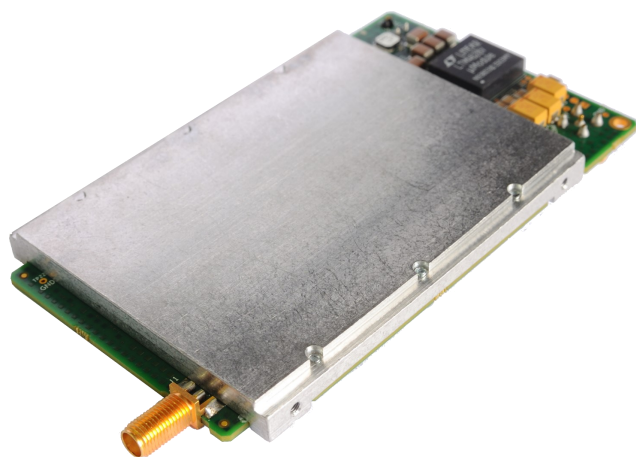


MON3120

Compact, Low-Power HF Receiver



Overview

The MON3120 is a member of MAC Ltd's MONITOR product range and is designed to receive and capture high-frequency (HF) signals between 5 and 30 MHz via direct digitisation of the input signal. With all of the same processing capabilities as the MON3100 and supplied in a convenient 2.5" hard-disk form factor it forms a powerful and compact system component.

The MON3120 can be connected to a host PC via a high-speed USB interface and is supplied with firmware to implement a multi-channel down-converter and channeliser, with filter responses appropriate for full-amplitude modulation (AM), narrowband frequency modulation (FM), and single-sideband (SSB) operation.

Features

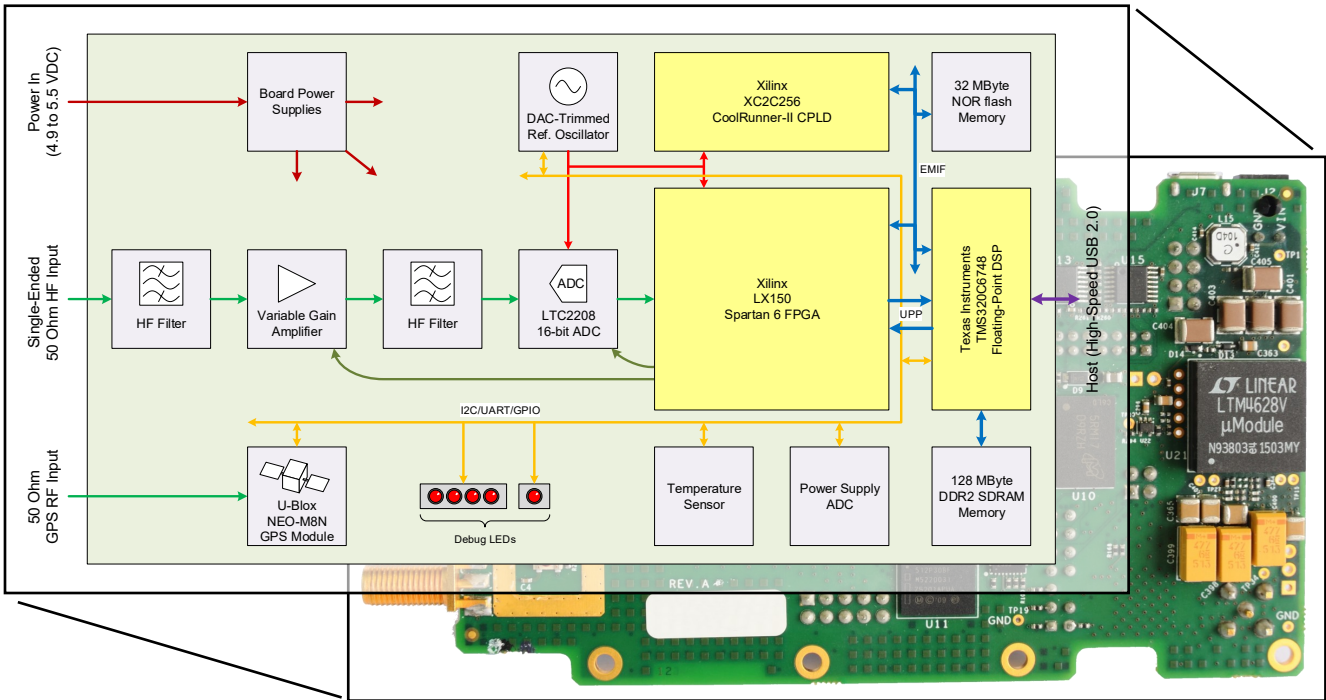
- 5 to 30 MHz input frequency range
- High dynamic range 16-bit ADC
- 122.8 MSps ADC sampling rate
- Software-controlled signal path gain
- Low noise figure
- 150k logic cell Xilinx Spartan 6 FPGA
- TMS320C6748 for signal processing and control
- High-speed 480 Mbit/s USB 2.0 interface
- PC-controlled/standalone operation
- High-performance GPS module
- GPS-conditioned ADC clock
- Custom firmware development available

Applications

- HF receivers
- RF measurement equipment
- High-speed data capture
- Software-defined radio
- High-speed spectral analysis

Specification

Parameter	Value
Input frequency range	5 to 30 MHz
Gain control range	50 dB
Noise figure (at maximum gain)	< 10 dB
Phase noise	
100 Hz offset	< -110 dBc/Hz
1 kHz offset	< -130 dBc/Hz
10 kHz offset	< -140 dBc/Hz
Input power for full-scale at the ADC:	
At maximum gain	> -30 dBm
At minimum gain	> +10 dBm
Input third-order intercept point (IIP3)	
At maximum gain	> -10 dBm
At minimum gain	> +30 dBm
Spurious free dynamic range (SFDR)	> 90 dB
Adjacent channel selectivity	> 90 dB
Reference frequency	122.88 MHz
Power consumption (typical)	< 10 W
Supply voltage	4.9 to 5.5 V
Size (L x W x H)	120x70x18 mm
Operating temperature range (when mounted on a suitable heatsink)	-10°C to +40°C



Description

The MON3120 combines a high-performance 16-bit analogue-to-digital converter (ADC) with a Xilinx XC6LX150 Spartan 6 field-programmable gate-array (FPGA) and a Texas Instruments TMS320C6748 floating-point digital signal processor (DSP) to form a small but powerful HF receiver module. By using a 2.5" disk form-factor, the MON3120 can easily be integrated with a small form factor PC, such as an Intel NUC, to create a complete, software-defined HF receiver system.

Good sensitivity is achieved through the addition of two stages of low noise amplification and analogue low pass filtering before the ADC. This filtering together with the use of a high, 122.88 MSps ADC sampling rate provides a high level of rejection of unwanted signals that would otherwise be aliased in band by the sampling process. Gain control of the front-end amplifiers allows sensitivity to be traded off against signal handling capability, which allows the receiver to be used in a wide range of operating environments. This is important because no channel filtering is performed before the ADC and hence the ADC must cope with the total signal power in the HF band without saturating.

Channel selectivity is performed in the digital domain using mixers and digital filters implemented within

the FPGA. This approach enables exceptional performance to be achieved, providing in excess of 90 dB of adjacent channel rejection. This, combined with its good sensitivity, means that the MON3120 is able to separate weak signals from strong ones in adjacent channels. The excellent phase noise that results from the direct sampling architecture also means that reciprocal mixing levels are very low.

The firmware supplied implements multiple, independent down-converters with support for full-AM (DSB), narrowband FM (NBFM), USB or LSB. Output I/Q samples are delivered to a host PC at a sampling rate of 8 kSps for subsequent processing.

Custom firmware designs can be created by MAC Ltd to meet your specific requirements. Example features include, the addition of extra channels, demodulators, spectrum scan functions, etc.

Ordering Information

Custom versions of the MON3120 hardware as well as a full software and FPGA design service are available on request. For this and ordering information please contact MAC Ltd using the contact details below.



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