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.

Genera Features

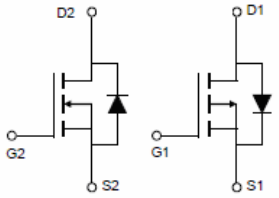
N-channel

- V_{DS} = 30V,I_D = 18A
  $R_{DS(ON)}$ <24mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ <37mΩ @ V_{GS}=4.5V

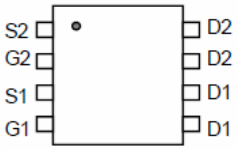
P-channel

- V_{DS} = -30V,I_D =- 12A
  $R_{DS(ON)}$ <35mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ <75mΩ @ V_{GS}=-4.5V

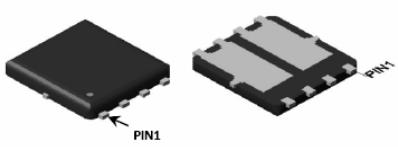
- High Power and current handing capability
- Lead free product is acquired
- Surface mount package



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℃unless otherwise noted)

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

Thermal Characteristic

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

N-channel Electrical Characteristics (T_C=25℃unless otherwise noted)

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.2	1.6	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=9A	-	19	24	mΩ
		V_{GS}=4.5V, I_D=9A	-	26	37	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=9A	15	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	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
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=15V,I_D=9A V_{GS}=10V,R_{GEN}=6Ω	-	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
Drain-Source Diode Characteristics						
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 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.Surface Mounted on FR4 Board, t ≤ 10 sec. The current rating is based on the t ≤ 10s thermal resistance rating.

3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production .

N-channel Typical Electrical and Thermal Characteristics

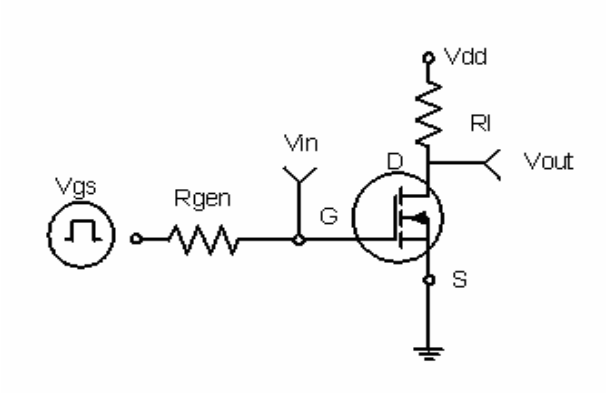


Figure 1:Switching Test Circuit

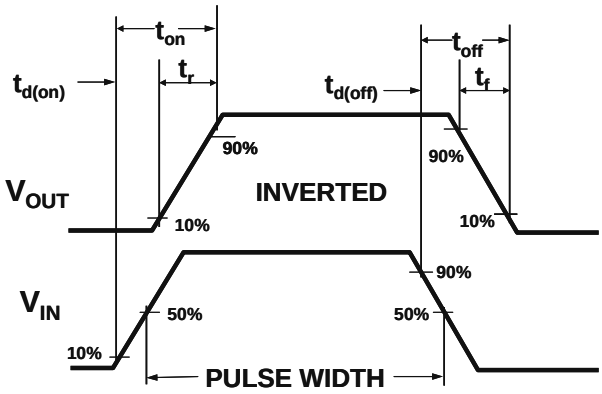


Figure 2:Switching Waveforms

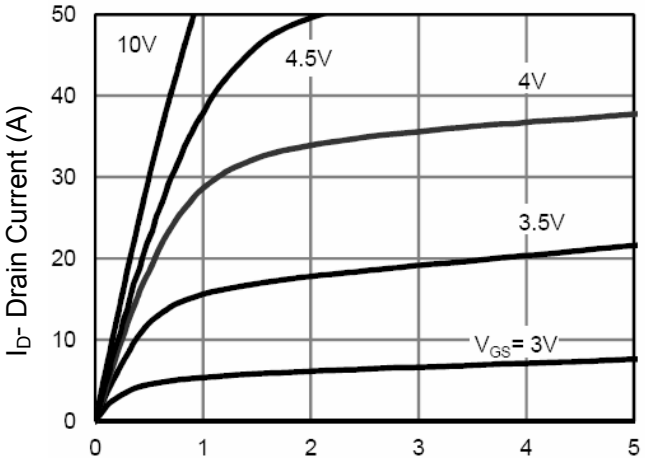


Figure 3 Output Characteristics

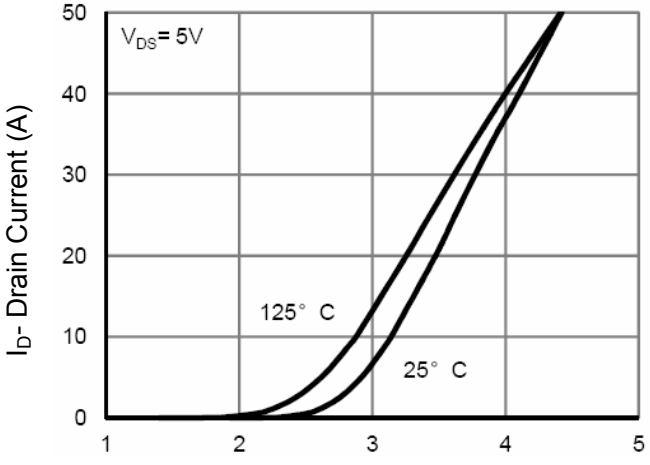


Figure 4 Transfer Characteristics

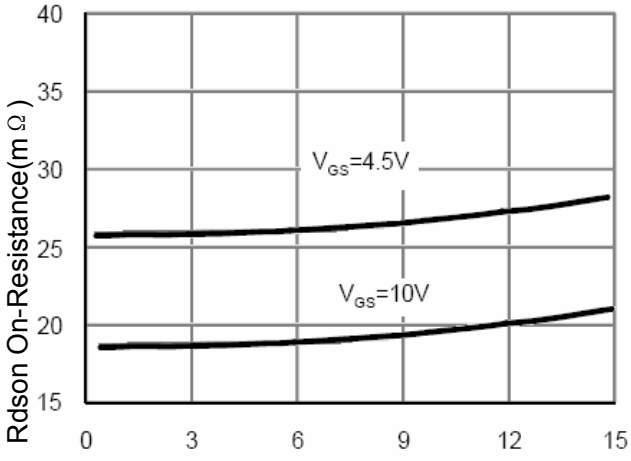


Figure 5 Drain-Source On-Resistance

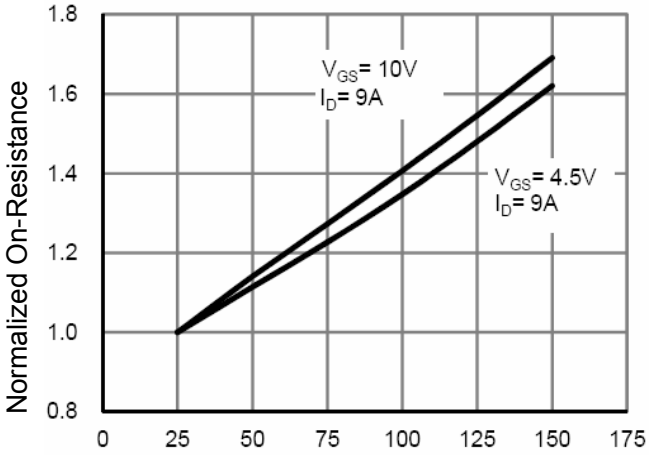


Figure 6 Drain-Source On-Resistance

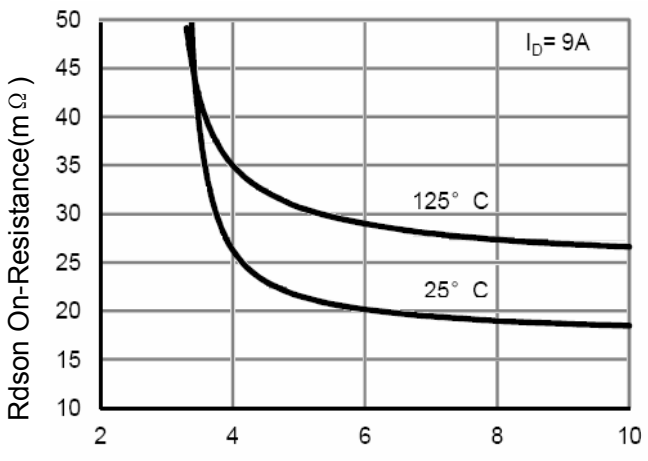


Figure7 Rdson vs Vgs

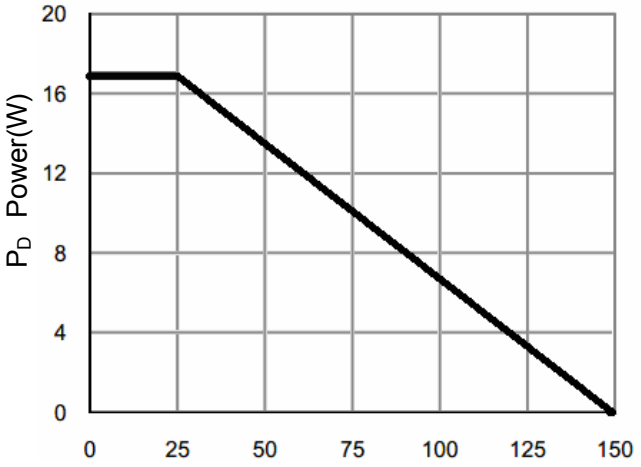


Figure 8 Power Dissipation

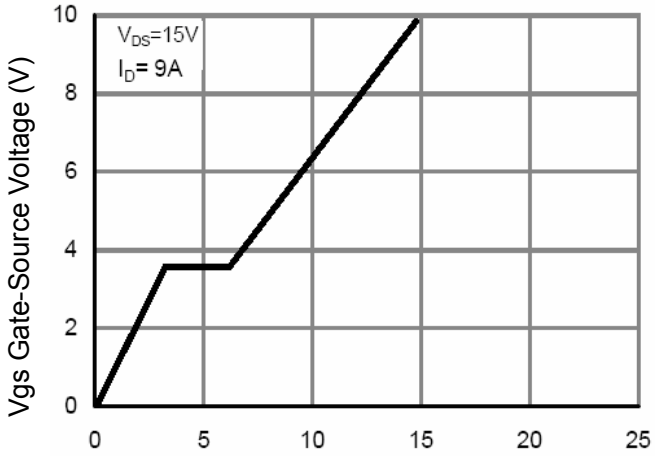


Figure 9 Gate Charge

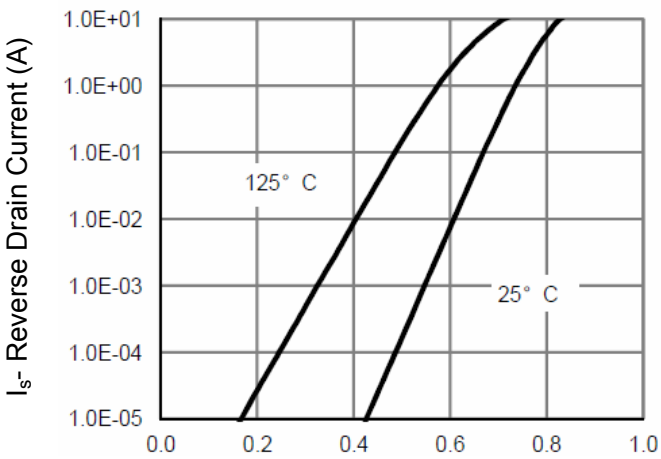


Figure 10 Source- Drain Diode Forward

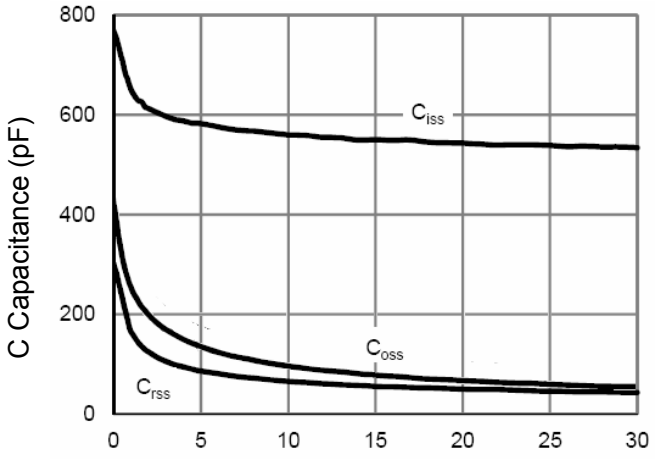


Figure 11 Capacitance vs Vds

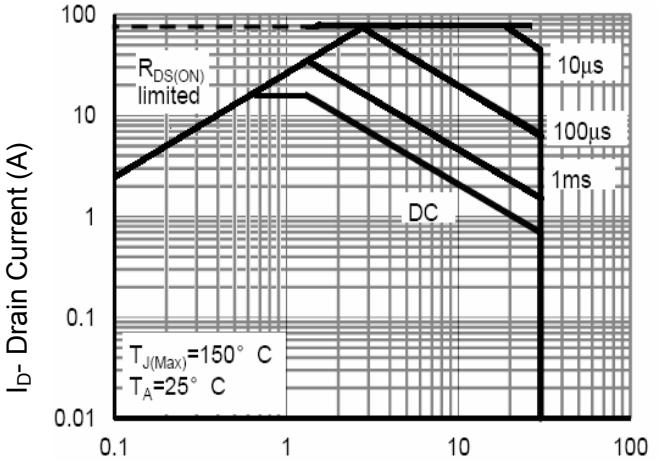


Figure 12 Safe Operation Area

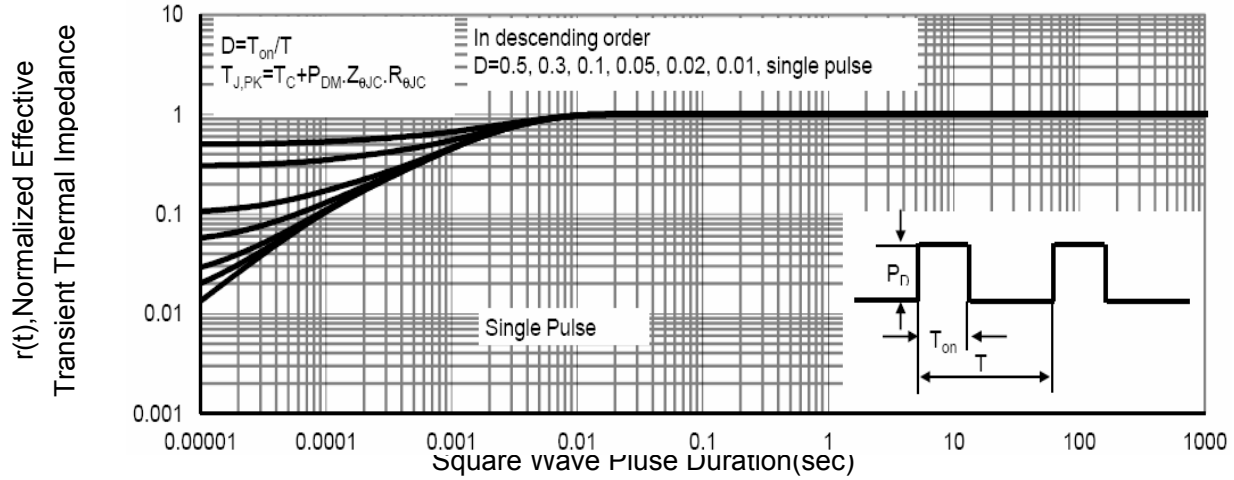


Figure 13 Normalized Maximum Transient Thermal Impedance

Electrical Characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-30	-33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.2	-1.7	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-6A	-	29	35	mΩ
		V_{GS}=-4.5V, I_D=-6A	-	55	75	
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-6A	-	13	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-15V,V_{GS}=0V, F=1.0MHz	-	691.9	-	PF
Output Capacitance	C_{oss}		-	113.7	-	PF
Reverse Transfer Capacitance	C_{rss}		-	109.4	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V,I_D=-6A V_{GS}=-10V,R_{GEN}=3Ω	-	7.5	-	nS
Turn-on Rise Time	t_r		-	5.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	19	-	nS
Turn-Off Fall Time	t_f		-	7	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-6A, V_{GS}=-10V	-	12.9	-	nC
Gate-Source Charge	Q_{gs}		-	2.5	-	nC
Gate-Drain Charge	Q_{gd}		-	2.7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-6A	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-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)

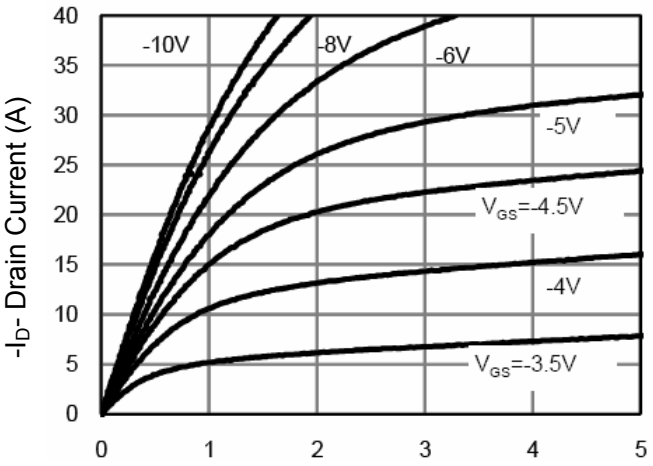


Figure 1 Output Characteristics

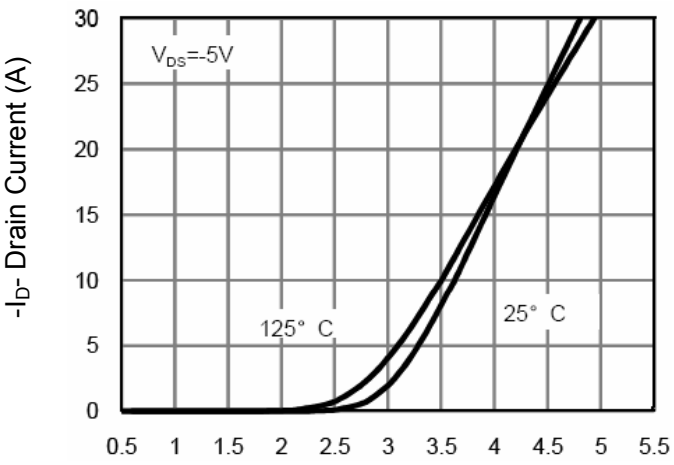


Figure 2 Transfer Characteristics

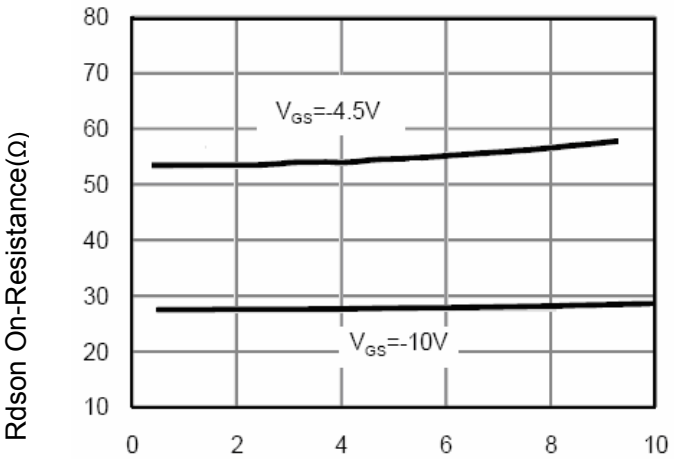


Figure 3 Rdson- Drain Current

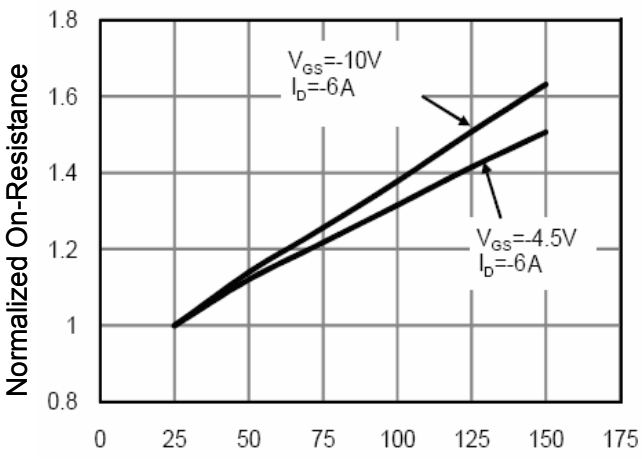


Figure 4 Rdson-Junction Temperature

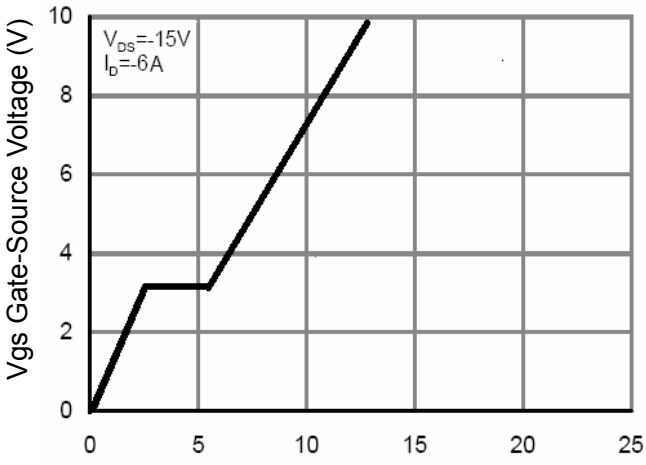


Figure 5 Gate Charge

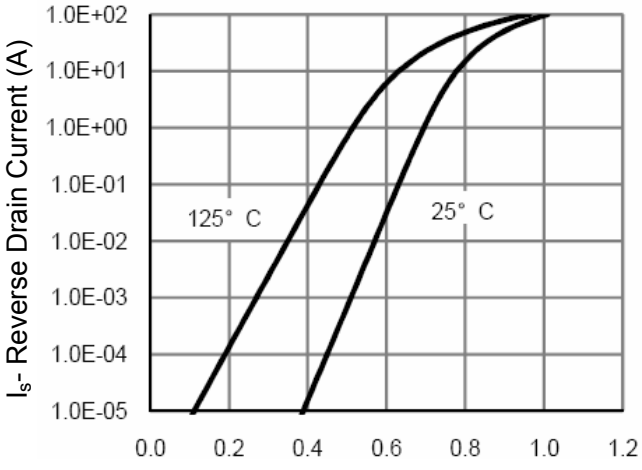


Figure 6 Source- Drain Diode Forward

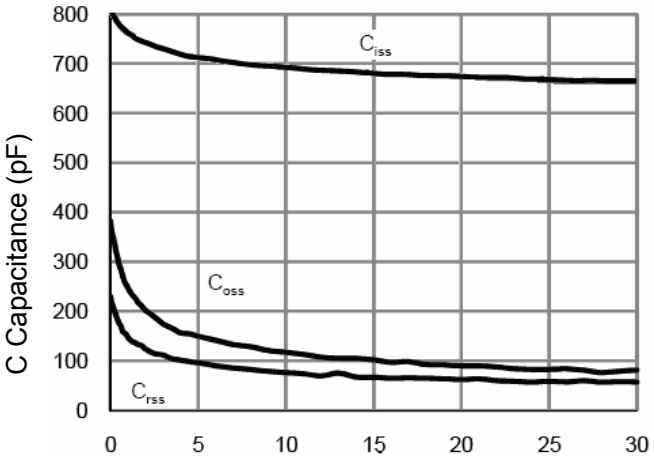


Figure 7 Capacitance vs Vds

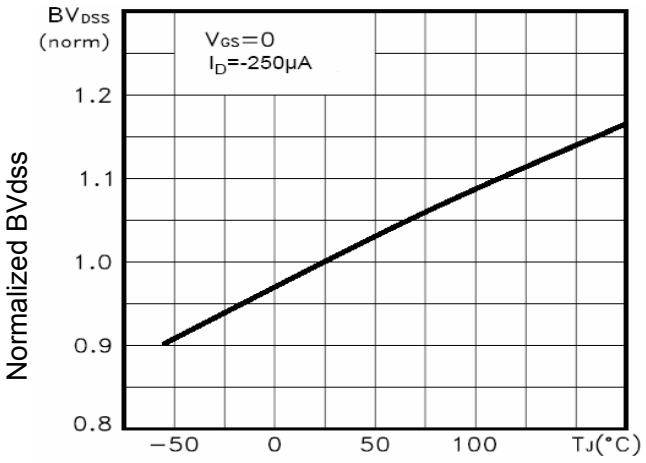


Figure 9 BV_{DSS} vs Junction Temperature

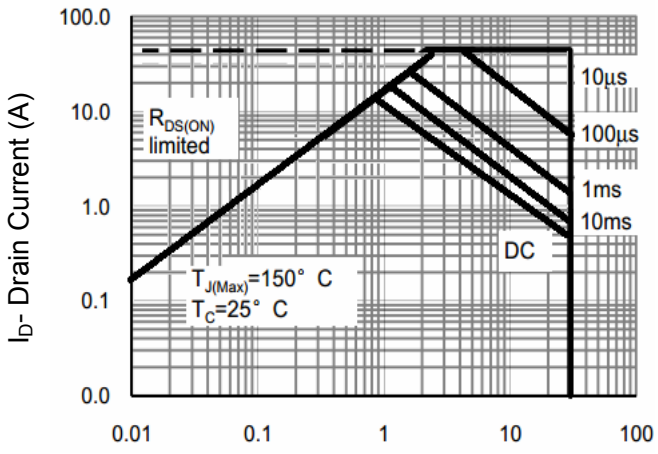


Figure 8 Safe Operation Area

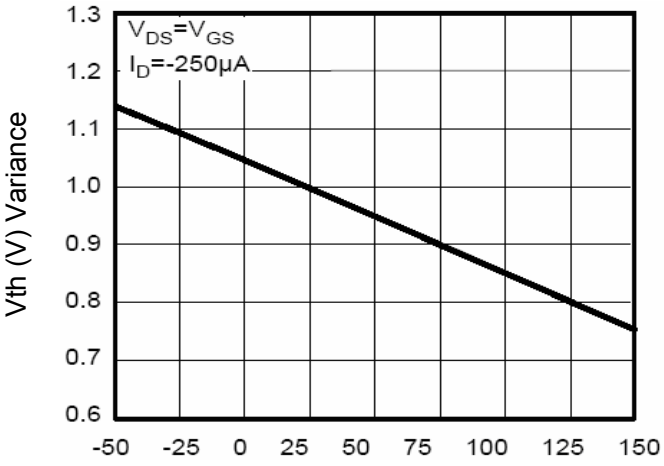


Figure 10 $V_{GS(th)}$ vs Junction Temperature

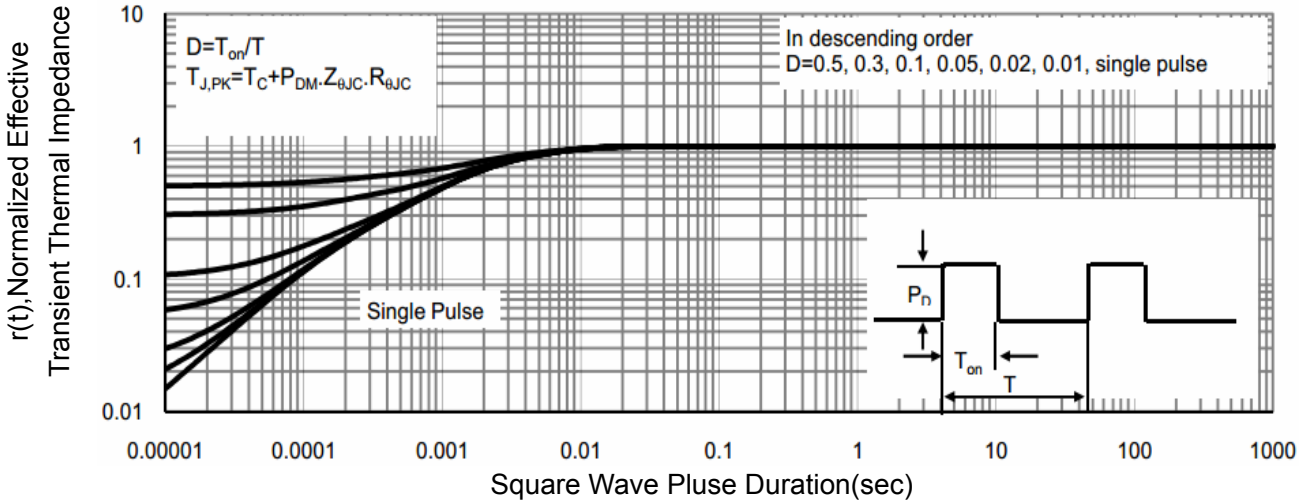
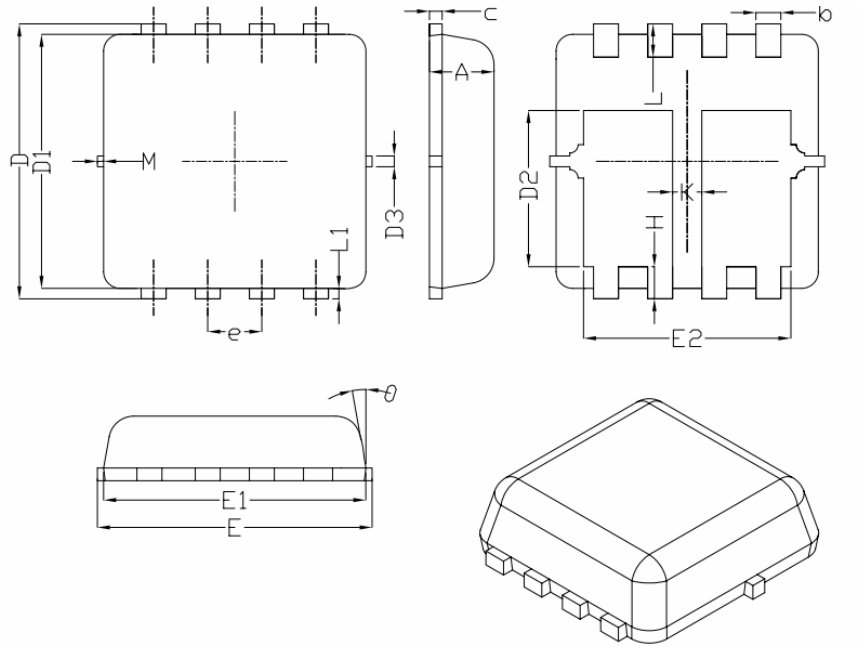
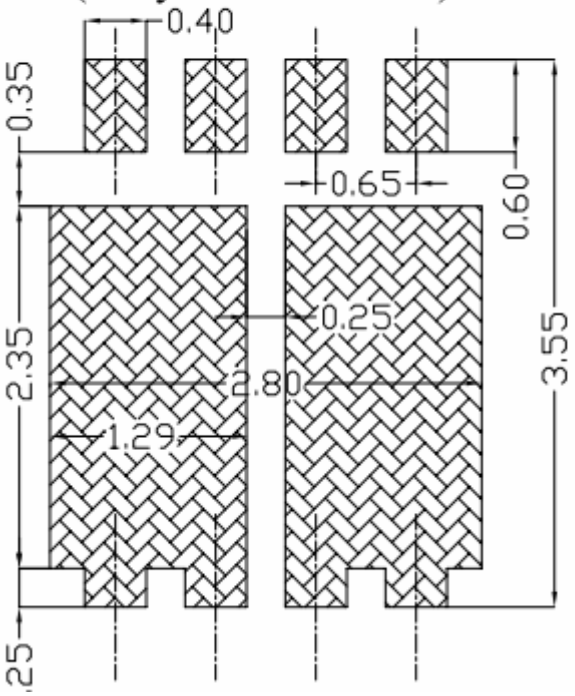


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN3.3X3.3-8L Package Information



Land Pattern
(Only for Reference)



SYMBOL	DIMENSIONAL REQMTS		
	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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