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.

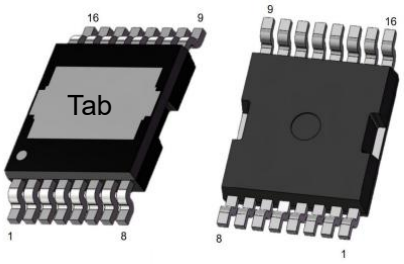
Application

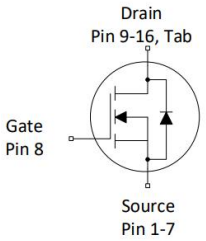
- Automotive application
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- V_{DS} =100V,I_D =354A
  $R_{DS(ON)}$=1.3mΩ , 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**

TOLT-16L





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AP018NH100LT	NCEAP018NH100LT	TOLT-16L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25℃)	I_D (T_C=25℃)	354	A
Drain Current-Continuous(T_C=100℃)	I_D (T_C=100℃)	250	A
Pulsed Drain Current	I_{DM}	1416	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}	2381	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 (Note4)	$R_{\theta JA}$	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	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,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	3.5	4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A	-	1.3	1.65	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=40A	-	75	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=50V,V_{GS}=0V, F=1.0MHz	-	8900	-	pF
Output Capacitance	C_{oss}		-	4040	-	pF
Reverse Transfer Capacitance	C_{rss}		-	99	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V,I_D=40A V_{GS}=10V,R_G=1.6Ω	-	17.7	-	nS
Turn-on Rise Time	t_r		-	15.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	46	-	nS
Turn-Off Fall Time	t_f		-	13.5	-	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=20A, V_{GS}=10V	-	148	-	nC
Gate-Source Charge	Q_{gs}		-	40	-	nC
Gate-Drain Charge	Q_{gd}		-	43	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=40A	-	-	1.2	V
Diode Forward Current	I_S		-	-	354	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 40A di/dt = 100A/μs	-	90	-	nS
Reverse Recovery Charge	Qrr		-	189	-	nC

1. EAS condition : Tj=25℃,V_{DD}=50V,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

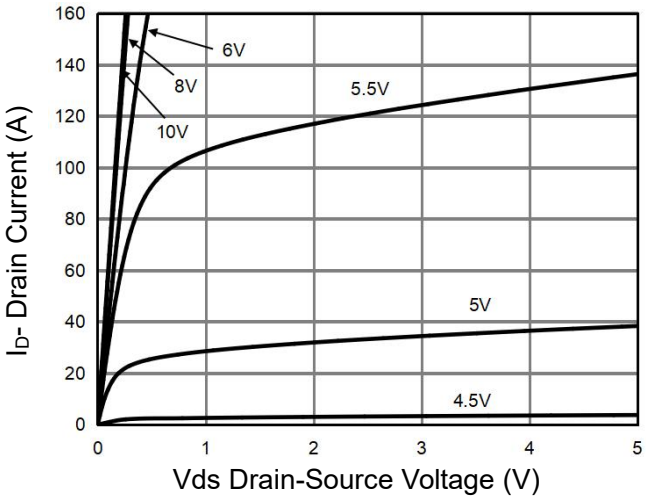


Figure 1 Output Characteristics

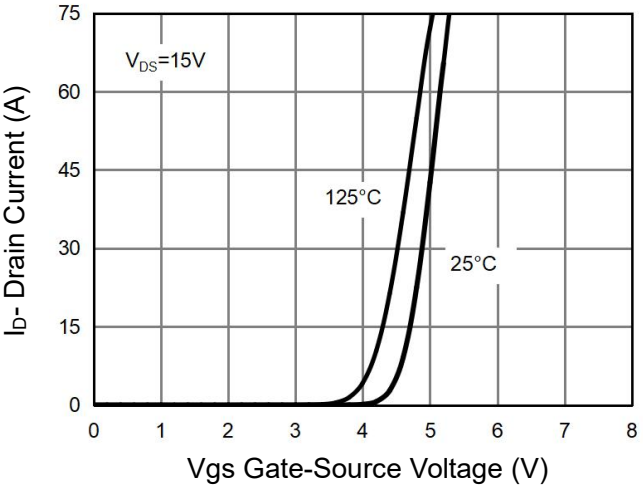


Figure 2 Transfer Characteristics

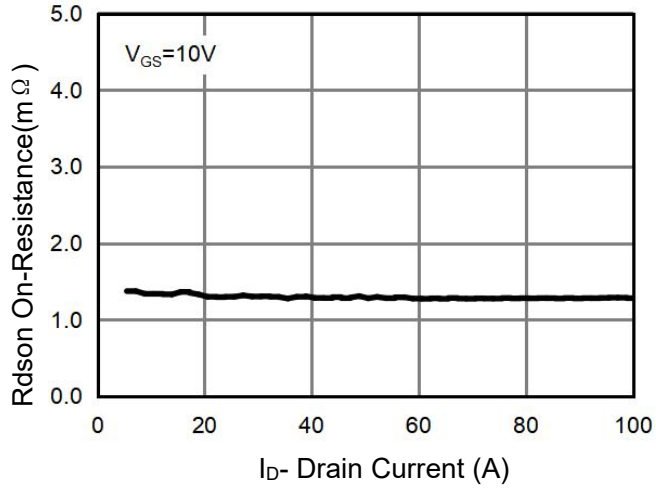


Figure 3 Rdson- Drain Current

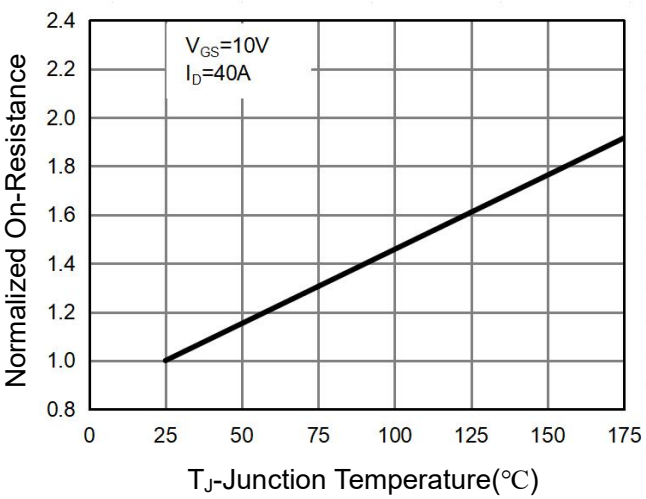


Figure 4 Rdson-Junction Temperature

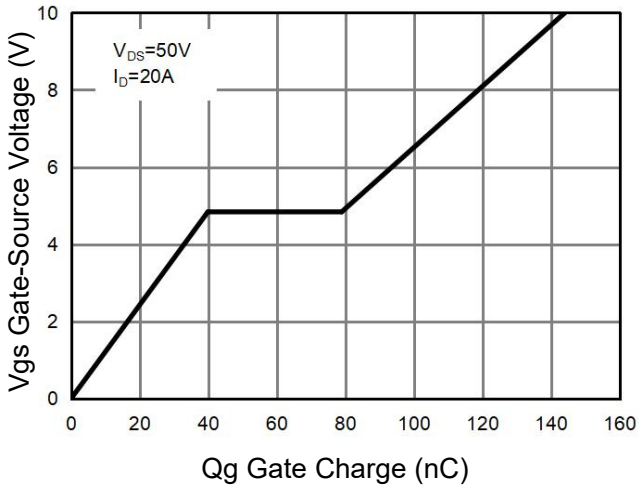


Figure 5 Gate Charge

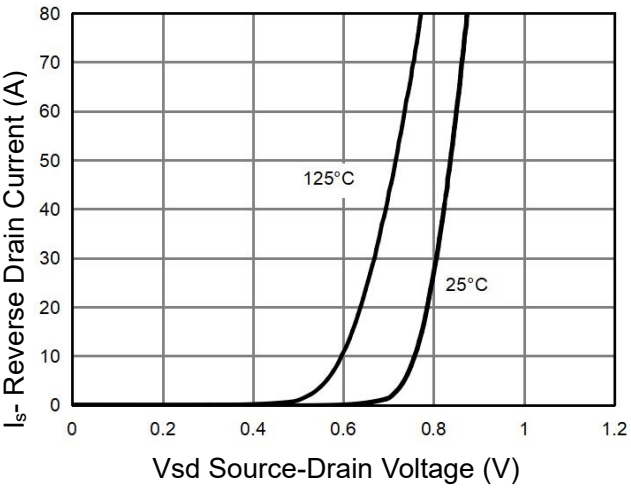


Figure 6 Source- Drain Diode Forward

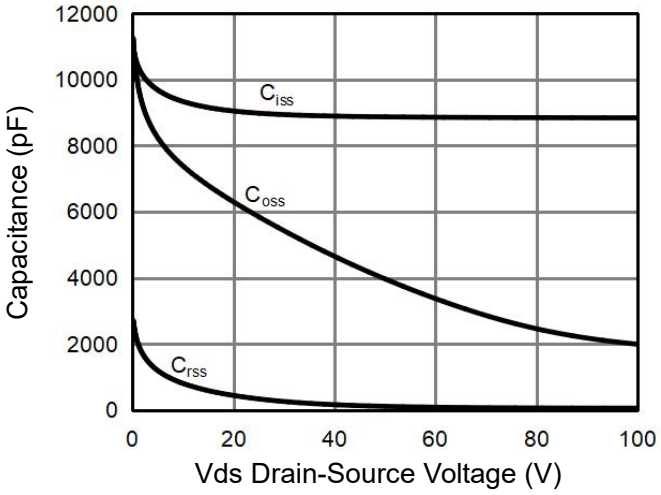


Figure 7 Capacitance vs Vds

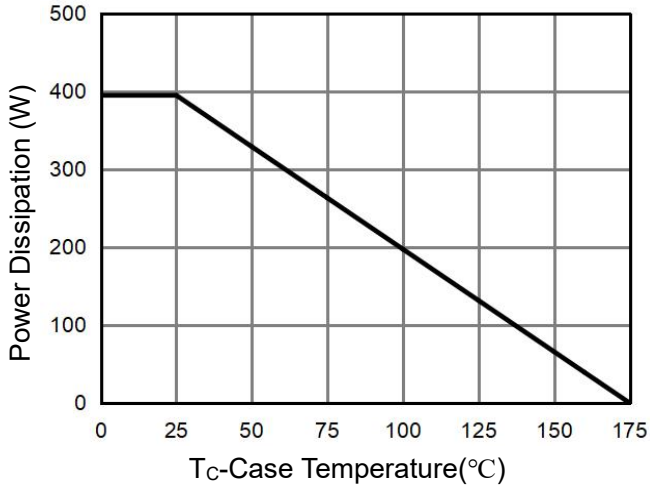


Figure 9 Power De-rating

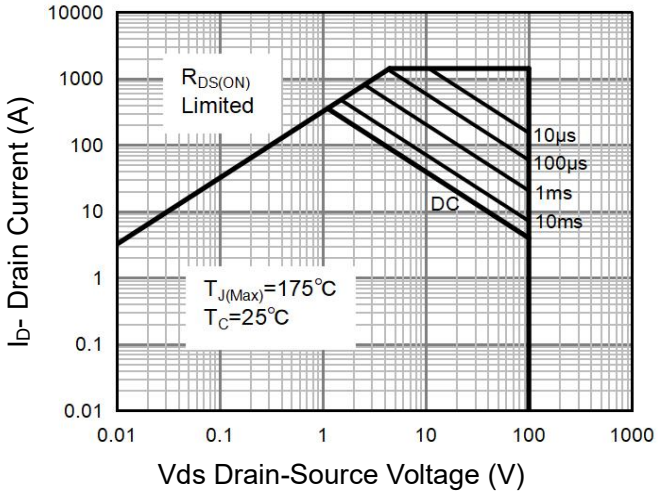


Figure 8 Safe Operation Area(Note3)

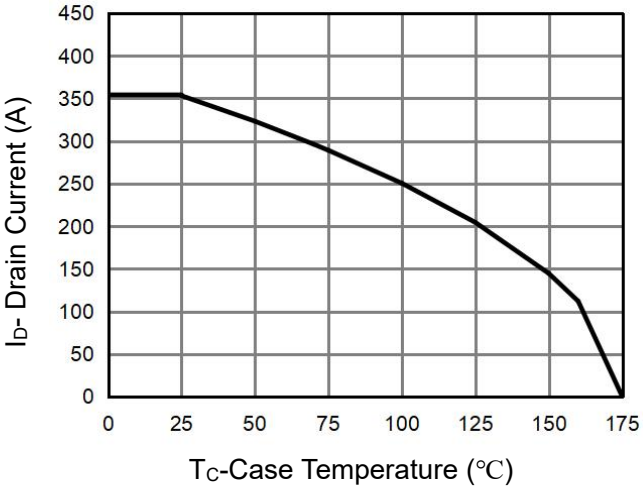


Figure 10 Current De-rat

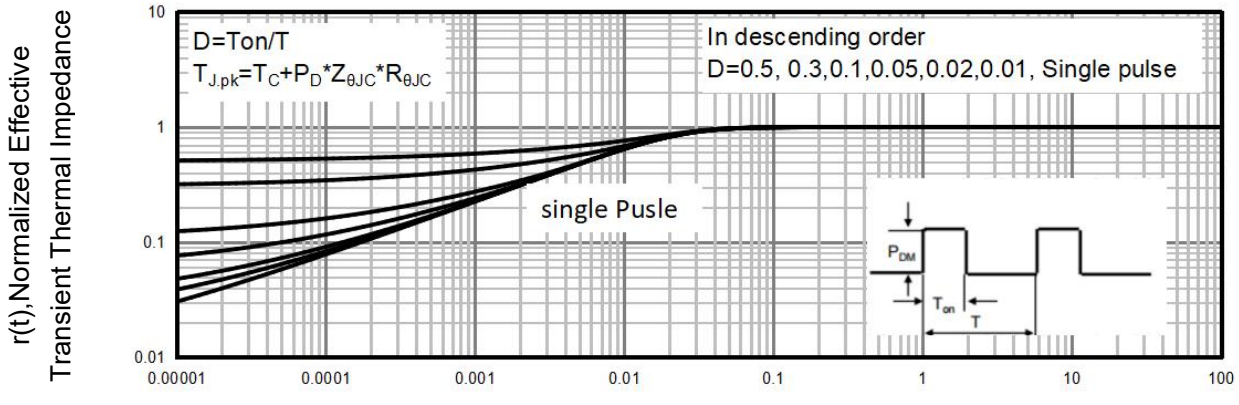
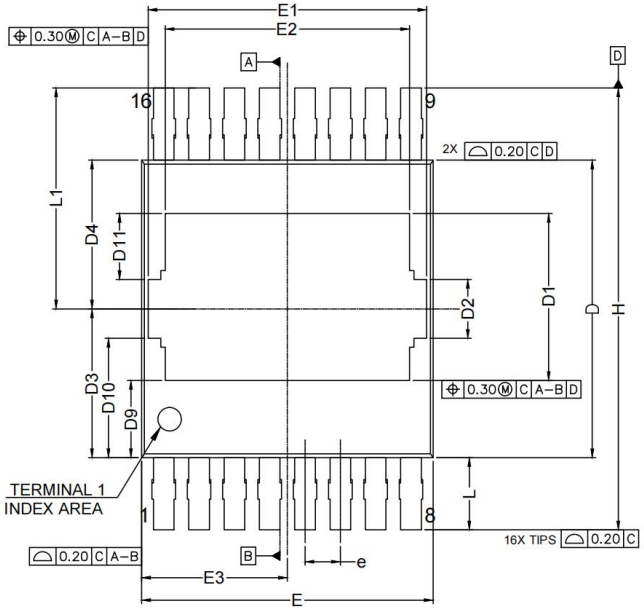
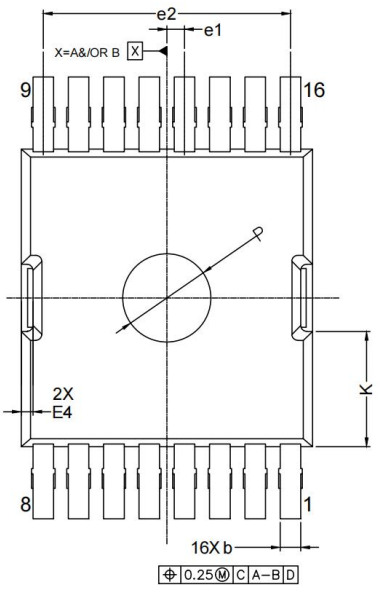


Figure 11 Normalized Maximum Transient Thermal Impedance

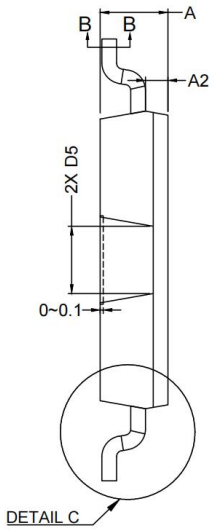
TOLT-16L Package Information

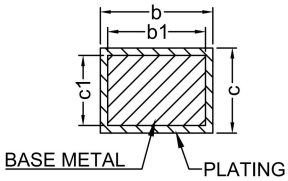


TOP VIEW

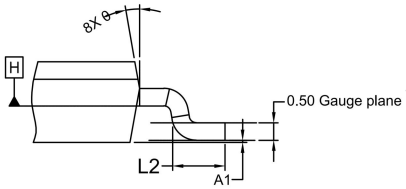


BOTTOM VIEW

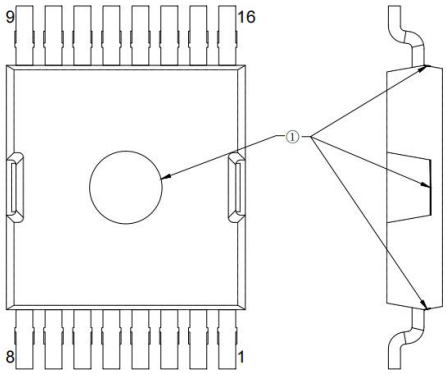




SECTION B-B



DETAIL C



SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A	2.20	2.35	E	9.70	10.10
A1	0.01	0.11	E1	9.26	9.66
A2	0.56	0.96	E2	8.10	8.50
b	0.60	0.85	E3	4.75	5.15
b1	0.60	0.80	E4	0.20	0.60
c	0.45	0.65	e	1.20 BSC.	
c1	0.45	0.60	e1	0.60 BSC.	
D	10.00	10.30	e2	8.40 BSC.	
D1	5.47	5.87	H	14.80	15.20
D2	1.80	2.20	K	3.71	4.11
D3	4.85	5.25	L	2.25	2.65
D4	5.00	5.13	L1	7.30	7.70
D5	2.08	2.48	L2	1.30	1.70
D9	2.42	2.82	R	0.07	-
D10	3.85	4.25	P	2.90	3.10
D11	2.04	2.44	θ	4°	10°

Revision History

Revision	Date	Subjects
V1.0	2025.09.29	Product data sheet

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