



# AF2301P

## 20V P-Channel Enhancement Mode MOSFET

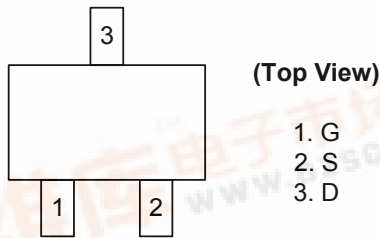
### ■ Features

- Advanced trench process technology
- High density cell design for ultra low on-resistance
- Excellent thermal and electrical capabilities
- Compact and low profile SOT-23 package

### ■ Product Summary

$V_{DS} = -20V$   
 $R_{DS(on)}, V_{GS}@-4.5V, I_{DS}@-2.8A} = 130m\Omega$ .  
 $R_{DS(on)}, V_{GS}@-2.5V, I_{DS}@-2.0A} = 190m\Omega$ .

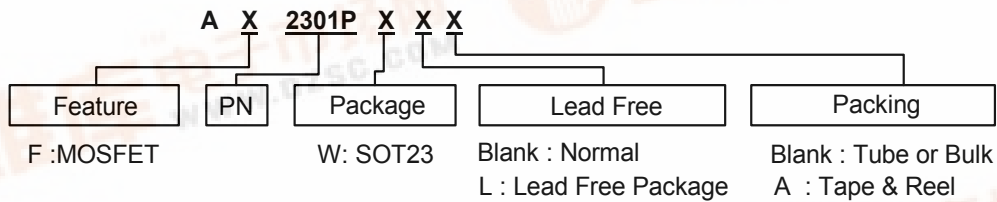
### ■ Pin Assignments



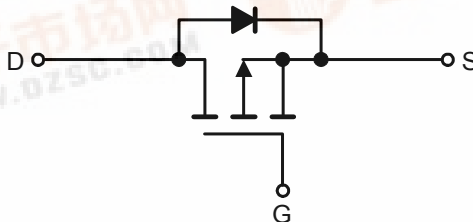
### ■ Pin Descriptions

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 ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 8$	V
$I_D$	Continuous Drain Current	-2.3	A
$I_{DM}$	Pulsed Drain Current	-10	A
$P_D$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	1.25
		$T_A=70^\circ\text{C}$	0.8
$T_J$	Operating Junction Temperature	+150	$^\circ\text{C}$
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

### ■ Thermal Performance

Symbol	Parameter	Limit	Units
$T_L$	Lead Temperature (1/8" from case)	5	S
$R_{\theta JA}$	Junction to Ambient Thermal Resistance (PCB mounted)	100	$^\circ\text{C/W}$

Note: Surface mounted on FR4 board  $t \leq 5$  sec.

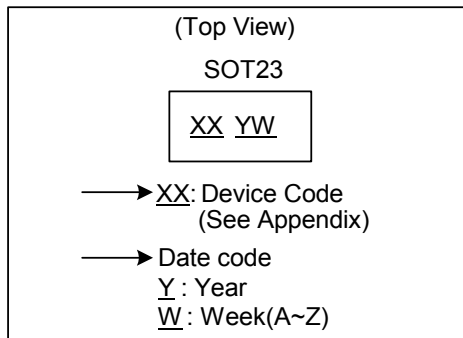
### ■ Electrical Characteristics Rate $I_D=-2.3\text{A}$ , ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=-250\mu\text{A}$	-20	-	-	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=-4.5\text{V}, I_D=-2.8\text{A}$	-	95	130	m $\Omega$
		$V_{GS}=-2.5\text{V}, I_D=-2.0\text{A}$	-	122	190	
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-0.45	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-16\text{V}, V_{GS}=0\text{V}$	-	-	-1.0	$\mu\text{A}$
$I_{GSS}$	Gate Body Leakage	$V_{GS}=\pm 8\text{V}, V_{DS}=0\text{V}$	-	-	$\pm 100$	nA
$I_{D(ON)}$	On-State Drain Current	$V_{DS}=-5\text{V}, V_{GS}=-10\text{V}$	-6	-	-	A
$g_{fs}$	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-2.8\text{A}$	-	6.5	-	S
<b>Dynamic</b>						
$Q_g$	Total Gate Charge	$V_{DS}=-6\text{V}, I_D=-2.8\text{A}, V_{GS}=-4.5\text{V}$	-	5.4	10	nC
$Q_{gs}$	Gate-Source Charge		-	0.8	-	
$Q_{gd}$	Gate-Drain Charge		-	1.1	-	
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-6\text{V}, R_L=6\Omega, I_D=-1\text{A}, V_{GEN}=-4.5\text{V}, R_G=6\Omega$	-	5	25	nS
$t_r$	Turn-On Rise Time		-	19	60	
$t_{d(off)}$	Turn-Off Delay Time		-	95	110	
$t_f$	Turn-Off Fall-Time		-	65	80	
$C_{iss}$	Input Capacitance	$V_{DS}=-6\text{V}, V_{GS}=0\text{V}, f=1.0\text{MHz}$	-	447	-	pF
$C_{oss}$	Output Capacitance		-	127	-	
$C_{rss}$	Reverse Transfer Capacitance		-	80	-	
<b>Source-Drain Diode</b>						
$I_S$	Max. Diode Forward Current		-	-	-1.6	A
$V_{SD}$	Diode Forward Voltage	$I_S=-1.6\text{A}, V_{GS}=0\text{V}$	-	-0.8	-1.2	V

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

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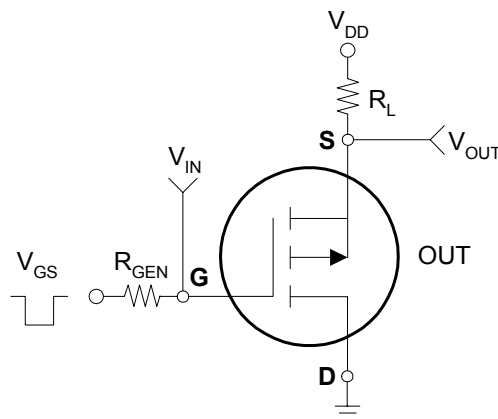
### ■ Marking Information



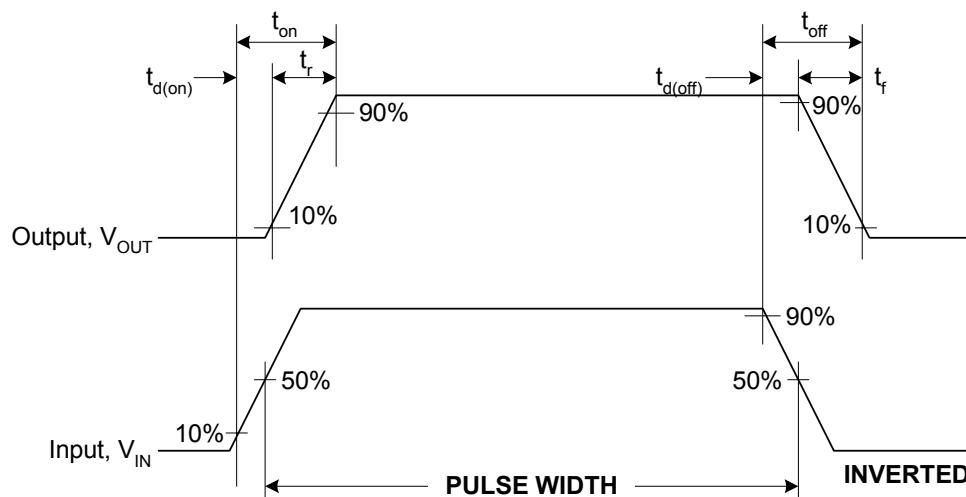
### Appendix

Part Number	Package	Device Code
AF2301P	SOT23-3	01

### ■ Switching Test Circuit

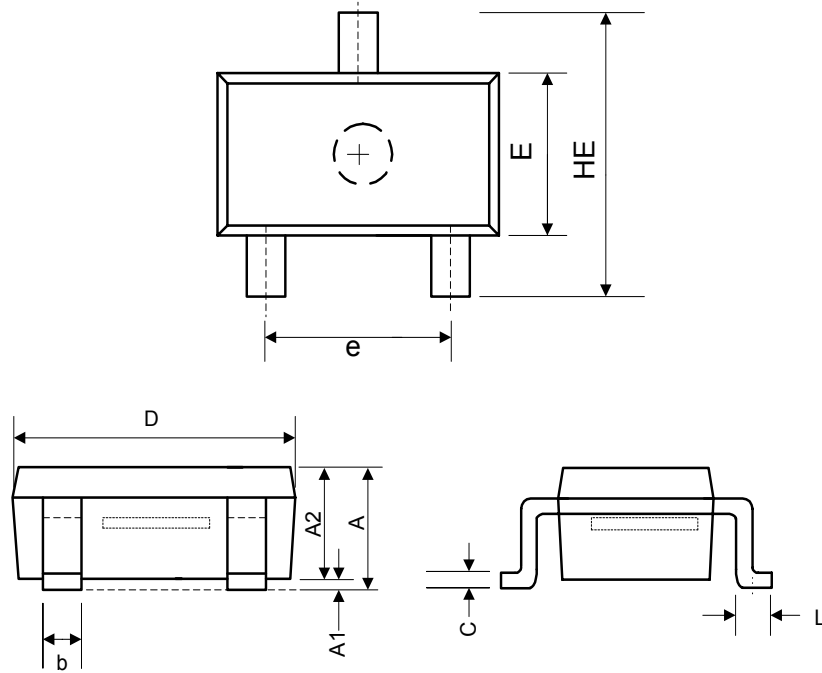


### ■ Switching Waveforms



## 20V P-Channel Enhancement Mode MOSFET

### ■ Package Information



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.00	1.20	1.40	0.039	0.047	0.055
A1	0.00	-	0.10	0.000	-	0.004
A2	1.00	1.15	1.30	0.039	0.045	0.051
b	0.35	-	0.50	0.014	-	0.020
C	0.10	0.175	0.25	0.004	0.007	0.010
D	2.70	2.90	3.10	0.106	0.114	0.122
E	1.40	1.60	1.80	0.055	0.063	0.071
e	1.70	2.00	2.30	0.067	0.079	0.091
HE	2.40	2.70	3.00	0.094	0.106	0.118
L	0.30	-	0.55	0.012	-	0.022