**Preferred Devices** 

## **Thyristor Surge Protectors** High Voltage Bidirectional

NP Series Thyristor Surge Protector Devices (TSPD) protect telecommunication circuits such as central office, access, and customer premises equipment from overvoltage conditions. These are bidirectional devices so they are able to have functionality of 2 devices in one package, saving valuable space on board layout.

These devices will act as a crowbar when overvoltage occurs and will divert the energy away from circuit or device that is being protected.

Use of the NP Series in equipment will help meet various regulatory requirements including: GR-1089-CORE, IEC 61000-4-5, ITU K.20/21/45, IEC 60950, TIA-968-A, FCC Part 68, EN 60950, UL 1950.

#### ELECTRICAL PARAMETERS

	V <sub>DRM</sub>	V <sub>(BO)</sub>	VT	I <sub>DRM</sub>	I <sub>(BO)</sub>	ŀт	Ι <sub>Η</sub>
Device	V	V	v	μΑ	mA	Α	mA
NP0640SxT3G	58	77	4	5	800	2.2	150
NP0720SxT3G	65	88	4	5	800	2.2	150
NP0900SxT3G	75	98	4	5	800	2.2	150
NP1100SxT3G	90	130	4	5	800	2.2	150
NP1300SxT3G	120	160	4	5	800	2.2	150
NP1500SxT3G	140	180	4	5	800	2.2	150
NP1800SxT3G	170	220	4	5	800	2.2	150
NP2100SxT3G	180	240	4	5	800	2.2	150
NP2300SxT3G	190	260	4	5	800	2.2	150
NP2600SxT3G	220	300	4	5	800	2.2	150
NP3100SxT3G	275	350	4	5	800	2.2	150
NP3500SxT3G	320	400	4	5	800	2.2	150

G = indicates leadfree, RoHS compliant

#### SURGE DATA RATINGS

	Waveform		x = s			
Specification	Voltage μs	Current μs	А	в	с	Unit
GR-1089-CORE	2x10	2x10	150	250	500	A(pk)
TIA-968-A	10x160	10x160	90	150	200	
GR-1089-CORE	10x360	10x360	75	125	175	
TIA-968-A	10x560	10x560	50	100	150	
ITU-T K.20/21	10x700	5x310	75	100	200	
GR-1089-CORE	10x1000	10x1000	50	80	100	

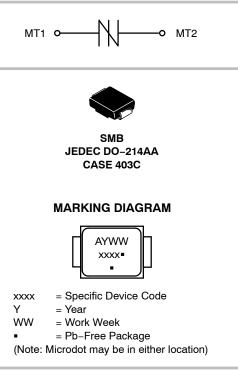
\*91 Recognized Components



## **ON Semiconductor®**

http://onsemi.com

## BIDIRECTIONAL SURFACE MOUNT THYRISTOR 64 – 350 VOLTS



## **ORDERING INFORMATION**

See detailed ordering and shipping information on page 4 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

<b>ELECTRICAL CHARACTERISTICS</b> (T <sub>A</sub> = 25	5°C unless otherwise noted)
--	-----------------------------

Characteristics (Note 1)	Symbol	Min	Тур	Max	Unit
Breakover Voltage (Both Polarities) NP0640SxT3G NP0720SxT3G NP0900SxT3G NP1100SxT3G NP1300SxT3G NP1500SxT3G NP1800SxT3G NP2100SxT3G NP2100SxT3G NP2600SxT3G NP2600SxT3G NP3100SxT3G	V <sub>(BO)</sub>			77 88 98 130 160 180 220 240 260 300 350 400	V
Off-State Voltage (Both Polarities) NP0640SxT3G NP0720SxT3G NP0900SxT3G NP1100SxT3G NP1300SxT3G NP1500SxT3G NP1800SxT3G NP2100SxT3G NP2300SxT3G NP2600SxT3G NP3100SxT3G NP3100SxT3G	V <sub>DRM</sub>	58 65 75 90 120 140 180 190 220 275 320			V
$ \begin{array}{ll} \mbox{Off State Current} & (V_{D1} = 50 \ V \ ) \ \mbox{Both Polarities} \\ & (V_{D2} = V_{DRM} \ ) \ \mbox{Both Polarities} \end{array} $	I <sub>DRM1</sub> I <sub>DRM2</sub>			2.0 5.0	μΑ μΑ
Holding Current (Both Polarities) (Note 4) $V_S$ = 500 V; I <sub>T</sub> = 2.2 A	Ι <sub>Η</sub>	150	250	-	mA
On–State Voltage I <sub>T</sub> = 1.0 A(pk) (PW = 300 $\mu$ Sec, DC = 2%)	V <sub>T</sub>	-	-	4.0	V
Maximum Non-Repetitive Rate of Change of On-State Current (Note 1) (Haefely test method, 1.0 pk < 100 A)	di/dt	-	_	500	A/µSec
Critical Rate of Rise of Off–State Voltage (Linear Waveform, $V_D$ = 0.8 $V_{DRM}$ , $T_J$ = 25°C)	dv/dt	5.0	_	_	kV/μSec

#### CAPACITANCE

				Тур		
Characteristics		Symbol	Α	В	С	Unit
(f=1.0 MHz, 1.0 V <sub>rms</sub> , 2 Vdc bias)		Co				pF
( ind. ,	NP0640SxT3G	Ŭ	84	129	222	•
	NP0720SxT3G		79	123	198	
	NP0900SxT3G		65	122	122	
	NP1100SxT3G		58	95	154	
	NP1300SxT3G		46	75	120	
	NP1500SxT3G		44	70	113	
	NP1800SxT3G		39	59	99	
	NP2100SxT3G		37	59	97	
	NP2300SxT3G		36	56	56	
	NP2600SxT3G		33	52	81	
	NP3100SxT3G		31	47	76	
	NP3500SxT3G		28	44	71	

Electrical parameters are based on pulsed test methods.
di/dt must not be exceeded of a maximum of 100 A/μSec in this application.
Measured under pulsed conditions to reduce heating
Allow cooling before testing second polarity.

### SURGE RATINGS

Characteristics	Symbol	Α	в	С	Unit
Nominal Pulse Surge Short Circuit Current Non – Repetitive Double Exponential Decay Waveform (Notes 5, 6 and 7) 2 x 10 μSec 10 x 160 μSec 10 x 360 μSec 10 x 560 μSec 10 x 700 μSec 10 x 1000 μSec	IPPS1 IPPS3 IPPS4 IPPS5 IPPS6 IPPS7	150 90 75 50 75 50	250 150 125 100 100 80	500 200 150 150 200 100	A(pk)

5. Allow cooling before testing second polarity.

Measured under pulse conditions to reduce heating.
Nominal values may not represent the maximum capability of a device.

### **THERMAL CHARACTERISTICS**

Symbol	Rating	Value	Unit
T <sub>STG</sub>	Storage Temperature Range	–65 to +150	°C
TJ	Operating Temperature Range	-40 to +150	°C
R <sub>0JA</sub>	Thermal Resistance: Junction-to-Ambient Per EIA/JESD51-3, PCB = FR4 3"x4.5"x0.06" Fan out in a 3x3 inch pattern, 2 oz copper track.	90	°C/W

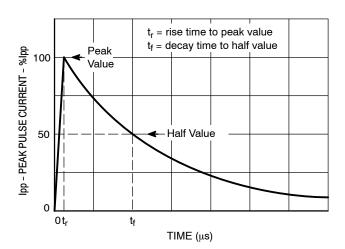


Figure 1. Exponential Decay Pulse Waveform

Symbol	Parameter
V <sub>DRM</sub>	Peak Off State Voltage
V <sub>(BO)</sub>	Breakover Voltage
I <sub>(BO)</sub>	Breakover Current
Ι <sub>Η</sub>	Holding Current
V <sub>T</sub>	On State Voltage
Ι <sub>Τ</sub>	On State Current

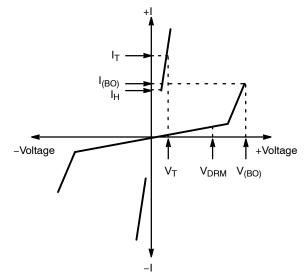


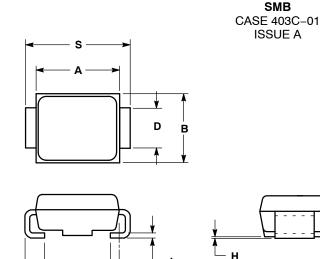
Figure 2. Voltage Current Characteristics of TSPD

#### **ORDERING INFORMATION**

Part Number	Marking	Case	Shipping <sup>†</sup>
NP0640SAT3G	064A		
NP0640SBT3G	064B		
NP0640SCT3G	064C		
NP0720SAT3G	072A		
NP0720SBT3G	072B		
NP0720SCT3G	072C		
NP0900SAT3G	090A		
NP0900SBT3G	090B		
NP0900SCT3G	090C		
NP1100SAT3G	110A		
NP1100SBT3G	110B		
NP1100SCT3G	110C		
NP1300SAT3G	130A		
NP1300SBT3G	130B		
NP1300SCT3G	130C		
NP1500SAT3G	150A		
NP1500SBT3G	150B		
NP1500SCT3G	150C	SMB	
NP1800SAT3G	180A	(Pb-Free)	2500 / Tape and Reel
NP1800SBT3G	180B		
NP1800SCT3G	180C		
NP2100SAT3G	210A		
NP2100SBT3G	210B		
NP2100SCT3G	210C		
NP2300SAT3G	230A		
NP2300SBT3G	230B		
NP2300SCT3G	230C		
NP2600SAT3G	260A		
NP2600SBT3G	260B		
NP2600SCT3G	260C	-1	
NP3100SAT3G	310A	-1	
NP3100SBT3G	310B	-1	
NP3100SCT3G	310C		
NP3500SAT3G	350A	-1	
NP3500SBT3G	350B	-1	
NP3500SCT3G	350C	-1	

+For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

#### PACKAGE DIMENSIONS



NOTES:

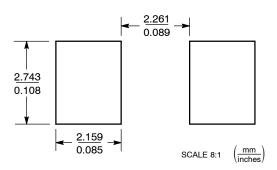
С

DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

CONTROLLING DIMENSION: INCH. 2 3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.

	INC	HES	MILLIMETER		
DIM	MIN	MAX	MIN	MAX	
Α	0.160	0.180	4.06	4.57	
В	0.130	0.150	3.30	3.81	
С	0.075	0.095	1.90	2.41	
D	0.077	0.083	1.96	2.11	
Н	0.0020	0.0060	0.051	0.152	
J	0.006	0.012	0.15	0.30	
Κ	0.030	0.050	0.76	1.27	
Р	0.020 REF		0.51	REF	
S	0.205	0.220	5.21	5.59	

#### **SOLDERING FOOTPRINT\***



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and 💷 are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

#### PUBLICATION ORDERING INFORMATION

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor P.O. Box 5163, Denver, Colorado 80217 USA Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada Europe, Middle East and Africa Technical Support:

ON Semiconductor Website: www.onsemi.com

Phone: 421 33 790 2910 Japan Customer Focus Center Phone: 81-3-5773-3850

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative