

Features

- ▶ compact design saves board space
- ▶ RoHS compliant and lead-free
- ▶ Halogen-free
- ▶ Fast reponse to fault current
- ▶ Symmetrical design

Applications

- ▶ 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

HF RoHS REACH Pb Free

1. Electrical Characteristics

| Model | I-hold | I-trip | Vmax | Imax | Pd typ | Max. Time to trip | | R0 min | R1max |
|------------------|--------|--------|-------|--------|--------|-------------------|--------|--------|-------|
| | | | | | | Current | Time | | |
| | | | | | | (A) | (Sec.) | | |
| SMD1210P005TF | 0.05 | 0.15 | 30.00 | 10.00 | 0.60 | 0.25 | 1.50 | 2.80 | 50.00 |
| SMD1210P005TF/60 | 0.05 | 0.15 | 60.00 | 10.00 | 0.60 | 0.25 | 1.50 | 2.80 | 50.00 |
| SMD1210P010TF | 0.10 | 0.30 | 30.00 | 10.00 | 0.60 | 0.50 | 1.50 | 1.50 | 15.00 |
| SMD1210P010TF/60 | 0.10 | 0.30 | 60.00 | 10.00 | 0.60 | 0.50 | 1.50 | 1.50 | 15.00 |
| SMD1210P020TF | 0.20 | 0.40 | 24.00 | 10.00 | 0.60 | 8.00 | 0.02 | 0.80 | 5.00 |
| SMD1210P035TF | 0.35 | 0.70 | 6.00 | 100.00 | 0.60 | 8.00 | 0.20 | 0.25 | 1.30 |
| SMD1210P035TF/30 | 0.35 | 0.70 | 30.00 | 40.00 | 0.60 | 8.00 | 0.20 | 0.25 | 1.30 |
| SMD1210P050TF | 0.50 | 1.00 | 13.20 | 100.00 | 0.60 | 8.00 | 0.10 | 0.18 | 0.90 |
| SMD1210P050TF/30 | 0.50 | 1.00 | 30.00 | 40.00 | 0.60 | 8.00 | 0.15 | 0.18 | 1.00 |
| SMD1210P075TF | 0.75 | 1.50 | 6.00 | 100.00 | 0.60 | 8.00 | 0.10 | 0.10 | 0.45 |
| SMD1210P075TF/24 | 0.75 | 1.50 | 24.00 | 100.00 | 0.60 | 8.00 | 0.10 | 0.10 | 0.45 |
| SMD1210P110TFT | 1.10 | 2.20 | 8.00 | 100.00 | 0.60 | 8.00 | 0.10 | 0.05 | 0.21 |
| SMD1210P110TF/12 | 1.10 | 2.20 | 12.00 | 100.00 | 0.60 | 8.00 | 0.10 | 0.05 | 0.21 |
| SMD1210P110TF/16 | 1.10 | 2.20 | 16.00 | 100.00 | 0.60 | 8.00 | 0.10 | 0.05 | 0.21 |
| SMD1210P150TFT | 1.50 | 3.00 | 6.00 | 100.00 | 0.80 | 8.00 | 0.30 | 0.03 | 0.11 |
| SMD1210P150TF/12 | 1.50 | 3.00 | 12.00 | 100.00 | 0.80 | 8.00 | 0.30 | 0.03 | 0.11 |
| SMD1210P150TF/16 | 1.50 | 3.00 | 16.00 | 100.00 | 0.80 | 8.00 | 0.30 | 0.03 | 0.11 |
| SMD1210P175TF | 1.75 | 3.50 | 6.00 | 100.00 | 0.80 | 8.00 | 0.60 | 0.02 | 0.09 |
| SMD1210P200TF | 2.00 | 4.00 | 6.00 | 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(Imax).

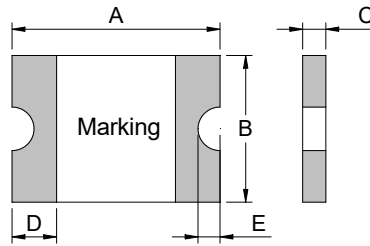
I max: Maximum fault current device can withstand without damage at rated voltage(Vmax).

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.

2. Product Dimensions(mm)&Marking



| Model | A | | B | | C | | D | | E | Marking |
|------------------|------|------|------|------|------|------|------|------|------|---------|
| | Min | Max | Min | Max | Min | Max | Min | Max | Min | |
| SMD1210P005TF | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 005 |
| SMD1210P005TF/60 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 005 |
| SMD1210P010TF | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 010 |
| SMD1210P010TF/60 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 010 |
| SMD1210P020TF | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 020 |
| SMD1210P035TF | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | 035 |
| SMD1210P035TF/30 | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | 035 |
| SMD1210P050TF | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | 050 |
| SMD1210P050TF/30 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 050 |
| SMD1210P075TF | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | 075 |
| SMD1210P075TF/24 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 075 |
| SMD1210P110TFT | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | 110 |
| SMD1210P110TF/12 | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | 110 |
| SMD1210P110TF/16 | 3.00 | 3.43 | 2.35 | 2.80 | 0.35 | 0.85 | 0.25 | 0.75 | 0.10 | 110 |
| SMD1210P150TFT | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 150 |
| SMD1210P150TF/12 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 150 |
| SMD1210P150TF/16 | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 150 |
| SMD1210P175TF | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 175 |
| SMD1210P200TF | 3.00 | 3.43 | 2.35 | 2.80 | 0.65 | 1.15 | 0.25 | 0.75 | 0.10 | 200 |

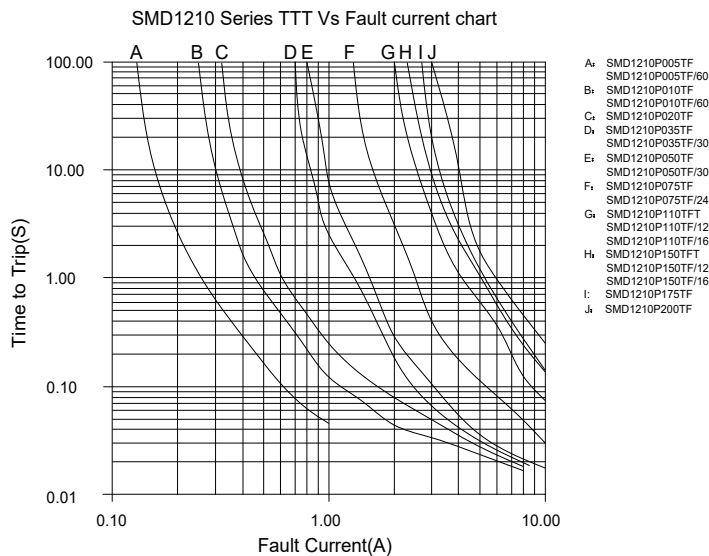
3. Thermal Derating Chart

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

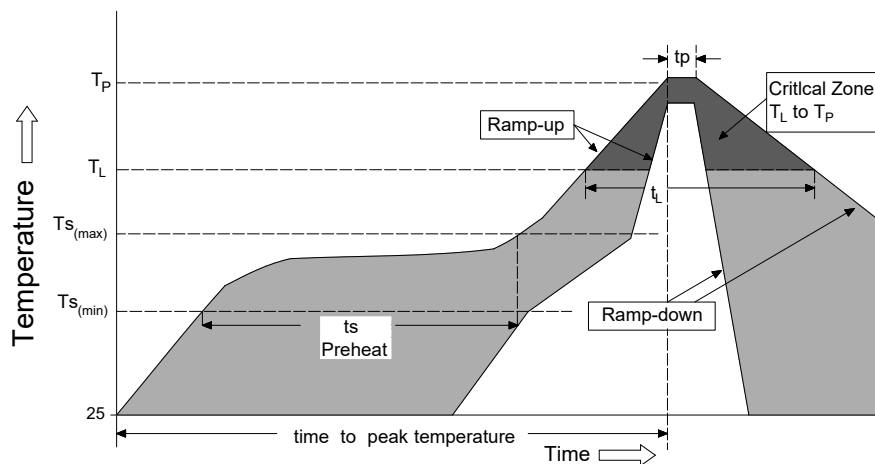
| Model | Ambient Operating Temperature | | | | | | | | |
|------------------|-------------------------------|-------|------|------|------|------|------|------|------|
| | -40°C | -20°C | 0°C | 25°C | 40°C | 50°C | 60°C | 70°C | 85°C |
| SMD1210P005TF | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 |
| SMD1210P005TF/60 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 |
| SMD1210P010TF | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 |
| SMD1210P010TF/60 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 |
| SMD1210P020TF | 0.29 | 0.26 | 0.22 | 0.20 | 0.16 | 0.14 | 0.13 | 0.11 | 0.08 |
| SMD1210P035TF | 0.47 | 0.45 | 0.40 | 0.35 | 0.33 | 0.28 | 0.24 | 0.21 | 0.18 |
| SMD1210P035TF/30 | 0.47 | 0.45 | 0.40 | 0.35 | 0.33 | 0.28 | 0.24 | 0.21 | 0.18 |
| SMD1210P050TF | 0.76 | 0.67 | 0.58 | 0.50 | 0.43 | 0.40 | 0.36 | 0.32 | 0.28 |
| SMD1210P050TF/30 | 0.76 | 0.67 | 0.58 | 0.50 | 0.43 | 0.40 | 0.36 | 0.32 | 0.28 |
| SMD1210P075TF | 1.00 | 0.97 | 0.86 | 0.75 | 0.64 | 0.59 | 0.54 | 0.48 | 0.40 |
| SMD1210P075TF/24 | 1.00 | 0.97 | 0.86 | 0.75 | 0.64 | 0.59 | 0.54 | 0.48 | 0.40 |
| SMD1210P110TFT | 1.60 | 1.42 | 1.26 | 1.10 | 0.94 | 0.86 | 0.80 | 0.70 | 0.58 |

| | | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|------|
| SMD1210P110TF/12 | 1.60 | 1.42 | 1.26 | 1.10 | 0.94 | 0.86 | 0.80 | 0.70 | 0.58 |
| SMD1210P110TF/16 | 1.60 | 1.42 | 1.26 | 1.10 | 0.94 | 0.86 | 0.80 | 0.70 | 0.58 |
| SMD1210P150TFT | 2.30 | 2.02 | 1.76 | 1.50 | 1.24 | 1.11 | 1.00 | 0.85 | 0.65 |
| SMD1210P150TF/12 | 2.30 | 2.02 | 1.76 | 1.50 | 1.24 | 1.11 | 1.00 | 0.85 | 0.65 |
| SMD1210P150TF/16 | 2.30 | 2.02 | 1.76 | 1.50 | 1.24 | 1.11 | 1.00 | 0.85 | 0.65 |
| SMD1210P175TF | 2.45 | 2.22 | 2.01 | 1.75 | 1.45 | 1.26 | 1.10 | 0.98 | 0.80 |
| SMD1210P200TF | 2.60 | 2.44 | 2.35 | 2.00 | 1.78 | 1.67 | 1.50 | 1.45 | 1.10 |

4. Typical time to trip at 25°C



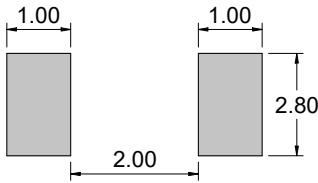
5. Soldering parameters



| 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 ^{+0/-5} °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, N2 environment for lead
- ◆ Recommended maximum paste thickness is 0.25mm (0.010inch)
- ◆ Devices can be cleaned using standard industry methods and solvents

6. 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. |

7. 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; +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. |

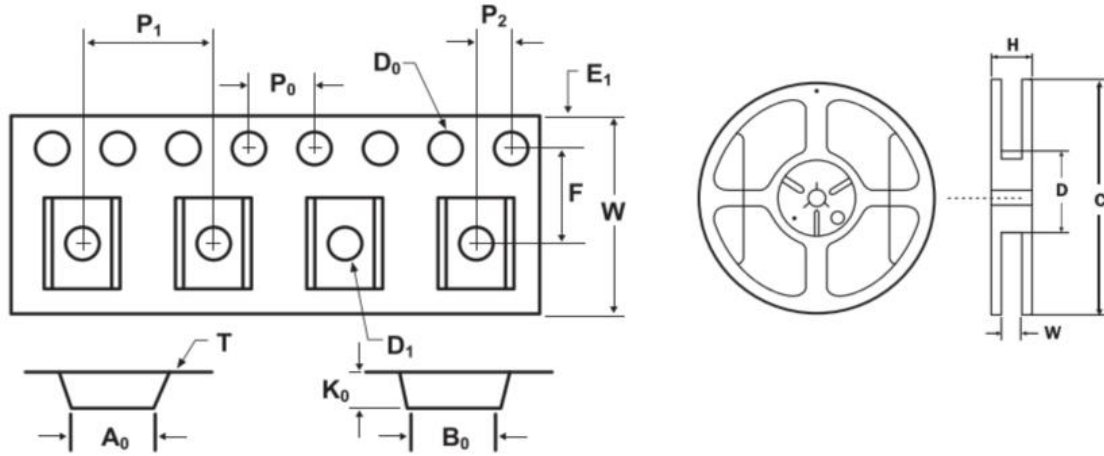
8. Test Procedures And Requirements

| 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 |

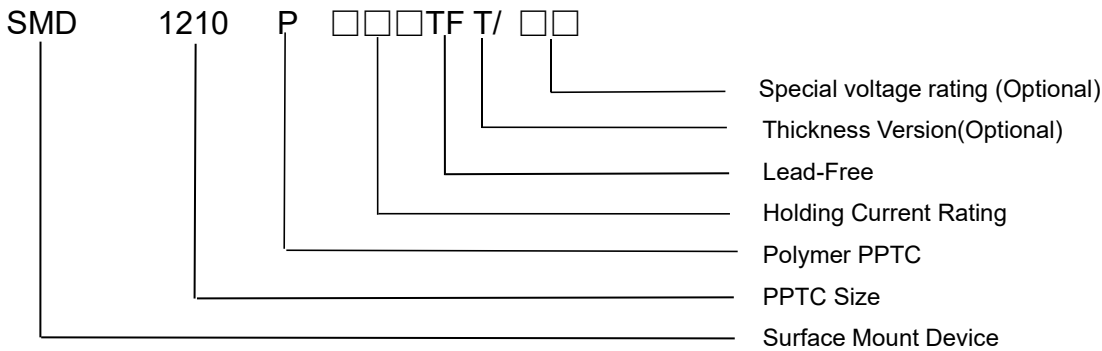
9. Tape and Reel Specifications & Packaging quantity per Reel

| TAPE SPECIFICATIONS: EIA-481-1 (mm) | | | | REEL DIMENSIONS: EIA-481-1 (mm) | |
|-------------------------------------|------------------|------------------|------------------|---------------------------------|-----------|
| Item | SMD1210P035TF | SMD1210P005TF | SMD1210P005TF/60 | C | Ø178±1.0 |
| | SMD1210P035TF/30 | SMD1210P010TF | SMD1210P010TF/60 | D | Ø60.2±0.5 |
| | SMD1210P050TF | SMD1210P020TF | SMD1210P050TF/30 | W | 9.0±1.5 |
| | SMD1210P075TF | SMD1210P075TF/24 | SMD1210P150TF | H | 11.0±0.5 |
| | SMD1210P110TFT | SMD1210P150TF/12 | SMD1210P150TF/16 | | |
| | SMD1210P110TF/12 | SMD1210P175TF | SMD1210P200TF | | |
| | SMD1210P110TF/16 | | | | |
| | 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 |
| Q'ty | 4,000pcs/Reel | 3,500pcs/Reel |



10. Part Ordering Number System



⚠ Warning:

- Users shall independently assess the suitability of these devices for each of their applications
- Operation of these devices beyond the stated maximum ratings could result in damage to the devices and lead to electrical arcing and/or fire
- These devices are intended to protect against the effects of temporary over-current or over-temperature conditions and are not intended to perform as protective devices where such conditions are expected to be repetitive or prolonged in duration
- Exposure to silicon-based oils, solvents, electrolytes, acids, and similar materials can adversely affect the performance of these PPTC devices
- These devices undergo thermal expansion under fault conditions, and thus shall be provided with adequate space and be protected against mechanical stresses
- Circuits with inductance may generate a voltage ($L di/dt$) above the rated voltage of the PPTC device.