# A3G40N1700MT4L

## 1700V, 40A, 72mΩ, N-Channel, Silicon Carbide MOSFET

## Features

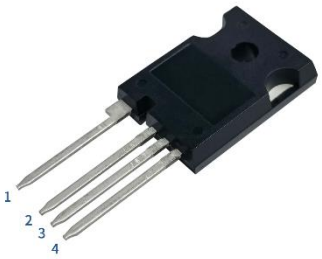
- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Optimized package with separate driver source pin
- 3rd Generation SiC MOSFET Technology
- Easy to parallel and simple to drive
- ROHS Compliant, Halogen free

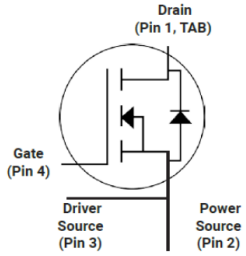
## Application

- EV motor drive
- High Voltage DC/DC Converters
- Switch Mode Power Supplies
- Solar inverters
- EV charging

## Product Summary

| | |
|---|---|
| $V_{DS}$ | 1700V |
| $I_D$ | 40A |




## Ordering Information

| Part Number | Marking | Package | Packaging |
|---|---|---|---|
| A2G40N1700MT4L | A2G40N1700MT4L | TO-247-4L | Tube |

## Absolute Maximum Ratings

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 1700 | V |
| $I_D$ | Drain Current (continuous) at $T_C$=25°C | 40 | A |
| $I_D$ | Drain Current (continuous) at $T_C$=100°C | 32 | A |
| $I_{DM}$ | Drain Current (pulsed) | 118 | A |
| $V_{GS}$ | Gate-Source Voltage | -10/+22 | V |
| $P_D$ | Power Dissipation $T_C$=25°C | 242 | W |
| $T_J$, $T_{stg}$ | Junction and Storage Temperature Range | -55 to +175 | °C |

## Electrical Characteristics ($T_J$=25°C unless otherwise specified)

### Typical Performance-Static

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DS}$ | Drain-source Breakdown Voltage | $I_D$=250uA, $V_{GS}$=0V | 1700 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=1700V, $V_{GS}$=0V, $T_J$=25°C | | 5 | 100 | uA |
| $I_{GSS}$ | Gate-body Leakage Current | $V_{DS}$=0V, $V_{GS}$=-10 to 22V | | 10 | 250 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=10mA | 2 | 3 | 4 | V |
| $V_{GSon}$ | Recommended turn-on Voltage | Static | | 18 | | V |
| $V_{GSoff}$ | Recommended turn-off Voltage | | | -5 | | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS}$=18V, $I_D$=20A | | 72 | 88 | mΩ |
| | | $V_{GS}$=18V, $I_D$=20A, $T_J$=175°C | | 130 | | mΩ |

## Typical Performance-Dynamic

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | $V_{DS}$=1000V, f=1MHz<br>$V_{AC}$=25mV | | 2405 | | pF |
| $C_{oss}$ | Output Capacitance | | | 90 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 3 | | pF |
| $g_{fs}$ | Transconductance | $V_{DS}$=20V, $I_D$=20A | | 16 | | S |
| $E_{OSS}$ | $C_{OSS}$ Stored Energy | $V_{DS}$=1000V, f=1MHz | | 60 | | uJ |
| $E_{ON}$ | Turn-On Energy (Body Diode) | $V_{DS}$=1000V<br>$V_{GS}$=-5/18V, $I_D$=25A<br>L=150uH, $T_J$=25°C | | 650 | | uJ |
| $E_{OFF}$ | Turn-Off Energy (Body Diode) | | | 162 | | uJ |
| $Q_g$ | Total Gate Charge | $V_{DS}$=1000V<br>$V_{GS}$=-5/18V<br>$I_D$=25A | | 100 | | nC |
| $Q_{gs}$ | Gate-source Charge | | | 45 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 22 | | nC |
| $R_{G(int)}$ | Internal Gate Resistance | f=1MHz, $V_{AC}$=25mV | | 5.6 | | Ω |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=1000V<br>$V_{GS}$=-5/18V, $I_D$=25A<br>L=150uH, $R_{ext}$=4.7Ω | | 16 | | ns |
| $t_r$ | Rise Time | | | 21 | | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | | 38 | | ns |
| $t_f$ | Fall Time | | | 15 | | ns |

## Typical Performance-Reverse Diode ($T_J$=25°C unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{FSD}$ | Forward Voltage | $V_{GS}$=0V, $I_F$=20A, $T_J$=25°C | | 3.9 | 6 | V |
| | | $V_{GS}$=0V, $I_F$=20A, $T_J$=175°C | | 3.6 | 6 | V |
| $I_S$ | Continuous Diode Forward Current | $V_{GS}$=0V, $T_C$=25°C | | 36 | | A |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$=-5V, $I_F$=20A<br>$V_R$=1000V<br>di/dt=1000A/μs, $T_J$=175°C | | 38 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | | 360 | | nC |
| $I_{rrm}$ | Peak Reverse Recovery Current | | | 10.5 | | A |

## Thermal Characteristics

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 0.62 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 40 | °C/W |

The values are based on the junction-to case thermal impedance which is measured with the device mounted to a large heat sink assuming maximum junction temperature of $T_j$(max)=175°C.

## Electrical Characteristics

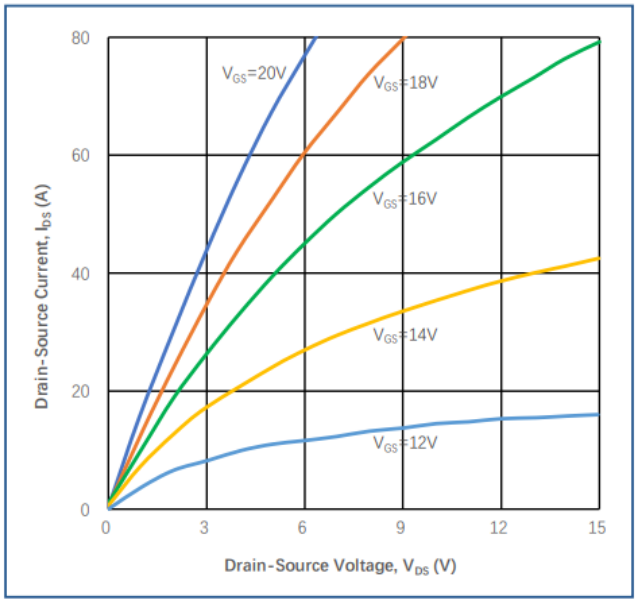



**Figure 1**
Output Characteristics ($T_J$=25°C)

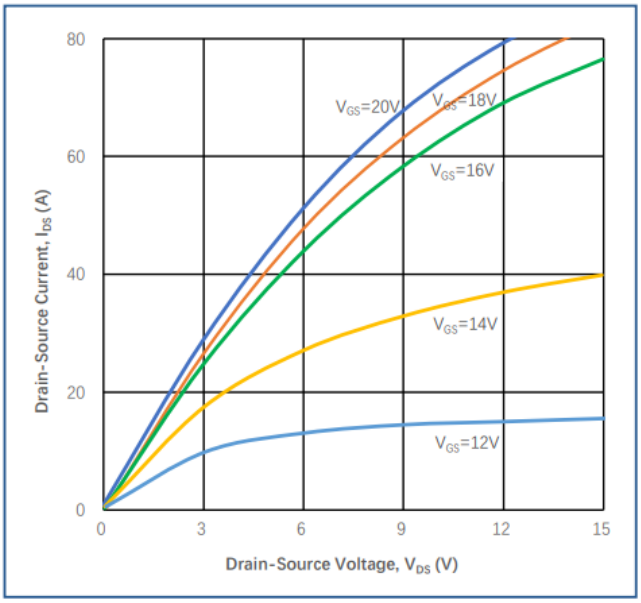



**Figure 2**
Output Characteristics ($T_J$=175°C)

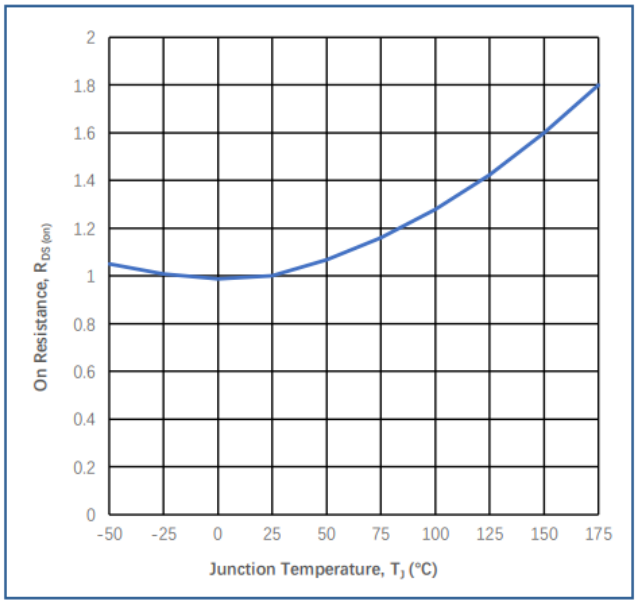



**Figure 3**
Normalized On-Resistance vs. Temperature

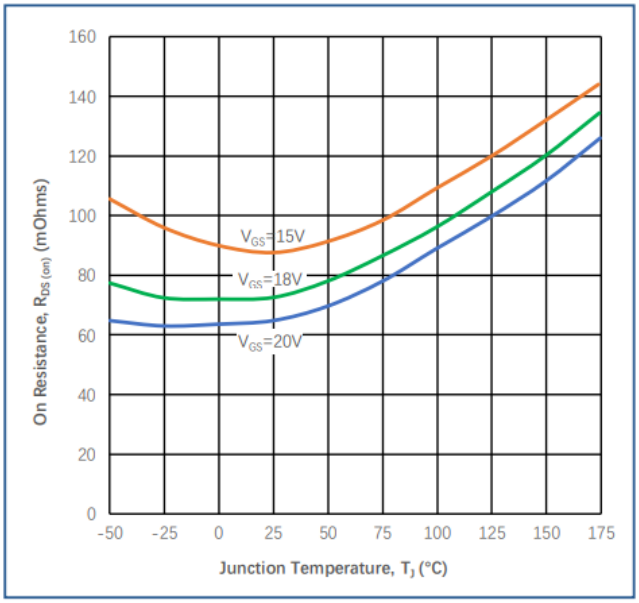



**Figure 4**
On-Resistance vs. Temperature

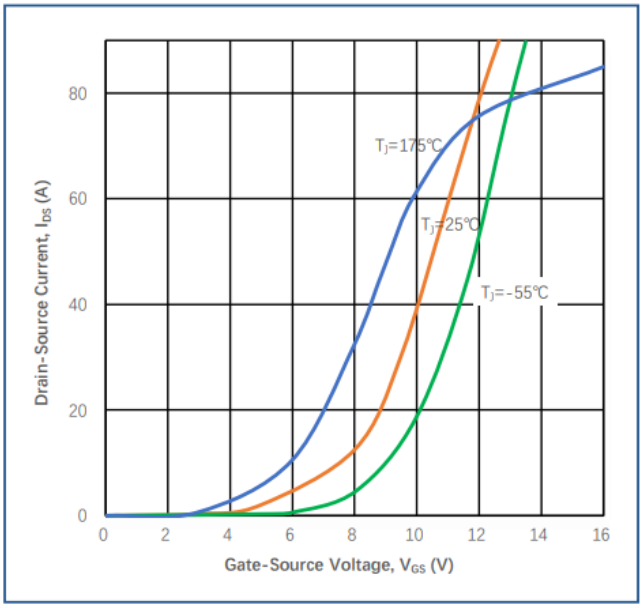



**Figure 5**
Transfer Characteristic

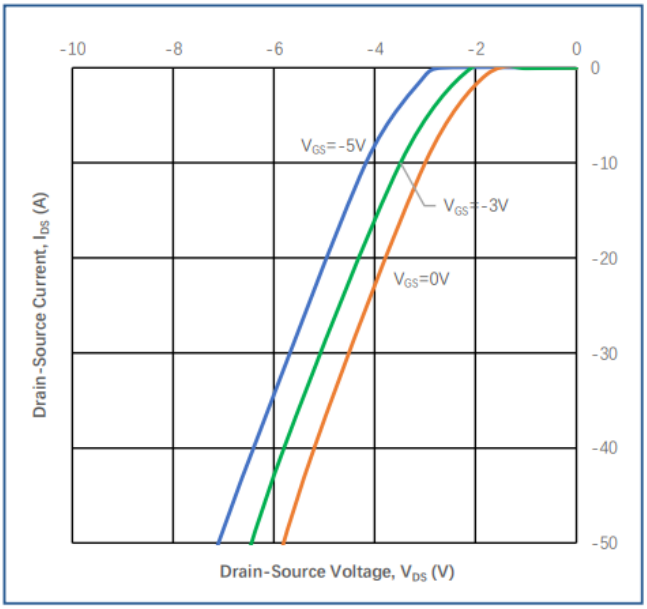



**Figure 6**
Body Diode Characteristic at 25°C

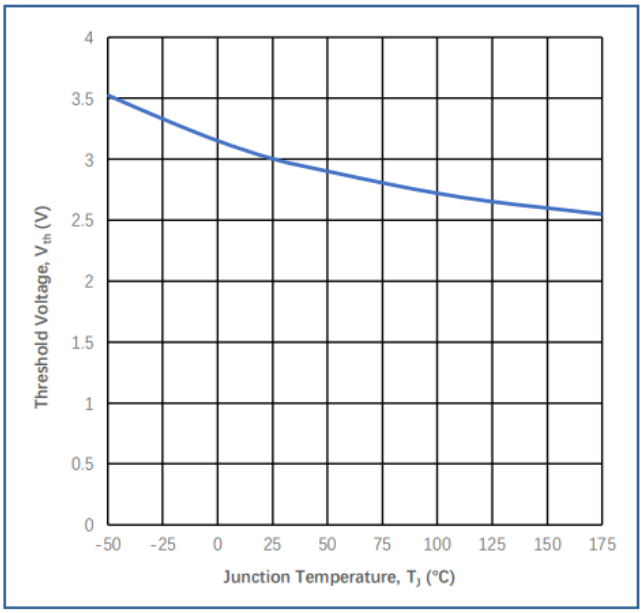



**Figure 7**
Threshold Voltage vs. Temperature

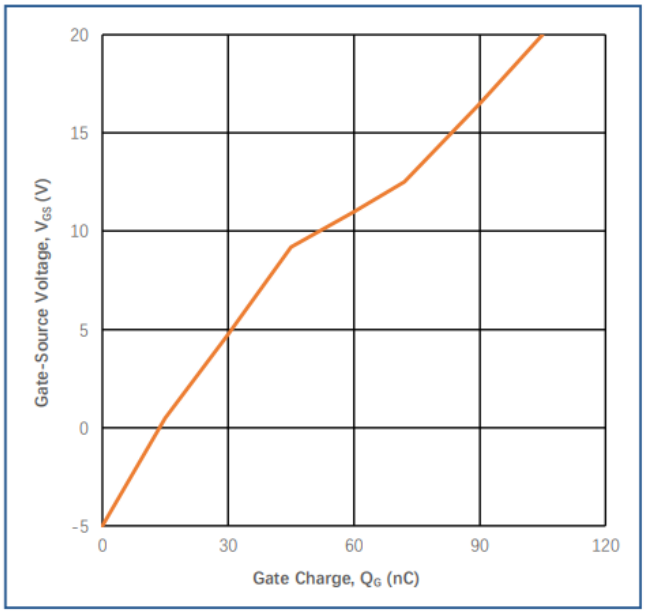



**Figure 8**
Gate Charge Characteristics

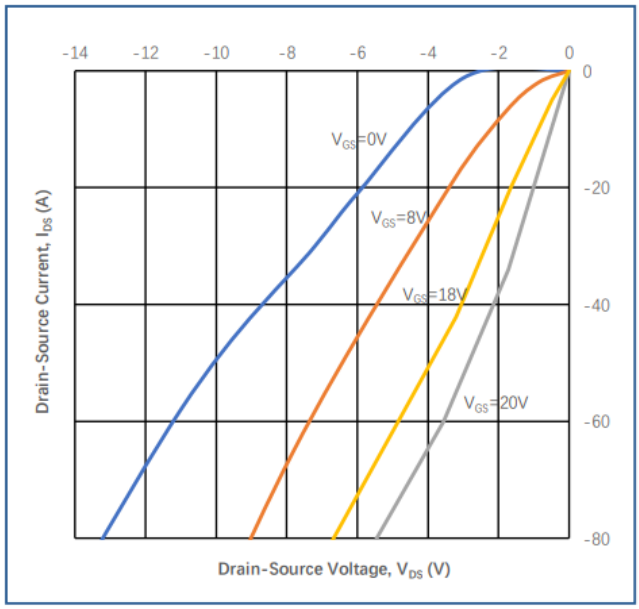



**Figure 9**

3rd Quadrant Characteristic at 25°C

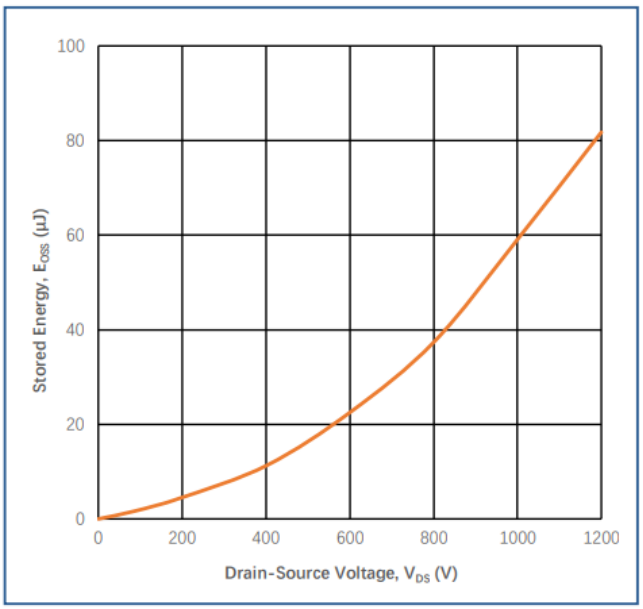



**Figure 10**

Output Capacitor Stored Energy

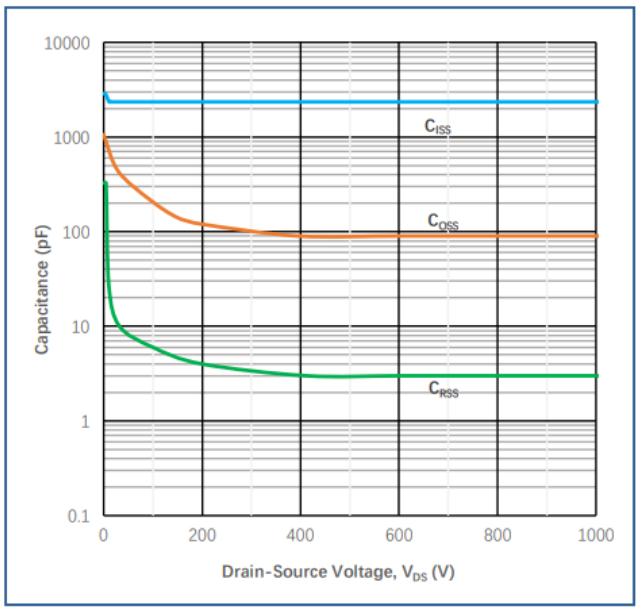



**Figure 11**

Capacitances vs. Drain-Source

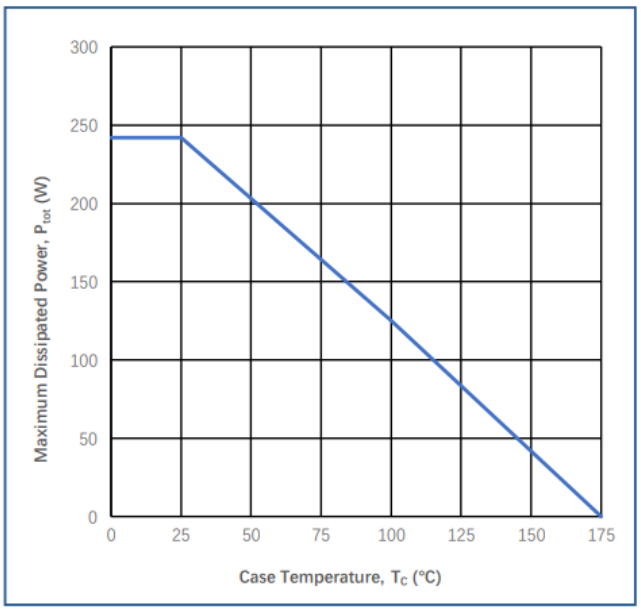



**Figure 12**

Max Power Dissipation Derating vs $T_C$

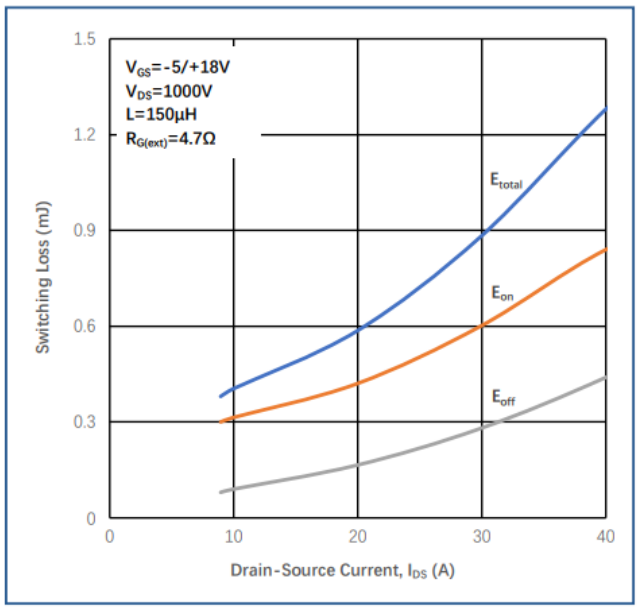



**Figure 13**
Switching Energy vs. Drain Current

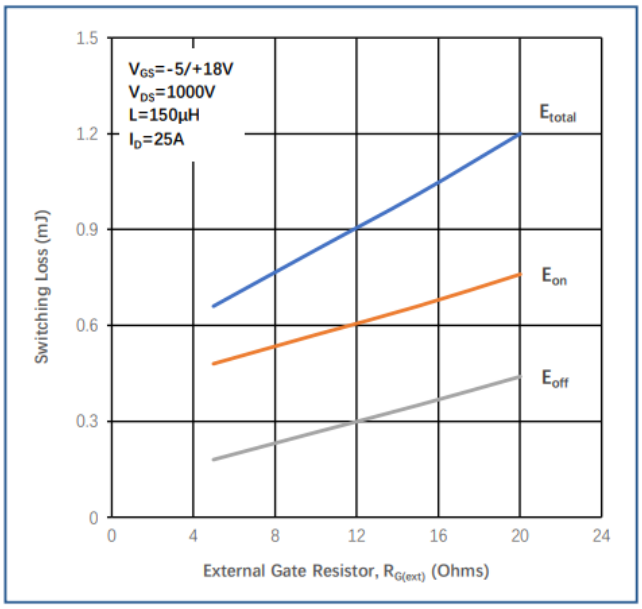



**Figure 14**
Switching Energy vs. $R_{G(ext)}$

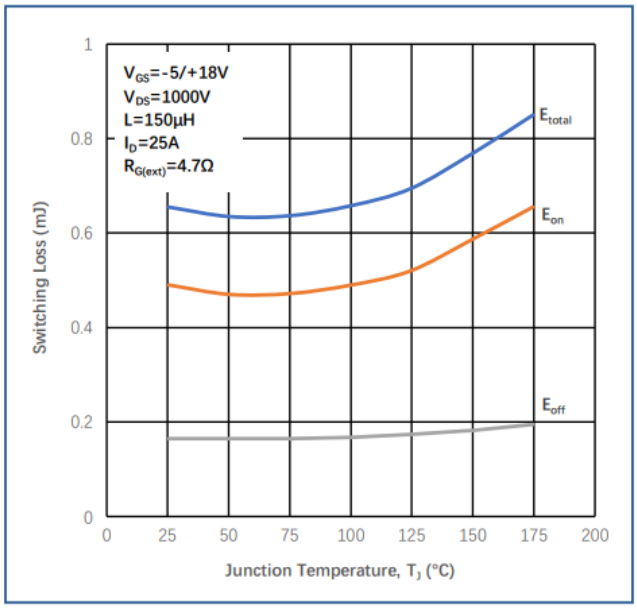



**Figure 15**
Switching Energy vs. Temperature

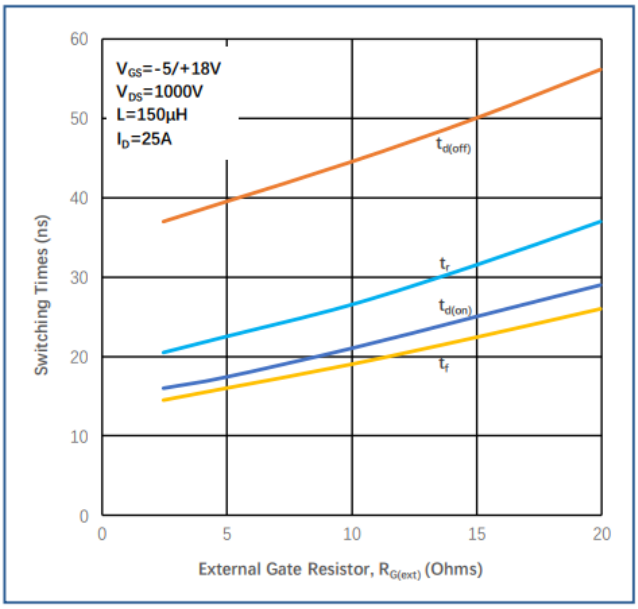



**Figure 16**
Switching Times vs. $R_{G(ext)}$

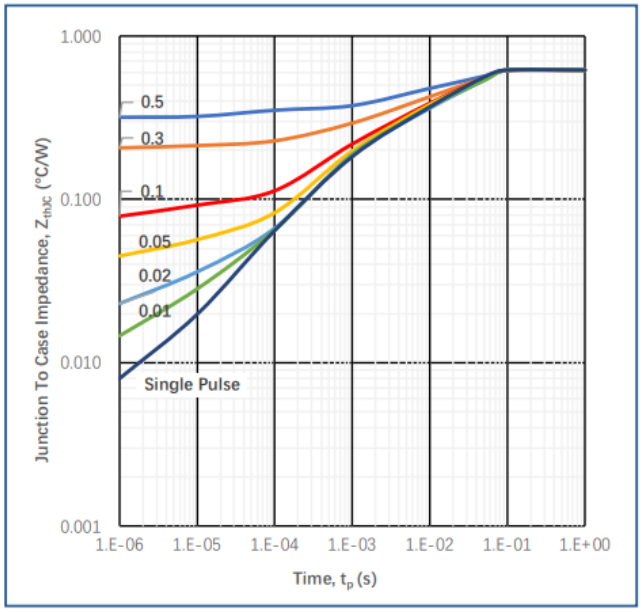



**Figure 17**
Transient Thermal Impedance

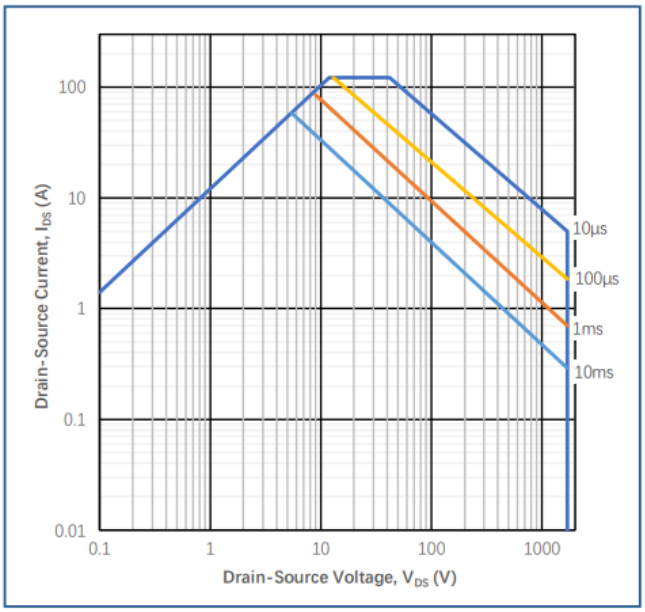
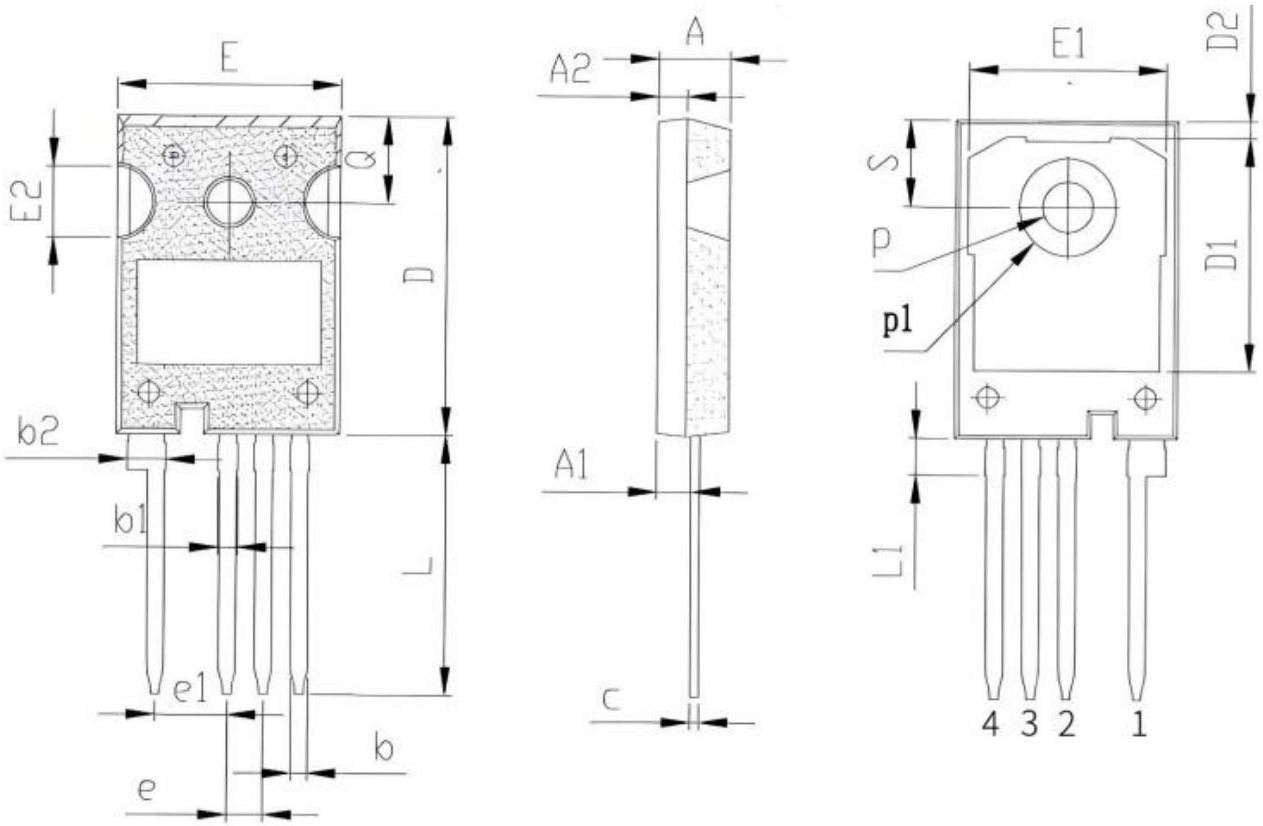



**Figure 18**
Safe Operating Area

## Package Drawing: TO-247-L




## Dimensions (Unit: mm)

| Symbols | Dimensions in millimeters | | |
|---|---|---|---|
| | Min. | Type | Max. |
| A | 4.90 | 5.00 | 5.10 |
| A1 | 2.30 | 2.40 | 2.50 |
| A2 | 1.90 | 2.00 | 2.10 |
| b | 1.15 | 1.20 | 1.25 |
| b1 | 1.15 | 1.30 | 1.45 |
| b2 | 2.45 | 2.65 | 2.80 |
| C | 0.55 | 0.60 | 0.65 |
| D | 22.30 | 22.54 | 22.69 |
| D1 | 16.20 | 16.50 | 16.80 |
| D2 | 1.02 | 1.17 | 1.32 |
| e | 2.54 BSC | | |
| E1 | 5.08 BSC | | |
| E | 15.70 | 15.80 | 15.90 |
| E1 | 13.80 | 14.0 | 14.20 |
| E2 | 4.90 | 5.00 | 5.10 |
| L | 18.20 | 18.38 | 18.55 |
| L1 | 2.23 | 2.58 | 2.73 |
| P | 3.50 | 3.60 | 3.70 |
| P1 | 7.04 | 7.19 | 7.34 |
| Q | 6.00 | 6.15 | 6.30 |

| Pin | Symbol | Description |
|---|---|---|
| 1, Tab | D | Drain |
| 2 | S | Power Source |
| 3 | S | Driver Source |
| 4 | G | Gate |

| Revision version | Description | Date |
|---|---|---|
| 1 | Initial | 03.2026 |