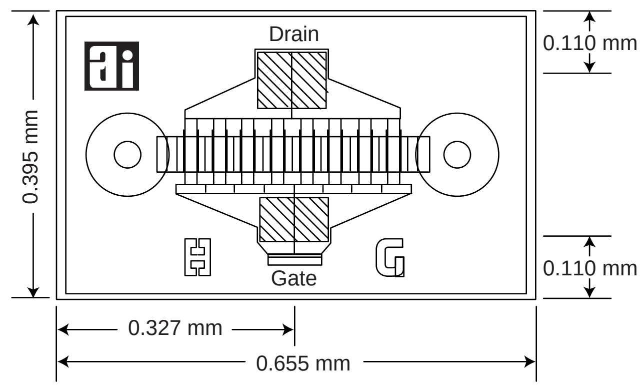
Ka Band Power GaAs MESFET Chip

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



Chip thickness = 0.1 mm.

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.

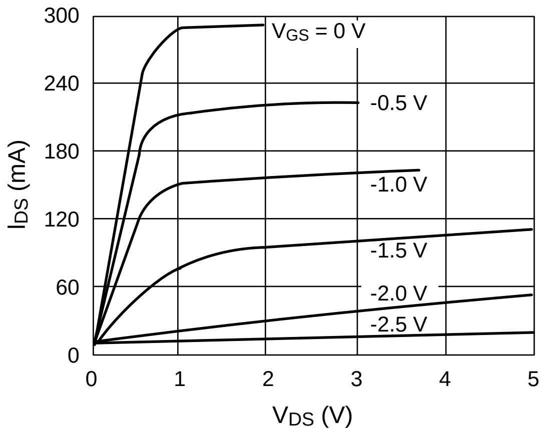
Absolute Maximum Ratings

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

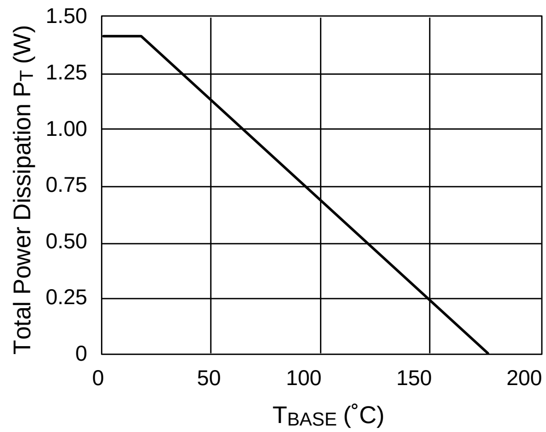
Electrical Specifications at 25°C

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

Typical Performance Data



I-V



Power Derating

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

Freq. (GHz)	S_{11} Mag.	S_{11} Ang.	S_{21} Mag.	S_{21} Ang.	S_{12} Mag.	S_{12} Ang.	S_{22} Mag.	S_{22} Ang.	k	S_{21} (dB)	MAG (dB)
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.