

NCE N-Channel Super Trench Power MOSFET

Description

The NCEP3060EQ 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. It is ESD protested.

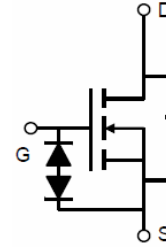
General Features

- $V_{DS} = 30V, I_D = 60A$
- $R_{DS(ON)} = 4m\Omega$ (typical) @ $V_{GS} = 10V$
- $R_{DS(ON)} = 5.4m\Omega$ (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
- ESD protection : HBM Class 2

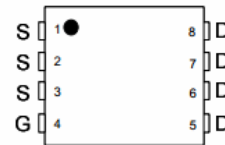
Application

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

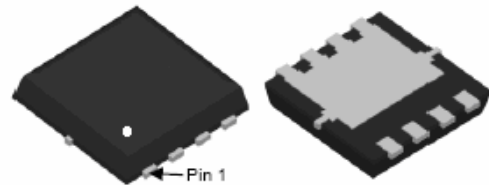
100% UIS TESTED!
100% ΔVds TESTED!



Schematic Diagram



Top View and Pin Assignment



Top View

Bottom View

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP3060EQ	NCEP3060EQ	DFN3.3X3.3-8L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous (Silicon Limited)	I_D	60	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	42	A
Pulsed Drain Current (Package Limited)	I_{DM}	200	A
Maximum Power Dissipation	P_D	48	W
Derating factor		0.38	W/°C
Single pulse avalanche energy ^(Note 5)	E_{AS}	352	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	2.6	$^{\circ}C/W$
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Electrical Characteristics ($T_C=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30		-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 10	μA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$	-	4	4.3	m Ω
		$V_{GS}=4.5V, I_D=30A$	-	5.4	6	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=30A$		30	-	S
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	2200	2640	PF
Output Capacitance	C_{oss}		-	807	906	PF
Reverse Transfer Capacitance	C_{rss}		-	22.7	27	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, I_D=30A$ $V_{GS}=10V, R_G=1.6\Omega$	-	8	-	nS
Turn-on Rise Time	t_r		-	4.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	29	-	nS
Turn-Off Fall Time	t_f		-	8.5	-	nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=30A,$ $V_{GS}=10V$	-	34.6	38	nC
Gate-Source Charge	Q_{gs}		-	7.8		nC
Gate-Drain Charge	Q_{gd}		-	3.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$V_{GS}=0V, I_S=30A$	-		1.2	V
Diode Forward Current ^(Note 2)	I_S		-	-	60	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}C, I_F = I_S$ $di/dt = 500A/\mu s$ ^(Note 3)	-	16	-	nS
Reverse Recovery Charge	Q_{rr}		-	35	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^{\circ}C, V_{DD}=15V, V_G=10V, L=0.5mH, R_G=25\Omega$

Typical Electrical and Thermal Characteristics

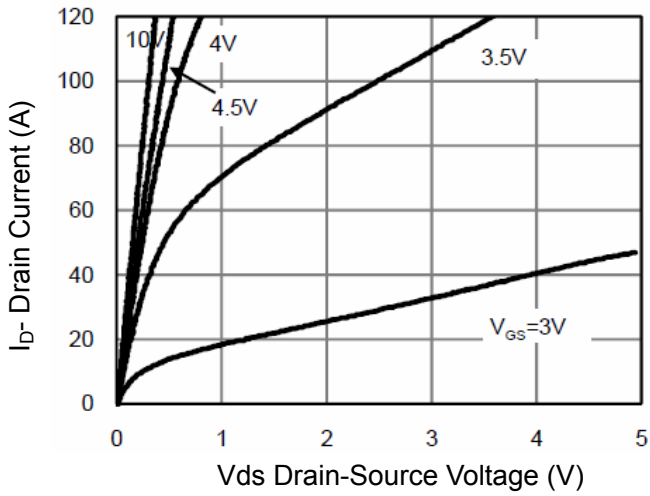


Figure 1 Output Characteristics

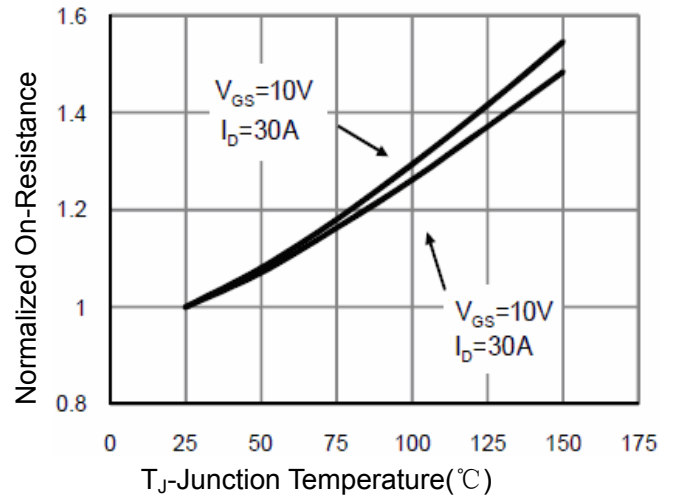


Figure 4 Rds(on)-Junction Temperature

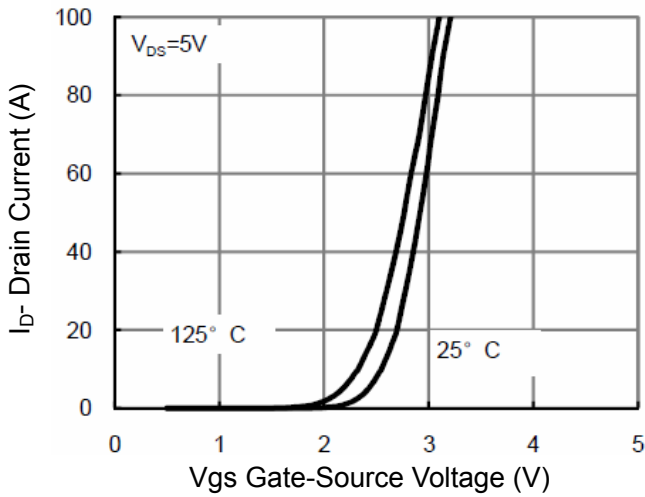


Figure 2 Transfer Characteristics

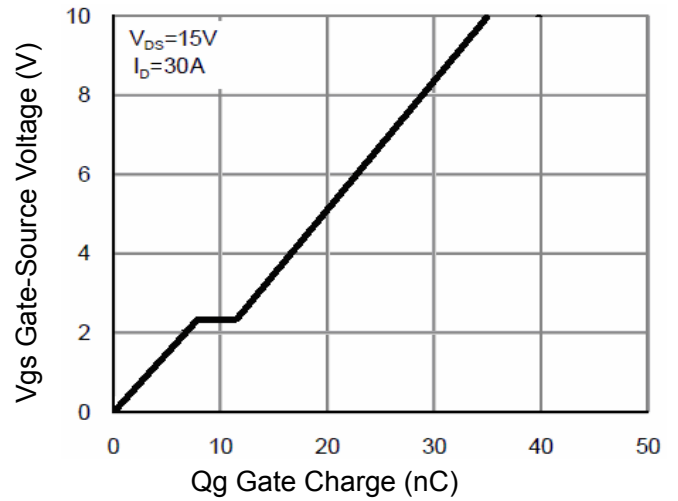


Figure 5 Gate Charge

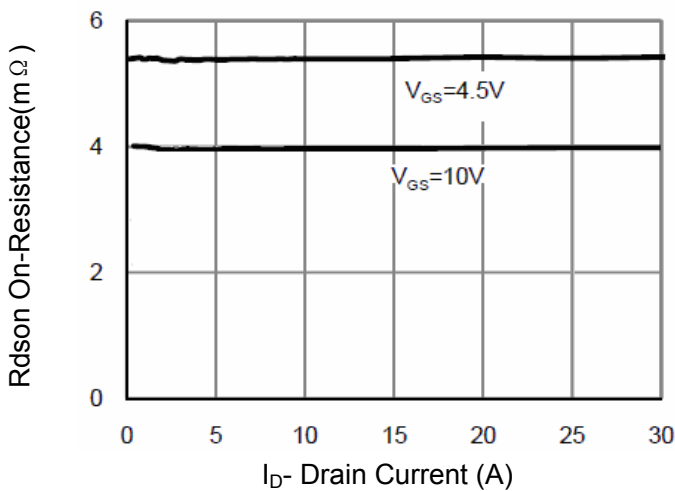


Figure 3 Rds(on)- Drain Current

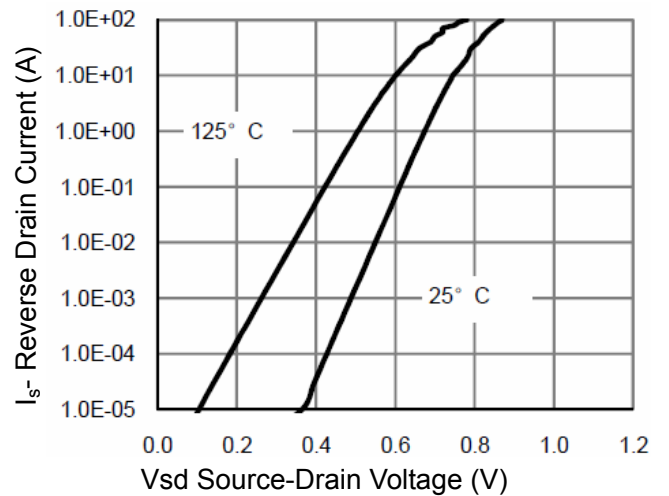


Figure 6 Source- Drain Diode Forward

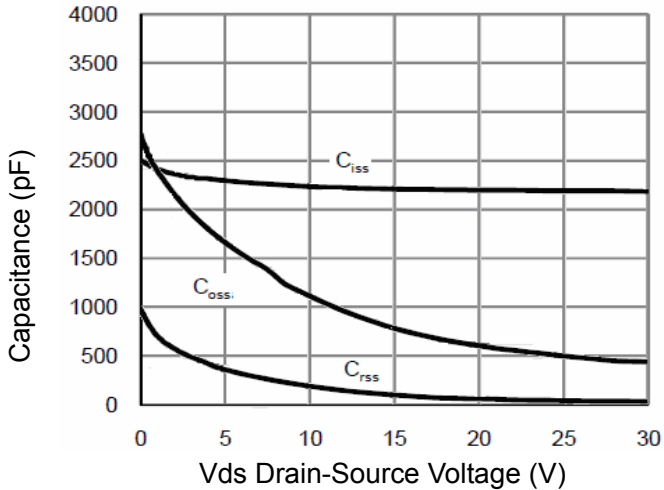


Figure 7 Capacitance vs Vds

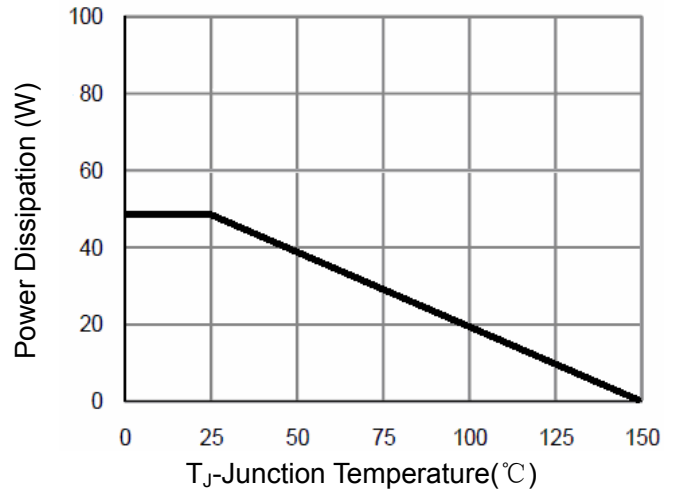


Figure 9 Power De-rating

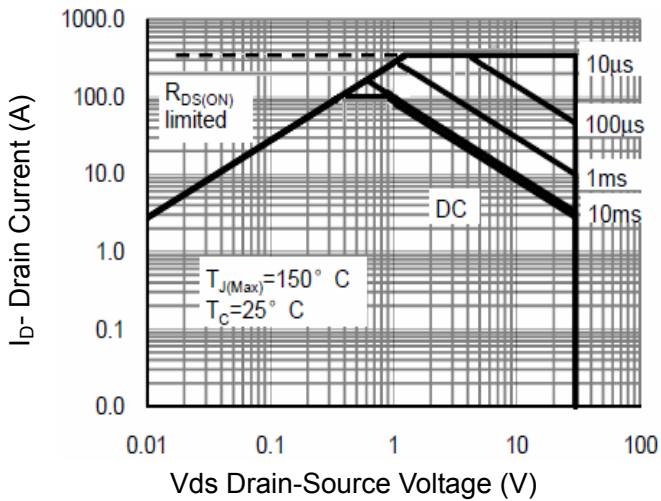


Figure 8 Safe Operation Area

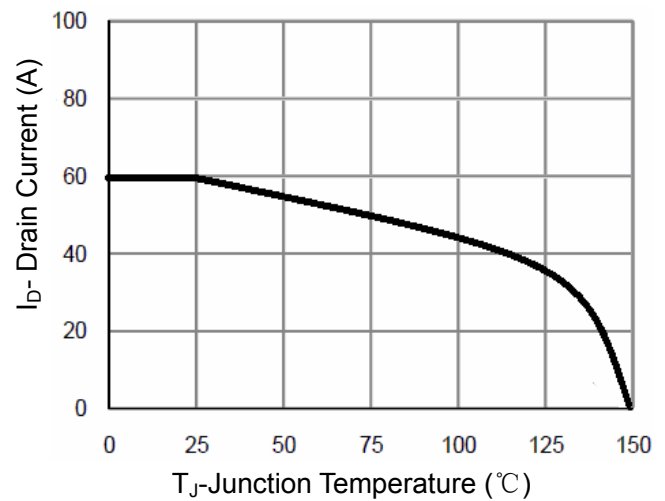


Figure 10 Current De-rating

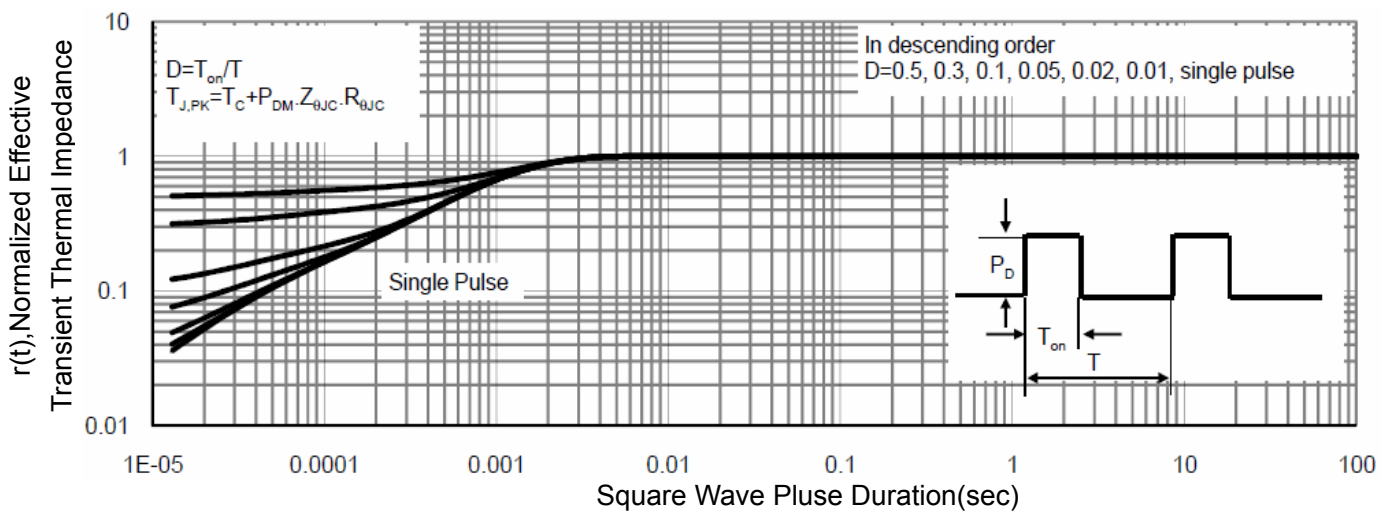
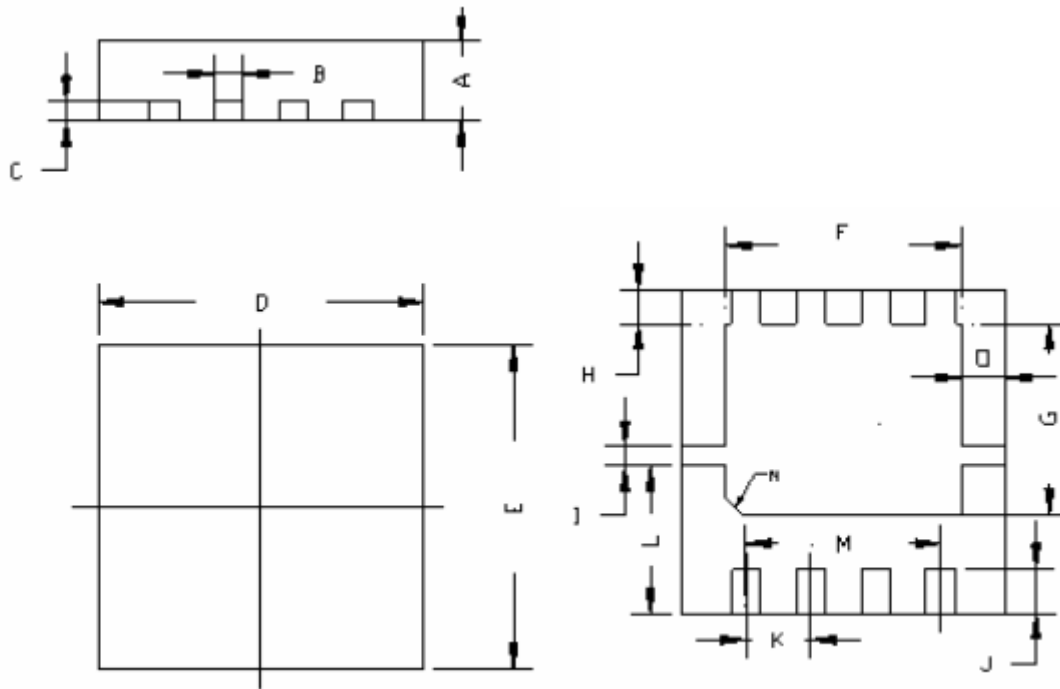


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN3.3X3.3-8L Package Information



A	B	C	D
0.8 ± 0.05	0.3 ± 0.05	0.2 ± 0.02	3.25 ± 0.05
E	F	G	H
3.25 ± 0.05	2.35 ± 0.15	1.9 ± 0.1	0.35 ± 0.05
I	J	K	L
0.2 ± 0.05	0.45 ± 0.05	0.65 ± 0.05	1.48 ± 0.1
M	N	O	
1.95 ± 0.15	$0.15^{\circ}45$	0.45 ± 0.05	
单位: mm			

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