

P-Channel Enhancement Mode Power MOSFET

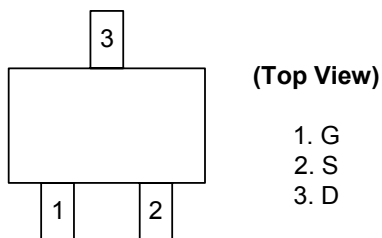
■ Features

- Simple Drive Requirement
- Small Package Outline
- Surface Mount Device

■ Product Summary

BV _{DSS} (V)	R _{DS(ON)} (mΩ)	I _D (A)
-20	130	-2.6

■ Pin Assignments



■ General Description

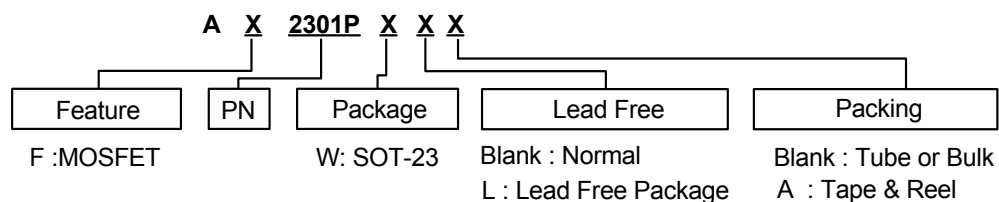
The advanced power MOSFET provides the designer with the best combination of fast switching, low on-resistance and cost-effectiveness.

The SOT-23 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

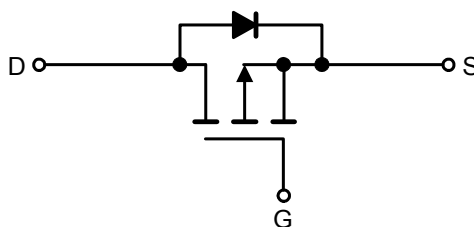
■ Pin Descriptions

Pin No.	Pin Name	Description
1	G	Gate
2	S	Source
3	D	Drain

■ Ordering information



■ Block Diagram





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■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Continuous Drain Current (Note 1)	$T_A=25^\circ\text{C}$	-2.6
		$T_A=70^\circ\text{C}$	-2.1
I_{DM}	Pulsed Drain Current (Note 2, 3)	-10	A
P_D	Total Power Dissipation	$T_A=25^\circ\text{C}$	1.38
	Linear Derating Factor		0.01
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to +150	$^\circ\text{C}$

■ Thermal Data

Symbol	Parameter	Limit	Units
$R_{\theta JA}$	Thermal Resistance Junction-Ambient (Note 1) Max.	90	$^\circ\text{C/W}$

■ Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu\text{A}$	-20	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	-	-0.1	-	$\text{V}/^\circ\text{C}$
$R_{DS(ON)}$	Drain-Source On-State Resistance (Note 3)	$V_{GS}=-5V, I_D=-2.8\text{A}$	-	-	130	m Ω
		$V_{GS}=-2.8V, I_D=-2.0\text{A}$	-	-	190	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-0.5	-	-	V
g_{fs}	Forward Transconductance	$V_{DS}=-5V, I_D=-2.8\text{A}$	-	4.4	-	S
I_{DSS}	Drain-Source Leakage Current	$T_J=25^\circ\text{C}$ $V_{DS}=-20V, V_{GS}=0V$	-	-	-1	uA
		$T_J=70^\circ\text{C}$ $V_{DS}=-16V, V_{GS}=0V$	-	-	-10	
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 12V$	-	-	± 100	nA
Q_g	Total Gate Charge (Note 3)	$V_{DS}=-6V, I_D=-2.8\text{A}$, $V_{GS}=-5V$	-	5.2	10	nC
Q_{gs}	Gate-Source Charge		-	1.36	-	
Q_{gd}	Gate-Drain ("Miller") Charge		-	0.6	-	
$t_{d(on)}$	Turn-On Delay Time (Note 3)	$V_{DS}=-15V, R_D=15\Omega$, $I_D=-1\text{A}, V_{GS}=-10V$, $R_G=6\Omega$	-	5.2	-	nS
t_r	Turn-On Rise Time		-	9.7	-	
$t_{d(off)}$	Turn-Off Delay Time		-	19	-	
t_f	Turn-Off Fall-Time		-	29	-	
C_{iss}	Input Capacitance	$V_{DS}=-6V, V_{GS}=0V$, $f=1.0\text{MHz}$	-	295	-	pF
C_{oss}	Output Capacitance		-	170	-	
C_{rss}	Reverse Transfer Capacitance		-	65	-	

■ Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current (Body Diode)	$V_D=V_G=0V, V_S=-1.2V$	-	-	-1	A
I_{SM}	Pulsed Source Current (Body Diode) (Note 2)		-	-	-10	A
V_{SD}	Forward On Voltage (Note 3)	$T_J=25^\circ\text{C}, I_S=-1.6\text{A}$, $V_{GS}=0V$	-	-	1.2	V

Note 1: Surface mounted on 1 in² copper pad of FR4 board; 270 $^\circ\text{C/W}$ when mounted on min. copper pad.

Note 2: Pulse width limited by Max. junction temperature.

Note 3: Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

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■ Typical Performance Characteristics

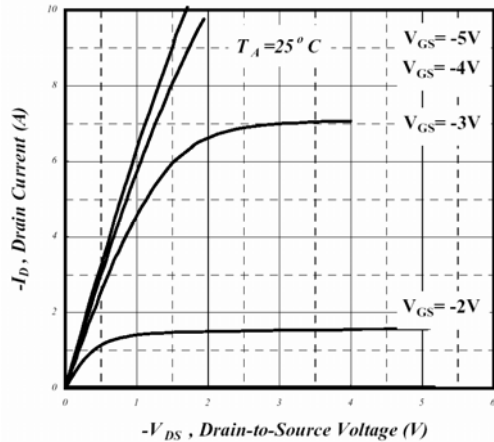


Fig 1. Typical Output Characteristics

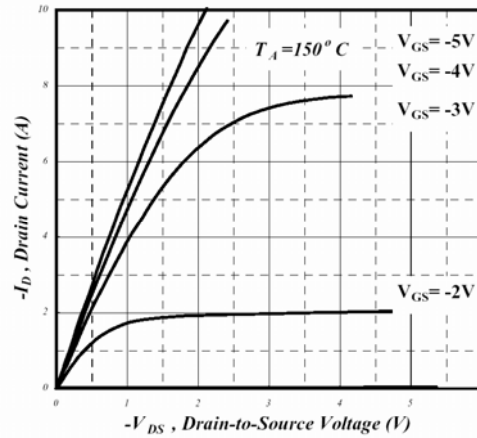


Fig 2. Typical Output Characteristics

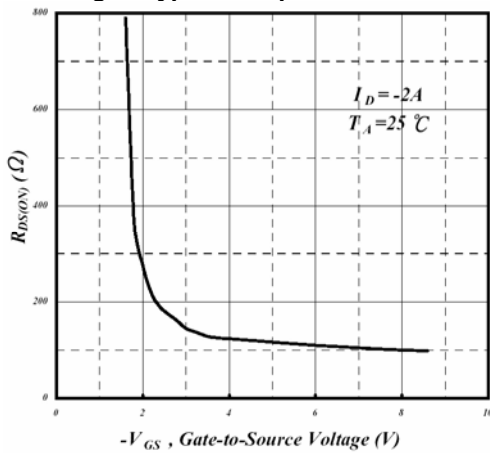


Fig 3. On-Resistance v.s. Gate Voltage

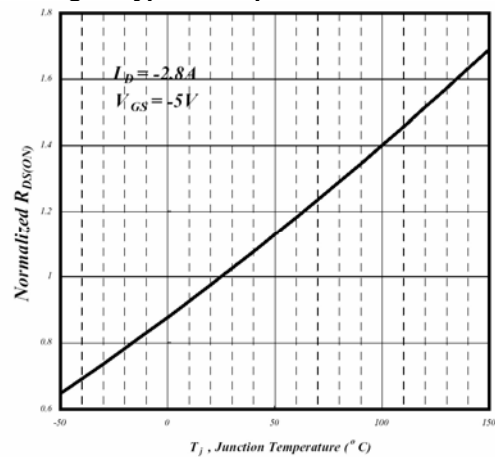


Fig 4. Normalized On-Resistance v.s. Junction Temperature

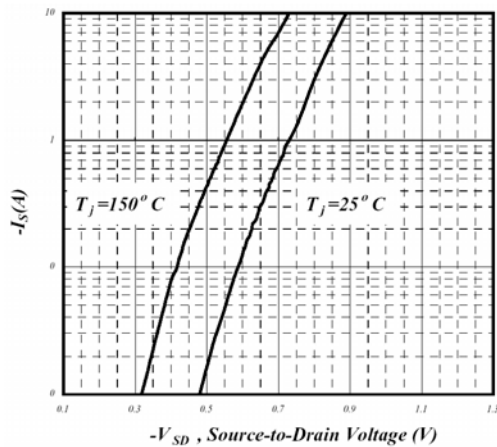


Fig 5. Forward Characteristic of Reverse Diode

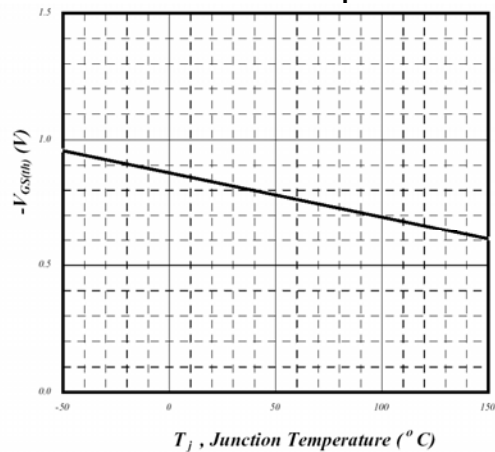


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

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■ Typical Performance Characteristics (Continued)

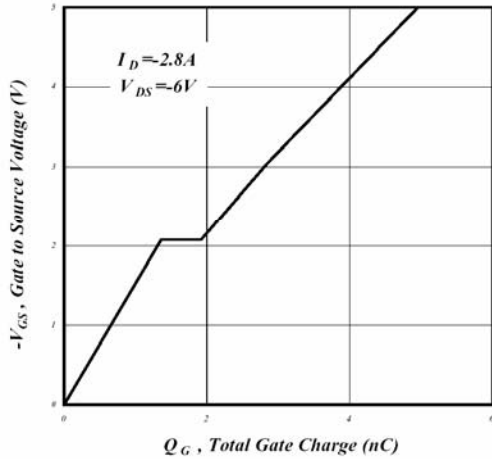


Fig 7. Gate Charge Characteristics

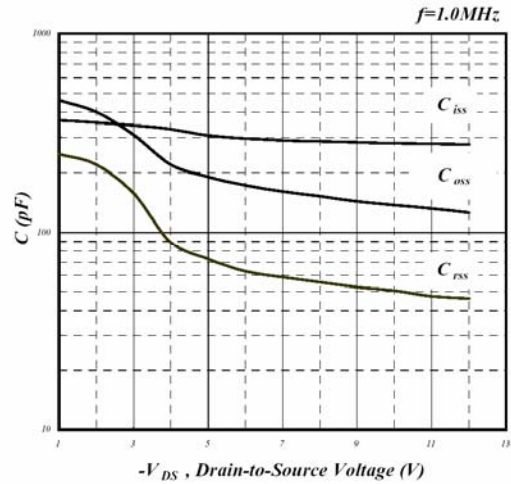


Fig 8. Typical Capacitance Characteristics

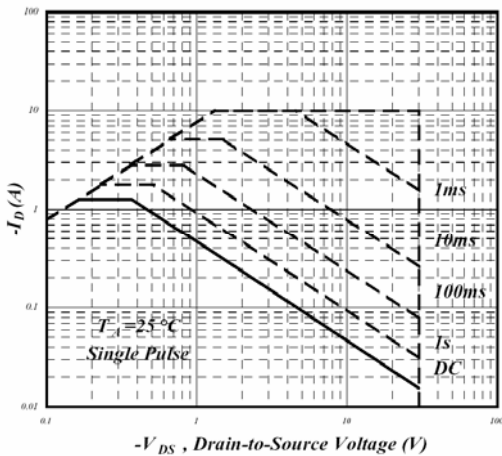


Fig 9. Maximum Safe Operating Area

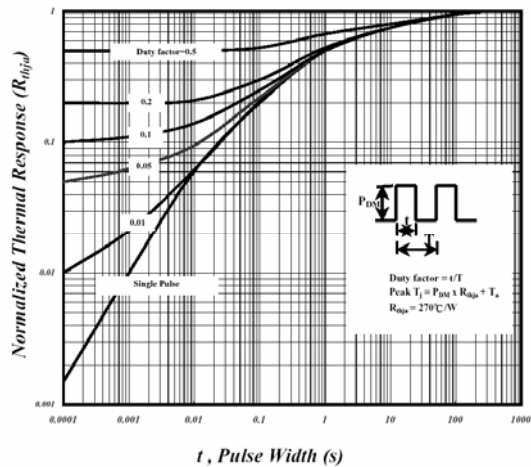


Fig 10. Effective Transient Thermal Impedance

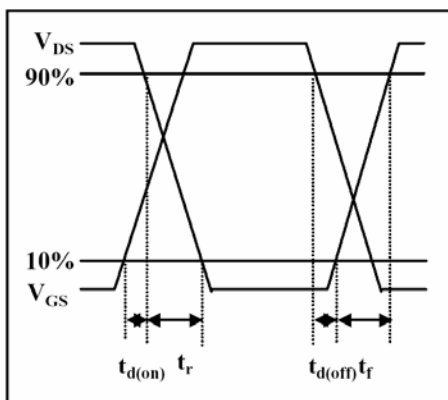


Fig 11. Switching Time Waveform

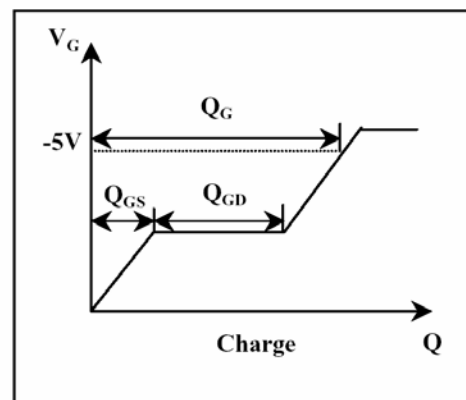


Fig 12. Gate Charge Waveform

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■ Marking Information

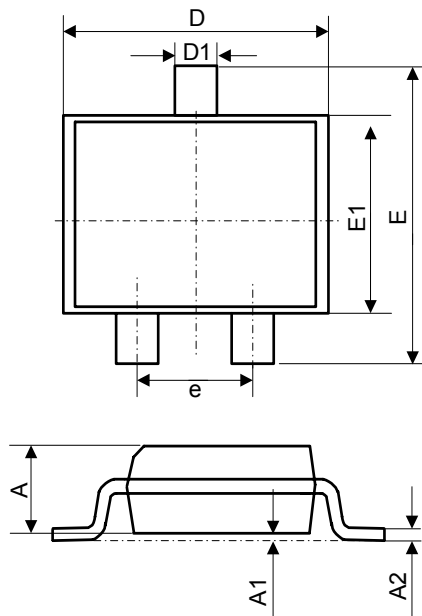


Appendix

Part Number	Package	Device Code
AF2301P	SOT-23	01

■ Package Information

Package Type: SOT-23



1. All Dimensions Are in Millimeters.
2. Dimension Does Not Include Mold Protrusions.

Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	1.00	1.15	1.30
A1	0.00	-	0.10
A2	0.10	0.15	0.20
D	2.70	2.90	3.10
D1	0.30	0.40	0.50
e	1.70	2.00	2.30
E	2.40	2.65	2.90
E1	1.40	1.50	1.60