





Power MOSFETS


DATASHEET

LM40038NHK8A

N-Channel
Enhancement Mode MOSFET

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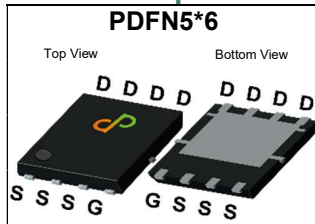


Quality Management Systems

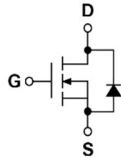
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	40	V
$R_{DS(ON)-Max}$	3.8	m Ω
I_D	95	A

Feature

- Low R_{dson} and low conduction loss
- Surface mount package
- Reliable and Rugged
- ROHS Compliant & Halogen-Free

Applications

- DC/DC Converters
- SMPS Synchronous Rectification

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM40038NHNK8A	PDFN5*6	Tape & Reel	5000 / Tape & Reel	40038 □□□□□□

Note : □□□□□□ = Lot Code

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

Symbol	Parameter	N-Channel	Unit	
V_{DSS}	Drain-Source Voltage	40	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	$T_C=25^\circ C$	46	A
$I_{DM}^{(1)}$	Pulse Drain Current Tested	$T_C=25^\circ C$	141	A
I_D	Continuous Drain Current	$T_C=25^\circ C$	95	A
		$T_C=100^\circ C$	60	
P_D	Maximum Power Dissipation	$T_C=25^\circ C$	50	W
		$T_C=100^\circ C$	20	
I_D	Continuous Drain Current	$T_A=25^\circ C$	21	A
		$T_A=70^\circ C$	17	
P_D	Maximum Power Dissipation	$T_A=25^\circ C$	2.5	W
		$T_A=70^\circ C$	1.6	
$I_{AS}^{(2)}$	Avalanche Current, Single pulse	L=0.1mH	15	A
		L=0.5mH	11	
$E_{AS}^{(2)}$	Avalanche Energy, Single pulse	L=0.1mH	11	mJ
		L=0.5mH	30	

Thermal Characteristics

Symbol	Parameter	Rating	Unit	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	2.5	°C/W
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	Steady State	50	°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	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V, V _{GS} =0V	-	-	1	uA
V_{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	2	2.8	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} =20A	-	3.2	3.8	mΩ
		V _{GS} =6V, I _{DS} =15A	-	7.4	-	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =18A	-	20	-	S
Dynamic Characteristics ^⑤						
R_G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	2.9	-	Ω
C_{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, Freq.=1MHz	-	3183	-	pF
C_{oss}	Output Capacitance		-	305	-	
C_{rss}	Reverse Transfer Capacitance		-	183	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V, V _{DS} =15V, I _D =1A, R _{GEN} =1Ω	-	28	-	nS
t_r	Turn-on Rise Time		-	21	-	
t_{d(OFF)}	Turn-off Delay Time		-	38	-	
t_f	Turn-off Fall Time		-	19	-	
Q_g	Total Gate Charge	V _{GS} =6V, V _{DS} =25V I _D =14A	-	33.8	-	nC
Q_g	Total Gate Charge	V _{GS} =10V, V _{DS} =25V, I _D =14A	-	53.4	-	
Q_{gs}	Gate-Source Charge		-	11.8	-	
Q_{gd}	Gate-Drain Charge		-	16.3	-	
Source-Drain Characteristics						
V_{SD} ^④	Diode Forward Voltage	I _{SD} =15A, V _{GS} =0V	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	I _F =15A, V _R =0V	-	19.1	-	nS
Q_{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	10.4	-	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

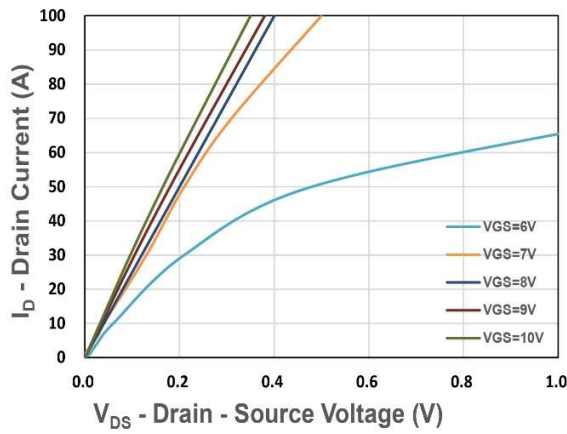


Figure 1. Output Characteristics

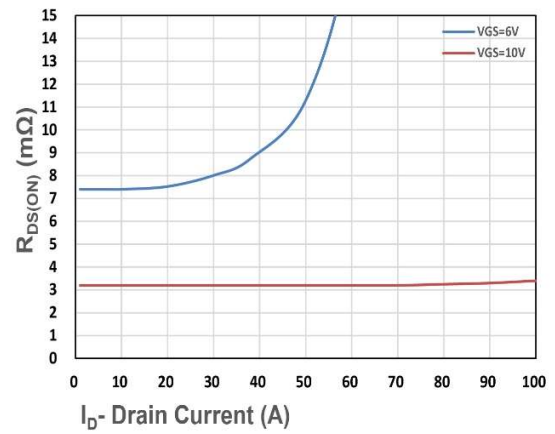


Figure 2. On-Resistance vs. ID

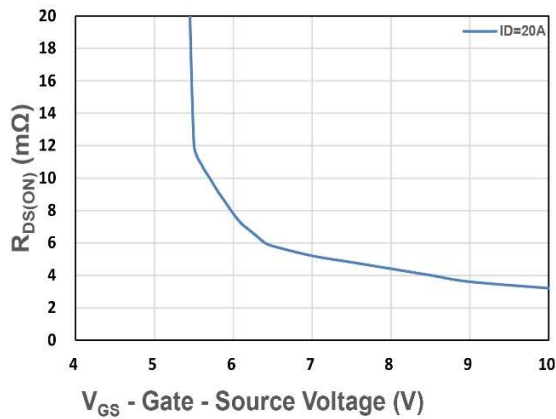


Figure 3. On-Resistance vs. VGS

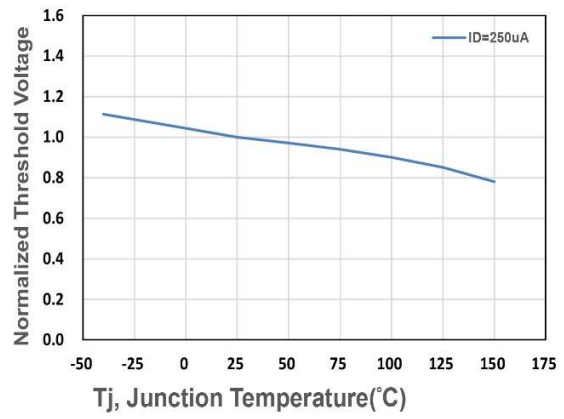


Figure 4. Gate Threshold Voltage

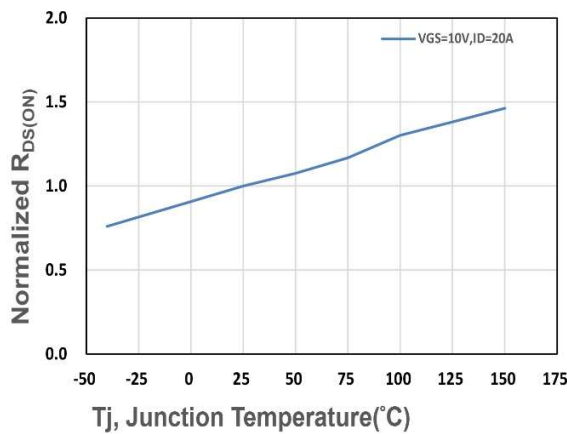


Figure 5. Drain-Source On Resistance

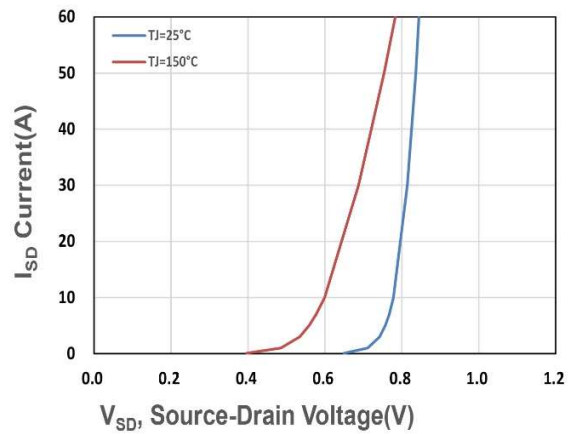


Figure 6. Source-Drain Diode Forward

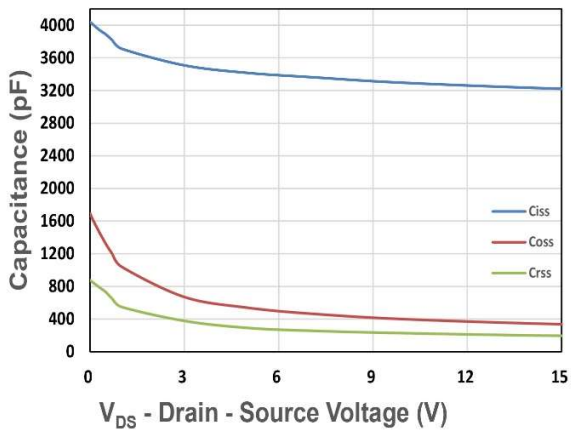


Figure 7. Capacitance

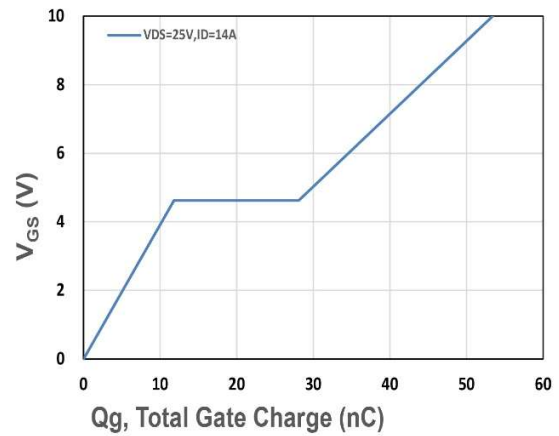


Figure 8. Gate Charge Characteristics

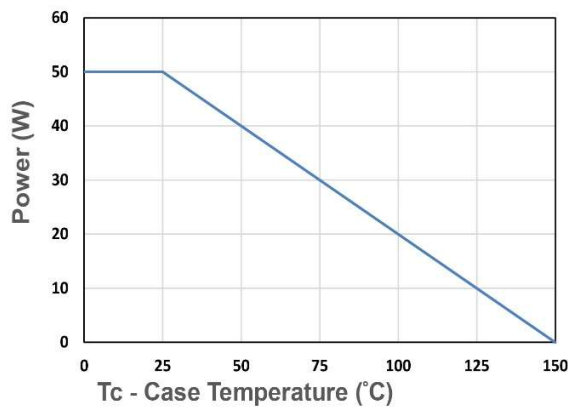


Figure 9. Power Dissipation

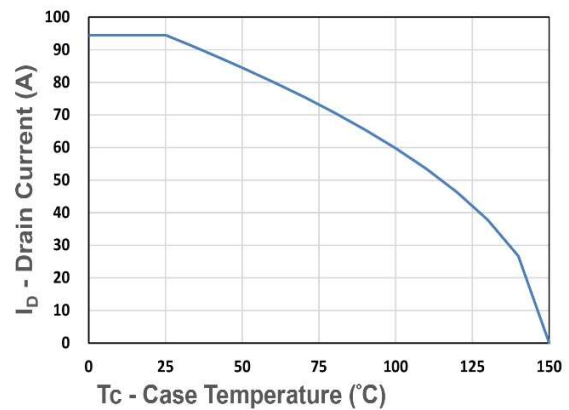


Figure 10. Drain Current

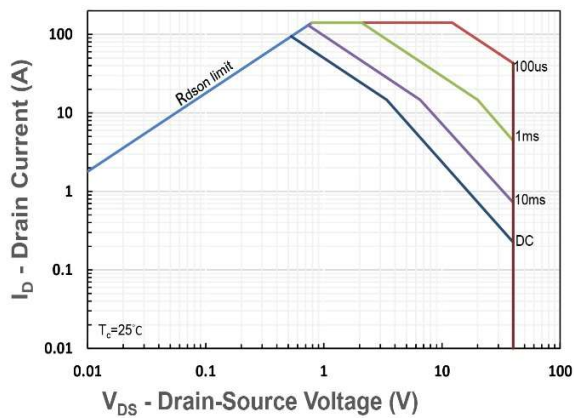


Figure 11. Safe Operating Area

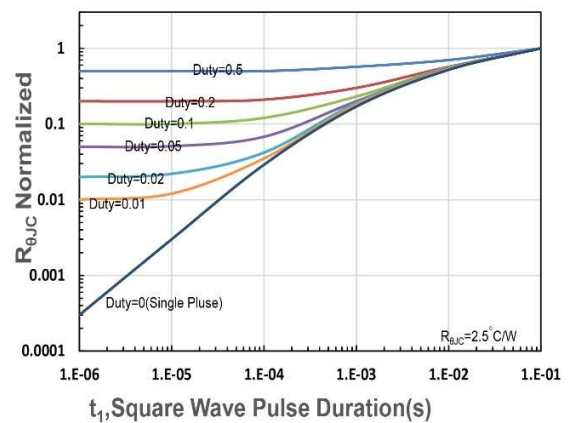


Figure 12. $R_{\theta JC}$ Transient Thermal Impedance