





Power MOSFETS


DATASHEET

LM30120NAK8A

N-Channel
Enhancement Mode MOSFET

 Leadpower-semiconductor Corp., Ltd

 sales@leadpower-semi.com

 (03) 6577339 FAX : (03) 6577229

 www.leadpower-semi.com

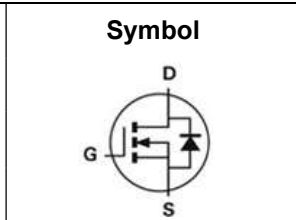
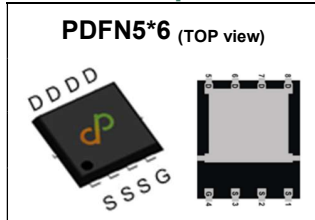


Quality Management Systems

ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Product Summary

Symbol	N-Channel	Unit
V _{DSS}	30	V
R _{DS(ON)-Max}	12	mΩ
I _D	46	A

Feature

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

Applications

- DC-DC Converters
- Portable equipment application

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM30120NAK8A	PDFN5*6	Tape & Reel	5000 / Tape & Reel	30120 □□□□□□

Note : □□□□□□ = Lot Code

Absolute Maximum Ratings (T_J=25°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	°C	
T _{STG}	Storage Temperature Range	-55 to 150	°C	
I _S	Diode Continuous Forward Current	T _C =25°C	23	A
I _{DM} ^①	Pulse Drain Current Tested	T _C =25°C	52	
I _D	Continuous Drain Current	T _C =25°C	46	A
		T _C =100°C	29	
P _D	Maximum Power Dissipation	T _C =25°C	25.5	W
		T _C =100°C	10.2	
I _D	Continuous Drain Current	T _A =25°C	12.2	A
		T _A =70°C	9.8	
P _D	Maximum Power Dissipation	T _A =25°C	1.8	W
		T _A =70°C	1.1	
I _{AS} ^②	Avalanche Current, Single pulse	L=0.1mH	19	A
		L=0.5mH	10	
E _{AS} ^②	Avalanche Energy, Single pulse	L=0.1mH	18	mJ
		L=0.5mH	25	

Thermal Characteristics

Symbol	Parameter	Rating	Unit	
R _{θJC}	Thermal Resistance-Junction to Case	Steady State	4.9	°C/W
R _{θJA} ^③	Thermal Resistance-Junction to Ambient	Steady State	70	°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 1in² FR-4 board with 1oz.

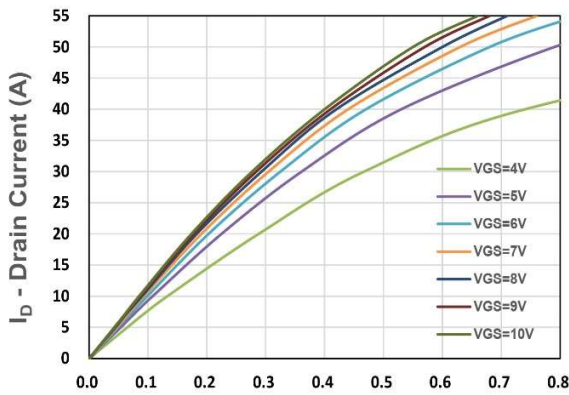
N-Channel Electrical Characteristics (T_J=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250uA	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	1.6	2.1	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} =10A	-	10	12	mΩ
		V _{GS} =4.5V, I _{DS} =6A	-	12	16	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =5A	-	9	-	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} =15V, Freq.=1MHz	-	872	-	pF
C_{oss}	Output Capacitance		-	112	-	
C_{rss}	Reverse Transfer Capacitance		-	104	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V, V _{DS} =15V, I _D =1A, R _{GEN} =6Ω	-	17	-	nS
t_r	Turn-on Rise Time		-	30	-	
t_{d(OFF)}	Turn-off Delay Time		-	30	-	
t_f	Turn-off Fall Time		-	16	-	
Q_g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =15V, I _D =10A	-	10.3	-	nC
Q_g	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =10A	-	20.5	-	
Q_{gs}	Gate-Source Charge		-	2.32	-	
Q_{gd}	Gate-Drain Charge		-	4.8	-	
Source-Drain Characteristics						
V_{SD} ^④	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.75	1.1	V
t_{rr}	Reverse Recovery Time	I _F =1A, V _R =20V	-	25.4	-	nS
Q_{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	10.7	-	nC

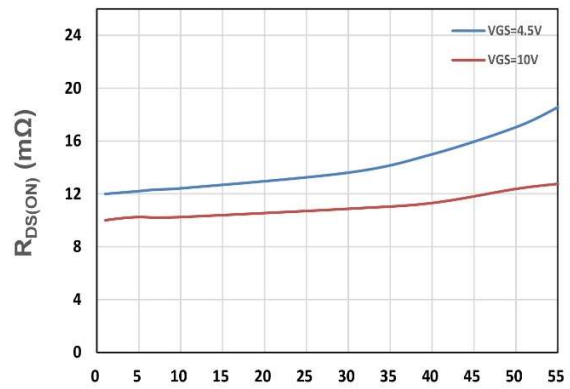
Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

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

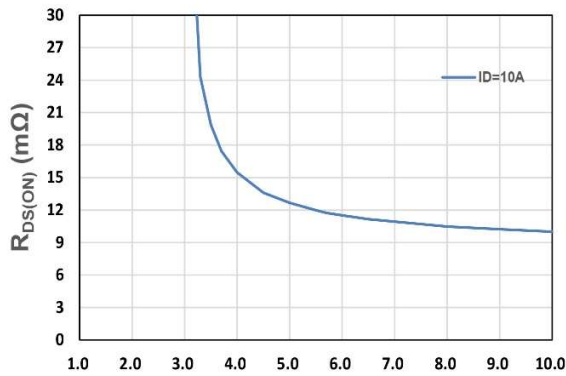
N-Channel Typical Characteristics



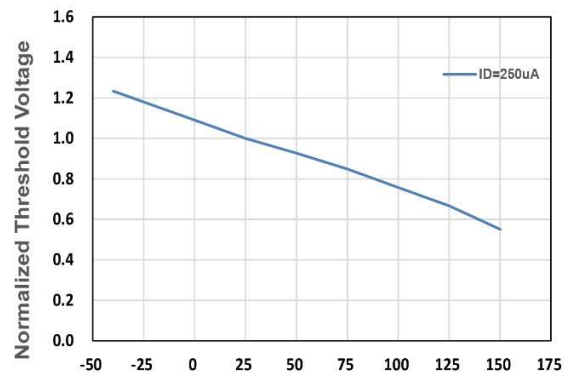
V_{DS} - Drain - Source Voltage (V)
Figure 1. Output Characteristics



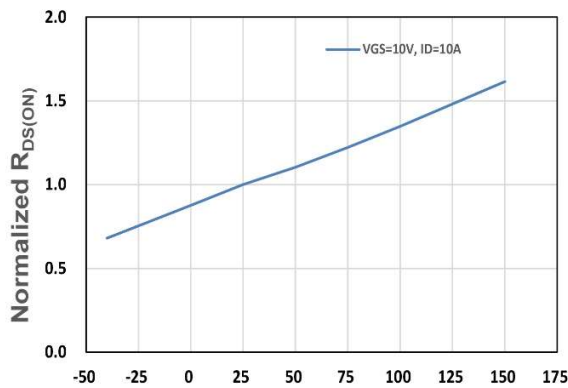
I_D - Drain Current (A)
Figure 2. On-Resistance vs. I_D



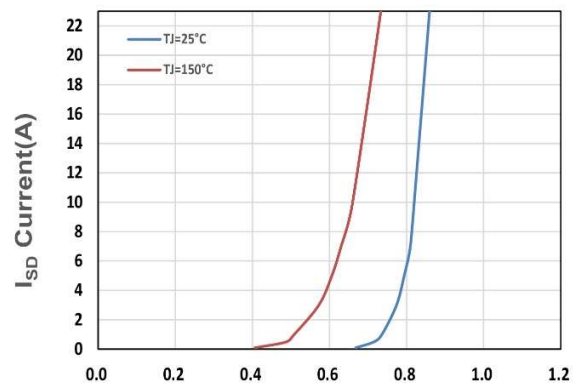
V_{GS} - Gate - Source Voltage (V)
Figure 3. On-Resistance vs. V_{GS}



T_j , Junction Temperature($^{\circ}C$)
Figure 4. Gate Threshold Voltage

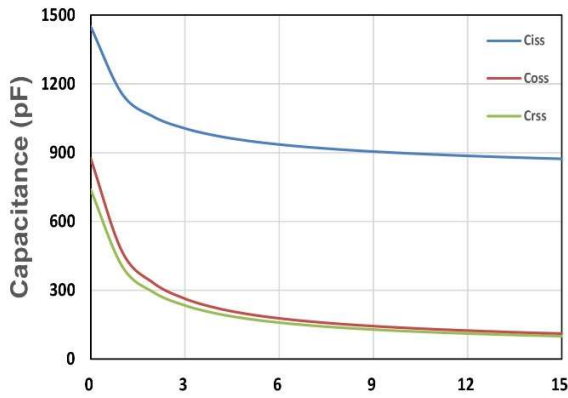


T_j , Junction Temperature($^{\circ}C$)
Figure 5. Drain-Source On Resistance

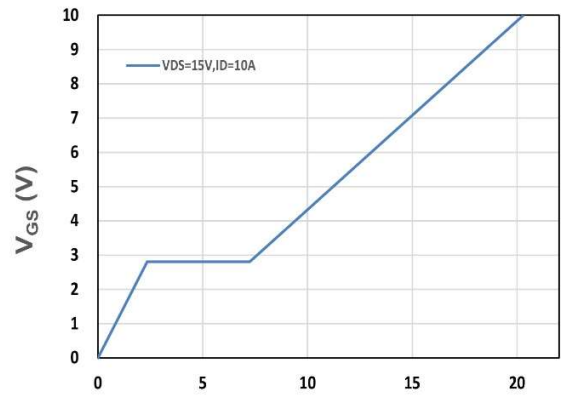


V_{SD} , Source-Drain Voltage(V)
Figure 6. Source-Drain Diode Forward

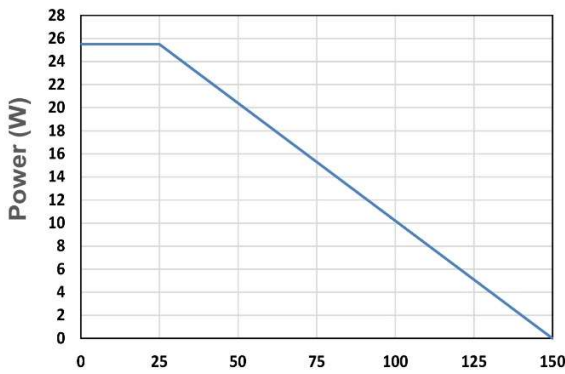
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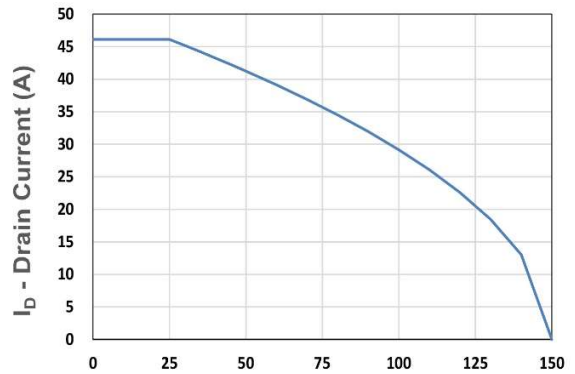
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



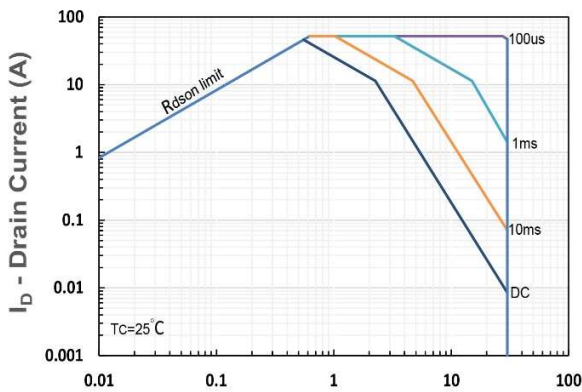
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



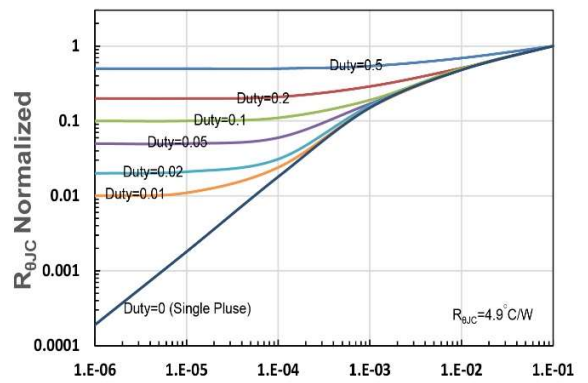
T_c - Case Temperature (°C)
Figure 9. Power Dissipation



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



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



t_1 , Square Wave Pulse Duration(s)
Figure 12. $R_{\theta JC}$ Transient Thermal Impedance