HEWLETT® PACKARD

2–8 GHz Medium Power Gallium Arsenide FET

Technical Data

ATF-44101

Features

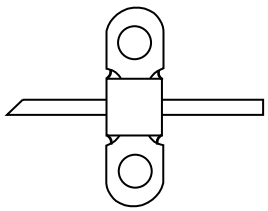
- **High Output Power:** 32.0 dBm Typical $P_{1\,dB}$ at 4 GHz
- **High Gain at 1 dB Compression:** 8.5 dB Typical $G_{1\,dB}$ at 4 GHz
- **High Power Efficiency:** 35% Typical at 4 GHz
- **Hermetic Metal-Ceramic Stripline Package**

Description

The ATF-44101 is a gallium arsenide Schottky-barrier-gate field effect transistor designed for medium power, linear amplification in the 2 to 8 GHz frequency range. This nominally .5 micron gate length GaAs FET is an interdigitated four-cell structure using airbridge interconnects between source fingers. Total gate periphery is 5 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



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} = 500 mA	f = 4.0 GHz f = 6.0 GHz	dBm	31.0	32.0 31.5	
$G_{1\,dB}$	1 dB Compressed Gain: V_{DS} = 9 V, I_{DS} = 500 mA	f = 4.0 GHz f = 6.0 GHz	dB	7.5	8.5 5.5	
η_{add}	Efficiency @ P_{1dB}: V_{DS} = 9 V, I_{DS} = 500 mA	f = 4.0 GHz	%		35	
g_m	Transconductance: V_{DS} = 2.5 V, I_{DS} = 500 mA		mmho		300	
I_{DSS}	Saturated Drain Current: V_{DS} = 1.75 V, V_{GS} = 0 V		mA	800	1300	1500
V_P	Pinch-off Voltage: V_{DS} = 2.5 V, I_{DS} = 25 mA		V	-5.4	-4.0	-2.0

ATF-44101 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	6.5
T_{CH}	Channel Temperature	°C	175
T_{STG}	Storage Temperature	°C	-65 to +175

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{CASE\ TEMPERATURE}$ = 25°C.
3. Derate at 43 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.

Thermal Resistance:	θ_{jc} = 23°C/W; T_{CH} = 150°C
Liquid Crystal Measurement:	1 µm Spot Size[4]

ATF-44101 Typical Performance, T_A = 25°C

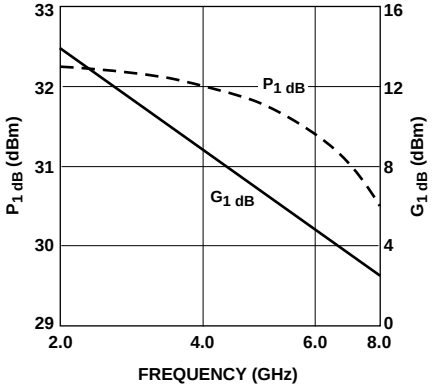


Figure 1. Power Output @ 1 dB Gain Compression and 1 dB Compressed Gain vs. Frequency. V_{DS} = 9V, I_{DS} = 500 mA.

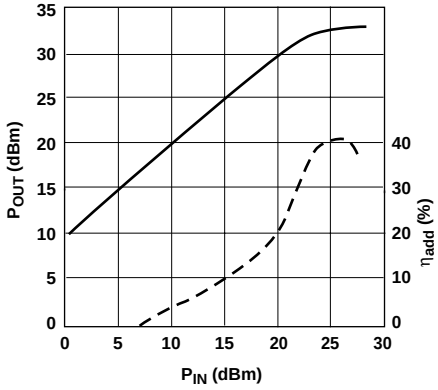


Figure 2. Output Power and Power Added Efficiency vs. Input Power. V_{DS} = 9 V, I_{DS} = 500 mA, f = 4 GHz.

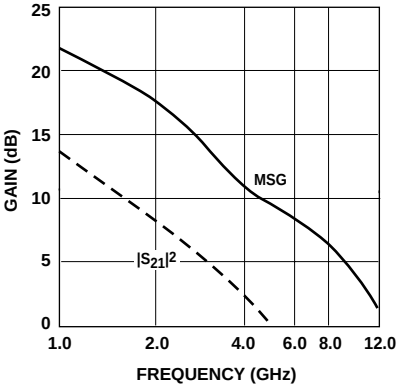


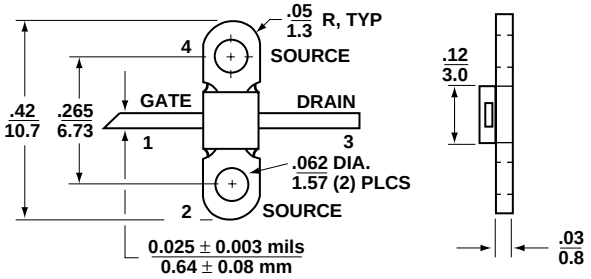
Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{DS} = 9 V, I_{DS} = 500 mA.

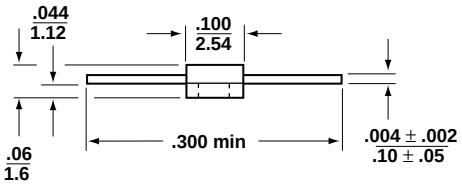
Typical Scattering Parameters, Common Emitter, $Z_O = 50\ \Omega$, $T_A = 25°C$, $V_{DS} = 9\ V$, $I_{DS} = 500\ mA$

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	.88	-125	13.4	4.69	104	-28.2	.039	31	.29	-154
2.0	.87	-161	8.1	2.53	74	-26.7	.046	21	.38	-164
3.0	.87	-178	4.8	1.73	54	-26.7	.046	22	.44	-167
4.0	.87	168	2.5	1.34	35	-25.7	.052	17	.47	-175
5.0	.88	153	0.8	1.10	16	-25.5	.053	13	.49	175
6.0	.88	136	-0.8	.91	-5	-23.6	.066	0	.52	160
7.0	.89	122	-2.5	.75	-25	-23.4	.068	-7	.56	144
8.0	.89	114	-4.2	.62	-39	-22.7	.073	-13	.62	132
9.0	.88	109	-5.5	.53	-52	-22.2	.078	-18	.68	124
10.0	.86	103	-6.7	.46	-64	-20.9	.090	-24	.72	118
11.0	.81	91	-6.9	.45	-78	-19.3	.108	-33	.73	112
12.0	.77	74	-7.5	.42	-95	-17.2	.138	-49	.73	101

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

100 mil Flange Dimensions





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

Package marking code is 441