





Power MOSFETS

DATASHEET

LM30013NAP3A

N-Channel
Enhancement Mode MOSFET

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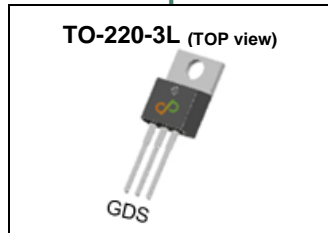


Quality Management Systems

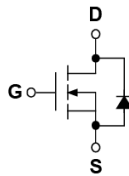
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	30	V
$R_{DS(ON)-Max}$	2	m Ω
ID	182	A

Feature

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

Applications

- Power Load Switch
- Motor Control

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM30013NAP3A	TO-220-3L	Tube	50 / Tube	30013 □□□□□□

Note: □□□□□□ = Lot code

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

Symbol	Parameter	N-Channel	Unit	
V_{DSS}	Drain-Source Voltage	30	V	
V_{GSS}	Gate-Source Voltage	± 20		
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
I_S	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$	40.3	A
$I_{DM}^{(1)}$	Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	400	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	182	A
		$T_C=100^\circ\text{C}$	115	
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	96	W
		$T_C=100^\circ\text{C}$	38	
$I_D^{(2)}$	Continuous Drain Current	$T_A=25^\circ\text{C}$	30	A
		$T_A=70^\circ\text{C}$	24	
$P_D^{(2)}$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	2.5	W
		$T_A=70^\circ\text{C}$	1.6	
$I_{AS}^{(3)}$	Avalanche Current, Single pulse	L=0.1mH	64	A
		L=0.5mH	35	A
$E_{AS}^{(3)}$	Avalanche Energy, Single pulse	L=0.1mH	205	mJ
		L=0.5mH	306	

Thermal Characteristics

Symbol	Parameter	Rating	Unit	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	1.3	$^\circ\text{C}/\text{W}$
$R_{\theta JA}^{(2)}$	Thermal Resistance-Junction to Ambient	Steady State	50	$^\circ\text{C}/\text{W}$

Note ① : Max. current is limited by junction temperature.

Note ② : Surface Mounted on 1in² FR-4 board with 1oz.

Note ③ : UIS tested and pulse width are limited by maximum junction temperature 150 $^\circ\text{C}$.

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	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V	-	-	1	uA
V_{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	1	1.5	2	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	-	1.7	2.0	mΩ
		V _{GS} =4.5V, I _{DS} =15A	-	2.0	2.6	
g_{fs}	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	45	-	S
Dynamic Characteristics[®]						
R_G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	4	-	Ω
C_{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Freq.=1MHz	-	6545	-	pF
C_{oss}	Output Capacitance					
C_{rss}	Reverse Transfer Capacitance					
t_{d(ON)}	Turn-on Delay Time	V _{GS} =10V, V _{DS} =15V, I _D =1A, R _{GEN} =6Ω	-	14	-	nS
t_r	Turn-on Rise Time					
t_{d(OFF)}	Turn-off Delay Time					
t_f	Turn-off Fall Time					
Q_g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =15V, I _D =20A	-	84	-	nC
Q_g	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =20A	-	175.7	-	
Q_{gs}	Gate-Source Charge		-	30.6	-	
Q_{gd}	Gate-Drain Charge		-	30	-	
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 =15V	-	37	-	nS
Q_{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	35.6	-	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

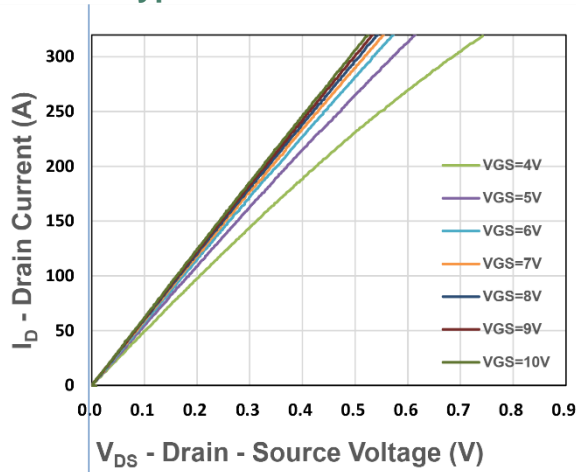


Figure 1. Output Characteristics

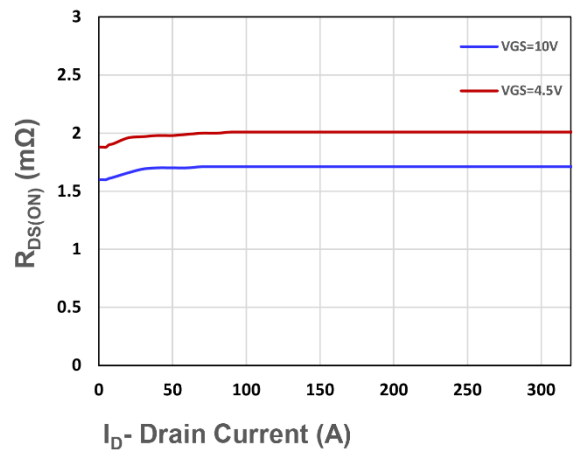


Figure 2. On-Resistance vs. ID

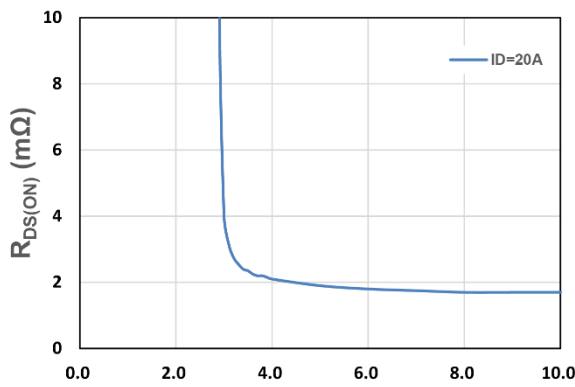


Figure 3. On-Resistance vs. VGS

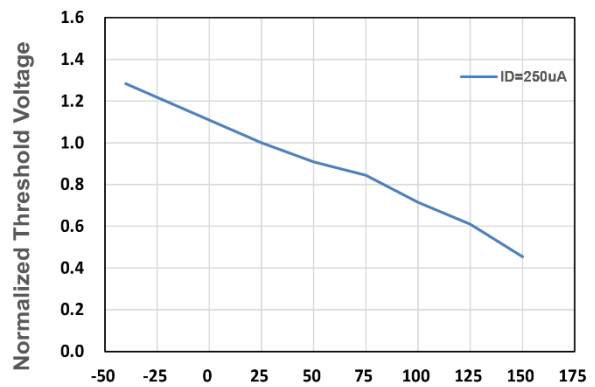


Figure 4. Gate Threshold Voltage

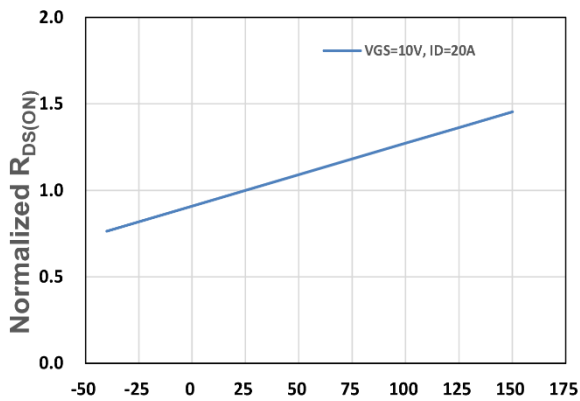


Figure 5. Drain-Source On Resistance

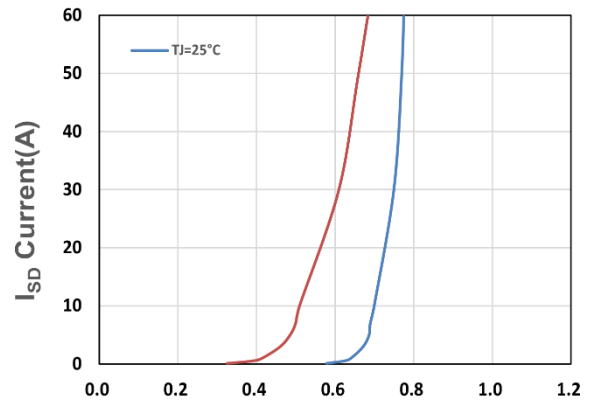
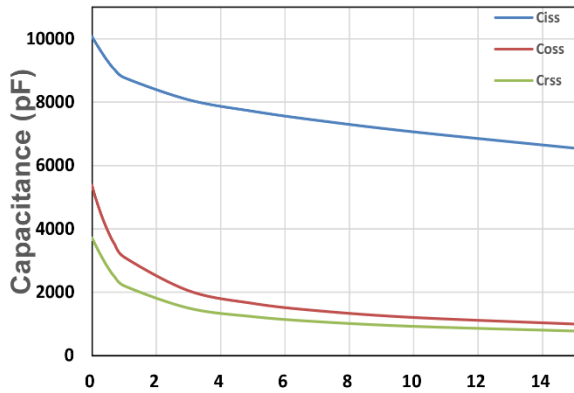
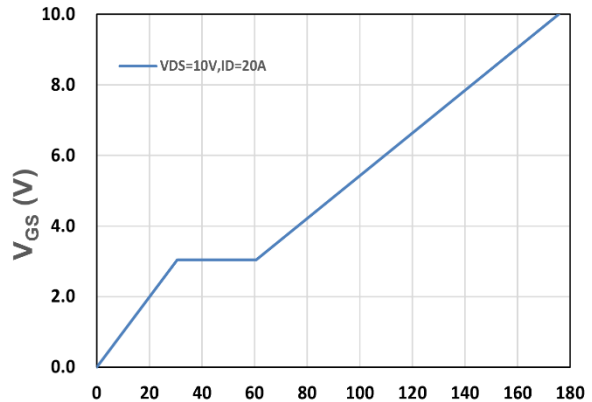


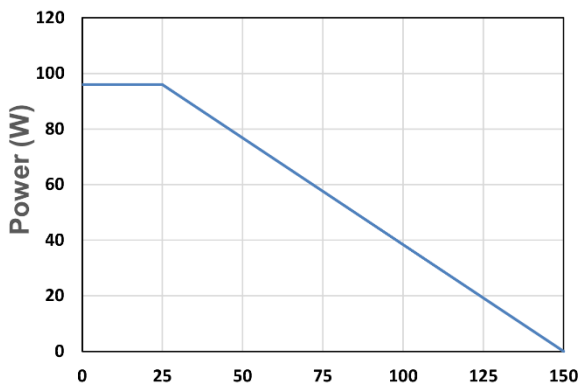
Figure 6. Source-Drain Diode Forward



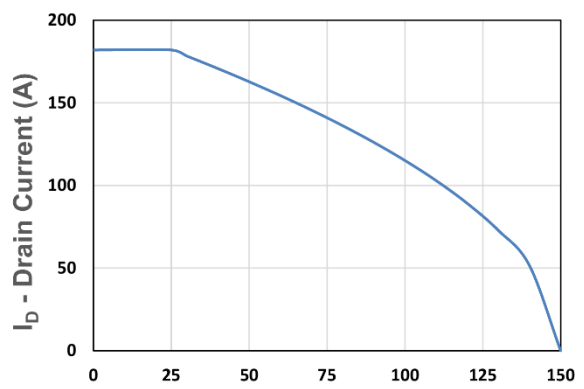
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



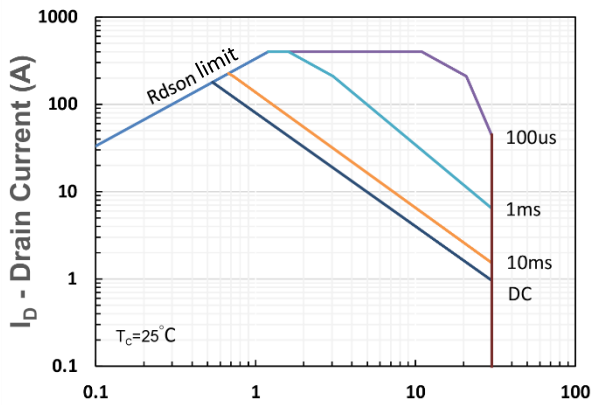
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



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

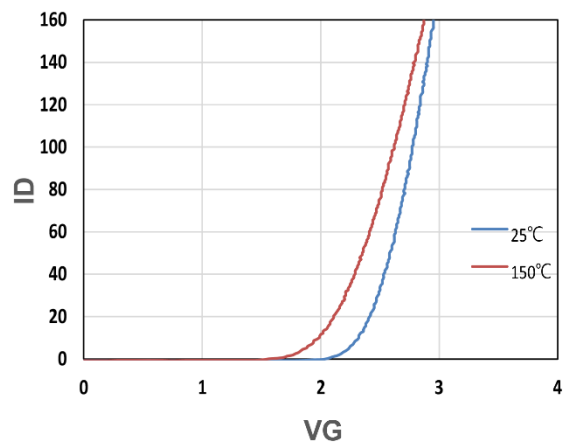


Figure 12. Transfer Characteristics

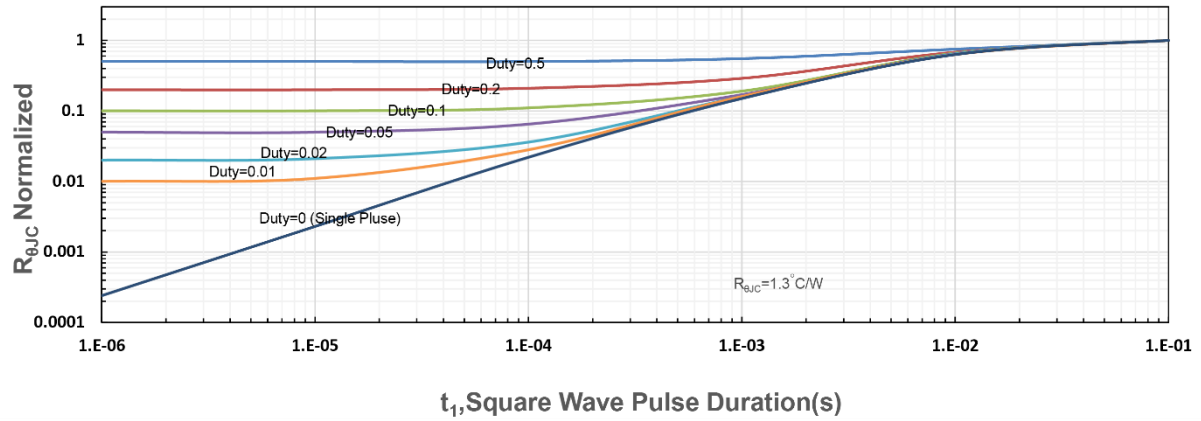


Figure 13. $R_{\theta JC}$ Transient Thermal Impedance