Dual Digital Tuner with USB interface

(ADC/DDC/USB board)

Specification

1 Features overview

- Max. 78 MSPS Operation
- Two Independent Channels
- Wide Dynamic Range: >100 dB
- User Programmable AGC, DDC, CIC, FIR
- Direct IF Sampling up to 300 MHz
- Channel Filters include a Fourth Order CIC followed by 21-tap and 63-tap Symmetric FIRs
- Flexible output formats include 12 bit Floating Point and 8, 16, 24, or 32 bit Fixed Point
- USB 2.0 Interface

2 Specification in brief

The RFmondial ADC/DDC/USB board is a high quality dual digital tuner board with USB 2.0 interface. This board allows direct IF sampling of signals up to 30 MHz (Nyquist band) or up to 300 MHz (with downsampling) for enhanced receiver performance and reduced system costs. A block diagram of an ADC/DDC/USB board is shown in Figure 1.

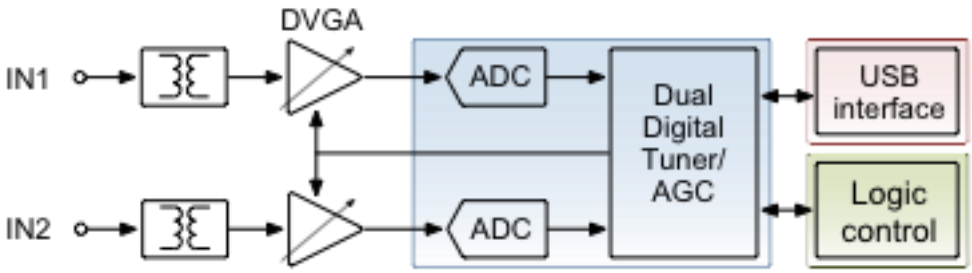

Figure 1: Block diagram of ADC/DDC/USB board.

This dual digital tuner board has been designed to support software re-configurable narrowband receivers. Direct IF-sampling removes the need for an LO, mixer, and associated channel filters. All subsequent tuning and channel filtering is performed digitally by the integrated chipsets. Tuning is accomplished by quadrature mixing of the digital input signal with a programmable digital LO. The quadrature mixer outputs are then channel-filtered by two stages of programmable FIR filters.

The board offers high dynamic range digital tuning and filtering based on hard-wired digital signal processing technology. Each channel has independent tuning, phase offset, filter coefficients, and gain settings.

2.1 RF/IF input circuit

For the single-ended analog input signals two transformers are used to generate the differential input signals for the DVGA. The DVGA circuit provides differential outputs for the Analog to Digital convertor.

2.2 Automatic Gain Control (AGC)

The integrated digital AGC controller monitors the ADC output and controls the ADC input signal level by adjusting the DVGA setting. AGC threshold, deadband&hysteresis, and the loop time constant are user defined. Total dynamic range of more than 100 dB full-scale signal to noise in 100 kHz bandwidth can be achieved.

2.3 Channel filtering

Channel filtering is performed by a series of three filters. The first is a 4-stage Cascaded Integrator Comb (CIC) filter with programmable decimation ratio from 8 to 2048. Next there are two symmetric FIR filters both with independent programmable coefficients. The first FIR filter decimates the data by 2, the second FIR decimates by

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either 2 or 4. Channel filter bandwidth at 52 MSPS ranges from ±650 kHz down to ±1.3 kHz. At 65 MSPS, the maximum bandwidth increases to ±812 kHz.

The board supports all common modes of the DRM standard. The DDC/USB board can be used primarily as test equipment for DRM systems but also for other systems.

Parameter	Value	Comments
ADC/DDC		
ADC	Dual 14 bit	
Sampling rate	≤ 78 MHz	
SFDR	>100 dB	
IF dynamic range	>100 dB	
Maximum input level	+16 dBm	
Output data	I/Q base band	
Output data rate	192 ksps	(can be configured for other data rates)
Output format	32/24/16	fixed/floating
Output interface	USB 2.0	
Power supply		
Input	6 V @ 500 mA	
Mechanical dimensions	BxLxH (70x120x20)	

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