HEWLETT® PACKARD

0.5 – 12 GHz Low Noise Gallium Arsenide FET

Technical Data

ATF-10236

Features

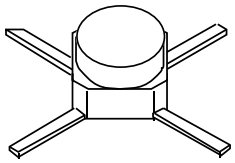
- **Low Noise Figure:** 0.8 dB Typical at 4 GHz
- **Low Bias:** V_{DS} = 2 V, I_{DS} = 20 mA
- **High Associated Gain:** 13.0 dB Typical at 4 GHz
- **High Output Power:** 20.0 dBm Typical P_{1dB} at 4 GHz
- **Cost Effective Ceramic Microstrip Package**
- **Tape-And-Reel Packaging Option Available** [1]

Description

The ATF-10236 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a cost effective microstrip package. Its low noise figure makes this device appropriate for use in the first and second stages of low noise amplifiers operating in the 0.5-12 GHz frequency range.

This GaAs FET device has a nominal 0.3 micron gate length using airbridge interconnects between drain fingers. Total gate periphery is 500 microns. Proven gold based metallization systems and nitride passivation assure a rugged, reliable device.

36 micro-X Package



Electrical Specifications, T_A = 25°C

Symbol	Parameters and Test Conditions		Units	Min.	Typ.	Max.
NF_O	Optimum Noise Figure: V_{DS} = 2 V, I_{DS} = 25 mA	f = 2.0 GHz f = 4.0 GHz f = 6.0 GHz	dB dB dB		0.6 0.8 1.0	 1.0
G_A	Gain @ NF_O; V_{DS} = 2 V, I_{DS} = 25 mA	f = 2.0 GHz f = 4.0 GHz f = 6.0 GHz	dB dB dB	 12.0 	16.5 13.0 10.5	
$P_{1\,dB}$	Power Output @ 1 dB Gain Compression V_{DS} = 4 V, I_{DS} = 70 mA	f = 4.0 GHz	dBm		20.0	
$G_{1\,dB}$	1 dB Compressed Gain: V_{DS} = 4 V, I_{DS} = 70 mA	f = 4.0 GHz	dB		12.0	
g_m	Transconductance: V_{DS} = 2 V, V_{GS} = 0 V		mmho	80	140	
I_{DSS}	Saturated Drain Current: V_{DS} = 2 V, V_{GS} = 0 V		mA	70	130	180
V_P	Pinchoff Voltage: V_{DS} = 2 V, I_{DS} = 1 mA		V	-3.0	-1.3	-0.8

Note:

1. Refer to PACKAGING section, "Tape-and-Reel Packaging for Surface Mount Semiconductors."

ATF-10236 Absolute Maximum Ratings

Symbol	Parameter	Units	Absolute Maximum[1]
V_{DS}	Drain-Source Voltage	V	+5
V_{GS}	Gate-Source Voltage	V	-4
V_{GD}	Gate-Drain Voltage	V	-7
I_{DS}	Drain Current	mA	I_{DSS}
P_T	Power Dissipation [2,3]	mW	430
T_{CH}	Channel Temperature	°C	175
T_{STG}	Storage Temperature[4]	°C	175

Thermal Resistance:	$\theta_{jc} = 350°C/W; T_{CH} = 150°C$
Liquid Crystal Measurement:	1µm Spot Size[5]

Notes:

1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{CASE\ TEMPERATURE} = 25°C$.
3. Derate at 2.9 mW/°C for $T_{CASE} > 25°C$.
4. Storage above +150°C may tarnish the leads of this package making it difficult to solder into a circuit. After a device has been soldered into a circuit, it may be safely stored up to 175°C.
5. The small spot size of this technique results in a higher, though more accurate determination of θ_{jc} than do alternate methods. See MEASUREMENTS section for more information.

Part Number Ordering Information

Part Number	Devices Per Reel	Reel Size
ATF-10236-TR1	1000	7"
ATF-10236-STR	10	STRIP

For more information, see "Tape and Reel Packaging for Semiconductor Devices."

ATF-10236 Noise Parameters: $V_{DS} = 2\ V, I_{DS} = 25\ mA$

Freq. GHz	NF_O dB	Γ_{opt}		$R_N/50$
		Mag	Ang	
0.5	0.45	0.93	18	0.75
1.0	0.5	0.87	36	0.63
2.0	0.6	0.73	74	0.33
4.0	0.8	0.45	148	0.15
6.0	1.0	0.42	-137	0.12
8.0	1.3	0.49	-80	0.45

ATF-10236 Typical Performance, $T_A = 25°C$

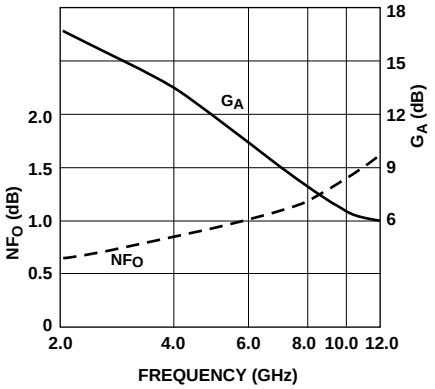


Figure 1. Optimum Noise Figure and Associated Gain vs. Frequency. V_{DS} = 2V, I_{DS} = 25 mA, T_A = 25°C.

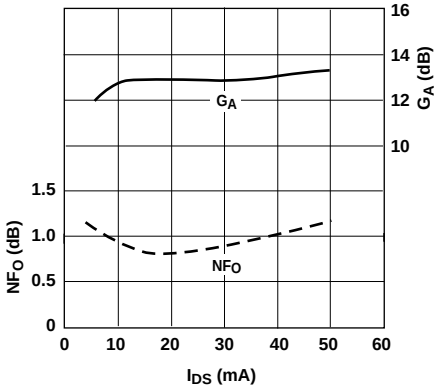


Figure 2. Optimum Noise Figure and Associated Gain vs. I_{DS}. V_{DS} = 2V, f = 4.0 GHz.

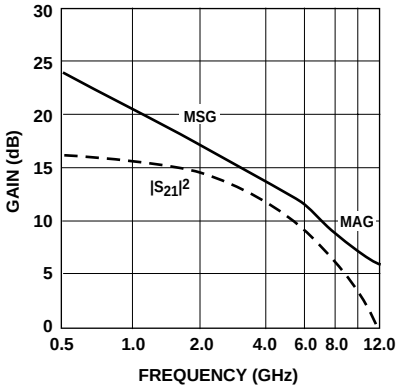


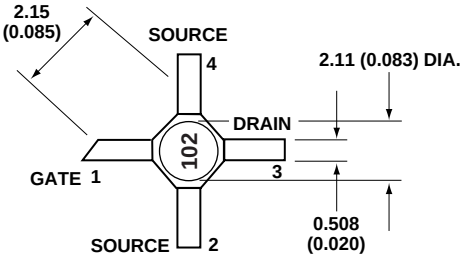
Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{DS} = 2 V, I_{DS} = 25 mA.

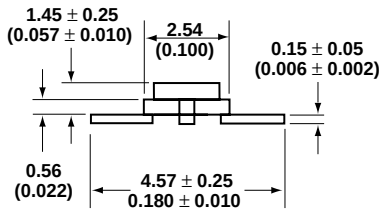
Typical Scattering Parameters, Common Source, $Z_O = 50\ \Omega, T_A = 25°C, V_{DS} = 2\,V, I_{DS} = 25\,mA$

Freq.	S_{11}		S_{21}			S_{12}			S_{22}	
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
0.5	.97	-20	15.1	5.68	162	-32.8	.023	76	.47	-11
1.0	.93	-41	14.9	5.58	143	-26.0	.050	71	.45	-23
2.0	.77	-81	13.6	4.76	107	-21.3	.086	51	.36	-38
3.0	.59	-114	12.2	4.06	80	-18.4	.120	35	.30	-51
4.0	.48	-148	10.9	3.51	52	-16.5	.149	18	.23	-67
5.0	.46	166	9.6	3.03	26	-15.3	.172	3	.10	-67
6.0	.53	125	8.5	2.65	1	-14.5	.189	-14	.09	48
7.0	.62	96	6.9	2.22	-20	-14.4	.191	-28	.24	55
8.0	.71	73	4.9	1.75	-39	-14.5	.189	-41	.37	51
9.0	.75	54	3.3	1.47	-55	-14.7	.184	-46	.46	42
10.0	.78	39	2.1	1.28	-72	-14.9	.180	-59	.51	34
11.0	.82	26	0.3	1.04	-86	-14.9	.179	-71	.54	26
12.0	.84	12	-0.5	0.95	-101	-15.0	.177	-82	.54	17

A model for this device is available in the DEVICE MODELS section.

36 micro-X Package Dimensions





Notes:
1. **Dimensions are in millimeters (inches)**
2. **Tolerances: in .xxx = ± 0.005**
   mm .xx = ± 0.13