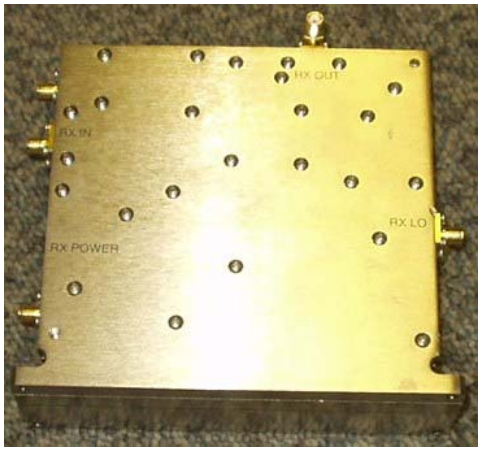


Ceragon 7GHz Module for 5.76GHz

by Roger Ray G8CUB

These will work after modification on 5760MHz. They consist of a receive LNA mixer & IF amplifier, plus a transmit filter, amplifier & output monitor. Thus just needing an LO, Tx mixer, and a couple of relays to complete a 5.76GHz transverter.

Measured performance on receive with a 432MHz IF, is as follows:
Conversion gain +19dB
System noise figure 2.6dB
Image rejection (5.328GHz LO) -22dB

Performance on transmit:
+34.4dBm output (2.75W) - 1dB compression
+35.2dBm output (3.3W) saturated
+57dB gain

Supply requirements:

	Receive (Tx Inhibited)	Full Output
+5.0V	0mA	100mA
+6.8V	180mA	0mA (switched)
+6.0V driver	0mA	0.93A
+10.0V pa	0mA	0.95A
-6.0V	40mA	40mA

On the transmit side, the only essential modification is to place a piece of ceramic on top of the existing inter-digital filter. This shifted the entire frequency response down about 1.5GHz, to exactly where needed. Transmit image was 60 – 80dB dependant on the size of the ceramic. With the high transmit gain, it is necessary to either use an input attenuator, or use the AGC control to turn the gain down. This will give 1dB compression of around +32dBm. Adding some small tabs around the PA pushed the power up to +34.4dBm.

On receive, the image filter strips were extended by about 2mm using silver paint. This gave 22dB image rejection, but conversion gain was only about 11dB. Starring the RF amplifiers with small pieces of copper, improved the gain by about 7dB
The IF response was about 1 dB down at 432MHz, so the IF output capacitor was changed to 330pF to give a final conversion gain of 19dB. On a second unit, I used a piece of ceramic like on the TX filter. However the size is critical, it needed to be very slightly less than the board outline of the filter. With a bit of playing, I achieved 20dB conversion gain (modifying the RF amp as above) with the image -25dB. Also on this one, I was not convinced that the IF capacitor change made any difference, so it may be easier to leave it alone.

In my 5.7GHz system I use the Ceragon block with an Alcatel synthesiser switched for either 10 or 5.7GHz, using a 10MHz reference.

No information was available on pin-out or supply voltages, so the following is my derivation. From data on the TX driver, a negative supply of -6V is required.

Pin-out on the two connectors as pictured above, left to right, is as follows.

Rx

Connector 1 (6 way)

1	2	3	4	5	6
n/c	+6.8V	-6V	0V	+6.8V	n/c
	IF			RF	

Tx

Connector 2 (6 way)

1	2	3	4	5	6
n/c	+6V	-5V	0V	+5V	+10V
	driver			amps	PA

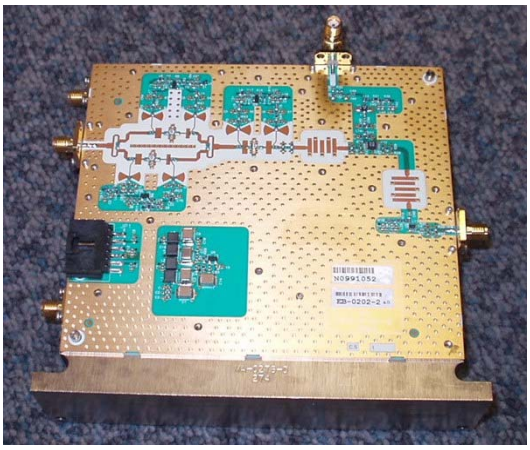
Connector 3 (5 way)

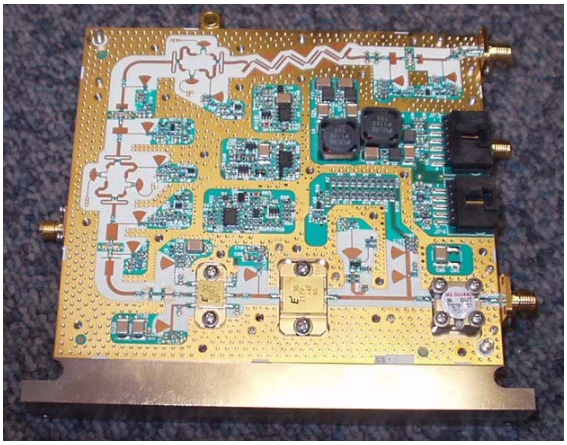
7	8	9	10	11
n/c	Tx Det	AGC	0V	Tx Mute

Connections to the unit are by two, 0.1” pitch single in line connectors. It is quite easy to solder wires straight on if you don’t have suitable mating plugs.
In my system, the 6.8V supply is provided by a 7808 regulator and dropper resistor. The 10V supply, uses a 10V 1A low voltage drop regulator. The -6V is provided by a block DC-DC converter, and -6V (79L06) regulator.
External protection is required, to inhibit the positive supplies, if the -6V supply fails.

Tx Mute – 0V to inhibit
Tx Det – DC proportional to dB output power (log detector) Max ~ 4V
AGC – 0- 5V Control I guess (I have not tried this, just left the pin o/c)

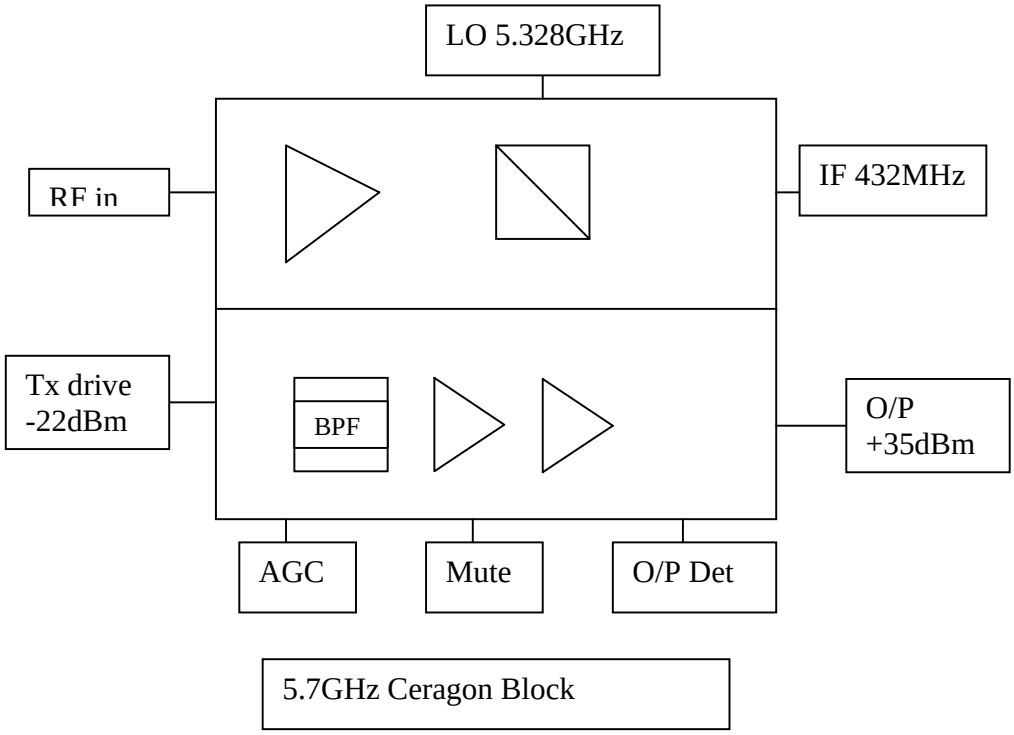
Local oscillator power required is +10dBm (5.328GHz). Around -22dBm Tx drive will give you full output (at max gain). The 2 SMA output connectors allow easy use of a coax relay, or the addition of a single stage low noise amp and / or PA.

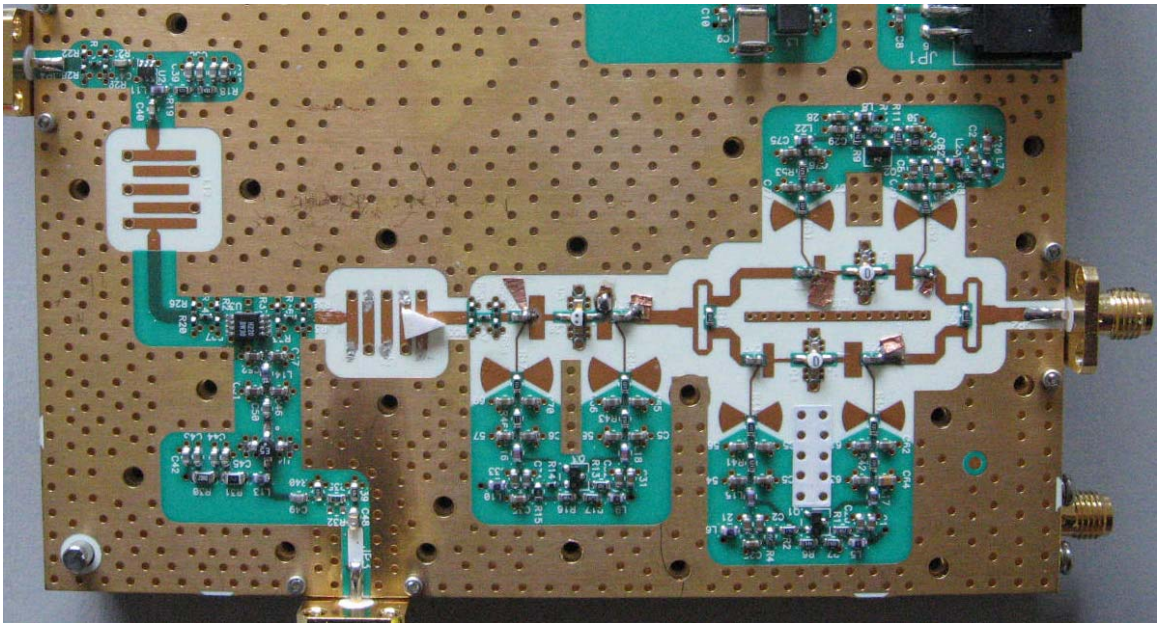




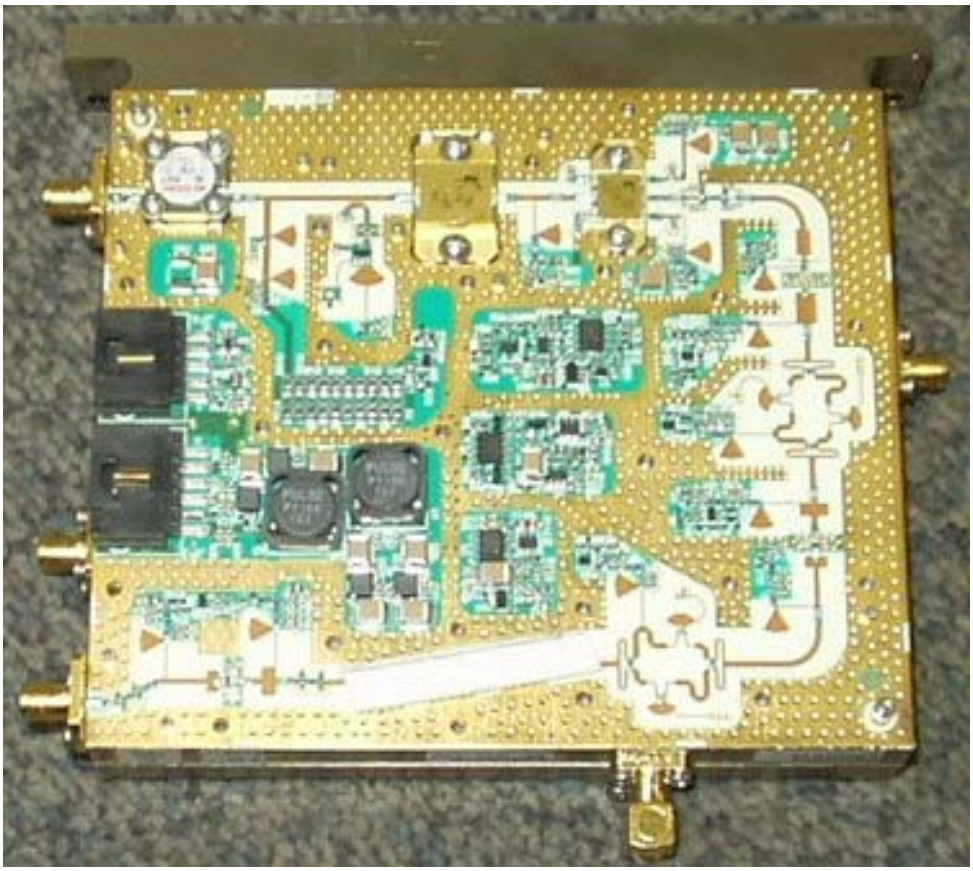
Unmodified PCBs

Block diagram

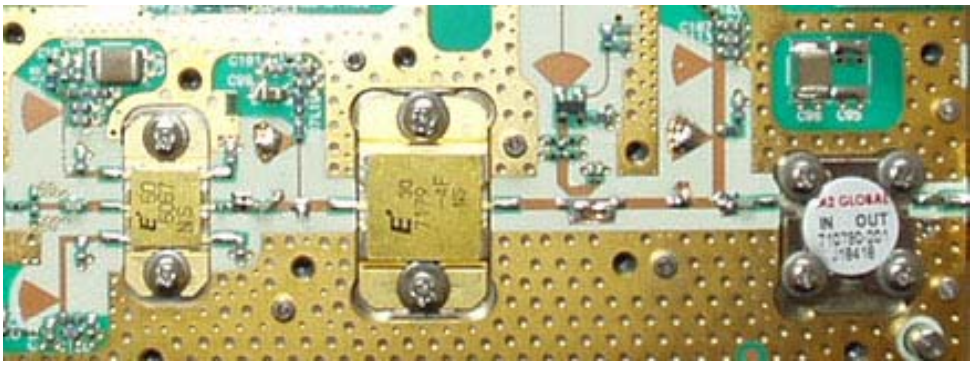




Modified receive board



Modified Transmit board – ceramic in place.



Power Amplifier mods for 2.7W Output. Driver FMM5057VF, PA FLM7179-4F,

Availability
Units are currently available on Ebay from 'art-in-part'. These however may have some faults, particularly damaged SMA connectors (an easy change).
I have a few that have been checked, but are un-modified. These are available on a first come first served basis for £40 plus £4.50 postage (UK). These will be provided with Tx ceramic strips. Contact littlemallards@hotmail.com