NCE P-Channel Super Trench Power MOSFET

Description

The NCEP40PT15G 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

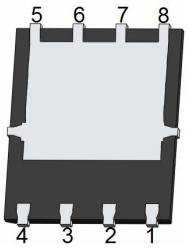
General Features

- V_{DS} =-40V,I_D =-150A
  $R_{DS(ON)}$=2.8mΩ (typical) @ V_{GS}=-10V
  $R_{DS(ON)}$=3.8mΩ (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

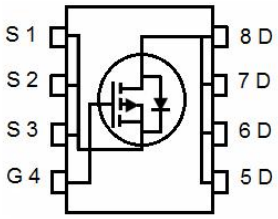
100% UIS TESTED!
100% ΔVds TESTED!

DFN 5X6

Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP40PT15G	NCEP40PT15G	DFN5X6-8L	-	-	-

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25℃)	I_D (T_C=25℃)	-150	A
Drain Current-Continuous(T_C=100℃)	I_D (T_C=100℃)	-106	A
Drain Current-Continuous (T_A=25℃)	I_D (T_A=25℃)	-20.5	A
Pulsed Drain Current (Note 1)	I_{DM}	-600	A
Maximum Power Dissipation(T_C=25℃)	P_D(T_C=25℃)	150	W
Maximum Power Dissipation(T_A=25℃)	P_D(T_A=25℃)	2.5	W
Derating factor		1.2	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	1076	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case(Note 2)	$R_{\theta JC}$	0.83	℃/W
Thermal Resistance,Junction-to-Ambient(Note 2)	$R_{\theta JA}$	50	℃/W

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	-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 (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.0	-1.5	-2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-75A	-	2.8	3.5	mΩ
		V_{GS}=-4.5V, I_D=-75A	-	3.9	6.0	mΩ
Gate resistance	R_G	F=1.0MHz	-	5.5	-	Ω
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-75A	-	30	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-20V,V_{GS}=0V, F=1.0MHz	-	8940	-	PF
Output Capacitance	C_{oss}		-	1900	-	PF
Reverse Transfer Capacitance	C_{rss}		-	45	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-20V,I_D=-75A V_{GS}=-10V,R_G=1.6Ω	-	18	-	nS
Turn-on Rise Time	t_r		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	90	-	nS
Turn-Off Fall Time	t_f		-	15	-	nS
Total Gate Charge	Q_g	V_{DS}=-20V,I_D=-75A, V_{GS}=-10V	-	104.4	-	nC
Gate-Source Charge	Q_{gs}		-	20.8		nC
Gate-Drain Charge	Q_{gd}		-	13.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-75A	-		-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-150	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =-75A di/dt = 100A/μs (Note3)	-		35	nS
Reverse Recovery Charge	Qrr		-		85	nC

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.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : Tj=25℃,V_{DD}=-20V,V_G=-10V,L=0.5mH,Rg=25Ω

Typical Electrical and Thermal Characteristics

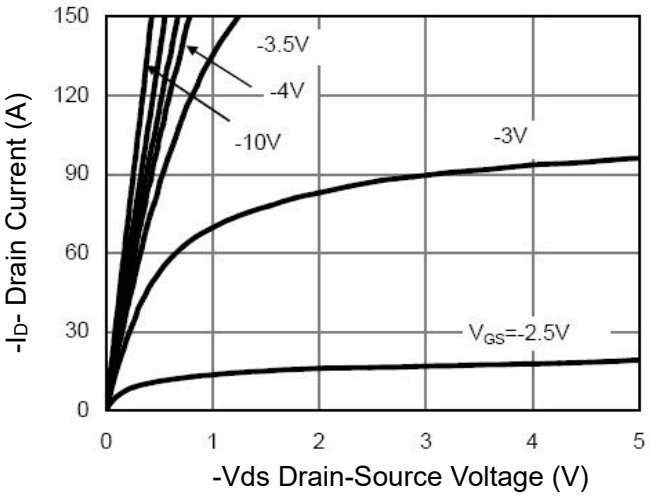


Figure 1 Output Characteristics

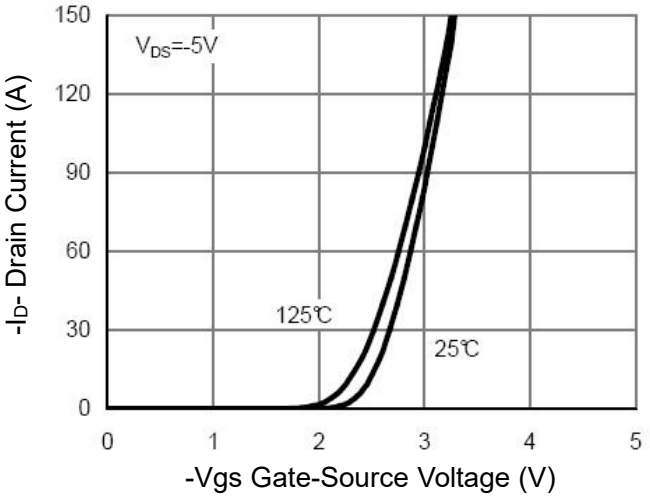


Figure 2 Transfer Characteristics

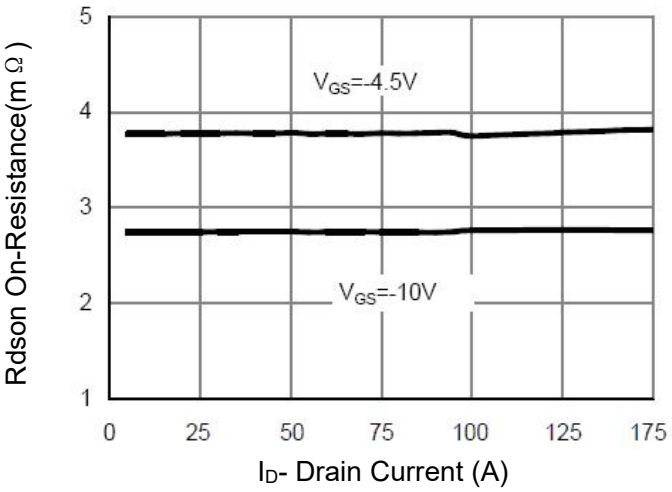


Figure 3 Rdson- Drain Current

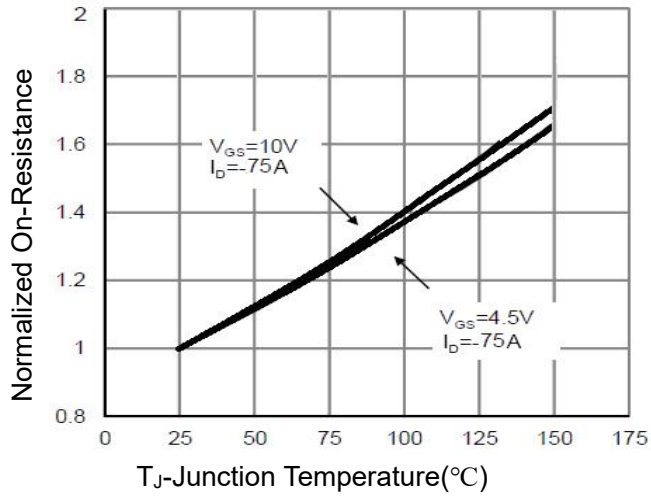


Figure 4 Rdson-JunctionTemperature

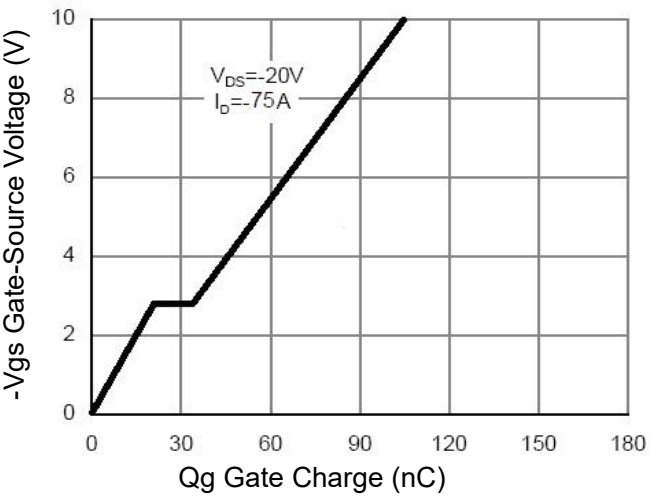


Figure 5 Gate Charge

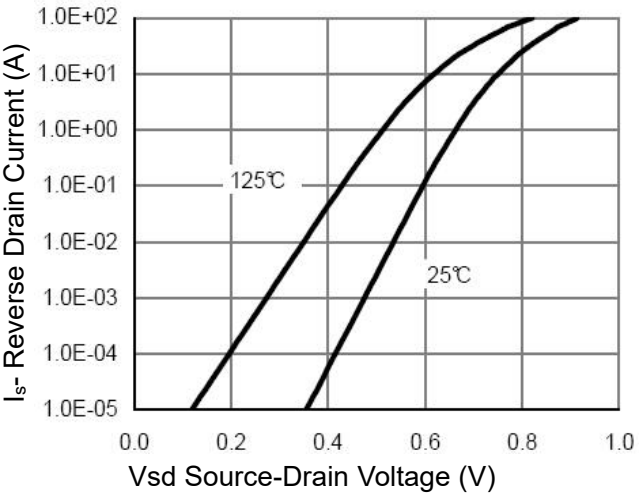


Figure 6 Source- Drain Diode Forward

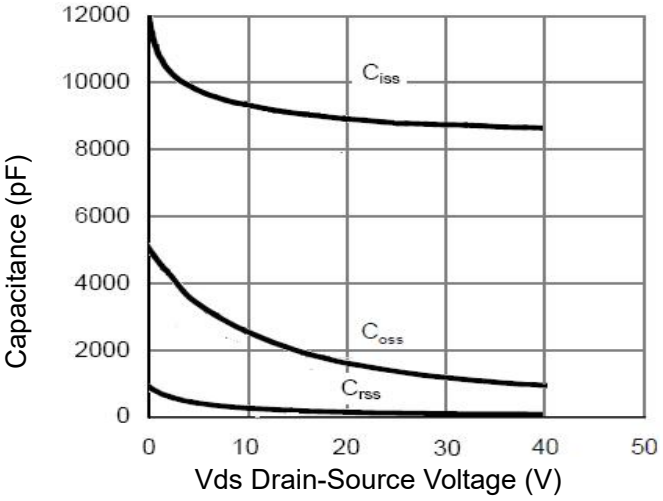


Figure 7 Capacitance vs Vds

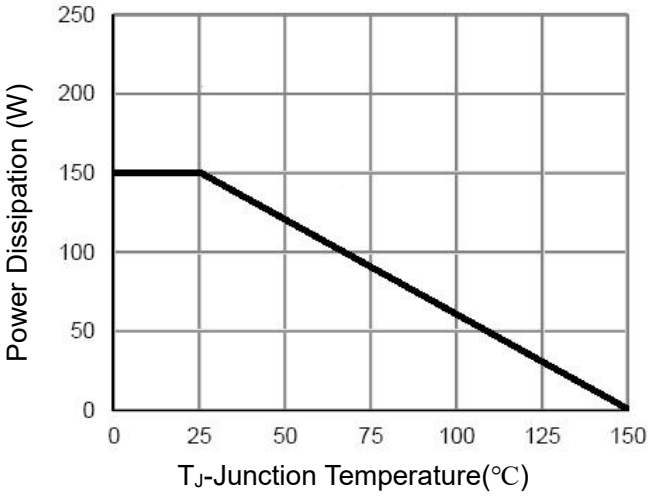


Figure 9 Power De-rating

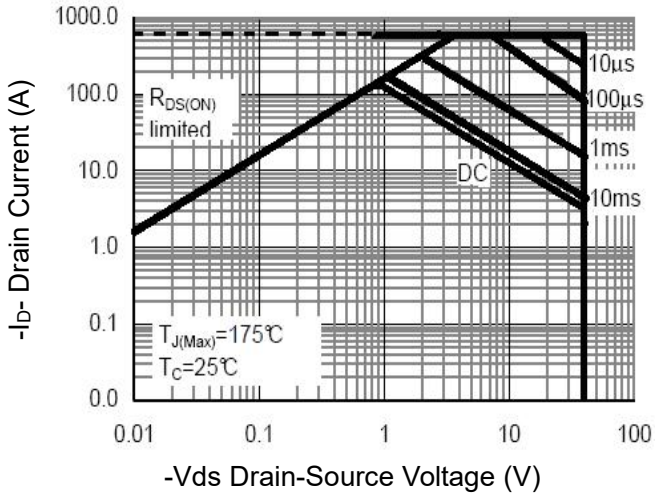


Figure 8 Safe Operation Area

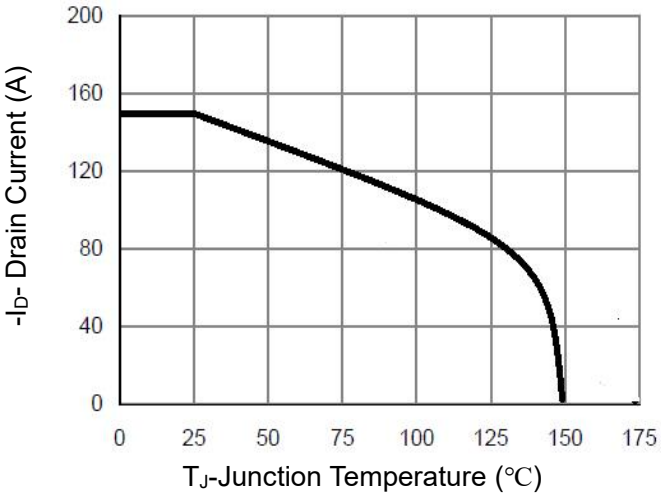


Figure 10 Current De-rating

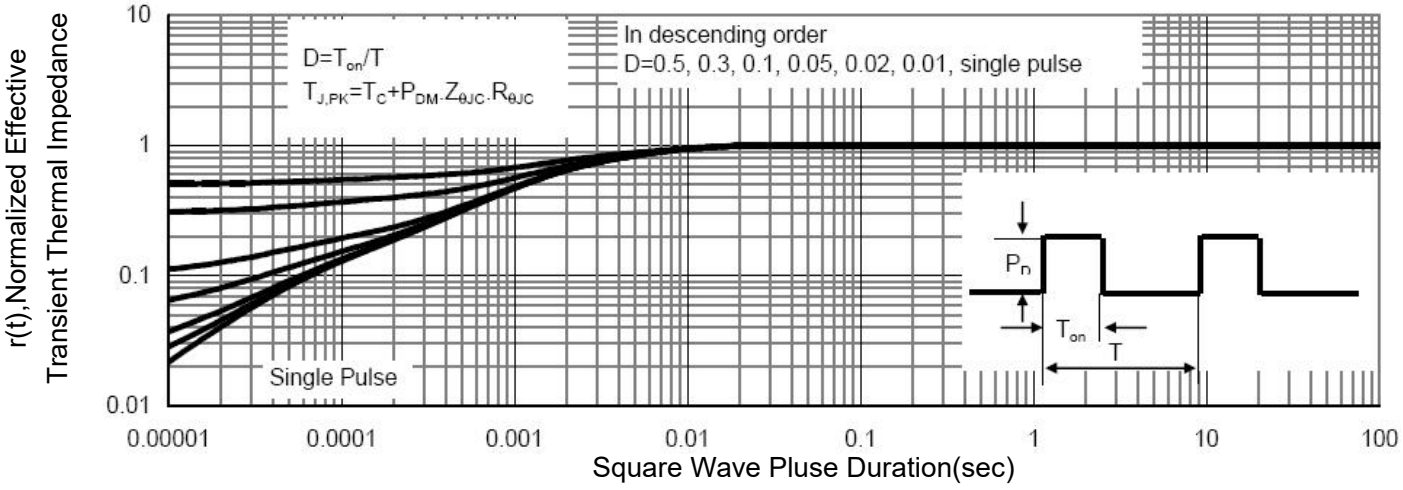
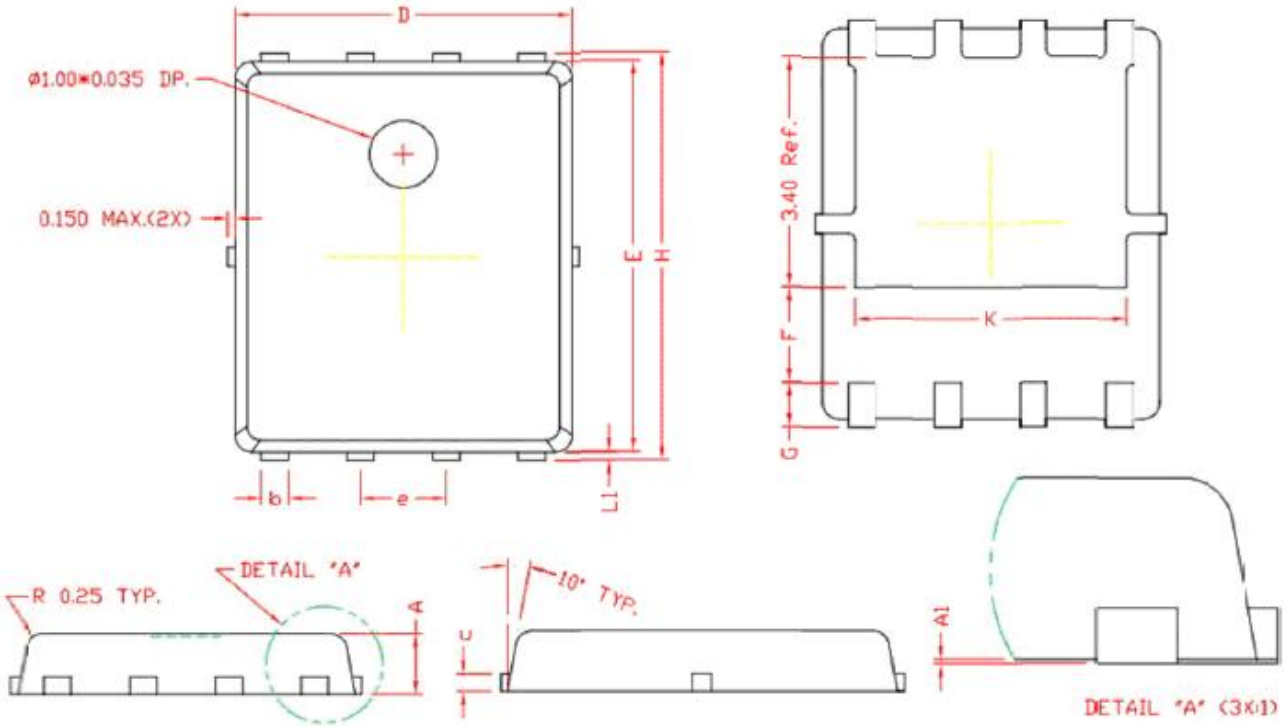


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0.00	0.03	0.05
b	0.35	0.42	0.49
c	0.254 REF.		
D	4.90	5.00	5.10
F	1.40 REF.		
E	5.70	5.80	5.90
e	1.27 BSC.		
H	5.95	6.08	6.20
L1	0.10	0.14	0.18
G	0.60 REF.		
K	4.00 REF.		

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