



Power MOSFETS

DATASHEET

LM45012NAM8A

N-Channel
Enhancement Mode MOSFET



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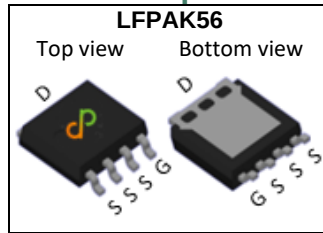


Quality Management Systems

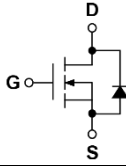
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DS}	45	V
$R_{DS(ON)-Max}$	1.1	m Ω
I_D	233	A

Feature

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS and Rg Tested
- Moisture Sensitivity Level MSL1

Applications

- DC-to-DC converters
- Switch Mode Power Supply
- Brushless DC motor control

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM45012NAM8A	LFPAK56	Tape & Reel	4000 / Tape & Reel	45012 □□□□□□

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		45	V
V _{GSS}	Gate-Source Voltage		±20	
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°C	98	A
I _{SP}	Diode Pulse Current	T _C =25°C	400 ^①	A
I _{DM}	Pulse Drain Current Tested	T _C =25°C	800 ^①	A
I _D	Continuous Drain Current	T _C =25°C	233	A
		T _C =100°C	147	
P _D	Maximum Power Dissipation	T _C =25°C	104	W
		T _C =100°C	41	
I _D	Continuous Drain Current	T _A =25°C	38	A
		T _A =70°C	30	
P _D	Maximum Power Dissipation	T _A =25°C	2.78	W
		T _A =70°C	1.78	
I _{AS} ^②	Avalanche Current, Single pulse	L=0.1mH	64	A
		L=0.5mH	34	
E _{AS} ^②	Avalanche Energy, Single pulse	L=0.1mH	204	mJ
		L=0.5mH	290	

Thermal Characteristics

Symbol	Parameter		Rating	Unit
R _{θJC}	Thermal Resistance-Junction to Case	Steady State	1.2	°C/W
R _{θJA} ^③	Thermal Resistance-Junction to Ambient	Steady State	45	°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 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	45	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =36V, V _{GS} =0V	-	-	1	uA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	1.2	2	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	-	0.85	1.1	mΩ
		V _{GS} =4.5V, I _{DS} =10A	-	1.5	2.0	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	48	-	S
Dynamic Characteristics ⑥						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	0.9	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, Freq.=1MHz	-	5828	-	pF
C _{oss}	Output Capacitance		-	1439	-	
C _{rss}	Reverse Transfer Capacitance		-	80	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V, V _{DS} =22.5V, I _D =1A, R _{GEN} =1Ω	-	15.3	-	nS
tr	Turn-on Rise Time		-	12.5	-	
td(OFF)	Turn-off Delay Time		-	49.8	-	
tf	Turn-off Fall Time		-	88	-	
Qg	Total Gate Charge	V _{GS} =10V, V _{DS} =22.5V, I _D =20A	-	87.2	-	nC
Qgs	Gate-Source Charge		-	19.3	-	
Qgd	Gate-Drain Charge		-	17.3	-	
Source-Drain Characteristics						
VSD④	Diode Forward Voltage	ISD=10A, VGS=0V	-	0.7	1.1	V
trr	Reverse Recovery Time	IF=10A, VR=22.5V	-	45.1	-	nS
Qrr	Reverse Recovery Charge	dIF/dt=100A/μs	-	39	-	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

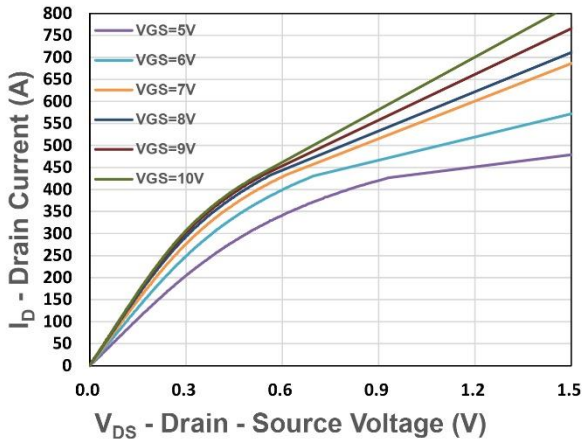


Figure 1. Output Characteristics

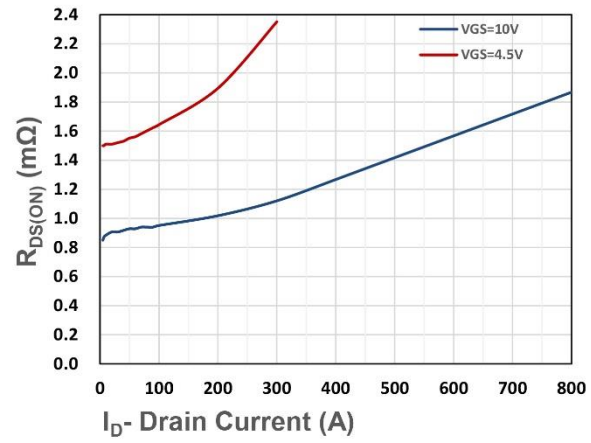


Figure 2. On-Resistance vs. ID

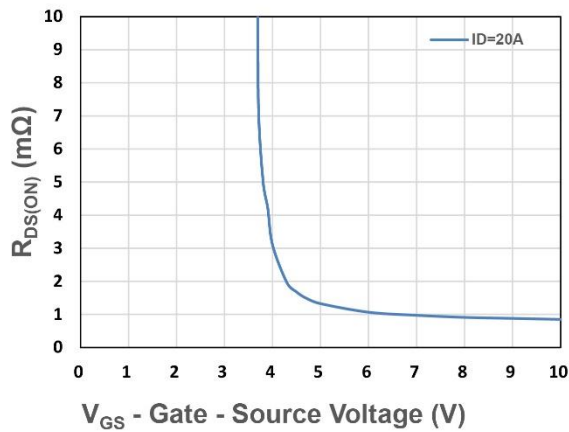


Figure 3. On-Resistance vs. VGS

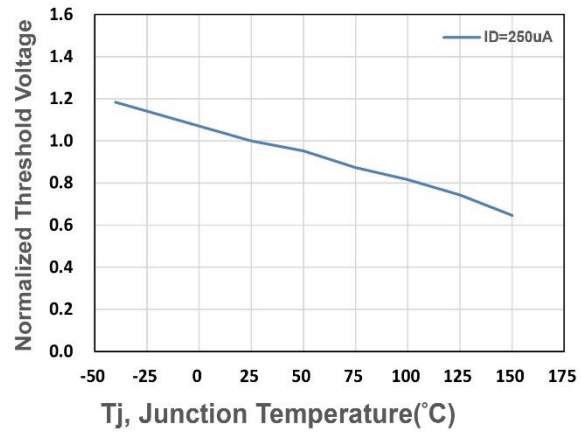


Figure 4. Gate Threshold Voltage

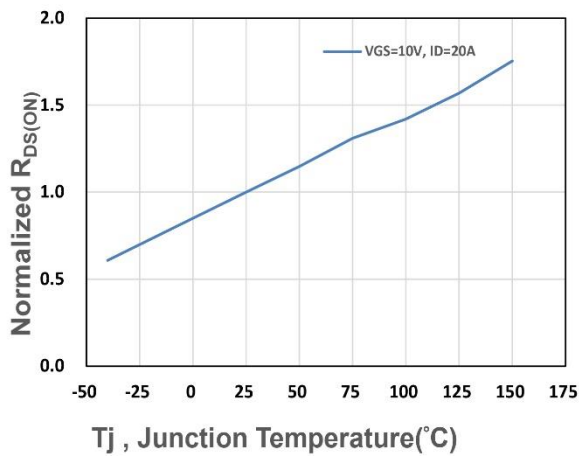


Figure 5. Drain-Source On Resistance

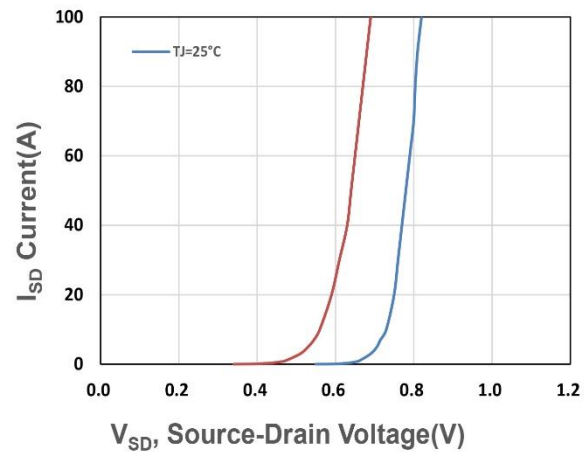


Figure 6. Source-Drain Diode Forward

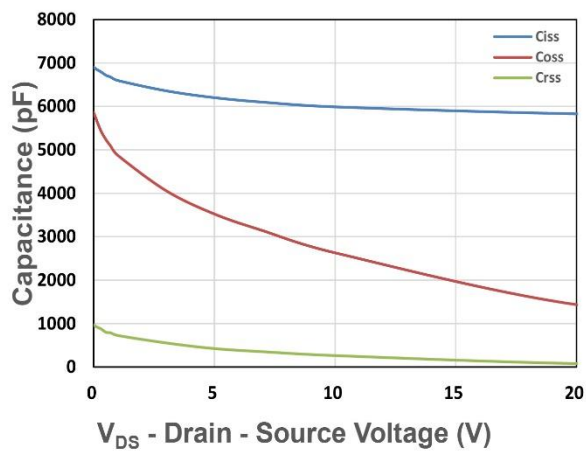


Figure 7. Capacitance

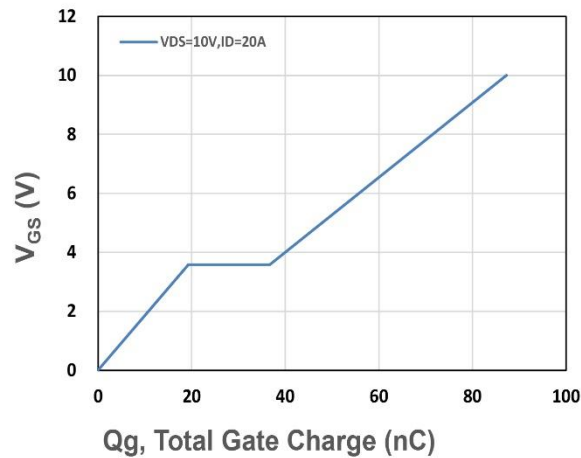


Figure 8. Gate Charge Characteristics

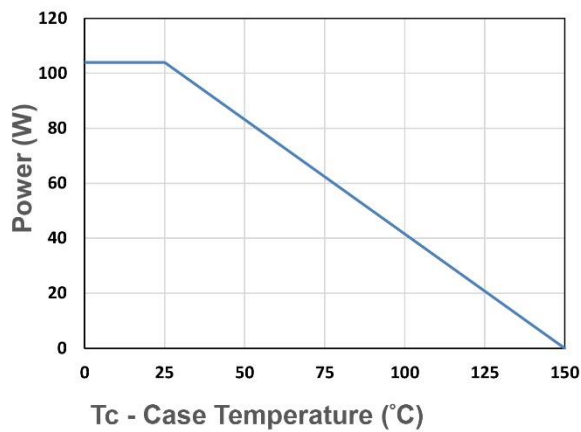


Figure 9. Power Dissipation

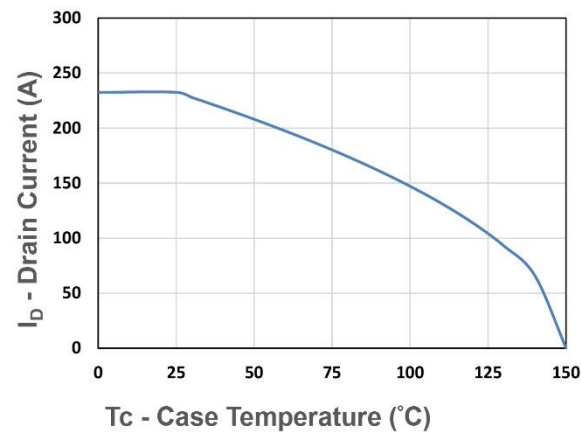


Figure 10. Drain Current

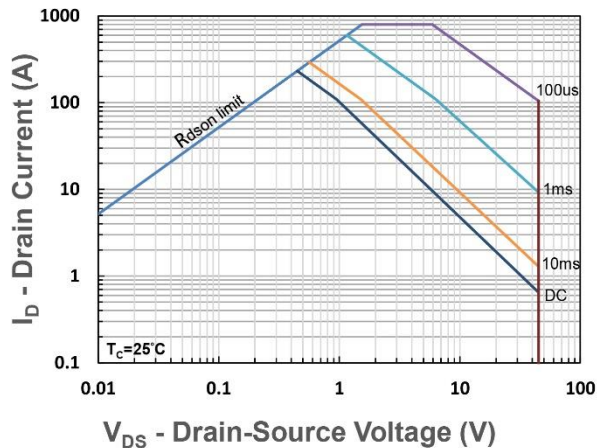


Figure 11. Safe Operating Area

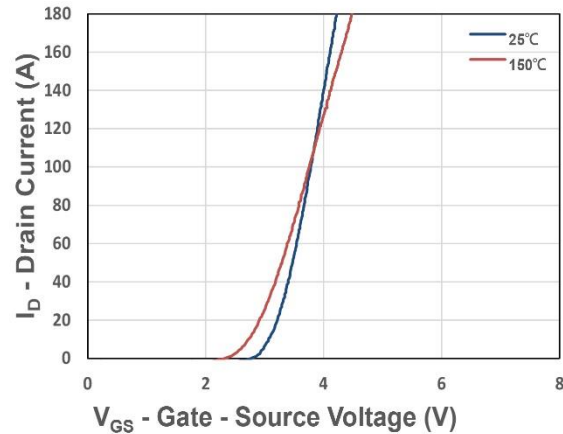


Figure 12. Transfer Characteristics

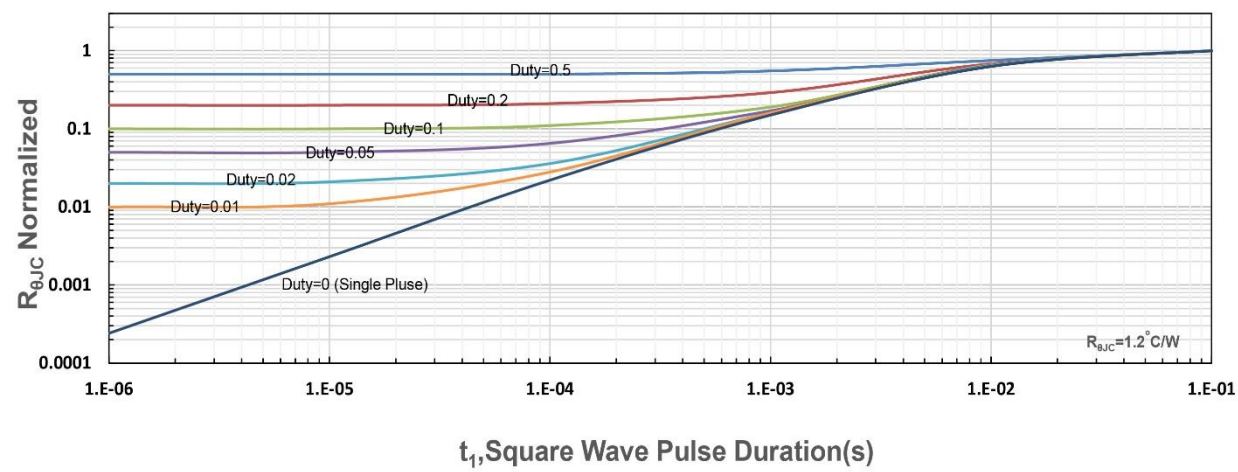


Figure 13. $R_{\theta JC}$ Transient Thermal Impedance