

# STARPOWER

SEMICONDUCTOR™

## Rectifier with Chopper

**RD100PBH160C5S****Preliminary****Molding Type Module****1600V/100A Rectifier Module**

### General Description

STARPOWER Rectifier Diode Power Module provides ultra low conduction loss. They are designed for the applications such as inverters.

### Features

- Planar Passivated Chips
- High Surge Capacity
- Dual Diodes Cascaded Circuit
- Isolated Copper Baseplate Using DBC Technology



### Typical Applications

- Input Bridge Rectifier For Inverter
- AC/DC Motor Control
- Power Supply

**DIODE-rectifier**  $T_C=25^{\circ}\text{C}$  unless otherwise noted**Maximum Rated Values**

| Symbol      | Description                                                                                                       | RD100PBH160C5S | Units                |
|-------------|-------------------------------------------------------------------------------------------------------------------|----------------|----------------------|
| $V_{RRM}$   | Collector-Emitter Voltage @ $T_j=25^{\circ}\text{C}$                                                              | 1600           | V                    |
| $I_{FRMSM}$ | RMS Forward Current Maximum Per Diode @ $T_C=80^{\circ}\text{C}$                                                  | 78             | A                    |
| $I_{RMSM}$  | Maximum RMS Current at Rectifier output @ $T_C=100^{\circ}\text{C}$                                               | 110            | A                    |
| $I_{FSM}$   | Surge Forward Current $V_R=0\text{V}$ , $t_p=10\text{ms}$ , $T_j=45^{\circ}\text{C}$<br>$T_j=150^{\circ}\text{C}$ | 1100<br>990    | A                    |
| $I^2t$      | $I^2t$ -value, $V_R=0\text{V}$ , $t_p=10\text{ms}$ , $T_j=45^{\circ}\text{C}$<br>$T_j=150^{\circ}\text{C}$        | 6050<br>4725   | $\text{A}^2\text{s}$ |

**Characteristics Values**

| Symbol | Parameter             | Test Conditions                                | Min. | Typ. | Max. | Units |
|--------|-----------------------|------------------------------------------------|------|------|------|-------|
| $V_F$  | Diode Forward Voltage | $I_F=100\text{A}$ , $T_j=25^{\circ}\text{C}$   |      | 1.19 |      | V     |
| $I_R$  | Reverse Current       | $T_j=150^{\circ}\text{C}$ , $V_R=1600\text{V}$ |      |      | 2.0  | mA    |

**IGBT-brake-chopper**  $T_C=25^{\circ}\text{C}$  unless otherwise noted**Maximum Rated Values**

| Symbol    | Description                                          | RD100PBH160C5S | Units |
|-----------|------------------------------------------------------|----------------|-------|
| $V_{CES}$ | Collector-Emitter Voltage @ $T_j=25^{\circ}\text{C}$ | 1200           | V     |
| $V_{GES}$ | Gate-Emitter Voltage                                 | $\pm 20$       | V     |
| $I_C$     | Collector Current @ $T_C=80^{\circ}\text{C}$         | 50             | A     |
| $I_{CM}$  | Pulsed Collector Current $t_p=1\text{ms}$            | 100            | A     |
| $P_{tot}$ | Total Power Dissipation @ $T_j=150^{\circ}\text{C}$  | 412            | W     |

**Off Characteristics**

| Symbol        | Parameter                           | Test Conditions                                                     | Min. | Typ. | Max. | Units |
|---------------|-------------------------------------|---------------------------------------------------------------------|------|------|------|-------|
| $V_{(BR)CES}$ | Collector-Emitter Breakdown Voltage | $T_j=25^{\circ}\text{C}$                                            | 1200 |      |      | V     |
| $I_{CES}$     | Collector Cut-Off Current           | $V_{CE}=V_{CES}$ , $V_{GE}=0\text{V}$ ,<br>$T_j=25^{\circ}\text{C}$ |      |      | 5.0  | mA    |
| $I_{GES}$     | Gate-Emitter Leakage Current        | $V_{GE}=V_{GES}$ , $V_{CE}=0\text{V}$ ,<br>$T_j=25^{\circ}\text{C}$ |      |      | 400  | nA    |

## On Characteristics

| Symbol        | Parameter                               | Test Conditions                             | Min. | Typ. | Max. | Units |
|---------------|-----------------------------------------|---------------------------------------------|------|------|------|-------|
| $V_{GE(th)}$  | Gate-Emitter Threshold Voltage          | $I_C=2.0mA, V_{CE}=V_{GE}, T_J=25^{\circ}C$ | 5.0  | 6.3  | 7.0  | V     |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C=50A, V_{GE}=15V, T_J=25^{\circ}C$      |      | 1.90 | 2.35 | V     |
|               |                                         | $I_C=50A, V_{GE}=15V, T_J=125^{\circ}C$     |      | 2.10 |      |       |
| $C_{ies}$     | Input Capacitance                       | $V_{CE}=25V, f=1Mhz, V_{GE}=0V$             |      | 4.29 |      | pF    |
| $C_{oes}$     | Output Capacitance                      |                                             |      | 0.30 |      | pF    |
| $C_{res}$     | Reverse Transfer Capacitance            |                                             |      | 0.20 |      | pF    |

DIODE-brake-chopper  $T_C=25^{\circ}C$  unless otherwise noted

## Maximum Rated Values

| Symbol    | Description                                   | RD100PBH160C5S | Units |
|-----------|-----------------------------------------------|----------------|-------|
| $V_{RRM}$ | Collector-Emitter Voltage @ $T_J=25^{\circ}C$ | 1200           | V     |
| $I_F$     | DC Forward Current @ $T_C=80^{\circ}C$        | 50             | A     |
| $I_{FRM}$ | Repetitive Peak Forward Current $t_p=1ms$     | 100            | A     |

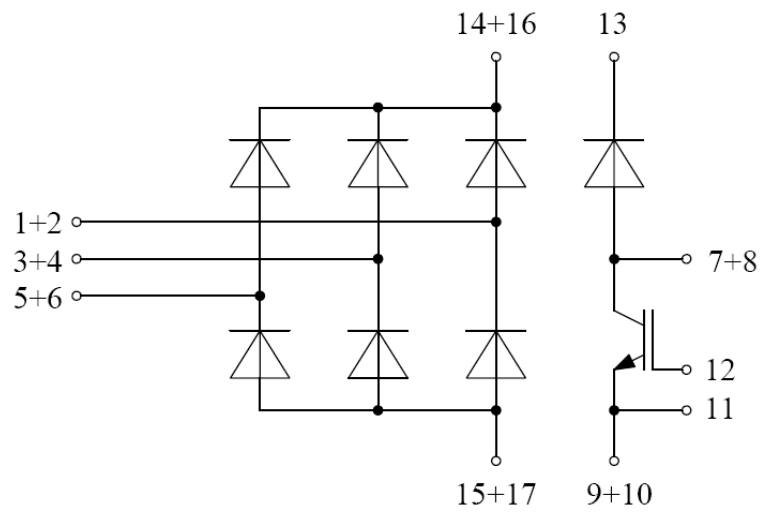
## Characteristics Values

| Symbol           | Parameter                     | Test Conditions                                                                           |                      | Min. | Typ. | Max. | Units |
|------------------|-------------------------------|-------------------------------------------------------------------------------------------|----------------------|------|------|------|-------|
| V <sub>F</sub>   | Diode Forward Voltage         | I <sub>F</sub> =50A,V <sub>GE</sub> =0V                                                   | T <sub>j</sub> =25℃  |      | 1.82 | 2.22 | V     |
|                  |                               |                                                                                           | T <sub>j</sub> =125℃ |      | 1.95 |      |       |
| Q <sub>r</sub>   | Recovered Charge              | I <sub>F</sub> =50A,<br>V <sub>R</sub> =600V,<br>di/dt=-830A/μs,<br>V <sub>GE</sub> =-15V | T <sub>j</sub> =25℃  |      | 3.3  |      | μC    |
|                  |                               |                                                                                           | T <sub>j</sub> =125℃ |      | 6.5  |      |       |
| I <sub>RM</sub>  | Peak Reverse Recovery Current |                                                                                           | T <sub>j</sub> =25℃  |      | 34   |      | A     |
|                  |                               |                                                                                           | T <sub>j</sub> =125℃ |      | 47   |      |       |
| E <sub>rec</sub> | Reverse Recovery Energy       |                                                                                           | T <sub>j</sub> =25℃  |      | 0.76 |      | mJ    |
|                  |                               |                                                                                           | T <sub>j</sub> =125℃ |      | 1.81 |      |       |

**Module**

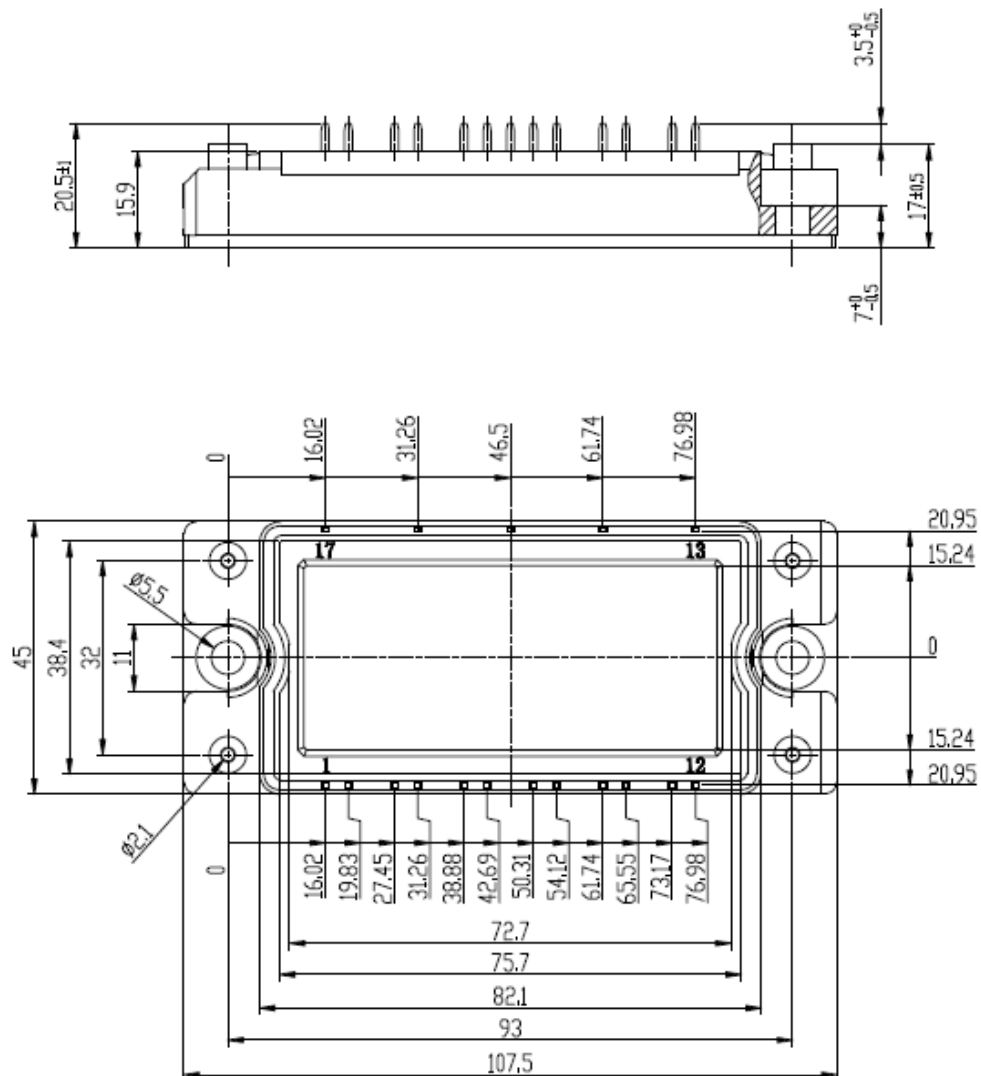
| Symbol           | Parameter                                  | Min. | Typ. | Max.  | Units |
|------------------|--------------------------------------------|------|------|-------|-------|
| V <sub>ISO</sub> | Isolation Voltage RMS, f=50Hz, t=1min      | 2500 |      |       | V     |
| R <sub>θJC</sub> | Junction-to-Case (per DIODE-rectifier)     |      |      | 0.469 | K/W   |
|                  | Junction-to-Case (per IGBT-brake-chopper)  |      |      | 0.303 |       |
|                  | Junction-to-Case (per DIODE-brake-chopper) |      |      | 0.500 |       |
| R <sub>θCS</sub> | Case-to-Sink (Conductive grease applied)   |      | 0.02 |       | K/W   |
| T <sub>j</sub>   | Junction Temperature                       | -40  |      | 150   | °C    |
| T <sub>STG</sub> | Storage Temperature Range                  | -40  |      | 125   | °C    |
| Mounting Torque  | Mounting Screw:M5                          | 3.0  |      | 6.0   | N.m   |
| G                | Weight of Module                           |      | 200  |       | g     |

## Equivalent Circuit Schematic



## Package Dimension

Dimensions in Millimeters



## **Terms and Conditions of Usage**

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