SiBar Thyristor Surge Protectors
TVBxxxNSA-L Series

Raychem Circuit Protection's SiBar thyristor surge protection devices are designed to 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 are designed to assist telecommunication and computer telephony equipment in meeting the applicable 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
- Helps designers 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
- Broad voltage range 58V – 320V with improved Vdrm/Vbo voltage range
- High off-state impedance
- Low on-state voltage
- High surge capability
- Short-circuit failure mode
- Surface-mount technology
- DO-214AA SMB package
- 10 x 1000 µs 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_{DM} Max. (V)	V_{BO} Max. (V)	I_H Min. (mA)	V_T Max. (V)	C1 (Typ) 50V_{DC} Bias	C2 (Typ) 2V_{DC} Bias	Off-State Current VD2=VDM (µA)
TVB058NSA-L	58	77	150	4	44	84	5
TVB065NSA-L	65	88	150	4	41	79	5
TVB075NSA-L	75	98	150	4	34	65	5
TVB090NSA-L	90	130	150	4	31	58	5
TVB120NSA-L	120	160	150	4	24	46	5
TVB140NSA-L	140	180	150	4	23	44	5
TVB170NSA-L	170	220	150	4	20	39	5
TVB180NSA-L	180	240	150	4	19	37	5
TVB190NSA-L	190	260	150	4	19	36	5
TVB220NSA-L	220	300	150	4	17	33	5
TVB275NSA-L	275	350	150	4	15	31	5
TVB320NSA-L	320	400	150	4	14	27	5

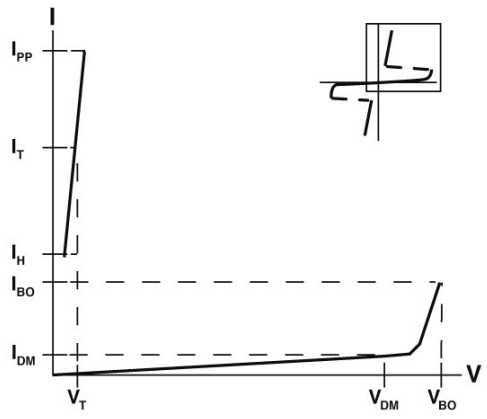
Notes: All electrical characteristics are measured at 25°C.
V_{DM} measured per UL497B pulse requirements: at max. off-state leakage current (IDM) = 5 µA.
V_{BO} measured at 100V/µs.
C1 measured at 1 MHz with a 50 V_{DC} bias.
C2 measured at 1MHz with a 2V_{DC} bias.

Table SB2 – Surge Current Rating

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

Notes: *Lightning current wave forms for applicable industry specification.
I_{TSM}, 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-stage voltage (linear wave form, V_D = rated V_{BO}, Tj = 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

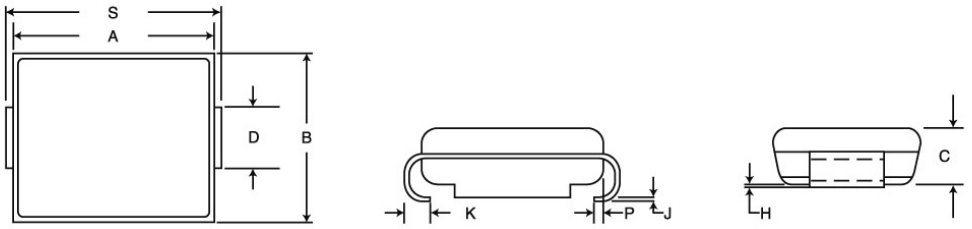

Table SB3 – Dimensions in Millimeters

	A		B		C		D	
Dimension	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**
TVBxxxNSA-L	4.06	4.57	3.30	3.94	1.90	2.41	1.95	2.20
	(0.160)	(0.180)	(0.130)	(0.155)	(0.075)	(0.095)	(0.077)	(0.087)

	H		J		K		P	S	
Dimension	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Ref**	**Min**	**Max.**
TVBxxxNSA-L	0.051	0.200	0.150	0.31	0.76	1.27	0.51	5.21	5.59
	(0.002)	(0.008)	(0.006)	(0.012)	(0.030)	(0.050)	(0.202)	(0.205)	(0.220)

Notes: *D dimension is measured within dimension P.
TVB series devices use industry standard SMB 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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Figures SB3-SB6 - Typical Electrical Charateristics vs. Temperature for Sibar Thyristor Surge Protectors

Figure SB3 - Off-state Voltage vs. Temperature

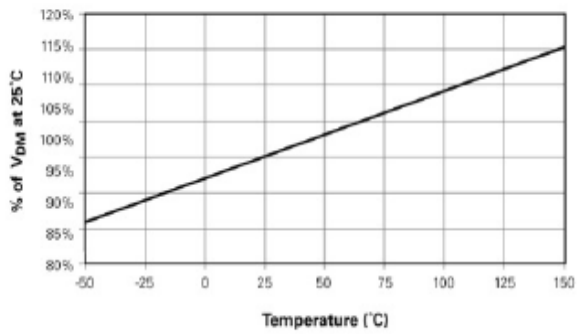

Figure SB4 - Breakover Voltage vs. Temperature

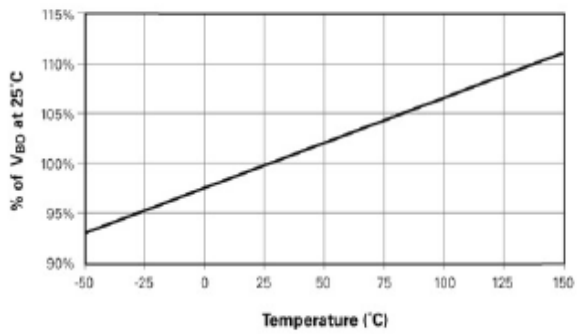

Figure SB5 - Hold Current vs. Temperature

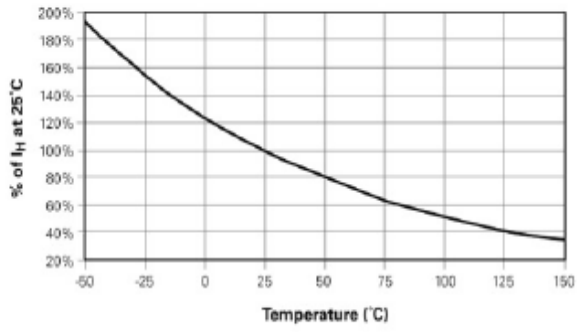

Figure SB6 - Off-state Current vs. Temperature

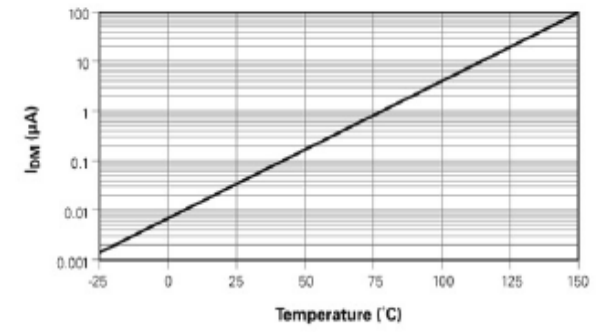

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Figure SB7 - Recommended Pad Layout

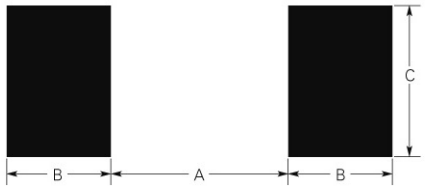

Table SB6 – Packaging and Marking Information

				Recommended Pad Layout (millimeters/inchs)			
Part Description	Tape and Reel Quantity	Standard Package	Part Marking	Dimension A (Nom.)	Dimension B (Nom.)	Dimension C (Nom.)	Agency Recognition*
TVB058NSA-L	2,500	10,000	58NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB065NSA-L	2,500	10,000	65NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB075NSA-L	2,500	10,000	75NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB090NSA-L	2,500	10,000	90NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB120NSA-L	2,500	10,000	12NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB140NSA-L	2,500	10,000	14NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB170NSA-L	2,500	10,000	17NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB180NSA-L	2,500	10,000	18NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB190NSA-L	2,500	10,000	19NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB220NSA-L	2,500	10,000	22NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB275NSA-L	2,500	10,000	27NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL
TVB320NSA-L	2,500	10,000	32NA	2.261 (0.089)	2.159 (0.085)	2.743 (0.108)	UL

* UL497B, File # E179610

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