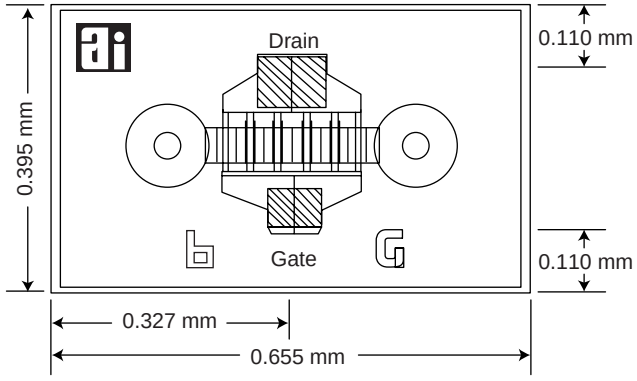
Ka Band Power GaAs MESFET Chip

AFM06P2-000

Features

- 22.5 dBm Output Power @ 18 GHz
- High Associated Gain, 9 dB @ 18 GHz
- High Power Added Efficiency, 23%
- 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 AFM06P2-000 is a high performance power GaAs MESFET chip having a gate length of 0.25 µm and a total gate periphery of 600 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.

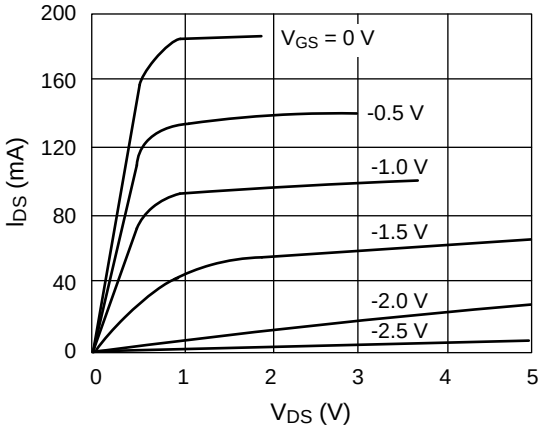
Absolute Maximum Ratings

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})	1 mA
Total Power Dissipation (P_T)	1.1 W
Storage Temperature (T_{ST})	-65 to +150°C
Channel Temperature (T_{CH})	175°C

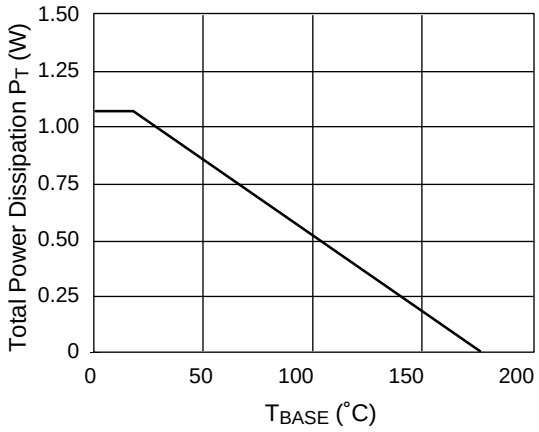
Electrical Specifications at 25°C

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Saturated Drain Current (I_{DSS})	V_{DS} = 2 V, V_{GS} = 0 V	130.0	200.0	270.0	mA
Transconductance (gm)		90.0	120.0		mS
Pinch-off Voltage (V_P)	V_{DS} = 5 V, I_{DS} = 1.5 mA	1.0	3.0	5.0	-V
Gate to Drain Breakdown Voltage (V_{bgd})	I_{GD} = 600 µA	8.0	12.0		-V
Output Power at 1 dB Compression ($P_{1\ dB}$)	V_{DS} = 5 V, I_{DS} = 100 mA, F = 18 GHz		22.5		dBm
Gain at 1 dB Compression ($G_{1\ dB}$)			9.0		dB
Power Added Efficiency (ηadd)			23.0		%
Output Power at 1 dB Compression ($P_{1\ dB}$)	V_{DS} = 5 V, I_{DS} = 100 mA, F = 30 GHz		22.0		dBm
Gain at 1 dB Compression ($G_{1\ dB}$)			4.5		dB
Power Added Efficiency (ηadd)			15.0		%
Thermal Resistance (Θ_{JC})	T_{BASE} = 25°C			160.0	°C/W

Typical Performance Data



I-V



Power Derating

Typical S-Parameters (V_{DS} = 5 V, I_{DS} = 120 mA)

Freq. (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		k	MAG (dB)
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.		
2	0.943	-63.246	7.140	136.7680	0.031	53.027	0.340	-48.993	0.160	23.563
3	0.905	-86.534	6.080	120.3940	0.040	39.817	0.340	-66.574	0.240	21.828
4	0.876	-104.502	5.155	107.1240	0.045	29.754	0.346	-69.967	0.321	20.614
5	0.856	-118.460	4.405	96.0760	0.047	21.969	0.360	-90.387	0.403	19.690
6	0.843	-129.538	3.807	86.5660	0.048	15.797	0.368	-98.818	0.486	18.953
7	0.835	-138.558	3.328	68.1380	0.049	10.797	0.399	-105.932	0.569	18.348
8	0.830	-146.091	2.940	60.4900	0.048	6.688	0.423	-112.160	0.643	17.841
9	0.827	-152.503	2.619	63.4278	0.048	3.296	0.448	-117.776	0.693	1.410
10	0.825	-158.149	2.352	56.8180	0.046	0.510	0.473	-122.953	0.825	17.041
11	0.825	-163.140	2.125	50.5720	0.045	-1.735	0.499	-127.805	0.913	16.721
12	0.825	-167.642	1.931	44.6260	0.044	-3.476	0.524	-132.404	1.000	16.350
13	0.826	-171.656	1.672	38.9370	0.042	-4.733	0.549	-136.801	1.088	14.389
14	0.828	-175.561	1.615	33.4710	0.051	-5.512	0.564	-141.028	1.174	13.447
15	0.390	-169.110	1.485	28.2060	0.039	-5.818	0.598	-145.111	1.257	12.715
16	0.832	177.551	1.370	23.1220	0.038	-5.654	0.621	-149.064	1.336	12.105
17	0.834	167.439	1.267	18.2060	0.037	-5.028	0.643	-152.901	1.408	11.581
18	0.837	171.378	1.175	13.4470	0.036	-3.962	0.664	-156.631	1.471	11.124
19	0.839	168.496	1.091	8.8370	0.035	-2.492	0.685	-160.260	1.521	10.724
20	0.842	165.727	1.016	4.3690	0.034	-0.675	0.704	-163.695	1.556	10.373
21	0.845	163.057	0.947	0.0360	0.033	1.413	0.722	-167.239	1.574	10.066
22	0.847	160.476	0.884	-4.6500	0.033	3.678	0.740	-160.596	1.572	9.800
23	0.850	157.974	0.826	-8.2380	0.033	6.018	0.756	-173.869	1.551	9.574
24	0.852	155.545	0.773	-12.1880	0.034	8.333	0.722	-177.061	1.513	9.387
25	0.855	153.182	0.725	-16.0160	0.034	10.535	0.786	179.825	1.460	9.240
26	0.857	150.880	0.680	-19.7270	0.035	12.552	0.800	176.688	1.935	9.138
27	0.860	148.635	0.638	-23.3210	0.036	14.335	0.813	163.824	1.321	9.087
28	0.862	146.443	0.600	-26.8020	0.037	15.855	0.825	160.933	1.243	9.101
29	0.864	144.301	0.564	-30.1710	0.039	17.104	0.837	168.112	1.162	9.208
30	0.866	142.207	0.531	-33.4290	0.040	18.085	0.847	165.360	1.081	9.482
31	0.868	140.157	0.500	-36.5690	0.042	18.811	0.857	162.674	1.002	10.501
32	0.870	138.151	0.471	-39.6210	0.043	19.303	0.867	160.052	0.926	10.367
33	0.872	136.185	0.444	-42.5560	0.045	19.582	0.875	157.494	0.854	9.943
34	0.874	134.259	0.419	-45.3870	0.047	19.671	0.884	154.997	0.785	9.523
35	0.876	132.371	0.395	-48.1120	0.048	19.594	0.891	152.560	0.721	9.109
36	0.878	130.519	0.373	-50.7340	0.050	19.370	0.898	150.818	0.661	8.701
37	0.869	128.603	0.352	-53.2520	0.052	19.020	0.905	147.859	0.605	8.299
38	0.881	126.920	0.333	-55.6670	0.054	18.561	0.911	145.592	0.553	6.904
39	0.883	125.171	0.314	-567.9680	0.056	18.008	0.917	143.378	0.505	6.516
40	0.884	123.453	0.297	-60.1850	0.057	17.375	0.923	141.216	0.461	7.133

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.