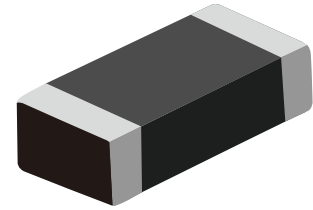


## FEATURES

- | Fast response, instantly clamping the transient over voltage.
- | High surge current handling capability.
- | High energy absorption capability.
- | Low clamping voltages, providing better surge protection.
- | Low capacitance values, providing digital switching circuitry protection.
- | High insulation resistance, preventing electric arcing to the adjacent devices or circuits.



## APPLICATIONS

- | Universal Serial Bus (USB).
- | Mobile communication.
- | Computer/DSP product.
- | Video and audio ports.
- | Portable/Hand-Held Products.
- | Data, Diagnostic I/O ports.

## APPROVALS

<b>RoHS</b>	Compliance with 2011/65/EU
<b>HF</b>	Compliance with IEC61249-2-21:2003

## ELECTRICAL SPECIFICATION

	Test condition
Varistor voltage	$I_n = 1 \text{ mA DC}$
Leakage current	$V_{dc} = 12 \text{ V DC}$
Maximum clamping voltage	$I_c = 1 \text{ A}$
Rated peak single pulse transient current	8 / 20 $\mu\text{s}$ waveform, +/- each 1 time induce
Capacitance	10/1000 $\mu\text{s}$ waveform
Insulation resistance after reflow soldering	$f = 1 \text{ MHz}, V_{rms} = 0.5 \text{ V}$

## ELECTRICAL SPECIFICATION

Electrical specification			
Maximum allowable continuous DC voltage	12	V	
trigger voltage / Varistor voltage / breakdown voltage	110-150	V	
Maximum clamping voltage	200	V	Maximum
Rated peak single pulse transient current	1	A	Maximum
Nonlinearity coefficient	> 12		
Leakage current at continuous DC voltage	< 0.1	uA	
Response time	< 0.5	ns	
Varistor voltage temperature coefficient	< 0.05	%/°C	
Capacitance measured at 1MHz	3.0	pF	Typical
Capacitance tolerance	-50 to +50	%	
Insulation resistance after reflow soldering on PCB	> 10	MΩ	
Operating ambient temperature	-55 to +125	°C	
Storage temperature	-55 to +125	°C	

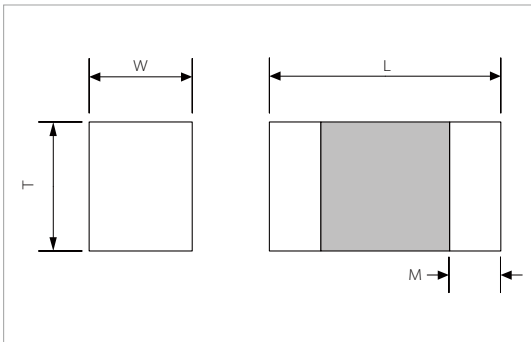
## RELIABILITY TESTING PROCEDURES

Reliability parameter		Test methods and remarks	Test requirement
Pulse current capability	$I_{max}$ 8/20 $\mu s$	IEC 1051-1, Test 4.5. 10 pulses in the same direction at 2 pulses per minute at maximum peak current	$d V_n /V_n \leq 10\%$ no visible damage
Electrostatic discharge capability	ESD C=150 pF, R=330 $\Omega$	IEC 1000-4-2 Each 10 times in positive/negative direction in 10 sec at 8KV contact discharge (Level 4)	$d V_n /V_n \leq 10\%$ no visible damage
Environmental reliability	Thermal shock	IEC 68-2-14 Condition for 1 cycle Step 1 : Min. -40 $^{\circ}C$ , 30 $\pm$ 3 min. Step 2 : Max. +125 $^{\circ}C$ , 30 $\pm$ 3 min. Number of cycles: 30 times	$d V_n /V_n \leq 5\%$ no visible damage
	Low temperature	IEC 68-2-1 Place the chip at -40 $\pm$ 5 $^{\circ}C$ for 1000 $\pm$ 12hrs. Remove and place for 24 $\pm$ 2hrs at room temp. condition, then measure	$d V_n /V_n \leq 5\%$ no visible damage
	High temperature	IEC 68-2-2 Place the chip at 125 $\pm$ 5 $^{\circ}C$ for 1000 $\pm$ 24hrs. Remove and place for 24 $\pm$ 2hrs at room temp. condition, then measure	$d V_n /V_n \leq 5\%$ no visible damage
	Heat resistance	IEC 68-2-3 Apply the rated voltage for 1000 $\pm$ 48hrs at 85 $\pm$ 3 $^{\circ}C$ . Remove and place for 24 $\pm$ 2hrs at room temp. condition, then measure	$d V_n /V_n \leq 5\%$ no visible damage
	Humidity resistance	IEC 68-2-30 Place the chip at 40 $\pm$ 2 $^{\circ}C$ and 90 to 95% humidity for 1000 $\pm$ 24hrs. Remove and place for 24 $\pm$ 2hrs at room temp. condition, then measure	$d V_n /V_n \leq 5\%$ no visible damage
	Pressure cooker test	Place the chip at 2 atm, 120 $^{\circ}C$ , 85%RH for 60 hrs. Remove and place for 24 $\pm$ 2hrs at room temp. condition, then measure	$d V_n /V_n \leq 10\%$ no visible damage
	Operating life	Apply the rated voltage for 1000 $\pm$ 48hrs at 125 $\pm$ 3 $^{\circ}C$ . Remove and place for 24 $\pm$ 2hrs at room temp. condition, then measure	$d V_n /V_n \leq 10\%$ no visible damage
Mechanical Reliability	Adhesive strength	IEC 68-2-22 Applied force on SMD chip by fracture from PCB	Strength > 10 N no visible damage

## MATERIAL SPECIFICATION

Body	Internal electrode	External electrode	Thickness of Ni/Sn plating layer
ZnO based ceramics	Silver – Palladium	Silver – Nickel – Tin	Nickel > 1 $\mu\text{m}$ , Tin > 2 $\mu\text{m}$

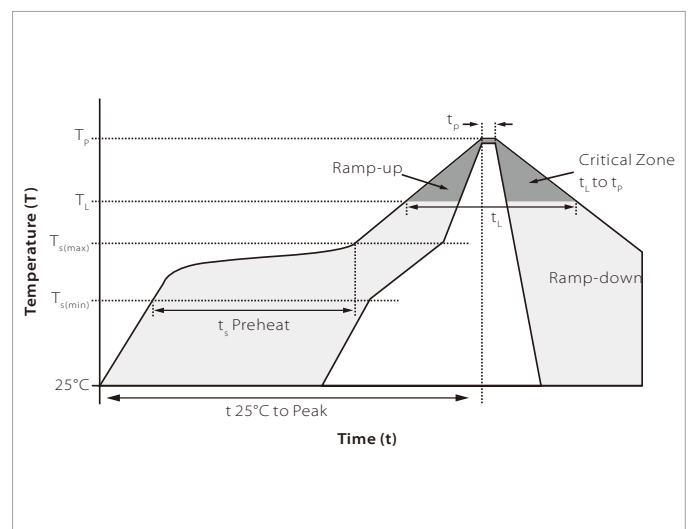
## DIMENSION SPECIFICATION



Size	L(mm)	W(mm)	T(mm)	M(mm)
0402	1.0±0.10	0.5±0.10	≤ 0.6	0.20±0.10

## SOLDERING RECOMMENDATIONS

Reflow Condition		Lead-free assembly
Pre Heat	Temperature Max ( $T_{s(\text{min})}$ )	150°C
	Temperature Max ( $T_{s(\text{max})}$ )	200°C
	Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/second max
$T_{s(\text{max})}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	Temperature ( $T_L$ ) (Liquidus)	217°C
	Time (min to max) ( $t_r$ )	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 ( $T_p$ )		8 minutes max.
Do not exceed		260°C



## DRDERING INF ORMATIOON

Part Number	Package&Size	QTY/Reel	Reel Size
SME0402B12MA	0402 (1.0 x 0.5 mm)	10000PCS	7"

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