NCE Automotive N-Channel Super Trench Power MOSFET

Description

The series of devices 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.

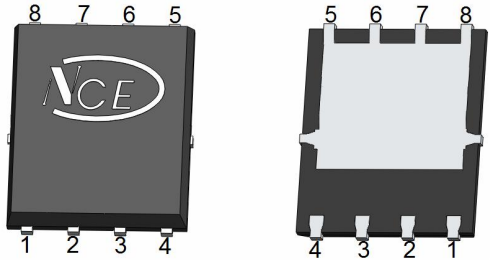
Application

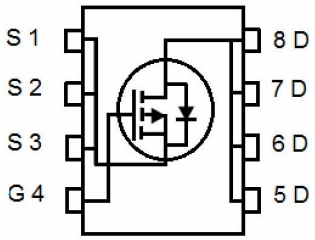
- Automotive application
- High-frequency Switching and Synchronous Rectification
- DC/DC and AC/DC Converter
- Motor Driver
- Battery Management System (BMS)

General Features

- V_{DS} =60V,I_D =190A
  $R_{DS(ON)}$=2.7mΩ , 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**

PDFN 5X6-8L





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AP60T15G	NCEAP60T15G	PDFN 5X6-8L	Ø330mm	12mm	5000units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25℃)	I_D (T_C=25℃)	190	A
Drain Current-Continuous(T_C=100℃)	I_D (T_C=100℃)	133	A
Pulsed Drain Current	I_{DM}	760	A
Maximum Power Dissipation (T_C=25℃)	P_D (T_C=25℃)	240	W
Derating factor		1.6	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	1070	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.625	℃/W
Thermal Resistance,Junction-to-Ambient (Note 4)	$R_{\theta JA}$	50	℃/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	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,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	2.0	3.0	4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A	-	2.7	3.3	mΩ
Gate resistance	R_G	V_{GS}=0V,V_{DS}=0V, F=1.0MHz	-	2.7	-	Ω
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=20A	-	75	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz	-	4500	-	pF
Output Capacitance	C_{oss}		-	965	-	pF
Reverse Transfer Capacitance	C_{rss}		-	24	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,I_D=20A V_{GS}=10V,R_G=4.7Ω	-	10	-	nS
Turn-on Rise Time	t_r		-	22	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	35	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=20A, V_{GS}=10V	-	70.0	-	nC
Gate-Source Charge	Q_{gs}		-	19.0	-	nC
Gate-Drain Charge	Q_{gd}		-	15.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=40A	-	-	1.2	V
Diode Forward Current	I_S		-	-	190	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =100A di/dt = 100A/μs	-	56	-	nS
Reverse Recovery Charge	Qrr		-	80	-	nC

1. EAS condition : Tj=25℃,V_{DD}=30V,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

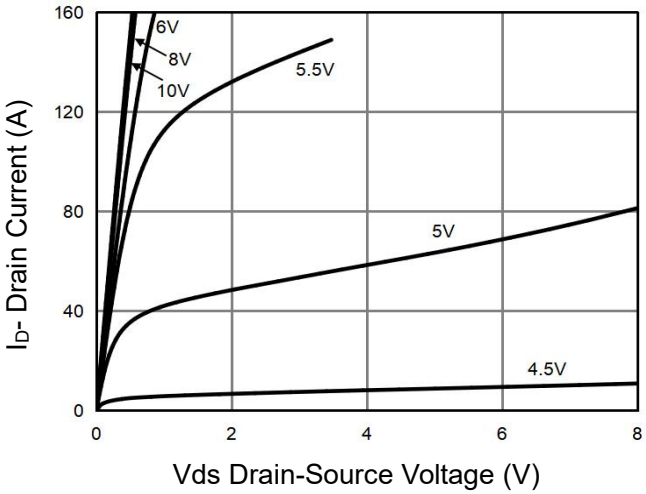


Figure 1 Output Characteristics

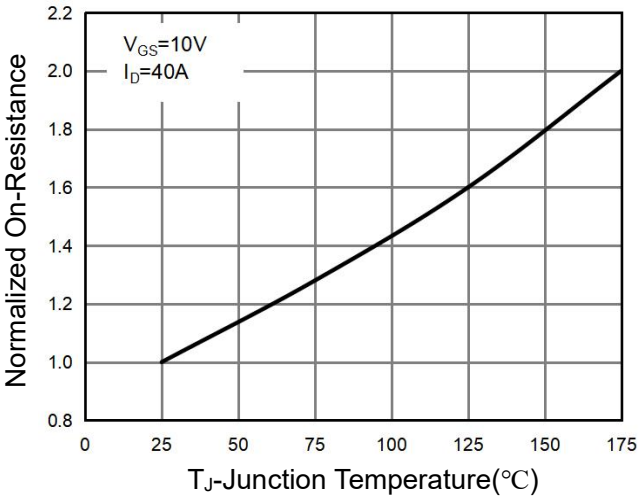


Figure 4 Rdson-Junction Temperature

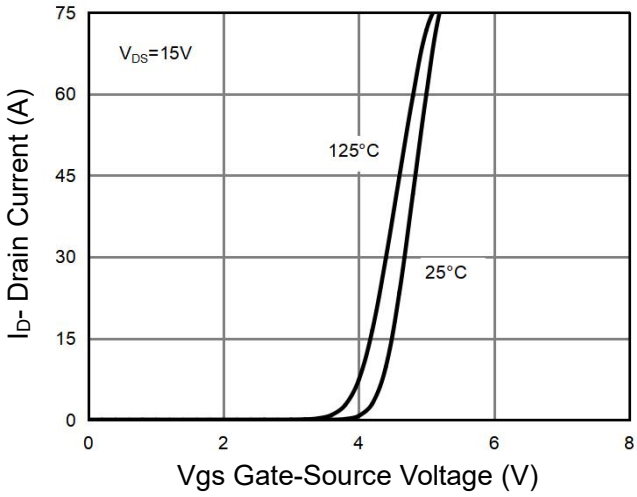


Figure 2 Transfer Characteristics

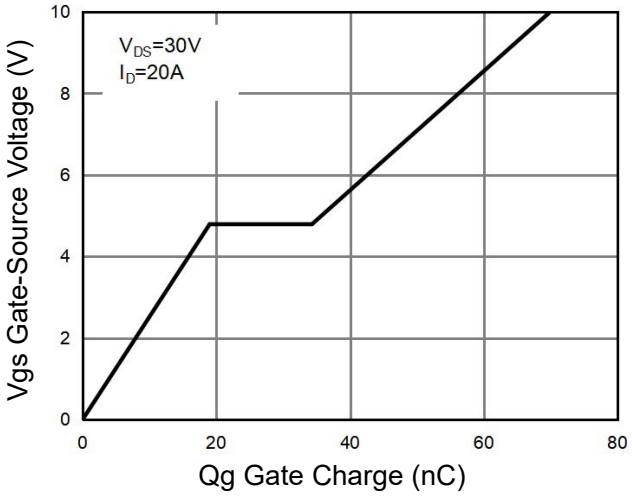


Figure 5 Gate Charge

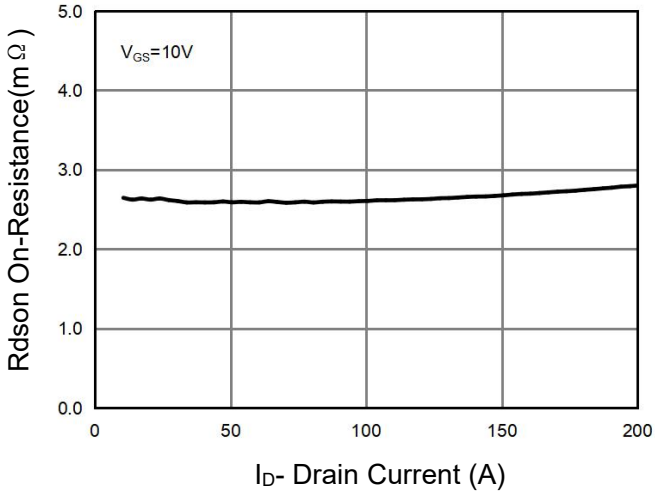


Figure 3 Rdson- Drain Current

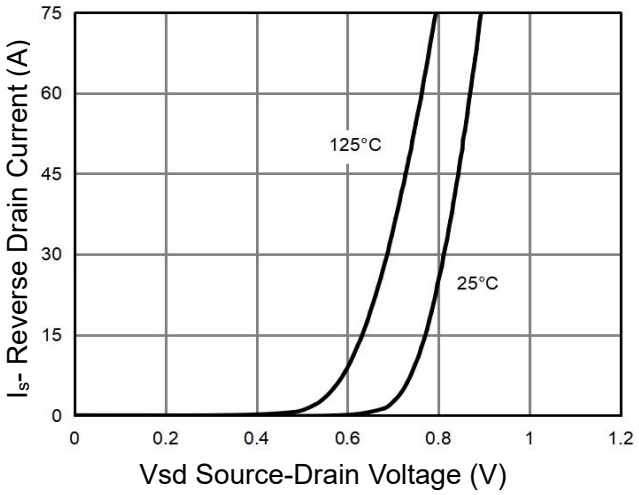


Figure 6 Source- Drain Diode Forward

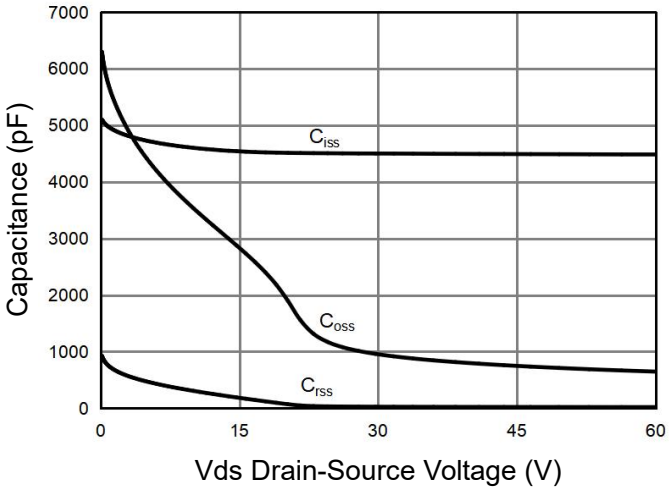


Figure 7 Capacitance vs Vds

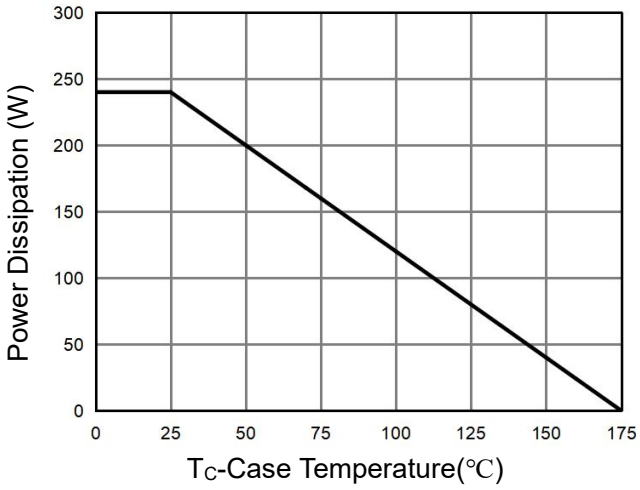


Figure 9 Power De-rating

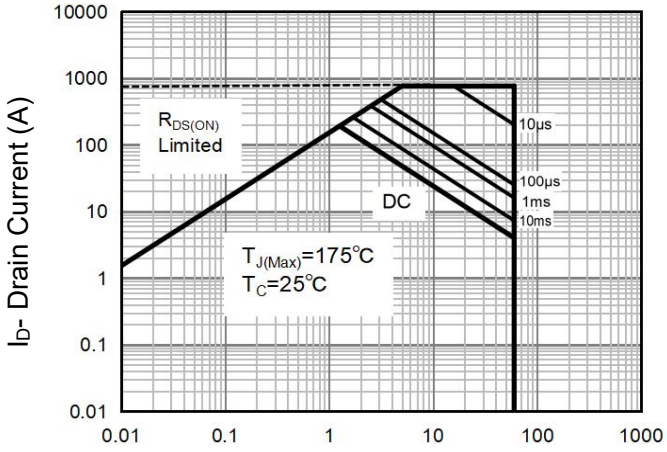


Figure 8 Safe Operation Area(Note3)

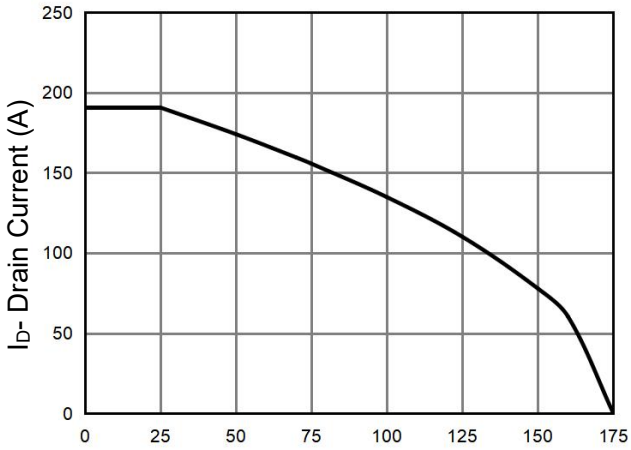


Figure 10 Current De-rat

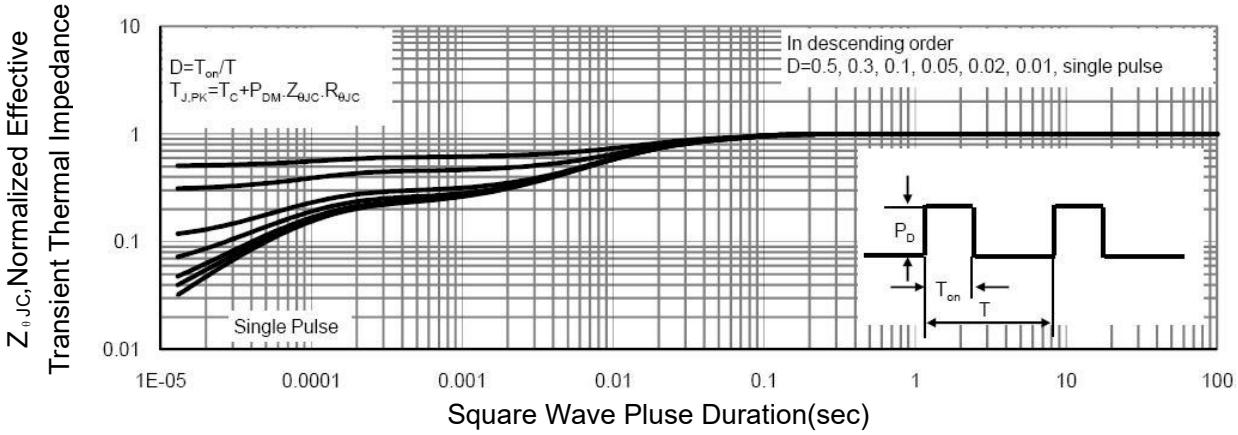
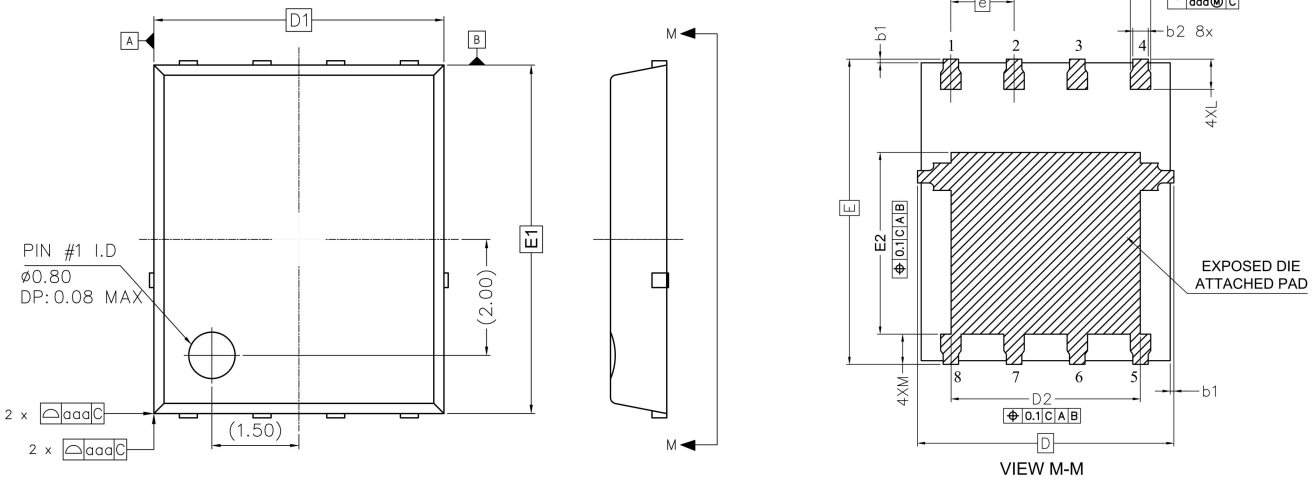
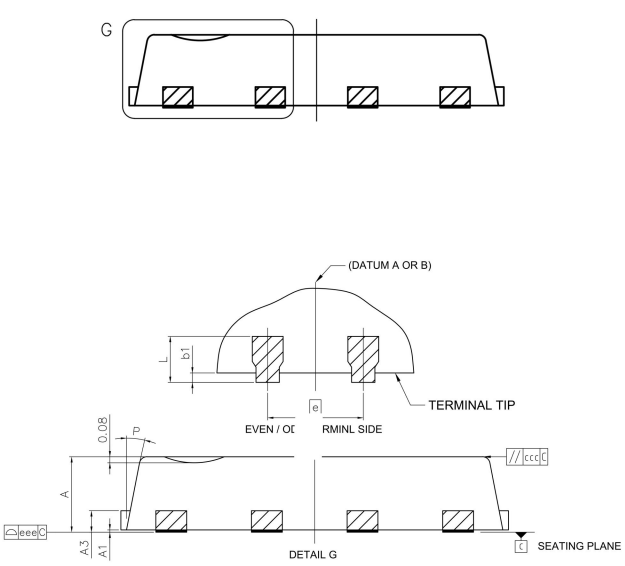


Figure 11 Normalized Maximum Transient Thermal Impedance

PDFN 5X6-8L Package Information





SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A	0.95	1.05	aaa	0.10	
A1	0.00	0.05	bbb	0.10	
A3	0.25 REF		ccc	0.10	
b	0.31	0.51	ddd	0.05	
b1	0.03	0.13	eee	0.08	
b2	0.21	0.41			
D	5.15 BSC				
D1	5.00 BSC				
D2	3.70	3.90			
E	6.15 BSC				
E1	6.00 BSC				
E2	3.56	3.76			
e	1.27 BSC				
L	0.51	0.71			
M	0.51	0.71			
P	10°	12°			

Revision History

Revision	Date	Subjects
V1.0	2026.01.07	Product data sheet

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