

Silicon P Channel MOSFET

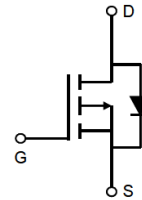
Features

- $V_{DS} = -20V$, $I_D = -2.3A$
- $R_{DS(ON)} < 120m\Omega$ @ $V_{GS} = -4.5V$
- Super Vertical RESURF technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent E_{AS} ability
- RoHS Product

Application

- Load switch
- Battery protection
- PWM application
- Video monitor
- General purpose applications

Schematic diagram



Pin assignment and Top view



Ordering and Marking Information

Device	Package	Packing	Reel Size	Quantity
HLG2301A1N	SOT-23	Tape & Reel	7"	3000/Reel

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Max value	Unit
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 10	V
I_D	Continuous Drain Current	-2.3	A
I_{DM}	Pulsed Drain Current (Note1)	-9.2	A
P_D	Max Power Dissipation	0.7	W
T_J, T_{STG}	Operating Junction and Storage Temperature	-55~150	$^\circ C$

Thermal Resistance

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Max Thermal Resistance, Junction to Ambient (Note2)	177	$^\circ C/W$

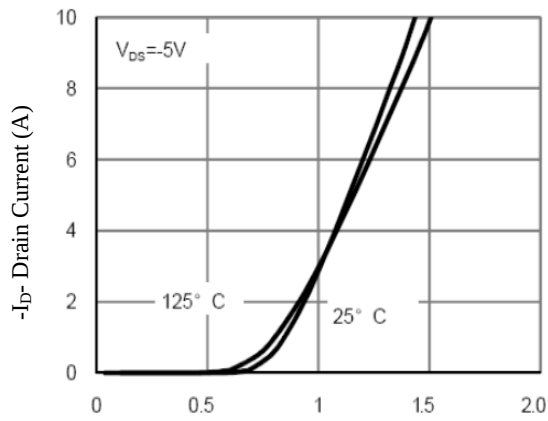
Electrical Characteristics @ T_C = 25°C (unless otherwise specified)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Characteristic						
B _V DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-20	-	-	V
I _D SS	Zero Gate Voltage Drain Current	V _{DS} =-20V, V _{GS} =0V T _C =25°C T _C =55°C	- -	- -	-1 -10	uA
I _G SS	Gate-Body Leakage Current	V _{GS} =±10V, V _{DS} =0V	-	-	±100	nA
V _{GS} (th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250uA	-0.4	-0.62	-1.0	V
R _{DS} (ON)	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _D =-2.3A	-	90	120	mΩ
		V _{GS} =-2.5V, I _D =-1.5A	-	115	150	
		V _{GS} =-1.8V, I _D =-1.0A	-	150	250	
Dynamic Characteristic						
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1.0MHz	-	305	-	pF
C _{oss}	Output Capacitance		-	51	-	
C _{rss}	Reverse Transfer Capacitance		-	32	-	
t _d (on)	Turn-on Delay Time	V _{DD} =-10V, V _{GS} =-4.5V, I _D =-1A, R _L =2.5Ω	-	12	-	nS
t _r	Turn-on Rise Time		-	54	-	
t _d (off)	Turn-off Delay Time		-	15	-	
t _f	Turn-off Fall Time		-	9	-	
Q _g	Total Gate Charge	V _{DS} =-10V, I _D =-2A, V _{GS} =-4.5V	-	4	-	nC
Q _{gs}	Gate-Source Charge		-	0.7	-	
Q _{gd}	Gate-Drain Charge		-	1	-	
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage ^(Note3)	V _{GS} =0V, I _S =-2.3A	-	-	-1.2	V
t _{rr}	Diodes Reverse Recovery Time	I _F =-2.3A, di/dt=-100A/us	-	41	-	ns
Q _{rr}	Diodes Reverse Recovery Charge		-	19	-	nC

Noted:

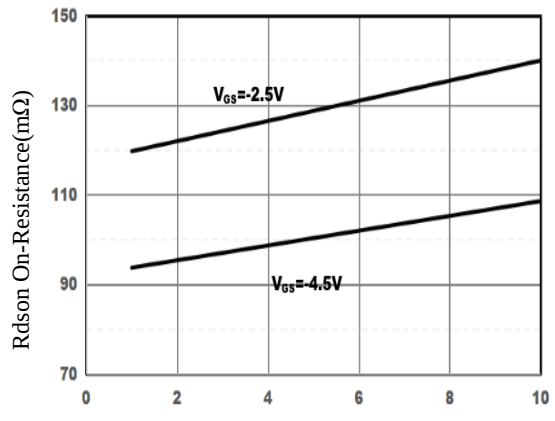
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

Typical Electrical and Thermal Characteristics



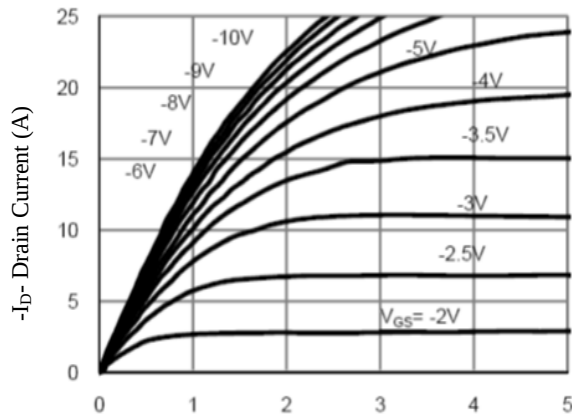
$-V_{GS}$ Gate-Source Voltage (V)

Transfer Characteristics



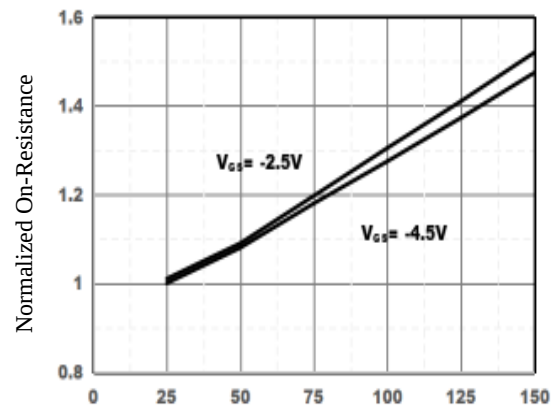
$-I_D$ - Drain Current (A)

Drain-Source On-Resistance vs I_D



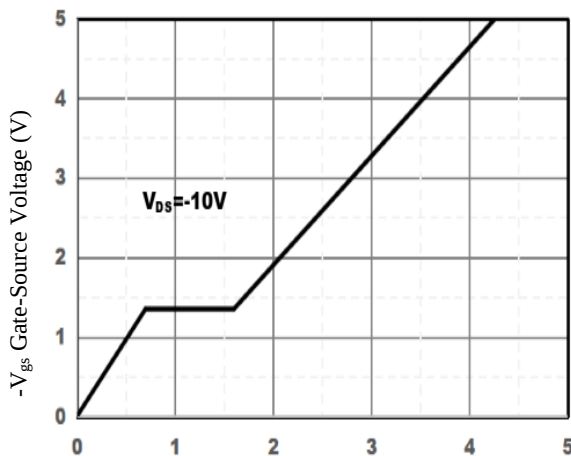
$-V_{DS}$ Drain-Source Voltage (V)

Output Characteristics



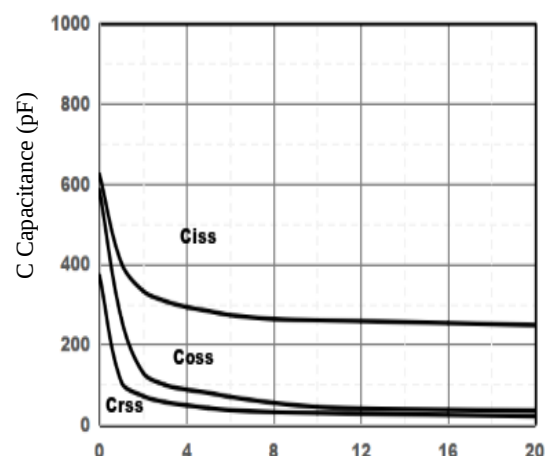
T_J -Junction Temperature ($^\circ C$)

Drain-Source On-Resistance vs T_J



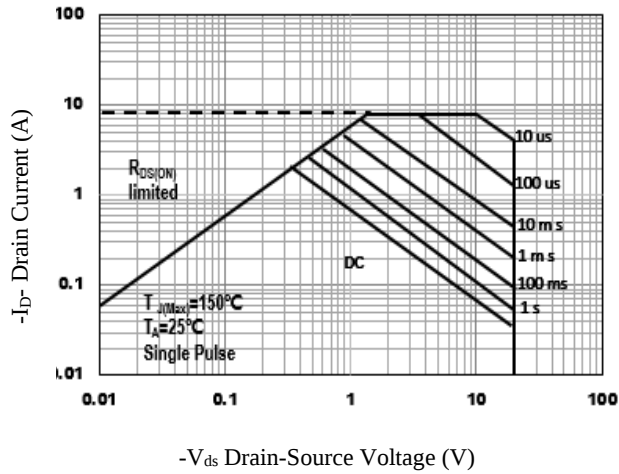
Q_g Gate Charge (nC)

Gate Charge

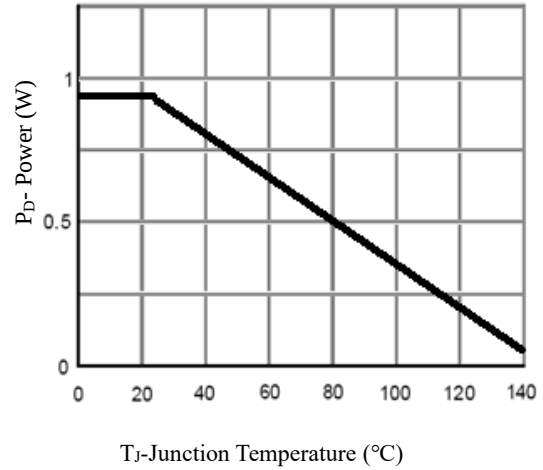


$-V_{DS}$ Drain-Source Voltage (V)

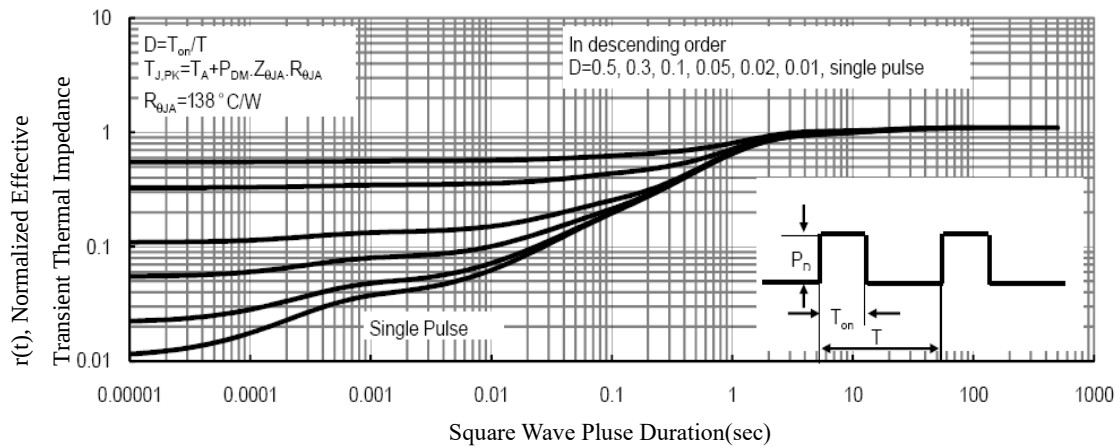
Capacitance Characteristics



Safe Operation Area



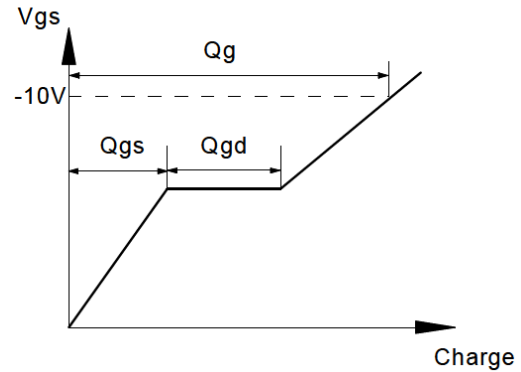
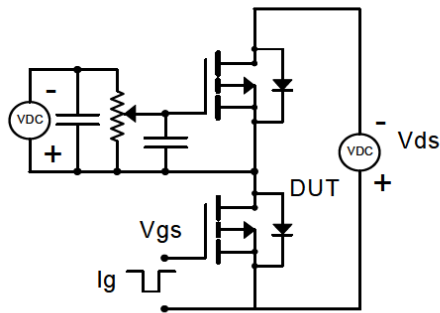
Power Dissipation



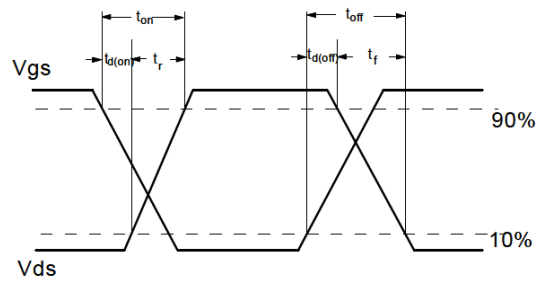
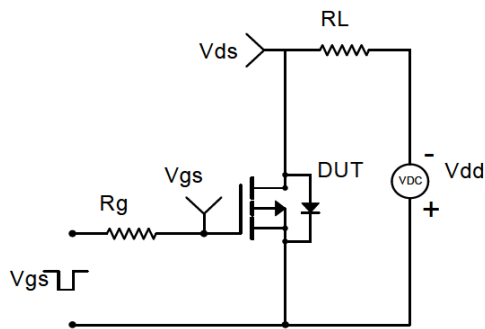
Normalized Maximum Transient Thermal Impedance

Test Circuit & Waveform

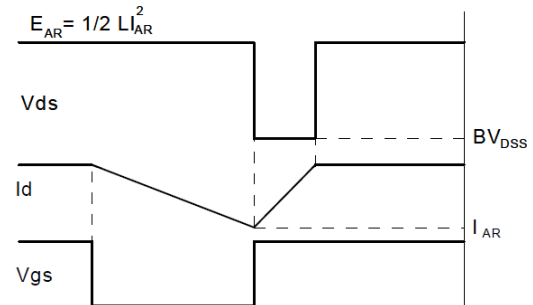
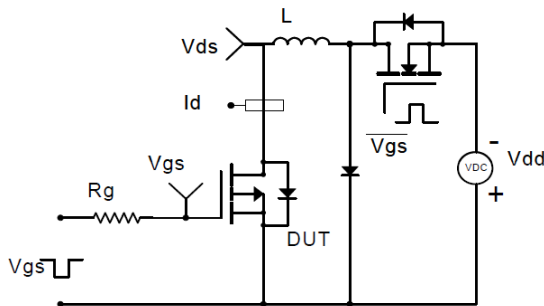
Gate Charge Test Circuit & Waveform



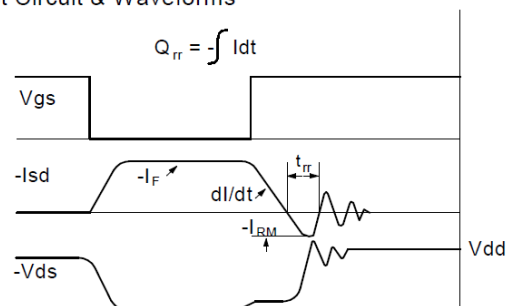
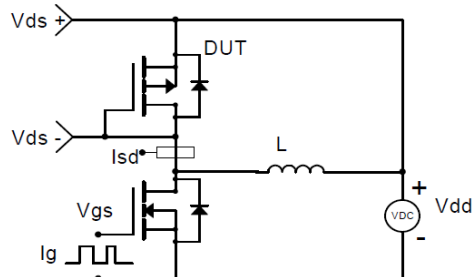
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

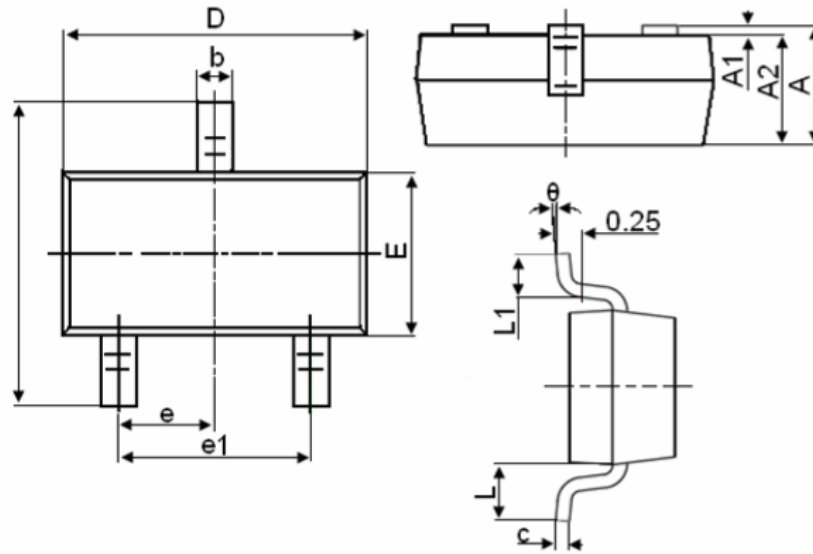


Diode Recovery Test Circuit & Waveforms



Package Information

SOT-23



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

Notes:

1. All dimensions are in millimeters.
2. Tolerance $\pm 0.10\text{mm}$ unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.