

## IRK.56, .71 SERIES

### STANDARD DIODES

### NEW ADD-A-pak™ Power Modules

#### Features

- Electrically isolated: DBC base plate
- 3500 V<sub>RMS</sub> isolating voltage
- Standard JEDEC package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Wide choice of circuit configurations
- Large creepage distances
- UL E78996 approved 

60 A

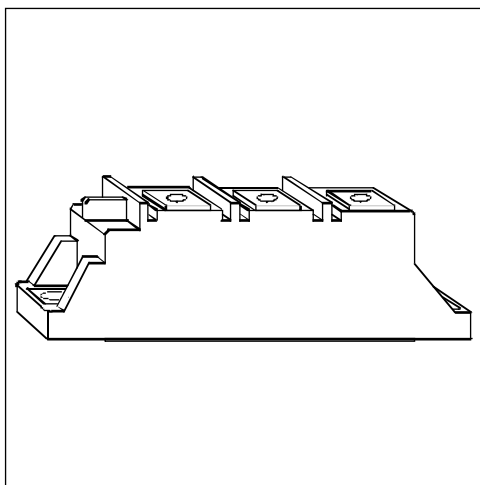
80 A

#### Description

These IRK series of NEW ADD-A-paks use power diodes in a variety of circuit configurations. The semiconductor chips are electrically isolated from the base plate, allowing common heatsinks and compact assemblies to be built. They can be interconnected to form single phase or three phase bridges. These modules are intended for general purpose high voltage applications such as battery chargers, welders and plating equipment

#### Major Ratings and Characteristics

| Parameters             | IRK.56      | IRK.71 | Units              |
|------------------------|-------------|--------|--------------------|
| $I_{F(AV)}$<br>@ 100°C | 60          | 80     | A                  |
| $I_{F(RMS)}$           | 94          | 126    | A                  |
| $I_{FSM}$ @ 50Hz       | 1600        | 1790   | A                  |
| @ 60Hz                 | 1680        | 1870   | A                  |
| $I^2t$ @ 50Hz          | 12.89       | 15.90  | KA <sup>2</sup> s  |
| @ 60Hz                 | 11.76       | 14.53  | KA <sup>2</sup> s  |
| $I^2\sqrt{t}$          | 128.9       | 159    | KA <sup>2</sup> √s |
| V <sub>RRM</sub> range | 400 to 1600 |        | V                  |
| T <sub>J</sub>         | - 40 to 150 |        | °C                 |
| T <sub>STG</sub>       | - 40 to 150 |        | °C                 |



## IRK.56, .71 Series

Bulletin I27140 rev. B 09/97

International  
**IR** Rectifier

### ELECTRICAL SPECIFICATIONS

#### Voltage Ratings

| Type number | Voltage Code | $V_{RRM}$ , maximum repetitive peak reverse voltage<br>V | $V_{RSM}$ , maximum non-repetitive peak rev. voltage<br>V | $I_{RRM}$ max.<br>@ 150°C<br>mA |
|-------------|--------------|----------------------------------------------------------|-----------------------------------------------------------|---------------------------------|
| IRK.56/ .71 | 04           | 400                                                      | 500                                                       | 10                              |
|             | 06           | 600                                                      | 700                                                       |                                 |
|             | 08           | 800                                                      | 900                                                       |                                 |
|             | 10           | 1000                                                     | 1100                                                      |                                 |
|             | 12           | 1200                                                     | 1300                                                      |                                 |
|             | 14           | 1400                                                     | 1500                                                      |                                 |
|             | 16           | 1600                                                     | 1700                                                      |                                 |

#### Forward Conduction

| Parameter                                                               | IRK.56 | IRK.71 | Units | Conditions                                                                                |
|-------------------------------------------------------------------------|--------|--------|-------|-------------------------------------------------------------------------------------------|
| $I_{F(AV)}$ Max. average forward current<br>@ Case temperature          | 60     | 80     | A     | 180° conduction, half sine wave                                                           |
|                                                                         | 100    | 100    | °C    |                                                                                           |
| $I_{F(AV)}$ Max. average forward current<br>@ Case temperature          | 55     | 70     | A     | 180° conduction, half sine wave                                                           |
|                                                                         | 105    | 108    | °C    |                                                                                           |
| $I_{F(RMS)}$ Max. RMS forward current                                   | 94     | 126    | A     | DC @ 92°C case temperature                                                                |
| $I_{FSM}$ Max. peak, one-cycle forward,<br>non-repetitive surge current | 1600   | 1790   | A     | t = 10ms No voltage                                                                       |
|                                                                         | 1680   | 1870   |       | t = 8.3ms reapplied                                                                       |
|                                                                         | 1350   | 1500   |       | t = 10ms 100% $V_{RRM}$                                                                   |
|                                                                         | 1420   | 1570   |       | t = 8.3ms reapplied                                                                       |
| $I^2t$ Maximum $I^2t$ for fusing                                        | 12.89  | 15.90  | KA²s  | t = 10ms No voltage                                                                       |
|                                                                         | 11.76  | 14.53  |       | t = 8.3ms reapplied                                                                       |
|                                                                         | 9.12   | 11.25  |       | t = 10ms 100% $V_{RRM}$                                                                   |
|                                                                         | 8.32   | 10.23  |       | t = 8.3ms reapplied                                                                       |
| $I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing                          | 128.9  | 159.0  | KA²√s | t = 0.1 to 10ms, no voltage reapplied                                                     |
| $V_{F(TO)1}$ Low level value of threshold voltage                       | 0.96   | 0.83   | V     | $(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$ |
| $V_{F(TO)2}$ High level value of threshold voltage                      | 1.03   | 0.92   |       | $(I > \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$                                      |
| $r_{f1}$ Low level value of forward slope resistance                    | 2.81   | 2.68   | mΩ    | $(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$ |
| $r_{f2}$ High level value of forward slope resistance                   | 2.48   | 2.40   |       | $(I > \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$                                      |
| $V_{FM}$ Max. forward voltage drop                                      | 1.51   | 1.50   | V     | $I_{FM} = \pi \times I_{F(AV)}, T_J = 25^\circ\text{C}, t_p = 400\mu\text{s}$ square wave |

#### Blocking

| Parameter                                   | IRK.56       | IRK.71 | Units | Conditions                                    |
|---------------------------------------------|--------------|--------|-------|-----------------------------------------------|
| $I_{RRM}$ Max. peak reverse leakage current | 10           |        | mA    | $T_J = 150^\circ\text{C}$                     |
| $V_{INS}$ RMS isolation voltage             | 3500 (1 sec) |        | V     | 50 Hz, circuit to base, all terminals shorted |

### Thermal and Mechanical Specifications

| Parameter                                                      | IRK.56     | IRK.71 | Units  | Conditions                                                                                                                              |
|----------------------------------------------------------------|------------|--------|--------|-----------------------------------------------------------------------------------------------------------------------------------------|
| T <sub>j</sub> Junction temperature range                      | -40 to 150 |        | °C     |                                                                                                                                         |
| T <sub>stg</sub> Storage temperature range                     | -40 to 150 |        | °C     |                                                                                                                                         |
| R <sub>thJC</sub> Max. thermal resistance, junction to case    | 0.5        | 0.4    | K/W    | Per junction, DC operation                                                                                                              |
| R <sub>thCS</sub> Typical thermal resistance, case to heatsink | 0.1        |        | K/W    | Mounting surface flat, smooth and greased<br>Flatness < 0.03 mm; roughness < 0.02 mm                                                    |
| T Mounting torque ±10%<br>to heatsink<br>busbar                | 5<br>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 |
| wt Approximate weight                                          | 83 (3)     |        | g (oz) |                                                                                                                                         |
| Case style                                                     | TO-240AA   |        |        | JEDEC                                                                                                                                   |

### ΔR Conduction (per Junction)

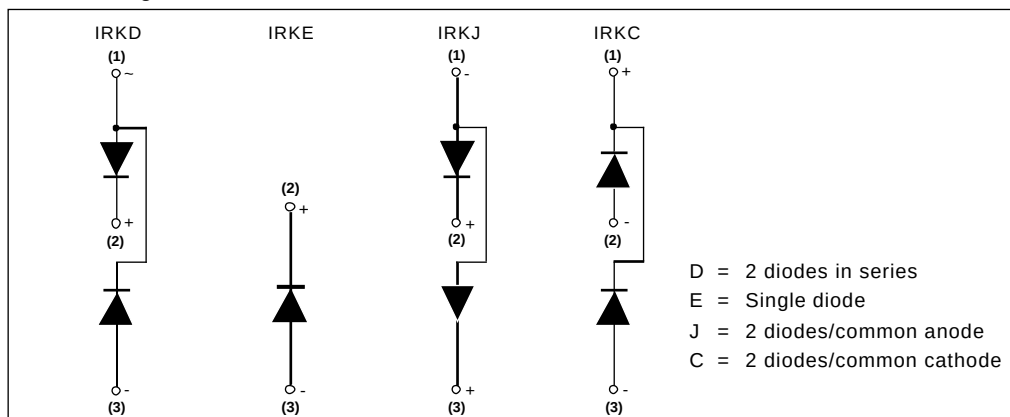
(The following table shows the increment of thermal resistance R<sub>thJC</sub> when devices operate at different conduction angles than DC)

| Devices | Sine half wave conduction |      |      |      |      | Rect. wave conduction |      |      |      |      | Units |
|---------|---------------------------|------|------|------|------|-----------------------|------|------|------|------|-------|
|         | 180°                      | 120° | 90°  | 60°  | 30°  | 180°                  | 120° | 90°  | 60°  | 30°  |       |
| IRK.56  | 0.11                      | 0.13 | 0.16 | 0.22 | 0.32 | 0.09                  | 0.14 | 0.17 | 0.23 | 0.32 | °C/W  |
| IRK.71  | 0.06                      | 0.08 | 0.11 | 0.14 | 0.21 | 0.06                  | 0.09 | 0.11 | 0.15 | 0.21 |       |

### Ordering Information Table

| Device Code |                                                           |          |           |             |
|-------------|-----------------------------------------------------------|----------|-----------|-------------|
| <b>1</b>    | <b>IRK</b>                                                | <b>D</b> | <b>71</b> | <b>/ 16</b> |
|             | (1)                                                       | (2)      | (3)       | (4)         |
| <b>1</b>    | - Module type                                             |          |           |             |
| <b>2</b>    | - Circuit configuration (See Circuit Configuration Table) |          |           |             |
| <b>3</b>    | - Current code                                            |          |           |             |
| <b>4</b>    | - Voltage code (See Voltage Ratings Table)                |          |           |             |

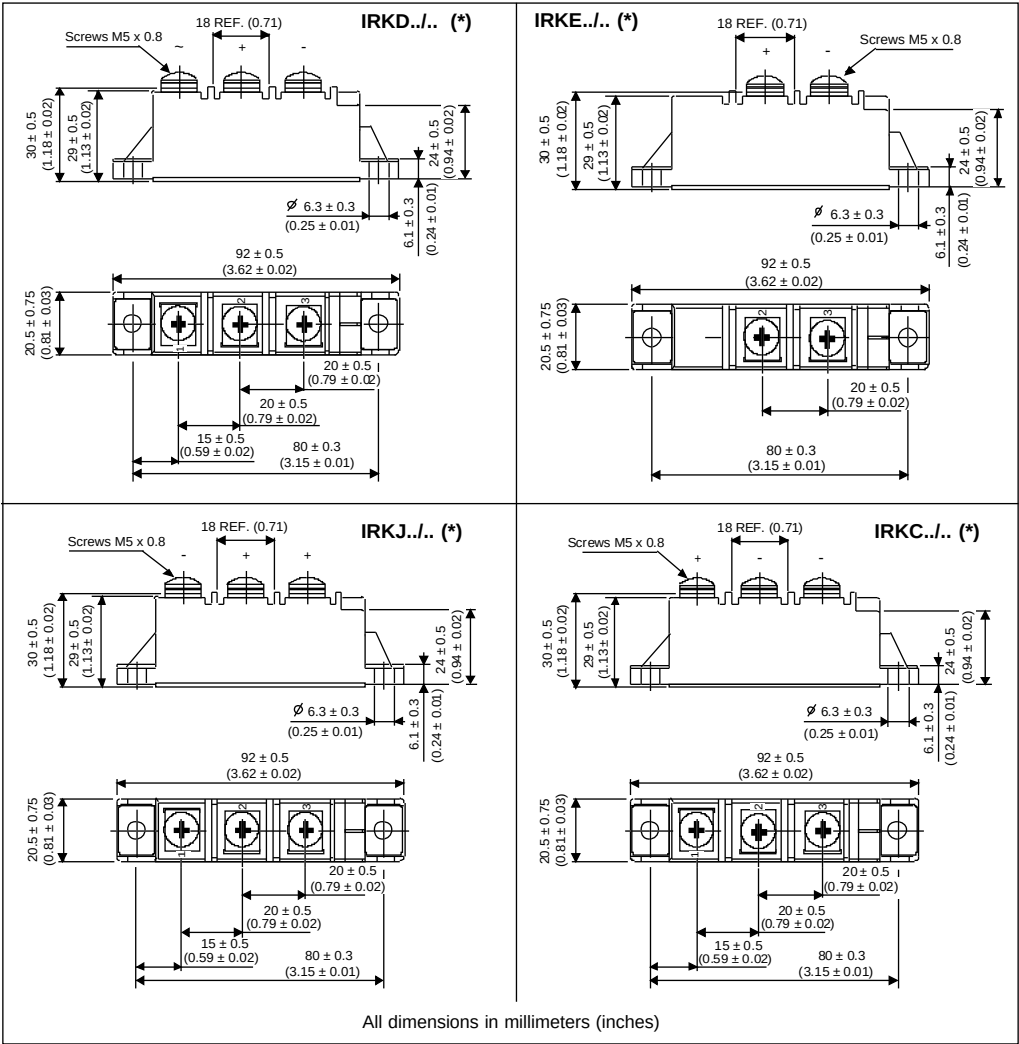
### Circuit Configurations Table



IRK.56, .71 Series

Bulletin I27140 rev. B 09/97

Outlines Table



(\*) For terminals connections, see Circuit Configurations Table

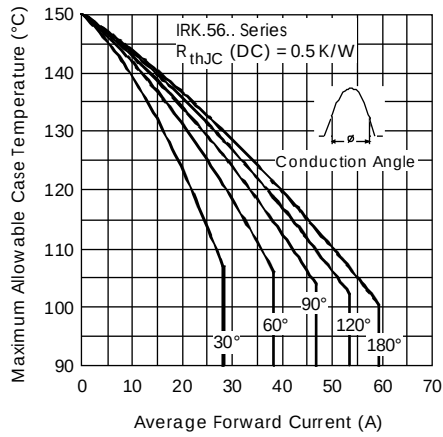


Fig. 1 - Current Ratings Characteristics

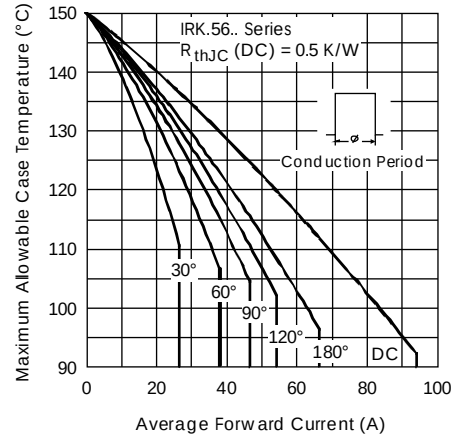


Fig. 2 - Current Ratings Characteristics

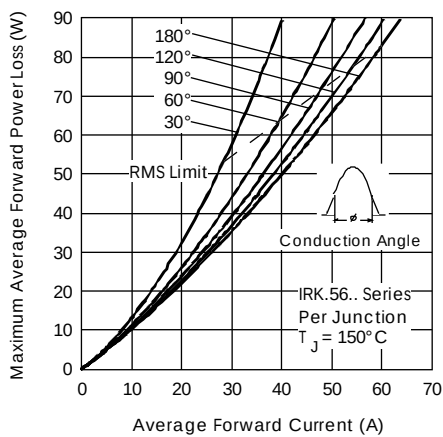


Fig. 3 - Forward Power Loss Characteristics

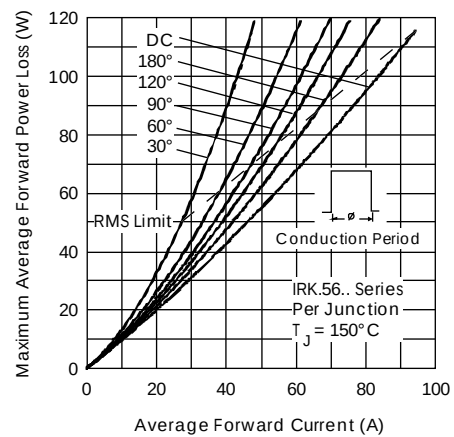


Fig. 4 - Forward Power Loss Characteristics

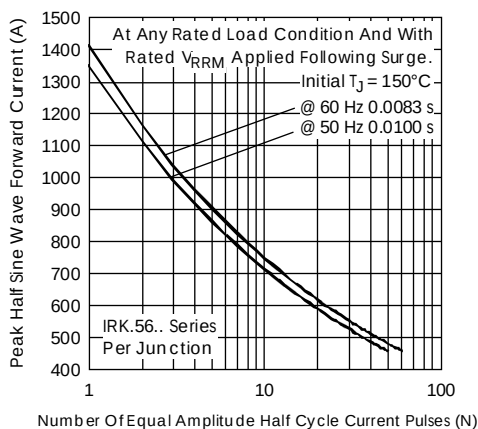


Fig. 5 - Maximum Non-Repetitive Surge Current

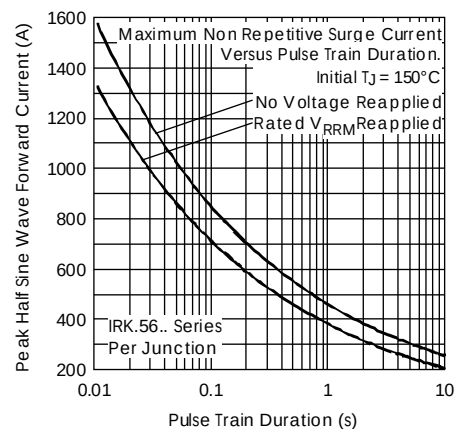


Fig. 6 - Maximum Non-Repetitive Surge Current

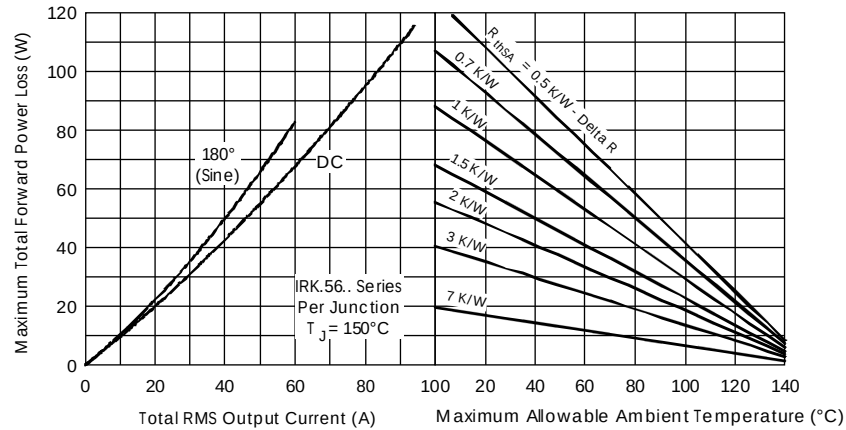


Fig. 7 - Forward Power Loss Characteristics

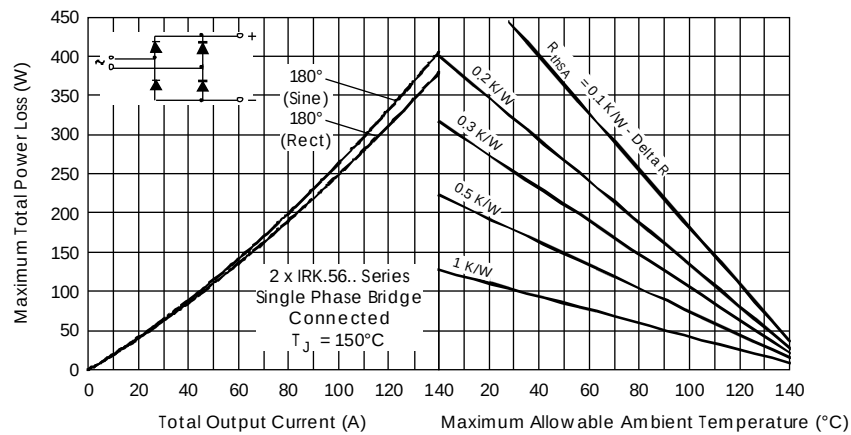


Fig. 8 - Forward Power Loss Characteristics

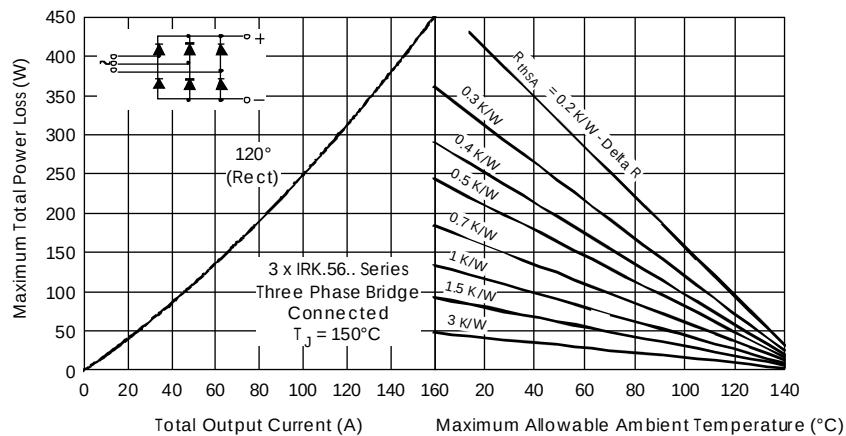


Fig. 9 - Forward Power Loss Characteristics

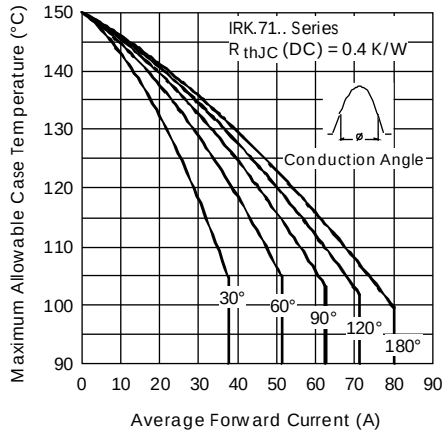


Fig. 10 - Current Ratings Characteristics

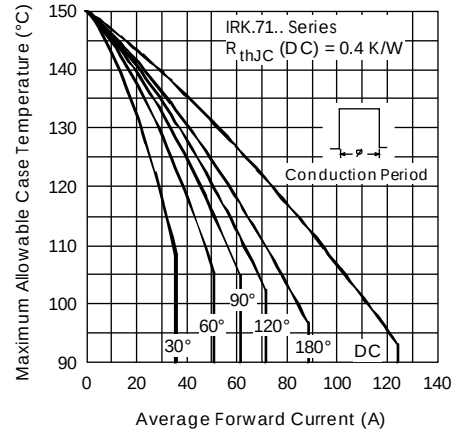


Fig. 11 - Current Ratings Characteristics

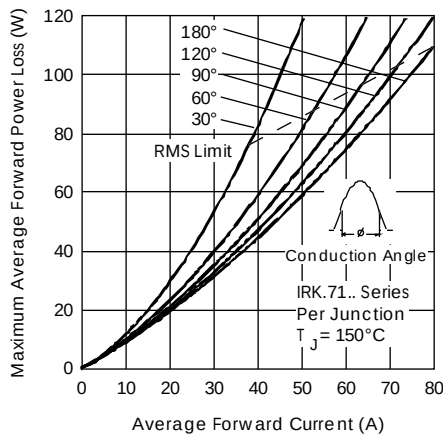


Fig. 12 - Forward Power Loss Characteristics

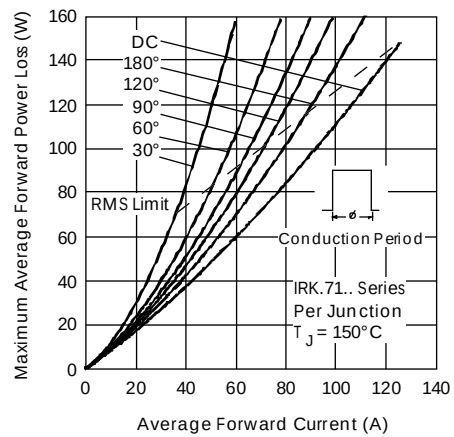


Fig. 13 - Forward Power Loss Characteristics

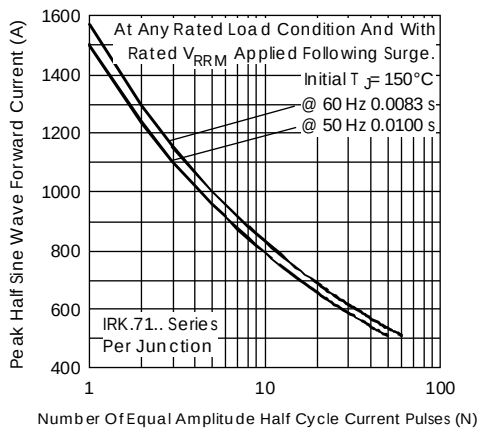


Fig. 14 - Maximum Non-Repetitive Surge Current

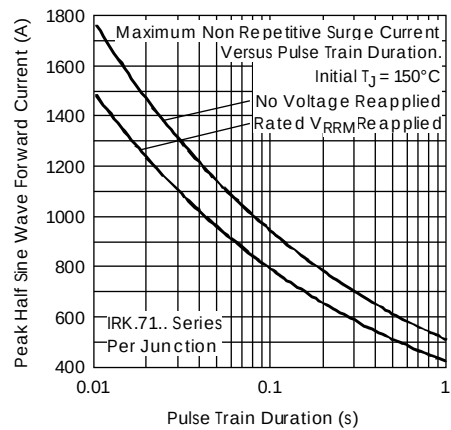


Fig. 15 - Maximum Non-Repetitive Surge Current

## IRK.56, .71 Series

Bulletin I27140 rev. B 09/97

International  
**IR** Rectifier

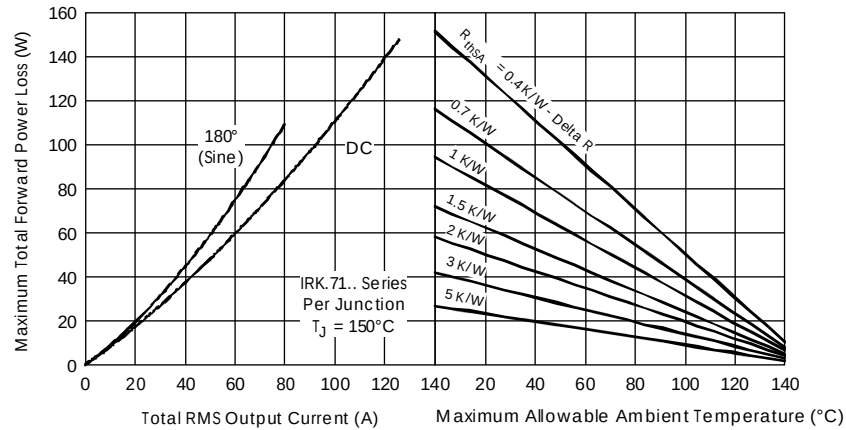


Fig. 16 - Forward Power Loss Characteristics

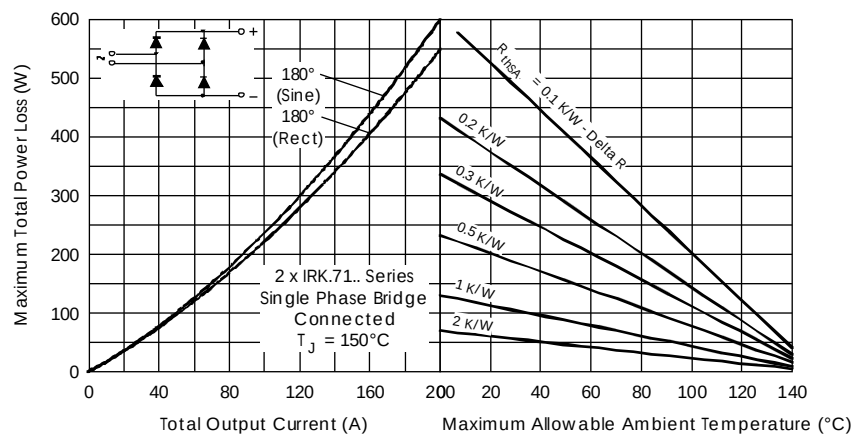


Fig. 17 - Forward Power Loss Characteristics

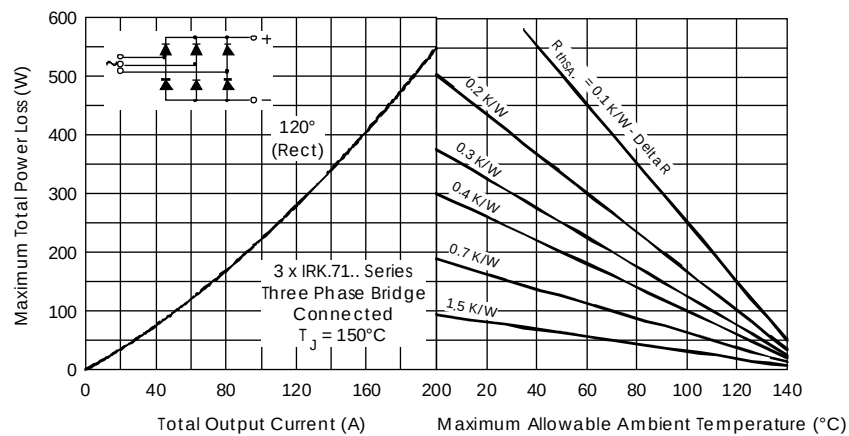


Fig. 18 - Forward Power Loss Characteristics



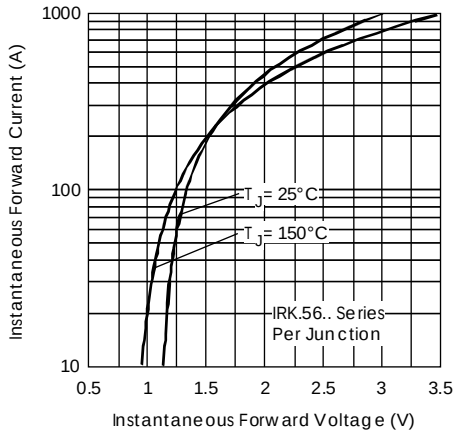


Fig. 19 - Forward Voltage Drop Characteristics

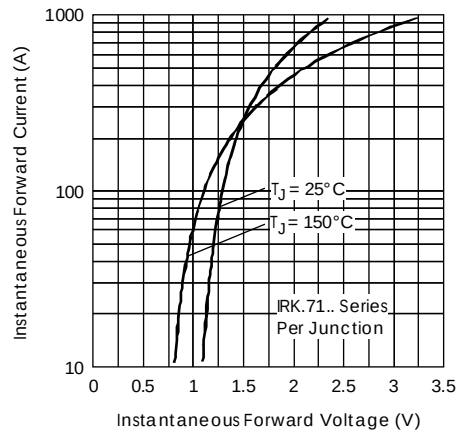


Fig. 20 - Forward Voltage Drop Characteristics

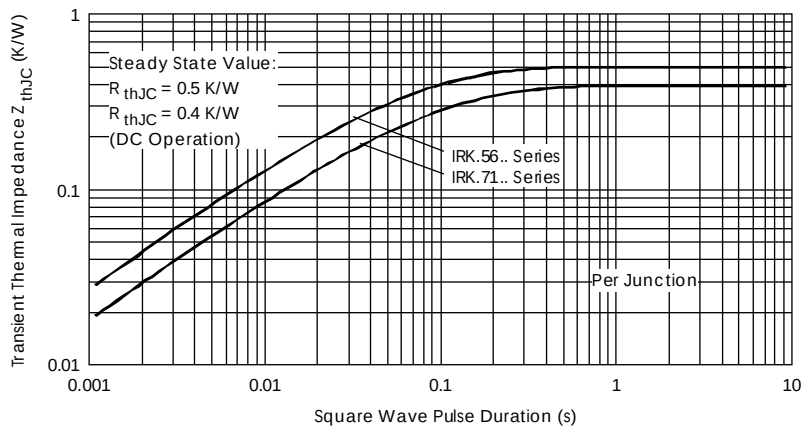


Fig. 21 - Thermal Impedance  $Z_{thJC}$  Characteristic