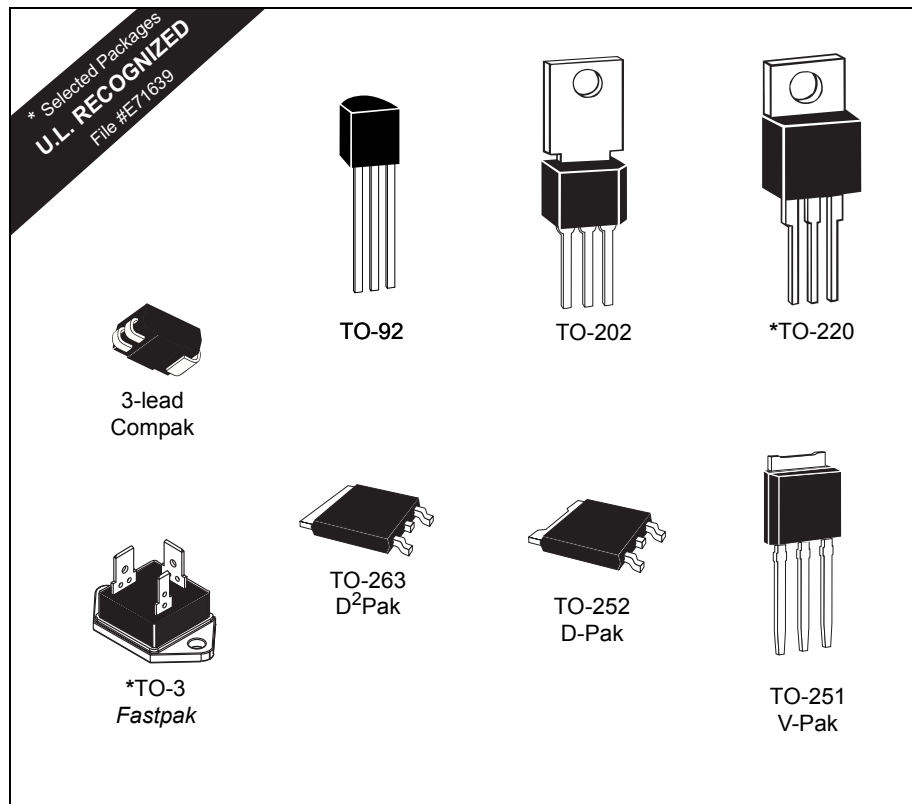
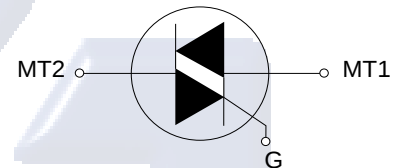




E2



# Triacs

(0.8 A to 35 A) RoHS

## General Description

These gated triacs from Teccor Electronics are part of a broad line of bidirectional semiconductors. The devices range in current ratings from 0.8 A to 35 A and in voltages from 200 V to 1000 V.

The triac may be gate triggered from a blocking to conduction state for either polarity of applied voltage and is designed for AC switching and phase control applications such as speed and temperature modulation controls, lighting controls, and static switching relays. The triggering signal is normally applied between the gate and MT1.

Isolated packages are offered with internal construction, having the case or mounting tab electrically isolated from the semiconductor chip. This feature facilitates the use of low-cost assembly and convenient packaging techniques. Tape-and-reel capability is available. See "Packing Options" section of this catalog.

All Teccor triacs have glass-passivated junctions to ensure long-term device reliability and parameter stability. Teccor's glass-passivated junctions offer a rugged, reliable barrier against junction contamination.

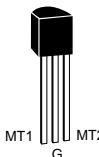
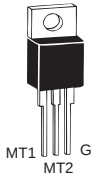
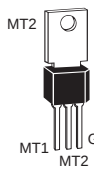
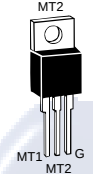
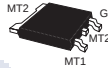
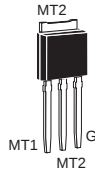
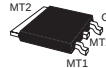
Variations of devices covered in this data sheet are available for custom design applications. Consult factory for more information.

## Features

- RoHS Compliant
- Electrically-isolated packages
- Glass-passivated junctions
- Voltage capability — up to 1000 V
- Surge capability — up to 200 A

## Compak Package

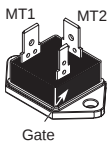
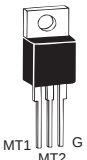
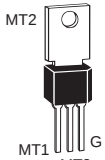
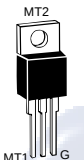
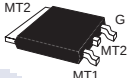
- Surface mount package — 0.8 A and 1 A series
- New small profile three-leaded Compak package
- Packaged in embossed carrier tape with 2,500 devices per reel
- Can replace SOT-223

| I <sub>T(RMS)</sub><br>(4) | Part Number                                                                                |                                                                                             |                                                                                             |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | V <sub>DRM</sub><br>(1) | I <sub>GT</sub><br>(3) (7) (15) |       |     |      |     |     |
|----------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------|-------|-----|------|-----|-----|
|                            | Isolated                                                                                   |                                                                                             |                                                                                             | Non-isolated                                                                                |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        |                         | Volts                           | mAmps |     |      |     |     |
|                            | <br>TO-92 | <br>TO-220 | <br>Compak | <br>TO-202 | <br>TO-220 | <br>TO-252<br>D-Pak | <br>TO-251<br>V-Pak | <br>TO-263<br>D²Pak |                         |                                 | QI    | QII | QIII | QIV | QIV |
| MAX                        | See "Package Dimensions" section for variations. (11)                                      |                                                                                             |                                                                                             |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | MIN                     | MAX                             |       |     |      |     | TYP |
| 0.8 A                      | Q2X8E3                                                                                     |                                                                                             | Q2X3                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 200                     | 10                              | 10    | 10  |      | 25  |     |
|                            | Q4X8E3                                                                                     |                                                                                             | Q4X3                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 400                     | 10                              | 10    | 10  |      | 25  |     |
|                            | Q6X8E3                                                                                     |                                                                                             | Q6X3                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 600                     | 10                              | 10    | 10  |      | 25  |     |
|                            | Q2X8E4                                                                                     |                                                                                             | Q2X4                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 200                     | 25                              | 25    | 25  |      | 50  |     |
|                            | Q4X8E4                                                                                     |                                                                                             | Q4X4                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 400                     | 25                              | 25    | 25  |      | 50  |     |
|                            | Q6X8E4                                                                                     |                                                                                             | Q6X4                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 600                     | 25                              | 25    | 25  |      | 50  |     |
| 1 A                        | Q201E3                                                                                     |                                                                                             | Q2N3                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 200                     | 10                              | 10    | 10  |      | 25  |     |
|                            | Q401E3                                                                                     |                                                                                             | Q4N3                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 400                     | 10                              | 10    | 10  |      | 25  |     |
|                            | Q601E3                                                                                     |                                                                                             | Q6N3                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 600                     | 10                              | 10    | 10  |      | 25  |     |
|                            | Q201E4                                                                                     |                                                                                             | Q2N4                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 200                     | 25                              | 25    | 25  |      | 50  |     |
|                            | Q401E4                                                                                     |                                                                                             | Q4N4                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 400                     | 25                              | 25    | 25  |      | 50  |     |
|                            | Q601E4                                                                                     |                                                                                             | Q6N4                                                                                        |                                                                                             |                                                                                             |                                                                                                      |                                                                                                      |                                                                                                        | 600                     | 25                              | 25    | 25  |      | 50  |     |
| 4 A                        |                                                                                            | Q2004L3                                                                                     |                                                                                             | Q2004F31                                                                                    |                                                                                             | Q2004D3                                                                                              | Q2004V3                                                                                              |                                                                                                        | 200                     | 10                              | 10    | 10  |      | 25  |     |
|                            |                                                                                            | Q4004L3                                                                                     |                                                                                             | Q4004F31                                                                                    |                                                                                             | Q4004D3                                                                                              | Q4004V3                                                                                              |                                                                                                        | 400                     | 10                              | 10    | 10  |      | 25  |     |
|                            |                                                                                            | Q6004L3                                                                                     |                                                                                             | Q6004F31                                                                                    |                                                                                             | Q6004D3                                                                                              | Q6004V3                                                                                              |                                                                                                        | 600                     | 10                              | 10    | 10  |      | 25  |     |
|                            |                                                                                            | Q2004L4                                                                                     |                                                                                             | Q2004F41                                                                                    |                                                                                             | Q2004D4                                                                                              | Q2004V4                                                                                              |                                                                                                        | 200                     | 25                              | 25    | 25  |      | 50  |     |
|                            |                                                                                            | Q4004L4                                                                                     |                                                                                             | Q4004F41                                                                                    |                                                                                             | Q4004D4                                                                                              | Q4004V4                                                                                              |                                                                                                        | 400                     | 25                              | 25    | 25  |      | 50  |     |
|                            |                                                                                            | Q6004L4                                                                                     |                                                                                             | Q6004F41                                                                                    |                                                                                             | Q6004D4                                                                                              | Q6004V4                                                                                              |                                                                                                        | 600                     | 25                              | 25    | 25  |      | 50  |     |
|                            |                                                                                            | Q8004L4                                                                                     |                                                                                             |                                                                                             |                                                                                             | Q8004D4                                                                                              | Q8004V4                                                                                              |                                                                                                        | 800                     | 25                              | 25    | 25  |      | 50  |     |
|                            |                                                                                            | QK004L4                                                                                     |                                                                                             |                                                                                             |                                                                                             | QK004D4                                                                                              | QK004V4                                                                                              |                                                                                                        | 1000                    | 25                              | 25    | 25  |      | 50  |     |
| 6 A                        |                                                                                            | Q2006L4                                                                                     |                                                                                             | Q2006F41                                                                                    | Q2006R4                                                                                     |                                                                                                      | Q2006N4                                                                                              | 200                                                                                                    | 25                      | 25                              | 25    |     | 50   |     |     |
|                            |                                                                                            | Q4006L4                                                                                     |                                                                                             | Q4006F41                                                                                    | Q4006R4                                                                                     |                                                                                                      | Q4006N4                                                                                              | 400                                                                                                    | 25                      | 25                              | 25    |     | 50   |     |     |
|                            |                                                                                            | Q6006L5                                                                                     |                                                                                             | Q6006F51                                                                                    | Q6006R5                                                                                     |                                                                                                      | Q6006N5                                                                                              | 600                                                                                                    | 50                      | 50                              | 50    |     | 75   |     |     |
|                            |                                                                                            | Q8006L5                                                                                     |                                                                                             |                                                                                             | Q8006R5                                                                                     |                                                                                                      | Q8006N5                                                                                              | 800                                                                                                    | 50                      | 50                              | 50    |     | 75   |     |     |
|                            |                                                                                            | QK006L5                                                                                     |                                                                                             |                                                                                             | QK006R5                                                                                     |                                                                                                      | QK006N5                                                                                              | 1000                                                                                                   | 50                      | 50                              | 50    |     | 75   |     |     |
| 8 A                        |                                                                                            | Q2008L4                                                                                     |                                                                                             | Q2008F41                                                                                    | Q2008R4                                                                                     |                                                                                                      | Q2008N4                                                                                              | 200                                                                                                    | 25                      | 25                              | 25    |     | 50   |     |     |
|                            |                                                                                            | Q4008L4                                                                                     |                                                                                             | Q4008F41                                                                                    | Q4008R4                                                                                     |                                                                                                      | Q4008N4                                                                                              | 400                                                                                                    | 25                      | 25                              | 25    |     | 50   |     |     |
|                            |                                                                                            | Q6008L5                                                                                     |                                                                                             | Q6008F51                                                                                    | Q6008R5                                                                                     |                                                                                                      | Q6008N5                                                                                              | 600                                                                                                    | 50                      | 50                              | 50    |     | 75   |     |     |
|                            |                                                                                            | Q8008L5                                                                                     |                                                                                             |                                                                                             | Q8008R5                                                                                     |                                                                                                      | Q8008N5                                                                                              | 800                                                                                                    | 50                      | 50                              | 50    |     | 75   |     |     |
|                            |                                                                                            | QK008L5                                                                                     |                                                                                             |                                                                                             | QK008R5                                                                                     |                                                                                                      | QK008N5                                                                                              | 1000                                                                                                   | 50                      | 50                              | 50    |     | 75   |     |     |

See "General Notes" on page E2 - 4 and "Electrical Specification Notes" on page E2 - 5.

| $I_{DRM}$          |                     |                     | $V_{TM}$           | $V_{GT}$                     | $I_H$           | $I_{GTM}$ | $P_{GM}$ | $P_{G(AV)}$ | $I_{TSM}$ | $dv/dt(c)$       | $dv/dt$             |                     | $t_{gt}$  | $I^2t$               | $di/dt$         |
|--------------------|---------------------|---------------------|--------------------|------------------------------|-----------------|-----------|----------|-------------|-----------|------------------|---------------------|---------------------|-----------|----------------------|-----------------|
| (1) (16)           |                     |                     | (1) (5)            | (2) (6)<br>(15) (18)<br>(19) | (1) (8)<br>(12) | (14)      | (14)     |             | (9) (13)  | (1) (4) (13)     | (1)                 |                     | (10)      |                      |                 |
| mAmps              |                     |                     | Volts              | Volts                        |                 |           |          |             | Amps      |                  | Volts/ $\mu$ Sec    |                     |           |                      |                 |
| $T_C = 25^\circ C$ | $T_C = 100^\circ C$ | $T_C = 125^\circ C$ | $T_C = 25^\circ C$ | $T_C = 25^\circ C$           | mAmps           | Amps      | Watts    | Watts       | 60/50 Hz  | Volts/ $\mu$ Sec | $T_C = 100^\circ C$ | $T_C = 125^\circ C$ | $\mu$ Sec | Amp <sup>2</sup> Sec | Amps/ $\mu$ Sec |
| MAX                |                     |                     | MAX                | MAX                          | MAX             |           |          |             |           | TYP              | MIN                 |                     | TYP       |                      |                 |
| 0.02               | 0.5                 | 1                   | 1.6                | 2                            | 15              | 1         | 10       | 0.2         | 10/8.3    | 1                | 40                  | 30                  | 2.5       | 0.41                 | 20              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2                            | 15              | 1         | 10       | 0.2         | 10/8.3    | 1                | 35                  | 25                  | 2.5       | 0.41                 | 20              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2                            | 15              | 1         | 10       | 0.2         | 10/8.3    | 1                | 25                  | 15                  | 2.5       | 0.41                 | 20              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2.5                          | 25              | 1         | 10       | 0.2         | 10/8.3    | 1                | 50                  | 40                  | 3         | 0.41                 | 20              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2.5                          | 25              | 1         | 10       | 0.2         | 10/8.3    | 1                | 45                  | 35                  | 3         | 0.41                 | 20              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2.5                          | 25              | 1         | 10       | 0.2         | 10/8.3    | 1                | 35                  | 25                  | 3         | 0.41                 | 20              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2                            | 15              | 1         | 10       | 0.2         | 20/16.7   | 1                | 40                  | 30                  | 2.5       | 1.6                  | 30              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2                            | 15              | 1         | 10       | 0.2         | 20/16.7   | 1                | 40                  | 30                  | 2.5       | 1.6                  | 30              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2                            | 15              | 1         | 10       | 0.2         | 20/16.7   | 1                | 30                  | 20                  | 2.5       | 1.6                  | 30              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2.5                          | 25              | 1         | 10       | 0.2         | 20/16.7   | 1                | 50                  | 40                  | 3         | 1.6                  | 30              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2.5                          | 25              | 1         | 10       | 0.2         | 20/16.7   | 1                | 50                  | 40                  | 3         | 1.6                  | 30              |
| 0.02               | 0.5                 | 1                   | 1.6                | 2.5                          | 25              | 1         | 10       | 0.2         | 20/16.7   | 1                | 40                  | 30                  | 3         | 1.6                  | 30              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2                            | 20              | 1.2       | 15       | 0.3         | 55/46     | 2                | 50                  | 40                  | 2.5       | 12.5                 | 50              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2                            | 20              | 1.2       | 15       | 0.3         | 55/46     | 2                | 50                  | 40                  | 2.5       | 12.5                 | 50              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2                            | 20              | 1.2       | 15       | 0.3         | 55/46     | 2                | 40                  | 30                  | 2.5       | 12.5                 | 50              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 30              | 1.2       | 15       | 0.3         | 55/46     | 2                | 100                 | 75                  | 3         | 12.5                 | 50              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 30              | 1.2       | 15       | 0.3         | 55/46     | 2                | 100                 | 75                  | 3         | 12.5                 | 50              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 30              | 1.2       | 15       | 0.3         | 55/46     | 2                | 75                  | 50                  | 3         | 12.5                 | 50              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 30              | 1.2       | 15       | 0.3         | 55/46     | 2                | 60                  | 40                  | 3         | 12.5                 | 50              |
| 0.05               | 3                   |                     | 1.6                | 2.5                          | 30              | 1.2       | 15       | 0.3         | 55/46     | 2                | 50                  |                     | 3         | 12.5                 | 50              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 50              | 1.6       | 18       | 0.5         | 80/65     | 4                | 200                 | 120                 | 3         | 26.5                 | 70              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 50              | 1.6       | 18       | 0.5         | 80/65     | 4                | 200                 | 120                 | 3         | 26.5                 | 70              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 50              | 1.6       | 18       | 0.5         | 80/65     | 4                | 150                 | 100                 | 3         | 26.5                 | 70              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 50              | 1.6       | 18       | 0.5         | 80/65     | 4                | 125                 | 85                  | 3         | 26.5                 | 70              |
| 0.05               | 3                   |                     | 1.6                | 2.5                          | 50              | 1.6       | 18       | 0.5         | 80/65     | 4                | 100                 |                     | 3         | 26.5                 | 70              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 50              | 1.8       | 20       | 0.5         | 100/83    | 4                | 250                 | 150                 | 3         | 41                   | 70              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 50              | 1.8       | 20       | 0.5         | 100/83    | 4                | 250                 | 150                 | 3         | 41                   | 70              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 50              | 1.8       | 20       | 0.5         | 100/83    | 4                | 220                 | 125                 | 3         | 41                   | 70              |
| 0.05               | 0.5                 | 2                   | 1.6                | 2.5                          | 50              | 1.8       | 20       | 0.5         | 100/83    | 4                | 150                 | 100                 | 3         | 41                   | 70              |
| 0.05               | 3                   |                     | 1.6                | 2.5                          | 50              | 1.8       | 20       | 0.5         | 100/83    | 4                | 100                 |                     | 3         | 41                   | 70              |

See "General Notes" on page E2 - 4 and "Electrical Specification Notes" on page E2 - 5.

| I <sub>T(RMS)</sub><br>(4) (16)                                                                      | Part Number                                                                                 |                                                                                             |                                                                                             |                                                                                                                   |         | V <sub>DRM</sub><br>(1) | I <sub>GT</sub><br>(3) (7) (15) |    |    |    |    | I <sub>DRM</sub><br>(1) (16) |     |   |  |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------|-------------------------|---------------------------------|----|----|----|----|------------------------------|-----|---|--|
|                                                                                                      | Isolated                                                                                    |                                                                                             | Non-isolated                                                                                |                                                                                                                   |         |                         | mAmps                           |    |    |    |    | mAmps                        |     |   |  |
| <br>TO-3<br>Fastpak | <br>TO-220 | <br>TO-202 | <br>TO-220 | <br>TO-263<br>D <sup>2</sup> Pak |         |                         |                                 |    |    |    |    |                              |     |   |  |
| MAX                                                                                                  | See "Package Dimensions" section for variations. (11)                                       |                                                                                             |                                                                                             |                                                                                                                   |         | MIN                     | MAX                             |    |    |    |    | TYP                          | MAX |   |  |
| 10 A                                                                                                 |                                                                                             | Q2010L4                                                                                     |                                                                                             | Q2010R4                                                                                                           | Q2010N4 | 200                     | 25                              | 25 | 25 | 50 |    | 0.05                         | 1   |   |  |
|                                                                                                      |                                                                                             | Q4010L4                                                                                     |                                                                                             | Q4010R4                                                                                                           | Q4010N4 | 400                     | 25                              | 25 | 25 | 50 |    | 0.05                         | 1   |   |  |
|                                                                                                      |                                                                                             | Q6010L4                                                                                     |                                                                                             | Q6010R4                                                                                                           | Q6010N4 | 600                     | 25                              | 25 | 25 | 50 |    | 0.05                         | 1   |   |  |
|                                                                                                      |                                                                                             | Q8010L4                                                                                     |                                                                                             | Q8010R4                                                                                                           | Q8010N4 | 800                     | 25                              | 25 | 25 | 50 |    | 0.1                          | 1   |   |  |
|                                                                                                      |                                                                                             | QK010L4                                                                                     |                                                                                             | QK010R4                                                                                                           | QK010N4 | 1000                    | 25                              | 25 | 25 | 50 |    | 0.1                          | 3   |   |  |
|                                                                                                      |                                                                                             | Q2010L5                                                                                     | Q2010F51                                                                                    | Q2010R5                                                                                                           | Q2010N5 | 200                     | 50                              | 50 | 50 |    | 75 | 0.05                         | 0.5 | 2 |  |
|                                                                                                      |                                                                                             | Q4010L5                                                                                     | Q4010F51                                                                                    | Q4010R5                                                                                                           | Q4010N5 | 400                     | 50                              | 50 | 50 |    | 75 | 0.05                         | 0.5 | 2 |  |
|                                                                                                      |                                                                                             | Q6010L5                                                                                     | Q6010F51                                                                                    | Q6010R5                                                                                                           | Q6010N5 | 600                     | 50                              | 50 | 50 |    | 75 | 0.05                         | 0.5 | 2 |  |
| 15 A                                                                                                 |                                                                                             |                                                                                             |                                                                                             |                                                                                                                   |         |                         |                                 |    |    |    |    |                              |     |   |  |
|                                                                                                      |                                                                                             | Q2015L5                                                                                     |                                                                                             | Q2015R5                                                                                                           | Q2015N5 | 200                     | 50                              | 50 | 50 |    |    | 0.05                         | 0.5 | 2 |  |
|                                                                                                      |                                                                                             | Q4015L5                                                                                     |                                                                                             | Q4015R5                                                                                                           | Q4015N5 | 400                     | 50                              | 50 | 50 |    |    | 0.05                         | 0.5 | 2 |  |
|                                                                                                      |                                                                                             | Q6015L5                                                                                     |                                                                                             | Q6015R5                                                                                                           | Q6015N5 | 600                     | 50                              | 50 | 50 |    |    | 0.05                         | 0.5 | 2 |  |
|                                                                                                      |                                                                                             | Q8015L5                                                                                     |                                                                                             | Q8015R5                                                                                                           | Q8015N5 | 800                     | 50                              | 50 | 50 |    |    | 0.1                          | 1   | 3 |  |
| 25 A                                                                                                 |                                                                                             |                                                                                             |                                                                                             |                                                                                                                   |         |                         |                                 |    |    |    |    |                              |     |   |  |
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|                                                                                                      |                                                                                             |                                                                                             |                                                                                             |                                                                                                                   |         |                         |                                 |    |    |    |    |                              |     |   |  |
| 35 A                                                                                                 |                                                                                             |                                                                                             |                                                                                             |                                                                                                                   |         |                         |                                 |    |    |    |    |                              |     |   |  |
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|                                                                                                      |                                                                                             |                                                                                             |                                                                                             |                                                                                                                   |         |                         | </                              |    |    |    |    |                              |     |   |  |

## Specific Test Conditions

$di/dt$  — Maximum rate-of-change of on-state current;  $I_{GT} = 200$  mA with  $\leq 0.1$   $\mu$ s rise time

$dv/dt$  — Critical rate-of-rise of off-state voltage at rated  $V_{DRM}$  gate open

$dv/dt(c)$  — Critical rate-of-rise of commutation voltage at rated  $V_{DRM}$  and  $I_{T(RMS)}$  commutating  $di/dt = 0.54$  rated  $I_{T(RMS)}/ms$ ; gate unenergized

$I^2t$  — RMS surge (non-repetitive) on-state current for period of 8.3 ms for fusing

$I_{DRM}$  — Peak off-state current, gate open;  $V_{DRM} =$  maximum rated value

$I_{GT}$  — DC gate trigger current in specific operating quadrants;  $V_D = 12$  V dc

$I_{GTM}$  — Peak gate trigger current

$I_H$  — Holding current (DC); gate open

$I_{T(RMS)}$  — RMS on-state current conduction angle of  $360^\circ$

$I_{TSM}$  — Peak one-cycle surge

$P_{G(AV)}$  — Average gate power dissipation

$P_{GM}$  — Peak gate power dissipation;  $I_{GT} \leq I_{GTM}$

$t_{gt}$  — Gate controlled turn-on time;  $I_{GT} = 200$  mA with  $0.1$   $\mu$ s rise time

$V_{DRM}$  — Repetitive peak blocking voltage

$V_{GT}$  — DC gate trigger voltage;  $V_D = 12$  V dc;  $R_L = 60$   $\Omega$

$V_{TM}$  — Peak on-state voltage at maximum rated RMS current

## General Notes

- All measurements are made at 60 Hz with a resistive load at an ambient temperature of  $+25^\circ C$  unless specified otherwise.
- Operating temperature range ( $T_J$ ) is  $-65^\circ C$  to  $+125^\circ C$  for TO-92,  $-25^\circ C$  to  $+125^\circ C$  for Fastpak, and  $-40^\circ C$  to  $+125^\circ C$  for all other devices.
- Storage temperature range ( $T_S$ ) is  $-65^\circ C$  to  $+150^\circ C$  for TO-92,  $-40^\circ C$  to  $+150^\circ C$  for TO-202, and  $-40^\circ C$  to  $+125^\circ C$  for all other devices.
- Lead solder temperature is a maximum of  $230^\circ C$  for 10 seconds, maximum;  $\geq 1/16"$  (1.59 mm) from case.
- The case temperature ( $T_C$ ) is measured as shown on the dimensional outline drawings. See "Package Dimensions" section of this catalog.

| $V_{TM}$           | $V_{GT}$                  | $I_H$        | $I_{GTM}$ | $P_{GM}$ | $P_{G(AV)}$ | $I_{TSM}$ | $dv/dt(c)$       | $dv/dt$             |                     | $t_{gt}$  | $I^2t$                | $di/dt$         |
|--------------------|---------------------------|--------------|-----------|----------|-------------|-----------|------------------|---------------------|---------------------|-----------|-----------------------|-----------------|
| (1) (5)            | (2) (6) (15)<br>(18) (19) | (1) (8) (12) | (14)      | (14)     |             | (9) (13)  | (1) (4) (13)     | (1)                 |                     | (10) (17) |                       |                 |
| Volts              | Volts                     |              |           |          |             | Amps      |                  | Volts/ $\mu$ Sec    |                     |           |                       |                 |
| $T_C = 25^\circ C$ | $T_C = 25^\circ C$        | mAmps        | Amps      | Watts    | Watts       | 60/50 Hz  | Volts/ $\mu$ Sec | $T_C = 100^\circ C$ | $T_C = 125^\circ C$ | $\mu$ Sec | Amps <sup>2</sup> Sec | Amps/ $\mu$ Sec |
| MAX                | MAX                       | MAX          |           |          |             |           | TYP              | MIN                 |                     | TYP       |                       |                 |
| 1.6                | 2.5                       | 35           | 1.8       | 20       | 0.5         | 120/100   | 2                | 150                 |                     | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 35           | 1.8       | 20       | 0.5         | 120/100   | 2                | 150                 |                     | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 35           | 1.8       | 20       | 0.5         | 120/100   | 2                | 100                 |                     | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 35           | 1.8       | 20       | 0.5         | 120/100   | 2                | 75                  |                     | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 35           | 1.8       | 20       | 0.5         | 120/100   | 2                | 50                  |                     | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 50           | 1.8       | 20       | 0.5         | 120/100   | 4                | 350                 | 225                 | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 50           | 1.8       | 20       | 0.5         | 120/100   | 4                | 350                 | 225                 | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 50           | 1.8       | 20       | 0.5         | 120/100   | 4                | 300                 | 200                 | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 50           | 1.8       | 20       | 0.5         | 120/100   | 4                | 250                 | 175                 | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 50           | 1.8       | 20       | 0.5         | 120/100   | 4                | 150                 |                     | 3         | 60                    | 70              |
| 1.6                | 2.5                       | 70           | 2         | 20       | 0.5         | 200/167   | 4                | 400                 | 275                 | 4         | 166                   | 100             |
| 1.6                | 2.5                       | 70           | 2         | 20       | 0.5         | 200/167   | 4                | 400                 | 275                 | 4         | 166                   | 100             |
| 1.6                | 2.5                       | 70           | 2         | 20       | 0.5         | 200/167   | 4                | 350                 | 225                 | 4         | 166                   | 100             |
| 1.6                | 2.5                       | 70           | 2         | 20       | 0.5         | 200/167   | 4                | 300                 | 200                 | 4         | 166                   | 100             |
| 1.6                | 2.5                       | 70           | 2         | 20       | 0.5         | 200/167   | 4                | 200                 |                     | 4         | 166                   | 100             |
| 1.8                | 2.5                       | 100          | 2         | 20       | 0.5         | 200/167   | 5                | 400                 | 275                 | 4         | 166                   | 100             |
| 1.8                | 2.5                       | 100          | 2         | 20       | 0.5         | 200/167   | 5                | 400                 | 275                 | 4         | 166                   | 100             |
| 1.8                | 2.5                       | 100          | 2         | 20       | 0.5         | 200/167   | 5                | 350                 | 225                 | 4         | 166                   | 100             |
| 1.8                | 2.5                       | 100          | 2         | 20       | 0.5         | 200/167   | 5                | 300                 | 200                 | 4         | 166                   | 100             |
| 1.8                | 2.5                       | 100          | 2         | 20       | 0.5         | 200/167   | 5                | 200                 |                     | 4         | 166                   | 100             |
| 1.4                | 2.75                      | 50           | 2         | 20       | 0.5         | 250/220   | 5                | 550                 | 475                 | 3         | 260                   | 100             |
| 1.4                | 2.75                      | 50           | 2         | 20       | 0.5         | 250/220   | 5                | 450                 | 400                 | 3         | 260                   | 100             |
| 1.5                | 2.75                      | 50           | 2         | 20       | 0.5         | 350/300   | 5                | 550                 | 475                 | 3         | 508                   | 100             |
| 1.5                | 2.75                      | 50           | 2         | 20       | 0.5         | 350/300   | 5                | 450                 | 400                 | 3         | 508                   | 100             |

## Electrical Specification Notes

- (1) For either polarity of MT2 with reference to MT1 terminal
- (2) For either polarity of gate voltage ( $V_{GT}$ ) with reference to MT1 terminal
- (3) See Gate Characteristics and Definition of Quadrants.
- (4) See Figure E2.1 through Figure E2.7 for current rating at specific operating temperature.
- (5) See Figure E2.8 through Figure E2.10 for  $i_T$  versus  $v_T$ .
- (6) See Figure E2.12 for  $V_{GT}$  versus  $T_C$ .
- (7) See Figure E2.11 for  $I_{GT}$  versus  $T_C$ .
- (8) See Figure E2.14 for  $I_H$  versus  $T_C$ .
- (9) See Figure E2.13 for surge rating with specific durations.
- (10) See Figure E2.15 for  $t_{gt}$  versus  $I_{GT}$ .
- (11) See package outlines for lead form configurations. When ordering special lead forming, add type number as suffix to part number.
- (12) Initial on-state current = 200 mA dc for 0.8 A to 10 A devices, 400 mA dc for 15 A to 35 A devices
- (13) See Figure E2.1 through Figure E2.6 for maximum allowable case temperature at maximum rated current.
- (14) Pulse width  $\leq 10 \mu s$ ;  $I_{GT} \leq I_{GTM}$

(15)  $R_L = 60 \Omega$  for 0.8 A to 10 A triacs;  $R_L = 30 \Omega$  for 15 A to 35 A triacs

(16)  $T_C = T_J$  for test conditions in off state

(17)  $I_{GT} = 300$  mA for 25 A and 35 A devices

(18) Quadrants I, II, III only

(19) Minimum non-trigger  $V_{GT}$  at 125 °C is 0.2 V for all except 50 mA MAX QIV devices which are 0.2 V at 110 °C.

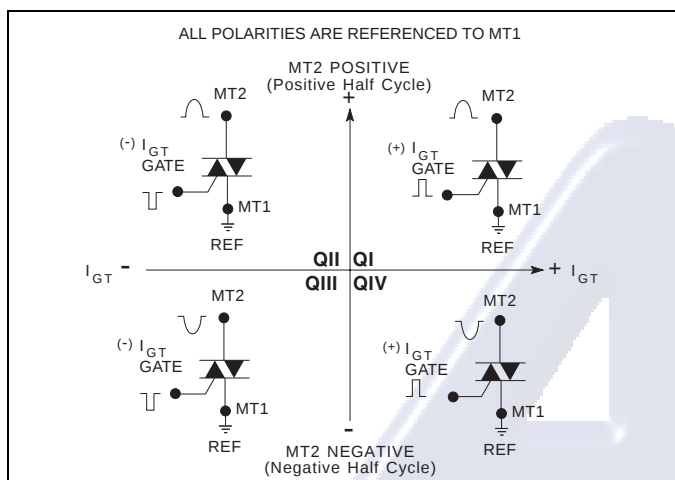
## Gate Characteristics

Teccor triacs may be turned on between gate and MT1 terminals in the following ways:

- In-phase signals (with standard AC line) using Quadrants I and III
- Application of unipolar pulses (gate always positive or negative), using Quadrants II and III with negative gate pulses and Quadrants I and IV with positive gate pulses

However, due to higher gate requirements for Quadrant IV, it is recommended that only negative pulses be applied. If positive pulses are required, see "Sensitive Triacs" section of this catalog or contact the factory. Also, see Figure AN1002.8, "Amplified Gate" Thyristor Circuit.

In all cases, if maximum surge capability is required, pulses should be a minimum of one magnitude above  $I_{GT}$  rating with a steep rising waveform ( $\leq 1 \mu s$  rise time).



Definition of Quadrants

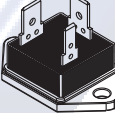
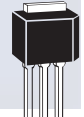
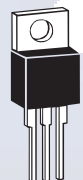
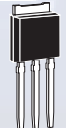
## Electrical Isolation

Teccor's isolated triac packages will withstand a minimum high potential test of 2500 V ac rms from leads to mounting tab or base, over the operating temperature range of the device. The following isolation table shows standard and optional isolation ratings.

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

\* UL Recognized File E71639

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

| Thermal Resistance (Steady State)<br>$R_{\theta JC}$ [ $R_{\theta JA}$ ] (TYP.) °C/W |                                                                                                        |                                                                                             |                                                                                               |                                                                                                        |                                                                                                         |                                                                                                          |                                                                                                               |                                                                                                          |                                                                                                          |                                                                                                          |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Package Code                                                                         | P                                                                                                      | E                                                                                           | C                                                                                             | F                                                                                                      | F2                                                                                                      | L                                                                                                        | R                                                                                                             | D                                                                                                        | V                                                                                                        | N                                                                                                        |
| Type                                                                                 | <br>TO-3<br>Fastpak | <br>TO-92 | <br>Compak | <br>TO-202<br>Type 1 | <br>TO-202<br>Type 2 | <br>TO-220<br>Isolated | <br>TO-220<br>Non-isolated | <br>TO-252<br>D-Pak | <br>TO-251<br>V-Pak | <br>TO-263<br>D²Pak |
| 0.8 A                                                                                |                                                                                                        | 60 [135]                                                                                    | 60 *                                                                                          |                                                                                                        |                                                                                                         |                                                                                                          |                                                                                                               |                                                                                                          |                                                                                                          |                                                                                                          |
| 1 A                                                                                  |                                                                                                        | 50 [95]                                                                                     | 40 *                                                                                          |                                                                                                        |                                                                                                         |                                                                                                          |                                                                                                               |                                                                                                          |                                                                                                          |                                                                                                          |
| 4 A                                                                                  |                                                                                                        |                                                                                             |                                                                                               | 3.5 [45]                                                                                               | 6 [70]                                                                                                  | 3.6 [50]                                                                                                 |                                                                                                               | 3.5                                                                                                      | 6.0 [70]                                                                                                 |                                                                                                          |
| 6 A                                                                                  |                                                                                                        |                                                                                             |                                                                                               | 3.8                                                                                                    |                                                                                                         | 3.3                                                                                                      | 1.8 [45]                                                                                                      |                                                                                                          |                                                                                                          | 1.8                                                                                                      |
| 8 A                                                                                  |                                                                                                        |                                                                                             |                                                                                               | 3.3                                                                                                    |                                                                                                         | 2.8                                                                                                      | 1.5                                                                                                           |                                                                                                          |                                                                                                          | 1.5                                                                                                      |
| 10 A                                                                                 |                                                                                                        |                                                                                             |                                                                                               | 3.5                                                                                                    |                                                                                                         | 2.6                                                                                                      | 1.3                                                                                                           |                                                                                                          |                                                                                                          | 1.3                                                                                                      |
| 15 A                                                                                 |                                                                                                        |                                                                                             |                                                                                               |                                                                                                        |                                                                                                         | 2.1                                                                                                      | 1.1                                                                                                           |                                                                                                          |                                                                                                          | 1.1                                                                                                      |
| 25 A                                                                                 | 1.6                                                                                                    |                                                                                             |                                                                                               |                                                                                                        |                                                                                                         |                                                                                                          | 0.89                                                                                                          |                                                                                                          |                                                                                                          | 0.89                                                                                                     |
| 35 A                                                                                 | 1.5                                                                                                    |                                                                                             |                                                                                               |                                                                                                        |                                                                                                         |                                                                                                          |                                                                                                               |                                                                                                          |                                                                                                          |                                                                                                          |

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

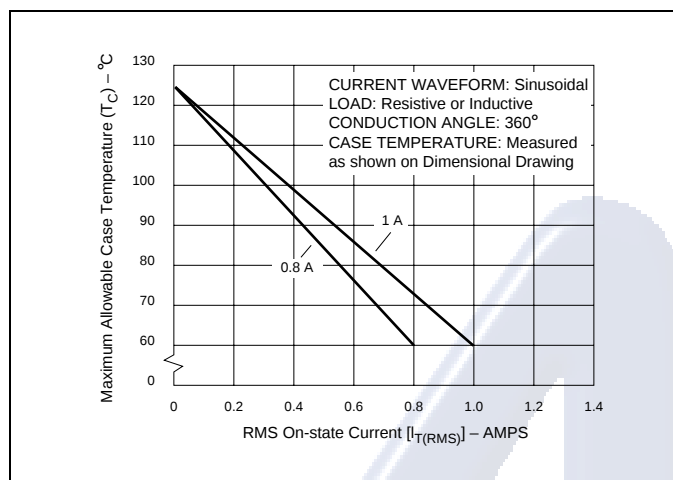


Figure E2.1 Maximum Allowable Case Temperature versus On-state Current (0.8 A and 1 A)

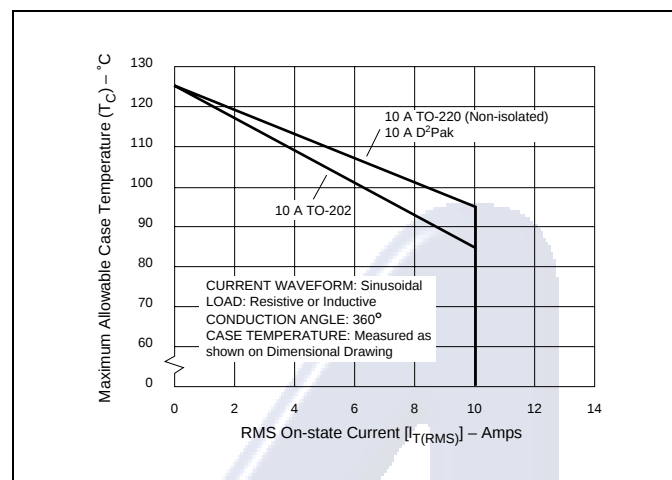


Figure E2.4 Maximum Allowable Case Temperature versus On-state Current (10 A)

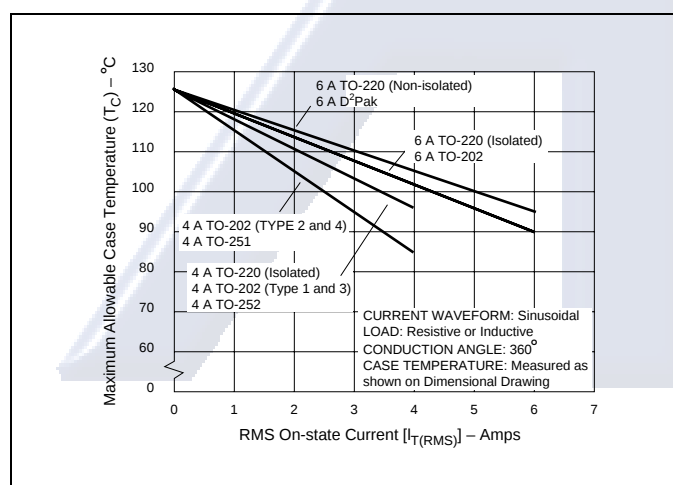


Figure E2.2 Maximum Allowable Case Temperature versus On-state Current (4 A and 6 A)

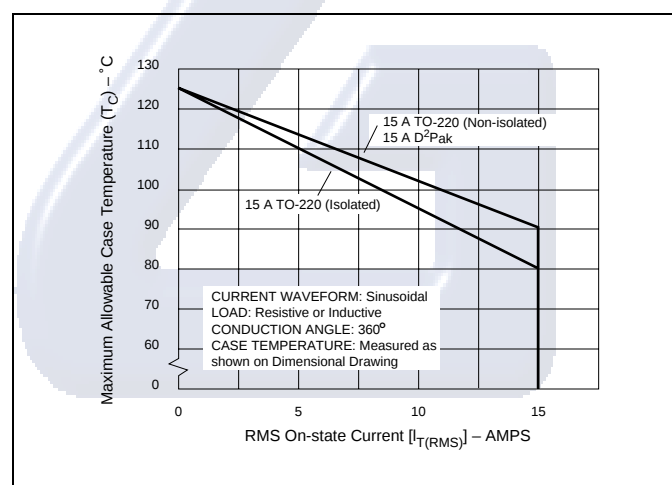


Figure E2.5 Maximum Allowable Case Temperature versus On-state Current (15 A)

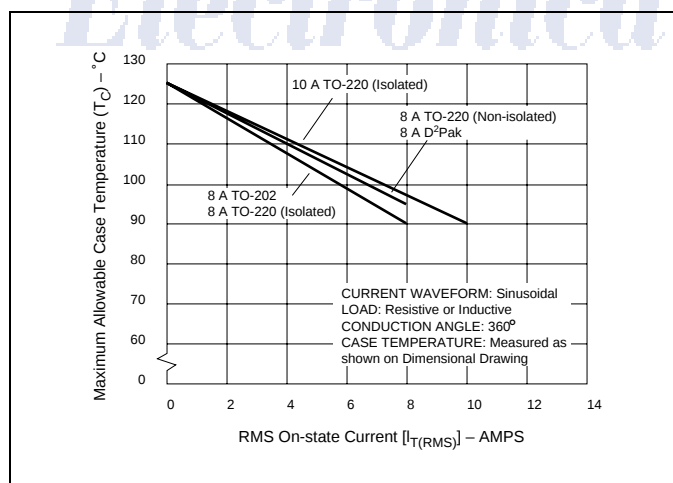


Figure E2.3 Maximum Allowable Case Temperature versus On-state Current (8 A and 10 A)

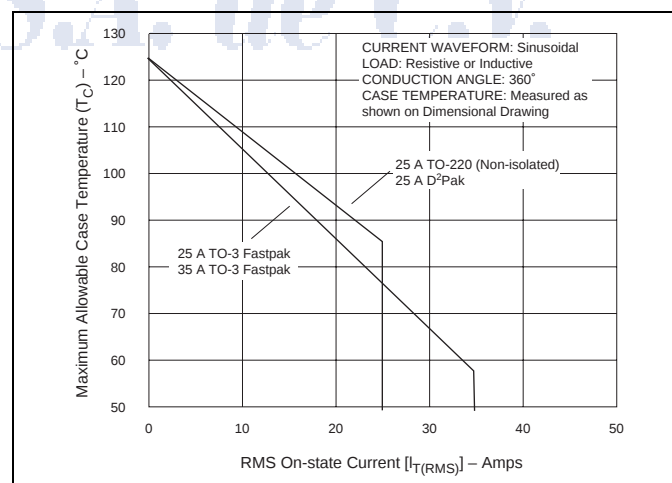


Figure E2.6 Maximum Allowable Case Temperature versus On-state Current (25 A and 35 A)

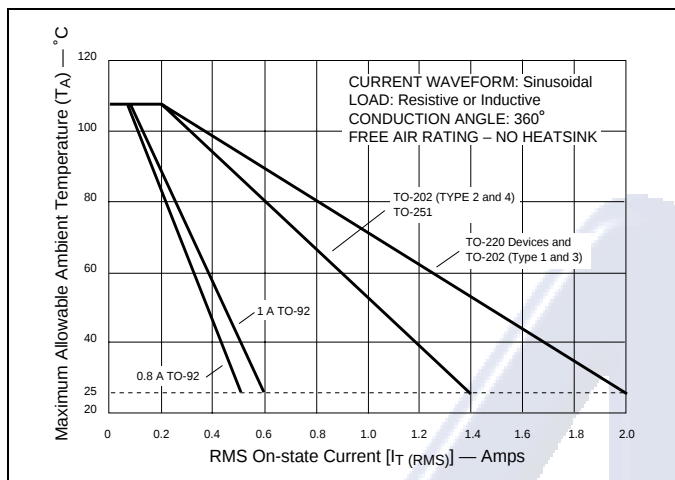


Figure E2.7 Maximum Allowable Ambient Temperature versus On-state Current

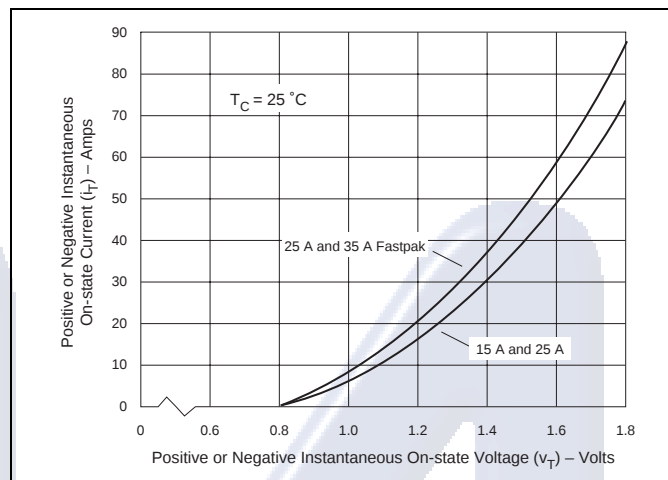


Figure E2.10 On-state Current versus On-state Voltage (Typical) (15 A and 25 A)

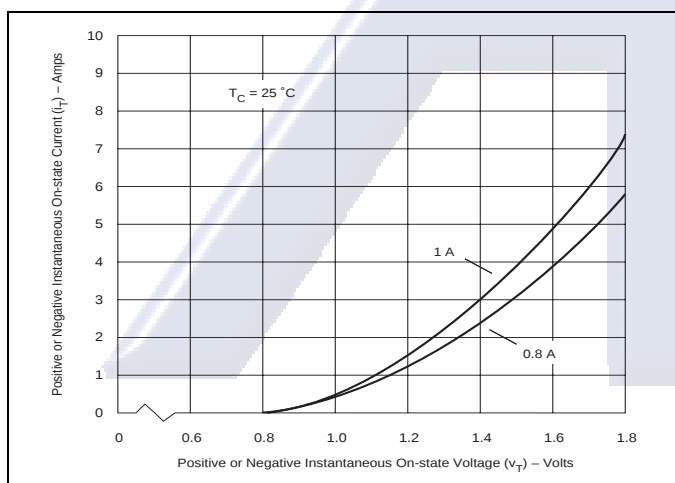


Figure E2.8 On-state Current versus On-state Voltage (Typical) (0.8 A and 1 A)

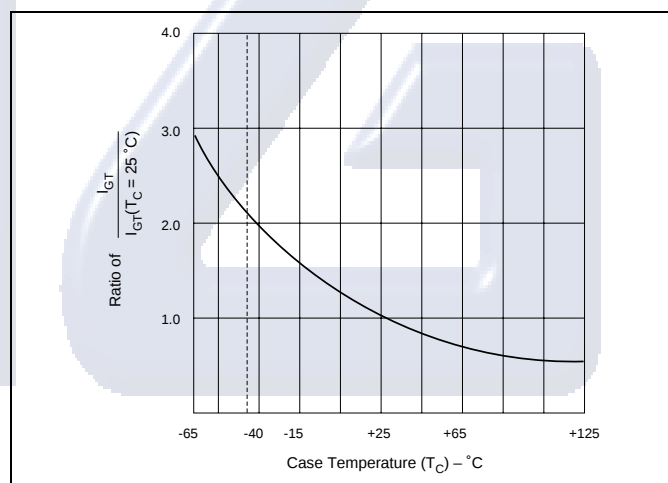


Figure E2.11 Normalized DC Gate Trigger Current for All Quadrants versus Case Temperature

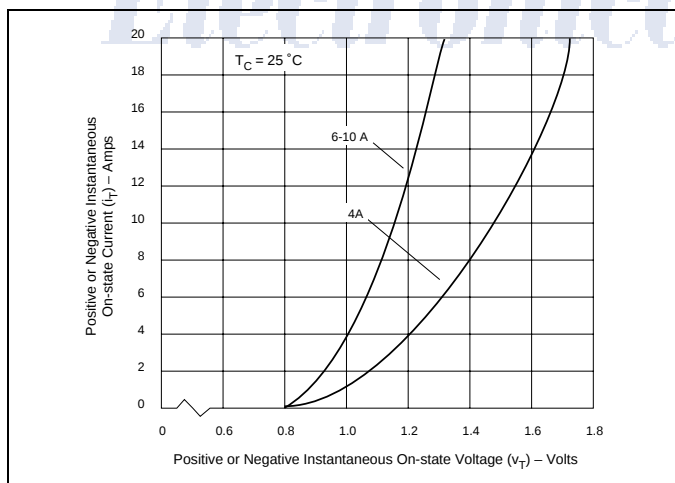


Figure E2.9 On-state Current versus On-state Voltage (Typical) (4 A, 6 A, 8 A, and 10 A)

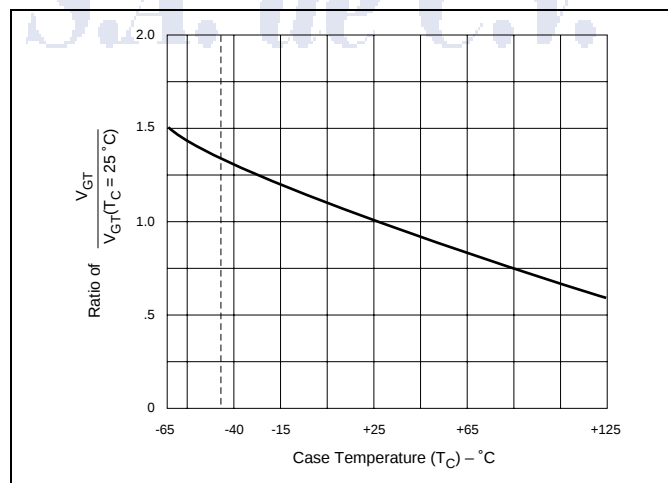


Figure E2.12 Normalized DC Gate Trigger Voltage for All Quadrants versus Case Temperature

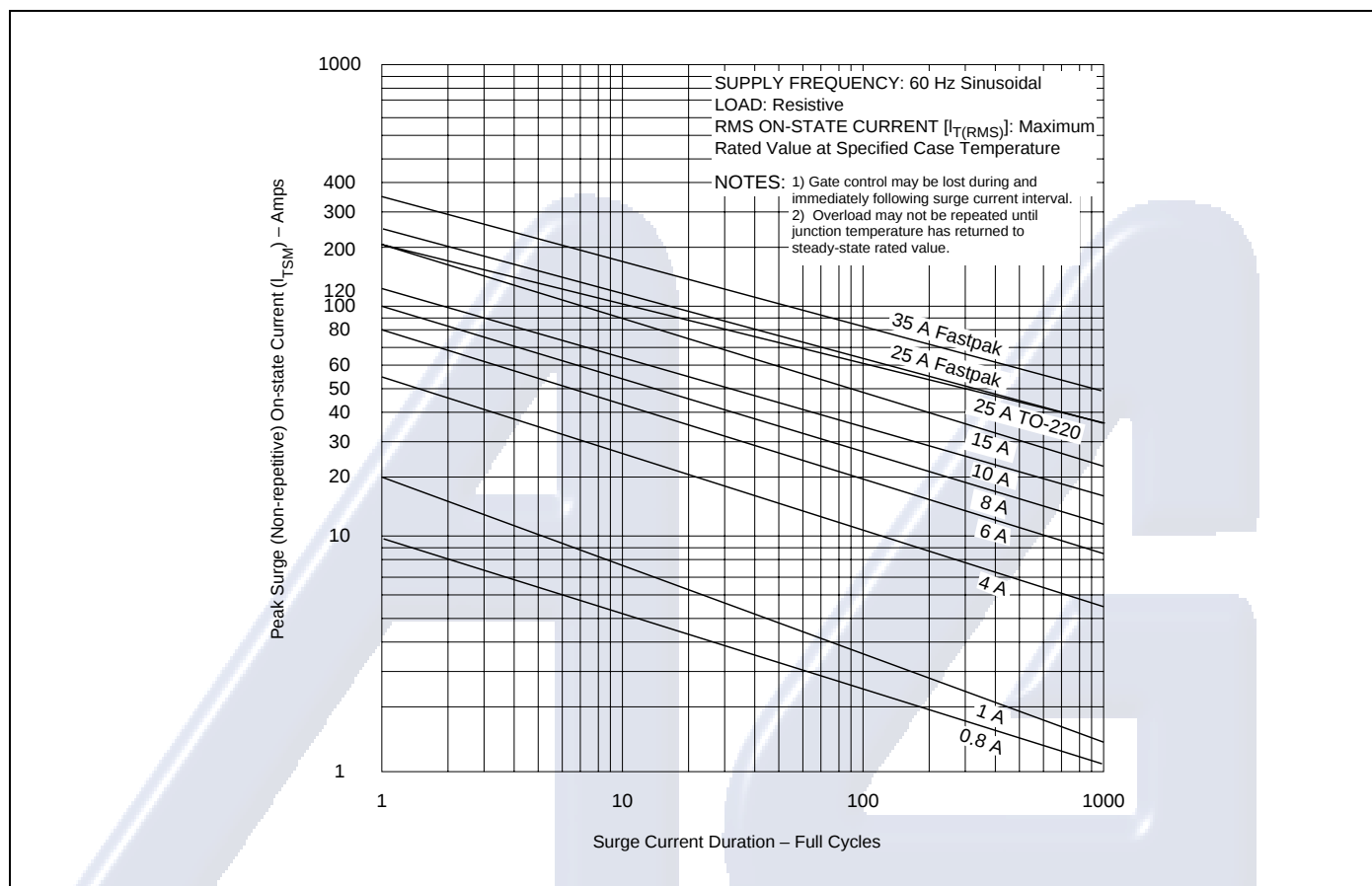


Figure E2.13 Peak Surge Current versus Surge Current Duration

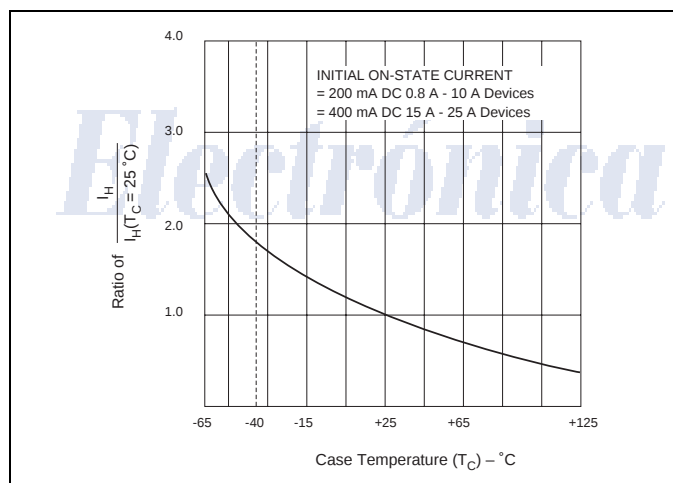


Figure E2.14 Normalized DC Holding Current versus Case Temperature

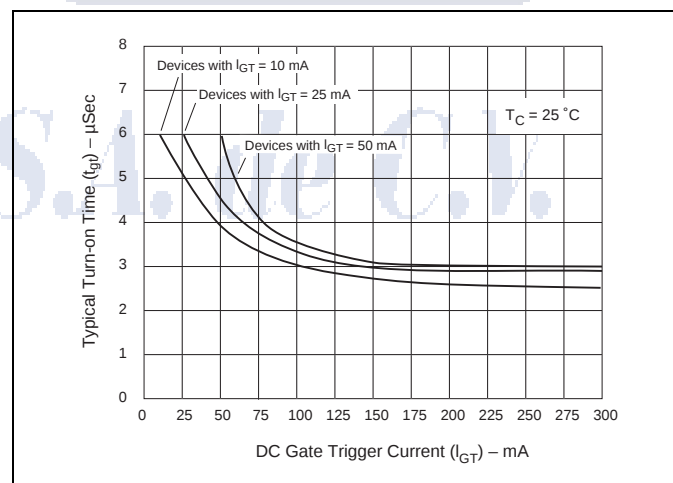


Figure E2.15 Turn-on Time versus Gate Trigger Current (Typical)

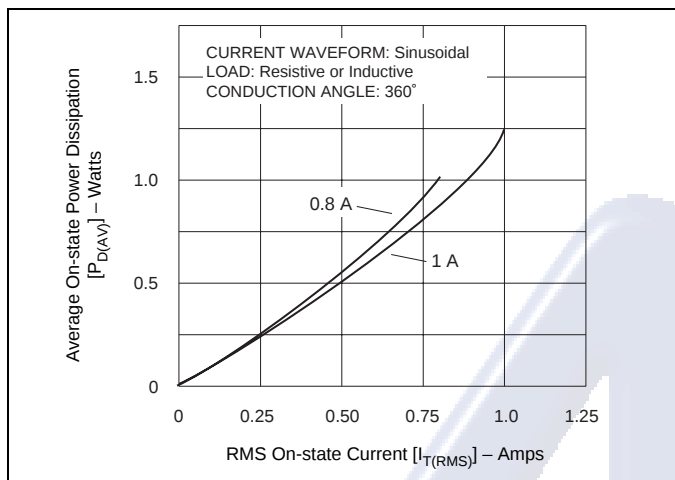


Figure E2.16 Power Dissipation (Typical) versus On-state Current (0.8 A and 1 A)

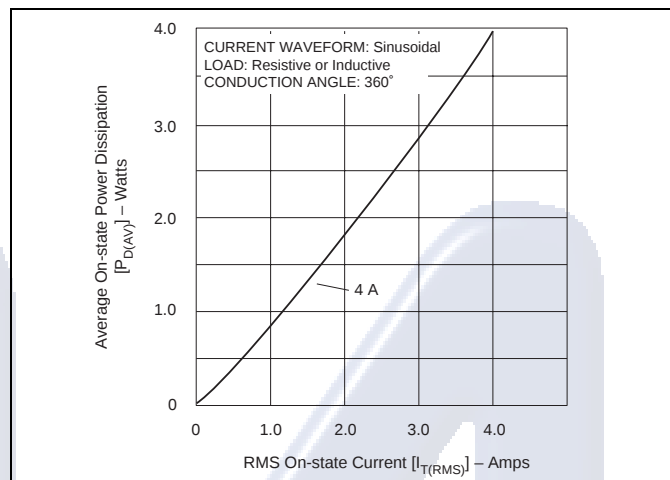


Figure E2.19 Power Dissipation (Typical) versus RMS On-state Current (4 A)

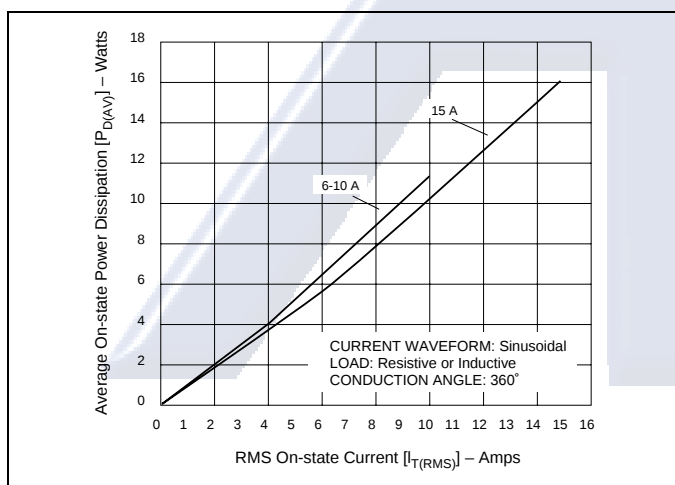


Figure E2.17 Power Dissipation (Typical) versus On-state Current (6 A to 10 A and 15 A)

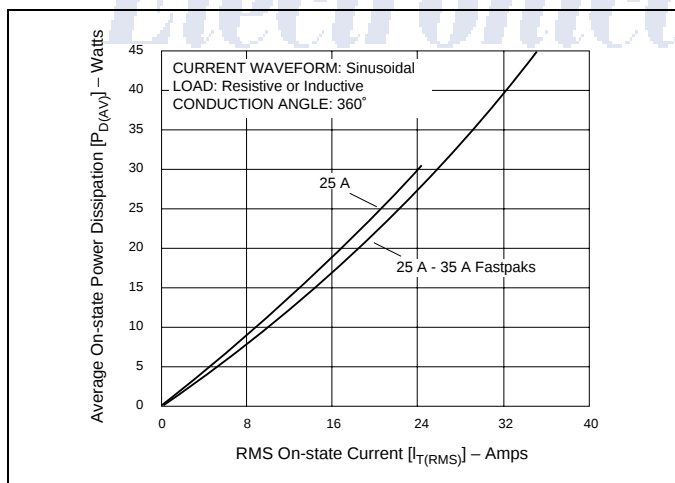


Figure E2.18 Power Dissipation (Typical) versus On-state Current (25 A to 35 A)