TPN3021

Tripolar overvoltage protection for network interfaces

Features

- Triple crowbar protection
- Low capacitance
- Low holding current: I_H = 30 mA minimum
- Surge current:
  - I_{PP} = 200 A, 2/10 µs
  - I_{PP} = 30 A, 10/1000 µs

Main applications

Dedicated to data line protection, this device provides a tripolar protection function. It ensures the same protection capability with the same breakdown voltage in both common and differential modes.

Description

The TPN3021 is a low capacitance transient surge arrestor designed for protection of high debit rate communication network. Its low capacitance avoids distorsion of the signal as it has been designed for T1/E1 and Ethernet networks.

Benefits

Trisil technology is not subject to ageing and provides a fail safe mode in short circuit for a better protection. They are used to help equipment to meet main standards such as UL1950, IEC950 / CSA C22.2 and UL1459. They have UL94 V0 ap-proved resin. SO8 package is JEDEC registered.

Trisils comply with the following standards GR-1089 Core, ITU-T-K20/K21, VDE0433, VDE0878, IEC61000-4-2.

SO-8
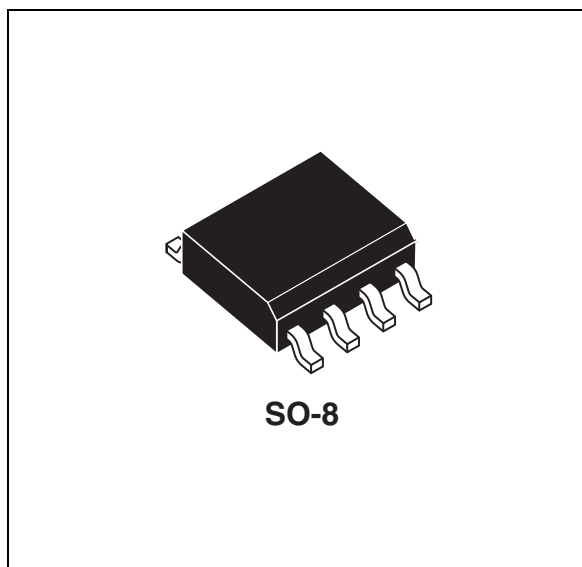
Schematic diagram
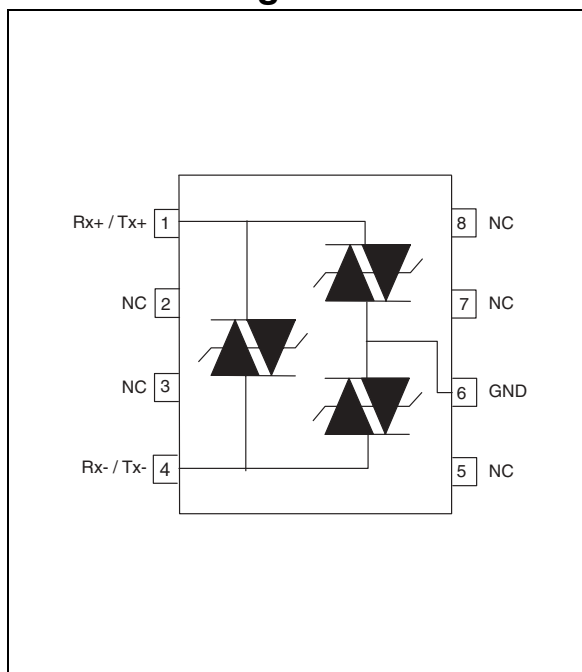
1   Characteristics

Table 1.   Complies with the following standards

Standard	Peak surge voltage (V)	Voltage waveform	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	7.5 25
GR-1089 Core Intrabuilding	1500	2/10 µs	100	2/10 µs	0
ITU-T-K20/K21	1000	10/700 µs	25	5/310 µs	0
ITU-T-K20 (IEC61000-4-2)	6000 8000	1/60 ns	ESD contact discharge ESD air discharge		- -
VDE0433	4000 2000	10/700 µs	100 50	5/310 µs	40 0
VDE0878	4000 2000	1.2/50 µs	100 50	1/20 µs	0 0
IEC61000-4-5	2000 2000	10/700 µs 1.2/50 µs	50 50	5/310 µs 8/20 µs	0 0

Table 2.   Electrical characteristics (T_{amb}=25°C)

Symbol	Parameter
V_{RM}	Stand-off voltage
V_{BO}	Breakover voltage
V_{BR}	Breakdown voltage
I_H	Holding current
I_{BO}	Breakover current
I_{RM}	Leakage current at VRM
I_{PP}	Peak pulse current
C	Capacitance
V_R	Continous reverse voltage
I_R	Leakage current at VR
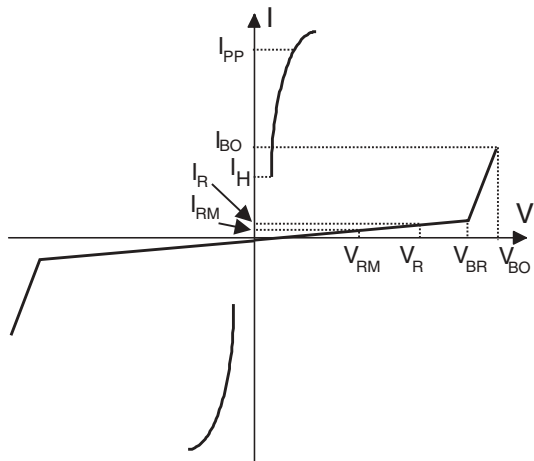
Table 3.   Absolute ratings (T$_{amb}$ =25°C)

Symbol	Parameter		Value	Unit
I$_{pp}$	Peak pulse pulse current: tr / tp	10/1000 µs 8/20 µs 10/560 µs 5/310 µs 10/160 µs 1/20 µs 2/10 µs	30 100 40 50 75 100 200	A
I$_{TSM}$	Non repetitive surge peak on-state current One cycle	50 Hz 60 Hz	8 9	A
	Non repetitive surge peak on-state current F=50Hz	0.2 s 2 s	3 1.5	A
T$_{stg}$ T$_j$	Storage temperature range Operating junction temperature range		-55 to +150 -40 to +150	°C °C
T$_L$	Maximum lead temperature for soldering during 10s		260	°C

Repetitive peak pulse current
t$_r$: rise time (µs)
t$_p$: pulse duration time (µs)

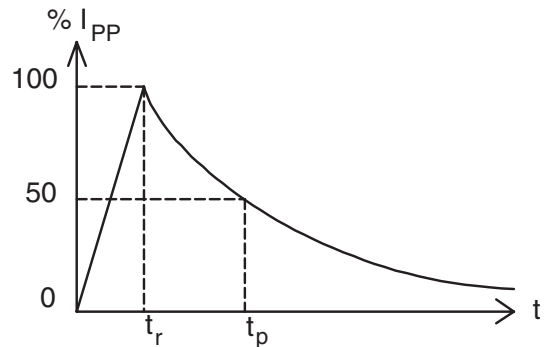example: pulse waveform
10/1000 µs, tr = 10 µs, tp = 1000 µs

Table 4.   Thermal resistances

Symbol	Parameter	Value	Unit
R$_{th(j-a)}$	Junction to ambient	170	°C/W

Table 5.   Electrical parameters (T$_{amb}$ = 25°C)

Type	I$_{RM}$ @V$_{RM}$ max.		V$_{BO}$ max@I$_{BO}$ [1] max.		I$_H$ [2] min.	C[3] typ.
	µA	V	V	mA	mA	pF
TPN3021	4	28	38	300	30	16

1. See *Figure 1: Test circuit 1 for I$_{BO}$ and V$_{BO}$ parameters*

2. See *Figure 2: Test circuit 2 for I$_H$ parameter*

3. V$_R$ = 0 V bias, V$_{RMS}$ = 1 V, F = 1 MHz

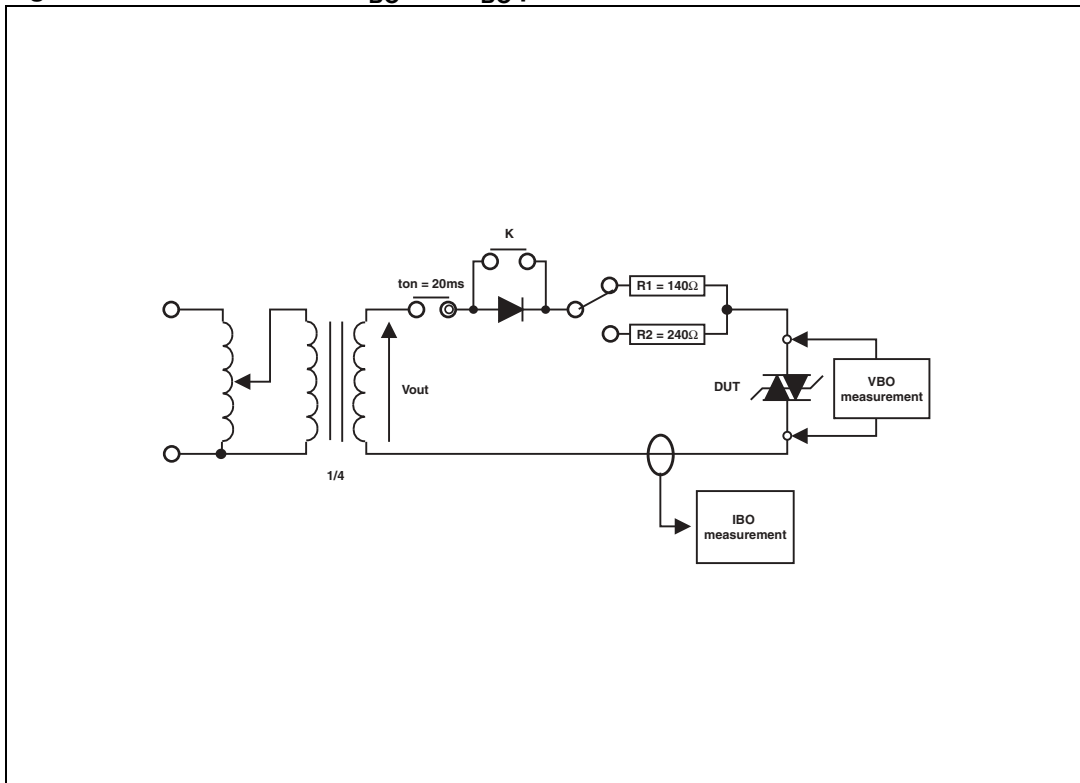### Figure 1. Test circuit 1 for I_{BO} and V_{BO} parameters

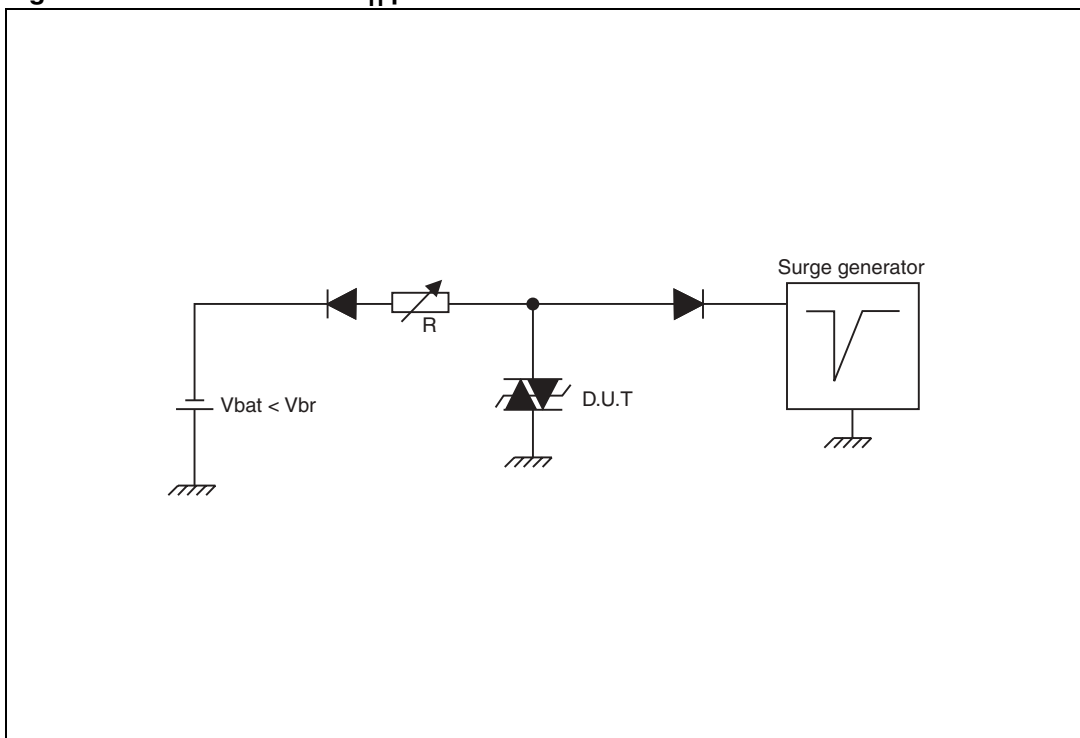### Figure 2. Test circuit 2 for I_H parameter

Figure 3. **Non repetitive surge peak on-state current versus overload duration (T_j initial = 25°C)**
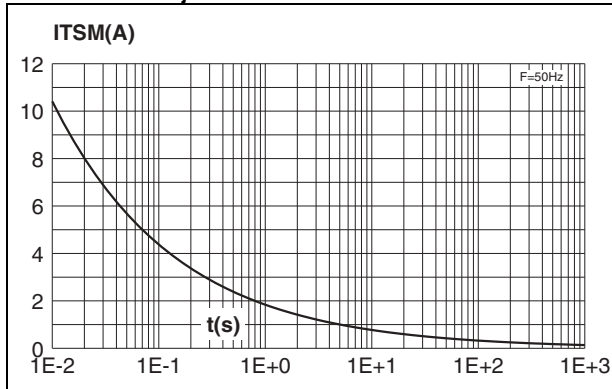
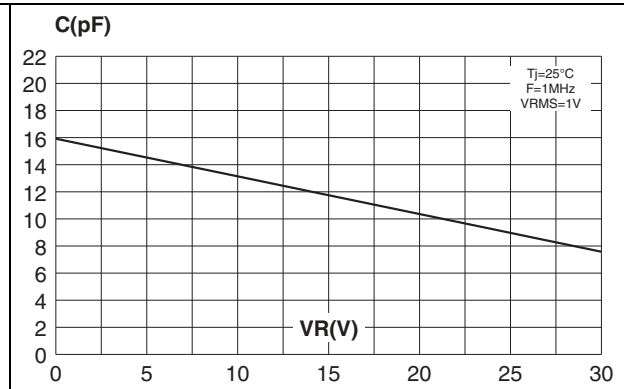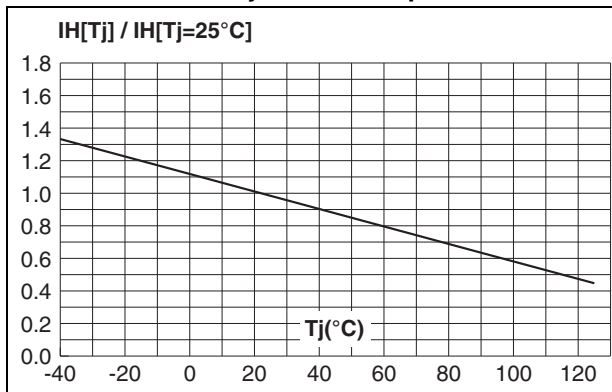**Figure 4.** **Variation of junction capacitance versus reverse voltage applied (typical values)**

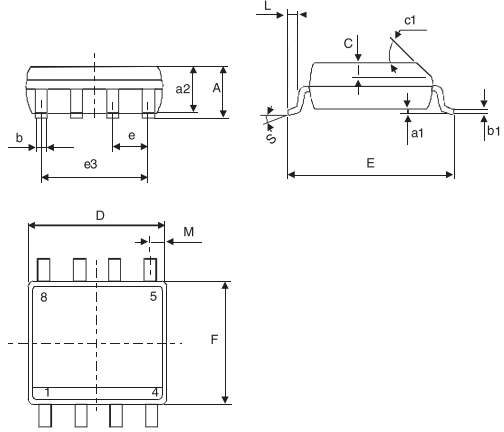**Figure 5.** **Relative variation of holding current versus junction temperature**

2 Ordering information scheme


```
                    TPN   30   2   1   RL

Tripolar Protection
for Network

Numerical code

Version

Package:
1 = SO-8 Plastic

Packaging:
RL = Tape & reel
    = Tube
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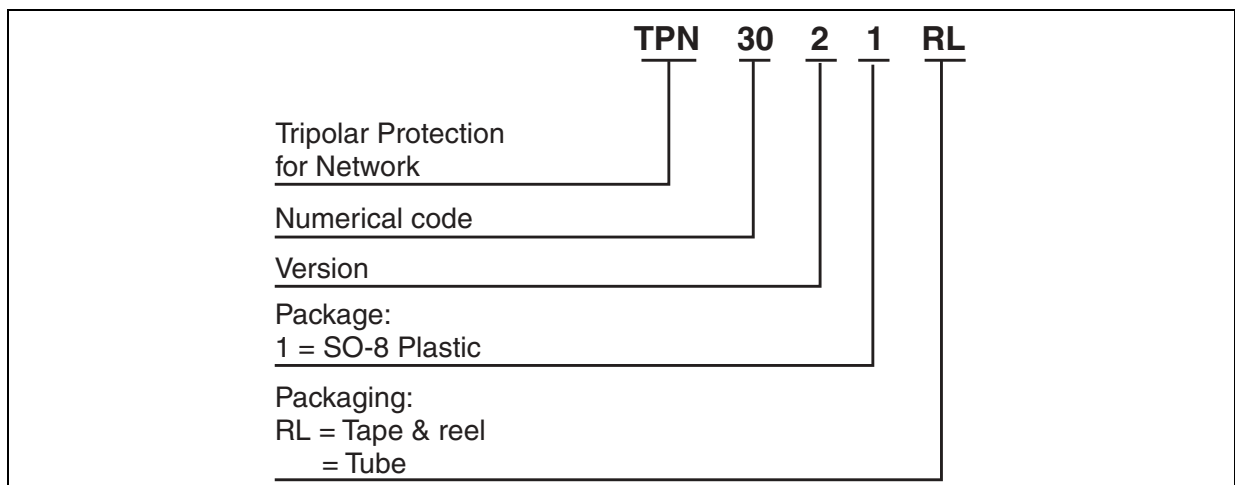
3 Package mechanical data

Table 6. SO-8 (Plastic) dimensions

REF.	DIMENSIONS					
	Millimetres			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.50				0.020	
c1	45° (typ)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max)					

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

4 Ordering information

Part number	Marking	Package	Weight	Base qty	Delivery mode
TPN3021	TPN302	SO-8	0.08 g	100	Tube
TPN3021RL[1]	TPN302			2500	Tape and reel

1. Preferred device

5 Revision history

Date	Revision	Changes
Sep 2001	3	Previous release.
07-Feb-2006	4	Reformatted to current template. Maximum junction temperature parameter replaced by Operating junction temperature range in Table 3. Added footnote 1 to Ordering information table

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