

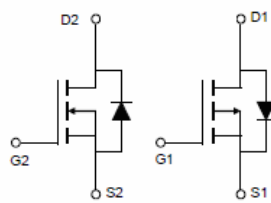
## NCE N-Channel and P-Channel Enhancement Mode Power MOSFET

**Description**  
The NCE30NP1812Q uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This device is suitable for use in inverter and other applications.

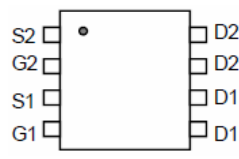
**General Features**

<b>N-channel</b>	<b>P-channel</b>
● $V_{DS} = 30V, I_D = 18A$	● $V_{DS} = -30V, I_D = -12A$
$R_{DS(ON)} < 24m\Omega @ V_{GS}=10V$	$R_{DS(ON)} < 35m\Omega @ V_{GS}=-10V$
$R_{DS(ON)} < 37m\Omega @ V_{GS}=4.5V$	$R_{DS(ON)} < 75m\Omega @ V_{GS}=-4.5V$

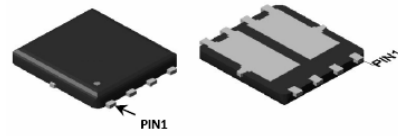
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package



**Schematic diagram**



**Pin assignment**



**DFN3.3X3.-8L Bottom View**

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE30NP1812Q	NCE30NP1812Q	DFN3X3-8L	-	-	-

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

Parameter	Symbol	N-channel	P-channel	Unit
Drain-Source Voltage	$V_{DS}$	30	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Drain Current-Continuous (Note 2)	$T_A=25^\circ C$	18	-12	A
	$T_A=70^\circ C$	13.7	-9.4	A
Drain Current -Pulsed (Note 1)	$I_{DM}$	72	-48	A
Power Dissipation	$T_A=25^\circ C$	17	15	W
	$T_A=70^\circ C$	11.1	9.6	
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2) (N-channel)	$R_{\theta JC}$	7.4	$^\circ C/W$
Thermal Resistance, Junction-to-Case (Note 2) (P-channel)	$R_{\theta JC}$	8.3	$^\circ C/W$

### N-channel Electrical Characteristics ( $T_C=25^\circ C$ unless otherwise noted)

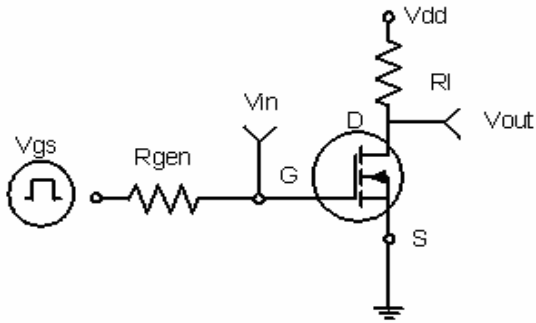
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.6	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=9A$	-	19	24	m $\Omega$
		$V_{GS}=4.5V, I_D=9A$	-	26	37	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=9A$	15	-	-	S
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	547	-	PF
Output Capacitance	$C_{oss}$		-	65.6	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	58.8	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, I_D=9A$ $V_{GS}=10V, R_{GEN}=6\Omega$	-	4.5	-	nS
Turn-on Rise Time	$t_r$		-	2.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14.5	-	nS
Turn-Off Fall Time	$t_f$		-	3.5	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=9A,$ $V_{GS}=10V$	-	15	-	nC
Gate-Source Charge	$Q_{gs}$		-	3.2	-	nC
Gate-Drain Charge	$Q_{gd}$		-	2.9	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=9A$	-	0.8	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	18	A

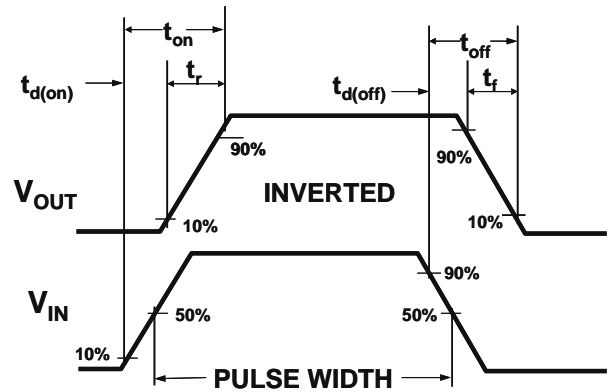
## Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 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. Surface Mounted on FR4 Board,  $t \leq 10$  sec. The current rating is based on the  $t \leq 10s$  thermal resistance rating.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production .

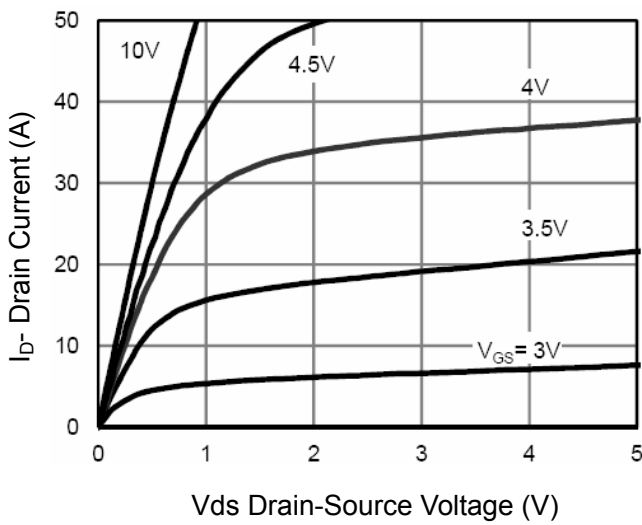
## N-channel Typical Electrical and Thermal Characteristics



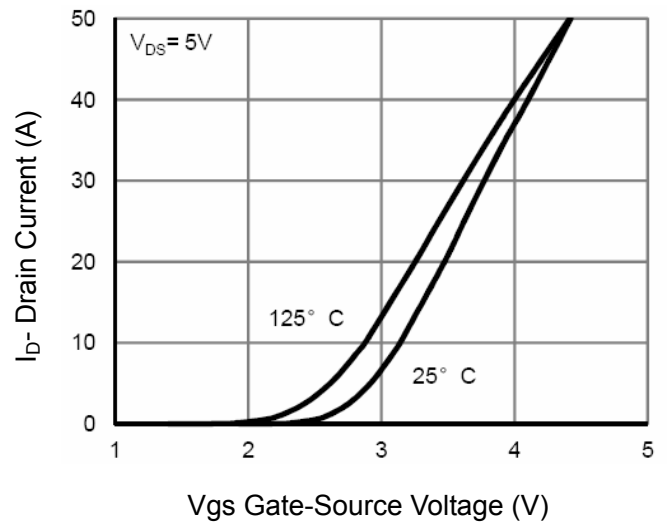
**Figure 1: Switching Test Circuit**



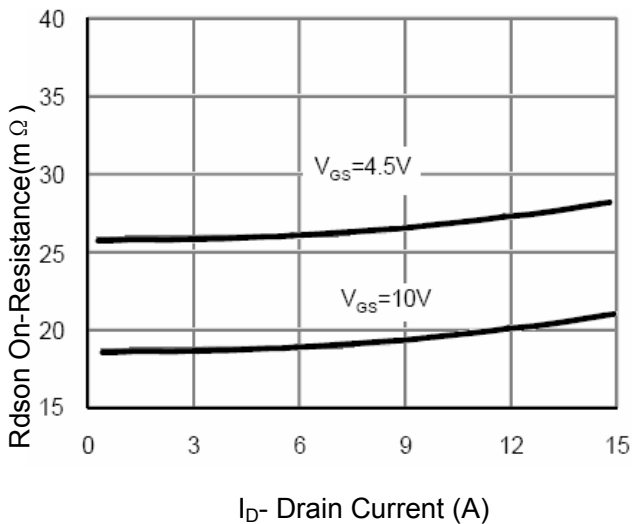
**Figure 2: Switching Waveforms**



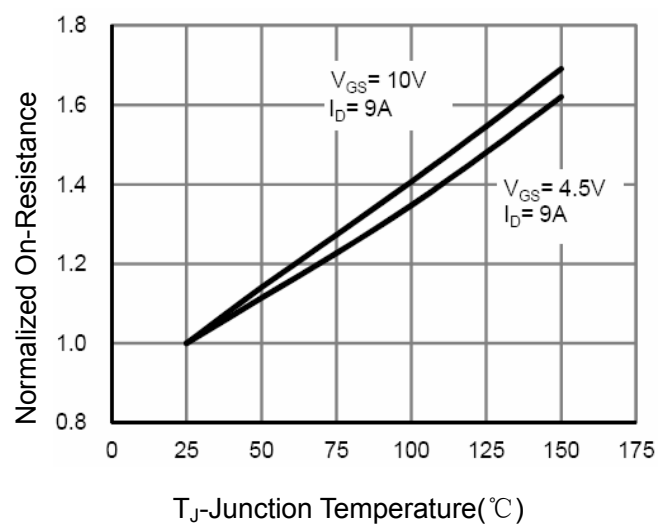
**Figure 3 Output Characteristics**



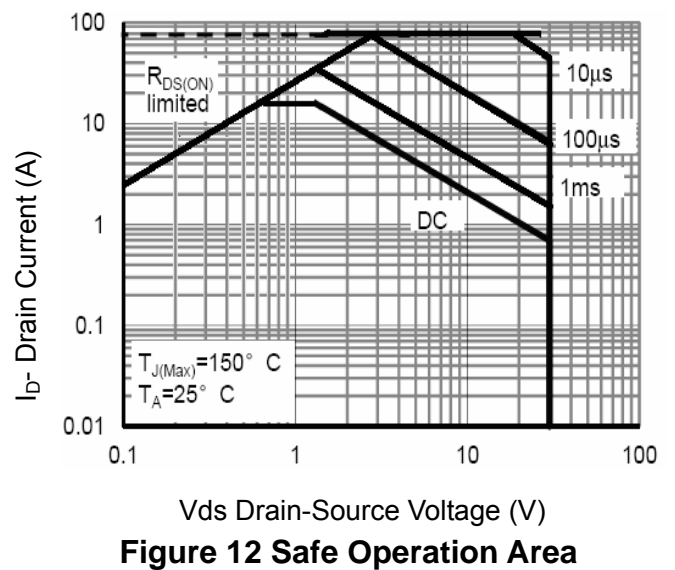
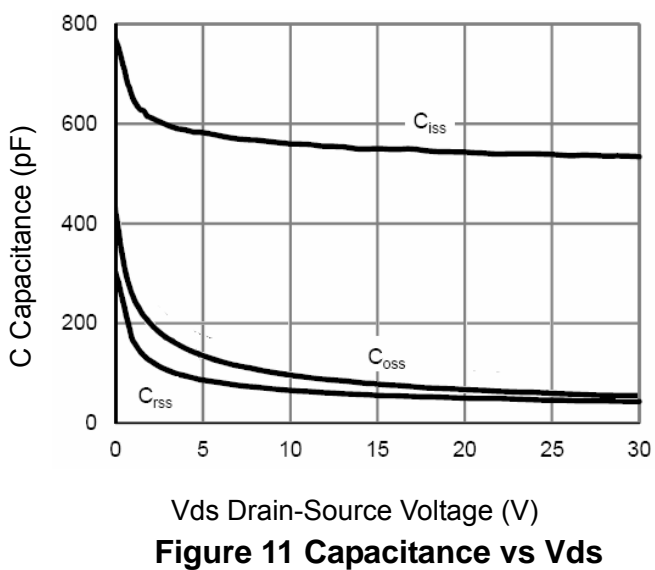
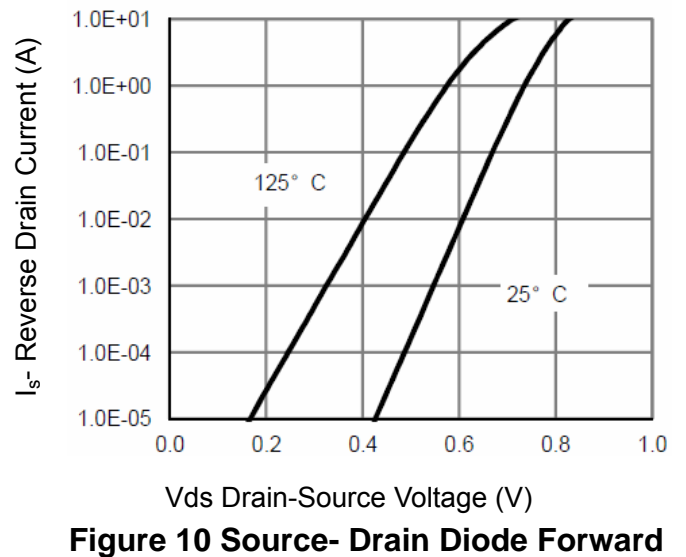
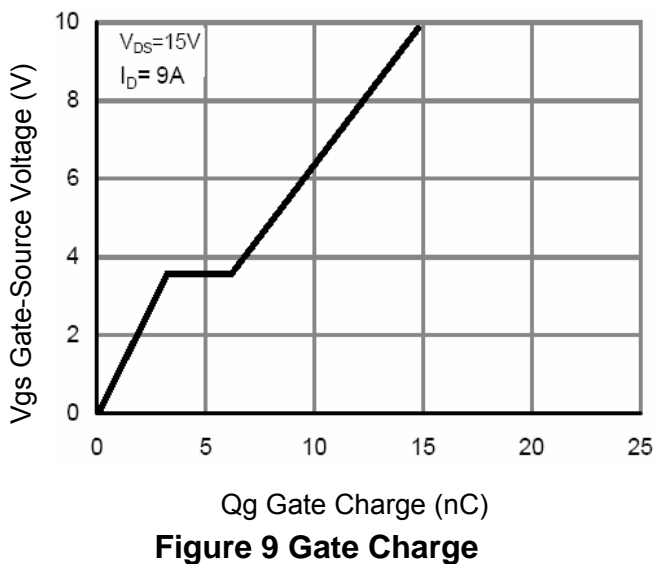
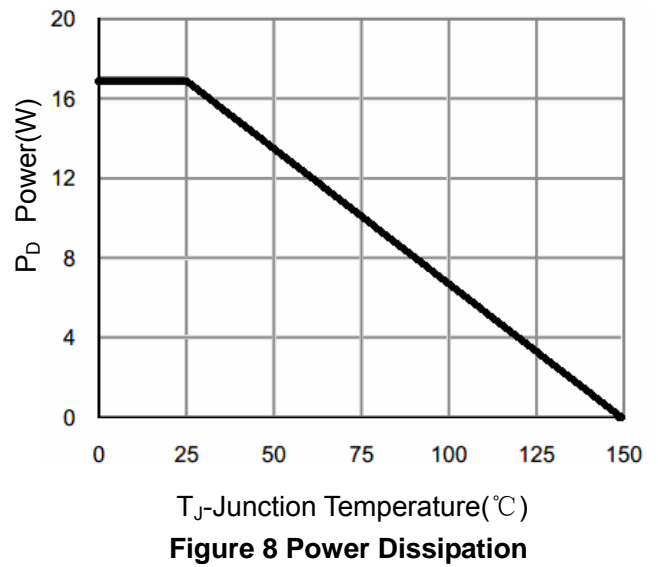
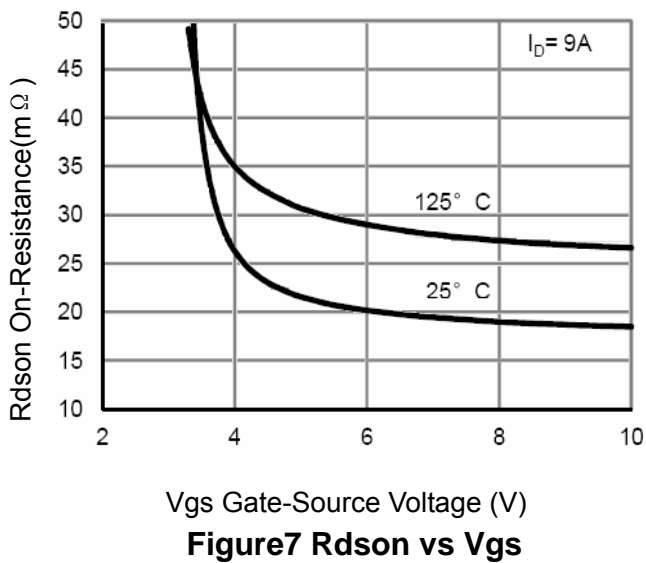
**Figure 4 Transfer Characteristics**

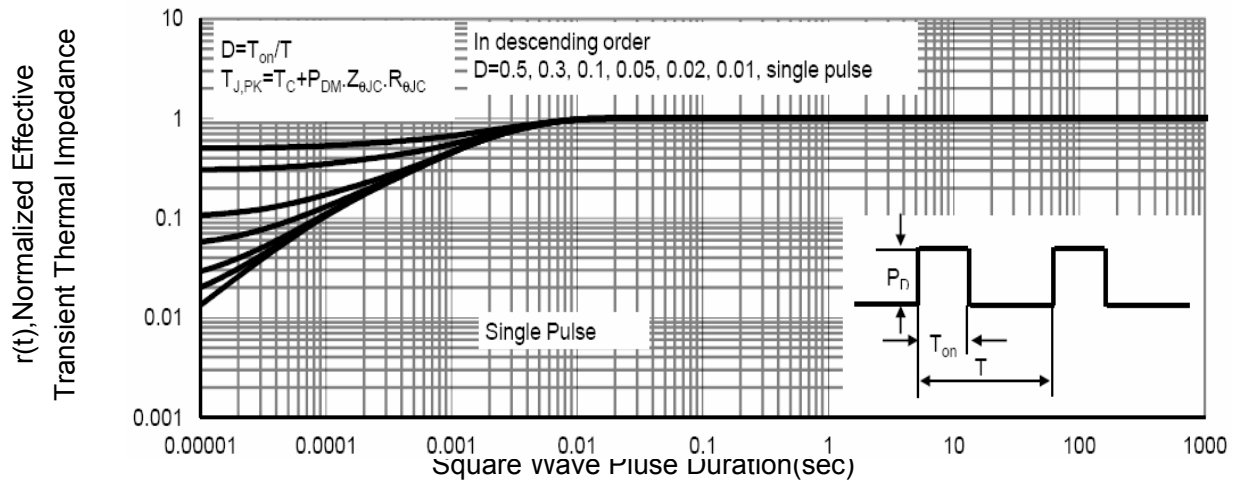


**Figure 5 Drain-Source On-Resistance**



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





**Figure 13 Normalized Maximum Transient Thermal Impedance**

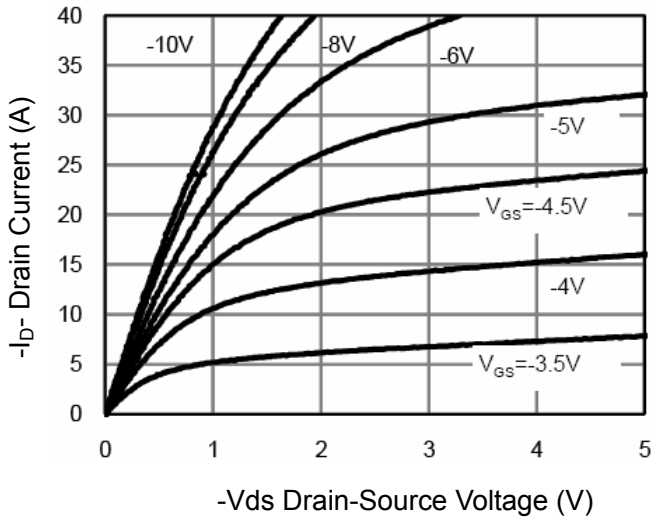
## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

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	-30	-33	-	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
<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	-1.2	-1.7	-2.5	V
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A	-	29	35	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A	-	55	75	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-6A	-	13	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, F=1.0MHz	-	691.9	-	PF
Output Capacitance	C <sub>oss</sub>		-	113.7	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	109.4	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-15V, I <sub>D</sub> =-6A V <sub>GS</sub> =-10V, R <sub>GEN</sub> =3Ω	-	7.5	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	5.5	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	19	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	7	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-6A, V <sub>GS</sub> =-10V	-	12.9	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	2.5	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	2.7	-	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> =-6A	-	-	-1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		-	-	-12	A

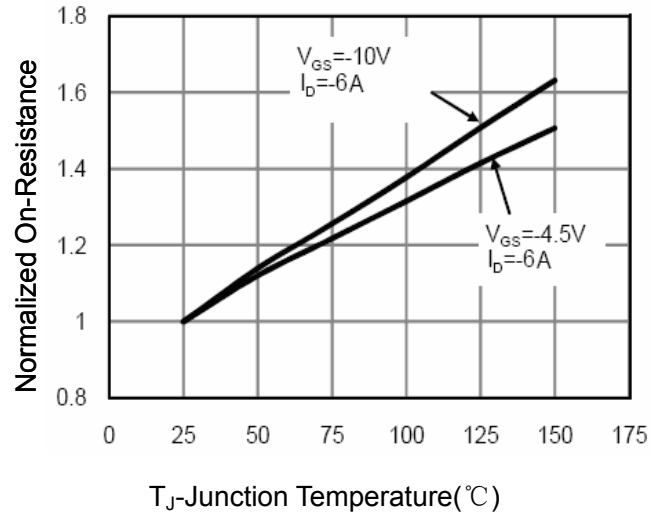
### Notes:

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

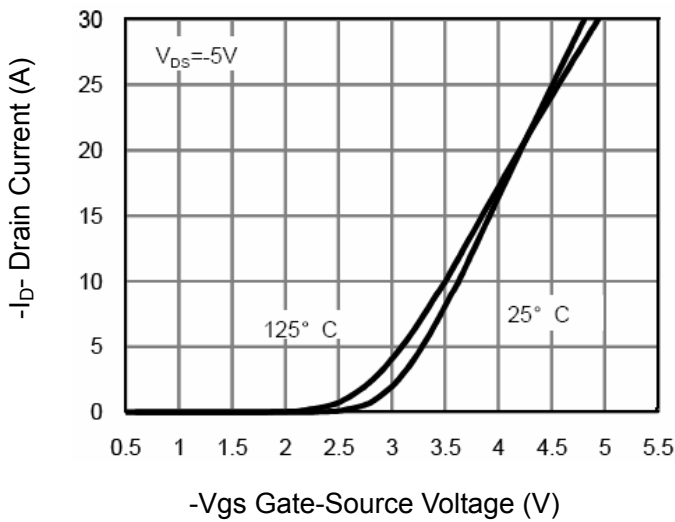
## P- Channel Typical Electrical and Thermal Characteristics (Curves)



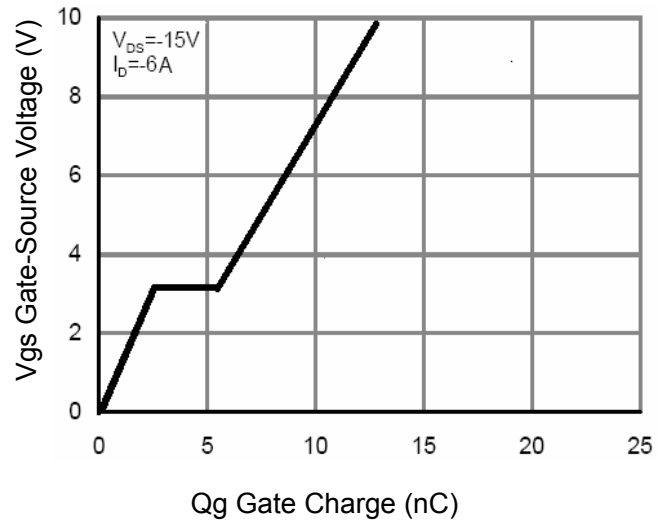
**Figure 1 Output Characteristics**



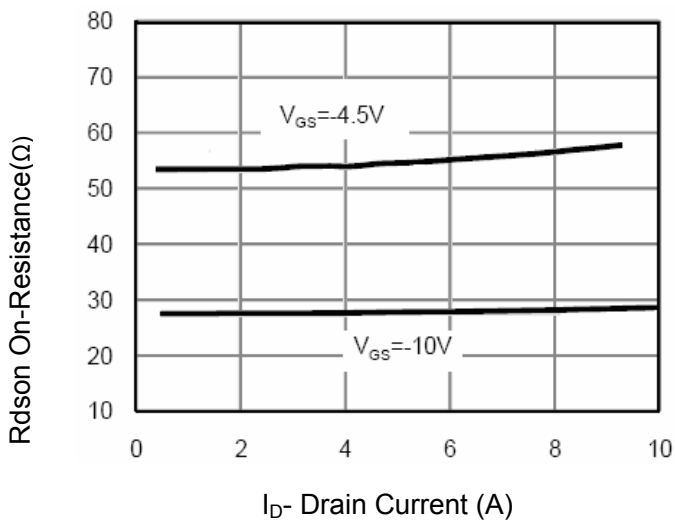
**Figure 4 Rdson-Junction Temperature**



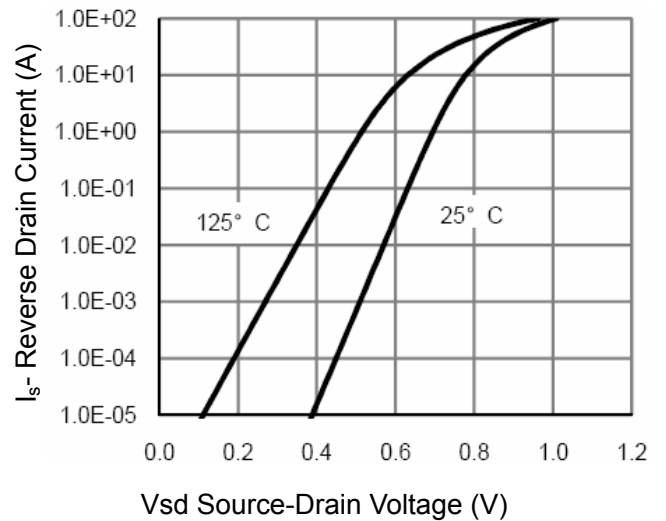
**Figure 2 Transfer Characteristics**



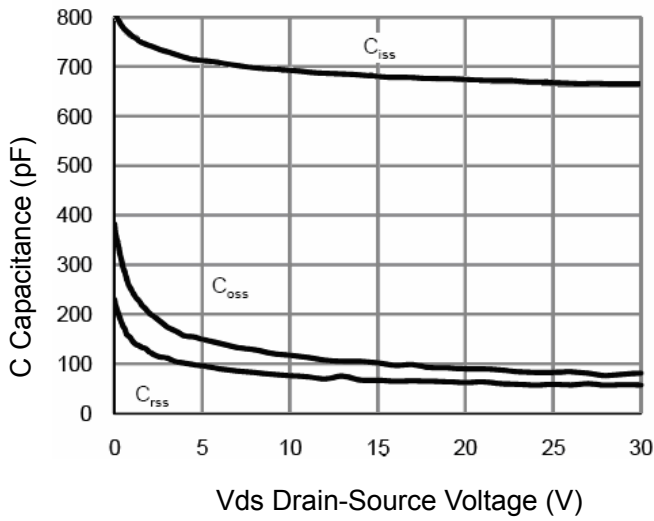
**Figure 5 Gate Charge**



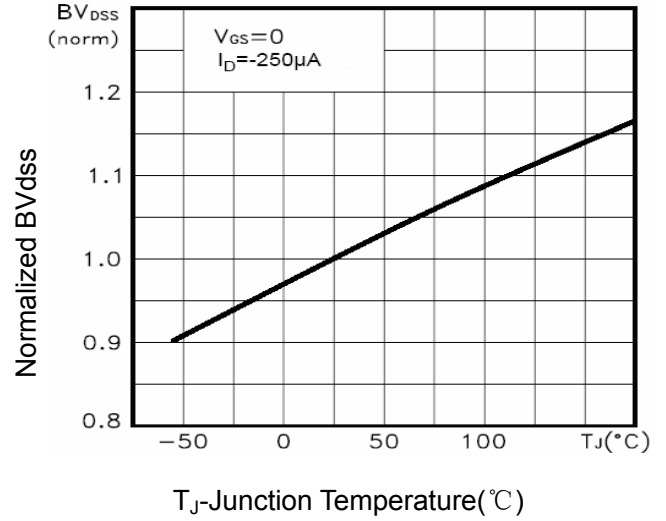
**Figure 3 Rdson- Drain Current**



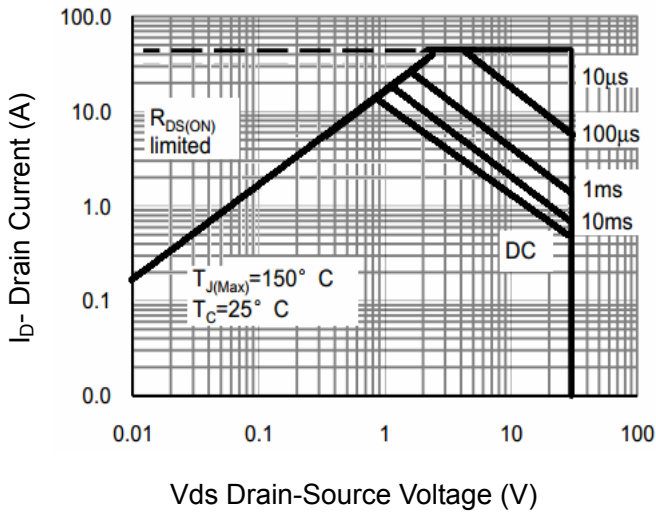
**Figure 6 Source- Drain Diode Forward**



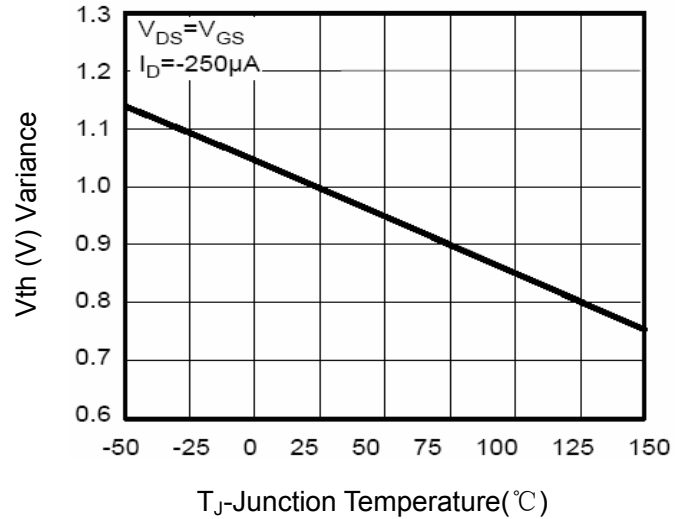
**Figure 7 Capacitance vs Vds**



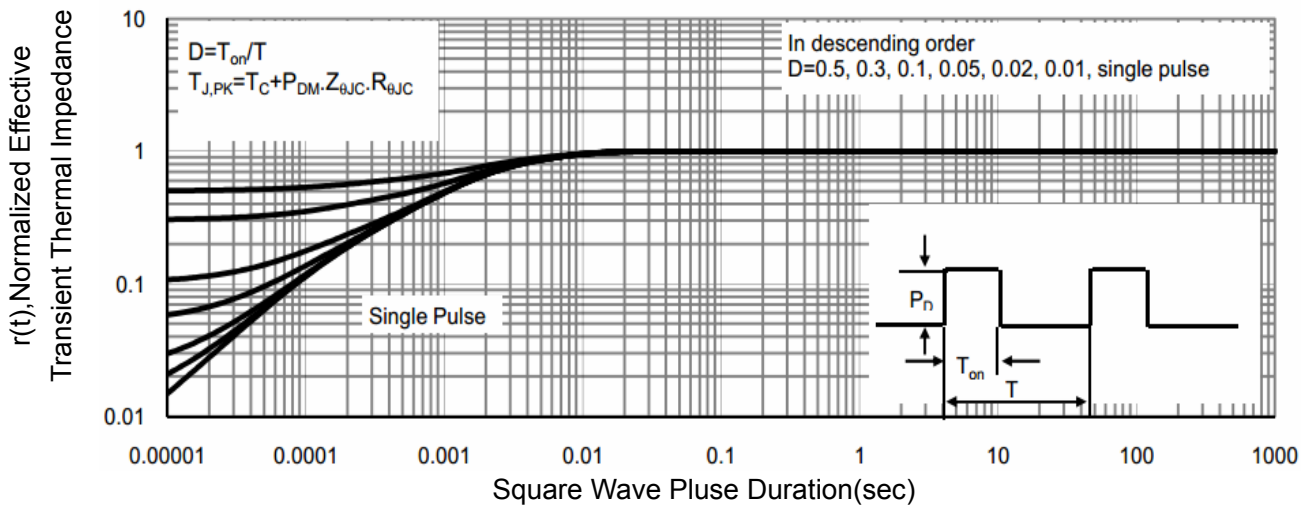
**Figure 9 BV<sub>DSS</sub> vs Junction Temperature**



**Figure 8 Safe Operation Area**

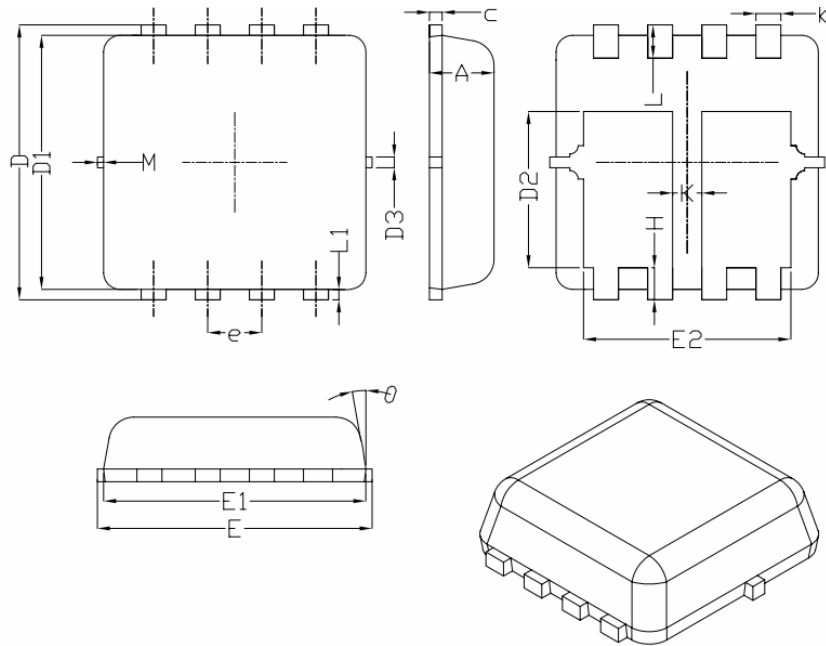


**Figure 10 V<sub>GS(th)</sub> vs Junction Temperature**

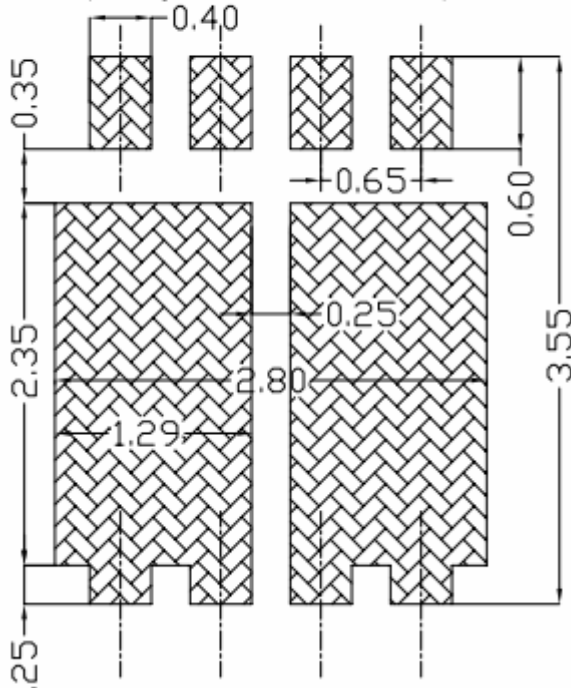


**Figure 11 Normalized Maximum Transient Thermal Impedance**

## DFN3.3X3.3-8L Package Information



### Land Pattern (Only for Reference)



SYMBOL	DIMENSIONAL REOMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
K	0.30	---	---
θ	---	10°	12°
M	*	*	0.15

\* Not specified

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