

MON3600



Four-channel, Wideband, Phase-coherent Receiver

Overview

The MON3600 provides four channels of phase coherent reception and one channel of transmission in a low power, small form factor package. Covering all the major VHF and UHF frequency bands it is ideally suited to monitoring and direction finding applications in the defence, cellular and industrial, scientific and medical (ISM) bands.

The MON3600 is compatible with MAC Ltd's low power signal processing platform the MON3100; the pair forming a compact transceiver consuming less than 10W in a typical operating mode.

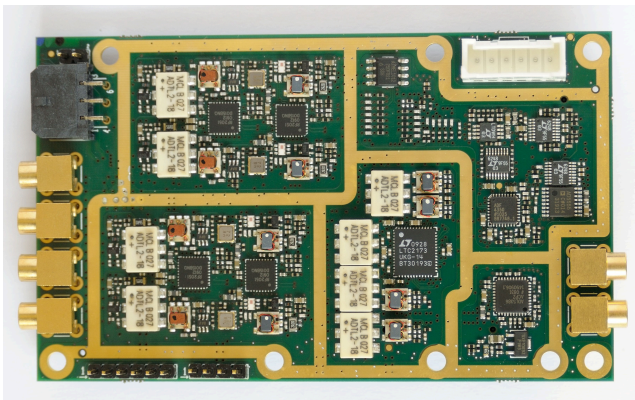
Features

- Four channel phase coherent reception
- Single channel transmitter
- Frequency range 200 MHz to 2500 MHz
- Receive bandwidth 20 MHz
- Transmit bandwidth 10 MHz
- Receive channels can be independently enabled
- Transmitter power levelling control
- Up to 80 MSample/s receiver sample rate

Applications

- Direction finding systems
- Beamforming systems
- MIMO reception
- Multi-channel wideband receivers
- Unattended monitoring systems

The MON3600



Description

Each receive channel of the MON3600 is a double-conversion superheterodyne receiver culminating in an intermediate frequency (IF) of 140 MHz. A low-power, quad analogue-to-digital converter (ADC) digitises the final IF at up to 80 MSamples/s with 14-bits of precision. The four receive channels on the MON3600 are organised into two pairs (Rx0 plus Rx1 and Rx2 plus Rx3). In its standard configuration Rx0 and Rx1 have a first IF at 1732.5 MHz whereas Rx2 and Rx3 have a first IF at 1056 MHz. This configuration permits the MON3600 to cover the complete frequency range of 200 MHz to 2500 MHz.

Each pair of receivers shares local oscillators (LOs) and hence is fully phase coherent. With careful choice of LO frequencies the pairs themselves can be coherent by virtue of sharing the reference oscillator for the synthesisers. Thus, the board may be operated as a four channel receiver or two independent two channel receivers, permitting phase coherent reception simultaneously in two frequency bands.

A single channel transmitter with a modulation bandwidth of 10 MHz enables forward channel signals to be generated across most of the receive frequency band. Such signals may be useful for control of a remote device or, with the addition of suitable combining, for generating a time or frequency division duplex transceiver.

The transmitter takes quadrature 14-bit digital samples at up to 64 MSamples/s and after converting these to the analogue domain uses a direct conversion transmitter to create the final radio frequency signal. The RF signal is amplified to approximately +10 dBm (more at lower frequencies), which can then be used as the drive for an external power amplifier. A feedback input to the modulator and a variable attenuator in the transmit path can be used to create a power levelling loop around an external amplifier.

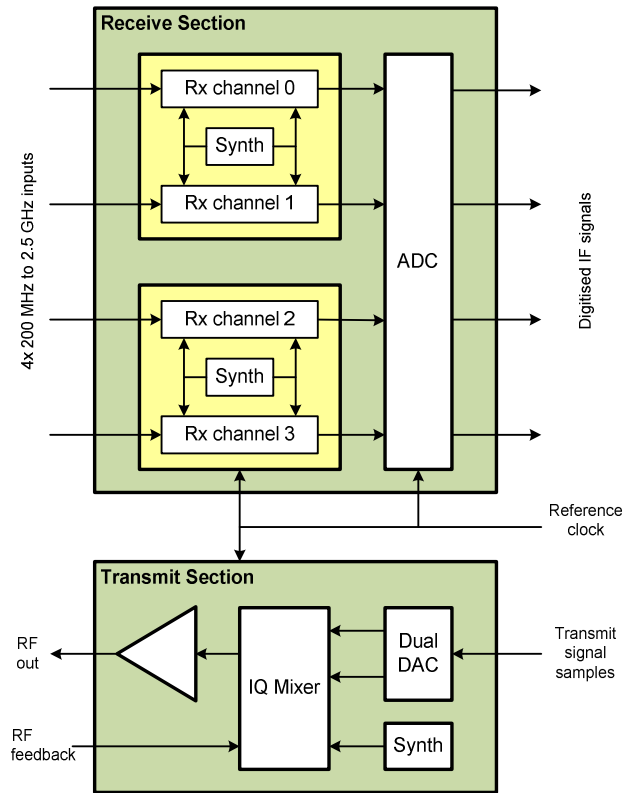
System power can be optimised by independently enabling and disabling the transmitter and each receive chain.

The card is controlled via a simple command-response protocol over a logic level UART. An on-board low power processor interprets the high level commands and converts these into the required control signals for each of the on-board devices.

Specification (preliminary)

| Parameter | Min | Max |
|----------------------------|----------|------------|
| Rx input frequency range | 200 MHz | 2500 MHz |
| First IF (Rx0 + Rx1) | 1710 MHz | 1755 MHz |
| (Rx2 + Rx3) | 1041 MHz | 1071 MHz |
| Rx noise figure < 1 GHz | | < 8 dB |
| Second IF bandwidth | | 20 MHz |
| Rx gain < 1 GHz | 30 dB | |
| Phase noise | | |
| 10 kHz offset | | -80 dBc/Hz |
| 100 kHz offset | | -85 dBc/Hz |
| 200 kHz offset | | -93 dBc/Hz |
| Input gain compression | | |
| Max gain | -30 dBm | |
| Min gain | -15 dBm | |
| IF ripple | | ± 2 dB |
| Tx frequency range | 200 MHz | 2200 MHz |
| Tx modulation bandwidth | 10 MHz | |
| Open loop transmit power | | |
| < 1 GHz | 15 dBm | 18 dBm |
| > 1 GHz | 10 dBm | 15 dBm |
| Size | | 100 mm x |
| Power consumption | | |
| 1 Rx channel | | 2.2 W |
| 4 Rx channels | | 4.7 W |
| Tx active, Rx off | | 3 W |

MON3600 block diagram



MONITOR Product Range

In addition to the card described herein, the MONITOR product family includes a low power digital signal processing card, a multi-band receiver and a gigabit Ethernet interface.

Further members of the family are planned and bespoke versions can be developed. Please ask for further details.

Ordering Information

To order please contact MAC Ltd at the address below. Custom systems based on the MONITOR product range as well as a full software and FPGA design service are available on request. Please contact MAC Ltd for further details.



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