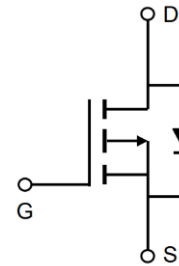


-20V P-Channel Enhancement Mode MOSFET

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.



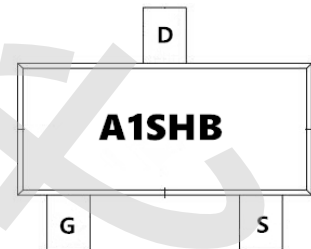
General Features

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

$R_{DS(ON)} < 80m\Omega @ V_{GS} = -4.5V$

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

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

-20V P-Channel Enhancement Mode MOSFET

Electrical Characteristics (T_J=25°C, 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°C	---	---	-1	uA
		V _{DS} =-20V, V _{GS} =0V, T _J =55°C	---	---	-5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	±100	nA
g _{fs}	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°C	---	---	-1	V

Note :

- 1、 The data tested by surface mounted on a 1 inch² 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°C 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

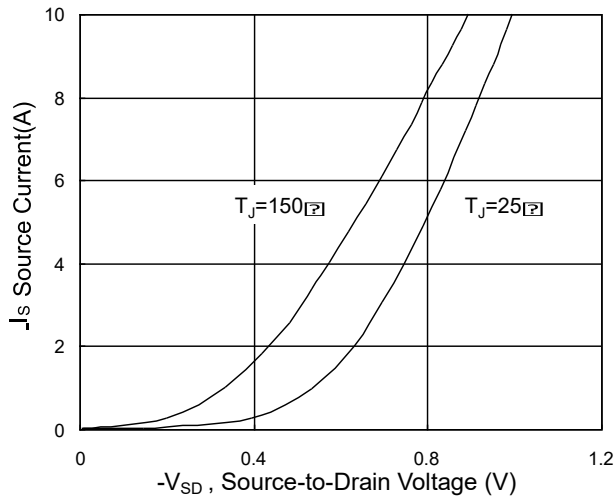


Fig.1 Typical Output Characteristics

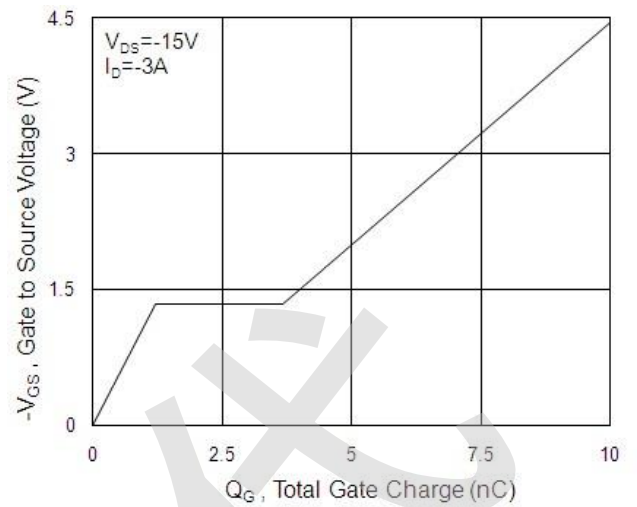
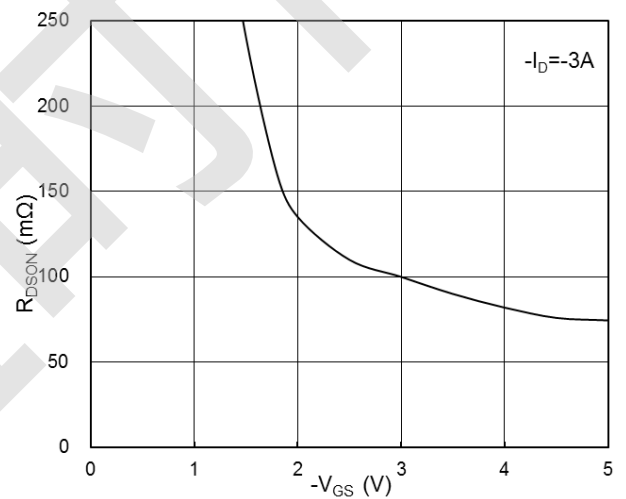
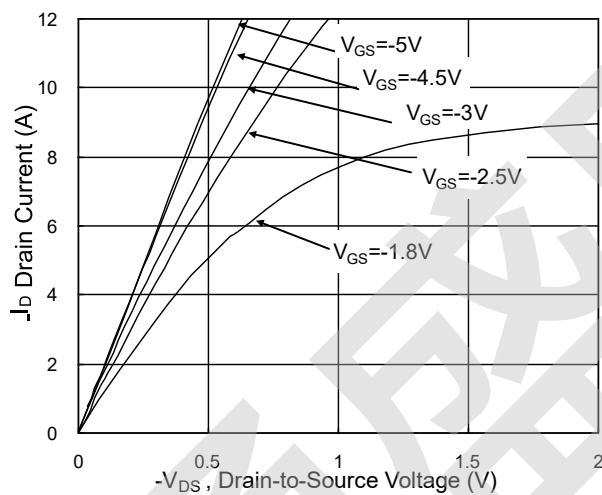


Fig.2 On-Resistance vs. G-S Voltage



Source Drain Forward Characteristics

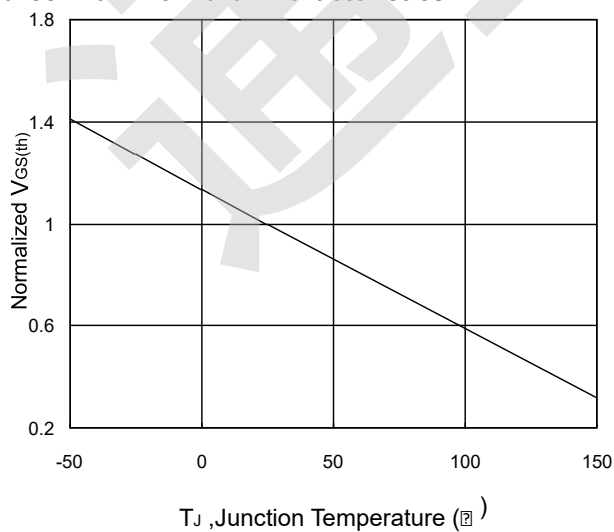
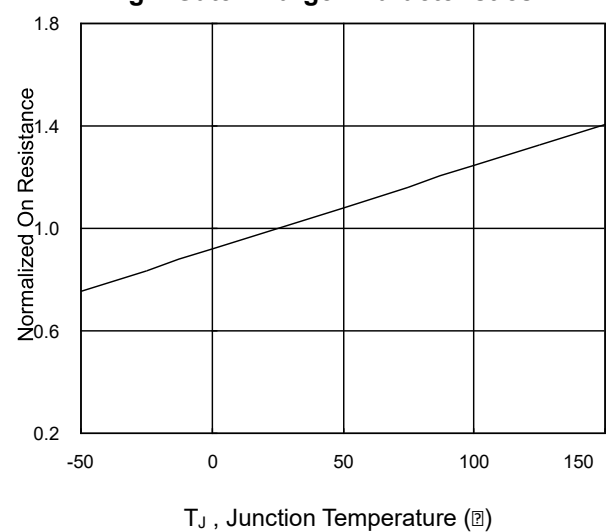


Fig.4 Gate-Charge Characteristics



-20V P-Channel Enhancement Mode MOSFET

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

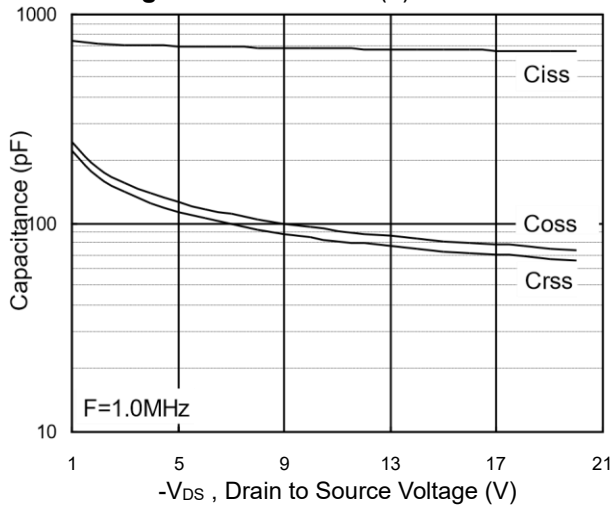


Fig.7 Capacitance

Fig.6 Normalized $R_{DS(on)}$ vs. T_J

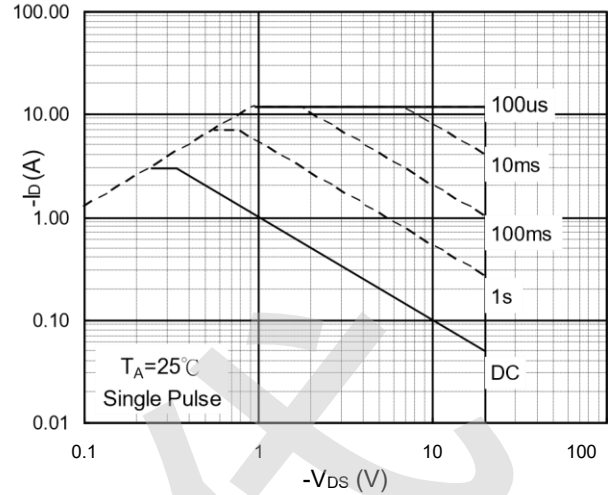


Fig.8 Safe Operating Area

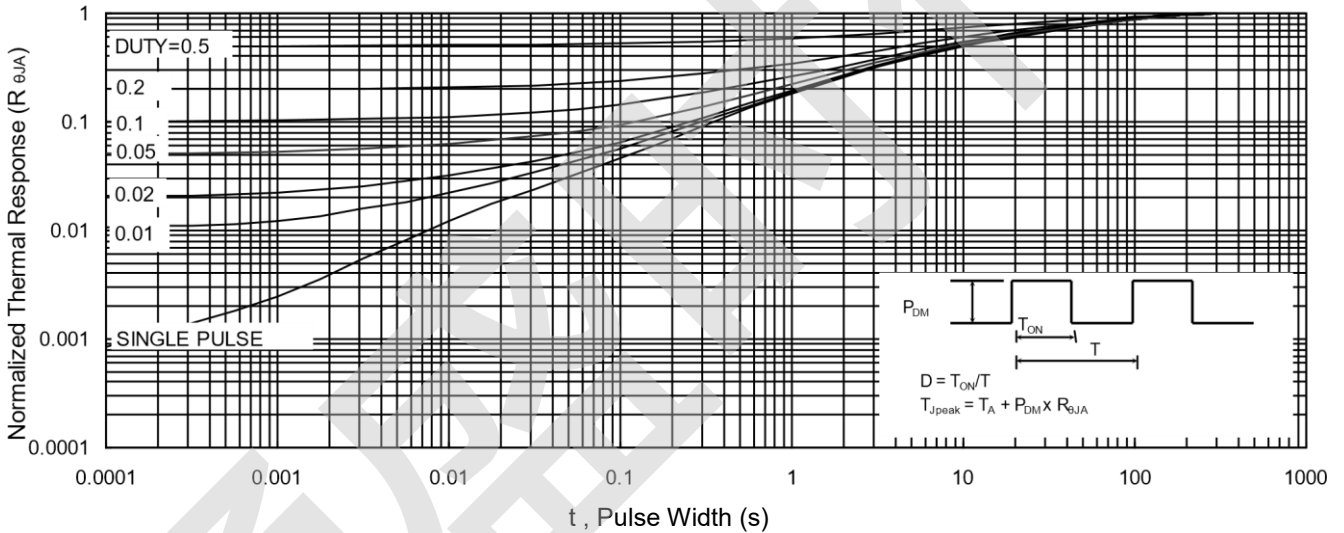


Fig.9 Normalized Maximum Transient Thermal Impedance

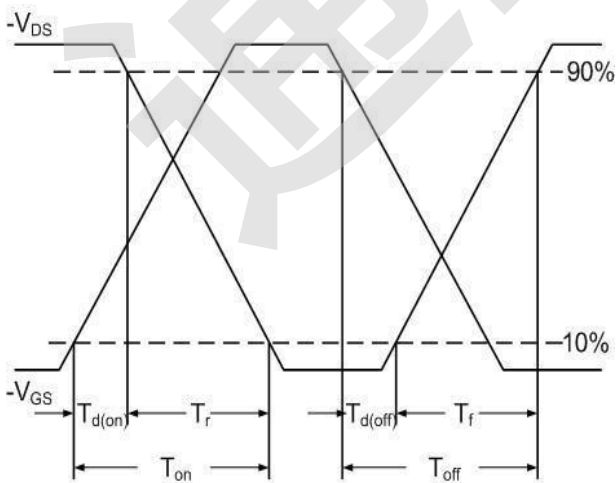


Fig.10 Switching Time Waveform

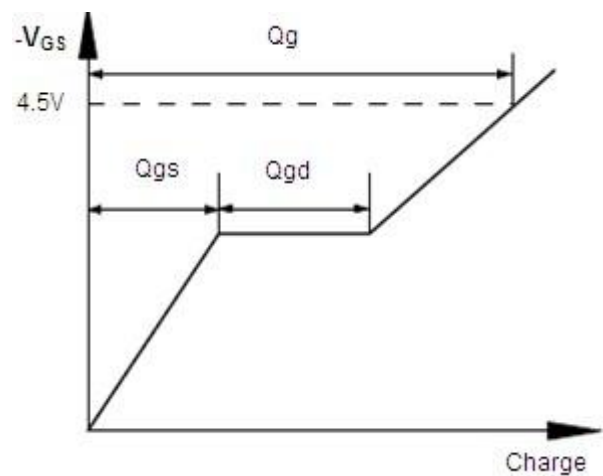
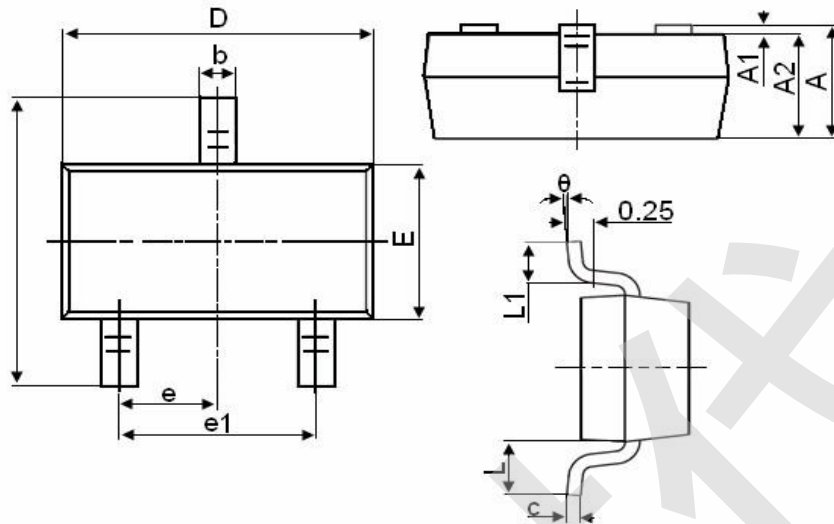


Fig.11 Gate Charge Waveform

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°

-20V P-Channel Enhancement Mode MOSFET**Attention**

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

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