



Power MOSFETS

DATASHEET

LM1A013NHV6A

N-Channel
Enhancement Mode MOSFET



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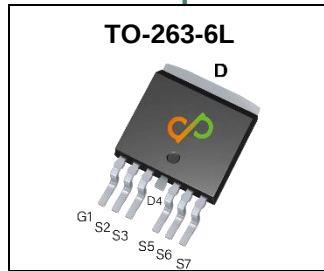


Quality Management Systems

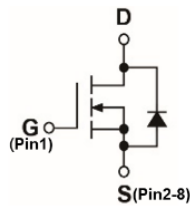
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DS}	100	V
$R_{DS(ON)-Max}$	1.6	mΩ
ID	403	A

Feature

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

Applications

- Power Management in DC/DC Converters
- USB Power Delivery (USB PD)

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM1A013NHV6A	TO-263-6L	Tape & Reel	800 / Tape & Reel	1A013 □□□□□□

Note : □□□□□□ = Lot Code

Absolute Maximum Ratings ($T_J=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	N-Channel	Unit
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
T_J	Maximum Junction Temperature	175	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to 175	$^{\circ}\text{C}$
I_S	Diode Continuous Forward Current	$T_C=25^{\circ}\text{C}$ 227	A
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_C=25^{\circ}\text{C}$ 1009	A
I_D	Continuous Drain Current	$T_C=25^{\circ}\text{C}$ 403 $T_C=100^{\circ}\text{C}$ 285	A
P_D	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$ 500 $T_C=100^{\circ}\text{C}$ 250	W
I_D	Continuous Drain Current	$T_A=25^{\circ}\text{C}$ 33 $T_A=70^{\circ}\text{C}$ 27.6	A
P_D	Maximum Power Dissipation	$T_A=25^{\circ}\text{C}$ 3.3 $T_A=70^{\circ}\text{C}$ 2.3	W
$I_{AS}^{②}$	Avalanche Current, Single pulse	$L=0.1\text{mH}$ 100 $L=0.5\text{mH}$ 55	A
$E_{AS}^{②}$	Avalanche Energy, Single pulse	$L=0.1\text{mH}$ 500 $L=0.5\text{mH}$ 756	mJ

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State 0.3	$^{\circ}\text{C/W}$
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State 45	$^{\circ}\text{C/W}$

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 ($T_J=25^{\circ}\text{C}$ 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	-	1.3	1.6	mΩ
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =50A	-	140	-	S
Dynamic Characteristics ⑥						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V, Freq.=1MHz	-	0.7	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, Freq.=1MHz	-	12340	-	pF
C _{oss}	Output Capacitance		-	3992	-	
C _{rss}	Reverse Transfer Capacitance		-	37	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V,V _{DS} =50V, Id=1A,RGEN=1Ω	-	37	-	nS
tr	Turn-on Rise Time		-	21	-	
td(OFF)	Turn-off Delay Time		-	78	-	
tf	Turn-off Fall Time		-	107	-	
Qg	Total Gate Charge	V _{GS} =6V,V _{DS} =50V Id=30A	-	133	-	nC
Qg	Total Gate Charge	V _{GS} =10V,V _{DS} =50V, Id=30A	-	203	-	
Qgs	Gate-Source Charge		-	60	-	
Qgd	Gate-Drain Charge		-	53	-	
Source-Drain Characteristics						
VSD④	Diode Forward Voltage	ISD=30A, VGS=0V	-	0.75	1.1	V
trr	Reverse Recovery Time	IF=10A, VR=30V	-	119	-	nS
Qrr	Reverse Recovery Charge	dIF/dt=100A/μs	-	347	-	nC

Note ④ : Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

Note ⑤ : Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

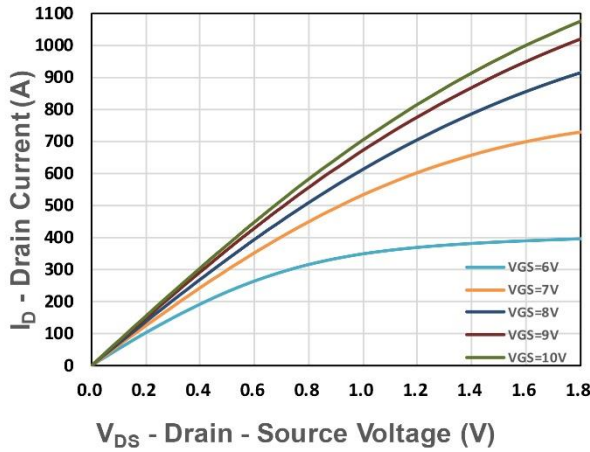


Figure 1. Output Characteristics

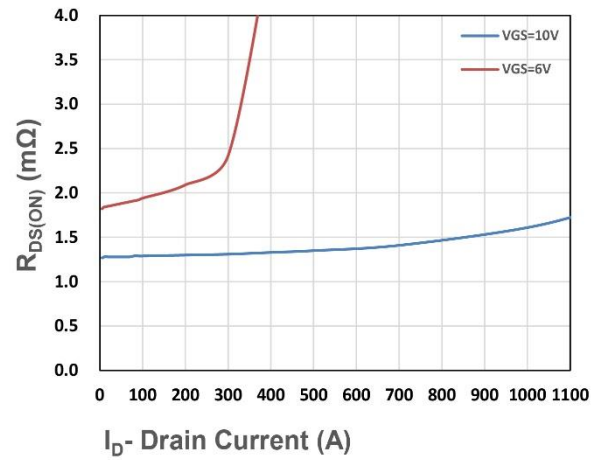


Figure 2. On-Resistance vs. I_D

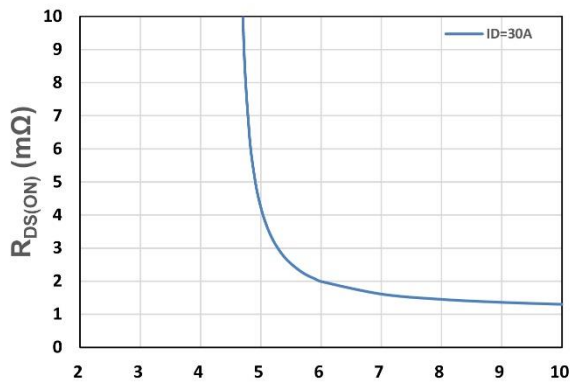


Figure 3. On-Resistance vs. V_{GS}

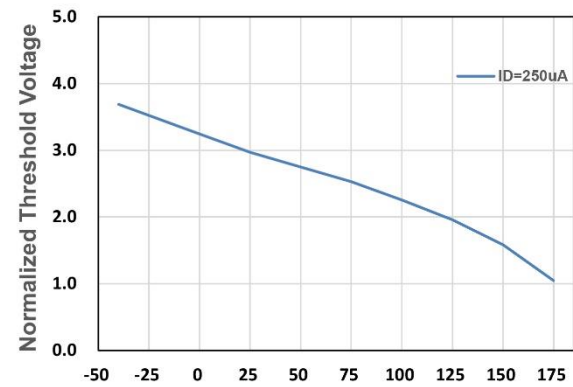


Figure 4. Gate Threshold Voltage

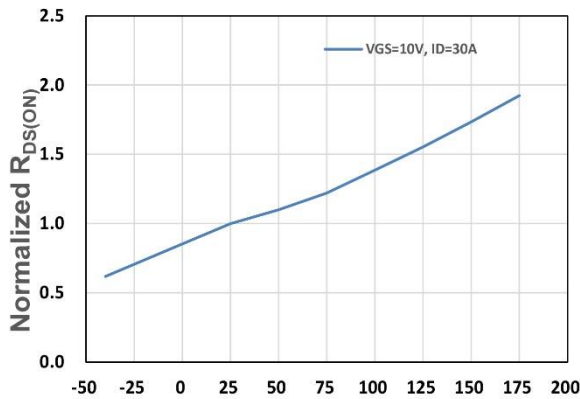


Figure 5. Drain-Source On Resistance

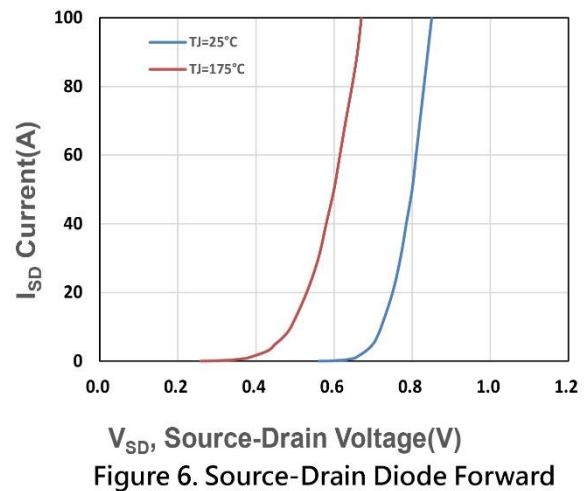
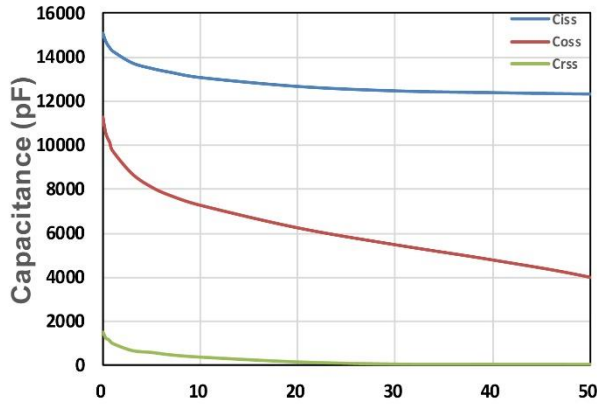
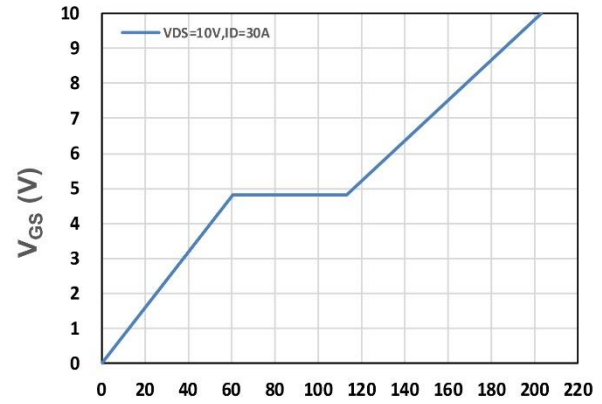


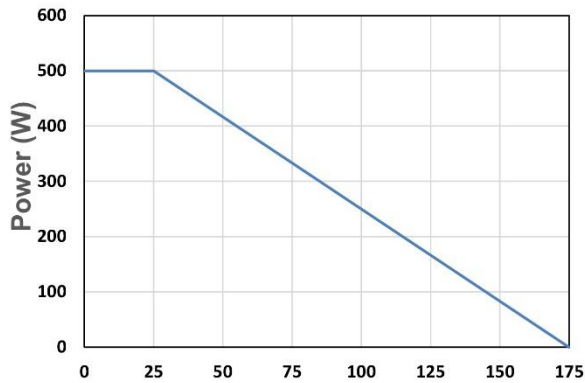
Figure 6. Source-Drain Diode Forward



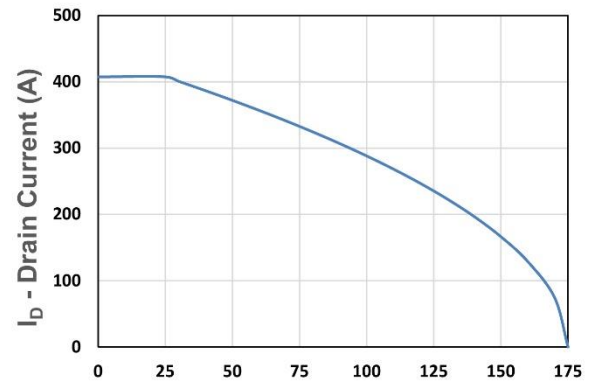
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



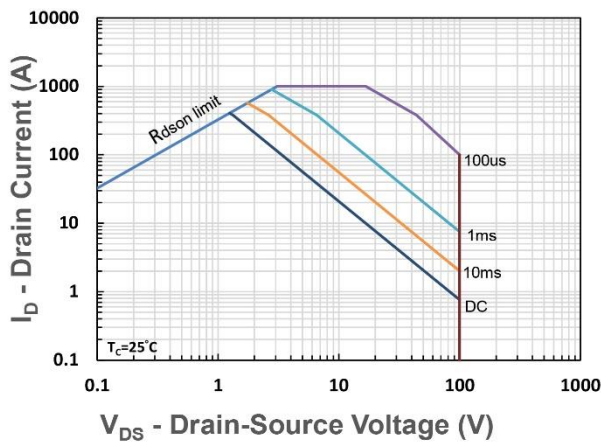
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



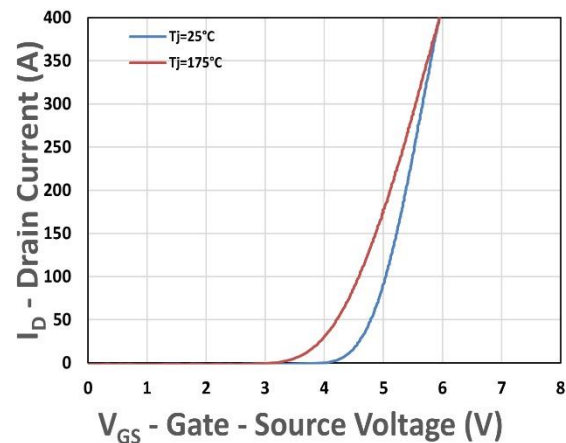
T_c - Case Temperature ($^{\circ}C$)
Figure 9. Power Dissipation



T_c - Case Temperature ($^{\circ}C$)
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

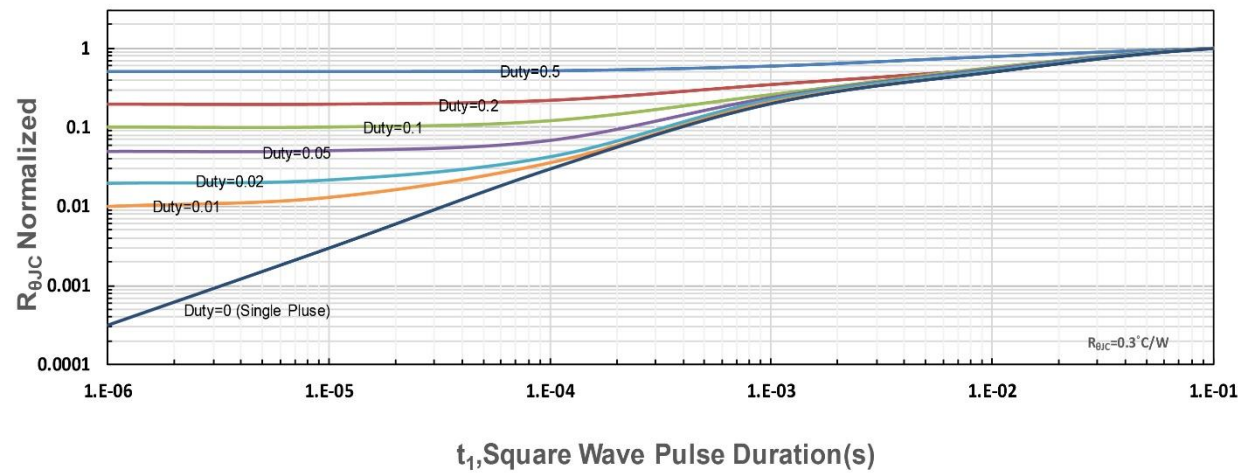


Figure 13. $R_{\theta JC}$ Transient Thermal Impedance