

## -20V P-Channel Enhancement Mode MOSFET

### Description

The AP2301BI 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

$V_{DS} = -20V$   $I_D = -2.3A$

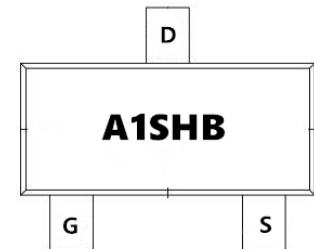
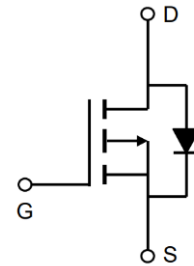
$R_{DS(ON)} < 150m\Omega @ V_{GS} = -4.5V$

### Application

Battery protection

Load switch

Uninterruptible power supply



### Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP2301BI	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	$\pm 12$	V
$I_D$	Drain Current-Continuous	-2.3	A
$I_{DM}$	Drain Current -Pulsed <sup>(Note 1)</sup>	-10	A
$P_D$	Maximum Power Dissipation	0.7	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	178	$^\circ C/W$



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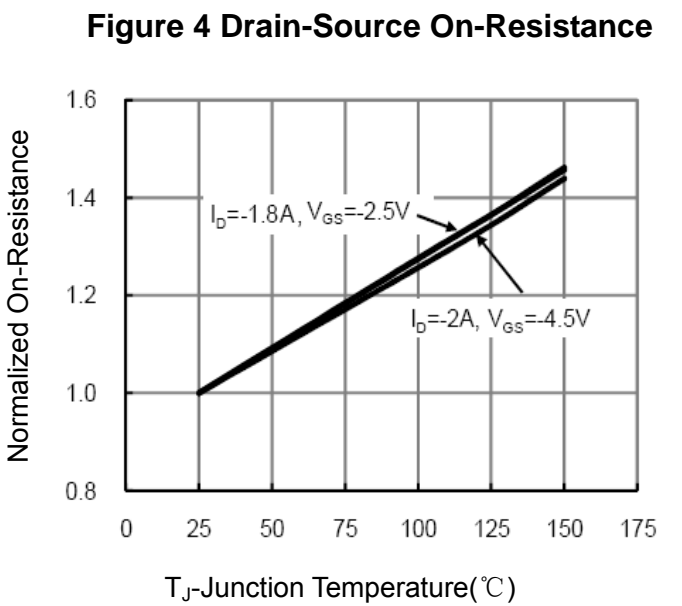
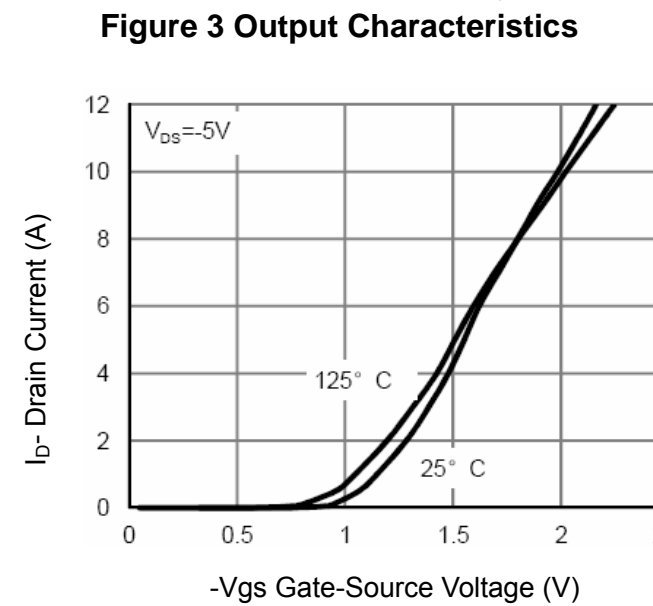
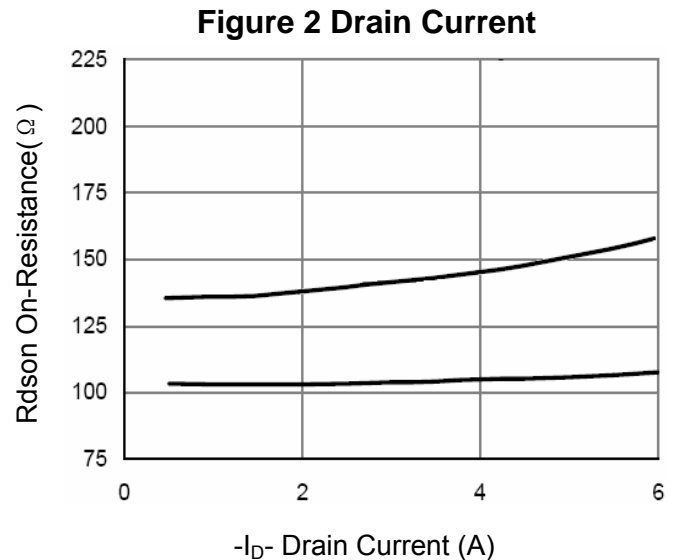
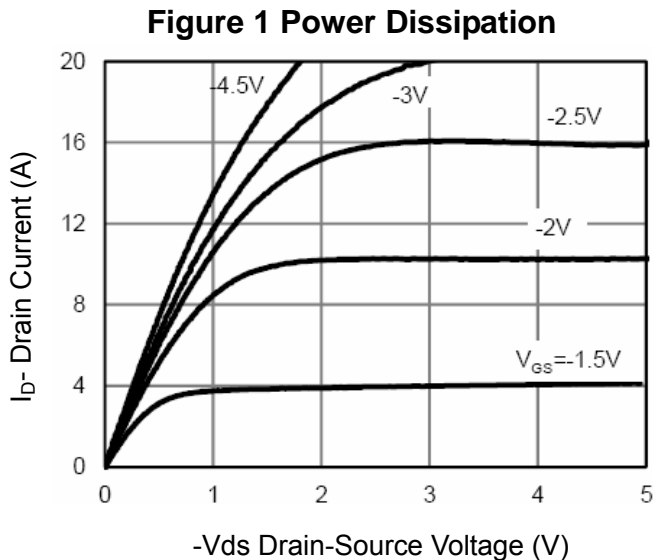
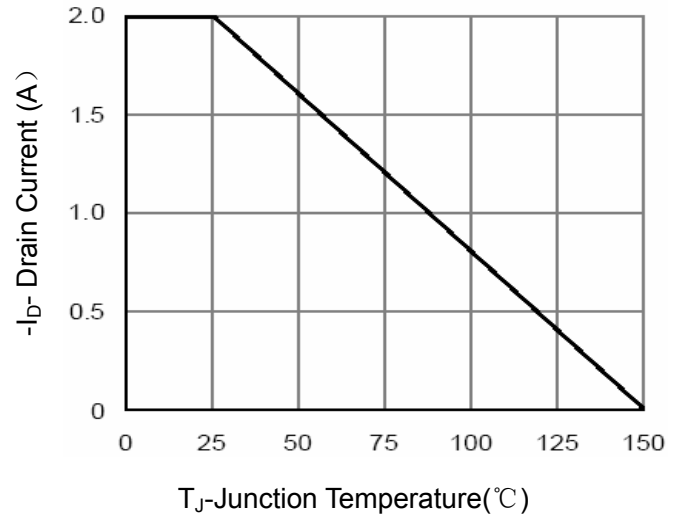
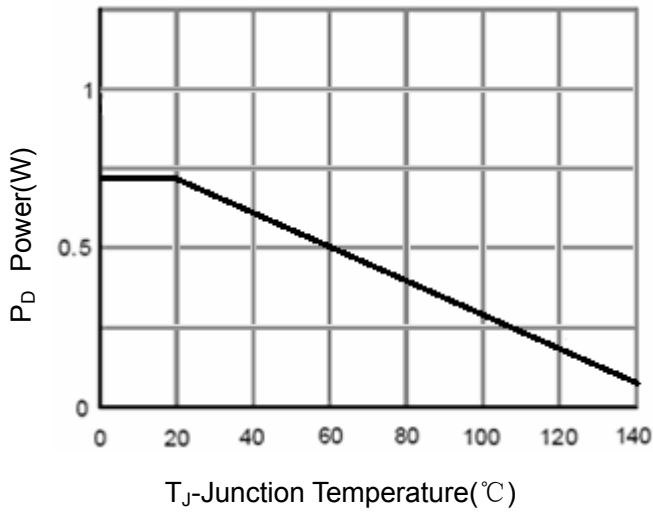
### Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V I <sub>D</sub> =-250μA	-20		-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V	-	-	-1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.5	-0.7	-1.2	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2 A	-	135	165	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1.8A	-	150	185	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2A	4	-	-	S
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, F=1.0MHz	-	290	-	PF
C <sub>OSS</sub>	Output Capacitance		-	60	-	PF
C <sub>RSS</sub>	Reverse Transfer Capacitance		-	34	-	PF
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =-10V, R <sub>L</sub> =5Ω V <sub>GS</sub> =-4.5V, R <sub>GEN</sub> =3Ω	-	10	-	nS
t <sub>r</sub>	Turn-on Rise Time		-	5.0	-	nS
t <sub>d(off)</sub>	Turn-Off Delay Time		-	21	-	nS
t <sub>f</sub>	Turn-Off Fall Time		-	7	-	nS
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-10V, I <sub>D</sub> =-2A, V <sub>GS</sub> =-4.5V	-	3.0	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	0.5	-	nC
Q <sub>gd</sub>	Gate-Drain Charge		-	0.8	-	nC
V <sub>SD</sub>	Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-2A	-	-	-1.2	V

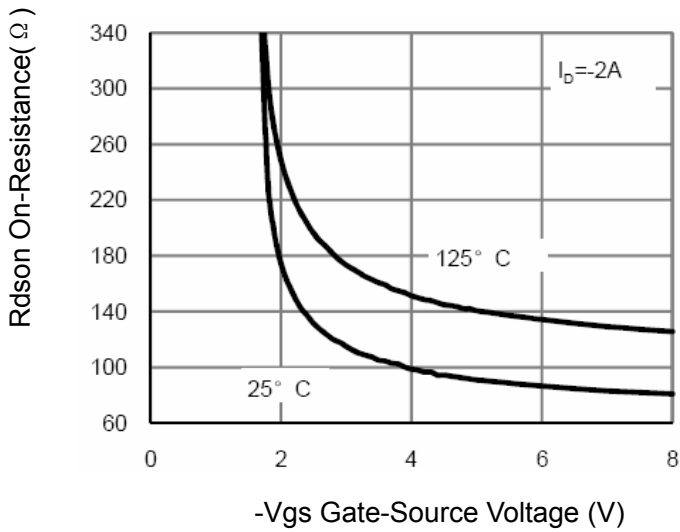
**Notes:**

- 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

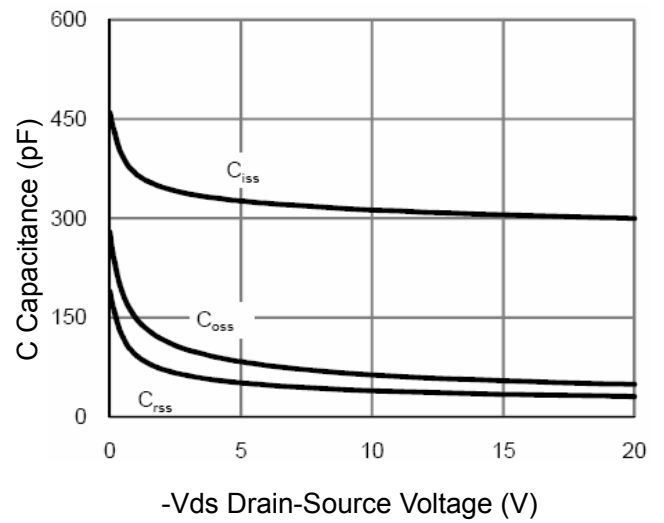
**Typical Characteristics**



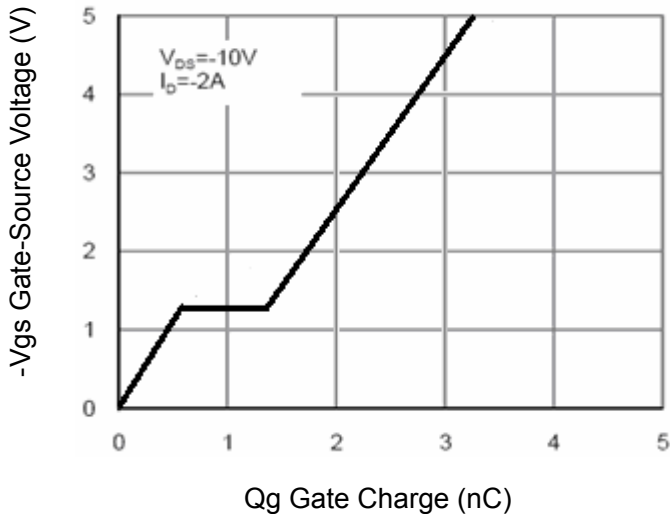
**-20V P-Channel Enhancement Mode MOSFET**



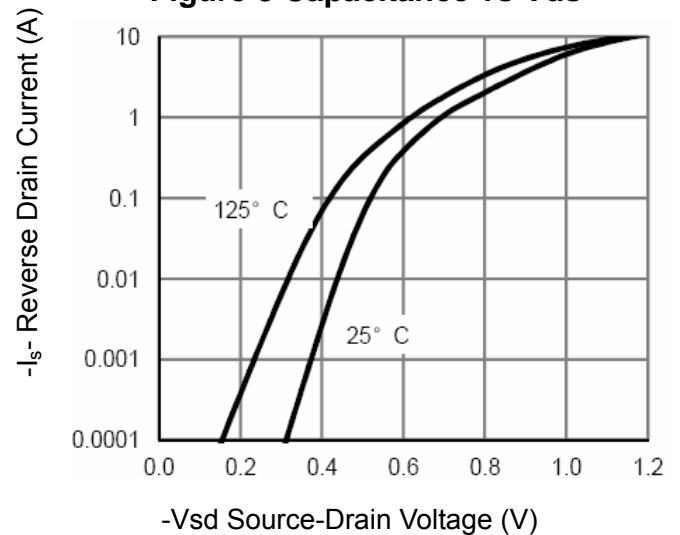
**Figure 7 Rdson vs Vgs**



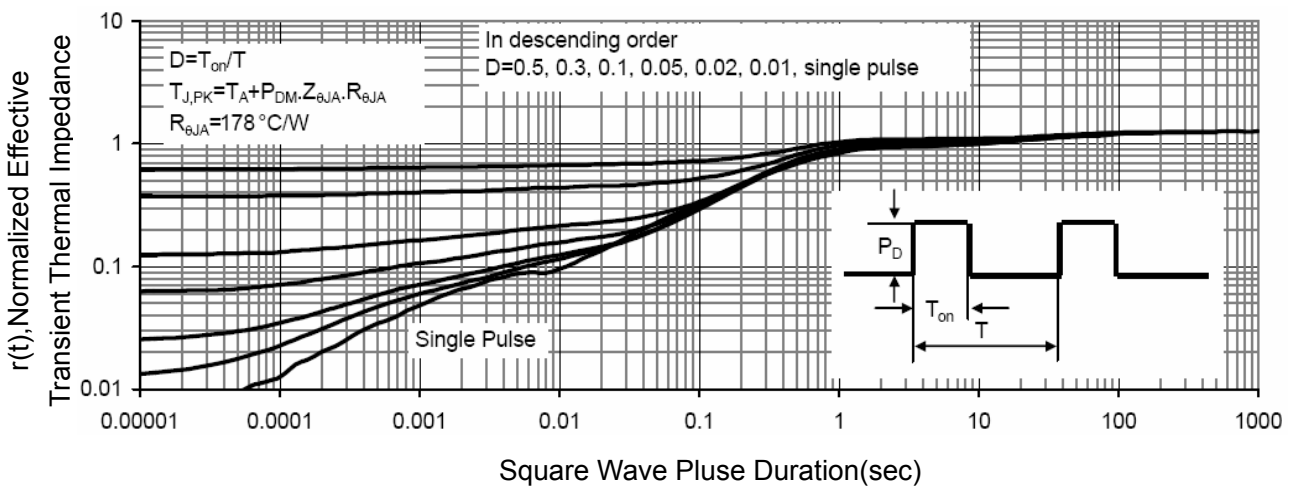
**Figure 8 Capacitance vs Vds**



**Figure 9 Gate Charge**

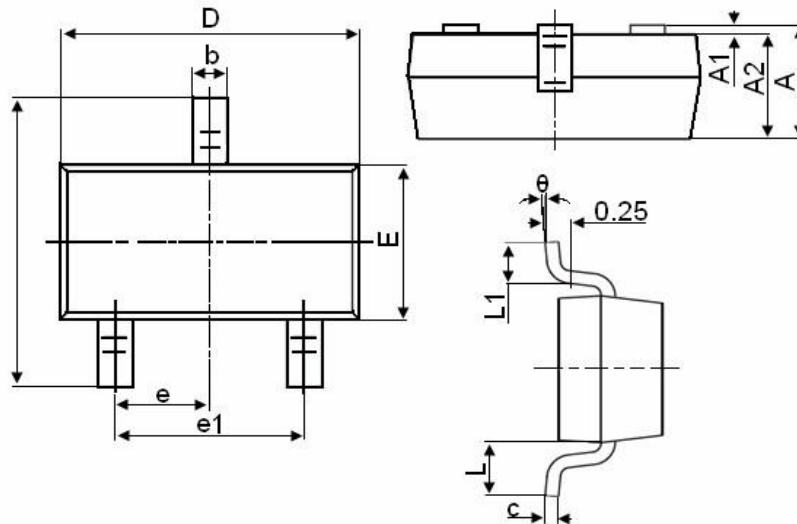


**Figure 10 Source- Drain Diode Forward**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

### 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

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