



# SMP50 / SMTPA / TPA

## TRISIL™ FOR TELECOM EQUIPMENT PROTECTION

### FEATURES

- Bidirectional crowbar protection
- Voltage range from 62V to 270V
- Low capacitance from 12pF to 20pF @ 50V
- Low leakage current :  $I_R = 2\mu A$  max
- Holding current:  $I_H = 150$  mA min
- Repetitive peak pulse current :  
 $I_{PP} = 50$  A (10/1000 $\mu s$ )

### MAIN APPLICATIONS

Telecommunication equipment such as:

- Analog and digital line cards (xDSL, T1/E1, ISDN, ...)
- Terminals (phone, fax, modem, ...) and central office equipment

### DESCRIPTION

These Trisil series have been designed to protect telecommunication equipment against lightning and transient induced by AC power lines. They are available in SMA, SMB and DO-15 packages.

### BENEFITS

Trisils are not subject to ageing and provide a fail safe mode in short circuit for a better protection. They are used to help equipment to meet various standards such as UL1950, IEC950 / CSA C22.2, UL1459 and FCC part 68.

Trisils have UL94 V0 approved resin.

SMA and SMB packages are JEDEC registered (DO-214AC and DO-214AA).

Trisils are UL497B approved (file: E136224).

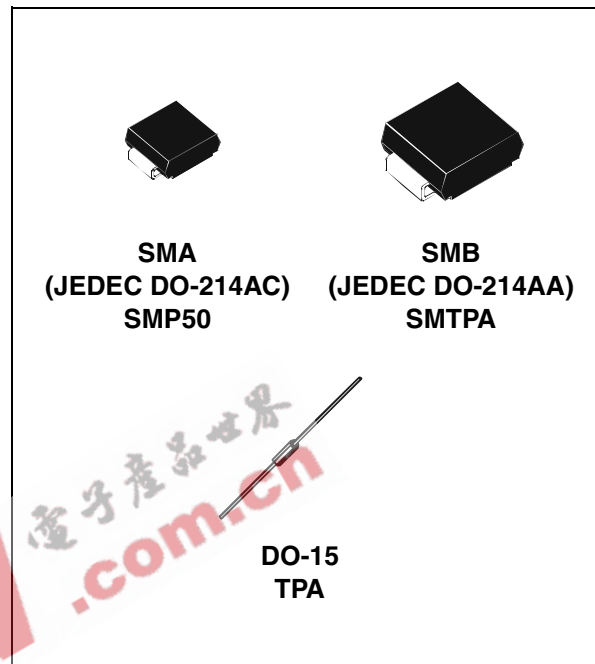


Table 1: Order Codes

Part Number	Marking
SMP50-xxx	See page 9
TPAxxx	
SMTPAxxx	

Figure 1: Schematic Diagram

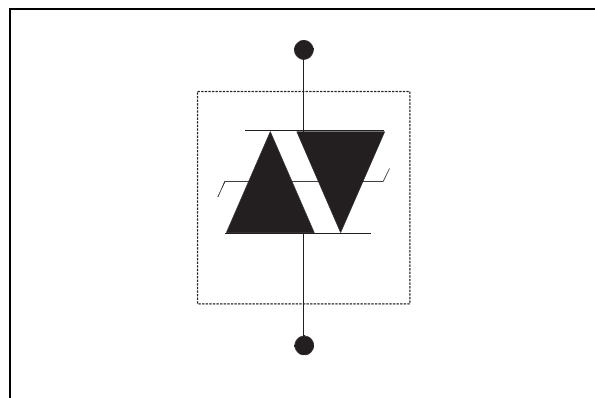


Table 2: In compliances with the following standards

STANDARD	Peak Surge Voltage (V)	Waveform Voltage	Required peak current (A)	Current waveform	Minimum serial resistor to meet standard ( $\Omega$ )
GR-1089 Core First level	2500	2/10 $\mu$ s	500	2/10 $\mu$ s	20
	1000	10/1000 $\mu$ s	100	10/1000 $\mu$ s	10
GR-1089 Core Second level	5000	2/10 $\mu$ s	500	2/10 $\mu$ s	40
GR-1089 Core Intra-building	1500	2/10 $\mu$ s	100	2/10 $\mu$ s	0
ITU-T-K20/K21	6000	10/700 $\mu$ s	150	5/310 $\mu$ s	53
	1500		37.5		0
ITU-T-K20 (IEC61000-4-2)	8000	1/60 ns	ESD contact discharge		0
	15000		ESD air discharge		0
VDE0433	4000	10/700 $\mu$ s	100	5/310 $\mu$ s	21.5
	2000		50		0
VDE0878	4000	1.2/50 $\mu$ s	100	1/20 $\mu$ s	0
	2000		50		0
IEC61000-4-5	4000	10/700 $\mu$ s	100	5/310 $\mu$ s	21.5
	4000	1.2/50 $\mu$ s	100	8/20 $\mu$ s	0
FCC Part 68, lightning surge type A	1500	10/160 $\mu$ s	200	10/160 $\mu$ s	12.5
	800	10/560 $\mu$ s	100	10/560 $\mu$ s	6.5
FCC Part 68, lightning surge type B	1000	9/720 $\mu$ s	25	5/320 $\mu$ s	0

Table 3: Absolute Ratings ( $T_{amb} = 25^{\circ}\text{C}$ )

Symbol	Parameter		Value	Unit
$I_{PP}$	Repetitive peak pulse current (see figure 2)	10/1000 $\mu$ s	50	A
		8/20 $\mu$ s	100	
		10/560 $\mu$ s	55	
		5/310 $\mu$ s	65	
		10/160 $\mu$ s	75	
		1/20 $\mu$ s	100	
		2/10 $\mu$ s	100	
$I_{FS}$	Fail-safe mode : maximum current (note 1)	8/20 $\mu$ s	2.5	kA
$I_{TSM}$	Non repetitive surge peak on-state current (sinusoidal)	t = 0.2 s	16	A
		t = 1 s	11.5	
		t = 2 s	10	
		t = 15 mn	3.5	
$I^2t$	$I^2t$ value for fusing	t = 16.6 ms	6.2	$\text{A}^2\text{s}$
		t = 20 ms	6.5	
$T_{stg}$	Storage temperature range		-55 to 150	$^{\circ}\text{C}$
$T_j$	Maximum junction temperature		150	$^{\circ}\text{C}$
$T_L$	Maximum lead temperature for soldering during 10 s.		260	$^{\circ}\text{C}$

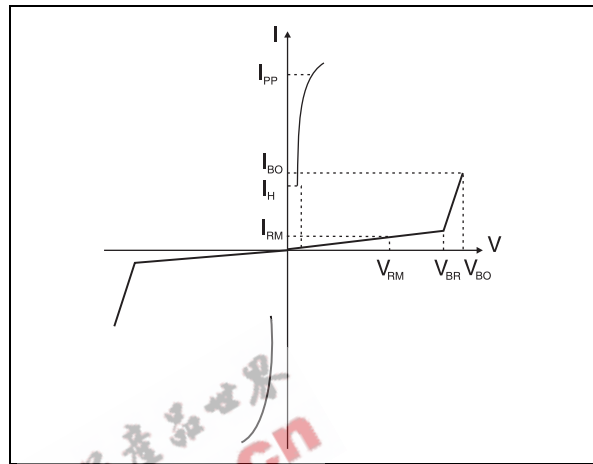
Note 1: in fail safe mode, the device acts as a short circuit

**Table 4: Thermal Resistances**

Symbol	Parameter	Value			Unit
		DO-15	SMA	SMB	
$R_{th(j-a)}$	Junction to ambient (with recommended footprint or with $L_{lead} = 10mm$ for DO-15)	100	120	100	°C/W
$R_{th(j-l)}$	Junction to leads ( $L_{lead} = 10mm$ for DO-15)	60	30	20	°C/W

**Table 5: Electrical Characteristics** ( $T_{amb} = 25^{\circ}C$ )

Symbol	Parameter
$V_{RM}$	Stand-off voltage
$V_{BR}$	Breakdown voltage
$V_{BO}$	Breakover voltage
$I_{RM}$	Leakage current
$I_{PP}$	Peak pulse current
$I_{BO}$	Breakover current
$I_H$	Holding current
$V_R$	Continuous reverse voltage
$I_R$	Leakage current at $V_R$
C	Capacitance



Types	$I_{RM} @ V_{RM}$		$I_R @ V_R$		Dynamic	Static		$I_H$	C	C						
	max.		max.		$V_{BO}$	$V_{BO} @ I_{BO}$										
	$\mu A$	V	$\mu A$	V	max.	max.	max.	min.	typ.	typ.						
SMP50-62 / TPA62 SMTPA62	2	56	5	62	85	82	800	150	20	40						
SMP50-68 / TPA68 SMTPA68											61	68	93	90	20	40
SMP50-100 / TPA100 SMTPA100											90	100	135	133	16	35
SMP50-120 / TPA120 SMTPA120											108	120	160	160	16	30
SMP50-130 / TPA130 SMTPA130											117	130	173	173	14	30
SMP50-180 / TPA180 SMTPA180											162	180	235	240	14	25
SMP50-200 / TPA200 SMTPA200											180	200	262	267	12	25
SMP50-220 / TPA220 SMTPA220											198	220	285	293	12	25
SMP50-240 / TPA240 SMTPA240											216	240	300	320	12	25
SMP50-270 / TPA270 SMTPA270											243	270	350	360	12	25

**Note 1:**  $I_R$  measured at  $V_R$  guarantee  $V_{BR} \min \geq V_R$

**Note 2:** see functional test circuit 1

**Note 3:** see test circuit 2

**Note 4:** see functional holding current test circuit 3

**Note 5:**  $V_R = 50V$  bias,  $V_{RMS}=1V$ ,  $F=1MHz$

**Note 6:**  $V_R = 2V$  bias,  $V_{RMS}=1V$ ,  $F=1MHz$



Figure 2: Pulse waveform (10/1000µs)

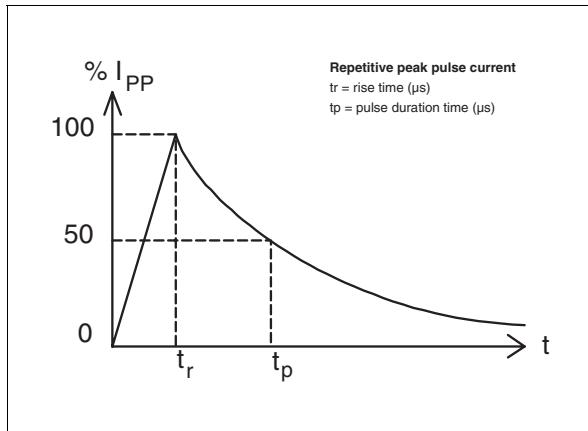


Figure 3: Non repetitive surge peak on-state current versus overload duration

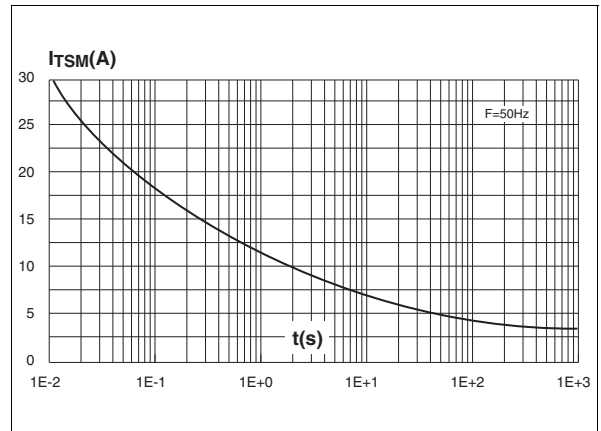


Figure 4: On-state voltage versus on-state current (typical values)

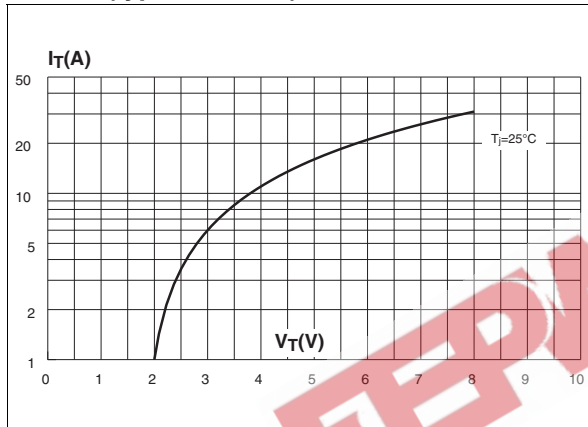


Figure 5: Relative variation of holding current versus junction temperature

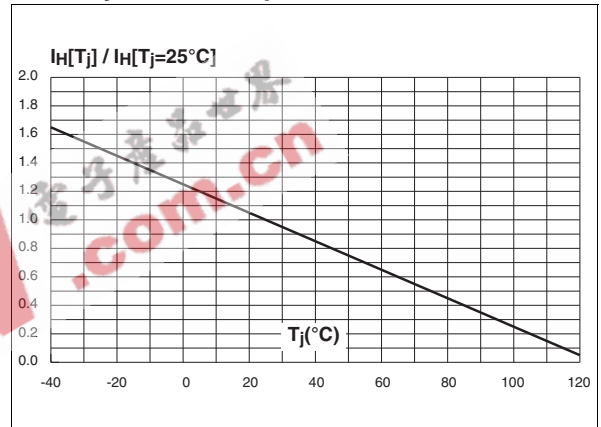


Figure 6: Relative variation of breakover voltage versus junction temperature

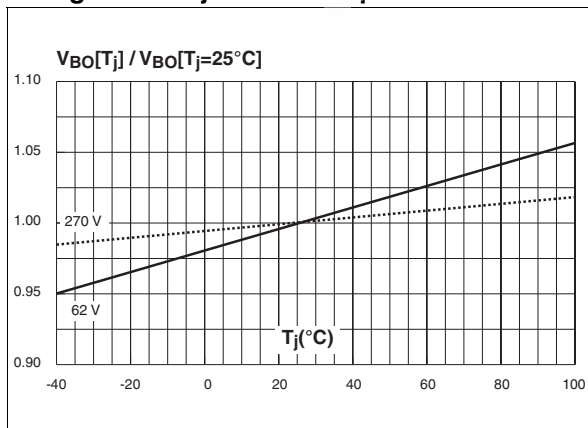


Figure 7: Relative variation of leakage current versus reverse voltage applied (typical values)

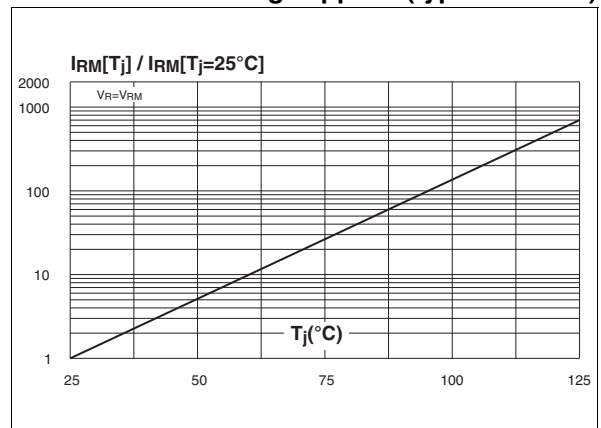


Figure 8: Variation of thermal impedance junction to ambient versus pulse duration (Printed circuit board FR4, SCu=35µm, recommended pad layout)

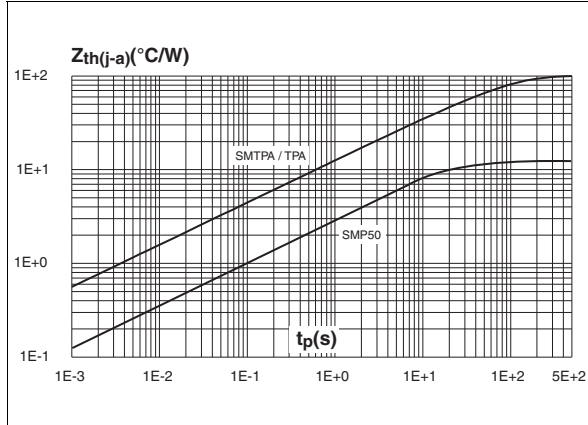


Figure 9: Relative variation of junction capacitance versus reverse voltage applied (typical values)

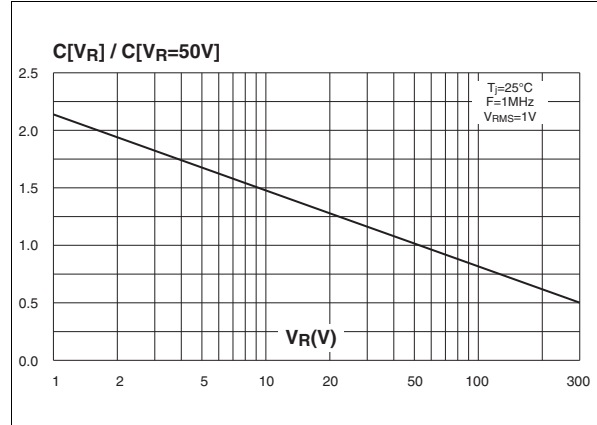


Figure 10: Test circuit 1 for Dynamic  $I_{BO}$  and  $V_{BO}$  parameters

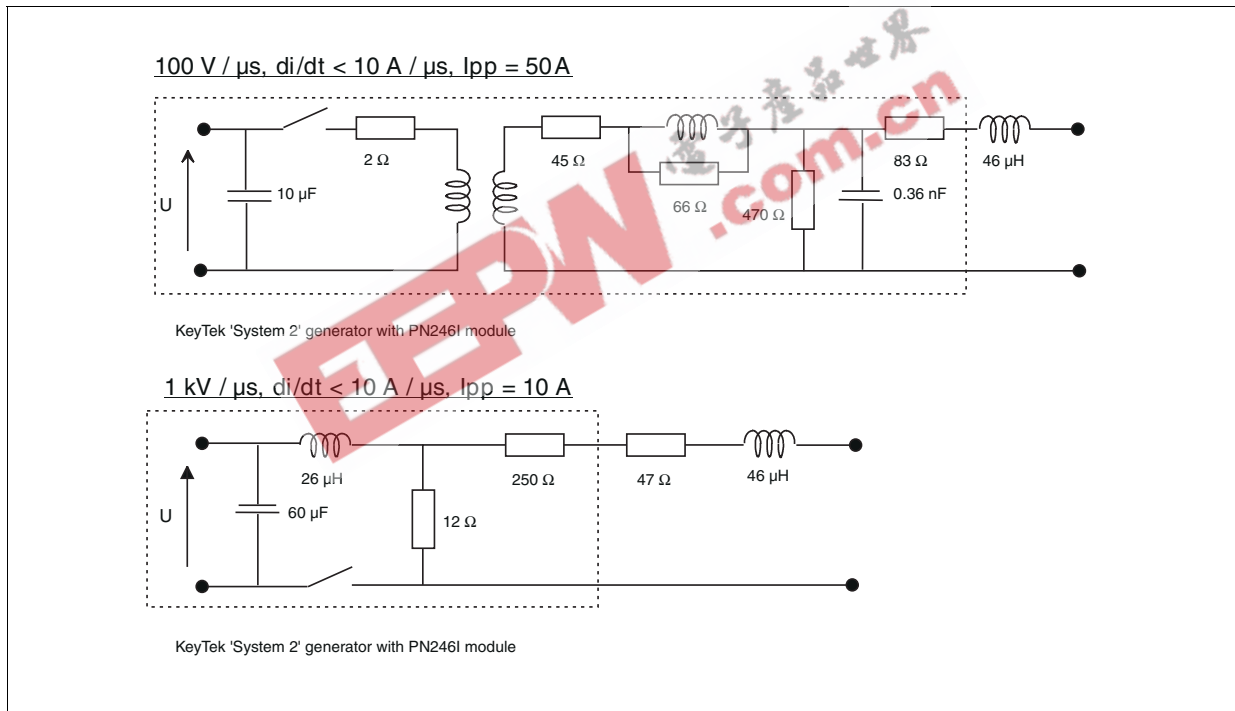


Figure 11: Test circuit 2 for  $I_{BO}$  and  $V_{BO}$  parameters

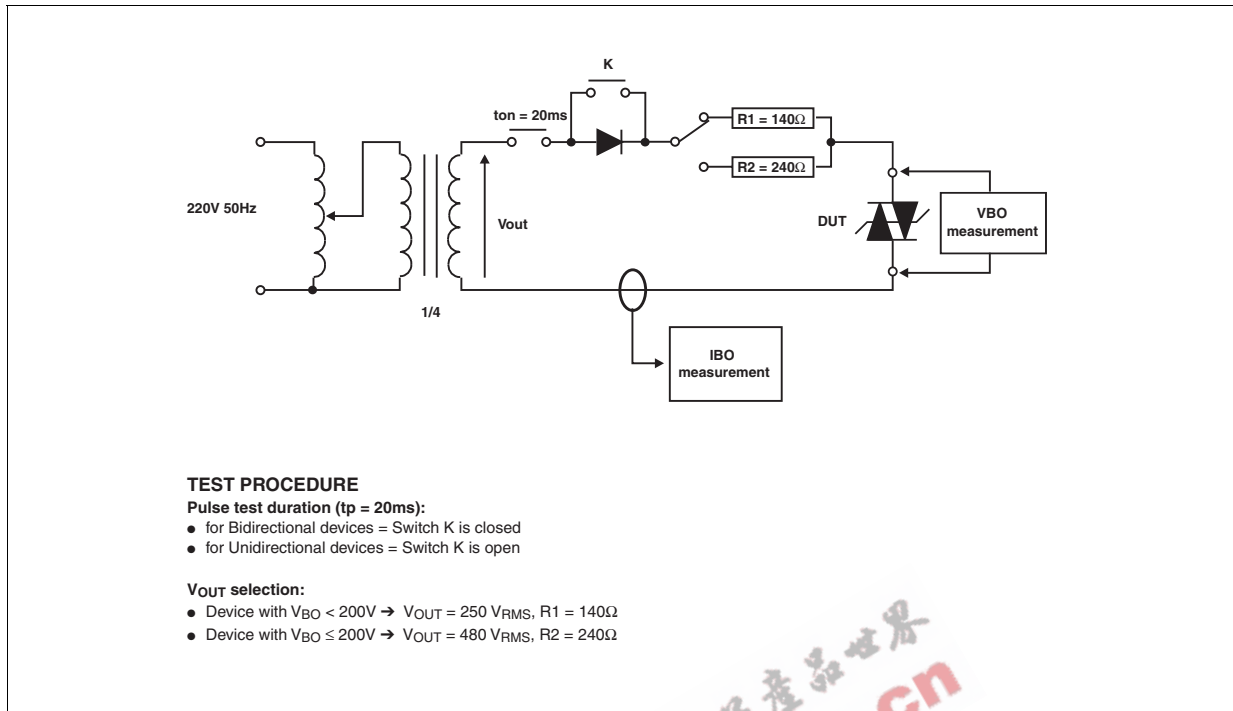


Figure 12: Test circuit 3 for dynamic  $I_H$  parameters

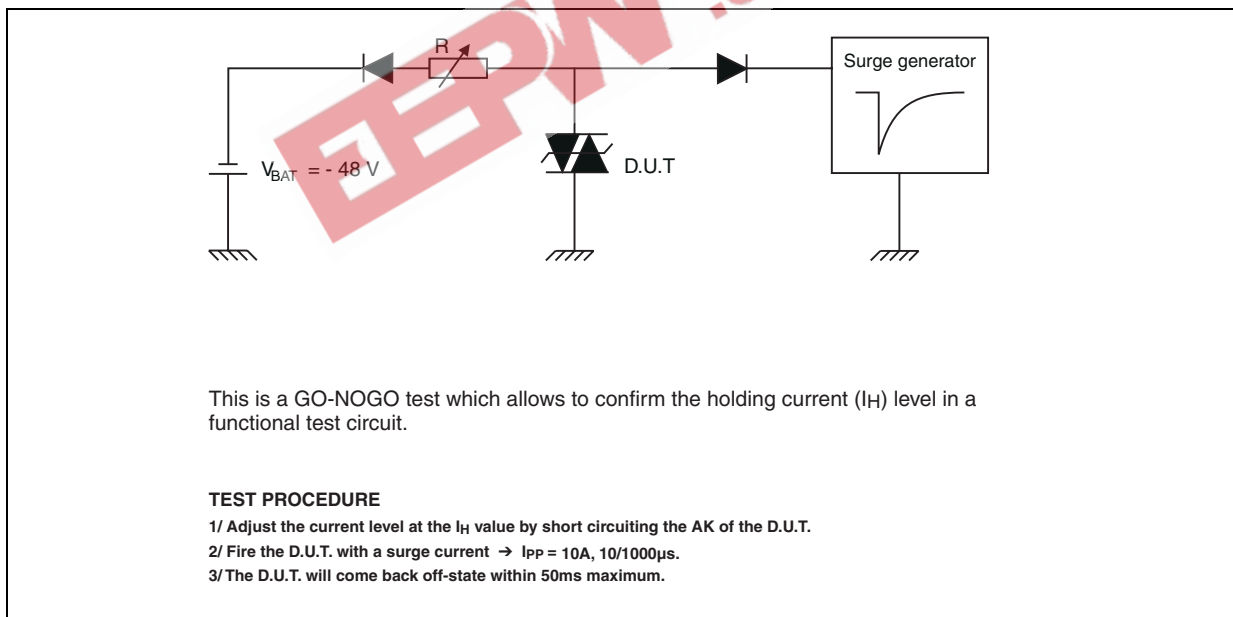


Figure 13: Ordering Information Scheme

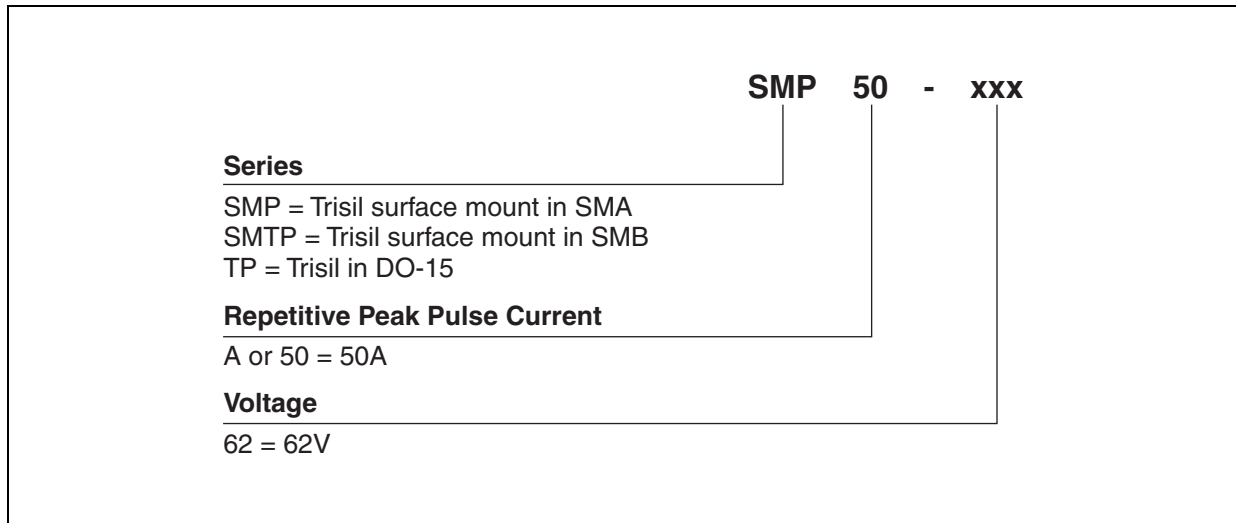


Figure 14: SMA Package Mechanical Data

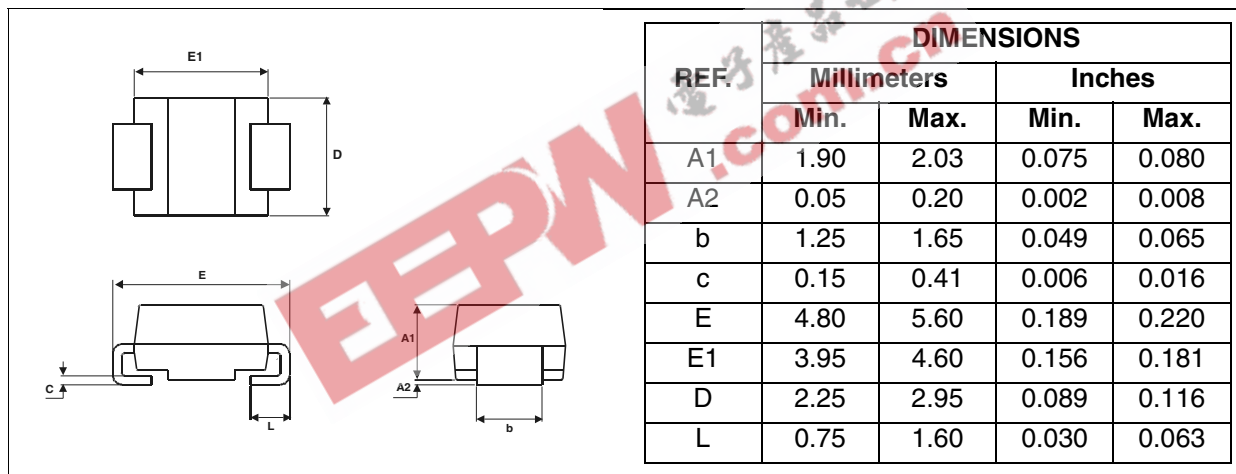


Figure 15: Foot Print Dimensions (in millimeters)

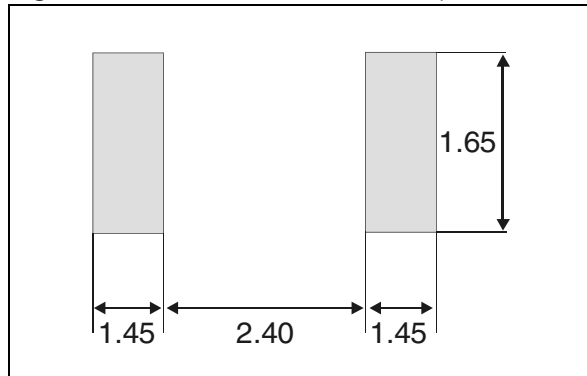


Figure 16: SMB Package Mechanical Data

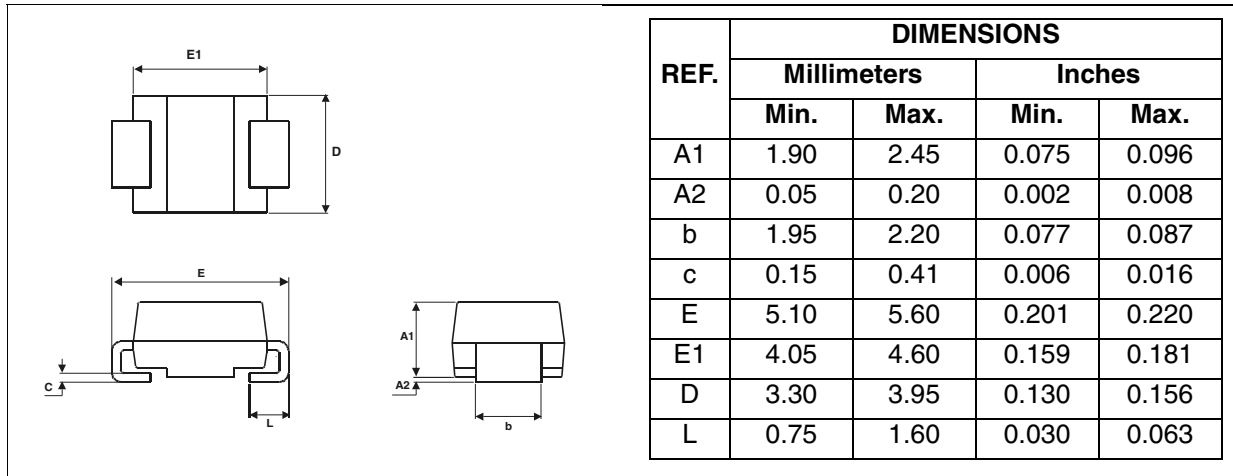


Figure 17: Foot Print Dimensions (in millimeters)

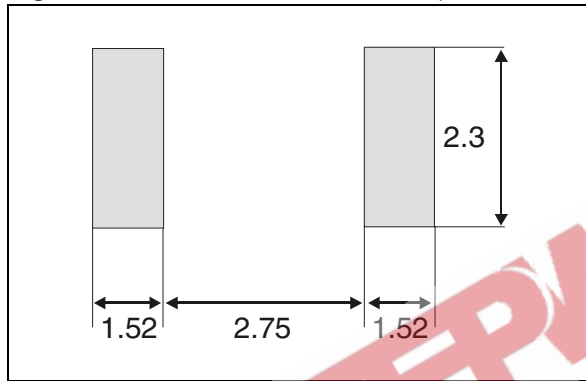


Figure 18: DO-15 Package Mechanical data

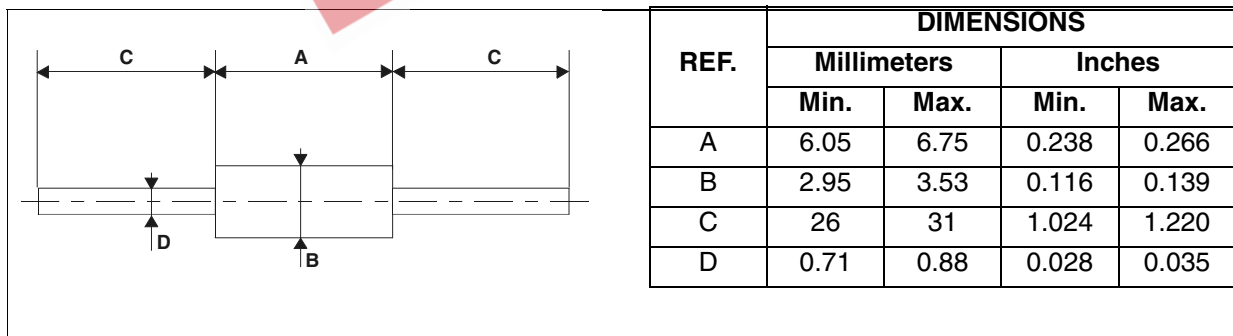




Table 6: Ordering Information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
SMP50-62	V06	SMA	0.068 g	5000	Tape & reel
SMP50-68	V07				
SMP50-100	V10				
SMP50-120	V12				
SMP50-130	V13				
SMP50-180	V18				
SMP50-200	V20				
SMP50-220	V22				
SMP50-240	V24				
SMP50-270	V27				
SMTPA62	U01	SMB	0.11 g	2500	Tape & reel
SMTPA68	U05				
SMTPA100	U13				
SMTPA120	U17				
SMTPA130	U19				
SMTPA180	U25				
SMTPA200	U27				
SMTPA220	U31				
SMTPA240	U35				
SMTPA270	U39				
TPA62	TPA62	DO-15	0.40 g	1000	Ammopack
TPA62RL				6000	Tape & reel
TPA68	TPA68			1000	Ammopack
TPA68RL				6000	Tape & reel
TPA100	TPA100			1000	Ammopack
TPA100RL				6000	Tape & reel
TPA120	TPA120			1000	Ammopack
TPA130	TPA130			1000	Ammopack
TPA130RL				6000	Tape & reel
TPA180	TPA180			1000	Ammopack
TPA180RL				6000	Tape & reel
TPA200	TPA200			1000	Ammopack
TPA200RL				6000	Tape & reel
TPA220	TPA220			1000	Ammopack
TPA220RL				6000	Tape & reel
TPA240	TPA240			1000	Ammopack
TPA240RL				6000	Tape & reel
TPA270	TPA270			1000	Ammopack
TPA270RL		6000	Tape & reel		

Table 7: Revision History

Date	Revision	Description of Changes
16-Nov-2004	1	SMP50, SMTPA and TPA datasheets merge.

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