## Description

The HM25N03Q 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.

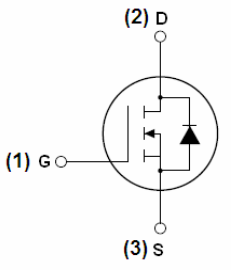
## General Features

- $V_{DS}$ =30V,$I_D$ =25A
  $R_{DS(ON)}$ < 11mΩ @ $V_{GS}$=10V
  $R_{DS(ON)}$ < 16mΩ @ $V_{GS}$=5V
- High density cell design for ultra low Rdson
- 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

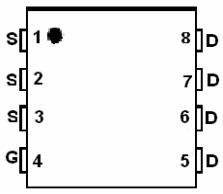
## Application

- Secondary side synchronous rectifier
- High side switch in POL DC/DC converter

***100% UIS TESTED!***




**Schematic diagram**




**DFN 3x3 EP top view**

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| HM25N03Q | HM25N03Q | DFN 3x3 EP | - | - | - |

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

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 25 | A |
| Pulsed Drain Current | $I_{DM}$ | 70 | A |
| Maximum Power Dissipation | $P_D$ | 30 | W |
| Derating factor | | 0.28 | W/℃ |
| Single pulse avalanche energy (Note 5) | $E_{AS}$ | 150 | mJ |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 150 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Case (Note 2) | $R_{\theta JC}$ | 3.6 | ℃/W |

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

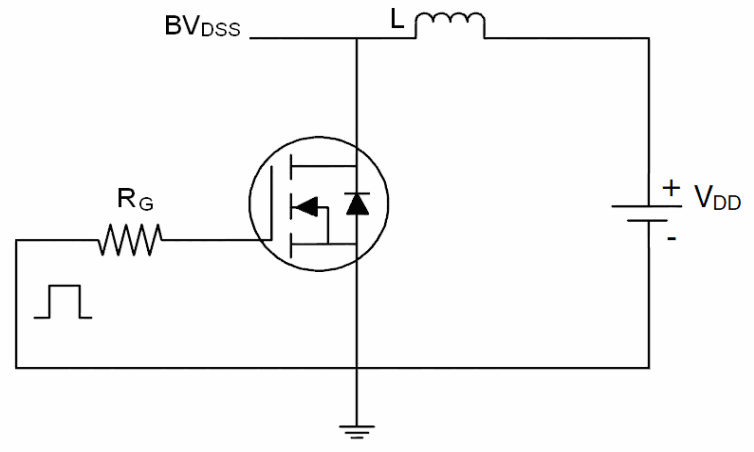
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 30 | 33 | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics (Note 3)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1 | 1.6 | 3 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=12A | - | 8 | 11 | mΩ |
| | | $V_{GS}$=5V, $I_D$=10A | - | 10 | 16 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=10V,$I_D$=12A | 30 | - | - | S |
| **Dynamic Characteristics (Note4)** | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=15V,$V_{GS}$=0V, F=1.0MHz | - | 1265 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 600 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 130 | - | PF |
| **Switching Characteristics (Note 4)** | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=15V,$I_D$=12A $V_{GS}$=10V,$R_{GEN}$=6Ω | - | 18 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 10 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 34 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 10 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V,$I_D$=12A, $V_{GS}$=10V | - | 19 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 2.7 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 2.5 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=12A | - | 0.85 | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 25 | A |
| Reverse Recovery Time | $t_{rr}$ | TJ = 25°C, IF = 12A di/dt = 100A/μs(Note3) | - | - | 47 | nS |
| Reverse Recovery Charge | Qrr | | - | - | 25 | nC |
| Forward Turn-On Time | $t_{on}$ | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

## Notes:

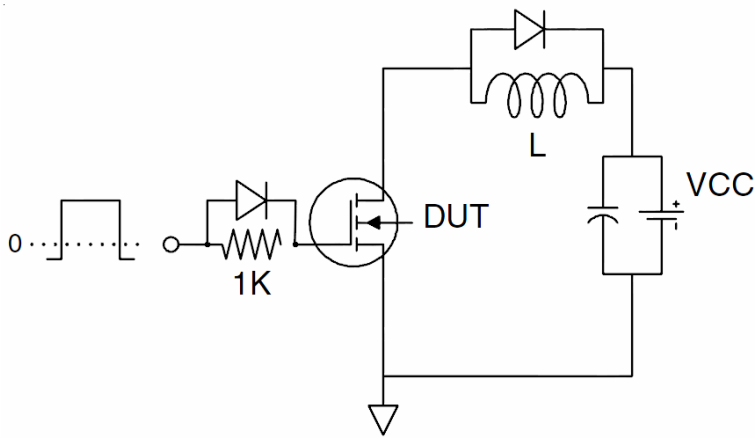
**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.
**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.
**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
**4.** Guaranteed by design, not subject to production
**5.** EAS condition：Tj=25℃,$V_{DD}$=15V,$V_G$=10V,L=0.1mH,Rg=25Ω

## Test Circuit

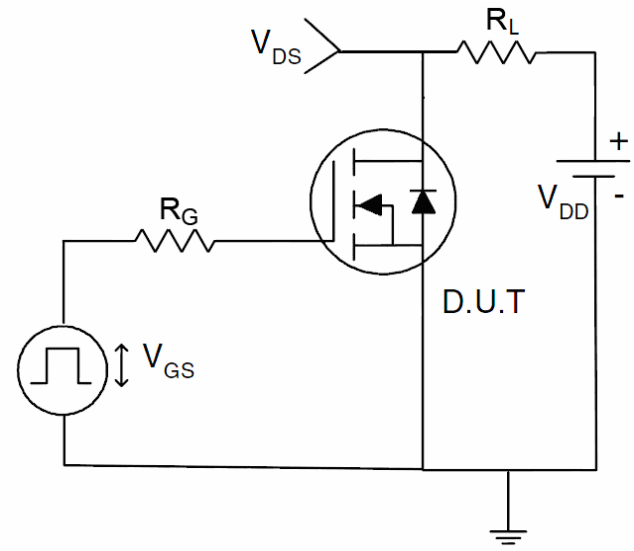
### 1) $E_{AS}$ Test Circuits




### 2) Gate Charge Test Circuit




### 3) Switch Time Test Circuit



## Typical Electrical and Thermal Characteristics (Curves)

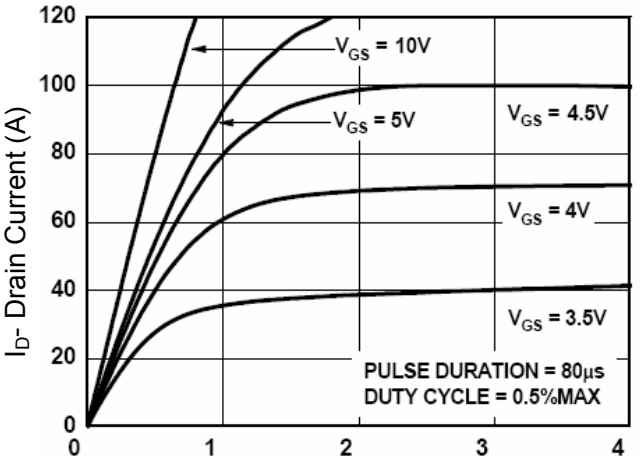



**Figure 1 Output Characteristics**

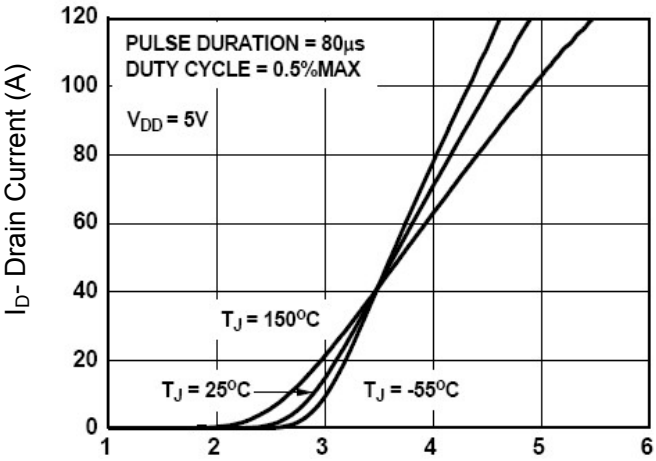



**Figure 2 Transfer Characteristics**

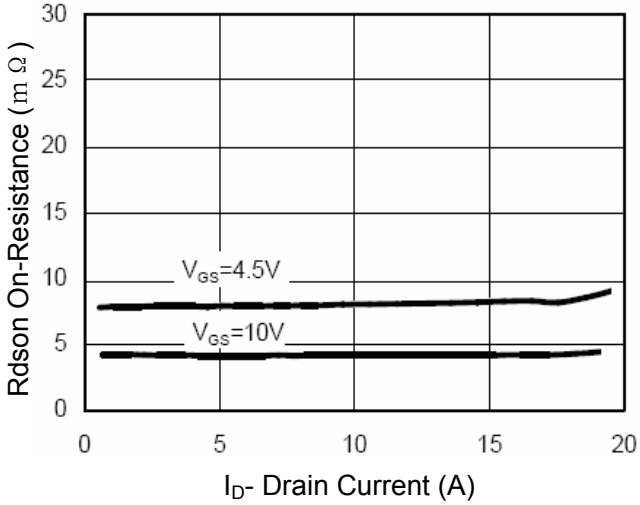



**Figure 3 Rdson- Drain Current**

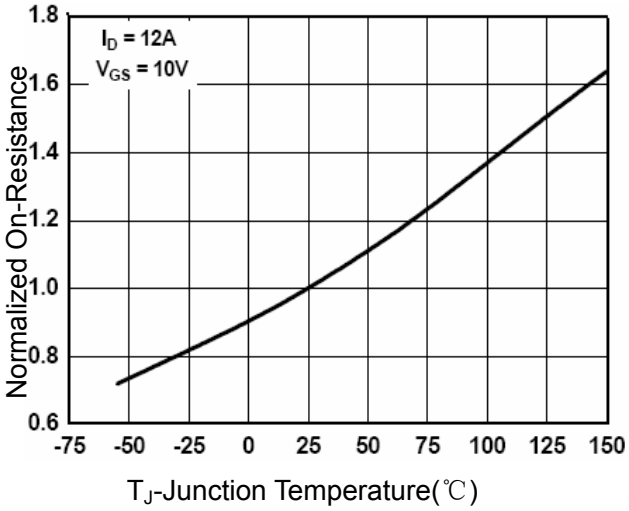



**Figure 4 Rdson-Junction Temperature**

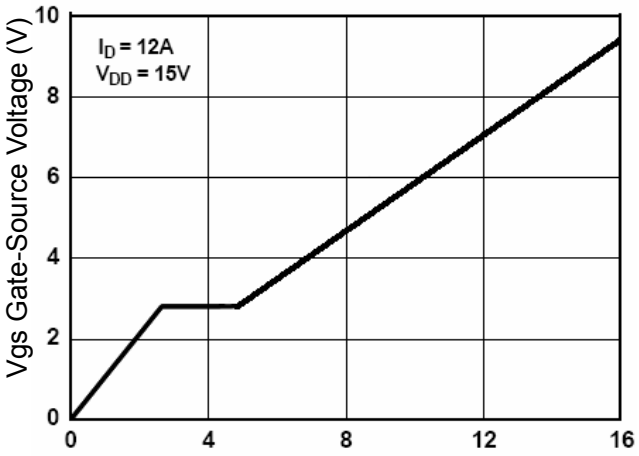



**Figure 5 Gate Charge**

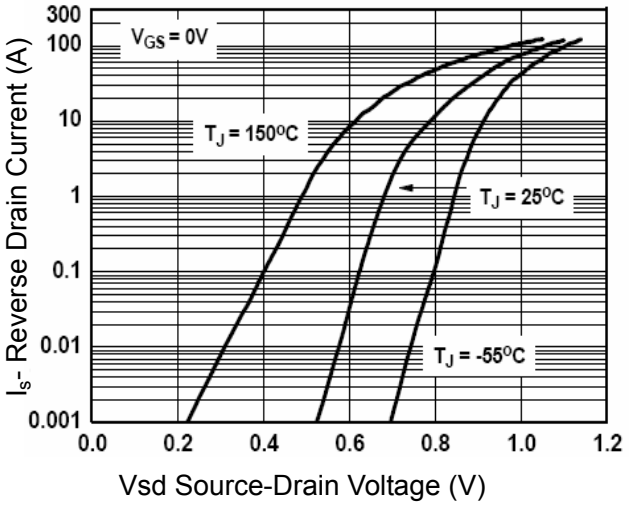



**Figure 6 Source- Drain Diode Forward**

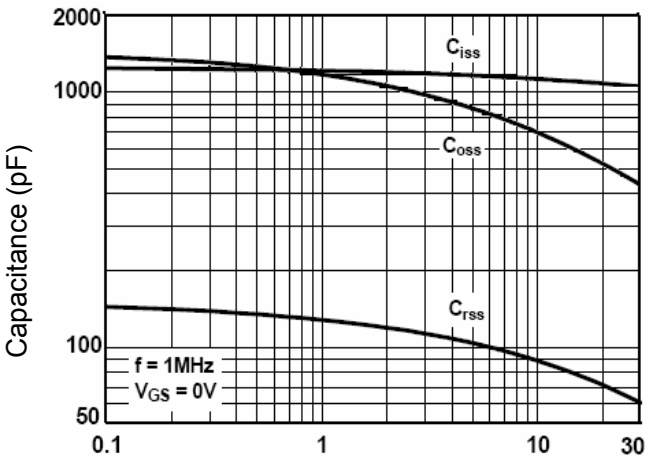



**Figure 7 Capacitance vs Vds**

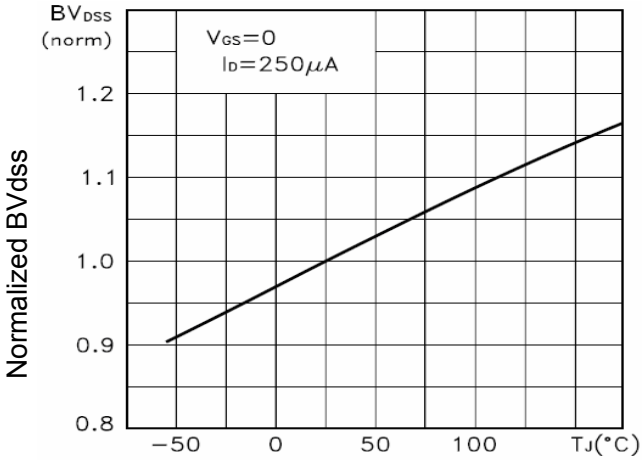



**Figure 9 $BV_{DSS}$ vs Junction Temperature**

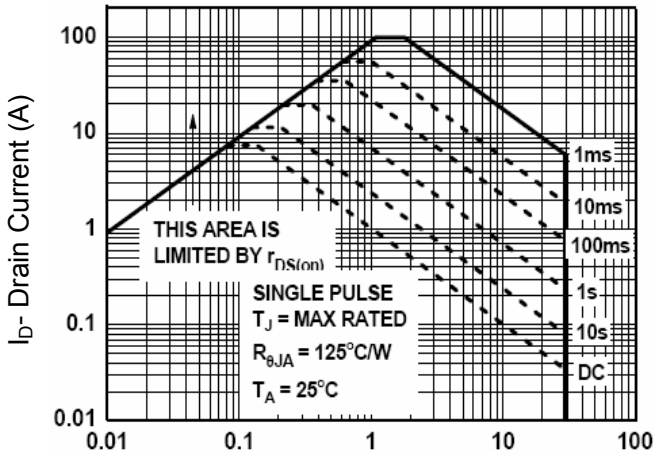



**Figure 8 Safe Operation Area**

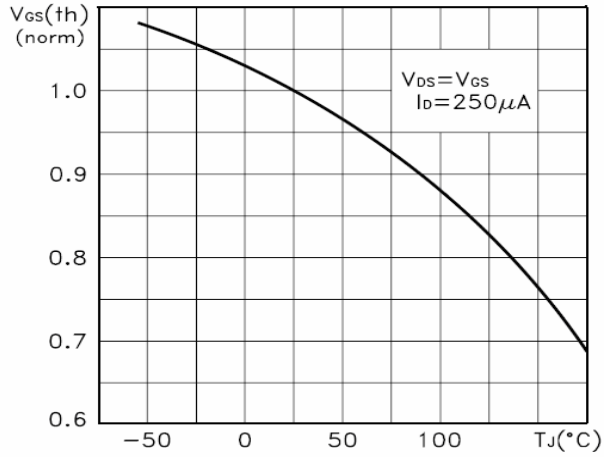



**Figure 10 $V_{GS(th)}$ vs Junction Temperature**

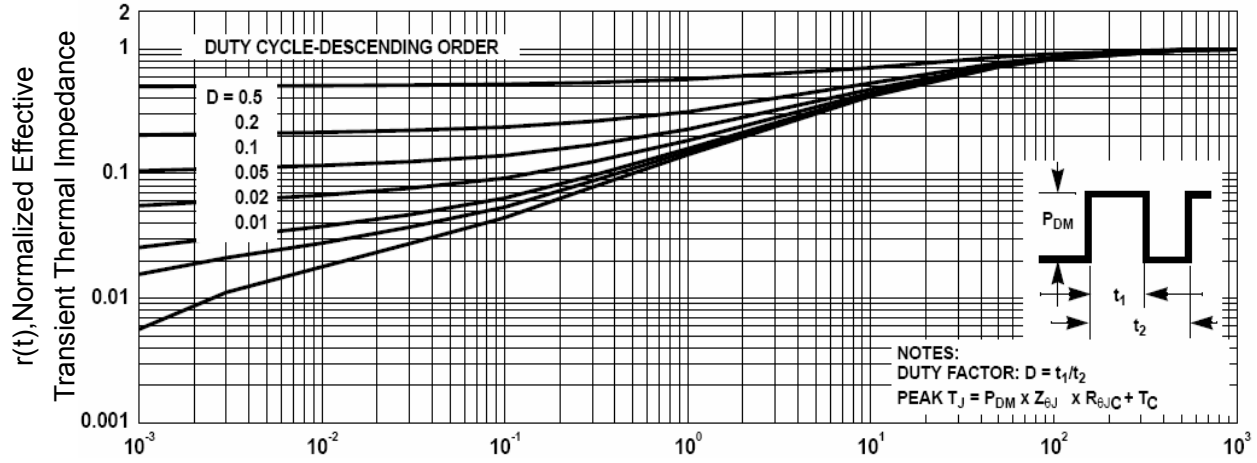
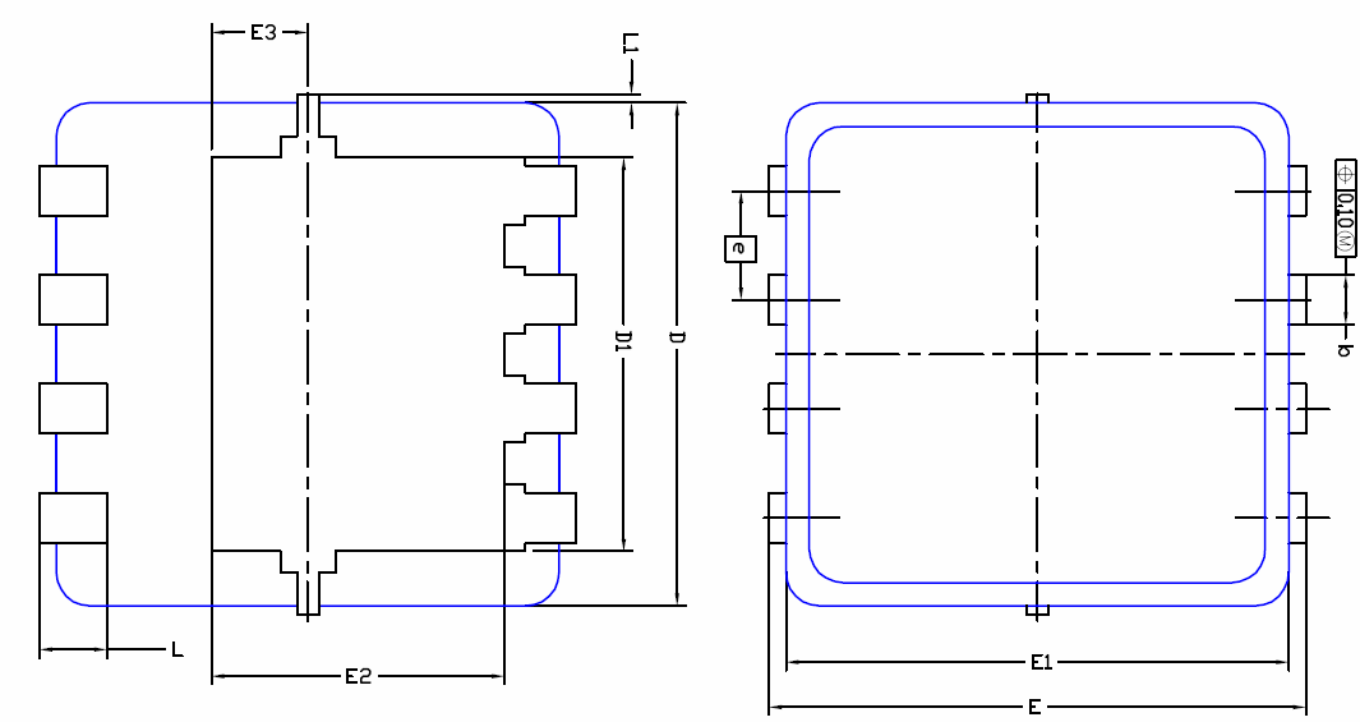
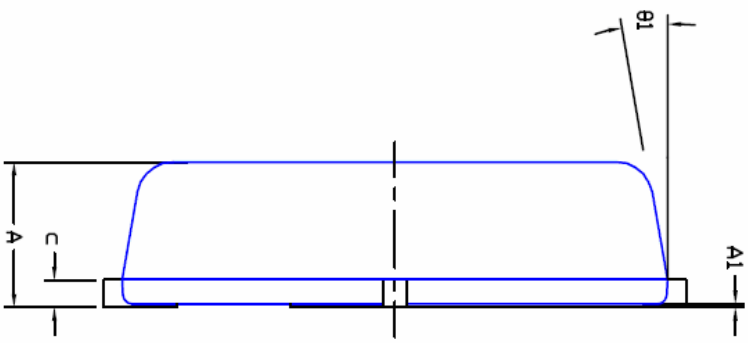



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## DFN3X3 EP Package Information




| DIM. | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.700 | 0.80 | 0.900 | 0.0276 | 0.0315 | 0.0354 |
| A1 | 0.00 | --- | 0.05 | 0.000 | --- | 0.002 |
| b | 0.24 | 0.30 | 0.35 | 0.009 | 0.012 | 0.014 |
| c | 0.10 | 0.152 | 0.25 | 0.004 | 0.006 | 0.010 |
| D | 3.00 BSC | | | 0.118 BSC | | |
| D1 | 2.35 BSC | | | 0.093 BSC | | |
| E | 3.20 BSC | | | 0.126 BSC | | |
| E1 | 3.00 BSC | | | 0.118 BSC | | |
| E2 | 1.75 BSC | | | 0.069 BSC | | |
| E3 | 0.575 BSC | | | 0.023 BSC | | |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.30 | 0.40 | 0.50 | 0.0118 | 0.0157 | 0.0197 |
| L1 | 0 | --- | 0.100 | 0 | --- | 0.004 |
| θ1 | 0° | 10° | 12° | 0° | 10° | 12° |