



Low Noise, High IP₃, and Excellent VSWR Amplifiers for 800 – 1000 MHz Applications Using WanTcom WHM08-2030A

1. Introduction

WHM08-2030A LNA is a low noise figure, wideband, and high linearity amplifiers with SMT package design. The amplifier offers typical noise figure of 0.70 dB and output IP₃ of 35 dBm at the frequency range from 650 MHz to 1050 MHz. WHM08-2030A has excellent VSWR better than 1.22 at input and output ports. While with the very high IP₃ (-70 dBc), the WHM08-2030A only consumes 60 mA under a single DC +5 V power supply.

WHM08-2030A has the optimum source and load impedances of noise figure, IP₃, and VSWR at 50 Ohm.

WHM08-2030A is a 6-pin surface mount (SMT) device and requires only one external de-coupling capacitor of 0.47UF. It measures 0.350" x 0.350" x 0.100" (8.89 mm x 8.89 mm x 2.54 mm).

WHM08-2030A LNA is most suitable for cellular base stations, wireless data communications, tower top receiver amplifiers, cellular micro-cells, last-mile wireless communication systems, and wireless measurement applications.

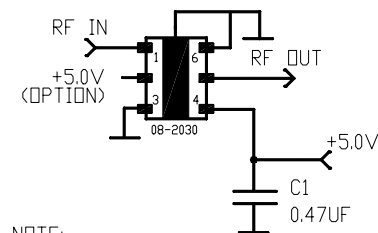
This application note describes the use of the WHM08-2030A in the low noise, high IP₃, and excellent VSWR design specifically for 800 – 1000 MHz wireless applications.

2. Single Stage LNA

The WHM08-2030A only requires the 0.47 UF decoupling capacitor on the DC bias supply of +5 V. With additional two more

components, +5V regulator (7805) and 0.22 UF capacitor, you can design a single stage or dual stage high performance amplifier with the DC supply voltage from +7V to +35V in minutes.

Figure 1 shows one stage LNA schematic.



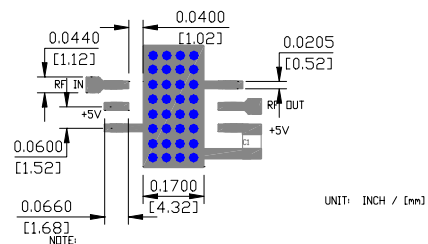
NOTE:

1. PIN 2 and 4 connected internally
2. EITHER PIN 2 OR PIN 4 FOR +5v
3. C1 MAYBE NEGLECTED IF +5V IS CLEAN

Fig. 1 The single stage LNA

The input and output DC block capacitors are not needed due to the built-in DC block capacitors.

Figure 2 shows the layout of the evaluation board.



1. THE BACKSIDE NEEDS TO BE METAL GROUND LAYER
2. GROUND VIA DIAMETER IS 0.024" (0.61 mm)
3. C1 IS 0.47 UF OR LARGER VALUE CAPACITOR
4. MATERIAL: FR-4, 4000-13, FROM NELCO
5. USE PROPER WIDTH FOR 50-OHM LINES FOR OTHER PCB MATERIAL

Fig. 2 The layout of the single stage LNA

Figure 3 shows the picture of the actual evaluation unit.

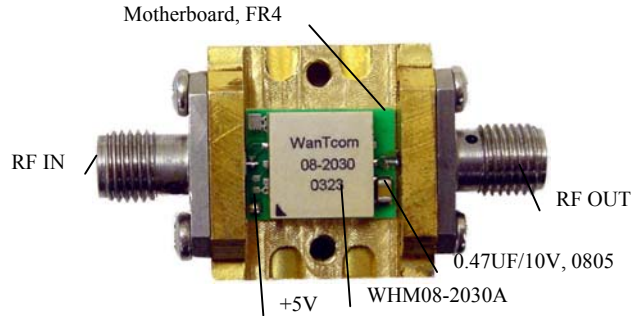
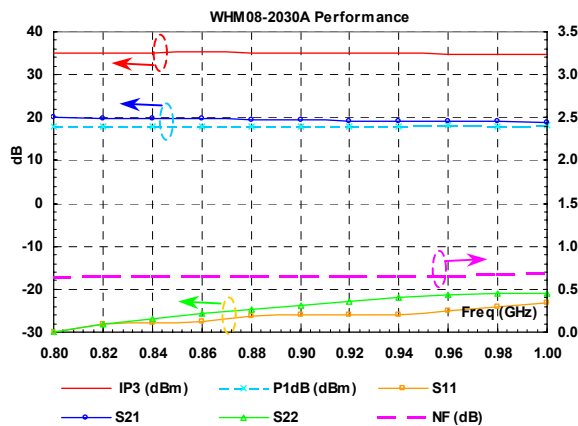


Fig. 3 The evaluation unit of the single stage LNA

The measured performance of WHM08-2030A on the evaluation unit is shown in **Figure 4**. The input and output return losses are better than 20 dB (VSWR 1.22:1), the gain is 20 dB from 800 MHz to 1000 MHz



2. Stability of WHM08-2030A

WHM08-2030A is a conditional stable device. The stability coefficient k is less than 1 in the frequency from 2.0 GHz to 4.5 GHz, as shown in **Figure 5**. It is from the output load. Adding a LC low pass filter at the output can make the amplifier unconditional

stable without degrading the amplifier performance.

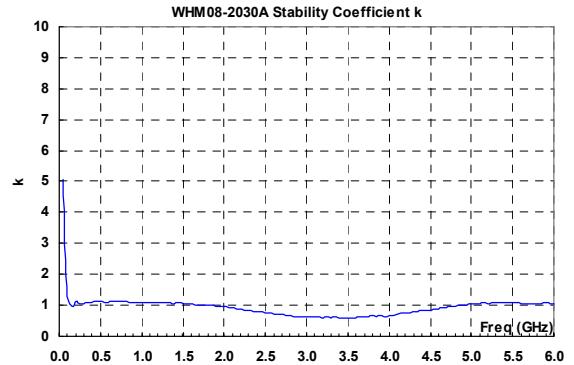


Fig. 5 The stability k of the single stage LNA