

**SxX8xSx Series**



**Main Features**

| Symbol              | Value      | Unit    |
|---------------------|------------|---------|
| $I_{T(RMS)}$        | 0.8        | A       |
| $V_{DRM} / V_{RRM}$ | 400 to 800 | V       |
| $I_{GT}$            | 5 to 200   | $\mu$ A |

**Applications**

The SxX8xSx EV series is specifically designed for GFCI (Ground Fault Circuit Interrupter) and gas ignition applications.

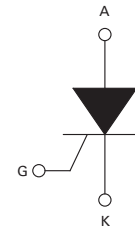
**Description**

New device series offers high static dv/dt and lower turn off ( $t_q$ ) sensitive SCR with its small die planar construction design. It is specifically designed for GFCI (Ground Fault Circuit Interrupter) and Gas Ignition applications. All SCRs junctions are glass-passivated to ensure long term reliability and parametric stability.

**Features**

- RoHS compliant and Halogen-Free
- Thru-hole and surface mount packages
- Surge current capability > 10Amps
- Blocking voltage ( $V_{DRM} / V_{RRM}$ ) capability - up to 800V
- High dv/dt noise immunity
- Improved turn-off time ( $t_q$ ) < 25  $\mu$ sec
- Sensitive gate for direct microprocessor interface

**Schematic Symbol**



**Absolute Maximum Ratings**

| Symbol       | Parameter  | Value  | Unit                        |
|--------------|--|--|-----------------------------|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave)  | TO-92 $T_c = 55^\circ\text{C}$                       | 0.8 A                       |
|              |  | SOT-89 $T_c = 60^\circ\text{C}$                      | 0.8 A                       |
|              |  | SOT-223 $T_L = 60^\circ\text{C}$                     | 0.8 A                       |
| $I_{T(AV)}$  | Average on-state current   | TO-92 $T_c = 55^\circ\text{C}$                       | 0.51 A                      |
|              |  | SOT-89 $T_c = 60^\circ\text{C}$                      | 0.51 A                      |
|              |  | SOT-223 $T_L = 60^\circ\text{C}$                     | 0.51 A                      |
| $I_{TSM}$    | Non repetitive surge peak on-state current (Single cycle, $T_j$ initial = $25^\circ\text{C}$ ) | TO-92 $F = 50\text{Hz}$                              | 8 A                         |
|              |  | SOT-89 $F = 60\text{Hz}$<br>SOT-223                  | 10 A                        |
| $I^2t$       | $I^2t$ Value for fusing  | $t_p = 10\text{ ms}$ $F = 50\text{ Hz}$              | 0.32 $\text{A}^2\text{s}$   |
|              |  | $t_p = 8.3\text{ ms}$ $F = 60\text{ Hz}$             | 0.41 $\text{A}^2\text{s}$   |
| di/dt        | Critical rate of rise of on-state current $I_G = 10\text{mA}$                                  | TO-92 $T_j = 125^\circ\text{C}$<br>SOT-89<br>SOT-223 | 50 $\text{A}/\mu\text{s}$   |
| $I_{GM}$     | Peak Gate Current  | $t_p = 10\ \mu\text{s}$ $T_j = 125^\circ\text{C}$    | 1.0 A                       |
| $P_{G(AV)}$  | Average gate power dissipation   | $T_j = 125^\circ\text{C}$                            | 0.1 W                       |
| $T_{stg}$    | Storage junction temperature range   | —  | -40 to 150 $^\circ\text{C}$ |
| $T_j$        | Operating junction temperature range   | —  | -40 to 125 $^\circ\text{C}$ |

**Electrical Characteristics (T<sub>J</sub> = 25°C, unless otherwise specified)**

| Symbol               | Description                                | Test Conditions   | Limit | Value   |         |        | Unit |
|----------------------|--|---|-------|---------|---------|--------|------|
|                      |  |   |       | SxX8yS1 | SxX8yS2 | SxX8yS |      |
| I <sub>GT</sub>      | DC Gate Trigger Current                    | V <sub>D</sub> = 6V<br>R <sub>L</sub> = 100 Ω   | MIN.  | 0.5     | 1       | 15     | μA   |
|                      |  |   | MAX.  | 5       | 50      | 200    | μA   |
| V <sub>GT</sub>      | DC Gate Trigger Voltage                    | V <sub>D</sub> = 6V<br>R <sub>L</sub> = 100 Ω   | MAX.  | 0.8     |         |        | V    |
| V <sub>GRM</sub>     | Peak Reverse Gate Voltage                  | I <sub>RG</sub> = 10μA  | MIN.  | 5       |         |        | V    |
| I <sub>H</sub>       | Holding Current                            | R <sub>GK</sub> = 1 kΩ<br>Initial Current = 20mA  | MAX.  | 5       |         |        | mA   |
| (dv/dt) <sub>s</sub> | Critical Rate-of-Rise of Off-State Voltage | T <sub>J</sub> = 125°C<br>V <sub>D</sub> = V <sub>DRM</sub> / V <sub>RRM</sub><br>Exp. Waveform<br>R <sub>GK</sub> = 1 kΩ | MIN.  | 75      |         |        | V/μs |
| V <sub>GD</sub>      | Gate Non-Trigger Voltage                   | V <sub>D</sub> = V <sub>DRM</sub><br>R <sub>GK</sub> = 1 kΩ<br>T <sub>J</sub> = 25°C                                      | MIN.  | 0.2     |         |        | V    |
| t <sub>q</sub>       | Turn-Off Time                              | T <sub>J</sub> = 25°C @ 600 V<br>R <sub>GK</sub> = 1 kΩ   | MAX.  | 30      | 25      | 25     | μs   |
| t <sub>gt</sub>      | Turn-On Time                               | I <sub>G</sub> = 10mA<br>PW = 15μsec<br>I <sub>T</sub> = 1.6A(pk)   | TYP.  | 2.0     | 2.0     | 2.0    | μs   |

Note: x = voltage, y = package

**Static Characteristics (T<sub>J</sub> = 25°C, unless otherwise specified)**

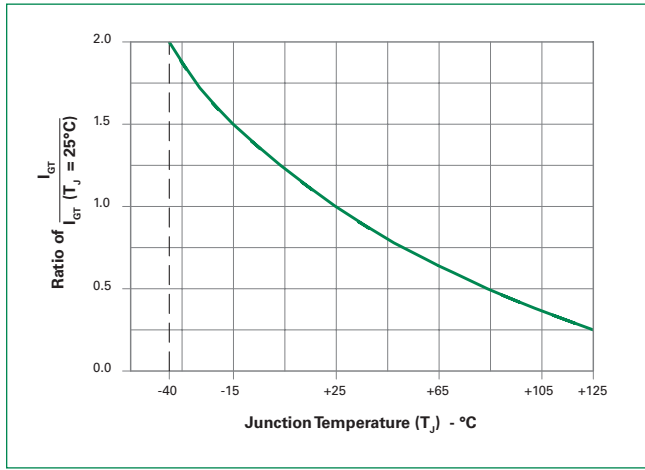
| Symbol           | Description                        | Test Conditions  | Limit | Value | Unit |
|------------------|------------------------------------|--|-------|-------|------|
| V <sub>TM</sub>  | Peak On-State Voltage              | I <sub>TM</sub> = 1.6A (pk)  | MAX.  | 1.70  | V    |
| I <sub>DRM</sub> | Off-State Current, Peak Repetitive | T <sub>J</sub> = 25°C @ V <sub>D</sub> = V <sub>DRM</sub><br>R <sub>GK</sub> = 1 kΩ  | MAX.  | 3     | μA   |
|                  |                                    | T <sub>J</sub> = 125°C @ V <sub>D</sub> = V <sub>DRM</sub><br>R <sub>GK</sub> = 1 kΩ | MAX.  | 500   | μA   |

**Thermal Resistances**

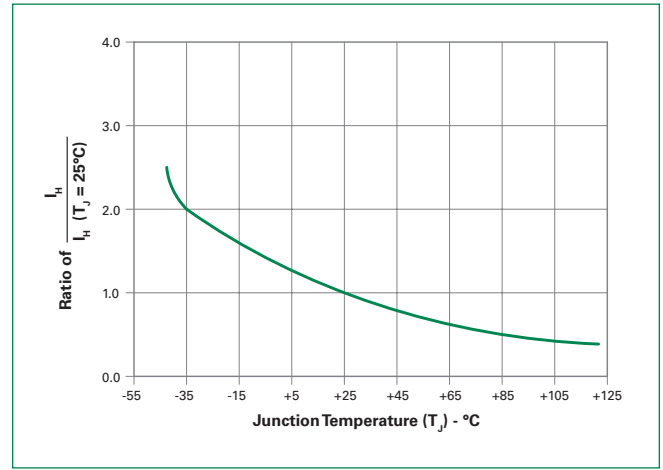
| Symbol               | Description           | Test Conditions                                     | Value   | Unit |      |
|----------------------|-----------------------|---|---------|------|------|
| R <sub>th(j-c)</sub> | Junction to case (AC) | I <sub>T</sub> = 0.8A <sub>(RMS)</sub> <sup>1</sup> | TO-92   | 75   | °C/W |
|                      |                       |   | SOT-223 | 30   | °C/W |
|                      |                       |   | SOT-89  | 50   | °C/W |
| R <sub>th(j-a)</sub> | Junction to ambient   | I <sub>T</sub> = 0.8A <sub>(RMS)</sub> <sup>1</sup> | TO-92   | 150  | °C/W |
|                      |                       |   | SOT-223 | 60   | °C/W |
|                      |                       |   | SOT-89  | 90   | °C/W |

<sup>1</sup> 60Hz AC resistive load condition, 100% conduction.

**Figure 1: Normalized DC Gate Trigger Current For All Quadrants vs. Junction Temperature**



**Figure 2: Normalized DC Holding Current vs. Junction Temperature**



**Figure 3: Normalized DC Gate Trigger Voltage vs. Junction Temperature**



**Figure 4: Power Dissipation (Typical) vs. RMS On-State Current**



**Figure 5: Maximum Allowable Case Temperature vs. On-State Current**

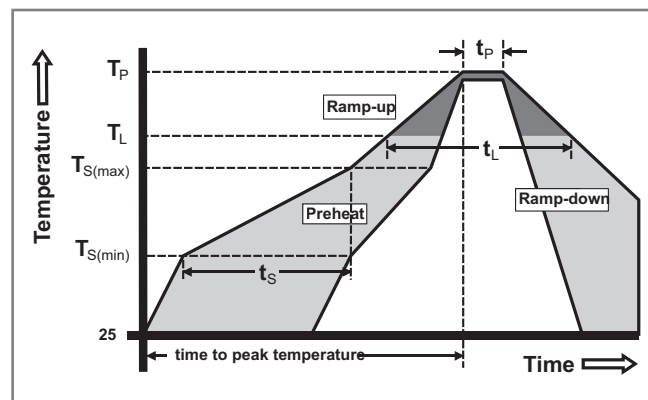


**Figure 6: Surge Peak On-State Current vs. Number of Cycles**



**Soldering Parameters**

|  |                                    |                         |
|--|------------------------------------|-------------------------|
| Reflow Condition                                       |                                    | Pb – Free assembly      |
| Pre Heat   | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|  | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 180 secs           |
| Average ramp up rate (Liquidus Temp) ( $T_L$ ) to peak |                                    | 5°C/second max          |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 5°C/second max          |
| Reflow   | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 150 seconds        |
| Peak Temperature ( $T_p$ )                             |                                    | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                    | 20 – 40 seconds         |
| Ramp-down Rate   |                                    | 5°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )                |                                    | 8 minutes Max.          |
| Do not exceed  |                                    | 280°C                   |



**Physical Specifications**

|                        |  |
|------------------------|--|
| <b>Terminal Finish</b> | 100% Matte Tin-plated.   |
| <b>Body Material</b>   | UL recognized epoxy meeting flammability classification 94V-0. |
| <b>Lead Material</b>   | Copper Alloy   |

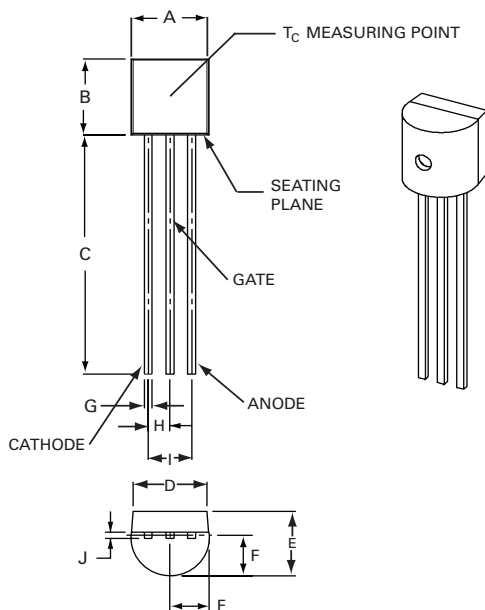
**Design Considerations**

Careful selection of the correct device for the application's operating parameters and environment will go a long way toward extending the operating life of the Thyristor. Good design practice should limit the maximum continuous current through the main terminals to 75% of the device rating. Other ways to ensure long life for a power discrete semiconductor are proper heat sinking and selection of voltage ratings for worst case conditions. Overheating, overvoltage (including dv/dt), and surge currents are the main killers of semiconductors. Correct mounting, soldering, and forming of the leads also help protect against component damage.

**Reliability/Environmental Tests**

| Test                             | Specifications and Conditions   |
|----------------------------------|---|
| <b>AC Blocking</b>               | MIL-STD-750, M-1040, Cond A Applied Peak AC voltage @ 110°C for 1008 hours  |
| <b>Temperature Cycling</b>       | MIL-STD-750, M-1051, 100 cycles; -40°C to +150°C; 15-min dwell-time   |
| <b>Temperature/Humidity</b>      | EIA / JEDEC, JESD22-A101 1008 hours; 320V - DC; 85°C; 85% rel humidity  |
| <b>High Temp Storage</b>         | MIL-STD-750, M-1031, 1008 hours; 150°C  |
| <b>Low-Temp Storage</b>          | 1008 hours; -40°C   |
| <b>Thermal Shock</b>             | MIL-STD-750, M-1056 10 cycles; 0°C to 100°C; 5-min dwell-time at each temperature; 10 sec (max) transfer time between temperature |
| <b>Autoclave</b>                 | EIA / JEDEC, JESD22-A102 168 hours (121°C at 2 ATMs) and 100% R/H   |
| <b>Resistance to Solder Heat</b> | MIL-STD-750 Method 2031   |
| <b>Solderability</b>             | ANSI/J-STD-002, category 3, Test A  |
| <b>Lead Bend</b>                 | MIL-STD-750, M-2036 Cond E  |

**Dimensions – TO-92**



| Dimension | Inches |       | Millimeters |       |
|-----------|--------|-------|-------------|-------|
|           | Min    | Max   | Min         | Max   |
| A         | 0.175  | 0.205 | 4.450       | 5.200 |
| B         | 0.170  | 0.210 | 4.320       | 5.330 |
| C         | 0.500  |       | 12.70       |       |
| D         | 0.135  |       | 3.430       |       |
| E         | 0.125  | 0.165 | 3.180       | 4.190 |
| F         | 0.080  | 0.105 | 2.040       | 2.660 |
| G         | 0.016  | 0.021 | 0.407       | 0.533 |
| H         | 0.045  | 0.055 | 1.150       | 1.390 |
| I         | 0.095  | 0.105 | 2.420       | 2.660 |
| J         | 0.015  | 0.020 | 0.380       | 0.500 |

**Dimensions – SOT-223**



Dimensions in Millimeters (Inches)

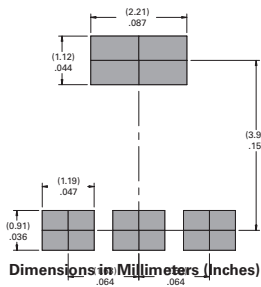


| Dimensions | Inches  |       |       | Millimeters |      |      |
|------------|---------|-------|-------|-------------|------|------|
|            | Min     | Typ   | Max   | Min         | Typ  | Max  |
| A          | 0.248   | 0.256 | 0.264 | 6.30        | 6.50 | 6.70 |
| B          | 0.130   | 0.138 | 0.146 | 3.30        | 3.50 | 3.70 |
| C          | —       | —     | 0.071 | —           | —    | 1.80 |
| D          | 0.001   | —     | 0.004 | 0.02        | —    | 0.10 |
| E          | 0.114   | 0.118 | 0.124 | 2.90        | 3.00 | 3.15 |
| F          | 0.024   | 0.027 | 0.034 | 0.60        | 0.70 | 0.85 |
| G          | —       | 0.090 | —     | —           | 2.30 | —    |
| H          | —       | 0.181 | —     | —           | 4.60 | —    |
| I          | 0.264   | 0.276 | 0.287 | 6.70        | 7.00 | 7.30 |
| J          | 0.009   | 0.010 | 0.014 | 0.24        | 0.26 | 0.35 |
| K          | 10° MAX |       |       |             |      |      |

**Dimensions – SOT-89**



**Pad Layout for SOT-89**



Dimensions in Millimeters (Inches)



| Dimension | Inches |     |       | Millimeters |     |      |
|-----------|--------|-----|-------|-------------|-----|------|
|           | Min    | Typ | Max   | Min         | Typ | Max  |
| A         | 0.173  | —   | 0.181 | 4.40        | —   | 4.60 |
| B         | 0.090  | —   | 0.102 | 2.29        | —   | 2.60 |
| C         | 0.055  | —   | 0.063 | 1.40        | —   | 1.60 |
| D         | 0.155  | —   | 0.167 | 3.94        | —   | 4.25 |
| E         | 0.035  | —   | 0.047 | 0.89        | —   | 1.20 |
| F         | 0.056  | —   | 0.062 | 1.42        | —   | 1.57 |
| G         | 0.115  | —   | 0.121 | 2.92        | —   | 3.07 |
| H         | 0.014  | —   | 0.017 | 0.35        | —   | 0.44 |
| I         | 0.014  | —   | 0.019 | 0.36        | —   | 0.48 |
| J         | 0.064  | —   | 0.072 | 1.62        | —   | 1.83 |

**Product Selector**

| Part Number | Voltage |      |      | Gate Sensitivity | Package |
|-------------|---------|------|------|------------------|---------|
|             | 400V    | 600V | 800V |                  |         |
| S4X8ES      | X       | —    | —    | 200 µA           | TO-92   |
| S6X8ES      | —       | X    | —    | 200 µA           | TO-92   |
| S8X8ES      | —       | —    | X    | 200 µA           | TO-92   |
| S4X8TS      | X       | —    | —    | 200 µA           | SOT-223 |
| S6X8TS      | —       | X    | —    | 200 µA           | SOT-223 |
| S8X8TS      | —       | —    | X    | 200 µA           | SOT-223 |
| S4X8BS      | X       | —    | —    | 200 µA           | SOT-89  |
| S6X8BS      | —       | X    | —    | 200 µA           | SOT-89  |
| S4X8ES1     | X       | —    | —    | 5 µA             | TO-92   |
| S6X8ES1     | —       | X    | —    | 5 µA             | TO-92   |
| S8X8ES1     | —       | —    | X    | 5 µA             | TO-92   |
| S4X8TS1     | X       | —    | —    | 5 µA             | SOT-223 |
| S6X8TS1     | —       | X    | —    | 5 µA             | SOT-223 |
| S8X8TS1     | —       | —    | X    | 5 µA             | SOT-223 |
| S4X8ES2     | X       | —    | —    | 50 µA            | TO-92   |
| S6X8ES2     | —       | X    | —    | 50 µA            | TO-92   |
| S8X8ES2     | —       | —    | X    | 50 µA            | TO-92   |
| S4X8TS2     | X       | —    | —    | 50 µA            | SOT-223 |
| S6X8TS2     | —       | X    | —    | 50 µA            | SOT-223 |
| S8X8TS2     | —       | —    | X    | 50 µA            | SOT-223 |

**Packing Options**

| Part Number | Marking | Weight | Packing Mode | Base Quantity |
|-------------|---------|--------|--------------|---------------|
| SxX8ESy     | SxX8ESy | 0.170g | Bulk         | 2500          |
| SxX8ESyAP   | SxX8ESy | 0.170g | Ammo Pack    | 2000          |
| SxX8ESyRP   | SxX8ESy | 0.170g | Tape & Reel  | 2000          |
| SxX8TSyRP   | SxX8TSy | 0.120g | Tape & Reel  | 1000          |
| SxX8BSRP    | xX8     | 0.053g | Tape & Reel  | 1000          |
| SxX8BSRP1   | xX8     | 0.053g | Tape & Reel  | 1000          |

Note: x = voltage, y = gate sensitivity

**TO-92 (3-lead) Reel Pack (RP) Radial Leaded Specifications**

Meets all EIA-468-C Standards



**TO-92 (3-lead) Ammo Pack (AP) Radial Leaded Specifications**

Meets all EIA-468-C Standards





**SOT-89 Reel Pack (RP) Specifications**



**SOT-89 Reel Pack (RP1) Specifications**



**SOT-223 Reel Pack (RP) Specifications**



**Part Numbering System**



**Part Marking System**





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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