COM-4005 CELLULAR BAND [800 -1000 MHz] QUADRATURE RF MODULATOR

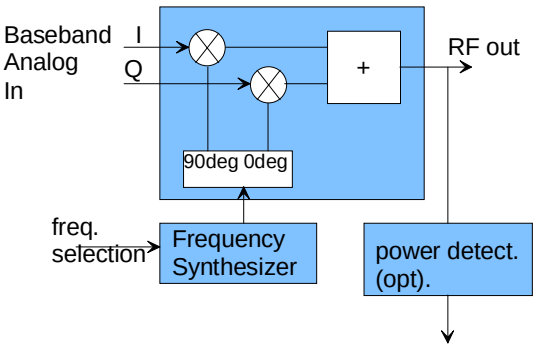
Key Features

- Quadrature modulator 800 – 1000 MHz center frequency.
- Low-noise frequency synthesizer can be tuned over entire range by steps of 100 KHz.
- Optional output power measurement has 0.1 dB resolution.
- Output power can be controlled over 20 dB range using 10-bit control words. Non-linear scale.
- Selectable internal / external 10 MHz frequency reference for the frequency synthesizer.
- Single 5V supply
- Connectorized 3"x 3" module for ease of prototyping. SMA connectors.

For the latest data sheet, please refer to the **ComBlock** web site: www.comblock.com/download/com4005.pdf. These specifications are subject to change without notice.

For an up-to-date list of **ComBlock** modules, please refer to www.comblock.com/product_list.htm .

Block Diagram



Electrical Interface

Inputs / Outputs

Input Module Interface	**Definition**
ANALOG_I_IN	Modulated input signal, analog, baseband, real axis. 1Vpp max. 0.85V DC bias. SMA connector.
ANALOG_Q_IN	Modulated input signal, analog, baseband, imaginary axis. 1Vpp max. 0.85V DC bias. SMA connector
EXT_REF_CLK	External 10 MHz frequency reference for frequency synthesis. Sinewave, clipped sinewave or squarewave. Minimum level 0.5Vpp. Maximum level: 3.3Vpp. Use square wave for best phase noise performances.
Analog Output Signals	**Definition**
RF_OUT	Modulated RF output. 800 – 1000MHz Maximum output level: -3 dBm. Impedance: 50 Ohms. SMA connector

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 Issued 6/22/2002

Serial Monitoring & Control	DB9 connector. 115 Kbaud/s. 8-bit, no parity, one stop bit. No flow control.
Power Interface	4.75 – 5.25VDC. Terminal block. Power consumption is 250mA max.

Configuration (via Serial Link / LAN)

Complete assemblies can be monitored and controlled centrally over a single serial or LAN connection.

The module configuration parameters are stored in non-volatile memory. The installation default values are highlighted in bold.

Parameters	**Configuration**
RF frequency	Range 800 MHz to 1000 MHz, steps 100 KHz, expressed in Hz. Default: **950 MHz**. REG0: bit 7:0 (LSB) REG1: bit 15:8 REG2: bit 23:16 REG3: bit 31:24 (MSB)
Gain control	10-bit control. Non-linear scale. Zero is lowest power. AGC range : 22 dB @ 800 MHz (typ.) 26 dB @ 1000 MHz (typ.) Default: **00 00000000** REG4: bit 7-0 (LSB) REG5: bit 1-0 (MSB)
External/Internal frequency reference	0 = internal 1 = external. Default:**0** REG6: bit 0
Modulator on/off	0 = modulator off 1 = modulator on Default:**0** REG6: bit 2

Default configuration at manufacturing:
REG0 = 0x80
REG1 = 0xD9
REG2 = 0x9F
REG3 = 0x38
REG4 = 0x00
REG5 = 0x00
REG6 = 0x00
950 MHz, minimum gain, internal frequency reference, modulator off.

Monitoring (via Serial Link / LAN)

Parameters	**Monitoring**
Version	Returns '4005A or B' when prompted for version number.
Power measurement (option)	10-bit number. The higher the number, the lower the power. The power measurement linearity is shown below. REG7 bits 7-0: bit 7-0 (LSB) REG8 bits 1-0: bits 9-8 (MSB)

Operations

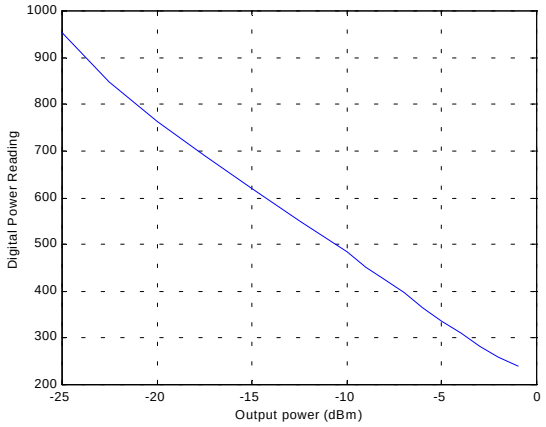
Internal vs External Frequency Reference

In order to use the external frequency reference, connect a 10 MHz sinewave, clipped sinewave or square wave to the SMA connector J2. Then select external frequency reference by software command from the ComBlock control center.

In order to use the internal frequency reference, either physically disconnect the external 10 MHz signal at SMA connector J2, or place the external input signal in high impedance mode. Then select internal frequency reference by software command from the ComBlock control center.

Power Measurement (Option -B)

Output power measurement is provided as an option (-B). Output power measured with +/- 0.2 dB accuracy over a range from –25 dBm to the maximum output power. The 10-bit measurement linarity is shown below [800 MHz output signal]:



Test Points

Test points are provided for easy access by an oscilloscope probe.

Test Point	Definition
TP1	Internal / External reference clock
TP2	Frequency synthesizer PLL lock status

Performance

Quadrature phase error: 1. deg rms. typ
I/Q amplitude balance error: 0.2 dB.typ
ON/OFF rejection: > 80 dB

LO leakage (at output, maximum AGC gain, +20 KHz input signal):

-36 dBm @ 800 MHz, typ.
-37 dBm @ 1.00 GHz, typ.

Sideband suppression (at output, maximum AGC gain, + 20KHz input signal):

-42 dBc @ 800 MHz, typ.
-51 dBc @ 1.0 GHz, typ.

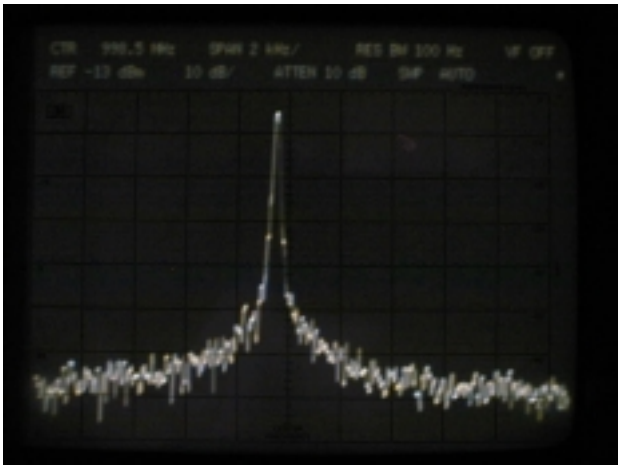
Out-of-band spurious spectral lines: < -60 dBc (Exception: a –47dBc spectral line may be present at 120 MHz from the center frequency).

Power detection (option -B) resolution: 0.1 dB.

Phase noise:

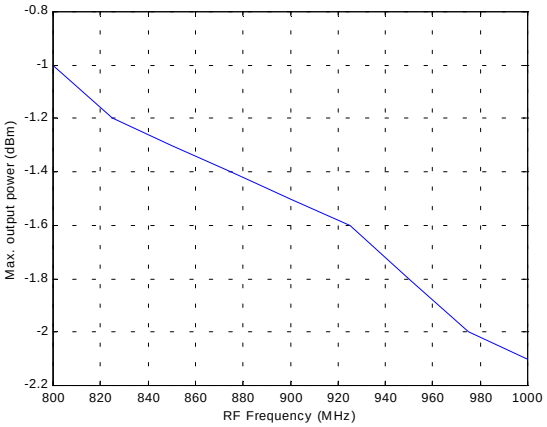
<-50 dBc @ 100 Hz
< -65 dBc @ 1 KHz
< -82 dBc @ 10 KHz
< -110 dBc @ 100 KHz

The phase noise measurements are similar when internal or external frequency references are used.



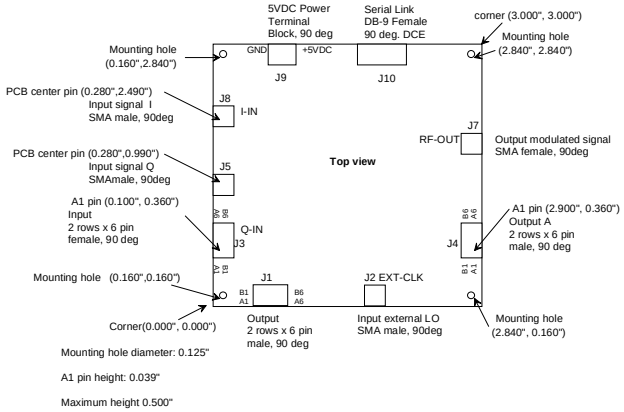
Phase noise measurement: internal reference clock 2 KHz/div, 10 dB/div. 998.5 MHz center freq., 100 Hz resolution bandwidth.

Maximum output power level (for a 1Vpp input):



Minimum output power: -25 dBm (800-1000 MHz).

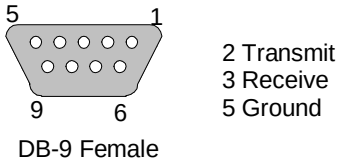
Mechanical Interface



Pinout

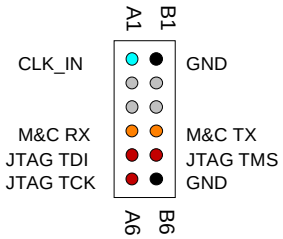
Serial Link J10

The DB-9 connector is wired as data circuit terminating equipment (DCE). Connection to a PC is over a straight-through cable. No null modem or gender changer is required.



Input Connector J3

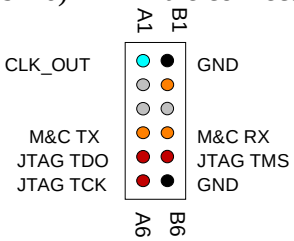
12-pin (2 rows x 6) 2mm female connector.



This module is is designed for direct connection to the COM-2001 baseband digital-to-analog conversion module.

Output Connectors J1,J4

12-pin (2 rows x 6) 2mm male connector.



This connector is to forward JTAG, GND and other monitoring and control signals to subsequent analog modules.

ComBlock Ordering Information

COM-4005-A	CELLULAR BAND [800 – 1000 MHz] QUADRATURE MODULATOR
COM-4005-B	CELLULAR BAND [800 -1000 MHz] QUADRATURE MODULATOR W/ OUTPUT POWER MEASUREMENT.

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