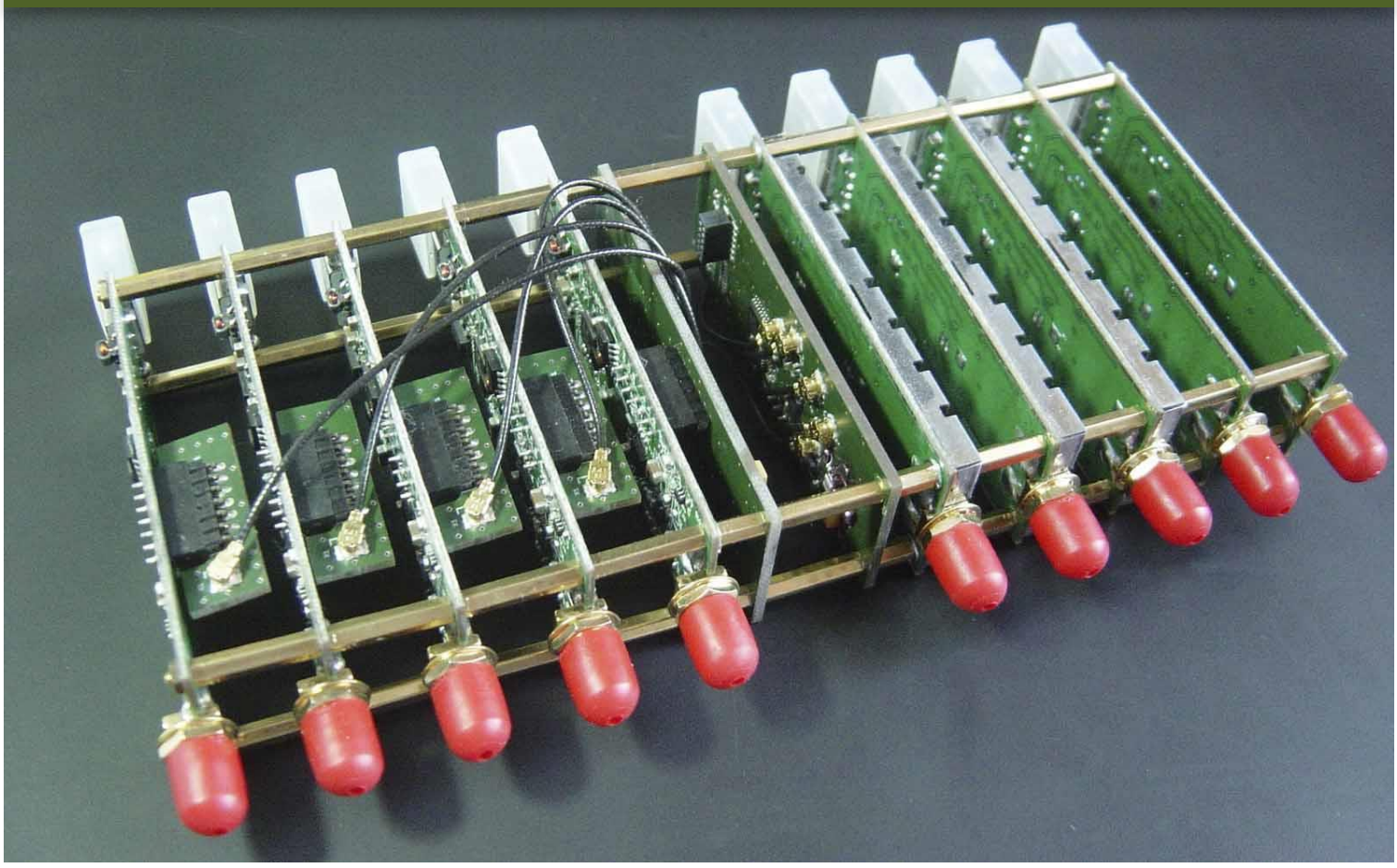
N-Channel Scalable Coherent Receiver



Coherent Receiver Family based on the RTL-SDR technology

CR0x is an N-channel scalable coherent receiver that employs the RTL-SDR technology in order to create inexpensive multi-channel receiving systems. Reconfigurable design techniques deliver high system performance, flexibility and small board space requirements. All these factors enable the use of the CR0x in many new, previously unavailable application scenarios.

Key Features and Benefits

Scalability from 2 up to 64 and more channels

Integrated common TCXO 28.8 MHz, 2 ppm (2 PPM initial offset, 0.5-1 PPM temperature drift). Higher precision, e.g. 0.1, 0.5, 1.0 ppm, available on request.

LPF with 35MHz cut-off frequency for spurs suppression in the 28,8 MHz clock frequency in each channel of the receiver

I2C bus repeater

Embedded 8 bit I2C register with LED indicator 1x8

Identical form-factor

Cost effective open source software

Configuration

N adapted RTL-SDR dongles

(N-1) HF_Adapters

(N-1) Pigtails

CLK_CARD

EXP_CARD (optional)

Applications

- ✓ Coherent receiving
- ✓ Signal decoding improvement
- ✓ Passive radars
- ✓ Radiolocation and Earth exploration
- ✓ Synchronized receiving on the different frequencies
- ✓ Direction finding (pseudo-Doppler and Watson-Watt technique)
- ✓ Radio telescope (high sensitivity wide-band pulsar detection)
- ✓ Multi-baseline interferometer observations and analysis

Description

We offer different models of multi-channel coherent receivers to meet your requirements. The current realization of the single channel receiver is based on the RTL2832U/R820T2 chips. We plan to add support of other single channel receivers in the future. All our models have been designed to be as flexible as possible using integrative construction components, thereby, a configuration change of the whole system (e.g. number of channels, addition of different filters, converters etc.) easily possible. Every coherent receiver has an integrated extension card that provides flexible and expandable connectivity for specific applications.

Moreover, we provide different types of extension cards for the RTL2832U (or RTL2832U-shields). These cards either enhance the characteristics of the single channel receiver (e.g. Filter or Band Extensions), or are used as building blocks to construct the coherent receivers (e.g. Clock or Expansion Cards).

The CR0xs are available in varied configurations. Figures below present some sample configurations for the implementation of the coherent receivers for (1+4), (1+8) or (1+16) channels using the RTL-SDR radio module and the CLK_CARD or the EXP_CARD.

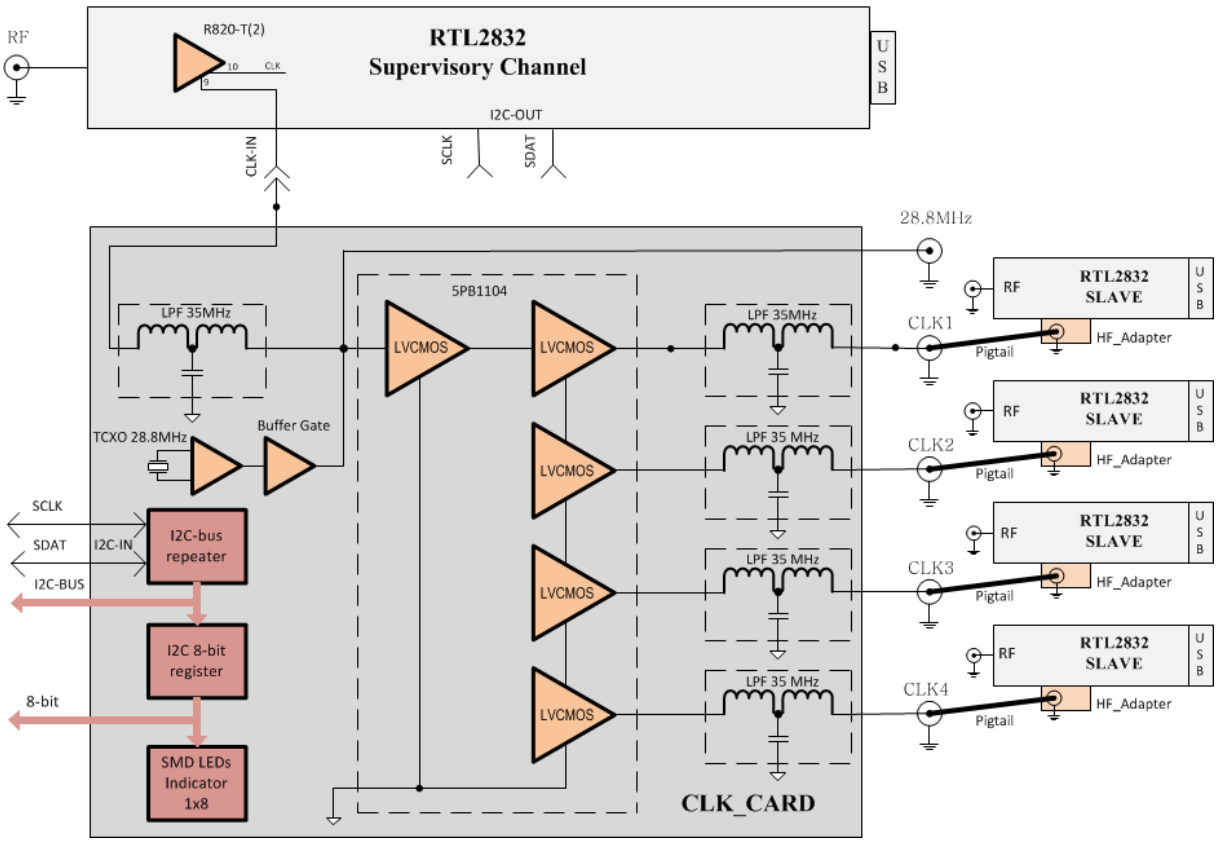


Figure 1. CR0 (1+4) Block Diagram (1 Supervisory and 4 coherent channels)

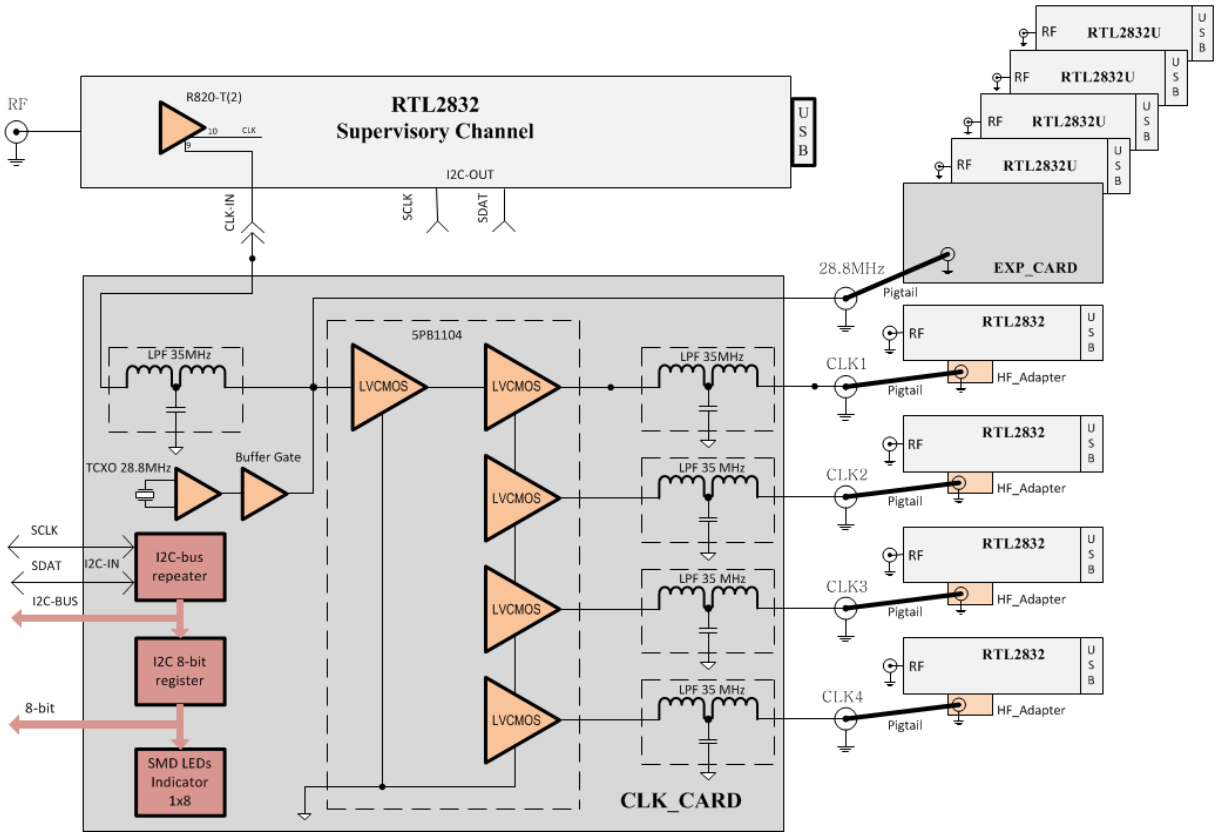


Figure 2. CR0 (1+8) Block Diagram (1 Supervisory and 8 coherent channels)

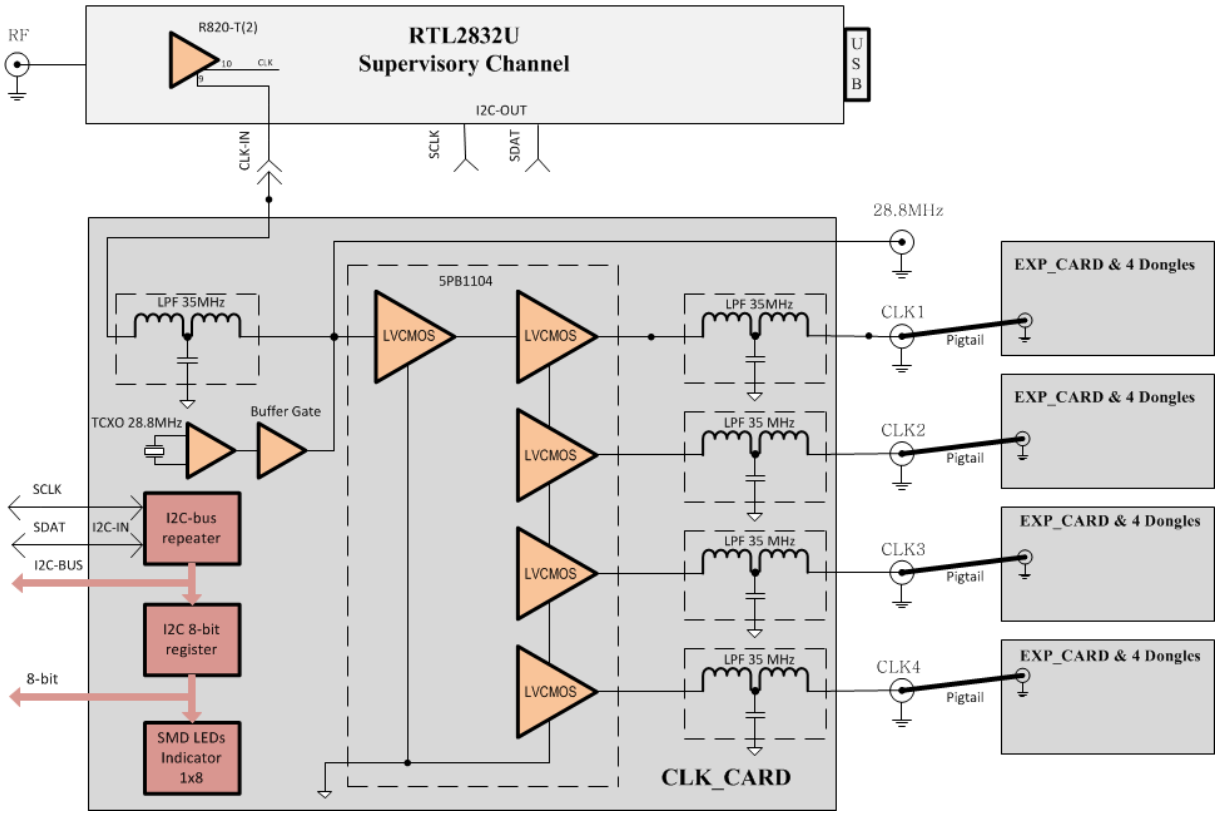


Figure 3. CR0 (1+16) Block Diagram (1 Supervisory and 16 coherent channels)

Technical characteristics (pro channel)

- ✓ ADC Resolution: 8 bit
- ✓ Clock: 28.8 MHz
- ✓ Sample rates:
  - 0.240 MHz
  - 0.288 MHz
  - 0.960 MHz
  - 1.200 MHz
  - 1.440 MHz
  - 2.016 MHz
  - 2.208 MHz
  - 2.400 MHz
  - 2.880 MHz
- ✓ Temperature compensated oscillator (TCXO): 2 PPM (2 PPM initial offset, 0.5-1 PPM temperature drift). Higher precision, e.g. 0.1, 0.5, 1.0 ppm, available on request.
- ✓ Female antenna port : SMA
- ✓ R820T2 tuner: 24 MHz - 1766 MHz (direct sampling with lower frequencies possible)
- ✓ USB powered bias tee: 4,5V
- ✓ Noise figure: 3.5 dB @ RF_IN
- ✓ Noise floor: –60 dBm
- ✓ Dimensions (RTL-SDR, CLK_CARD, EXP_CARD): 67 x 25 x 6 mm
- ✓ Open Source Software
  - Overview: http://www.rtl-sdr.com/big-list-rtl-sdr-supported-software/
  - RTL-Coherent: https://github.com/tejeez/rtl_coherent
  - Multi-RTL: https://github.com/ptrkrysik/multi-rtl
- ✓ Operation temperature: -10 to 60 ˚C

Contact

For more information regarding our N-channel scalable coherent receiver family please visit www.coherent-receiver.com.