

Ka Band Power GaAs MESFET Chip



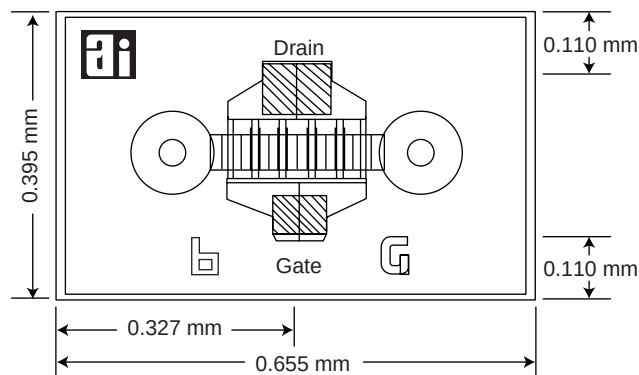
AFM06P2-000

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

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.



Chip thickness = 0.1 mm.

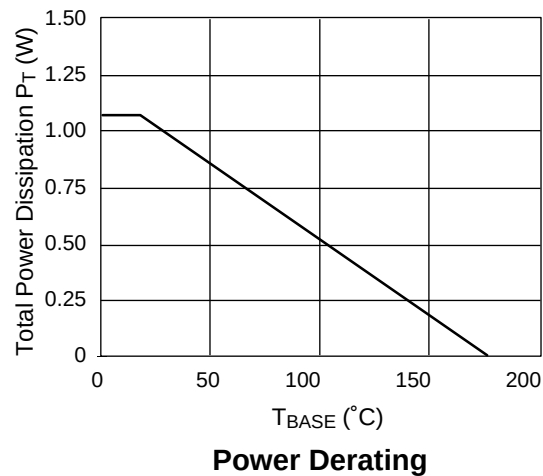
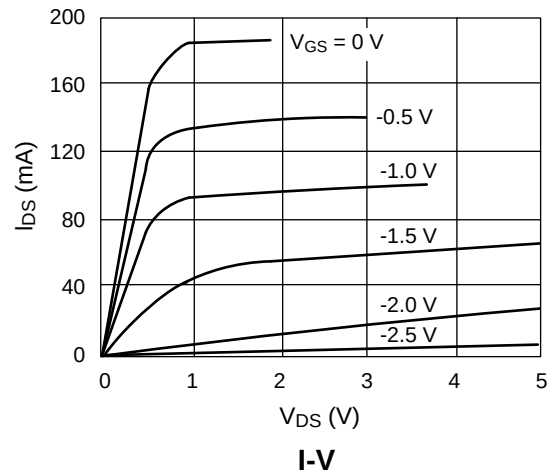
Absolute Maximum Ratings

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})	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})	$V_{DS} = 2 \text{ V}, V_{GS} = 0 \text{ V}$	130.0	200.0	270.0	mA
Transconductance (gm)		90.0	120.0		mS
Pinch-off Voltage (V_P)	$V_{DS} = 5 \text{ V}, I_{DS} = 1.5 \text{ mA}$	1.0	3.0	5.0	-V
Gate to Drain Breakdown Voltage (V_{bgd})	$I_{GD} = 600 \mu\text{A}$	8.0	12.0		-V
Output Power at 1 dB Compression ($P_{1 \text{ dB}}$)	$V_{DS} = 5 \text{ V}, I_{DS} = 100 \text{ mA}, F = 18 \text{ GHz}$		22.5		dBm
Gain at 1 dB Compression ($G_{1 \text{ dB}}$)			9.0		dB
Power Added Efficiency (η_{add})			23.0		%
Output Power at 1 dB Compression ($P_{1 \text{ dB}}$)	$V_{DS} = 5 \text{ V}, I_{DS} = 100 \text{ mA}, F = 30 \text{ GHz}$		22.0		dBm
Gain at 1 dB Compression ($G_{1 \text{ dB}}$)			4.5		dB
Power Added Efficiency (η_{add})			15.0		%
Thermal Resistance (Θ_{JC})	$T_{BASE} = 25^\circ\text{C}$			160.0	$^\circ\text{C/W}$

Typical Performance Data



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

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	-56.9680	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.