

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_{drm}/V_{bo} 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 μ 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 _{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 V _{D2} =V _{DM} (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 |

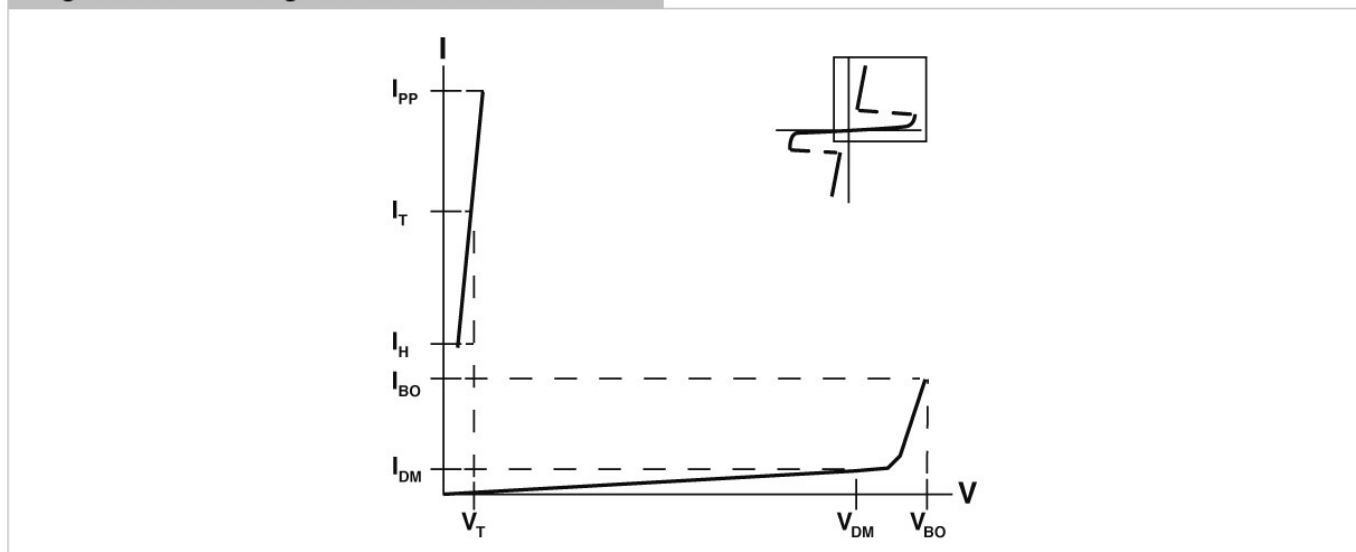
Notes: All electrical characteristics are measured at 25°C.
V_{DM} measured per UL497B pulse requirements: at max. off-state leakage current (IDM) = 5 μA.
V_{BO} measured at 100V/μs.
C1 measured at 1 MHz with a 50 V_{DC} bias.
C2 measured at 1MHz with a 2V_{DC} bias.

Table SB2 – Surge Current Rating

| Part Number | TIA-968 | | | Telcordia GR-1089* | | IEC61000-4-5 | ITU K.20/21/45* | | | |
|-------------|-----------------------------------|------------------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------------------|---------------------------|--------------|--------------|
| | Type A | Type B | | I _{pp} (A) | I _{pp} (A) | I _{pp} (A) | I _{pp} (A) | I _{TSM} Min. (A) | di/dt (A/μs) | dV/dt (V/μs) |
| | I _{pp} (A) 5 x 320 μs | I _{pp} (A) 10 x 560 μs | I _{pp} (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_{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-state voltage (linear wave form, V₀ = rated V_{BO}, T_i = 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

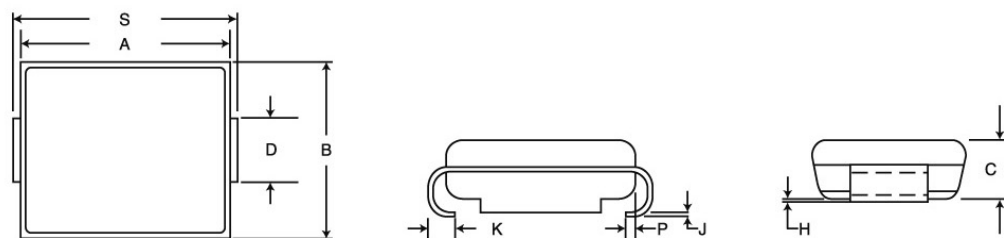


Table SB3 – Dimensions in Millimeters

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

Figure SB3 - Off-state Voltage vs. Temperature

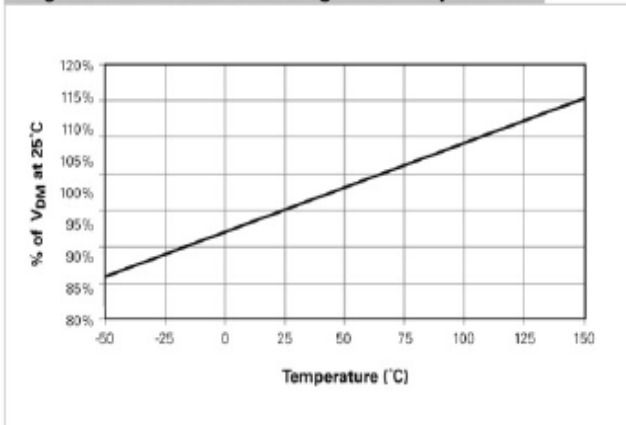


Figure SB4 - Breakover Voltage vs. Temperature

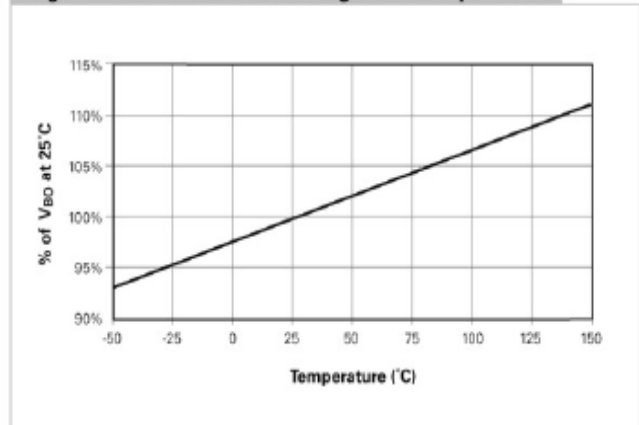


Figure SB5 - Hold Current vs. Temperature

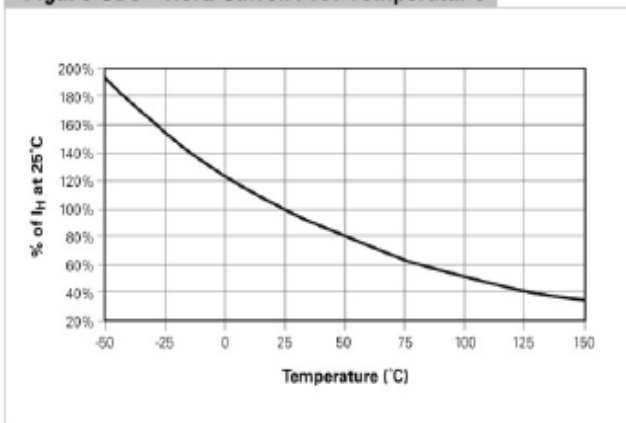
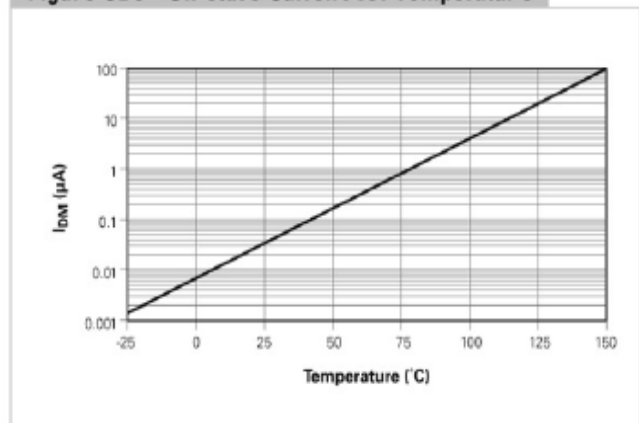


Figure SB6 - Off-state Current vs. Temperature



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Figure SB7 - Recommended Pad Layout

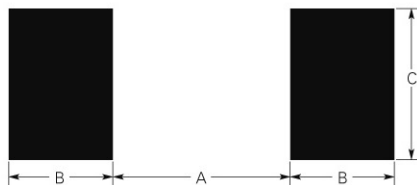


Table SB6 – Packaging and Marking Information

| 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