





Power MOSFETS


DATASHEET

LM1A090NAQ8A

N-Channel
Enhancement Mode MOSFET

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Quality Management Systems

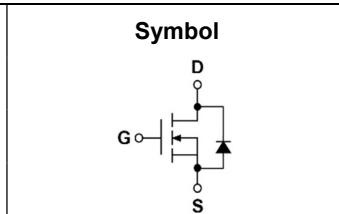
ISO 9001:2015 Certificate

LM1A090NAQ8A



N-Channel Enhancement Mode MOSFET

Pin Description



Ordering Information

Symbol	N-Channel	Unit
V_{DSS}	100	V
$R_{DS(ON)-Max}$	8.4	m Ω
I_D	10.7	A

Feature

- Optimized high performance of R_{dson} and Q_g
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS Tested

Applications

- Motor drivers
- DC DC converter

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM1A090NAQ8A	SOP-8L	Tape & Reel	3000 / Tape & Reel	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_S	Diode Pulse Forward Current	$T_A=25^\circ\text{C}$	1.5 A
$I_{DM}^{(1)}$	Pulse Drain Current Tested	$T_A=25^\circ\text{C}$	27 A
I_D	Continuous Drain Current	$T_A=25^\circ\text{C}$	10.7 A
		$T_A=70^\circ\text{C}$	6.8 A
P_D	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	1.7 W
		$T_A=70^\circ\text{C}$	0.7 W
$I_{AS}^{(2)}$	Avalanche Current, Single pulse	L=0.1mH	19 A
		L=0.5mH	10 A
$E_{AS}^{(2)}$	Avalanche Energy, Single pulse	L=0.1mH	18 mJ
		L=0.5mH	25 mJ

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	$t \leq 10s$	30
	Thermal Resistance-Junction to Ambient	Steady State	75

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°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} =12A	-	7	8.4	mΩ
		V _{GS} =4.5V, I _{DS} =8A	-	10	13	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =12A	-	34	-	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	-	1932	-	pF
C_{oss}	Output Capacitance		-	387	-	
C_{rss}	Reverse Transfer Capacitance		-	30	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V, V _{DS} =50V, I _D =1A, R _{GEN} =3Ω	-	10.2	-	nS
t_r	Turn-on Rise Time		-	20	-	
t_{d(OFF)}	Turn-off Delay Time		-	31	-	
t_f	Turn-off Fall Time		-	14	-	
Q_g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =50V, I _D =20A	-	22.8	-	nC
Q_g	Total Gate Charge	V _{GS} =10V, V _{DS} =50V, I _D =20A	-	41.8	-	
Q_{gs}	Gate-Source Charge		-	5.6	-	
Q_{gd}	Gate-Drain Charge		-	12.3	-	
Source-Drain Characteristics						
V_{SD} ^④	Diode Forward Voltage	I _{SD} =12A, V _{GS} =0V	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	I _F =20A, V _R =50V	-	49	-	nS
Q_{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	58.7	-	nC

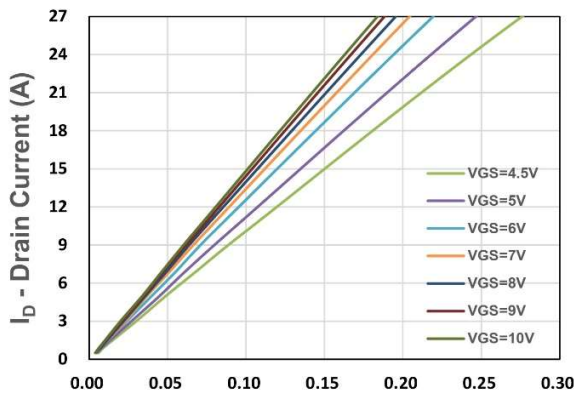
Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

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

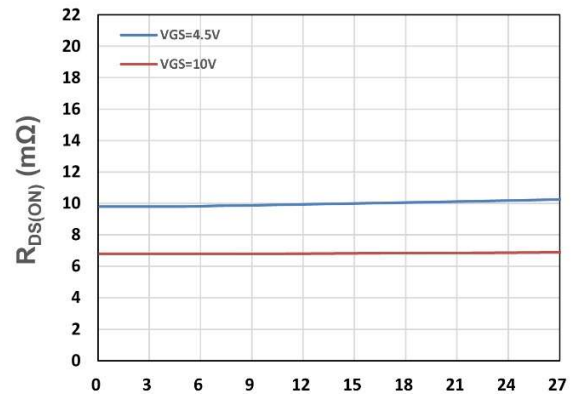
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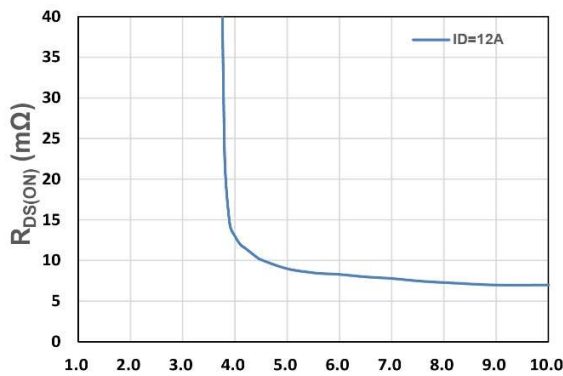
N-Channel Typical Characteristics



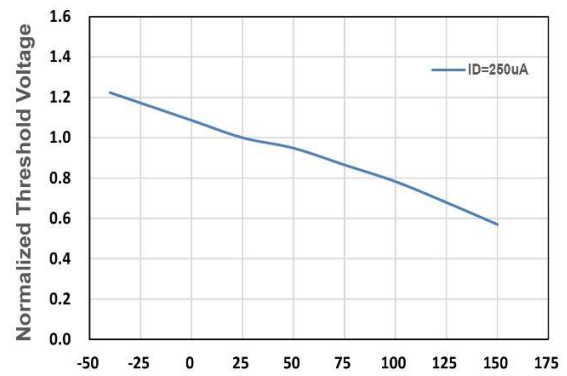
V_{DS} - Drain - Source Voltage (V)
Figure 1. Output Characteristics



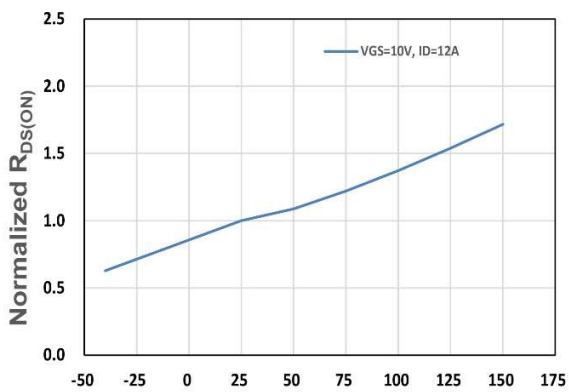
I_D - Drain Current (A)
Figure 2. On-Resistance vs. I_D



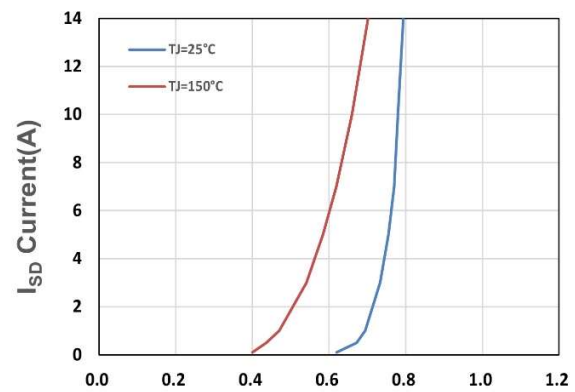
V_{GS} - Gate - Source Voltage (V)
Figure 3. On-Resistance vs. V_{GS}



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

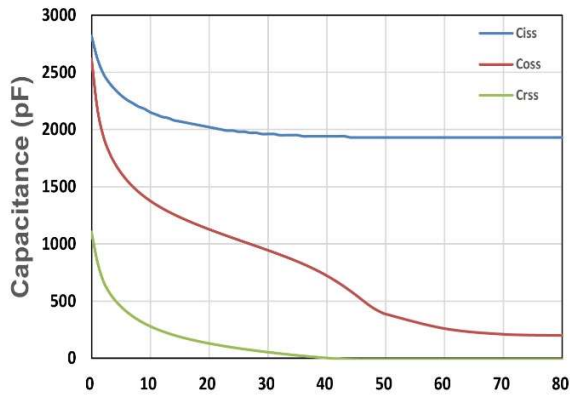


T_j , Junction Temperature($^{\circ}C$)
Figure 5. Drain-Source On Resistance

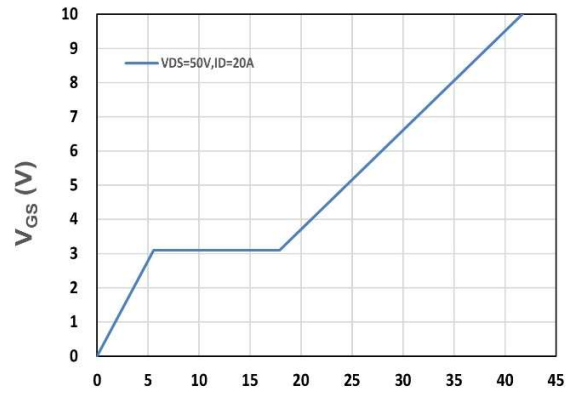


V_{SD} , Source-Drain Voltage(V)
Figure 6. Source-Drain Diode Forward

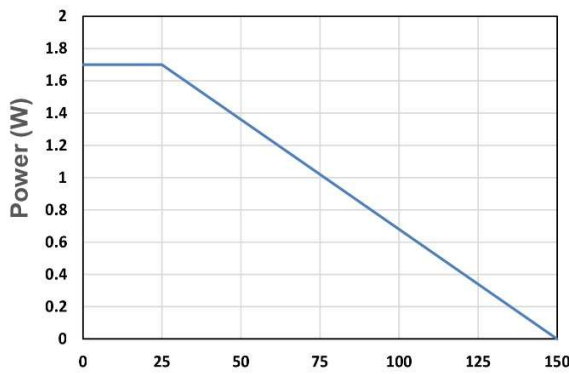
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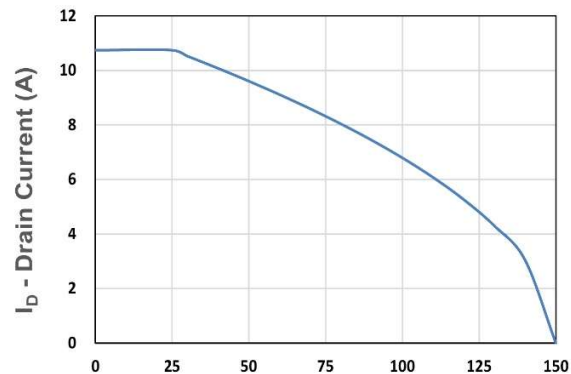
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



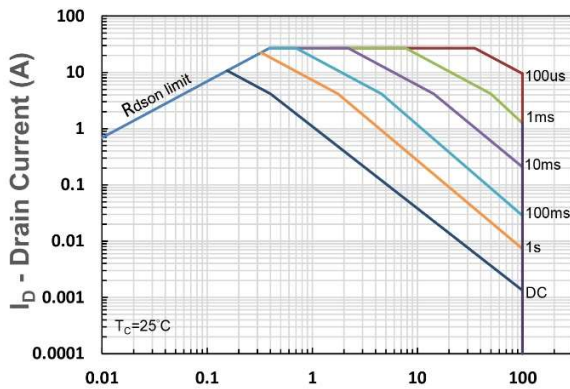
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



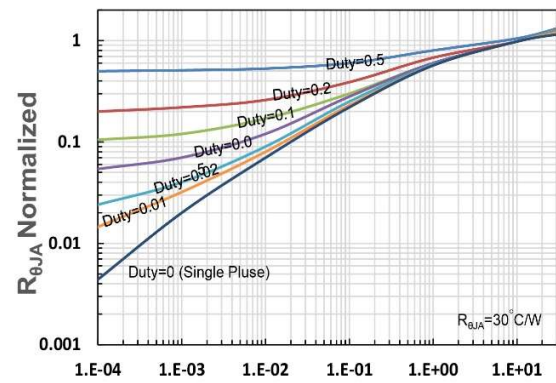
T_A - Ambient Temperature (°C)
Figure 9. Power Dissipation



T_A - Ambient 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. $R_{\theta JA}$ Transient Thermal Impedance