



# TPN3021

Application Specific Discretes  
A.S.D.™

## TRIPOLAR OVERVOLTAGE PROTECTION FOR NETWORK INTERFACES

### FEATURES

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

### MAIN APPLICATIONS

Dedicated to dataline 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.

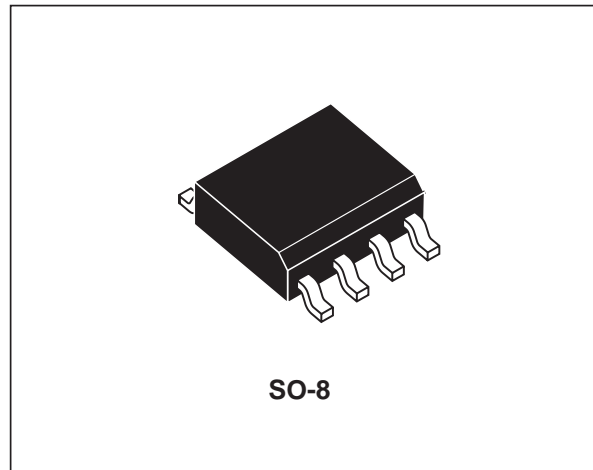
### DESCRIPTION

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

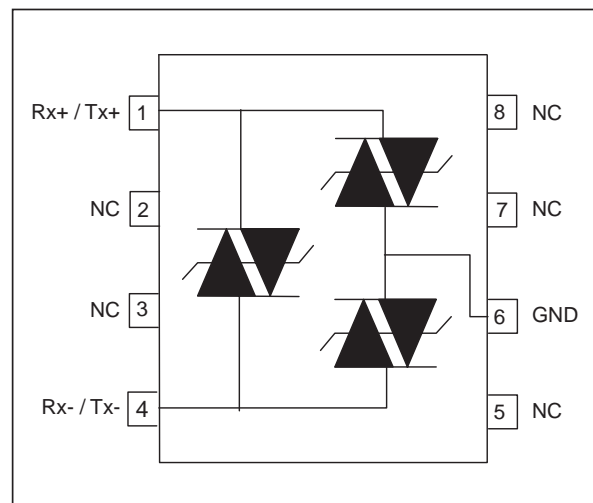
### BENEFITS

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 approved 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



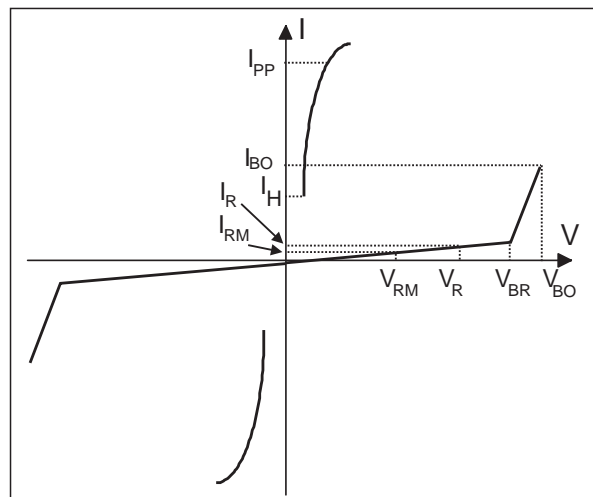
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IN COMPLIANCES WITH THE FOLLOWING STANDARDS

Standard	Peak surge voltage (V)	Voltage waveform	Required peak current (A)	Current waveform	Minimum serial resistor to meet standard ( $\Omega$ )
GR-1089 Core First level	2500 1000	2/10 $\mu$ s 10/1000 $\mu$ s	500 100	2/10 $\mu$ s 10/1000 $\mu$ s	7.5 25
GR-1089 Core Intrabuilding	1500	2/10 $\mu$ s	100	2/10 $\mu$ s	0
ITU-T-K20/K21	1000	10/700 $\mu$ s	25	5/310 $\mu$ s	0
ITU-T-K20 (IEC61000-4-2)	6000 8000	1/60 ns	ESD contact discharge ESD air discharge		- -
VDE0433	4000 2000	10/700 $\mu$ s	100 50	5/310 $\mu$ s	40 0
VDE0878	4000 2000	1.2/50 $\mu$ s	100 50	1/20 $\mu$ s	0 0
IEC61000-4-5	2000 2000	10/700 $\mu$ s 1.2/50 $\mu$ s	50 50	5/310 $\mu$ s 8/20 $\mu$ s	0 0

ELECTRICAL CHARACTERISTICS ( $T_{amb}=25^{\circ}C$ )

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 $V_{RM}$
$I_{PP}$	Peak pulse current
C	Capacitance
$V_R$	Continuous reverse voltage
$I_R$	Leakage current at $V_R$



**ABSOLUTE RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )

Symbol	Parameter		Value	Unit	
$I_{pp}$	Peak pulse current: tr / tp		10/1000 $\mu\text{s}$	30	A
			8/20 $\mu\text{s}$	100	
			10/560 $\mu\text{s}$	40	
			5/310 $\mu\text{s}$	50	
			10/160 $\mu\text{s}$	75	
			1/20 $\mu\text{s}$	100	
			2/10 $\mu\text{s}$	200	
$I_{TSM}$	Non repetitive surge peak on-state current One cycle	50 Hz	8	A	
		60 Hz	9		
	Non repetitive surge peak on-state current F = 50 Hz	0.2 s 2 s	3 1.5	A	
$T_{stg}$ $T_j$	Storage temperature range Maximum junction temperature		- 55 to + 150 150	$^{\circ}\text{C}$ $^{\circ}\text{C}$	
$T_L$	Maximum lead temperature for soldering during 10s		260	$^{\circ}\text{C}$	

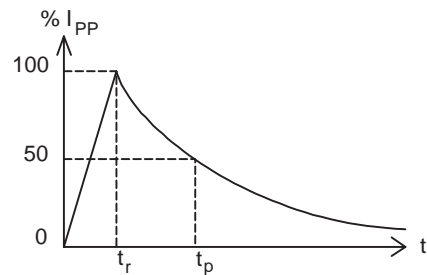
**Repetitive peak pulse current**

tr: rise time ( $\mu\text{s}$ )

tp: pulse duration time ( $\mu\text{s}$ )

ex: pulse waveform

10/1000  $\mu\text{s}$  tr = 10  $\mu\text{s}$  tp = 1000  $\mu\text{s}$



**THERMAL RESISTANCES**

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction to ambient	170	$^{\circ}\text{C}/\text{W}$

**ELECTRICAL PARAMETERS** ( $T_{amb} = 25^{\circ}\text{C}$ )

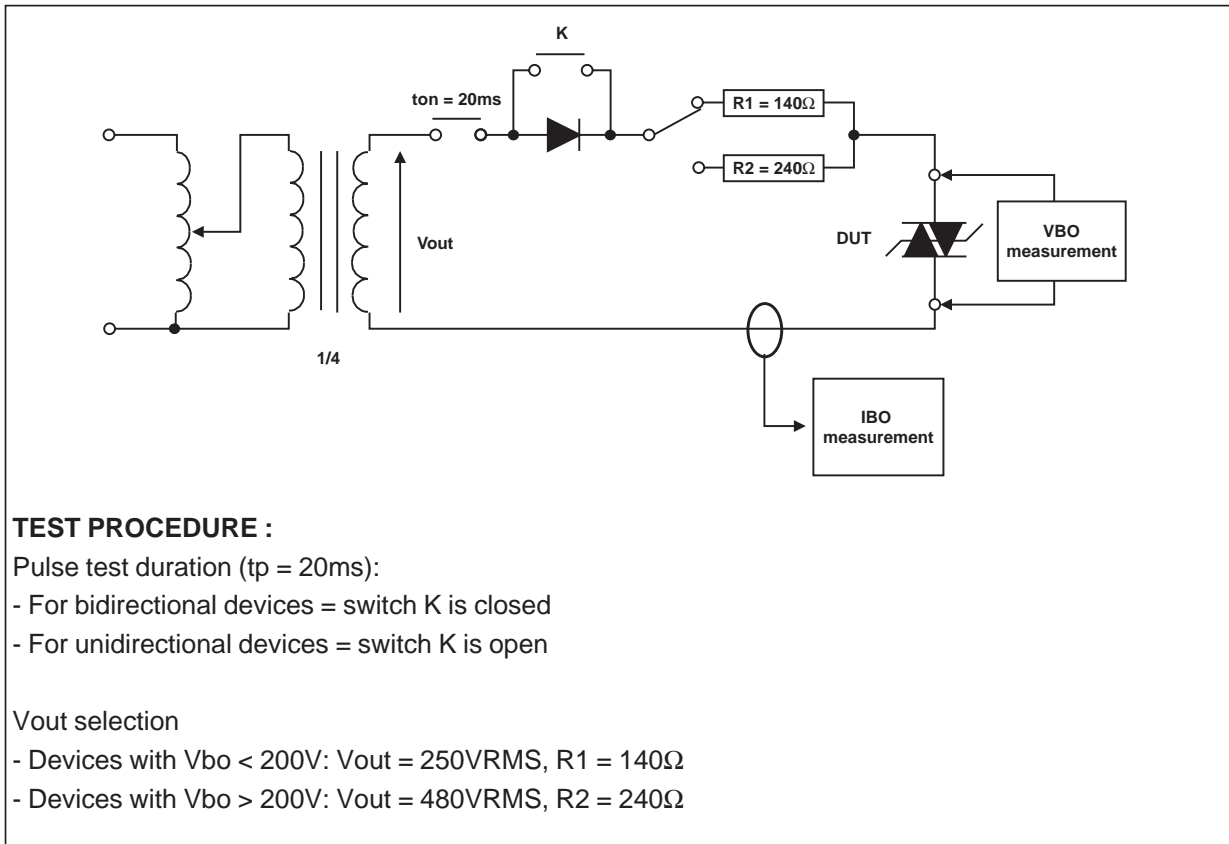
Type	$I_{RM} @ V_{RM}$		$V_{BO} \text{ max } @ I_{BO}$		$I_H$	$C$
	max.		note 1 max		note 2 min.	note 3 typ.
	$\mu\text{A}$	V	V	mA	mA	pF
TPN3021	4	28	38	300	30	16

**Note 1 :** See test circuit 1

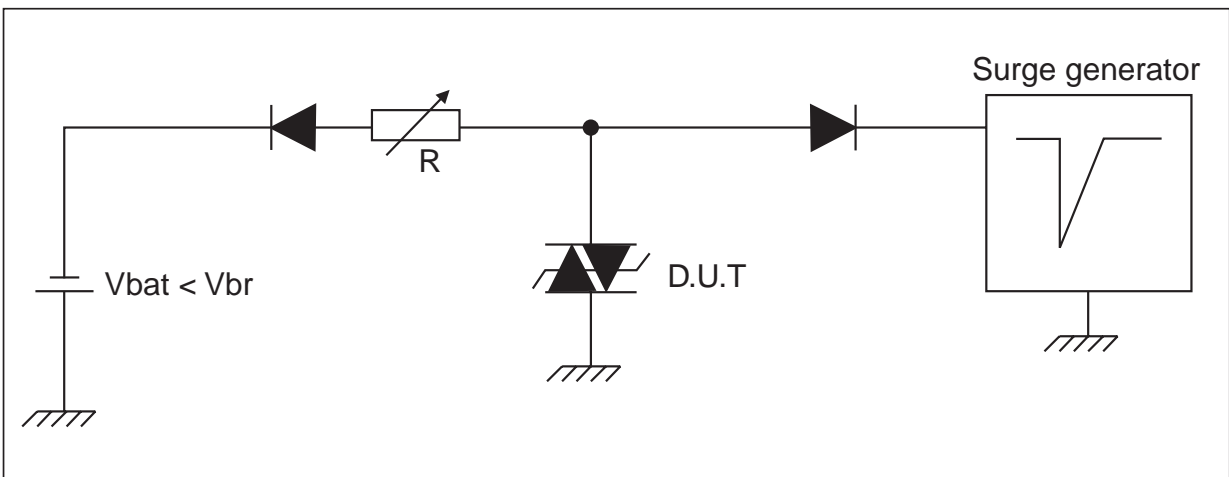
**Note 2 :** See functional holding current test circuit 2

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

**TEST CIRCUIT 1 FOR  $I_{BO}$  AND  $V_{BO}$  PARAMETERS**



**TEST CIRCUIT 2 FOR  $I_H$  PARAMETER**

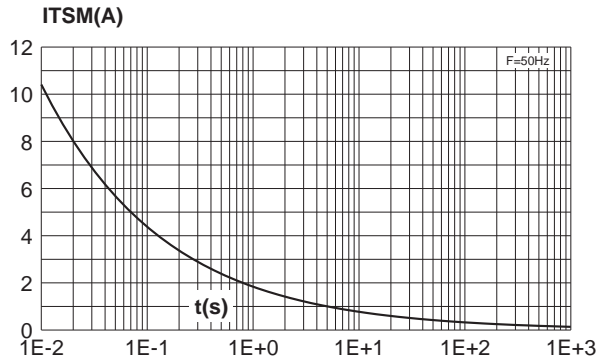


This is a GO-NOGO test which allows to confirm the holding current ( $I_H$ ) level in a functional test circuit.

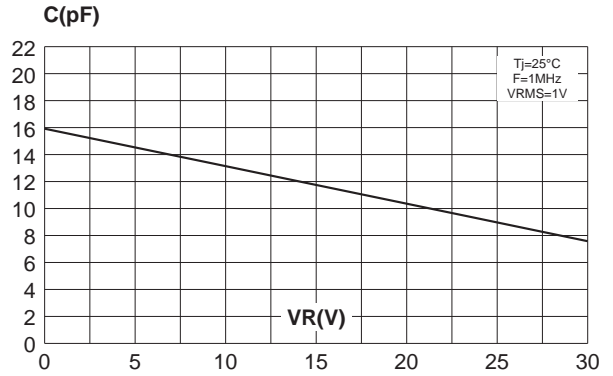
Test procedure:

- 1- Adjust the current level at the  $I_H$  value by short circuiting the DUT.
- 2- Fire the DUT with a surge current  $I_{PP} = 10A$ ,  $10/1000 \mu s$ .
- 3- DUT must come back in off state within maximum 50ns.

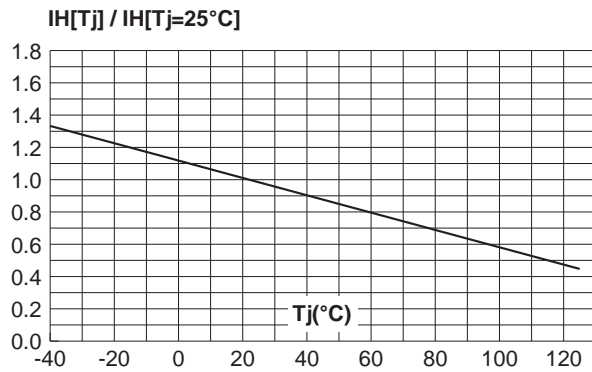
**Fig. 1:** Non repetitive surge peak on-state current versus overload duration ( $T_j$  initial = 25°C)



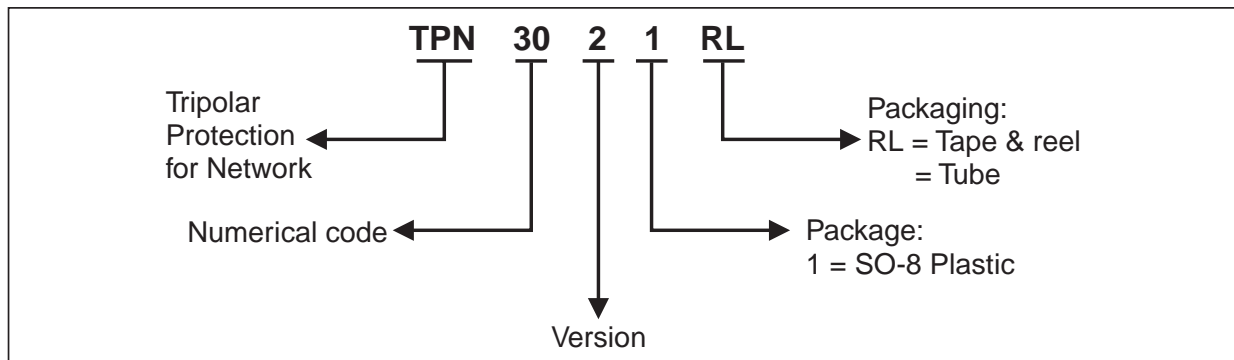
**Fig. 2:** Variation of junction capacitance versus reverse voltage applied (typical values).



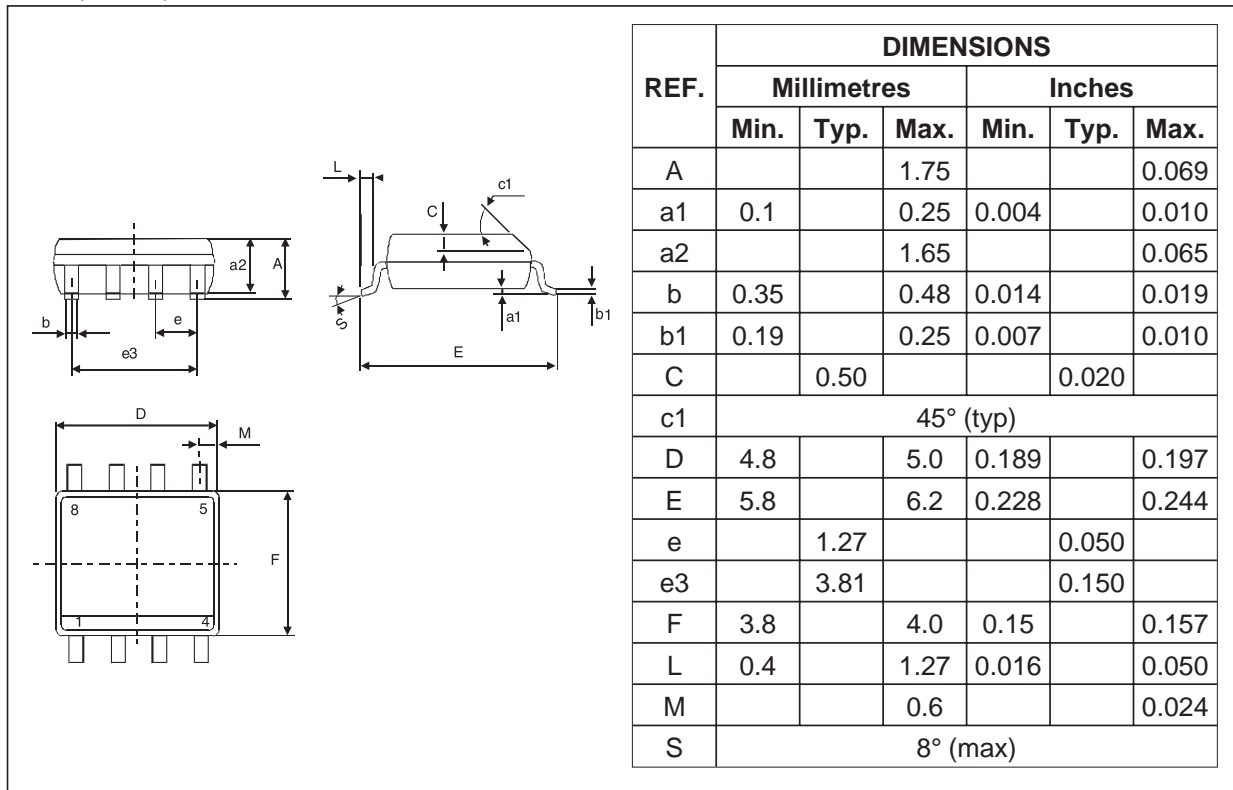
**Fig. 3:** Relative variation of holding current versus junction temperature.



**ORDER CODE**



**PACKAGE MECHANICAL DATA**  
SO-8 (Plastic)



Ordering code	Marking	Package	Weight	Base qty	Delivery mode
TPN3021	TPN302	SO-8	0.08 g	100	Tube
TPN3021RL	TPN302			2500	Tape & reel

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