

FH8838BG3

N- Channel Enhancement Mode Power MOSFET

Description

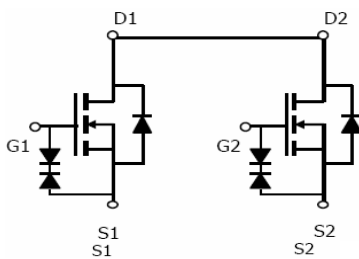
The FH8838BG3 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

Application

- PWM application
- Load switch

General Features

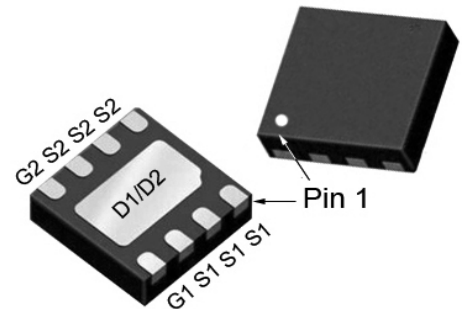
- $V_{DS}=18V, I_D=22A$
 $R_{DS(ON)} < 4.4m\Omega (MAX) @ V_{GS}=4.5V$
 $R_{DS(ON)} < 4.6m\Omega (MAX) @ V_{GS}=3.9V$
 $R_{DS(ON)} < 5.5m\Omega (MAX) @ V_{GS}=2.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package
- ESD Rating: 2000V HBM



Schematic diagram



Marking and pin assignment



DFN3x3-8L Pin assignment and Top / Bottom View

Absolute Maximum Ratings (TA=25°C 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 | I_D | $T_A = 25^\circ C$ | 22 |
| | | $T_A = 70^\circ C$ | |
| Pulsed Drain Current (Note 1) | I_{DM} | 88 | A |
| Avalanche Current | I_{AS} | 22 | |
| Avalanche Energy | E_{AS} | 29 | mJ |
| Power Dissipation | P_D | $T_A = 25^\circ C$ | 3.7 |
| | | $T_A = 70^\circ C$ | |
| Operating Junction & Storage Temperature Range | T_J, T_{stg} | -55 to 150 | $^\circ C$ |

Thermal Characteristic

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

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 $T_A = 25^\circ C$.

Electrical Characteristics (TA=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|--|------|------|----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 18 | 20 | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=20V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 10V, V_{DS}=0V$ | - | - | ± 10 | μA |
| On Characteristics (Note 2) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 0.45 | 0.80 | 1.20 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=8A$ | | 3.4 | 4.4 | m Ω |
| | | $V_{GS}=3.9V, I_D=7A$ | - | 3.6 | 4.6 | m Ω |
| | | $V_{GS}=2.5V, I_D=6A$ | - | 4.2 | 5.5 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=5A$ | - | 40 | - | S |
| Dynamic Characteristics (Note 3) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$ | - | 3150 | - | PF |
| Output Capacitance | C_{oss} | | - | 342 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | | 318 | | PF |
| Switching Characteristics (Note 3) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=10V, R_L=1.35\Omega$ $V_{GS}=5V, R_{GEN}=3\Omega$ | - | 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, $t \leq 10$ sec.
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
3. Guaranteed by design, not subject to production

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

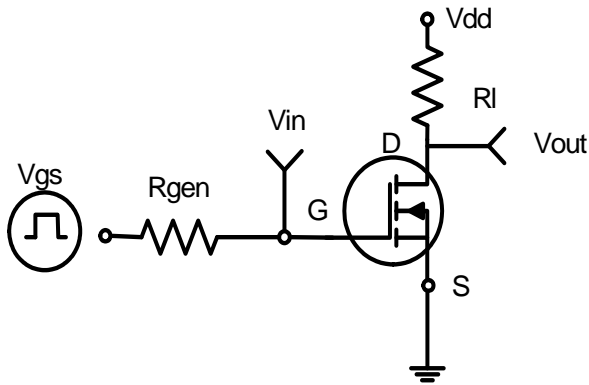


Figure 1: Switching Test Circuit

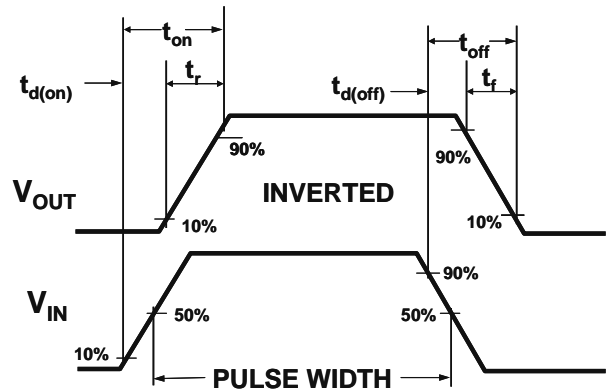


Figure 2: Switching Waveforms

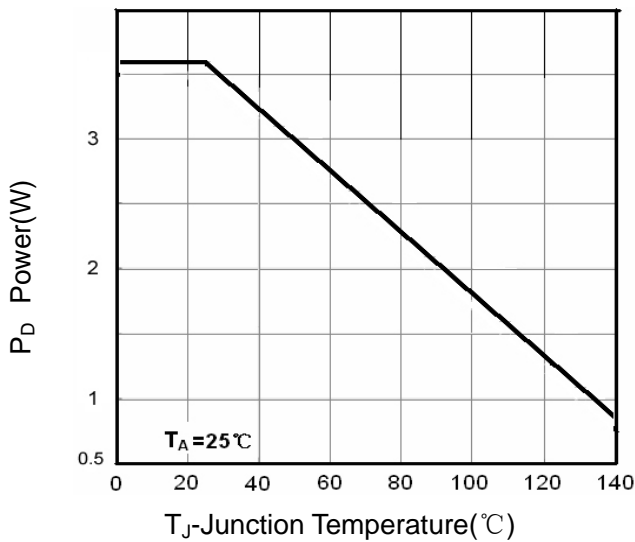


Figure 3 Power Dissipation

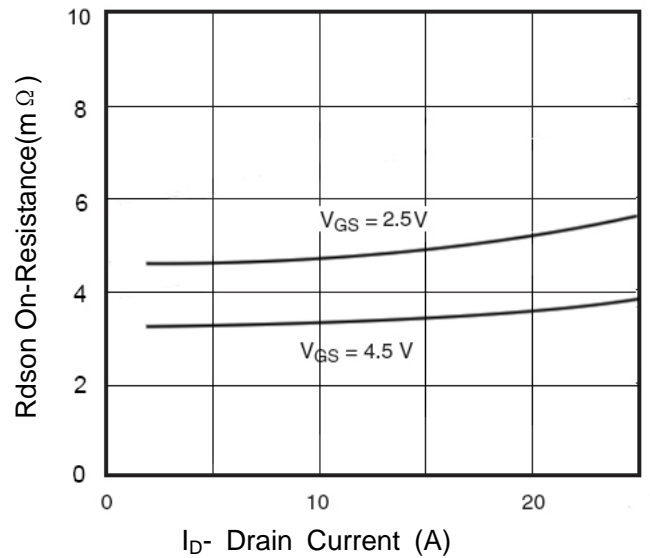


Figure 4 Drain-Source On-Resistance

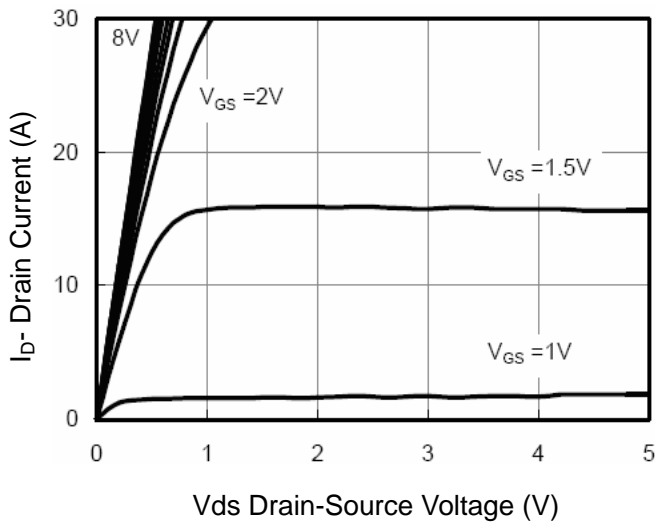


Figure 5 Output CHARACTERISTICS

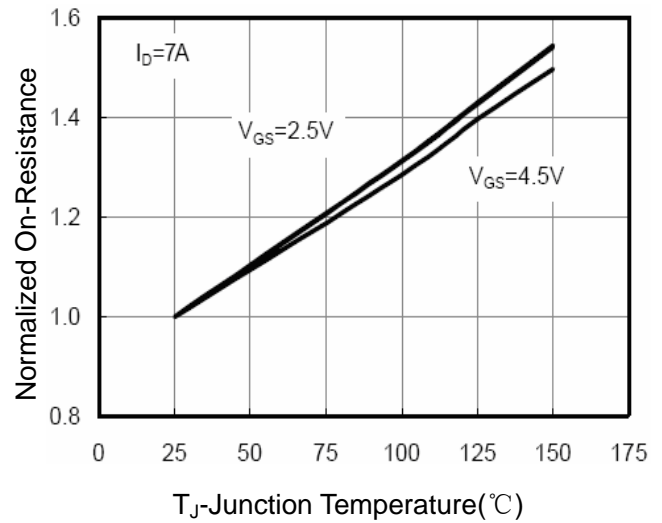
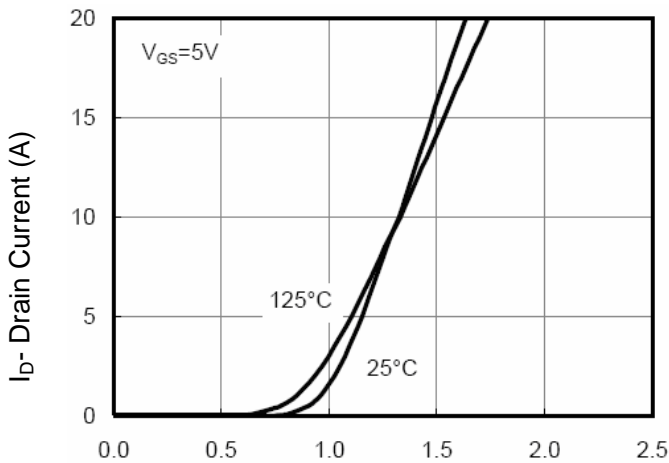
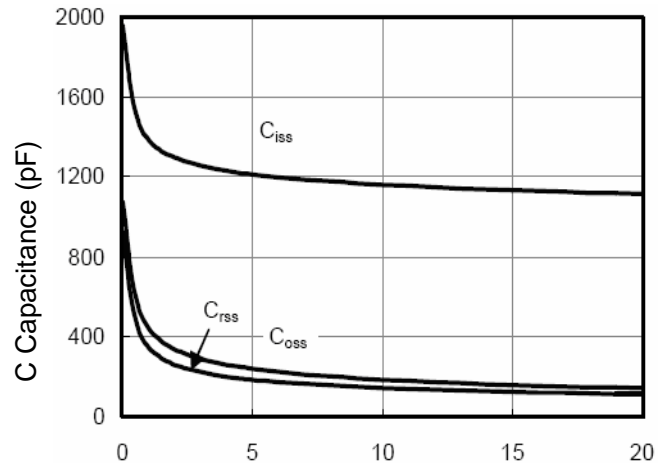


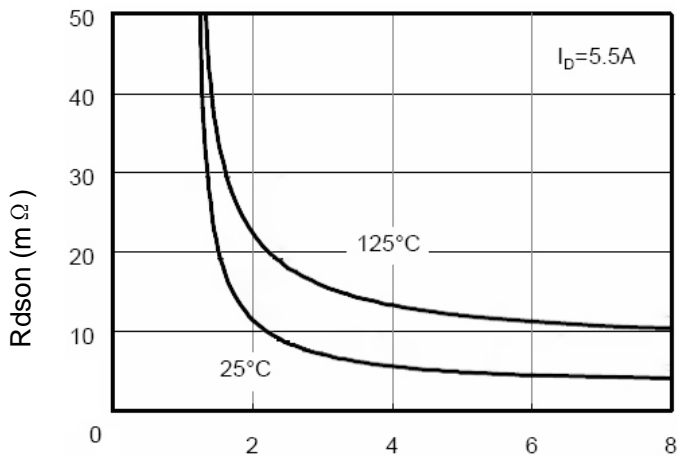
Figure 6 Drain-Source On-Resistance



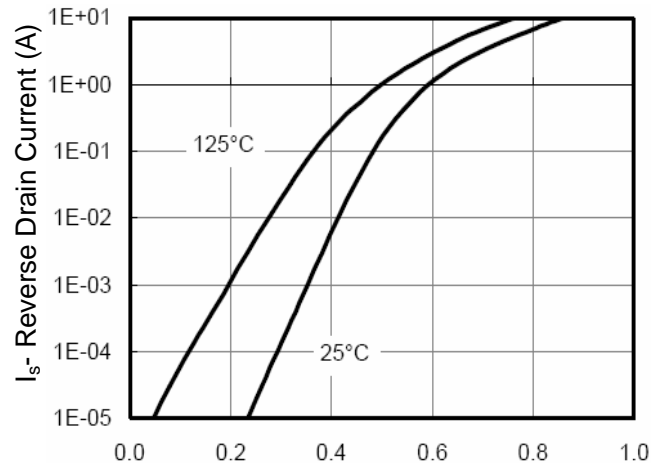
Vgs Gate-Source Voltage (V)
Figure 7 Transfer Characteristics



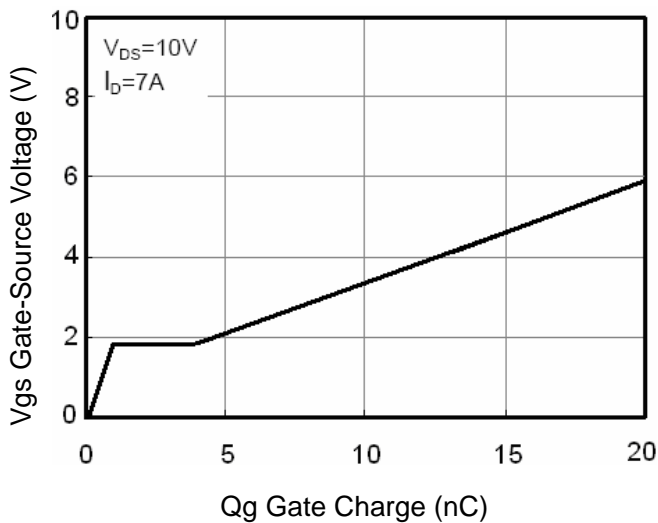
Vds Drain-Source Voltage (V)
Figure 8 Capacitance vs Vds



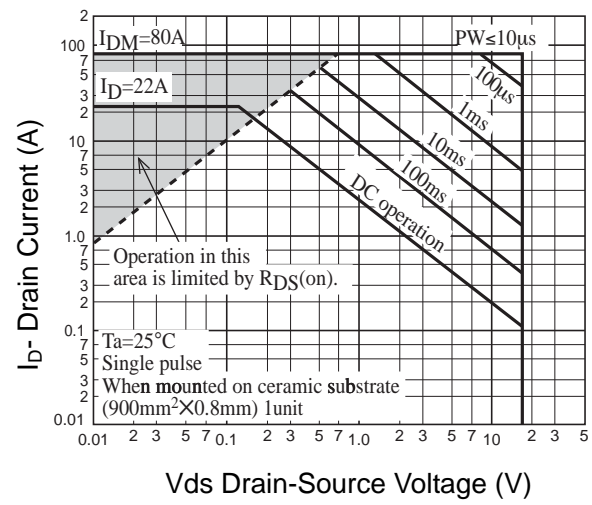
Vgs Gate-Source Voltage (V)
Figure 9 Rdson vs Vgs



Vds Drain-Source Voltage (V)
Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)
Figure 11 Gate Charge



Vds Drain-Source Voltage (V)
Figure 12 Safe Operation Area

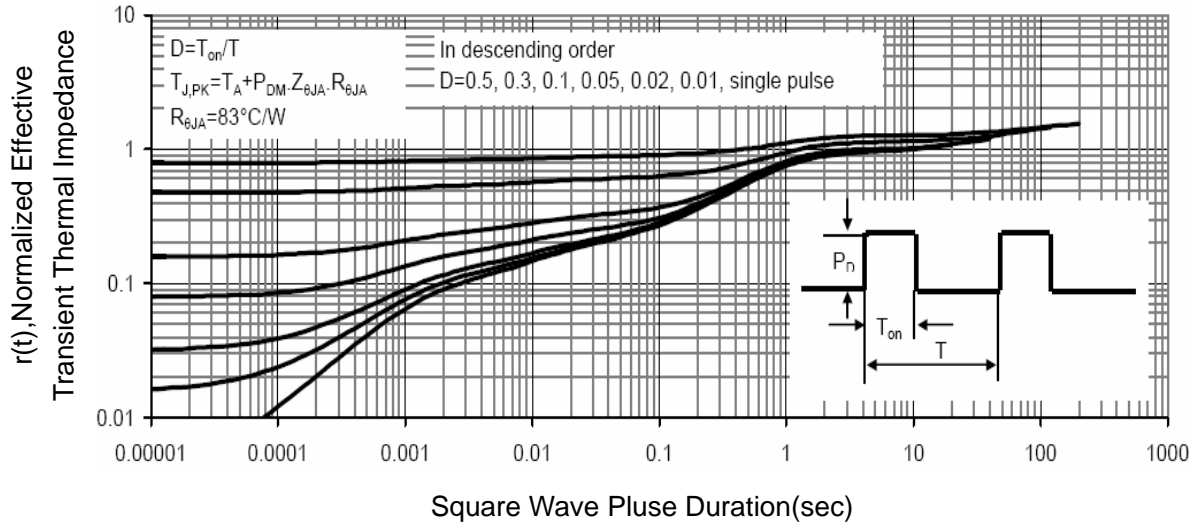
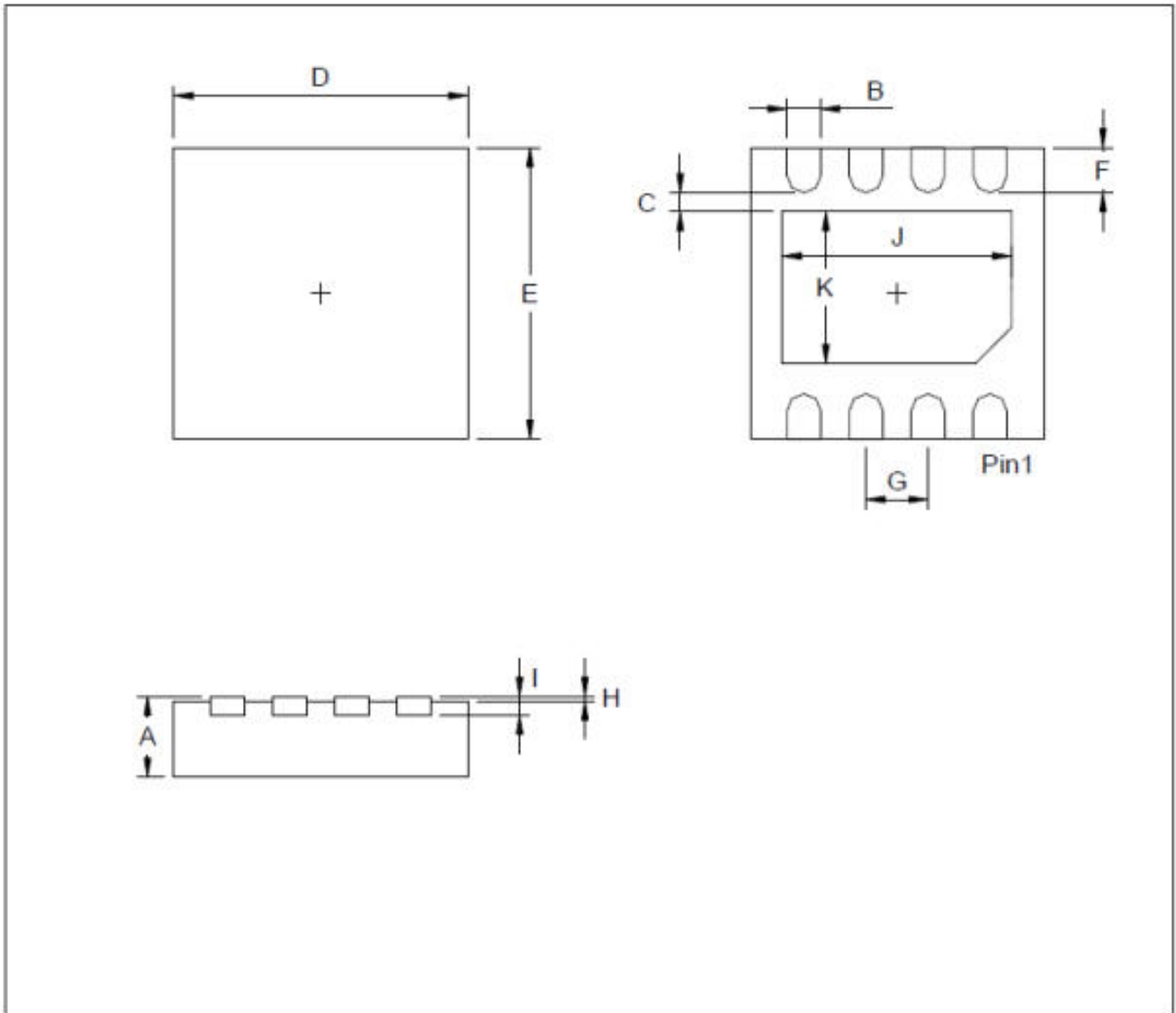


Figure 13 Normalized Maximum Transient Thermal Impedance

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 | | | | |