

DESCRIPTION

AMCOM's AM005WX-BI-R is a discrete GaAs pHEMT that has a total gate width of 0.5mm. 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=17dB, $P_{1dB}=24.5\text{dBm}$, Eff=50% @ 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, ($V_{ds} = 8\text{V}$, $I_{ds} = 75\text{mA}$)

Parameters	MIN	TYP
P_{1dB}^* (dBm)	23.5	24.5
Eff @ P_{1dB}	-	50%
P_{3dB}^* (dBm)	24.5	25.5
Eff @ P_{3dB}	-	57%
Small Signal Gain (dB)	15	17
IP3 (dBm)	-	32

* 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}	180
Continuous Dissipation At Room Temp. (W)	P_t	0.94
Operating Temp. ($^{\circ}\text{C}$)	T_A	-55 to +85
Max. Channel Temp. ($^{\circ}\text{C}$)	T_{ch}	+175

DC PARAMETERS

Parameters	Conditions	MIN	TYP	MAX
Saturation Current I_{dss} (mA)	$V_{ds}=3\text{V}$, $V_{gs}=0\text{V}$	120	150	180
Pinch-off Voltage V_p (V)	$V_{ds}=3\text{V}$, $I_{ds}=2.5\% I_{dss}$	-1.6	-1.2	-0.8
Drain to Gate Breakdown Voltage BV_{gd} (V)	$I_{dg} = 0.5\text{mA}$	15	20	
Thermal Resistance ($^{\circ}\text{C}/\text{W}$)			160	

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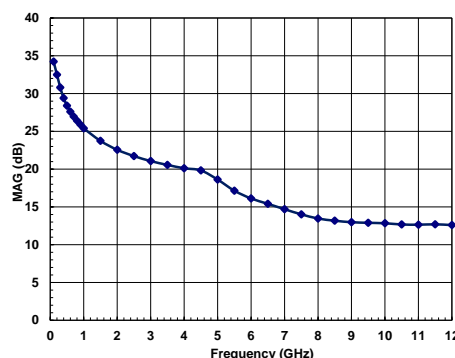
SMALL SIGNAL MEASUREMENTS*

S-Parameters* @ $V_{ds} = 8V$, $V_{gs} = -1.0V$, $I_{ds} = 50mA$

Freq(GHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
0.1	0.997	-8.37	11.016	173.39	0.004	82.89	0.757	-5.62
0.2	0.991	-15.63	10.722	167.31	0.006	77.95	0.755	-10.18
0.3	0.984	-22.8	10.449	161.36	0.009	73.01	0.751	-14.67
0.4	0.976	-29.88	10.196	155.54	0.012	68.07	0.747	-19.10
0.5	0.968	-36.88	9.966	149.85	0.014	63.96	0.742	-23.46
0.6	0.959	-43.79	9.753	144.29	0.017	58.99	0.736	-27.77
0.7	0.951	-50.62	9.545	138.75	0.019	53.92	0.729	-32.25
0.8	0.940	-57.33	9.311	133.29	0.021	49.36	0.720	-36.63
0.9	0.929	-63.79	9.038	127.98	0.023	44.78	0.711	-40.84
1	0.918	-70.03	8.755	122.77	0.025	40.6	0.705	-44.97
1.5	0.864	-98.12	7.334	99.34	0.031	20.89	0.684	-63.30
2	0.828	-116.42	6.085	81.18	0.034	7.21	0.683	-78.04
2.5	0.803	-132.2	5.237	65.16	0.035	-4.89	0.684	-89.71
3	0.773	-146.15	4.685	51.38	0.037	-14.70	0.691	-99.042
3.5	0.741	-159.33	4.271	38.05	0.038	-23.46	0.699	-107.15
4	0.706	-173.26	3.982	24.8	0.039	-31.55	0.704	-114.92
4.5	0.668	172.68	3.753	11.8	0.039	-40.07	0.707	-122.05
5	0.628	157.87	3.567	-1.707	0.040	-47.03	0.713	-129.42
5.5	0.582	142.2	3.420	-15.60	0.040	-54.35	0.718	-136.52
6	0.526	125.2	3.309	-29.83	0.041	-62.05	0.722	-142.92
6.5	0.457	104.36	3.222	-45.13	0.042	-69.1	0.726	-149.26
7	0.384	76.42	3.143	-61.37	0.044	-78.03	0.720	-154.95
7.5	0.341	38.21	3.029	-78.71	0.045	-86.99	0.706	-160.28
8	0.369	-2.72	2.869	-96.21	0.045	-95.61	0.685	-164.81
8.5	0.458	-34.59	2.69	-113.33	0.046	-103.62	0.657	-168.99
9	0.554	-57	2.492	-129.8	0.047	-111.74	0.625	-173.49
9.5	0.641	-73.26	2.309	-145.42	0.048	-118.64	0.587	-177.87
10	0.712	-87.74	2.132	-160.98	0.049	-126.34	0.542	177.89
10.5	0.768	-100.72	1.963	-176.54	0.050	-134.53	0.492	174.34
11	0.818	-112.62	1.788	167.69	0.051	-142.75	0.441	172.6
11.5	0.863	-123.75	1.619	151.74	0.051	-153.39	0.393	174.42
12	0.897	-133.83	1.444	135.74	0.052	-164.36	0.363	-179.64

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

Maximum Available Gain (8V,50mA)



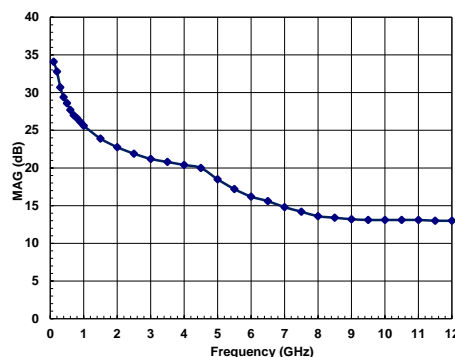
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S-Parameters* @ $V_{ds} = 8V$, $V_{gs} = -0.8V$, $I_{ds} = 75mA$

Freq(GHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
0.1	0.998	-8.22	11.005	173.35	0.004	82.53	0.760	-5.48
0.2	0.991	-15.52	10.698	167.34	0.006	77.16	0.756	-10
0.3	0.983	-22.69	10.417	161.44	0.009	72.17	0.753	-14.46
0.4	0.976	-29.72	10.162	155.67	0.012	67.54	0.749	-18.86
0.5	0.968	-36.63	9.932	150.02	0.014	63.29	0.745	-23.21
0.6	0.96	-43.40	9.728	144.49	0.016	59.39	0.740	-27.5
0.7	0.952	-50.24	9.523	138.96	0.018	54.1	0.732	-31.87
0.8	0.941	-56.88	9.29	133.51	0.021	49.41	0.724	-36.22
0.9	0.931	-63.30	9.025	128.2	0.022	45.2	0.716	-40.41
1	0.919	-69.53	8.746	123.02	0.024	40.7	0.709	-44.5
1.5	0.865	-97.55	7.343	99.58	0.03	21.37	0.692	-62.81
2	0.83	-115.79	6.107	81.5	0.032	7.33	0.689	-77.48
2.5	0.805	-131.69	5.255	65.45	0.034	-4.39	0.690	-89.23
3	0.775	-145.54	4.698	51.71	0.035	-14.49	0.694	-98.61
3.5	0.742	-158.73	4.284	38.38	0.036	-23.29	0.703	-106.84
4	0.709	-172.57	3.997	25.07	0.037	-31.18	0.711	-114.61
4.5	0.670	173.36	3.77	12.18	0.038	-38.94	0.712	-121.64
5	0.630	158.63	3.582	-1.28	0.038	-45.97	0.719	-129.1
5.5	0.584	143.17	3.433	-15.18	0.038	-53.19	0.725	-136.21
6	0.527	126.22	3.322	-29.33	0.039	-60.03	0.729	-142.57
6.5	0.459	105.76	3.234	-44.53	0.04	-67.06	0.734	-148.97
7	0.383	78.07	3.157	-60.69	0.042	-75.6	0.729	-154.65
7.5	0.335	39.99	3.046	-77.92	0.043	-83.85	0.716	-160.01
8	0.360	-1.50	2.888	-95.33	0.044	-92.38	0.697	-164.66
8.5	0.448	-33.76	2.716	-112.33	0.045	-99.86	0.671	-168.99
9	0.544	-56.39	2.521	-128.71	0.046	-107.59	0.64	-173.76
9.5	0.631	-72.71	2.341	-144.35	0.048	-114.85	0.602	-178.53
10	0.702	-87.22	2.167	-159.79	0.049	-122.49	0.556	176.74
10.5	0.761	-100.13	2.007	-175.44	0.051	-130.73	0.504	172.56
11	0.811	-112.11	1.836	168.8	0.052	-139.33	0.448	170.08
11.5	0.858	-123.23	1.671	152.79	0.053	-150.15	0.393	171.09
12	0.894	-133.35	1.497	136.51	0.053	-161.78	0.353	177.13

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

Maximum Available Gain (8V,75mA)

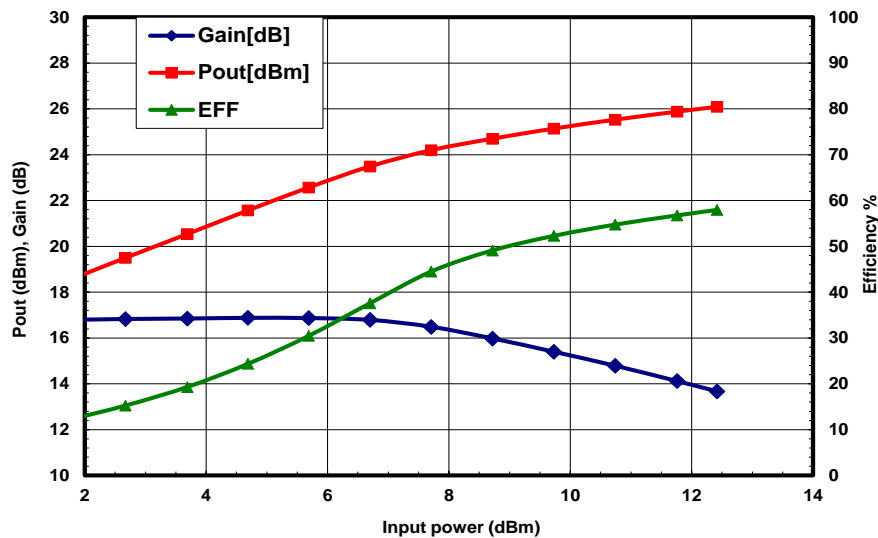


POWER MEASUREMENTS

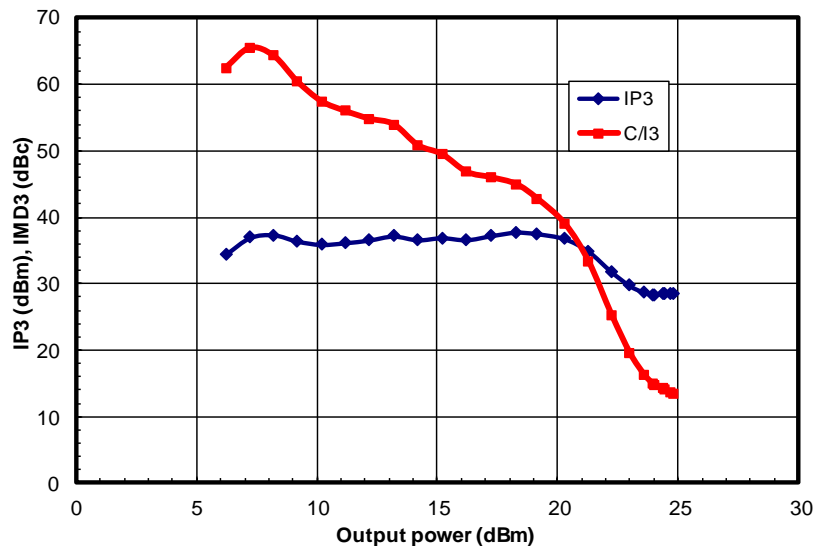
OPTIMUM LOAD TEST (8V/75mA)

Frequency	MAG(Γ_L)	ANG(Γ_L)	Gain* (dB)	P _{1dB} (dBm)	Eff @ P _{1dB}	P _{3dB} (dBm)	Eff @ P _{3dB}
2 GHz	0.41	63	21	24.3	47%	25.3	60%
3.5 GHz	0.51	90	18	24.9	50%	25.4	56%
4 GHz	0.57	99	17	24.7	50%	25.8	57%
6 GHz	0.53	118	13.5	25.5	50%	26.8	56%
8 GHz	0.57	138	11.5	24.8	45%	26.8	54%
10 GHz	0.60	147	10	25.2	41%	26	41%

Frequency = 4GHz, Bias = 8V /75mA



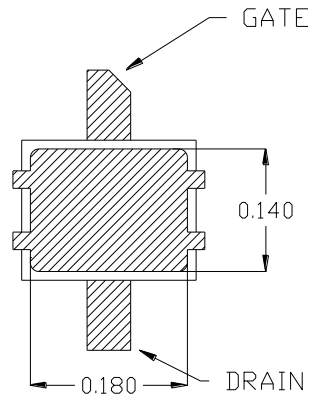
AM005WX-BI



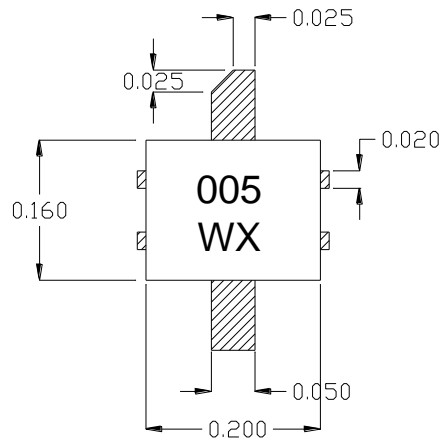
*Small signal power gain at optimum load.

PACKAGE OUTLINE

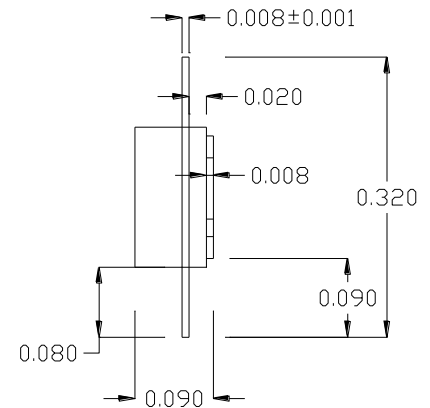
Bottom View



Top View



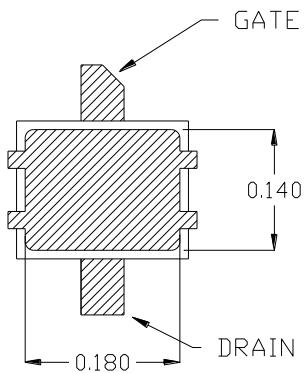
Side View



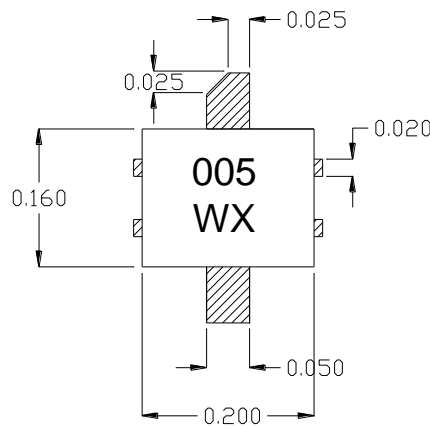
* All Dimensions are in inch

AM005WX-BI-R (Straight leads)

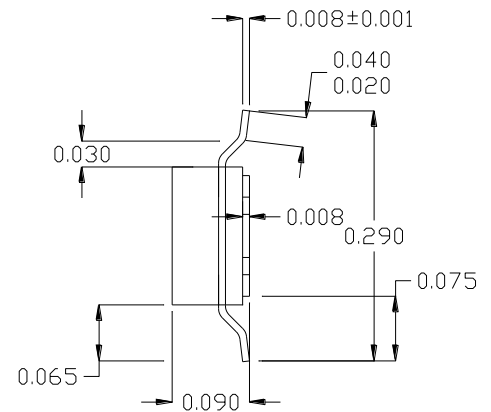
Bottom View



Top View



Side View



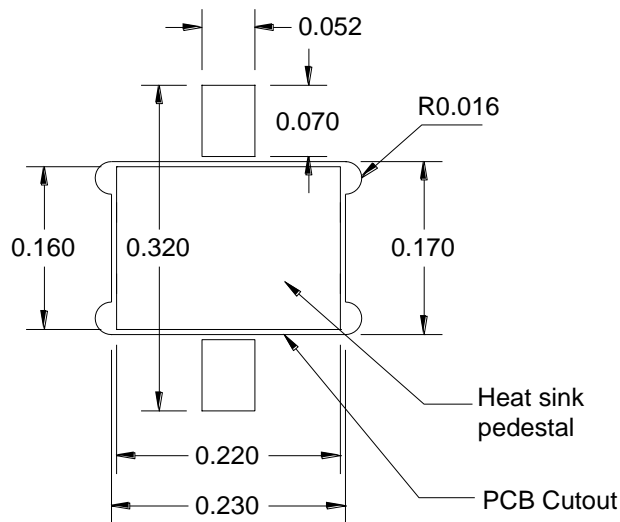
* All Dimensions are in inch

AM005WX-BI-G-R (Bent Leads)

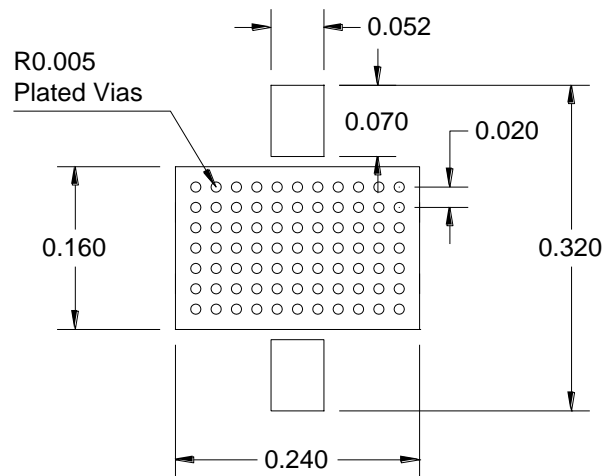
MOUNTING INSTRUCTIONS

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

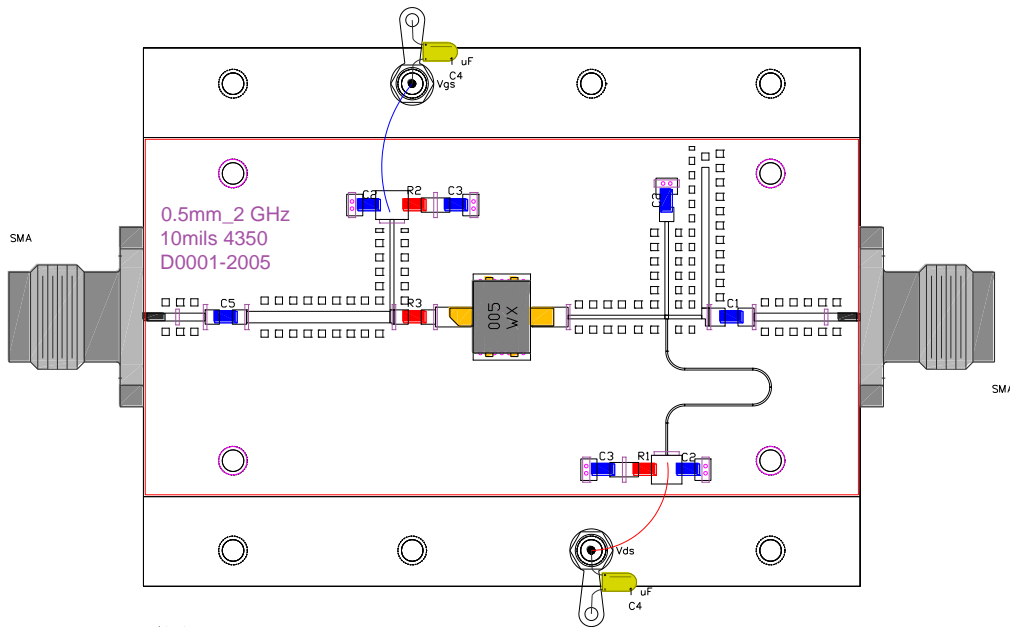
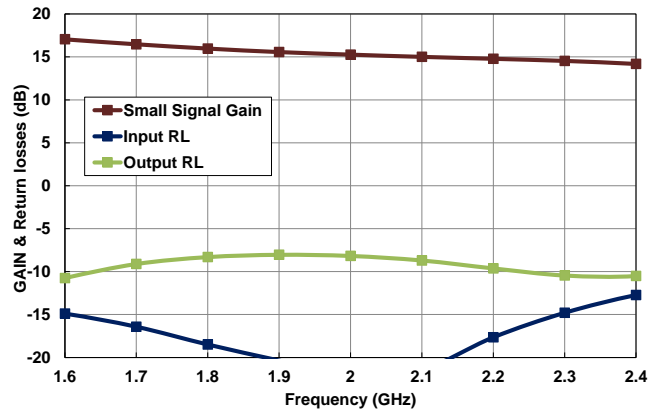
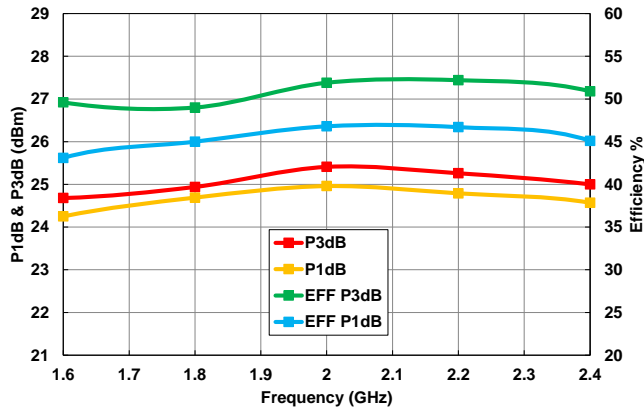


* All Dimensions are in inch

TEST CIRCUITS

A) 1.6 GHz to 2.4 GHz

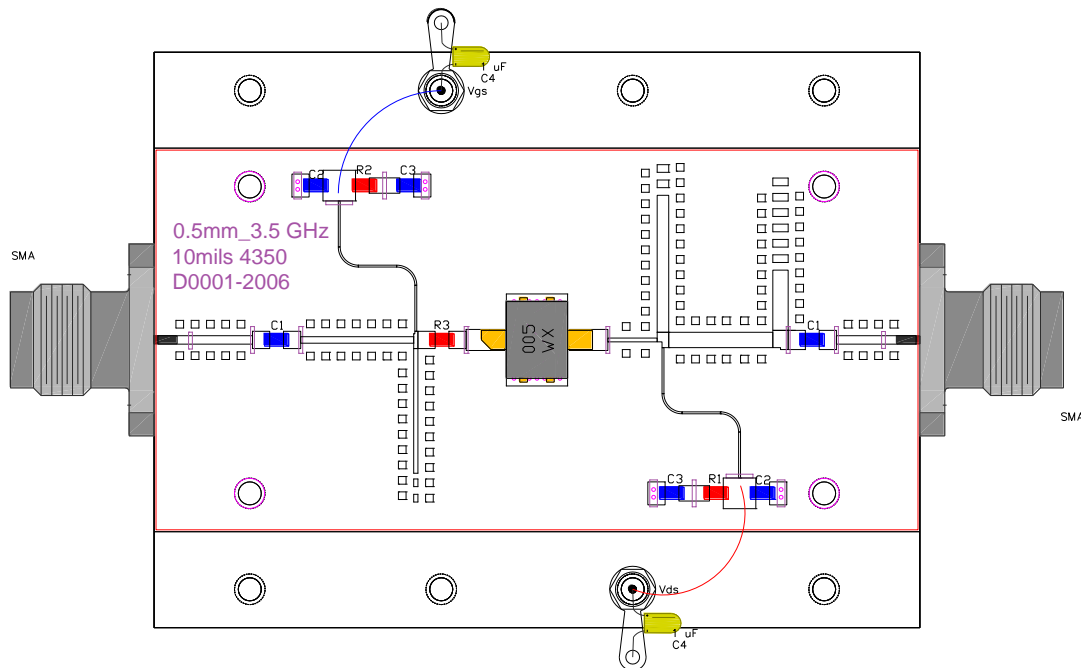
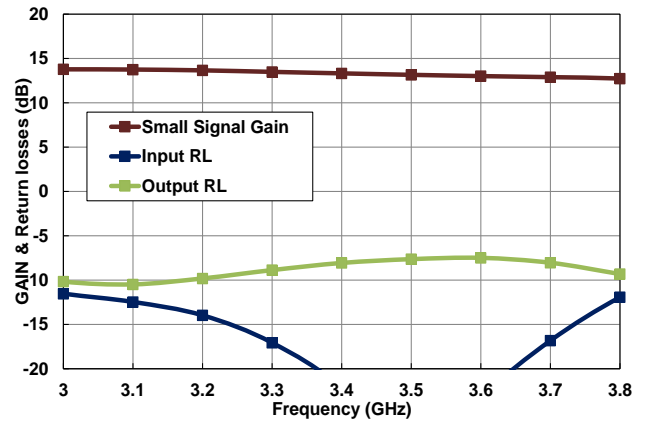
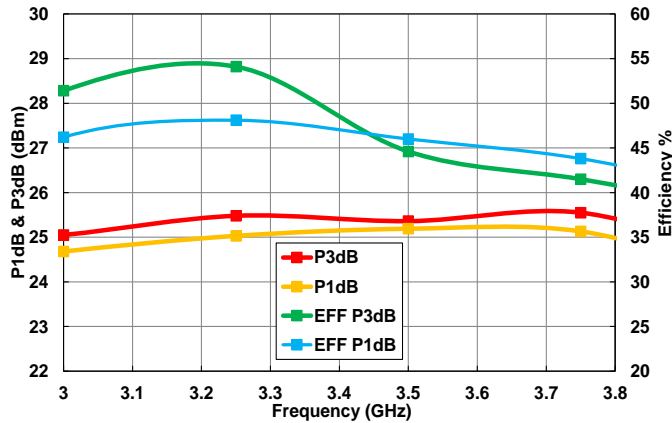
8V/75mA



Notes:
 1- 10mils Rogers 4350 Material (LoPro)
 2- Ckt is for 0.5mm mask58 @ 2GHz
 3- C1=10pF, C2=20pF, C3=1000pF, C4=1uF, C5=3.9pF
 R1=5.1ohms, R2=51ohms, R3=18ohms
 4- All Caps & Resistors are 0603 size

B) 3 GHz to 3.8 GHz

8V/75mA



- Notes:
- 1- 10mils Rogers 4350 Material (LoPro)
 - 2- Ckt is for 0.5mm mask58 @ 3.5 GHz
 - 3- C1=10pF, C2=20pF, C3=1000pF, C4=1uF
R1=5.1ohms, R2=51ohms, R3=15 ohms
 - 4- All Caps & Resistors are 0603 size