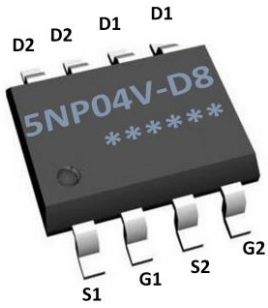
GL Silicon N,P-Channel Power MOSFET

General Description :

The GL5NP04V-D8 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications. The package form is SOP-8, which accords with the RoHS standard.

	N-Channel	P-Channel	
V_{DSS}	40	-40	V
I_D	7	-5	A
P_D	2	2	W
$R_{DS(ON)type}$	19.5	32	mΩ

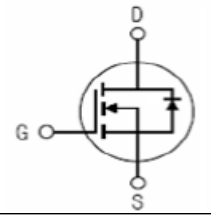
SOP-8



Features :

- N-Channel : $R_{DS(ON)}$ <23mΩ @ V_{GS}=10V (Typ19.5mΩ)
- P-Channel : $R_{DS(ON)}$ <36mΩ @ V_{GS}=10V (Typ32mΩ)
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Inner Equivalent Principium Chart



Applications :

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

Absolute (Tc= 25℃ unless otherwise specified) :

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DSS}	Drain-to-Source Voltage	40	-40	V
I_D	Continuous Drain Current	7	-5	A
I_{DM}	Pulsed Drain Current	30	-30	A
V_{GS}	Gate-to-Source Voltage	±12	±12	V
P_D	Power Dissipation	2	2	W
T_J , T_{stg}	Operating Junction and Storage Temperature Range	−55 to 175	−55 to 175	℃

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N-CH Electrical Characteristics (Tc= 25℃ 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
I_{DSS}	Drain to Source Leakage Current	V_{DS}=40V, V_{GS}= 0V,T_a=25℃	--	--	1.0	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS}=+10V	--	--	0.1	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS}=-10V	--	--	-0.1	μA

ON Characteristics[a3]						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=10V,I_D=6A	--	19.5	23	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.0	1.5	2.0	V
Pulse width tp≤380μs,δ≤2%						

Dynamic Characteristics[a4]						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	V_{DS}=5V,I_D=6A	15	--	--	S
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=20V f=1.0MHz	--	516	--	pF
C_{oss}	Output Capacitance		--	82	--	
C_{rss}	Reverse Transfer Capacitance		--	43	--	

Resistive Switching Characteristics[a4]						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, R_L=2.5Ω V_{GS}=10V,R_G=3Ω	--	4.5	--	ns
tr	Rise Time		--	2.5	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	14.5	--	
t_f	Fall Time		--	3.5	--	
Q_g	Total Gate Charge	V_{DD}=20V, I_D=6A V_{GS}=10V	--	8.9	--	nC
Q_{gs}	Gate to Source Charge		--	2.4	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	1.4	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current [a2](Body Diode)		--	--	6	A
V_{SD}	Diode Forward Voltage[a3]	I_S=6A,V_{GS}=0V	--	--	1.2	V

GL Silicon N,P-Channel Power MOSFET

P-CH Electrical Characteristics (Tc= 25℃ 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
I_{DSS}	Drain to Source Leakage Current	V_{DS}=-40V, V_{GS}= 0V,T_a=25℃	--	--	-1.0	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS}=+10V	--	--	-0.1	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS}=-10V	--	--	0.1	μA

ON Characteristics[a3]						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=-10V,I_D=-5A	--	32	36	mΩ
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250μA	-1.0	-1.5	-2.0	V
Pulse width tp≤380μs,δ≤2%						

Dynamic Characteristics[a4]						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	V_{DS}=-5V,I_D=-5A	10	--	--	S
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=-20V f=1.0MHz	--	940	--	pF
C_{oss}	Output Capacitance		--	97	--	
C_{rss}	Reverse Transfer Capacitance		--	72	--	

Resistive Switching Characteristics[a4]						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-20V, R_L=2.3Ω V_{GS}=-10V,R_G=6Ω	--	6.2	--	ns
tr	Rise Time		--	8.4	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	44.8	--	
t_f	Fall Time		--	16	--	
Q_g	Total Gate Charge	V_{DD}=-20V, I_D=-5A V_{GS}=-10V	--	17	--	nC
Q_{gs}	Gate to Source Charge		--	3.4	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	3.2	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current [a2](Body Diode)		--	--	-6	A
V_{SD}	Diode Forward Voltage[a3]	I_S=-6A,V_{GS}=0V	--	--	-1.2	V

GL Silicon N,P-Channel Power MOSFET

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Case[a2],N-Ch	62.5	℃/W
$R_{\theta JA}$	Junction-to-Case[a2],P-Ch	62.5	

[a1] : Repetitive Rating: Pulse width limited by maximum junction temperature.
[a2] : Surface Mounted on FR4 Board, t≤10sec.
[a3] : Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%.
[a4] : Guaranteed by design, not subject to production

N-Channel Characteristics Curve :

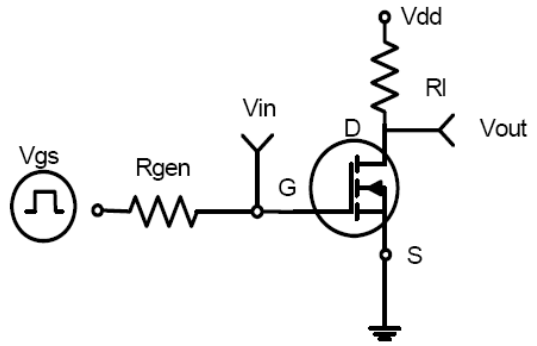

Figure 1:Switching Test Circuit

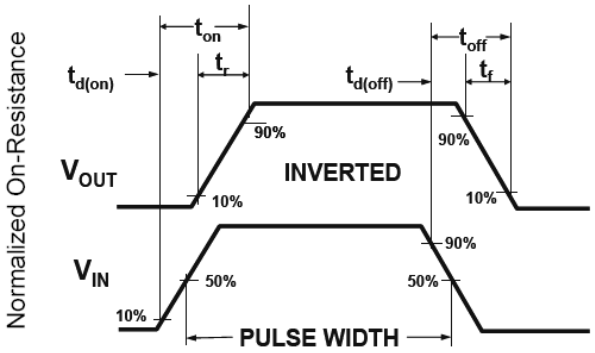

Figure 2:Switching Waveforms

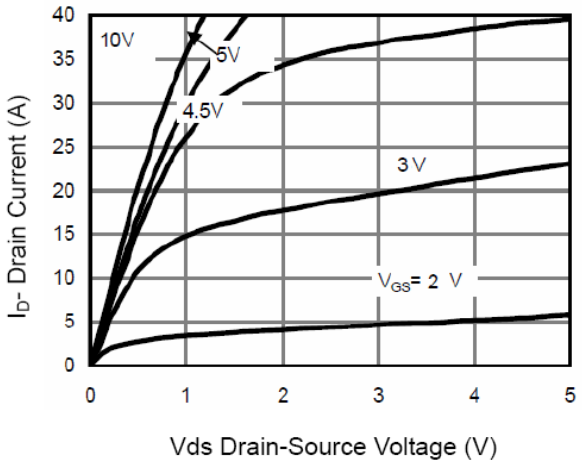

Figure 3 Output Characteristics

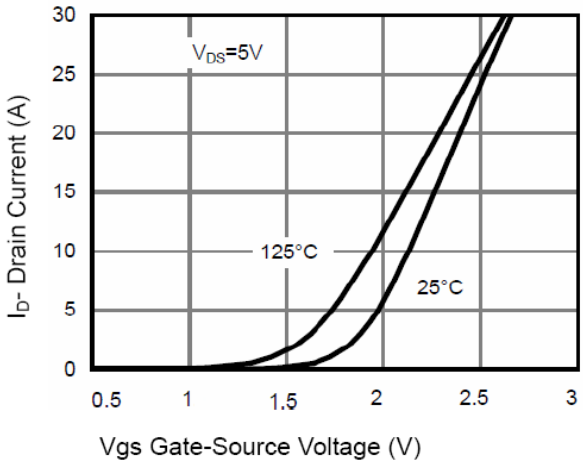

Figure 4 Transfer Characteristics

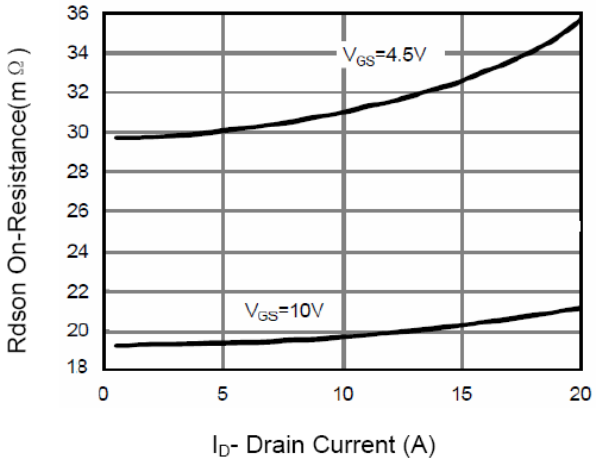

Figure 5 Drain-Source On-Resistance

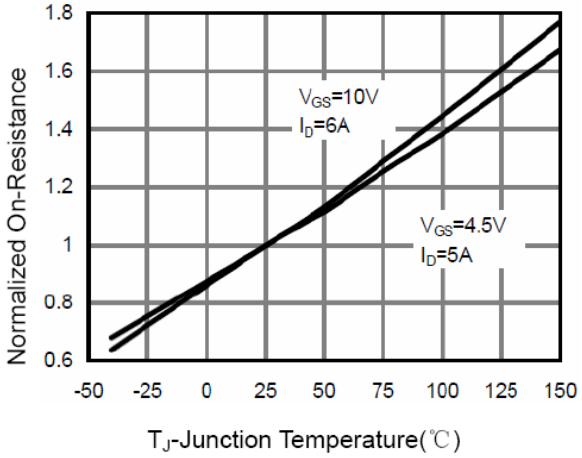

Figure 6 Drain-Source On-Resistance

GL Silicon N,P-Channel Power MOSFET

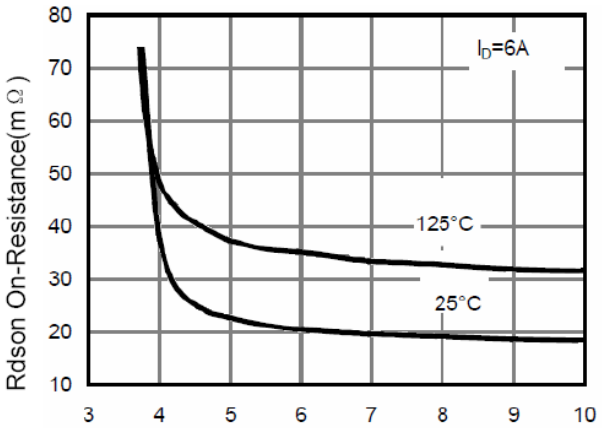

Figure7 Rdson vs Vgs

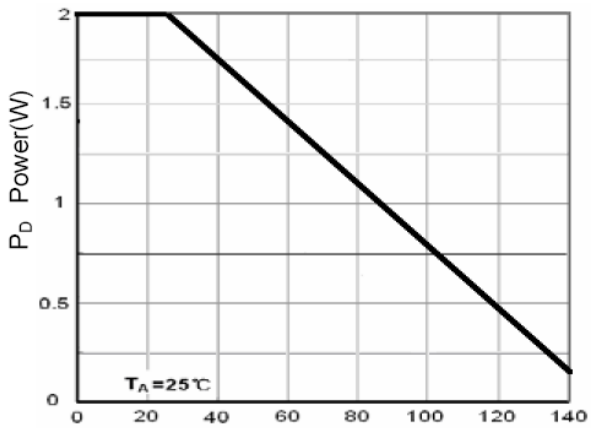

Figure 8 Power Dissipation

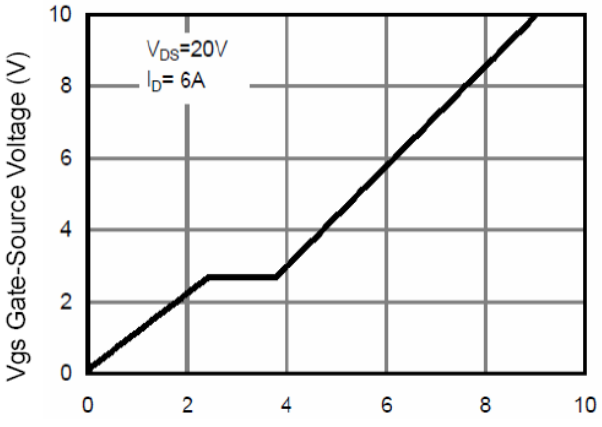

Figure 9 Gate Charge

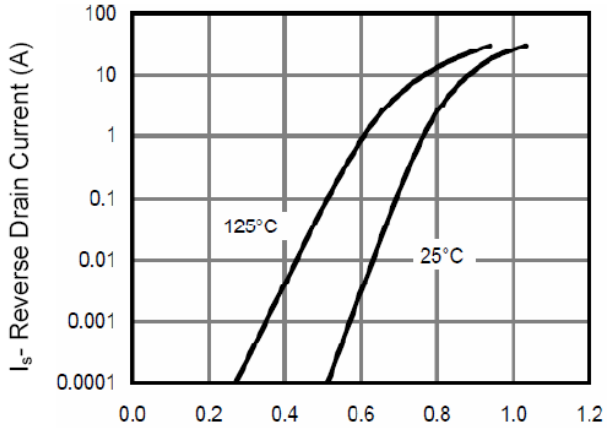

Figure 10 Source- Drain Diode Forward

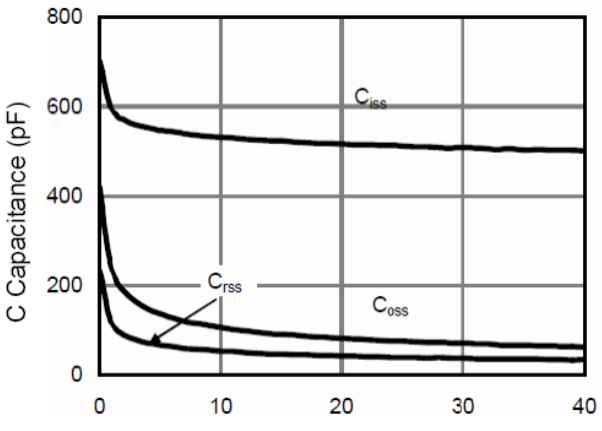

Figure 11 Capacitance vs Vds

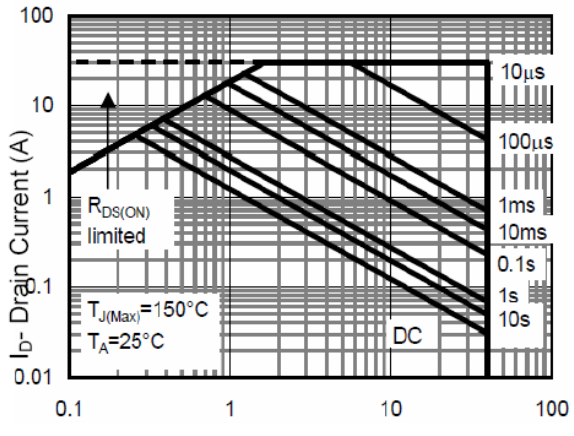

Figure 12 Safe Operation Area

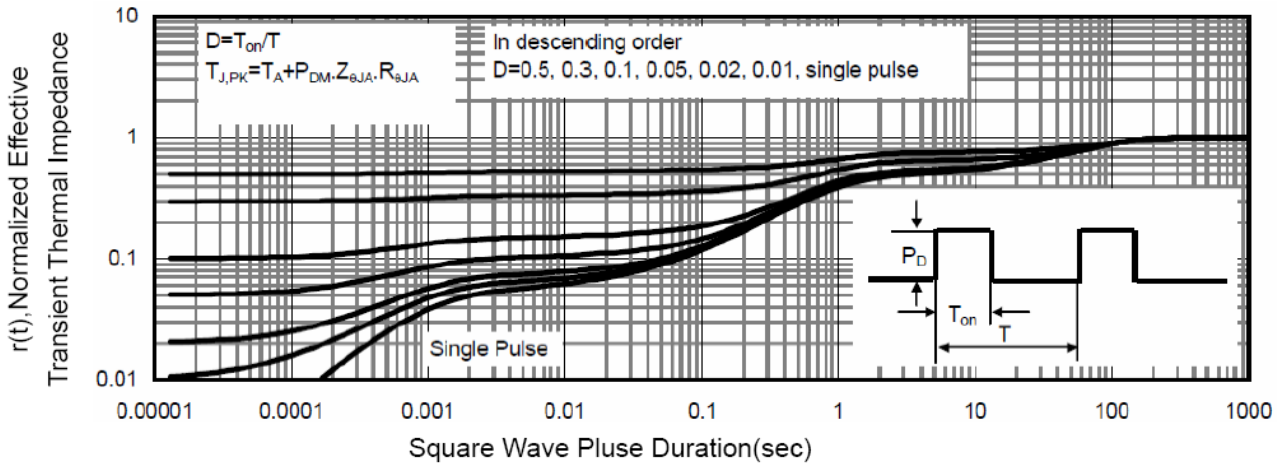

Figure 13 Normalized Maximum Transient Thermal Impedance

GL Silicon N,P-Channel Power MOSFET

P-Channel Characteristics Curve :

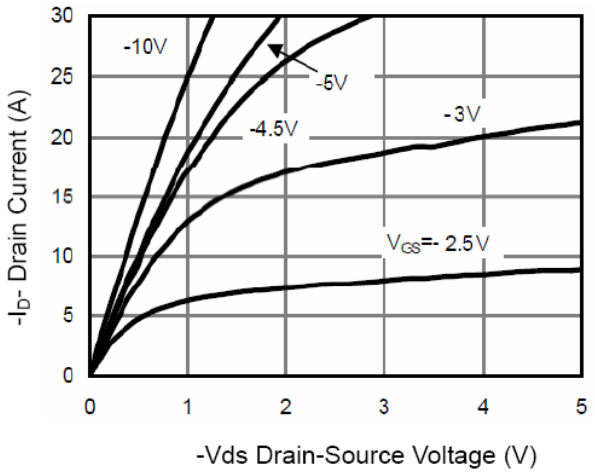

Figure 1 Output Characteristics

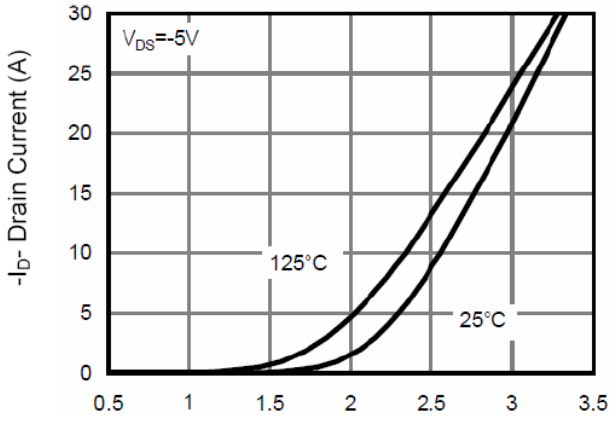

Figure 2 Transfer Characteristics

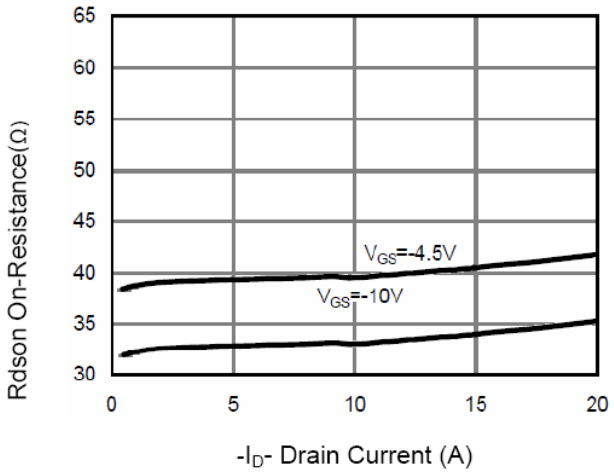

Figure 3 Rdson- Drain Current

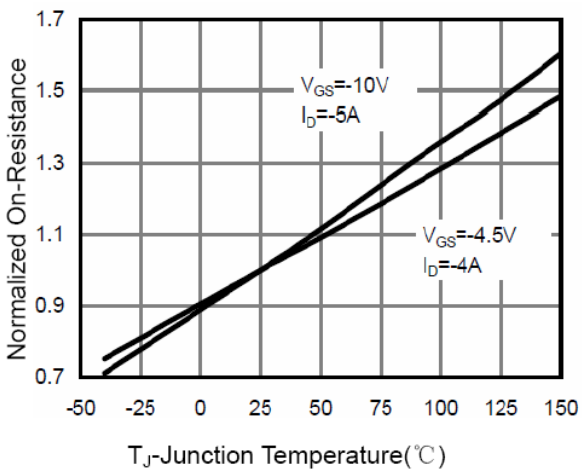

Figure 4 Rdson-Junction Temperature

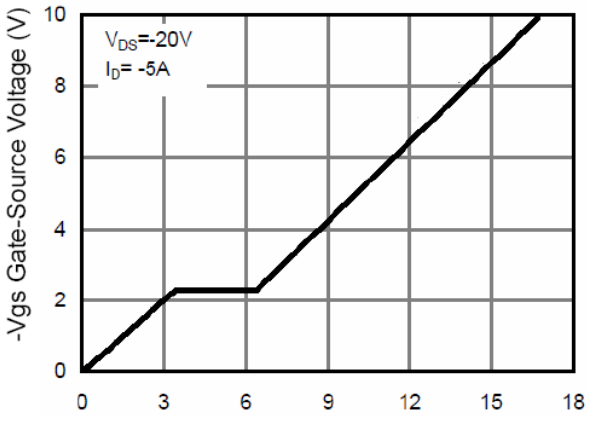

Figure 5 Gate Charge

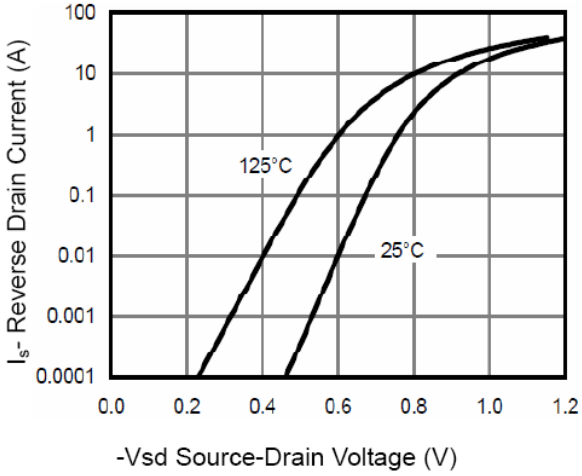

Figure 6 Source- Drain Diode Forward

GL Silicon N,P-Channel Power MOSFET

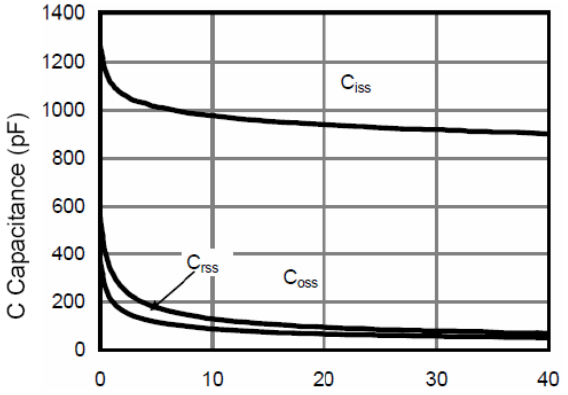

Figure 7 Capacitance vs Vds

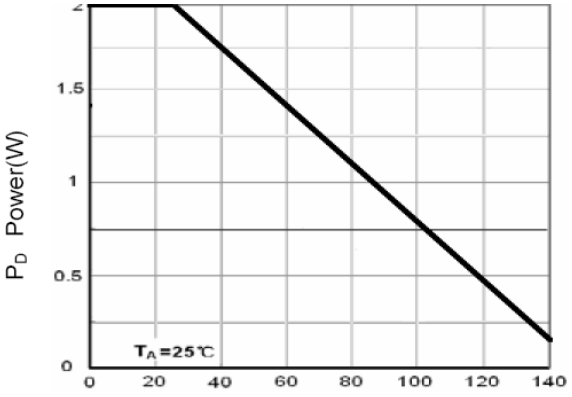

Figure 9 Power Dissipation

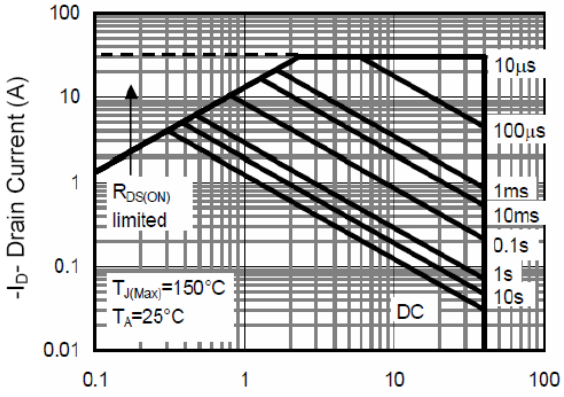

Figure 8 Safe Operation Area

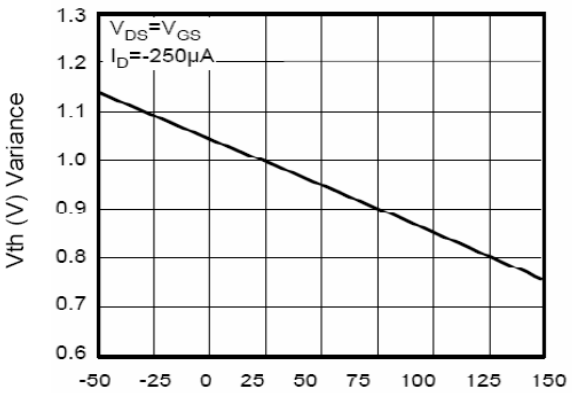

Figure 10 $V_{GS(th)}$ vs Junction Temperature

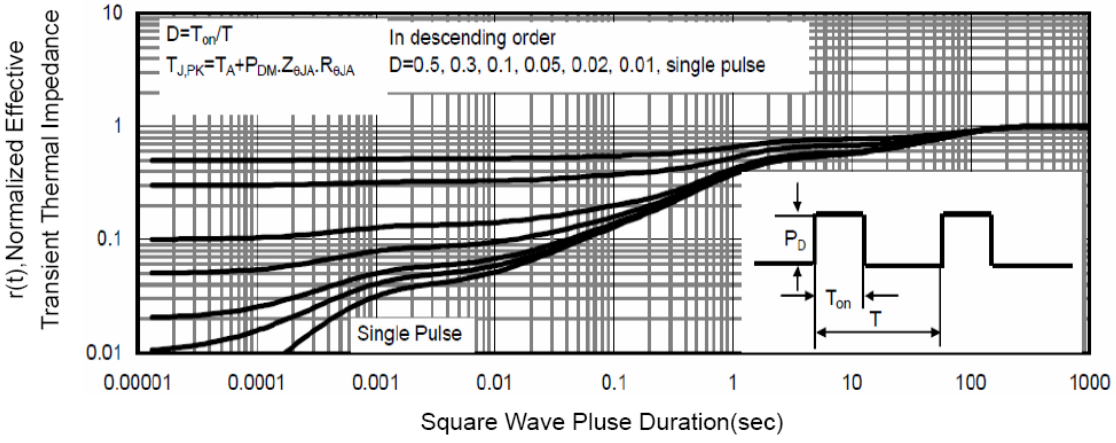

Figure 11 Normalized Maximum Transient Thermal Impedance

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