



Power MOSFETS

DATASHEET

LM60110NAQ8A

N-Channel
Enhancement Mode MOSFET

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Quality Management Systems

ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description

SOP-8L(TOP view)	Symbol	Symbol	N-Channel	Unit
		V_{DSS}	60	V
		$R_{DS(ON)-Max}$	11	m Ω
		ID	12	A

Feature

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

Applications

- Power Management in DC/DC Converters
- USB Power Delivery (USB PD)

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM60110NAQ8A	SOP-8L	Tape & Reel	3000 / Tape & Reel	60110 □□□□□□

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	V
T_J	Maximum Junction Temperature	150	°C
T_{STG}	Storage Temperature Range	-55 to 150	°C
I_S	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$	1.5
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	30
I_D	Continuous Drain Current	$T_A=25^\circ\text{C}$	12
		$T_A=70^\circ\text{C}$	9.7
P_D	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	1.6
		$T_A=70^\circ\text{C}$	1.0
$I_{AS}^{②}$	Avalanche Current, Single pulse	L=0.1mH	24
		L=0.5mH	13
$E_{AS}^{②}$	Avalanche Energy, Single pulse	L=0.1mH	29
		L=0.5mH	42

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	$t \leq 10s$	32
		Steady State	78

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	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} =20A	-	8.5	11	mΩ
		V _{GS} =4.5V, I _{DS} =10A		13	17	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	16.8	-	S
Dynamic Characteristics ^⑥						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V, Freq.=1MHz	-	1	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, Freq.=1MHz	-	1232	-	pF
C _{oss}	Output Capacitance		-	317	-	
C _{rss}	Reverse Transfer Capacitance		-	46	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V,V _{DS} =30V, Id=1A,RGEN=1Ω	-	8.8	-	nS
tr	Turn-on Rise Time		-	19.6	-	
td(OFF)	Turn-off Delay Time		-	25.6	-	
tf	Turn-off Fall Time		-	29	-	
Qg	Total Gate Charge	V _{GS} =4.5V,V _{DS} =30V Id=20A	-	11.2	-	nC
Qg	Total Gate Charge	V _{GS} =10V,V _{DS} =30V, Id=20A	-	22.3	-	
Qgs	Gate-Source Charge		-	4.9	-	
Qgd	Gate-Drain Charge		-	4.8	-	
Source-Drain Characteristics						
VSD ^④	Diode Forward Voltage	ISD=10A, VGS=0V	-	0.8	1.1	V
trr	Reverse Recovery Time	IF=10A, VR=48V	-	22.5	-	nS
Qrr	Reverse Recovery Charge	dIF/dt=100A/μs	-	11.1	-	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

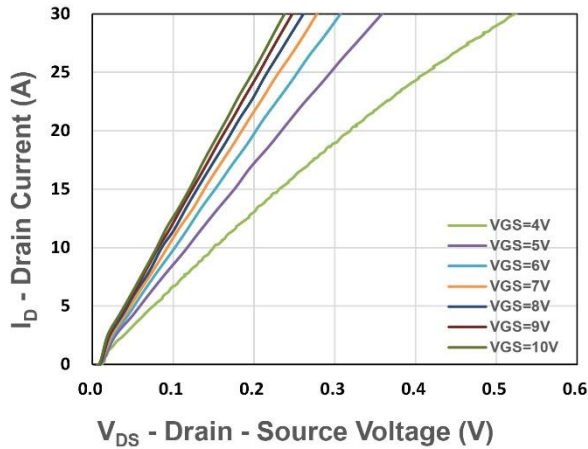


Figure 1. Output Characteristics

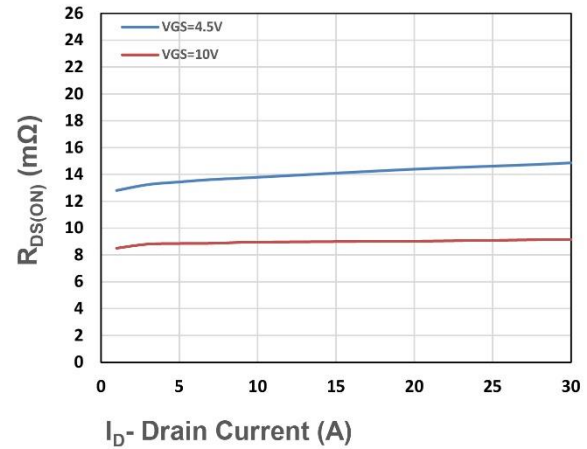


Figure 2. On-Resistance vs. I_D

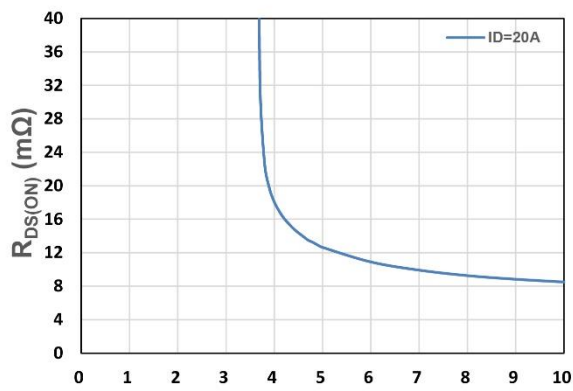


Figure 3. On-Resistance vs. V_{GS}

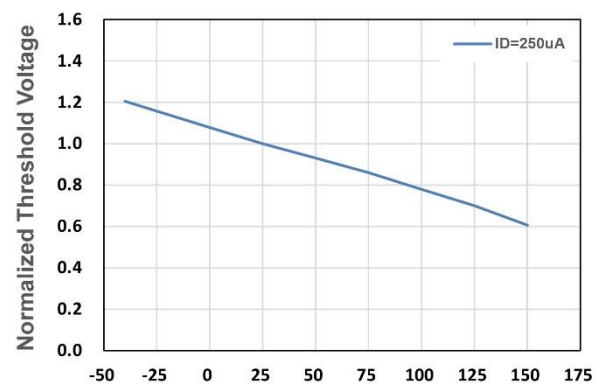


Figure 4. Gate Threshold Voltage

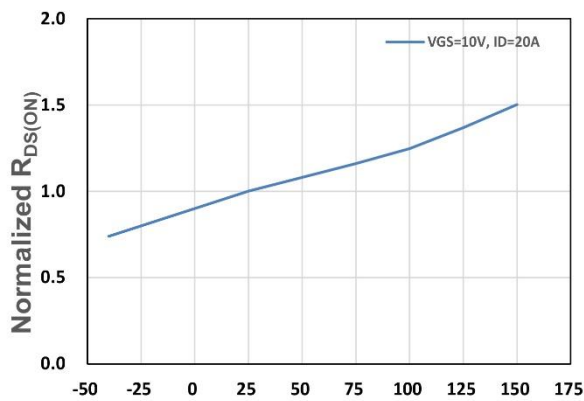


Figure 5. Drain-Source On Resistance

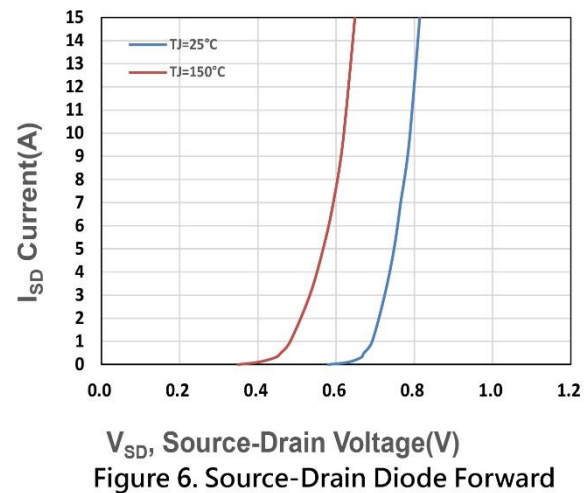


Figure 6. Source-Drain Diode Forward

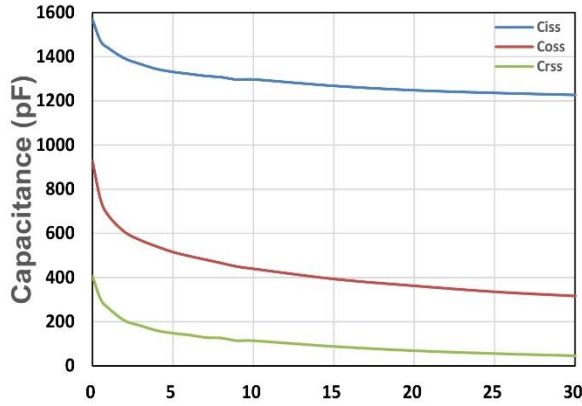


Figure 7. Capacitance

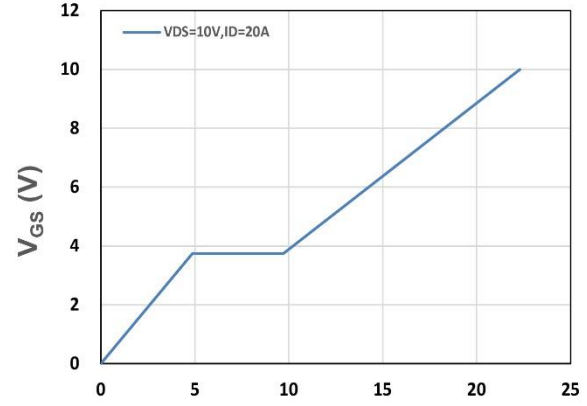


Figure 8. Gate Charge Characteristics

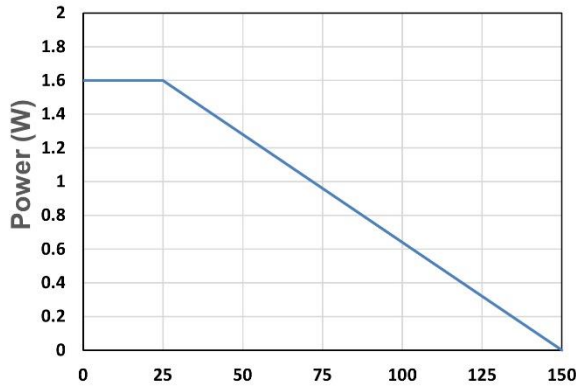


Figure 9. Power Dissipation

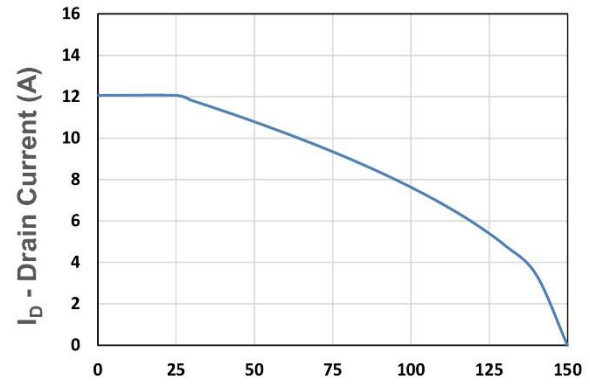


Figure 10. Drain Current

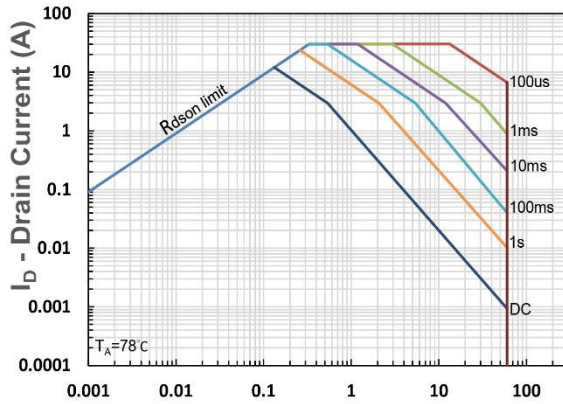


Figure 11. Safe Operating Area

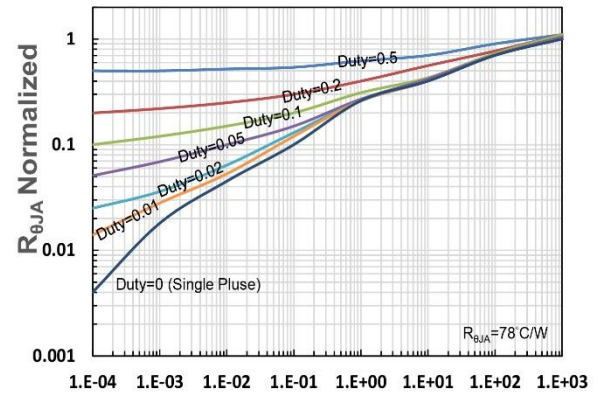


Figure 12. $R_{\theta JA}$ Transient Thermal Impedance