



GL3416

GL Silicon N-Channel Power MOSFET

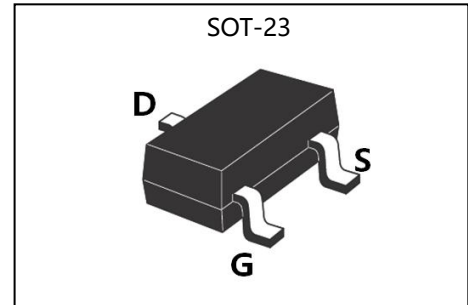
General Description

The GL3416 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, which accords with the RoHS standard.

V_{DSS}	20	V
I_D	6.5	A
P_D	1.4	W
$R_{DS(ON)}$	28	m Ω

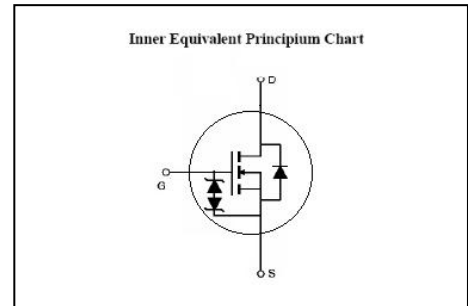
Features

- 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



Absolute (Tc=25°C unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	20	V
I_D	Continuous Drain Current	6.4	A
	Continuous Drain Current $T_C = 70^\circ\text{C}$	5.0	A
I_{DM}^{a1}	Pulsed Drain Current	30	A
V_{GS}	Gate-to-Source Voltage	± 12	V
dv/dt^{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	20	--	--	V
ΔBV _{DSS} /ΔT _J	Bvdss Temperature Coefficient	I _D =-250uA, Reference 25°C	--	0.03	--	V/°C
I _{DSS}	Drain to Source Leakage Current	V _{DS} =20, V _{GS} =0V, T _a =25°C	--	--	1	μA
		V _{DS} =16V, V _{GS} =0V, T _a =125°C	--	--	250	
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} =+10V	--	--	10	μA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} =-10V	--	--	-10	μA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =4.5V, I _D =6.5A	--	18	28	mΩ
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =2.5V, I _D =5.5A	--	22	33	mΩ
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =1.8V, I _D =5.0A	--	28	40	mΩ
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.45	0.7	1.0	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 =6.5A	8	--	--	S
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V f=1.0MHz	--	680	--	pF
C _{oss}	Output Capacitance		--	180	--	
C _{rss}	Reverse Transfer Capacitance		--	88	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =6.5A, V _{DD} =10V V _{GS} =5V, R _G =6.0Ω	--	0.8	--	ns
t _r	Rise Time		--	1.2	--	
t _{d(OFF)}	Turn-Off Delay Time		--	15	--	
t _f	Fall Time		--	4.4	--	
Q _g	Total Gate Charge	I _D =6.5A, V _{DD} =10V V _{GS} =5V	--	9	--	nC
Q _{gs}	Gate to Source Charge		--	2.5	--	
Q _{gd}	Gate to Drain ("Miller") Charge		--	3.0	--	

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Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)		--	--	6.5	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	30	A
V_{SD}	Diode Forward Voltage	$I_S = 6.5A, V_{GS} = 0V$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 6.5A, T_J = 25^\circ C$	--	40	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F/dt = 100A/us, V_{GS} = 0V$	--	100	--	nC

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

Thermal Characteristics

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Ambient	89	$^\circ C/W$

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

^{a3}: $I_{SD} = 3.0A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, \text{Start } T_J = 25^\circ C$

Typical Electrical and Thermal Characteristics

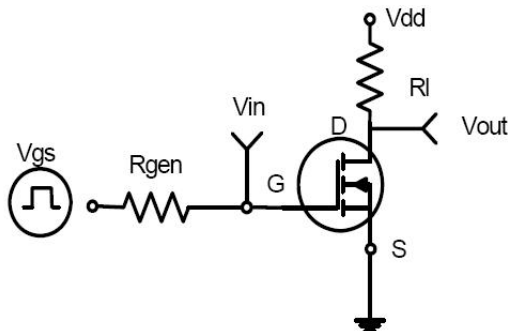


Figure 1: Switching Test Circuit

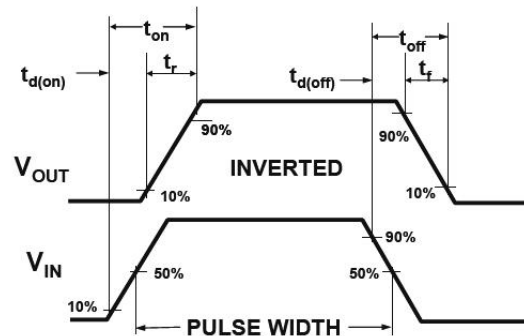


Figure 2: Switching Waveforms



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Characteristics Curves

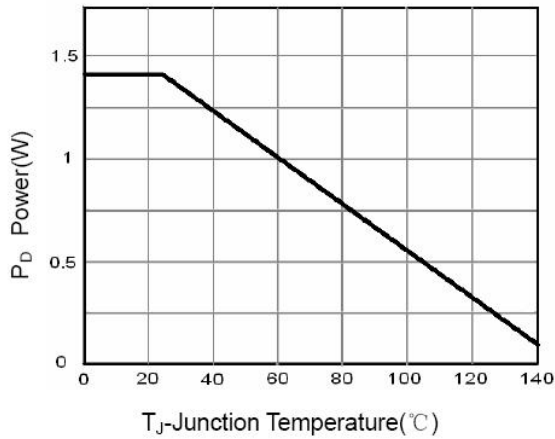


Figure 3 Power Dissipation

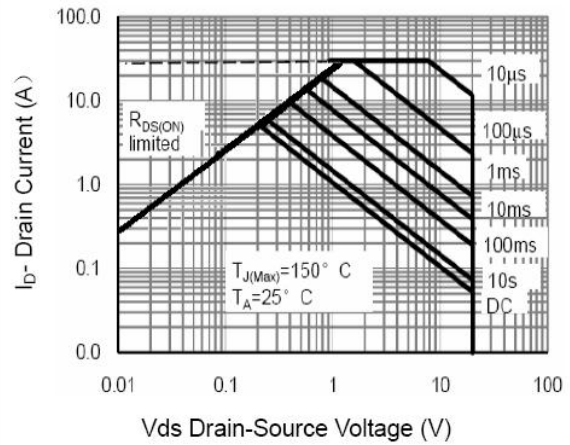


Figure 4 Safe Operation Area

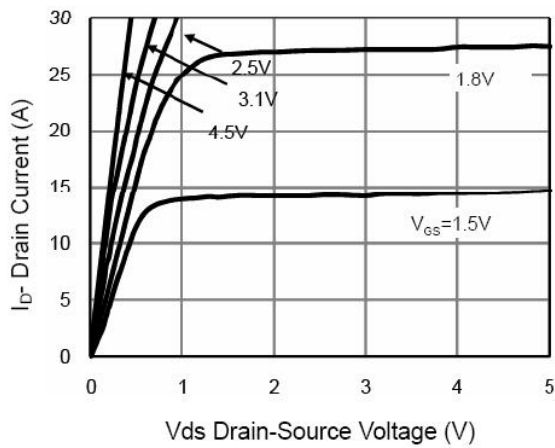


Figure 5 Output Characteristics

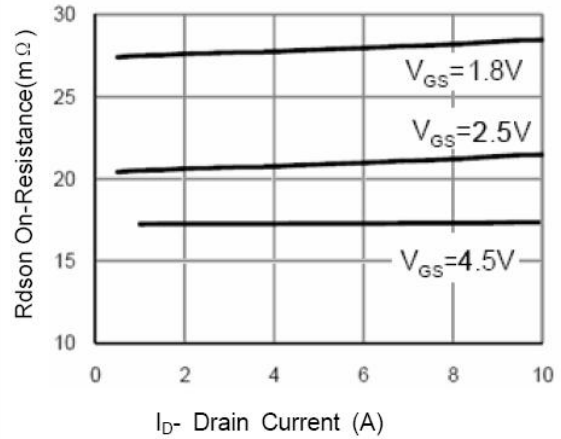


Figure 6 Drain-Source On-Resistance



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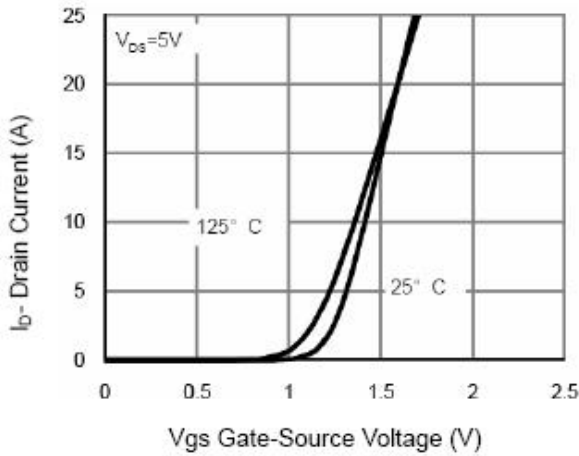


Figure 7 Transfer Characteristics

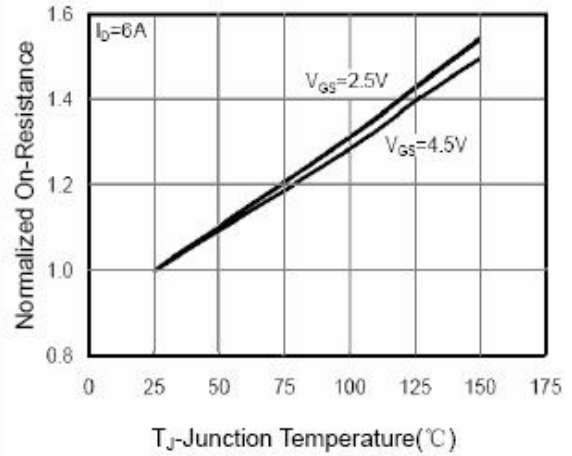


Figure 8 Drain-Source On-Resistance

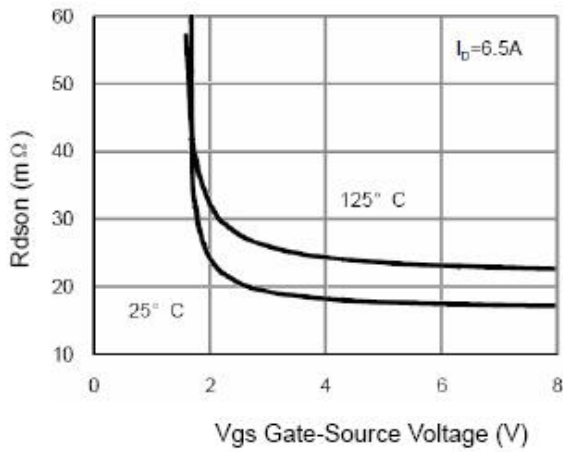


Figure 9 $R_{DS(on)}$ vs V_{GS}

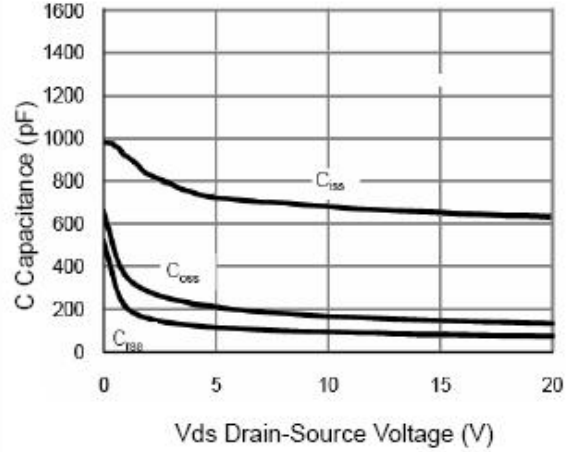


Figure 10 Capacitance vs V_{DS}

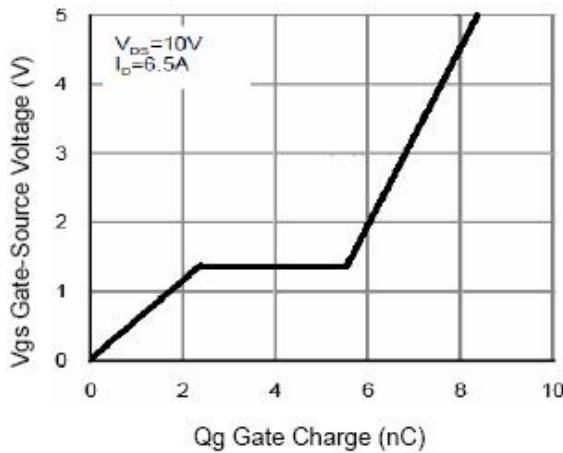


Figure 11 Gate Charge

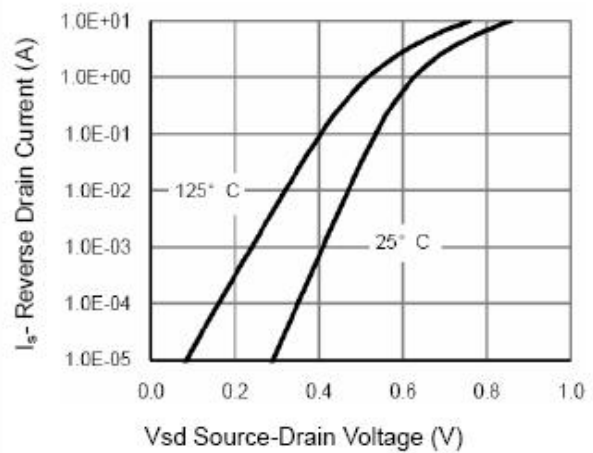


Figure 12 Source-Drain Diode Forward



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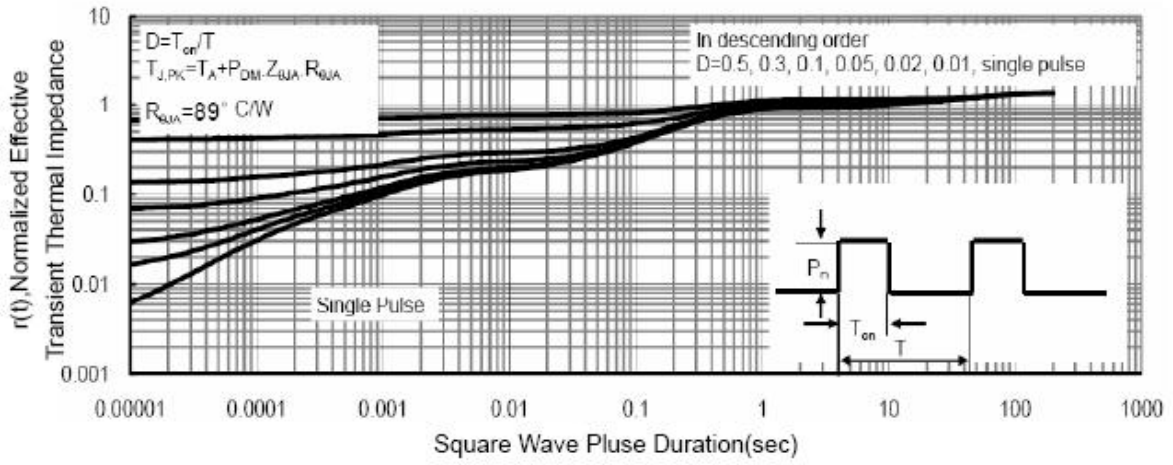


Figure 13 Normalized Maximum Transient Thermal Impedance