NCE Automotive N-Channel Super Trench Power MOSFET

Description

The NCEAP6090AGU 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

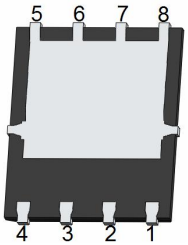
- Automotive application
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

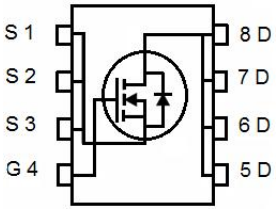
- V_{DS} =60V,I_D =130A
  $R_{DS(ON)}$=2.8mΩ (typical) @ V_{GS}=10V
  $R_{DS(ON)}$=3.5mΩ (typical) @ V_{GS}=4.5V
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- 100% UIS tested
- 100% ΔVds tested
- Pb-free lead plating
- **AEC-Q101 qualified**

DFN 5X6

Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AP6090AGU	NCEAP6090AGU	DFN5X6-8L	-	-	-

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	I_D	130	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	92	A
Pulsed Drain Current	I_{DM}	520	A
Maximum Power Dissipation	P_D	120	W
Derating factor		0.8	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	500	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.25	℃/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	1.0	1.7	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	2.8	3.5	mΩ
		V_{GS}=4.5V, I_D=20A	-	3.5	4.5	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=20A	40	-	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz	-	4000	-	PF
Output Capacitance	C_{oss}		-	680	-	PF
Reverse Transfer Capacitance	C_{rss}		-	23	-	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	-	11	-	nS
Turn-on Rise Time	t_r		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	nS
Turn-Off Fall Time	t_f		-	12	-	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=20A, V_{GS}=10V	-	67		nC
Gate-Source Charge	Q_{gs}		-	12		nC
Gate-Drain Charge	Q_{gd}		-	8.5		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=20A	-		1.2	V
Diode Forward Current	I_S		-	-	130	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = I_S di/dt = 100A/μs	-	48		nS
Reverse Recovery Charge	Qrr		-	60		nC

Notes:

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

Typical Electrical and Thermal Characteristics

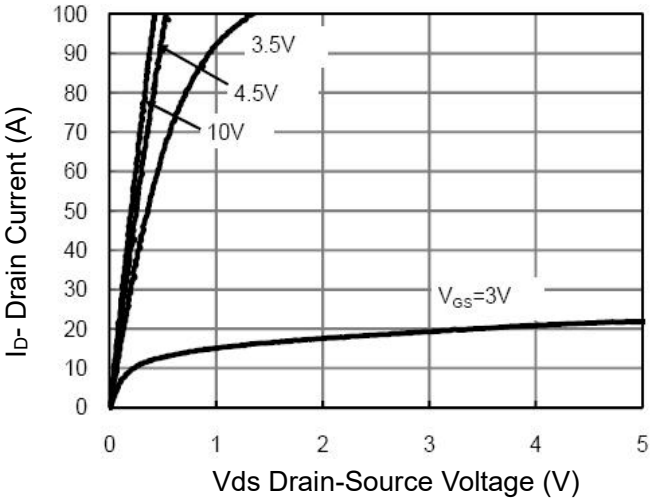


Figure 1 Output Characteristics

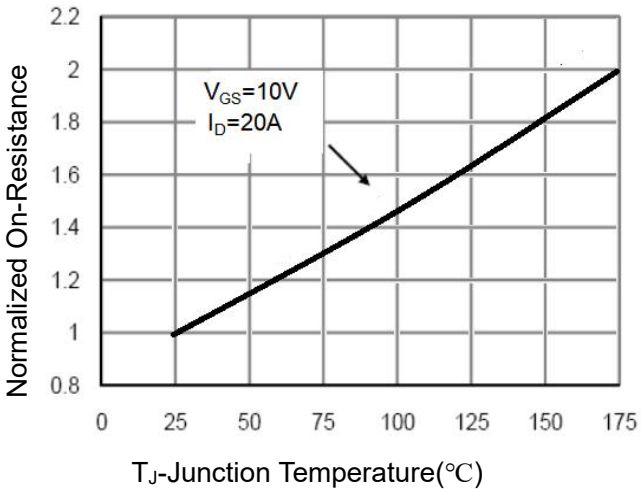


Figure 4 Rdson-JunctionTemperature

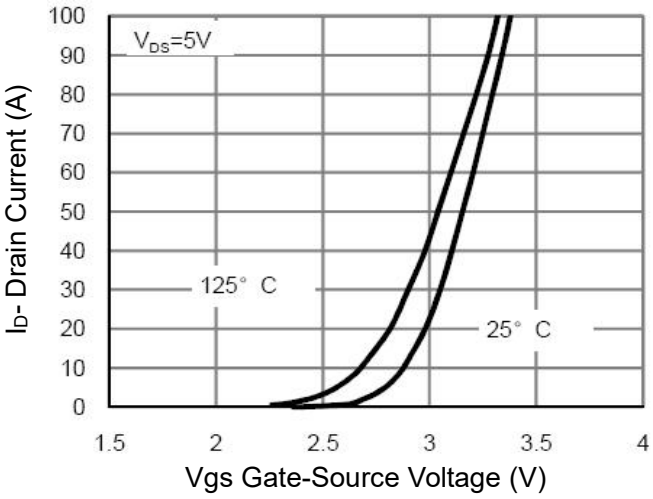


Figure 2 Transfer Characteristics

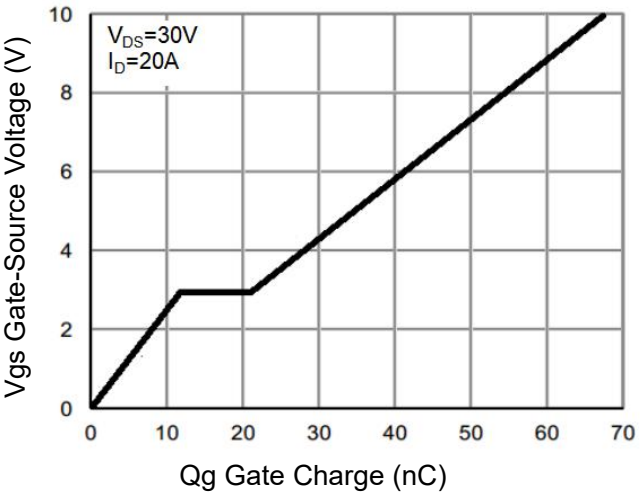


Figure 5 Gate Charge

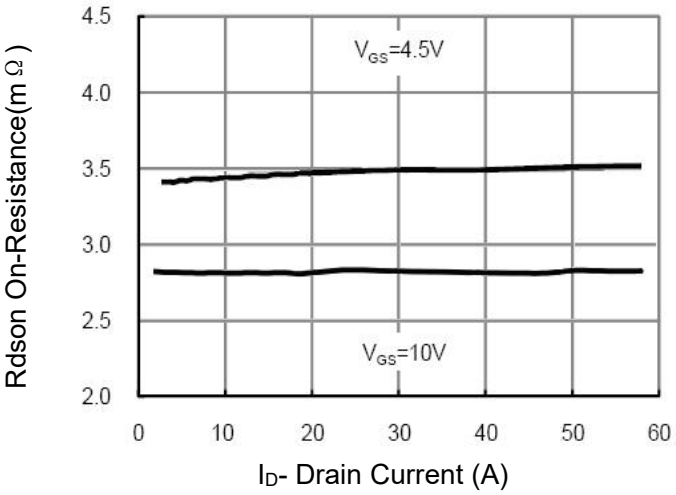


Figure 3 Rdson- Drain Current

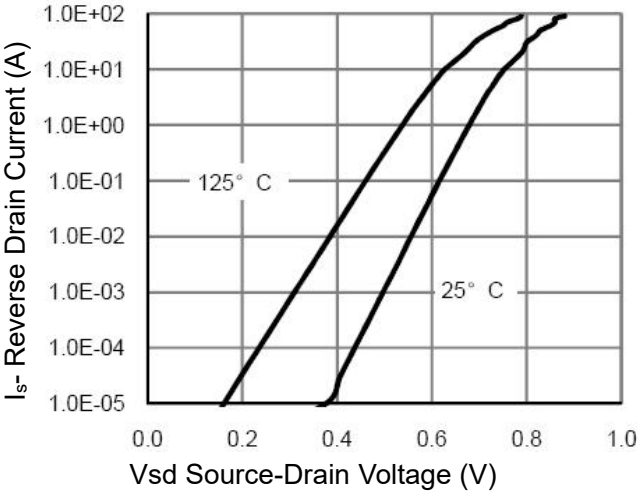


Figure 6 Source- Drain Diode Forward

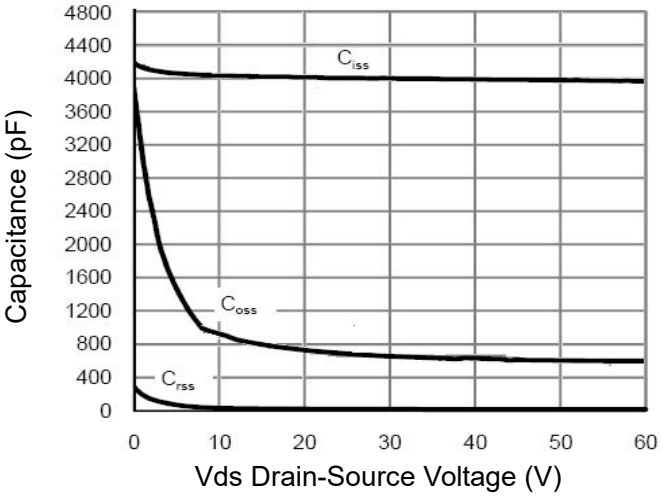


Figure 7 Capacitance vs Vds

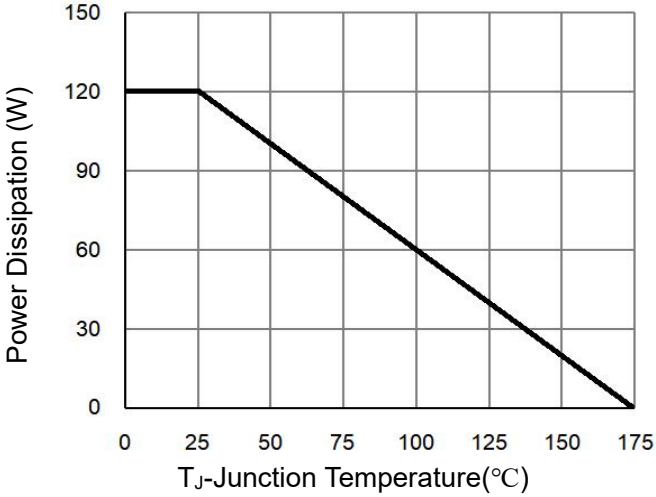


Figure 9 Power De-rating

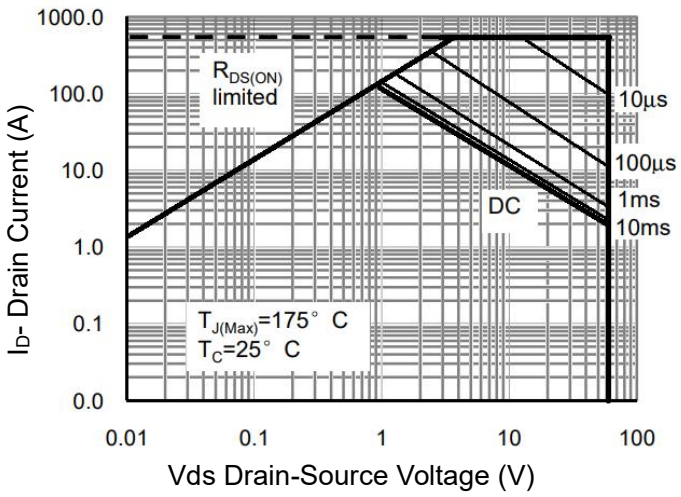


Figure 8 Safe Operation Area (Note3)

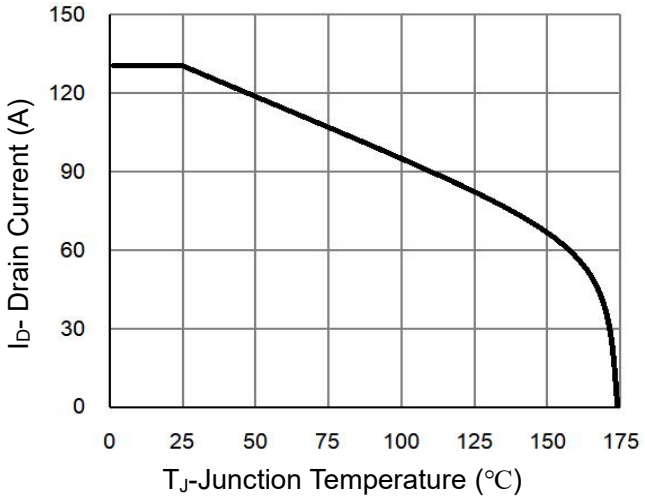


Figure 10 Current De-rating

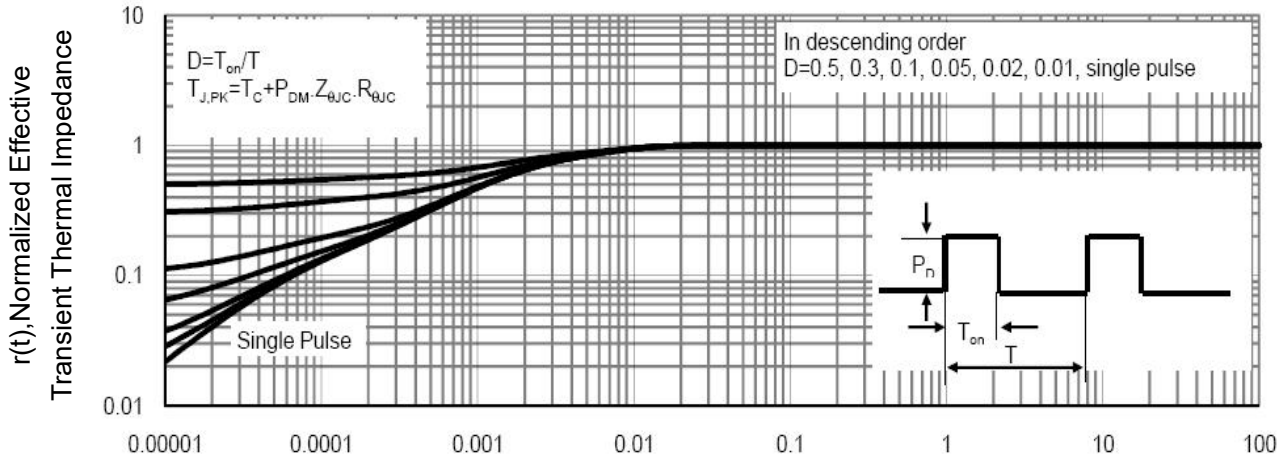
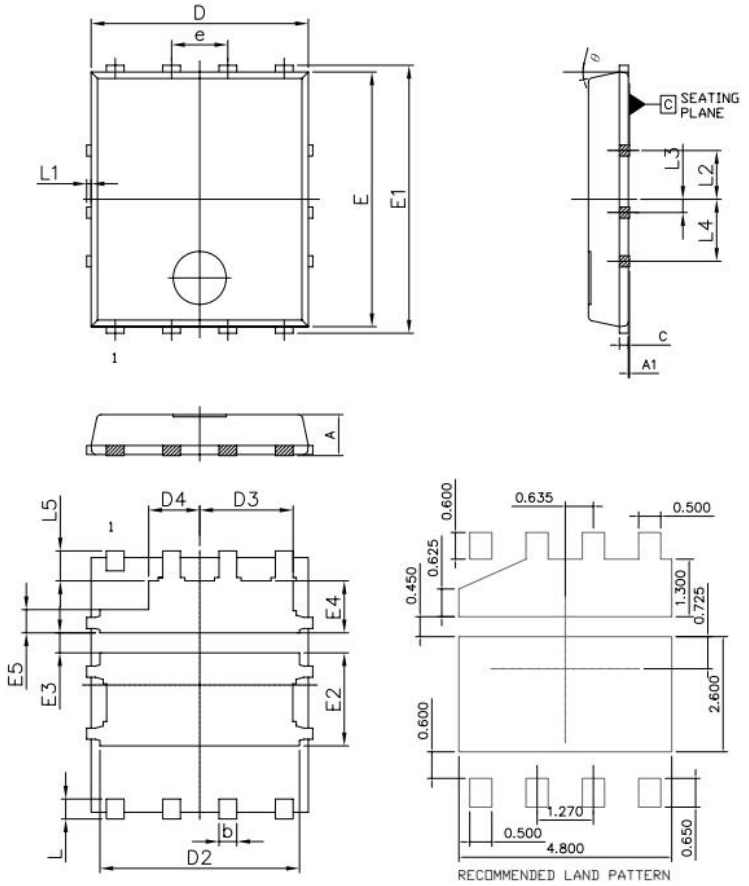


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.85	0.90	1.00
A1	0.00	/	0.05
b	0.35	0.40	0.48
c	0.15	0.20	0.28
D	4.80	4.90	5.00
D2	4.30	4.50	4.70
D3	1.955	2.105	2.255
D4	1.000	1.150	1.300
E	5.65	5.75	5.85
E1	5.90	6.05	6.20
E2	1.95	2.10	2.25
E3	0.30	0.45	0.60
E4	1.025	1.175	1.325
E5	0.375	0.525	0.675
e	/	1.27	/
L	0.35	0.45	0.55
L1	0	/	0.15
L2	1.00	1.10	1.20
L3	0.20	0.30	0.40
L4	1.30	1.40	1.50
L5	0.575	0.675	0.775
θ	0°	12°	14°

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