TPN3021

Application Specific Discretes
A.S.D.™

TRIPOLAR OVERVOLTAGE PROTECTION FOR NETWORK INTERFACES

FEATURES

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

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.

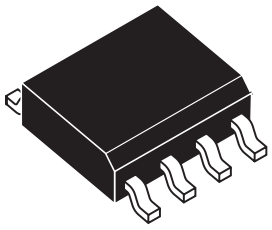
DESCRIPTION

The TPN3021 is a low capacitance transient surge 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

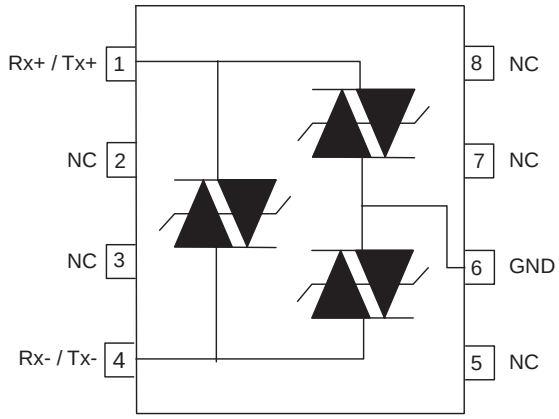
Trisil technology is not subject to ageing and provides a fail safe mode in short circuit for a better protection. They are used to help equipment to meet main standards such as UL1950, IEC950 / CSA C22.2 and UL1459. They have UL94 V0 approved resin. SO8 package is JEDEC registered.

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



SO-8

SCHEMATIC DIAGRAM



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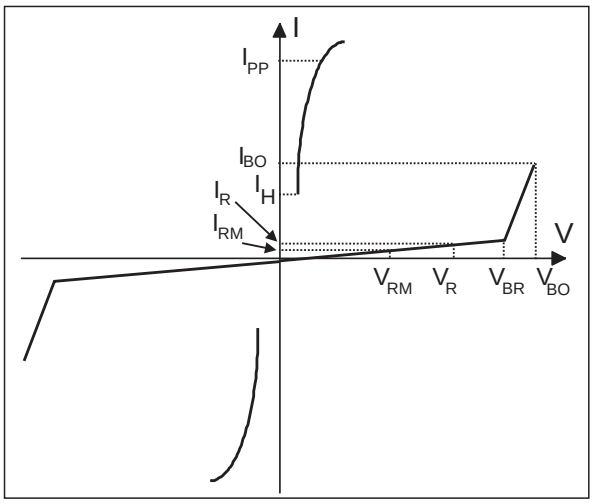
IN COMPLIANCES WITH THE FOLLOWING STANDARDS

Standard	Peak surge voltage (V)	Voltage waveform	Required peak current (A)	Current waveform	Minimum serial resistor to meet standard (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

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



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 = 50 Hz	0.2 s 2 s	3 1.5	A
T_{stg} Tj	Storage temperature range Maximum junction temperature		- 55 to + 150 150	°C °C
T_L	Maximum lead temperature for soldering during 10s		260	°C

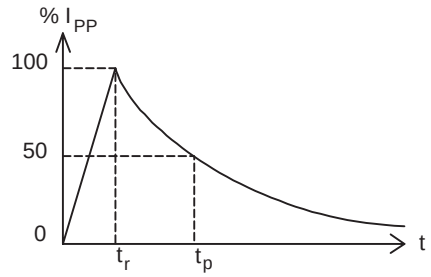
Repetitive peak pulse current

tr: rise time (µs)

tp: pulse duration time (µs)

ex: pulse waveform

10/1000 µs tr = 10 µs tp = 1000 µs



THERMAL RESISTANCES

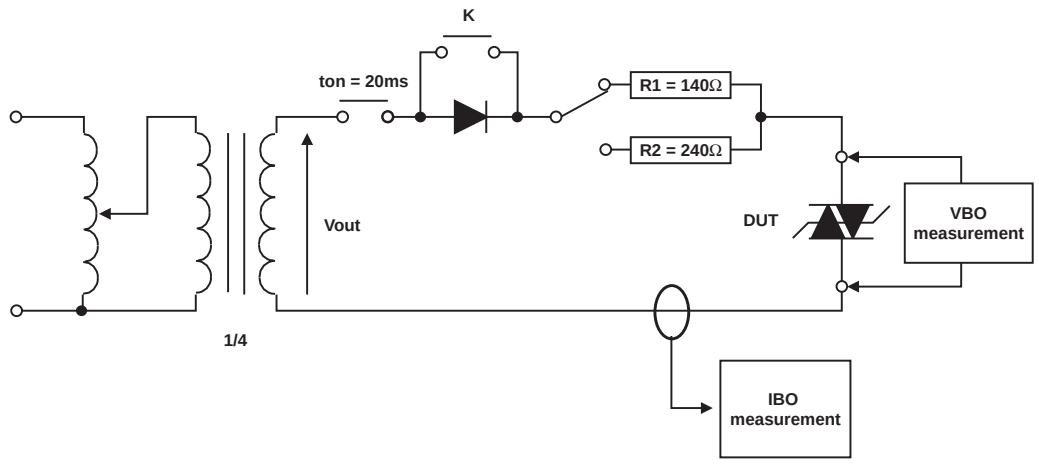
Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction to ambient	170	°C/W

ELECTRICAL PARAMETERS (T_{amb} = 25°C)

Type	I_{RM} @ V_{RM} max.		V_{BO} max @ I_{BO} note 1 max		I_H note 2 min.	C note 3 typ.
	µA	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 = 0V bias, V_{RMS} = 1V, F = 1MHz

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



TEST PROCEDURE :

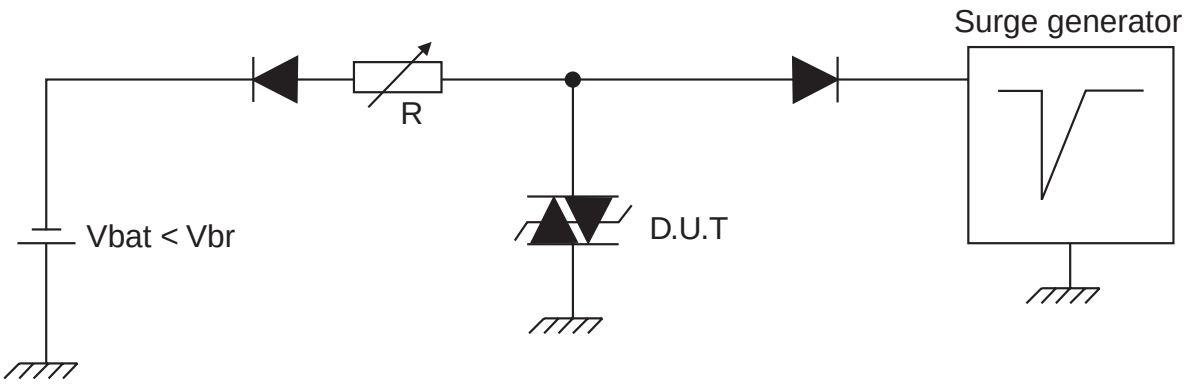
Pulse test duration (tp = 20ms):

- For bidirectional devices = switch K is closed
- For unidirectional devices = switch K is open

Vout selection

- Devices with Vbo < 200V: Vout = 250VRMS, R1 = 140Ω
- Devices with Vbo > 200V: Vout = 480VRMS, R2 = 240Ω

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 µs.

3- DUT must come back in off state within maximum 50ns.

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

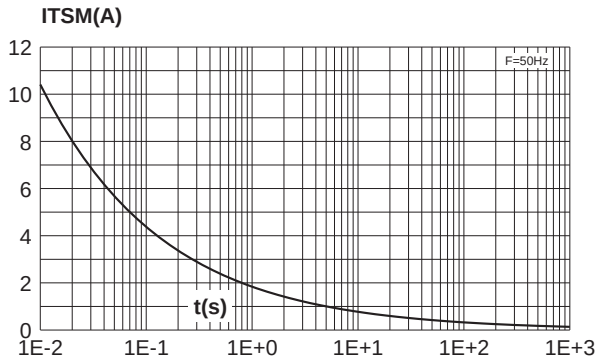


Fig. 2: Variation of junction capacitance versus reverse voltage applied (typical values).

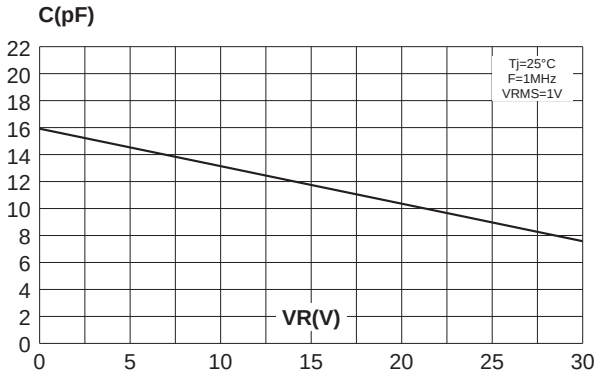
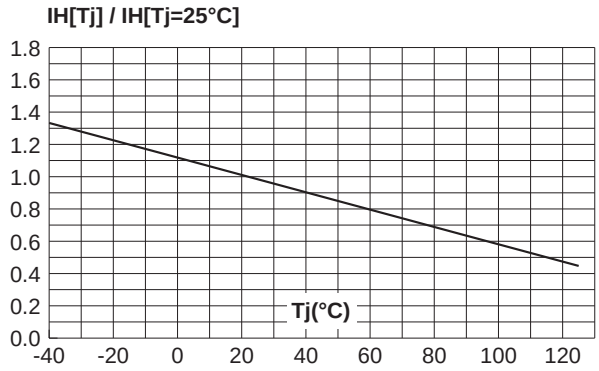
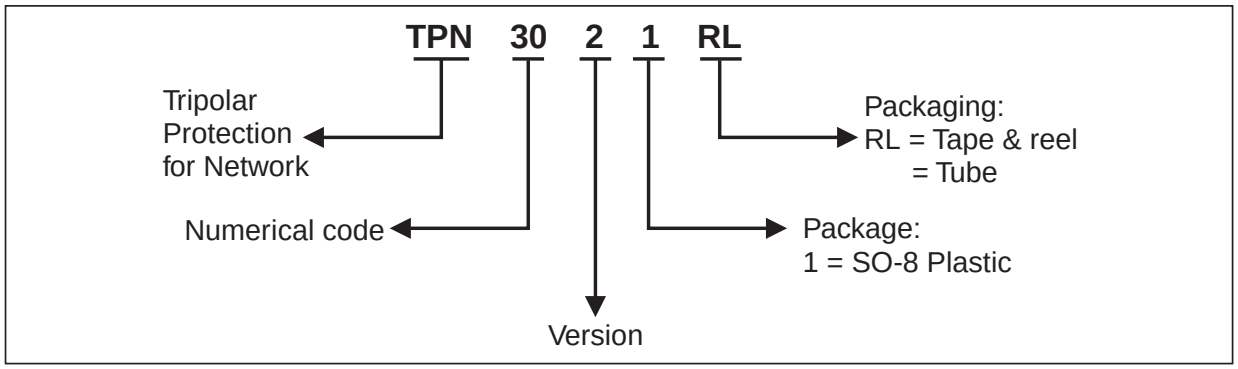


Fig. 3: Relative variation of holding current versus junction temperature.

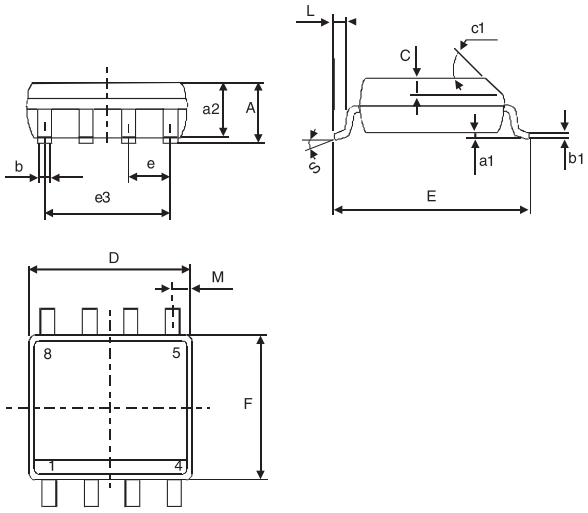


ORDER CODE



PACKAGE MECHANICAL DATA

SO-8 (Plastic)



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)					

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