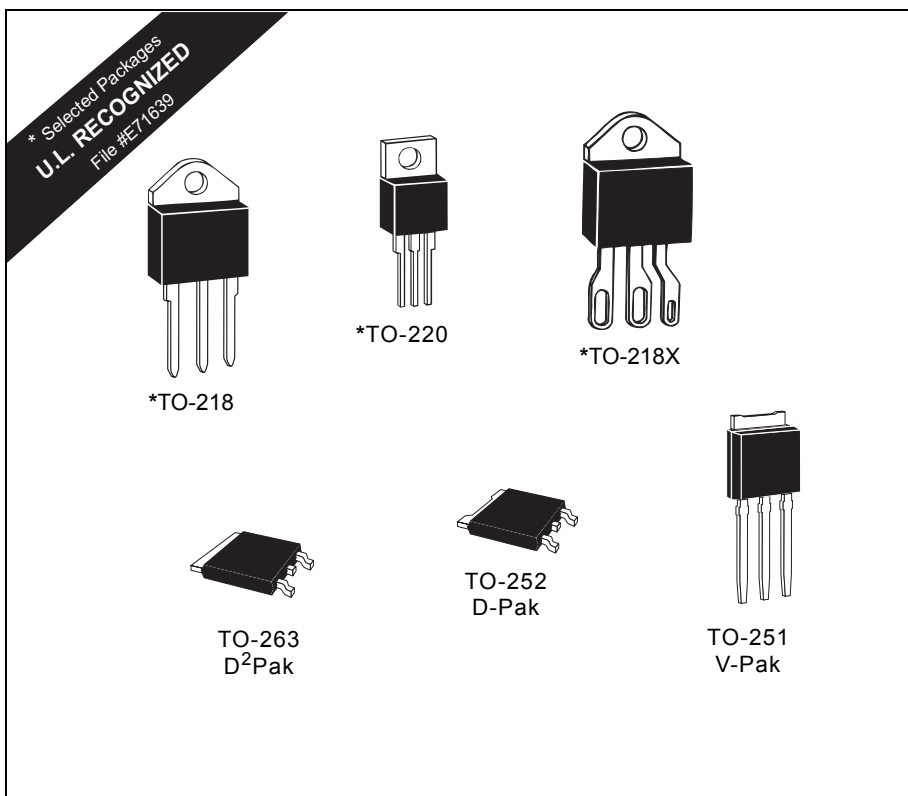


# Alternistor Triacs

(6 A to 40 A) RoHS

## General Description

Teccor offers bidirectional alternistors with current ratings from 6 A to 40 A and voltages from 200 V to 1000 V as part of Teccor's broad line of thyristors. Teccor's alternistor is specifically designed for applications that switch highly inductive loads. A special chip offers the same performance as two thyristors (SCRs) wired inverse parallel (back-to-back), providing better turn-off behavior than a standard triac. An alternistor may be triggered from a blocking to conduction state for either polarity of applied AC voltage with operating modes in Quadrants I, II, and III.

This new chip construction provides two electrically separate SCR structures, providing enhanced  $dv/dt$  characteristics while retaining the advantages of a single-chip device.

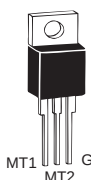
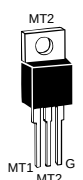
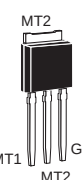
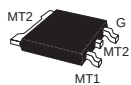
All alternistors have glass-passivated junctions to ensure long-term reliability and parameter stability. Teccor's glass-passivated junctions offer a reliable barrier against junction contamination.

Teccor's TO-218X package is designed for heavy, steady power-handling capability. It features large eyelet terminals for ease of soldering heavy gauge hook-up wire. All the isolated packages have a standard isolation voltage rating of 2500 V rms.

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

## Features

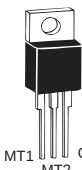
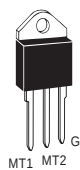
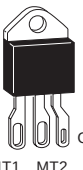
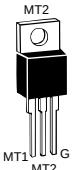
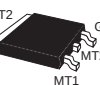
- RoHS Compliant
- High surge current capability
- Glass-passivated junctions
- 2500 V ac isolation for L, J, and K Packages
- High commutating  $dv/dt$
- High static  $dv/dt$

|              | Part Number                                                                                              |                                                                                                                 |                                                                                                                       |                                                                                                              |                                                                                                   |                  |                                               |    |      |                                                                                                 |     |   |
|--------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------|----|------|-------------------------------------------------------------------------------------------------|-----|---|
| $I_{T(RMS)}$ | Isolated                                                                                                 | Non-isolated                                                                                                    |                                                                                                                       |                                                                                                              |                                                                                                   | $V_{DRM}$        | $I_{GT}$                                      |    |      | $I_{DRM}$                                                                                       |     |   |
| (4)(16)      | <br>MT1 MT2 G<br>TO-220 | <br>MT2<br>MT1 MT2 G<br>TO-220 | <br>MT2<br>MT1 MT2 G<br>TO-251 V-Pak | <br>MT2 MT1<br>TO-252 D-Pak | <br>TO-263 D²Pak | (1)<br><br>Volts | (3) (7) (15) (17)<br><br>mAmps<br>QI QII QIII |    |      | (1) (18)<br><br>mAmps<br>T <sub>C</sub> = 25 °C T <sub>C</sub> = 100 °C T <sub>C</sub> = 125 °C |     |   |
| MAX          | See "Package Dimensions" section for variations. (11)                                                    |                                                                                                                 |                                                                                                                       |                                                                                                              |                                                                                                   | MIN              | MAX                                           |    |      | MAX                                                                                             |     |   |
| 6 A          |                                                                                                          |                                                                                                                 | Q2006VH3                                                                                                              | Q2006DH3                                                                                                     |                                                                                                   | 200              | 10                                            | 10 | 10   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q4006VH3                                                                                                              | Q4006DH3                                                                                                     |                                                                                                   | 400              | 10                                            | 10 | 10   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q6006VH3                                                                                                              | Q6006DH3                                                                                                     |                                                                                                   | 600              | 10                                            | 10 | 10   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q2006VH4                                                                                                              | Q2006DH4                                                                                                     |                                                                                                   | 200              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q4006VH4                                                                                                              | Q4006DH4                                                                                                     |                                                                                                   | 400              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q6006VH4                                                                                                              | Q6006DH4                                                                                                     |                                                                                                   | 600              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q8006VH4                                                                                                              | Q8006DH4                                                                                                     |                                                                                                   | 800              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | QK006VH4                                                                                                              | QK006DH4                                                                                                     |                                                                                                   | 1000             | 35                                            | 35 | 35   | 0.02                                                                                            | 2   |   |
|              | Q2006LH4                                                                                                 | Q2006RH4                                                                                                        |                                                                                                                       |                                                                                                              | Q2006NH4                                                                                          | 200              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              | Q4006LH4                                                                                                 | Q4006RH4                                                                                                        |                                                                                                                       |                                                                                                              | Q4006NH4                                                                                          | 400              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              | Q6006LH4                                                                                                 | Q6006RH4                                                                                                        |                                                                                                                       |                                                                                                              | Q6006NH4                                                                                          | 600              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
| Q8006LH4     | Q8006RH4                                                                                                 |                                                                                                                 |                                                                                                                       | Q8006NH4                                                                                                     | 800                                                                                               | 35               | 35                                            | 35 | 0.01 | 0.5                                                                                             | 2   |   |
| QK006LH4     | QK006RH4                                                                                                 |                                                                                                                 |                                                                                                                       | QK006NH4                                                                                                     | 1000                                                                                              | 35               | 35                                            | 35 | 0.02 | 3                                                                                               |     |   |
| 8 A          |                                                                                                          |                                                                                                                 | Q2008VH3                                                                                                              | Q2008DH3                                                                                                     |                                                                                                   | 200              | 10                                            | 10 | 10   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q4008VH3                                                                                                              | Q4008DH3                                                                                                     |                                                                                                   | 400              | 10                                            | 10 | 10   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q6008VH3                                                                                                              | Q6008DH3                                                                                                     |                                                                                                   | 600              | 10                                            | 10 | 10   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q2008VH4                                                                                                              | Q2008DH4                                                                                                     |                                                                                                   | 200              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q4008VH4                                                                                                              | Q4008DH4                                                                                                     |                                                                                                   | 400              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q6008VH4                                                                                                              | Q6008DH4                                                                                                     |                                                                                                   | 600              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | Q8008VH4                                                                                                              | Q8008DH4                                                                                                     |                                                                                                   | 800              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              |                                                                                                          |                                                                                                                 | QK008VH4                                                                                                              | QK008DH4                                                                                                     |                                                                                                   | 1000             | 35                                            | 35 | 35   | 0.02                                                                                            | 2   |   |
|              | Q2008LH4                                                                                                 | Q2008RH4                                                                                                        |                                                                                                                       |                                                                                                              | Q2008NH4                                                                                          | 200              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              | Q4008LH4                                                                                                 | Q4008RH4                                                                                                        |                                                                                                                       |                                                                                                              | Q4008NH4                                                                                          | 400              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
|              | Q6008LH4                                                                                                 | Q6008RH4                                                                                                        |                                                                                                                       |                                                                                                              | Q6008NH4                                                                                          | 600              | 35                                            | 35 | 35   | 0.01                                                                                            | 0.5 | 2 |
| Q8008LH4     | Q8008RH4                                                                                                 |                                                                                                                 |                                                                                                                       | Q8008NH4                                                                                                     | 800                                                                                               | 35               | 35                                            | 35 | 0.01 | 0.5                                                                                             | 2   |   |
| QK008LH4     | QK008RH4                                                                                                 |                                                                                                                 |                                                                                                                       | QK008NH4                                                                                                     | 1000                                                                                              | 35               | 35                                            | 35 | 0.02 | 3                                                                                               |     |   |
| 10 A         | Q2010LH5                                                                                                 | Q2010RH5                                                                                                        |                                                                                                                       |                                                                                                              | Q2010NH5                                                                                          | 200              | 50                                            | 50 | 50   | 0.01                                                                                            | 0.5 | 2 |
|              | Q4010LH5                                                                                                 | Q4010RH5                                                                                                        |                                                                                                                       |                                                                                                              | Q4010NH5                                                                                          | 400              | 50                                            | 50 | 50   | 0.01                                                                                            | 0.5 | 2 |
|              | Q6010LH5                                                                                                 | Q6010RH5                                                                                                        |                                                                                                                       |                                                                                                              | Q6010NH5                                                                                          | 600              | 50                                            | 50 | 50   | 0.01                                                                                            | 0.5 | 2 |
|              | Q8010LH5                                                                                                 | Q8010RH5                                                                                                        |                                                                                                                       |                                                                                                              | Q8010NH5                                                                                          | 800              | 50                                            | 50 | 50   | 0.01                                                                                            | 0.5 | 2 |
|              | QK010LH5                                                                                                 | QK010RH5                                                                                                        |                                                                                                                       |                                                                                                              | QK010NH5                                                                                          | 1000             | 50                                            | 50 | 50   | 0.02                                                                                            | 3   |   |
| 12 A         | Q2012LH5                                                                                                 | Q2012RH5                                                                                                        |                                                                                                                       |                                                                                                              | Q2012NH5                                                                                          | 200              | 50                                            | 50 | 50   | 0.01                                                                                            | 0.5 | 2 |
|              | Q4012LH5                                                                                                 | Q4012RH5                                                                                                        |                                                                                                                       |                                                                                                              | Q4012NH5                                                                                          | 400              | 50                                            | 50 | 50   | 0.01                                                                                            | 0.5 | 2 |
|              | Q6012LH5                                                                                                 | Q6012RH5                                                                                                        |                                                                                                                       |                                                                                                              | Q6012NH5                                                                                          | 600              | 50                                            | 50 | 50   | 0.01                                                                                            | 0.5 | 2 |
|              | Q8012LH5                                                                                                 | Q8012RH5                                                                                                        |                                                                                                                       |                                                                                                              | Q8012NH5                                                                                          | 800              | 50                                            | 50 | 50   | 0.01                                                                                            | 0.5 | 2 |
|              | QK012LH5                                                                                                 | QK012RH5                                                                                                        |                                                                                                                       |                                                                                                              | QK012NH5                                                                                          | 1000             | 50                                            | 50 | 50   | 0.02                                                                                            | 3   |   |

See "General Notes" and "Electrical Specification Notes" on page E4 - 5.

| V <sub>GT</sub>              | V <sub>TM</sub> | I <sub>H</sub>  | I <sub>GT</sub> | P <sub>GM</sub> | P <sub>G(AV)</sub> | I <sub>TSM</sub> | dv/dt(c)     | dv/dt                   |                         | t <sub>gt</sub> | I <sup>2</sup> t      | di/dt     |
|------------------------------|-----------------|-----------------|-----------------|-----------------|--------------------|------------------|--------------|-------------------------|-------------------------|-----------------|-----------------------|-----------|
| (2) (6)<br>(15) (17)<br>(20) | (1) (5)         | (1) (8)<br>(12) | (14)            | (14)            |                    | (9) (13)         | (1) (4) (13) | (1)                     |                         | (10)            |                       | (19)      |
| Volts                        |                 |                 |                 |                 |                    | Amps             |              | Volts/μSec              |                         |                 |                       |           |
| T <sub>C</sub> = 25 °C       | Volts           | mAmps           | Amps            | Watts           | Watts              | 60/50 Hz         | Volts/μSec   | T <sub>C</sub> = 100 °C | T <sub>C</sub> = 125 °C | μSec            | Amps <sup>2</sup> Sec | Amps/μSec |
| MAX                          | MAX             | MAX             |                 |                 |                    |                  | MIN          | MIN                     |                         | TYP             |                       |           |
| 1.3                          | 1.6             | 15              | 1.6             | 18              | 0.4                | 65/55            | 20           | 100                     | 75                      | 4               | 17.5                  | 70        |
| 1.3                          | 1.6             | 15              | 1.6             | 18              | 0.4                | 65/55            | 20           | 100                     | 75                      | 4               | 17.5                  | 70        |
| 1.3                          | 1.6             | 15              | 1.6             | 18              | 0.4                | 65/55            | 20           | 75                      | 50                      | 4               | 17.5                  | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 65/55            | 25           | 500                     | 400                     | 4               | 17.5                  | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 65/55            | 25           | 500                     | 400                     | 4               | 17.5                  | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 65/55            | 25           | 400                     | 300                     | 4               | 17.5                  | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 65/55            | 25           | 300                     | 200                     | 4               | 17.5                  | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 65/55            | 25           | 150                     |                         | 4               | 17.5                  | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 750                     | 600                     | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 575                     | 450                     | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 425                     | 350                     | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 300                     | 250                     | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 150                     |                         | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 15              | 1.6             | 18              | 0.4                | 85/80            | 20           | 100                     | 75                      | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 15              | 1.6             | 18              | 0.4                | 85/80            | 20           | 100                     | 75                      | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 15              | 1.6             | 18              | 0.4                | 85/80            | 20           | 75                      | 50                      | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 750                     | 400                     | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 575                     | 450                     | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 425                     | 350                     | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 300                     | 250                     | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 1.6             | 18              | 0.5                | 85/80            | 25           | 150                     |                         | 4               | 30                    | 70        |
| 1.3                          | 1.6             | 35              | 2               | 20              | 0.5                | 100/83           | 25           | 500                     | 400                     | 4               | 41                    | 70        |
| 1.3                          | 1.6             | 35              | 2               | 20              | 0.5                | 100/83           | 25           | 500                     | 400                     | 4               | 41                    | 70        |
| 1.3                          | 1.6             | 35              | 2               | 20              | 0.5                | 100/83           | 25           | 400                     | 300                     | 4               | 41                    | 70        |
| 1.3                          | 1.6             | 35              | 2               | 20              | 0.5                | 100/83           | 25           | 300                     | 200                     | 4               | 41                    | 70        |
| 1.3                          | 1.6             | 35              | 2               | 20              | 0.5                | 100/83           | 25           | 150                     |                         | 4               | 41                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 1150                    | 1000                    | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 1000                    | 750                     | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 850                     | 650                     | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 650                     | 500                     | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 300                     |                         | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 1150                    | 1000                    | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 1000                    | 750                     | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 850                     | 650                     | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 650                     | 500                     | 4               | 60                    | 70        |
| 1.3                          | 1.6             | 50              | 2               | 20              | 0.5                | 120/110          | 30           | 300                     |                         | 4               | 60                    | 70        |

See "General Notes" and "Electrical Specification Notes" on page E4 - 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) (17) |     |     |
|--------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------|-----|-----|
|                                | Isolated                                                                                                 |                                                                                                                  |                                                                                                           | Non-isolated                                                                                                    |                                                                                                                       |                         | mAmps                                |     |     |
|                                | <br>MT1 MT2 G<br>TO-220 | <br>MT1 MT2 G<br>TO-218<br>(16) | <br>MT1 MT2 G<br>TO-218X | <br>MT2<br>MT1 MT2 G<br>TO-220 | <br>MT2 G<br>MT1<br>TO-263<br>D²Pak | Volts                   |                                      |     |     |
| MAX                            | See "Package Dimensions" section for variations. (11)                                                    |                                                                                                                  |                                                                                                           |                                                                                                                 |                                                                                                                       |                         | MAX                                  |     |     |
| 16 A                           | Q2016LH3                                                                                                 |                                                                                                                  |                                                                                                           | Q2016RH3                                                                                                        | Q2016NH3                                                                                                              | 200                     | 20                                   | 20  | 20  |
|                                | Q4016LH3                                                                                                 |                                                                                                                  |                                                                                                           | Q4016RH3                                                                                                        | Q4016NH3                                                                                                              | 400                     | 20                                   | 20  | 20  |
|                                | Q6016LH3                                                                                                 |                                                                                                                  |                                                                                                           | Q6016RH3                                                                                                        | Q6016NH3                                                                                                              | 600                     | 20                                   | 20  | 20  |
|                                | Q8016LH3                                                                                                 |                                                                                                                  |                                                                                                           | Q8016RH3                                                                                                        | Q8016NH3                                                                                                              | 800                     | 20                                   | 20  | 20  |
|                                | QK016LH3                                                                                                 |                                                                                                                  |                                                                                                           | QK016RH3                                                                                                        | QK016NH3                                                                                                              | 1000                    | 20                                   | 20  | 20  |
|                                | Q2016LH4                                                                                                 |                                                                                                                  |                                                                                                           | Q2016RH4                                                                                                        | Q2016NH4                                                                                                              | 200                     | 35                                   | 35  | 35  |
|                                | Q4016LH4                                                                                                 |                                                                                                                  |                                                                                                           | Q4016RH4                                                                                                        | Q4016NH4                                                                                                              | 400                     | 35                                   | 35  | 35  |
|                                | Q6016LH4                                                                                                 |                                                                                                                  |                                                                                                           | Q6016RH4                                                                                                        | Q6016NH4                                                                                                              | 600                     | 35                                   | 35  | 35  |
|                                | Q8016LH4                                                                                                 |                                                                                                                  |                                                                                                           | Q8016RH4                                                                                                        | Q8016NH4                                                                                                              | 800                     | 35                                   | 35  | 35  |
|                                | QK016LH4                                                                                                 |                                                                                                                  |                                                                                                           | QK016RH4                                                                                                        | QK016NH4                                                                                                              | 1000                    | 35                                   | 35  | 35  |
|                                | Q2016LH6                                                                                                 |                                                                                                                  |                                                                                                           | Q2016RH6                                                                                                        | Q2016NH6                                                                                                              | 200                     | 80                                   | 80  | 80  |
|                                | Q4016LH6                                                                                                 |                                                                                                                  |                                                                                                           | Q4016RH6                                                                                                        | Q4016NH6                                                                                                              | 400                     | 80                                   | 80  | 80  |
|                                | Q6016LH6                                                                                                 |                                                                                                                  |                                                                                                           | Q6016RH6                                                                                                        | Q6016NH6                                                                                                              | 600                     | 80                                   | 80  | 80  |
|                                | Q8016LH6                                                                                                 |                                                                                                                  |                                                                                                           | Q8016RH6                                                                                                        | Q8016NH6                                                                                                              | 800                     | 80                                   | 80  | 80  |
| QK016LH6                       |                                                                                                          |                                                                                                                  | QK016RH6                                                                                                  | QK016NH6                                                                                                        | 1000                                                                                                                  | 80                      | 80                                   | 80  |     |
| 25 A                           | Q2025L6                                                                                                  | Q2025K6                                                                                                          | Q2025J6                                                                                                   | Q2025R6                                                                                                         | Q2025NH6                                                                                                              | 200                     | 80                                   | 80  | 80  |
|                                | Q4025L6                                                                                                  | Q4025K6                                                                                                          | Q4025J6                                                                                                   | Q4025R6                                                                                                         | Q4025NH6                                                                                                              | 400                     | 80                                   | 80  | 80  |
|                                | Q6025L6                                                                                                  | Q6025K6                                                                                                          | Q6025J6                                                                                                   | Q6025R6                                                                                                         | Q6025NH6                                                                                                              | 600                     | 80                                   | 80  | 80  |
|                                | Q8025L6                                                                                                  | Q8025K6                                                                                                          | Q8025J6                                                                                                   | Q8025R6                                                                                                         | Q8025NH6                                                                                                              | 800                     | 80                                   | 80  | 80  |
|                                | QK025L6                                                                                                  | QK025K6                                                                                                          |                                                                                                           | QK025R6                                                                                                         | QK025NH6                                                                                                              | 1000                    | 80                                   | 80  | 80  |
| 30 A                           | Q2030LH5                                                                                                 |                                                                                                                  |                                                                                                           |                                                                                                                 |                                                                                                                       | 200                     | 50                                   | 50  | 50  |
|                                | Q4030LH5                                                                                                 |                                                                                                                  |                                                                                                           |                                                                                                                 |                                                                                                                       | 400                     | 50                                   | 50  | 50  |
|                                | Q6030LH5                                                                                                 |                                                                                                                  |                                                                                                           |                                                                                                                 |                                                                                                                       | 600                     | 50                                   | 50  | 50  |
| 35 A                           |                                                                                                          |                                                                                                                  |                                                                                                           | Q2035RH5                                                                                                        | Q2035NH5                                                                                                              | 200                     | 50                                   | 50  | 50  |
|                                |                                                                                                          |                                                                                                                  |                                                                                                           | Q4035RH5                                                                                                        | Q4035NH5                                                                                                              | 400                     | 50                                   | 50  | 50  |
|                                |                                                                                                          |                                                                                                                  |                                                                                                           | Q6035RH5                                                                                                        | Q6035NH5                                                                                                              | 600                     | 50                                   | 50  | 50  |
| 40 A                           |                                                                                                          | Q2040K7                                                                                                          | Q2040J7                                                                                                   |                                                                                                                 |                                                                                                                       | 200                     | 100                                  | 100 | 100 |
|                                |                                                                                                          | Q4040K7                                                                                                          | Q4040J7                                                                                                   |                                                                                                                 |                                                                                                                       | 400                     | 100                                  | 100 | 100 |
|                                |                                                                                                          | Q6040K7                                                                                                          | Q6040J7                                                                                                   |                                                                                                                 |                                                                                                                       | 600                     | 100                                  | 100 | 100 |
|                                |                                                                                                          | Q8040K7                                                                                                          | Q8040J7                                                                                                   |                                                                                                                 |                                                                                                                       | 800                     | 100                                  | 100 | 100 |
|                                |                                                                                                          | QK040K7                                                                                                          |                                                                                                           |                                                                                                                 |                                                                                                                       | 1000                    | 100                                  | 100 | 100 |

See "General Notes" and "Electrical Specification Notes" on page E4 - 5.

## Test Conditions

$di/dt$  — Maximum rate-of-change of on-state current

$dv/dt$  — 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;  $I_{GT} = 300$  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

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

| I <sub>DRM</sub>          |                            |                            | V <sub>GT</sub>              | V <sub>TM</sub>           | I <sub>H</sub>  | I <sub>GT</sub> | P <sub>GM</sub> | P <sub>G(AV)</sub> | I <sub>TSM</sub> | dv/dt(c)     | dv/dt                      |                            | t <sub>gt</sub> | I <sup>2</sup> t      | di/dt     |
|---------------------------|----------------------------|----------------------------|------------------------------|---------------------------|-----------------|-----------------|-----------------|--------------------|------------------|--------------|----------------------------|----------------------------|-----------------|-----------------------|-----------|
| (1) (18)                  |                            |                            | (2) (6)<br>(15) (17)<br>(20) | (1) (5)                   | (1) (8)<br>(12) | (14)            | (14)            |                    | (9) (13)         | (1) (4) (13) | (1)                        |                            | (10)            |                       | (19)      |
| mAmps                     |                            |                            | Volts                        | Volts                     |                 |                 |                 |                    | Amps             |              | Volts/μSec                 |                            |                 |                       |           |
| T <sub>C</sub> =<br>25 °C | T <sub>C</sub> =<br>100 °C | T <sub>C</sub> =<br>125 °C | T <sub>C</sub> =<br>25 °C    | T <sub>C</sub> =<br>25 °C | mAmps           | Amps            | Watts           | Watts              | 60/50 Hz         | Volts/μSec   | T <sub>C</sub> =<br>100 °C | T <sub>C</sub> =<br>125 °C | μSec            | Amps <sup>2</sup> Sec | Amps/μSec |
| MAX                       |                            |                            | MAX                          | MAX                       | MAX             |                 |                 |                    |                  | MIN          | MIN                        |                            | TYP             |                       |           |
| 0.05                      | 0.5                        | 2                          | 1.5                          | 1.6                       | 35              | 2               | 20              | 0.5                | 200/167          | 20           | 500                        | 400                        | 3               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 1.5                          | 1.6                       | 35              | 2               | 20              | 0.5                | 200/167          | 20           | 400                        | 350                        | 3               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 1.5                          | 1.6                       | 35              | 2               | 20              | 0.5                | 200/167          | 20           | 300                        | 250                        | 3               | 166                   | 100       |
| 0.1                       | 1                          | 3                          | 1.5                          | 1.6                       | 35              | 2               | 20              | 0.5                | 200/167          | 20           | 275                        | 200                        | 3               | 166                   | 100       |
| 0.1                       | 3                          |                            | 1.5                          | 1.6                       | 35              | 2               | 20              | 0.5                | 200/167          | 20           | 200                        |                            | 3               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.6                       | 50              | 2               | 20              | 0.5                | 200/167          | 25           | 650                        | 500                        | 3               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.6                       | 50              | 2               | 20              | 0.5                | 200/167          | 25           | 600                        | 475                        | 3               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.6                       | 50              | 2               | 20              | 0.5                | 200/167          | 25           | 500                        | 400                        | 3               | 166                   | 100       |
| 0.1                       | 1                          | 3                          | 2                            | 1.6                       | 50              | 2               | 20              | 0.5                | 200/167          | 25           | 425                        | 350                        | 3               | 166                   | 100       |
| 0.1                       | 3                          |                            | 2                            | 1.6                       | 50              | 2               | 20              | 0.5                | 200/167          | 25           | 300                        |                            | 3               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2.5                          | 1.6                       | 70              | 2               | 20              | 0.5                | 200/167          | 30           | 1090                       | 925                        | 5               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2.5                          | 1.6                       | 70              | 2               | 20              | 0.5                | 200/167          | 30           | 1090                       | 925                        | 5               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2.5                          | 1.6                       | 70              | 2               | 20              | 0.5                | 200/167          | 30           | 1000                       | 850                        | 5               | 166                   | 100       |
| 0.1                       | 1                          | 3                          | 2.5                          | 1.6                       | 70              | 2               | 20              | 0.5                | 200/167          | 30           | 700                        | 475                        | 5               | 166                   | 100       |
| 0.1                       | 3                          |                            | 2.5                          | 1.6                       | 70              | 2               | 20              | 0.5                | 200/167          | 30           | 350                        |                            | 5               | 166                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2.5                          | 1.8                       | 100             | 2               | 20              | 0.5                | 250/208          | 30           | 875                        | 600                        | 5               | 259                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2.5                          | 1.8                       | 100             | 2               | 20              | 0.5                | 250/208          | 30           | 875                        | 600                        | 5               | 259                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2.5                          | 1.8                       | 100             | 2               | 20              | 0.5                | 250/208          | 30           | 800                        | 520                        | 5               | 259                   | 100       |
| 0.1                       | 1                          | 3                          | 2.5                          | 1.8                       | 100             | 2               | 20              | 0.5                | 250/208          | 30           | 700                        | 475                        | 5               | 259                   | 100       |
| 0.1                       | 3                          |                            | 2.5                          | 1.8                       | 100             | 2               | 20              | 0.5                | 250/208          | 30           | 400                        |                            | 5               | 259                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.4                       | 75              | 2               | 20              | 0.5                | 350/290          | 20           | 650                        | 500                        | 3               | 508                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.4                       | 75              | 2               | 20              | 0.5                | 350/290          | 20           | 600                        | 475                        | 3               | 508                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.4                       | 75              | 2               | 20              | 0.5                | 350/290          | 20           | 500                        | 400                        | 3               | 508                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.5                       | 75              | 2               | 20              | 0.5                | 350/290          | 20           | 650                        | 500                        | 3               | 508                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.5                       | 75              | 2               | 20              | 0.5                | 350/290          | 20           | 600                        | 475                        | 3               | 508                   | 100       |
| 0.05                      | 0.5                        | 2                          | 2                            | 1.5                       | 75              | 2               | 20              | 0.5                | 350/290          | 20           | 500                        | 400                        | 3               | 508                   | 100       |
| 0.2                       | 2                          | 5                          | 2.5                          | 1.8                       | 120             | 4               | 40              | 0.8                | 400/335          | 50           | 1100                       | 700                        | 5               | 664                   | 150       |
| 0.2                       | 2                          | 5                          | 2.5                          | 1.8                       | 120             | 4               | 40              | 0.8                | 400/335          | 50           | 1100                       | 700                        | 5               | 664                   | 150       |
| 0.2                       | 2                          | 5                          | 2.5                          | 1.8                       | 120             | 4               | 40              | 0.8                | 400/335          | 50           | 1000                       | 625                        | 5               | 664                   | 150       |
| 0.2                       | 2                          | 5                          | 2.5                          | 1.8                       | 120             | 4               | 40              | 0.8                | 400/335          | 50           | 900                        | 575                        | 5               | 664                   | 150       |
| 0.2                       | 5                          |                            | 2.5                          | 1.8                       | 120             | 4               | 40              | 0.8                | 400/335          | 50           | 500                        |                            | 5               | 664                   | 150       |

## General Notes

- All measurements are made at 60 Hz with a resistive load at an ambient temperature of +25 °C unless specified otherwise.
- Operating temperature range (T<sub>J</sub>) is -40 °C to +125 °C.
- Storage temperature range (T<sub>S</sub>) is -40 °C to +125 °C.
- Lead solder temperature is a maximum of 230 °C for 10 seconds maximum ≥1/16" (1.59 mm) from case.
- The case temperature (T<sub>C</sub>) is measured as shown in the dimensional outline drawings. See "Package Dimensions" section.

## Electrical Specification Notes

- (1) For either polarity of MT2 with reference to MT1 terminal
- (2) For either polarity of gate voltage (V<sub>GT</sub>) with reference to MT1 terminal
- (3) See Gate Characteristics and Definition of Quadrants.
- (4) See Figure E4.1 through Figure E4.4 for current rating at specific operating temperature and Figure 4.16 for free air rating (no heat sink).
- (5) See Figure E4.5 and Figure E4.6 for i<sub>T</sub> and v<sub>T</sub>.
- (6) See Figure E4.7 for V<sub>GT</sub> versus T<sub>C</sub>.
- (7) See Figure E4.8 for I<sub>GT</sub> versus T<sub>C</sub>.
- (8) See Figure E4.9 for I<sub>H</sub> versus T<sub>C</sub>.
- (9) See Figure E4.10 and Figure E4.11 for surge rating with specific durations.

- (10) See Figure E4.12 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 = 400 mA dc for 16 A to 40 A devices and 100 mA for 6 A to 12 A devices.
- (13) See Figure E4.1 through Figure E4.4 for maximum allowable case temperature at maximum rated current.
- (14) Pulse width  $\leq 10 \mu s$ ;  $I_{GT} \leq I_{GTM}$
- (15) For 6 A to 12 A devices,  $R_L = 60 \Omega$ ; 16 A and above,  $R_L = 30 \Omega$
- (16) 40 A pin terminal leads on K package can run 100 °C to 125 °C.
- (17) Alternistor does not turn on in Quadrant IV.
- (18)  $T_C = T_J$  for test conditions in off state
- (19)  $I_{GT} = 200$  mA for 6 A to 12 A devices and 500 mA for 16 A to 40 A devices with gate pulse having rise time of  $\leq 0.1 \mu s$ .
- (20) Minimum non-trigger  $V_{GT}$  at 125 °C is 0.2 V.

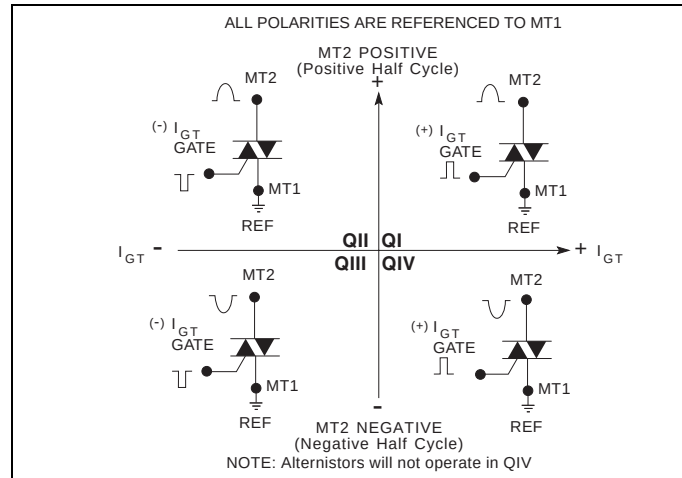
## Gate Characteristics

Teccor triacs may be turned on in the following ways:

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

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

If QIV and QI operation is required (gate always positive), see Figure AN1002.8, "Amplified Gate" Thyristor Circuit.



Definition of Quadrants

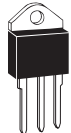
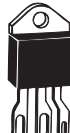
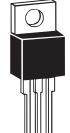
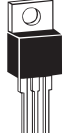
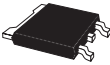
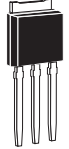
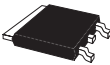
## Electrical Isolation

Teccor's isolated alternistor packages withstand a minimum high potential test of 2500 V ac rms from leads to mounting tab, 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-218<br>Isolated | TO-220<br>Isolated | TO-218X<br>Isolated |
| 2500                                                 | Standard           | Standard           | Standard            |
| 4000                                                 | N/A                | 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                                                                     | K                                                                                                           | J                                                                                                            | L                                                                                                            | R                                                                                                             | D                                                                                                        | V                                                                                                        | N                                                                                                        |
| Type                                                                             | <br>TO-218<br>Isolated * | <br>TO-218X<br>Isolated * | <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 |
| 6 A                                                                              |                                                                                                             |                                                                                                              | 3.3 [50]                                                                                                     | 1.80 [45]                                                                                                     | 2.1                                                                                                      | 2.3 [64]                                                                                                 | 1.80                                                                                                     |
| 8 A                                                                              |                                                                                                             |                                                                                                              | 2.8                                                                                                          | 1.50                                                                                                          | 1.8                                                                                                      | 2.1                                                                                                      | 1.50                                                                                                     |
| 10 A                                                                             |                                                                                                             |                                                                                                              | 2.6                                                                                                          | 1.30                                                                                                          |                                                                                                          |                                                                                                          | 1.30                                                                                                     |
| 12 A                                                                             |                                                                                                             |                                                                                                              | 2.3                                                                                                          | 1.20                                                                                                          |                                                                                                          |                                                                                                          | 1.20                                                                                                     |
| 16 A                                                                             |                                                                                                             |                                                                                                              | 2.1                                                                                                          | 1.10                                                                                                          |                                                                                                          |                                                                                                          | 1.10                                                                                                     |
| 25 A                                                                             | 1.35                                                                                                        | 1.32                                                                                                         | 2.0                                                                                                          | 0.87                                                                                                          |                                                                                                          |                                                                                                          | 0.87                                                                                                     |
| 30 A                                                                             |                                                                                                             |                                                                                                              | 2.3                                                                                                          |                                                                                                               |                                                                                                          |                                                                                                          |                                                                                                          |
| 35 A                                                                             |                                                                                                             |                                                                                                              |                                                                                                              | 0.85                                                                                                          |                                                                                                          |                                                                                                          |                                                                                                          |
| 40 A                                                                             | 0.97                                                                                                        | 0.95                                                                                                         |                                                                                                              |                                                                                                               |                                                                                                          |                                                                                                          |                                                                                                          |

\* UL Recognized Product per UL File E71639

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

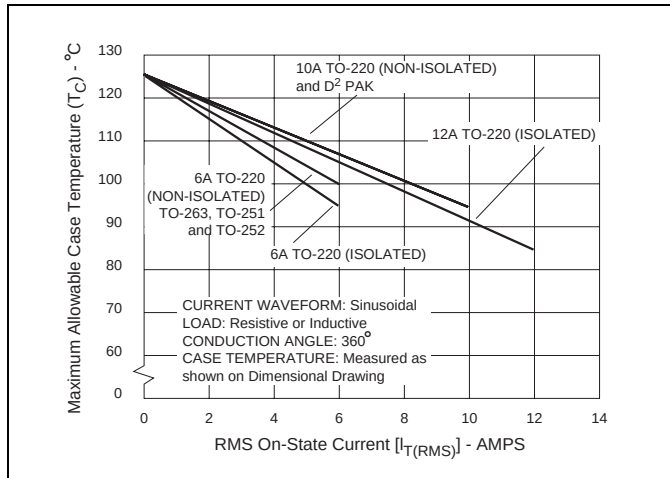


Figure E4.1 Maximum Allowable Case Temperature versus On-state Current (6 A to 12 A)

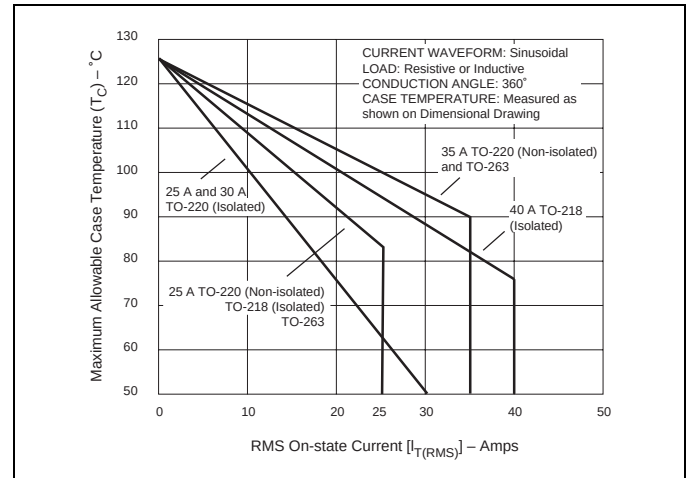


Figure E4.4 Maximum Allowable Case Temperature versus On-state Current (25 A to 40 A)

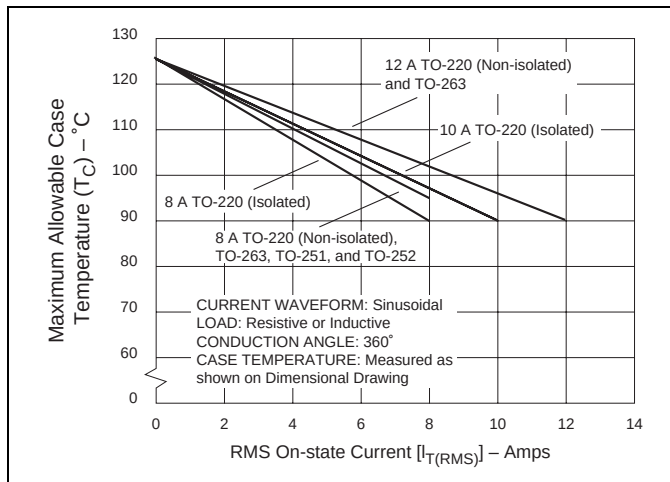


Figure E4.2 Maximum Allowable Case Temperature versus On-state Current (8 A to 12 A)

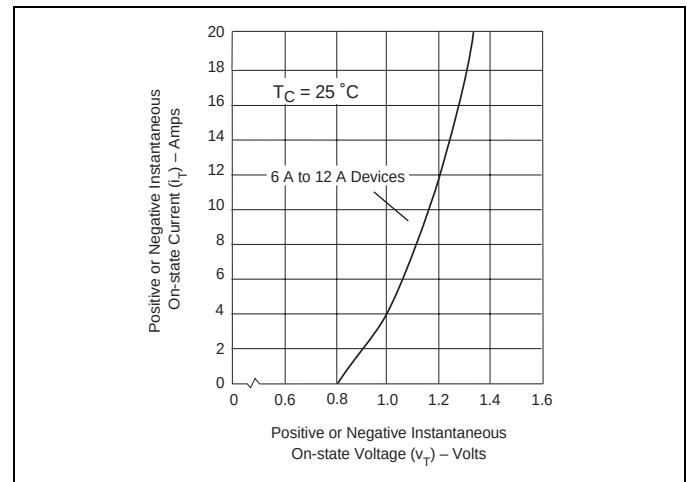


Figure E4.5 On-state Current versus On-state Voltage (Typical) (6 A to 12 A)

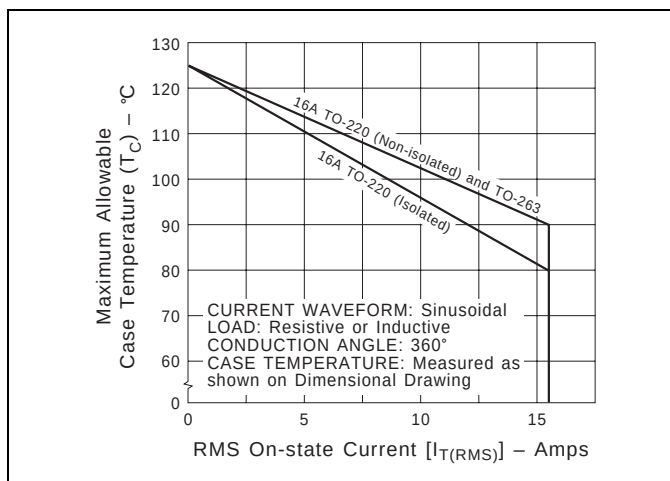


Figure E4.3 Maximum Allowable Case Temperature versus On-state Current (16 A)

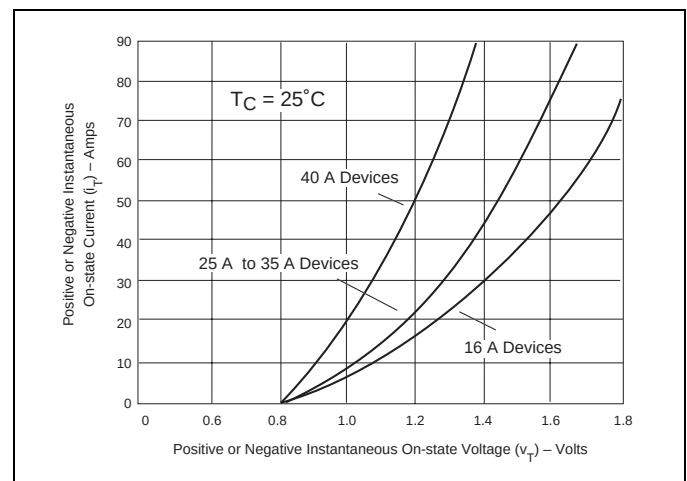


Figure E4.6 On-state Current versus On-state Voltage (Typical) (16 A to 40 A)

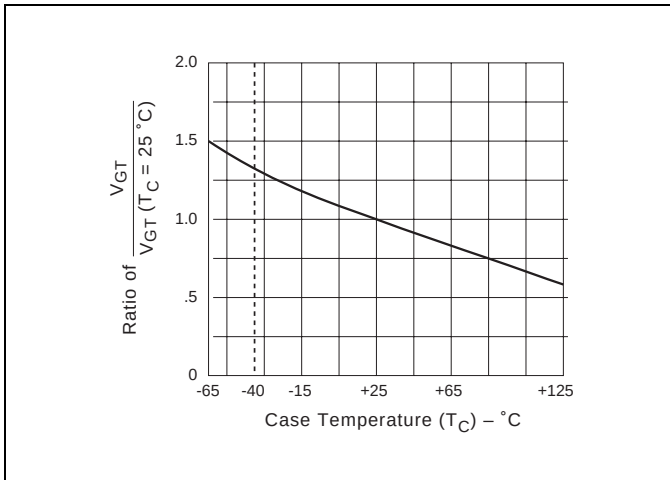


Figure E4.7 Normalized DC Gate Trigger Voltage for all Quadrants versus Case Temperature

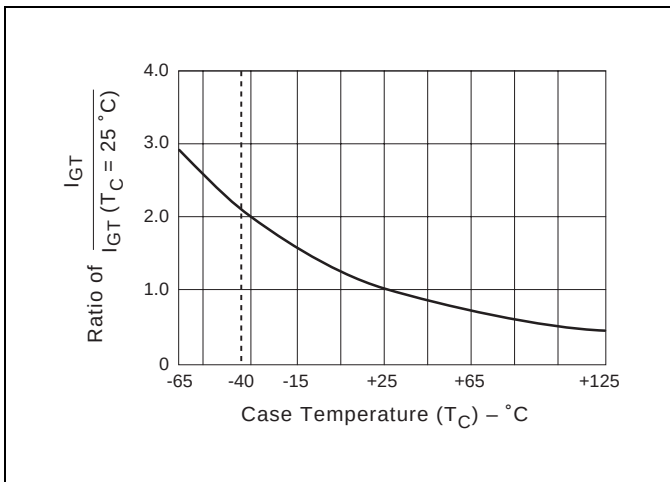


Figure E4.8 Normalized DC Gate Trigger Current for all Quadrants versus Case Temperature

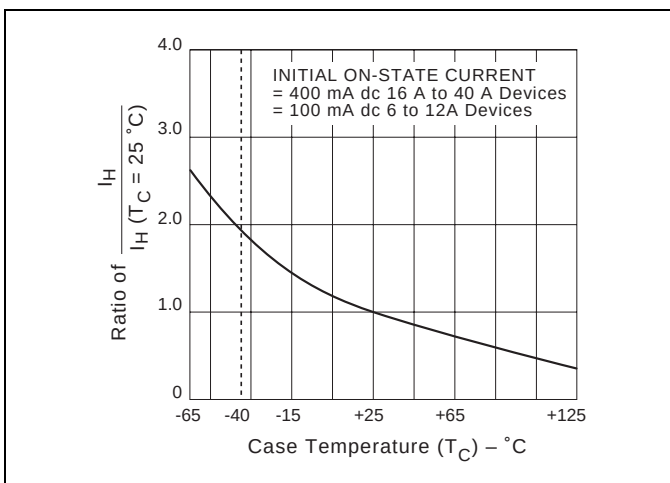


Figure E4.9 Normalized DC Holding Current versus Case Temperature

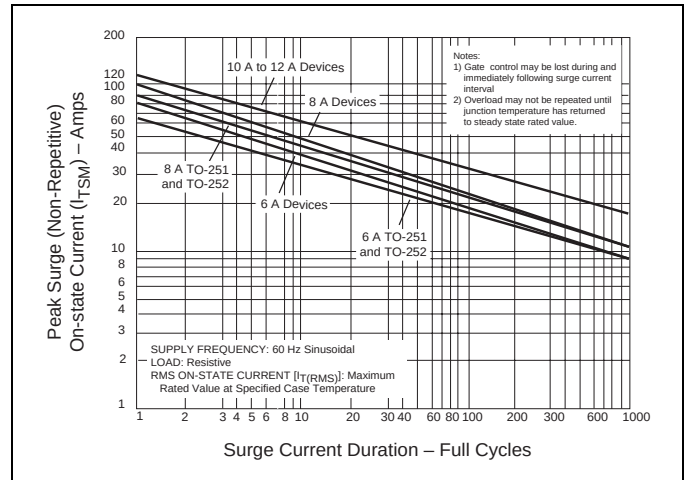


Figure E4.10 Peak Surge Current versus Surge Current Duration (6 A to 12 A)

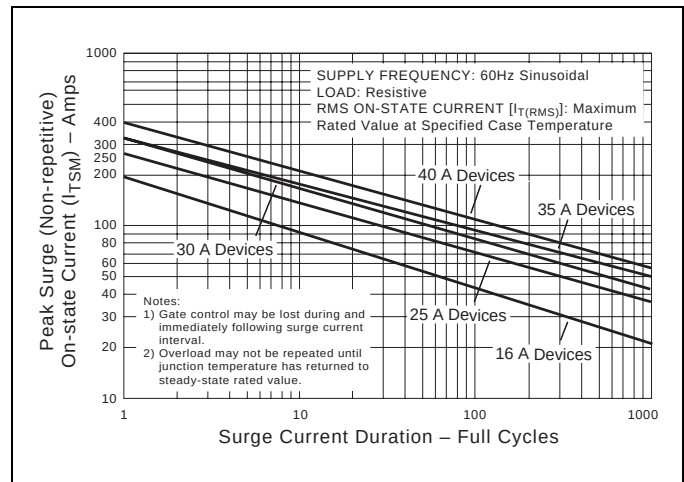


Figure E4.11 Peak Surge Current versus Surge Current Duration (16 A to 40 A)

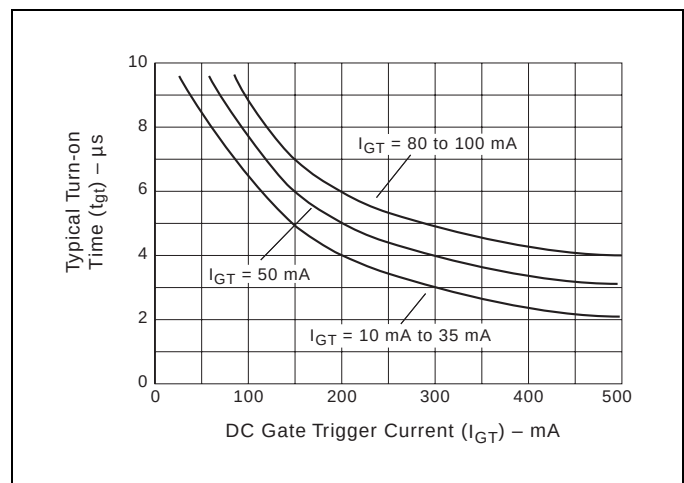


Figure E4.12 Turn-on Time versus Gate Trigger Current (Typical)



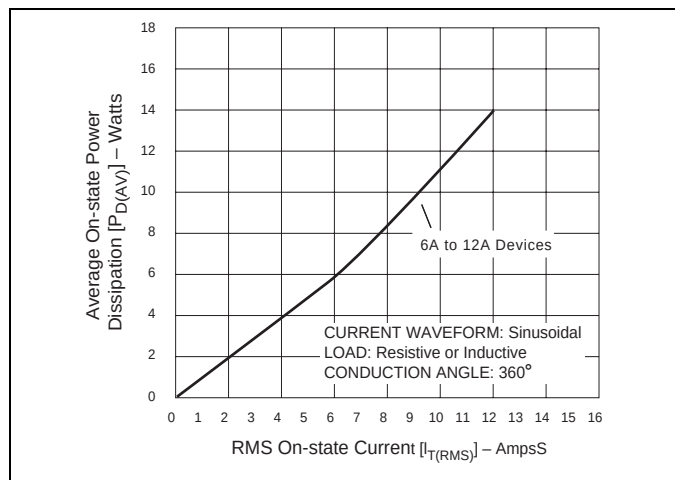


Figure E4.13 Power Dissipation (Typical) versus On-state Current (6 A to 12 A)

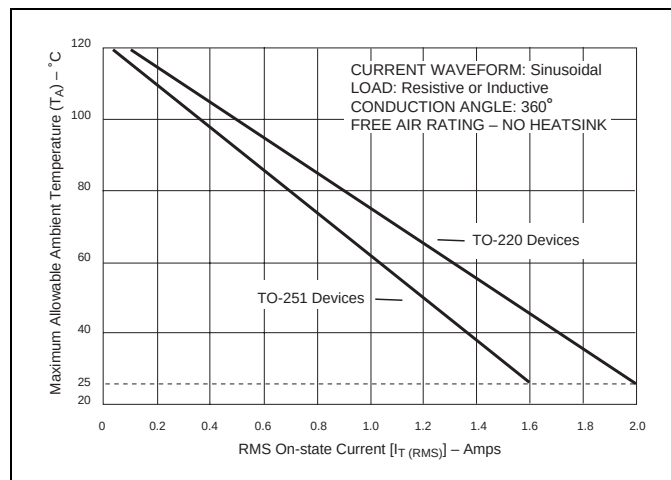


Figure E4.16 Maximum Allowable Ambient Temperature versus On-state Current

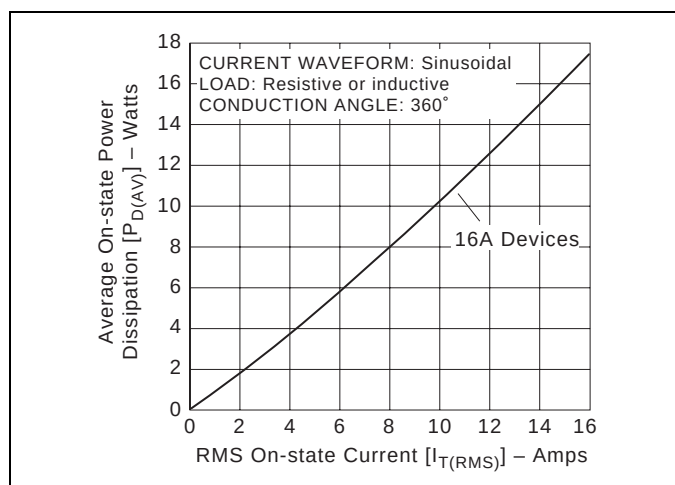


Figure E4.14 Power Dissipation (Typical) versus On-state Current (16 A)

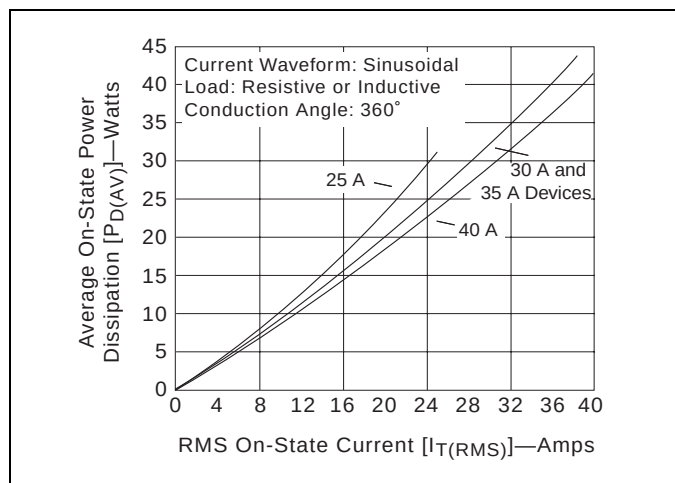


Figure E4.15 Power Dissipation (Typical) versus On-state Current (25 A to 40 A)

