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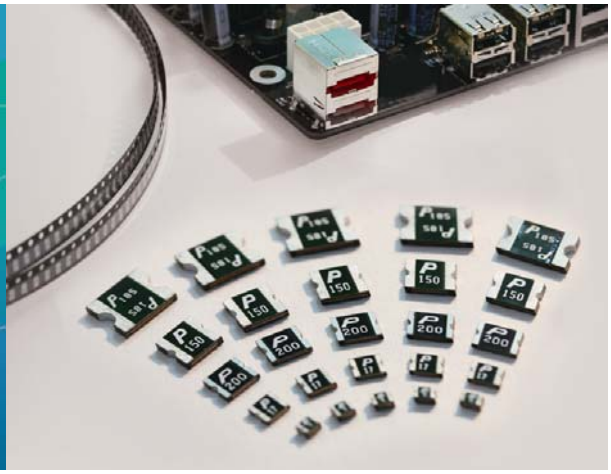
POLYTRONICS TECHNOLOGY CORP.

PRODUCT
DATASHEET



SMD0603 HF Series Surface Mount PTC Devices

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Description

The 0603 series provides miniature surface mount resettable overcurrent protection with holding current from 100mA to 500mA. This world's smallest PTC is suitable for ultra portable applications where space is at a premium and the device current is low.

Features

- RoHS compliant and lead-free
- Halogen-free
- Compact design saves board space
- Low profile
- Fast response to fault current
- Compatible with high temperature solders

Applications

- Mobile phones and PDAs
- Portable MP3 and media player
- Mobile Internet Device (MID)
- USB peripherals
- IC VCC protection

Agency Approval and Environmental Compliance

Agency	File Number
c UL us	E201431
TÜV Rheinland Product Safety / BAUART GEPRÜFT TYPE APPROVED	R50099121

Regulation	Standard
RoHS	2002/95/EC
Halogen Free	IEC 61249-2-21:2003

Electrical Characteristics

Part Number	I_{hold} (A)	I_{trip} (A)	V_{max} (Vdc)	I_{max} (A)	$P_{d\ typ}$ (W)	Maximum Time To Trip		Resistance		Agency Approval	
						Current (A)	Time (Sec.)	R_{min} (Ω)	R_{1max} (Ω)	c UL us	TÜV
SMD0603P010TF	0.10	0.30	15	40	0.5	0.50	1.00	0.900	6.000	✓	✓
SMD0603P020TF	0.20	0.50	9	40	0.5	1.00	0.60	0.550	3.500	✓	✓
SMD0603P025TF	0.25	0.55	9	40	0.5	8.00	0.08	0.500	3.000	✓	✓
SMD0603P035TF	0.35	0.75	6	40	0.5	8.00	0.10	0.200	1.000	✓	✓
SMD0603P050TF	0.50	1.00	6	40	0.5	8.00	0.10	0.100	0.680	✓	✓

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Note on Electrical Characteristics

- **Vocabulary**

  I_{hold} = Hold current: maximum current device will pass without tripping in 23ºC still air.

  I_{trip} = Trip current: minimum current at which the device will trip in 23 ºC 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 23 ºC still air.

  R_{min} = Minimum resistance of device in initial (un-soldered) state.

  R_{1max} = Maximum resistance of device at 23 ºC measured one hour after tripping or reflow soldering of 260 ºC for 20 sec.

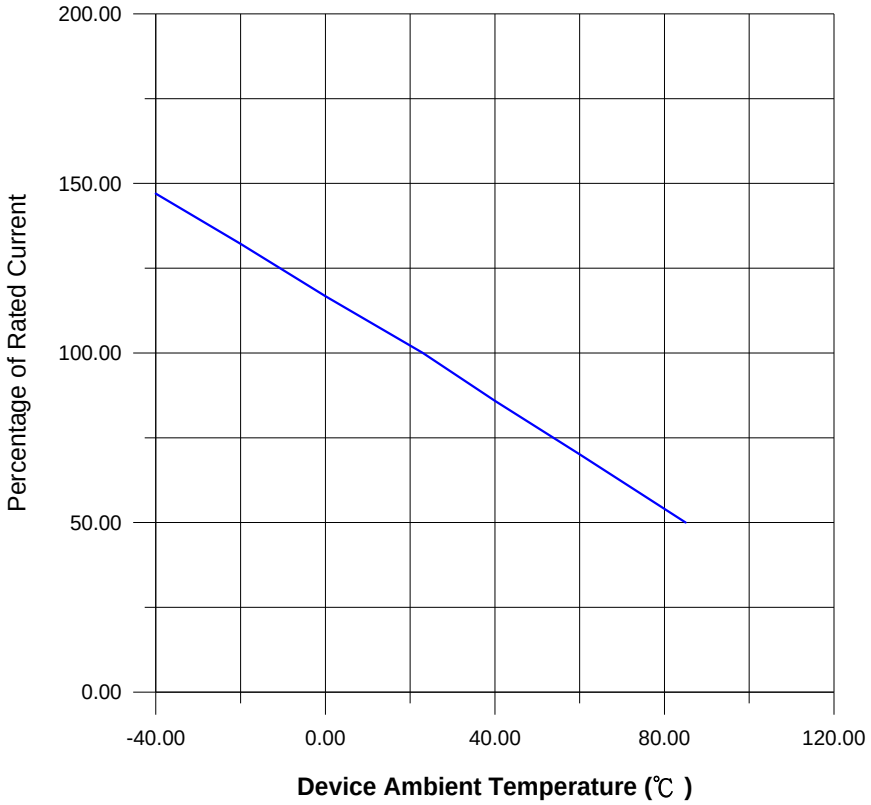
- **Value specified is determined by using the PWB with 0.020"*1.5oz copper traces.**
- **Caution: Operation beyond the specified rating may result in damage and possible arcing and flame.**
- **Specifications are subject to change without notice.**

Polymeric PTC Selecting Guide

- **Determine the following operating parameters for the circuits:**
  - Normal operating current (I_{hold})
  - Maximum circuit voltage (V_{max})
  - Maximum interrupt current (I_{max})
  - Normal operating temperature surrounding device (minºC/maxºC)
- **Select the device form factor and dimension suitable for the application:**
  - Surface Mount Device (SMD)
  - Radial Leaded Device (RLD)
  - Axial Leaded Device (ALD)
  - DISC Device
  - Other Customized Form Factors
- **Compare the maximum rating for V_{max} and I_{max} of the PPTC device with the circuit in application and make sure the circuit's requirement does not exceed the device rating.**
- **Check that PPTC device's trip time (time-to-trip) will protect the circuit.**
- **Verify that the circuit operating temperature is within the PPTC device's normal operating temperature range.**
- **Verify the performance and suitability of the chosen PPTC device in the application.**

SMD0603 HF Series Surface Mount PTC Devices

Thermal Derating Curve



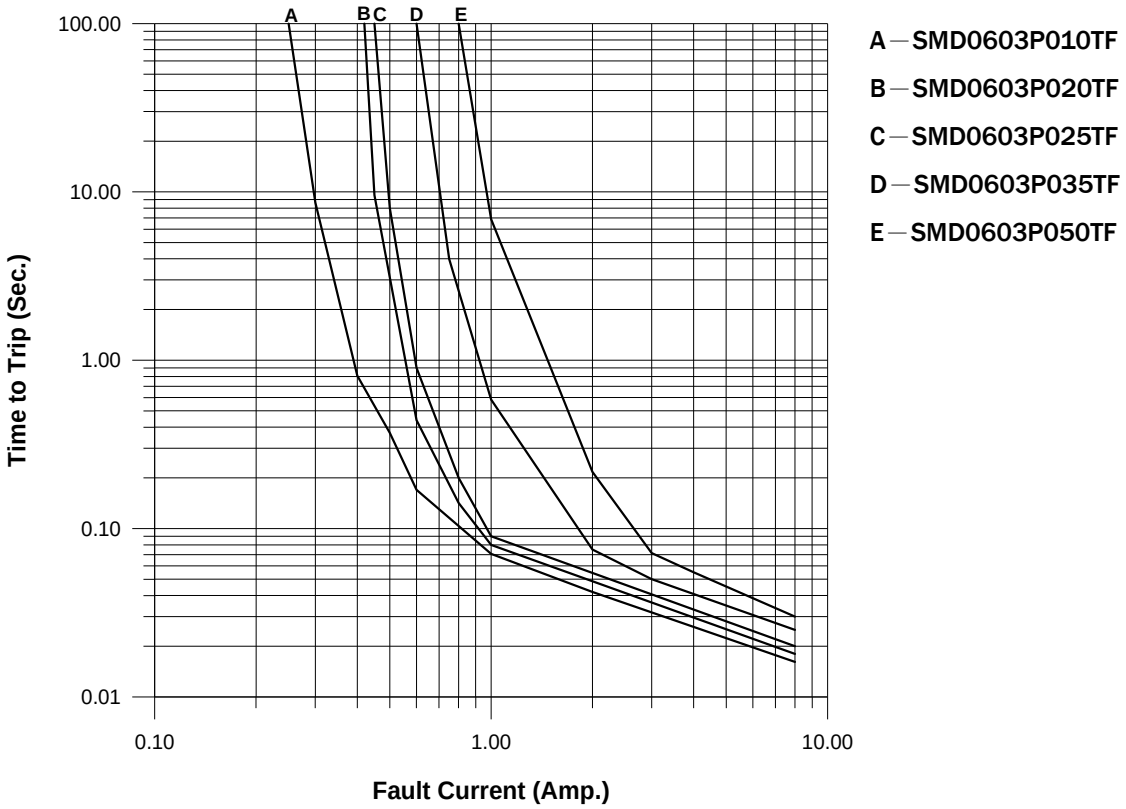
Thermal Derating Chart

Recommended Hold Current (A) at Ambient Temperature (°C)

Part Number	Ambient Operation Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
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

SMD0603 HF Series Surface Mount PTC Devices

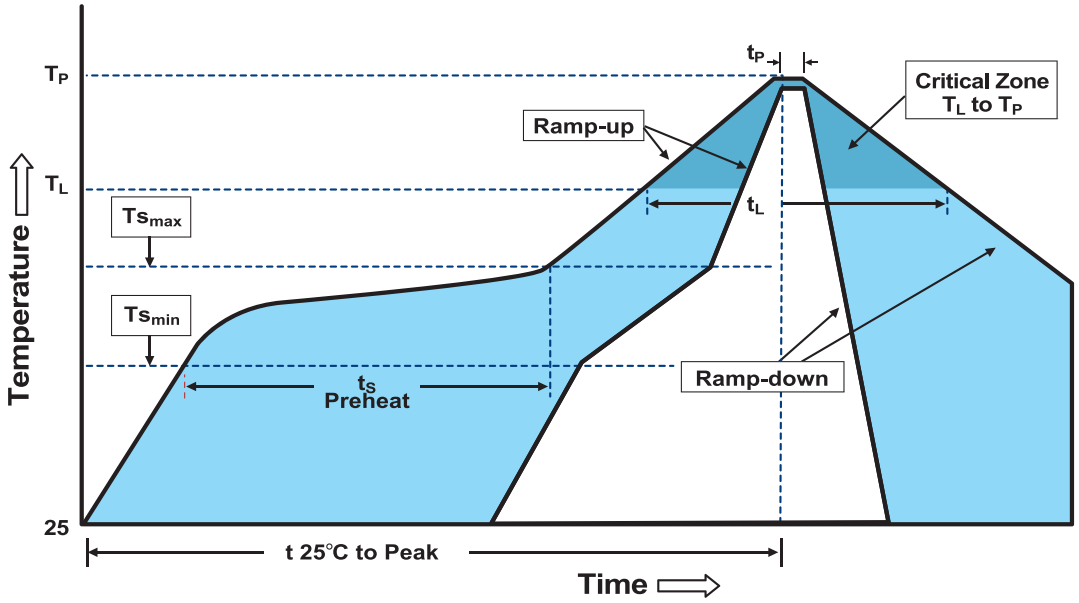
Average Time-Current Curve



A — SMD0603P010TF
B — SMD0603P020TF
C — SMD0603P025TF
D — SMD0603P035TF
E — SMD0603P050TF

SMD0603 HF Series Surface Mount PTC Devices

Soldering Parameters



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to T_P)	3°C/second max.
Preheat -Temperature Min (Ts_{min}) -Temperature Max (Ts_{max}) -Time (Ts_{min} to Ts_{max})	 150°C 200°C 60-180 seconds
Time maintained above: -Temperature (T_L) -Time (t_L)	 217°C 60-150 seconds
Peak Temperature (T_P)	260°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	8 minutes max.
Storage Condition	0°C ~35°C, ≦70%RH

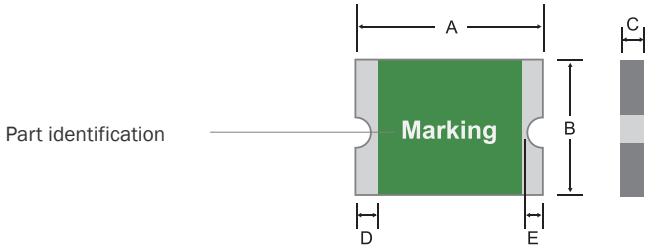
- Recommended reflow methods: IR, vapor phase oven, hot air oven, N_2 environment for lead-free
- Recommended maximum paste thickness is 0.25mm (0.010 inch)
- Devices can be cleaned using standard industry methods and solvents.

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 HF Series Surface Mount PTC Devices

Physical Dimensions (mm.)



Part Number	A		B		C		D		E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
SMD0603P010TF	1.40	1.80	0.60	1.00	0.40	0.75	0.15	0.50	--	0.40
SMD0603P020TF	1.40	1.80	0.60	1.00	0.40	0.75	0.15	0.50	--	0.40
SMD0603P025TF	1.40	1.80	0.60	1.00	0.40	0.75	0.15	0.50	--	0.40
SMD0603P035TF	1.40	1.80	0.60	1.00	0.75	1.55	0.15	0.50	--	0.40
SMD0603P050TF	1.40	1.80	0.60	1.00	0.75	1.55	0.15	0.50	--	0.40

Environmental Specifications

Operating/Storage 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 107G +85°C /-40°C 20 times -30% typical resistance change
Solvent Resistance	MIL-STD-202, Method 215 No change
Vibration	MIL-STD-883C, Method 2007.1, Condition A No change
Moisture Level Sensitivity	Level 1, J-STD-020C

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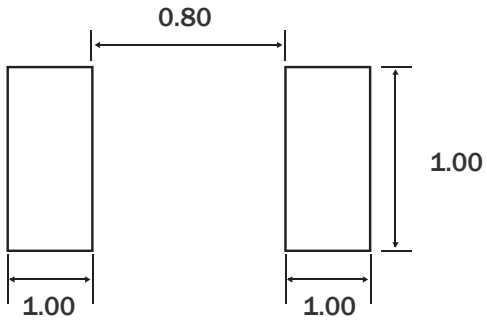
Packaging Quantity and Marking

Recommended Pad Layout (mm.)



Part Number	Marking	Quantity
SMD0603P010TF	C	4000
SMD0603P020TF	H	4000
SMD0603P025TF	I	4000
SMD0603P035TF	F	4000
SMD0603P050TF	J	4000

◎ 8 mm tape on 7 inch reel per EIA-481-1 (equivalent to IEC286, part 3)

Physical Specifications

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

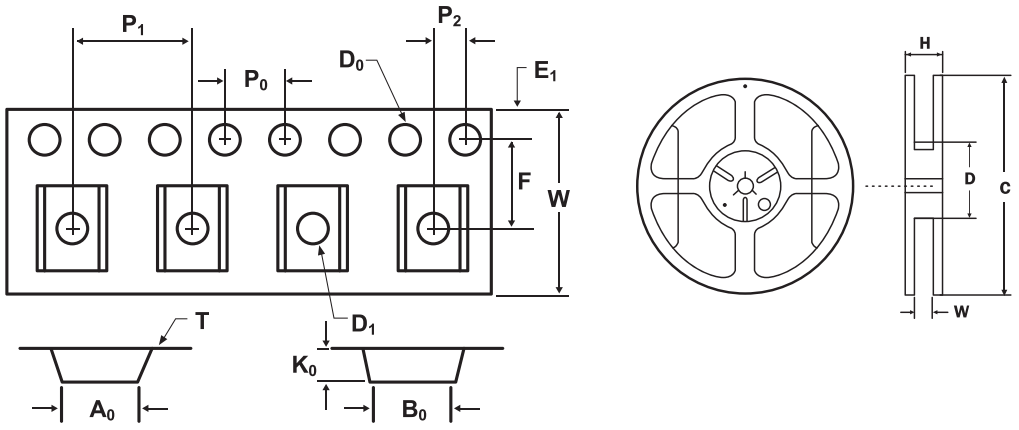
SMD0603 HF Series Surface Mount PTC Devices

Tape Specifications: EIA-481-1 (mm.)

	P010TF P020TF P025TF	P035TF P050TF
W	8.00 ± 0.30	8.00 ± 0.30
F	3.50 ± 0.05	3.50 ± 0.05
E_1	1.75 ± 0.10	1.75 ± 0.10
D_0	1.55 ± 0.05	1.55 ± 0.05
D_1	0.50 ± 0.10	0.50 ± 0.10
P_0	4.00 ± 0.10	4.00 ± 0.10
P_1	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	2.00 ± 0.05
A_0	1.10 ± 0.10	1.10 ± 0.10
B_0	1.92 ± 0.10	1.92 ± 0.10
T	0.20 ± 0.10	0.20 ± 0.10
K_0	0.72 ± 0.10	0.96 ± 0.10
Leader min.	390	390
Trailer min.	160	160

Reel Dimensions: EIA-481-1 (mm.)

C	Ø178 ± 1.0
D	Ø60.2 ± 0.5
H	11.0 ± 0.5
W	9.0 ± 1.5



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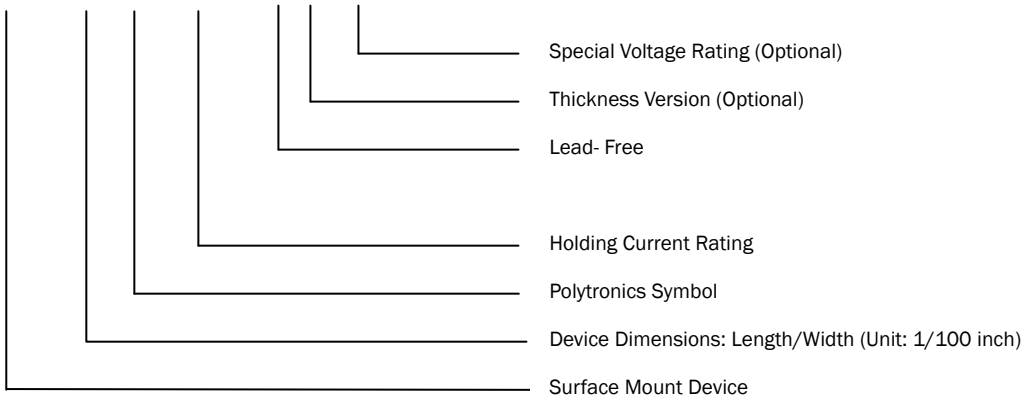
Part Number System

SMD 0603 P □□□ TF T /□□



Cross Reference

Polytronics / EVERFUSE®	Cross Reference	
	Tyco / PolySwitch®	Bourns / Multifuse®
SMD0603P010TF	-	-
SMD0603P020TF	-	MF-FSMF020X
SMD0603P025TF	-	-
SMD0603P035TF	-	MF-FSMF035X
SMD0603P050TF	-	MF-FSMF050X

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“Multifuse” is a registered trademark of Bourns , Inc.

“PolySwitch” is a registered trademark of Tyco Electronics.