Low Noise/Medium Power GaAs MESFET Chip

AFM04P3-000

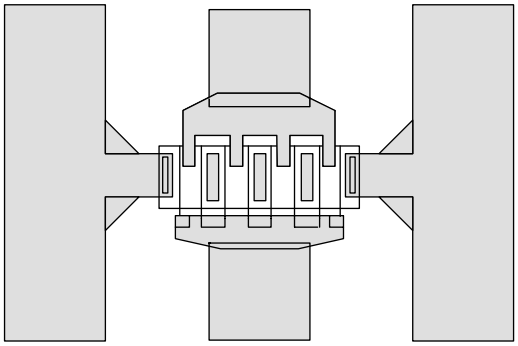
Features

- 21 dBm Output Power @ 18 GHz
- High Associated Gain, 9 dB @ 18 GHz
- High Power Added Efficiency, 25%
- Broadband Operation, DC–26 GHz
- 0.25 µm Ti/Pd/Au Gates
- Passivated Surface

Description

The AFM04P3-000 is a high performance power GaAs MESFET chip having a gate length of 0.25 µm and a total gate periphery of 400 µm. The device has excellent gain and power performance through 26 GHz, making it suitable for a wide range of commercial and military applications in oscillator and amplifier circuits. The device employs Ti/Pd/Au gate metallization and surface passivation to ensure a rugged, reliable part.

Chip Layout



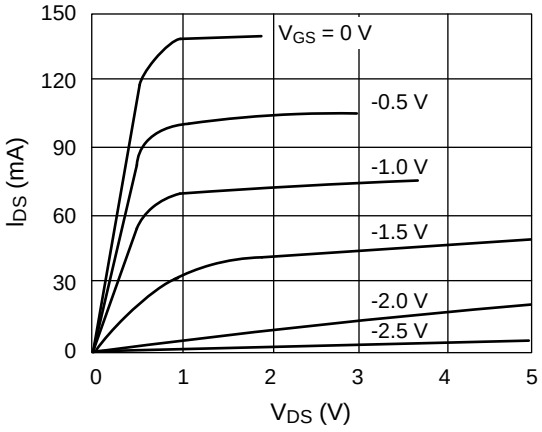
Absolute Maximum Ratings

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)	700 mW
Storage Temperature (T_{ST})	-65 to +150°C
Channel Temperature (T_{CH})	175°C

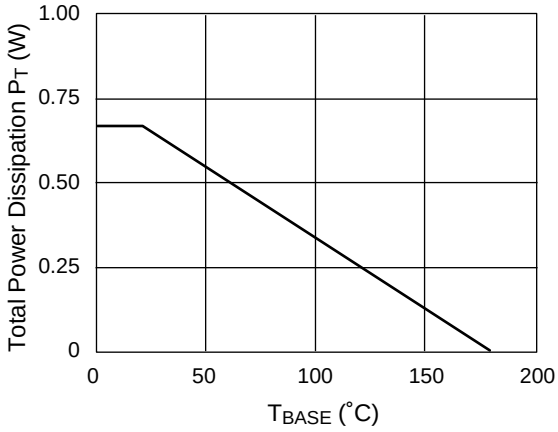
Electrical Specifications at 25°C

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Saturated Drain Current (I_{DSS})	V_{DS} = 2 V, V_{GS} = 0 V	90.0	140.0	190.0	mA
Transconductance (gm)		60.0	80.0		mS
Pinch-off Voltage (V_P)	V_{DS} = 5 V, I_{DS} = 1 mA	1.0	3.0	5.0	-V
Gate to Drain Breakdown Voltage (V_{bgd})	I_{GD} = -400 µA	8.0	12.0		-V
Noise Figure (NF)	V_{DS} = 2 V, I_{DS} = 25 mA, F = 4 GHz		0.6		dB
Associated Gain (G_A)			13.8		dB
Output Power at 1 dB Compression ($P_{1\ dB}$)	V_{DS} = 5 V, I_{DS} = 70 mA, F = 18 GHz		21.0		dBm
Gain at 1 dB Compression ($G_{1\ dB}$)			9.0		dB
Power Added Efficiency (ηadd)			25.0		%
Thermal Resistance (Θ_{JC})	T_{BASE} = 25°C			250.0	°C/W

Typical Performance Data



I-V



Power Derating

Typical S-Parameters (V_{DS} = 5 V, I_{DS} = 70 mA)

Freq. (GHz)	S_{11}		S_{21}		S_{12}		S_{22}		k	MAG (dB)
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.		
2	0.969	-37.191	5.040	153.579	0.029	68.605	0.550	-18.296	0.100	22.364
3	0.958	-54.069	4.740	141.521	0.041	59.064	0.533	-26.529	0.150	20.613
4	0.935	-69.318	4.398	130.518	0.051	50.587	0.514	-33.959	0.200	19.278
5	0.913	-82.889	4.050	120.568	0.058	43.171	0.497	-40.630	0.250	18.247
6	0.893	-94.881	3.719	111.573	0.064	36.722	0.482	-46.663	0.299	17.658
7	0.877	-105.468	3.415	103.398	0.068	31.107	0.471	-52.183	0.349	17.104
8	0.863	-114.843	31.420	95.911	0.071	26.196	0.462	-57.310	0.398	16.464
9	0.852	-123.189	2.898	88.991	0.073	21.873	0.456	-62.138	0.447	15.986
10	0.843	-130.670	2.683	82.540	0.074	18.042	0.453	-66.738	0.496	15.566
11	0.836	-137.422	2.492	67.477	0.075	14.624	0.452	-71.161	0.544	15.193
12	0.831	-143.563	2.322	70.736	0.076	11.558	0.453	-75.442	0.593	14.858
13	0.826	-149.188	2.171	65.267	0.076	8.796	0.455	-79.606	0.641	14.447
14	0.823	-154.374	2.036	60.027	0.076	6.302	0.459	-83.671	0.688	14.285
15	0.821	-159.187	1.914	54.985	0.065	4.047	0.464	-87.648	0.735	14.037
16	0.819	-163.679	1.805	50.114	0.074	2.007	0.470	-91.546	0.781	13.811
17	0.818	-167.895	1.605	45.393	0.074	0.167	0.477	-95.372	0.827	13.063
18	0.817	171.872	1.615	40.805	0.073	-1.486	0.484	-99.129	0.872	13.412
19	0.817	-175.369	1.532	36.335	0.072	-2.961	0.492	-102.821	0.916	13.235
20	0.817	-179.221	1.456	31.973	0.071	-4.266	0.501	-106.451	0.959	13.071
21	0.818	177.359	1.386	27.760	0.060	-5.405	0.510	-110.021	1.001	12.753
22	0.819	174.083	1.321	23.535	0.069	-6.382	0.520	-113.533	1.041	11.534
23	0.820	170.936	1.261	19.445	0.068	-7.201	0.530	-116.989	1.069	10.915
24	0.821	167.905	1.205	15.343	0.067	-7.863	0.540	-120.389	1.116	10.431
25	0.822	164.969	1.512	11.498	0.066	-8.371	0.551	-123.737	1.150	10.024
26	0.824	162.148	1.103	6.633	0.065	-8.728	0.561	-127.031	1.181	9.671

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.