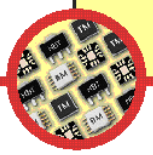
Ceramic Packaged GaAs Power pHEMT
DC-12 GHz

AM010WX-BI-R
AM010WX-BI-G-R
December 2014
Rev 2



DESCRIPTION

AMCOM's AM010WX-BI-R is a discrete GaAs pHEMT that has a total gate width of 1.0mm. It is in a ceramic BI package for operating up to 12 GHz. 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
- Gain=16 dB, P_{1dB}=28.5dBm, Eff = 53% @ 4GHz
- Surface Mountable
- Bottom ground for Effective Heat Removal

APPLICATIONS

- Wireless Local Loop
- Driver Amplifier
- Cellular Radio
- Repeaters
- C-Band VSAT
- Radar

RF PERFORMANCE

Load pull @ 4 GHz, (V_{ds} = 8V, I_{ds} =150mA)

Parameters	MIN	TYP
P_{1dB}* (dBm)	27.5	28.5
Eff @ P_{1dB}	-	53%
P_{3dB}* (dBm)	29	30
Eff @ P_{3dB}	-	57%
Small Signal Gain (dB)	14	16
IP3 (dBm)	-	37

* Power typically remains the same as frequency changes.

ABSOLUTE MAXIMUM RATING

Parameters	Symbol	Rating
Drain-Source Voltage (V)	V_{ds}	10
Gate-Source Voltage (V)	V_{gs}	-5
Drain Current (mA)	I_{ds}	360
Continuous Dissipation At Room Temp. (W)	P_t	1.9
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} (mA)	V_{ds}=3V, Vgs=0V	240	300	360
Pinch-off Voltage V_p (V)	V_{ds}=3V, Ids=2.5% Idss	-1.6	-1.2	-0.8
Drain to Gate Breakdown Voltage BV_{gd} (V)	I_{dg} = 1mA	15	20	
Thermal Resistance ($^oC/W$)			80	

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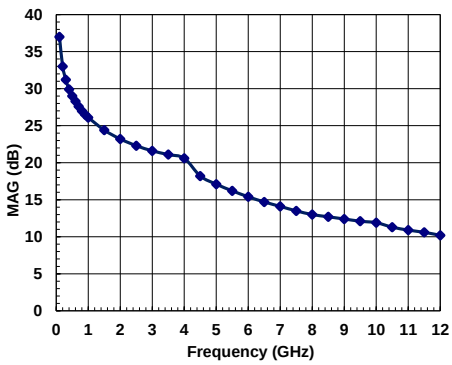
SMALL SIGNAL MEASUREMENTS

S-Parameters for AM010WX-BI-R. Vds = 8V, Vgs = - 1V, Ids = 100mA*

Freq(GHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
0.1	0.996	-14.34	19.526	170.26	0.004	74.68	0.574	-9.46
0.2	0.979	-27.04	18.641	161.47	0.009	69.50	0.564	-16.52
0.3	0.962	-39.12	17.774	153.13	0.013	64.18	0.553	-23.31
0.4	0.945	-50.58	16.927	145.25	0.017	58.72	0.539	-29.85
0.5	0.929	-61.41	16.098	137.82	0.020	53.11	0.524	-36.13
0.6	0.913	-71.62	15.288	130.85	0.023	47.37	0.507	-42.15
0.7	0.897	-81.37	14.444	124.18	0.025	42.04	0.491	-47.84
0.8	0.885	-90.27	13.645	118.03	0.027	36.72	0.476	-53.1
0.9	0.871	-98.53	12.871	112.28	0.029	31.98	0.462	-57.83
1	0.860	-106.09	12.15	106.89	0.030	27.71	0.451	-62.21
1.5	0.821	-135.32	9.183	84.32	0.033	10.97	0.418	-80.21
2	0.797	-152.58	7.287	66.73	0.035	-0.86	0.426	-93.79
2.5	0.770	-167.85	6.161	51.94	0.036	-10.03	0.442	-102.72
3	0.747	178.14	5.458	37.81	0.037	-17.80	0.451	-111.22
3.5	0.721	164.23	4.937	24.10	0.039	-25.31	0.457	-119.16
4	0.695	149.15	4.558	10.03	0.040	-32.34	0.460	-126.91
4.5	0.669	133.54	4.261	-3.99	0.041	-39.15	0.463	-134.18
5	0.646	117.07	4.017	-18.52	0.042	-45.43	0.467	-141.86
5.5	0.619	99.56	3.818	-33.44	0.044	-52.68	0.467	-148.93
6	0.587	79.48	3.67	-49.21	0.047	-60.36	0.464	-155.66
6.5	0.559	55.06	3.542	-66.39	0.049	-69.17	0.455	-162.54
7	0.549	26.25	3.386	-84.835	0.052	-79.74	0.436	-169.14
7.5	0.576	-4.86	3.168	-104.46	0.054	-91.87	0.402	-175.18
8	0.639	-32.47	2.882	-123.96	0.055	-103.57	0.355	-179.56
8.5	0.713	-54.28	2.577	-142.68	0.054	-115.22	0.298	179.72
9	0.779	-70.57	2.285	-160.37	0.053	-126.34	0.242	-175.59
9.5	0.833	-84.46	2.016	-177.53	0.051	-137.36	0.201	-160.67
10	0.875	-96.27	1.772	165.69	0.049	-147.76	0.209	-140.02
10.5	0.901	-107.71	1.546	149.22	0.046	-158.19	0.265	-126.12
11	0.923	-118.72	1.330	133.22	0.042	-167.17	0.342	-122.66
11.5	0.942	-129.29	1.129	117.37	0.037	-178.1	0.426	-125.08
12	0.954	-138.9	0.945	102.21	0.031	177.41	0.507	-131.31

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

Maximum Available Gain (8V,100mA)

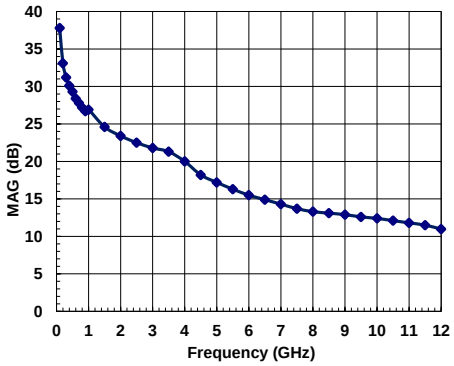


S-Parameters for AM010WX-BI-R. Vds = 8V, Vgs = - 0.8V, Ids = 150mA*

Freq(GHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
0.1	0.997	-14.11	19.572	170.24	0.007	84.17	0.584	-9.09
0.2	0.979	-26.59	18.722	161.66	0.009	75.36	0.575	-16.14
0.3	0.962	-38.57	17.884	153.42	0.013	67.24	0.564	-22.94
0.4	0.947	-50.05	17.058	145.52	0.017	59.82	0.552	-29.47
0.5	0.932	-61.02	16.245	137.95	0.019	53.09	0.537	-35.75
0.6	0.918	-71.49	15.444	130.72	0.022	47.05	0.52	-41.77
0.7	0.904	-80.91	14.59	124.33	0.024	42.02	0.504	-46.9
0.8	0.891	-89.61	13.785	118.27	0.026	37.03	0.491	-51.94
0.9	0.878	-98.12	13.019	112.29	0.028	32.33	0.477	-56.78
1	0.865	-105.74	12.274	106.85	0.029	27.7	0.465	-60.92
1.5	0.825	-134.94	9.283	84.24	0.032	10.84	0.431	-78.54
2	0.793	-152.04	7.357	67.24	0.034	-0.02	0.434	-93.08
2.5	0.771	-167.3	6.191	51.9	0.035	-9.69	0.445	-103.01
3	0.75	178.56	5.42	38.06	0.035	-17.2	0.448	-111.87
3.5	0.726	164.94	4.904	24.42	0.036	-24.48	0.462	-119.32
4	0.703	150.49	4.517	10.56	0.037	-30.82	0.469	-127.04
4.5	0.676	135.17	4.24	-3.28	0.039	-37.35	0.474	-133.82
5	0.647	118.96	4.018	-17.74	0.04	-43.3	0.482	-141.5
5.5	0.615	100.63	3.842	-32.98	0.042	-50.12	0.483	-148.59
6	0.583	79.64	3.699	-48.9	0.044	-58.08	0.482	-155.5
6.5	0.56	55.03	3.552	-65.94	0.047	-66.47	0.474	-162.37
7	0.555	26.94	3.387	-84.01	0.05	-76.17	0.455	-168.65
7.5	0.583	-1.5	3.171	-102.77	0.052	-86.85	0.423	-174.76
8	0.64	-27.42	2.918	-121.47	0.053	-97.79	0.378	-179.48
8.5	0.708	-49.23	2.647	-139.88	0.054	-108.65	0.319	177.93
9	0.773	-67.29	2.374	-158.08	0.054	-120.68	0.254	178.59
9.5	0.828	-82.49	2.101	-175.85	0.053	-132.38	0.194	-170.65
10	0.873	-95.88	1.842	166.99	0.051	-143.7	0.176	-147.48
10.5	0.907	-107.55	1.598	150.14	0.047	-153.91	0.218	-127.51
11	0.932	-118.15	1.372	133.82	0.044	-164.11	0.301	-121.55
11.5	0.95	-127.91	1.168	117.9	0.039	-174.73	0.393	-123.53
12	0.96	-136.96	0.983	102.56	0.034	179.54	0.483	-129.75

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

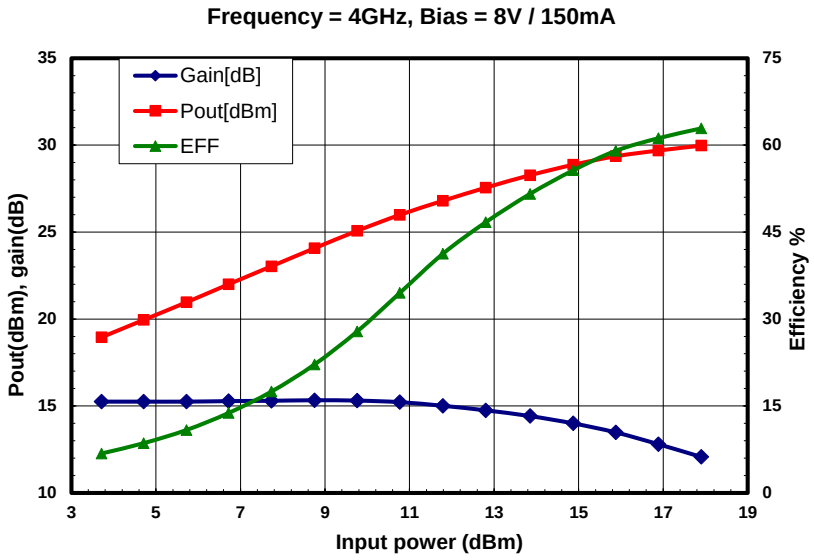
Maximum Available Gain (8V,150mA)

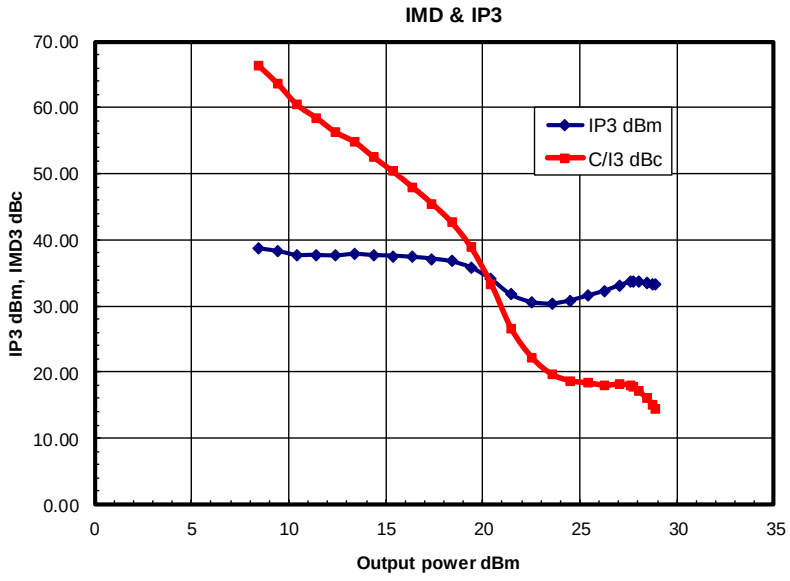


POWER MEASUREMENTS

OPTIMUM LOAD TEST (8V/150mA)

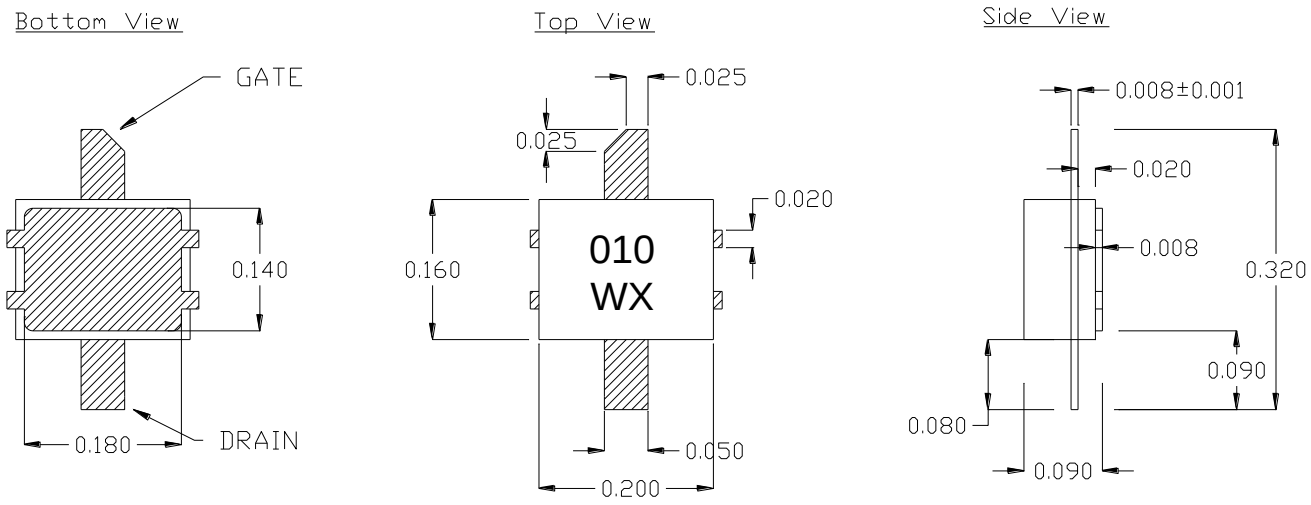
Frequency	MAG(Γ_L)	ANG(Γ_L)	Gain* (dB)	P_{1dB} (dBm)	Eff @ P_{1dB}	P_{3dB} (dBm)	Eff @ P_{3dB}
2 GHz	0.05	110	20	28.5	54%	29.3	60%
3.5 GHz	0.2	114	18	28.4	53%	29.6	61%
4 GHz	0.17	115	16	28.8	53%	30	57%
6 GHz	0.19	102	13	29.4	51%	30.2	52%
8 GHz	0.27	97	11	29.5	51%	30.2	53%
10 GHz	0.48	119	10	28.5	44%	29.4	44%





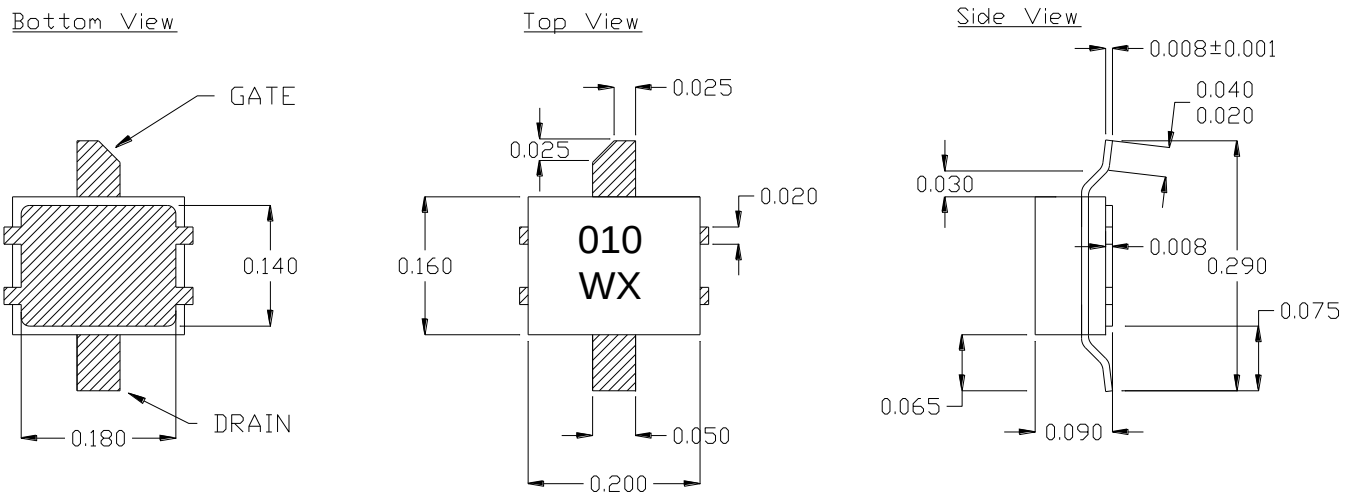
*Small signal power gain at optimum load.

PACKAGE OUTLINE



* All Dimensions are in inch

AM010WX-BI-R (Straight Leads)



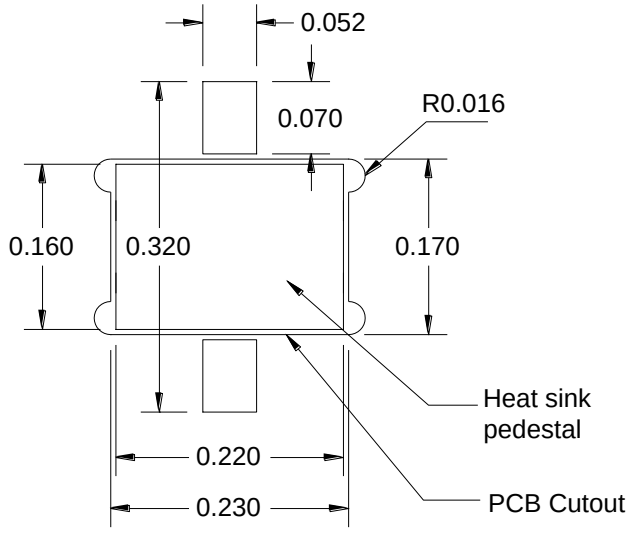
* All Dimensions are in inch

AM010WX-BI-G-R (Bent Leads)

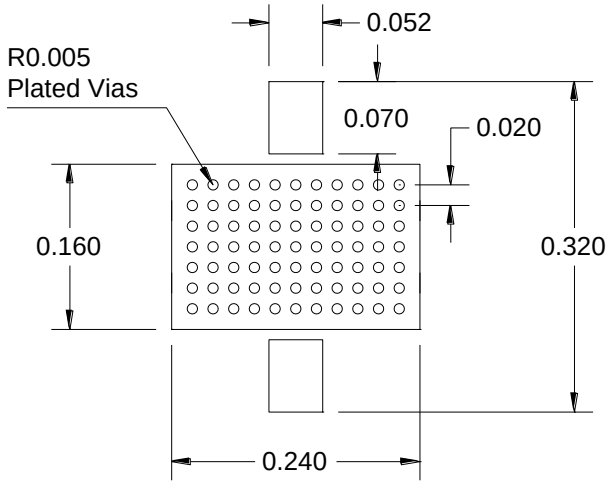
MOUNTING INSTRUCTIONS

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 amplifier, as shown. The most effective way is to mount the amplifier 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

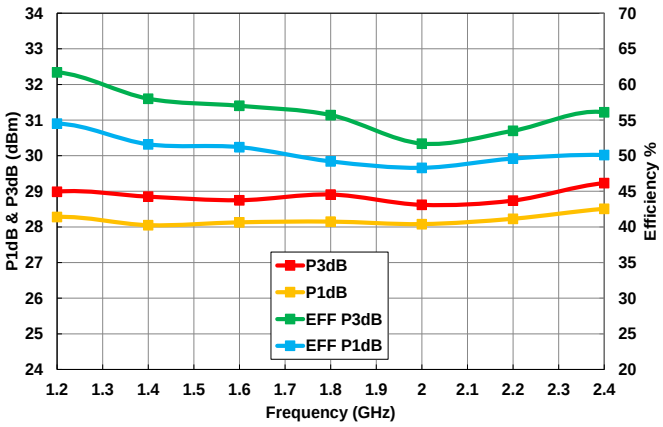


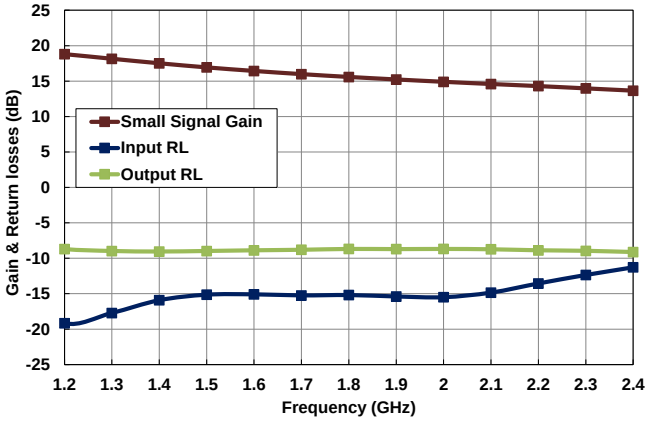
* All Dimensions are in inch

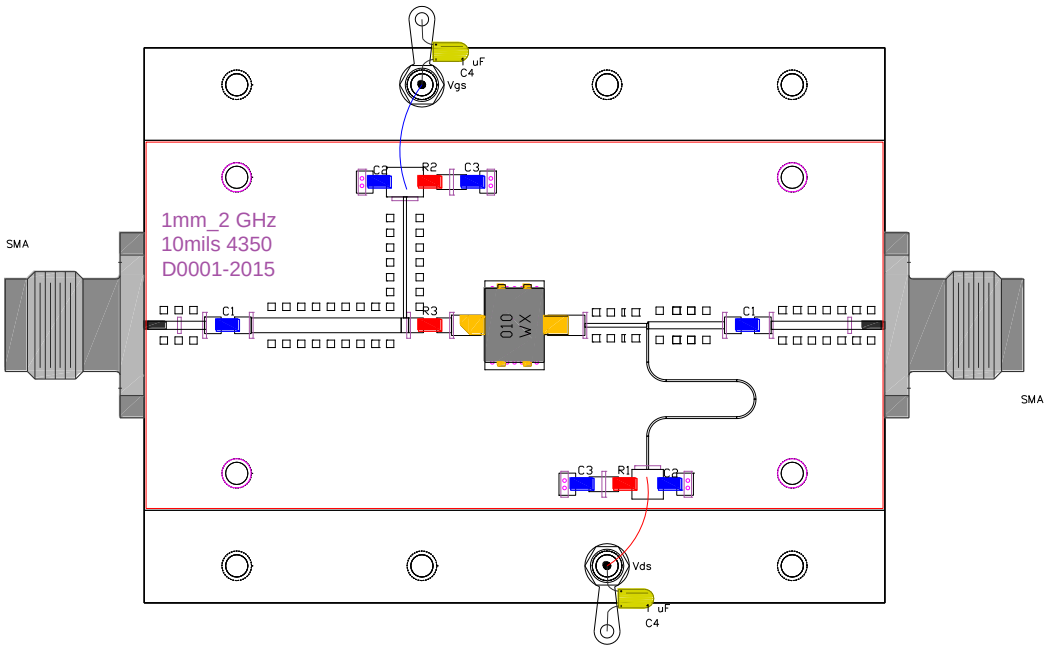
TEST CIRCUITS

A) 1.2 GHz to 2.4 GHz

8V/150mA



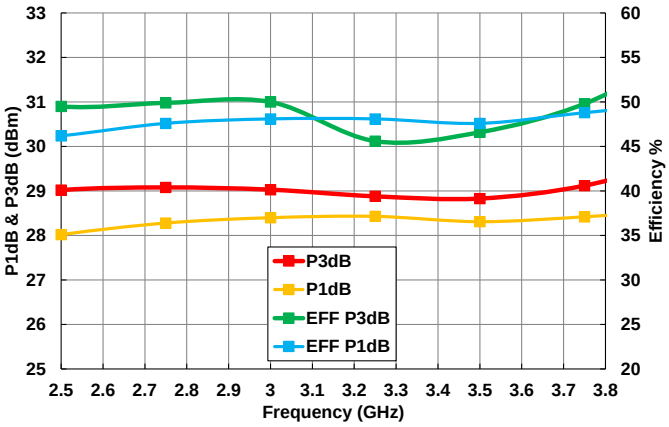


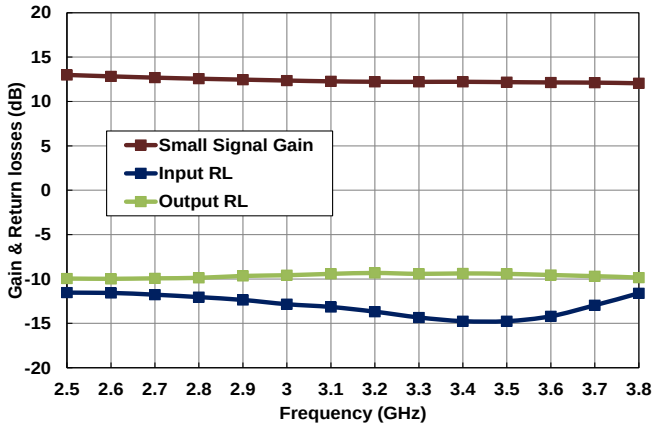


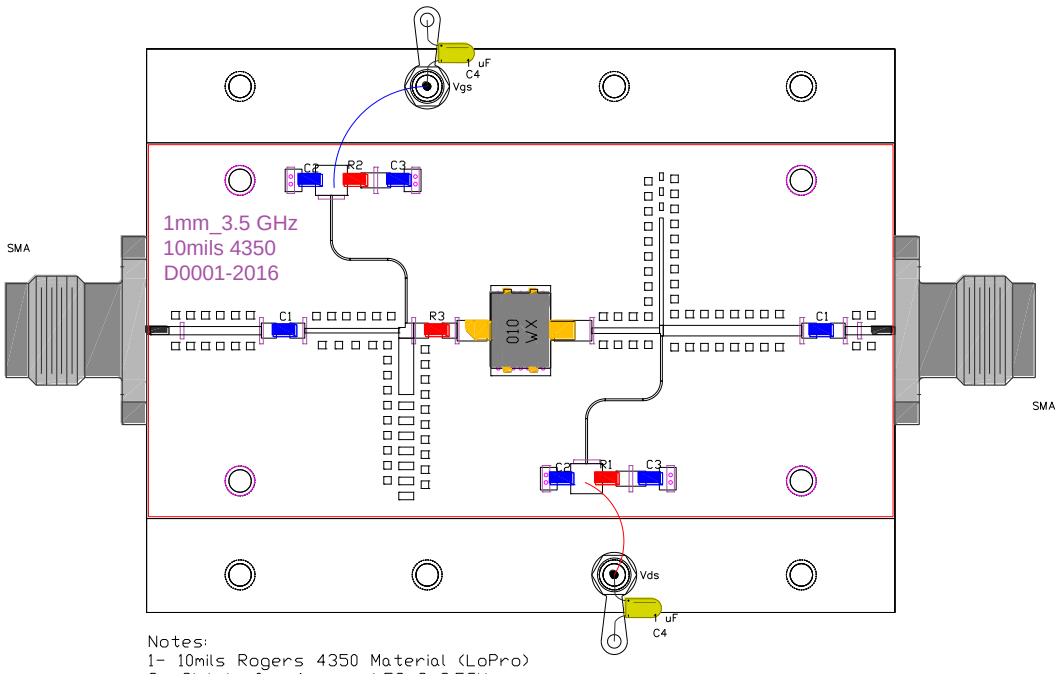
Notes:
1- 10mils Rogers 4350 Material (LoPro)
2- Ckt is for 1mm mask58 @ 2GHz
3- C1=10pF, C2=20pF, C3=1000pF, C4=1uF
   R1=5.1ohms, R2=51ohms, R3=18ohms
4- All Caps & Resistors are 0603 size

B) 2.5 GHz to 3.8 GHz

8V/150mA







Notes:
1- 10mils Rogers 4350 Material (LoPro)
2- Ckt is for 1mm mask58 @ 3.5GHz
3- C1=10pF, C2=20pF, C3=1000pF, C4=1uF
   R1=5.1ohms, R2=51ohms, R3=22ohms
4- All Caps & Resistors are 0603 size