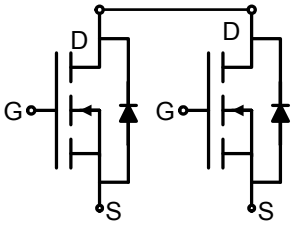
# FNK N-Channel Enhancement Mode Power MOSFET

## Description

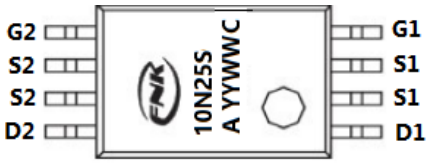
The FNK10N25S uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.




**Schematic diagram**

## General Features

- $V_{DS}$ = 18V,$I_d$ = 8A
  $R_{DS(ON)}$ <18mΩ @ $V_{GS}$=2.5V
  $R_{DS(ON)}$ < 14mΩ @ $V_{GS}$=4.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package




**Marking and pin assignment**

## Application

- Battery protection
- Load switch
- Power management

**TSSOP-8 top view**

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| FNK10N25S | FNK10N25S | TSSOP-8L | Ø330mm | 12 mm | 3000 units |

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

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 18 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | V |
| Drain Current-Continuous | $I_D$ | 8 | A |
| Drain Current-Pulsed (Note 1) | $I_{DM}$ | 32 | A |
| Maximum Power Dissipation | $P_D$ | 1.5 | W |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 150 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 100 | ℃/W |

## Electrical Characteristics ($T_A$=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 | 22 | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=16V,$V_{GS}$=0V | - | - | 1 | μA |

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±10V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics (Note 3)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 0.5 | 0.7 | 1.2 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=2.5V, $I_D$=4.5 A | - | 14 | 18 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=5A | - | 10.5 | 14 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=15V,$I_D$=5A | 8 | - | - | S |
| **Dynamic Characteristics (Note4)** | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=10V,$V_{GS}$=0V, F=1.0MHz | - | 990 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 200 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 140 | - | PF |
| **Switching Characteristics (Note 4)** | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=10V,$I_D$=1A $V_{GS}$=4.5V,$R_{GEN}$=6Ω | - | 9 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 30 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 35 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 10 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=10V,$I_D$=5A,$V_{GS}$=4.5V | - | 11.4 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 2.3 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 2.9 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=1A | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 5 | A |

## 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

## Typical Electrical and Thermal Characteristics

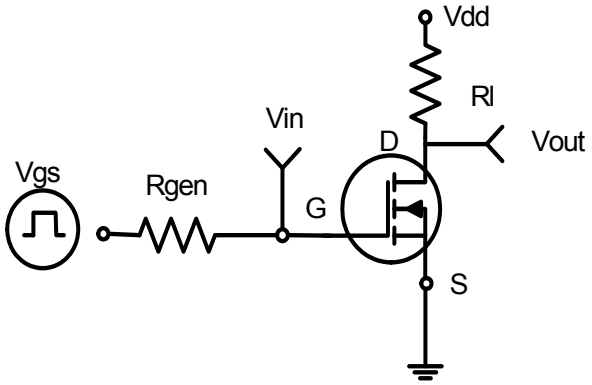



**Figure 1:Switching Test Circuit**

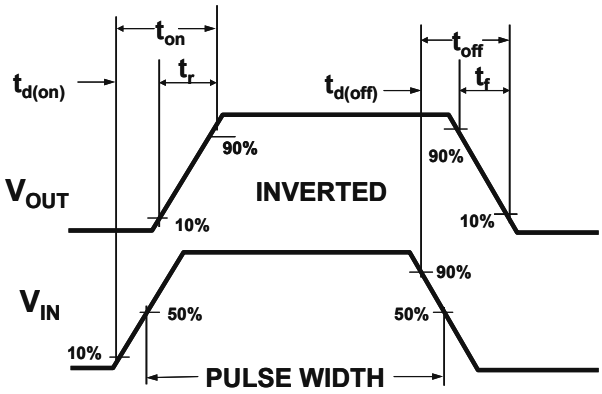



**Figure 2:Switching Waveforms**

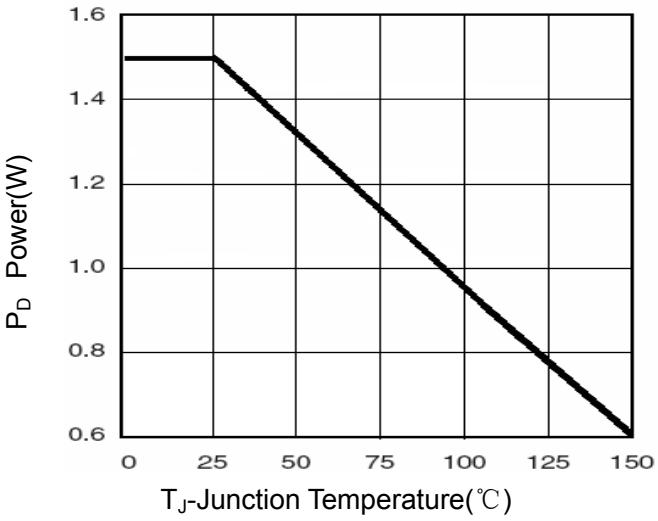



**Figure 3 Power Dissipation**

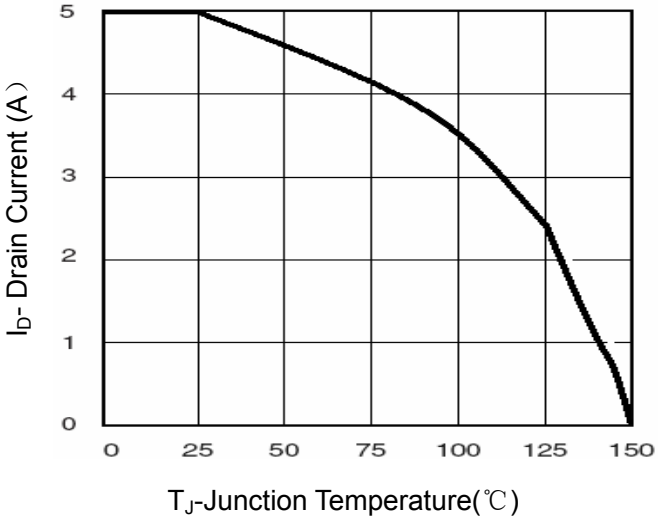



**Figure 4 Drain Current**

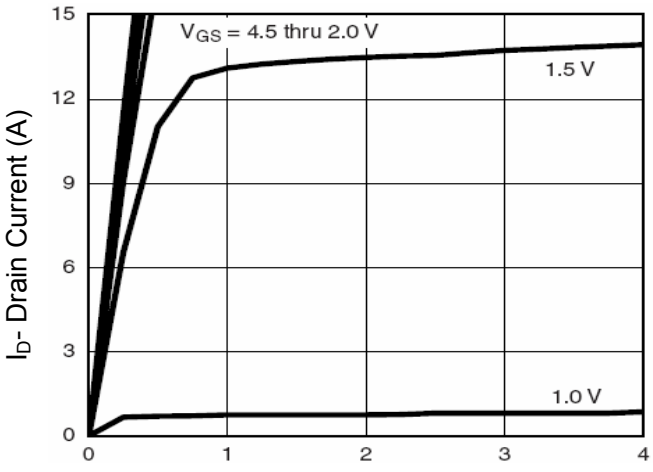



**Figure 5 Output Characteristics**

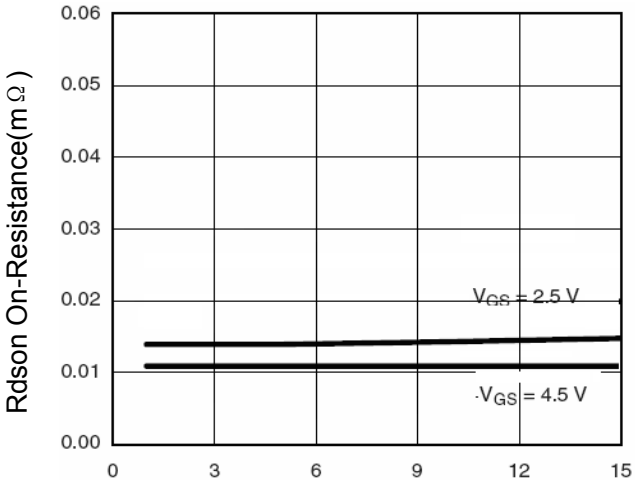



**Figure 6 Drain-Source On-Resistance**

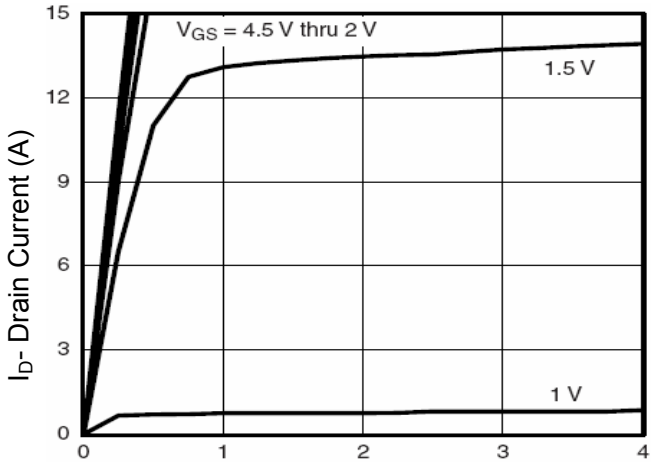



**Figure 7 Transfer Characteristics**

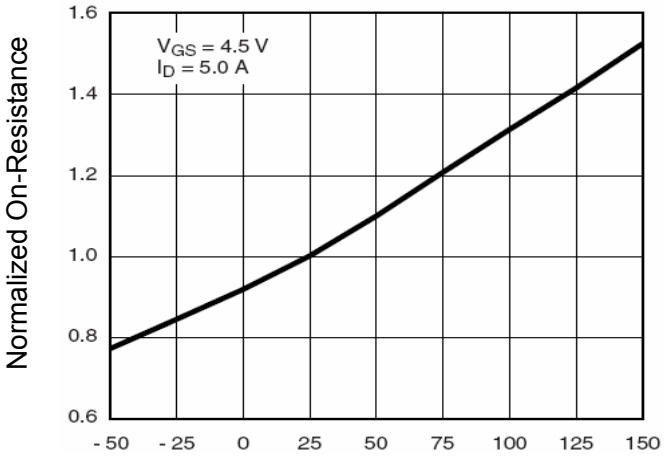



**Figure 8 Drain-Source On-Resistance**

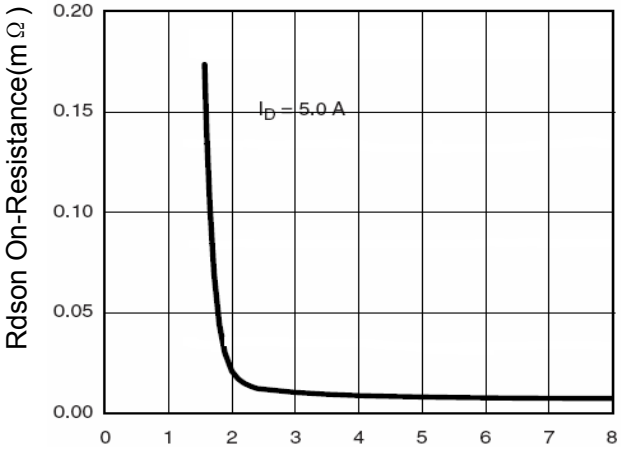



**Figure 9 Rdson vs Vgs**

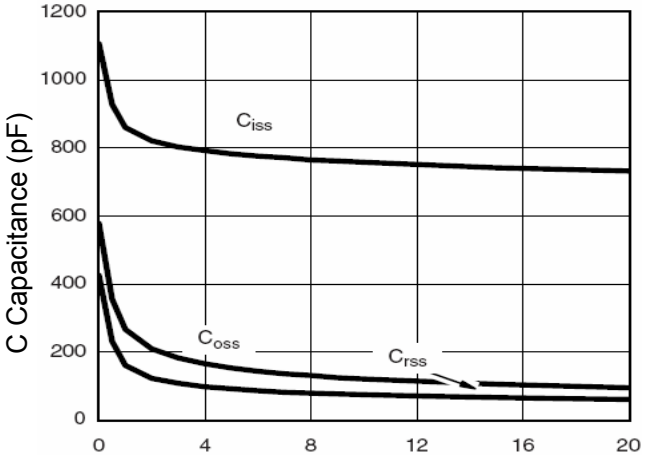



**Figure 10 Capacitance vs Vds**

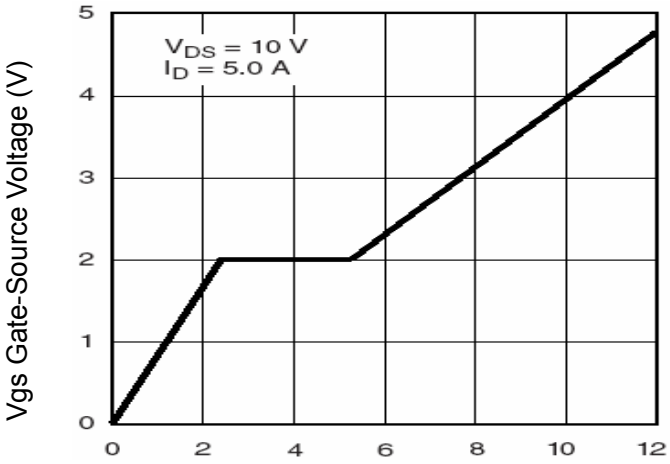



**Figure 11 Gate Charge**

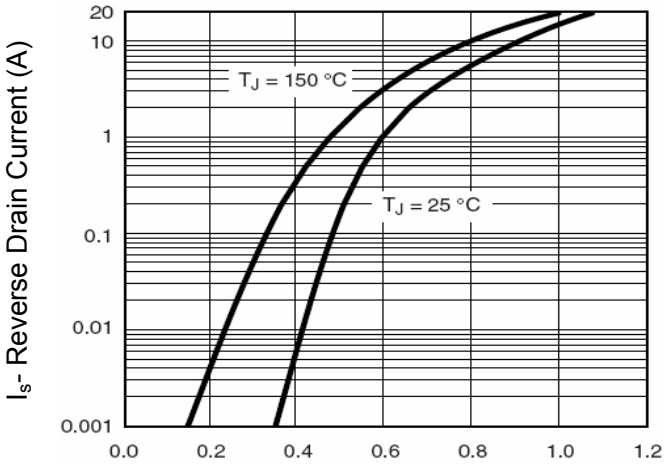
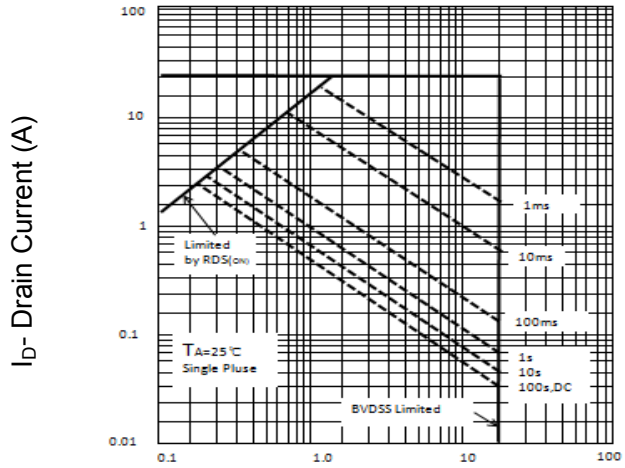
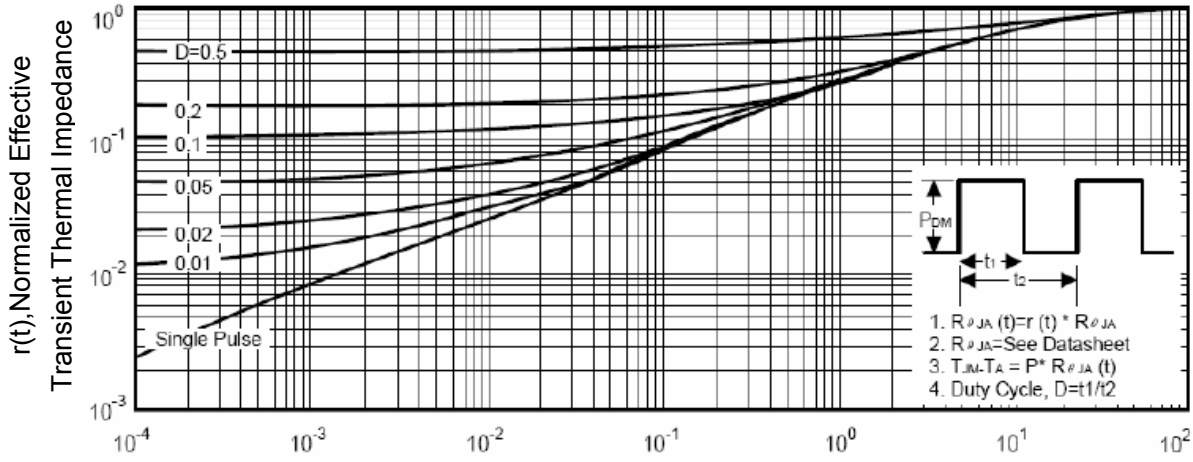



**Figure 12 Source- Drain Diode Forward**




Vds Drain-Source Voltage (V)

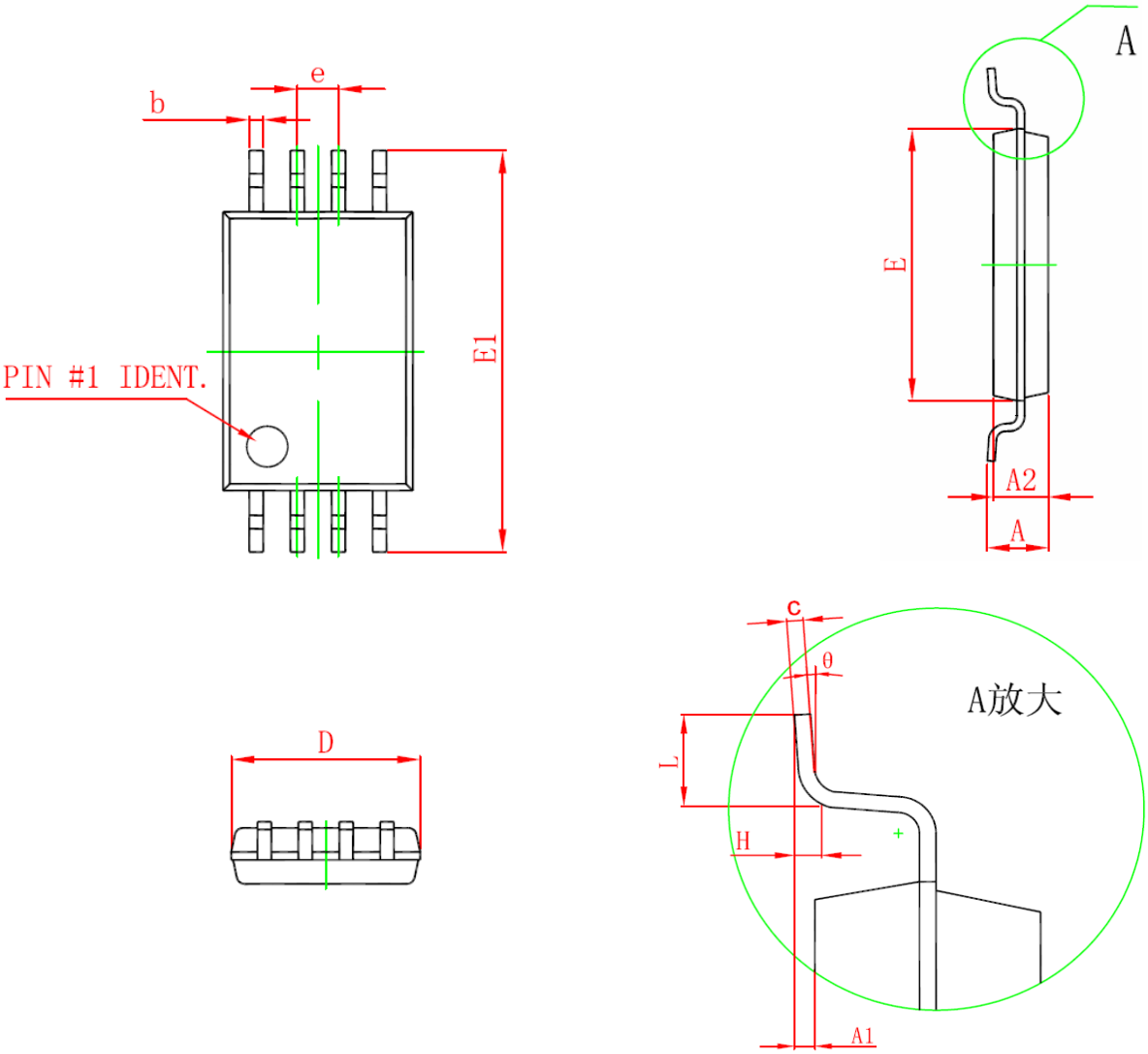
**Figure 13 Safe Operation Area**




Square Wave Pluse Duration(sec)

**Figure 14 Normalized Maximum Transient Thermal Impedance**

# TSSOP-8 PACKAGE INFORMATION




| Symbol | Dimensions In Millimeters | |
|---|---|---|
| | Min | Max |
| D | 2.900 | 3.100 |
| E | 4.300 | 4.500 |
| b | 0.190 | 0.300 |
| c | 0.090 | 0.200 |
| E1 | 6.250 | 6.550 |
| A | | 1.100 |
| A2 | 0.800 | 1.000 |
| A1 | 0.020 | 0.150 |
| e | 0.65(BSC) | |
| L | 0.500 | 0.700 |
| H | 0.25(TYP) | |
| Θ | 1° | 7° |

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