2–8 GHz Medium Power Gallium Arsenide FET

Technical Data

ATF-45101

Features

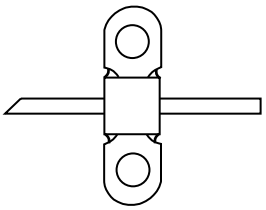
- **High Output Power:** 29.0 dBm Typical $P_{1\,dB}$ at 4 GHz
- **High Gain at 1dB Compression:** 10.0 dB Typical $G_{1\,dB}$ at 4 GHz
- **High Power Efficiency:** 38% Typical at 4 GHz
- **Hermetic Metal-Ceramic Stripline Package**

Description

The ATF-45101 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.

100 mil Flange Package



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} = 250 mA	f = 4.0 GHz f = 8.0 GHz	dBm	28.0	29.0 28.0	
$G_{1\,dB}$	1 dB Compressed Gain: V_{DS} = 9 V, I_{DS} = 250 mA	f = 4.0 GHz f = 8.0 GHz	dB	9.0	10.0 4.0	
η_{add}	Efficiency @ P_{1dB}: V_{DS} = 9 V, I_{DS} = 250 mA	f = 4.0 GHz	%		38	
g_m	Transconductance: V_{DS} = 2.5 V, I_{DS} = 250 mA		mmho		200	
I_{DSS}	Saturated Drain Current: V_{DS} = 1.75 V, V_{GS} = 0 V		mA	400	600	800
V_P	Pinch-off Voltage: V_{DS} = 2.5 V, I_{DS} = 12.5 mA		V	-5.4	-4.0	-2.0

ATF-45101 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

Notes:
1. Permanent damage may occur if any of these limits are exceeded.
2. $T_{CASE\ TEMPERATURE}$ = 25°C.
3. Derate at 24 mW/°C for T_{CASE} > 24°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} = 42°C/W; T_{CH} = 150°C
Liquid Crystal Measurement:	1 µm Spot Size[4]

ATF-45101 Typical Performance, T_A = 25°C

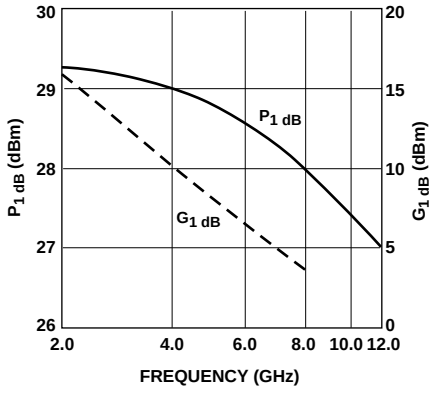


Figure 1. Power Output @ 1 dB Gain Compression and 1 dB Compressed Gain vs. Frequency. V_{DS} = 9V, I_{DS} = 250 mA.

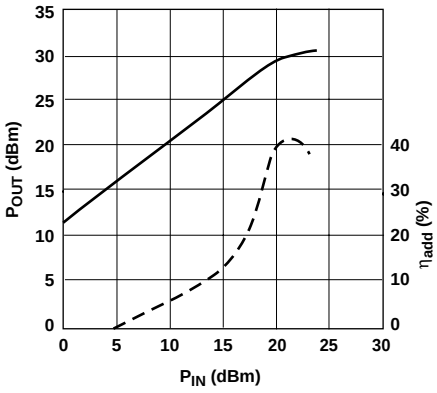


Figure 2. Output Power and Power Added Efficiency vs. Input Power. V_{DS} = 9 V, I_{DS} = 250 mA, f = 4.0 GHz.

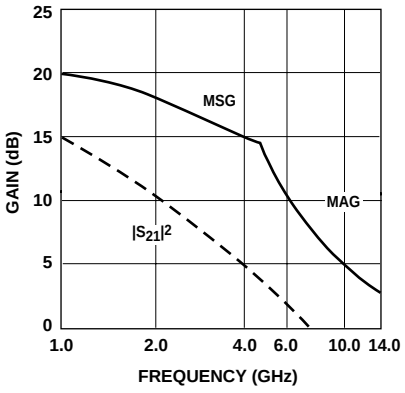


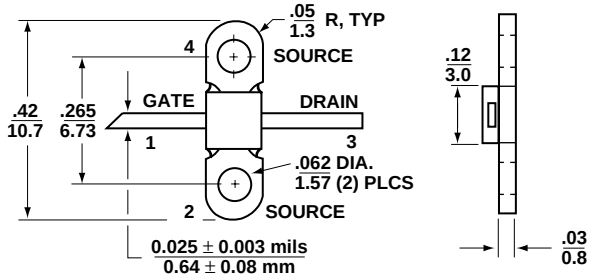
Figure 3. Insertion Power Gain, Maximum Available Gain and Maximum Stable Gain vs. Frequency. V_{DS} = 9 V, I_{DS} = 250 mA.

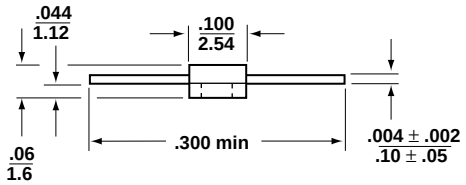
Typical Scattering Parameters, Common Emitter, $Z_O = 50\ \Omega$, $T_A = 25°C$, $V_{DS} = 9\ V$, $I_{DS} = 250\ mA$

Freq.	S_{11}		S_{21}			S_{12}			S_{22}	
GHz	Mag.	Ang.	dB	Mag.	Ang.	dB	Mag.	Ang.	Mag.	Ang.
1.0	.89	-88	14.9	5.54	119	-26.2	.049	43	.31	-63
2.0	.83	-135	10.8	3.48	82	-26.0	.050	18	.33	-108
3.0	.81	-158	7.6	2.40	58	-25.8	.051	7	.39	-129
4.0	.84	-174	5.4	1.86	38	-25.5	.053	3	.46	-144
5.0	.82	-170	3.8	1.55	18	-25.2	.055	-2	.50	-154
6.0	.81	152	2.6	1.36	-2	-24.4	.060	-8	.52	-168
7.0	.81	133	1.2	1.15	-25	-23.9	.064	-15	.55	173
8.0	.81	122	-0.3	.97	-42	-23.5	.067	-20	.59	154
9.0	.80	113	-1.8	.81	-60	-22.6	.074	-31	.64	137
10.0	.79	107	-3.2	.69	-73	-22.0	.079	-40	.68	123
11.0	.77	94	-4.6	.59	-91	-21.5	.084	-45	.72	113
12.0	.73	82	-5.8	.51	-106	-20.3	.097	-55	.76	99
13.0	.68	69	-6.7	.46	-123	-18.3	.121	-63	.78	89
14.0	.64	56	-7.1	.44	-137	-15.9	.161	-79	.80	79

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

100 mil Flange Package Dimensions





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

Package marking code is 451