

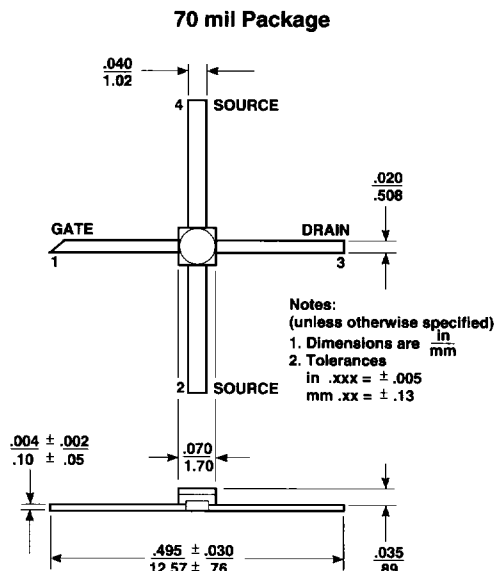
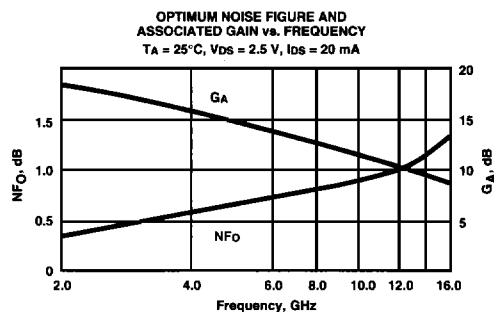
Features

- Low Noise Figure: 1.0 dB typical at 12 GHz
- High Associated Gain: 10.0 dB typical at 12 GHz
- High Output Power: 17.5 dBm typical P_1 dB at 12 GHz
- Hermetic Gold-Ceramic Microstrip Package

Description

The ATF-13170 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a hermetic, high reliability package. Its premium noise figure makes this device appropriate for use in 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.



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

Freq. GHz	NF ₀ dB	Gamma Opt Mag	Ang	RN/50
4.0	0.5	.62	56	.44
6.0	0.7	.47	81	.34
8.0	0.8	.53	116	.19
12.0	1.0	.44	157	.12
14.0	1.3	.43	179	.07

Electrical Specifications, $T_A = 25^\circ\text{C}$

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF ₀	Optimum Noise Figure: $V_{DS} = 2.5\text{ V}$, $I_{DS} = 20\text{ mA}$ $f = 8.0\text{ GHz}$ $f = 12.0\text{ GHz}$ $f = 14.0\text{ GHz}$	dB dB dB		0.8 1.0 1.3	1.1
GA	Gain @ NF ₀ : $V_{DS} = 2.5\text{ V}$, $I_{DS} = 20\text{ mA}$ $f = 8.0\text{ GHz}$ $f = 12.0\text{ GHz}$ $f = 14.0\text{ GHz}$	dB dB dB	9.0	12.0 10.0 8.5	
P_1 dB	Output Power @ 1 dB Gain Compression: $V_{DS} = 4\text{ V}$, $I_{DS} = 40\text{ mA}$	dBm		17.5	
G ₁ dB	1 dB Compressed Gain: $V_{DS} = 4\text{ V}$, $I_{DS} = 40\text{ mA}$ $f = 12.0\text{ GHz}$	dB		8.5	
g _m	Transconductance: $V_{DS} = 2.5\text{ V}$, $V_{GS} = 0\text{ V}$	mmho	30	55	
I_{DSS}	Saturated Drain Current: $V_{DS} = 2.5\text{ V}$, $V_{GS} = 0\text{ V}$	mA	40	50	90
V_P	Pinchoff Voltage: $V_{DS} = 2.5\text{ V}$, $I_{DS} = 1\text{ mA}$	V	-3.0	-1.5	-0.8

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	T _{STG}	−65°C to +175°C

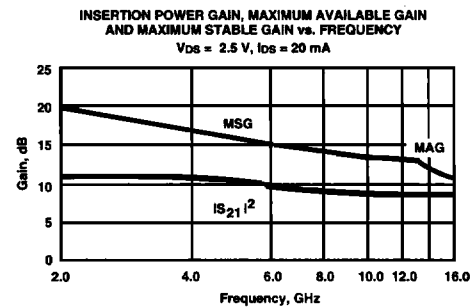
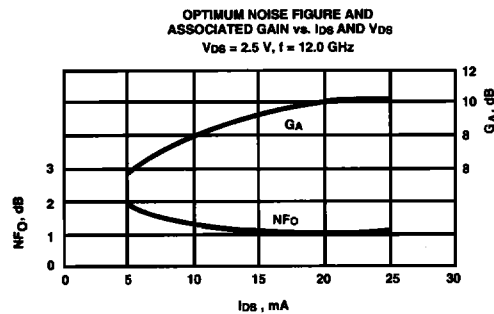
Thermal Resistance: $\theta_{jc} = 350^\circ\text{C/W}$; T_{CH} = 150°C
Liquid Crystal Measuremen; 1 μm Spot Size⁴

Notes:

1. Operation of this device above any one of these parameters may cause permanent damage.
2. Case Temperature = 25°C.
3. Derate at 2.9 mW/°C for T_{CASE} > 96°C.
4. 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.

Typical Performance, T_A = 25°C

(unless otherwise noted)



Typical Scattering Parameters: Common Source, Z₀ = 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	.97	−36	11.4	3.73	143	−28.4	.038	65	.48	−28
3.0	.94	−51	11.2	3.63	128	−25.3	.054	55	.47	−39
4.0	.90	−69	10.9	3.51	111	−23.1	.070	43	.45	−53
5.0	.86	−85	10.5	3.34	94	−21.6	.083	32	.44	−67
6.0	.82	−101	10.1	3.20	78	−20.6	.093	20	.42	−79
7.0	.77	−116	9.7	3.06	63	−19.8	.102	10	.41	−91
8.0	.74	−127	9.3	2.92	50	−19.3	.108	2	.40	−99
9.0	.70	−140	8.9	2.79	37	−18.7	.116	−7	.40	−109
10.0	.67	−153	8.7	2.73	23	−18.2	.123	−17	.41	−120
11.0	.64	−167	8.6	2.69	8	−17.7	.131	−28	.41	−130
12.0	.60	179	8.4	2.64	−7	−17.2	.137	−39	.40	−139
13.0	.57	166	8.3	2.59	−21	−16.8	.144	−50	.39	−148
14.0	.53	153	8.3	2.60	−33	−16.3	.153	−59	.38	−155
15.0	.48	136	8.3	2.61	−49	−15.6	.166	−73	.37	−167
16.0	.41	112	8.4	2.62	−67	−14.9	.180	−88	.34	180
17.0	.36	79	8.3	2.61	−86	−14.4	.191	−105	.26	170
18.0	.35	34	8.2	2.56	−107	−14.0	.200	−124	.17	170

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