





Power MOSFETS


DATASHEET


LM20200NGI3A

N-Channel
Enhancement Mode MOSFET

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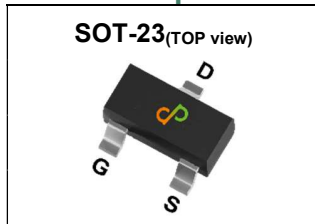


Quality Management Systems

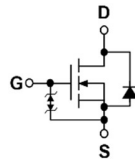
ISO 9001:2015 Certificate

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	7.5	A

Feature

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- ESD protection

Applications

- Power Management in DC/DC Converters
- USB Power Delivery (USB PD)
- Load switch

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
LM20200NGI3A	SOT-23	Tape & Reel	3000 / Tape & Reel	30□□□

Note : □□□ = Lot Code

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

Symbol	Parameter	N-Channel	Unit
V_{DSS}	Drain-Source Voltage	20	V
V_{GSS}	Gate-Source Voltage	±8	V
T_J	Maximum Junction Temperature	150	°C
T_{STG}	Storage Temperature Range	-55 to 150	°C
I_S	Diode Continuous Forward Current	$T_A=25^\circ\text{C}$ 1	A
$I_{DM}^{①}$	Pulse Drain Current Tested	$T_A=25^\circ\text{C}$ 11.2	A
I_D	Continuous Drain Current	$T_A=25^\circ\text{C}$ 7.5	A
		$T_A=70^\circ\text{C}$ 6	
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=0.1mH 13	A
		L=0.5mH 7.5	
$E_{AS}^{②}$	Avalanche Energy, Single pulse	L=0.1mH 8.5	mJ
		L=0.5mH 14	

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

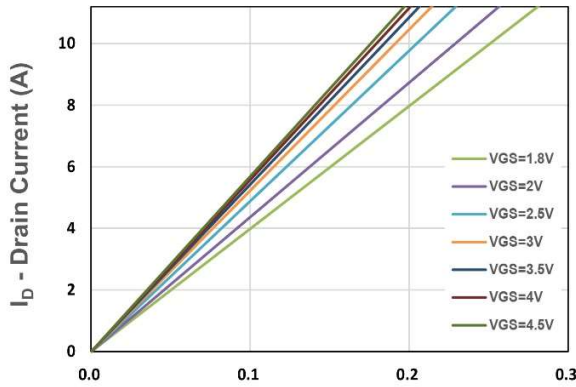
N-Channel Electrical Characteristics (T_J=25°C Unless Otherwise Noted)

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	0.4	0.65	0.9	V
I_{GSS}	Gate Leakage Current	V _{GS} =±8V, 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	-	24	36	
gfs	Forward Transconductance	V _{DS} =3V, I _{DS} =2A	-	6.8	-	S
Dynamic Characteristics ^⑤						
R_G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, Freq.=1MHz	-	1.9	-	Ω
C_{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V, Freq.=1MHz	-	702	-	pF
C_{oss}	Output Capacitance		-	96	-	
C_{rss}	Reverse Transfer Capacitance		-	70	-	
td(ON)	Turn-on Delay Time	V _{GS} =4.5V, V _{DS} =7V, I _D =1A, R _{GEN} =1Ω	-	4.7	-	nS
t_r	Turn-on Rise Time		-	1.6	-	
t_{d(OFF)}	Turn-off Delay Time		-	31	-	
t_f	Turn-off Fall Time		-	2.3	-	
Q_g	Total Gate Charge	V _{GS} =2.5V, V _{DS} =10V I _D =4A	-	4.7	-	nC
Q_g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =4A	-	8.3	-	
Q_{gs}	Gate-Source Charge		-	1.4	-	
Q_{gd}	Gate-Drain Charge		-	1.5	-	
Source-Drain Characteristics						
V_{SD} ^④	Diode Forward Voltage	I _{SD} =2A, V _{GS} =0V	-	0.6	1.1	V
t_{rr}	Reverse Recovery Time	I _F =2A, V _R =20V	-	12.8	-	nS
Q_{rr}	Reverse Recovery Charge	di _F /dt=100A/μs	-	2.9	-	nC

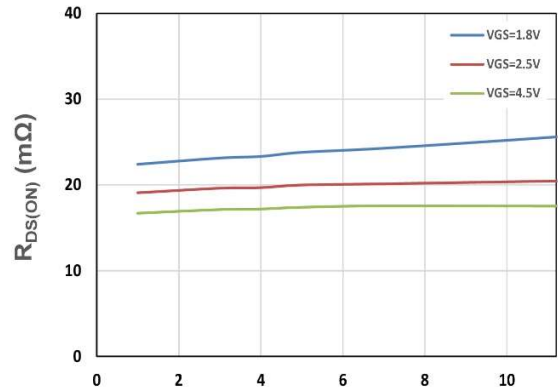
Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

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

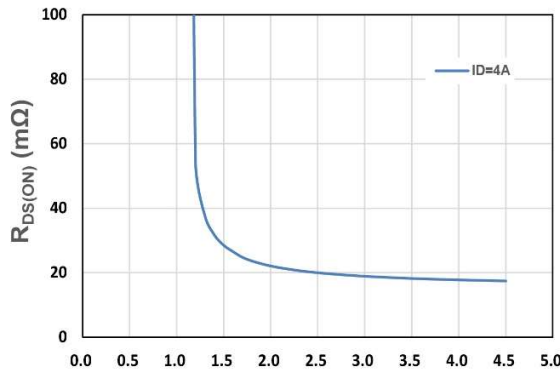
N-Channel Typical Characteristics



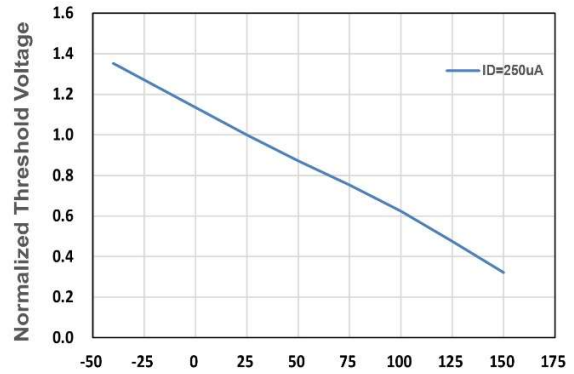
V_{DS} - Drain - Source Voltage (V)
Figure 1. Output Characteristics



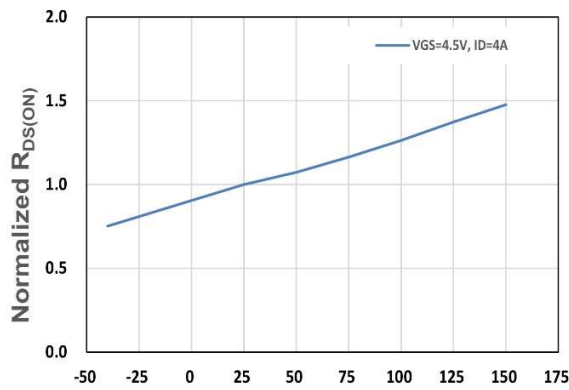
I_D - Drain Current (A)
Figure 2. On-Resistance vs. ID



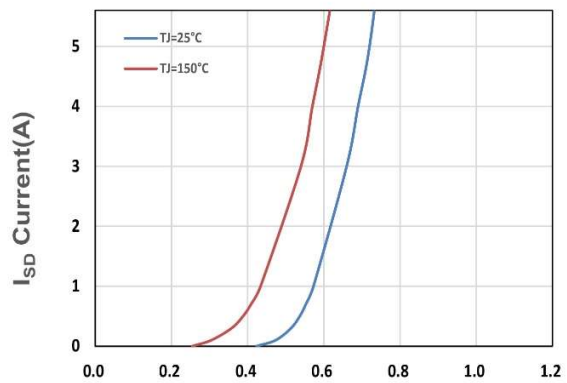
V_{GS} - Gate - Source Voltage (V)
Figure 3. On-Resistance vs. VGS



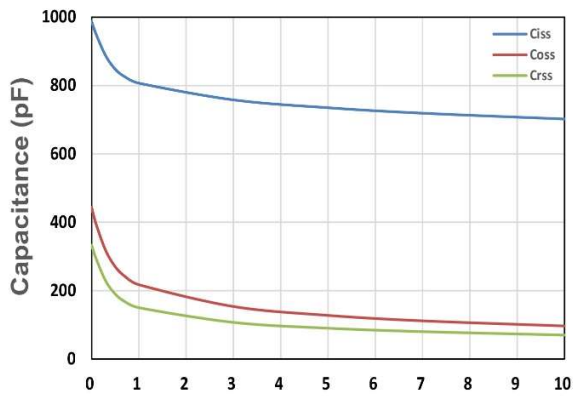
T_j , Junction Temperature($^{\circ}C$)
Figure 4. Gate Threshold Voltage



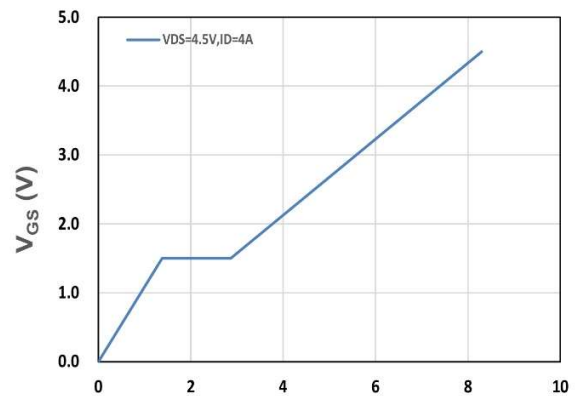
T_j , Junction Temperature($^{\circ}C$)
Figure 5. Drain-Source On Resistance



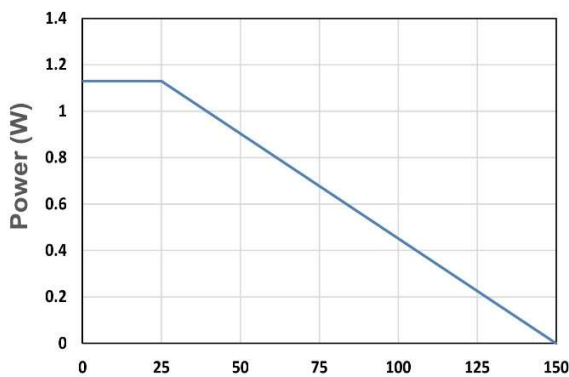
V_{SD} , Source-Drain Voltage(V)
Figure 6. Source-Drain Diode Forward



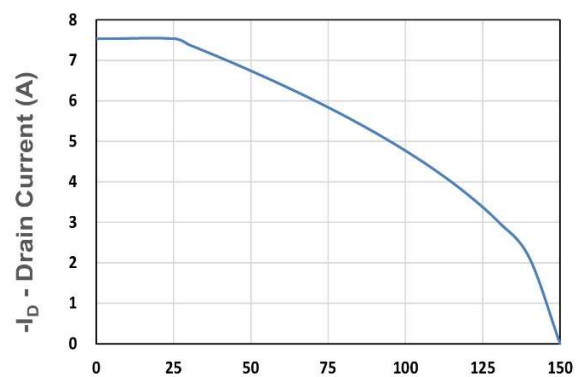
V_{DS} - Drain - Source Voltage (V)
Figure 7. Capacitance



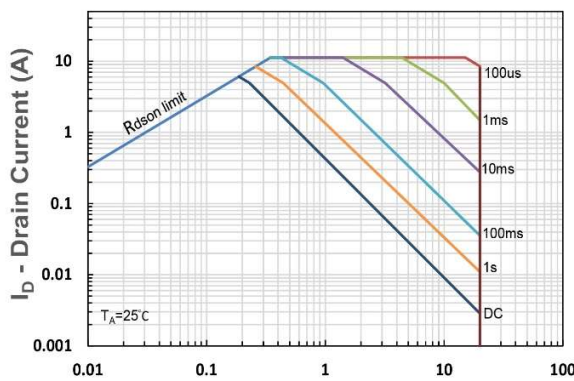
Q_g , Total Gate Charge (nC)
Figure 8. Gate Charge Characteristics



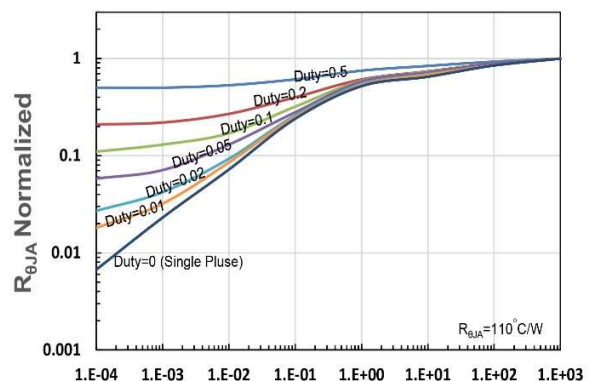
T_A - Ambient Temperature (°C)
Figure 9. Power Dissipation



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