

Positive Temperature Coefficient (PTC) Datasheet

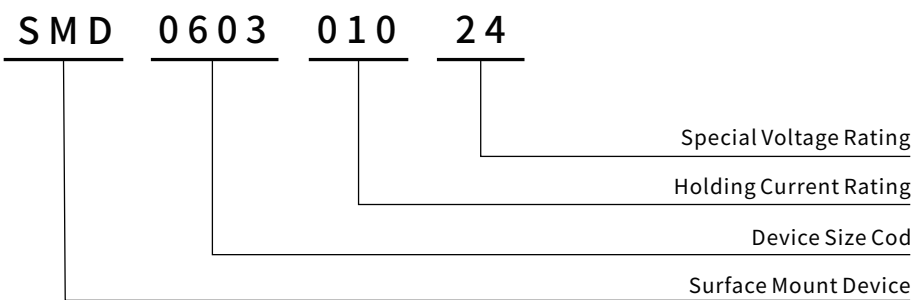
Features

- I Hold: 0.01~1.0A
- Fast responding to fault current
- Size 0603 / 1.6*0.8mm
- Low resistance
- Low profile
- RoHS compliant & Lead-Free & Halogen Free

Applications

- USB hubs, ports and peripherals
- Computer, Mobile phones, Multimedia
- General electronics
- Disk drives
- Game machines, Portable electronics, Battery
- Plug and play protection for motherboards and peripherals

Part Number Code

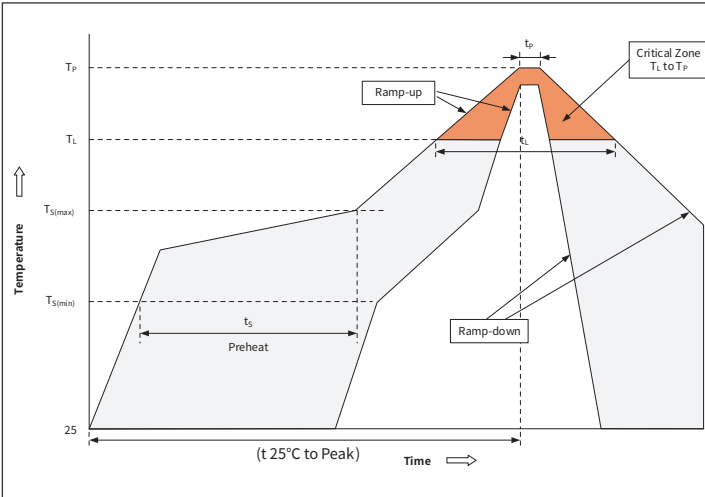


I Hold
0.01A to 1.0A

SMD0603



Recommended Soldering Conditions



Profile Feature		Pb-Free Assembly
Pre-heat	Temperature Min (Ts(min))	+150°C
	Temperature Max(Ts(max))	+200°C
	Time (Min to Max) (tS)	60-180 secs.
Average ramp up rate (Liquid us Temp (Tl) to peak)		3°C /sec. Max
Ts(max) to Tl - Ramp-up Rate		3°C /sec. Max
Reflow	Temperature(Tl)(Liquid us)	+217°C
	Temperature(tl)	60-150 secs.
Peak Temp (Tp)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (tp)		20-40secs
Ramp-down Rate		6°C /sec. Max
Time 25°C to Peak Temp (Tp)		8 min. Max
Do not exceed		+260°C

Recommended reflow methods: IR, vapor phase oven, hot air oven, N2 environment for lead-free.

Recommended maximum paste thickness is 0.25mm.

Devices can be cleaned using standard industry methods and solvents.

Note 1: All temperature refer to topside of the package, measured on the package body surface.

Note 2: If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

SMD0603 SERIES

Surface Mount PTC Device

● Electrical Characteristics (Ta=25°C Unless otherwise specified)

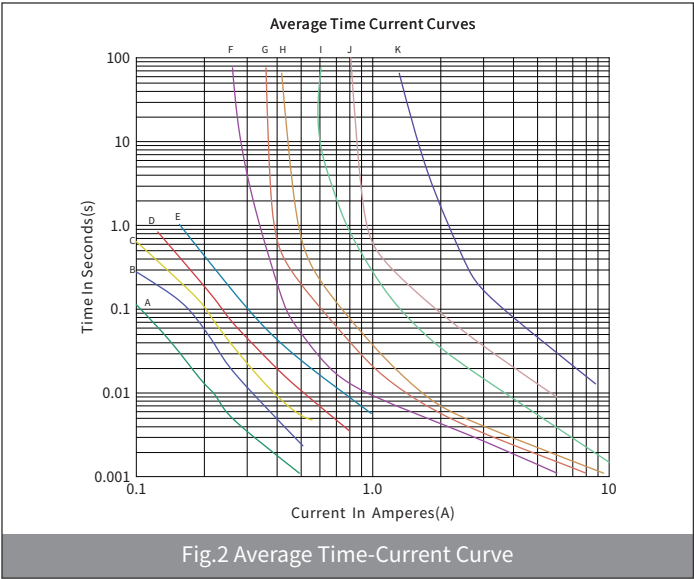
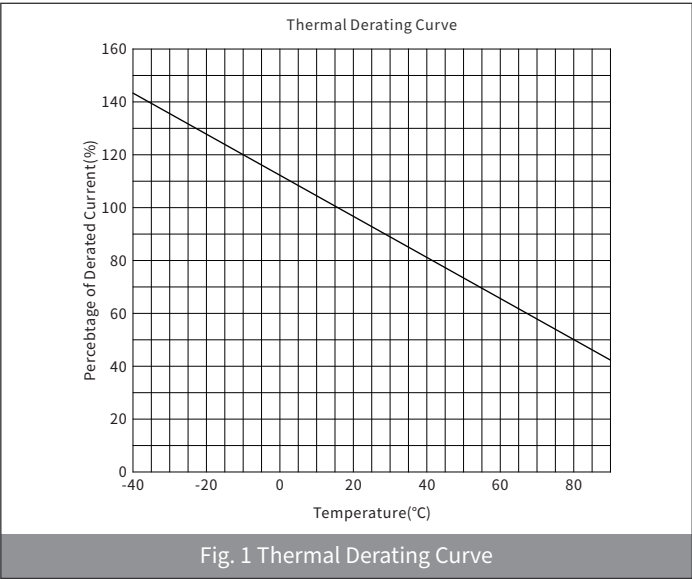
Part Number	Marking	I _{hold}	I _{trip}	V _{max}	I _{max}	P _{d typ}	Max. Time-to-trip		R _{i min}	R _{1 max}
		(A)	(A)	(V)	(A)	(W)	(A)	(Sec)	(Ω)	(Ω)
SMD0603-001-30	A	0.01	0.05	30	20	0.5	0.20	1.00	15.00	100
SMD0603-001-60	A	0.01	0.05	60	20	0.5	0.20	1.00	15.00	100
SMD0603-002-9	B	0.02	0.06	9	20	0.5	0.20	1.00	12.00	70
SMD0603-002-30	B	0.02	0.06	30	20	0.5	0.20	1.00	12.00	70
SMD0603-002-60	B	0.02	0.06	60	20	0.5	0.20	1.00	12.00	70
SMD0603-003-9	C	0.03	0.09	9	20	0.5	0.20	1.00	6.00	50
SMD0603-003-30	C	0.03	0.09	30	20	0.5	0.20	1.00	6.00	50
SMD0603-003-60	C	0.03	0.09	60	20	0.5	0.20	1.00	6.00	50
SMD0603-004-24	D	0.04	0.12	24	20	0.5	1.00	0.20	4.00	40
SMD0603-005-9	E	0.05	0.15	9	20	0.5	0.25	1.00	3.80	30
SMD0603-005-15	E	0.05	0.15	15	20	0.5	0.25	1.00	3.80	30
SMD0603-005-24	E	0.05	0.15	24	20	0.5	0.25	1.00	3.80	30
SMD0603-005-33	E	0.05	0.15	33	20	0.5	0.25	1.00	3.80	30
SMD0603-010-6	H	0.10	0.30	6	40	0.5	0.50	0.60	0.90	8.00
SMD0603-010-9	H	0.10	0.30	9	40	0.5	0.50	0.60	0.90	8.00
SMD0603-010-12	H	0.10	0.30	12	40	0.5	0.50	0.60	0.90	8.00
SMD0603-010-15	H	0.10	0.30	15	40	0.5	0.50	0.60	0.90	8.00
SMD0603-010-24	H	0.10	0.30	24	40	0.5	0.50	0.60	0.90	8.00
SMD0603-010-33	H	0.10	0.30	33	40	0.5	0.50	0.60	0.90	8.00
SMD0603-020-6	K	0.20	0.50	6	40	0.5	1.00	0.60	0.55	3.50
SMD0603-020-9	K	0.20	0.50	9	40	0.5	1.00	0.60	0.55	3.50
SMD0603-020-12	K	0.20	0.50	12	40	0.5	1.00	0.60	0.55	3.50
SMD0603-020-16	K	0.20	0.50	16	40	0.5	1.00	0.60	0.55	3.50
SMD0603-025-6	L	0.25	0.55	6	40	0.5	8.00	0.08	0.50	3.00
SMD0603-025-9	L	0.25	0.55	9	40	0.5	8.00	0.08	0.50	3.00
SMD0603-025-12	L	0.25	0.55	12	40	0.5	8.00	0.08	0.50	3.00
SMD0603-025-16	L	0.25	0.55	16	40	0.5	8.00	0.08	0.50	3.00
SMD0603-035-6	M	0.35	0.75	6	40	0.5	8.00	0.10	0.20	1.40
SMD0603-035-12	M	0.35	0.75	12	40	0.5	8.00	0.10	0.20	1.40
SMD0603-035-16	M	0.35	0.75	16	40	0.5	8.00	0.10	0.20	1.40
SMD0603-050-6	N	0.50	1.00	6	40	0.5	8.00	0.10	0.10	0.80
SMD0603-050-9	N	0.50	1.00	9	40	0.5	8.00	0.10	0.10	0.80
SMD0603-050-12	N	0.50	1.00	12	40	0.5	8.00	0.10	0.10	0.80
SMD0603-050-16	N	0.50	1.00	16	40	0.5	8.00	0.10	0.10	0.80
SMD0603-075-6	P	0.75	1.50	6	40	0.5	8.00	0.10	0.06	0.45
SMD0603-075-8	P	0.75	1.50	8	40	0.5	8.00	0.10	0.06	0.45
SMD0603-075-12	P	0.75	1.50	12	40	0.5	8.00	0.10	0.06	0.45
SMD0603-100-6	Q	1.00	2.00	6	40	0.5	8.00	0.10	0.05	0.30

Vocabulary

- I_{hold} = Hold current: maximum current device will pass without tripping in 25°C still air.
- I_{trip} = Trip current: minimum current at which the device will trip in 25°C still air.
- V_{max} = Maximum voltage device can withstand without damage at rated current (I_{max}).
- I_{max} = Maximum fault current device can withstand without damage at rated voltage (V_{max}).
- $P_{d\,typ.}$ = Typical power dissipated from device when in the tripped state at 25°C still air.
- $R_{i\,min}$ = Minimum resistance of device in initial (un-soldered) state.
- $R_{1\,max}$ = Maximum resistance of device at 25°C measured one hour after tripping or reflow soldering of 260°C for 20 sec.

Caution: Operation beyond the specified ratings may result in damage and possible arcing and flame.

Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)



Note: Fig.2 Average Time-Current Curve
A: SMD0603-001 B: SMD0603-002 C: SMD0603-003 D: SMD0603-004
E: SMD0603-005 F: SMD0603-010 G: SMD0603-020 H: SMD0603-025
I: SMD0603-035 J: SMD0603-050 K: SMD0603-075

Thermal Derating Chart

Part Number	Ambient operating temperature hold current(I_{hold})								
	-40°C	-20°C	0°C	25°C	40°C	50°C	60°C	70°C	85°C
SMD0603-001	0.016	0.014	0.012	0.010	0.008	0.007	0.006	0.005	0.0035
SMD0603-002	0.031	0.027	0.024	0.020	0.016	0.014	0.012	0.011	0.007
SMD0603-003	0.048	0.041	0.036	0.030	0.024	0.021	0.018	0.016	0.011
SMD0603-004	0.052	0.048	0.044	0.040	0.032	0.028	0.024	0.020	0.012
SMD0603-005	0.065	0.060	0.055	0.050	0.040	0.035	0.031	0.025	0.015
SMD0603-010	0.13	0.12	0.11	0.10	0.08	0.07	0.06	0.05	0.03
SMD0603-020	0.27	0.25	0.23	0.20	0.17	0.14	0.12	0.10	0.07
SMD0603-025	0.32	0.29	0.27	0.25	0.21	0.18	0.16	0.14	0.10
SMD0603-035	0.47	0.41	0.38	0.35	0.29	0.26	0.24	0.20	0.14
SMD0603-050	0.67	0.59	0.51	0.50	0.41	0.37	0.34	0.29	0.20
SMD0603-075	0.98	0.85	0.81	0.75	0.60	0.54	0.44	0.40	0.31
SMD0603-100	1.19	1.13	1.08	1.00	0.80	0.72	0.59	0.54	0.43

SMD0603 SERIES

Surface Mount PTC Device

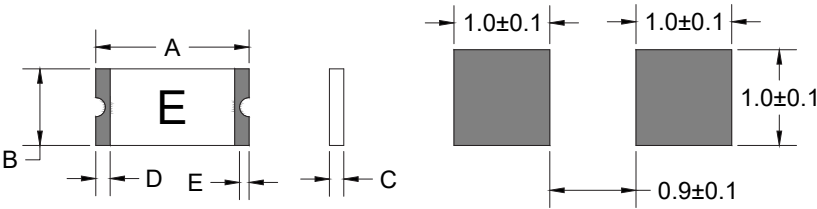
● Environmental Specifications

Operating / Storage temperature:	-40°C to +85°C
Passive Aging :	+85°C , 1000 hours
Humidity Aging :	+85°C , 85%R.H. 168 hours
Thermal Shock :	MIL-STD-202, Method 107G ; +85°C /-40°C 20 times
Solvent Resistance:	MIL-STD-202, Method 215 No change
Vibration:	MIL-STD-202,Method 201 No change
Maximum Device Surface Temperature in Tripped State :	125°C
Storage Conditions:	Light-proof, Hermetically Sealed, Moisture-proof

● Ordering Information

PACKAGE	SIZE(mm)	Part Number	DELIVERY MODE	MPQ(PCS)
SMD0603	1.6×0.8	SMD0603-010-6 SMD0603-010-33 SMD0603-020-6 SMD0603-025-6 SMD0603-035-XX SMD0603-050-XX SMD0603-075-XX SMD0603-100-XX	7"REEL	4,000
		SMD0603-001-30 SMD0603-001-60 SMD0603-002-9 SMD0603-002-30 SMD0603-002-60 SMD0603-003-9 SMD0603-003-30 SMD0603-003-60 SMD0603-004-24 SMD0603-005-9 SMD0603-005-15 SMD0603-005-24 SMD0603-005-33 SMD0603-010-9 SMD0603-010-12 SMD0603-010-15 SMD0603-010-24 SMD0603-020-9 SMD0603-020-12 SMD0603-020-16 SMD0603-025-9 SMD0603-025-12 SMD0603-025-16		5,000

Physical Dimensions & Recommended Pad Layout



Recommended Pad Size

Part Number	A		B		C		D	E
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.
SMD0603-001-30	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-001-60	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-002-9	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-002-30	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-002-60	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-003-9	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-003-30	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-003-60	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-004-24	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-005-9	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-005-15	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-005-24	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-005-33	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-010-6	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-010-9	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-010-12	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-010-15	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-010-24	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-010-33	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-020-6	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-020-12	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-020-16	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-020-9	1.45	1.85	0.65	1.05	0.40	1.00	0.15	0.10
SMD0603-025-6	1.45	1.85	0.65	1.05	0.35	1.00	0.15	0.10
SMD0603-025-9	1.45	1.85	0.65	1.05	0.35	1.00	0.15	0.10
SMD0603-025-12	1.45	1.85	0.65	1.05	0.35	1.00	0.15	0.10
SMD0603-025-16	1.45	1.85	0.65	1.05	0.35	1.00	0.15	0.10
SMD0603-035-6	1.45	1.85	0.65	1.05	0.35	0.90	0.15	0.10
SMD0603-035-12	1.45	1.85	0.65	1.05	0.35	0.90	0.15	0.10
SMD0603-035-16	1.45	1.85	0.65	1.05	0.35	0.90	0.15	0.10
SMD0603-050-6	1.45	1.85	0.65	1.05	0.55	1.15	0.15	0.10
SMD0603-050-9	1.45	1.85	0.65	1.05	0.55	1.15	0.15	0.10
SMD0603-050-12	1.45	1.85	0.65	1.05	0.55	1.15	0.15	0.10
SMD0603-050-16	1.45	1.85	0.65	1.05	0.55	1.15	0.15	0.10
SMD0603-075-6	1.45	1.85	0.65	1.05	0.55	1.15	0.15	0.10
SMD0603-075-8	1.45	1.85	0.65	1.05	0.55	1.15	0.15	0.10
SMD0603-075-12	1.45	1.85	0.65	1.05	0.55	1.15	0.15	0.10
SMD0603-100-6	1.45	1.85	0.65	1.05	0.55	1.15	0.15	0.10

● 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 prolonged 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.