Agilent Technologies
Innovating the HP Way

2–10 GHz Medium Power Gallium Arsenide FET

Technical Data

ATF-46101

Features

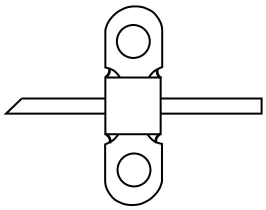
- **High Output Power:** 27.0 dBm Typical $P_{1\,dB}$ at 4 GHz
- **High Gain at 1 dB Compression:** 12.0 dB Typical $G_{1\,dB}$ at 4 GHz
- **High Power Efficiency:** 38% Typical at 4 GHz

Description

The ATF-46101 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.

100 mil Flange Package



Electrical Specifications, $T_A = 25°C$

Symbol	Parameters and Test Conditions[1]		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	9.0	10.0 5.0	
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

Note:
1. RF Performance is determined by packaging and testing 10 samples per wafer.

ATF-46101 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:	θ_{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. $T_{MOUNTING\ SURFACE}$ = 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-46101 Typical Performance, T_A = 25°C

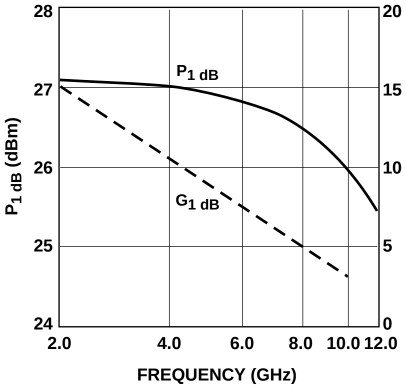


Figure 1. Power Output @ 1 dB Gain Compression and 1 dB Compressed Gain vs. Frequency. V_{DS} = 9 V, I_{DS} = 125 mA.

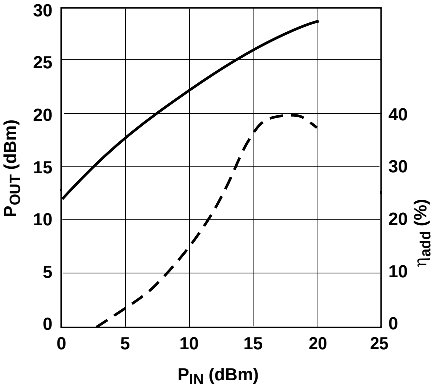


Figure 2. Output Power and Power Added Efficiency vs. Input Power. V_{DS} = 9 V, I_{DS} = 125 mA, f = 4.0 GHz.

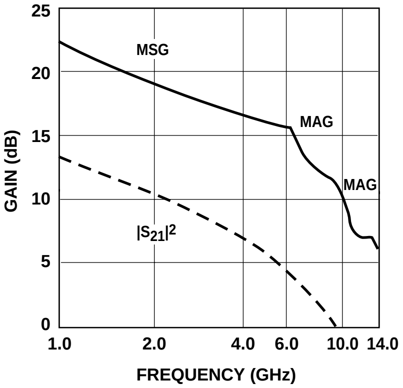


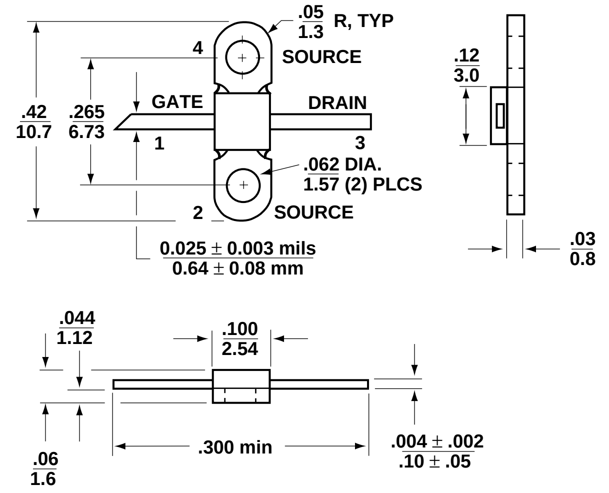
Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{DS} = 9 V, I_{DS} = 125 mA.

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

Freq. GHz	S_{11} Mag.	S_{11} Ang.	S_{21} dB	S_{21} Mag.	S_{21} Ang.	S_{12} dB	S_{12} Mag.	S_{12} Ang.	S_{22} Mag.	S_{22} Ang.
1.0	.94	-56	12.8	4.37	135	-31.4	.027	52	.64	-28
2.0	.86	-101	10.7	3.41	98	-27.3	.043	30	.59	-56
3.0	.82	-131	8.4	2.64	71	-26.9	.045	18	.58	-79
4.0	.82	-152	6.7	2.16	48	-26.4	.048	9	.62	-98
5.0	.80	-173	5.4	1.86	26	-26.0	.050	-1	.63	-112
6.0	.79	165	4.3	1.64	5	-25.8	.051	-12	.65	-126
7.0	.78	143	3.1	1.43	-18	-25.4	.054	-24	.65	-145
8.0	.78	131	1.6	1.20	-36	-24.7	.058	-37	.70	-166
9.0	.77	123	0.3	1.03	-55	-23.9	.064	-40	.73	173
10.0	.76	118	-1.2	.87	-72	-23.1	.070	-52	.76	158
11.0	.67	104	-2.0	.79	-91	-22.6	.074	-57	.79	146
12.0	.60	86	-2.7	.73	-110	-21.2	.087	-66	.83	136
13.0	.54	71	-3.5	.67	-133	-19.7	.104	-79	.87	124
14.0	.50	64	-4.0	.63	-154	-15.9	.160	-99	.92	115

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

100 mil Flange Package Dimensions



Notes:
(unless otherwise specified)
1. Dimensions are $\frac{\text{in}}{\text{mm}}$
2. Tolerances
in .xxx = ± 0.005
mm .xx = ± 0.13

Package marking code is 461

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Data subject to change.

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