

AP2302B

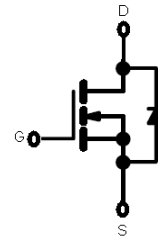
N-Channel Enhancement Mosfet

AIPOWER

DATA SHEET

Features

- 20V,2.8A
 $R_{DS(ON)} < 55m\Omega @ V_{GS}=4.5V$ TYP:45m Ω
 $R_{DS(ON)} < 80m\Omega @ V_{GS}=2.5V$ TYP:62m Ω



Schematic diagram

- Advanced trench cell design

Applications

- Load Switch for Portable Devices
- DC/DC Converter



SOT-23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
2302	AP2302B	SOT-23	-	-	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}	± 10	V
Continuous Drain Current ($T_a=25^\circ\text{C}$) ⁽¹⁾	I_D	2.8	A
Continuous Drain Current ($T_a=100^\circ\text{C}$) ⁽¹⁾	I_D	2.0	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	12	A
Drain Power Dissipation	P_D	0.77	W
Thermal Resistance- Junction to Ambient ⁽²⁾	$R_{\theta JA}$	162	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

Notes:

1. Pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$
2. Mounted on Large Heat Sink
3. Limited by bonding wire

MOSFET ELECTRICAL CHARACTERISTICS(T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D =250μA	20	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =20V, V _{GS} = 0V	-	-	1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ± 10V, V _{DS} = 0V	-	-	±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.3	0.7	1.0	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =4.5V, I _D =2.8A	-	45	55	mΩ
		V _{GS} =2.5V, I _D =2A	-	62	80	mΩ
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V, f =1.0MHz	-	184	-	pF
Output Capacitance	C _{oss}		-	38	-	
Reverse Transfer Capacitance	C _{rss}		-	28	-	
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} =10V, I _D =2.3A, R _G =5.5Ω, V _G =4.5V	-	2.3	-	ns
Turn-on rise time	t _r		-	3.1	-	
Turn-off delay time	t _{d(off)}		-	9.2	-	
Turn-off fall time	t _f		-	2.5	-	
Total Gate Charge	Q _g	V _{DS} =10V, I _D =2.8A, V _{GS} =4.5V	-	2.7	-	nC
Gate-Source Charge	Q _{gs}		-	0.4	-	
Gate-Drain Charge	Q _{gd}		-	0.5	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V _{SD}	T _C =25°C, V _{GS} =0V, I _S =0.94A	-	0.76	1.2	V
Diode Forward current	I _S	T _C =25°C	-	-	2.8	A

Notes:

- a) Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%
- b) Guaranteed by design, not subject to production testing

Test Circuit

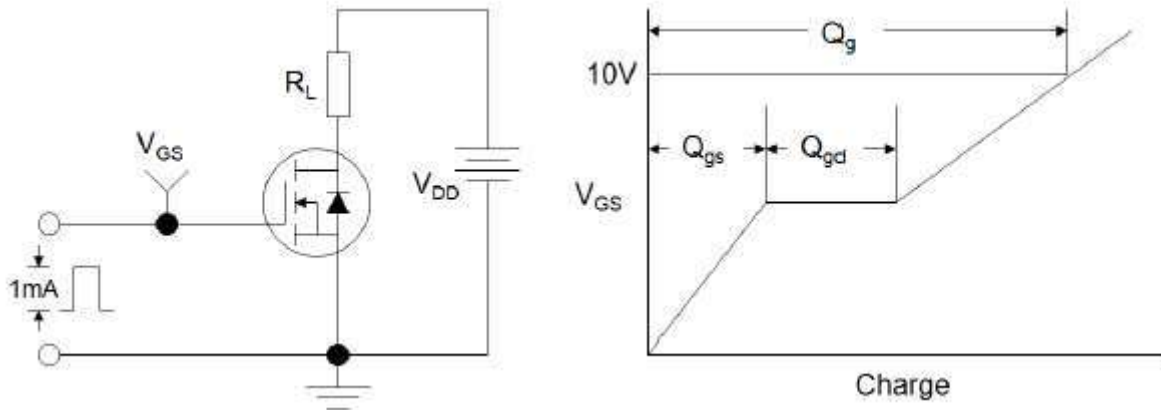


Figure1:Gate Charge Test Circuit & Waveform

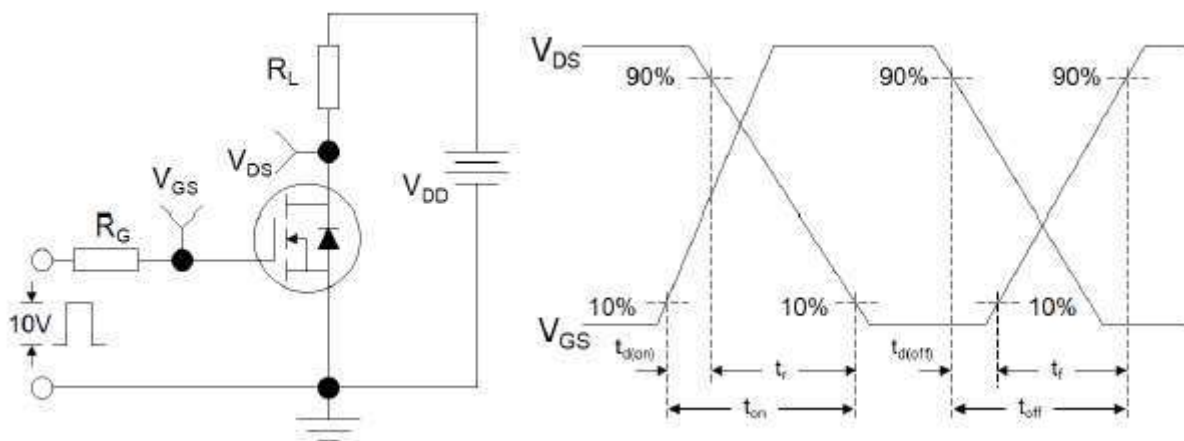


Figure 2: Resistive Switching Test Circuit & Waveforms

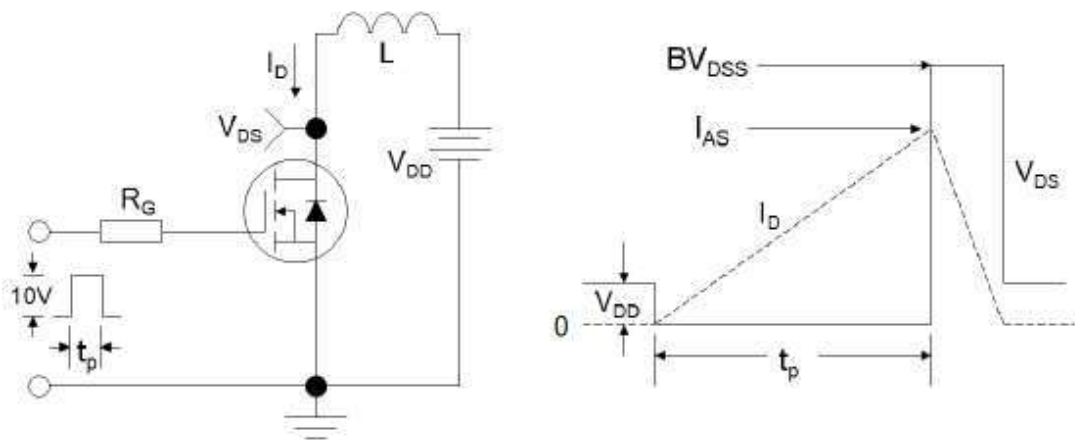


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Typical Performance Characteristics

Figure 1: Output Characteristics

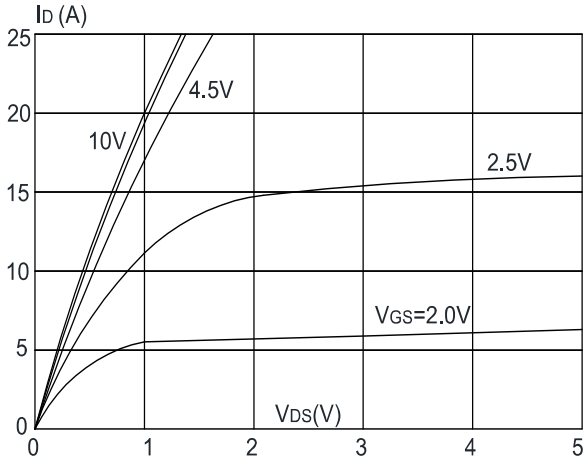


Figure 2: Typical Transfer Characteristics

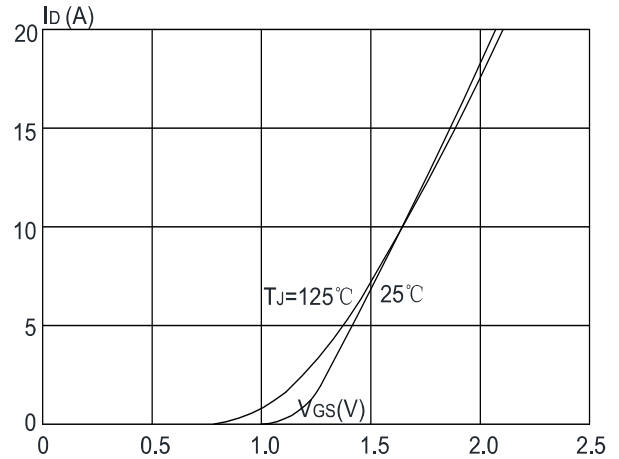


Figure 3: On-resistance vs. Drain Current

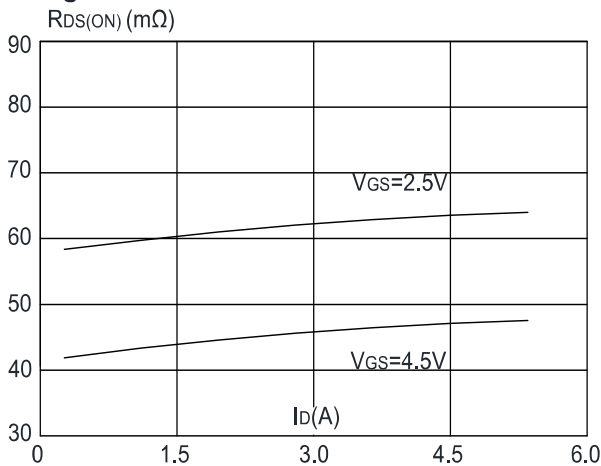


Figure 4: Body Diode Characteristics

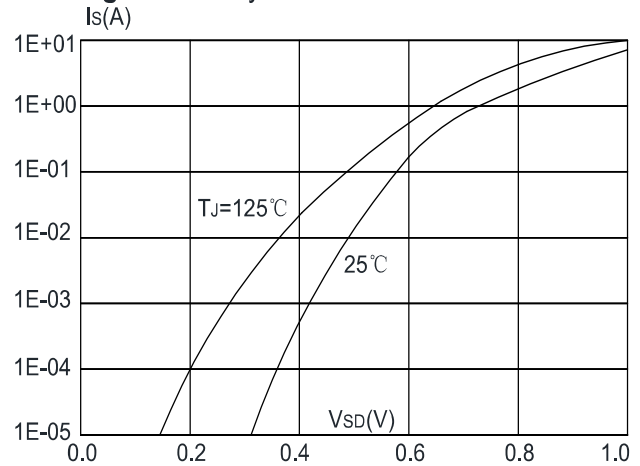


Figure 5: Gate Charge Characteristics

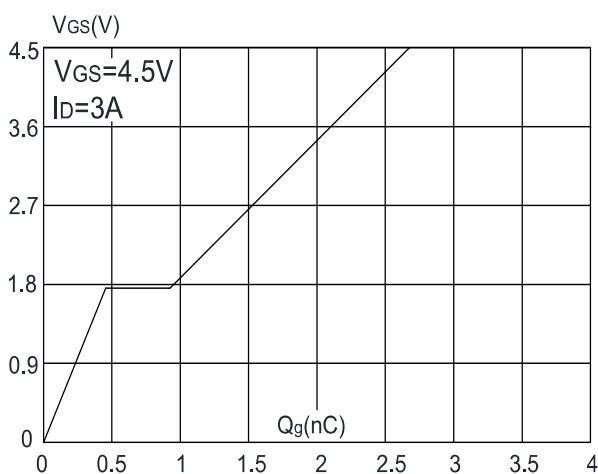
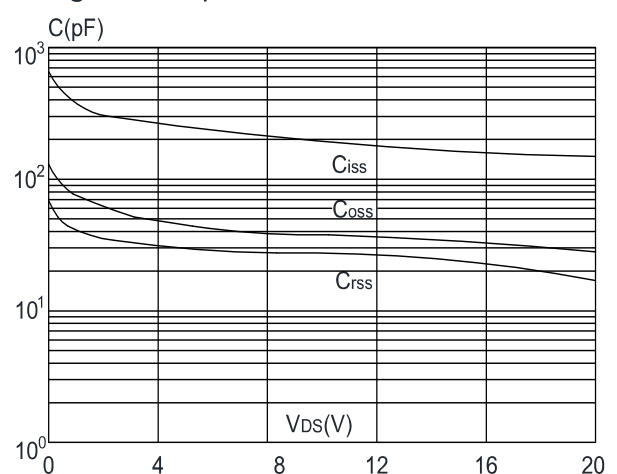


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

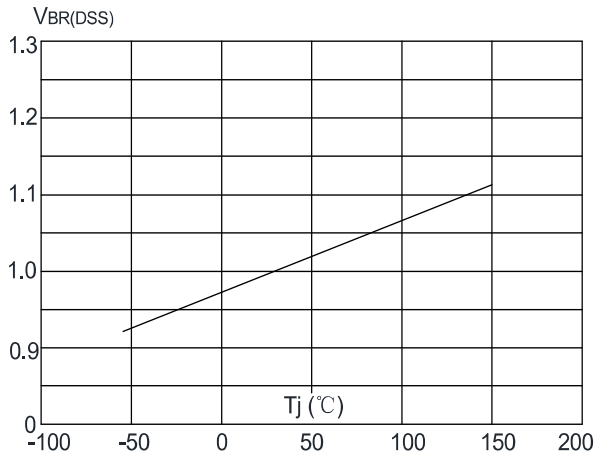


Figure 8: Normalized on Resistance vs. Junction Temperature

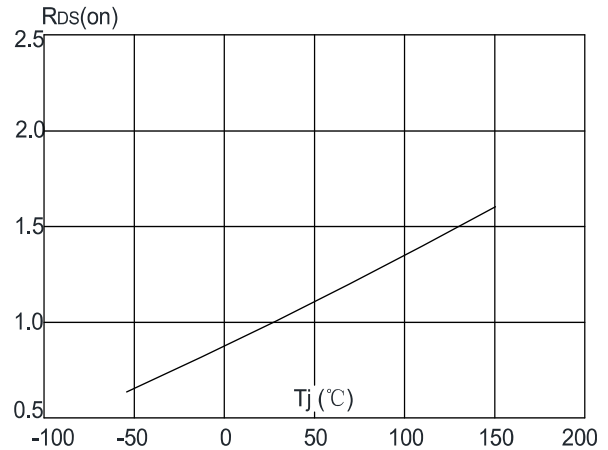


Figure 9: Maximum Safe Operating Area

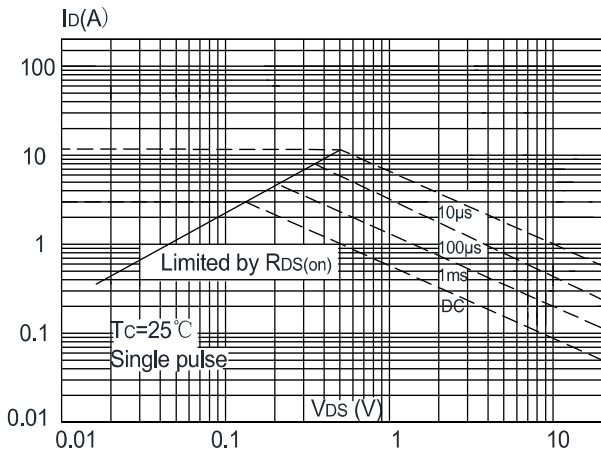


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

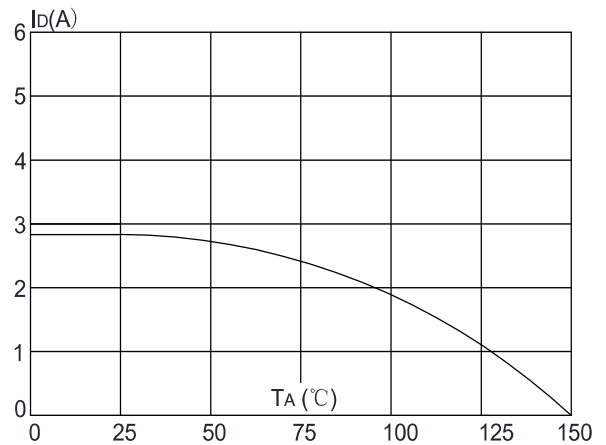
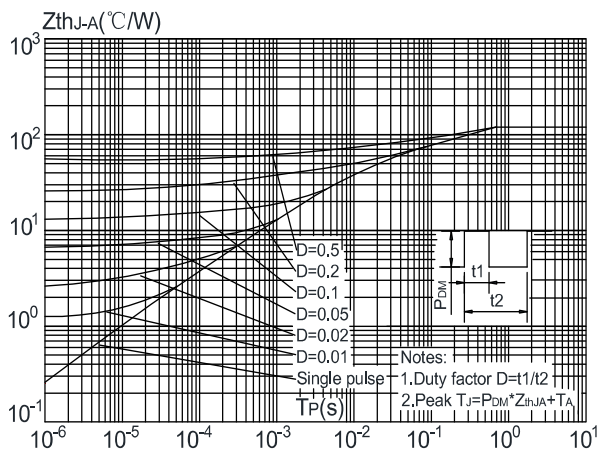


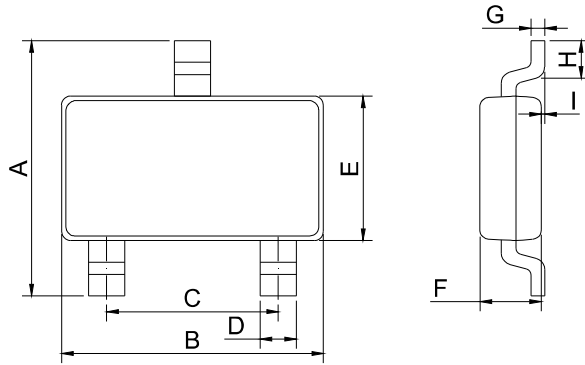
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



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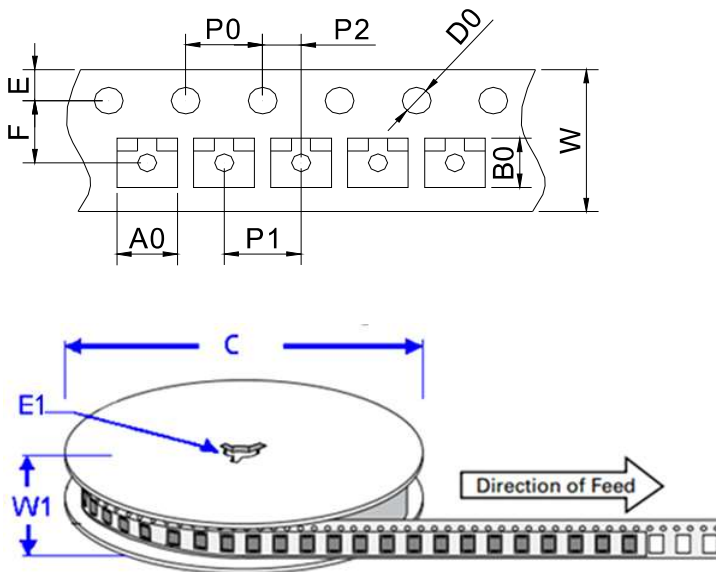
SOT-23 Package Information



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.

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