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## Trisil™ for telecom equipment protection

### Features

- bidirectional crowbar protection
- voltage: 8 V
- low leakage current:  $I_R = 2 \mu\text{A}$  max
- holding current:  $I_H = 150 \text{ mA}$  min
- repetitive peak pulse current:  
 $I_{PP} = 75 \text{ A}$  (10/1000  $\mu\text{s}$ )

### 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 to meet main standards such as UL1950, IEC 950 / CSA C22.2 and UL1459.
- Trisils have UL94 V0 approved resin.
- SMB package is JEDEC registered (DO-214AA).
- Trisils comply with the following standards:
  - GR-1089 Core
  - ITU-T-K20/K21
  - VDE0433
  - VDE0878
  - IEC 61000-4-5
  - FCC part 68

### Applications

Any sensitive equipment requiring protection against lightning strikes and power crossing:

- Ethernet,
- T1/E1

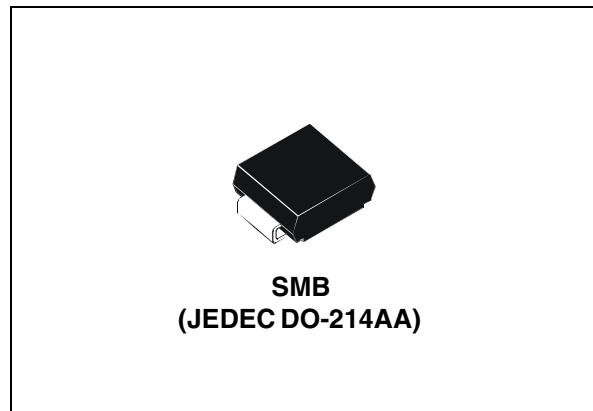
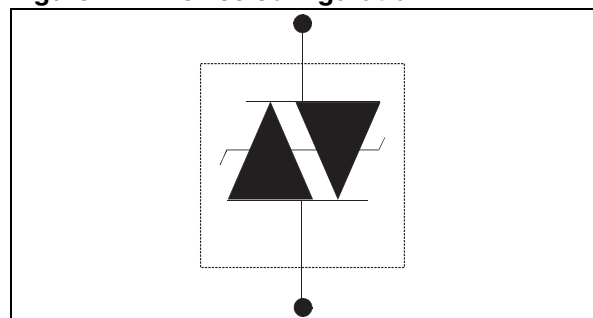


Figure 1. Device configuration



### Description

The SMP75 is a very low voltage transient surge arrester especially designed to protect sensitive telecommunication equipment against lightning strikes and other transients. Its low voltage makes it suitable to protect low voltage transformer in T1/E1 and Ethernet links without saturation of the transformer.

**TM:** Trisil is a trademark of STMicroelectronics.

# 1 Characteristics

**Table 1. 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 ( $\Omega$ )
GR-1089 Core First level	2500	2/10 $\mu$ s	500	2/10 $\mu$ s	5
	1000	10/1000 $\mu$ s	100	10/1000 $\mu$ s	3.3
GR-1089 Core Second level	5000	2/10 $\mu$ s	500	2/10 $\mu$ s	10
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	10
	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	0
	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	0
	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	2.5
	800	10/560 $\mu$ s	100	10/560 $\mu$ s	0
FCC Part 68, lightning surge type B	1000	9/720 $\mu$ s	25	5/320 $\mu$ s	0

**Table 2. Absolute ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

Symbol	Parameter	Value	Unit	
$I_{PP}$	Repetitive peak pulse current	10/1000 $\mu\text{s}$ 8/20 $\mu\text{s}$ 10/560 $\mu\text{s}$ 5/310 $\mu\text{s}$ 10/160 $\mu\text{s}$ 1/20 $\mu\text{s}$ 2/10 $\mu\text{s}$	75 250 100 120 150 250 250	A
$I_{FS}$	Fail-safe mode : maximum current <sup>(1)</sup>	8/20 $\mu\text{s}$	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 8 6.5 2	A
$I^2t$	$I^2t$ value for using	t = 16.6 ms t = 20 ms	12 12.2	A <sup>2</sup> s
$T_{stg}$	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	$^{\circ}\text{C}$

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)	100	$^{\circ}\text{C/W}$
$R_{th(j-l)}$	Junction to leads	20	$^{\circ}\text{C/W}$

**Table 4. Electrical characteristics - definitions ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

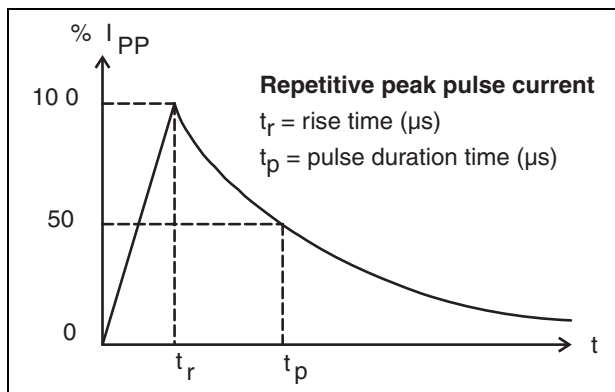
Symbol	Parameter
$V_{RM}$	Stand-off voltage
$V_{BR}$	Breakdown voltage
$V_{BO}$	Breakover voltage
$I_{RM}$	Leakage current
$I_{PP}$	Peak pulse current
$I_{BO}$	Breakover current
$I_H$	Holding current
$V_R$	Continuous reverse voltage
$I_R$	Leakage current at $V_R$
C	Capacitance

**Table 5. Electrical characteristics - values ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

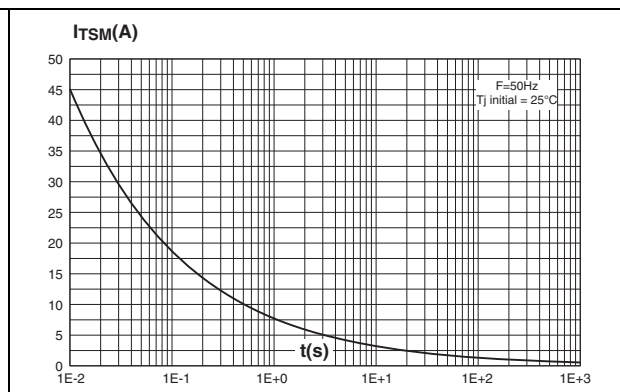
Order code	$I_{RM} @ V_{RM}$		$I_R^{(1)} @ V_R$		Dynamic $V_{BO}$	Static $V_{BO} @ I_{BO}$		$I_H$	$C^{(2)}$
	max.		max.		max.	max.	max.	typ.	max.
	$\mu\text{A}$	V	$\mu\text{A}$	V	V	V	mA	mA	pF
SMP75-8	2	6	5	8	20	15	800	50	60

- $I_R$  measured at  $V_R$  guaranteed  $V_{BR} \text{ min} \geq V_R$
- $V_R = 2\text{ V}$  bias,  $V_{RMS} = 1\text{ V}$ ,  $F = 1\text{ MHz}$

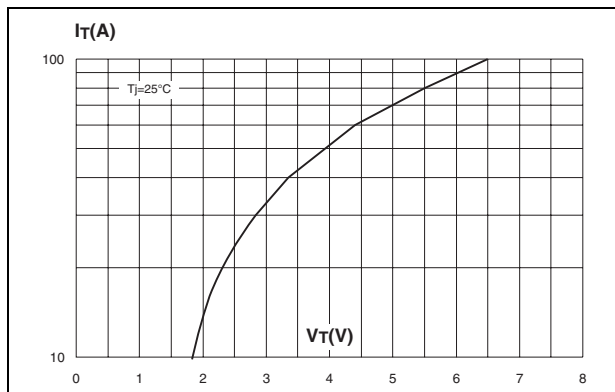
**Figure 2. Pulse waveform**



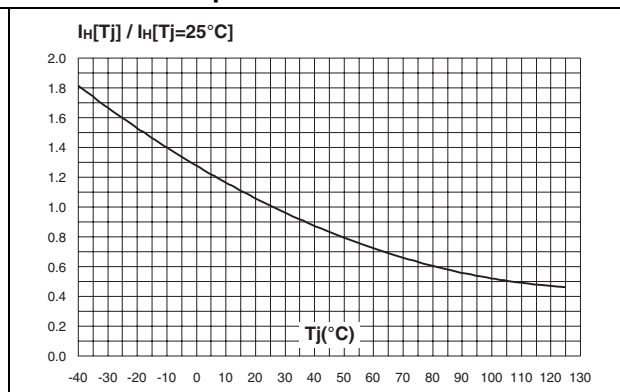
**Figure 3. Non repetitive surge peak on-state current versus overload duration**



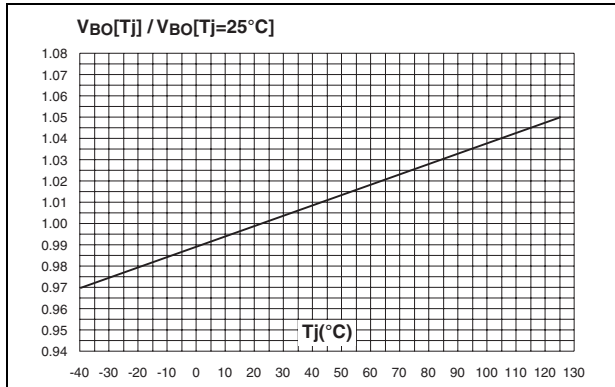
**Figure 4. On-state voltage versus on-state current (typical values)**



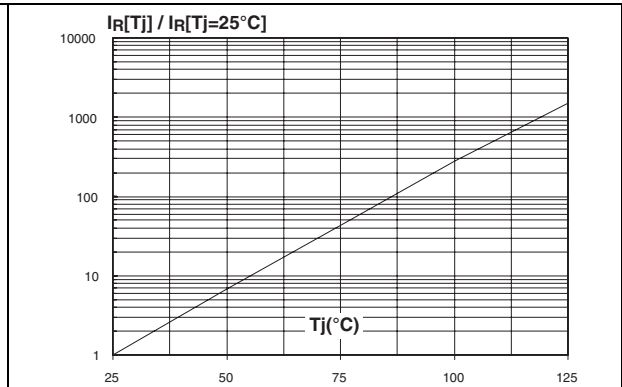
**Figure 5. Relative variation of holding current versus junction temperature**



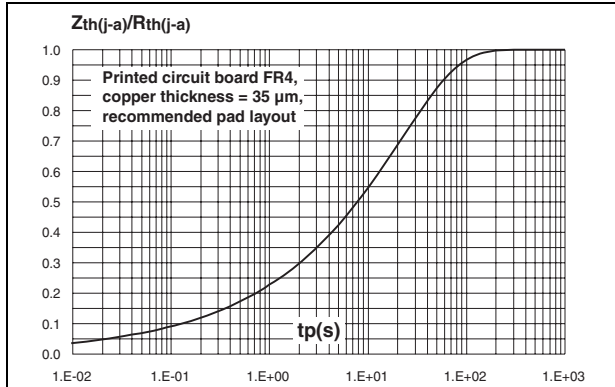
**Figure 6. Relative variation of breakover voltage versus junction temperature**



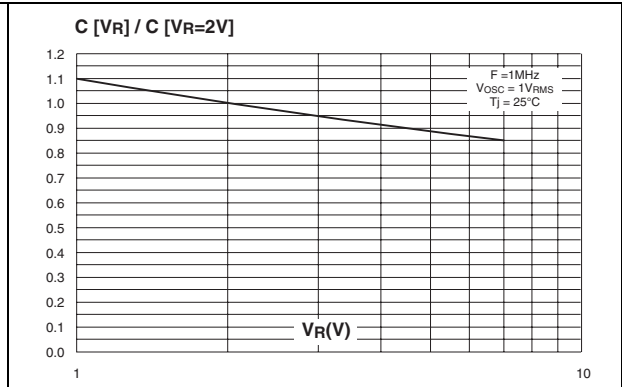
**Figure 7. Relative variation of leakage current versus reverse voltage applied (typical values)**



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

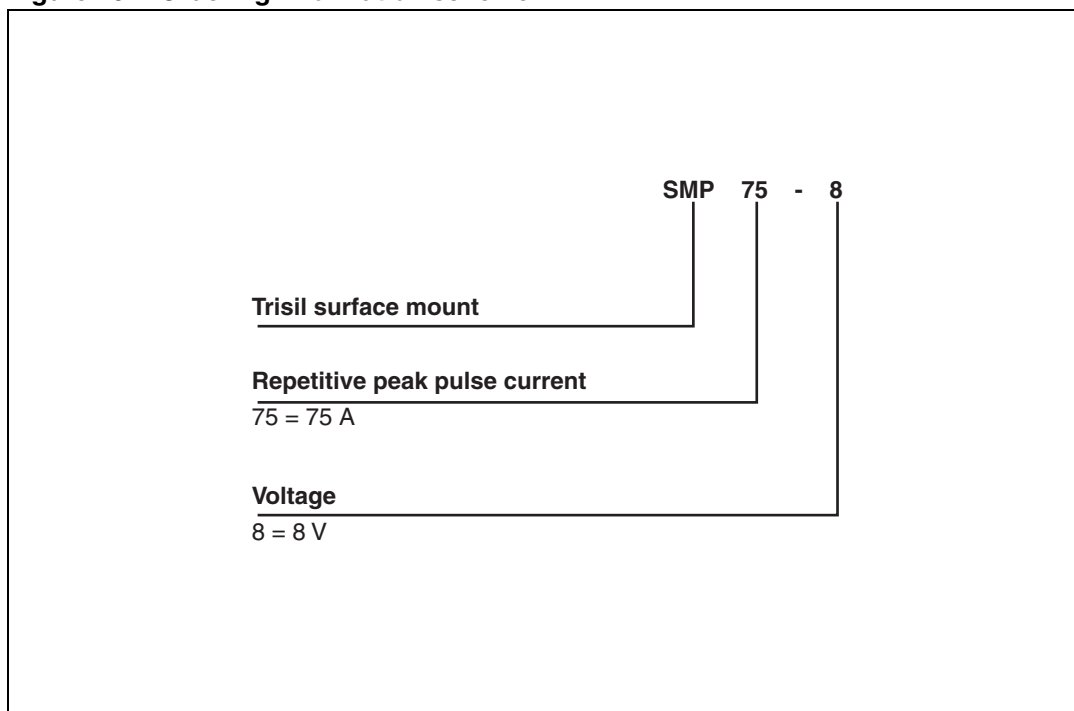


**Figure 9. Relative variation of junction capacitance versus reverse voltage applied (typical values)**



## 2 Ordering information scheme

Figure 10. Ordering information scheme



### 3 Package information

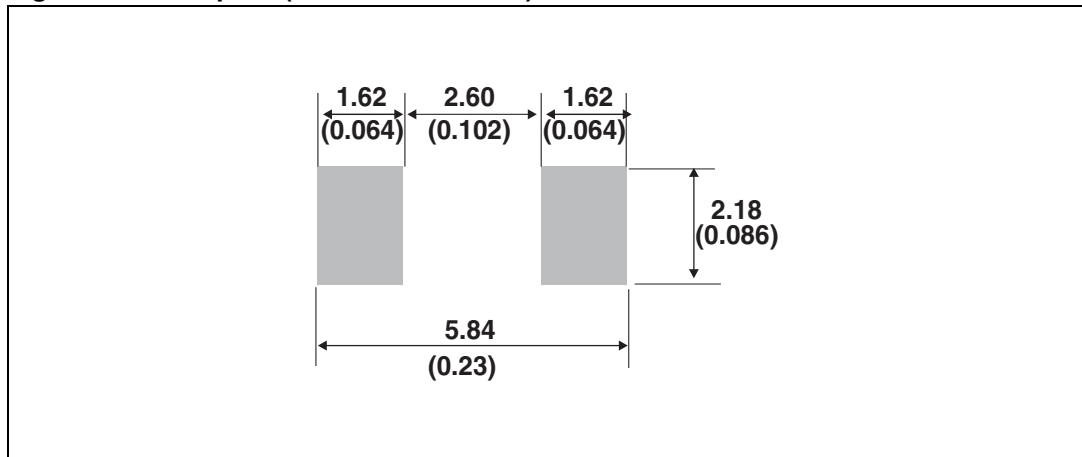
- Epoxy meets UL94, V0
- Lead-free package

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](http://www.st.com). ECOPACK® is an ST trademark.

**Table 6. SMB Dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	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
SMP75-8	L08	SMB	0.11 g	2500	Tape and reel

## 5 Revision history

Table 8. Document revision history

Date	Revision	Changes
19-July-2005	3	Previous issue
02-Jan-2006	4	Added ECOPACK statement and changed page layout. Minor updates to technical values in Tables 1, 2, and 4.
19-Oct-2010	5	Updated ECOPACK statement. Updated trademark statement. Updated <a href="#">Figure 11</a> . Removed Section 2 Test circuits.

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