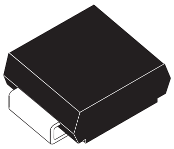
Trisil™ for telecom equipment protection

Features

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

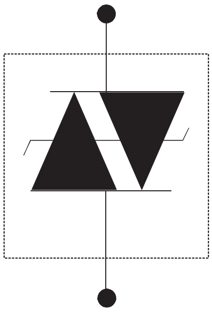


SMA
(JEDEC DO-214AC)

Benefits

- Trisils are not subject to ageing and provide a fail safe mode in short circuit for a better protection.
- This device can be used to help equipment 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).

Figure 1. Device configuration



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 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.

TM: Trisil is a trademark of STMicroelectronics.

1 Characteristics

Table 1. Compliant 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 2. Absolute ratings (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
I_{PP}	Repetitive peak pulse current	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(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 using	t = 16.6 ms t = 20 ms	5.7 4.9	A^2s
T_{stg}	Storage temperature range		-55 to + 150	°C
Tj	Maximum junction temperature		150	°C
T_L	Maximum lead temperature for soldering during 10 s.		260	°C

1. In fail safe mode, the device acts as a short circuit.

Table 3. 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 4. Electrical characteristics - definitions (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

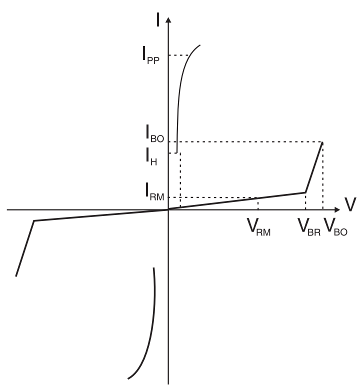


Table 5. Electrical characteristics - values (T_{amb} = 25 °C)

Types	I_{RM} @ V_{RM}		I_R (1) @ V_R		Dynamic V_{BO}	Static V_{BO} @ I_{BO}		I_H	C(2)	C(3)
	max.		max.		max.	max.	max.	min.	typ.	typ.
	µA	V	µA	V	V	V	mA	mA	pF	pF
SMP30-62	2	56	5	62	85	82	800	150	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		117		130	173	173			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

1. I_R measured at V_R guarantee V_{BR} min ≥ V_R
2. V_R = 50 V bias, V_{RMS} = 1 V, F = 1 MHz
3. V_R = 2 V bias, V_{RMS} = 1 V, F = 1 MHz

Figure 2. Pulse waveform

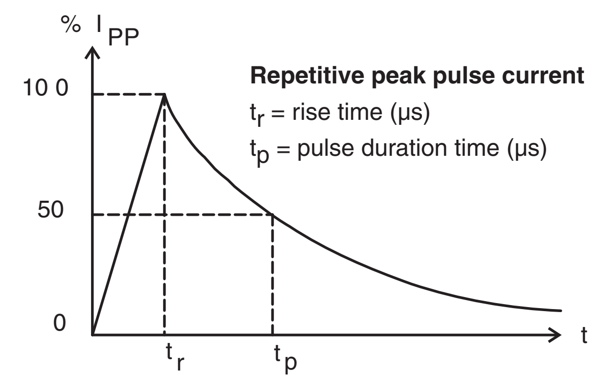


Figure 3. Non repetitive surge peak on-state current versus overload duration

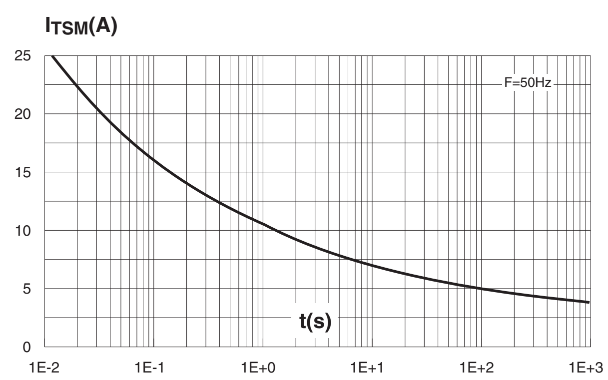


Figure 4. On-state voltage versus on-state current (typical values)

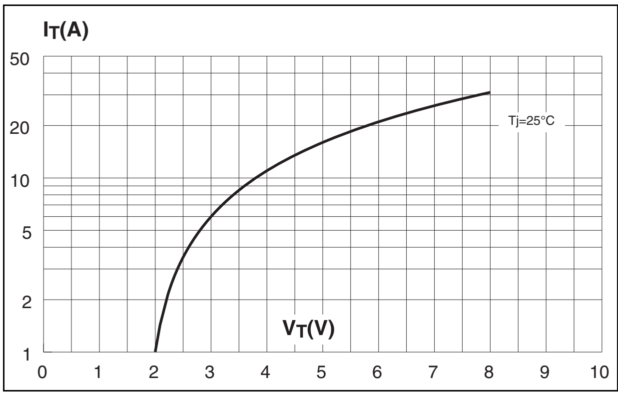


Figure 5. Relative variation of holding current versus junction temperature

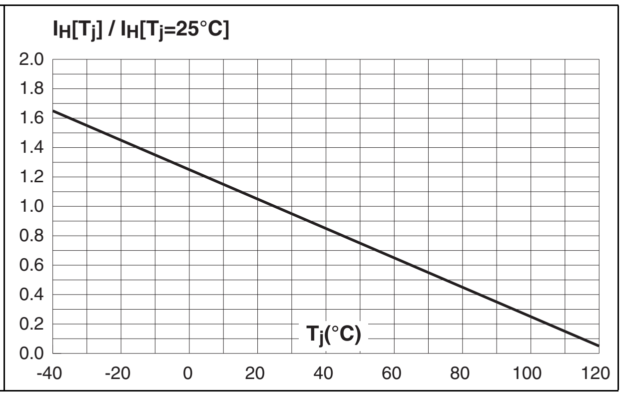


Figure 6. Relative variation of breakover voltage versus junction temperature

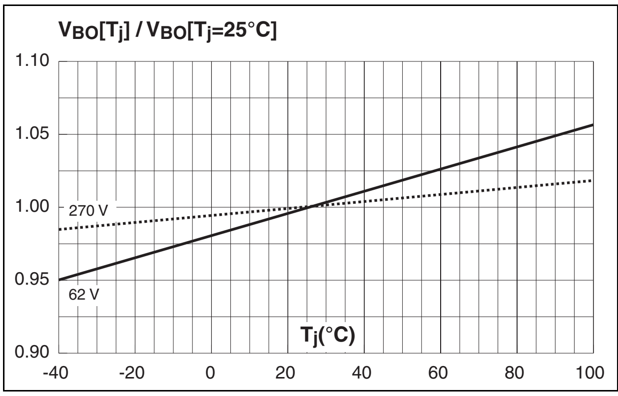


Figure 7. Relative variation of leakage current versus reverse voltage applied (typical values)

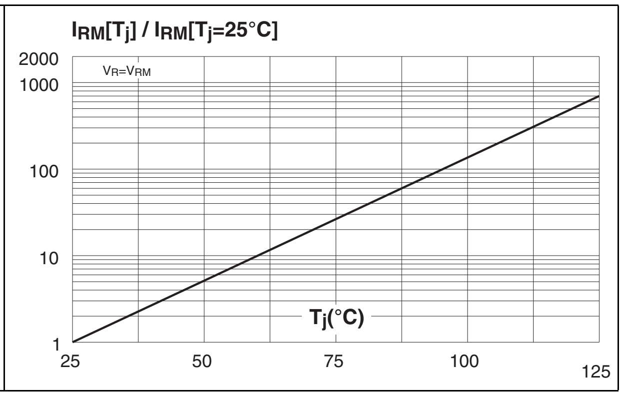


Figure 8. Variation of thermal impedance junction to ambient versus pulse duration

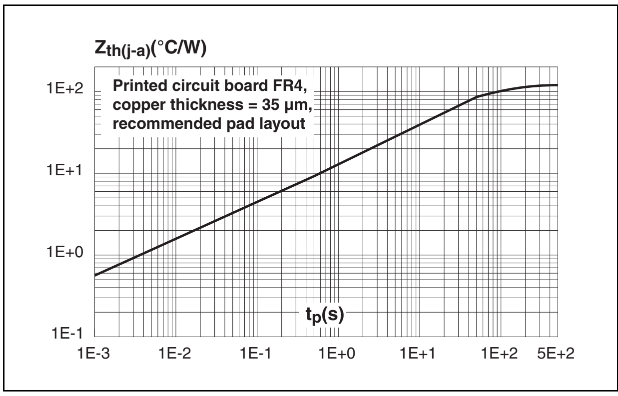
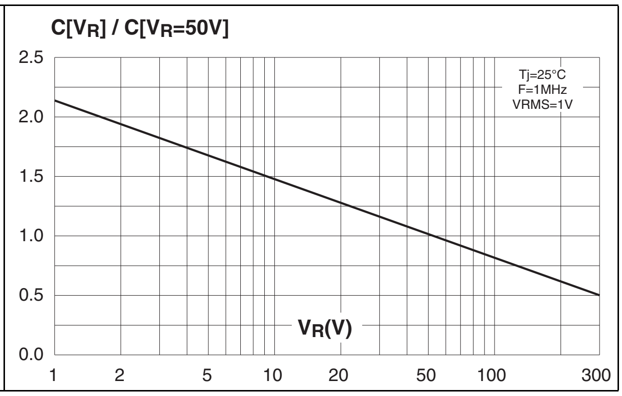
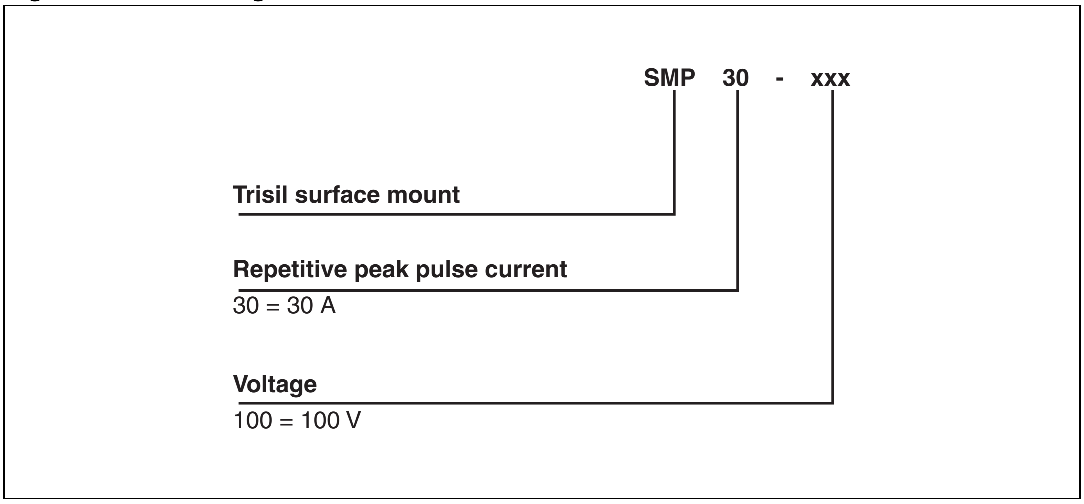


Figure 9. Relative variation of junction capacitance versus reverse voltage applied (typical values)



2 Ordering information scheme

Figure 10. Ordering information scheme

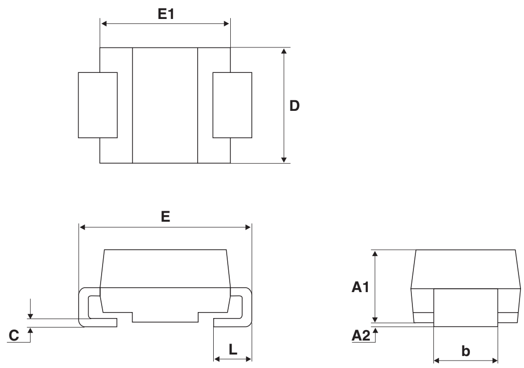


3 Package mechanical data

- Epoxy meets UL94, V0
- Lead-free package

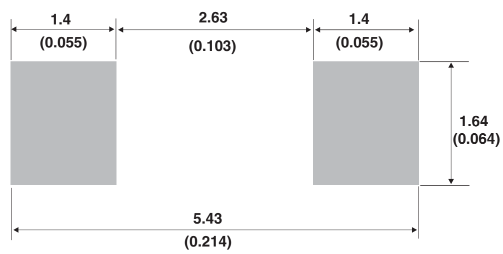
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 6. SMA dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.006	0.016
D	2.25	2.90	0.089	0.114
E	4.80	5.35	0.189	0.211
E1	3.95	4.60	0.156	0.181
L	0.75	1.50	0.030	0.059

Figure 11. Footprint (dimensions in mm)



4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
SMP30-62	QAA	SMA	0.06 g	5000	Tape and 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				

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
November-2002	4B	Last update.
10-Nov-2004	5	SMA package dimensions update. Reference A1 max. changed from 2.70mm (0.106 inch) to 2.03mm (0.080 inch).
13-Dec-2004	6	Figure 7 text legend corrected from "... reverse voltage applied" to "... junction capacitance".
01-Jul-2010	7	Added ECOPACK statement. Updated trademark statement. Removed section on test circuits.