WiMAX RF modules
Add-on modules for SFF SDR development platforms

WiMAX RF modules are WiMAX, RF, analog front ends for Lyrtech's small form factor (SFF) software defined-radio (SDR) development platforms. The modules are designed to cover the WiMAX 2.5 GHz band and the WiMAX 3.5 GHz band, and, when they are combined with the SFF SDR evaluation module and ADACMaster III module (high-speed ADDA board), the whole becomes a complete and integrated hardware and software development solution for advanced WiMAX development. In the 2.5 GHz band, the front end covers all the ISM bands and makes all sorts of Wi-Fi (b, g, n) applications possible with the SFF SDR development platform.

**Applications**

**MAN/WAN (WiMAX)**
WiMAX RF modules allow targeting WiMAX applications in the 2.5 GHz and 3.5 GHz bands.

**WLAN (Wi-Fi)**
WLAN applications in all the ISM bands (Wi-Fi b, g, or n) can be developed with SFF SDR development platforms equipped with WiMAX RF modules.

**Software-defined radio**
WiMAX RF modules are handy in developing DSP–FPGA-based software-defined radio applications within the 2.5 GHz and 3.5 GHz ranges.

**Software tools**
WiMAX RF modules benefit from drivers and application examples supplied with the SFF SDR evaluation module's board software development kit (BSDK) and model-based design blocksets supplied with the SFF SDR development platform's model-based design kit (MBDK). (The software allowing to target the FPGA of the ADACMaster III is also recommended to benefit from the module's real-time FPGA gain control parameters, useful in transceiver applications.)

**Available hardware options**

- Low-band—covers the frequency range from 2.3 GHz to 2.7 GHz
- High-band—covers the frequency range from 3.3 GHz to 3.8 GHz

Note that up to two of these modules can be used on the platform at any given time. Don't hesitate to write to info@lyrtech.com if you need different frequency bands or have different frequency requirements.
### Specifications

**General**
- **Supply voltage:** 12 V
- **Supply current:** 1.1 A
- **Power consumption:** 13.2 W
- **GPIO-32 control interface (SPI ports, others)**
  - Supports configuration from the SFF SDR EVM’s GPIO-32 port or the USB-2-GPIO-32 adapter
  - Half-duplex transceiver (shared RX/TX antenna)
  - Software-selectable reception bandwidth: 7.0 MHz and 22 MHz

**2.5 GHz band channels**
- **RF frequency range:** 2.3 GHz to 2.7 GHz
- **RF input**
  - Gain: 20 dB to 100 dB (BW: 7 MHz)
  - Gain: 30 dB to 110 dB (BW: 22 MHz)
  - Noise: 7 dB
  - Phase noise at 100 kHz from carrier: -90 dBc/Hz (RF: 2.5 GHz)
  - Phase noise at 1 MHz from carrier: -90 dBc/Hz (RF: 2.5 GHz)
  - Minimum detectable signal: -98 dBm (BW: 7 MHz)
  - RX IF baseband center frequency: 44 MHz
  - RX IF resolution: 1 MHz

**RF output**
- Phase noise at 100 kHz from carrier: -94 dBc/Hz (RF: 2.5 GHz)
- Phase noise at 1 MHz from carrier: -92 dBc/Hz (RF: 2.5 GHz)
- Gain: -2 dB to 30 dB
- IP3 output: 10 dBm
- TX IF frequency range: 15 MHz to 23 MHz

Reference clock input (36 MHz): 12 dBm to 17 dBm
Reference clock output (36 MHz): 14 dBm

**3.5 GHz band channels**
- **RF frequency range:** 3.3 GHz to 3.8 GHz
- **RF input**
  - Gain: 40 dB to 115 dB (BW: 7 MHz)
  - Gain: 30 dB to 105 dB (BW: 22 MHz)
  - Gain: 30 dB
  - Noise: 5 dB
  - Phase noise at 100 kHz from carrier: -90 dBc/Hz (RF: 3.5 GHz)
  - Phase noise at 1 MHz from carrier: -90 dBc/Hz (RF: 3.5 GHz)
  - Minimum detectable signal: -100 dBm (BW: 7 MHz)
  - Minimum detectable signal: -95 dBm (BW: 22 MHz)
  - RX IF baseband center frequency: 44 MHz
  - RX IF resolution: 1 MHz

**RF output**
- Phase noise at 100 kHz from carrier: -95 dBc/Hz (RF: 3.5 GHz)
- Phase noise at 1 MHz from carrier: -95 dBc/Hz (RF: 3.5 GHz)
- Gain: -5 dB to 27 dB
- IP3 output: 17 dBm
- TX IF frequency range: 15 MHz to 23 MHz

Reference clock input (36 MHz): 12 dBm to 20 dBm
Reference clock output (36 MHz): 15 dBm

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### Block diagram

[Block diagram image showing the receiver and transmitter components, including reference clock inputs and outputs, power detector, and SPI ADC connections.]
### Specifications

**General**
- **Supply voltage:** 12 V
- **Supply current:** 1.1 A
- **Power consumption:** 13.2 W
- **GPIO-32 control interface (SPI ports, others)**
- **Supports configuration from the SFF SDN EVM's GPIO-32 port or the USB-2-GPIO-32 adapter**
- **Half-duplex transceiver (shared RX/TX antenna)**
- **Software-selectable reception bandwidth: 7.0 MHz and 22 MHz**

#### 2.5 GHz band channels
- **RF frequency range:** 2.3 GHz to 2.7 GHz
- **RF input**
  - Gain: 20 dB to 100 dB (BW: 7 MHz)
  - Gain: 20 dB to 110 dB (BW: 22 MHz)
  - Gain: 2 dB to 30 dB
  - Phase noise at 100 kHz from carrier: –90 dBc/Hz (RF: 2.5 GHz)
  - Phase noise at 1 MHz from carrier: –92 dBc/Hz (RF: 2.5 GHz)
  - Minimum detectable signal: –88 dBm (BW: 7 MHz)
  - Minimum detectable signal: –84 dBm (BW: 22 MHz)
- **RF output**
  - Gain: –2 dB to 30 dB
  - Phase noise at 100 kHz from carrier: –90 dBc/Hz (RF: 2.5 GHz)
  - Phase noise at 1 MHz from carrier: –92 dBc/Hz (RF: 2.5 GHz)
  - RX IF baseband center frequency: 44 MHz
  - RX IF resolution: 1 MHz
- **Reference clock input (36 MHz): 12 dBm to 17 dBm**

#### 3.5 GHz band channels
- **RF frequency range:** 3.3 GHz to 3.8 GHz
- **RF input**
  - Gain: 40 dB to 115 dB (BW: 7 MHz)
  - Gain: 40 dB to 105 dB (BW: 22 MHz)
  - Gain: 2 dB to 30 dB
  - Phase noise at 100 kHz from carrier: –90 dBc/Hz (RF: 3.5 GHz)
  - Phase noise at 1 MHz from carrier: –92 dBc/Hz (RF: 3.5 GHz)
  - Minimum detectable signal: –100 dBm (BW: 7 MHz)
  - Minimum detectable signal: –95 dBm (BW: 22 MHz)
- **RF output**
  - Gain: –5 dB to 27 dB
  - Phase noise at 100 kHz from carrier: –90 dBc/Hz (RF: 3.5 GHz)
  - Phase noise at 1 MHz from carrier: –92 dBc/Hz (RF: 3.5 GHz)
  - RX IF baseband center frequency: 44 MHz
  - RX IF resolution: 1 MHz
- **Reference clock input (36 MHz): 12 dBm to 20 dBm**
- **Reference clock output (36 MHz): 15 dBm**

### Block diagram

- **Receiver**
- **Transmitter**
- **Control CPLD + SPI distribution**
- **12-V DC supply**
- **Clock**

- **Differential link**
- **Single-ended link**
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