SMP30

TRISIL™ FOR TELECOM EQUIPMENT PROTECTION

FEATURES

- Bidirectional crowbar protection
- Voltage range from 62V to 270V
- Low capacitance from 10pF to 20pF typ.@ 50V
- Low leakage current: I_R = 2µA max.
- Holding current: I_H = 150 mA min.
- Repetitive peak pulse current: I_{PP} = 30 A (10/1000 µs)

MAIN APPLICATIONS

Telecommunication equipment such as:

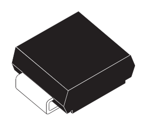
- Analog and digital line cards (xDSL, T1/E1, ISDN...).
- Terminals (phone, fax, modem...) and central office equipment.

DESCRIPTION

The SMP30-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.

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 package is JEDEC registered (DO-214AC).
Trisils are UL497B approved (file: E136224).



SMA
(JEDEC DO-214AC)

Table 1: Order Codes

Part Number	Marking
SMP30-62	QAA
SMP30-68	QAB
SMP30-100	QAC
SMP30-120	QAD
SMP30-130	QAE
SMP30-180	QAF
SMP30-200	QAG
SMP30-220	QAH
SMP30-240	QAI
SMP30-270	QAJ

Figure 1: Schematic Diagram

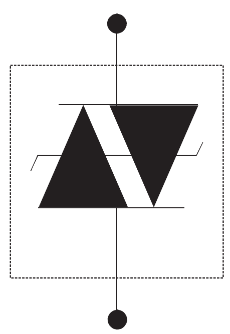


Table 2: In compliance with the following standards

STANDARD	Peak Surge Voltage (V)	Waveform Voltage	Required peak current (A)	Current waveform	Minimum serial resistor to meet standard (Ω)
GR-1089 Core First level	2500 1000	2/10 µs 10/1000 µs	500 100	2/10 µs 10/1000 µs	20 24
GR-1089 Core Second level	5000	2/10 µs	500	2/10 µs	40
GR-1089 Core Intra-building	1500	2/10 µs	100	2/10 µs	0
ITU-T-K20/K21	6000 1500	10/700 µs	150 37.5	5/310 µs	110 0
ITU-T-K20 (IEC61000-4-2)	8000 15000	1/60 ns	ESD contact discharge ESD air discharge		0 0
VDE0433	4000 2000	10/700 µs	100 50	5/310 µs	60 10
VDE0878	4000 2000	1.2/50 µs	100 50	1/20 µs	18 0
IEC61000-4-5	4000 4000	10/700 µs 1.2/50 µs	100 100	5/310 µs 8/20 µs	60 18
FCC Part 68, lightning surge type A	1500 800	10/160 µs 10/560 µs	200 100	10/160 µs 10/560 µs	26 15
FCC Part 68, lightning surge type B	1000	9/720 µs	25	5/320 µs	0

Table 3: Absolute Ratings (T_{amb} = 25°C)

Symbol	Parameter		Value	Unit
I_{PP}	Repetitive peak pulse current (see figure 2)	10/1000 µs 8/20 µs 10/560 µs 5/310 µs 10/160 µs 1/20 µs 2/10 µs	30 70 35 40 45 70 100	A
I_{FS}	Fail-safe mode : maximum current (note 1)	8/20 µs	2.5	kA
I_{TSM}	Non repetitive surge peak on-state current (sinusoidal)	t = 0.2 s t = 1 s t = 2 s t = 15 mn	14 10.5 9 3	A
I^2t	I^2t value for fusing	t = 16.6 ms t = 20 ms	5.7 4.9	A^2s
T_{stg} T_j	Storage temperature range Maximum junction temperature		-55 to 150 150	°C
T_L	Maximum lead temperature for soldering during 10 s.		260	°C

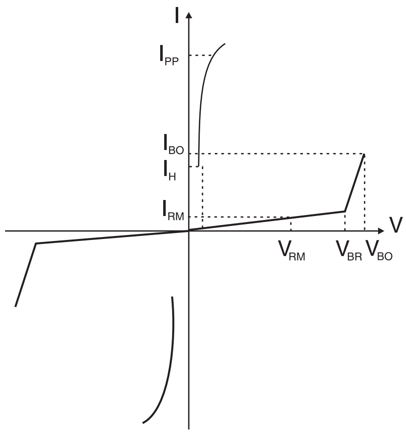
Note 1: in fail safe mode, the device acts as a short circuit.

Table 4: Thermal Resistances

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

Table 5: Electrical Characteristics (T_{amb} = 25°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} max.		I_R @ V_R max.		Dynamic V_{BO} max.	Static V_{BO} @ I_{BO} max.	max.	I_H min.	C typ.	C typ.
			note1		note 2	note 3		note 4	note 5	note 6
	µA	V	µA	V	V	V	mA	mA	pF	pF
SMP30-62		56		62	85	82			20	40
SMP30-68		61		68	93	90			20	40
SMP30-100		90		100	135	133			16	35
SMP30-120		108		120	160	160			16	30
SMP30-130	2	117	5	130	173	173	800	150	14	30
SMP30-180		162		180	235	240			12	25
SMP30-200		180		200	262	267			12	25
SMP30-220		198		220	285	293			10	20
SMP30-240		216		240	300	320			10	20
SMP30-270		243		270	350	360			10	20

Note 1: I_R measured at V_R guarantee V_{BR} min ≥ VR
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

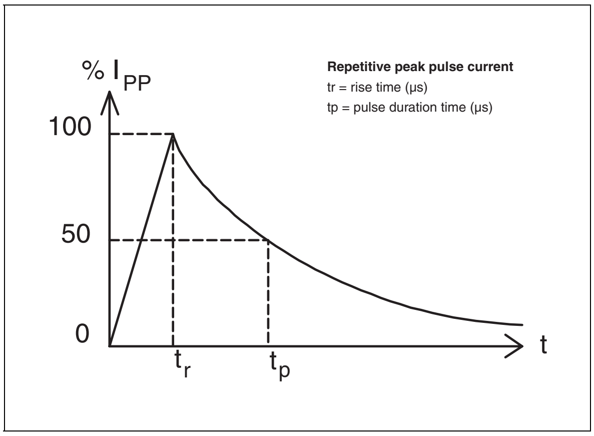


Figure 3: Non repetitive surge peak on-state current versus overload duration

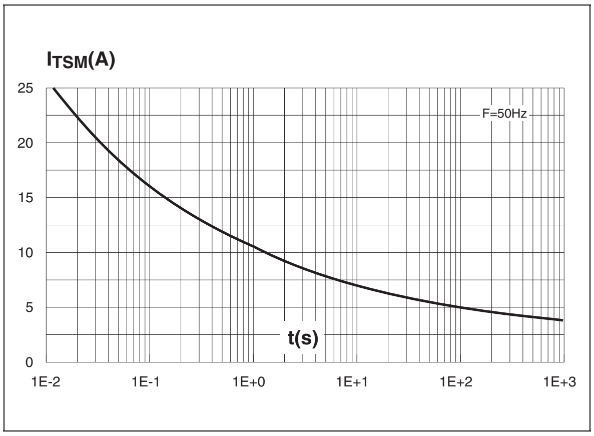


Figure 4: On-state voltage versus on-state current (typical values)

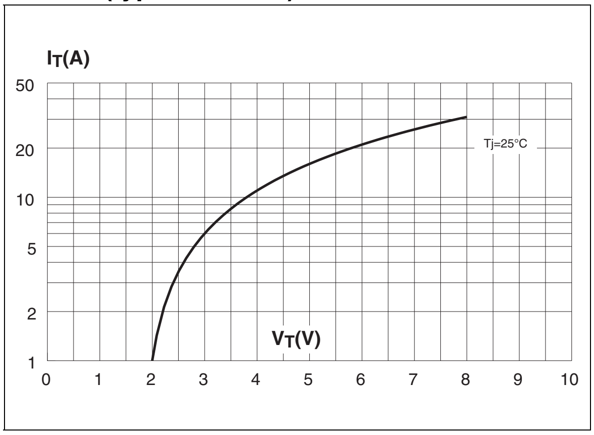


Figure 5: Relative variation of holding current versus junction temperature

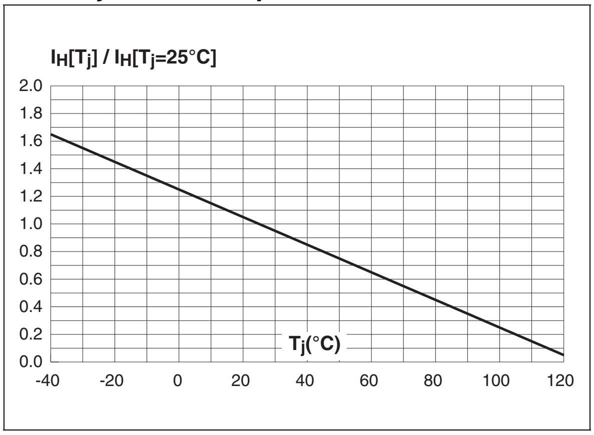


Figure 6: Relative variation of breakover voltage versus junction temperature

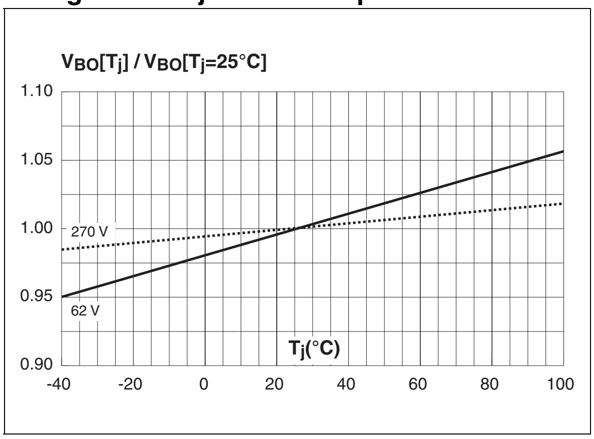


Figure 7: Relative variation of leakage current versus junction temperature (typical values)

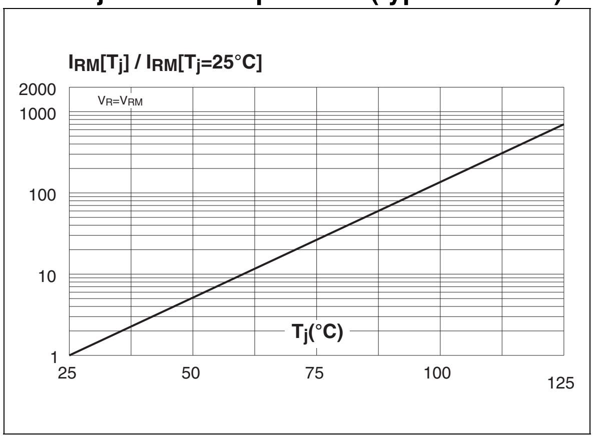


Figure 8: Variation of thermal impedance junction to ambient versus pulse duration (Printed circuit board FR4, SCu=35µm, recommended pad layout)

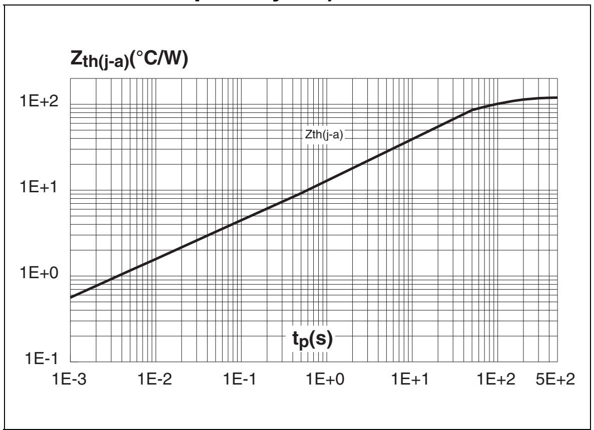


Figure 9: Relative variation of junction capacitance versus reverse voltage applied (typical values)

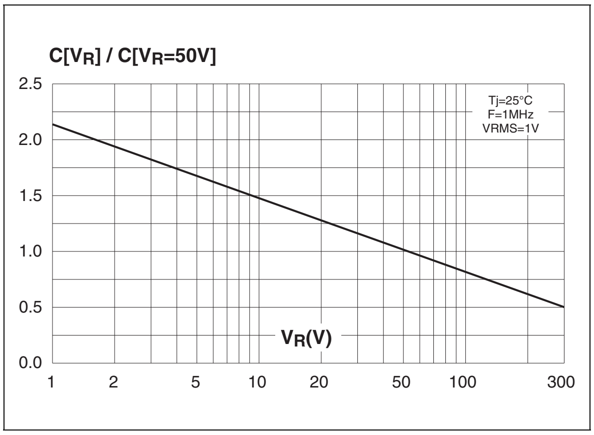


Figure 10: Test circuit 1 for dynamic I_{BO} and V_{BO} parameters

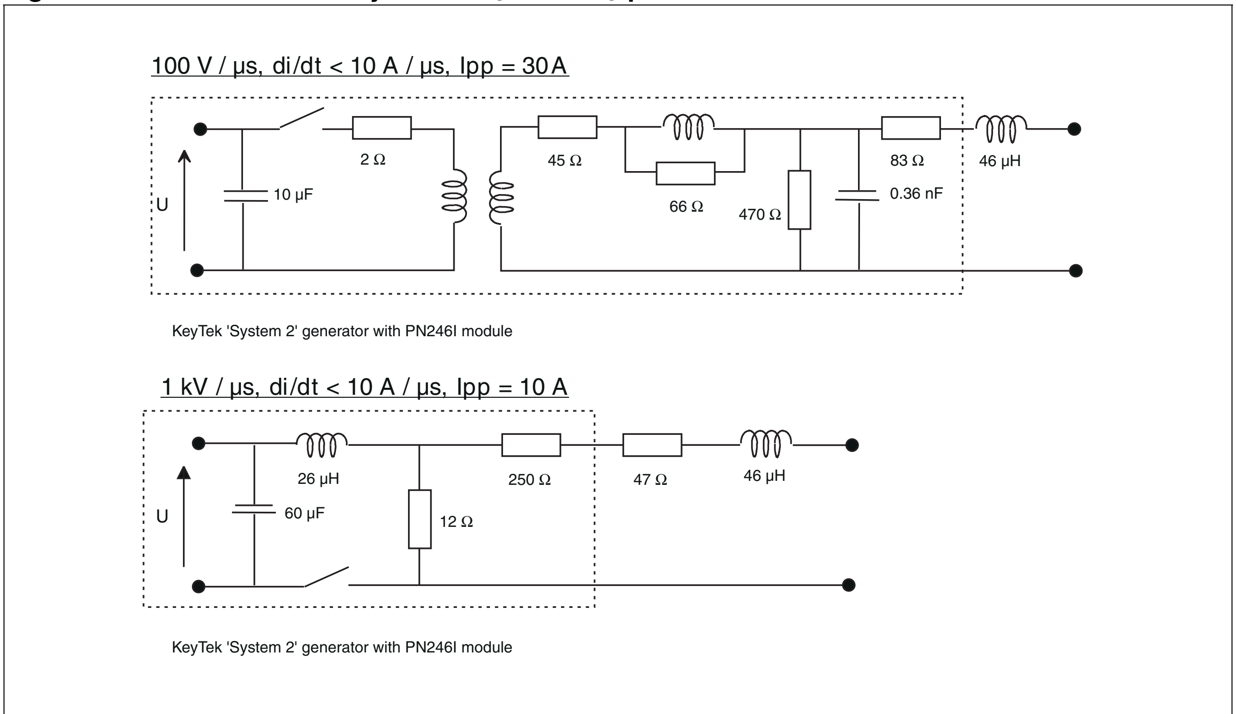
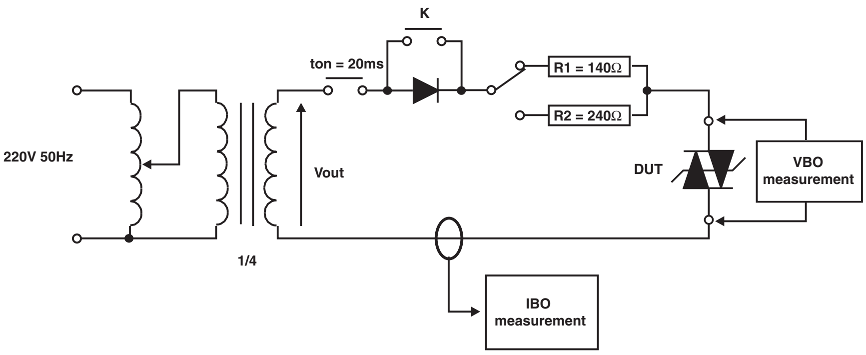


Figure 11: Test circuit 2 for I_{BO} and V_{BO} parameters



TEST PROCEDURE

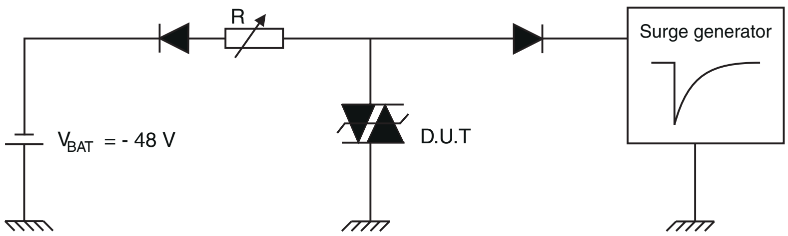
Pulse test duration (tp = 20ms):

- for Bidirectional devices = Switch K is closed
- for Unidirectional devices = Switch K is open

V_{OUT} selection:

- Device with V_{BO} < 200V ➔ V_{OUT} = 250 V_{RMS}, R1 = 140Ω
- Device with V_{BO} ≤ 200V ➔ V_{OUT} = 480 V_{RMS}, R2 = 240Ω

Figure 12: Test circuit 3 for dynamic I_H parameter



This is a GO-NOGO test which allows to confirm the holding current (I_H) level in a functional test circuit.

TEST PROCEDURE

1/ Adjust the current level at the I_H value by short circuiting the AK of the D.U.T.

2/ Fire the D.U.T. with a surge current ➔ I_{PP} = 10A, 10/1000µs.

3/ The D.U.T. will come back off-state within 50ms maximum.

Figure 13: Ordering Information Scheme

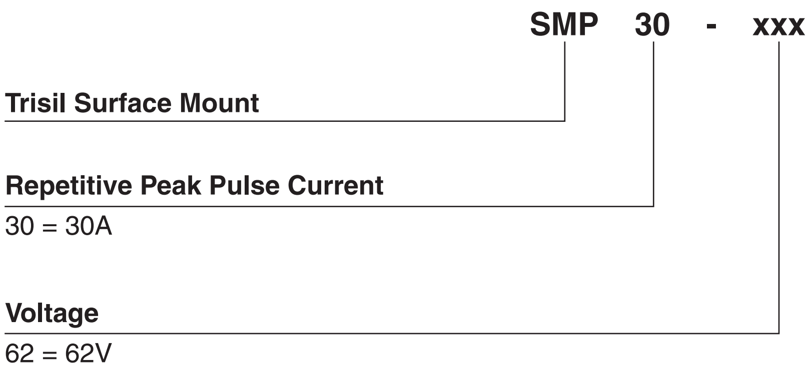
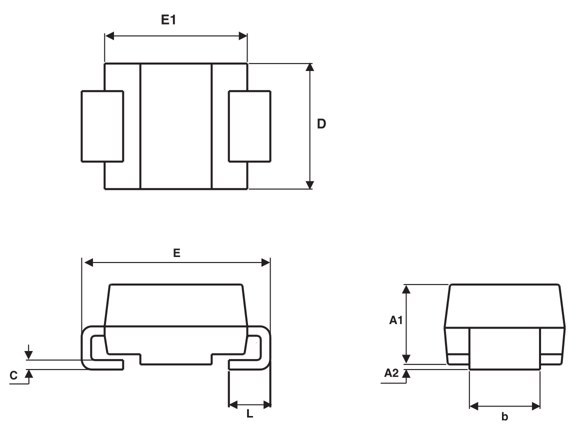


Figure 14: SMA Package Mechanical data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.03	0.075	0.080
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

Figure 15: Foot Print Dimensions (in millimeters)

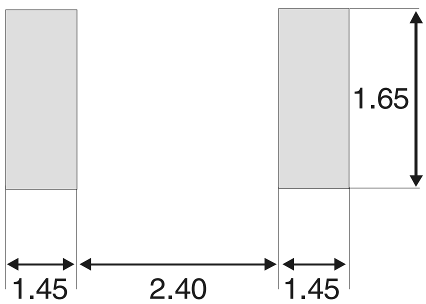


Table 6: Ordering Information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
SMP30-62	QAA	SMA	0.06 g	5000	Tape & reel
SMP30-68	QAB				
SMP30-100	QAC				
SMP30-120	QAD				
SMP30-130	QAE				
SMP30-180	QAF				
SMP30-200	QAG				
SMP30-220	QAH				
SMP30-240	QAI				
SMP30-270	QAJ				

Table 7: Revision History

Date	Revision	Description of Changes
November-2002	4B	Last update.
10-Nov-2004	5	SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106 inc.) to 2.03mm (0.080 inc.).
13-Dec-2004	6	Figure 7 text legend corrected from “... reverse voltage applied” to “... junction capacitance”.