





Power MOSFETS

DATASHEET

LM20170NGI3A

N-Channel
Enhancement Mode MOSFET

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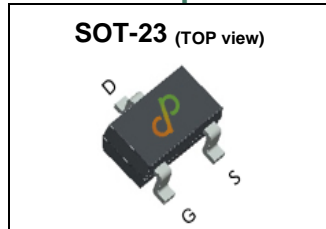


Quality Management Systems

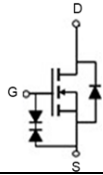
ISO 9001:2015 Certificate

N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DSS}	20	V
$R_{DS(ON)-Max}$	20	m Ω
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□□□

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

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

Thermal Characteristics

Symbol	Parameter	Rating	Unit	
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	Steady State	110	$^\circ\text{C/W}$

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 1in^2 FR-4 board with 1oz.

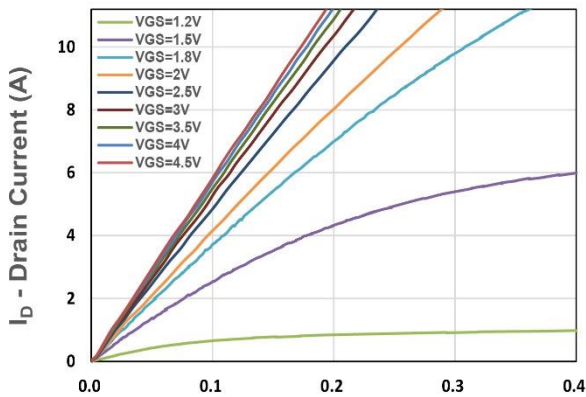
N-Channel Electrical Characteristics (T_J=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250uA	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, I _D =1A, R _{GEN} =6Ω	-	4.8	-	nS
t_r	Turn-on Rise Time		-	18.7	-	
t_{d(OFF)}	Turn-off Delay Time		-	21.5	-	
t_f	Turn-off Fall Time		-	21.3	-	
Q_g	Total Gate Charge	V _{GS} =2.5V, V _{DS} =10V, I _D =4A	-	4.3	-	nC
Q_g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =4A	-	7.4	-	
Q_{gs}	Gate-Source Charge		-	1.31	-	
Q_{gd}	Gate-Drain Charge		-	1.62	-	
Source-Drain Characteristics						
V_{SD}^④	Diode Forward Voltage	I _{SD} =2A, V _{GS} =0V	-	0.7	1.1	V
t_{rr}	Reverse Recovery Time	I _F =2A, V _R =10V	-	9.4	-	nS
Q_{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	2.6	-	nC

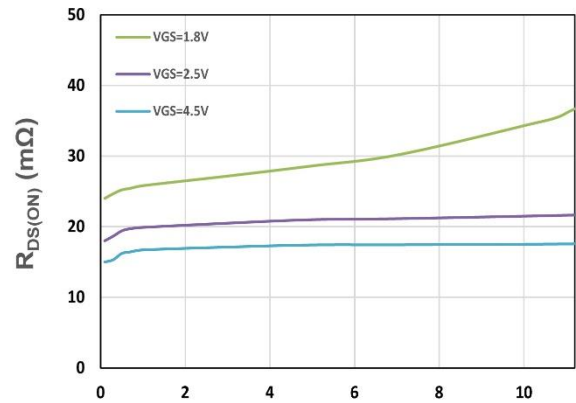
Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

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

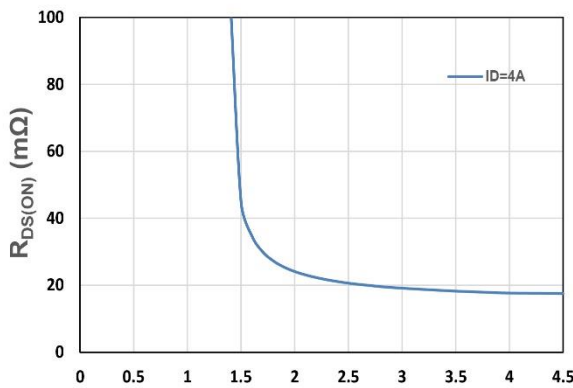
N-Channel Typical Characteristics



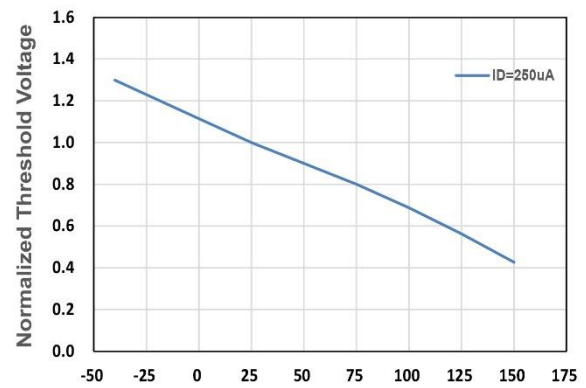
V_{DS} - Drain - Source Voltage (V)
Figure 1. Output Characteristics



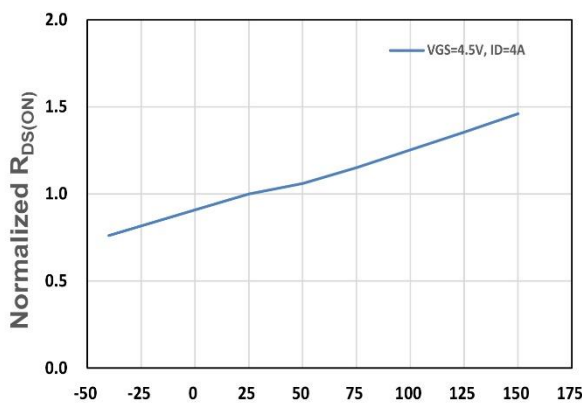
I_D - Drain Current (A)
Figure 2. On-Resistance vs. ID



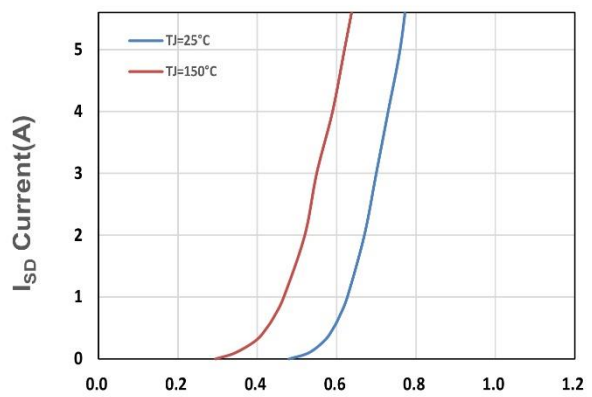
V_{GS} - Gate - Source Voltage (V)
Figure 3. On-Resistance vs. VGS



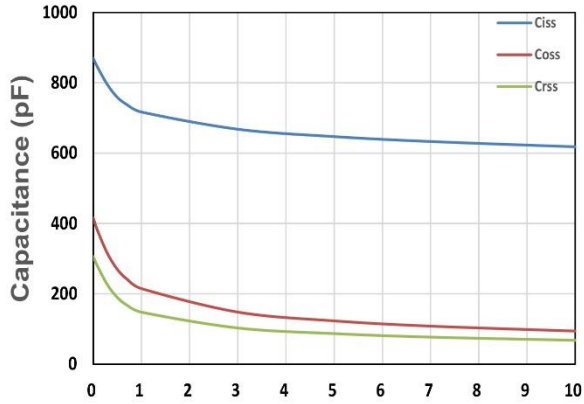
T_j, Junction Temperature(°C)
Figure 4. Gate Threshold Voltage



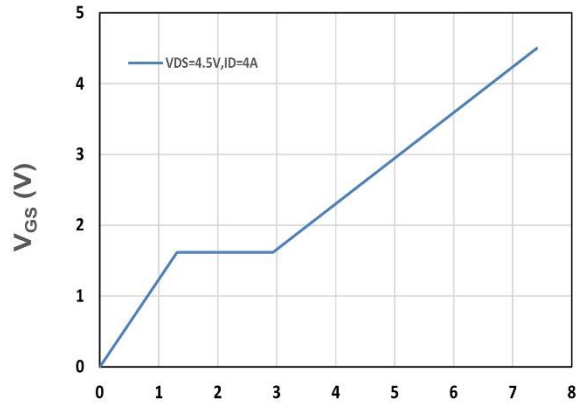
T_j, Junction Temperature(°C)
Figure 5. Drain-Source On Resistance



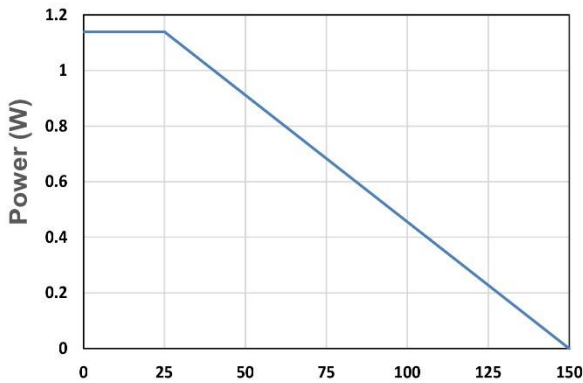
V_{SD}, Source-Drain Voltage(V)
Figure 6. Source-Drain Diode Forward



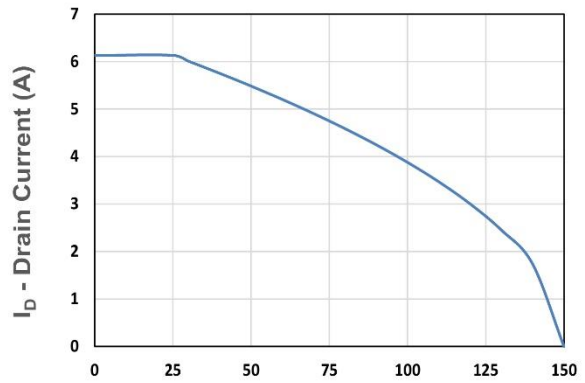
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



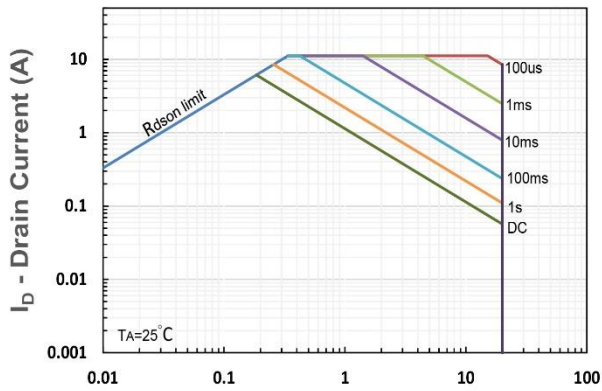
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



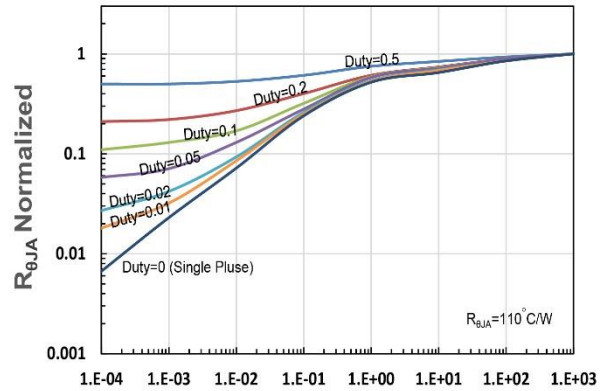
T_A - Ambient Temperature (°C)
Figure 9. Power Dissipation



T_A - Ambient 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. $R_{\theta JA}$ Transient Thermal Impedance