



Eyal Gal 21.2-23.6GHz Transceiver by Roger Ray G8CUB

These units with the part number 6058-00 will work un-modified at 24.048GHz, with high side LO. Which is good as it is impractical to change the RF circuitry! They consist of a combined transmit and receive system. Just needing an LO at half frequency, Tx output filter, and a couple of relays to make a complete 24GHz transverter.

Measured performance on receive with a 432MHz IF, is as follows:

Conversion gain +26dB

System noise figure 3.3 – 3.9dB*

Image rejection (12.24GHz LO) -17 to -22dB*

Performance on transmit:

+30.5dBm output, - 1dB compression

+53dB gain

Saturated power output on transmit is >1.2W.

Supply requirements:

	Receive (Tx Inhibited)	Full Output
+8.0V	600-700mA*	0.9-1.0A*
+12V	10-25mA*	500-750mA*
-12V	120mA	100mA

* spread shows measured results over three units

My existing 24GHz system is an Alcatel unit using the Alcatel synthesiser, already with high side injection, and 10MHz reference. So I was ready to try the Eyal Gal block.

A specification sheet was available on the web <http://www.eyal-emi.com/siteFiles/1/32/1081.asp> This suggested that operation on 24GHz might be possible. The original IF was 2.8 – 4.1GHz, so would they work with a 432MHz IF? The IF response measured was essentially flat down to 100 MHz, so it all looked hopeful. But the RF response has rolled off around 4dB at 24.048GHz. However this still leaves around 26dB conversion gain. Noise figure was around 0.2dB worse, but was still rather good (better than my more complex Alcatel based system).

The real novelty for me, was that the available data included both pin-out, and voltages! The modules are designed for linear operation, so it was hoped to get around +27dBm out. In fact the first unit that I tried gave +31dBm, a very useful power level at 24GHz. Performance on receive is good with +26dB conversion gain, image -17 to -22dB, and noise figure of 3.3 to 3.9dB. With the high transmit gain, it is necessary to use an input attenuator, and if required to use the AGC control to turn the gain down.

On transmit it is necessary to use a filter on the output to reduce the LO and image to acceptable levels. The block dissipates a fair amount of heat when in transmit mode, so additional heat-sinking may be required for FM use.

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

Connector 1 (6 way)

6	5	4	3	2	1
n/c	+8V	-12V	0V	n/c	+12V

Connector 2 (7 way)

7	6	5	4	3	2	1
Rx	Tx Det	AGC	0V	n/c	n/c	Tx Mute
Agc						

Connections to the unit are by two, 0.1" pitch single in line connectors..

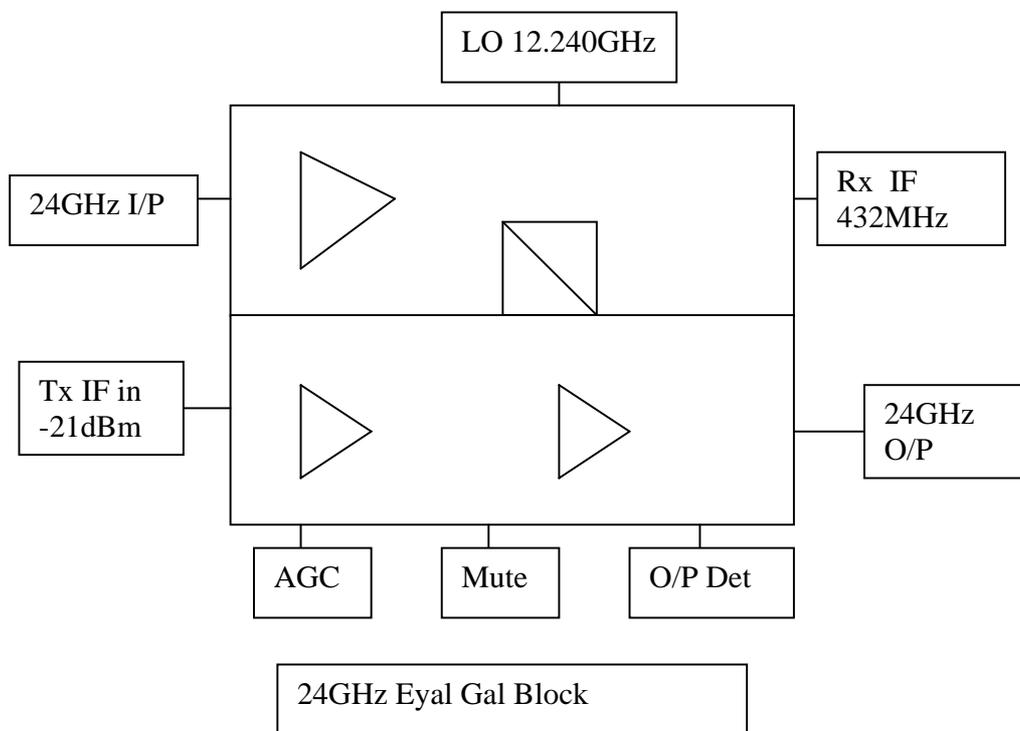
Tx Mute – 0V to inhibit

Tx Det – DC proportional to dB output power (log detector) Max ~ 4 V

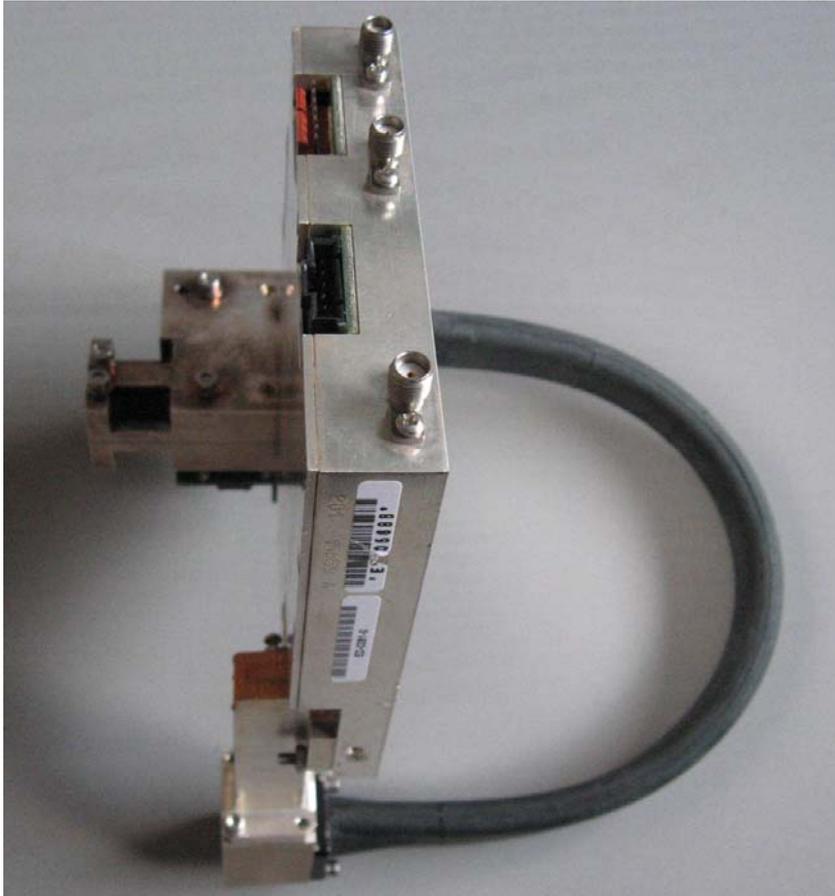
AGC – 0- 5V Control - from the data sheet turning the power down more than 10dB will limit the output power (I have not tried this, just left the pin o/c)

Local oscillator power required is +10dBm (12.24GHz). Around -22dBm Tx drive will give you full output (at max gain). Both receive and transmit RF ports are WR-42 (wg20) waveguide.

Block diagram



My 24GHz unit with filter and PIN waveguide switch



It is hoped that this type of module will help promote activity on 24GHz in 2009. Similar modules by other manufacturers may well work as well.

Availability

Modules are appearing on Ebay, again mainly from dealers in Israel. Any additional modifications will be posted on www.rfdesign.co.uk/microwave Roger G8CUB email: littlemallards@hotmail.com