

## FNK N-Channel Enhancement Mode Power MOSFET

### Description

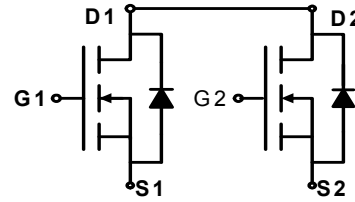
The FNK5A uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

- $V_{DS} = 19.5V, I_D = 4A$   
 $R_{DS(ON)} < 37m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)} < 27m\Omega @ V_{GS}=4.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

### Application

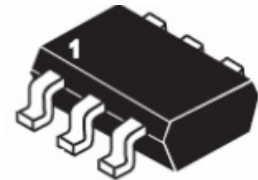
- Battery protection
- Load switch
- Power management



Schematic diagram



Marking and pin Assignment



SOT23-6L top view

### Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FNK5A	FNK5A	SOT23-6L	Ø180mm	8mm	3000 units

### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	19.5	V
Gate-Source Voltage	$V_{GS}$	±10	V
Drain Current-Continuous	$I_D$	4	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	16	A
Maximum Power Dissipation	$P_D$	1.25	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

### Thermal Characteristic

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

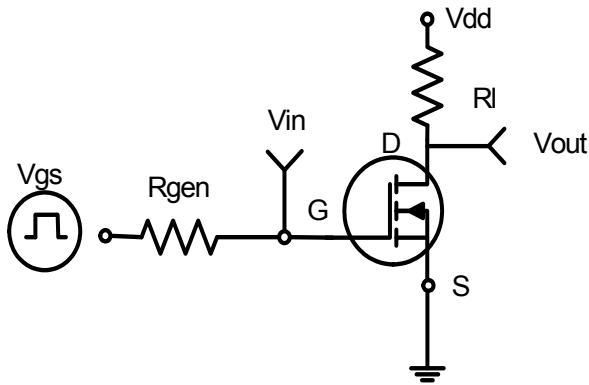
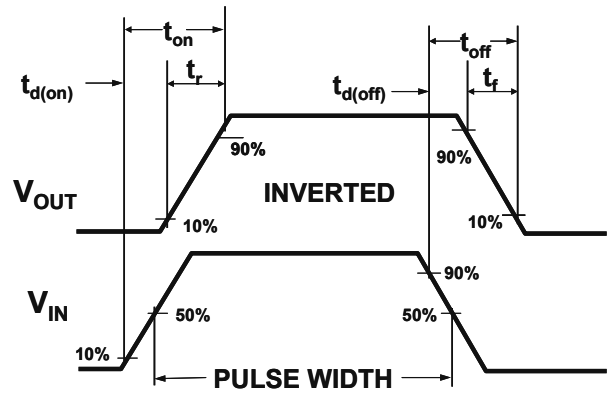
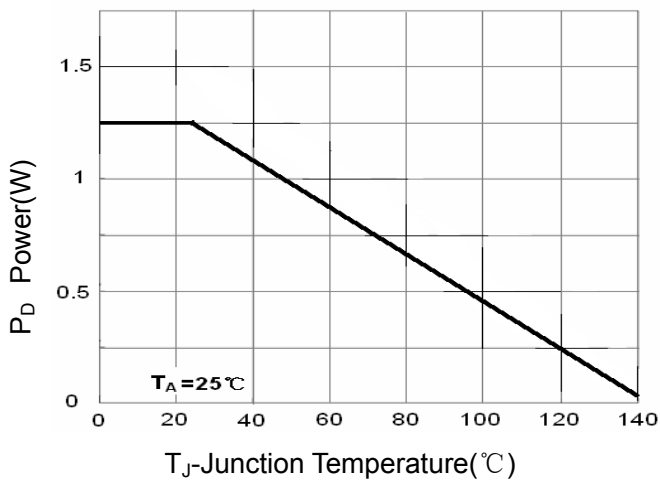
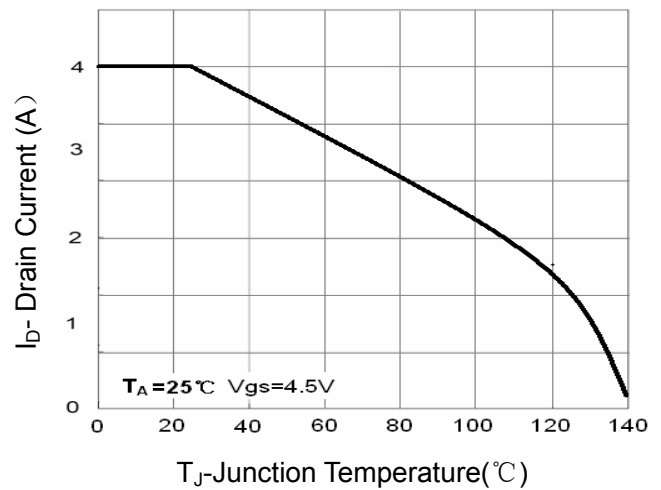
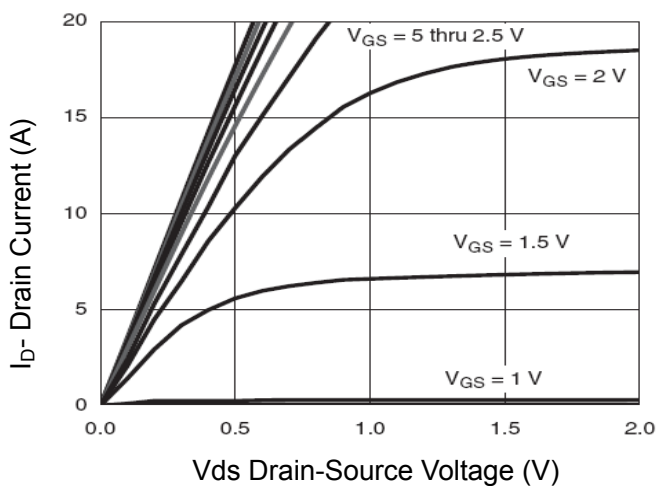
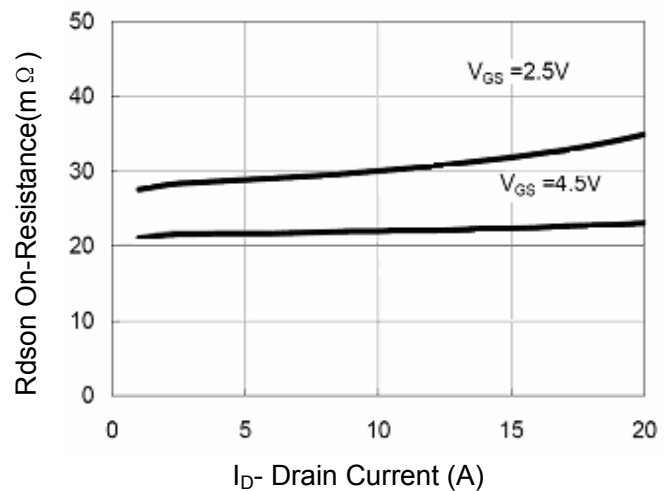
### Electrical Characteristics (TA=25°C unless otherwise noted)

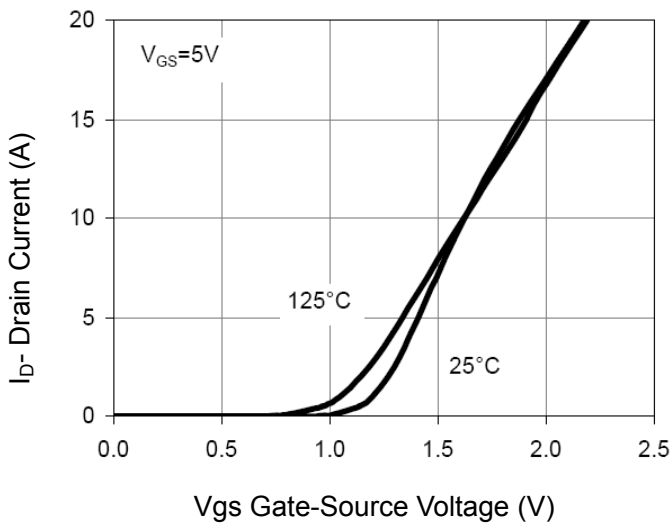
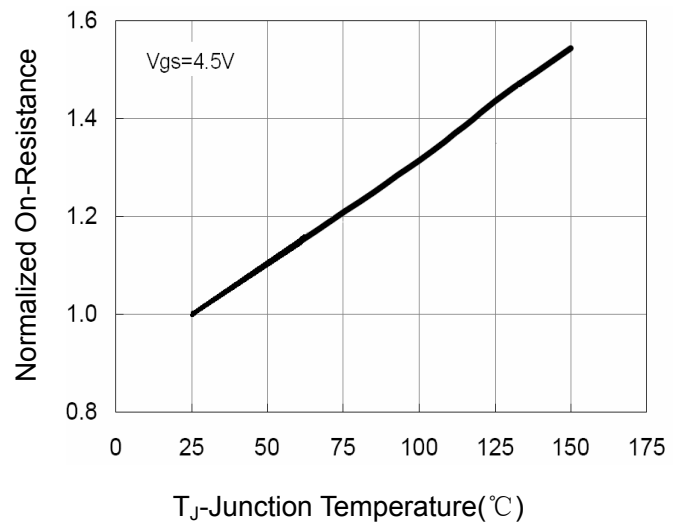
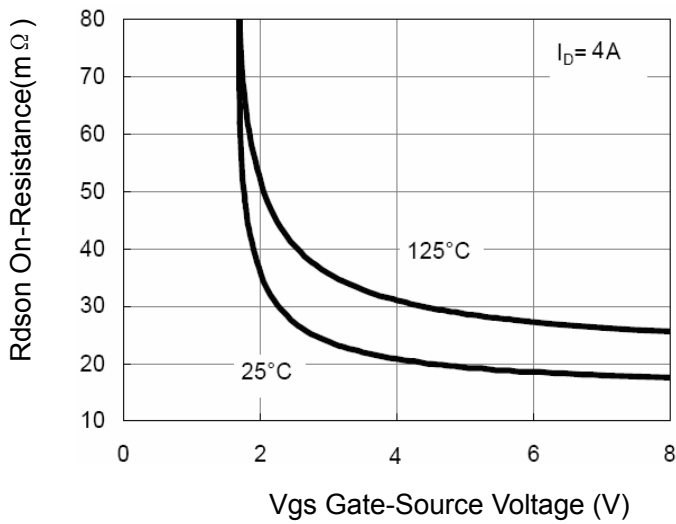
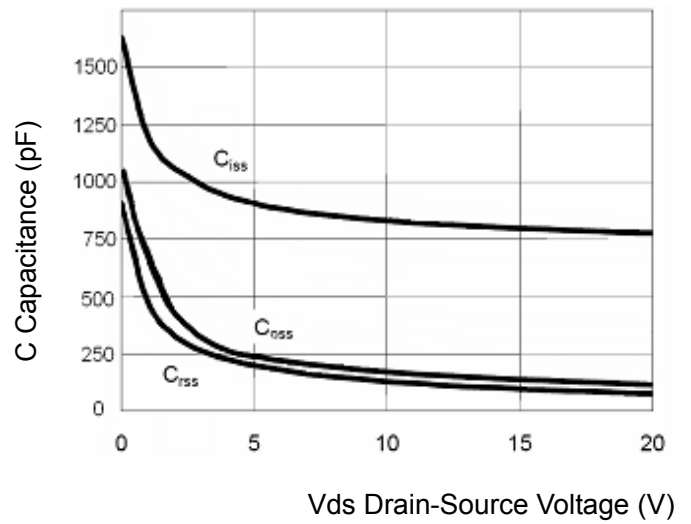
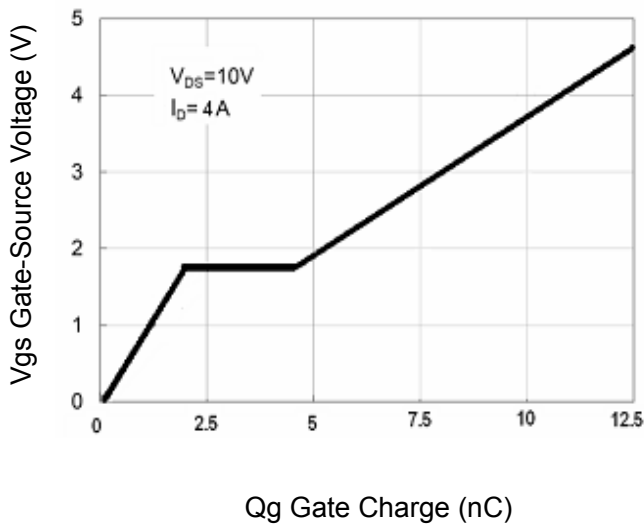
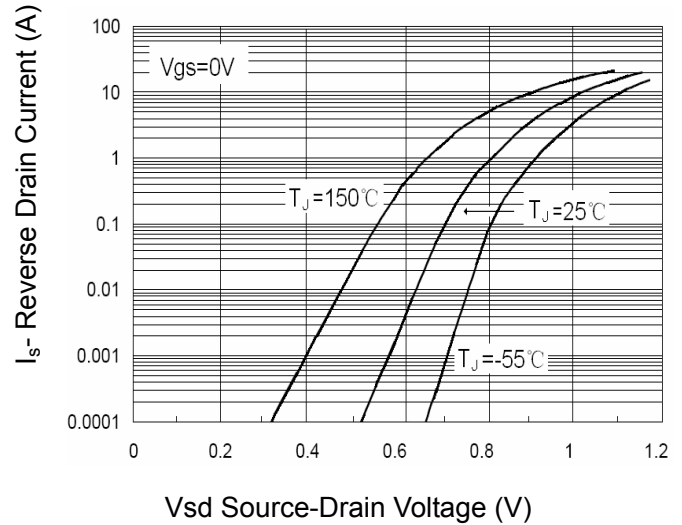
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	19.5	21	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=19.5V, V_{GS}=0V$	-	-	1	μA

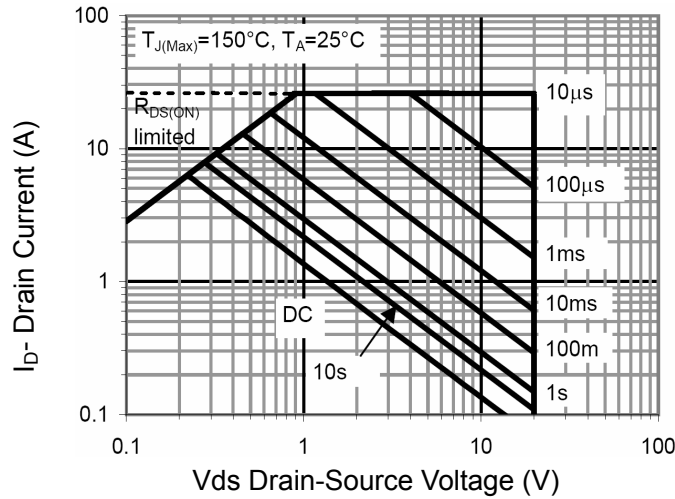
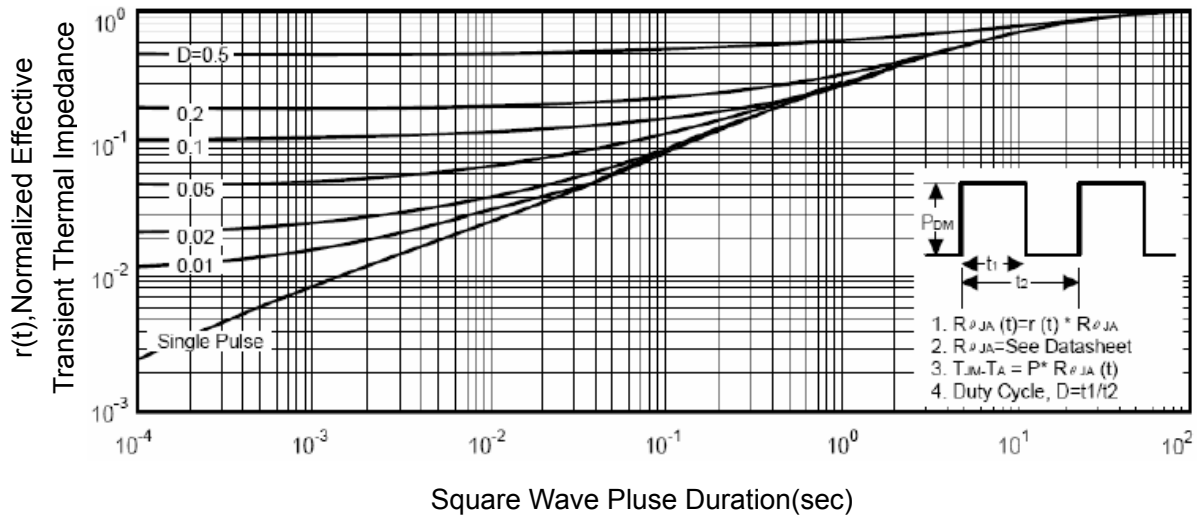
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.7	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=4A$	-	18	27	m $\Omega$
		$V_{GS}=2.5V, I_D=3A$	-	24	37	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=4A$	-	10	-	S
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=8V, V_{GS}=0V,$ $F=1.0MHz$	-	800	-	PF
Output Capacitance	$C_{oss}$		-	155	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	125	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=1A$ $V_{GS}=4V, R_{GEN}=10\Omega$	-	18	-	nS
Turn-on Rise Time	$t_r$		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	43	-	nS
Turn-Off Fall Time	$t_f$		-	20	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=4A,$ $V_{GS}=4.5V$	-	11	-	nC
Gate-Source Charge	$Q_{gs}$		-	2.3	-	nC
Gate-Drain Charge	$Q_{gd}$		-	2.5	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=2A$	-	0.8	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	2	A

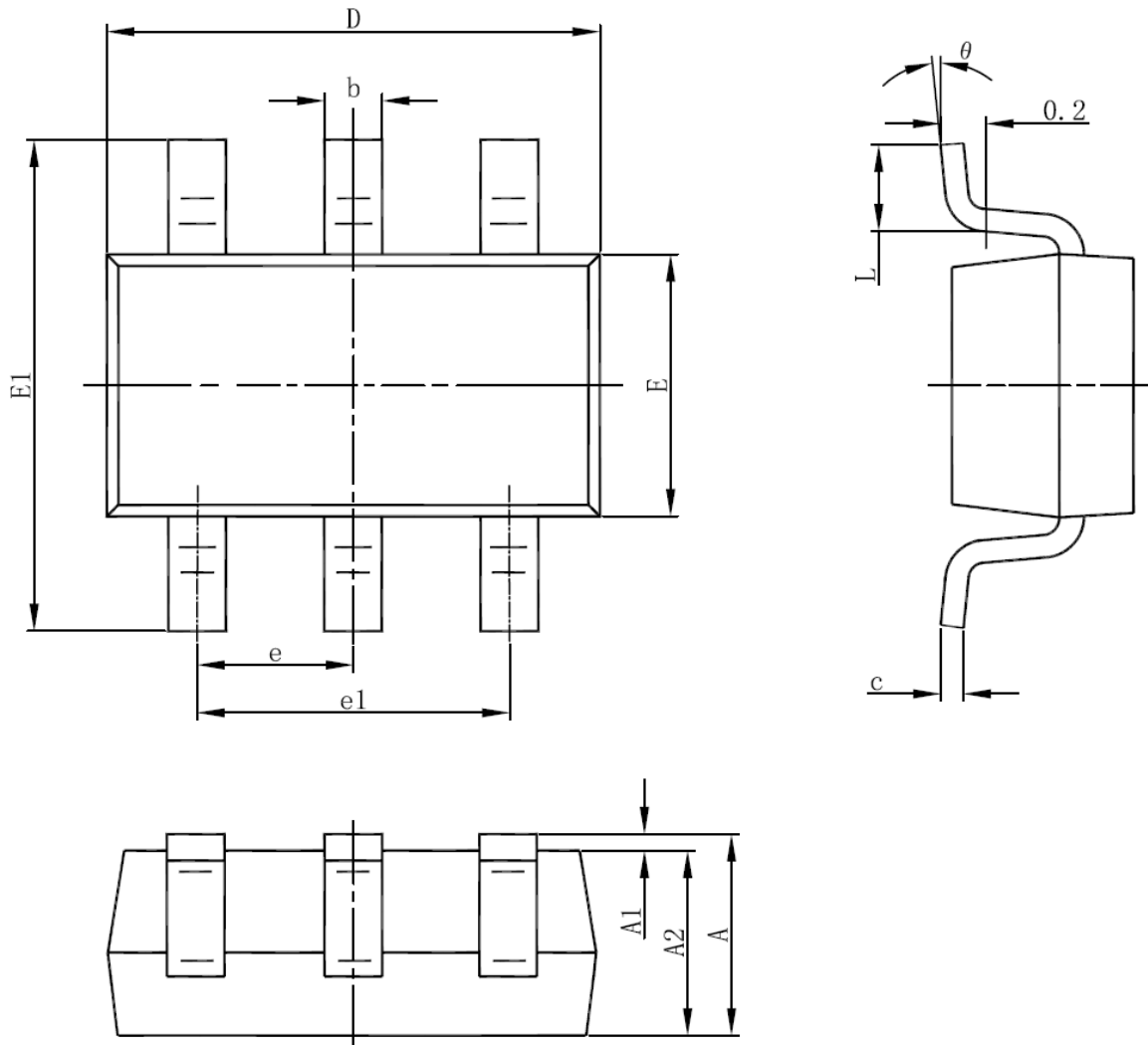
### Notes:

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**


**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**


**Figure 13 Safe Operation Area**

**Figure 14 Normalized Maximum Transient Thermal Impedance**

**SOT23-6L PACKAGE INFORMATION**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

**Disclaimer:**

- FNK reserves the right to make changes to the information herein for the improvement of the design and performance without further notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using FNK products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- FNK will supply the best possible product for customers!