

## 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  $\mu\text{s}$ )

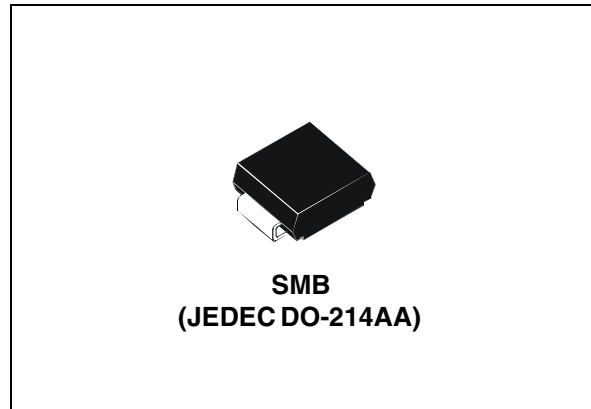
### Benefits

- 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

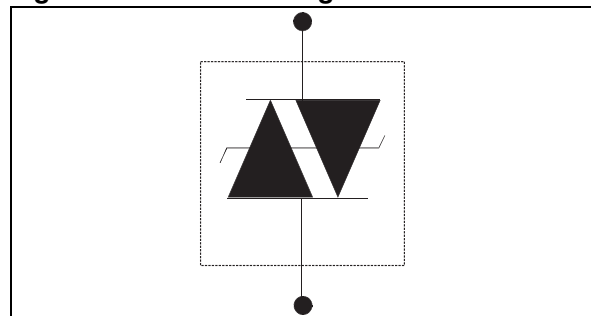
### Applications

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

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

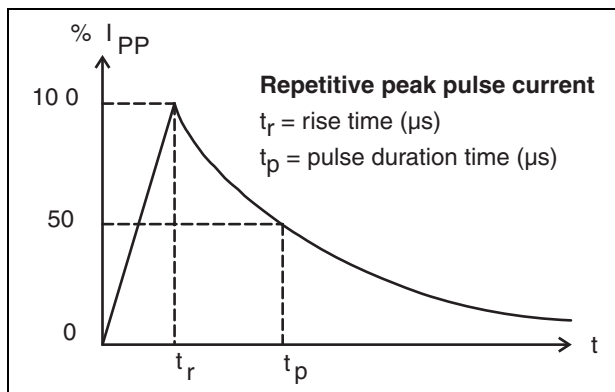
Symbol	Parameter	
$V_{RM}$	Stand-off voltage	
$V_{BR}$	Breakdown voltage	
$V_{BO}$	Breakover voltage	
$I_{RM}$	Leakage current	
$I_{PP}$	Peak pulse current	
$I_{BO}$	Breakover current	
$I_H$	Holding current	
$V_R$	Continuous reverse voltage	
$I_R$	Leakage current at $V_R$	
C	Capacitance	

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

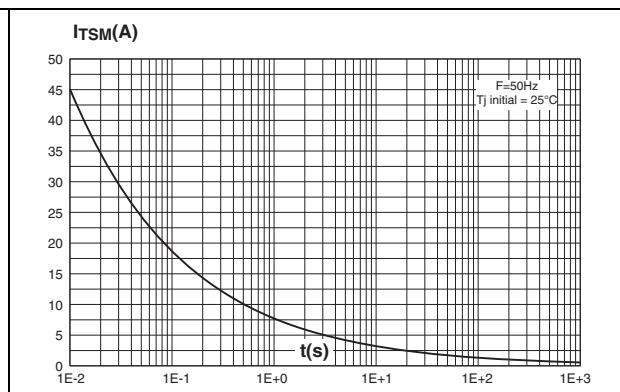
Order code	$I_{RM} @ V_{RM}$		$I_R^{(1)} @ V_R$		Dynamic $V_{BO}$	Static $V_{BO} @ I_{BO}$		$I_H$	$C^{(2)}$
	max.		max.		max.	max.	max.	typ.	max.
	$\mu\text{A}$	V	$\mu\text{A}$	V	V	V	mA	mA	pF
SMP75-8	2	6	5	8	20	15	800	50	60

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

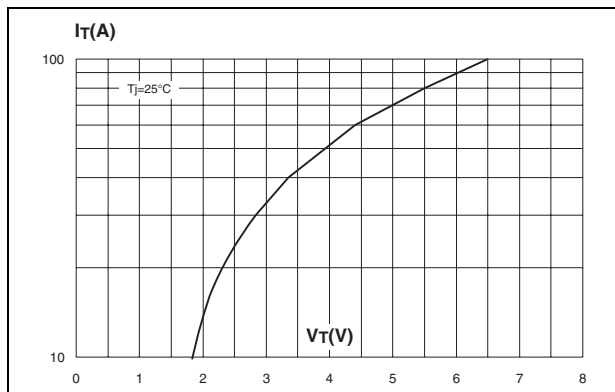
**Figure 2. Pulse waveform**



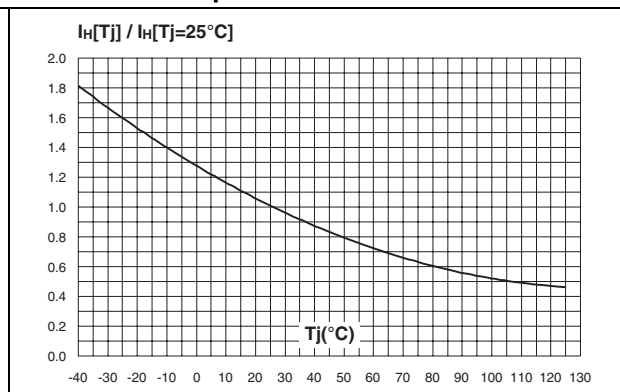
**Figure 3. Non repetitive surge peak on-state current versus overload duration**



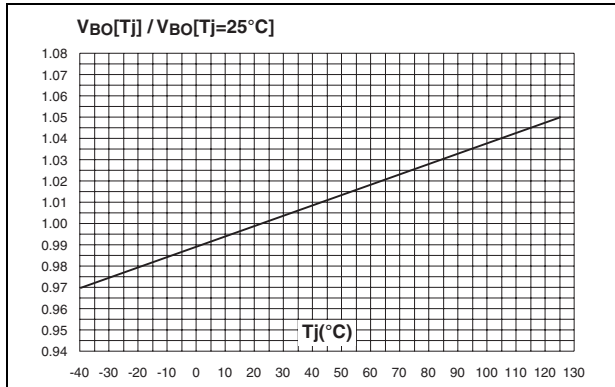
**Figure 4. On-state voltage versus on-state current (typical values)**



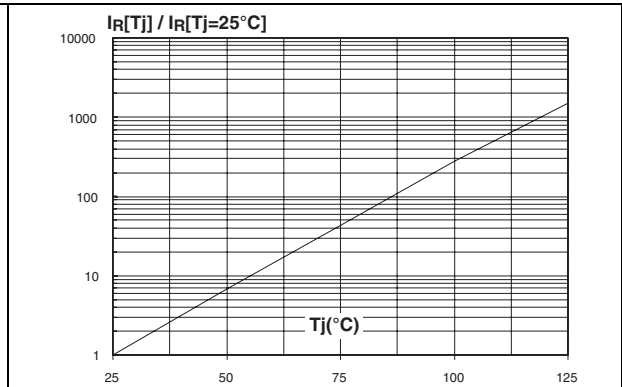
**Figure 5. Relative variation of holding current versus junction temperature**



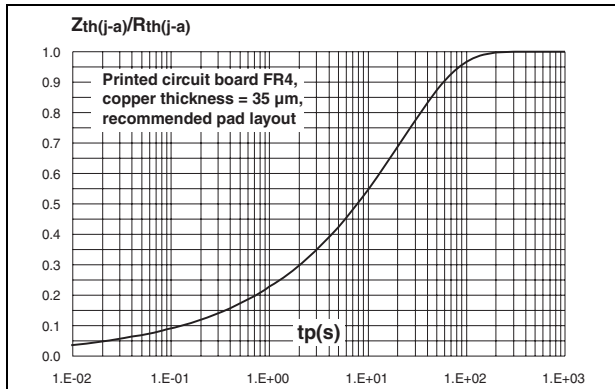
**Figure 6. Relative variation of breakover voltage versus junction temperature**



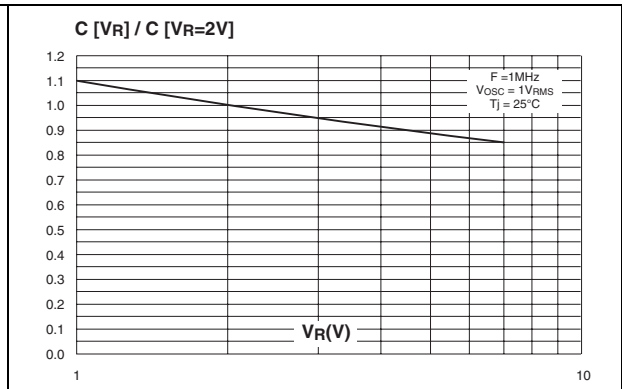
**Figure 7. Relative variation of leakage current versus reverse voltage applied (typical values)**



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

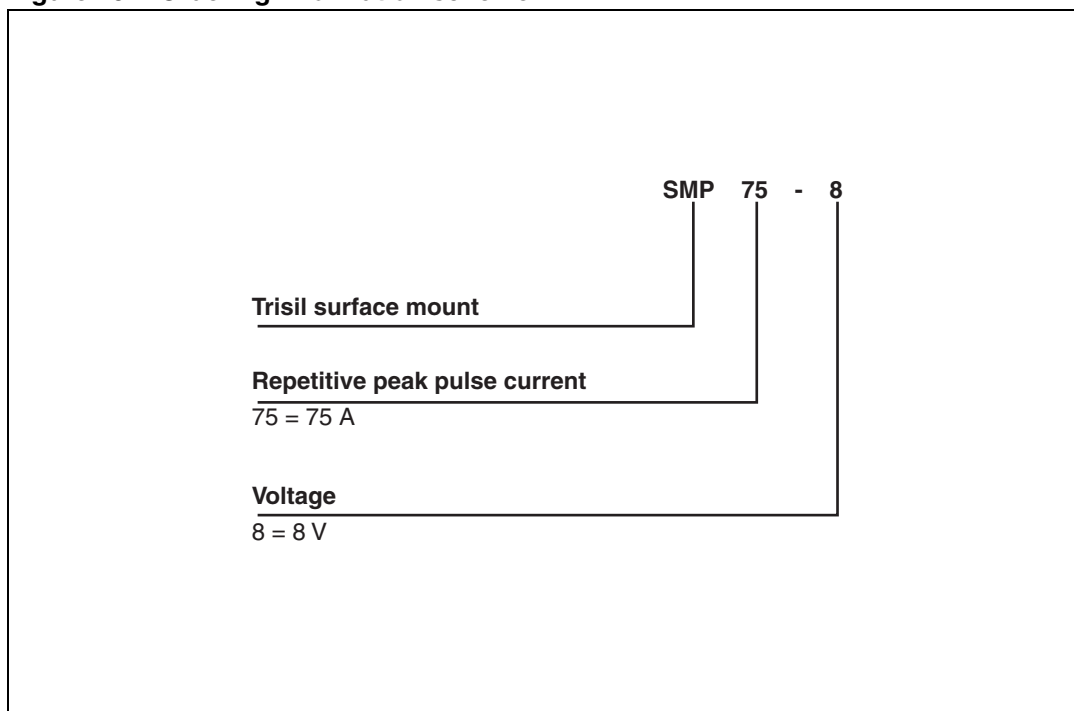


**Figure 9. Relative variation of junction capacitance versus reverse voltage applied (typical values)**



## 2 Ordering information scheme

Figure 10. Ordering information scheme



### 3 Package information

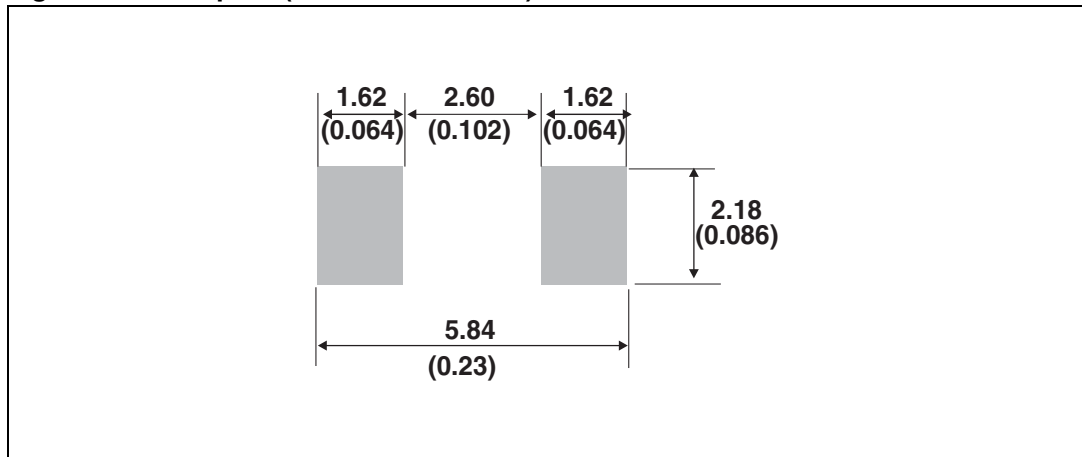
- Epoxy meets UL94, V0
- Lead-free package

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.



**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2010 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)