Description

Electrical Characteristics

The electrical characteristics of an SMT50 device is similar to that of a self-gated Triac, but the SMT50 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 SMT50 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 SMT50 is negligible and will not affect the protected system.

When a transient occurs, the voltage across the SMT50 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 an 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 switches 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 SMT50 due to the low voltage across the device, since the limiting factor in such devices is dissipated power (V x I).

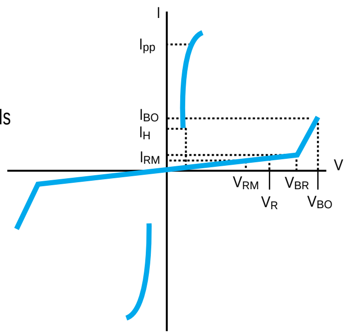
Resetting of the device to the non conducting state is controlled by the current flowing through the device. When the current falls below a certain value, known as the Holding Current (I_H), the device resets automatically.

As with the avalanche T.V.S. device, if the SMT50 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 SMT50

1. When selecting an SMT50 device, it is important that the Vrm of the device is equal to or greater than the operating voltage of the system.
2. 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 SMT50 surge protection device



COMPLIES WITH THE FOLLOWING STANDARDS	PEAK SURGE VOLTAGE (V)	VOLTAGE WAVEFORM (µS)	CURRENT WAVEFORM (µS)	ADMISSIBLE IPP (A)	NECESSARY RESISTOR (Ω)
(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	-

Specifications

Electrical Characteristics (T_{amb} = 25°C)

SYMBOL	PARAMETER	SYMBOL	PARAMETER
V_{RM}	Stand-off Voltage	V_{BO}	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		

Thermal Resistances

SYMBOL	PARAMETER	VALUE	UNIT
R_{th} (j-l)	Junction to Leads	20	°C/W
R_{th} (j-a)	Junction to Ambient on Printed Circuit with Standard Footprint Dimensions	100	°C/W

Absolute Maximum Ratings (T_{amb} = 25°C

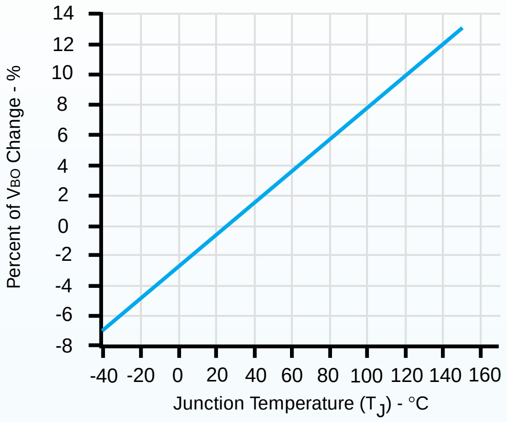
SYMBOL	PARAMETER		VALUE	UNIT
P	Power Dissipation	T_{lead} = 50°C	5	W
I_{pp}	Peak Pulse Current	10/1000µS 8/20µS	50 100	A A
I_{TSM}	Non Repetitive Surge Peak on-state Current	tp = 20ms	30	A
dV/dt	Critical Rate of Rise of off-state Voltage	V_{RM}	5	KV/µS
Tstg Tj	Storage Temperature Range Maximum Junction Temperature		-55 to +150 150	°C °C
T_L	Maximum Lead Temperature For Soldering during 10s		260	°C

TYPE	MARKING	I_{RM} @ V_{RM} MAX		I_R @ V_R MAX		V_{BO} @ I_{BO} MAX		I_H MIN	C MAX (Note 1)
	LASER	(µA)	(V)	(µA)	(V)	(V)	(mA)	(mA)	(pF)
SMT50-62	A062	2	56	50	62	82	800	150	150
SMT50-68	A068	2	61	50	68	90	800	150	150
SMT50-100	A100	2	90	50	100	133	800	150	100
SMT50-120	A120	2	108	50	120	160	800	150	100
SMT50-130	A130	2	117	50	130	173	800	150	100
SMT50-180	A180	2	162	50	180	240	800	150	100
SMT50-200	A200	2	180	50	200	267	800	150	100
SMT50-220	A220	2	198	50	220	293	800	150	100
SMT50-240	A240	2	216	50	240	320	800	150	100
SMT50-270	A270	2	243	50	270	360	800	150	100

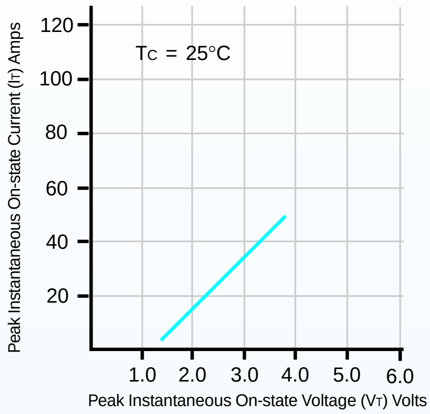
All parameters tested at 25°C, except where indicated.

Note 1: Measured @ 1V bias, 1MHz   All parameters are measured using a FET TEST™ model 3600

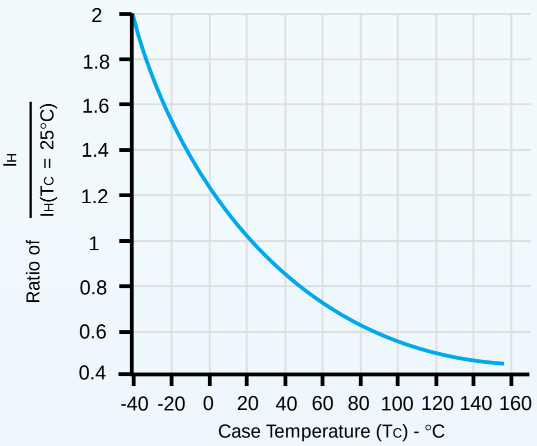
TYPICAL VBO CHANGE VS
JUNCTION TEMPERATURE



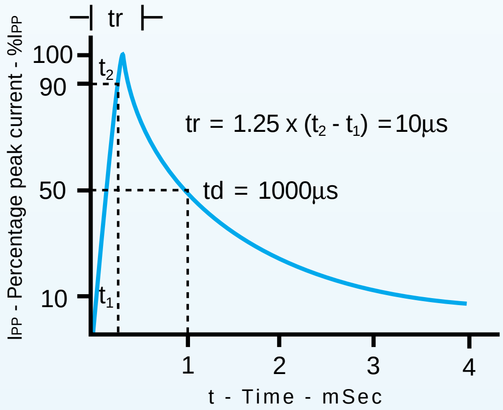
ON-STATE VOLTAGE (VT) VS
ON-STATE CURRENT (IT)



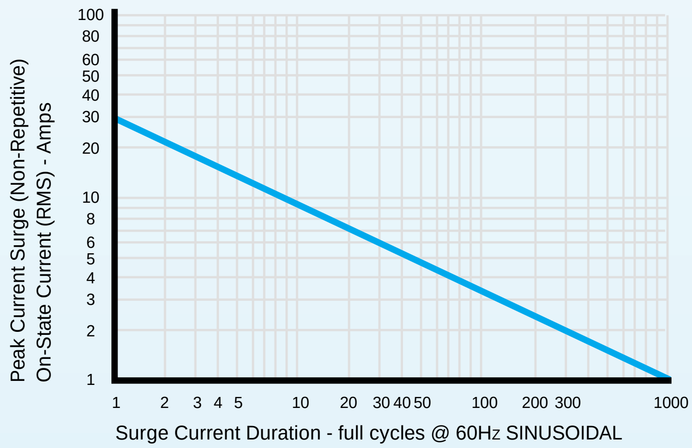
TYPICAL DC HOLDING CURRENT VS
CASE TEMPERATURE



PULSE WAVE FORM
(10/1000µS)

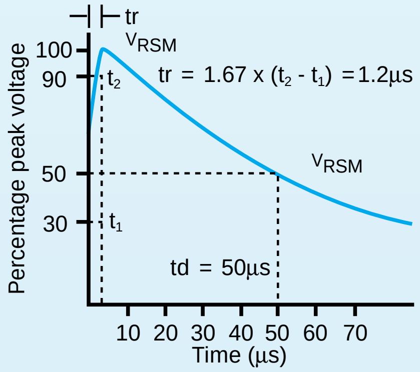


PEAK SURGE ON-STATE CURRENT VS SURGE CURRENT DURATION



INTERNATIONAL EMMISSIONS STANDARD IEC 1000-4-5

1.2/50µS IMPULSE DISCHARGE
VOLTAGE WAVESHAPE



8/20µS IMPULSE DISCHARGE
CURRENT WAVESHAPE