

GL Silicon N-Channel Super-Junction Power MOSFET

General Description :

GL20J60A8the silicon N-channel Enhanced VDMOSFETS, is obtained by the self-aligned Superjunction Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220AB, which accords with the RoHS standard.

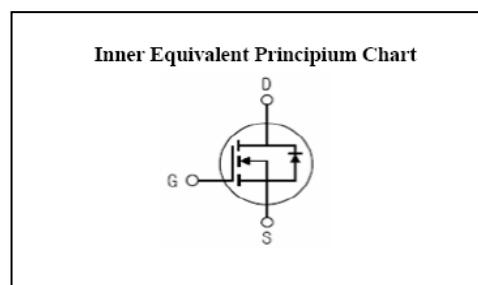
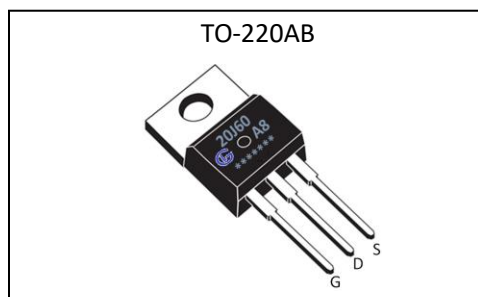
Features :

- Fast Switching
- Low Gate Charge and $R_{ds(on)}$
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications :

- Switch Mode Power Supply(SMPS)
- Uninterruptible Power Supply(UPS)
- Power Factor Correction(PFC)

$V_{DSS}(T_C=150^{\circ}C)$	650	V
$V_{DSS}(T_C=25^{\circ}C)$	600	V
I_D	20	A
$P_D(T_C=25^{\circ}C)$	150	W
$R_{DS(ON)}$	0.12	Ω



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

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current	20	A
	Continuous Drain Current $T_C = 100^{\circ}C$	15	A
I_{DM}^{a1}	Pulsed Drain Current	60	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}^{a2}	Single Pulse Avalanche Energy	532	mJ
E_{AR}^{a1}	Avalanche Energy ,Repetitive	166	mJ
I_{AR}^{a1}	Avalanche Current	12	A
dv/dt^{a3}	Peak Diode Recovery dv/dt	15.0	V/ns
P_D	Power Dissipation	150	W
	Derating Factor above $25^{\circ}C$	1.2	W/ $^{\circ}C$
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150 , -55 to 150	$^{\circ}C$
T_L	MaximumTemperature for Soldering	300	$^{\circ}C$

**GL Silicon N-Channel Super-Junction 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	$V_{GS}=0V, I_D=250\mu A$	600	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	$I_D=250\mu A$, Reference 25°C	--	0.60	--	V/°C
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=600V, V_{GS}=0V, T_a=25^\circ C$	--	--	1	μA
		$V_{DS}=480V, V_{GS}=0V, T_a=125^\circ C$	--	--	250	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+30V$	--	--	10	μA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-30V$	--	--	-10	μA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=10A$	--	0.12	0.15	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	V
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=20A$	--	18.8	--	S
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=25V$ $f=1.0MHz$	--	1600	--	pF
C_{oss}	Output Capacitance		--	14	--	
C_{rss}	Reverse Transfer Capacitance		--	225	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=300V, I_D=20A,$ $V_{GS}=10V, R_g=25\Omega$	--	48	--	ns
t_r	Rise Time		--	108	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	176	--	
t_f	Fall Time		--	50	--	
Q_g	Total Gate Charge	$I_D=20A, V_{DD}=480V$ $V_{GS}=0 \text{ to } 10V$	--	41	--	nC
Q_{gs}	Gate to Source Charge		--	8	--	
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)		--	--	20	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	60	A
V_{SD}	Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	--	0.95	1.5	V
t_{rr}	Reverse Recovery Time	$I_S=20A, T_J=25^\circ C$	--	440	--	ns
Q_{rr}	Reverse Recovery Charge	$dI_F/dt=100A/us, V_{GS}=0V$	--	5	--	uC

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

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	0.83	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	62.5	$^\circ C/W$

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

^{a2} : $I_{AS}=6A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ C$

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

Test Circuit and Waveform

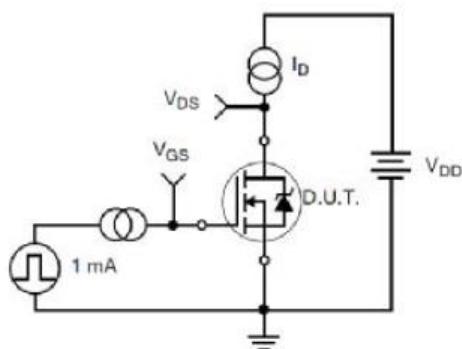


Figure 17. Gate Charge Test Circuit

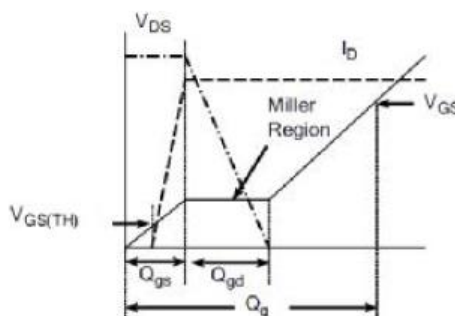


Figure 18. Gate Charge Waveform

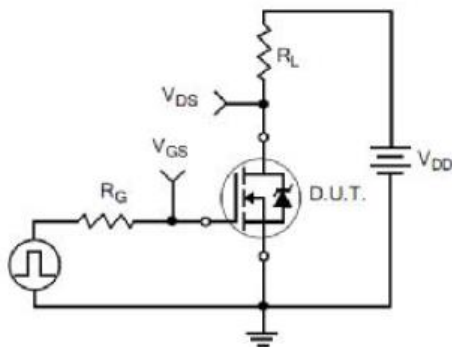


Figure 19. Resistive Switching Test Circuit

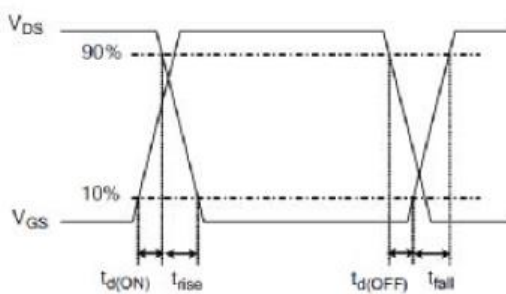


Figure 20. Resistive Switching Waveforms

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Typical Characteristics

Figure 1. Output Characteristics

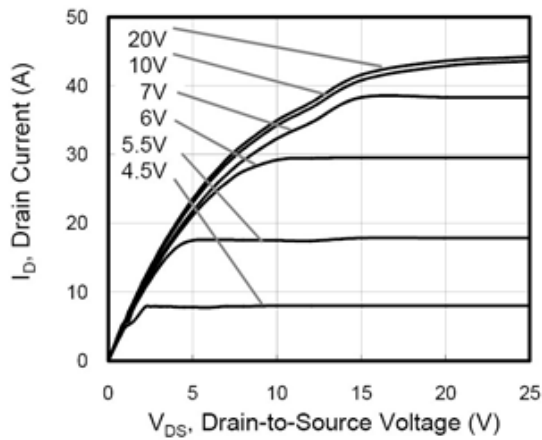


Figure 2. Transfer Characteristics

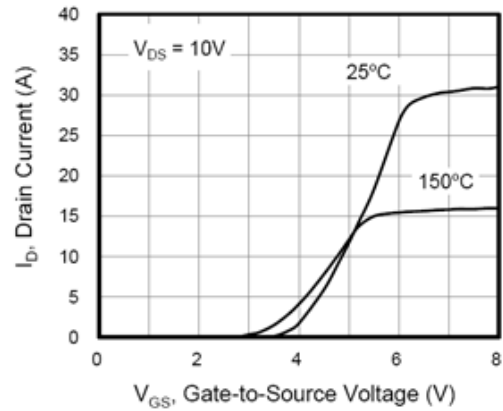


Figure 3. On-Resistance vs. Drain Current

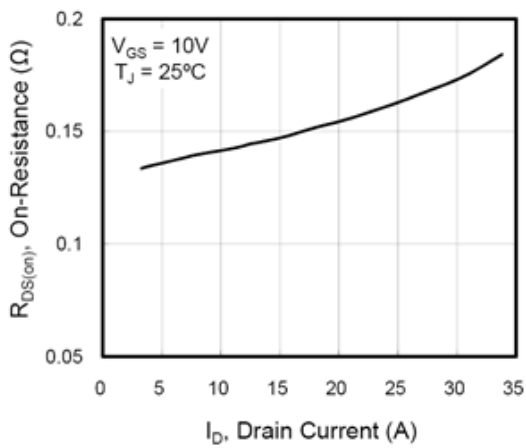


Figure 4. Capacitance

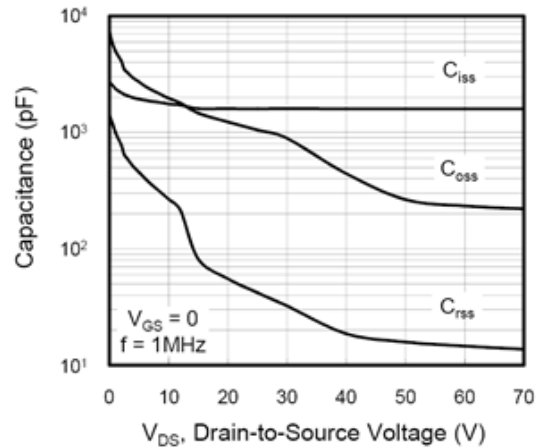


Figure 5. Gate Charge

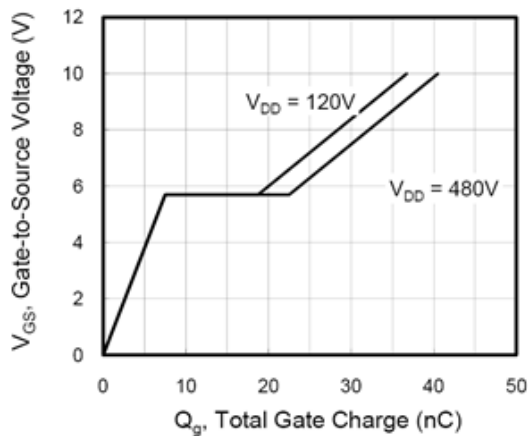
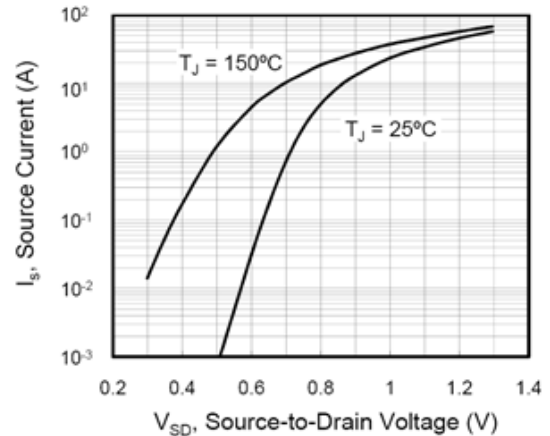


Figure 6. Body Diode Forward Voltage



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Figure 7. On-Resistance vs. Junction Temperature

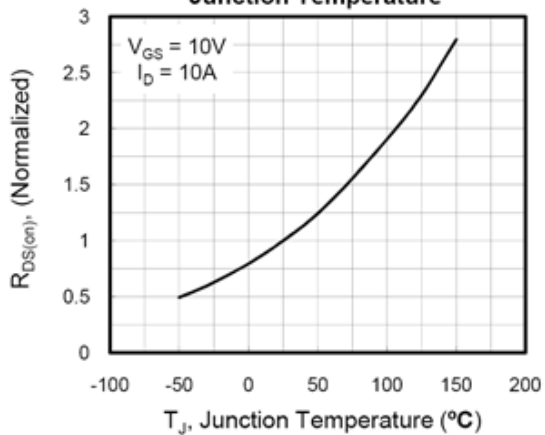
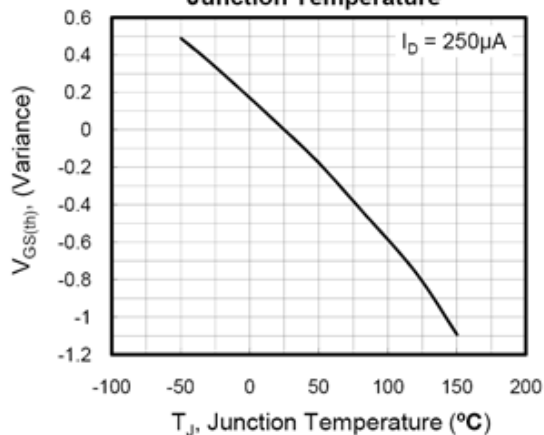


Figure 8. Threshold Voltage vs. Junction Temperature



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