

SOT-23 Plastic-Encapsulate MOSFETS

si2301

P-Channel 20V(D-S) MOSFET

Features

- $V_{DS} = -20V$, $I_D = -2.8A$
- $R_{DS(ON)} < 140m\Omega$ @ $V_{GS} = -2.5V$
- $R_{DS(ON)} < 110m\Omega$ @ $V_{GS} = -4.5V$
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Applications

- PWM applications
- Load switch
- Power management

Description

The 2301 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

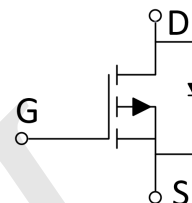
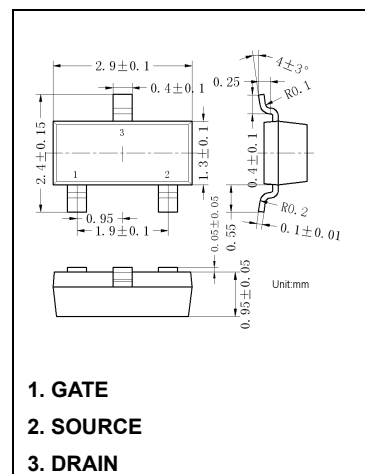
Marking: A1SHB

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	-20	V
V_{GS}	Gate-source voltage	± 12	V
I_D	Continuous drain current	-2.8	A
I_{DM}	Pulsed Drain Current ¹⁾	-10	
P_D	Power dissipation	1	W
T_J	Operating Junction	150	$^\circ C$
T_{stg}	Storage temperature	-55 to 150	$^\circ C$

Thermal Characteristic

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient ($t \leq 5s$) ²⁾	125	$^\circ C / W$



Electrical Characteristics (T_a=25 °C unless otherwise noted)

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
Off Characteristics						
V _{(BR)DSS}	Drain- source breakdown voltage	V _{GS} = 0 V, I _D = -250uA	-20	-24		V
I _{DSS}	Zero gate voltage drain current	V _{DS} = -20 V, V _{GS} = 0 V			-1	μA
I _{GSS}	Gate-body leakage current	V _{GS} = ±12V, V _{DS} = 0 V			±100	nA
On Characteristics ³⁾						
V _{GS(th)}	Gate threshold voltage	V _{GS} =V _{DS} , I _D = -250uA	-0.4	-0.7	-1	V
R _{DS(on)}	Drain-Source on-state resistance	V _{GS} = -4.5 V, I _D = -2.8A		64	110	mΩ
		V _{GS} = -2.5 V, I _D = -2A		89	140	
g _{fs}	Forward Transconductance	V _{DS} = -5V, I _D = -2A	5			S
Dynamic Characteristics ⁴⁾						
C _{iss}	Input capacitance	V _{GS} = 0 V, V _{DS} = -10 V, f = 1 MHz		405		pF
C _{oss}	Output capacitance			75		
C _{rss}	Reverse transfer capacitance			55		
Switching Characteristics ⁴⁾						
t _{d(on)}	Turn-on delay time	V _{DD} = -10V, I _D = -1A V _{GS} = -4.5V, R _{GEN} = 10Ω		11		ns
t _r	Rise time			35		
t _{d(off)}	Turn-off delay time			30		
t _f	Fall time			10		
Q _g	Total gate charge	V _{DS} = -10V, V _{GS} = -2.5V, I _D = -2.8A		3.3	12	nC
Q _{gs}	Gate-source charge			0.7		
Q _{gd}	Gate-drain charge			1.3		
Drain-source body diode characteristics						
V _{SD}	Diode forward voltage ³⁾	V _{GS} = 0 V, I _S = -1.3A			-1.2	V
I _S	Diode Forward Current ²⁾				-3	A

Notes:

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%
4. Guaranteed by design, not subject to production

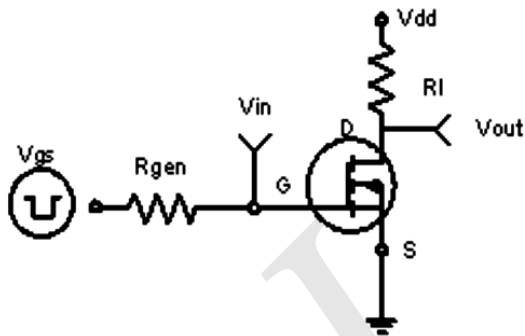


Figure 1: Switching Test Circuit

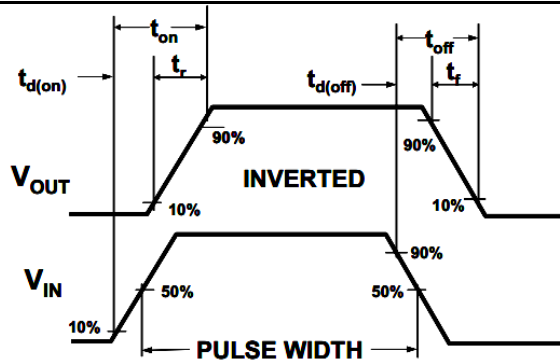


Figure 2: Switching Waveforms

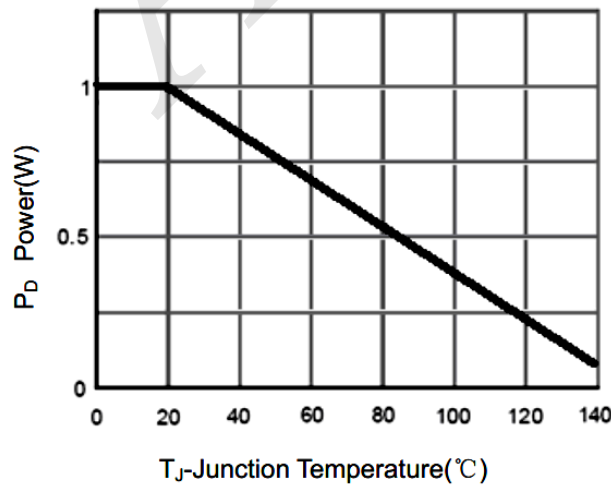


Figure 3 Power Dissipation

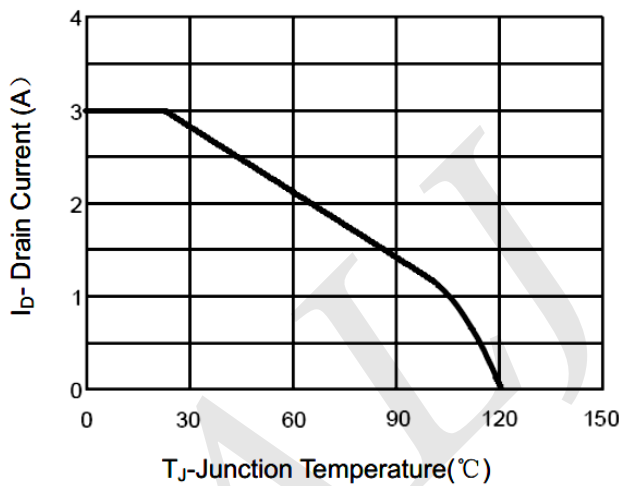


Figure 4 Drain Current

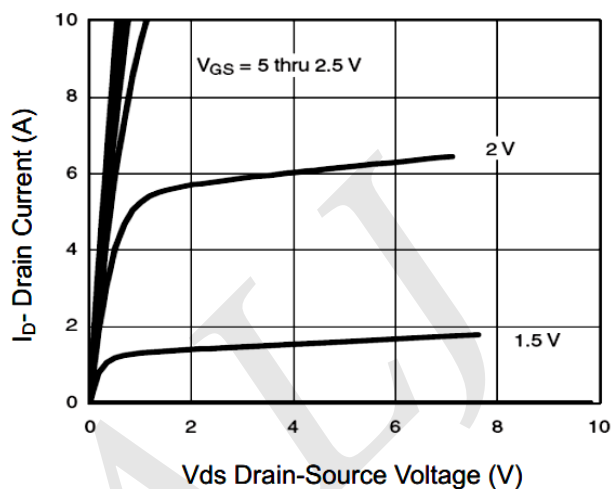


Figure 5 Output Characteristics

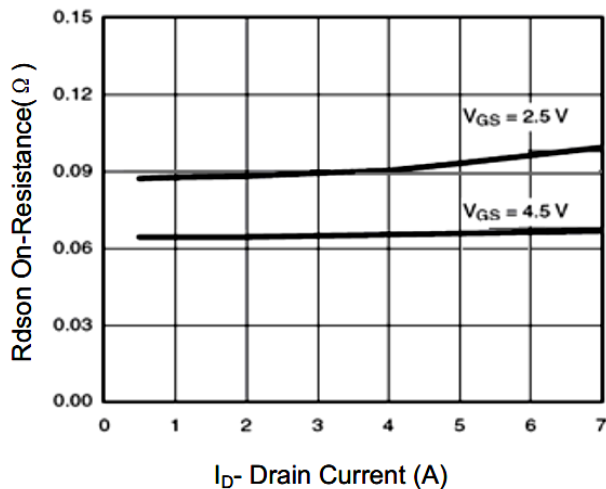


Figure 6 Drain-Source On-Resistance

Typical Electrical and Thermal Characteristics(Cont.)

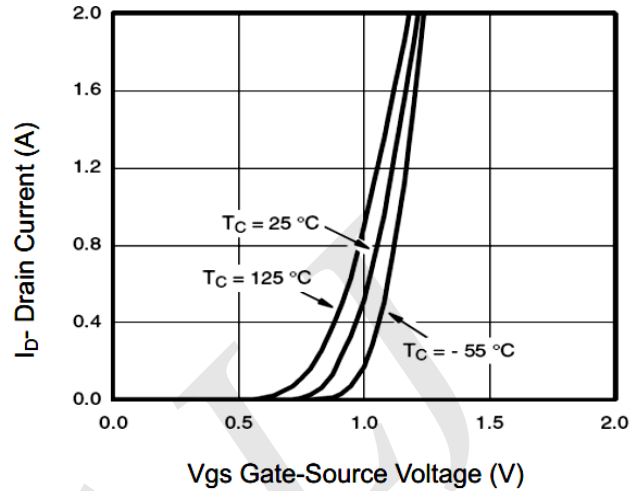


Figure 7 Transfer Characteristics

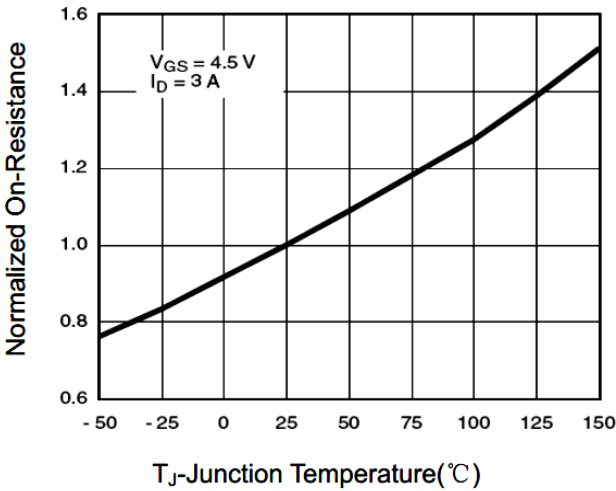


Figure 8 Drain-Source On-Resistance

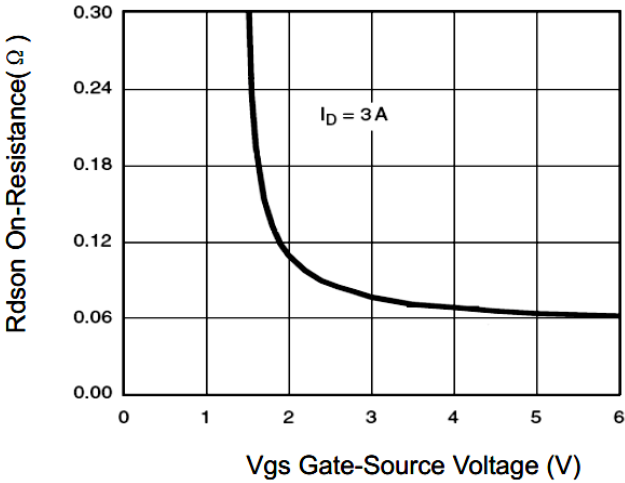


Figure 9 $R_{DS(on)}$ vs V_{GS}

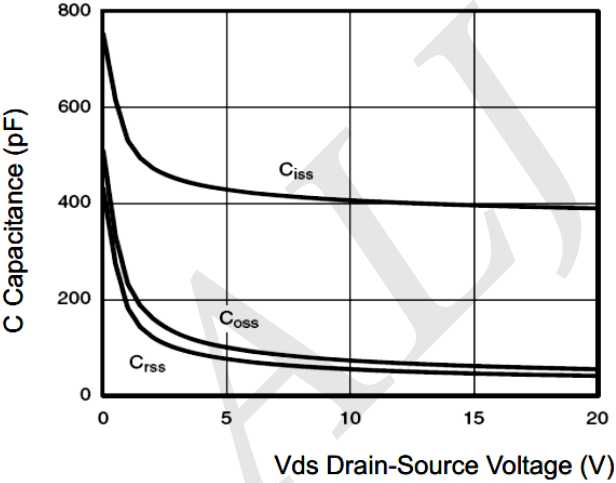


Figure 10 Capacitance vs V_{DS}

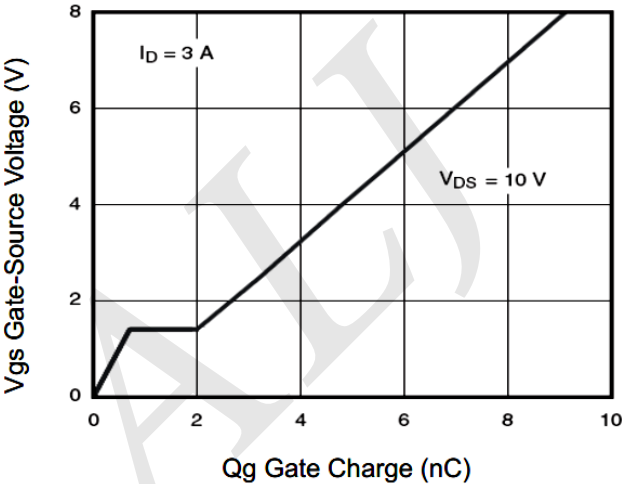


Figure 11 Gate Charge

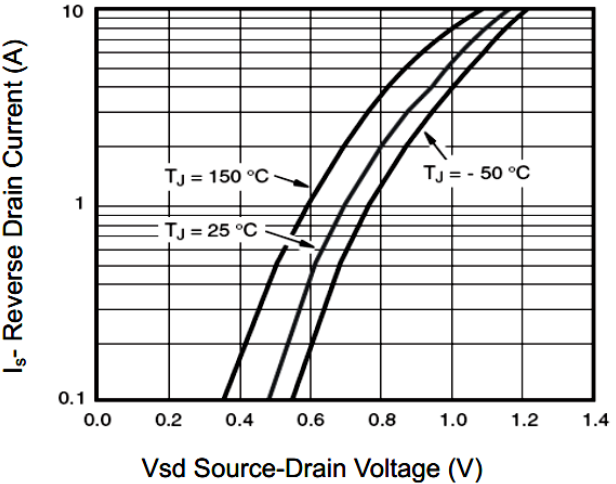


Figure 12 Source- Drain Diode Forward

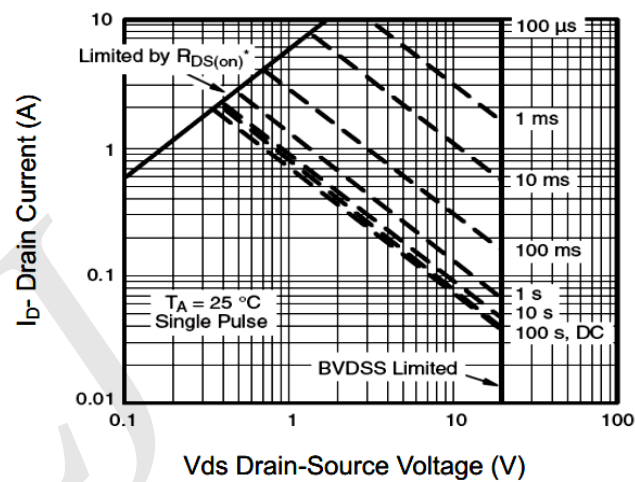


Figure 13 Safe Operation Area

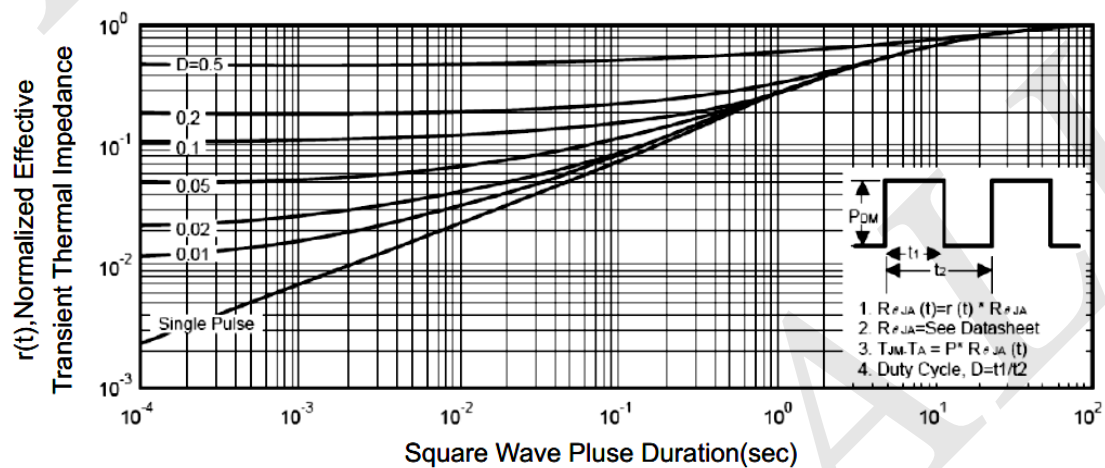


Figure 14 Normalized Maximum Transient Thermal Impedance