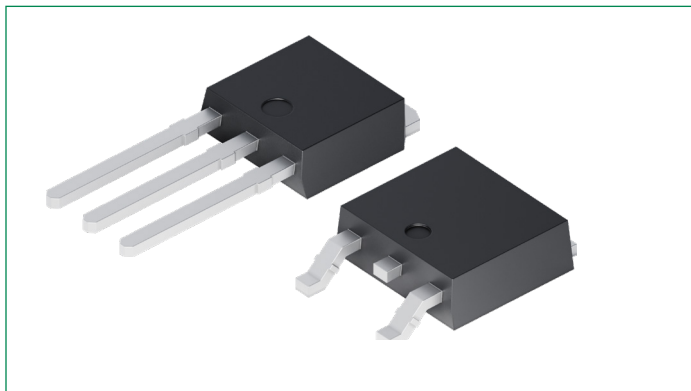


# SJxx08xSx and SJxx08xx Series

## 8 A High Temperature Sensitive and Standard SCRs

HF RoHS



### Description

The SJxx080xx high temperature SCR series is ideal for uni-directional switch applications such as phase control in heating, motor speed controls, converters/rectifiers, and capacitive discharge ignitions.

These SCRs have a low gate current trigger level of 6 mA or 15 mA maximum at approximately 1.5 V gate trigger voltage, with a sensitive version of this series having a gate trigger current less than 200  $\mu$ A. The sensitive gate SCR version is easily triggered by sense coils, proximity switches, and microprocessors.

### Features

- Voltage capability up to 800 V
- Surge current capability up to 100 A at 60 Hz half cycle
- Maximum  $T_{vj(max)}$  of 150 °C

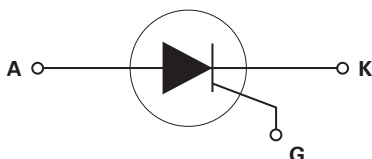
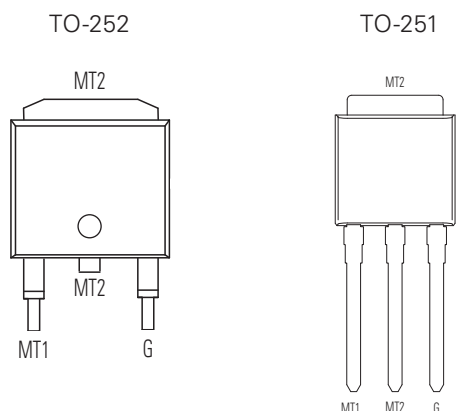
### Applications

Typical applications include capacitive discharge system for motorcycle engine CDI, portable generator engine ignition, strobe lights, and nailers. These devices are also suitable for applications such as generic rectifiers, battery voltage regulators and converters, controls for power tools, home/brown goods, and white goods appliances.

### Product Summary

| Characteristic    | Value             | Unit |
|-------------------|-------------------|------|
| $I_{T(RMS)}$      | 8                 | A    |
| $V_{DRM}/V_{RRM}$ | 400 or 600 or 800 | V    |
| $I_{GT}$          | 0.2 to 15         | mA   |

### Pinout Diagram



**K:** Cathode; **A:** Anode; **G:** Gate

### Maximum Ratings – Sensitive SCRs

| Symbol            | Characteristics                             | Conditions   | Value                      | Units            |   |
|-------------------|---|--|----------------------------|------------------|---|
| $I_{T(RMS)}$      | On-state RMS Current                        | $T_C = 120\text{ }^\circ\text{C}$                                    | 8                          | A                |   |
| $I_{T(AV)}$       | Average On-state Current                    | $T_C = 120\text{ }^\circ\text{C}$                                    | 5.1                        | A                |   |
| $I_{TSM}$         | Non-repetitive Surge Peak On-state Current  | f = 50 Hz  | single half cycle,         | 83               | A |
|                   |   | f = 60 Hz  | $T_{vj}$ (initial) = 25 °C | 100              |   |
| $I^2t$            | $I^2t$ Value for Fusing                     | $t_p = 8.3\text{ ms}$  | 41                         | A <sup>2</sup> s |   |
| di/dt             | Critical Rate of Rise of On-state Current   | f = 60 Hz, $T_{vj} = 150\text{ }^\circ\text{C}$                      | 70                         | A/ $\mu$ s       |   |
| $I_{GM}$          | Peak Gate Current                           | $P_W = 20\text{ }\mu\text{s}$ , $T_{vj} = 150\text{ }^\circ\text{C}$ | 0.5                        | A                |   |
| $P_{G(AV)}$       | Average Gate Power Dissipation              | $T_{vj} = 150\text{ }^\circ\text{C}$                                 | 0.1                        | W                |   |
| $T_{stg}$         | Storage Temperature Range                   | –  | –40 to 150                 | °C               |   |
| $T_{vj}$          | Virtual Junction Temperature Range          | –  | –40 to 150                 | °C               |   |
| $V_{DSM}/V_{RSM}$ | Non-repetitive Surge Peak Off-state Voltage | $P_W = 100\text{ }\mu\text{s}$                                       | $V_{DRM}/V_{RRM} + 100$    | V                |   |

### Maximum Ratings— Standard SCRs

| Symbol            | Characteristics                             | Conditions   | Value                      | Units                   |   |
|-------------------|---|--|----------------------------|-------------------------|---|
| $I_{T(RMS)}$      | On-state RMS Current                        | $T_C = 125\text{ }^\circ\text{C}$                                    | 8                          | A                       |   |
| $I_{T(AV)}$       | Average On-state Current                    | $T_C = 125\text{ }^\circ\text{C}$                                    | 5.1                        | A                       |   |
| $I_{TSM}$         | Non-repetitive Surge Peak On-state Current  | f = 50 Hz  | single half cycle,         | 83                      | A |
|                   |   | f = 60 Hz  | $T_{vj}$ (initial) = 25 °C | 100                     |   |
| $I^2t$            | $I^2t$ Value for Fusing                     | $t_p = 8.3\text{ ms}$  | 41                         | A <sup>2</sup> s        |   |
| di/dt             | Critical Rate of Rise of On-state Current   | f = 60 Hz, $T_{vj} = 150\text{ }^\circ\text{C}$                      | 100                        | A/ $\mu$ s              |   |
| $I_{GM}$          | Peak Gate Current                           | $P_W = 20\text{ }\mu\text{s}$ , $T_{vj} = 150\text{ }^\circ\text{C}$ | 0.5                        | A                       |   |
| $P_{G(AV)}$       | Average Gate Power Dissipation              | $T_{vj} = 150\text{ }^\circ\text{C}$                                 | 0.1                        | W                       |   |
| $T_{stg}$         | Storage Temperature Range                   | –  | –40 to 150                 | °C                      |   |
| $T_{vj}$          | Virtual Junction Temperature Range          | –  | –40 to 150                 | °C                      |   |
| $V_{DSM}/V_{RSM}$ | Non-repetitive Surge Peak Off-state Voltage | $P_W = 100\text{ }\mu\text{s}$                                       | 400–600 V                  | $V_{DRM}/V_{RRM} + 100$ | V |
|                   |   |  | 800 V                      | $V_{DRM}/V_{RRM} + 200$ |   |

### Electrical Characteristics ( $T_{vj} = 25\text{ }^\circ\text{C}$ , unless otherwise specified) – Sensitive SCRs

| Symbol    | Characteristics                   | Conditions  | SJxx08xS2 |      |      | Units      |
|-----------|-----------------------------------|---|-----------|------|------|------------|
|           |                                   |   | Min.      | Typ. | Max. |            |
| $I_{GT}$  | DC Gate Trigger Current           | $V_D = 6\text{ V}$ , $R_L = 100\text{ }\Omega$  | 20        | –    | 200  | $\mu$ A    |
| $V_{GT}$  | DC Gate Trigger Voltage           | $V_D = 6\text{ V}$ , $R_L = 100\text{ }\Omega$  | –         | –    | 0.8  | V          |
| dv/dt     | Rate of Rise of Off-stage Voltage | $V_D = V_{DRM}$ , $R_{GK} = 220\text{ }\Omega$ , $T_{vj} = 125\text{ }^\circ\text{C}$                 | 15        | –    | –    | V/ $\mu$ s |
| $V_{GD}$  | Gate Non-trigger Voltage          | $V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $T_{vj} = 125\text{ }^\circ\text{C}$                   | 0.2       | –    | –    | V          |
|           |                                   | $V_D = V_{DRM}$ , $R_L = 3.3\text{ k}\Omega$ , $T_{vj} = 150\text{ }^\circ\text{C}$                   | 0.1       | –    | –    |            |
| $V_{RGM}$ | Peak Reverse Gate Voltage         | $I_{GR} = 10\text{ }\mu\text{A}$  | 6         | –    | –    | V          |
| $I_H$     | Holding Current                   | $I_T = 200\text{ mA}$ (initial)   | –         | –    | 6    | mA         |
| $t_q$     | Turn-off Time                     | $t_p = 50\text{ }\mu\text{s}$ , $dv/dt = 5\text{ V}/\mu\text{s}$ , $di/dt = -30\text{ A}/\mu\text{s}$ | –         | –    | 130  | $\mu$ s    |
| $t_{gt}$  | Turn-on Time                      | $I_G = 2 \times I_{GT}$ , $P_W = 15\text{ }\mu\text{s}$ , $I_T = 8\text{ A}$                          | –         | 6    | –    | $\mu$ s    |

xx = voltage

**Electrical Characteristics** ( $T_{vj} = 25\text{ }^\circ\text{C}$ , unless otherwise specified) — **Standard SCRs**

| Symbol   | Characteristics                   | Conditions  | SJxx08x1 |      |      | SJxx08x |      |      | Units            |
|----------|-----------------------------------|---|----------|------|------|---------|------|------|------------------|
|          |                                   |   | Min.     | Typ. | Max. | Min.    | Typ. | Max. |                  |
| $I_{GT}$ | DC Gate Trigger Current           | $V_D = 12\text{ V}, R_L = 60\ \Omega$   | –        | –    | 6    | –       | –    | 15   | mA               |
| $V_{GT}$ | DC Gate Trigger Voltage           | $V_D = 12\text{ V}, R_L = 60\ \Omega$   | –        | –    | 1.5  | –       | –    | 1.5  | V                |
| $dv/dt$  | Rate of Rise of Off-stage Voltage | $V_D = V_{DRM}, \text{ gate open}, T_{vj} = 125\text{ }^\circ\text{C}$  | 100      | –    | –    | 200     | –    | –    | V/ $\mu\text{s}$ |
|          |                                   | $V_D = V_{DRM}, \text{ gate open}, T_{vj} = 150\text{ }^\circ\text{C}$  | 50       | –    | –    | 120     | –    | –    |                  |
| $V_{GD}$ | Gate Non-trigger Voltage          | $V_D = V_{DRM}, R_L = 3.3\text{ k}\Omega, T_{vj} = 125\text{ }^\circ\text{C}$                                 | 0.2      | –    | –    | 0.2     | –    | –    | V                |
|          |                                   | $V_D = V_{DRM}, R_L = 3.3\text{ k}\Omega, T_{vj} = 150\text{ }^\circ\text{C}$                                 | 0.15     | –    | –    | 0.15    | –    | –    |                  |
| $I_H$    | Holding Current                   | $I_T = 200\text{ mA (initial)}$   | –        | –    | 20   | –       | –    | 30   | mA               |
| $t_q$    | Turn-off Time                     | $I_T = 0.5\text{ A}, t_p = 50\ \mu\text{s}, dv/dt = 5\text{ V}/\mu\text{s}, di/dt = -30\text{ A}/\mu\text{s}$ | –        | –    | 30   | –       | –    | 35   | $\mu\text{s}$    |
| $t_{gt}$ | Turn-on Time                      | $I_G = 2 \times I_{GT}, P_W = 15\ \mu\text{s}, I_T = 8\text{ A}$  | –        | 0.5  | –    | –       | 2    | –    | $\mu\text{s}$    |

xx = voltage

**Thermal Characteristics**

| Symbol        | Characteristics                           | Value     | Units |
|---------------|---|-----------|-------|
| $R_{th(j-c)}$ | Thermal Resistance, Junction to Case (AC) | SJxx08xS2 | 1.2   |
|               |   | SJxx08xx  | 1.2   |

xx = voltage

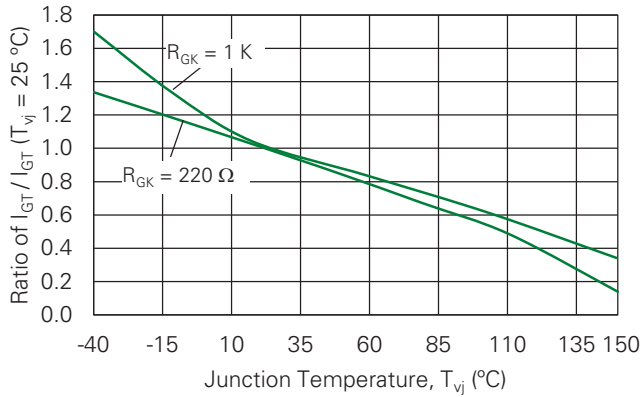
**Static Characteristics**

| Symbol            | Characteristics                   | Conditions                                  | Maximum Value  | Units |
|-------------------|-----------------------------------|---|--|-------|
| $V_{TM}$          | Peak On-state Voltage             | $I_T = 16\text{ A}, t_p = 380\ \mu\text{s}$ | 1.6  | V     |
| $I_{DRM}/I_{RRM}$ | Peak Repetitive Off-state Current | SJxx08xS2                                   | $T_{vj} = 25\text{ }^\circ\text{C}$                        | 5     |
|                   |                                   |   | $T_{vj} = 125\text{ }^\circ\text{C}, R_{GK} = 220\ \Omega$ | 1000  |
|                   |                                   |   | $T_{vj} = 150\text{ }^\circ\text{C}, R_{GK} = 220\ \Omega$ | 3000  |
|                   |                                   | SJxx08xx                                    | $T_{vj} = 25\text{ }^\circ\text{C}$                        | 10    |
|                   |                                   |   | $T_{vj} = 125\text{ }^\circ\text{C}$                       | 1000  |
|                   |                                   |   | $T_{vj} = 150\text{ }^\circ\text{C}$                       | 3000  |

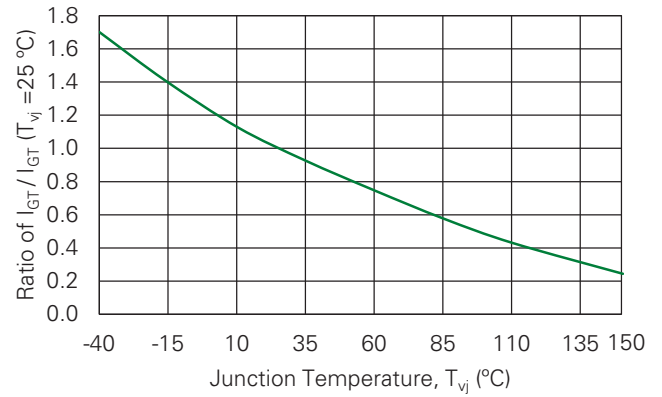
xx = voltage

**Characteristic Curves**

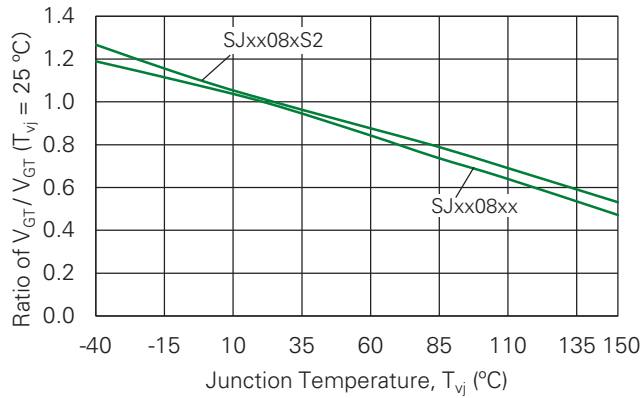
**Fig. 1. Normalized DC Gate Trigger Current vs. Junction Temperature (Sensitive SCR)**



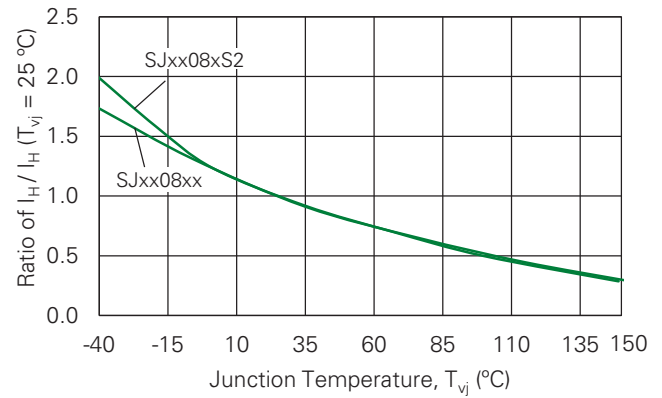
**Fig. 2. Normalized DC Gate Trigger Current vs. Junction Temperature (Standard SCR)**



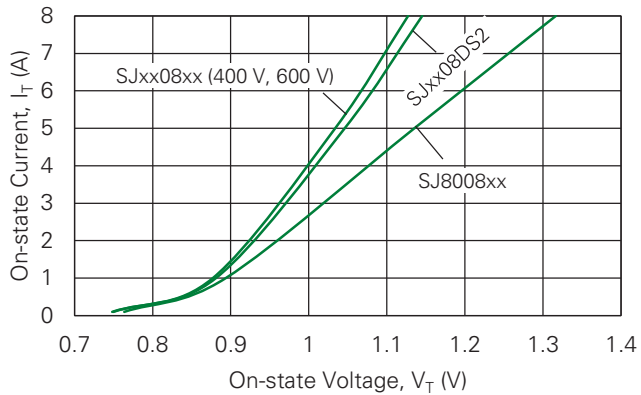
**Fig. 3. Normalized DC Gate Trigger Voltage vs. Junction Temperature**



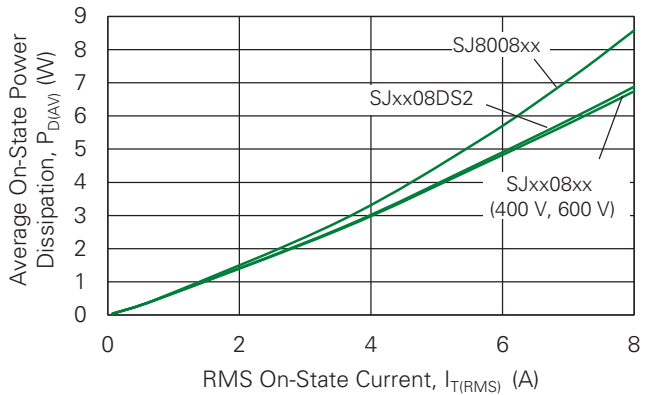
**Fig. 4. Normalized DC Holding Current vs. Junction Temperature**



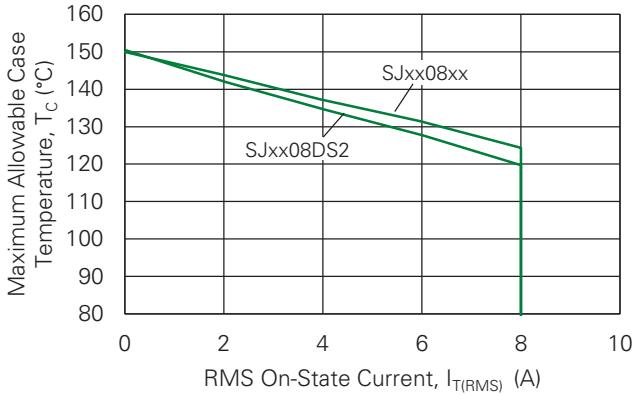
**Fig. 5. Typical On-state Current vs. On-state Voltage**



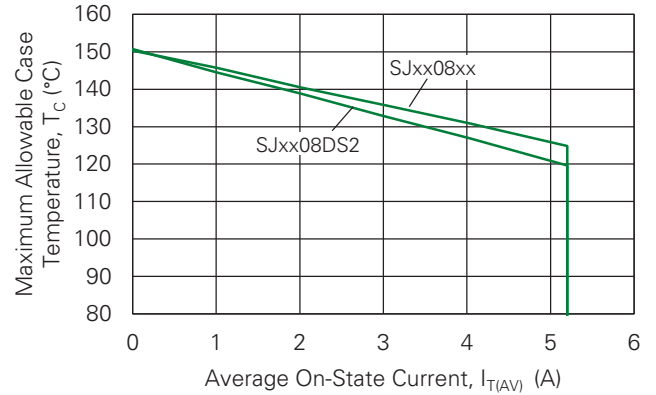
**Fig. 6. Typical Power Dissipation vs. RMS On-state Current**



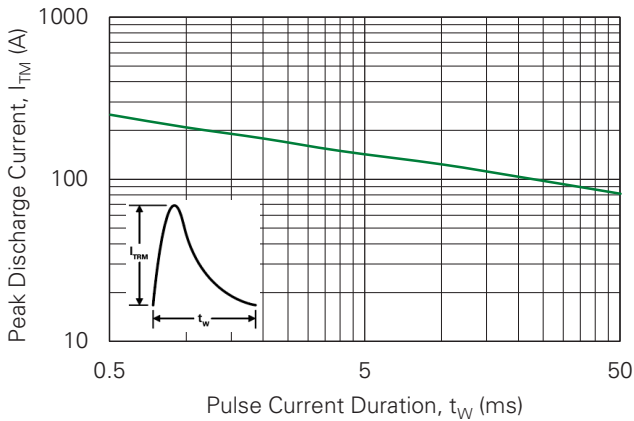
**Fig. 7. Maximum Allowable Case Temperature vs. RMS On-state Current**



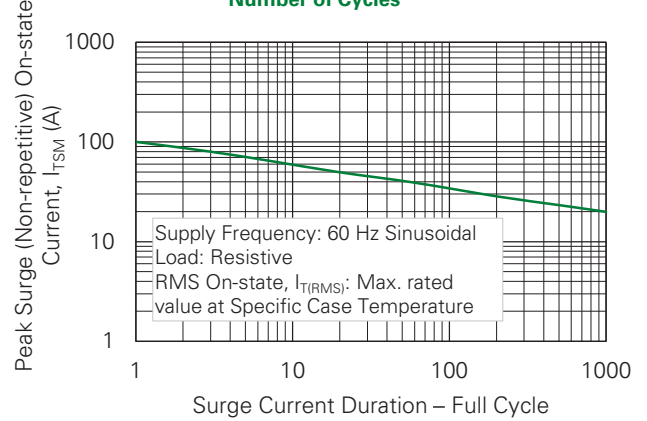
**Fig. 8. Maximum Allowable Case Temperature vs. Average On-state Current**



**Fig. 9. Peak Capacitor Discharge Current**



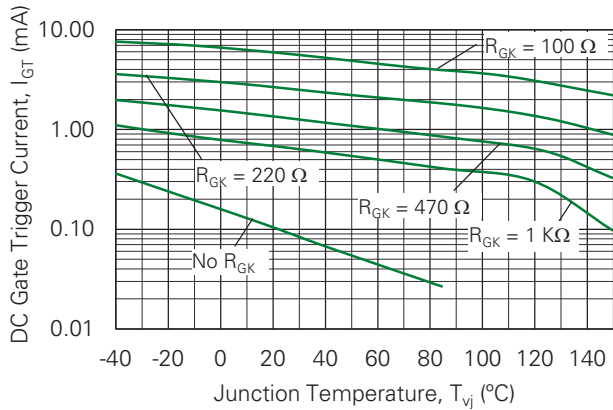
**Fig. 10. Surge Peak On-state Current vs. Number of Cycles**



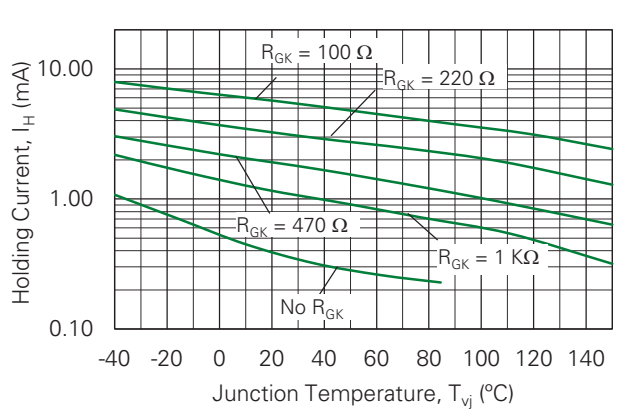
Notes:

1. Gate control may be lost during and immediately following surge current interval.
2. Overload should not be repeated until junction temperature has returned to steady-state rated value.

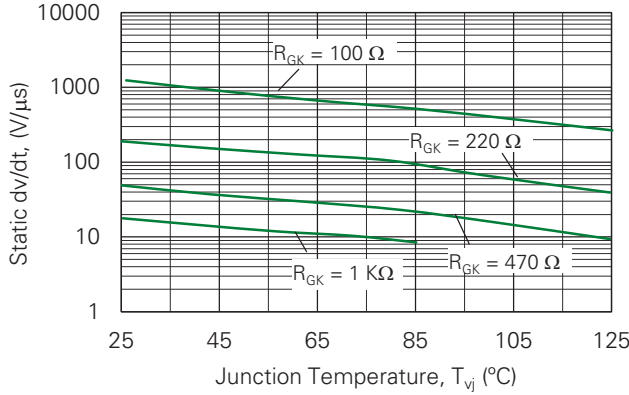
**Fig. 11. Typical DC Gate Trigger Current with  $R_{GK}$  vs. Junction Temperature (Sensitive SCR)**



**Fig. 12. Typical DC Holding Current with  $R_{GK}$  vs. Junction Temperature (Sensitive SCR)**



**Fig. 13. Typical Static dv/dt with  $R_{GK}$  vs. Junction Temperature (Sensitive SCR)**

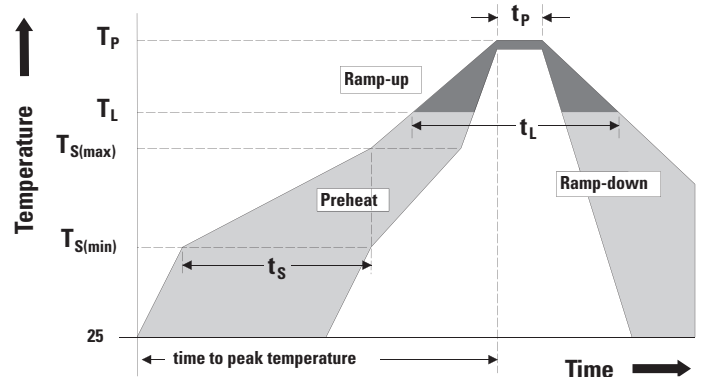


### Soldering Parameters

| Characteristic  |                                  | Value                   |
|---|----------------------------------|-------------------------|
| 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 – 120 secs           |
| Average ramp up rate (Liquidus Temp)( $T_L$ ) to peak |                                  | 3 °C/second max         |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                  |                                  | 3 °C/second max         |
| Reflow  | Temperature ( $T_L$ ) (Liquidus) | 217 °C                  |
|   | Time ( $t_L$ )                   | 60 – 150 seconds        |
| Peak Temperature ( $T_p$ )                            |                                  | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )  |                                  | 30 seconds max.         |
| Ramp-down Rate  |                                  | 5°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )               |                                  | 6 minutes max           |
| Do Not Exceed   |                                  | 260 °C                  |

### Physical Specifications

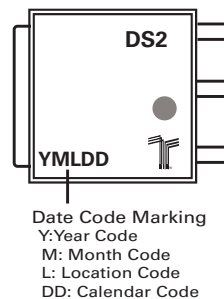
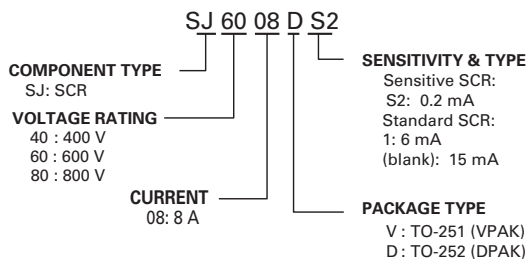
| Characteristic    | Value  |
|-------------------|--|
| Terminal Finish   | 100% Matte Tin-plated                                  |
| Body Material     | UL Recognized compound meeting flammability rating V-0 |
| Terminal Material | Copper Alloy   |



### Environmental Specifications

| Test                       | Specifications and Conditions  |
|----------------------------|--|
| AC Blocking                | MIL-STD-750, M-1040, Cond A Applied Peak AC voltage for 1008 hours             |
| Temperature/Humidity       | EIA / JEDEC, JESD22-A101, 1008 hours; 160 V - DC: 85 °C; 85% relative humidity |
| Temperature Cycling        | MIL-STD-750, M-1051, 100 cycles; -40 °C to +150 °C; 15-min dwell-time          |
| High Temperature Storage   | MIL-STD-750 M-1031, 1008 hours, 150 °C   |
| Low Temperature Storage    | 1008 hours, -40 °C   |
| Resistance to Solder Heat  | MIL-STD-750, Method 2031   |
| Solderability              | ANSI/J-STD-002: category 3, Test A   |
| Lead Bend                  | MIL-STD-750, M-2036 Cond E   |
| Moisture Sensitivity Level | Level 1, JEDEC-J-STD-020   |

## Part Numbering and Marking



## Packing Options

| Part Number | Marking   | Weight | Packing Mode     | Base Quantity     |
|-------------|-----------|--------|------------------|-------------------|
| SJxx08DS2TP | SJxx08DS2 | 0.3 g  | Tube             | 750 (75 per tube) |
| SJxx08DS2RP | SJxx08DS2 | 0.3 g  | Embossed Carrier | 2500              |
| SJxx08VS2TP | SJxx08VS2 | 0.4 g  | Tube             | 750 (75 per tube) |
| SJxx08DTP   | SJxx08D   | 0.3 g  | Tube             | 750 (75 per tube) |
| SJxx08DRP   | SJxx08D   | 0.3 g  | Embossed Carrier | 2500              |
| SJxx08VTP   | SJxx08V   | 0.4 g  | Tube             | 750 (75 per tube) |
| SJxx08D1TP  | SJxx08D1  | 0.3 g  | Tube             | 750 (75 per tube) |
| SJxx08D1RP  | SJxx08D1  | 0.3 g  | Embossed Carrier | 2500              |
| SJxx08V1TP  | SJxx08V1  | 0.4 g  | Tube             | 750 (75 per tube) |

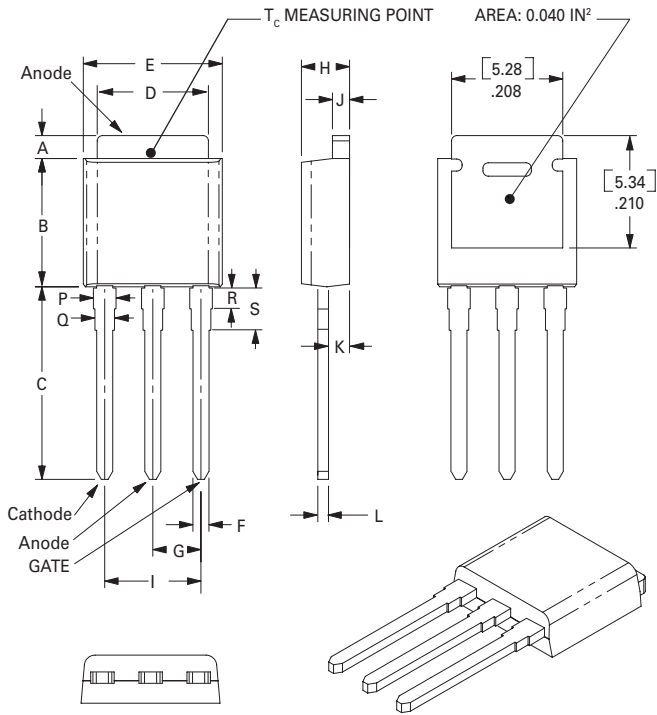
xx = voltage

## Product Selector

| Part Number | Voltage |       |       | Gate Sensitivity Quadrants | Type          | Package       |
|-------------|---------|-------|-------|----------------------------|---------------|---------------|
|             | 400 V   | 600 V | 800 V | I-II-III                   |               |               |
| SJxx08VS2   | X       | X     | –     | 0.2 mA                     | Sensitive SCR | TO-251 (VPAK) |
| SJxx08DS2   | X       | X     | –     | 0.2 mA                     | Sensitive SCR | TO-252 (DPAK) |
| SJxx08V     | X       | X     | X     | 15 mA                      | Sensitive SCR | TO-251 (VPAK) |
| SJxx08D     | X       | X     | X     | 15 mA                      | Sensitive SCR | TO-252 (DPAK) |
| SJxx08V1    | X       | X     | –     | 6 mA                       | Sensitive SCR | TO-251 (VPAK) |
| SJxx08D1    | X       | X     | –     | 6 mA                       | Sensitive SCR | TO-252 (DPAK) |

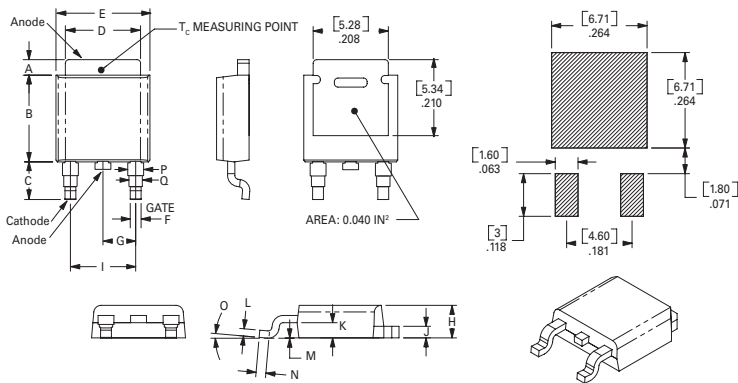
xx = voltage

**Package Dimensions** TO-251AA (V Package) – VPAK Through Hole



| Symbol | Millimeters |      | Inches |       |
|--------|-------------|------|--------|-------|
|        | Min.        | Max. | Min.   | Max.  |
| A      | 0.94        | 1.09 | 0.037  | 0.043 |
| B      | 5.97        | 6.22 | 0.235  | 0.245 |
| C      | 8.89        | 9.53 | 0.350  | 0.375 |
| D      | 5.21        | 5.41 | 0.205  | 0.213 |
| E      | 6.48        | 6.73 | 0.255  | 0.265 |
| F      | 0.69        | 0.84 | 0.027  | 0.033 |
| G      | 2.21        | 2.36 | 0.087  | 0.093 |
| H      | 2.16        | 2.41 | 0.085  | 0.095 |
| I      | 4.47        | 4.67 | 0.176  | 0.184 |
| J      | 0.46        | 0.58 | 0.018  | 0.023 |
| K      | 0.90        | 1.00 | 0.035  | 0.039 |
| L      | 0.46        | 0.58 | 0.018  | 0.023 |
| P      | 1.06        | 1.32 | 0.042  | 0.052 |
| Q      | 0.86        | 1.11 | 0.034  | 0.044 |
| R      | 0.86        | 1.11 | 0.034  | 0.044 |
| S      | 1.86        | 2.11 | 0.074  | 0.084 |

**Package Dimensions** TO-252AA (D Package) – DPAK Surface Mount

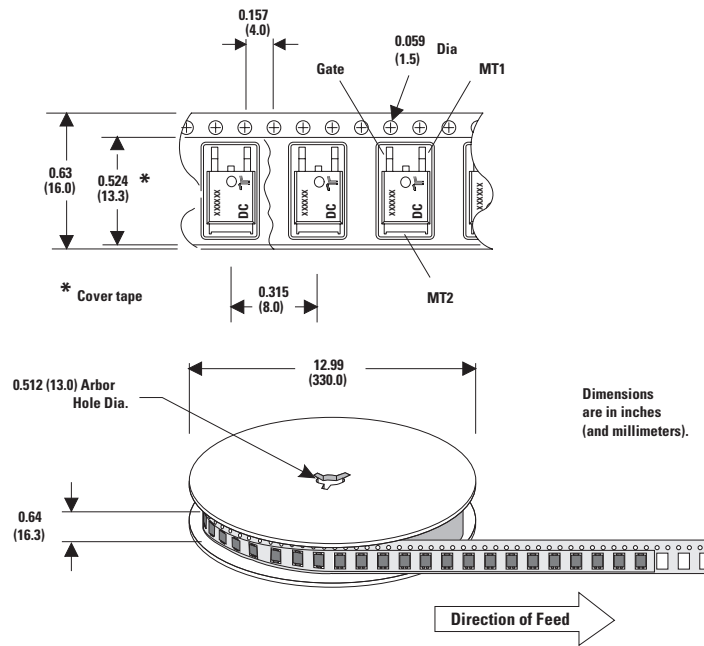


| Symbol | Millimeters |      | Inches |       |
|--------|-------------|------|--------|-------|
|        | Min.        | Max. | Min.   | Max.  |
| A      | 0.94        | 1.09 | 0.037  | 0.043 |
| B      | 5.97        | 6.22 | 0.235  | 0.245 |
| C      | 2.69        | 2.87 | 0.106  | 0.113 |
| D      | 5.21        | 5.41 | 0.205  | 0.213 |
| E      | 6.48        | 6.73 | 0.255  | 0.265 |
| F      | 0.69        | 0.84 | 0.027  | 0.033 |
| G      | 2.21        | 2.36 | 0.087  | 0.093 |
| H      | 2.16        | 2.41 | 0.085  | 0.095 |
| I      | 4.47        | 4.67 | 0.176  | 0.184 |
| J      | 0.46        | 0.58 | 0.018  | 0.023 |
| K      | 0.90        | 1.00 | 0.035  | 0.039 |
| L      | 0.46        | 0.58 | 0.018  | 0.023 |
| M      | 0.00        | 0.10 | 0.000  | 0.004 |
| N      | 0.53        | 0.69 | 0.021  | 0.027 |
| O      | 0°          | 5°   | 0°     | 5°    |
| P      | 1.06        | 1.32 | 0.042  | 0.052 |
| Q      | 0.86        | 1.11 | 0.034  | 0.044 |



**Reel Pack (RP) Specifications** (TO-252 Embossed Carrier)

Meets all EIA-481-2 Standards



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