



# THE DATASHEET OF S2S2RP





# Sensitive SCRs

(0.8 A to 10 A) RoHS

## General Description

The Teccor line of sensitive SCR semiconductors are half-wave unidirectional, gate-controlled rectifiers (SCR-thyristor) which complement Teccor's line of power SCRs. This group of packages offers ratings of 0.8 A to 10 A, and 200 V to 600 V with gate sensitivities of 12  $\mu$ A to 500  $\mu$ A. For gate currents in the 10 mA to 50 mA ranges, see "SCRs" section of this catalog.

The TO-220 and TO-92 are electrically isolated where the case or tab is internally isolated to allow the use of low-cost assembly and convenient packaging techniques.

Teccor's line of SCRs features glass-passivated junctions to ensure long-term device reliability and parameter stability. Teccor's glass offers a rugged, reliable barrier against junction contamination.

Tape-and-reel packaging is available for the TO-92 package. Consult the factory for more information.

Variations of devices covered in this data sheet are available for custom design applications. Consult the factory for more information.

## Features

- RoHS Compliant
- Electrically-isolated TO-220 package
- High voltage capability — up to 600 V
- High surge capability — up to 100 A
- Glass-passivated chip

## Compak Features

- Surface mount package — 0.8 A series
- New small-profile three-leaded Compak package
- Four gate sensitivities available
- Packaged in embossed carrier tape with 2,500 devices per reel
- Can replace SOT-223

| TYPE  | Part Number   |   |   |   |   | $I_T$        |             | $V_{DRM}$ & $V_{RRM}$ | $I_{GT}$   | $I_{DRM}$ & $I_{RRM}$       |                              |                              | $V_{TM}$ |     |
|---|---|---|---|---|---|--------------|-------------|-----------------------|------------|-----------------------------|------------------------------|------------------------------|----------|-----|
|   | Non-isolated  |   |   |   |   | $I_T$        |             |                       |            | $I_{DRM}$ & $I_{RRM}$       |                              |                              |          |     |
|   |  |  |  |  |  | Amps         |             | Volts                 | $\mu$ Amps | $\mu$ Amps                  |                              |                              |          |     |
|   | TO-92   | TO-202  | TO-251 V-Pak  | Compak  | TO-252 D-Pak  | $I_{T(RMS)}$ | $I_{T(AV)}$ |                       |            | $T_C$ or $T_L = 25^\circ C$ | $T_C$ or $T_L = 100^\circ C$ | $T_C$ or $T_L = 110^\circ C$ |          |     |
| See "Package Dimensions" section for variations. (11) |   |   |   |   | MAX   | MAX          | MIN         | MAX                   | MAX        | MAX                         | MAX                          |                              |          |     |
| 0.8 A   |   |   |   | S2S1  |   | 0.8          | 0.51        | 200                   | 12         | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S4S1  |   | 0.8          | 0.51        | 400                   | 12         | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S6S1  |   | 0.8          | 0.51        | 600                   | 12         | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S2S2  |   | 0.8          | 0.51        | 200                   | 50         | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S4S2  |   | 0.8          | 0.51        | 400                   | 50         | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S6S2  |   | 0.8          | 0.51        | 600                   | 50         | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S2S   |   | 0.8          | 0.51        | 200                   | 200        | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S4S   |   | 0.8          | 0.51        | 400                   | 200        | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S6S   |   | 0.8          | 0.51        | 600                   | 200        | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S2S3  |   | 0.8          | 0.51        | 200                   | 500        | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S4S3  |   | 0.8          | 0.51        | 400                   | 500        | 2                           |                              | 100                          | 1.7      |     |
|   |   |   |   | S6S3  |   | 0.8          | 0.51        | 600                   | 500        | 2                           |                              | 100                          | 1.7      |     |
|   |   | EC103B  |   |   |   | 0.8          | 0.51        | 200                   | 200        | 1                           | 50                           |                              | 100      | 1.7 |
|   |   | EC103D  |   |   |   | 0.8          | 0.51        | 400                   | 200        | 1                           | 50                           |                              | 100      | 1.7 |
|   |   | EC103M  |   |   |   | 0.8          | 0.51        | 600                   | 200        | 2                           | 100                          |                              | 100      | 1.7 |
|   |   | EC103B1   |   |   |   | 0.8          | 0.51        | 200                   | 12         | 1                           | 50                           |                              | 100      | 1.7 |
|   |   | EC103D1   |   |   |   | 0.8          | 0.51        | 400                   | 12         | 1                           | 50                           |                              | 100      | 1.7 |
|   |   | EC103M1   |   |   |   | 0.8          | 0.51        | 600                   | 12         | 2                           | 100                          |                              | 100      | 1.7 |
|   |   | EC103B2   |   |   |   | 0.8          | 0.51        | 200                   | 50         | 1                           | 50                           |                              | 100      | 1.7 |
|   |   | EC103D2   |   |   |   | 0.8          | 0.51        | 400                   | 50         | 1                           | 50                           |                              | 100      | 1.7 |
|   | EC103M2   |   |   |   | 0.8   | 0.51         | 600         | 50                    | 2          | 100                         |                              | 100                          | 1.7      |     |
|   | EC103B3   |   |   |   | 0.8   | 0.51         | 200         | 500                   | 1          | 50                          |                              | 100                          | 1.7      |     |
|   | EC103D3   |   |   |   | 0.8   | 0.51         | 400         | 500                   | 1          | 50                          |                              | 100                          | 1.7      |     |
|   | EC103M3   |   |   |   | 0.8   | 0.51         | 600         | 500                   | 2          | 100                         |                              | 100                          | 1.7      |     |
|   | 2N5064  |   |   |   | 0.8   | 0.51         | 200         | 200                   | 1          |                             | 50                           | 100                          | 1.7      |     |
|   | 2N6565  |   |   |   | 0.8   | 0.51         | 400         | 200                   | 1          |                             | 100                          | 100                          | 1.7      |     |
| 1.5 A   |   |   |   | TCR22-4   |   | 1.5          | 0.95        | 200                   | 200        | 1                           |                              | 100                          | 1.5      |     |
|   |   |   |   | TCR22-6   |   | 1.5          | 0.95        | 400                   | 200        | 1                           |                              | 100                          | 1.5      |     |
|   |   |   |   | TCR22-8   |   | 1.5          | 0.95        | 600                   | 200        | 2                           |                              | 100                          | 1.5      |     |
| 4 A   |   |   |   | T106B1  |   | 4            | 2.5         | 200                   | 200        | 2                           |                              | 100                          | 2.2      |     |
|   |   |   |   | T106D1  |   | 4            | 2.5         | 400                   | 200        | 2                           |                              | 100                          | 2.2      |     |
|   |   |   |   | T106M1  |   | 4            | 2.5         | 600                   | 200        | 2                           |                              | 100                          | 2.2      |     |
|   |   |   |   | T107B1  |   | 4            | 2.5         | 200                   | 500        | 2                           |                              | 100                          | 2.5      |     |
|   |   |   |   | T107D1  |   | 4            | 2.5         | 400                   | 500        | 2                           |                              | 100                          | 2.5      |     |
|   |   |   |   | T107M1  |   | 4            | 2.5         | 600                   | 500        | 2                           |                              | 100                          | 2.5      |     |
|   |   |   |   | S2004VS1  | S2004DS1  | 4            | 2.5         | 200                   | 50         | 2                           |                              | 100                          | 1.6      |     |
|   |   |   |   | S4004VS1  | S4004DS1  | 4            | 2.5         | 400                   | 50         | 2                           |                              | 100                          | 1.6      |     |
|   |   |   |   | S6004VS1  | S6004DS1  | 4            | 2.5         | 600                   | 50         | 2                           |                              | 100                          | 1.6      |     |
|   |   |   |   | S2004VS2  | S2004DS2  | 4            | 2.5         | 200                   | 200        | 2                           |                              | 100                          | 1.6      |     |
|   |   |   | S4004VS2  | S4004DS2  | 4   | 2.5          | 400         | 200                   | 2          |                             | 100                          | 1.6                          |          |     |
|   |   |   | S6004VS2  | S6004DS2  | 4   | 2.5          | 600         | 200                   | 2          |                             | 100                          | 1.6                          |          |     |

See "General Notes" on page E5 - 4 and "Electrical Specifications Notes" on page E5 - 5

| V <sub>GT</sub>                              |   |  | I <sub>H</sub>        | I <sub>GM</sub> | V <sub>GRM</sub> | P <sub>GM</sub> | P <sub>G(AV)</sub> | I <sub>TSM</sub> | dv/dt |            | di/dt     | t <sub>gt</sub> | t <sub>q</sub> | I <sup>2</sup> t       |
|--|---|--|-----------------------|-----------------|------------------|-----------------|--------------------|------------------|-------|------------|-----------|-----------------|----------------|------------------------|
| (4) (12) (22)                                |   |  | (5) (15)<br>(16) (19) | (17)            |                  | (17)            |                    | (6) (7) (13)     |       |            |           | (8)             | (9)            |                        |
| Volts  |   |  |                       |                 |                  |                 |                    | Amps             |       |            |           |                 |                |                        |
| T <sub>C</sub> or T <sub>L</sub> =<br>-40 °C | T <sub>C</sub> or T <sub>L</sub> =<br>25 °C | T <sub>C</sub> or T <sub>L</sub> =<br>110 °C | mAmps                 | Amps            | Volts            | Watts           | Watts              | 60/50 Hz         |       | Volts/μSec | Amps/μSec | μSec            | μSec           | Amps <sup>2</sup> /Sec |
| MAX  |   |  | MAX                   |                 | MIN              |                 |                    |                  | MIN   | TYP (23)   |           | TYP             | MAX            |                        |
| 1.2  | 0.8   | 0.2  | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 20    |            | 50        | 2               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.2  | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 20    |            | 50        | 2               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.2  | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 10    |            | 50        | 2               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 25    |            | 50        | 3               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 25    |            | 50        | 3               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 10    |            | 50        | 3               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 30    |            | 50        | 4               | 50             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 30    |            | 50        | 4               | 50             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 15    |            | 50        | 4               | 50             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 8                     | 1               | 5                | 1               | 0.1                | 20/16            | 40    |            | 50        | 5               | 45             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 8                     | 1               | 5                | 1               | 0.1                | 20/16            | 40    |            | 50        | 5               | 45             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 8                     | 1               | 5                | 1               | 0.1                | 20/16            | 20    |            | 50        | 5               | 45             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 30    |            | 50        | 3.5             | 50             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 30    |            | 50        | 3.5             | 50             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 15    |            | 50        | 3.5             | 50             | 1.6                    |
| 1.2  | 0.8   | 0.2  | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 20    |            | 50        | 2               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.2  | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 20    |            | 50        | 2               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.2  | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 10    |            | 50        | 2               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 25    |            | 50        | 3               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 25    |            | 50        | 3               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 10    |            | 50        | 3               | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 8                     | 1               | 5                | 1               | 0.1                | 20/16            | 40    |            | 50        | 5               | 45             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 8                     | 1               | 5                | 1               | 0.1                | 20/16            | 40    |            | 50        | 5               | 45             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 8                     | 1               | 5                | 1               | 0.1                | 20/16            | 20    |            | 50        | 5               | 45             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 5                | 1               | 0.1                | 20/16            | 25    |            | 50        | 2.2             | 60             | 1.6                    |
| 1.2  | 0.8   | 0.25   | 5                     | 1               | 6                | 1               | 0.1                | 20/16            | 25    |            | 50        | 2.2             | 60             | 1.6                    |
| 1  | 0.8   | 0.25   | 5                     | 1               | 6                | 1               | 0.1                | 20/16            | 60    |            | 50        | 3.5             | 50             | 1.6                    |
| 1  | 0.8   | 0.25   | 5                     | 1               | 6                | 1               | 0.1                | 20/16            | 40    |            | 50        | 3.5             | 50             | 1.6                    |
| 1  | 0.8   | 0.25   | 5                     | 1               | 6                | 1               | 0.1                | 20/16            | 30    |            | 50        | 3.5             | 50             | 1.6                    |
| 1  | 0.8   | 0.2  | 5                     | 1               | 6                | 1               | 0.1                | 20/16            |       | 8          | 50        | 4               | 50             | 1.6                    |
| 1  | 0.8   | 0.2  | 5                     | 1               | 6                | 1               | 0.1                | 20/16            |       | 8          | 50        | 4               | 50             | 1.6                    |
| 1  | 0.8   | 0.2  | 5                     | 1               | 6                | 1               | 0.1                | 20/16            |       | 8          | 50        | 4               | 50             | 1.6                    |
| 1  | 0.8   | 0.2  | 6                     | 1               | 6                | 1               | 0.1                | 20/16            |       | 8          | 50        | 5               | 45             | 1.6                    |
| 1  | 0.8   | 0.2  | 6                     | 1               | 6                | 1               | 0.1                | 20/16            |       | 8          | 50        | 5               | 45             | 1.6                    |
| 1  | 0.8   | 0.2  | 6                     | 1               | 6                | 1               | 0.1                | 20/16            |       | 8          | 50        | 5               | 45             | 1.6                    |
| 1  | 0.8   | 0.2  | 4                     | 1               | 6                | 1               | 0.1                | 30/25            |       | 8          | 50        | 3               | 50             | 3.7                    |
| 1  | 0.8   | 0.2  | 4                     | 1               | 6                | 1               | 0.1                | 30/25            |       | 8          | 50        | 3               | 50             | 3.7                    |
| 1  | 0.8   | 0.2  | 4                     | 1               | 6                | 1               | 0.1                | 30/25            |       | 8          | 50        | 3               | 50             | 3.7                    |
| 1  | 0.8   | 0.2  | 6                     | 1               | 6                | 1               | 0.1                | 30/25            |       | 8          | 50        | 4               | 50             | 3.7                    |
| 1  | 0.8   | 0.2  | 6                     | 1               | 6                | 1               | 0.1                | 30/25            |       | 8          | 50        | 4               | 50             | 3.7                    |
| 1  | 0.8   | 0.2  | 6                     | 1               | 6                | 1               | 0.1                | 30/25            |       | 8          | 50        | 4               | 50             | 3.7                    |

See "General Notes" on page E5 - 4 and "Electrical Specifications Notes" on page E5 - 5

| TYPE | Part Number   |   |  |  | $I_T$               |                    | $V_{DRM}$ & $V_{RRM}$ | $I_{GT}$          | $I_{DRM}$ & $I_{RRM}$     |                            | $V_{TM}$     |
|------|---|---|--|--|---------------------|--------------------|-----------------------|-------------------|---------------------------|----------------------------|--------------|
|      | Isolated  | Non-isolated  |  |  |                     |                    |                       |                   |                           |                            |              |
|      | <br>TO-220 | <br>TO-202 | <br>TO-251<br>V-Pak | <br>TO-252<br>D-Pak | (1)                 |                    |                       | (2) (12)          | (20) (21)                 |                            | (3) (10)     |
|      | See "Package Dimensions" section for variations. (11)                                       |   |  |  | $I_{T(RMS)}$<br>MAX | $I_{T(AV)}$<br>MAX | Volts<br>MIN          | $\mu$ Amps<br>MAX | $T_C = 25^\circ C$<br>MAX | $T_C = 110^\circ C$<br>MAX | Volts<br>MAX |
| 6 A  | S2006LS2  | S2006FS21   | S2006VS2   | S2006DS2   | 6                   | 3.8                | 200                   | 200               | 5                         | 250                        | 1.6          |
|      | S4006LS2  | S4006FS21   | S4006VS2   | S4006DS2   | 6                   | 3.8                | 400                   | 200               | 5                         | 250                        | 1.6          |
|      | S6006LS2  | S6006FS21   | S6006VS2   | S6006DS2   | 6                   | 3.8                | 600                   | 200               | 5                         | 250                        | 1.6          |
|      | S2006LS3  | S2006FS31   | S2006VS3   | S2006DS3   | 6                   | 3.8                | 200                   | 500               | 5                         | 250                        | 1.6          |
|      | S4006LS3  | S4006FS31   | S4006VS3   | S4006DS3   | 6                   | 3.8                | 400                   | 500               | 5                         | 250                        | 1.6          |
|      | S6006LS3  | S6006FS31   | S6006VS3   | S6006DS3   | 6                   | 3.8                | 600                   | 500               | 5                         | 250                        | 1.6          |
| 8 A  | S2008LS2  | S2008FS21   | S2008VS2   | S2008DS2   | 8                   | 5.1                | 200                   | 200               | 5                         | 250                        | 1.6          |
|      | S4008LS2  | S4008FS21   | S4008VS2   | S4008DS2   | 8                   | 5.1                | 400                   | 200               | 5                         | 250                        | 1.6          |
|      | S6008LS2  | S6008FS21   | S6008VS2   | S6008DS2   | 8                   | 5.1                | 600                   | 200               | 5                         | 250                        | 1.6          |
|      | S2008LS3  | S2008FS31   | S2008VS3   | S2008DS3   | 8                   | 5.1                | 200                   | 500               | 5                         | 250                        | 1.6          |
|      | S4008LS3  | S4008FS31   | S4008VS3   | S4008DS3   | 8                   | 5.1                | 400                   | 500               | 5                         | 250                        | 1.6          |
|      | S6008LS3  | S6008FS31   | S6008VS3   | S6008DS3   | 8                   | 5.1                | 600                   | 500               | 5                         | 250                        | 1.6          |
| 10 A | S2010LS2  | S2010FS21   | S2010VS2   | S2010DS2   | 10                  | 6.4                | 200                   | 200               | 5                         | 250                        | 1.6          |
|      | S4010LS2  | S4010FS21   | S4010VS2   | S4010DS2   | 10                  | 6.4                | 400                   | 200               | 5                         | 250                        | 1.6          |
|      | S6010LS2  | S6010FS21   | S6010VS2   | S6010DS2   | 10                  | 6.4                | 600                   | 200               | 5                         | 250                        | 1.6          |
|      | S2010LS3  | S2010FS31   | S2010VS3   | S2010DS3   | 10                  | 6.4                | 200                   | 500               | 5                         | 250                        | 1.6          |
|      | S4010LS3  | S4010FS31   | S4010VS3   | S4010DS3   | 10                  | 6.4                | 400                   | 500               | 5                         | 250                        | 1.6          |
|      | S6010LS3  | S6010FS31   | S6010VS3   | S6010DS3   | 10                  | 6.4                | 600                   | 500               | 5                         | 250                        | 1.6          |

**Specific Test Conditions**

- $di/dt$  — Maximum rate-of-change of on-state current;  $I_{GT} = 50$  mA pulse width  $\geq 15$   $\mu$ sec with  $\leq 0.1$   $\mu$ s rise time
- $dv/dt$  — Critical rate-of-rise of forward off-state voltage
- $I^2t$  — RMS surge (non-repetitive) on-state current for period of 8.3 ms for fusing
- $I_{DRM}$  and  $I_{RRM}$  — Peak off-state current at  $V_{DRM}$  and  $V_{RRM}$
- $I_{GT}$  — DC gate trigger current  $V_D = 6$  V dc;  $R_L = 100 \Omega$
- $I_{GM}$  — Peak gate current
- $I_H$  — DC holding current; initial on-state current = 20 mA
- $I_T$  — Maximum on-state current
- $I_{TSM}$  — Peak one-cycle forward surge current
- $P_{G(AV)}$  — Average gate power dissipation
- $P_{GM}$  — Peak gate power dissipation
- $t_{gt}$  — Gate controlled turn-on time gate pulse = 10 mA; minimum width = 15  $\mu$ S with rise time  $\leq 0.1$   $\mu$ s
- $t_q$  — Circuit commutated turn-off time
- $V_{DRM}$  and  $V_{RRM}$  — Repetitive peak off-state forward and reverse voltage
- $V_{GRM}$  — Peak reverse gate voltage
- $V_{GT}$  — DC gate trigger voltage;  $V_D = 6$  V dc;  $R_L = 100 \Omega$
- $V_{TM}$  — Peak on-state voltage

**General Notes**

- Teccor 2N5064 and 2N6565 Series devices conform to all JEDEC registered data. See specifications table on pages E5 - 2 and E5 - 3.
- The case lead temperature ( $T_C$  or  $T_L$ ) is measured as shown on dimensional outline drawings in the "Package Dimensions" section of this catalog.
- All measurements (except  $I_{GT}$ ) are made with an external resistor  $R_{GK} = 1$  k $\Omega$  unless otherwise noted.
- All measurements are made at 60 Hz with a resistive load at an ambient temperature of +25  $^\circ$ C unless otherwise specified.
- Operating temperature ( $T_J$ ) is -65  $^\circ$ C to +110  $^\circ$ C for EC Series devices, -65  $^\circ$ C to +125  $^\circ$ C for 2N Series devices, -40  $^\circ$ C to +125  $^\circ$ C for "TCR" Series, and -40  $^\circ$ C to +110  $^\circ$ C for all others.
- Storage temperature range ( $T_S$ ) is -65  $^\circ$ C to +150  $^\circ$ C for TO-92 devices, -40  $^\circ$ C to +150  $^\circ$ C for TO-202 and Compak devices, and -40  $^\circ$ C to +125  $^\circ$ C for all others.
- Lead solder temperature is a maximum of +230  $^\circ$ C for 10 seconds maximum  $\geq 1/16"$  (1.59 mm) from case.

| V <sub>GT</sub>         |                        |                         | I <sub>H</sub> | I <sub>GM</sub> | V <sub>GRM</sub> | P <sub>GM</sub> | P <sub>G(AV)</sub> | I <sub>TSM</sub> | dv/dt                   | di/dt     | t <sub>gt</sub> | t <sub>q</sub> | I <sup>2</sup> t      |
|-------------------------|------------------------|-------------------------|----------------|-----------------|------------------|-----------------|--------------------|------------------|-------------------------|-----------|-----------------|----------------|-----------------------|
| (4) (12) (22)           |                        |                         | (5) (19)       | (17)            |                  | (17)            |                    | (6) (13)         |                         |           | (8)             | (9)            |                       |
| Volts                   |                        |                         |                |                 |                  |                 |                    |                  | Volts/μSec              |           |                 |                |                       |
| T <sub>C</sub> = -40 °C | T <sub>C</sub> = 25 °C | T <sub>C</sub> = 110 °C | mAmps          | Amps            | Volts            | Watts           | Watts              | Amps             | T <sub>C</sub> = 110 °C | Amps/μSec | μSec            | μSec           | Amps <sup>2</sup> Sec |
| MAX                     |                        |                         | MAX            |                 | MIN              |                 |                    | 60/50 Hz         | TYP                     |           | TYP             | MAX            |                       |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 10                      | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 10                      | 100       | 5               | 45             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 5               | 45             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 5               | 45             | 41                    |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 10                      | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 10                      | 100       | 5               | 45             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 5               | 45             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 5               | 45             | 41                    |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 10                      | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 6              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 4               | 50             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 10                      | 100       | 5               | 45             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 5               | 45             | 41                    |
| 1                       | 0.8                    | 0.25                    | 8              | 1               | 6                | 1               | 0.1                | 100/83           | 8                       | 100       | 5               | 45             | 41                    |

## Electrical Specifications Notes

- (1) See Figure E5.1 through Figure E5.9 for current ratings at specified operating temperatures.
- (2) See Figure E5.10 for I<sub>GT</sub> versus T<sub>C</sub> or T<sub>L</sub>.
- (3) See Figure E5.11 for instantaneous on-state current (I<sub>T</sub>) versus on-state voltage (V<sub>T</sub>) TYP.
- (4) See Figure E5.12 for V<sub>GT</sub> versus T<sub>C</sub> or T<sub>L</sub>.
- (5) See Figure E5.13 for I<sub>H</sub> versus T<sub>C</sub> or T<sub>L</sub>.
- (6) For more than one full cycle, see Figure E5.14.
- (7) 0.8 A to 4 A devices also have a pulse peak forward current on-state rating (repetitive) of 75 A. This rating applies for operation at 60 Hz, 75 °C maximum tab (or anode) lead temperature, switching from 80 V peak, sinusoidal current pulse width of 10 μs minimum, 15 μs maximum. See Figure E5.20 and Figure E5.21.
- (8) See Figure E5.15 for t<sub>gt</sub> versus I<sub>GT</sub>.
- (9) Test conditions as follows:
  - T<sub>C</sub> or T<sub>L</sub> ≤ 80 °C, rectangular current waveform
  - Rate-of-rise of current ≤ 10 A/μs
  - Rate-of-reversal of current ≤ 5 A/μs
  - I<sub>TM</sub> = 1 A (50 μs pulse), Repetition Rate = 60 pps
  - V<sub>RRM</sub> = Rated
  - V<sub>R</sub> = 15 V minimum, V<sub>DRM</sub> = Rated
  - Rate-of-rise reapplied forward blocking voltage = 5 V/μs
  - Gate Bias = 0 V, 100 Ω (during turn-off time interval)
- (10) Test condition is maximum rated RMS current except TO-92 devices are 1.2 A<sub>PK</sub>; T106/T107 devices are 4 A<sub>PK</sub>.
- (11) See package outlines for lead form configurations. When ordering special lead forming, add type number as suffix to part number.
- (12) V<sub>D</sub> = 6 V dc, R<sub>L</sub> = 100 Ω (See Figure E5.19 for simple test circuit for measuring gate trigger voltage and gate trigger current.)
- (13) See Figure E5.1 through Figure E5.9 for maximum allowable case temperature at maximum rated current.
- (14) I<sub>GT</sub> = 500 μA maximum at T<sub>C</sub> = -40 °C for T106 devices
- (15) I<sub>H</sub> = 10 mA maximum at T<sub>C</sub> = -65 °C for 2N5064 Series and 2N6565 Series devices
- (16) I<sub>H</sub> = 6 mA maximum at T<sub>C</sub> = -40 °C for T106 devices
- (17) Pulse Width ≤ 10 μs
- (18) I<sub>GT</sub> = 350 μA maximum at T<sub>C</sub> = -65 °C for 2N5064 Series and 2N6565 Series devices
- (19) Latching current can be higher than 20 mA for higher I<sub>GT</sub> types. Also, latching current can be much higher at -40 °C. See Figure E5.18.
- (20) T<sub>C</sub> or T<sub>L</sub> = T<sub>J</sub> for test conditions in off state
- (21) I<sub>DRM</sub> and I<sub>RRM</sub> = 50 μA for 2N5064 and 100 μA for 2N6565 at 125 °C
- (22) TO-92 devices specified at -65 °C instead of -40 °C
- (23) T<sub>C</sub> = 110 °C

| Thermal Resistance (Steady State)<br>$R_{\theta JC}$ [ $R_{\theta JA}$ ] °C/W (TYPICAL) |  |   |  |   |  |  |  |
|---|--|---|--|---|--|--|--|
| Package Code  | E  | L   | F2   | F   | C  | D  | V  |
| Type  | <br>TO-92 | <br>TO-220 | <br>TO-202<br>Type 2, 4, & 41 | <br>TO-202<br>Type 1 & 3 | <br>Compak | <br>TO-252<br>D-Pak | <br>TO-251<br>V-Pak |
| 0.8 A   | 75 [160]   |   |  |   | 60*  |  |  |
| 1.5 A   | 50 [160]   |   |  |   |  |  |  |
| 4.0 A   |  |   | 10 [100]   | 6.2 [80]  |  | 3.0  | 3.8 [85]   |
| 6.0 A   |  | 4.0 [65]  |  | 4.3   |  | 1.8  | 2.4  |
| 8.0 A   |  | 3.4   |  | 3.9   |  | 1.5  | 2.1  |
| 10.0 A  |  | 3.0   |  | 3.4   |  | 1.45   | 1.72   |

\*Mounted on 1 cm<sup>2</sup> copper foil surface; two-ounce copper foil

### Electrical Isolation

Tecor's isolated sensitive SCRs will withstand a minimum high potential test of 2500 V ac rms from leads to mounting tab over the device's operating temperature range. The following table shows other standard and optional isolation ratings.

| Electrical Isolation *<br>from Leads to Mounting Tab |             |
|--|-------------|
| V AC RMS   | TO-220      |
| 2500   | Standard    |
| 4000   | Optional ** |

\*UL Recognized File #E71639

\*\*For 4000 V isolation, use "V" suffix in part number.

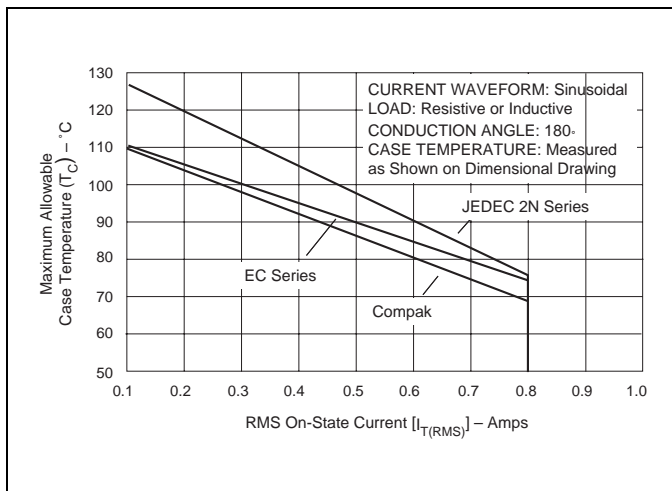


Figure E5.1 Maximum Allowable Case Temperature versus RMS On-state Current

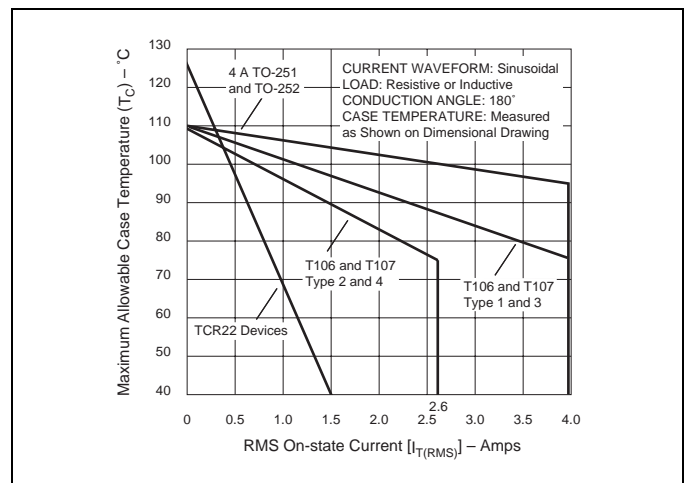


Figure E5.2 Maximum Allowable Case Temperature versus RMS On-state Current

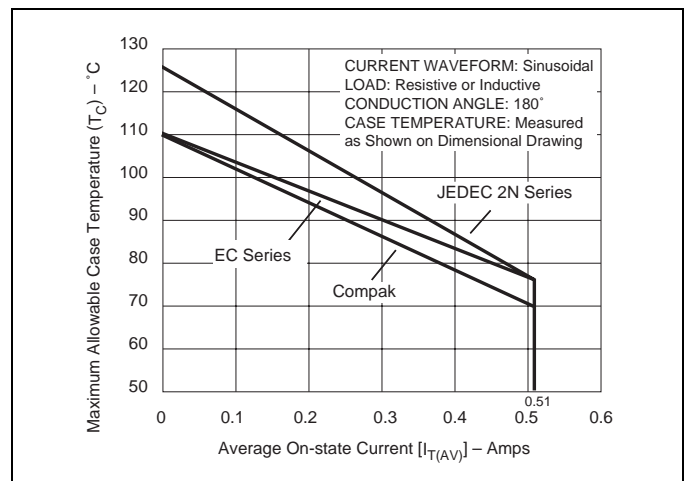


Figure E5.3 Maximum Allowable Case Temperature versus Average On-state Current



Figure E5.4 Maximum Allowable Case Temperature versus Average On-state Current



Figure E5.7 Maximum Allowable Ambient Temperature versus Average On-state Current



Figure E5.5 Maximum Allowable Ambient Temperature versus On-state Current



Figure E5.8 Maximum Allowable Case Temperature versus RMS On-state Current



Figure E5.6 Maximum Allowable Ambient Temperature versus RMS On-state Current



Figure E5.9 Maximum Allowable Case Temperature versus Average On-state Current

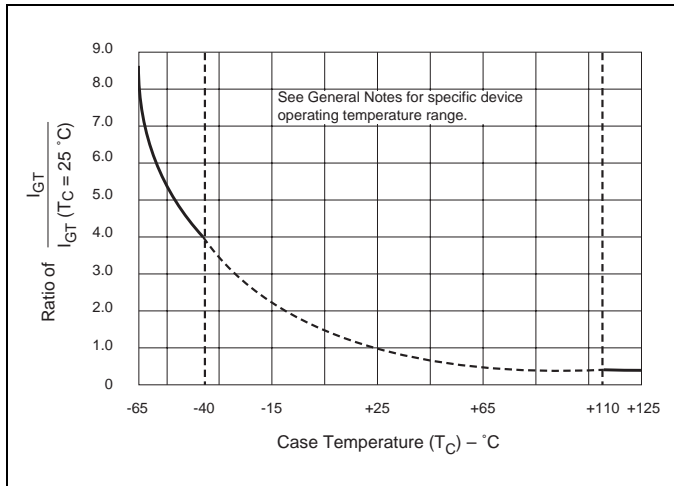


Figure E5.10 Normalized DC Gate-Trigger Current versus Case Temperature

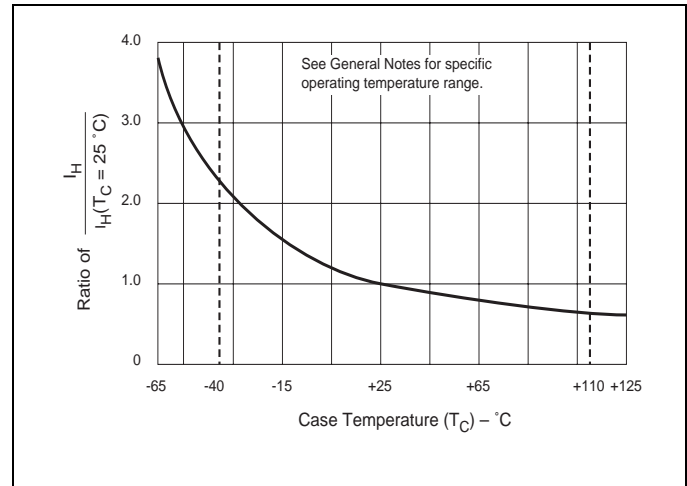


Figure E5.13 Normalized DC Holding Current versus Case Temperature

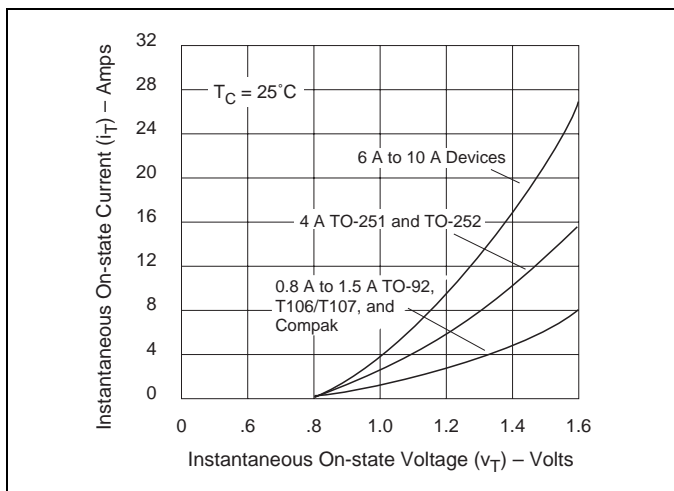


Figure E5.11 Instantaneous On-state Current versus On-state Voltage (Typical)

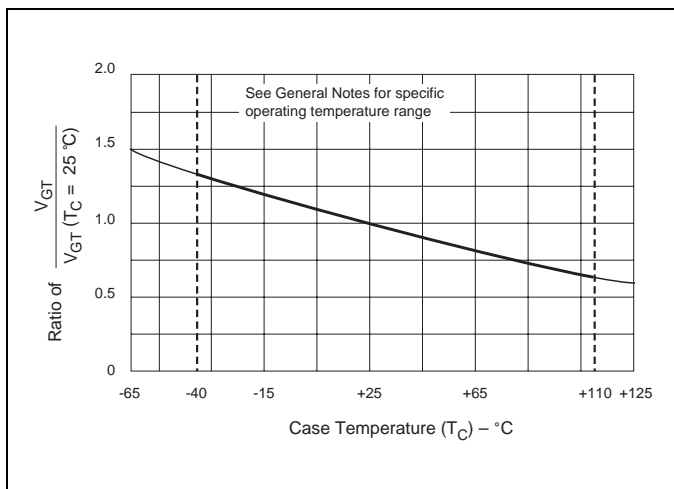


Figure E5.12 Normalized DC Gate-Trigger Voltage versus Case Temperature



Figure E5.14 Peak Surge On-state Current versus Surge Current Duration



Figure E5.15 Typical Turn-on Time versus Gate Trigger Current



Figure E5.16 Power Dissipation (Typical) versus RMS On-state Current



Figure E5.17 Power Dissipation (Typical) versus RMS On-state Current



Figure E5.19 Simple Test Circuit for Gate Trigger Voltage and Current Measurement

Note:  $V_1$  — 0 V to 10 V dc meter  
 $V_{GT}$  — 0 V to 1 V dc meter  
 $I_G$  — 0 mA to 1 mA dc milliammeter  
 $R_1$  — 1 k potentiometer

To measure gate trigger voltage and current, raise gate voltage ( $V_{GT}$ ) until meter reading  $V_1$  drops from 6 V to 1 V. Gate trigger voltage is the reading on  $V_{GT}$  just prior to  $V_1$  dropping. Gate trigger current  $I_{GT}$  can be computed from the relationship

$$I_{GT} = I_G - \frac{V_{GT}}{1000} \text{ Amps}$$

where  $I_G$  is reading (in amperes) on meter just prior to  $V_1$  dropping.

Note:  $I_{GT}$  may turn out to be a negative quantity (trigger current flows out from gate lead). If negative current occurs,  $I_{GT}$  value is not a valid reading. Remove 1 k resistor and use  $I_G$  as the more correct  $I_{GT}$  value. This will occur on 12  $\mu$ A gate products.



Figure E5.18 Normalized DC Latching Current versus Case Temperature



Figure E5.20 Peak Repetitive Capacitor Discharge Current



Figure E5.21 Peak Repetitive Sinusoidal Curve



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