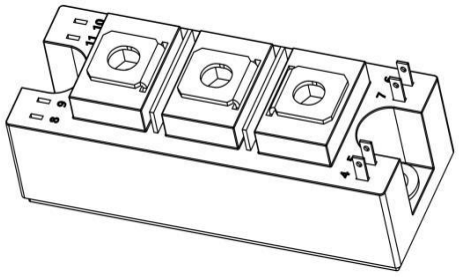
# Silicon Carbide (SiC)
# 1700V 4.5 mohm
# Half-Bridge MOSFET Module
# 34mm
# SC300HB17C2



94.00 × 34.00 × 29.00

The SC300HB17C2 is a power module containing 4.5 mΩ / 1700 V SiC MOSFET half-bridge and a thermistor with $Si_3N_4$ AMB in an 34mm package.

### Features

- 4.5mΩ / 1700 V SiC MOSFET Half−Bridge
- $Si_3N_4$ AMB
- NTC Thermistor
- Low Inductive Layout
- Solderable Pins
- Isolated Base Plate

### Typical Applications

- Motor Drives
- Vehicle Fast Chargers
- Renewable energy
- Uninterruptible Power Supply Systems (UPS)

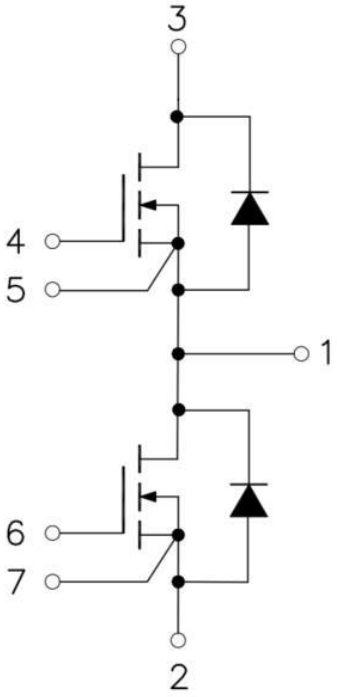
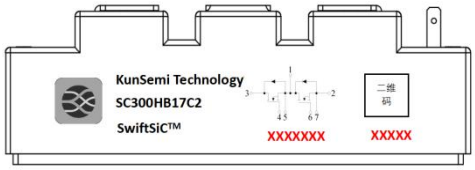


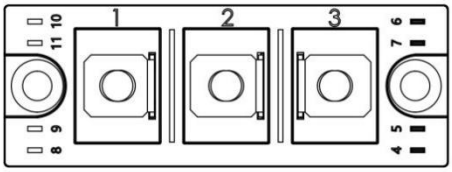

**Figure 1. Schematic**

### MARKING DIAGRAM




SC300HB17C2 = Device Code
XXXXXXX = Year, week and batch Code
XXXXX = Flow code

### PIN ASSIGNMENTS




### ORDERING INFORMATION

| Device | Package |
|---|---|
| SC300HB17C2 | 34mm |

### PIN DESCRIPTION

| Pin | Name | Description |
|---|---|---|
| 1 | OUT | Center Point of Half Bridge |
| 2 | DC- | DC Negative Bus Connection |
| 3 | DC+ | DC Positive Bus Connection |
| 4 | G1 | T1 Gate |
| 5 | S1 | T1 Source |
| 6 | G2 | T2 Gate |
| 7 | S2 | T2 Source |

## MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| **SiC MOSFET** | | | |
| Drain−Source Voltage | $V_{DSS}$ | 1700 | V |
| Gate−Source Voltage | $V_{GS}$ | + 25 /− 10 | V |
| Continuous Drain Current @ $T_C$ = 80 °C ($T_j$ = 175°C) | $I_{DS}$ | 300 | A |
| Pulsed Drain Current ($T_j$ = 175°C) | $I_{Dpluse}$ | 600 | A |
| Maximum Power Dissipation @ $T_C$ = 80°C ($T_j$ = 175°C) | $P_{tol}$ | 1800 | W |
| Minimum Operating Junction Temperature | $T_{JMIN}$ | −40 | °C |
| Maximum Operating Junction Temperature | $T_{JMAX}$ | 175 | °C |

## ELECTRICAL CHARACTERISTICS ($T_j$ = 25°C unless otherwise noted)

| Parameter | Test Conditions | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **SiC MOSFET CHARACTERISTICS** | | | | | | | |
| Zero Gate Voltage Drain Current | $V_{GS}$ = 0V, $V_{DS}$ = 1700V | | $I_{DSS}$ | - | - | 1 | mA |
| Drain−Source On Resistance | $V_{GS}$ = 18V, $I_{DS}$ = 300A, $T_j$ = 25°C | | $R_{DS(ON)}$ | - | 4.45 | 4.72 | mΩ |
| | $V_{GS}$ = 18V, $I_{DS}$ = 300A, $T_j$ = 125°C | | | - | 6.26 | - | |
| | $V_{GS}$ = 18V, $I_{DS}$ = 300A, $T_j$ = 175°C | | | - | 8.38 | - | |
| Gate−Source Threshold Voltage | $V_{GS}$ = $V_{DS}$ , $I_{DS}$ = 168mA, $T_j$ = 25°C | | $V_{GS(TH)}$ | 2.30 | 2.77 | 3.40 | V |
| Gate Resistance | $V_{GS}$ = 0V, f = 100kHz | | $R_g$ | - | 1.4 | - | Ω |
| Gate Leakage Current | $V_{GS}$ = -10 / 20 V,$V_{DS}$ = 0V | | $I_{GSS}$ | -800 | - | +800 | nA |
| Input Capacitance | $V_{DS}$ = 1000V, $V_{GS}$ = 0V, f = 100kHz | | $C_{iss}$ | - | 19.5 | - | nF |
| Output Capacitance | | | $C_{oss}$ | - | 0.89 | - | nF |
| Reverse Transfer Capacitance | | | $C_{rss}$ | - | 57.5 | - | pF |
| Total Gate Charge | $V_{DS}$ = 1200V, $V_{GS}$ = -4 / 18V, $I_D$ = 300A | | $Q_{g(on)}$ | - | 899 | - | nC |
| Gate-Source Charge | | | $Q_{gs}$ | - | 357 | - | |
| Gate-Drain Charge | | | $Q_{gd}$ | - | 384 | - | |
| Turn−on Delay Time | $V_{DS}$ = 900V, $I_{DS}$ = 300A $V_{GS}$ = -4 / 18V, $R_G$ = 2.4Ω, $L_S$ = 16uH | $T_j$ = 25°C | $T_{d(on)}$ | - | 51.5 | - | ns |
| | | $T_j$ = 125°C | | - | 46.1 | - | ns |
| | | $T_j$ = 175°C | | - | 43.8 | - | ns |
| Rise Time | $V_{DS}$ = 900V, $I_{DS}$ = 300A $V_{GS}$ = -4 / 18V, $R_G$ = 2.4Ω, $L_S$ = 16uH | $T_j$ = 25°C | $t_r$ | - | 62.7 | - | ns |
| | | $T_j$ = 125°C | | - | 57.0 | - | ns |
| | | $T_j$ = 175°C | | - | 58.9 | - | ns |
| Turn−off Delay Time | $V_{DS}$ = 900V, $I_{DS}$ = 300A $V_{GS}$ = -4 / 18V, $R_G$ = 2.4Ω, $L_S$ = 16uH | $T_j$ = 25°C | $T_{d(off)}$ | - | 153.0 | - | ns |
| | | $T_j$ = 125°C | | - | 178.2 | - | ns |
| | | $T_j$ = 175°C | | - | 191.4 | - | ns |
| Fall Time | $V_{DS}$ = 900V, $I_{DS}$ = 300A $V_{GS}$ = -4 / 18V, $R_G$ = 2.4Ω, $L_S$ = 16uH | $T_j$ = 25°C | $t_f$ | - | 41.0 | - | ns |
| | | $T_j$ = 125°C | | - | 41.8 | - | ns |
| | | $T_j$ = 175°C | | - | 41.6 | - | ns |
| Turn−on Switching Loss per Pulse | $V_{DS}$ = 900V, $I_{DS}$ = 300A $V_{GS}$ = -4 / 18V, $R_G$ = 2.4Ω, $L_S$ = 16uH | $T_j$ = 25°C | $E_{ON}$ | - | 5.15 | - | mJ |
| | | $T_j$ = 125°C | | - | 4.50 | - | mJ |
| | | $T_j$ = 175°C | | - | 4.82 | - | mJ |
| Turn−off Switching Loss per Pulse | $V_{DS}$ = 900V, $I_{DS}$ = 300A $V_{GS}$ = -4 / 18V, $R_G$ = 2.4Ω, $L_S$ = 16uH | $T_j$ = 25°C | $E_{OFF}$ | - | 9.78 | - | mJ |
| | | $T_j$ = 125°C | | - | 10.73 | - | mJ |
| | | $T_j$ = 175°C | | - | 11.31 | - | mJ |
| Thermal Resistance, Junction to Case (MOSFET) | | | $R_{thJC}$ | - | 0.095 | - | °C/W |

**ELECTRICAL CHARACTERISTICS** ($T_j$ = 25℃ unless otherwise noted) (continued)

| Parameter | Test Conditions | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **BODY DIODE CHARACTERISTICS** | | | | | | | |
| Diode Forward Voltage | $I_{SD}$ = 300 A | $T_j$ = 25 ℃ | $V_{SD}$ | - | 3.98 | 4.38 | V |
| | | $T_j$ = 125 ℃ | | - | 3.72 | - | |
| | | $T_j$ = 175 ℃ | | - | 3.56 | - | |
| Diode Reverse Recovery Charge | $V_R$ = 900V, $I_{SD}$ = 300A<br>$V_{GS}$ = -4V, $R_G$ = 2.4Ω<br>$L_S$ = 16uH | $T_j$ = 25 ℃ | $Q_r$ | - | 2.8 | - | uC |
| | | $T_j$ = 125 ℃ | | - | 4.0 | - | uC |
| | | $T_j$ = 175 ℃ | | - | 7.1 | - | uC |
| Peak Reverse Recovery Current | $V_R$ = 900V, $I_{SD}$ = 300A<br>$V_{GS}$ = -4V, $R_G$ = 2.4Ω<br>$L_S$ = 16uH | $T_j$ = 25 ℃ | $I_{rrm}$ | - | 162.5 | - | A |
| | | $T_j$ = 125 ℃ | | - | 194.4 | - | A |
| | | $T_j$ = 175 ℃ | | - | 284.8 | - | A |
| Reverse Recovery Energy | $V_R$ = 900V, $I_{SD}$ = 300A<br>$V_{GS}$ = -4V, $R_G$ = 2.4Ω<br>$L_S$ = 16uH | $T_j$ = 25 ℃ | $E_{rr}$ | | 3.04 | | mJ |
| | | $T_j$ = 125 ℃ | | | 4.56 | | mJ |
| | | $T_j$ = 175 ℃ | | | 7.87 | | mJ |

**MODULE**

| | | | |
|---|---|---|---|
| Storage Temperature Range | $T_{stg}$ | -40 to 150 | ℃ |
| Module Operating Junction Temperature | $T_J$ | -40 to 150 | ℃ |
| Isolation Test Voltage, t = 1 s, 50 Hz | $V_{iso}$ | 4000 | V |
| Mounting torque to main terminals(M6 screw) | $M_T$ | 6.0 | N.m |
| Mounting torque to main terminals(M5 screw) | $M_H$ | 6.0 | N.m |
| Stray Inductance | $L_{DS}$ | 13.5 | nH |
| Weight of Module | G | 155 | g |

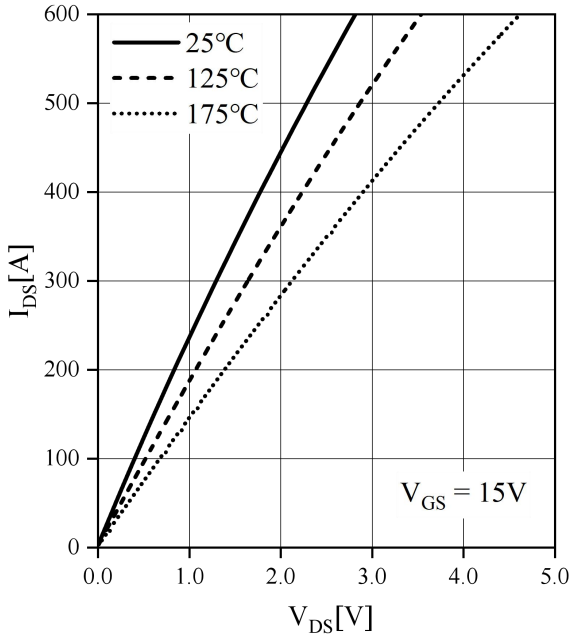



**Figure 2. MOSFET Typical Output Characteristic**

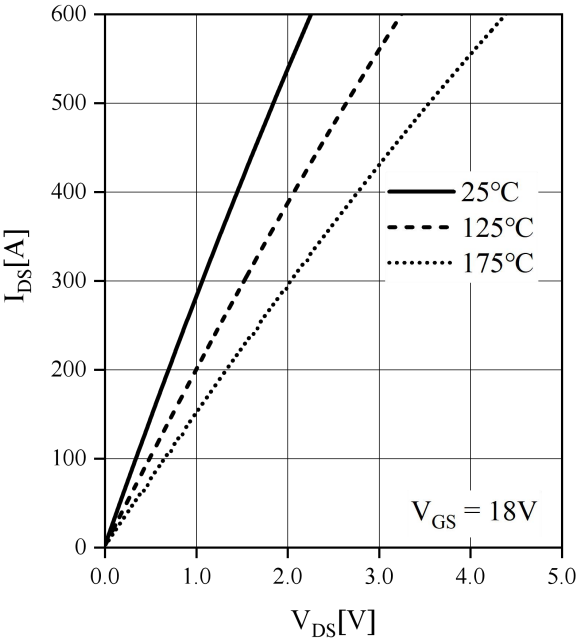



**Figure 3. MOSFET Typical Output Characteristic**

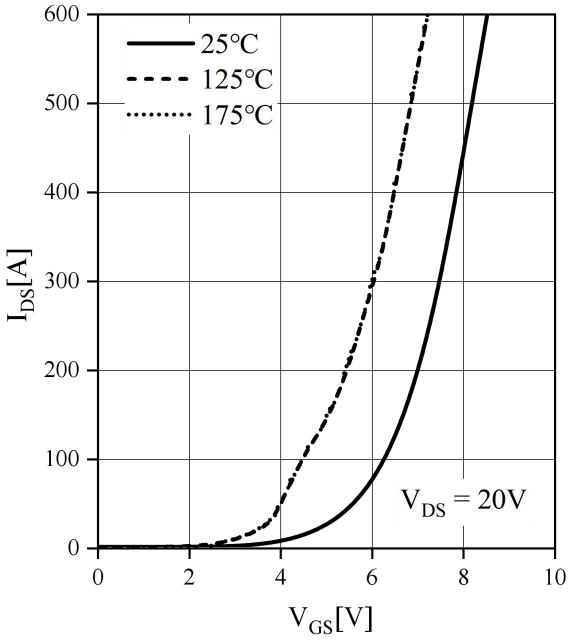



**Figure 4. MOSFET Typical Transfer Characteristic**

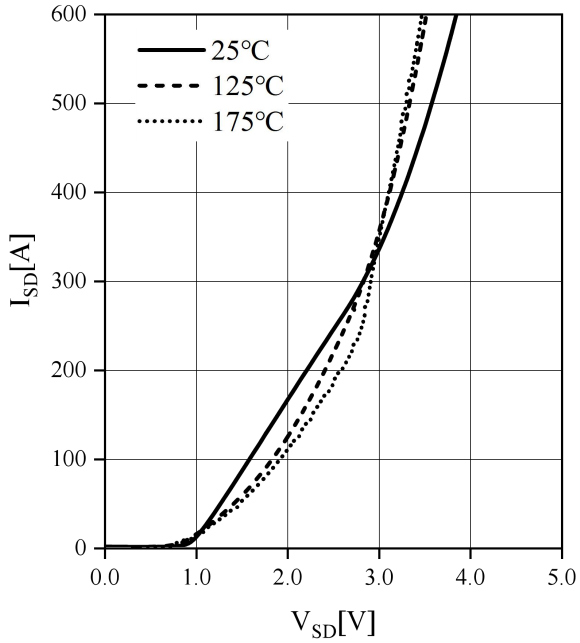



**Figure 5. Body Diode Forward Characteristic**

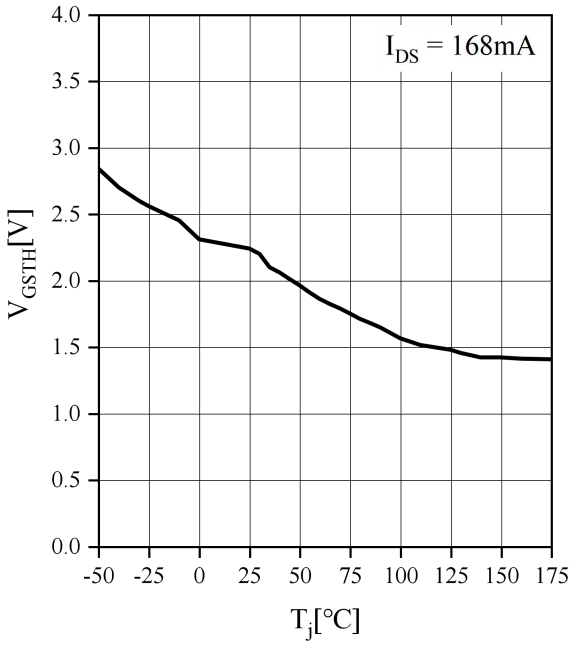



Figure 6. MOSFET $V_{GS(th)}$ vs. $T_j$

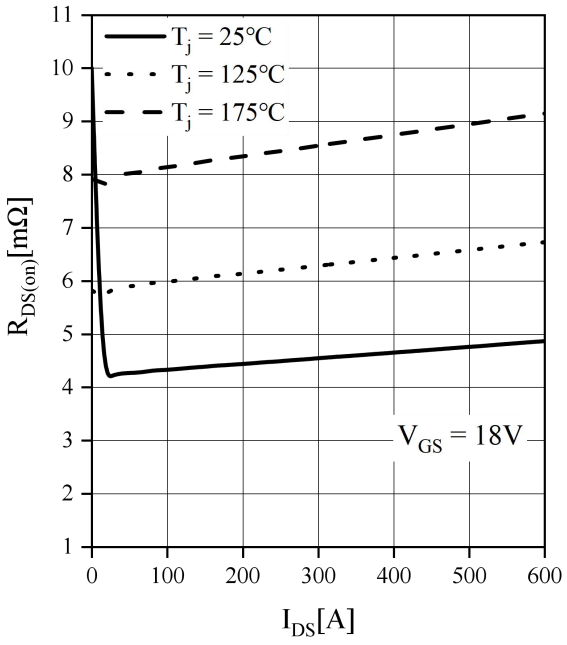



Figure 7. MOSFET $R_{dson}$ vs. $I_{DS}$

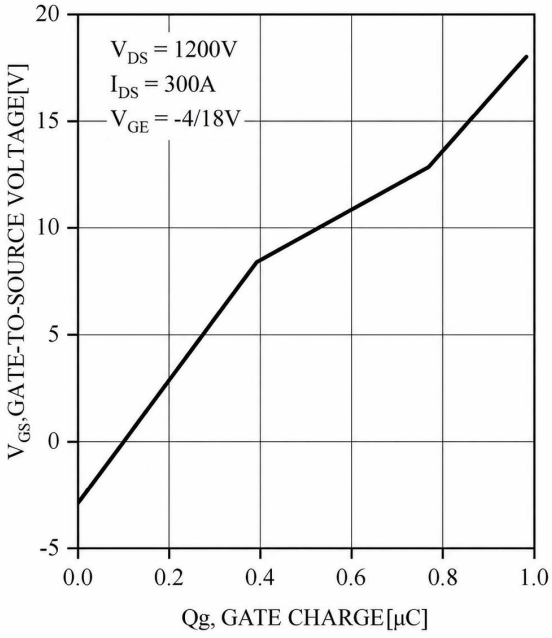



Figure 8. Gate−to−Source Voltage vs. Total Charge

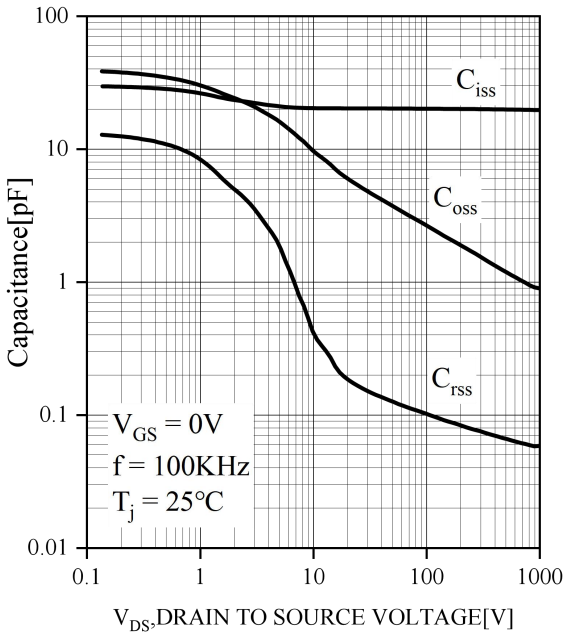



Figure 9. Capacitance vs. Drain−to−Source Voltage

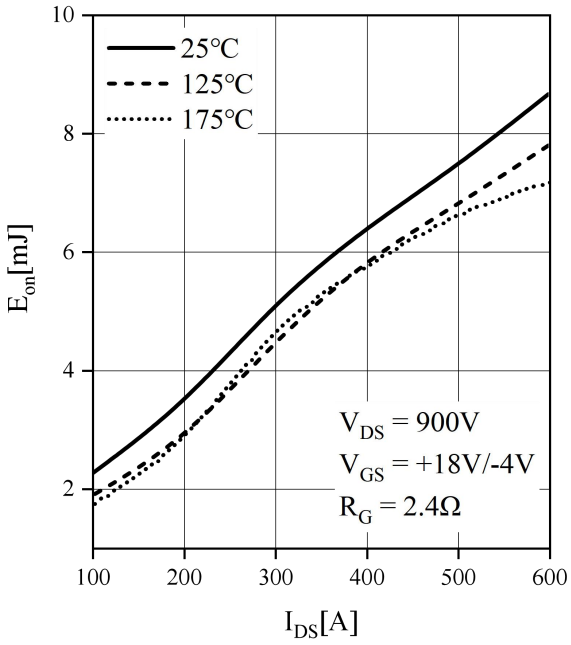



**Figure 10. Typical Switching Loss $E_{on}$ vs. $I_{DS}$**

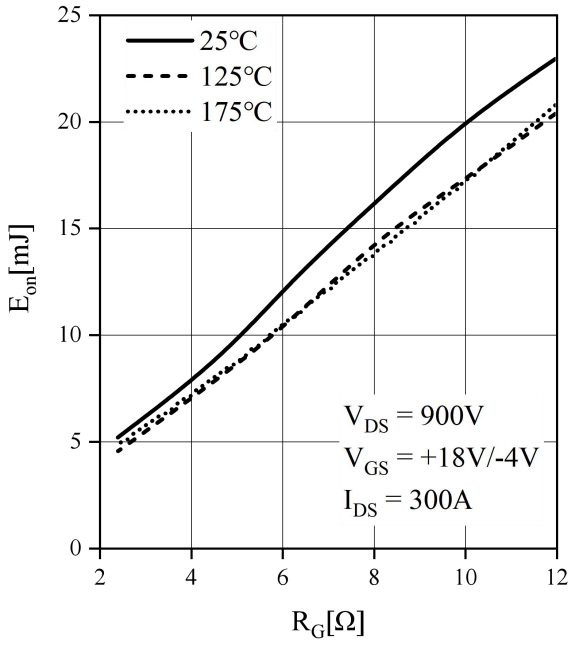



**Figure 11. Typical Switching Loss $E_{on}$ vs. $R_G$**

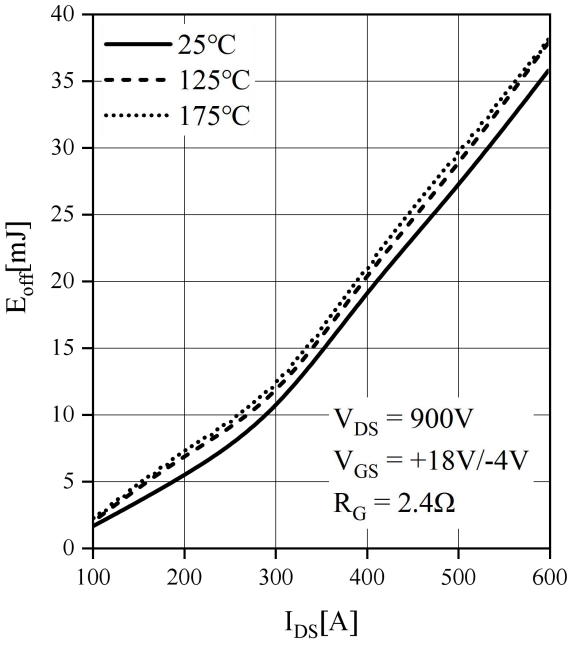



**Figure 12. Typical Switching Loss $E_{off}$ vs. $I_{DS}$**

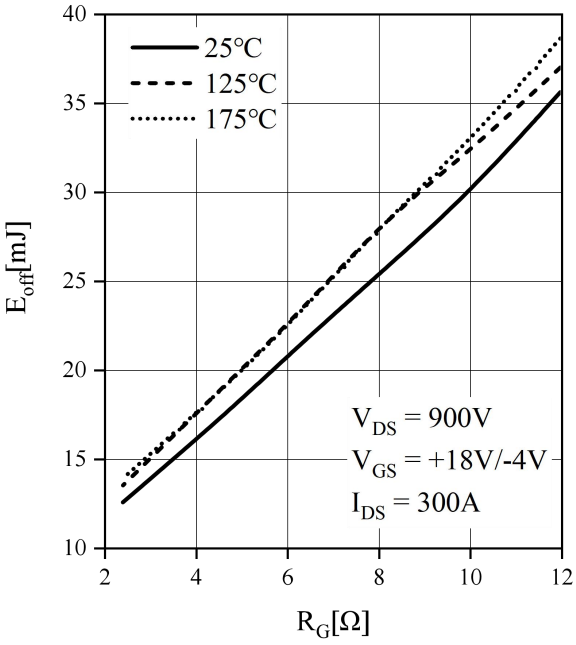



**Figure 13. Typical Switching Loss $E_{off}$ vs. $R_G$**

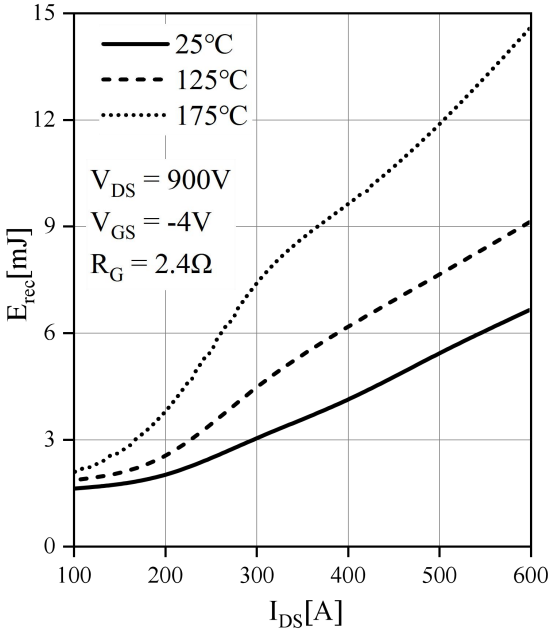



**Figure 14. Typical Switching Loss $E_{rec}$ vs. $I_{DS}$**

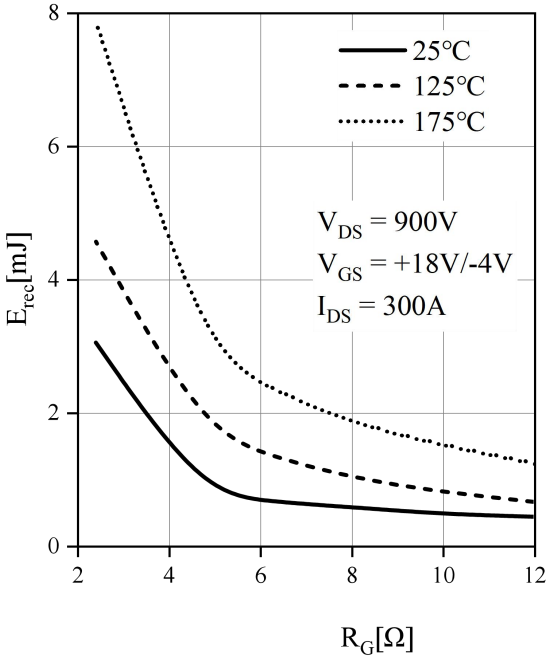



**Figure 15. Typical Switching Loss $E_{rec}$ vs. $R_G$**

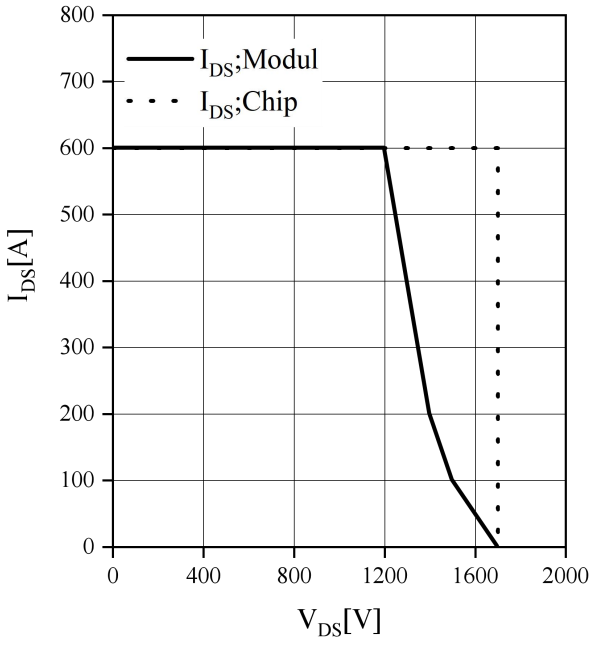



**Figure 16. Reverse bias safe operating area**

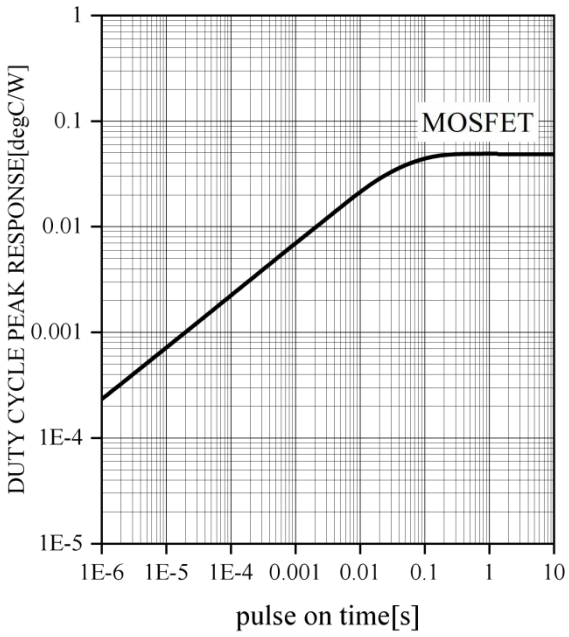
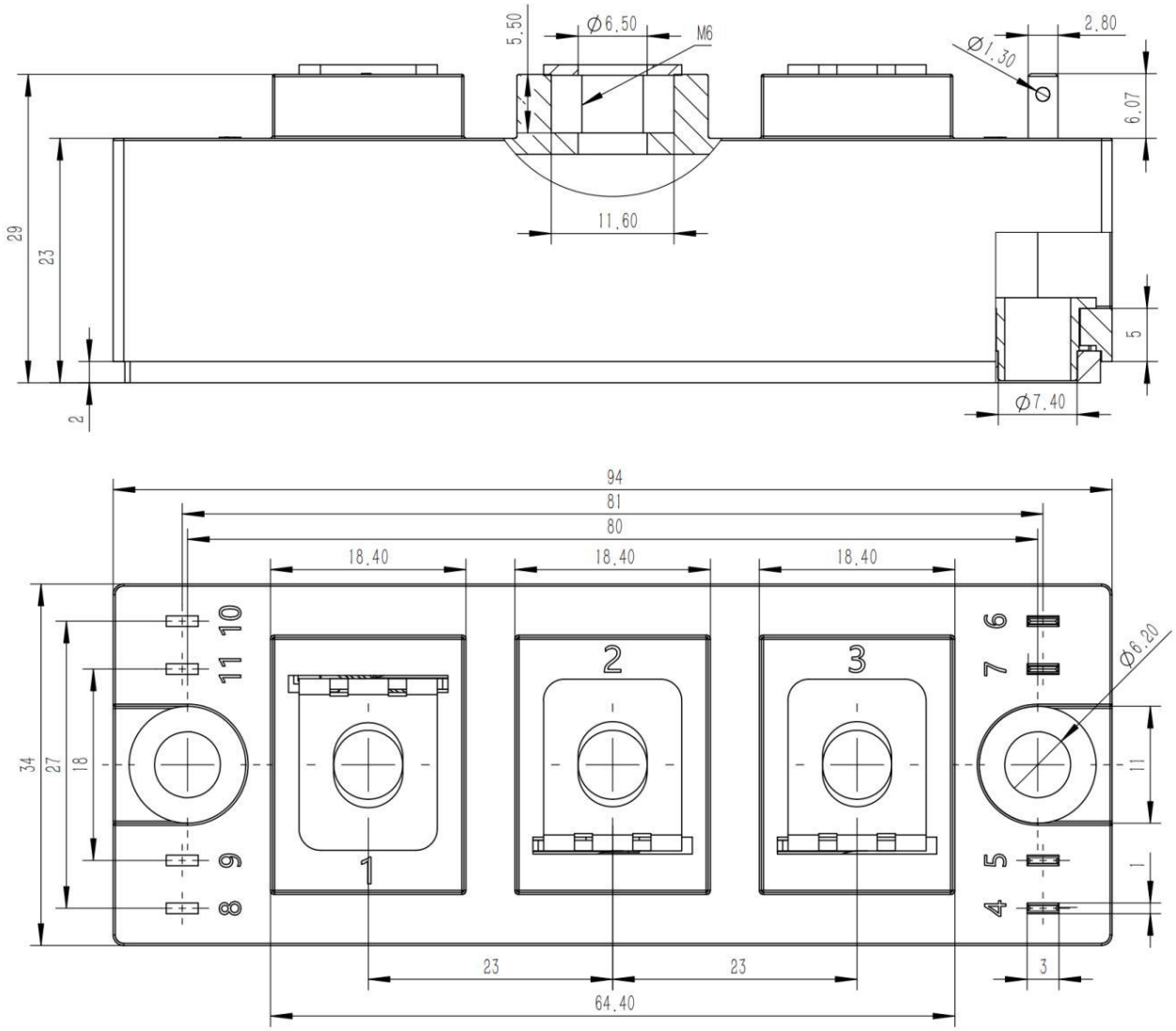



**Figure 17. MOSFET Junction−to−Case Transient Thermal Impedance**

**Package Drawing**




**UNIT:mm**