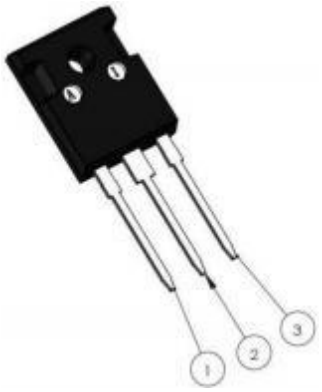
# JX0320R065MT3

**650V N-Channel MOSFET**

## Description

Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size.

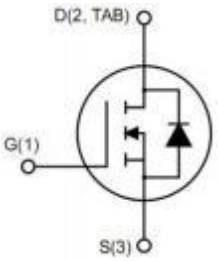



## Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Optimized package with separate driver source pin
- Easy to parallel and simple to drive
- ROHS Compliant, Halogen free

## Application

- EV Charging
- DC/DC Converters
- Switch Mode Power Supplies
- Power Factor Correction Modules
- Solar PV inverters






## Ordering Information

| Part Number | Marking | Package | Packaging |
|---|---|---|---|
| JX0320R065MT3 | JX0320R065MT3 | TO247-3 | Tube |

## Absolute Maximum Ratings(Tc=25℃)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 650 | V |
| $I_D$ | Drain Current(continuous)at Tc=25℃ | 8 | A |
| $I_D$ | Drain Current(continuous)at Tc=100℃ | 6 | A |
| $I_{DM}$ | Drain Current (pulsed) | 12 | A |
| $V_{GS}$ | Gate-Source Voltage | -8/+18 | V |
| $P_D$ | Power Dissipation $T_C$ = 25°C | 65 | W |
| $T_J$, Tstg | Junction and Storage Temperature Range | -55 to +150 | ℃ |



## Electrical Characteristics($T_J$ = 25℃ 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 | 650 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ =650V, $V_{GS}$ =0V, $T_J$=25。C | | | 50 | μA |
| $I_{GSS}$ | Gate-body Leakage Current | $V_{DS}$ =0 V ; $V_{GS}$ =-8 to 18V | | 10 | 250 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$= $V_{GS}$, $I_D$=1mA | 1.5 | 1.9 | 2.5 | V |
| $V_{GSon}$ | Recommended turn-on Voltage | Static | | 15 | | V |
| $V_{GSoff}$ | Recommended turn-off Voltage | | | -3 | | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS}$=15V, $I_D$=2A | | 320 | 450 | mΩ |
| | | $V_{GS}$=15V,$I_D$=2A $T_J$=150°C | | 500 | | mΩ |

## Typical Performance-Dynamic

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input Capacitance | $V_{DS}$=600V,f= 1MHz, $V_{AC}$=25mV | | 339 | | pF |
| $C_{oss}$ | Output Capacitance | | | 20 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 3.5 | | pF |
| $g_{fs}$ | Transconductance | $V_{DS}$= 15V , $I_D$=2A | | 2.8 | | S |
| $E_{OSS}$ | Coss Stored Energy | $V_{DS}$=600V,f= 1MHz | | 5 | | μJ |
| $E_{ON}$ | Turn-On Energy（Body Diode） | $V_{DS}$=400V,$V_{GS}$=-3/15V, $I_D$=2A，L= 1.5mH $T_J$= 150℃ | | 47 | | μJ |
| $E_{OFF}$ | Turn-Off Energy（Body Diode） | | | 8.5 | | μJ |
| $Q_g$ | Total Gate Charge | $V_{DS}$=400V, $V_{GS}$=-3V/15V, $I_D$= 2 A | | 12.8 | | nC |
| $Q_{gs}$ | Gate-source Charge | | | 3 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 4 | | nC |
| $R_{G(int)}$ | Internal Gate Resistance | f= 1MHz,$V_{AC}$=25mV | | 8 | | Ω |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=400V,$V_{GS}$=-3V/15V, $I_D$ =2A, L= 1mH Rext=2.5Ω | | 5 | | ns |
| $t_r$ | Rise Time | | | 6 | | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | | 7 | | ns |
| $t_f$ | Fall Time | | | 8.8 | | ns |

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

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{FSD}$ | Forward Voltage | $V_{GS}$=0V,$I_F$=2A,$T_J$=25°C | | 5.5 | 6.5 | V |
| | | $V_{GS}$=0V,$I_F$=2A,$T_J$= 150°C | | 4.8 | 6.5 | V |
| Is | Continuous Diode Forward Current | $V_{GS}$=0V，$T_C$=25°C | | | | A |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$=-3 V, $I_F$=2 A, $V_R$=400 V, $T_J$= 150°C di/dt= 1000 A/μs | | | | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | | | | nC |
| $I_{rrm}$ | Peak Reverse Recovery Current | | | | | A |

## Thermal Characteristics

| Symbol | Parameter | Value. | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 1.92 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 62 | °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 Tj(max)= 150℃

## Electrical Characteristics

**Fig1. Output characteristics ($T_J$ = 25 °C)**

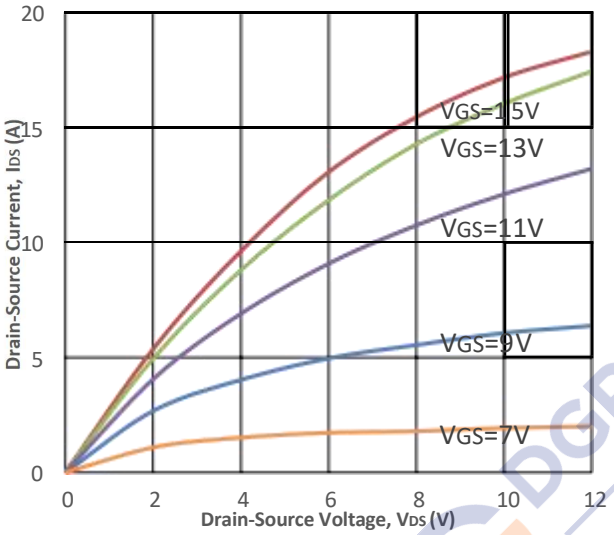



**Fig2. Output characteristics ($T_J$ = 150 °C)**

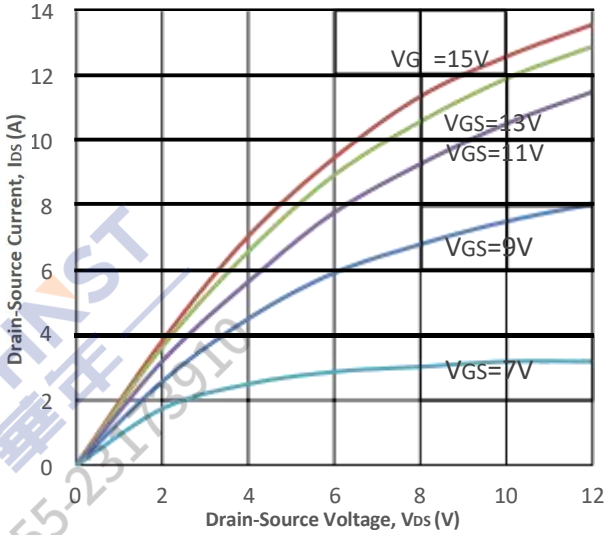



**Fig3.Normalized On-Resistance vs. Temperature**

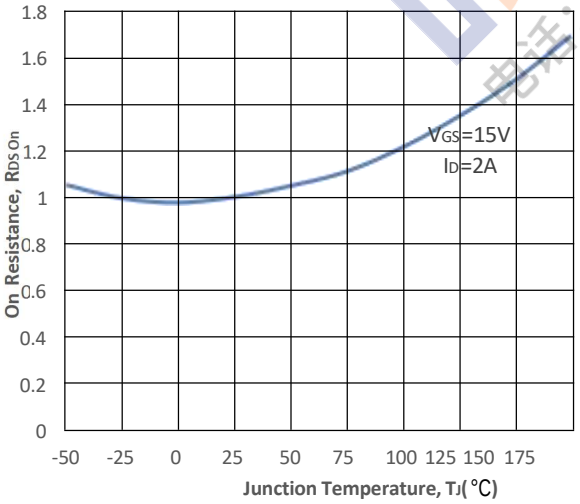



**Fig4. On-Resistance vs. Temperature**

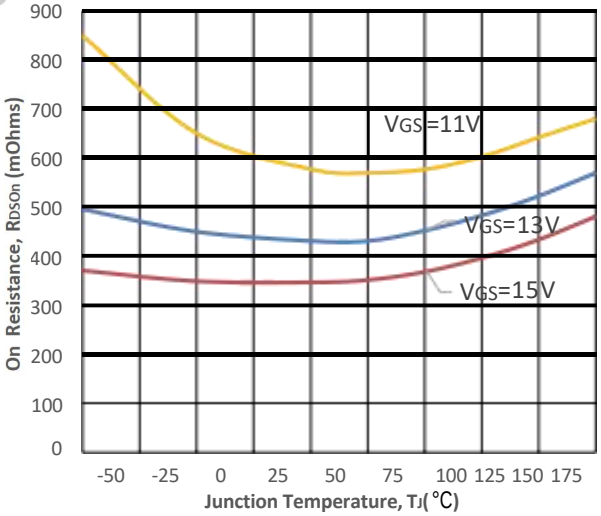



**Fig5. Transfer Characteristic**

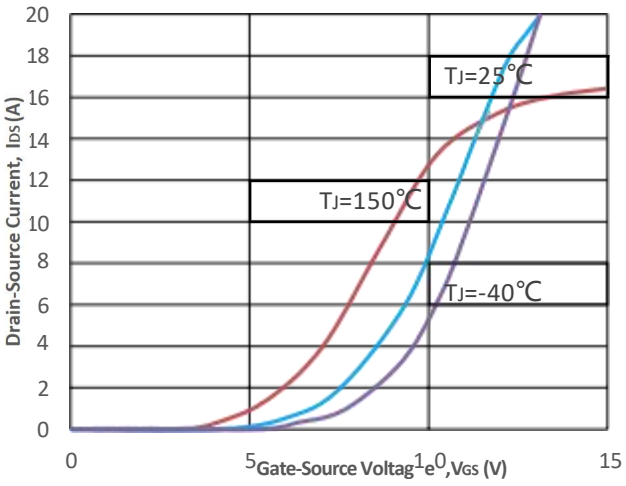



**Fig6. Body Diode Characteristic at 25 °C**

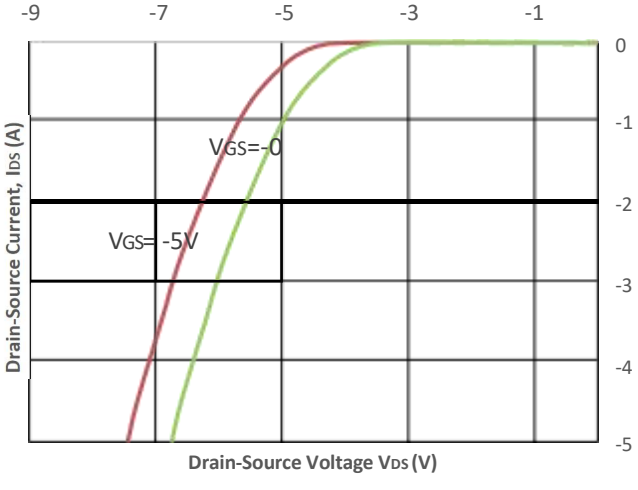


Fig7.Threshold Voltage vs. Temperature

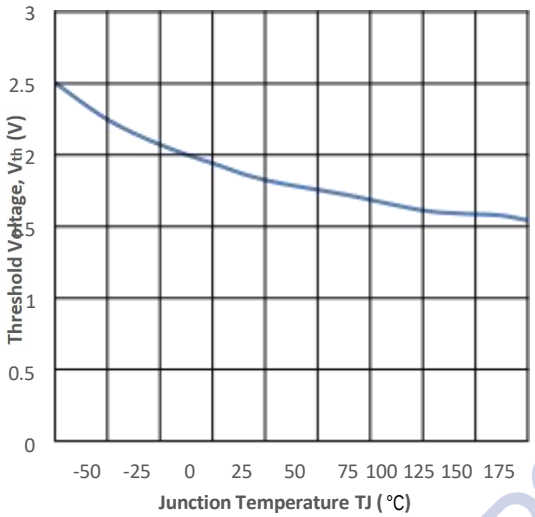



Fig8. Gate Charge Characteristics

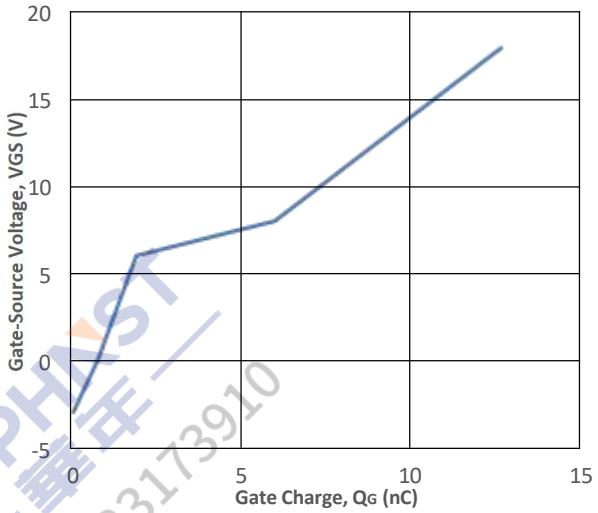



Fig9. 3rd Quadrant Characteristic at 25 °C

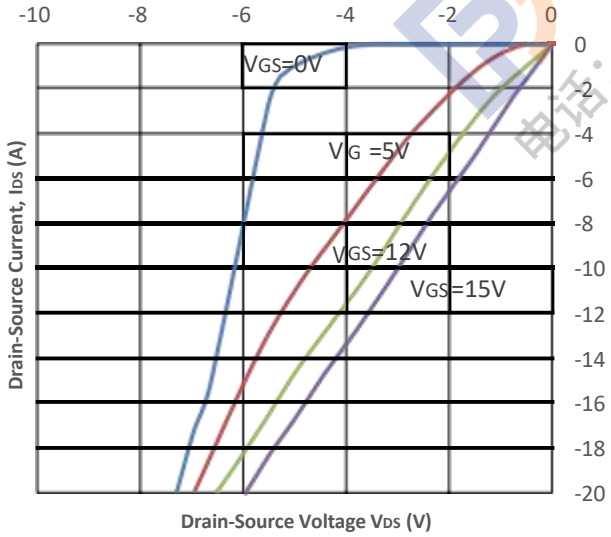



Fig10. Output Capacitor Stored Energy

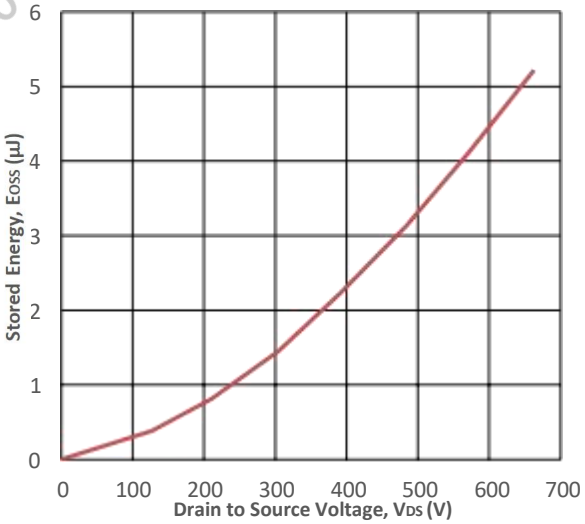



Fig11. Capacitances vs. Drain-Source

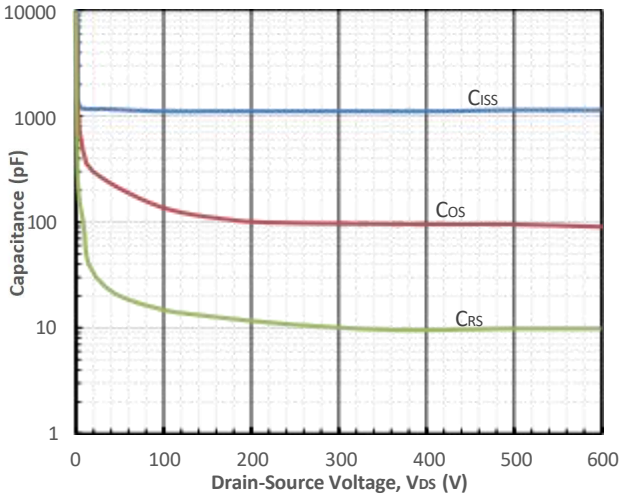



Fig12. Max Power Dissipation Derating Vs TC

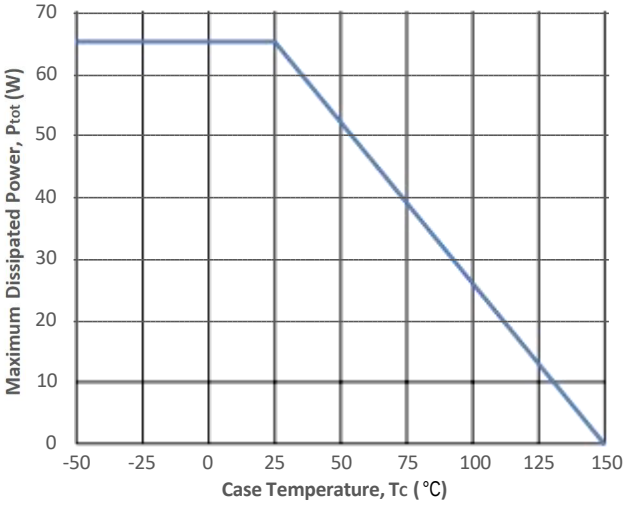


Fig13. Switching Energy vs. Drain Current

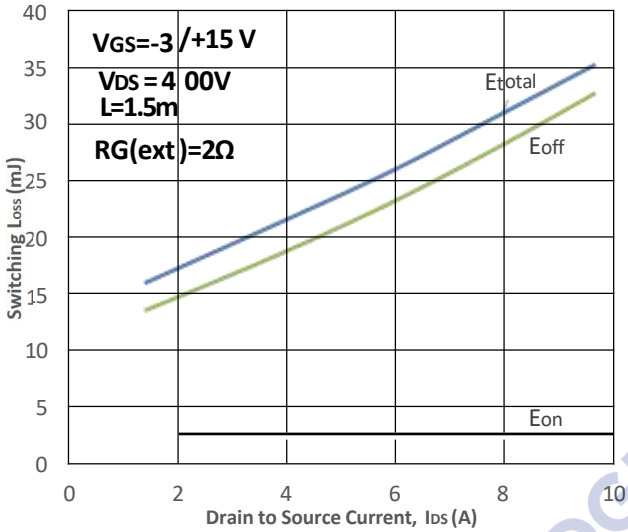



Fig14. Switching Energy vs. RG(ext)

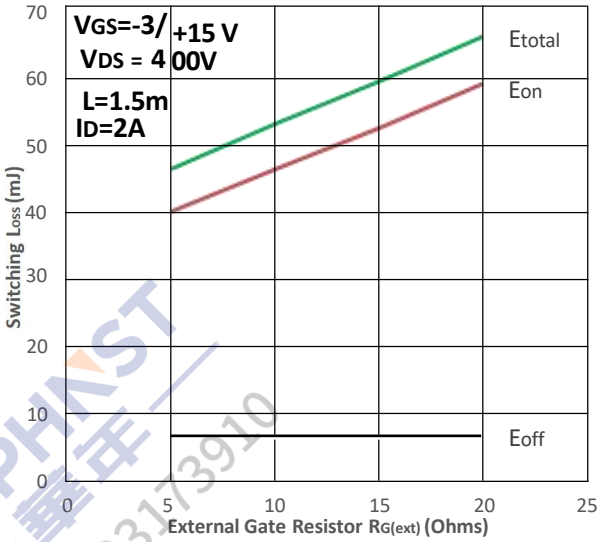



Fig15. Switching Energy vs. Temperature

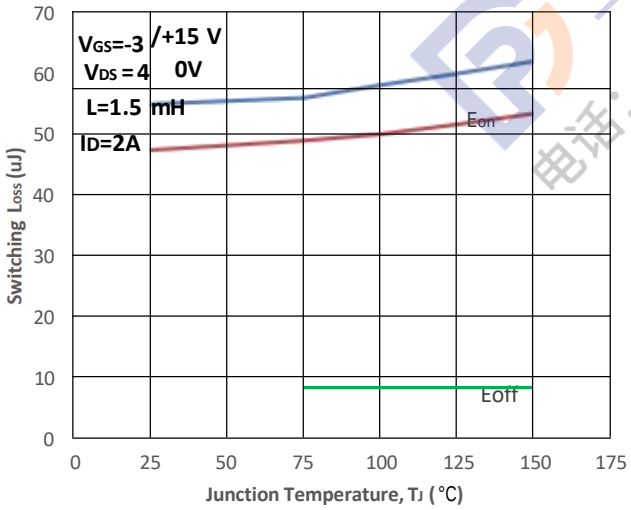



Fig16. Switching Times vs. RG(ext)

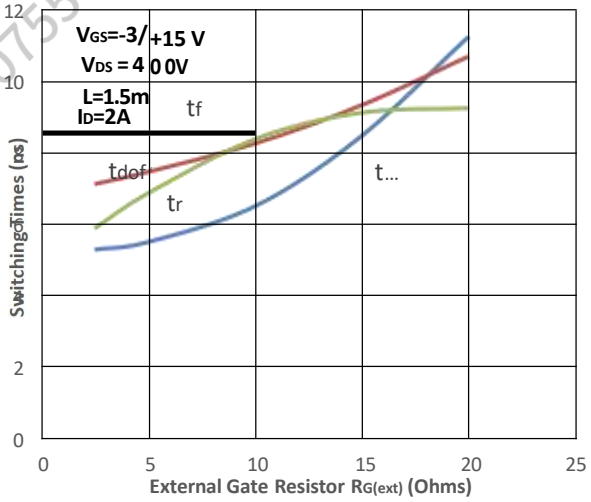



Fig17.Transient Thermal Impedance

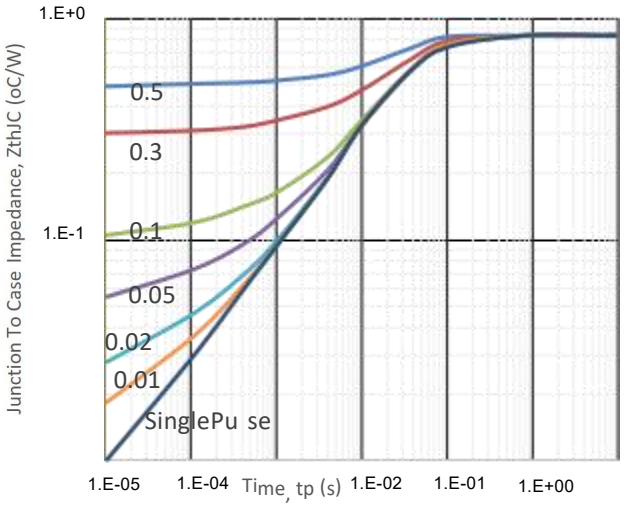
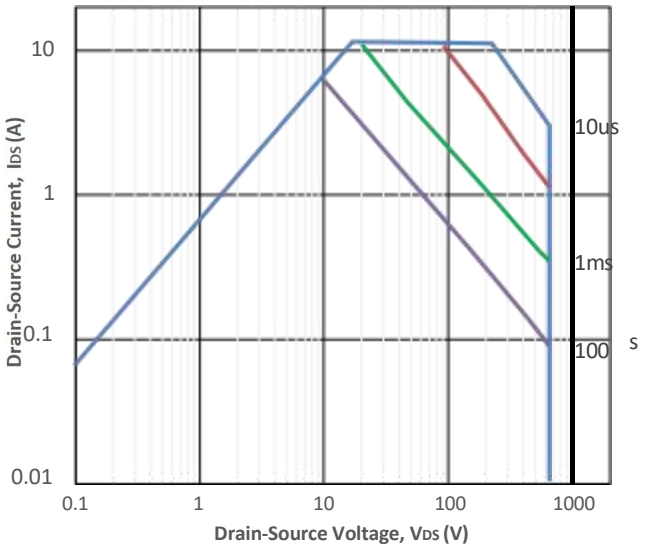
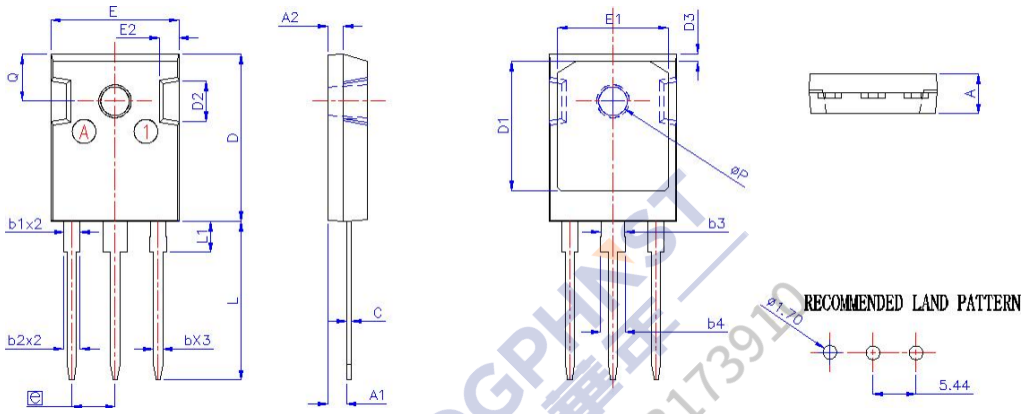



Fig18. Safe Operating Area



## Package Drawing:




## Dimensions ( UNIT: mm )

| SYMBDLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.90 | 5.00 | 5.10 | 0.193 | 0.197 | 0.201 |
| A1 | 2.31 | 2.42 | 2.52 | 0.091 | 0.095 | 0.099 |
| A2 | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| b | 1.16 | 1.22 | 1.27 | 0.046 | 0.048 | 0.050 |
| b1 | 1.96 | 2.02 | 2.07 | 0.079 | 0.080 | 0.081 |
| b2 | 2.03 | 2.07 | 2.10 | 0.080 | 0.0815 | 0.083 |
| b3 | 2.96 | 3.02 | 3.07 | 0.117 | 0.119 | 0.121 |
| b4 | 3.03 | 3.07 | 3.1 | 0.119 | 0.120 | 0.122 |
| C | 0.59 | 0.62 | 0.66 | 0.023 | 0.024 | 0.026 |
| D | 20.90 | 21.00 | 21.10 | 0.823 | 0.827 | 0.831 |
| D1 | 15.96 | 16.26 | 16.56 | 0.628 | 0.640 | 0.652 |
| D2 | | 4.3 | | | 4.3 | |
| D3 | 0.8 | 0.95 | 1.1 | 0.031 | 0.037 | 0.043 |
| e | | 5.44 BSC | | | 0.214 BSC | |
| E | 15.95 | 16.15 | 16.35 | 0.628 | 0.636 | 0.644 |
| E1 | 13.82 | 14.02 | 14.26 | 0.544 | 0.552 | 0.561 |
| E2 | | 4.3 | | | 0.169 | |
| L | 19.72 | 19.92 | 20.12 | 0.776 | 0.784 | 0.792 |
| L1 | —— | —— | 3.86 | —— | —— | 0.152 |
| Q | | 5.95 BSC | | | 0.234BSC | |
| ØP | 3.55 | 3.60 | 3.70 | 0.140 | 0.142 | 0.146 |