


# International IOR Rectifier

## P100 SERIES

### PASSIVATED ASSEMBLED CIRCUIT ELEMENTS

#### Features

- Glass passivated junctions for greater reliability
- Electrically isolated base plate
- Available up to 1200 V<sub>RRM</sub>, V<sub>DRM</sub>
- High dynamic characteristics
- Wide choice of circuit configurations
- Simplified mechanical design and assembly
- UL E78996 approved 

25A

#### Description

The P100 series of Integrated Power Circuits consists of power thyristors and power diodes configured in a single package. With its isolating base plate, mechanical designs are greatly simplified giving advantages of cost reduction and reduced size.

Applications include power supplies, control circuits and battery chargers.

#### Major Ratings and Characteristics

| Parameters       | P100        | Units             |
|------------------|-------------|-------------------|
| I <sub>D</sub>   | 25          | A                 |
| @ T <sub>C</sub> | 85          | °C                |
| I <sub>FSM</sub> | 357         | A                 |
| @ 50Hz           |             |                   |
| @ 60Hz           | 375         | A                 |
| i <sup>2</sup> t | 637         | A <sup>2</sup> s  |
| @ 50Hz           |             |                   |
| @ 60Hz           | 580         | A <sup>2</sup> s  |
| i <sup>2</sup> t | 6365        | A <sup>2</sup> √s |
| V <sub>RRM</sub> | 400 to 1200 | V                 |
| V <sub>INS</sub> | 2500        | V                 |
| T <sub>J</sub>   | - 40 to 125 | °C                |

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## P100 Series

Bulletin I27125 rev. A 04/99

International  
IR Rectifier

### ELECTRICAL SPECIFICATIONS

#### Voltage Ratings

| Typenumber       | $V_{RRM}$ maximum repetitive peak reverse voltage<br>V | $V_{RSM}$ maximum non-repetitive peak reverse voltage<br>V | $V_{DRM}$ maximum repetitive peak off-state voltage<br>V | $I_{RRM}$ max. @ $T_J$ max.<br>mA |
|------------------|--|--|--|-----------------------------------|
| P101, P121, P131 | 400  | 500  | 400  | 10                                |
| P102, P122, P132 | 600  | 700  | 600  |                                   |
| P103, P123, P133 | 800  | 900  | 800  |                                   |
| P104, P124, P134 | 1000   | 1100   | 1000   |                                   |
| P105, P125, P135 | 1200   | 1300   | 1200   |                                   |

#### On-state Conduction

| Parameter  | P100 | Units                       | Conditions  |
|--|------|-----------------------------|---|
| $I_D$ Maximum DC output current  | 25   | A                           | @ $T_C = 85^\circ\text{C}$ , full bridge  |
| $I_{TSM}$ Max. peak one-cycle non-repetitive on-state or forward current | 357  | A                           | $t = 10\text{ms}$ No voltage  |
|  | 375  |                             | $t = 8.3\text{ms}$ reapplied  |
|  | 300  |                             | $t = 10\text{ms}$ 100% $V_{RRM}$  |
|  | 315  |                             | $t = 8.3\text{ms}$ reapplied  |
| $I^2t$ Maximum $I^2t$ for fusing   | 637  | $\text{A}^2\text{s}$        | $t = 10\text{ms}$ No voltage  |
|  | 580  |                             | $t = 8.3\text{ms}$ reapplied  |
|  | 450  |                             | $t = 10\text{ms}$ 100% $V_{RRM}$  |
|  | 410  |                             | $t = 8.3\text{ms}$ reapplied  |
| $I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing                           | 6365 | $\text{A}^2\sqrt{\text{s}}$ | $t = 0.1$ to $10\text{ms}$ , no voltage reapplied<br>$I^2t$ for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$   |
| $V_{T(TO)}$ Max. value of threshold voltage                              | 0.82 | V                           | $T_J = 125^\circ\text{C}$   |
| $r_{\theta 1}$ Max. level value of on-state slope resistance             | 12   | $\text{m}\Omega$            | $T_J = 125^\circ\text{C}$ , Av. power = $V_{T(TO)} \cdot I_{T(AV)} + r_{\theta 1} + (I_{T(RMS)})^2$   |
| $V_{TM}$ Max. peak on-state or forward voltage drop                      | 1.35 | V                           | $T_J = 25^\circ\text{C}$ , $I_{TM} = \pi \times I_{T(AV)}$  |
| $di/dt$ Maximum non repetitive rate of rise of turned on current         | 200  | $\text{A}/\mu\text{s}$      | $T_J = 125^\circ\text{C}$ from $0.67 V_{DRM}$<br>$I_{TM} = \pi \times I_{T(AV)}$ , $I_g = 500\text{mA}$ , $t_r < 0.5\mu\text{s}$ , $t_p > 6\mu\text{s}$ |
| $I_H$ Maximum holding current  | 130  | mA                          | $T_J = 25^\circ\text{C}$ anode supply = 6V, resistive load, gate open   |
| $I_L$ Maximum latching current   | 250  | mA                          | $T_J = 25^\circ\text{C}$ anode supply = 6V, resistive load  |

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**Blocking**

| Parameter  | P100 | Units      | Conditions   |
|--|------|------------|--|
| dv/dt Maximum critical rate of rise of off-state voltage   | 200  | V/ $\mu$ s | $T_J = 125^\circ\text{C}$ , exponential to $0.67 V_{\text{DRM}}$ gate open                 |
| $I_{\text{RRM}}$ Max. peak reverse and off-state leakage current at $V_{\text{RRM}}, V_{\text{DRM}}$ | 10   | mA         | $T_J = 125^\circ\text{C}$ , gate open circuit  |
| $I_{\text{RRM}}$ Max peak reverse leakage current  | 100  | $\mu$ A    | $T_J = 25^\circ\text{C}$   |
| $V_{\text{INS}}$ RMS isolation voltage   | 2500 | V          | 50Hz, circuit to base, all terminal shorted,<br>$T_J = 25^\circ\text{C}$ , $t = 1\text{s}$ |

**Triggering**

| Parameter  | P100 | Units | Conditions   |
|--|------|-------|--|
| $P_{\text{GM}}$ Maximum peak gate power                    | 8    | W     |  |
| $P_{\text{G(AV)}}$ Maximum average gate power              | 2    |       |  |
| $I_{\text{GM}}$ Maximum peak gate current                  | 2    | A     |  |
| $-V_{\text{GM}}$ Maximum peak negative gate voltage        | 10   |       |  |
| $V_{\text{GT}}$ Maximum gate voltage required to trigger   | 3    | V     | Anode Supply = 6V resistive load                           |
|  | 2    |       |  |
|  | 1    |       |  |
| $I_{\text{GD}}$ Maximum gate current required to trigger   | 90   | mA    | Anode Supply = 6V resistive load                           |
|  | 60   |       |  |
|  | 35   |       |  |
| $V_{\text{GD}}$ Maximum gate voltage that will not trigger | 0.2  | V     | $T_J = 125^\circ\text{C}$ , rated $V_{\text{DRM}}$ applied |
| $I_{\text{GD}}$ Maximum gate current that will not trigger | 2    | mA    | $T_J = 125^\circ\text{C}$ , rated $V_{\text{DRM}}$ applied |

**Thermal and Mechanical Specification**

| Parameter   | P100       | Units            | Conditions  |
|---|------------|------------------|---|
| $T_J$ Max. operating temperature range                      | -40 to 125 | $^\circ\text{C}$ |   |
| $T_{\text{stg}}$ Max. storage temperature range             | -40 to 125 |                  |   |
| $R_{\text{thJC}}$ Max. thermal resistance, junction to case | 2.24       | K/W              | DC operation per junction   |
| $R_{\text{thCS}}$ Max. thermal resistance, case to heatsink | 0.10       | K/W              | Mounting surface, smooth and greased  |
| T Mounting torque, base to heatsink                         | 4          | Nm               | A mounting compound is recommended and the torque should be checked after a period of 3 hours to allow for the spread of the compound |
| wt Approximate weight                                       | 58 (2.0)   | g (oz)           |   |

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# P100 Series

Bulletin I27125 rev. A 04/99

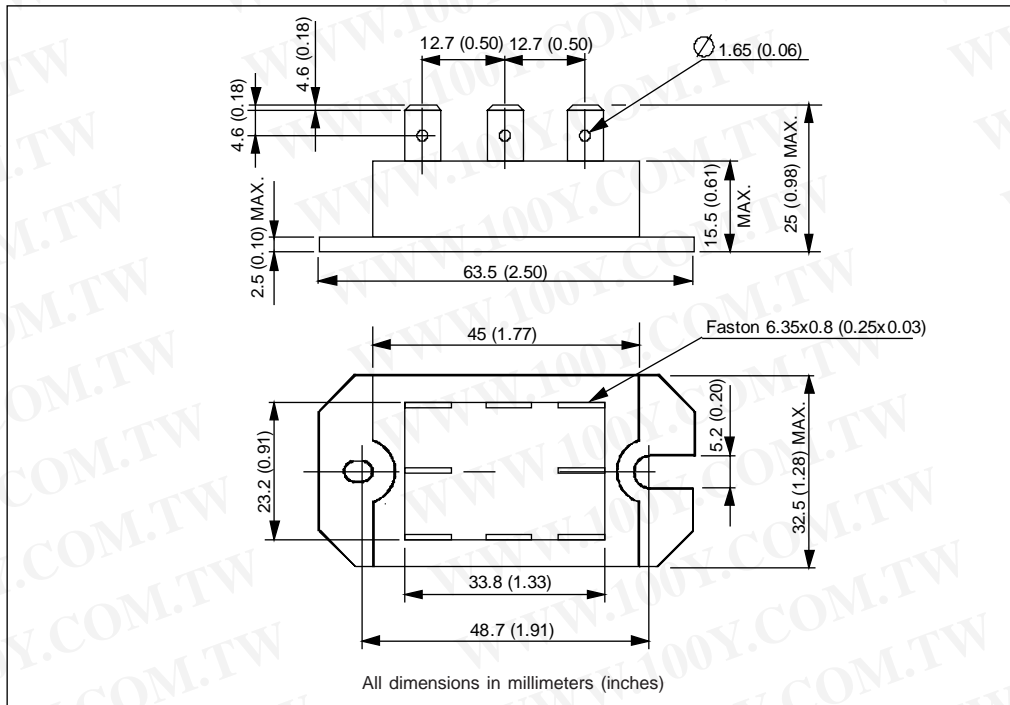
International  
**IR** Rectifier

## Circuit Type and Coding \*

|   | Circuit"0"                               | Circuit"2"                        | Circuit"3"                |
|---|--|-----------------------------------|---------------------------|
| Terminal Positions                                    |  |                                   |                           |
| Schematic diagram                                     |  |                                   |                           |
|   | SinglePhase Hybrid Bridge Common Cathode | SinglePhase Hybrid Bridge Doubler | SinglePhase AllSCR Bridge |
| Basic series  | P10.                                     | P12.                              | P13.                      |
| With voltage suppression                              | P10.K                                    | P12.K                             | P13.K                     |
| With free-wheeling diode                              | P10.W                                    | -                                 | -                         |
| With both voltage suppression and free-wheeling diode | P10.KW                                   | -                                 | -                         |

\* To complete code refer to voltage ratings table, i.e.: for 600V P10.W complete code is P102W

## Outline Table



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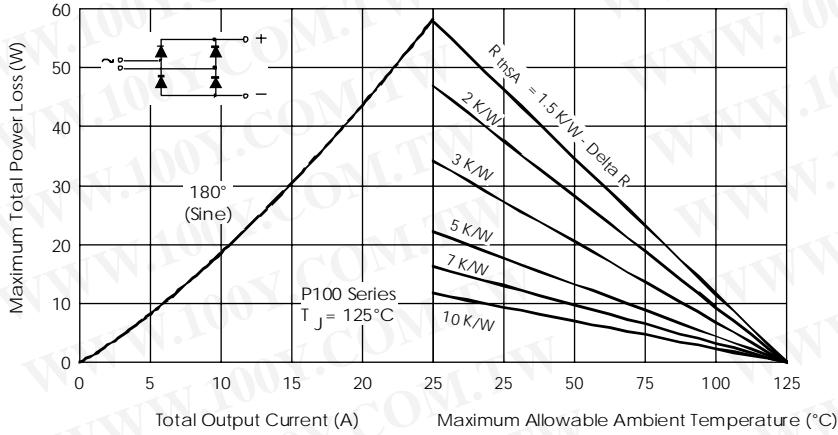


Fig. 1 - Current Ratings Nomogram (1 Module Per Heatsink)

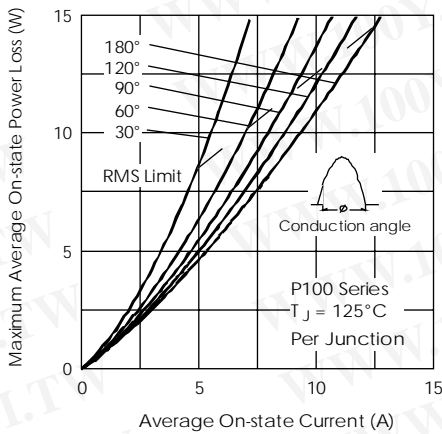


Fig. 2 - On-state Power Loss Characteristics

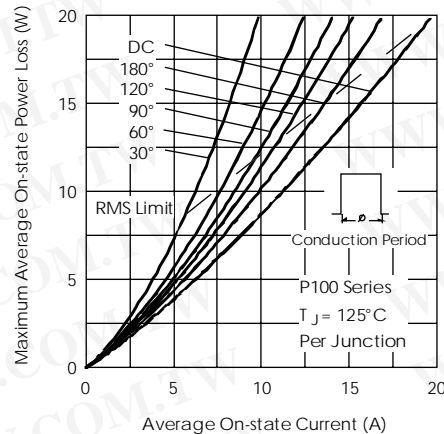


Fig. 3 - On-state Power Loss Characteristics

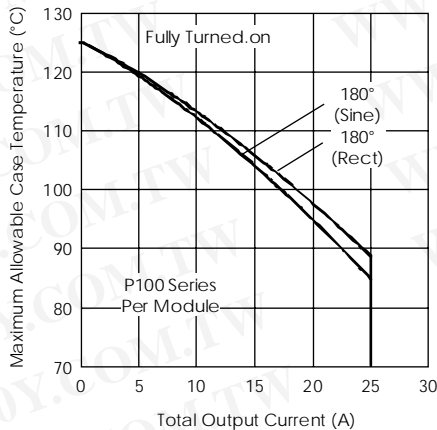


Fig. 4 - Current Ratings Characteristics

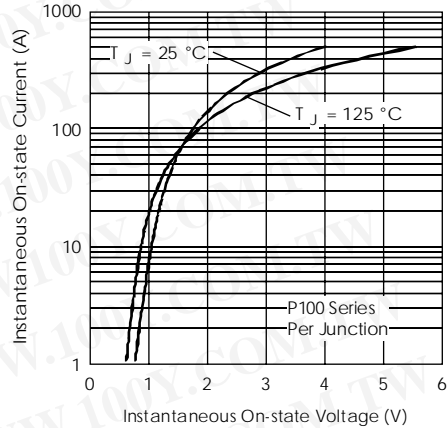


Fig. 5 - On-state Voltage Drop Characteristics

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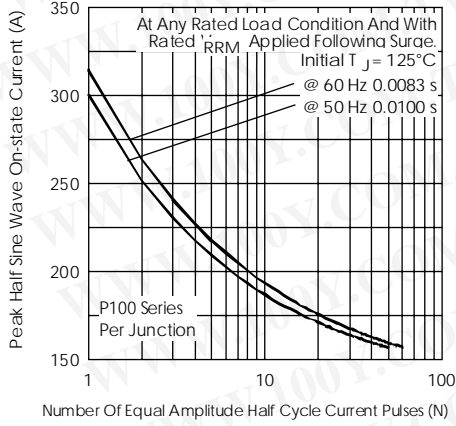


Fig. 6 - Maximum Non-Repetitive Surge Current

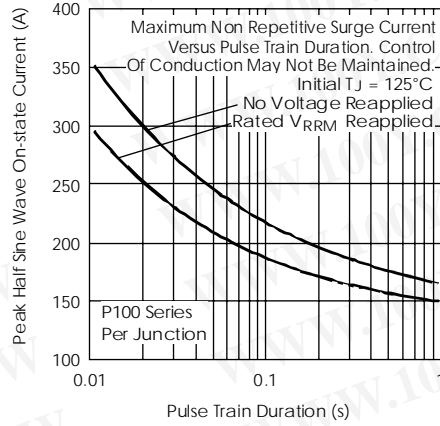


Fig. 7 - Maximum Non-Repetitive Surge Current

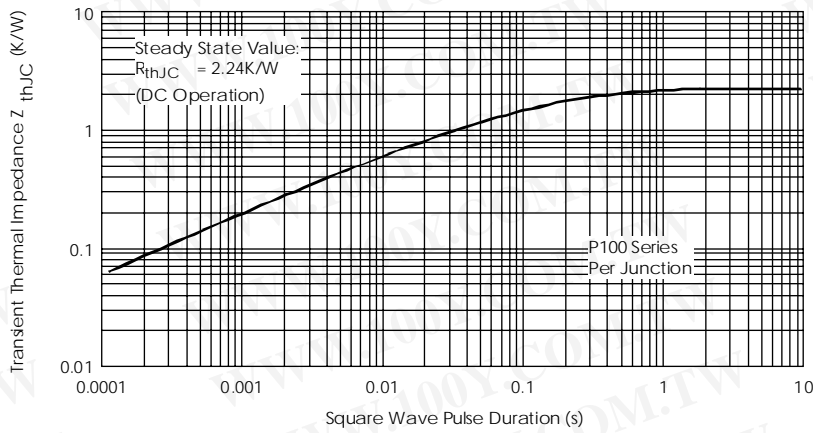


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

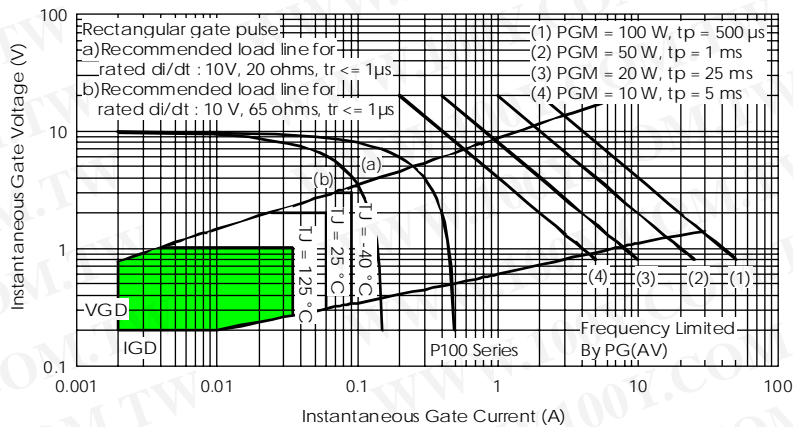


Fig. 9 - Gate Characteristics

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