

DESCRIPTION

AMCOM's AM030WX-BI-R is a discrete GaAs pHEMT that has a total gate width of 3.0mm. It is in a ceramic BI package for operating up to 10 GHz. The BI package 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 10 GHz
- Gain=14dB, $P_{1dB}=33dBm$, Eff = 46% @ 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, ($V_{ds} = 8V$, $I_{ds} = 450mA$)

| Parameters | MIN | TYP |
|------------------------|-----|-----|
| P_{1dB}^* (dBm) | 32 | 33 |
| Eff @ P_{1dB} | - | 46% |
| P_{3dB}^* (dBm) | 33 | 34 |
| Eff @ P_{3dB} | - | 51% |
| Small Signal Gain (dB) | 12 | 14 |
| IP3 (dBm) | - | 41 |

* 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} | 1080 |
| Continuous Dissipation At Room Temp. (W) | P_t | 5.5 |
| Operating Temp. (°C) | T_A | -55 to +85 |
| Max. Channel Temp. (°C) | T_{ch} | +175 |

DC PARAMETERS

| Parameters | Conditions | MIN | TYP | MAX |
|---|--------------------------------------|------|------|------|
| Saturation Current I_{dss} (mA) | $V_{ds}=3V$, $V_{gs}=0V$ | 720 | 900 | 1080 |
| Pinch-off Voltage V_p (V) | $V_{ds}=3V$, $I_{ds}=2.5\% I_{dss}$ | -1.6 | -1.2 | -0.8 |
| Drain to Gate Breakdown Voltage BV_{gd} (V) | $I_{dg} = 3mA$ | 15 | 20 | |
| Thermal Resistance (°C/W) | | | 28 | |

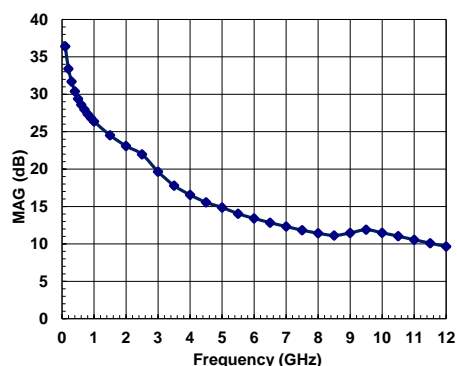
SMALL SIGNAL MEASUREMENTS

S-Parameters for AM030WX-BI-R. Vds = 8V, Vgs = -1V, Ids = 300mA *

| Freq(GHz) | MAG(S11) | ANG(S11) | MAG(S21) | ANG(S21) | MAG(S12) | ANG(S12) | MAG(S22) | ANG(S22) |
|-----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 0.1 | 0.976 | -42.96 | 36.678 | 154.29 | 0.008 | 67.68 | 0.195 | -87.29 |
| 0.2 | 0.948 | -70.93 | 30.517 | 138.91 | 0.014 | 54.13 | 0.250 | -108.1 |
| 0.3 | 0.923 | -94.33 | 25.287 | 125.86 | 0.017 | 42.93 | 0.294 | -125.04 |
| 0.4 | 0.904 | -113.17 | 20.989 | 115.13 | 0.019 | 34.08 | 0.327 | -138.09 |
| 0.5 | 0.889 | -127.45 | 17.622 | 106.73 | 0.020 | 27.58 | 0.350 | -147.26 |
| 0.6 | 0.879 | -137.16 | 15.187 | 100.65 | 0.021 | 23.43 | 0.361 | -152.55 |
| 0.7 | 0.880 | -144.81 | 13.31 | 95.49 | 0.021 | 20.5 | 0.368 | -157.01 |
| 0.8 | 0.876 | -150.96 | 11.818 | 90.95 | 0.022 | 18.04 | 0.376 | -160.25 |
| 0.9 | 0.873 | -156.23 | 10.607 | 86.95 | 0.022 | 16.25 | 0.380 | -162.77 |
| 1 | 0.872 | -160.71 | 9.639 | 83.28 | 0.022 | 14.58 | 0.384 | -164.54 |
| 1.5 | 0.867 | -175.99 | 6.571 | 68.31 | 0.023 | 9.67 | 0.394 | -171.63 |
| 2 | 0.858 | 174.8 | 5.150 | 56.13 | 0.025 | 7.89 | 0.396 | -174.24 |
| 2.5 | 0.848 | 165.35 | 4.257 | 44.26 | 0.027 | 6.09 | 0.395 | -178.41 |
| 3 | 0.840 | 156.03 | 3.682 | 32.31 | 0.029 | 3.77 | 0.397 | 176.95 |
| 3.5 | 0.830 | 146.78 | 3.276 | 20.61 | 0.032 | 1.01 | 0.398 | 172.43 |
| 4 | 0.822 | 137.37 | 2.967 | 8.79 | 0.036 | -1.97 | 0.398 | 167.29 |
| 4.5 | 0.811 | 127.85 | 2.749 | -3.08 | 0.040 | -6.26 | 0.395 | 162.12 |
| 5 | 0.801 | 118 | 2.587 | -15.23 | 0.045 | -10.88 | 0.391 | 156.97 |
| 5.5 | 0.782 | 107.22 | 2.477 | -28.08 | 0.051 | -17.30 | 0.377 | 151.5 |
| 6 | 0.761 | 94.83 | 2.413 | -41.63 | 0.059 | -24.77 | 0.360 | 144.67 |
| 6.5 | 0.738 | 79.87 | 2.376 | -56.55 | 0.067 | -34.02 | 0.336 | 136.83 |
| 7 | 0.718 | 62.44 | 2.334 | -72.49 | 0.077 | -44.99 | 0.312 | 126.58 |
| 7.5 | 0.710 | 42.47 | 2.273 | -89.60 | 0.087 | -57.21 | 0.282 | 112.18 |
| 8 | 0.716 | 22.10 | 2.174 | -106.85 | 0.096 | -70.21 | 0.254 | 94.32 |
| 8.5 | 0.736 | 3.24 | 2.051 | -124.27 | 0.105 | -84.15 | 0.231 | 68.66 |
| 9 | 0.774 | -14.13 | 1.920 | -141.62 | 0.110 | -98.39 | 0.228 | 36.93 |
| 9.5 | 0.810 | -30.01 | 1.762 | -159.45 | 0.113 | -113.38 | 0.252 | 2.11 |
| 10 | 0.852 | -45.38 | 1.601 | -177.47 | 0.114 | -127.94 | 0.325 | -28.83 |
| 10.5 | 0.880 | -60.79 | 1.41 | 164.51 | 0.111 | -142.98 | 0.411 | -53.10 |
| 11 | 0.904 | -76.24 | 1.214 | 146.81 | 0.107 | -157.56 | 0.510 | -71.17 |
| 11.5 | 0.925 | -90.99 | 1.023 | 130.24 | 0.100 | -171.84 | 0.594 | -86.75 |
| 12 | 0.940 | -104.16 | 0.853 | 115.24 | 0.092 | 174.82 | 0.668 | -99.4 |

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

Maximum Available Gain (8V,300mA)



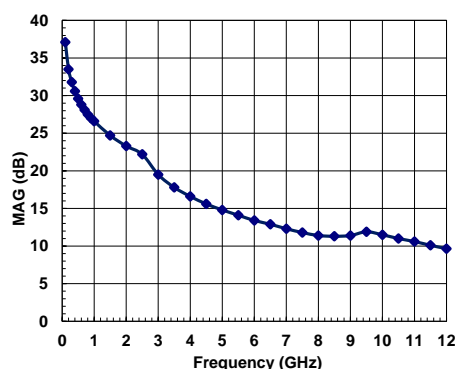
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S-Parameters for AM030WX-BI-R. Vds = 8V, Vgs = -0.8V, Ids = 450mA *

| Freq(GHz) | MAG(S11) | ANG(S11) | MAG(S21) | ANG(S21) | MAG(S12) | ANG(S12) | MAG(S22) | ANG(S22) |
|-----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 0.1 | 0.977 | -41.89 | 36.728 | 154.48 | 0.007 | 62.93 | 0.196 | -82.52 |
| 0.2 | 0.941 | -69.87 | 30.709 | 139.22 | 0.014 | 51.87 | 0.246 | -104.28 |
| 0.3 | 0.913 | -93.26 | 25.573 | 126.17 | 0.017 | 42.37 | 0.287 | -122.13 |
| 0.4 | 0.895 | -112.08 | 21.32 | 115.31 | 0.018 | 34.43 | 0.318 | -136.08 |
| 0.5 | 0.884 | -126.32 | 17.95 | 106.67 | 0.02 | 28.04 | 0.34 | -146.12 |
| 0.6 | 0.883 | -135.98 | 15.463 | 100.23 | 0.02 | 23.22 | 0.352 | -152.26 |
| 0.7 | 0.88 | -143.5 | 13.549 | 95.03 | 0.021 | 20.24 | 0.359 | -156.87 |
| 0.8 | 0.875 | -149.81 | 12.043 | 90.35 | 0.021 | 17.59 | 0.369 | -160.43 |
| 0.9 | 0.874 | -155.34 | 10.795 | 86.04 | 0.022 | 15.23 | 0.378 | -163.31 |
| 1 | 0.871 | -159.83 | 9.767 | 82.27 | 0.022 | 13.9 | 0.381 | -165.46 |
| 1.5 | 0.864 | -175.35 | 6.623 | 66.44 | 0.023 | 8.37 | 0.39 | -171.57 |
| 2 | 0.855 | 175.51 | 5.207 | 55.76 | 0.024 | 8.13 | 0.387 | -171.83 |
| 2.5 | 0.845 | 166.16 | 4.309 | 43.63 | 0.026 | 5.83 | 0.39 | -175.58 |
| 3 | 0.837 | 156.67 | 3.727 | 31.72 | 0.029 | 3.75 | 0.394 | 179.82 |
| 3.5 | 0.827 | 147.27 | 3.327 | 19.87 | 0.031 | 1.35 | 0.395 | 175.34 |
| 4 | 0.819 | 137.57 | 3.01 | 7.86 | 0.035 | -1.91 | 0.399 | 169.88 |
| 4.5 | 0.809 | 127.57 | 2.782 | -4.21 | 0.039 | -5.94 | 0.396 | 164.69 |
| 5 | 0.797 | 117.71 | 2.603 | -16.32 | 0.043 | -10.21 | 0.396 | 159.11 |
| 5.5 | 0.78 | 106.91 | 2.485 | -29.1 | 0.049 | -15.91 | 0.387 | 153.54 |
| 6 | 0.759 | 94.76 | 2.413 | -42.5 | 0.057 | -23.4 | 0.373 | 147.32 |
| 6.5 | 0.736 | 80.17 | 2.373 | -57.23 | 0.066 | -32.48 | 0.353 | 140.14 |
| 7 | 0.712 | 62.41 | 2.345 | -73.35 | 0.076 | -43.58 | 0.325 | 130.64 |
| 7.5 | 0.7 | 42.02 | 2.289 | -90.82 | 0.086 | -56.07 | 0.293 | 117.24 |
| 8 | 0.707 | 20.97 | 2.201 | -108.48 | 0.096 | -69.81 | 0.259 | 98.83 |
| 8.5 | 0.734 | 0.67 | 2.078 | -126.54 | 0.104 | -84.08 | 0.233 | 72.6 |
| 9 | 0.77 | -17.13 | 1.927 | -144.34 | 0.109 | -98.9 | 0.228 | 39.4 |
| 9.5 | 0.812 | -32.99 | 1.767 | -161.93 | 0.112 | -113.58 | 0.261 | 4.73 |
| 10 | 0.848 | -48.45 | 1.593 | -179.26 | 0.113 | -127.76 | 0.322 | -24.11 |
| 10.5 | 0.879 | -63.55 | 1.408 | 163 | 0.111 | -142.16 | 0.402 | -47.41 |
| 11 | 0.902 | -78.83 | 1.217 | 145.34 | 0.107 | -156.72 | 0.494 | -67.63 |
| 11.5 | 0.924 | -93.53 | 1.027 | 128.3 | 0.1 | -171.76 | 0.58 | -84.19 |
| 12 | 0.938 | -106.81 | 0.852 | 112.9 | 0.092 | 174.6 | 0.657 | -98.32 |

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

Maximum Available Gain (8V,450mA)

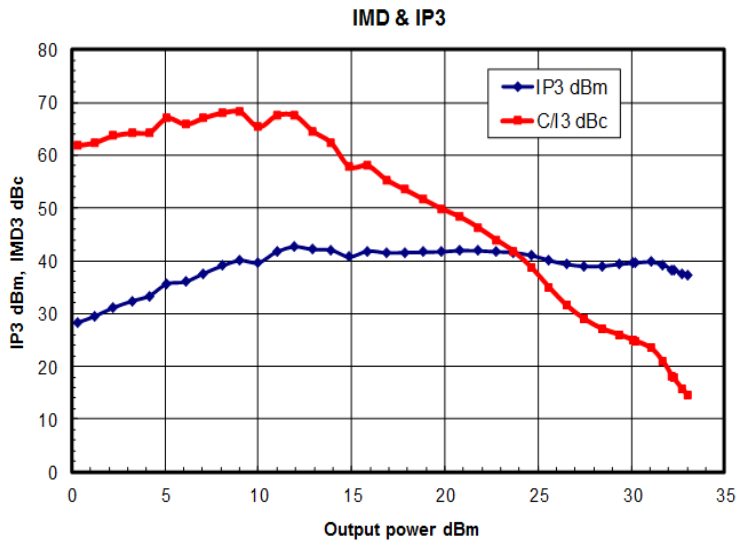
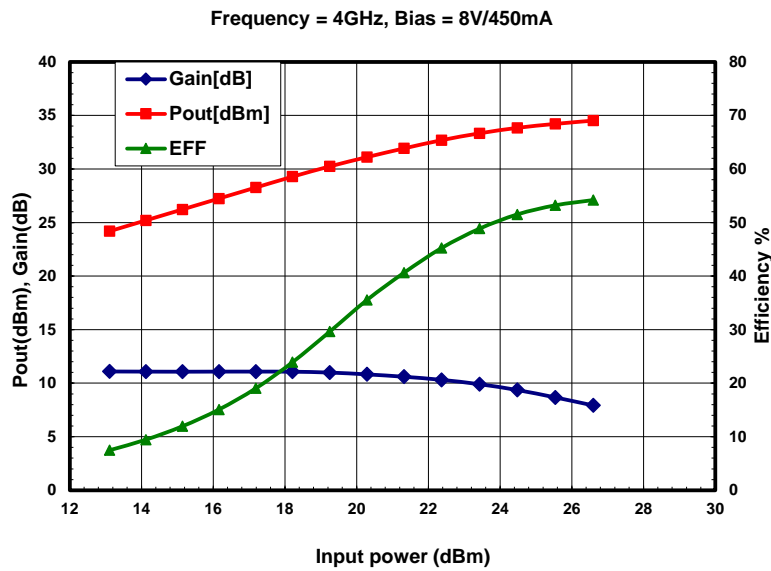


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POWER MEASUREMENTS

Optimum load test (8V,450mA)

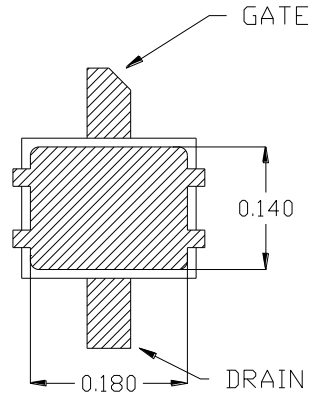
| Frequency | MAG(Γ_L) | ANG(Γ_L) | Gain* (dB) | P _{1dB} (dBm) | Eff @ P _{1dB} | P _{3dB} (dBm) | Eff @ P _{3dB} |
|-----------|-------------------|-------------------|------------|------------------------|------------------------|------------------------|------------------------|
| 2 GHz | 0.7 | -178 | 20 | 33.7 | 51% | 34.5 | 56% |
| 3.5 GHz | 0.44 | -144 | 15 | 33.2 | 48% | 34.2 | 55% |
| 4 GHz | 0.43 | -128 | 14.2 | 33 | 46% | 34.3 | 51% |
| 6 GHz | 0.31 | -99 | 11 | 33.3 | 46% | 34.5 | 53% |
| 8 GHz | 0.24 | -47 | 9.5 | 33.1 | 48% | 34.6 | 55% |



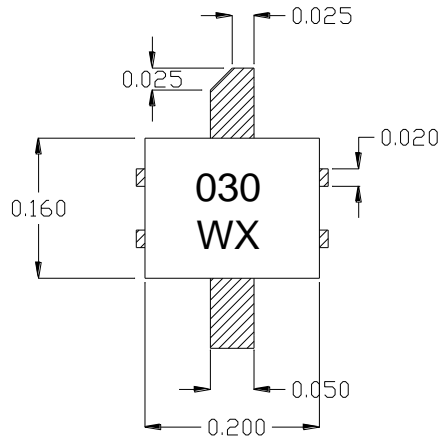
*Small signal power gain at optimum load.

PACKAGE OUTLINE

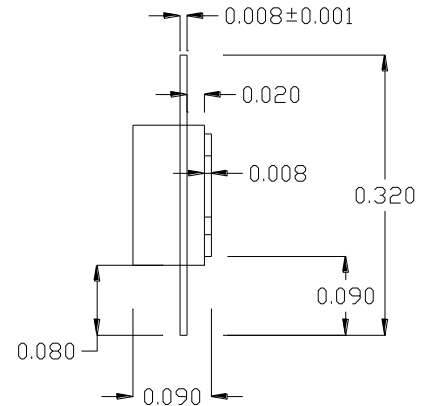
Bottom View



Top View



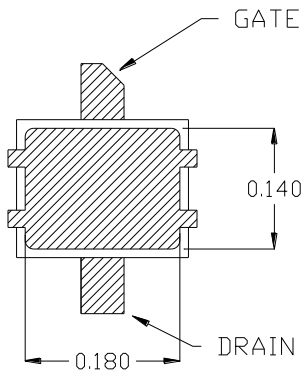
Side View



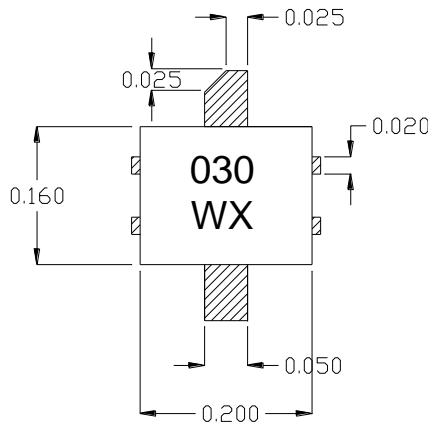
* All Dimensions are in inch

AM030WX-BI-R (Straight Leads)

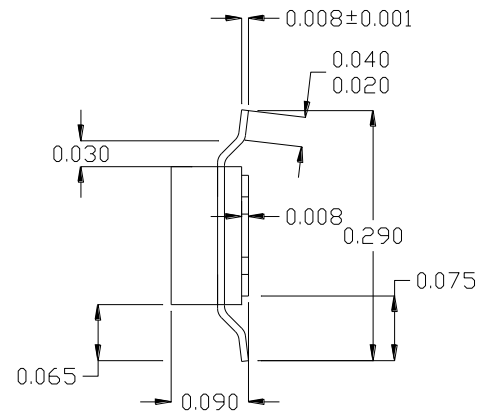
Bottom View



Top View



Side View



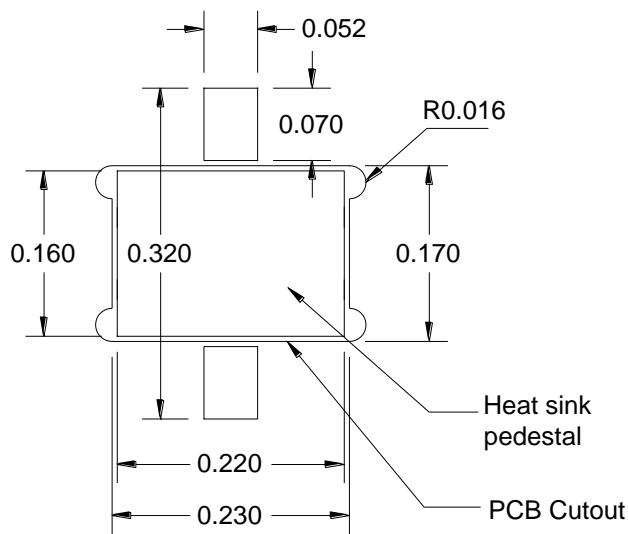
* All Dimensions are in inch

AM030WX-BI-G-R (Bent Leads)

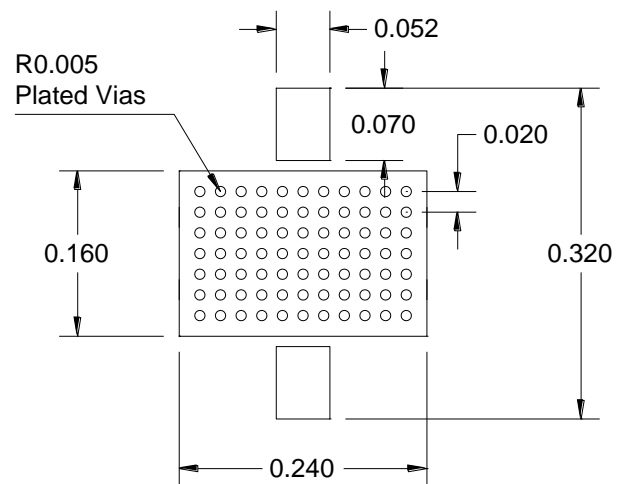
MOUNTING INSTRUCTIONS

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

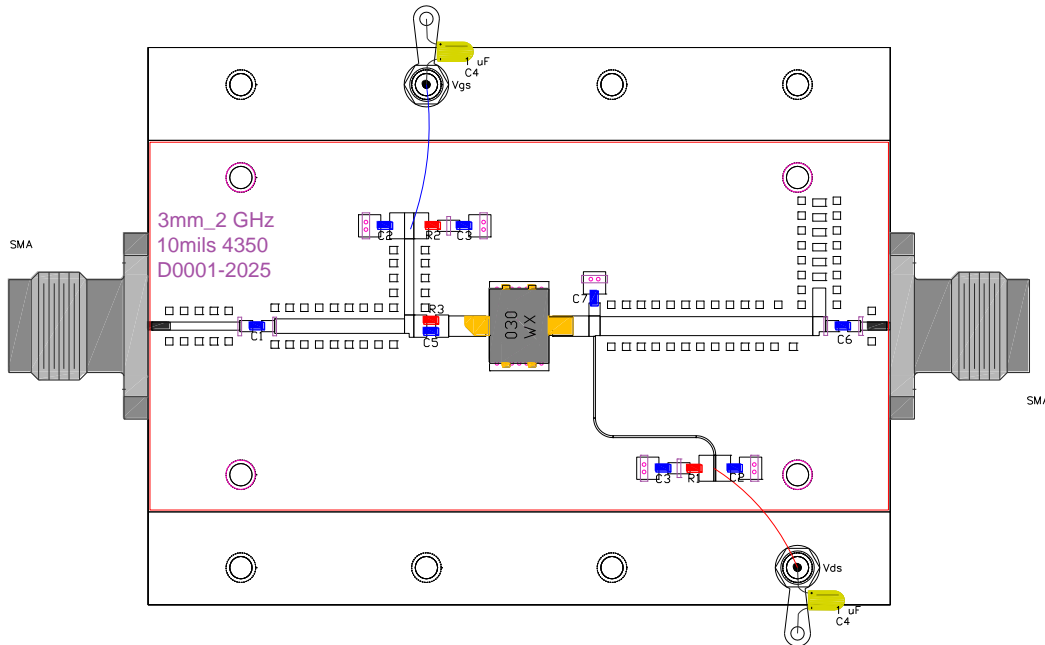
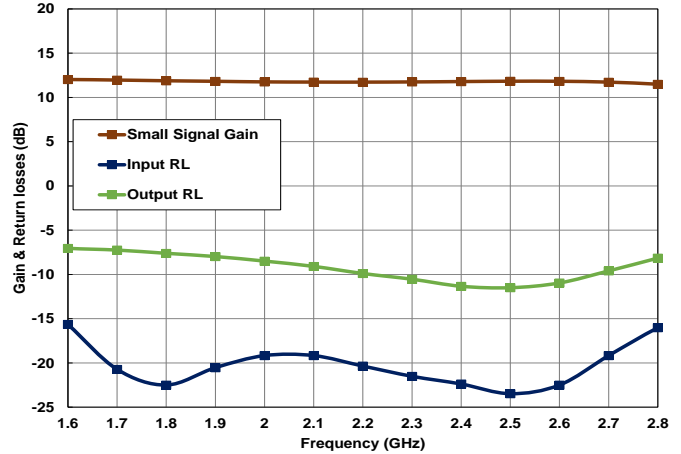
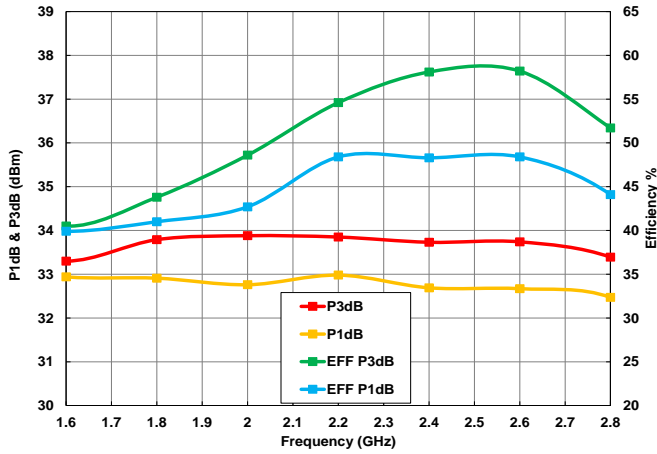


* All Dimensions are in inch

TEST CIRCUITS

A) 1.6 GHz to 2.8 GHz

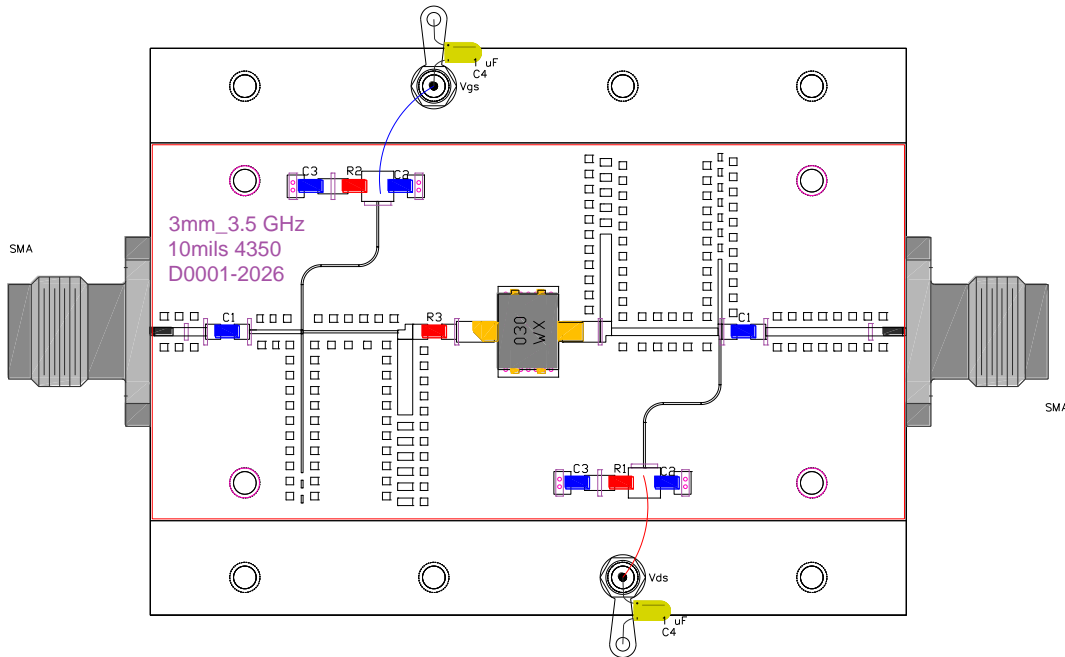
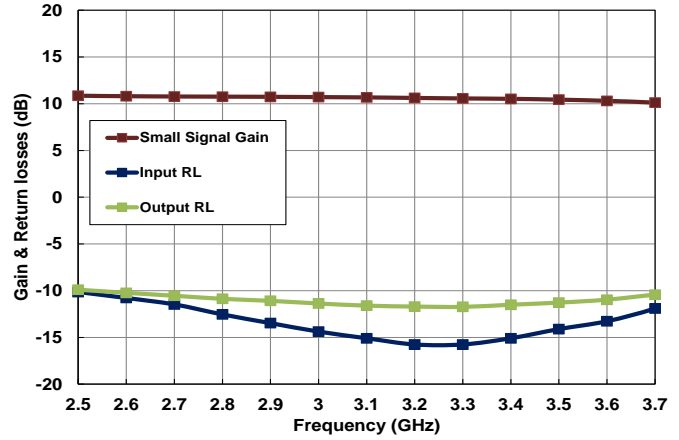
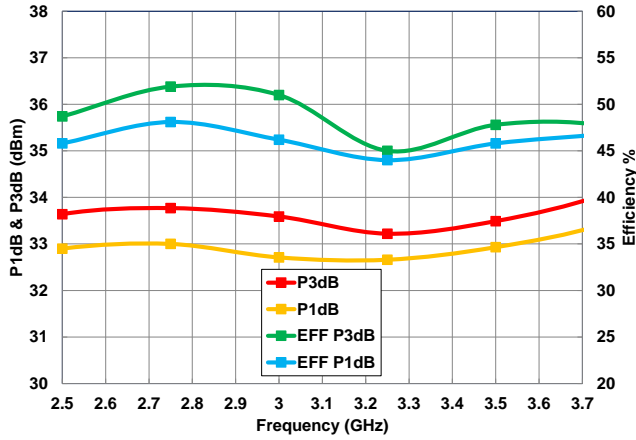
8V/450 mA



- Notes:
 1- 10mils Rogers 4350 Material (LoPro)
 2- Ckt is for 3mm mask58 @ 2GHz
 3- C1=2.4pF, C2=20pF, C3=1000pF, C4=1uF
 C5=2pF, C6=3.9pF, C7=2.2pF
 R1=5.1ohms, R2=51ohms, R3=33ohms
 4- All Caps & Resistors are 0402 size

B) 2.5 GHz to 3.7 GHz

8V/450 mA



- Notes:
- 1- 10mils Rogers 4350 Material (LoPro)
 - 2- Ckt is for 3mm mask58 @ 3.5GHz
 - 3- C1=10pF, C2=20pF, C3=1000pF, C4=1uF
R1=5.1ohms, R2=51ohms, R3=18ohms
 - 4- All Caps & Resistors are 0603 size