

## NCE N-Channel Enhancement Mode Power MOSFET

### Description

The NCE011N30GU 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.

### Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

**100% UIS TESTED!**  
**100%  $\Delta V_{ds}$  TESTED!**

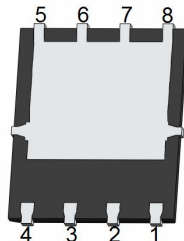
### General Features

- $V_{DS} = 30V, I_D = 325A$   
 $R_{DS(ON)} = 0.75m\Omega$  (typical) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 1.5m\Omega$  (typical) @  $V_{GS} = 4.5V$
- High density cell design for ultra low  $R_{dson}$
- Very low on-resistance  $R_{DS(on)}$
- Good stability and uniformity with high  $E_{AS}$
- 150 °C operating temperature
- Pb-free lead plating

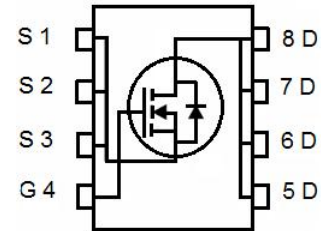
DFN5X6-8L



Top View



Bottom View



Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
011N30GU	NCE011N30GU	DFN5x6-8L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	325	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	205	A
Pulsed Drain Current	$I_{DM}$	1300	A
Maximum Power Dissipation	$P_D$	147	W
Derating factor		1.18	W/ $^\circ C$
Single pulse avalanche energy (Note 1)	$E_{AS}$	1600	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.85	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient (Note 4)	$R_{\theta JA}$	50	$^\circ C/W$

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

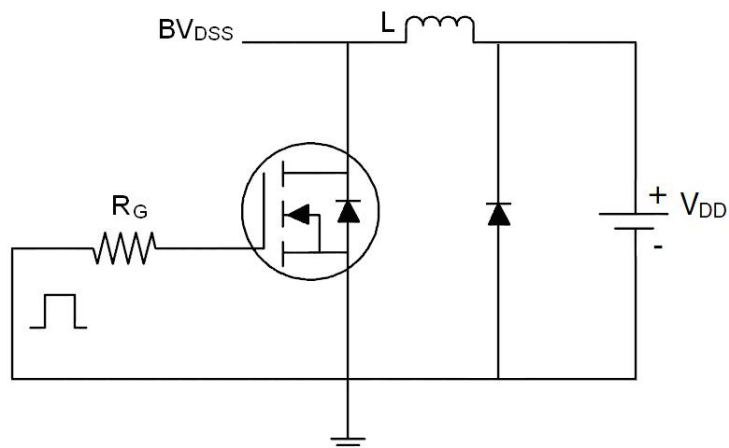
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	30	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.7	2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	0.75	1.0	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	1.5	2.0	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =40A	-	80	-	S
Dynamic Characteristics						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1.0MHz	-	7264	-	PF
Output Capacitance	C <sub>oss</sub>		-	1049	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	949	-	PF
Switching Characteristics <sup>(Note 2)</sup>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =40A V <sub>GS</sub> =10V, R <sub>GEN</sub> =6Ω	-	20	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	50	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	120	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	35	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =40A, V <sub>GS</sub> =10V	-	156.1	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	15.7	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	40.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =20A	-	0.85	1.2	V
Diode Forward Current	I <sub>S</sub>		-	-	325	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 40A di/dt = 100A/μs	-	56	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	125	-	nC
Forward Turn-On Time	t <sub>on</sub>	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

### Notes:

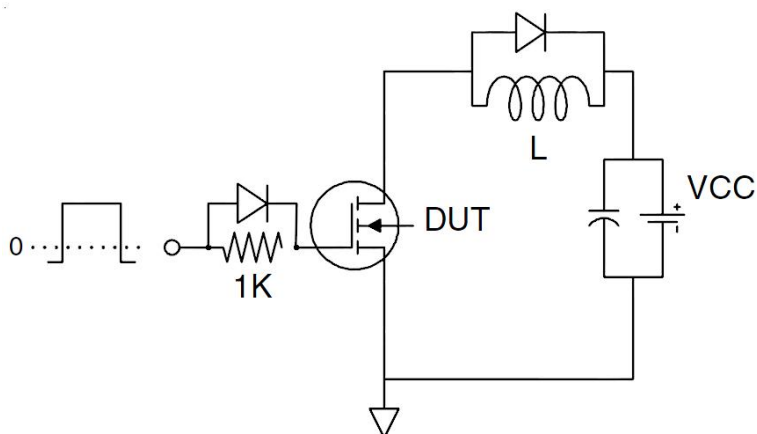
1. EAS condition :  $T_J=25^\circ C, V_{DD}=15V, V_G=10V, L=0.5mH, R_g=25\Omega$
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of  $T_J(MAX)=175^\circ C$ . The SOA curve provides a single pulse rating.
4. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The value in any given application depends on the user's specific board design, and the maximum temperature of  $175^\circ C$  may be used if the PCB allows it.

## Test Circuit

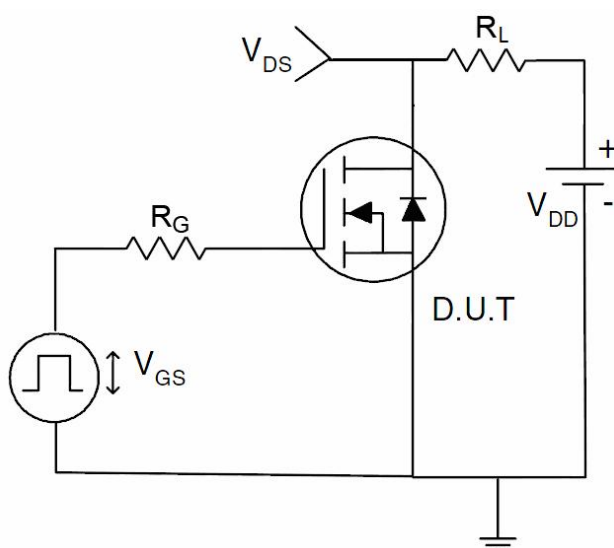
### 1) $E_{AS}$ Test Circuits



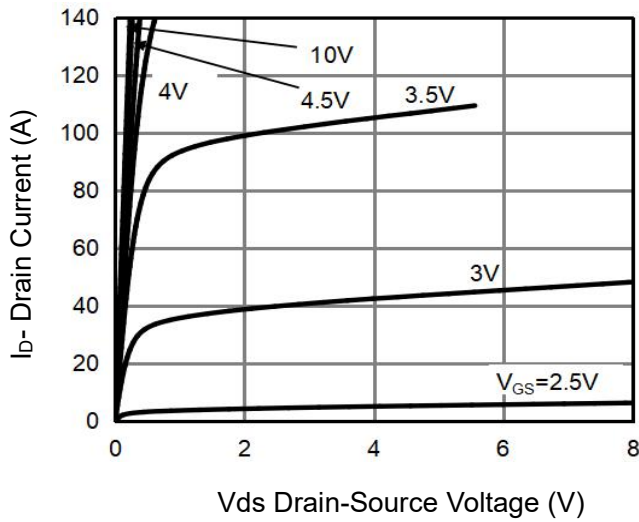
### 2) Gate Charge Test Circuit



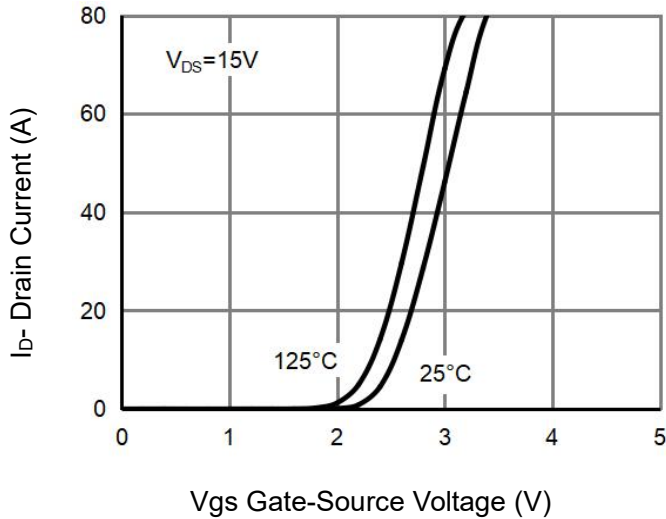
### 3) Switch Time Test Circuit



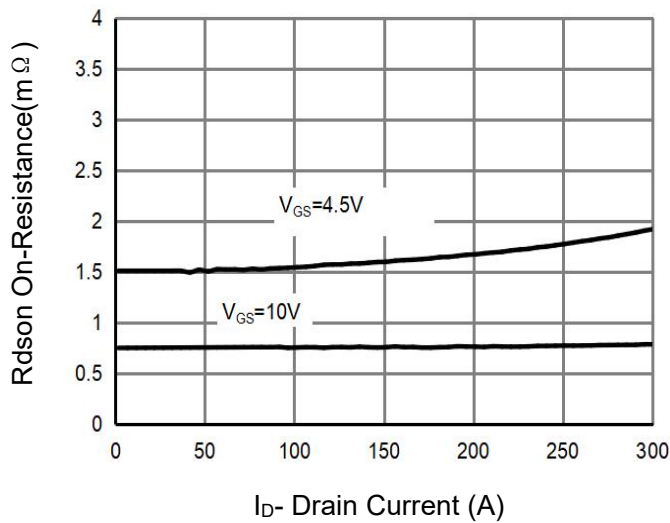
## Typical Electrical and Thermal Characteristics (Curves)



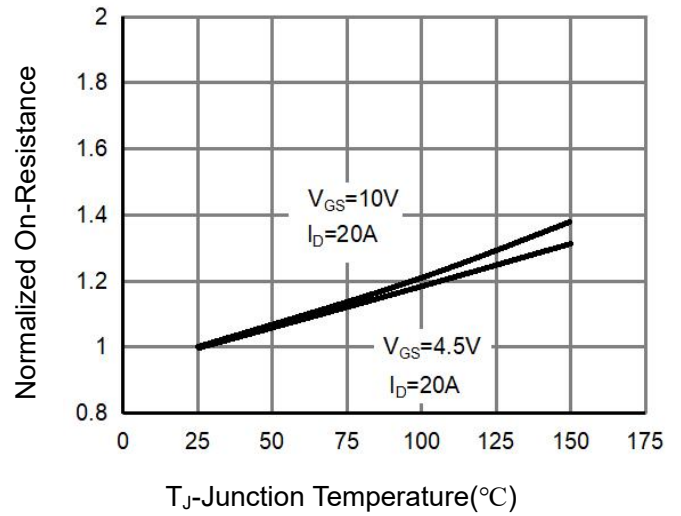
**Figure 1 Output Characteristics**



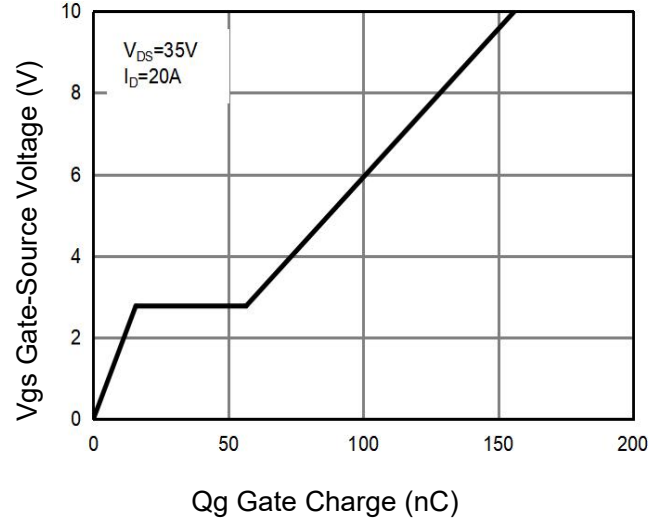
**Figure 2 Transfer Characteristics**



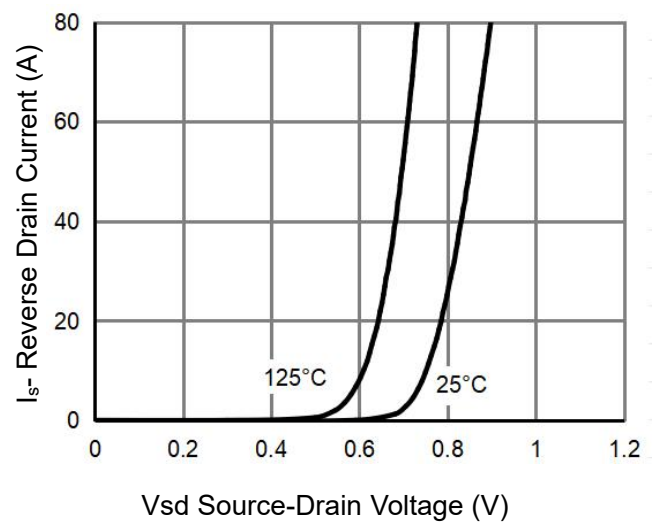
**Figure 3  $R_{DS(on)}$ - Drain Current**



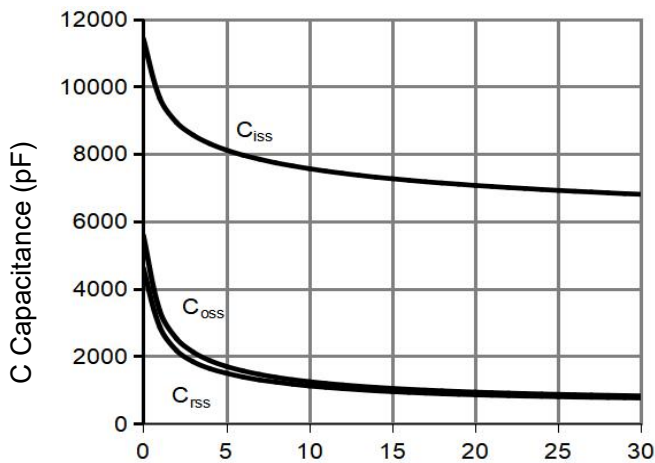
**Figure 4  $R_{DS(on)}$ -Junction Temperature**



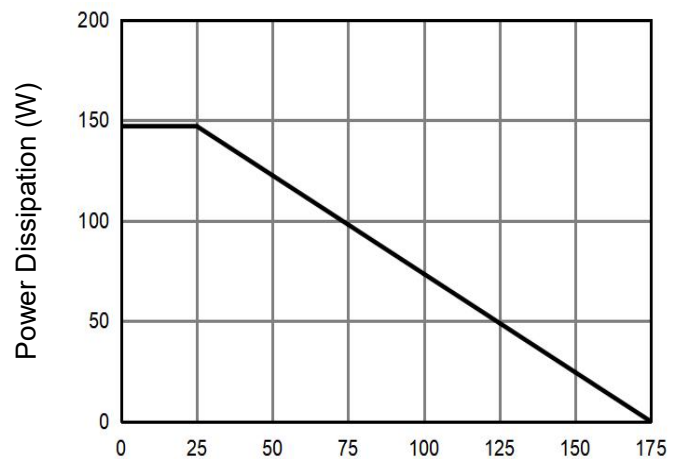
**Figure 5 Gate Charge**



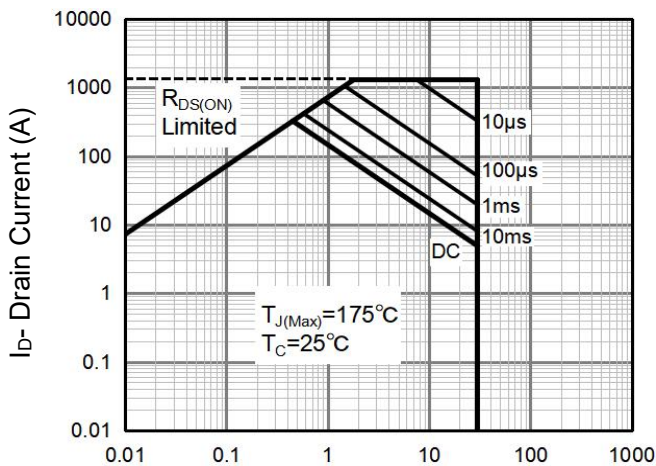
**Figure 6 Source- Drain Diode Forward**



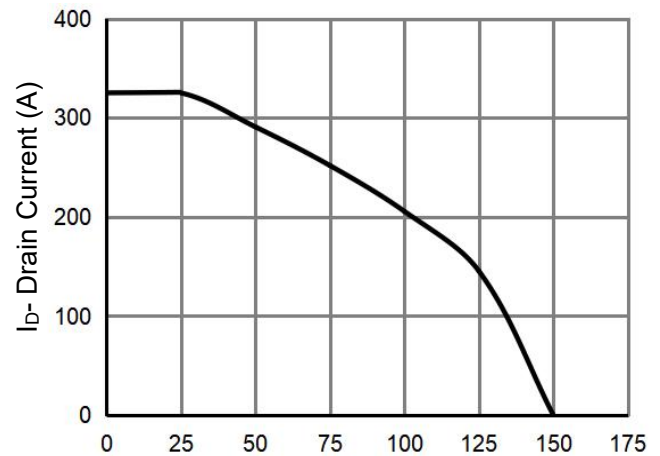
Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



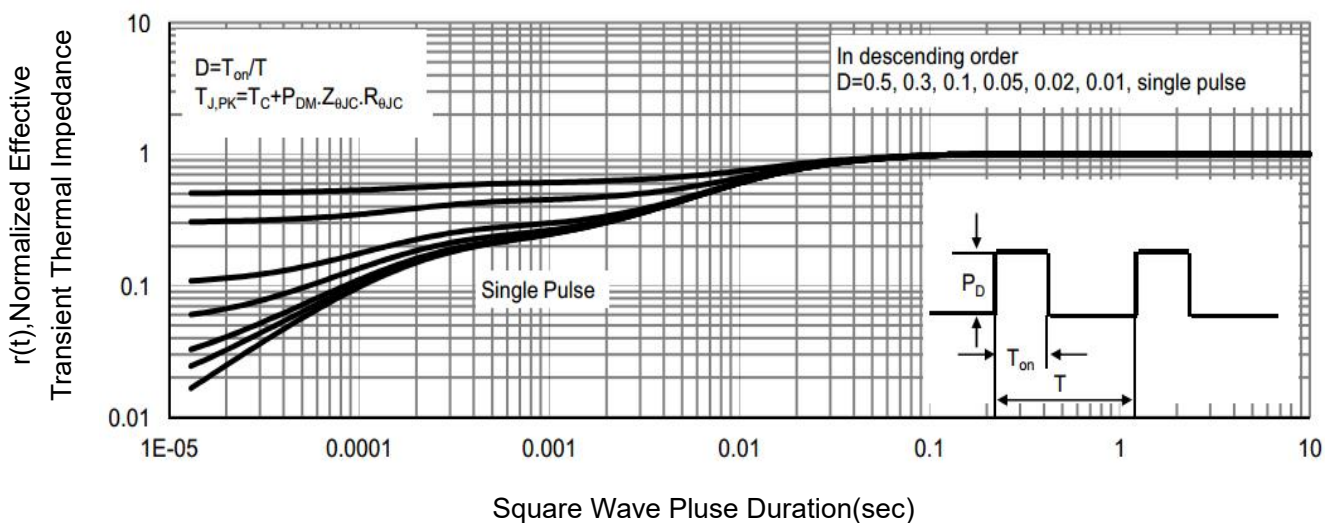
Tc-Case Temperature(°C)  
**Figure 9 Power De-rating**



Vds Drain-Source Voltage (V)  
**Figure 8 Safe Operation Area** (Note3)

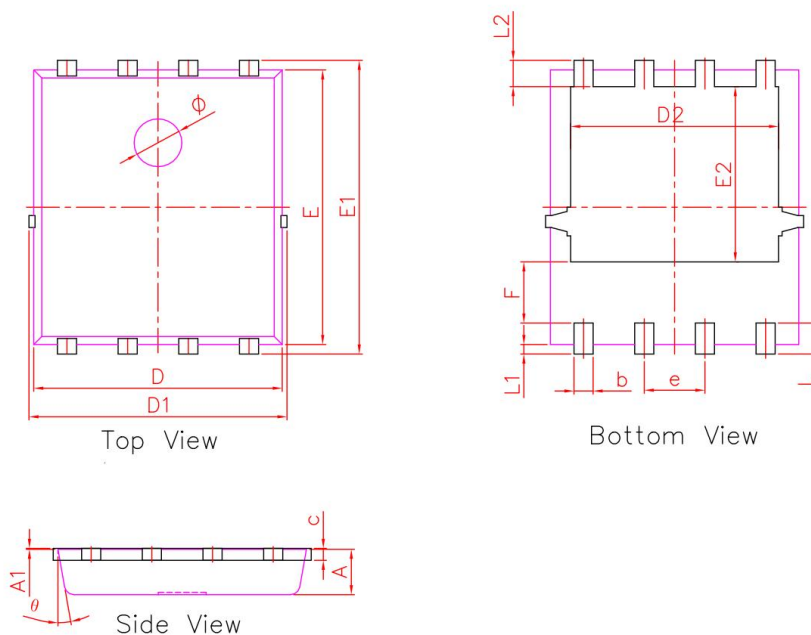


Tc-Case Temperature(°C)  
**Figure 10 ID Current- Case Temperature**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

## DFN5X6-8L Package Information



PDFN5X6-8L			
DIM.	MIN.	NOM.	MAX.
A	0.90	0.95	1.00
A1	0.00	0.02	0.05
b	0.35	0.40	0.50
c	0.20	0.25	0.30
D	5.10	5.20	5.30
D1	5.10	5.40	5.50
D2	4.25	4.35	4.45
e	1.27 BSC		
E	5.70	5.75	5.80
E1	6.00	6.15	6.30
E2	3.57	3.67	3.77
F	1.18	1.28	1.38
L	0.55	0.65	0.75
L1	0.15	0.20	0.25
L2	0.45	0.55	0.65
Φ	0.90	1.00	1.10
Θ	8°	10°	12°
All dimensions in millimeters			

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