

CPTC Thermistor: PT Series

Temperature Sensor



■ Features

1. RoHS compliant
2. Small size
3. Very fast reaction time
4. Wide range of protection temperatures
5. Stable over a long life
6. Operating temperature range: $0 \sim T_s + 25^\circ\text{C}$ ($V = V_{\text{max}}$)
7. Agency Recognition: UL /cUL/CQC

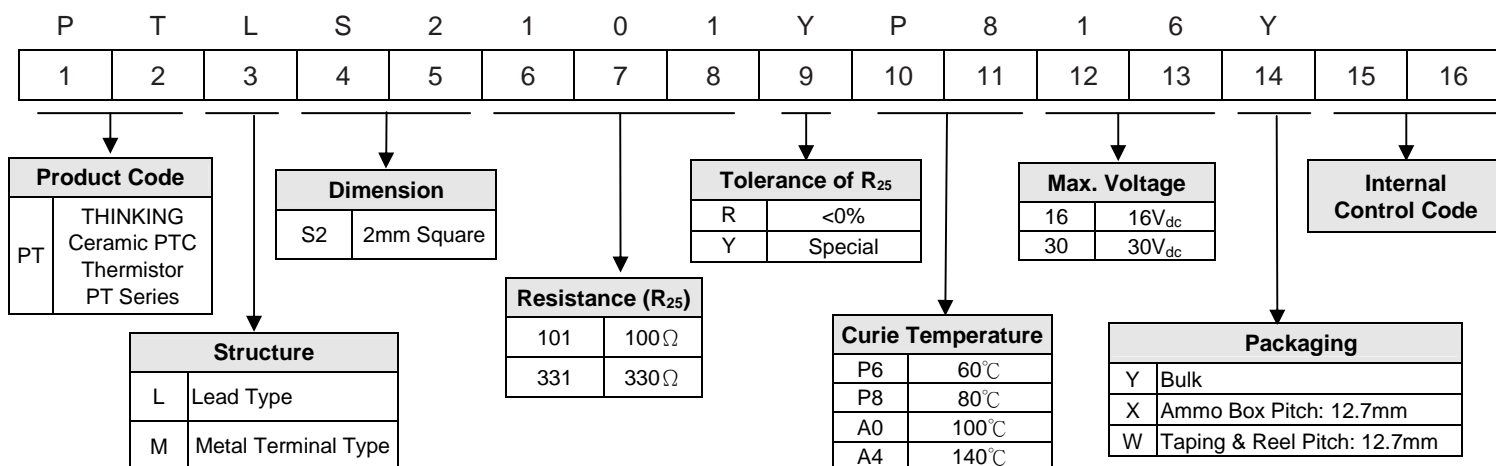
UL&cUL File No. E138827, CQC File No. CQC03001008129 / CQC03001008130



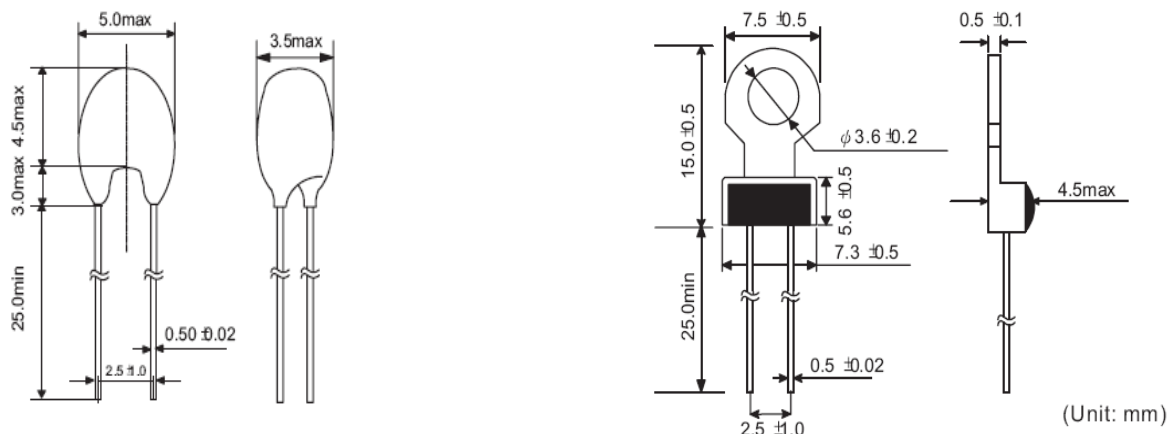
■ Recommended Applications

1. Lighting applications
2. Home appliances
3. Automotive electronics
4. Motor windings

■ Part Number Code



■ Structure and Dimensions



CPTC Thermistor: PT Series

Temperature Sensor



■ Characteristics

PTL Series

| Part No. | Curie Temperature | Sensing Temperature | Resistance Value | | | Max. Voltage | Max. Current | Safety Approvals | |
|---------------|---------------------|---------------------|------------------|-------------------------|-------------------------|-------------------------------------|-----------------------|------------------|-----|
| | T _c (°C) | T _s (°C) | 25°C (Ω) | T _s -5°C (Ω) | T _s +5°C (Ω) | V _{max} (V _{dc}) | I _{max} (mA) | UL/cUL | CQC |
| PTLS2101□P4** | 40±10 | 55 | 100 max. | 330 max. | 470 min. | 16/30 | 100 | √ | √ |
| PTLS2101□P5** | 50±10 | 65 | | | | | | √ | √ |
| PTLS2101□P6** | 60±10 | 75 | | | | | | √ | √ |
| PTLS2101□P7** | 70±10 | 85 | | | | | | √ | √ |
| PTLS2101□P8** | 80±10 | 95 | | | | | | √ | √ |
| PTLS2101□P9** | 90±10 | 105 | | | | | | √ | √ |
| PTLS2101□A0** | 100±10 | 115 | | | | | | √ | √ |
| PTLS2331□P4** | 40±10 | 55 | 330 max. | 1500 max. | 2200 min. | | | √ | √ |
| PTLS2331□P5** | 50±10 | 65 | | | | | | √ | √ |
| PTLS2331□P6** | 60±10 | 75 | | | | | | √ | √ |
| PTLS2331□P7** | 70±10 | 85 | | | | | | √ | √ |
| PTLS2331□P8** | 80±10 | 95 | | | | | | √ | √ |
| PTLS2331□P9** | 90±10 | 105 | | | | | | √ | √ |
| PTLS2331□A0** | 100±10 | 115 | | | | | | √ | √ |

Note: 1: □ means Tolerance of R₂₅

2: ** means Maximum Voltage (16V_{dc} or 30V_{dc})

PTL -02/03 Series

| Part No. | Curie Temperature | Sensing Temperature | Resistance Value | | | | | Max. Voltage | Max. Current | Safety Approvals | |
|-----------------|---------------------|---------------------|------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------------------|-----------------------|------------------|-----|
| | T _c (°C) | T _s (°C) | 25°C (Ω) | T _s -5°C (Ω) | T _s +5°C (Ω) | T _s +15°C (Ω) | T _s +23°C (Ω) | V _{max} (V _{dc}) | I _{max} (mA) | UL/cUL | CQC |
| PTLS2101□P4**02 | 40±10 | 60 | 100 max. | 570 max. | 570 min. | — | 10K min. | 16/30 | 100 | √ | √ |
| PTLS2101□P5**02 | 50±10 | 70 | | | | | | | | √ | √ |
| PTLS2101□P6**02 | 60±10 | 80 | | | | | | | | √ | √ |
| PTLS2101□P7**03 | 70±10 | 90 | | | | | | | | √ | √ |
| PTLS2101□P8**03 | 80±10 | 100 | | | | | | | | √ | √ |
| PTLS2101□P9**03 | 90±10 | 110 | | | | | | | | √ | √ |
| PTLS2101□A0**03 | 100±10 | 120 | | √ | √ | | | | | | |
| PTLS2101□A1**03 | 110±10 | 130 | | 550 max. | 1330 min. | 4000 min. | — | | | √ | √ |
| PTLS2101□A2**03 | 120±10 | 140 | | | | | | | | √ | √ |
| PTLS2101□A3**03 | 130±10 | 150 | | | | | | | | √ | √ |
| PTLS2101□A4**03 | 140±10 | 160 | | | | | | | | √ | √ |
| PTLS2101□A5**03 | 150±10 | 170 | | | | | | | | √ | √ |
| PTLS2101□A6**03 | 160±10 | 180 | | | | | | | | √ | √ |

Note: 1: □ means Tolerance of R₂₅

2: ** means Maximum Voltage (16V_{dc} or 30V_{dc})

CPTC Thermistor: PT Series

Temperature Sensor



PTM Series

| Part No. | Curie Temperature | Sensing Temperature | Resistance Value | | | Max. Voltage | Max. Current | Safety Approvals | |
|---------------|---------------------|---------------------|------------------|-------------------------|-------------------------|-------------------------------------|-----------------------|------------------|-----|
| | T _c (°C) | T _s (°C) | 25°C (Ω) | T _s -5°C (Ω) | T _s +5°C (Ω) | V _{max} (V _{dc}) | I _{max} (mA) | UL/ cUL | CQC |
| PTMS2101□P4** | 40±10 | 55 | 100 max. | 330 max. | 470 min. | 16/30 | 100 | √ | √ |
| PTMS2101□P5** | 50±10 | 65 | | | | | | √ | √ |
| PTMS2101□P6** | 60±10 | 75 | | | | | | √ | √ |
| PTMS2101□P7** | 70±10 | 85 | | | | | | √ | √ |
| PTMS2101□P8** | 80±10 | 95 | | | | | | √ | √ |
| PTMS2101□P9** | 90±10 | 105 | | | | | | √ | √ |
| PTMS2101□A0** | 100±10 | 115 | | | | | | √ | √ |
| PTMS2331□P4** | 40±10 | 55 | 330 max. | 1500 max. | 2200 min. | | | √ | √ |
| PTMS2331□P5** | 50±10 | 65 | | | | | | √ | √ |
| PTMS2331□P6** | 60±10 | 75 | | | | | | √ | √ |
| PTMS2331□P7** | 70±10 | 85 | | | | | | √ | √ |
| PTMS2331□P8** | 80±10 | 95 | | | | | | √ | √ |
| PTMS2331□P9** | 90±10 | 105 | | | | | | √ | √ |
| PTMS2331□A0** | 100±10 | 115 | | | | | | √ | √ |

Note: 1: □ means Tolerance of R₂₅

2: ** means Maximum Voltage (16V_{dc} or 30V_{dc})

PTM -02/03 Series

| Part No. | Curie Temperature | Sensing Temperature | Resistance Value | | | | | Max. Voltage | Max. Current | Safety Approvals | |
|-----------------|---------------------|---------------------|------------------|-------------------------|-------------------------|--------------------------|--------------------------|-------------------------------------|-----------------------|------------------|-----|
| | T _c (°C) | T _s (°C) | 25°C (Ω) | T _s -5°C (Ω) | T _s +5°C (Ω) | T _s +15°C (Ω) | T _s +23°C (Ω) | V _{max} (V _{dc}) | I _{max} (mA) | UL/ cUL | CQC |
| PTMS2101□P4**02 | 40±10 | 60 | 100 max. | 570 max. | 570 min. | — | 10K min. | 16/30 | 100 | √ | √ |
| PTMS2101□P5**02 | 50±10 | 70 | | | | | | | | √ | √ |
| PTMS2101□P6**02 | 60±10 | 80 | | | | | | | | √ | √ |
| PTMS2101□P7**03 | 70±10 | 90 | | | | | | | | √ | √ |
| PTMS2101□P8**03 | 80±10 | 100 | | 550 max. | 1330 min. | 4000 min. | — | | | √ | √ |
| PTMS2101□P9**03 | 90±10 | 110 | | | | | | | | √ | √ |
| PTMS2101□A0**03 | 100±10 | 120 | | | | | | | | √ | √ |
| PTMS2101□A1**03 | 110±10 | 130 | | | | | | | | √ | √ |
| PTMS2101□A2**03 | 120±10 | 140 | √ | √ | | | | | | | |

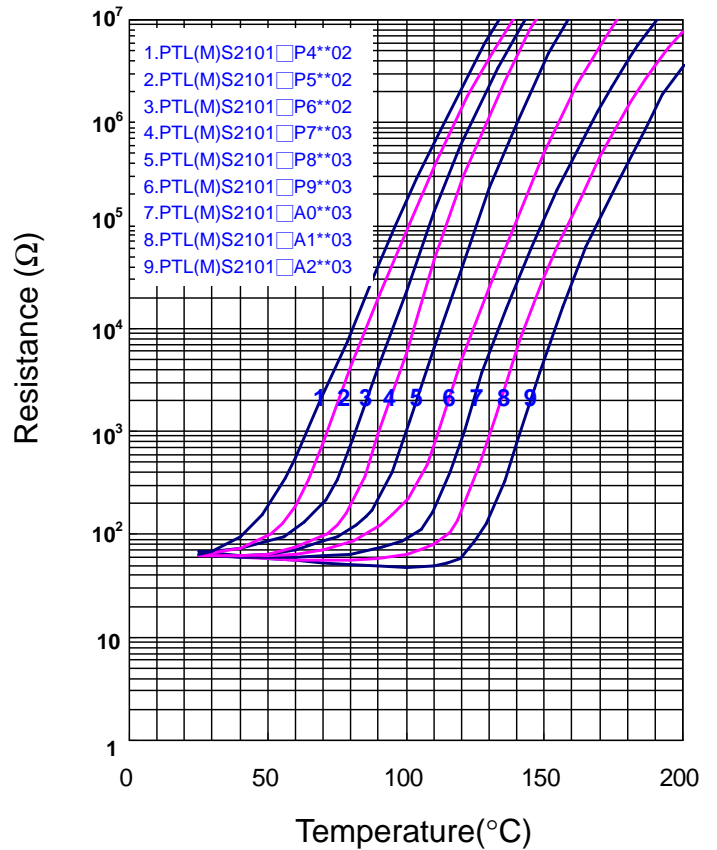
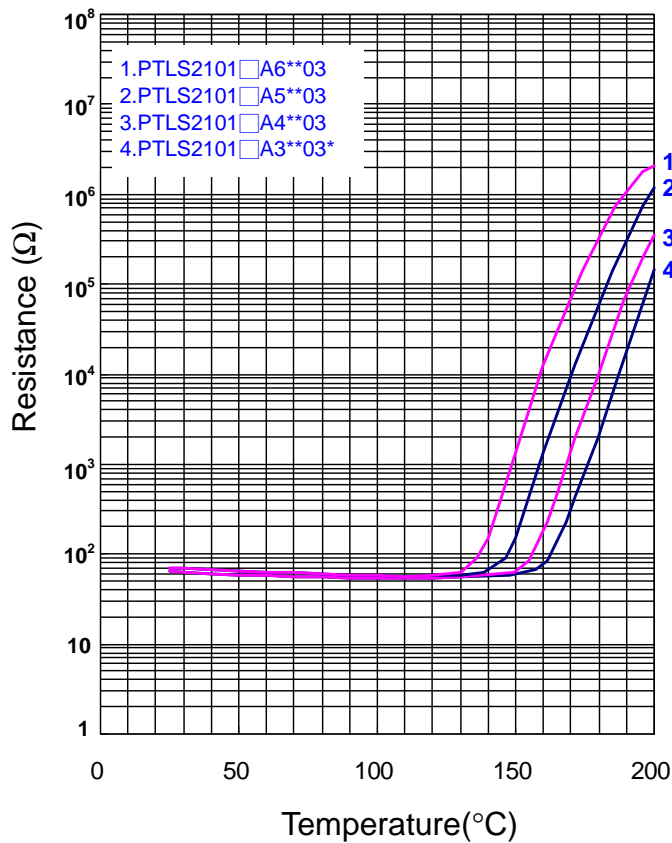
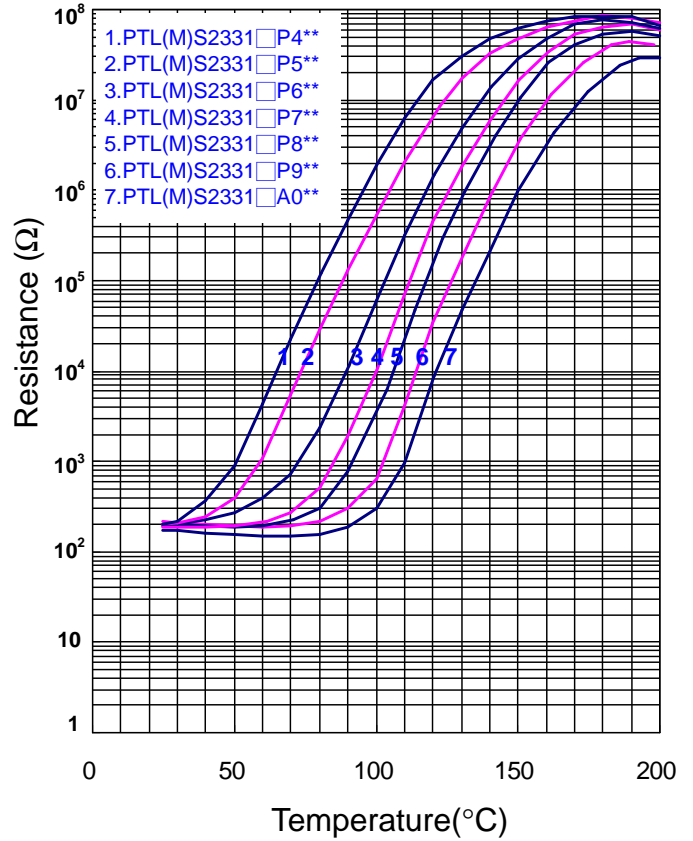
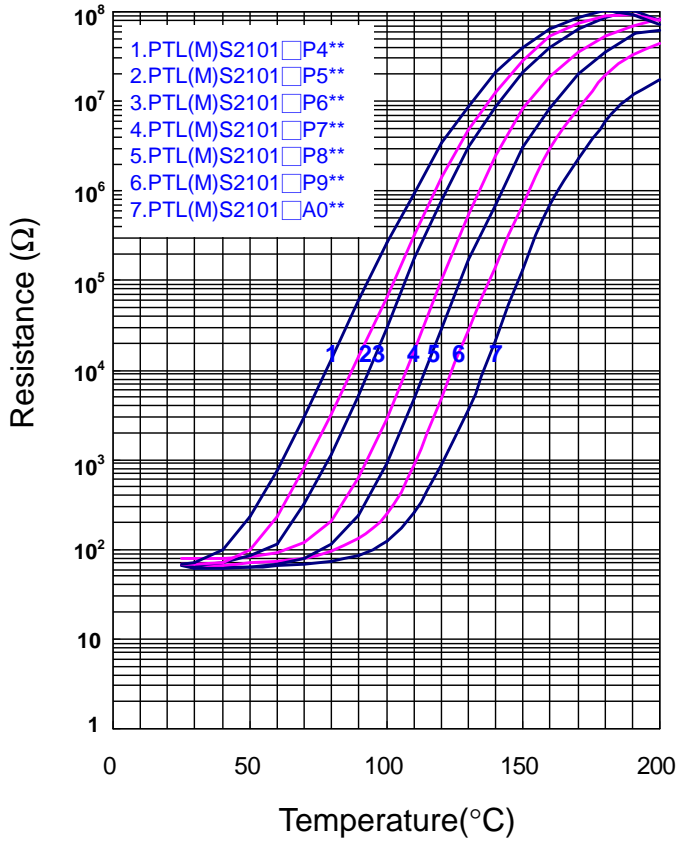
Note: 1: □ means Tolerance of R₂₅

2: ** means Maximum Voltage (16V_{dc} or 30V_{dc})

CPTC Thermistor: PT Series Temperature Sensor



R-T Characteristic Curve (Typical)

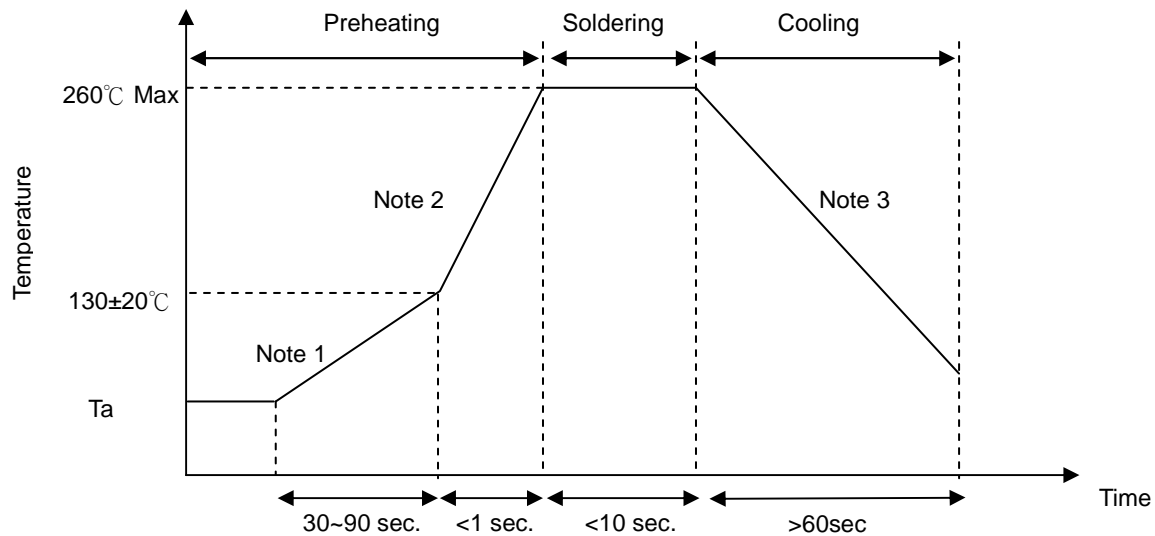


CPTC Thermistor: PT Series

Temperature Sensor



- Soldering Recommendation
 - Wave Flow Soldering Profile



Note

1. $(1\sim 3^\circ\text{C})/\text{sec}$
2. Approx. $200^\circ\text{C}/\text{sec}$
3. $5^\circ\text{C}/\text{sec. (Max)}$

- Recommended Reworking Conditions With Soldering Iron

| Item | Conditions |
|-----------------------------------|----------------------------|
| Temperature of Soldering Iron-tip | 360°C (max.) |
| Soldering Time | 3 sec (max.) |
| Distance from Coating | 2 mm (min.) |

CPTC Thermistor: PT Series

Temperature Sensor



■ Reliability Test

| Item | Standard | Test Conditions and Methods | Specifications | | | | | | | | | | | | | | | |
|--|------------------|---|---|------------------|------------------|-----|-----------|--------|--------------------------------------|------------------|-------|---|--------|--------|---|------------------|-------|--------------------------------------|
| Robustness of Terminations | IEC 60738-1 | Gradually apply the specified force and keep the unit fixed for 10±1 sec. <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; border-bottom: 1px solid black;">Terminal diameter (mm)</td> <td style="text-align: center; border-bottom: 1px solid black;">Force T(N)</td> </tr> <tr> <td style="text-align: center;">0.35<d≤0.5</td> <td style="text-align: center;">5.0</td> </tr> <tr> <td style="text-align: center;">0.5<d≤0.8</td> <td style="text-align: center;">10.0</td> </tr> </table> | Terminal diameter (mm) | Force T(N) | 0.35<d≤0.5 | 5.0 | 0.5<d≤0.8 | 10.0 | ΔR25/R25 ≤20% No visible damage | | | | | | | | | |
| Terminal diameter (mm) | Force T(N) | | | | | | | | | | | | | | | | | |
| 0.35<d≤0.5 | 5.0 | | | | | | | | | | | | | | | | | |
| 0.5<d≤0.8 | 10.0 | | | | | | | | | | | | | | | | | |
| Solderability | IEC 60738-1 | 245±3 °C , 2±0.5 sec | At least 95% of terminal electrode is covered by new solder | | | | | | | | | | | | | | | |
| Resistance to Soldering Heat | IEC 60738-1 | 260±3 °C , 10±1 sec | ΔR25/R25 ≤20% No visible damage | | | | | | | | | | | | | | | |
| Vibration | IEC 60738-1 | Frequency range:10~55Hz Amplitude: 0.75mm or 98m/s ² Direction: 3 mutually perpendicular directions Duration: 6hrs(3x2 hrs) | ΔR25/R25 ≤20% No visible damage | | | | | | | | | | | | | | | |
| Shock | IEC 60738-1 | Wave: half-sine ΔV: 1.0m/s Acceleration: 50 m/s ² Pulse time: 30ms | ΔR25/R25 ≤20% No visible damage | | | | | | | | | | | | | | | |
| Rapid Change of Temperature | IEC 60738-1 | The thermal shock conditions shown below shall be repeated 5 cycles. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">-40 ± 5</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room temperature</td> <td style="text-align: center;">5 ± 3</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">85 ± 5</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room temperature</td> <td style="text-align: center;">5 ± 3</td> </tr> </tbody> </table> | Step | Temperature (°C) | Period (minutes) | 1 | -40 ± 5 | 30 ± 3 | 2 | Room temperature | 5 ± 3 | 3 | 85 ± 5 | 30 ± 3 | 4 | Room temperature | 5 ± 3 | ΔR25/R25 ≤20% No visible damage |
| Step | Temperature (°C) | Period (minutes) | | | | | | | | | | | | | | | | |
| 1 | -40 ± 5 | 30 ± 3 | | | | | | | | | | | | | | | | |
| 2 | Room temperature | 5 ± 3 | | | | | | | | | | | | | | | | |
| 3 | 85 ± 5 | 30 ± 3 | | | | | | | | | | | | | | | | |
| 4 | Room temperature | 5 ± 3 | | | | | | | | | | | | | | | | |
| Damp Heat, Steady State | IEC 60738-1 | 40±2°C, 90~95%RH, 12±2V _{dc} * for 1000±2 hrs | ΔR25/R25 ≤20% No visible damage | | | | | | | | | | | | | | | |
| Climatic sequence | IEC60738-1 | Dry heat: Ts+25°C for 16 hrs Damp heat first cycle: 55°C, 95% R.H ,cycle time: 24 hrs Cold: 0°C for 2 hrs Damp heat (cyclic), remaining cycles: 5 cycles Test according to IEC60068-2-30 | ΔR25/R25 ≤20% No damage observed | | | | | | | | | | | | | | | |
| Endurance at upper category temperature | IEC60738-1 | Ts+25°C, for 1000±2hrs | ΔR25/R25 ≤20% No damage observed | | | | | | | | | | | | | | | |
| Endurance at maximum operating temperature and maximum voltage | IEC60738-1 | Ts+25°C, Vmax, Imax for 1000±2 hrs | ΔR25/R25 ≤20% No damage observed | | | | | | | | | | | | | | | |
| Insulation * | CECC42000 | 100±15Vdc, 60±5 Sec | ≥ 100MΩ | | | | | | | | | | | | | | | |
| Voltage Proof * | CECC42000 | 1000±10Vrms, 60±5 Sec | No damage observed | | | | | | | | | | | | | | | |

Note: * Available for PTM series only.

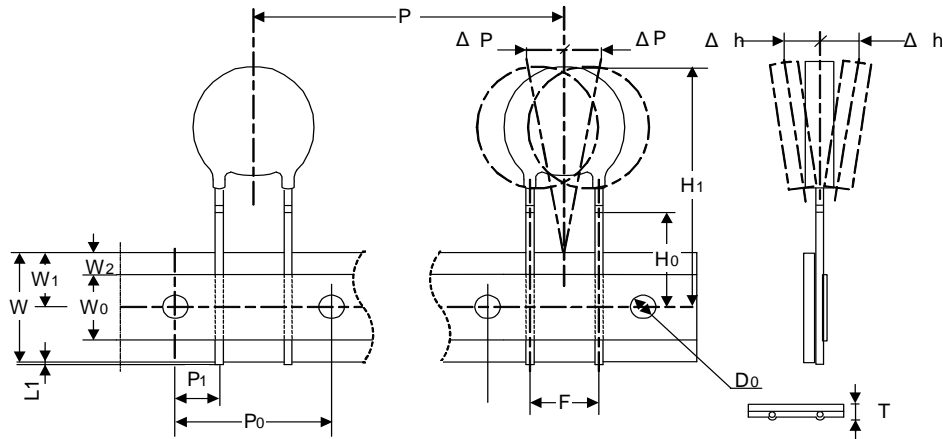
CPTC Thermistor: PT Series

Temperature Sensor



■ Packaging

● Taping Specification (For PTL Series only)



● Parameter List

(Unit: mm)

| Index | Parameter | Nominal dimensions | Tolerance |
|----------------|-------------------------------------|--------------------|-----------|
| F | Lead spacing | 2.5 | ±1 |
| P ₀ | Sprocket hole pitch | 12.7 | ±0.3 |
| P ₁ | Ordinate to adjacent component lead | 5.10 | ±1 |
| P | Device pitch | 12.7 | ±1 |
| H ₀ | Abscissa to plane (kinked lead) | 18 | ±1 |
| H ₁ | Abscissa to top | 32.5 | Max. |
| W | Carrier tape width | 18 | ±1 |
| W ₀ | Hold-down tape width | 12 | ±1 |
| W ₁ | Sprocket hole position | 9 | ±1 |
| W ₂ | Top distance between tape edges | 3 | 3 Max. |
| ΔP | Body tape plane deviation | 1 | 1 Max. |
| Δh | Body lateral deviation | 2 | 2 Max. |
| L ₁ | Lead protrusion | 0.5 | 0.5 Max. |
| D ₀ | Sprocket hole diameter | 4 | ±0.2 |
| T | Tape thickness | 0.5 | ±0.2 |

CPTC Thermistor: PT Series

Temperature Sensor



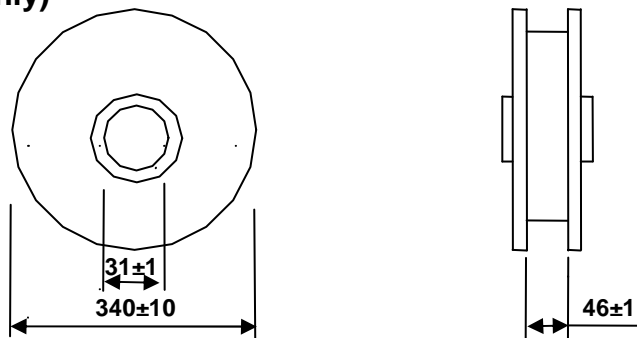
■ Quantity

● Bulk Packing

| Type | Quantity (pcs per bag) |
|------|------------------------|
| PTL | 500 |
| PTM | 200 |

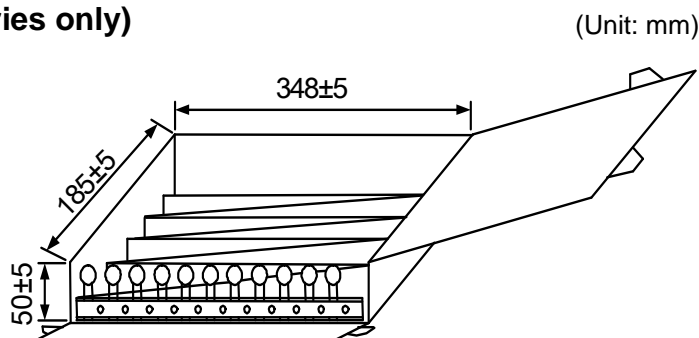
● Reel Packing (For PTL Series only)

2,000 pcs per reel



● Ammo packing (For PTL Series only)

1,500 pcs per box



■ Warehouse Storage Conditions of Products

● Storage Conditions :

1. Storage Temperature : $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
2. Relative Humidity : $\leq 75\% \text{RH}$
3. Keep away from corrosive atmosphere and sunlight.

● Period of Storage : 1 year

■ Usage

Please keep products away from the conditions mentioned below to avoid their characteristic deterioration and failure.

1. Corrosive gas or deoxidizing gas (Cl_2 , H_2S , NH_3 , SO_x , NO_x etc.)
2. Place in a vacuum or put pressure
3. Salt water, oil, solvent and chemical liquid
4. Flammable gas
5. Place in splashed water, or high humidity and dewing place
6. Other places similar to any conditions mentioned above