

**Surface Mount PPTC Resettable Fuse: FSMD0603 Series**
**1. Summary**

- (a) **RoHS Compliant & Halogen Free**
- (b) Applications: All high -density boards
- (c) Product Features: Small surface mountable, Solid state, Faster time to trip than standard SMD devices, Lower resistance than standard SMD devices
- (d) Operation Current: 0.01A~0.25A
- (e) Maximum Voltage: 9V~60V<sub>DC</sub>
- (f) Temperature Range: -40°C to 85°C

**2. Agency Recognition**

UL: File No. E211981  
 C-UL: File No. E211981  
 TÜV: File No. R50090556

**3. Electrical Characteristics (23°C)**

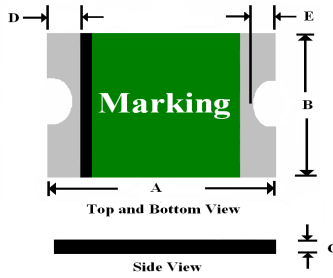
Part Number	Hold Current	Trip Current	Rated Voltage	Max. Current	Typical Power	Max. Time to Trip		Resistance	
	$I_H$ , A	$I_T$ , A	$V_{MAX}$ , V <sub>DC</sub>	$I_{MAX}$ , A	$P_d$ , W	Current	Time	$R_{MIN}$	$R1_{MAX}$
						A	Sec.	Ohm	Ohm
FSMD001-0603-R	0.01	0.03	60	40	0.5	0.20	1.00	15.00	100.00
FSMD002-0603-R	0.02	0.06	60	40	0.5	0.20	1.00	12.00	70.00
FSMD003-0603-R	0.03	0.09	30	40	0.5	0.20	1.00	6.00	50.00
FSMD004-0603-R	0.04	0.12	24	40	0.5	0.20	1.00	4.00	40.00
FSMD005-0603-R	0.05	0.15	15	40	0.5	0.50	0.10	3.80	30.00
FSMD008-0603-R	0.08	0.20	15	40	0.5	0.60	0.10	2.80	14.00
FSMD010-0603-R	0.10	0.25	15	40	0.5	0.70	0.10	0.90	8.00
FSMD012-0603-R	0.12	0.30	9	40	0.5	0.80	0.10	1.10	5.80
FSMD016-0603-R	0.16	0.40	9	40	0.5	1.00	0.10	1.00	4.20
FSMD020-0603-R	0.20	0.45	9	40	0.5	2.00	0.10	0.55	3.50
FSMD025-0603-R	0.25	0.55	9	40	0.5	8.00	0.08	0.50	3.00

$I_H$ =Hold current-maximum current at which the device will not trip at 23°C still air.  
 $I_T$ =Trip current-minimum current at which the device will always trip at 23°C still air.  
 $V_{MAX}$ =Maximum voltage device can withstand without damage at it rated current ( $I_{MAX}$ ).  
 $I_{MAX}$ = Maximum fault current device can withstand without damage at rated voltage ( $V_{MAX}$ ).  
 $P_d$ =Typical power dissipated-type amount of power dissipated by the device when in the tripped state in 23°C still air environment.  
 $R_{MIN}$ =Minimum device resistance at 23°C prior to tripping.  
 $R1_{MAX}$ =Maximum device resistance at 23°C measured 1 hour after tripping or reflow soldering of 260°C for 20 seconds.  
 Termination pad characteristics  
 Termination pad materials: Pure Tin

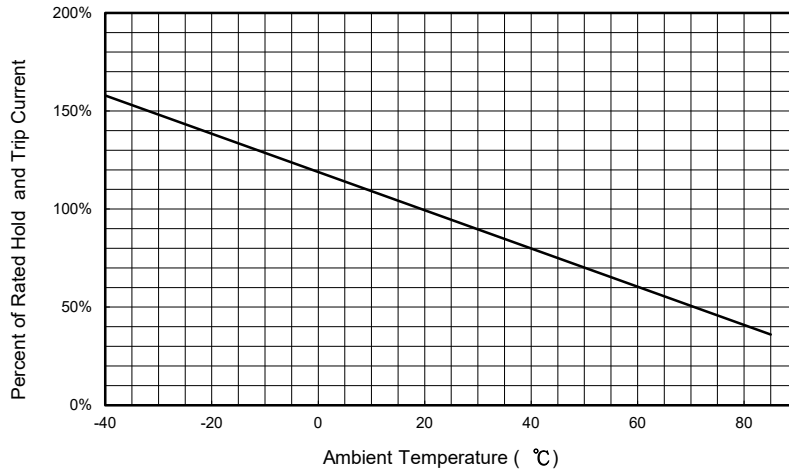
**4. FSMD Product Dimensions (Millimeters)**

Part Number	A		B		C		D		E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
FSMD001-0603-R	1.40	1.80	0.45	1.00	0.35	0.85	0.10	0.50	0.08	0.40
FSMD002-0603-R	1.40	1.80	0.45	1.00	0.35	0.85	0.10	0.50	0.08	0.40
FSMD003-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40
FSMD004-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40
FSMD005-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40
FSMD008-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40
FSMD010-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40
FSMD012-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40
FSMD016-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40
FSMD020-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40
FSMD025-0603-R	1.40	1.80	0.45	1.00	0.35	0.75	0.10	0.50	0.08	0.40

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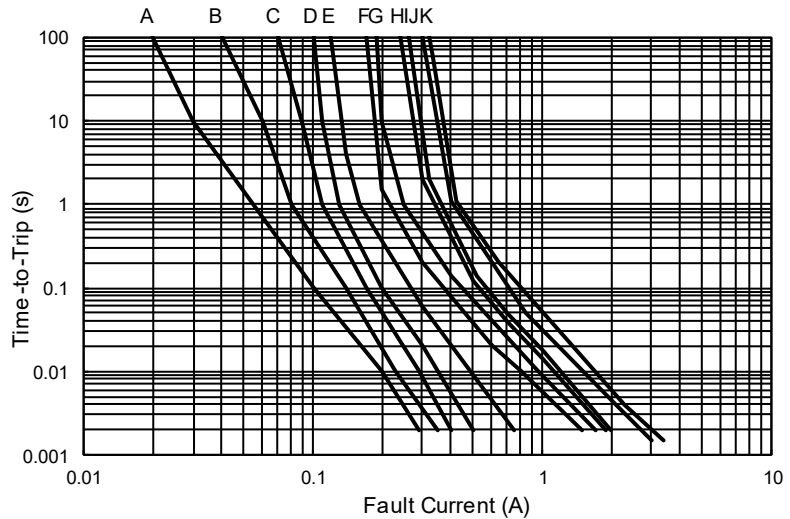


5. Thermal Derating Curve FSMD0603 Series



6. Typical Time -to-Trip at 23 °C

- A = FSMD001-0603-R
- B = FSMD002-0603-R
- C = FSMD003-0603-R
- D = FSMD004-0603-R
- E = FSMD005-0603-R
- F = FSMD008-0603-R
- G = FSMD010-0603-R
- H = FSMD012-0603-R
- I = FSMD016-0603-R
- J = FSMD020-0603-R
- K = FSMD025-0603-R



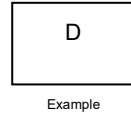
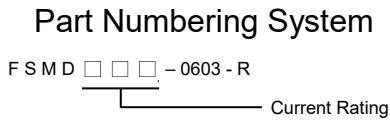
7. Material Specification

Terminal pad material: Pure Tin

Soldering characteristics: Meets EIA specification RS 186-9E, ANSI/J-std-002 Category 3

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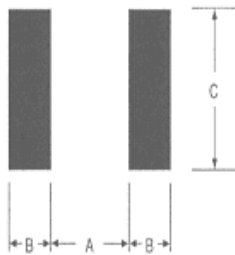
8. Part Numbering and Marking System



- X=FSMD001-0603-R
- Y=FSMD002-0603-R
- Z=FSMD003-0603-R
- A=FSMD004-0603-R
- B=FSMD005-0603-R
- C=FSMD008-0603-R
- D=FSMD010-0603-R
- E=FSMD012-0603-R
- F=FSMD016-0603-R
- G=FSMD020-0603-R
- V=FSMD025-0603-R

9. Pad Layouts 、 Solder Reflow and Rework Recommendations

The dimension in the table below provide the recommended pad layout for each FSMD0603 device



Pad dimensions (millimeters)			
Device	A Nominal	B Nominal	C Nominal
FSMD0603 Series	0.80	0.60	0.80

Profile Feature	Pb-Free Assembly
Average Ramp -Up Rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.
Preheat:	
Temperature Min (T <sub>smin</sub> )	150°C
Temperature Max (T <sub>smax</sub> )	200°C
Time (t <sub>smin</sub> to t <sub>smax</sub> )	60-180 seconds
Time maintained above:	
Temperature (T <sub>L</sub> )	217°C
Time (t <sub>L</sub> )	60-150 seconds
Peak/Classification Temperature (T <sub>p</sub> )	260°C
Time within 5 °C of actual Peak:	
Temperature (t <sub>p</sub> )	20-40 seconds
Ramp-Down Rate :	6°C/second max.
Time 25 °C to Peak Temperature :	8 minutes max.

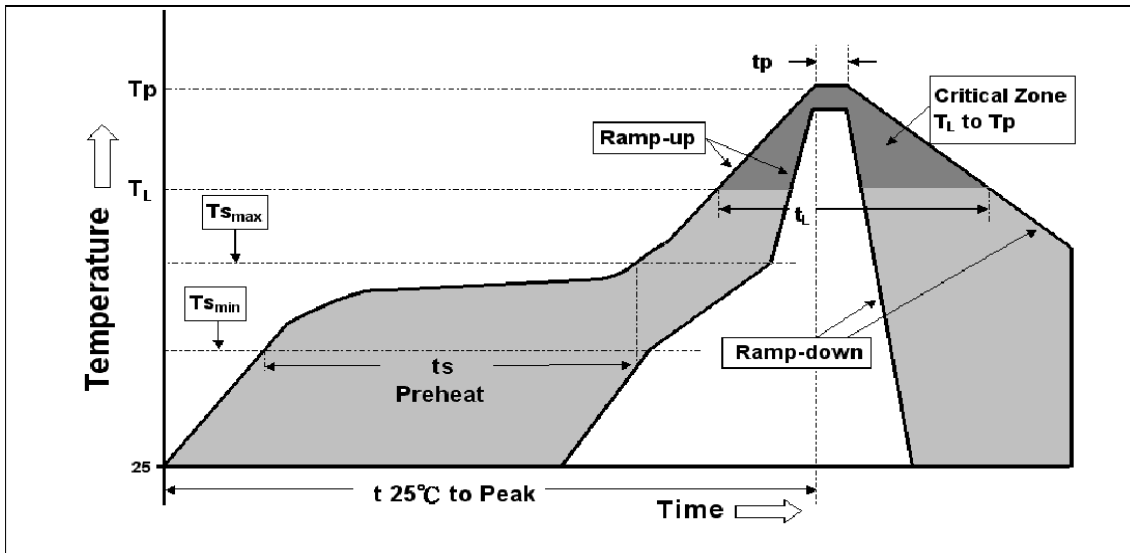
Note 1: All temperatures are measured on the package body surface.

**Solder reflow**

- ※ Due to "Lead Free" nature, Temperature and Dwelling time for the soldering zone is higher than those for Regular. This may cause damage to other components.
  - 1. Recommended max paste thickness is 0.25mm.
  - 2. Devices can be cleaned using standard methods and aqueous solvent.
  - 3. Rework use standard industry practices.
  - 4. Storage Environment: < 30°C / 60%RH.
- Caution:

- 1. If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.
- 2. Devices are not designed to be wave soldered to the bottom side of the board.

Reflow Profile



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10. Tape & Reel Specifications (mm)  
 FSMD005-0603-R ~ FSMD020-0603-R

EIA MARK	Dimension	
	Dim(mm)	Tol.(mm)
W	8.0	+0.30
P <sub>0</sub>	4.0	+0.10
P <sub>1</sub>	4.0	+0.10
P <sub>2</sub>	2.0	+0.10
A <sub>0</sub>	1.00	+0.10
B <sub>0</sub>	1.85	+0.10
B <sub>1max</sub>	4.35	
D <sub>0</sub>	1.50	+0.10
F	3.50	+0.05
E <sub>1</sub>	1.75	+0.10
E <sub>2 min.</sub>	6.25	
T min.	0.15	
T <sub>1 max.</sub>	0.10	
K <sub>0</sub>	0.90	+/-0.10
Leader min.	390	
Trailer min.	160	
Reel Dimensions		
A max	185	max
N min.	50	
W <sub>1</sub>	9.0	+2.0/-0.0
W <sub>2 max.</sub>	12.10	

P/N	Reel/Tape
FSMD001-0603-R	4000
FSMD002-0603-R	4000
FSMD003-0603-R	4000
FSMD004-0603-R	4000
FSMD005-0603-R	4000
FSMD010-0603-R	4000
FSMD012-0603-R	4000
FSMD016-0603-R	4000
FSMD020-0603-R	4000

FIGURE 1: EIA Taped Component Dimensions

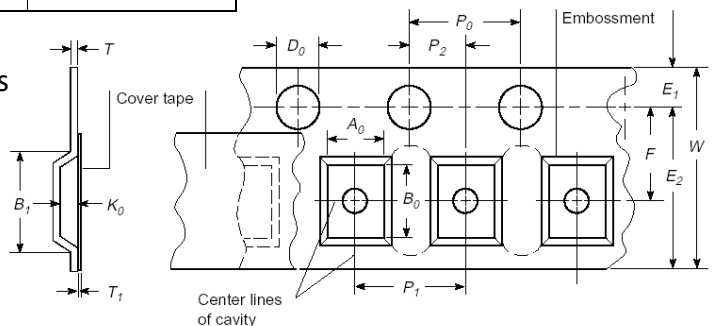
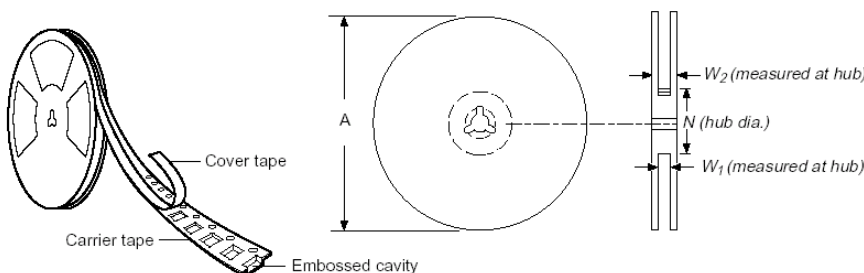


FIGURE 2: EIA Reel Dimensions



- Warning:**
- Each product should be carefully evaluated and tested for their suitability of application.
  - Operation beyond the specified maximum rating or improper use may result in damage and possible electrical arcing and/or flame.
  - PPTC device are intended for occasional overcurrent protection. Application for repeated overcurrent condition and/or prolonged trip are not anticipated.
  - Avoid contact of PPTC device with chemical solvent, including some inert material such as silicone based oil, lubricant and etc. Prolonged contact will damage the device performance.
  - Additional protection mechanism are strongly recommended to be used in conjunction with the PPTC device for protection against abnormal or failure conditions.
  - Avoid use of PPTC device in a constrained space such as potting material, housing and containers where have limited space to accommodate device thermal expansion and/or contraction.