

# TPN3021

# Tripolar overvoltage protection for network interfaces

## Features

- Triple crowbar protection
- Low capacitance
- Low holding current: I<sub>H</sub> = 30 mA minimum
- Surge current:
  - I<sub>PP</sub> = 200 A, 2/10 μs
  - I<sub>PP</sub> = 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.

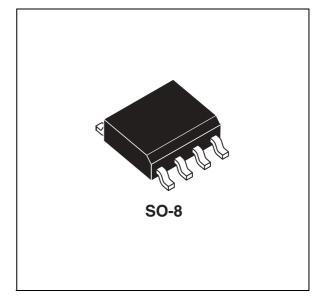
## Description

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.

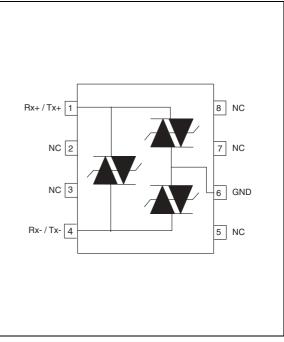
## Benefits

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.



## Schematic diagram



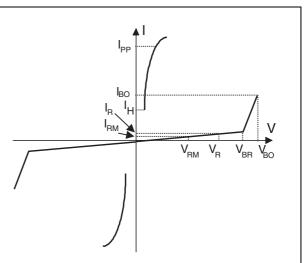
# 1 Characteristics

Standard	Peak surge voltage (V)	Voltage waveform	Required peak current (A)		
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		t discharge discharge	
VDE0433	4000 2000	10/700 µs	00 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 1.	Complies with the following standards

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

Symbol	Parameter
V <sub>RM</sub>	Stand-off voltage
V <sub>BO</sub>	Breakover voltage
V <sub>BR</sub>	Breakdown voltage
I <sub>H</sub>	Holding current
I <sub>BO</sub>	Breakover current
I <sub>RM</sub>	Leakage current at VRM
I <sub>PP</sub>	Peak pulse current
С	Capacitance
V <sub>R</sub>	Continous reverse voltage
۱ <sub>R</sub>	Leakage current at VR



	Absolute ratings (ramb =25 0)			
Symbol	Parameter	Value	Unit	
I <sub>pp</sub>	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
	Non repetitive surge peak on-state current One cycle	50 Hz 60 Hz	8 9	А
I <sub>TSM</sub>	Non repetitive surge peak on-state current F=50Hz	0.2 s 2 s	3 1.5	A
T <sub>stg</sub> T <sub>j</sub>	Storage temperature range Operating junction temperature range		-55 to +150 -40 to +150	°C ℃
Τ <sub>L</sub>	Maximum lead temperature for soldering during 10s	260	°C	

Table 3. Absolute ratings (T<sub>amb</sub> =25°C)

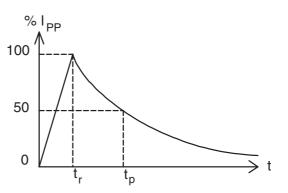
#### Repetitive peak pulse current

 $t_r$ : rise time (µs)

 $t_p$ : pulse duration time (µs)

example: pulse waveform

 $10/1000 \ \mu s, tr = 10 \ \mu s, tp = 1000 \ \mu s$ 



#### Table 4. Thermal resistances

Symbol	Parameter	Value	Unit	
R <sub>th(j-a)</sub>	Junction to ambient	170	°C/W	

#### Table 5.Electrical parameters ( $T_{amb} = 25^{\circ}C$ )

Туре	I <sub>RM</sub> @V <sub>RM</sub> max.		V <sub>BO</sub> max max.	(@I <sub>BO</sub> <sup>(1)</sup>	l <sub>H</sub> <sup>(2)</sup> min.	C <sup>(3)</sup> 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<sub>H</sub> parameter

3.  $V_R = 0 V \text{ bias}, V_{RMS} = 1 V, F = 1 MHz$ 



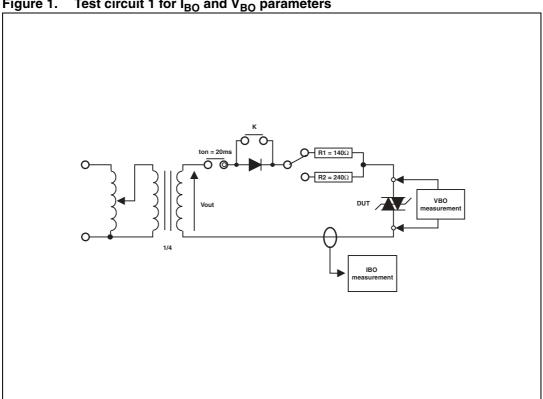
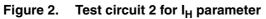
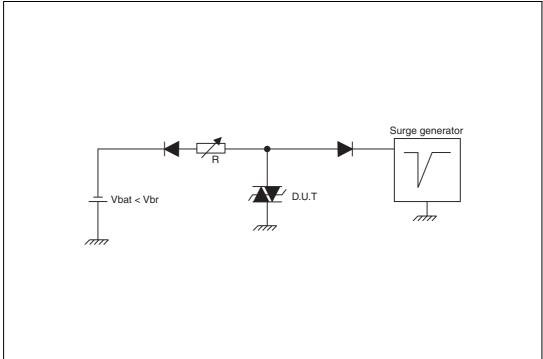


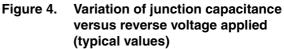
Figure 1. Test circuit 1 for  $I_{BO}$  and  $V_{BO}$  parameters

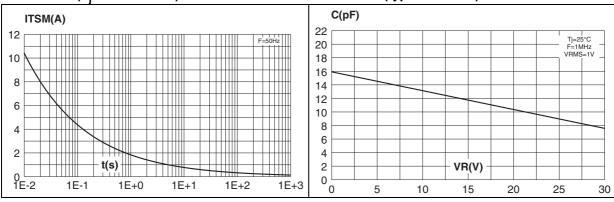




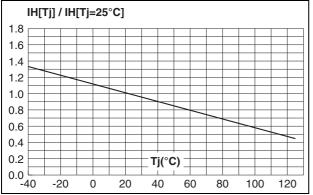
#### **TPN3021**

# Figure 3. Non repetitive surge peak on-state current versus overload duration $(T_i \text{ initial} = 25^{\circ}\text{C})$

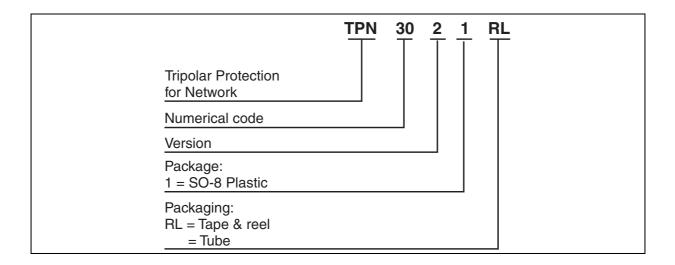








# 2 Ordering information scheme





# **3** Package mechanical data

				DIMEN	ISIONS		
	REF.	Mi	illimetr	es		Inches	
		Min.	Тур.	Max.	Min.	Тур.	Max.
	А			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
	С	0.50				0.020	
	c1			45°	(typ)		
	D	4.8		5.0	0.189		0.197
F	E	5.8		6.2	0.228		0.244
	е		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
	М			0.6			0.024
	S			8° (1	max)		

Table 6.SO-8 (Plastic) dimensions

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	<u> </u>	0.08 g	100	Tube
<b>TPN3021RL</b> <sup>(1)</sup>	TPN302	SO-8	0.00 Y	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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