HiFET
High Voltage GaAs FET
DC-12 GHz

AM030WH2-BI-R
AM030WH2-BI-G-R
May 2014
Rev 3

DESCRIPTION

AMCOM's AM030WH2-BI-R is a part of the BI series of GaAs HiFETs. The HiFET is a partially matched patented device configuration for high voltage, high power and broadband applications. This part has a total device periphery of 6mm (Two 3mm FETs in series). The AM030WH2-BI-R is designed for high power microwave applications, operating up to 12 GHz. It is also an ideal driver for larger power devices. The BI series uses a specially designed ceramic package with bent (BI-G) or straight (BI) leads in a drop-in mounting style. The flange at the bottom of the package serves simultaneously as DC ground, RF ground, and thermal path. This part is RoHS compliant.

FEATURES

- High Frequency Operation up to 12 GHz
- High Gain & High Power, P_{1dB}=34.5 dBm @3.5GHz
- Surface Mountable
- Bottom ground for Effective Heat Removal

APPLICATIONS

- Wireless Local Loop Network
- Cellular Radio Communications
- WLAN, Repeaters & HYPERLAN
- C-Band VSAT
- Radar

RF PERFORMANCE @ 3.5 GHz, (V_{dd} = 14V, I_{ds} = 0.45A)

Parameters	MIN	TYP
P_{1dB}* (dBm)	33.5	34.5
Eff @ P_{1dB}	-	43%
P_{3dB}* (dBm)	35	36
Eff @ P_{3dB}	-	48%
Small Signal Gain (dB)	15.5	18
IP3 (dBm)	-	44

ABSOLUTE MAXIMUM RATING

Parameters	Symbol	Rating
Drain-Source Voltage (V)	V_{dd}	18
Gate-Source Voltage (V)	V_{gs}	-5
Drain Current (A)	I_{ds}	1.2
Continuous Dissipation At Room Temp. (W)	P_t	8.3
Operating Temp. (^oC)	T_A	-55 to +85
Max. Channel Temp. (^oC)	T_{ch}	+175

DC PARAMETERS

Parameters	Conditions	MIN	TYP	MAX
Saturation Current I_{dss} (A)	V_{dd}=6V, Vgs=0V	0.6	0.9	1.2
Pinch-off Voltage V_p (V)	V_{dd}=6V, Ids=2.5% Idss	-2.2	-1.7	-1.2
Drain to Gate Breakdown Voltage BV_{gd} (V)	I_{dg} = 3mA	22	30	
Thermal Resistance ($^oC/W$)			17	

*Note: There is an internal DC resistor from output to ground,therefore leakage gate current should be measured only at input lead.

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SMALL SIGNAL MEASUREMENTS

S-parameters at 14 V, 0.3 A*

Freq(GHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
0.1	0.98	-34.55	42.72	158.77	0.005	74.31	0.348	-23.57
0.2	0.934	-60.68	37.056	144.3	0.009	56.14	0.297	-34.25
0.3	0.898	-82.8	32.097	131.7	0.009	40.93	0.258	-42.33
0.4	0.873	-100.9	27.843	120.98	0.011	28.66	0.23	-47.81
0.5	0.859	-114.98	24.293	112.13	0.012	19.35	0.214	-50.69
0.6	0.854	-125.05	21.448	105.16	0.012	12.99	0.209	-50.97
0.7	0.852	-133.12	19.188	99.14	0.012	8.89	0.215	-51.31
0.8	0.849	-139.92	17.335	93.62	0.012	5.31	0.226	-52.85
0.9	0.848	-145.86	15.76	88.4	0.011	2.06	0.241	-55.46
1	0.849	-150.74	14.44	83.62	0.011	-0.4	0.26	-58.45
1.5	0.855	-167.65	10.008	62.93	0.009	-5.25	0.364	-77.12
2	0.852	-177.46	7.542	45.91	0.007	1.1	0.462	-94.97
2.5	0.852	173	6.019	30.48	0.007	17	0.539	-108.2
3	0.851	163.56	5.022	16.58	0.008	36.25	0.593	-119.2
3.5	0.848	154.55	4.346	3.25	0.01	48.71	0.642	-128.69
4	0.845	145.13	3.848	-9.88	0.014	51.73	0.679	-138.09
4.5	0.84	135.39	3.507	-22.73	0.019	50.4	0.711	-146.61
5	0.832	125.05	3.25	-36	0.025	45.24	0.742	-155.55
5.5	0.819	113.24	3.069	-49.72	0.032	38.43	0.767	-164.06
6	0.803	99.34	2.957	-64.08	0.041	30.1	0.794	-172.34
6.5	0.787	83.3	2.881	-79.29	0.051	20.03	0.818	179.27
7	0.772	64.52	2.836	-95.58	0.063	8.15	0.842	170.35
7.5	0.771	44.12	2.805	-112.91	0.078	-4.69	0.869	160.17
8	0.787	22.8	2.787	-131.29	0.095	-19.2	0.894	147.85
8.5	0.822	1.57	2.775	-151.22	0.115	-35.66	0.922	132.12
9	0.874	-19.46	2.745	-173.51	0.135	-55.07	0.951	111.23
9.5	0.938	-40.09	2.64	161.61	0.152	-77.18	0.972	84.2
10	0.989	-60.51	2.377	134.47	0.158	-100.75	0.978	52.27
10.5	1.018	-78.9	1.993	107.18	0.152	-124.69	0.976	17.89
11	1.017	-94.44	1.556	81.97	0.136	-146.64	0.971	-14.76
11.5	1.005	-106.94	1.163	59.43	0.115	-166.04	0.964	-43.99
12	0.985	-117	0.855	40.1	0.094	178.6	0.968	-68.07

* S2P file downloadable from the web : http://www.amcomusa.com/products/rftrans.html

Note: The device is conditional stable at high frequencies, please pay attention to amplifier design.

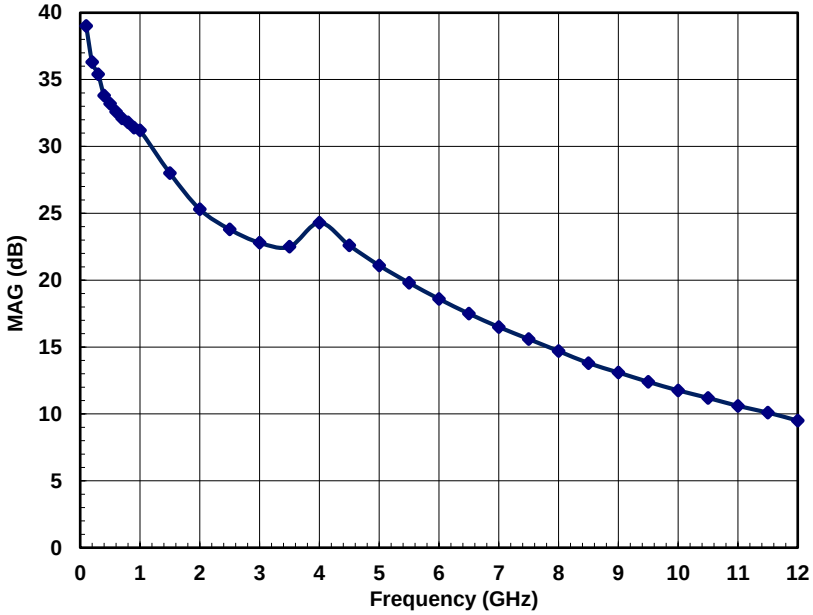
S-parameters at 14 V, 0.45 A*

Freq(GHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
0.1	0.983	-34.92	43.493	159.39	0.005	58.42	0.357	-20.63
0.2	0.937	-60.65	37.611	144.78	0.009	45.53	0.308	-30.7
0.3	0.901	-82.48	32.481	132.05	0.010	34.58	0.271	-38.35
0.4	0.875	-100.43	28.105	121.22	0.011	25.56	0.246	-43.57
0.5	0.859	-114.48	24.482	112.27	0.011	18.48	0.232	-46.37
0.6	0.853	-124.64	21.612	105.21	0.011	13.33	0.230	-46.75
0.7	0.852	-132.72	19.353	99.13	0.011	8.00	0.237	-47.38
0.8	0.850	-139.55	17.471	93.50	0.011	4.89	0.249	-49.50
0.9	0.849	-145.48	15.885	88.22	0.011	1.02	0.263	-52.67
1	0.850	-150.44	14.545	83.36	0.010	-1.00	0.284	-55.73
1.5	0.857	-167.4	10.066	62.46	0.009	-5.22	0.387	-75.27
2	0.854	-177.29	7.557	45.24	0.007	2.30	0.482	-93.76
2.5	0.854	173.12	6.025	29.72	0.006	20.88	0.559	-107.08
3	0.853	163.67	5.020	15.77	0.007	40.13	0.611	-118.21
3.5	0.850	154.63	4.341	2.39	0.010	52.96	0.659	-127.84
4	0.847	145.19	3.841	-10.85	0.014	54.77	0.697	-137.31
4.5	0.843	135.46	3.496	-23.76	0.019	52.73	0.729	-145.98
5	0.835	125.07	3.237	-37.09	0.026	47.67	0.761	-155.03
5.5	0.822	113.22	3.056	-50.90	0.033	40.31	0.787	-163.54
6	0.806	99.37	2.941	-65.33	0.041	31.73	0.815	-171.91
6.5	0.791	83.23	2.864	-80.57	0.052	21.58	0.841	179.6
7	0.777	64.37	2.820	-96.95	0.064	9.70	0.867	170.64
7.5	0.776	44.01	2.789	-114.35	0.079	-3.23	0.897	160.4
8	0.792	22.64	2.773	-132.86	0.097	-17.91	0.927	148.04
8.5	0.828	1.33	2.765	-152.93	0.118	-34.59	0.961	132.19
9	0.882	-19.62	2.742	-175.46	0.139	-54.12	0.999	111.16
9.5	0.946	-40.49	2.640	159.18	0.157	-76.54	1.030	83.90
10	0.997	-60.98	2.371	131.57	0.164	-100.75	1.041	51.87
10.5	1.022	-79.45	1.974	103.82	0.157	-125.11	1.035	17.67
11	1.018	-94.95	1.527	78.12	0.140	-147.66	1.019	-15.39
11.5	1.004	-107.32	1.132	55.41	0.117	-167.15	1.001	-44.41
12	0.983	-117.22	0.825	35.98	0.095	177.5	0.994	-68.43

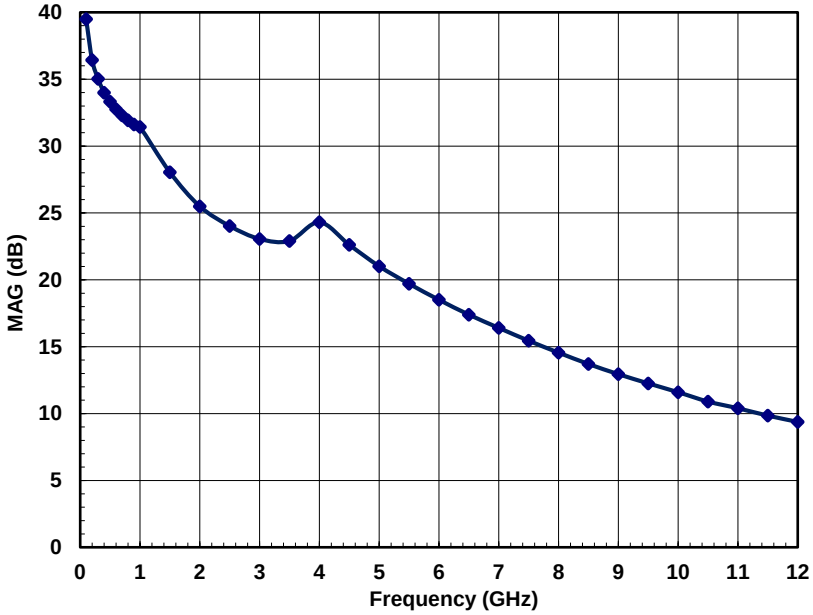
* S2P file downloadable from the web : http://www.amcomusa.com/products/rftrans.html

Note: The device is conditional stable at high frequencies, please pay attention to amplifier design.

MAXIMUM AVAILABLE GAIN (14V,0.3A)



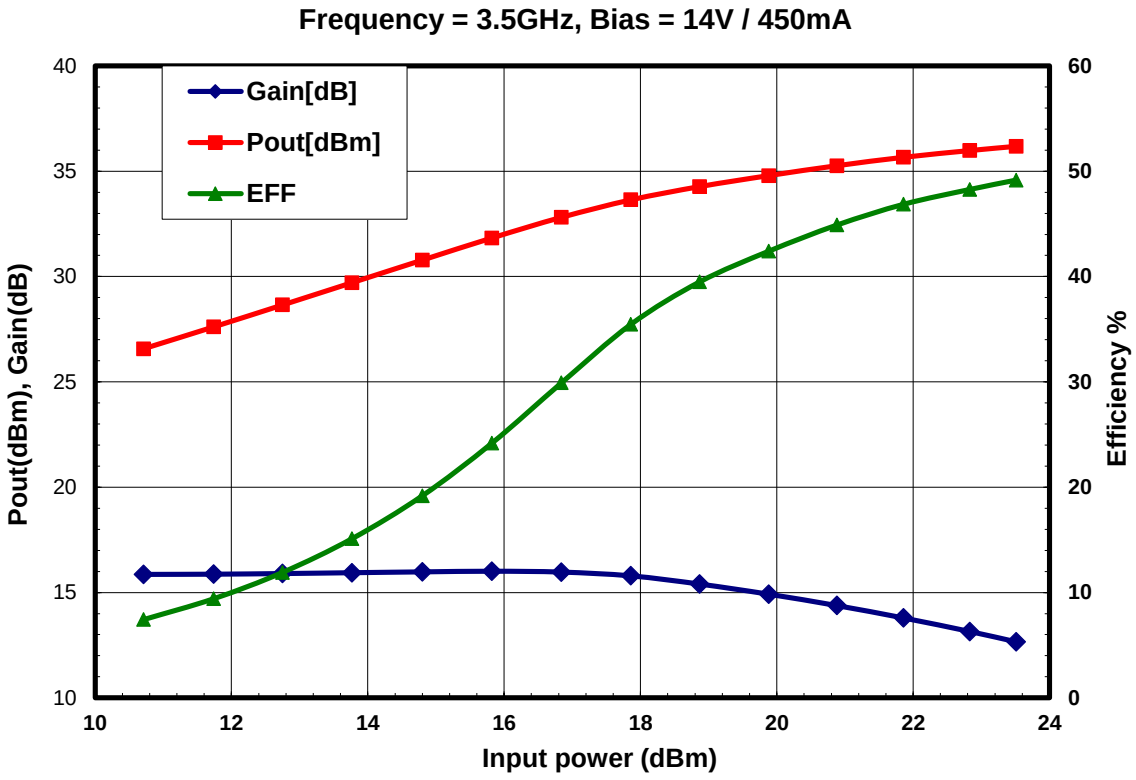
MAXIMUM AVAILABLE GAIN (14V,0.45A)



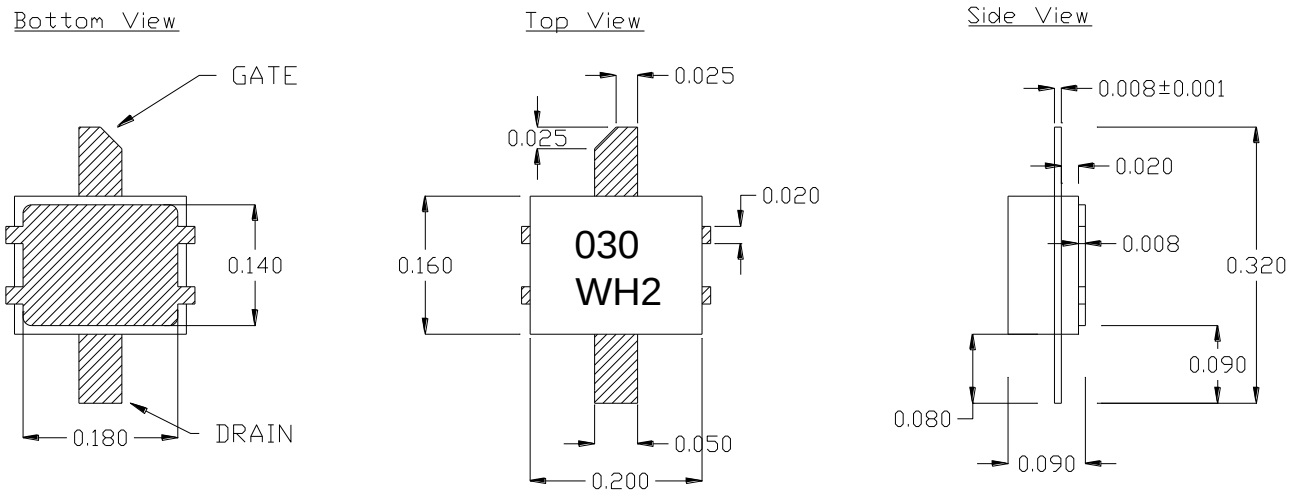
POWER MEASUREMENTS

OPTIMUM LOAD TEST (14V/450mA)

Frequency	MAG(Γ_L)	ANG(Γ_L)	Gain (dB)	P_{1dB} (dBm)	Eff @ P_{1dB}	P_{3dB} (dBm)	Eff @ P_{3dB}
2 GHz	0.38	164	22	35.1	45%	35.8	48%
3.5 GHz	0.37	174	18	34.8	43%	36	48%
4 GHz	0.38	-178	17	35	44%	35.9	48%
6 GHz	0.5	-150	15	34.7	41%	35.4	43%
8 GHz	0.18	-110	12	34.3	36%	35.1	37%

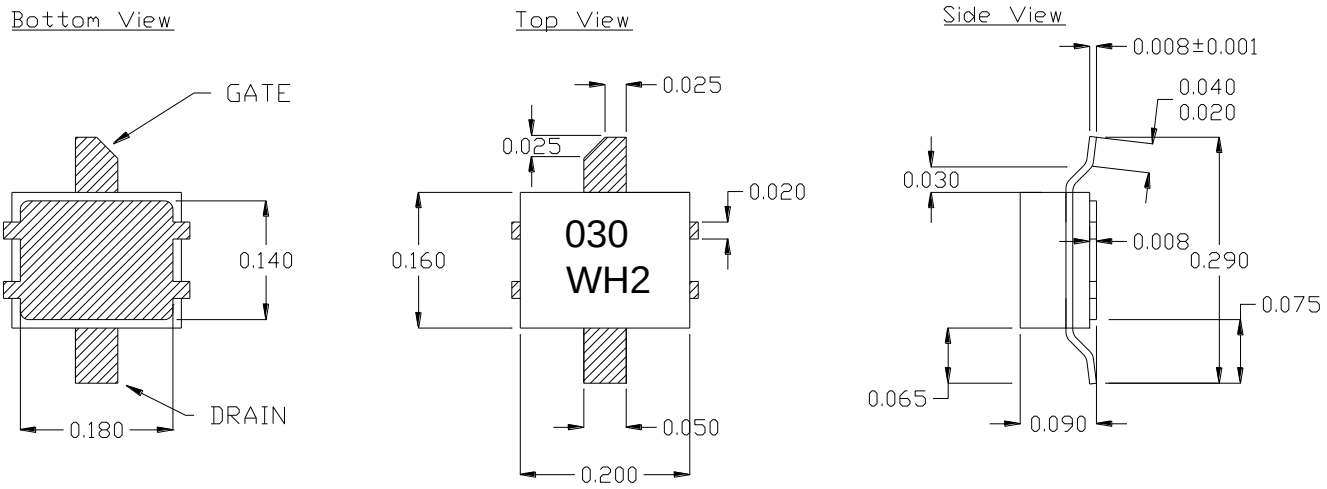


PACKAGE OUTLINE



* All Dimensions are in inch

AM030WH2-BI-R (Straight Leads)



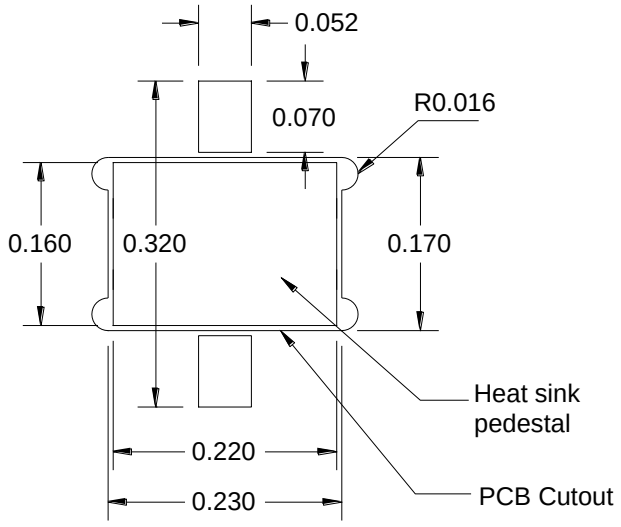
* All Dimensions are in inch

AM030WH2-BI-G-R (Bent Leads)

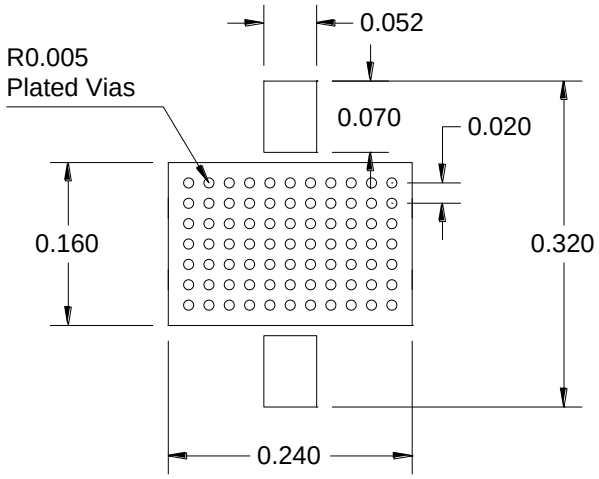
MOUNTING INSTRUCTIONS

The device may dissipate several watts of power. It is important to provide a good heat sink to dissipate the heat. There are two options of mounting the device, as shown below. The most effective way is to mount the device to a heat sink pedestal (Option 1). We strongly recommend this way for high power device. The other option, which is mounted directly on PCB, is to add sufficient number of plated through via holes to the PCB. The base of the device is soldered to the PCB (Option 2). The via hole wall should be plated by at least 1 oz thick (1.5 mil) of high thermal conductivity copper to conduct the heat from the top of PCB to the bottom of PCB. Also fill the via holes with solder to help conducting the heat.

Option 1 for Straight Leads (Recommended)



Option 2 for Bent Leads



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