



Power MOSFETS

DATASHEET

LM45012NAK8A

N-Channel
Enhancement Mode MOSFET

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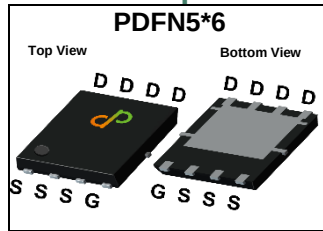


Quality Management Systems

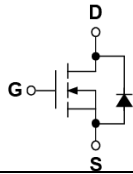
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DS}	45	V
$R_{DS(ON)-Max}$	1.2	m Ω
ID	224	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
LM45012NAK8A	PDFN5*6	Tape & Reel	5000 / Tape & Reel	45012 □□□□□□

Note : □□□□□□ = Lot Code

Absolute Maximum Ratings (T_J=25°C Unless Otherwise Noted)

Symbol	Parameter	N-Channel	Unit
V_{DS}	Drain-Source Voltage	45	V
V_{GS}	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	$T_C=25^\circ\text{C}$ 98	A
I_{SP}	Diode Pulse Current	$T_C=25^\circ\text{C}$ 400 ^①	A
I_{DM}	Pulse Drain Current Tested	$T_C=25^\circ\text{C}$ 800 ^①	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$ 224	A
		$T_C=100^\circ\text{C}$ 141	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$ 96	W
		$T_C=100^\circ\text{C}$ 39	
I_D	Continuous Drain Current	$T_A=25^\circ\text{C}$ 33	A
		$T_A=70^\circ\text{C}$ 26	
P_D	Maximum Power Dissipation	$T_A=25^\circ\text{C}$ 2.1	W
		$T_A=70^\circ\text{C}$ 1.3	
$I_{AS}^{②}$	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
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State 1.3	°C/W
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State 60	°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 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	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	-	0.95	1.2	mΩ
		V _{GS} =4.5V, I _{DS} =10A	-	1.6	2.1	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	48	-	S
Dynamic Characteristics ^⑤						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	0.95	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, Freq.=1MHz	-	5828	-	pF
C _{oss}	Output Capacitance		-	1440	-	
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
t _r	Turn-on Rise Time		-	12.5	-	
t _{d(OFF)}	Turn-off Delay Time		-	49.8	-	
t _f	Turn-off Fall Time		-	88	-	
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =22.5V, I _D =20A	-	87.2	-	nC
Q _{gs}	Gate-Source Charge		-	19.5	-	
Q _{gd}	Gate-Drain Charge		-	17.3	-	
Source-Drain Characteristics						
V _{SD} ^④	Diode Forward Voltage	I _{SD} =10A, V _{GS} =0V	-	0.7	1.1	V
t _{rr}	Reverse Recovery Time	I _F =10A, V _R =22.5V	-	45.1	-	nS
Q _{rr}	Reverse Recovery Charge	dI _F /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

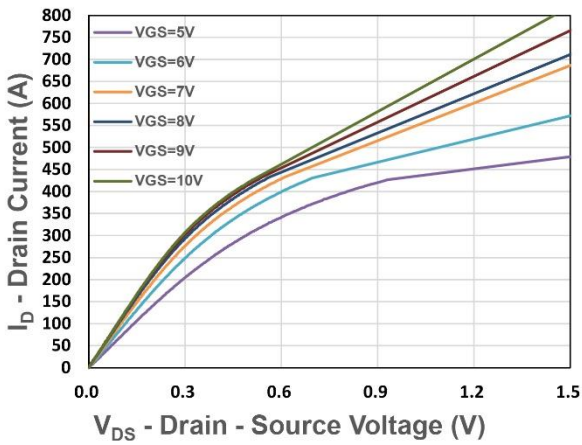


Figure 1. Output Characteristics

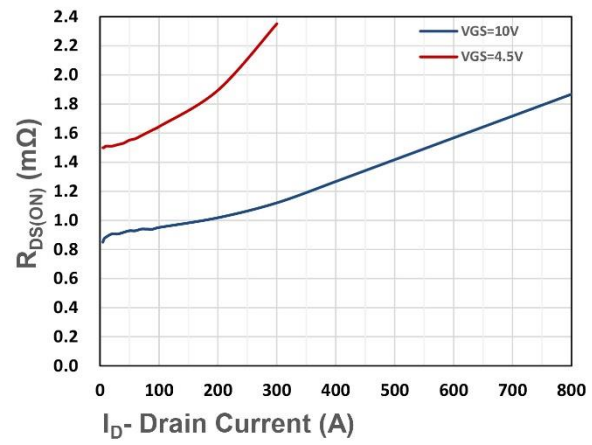


Figure 2. On-Resistance vs. I_D

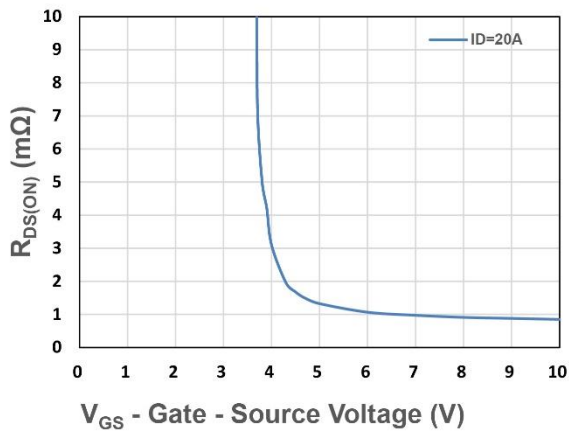


Figure 3. On-Resistance vs. V_{GS}

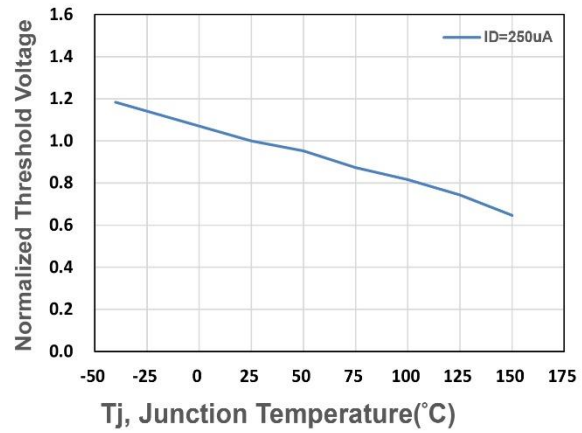


Figure 4. Gate Threshold Voltage

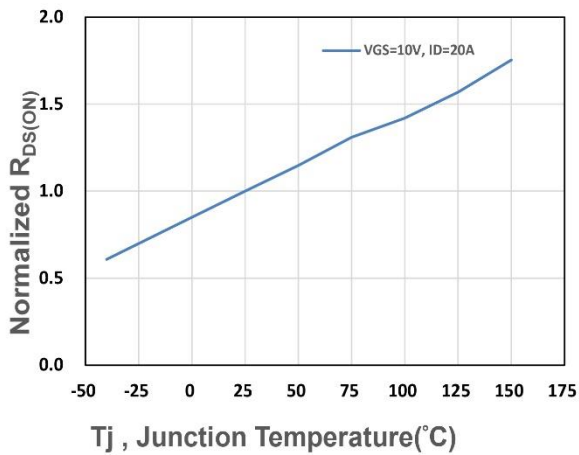


Figure 5. Drain-Source On Resistance

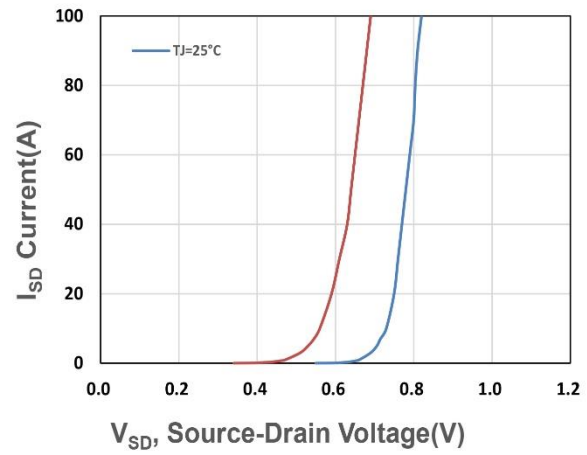


Figure 6. Source-Drain Diode Forward

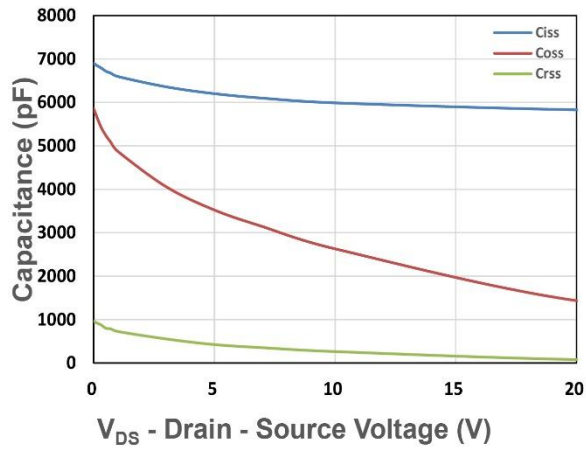


Figure 7. Capacitance

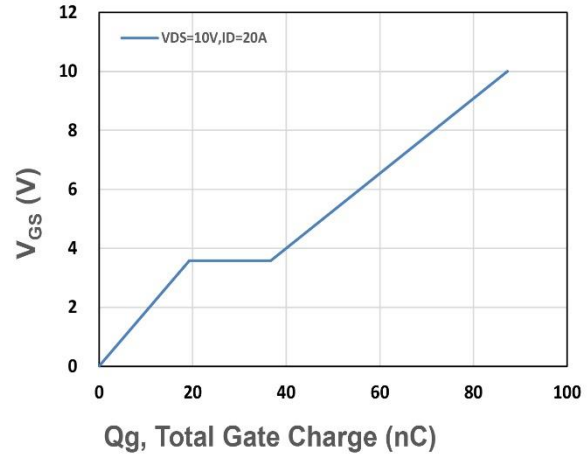


Figure 8. Gate Charge Characteristics

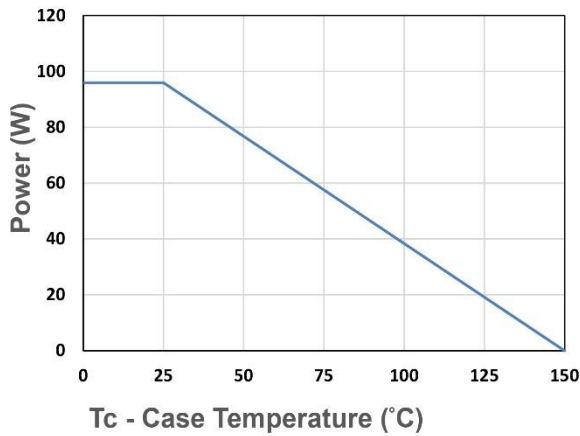


Figure 9. Power Dissipation

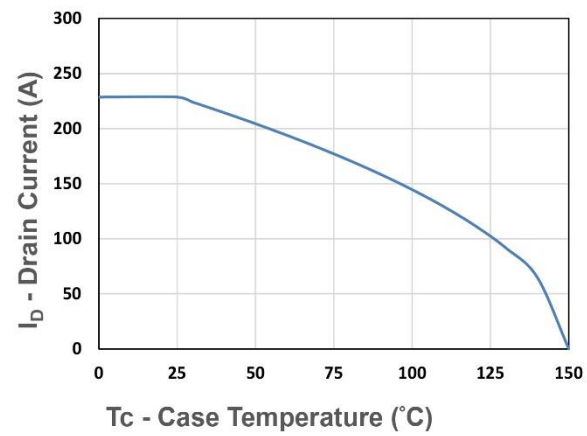


Figure 10. Drain Current

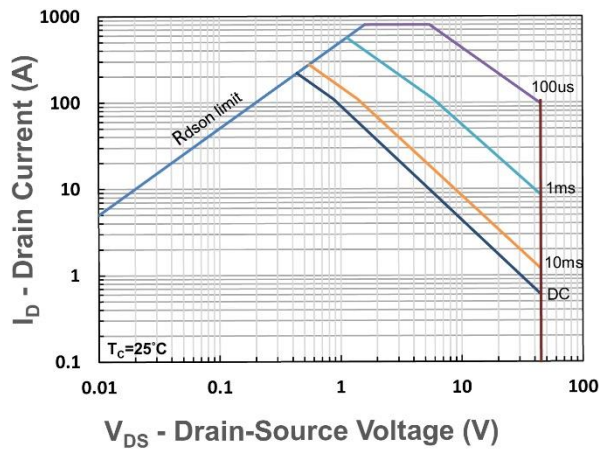


Figure 11. Safe Operating Area

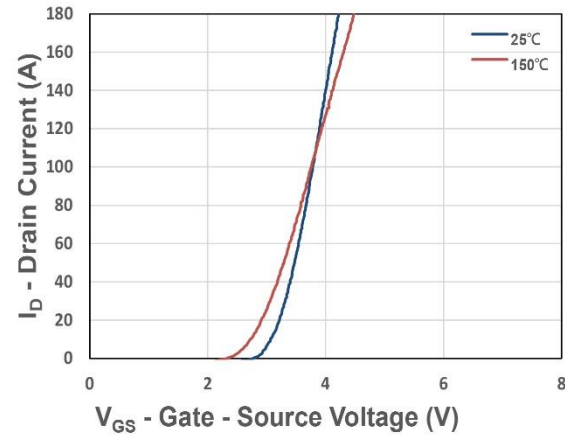


Figure 12. Transfer Characteristics

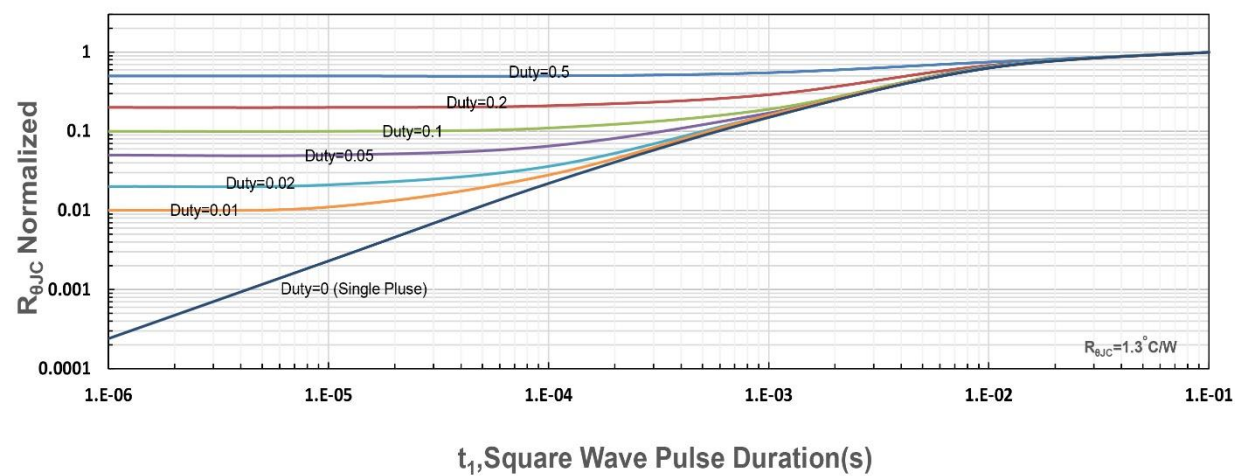


Figure 13. $R_{\theta JC}$ Transient Thermal Impedance