

Tunable RF modules

Add-on modules for SFF SDR development platforms

These RF modules are tunable, RF, analog front ends designed for Lyrtech small form factor (SFF) software defined-radio (SDR) development platforms. The modules cover frequencies in the low band (0.2–1.0 GHz) and high band (1.6–2.3 GHz) ranges and, when they are combined with the [SFF SDR evaluation module](#) and [ADACMaster III](#) module (high-speed AD/DA board), the whole becomes a complete and integrated hardware and software development solution for a wide range of software-defined radio applications.

AT A GLANCE

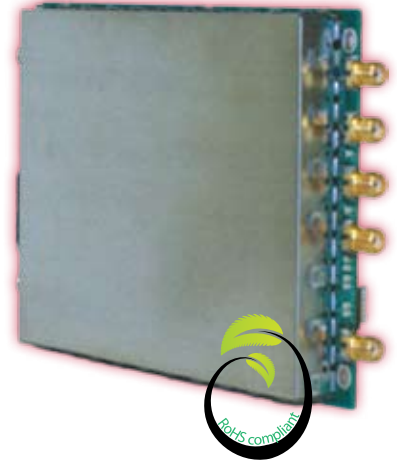
- Low-band module: 0.2–1.0 GHz
- High-band module: 1.6–2.3 GHz
- Superheterodyne receiver (IF = 30 MHz)
- Direct quadrature transmitter (IF < 65 MHz)
- Full-duplex transceiver—allows TDD and FDD
- Plug and Play with Lyrtech SFF SDR evaluation module
- Software-selectable 5 MHz or 20 MHz RX bandwidths
- Up to 80 dB of isolation between TX and RX

Applications

The following are only a few of the applications where tunable RF modules are at their best:

Military

Military applications such as tactical military communications (MILCOM), military communications gateways, handsets and man-pack systems, and vehicular systems are prime candidates for SDR development.



Public safety

Tunable RF modules allow public safety applications such as TETRA and APCO band communications, vehicular systems, transponders, and broadband data systems.

Commercial

RFID readers, broadband data systems, vehicular systems, as well as femto and pico base stations are all applications that can be developed with tunable RF modules. Potential waveforms are Quad band GSM/GPRS/EDGE, DECT, PHS, W-CDMA, HSDPA/HSUPA, TD-SCDMA, IS-95, and CDMA2000.

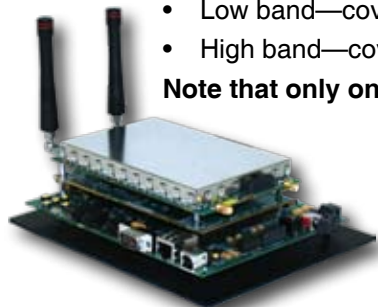
Software tools

Tunable 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 SFF SDR development platforms' model-based design kits (MBDKs). (The target FPGA software for 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 0.2 GHz to 1.0 GHz
- High band—covers the frequency range from 1.6 GHz to 2.3 GHz

Note that only one of these two modules can be used on the platform at any given time.



SFF SDR development platform



SFF SDR evaluation module



ADACMaster III

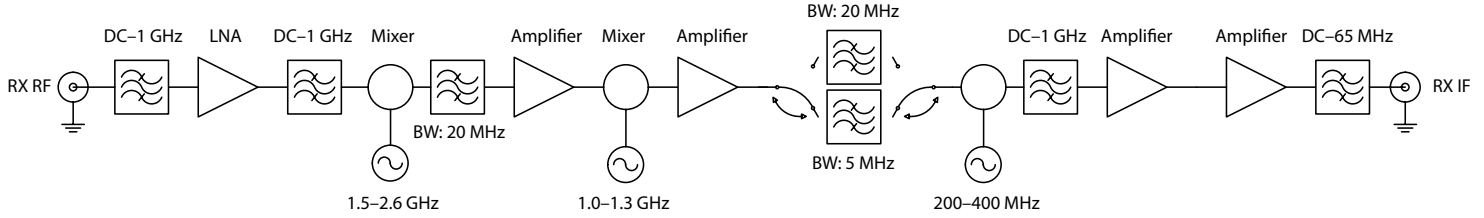
Specifications

<p>General</p>	<ul style="list-style-type: none"> • Supply voltage: 12 V • Supply current: 0.6 A • Power consumption: 7.2 W • Up to 80 dB of isolation between TX and RX • 3-dBm transmission power at P-1 dB • GPIO-16 control interface (SPI ports, others) • Supports configuration from the SFF SDR evaluation module's GPIO-16 port • Full-duplex transceivers (separate RX and TX antennas) • Software-selectable reception bandwidths: 5 MHz or 20 MHz
<p>Low-band channel</p>	<ul style="list-style-type: none"> • RX/TX IF center frequency: 30 MHz • Reference clock input: 4 MHz to 100 MHz, -20 dBm to 10 dBm • Reference clock output: 10 MHz, 10 dBm <p>RF frequency range</p> <ul style="list-style-type: none"> • TX: 0.2 GHz to 1.0 GHz • RX: 0.2 GHz to 1.0 GHz <p>RF input</p> <ul style="list-style-type: none"> • Gain: 50 dB (RX selectable filter: 20 MHz) • Gain: 46 dB (RX selectable filter: 5 MHz) • Noise figure : 5 dB • Phase noise at 10 kHz from carrier: -75 dBc/Hz (RF: 425 MHz) • Phase noise at 100 kHz from carrier: -103 dBc/Hz (RF: 425 MHz) • Minimum detectable signal: -102 dBm (bandwidth: 5 MHz) <p>RF output</p> <ul style="list-style-type: none"> • Carrier suppression: -55 dBc • Sideband suppression: -37 dBc • Phase noise at 10 kHz from carrier: -83 dBc/Hz (RF: 425 MHz) • Phase noise at 100 kHz from carrier: -109 dBc/Hz (RF: 425 MHz) • Gain: 8 dB • IP3 output: 25 dBm
<p>High-band channel</p>	<ul style="list-style-type: none"> • RX/TX IF center frequency: 30 MHz • Reference clock input: 4 MHz to 100 MHz, -20 dBm to 10 dBm • Reference clock output: 10 MHz, 10 dBm <p>RF frequency range</p> <ul style="list-style-type: none"> • TX: 1.6 GHz to 2.5 GHz • RX: 1.6 GHz to 2.3 GHz <p>RF input</p> <ul style="list-style-type: none"> • Gain: 42 dB (RX selectable filter: 20 MHz) • Gain: 40 dB (RX selectable filter: 5 MHz) • Noise figure : 6 dB • Phase noise at 10 kHz from carrier: -75 dBc/Hz (RF: 2 GHz) • Phase noise at 100 kHz from carrier: -103 dBc/Hz (RF: 2 GHz) • Minimum detectable signal : -101 dBm (5 MHz bandwidth filter) <p>RF output</p> <ul style="list-style-type: none"> • Carrier suppression: -55 dBc • Sideband suppression: -37 dBc • Phase noise at 10 kHz from carrier: -80 dBc/Hz (RF: 2 GHz) • Phase noise at 100 kHz from carrier: -109 dBc/Hz (RF: 2 GHz) • Gain: 8 dB • IP3 output: 23 dBm

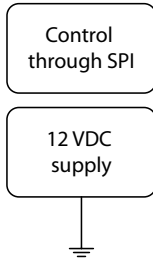
Block diagrams

Low-band RF module

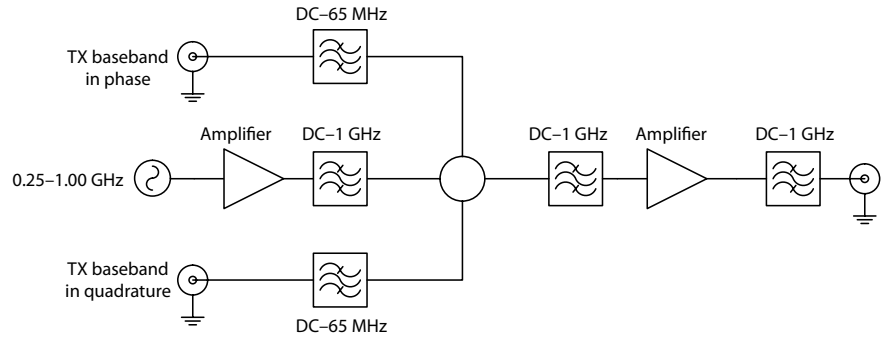
Superheterodyne receiver



Supply and control

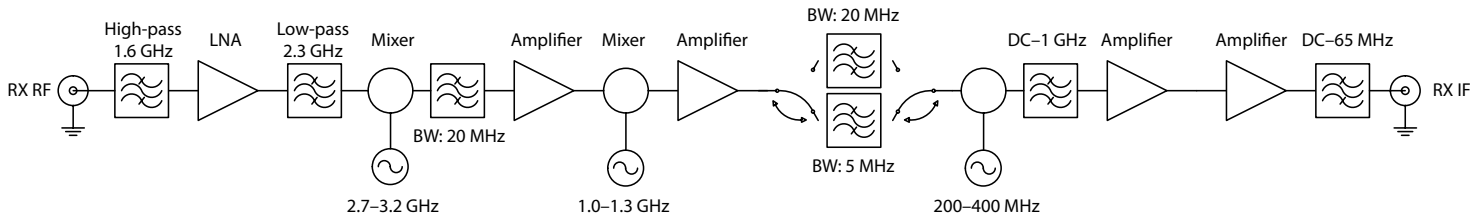


Transmitter

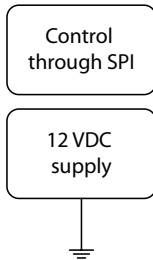


High-band RF module

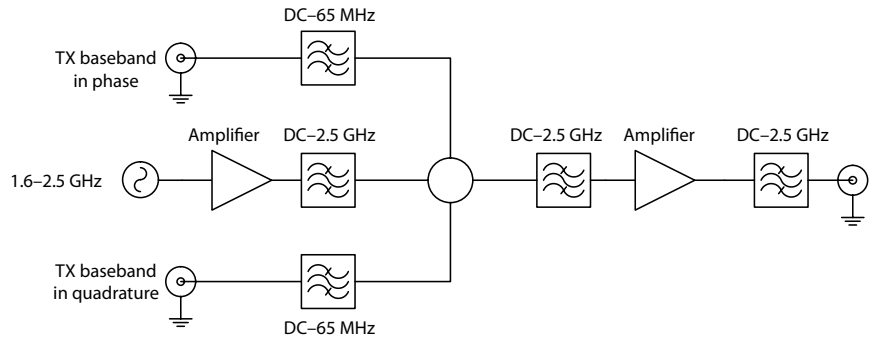
Superheterodyne receiver



Supply and control



Transmitter





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