POLYTRONICS
POLYTRONICS TECHNOLOGY CORP.

PRODUCT
DATASHEET

SMFF4012 Series Surface Mount Fuses Devices

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Description

Polytronics SMFF4012 series square shape surface mount fast-acting fuses adopt Wire-in-Air (WIR) construction. Small footprint with wide range of available current rating makes the fuse ideal for over-current protection applications, in DC circuits using surface mount technology. SMFF4012 series is also RoHS compliant and halogen-free to meet global environmental standard.

Features

- Fast acting, Inrush withstand capability
- Surface mount high current fuse
- Excellent environmental integrity
- Wide Operating temperature
- Enhanced thermal cycling endurance

Application

- Storage system power
- Cooling fan system for PC server
- Voltage regulator module
- Base station power supply
- Voltage regulator module for PC server
- High end servers/Blade computing
- Battery Management System

Agency Approval and Environmental Compliance

Agency	File Number
c UL us	UL/CSA:E331807
TÜVRheinland	TÜV: J50649605

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

Electrical Characteristic

Part Number	Current Rating (A)	Voltage Rating	Interrupting Rating	Typical Cold DCR† (mΩ)	Nominal I²T‡ (A²S)	Agency Approval	
						c UL us	
SMFF4012P2000	20	100V DC	300A / 100V DC 500A / 72V DC 1000A / 32V DC	3.08	264	✓	✓
SMFF4012P2500	25			2.15	413	✓	✓
SMFF4012P3000	30			2.08	594	✓	✓
SMFF4012P4000	40	72V DC	180A / 72V DC 600A / 60V DC	1.23	1024	✓	✓
SMFF4012P5000	50			1.00	1650	✓	✓
SMFF4012P6000	60			0.88	2376	✓	✓

† 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
20A~60A	100%	4 Hours Min.
	200%	60 Seconds Max.
	1000%	1 mSec Min.

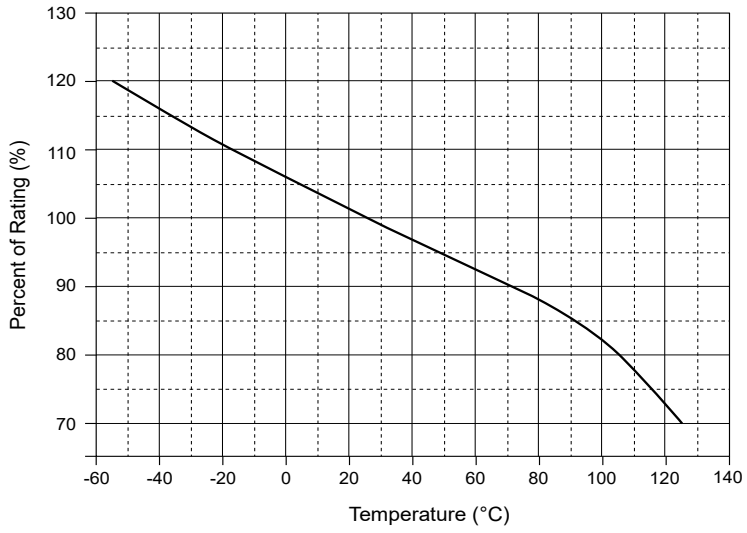
Physical Specifications

Materials	Substrate: Ceramic Terminations: Au Plated Brass Cap Element: Tin Plated Copper
Solderability	MIL-STD-202
Soldering Parameters	Wave Solder: 260°C, 10 seconds max. Reflow Solder: 260°C, 5 seconds max. Hand Solder: 350°C, 3 seconds max. (Soldering iron avoid touch Brass Cap.)

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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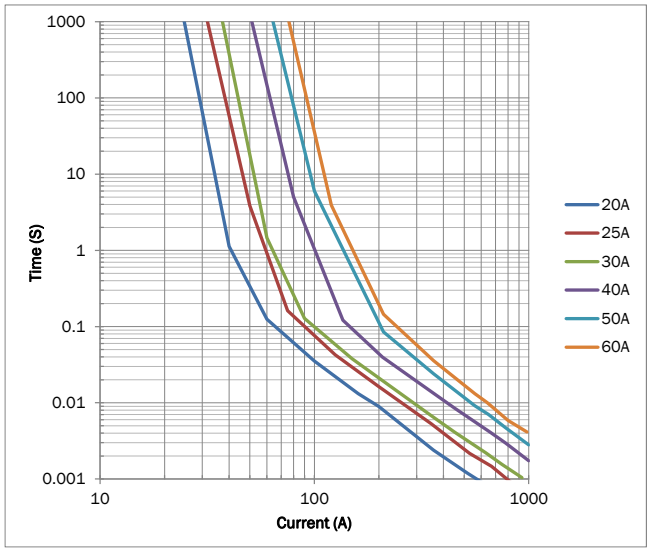
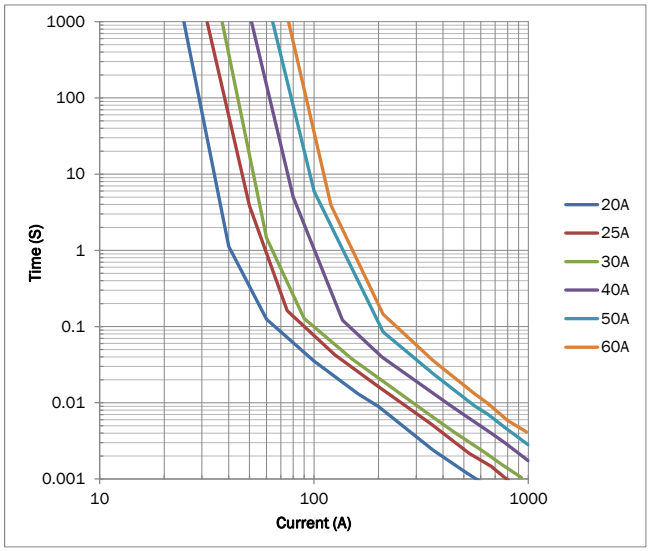
Time-Current Curve



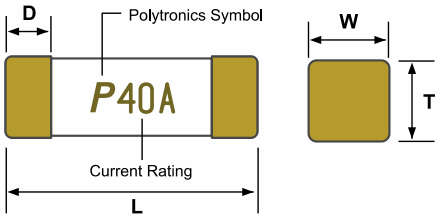
I²T vs Time Curve



Physical Dimensions (mm.)

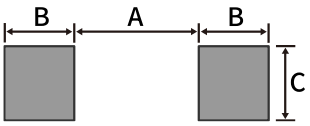
Dimensions (mm)

L	W	T	D
10.25±0.20	3.20±0.15	3.20±0.15	1.75±0.15

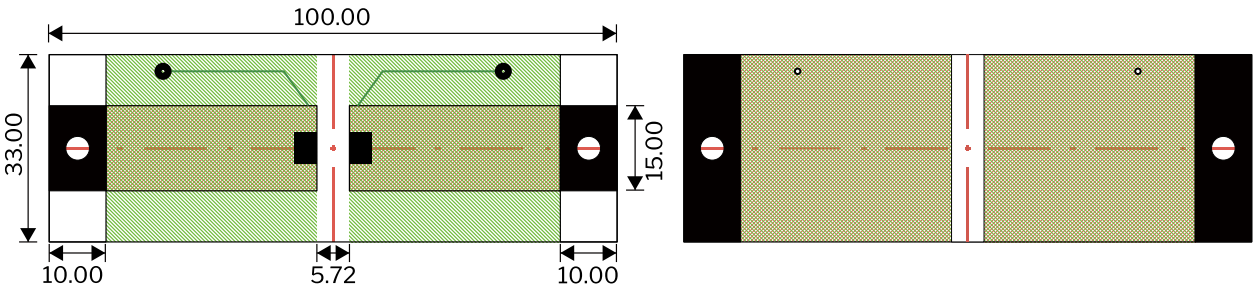


Recommended Solder Pad Dimension (mm)

A	B	C
5.72±0.30	3.25±0.30	3.25±0.30



Dimensionsof Standard Test Board (mm)



Glass epoxy body on double side
Board thickness: 1.6mm
Thickness of Copper layer: ≥100μm
Width of Copper trace: One side 15mm and the other side 33mm

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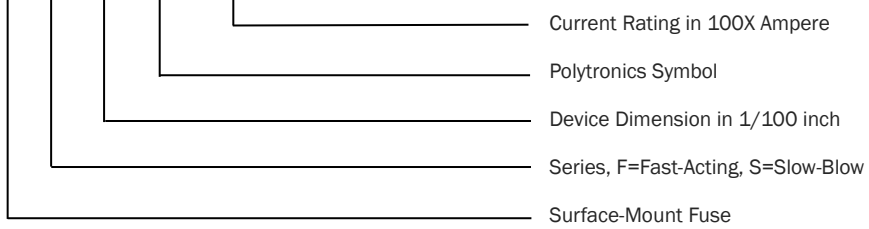
Part Number System

SMF F 4012 P □□□□



Reliability Test

Characteristics	Test condition / Methods		Requirement	Test Reference
Time/Current	100% of current rating		No fusing, 4 hours min.	UL248-14
	200% of current rating		60 Seconds Max.	Refer to Spec.
	1000%of current rating		1 mSec. Min.	
Endurance Test	100% of rating current for 4 hours and testing Temperature rise at the last 5min.		No fusing; 20~40A: <90°C 50~60A: <105°C	UL248-14
Interrupting Ability	20A-30A	100VDC 300A 72VDC 500A 32VDC 1000A	without permanent arcing, ignition and bursting of fuse link	UL248-14 IEC 60127-4
	40A-60A	72VDC 180A 60VDC 600A		
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		No Breaking	MIL-STD-202 Method 210
Moisture resistance	Temperature Humidity, T: 85°C ± 3°C, RH: 85% ± 5%, Duration: 1000 hours		ΔR|: <10% No mechanical damage	MIL-STD-202 Method 106
Low Temperature Storage	T= -55°C ± 3°C, 1000hours		|ΔR|: <10%	IEC 60068-2-1
High temperature Storage	T=125°C ± 2°C, 1000hours		|ΔR|: <10%	IEC 60068-2-2
Salt Spray	5% ± 1% salt solution, 48hours		|ΔR|: <10%	MIL-STD-202 Method 101
Thermal Shock	100 cycles，-55°C to +125°C, 30 minutes @ each extreme		|ΔR|: <10%	IEC 60068-2-14
Vibration	Amplitude 10Hz~55Hz in 1 min. 2 hours each XYZ, total 6 hours		ΔR|: <10% No mechanical damage	MIL-STD-202F Method 201
Mechanical shock	100G's peak amplitude, saw tooth wave 6ms duration, 3 cycles XYZ + xyz = 18		ΔR|: <10% No mechanical damage	MIL-STD-202 Method 213

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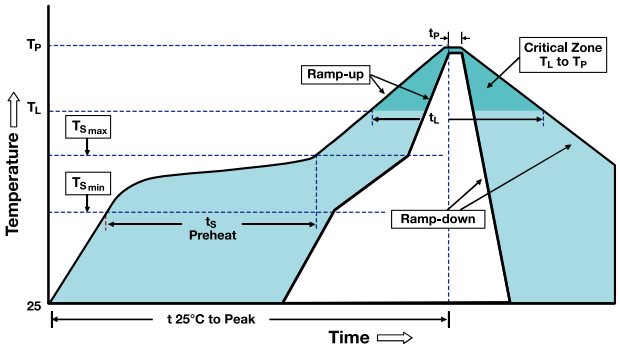
Soldering Parameters



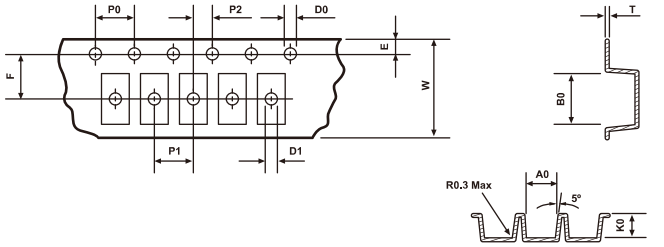
Average Ramp-Up Rate (Ts_{max} to T_P)	3°C/second max.
Preheat -Temperature Min (Ts_{min}) -Temperature Max (Ts_{max}) -Time (Ts_{min} to Ts_{max})	 150°C 200°C 60-120 seconds
Time maintained above: -Temperature (T_L) -Time (t_L)	 217°C 600-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_P)	20 seconds
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.

Packaging Quantity

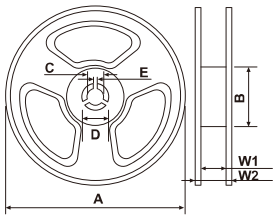
Part Number	Tape & Reel Quantity
SMFF4012PXXXX	2000

Tape & Reel Specification (mm.)



A0	3.50 ± 0.10
B0	10.60 ± 0.15
E	1.75 ± 0.10
F	11.50 ± 0.10
W	24.00 ± 0.30
K0	3.50 ± 0.10

P0	4.00 ± 0.10
P1	8.00 ± 0.10
P2	2.00 ± 0.10
D0	1.50 + 0.10/-0
D1	1.50 + 0.10/-0
T	0.35 ± 0.05



A	330.0 ± 2.0
B	100.0 ± 1.5
C	13.0 ± 0.5
D	21.0 ± 0.5
E	2.2 ± 0.2
W1	24.5 ± 1.5
W2	28.5 ± 2.0

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.