



# SMP50-xxx

## TELECOM EQUIPMENT PROTECTION: TRISIL™

### FEATURES

- Bidirectional crowbar protection
- Voltage range from 62V to 270V
- Low capacitance from 15pF to 30pF typ. @ 50V
- Low leakage current:  $I_R = 2\mu\text{A}$  max.
- Holding current:  $I_H = 150$  mA min.
- Repetitive peak pulse current:  
 $I_{PP} = 50$  A (10/1000  $\mu\text{s}$ )

### MAIN APPLICATIONS

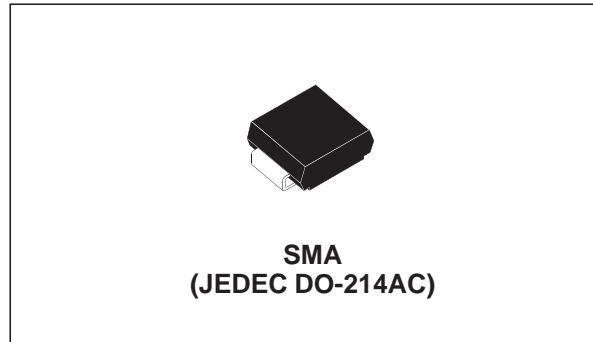
Telecommunication equipment such as

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

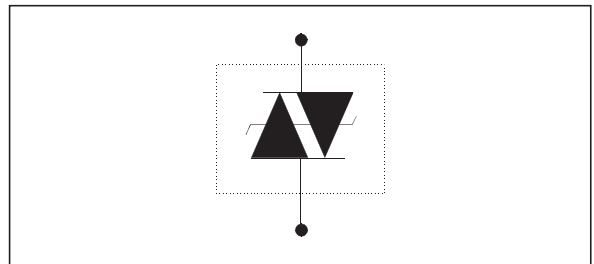
### DESCRIPTION

The SMP50-xxx series has been designed to protect telecommunication equipment against lightning and transient induced by AC power lines.

The package / die size ratio has been optimized by using the SMA package.



### SCHEMATIC DIAGRAM



### BENEFITS

Trisils are not subject to ageing and provide a fail safe mode in short circuit for a better protection. Trisils 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 resin approved. SMA package is JEDEC registered. (Trisils are UL 497B approved - file: E136224).

## SMP50-xxx

### IN COMPLIANCES WITH THE FOLLOWING STANDARDS

Standard	Peak Surge Voltage (V)	Voltage Waveform ( $\mu$ s)	Required peak current (A)	Current Waveform ( $\mu$ s)	Minimum serial resistor to meet standard ( $\Omega$ )
GR-1089 Core First level	2500	2/10	500	2/10	12
	1000	10/1000	100	10/1000	10
GR-1089 Core Second level	5000	2/10	500	2/10	24
GR-1089 Core Intra-building	1500	2/10	100	2/10	0
ITU-T-K20 / K21	6000	10/700	150	5/310	53
	1500		37.5		0
ITU-T-K20 (IEC61000-4-2)	6000	1/60 ns	ESD contact discharge		0
	8000		ESD air discharge		0
VDE0433	4000	10/700	100	5/310	21.5
	2000		50		0
VDE0878	4000	1.2/50	100	1/20	0
	2000		50		0
IEC61000-4-5	4000	10/700	100	5/310	21.5
	4000	1.2/50	100	8/20	0
FCC Part 68, lightning surge type A	1500	10/160	200	10/160	12.5
	800	10/560	100	10/560	6.5
FCC Part 68, lightning surge type B	1000	9/720	25	5/320	0

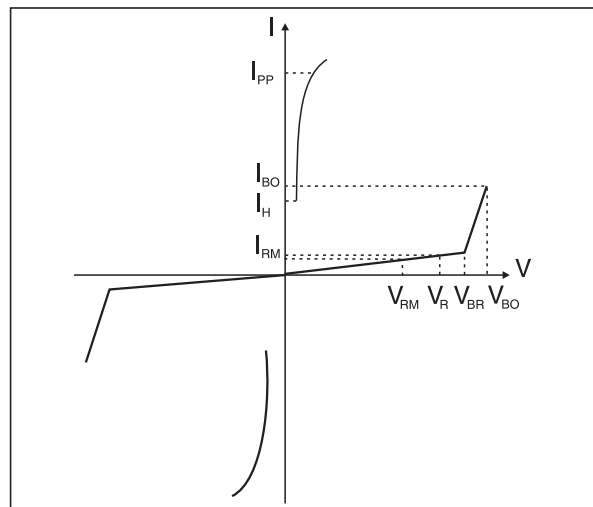
### THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction to ambient with recommended footprint	120	$^{\circ}$ C/W
$R_{th(j-l)}$	Junction to leads	30	$^{\circ}$ C/W

### ELECTRICAL CHARACTERISTICS

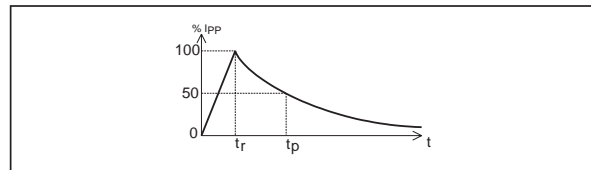
( $T_{amb} = 25^{\circ}$ C)

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



**ABSOLUTE RATINGS** ( $T_{amb} = 25^{\circ}\text{C}$ )

Symbol	Parameter	Value	Unit	
$I_{PP}$	Repetitive peak pulse current:	10/1000 $\mu\text{s}$	50	A
		8/20 $\mu\text{s}$	100	
		10/560 $\mu\text{s}$	55	
		5/310 $\mu\text{s}$	65	
		10/160 $\mu\text{s}$	75	
		1/20 $\mu\text{s}$	100	
		2/10 $\mu\text{s}$	150	
$I_{FS}$	Fail safe mode: maximum current (note 1)	8/20 $\mu\text{s}$	2.5	kA
$I_{TSM}$	Non repetitive surge peak on-state current (Sinusoidal)	$t = 20\text{ms}$	25	A
		$t = 16.6\text{ms}$	28	
		$t = 0.2\text{s}$	16	
		$t = 2\text{s}$	8.5	
$I^2t$	$I^2t$ value for fusing	$t = 16.6\text{ms}$	6.5	$\text{A}^2\text{s}$
		$t = 20\text{ms}$	6.3	
$T_L$	Maximum lead temperature for soldering during 10 s.	260	$^{\circ}\text{C}$	
$T_{stg}$ $T_j$	Storage temperature range	- 55 to + 150	$^{\circ}\text{C}$	
	Maximum junction temperature	150	$^{\circ}\text{C}$	

**Repetitive peak pulse current**tr: rise time ( $\mu\text{s}$ )tp: pulse duration time ( $\mu\text{s}$ )ex: Pulse waveform 10/1000 $\mu\text{s}$ tr = 10 $\mu\text{s}$     tp = 1000 $\mu\text{s}$ 

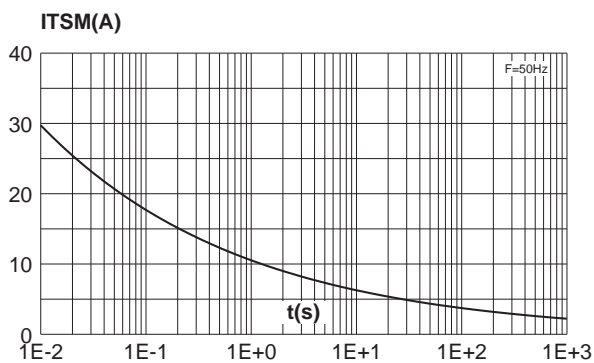
# SMP50-xxx

## ELECTRICAL PARAMETERS (Tamb = 25°C)

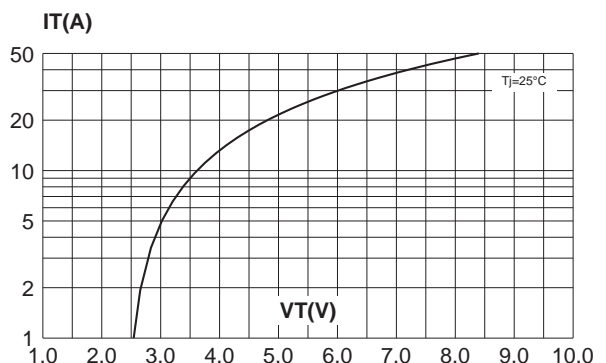
Type	IRM @ VRM max		IR @ VR MAX		DYNAMIC VBO @ IBO max		STATIC VBO @ IBO max		IH min	C typ.	C typ.
	µA	V	µA	V	V	mA	V	mA	mA	pF	pF
SMP50-62	2	56	50	62	85	800	82	800	150	30	50
SMP50-68		61		68	93		90		150	30	45
SMP50-100		90		100	135		133		150	20	40
SMP50-120		108		120	160		160		150	20	40
SMP50-130		117		130	173		173		150	20	35
SMP50-180		162		180	235		240		150	15	30
SMP50-200		180		200	262		267		150	15	30
SMP50-220		198		220	285		293		150	15	30
SMP50-240		216		240	300		320		150	15	30
SMP50-270		243		270	350		360		150	15	30

- Note 1:** IR measured at VR guarantee VBRmin ≥ VR
- Note 2:** See functional breakover voltage test circuit 1.
- Note 3:** See test circuit 2.
- Note 4:** See functional holding current test circuit 3.
- Note 5:** VR = 50V bias, VRMS = 1V, F = 1MHz.
- Note 6:** VR = 2V bias, VRMS = 1V, F = 1MHz

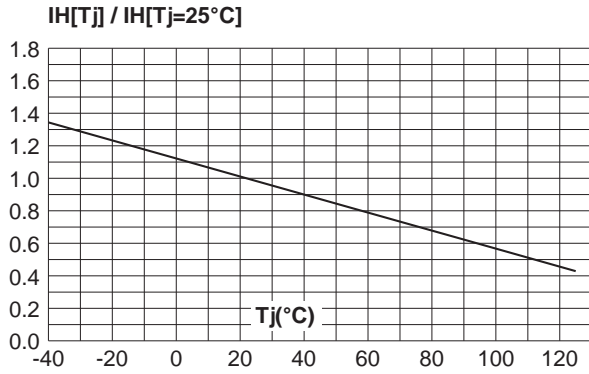
**Fig. 1:** Non repetitive surge peak on-state current versus overload duration (Tj initial = 25°C)



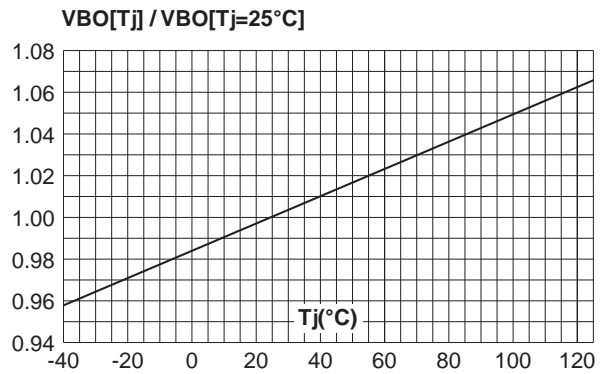
**Fig. 2:** On-state voltage versus on-state current (typical values).



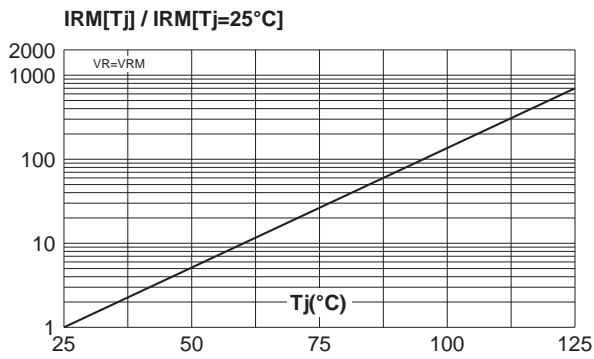
**Fig. 3:** Relative variation of holding current versus junction temperature.



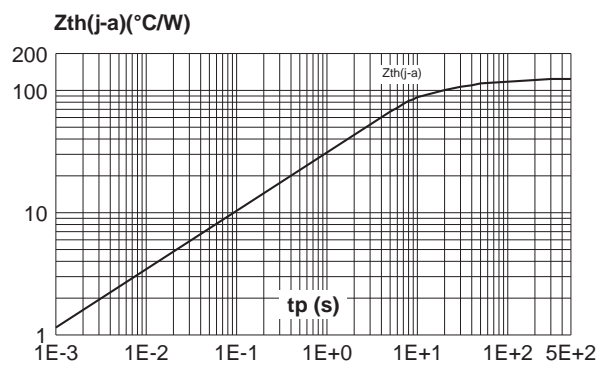
**Fig. 4:** Relative variation of breakover voltage versus junction temperature.



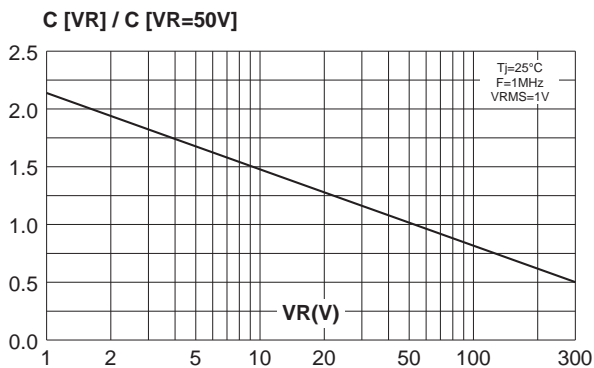
**Fig. 5:** Relative variation of leakage current versus junction temperature (typical values).



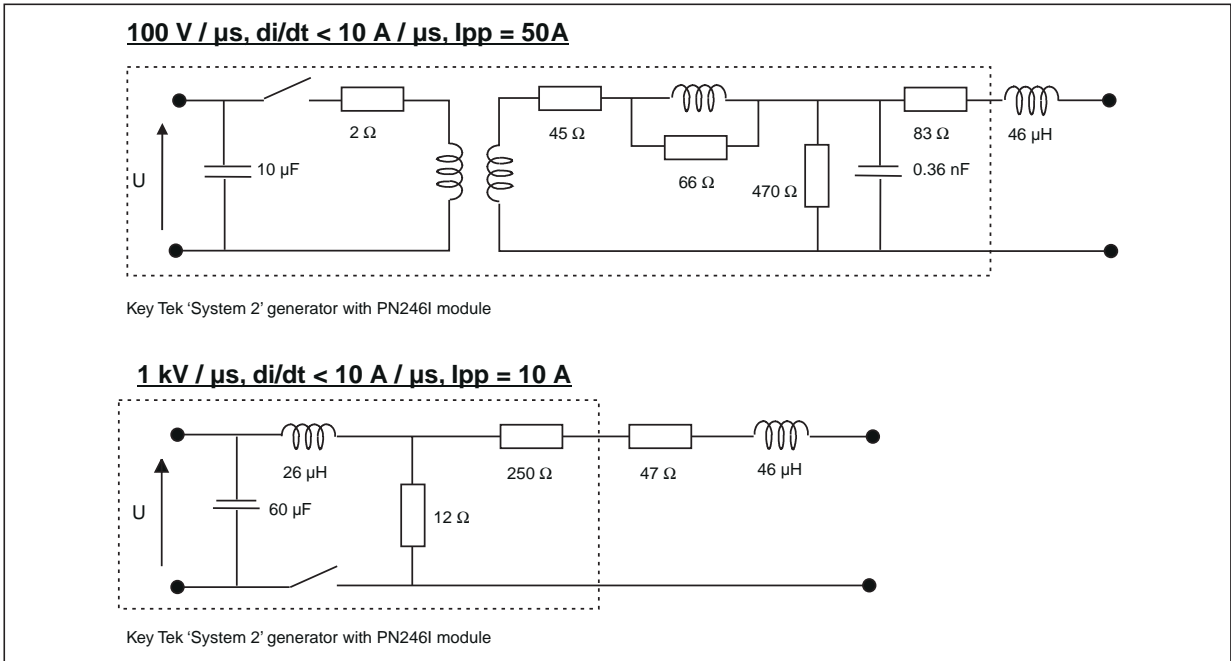
**Fig. 6:** Relative variation of thermal impedance versus pulse duration.



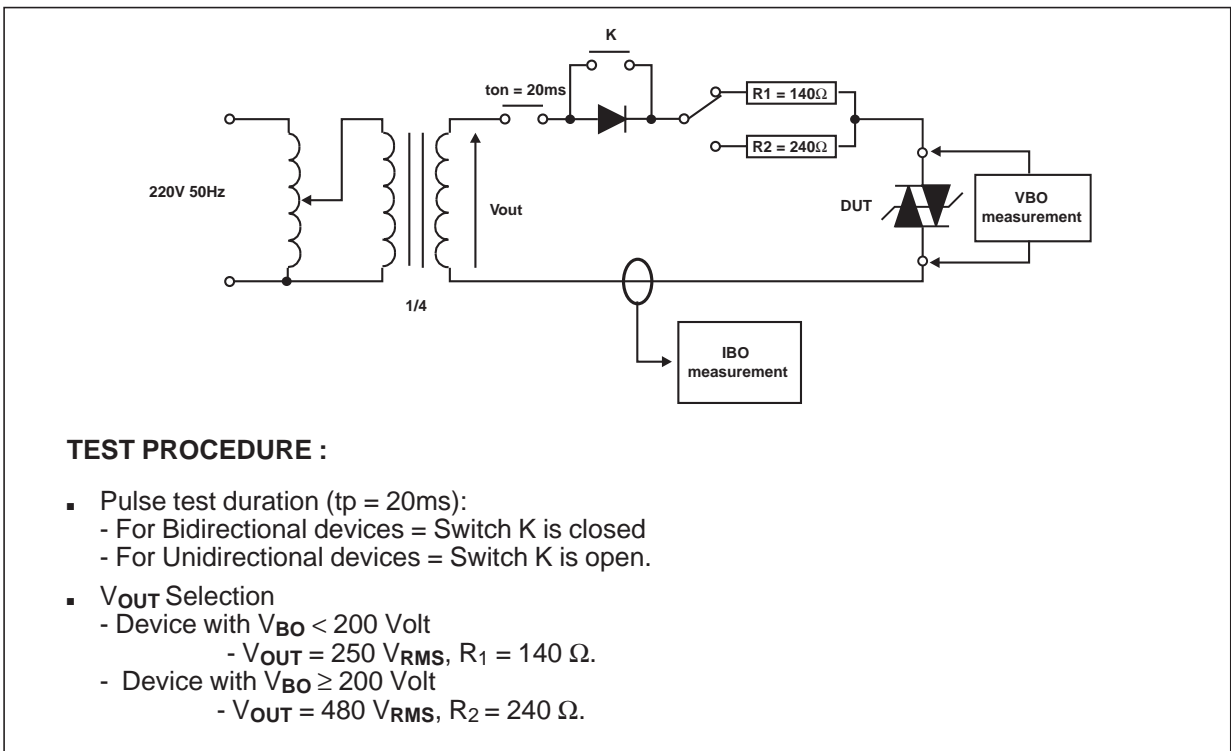
**Fig. 7:** Relative variation of junction capacitance versus reverse voltage applied (typical values).



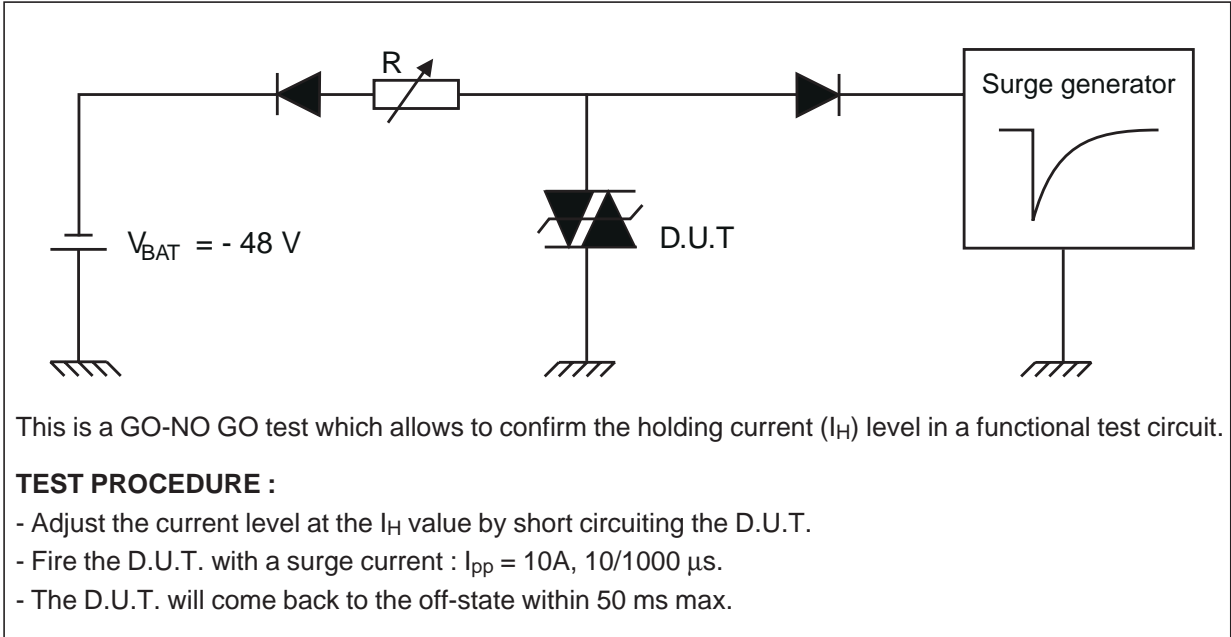
TEST CIRCUIT 1 FOR DYNAMIC  $I_{BO}$  and  $V_{BO}$  PARAMETERS



TEST CIRCUIT 2 for  $I_{BO}$  AND  $V_{BO}$  PARAMETERS.



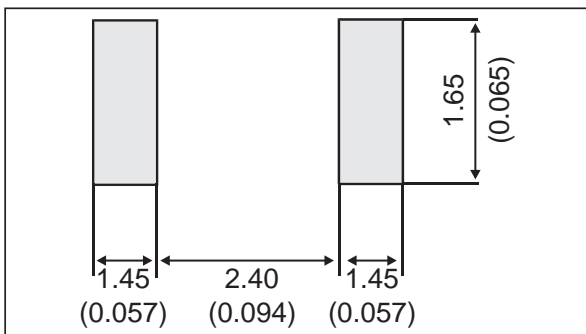
**TEST CIRCUIT 3 for  $I_H$  PARAMETERS.**



**PACKAGE MECHANICAL DATA**  
SMA (JEDEC DO-214AC)

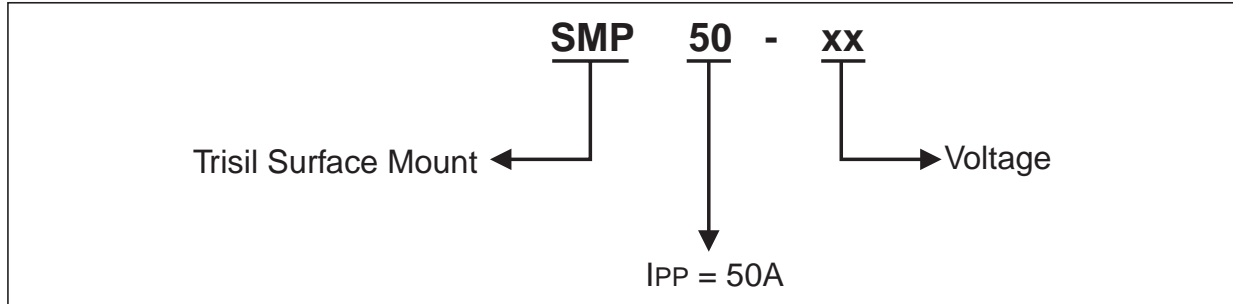
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.70	0.075	0.106
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.41	0.006	0.016
E	4.80	5.60	0.189	0.220
E1	3.95	4.60	0.156	0.181
D	2.25	2.95	0.089	0.116
L	0.75	1.60	0.030	0.063

**FOOT PRINT** in millimeters (in inches)



## SMP50-xxx

### ORDER CODE



### 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				

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