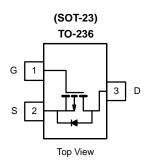
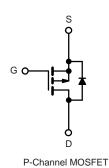


# AFP2311S23RG-VB Datasheet

# P-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY					
V <sub>DS</sub> (V)	$R_{DS(on)}$ ( $\Omega$ ) Typ.	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)		
	0.046 at V <sub>GS</sub> = - 10 V	- 5.6			
- 30	0.049 at V <sub>GS</sub> = - 6 V	- 5	11.4 nC		
	0.054 at V <sub>GS</sub> = - 4.5 V	-4.5			





# **APPLICATIONS**

**FEATURES** 

• For Mobile Computing

 Trench Power MOSFET 100 % R<sub>g</sub> Tested

- Load Switch
- Notebook Adaptor Switch
- DC/DC Converter



Parameter		Symbol	Limit	Unit	
Drain-Source Voltage		V <sub>DS</sub>	- 30	V	
Gate-Source Voltage		$V_{GS}$	± 20		
	T <sub>C</sub> = 25 °C		- 5.6		
Continuous Proin Current (T. 150 °C)	T <sub>C</sub> = 70 °C	1 .	- 5.1		
Continuous Drain Current (T <sub>J</sub> = 150 °C)	T <sub>A</sub> = 25 °C	l <sub>D</sub>	- 5.4 <sup>b,c</sup>		
	T <sub>A</sub> = 70 °C		- 4.3 <sup>b,c</sup>	Α	
Pulsed Drain Current (t = 100 µs)		I <sub>DM</sub>	- 18		
Continuo Source Drain Diada Current	T <sub>C</sub> = 25 °C	- I <sub>S</sub>	- 2.1		
Continous Source-Drain Diode Current	T <sub>A</sub> = 25 °C		- 1 <sup>b,c</sup>		
	T <sub>C</sub> = 25 °C		2.5		
Maximum Power Dissipation	T <sub>C</sub> = 70 °C		1.6	I w	
	T <sub>A</sub> = 25 °C	P <sub>D</sub>	1.25 <sup>b,c</sup>	- vv	
	T <sub>A</sub> = 70 °C		0.8 <sup>b,c</sup>	1	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>b,d</sup>	t ≤ 5 s	R <sub>thJA</sub>	75	100	°C/W	
Maximum Junction-to-Foot (Drain)	Steady State	R <sub>thJF</sub>	40	50	C/VV	

#### Notes:

- a. Based on  $T_C$  = 25 °C. b. Surface mounted on 1" x 1" FR4 board.
- c. t = 5 s.
- d. Maximum under steady state conditions is 166 °C/W.

服务热线:400-655-8788

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Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0 \text{ V}, I_D = -250 \mu\text{A}$				V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	I <sub>D</sub> = - 250 μA		- 19		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	1 <sub>D</sub> = - 230 μΑ		4		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}$ , $I_{D} = -250 \mu A$	- 0.5		- 2.0	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zoro Coto Voltogo Droin Current	1	V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V			- 1	μА
Zero Gate Voltage Drain Current	IDSS	V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			- 5	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \le -5 \text{ V}, V_{GS} = -10 \text{ V}$	- 2.5			Α
		$V_{GS} = -10 \text{ V}, I_D = -4.4 \text{ A}$		0.046		
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =- 6 V, I <sub>D</sub> = - 4 A		0.049		Ω
		V <sub>GS</sub> =- 4.5 V, I <sub>D</sub> = - 3.6 A		0.054		
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 3.4 A		18		S
Dynamic <sup>b</sup>				ļ.	ļ.	
Input Capacitance	C <sub>iss</sub>			1295		
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		150		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			130		i .
· ·		V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 5.4 A		24	36	
Total Gate Charge	Q <sub>g</sub> Q <sub>gs</sub>			11.4	17	nC
Gate-Source Charge		V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 5.4 A		3.4		
Gate-Drain Charge	Q <sub>gd</sub>			3.8		
Gate Resistance	R <sub>g</sub>	f = 1 MHz	1.5	7.7	15.4	Ω
Turn-On Delay Time	t <sub>d(on)</sub>			13	20	
Rise Time	t <sub>r</sub>	$V_{DD} = -15 \text{ V}, R_{L} = 3.5 \Omega$		4	8	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ - 4.3 A, $V_{GEN}$ = - 10 V, $R_g$ = 1 $\Omega$		38	57	
Fall Time	t <sub>f</sub>	İ		6	12	
Turn-On Delay Time	t <sub>d(on)</sub>			28	42	ns
Rise Time	t <sub>r</sub>	$V_{DD} = -15 \text{ V}, R_{L} = 3.5 \Omega$		16	24	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong -4.3 \text{ A}, V_{GEN} = -4.5 \text{ V}, R_g = 1 \Omega$		30	45	
Fall Time	t <sub>f</sub>	İ		10	20	
<b>Drain-Source Body Diode Characteristic</b>	s			l		
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			- 2.1	
Pulse Diode Forward Current (t = 100 µs)					- 80	A
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 4.3 A, V <sub>GS</sub> = 0 V		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>			15	23	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	1 4 2 A 41/44 400 A/44 T 0500		7	14	nC
Reverse Recovery Fall Time	t <sub>a</sub>	$I_F = -4.3 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, T_J = 25 ^{\circ}\text{C}$		8		ns
Reverse Recovery Rise Time	t <sub>b</sub>	†		7		

#### Notes

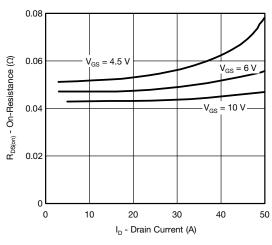
- a. Pulse test; pulse width  $\leq$  300 µs, duty cycle  $\leq$  2 %.
- b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

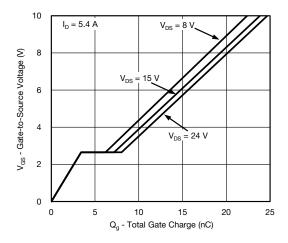




#### **Output Characteristics**



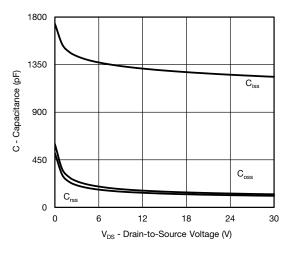
On-Resistance vs. Drain Current



**Gate Charge** 



**Transfer Characteristics** 



Capacitance

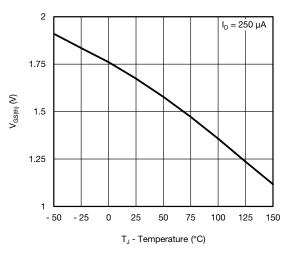


On-Resistance vs. Junction Temperature

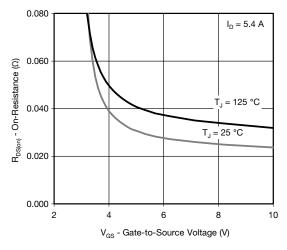




Source-Drain Diode Forward Voltage



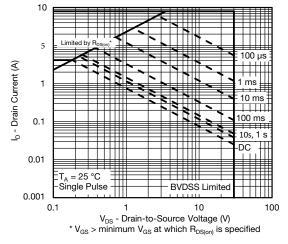
**Threshold Voltage** 



On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power (Junction-to-Ambient)

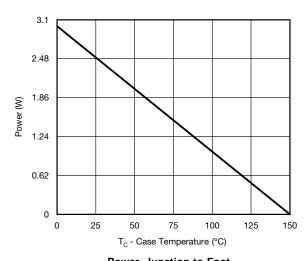


Safe Operating Area, Junction-to-Ambient

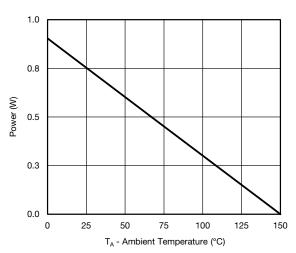




#### **Current Derating\***



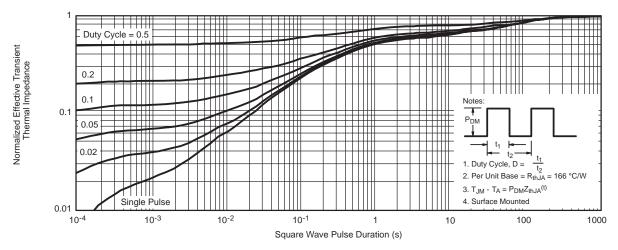




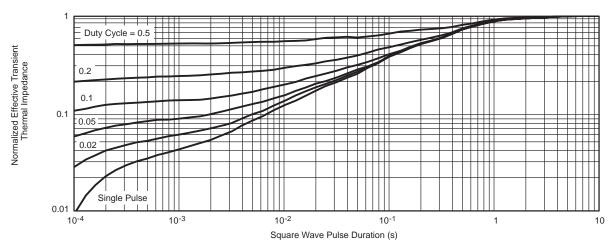
Power, Junction-to-Ambient

<sup>\*</sup> The power dissipation  $P_D$  is based on  $T_{J(max.)}$  = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.





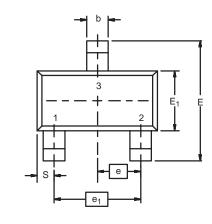
#### Normalized Thermal Transient Impedance, Junction-to-Ambient



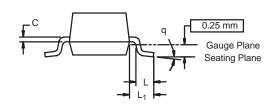
Normalized Thermal Transient Impedance, Junction-to-Foot



# SOT-23 (TO-236): 3-LEAD







Dim -	MILLIM	IETERS	INCHES		
	Min	Max	Min	Max	
Α	0.89	1.12	0.035	0.044	
A <sub>1</sub>	0.01	0.10	0.0004	0.004	
A <sub>2</sub>	0.88	1.02	0.0346	0.040	
b	0.35	0.50	0.014	0.020	
С	0.085	0.18	0.003	0.007	
D	2.80	3.04	0.110	0.120	
E	2.10	2.64	0.083	0.104	
E <sub>1</sub>	1.20	1.40	0.047	0.055	
е	0.95 BSC		0.0374 Ref		
e <sub>1</sub>	1.90 BSC		0.0748 Ref		
L	0.40	0.60	0.016	0.024	
L <sub>1</sub>	0.64 Ref		0.025 Ref		
S	0.50 Ref		0.020 Ref		
q	3°	8°	3°	8°	

ECN: S-03946-Rev. K, 09-Jul-01

DWG: 5479



#### **RECOMMENDED MINIMUM PADS FOR SOT-23**



Recommended Minimum Pads Dimensions in Inches/(mm)



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