# FH8838BG3

**N- Channel Enhancement Mode Power MOSFET**

## Description

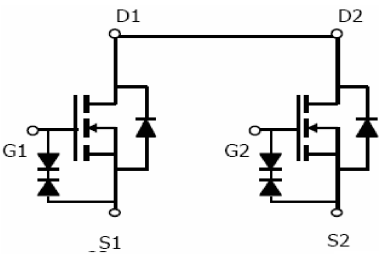
The FH8838BG3 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gatevoltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

## Application

- PWM application
- Load switch

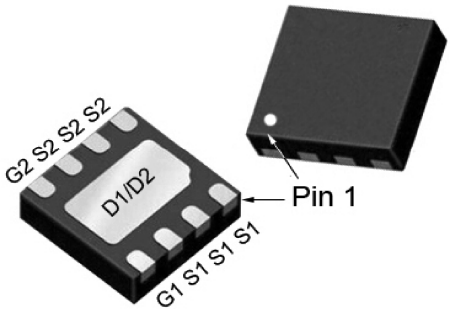
## General Features

- $V_{DS}$ =18V,$I_D$ =22A
  $R_{DS(ON)}$ = 3.4 mΩ (Typ) @ $V_{GS}$ =4.5V
  $R_{DS(ON)}$ = 3.6 mΩ (Typ) @ $V_{GS}$ =3.9V
  $R_{DS(ON)}$ = 4.2 mΩ (Typ) @ $V_{GS}$ =2.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package
- ESD Rating: 2000V HBM




Schematic diagram


Marking and pin assignment




DFN3x3-8L Pin assignment and Top / Bottom View

## Absolute Maximum Ratings (TA=25℃unless otherwise noted)

| PARAMETERS/TEST CONDITIONS | | SYMBOL | LIMITS | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 18 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±12 | |
| Continuous Drain Current | $T_A$ = 25 °C | $I_D$ | 22 | A |
| | $T_A$ = 70 °C | | 18 | |
| Pulsed Drain Current (Note 1) | | $I_{DM}$ | 88 | |
| Avalanche Current | | $I_{AS}$ | 22 | |
| Avalanche Energy | L = 0.1mH | $E_{AS}$ | 29 | mJ |
| Power Dissipation | $T_A$ = 25 °C | $P_D$ | 3.7 | W |
| | $T_A$ = 70 °C | | 2.5 | |
| Operating Junction & Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 to 150 | °C |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 33.5 | ℃/W |

## Notes:

1. Pulse width limited by maximum junction temperature.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25°C.

## Electrical Characteristics (TA=25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 18 | 20 | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=20V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±10V,$V_{DS}$=0V | - | - | ±10 | μA |
| **On Characteristics (Note 2)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 0.45 | 0.80 | 1.20 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=8A | 2.0 | 3.4 | 4.4 | mΩ |
| | | $V_{GS}$=3.9V, $I_D$=7A | 2.1 | 3.6 | 4.6 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$=6A | 3.0 | 4.2 | 5.5 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V,$I_D$=5A | - | 40 | - | S |
| **Dynamic Characteristics (Note 3)** | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=10V,$V_{GS}$=0V, F=1.0MHz | - | 3150 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 342 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 318 | - | PF |
| **Switching Characteristics (Note 3)** | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=10V,$R_L$=1.35Ω $V_{GS}$=5V,$R_{GEN}$=3Ω | - | 19 | | nS |
| Turn-on Rise Time | $t_r$ | | - | 40 | | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 69 | | nS |
| Turn-Off Fall Time | $t_f$ | | - | 16 | | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=10V,$I_D$=7A, $V_{GS}$=4.5V | - | 35 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 3 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 10 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 2) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=1A | - | - | 1.3 | V |
| Diode Forward Current (Note 1) | $I_S$ | | - | - | 22 | A |

## Notes:

**1.** Surface Mounted on FR4 Board, t ≤ 10 sec.
**2.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
**3.** Guaranteed by design, not subject to production

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

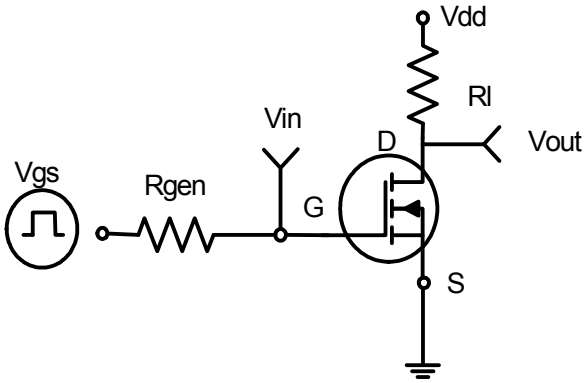



**Figure 1:Switching Test Circuit**

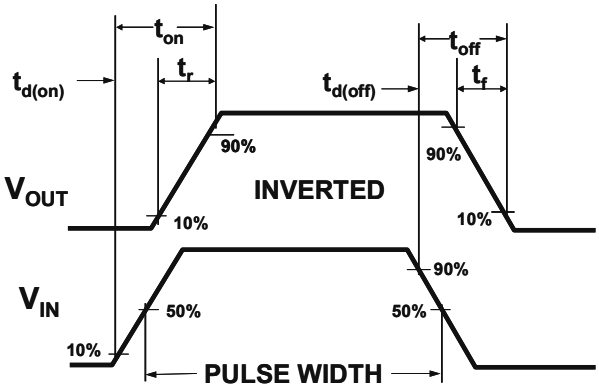



**Figure 2:Switching Waveforms**

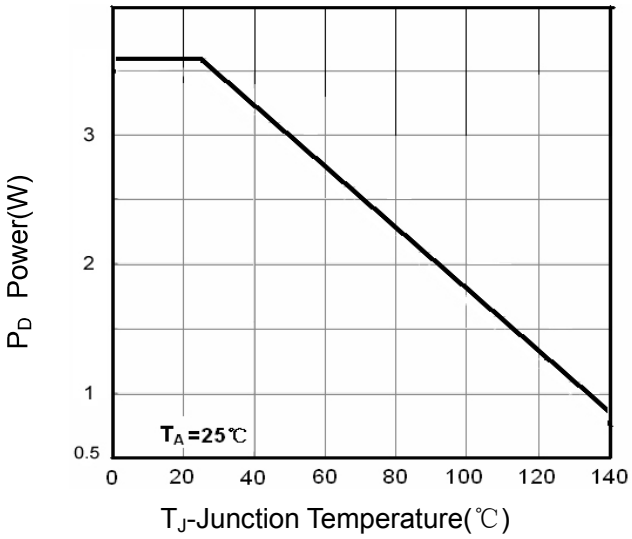



**Figure 3 Power Dissipation**

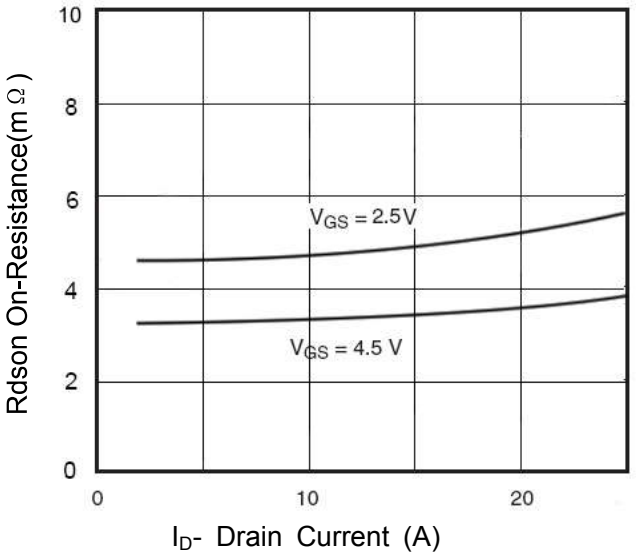



**Figure 4 Drain-Source On-Resistance**

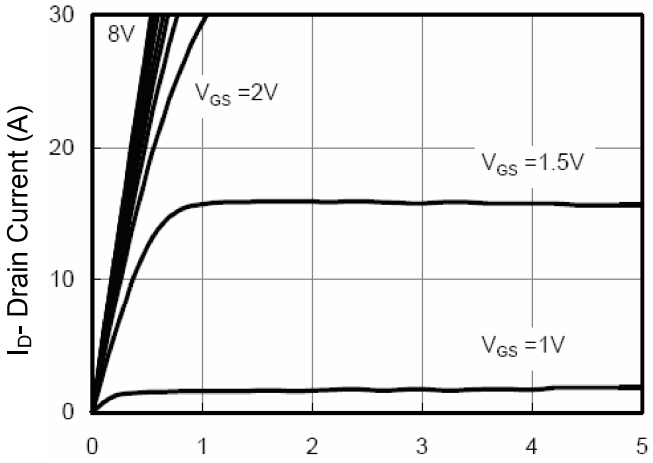



**Figure 5 Output CHARACTERISTICS**

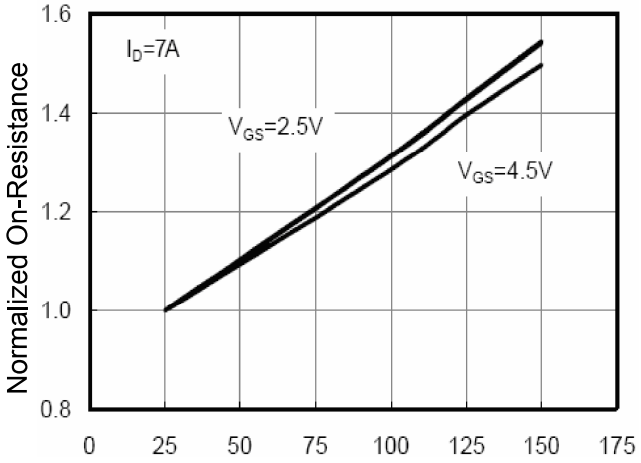



**Figure 6 Drain-Source On-Resistance**

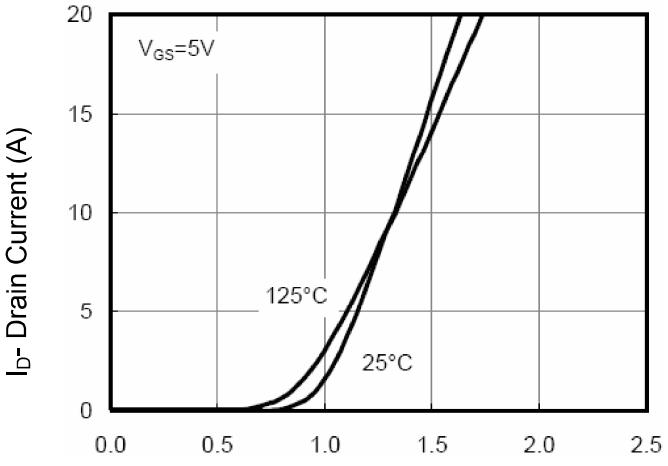



**Figure 7 Transfer Characteristics**

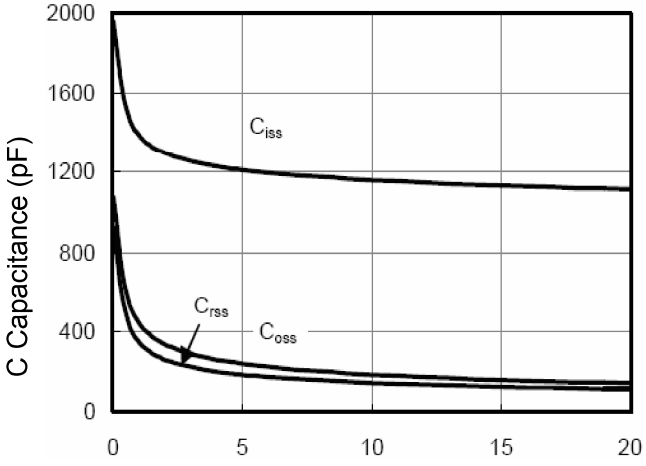



**Figure 8 Capacitance vs Vds**

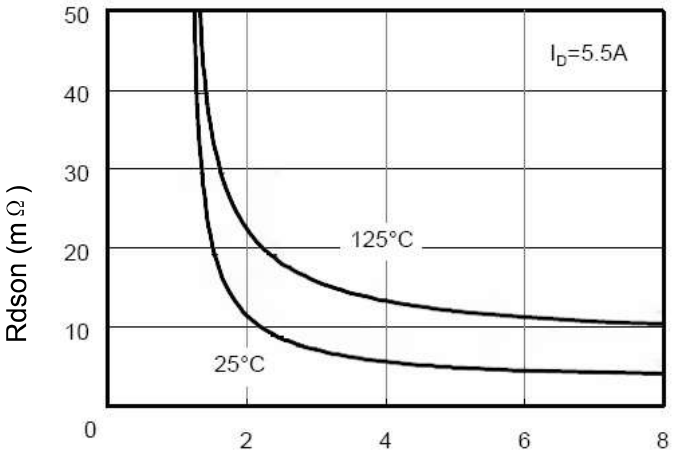



**Figure 9 Rdson vs Vgs**

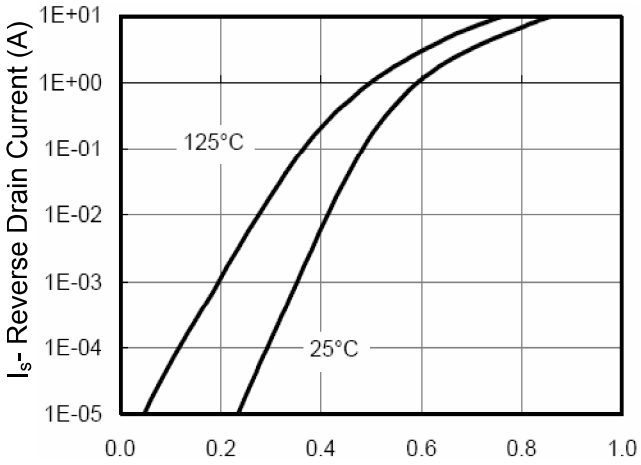



**Figure 10 Capacitance vs Vds**

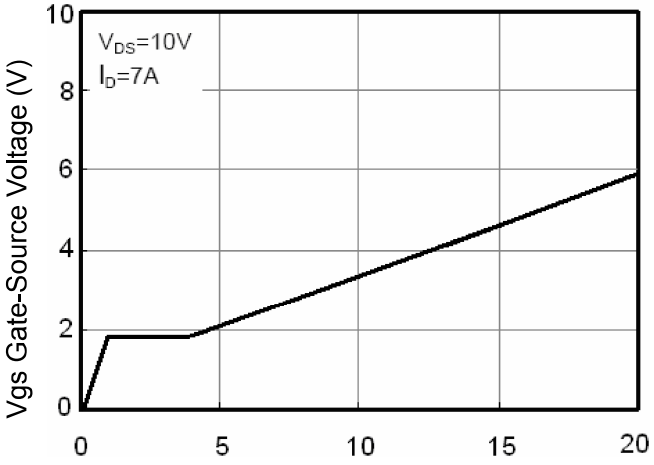



**Figure 11 Gate Charge**

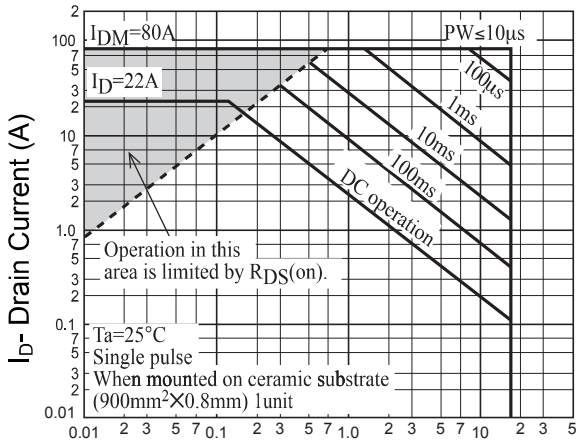



**Figure 12 Safe Operation Area**

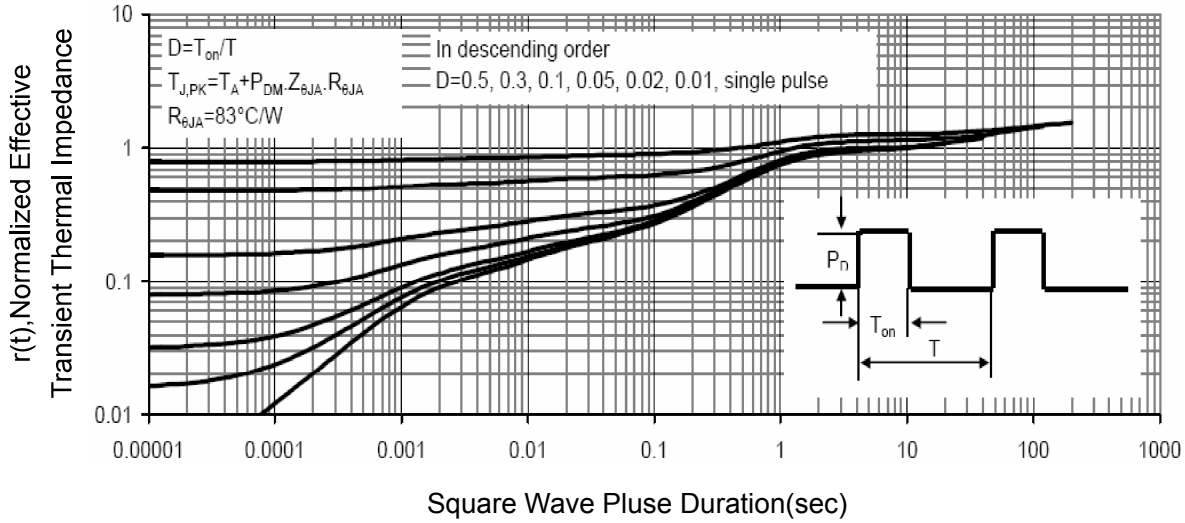
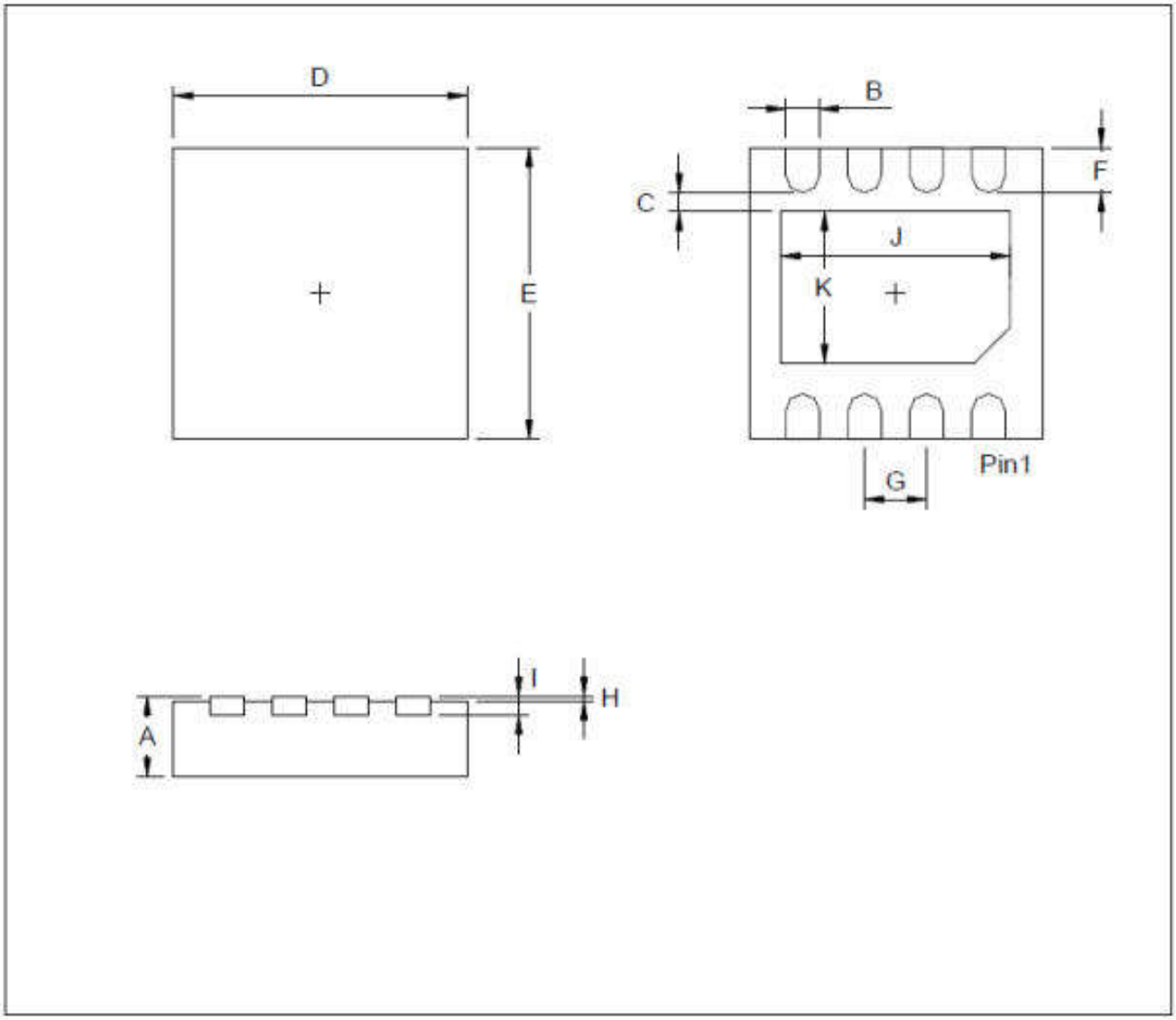



**Figure 13 Normalized Maximum Transient Thermal Impedance**

## Package Outline Dimensions ： DFN3*3-8L




| Dimension | mm | | | Dimension | mm | | |
|---|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | Min. | Typ. | Max. |
| A | 0.7 | | 0.8 | I | | 0.203 | |
| B | 0.25 | | 0.35 | J | 2.2 | | 2.4 |
| C | 0.2 | | | K | 1.4 | | 1.6 |
| D | 2.924 | | 3.076 | | | | |
| E | 2.924 | | 3.076 | | | | |
| F | 0.324 | | 0.476 | | | | |
| G | | 0.65 | | | | | |
| H | 0 | | 0.05 | | | | |