

CatchAll™-M1 High-Performance, Low-Power, Reconfigurable Transceiver

Overview

Built on the heritage of the world's first commercial software defined measurement receiver, the CatchAll-M1 is the latest product generation, delivering more processing power whilst consuming less power and occupying less space. In contrast to its predecessors, the CatchAll-M1 also adds a transmitter capability. It is supplied as standard with flexible digital up and down-converters and an easy to use interface to applications running on a host PC, which may be bespoke applications or third party tools such as Matlab® or Octave. A software development kit provides user access to the embedded field programmable gate array (FPGA) and digital signal processor (DSP) allowing full access to the significant processing resources that these provide.

The CatchAll-M1 is based on MAC Ltd's MON3100 and MON3600 cards, which are described in separate datasheets, together with a filtering, RF switching and power supply unit. Each unit provides two channels of reception and a single channel transmitter. An embedded GPS receiver supplies position information and stabilises the on-board reference oscillator to ± 0.01 ppm. The complete transceiver is housed in a 100 × 100 × 60 mm case.

Features

- Compact, low-power design, typically < 10 W
- Two receiver channels, bandwidth 20 MHz
- One transmitter channel, bandwidth 10 MHz
- Integrated GPS
- Frequency range 200 MHz to 2.5 GHz
- User definable FPGA (XC6SLX150) and DSP (TMS320C6748)
- High speed USB2 interface to host PC
- Operating voltage 7 V to 14 V DC
- Simple interface to COM-compatible applications, eg, Matlab

Applications

- Survey receivers
- Signal analysers
- Test transmitters
- Custom transceivers
- Algorithm development

CatchAll-M1



As-Supplied Configuration

The CatchAll-M1 is supplied pre-configured with generic transceiver firmware. This allows received signals to be down-converted from a radio frequency, decimated and streamed as IQ samples to a host-PC, and similarly allows IQ samples to be streamed from the PC to the CatchAll-M1, interpolated and output as a modulated RF signal. An example Matlab application illustrates how the CatchAll-M1 can be used and can form the basis of user applications.

User Configurations

For many users the pre-configured firmware and a user-provided application will be all that is needed; however, the As-Supplied configuration merely scratches the surface of the CatchAll-M1's capabilities. Users with FPGA and DSP development skills can take advantage of the on-board processing elements to design their own embedded applications. This approach relieves the processing pressure on the host PC and is the only way to handle wide bandwidth signals whose sampling rate would otherwise exceed the capacity of the USB2 link.

Alternatively, for users who require the capability offered by the embedded resources, but who do not have the necessary design skills in-house, MAC Ltd can provide a customised design service.

Software Development Kit

Users wishing to develop their own FPGA and DSP applications can take advantage of the optional software development kit (SDK).

The SDK provides interface blocks to all of the on-board hardware, and each FPGA function is supported by an equivalent DSP class so that the supplied blocks can easily be used without requiring a detailed understanding of their implementation.

Using the SDK commonly required functions such as mixing, filtering and passing high-rate data to and from the DSP can be implemented with ease leaving the user free to concentrate on their own applications. Furthermore, the SDK blocks are AXI4 compatible simplifying their use with other blocks in the Xilinx CORE Generator™.

Communication with a host device, typically a PC, is handled by a high-speed USB2 interface. This is supported by MAC Ltd's CDC-ACM USB driver, which can deliver data from the CatchAll-M1 at 160 Mb/s and to it at 240 Mb/s.

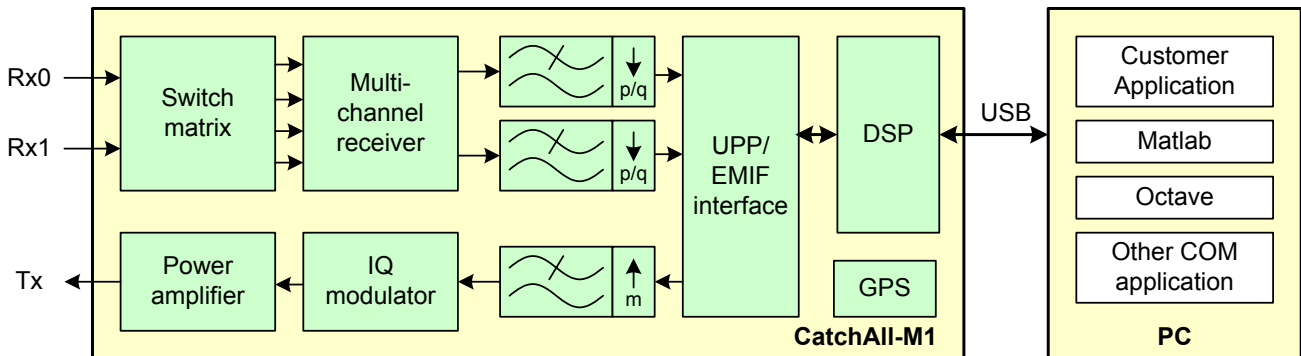
A convenient COM-based interface allows the CatchAll-M1 to be used with a variety of PC applications such as Matlab, Octave or bespoke C/C++ applications.

Technical Specification

Frequency ranges	Rx 200 to 2500 MHz Tx 200 to 2200 MHz
IF bandwidth	20 MHz
Noise figure	< 10 dB
Sampling rate	61.44 Msamples/s
Input 1 dB compression point	-25 dBm
Dynamic range	> 80 dB
Phase noise	< -85 dBc/Hz @ 10 kHz
IF rejection	> 60 dB
Modulation bandwidth	10 MHz
Output power	+10 dBm
Operating temp range	0°C to +50°C
Typical power consumption	8 W
Power supply	7 to 14 V DC
Size	100 x 100 x 60 mm
Gross weight	0.5 kg

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As-supplied system configuration



www.mac ltd.com

Multiple Access Communications Limited
Delta House, Southampton Science Park
Southampton, SO16 7NS
United Kingdom

Tel: +44 23 8076 7808
Fax: +44 23 8076 0602
Email: enquiries@mac ltd.com