

NCE P-Channel Super Trench Power MOSFET

Description

The NCEP40P30Q uses **Super Trench** 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

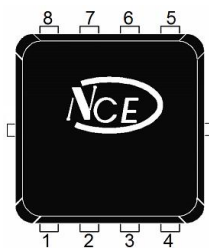
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

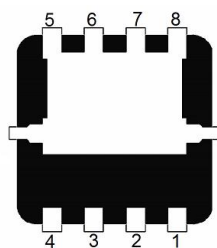
- $V_{DS} = -40V, I_D = -30A$
 $R_{DS(on)} = 21.0m\Omega$ (typical) @ $V_{GS} = -10V$
 $R_{DS(on)} = 32.0m\Omega$ (typical) @ $V_{GS} = -4.5V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔV_{ds} TESTED!

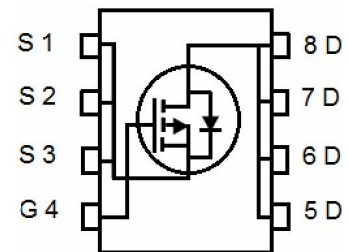
PDFN 3.3X3.3-8L



Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP40P30Q	NCEP40P30Q	PDFN3.3X3.3-8L	Ø330mm	12mm	5000units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-30	A
Drain Current-Continuous($T_c = 100^\circ C$)	$I_D(100^\circ C)$	-21	A
Pulsed Drain Current	I_{DM}	-120	A
Maximum Power Dissipation	P_D	50	W
Derating factor		0.4	W/ $^\circ C$
Single pulse avalanche energy ^(Note 1)	E_{AS}	80	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	$^\circ C/W$
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Electrical Characteristics (T_c=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-40		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.0	-1.7	-2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-15A	-	21.0	28.0	mΩ
		V _{GS} =-4.5V, I _D =-15A	-	32.0	44.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-20A	-	18	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =-20V, V _{GS} =0V, F=1.0MHz	-	1000	-	PF
Output Capacitance	C _{oss}		-	315	-	PF
Reverse Transfer Capacitance	C _{rss}		-	18.5	-	PF
Switching Characteristics (Note 2)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-20V, I _D =-15A V _{GS} =-10V, R _G =1.6Ω	-	8	-	nS
Turn-on Rise Time	t _r		-	10	-	nS
Turn-Off Delay Time	t _{d(off)}		-	25	-	nS
Turn-Off Fall Time	t _f		-	6	-	nS
Total Gate Charge	Q _g	V _{DS} =-20V, I _D =-15A, V _{GS} =-10V	-	18.5	-	nC
Gate-Source Charge	Q _{gs}		-	4.2		nC
Gate-Drain Charge	Q _{gd}		-	2.4		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-15A	-		-1.2	V
Diode Forward Current	I _S		-	-	-30	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =-30A	-	22	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs	-	25	-	nC

Notes:

1. EAS condition : T_J=25°C, V_{DD}=-20V, V_G=-10V, L=0.5mH, R_G=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_{J(MAX)}=150°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

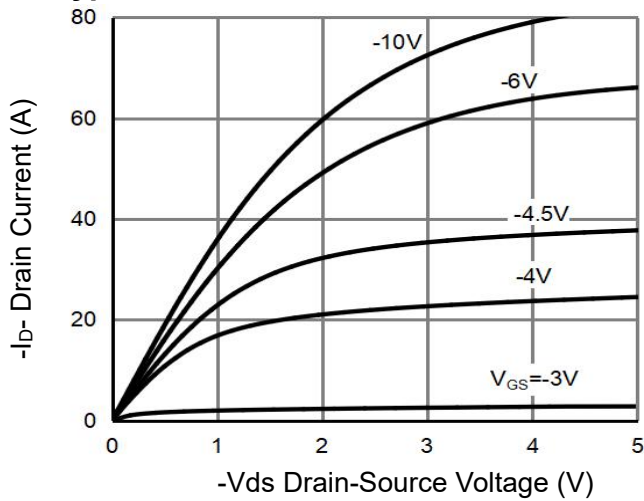


Figure 1 Output Characteristics

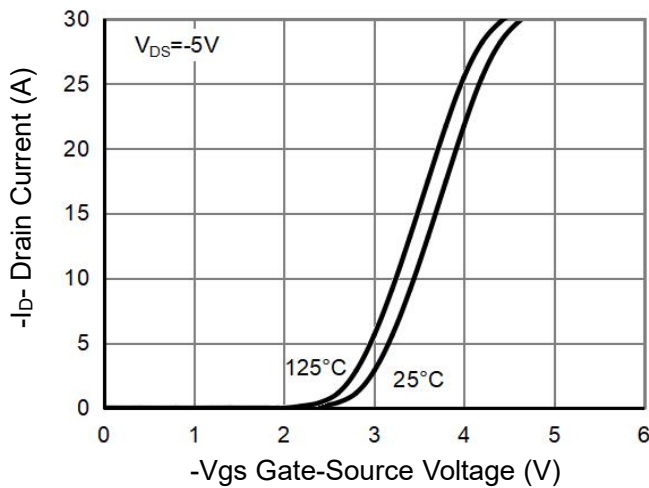


Figure 2 Transfer Characteristics

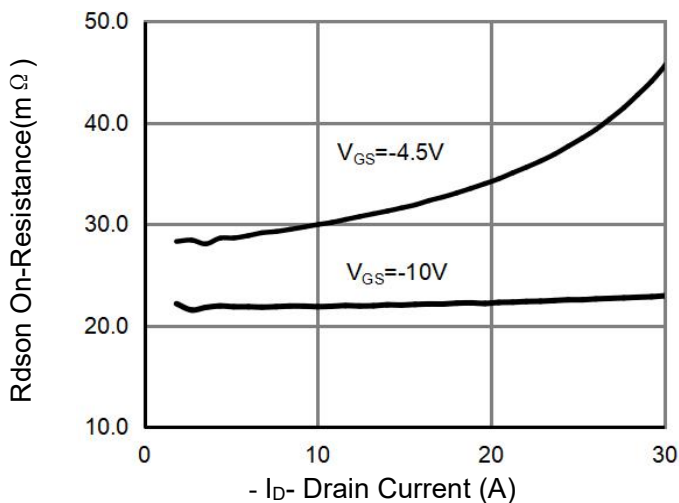


Figure 3 Rdson- Drain Current

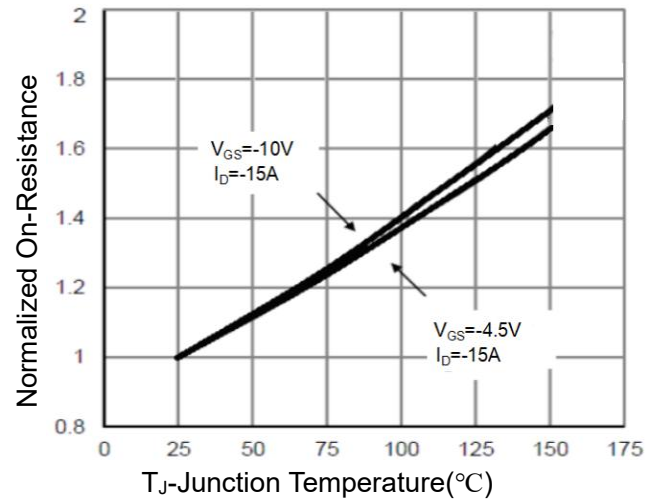


Figure 4 Rdson-Junction Temperature

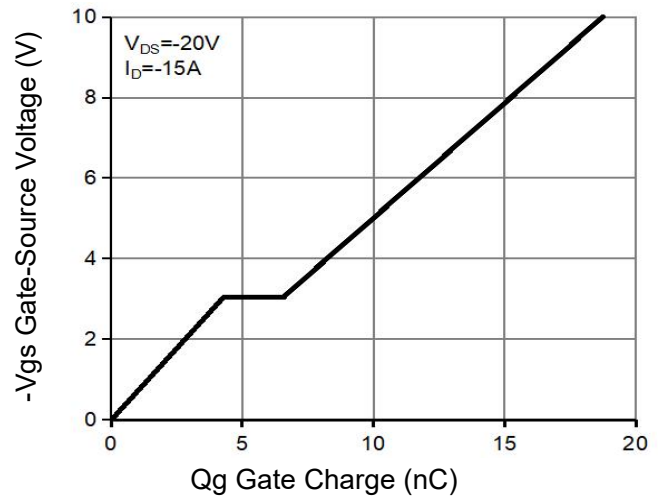


Figure 5 Gate Charge

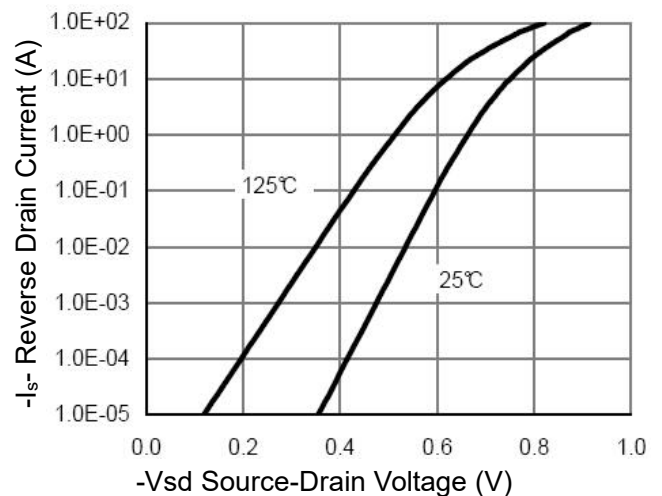


Figure 6 Source- Drain Diode Forward

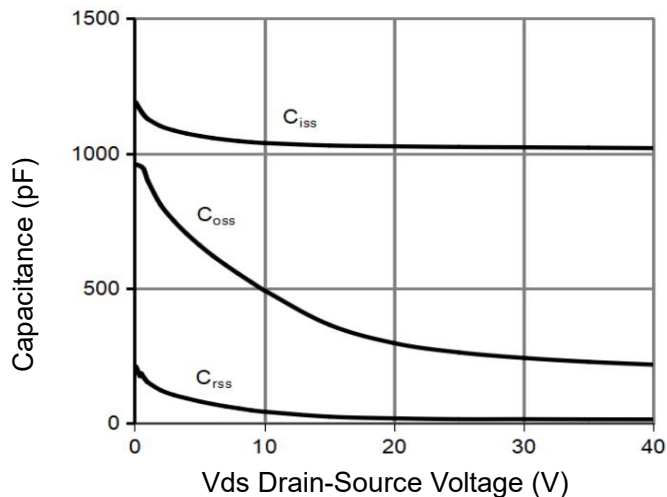


Figure 7 Capacitance vs Vds

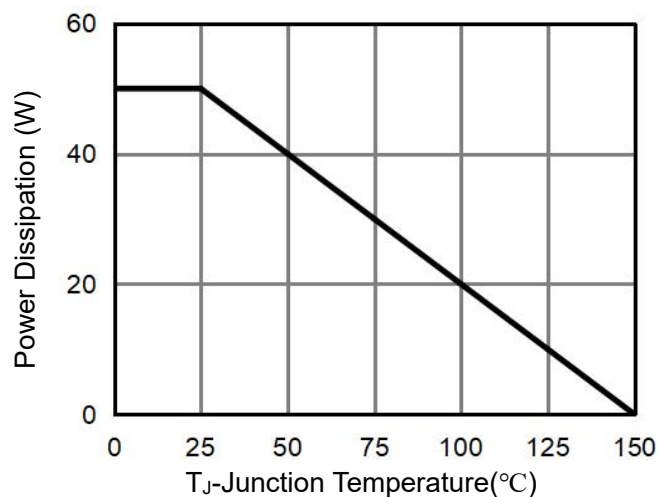


Figure 9 Power De-rating

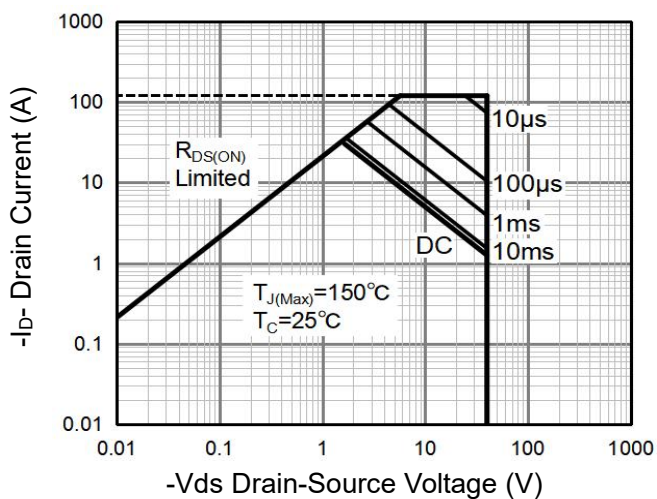


Figure 8 Safe Operation Area(Note3)

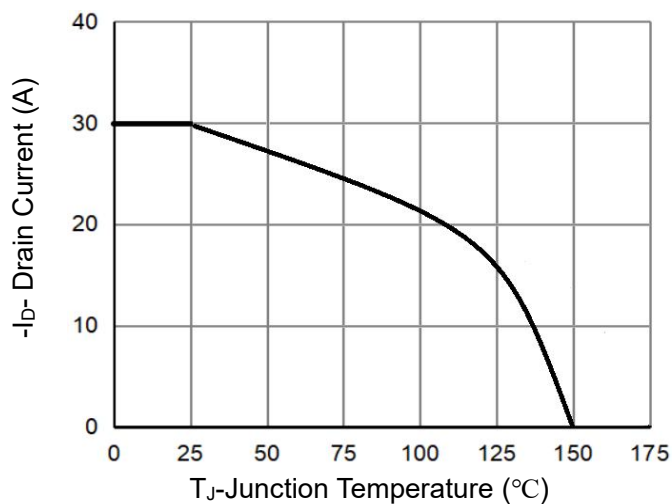


Figure 10 Current De-rating

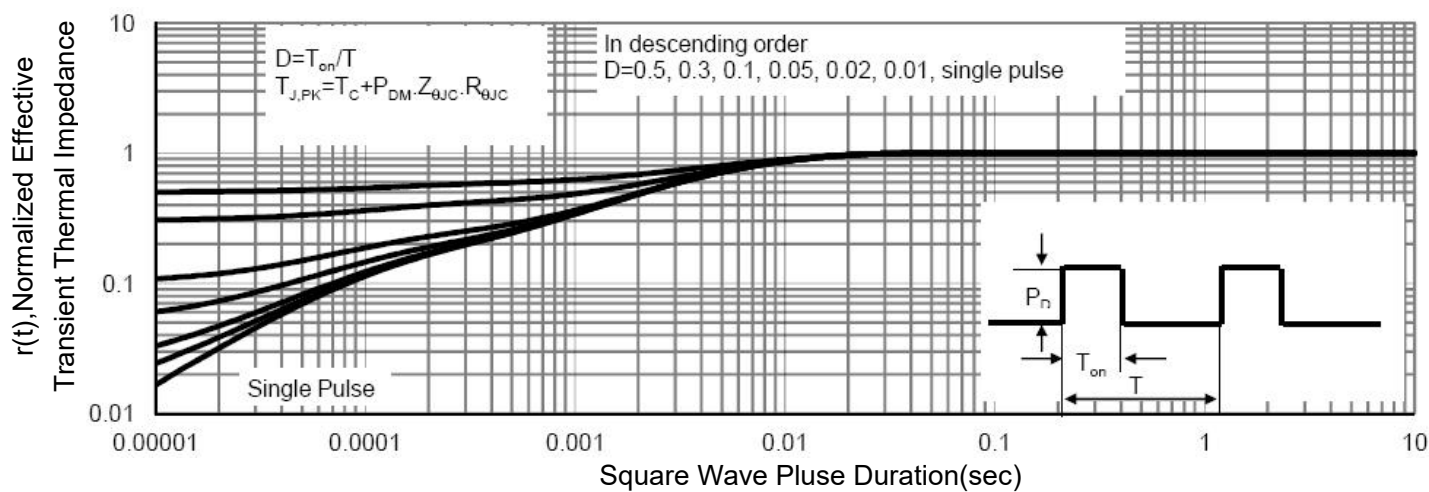
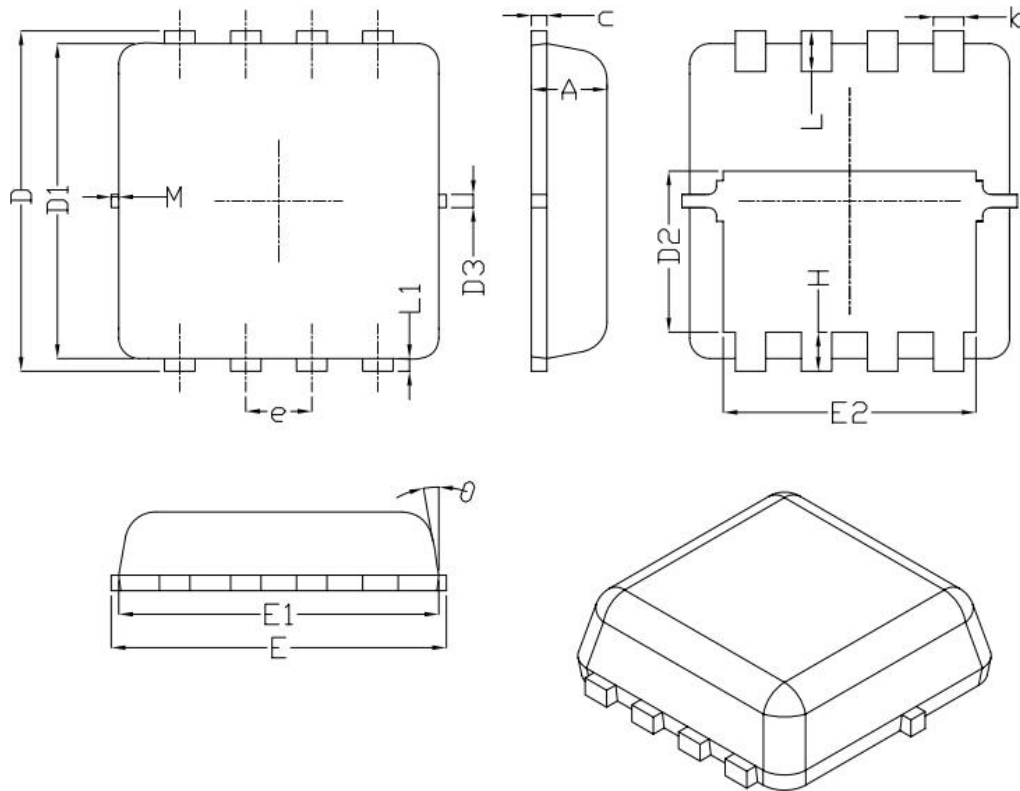
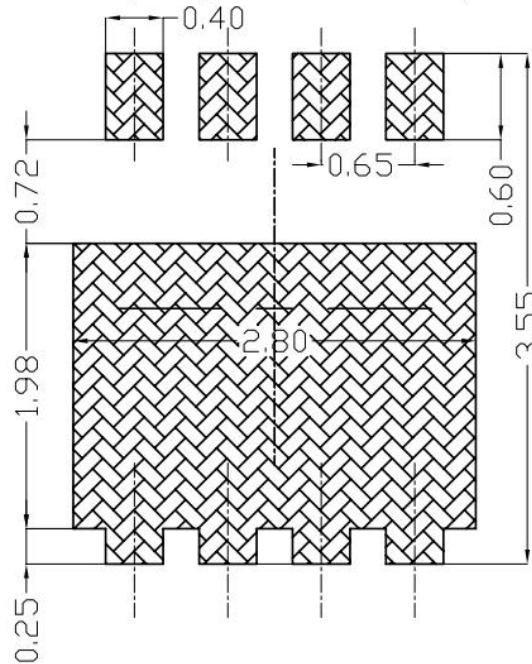


Figure 11 Normalized Maximum Transient Thermal Impedance

PDFN 3.3X3.3-8L 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	1.48	1.58	1.68
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	---
θ	---	10°	12°
M	*	*	0.15
* Not specified			

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