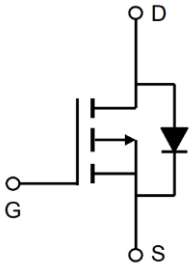
AP2301AI

-20V P-Channel Enhancement Mode MOSFET

Description

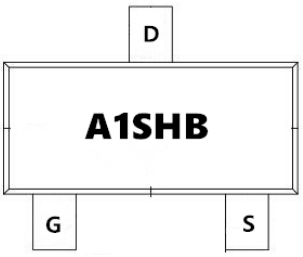
The AP2301AI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

V_{DS} = -20V I_D =-3.3A

$R_{DS(ON)}$ < 80mΩ@ V_{GS}=-4.5V



Application

Battery protection

Load switch

Uninterruptible power supply

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP2301AI	SOT-23	A1SHB	3000

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-3.3	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-2.6	A
I_{DM}	Pulsed Drain Current[2]	-13	A
P_D@T_A=25℃	Total Power Dissipation[3]	1.4	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance Junction-ambient [1]	125	℃/W
$R_{\theta JA}$	Thermal Resistance Junction-ambient[1](t≤10s)	90	℃/W

-20V P-Channel Enhancement Mode MOSFET

Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-20	-22	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-4.5V , I_D=-3A	---	55	80	mΩ
		V_{GS}=-2.5V , I_D=-2A	---	75	100	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-0.5	-0.7	-1.2	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-20V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-20V , V_{GS}=0V , T_J=55℃	---	---	-5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-3A	---	12.2	---	S
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-3A	---	10.1	---	nC
Q_{gs}	Gate-Source Charge		---	1.21	---	
Q_{gd}	Gate-Drain Charge		---	2.46	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-10V , V_{GS}=-4.5V , R_G=3.3Ω I_D=-3A	---	5.6	---	ns
T_r	Rise Time		---	32.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	45.6	---	
T_f	Fall Time		---	29.2	---	
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	677	---	pF
C_{oss}	Output Capacitance		---	82	---	
C_{rss}	Reverse Transfer Capacitance		---	73	---	
I_S	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	-3	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1	V

Note :

1、The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2、The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3、The power dissipation is limited by 150℃ junction temperature

4、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

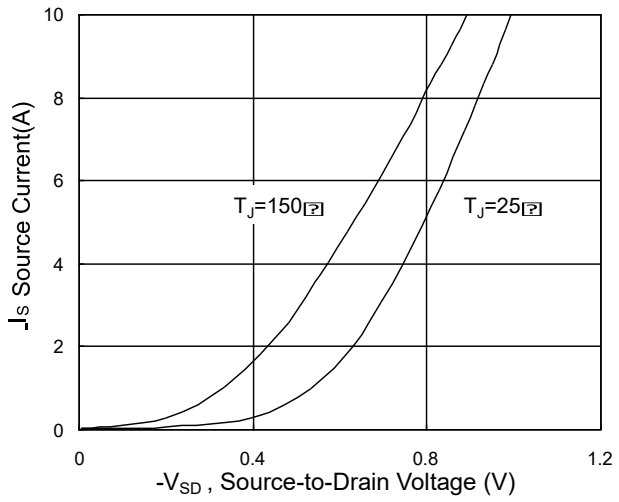


Fig.1 Typical Output Characteristics

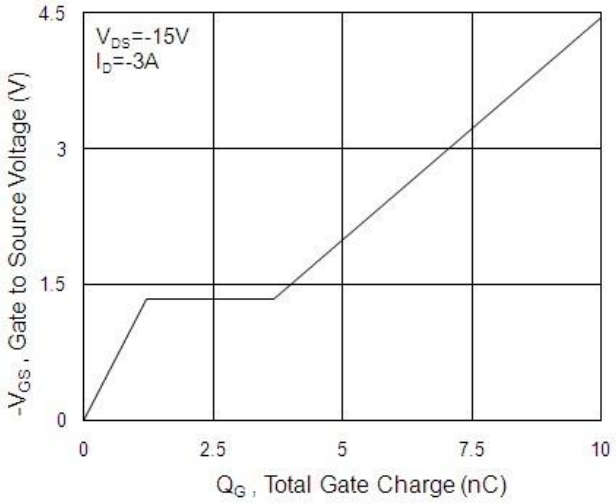
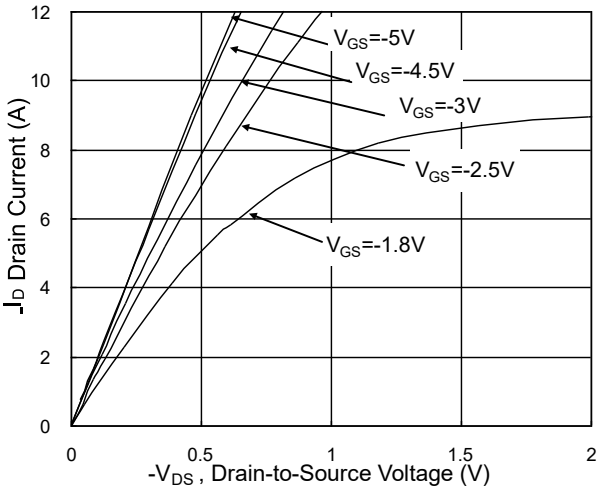
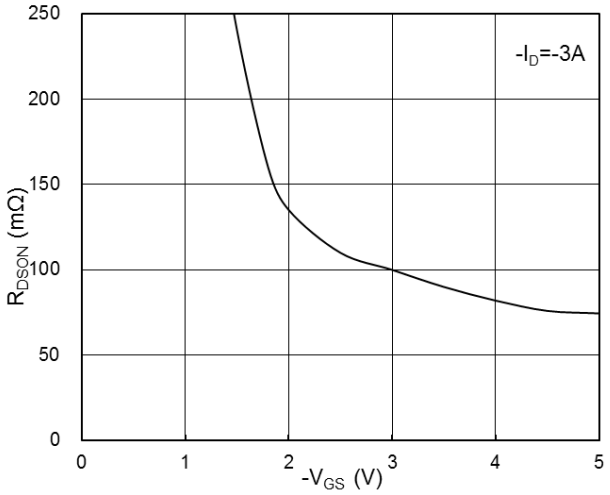


Fig.2 On-Resistance vs. G-S Voltage

Fig.3





Source Drain Forward Characteristics

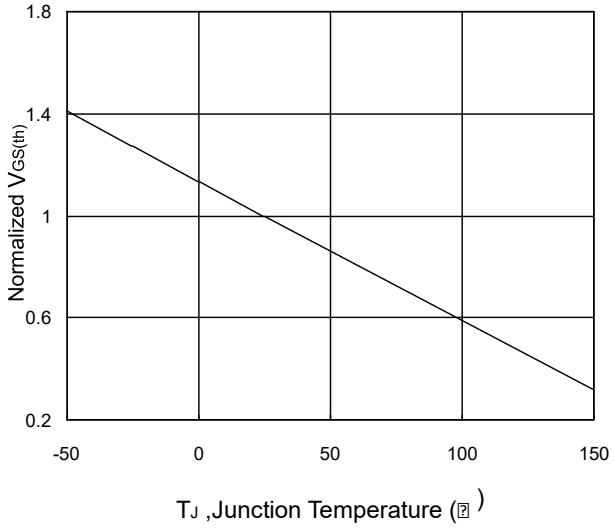


Fig.4 Gate-Charge Characteristics

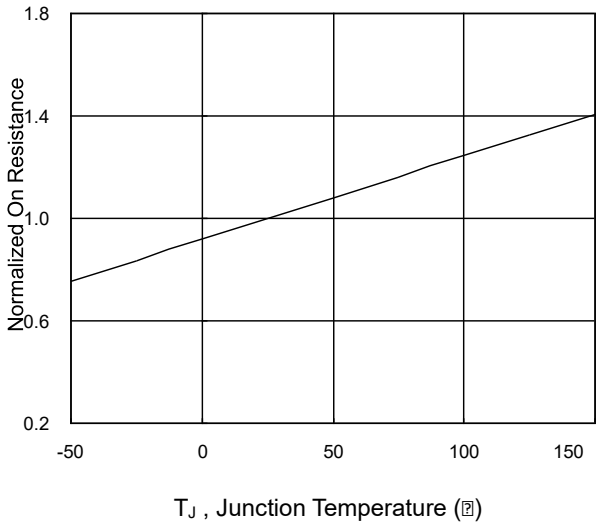


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

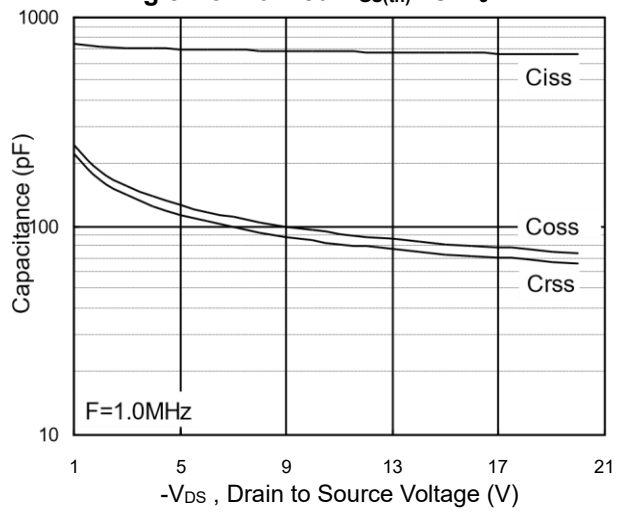


Fig.6 Normalized R_{DSON} vs. T_J

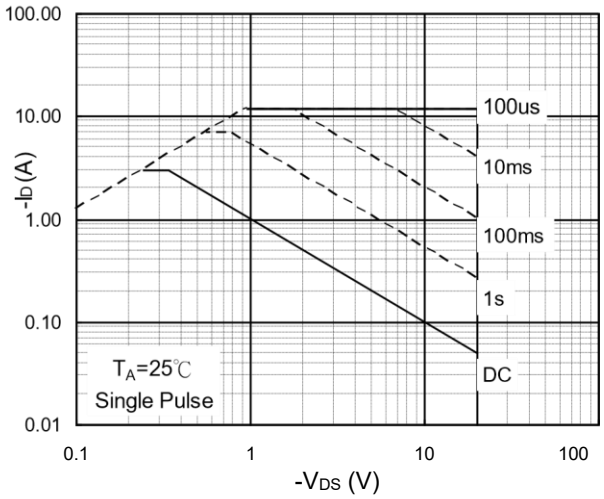


Fig.7 Capacitance

Fig.8 Safe Operating Area

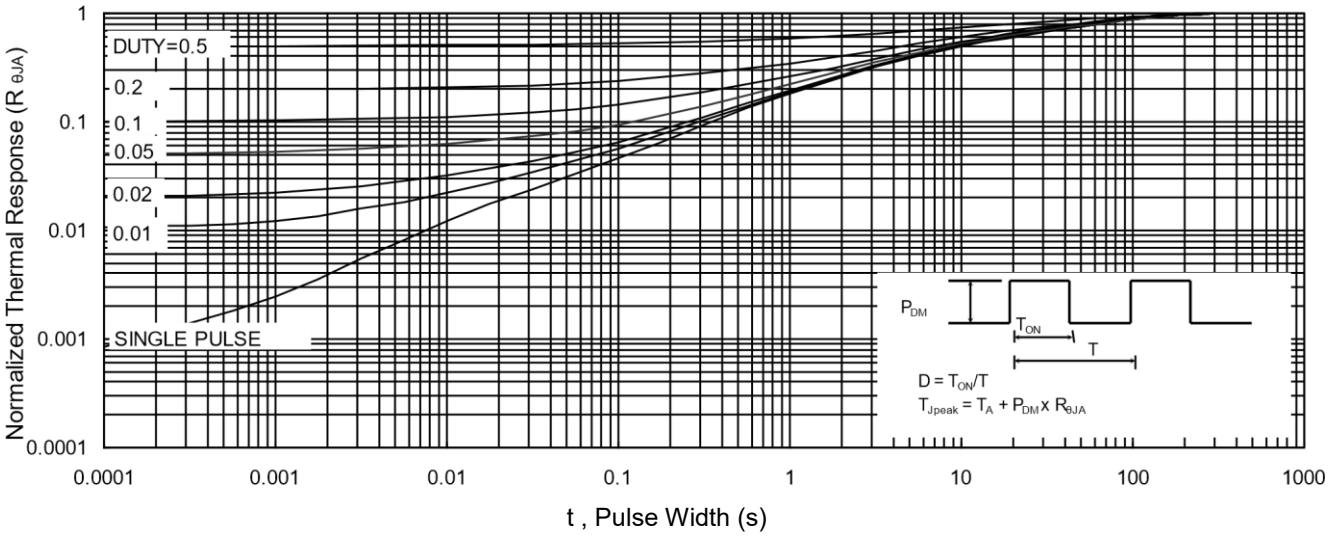
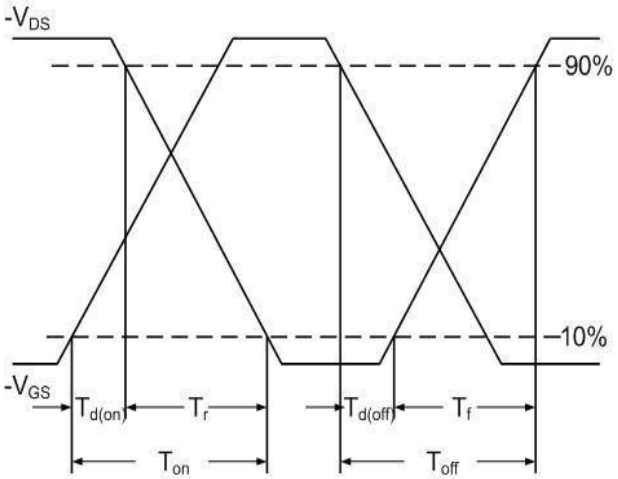


Fig.9 Normalized Maximum Transient Thermal Impedance



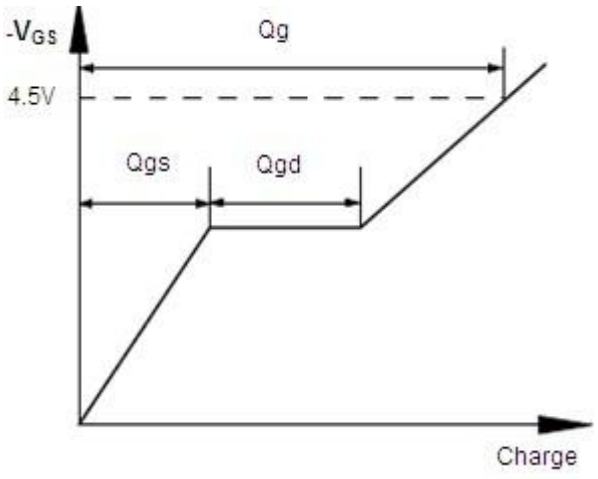
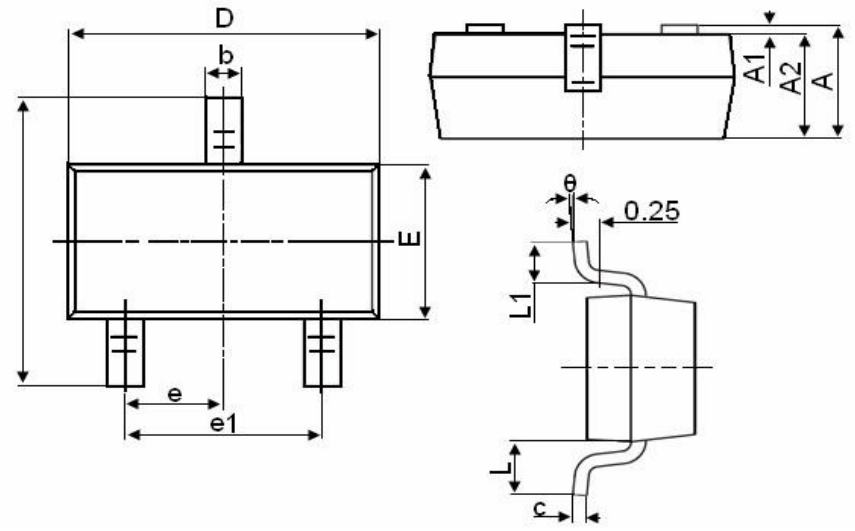


Fig.10 Switching Time Waveform

Fig.11 Gate Charge Waveform

Package Mechanical Data-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°

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Edition	Date	Change
RVE1.2	2017/6/19	Initial release
RVE1.3	2020/8/19	Reduce RDS(on)