

COM-1900 [400MHz – 3GHz] RF + FPGA SOFTWARE DEFINED RADIO

Key Features

- Complete full-duplex modem hardware from RF to network interface.
- Anodized aluminum enclosure:
Size: 168.5 x 139 x 41mm.
- Custom radio-frequency bands within 400 MHz– 3GHz at no extra charge. To be specified at the time of order.
- Independently tunable low-phase noise RF frequency synthesizers for transmit and receive.
- Large digital signal processing capabilities:
 - Xilinx Artix-7 100 FPGA
 - 32-bit ARM processor running at 120 MHz
 - A/D converter (IF undersampling): 12-bit, 170 MSamples/s
 - Dual D/A converters: 14-bit, 175 MSamples/s
 - 1 Gbit DDR3 SDRAM
 - 1 Gbit NAND flash for program storage.
- Radio-Frequency interfaces:
 - RF input:
-50 to 0 dBm, 50 Ohm
Direct LNB interface (10 MHz, power, DiSEqC)
 - RF output:
-30 to +0 dBm, 50 Ohm
- External data interface:
 - Two 10/100/1000 Ethernet LANs (RJ-45)
 - USB
- Internal data interfaces:
 - FPGA JTAG
 - ARM JTAG
- Frequency reference: internal TCXO or input for an external, higher-stability 10 MHz frequency reference.
- Supply voltage: 18¹ – 36VDC with reverse voltage and surge protection.



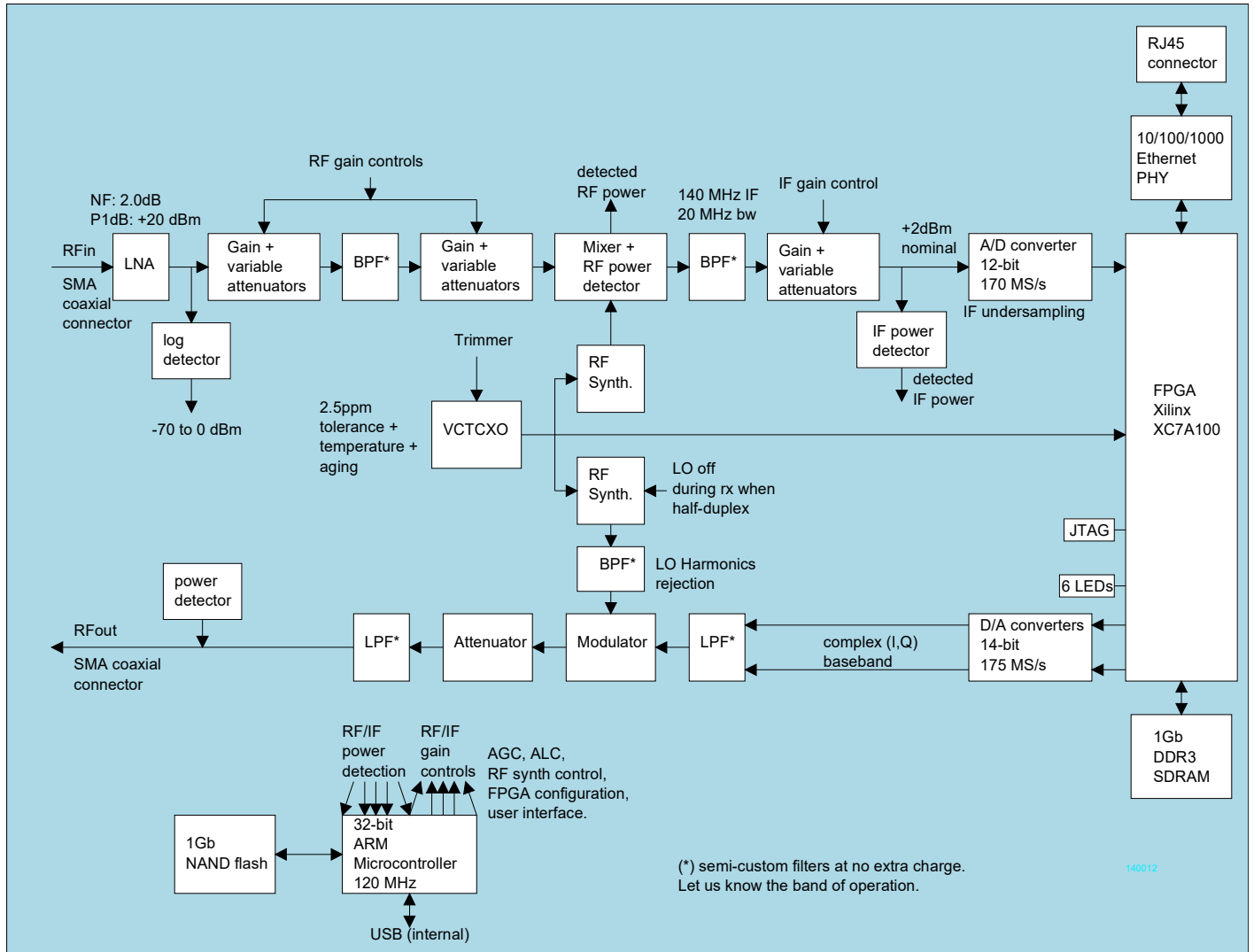
For the latest data sheet, please refer to the **ComBlock** web site: comblock.com/download/com1900.pdf. These specifications are subject to change without notice.

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

¹ 5.6V min when not supplying external LNB power



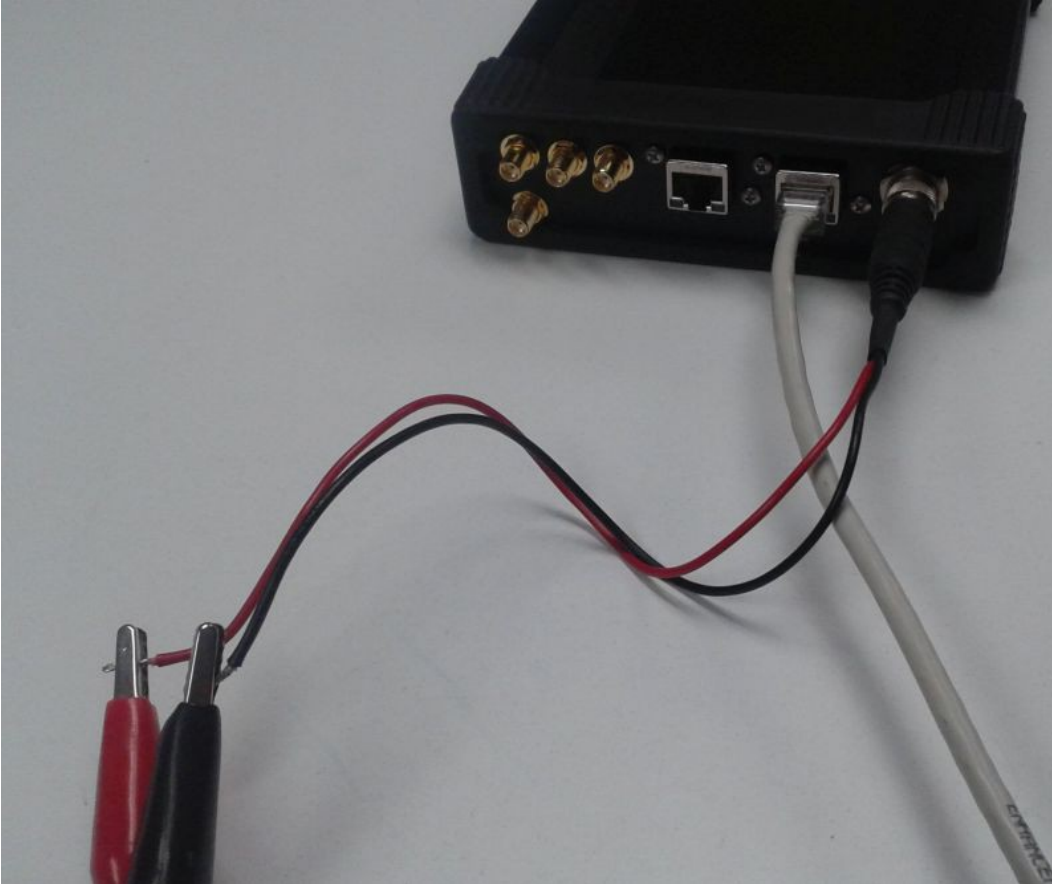
Block Diagram



Getting Started

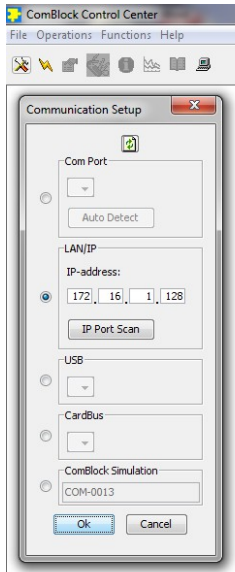
Connect the supply voltage to the supplied barrel plug. Any voltage in the range +18² to +36VDC. The positive voltage is on the center pin, the ground on the outer barrel.

Connect a LAN cable to the RJ45 connector close to the power entry. The default IP address is 172.16.1.128. Alternatively, connect the supplied USB cable to the USB connector close to the power switch. This requires prior installation of a USB driver.



Install the ComBlock control center software (ComBlock_Control_Center_windows_3_12o.exe or latest version) if not already done. Start the ComBlock Control Center, click on the leftmost button and select USB or LAN communication IP address 172.16.1.128 as shown below.

² 5.6V min when not supplying external LNB power



Turn the power supply on. A red LED will be visible for 2 seconds.
 From the ComBlock Control Center, detect the COM-1900 by clicking on the second button from the left.

Customization

The transceiver design can be customized to meet alternate customer requirements. The customizable features are

- Custom radio-frequency bands within 400 MHz– 3GHz at no extra charge.
 PLEASE SPECIFY AT THE TIME OF ORDER:
 1. MAXIMUM TRANSMIT FREQUENCY (for the harmonics rejection filter)
 2. RECEIVE FREQUENCY BAND (MIN/MAX)

Interfaces

10/100/1000 Ethernet LAN for data, monitoring and control	RJ45 Supports auto MDIX to alleviate the need for crossover cable.
10 MHz frequency reference input	10 MHz frequency reference input for frequency synthesis. Sinewave, clipped sinewave or squarewave. SMA female connector Input is AC coupled. Minimum level 0.6Vpp. Maximum level: 3.3Vpp.
10 MHz frequency reference output	10 MHz frequency reference output
RF Rx	Receiver input. 50 Ohm, SMA female connector. Operating range: -60 to -10 dBm Maximum no damage input level: + 20 dBm Two other signals can be multiplexed onto the same coaxial connection between the COM-1900 transceiver and an external LNB: <ul style="list-style-type: none"> • 10 MHz frequency reference (software enabled) Level: -2 dBm typ. • 13/18V supply (software enabled)
RF Tx	Transmitter output. 50 Ohm, SMA female connector. Transmit level: -30 to 0 dBm, user selectable. One other signal can be multiplexed onto the same coaxial connection between the COM-1900 transceiver and an external BUC: <ul style="list-style-type: none"> • 10 MHz frequency reference (software enabled) Level: 0 dBm typ.

Operating input voltage range

Supply voltage	+18V min, +36V max 320mA typ. under +28VDC
Supply voltage (when no LNB 13/18V supply needed)	+5.6V min, +36V max

The positive voltage is on the center pin, the ground on the outer barrel.

Absolute maximum ratings

Supply voltage	+45 V max
RF input	+20dBm max

Mechanical interface

Aluminum enclosure with rubberized end caps.

L x W x H: 168.5mm x 138.96 mm x 40.98 mm.

Includes two optional 40mm mounting flanges for mounting to a flat support plate.

Schematics

The board schematics are available on-line at http://comblock.com/download/com_1900schematics.pdf

Code templates

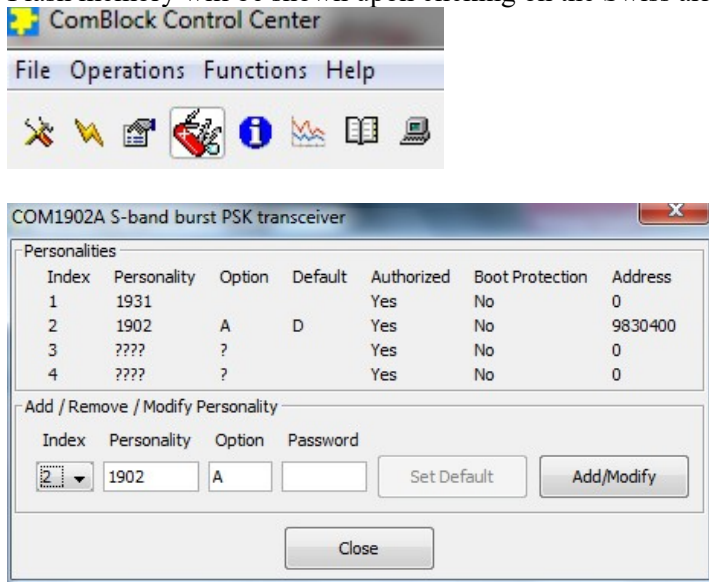
Source code templates are available for both the FPGA (in VHDL) and the ARM processor (in C)

ARM template: https://comblock.com/download/ARM/CB1900_1_6.7z

Load software updates

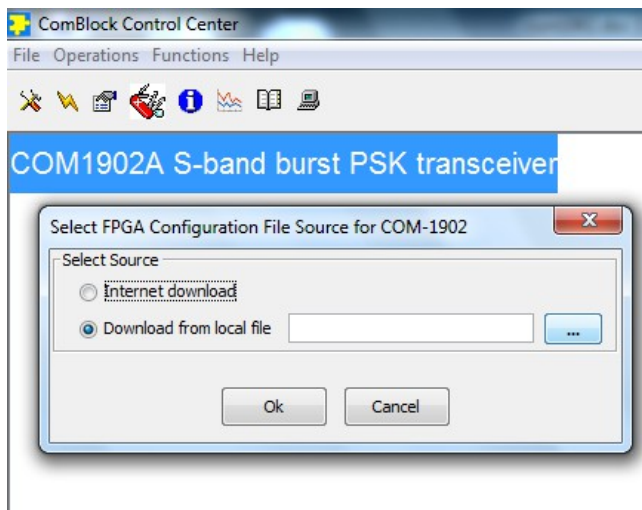
The software configuration files generated by Xilinx ISE or Vivado tools are named with the .bit extension.

The COM-1900 can store multiple .bit files (personalities). The list of personalities stored within the ComBlock Flash memory will be shown upon clicking on the Swiss army knife button.



The default personality loaded at power up or after a reboot is identified by a 'D' in the Default column. Any unprotected personality can be updated while the Default personality is running.

To burn the .bit file into persistent (flash) memory, select the desired personality index and click on the “Add/Modify” button.



To identify the option and revision, it is recommended to use the code template and declare both option and revision as two ASCII characters. The option and revision for the software currently running within the FPGA are listed at the bottom of the advanced settings window.

Recovery

The toggle button under the backpanel can be used to

- (a) prevent the FPGA configuration at power up. This can be useful if a bad FPGA configuration was loaded which resulted in loss of communication with the user.
- (b) reset the LAN1 IP address to 172.16.1.128.

To prevent the FPGA configuration at power up, turn off power. Toggle the button. Turn on power, wait 1 second, then toggle the button a second time.

To reset the LAN1 IP address to a factory default of 172.16.1.128: Turn on power. Toggle the button, wait at least 30 seconds, during which time the red led blinks, then toggle the button a second time. Wait another 10 seconds, then cycle power off/on.

Operation

Frequency reference

Two frequency references are software-selectable:

- external 10 MHz signal supplied through the front panel
- internal 19.2 VCTCXO

Warning: when selected as external frequency reference, the 10 MHz frequency reference must be present prior to powering on the modem.

If no 10 MHz signal is available and the modem expects such a signal, it is possible to reinitialize the modem by removing the backpanel (where the power switch is located) and pressing the hidden reset button. See the recovery section below.

Output 10 MHz frequency reference

A 10 MHz frequency reference signal can be multiplexed with RF signals on the RF input (to an external LNB) and RF output (to an external BUC). The same 10 MHz is also available as an output on the front panel, labeled "10 MHz OUT". Each one of these three clocks signals can be enabled or disabled by software command.

ComBlock Ordering Information

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SOFTWARE DEFINED RADIO

PLEASE SPECIFY AT THE TIME OF ORDER:

3. MAXIMUM TRANSMIT FREQUENCY (for the harmonics rejection filter)
4. RECEIVE FREQUENCY BAND (MIN/MAX)

ECCN: 5A991.g

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