

PRODUCT FEATURES

- IGBT chip in trench FS-technology
- Low switching losses
- $V_{CE(sat)}$ with positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery



APPLICATIONS

- AC motor control
- Motion/servo control
- Inverter and power supplies

IGBT-inverter

ABSOLUTE MAXIMUM RATINGS

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

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

Diode-inverter

ABSOLUTE MAXIMUM RATINGS

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

| Symbol | Parameter/Test Conditions | | Values | Unit |
|-------------|---------------------------------|---|--------|----------------------|
| V_{RRM} | Repetitive Reverse Voltage | $T_J=25^\circ\text{C}$ | 1200 | V |
| $I_{F(AV)}$ | Average Forward Current | $T_C=25^\circ\text{C}$ | 15 | A |
| I_{FRM} | Repetitive Peak Forward Current | $t_p=1\text{ms}$ | 30 | |
| I^2t | | $T_J=125^\circ\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$ | 60 | A^2S |

**IGBT-inverter
ELECTRICAL CHARACTERISTICS**
T_C=25°C unless otherwise specified

| Symbol | Parameter/Test Conditions | | Min. | Typ. | Max. | Unit |
|----------------------|---|--|-----------------------|------|------|------|
| V _{GE(th)} | Gate Emitter Threshold Voltage | V _{CE} =V _{GE} , I _C =1.6mA | 5.0 | 5.8 | 6.5 | V |
| V _{CE(sat)} | Collector Emitter Saturation Voltage | I _C =40A, V _{GE} =15V, T _J =25°C | | 2.2 | 2.5 | |
| | | I _C =40A, V _{GE} =15V, T _J =125°C | | 2.5 | | |
| I _{CES} | Collector Leakage Current | V _{CE} =1200V, V _{GE} =0V, T _J =25°C | | | 100 | μA |
| | | V _{CE} =1200V, V _{GE} =0V, T _J =125°C | | | 1 | mA |
| I _{GES} | Gate Leakage Current | V _{CE} =0V, V _{GE} =±15V, T _J =125°C | -400 | | 400 | nA |
| R _{gint} | Integrated Gate Resistor | | | 0 | | Ω |
| Q _g | Gate Charge | V _{CE} =600V, I _C =40A, V _{GE} =15V | | 0.22 | | μC |
| C _{ies} | Input Capacitance | V _{CE} =25V, V _{GE} =0V, f =1MHz | | 5.3 | | nF |
| C _{res} | Reverse Transfer Capacitance | | | | 60 | |
| t _{d(on)} | Turn on Delay Time | V _{CC} =600V, I _C =40A R _G =30Ω, V _{GE} =±15V, Inductive Load | T _J =25°C | | 100 | ns |
| | | | T _J =125°C | | 110 | ns |
| t _r | Rise Time | Inductive Load | T _J =25°C | | 30 | ns |
| | | | T _J =125°C | | 35 | ns |
| t _{d(off)} | Turn off Delay Time | V _{CC} =600V, I _C =40A R _G =30Ω, V _{GE} =±15V, Inductive Load | T _J =25°C | | 320 | ns |
| | | | T _J =125°C | | 360 | ns |
| t _f | Fall Time | Inductive Load | T _J =25°C | | 50 | ns |
| | | | T _J =125°C | | 60 | ns |
| E _{on} | Turn on Energy | V _{CC} =600V, I _C =40A R _G =30Ω, V _{GE} =±15V, Inductive Load | T _J =25°C | | 2.7 | mJ |
| | | | T _J =125°C | | 4 | mJ |
| E _{off} | Turn off Energy | Inductive Load | T _J =25°C | | 1.5 | mJ |
| | | | T _J =125°C | | 1.9 | mJ |
| I _{sc} | Short Circuit Current | tpsc ≤ 10μS, V _{GE} =15V T _J =125°C, V _{CC} =600V | | 160 | | A |
| R _{thJC} | Junction to Case Thermal Resistance (Per IGBT) | | | | 0.5 | K /W |

**Diode-inverter
ELECTRICAL CHARACTERISTICS**
T_C=25°C unless otherwise specified

| Symbol | Parameter/Test Conditions | | Min. | Typ. | Max. | Unit |
|--------------------|--|---|------|------|------|------|
| V _F | Forward Voltage | I _F =15A, V _{GE} =0V, T _J =25°C | | 1.65 | 2.15 | V |
| | | I _F =15A, V _{GE} =0V, T _J =125°C | | 1.65 | | |
| t _{rr} | Reverse Recovery Time | I _F =15A, V _R =600V | | 150 | | ns |
| I _{RRM} | Max. Reverse Recovery Current | di _F /dt=-700A/μs | | 32 | | A |
| Q _{RR} | Reverse Recovery Charge | T _J =125°C | | 3.6 | | μC |
| E _{rec} | Reverse Recovery Energy | | | | 1.2 | |
| R _{thJCD} | 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 | | 150 | °C |
| T_{Jop} | Operating Temperature | | -40~125 | |
| 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 (M6) | 3~5 | Nm |
| | to terminal | Recommended (M5) | 2.5~5 | Nm |
| Weight | | | 160 | g |

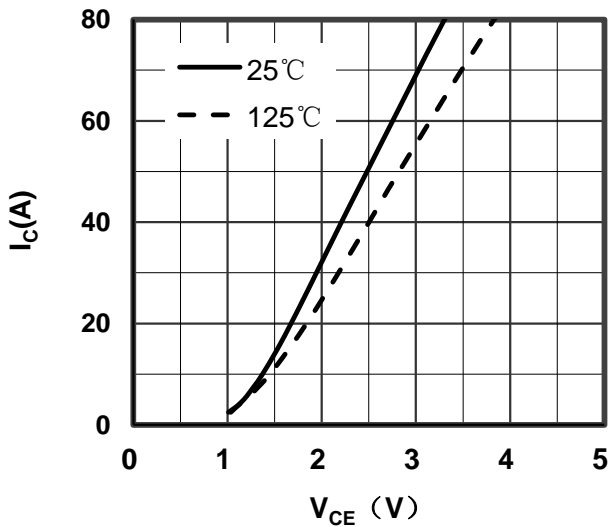


Figure 1. Typical Output Characteristics IGBT-inverter

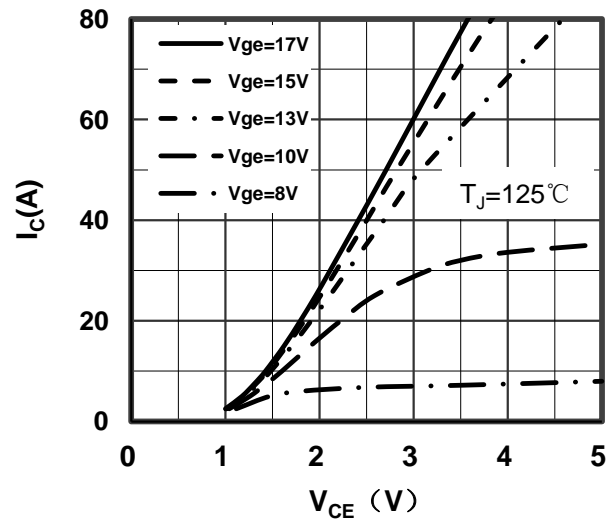


Figure 2. Typical Output Characteristics IGBT-inverter

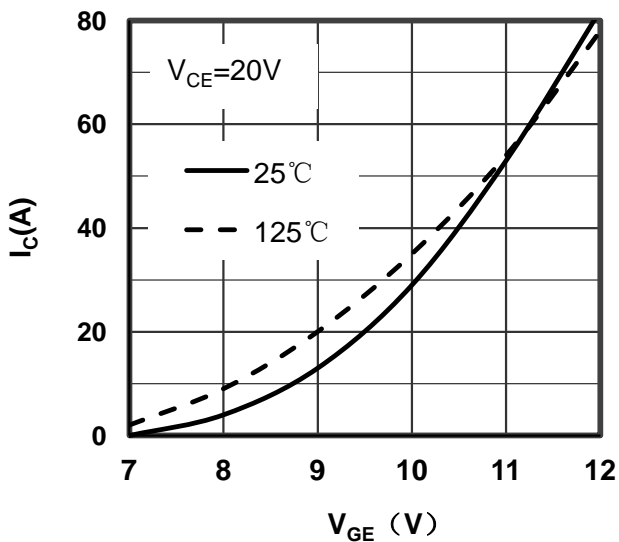


Figure 3. Typical Transfer characteristics IGBT-inverter

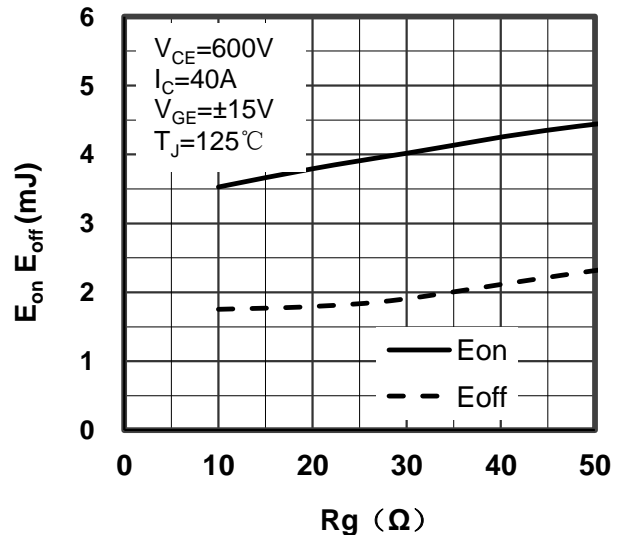


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

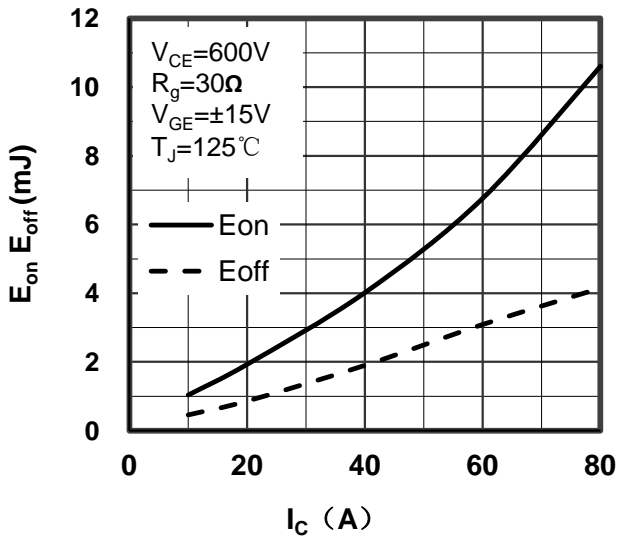


Figure 5. Switching Energy vs Collector Current IGBT-inverter

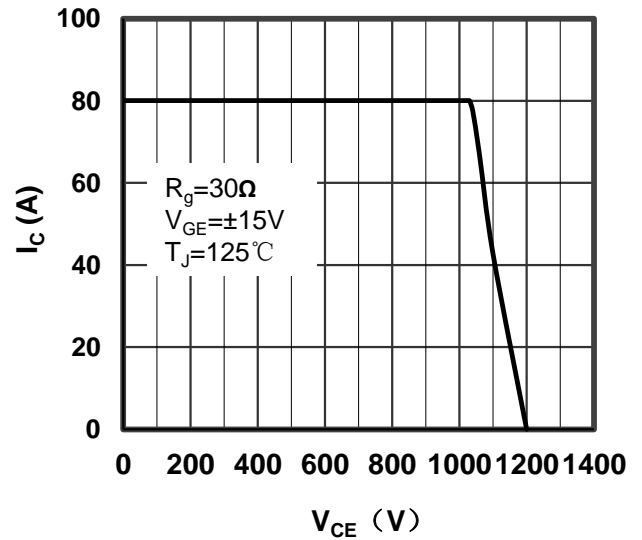


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

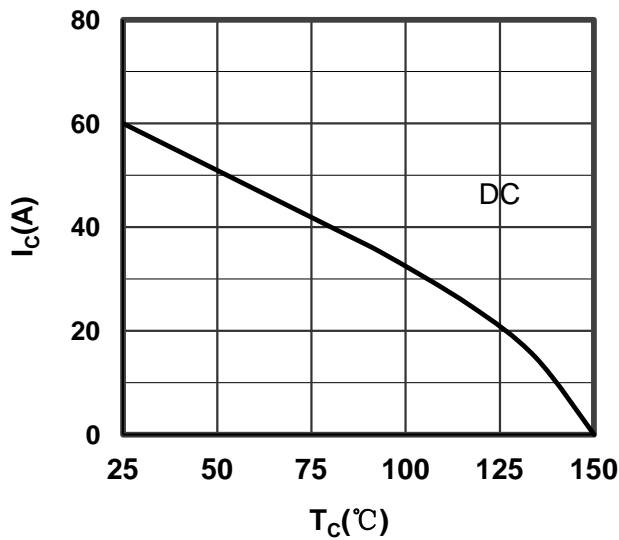


Figure 7. Collector Current vs Case temperature IGBT-inverter

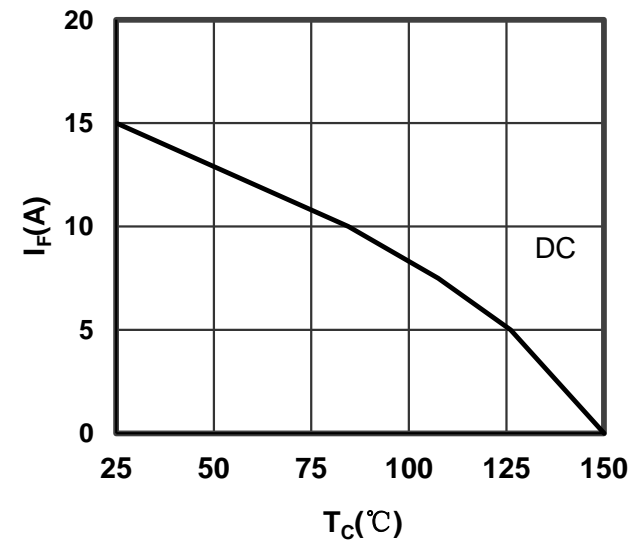


Figure 8. Forward current vs Case temperature Diode-inverter

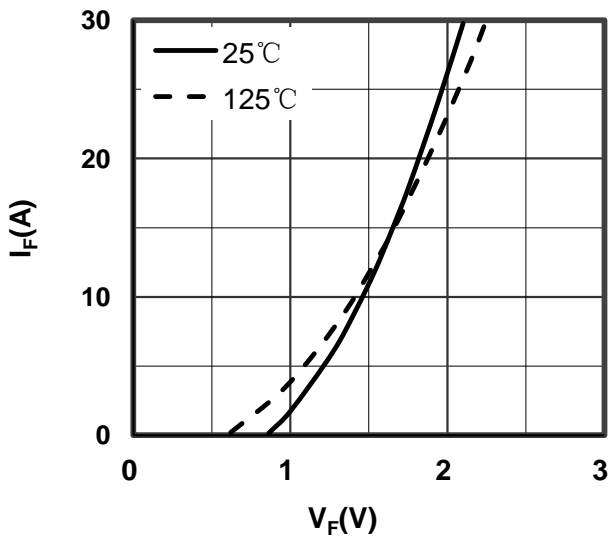


Figure 9. Diode Forward Characteristics Diode-inverter

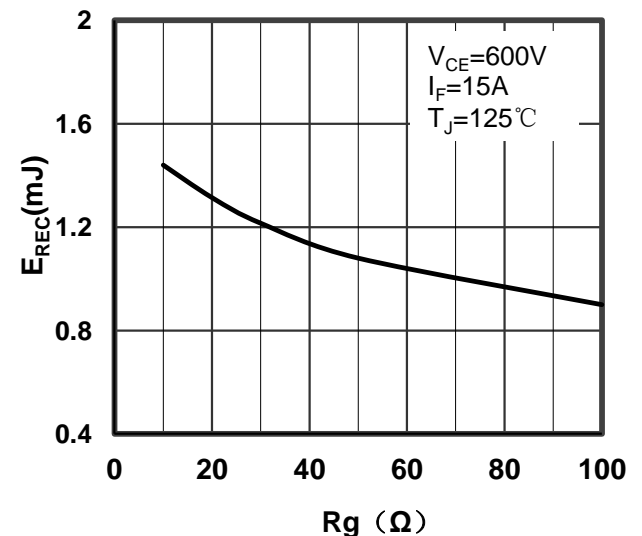


Figure 10. Switching Energy vs Gate Resistor Diode-inverter

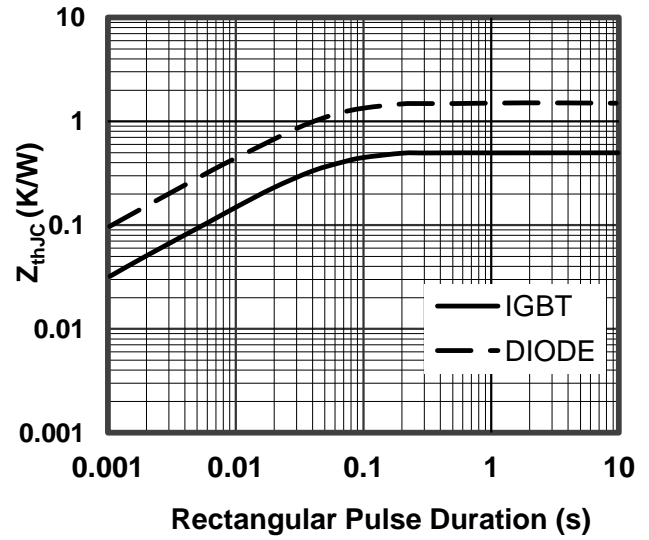
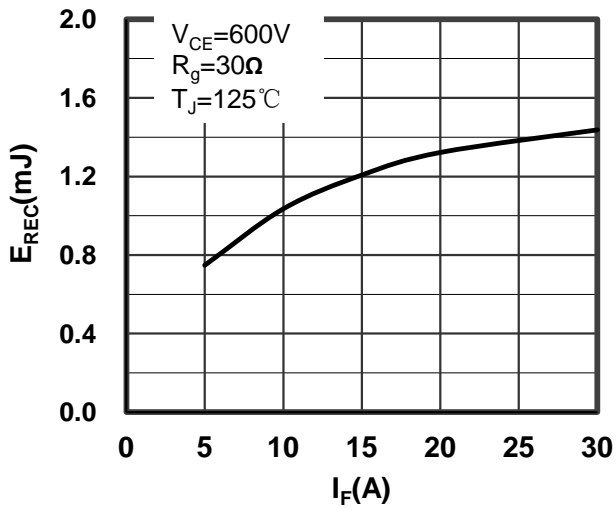


Figure 11. Switching Energy vs Forward Current Diode-inverter

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

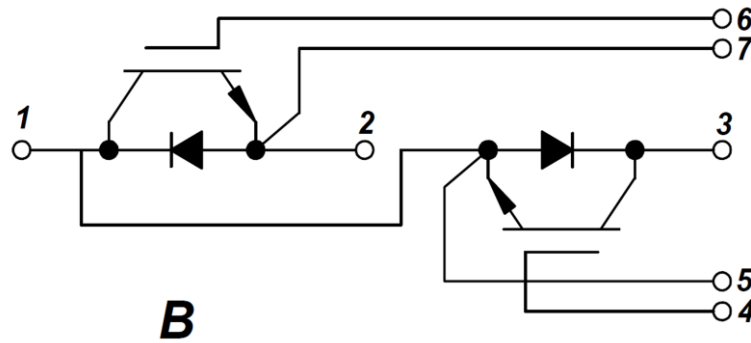
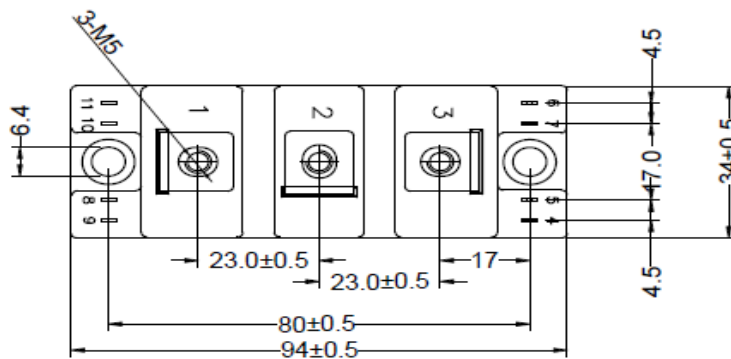
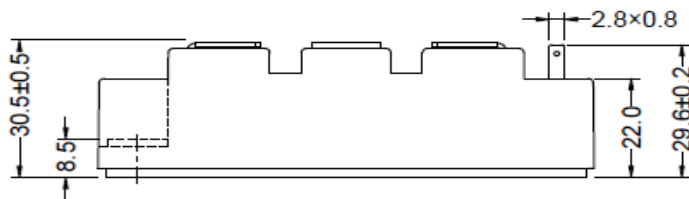


Figure 13. Circuit Diagram



Dimensions in (mm)
Figure 14. Package Outline