

## ELECTRICAL CHARACTERISTICS

The electrical characteristics of a SMT100 device are similar to that of a self-gated Triac, but the SMT100 is a two terminal device with no gate. The gate function is achieved by an internal current controlled mechanism.

Like the T.V.S. diodes, the SMT100 has a standoff voltage ( $V_{RM}$ ) which should be equal to or greater than the operating voltage of the system to be protected. At this voltage ( $V_{RM}$ ) the current consumption of the SMT100 is negligible and will not affect the protected system.

When a transient occurs, the voltage across the SMT100 will increase until the breakdown voltage ( $V_{BR}$ ) is reached. At this point the device will operate in a similar way to a T.V.S. device and is in avalanche mode.

The voltage of the transient will now be limited and will only increase by a few volts as the device diverts more current. As this transient current rises, a level of current through the

device is reached ( $I_{BO}$ ) which causes the device to switch to a fully conductive state such that the voltage across the device is now only a few volts ( $V_t$ ). The voltage at which the device switched from the avalanche mode to the fully conductive state ( $V_t$ ) is known as the Breakover voltage ( $V_{BO}$ ). When the device is in the  $V_t$  state, high currents can be diverted without damage to the SMT100 due to the low voltage across the device, since the limiting factor in such devices is dissipated power ( $V \times I$ ).

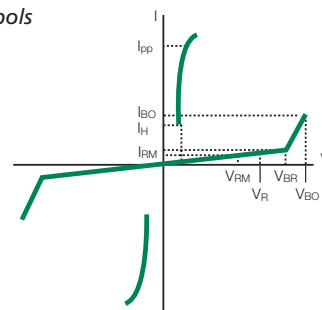
Resetting of the device to the non-conducting state is controlled by the current flowing through the device. When the current falls below a certain value, known as the Holding Current ( $I_H$ ), the device resets automatically.

As with the avalanche T.V.S. device, if the SMT100 is subjected to a surge current which is beyond its maximum rating, then the device will fail in short circuit mode, ensuring that the equipment is ultimately protected.

## SELECTING A SMT100

- When selecting a SMT100 device, it is important that the  $V_{RM}$  of the device is equal to or greater than the the operating voltage of the system.
- The minimum Holding Current ( $I_H$ ) must be greater than the current the system is capable of delivering otherwise the device will remain conducting following a transient condition.

*V-I Graph illustrating symbols and terms for the SMT100 surge protection device*



COMPLIES WITH THE FOLLOWING STANDARDS	PEAK SURGE VOLTAGE (V)	VOLTAGE WAVEFORM ( $\mu$ S)	CURRENT WAVEFORM ( $\mu$ S)	ADMISSIBLE IPP (A)	NECESSARY RESISTOR $\square$
(CCITT) ITU-K20	1000	10/700	5/310	25	-
(CCITT) ITU-K17	1500	10/700	5/310	38	-
VDE0433	2000	10/700	5/310	50	-
VDE0878	2000	1.2/50	1/20	50	-
IEC-1000-4-5	level 3	10/700	5/310	50	-
	level 4	1.2/500	8/20	100	-
FCC Part 68, lightning surge type A	1500	10/160	10/160	75	12.5
	800	10/560	10/560	55	6.5
FCC Part 68, lightning surge type B	1000	9/720	5/320	25	-
Bellcore TR-NWT-001089 first level	2500	2/10	2/10	150	11.5
	1000	10/1000	10/1000	50	10
Bellcore TR-NWT-001089 second level	5000	2/10	2/10	150	11.5
CNET I31-24	1000	0.5/700	0.8/310	25	-

## ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> 25°C)

SYMBOL	PARAMETER	SYMBOL	PARAMETER
V <sub>RM</sub>	Stand-off Voltage	V <sub>RO</sub>	Breakover Voltage
I <sub>RM</sub>	Leakage Current at Stand-off Voltage	I <sub>H</sub>	Holding current
V <sub>R</sub>	Continuous Reverse Voltage	I <sub>BO</sub>	Breakover Current
V <sub>BR</sub>	Breakdown Voltage	I <sub>PP</sub>	Peak pulse Current
C	Capacitance	I <sub>R</sub>	Continuous Reverse Current

## THERMAL RESISTANCE

SYMBOL	PARAMETER	VALUE	UNIT
R <sub>TH</sub> (J-I)	Junction to leads	20	°C/W
R <sub>TH</sub> (J-l)	Junction to ambient on printed circuit (with standard footprint dimensions)	100	°C/W

## ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> 25°C)

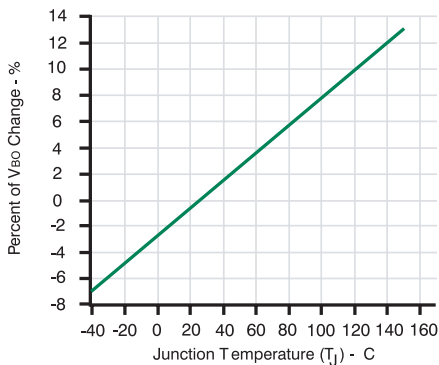
SYMBOL	PARAMETER		VALUE	UNIT
I <sub>PP</sub>	Peak pulse Current:			
	10/1000μS (open circuit voltage waveform 1kV 10/1000μS)		100	A
	5/310μS (open circuit voltage waveform 4kV 10/700μS)		150	A
	8/20μS (open circuit voltage waveform 4kV 1.2/50μS)		250	A
	2/10μS (open circuit voltage waveform 2.5kV 2/10μS)		500	A
I <sub>TSM</sub>	Non-repetitive surge peak on-state current F = 50Hz	50Hz	55	A
		60Hz	60	A
	Non-repetitive surge peak on-state current F = 50Hz	0.2s	25	A
		2s	12	A
T <sub>L</sub>	Maximum lead temperature range		260	°C
T <sub>stg</sub>	Storage temperature range		-55 to +150	°C
T <sub>j</sub>	Maximum junction temperature		150	°C

Type	Marking	I <sub>RM</sub> @ V <sub>RM</sub> MAX		I <sub>RM</sub> @ V <sub>R</sub> MAX		V <sub>BO</sub> @ I <sub>BO</sub> MAX		I <sub>H</sub> MIN (Note 1) (mA)	C MAX (pF)
		(μA)	(V)	(μA)	(V)	(V)	(mA)		
SMT100-35	B035	2	32	50	35	55	800	150	180
SMT100-65	B065	2	55	50	65	80	800	150	160
SMT100-120	B120	2	110	50	120	160	800	150	140
SMT100-140	B140	2	120	50	140	200	800	150	140
SMT100-200	B200	2	170	50	200	265	800	150	130
SMT100-230	B230	2	200	50	230	300	800	150	120
SMT100-270	B270	2	230	50	270	350	800	150	120

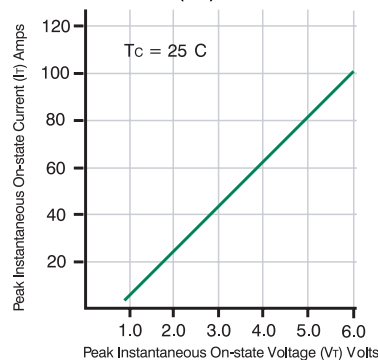
Note 1: Measured @ 1V bias, 1MHz.

All parameters are tested using a FET TEST™ model 3600.

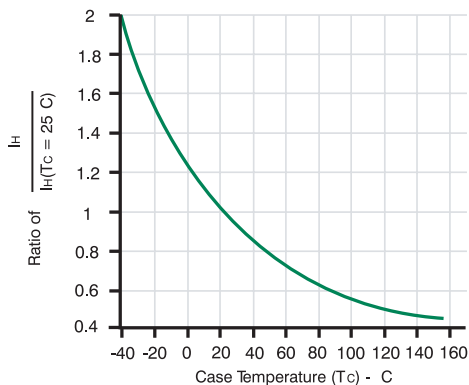
**TYPICAL VBO CHANGE vs JUNCTION TEMPERATURE**



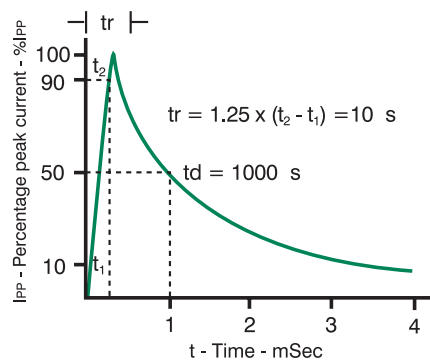
**ON-STATE VOLTAGE (VT) vs ON-STATE CURRENT (IT)**



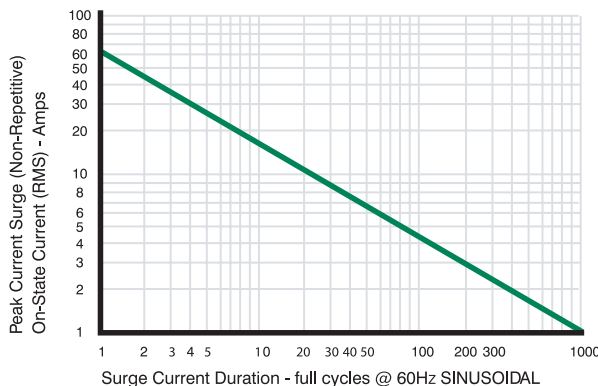
**TYPICAL DC HOLDING CURRENT vs CASE TEMPERATURE**



**PULSE WAVE FORM (10/1000μS)**

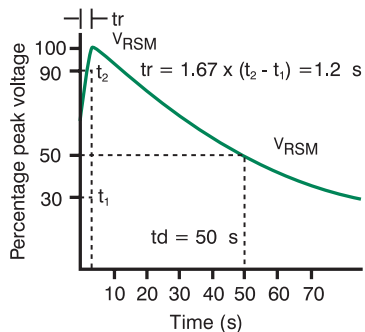


**PEAK SURGE ON-STATE CURRENT vs SURGE CURRENT DURATION**



**INTERNATIONAL EMISSIONS STANDARD IEC 1000-4-5**

**1.2/50μS IMPULSE DISCHARGE VOLTAGE WAVESHAP**



**8/20μS IMPULSE DISCHARGE CURRENT WAVESHAP**

