2 – 10 GHz Medium Power Gallium Arsenide FET

Technical Data

ATF-46171

Features

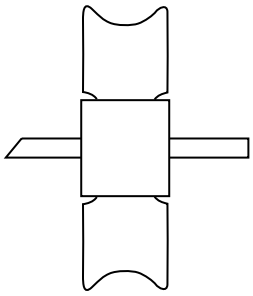
- **High Output Power:** 27.0 dBm Typical $P_{1\,dB}$ at 4 GHz
- **High Gain at 1 dB Compression:** 11.0 dB Typical $G_{1\,dB}$ at 4 GHz
- **High Power Efficiency:** 38% Typical at 4 GHz
- **Hermetic Metal-Ceramic Stripline Package**

Description

The ATF-46171 is a gallium arsenide Schottky-barrier-gate field effect transistor designed for medium power, linear amplification in the 2 to 10 GHz frequency range. This nominally 0.5 micron gate length GaAs FET is an interdigitated four-cell structure using airbridge interconnects between drain fingers. Total gate periphery is 1.25 millimeters. Proven gold based metallization systems and nitride passivation assure a rugged, reliable device.

This device is suitable for applications in space, airborne, military ground and shipboard, and commercial environments. It is supplied in a hermetic high reliability package with low parasitic reactance and minimum thermal resistance.

70 mil Flange Package



Electrical Specifications, T_A = 25°C

Symbol	Parameters and Test Conditions		Units	Min.	Typ.	Max.
$P_{1\,dB}$	Power Output @ 1 dB Gain Compression: V_{DS} = 9 V, I_{DS} = 125 mA	f = 4.0 GHz f = 8.0 GHz	dBm	25.0	27.0 26.5	
$G_{1\,dB}$	1 dB Compressed Gain: V_{DS} = 9 V, I_{DS} = 125 mA	f = 4.0 GHz f = 8.0 GHz	dB	10.0	11.0 6.0	
η_{add}	Efficiency @ P_{1dB}: V_{DS} = 9 V, I_{DS} = 125 mA	f = 4.0 GHz	%		38	
g_m	Transconductance: V_{DS} = 2.5 V, I_{DS} = 125 mA		mmho		100	
I_{DSS}	Saturated Drain Current: V_{DS} = 2.5 V, V_{GS} = 0 V		mA	200	330	450
V_P	Pinch-off Voltage: V_{DS} = 2.5 V, I_{DS} = 5 mA		V	-5.4	-3.5	-2.0

ATF-46171 Absolute Maximum Ratings

Symbol	Parameter	Units	Absolute Maximum[1]
V_{DS}	Drain-Source Voltage	V	+14
V_{GS}	Gate-Source Voltage	V	-7
V_{GD}	Gate-Drain Voltage	V	-16
I_{DS}	Drain Current	mA	I_{DSS}
P_T	Power Dissipation [2,3]	W	2.0
T_{CH}	Channel Temperature	°C	175
T_{STG}	Storage Temperature	°C	-65 to +175

Thermal Resistance:	$\theta_{jc} = 75°C/W; T_{CH} = 150°C$
Liquid Crystal Measurement:	1 µm Spot Size[4]

Notes:

1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{CASE\ TEMPERATURE} = 25°C$.
3. Derate at 13 mW/°C for $T_{CASE} > 25°C$.
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.

ATF-46171 Typical Performance, $T_A = 25°C$

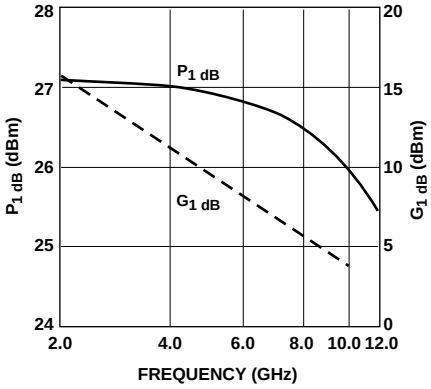


Figure 1. Power Output @ 1 dB Gain Compression and 1 dB Compressed Gain vs. Frequency. V_{DS} = 9V, I_{DS} = 125 mA.

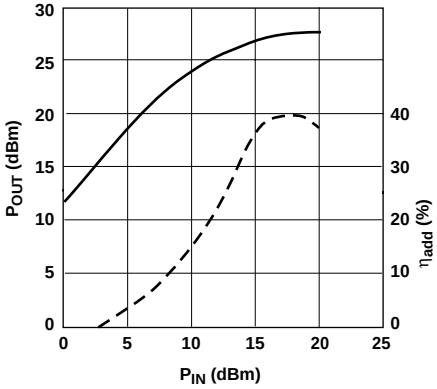


Figure 2. Output Power and Power Added Efficiency vs. Input Power. V_{DS} = 9 V, I_{DS} = 125 mA, f = 4.0 GHz.

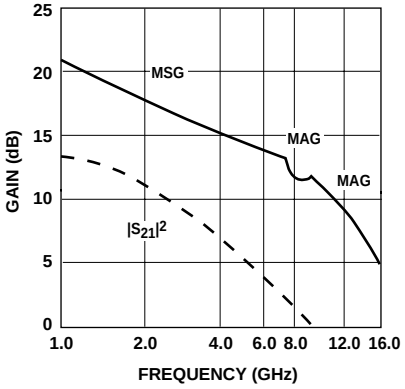


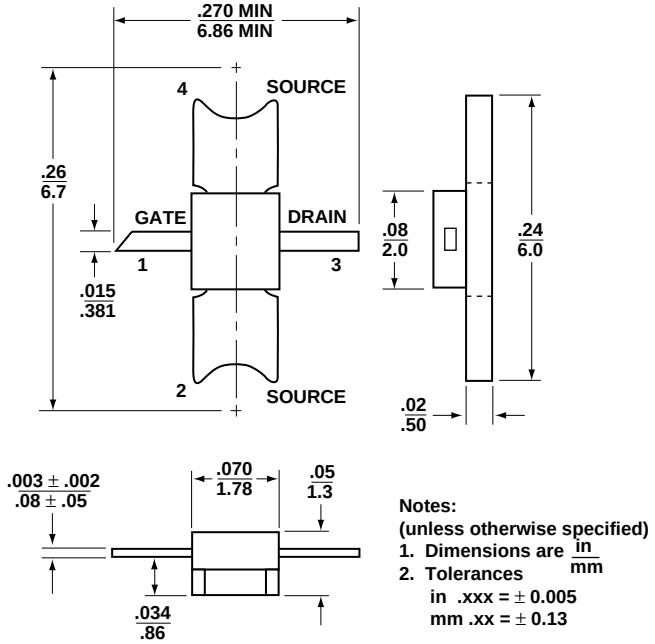
Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{DS} = 9 V, I_{DS} = 125 mA.

Typical Scattering Parameters, Common Emitter, $Z_O = 50\ \Omega$, $T_A = 25°C$, $V_{DS} = 9\ V$, $I_{DS} = 125\ mA$

Freq.	S_{11}		S_{21}			S_{12}			S_{22}	
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
1.0	.95	-54	12.7	4.30	138	-29.4	.034	63	.71	-22
2.0	.84	-106	11.0	3.56	99	-26.7	.046	30	.60	-44
3.0	.81	-145	8.9	2.80	67	-25.7	.052	13	.52	-71
4.0	.81	-172	6.6	2.14	40	-25.0	.056	2	.52	-101
5.0	.80	171	4.6	1.70	18	-24.4	.060	-3	.58	-122
6.0	.79	159	3.1	1.44	1	-24.0	.063	-6	.63	-135
7.0	.78	141	2.2	1.29	-18	-23.5	.067	-10	.63	-147
8.0	.77	123	1.4	1.17	-36	-23.0	.071	-14	.64	-164
9.0	.79	108	-0.1	.99	-58	-22.5	.075	-17	.67	171
10.0	.79	100	-1.4	.85	-73	-22.0	.079	-21	.74	152
11.0	.78	93	-2.5	.75	-86	-21.6	.083	-24	.76	142
12.0	.76	85	-3.5	.67	-97	-20.6	.093	-32	.79	133
13.0	.73	67	-4.3	.61	-118	-19.5	.106	-49	.80	119
14.0	.71	47	-5.8	.51	-138	-19.0	.112	-66	.83	98
15.0	.73	35	-7.5	.42	-157	-18.6	.118	-71	.85	83
16.0	.75	26	-8.9	.36	-157	-18.3	.121	-78	.90	72

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

70 mil Flange Package



Notes:
(unless otherwise specified)
1. Dimensions are in / mm
2. Tolerances
in .xxx = ± 0.005
mm .xx = ± 0.13

Package marking code is 461