





Power MOSFETS


DATASHEET

LM45013NHM8A

N-Channel
Enhancement Mode MOSFET

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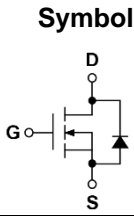
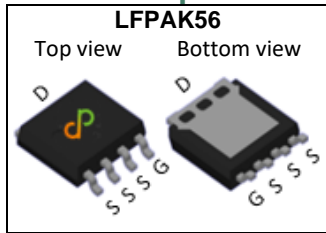


Quality Management Systems

ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	45	V
$R_{DS(ON)-Max}$	1.1	m Ω
ID	234	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
LM45013NHM8A	LFPAK56	Tape & Reel	4000 / Tape & Reel	45013 □□□□□□

Note : □□□□□□ = Lot Code

Absolute Maximum Ratings (T_J=25°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	175	°C
T_{STG}	Storage Temperature Range	-55 to 175	°C
I_S	Diode Continuous Forward Current	T _C =25°C 95	A
I_{SP}	Diode Pulse Current	T _C =25°C 400	A
I_{DM}	Pulse Drain Current Tested	T _C =25°C 585 ^①	A
I_D	Continuous Drain Current	T _C =25°C 234	A
		T _C =100°C 166	
P_D	Maximum Power Dissipation	T _C =25°C 125	W
		T _C =100°C 63	
I_D	Continuous Drain Current	T _A =25°C 38.2	A
		T _A =70°C 32	
P_D	Maximum Power Dissipation	T _A =25°C 3.3	W
		T _A =70°C 2.3	
I_{AS} ^②	Avalanche Current, Single pulse	L=0.1mH 52	A
		L=0.5mH 29	
E_{AS} ^②	Avalanche Energy, Single pulse	L=0.1mH 135	mJ
		L=0.5mH 210	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	1.2 °C/W
$R_{\theta JA}$ ^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 175°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	2.5	3	3.5	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	-	0.9	1.1	mΩ
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	34	-	S
Dynamic Characteristics^⑤						
R_G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	1	-	Ω
C_{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =22.5V, Freq.=1MHz	-	5236	-	pF
C_{oss}	Output Capacitance		-	1480	-	
C_{rss}	Reverse Transfer Capacitance		-	35	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V, V _{DS} =22.5V, I _D =1A, R _{GEN} =1Ω	-	21	-	nS
t_r	Turn-on Rise Time		-	12.2	-	
t_{d(OFF)}	Turn-off Delay Time		-	43.6	-	
t_f	Turn-off Fall Time		-	98	-	
Q_g	Total Gate Charge	V _{GS} =10V, V _{DS} =22.5V, I _D =20A	-	68	-	nC
Q_{gs}	Gate-Source Charge		-	26	-	
Q_{gd}	Gate-Drain Charge		-	13	-	
Source-Drain Characteristics						
V_{SD}^④	Diode Forward Voltage	I _{SD} =10A, V _{GS} =0V	-	0.75	1.1	V
t_{rr}	Reverse Recovery Time	I _F =10A, V _R =22.5V	-	55	-	nS
Q_{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	63	-	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

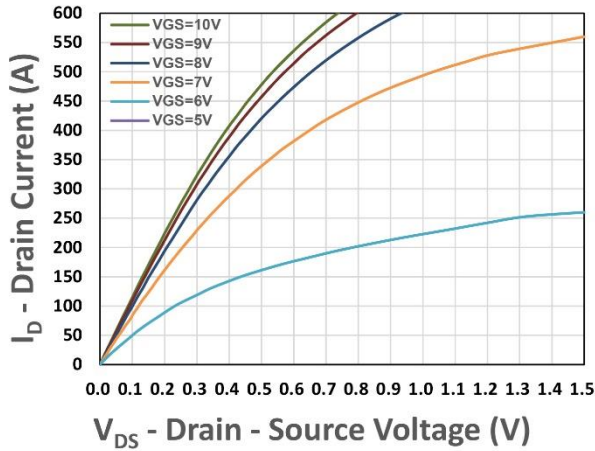


Figure 1. Output Characteristics

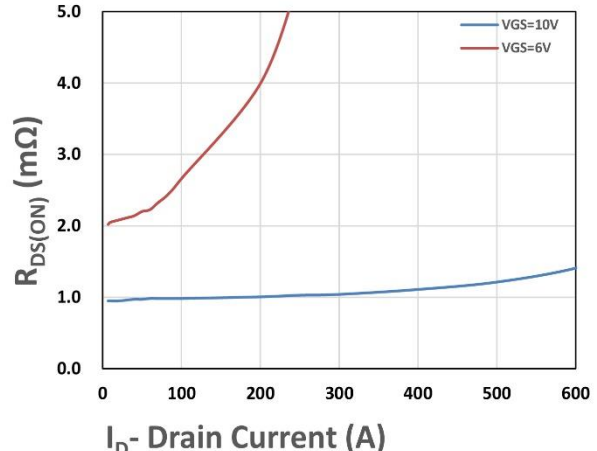


Figure 2. On-Resistance vs. ID

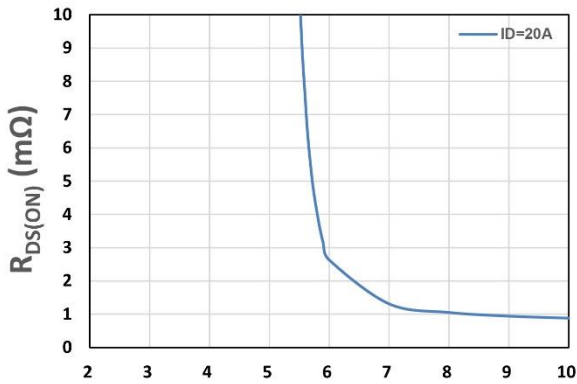


Figure 3. On-Resistance vs. VGS

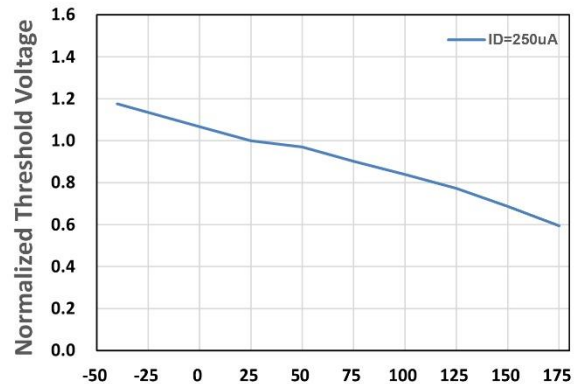


Figure 4. Gate Threshold Voltage

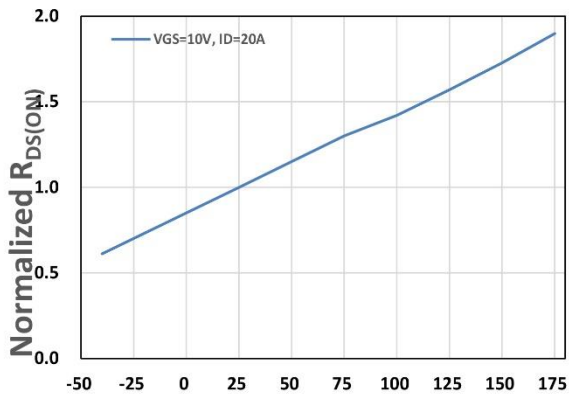


Figure 5. Drain-Source On Resistance

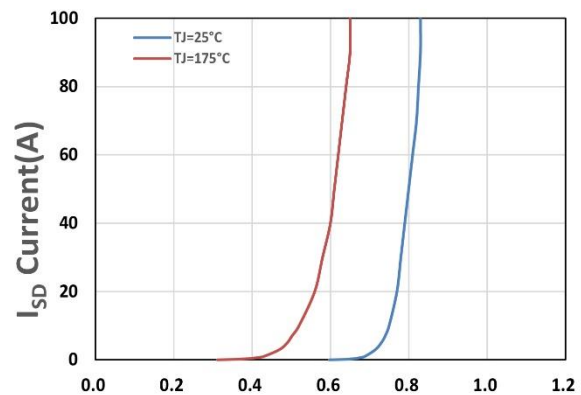
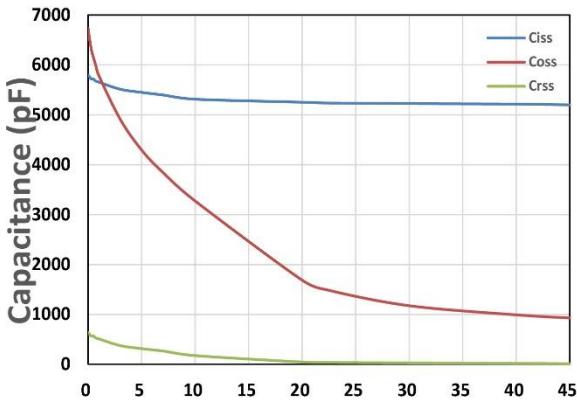
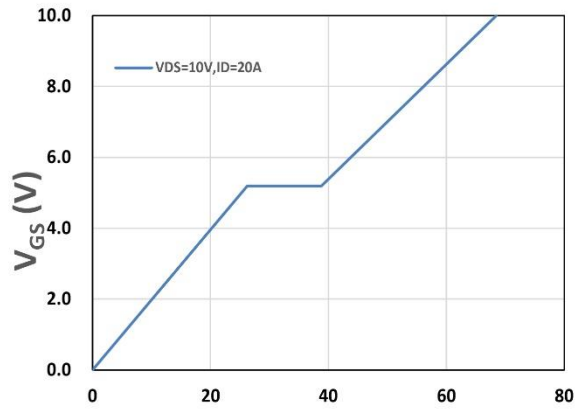


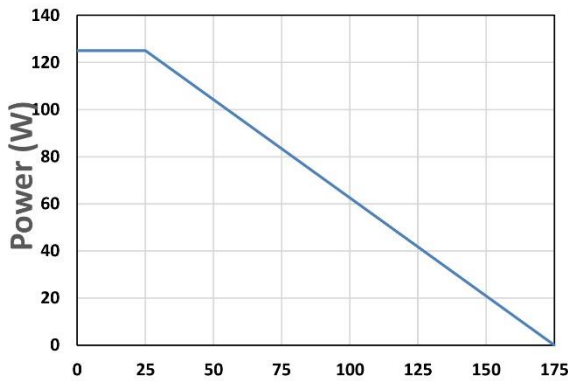
Figure 6. Source-Drain Diode Forward



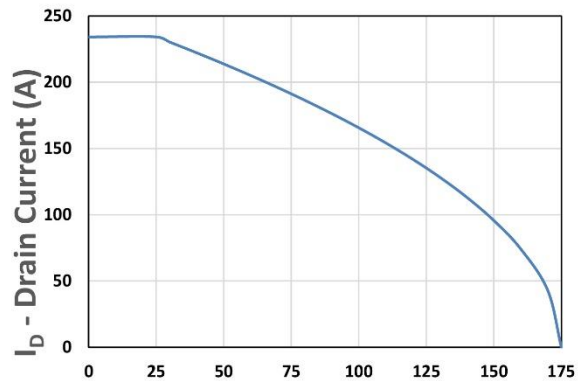
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



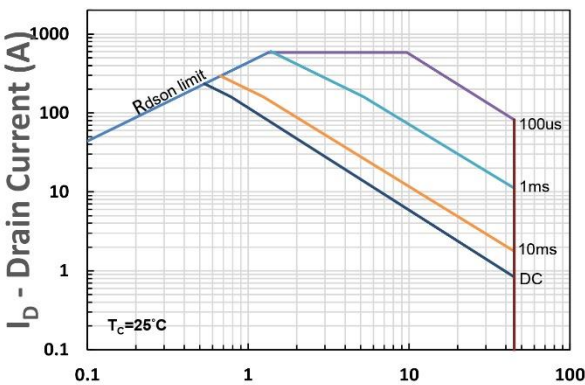
Qg, Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



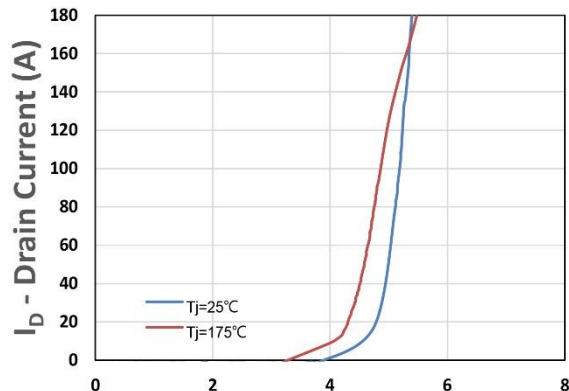
Tc - Case Temperature (°C)
Figure 9. Power Dissipation



Tc - Case Temperature (°C)
Figure 10. Drain Current



V_{DS} - Drain-Source Voltage (V)
Figure 11. Safe Operating Area



V_{GS} - Gate - Source Voltage (V)
Figure 12. Transfer Characteristics

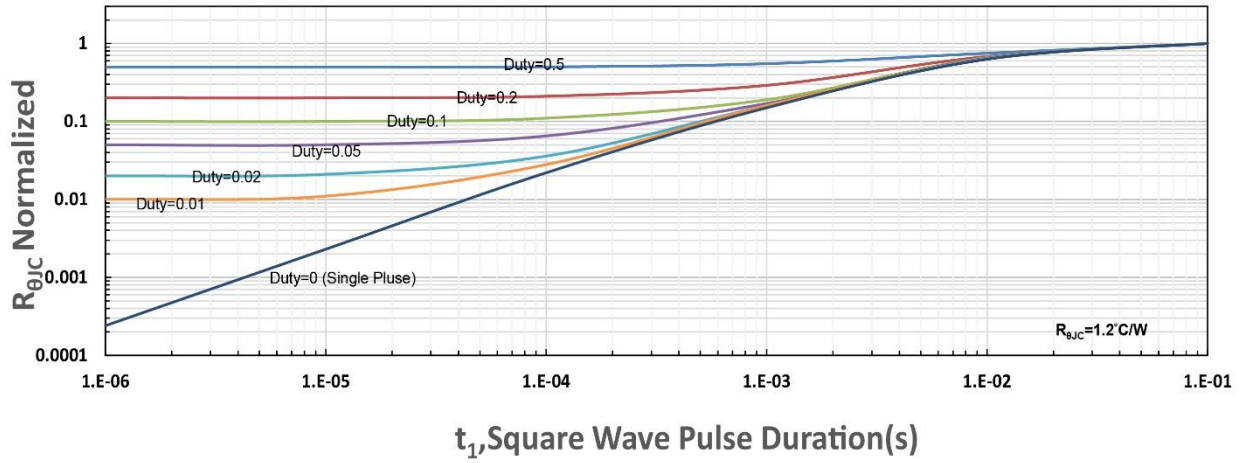


Figure 13. $R_{\theta JC}$ Transient Thermal Impedance