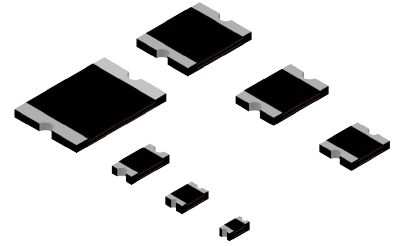


## DW-1210 Series Surface Mount PPTC Devices

### Features & Applications

- Compact design saves board space
- RoHS compliant and lead-free
- Halogen-free
- Fast response to fault current
- Symmetrical design
- USB port protection - USB 2.0, 3.0&OTG
- HDMI 1.4 Source protection
- PDAs / digital cameras
- Game console port protection
- PC motherboards-plug and play protection



### Electrical Characteristics

| Part Number      | I-hold<br>(A) | I-trip<br>(A) | Vmax<br>(Vdc) | Imax<br>(A) | Pd typ<br>(W) | Max. Time to trip |                | R0 min<br>(Ω) | R1max<br>(Ω) |
|------------------|---------------|---------------|---------------|-------------|---------------|-------------------|----------------|---------------|--------------|
|                  |               |               |               |             |               | Current<br>(A)    | Time<br>(Sec.) |               |              |
|                  |               |               |               |             |               |                   |                |               |              |
| DW-1210-005-30   | 0.05          | 0.15          | 30.00         | 10.00       | 0.60          | 0.25              | 1.50           | 2.80          | 50.00        |
| DW-1210-005-60   | 0.05          | 0.15          | 60.00         | 10.00       | 0.60          | 0.25              | 1.50           | 2.80          | 50.00        |
| DW-1210-010-30   | 0.10          | 0.30          | 30.00         | 10.00       | 0.60          | 0.50              | 1.50           | 1.50          | 15.00        |
| DW-1210-010-60   | 0.10          | 0.30          | 60.00         | 10.00       | 0.60          | 0.50              | 1.50           | 1.50          | 15.00        |
| DW-1210-020-24   | 0.20          | 0.40          | 24.00         | 10.00       | 0.60          | 8.00              | 0.02           | 0.80          | 5.00         |
| DW-1210-020-30   | 0.20          | 0.40          | 30.00         | 10.00       | 0.60          | 8.00              | 0.02           | 0.80          | 5.00         |
| DW-1210-020-60   | 0.20          | 0.40          | 60.00         | 10.00       | 0.60          | 8.00              | 0.02           | 0.80          | 5.00         |
| DW-1210-035-06   | 0.35          | 0.70          | 6.00          | 100.00      | 0.60          | 8.00              | 0.20           | 0.25          | 1.30         |
| DW-1210-035-24   | 0.35          | 0.70          | 24.00         | 40.00       | 0.60          | 8.00              | 0.20           | 0.25          | 1.30         |
| DW-1210-035-30   | 0.35          | 0.70          | 30.00         | 40.00       | 0.60          | 8.00              | 0.20           | 0.20          | 1.50         |
| DW-1210-035-30S  | 0.35          | 0.70          | 30.00         | 40.00       | 0.60          | 8.00              | 0.20           | 0.25          | 1.30         |
| DW-1210-050-13.2 | 0.50          | 1.00          | 13.20         | 100.00      | 0.60          | 8.00              | 0.10           | 0.18          | 0.90         |
| DW-1210-050-16   | 0.50          | 1.00          | 16.00         | 100.00      | 0.60          | 8.00              | 0.10           | 0.18          | 0.90         |
| DW-1210-050-24   | 0.50          | 1.00          | 24.00         | 100.00      | 0.60          | 8.00              | 0.10           | 0.18          | 0.90         |
| DW-1210-050-30   | 0.50          | 1.00          | 30.00         | 40.00       | 0.60          | 8.00              | 0.15           | 0.18          | 1.00         |
| DW-1210-075-06   | 0.75          | 1.50          | 6.00          | 100.00      | 0.60          | 8.00              | 0.10           | 0.10          | 0.45         |
| DW-1210-075-13.2 | 0.75          | 1.50          | 13.20         | 100.00      | 0.60          | 8.00              | 0.10           | 0.10          | 0.45         |
| DW-1210-075-16   | 0.75          | 1.50          | 16.00         | 100.00      | 0.60          | 8.00              | 0.10           | 0.10          | 0.45         |
| DW-1210-075-24   | 0.75          | 1.50          | 24.00         | 100.00      | 0.60          | 8.00              | 0.10           | 0.10          | 0.45         |
| DW-1210-110-08   | 1.10          | 2.20          | 8.00          | 100.00      | 0.60          | 8.00              | 0.10           | 0.05          | 0.21         |
| DW-1210-110-12   | 1.10          | 2.20          | 12.00         | 100.00      | 0.60          | 8.00              | 0.10           | 0.05          | 0.21         |
| DW-1210-110-16   | 1.10          | 2.20          | 16.00         | 100.00      | 0.60          | 8.00              | 0.10           | 0.05          | 0.21         |
| DW-1210-110-16S  | 1.10          | 2.20          | 16.00         | 100.00      | 0.60          | 8.00              | 0.10           | 0.05          | 0.21         |
| DW-1210-110-24   | 1.10          | 2.20          | 24.00         | 100.00      | 0.60          | 8.00              | 0.10           | 0.05          | 0.21         |
| DW-1210-150-06   | 1.50          | 3.00          | 6.00          | 100.00      | 0.80          | 8.00              | 0.30           | 0.03          | 0.11         |
| DW-1210-150-08   | 1.50          | 3.00          | 8.00          | 100.00      | 0.80          | 8.00              | 0.30           | 0.03          | 0.11         |
| DW-1210-150-12   | 1.50          | 3.00          | 12.00         | 100.00      | 0.80          | 8.00              | 0.30           | 0.03          | 0.11         |
| DW-1210-150-16   | 1.50          | 3.00          | 16.00         | 100.00      | 0.80          | 8.00              | 0.30           | 0.03          | 0.11         |
| DW-1210-175-06   | 1.75          | 3.50          | 6.00          | 100.00      | 0.80          | 8.00              | 0.60           | 0.02          | 0.09         |
| DW-1210-175-12   | 1.75          | 3.50          | 12.00         | 100.00      | 0.80          | 8.00              | 0.60           | 0.02          | 0.09         |
| DW-1210-175-16   | 1.75          | 3.50          | 16.00         | 100.00      | 0.80          | 8.00              | 0.60           | 0.02          | 0.09         |
| DW-1210-200-06   | 2.00          | 4.00          | 6.00          | 100.00      | 0.80          | 8.00              | 1.00           | 0.015         | 0.090        |
| DW-1210-200-12   | 2.00          | 4.00          | 12.00         | 100.00      | 0.80          | 8.00              | 1.00           | 0.015         | 0.090        |
| DW-1210-200-16   | 2.00          | 4.00          | 16.00         | 100.00      | 0.80          | 8.00              | 1.00           | 0.015         | 0.090        |

I-hold: Holding Current: maximum current at which the device will not trip in 25°C still air.

I-trip: Tripping Current: minimum current at which the device will trip in 25°C still air.

Vmax: Maximum voltage device can withstand without damage at rated current(I<sub>max</sub>).

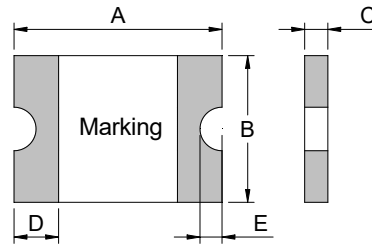
I<sub>max</sub>: Maximum fault current device can withstand without damage at rated voltage(V<sub>max</sub>).

Pd typ: Typical power dissipated from device when in the tripped state at 25°C still air.

R0 min: Minimum resistance of device in initial (un-soldered) state.

R1 max: Maximum resistance of device at 25°C measured one hour after tripping or reflow soldering of 260°C for 20 sec.

## Product Dimensions(mm) & Marking



| Part Number      | A    |      | B    |      | C    |      | D    |      | E    | Marking | Quantity pcs/R |
|------------------|------|------|------|------|------|------|------|------|------|---------|----------------|
|                  | Min  | Max  | Min  | Max  | Min  | Max  | Min  | Max  | Min  |         |                |
| DW-1210-005-30   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | D0      | 3500           |
| DW-1210-005-60   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | D0      | 3500           |
| DW-1210-010-30   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | D1      | 3500           |
| DW-1210-010-60   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | D1      | 3500           |
| DW-1210-020-24   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | D2      | 3500           |
| DW-1210-020-30   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | D2      | 3500           |
| DW-1210-020-60   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | D1      | 3500           |
| DW-1210-035-06   | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D3      | 4000           |
| DW-1210-035-24   | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D3      | 4000           |
| DW-1210-035-30   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DA      | 3500           |
| DW-1210-035-30S  | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D3      | 4000           |
| DW-1210-050-13.2 | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D5      | 4000           |
| DW-1210-050-16   | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D5      | 4000           |
| DW-1210-050-24   | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D5      | 4000           |
| DW-1210-050-30   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DB      | 3500           |
| DW-1210-075-06   | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D7      | 4000           |
| DW-1210-075-13.2 | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D7      | 4000           |
| DW-1210-075-16   | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D7      | 4000           |
| DW-1210-075-24   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DC      | 3500           |
| DW-1210-110-08   | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D8      | 4000           |
| DW-1210-110-12   | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D8      | 4000           |
| DW-1210-110-16   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DE      | 3500           |
| DW-1210-110-16S  | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | D8      | 4000           |
| DW-1210-110-24   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DE      | 3500           |
| DW-1210-150-06   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DF      | 3500           |
| DW-1210-150-08   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DF      | 3500           |
| DW-1210-150-12   | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DF      | 3500           |

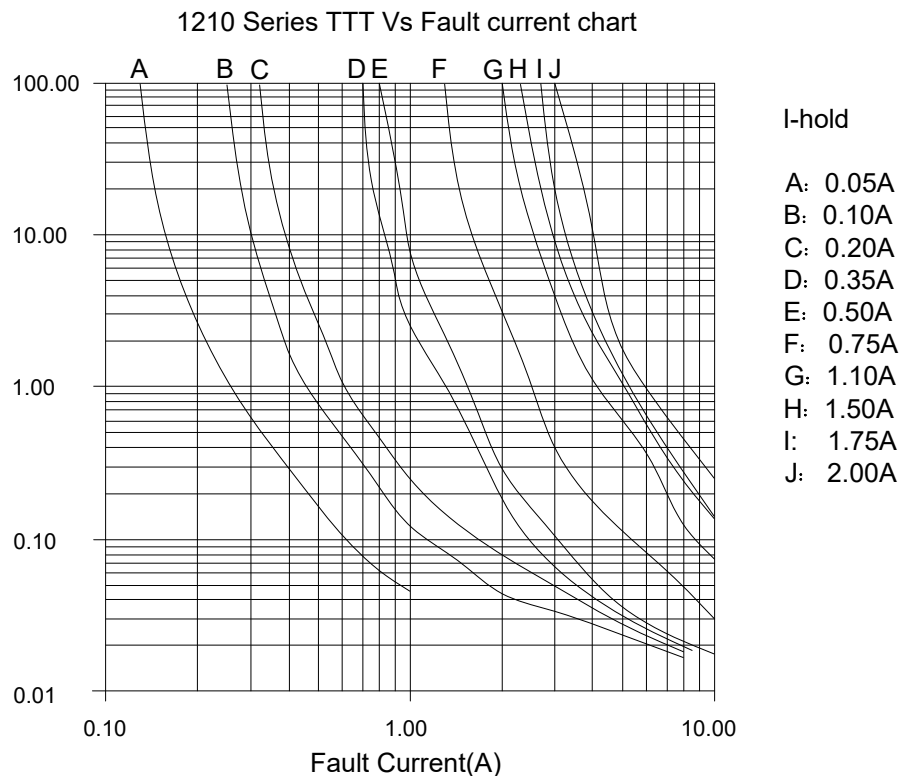
|                |      |      |      |      |      |      |      |      |      |                 |      |
|----------------|------|------|------|------|------|------|------|------|------|-----------------|------|
| DW-1210-150-16 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DF              | 3500 |
| DW-1210-175-06 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DG              | 3500 |
| DW-1210-175-12 | 3.00 | 3.43 | 2.35 | 2.80 | 0.85 | 1.25 | 0.25 | 0.75 | 0.10 | D <sub>17</sub> | 3500 |
| DW-1210-175-16 | 3.00 | 3.43 | 2.35 | 2.80 | 0.85 | 1.25 | 0.25 | 0.75 | 0.10 | D <sub>17</sub> | 3500 |
| DW-1210-200-06 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | DH              | 3500 |
| DW-1210-200-12 | 3.00 | 3.43 | 2.35 | 2.80 | 0.85 | 1.25 | 0.25 | 0.75 | 0.10 | D <sub>20</sub> | 3500 |
| DW-1210-200-16 | 3.00 | 3.43 | 2.35 | 2.80 | 0.85 | 1.25 | 0.25 | 0.75 | 0.10 | D <sub>20</sub> | 3500 |

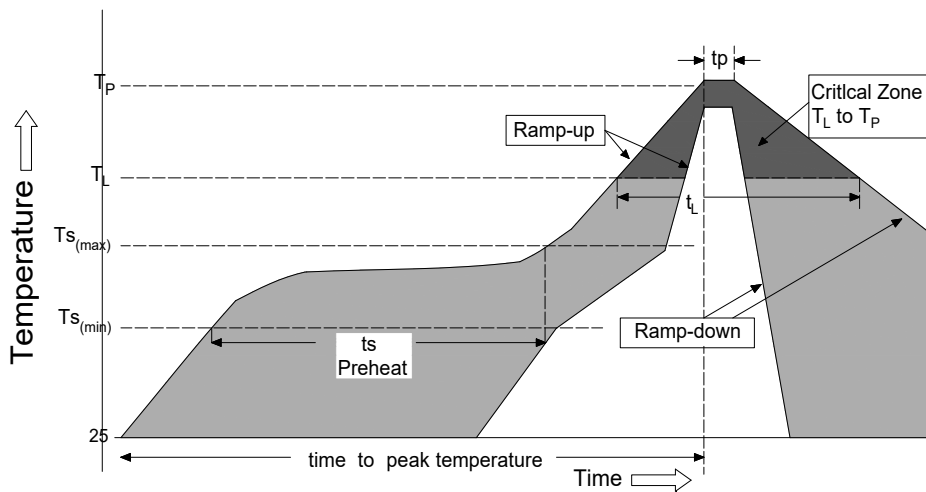
### Thermal Derating Chart

Recommended hold current(A) at ambient Temperature(°C)

| I-hold | Ambient Operating Temperature |       |      |      |      |      |      |      |      |  |
|--------|-------------------------------|-------|------|------|------|------|------|------|------|--|
|        | -40°C                         | -20°C | 0°C  | 25°C | 40°C | 50°C | 60°C | 70°C | 85°C |  |
| 0.05A  | 0.08                          | 0.07  | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 |  |
| 0.10A  | 0.16                          | 0.14  | 0.12 | 0.10 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 |  |
| 0.20A  | 0.29                          | 0.26  | 0.22 | 0.20 | 0.16 | 0.14 | 0.13 | 0.11 | 0.08 |  |
| 0.35A  | 0.47                          | 0.45  | 0.40 | 0.35 | 0.33 | 0.28 | 0.24 | 0.21 | 0.18 |  |
| 0.50A  | 0.76                          | 0.67  | 0.58 | 0.50 | 0.43 | 0.40 | 0.36 | 0.32 | 0.28 |  |
| 0.75A  | 1.00                          | 0.97  | 0.86 | 0.75 | 0.64 | 0.59 | 0.54 | 0.48 | 0.40 |  |
| 1.10A  | 1.60                          | 1.42  | 1.26 | 1.10 | 0.94 | 0.86 | 0.80 | 0.70 | 0.58 |  |
| 1.50A  | 2.30                          | 2.02  | 1.76 | 1.50 | 1.24 | 1.11 | 1.00 | 0.85 | 0.65 |  |
| 1.75A  | 2.45                          | 2.22  | 2.01 | 1.75 | 1.45 | 1.26 | 1.10 | 0.98 | 0.80 |  |
| 2.00A  | 2.60                          | 2.44  | 2.35 | 2.00 | 1.78 | 1.67 | 1.50 | 1.45 | 1.10 |  |

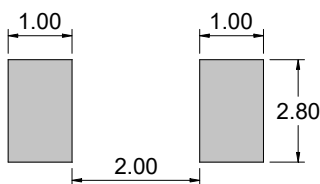
### Typical Time To Trip at 25°C



**Soldering Parameters**


| Profile Feature                                      |                                  | Pb-Free Assembly        |
|--|----------------------------------|-------------------------|
| Average Ramp-Up Rate ( $T_{s(max)}$ to $T_P$ )       |                                  | 3°C/second max          |
| Pre Heat:  | Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|  | Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|  | Time (Min to Max) ( $t_s$ )      | 60 – 180 secs           |
| Time Maintained Above:                               | Temperature ( $T_L$ )            | 217°C                   |
|  | Temperature ( $t_L$ )            | 60 – 150 seconds        |
| Peak / Classification Temperature ( $T_P$ )          |                                  | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ ) |                                  | 20 – 40 seconds         |
| Ramp-down Rate                                       |                                  | 6°C/second max          |
| Time 25°C to peak Temperature ( $T_P$ )              |                                  | 8 minutes Max.          |

- ◆ All temperature refer to topside of the package, measured on the package body surface
- ◆ If reflow temperature exceeds the recommended profile, devices may not meet the performance requirements
- ◆ Recommended reflow methods: IR, vapor phase oven, hot air oven, N<sub>2</sub> environment for lead
- ◆ Recommended maximum paste thickness is 0.25mm (0.010inch)
- ◆ Devices can be cleaned using standard industry methods and solvents

**Recommended Pad Layout(mm) & Physical Specifications**


|                    |  |
|--------------------|--|
| Terminal Material  | Tin-Plated Nickel-Copper (Solder Material: Matte Tin (Sn))   |
| Lead Solderability | Meets EIA Specification RS186-9E, ANSI/J-STD-002 Category 3. |

**Environmental Specifications**

|   |   |
|---|---|
| Operating Temperature                               | -40 °C to +85 °C  |
| Maximum Device Surface Temperature in Tripped State | 125°C   |
| Passive Aging                                       | +85 °C, 1000 hours ; ±5 % typical resistance change                                     |
| Humidity Aging                                      | +85 °C, 85 % R.H. 1000 hours; ±5 % typical resistance change                            |
| Thermal Shock                                       | MIL-STD-202, Method 107;<br>+85 °C to -40 °C, 20 times; -30 % typical resistance change |
| Solvent Resistance                                  | MIL-STD-202, Method 215 ; No change   |
| Vibration   | MIL-STD-883, Method 2007, Condition A; No change  |
| Moisture Sensivity Level                            | Level 1, J-STD-020  |
| Storage Conditions                                  | +40 °C Max. 70% RH Max. Packed in original packaging.                                   |

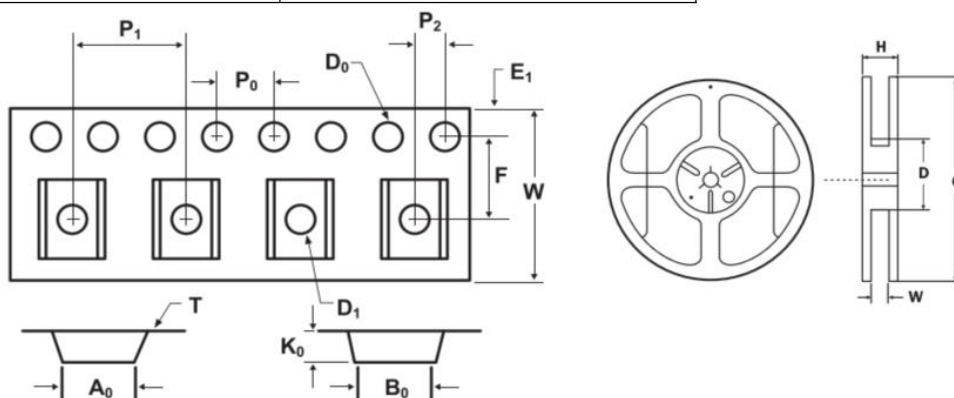
Test Procedures & Requirements

| No. | Test              | Test Conditions   | Accept/Reject Criteria                      |
|-----|-------------------|---|---|
| 1   | R0 min            | Resistance measurement at 25°C                                | $R_{0min} \leq R \leq R_{1max}$             |
| 2   | R1 max            | Resistance measurement one hour after post trip               | $R_{0min} \leq R \leq R_{1max}$             |
| 3   | I-hold            | Hold rated current 1800 second without trip, @ 25°C           | No trip                                     |
| 4   | I-trip            | Device must trip within 900 second under rated current, @25°C | Trip  |
| 5   | Max. time to trip | At specified current, 25 °C                                   | $T \leq \text{max. time to trip (seconds)}$ |
| 6   | Trip Cycle Life   | $V_{max}$ , $I_{max}$ , 100 cycles                            | No arcing or burning                        |
| 7   | Trip Endurance    | $V_{max}$ , $I_{max}$ 24 hours                                | No arcing or burning                        |
| 8   | Solderability     | ANSI/J-STD-002  | 95 % min. coverage                          |

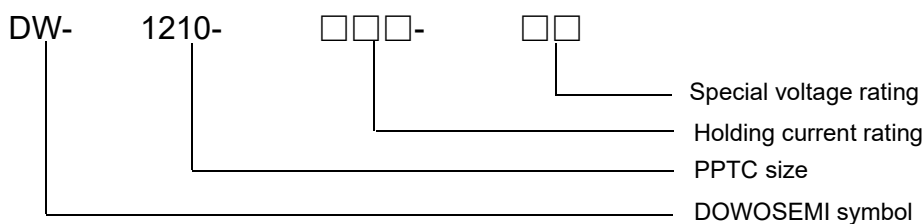
Tape and Reel Specifications & Packaging Quantity per Reel

| Tape Specifications: EIA-481-1 (mm) |               |               |
|-------------------------------------|---------------|---------------|
| Q'ty                                | 4,000pcs/Reel | 3,500pcs/Reel |
| W                                   | 8.10±0.10     | 8.10±0.10     |
| F                                   | 3.50±0.05     | 3.50±0.05     |
| E1                                  | 1.75±0.10     | 1.75±0.10     |
| D0                                  | 1.55±0.05     | 1.55±0.05     |
| D1                                  | 1.00 min      | 1.00 min      |
| P0                                  | 4.0±0.10      | 4.0±0.10      |
| P1                                  | 4.0±0.10      | 4.0±0.10      |
| P2                                  | 2.0±0.05      | 2.0±0.05      |
| A0                                  | 3.00±0.10     | 3.00±0.10     |
| B0                                  | 3.50±0.10     | 3.50±0.10     |
| T                                   | 0.25±0.05     | 0.25±0.05     |
| K0                                  | 0.85±0.10     | 1.22±0.10     |
| Leader                              | 390mm         | 390mm         |
| Trailer                             | 160mm         | 160mm         |

| Reel Dimensions: EIA-481-1 (mm) |           |
|---------------------------------|-----------|
| C                               | Ø178±1.0  |
| D                               | Ø60.2±0.5 |
| W                               | 9.0±1.5   |
| H                               | 11.0±0.5  |



Part Ordering Number System



## Application Notice

1. Operation of these PPTC devices beyond the stated maximum ratings could result in damage to the devices and lead to electrical arcing and/or fire.
2. These PPTC devices are intended to protect against the effects of temporary over-current or over-temperature conditions and shall not be taken for use as switch, Multiple times tripping shall lower the PPTC hold current.
3. Exposure to lubricants, silicon-based oils, solvents, gels, electrolytes, acids, and other related or similar materials may adversely affect the performance of PPTC devices.
4. Circuits with inductance may generate a voltage above the rated voltage of the PPTC device and should be thoroughly evaluated within the user's application during the PPTC selection and qualification process.
5. Please do not smash, clamp, pull, dent or twist by tool during assembling process, as they may result in the PPTC damage.
6. The above parameters are concluded from one time of reflow soldering processing the PPTC. If there is any further heat generated process like injection or dispensing at the customer's premise, the aforementioned parameters will decrease at certain degree. Therefore the verification test to be conducted is necessary.
7. When mounting or using PPTC, all injection molding materials, curing adhesives, UV glue, silica gel and cleaning agents or solvents must be tested in terms of application parameters e.g. temperature, time, and etc to ensure the consistency between the product and the processing before use.
8. The PPTC is thermal sensitive device. It is recommended not to design any heat source devices around it to reduce the outside heat source impact.
9. SMD PPTC is designed for SMT processing which applies reflow soldering. Please refer to the recommended curve for reference. If the reflow soldering temperature exceeds the recommended value, the PPTC might be damaged. Hand welding PPTC is prohibited, if there is soldering iron welding process, it is suggested that the welding position should be more than 1.5mm away from PPTC, the welding tool temperature should be lower than 350°C, and the contact time between soldering iron and solder joint should not exceed 3sec.
10. In charging terminal application, PP type material is recommended to use as inner membrane and TPE and PVC type material is inhibited.