

Features

- **Low Noise Figure:** 1.1 dB typical at 12 GHz
- **High Associated Gain:** 9.5 dB typical at 12 GHz
- **High Output Power:** 17.5 dBm typical P_1 dB at 12 GHz

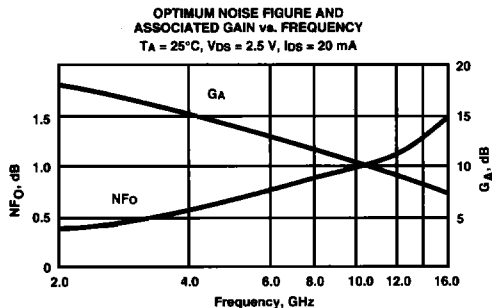
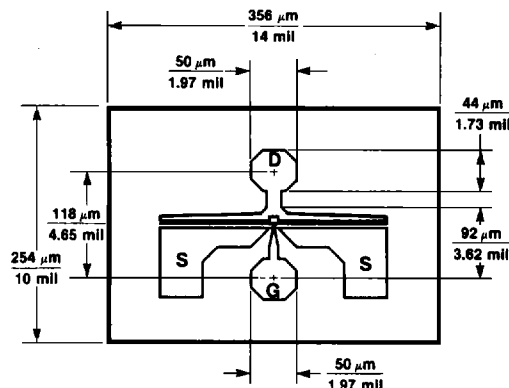
Description

The ATF-13100 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor chip. This device is designed for use in low noise, wideband amplifier and oscillator applications in the 2-18 GHz frequency range.

This GaAs FET device has a nominal 0.3 micron gate length with a total gate periphery of 250 microns. Proven gold based metalization systems and nitride passivation assure a rugged, reliable device.

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

Chip Outline



Noise Parameters: $V_{DS} = 2.5\text{ V}$, $I_{DS} = 20\text{ mA}$

Freq. GHz	NFo dB	Gamma Opt Mag	Ang	Rn/50
4.0	0.5	.60	30	.32
6.0	0.7	.32	68	.21
8.0	0.8	.25	102	.15
12.0	1.1	.23	-165	.09
15.0	1.5	.32	-112	.21

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

Symbol	Parameters and Test Conditions ¹	Units	Min.	Typ.	Max.
NFo	Optimum Noise Figure: $V_{DS} = 2.5\text{ V}$, $I_{DS} = 15 - 30\text{ mA}$	dB		0.8	1.2
	$f = 8.0\text{ GHz}$	dB		1.1	
	$f = 12.0\text{ GHz}$	dB		1.5	
GA	Gain @ NFo: $V_{DS} = 2.5\text{ V}$, $I_{DS} = 15 - 30\text{ mA}$	dB		12.0	
	$f = 8.0\text{ GHz}$	dB	9.0	9.5	
	$f = 12.0\text{ GHz}$	dB		8.0	
	$f = 15.0\text{ GHz}$	dB			
P_1 dB	Output Power @ 1 dB Gain Compression: $V_{DS} = 4\text{ V}$, $I_{DS} = 40\text{ mA}$	dBm		17.5	
G_1 dB	1 dB Compressed Gain: $V_{DS} = 4\text{ V}$, $I_{DS} = 40\text{ mA}$	dB		8.5	
g_m	Transconductance: $V_{DS} = 2.5\text{ V}$, $V_{GS} = 0\text{ V}$	mmho	30	55	
I_{DSS}	Saturated Drain Current: $V_{DS} = 2.5\text{ V}$, $V_{GS} = 0\text{ V}$	mA	40	50	90
V_P	Pinchoff Voltage: $V_{DS} = 2.5\text{ V}$, $I_{DS} = 1\text{ mA}$	V	-3.0	-1.5	-0.8

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

Absolute Maximum Ratings

Parameter	Symbol	Absolute Maximum ¹
Drain-Source Voltage	V _{DS}	+5 V
Gate-Source Voltage	V _{GS}	-4 V
Drain Current	I _{DS}	I _{DSS}
Total Power Dissipation ^{2,3}	P _T	225 mW
Channel Temperature	T _{CH}	175°C
Storage Temperature	T _{STG}	-65°C to +175°C

Thermal Resistance: $\theta_{JC} = 250^\circ\text{C/W}$; T_{CH} = 150°C
Liquid Crystal Measurement; 1 μm Spot Size⁴

Notes:

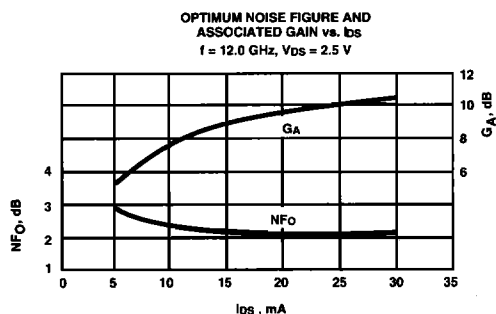
- Operation of this device above any one of these parameters may cause permanent damage.
- Mounting Surface Temperature = 25°C.
- Derate at 4 mW/°C for T_{MOUNTING SURFACE} > 119°C.
- The small spot size of this technique results in a higher, though more accurate determination of θ_{JC} than do alternate methods. See MEASUREMENTS section for more information.

Part Number Ordering Information

Part Number	Devices Per Tray
ATF-13100-GP1	5
ATF-13100-GP3	50
ATF-13100-GP6	up to 300

Typical Performance, T_A = 25°C

(unless otherwise noted)



Typical Scattering Parameters: Common Source, Z₀ = 50 Ω

T_A = 25°C, V_{DS} = 2.5 V, I_{DS} = 20 mA

Freq. GHz	S ₁₁		dB	S ₂₁		dB	S ₁₂		S ₂₂	
	Mag	Ang		Mag	Ang		Mag	Ang	Mag	Ang
2.0	.96	-27	13.4	4.68	153	-26.9	.045	75	.55	-16
3.0	.92	-41	13.4	4.65	140	-23.6	.066	67	.52	-24
4.0	.85	-58	13.1	4.54	126	-21.4	.085	59	.49	-33
5.0	.79	-76	12.9	4.40	113	-19.8	.102	50	.44	-41
6.0	.73	-95	12.4	4.19	100	-18.7	.116	42	.38	-48
7.0	.68	-113	12.0	3.97	87	-18.0	.126	34	.30	-54
8.0	.63	-132	11.4	3.71	75	-17.5	.134	25	.24	-64
9.0	.62	-151	10.9	3.51	63	-17.1	.140	18	.18	-75
10.0	.59	-167	10.3	3.27	53	-16.8	.144	11	.13	-84
11.0	.59	173	9.7	3.07	40	-16.5	.149	2	.08	-104
12.0	.57	155	9.0	2.83	30	-16.5	.150	-9	.02	160
13.0	.60	136	8.6	2.69	19	-16.4	.151	-16	.08	106
14.0	.64	116	7.9	2.47	7	-16.4	.151	-25	.15	103
15.0	.67	98	7.1	2.26	-6	-16.4	.152	-34	.23	100
16.0	.73	83	5.8	1.96	-16	-16.9	.143	-40	.31	90
17.0	.77	72	4.6	1.70	-26	-17.0	.141	-45	.36	82
18.0	.80	63	3.5	1.50	-35	-17.4	.135	-48	.40	72

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