

# 2–8 GHz Medium Power Gallium Arsenide FET

## Technical Data

**ATF-45171**

### Features

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

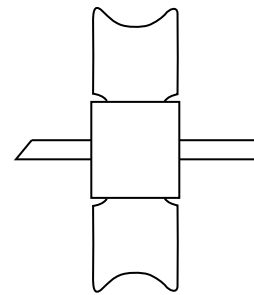
### Description

The ATF-45171 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 0.5 micron gate length GaAs FET is an interdigitated four-cell structure using airbridge interconnects between drain fingers. Total gate periphery is 2.5 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.

### 70 mil Flange Package



### 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: $V_{\text{DS}} = 9\text{ V}$ , $I_{\text{DS}} = 250\text{ mA}$	$f = 4.0\text{ GHz}$ $f = 8.0\text{ GHz}$	dBm	28.0	29.0 28.0	
$G_{1\text{dB}}$	1 dB Compressed Gain: $V_{\text{DS}} = 9\text{ V}$ , $I_{\text{DS}} = 250\text{ mA}$	$f = 4.0\text{ GHz}$ $f = 8.0\text{ GHz}$	dB	9.5	10.5 4.5	
$\eta_{\text{add}}$	Efficiency @ $P_{1\text{dB}}$ : $V_{\text{DS}} = 9\text{ V}$ , $I_{\text{DS}} = 250\text{ mA}$	$f = 4.0\text{ GHz}$	%		38	
$g_m$	Transconductance: $V_{\text{DS}} = 2.5\text{ V}$ , $I_{\text{DS}} = 250\text{ mA}$		mmho		200	
$I_{\text{DSS}}$	Saturated Drain Current: $V_{\text{DS}} = 1.75\text{ V}$ , $V_{\text{GS}} = 0\text{ V}$		mA	400	600	800
$V_P$	Pinch-off Voltage: $V_{\text{DS}} = 2.5\text{ V}$ , $I_{\text{DS}} = 12.5\text{ mA}$		V	-5.4	-4.0	-2.0

## ATF-45171 Absolute Maximum Ratings

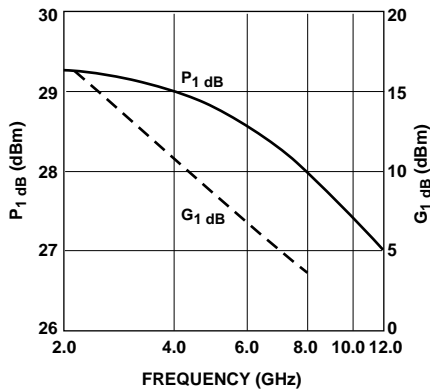
Symbol	Parameter	Units	Absolute Maximum <sup>[1]</sup>
$V_{DS}$	Drain-Source Voltage	V	+14
$V_{GS}$	Gate-Source Voltage	V	-7
$V_{GD}$	Gate-Drain Voltage	V	-16
$I_{DS}$	Drain Current	mA	$I_{DSS}$
$P_T$	Power Dissipation <sup>[2,3]</sup>	W	3.6
$T_{CH}$	Channel Temperature	°C	175
$T_{STG}$	Storage Temperature	°C	-65 to +175

**Thermal Resistance:**  $\theta_{jc} = 42^\circ\text{C/W}$ ;  $T_{CH} = 150^\circ\text{C}$   
**Liquid Crystal Measurement:** 1  $\mu\text{m}$  Spot Size<sup>[4]</sup>

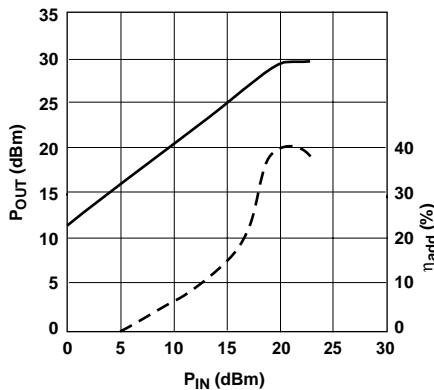
### Notes:

1. Permanent damage may occur if any of these limits are exceeded.
2.  $T_{CASE\ TEMPERATURE} = 25^\circ\text{C}$ .
3. Derate at  $24\ \text{mW}/^\circ\text{C}$  for  $T_{CASE} > 24^\circ\text{C}$ .
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.

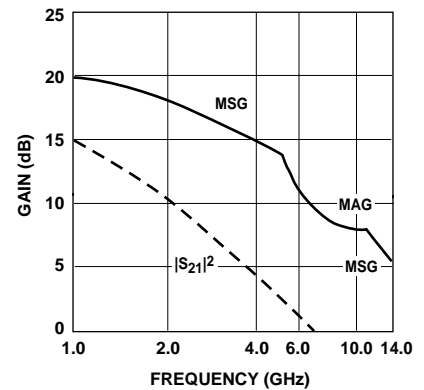
## ATF-45171 Typical Performance, $T_A = 25^\circ\text{C}$



**Figure 1. Power Output @ 1 dB Gain Compression and 1 dB Compressed Gain vs. Frequency.**  
 $V_{DS} = 9\text{V}$ ,  $I_{DS} = 250\ \text{mA}$ .



**Figure 2. Output Power and Power Added Efficiency vs. Input Power.**  
 $V_{DS} = 9\ \text{V}$ ,  $I_{DS} = 250\ \text{mA}$ ,  $f = 4.0\ \text{GHz}$ .



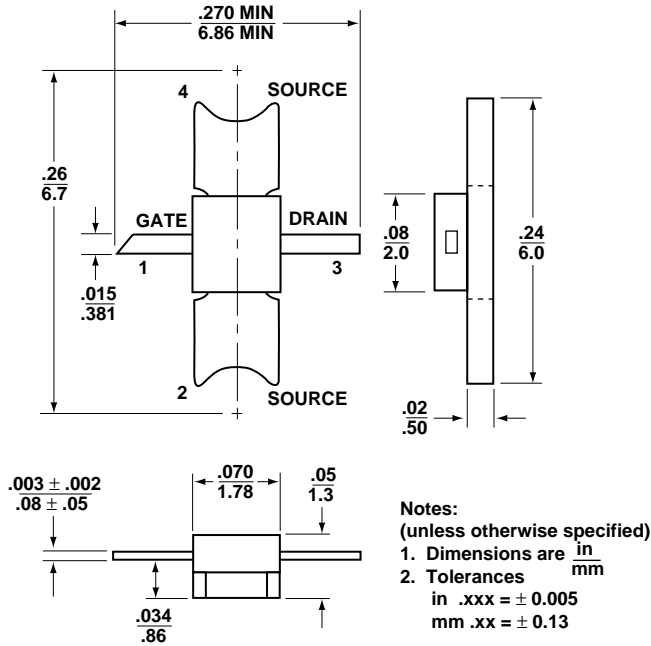
**Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency.**  
 $V_{DS} = 9\ \text{V}$ ,  $I_{DS} = 250\ \text{mA}$ .

**Typical Scattering Parameters, Common Emitter,  $Z_0 = 50 \Omega$ ,  $T_A = 25^\circ\text{C}$ ,  $V_{DS} = 9\text{V}$ ,  $I_{DS} = 250\text{mA}$**

Freq. GHz	$S_{11}$		$S_{21}$			$S_{12}$			$S_{22}$	
	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
1.0	.91	-83	14.5	5.30	122	-26.7	.046	46	.37	-46
2.0	.83	-137	10.8	3.45	83	-26.4	.048	19	.26	-91
3.0	.83	-167	7.4	2.34	54	-26.0	.050	5	.31	-131
4.0	.86	174	4.4	1.66	32	-25.5	.053	2	.43	-155
5.0	.86	162	2.1	1.28	12	-25.1	.055	0	.52	-167
6.0	.85	152	0.7	1.09	-3	-24.7	.058	-2	.56	-176
7.0	.84	138	0.1	1.01	-22	-24.4	.060	-6	.59	173
8.0	.84	124	-0.9	.90	-40	-23.8	.064	-13	.62	154
9.0	.85	114	-2.5	.75	-59	-23.4	.068	-19	.66	135
10.0	.85	106	-4.3	.61	-70	-22.5	.075	-25	.71	123
11.0	.85	100	-5.2	.55	-81	-21.6	.083	-30	.76	119
12.0	.83	95	-6.2	.49	-90	-20.8	.091	-39	.79	111
13.0	.80	76	-6.7	.46	-107	-19.3	.109	-50	.81	98
14.0	.77	59	-8.0	.40	-125	-18.9	.113	-61	.83	78

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

**70 mil Flange Package Dimensions**



Package marking code is 451