

-20V P-Channel Enhancement Mode MOSFET

Description

The AP2311BI 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

$V_{DS} = -20V$ $I_D = -6.8A$

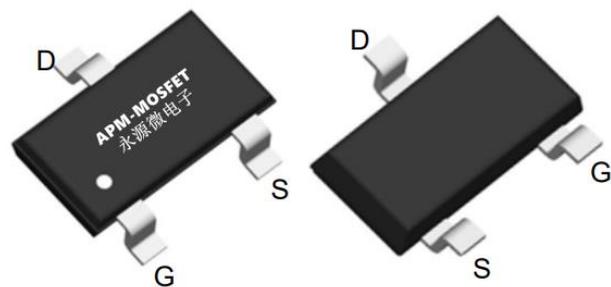
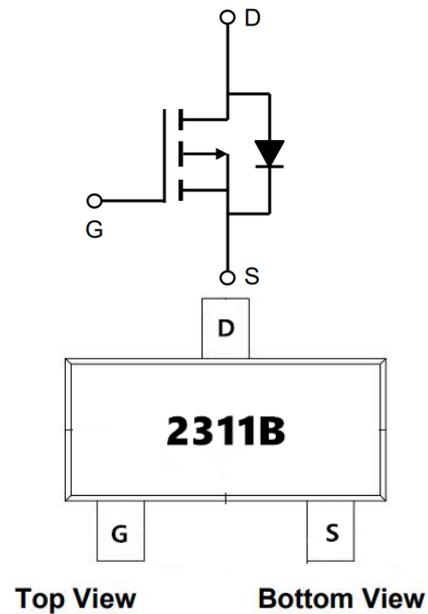
$R_{DS(ON)} < 30m\Omega$ @ $V_{GS}=4.5V$ (Type: 25m Ω)

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP2311BI	SOT23L	2311B	3000

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

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-Source Voltage	-20	V
V_{GSS}	Gate-Source Voltage	± 12	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-6.8	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-3.6	A
IDM	Pulsed Drain Current ^{note1}	-16	A
$P_D @ T_C=25^\circ C$	Power Dissipation	1	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	125	$^\circ C/W$
TJ, TSTG	Operating and Storage Temperature Range	-55 to +150	$^\circ C$



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Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-20	-	-	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} = 0V	-	-	-1	μA
IGSS	Gate to Body Leakage Current	V _{DS} = 0V, V _{GS} = ±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-0.4	-0.65	-1.0	V
RDS(on)	Static Drain-Source on-Resistance note2	V _{GS} = -4.5V, I _D = -4.1A	-	25	30	mΩ
		V _{GS} = -2.5V, I _D = -3A	-	35	53	
C _{iss}	Input Capacitance	V _{DS} = -4V, V _{GS} = 0V, f = 1.0MHz	-	905	-	pF
C _{oss}	Output Capacitance		-	210	-	pF
C _{rss}	Reverse Transfer Capacitance		-	195	-	pF
Q _g	Total Gate Charge	V _{DS} = -4V, I _D = -4.1A, V _{GS} = -4.5V	-	7.8	15	nC
Q _{gs}	Gate-Source Charge		-	1.2	-	nC
Q _{gd}	Gate-Drain("Miller") Charge		-	1.6	-	nC
td(on)	Turn-on Delay Time	V _{DD} = -4V, I _D = -3.3A, R _G =1.0Ω, V _{GEN} =-4.5V, R _L =1.2Ω	-	13	20	ns
t _r	Turn-on Rise Time		-	35	53	ns
td(off)	Turn-off Delay Time		-	32	48	ns
t _f	Turn-off Fall Time		-	10	20	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4.1	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-16	A
VSD	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -4.1A	-	-	-1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _S = -4.1A, di/dt=100A/μs	-	20	-	ns
Q _{rr}	Reverse Recovery Charge		-	9	-	nC

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.

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Typical Characteristics

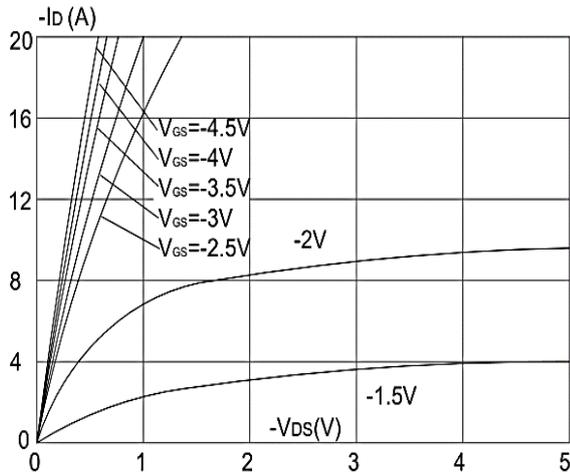


Figure 1: Output Characteristics

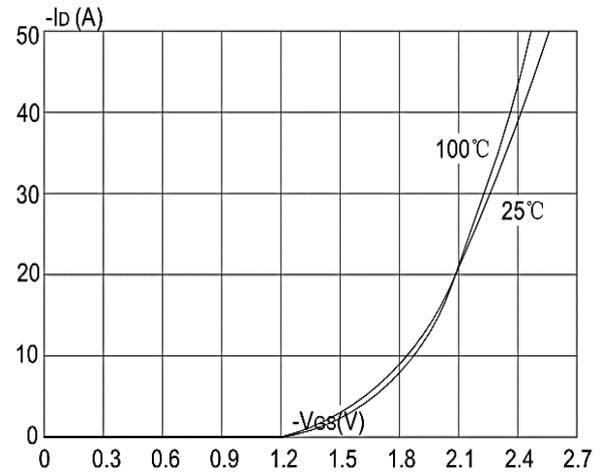


Figure 2: Typical Transfer Characteristics

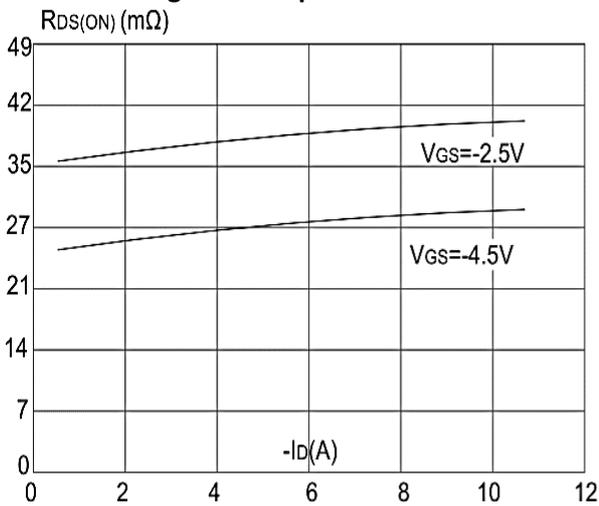


Figure 3: On-resistance vs. Drain Current

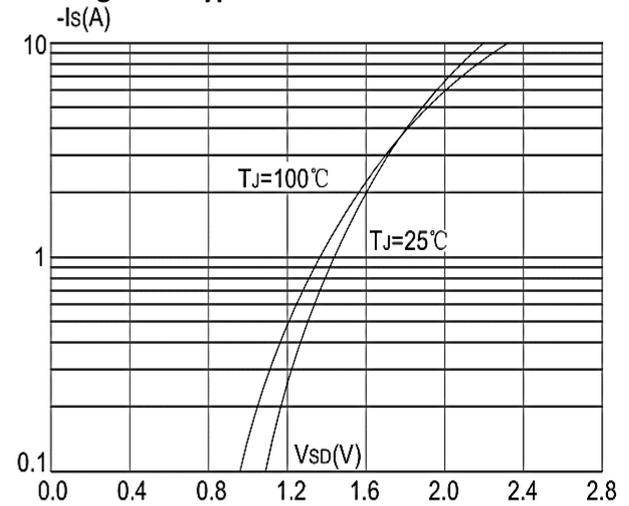


Figure 4: Body Diode Characteristics

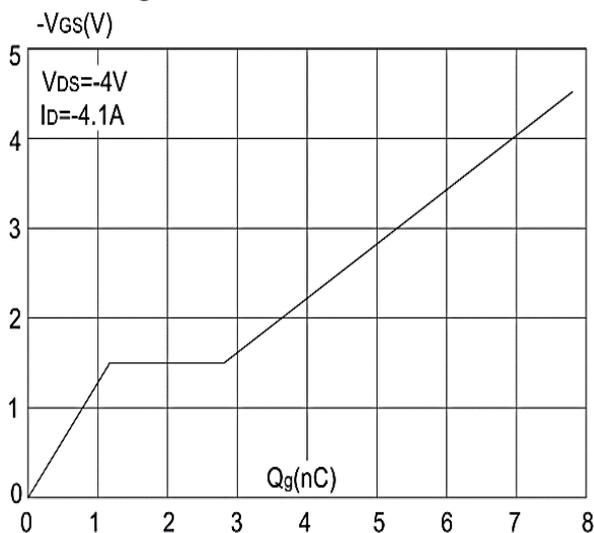


Figure 5: Gate Charge Characteristics

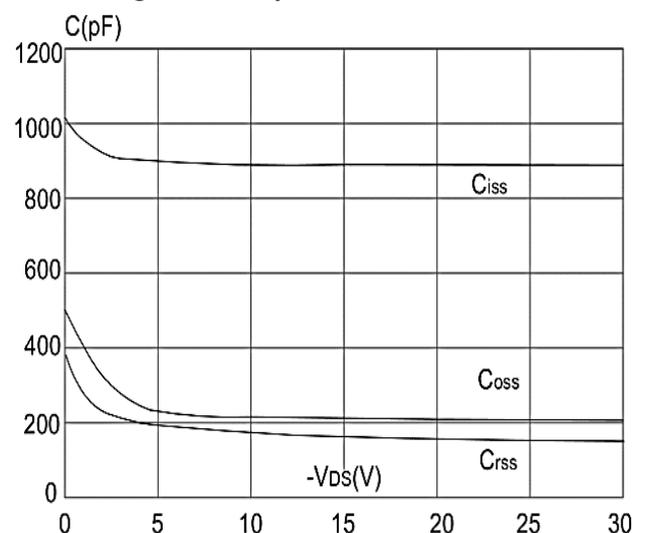


Figure 6: Capacitance Characteristics

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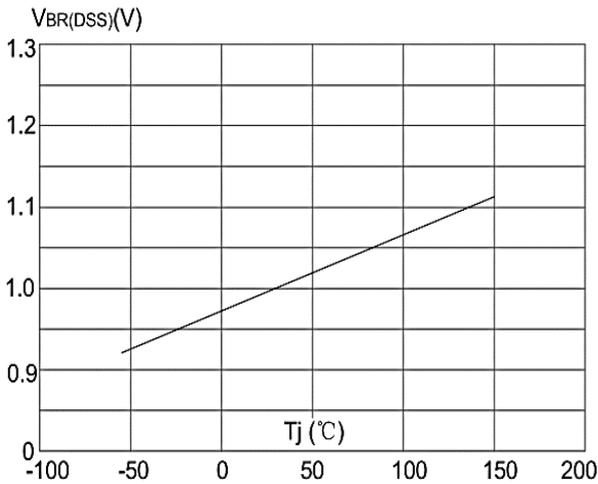


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

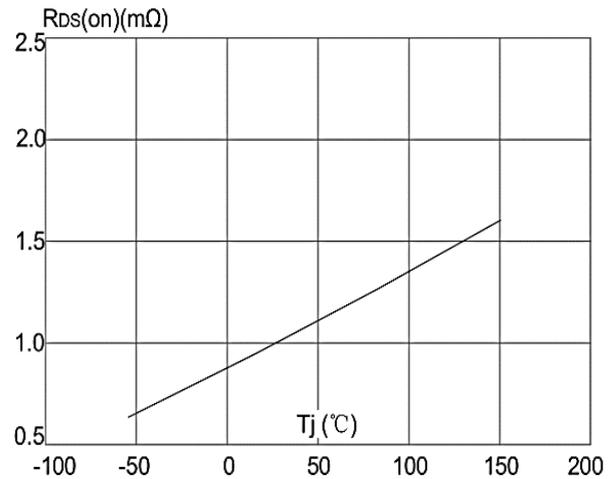


Figure 8: Normalized on Resistance vs. Junction Temperature

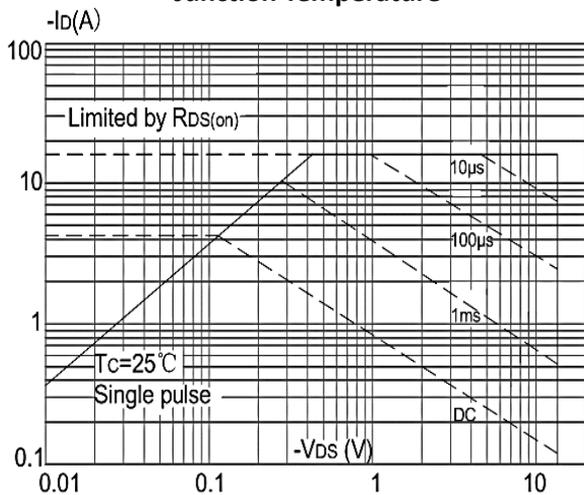


Figure 9: Maximum Safe Operating Area

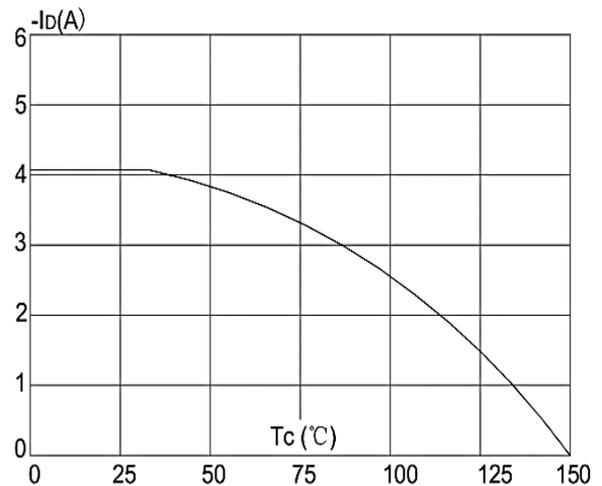


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

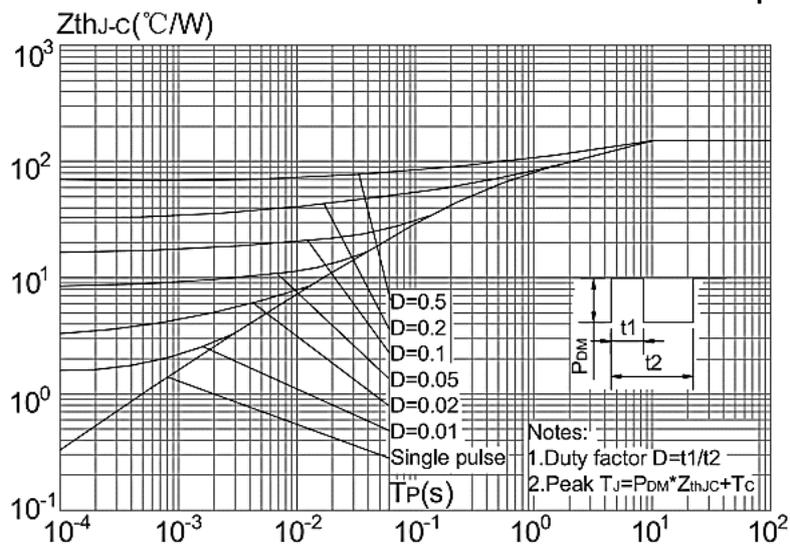
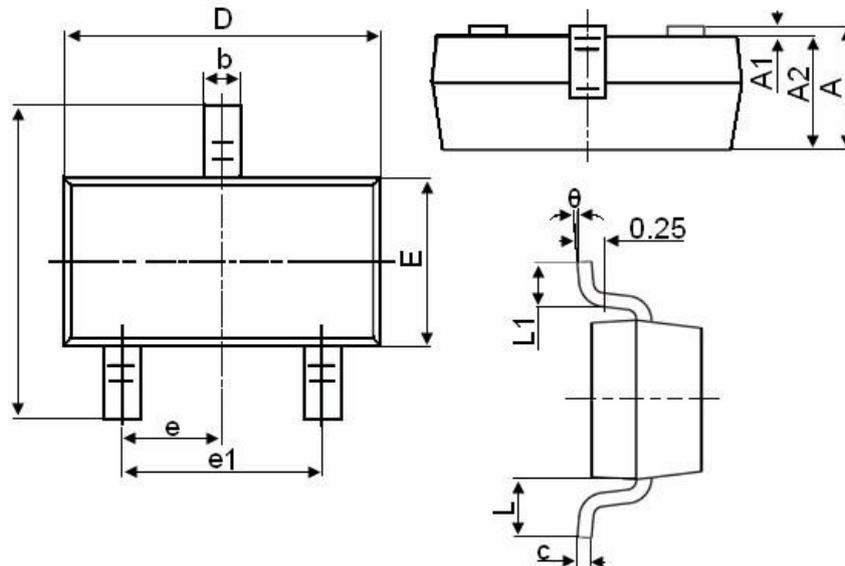


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Mechanical Data-SOT23-XC-Single



Symbol	Dimensions in Millimeters	
	Mim.	Mim
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
REV1.0	2020/9/8	Initial release
REV1.1	2023/4/23	Reduce RDS

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