



Power MOSFETS

DATASHEET

LM60140NAI8A

N-Channel
Enhancement Mode MOSFET

 Leadpower-semiconductor Corp., Ltd

 sales@leadpower-semi.com

 (03) 6577339 FAX : (03) 6577229

 www.leadpower-semi.com

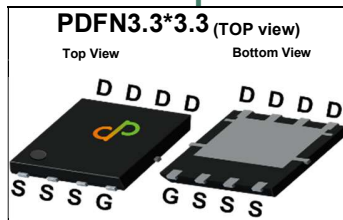


Quality Management Systems

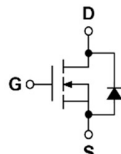
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	60	V
$R_{DS(ON)-Max}$	17	mΩ
I_D	36	A

Feature

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS and Rg Tested

Applications

- Power switching application
- Hard switched and high frequency circuits

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM60140NAI8A	PDFN3.3*3.3	Tape & Reel	5000 / Tape & Reel	60140 □□□□□□

Note : □□□□□□ = Lot Code

Absolute Maximum Ratings ($T_J=25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter		N-Channel	Unit
V_{DSS}	Drain-Source Voltage		60	V
V_{GSS}	Gate-Source Voltage		± 20	
T_J	Maximum Junction Temperature		150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		-55 to 150	$^\circ\text{C}$
$I_{DM}^{(1)}$	Pulse Drain Current Tested	$T_c=25^\circ\text{C}$	91	A
I_D	Continuous Drain Current	$T_c=25^\circ\text{C}$	36	A
		$T_c=100^\circ\text{C}$	23	
P_D	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	42	W
		$T_c=100^\circ\text{C}$	17	
$I_{AS}^{(2)}$	Avalanche Current, Single pulse	$L=0.1\text{mH}$	23	A
$E_{AS}^{(2)}$	Avalanche Energy, Single pulse	$L=0.1\text{mH}$	26	mJ

Thermal Characteristics

Symbol	Parameter		Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	3	$^\circ\text{C/W}$
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	Steady State	80	$^\circ\text{C/W}$

Note ① : Max. current is limited by junction temperature

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C

Note ③ : Surface Mounted on 1in^2 FR-4 board with 1oz.

N-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Electrical Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250uA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, V _{GS} =0V	-	-	1	uA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	1	1.5	2.5	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ④	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =6A	-	14	17	mΩ
		V _{GS} =4.5V, I _{DS} =5A	-	15	19.5	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =6A	-	16.2	-	S
Dynamic Characteristics ⑤						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	1.5	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Freq.=1MHz	-	2175	-	pF
C _{oss}	Output Capacitance		-	115	-	
C _{rss}	Reverse Transfer Capacitance		-	80	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V, V _{DS} =30V, Id=1A, RGEN=6Ω	-	9.2	-	nS
tr	Turn-on Rise Time		-	18	-	
td(OFF)	Turn-off Delay Time		-	42	-	
tf	Turn-off Fall Time		-	31	-	
Qg	Total Gate Charge	V _{GS} =4.5V, V _{DS} =30V Id=6A	-	24.5	-	nC
Qg	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, Id=6A	-	51	-	
Qgs	Gate-Source Charge		-	10	-	
Qgd	Gate-Drain Charge		-	7.8	-	
Source-Drain Characteristics						
VSD ④	Diode Forward Voltage	ISD=1A, VGS=0V	-	0.7	1.1	V
trr	Reverse Recovery Time	IF=1A, VR=0V	-	17.8	-	nS
Qrr	Reverse Recovery Charge	dIF/dt=100A/μs	-	11.2	-	nC

Note ④ : Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

Note ⑤ : Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

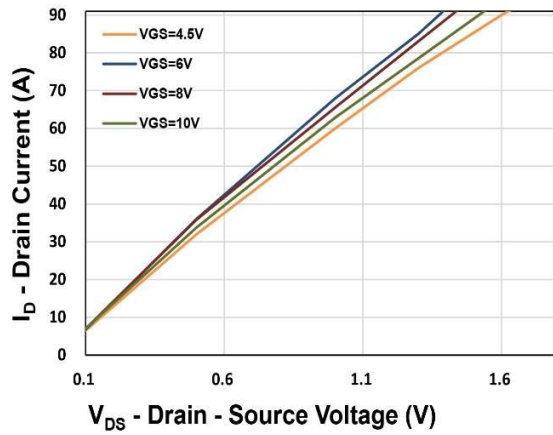


Figure 1. Output Characteristics

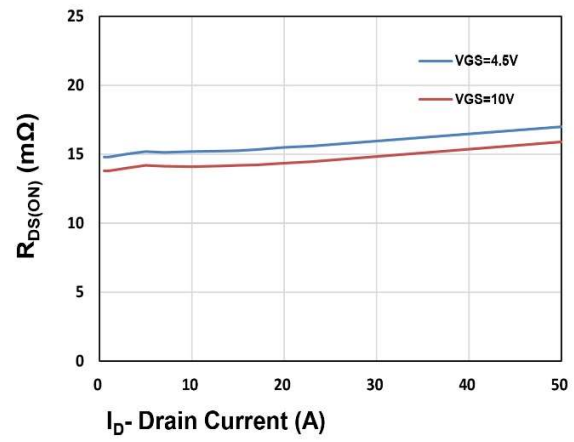


Figure 2. On-Resistance vs. ID

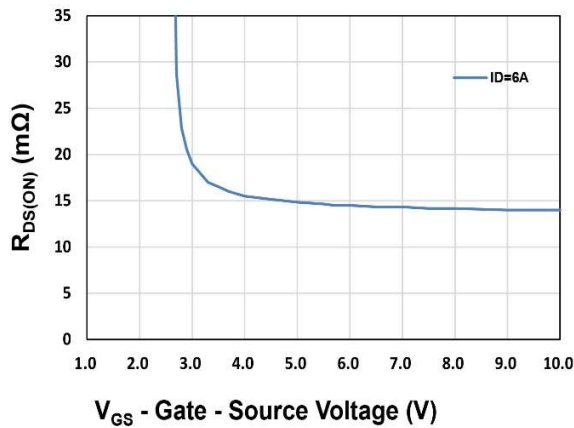


Figure 3. On-Resistance vs. VGS

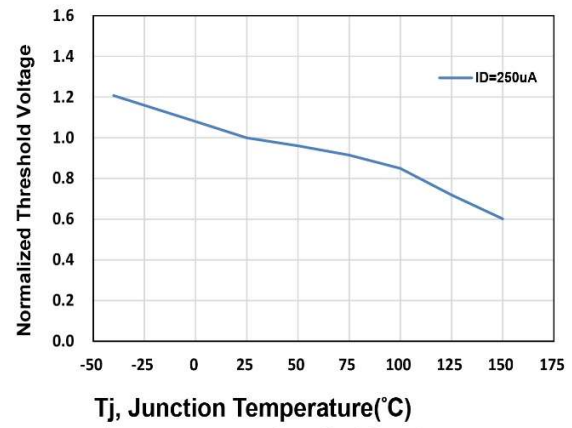


Figure 4. Gate Threshold Voltage

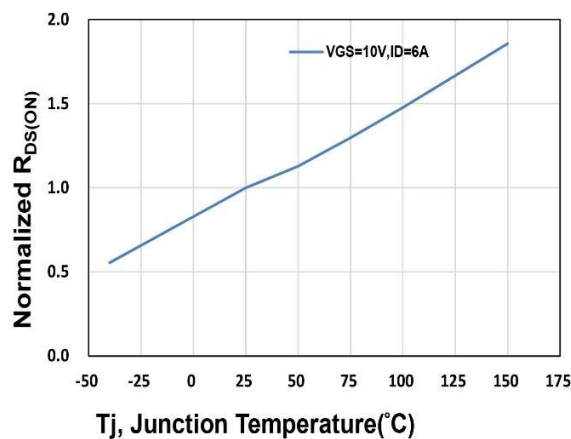


Figure 5. Drain-Source On Resistance

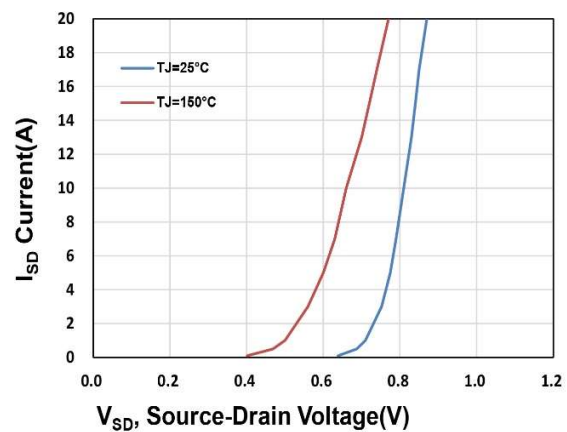


Figure 6. Source-Drain Diode Forward

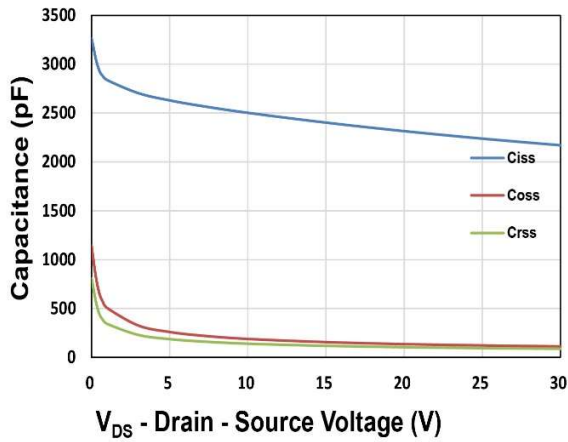


Figure 7. Capacitance

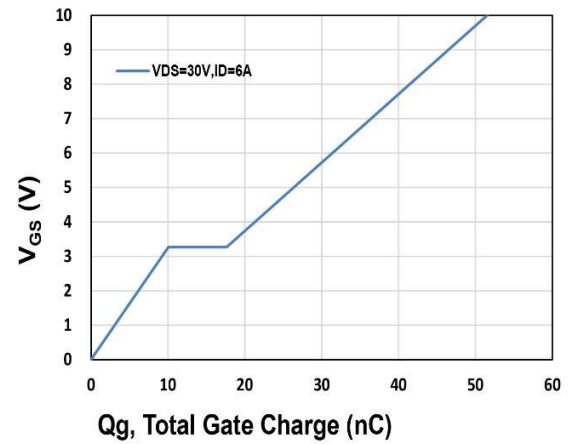


Figure 8. Gate Charge Characteristics

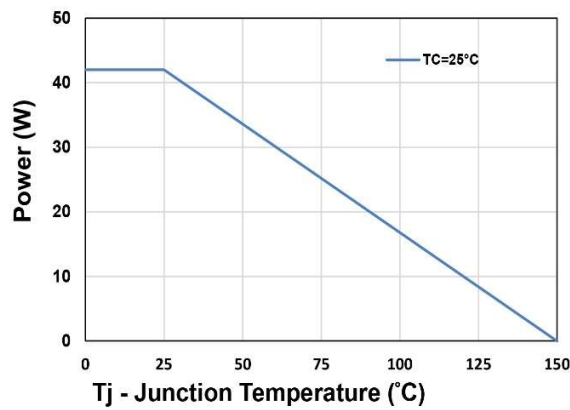


Figure 9. Power Dissipation

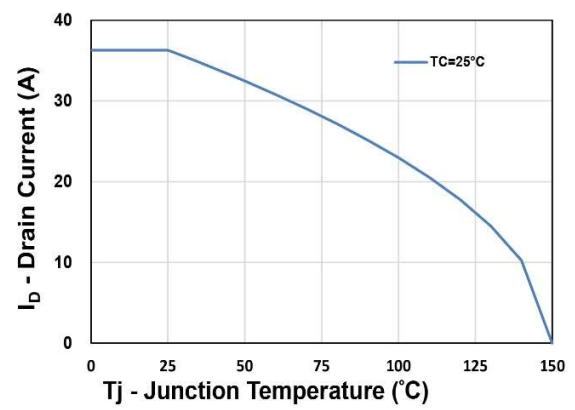


Figure 10. Drain Current

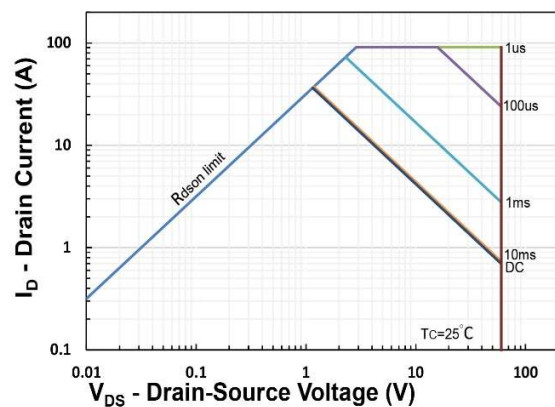


Figure 11. Safe Operating Area

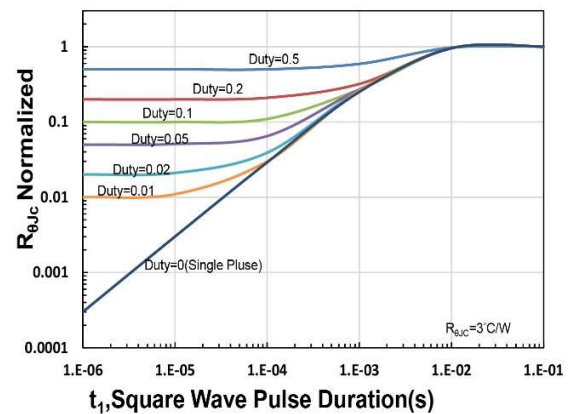


Figure 12. $R_{\theta Jc}$ Transient Thermal Impedance