

## NCE N-Channel Super Trench II Power MOSFET

<p><b>Description</b></p> <p>The series of devices uses <b>Super Trench II</b> 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 <math>R_{DS(ON)}</math> and <math>Q_g</math>. This device is ideal for high-frequency switching and synchronous rectification.</p> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● DC/DC Converter</li> <li>● Ideal for high-frequency switching and synchronous rectification</li> </ul>	<p><b>General Features</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS} = 85V, I_D = 260A</math>  <math>R_{DS(ON)} = 2.0m\Omega</math>, typical @ <math>V_{GS} = 10V</math></li> <li>● Excellent gate charge x <math>R_{DS(on)}</math> product(FOM)</li> <li>● Very low on-resistance <math>R_{DS(on)}</math></li> <li>● 175 °C operating temperature</li> <li>● Pb-free lead plating</li> </ul> <p style="text-align: center; color: red; font-weight: bold;">100% UIS TESTED! 100% ΔVds TESTED!</p>
	<p><b>Schematic Diagram</b></p>

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP025N85LL	NCEP025N85LL	TOLL	Ø330mm	24mm	2000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	85	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current-Continuous	$I_D$	260	A
Drain Current-Continuous( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	195	A
Pulsed Drain Current	$I_{DM}$	1040	A
Maximum Power Dissipation	$P_D$	340	W
Derating factor		2.27	W/°C
Single pulse avalanche energy <sup>(Note 1)</sup>	$E_{AS}$	1767	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	°C

### Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.44	°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	85		-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =85V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, 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	2.0	3.0	4.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =130A	-	2.0	2.5	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =130A		200	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, F=1.0MHz	-	9600	-	PF
Output Capacitance	C <sub>oss</sub>		-	1450	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	62	-	PF
<b>Switching Characteristics</b> (Note 2)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =40V, I <sub>D</sub> =130A V <sub>GS</sub> =10V, R <sub>G</sub> =1.6Ω	-	25	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	15	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	52	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	17	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =40V, I <sub>D</sub> =130A, V <sub>GS</sub> =10V	-	142	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	43.5		nC
Gate-Drain Charge	Q <sub>gd</sub>		-	35.5		nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =130A	-		1.2	V
Diode Forward Current	I <sub>S</sub>		-	-	260	A
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 130A di/dt = 100A/μs	-	98	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	280	-	nC

### Notes:

1. EAS condition : T<sub>j</sub>=25°C, V<sub>DD</sub>=40V, 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>=175°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

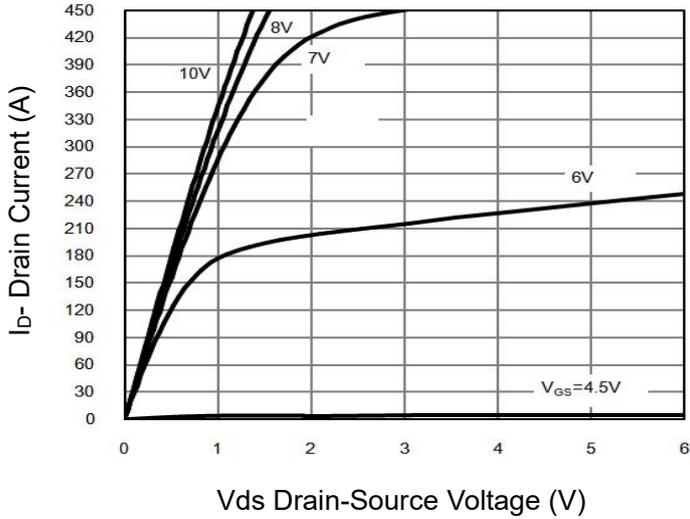


Figure 1 Output Characteristics

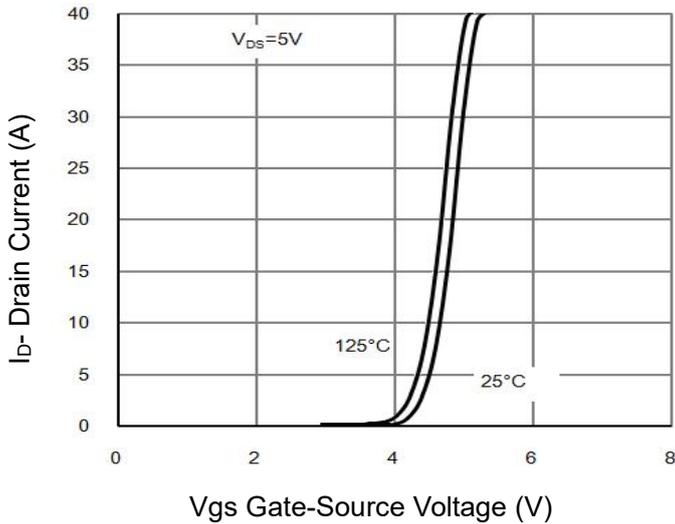


Figure 2 Transfer Characteristics

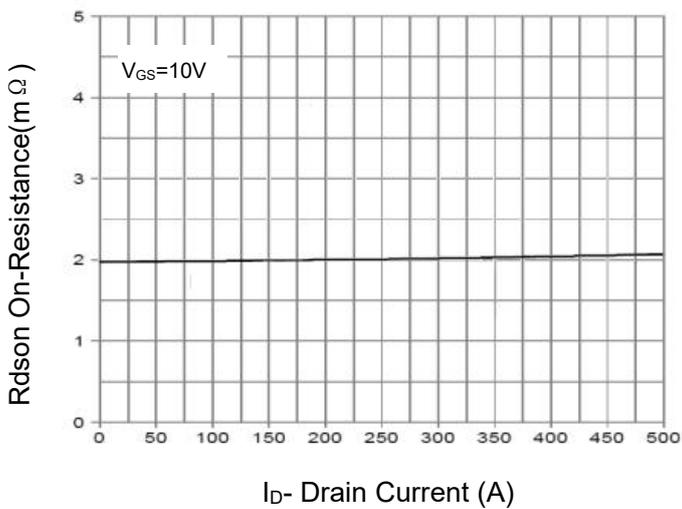


Figure 3  $R_{DS(on)}$ - Drain Current

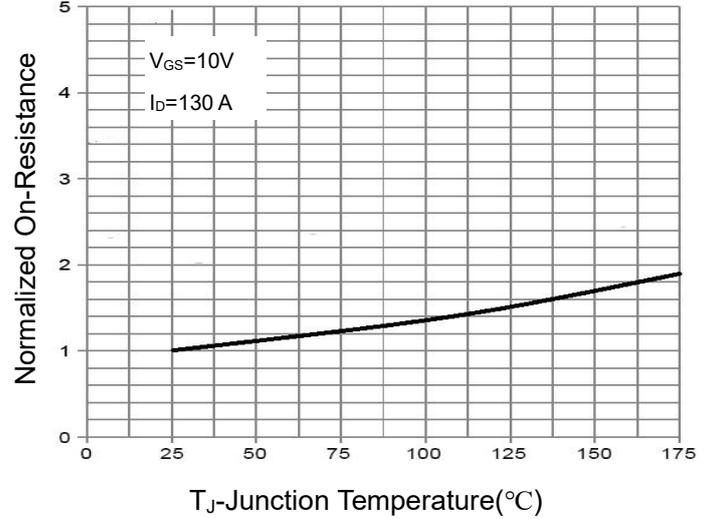


Figure 4  $R_{DS(on)}$ -Junction Temperature

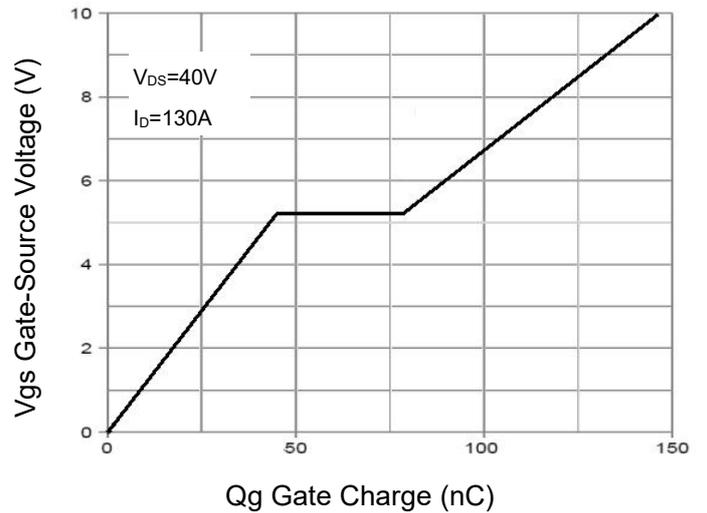


Figure 5 Gate Charge

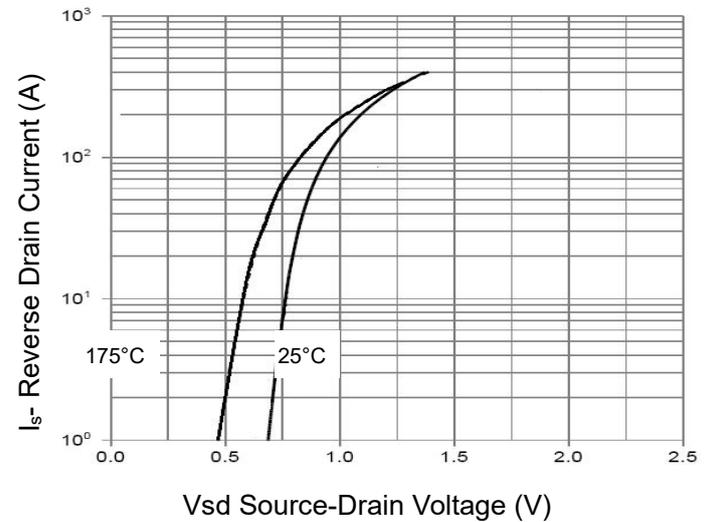
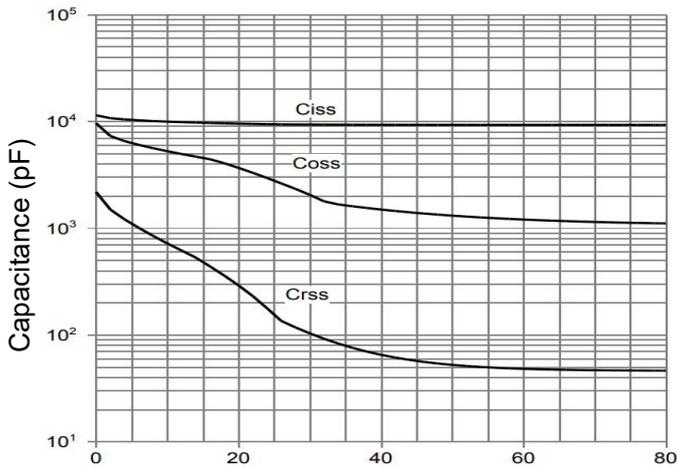
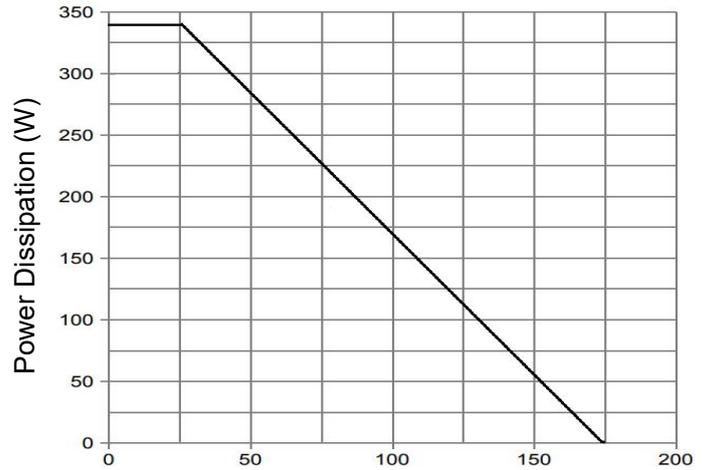


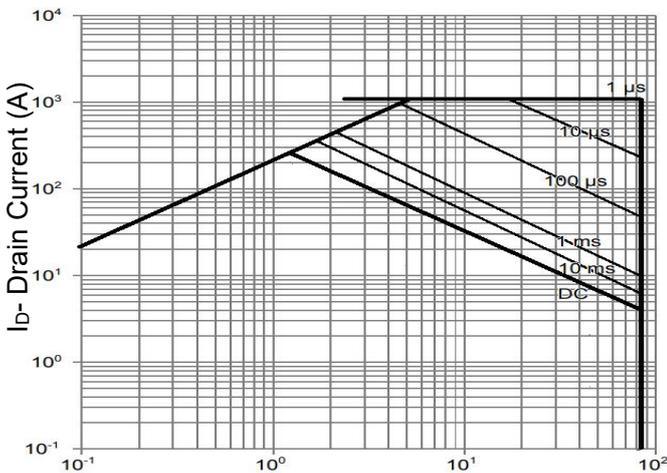
Figure 6 Source- Drain Diode Forward



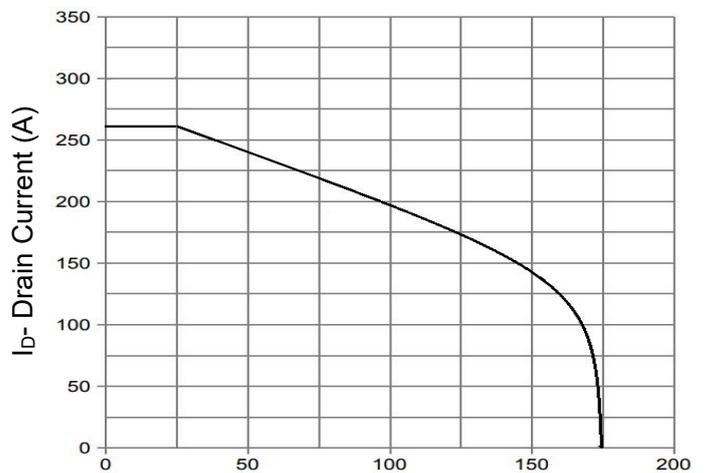
Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



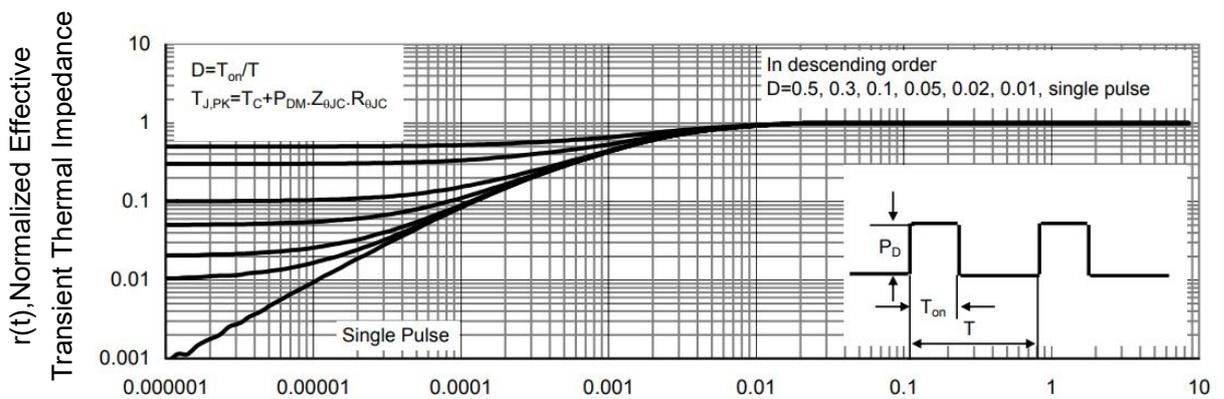
TA-Junction Temperature(°C)  
**Figure 9 Power De-rating**



Vds Drain-Source Voltage (V)  
**Figure 8 Safe Operation Area** (Note3)

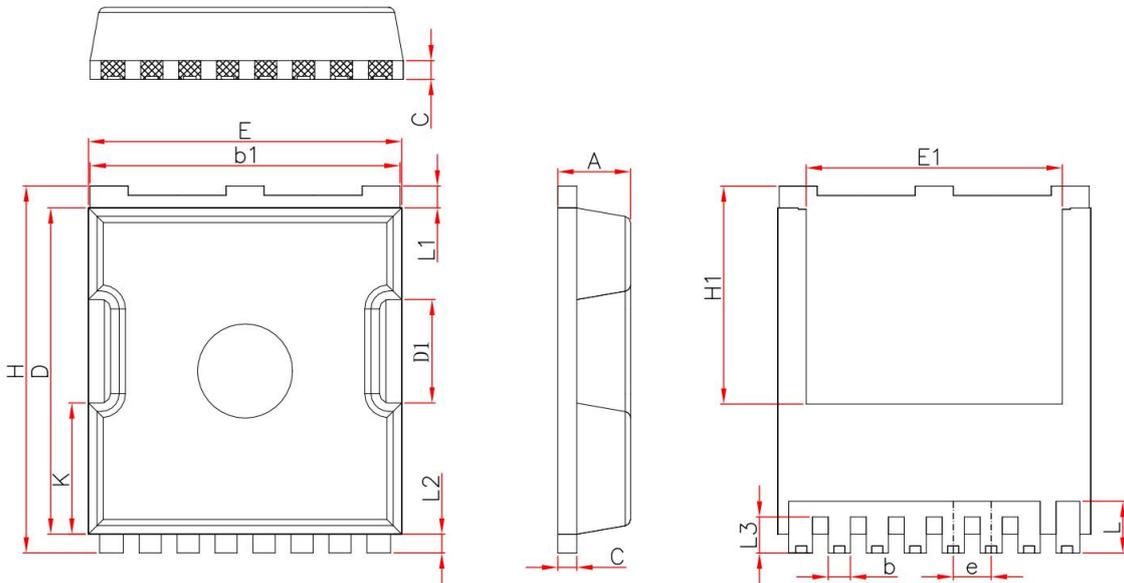


TA-Junction Temperature (°C)  
**Figure 10 Current De-rating**



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

## TOLL Package Information



Symbol	Millimeters		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
b	0.65	0.75	0.85
b1	9.70	9.80	9.90
C	0.50	0.60	0.70
D	10.30	10.40	10.50
D1	3.15	3.3	3.45
E	9.70	9.90	10.10
E1	8.00	8.10	8.20
e	1.10	1.20	1.30
H	11.6	11.7	11.8
H1	6.85	6.95	7.05
K	4.08	4.18	4.28
L	1.60	1.65	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	1.05	1.20	1.30

**NOTES:**

- 1.FOLLOW JEDEC STANDARD MO-299B.
- 2.ALL DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSION.
3.  Exposed Cu

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