

## PRODUCT FEATURES

- ☐ High short circuit capability, self limiting short circuit current
- ☐ IGBT CHIP(T4 Fast Trench+Field Stop technology)
- ☐  $V_{CE(sat)}$  with positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery
- ☐ Low switching losses
- ☐  $T_{Jmax} = 175^{\circ}C$



## APPLICATIONS

- ☐ High frequency switching application
- ☐ Medical applications
- ☐ Motion/servo control
- ☐ UPS systems

## IGBT-inverter

### ABSOLUTE MAXIMUM RATINGS

$T_C = 25^{\circ}C$  unless otherwise specified

| Symbol    | Parameter/Test Conditions         |                     | Values   | Unit |
|-----------|-----------------------------------|---------------------|----------|------|
| $V_{CES}$ | Collector Emitter Voltage         | $T_J = 25^{\circ}C$ | 1200     | V    |
| $V_{GES}$ | Gate Emitter Voltage              |                     | $\pm 20$ |      |
| $I_C$     | DC Collector Current              | $T_C = 25^{\circ}C$ | 60       | A    |
|           |                                   | $T_C = 95^{\circ}C$ | 40       |      |
| $I_{CM}$  | Repetitive Peak Collector Current | $t_p = 1ms$         | 80       |      |
| $P_{tot}$ | Power Dissipation Per IGBT        |                     | 250      | W    |

## Diode-inverter

### ABSOLUTE MAXIMUM RATINGS

$T_C = 25^{\circ}C$  unless otherwise specified

| Symbol      | Parameter/Test Conditions       |                                          | Values | Unit   |
|-------------|---------------------------------|------------------------------------------|--------|--------|
| $V_{RRM}$   | Repetitive Reverse Voltage      | $T_J = 25^{\circ}C$                      | 1200   | V      |
| $I_{F(AV)}$ | Average Forward Current         | $T_C = 25^{\circ}C$                      | 25     | A      |
| $I_{FRM}$   | Repetitive Peak Forward Current | $t_p = 1ms$                              | 50     |        |
| $I^2t$      |                                 | $T_J = 125^{\circ}C, t = 10ms, V_R = 0V$ | 170    | $A^2S$ |

## IGBT-inverter

## ELECTRICAL CHARACTERISTICS

 $T_C = 25^\circ\text{C}$  unless otherwise specified

| Symbol               | Parameter/Test Conditions                        |                                                                                                                | Min.                 | Typ. | Max. | Unit |
|----------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------|------|------|------|
| V <sub>GE(th)</sub>  | Gate Emitter Threshold Voltage                   | V <sub>CE</sub> =V <sub>GE</sub> , I <sub>C</sub> =1.6mA                                                       | 5.4                  | 6.0  | 6.5  | V    |
| V <sub>CE(sat)</sub> | Collector Emitter Saturation Voltage             | I <sub>C</sub> =40A, V <sub>GE</sub> =15V, T <sub>J</sub> =25℃                                                 |                      | 2.1  | 2.5  |      |
|                      |                                                  | I <sub>C</sub> =40A, V <sub>GE</sub> =15V, T <sub>J</sub> =125℃                                                |                      | 2.5  |      |      |
| I <sub>CES</sub>     | Collector Leakage Current                        | V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V, T <sub>J</sub> =25℃                                               |                      |      | 1    | mA   |
|                      |                                                  | V <sub>CE</sub> =1200V, V <sub>GE</sub> =0V, T <sub>J</sub> =125℃                                              |                      |      | 10   | mA   |
| I <sub>GES</sub>     | Gate Leakage Current                             | V <sub>CE</sub> =0V, V <sub>GE</sub> =±15V, T <sub>J</sub> =25℃                                                | -400                 |      | 400  | nA   |
| R <sub>gint</sub>    | Integrated Gate Resistor                         |                                                                                                                |                      | 0    |      | Ω    |
| Q <sub>g</sub>       | Gate Charge                                      | V <sub>CE</sub> =600V, I <sub>C</sub> =40A , V <sub>GE</sub> =15V                                              |                      | 0.18 |      | μC   |
| C <sub>ies</sub>     | Input Capacitance                                | V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f =1MHz                                                             |                      | 2.3  |      | nF   |
| C <sub>res</sub>     | Reverse Transfer Capacitance                     |                                                                                                                |                      | 130  |      | pF   |
| t <sub>d(on)</sub>   | Turn on Delay Time                               | V <sub>CC</sub> =600V, I <sub>C</sub> =40A<br>R <sub>G</sub> =15Ω,<br>V <sub>GE</sub> =±15V,<br>Inductive Load | T <sub>J</sub> =25℃  |      | 50   | ns   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =125℃ |      | 60   | ns   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =150℃ |      | 70   | ns   |
| t <sub>r</sub>       | Rise Time                                        |                                                                                                                | T <sub>J</sub> =25℃  |      | 40   | ns   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =125℃ |      | 45   | ns   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =150℃ |      | 50   | ns   |
| t <sub>d(off)</sub>  | Turn off Delay Time                              | V <sub>CC</sub> =600V, I <sub>C</sub> =40A<br>R <sub>G</sub> =15Ω,<br>V <sub>GE</sub> =±15V,<br>Inductive Load | T <sub>J</sub> =25℃  |      | 280  | ns   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =125℃ |      | 320  | ns   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =150℃ |      | 360  | ns   |
| t <sub>f</sub>       | Fall Time                                        |                                                                                                                | T <sub>J</sub> =25℃  |      | 40   | ns   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =125℃ |      | 50   | ns   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =150℃ |      | 60   | ns   |
| E <sub>on</sub>      | Turn on Energy                                   | V <sub>CC</sub> =600V, I <sub>C</sub> =40A<br>R <sub>G</sub> =15Ω,<br>V <sub>GE</sub> =±15V,<br>Inductive Load | T <sub>J</sub> =125℃ |      | 3.2  | mJ   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =150℃ |      | 3.7  | mJ   |
| E <sub>off</sub>     | Turn off Energy                                  |                                                                                                                | T <sub>J</sub> =125℃ |      | 2.5  | mJ   |
|                      |                                                  |                                                                                                                | T <sub>J</sub> =150℃ |      | 3.0  | mJ   |
| I <sub>sc</sub>      | Short Circuit Current                            | tpsc≤10μS , V <sub>GE</sub> =15V<br>T <sub>J</sub> =125℃, V <sub>CC</sub> =600V                                |                      | 160  |      | A    |
| R <sub>thJC</sub>    | Junction to Case Thermal Resistance （ Per IGBT ） |                                                                                                                |                      |      | 0.6  | K /W |

## Diode-inverter

## ELECTRICAL CHARACTERISTICS

 $T_C = 25^\circ\text{C}$  unless otherwise specified

| Symbol             | Parameter/Test Conditions                           |                                                                                                     | Min. | Typ. | Max. | Unit |
|--------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------|------|------|------|------|
| V <sub>F</sub>     | Forward Voltage                                     | I <sub>F</sub> =25A , V <sub>GE</sub> =0V, T <sub>J</sub> =25℃                                      |      | 1.65 | 2.15 | V    |
|                    |                                                     | I <sub>F</sub> =25A , V <sub>GE</sub> =0V, T <sub>J</sub> =125℃                                     |      | 1.65 |      |      |
| t <sub>rr</sub>    | Reverse Recovery Time                               | I <sub>F</sub> =25A , V <sub>R</sub> =600V<br>dI <sub>F</sub> /dt=-1000A/μs<br>T <sub>J</sub> =125℃ |      | 270  |      | ns   |
| I <sub>RRM</sub>   | Max. Reverse Recovery Current                       |                                                                                                     |      | 35   |      | A    |
| Q <sub>RR</sub>    | Reverse Recovery Charge                             |                                                                                                     |      | 5    |      | μC   |
| E <sub>rec</sub>   | Reverse Recovery Energy                             |                                                                                                     |      | 2    |      | mJ   |
| R <sub>thJCD</sub> | Junction to Case Thermal Resistance   （ Per Diode ） |                                                                                                     |      |      | 1.5  | K /W |

MODULE CHARACTERISTICS

$T_C=25^{\circ}\text{C}$  unless otherwise specified

| Symbol     | Parameter/Test Conditions   |                            | Values  | Unit               |
|------------|-----------------------------|----------------------------|---------|--------------------|
| $T_{Jmax}$ | Max. Junction Temperature   |                            | 175     | $^{\circ}\text{C}$ |
| $T_{Jop}$  | Operating Temperature       |                            | -40~150 |                    |
| $T_{stg}$  | Storage Temperature         |                            | -40~125 |                    |
| $V_{isol}$ | Isolation Breakdown Voltage | AC, 50Hz(R.M.S), t=1minute | 3000    | V                  |
| CTI        | Comparative Tracking Index  |                            | > 200   |                    |
| Torque     | to heatsink                 | Recommended (M5)           | 2.5~5   | Nm                 |
|            | to terminal                 | Recommended (M5)           | 2.5~5   | Nm                 |
| Weight     |                             |                            | 120     | g                  |

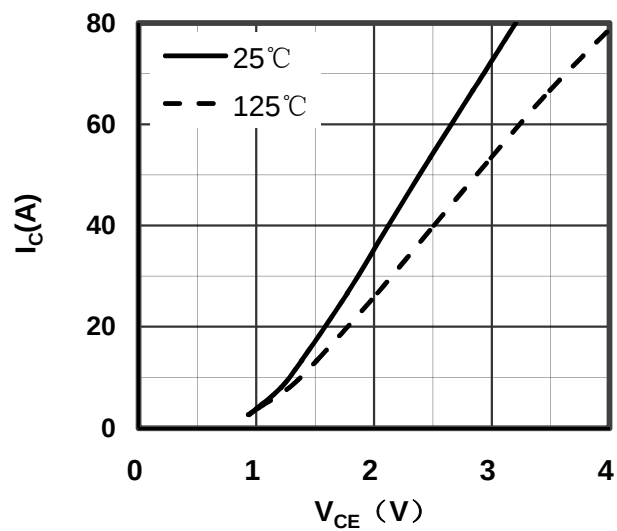


Figure 1. Typical Output Characteristics IGBT-inverter

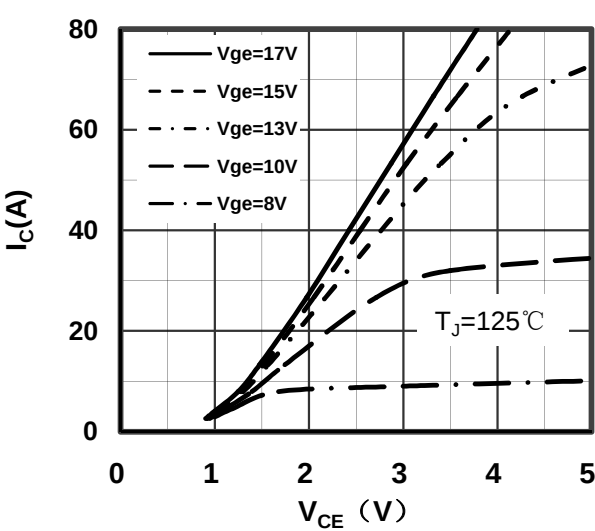


Figure 2. Typical Output Characteristics IGBT-inverter

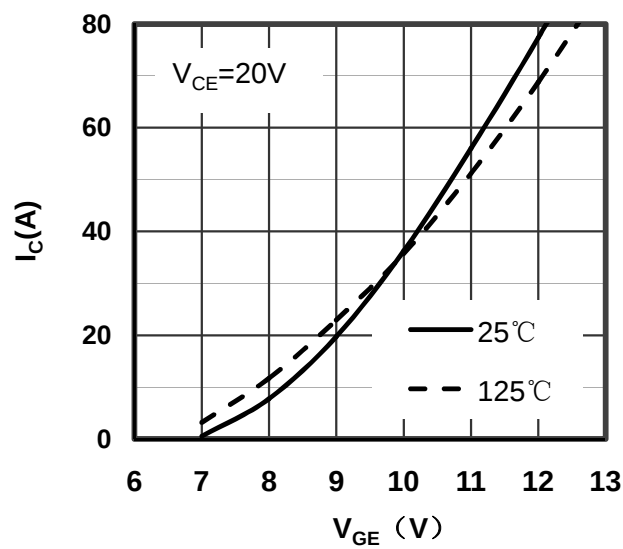


Figure 3. Typical Transfer Characteristics IGBT-inverter

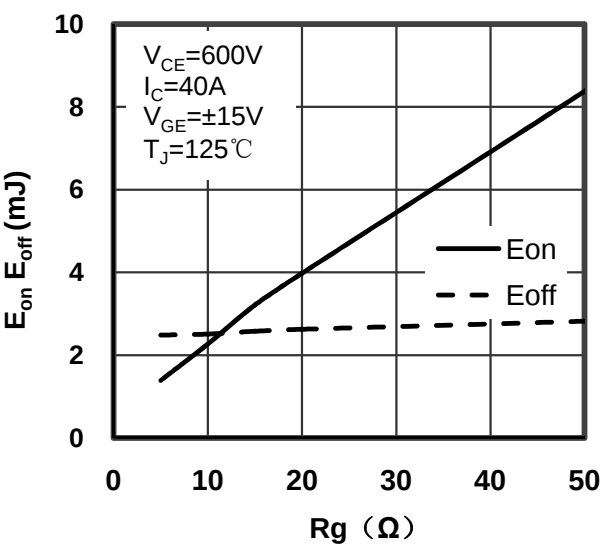


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

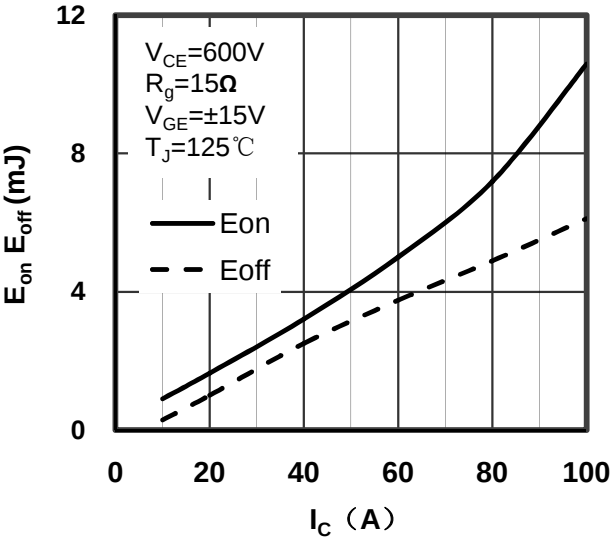


Figure 5. Switching Energy vs Collector Current IGBT-inverter

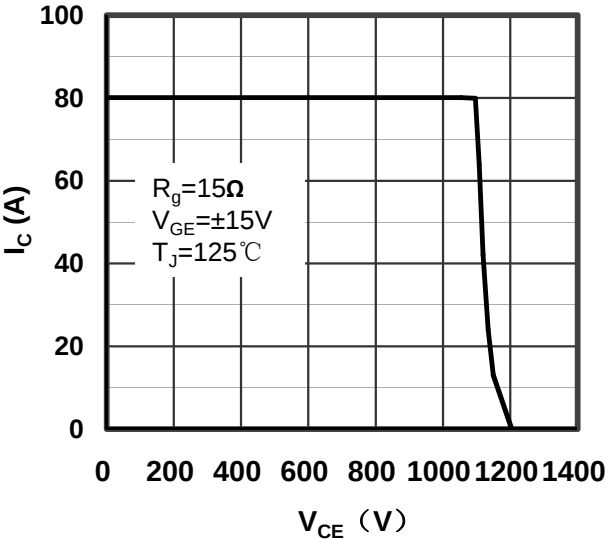


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

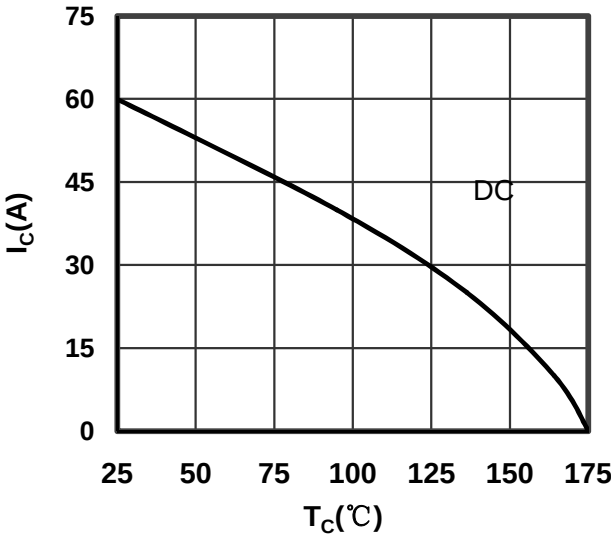


Figure 7. Collector Current vs Case temperature IGBT -inverter

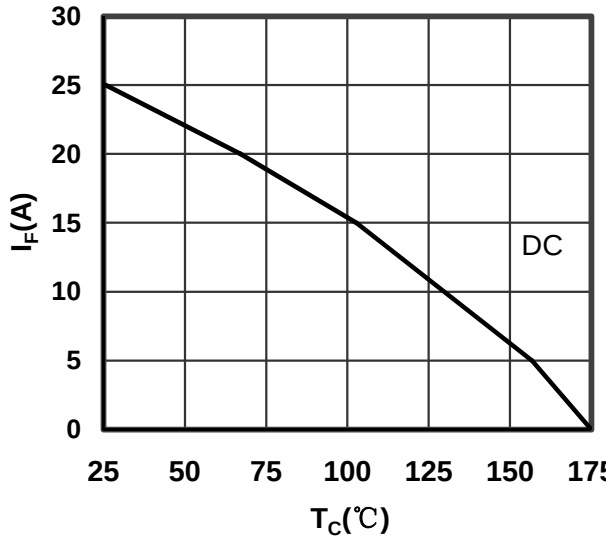


Figure 8. Forward current vs Case temperature Diode -inverter

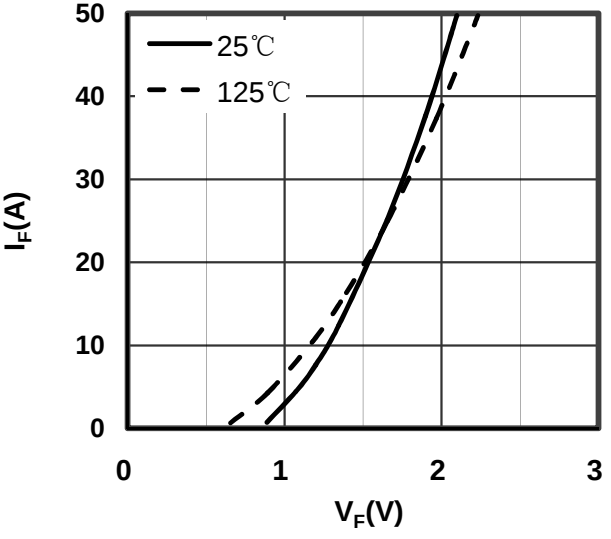


Figure 9. Diode Forward Characteristics Diode -inverter

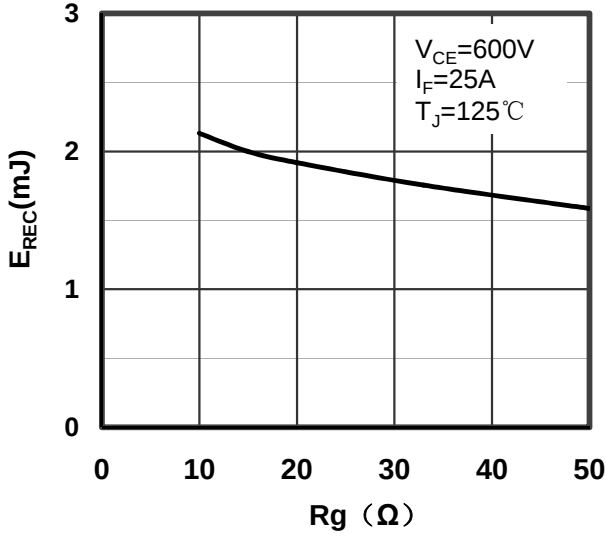
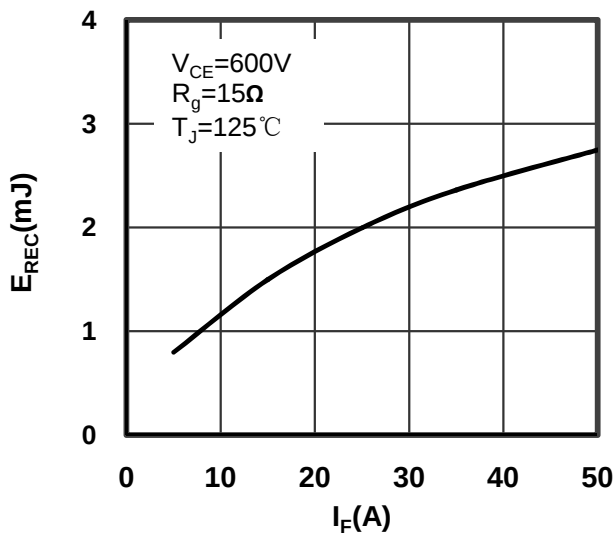
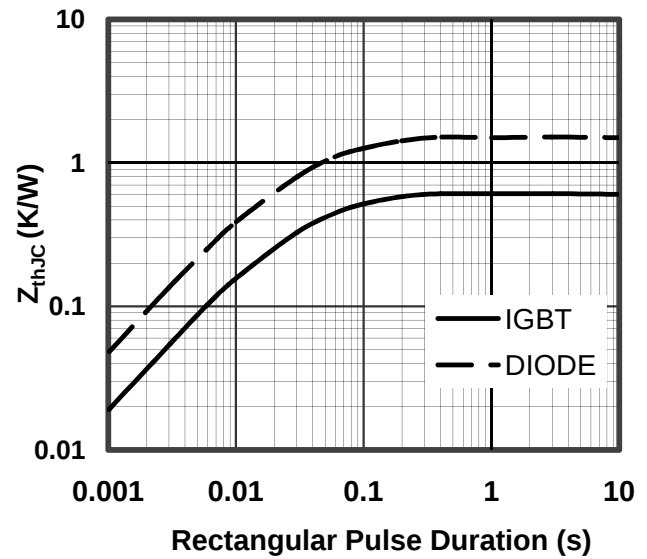


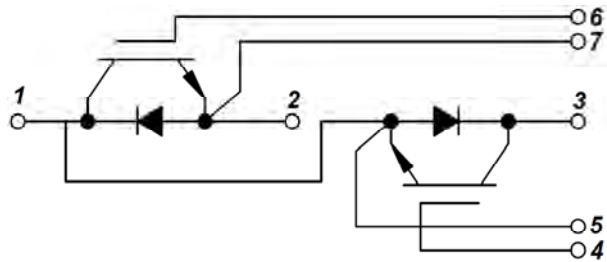
Figure 10. Switching Energy vs Gate Resistor Diode -inverter



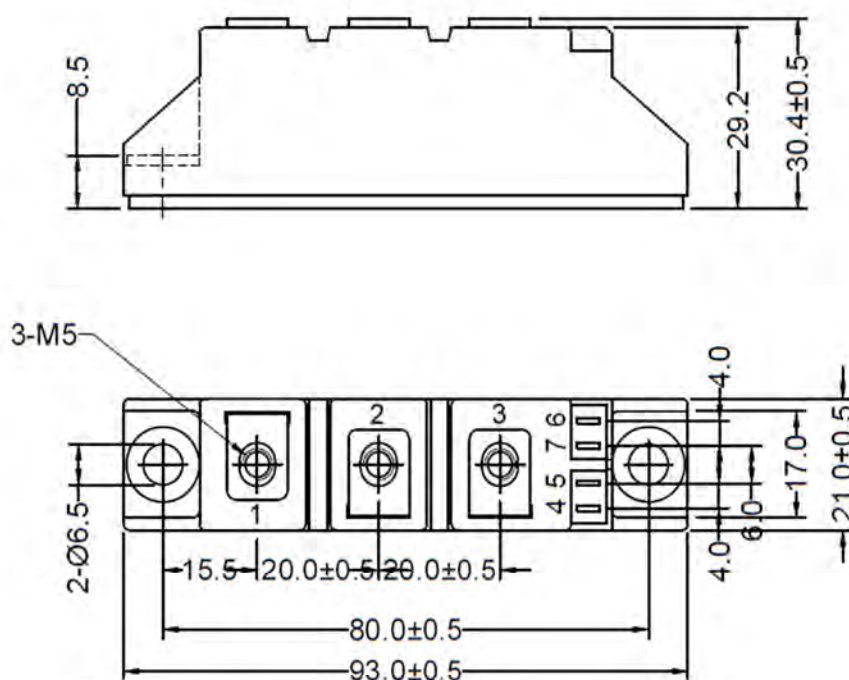
**Figure 11. Switching Energy vs Forward Current  
Diode-inverter**



**Figure 12. Transient Thermal Impedance of Diode and IGBT-inverter**



**Figure 13. Circuit Diagram**



**Dimensions in (mm)**  
**Figure 14. Package Outline**