

NCE N-Channel Super Trench II Power MOSFET

Description

The series of devices 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

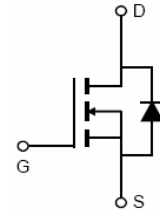
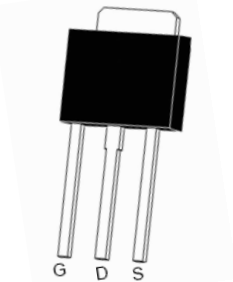
General Features

- $V_{DS} = 120V, I_D = 90A$
 $R_{DS(ON)} = 9.0m\Omega$, typical @ $V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!

100% ΔV_{ds} TESTED!

TO-251



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP080N12I	NCEP080N12I	TO-251	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	120	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	90	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	64	A
Pulsed Drain Current ^(Note 1)	I_{DM}	360	A
Maximum Power Dissipation	P_D	140	W
Derating factor		0.93	W/ $^\circ C$
Single pulse avalanche energy ^(Note 4)	E_{AS}	352	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.07	$^\circ C/W$
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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	120		-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =120V, 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	2.0	3.0	4.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =45A	-	9.0	10.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =45A		55	-	S
Dynamic Characteristics (Note 3)						
Input Capacitance	C _{ISS}	V _{DS} =60V, V _{GS} =0V, F=1.0MHz	-	3715	-	pF
Output Capacitance	C _{OSS}		-	275	-	pF
Reverse Transfer Capacitance	C _{RSS}		-	18	-	pF
Switching Characteristics (Note 3)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =60V, I _D =45A V _{GS} =10V, R _G =1.6Ω	-	20	-	nS
Turn-on Rise Time	t _r		-	16	-	nS
Turn-Off Delay Time	t _{d(off)}		-	45	-	nS
Turn-Off Fall Time	t _f		-	12	-	nS
Total Gate Charge	Q _g	V _{DS} =60V, I _D =45A, V _{GS} =10V	-	58	-	nC
Gate-Source Charge	Q _{gs}		-	21	-	nC
Gate-Drain Charge	Q _{gd}		-	14.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 2)	V _{SD}	V _{GS} =0V, I _S =45A	-	-	1.2	V
Diode Forward Current	I _S		-	-	90	A
Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 90A	-	65	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs (Note 3)	-	105	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Guaranteed by design, not subject to production
4. EAS condition : T_J=25 °C, V_{DD}=50V, V_G=10V, L=0.25mH, R_g=25Ω

Typical Electrical and Thermal Characteristics

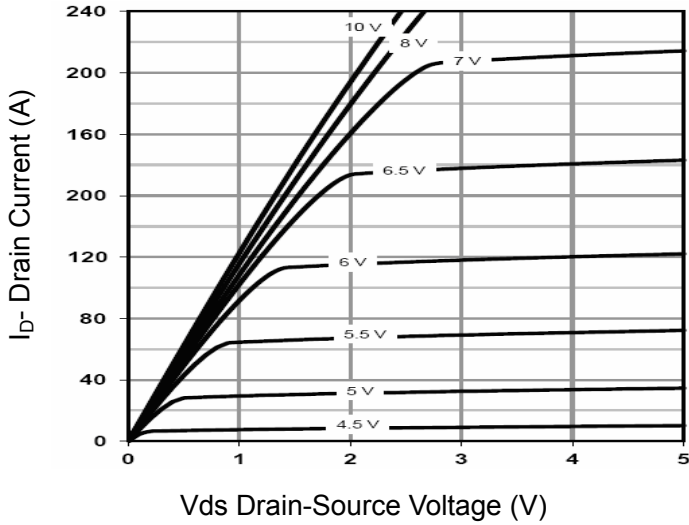


Figure 1 Output Characteristics

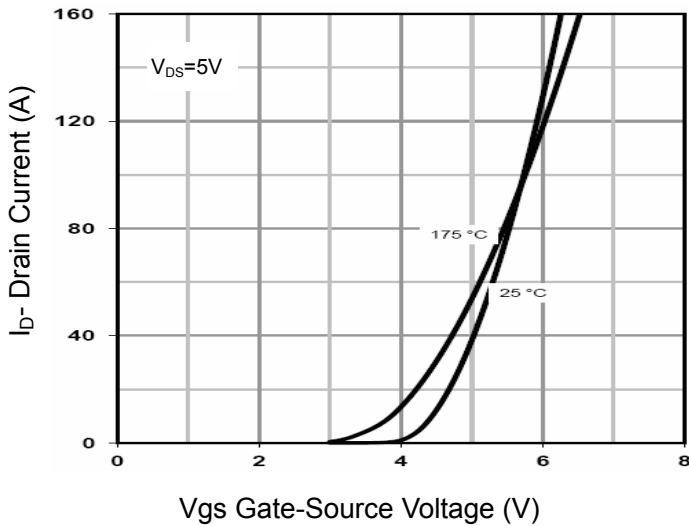


Figure 2 Transfer Characteristics

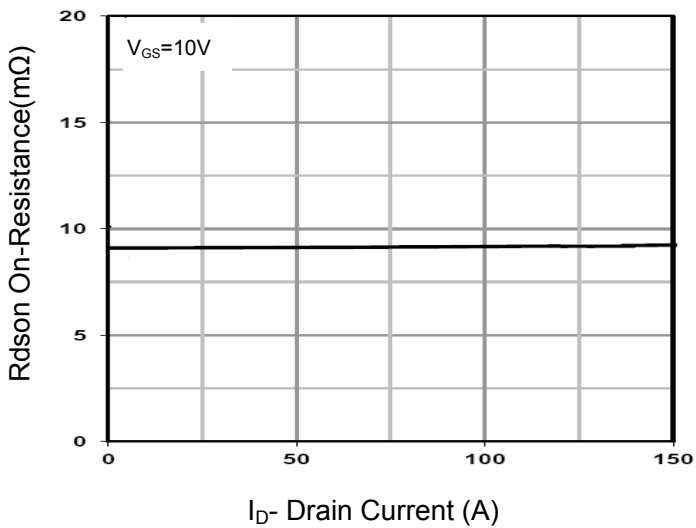


Figure 3 $R_{DS(on)}$ - Drain Current

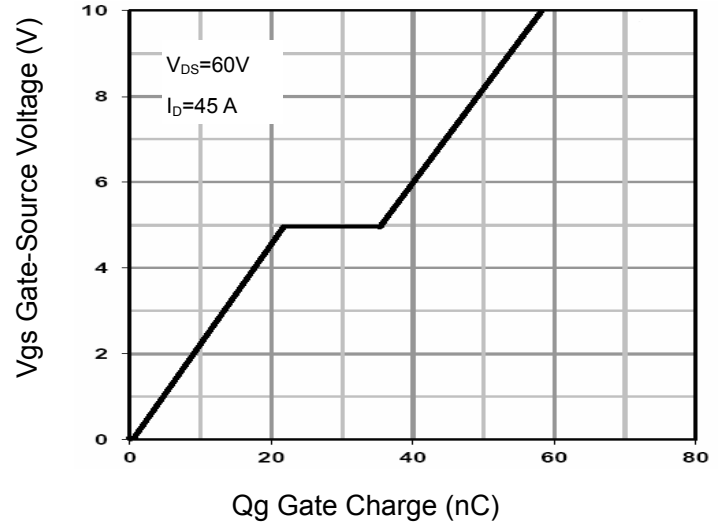


Figure 4 Gate Charge

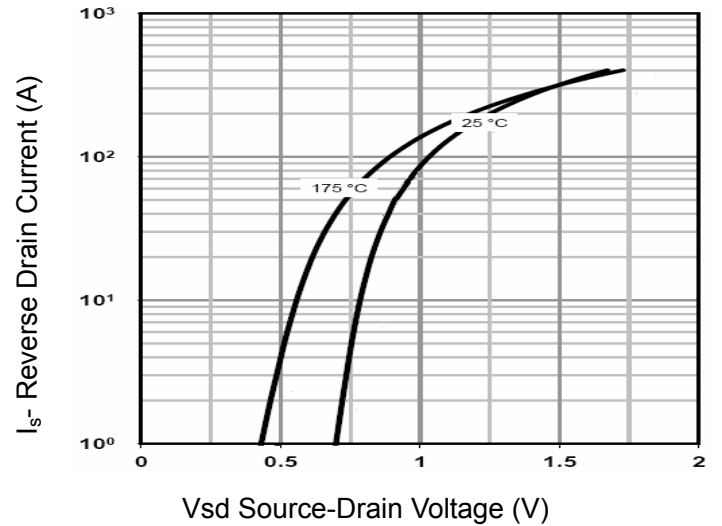


Figure 5 Source- Drain Diode Forward

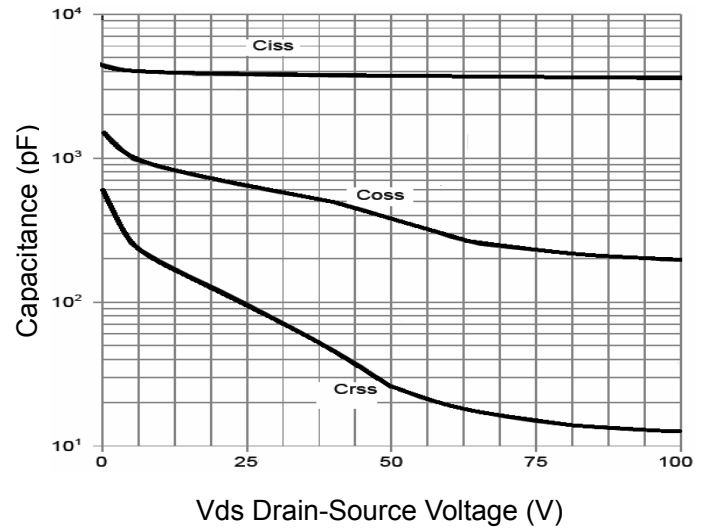
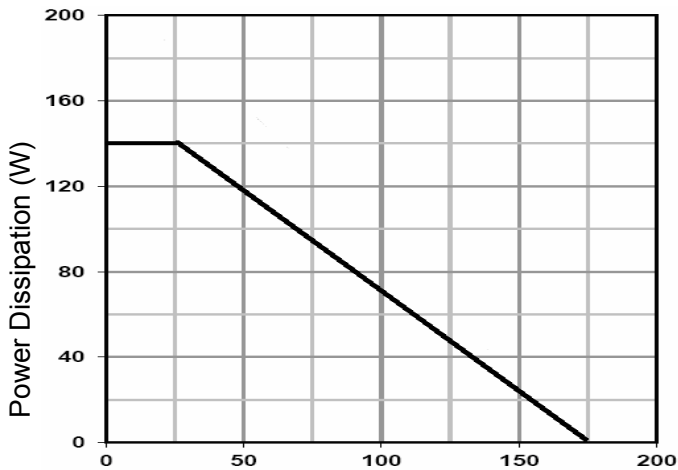
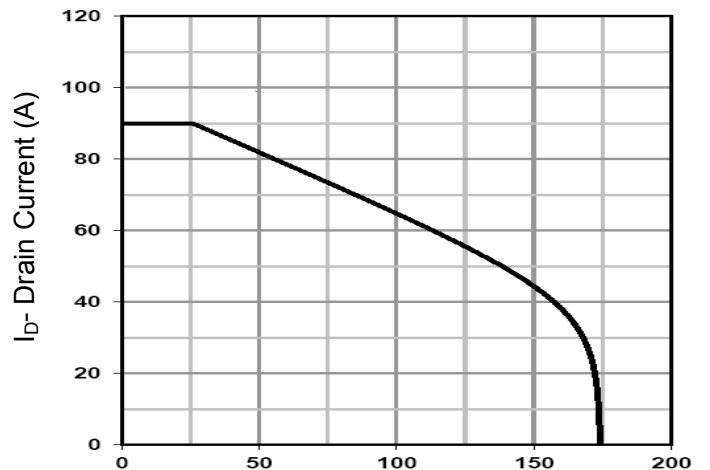


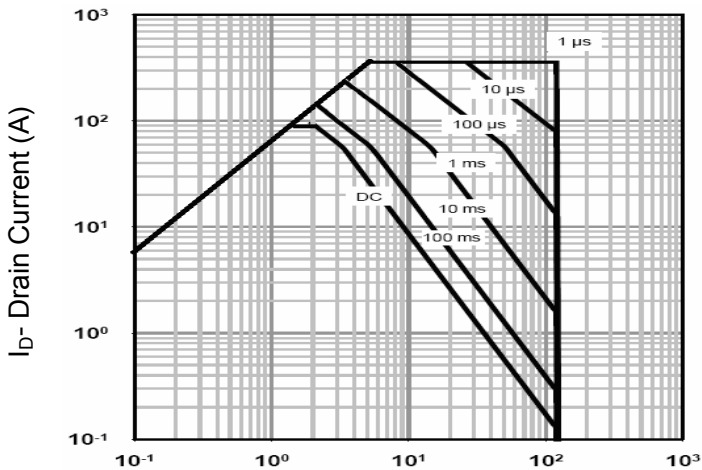
Figure 6 Capacitance vs V_{DS}



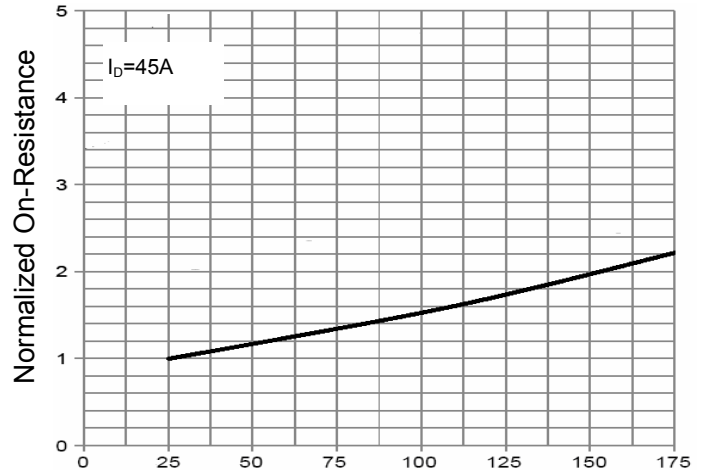
T_J-Junction Temperature(°C)
Figure 7 Power De-rating



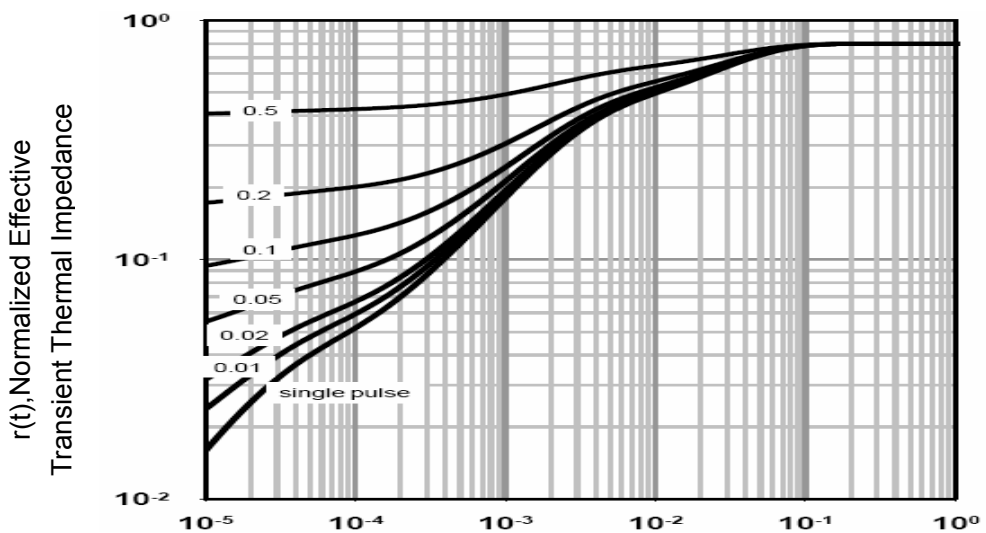
T_J-Junction Temperature (°C)
Figure 9 Current De-rating



V_{ds} Drain-Source Voltage (V)
Figure 8 Safe Operation Area

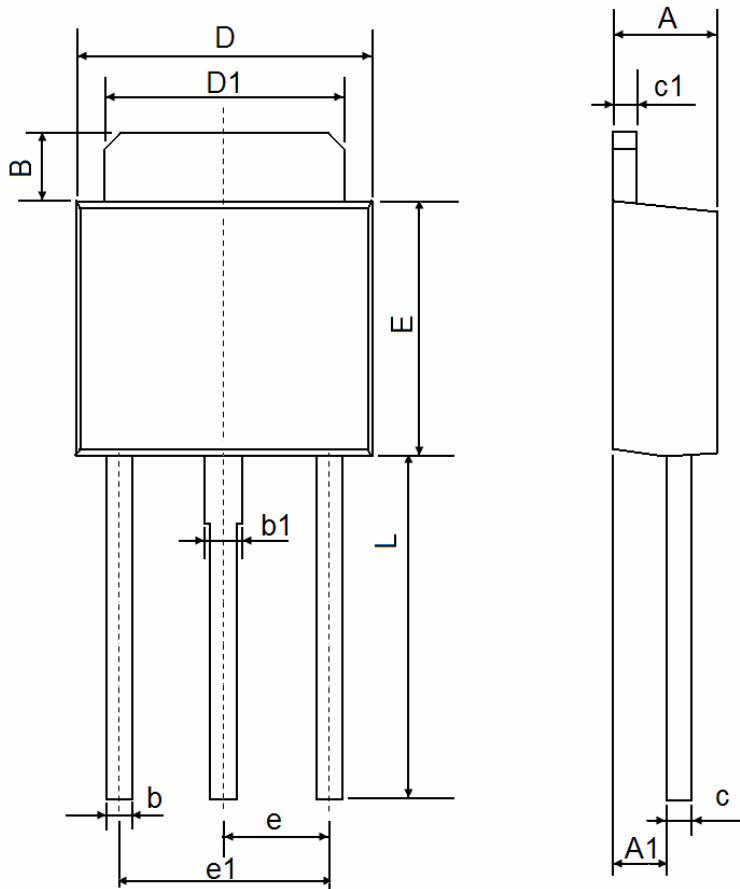


T_J-Junction Temperature(°C)
Figure 10 Rdson-Junction Temperature



Square Wave Pluse Duration(sec)
Figure 11 Normalized Maximum Transient Thermal Impedance

TO-251 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	1.050	1.350	0.042	0.054
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	7.500	7.900	0.295	0.311

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