HEWLETT PACKARD

ATF-45100 (AT-8151)
2-12 GHz Medium Power Gallium Arsenide FET

Features

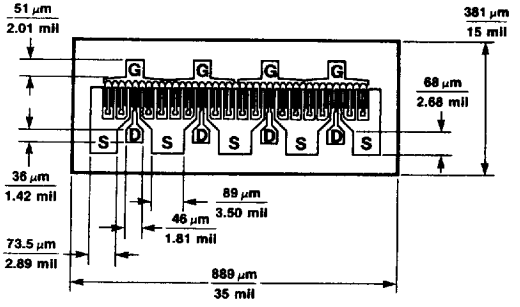
- **High Output Power:**
  29.0 dBm typical $P_{1\,dB}$ at 4 GHz
- **High Gain at 1 dB Compression:**
  11.0 dB typical $G_{1\,dB}$ at 4 GHz
- **High Power Efficiency:**
  38% typical at 4 GHz

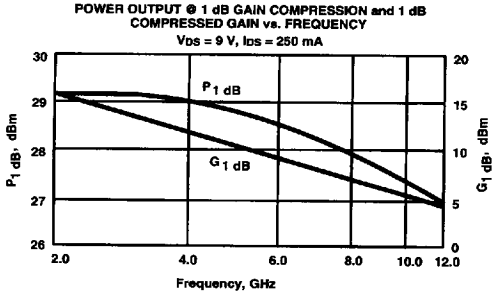
Description

The ATF-45100 is a gallium arsenide Schottky-barrier-gate field effect transistor designed for medium power, linear amplification in the 2 to 12 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. All metal surfaces are gold plated for ease of bonding and die attach.

The recommended mounting procedure is to die attach temperature of 300°C using a gold-tin preform under forming gas. Assembly should be performed with wedge bonding using either 0.7 mil of 1.0 mil gold wire. See also "Chip Use" in the APPLICATIONS section.

Chip Outline





Electrical Specifications, T_A = 25°C

Symbol	Parameters and Test Conditions[1]		Units	Min.	Typ.	Max.
$P_{1\,dB}$	Output Power @ 1 dB Gain Compression: V_{DS} = 9 V, I_{DS} = 250 mA	f = 4.0 GHz f = 8.0 GHz f = 12.0 GHz	dBm	28.0	29.0 28.0 27.0	
$G_{1\,dB}$	1 dB Compressed Gain: V_{DS} = 9 V, I_{DS} = 250 mA	f = 4.0 GHz f = 8.0 GHz f = 12.0 GHz	dB	10.0	11.0 6.5 4.5	
η_{add}	Efficiency @ $P_{1\,dB}$: 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	Pinchoff Voltage: V_{DS} = 2.5 V, I_{DS} = 5 mA		V	–5.4	–4.0	–2.0

Note: 1. RF Performance is determined by packaging and testing 10 samples per wafer.

Absolute Maximum Ratings

Parameter	Symbol	Absolute Maximum[1]
Drain-Source Voltage	V_{DS}	+14 V
Gate-Source Voltage	V_{GS}	–7 V
Drain Current	I_{DS}	I_{DSS}
Power Dissipation[2,3]	P_T	4.0 W
Channel Temperature	T_{CH}	175°C
Storage Temperature	T_{STG}	–65°C to +175°C

Thermal Resistance: θ_{jc} = 38°C/W; T_{CH} = 150°C
Liquid Crystal Measurement; 1 µm Spot Size[4]

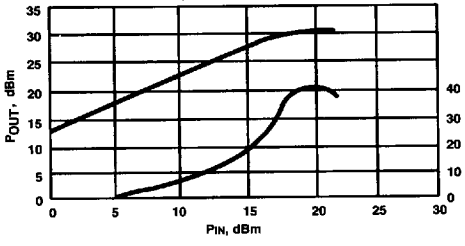
Notes:
1. Operation of this device above any one of these parameters may cause permanent damage.
2. Mounting Surface Temperature = 25°C.
3. Derate at 26 mW/°C for $T_{MOUNTING\ SURFACE}$ > 23°C.
4. The small spot size of this technique results in a higher, though more accurate determination of θ_{jc} than do alternate methods. See MEASUREMENTS section for more information.

Part Number Ordering Information

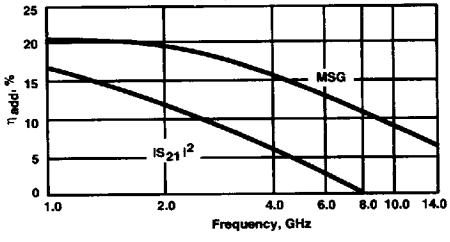
Part Number	Devices Per Tray
ATF-45100-GP1	5
ATF-45100-GP3	50
ATF-45100-GP6	up to 300

Typical Performance, T_A = 25°C
(unless otherwise noted)

OUTPUT POWER AND POWER ADDED EFFICIENCY vs. INPUT POWER
V_{DS} = 9 V, I_{DS} = 250 mA, f = 4.0 GHz



INSERTION POWER GAIN, MAXIMUM AVAILABLE GAIN AND MAXIMUM STABLE GAIN vs. FREQUENCY
V_{DS} = 9 V, I_{DS} = 250 mA



Typical Scattering Parameters: Common Source, Z_O = 50 Ω
T_A = 25°C, V_{DS} = 9 V, I_{DS} = 250 mA

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
1.0	.92	–88	16.1	6.41	124	–27.3	.043	36	.32	–45
2.0	.85	–127	12.1	4.01	96	–26.0	.050	38	.29	–68
3.0	.84	–147	9.3	2 93	78	–25.4	.054	40	.29	–87
4.0	.85	–159	6.8	2.19	64	–24.9	.057	43	.31	–102
5.0	.87	–169	4.8	1.74	51	–24.3	.061	48	.37	–118
6.0	.88	–177	3.1	1.43	38	–23.9	.064	53	.43	–130
7.0	.88	177	1.3	1.17	27	–23.5	.067	57	.50	–139
8.0	.89	173	0.0	1.00	19	–22.4	.076	60	.57	–149
9.0	.90	167	–1.3	.86	8	–21.7	.082	63	.63	–157
10.0	.90	162	–2.6	.74	1	–21.2	.087	60	.68	–162
11.0	.91	157	–4.0	.63	–9	–20.4	.096	57	.72	–169
12.0	.91	148	–5.4	.54	–18	–19.9	.101	54	.75	–171
13.0	.90	145	–6.0	.50	–25	–19.6	.105	48	.79	–175
14.0	.90	135	–6.9	.45	–35	–19.7	.104	41	.82	–179

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