# P-Channel Enhancement Mode Power MOSFET

## Description

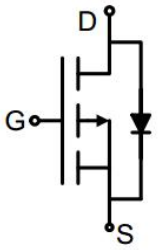
The G75P04K uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

## General Features

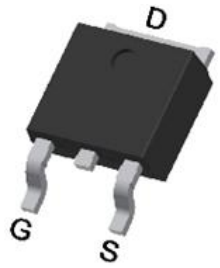
- $V_{DS}$ -40V
- $I_D$ (at $V_{GS}$ = -10V) -80A
- $R_{DS(ON)}$ (at $V_{GS}$ = -10V) < 6.5mΩ
- $R_{DS(ON)}$ (at $V_{GS}$ = -4.5V) < 8.5mΩ
- 100% Avalanche Tested
- RoHS Compliant

## Application

- Power switch
- DC/DC converters




Schematic diagram




TO-252

## Ordering Information

| Device | Package | Marking | Packaging |
|---|---|---|---|
| G75P04K | TO-252 | G75P04 | 2500pcs/Reel |

## Absolute Maximum Ratings $T_C$ = 25ºC, unless otherwise noted

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -40 | V |
| Continuous Drain Current | $T_C$ = 25ºC | $I_D$ | -80 | A |
| | $T_C$ = 100ºC | | -50 | |
| Pulsed Drain Current (note1) | | $I_{DM}$ | -320 | A |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Power Dissipation | | $P_D$ | 115 | W |
| Single pulse avalanche energy （note2） | | $E_{AS}$ | 306 | mJ |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 To 150 | ºC |

## Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 55 | ºC/W |
| Thermal Resistance, Junction-to-Case | $R_{thJC}$ | 1.1 | ºC/W |

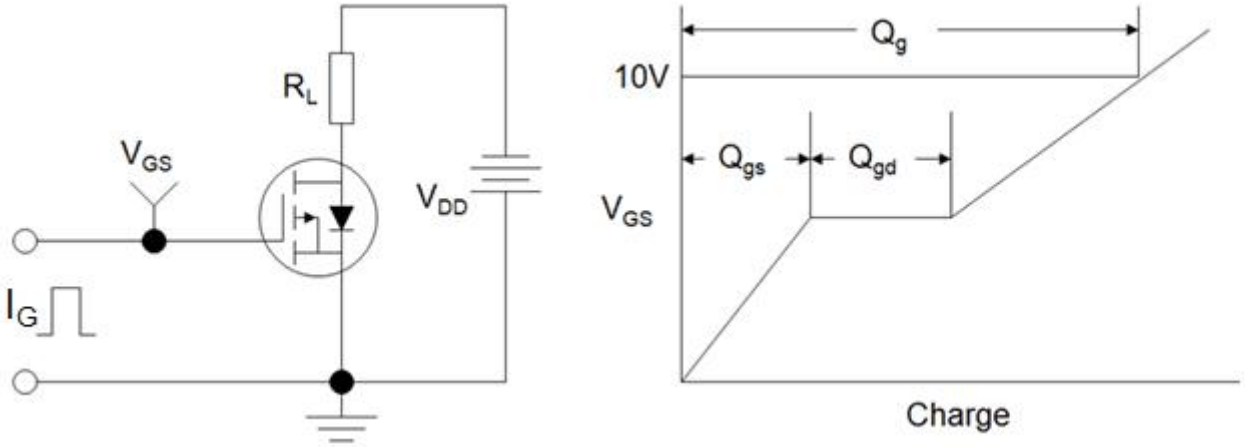
**Specifications** $T_J$ = 25ºC, unless otherwise noted

| Parameter | Symbol | Test Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| **Static Parameters** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = -250μA | -40 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = -40V, $V_{GS}$ = 0V | -- | -- | -1 | μA |
| Gate-Source Leakage | $I_{GSS}$ | $V_{GS}$ = ±20V | -- | -- | ±100 | nA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = -250μA | -1.0 | -1.4 | -2.5 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = -10V, $I_D$ = -20A | -- | 5.0 | 6.5 | mΩ |
| | | $V_{GS}$ = -4.5V, $I_D$ = -20A | -- | 6.7 | 8.5 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = -5V,$I_D$ = -20A | -- | 44 | -- | S |
| **Dynamic Parameters** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = -20V, f = 1.0MHz | -- | 6600 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 690 | -- | |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 670 | -- | |
| Total Gate Charge | $Q_g$ | $V_{DD}$ = -20V, $I_D$ = -20A, $V_{GS}$ = -10V | -- | 125 | -- | nC |
| Gate-Source Charge | $Q_{gs}$ | | -- | 16 | -- | |
| Gate-Drain Charge | $Q_{gd}$ | | -- | 25 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = -20V, $I_D$ = -20A, $R_G$ = 1Ω | -- | 15 | -- | ns |
| Turn-on Rise Time | $t_r$ | | -- | 12 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 70 | -- | |
| Turn-off Fall Time | $t_f$ | | -- | 18 | -- | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | $T_C$ = 25ºC | -- | -- | -80 | A |
| Body Diode Voltage | $V_{SD}$ | $T_J$ = 25ºC, $I_{SD}$ = -20A, $V_{GS}$ = 0V | -- | -- | -1.2 | V |
| Reverse Recovery Charge | $Q_{rr}$ | $I_F$ = -20A, $V_{GS}$ = 0V di/dt=-100A/us | -- | 50 | -- | nC |
| Reverse Recovery Time | $T_{rr}$ | | -- | 53 | -- | ns |

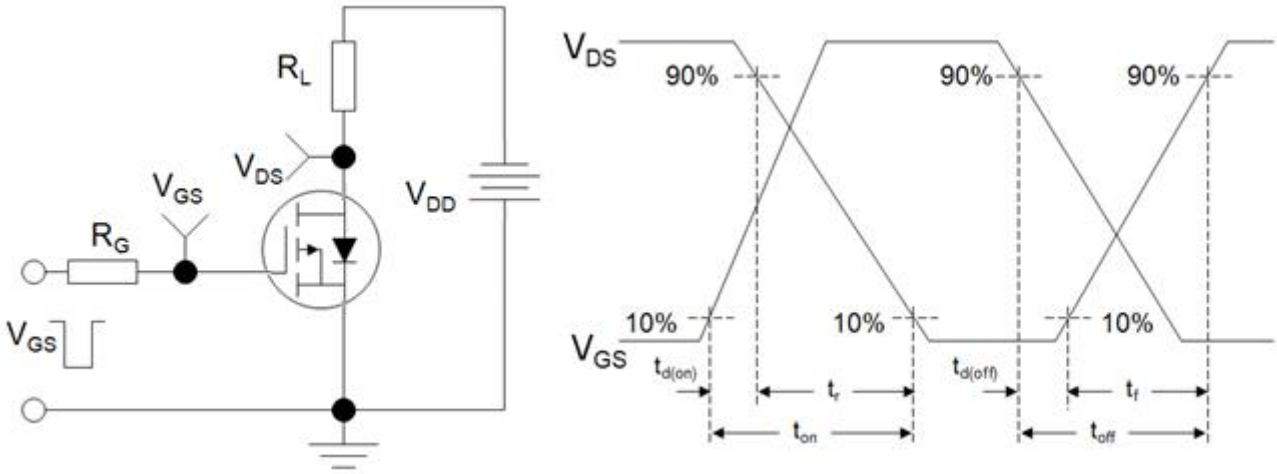
**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=-40V,VGS=-10V,L=0.5mH,Rg=25Ω
   The table shows the minimum avalanche energy, which is 841mJ when the device is tested until failure
3. Identical low side and high side switch with identical $R_G$

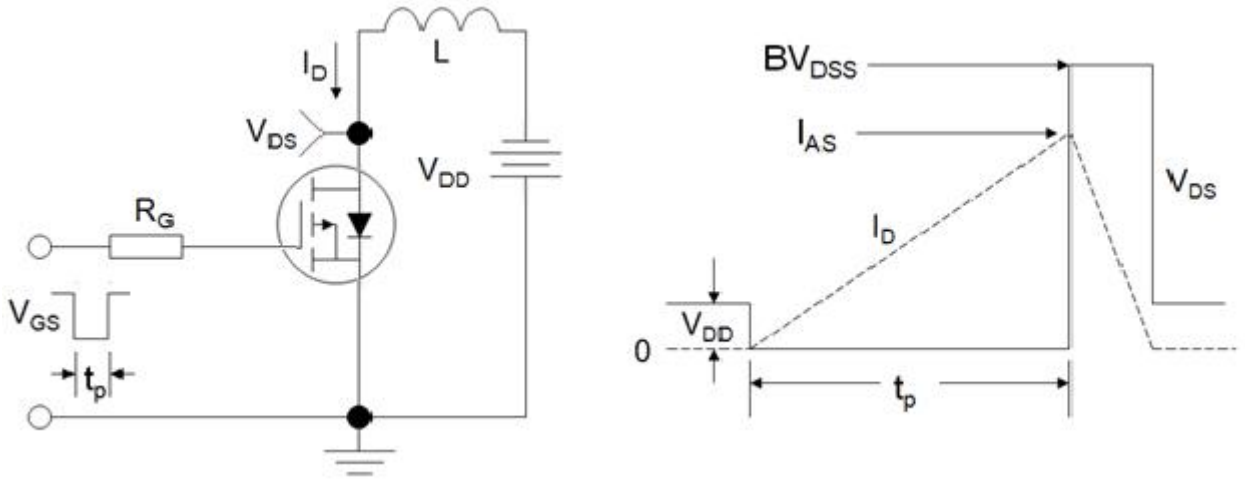
**Gate Charge Test Circuit**




**Switch Time Test Circuit**




**EAS Test Circuit**



**Typical Characteristics** $T_J$ = 25ºC, unless otherwise noted

**Figure 1. Output Characteristics**

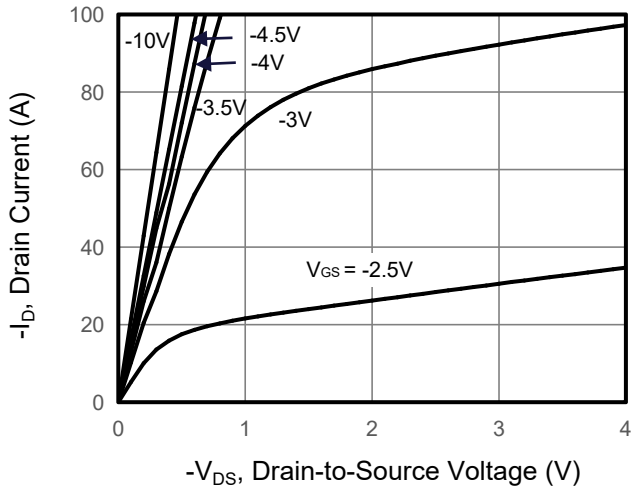



**Figure 2. Transfer Characteristics**

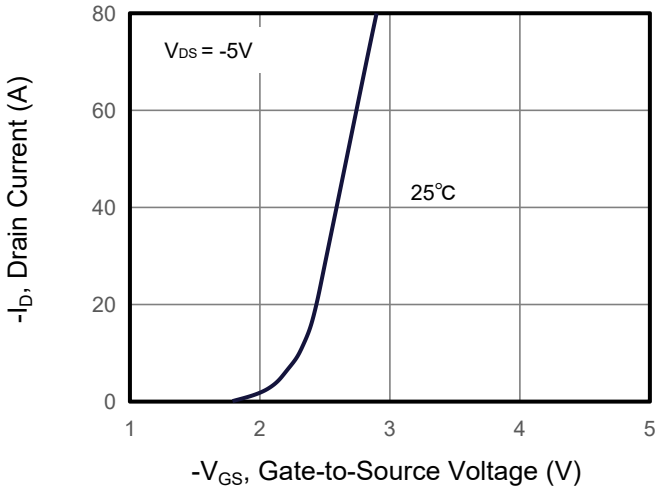



**Figure 3.Drain Source On Resistance**

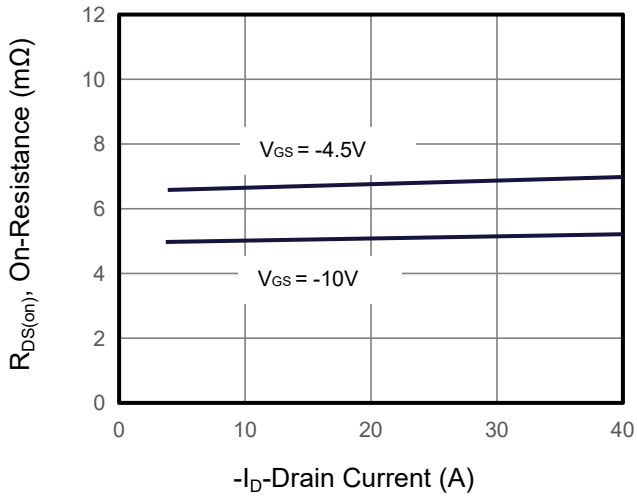



**Figure 4. Gate Charge**

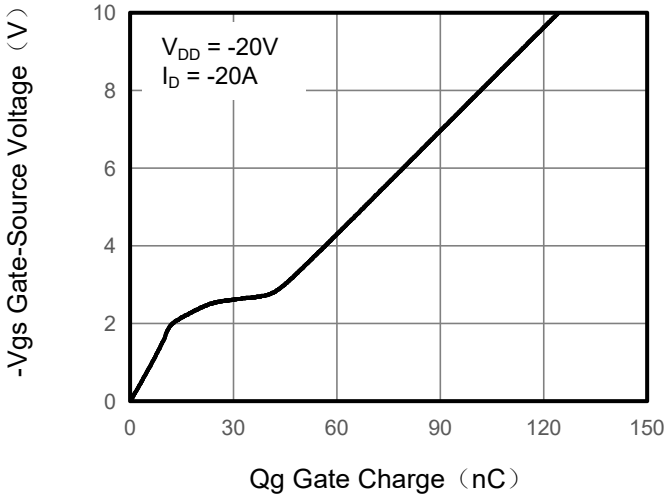



**Figure 5. Capacitance**

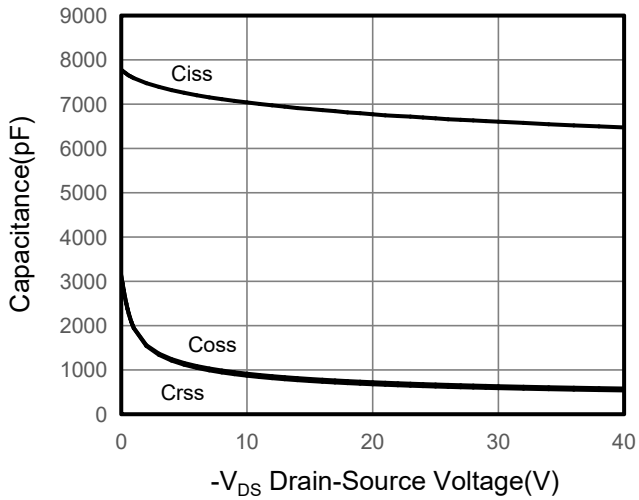
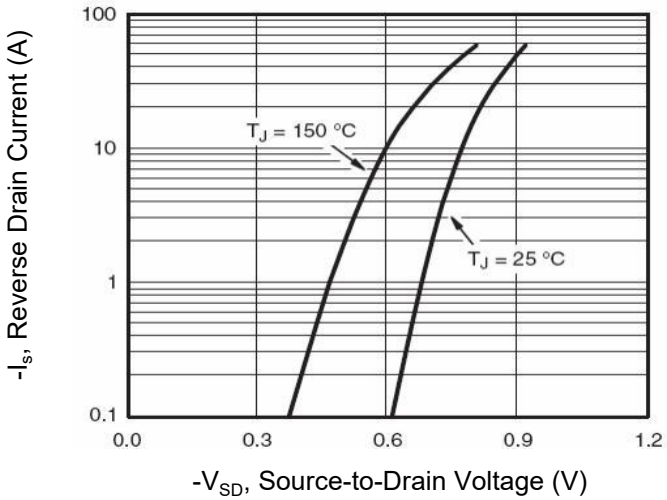



**Figure 6. Source-Drain Diode Forward**



**Typical Characteristics** $T_J$ = 25ºC, unless otherwise noted

**Figure 7. Drain-Source On-Resistance**

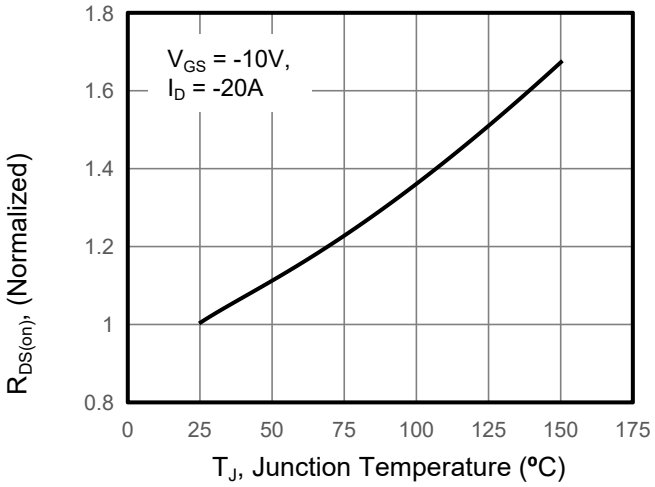



**Figure 8. Safe Operation Area**

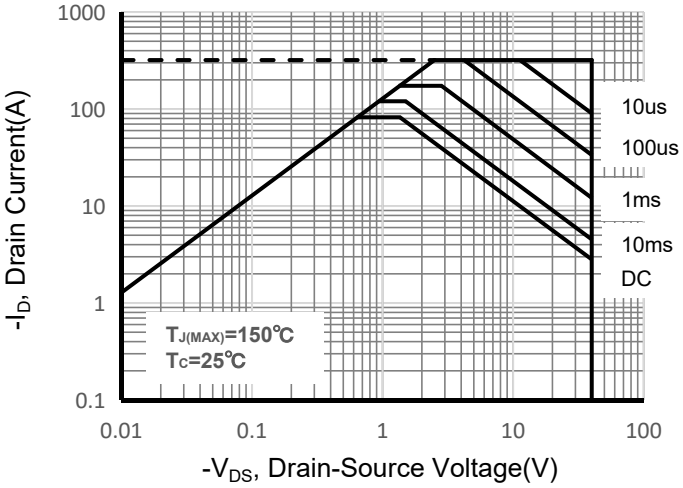



**Figure 9. Maximum Continuous Drain Current vs Case Temperature**

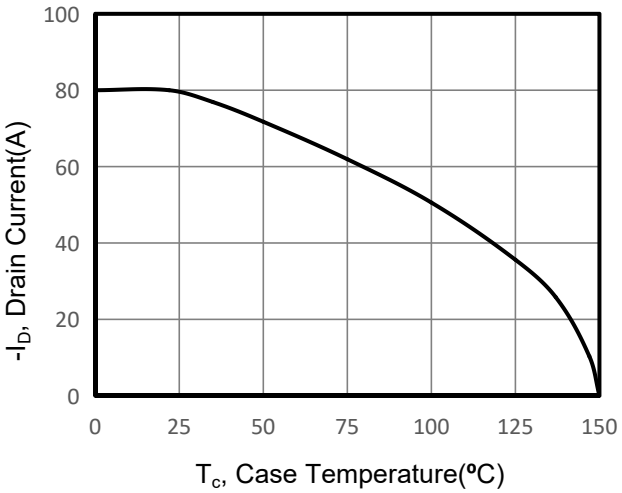
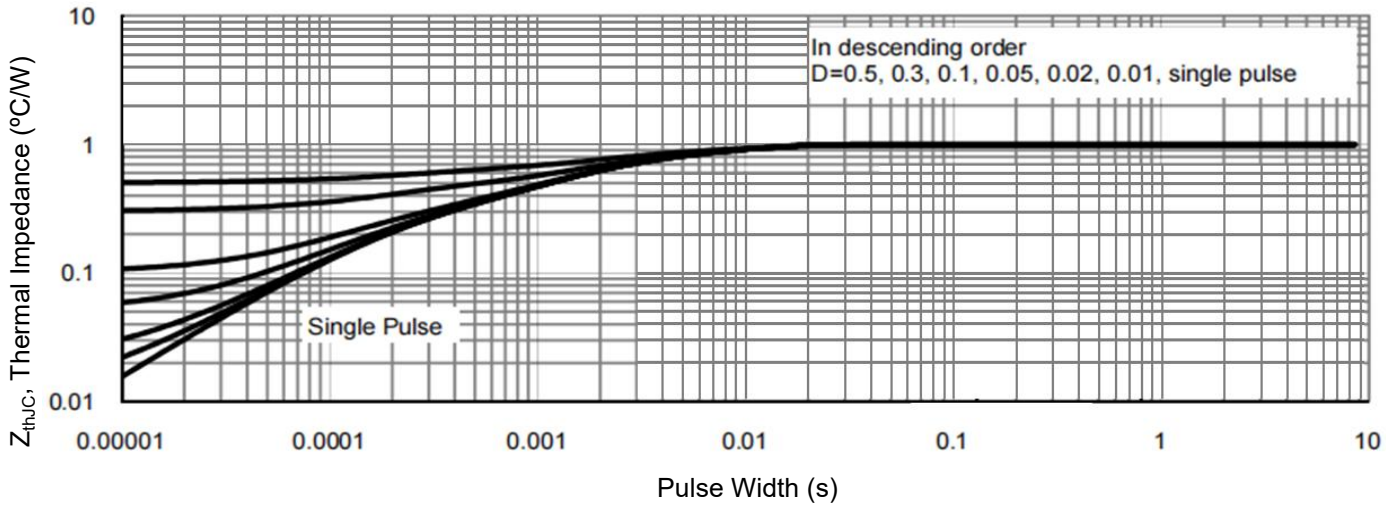
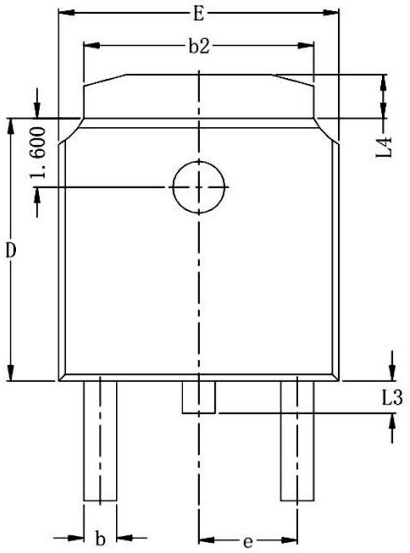


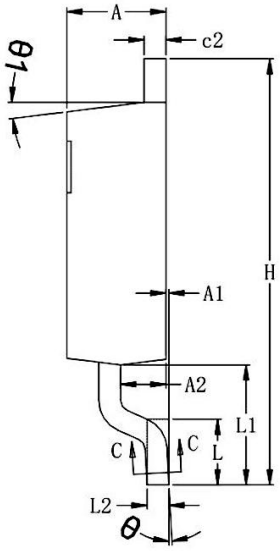

**Figure 10. Normalized Maximum Transient Thermal Impedance**



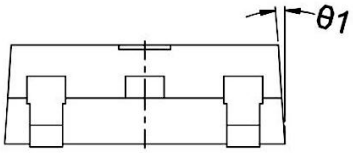
## TO-252 Package Information



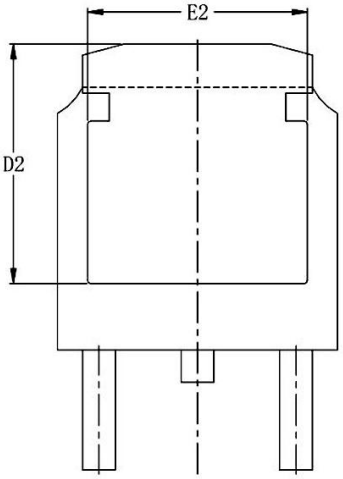

TOP VIEW




SIDE VIEW(Right)

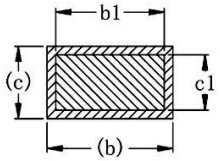



SIDE VIEW(Front)




OPTION 1

BOTTOM VIEW




SECTION:C-C

| DIM / SYMBOL | MIN. | NOM. | MAX. | DIM / SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|---|---|---|---|
| A | 2.200 | 2.300 | 2.400 | E | 6.400 | 6.500 | 6.600 |
| A1 | 0.000 | 0.070 | 0.130 | E2 | 4.900 | 5.100 | 5.300 |
| A2 | 0.950 | 1.050 | 1.150 | e | | 2.286 BSC. | |
| b | 0.700 | 0.800 | 0.900 | H | 9.700 | 9.900 | 10.100 |
| b1 | 0.660 | 0.760 | 0.860 | L | 1.380 | 1.525 | 1.725 |
| b2 | 5.134 | 5.334 | 5.534 | L1 | 2.588 | 2.788 | 2.988 |
| c | 0.448 | 0.548 | 0.648 | L2 | | 0.508 BSC. | |
| c1 | 0.458 | 0.508 | 0.558 | L3 | 0.600 | 0.750 | 0.950 |
| c2 | 0.448 | 0.548 | 0.648 | L4 | 0.812 | 1.012 | 1.212 |
| D | 6.000 | 6.100 | 6.200 | θ | 1° | 3° | 5° |
| D2 | 5.372 | 5.572 | 5.772 | θ1 | 6° | 7° | 8° |