



Power MOSFETS

DATASHEET

LM1A013NHP3A

N-Channel
Enhancement Mode MOSFET

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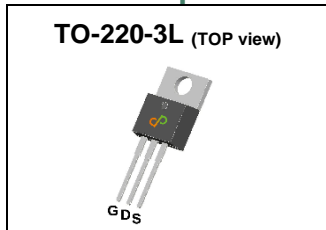


Quality Management Systems

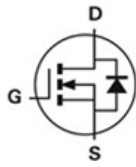
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	100	V
$R_{DS(ON)-Max}$	2.2	m Ω
ID	243	A

Feature

- High Threshold Voltage
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS and Rg Tested

Applications

- Battery Management System
- Machine tool
- High power inverter system

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM1A013NHP3A	TO-220-3L	Tube	50 / Tube	1A013 □□□□□□

Note : □□□□□□ = Lot Code

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

Symbol	Parameter	N-Channel	Unit	
V_{DSS}	Drain-Source Voltage	100	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	114	A
$I_{DM}^{①}$	Pulse Drain Current Tested	T _C =25°C	608	A
I_D	Continuous Drain Current	T _C =25°C	243	A
		T _C =100°C	172	
P_D	Maximum Power Dissipation	T _C =25°C	250	W
		T _C =100°C	125	
I_D	Continuous Drain Current	T _A =25°C	24.7	A
		T _A =70°C	20.7	
P_D	Maximum Power Dissipation	T _A =25°C	2.6	W
		T _A =70°C	1.8	
$I_{AS}^{②}$	Avalanche Current, Single pulse	L=0.1mH	100	A
		L=0.5mH	55	
$E_{AS}^{②}$	Avalanche Energy, Single pulse	L=0.1mH	500	mJ
		L=0.5mH	756	

Thermal Characteristics

Symbol	Parameter	Rating	Unit	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	0.6	°C/W
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State	58	°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	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V _{DS} =80V, V _{GS} =0V	-	-	1	uA
V_{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	2	3	4	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} =30A	-	1.8	2.2	mΩ
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =50A	-	140	-	S
Dynamic Characteristics^⑤						
R_G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	0.75	-	Ω
C_{iSS}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, Freq.=1MHz	-	12340	-	pF
C_{oss}	Output Capacitance		-	3995	-	
C_{rSS}	Reverse Transfer Capacitance		-	37	-	
t_{d(ON)}	Turn-on Delay Time	V _{GS} =10V, V _{DS} =50V, I _D =1A, R _{GEN} =1Ω	-	37	-	nS
t_r	Turn-on Rise Time		-	21	-	
t_{d(OFF)}	Turn-off Delay Time		-	78	-	
t_f	Turn-off Fall Time		-	107	-	
Q_g	Total Gate Charge	V _{GS} =6V, V _{DS} =50V, I _D =30A	-	133	-	nC
Q_g	Total Gate Charge	V _{GS} =10V, V _{DS} =50V, I _D =30A	-	203	-	
Q_{gs}	Gate-Source Charge		-	60	-	
Q_{gd}	Gate-Drain Charge		-	53	-	
Source-Drain Characteristics						
V_{SD}^④	Diode Forward Voltage	I _{SD} =30A, V _{GS} =0V	-	0.75	1.1	V
t_{rr}	Reverse Recovery Time	I _F =10A, V _R =30V	-	119	-	nS
Q_{rr}	Reverse Recovery Charge	di _F /dt=100A/μs	-	347	-	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

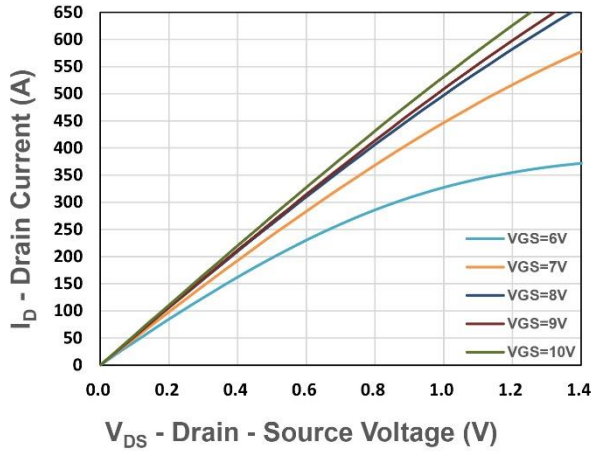


Figure 1. Output Characteristics

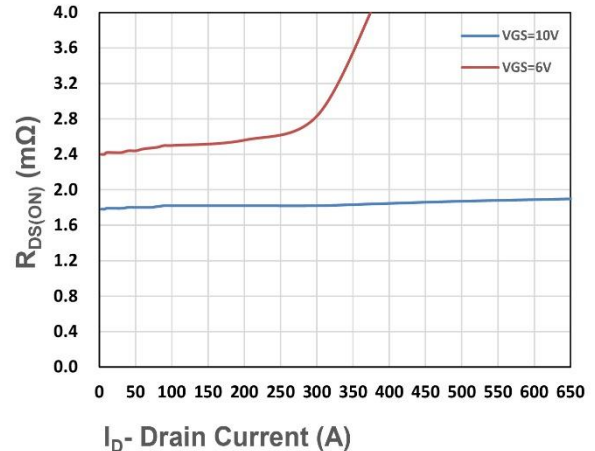


Figure 2. On-Resistance vs. I_D

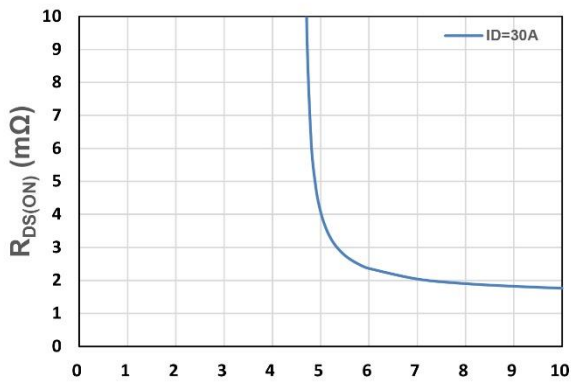


Figure 3. On-Resistance vs. V_{GS}

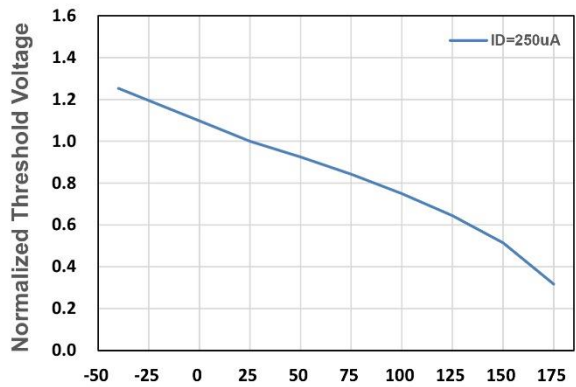


Figure 4. Gate Threshold Voltage

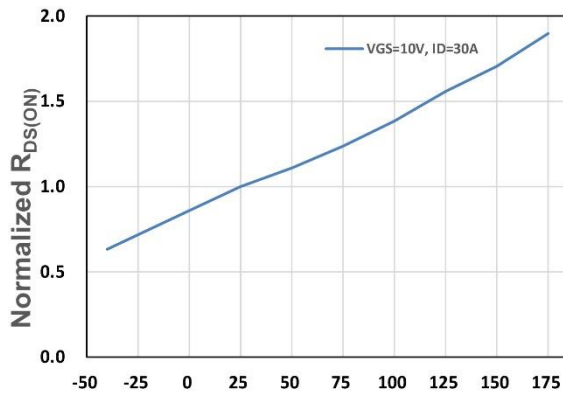


Figure 5. Drain-Source On Resistance

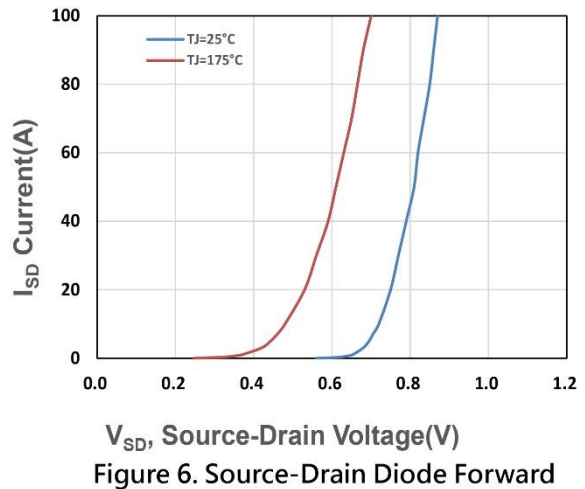
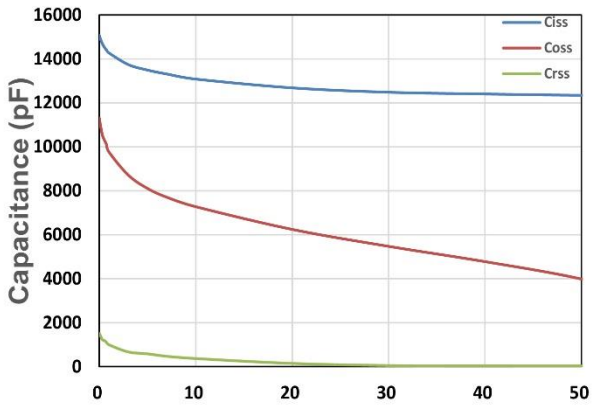
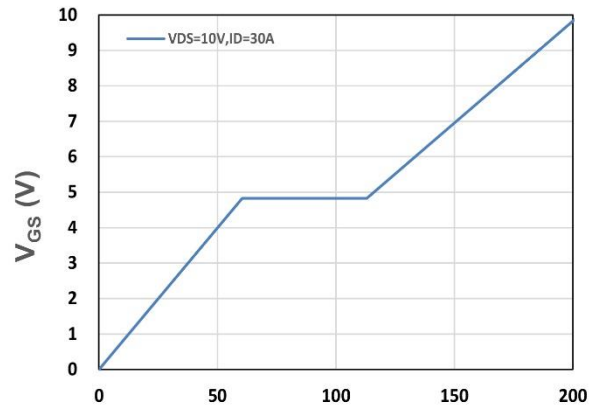


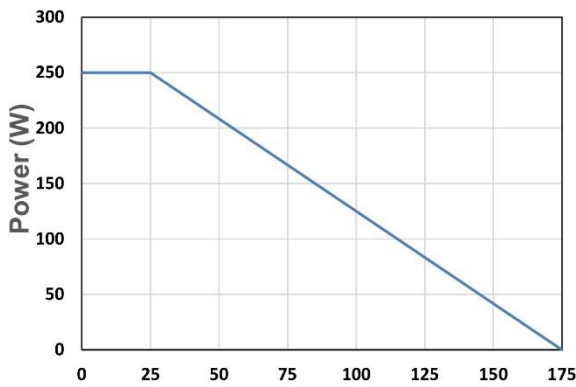
Figure 6. Source-Drain Diode Forward



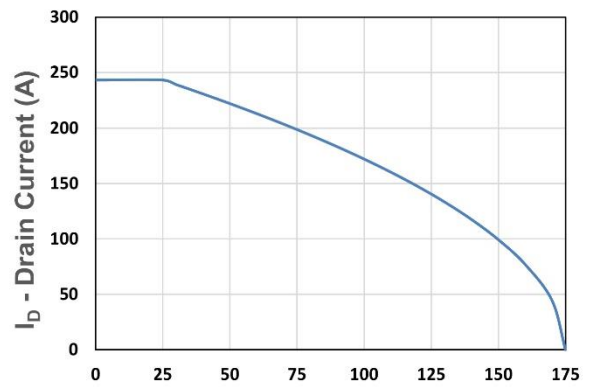
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



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



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



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

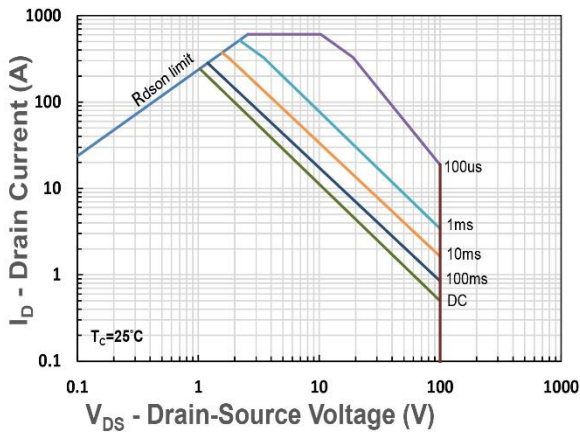


Figure 11. Safe Operating Area

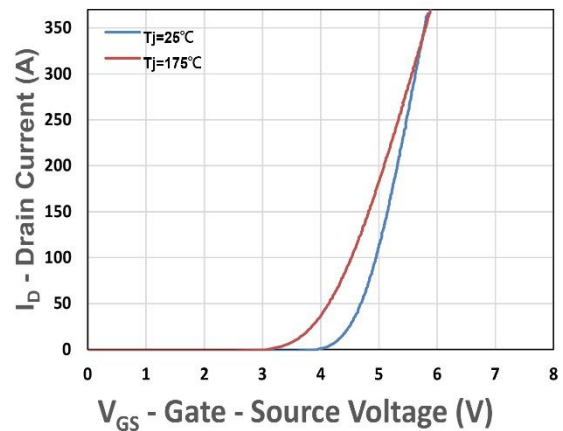


Figure 12. Transfer Characteristics

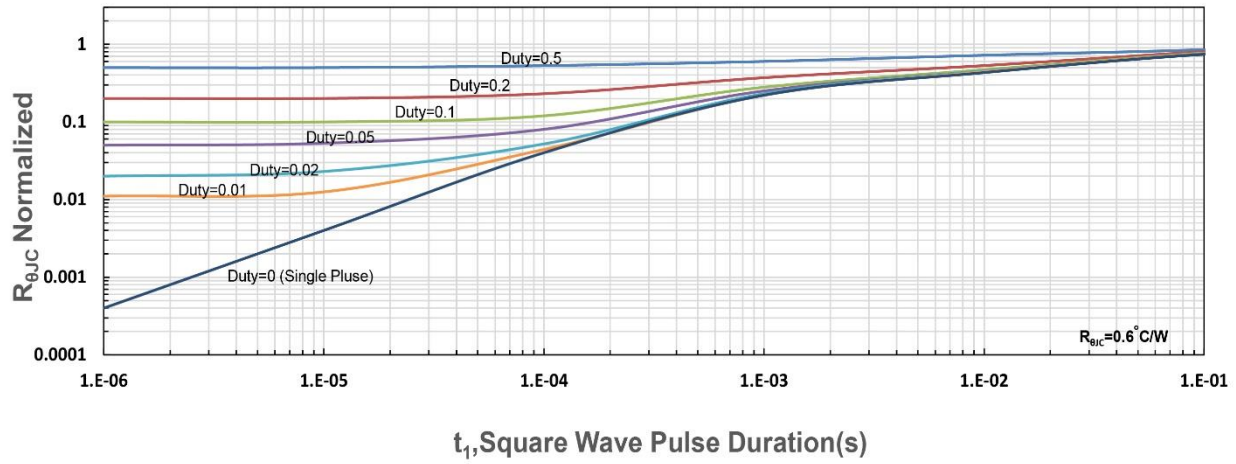


Figure 13. $R_{\theta JC}$ Transient Thermal Impedance