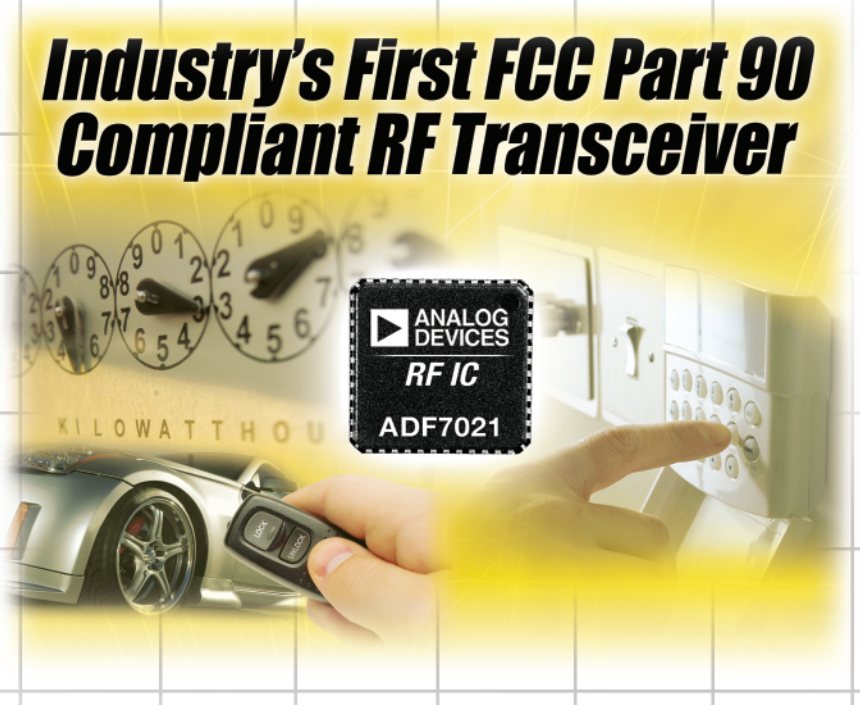
RF Transceivers for Short Range Devices



Features

- 75 MHz to 1 GHz operation
- Development platform: ADIismLINK, ADI SRD Design Studio
- High sensitivity performance
- FSK/GFSK/ASK/OOK/GOOK/MSK modulation
- Data rates up to 384 kbps
- Low external BOM
- Output power up to 14 dBm

Applications

- Automatic meter reading (AMR)
- Building control/automation
- Industrial process control
- Residential security and automation
- Wireless sensor networks
- Healthcare monitoring
- TV wireless remote control
- Voice over RF transmission
- Suitable for:
  - FCC Part 15 (U.S.)
  - FCC Part 90 (U.S.)
  - ARIB STD-T67 (Japan)
  - EN300 220 (Europe)
  - Licensed bands from 75 MHz to 1 GHz

Overview

The ADF7000 series of transmitter and transceiver ICs provides high performance, robust, short range wireless connections. Covering the 75 MHz to 1 GHz frequency range, the ADF7000 series is ideally suited for many applications requiring short range wireless connectivity. The popular ADIismLINK air interface protocol allows users to transfer data between multiple endpoints and a base station (ADF702x) without having to develop their own protocol software. This greatly speeds the time to market of the final product. In addition, ADI SRD Design Studio™ allows real-time simulation and optimization of many of the parameters in a typical wireless system using the ADF7000 family of transceivers and transmitters.

ADF7000 Series Highlights

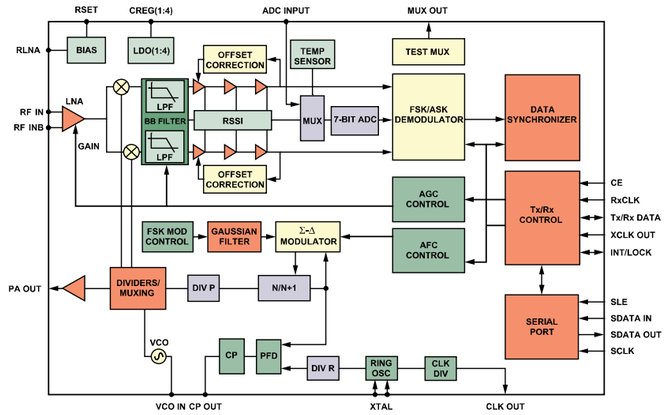
- Single-chip transmit and receive with few external components
- Excellent link margin and resilience to interfering signals
- Reference designs available including Gerber files
- ADIismLINK protocol—allows user to establish a radio link straight out of the box
- ADI SRD Design Studio—for real-time simulation and optimization

www.analog.com/srd

ANALOG DEVICES

ISM Transceivers

Specification	ADF7020	ADF7020-1	ADF7021	ADF7025
Frequency (MHz)	431 to 478, 862 to 956	80 to 650	80 to 650, 868 to 940	431 to 464, 862 to 928
Modulation	GFSK/FSK/ASK/OOK/GOOK	GFSK/FSK/ASK/OOK/GOOK	GFSK/FSK/2FSK/3FSK/4FSK/MSK	FSK
Supply Voltage (V)	2.3 to 3.6	2.3 to 3.6	2.3 to 3.6	2.3 to 3.6
Rx Current (mA)	19	17.6	17.5 @ 426 MHz	19
Tx Current for 0 dB Output (mA)	19.1	13 @ 433 MHz	13.5 @ 426 MHz	19.3
Output Power (dBm)	–16 to +13 in 0.3 dBm steps	–16 to +13 in 0.3 dBm steps	–16 to +13 in 0.3 dBm steps	–16 to +13 in 0.3 dBm steps
Rx Sensitivity (BER 0.1% @ 1 kbps)	–119 dBm (fo = 915 MHz)	–119 dBm (fo = 315 MHz)	–122 dBm (fo = 868 MHz)	–108 dBm (fo = 915 MHz)
Maximum Data Rate (kbps)	200	200	32.5	384
Automatic Frequency Control	Yes	Yes	Yes	No
7-Bit Digital RSSI Output	Yes	Yes	Yes	Yes
Automatic PA Ramp	No	No	Yes	No
Narrow-Band Operation (12.5 kHz to 25 kHz)	No	No	Yes	No
External Components Needed	XTAL/PLL loop filter/matching	XTAL/PLL loop filter/matching	TCXO/PLL loop filter/matching	XTAL/PLL loop filter/matching
Package (RoHS-Compliant)	7 mm × 7 mm, 48-lead LFCSP	7 mm × 7 mm, 48-lead LFCSP	7 mm × 7 mm, 48-lead LFCSP	7 mm × 7 mm, 48-lead LFCSP

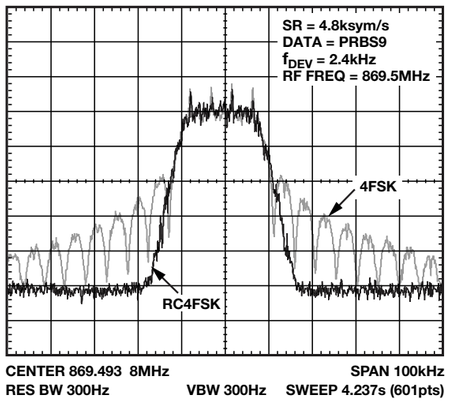


ADF7020—transceiver block diagram.

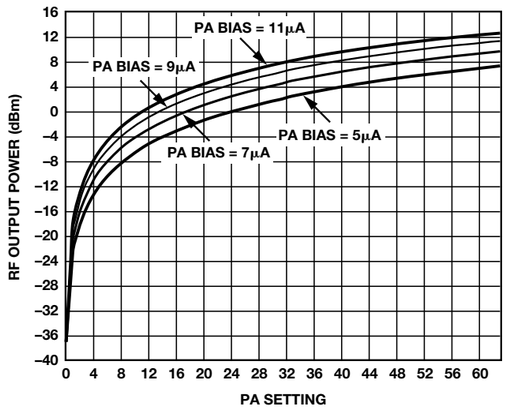
ISM Transmitters and Receivers

Specification	ADF7012	ADF7901	ADF7902
Frequency (MHz)	75 to 1000	369.5 to 395.9	369.5 TO 395.9
Modulation	GFSK/ASK/FSK/OOK/GOOK	FSK/OOK	FSK/OOK
Supply Voltage (V)	2.3 to 3.6	–0.3 to 6.0	–0.3 to 6.0
Current for 0dBm Output (mA)	8	8	18.5
Output Power (dBm)	14	14	N/A
Maximum Data Rate (kbps)	179.2	50	2
Synthesizer Phase Noise Floor (dBc/Hz)	–194	–194	N/A
External Components Needed	XTAL/PLL loop filter/matching	XTAL/PLL loop filter/matching/LPF	XTAL/PLL loop filter/matching
Package (RoHS-Compliant)	24-lead TSSOP	24-lead TSSOP	24-lead TSSOP

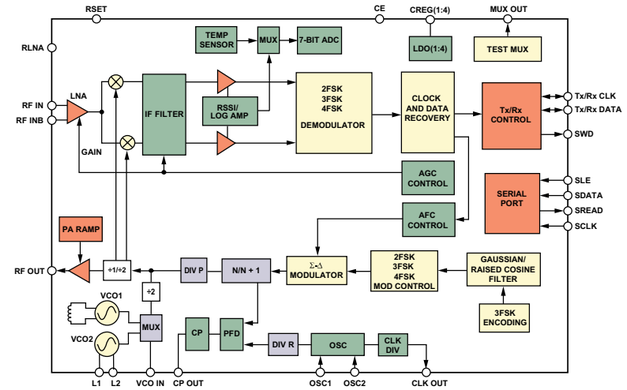
ADF7012—transmitter block diagram.



ADF7021 — output spectrum in 4FSK and raised cosine 4FSK modes.

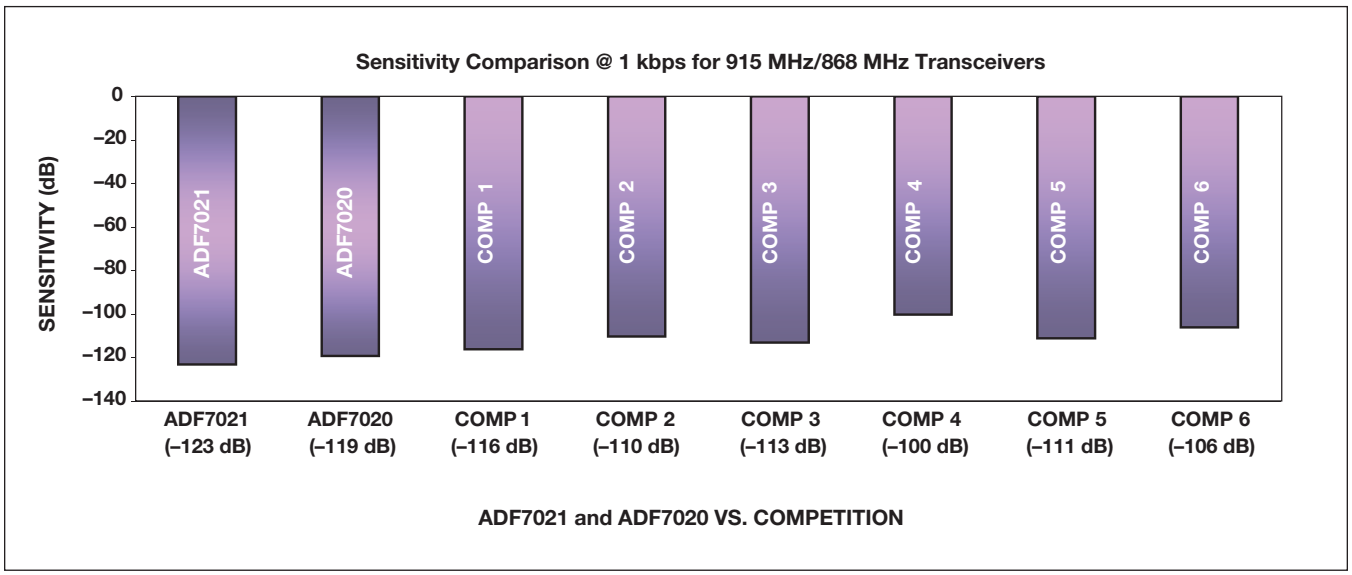


ADF7021 — output power vs. PA setting.



ADF7021—transceiver block diagram.

ADF7021 sensitivity is 7 dB better than competition at low data rates

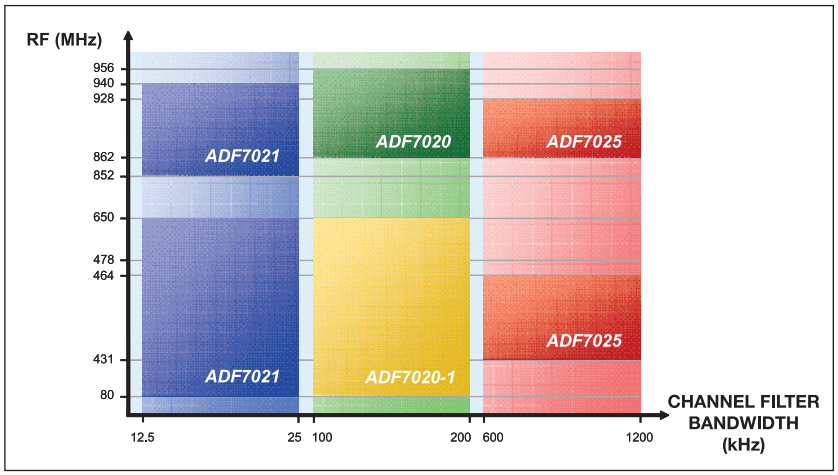


Typical Applications

- Industrial process control
  - Automatic data acquisition from remote sensors
  - Extend existing control systems
- Automatic Meter Reading (AMR)
  - Automatic data acquisition from remote sensors reduces user intervention
  - Applications for energy/water/gas metering
- Home building automation
  - Wireless control for shutters, awning, garage door, etc.
  - Wireless control for lighting/heating/cooling
  - Wireless sensor for security/alarm systems/PIR detectors

Other Applications

- Wireless security
- Remote patient monitoring
- Auto—key fobs, tire pressure monitor
- Remote control
- Wireless headphones
- Remote toys



Summary

Sensitivity—Best in Class

- ADF7021 sensitivity is 7 dB better than competition at low data rates

Resilience

- Better blocking and IP3 performance

PA Efficiency

- Efficient PA operates at up to +14 dBm

AFC—Automatic Frequency Control

- Removes the need to calibrate the XTAL at production

PA Ramp profile

- Automatic PA ramping feature reduces unwanted emissions

Low Cost

- Price competitive

Complete Solution

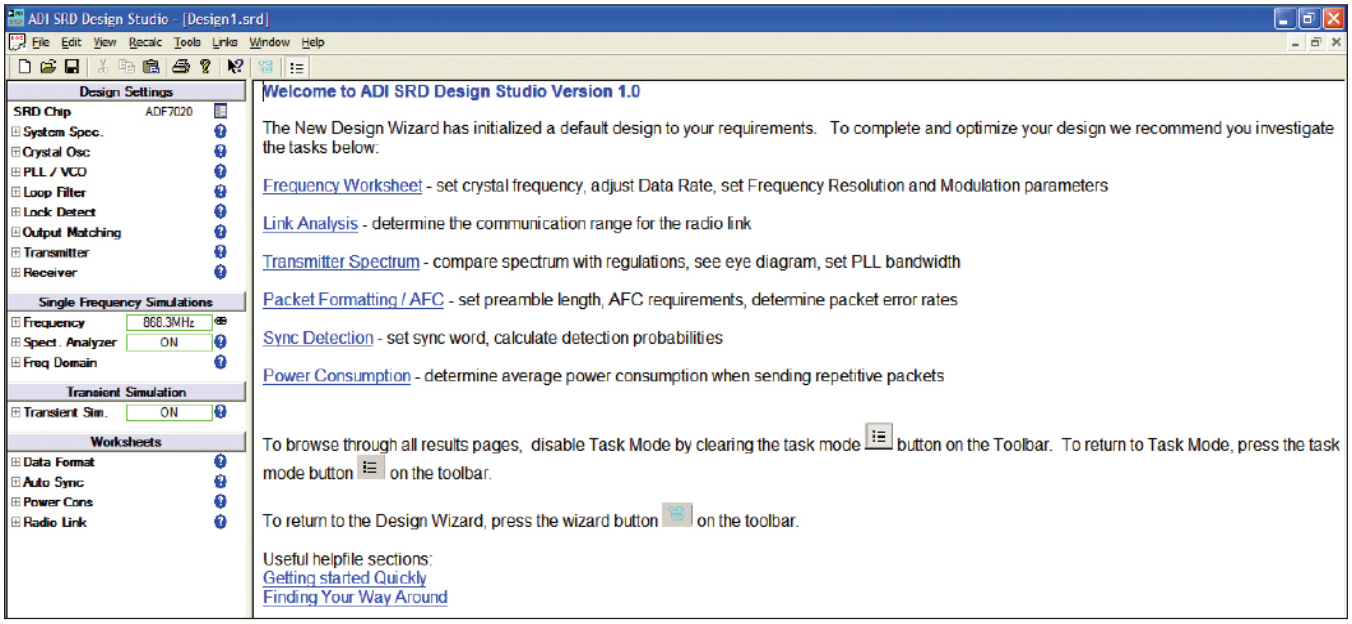
- Board layout and antenna reference designs
- Networking protocol kit (ADIismLINK)
- ADI SRD Design Studio

ADI SRD Design Studio

A tool for designers of wireless links

Overview

ADI SRD Design Studio enables users to design, evaluate, and troubleshoot short range communications devices utilizing Analog Devices' ADF7000 family of SRD transmitters and transceivers. ADI SRD Design Studio can quickly and efficiently conduct real-time simulations, test various configurations, and troubleshoot potential problems when implementing short range wireless links in designs.

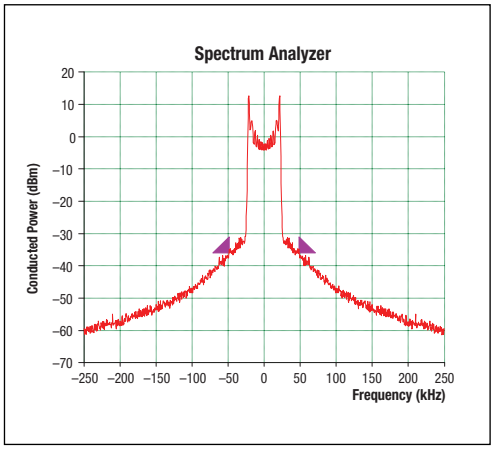


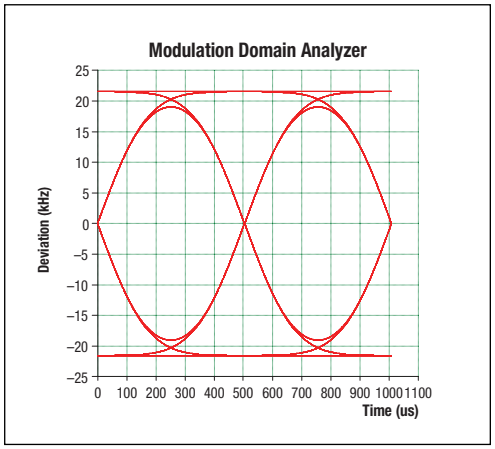
List of Tasks Available:

- New design wizard
- Link budget
- Frequencies worksheet
- Transmitter spectrum
- Antenna/filter
- Packet formatting
- Sync detection
- Power consumption

Highlights of SRD Design Studio

- Eliminates time consuming iterations from the design process
- Enables rapid prototype development and design optimization
- FCC, ETSI, and ARIB compliant designs





SRD Design Studio—spectrum analyzer and modulation domain analyzer screenshots.

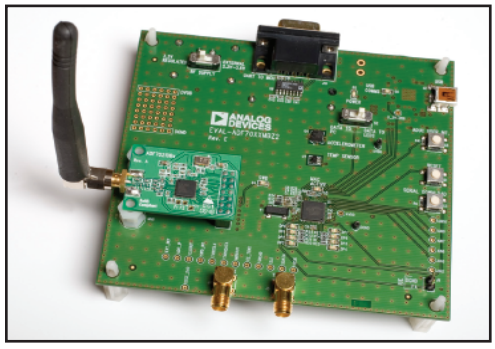
Free to download from: www.analog.com/srddesign

ADF702x Development Platform

The ADF702x development platform provides the hardware and software to demonstrate, evaluate, and develop a low power, low data rate, wireless network using any of the ADF702x SRD transceivers. The platform provides over-the-air communication protocols (ADIismLINK) intended for use in the license-free ISM bands and adheres to the regulations specified by ETSI (433 MHz and 868 MHz) and the frequency hopping requirements of FCC 15.247 (902 MHz to 928 MHz). The platform allows straightforward yet comprehensive configuration of the physical (PHY) and media access control (MAC) layers of the ADIismLINK protocol using the provided application software. This allows users to investigate the trade-offs in the protocol performance and also modify the protocol to suit their application.

Evaluation Boards for SRD Transceivers/Transmitters

Analog Devices provides a complete range of evaluation boards for its portfolio of SRD transmitter and transceiver products. These evaluation boards come with user-friendly driver software, which allows our customers to rapidly evaluate the actual performance of our SRD transmitter and transceiver ICs. When used in conjunction with ADIismLINK, a customer can quickly and accurately design, optimize, and breadboard a new radio system, thereby reducing cycle time and improving time to market. A complete list of evaluation boards, associated documentation, and driver software are available via our website at *www.analog.com/srd.*



For further information, visit *www.analog.com/srd.*

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