NCE Automotive 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.

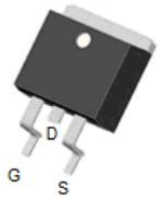
Application

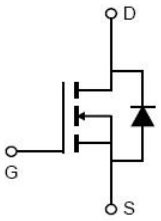
- Automotive application
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- V_{DS} =120V,I_D =128A
  $R_{DS(ON)}$=5.0mΩ , 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**

TO-263-2L





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AP055N12D	NCEAP055N12D	TO-263-2L	-	-	-

Absolute Maximum Ratings (T_C=25℃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	128	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	90.9	A
Pulsed Drain Current	I_{DM}	512	A
Maximum Power Dissipation	P_D	200	W
Derating factor		1.33	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	615	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.75	℃/W
Thermal Resistance,Junction-to-Ambient (Note 4)	$R_{\theta JA}$	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	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						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	5.0	5.5	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=20A	-	55	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=60V,V_{GS}=0V, F=1.0MHz	-	5250	-	pF
Output Capacitance	C_{oss}		-	380	-	pF
Reverse Transfer Capacitance	C_{rss}		-	27	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=60V,I_D=40A, V_{GS}=10V,R_G=3Ω	-	21	-	nS
Turn-on Rise Time	t_r		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	40	-	nS
Turn-Off Fall Time	t_f		-	12	-	nS
Total Gate Charge	Q_g	V_{DS}=60V,I_D=20A, V_{GS}=10V	-	92	-	nC
Gate-Source Charge	Q_{gs}		-	29.6		nC
Gate-Drain Charge	Q_{gd}		-	26.4		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=60A	-	-	1.2	V
Diode Forward Current	I_S		-	-	120	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =60A di/dt = 100A/μs	-	72	-	nS
Reverse Recovery Charge	Qrr		-	140	-	nC

Notes:

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 maximum allowed junction temperature of 175° C. The value in any given application depends on the user's specific board design.

Typical Electrical and Thermal Characteristics

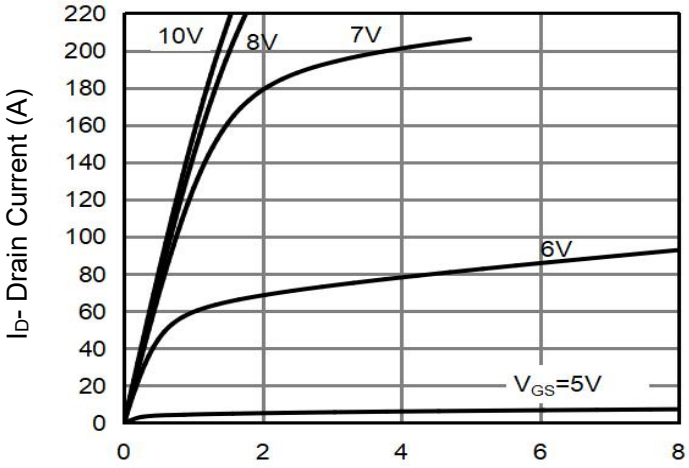


Figure 1 Output Characteristics

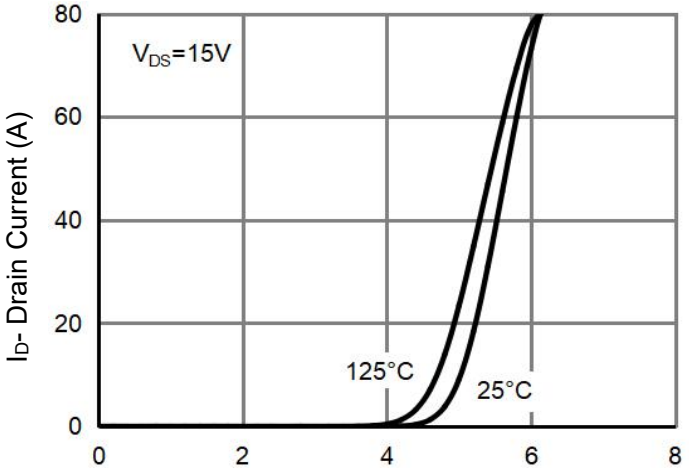


Figure 2 Transfer Characteristics

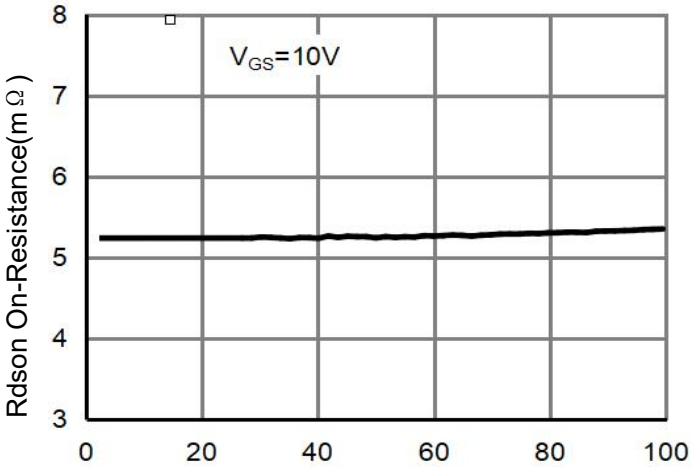


Figure 3 Rdson- Drain Current

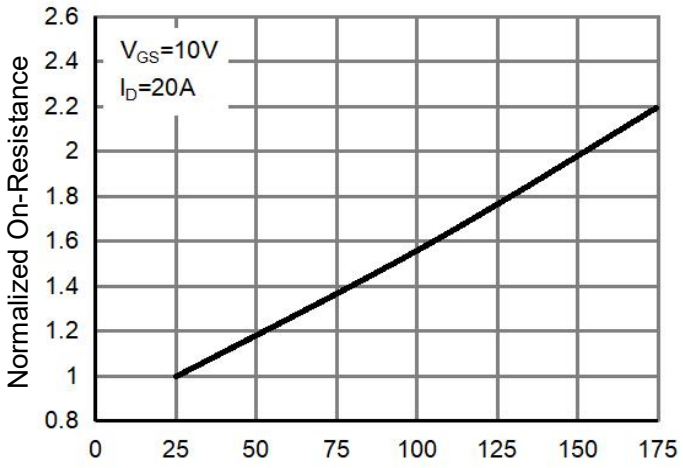


Figure 4 Rdson-Junction Temperature

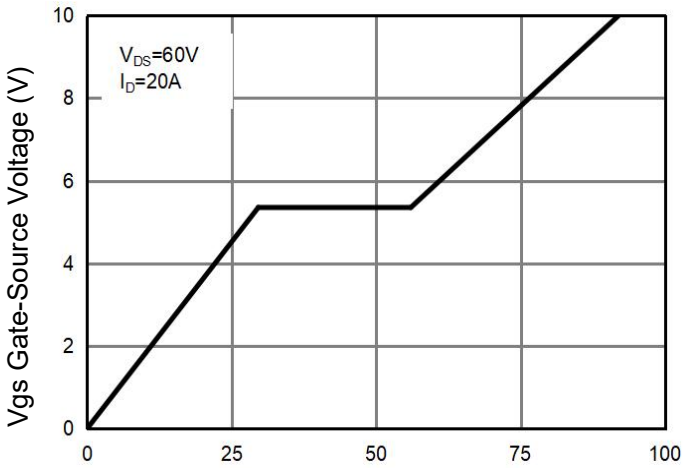


Figure 5 Gate Charge

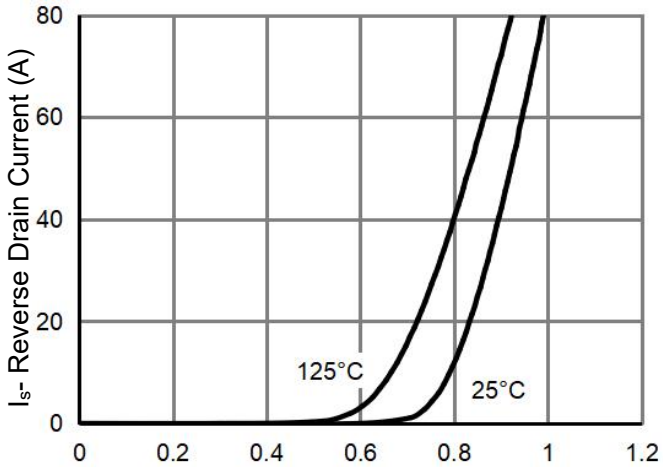


Figure 6 Source- Drain Diode Forward

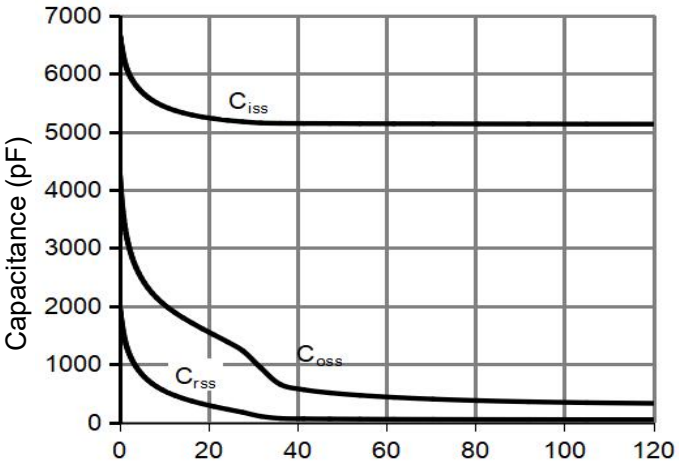


Figure 7 Capacitance vs Vds

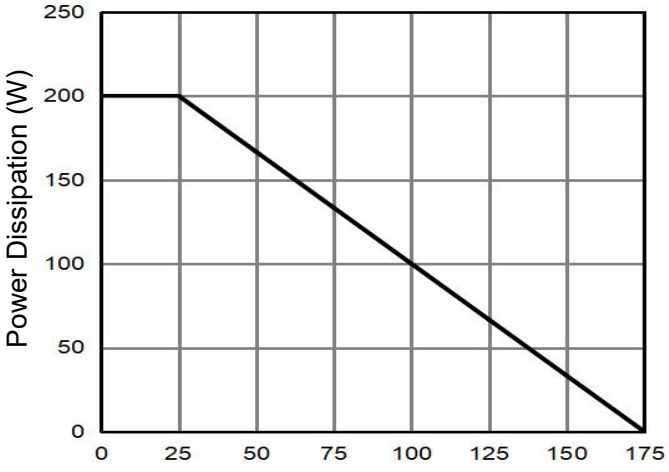


Figure 9 Power De-rating

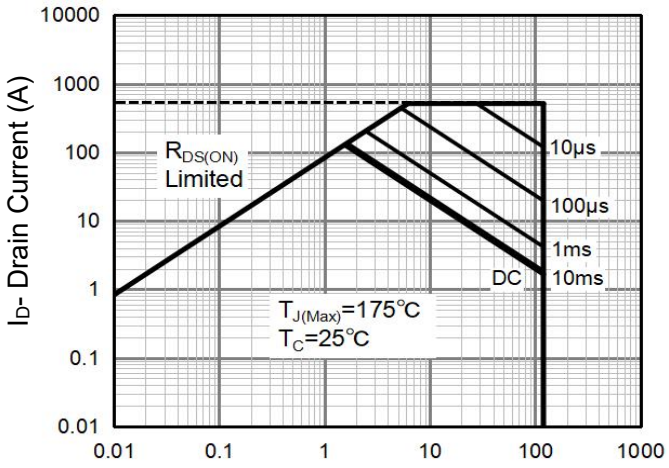


Figure 8 Safe Operation Area (Note3)

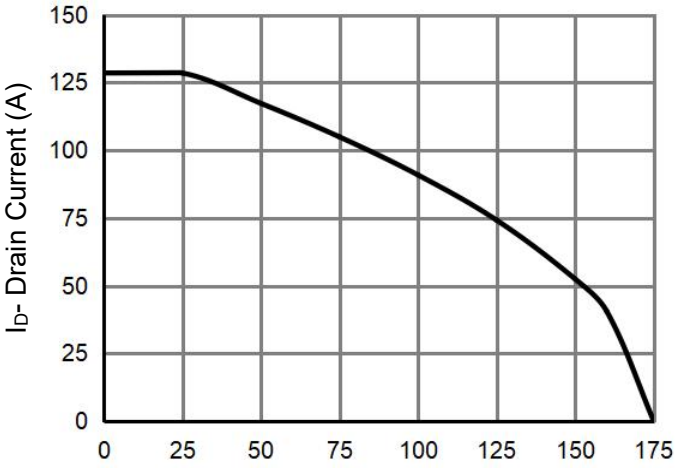


Figure 10 Current De-rating

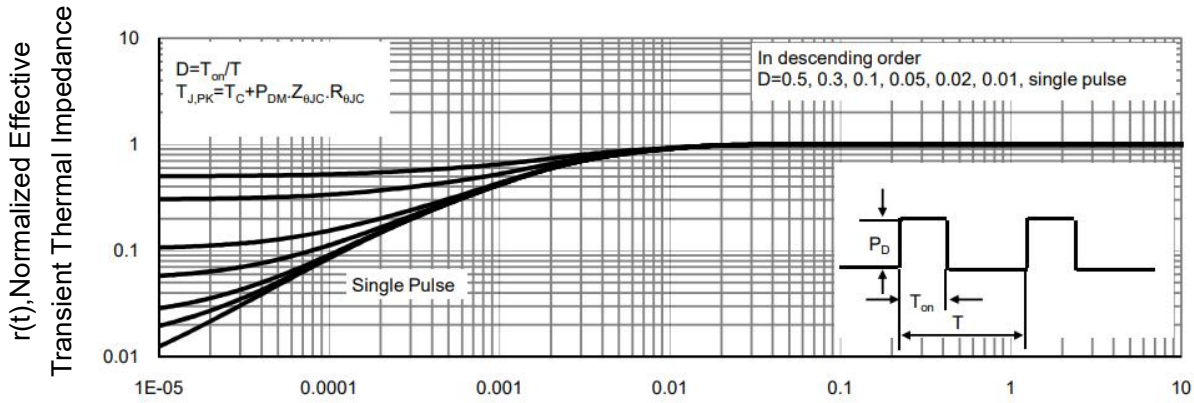
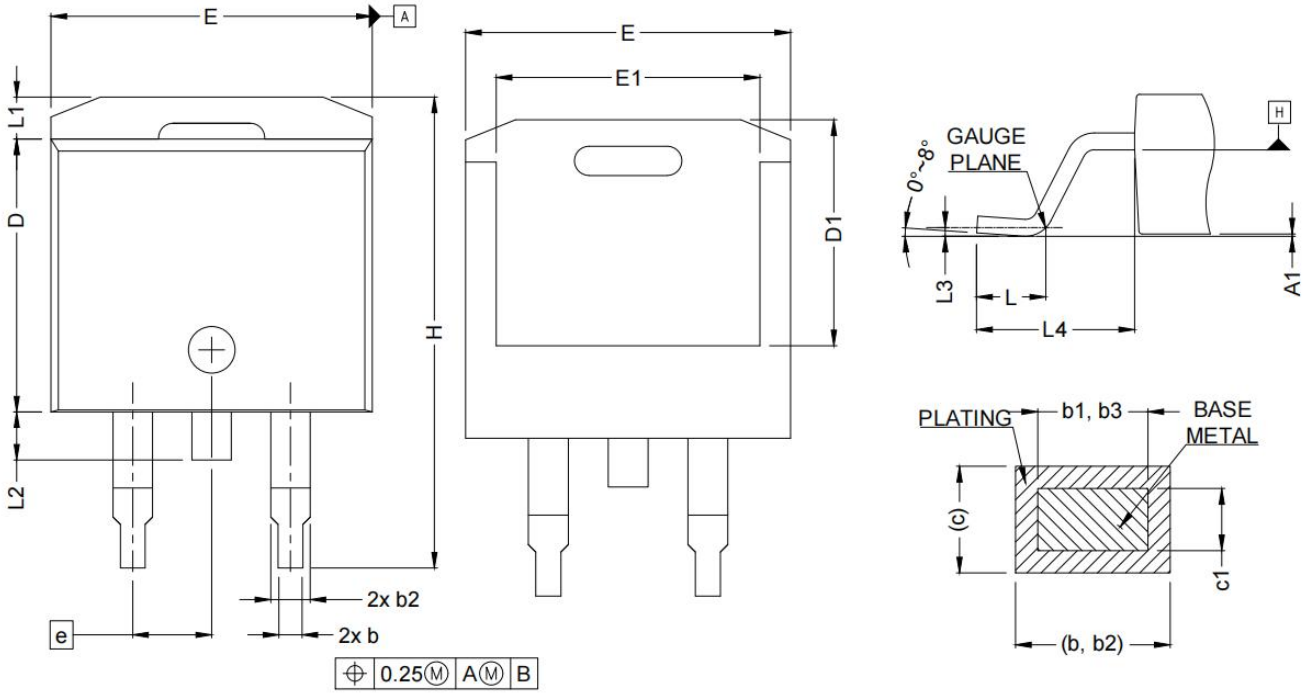
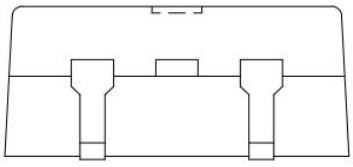


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-263-2L Package Information





OPTION 1

2 LEADs

SYMBOL	MIN.	MAX.	SYMBOL	MIN.	MAX.
A	4.36	4.56	E	10.15	10.55
A1	0	0.25	E1	8.10	8.70
b	0.70	0.90	e	2.54 BSC	
b1	0.51	0.89	H	15.00	15.60
b2	1.17	1.37	L	1.90	2.50
b3	1.17	1.37	L1	-	1.65
c	0.38	0.69	L2	-	1.78
c1	0.38	0.53	L3	0.25 TYP	
c2	1.19	1.34	L4	4.78	5.28
D	8.60	9.00	J1	2.56	2.96
D1	6.90	7.50			

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