



GL5N04

GL Silicon N-Channel Power MOSFET

General Description:

The GL5N04 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications. The package form is SOT-23-3L which accords with the RoHS standard.

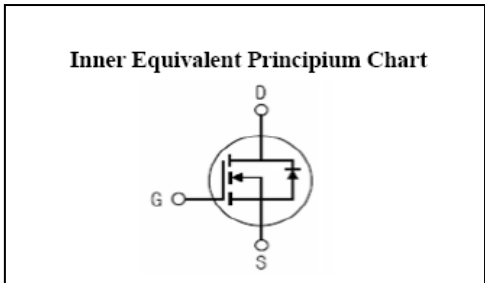
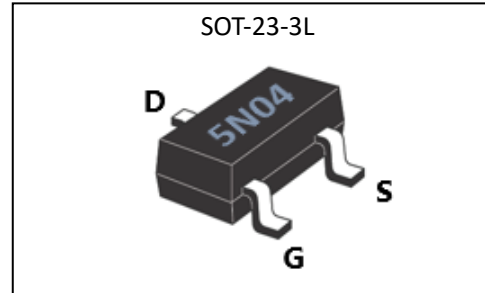
Features:

- Fast Switching
- Low Gate Charge and Rds on
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications:

- PWM applications
- Load switch
- Power management

V_{DSS}	40	V
I_D	5	A
P_D	1.4	W
$R_{DS(ON)TYPE}$	30	m Ω



Absolute (Tc= 25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	40	V
I_D	Continuous Drain Current	5	A
	Continuous Drain Current $T_C = 70^\circ\text{C}$	3.8	A
I_{DM}^{a1}	Pulsed Drain Current	20	A
V_{GS}	Gate-to-Source Voltage	± 20	V
d_v/d_t^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	1.4	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	300	$^\circ\text{C}$



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Electrical Characteristics (Tc= 25°C unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V _{DSS}	Drain to Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	40	--	--	V
ΔBV _{DSS} /ΔT _J	Bvdss Temperature Coefficient	I _D =-250uA, Reference 25°C	--	0.1	--	V/°C
I _{DSS}	Drain to Source Leakage Current	V _{DS} =40, V _{GS} =0V, T _a =25°C	--	--	1	μA
		V _{DS} =32V, V _{GS} =0V, T _a =125°C	--	--	250	
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} = +20V	--	--	1	μA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} = -20V	--	--	-1	μA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =10V, I _D =2.5A	--	30	45	mΩ
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =4.5V, I _D =2.5A	--	40	60	mΩ
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1	1.6	2.5	V
Pulse width tp ≤ 380μs, δ ≤ 2%						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g _{fs}	Forward Transconductance	V _{DS} =15V, I _D =5.0A	10	--	--	S
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V f=1.0MHz	--	620	--	pF
C _{oss}	Output Capacitance		--	130	--	
C _{rss}	Reverse Transfer Capacitance		--	50	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =1.0A, V _{DD} =15V V _{GS} =10V, R _G =5.0Ω	--	7	--	ns
t _r	Rise Time		--	21	--	
t _{d(OFF)}	Turn-Off Delay Time		--	27	--	
t _f	Fall Time		--	7	--	
Q _g	Total Gate Charge	I _D =5.0A, V _{DD} =15V V _{GS} =10V	--	10	--	nC
Q _{gs}	Gate to Source Charge		--	1.9	--	
Q _{gd}	Gate to Drain ("Miller") Charge		--	2.8	--	



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Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	5.0	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	20	A
V_{SD}	Diode Forward Voltage	$I_S=5.0A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=5.0A, T_j = 25^\circ C$	--	50	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100A/us, V_{GS}=0V$	--	120	--	nC
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Ambient	90	$^\circ C/W$

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

^{a3}: $I_{SD} = 7.0A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, \text{Start } T_j = 25^\circ C$

Typical Electrical and Thermal Characteristics

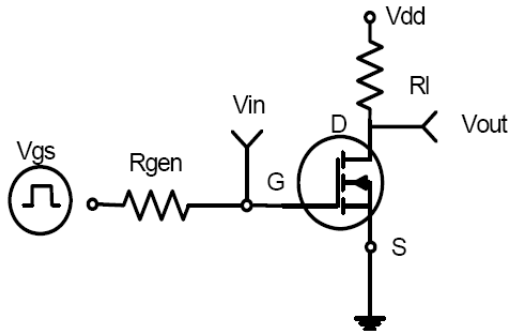


Figure 1: Switching Test Circuit

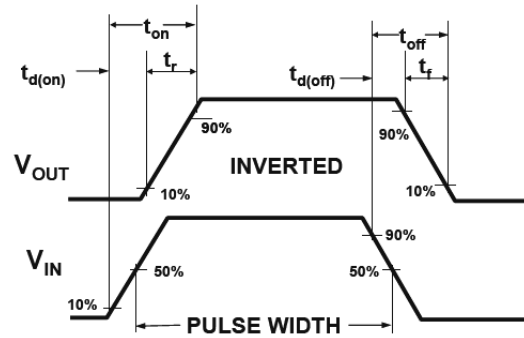


Figure 2: Switching Waveforms

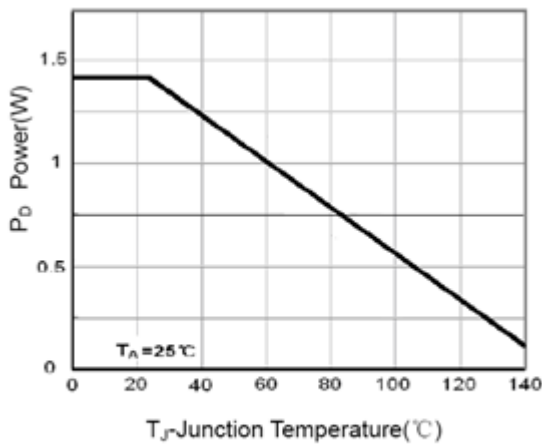


Figure 3 Power Dissipation

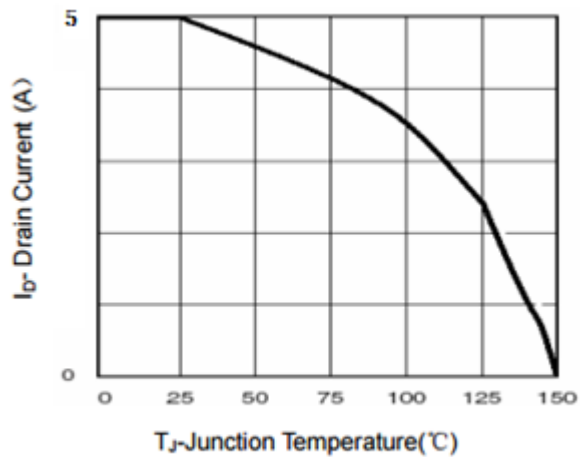


Figure 4 Drain Current

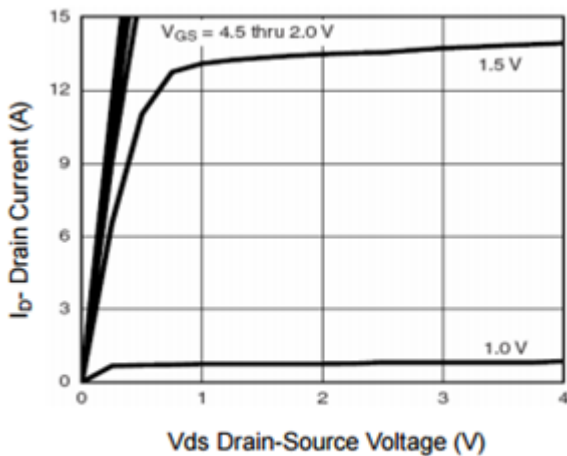


Figure 5 Output Characteristics

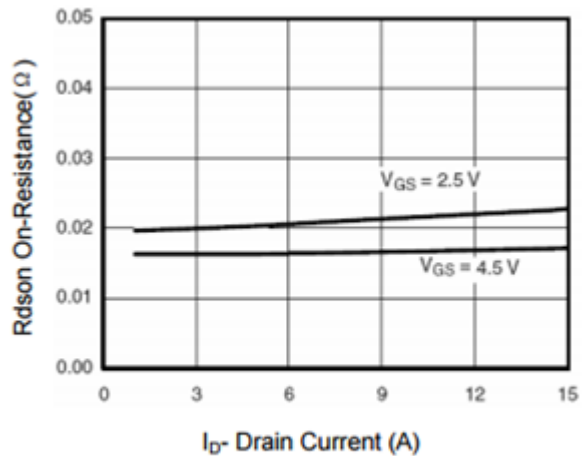
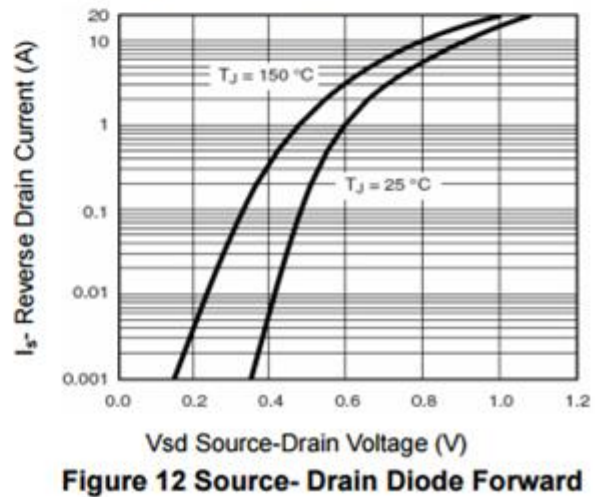
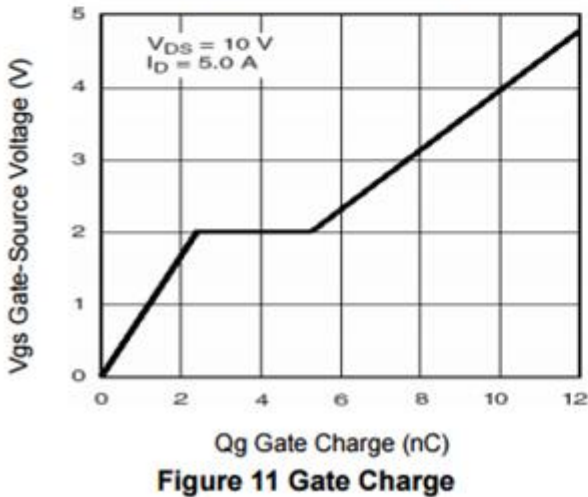
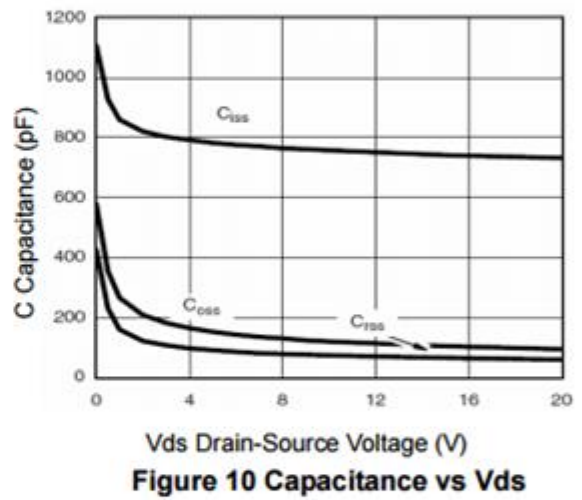
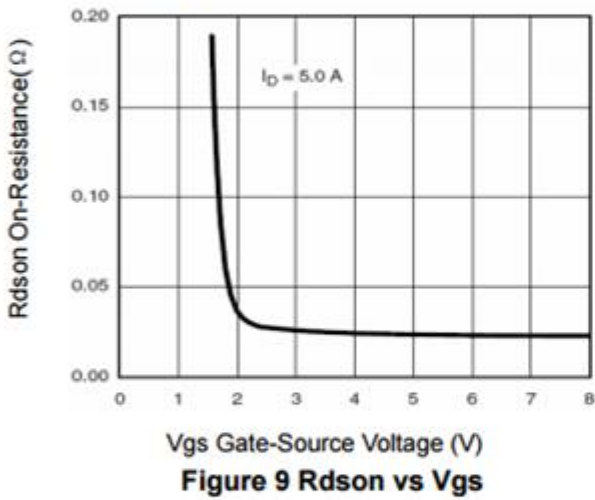
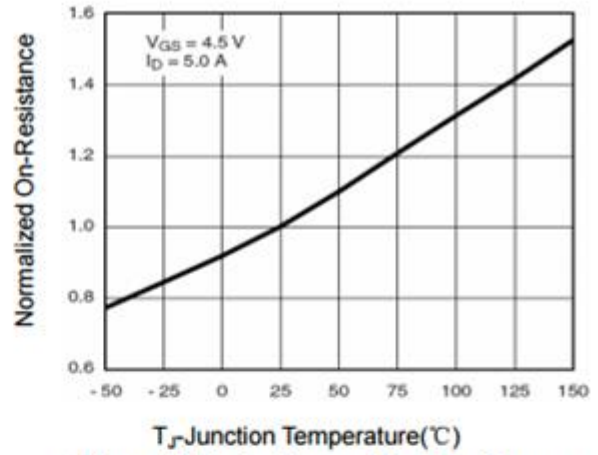
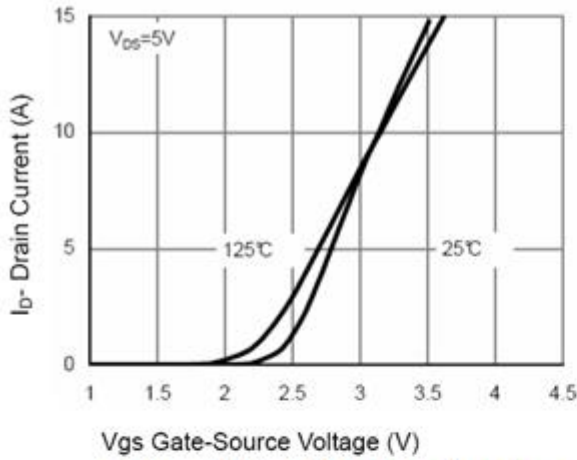


Figure 6 Drain-Source On-Resistance



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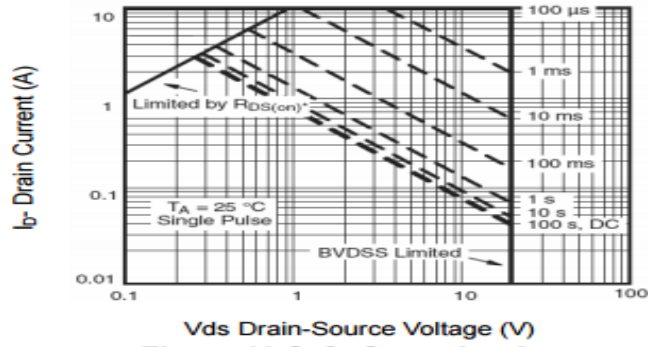


Figure 13 Safe Operation Area

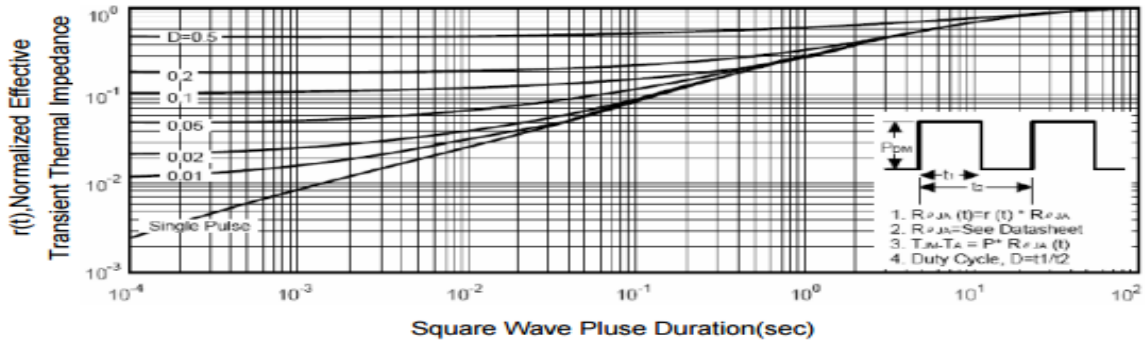


Figure 14 Normalized Maximum Transient Thermal Impedance