

# SiBar Thyristor Surge Protectors TVAxNSA-L Series

SiBar thyristor surge protection devices help protect sensitive telecommunication equipment from the hazards caused by lightning, power contact, and power induction. These devices have a high electrical surge capability to help protect against transient faults and a high off-state impedance, rendering them virtually transparent during normal system operation.

SiBar thyristor surge protectors assist designers to meet telecommunication and computer telephony equipment requirements and industry specifications.



## Benefits:

- Helps provide protection for sensitive telecom electronic equipment
- Low leakage current
- Low power dissipation
- Fast, reliable operation
- No wear-out mechanisms
- Assists designers to meet worldwide telecom standards
- Helps reduce warranty and service costs
- Easy installation
- Helps improve power efficiency of equipment

## Features:

- RoHS compliant
- Bidirectional crowbar transient voltage protection
- Voltage range: 170V – 275V with improved V<sub>drm</sub>/V<sub>bo</sub> range
- High off-state impedance
- Low on-state voltage
- High surge capability
- Short-circuit failure mode
- Surface-mount technology
- DO-214AC SMA package
- 10 x 1000  $\mu$ s 50A surge rating
- Helps equipment comply with TIA-968, Telcordia GR-1089, IEC61000-4-5, ITU K.20/21/45

## Applications:

- Modems
- Fax machines
- Phones, answering machines
- PBX systems
- Set top boxes
- POS systems
- Analog and digital linecards (xDSL, T1/E1...)
- Other customer premise and central office network equipment requiring protection

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**Table SB1 - Electrical Characteristics**

Part Number	V <sub>DM</sub> Max. (V)	V <sub>BO</sub> Max. (V)	I <sub>H</sub> Min. (mA)	V <sub>T</sub> Max. (V)	C1 (Typ) 50V <sub>DC</sub> Bias	C2 (Typ) 2V <sub>DC</sub> Bias	Off-State Current V <sub>D2</sub> =V <sub>DM</sub> (μA)
TVA170NSA-L	170	220	150	4	20	39	5
TVA220NSA-L	220	300	150	4	17	33	5
TVA275NSA-L	275	350	150	4	16	31	5

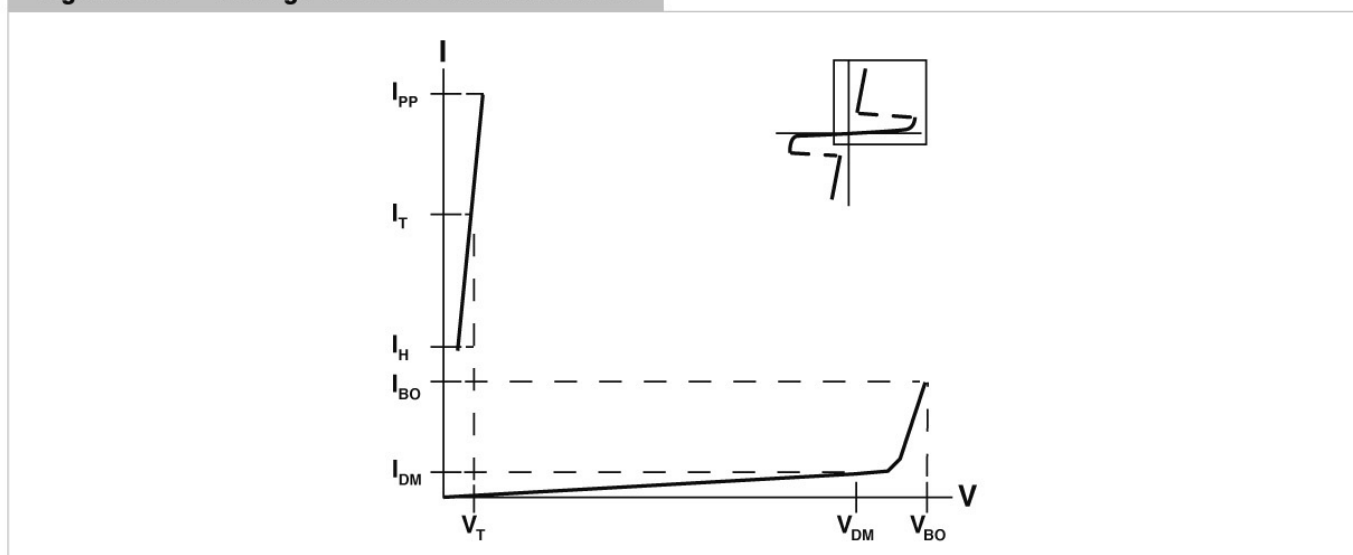
Notes: All electrical characteristics are measured at 25°C.  
V<sub>DM</sub> measured per UL497B pulse requirements: at max. off-state leakage current (IDM) = 5 μA.  
V<sub>BO</sub> measured at 100V/μs.  
C1 measured at 1 MHz with a 50 V<sub>DC</sub> bias.  
C2 measured at 1MHz with a 2V<sub>DC</sub> bias.

**Table SB2 – Surge Current Rating**

Part Number	TIA-968			Telcordia GR-1089*		IEC61000-4-5	ITU K.20/21/45*			
	Type A	Type B		I <sub>pp</sub> (A)	I <sub>pp</sub> (A)	I <sub>pp</sub> (A)	I <sub>pp</sub> (A)	I <sub>TSM</sub> Min. (A)	di/dt (A/μs)	dV/dt (V/μs)
	I <sub>pp</sub> (A) 5 x 320 μs	I <sub>pp</sub> (A) 10 x 560 μs	I <sub>pp</sub> (A) 10 x 160 μs	10 x 1000 μs	2 x 10 μs	8 x 20 μs	5 x 310 μs (VOC: 10 x 700μs)			
TVAxNSA-L	90	70	100	50	150	150	90	22	500	2000

Notes: \*Lightning current wave forms for applicable industry specification.  
I<sub>TSM</sub>, peak on-state surge current is measured at 60 Hz, one cycle.  
di/dt: critical rate-of-rise of on-state current (pulsed power amplifier Vmax = 600V; C = 30μF).  
dV/dt: critical rate-of-rise of off-state voltage (linear wave form, V<sub>0</sub> = rated V<sub>BO</sub>, T<sub>i</sub> = 25°C

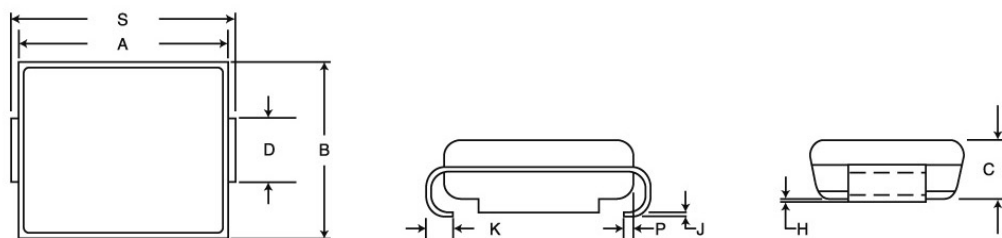
**Figure SB1 - Voltage-Current Characteristics**



The voltage current (V-I) is useful in depicting the electrical characteristics of the SiBar thyristor surge protectors in relation to each other.

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**Figure SB2 - Dimension Figure**



**Table SB3 – Dimensions in Millimeters**

Dimension	A		B		C		D	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
TVAxNSA-L	4.06 (0.160)	4.57 (0.180)	2.25 (0.089)	2.92 (0.115)	1.90 (0.075)	2.41 (0.095)	1.25 (0.049)	1.65 (0.065)

Dimension	H		J		K		P	S	
	Min.	Max.	Min.	Max.	Min.	Max.	Ref	Min	Max.
TVAxNSA-L	0.051 (0.002)	0.200 (0.008)	0.150 (0.006)	0.41 (0.016)	0.76 (0.030)	1.52 (0.060)	0.051 (0.0020)	4.80 (0.189)	5.59 (0.220)

Notes: \*D dimension is measured within dimension P.  
TVA series devices use industry standard SMA package type.  
All devices are bidirectional and may be oriented in either direction for installation

**Table SB4 – Physical Characteristics and Environmental Specifications**

Lead material	Matte tin finish (-L devices)
Encapsulating material	Epoxy, meets UL94V-0 requirements
Solderability	per MIL-STD-750, Method 2026
Solder heat withstand	per MIL-STD-750, Method 2031
Solvent resistance	per MIL-STD-750, Method 1022
Mechanical shock	per MIL-STD-750, Method 2016
Vibration	per MIL-STD-750, Method 2056
Storage temperature (°C)	-55 to 150
Operating temperature (°C)	-40 to 125
Junction temperature (°C)	175
Maximum Lead Temperature for Soldering Purpose; for 10s (°C)	260

**Table SB5 – Reliability Tests**

Test	Conditions	Duration
High temperature, reverse bias	+100°C, 50VDC bias	1000 hours
High humidity, high temperature, reverse bias	85% RH, +85°C, 50VDC bias	1000 hours
High temperature storage life	+150°C	1000 hours
Temperature cycling	-65°C to +150°C, 15 minute dwell	1000 cycles
Autoclave	100% RH, +121°C, 15 PSI	96 hours

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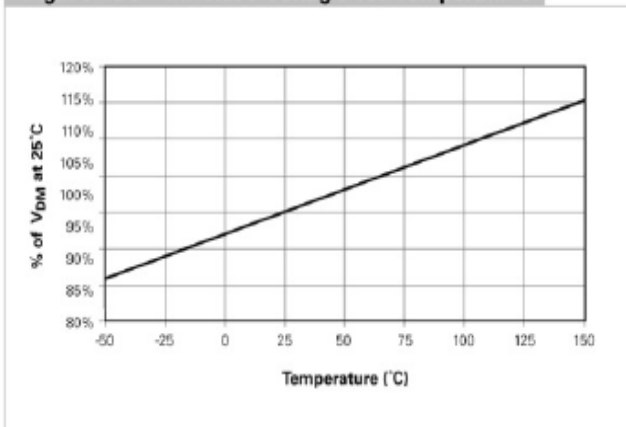
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Rev: B Date: DECEMBER 12, 2007

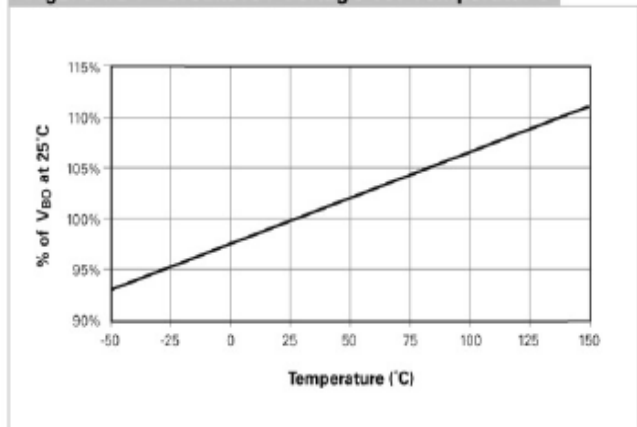
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## Figures SB3-SB6 - Typical Electrical Characteristics vs. Temperature for SiBar Thyristor Surge Protectors

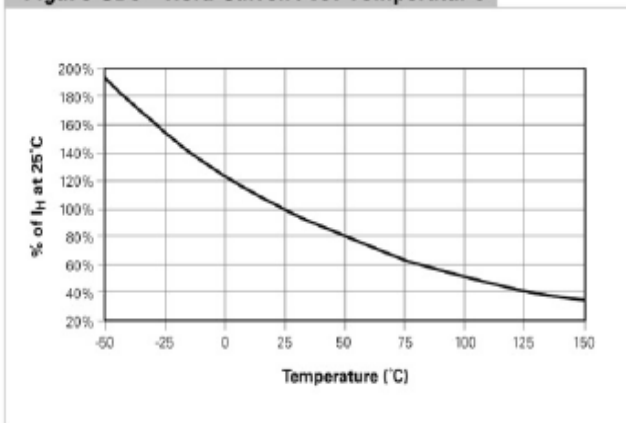
**Figure SB3 - Off-state Voltage vs. Temperature**



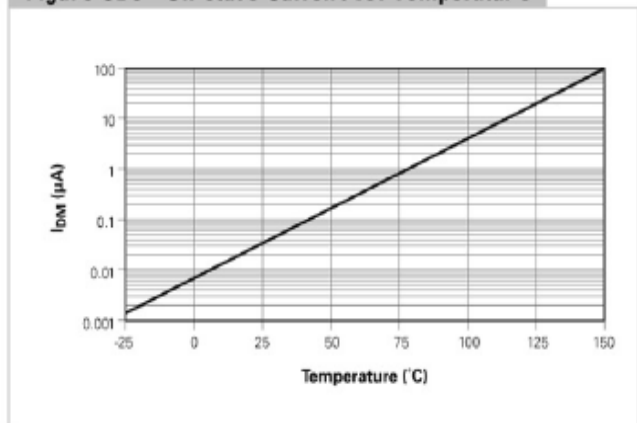
**Figure SB4 - Breakover Voltage vs. Temperature**



**Figure SB5 - Hold Current vs. Temperature**

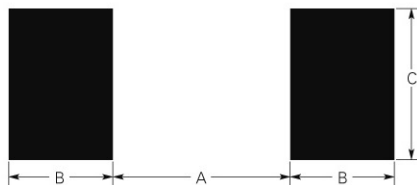


**Figure SB6 - Off-state Current vs. Temperature**



# SiBar Thyristor Surge Protectors TVAXxxNSA-L Series

**Figure SB7 - Recommended Pad Layout**



**Table SB6 – Packaging and Marking Information**

Part Description	Tape and Reel Quantity	Standard Package	Part Marking	Recommended Pad Layout (millimeters/inchs)			Agency Recognition*
				Dimension A (Nom.)	Dimension B (Nom.)	Dimension C (Nom.)	
TVA170NSA-L	5,000	20,000	17NA	2.0 (0.079)	2.0 (0.079)	2.0 (0.079)	**
TVA220NSA-L	5,000	20,000	22NA	2.0 (0.079)	2.0 (0.079)	2.0 (0.079)	**
TVA275NSA-L	5,000	20,000	27NA	2.0 (0.079)	2.0 (0.079)	2.0 (0.079)	**

\* UL 497B, File # E179610  
\*\*UL Pending