HEWLETT PACKARD

ATF-13136
2-16 GHz Low Noise Gallium Arsenide FET

Features

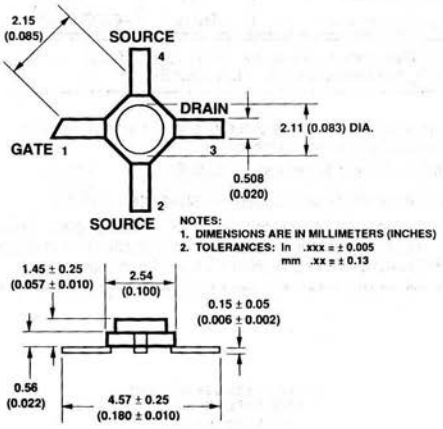
- **Low Noise Figure: 1.2 dB typical at 12 GHz**
- **High Associated Gain: 9.5 dB typical at 12 GHz**
- **High Output Power: 17.5 dBm typical $P_{1\,dB}$ at 12 GHz**
- **Cost Effective Ceramic Microstrip Package**
- **Tape-and-Reel Packaging Option Available[2]**

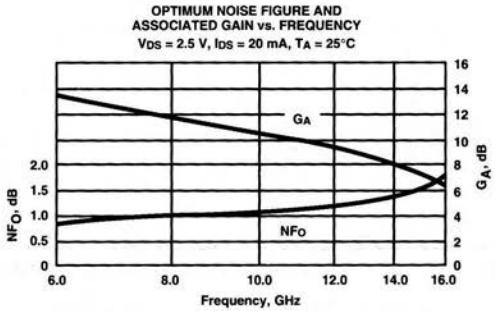
Description

The ATF-13136 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a cost effective microstrip package. Its premium noise figure makes this device appropriate for use in the first stage of low noise amplifiers operating in the 2-16 GHz frequency range.

This GaAs FET device has a nominal 0.3 micron gate length with a total gate periphery of 250 microns. Proven gold based metallization systems and nitride passivation assure a rugged, reliable device.

36 micro-X Package[1]





Noise Parameters: V_{DS} = 3 V, I_{DS} = 20 mA

Freq. GHz	NF_O dB	Gamma Opt Mag	Gamma Opt Ang	$R_N/50$
4.0	0.5	.58	87	.22
6.0	0.8	.47	130	.18
8.0	1.0	.37	–163	.17
12.0	1.2	.47	–65	.80
14.0	1.4	.52	–15	1.20

Electrical Specifications, T_A = 25°C

Symbol	Parameters and Test Conditions		Units	Min.	Typ.	Max.
NF_O	Optimum Noise Figure:	f = 8.0 GHz	dB		1.0	
	V_{DS} = 2.5 V, I_{DS} = 15 - 30 mA	f = 12.0 GHz	dB		1.2	1.4
		f = 14.0 GHz	dB		1.4	
G_A	Gain @ NF_O: V_{DS} = 2.5 V, I_{DS} = 15 - 30 mA	f = 8.0 GHz	dB		11.5	
		f = 12.0 GHz	dB	8.5	9.5	
		f = 14.0 GHz	dB		8.0	
$P_{1\,dB}$	Output Power @ 1 dB Gain Compression: V_{DS} = 4 V, I_{DS} = 40 mA	f = 12.0 GHz	dBm		17.5	
$G_{1\,dB}$	1dB Compressed Gain: V_{DS} = 4 V, I_{DS} = 40 mA	f = 12.0 GHz	dB		8.5	
g_m	Transconductance: V_{DS} = 2.5 V, V_{GS} = 0 V		mmho	25	55	
I_{DSS}	Saturated Drain Current: V_{DS} = 2.5 V, V_{GS} = 0 V		mA	40	50	90
V_P	Pinchoff Voltage: V_{DS} = 2.5 V, I_{DS} = 1 mA		V	–4.0	–1.5	–0.5

Notes: 1. Long leaded 35 package available upon request.
2. Refer to PACKAGING section "Tape-and-Reel Packaging for Surface Mount Semiconductors".

Absolute Maximum Ratings

Parameter	Symbol	Absolute Maximum[1]
Drain-Source Voltage	V_{DS}	+5 V
Gate-Source Voltage	V_{GS}	–4 V
Drain Current	I_{DS}	I_{DSS}
Power Dissipation[2,3]	P_T	225 mW
Channel Temperature	T_{CH}	175°C
Storage Temperature[4]	T_{STG}	–65°C to +175°C

Thermal Resistance: θ_{jc} = 400°C/W; T_{CH} = 150°C
Liquid Crystal Measurement; 1 μm Spot Size[5]

Notes:

1. Operation of this device above any one of these parameters may cause permanent damage.
2. Case Temperature = 25°C.
3. Derate at 2.5 mW/°C for T_{CASE} > 85°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 safety 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.

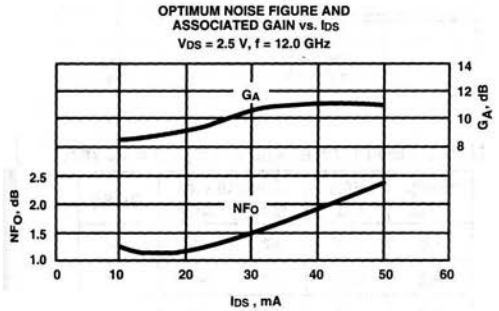
Part Number Ordering Information

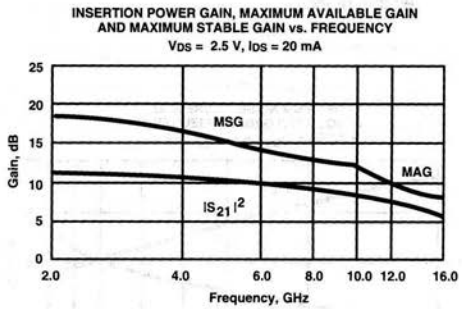
Part Number	Devices Per Reel	Reel Size
ATF-13136-TR1	1000	7"
ATF-13136-TR2	4000	13"
ATF-13136-STR	1	STRIP

For more information, see "Tape and Reel Packaging for Semiconductor Devices", page 14-14.

Typical Performance, T_A = 25°C

(unless otherwise noted)





Typical Scattering Parameters: Common Source, Z_O = 50 Ω

T_A = 25°C, V_{DS} = 2.5 V, I_{DS} = 20 mA

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
2.0	.95	–42	11.2	3.65	134	–26.7	.046	62	.56	–37
3.0	.87	–65	10.7	3.43	112	–24.2	.062	40	.53	–47
4.0	.84	–85	10.3	3.28	93	–22.3	.077	31	.53	–54
5.0	.78	–104	10.1	3.21	73	–20.3	.097	18	.48	–62
6.0	.69	–128	10.4	3.30	52	–18.6	.117	7	.43	–76
7.0	.59	–163	10.4	3.32	27	–17.3	.137	–12	.35	–95
8.0	.54	157	9.8	3.10	2	–17.0	.142	–27	.26	–110
9.0	.55	121	9.2	2.89	–19	–16.3	.153	–43	.15	–119
10.0	.54	93	8.7	2.71	–41	–16.0	.159	–58	.07	–142
11.0	.56	64	8.1	2.54	–61	–16.2	.155	–73	.06	92
12.0	.61	37	7.4	2.34	–84	–16.8	.144	–89	.15	46
13.0	.65	19	6.8	2.18	–102	–17.6	.132	–100	.18	23
14.0	.65	7	6.4	2.09	–120	–18.0	.126	–114	.19	–2
15.0	.67	–6	5.9	1.98	–139	–18.2	.123	–119	.16	–27
16.0	.68	–25	5.3	1.84	–170	–18.4	.120	–134	.13	–30

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