NCE Automotive N-Channel Super Trench II Power MOSFET

Description

The NCEAP028N85D 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.

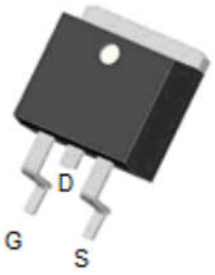
Application

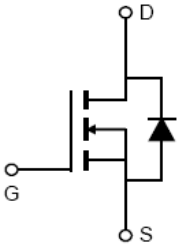
- Automotive application
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

- V_{DS} =85V,I_D =220A
  $R_{DS(ON)}$=2.4mΩ , 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





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AP028N85D	NCEAP028N85D	TO-263	-	-	-

Absolute Maximum Ratings (T_C=25℃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	220	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	150	A
Pulsed Drain Current	I_{DM}	800	A
Maximum Power Dissipation	P_D	245	W
Derating factor		1.63	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	1767	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.61	℃/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	85	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=85V,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=20A	-	2.4	2.8	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=20A	-	200	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=40V,V_{GS}=0V, F=1.0MHz	-	7680	-	pF
Output Capacitance	C_{oss}		-	1472	-	pF
Reverse Transfer Capacitance	C_{rss}		-	60	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=40V,I_D=20A V_{GS}=10V,R_G=1.6Ω	-	25	-	nS
Turn-on Rise Time	t_r		-	15	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	52	-	nS
Turn-Off Fall Time	t_f		-	17	-	nS
Total Gate Charge	Q_g	V_{DS}=40V,I_D=100A, V_{GS}=10V	-	124	-	nC
Gate-Source Charge	Q_{gs}		-	37	-	nC
Gate-Drain Charge	Q_{gd}		-	33	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=20A	-	-	1.2	V
Diode Forward Current	I_S		-	-	220	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 100A di/dt = 100A/μs	-	98	-	nS
Reverse Recovery Charge	Qrr		-	280	-	nC

Notes:

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 TJ(MAX)=175° C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

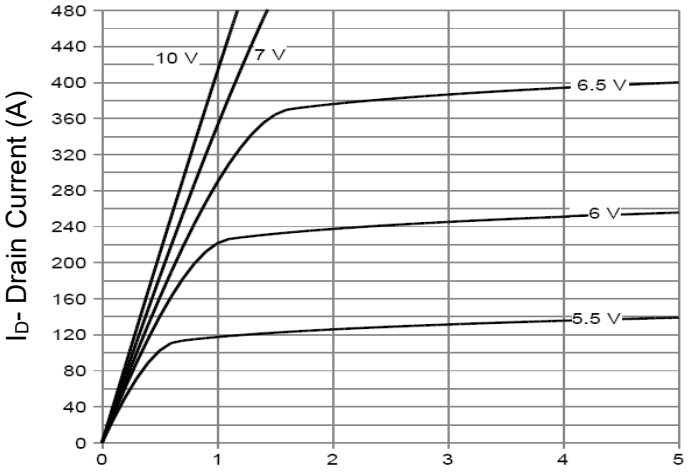


Figure 1 Output Characteristics

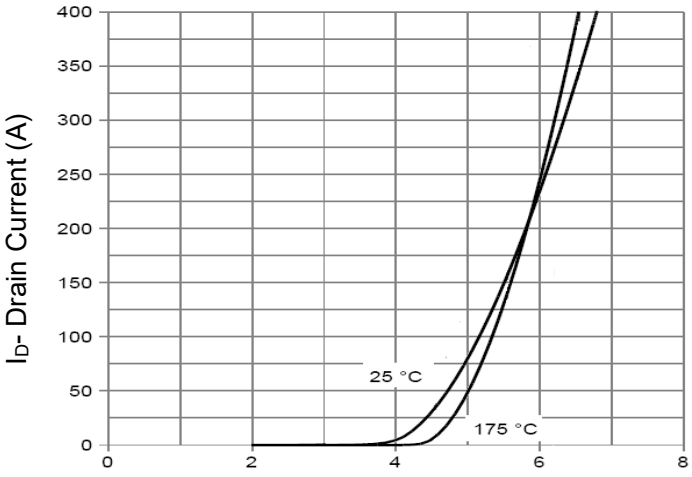


Figure 2 Transfer Characteristics

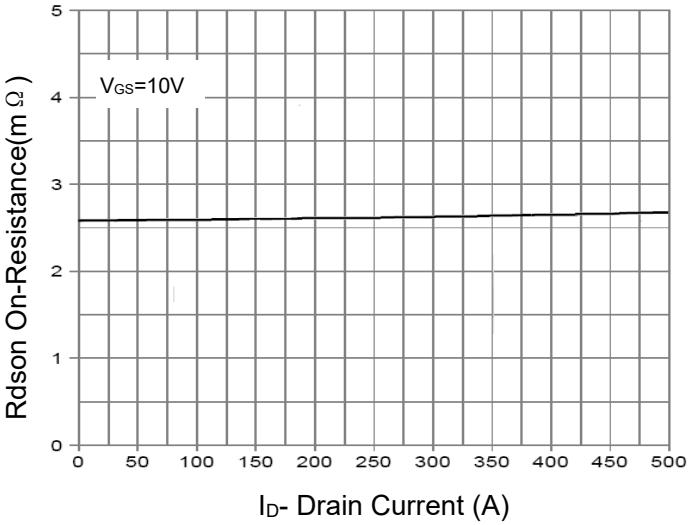


Figure 3 Rdson- Drain Current

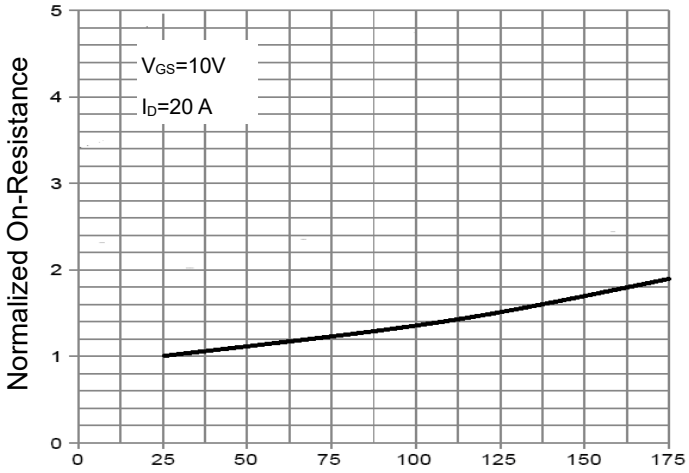


Figure 4 Rdson-Junction Temperature

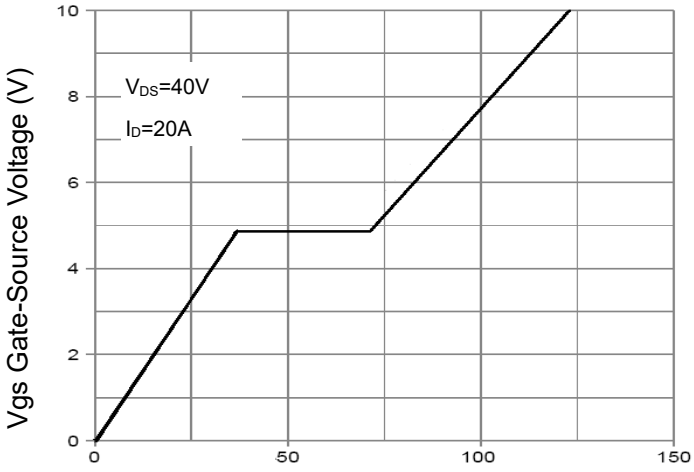


Figure 5 Gate Charge

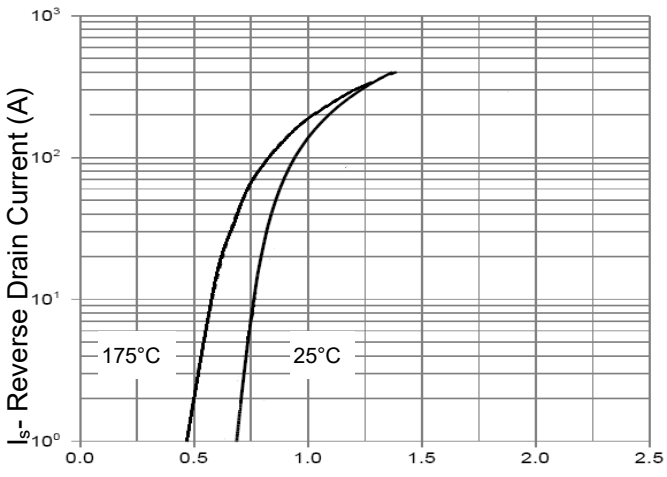


Figure 6 Source- Drain Diode Forward

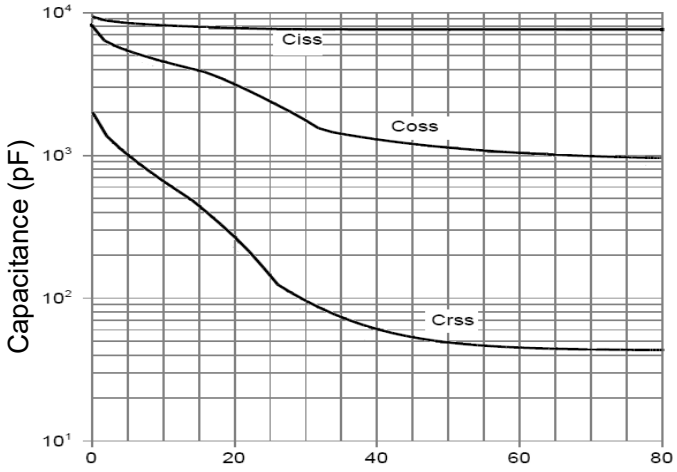


Figure 7 Capacitance vs Vds

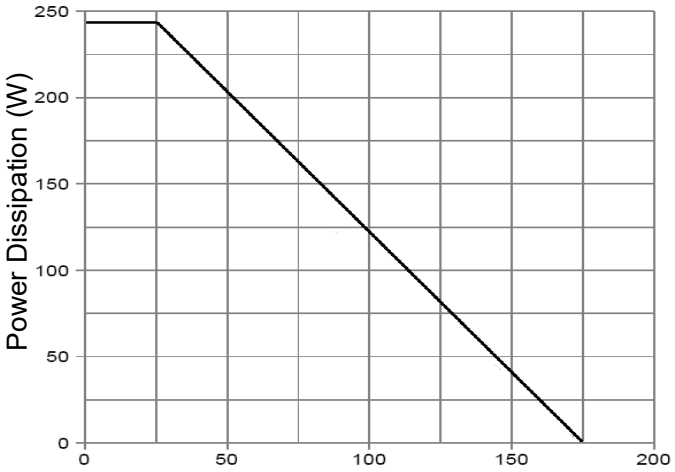


Figure 9 Power De-rating

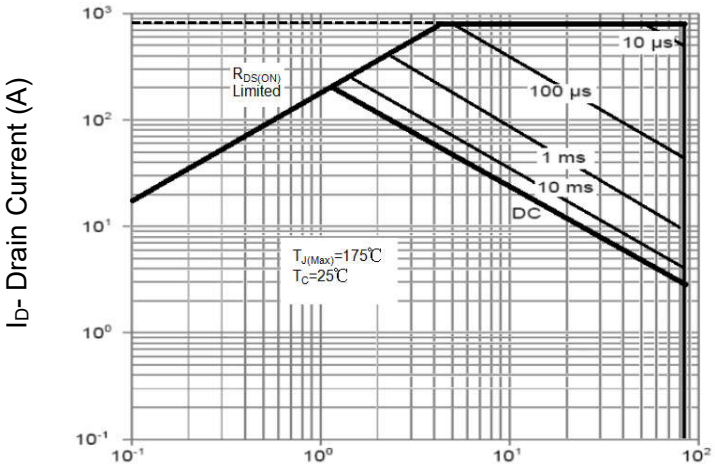


Figure 8 Safe Operation Area

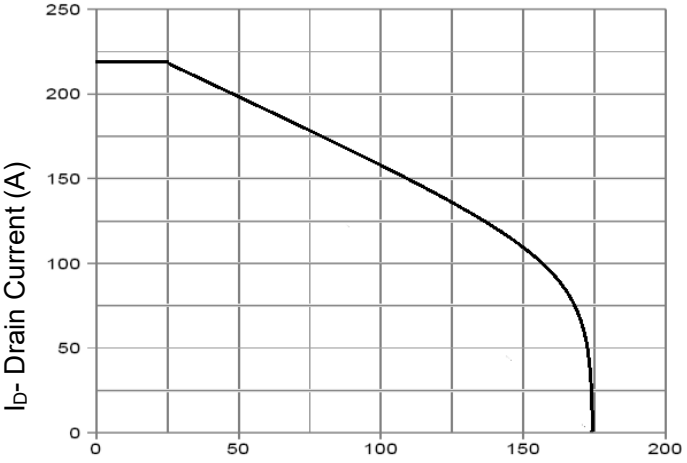


Figure 10 Current De-rating

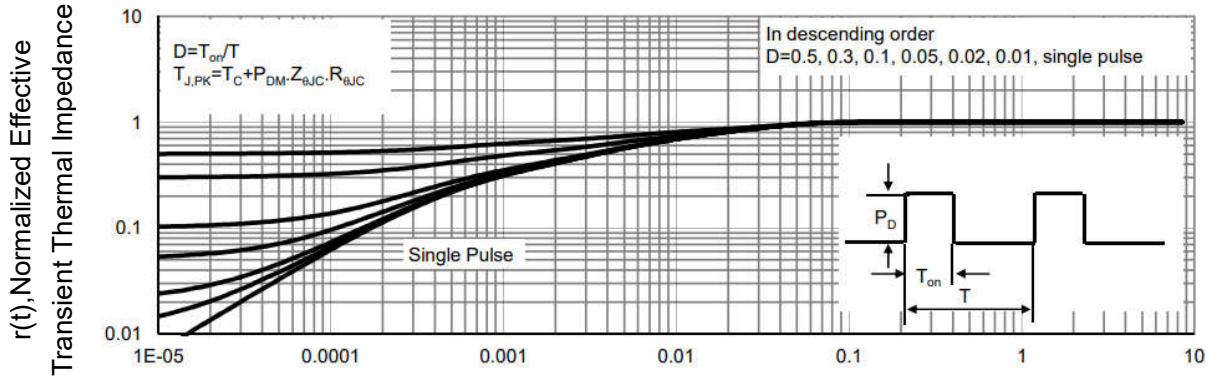
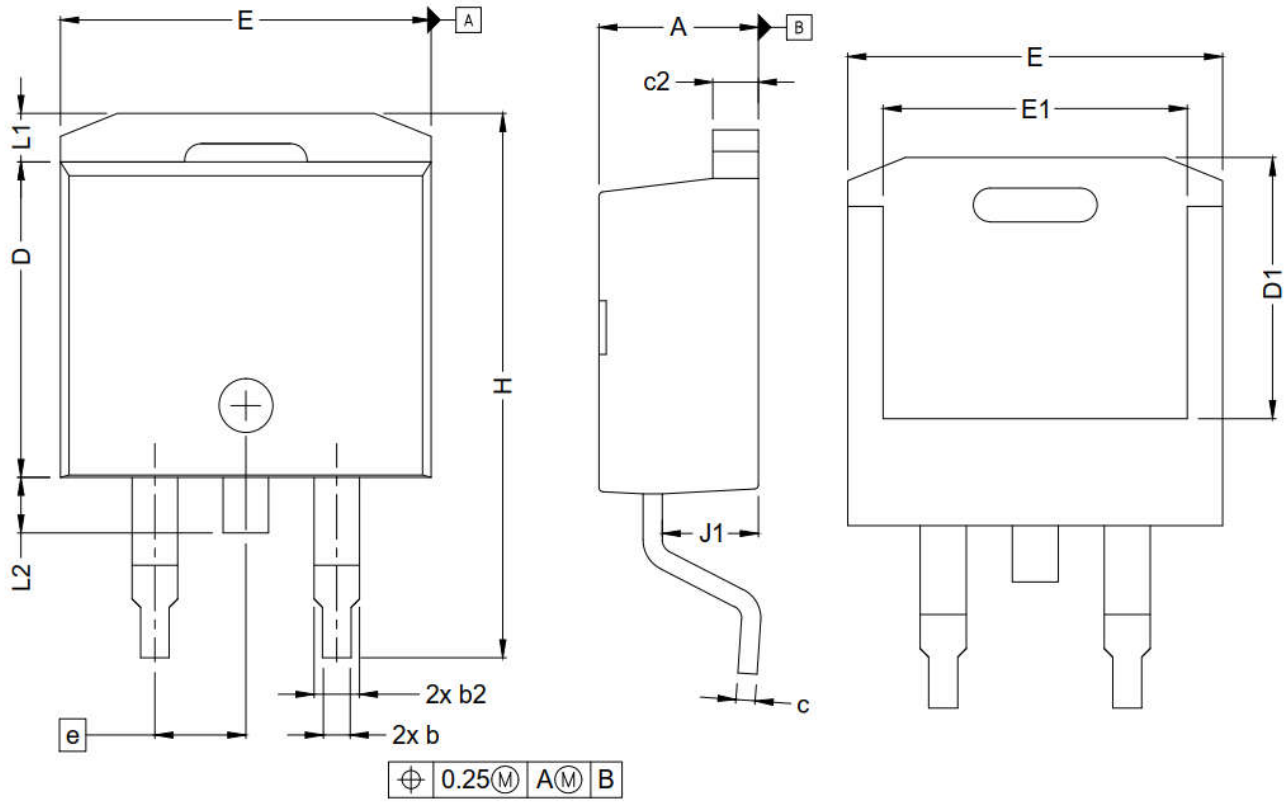
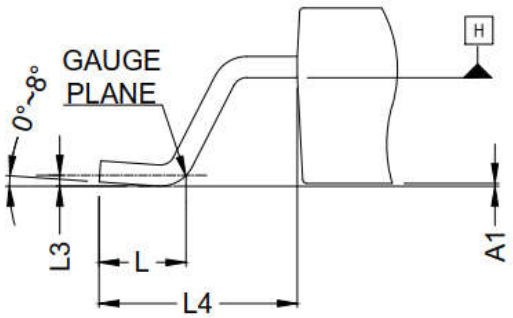
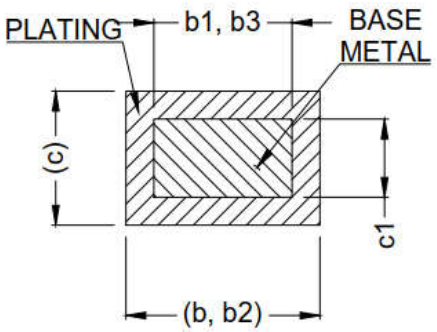


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-263-2L Package Information







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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