

**Features**

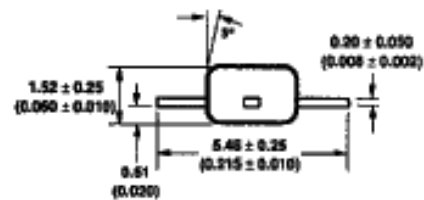
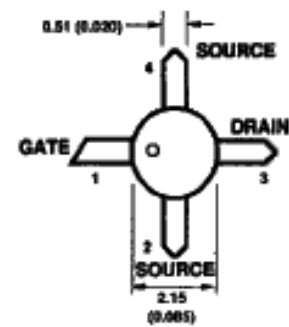
- **Low Noise Figure:** 0.7 dB typical at 4 GHz
- **High Associated Gain:** 15.0 dB typical at 4 GHz
- **High Output Power:** 18.0 dBm typical  $P_{1\text{ dB}}$  at 4 GHz
- **Low Cost Plastic Package**
- **Tape-and-Reel Packaging Option Available<sup>1</sup>**

**Description**

The ATF-13284 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a low cost plastic package. Its low noise figure makes this device appropriate for use in the first or second stages of low noise amplifiers operating in the 1-16 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.

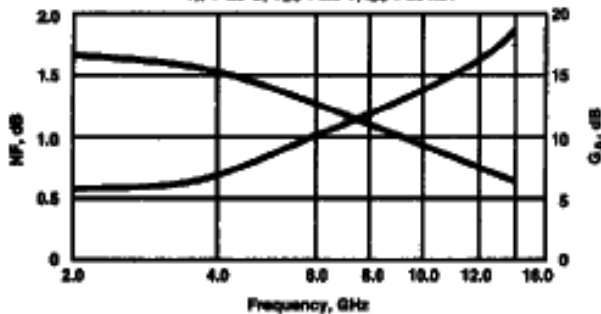
**84 Plastic Package**



DIMENSIONS ARE IN MILLIMETERS (INCHES)

**OPTIMUM NOISE FIGURE AND ASSOCIATED GAIN vs. FREQUENCY**

$T_A = 25^\circ\text{C}$ ,  $V_{DS} = 2.5\text{ V}$ ,  $I_{DS} = 20\text{ mA}$



**Noise Parameters:  $V_{DS} = 2.5\text{ V}$ ,  $I_{DS} = 20\text{ mA}$**

Freq. GHz	NF0 dB	Gamma Opt Mag	Ang	$R_n/50$
1.0	0.6	.92	10	1.3
2.0	0.6	.85	21	1.2
4.0	0.7	.75	54	1.0
8.0	1.2	.57	144	0.3
12.0	1.6	.51	-118	0.1

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

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF0	Optimum Noise Figure: $V_{DS} = 2.5\text{ V}$ , $I_{DS} = 15 - 30\text{ mA}$	$f = 4.0\text{ GHz}$ $f = 12.0\text{ GHz}$	dB		0.7 1.6
GA	Gain @ NF0: $V_{DS} = 2.5\text{ V}$ , $I_{DS} = 15 - 30\text{ mA}$	$f = 4.0\text{ GHz}$ $f = 12.0\text{ GHz}$	dB	13.0	15.0 8.5
$P_{1\text{ dB}}$	Power Output @ 1 dB Gain Compression: $V_{DS} = 4\text{ V}$ , $I_{DS} = 40\text{ mA}$	$f = 4.0\text{ GHz}$	dBm		18.0
$G_{1\text{ dB}}$	1dB Compressed Gain: $V_{DS} = 4\text{ V}$ , $I_{DS} = 40\text{ mA}$	$f = 4.0\text{ GHz}$	dB		15.0
$g_m$	Transconductance: $V_{DS} = 2.5\text{ V}$ , $V_{GS} = 0\text{ V}$		mmho	25	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	-4.0	-1.5 -0.5

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

**Absolute Maximum Ratings**

Parameter	Symbol	Absolute Maximum <sup>1</sup>
Drain-Source Voltage	V <sub>DS</sub>	+5 V
Gate-Source Voltage	V <sub>GS</sub>	-4 V
Drain Current	I <sub>DS</sub>	I <sub>DSS</sub>
Total Power Dissipation <sup>2,3</sup>	P <sub>T</sub>	225 mW
Channel Temperature	T <sub>CH</sub>	175°C
Storage Temperature	T <sub>STG</sub>	-65°C to +150°C

Thermal Resistance:  $\theta_{JC} = 325^\circ\text{C/W}$ ; T<sub>CH</sub> = 150°C  
Liquid Crystal Measurement: 1  $\mu\text{m}$  Spot Size<sup>4</sup>

**Notes:**

1. Operation of this device above any one of these parameters may cause permanent damage.
2. Case Temperature = 25°C.
3. Derate at 3.1 mW/°C for T<sub>C</sub> > 102°C.
4. The small spot size of this technique results in a higher, though more accurate determination of  $\theta_{JC}$  than do alternate methods. See MEASUREMENTS section for more information.

**Part Number Ordering Information**

Part Number	Devices Per Reel	Reel Size
ATF-13284-TR1	1000	7"
ATF-13284-TR2	4000	13"
ATF-13284-STR	1	strip

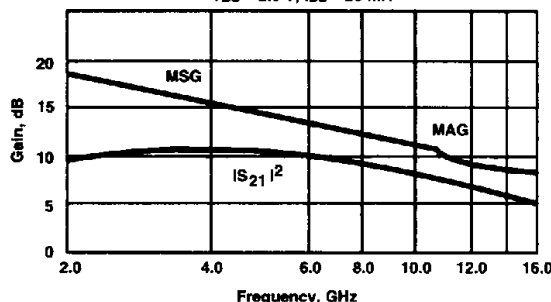
For more information, see "Tape and Reel Packaging for Semiconductor Devices", page 14-14.

**Typical Performance, T<sub>A</sub> = 25°C**

(unless otherwise noted)

INSERTION POWER GAIN, MAXIMUM AVAILABLE GAIN AND MAXIMUM STABLE GAIN vs. FREQUENCY

V<sub>DS</sub> = 2.5 V, I<sub>DS</sub> = 20 mA



**Typical Scattering Parameters: Common Source, Z<sub>0</sub> = 50  $\Omega$**

T<sub>A</sub> = 25°C, V<sub>DS</sub> = 2.5 V, I<sub>DS</sub> = 20 mA

Freq. GHz	S <sub>11</sub>		dB	S <sub>21</sub>		dB	S <sub>12</sub>		S <sub>22</sub>	
	Mag	Ang		Mag	Ang		Mag	Ang	Mag	Ang
0.5	.99	-11	10.2	3.22	169	-36.5	.015	80	.50	-11
1.0	.98	-21	10.2	3.24	157	-32.8	.023	74	.50	-17
2.0	.97	-33	10.3	3.26	145	-26.9	.045	67	.50	-24
3.0	.91	-52	10.4	3.30	127	-23.2	.069	55	.49	-37
4.0	.84	-73	10.5	3.36	108	-20.7	.092	42	.47	-50
5.0	.77	-91	10.2	3.23	91	-19.3	.109	31	.46	-61
6.0	.70	-108	9.8	3.08	76	-18.3	.121	22	.45	-71
7.0	.64	-123	9.3	2.93	62	-17.6	.132	14	.43	-79
8.0	.59	-142	9.1	2.85	47	-16.9	.153	5	.39	-89
9.0	.54	-166	8.8	2.74	30	-16.3	.153	-5	.33	-104
10.0	.51	168	8.3	2.59	14	-16.0	.159	-15	.25	-123
11.0	.51	147	7.4	2.34	-2	-16.2	.155	-22	.19	-151
12.0	.48	127	7.0	2.25	-12	-16.0	.159	-30	.14	-171
13.0	.51	108	6.7	2.17	-26	-15.9	.161	-35	.12	177
14.0	.57	87	6.1	2.02	-41	-16.0	.160	-46	.12	144
15.0	.59	70	5.6	1.90	-57	-16.1	.158	-53	.15	102
16.0	.62	58	5.1	1.79	-66	-16.1	.157	-59	.21	74
17.0	.63	46	4.6	1.69	-80	-16.1	.157	-67	.28	60
18.0	.64	35	3.7	1.53	-93	-16.1	.157	-84	.36	47