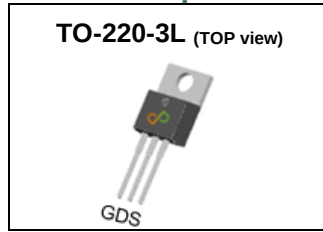
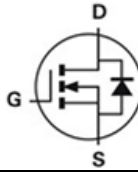


N-Channel Enhancement Mode MOSFET

Pin Description



Symbol



Product Summary

Symbol	N-Channel	Unit
V_{DS}	100	V
$R_{DS(ON)-Max}$	10.7	mΩ
I_D	64	A

Feature

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS Tested

Applications

- Motor drivers
- DC-DC Converter

Ordering Information

Orderable Part Number	Package Type	Form	Shipping	Marking
MGP089N10N	TO-220-3L	Tube	50 / Tape & Reel	

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

Symbol	Parameter	N-Channel	Unit
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	
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	$T_c=25^\circ\text{C}$	A
I_D	Continuous Drain Current	$T_c=25^\circ\text{C}$	A
		$T_c=100^\circ\text{C}$	
P_D	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	W
		$T_c=100^\circ\text{C}$	
$I_{AS}^{②}$	Avalanche Current, Single pulse	$L=0.1\text{mH}$	A
$E_{AS}^{②}$	Avalanche Energy, Single pulse	$L=0.1\text{mH}$	mJ

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	1.5
$R_{\theta JA}^{③}$	Thermal Resistance-Junction to Ambient	Steady State	62.5

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 ($T_J=25^{\circ}\text{C}$ 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	100	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =80V, 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	-	8.9	10.7	mΩ
		V _{GS} =6V, I _{DS} =20A	-	12.5	16	
gfs	Forward Transconductance	V _{DS} =5V, I _{DS} =10A	-	18.5	-	S
Dynamic Characteristics ⑥						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V, Freq.=1MHz	-	0.9	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, Freq.=1MHz	-	1558	-	pF
C _{oss}	Output Capacitance		-	523	-	
C _{rss}	Reverse Transfer Capacitance		-	55	-	
td(ON)	Turn-on Delay Time	V _{GS} =10V,V _{DS} =30V, I _D =1A,R _{GEN} =6Ω	-	10.4	-	nS
t _r	Turn-on Rise Time		-	17.5	-	
t _{d(OFF)}	Turn-off Delay Time		-	26.5	-	
t _f	Turn-off Fall Time		-	68.9	-	
Q _g	Total Gate Charge	V _{GS} =6V,V _{DS} =50V I _D =20A	-	19.9	-	nC
Q _g	Total Gate Charge	V _{GS} =10V,V _{DS} =50V, I _D =20A	-	30.1	-	
Q _{gs}	Gate-Source Charge		-	8.8	-	
Q _{gd}	Gate-Drain Charge		-	8.8	-	
Source-Drain Characteristics						
V _{SD} ④	Diode Forward Voltage	I _{SD} =10A, V _{GS} =0V	-	0.8	1.1	V
t _{rr}	Reverse Recovery Time	I _F =10A, V _R =50V	-	50.8	-	nS
Q _{rr}	Reverse Recovery Charge	dI _F /dt=100A/μs	-	40	-	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

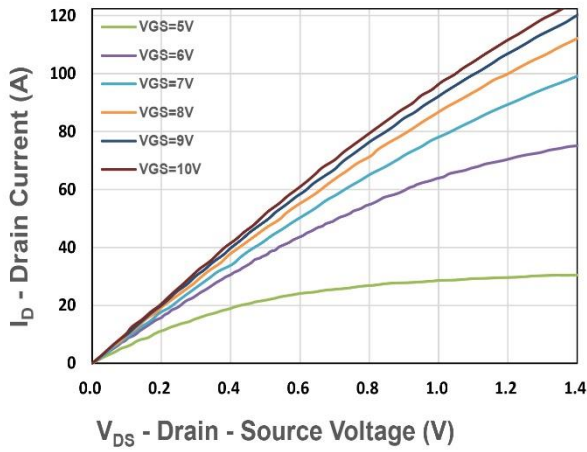


Figure 1. Output Characteristics

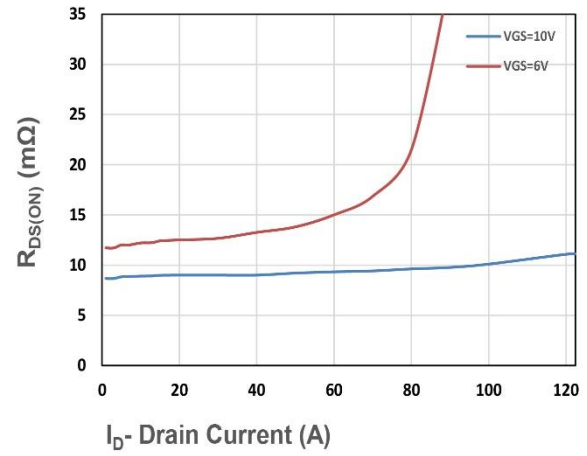


Figure 2. On-Resistance vs. I_D

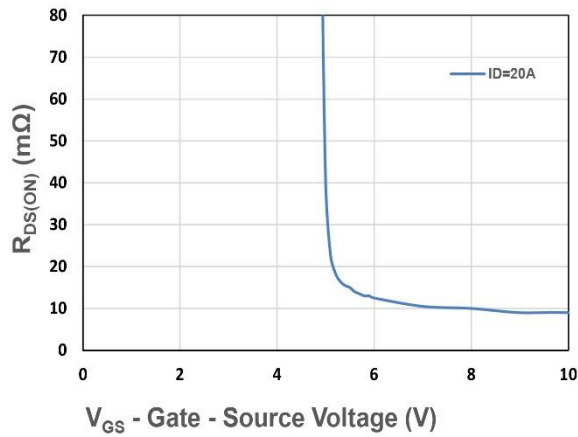


Figure 3. On-Resistance vs. V_{GS}

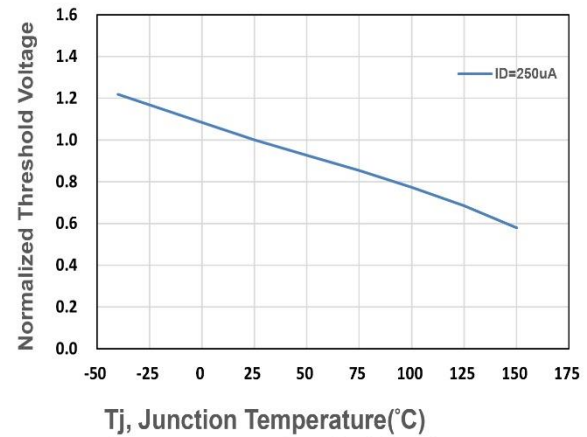


Figure 4. Gate Threshold Voltage

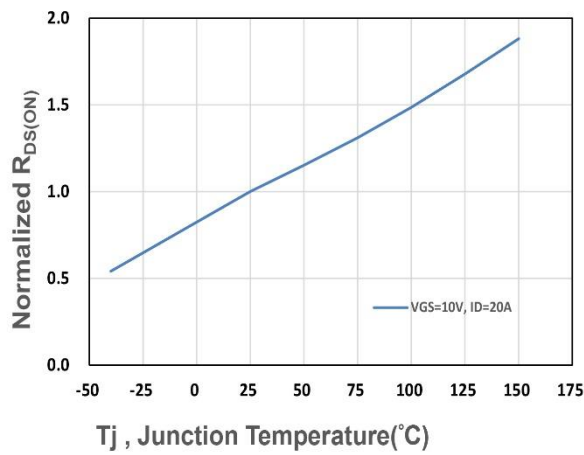


Figure 5. Drain-Source On Resistance

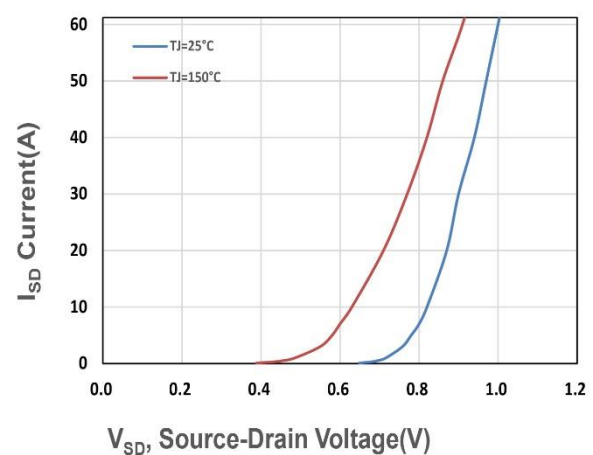
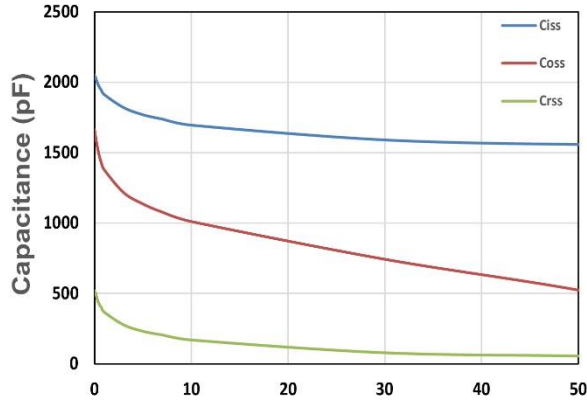
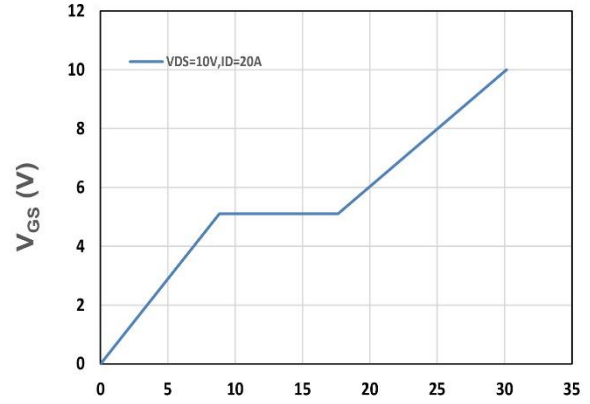


Figure 6. Source-Drain Diode Forward



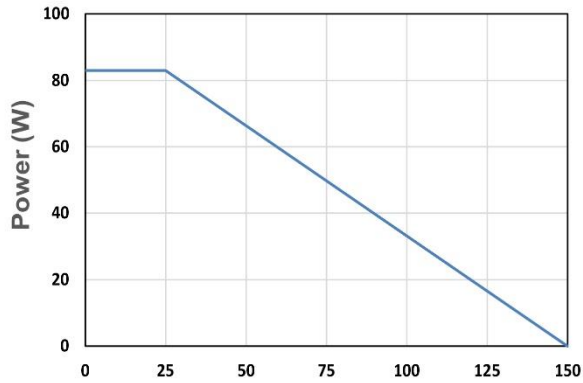
V_{DS} - Drain - Source Voltage (V)

Figure 7. Capacitance



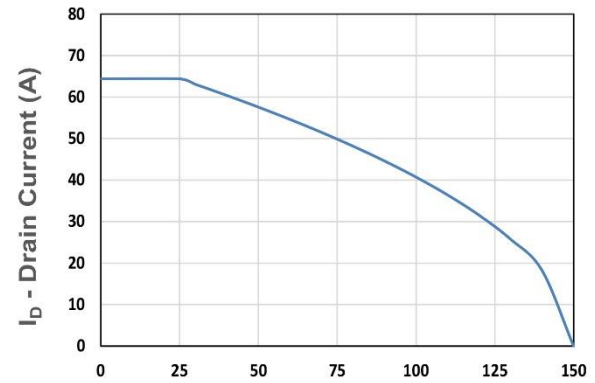
Q_g , Total Gate Charge (nC)

Figure 8. Gate Charge Characteristics



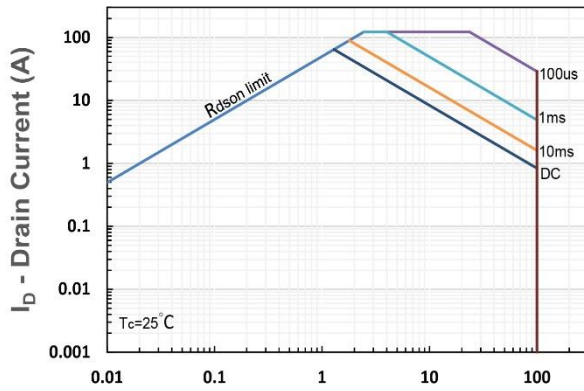
T_c - Case Temperature ($^{\circ}\text{C}$)

Figure 9. Power Dissipation



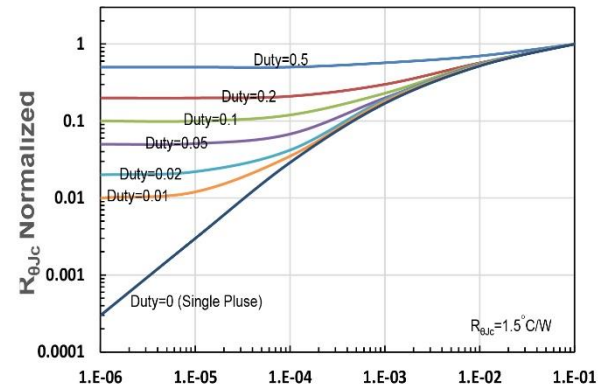
T_c - Case Temperature ($^{\circ}\text{C}$)

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