

International  
**IOR** Rectifier

# 45MT160P

**THREE PHASE CONTROLLED BRIDGE**

**Power Module**

40 A

## Features

- High thermal conductivity package, electrically insulated case
- 4000 V<sub>RMS</sub> isolating voltage

## Major Ratings and Characteristics

| Parameters        | 45MT160P   | Units             |
|-------------------|------------|-------------------|
| $I_o$             | 40(36)     | A                 |
| @ $T_c$           | 78(85)     | °C                |
| $I_{FSM}$ @50Hz   | 390        | A                 |
| @60Hz             | 410        |                   |
| $I^2t$ @50Hz      | 770        | A <sup>2</sup> s  |
| @60Hz             | 700        |                   |
| $I^2\sqrt{t}$     | 7700       | A <sup>2</sup> √s |
| $V_{RRM}$         | 1600       | V                 |
| $T_{STG}$ range   | -40 to 150 | °C                |
| $T_J$ range Diode | -40 to 125 |                   |
| $T_J$ range Scr   | -40 to 100 |                   |

## 45MT160P

Bulletin I27600 rev. C 11/00

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### ELECTRICAL SPECIFICATIONS

#### Voltage Ratings

| Typenumber | Voltage Code | $V_{RRM}$ , maximum repetitive peak reverse voltage<br>V | $V_{RSM}$ , maximum non-repetitive peak reverse voltage<br>V | $V_{DRM}$ , max. repetitive peak off-state voltage gate open circuit<br>V | $I_{RRM}/I_{DRM}$ max. @ $T_J = T_J$ max.<br>mA |
|------------|--------------|--|--|---|---|
| 45MT160P   | 160          | 1600   | 1700   | 1600  | 15  |

#### Forward Conduction

| Parameter  | 45MT160P | Units             | Conditions  |
|--|----------|-------------------|---|
| $I_O$ Maximum DC output current @ Case temperature                               | 40 (36)  | A                 | 120° Rect conduction angle  |
|  | 78 (85)  | °C                |   |
| $I_{TSM}$ Maximum peak, one-cycle forward, non-repetitive on state surge current | 390      | A                 | t = 10ms No voltage reappplied  |
|  | 410      |                   | t = 8.3ms reappplied  |
|  | 330      |                   | t = 10ms 100% $V_{RRM}$ reappplied  |
|  | 345      |                   | t = 8.3ms reappplied  |
| $I^2t$ Maximum $I^2t$ for fusing   | 770      | A <sup>2</sup> s  | t = 10ms No voltage reappplied  |
|  | 700      |                   | t = 8.3ms reappplied  |
|  | 540      |                   | t = 10ms 100% $V_{RRM}$ reappplied  |
|  | 500      |                   | t = 8.3ms reappplied  |
| $I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing                                   | 7700     | A <sup>2</sup> √s | t = 0.1 to 10ms, no voltage reappplied  |
| $V_{T(TO)}$ Value of threshold voltage   | 0.98     | V                 | @ $T_J$ max.  |
| $r_t$ Low level value on-state   | 11       | mΩ                |   |
| $V_{TM}$ Maximum on-state voltage drop   | 1.33     | V                 | $I_{pk} = 30A, T_J = 25^\circ C$<br>$t_p = 400\mu s$ single junction  |
| di/dt Maximum non-repetitive rate of rise of turned on current                   | 150      | A/μs              | $T_J = 25^\circ C$ , from 0.67 $V_{DRM}$ , $I_{TM} = \pi \times I_{T(AV)}$ ,<br>$I_g = 500mA, t_r < 0.5 \mu s, t_p > 6 \mu s$ |
| $I_H$ Maximum Holding Current  | 200      | mA                | $T_J = 25^\circ C$ , anode supply = 6V, resistive load, gate open circuit   |
| $I_L$ Maximum Latching Current   | 400      |                   | $T_J = 25^\circ C$ , anode supply = 6V, resistive load  |

#### Blocking

| Parameter   | 45MT160P | Units | Conditions   |
|---|----------|-------|--|
| $V_{INS}$ RMS isolation voltage                       | 4000     | V     | $T_J = 25^\circ C$ all terminal shorted<br>f = 50Hz, t = 1s    |
| dv/dt Max. critical rate of rise of off-state voltage | 1000     | V/μs  | $T_J = T_J$ max., linear to 0.67 $V_{DRM}$ , gate open circuit |

**Triggering**

| Parameter   | 45MT160P | Units | Conditions   |
|---|----------|-------|--|
| $P_{GM}$ Max. peak gate power                     | 10       | W     | $T_J = T_J \text{ max.}$                             |
| $P_{G(AV)}$ Max. average gate power               | 2.5      |       |  |
| $I_{GM}$ Max. peak gate current                   | 2.5      | A     |  |
| $-V_{GT}$ Max. peak negative gate voltage         | 10       | V     |  |
| $V_{GT}$ Max. required DC gate voltage to trigger | 4.0      | V     | $T_J = -40^\circ\text{C}$                            |
|   | 2.5      |       | $T_J = 25^\circ\text{C}$                             |
|   | 1.7      |       | $T_J = T_J \text{ max.}$                             |
| $I_{GT}$ Max. required DC gate current to trigger | 270      | mA    | $T_J = -40^\circ\text{C}$                            |
|   | 150      |       | $T_J = 25^\circ\text{C}$                             |
|   | 80       |       | $T_J = T_J \text{ max.}$                             |
| $V_{GD}$ Max. gate voltage that will not trigger  | 0.25     | V     | @ $T_J = T_J \text{ max.}$ , rated $V_{DRM}$ applied |
| $I_{GD}$ Max. gate current that will not trigger  | 6        | mA    |  |

**Thermal and Mechanical Specifications**

| Parameter   | 45MT160P                   | Units            | Conditions   |
|---|----------------------------|------------------|--|
| $T_J$ Maximum junction operating temperature range      | - 40 to 125<br>- 40 to 100 | $^\circ\text{C}$ | for diodes<br>for Scr  |
| $T_{stg}$ Maximum storage temperature range             | -40 to 150                 | $^\circ\text{C}$ |  |
| $R_{thJC}$ Maximum thermal resistance, junction to case | 0.32                       | K/W              | DC operation per module  |
|   | 1.9                        |                  | DC operation per junction  |
|   | 0.4                        |                  | 120° Rect conduction angle per module  |
|   | 2.42                       |                  | 120° Rect conduction angle per junction  |
| $R_{thCS}$ Maximum thermal resistance, case to heatsink | 0.1                        | K/W              | Per module<br>Mounting surface smooth, flat an greased   |
| T Mounting torque $\pm 10\%$ to heatsink                | 4                          | Nm               | A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound. Lubricated threads. |
| wt Approximate weight                                   | 60                         | g                |  |

**$\Delta R$  Conduction (per Junction)**

(The following table shows the increment of thermal resistance  $R_{thJC}$  when device operate at different conduction angles than DC)

| Device   | Sinusoidal conduction @ $T_J \text{ max.}$ |      |      |       |      | Rectangular conduction @ $T_J \text{ max.}$ |       |      |       |       | Units |
|----------|--|------|------|-------|------|---|-------|------|-------|-------|-------|
|          | 180°                                       | 120° | 90°  | 60°   | 30°  | 180°  | 120°  | 90°  | 60°   | 30°   |       |
| 45MT160P | 0.469                                      | 0.55 | 0.69 | 1.005 | 1.87 | 0.289                                       | 0.521 | 0.72 | 1.065 | 1.891 | K/W   |

# 45MT160P

Bulletin I27600 rev. C 11/00

## Ordering Information Table

**Device Code**

|   |   |    |     |   |
|---|---|----|-----|---|
| 4 | 5 | MT | 160 | P |
| ① | ② | ③  | ④   |   |

- 1** - Current rating code: 4 = 40 A (Avg)
- 2** - Circuit configuration code
- 3** - Essential part number
- 4** - Voltage code: Code x 10 =  $V_{RRM}$  (See Voltage Ratings Table)

## Outline Table

All dimensions are in millimeters

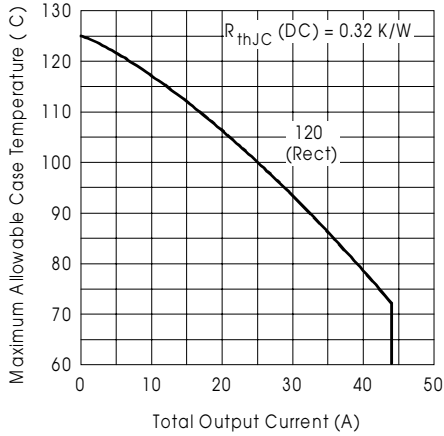


Fig. 1 - Current Rating Characteristics

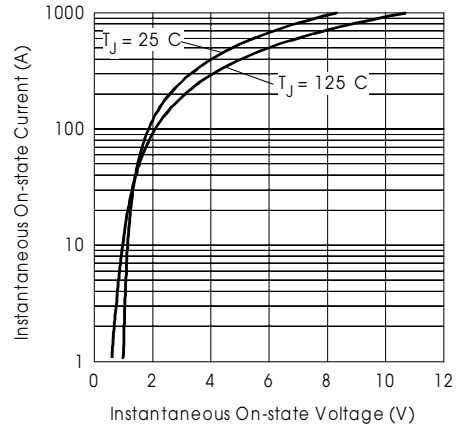


Fig. 2 - On-state Voltage Drop Characteristics

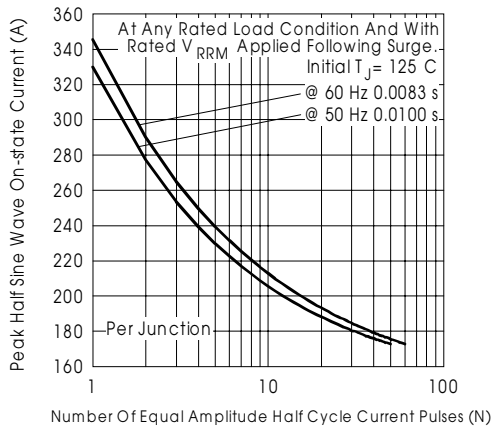


Fig. 3 - Maximum Non-Repetitive Surge Current

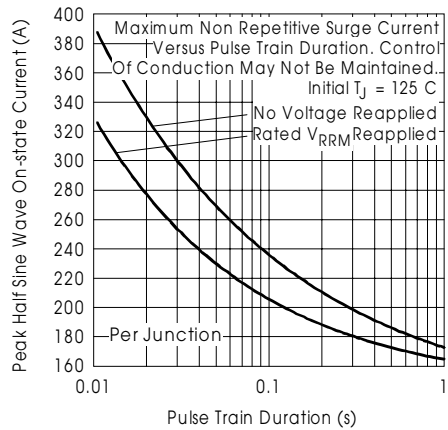


Fig. 4 - Maximum Non-Repetitive Surge Current

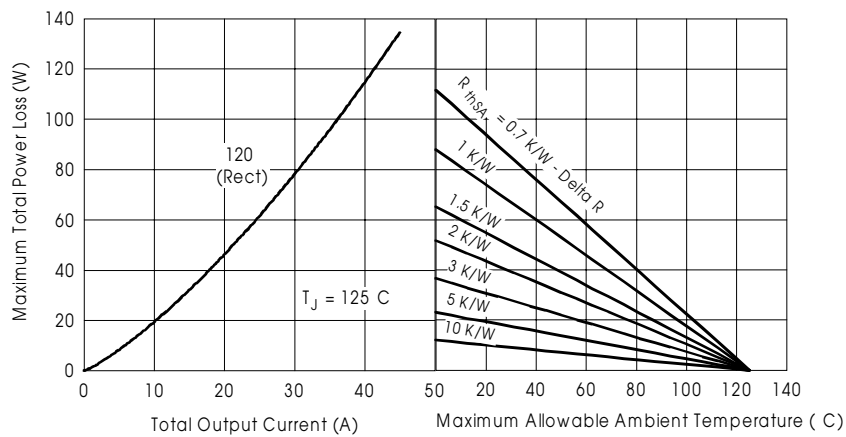


Fig. 5 - Current Rating Nomogram (1 Module Per Heatsink)

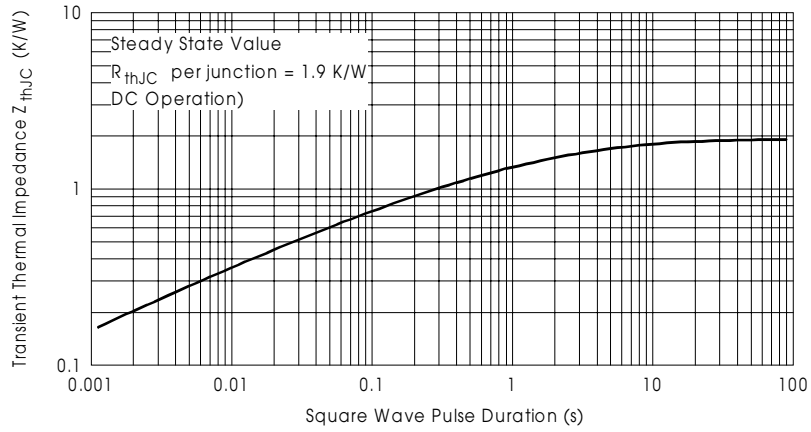


Fig. 6 - Thermal Impedance  $Z_{thJC}$  Characteristics

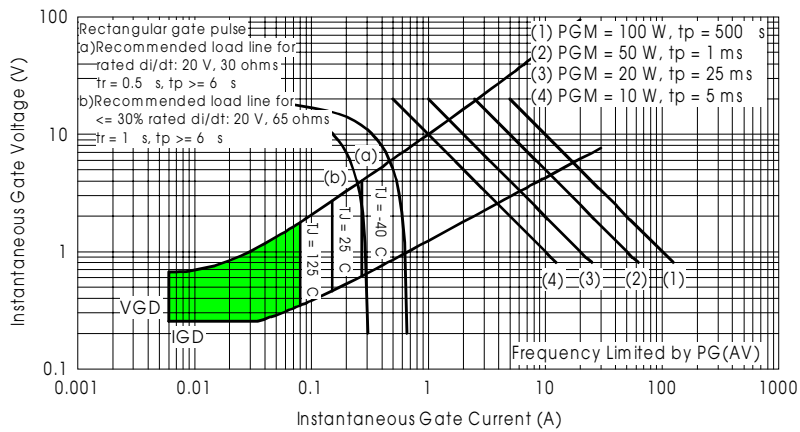


Fig. 7 - Gate Characteristics

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