Power MOSFETS

DATASHEET

LM40046NAK8A

N-Channel

Enhancement Mode MOSFET

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Quality Management Systems

ISO 9001:2015 Certificate

LM40046NAK8A

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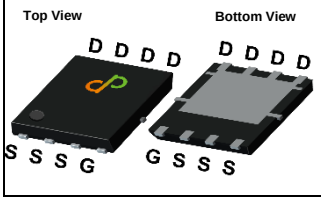
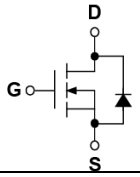
Pin Description

PDFN5*6



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	40	V
$R_{DS(ON)-Max}$	5	mΩ
ID	93	A

Feature

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

Applications

- Portable Equipment
- Battery Powered System

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM40046NAK8A	PDFN5*6	Tape & Reel	5000 / Tape & Reel	40046 □□□□□□

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

Symbol	Parameter		N-Channel	Unit
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_{DM}①	Pulse Drain Current Tested	T_C=25°C	184	A
I_D	Continuous Drain Current	T_C=25°C	93	A
		T_C=100°C	59	
P_D	Maximum Power Dissipation	T_C=25°C	83	W
		T_C=100°C	33	
I_{AS}②	Avalanche Current, Single pulse	L=0.1mH	35	A
E_{AS}②	Avalanche Energy, Single pulse	L=0.1mH	61	mJ

Thermal Characteristics

Symbol	Parameter		Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	1.5	°C/W
$R_{\theta JA}$③	Thermal Resistance-Junction to Ambient	Steady State	62.5	°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°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	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=32V, V_{GS}=0V	-	-	1	uA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250uA	1.3	1.6	1.9	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	-	4.2	5	mΩ
		V_{GS}=4.5V, I_{DS}=15A	-	4.9	6.4	
gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=20A	-	2.7	-	S
Dynamic Characteristics ⑤						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V, Freq.=1MHz	-	3	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, Freq.=1MHz	-	3105	-	pF
C_{oss}	Output Capacitance		-	255	-	
C_{rss}	Reverse Transfer Capacitance		-	180	-	
$td_{(ON)}$	Turn-on Delay Time	V_{GS}=10V,V_{DS}=20V, I_D=1A,R_{GEN}=6Ω	-	15.2	-	nS
t_r	Turn-on Rise Time		-	63	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	132	-	
t_f	Turn-off Fall Time		-	58	-	
Q_g	Total Gate Charge	V_{GS}=4.5V,V_{DS}=25V I_D=20A	-	34	-	nC
Q_g	Total Gate Charge	V_{GS}=10V,V_{DS}=25V, I_D=20A	-	68	-	
Qgs	Gate-Source Charge		-	9	-	
Qgd	Gate-Drain Charge		-	11.5	-	
Source-Drain Characteristics						
V_{SD}④	Diode Forward Voltage	I_{SD}=15A, V_{GS}=0V	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	I_F=15A, V_R=20V dI$_F$/dt=100A/μs	-	27.2	-	nS
Q_{rr}	Reverse Recovery Charge		-	20.4	-	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

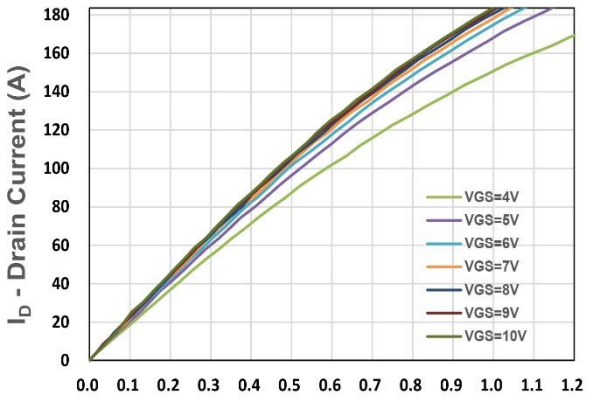


Figure 1. Output Characteristics

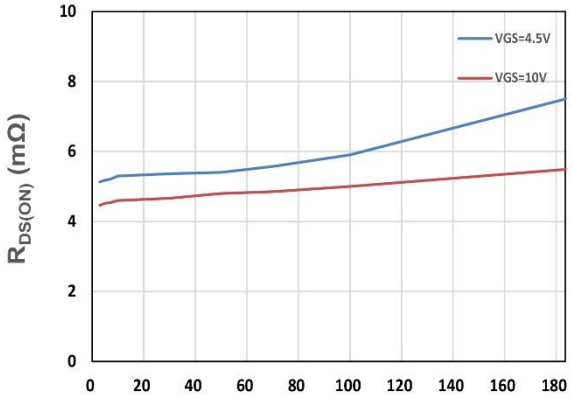


Figure 2. On-Resistance vs. ID

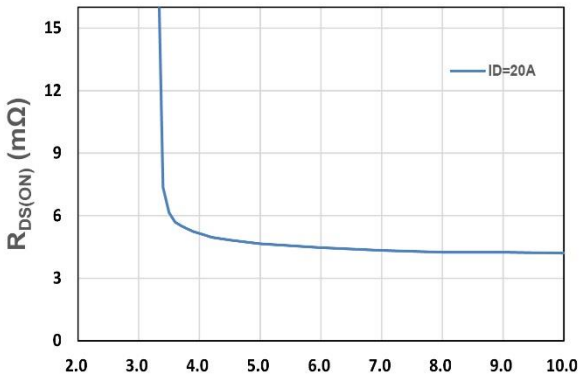


Figure 3. On-Resistance vs. VGS

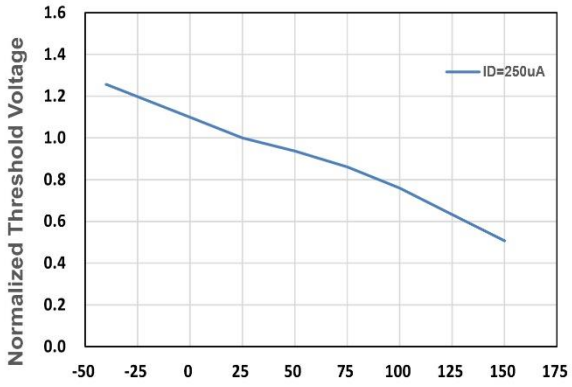


Figure 4. Gate Threshold Voltage

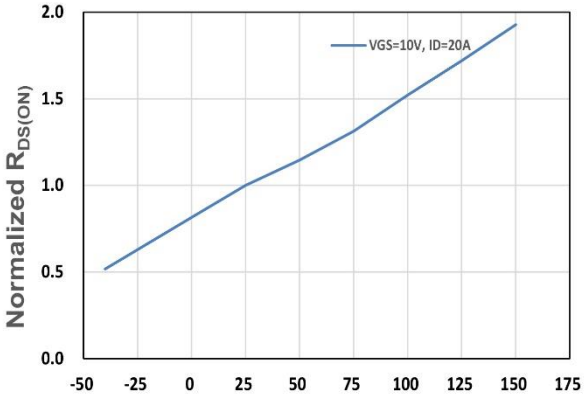


Figure 5. Drain-Source On Resistance

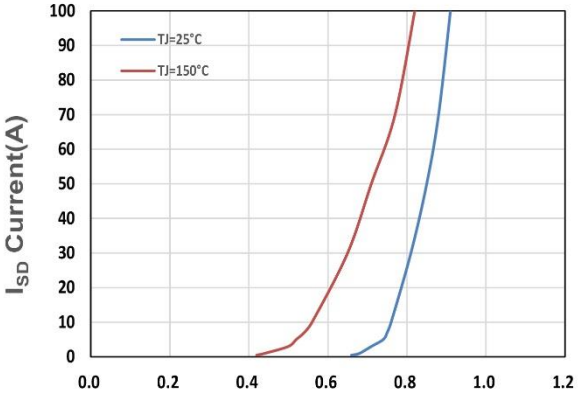


Figure 6. Source-Drain Diode Forward

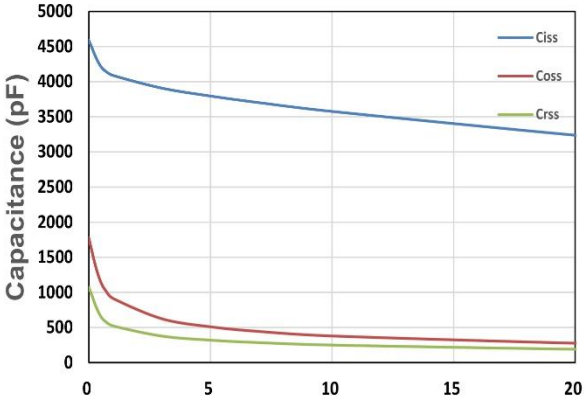


Figure 7. Capacitance

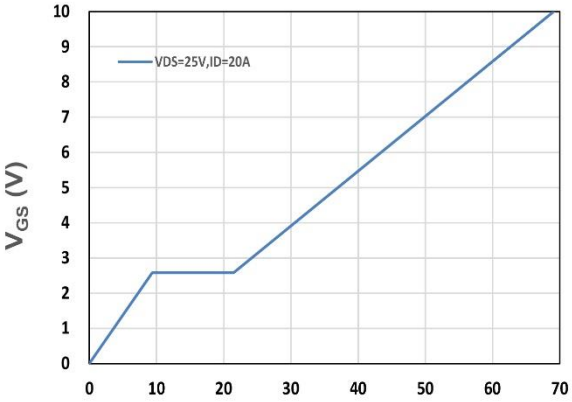


Figure 8. Gate Charge Characteristics

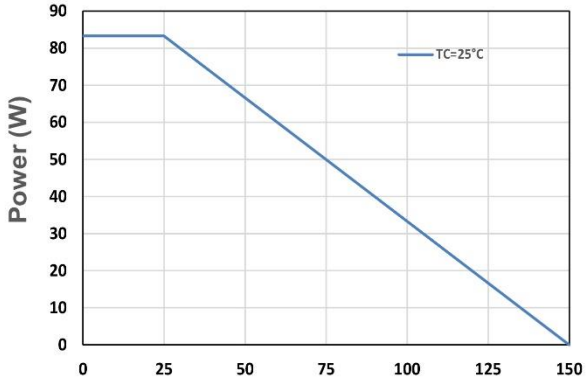


Figure 9. Power Dissipation

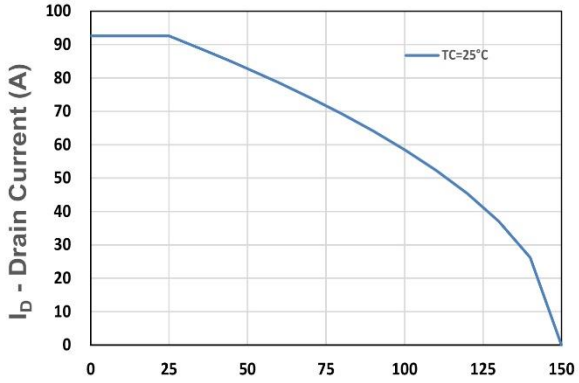


Figure 10. Drain Current

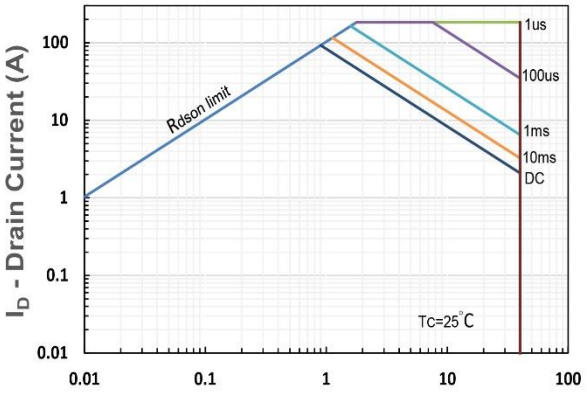


Figure 11. Safe Operating Area

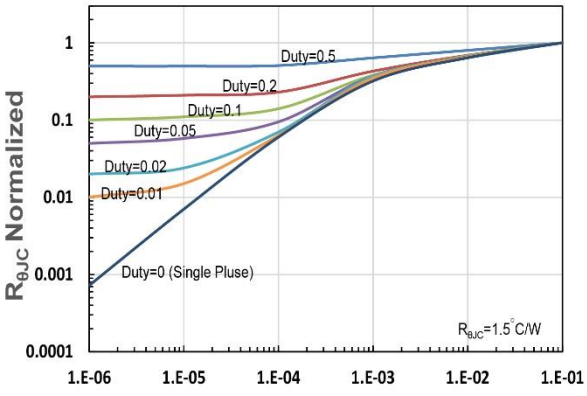


Figure 12. RθJC Transient Thermal Impedance