





Power MOSFETS


DATASHEET


LM60J90NEI3A

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

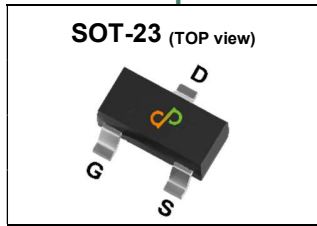
ISO 9001:2015 Certificate

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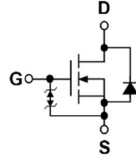


N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	60	V
$R_{DS(ON)-Max}$	1.9	Ω
I_D	0.31	A

Feature

- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- ESD Protection

Applications

- Small signal application
- Load switch

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM60J90NEI3A	SOT-23	Tape & Reel	3000 / Tape & Reel	21□□□

Note : □□□ = Lot Code

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	$T_A=25^\circ C$	0.77	A
I_D	Continuous Drain Current	$T_A=25^\circ C$	0.31	A
		$T_A=70^\circ C$	0.25	
P_D	Maximum Power Dissipation	$T_A=25^\circ C$	0.36	W
		$T_A=70^\circ C$	0.23	

Thermal Characteristics

Symbol	Parameter	Rating	Unit	
$R_{\theta JA}^{②}$	Thermal Resistance-Junction to Ambient	Steady State	350	°C/W

Note ① : Max. current is limited by junction temperature.

Note ② : Surface Mounted on 1in² FR-4 board with 1oz.

N-Channel Electrical Characteristics (T_J=25°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	1.6	2.5	V
I_{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±10	uA
R_{DS(on)} ^④	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =0.3A	-	1.6	1.9	Ω
		V _{GS} =4.5V, I _{DS} =0.2A	-	1.7	2.2	
gfs	Forward Transconductance	V _{DS} =10V, I _{DS} =0.15A	-	0.45	-	S
Dynamic Characteristics ^④						
C_{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Freq.=1MHz	-	26.2	-	pF
C_{oss}	Output Capacitance		-	2.7	-	
C_{rss}	Reverse Transfer Capacitance		-	1.7	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V, V _{DS} =30V, I _D =0.3A, R _{GEN} =10Ω	-	1	-	nS
t_r	Turn-on Rise Time		-	19.4	-	
t_{d(OFF)}	Turn-off Delay Time		-	23.2	-	
t_f	Turn-off Fall Time		-	21	-	
Q_g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =30V I _D =1A	-	0.9	-	nC
Q_g	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, I _D =1A	-	1.7	-	
Q_{gs}	Gate-Source Charge		-	0.4	-	
Q_{gd}	Gate-Drain Charge		-	0.3	-	
Source-Drain Characteristics						
V_{SD} ^⑤	Diode Forward Voltage	I _{SD} =0.15A, V _{GS} =0V	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	I _F =0.1A, V _R =0V	-	7.4	-	nS
Q_{rr}	Reverse Recovery Charge	di _F /dt=100A/μs	-	2.3	-	nC

Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

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

N-Channel Typical Characteristics

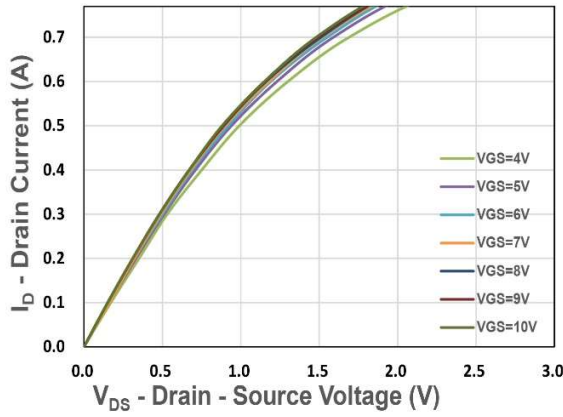


Figure 1. Output Characteristics

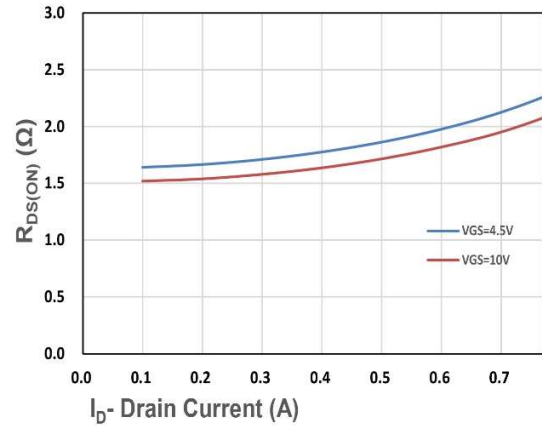


Figure 2. On-Resistance vs. ID

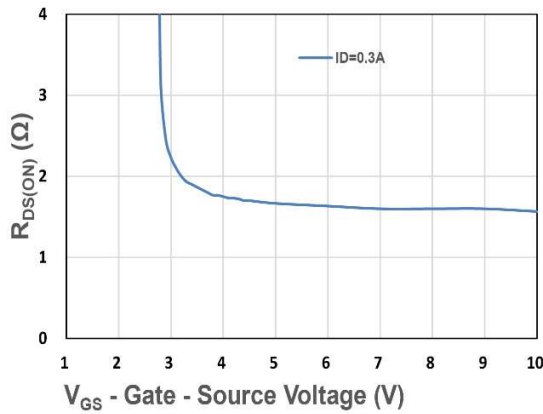


Figure 3. On-Resistance vs. VGS

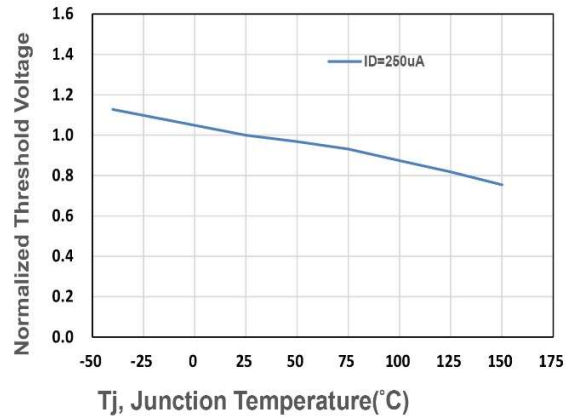


Figure 4. Gate Threshold Voltage

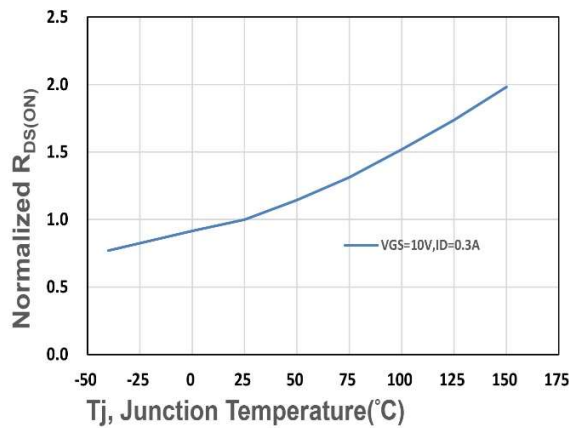


Figure 5. Drain-Source On Resistance

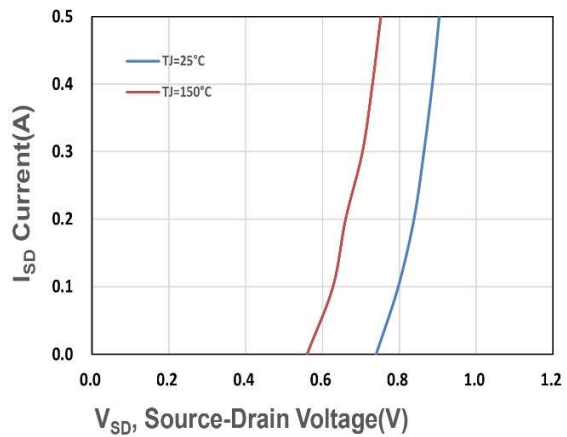


Figure 6. Source-Drain Diode Forward

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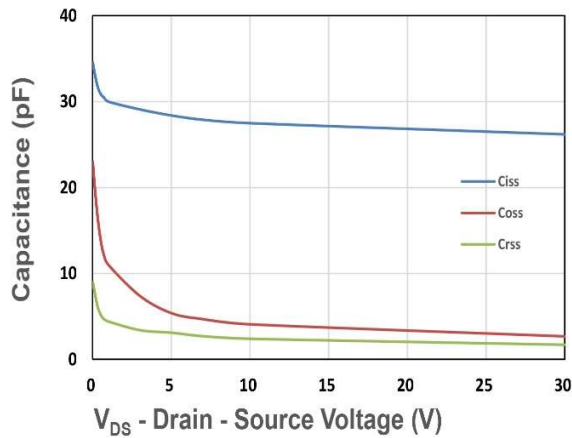


Figure 7. Capacitance

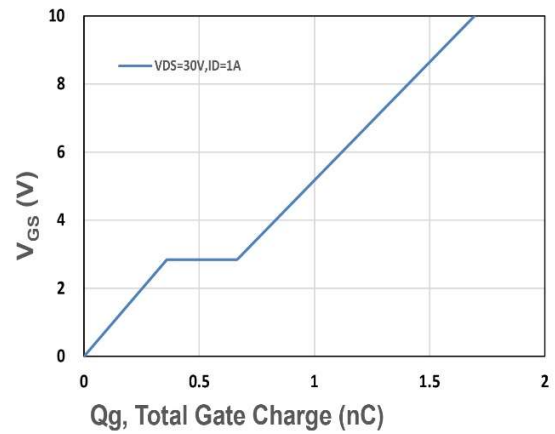


Figure 8. Gate Charge Characteristics

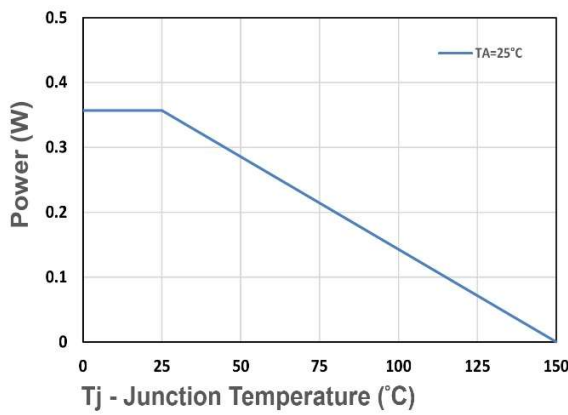


Figure 9. Power Dissipation

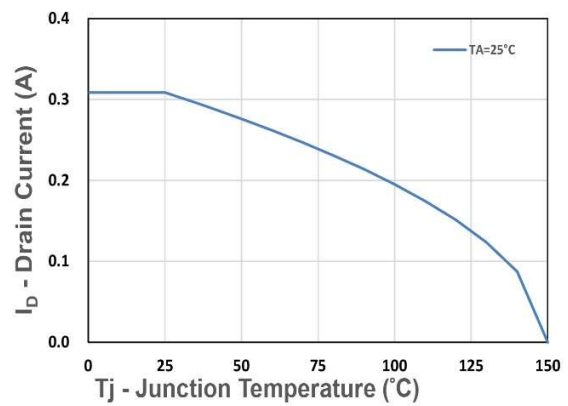


Figure 10. Drain Current

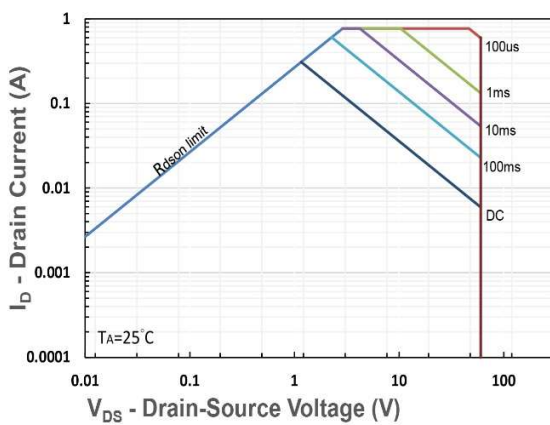


Figure 11. Safe Operating Area

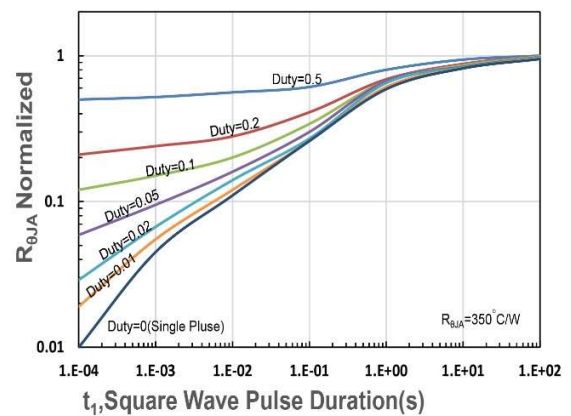


Figure 12. $R_{\theta JA}$ Transient Thermal Impedance