HEWLETT PACKARD

0.5–12 GHz General Purpose Gallium Arsenide FET

Technical Data

ATF-10736

Features

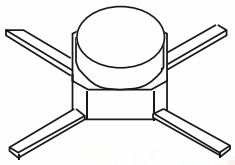
- **High Associated Gain:** 13.0 dB Typical at 4 GHz
- **Low Bias:** V_{DS} = 2 V, I_{DS} = 25 mA
- **High Output Power:** 20.0 dBm typical $P_{1\,dB}$ at 4 GHz
- **Low Noise Figure:** 1.2 dB Typical at 4 GHz
- **Cost Effective Ceramic Microstrip Package**
- **Tape-and-Reel Packaging Option Available** [1]

Description

The ATF-10736 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a cost effective microstrip package. Its noise figure makes this device appropriate for use in the gain 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 interconcnects 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		0.9 1.2 1.4	 1.4
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	70	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	-4.0	-1.3	-0.5

Note:

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

ATF-10736 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	Total Power Dissipation[2,3]	mW	430
T_{CH}	Channel Temperature	°C	175
T_{STG}	Storage Temperature[4]	°C	-65 to +175

Thermal Resistance:	$\theta_{jc} = 350°C/W; T_{CH} = 150°C$
Liquid Crystal Measurement:	1 µm 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 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-10736-TR1	1000	7"
ATF-10736-STR	10	STRIP

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

ATF-10736 Noise Parameters: $V_{DS} = 2\ V, I_{DS} = 25\ mA$

Freq. GHz	NF_O dB	Γ_{opt}		$R_N/50$
		Mag	Ang	
1.0	0.8	0.88	41	0.52
2.0	0.9	0.75	85	0.27
4.0	1.2	0.48	159	0.08
6.0	1.4	0.46	-122	0.08
8.0	1.7	0.53	-71	0.43

ATF-10736 Typical Performance, $T_A = 25°C$

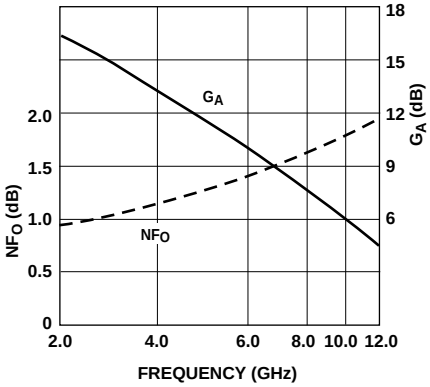


Figure 1. Optimum Noise Figure and Associated Gain vs. Frequency. V_{DS} = 2V, I_{DS} = 25 mA, T_A = 25°C.

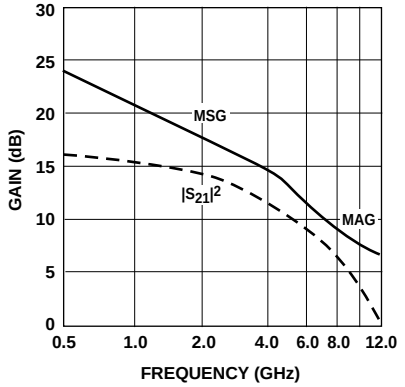


Figure 2. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{DS} = 2 V, I_{DS} = 25 mA.

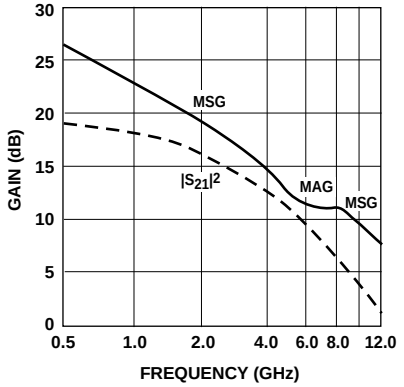


Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{DS} = 4 V, I_{DS} = 70 mA.

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

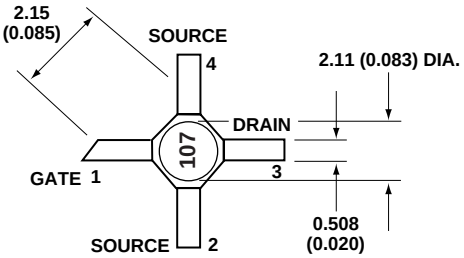
Freq.	S_{11}		S_{21}			S_{12}			S_{22}	
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
0.5	.96	-20	15.4	5.90	162	-32.4	.024	77	.50	-10
1.0	.92	-40	15.2	5.77	144	-26.7	.046	66	.48	-21
2.0	.77	-76	13.8	4.92	109	-21.3	.086	52	.39	-34
3.0	.59	-107	12.5	4.20	83	-20.0	.111	40	.33	-45
4.0	.49	-136	11.2	3.64	57	-17.3	.137	24	.26	-61
5.0	.43	-179	10.0	3.15	32	-15.5	.167	9	.14	-65
6.0	.49	138	8.6	2.74	8	-14.9	.179	-5	.05	22
7.0	.57	106	7.3	2.32	-13	-14.8	.183	-18	.19	60
8.0	.68	81	5.6	1.92	-32	-14.7	.185	-33	.33	57
9.0	.73	62	4.2	1.62	-50	-14.8	.183	-40	.42	46
10.0	.77	47	3.0	1.41	-66	-14.8	.182	-52	.46	38
11.0	.82	36	1.0	1.12	-81	-14.6	.186	-67	.50	27
12.0	.85	22	-0.2	0.98	-97	-14.5	.189	-75	.51	15

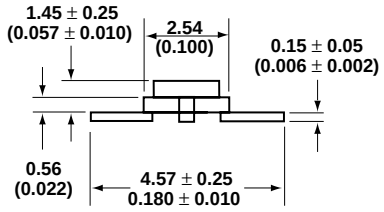
Typical Scattering Parameters, Common Emitter, $Z_O = 50\ \Omega, T_A = 25°C, V_{DS} = 4\,V, I_{DS} = 70\,mA$

Freq.	S_{11}		S_{21}			S_{12}			S_{22}	
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
0.5	.90	-32	19.0	8.95	147	-34.9	.018	77	.40	-7
1.0	.79	-53	18.0	7.96	128	-28.6	.037	70	.38	-17
2.0	.57	-96	15.5	5.99	90	-22.5	.075	56	.34	-38
3.0	.43	-129	13.3	4.60	64	-19.5	.106	43	.31	-50
4.0	.36	-163	11.6	3.78	39	-17.3	.136	31	.28	-51
5.0	.35	156	10.1	3.21	16	-15.6	.166	14	.22	-45
6.0	.47	110	8.8	2.76	-11	-14.5	.189	-5	.15	-4
7.0	.65	78	7.0	2.23	-36	-14.2	.196	-23	.28	35
8.0	.77	58	5.1	1.80	-56	-14.1	.198	-38	.42	37
9.0	.83	44	3.5	1.50	-72	-14.2	.195	-48	.51	33
10.0	.86	30	2.4	1.32	-88	-14.5	.188	-64	.55	26
11.0	.87	16	1.1	1.13	-106	-14.8	.182	-77	.60	18
12.0	.91	1	0.1	0.99	-123	-15.3	.171	-91	.65	7

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