

## FNK N-Channel Enhancement Mode Power MOSFET

### Description

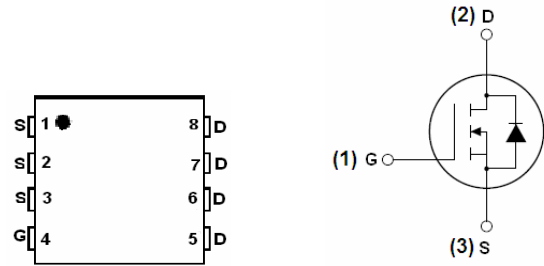
The FNK10N01 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

- $V_{DS} = 20V, I_D = 100A$   
 $R_{DS(ON)} < 2.05m\Omega @ V_{GS} = 4.5V$  (Typ 1.8m $\Omega$ )
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation

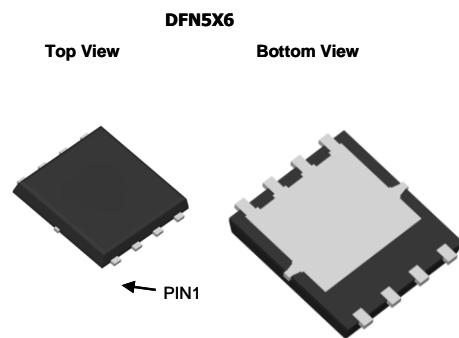
### Application

- Power switching application
- Load switching
- Uninterruptible power supply



Marking and pin assignment

Schematic diagram



### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
FNK10N01	FNK10N01	DFN5*6-8L	-	-	-

### 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	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	100	A
Drain Current-Continuous ( $T_C = 100^\circ C$ )	$I_D (100^\circ C)$	77	A
Pulsed Drain Current	$I_{DM}$	400	A
Maximum Power Dissipation	$P_D$	83	W
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	504	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	1.5	$^\circ C/W$
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## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

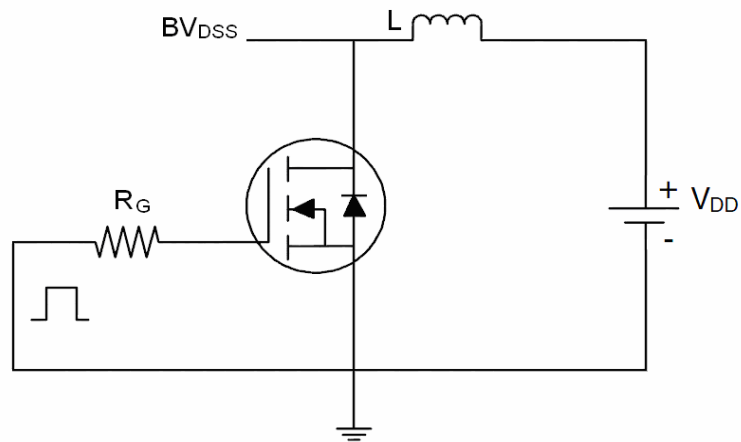
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.55	0.6	1	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	1.8	2.05	mΩ
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =2.5V, I <sub>D</sub> =20A	-	2.3	2.5	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =30A	100	-	-	S
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, F=1.0MHz		9585		PF
Output Capacitance	C <sub>oss</sub>			1145		PF
Reverse Transfer Capacitance	C <sub>rss</sub>			940		PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =10V RL=0.5Ω, R <sub>GEN</sub> =3Ω	-	12.5	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	35.5	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	40	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	32.5	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =30A		30.4		nC
Gate-Source Charge	Q <sub>gs</sub>			9.5		nC
Gate-Drain Charge	Q <sub>gd</sub>			19.8		nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =20A	-	-	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>	-	-	-	110	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 30A di/dt = 100A/μs (Note3)	-	35.3	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	30.7	-	nC

### Notes:

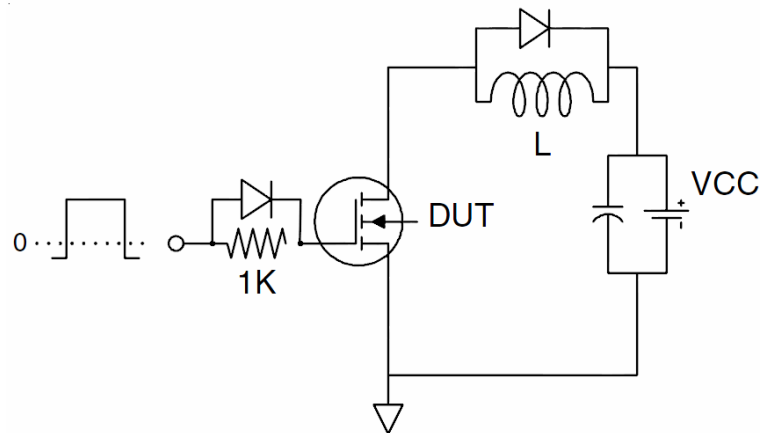
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=10V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω

## Test circuit

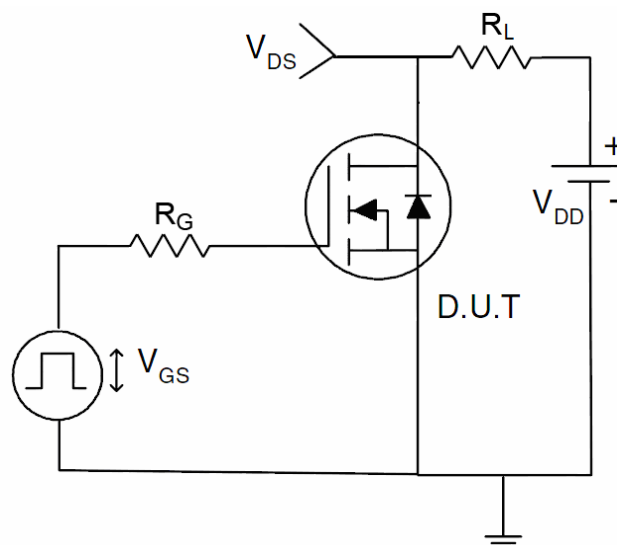
### 1) E<sub>AS</sub> test Circuits

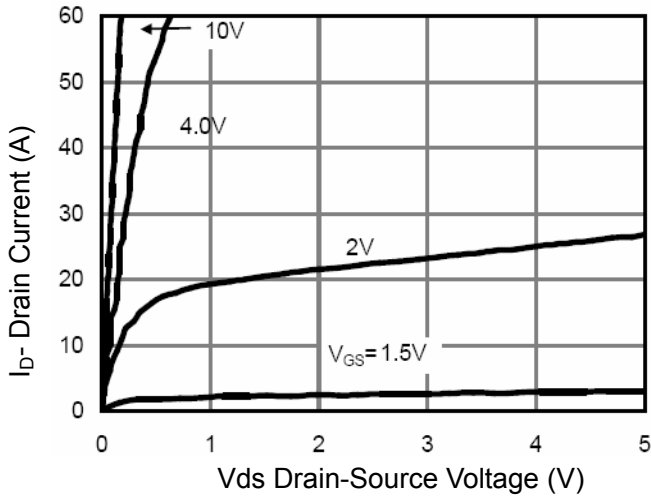
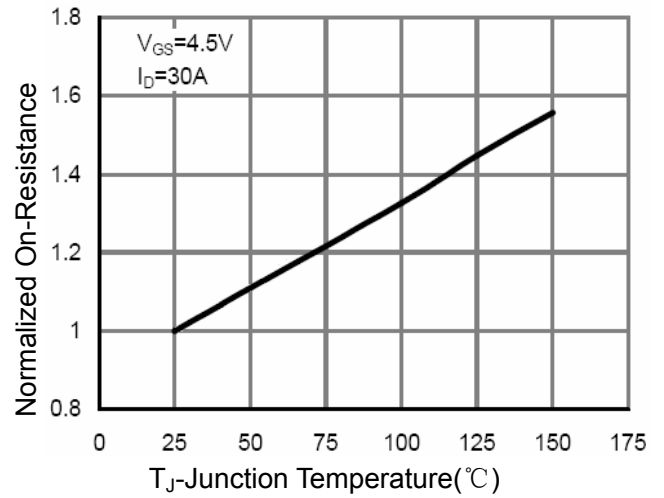
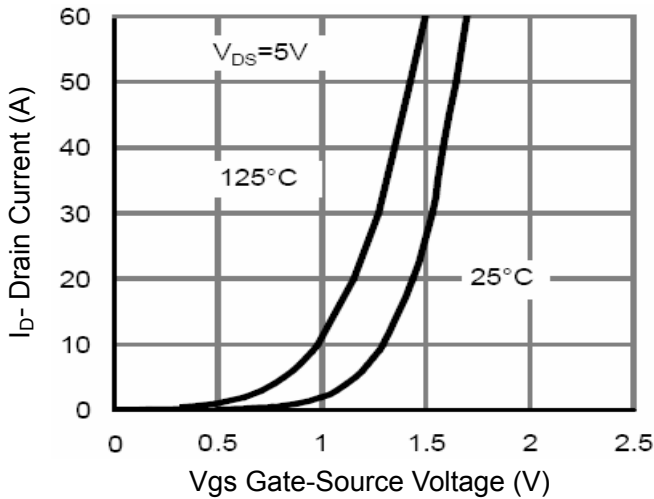
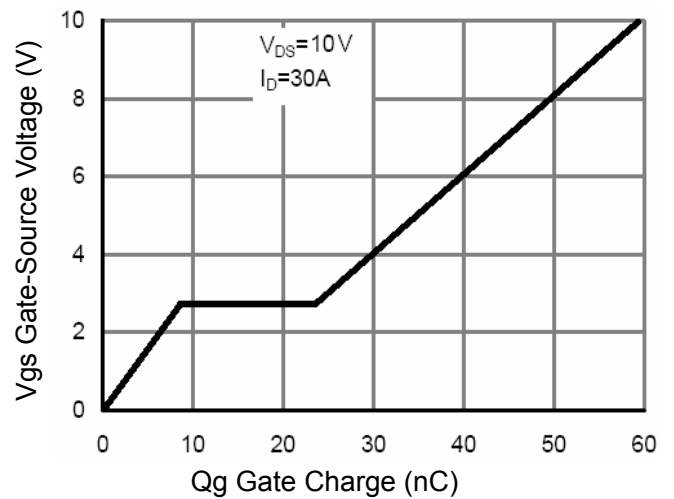
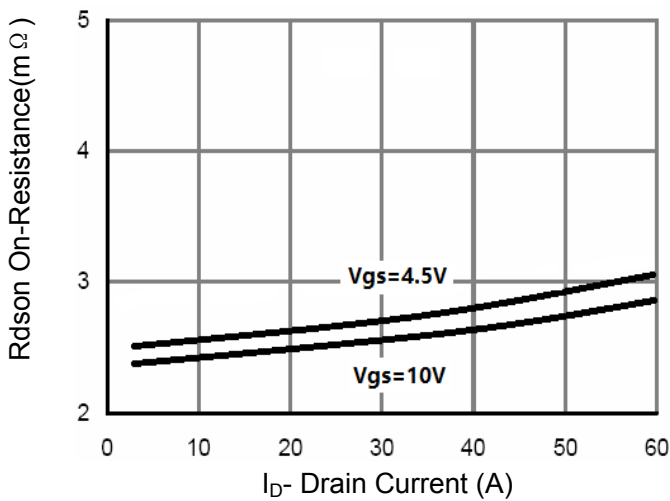
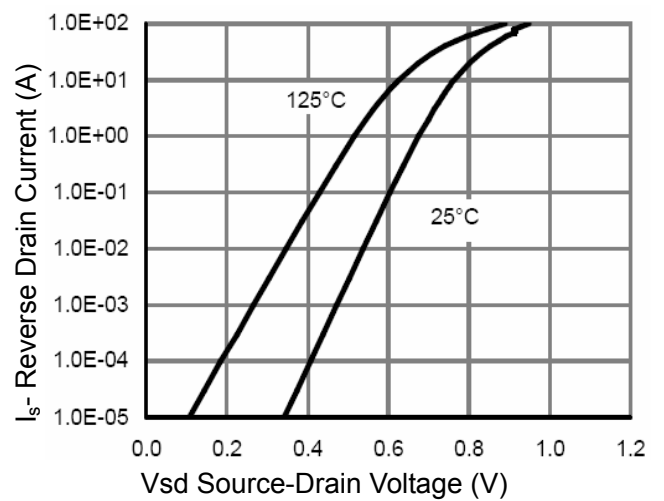


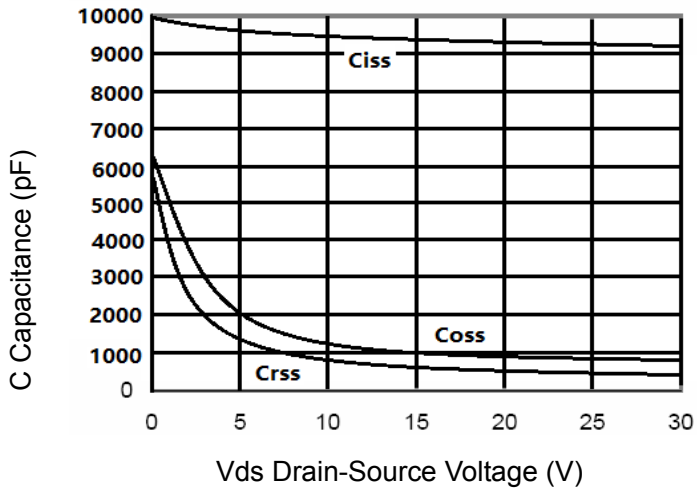
### 2) Gate charge test Circuit:



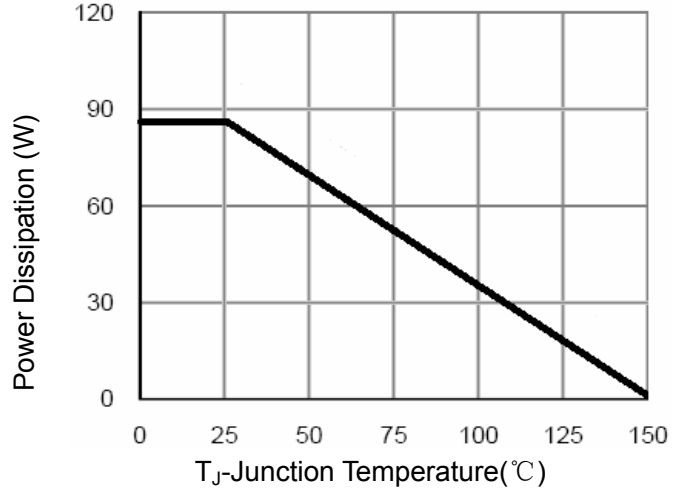
### 3) Switch Time Test Circuit:



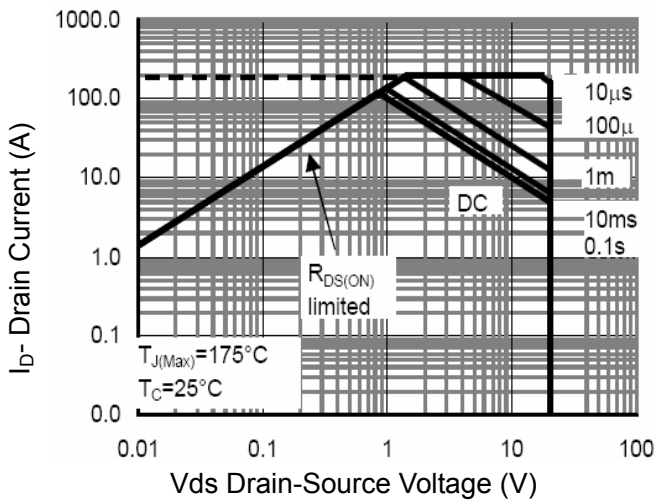
**Typical Electrical and Thermal Characteristics (Curves)**

**Figure 1 Output Characteristics**

**Figure 4 Rdson-Junction Temperature**

**Figure 2 Transfer Characteristics**

**Figure 5 Gate Charge**

**Figure 3 Rdson- Drain Current**

**Figure 6 Source- Drain Diode Forward**



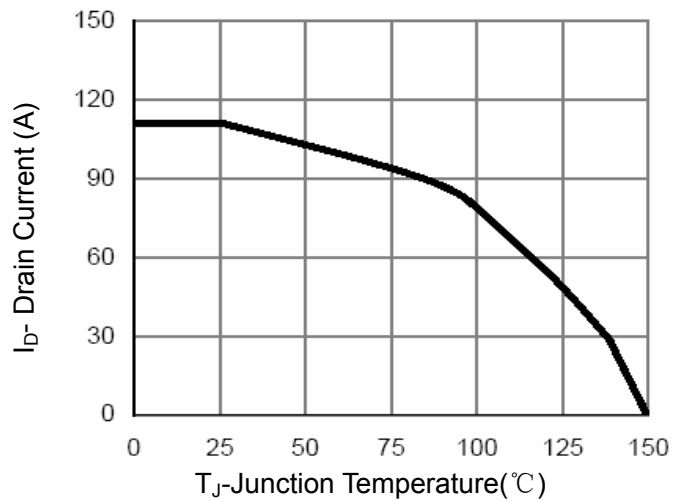
**Figure 7 Capacitance vs Vds**



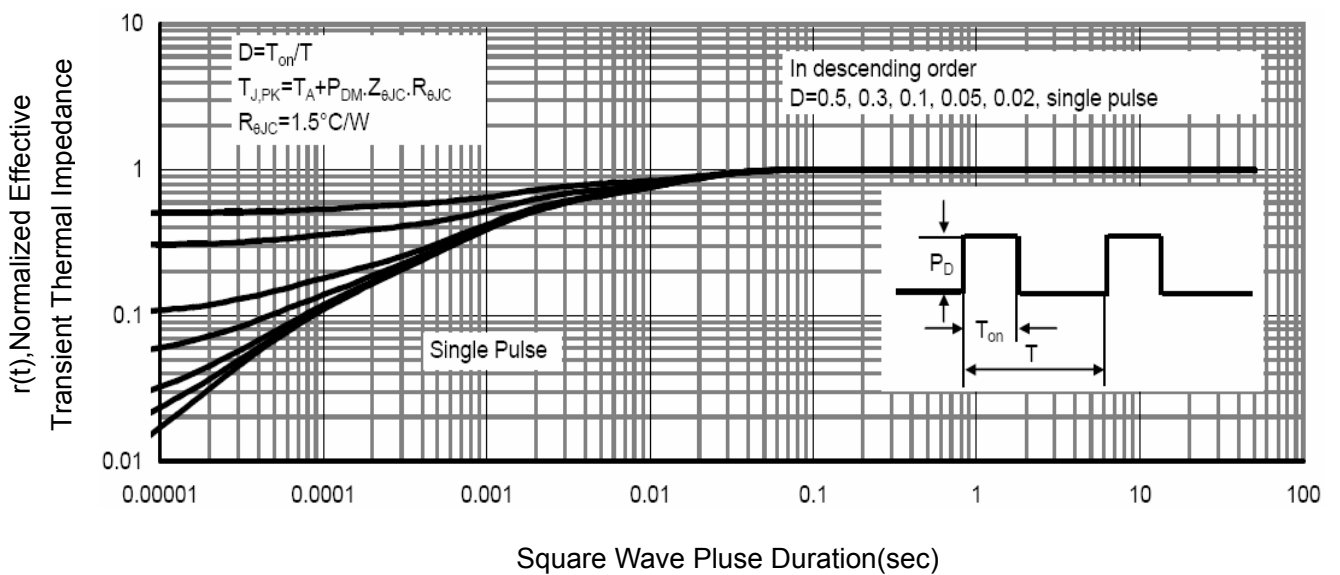
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**

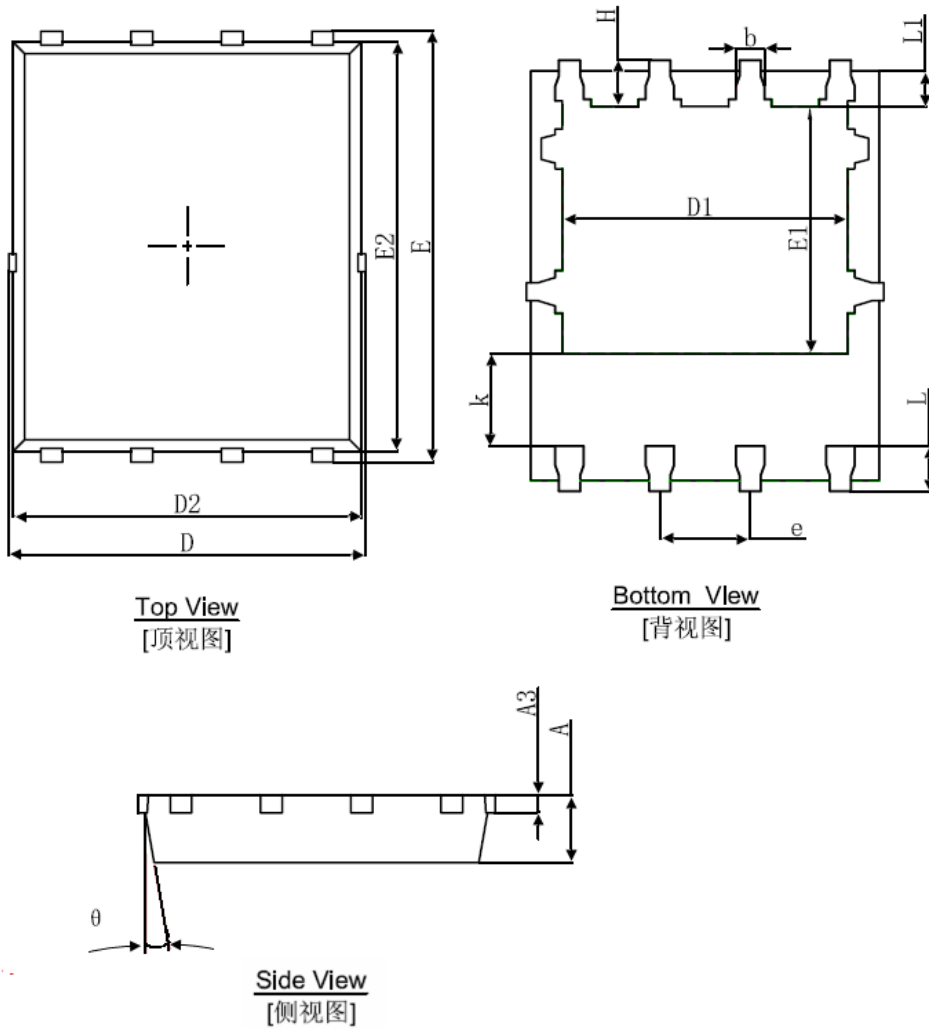


**Figure 10 Current De-rating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## DFN5X6-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
$\theta$	8°	12°	8°	12°

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