

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**

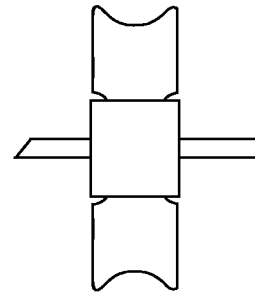
Description

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

ATF-45171 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	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 μm Spot Size^[4]

Notes:

1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{CASE\ TEMP} = 25^\circ\text{C}$.
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 θ_{jc} than do alternate methods. See MEASUREMENTS section for more information.

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

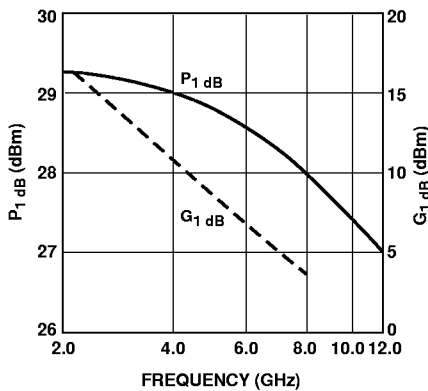


Figure 1. Power Output @ 1 dB Gain Compression and 1 dB Compressed Gain vs. Frequency.
 $V_{DS} = 9\text{V}$, $I_{DS} = 250\text{ mA}$.

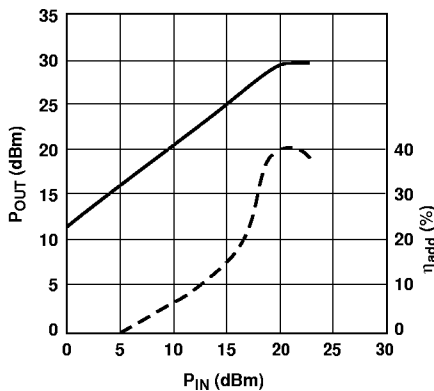


Figure 2. Output Power and Power Added Efficiency vs. Input Power.
 $V_{DS} = 9\text{ V}$, $I_{DS} = 250\text{ mA}$, $f = 4.0\text{ GHz}$.

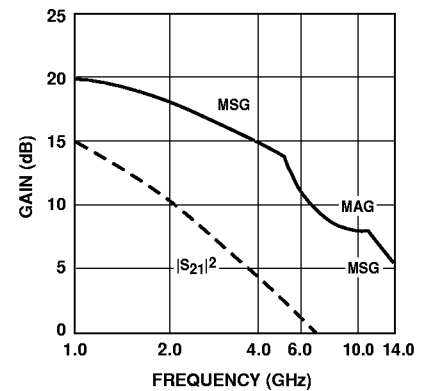


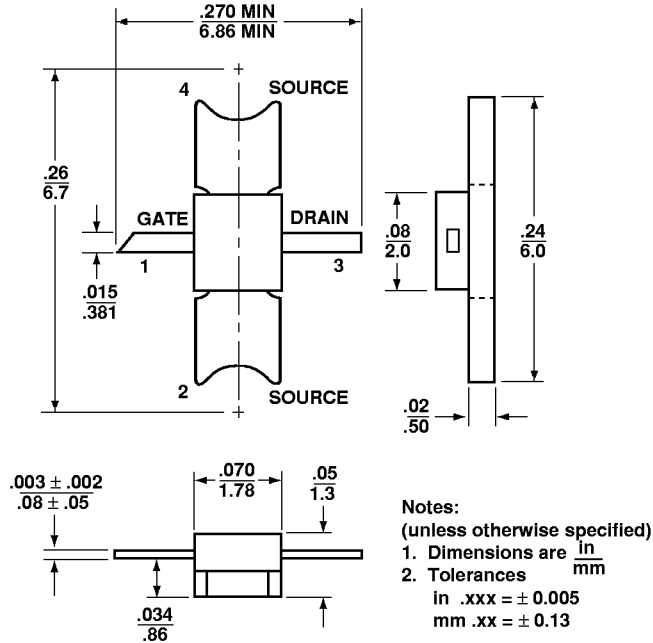
Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency.
 $V_{DS} = 9\text{ V}$, $I_{DS} = 250\text{ mA}$.

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

Freq. GHz	S_{11}		dB	S_{21}		dB	S_{12}		dB	S_{22}	
	Mag.	Ang.		Mag.	Ang.		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