



Power MOSFETS

DATASHEET

LM20170NGI3A

N-Channel
Enhancement Mode MOSFET

 Leadpower-semiconductor Corp., Ltd

 sales@leadpower-semi.com

 (03) 6577339 FAX : (03) 6577229

 www.leadpower-semi.com

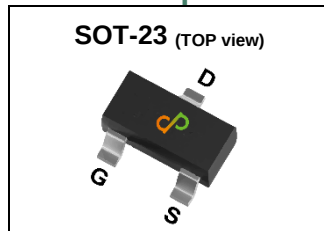


Quality Management Systems

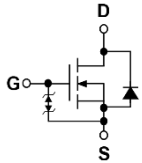
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DS}	20	V
$R_{DS(ON)-Max}$	20	mΩ
I_D	6.2	A

Feature

- Ultra low On-Resistance
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- Gate to source ESD protect

Applications

- Portable Equipment
- Battery Powered System

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM20170NGI3A	SOT-23	Tape & Reel	3000 / Tape & Reel	27□□□

Note : □□□ = Lot Code

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

Symbol	Parameter		N-Channel	Unit
V_{DS}	Drain-Source Voltage		20	V
V_{GS}	Gate-Source Voltage		±12	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_A=25^{\circ}C$	11.2	A
I_D	Continuous Drain Current	$T_A=25^{\circ}C$	6.2	A
		$T_A=70^{\circ}C$	4.9	
P_D	Maximum Power Dissipation	$T_A=25^{\circ}C$	1.1	W
		$T_A=70^{\circ}C$	0.7	
$I_{AS}^{②}$	Avalanche Current, Single pulse	L=0.1mH	11.2	A
$E_{AS}^{②}$	Avalanche Energy, Single pulse	L=0.1mH	6	mJ

Thermal Characteristics

Symbol	Parameter		Rating	Unit
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State	110	°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.

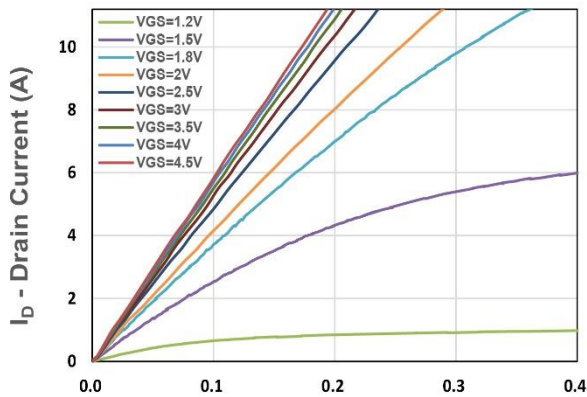
N-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Electrical Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250uA	20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V	-	-	1	uA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250uA	0.45	0.7	1	V
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±10	uA
R _{DS(ON)} ④	Drain-Source On-state Resistance	V _{GS} =4.5V, I _{DS} =4A	-	17	20	mΩ
		V _{GS} =2.5V, I _{DS} =4A	-	20	26	
		V _{GS} =1.8V, I _{DS} =1A	-	27	40	
gfs	Forward Transconductance	V _{DS} =3V, I _{DS} =2A	-	11	-	S
Dynamic Characteristics ⑤						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V, Freq.=1MHz	-	3.5	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Freq.=1MHz	-	618	-	pF
C _{oss}	Output Capacitance		-	94	-	
C _{rss}	Reverse Transfer Capacitance		-	68	-	
td(ON)	Turn-on Delay Time	V _{GS} =4.5V,V _{DS} =10V, Id=1A,RGEN=6Ω	-	4.8	-	nS
tr	Turn-on Rise Time		-	18.7	-	
td(OFF)	Turn-off Delay Time		-	21.5	-	
tf	Turn-off Fall Time		-	21.3	-	
Qg	Total Gate Charge	V _{GS} =2.5V,V _{DS} =10V Id=4A	-	4.3	-	nC
Qg	Total Gate Charge	V _{GS} =4.5V,V _{DS} =10V, Id=4A	-	7.4	-	
Qgs	Gate-Source Charge		-	1.31	-	
Qgd	Gate-Drain Charge		-	1.62	-	
Source-Drain Characteristics						
VSD④	Diode Forward Voltage	ISD=2A, VGS=0V	-	0.7	1.1	V
trr	Reverse Recovery Time	IF=2A, VR=10V	-	9.4	-	nS
Qrr	Reverse Recovery Charge	dIF/dt=100A/μs	-	2.6	-	nC

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

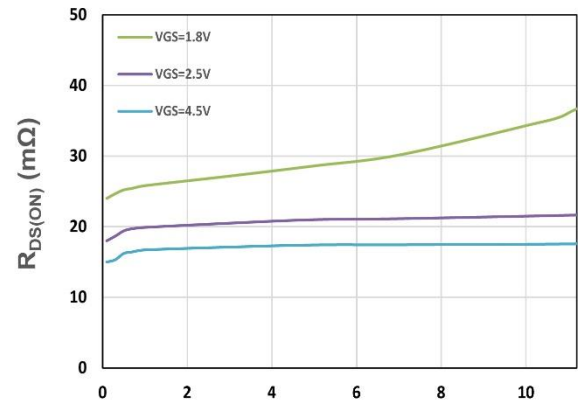
Note ⑤ : Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics



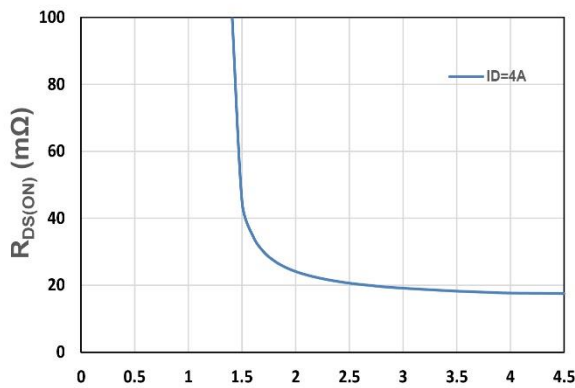
V_{DS} - Drain - Source Voltage (V)

Figure 1. Output Characteristics



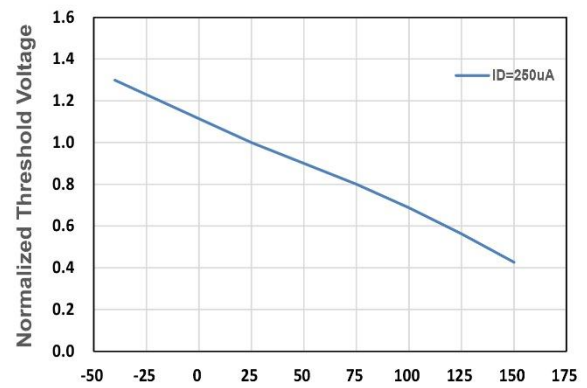
I_D - Drain Current (A)

Figure 2. On-Resistance vs. ID



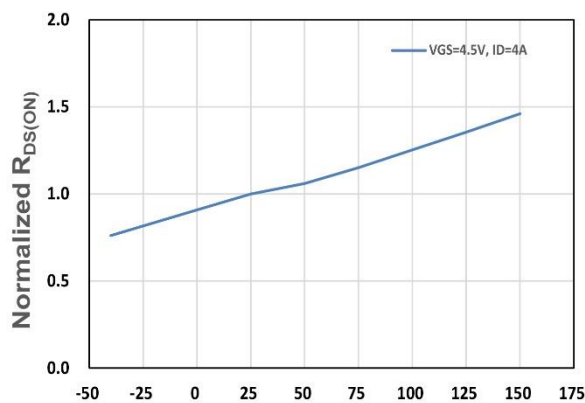
V_{GS} - Gate - Source Voltage (V)

Figure 3. On-Resistance vs. VGS



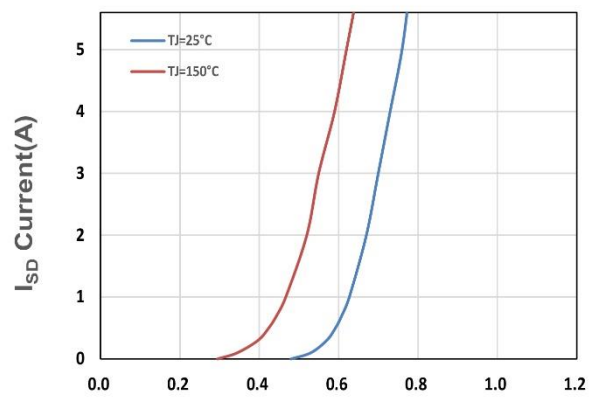
T_j , Junction Temperature($^{\circ}$ C)

Figure 4. Gate Threshold Voltage



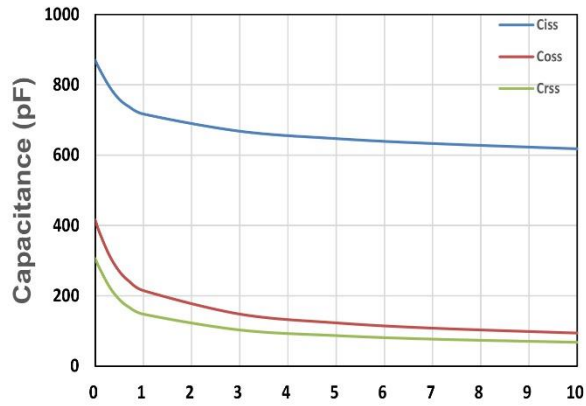
T_j , Junction Temperature($^{\circ}$ C)

Figure 5. Drain-Source On Resistance

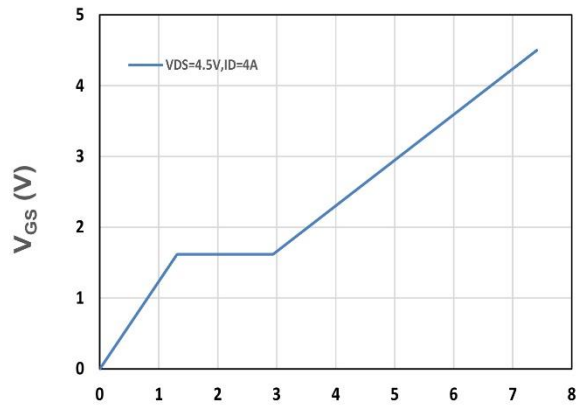


V_{SD} , Source-Drain Voltage(V)

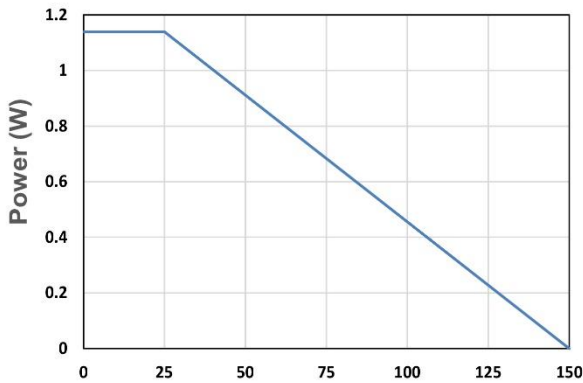
Figure 6. Source-Drain Diode Forward



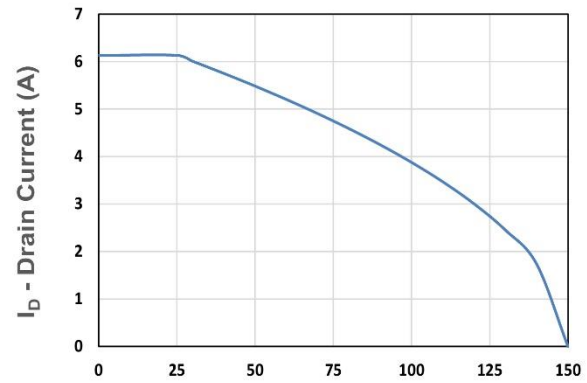
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



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



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



T_A - Ambient Temperature ($^{\circ}C$)
Figure 10. Drain Current

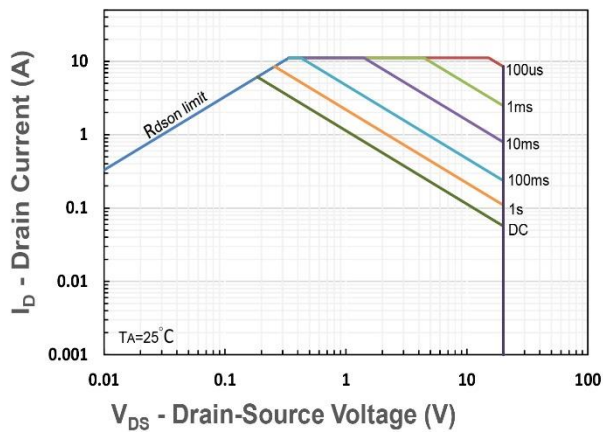


Figure 11. Safe Operating Area

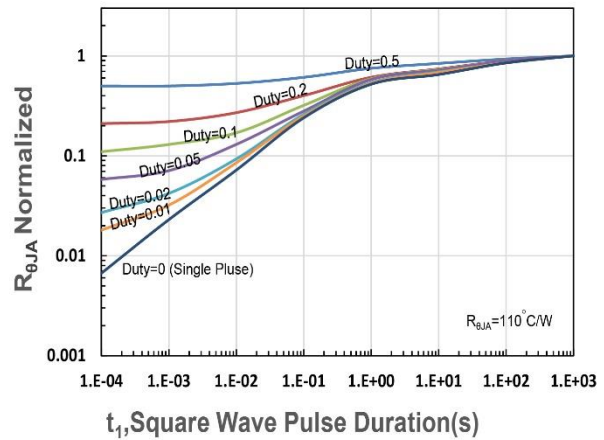


Figure 12. $R_{\theta JA}$ Transient Thermal Impedance