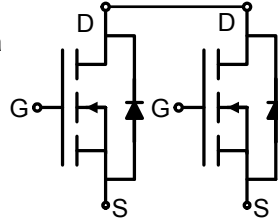


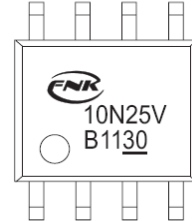
## FNK N-Channel Enhancement Mode Power MOSFET

### Description

The FNK10N25V 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



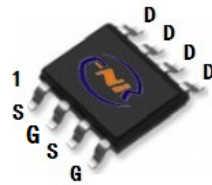
Marking and pin assignment

### General Features

- $V_{DS} = 20V, I_D = 5A$
- $R_{DS(ON)} < 14m\Omega @ V_{GS}=2.5V$
- $R_{DS(ON)} < 11m\Omega @ V_{GS}=4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

### Application

- Battery protection
- Load switch
- Power management



SOP-8L top view



### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FNK10N25V	FNK10N25V	SOP-8L	Ø330mm	12 mm	2500 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 10$	V
Drain Current-Continuous	$I_D$	12.5	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	35	A
Maximum Power Dissipation	$P_D$	2.5	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	100	$^\circ C/W$
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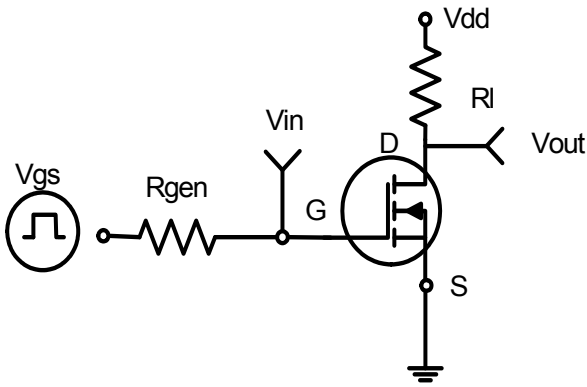
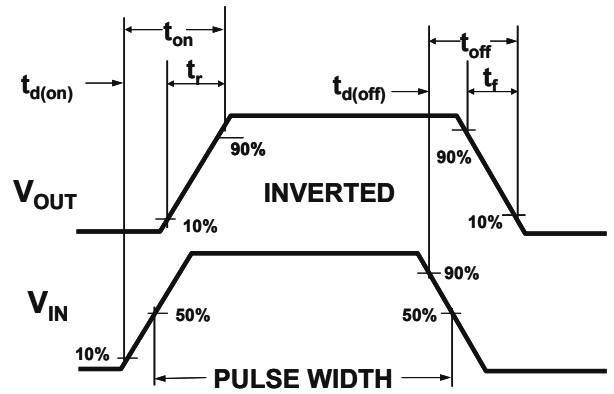
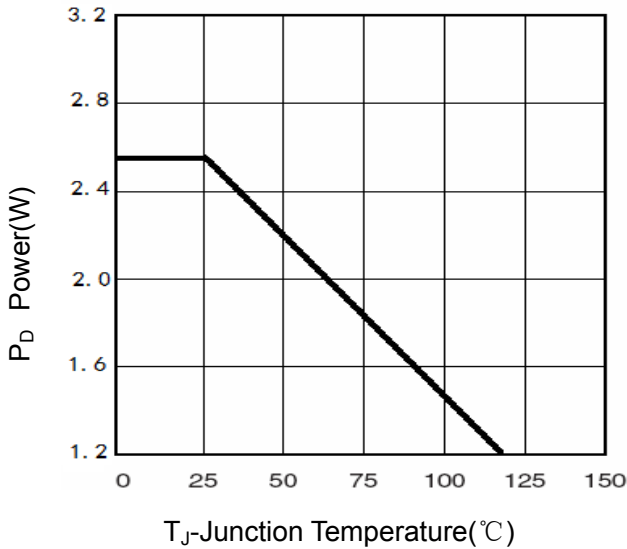
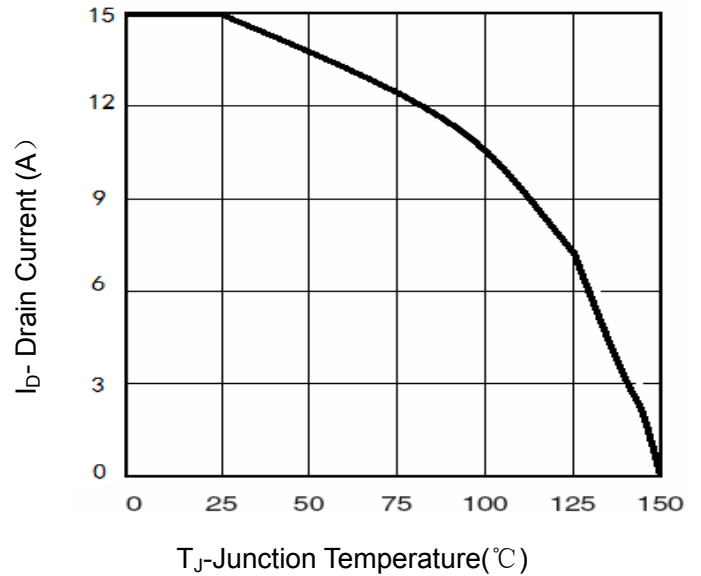
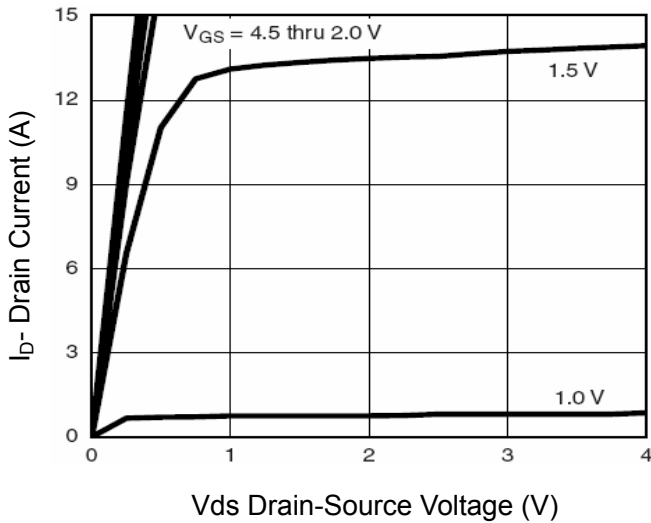
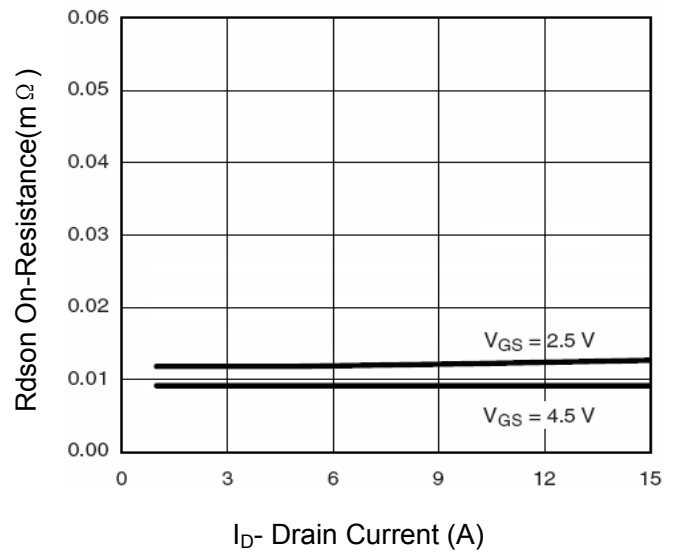
### Electrical Characteristics ( $T_A=25^\circ C$ unless otherwise noted)

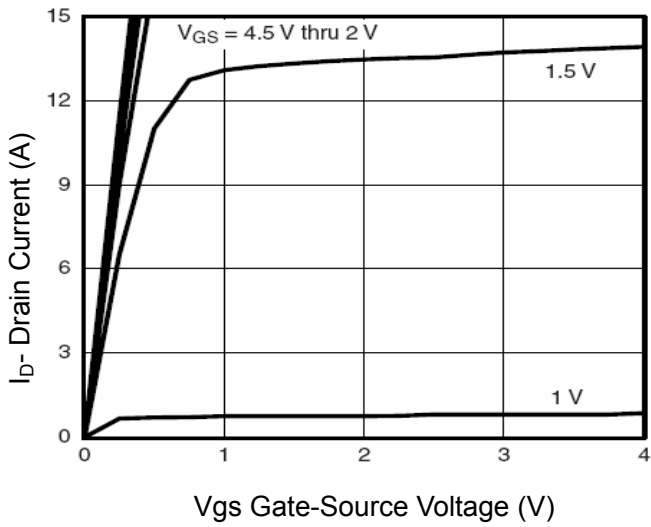
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	20	22	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$	-	-	1	$\mu A$

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.65	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=2.5V, I_D=4.5 A$	-	11.5	14	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	9.5	11	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=15V, I_D=5A$		12	-	S
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$	-	780	-	PF
Output Capacitance	$C_{oss}$		-	140	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	80	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=1A$ $V_{GS}=4.5V, R_{GEN}=6\Omega$	-	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
<b>Drain-Source Diode Characteristics</b>						
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

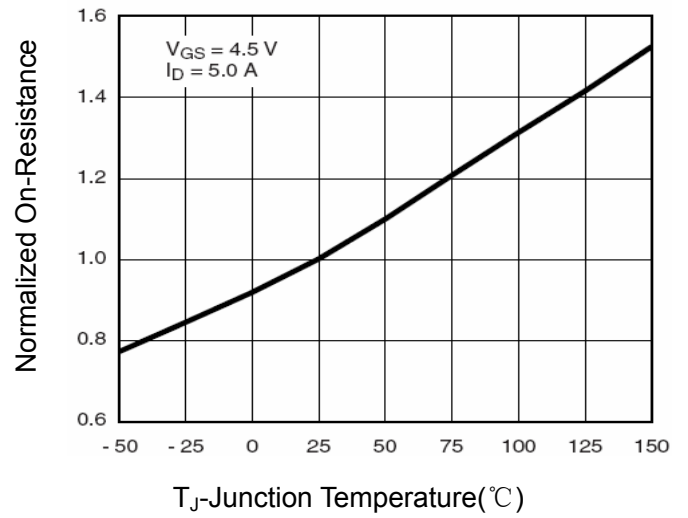
### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

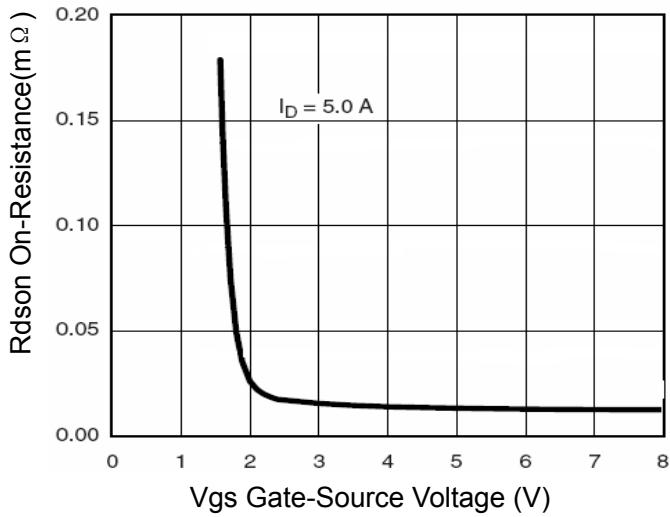
**Typical Electrical and Thermal Characteristics**

**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**



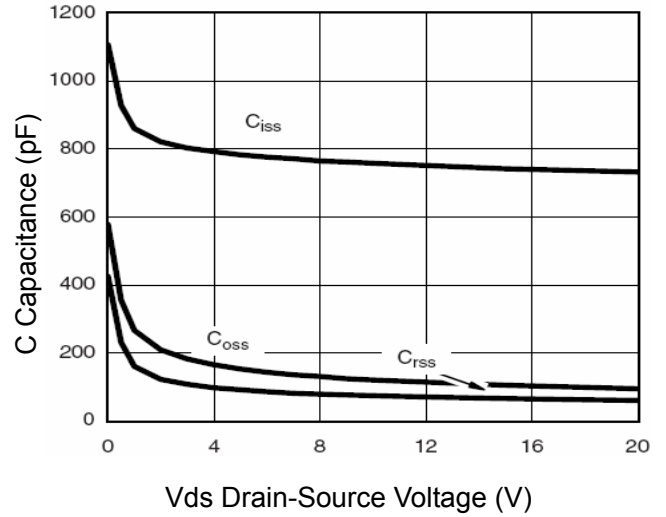
Vgs Gate-Source Voltage (V)  
**Figure 7 Transfer Characteristics**



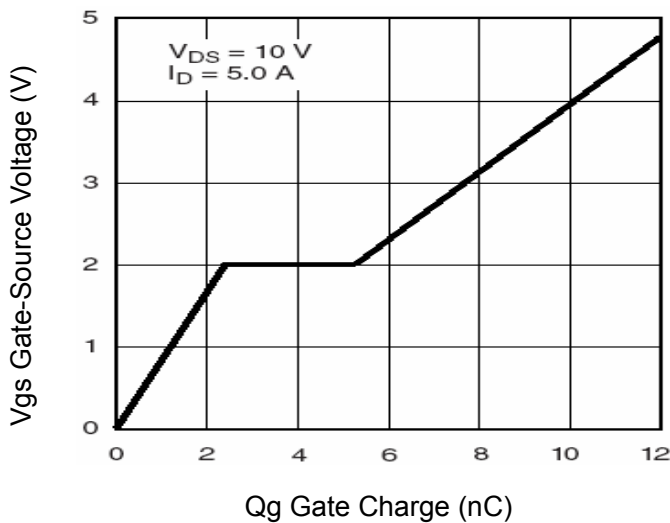
$T_J$ -Junction Temperature ( $^{\circ}\text{C}$ )  
**Figure 8 Drain-Source On-Resistance**



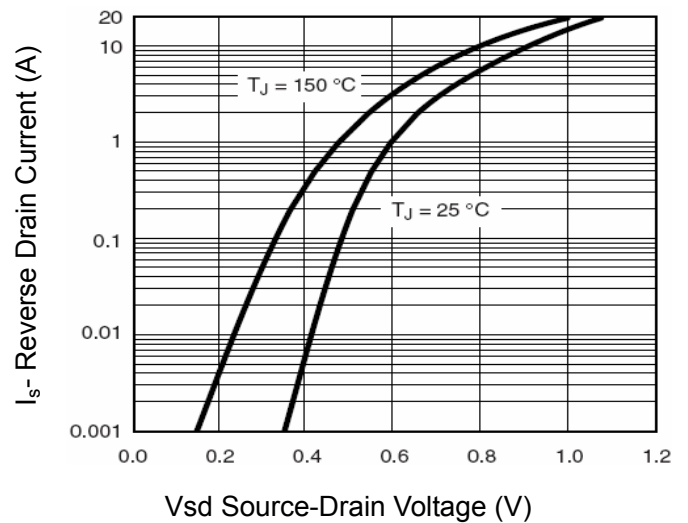
Vgs Gate-Source Voltage (V)  
**Figure 9 Rdson vs Vgs**



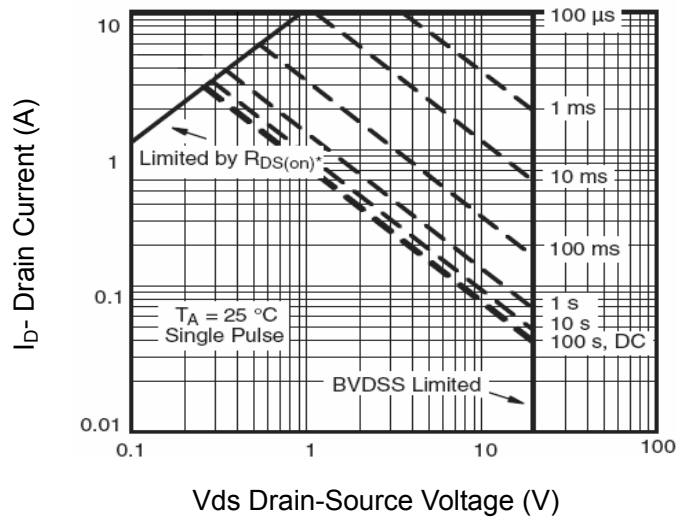
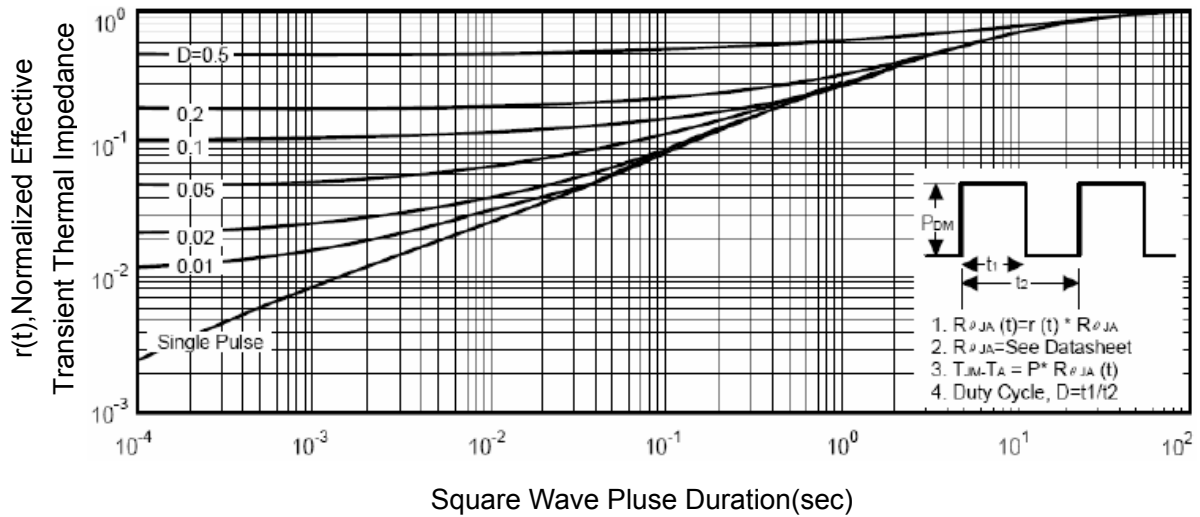
Vds Drain-Source Voltage (V)  
**Figure 10 Capacitance vs Vds**

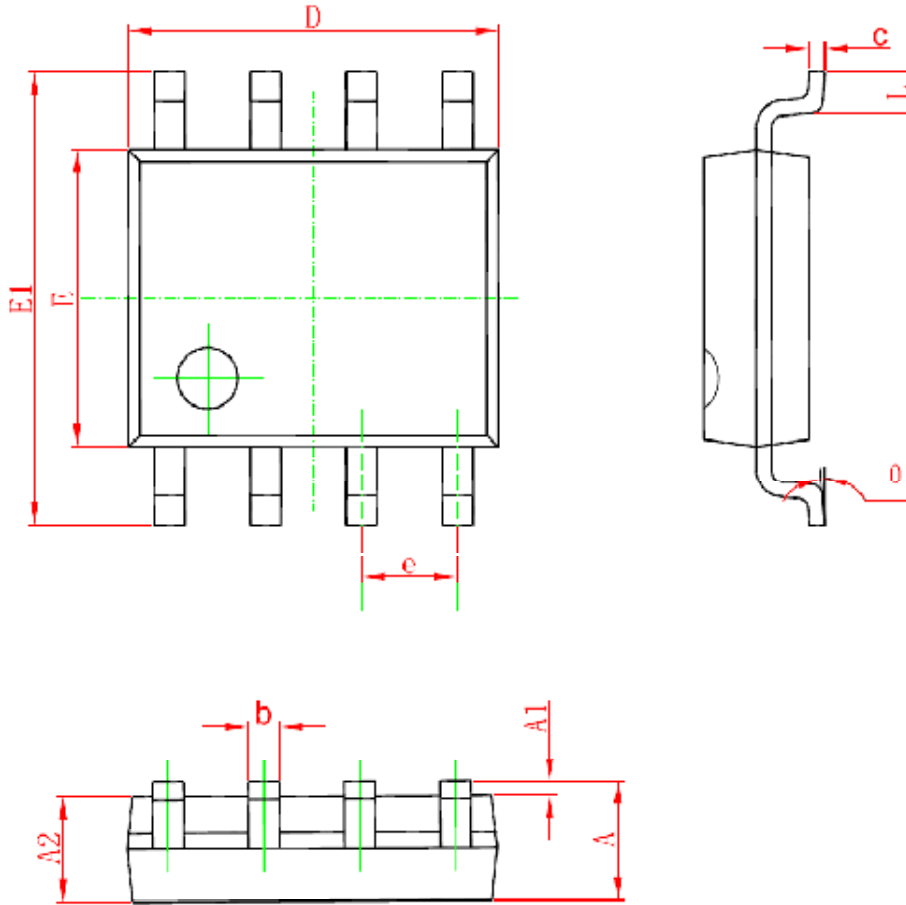


Qg Gate Charge (nC)  
**Figure 11 Gate Charge**



Vsd Source-Drain Voltage (V)  
**Figure 12 Source- Drain Diode Forward**


**Figure 13 Safe Operation Area**

**Figure 14 Normalized Maximum Transient Thermal Impedance**

**SOP-8 Package Information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°