



Features

- ▶ compact design saves board space
- ▶ RoHS compliant and lead-free
- ▶ Halogen-free
- ▶ Fast response to fault current
- ▶ Symmetrical design

Applications

- ▶ USB port protection - USB 2.0, 3.0&OTG
- ▶ HDMI 1.4 Source protection
- ▶ PDAs / digital cameras
- ▶ Game console port protection
- ▶ PC motherboards-plug and play protection

HF RoHS REACH Pb Free

1.Electrical Characteristics

Model	I-hold	I-trip	Vmax	Imax	Pd typ	Max. Time to trip		R0 min	R1max
						Current	Time		
	(A)	(A)	(Vdc)	(A)	(W)	(A)	(Sec.)	(Ohm)	(Ohm)
MF-NSMF025X-2	0.25	0.50	16.00	100.00	0.60	8.00	0.08	0.40	2.40
MF-NSMF035X-2	0.35	0.70	16.00	100.00	0.60	8.00	0.10	0.30	1.20
MF-NSMF050-2	0.50	1.00	15.00	100.00	0.60	8.00	0.10	0.15	0.75
MF-NSMF075-2	0.75	1.50	8.00	100.00	0.60	8.00	0.20	0.09	0.40
MF-NSMF110-2	1.10	2.20	8.00	100.00	0.80	8.00	0.10	0.04	0.21
MF-NSMF150-2	1.50	3.00	8.00	100.00	0.80	8.00	0.30	0.03	0.15
MF-NSMF175-2	1.75	3.50	6.00	100.00	0.80	8.00	0.50	0.02	0.09
MF-NSMF200-2	2.00	4.00	6.00	100.00	0.80	8.00	0.50	0.018	0.085

I-hold: Holding Current: maximum current at which the device will not trip in 25°C still air.

I-trip: Tripping Current: minimum current at which the device will trip in 25°C still air.

Vmax: Maximum voltage device can withstand without damage at rated current(Imax).

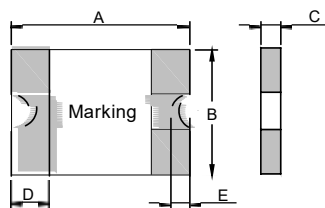
I max: Maximum fault current device can withstand without damage at rated voltage(Vmax).

Pd typ:Typical power dissipated from device when in the tripped state at 25°C still air.

R0 min:Minimum resistance of device in initial (un-soldered) state.

R1 max:Maximum resistance of device at 25°C measured one hour after tripping or reflow soldering of 260°C for 20 sec.

2.Product Dimensions(mm)&Marking



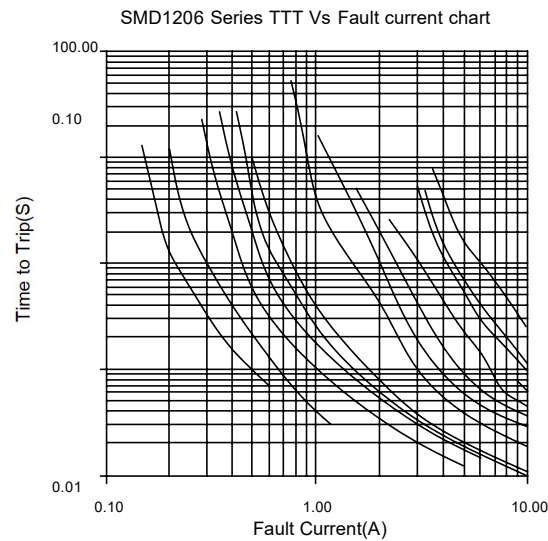
Model	A		B		C		D		E	Marking
	Min	Max	Min	Max	Min	Max	Min	Max	Min	
MF-NSMF025X-2	3.00	3.40	1.40	1.80	0.35	0.85	0.25	0.75	0.10	025
MF-NSMF035X-2	3.00	3.40	1.40	1.80	0.35	0.85	0.25	0.75	0.10	035
MF-NSMF050-2	3.00	3.40	1.40	1.80	0.35	0.85	0.25	0.75	0.10	050
MF-NSMF075-2	3.00	3.40	1.40	1.80	0.35	0.85	0.25	0.75	0.10	075
MF-NSMF110-2	3.00	3.40	1.40	1.80	0.35	0.85	0.25	0.75	0.10	110
MF-NSMF150-2	3.00	3.40	1.40	1.80	0.65	1.15	0.25	0.75	0.10	150
MF-NSMF175-2	3.00	3.40	1.40	1.80	0.65	1.15	0.25	0.75	0.10	175
MF-NSMF200-2	3.00	3.40	1.40	1.80	0.65	1.15	0.25	0.75	0.10	200

3. Thermal Derating Chart

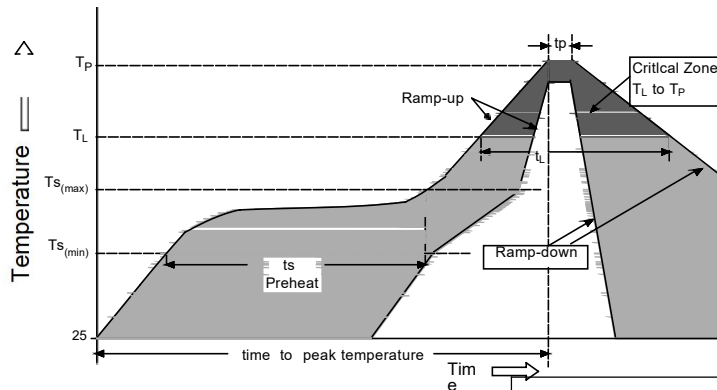
Recommended hold current(A) at ambient Temperature (°C)

Model	Ambient Operating Temperature								
	-40°C	-20°C	0°C	25°C	40°C	50°C	60°C	70°C	85°C
MF-NSMF025X-2	0.37	0.33	0.29	0.25	0.22	0.2	0.17	0.15	0.12
MF-NSMF035X-2	0.50	0.45	0.40	0.35	0.30	0.27	0.24	0.21	0.15
MF-NSMF050-2	0.71	0.64	0.57	0.50	0.42	0.39	0.35	0.31	0.25
MF-NSMF075-2	1.14	1.01	0.88	0.75	0.65	0.59	0.54	0.49	0.41
MF-NSMF110-2	1.64	1.46	1.30	1.10	0.92	0.83	0.80	0.65	0.52
MF-NSMF150-2	2.20	1.99	1.77	1.50	1.34	1.23	1.10	1.01	0.84
MF-NSMF175-2	2.50	2.25	2.00	1.75	1.55	1.45	1.35	1.25	1.10
MF-NSMF200-2	2.60	2.44	2.35	2.00	1.78	1.67	1.50	1.45	1.10

4. Typical time to trip at 25°C



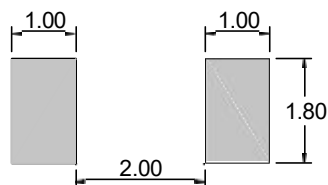
5. Soldering parameters



Profile Feature		Pb-Free Assembly
Average Ramp-Up Rate ($T_{S(max)}$ to T_P)		3°C/second max
Pre Heat:	Temperature Min ($T_{S(min)}$)	150°C
	Temperature Max ($T_{S(max)}$)	200°C
	Time (Min to Max) (t_s)	60 – 180 secs
Time Maintained Above:	Temperature (T_L)	217°C
	Temperature (t_L)	60 – 150 seconds
Peak / Classification Temperature (T_P)		260 ^{+0/-5} °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 (T_P)		8 minutes Max.

- ◆ All temperature refer to topside of the package, measured on the package body surface
- ◆ If reflow temperature exceeds the recommended profile, devices may not meet the performance requirements
- ◆ Recommended reflow methods: IR, vapor phase oven, hot air oven, N2 environment for lead
- ◆ Recommended maximum paste thickness is 0.25mm (0.010inch)
- ◆ Devices can be cleaned using standard industry methods and solvents

6.Recommended Pad Layout(mm) & Physical Specifications



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

7.Environmental Specifications

Operating 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 107; +85 °C to -40 °C, 20 times;-30 % typical resistance change
Solvent Resistance	MIL-STD-202, Method 215 ; No change
Vibration	MIL-STD-883, Method 2007, Condition A; No change
Moisture Sensivity Level	Level 1, J-STD-020
Storage Conditions	+40 °C Max. 70% RH Max. Packed in original packaging.

8.Test Procedures And Requirements

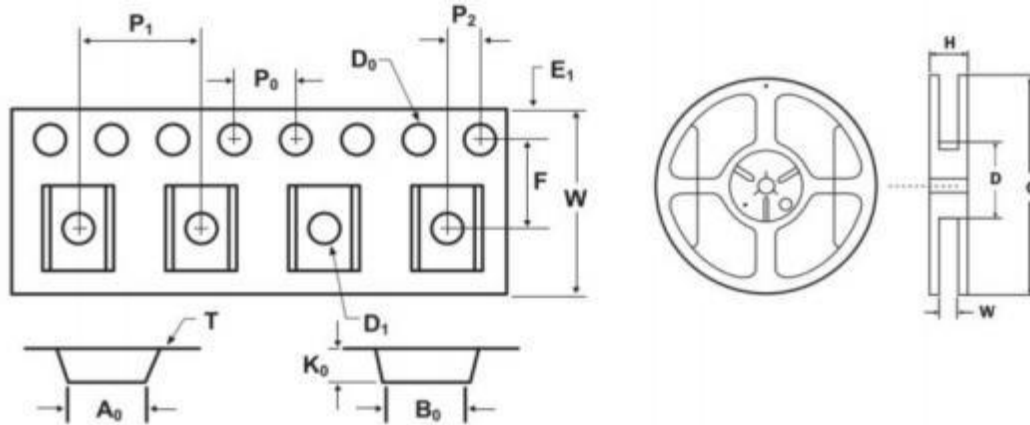
No.	Test	Test Conditions	Accept/Reject Criteria
1	R0 min	Resistance measurement at 25°C	$R0min \leq R \leq R1max$
2	R1 max	Resistance measurement one hour after post trip	$R0min \leq R \leq R1max$
3	I-hold	Hold rated current 1800 second without trip, @ 25°C	No trip
4	I-trip	Device must trip within 900 second under rated current, @25°C	Trip
5	Max. time to trip	At specified current, 25 °C	$T \leq \text{max. time to trip (seconds)}$
6	Trip Cycle Life	Vmax, Imax, 100 cycles	No arcing or burning
7	Trip Endurance	Vmax,Imax 24 hours	No arcing or burning
8	Solderability	ANSI/J-STD-002	95 % min. coverage

9.Tape and Reel Specifications&Packaging quantity per Reel

TAPE SPECIFICATIONS: EIA-481-1 (mm)					REEL DIMENSIONS: EIA-481-1 (mm)	
Item	MF-NSMF050-2 MF-NSMF035X-2 MF-NSMF025X-2	MF-NSMF075-2 MF-NSMF110-2	MF-NSMF150-2 MF-NSMF200-2	MF-NSMF175-2	C	Ø178±1.0
					D	Ø60.2±0.5
					W	9.0±1.5
					H	11.0±0.5
W	8.10±0.10		8.10±0.10			
F	3.50±0.05		3.50±0.05			
E1	1.75±0.10		1.75±0.10			
D0	1.55±0.05		1.55±0.05			
D1	1.00 min		1.00 min			
P0	4.0±0.10		4.0±0.10			
P1	4.0±0.10		4.0±0.10			
P2	2.0±0.05		2.0±0.05			
A0	1.90±0.10		2.00±0.10			



B0	3.45±0.10	3.50±0.10
T	0.25±0.05	0.25±0.05
K0	0.80±0.10	1.30±0.10
Leader	390mm	390mm
Trailer	160mm	160mm
Q'ty	5,000pcs/Reel	3,500pcs/Reel



△ 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 performance 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 ($L \frac{di}{dt}$) above the rated voltage of the PPTC device.