

## N-Channel Enhancement Mode Power MOSFET

### Description

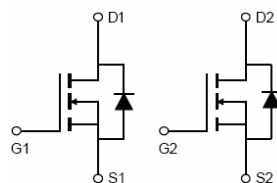
The HM08DN10D uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

- $V_{DS} = 100V, I_D = 8A$   
 $R_{DS(ON)} < 80m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 85m\Omega @ V_{GS} = 4.5V$
- High density cell design for ultra low  $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

### Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic diagram



Top View

**100% UIS TESTED!**

**100%  $\Delta V_{DS}$  TESTED!**

### Package Marking and Ordering Information

| Device Marking | Device    | Device Package | Reel Size | Tape width | Quantity |
|----------------|-----------|----------------|-----------|------------|----------|
| HM08DN10D      | HM08DN10D | DFN5X6-8L      | -         | -          | -        |

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

| Parameter                                         | Symbol             | Limit      | Unit          |
|---------------------------------------------------|--------------------|------------|---------------|
| Drain-Source Voltage                              | $V_{DS}$           | 100        | V             |
| Gate-Source Voltage                               | $V_{GS}$           | $\pm 20$   | V             |
| Drain Current-Continuous                          | $I_D$              | 8          | A             |
| Drain Current-Continuous( $T_C = 100^\circ C$ )   | $I_D(100^\circ C)$ | 5.6        | A             |
| Pulsed Drain Current                              | $I_{DM}$           | 24         | A             |
| Maximum Power Dissipation                         | $P_D$              | 45         | W             |
| Derating factor                                   |                    | 0.3        | W/ $^\circ C$ |
| Single pulse avalanche energy <sup>(Note 5)</sup> | $E_{AS}$           | 72         | mJ            |
| Operating Junction and Storage Temperature Range  | $T_J, T_{STG}$     | -55 To 175 | $^\circ C$    |

### Thermal Characteristic

|                                                          |                 |     |              |
|----------------------------------------------------------|-----------------|-----|--------------|
| Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> | $R_{\theta JC}$ | 3.3 | $^\circ C/W$ |
|----------------------------------------------------------|-----------------|-----|--------------|

Electrical Characteristics ( $T_c=25^{\circ}\text{C}$  unless otherwise noted)

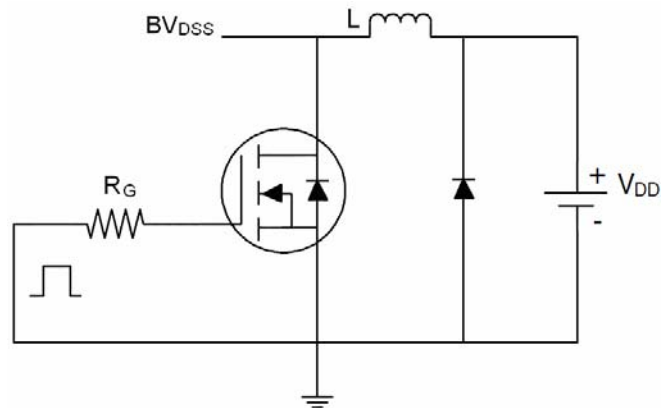
| Parameter                                     | Symbol       | Condition                                                                 | Min | Typ  | Max       | Unit       |
|-----------------------------------------------|--------------|---------------------------------------------------------------------------|-----|------|-----------|------------|
| Off Characteristics                           |              |                                                                           |     |      |           |            |
| Drain-Source Breakdown Voltage                | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                                                 | 100 | -    | -         | V          |
| Zero Gate Voltage Drain Current               | $I_{DSS}$    | $V_{DS}=100V, V_{GS}=0V$                                                  | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current                     | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                               | -   | -    | $\pm 100$ | nA         |
| On Characteristics <sup>(Note 3)</sup>        |              |                                                                           |     |      |           |            |
| Gate Threshold Voltage                        | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                             | 1.0 |      | 2.5       | V          |
| Drain-Source On-State Resistance              | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=10A$                                                     | -   |      | 80        | m $\Omega$ |
|                                               |              | $V_{GS}=4.5V, I_D=10A$                                                    |     |      | 85        |            |
| Forward Transconductance                      | $g_{FS}$     | $V_{DS}=5V, I_D=10A$                                                      | 11  | -    | -         | S          |
| Dynamic Characteristics <sup>(Note4)</sup>    |              |                                                                           |     |      |           |            |
| Input Capacitance                             | $C_{iss}$    | $V_{DS}=100V, V_{GS}=0V,$<br>$F=1.0MHz$                                   | -   | 973  | -         | PF         |
| Output Capacitance                            | $C_{oss}$    |                                                                           | -   | 61.2 | -         | PF         |
| Reverse Transfer Capacitance                  | $C_{rss}$    |                                                                           | -   | 58.8 | -         | PF         |
| Switching Characteristics <sup>(Note 4)</sup> |              |                                                                           |     |      |           |            |
| Turn-on Delay Time                            | $t_{d(on)}$  | $V_{DD}=100V, R_L=6.7\Omega$<br>$V_{GS}=10V, R_G=3\Omega$                 | -   | 5    | -         | nS         |
| Turn-on Rise Time                             | $t_r$        |                                                                           | -   | 2.6  | -         | nS         |
| Turn-Off Delay Time                           | $t_{d(off)}$ |                                                                           | -   | 16.1 | -         | nS         |
| Turn-Off Fall Time                            | $t_f$        |                                                                           | -   | 2.3  | -         | nS         |
| Total Gate Charge                             | $Q_g$        | $V_{DS}=100V, I_D=10A,$<br>$V_{GS}=10V$                                   | -   | 25   |           | nC         |
| Gate-Source Charge                            | $Q_{gs}$     |                                                                           | -   | 4.5  |           | nC         |
| Gate-Drain Charge                             | $Q_{gd}$     |                                                                           | -   | 6.5  |           | nC         |
| Drain-Source Diode Characteristics            |              |                                                                           |     |      |           |            |
| Diode Forward Voltage <sup>(Note 3)</sup>     | $V_{SD}$     | $V_{GS}=0V, I_S=10A$                                                      | -   |      | 1.2       | V          |
| Diode Forward Current <sup>(Note 2)</sup>     | $I_S$        |                                                                           | -   | -    | 35        | A          |
| Reverse Recovery Time                         | $t_{rr}$     | $T_J = 25^{\circ}C, I_F = 10A$<br>$di/dt = 100A/\mu s$ <sup>(Note3)</sup> | -   | 29   | -         | nS         |
| Reverse Recovery Charge                       | $Q_{rr}$     |                                                                           | -   | 49   | -         | nC         |
| Forward Turn-On Time                          | $t_{on}$     | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)      |     |      |           |            |

**Notes:**

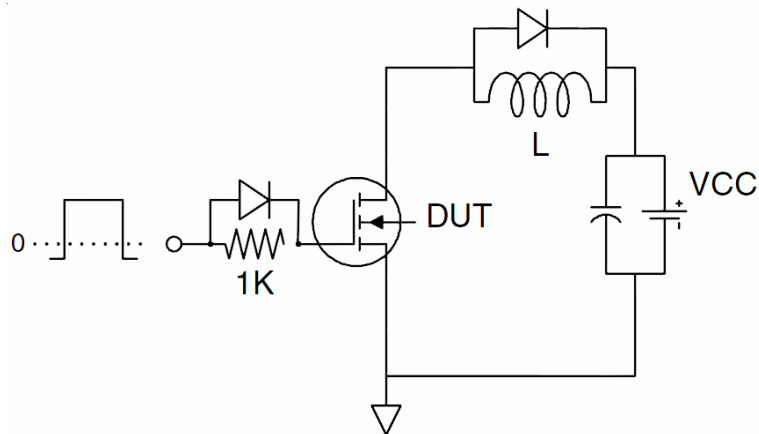
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=100V$ ,  $V_G=10V$ ,  $L=0.5mH$ ,  $R_g=25\Omega$

## Test Circuit

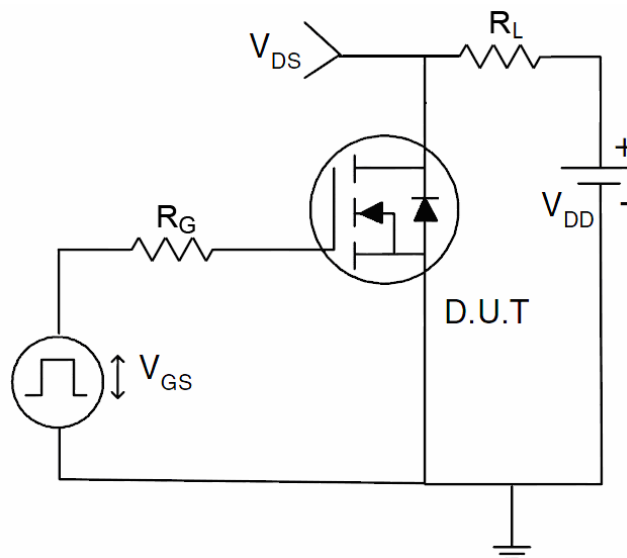
### 1) $E_{AS}$ test Circuit



### 2) Gate charge test Circuit



### 3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

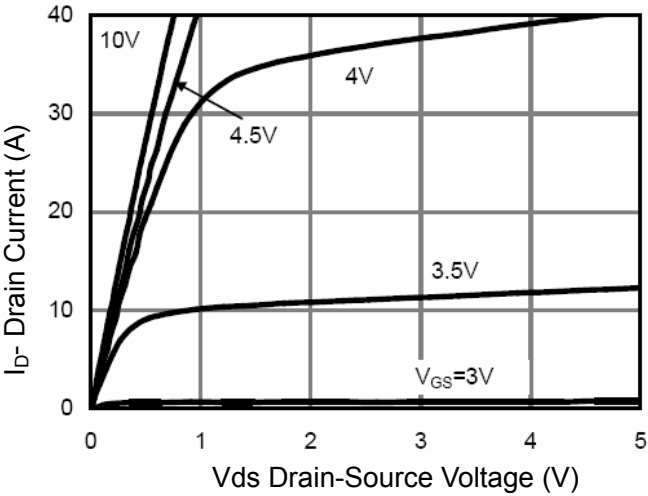


Figure 1 Output Characteristics

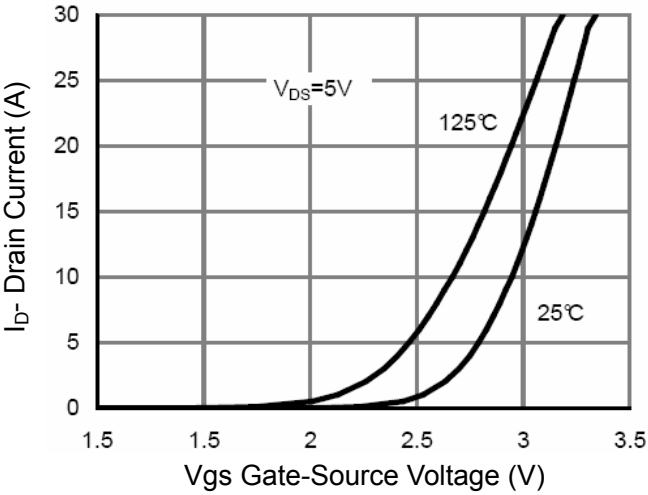


Figure 2 Transfer Characteristics

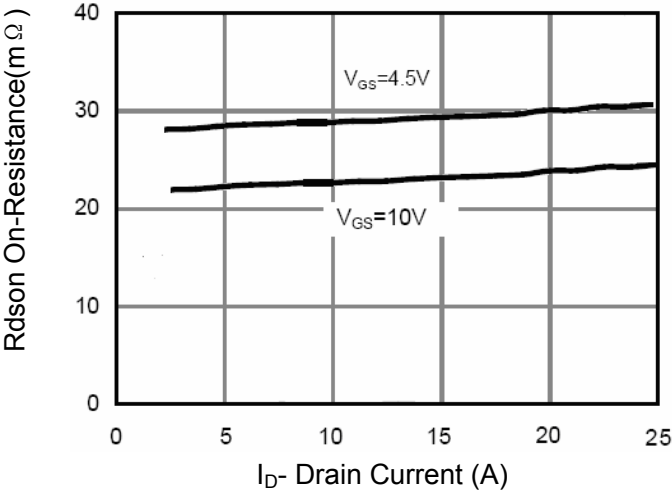


Figure 3 Rdson- Drain Current

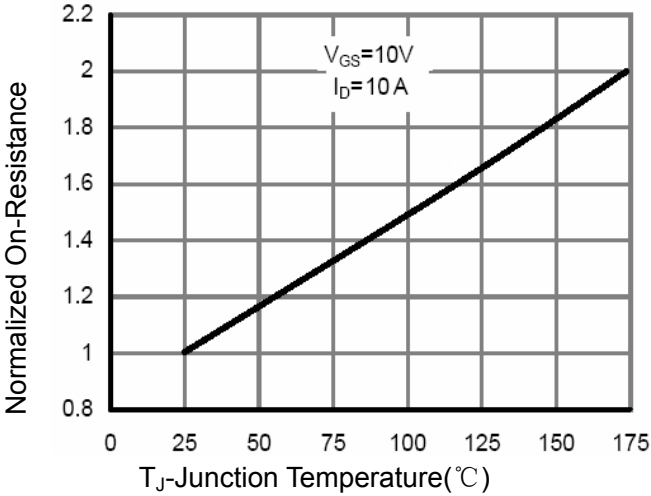


Figure 4 Rdson-Junction Temperature

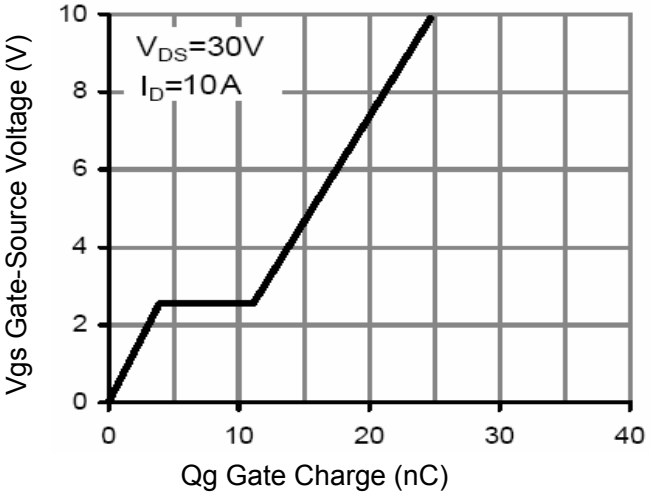


Figure 5 Gate Charge

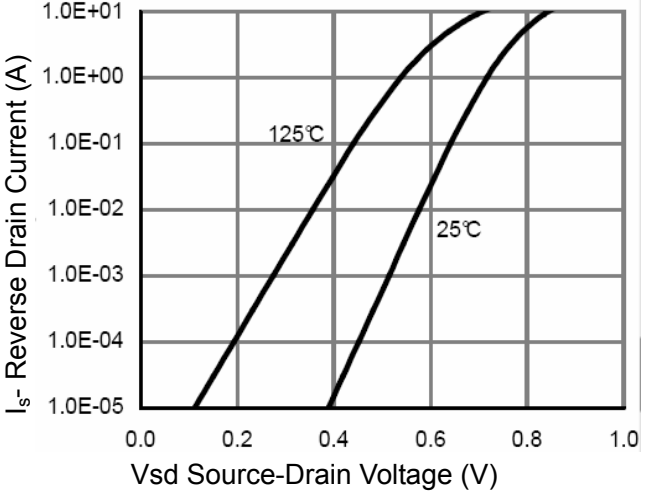


Figure 6 Source- Drain Diode Forward

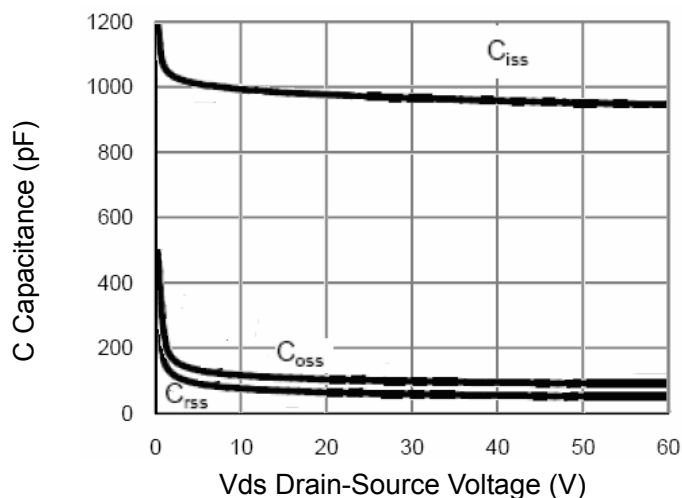


Figure 7 Capacitance vs Vds

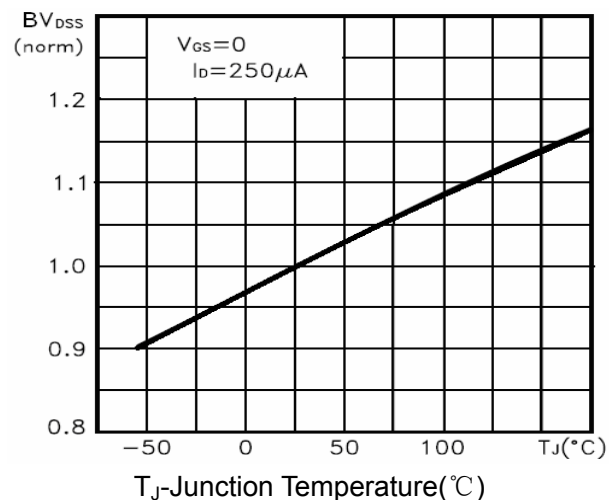


Figure 9  $BV_{DSS}$  vs Junction Temperature

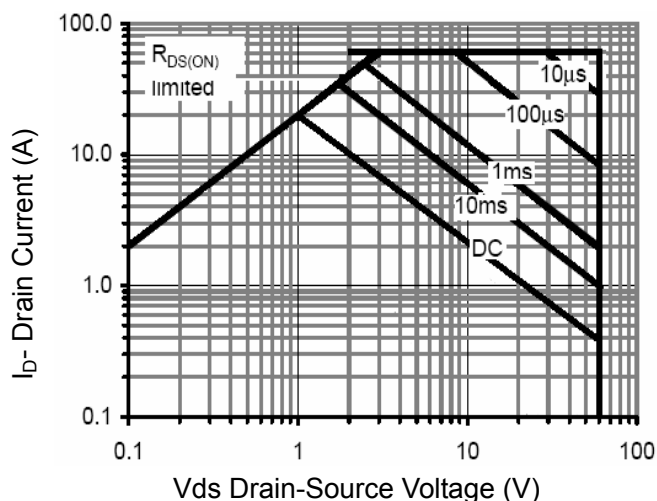


Figure 8 Safe Operation Area

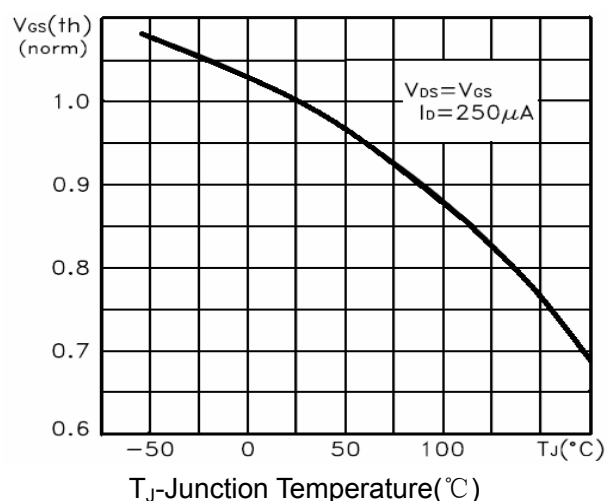


Figure 10  $V_{GS(th)}$  vs Junction Temperature

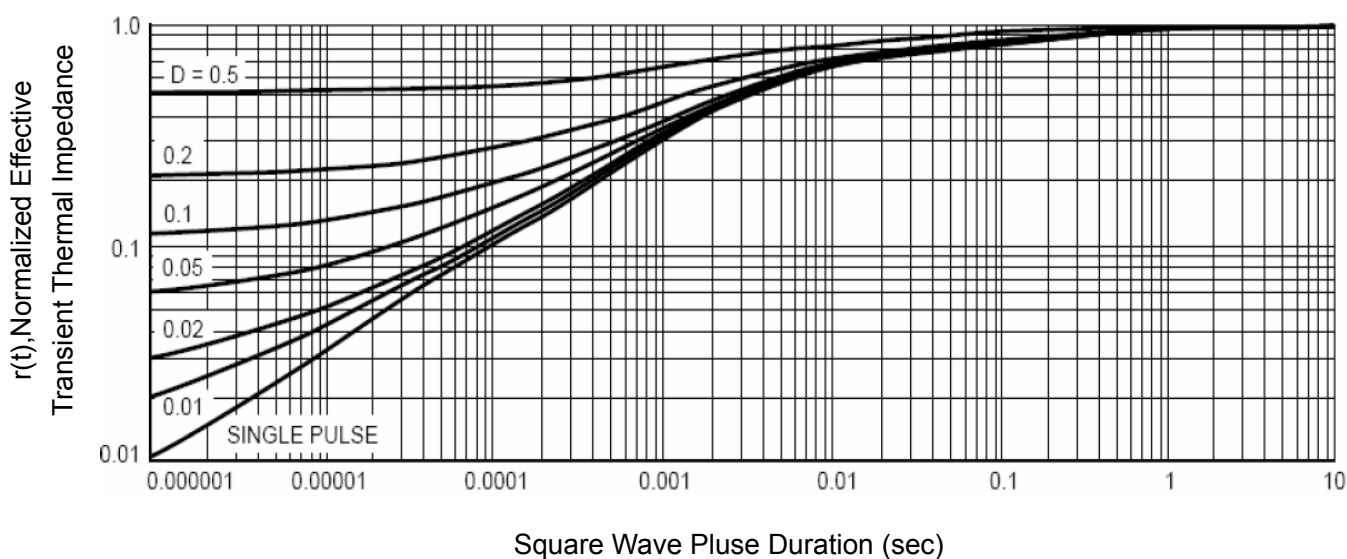
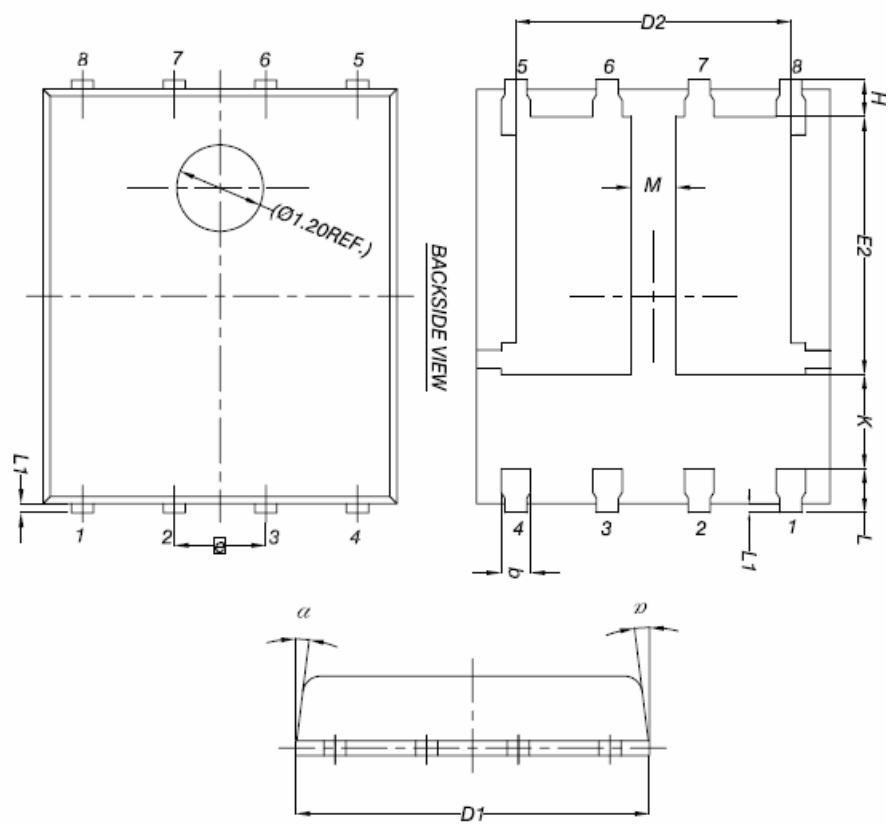


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



| DIM. | MILLIMETERS |      |      |
|------|-------------|------|------|
|      | MIN.        | NOM. | MAX. |
| A    | 0.90        | 1.00 | 1.10 |
| b    | 0.33        | 0.41 | 0.51 |
| C    | 0.20        | 0.25 | 0.30 |
| D1   | 4.80        | 4.90 | 5.00 |
| D2   | 3.61        | 3.81 | 3.96 |
| E    | 5.90        | 6.00 | 6.10 |
| E1   | 5.70        | 5.75 | 5.80 |
| E2   | 3.38        | 3.58 | 3.78 |
| e    | 1.27 BSC    |      |      |
| H    | 0.41        | 0.51 | 0.61 |
| K    | 1.10        | -    | -    |
| L    | 0.51        | 0.61 | 0.71 |
| L1   | 0.06        | 0.13 | 0.20 |
| M    | 0.50        | -    | -    |
| α    | 0°          | -    | 12°  |

