POLYTRONICS
POLYTRONICS TECHNOLOGY CORP.

PRODUCT
DATASHEET

SMFD0603 Series Surface Mount Fuses Devices

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Description

Polytronics SMFD0603 series surface mount slow-blow fuse utilizes thick film process with extremely stable fusing element. The glass over coating can tolerate higher temperature profile, and the non-flammable ceramic substrate offers better heat conductivity and safety. SMFD0603 series is also RoHS compliant and halogen-free to meet global environmental standard.

Features

- Slow blow
- Compact size
- Thick film manufacturing method
- Ceramic substrate with silver fusing element
- Excellent environmental integrity

Application

- Battery pack
- Digital camera
- Game equipment
- Wireless base station
- Wearable devices
- PC related equipment / peripherals
- LCD monitors and modules
- Medical device

Agency Approval and Environmental Compliance

Agency	File Number
c UL us	UL/CSA: E331807
TÜV	TÜV: J50583167

Regulation	Standard
RoHS	2011/65/EU
Halogen Free	IEC 61249-2-21:2003

Electrical Characteristics

Part Number	Marking	Current Rating (A)	Voltage Rating	Interrupting Rating	Typical Cold DCR† (mΩ)	Typical I²T‡ (A²S)	Agency Approval	
							c UL us	
SMFD0603P100	H	1.0	80V	50A / 80V DC (UL) 50A / 63V DC (TÜV)	205	0.160	✓	✓
SMFD0603P150	K	1.5			85	0.210	✓	✓
SMFD0603P200	N	2.0			45.5	0.348	✓	✓
SMFD0603P250	O	2.5			37	0.500	✓	✓
SMFD0603P300	P	3.0			23	0.756	✓	✓
SMFD0603P350	R	3.5			17.8	1.372	✓	✓
SMFD0603P400	S	4.0			13	3.824	✓	✓
SMFD0603P500	T	5.0			8.5	4.700	✓	✓
SMFD0603P600	6	6.0			6	7.200	✓	✓

† Measured at ≤ 10% rated current and 25°C
‡ Melting I²T at 10 times of rated current
♦ **Specifications are subject to change without notice.** ♦

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Electrical Specification

Ampere Rating	% of Current Rating	Opening Time
1A~6A	100%	4 Hours Min.
	200%	60 Seconds Max.
1A~3.5A	1000%	0.3 mSec. Min.
4A~6A	1000%	0.6 mSec. Min.

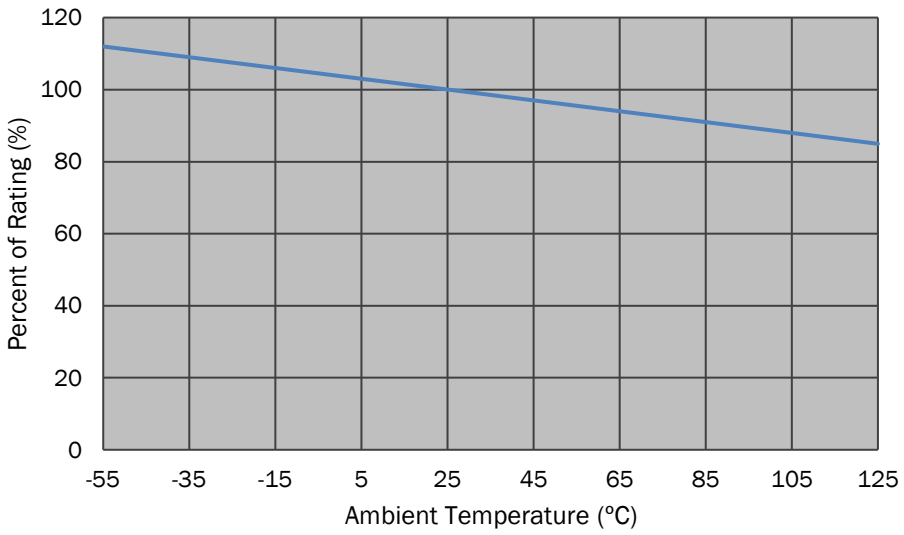
Physical Specifications

Materials	Substrate: Ceramic Terminations: Silver over-plated with 100% tin Element: Silver or Silver/Palladium
Solderability	MIL-STD-202
Soldering Parameters	Wave Solder: 260°C, 10 seconds max. Reflow Solder: 260°C, 20 seconds max. Hand Solder: 350°C, 5 seconds max.

Environmental Specifications

Operating Temperature	-55°C to 125°C
Moisture Sensitivity Level	Level 1, JEDEC J-STD-020F

Thermal Derating Curve



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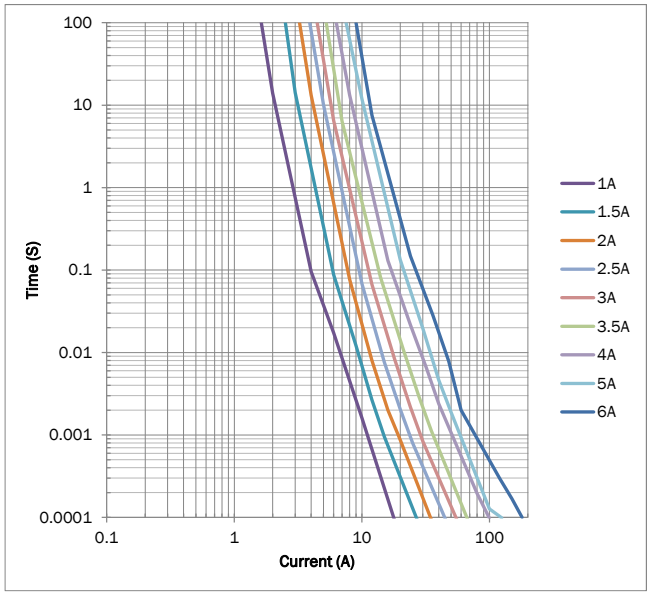
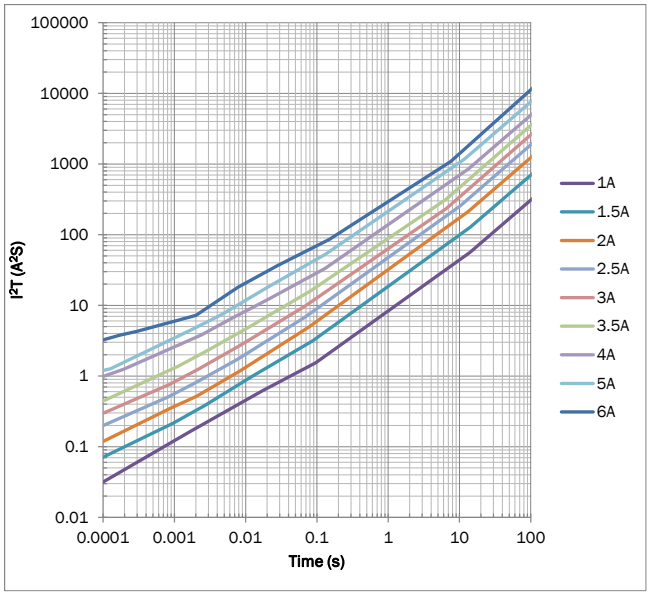
Time-Current Curve



I²T vs Time Curve



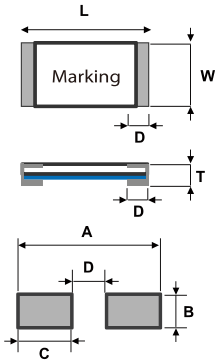
Physical Dimensions (mm.)

Dimensions (mm)

L	W	T	D
1.60±0.15	0.80±0.15	0.45±0.10	0.30±0.20

Recommended Solder Pad Dimension (mm)

A	B	C	D
2.05±0.05	1.20±0.10	0.60±0.10	0.85±0.05



Dimensionsof Standard Test Board (mm)

Ampere Rating	Board Thickness	Copper Layer Thickness	Copper Trace Width
1A~6A	1.6	0.035	5.0

Part Number System

SMF D 0603 P □□□

- Current Rating in 100X Ampere
- Polytronics Symbol
- Device Dimension in 1/100 inch
- Series, F=Fast-Acting, S=Slow-Blow, D=Slow-Blow 80V
- Surface-Mount Fuse

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Reliability Test

Characteristics	Test condition / Methods	Requirement	Test Reference
Time/Current	100% In	No Fusing; 4 hours min.	UL 248-14
	200% In	≤ 60 sec	Refer to Spec
	1000% In	1.0A ~ 3.5A: > 0.3 ms 4A ~ 6A: > 0.6 ms	
Voltage Drop	100% In	Deviation between the mean value: <15%	
Endurance Test	Repeating 100 cycles of 1In for 1 h and switching off for 15min, following by 1 h at 1.25In and testing temperature rise	|ΔR|: <10% ΔT<75°C	IEC 60127-4
Interrupting Ability	50A/80V DC	Without permanent arcing, ignition and bursting of fuse link	UL 248-14 IEC 60127-4
Solderability	240°C ± 5°C, 3sec ± 0.5sec	95% coverage min	IEC 60127-4 IEC 60068-2-20 MIL-STD-202
Resistance to Soldering	260°C ± 5°C, 10sec ± 0.5sec	|ΔR|: <10%	MIL-STD-202 Method 210
Bending Test	Distance between holding points: 90mm Bending: 1 mm; Time: 10 second	|ΔR|: <10% No mechanical damages	IEC 60127-4
High Temperature Operating Life	96 hours, 70°C ± 2°C at 0.6 In.	|ΔR|: <10%	MIL-STD-202 Method 108
Humidity (Steady State)	1000 hours at 40°C ± 2°C 90~95%RH	|ΔR|: <10%	MIL-STD-202 Method 103
Low Temperature Storage	96 hours at -55°C ± 3°C.	|ΔR|: <10%	IEC 60068-2-1
High temperature Storage	96 hours at 125°C ± 2°C.	|ΔR|: <10%	IEC 60068-2-2
Salt Spray	5% salt solution, 48 hours	|ΔR|: <10%	MIL-STD-202 Method 101
Thermal Shock	100 cycles between -65°C /+125°C 60 minutes at each extreme zone	I ΔR I: <(10%R+0.005Ω)	MIL-STD-202 Method 107

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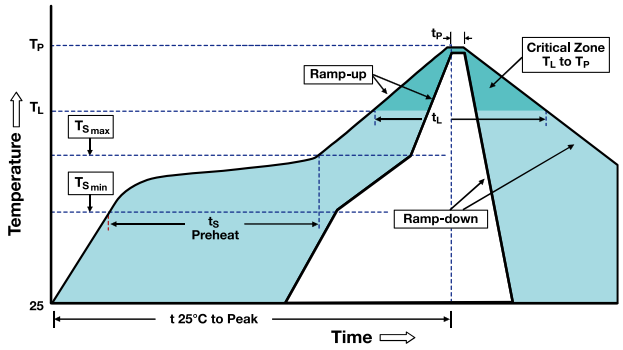
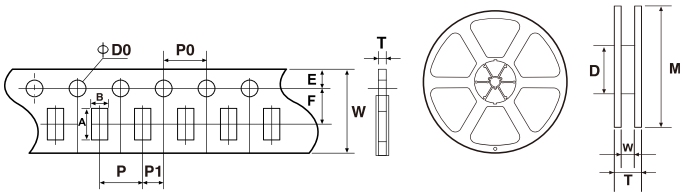
Soldering Parameters



Average Ramp-Up Rate (T_{Smax} to T_P)	3°C/second max.
Preheat	
-Temperature Min (T_{Smin})	150°C
-Temperature Max (T_{Smax})	200°C
-Time (T_{Smin} to T_{Smax})	60-120 seconds
Time maintained above:	
-Temperature (T_L)	217°C
-Time (t_L)	60-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_P)	20 seconds max.
Ramp-Down Rate	6°C /second max.
Time 25°C to Peak Temperature	8 minutes max.

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.

Tape & Reel Specification (mm.)



A	1.85 ± 0.10
B	1.10 ± 0.10
W	8.00 ± 0.20
F	3.50 ± 0.05
E	1.75 ± 0.10
P	4.00 ± 0.10
P0	4.00 ± 0.10
P1	2.00 ± 0.10
D0	Ø1.50 ± 0.10
T	0.60 ± 0.10

M	Ø 178.0 ± 2.0
W	9.5 ± 1.0
T	12.5 ± 1.5
A	2.0 ± 0.5
B	Ø 13.0 ± 0.5
C	Ø 21.0 ± 0.5
D	Ø 58.0 ± 2.0

Packaging Quantity

Part Number	Tape & Reel Quantity
SMFD0603PXXX	5000

Storage

- The ambient temperature recommended for storage shall be between 5°C ~30°C.
- The relative humidity recommended for storage shall be between 25%RH~60%RH.
- The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.

Warning

- Fuse product is not recommended for any type of coating. Polytronics is not responsible for any damage directly or indirectly related to the coating.
- For copper layer thickness or copper trace width different from the standard test board, fusing characteristics needs to be verified to ensure product performance meet user requirement.