



Power MOSFETS

DATASHEET

LM60350NAO2A

N-Channel
Enhancement Mode MOSFET

 Leadpower-semiconductor Corp., Ltd

 sales@leadpower-semi.com

 (03) 6577339 FAX : (03) 6577229

 www.leadpower-semi.com

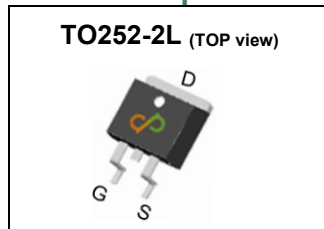


Quality Management Systems

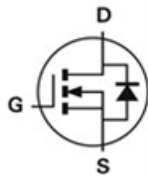
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	60	V
$R_{DS(ON)-Max}$	35	m Ω
ID	22	A

Feature

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

Applications

- Motor Control
- Power Tools
- Load Switching

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM60350NAO2A	TO-252-2L	Tape & Reel	3000 / Tape & Reel	60350 □□□□□□

Absolute Maximum Ratings (T_J=25°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	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_c=25^\circ\text{C}$	72	A
I_D	Continuous Drain Current	$T_c=25^\circ\text{C}$	22	A
		$T_c=100^\circ\text{C}$	14	
P_D	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	37	W
		$T_c=100^\circ\text{C}$	15	
$I_{AS}^{②}$	Avalanche Current, Single pulse	L=0.1mH	18	A
$E_{AS}^{②}$	Avalanche Energy, Single pulse	L=0.1mH	16	mJ

Thermal Characteristics

Symbol	Parameter		Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	3.4	°C/W
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State	60	°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 1in² FR-4 board with 1oz.

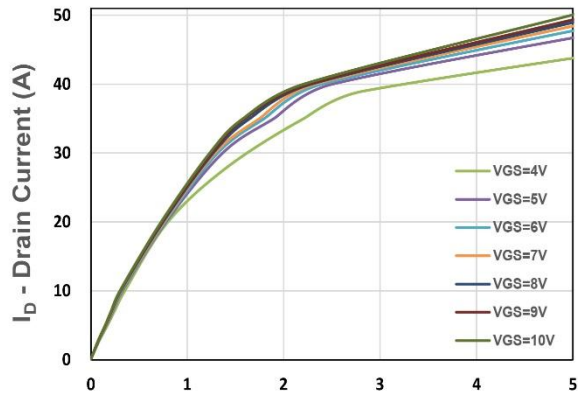
N-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$ Unless Otherwise Noted)

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	1.3	1.8	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	-	30	35	mΩ
		V _{GS} =4.5V, I _{DS} =5A	-	33	43	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =3A	-	16.3	-	S
Dynamic Characteristics ⑥						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V, Freq.=1MHz	-	3.9	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Freq.=1MHz	-	1147	-	pF
C _{oss}	Output Capacitance		-	52	-	
C _{rss}	Reverse Transfer Capacitance		-	40	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V,V _{DS} =30V, Id=1A,RGEN=6Ω	-	6.9	-	nS
tr	Turn-on Rise Time		-	3.5	-	
td(OFF)	Turn-off Delay Time		-	32.7	-	
tf	Turn-off Fall Time		-	18.1	-	
Qg	Total Gate Charge	V _{GS} =4.5V,V _{DS} =30V Id=6A	-	12	-	nC
Qg	Total Gate Charge	V _{GS} =10V,V _{DS} =30V, Id=6A	-	26	-	
Qgs	Gate-Source Charge		-	6.3	-	
Qgd	Gate-Drain Charge		-	3.7	-	
Source-Drain Characteristics						
VSD④	Diode Forward Voltage	ISD=3A, VGS=0V	-	0.8	1.1	V
trr	Reverse Recovery Time	IF=3A, VR=30V	-	14	-	nS
Qrr	Reverse Recovery Charge	dIF/dt=100A/μs	-	9	-	nC

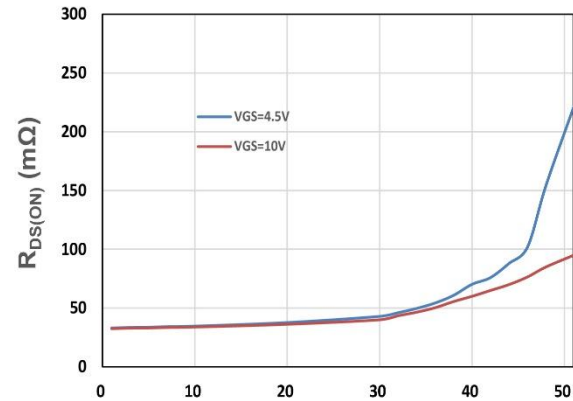
Note ④ : Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

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

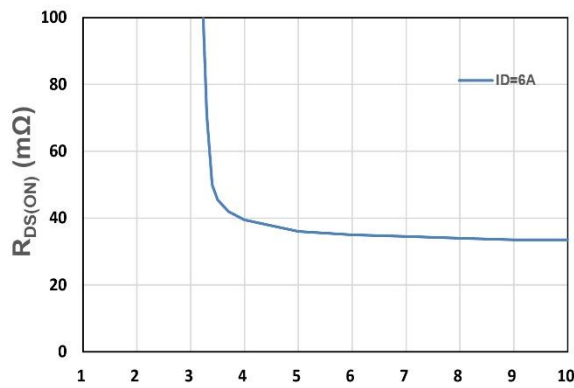
N-Channel Typical Characteristics



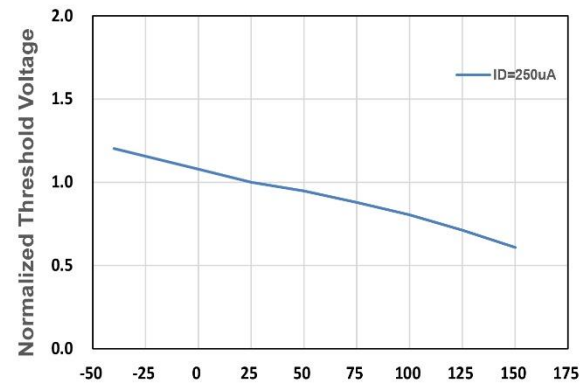
V_{DS} - Drain - Source Voltage (V)
Figure 1. Output Characteristics



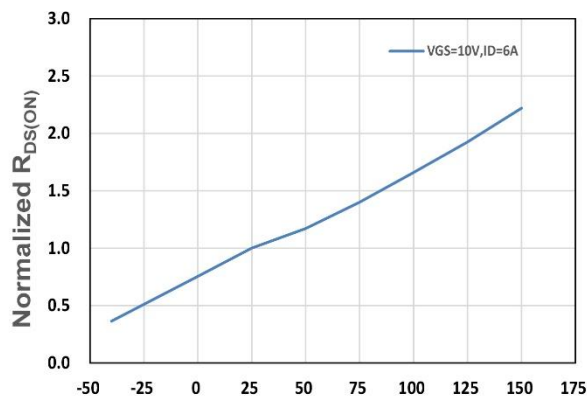
I_D - Drain Current (A)
Figure 2. On-Resistance vs. I_D



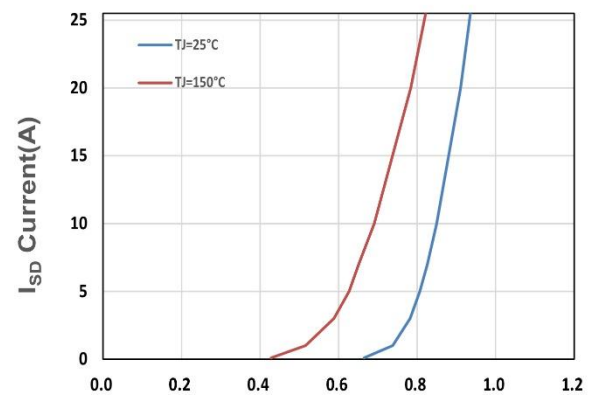
V_{GS} - Gate - Source Voltage (V)
Figure 3. On-Resistance vs. V_{GS}



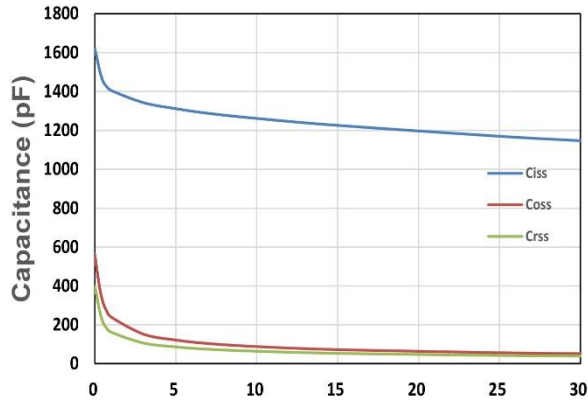
T_j , Junction Temperature($^{\circ}C$)
Figure 4. Gate Threshold Voltage



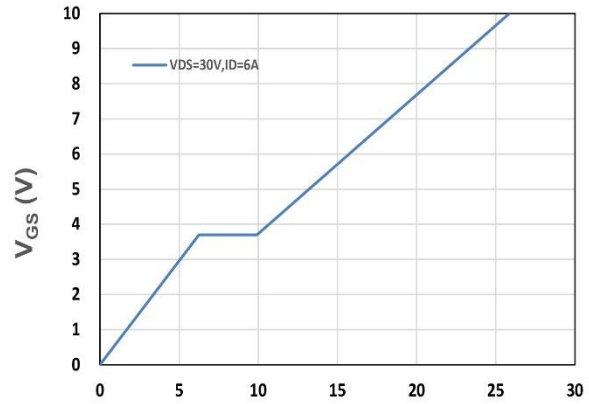
T_j , Junction Temperature($^{\circ}C$)
Figure 5. Drain-Source On Resistance



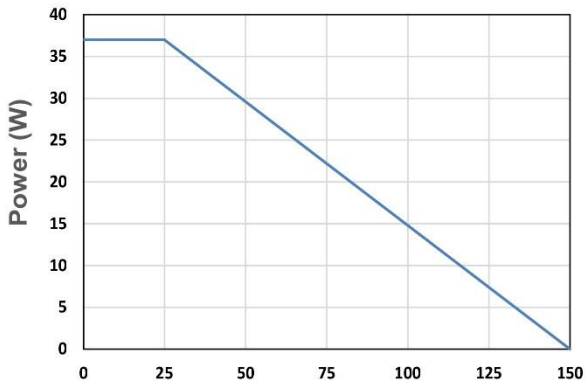
V_{SD} , Source-Drain Voltage(V)
Figure 6. Source-Drain Diode Forward



V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



T_J - Junction Temperature (°C)
Figure 9. Power Dissipation

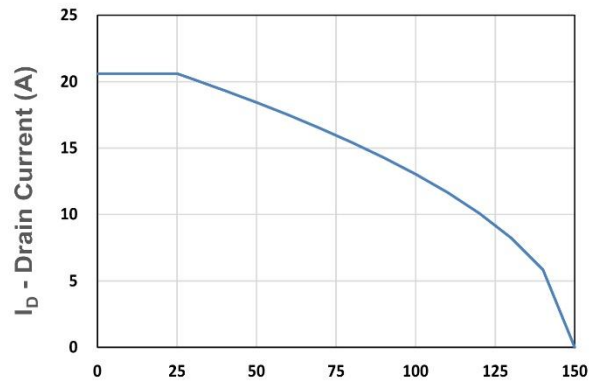
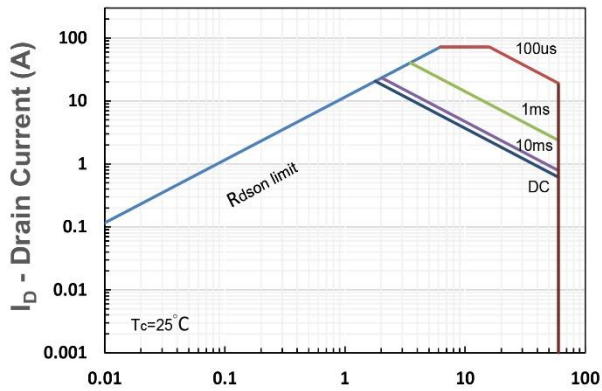
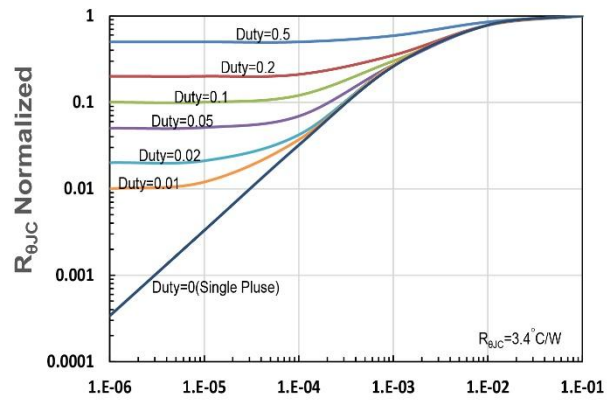


Figure 10. Drain Current



V_{DS} - Drain-Source Voltage (V)
Figure 11. Safe Operating Area



t_1 , Square Wave Pulse Duration(s)
Figure 12. $R_{\theta JC}$ Transient Thermal Impedance