

## NCE N-Channel Super Trench II Power MOSFET

### Description

The NCEP011NH25QU uses **Super Trench II** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of  $R_{DS(ON)}$  and  $Q_g$ . This device is ideal for high-frequency switching and synchronous rectification.

### Application

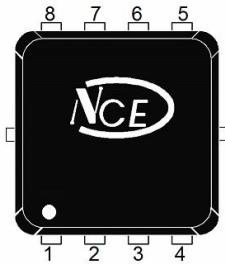
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

### General Features

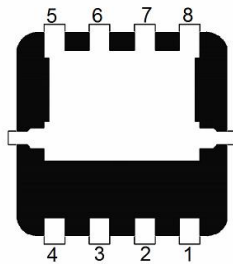
- $V_{DS} = 25V, I_D = 161A$ 
  - $R_{DS(ON)} = 1.1m\Omega$  (typical) @  $V_{GS} = 10V$
  - $R_{DS(ON)} = 1.8m\Omega$  (typical) @  $V_{GS} = 4.5V$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 150°C operating temperature
- Pb-free lead plating

**100% UIS TESTED!**  
**100% ΔV<sub>ds</sub> TESTED!**

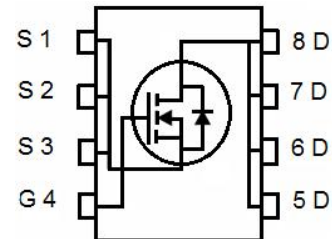
PDFN 3.3X3.3-8L



Top View



Bottom View



Schematic Diagram

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP011NH25QU	NCEP011NH25QU	PDFN3.3X3.3-8L	Ø330mm	12mm	5000units

### Absolute Maximum Ratings (T<sub>c</sub>=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	25	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current-Continuous	$I_D$	161	A
Drain Current-Continuous(T <sub>c</sub> =100°C)	$I_D(100^\circ C)$	102	A
Pulsed Drain Current	$I_{DM}$	644	A
Maximum Power Dissipation	$P_D$	69	W
Derating factor		0.55	W/°C
Single pulse avalanche energy (Note 1)	$E_{AS}$	540	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

### Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.81	°C/W
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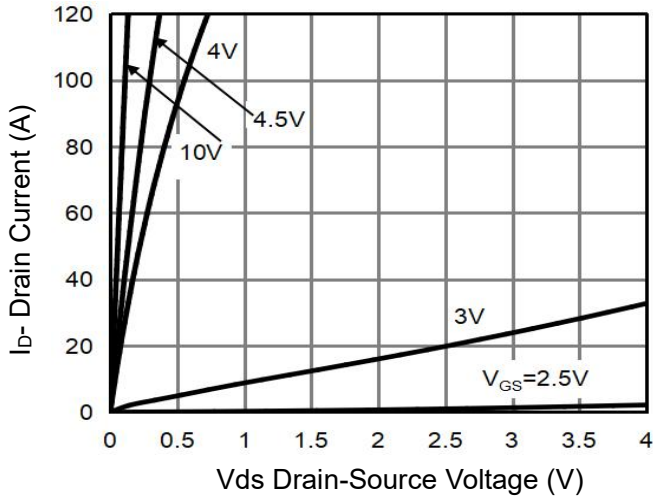
## Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise noted)

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	25		-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.5	2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	1.1	1.65	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	1.8	2.75	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =30A	-	50	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1.0MHz	-	2900	-	pF
Output Capacitance	C <sub>oss</sub>		-	805	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	80	-	pF
<b>Switching Characteristics</b> (Note 2)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =20A V <sub>GS</sub> =10V, R <sub>G</sub> =1.6Ω	-	8	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	7	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	35	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	12	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	-	40	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	9.2		nC
Gate-Drain Charge	Q <sub>gd</sub>		-	5.0		nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =20A	-	-	1.2	V
Diode Forward Current	I <sub>S</sub>		-	-	161	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> =100A di/dt = 100A/μs	-	22	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	40	-	nC

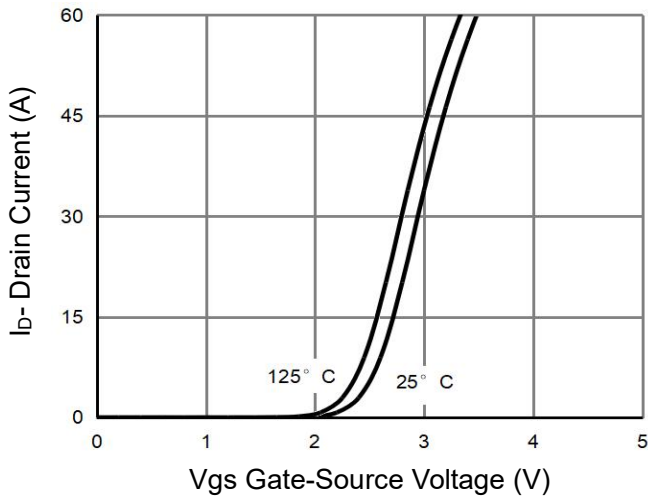
### Notes:

1. EAS condition : T<sub>j</sub>=25°C, V<sub>DD</sub>=15V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω
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<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

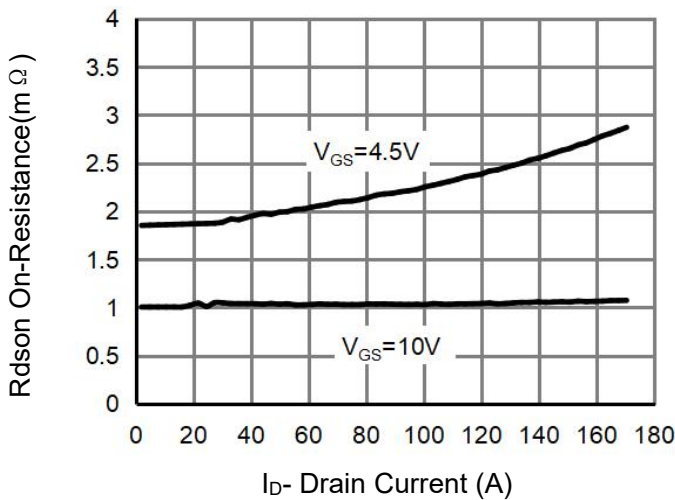
**Typical Electrical and Thermal Characteristics**



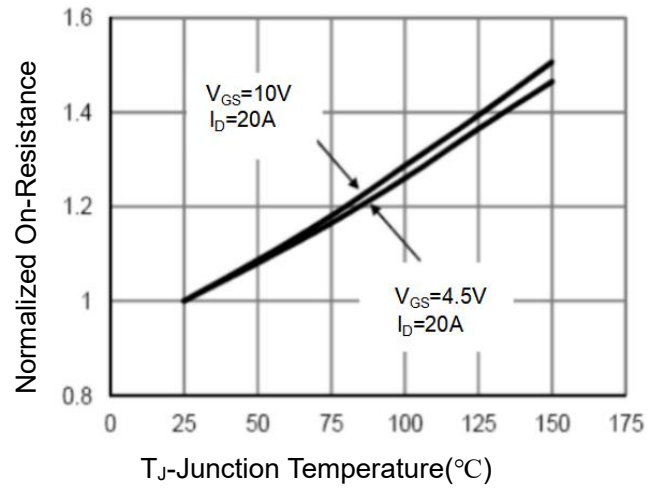
**Figure 1 Output Characteristics**



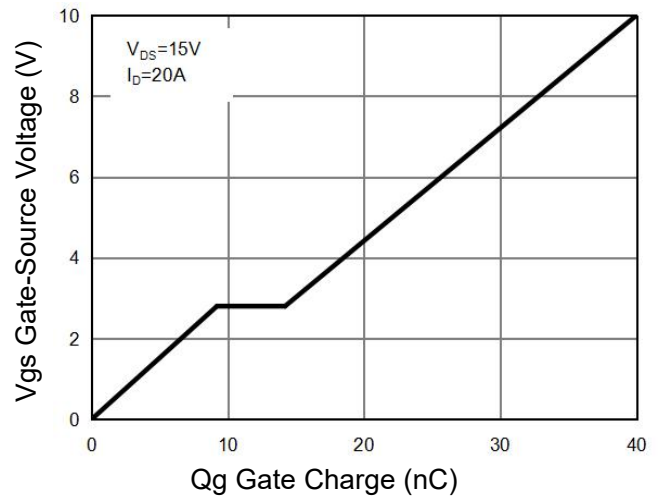
**Figure 2 Transfer Characteristics**



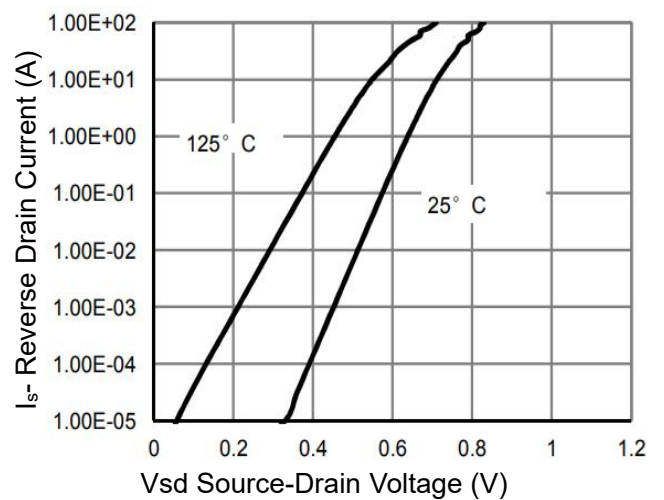
**Figure 3 Rds(on)- Drain Current**



**Figure 4 Rds(on)-Junction Temperature**



**Figure 5 Gate Charge**



**Figure 6 Source- Drain Diode Forward**

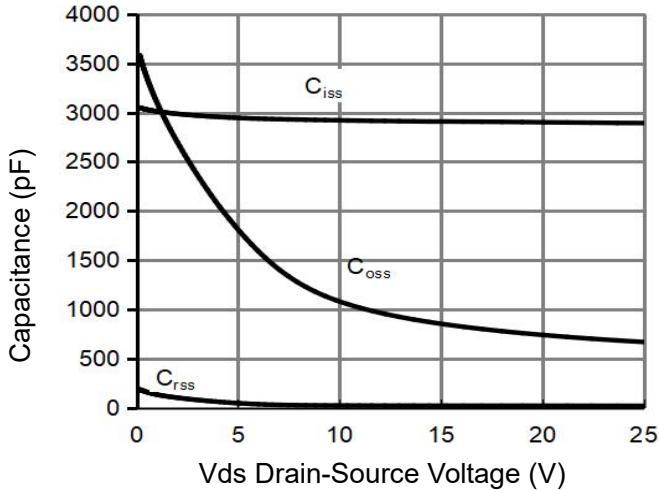


Figure 7 Capacitance vs Vds

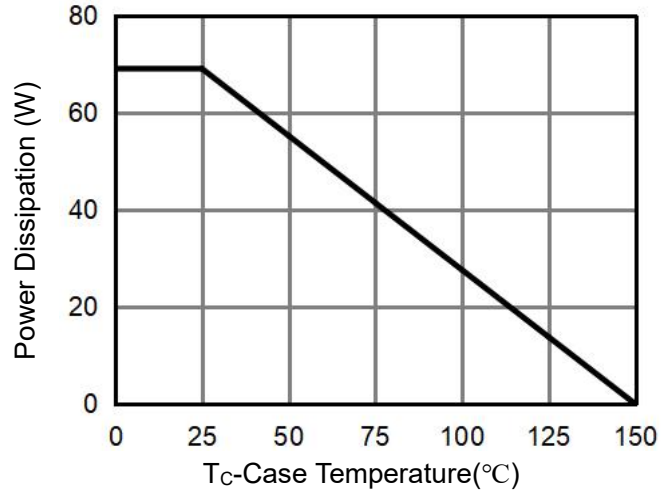


Figure 9 Power De-rating

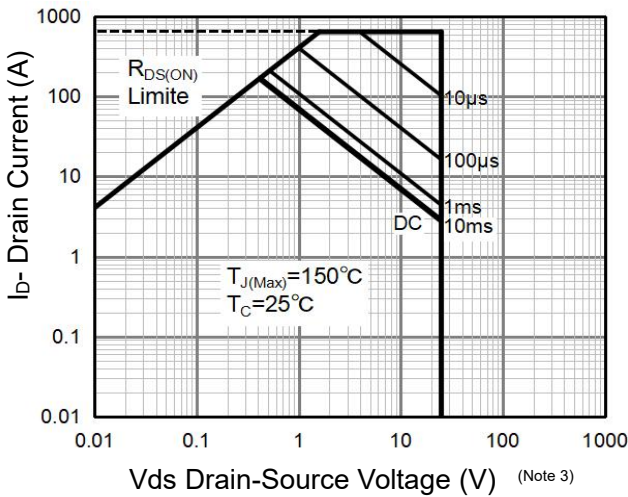


Figure 8 Safe Operation Area

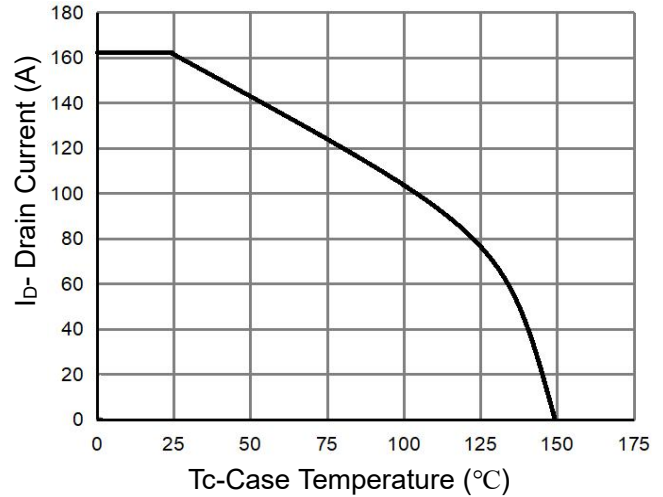


Figure 10 Current De-rating

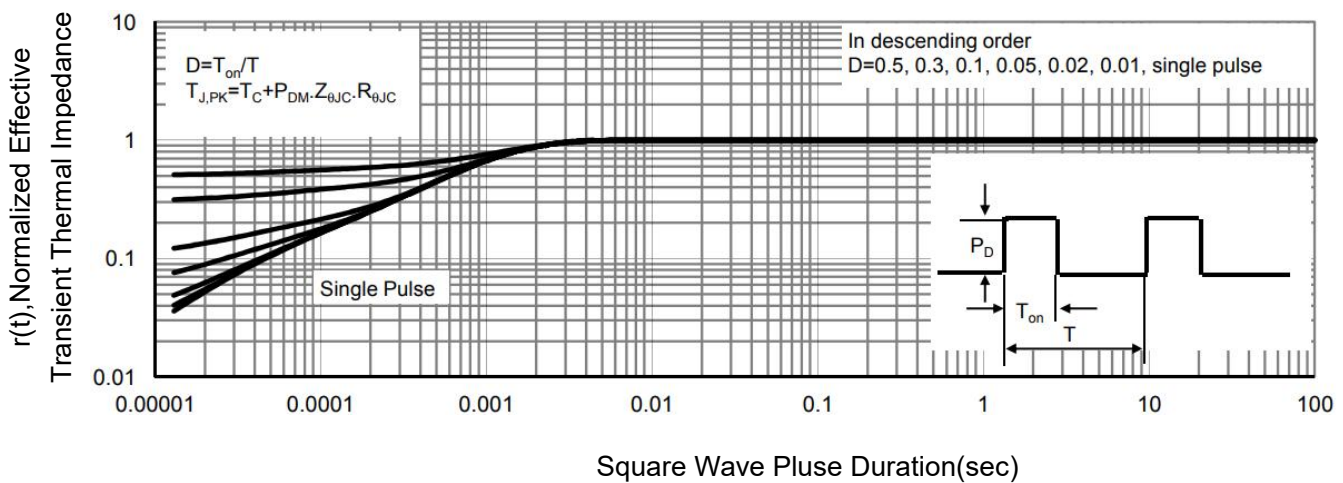
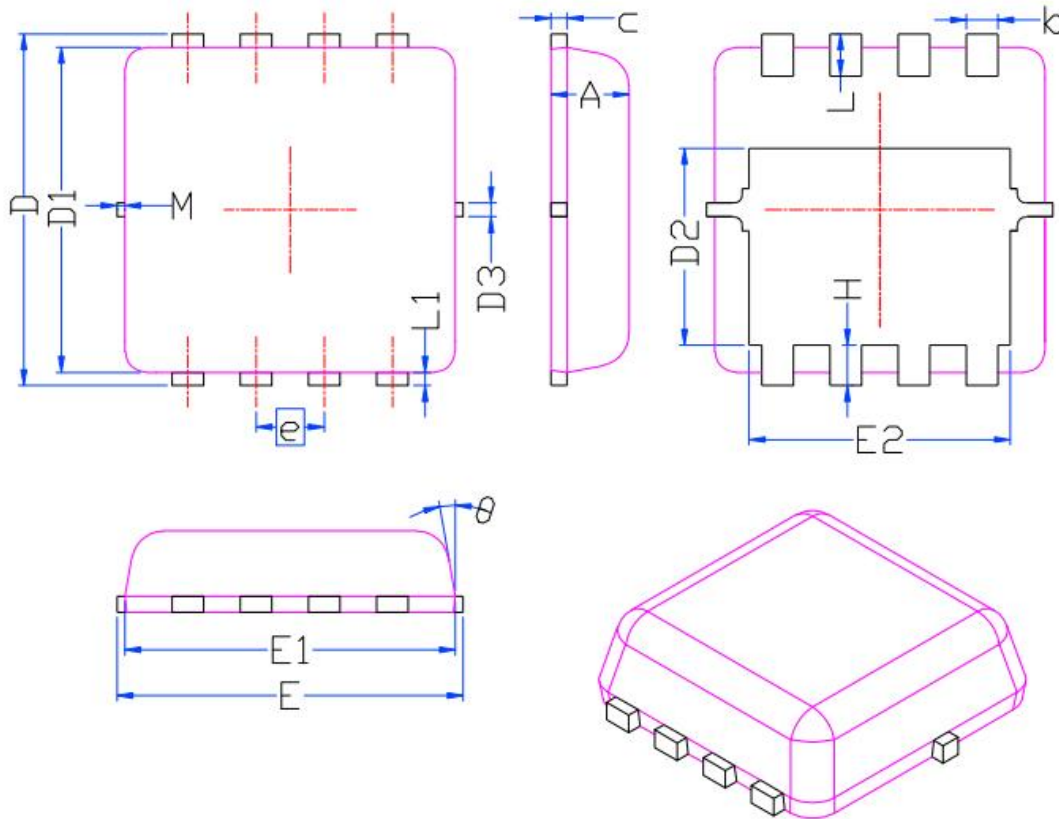


Figure 11 Normalized Maximum Transient Thermal Impedance

## PDFN3.3X3.3-8L Package Information



Symbol	Dimensions In Millimeters		
	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	3.10	3.20	3.30
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	-
M	*	*	0.15
θ		10°	12°

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