# P-Channel Enhancement Mode Power MOSFET

## Description

The G200P04D3A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

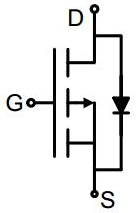
AEC-Q101 Qualified

## General Features

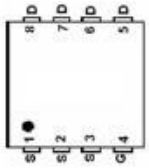
- $V_{DS}$ -40V
- $I_D$ (at $V_{GS}$ = -10V) -22A
- $R_{DS(ON)}$ (at $V_{GS}$ = -10V) < 16mΩ
- $R_{DS(ON)}$ (at $V_{GS}$ = -4.5V) < 20mΩ
- 100% Avalanche Tested
- RoHS Compliant

## Application

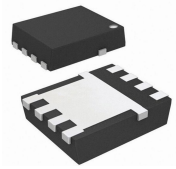
- Power switch
- DC/DC converters




Schematic diagram




pin assignment



DFN3X3-8L

## Ordering Information

| Device | Package | Marking | Packaging |
|---|---|---|---|
| G200P04D3A | DFN3X3-8L | G200P04 | 5000pcs/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 | $I_D$ | -22 | A |
| | $T_C$ = 100ºC | | -16 | |
| Pulsed Drain Current (note1) | | $I_{DM}$ | -88 | A |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Power Dissipation | | $P_D$ | 36 | W |
| Single pulse avalanche energy （note2） | | $E_{AS}$ | 61 | mJ |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 To 175 | ºC |

## Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 55 | ºC/W |
| Thermal Resistance, Junction-to-Case | $R_{thJC}$ | 4.17 | ºC/W |

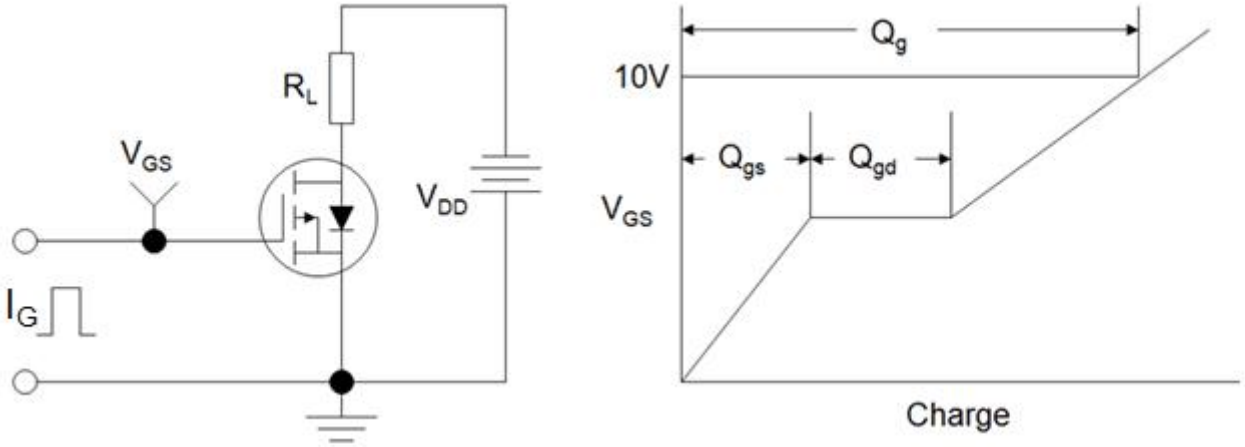
**Specifications** $T_J$ = 25ºC, unless otherwise noted

| 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 | -1.6 | -2.5 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = -10V, $I_D$ = -10A | -- | 13 | 16 | mΩ |
| | | $V_{GS}$ = -4.5V, $I_D$ = -5A | -- | 17 | 20 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = -5V,$I_D$ = -10A | -- | 15 | -- | S |
| **Dynamic Parameters** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = -20V, f = 1.0MHz | -- | 2500 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 220 | -- | |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 205 | -- | |
| Total Gate Charge | $Q_g$ | $V_{DD}$ = -20V, $I_D$ = -10A, $V_{GS}$ = -10V | -- | 45 | -- | nC |
| Gate-Source Charge | $Q_{gs}$ | | -- | 7 | -- | |
| Gate-Drain Charge | $Q_{gd}$ | | -- | 8 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = -20V, $I_D$ = -10A, $R_G$ = 3Ω | -- | 11 | -- | ns |
| Turn-on Rise Time | $t_r$ | | -- | 10 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 24 | -- | |
| Turn-off Fall Time | $t_f$ | | -- | 12 | -- | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | $T_C$ = 25ºC | -- | -- | -22 | A |
| Body Diode Voltage | $V_{SD}$ | $T_J$ = 25ºC, $I_{SD}$ = -10A, $V_{GS}$ = 0V | -- | -- | -1.2 | V |
| Reverse Recovery Charge | $Q_{rr}$ | $I_F$ = -10A, $V_{GS}$ = 0V di/dt=-500A/us | -- | 20 | -- | nC |
| Reverse Recovery Time | $T_{rr}$ | | -- | 13 | -- | ns |

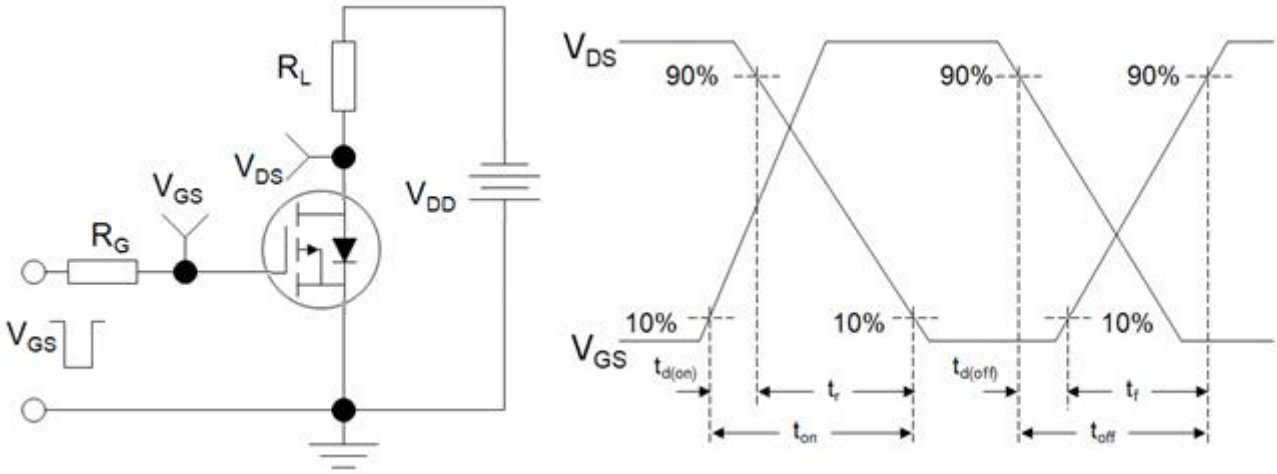
**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=-40V,VGS=-10V,L=0.1mH,Rg=25Ω
   The table shows the minimum avalanche energy, which is 168mJ when the device is tested until failure
3. Identical low side and high side switch with identical $R_G$

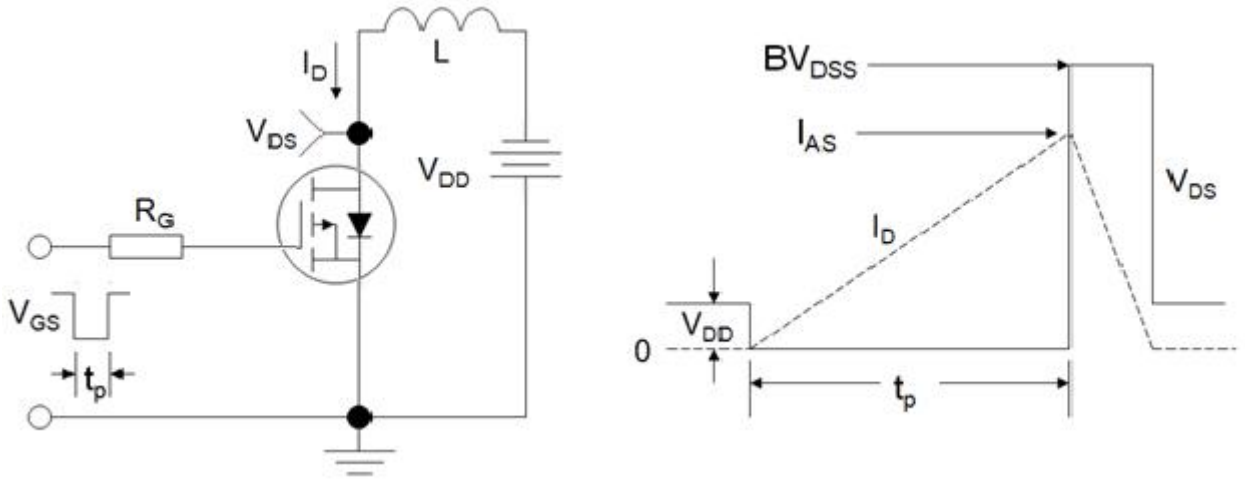
**Gate Charge Test Circuit**




**Switch Time Test Circuit**




**EAS Test Circuit**



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

**Figure 1. Output Characteristics**

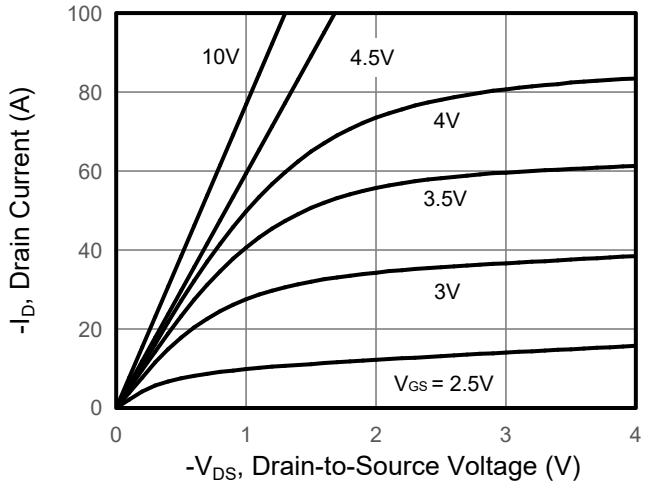



**Figure 2. Transfer Characteristics**

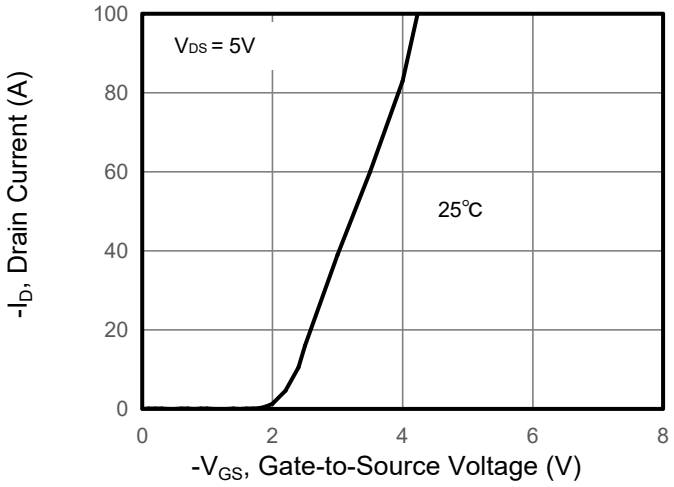



**Figure 3.Drain Source On Resistance**

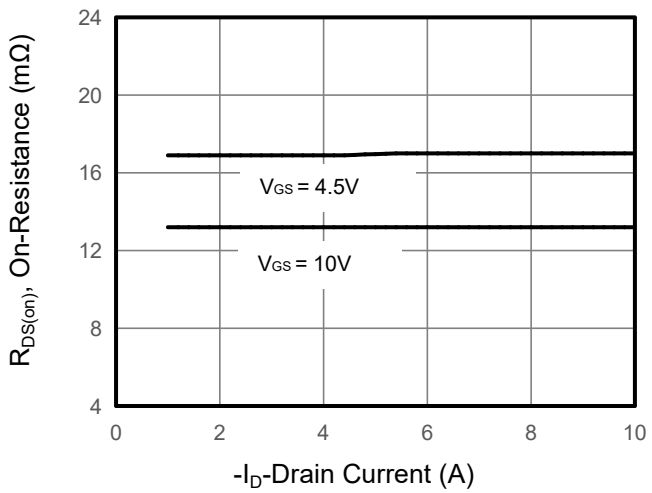



**Figure 4. Gate Charge**

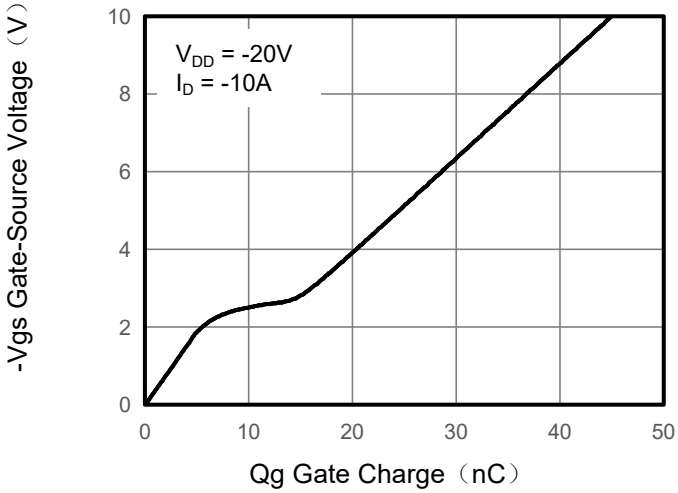



**Figure 5. Capacitance**

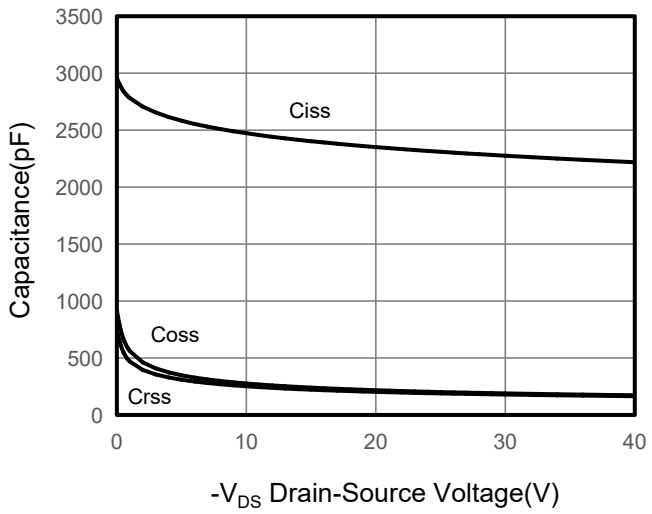
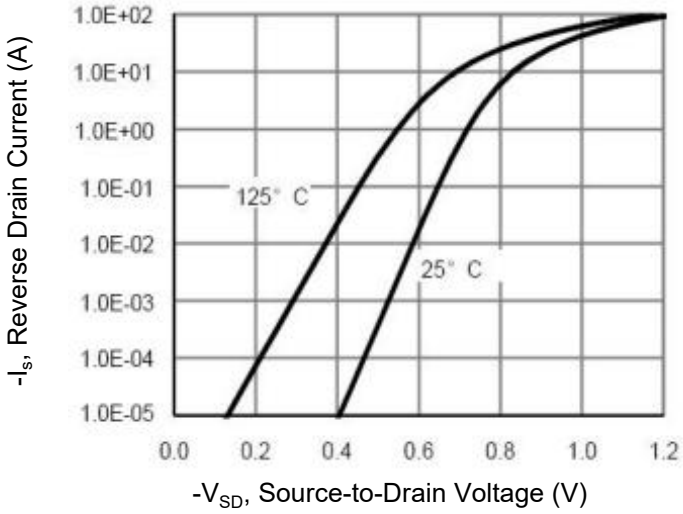



**Figure 6. Source-Drain Diode Forward**



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

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

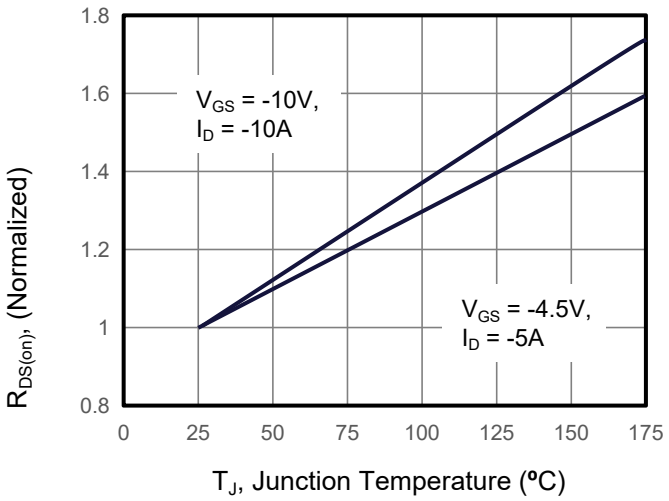



**Figure 8. Safe Operation Area**

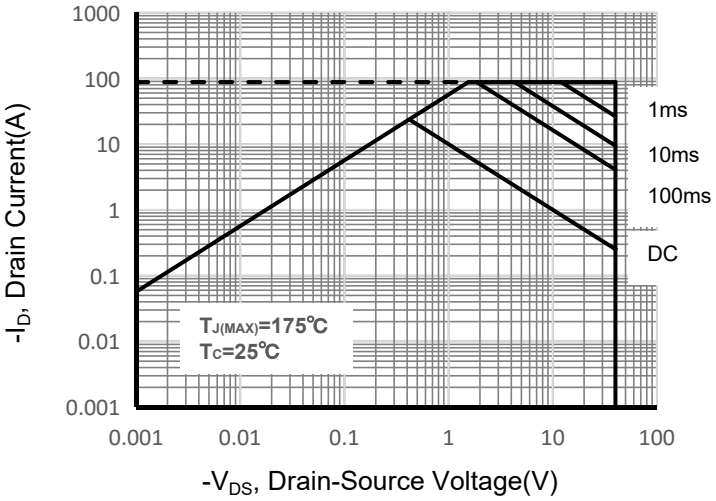



**Figure 9. Maximum Continuous Drain Current vs Case Temperature**

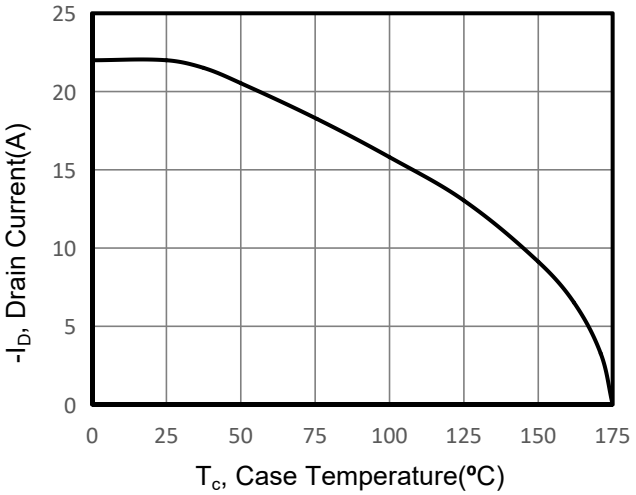
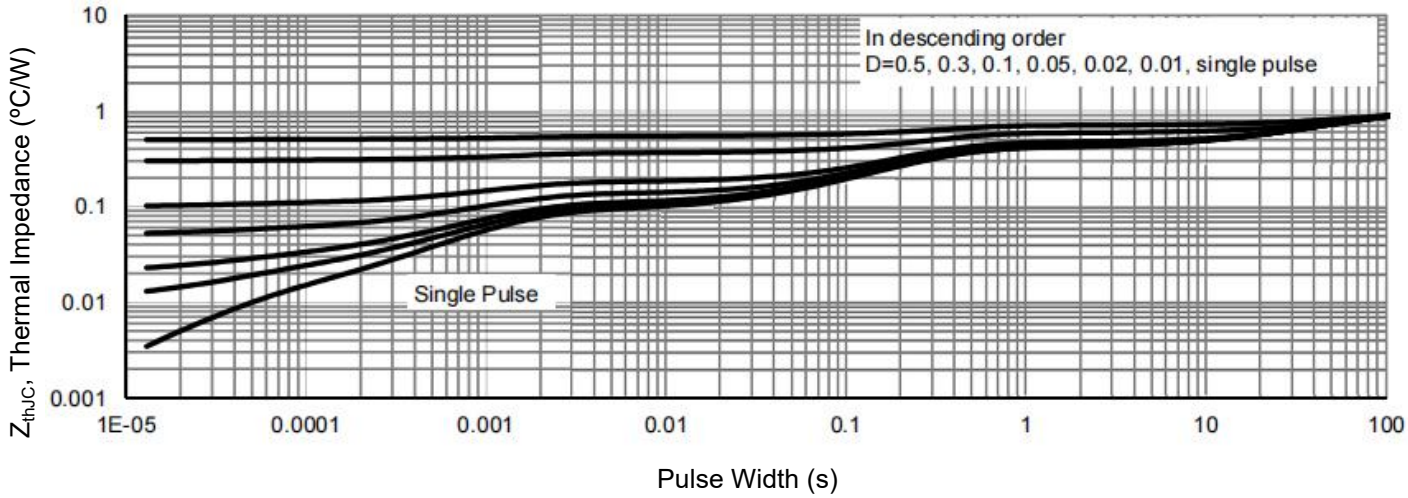
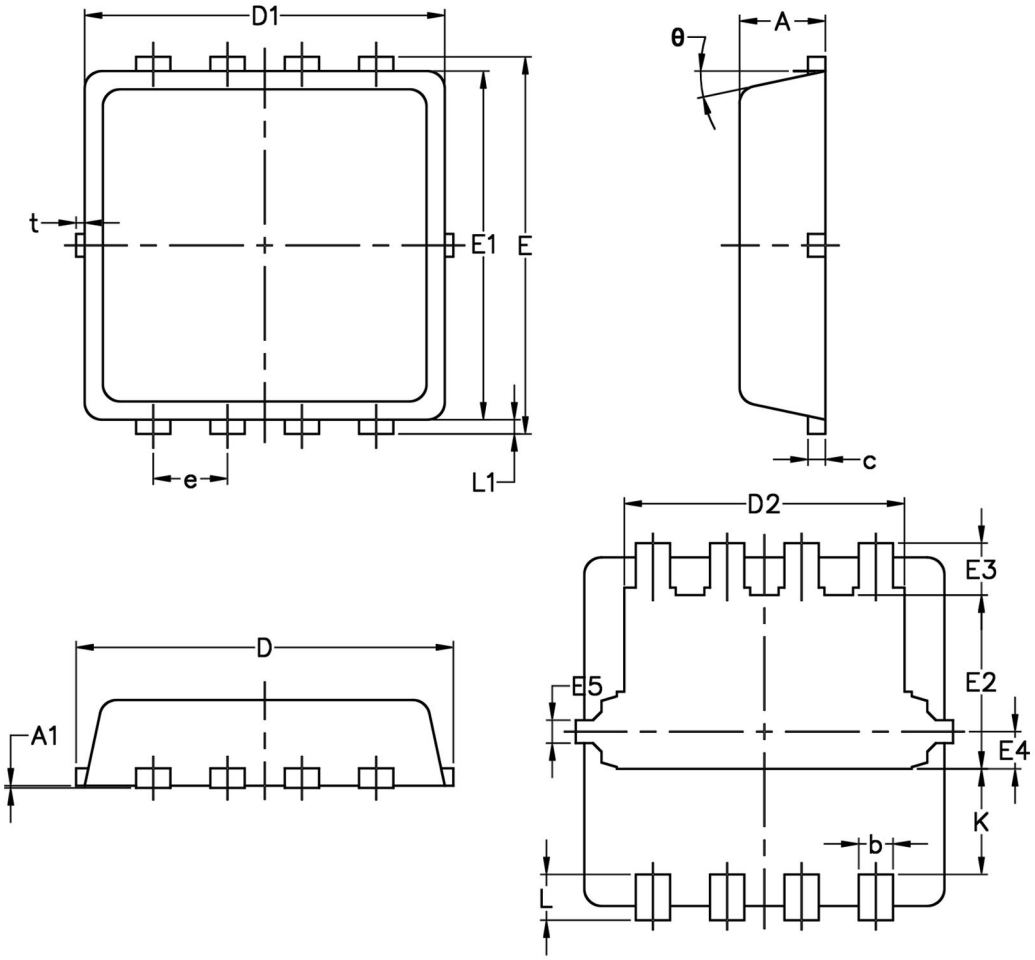



**Figure 10. Normalized Maximum Transient Thermal Impedance**



**DFN3x3-8L Package Information**




| SYMBOL | COMMON MM | | | SYMBOL | COMMON MM | | |
|---|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | | MIN | NOM | MAX |
| A | 0.70 | 0.75 | 0.85 | E3 | 0.28 | 0.46 | 0.65 |
| A1 | / | / | 0.05 | E4 | 0.18 | 0.33 | 0.48 |
| b | 0.20 | 0.30 | 0.40 | E5 | 0.10 | 0.20 | 0.30 |
| c | 0.10 | 0.152 | 0.25 | e | 0.60 | 0.65 | 0.70 |
| D | 3.15 | 3.30 | 3.45 | K | 0.78 | 0.93 | 1.13 |
| D1 | 3.00 | 3.15 | 3.25 | L | 0.30 | 0.40 | 0.50 |
| D2 | 2.29 | 2.45 | 2.65 | L1 | 0.06 | 0.125 | 0.20 |
| E | 3.15 | 3.30 | 3.45 | t | 0 | 0.075 | 0.13 |
| E1 | 2.90 | 3.05 | 3.20 | $\theta$ | 10° | 12° | 14° |
| E2 | 1.32 | 1.52 | 1.72 | | | | |