

Features

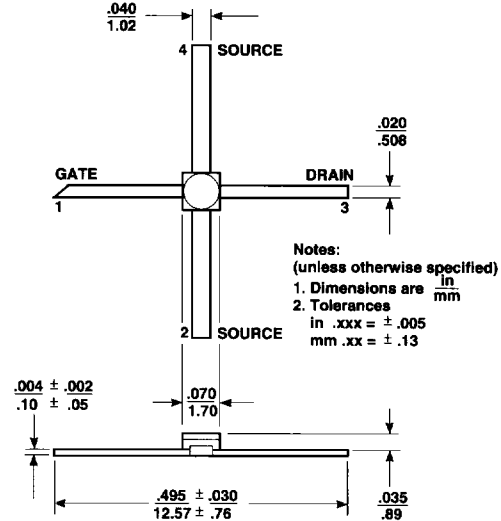
- **Low Noise Figure: 1.0 dB typical at 12 GHz**
- **High Associated Gain: 10.0 dB typical at 12 GHz**
- **High Output Power: 17.5 dBm typical P_{1 dB} at 12 GHz**
- **Hermetic Gold-Ceramic Microstrip Package**

Description

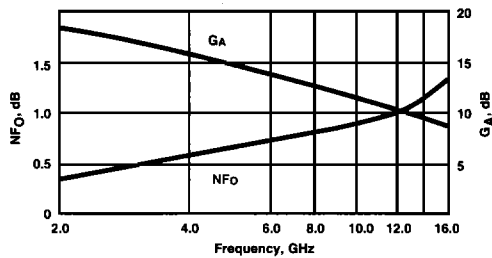
The ATF-13170 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a hermetic, high reliability package. Its premium noise figure makes this device appropriate for use in low noise amplifiers operating in the 2-16 GHz frequency range.

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.

70 mil Package



OPTIMUM NOISE FIGURE AND ASSOCIATED GAIN vs. FREQUENCY
 T_A = 25°C, V_{DS} = 2.5 V, I_{DS} = 20 mA



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

Freq. GHz	NF ₀ dB	Gamma Opt Mag	Ang	R _N /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°C

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF ₀	Optimum Noise Figure: V _{DS} = 2.5 V, I _{DS} = 20 mA	f = 8.0 GHz	dB	0.8	1.1
		f = 12.0 GHz	dB	1.0	
		f = 14.0 GHz	dB	1.3	
GA	Gain @ NF ₀ : V _{DS} = 2.5 V, I _{DS} = 20 mA	f = 8.0 GHz	dB	9.0	12.0
		f = 12.0 GHz	dB		10.0
		f = 14.0 GHz	dB		8.5
P _{1 dB}	Output Power @ 1 dB Gain Compression: V _{DS} = 4 V, I _{DS} = 40 mA	dBm		17.5	
G _{1 dB}	1 dB Compressed Gain: V _{DS} = 4 V, I _{DS} = 40 mA	dB		8.5	
g _m	Transconductance: V _{DS} = 2.5 V, V _{GS} = 0 V	mmho	30	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	-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

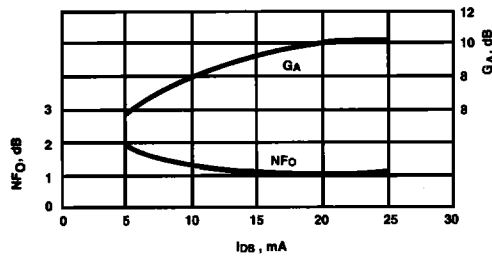
Notes:

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.

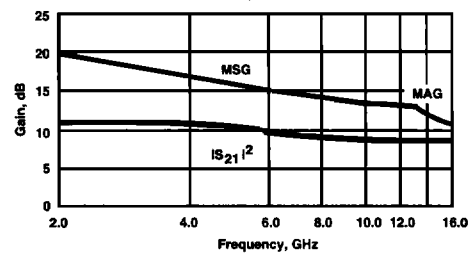
Typical Performance, T_A = 25°C

(unless otherwise noted)

OPTIMUM NOISE FIGURE AND ASSOCIATED GAIN vs. I_{DS} AND V_{DS}
V_{DS} = 2.5 V, f = 12.0 GHz



INSERTION POWER GAIN, MAXIMUM AVAILABLE GAIN AND MAXIMUM STABLE GAIN vs. FREQUENCY
V_{DS} = 2.5 V, I_{DS} = 20 mA



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.