

Ka Band Power GaAs MESFET Chip



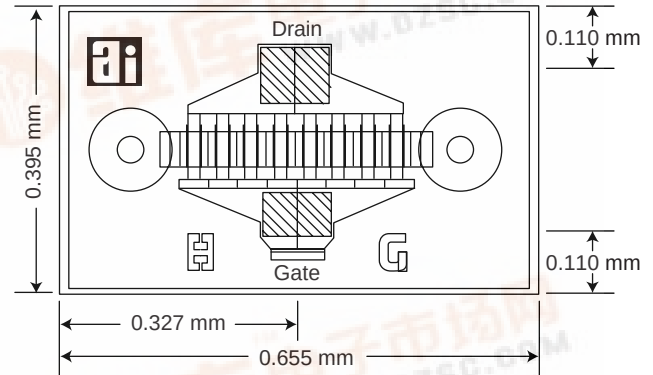
AFM08P2-000

Features

- 24 dBm Output Power @ 18 GHz
- High Associated Gain, 8.5 dB @ 18 GHz
- High Power Added Efficiency, 20%
- Broadband Operation, DC–40 GHz
- 0.25 μm Ti/Pd/Au Gates
- Passivated Surface
- Through-Substrate Via Hole Grounding

Description

The AFM08P2-000 is a high performance power GaAs MESFET chip having a gate length of 0.25 μm and a total gate periphery of 800 μm . The device has excellent gain and power performance through 40 GHz, making it suitable for a wide range of commercial and military applications in oscillator and amplifier circuits. It employs Ti/Pd/Au gate metallization and surface passivation to ensure a rugged, reliable part. Through-substrate via holes are incorporated into the chip to facilitate low inductance grounding of the source for improved high frequency and high gain performance.



Chip thickness = 0.1 mm.

Absolute Maximum Ratings

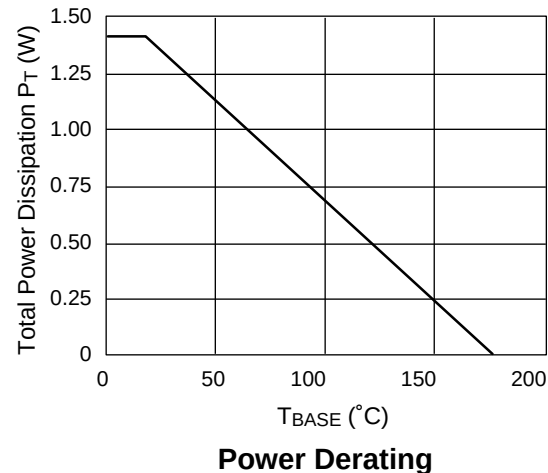
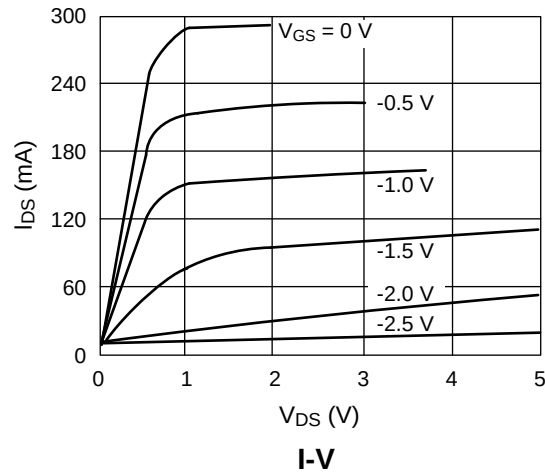
Characteristic	Value
Drain to Source Voltage (V_{DS})	6 V
Gate to Source Voltage (V_{GS})	-4 V
Drain Current (I_{DS})	I_{DSS}
Gate Current (I_{GS})	2 mA
Total Power Dissipation (P_T)	1.4 W
Storage Temperature (T_{ST})	-65 to +150°C
Channel Temperature (T_{CH})	175°C

Electrical Specifications at 25°C

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Saturated Drain Current (I_{DSS})	$V_{DS} = 2 \text{ V}, V_{GS} = 0 \text{ V}$	175.0	265.0	360.0	mA
Transconductance (gm)		120.0	160.0		mS
Pinch-off Voltage (V_P)	$V_{DS} = 5 \text{ V}, I_{DS} = 2.0 \text{ mA}$	1.0	3.0	5.0	-V
Gate to Drain Breakdown Voltage (V_{bgd})	$I_{GD} = 800 \mu\text{A}$	8.0	12.0		-V
Output Power at 1 dB Compression ($P_{1 \text{ dB}}$)	$V_{DS} = 5 \text{ V}, I_{DS} = 140 \text{ mA}, F = 18 \text{ GHz}$		24.0		dBm
Gain at 1 dB Compression ($G_{1 \text{ dB}}$)			8.5		dB
Power Added Efficiency (η_{add})			20.0		%
Output Power at 1 dB Compression ($P_{1 \text{ dB}}$)	$V_{DS} = 5 \text{ V}, I_{DS} = 140 \text{ mA}, F = 30 \text{ GHz}$		23.0		dBm
Gain at 1 dB Compression ($G_{1 \text{ dB}}$)			4.5		dB
Power Added Efficiency (η_{add})			10.0		%
Thermal Resistance (θ_{JC})	$T_{BASE} = 25^\circ\text{C}$			120.0	$^\circ\text{C/W}$



Typical Performance Data



Typical S-Parameters ($V_{DS} = 5\text{ V}$, $I_{DS} = 140\text{ mA}$)

Freq. (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		k	S ₂₁ (dB)	MAG (dB)
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.			
2	0.922	-60.551	6.183	137.340	0.034	56.434	0.268	-53.648	0.287	15.824	22.614
3	0.886	-83.281	5.297	121.790	0.043	45.053	0.276	-72.863	0.352	14.481	20.875
4	0.858	-100.870	4.511	109.080	0.048	37.488	0.288	-86.395	0.448	13.085	19.764
5	0.846	-114.840	3.873	98.238	0.052	31.412	0.311	-97.508	0.490	11.760	18.726
6	0.833	-125.710	3.349	89.148	0.053	26.013	0.330	-105.520	0.595	10.499	18.038
7	0.830	-134.240	2.937	81.086	0.053	22.971	0.356	-111.660	0.660	9.359	17.440
8	0.827	-141.250	2.594	73.980	0.053	20.266	0.380	-117.070	0.751	8.280	16.937
9	0.826	-146.950	2.320	67.488	0.052	19.130	0.403	-121.090	0.835	7.309	16.522
10	0.826	-151.670	2.099	61.486	0.051	18.861	0.430	-124.530	0.911	6.439	16.156
11	0.826	-155.980	1.912	55.846	0.050	18.901	0.453	-127.950	0.985	5.630	15.794
12	0.826	-159.860	1.757	50.480	0.050	19.638	0.473	-131.070	1.054	4.896	14.032
13	0.826	-163.530	1.626	45.189	0.050	20.670	0.494	-134.390	1.107	4.220	13.123
14	0.827	-167.030	1.511	40.055	0.050	22.571	0.513	-137.680	1.168	3.584	12.349
15	0.827	-170.710	1.412	34.928	0.050	24.590	0.529	-141.300	1.222	2.994	11.674
16	0.828	-174.110	1.319	29.877	0.051	27.112	0.543	-144.910	1.256	2.402	11.108
17	0.827	-177.880	1.238	24.729	0.053	30.441	0.560	-149.190	1.266	1.851	10.612
18	0.830	178.710	1.157	19.509	0.054	29.130	0.579	-153.840	1.234	1.266	10.358
19	0.833	175.150	1.082	14.691	0.055	30.607	0.597	-158.560	1.237	0.681	9.976
20	0.834	171.690	1.006	9.473	0.057	29.948	0.615	-163.450	1.248	0.056	9.504
21	0.833	168.290	0.931	4.393	0.055	29.691	0.634	-168.500	1.375	-0.624	8.613
22	0.826	165.410	0.854	-0.449	0.054	28.928	0.654	-173.410	1.567	-1.375	7.567
23	0.824	164.040	0.774	-2.962	0.055	40.109	0.659	-176.480	1.814	-2.221	6.302
24	0.837	162.480	0.725	-5.707	0.061	41.107	0.685	-178.940	1.477	-2.796	6.695
25	0.841	160.910	0.675	-8.703	0.065	41.668	0.712	178.250	1.317	-3.419	6.786
26	0.851	160.020	0.632	-11.155	0.066	39.422	0.726	176.760	1.190	-3.980	7.168
27	0.861	158.950	0.593	-13.702	0.068	41.344	0.749	175.380	1.036	-4.532	8.244
28	0.869	157.730	0.561	-15.712	0.072	42.416	0.772	174.350	0.864	-5.026	8.934
29	0.873	157.100	0.530	-17.951	0.075	43.221	0.790	173.430	0.742	-5.517	8.481
30	0.876	156.340	0.504	-19.794	0.079	43.832	0.800	172.620	0.665	-5.945	8.038
31	0.878	155.500	0.482	-21.803	0.084	44.410	0.812	171.720	0.574	-6.330	7.595
32	0.879	154.510	0.463	-24.305	0.088	43.920	0.825	170.440	0.492	-6.693	7.197
33	0.875	153.200	0.444	-26.438	0.094	43.615	0.830	169.140	0.473	-7.046	6.729
34	0.875	151.820	0.429	-28.745	0.100	42.418	0.832	167.450	0.439	-7.342	6.340
35	0.873	149.570	0.415	-31.738	0.105	40.012	0.834	164.770	0.420	-7.631	5.960
36	0.870	147.470	0.398	-34.529	0.109	38.334	0.830	162.000	0.476	-8.004	5.642
37	0.869	145.350	0.382	-37.857	0.111	36.215	0.825	158.610	0.519	-8.358	5.349
38	0.866	142.450	0.361	-41.301	0.115	34.590	0.821	154.480	0.610	-8.842	4.983
39	0.865	139.560	0.342	-44.109	0.117	31.940	0.822	150.320	0.666	-9.319	4.655
40	0.859	137.290	0.303	-48.395	0.121	28.969	0.814	145.770	0.846	-10.363	3.978

S-Parameters include the effects of two 0.8 mil diameter bond wires, each 10 mil long, to each of the gate and drain terminals.