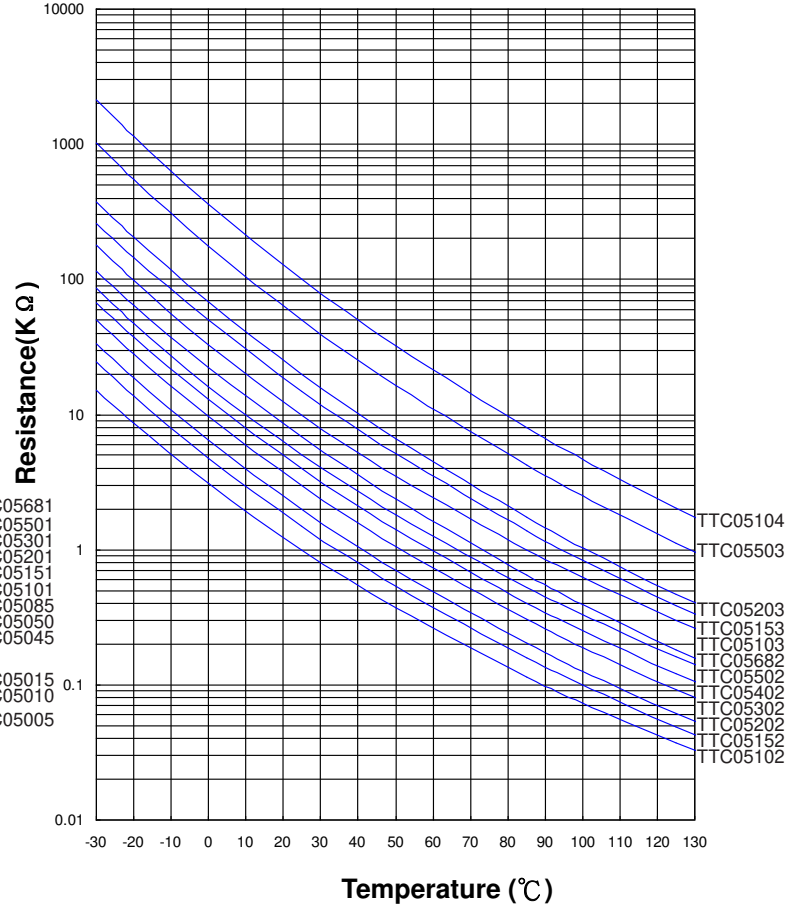
$$P_{Ta} = (T_U - T_a) / (T_U - 25) \times P_{max} = 70\% P_{max}$$

### R-T Characteristic Curves (representative)

TTC05005~TTC05681



TTC05102~TTC05104



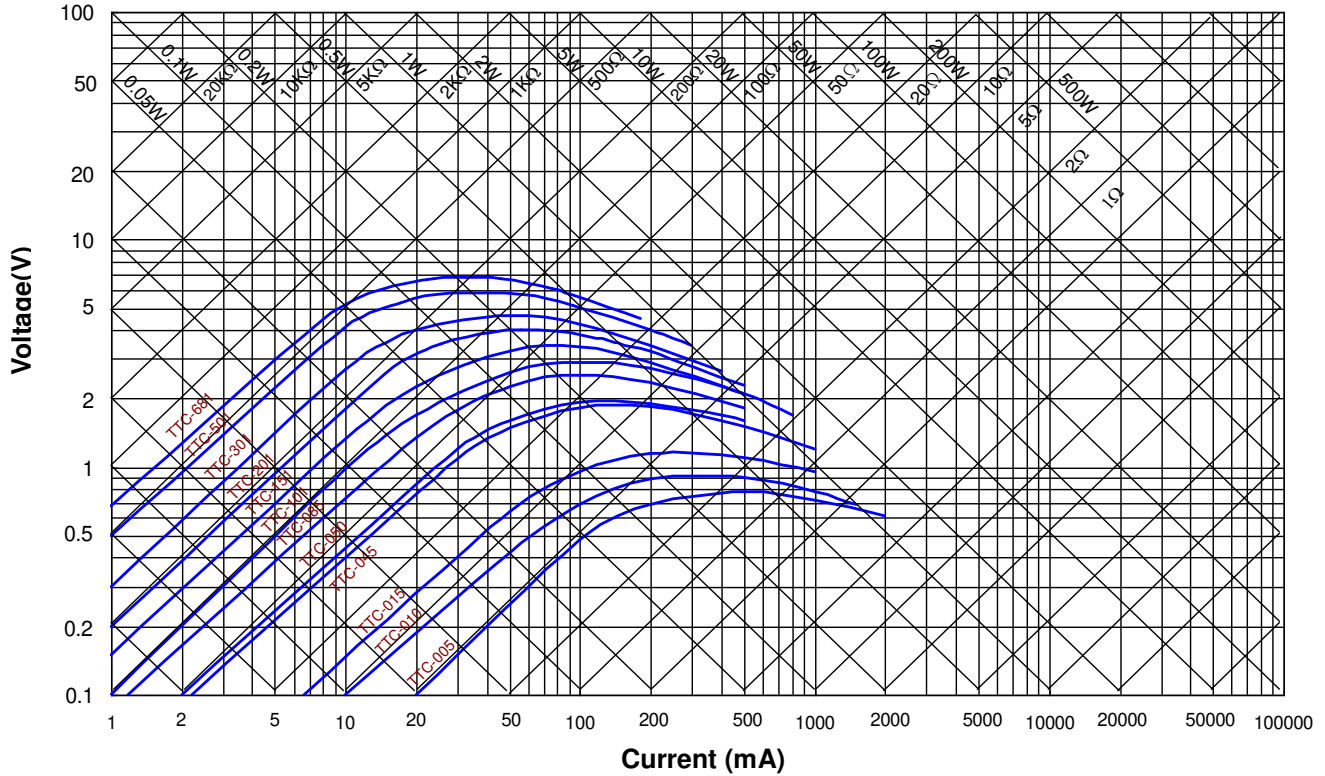
# NTC Thermistor : TTC05 Series



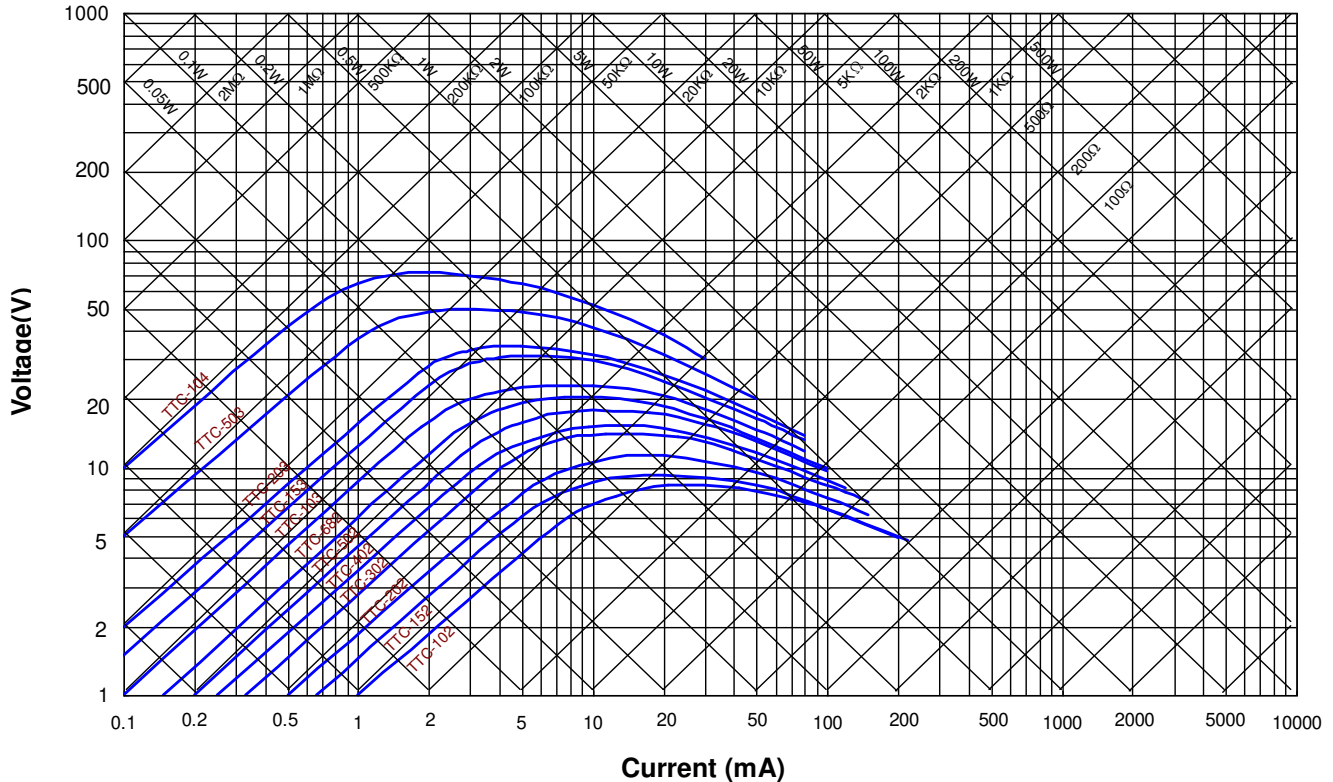
Φ5mm Lead Type for Temperature Sensing/Compensation

## ■ V-I Characteristic Curves (representative)

TTC05005~TTC05681



TTC05102~TTC05104



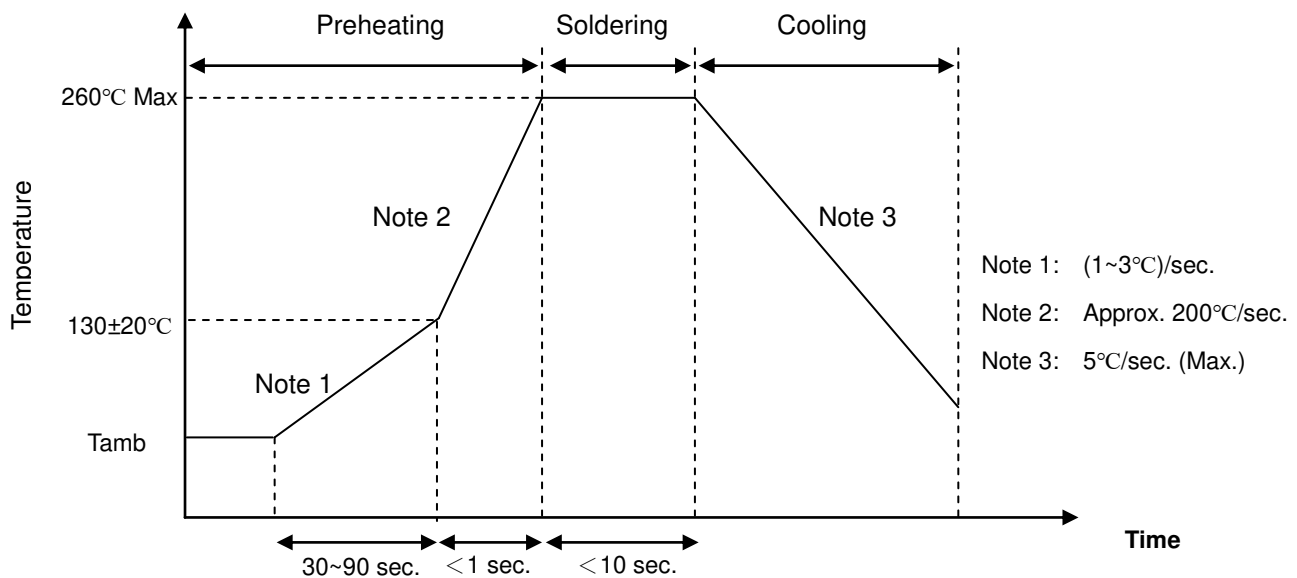
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## Φ5mm Lead Type for Temperature Sensing/Compensation

### ■ Soldering Recommendation

#### ● Wave Soldering Profile



Caution: It had better to keep the minimum distance as 6mm between the bottom of the thermistor body and PCB surface to prevent component damage.

#### ● Recommended Reworking Conditions with Soldering Iron

| Item                              | Conditions                 |
|-----------------------------------|----------------------------|
| Temperature of Soldering Iron-tip | $360^\circ\text{C}$ (max.) |
| Soldering Time                    | 3 sec. (max.)              |
| Distance from Thermistor          | 2 mm (min.)                |

# NTC Thermistor : TTC05 Series



## Φ5mm Lead Type for Temperature Sensing/Compensation

### ■ Reliability

| Item                          | Standard                 | Test conditions / Methods   | Specifications   |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
|-------------------------------|--------------------------|---|--|------------------|------------------|---|---------|--------|---|------------------|-------|---|---------|--------|---|------------------|-------|--|
| Tensile Strength of Terminals | IEC 60068-2-21           | Gradually apply the specified force and keep the unit fixed for 10±1 sec.<br><br>Terminal diameter (mm) $0.3 < d \leq 0.5$ Force (Kg) 0.5   | No visible damage  |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| Bending Strength of Terminals | IEC 60068-2-21           | Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, and then return to the original position. Repeat the procedure in the opposite direction.<br><br>Terminal diameter (mm) $0.3 < d \leq 0.5$ Force (Kg) 0.25  | No visible damage  |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| Solderability                 | IEC 60068-2-20           | 245 ± 3 °C , 3 ± 0.3 sec.   | At least 95% of terminal electrode is covered by new solder      |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| Resistance to Soldering Heat  | IEC 60068-2-20           | 260 ± 3 °C , 10 ± 1 sec.  | No visible damage<br>  ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 3 % |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| High Temperature Storage      | IEC 600068-2-2           | 125 ± 5 °C , 1000 ± 24 hrs  | No visible damage<br>  ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 5 % |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| Damp Heat, Steady State       | IEC 60068-2-78           | 40 ± 2 °C , 90~95% RH, 1000 ± 24 hrs  | No visible damage<br>  ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 3 % |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| Rapid Change of Temperature   | IEC 60068-2-14           | The conditions shown below shall be repeated 5 cycles.<br><table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-30 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> <tr> <td>3</td> <td>125 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> </tbody> </table> | Step   | Temperature (°C) | Period (minutes) | 1 | -30 ± 5 | 30 ± 3 | 2 | Room temperature | 5 ± 3 | 3 | 125 ± 5 | 30 ± 3 | 4 | Room temperature | 5 ± 3 | No visible damage<br>  ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 3 % |
| Step                          | Temperature (°C)         | Period (minutes)  |  |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| 1                             | -30 ± 5                  | 30 ± 3  |  |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| 2                             | Room temperature         | 5 ± 3   |  |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| 3                             | 125 ± 5                  | 30 ± 3  |  |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| 4                             | Room temperature         | 5 ± 3   |  |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| Max. Power Dissipation        | IEC 60539-1 4.26.3       | 25 ± 5 °C , Pmax. , 1000 ± 24 hrs   | No visible damage<br>  ΔR <sub>25</sub> /R <sub>25</sub>   ≤ 5 % |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |
| Insulation Test               | MIL-STD-202F -Method 302 | 1000 V <sub>DC</sub> , 1 min  | ≥ 500 MΩ   |                  |                  |   |         |        |   |                  |       |   |         |        |   |                  |       |  |

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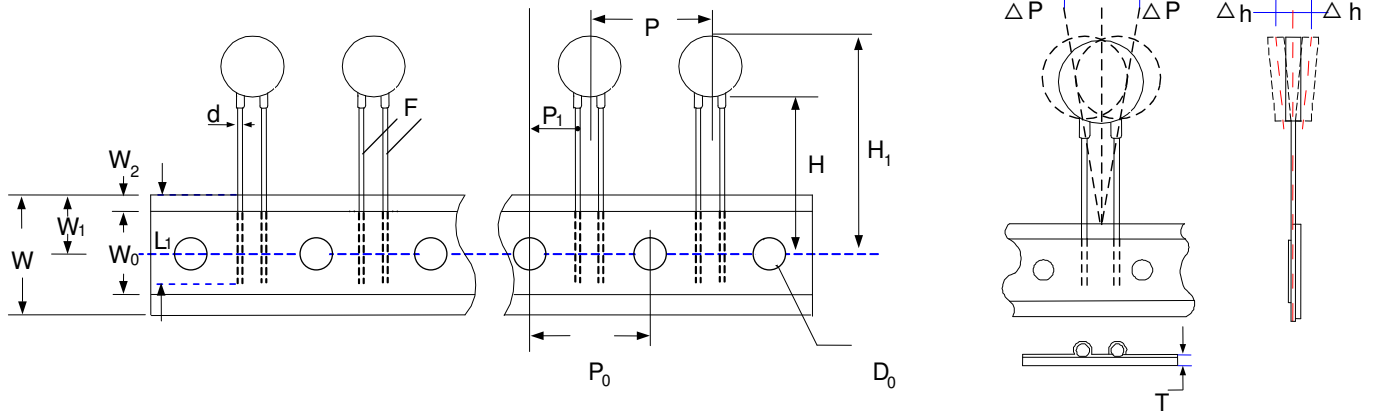


## Φ5mm Lead Type for Temperature Sensing/Compensation

### ■ Packaging

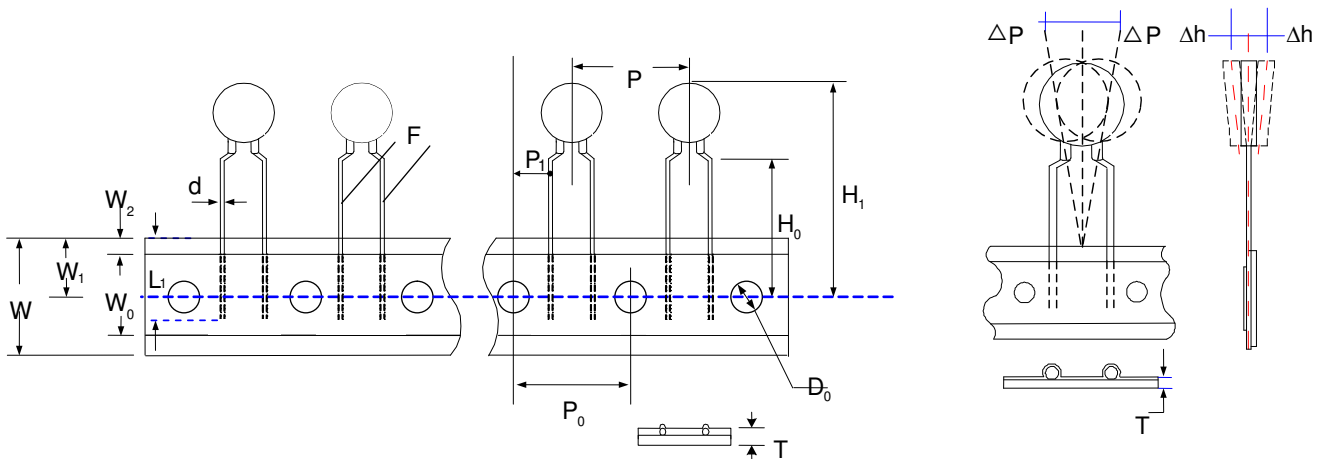
#### ● Taping Specification :

#### S Type (Straight Lead)



| Taping Dimension     | P <sub>0</sub> | F    | P    | P <sub>1</sub> | H     | H <sub>1</sub> | d     | W <sub>0</sub> | W <sub>1</sub> | W <sub>2</sub> | W           | ΔP   | Δh   | L <sub>1</sub> | D <sub>0</sub> | T    |
|----------------------|----------------|------|------|----------------|-------|----------------|-------|----------------|----------------|----------------|-------------|------|------|----------------|----------------|------|
|                      | ±0.3           | ±0.5 | ±1   | ±0.7           | +2/-0 | Max.           | ±0.02 | ±1             | +0.75<br>/-0.5 | Max.           | +1/<br>-0.5 | Max. | Max. | Min.           | ±0.2           | ±0.2 |
| P <sub>0</sub> :12.7 | 12.7           | 3.5  | 12.7 | 4.60           | 18    | 28             | 0.5   | 12             | 9              | 3              | 18          | 1    | 2    | 9              | 4              | 0.6  |
| P <sub>0</sub> :15.0 | 15.0           | 3.5  | 15.0 | 5.75           | 18    | 28             | 0.5   | 12             | 9              | 3              | 18          | 1    | 2    | 9              | 4              | 0.6  |

#### I Type (Kink Lead)



| Taping Dimension     | P <sub>0</sub> | F    | P    | P <sub>1</sub> | H <sub>0</sub> | H <sub>1</sub> | d     | W <sub>0</sub> | W <sub>1</sub> | W <sub>2</sub> | W           | ΔP   | Δh   | L <sub>1</sub> | D <sub>0</sub> | T    |
|----------------------|----------------|------|------|----------------|----------------|----------------|-------|----------------|----------------|----------------|-------------|------|------|----------------|----------------|------|
|                      | ±0.3           | ±0.5 | ±1   | ±0.7           | ±0.5           | Max.           | ±0.02 | ±1             | +0.75<br>/-0.5 | Max.           | +1/<br>-0.5 | Max. | Max. | Min.           | ±0.2           | ±0.2 |
| P <sub>0</sub> :12.7 | 12.7           | 5.0  | 12.7 | 3.85           | 16             | 28             | 0.5   | 12             | 9              | 3              | 18          | 1    | 2    | 9              | 4              | 0.6  |
| P <sub>0</sub> :15.0 | 15.0           | 5.0  | 15.0 | 5.00           | 16             | 28             | 0.5   | 12             | 9              | 3              | 18          | 1    | 2    | 9              | 4              | 0.6  |

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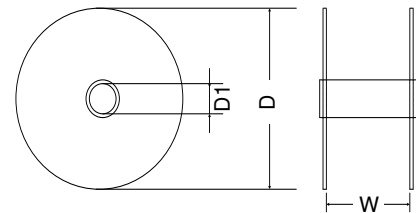
### ■ Quantity

#### ● Bulk Packing

| Series | Standard Lead Type<br>Quantity (pcs/bag) | Cut Lead Type<br>Quantity (pcs/bag) |
|--------|--|-------------------------------------|
| TTC05  | 250                                      | 500                                 |

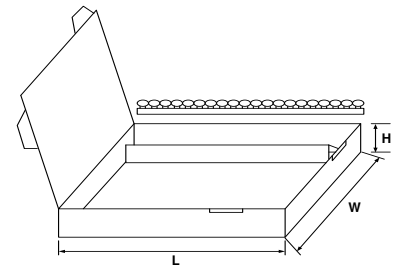
#### ● Reel Packing:

| Series | D<br>(mm) | D1<br>(mm) | W<br>(mm) | Quantity<br>(pcs/reel) |
|--------|-----------|------------|-----------|------------------------|
| TTC05  | 340±10    | 31±1       | 46±1      | 2,500                  |



#### ● Ammo Packing:

| Series | Quantity (pcs/box) |
|--------|--------------------|
| TTC05  | 2,000              |



| L     | W     | H    |
|-------|-------|------|
| 345mm | 275mm | 55mm |

### ■ Warehouse Storage Conditions of Products

#### ● Storage Conditions:

1. Storage Temperature: -10°C ~ +40°C
2. Relative Humidity: ≤ 75%RH
3. Keep away from corrosive atmosphere and sunlight.

#### ● Period of Storage: 1 year