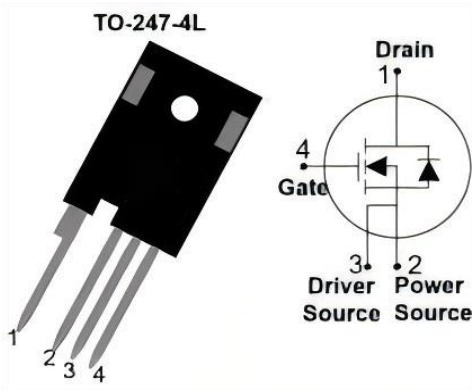
## SiC MOSFET N-channel 66A/1200V

| Parameter | Value | Unit |
|---|---|---|
| BVDSS | 1200 | V |
| $RDS_{(ON)}$,typ.(20V) | 40 | mΩ |
| $VGS_{(TH)}$ | 2.0 ~ 4.0 | V |
| Eon | 1.2 | mJ |
| Eoff | 0.54 | mJ |
| ID (at TC=25℃) | 66 | A |




### FEATURES

- Fast switching with low EMI/RFI
- Low gate charge minimize switching loss
- Short circuit withstand rated
- Low $RDS_{(ON)}$ Temperature coefficient for Improve efficiency

### APPLICATIONS

- Asymmetrical bridge
- Converter & Inverter
- Single switch forward
- Flyback

**MAXIMUM RATED VALUES** (at TJ = 25 °C, unless otherwise specified)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage [1] | 1200 | V |
| $V_{GSmax}$ | Maximum Gate-to-Source Voltage | -10 ~ +25 | |
| $V_{GSop(DC)}$ | Recommended operation Values of Gate to Source Voltage | -5.0 ~ +20 | |
| $V_{GSop(AC)}$ | Recommended operation Values of Gate to Source Voltage (f > 1Hz) | -5.0 ~ +20 | |
| $I_D$ | Continuous Drain Current | 66 | A |
| | Continuous Drain Current at $T_C$=100℃ | 47 | |
| $I_{DM}$ | Pulsed Drain Current at $V_{GS}$=10V [2] | 164 | |
| $E_{AS}$ | Single Pulse Avalanche Energy ($V_{DD}$=50V, $V_{GS}$=15V, $R_G$=25Ω, L=1mH) | 288 | mJ |
| $P_D$ | Power Dissipation | 333 | W |
| | Derating Factor above 25℃ | 2.2 | W/℃ |
| $T_L$ | Soldering Temperature, Distance of 1.6mm from case for 10 seconds | 300 | ℃ |
| $T_J$ & $T_{STG}$ | Operating and Storage Temperature Range | -55 to 175 | |

**Note1:**Stresses greater than those listed in the “Absolute Maximum Ratings” may cause permanent damage to the device.

## THERMAL CHARACTERISTICS

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | | | 0.45 | ℃/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | | | 40 | |

## ELECTRICAL CHARACTERISTICS (at TJ = 25°C unless otherwise specified)

### OFF Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | 1200 | | | V | $V_{GS}$ = 0V, $I_D$ = 100uA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | | | 100 | uA | $V_{DS}$ = 1200V, $V_{GS}$ = 0V |
| $I_{GSS+}$ | Gate-to-Source Leakage Current | | | 100 | nA | $V_{GS}$ = 20V, $V_{DS}$ = 0V |
| $I_{GSS-}$ | Gate-to-Source Leakage Current | | | -100 | nA | $V_{GS}$ = -10V, $V_{DS}$ = 0V |

### ON Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance [3] | | 40 | 50 | mΩ | $V_{GS}$ = 20V, $I_D$ = 40A |
| | | | 55 | | | $V_{GS}$ = 20V, $I_D$ = 40A TJ=150℃ |
| $V_{GS(TH)}$ | Gate Threshold Voltage | 2.0 | | 4.0 | V | $V_{DS}$ = $V_{GS}$ , $I_D$ = 10mA |

### Dynamic Characteristics( Essentially independent of operating temperature)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | | 2027 | | pF | $V_{GS}$ = 0V, $V_{DS}$ = 800V, f = 1.0MHz |
| $C_{rss}$ | Reverse Transfer Capacitance | | 11 | | | |
| $C_{oss}$ | Output Capacitance | | 115 | | | |
| $R_g$ | Gate Series Resistance | | 3.2 | | Ω | f = 1.0MHz |
| $Q_g$ | Total Gate Charge | | 132 | | nC | $V_{DD}$ = 800V, $I_D$ = 40A, $V_{GS}$ = -5/20V |
| $Q_{gs}$ | Gate-to-Source Charge | | 25 | | | |
| $Q_{gd}$ | Gate-to-Drain (Miller) Charge | | 61 | | | |

### Resistive Switching Characteristics( Essentially independent of operating temperature)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | | 11 | | ns | $V_{DD}$ = 800V, $I_D$ = 40A, $V_{GS}$ = -3.5/18V, $R_G$ = 2.0Ω, L = 0.1mH |
| $t_{rise}$ | Rise Time | | 31 | | | |
| $t_{d(off)}$ | Turn-off Delay Time | | 33 | | | |
| $t_{fall}$ | Fall Time | | 27 | | | |
| $E_{ON}$ | Turn-On Switching Energy | | 1.2 | | mJ | |
| $E_{OFF}$ | Turn Off Switching Energy | | 0.54 | | | |

### Source-Drain Body Diode Characteristics

| Symbol | Parameter | Min | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| $I_{SD}$ | Continuous Source Current | | | 66 | A | Maximum Ratings |
| $V_{SD}$ | Diode Forward Voltage | | 4.2 | | V | $I_S$ = 20A, $V_{GS}$ = 0V |
| $t_{rr}$ | Reverse Recovery Time | | 46 | | ns | $V_{GS}$ = 0V<br>$I_F$ = 40A<br>di/dt = 1000A/μs |
| $Q_{rr}$ | Reverse Recovery Charge | | 278 | | nC | |
| $I_{rrm}$ | Peak Reverse Recovery Current | | 9.3 | | A | |

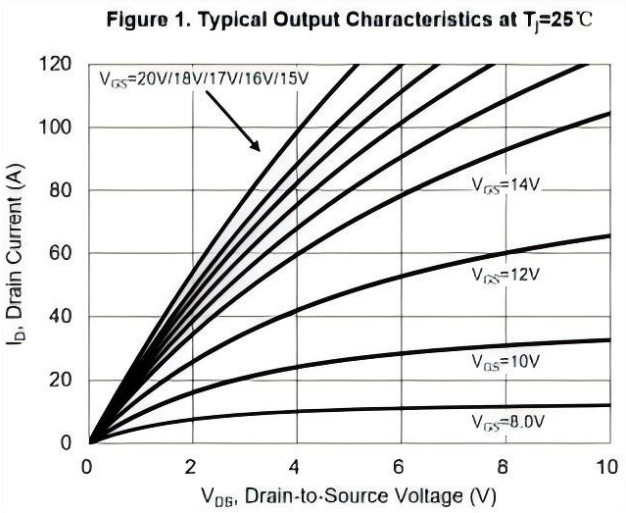
**Note:**

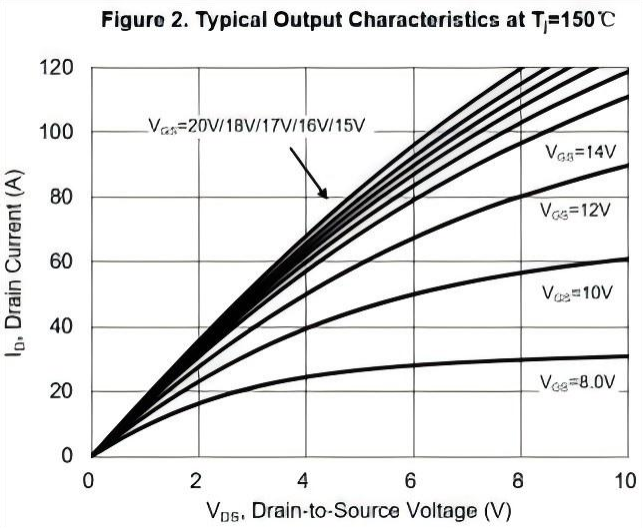
[1] TJ=25℃ to 175℃

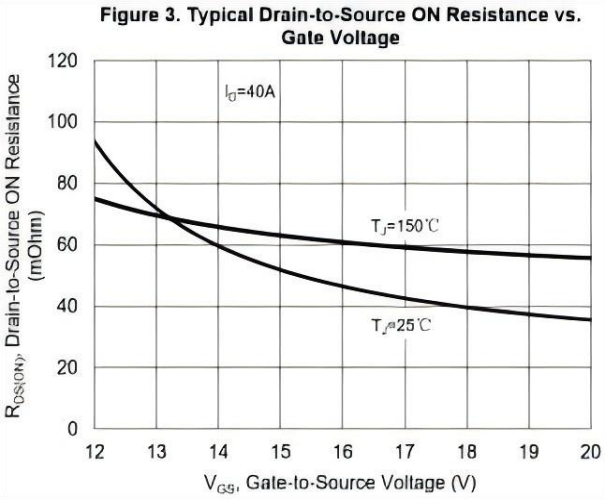
[2] Repetitive rating, pulse width limited by maximum junction temperature

[3] Pulse width≤380μs; duty cycle≤2%

### TYPICAL CHARACTERISTICS CURVES



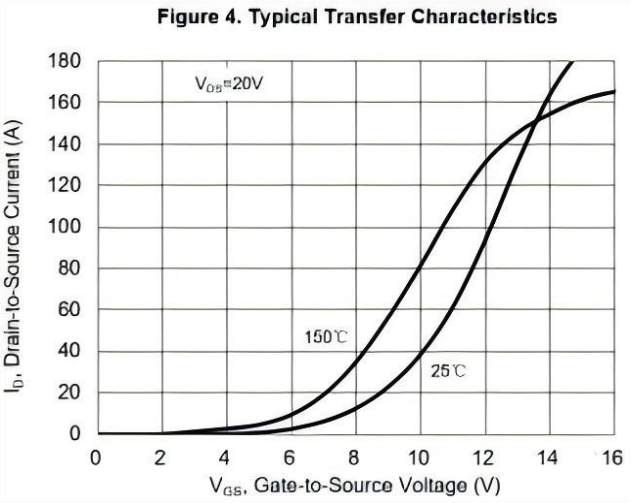



**Figure 5. Typical Drain-to-Source ON Resistance $T_j$=25℃**

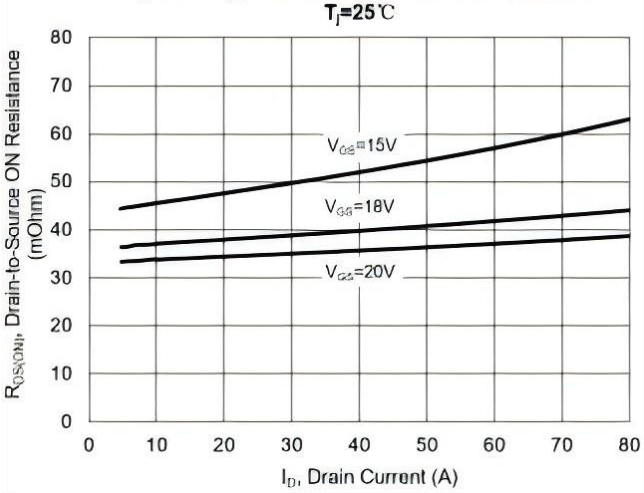



**Figure 6. Typical Drain-to-Source ON Resistance $T_j$=150℃**

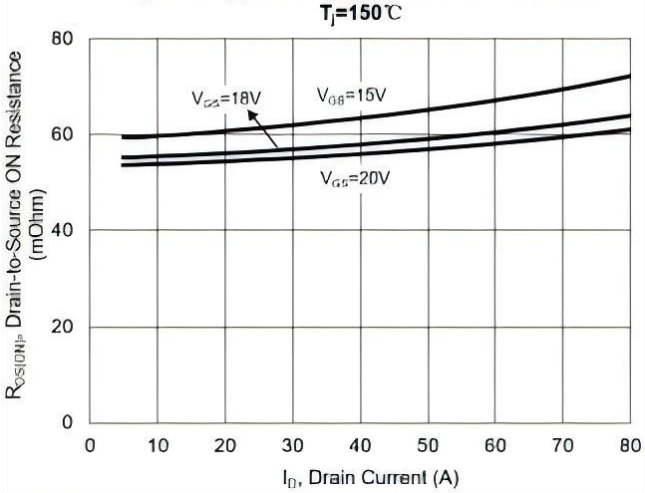



**Figure 7. Typical Body Diode Characteristics at $T_j$=25℃**

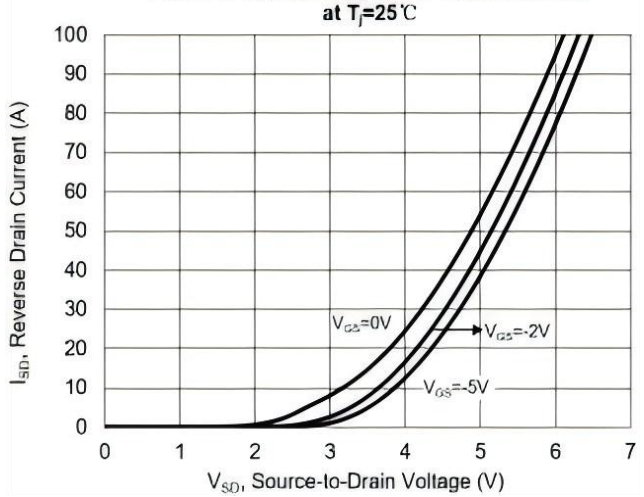



**Figure 8. Typical Body Diode Characteristics at $T_j$=150℃**

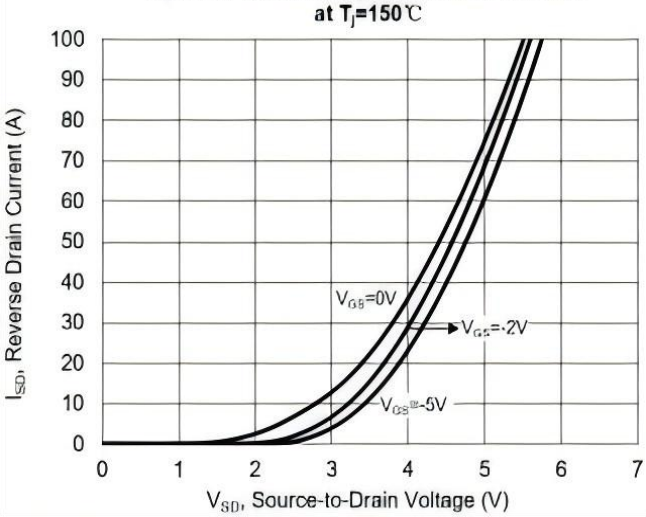



**Figure 9. 3rd Quadrant Characteristics at $T_j$=25℃**

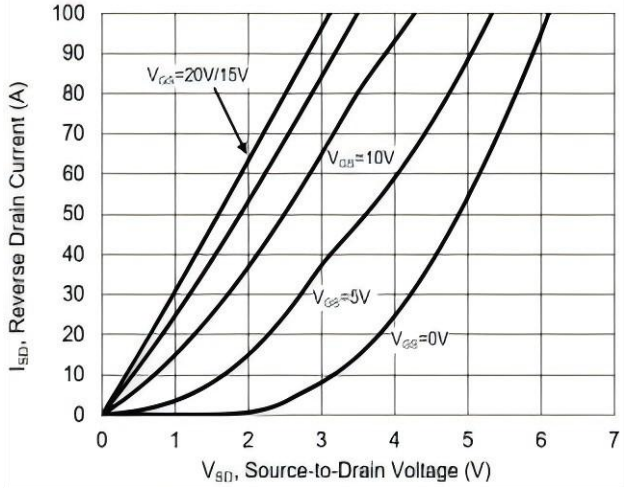



**Figure 10. 3rd Quadrant Characteristics at $T_j$=150℃**

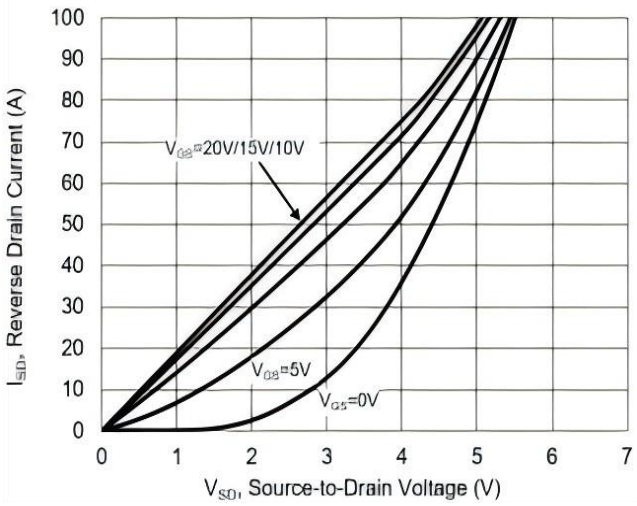


Figure 11. Typical Drain-to-Source On Resistance vs. Junction Temperature

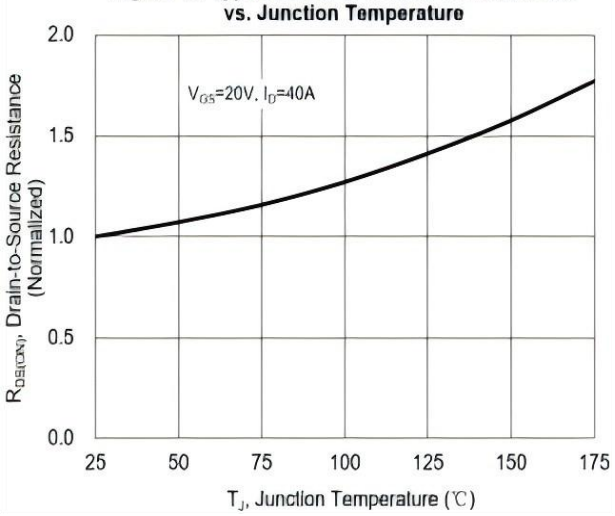



Figure 12.Typical Breakdown Voltage vs. Junction Temperature

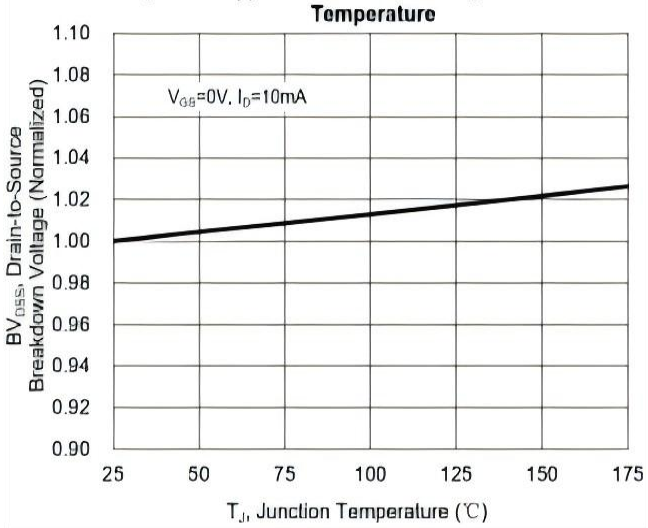



Figure 13.Typical Threshold Voltage vs. Junction Temperature

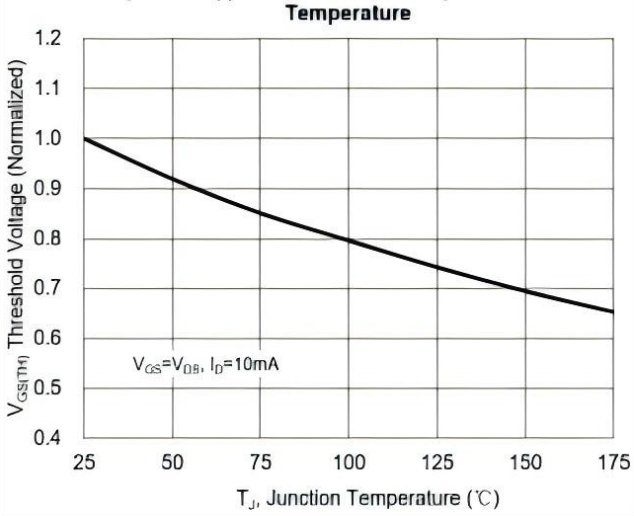



Figure 14. Typical Capacitance vs. Drain-to-Source Voltage

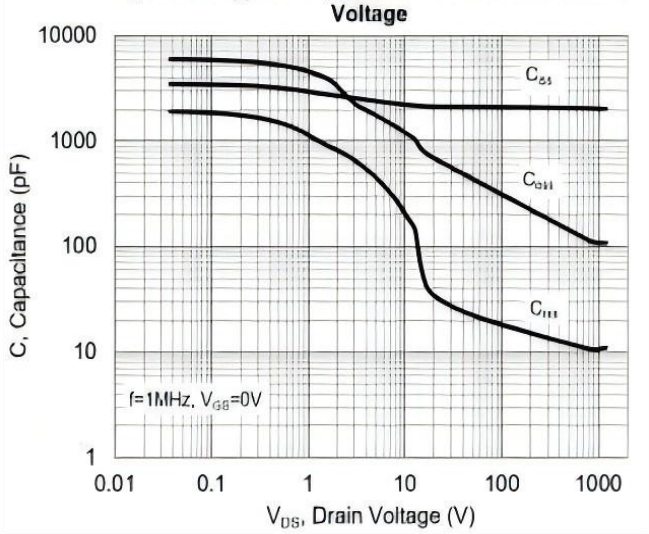



Figure 15. Typical Gate Charge vs. Gate-to-Source Voltage

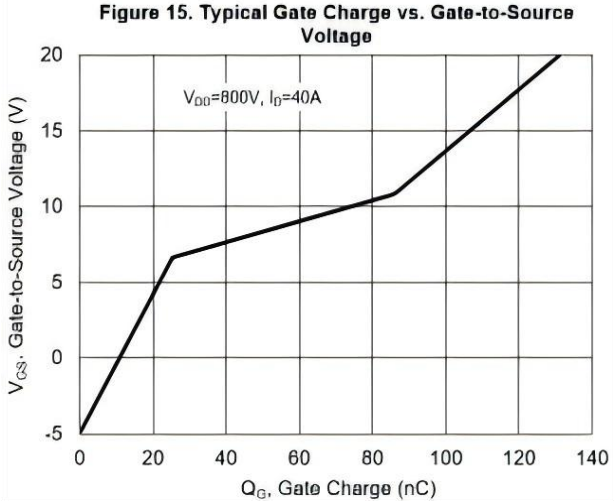



Figure 16. Switching Times vs. $R_G$

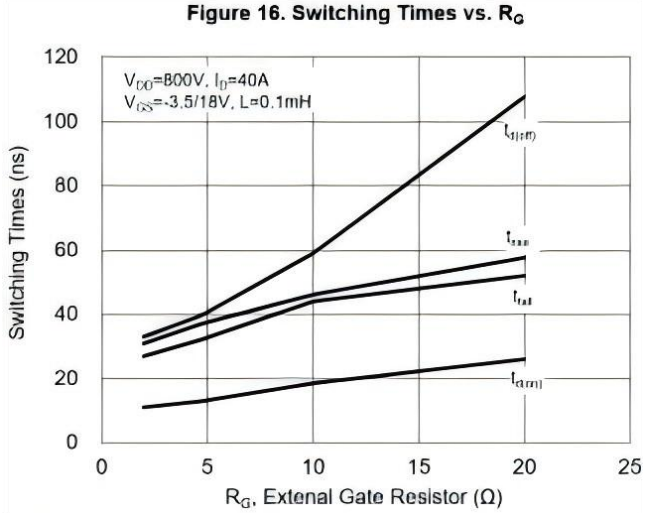


**Figure 17. Switching Loss vs. $R_G$**

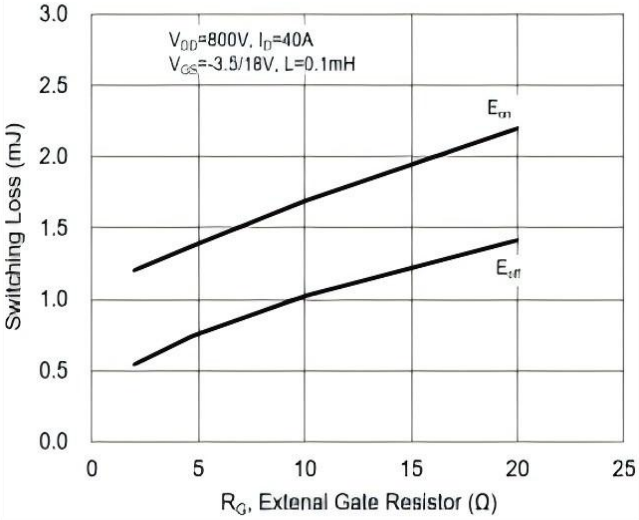



**Figure 18. Switching Loss vs. Drain Current**

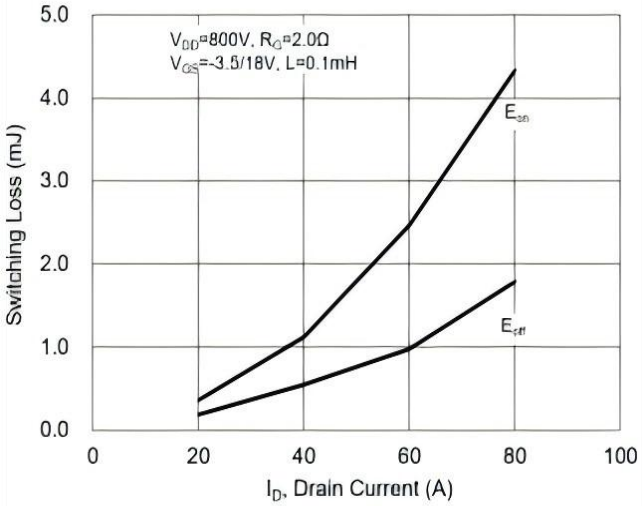



**Figure 19. Switching Loss vs. Drain Current**

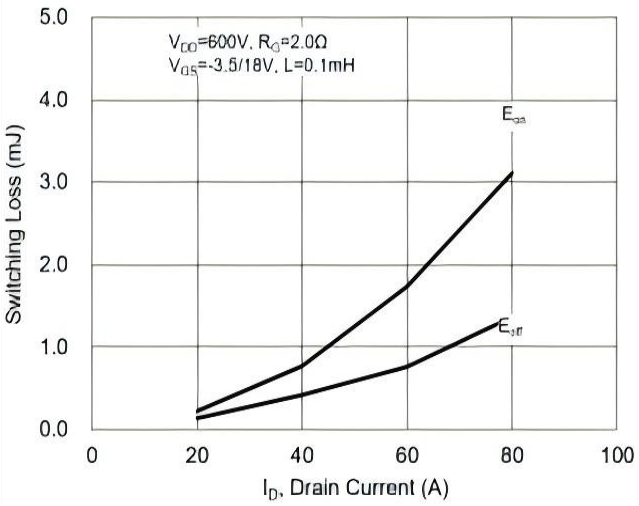



**Figure 20. Thermal Impedance Junction-to-Case**

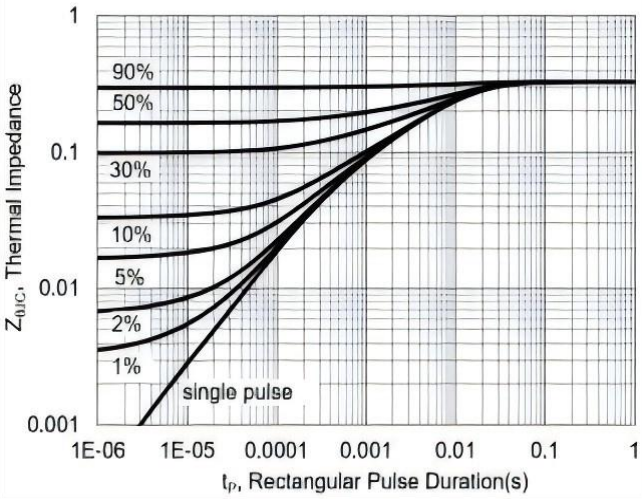



**Figure 21. Maximum Peak Current Capability**

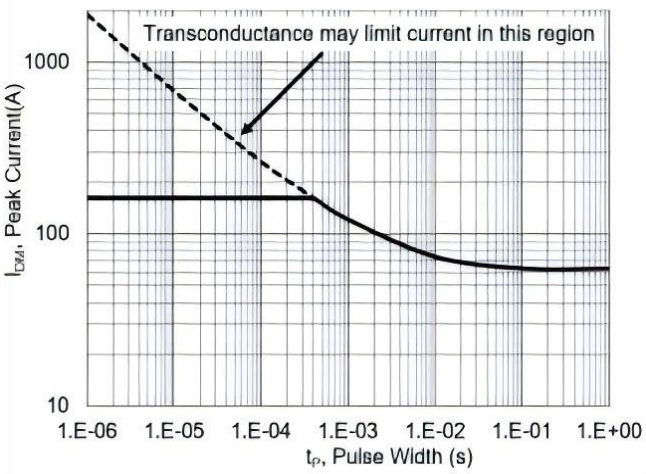



**Figure 22. Maximum Power Dissipation vs. Case Temperature**

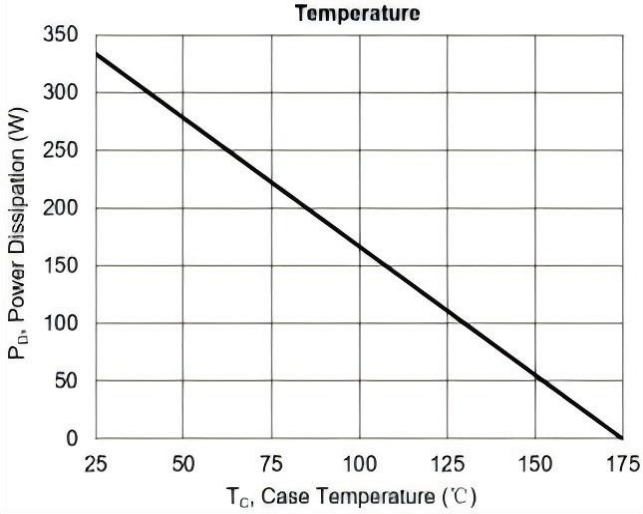


Figure 23. Maximum Continuous Drain Current vs Case Temperature

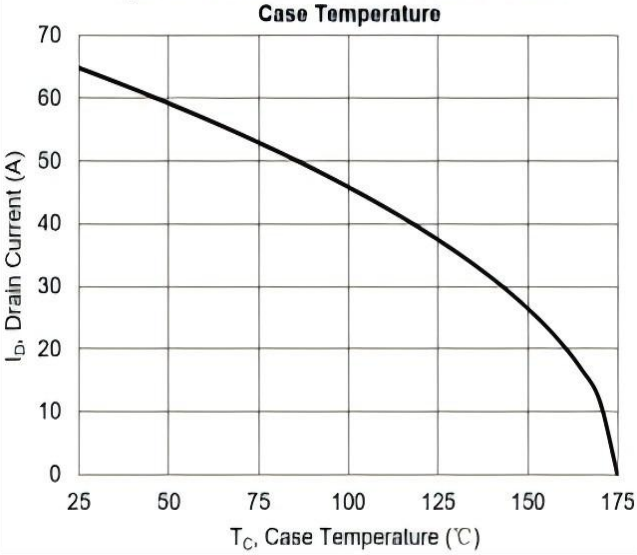
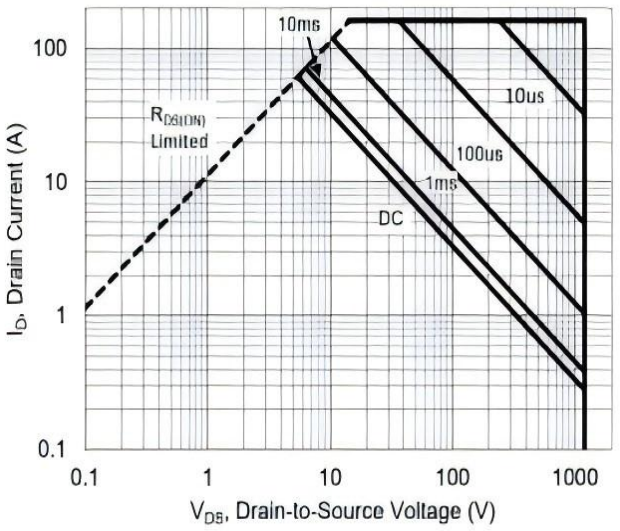
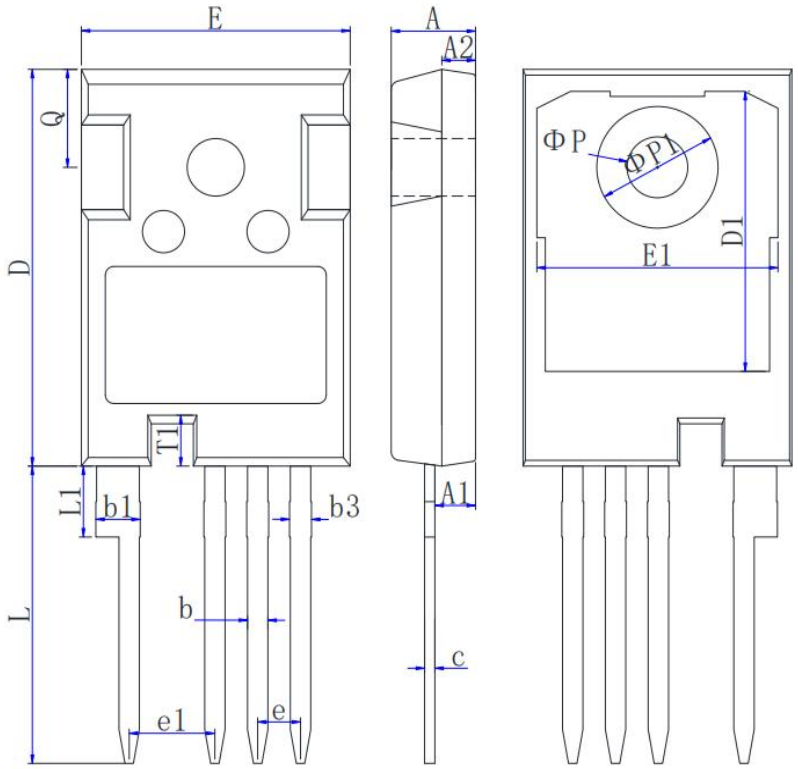



Figure 24. Maximum Forward Safe Operation Area




## PACKAGE OUTLINES




| SYMBOL | MM | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 4.80 | 5.00 | 5.20 |
| A1 | 2.21 | 2.41 | 2.61 |
| A2 | 1.80 | 2.00 | 2.20 |
| b | 1.06 | 1.21 | 1.36 |
| b1 | 2.33 | 2.63 | 2.93 |
| b3 | 1.07 | 1.30 | 1.60 |
| c | 0.51 | 0.61 | 0.75 |
| D | 23.30 | 23.45 | 23.60 |
| D1 | 16.25 | 16.55 | 16.85 |
| E | 15.74 | 15.94 | 16.14 |
| E1 | 13.72 | 14.02 | 14.32 |
| T1 | 2.35 | 2.50 | 2.65 |
| e | 2.54BSC | | |
| e1 | 5.08BSC | | |
| Q | 5.49 | 5.79 | 6.09 |
| L | 17.27 | 17.57 | 17.87 |
| L1 | 3.99 | 4.19 | 4.39 |
| ΦP | 3.40 | 3.60 | 3.80 |
| ΦP1 | 7.19REF | | |

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