

# 2–8 GHz Medium Power Gallium Arsenide FET

## Technical Data

ATF-44101

### Features

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

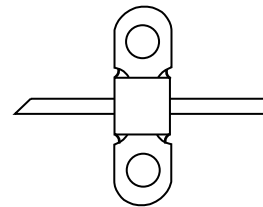
### Description

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

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
$P_{1\text{dB}}$	Power Output @ 1 dB Gain Compression: $V_{\text{DS}} = 9\text{ V}, I_{\text{DS}} = 500\text{ mA}$	f = 4.0 GHz dBm	31.0	32.0	
$G_{1\text{dB}}$	1 dB Compressed Gain: $V_{\text{DS}} = 9\text{ V}, I_{\text{DS}} = 500\text{ mA}$	f = 6.0 GHz dB	7.5	8.5	31.5
$\eta_{\text{add}}$	Efficiency @ $P_{1\text{dB}}$ : $V_{\text{DS}} = 9\text{ V}, I_{\text{DS}} = 500\text{ mA}$	f = 4.0 GHz %		35	
$g_m$	Transconductance: $V_{\text{DS}} = 2.5\text{ V}, I_{\text{DS}} = 500\text{ mA}$	mmho		300	
$I_{\text{DSS}}$	Saturated Drain Current: $V_{\text{DS}} = 1.75\text{ V}, V_{\text{GS}} = 0\text{ V}$	mA	800	1300	1500
$V_p$	Pinch-off Voltage: $V_{\text{DS}} = 2.5\text{ V}, I_{\text{DS}} = 25\text{ mA}$	V	-5.4	-4.0	-2.0

## ATF-44101 Absolute Maximum Ratings

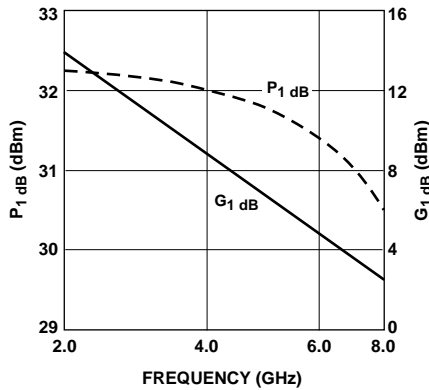
Symbol	Parameter	Units	Absolute Maximum <sup>[1]</sup>
$V_{DS}$	Drain-Source Voltage	V	+14
$V_{GS}$	Gate-Source Voltage	V	-7
$V_{GD}$	Gate-Drain Voltage	V	-16
$I_{DS}$	Drain Current	mA	$I_{DSS}$
$P_T$	Power Dissipation <sup>[2,3]</sup>	W	6.5
$T_{CH}$	Channel Temperature	°C	175
$T_{STG}$	Storage Temperature	°C	-65 to +175

**Thermal Resistance:**  $\theta_{jc} = 23^\circ\text{C/W}; T_{CH} = 150^\circ\text{C}$   
**Liquid Crystal Measurement:** 1  $\mu\text{m}$  Spot Size<sup>[4]</sup>

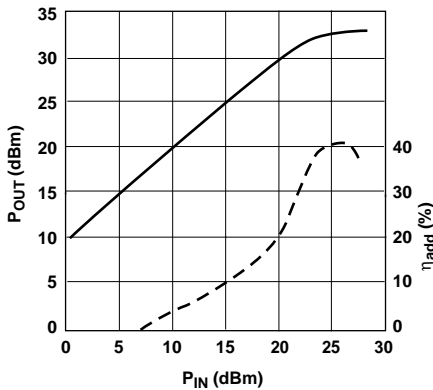
### Notes:

1. Permanent damage may occur if any of these limits are exceeded.
2.  $T_{CASE\ TEMPERATURE} = 25^\circ\text{C}$ .
3. Derate at  $43\text{ mW}/^\circ\text{C}$  for  $T_{CASE} > 25^\circ\text{C}$ .
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.

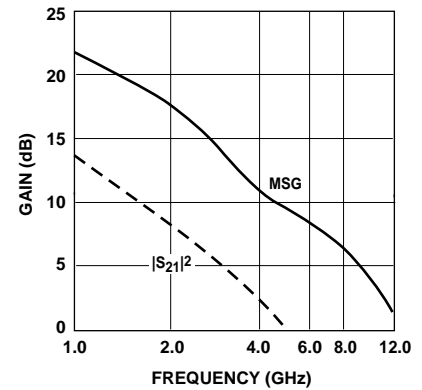
## ATF-44101 Typical Performance, $T_A = 25^\circ\text{C}$



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



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



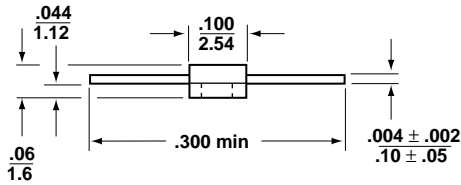
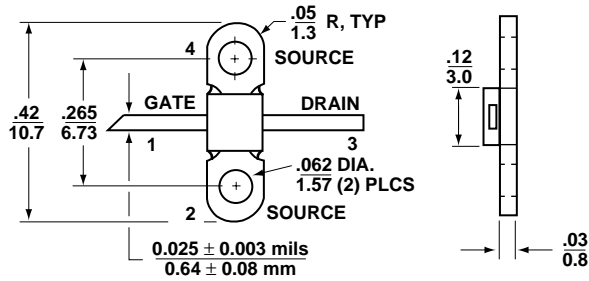
**Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency.**  
 $V_{DS} = 9\text{ V}, I_{DS} = 500\text{ mA}$ .

**Typical Scattering Parameters, Common Emitter,  $Z_0 = 50 \Omega$ ,  $T_A = 25^\circ\text{C}$ ,  $V_{DS} = 9\text{V}$ ,  $I_{DS} = 500\text{mA}$**

Freq. GHz	$S_{11}$		dB	$S_{21}$		dB	$S_{12}$		$S_{22}$	
	Mag.	Ang.		Mag.	Ang.		Mag.	Ang.	Mag.	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  $\frac{\text{in}}{\text{mm}}$
  2. Tolerances  
in .xxx =  $\pm 0.005$   
mm .xx =  $\pm 0.13$

Package marking code is 441