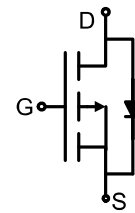


# AP2301

## P-Channel Enhancement Mosfet

### Feature

- -20V,-3A  
 $R_{DS(ON)} < 75m\Omega @ V_{GS} = -4.5V$  TYP:57m $\Omega$   
 $R_{DS(ON)} < 95m\Omega @ V_{GS} = -2.5V$  TYP:74 m $\Omega$
- Advanced Trench Technology
- Lead free product is acquired



Schematic diagram

### Application

- Interfacing Switching
- Load Switching
- Power management



SOT-23 top view

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
2301	AP2301	SOT-23	7 inch	-	3000

### ABSOLUTE MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current ( $T_a = 25^\circ\text{C}$ )	$I_D$	-3	A
Continuous Drain Current ( $T_a = 70^\circ\text{C}$ )	$I_D$	-2	A
Pulsed Drain Current	$I_{DM}$	-12	A
Power Dissipation	$P_D$	1	W
Thermal Resistance from Junction to Ambient <sup>(4)</sup>	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55~ +150	$^\circ\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS( $T_J=25^{\circ}\text{C}$  unless otherwise noted)

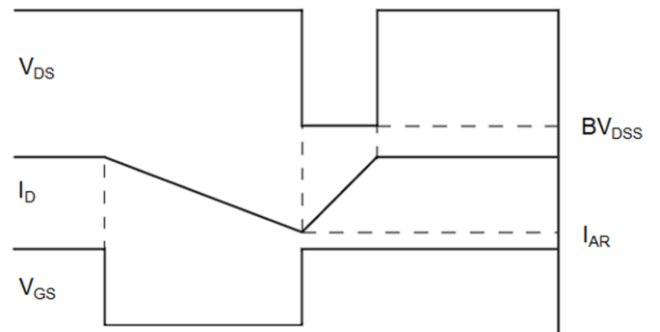
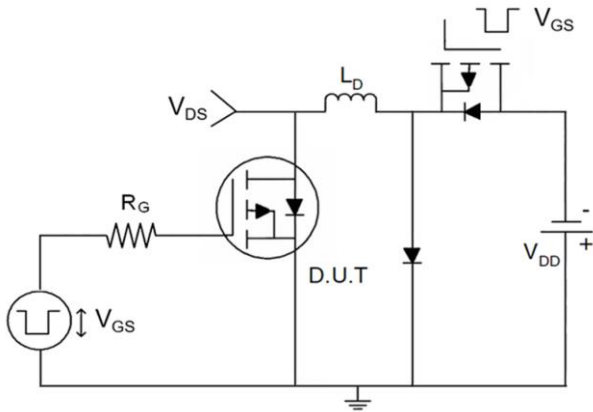
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 12V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage <sup>(3)</sup>	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.5	-0.7	-1.0	V
Drain-source on-resistance <sup>(3)</sup>	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -3A$	-	57	75	m $\Omega$
		$V_{GS} = -2.5V, I_D = -2A$	-	74	95	
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -10V, V_{GS} = 0V, f = 1MHz$	-	503	-	pF
Output Capacitance	$C_{oss}$		-	67	-	
Reverse Transfer Capacitance	$C_{rss}$		-	58	-	
<b>Switching characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -10V, I_D = -3A,$ $V_{GS} = -4.5V, R_G = 3\Omega$	-	11	-	ns
Turn-on rise time	$t_r$		-	52	-	
Turn-off delay time	$t_{d(off)}$		-	16	-	
Turn-off fall time	$t_f$		-	10	-	
Total Gate Charge	$Q_g$	$V_{DS} = -10V, I_D = -2A,$ $V_{GS} = -4.5V$	-	4.1	-	nC
Gate-Source Charge	$Q_{gs}$		-	0.8	-	
Gate-Drain Charge	$Q_{gd}$		-	1.1	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(3)</sup>	$V_{DS}$	$V_{GS} = 0V, I_S = -3A$	-	-	1.2	V
Diode Forward current <sup>(4)</sup>	$I_S$		-	-	-3	A

**Notes:**

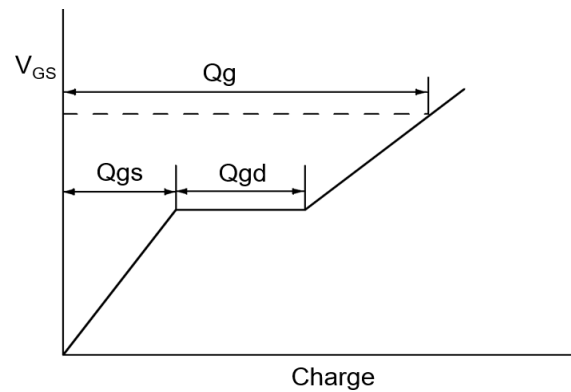
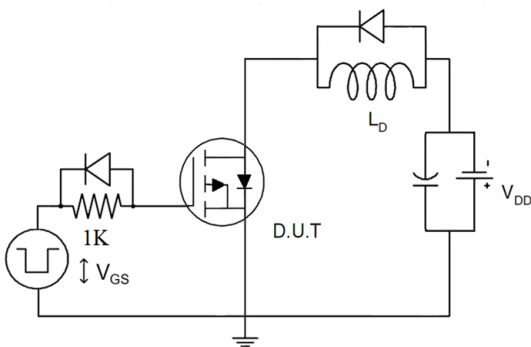
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. Surface Mounted on FR4 Board,  $t_s \leq 10$  sec

**Test Circuit**

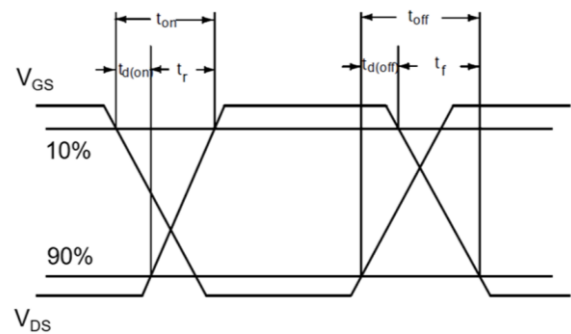
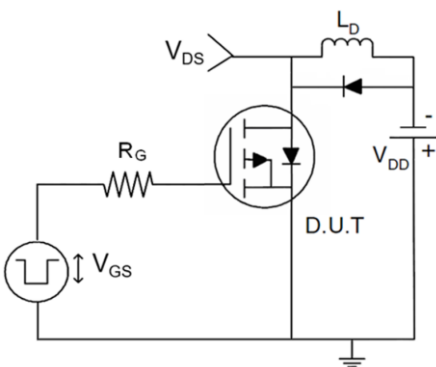
**1)  $E_{AS}$  Test Circuits**



**2) Gate Charge Test Circuit**

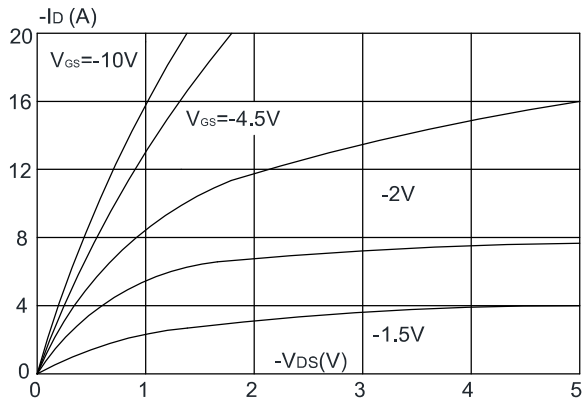


**3) Switch Time Test Circuit**

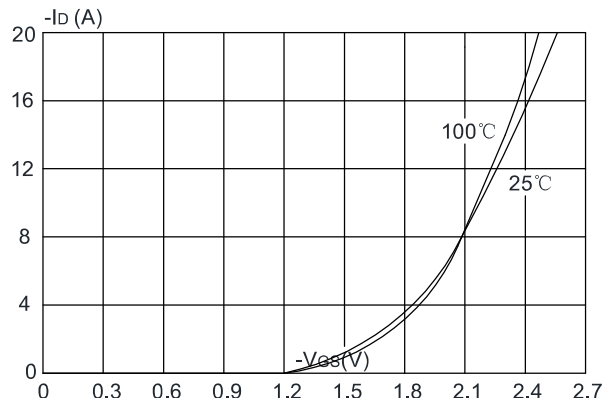


**Typical Performance Characteristics**

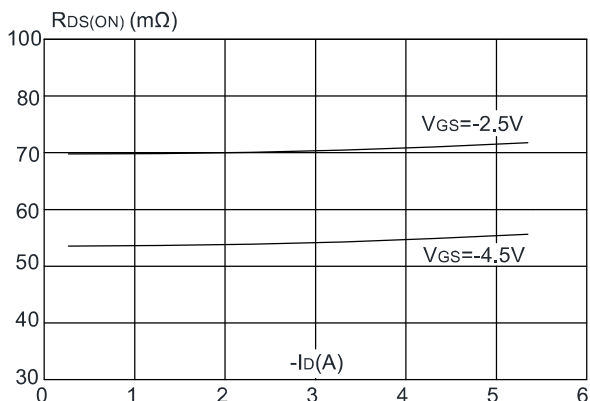
**Figure 1: Output Characteristics**



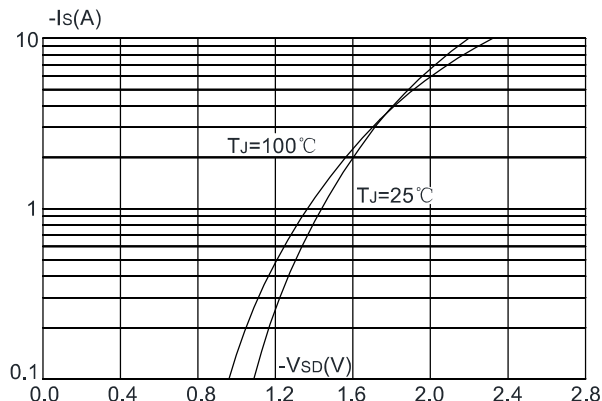
**Figure 2: Typical Transfer Characteristics**



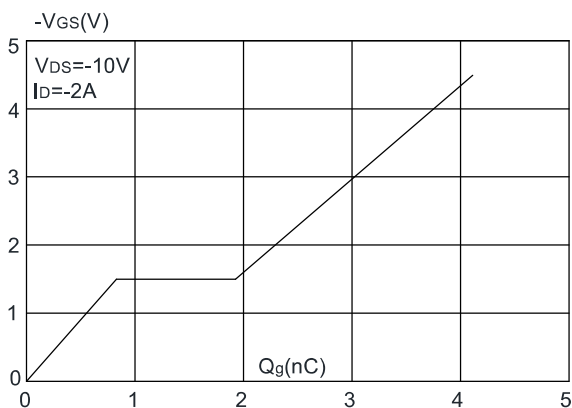
**Figure 3: On-resistance vs. Drain Current**



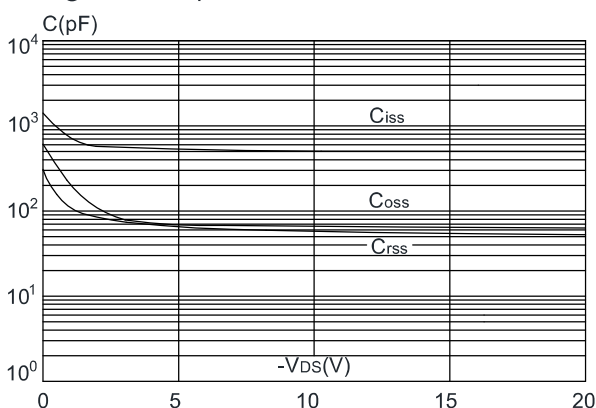
**Figure 4: Body Diode Characteristics**



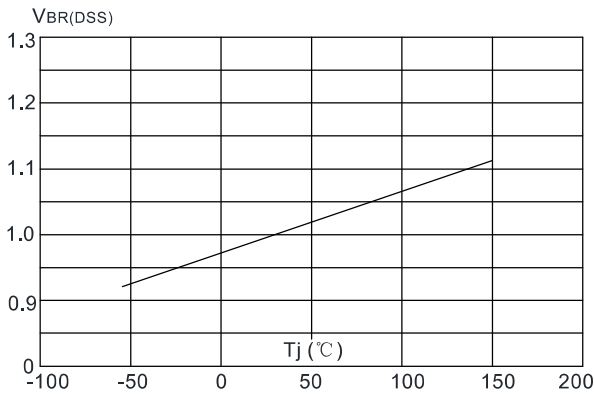
**Figure 5: Gate Charge Characteristics**



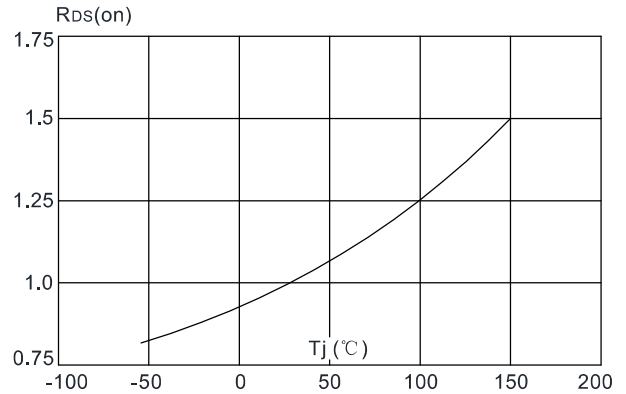
**Figure 6: Capacitance Characteristics**



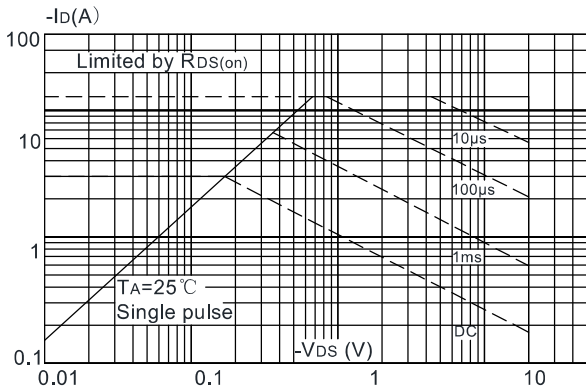
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



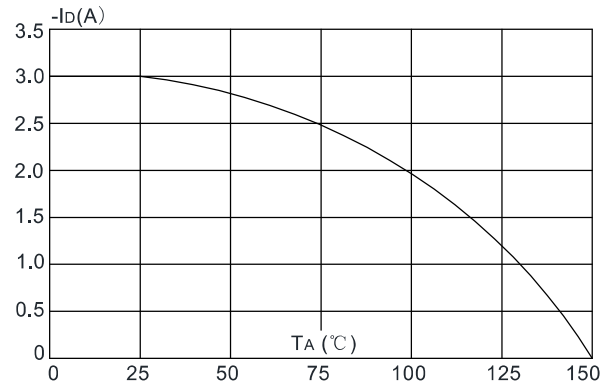
**Figure 8:** Normalized on Resistance vs. Junction Temperature



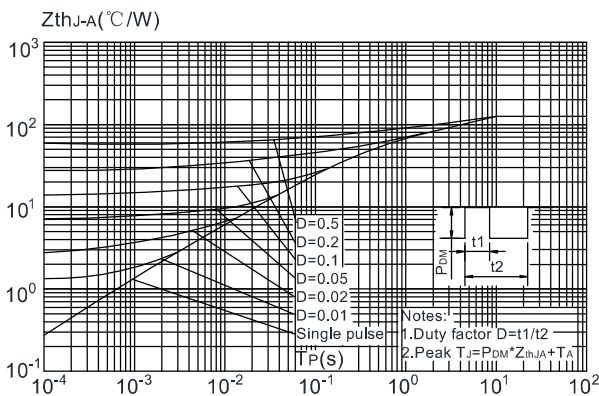
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature



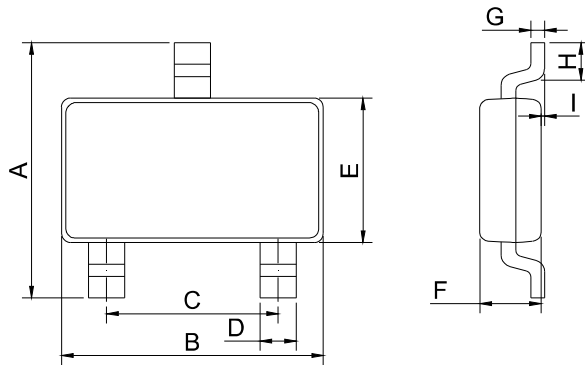
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



# AP2301

P-Channel Enhancement Mosfet

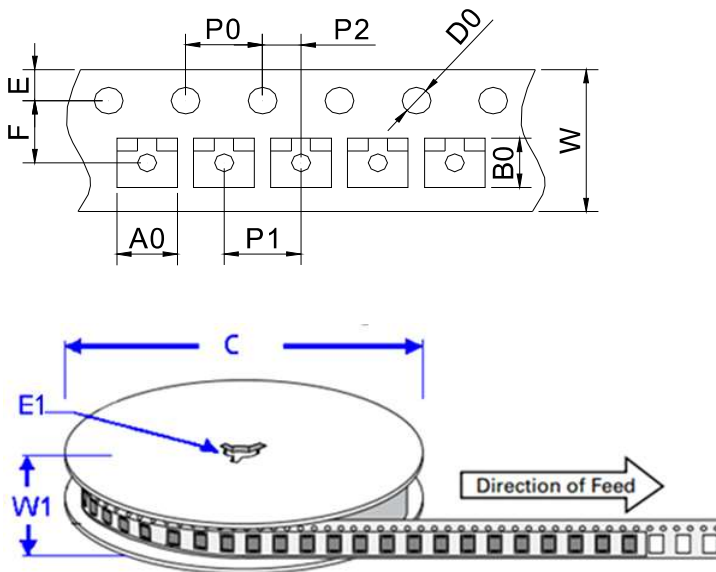
## SOT-23 Package Information



SOT-23

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.30	2.40	2.50	0.091	0.095	0.098
B	2.80	2.90	3.00	0.110	0.114	0.118
C	1.90 REF			0.075 REF		
D	0.35	0.40	0.45	0.014	0.016	0.018
E	1.20	1.30	1.40	0.047	0.051	0.055
F	0.90	1.00	1.10	0.035	0.039	0.043
G		0.10	0.15		0.004	0.006
H	0.20			0.008		
I	0		0.10	0		0.004

## Package Information-SOT-23



Ref.	Dimensions	
	Millimeters	Inches
A0	3.15 ± 0.3	0.124 ± 0.012
B0	2.77 ± 0.3	0.109 ± 0.012
C	178	7.0
D0	1.50 ± 0.1	0.059 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3 ± 0.3	0.524 ± 0.012
F	3.5 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.00 ± 0.2	0.315 ± 0.008
W1	11.5 ± 1.0	0.453 ± 0.039

**Revision History**

Revision	Release	Remark
V1.0	2023/04/10	Initial Release

**Disclaimer**

The information given in this document describes the independent performance of the product, but similar performance is not guaranteed under other working conditions, and cannot be guaranteed when installed with other products or equipment. To achieve the required performance of the product in actual scenarios, the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings, operating conditions, or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability. Customers using or selling these products for use in medical, life-saving, or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.