

Wide band amplifier with a punch

Chuck Steer, WA3IAC

A nice lower power device is the PHA-1+ from Mini circuits with 23dBm output power. The PHL-1+ is a nice replacement for the GAV-84 also from Mini Circuits with usable gain and power up to 5760Mhz although the gain drops off a bit. The price is about 1.50 in small quintiles. This would make a nice output stage for a transverter or just to play with as a QRP power. I was also thinking of using this in a frequency multiplier.

For my evaluation of the parts I used my printed circuit board for one MMIC that works fine up to about 3456MHz. I also used the same board for building and testing the wide band amplifier covering 100MHz to 2400MHz. with out tuning. As with some other FET's, this also requires +5 volts at about 130mA. A bit more then the 78L05 can handle, so a new board was lead out to accommodate the TO-220 regulator package. The board can be used with other MMIC's and if needed the 7805 can be replaced with an 8 or 9-volt regulator for use with other MMICs. Also added for the REV B board was two 1.0uF, 0603 capacitors under the board and at the regulator.

S11 input return loss, C1/C2 = 470pf, L1 = 1.0uH

146	223	903	1296	2304
-16.6	-19	-15	10.3	-4.5

At 50 S11 was just outside of the -10db RTL. (2:1 VSWR) at -8.5db, S21 was 17.2db.

S21 gain

146	223	903	1296	2304
15.9	15.8	14.8	13.8	10.3

Parts list

50 to 1300MHz AMPLIFIER

C1	470pf	Ceramic
C2	470pf	Ceramic
C3	n/a	
C7	1000pf	Ceramic
C8	100pf	Ceramic
L1	1.0uH	
U1	PHA-1+	Mini-Circuits

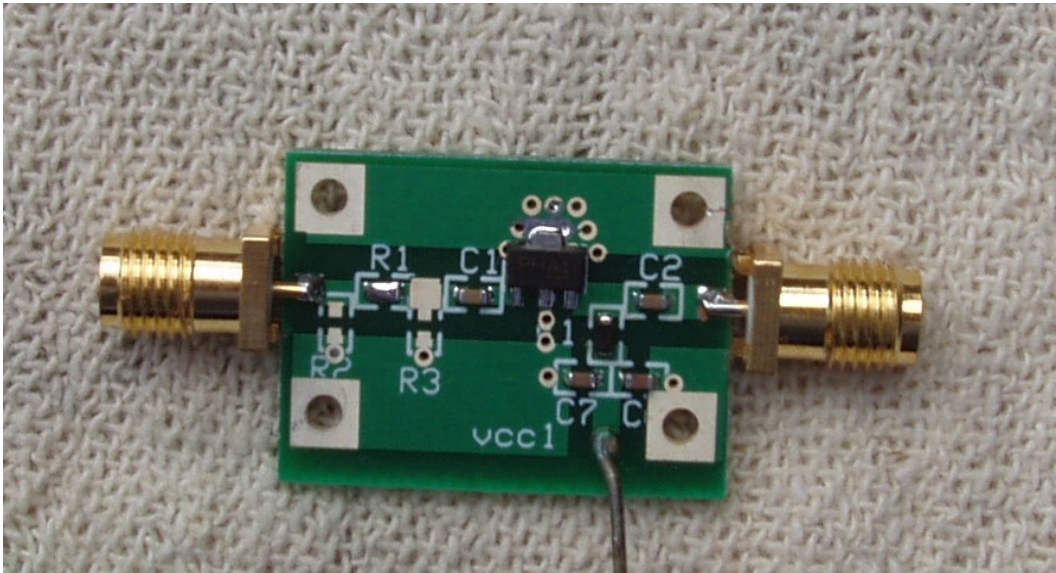


figure1, 50 to 1300MHz board (REV A)

For the 900 to 2450MHz amplifier I did the following:

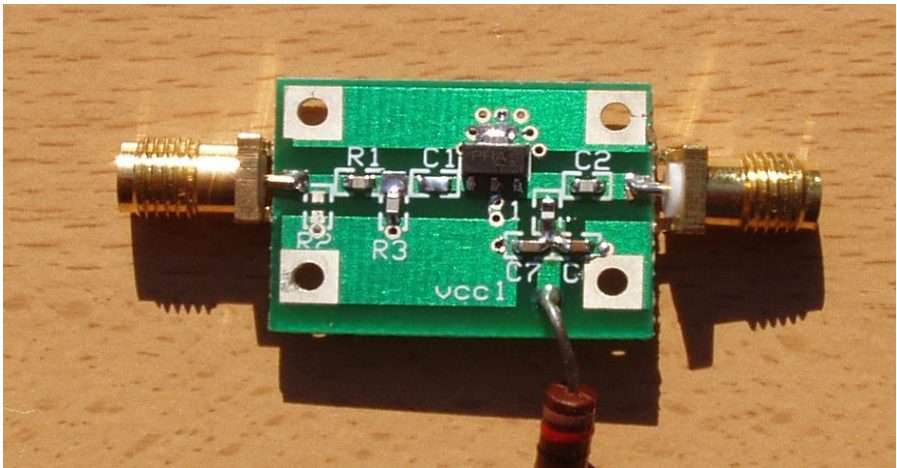
C1 was moved to R1, and a strap was placed at C1. The shunt C was added at R3. C shunt = 0.8pf (see photo below) Vcc = 4.5volts Capacitors C1/C2 were changed to 5.6pf and L1 change to 18nH with the following results:

S11 input return loss

903	1296	2304	2450
-10	-13	-14	-15

S21 gain

903	1296	2304	2450
14.5	14.5	12	12



900 to 2450MHz parts layout (REV A)

Parts list

900 to 2450MHz AMPLIFIER

C1	5.6pf	ATC 600S	Located at R1 spot
C2	5.6pf	ATC 600S	
C3	0.8pf	ATC 600S	Located at R3 spot
C7	1000pf	Ceramic	
C8	27pf	Ceramic	
L1	18nH		
U1	PHA-1+	Mini-Circuits	

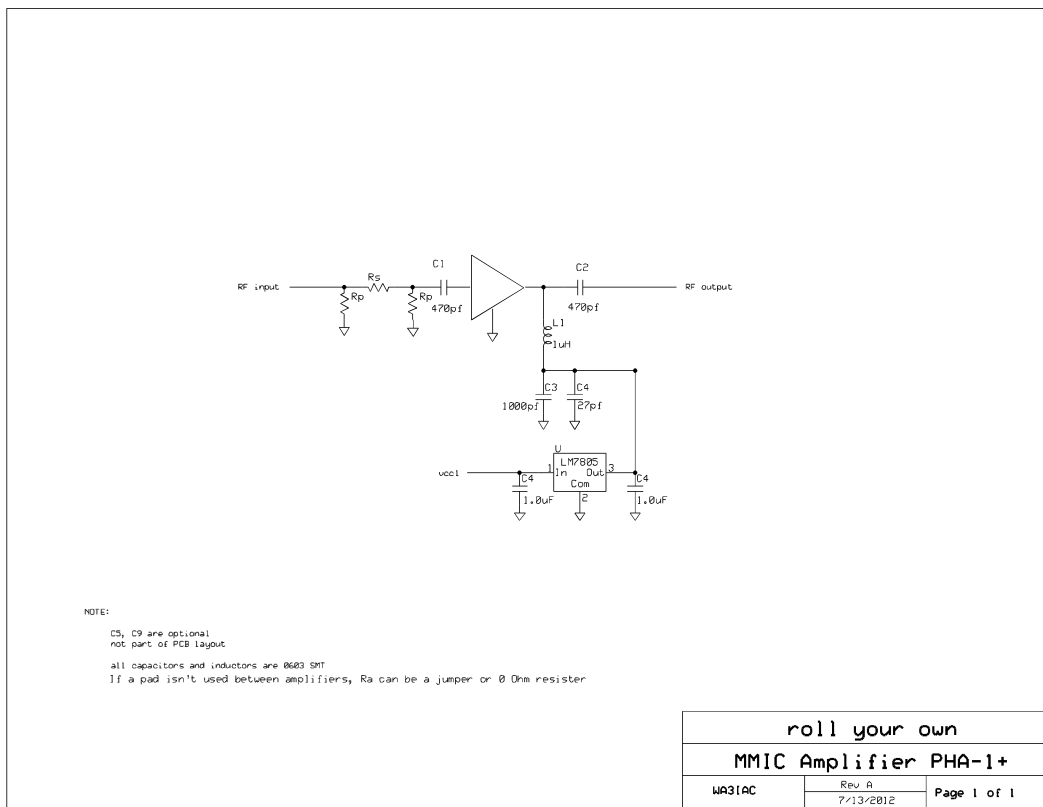
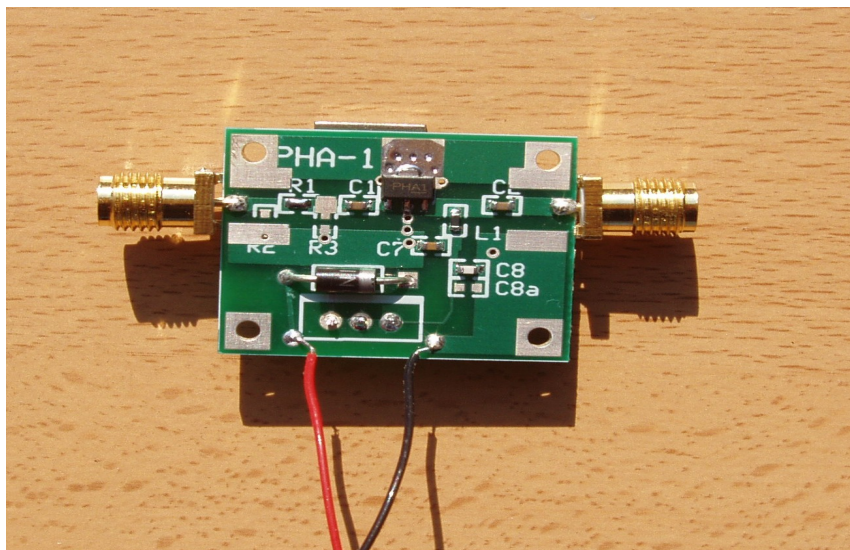


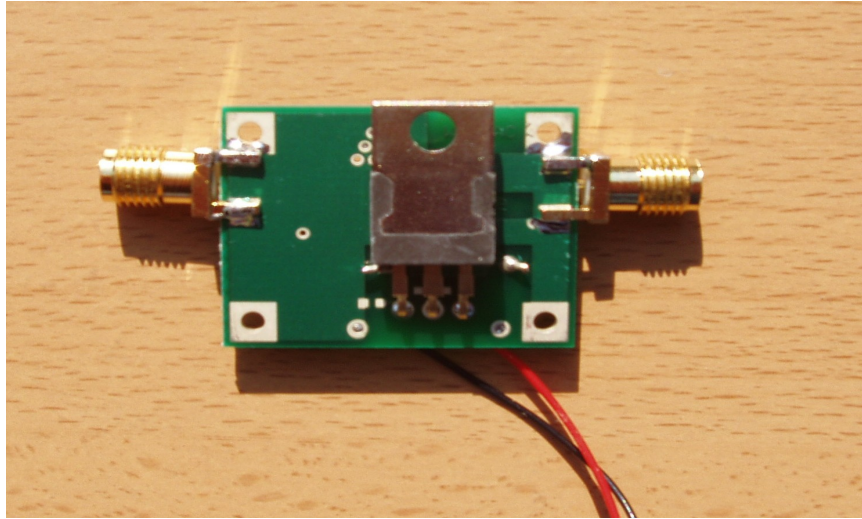
figure 2 schematic



PHA-1+ with +5 volt regulator mounted on bottom (REV B)

Added parts on the REV B layout:

D1	1N4001	
Q1	7805	TO-220
Cx, Cx	1.0uF, 50volt	0603



5 volt regulator on board (REV B)

web link to:

Digi-Key: www.digikey.com/

Analog Devices: www.analog.com/

Mini circuits: www.minicircuits.com/

w1ghz: www.w1ghz.org