





Power MOSFETS


PRELIMINARY DATASHEET


LM1C130NHPFA

N-Channel
Enhancement Mode MOSFET

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Quality Management Systems

ISO 9001:2015 Certificate


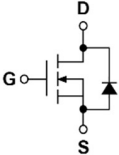
LM1C130NHPFA



N-Channel Enhancement Mode MOSFET

Pin Description

Product Summary

TO-220F-3L 	Symbol 	Symbol	N-Channel	Unit
		V_{DSS}	120	V
		$R_{DS(ON)-Max}$	13.5	mΩ
		I_D	50	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
LM1C130NHPFA	TO-220F-3L	Tube	50 / Tube	1C130 □□□□□□

Note : □□□□□□ = Lot Code

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

Symbol	Parameter	N-Channel	Unit
V_{DSS}	Drain-Source Voltage	120	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	$T_C=25^\circ C$ 26	A
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_C=25^\circ C$ 125	A
I_D	Continuous Drain Current	$T_C=25^\circ C$ 50	A
		$T_C=100^\circ C$ 31.6	
P_D	Maximum Power Dissipation	$T_C=25^\circ C$ 31.3	W
		$T_C=100^\circ C$ 12.5	
I_D	Continuous Drain Current	$T_A=25^\circ C$ 12.9	A
		$T_A=70^\circ C$ 10.3	
P_D	Maximum Power Dissipation	$T_A=25^\circ C$ 2.1	W
		$T_A=70^\circ C$ 1.3	
$I_{AS}^{②}$	Avalanche Current, Single pulse	$L=0.4mH$ 40	A
$E_{AS}^{②}$	Avalanche Energy, Single pulse	$L=0.4mH$ 320	mJ

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	4 °C/W
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State	60 °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

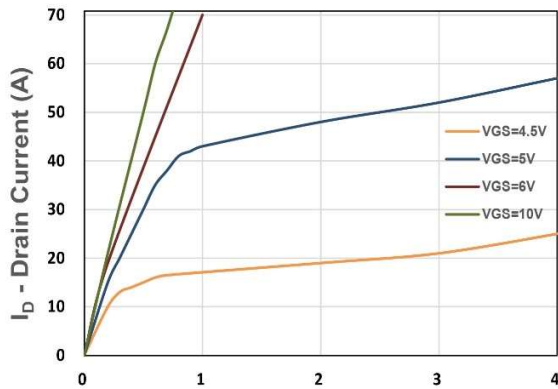
N-Channel Electrical Characteristics (T_J=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250uA	120	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V _{DS} =96V, 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} =20A	-	10.3	13.5	mΩ
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =20A	-	55	-	S
Dynamic Characteristics ^⑤						
R_G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	2.2	-	Ω
C_{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =60V, Freq.=1MHz	-	1986	-	pF
C_{oss}	Output Capacitance		-	230	-	
C_{rss}	Reverse Transfer Capacitance		-	8.6	-	
t_{d(ON)}	Turn-on Delay Time	V _{GS} =10V, V _{DS} =60V, I _D =20A, R _{GEN} =10Ω	-	9	-	nS
t_r	Turn-on Rise Time		-	9	-	
t_{d(OFF)}	Turn-off Delay Time		-	15	-	
t_f	Turn-off Fall Time		-	10	-	
Q_g	Total Gate Charge	V _{GS} =10V, V _{DS} =60V, I _D =20A	-	26	-	nC
Q_{gs}	Gate-Source Charge		-	9	-	
Q_{gd}	Gate-Drain Charge		-	3.5	-	
Source-Drain Characteristics						
V_{SD} ^④	Diode Forward Voltage	I _{SD} =20A, V _{GS} =0V	-	0.9	1.2	V
t_{rr}	Reverse Recovery Time	I _F =20A, V _R =60V	-	50	-	nS
Q_{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	100	-	nC

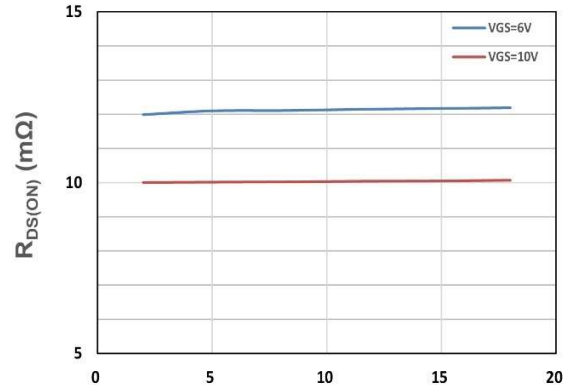
Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

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

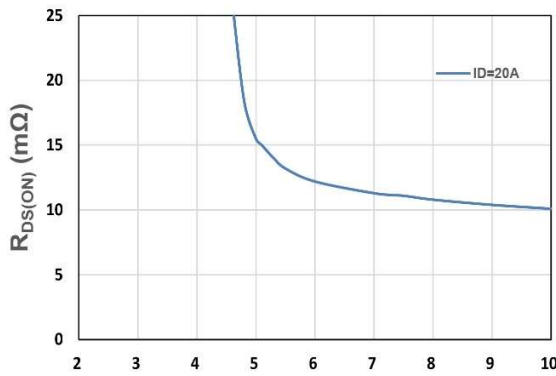
N-Channel Typical Characteristics



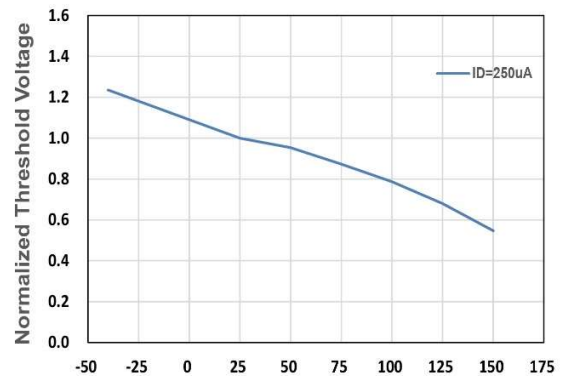
V_{DS} - Drain - Source Voltage (V)
Figure 1. Output Characteristics



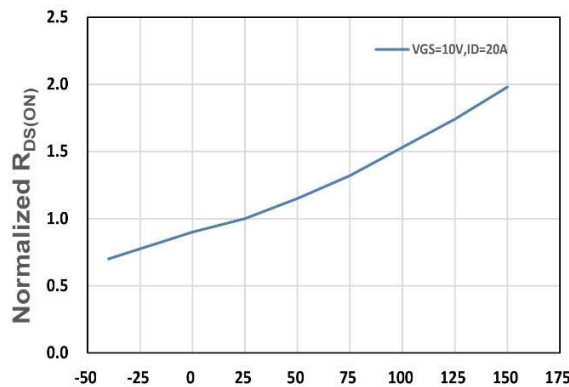
I_D - Drain Current (A)
Figure 2. On-Resistance vs. ID



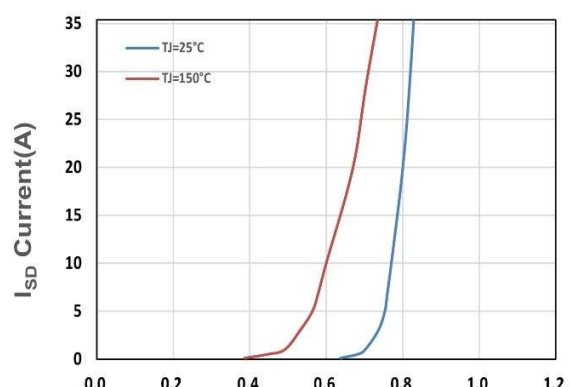
V_{GS} - Gate - Source Voltage (V)
Figure 3. On-Resistance vs. VGS



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

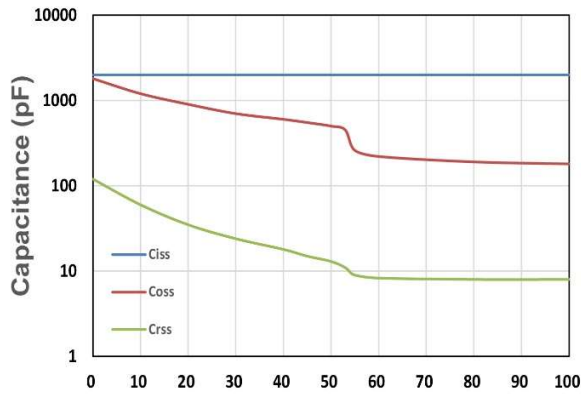


T_j , Junction Temperature($^\circ C$)
Figure 5. Drain-Source On Resistance

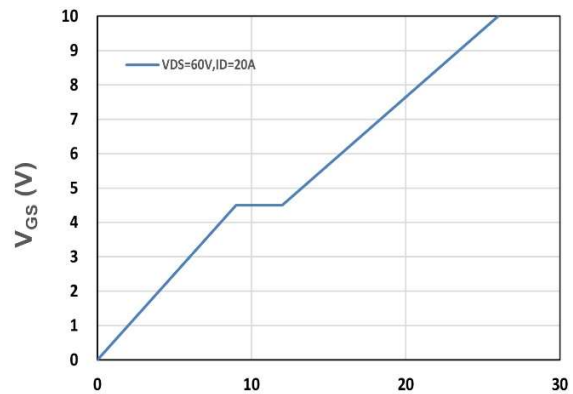


V_{SD} , Source-Drain Voltage(V)
Figure 6. Source-Drain Diode Forward

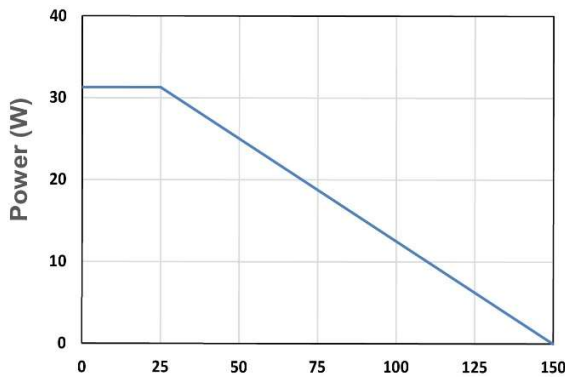
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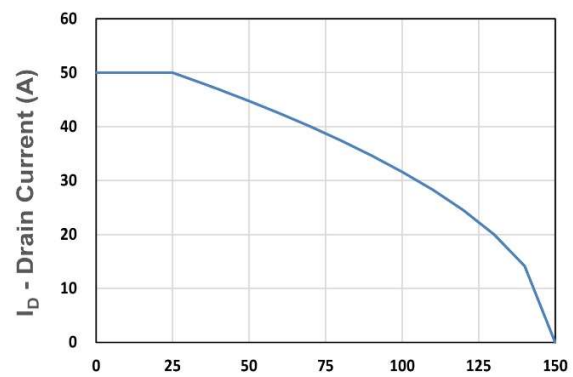
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



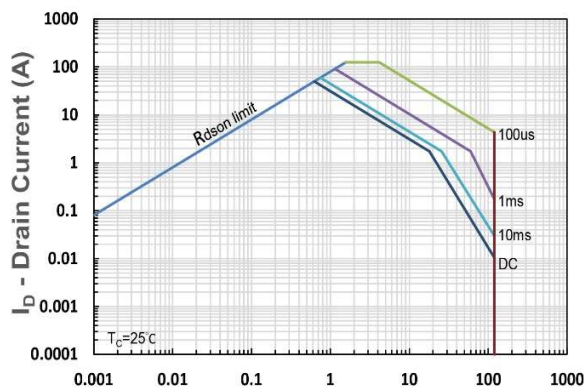
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



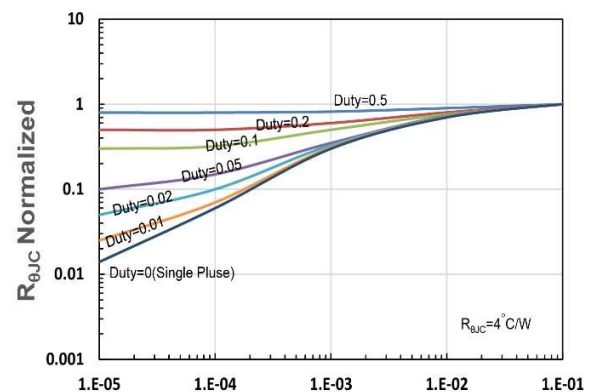
T_c - Case Temperature (°C)
Figure 9. Power Dissipation



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