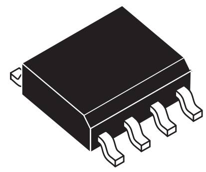
TPN3021

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

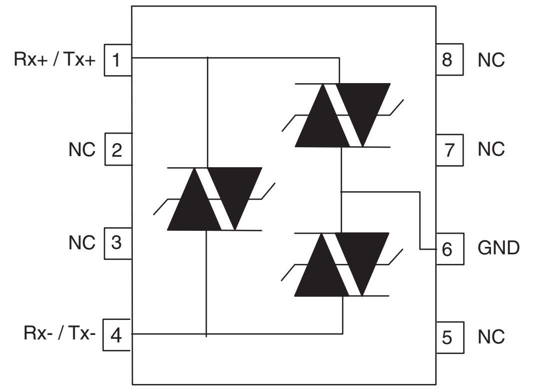


SO-8

Benefits

- Trisil™ technology is not subject to ageing and provides 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.
- SO8 package is JEDEC registered.
- Trisils comply with the following standards GR-1089 Core, ITU-T-K20/K21, VDE0433, VDE0878, IEC 61000-4-2.

Figure 1. Schematic diagram



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

TM: Trisil is a trademark of STMicroelectronics

1 Characteristics

Table 1. Compliant with the following standards

	Peak surge voltage (V)	Voltage waveform (μs)	Required peak current (A)	Current waveform (μs)	Minimum serial resistor to meet standard (Ω)
GR-1089-CORE First level	2500 1000	2/10 10/1000	500 100	2/10 10/1000	7.5 25
GR-1089-CORE Intrabuilding	1500	2/10	100	2/10	0
ITU-T-K20/K21	1000	10/700	25	5/310	0
ITU-T-K20 (IEC 61000-4-2)	6000 8000	1/60 ns	ESD contact discharge ESD air discharge		- -
VDE0433	4000 2000	10/700	100 50	5/310	40 0
VDE0878	4000 2000	1.2/50	100 50	1/20	0 0
IEC 61000-4-5	2000 2000	10/700 1.2/50	50 50	5/310 8/20	0 0

Table 2. Absolute ratings (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
I_{PP}	Peak pulse current: t_r / t_p	10/1000 8/20 10/560 5/310 10/160 1/20 2/10	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}	Storage temperature range		-55 to +150	°C
T_j	Operating junction temperature range		-40 to +150	°C
T_L	Maximum lead temperature for soldering during 10s		260	°C

Table 3. Thermal resistances

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

Table 4. Electrical characteristics - definitions (T_{amb} = 25° C)

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

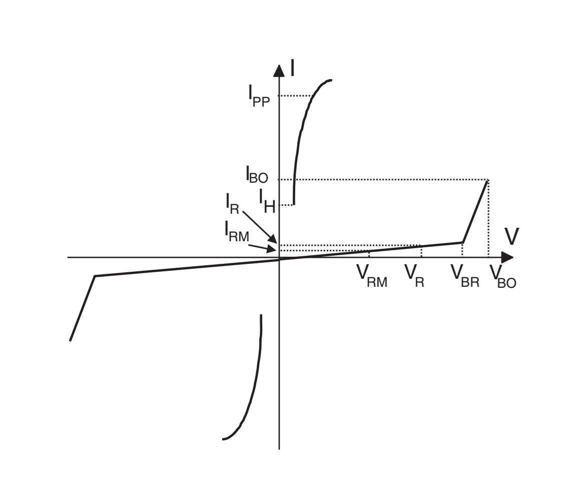


Table 5. Static parameters

Order code	I_{RM} max. @ V_{RM}		V_{BO}(1) max.@ I_{BO}		I_H(2) min.	C(3) typ.
	µA	V	V	mA	mA	pF
TPN3021	4	28	38	300	30	16

1. See *Figure 6: Test circuit 1 for IBO and VBO parameters*.
2. See *Figure 7: Test circuit 2 for dynamic IH parameter*
3. V_R = 0 V bias, V^{RMS} = 1 V, F = 1 MHz

Figure 2. Pulse waveform

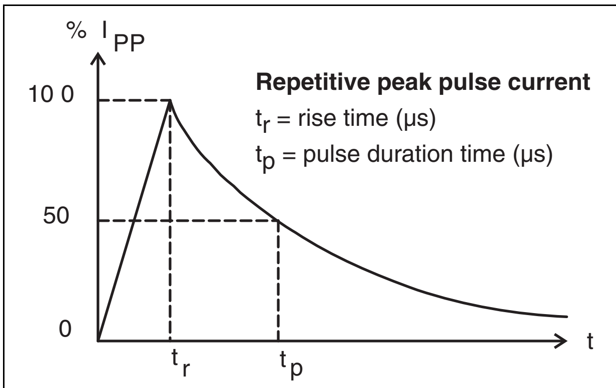


Figure 3. Non repetitive surge peak on-state current versus overload duration (T_j initial = 25 °C)

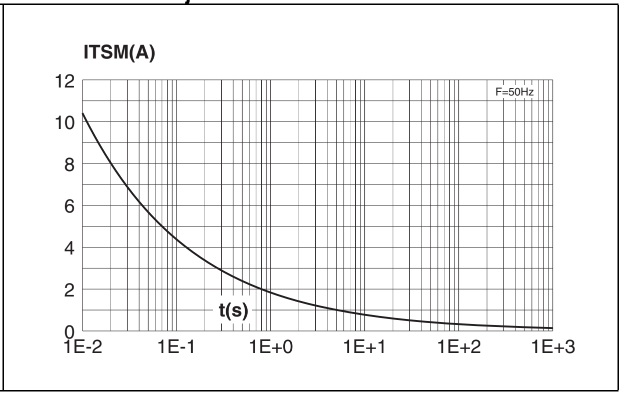


Figure 4. Variation of junction capacitance versus reverse voltage applied (typical values)

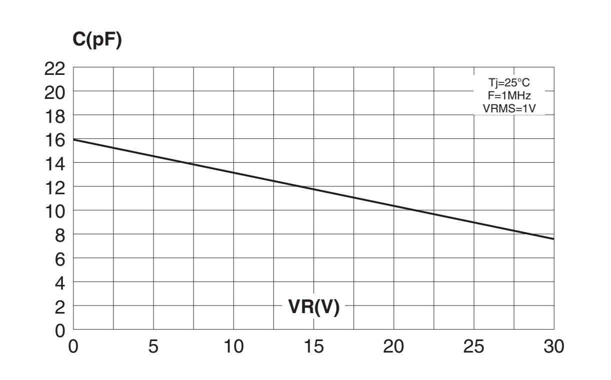
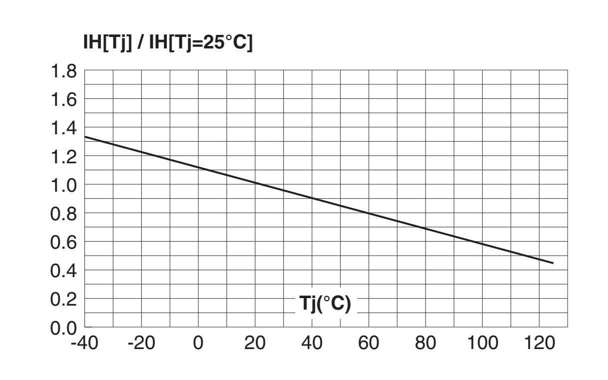


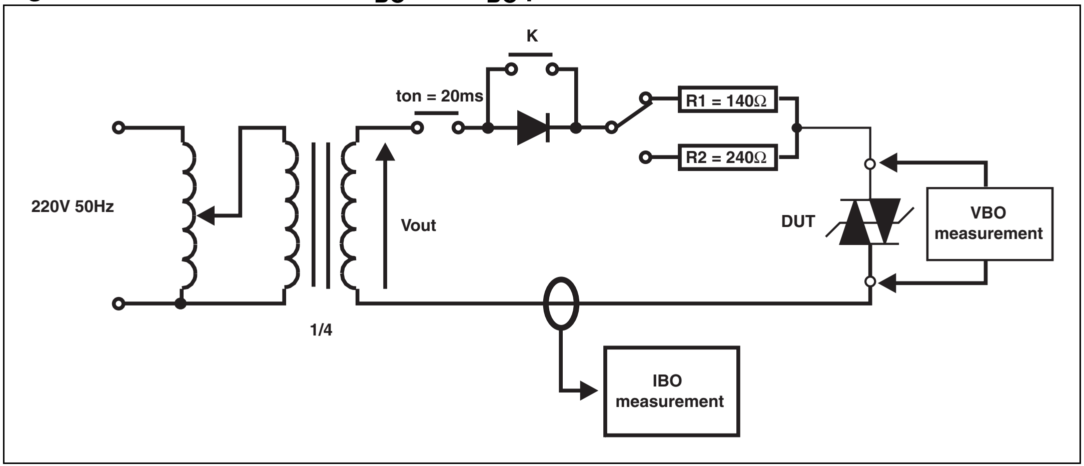
Figure 5. Relative variation of holding current versus junction temperature



2 Test circuits

2.1 Test procedure for test circuit 1

Figure 6. Test circuit 1 for I_{BO} and V_{BO} parameters



Pulse test duration (t_p = 20 ms):

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

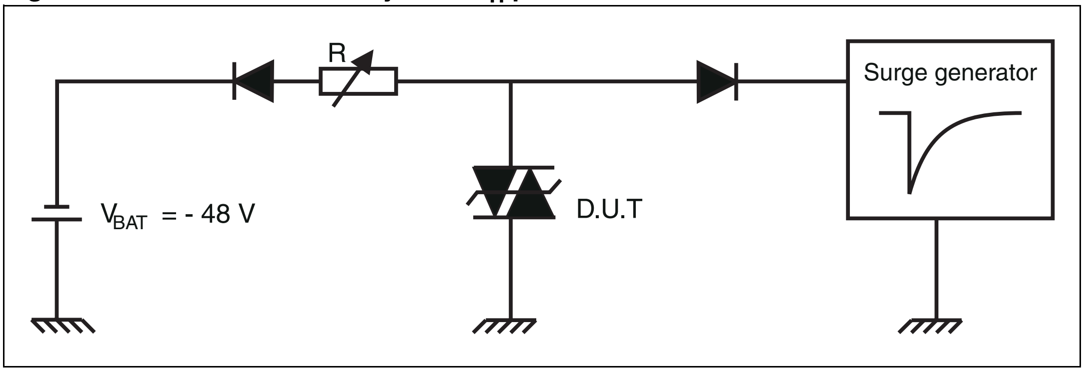
V_{OUT} selection:

Device with V_{BO} < 200 V, V_{OUT} = 250 V_{RMS}, R1 = 140 Ω

Device with V_{BO} ≥ 200 V, V_{OUT} = 480 V_{RMS}, R2 = 240 Ω

2.2 Test procedure for test circuit 2

Figure 7. Test circuit 2 for dynamic I_H parameter



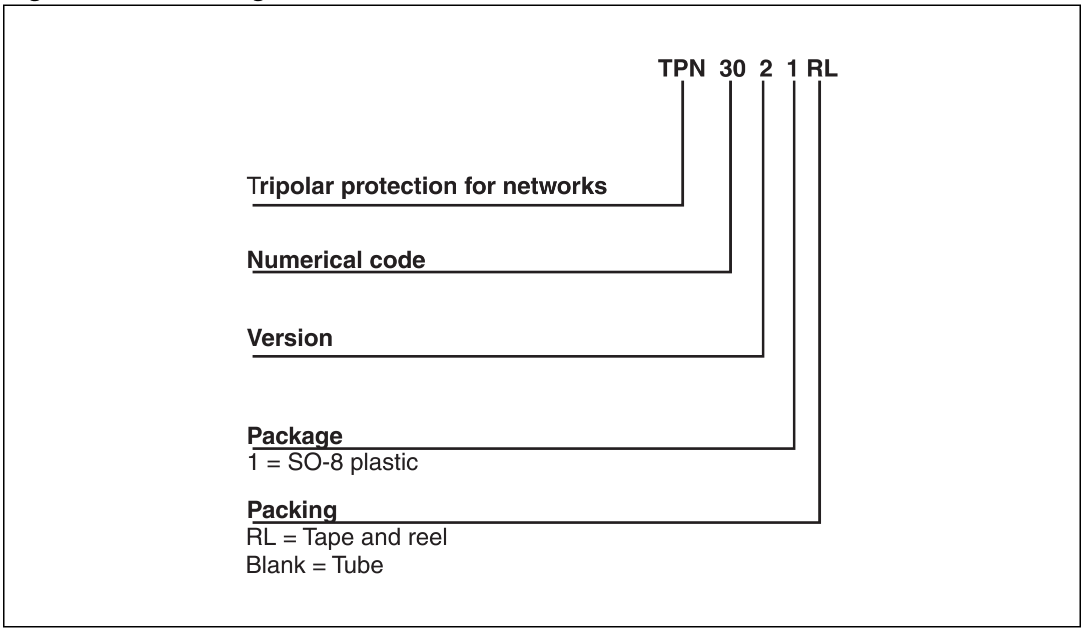
This is a go no-go test, which can confirm the holding current (I_H) level.

Procedure

1. Adjust the current level at the I_H value by short circuiting the AK of the D.U.T.
2. Fire the D.U.T. with a surge current I_{PP} = 10A, 10/1000µs.
3. The D.U.T. will come back off-state within 50 ms maximum.

3 Ordering information scheme

Figure 8. Ordering information scheme

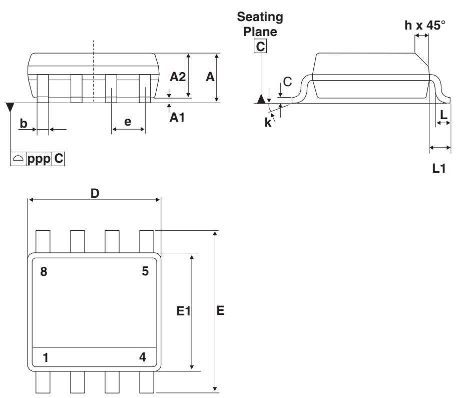


4 Package information

- Epoxy meets UL94, V0
- Lead-free package

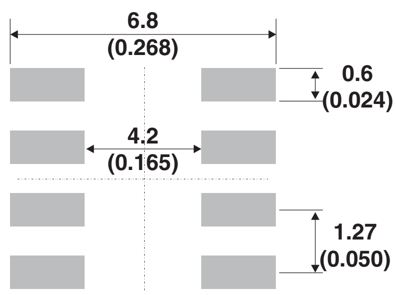
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 6. SO-8 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
A1	0.1		0.25	0.004		0.010
A2	1.25			0.049		
b	0.28		0.48	0.011		0.019
C	0.17		0.23	0.007		0.009
D	4.80	4.90	5.00	0.189	0.193	0.197
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e		1.27			0.050	
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
L1		1.04			0.041	
k	0°		8°	0°		8°
ppp			0.10			0.004

Footprint, dimensions in mm (inches)



5 Ordering information

Table 7. Ordering information

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

1. Preferred device

6 Revision history

Table 8. Document 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.
25-Jun-2010	5	Updated trademark statement.

Other Similar products are found below :

60KS200C D12V0H1U2WS-7 D18V0L1B2LP-7B 82356050220 D5V0M5U6V-7 NTE4902 P4KE27CA P6KE11CA P6KE39CA-TP P6KE8.2A SA110CA SA60CA SA64CA SMBJ12CATR SMBJ8.0A SMLJ30CA-TP ESD101-B1-02ELS E6327 ESD112-B1-02EL E6327 ESD119B1W01005E6327XTSA1 ESD5V0J4-TP ESD5V0L1B02VH6327XTSA1 ESD7451N2T5G 19180-510 CPDT-5V0USP-HF 3.0SMCJ33CA-F 3.0SMCJ36A-F HSPC16701B02TP D3V3Q1B2DLP3-7 D55V0M1B2WS-7 DESD5V0U1BL-7B DRTR5V0U4SL-7 SCM1293A-04SO ESD200-B1-CSP0201 E6327 ESD203-B1-02EL E6327 SM12-7 SMF8.0A-TP SMLJ45CA-TP CEN955 W/DATA 82350120560 82356240030 VESD12A1A-HD1-GS08 CPDUR5V0R-HF CPDUR24V-HF CPDQC5V0U-HF CPDQC5V0USP-HF CPDQC5V0-HF D1213A-01LP4-7B D1213A-02WL-7 ESDLIN1524BJ-HQ 5KP100A