NCE Automotive N-Channel Super Trench III Power MOSFET

Description

The series of devices uses **Super Trench III** 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.

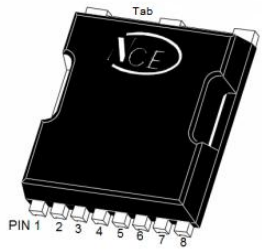
Application

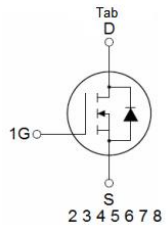
- Automotive application
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- V_{DS} =80V,I_D =384A
  $R_{DS(ON)}$=1.2mΩ , 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% ΔVds tested
- **AEC-Q101 qualified**

TOLL-8L





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AP015NH80LL	NCEAP015NH80LL	TOLL-8L	Ø330mm	24mm	2000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	80	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25℃)	I_D (T_C=25℃)	384	A
Drain Current-Continuous(T_C=100℃)	I_D (T_C=100℃)	271	A
Pulsed Drain Current	I_{DM}	1536	A
Maximum Power Dissipation (T_C=25℃)	P_D (T_C=25℃)	395	W
Derating factor		2.63	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	1936	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.38	℃/W
Thermal Resistance,Junction-to-Ambient (Note3)	$R_{\theta JA}$	40	℃/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	80	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=80V,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	2.5	3.3	4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A	-	1.2	1.45	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=40A	-	110	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=40V,V_{GS}=0V, F=1.0MHz	-	9256	-	pF
Output Capacitance	C_{oss}		-	4424	-	pF
Reverse Transfer Capacitance	C_{rss}		-	128	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=40V,I_D=40A V_{GS}=10V,R_G=3Ω	-	27.2	-	nS
Turn-on Rise Time	t_r		-	21.3	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	56.6	-	nS
Turn-Off Fall Time	t_f		-	25	-	nS
Total Gate Charge	Q_g	V_{DS}=40V,I_D=20A, V_{GS}=10V	-	136	-	nC
Gate-Source Charge	Q_{gs}		-	37	-	nC
Gate-Drain Charge	Q_{gd}		-	30	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=40A	-	-	1.2	V
Diode Forward Current	I_S		-	-	384	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 40A di/dt = 100A/μs	-	115.2	-	nS
Reverse Recovery Charge	Qrr		-	333	-	nC

1. EAS condition : Tj=25℃,V_{DD}=40V,V_G=10V,L=0.5mH,Rg=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 $T_{J(MAX)}$=175°C. The SOA curve provides a single pulse rating
4. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 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, and the maximum temperature of 175° C may be used if the PCB allows it.

Typical Electrical and Thermal Characteristics

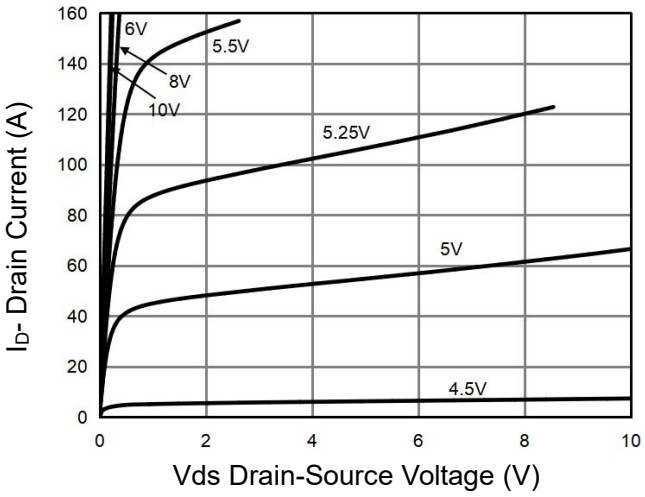


Figure 1 Output Characteristics

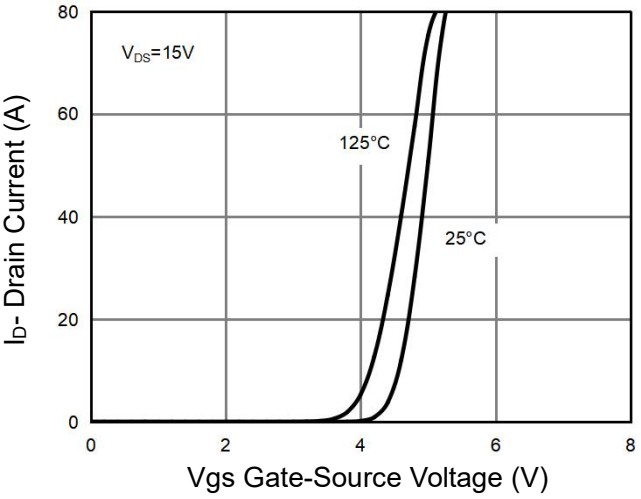


Figure 2 Transfer Characteristics

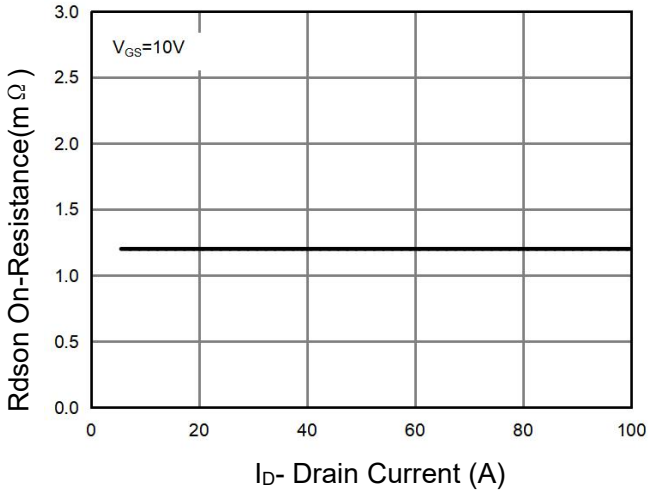


Figure 3 Rdson- Drain Current

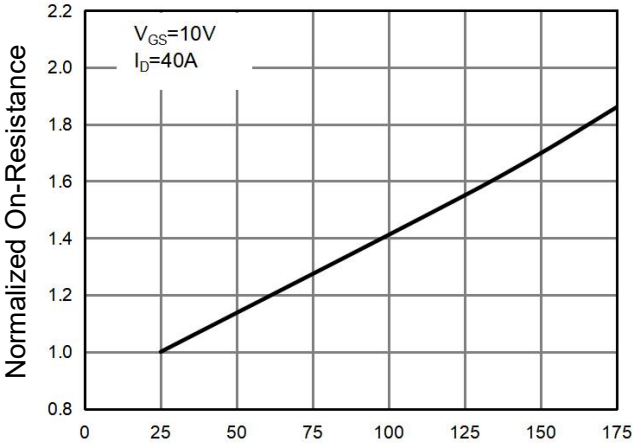


Figure 4 Rdson-Junction Temperature

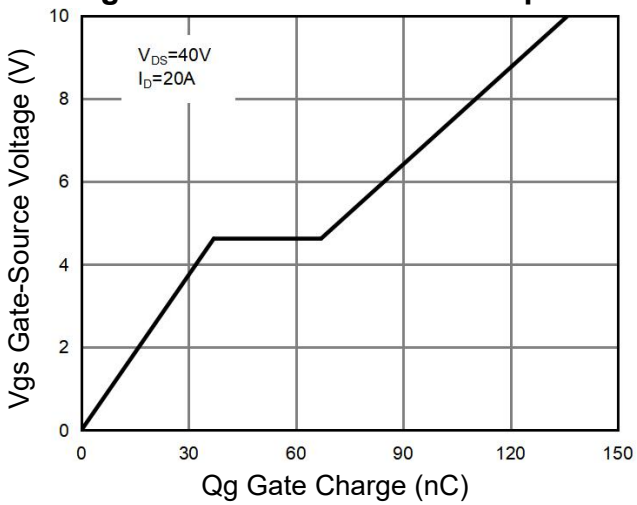


Figure 5 Gate Charge

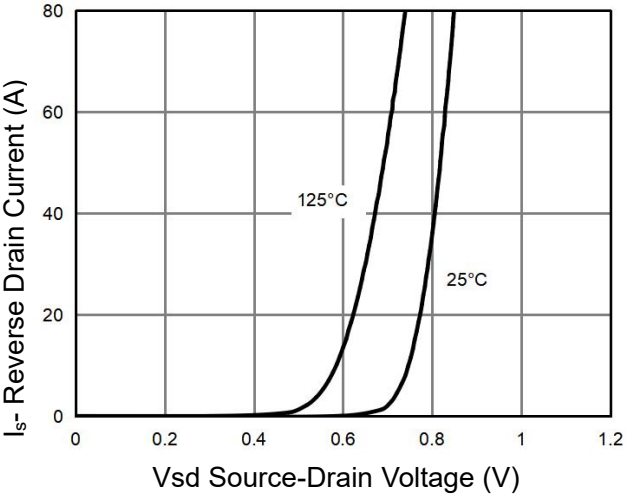


Figure 6 Source- Drain Diode Forward

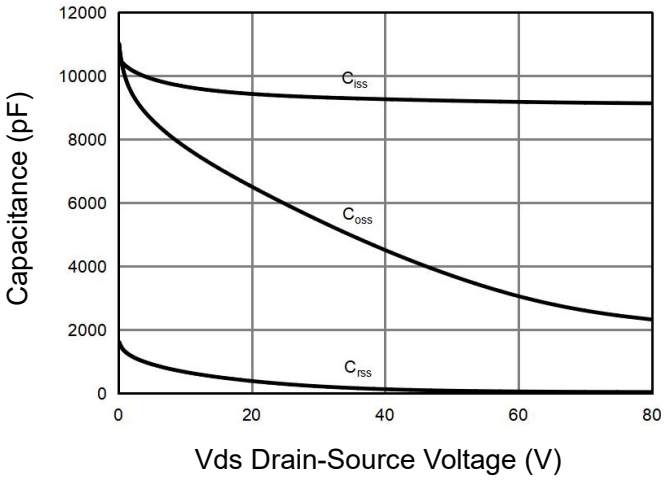


Figure 7 Capacitance vs Vds

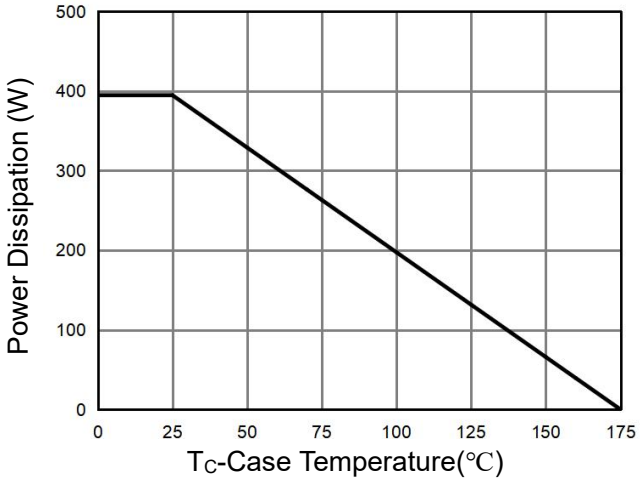


Figure 9 Power De-rating

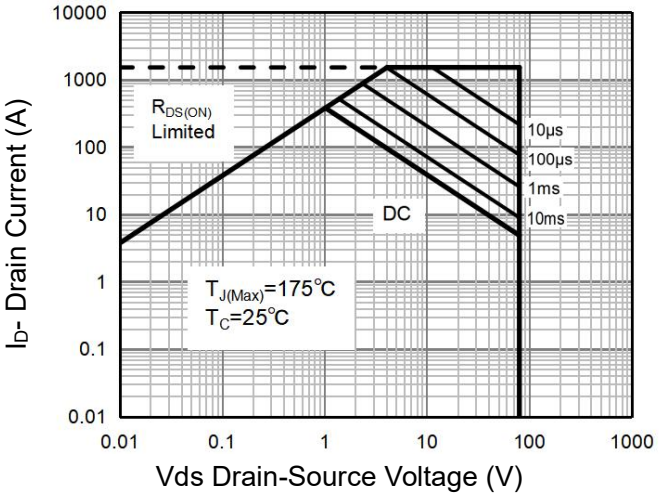


Figure 8 Safe Operation Area(Note3)

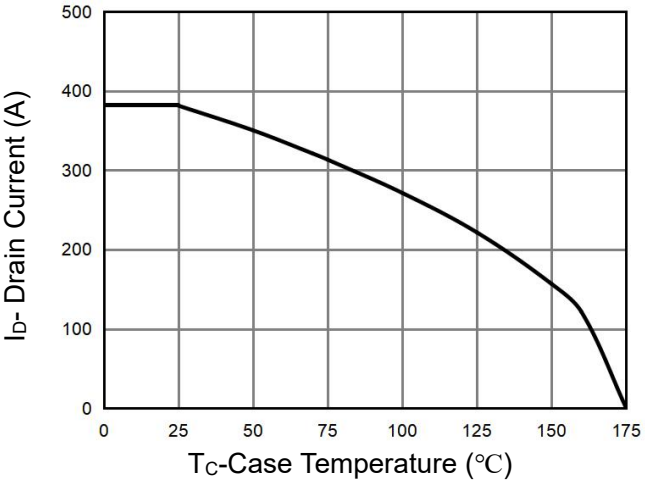


Figure 10 Current De-rat

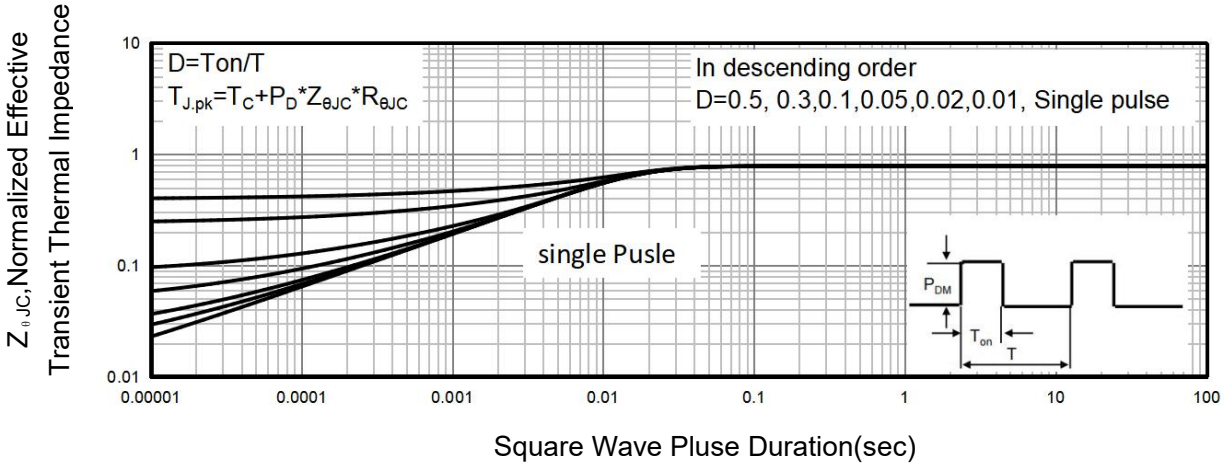
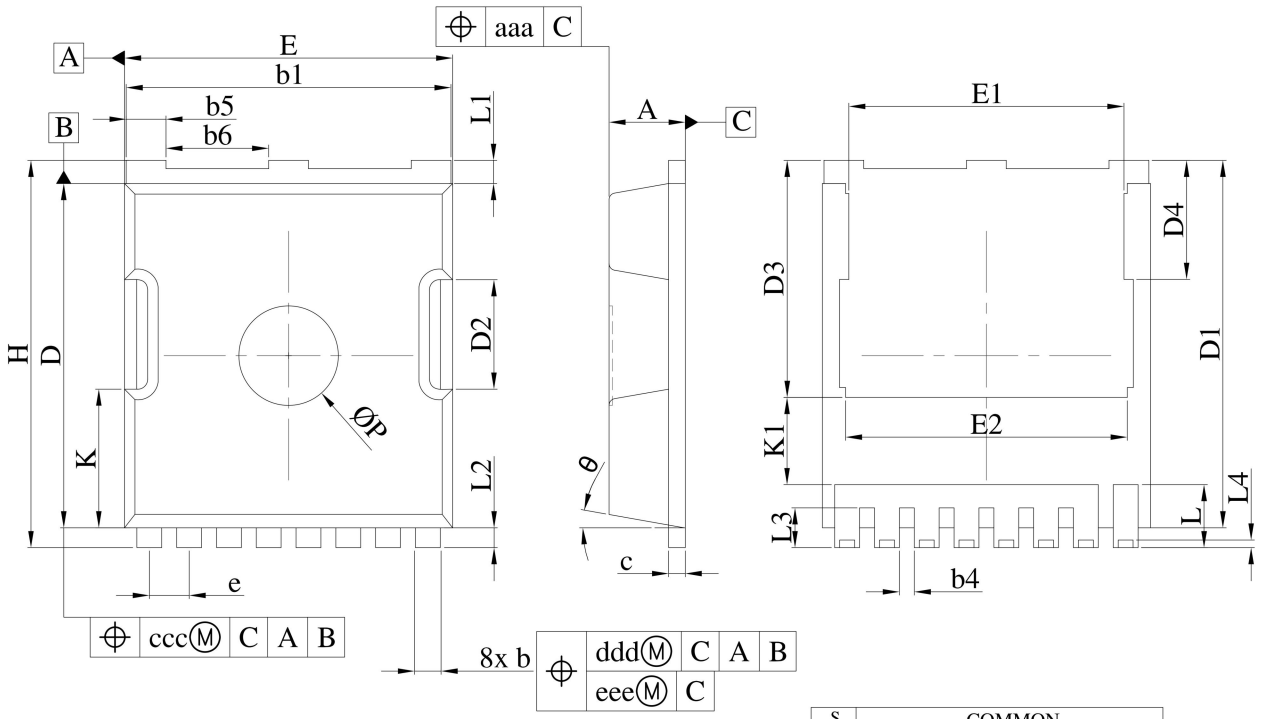
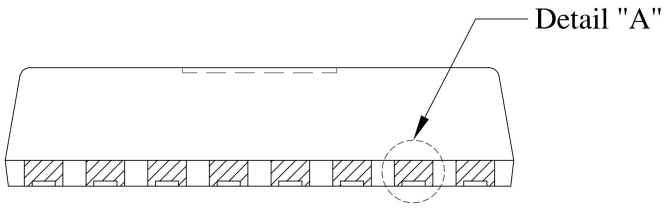
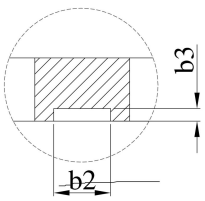


Figure 11 Normalized Maximum Transient Thermal Impedance

TOLL Package Information







SYMBOL	COMMON MILLIMETER		
	MIN.	NOMINAL	MAX.
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.36	0.45	0.55
b3	0.05	0.100	0.35
b4	0.30	0.40	0.50
b5	1.10	1.20	1.30
b6	3.00	3.10	3.20
c	0.40	0.50	0.60
D	10.28	10.38	10.55
D1	10.98	11.08	11.18
D2	3.20	3.30	3.40
D3	7.00	7.15	7.30
D4	3.44	3.59	3.74
e	1.10	1.20	1.30
E	9.80	9.90	10.00
E1	8.20	8.30	8.40
E2	8.35	8.50	8.65
H	11.50	11.68	11.85
K	4.08	4.18	4.28
K1	2.45	---	---
L	1.60	1.90	2.10
L1	0.50	0.70	0.90
L2	0.50	0.60	0.70
L3	1.00	1.20	1.30
L4	0.13	0.23	0.33
P	2.85	3.00	3.15
θ	10° REF		
aaa	0.20		
ccc	0.20		
ddd	0.25		
eee	0.20		

Revision History

Revision	Date	Subjects
V1.0	2025.11.06	Product data sheet

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