

NCE Automotive N-Channel Super Trench Power MOSFET

Description

The NCEAP6055AGU 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

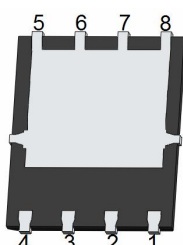
General Features

- $V_{DS} = 60V, I_D = 70A$
- $R_{DS(ON)} = 6.5m\Omega$ (typical) @ $V_{GS} = 10V$
- $R_{DS(ON)} = 7.7m\Omega$ (typical) @ $V_{GS} = 4.5V$
- Excellent gate charge $\times R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175°C operating temperature
- 100% UIS tested
- 100% ΔV_{ds} tested
- Pb-free lead plating
- **AEC-Q101 qualified**

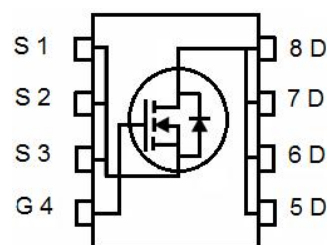
DFN 5X6-8L



Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AP6055AGU	NCEAP6055AGU	DFN5X6-8L	-	-	-

Absolute Maximum Ratings ($T_c = 25^\circ C$ 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	70	A
	$I_D (T_c = 100^\circ C)$	55	A
Pulsed Drain Current	I_{DM}	280	A
Maximum Power Dissipation	P_D	78	W
Derating factor		0.52	W/°C
Single pulse avalanche energy ^(Note 2)	E_{AS}	350	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.92	°C/W
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Electrical Characteristics (T_c=25°C 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	1.2	1.8	2.4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	6.5	7.5	mΩ
		V _{GS} =4.5V, I _D =20A	-	7.7	8.8	
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =20A		60	-	S
Dynamic Characteristics (Note1)						
Input Capacitance	C _{ISS}	V _{DS} =30V, V _{GS} =0V, F=1.0MHz	-	2000	-	pF
Output Capacitance	C _{OSS}		-	315	-	pF
Reverse Transfer Capacitance	C _{RSS}		-	9.9	-	pF
Switching Characteristics (Note 1)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =20A V _{GS} =10V, R _G =1.6Ω	-	8	-	nS
Turn-on Rise Time	t _r		-	2	-	nS
Turn-Off Delay Time	t _{d(off)}		-	29	-	nS
Turn-Off Fall Time	t _f		-	4	-	nS
Total Gate Charge	Q _g	V _{DS} =30V, I _D =20A, V _{GS} =10V	-	34.8	-	nC
Gate-Source Charge	Q _{gs}		-	7	-	nC
Gate-Drain Charge	Q _{gd}		-	5.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	-	-	1.2	V
Diode Forward Current	I _S		-	-	55	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =20A	-	38	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs ^(Note3)	-	48	-	nC

Notes:

1. Defined by design. Not Subject to production test
2. EAS condition : T_J=25°C, V_{DD}=30V, V_G=10V, L=0.5mH, R_G=25Ω
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.

Typical Electrical and Thermal Characteristics

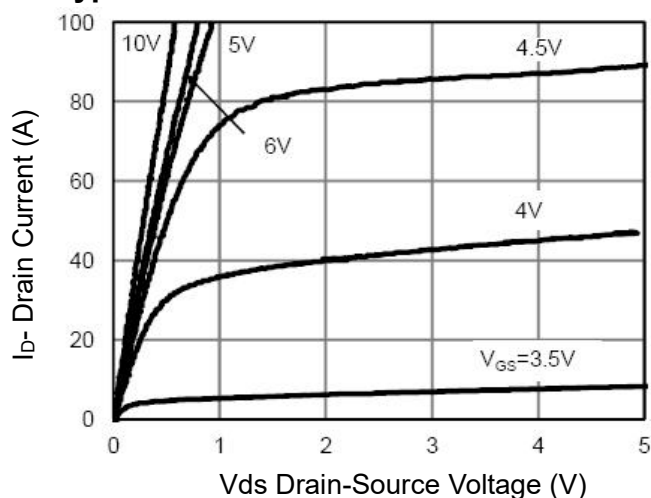


Figure 1 Output Characteristics

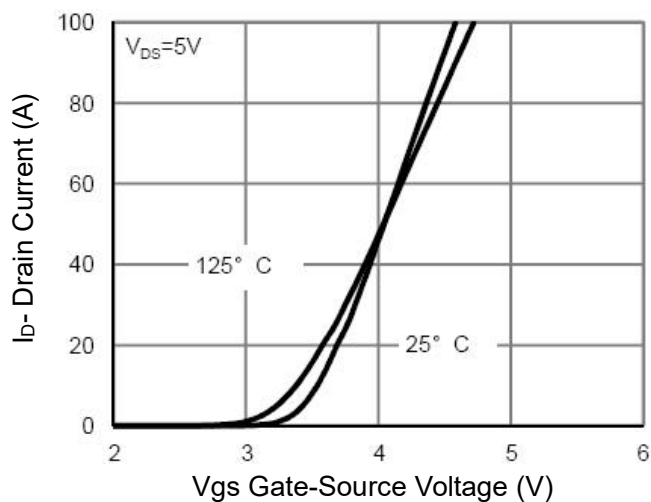


Figure 2 Transfer Characteristics

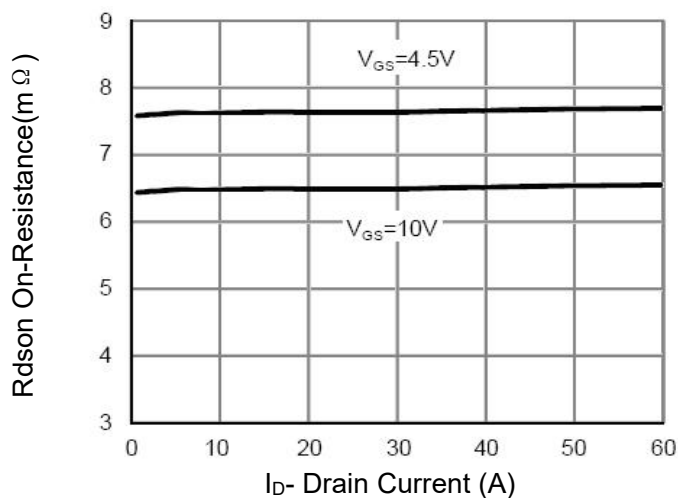


Figure 3 Rdson- Drain Current

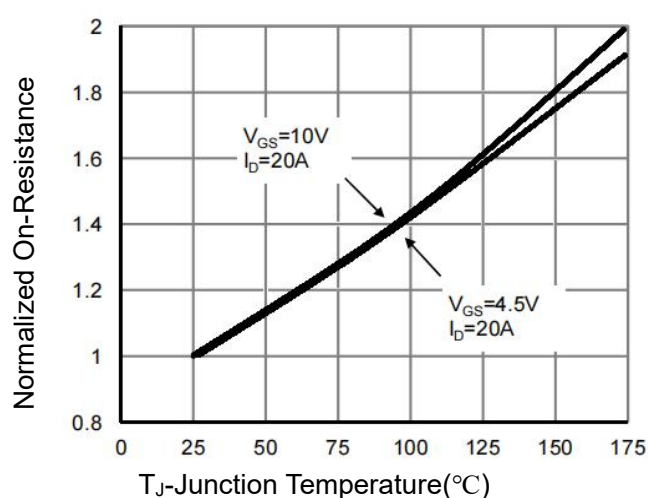


Figure 4 Rdson-Junction Temperature

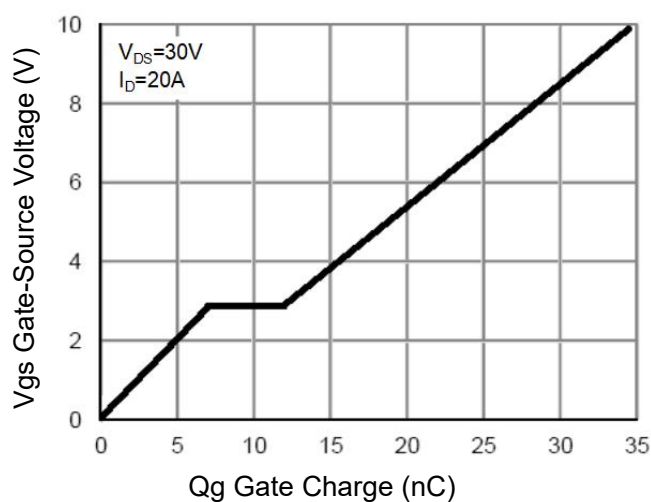


Figure 5 Gate Charge

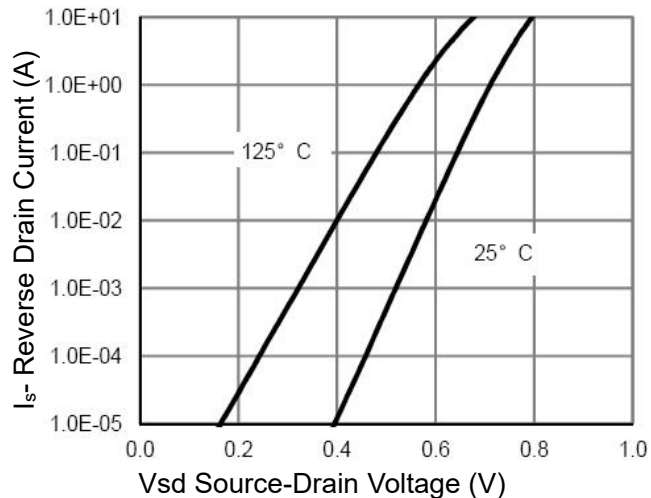


Figure 6 Source- Drain Diode Forward

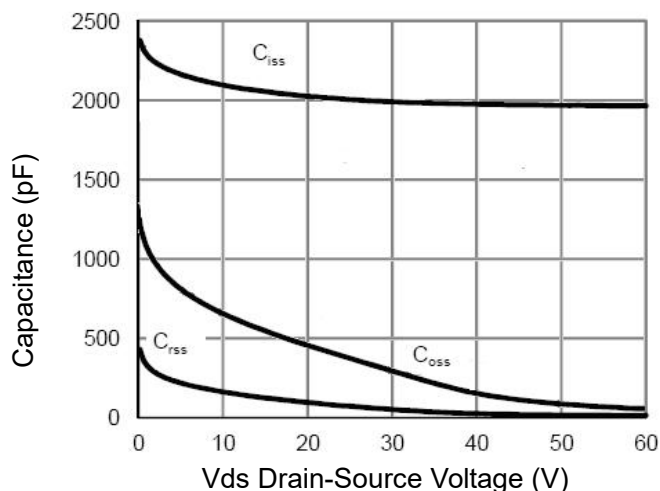


Figure 7 Capacitance vs Vds

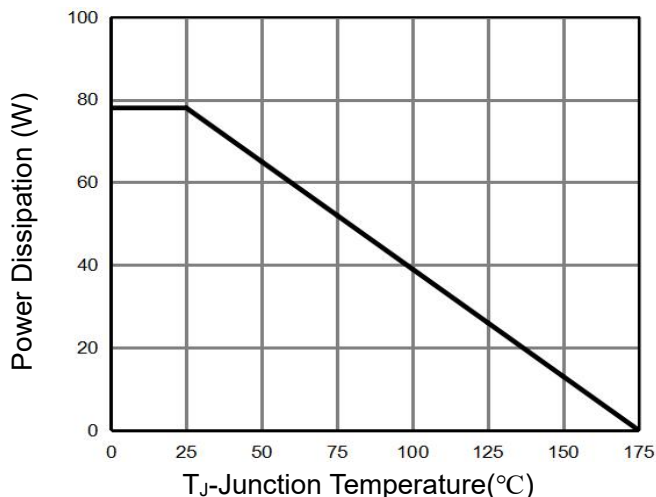


Figure 9 Power De-rating

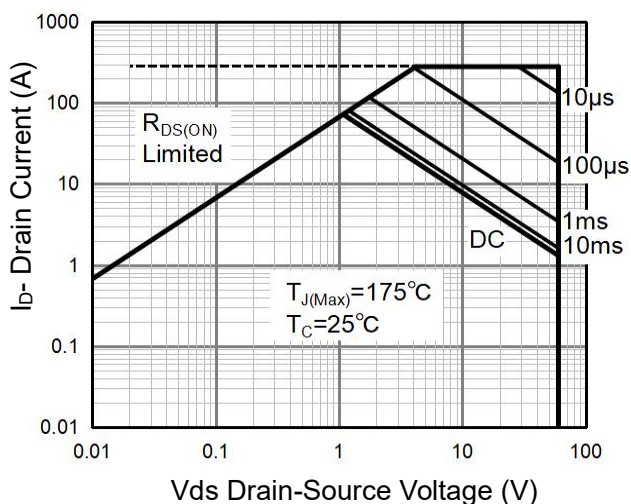


Figure 8 Safe Operation Area (Note 3)

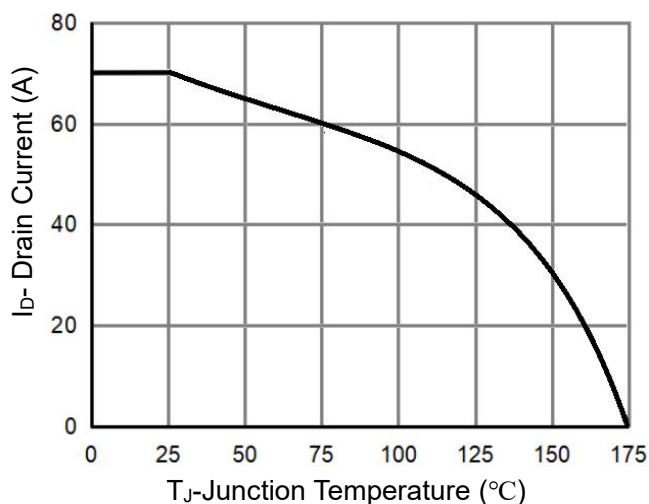


Figure 10 Current De-rating

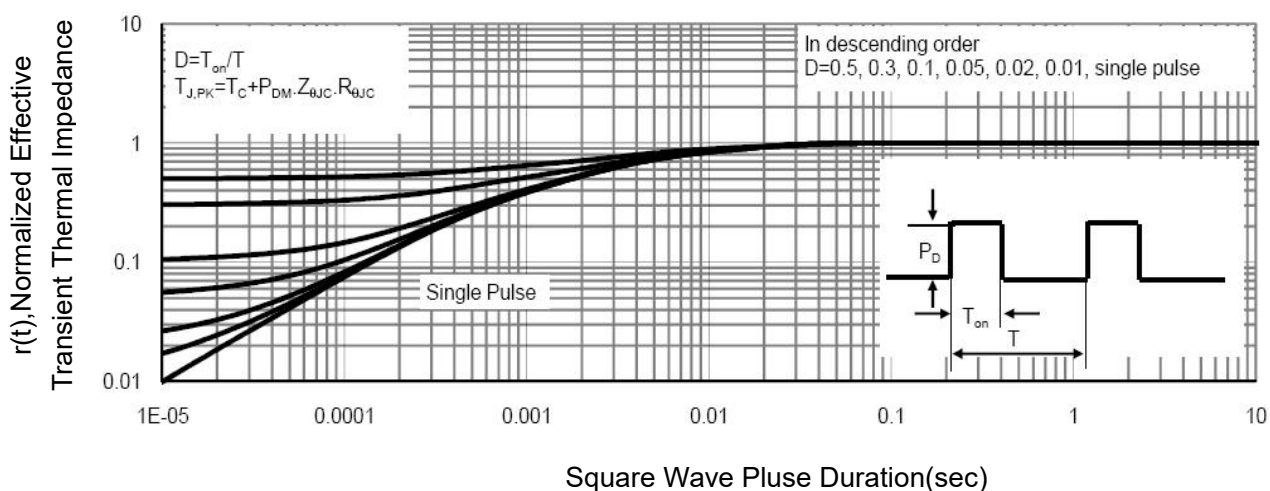
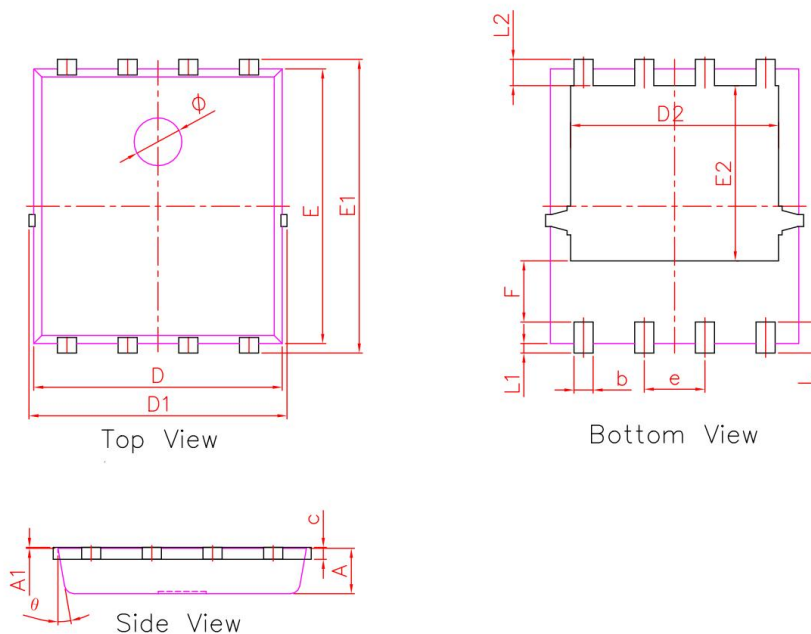


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



PDFN5X6-8L			
DIM.	MIN.	NOM.	MAX.
A	0.90	0.95	1.00
A1	0.00	0.02	0.05
b	0.35	0.40	0.50
c	0.20	0.25	0.30
D	5.10	5.20	5.30
D1	5.10	5.40	5.50
D2	4.25	4.35	4.45
e	1.27 BSC		
E	5.70	5.75	5.80
E1	6.00	6.15	6.30
E2	3.57	3.67	3.77
F	1.18	1.28	1.38
L	0.55	0.65	0.75
L1	0.15	0.20	0.25
L2	0.45	0.55	0.65
Φ	0.90	1.00	1.10
θ	8°	10°	12°
All dimensions in millimeters			

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