Ceramic Packaged GaN Power HEMT
DC-8 GHz

AM025WN-BI-R
AM025WN-BI-G-R
Feb 2015
Rev 0

DESCRIPTION

AMCOM's AM025WN-BI-R is a discrete GaN/SiC HEMT that has a total gate width of 2.5mm. It is in a ceramic package for operating up to 8 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 8 GHz
- Gain=16 dB, P_{5dB}=40 dBm, PAE=52%, ζ_{Drain}=56% @ 3 GHz
- Surface Mountable
- Bottom ground for Effective Heat Removal

APPLICATIONS

- High dynamic receiver
- Cellular Radio Base Stations
- Wideband and narrowband amplifiers
- Radar
- Test Instrumentation
- Military
- Jammers

RF PERFORMANCE @ 3 GHz (CW)

(V_{ds} = 28V, I_{dq} = 375mA)

Parameters	MIN	TYP
P_{5dB}* (dBm)	39	40
PAE @ P_{5dB}	40%	52%
Drain eff @ P_{5B}	45%	56%
Small Signal Gain (dB)	14	16
Optimum load reflection coeff.	-	0.47∠180°

* Power typically remains the same as frequency changes.

ABSOLUTE MAXIMUM RATING

Parameters	Symbol	Rating
Drain-Source Voltage (V)	V_{ds}	40
Gate-Source Voltage (V)	V_{gs}	-6
Drain Current (mA)	I_{ds}	1000
Continuous Dissipation At Room Temp. (W)	P_t	41.4
Operating Temp. (°C)	T_A	-55 to +85
Max. Channel Temp. (°C)	T_{ch}	+200

DC PARAMETERS

Parameters	Conditions	MIN	TYP	MAX
Saturation Current I_{dss} (mA)	V_{ds}=10V, V_{gs} =0V	1250	2000	2850
Pinch-off Voltage V_p (V)	V_{ds}=10V, Ids=2.5% I_{dss}	-3.9	-2.9	-1.9
Drain to Gate Breakdown Voltage BV_{gd} (V)	I_{dg} = 1 mA/mm	90	120	-
Thermal Resistance (°C/W)		-	4.23	-

E-mail: info@amcomusa.com
http://www.amcomusa.com
Tel. (301) 353-8400 Fax. (301) 353-8401
401 Professional Drive, Gaithersburg, MD 20879

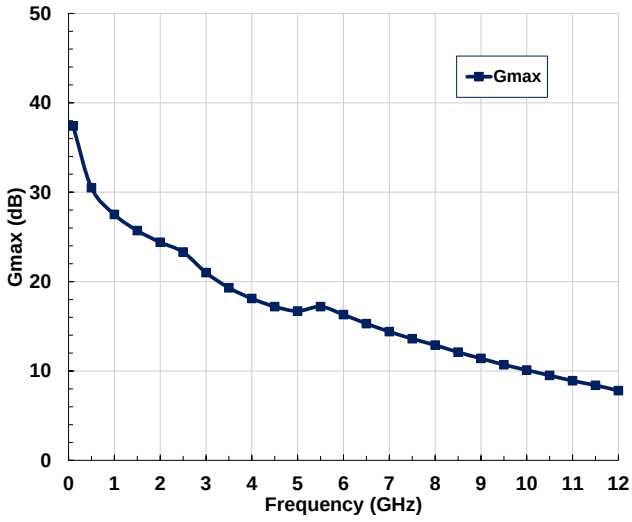
SMALL SIGNAL MEASUREMENTS

S-Parameters* @ V_{ds} = 28V, I_{dq} = 375mA

Freq(GHz)	MAG(S11)	ANG(S11)	MAG(S21)	ANG(S21)	MAG(S12)	ANG(S12)	MAG(S22)	ANG(S22)
0.1	0.984	-23.569	31.598	163.2	0.006	76.957	0.198	-37.053
0.5	0.868	-94.127	21.384	119.54	0.019	41.292	0.295	-112.16
1	0.804	-135.5	13.097	91.604	0.023	23.56	0.347	-139.61
1.5	0.784	-156.71	9.197	73.73	0.025	16.401	0.376	-150.36
2	0.774	-170.71	7.065	59.342	0.026	13.365	0.401	-156.68
2.5	0.767	178.27	5.752	46.502	0.027	12.485	0.425	-161.67
3	0.759	168.56	4.88	34.45	0.029	12.716	0.446	-166.32
3.5	0.749	159.28	4.274	22.795	0.032	13.18	0.464	-170.99
4	0.736	149.92	3.84	11.279	0.036	13.082	0.478	-175.82
4.5	0.72	140.06	3.527	-0.309	0.042	11.805	0.488	179.17
5	0.7	129.36	3.3	-12.162	0.049	8.978	0.495	173.89
5.5	0.677	117.44	3.137	-24.47	0.059	4.416	0.497	168.27
6	0.652	103.87	3.02	-37.424	0.071	-1.962	0.497	162.12
6.5	0.626	88.307	2.934	-51.199	0.085	-10.166	0.496	155.1
7	0.606	70.395	2.865	-65.968	0.102	-20.221	0.493	146.68
7.5	0.597	50.24	2.799	-81.855	0.12	-32.103	0.489	136.01
8	0.61	28.38	2.719	-98.988	0.14	-45.84	0.483	121.93
8.5	0.648	6.005	2.608	-117.43	0.16	-61.392	0.476	103.02
9	0.711	-15.78	2.449	-137.21	0.177	-78.717	0.473	77.942
9.5	0.79	-36.328	2.223	-158.1	0.187	-97.539	0.488	46.799
10	0.868	-55.283	1.929	-179.43	0.188	-117.12	0.535	12.947
10.5	0.931	-72.371	1.59	159.86	0.179	-136.37	0.611	-18.766
11	0.971	-87.229	1.255	140.92	0.161	-154.13	0.695	-45.5
11.5	0.992	-99.772	0.963	124.4	0.14	-169.71	0.769	-67.031
12	1.001	-110.24	0.73	110.41	0.12	177.01	0.827	-84.188

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

Maximum Available Gain (28V,375mA)



POWER MEASUREMENTS

OPTIMUM LOAD (28V/375mA)*

Freq (GHz)	MAG(Γ_L)	ANG(Γ_L)
1	0.36	174
1.5	0.39	173
2	0.41	173
2.5	0.44	176
3	0.47	180
3.5	0.49	-176
4	0.51	-172
4.5	0.51	-165
5	0.5	-158
5.5	0.49	-151
6	0.47	-142
6.5	0.44	-130
7	0.41	-117
7.5	0.38	-100
8	0.36	-78

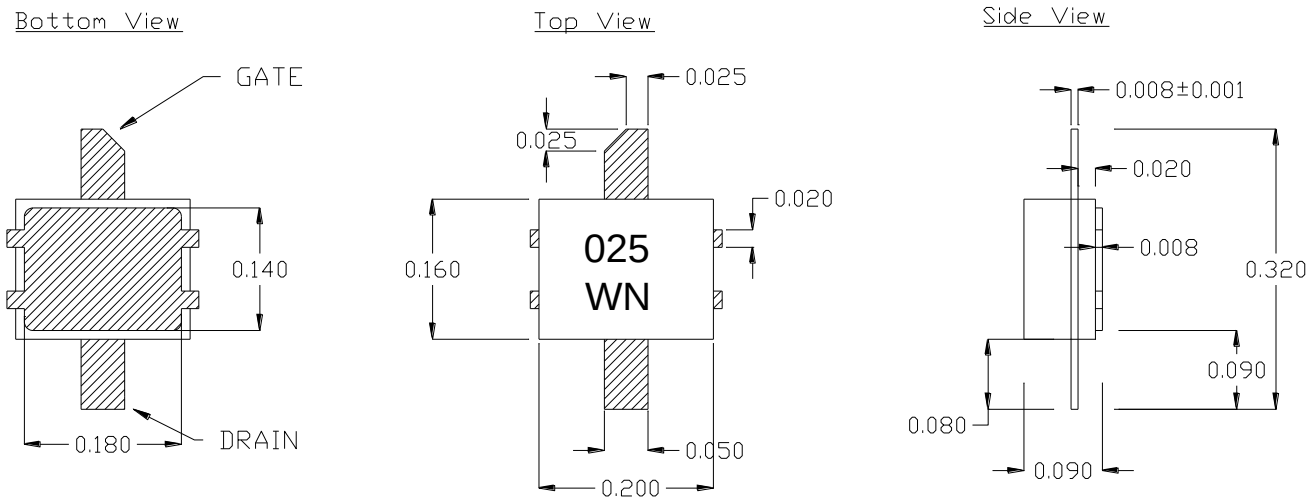
* Reference line is at the edge of the package.

Evaluation boards power measurements (CW)

(V_{ds} = 28V, I_{dq} = 375mA)

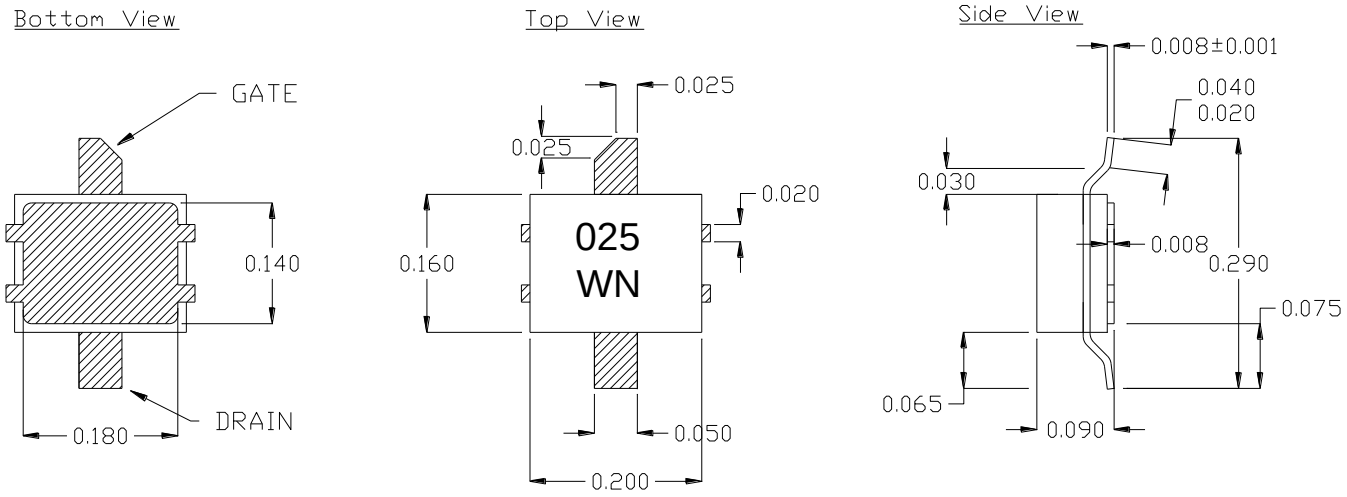
Parameters \ Frequency	1.8 GHz		3 GHz		5 GHz	
	MIN	TYP	MIN	TYP	MIN	TYP
P_{5dB} (dBm)	39.5	40.5	39	40	39	40
PAE @ P_{5dB}	43%	53%	40%	52%	40%	49%
Drain eff @ P_{5B}	48%	58%	45%	56%	43%	53%
Small Signal Gain (dB)	12.5	14.8	13.5	15.5	11.5	13.5
Input RL (dB)	-	15	-	15	-	15
IP3	-	-	-	47	-	-

PACKAGE OUTLINE



* All Dimensions are in inch

AM025WN-BI-R (Straight leads)



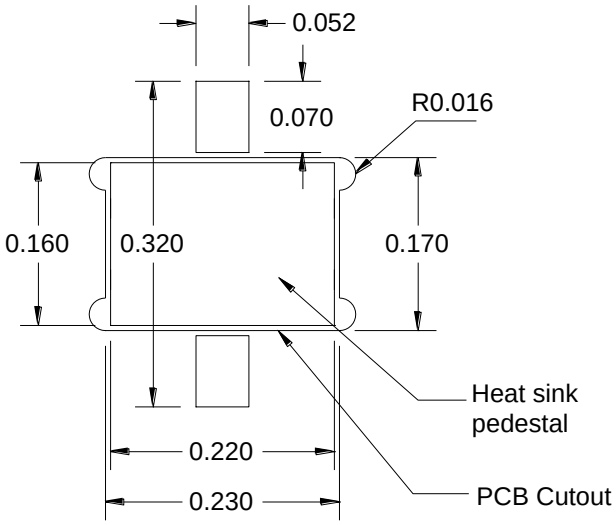
* All Dimensions are in inch

AM025WN-BI-G-R (Bent Leads)

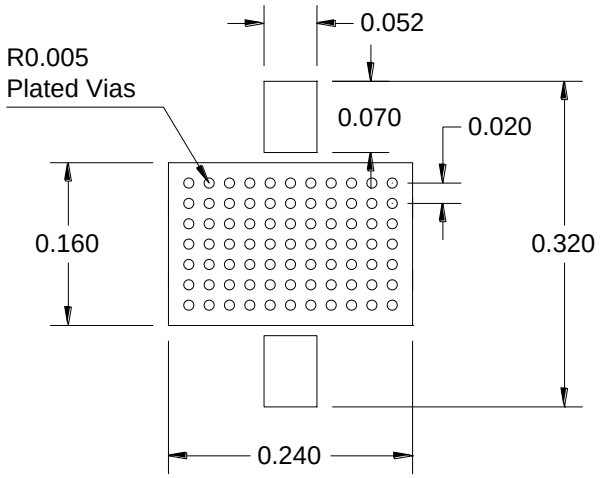
MOUNTING INSTRUCTIONS

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)



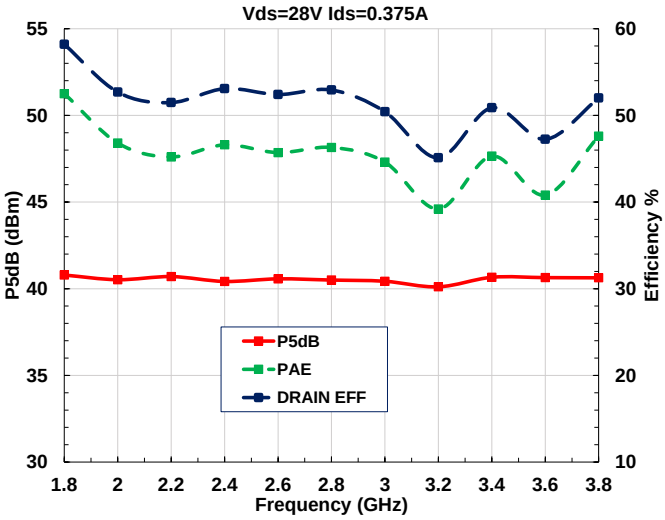
Option 2 for Bent Leads

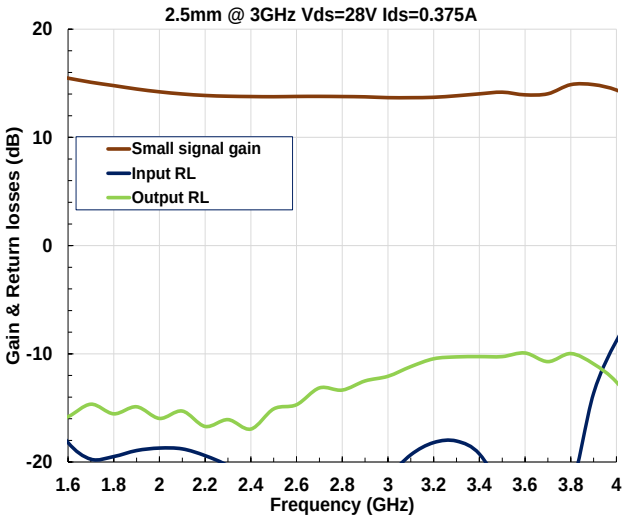


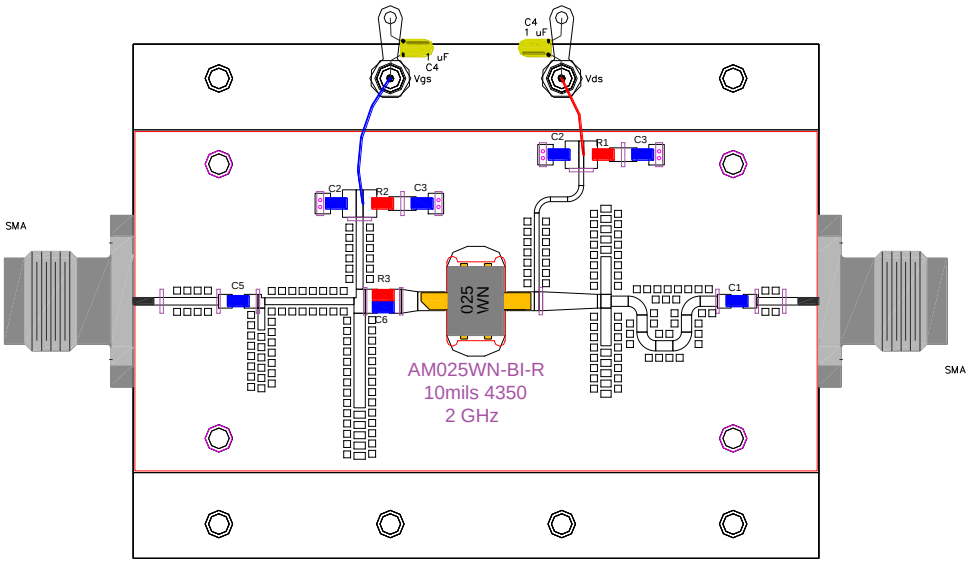
* All Dimensions are in inch

TEST CIRCUITS

1) 1.8 GHz to 3.8 GHz

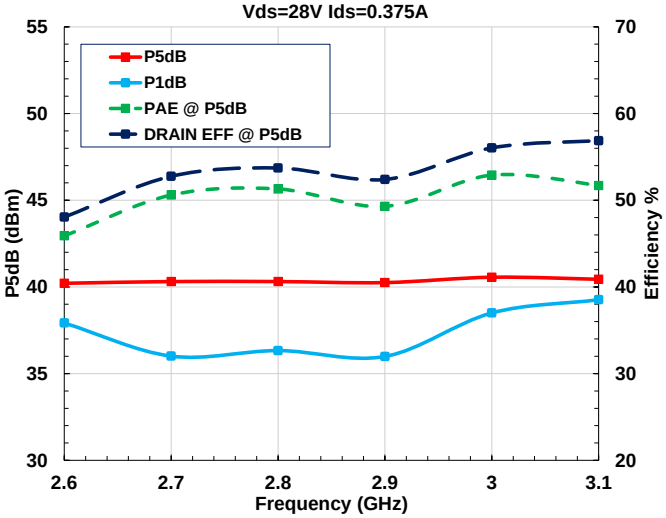


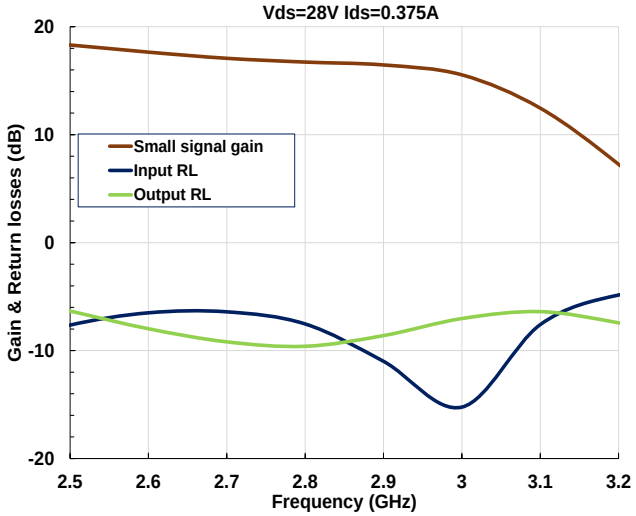


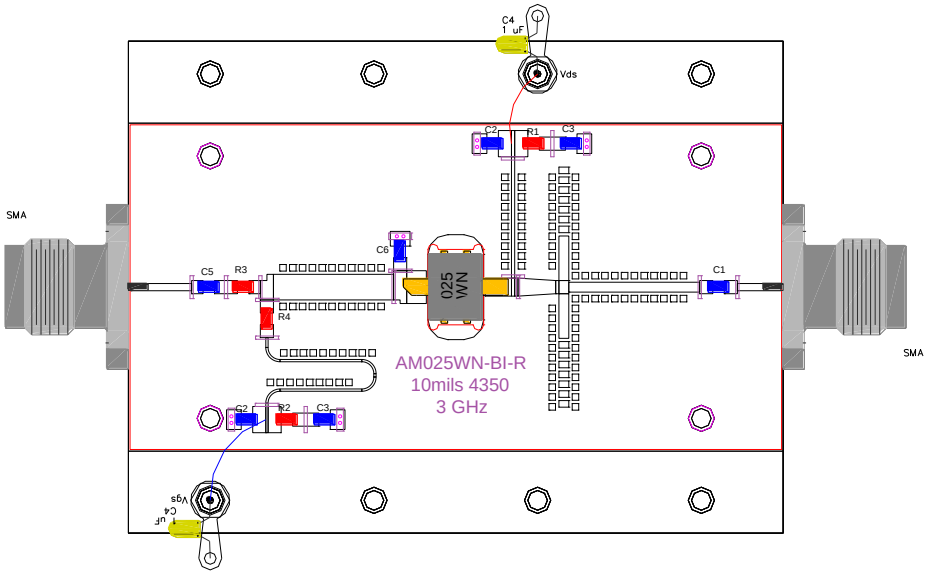


Notes:
1- 10mils Rogers 4350 Material (LoPro)
2- Ckt is for 2.5mm mask71 @ 2GHz
3- C1=10pF, C2=20pF, C3=1000pF, C4=1uF, C5=2.4pF, C6=2.2pF
R1=5.1ohms, R2=51ohms, R3=22ohms
4- All SMT Caps & Resistors are 0603 size

2) 2.6 GHz to 3.1 GHz

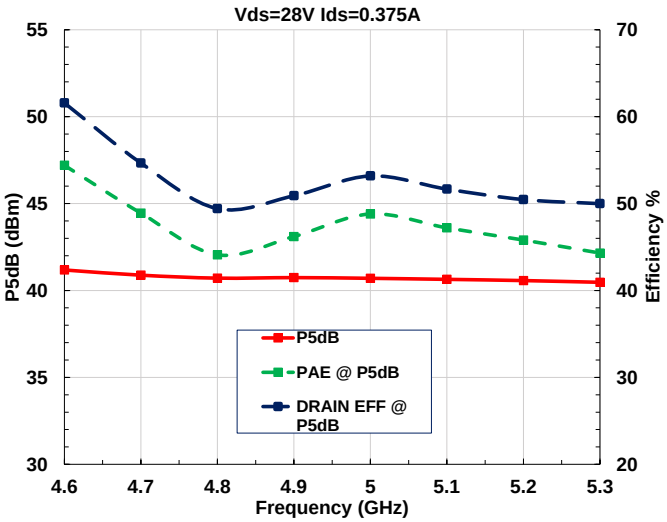


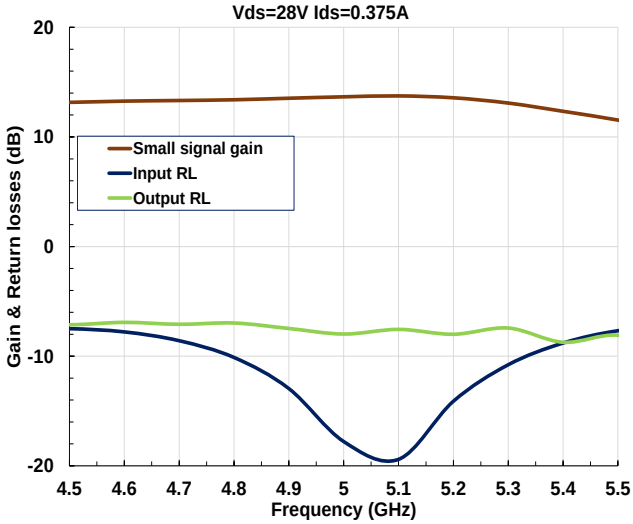


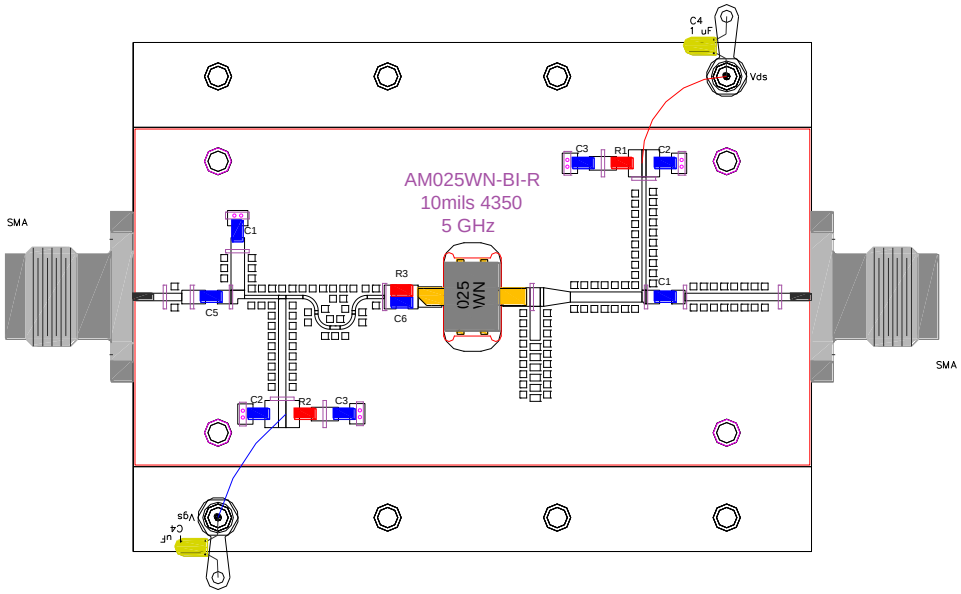


Notes:
1- 10mils Rogers 4350 Material (LoPro)
2- Ckt is for 2.5mm mask71 @ 3GHz
3- C1=10pF, C2=20pF, C3=1000pF, C4=1uF, C5=1pF, C6=2.7pF
R1=5.1ohms, R2=51ohms, R3=5.6ohms, R4=18ohms
4- All SMT Caps & Resistors are 0603 size

2) 4.6 GHz to 5.3 GHz







Notes:
1- 10mils Rogers 4350 Material (LoPro)
2- Ckt is for 2.5mm mask71 @ 5 GHz
3- C1=10pF, C2=6.8pF, C3=1000pF, C4=1uF, C5=1pF, C6=2.2pF
R1=5.1ohms, R2=51ohms, R3=43ohms
4- All SMT Caps & Resistors are 0603 size