

GL Silicon N-Channel Power MOSFET

General Description :

The GL1S50N06LA4 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 TO-252, which accords with the RoHS standard.

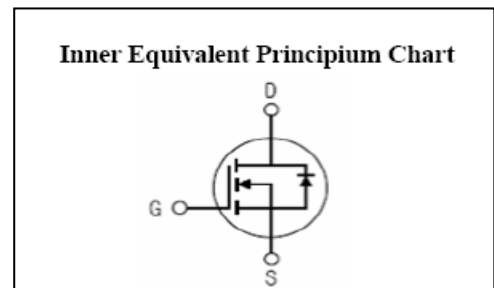
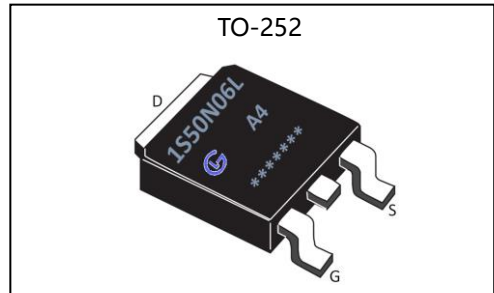
Features :

- Fast Switching
- Low Gate Charge and R_{dson}
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications :

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

V_{DSS}	60	V
I_D	50	A
P_D	85	W
$R_{DS(ON)type}$	13.5	m Ω



Absolute ($T_c = 25^\circ\text{C}$ unless otherwise specified) :

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	60	V
I_D	Continuous Drain Current	50	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	35	A
I_{DM}	Pulsed Drain Current	200	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	300	mJ
E_{AR}^{a1}	Avalanche Energy ,Repetitive	50	mJ
I_{AR}^{a1}	Avalanche Current	28	A
dv/dt^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	85	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	175 , -55 to 175	$^\circ\text{C}$
T_L	MaximumTemperature 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	60	--	--	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} =60V, V _{GS} =0V, T _a =25°C	--	--	1	μA
		V _{DS} =48V, 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 =20A	--	13.5	18	mΩ
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	1.5	1.85	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} =5V, I _D =20A	18	--	--	S
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V f=1.0MHz	--	2050	--	pF
C _{oss}	Output Capacitance		--	158	--	
C _{rss}	Reverse Transfer Capacitance		--	120	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =20A, V _{DD} =30V V _{GS} =10V, R _G =3.0Ω	--	7.5	--	ns
t _r	Rise Time		--	5.0	--	
t _{d(OFF)}	Turn-Off Delay Time		--	28.0	--	
t _f	Fall Time		--	5.5	--	
Q _g	Total Gate Charge	I _D =20A, V _{DD} =30V V _{GS} =10V	--	50	--	nC
Q _{gs}	Gate to Source Charge		--	6	--	
Q _{gd}	Gate to Drain ("Miller") Charge		--	15	--	

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Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	50	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	200	A
V_{SD}	Diode Forward Voltage	$I_S=50A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=20A, T_j = 25^\circ C$	--	30	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100A/us, V_{GS}=0V$	--	40	--	nC

Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Ambient	1.8	$^\circ C/W$

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

a² : EAS condition : $T_j=25^\circ C, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

a³ : $I_{SD}=20A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, Start T_j=25^\circ C$

Test Circuit and Waveform

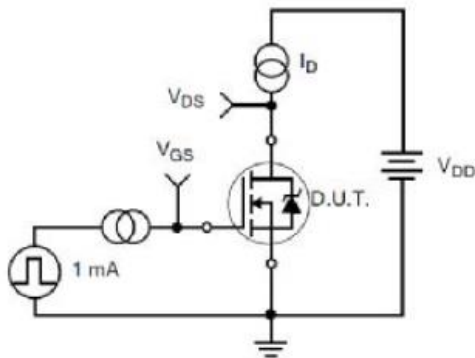


Figure 17. Gate Charge Test Circuit

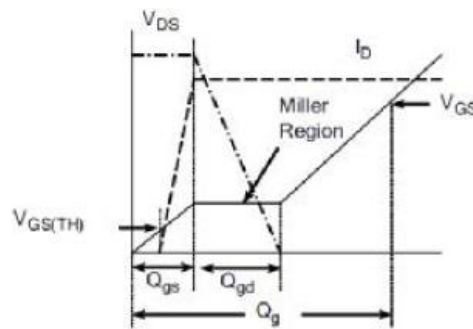


Figure 18. Gate Charge Waveform

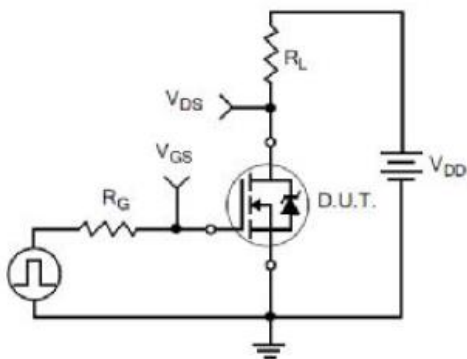


Figure 19. Resistive Switching Test Circuit

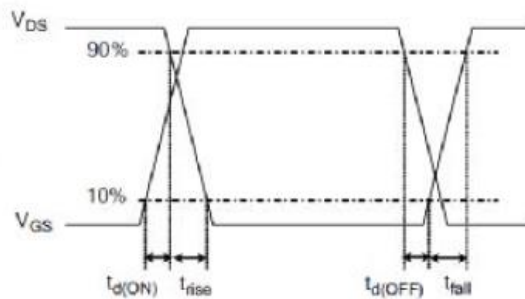


Figure 20. Resistive Switching Waveforms



Characteristics Curve :

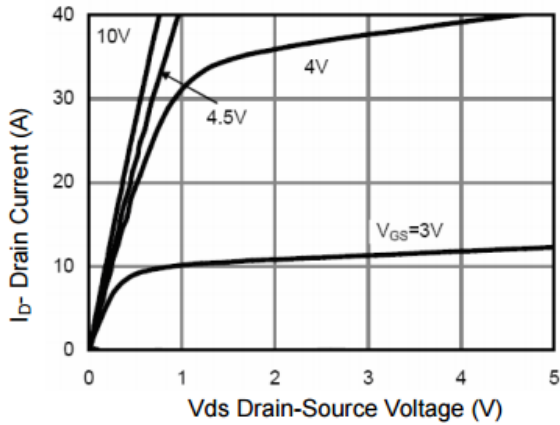


Figure 1 Output Characteristics

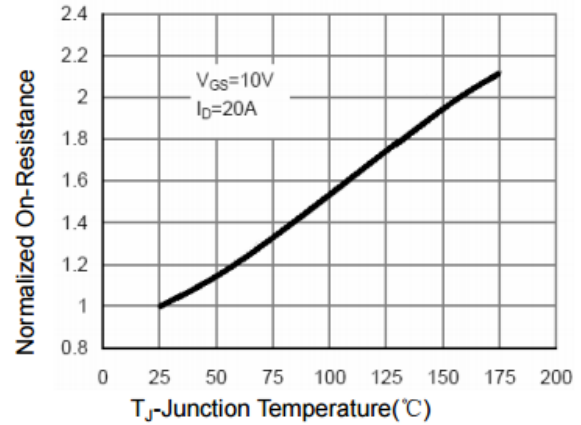


Figure 4 Rdson-Junction Temperature

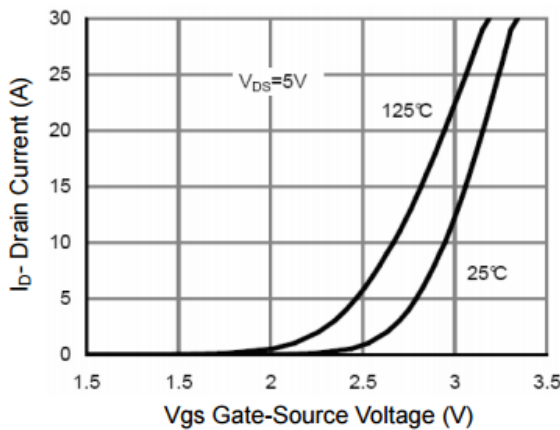


Figure 2 Transfer Characteristics

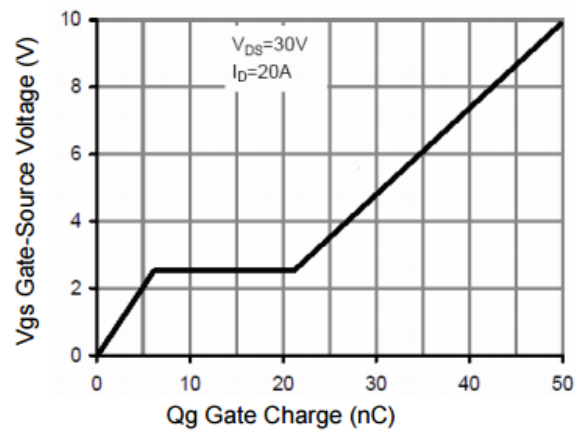


Figure 5 Gate Charge

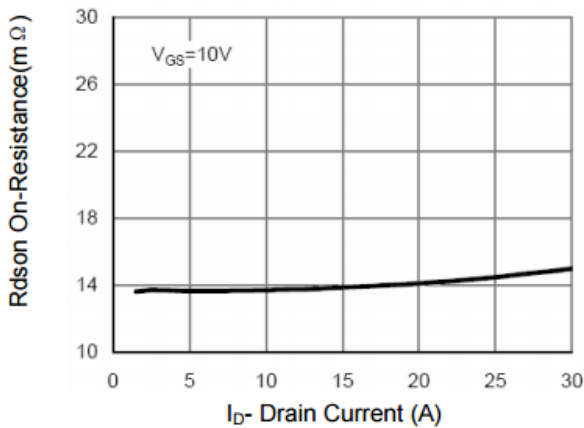


Figure 3 Rdson- Drain Current

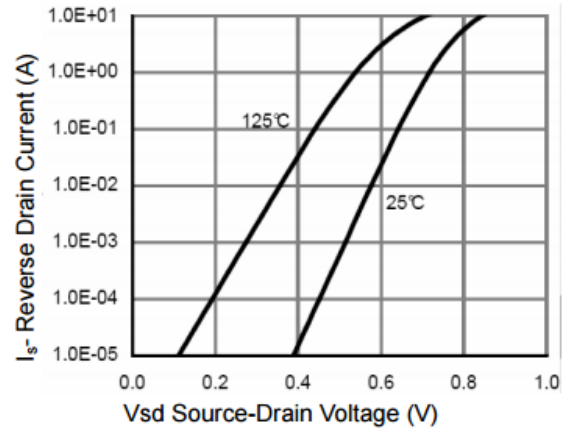


Figure 6 Source- Drain Diode Forward



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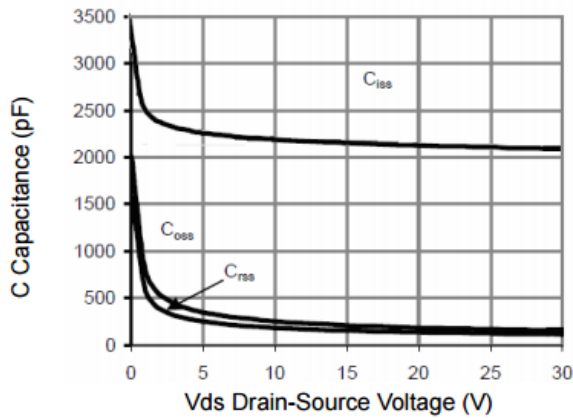


Figure 7 Capacitance vs Vds

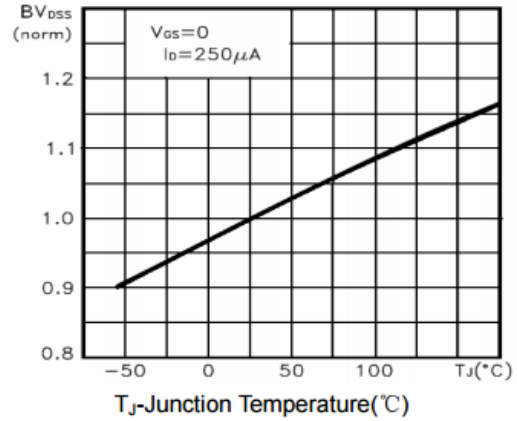


Figure 9 BV_{DSS} vs Junction Temperature

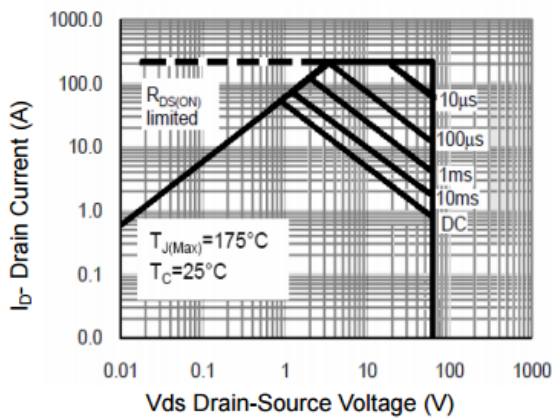


Figure 8 Safe Operation Area

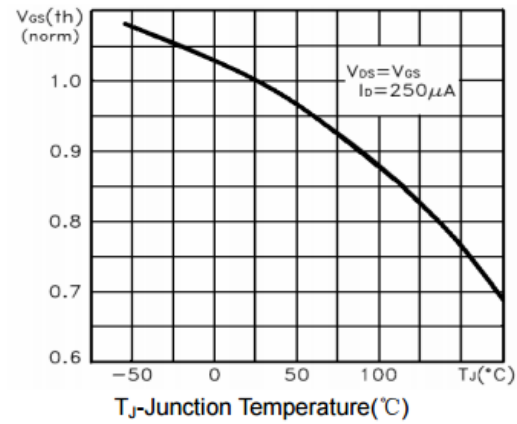


Figure 10 V_{GS(th)} vs Junction Temperature

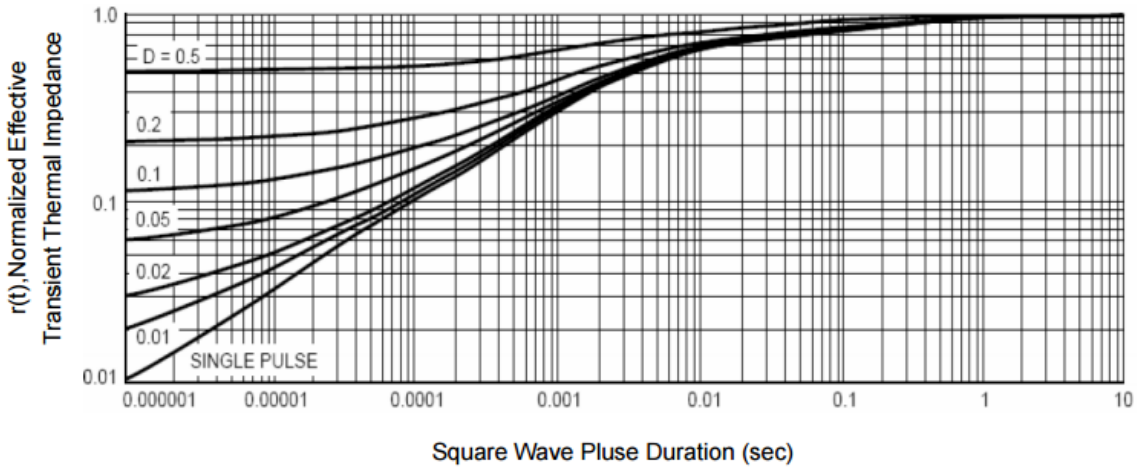


Figure 11 Normalized Maximum Transient Thermal Impedance

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