

GL Silicon N-Channel Power MOSFET

General Description:

The GL1S12N06LA4 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.

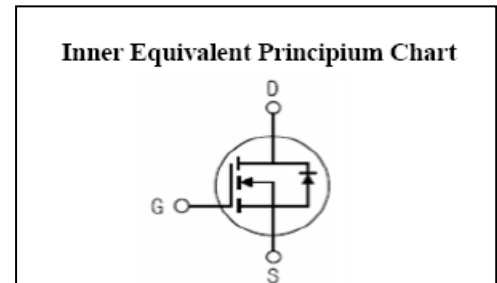
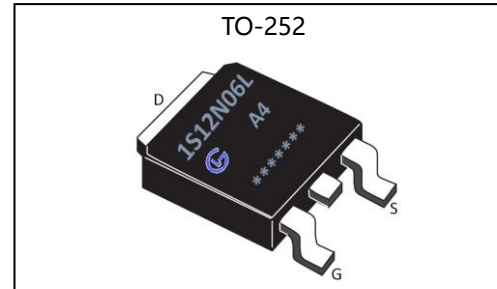
Features:

- Fast Switching
- Low Gate Charge and Rds(on)
- 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	12	A
P _D	35	W
R _{Ds(ON)}	85	mΩ



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

Symbol	Parameter	Rating	Units
V _{DSS}	Drain-to-Source Voltage	60	V
I _D	Continuous Drain Current	12	A
	Continuous Drain Current T _c = 100 °C	8.5	A
I _{DM}	Pulsed Drain Current	48	A
V _{GS}	Gate-to-Source Voltage	±20	V
E _{AS} ^{a2}	Single Pulse Avalanche Energy	30	mJ
E _{AR} ^{a1}	Avalanche Energy ,Repetitive	10	mJ
I _{AR} ^{a1}	Avalanche Current	6	A
dv/dt ^{a3}	Peak Diode Recovery dv/dt	5.0	V/ns
P _D	Power Dissipation	35	W
T _J , T _{stg}	Operating Junction and Storage Temperature Range	175, -55 to 175	°C
T _L	Maximum Temperature for Soldering	300	°C

**GL Silicon N-Channel Power MOSFET****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 =6A	--	60	85	mΩ
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.4	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 =3A	2	--	--	S
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V f=1.0MHz	--	250	--	pF
C _{oss}	Output Capacitance		--	35	--	
C _{rss}	Reverse Transfer Capacitance		--	20	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =2A, V _{DD} =30V V _{GS} =10V, R _G =3.0Ω	--	6	--	ns
t _r	Rise Time		--	15	--	
t _{d(OFF)}	Turn-Off Delay Time		--	15	--	
t _f	Fall Time		--	10	--	
Q _g	Total Gate Charge	I _D =3A, V _{DD} =30V V _{GS} =10V	--	6.6	--	nC
Q _{gs}	Gate to Source Charge		--	1.2	--	
Q _{gd}	Gate to Drain ("Miller") Charge		--	1.5	--	

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Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	12	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	48	A
V_{SD}	Diode Forward Voltage	$I_S=12A, V_{GS}=0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=10A, T_j = 25^\circ C$	--	28	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt=100A/us, V_{GS}=0V$	--	38	--	nC

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

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	3.58	$^\circ C/W$

^{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}: $I_{SD}=10A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, Start T_j=25^\circ C$

Test Circuit and Waveform

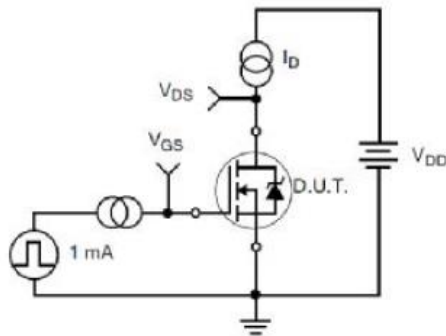


Figure 17. Gate Charge Test Circuit

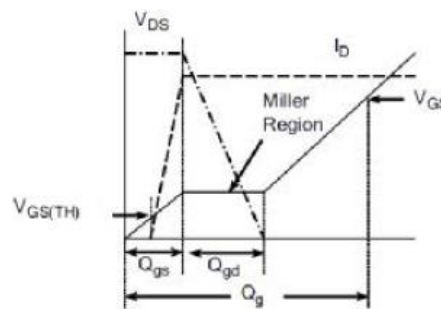


Figure 18. Gate Charge Waveform

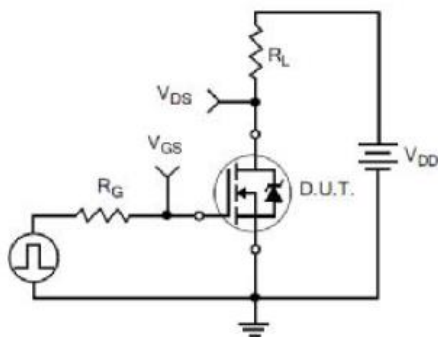


Figure 19. Resistive Switching Test Circuit

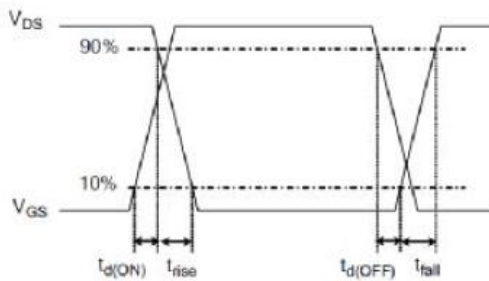
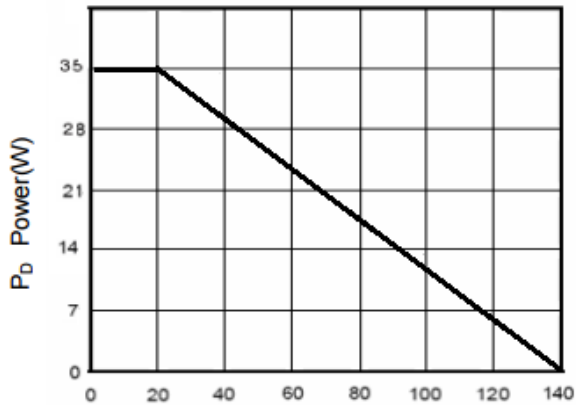


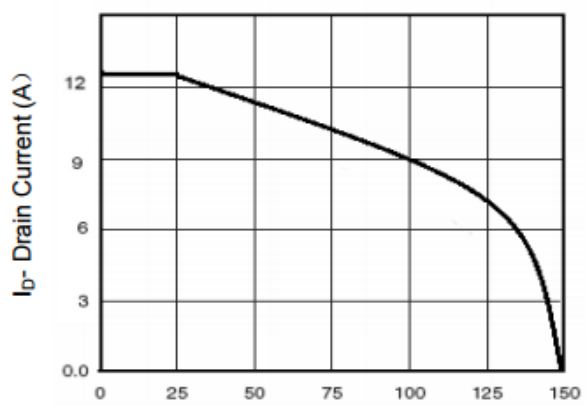
Figure 20. Resistive Switching Waveforms



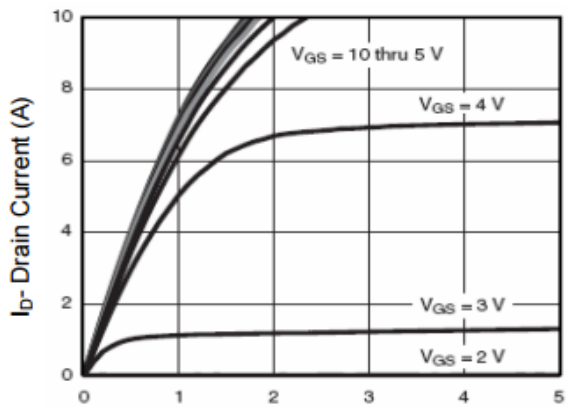
Characteristics Curve:



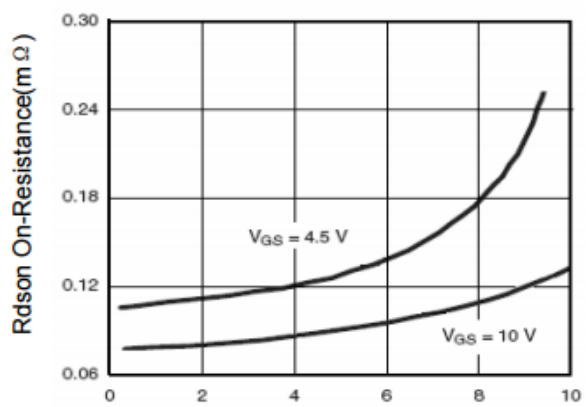
T_J -Junction Temperature(°C)
Figure 3 Power Dissipation



T_J -Junction Temperature(°C)
Figure 4 Drain Current



$V_{GS} = 10$ thru 5 V
 $V_{GS} = 4$ V
 $V_{GS} = 3$ V
 $V_{GS} = 2$ V
 V_{DS} Drain-Source Voltage (V)
Figure 5 Output Characteristics



$V_{GS} = 4.5$ V
 $V_{GS} = 10$ V
 I_D - Drain Current (A)
Figure 6 Drain-Source On-Resistance



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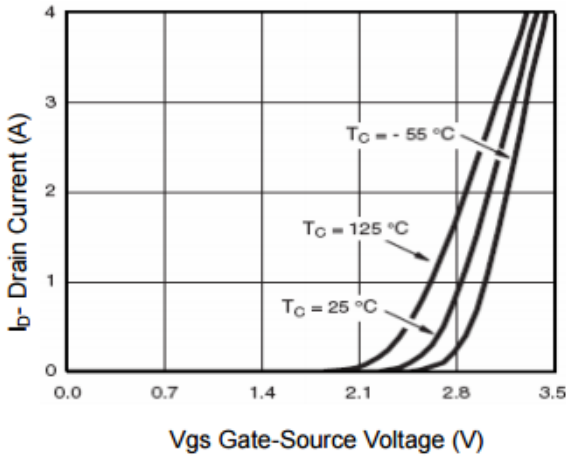


Figure 7 Transfer Characteristics

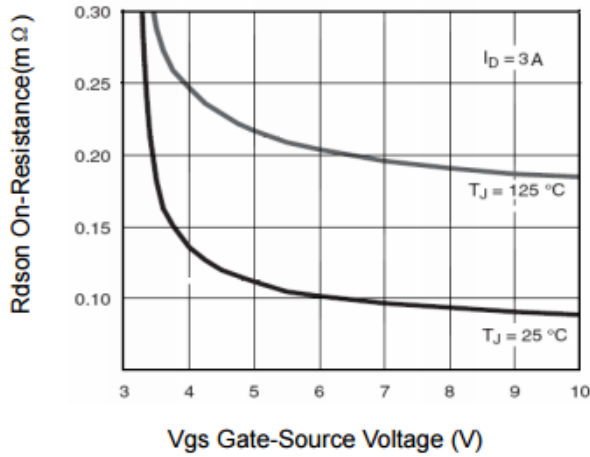


Figure 9 Rdson vs Vgs

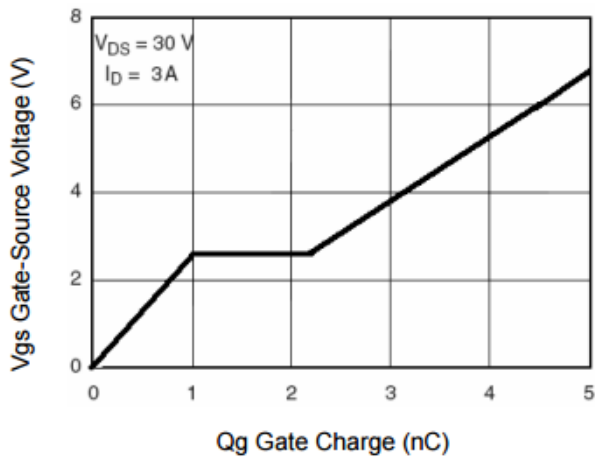


Figure 11 Gate Charge

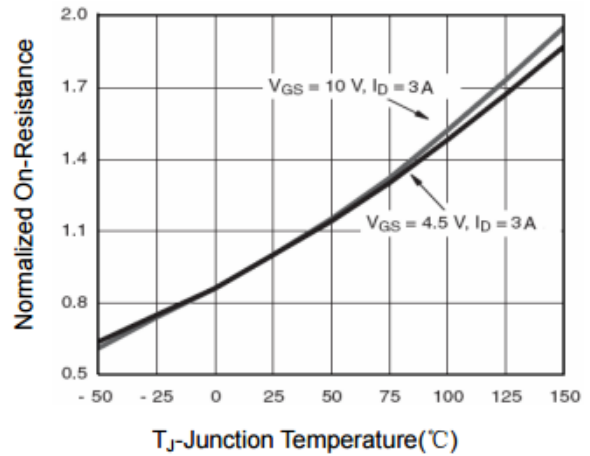


Figure 8 Drain-Source On-Resistance

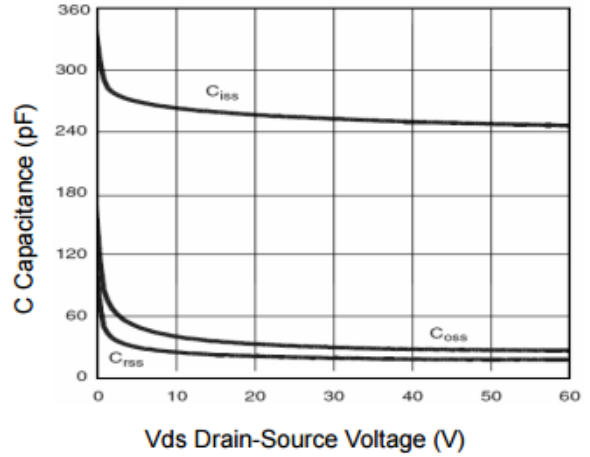


Figure 10 Capacitance vs Vds

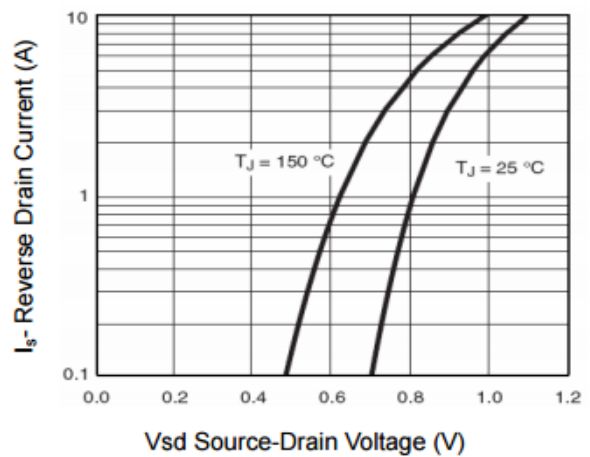


Figure 12 Source- Drain Diode Forward

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