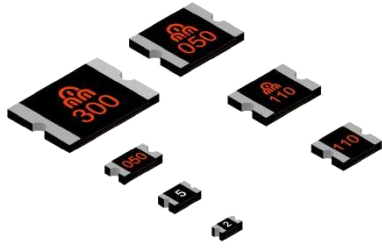


SMD0603 Series Surface Mount PPTC Devices



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.)		
SMD0603P004TF	0.04	0.12	24.00	20.00	0.50	0.20	1.00	4.00	40.00
SMD0603P010TF	0.10	0.30	15.00	40.00	0.50	0.50	1.00	0.90	6.00
SMD0603P020TF	0.20	0.50	9.00	40.00	0.50	1.00	0.60	0.55	3.50
SMD0603P025TF	0.25	0.50	9.00	40.00	0.50	1.00	0.60	0.50	3.00
SMD0603P035TF	0.35	0.70	6.00	40.00	0.50	8.00	0.10	0.20	1.40
SMD0603P050TF	0.50	1.00	6.00	40.00	0.50	8.00	0.10	0.10	0.80

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).

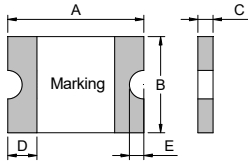
I max: Maximum fault current device can withstand without damage at rated voltage(Vmax).

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



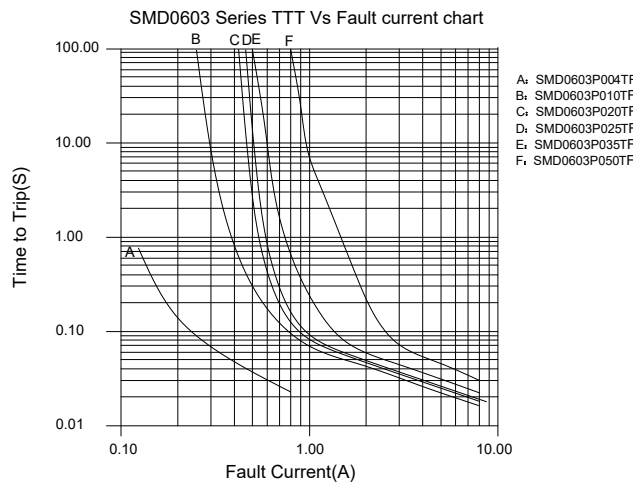
Model	A		B		C		D		E	Marking
	Min	Max	Min	Max	Min	Max	Min	Max	Min	
SMD0603P004TF	1.45	1.85	0.65	1.05	0.40	0.80	0.15	0.50	0.05	C
SMD0603P010TF	1.45	1.85	0.65	1.05	0.40	0.80	0.15	0.50	0.05	1
SMD0603P020TF	1.45	1.85	0.65	1.05	0.40	0.80	0.15	0.50	0.05	2
SMD0603P025TF	1.45	1.85	0.65	1.05	0.40	0.80	0.15	0.50	0.05	2
SMD0603P035TF	1.45	1.85	0.65	1.05	0.40	0.80	0.15	0.50	0.05	3
SMD0603P050TF	1.45	1.85	0.65	1.05	0.60	1.00	0.15	0.50	0.05	5

3. Thermal Derating Chart

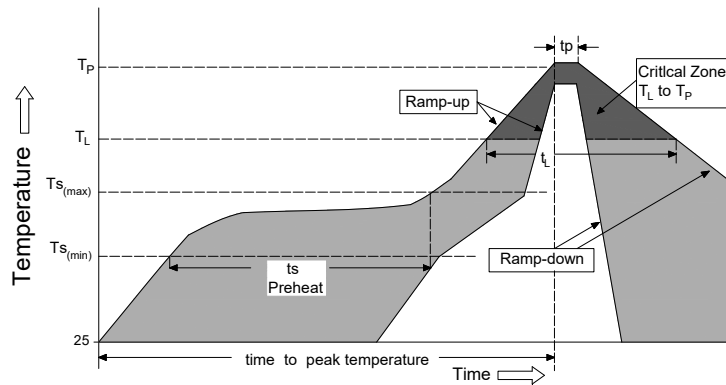
Recommended hold current(A) at ambient Temperature(°C)

Model	Ambient Operating Temperature								
	-40°C	-20°C	0°C	25°C	40°C	50°C	60°C	70°C	85°C
SMD0603P004TF	0.050	0.048	0.044	0.040	0.033	0.030	0.025	0.020	0.012
SMD0603P010TF	0.13	0.12	0.11	0.10	0.08	0.07	0.06	0.05	0.03
SMD0603P020TF	0.27	0.25	0.23	0.20	0.17	0.14	0.12	0.10	0.07
SMD0603P025TF	0.32	0.29	0.27	0.25	0.21	0.18	0.16	0.14	0.10
SMD0603P035TF	0.47	0.41	0.38	0.35	0.29	0.26	0.24	0.20	0.14
SMD0603P050TF	0.67	0.59	0.54	0.50	0.41	0.37	0.34	0.29	0.20

4. Typical time to trip at 25°C



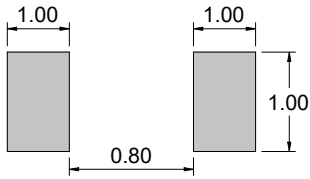
5. Soldering parameters



Profile Feature		Pb-Free Assembly
Average Ramp-Up Rate (Ts _(max) to Tp)		3°C/second max
Pre Heat:	Temperature Min (Ts _(min))	150°C
	Temperature Max (Ts _(max))	200°C
	Time (Min to Max) (ts)	60 – 180 secs
Time Maintained Above:	Temperature (TL)	217°C
	Temperature (tl)	60 – 150 seconds
Peak / Classification Temperature (Tp)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (tp)		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (Tp)		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	R0min ≤ R ≤ R1max
2	R1 max	Resistance measurement one hour after post trip	R0min ≤ R ≤ R1max
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 ≤ max. time to trip (seconds)
6	Trip Cycle Life	Vmax, Imax, 100 cycles	No arcing or burning
7	Trip Endurance	Vmax,Imax 24 hours	No arcing or burning
8	Solderability	ANSI/J-STD-002	95 % min. coverage

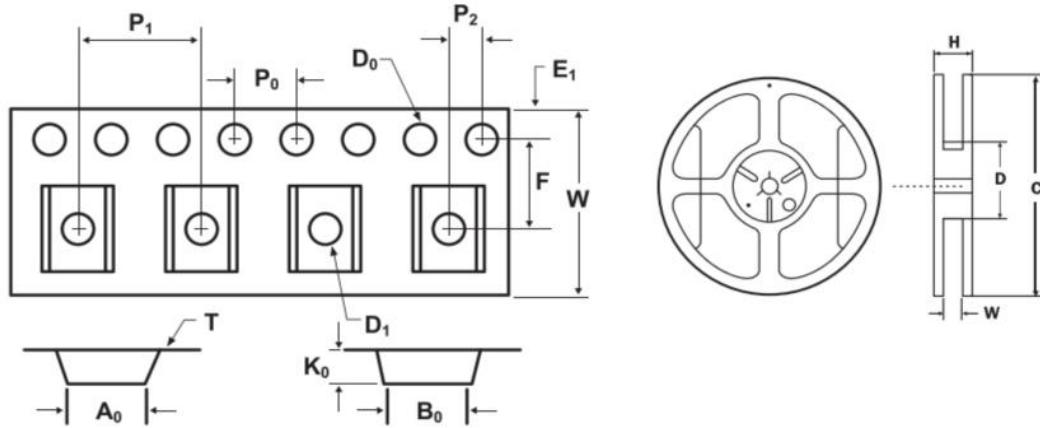
9. Tape and Reel Specifications&Packaging quantity per Reel

TAPE SPECIFICATIONS: EIA-481-1 (mm)			
Item	SMD0603P004TF SMD0603P020TF SMD0603P035TF	SMD0603P010TF SMD0603P025TF	SMD0603P050TF
W	8.00±0.30		8.00±0.30
F	3.50±0.10		3.50±0.10
E1	1.75±0.10		1.75±0.10
D0	1.55±0.05		1.55±0.05
D1	0.50±0.10		0.50±0.10
P0	4.00±0.10		4.00±0.10
P1	4.00±0.10		4.00±0.10
P2	2.00±0.05		2.00±0.05
A0	1.10±0.10		1.10±0.10
B0	1.85±0.10		1.90±0.10
T	0.20±0.10		0.20±0.10
K0	0.72±0.10		0.85±0.10
Leader	390mm		390mm

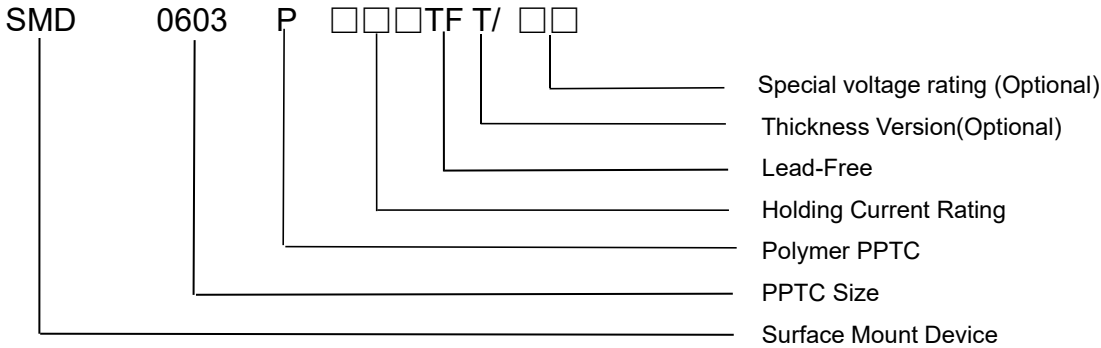
REEL DIMENSIONS: EIA-481-1 (mm)	
C	Ø178±1.0
D	Ø60.2±0.5
W	9.0±1.5
H	11.0±0.5



Trailer	160mm	160mm
Q'ty	5,000pcs/Reel	4,000pcs/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.