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 (Vrm) which should be equal to or greater than the operating voltage of the system to be protected. At this voltage (Vrm) 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 (Vbr) 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 (Ibo) which causes the device to switch to a fully conductive state such that the voltage across the device is now only a few volts (Vt). The voltage at which the device switched from the avalanche mode to the fully conductive state (Vt) is known as the Breakover voltage (Vbo). When the device is in the Vt 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 x 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 (Ih), the device resets automatically.

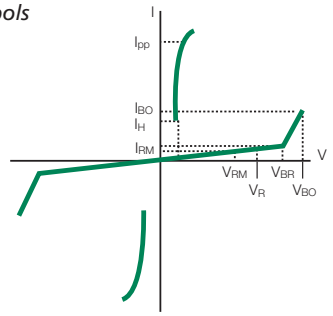
As with the avalanche T.V.S. device, if the SMT100 is subjected to a surge current which is beyond its maximum rating, then the device will fail in short circuit mode, ensuring that the equipment is ultimately protected.

SELECTING A SMT100

1. When selecting a SMT100 device, it is important that the Vrm of the device is equal to or greater than the the operating voltage of the system.

2. The minimum Holding Current (Ih) 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 (µS)	CURRENT WAVEFORM (µS)	ADMISSIBLE IPP (A)	NECESSARY RESISTOR
(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	1500	10/160	10/160	75	12.5
type A	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	2500	2/10	2/10	150	11.5
first level	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 (Tamb 25°C)

SYMBOL	PARAMETER	SYMBOL	PARAMETER
V_{RM}	Stand-off Voltage	V_{RO}	Breakover Voltage
I_{RM}	Leakage Current at Stand-off Voltage	I_H	Holding current
V_R	Continuous Reverse Voltage	I_{BO}	Breakover Current
V_{BR}	Breakdown Voltage	I_{PP}	Peak pulse Current
C	Capacitance	I_R	Continuous Reverse Current

THERMAL RESISTANCE

SYMBOL	PARAMETER	VALUE	UNIT
R_{TH} (J-I)	Junction to leads	20	°C/W
R_{TH} (J-I)	Junction to ambient on printed circuit (with standard footprint dimensions)	100	°C/W

ABSOLUTE MAXIMUM RATINGS (Tamb 25°C)

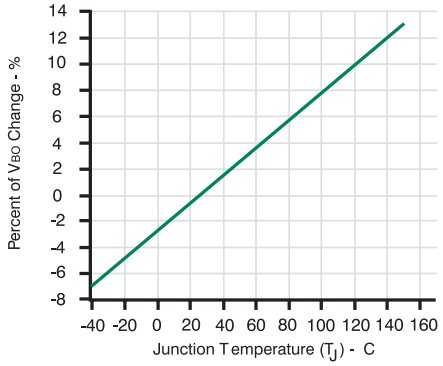
SYMBOL	PARAMETER		VALUE	UNIT
I_{PP}	Peak pulse Current:			
	10/1000µS (open circuit voltage waveform 1kV 10/1000µS)		100	A
	5/310µS (open circuit voltage waveform 4kV 10/700µS)		150	A
	8/20µS (open circuit voltage waveform 4kV 1.2/50µS)		250	A
	2/10µS (open circuit voltage waveform 2.5kV 2/10µS)		500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

Type	Marking	I_{RM} @ V_{RM} MAX		I_{RM} @ V_R MAX		V_{BO} @ I_{BO} MAX		I_H MIN (Note 1)	C MAX
	Laser	(µA)	(V)	(µA)	(V)	(V)	(mA)	(mA)	(pF)
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

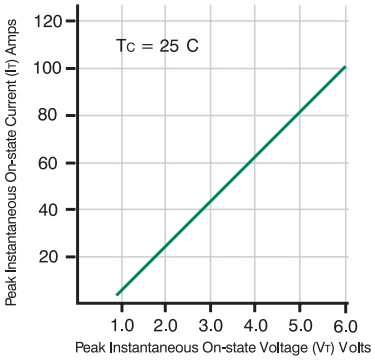
Note 1: Measured @ 1V bias, 1MHz.

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

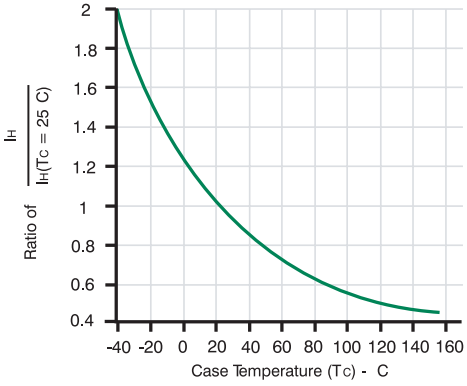
TYPICAL VBO CHANGE vs JUNCTION TEMPERATURE



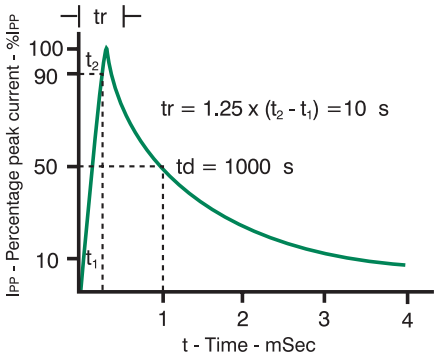
ON-STATE VOLTAGE (VT) vs ON-STATE CURRENT (IT)



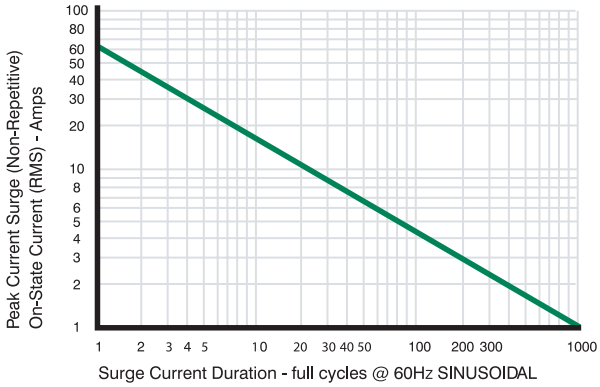
TYPICAL DC HOLDING CURRENT vs CASE TEMPERATURE



PULSE WAVE FORM (10/1000µS)



PEAK SURGE ON-STATE CURRENT vs SURGE CURRENT DURATION



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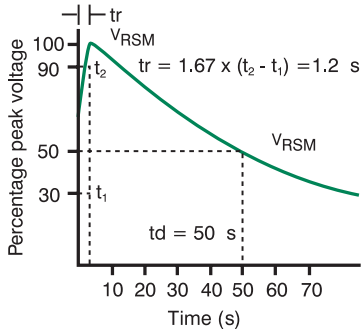
1.2/50µS IMPULSE DISCHARGE VOLTAGE WAVESHAPE



8/20µS IMPULSE DISCHARGE CURRENT WAVESHAPE