



Power MOSFETS

DATASHEET

LM1A090NAP3A

N-Channel
Enhancement Mode MOSFET

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Quality Management Systems

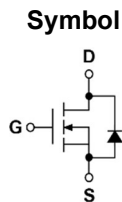
ISO 9001:2015 Certificate

LM1A090NAP3A



N-Channel Enhancement Mode MOSFET

Pin Description



Ordering Information

Symbol	N-Channel	Unit
V_{DSS}	100	V
$R_{DS(ON)-Max}$	9.3	mΩ
I_D	72	A

Feature

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

Applications

- DC-DC Converter
- Motor Control

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM1A090NAP3A	TO-220-3L	Tube	50 / Tube	1A090 □□□□□□

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		100	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	$T_c=25^{\circ}\text{C}$	122	A
I_D	Continuous Drain Current	$T_c=25^{\circ}\text{C}$	72	A
		$T_c=100^{\circ}\text{C}$	46	
P_D	Maximum Power Dissipation	$T_c=25^{\circ}\text{C}$	83	W
		$T_c=100^{\circ}\text{C}$	33	
$I_{AS}^{②}$	Avalanche Current, Single pulse	$L=0.1\text{mH}$	20	A
$E_{AS}^{②}$	Avalanche Energy, Single pulse	$L=0.1\text{mH}$	20	mJ

Thermal Characteristics

Symbol	Parameter		Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	1.5	$^{\circ}\text{C/W}$
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State	62.5	$^{\circ}\text{C/W}$

Note ① : Max. current is limited by bonding wire

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	100	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =80V, V _{GS} =0V	-	-	1	uA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	1	2	3	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} =20A	-	7.8	9.3	mΩ
		V _{GS} =4.5V, I _{DS} =10A	-	11.8	14.3	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	35	-	S
Dynamic Characteristics ⑤						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	2	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, Freq.=1MHz	-	1931	-	pF
C _{oss}	Output Capacitance		-	390	-	
C _{rss}	Reverse Transfer Capacitance		-	32	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V, V _{DS} =50V, Id=1A, RGEN=3Ω	-	11	-	nS
tr	Turn-on Rise Time		-	21	-	
td(OFF)	Turn-off Delay Time		-	32	-	
tf	Turn-off Fall Time		-	15	-	
Qg	Total Gate Charge	V _{GS} =4.5V, V _{DS} =50V Id=20A	-	22.9	-	nC
Qg	Total Gate Charge	V _{GS} =10V, V _{DS} =50V, Id=20A	-	41.8	-	
Qgs	Gate-Source Charge		-	5.4	-	
Qgd	Gate-Drain Charge		-	12.4	-	
Source-Drain Characteristics						
VSD ④	Diode Forward Voltage	ISD=10A, VGS=0V	-	0.8	1.1	V
trr	Reverse Recovery Time	IF=10A, VR=50V	-	48.2	-	nS
Qrr	Reverse Recovery Charge	dIF/dt=100A/μs	-	78.5	-	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

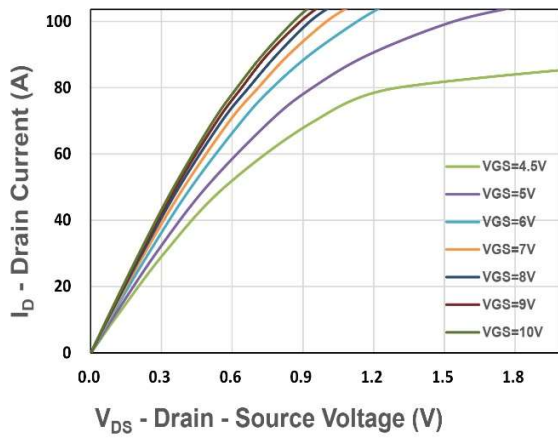


Figure 1. Output Characteristics

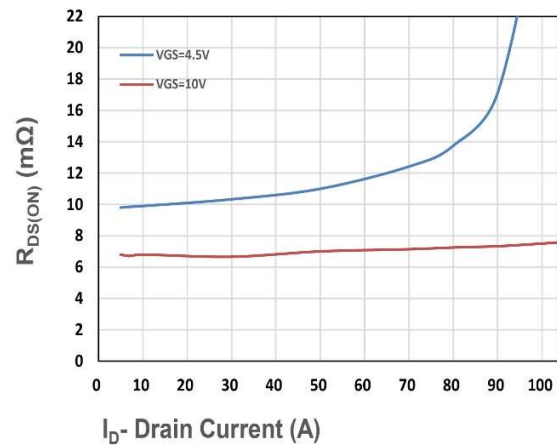


Figure 2. On-Resistance vs. ID

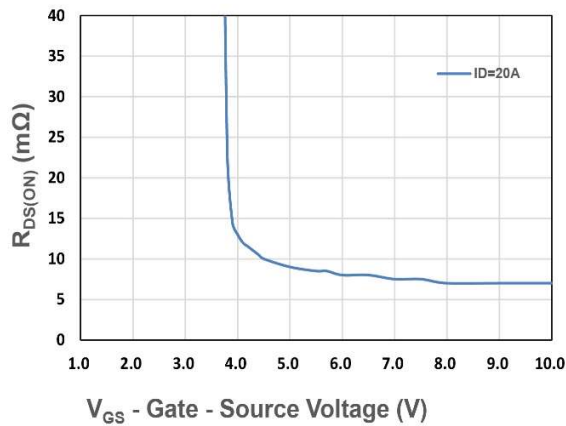


Figure 3. On-Resistance vs. VGS

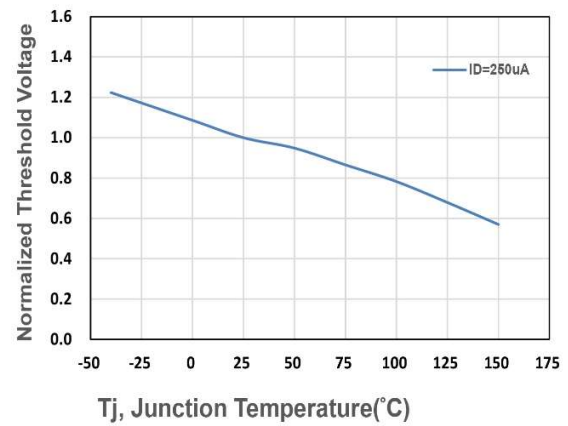


Figure 4. Gate Threshold Voltage

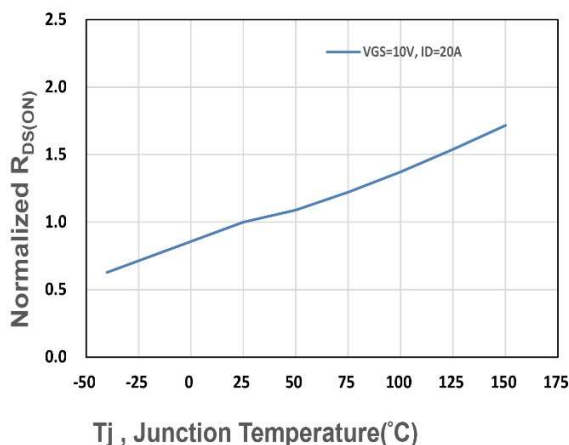


Figure 5. Drain-Source On Resistance

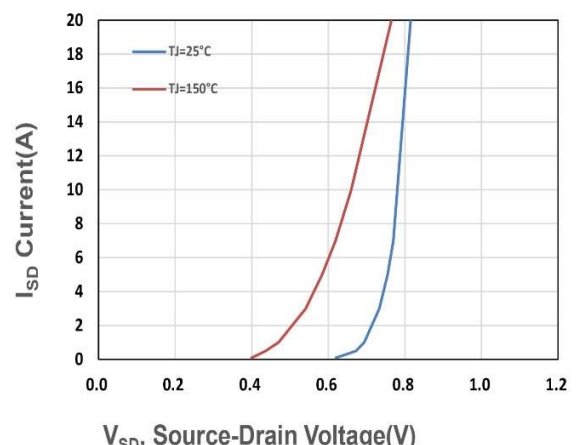
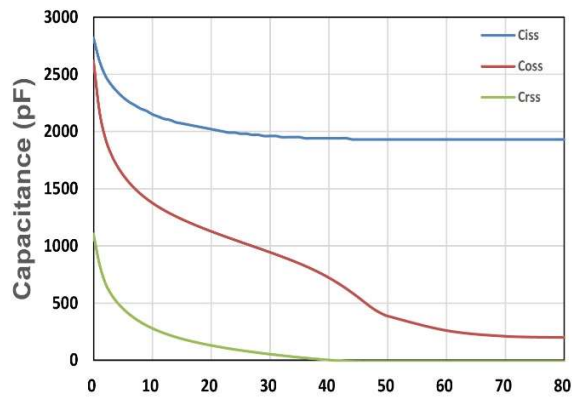
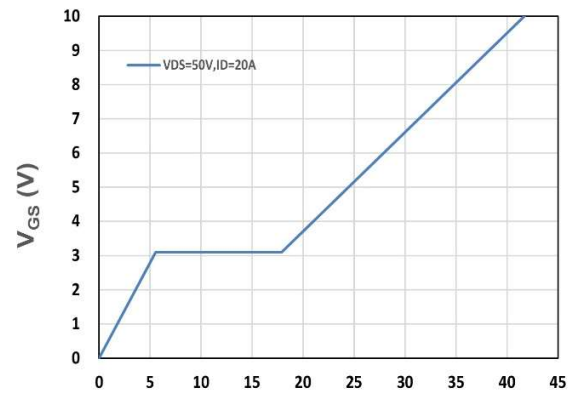


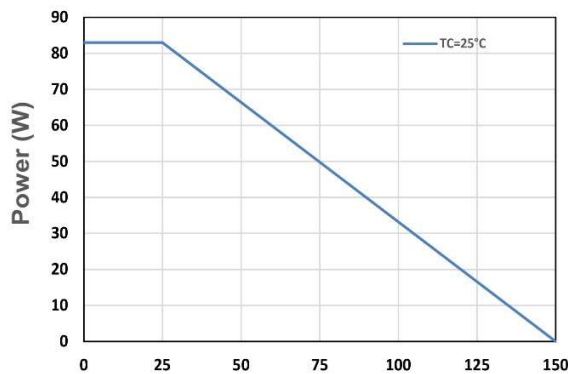
Figure 6. Source-Drain Diode Forward



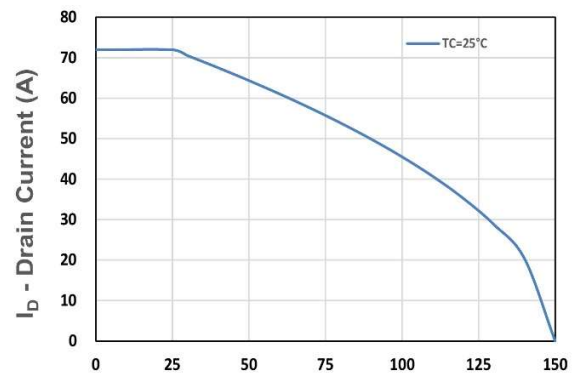
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



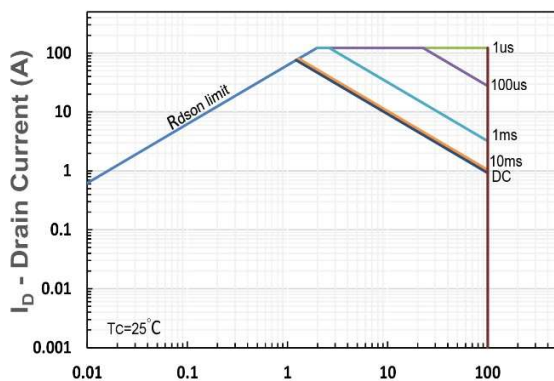
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



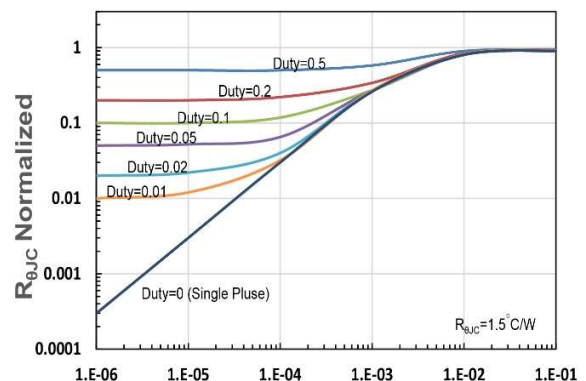
T_C - Junction Temperature (°C)
Figure 9. Power Dissipation



T_C - Junction Temperature (°C)
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