

# SDR-4000 Value Starter Kits

1U  
Rackmount



The SDR-4000 Value Starter Kits are complete integrated software defined radio development systems, containing a dual IF channel software defined radio transceiver, packaged in a cost-effective 1U rackmount enclosure. The Value Starter Kits let you develop and deploy on the same base hardware.

## Key Benefits

- Minimize program risk. Develop applications and port waveforms using a commercial-off-the-shelf (COTS) integrated development system (IDS) and deploy on binary-compatible rugged versions.
- In parallel with your development, Spectrum will work with you to modify your hardware to meet your deployment size, weight, power, cost and ruggedization requirements.
- Reduce time-to-deployment using a fully configured development platform ready for waveform porting and application development
- Substantially reduce waveform development and porting costs by using pre-loaded data flow examples with source code relevant to your application
- Easily integrate with external COTS and custom RF front ends through analog IF interface

## Target Applications

The SDR-4000 Value Starter Kits are ideal for the development, porting and deployment of waveform applications. Typical applications include:

- Commercial Satellite Communications gateways, terminals and hubs
- Public Safety Communications
- Military Satellite Communications (MILSATCOM) gateways, terminals and hubs
- Tactical Military Communications (MILCOM) - ground vehicular, airborne, unmanned aerial vehicles (UAV), shipborne
- Electronic Warfare (EW) including Electronic Support Measures (ESM) and Electronic Attack (jamming)

## Features

- Choose the platform based on your requirements
  - Narrowband: IF sampling rates up to 105 MSPS supporting industry standard IF frequencies such as 10.7, 21.4 and 70 MHz, and bandwidths up to 36 MHz
  - Wideband: IF sampling rates up to 213.33 MSPS supporting industry standard IF frequencies such as 70, 140, and 160 MHz and bandwidths up to 100 MHz
- Utilizes Xilinx® Virtex-4™, Texas Instruments TI DSP and Freescale™ general purpose processing technology
- 1U rackmount chassis with power supply
- Reusable source code examples illustrating relevant data flows between processors and cards from IF to Ethernet
- Separate data path and control bus ideal for wireless modem applications requiring low latency deterministic operation
- Spectrum's *quicComm*™ board support package and hardware abstraction layer (HAL) included
- Other software sold separately including: Software Communications Architecture (SCA) option with Core Framework, Tools and ORB, Green Hills® INTEGRITY® Real-Time Operating System (RTOS) with MULTI® or Wind River® VxWorks® RTOS with Tornado® embedded operating system
- RF available as an option
- External Serial (RS232/422), Gigabit Ethernet, and General Purpose I/O interfaces

## Description

The SDR-4000 Family of Value Starter Kits provides a hardware platform to develop and field your own custom modem or terminal solution. Since the Value Starter Kits share the same architecture as Spectrum's SDR-4000 multi-channel rugged form factor systems, users can migrate their completed applications unchanged to an SDR-4000 system more suited for harsh deployment environments.

The Value Starter Kits provide modem, link and network layer processing and can be integrated into your overall communications platform or terminal product for deployment. A wide variety of waveforms can be implemented on its reconfigurable processing architecture which consists of Xilinx Virtex-4 FPGA, Texas Instruments C6416 DSP, and Freescale MPC8541E General Purpose Processing technology. The Value Starter Kits also support a full Software Communications Architecture (SCA) software stack as an upgrade option.



Depending on your application, choose from one of the following:

Value Starter Kit	Analog IF Input	Analog IF Output	Supports Common IF Frequencies Including
SDR-4021	2 channels	2 channels	10.7, 21.4, and 70 MHz at bandwidths up to 36 MHz
SDR-4011	2 channels	1 channel	10.7, 70, 140, and 160 MHz at bandwidths up to 100 MHz

### About the SDR-4021 Value Starter Kit

The SDR-4021 Value Starter Kit is available in a commercial-grade, air-cooled package mounted in a 1U rackmount enclosure. The SDR-4021 supports common industry standard IF frequencies such as 10.7, 21.4 and 70 MHz IF frequencies. It provides two analog IF input channels, two analog IF output channels, and an internal or external 10 MHz reference or internal or external sampling clock.

The SDR-4021 has been architected to support waveforms requiring low-latency deterministic operation to maintain synchronization of the frequency-hopped Tactical MILCOM network. This is accomplished by placing control on a PCI bus that is separate from the data path. Waveforms supported by the SDR-4021 include:

- Wideband Networking Waveform - Orthogonal Frequency Division Multiplexing mode (WNW OFDM)
- Soldier Radio Waveform - Electronic Warfare mode (SRW EW)
- Single Channel Ground and Airborne Radio System (SINCGARS)
- Future Multiband Multiwaveform Modular Tactical Radio (FM3TR)
- APCO Project 25 (P25) public safety waveform
- Inmarsat BGAN

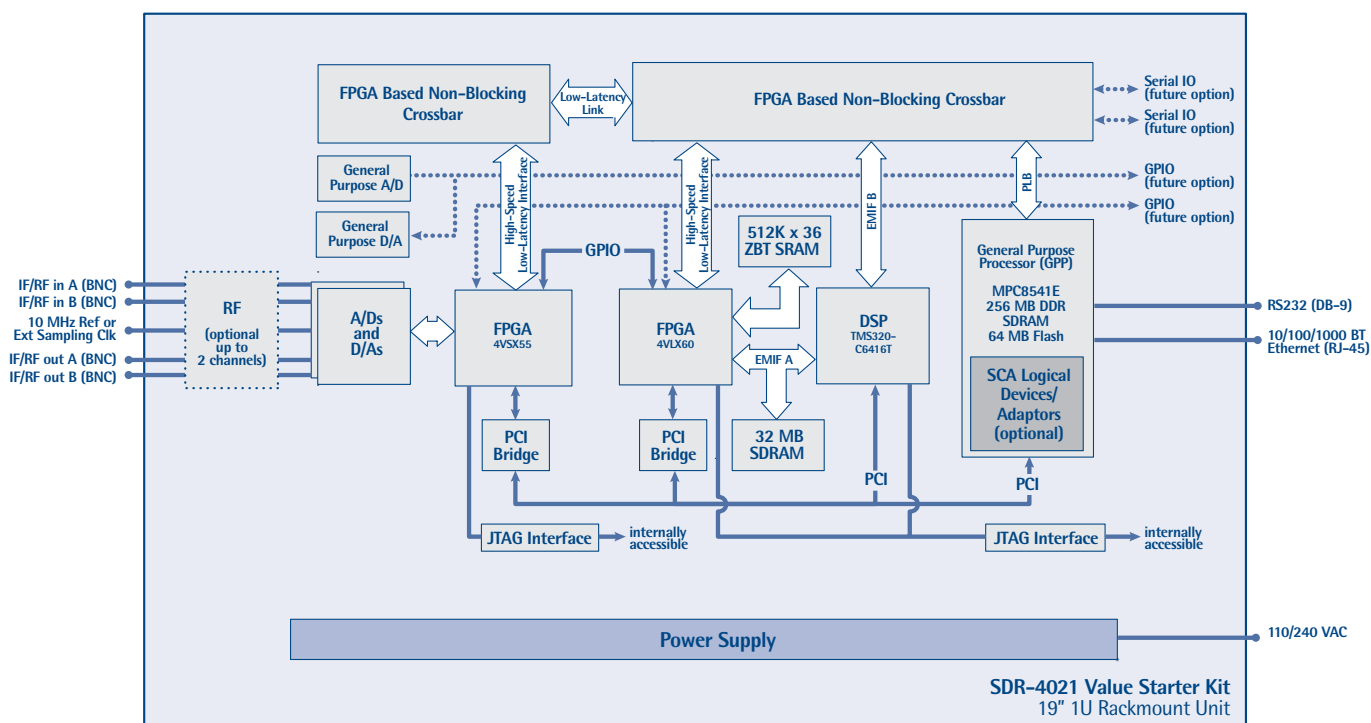


Figure 1. SDR-4021 Block Diagram

## About the SDR-4011 Value Starter Kit

The SDR-4011 Value Starter Kit comes in a commercial-grade, air-cooled package mounted in a 1U rackmount enclosure. The SDR-4011 supports common industry standard IF frequencies such as 70, 140, and 160 MHz IF frequencies. It provides two analog IF input channels and one analog IF output channel. It requires an external sample clock input at the sampling frequency.

The SDR-4011 has been architected to support the latest in satellite communications waveforms including:

- Digital Video Broadcast (DVB-S/DVB-S2, DVB-RCS)
- Mobile User Objective System (MUOS)
- INTELSAT Business Services (IBS)
- Inmarsat BGAN

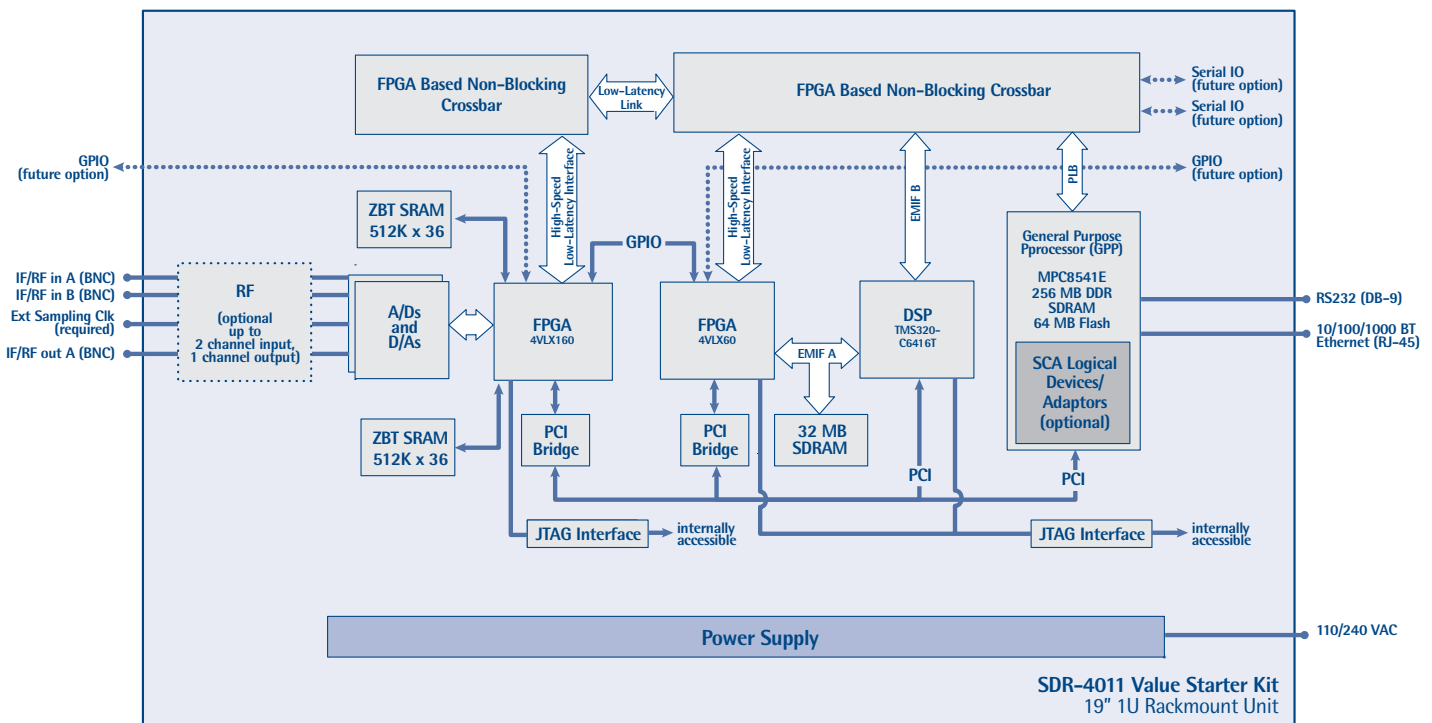


Figure 1. SDR-4011 Block Diagram



Figure 3. Front view of a SDR-4000 Value Starter Kit in 1U Rackmount chassis



## Specifications

		SDR-4021 Value Starter Kit	SDR-4011 Value Starter Kit
<b>General</b>	FPGA	Xilinx Virtex-4 SX55 and LX60	Xilinx Virtex-4 LX160 and LX60
	DSP	Texas Instruments 600 MHz TMS320C6416T processor with 16 MB SDRAM	Texas Instruments 600 MHz TMS320C6416T processor with 16 MB SDRAM
	GPP	400 MHz Freescale MPC8541E with 256 MB of 266 MHz DDR SDRAM and 64 MB flash	400 MHz Freescale MPC8541E with 256 MB of 266 MHz DDR SDRAM and 64 MB flash
<b>Analog I/O</b>	External Clock	Supports sampling range of 36 to 300 MHz	Supports sampling range of 110 to 213.33 MHz
	ADC	Two Analog Devices AD6645 14-bit @ 96.0 MSPS	Two Analog Devices AD9430 12-bit @ 213.33 MSPS
	ADC Input	AC coupled, 50 ohm load	AC coupled, 50 ohm load
	DAC	Two Analog Devices AD9755 14-bit @ 192.0 MSPS	One Analog Devices AD9755 14-bit @ 213.33 MSPS
	DAC Output	AC coupled, 50 ohm load	DAC Output: AC coupled, 50 ohm load
	Coupling	AC - standard, DC - optional	AC - standard, DC - optional
	Low-Speed ADC	Quad 12-bit @ 100 KSPS	None
	Low-Speed DAC	Dual 12-bit @ 100 KSPS	None
	<b>External Interfaces</b>	Ethernet	GigE (10/100/1000 BaseT) RJ-45 on the rear panel
Low-speed serial		RS232 data, DB-9 Serial port	RS232 data, DB-9 Serial port
Analog Input		2 channels, BNC connector, 50 ohms	2 channels, BNC connector, 50 ohms
Analog Output		2 channels, BNC connector, 50 ohms	1 channels, BNC connector, 50 ohms
<b>Software</b>		Spectrum's <i>quicComm</i> for INTEGRITY or VxWorks	
<b>Electrical</b>		110/240VAC, 60/50Hz	
<b>Mechanical</b>	Form Factor	1U 19" rackmount	
	Dimensions	483 mm (w) x 44 mm (h) x 450 mm (d)	
	Weight	13 lbs	
	Cooling	Air-cooled	
<b>Environmental</b>	Operational	+5 to 35 C	
	Storage	+5 to 35 C	
	Cooling	Forced air	
	Humidity	5% to 95% non-condensing	
<b>What does the Kit include?</b>		<ul style="list-style-type: none"> <li>• 19" 1U rackmount modem</li> <li>• <i>quicComm</i> Software Development Kit and Board Support Package <ul style="list-style-type: none"> <li>• Board-level and system example software for the DSP, GPP, and FPGA</li> <li>• Application Programming Interface (API)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• FPGA example code</li> <li>• FPGA wrapper interfaces</li> <li>• User Documentation</li> </ul>
<b>Optional*</b>		<ul style="list-style-type: none"> <li>• Development Laptop with software installed and tested including: <ul style="list-style-type: none"> <li>• Operating System and Integrated Development Environment (IDE)</li> <li>• Xilinx ISE Foundation FPGA Tools</li> <li>• Code Composer Studio</li> <li>• Software Communications Architecture (SCA) Core Framework and Tools</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Analog cable kits</li> <li>• Additional 2 IF channels</li> <li>• Integrated RF modules</li> <li>• Alternative FPGA sizes</li> <li>• Additional External Interfaces</li> <li>• General Purpose I/O</li> <li>• High-Speed Serial Links</li> <li>• External Sample Clock Source</li> </ul>
<b>Ordering Information</b>		901-00043 SDR-4021 (INTEGRITY) Value Starter Kit 1U System	901-00042 SDR-4011 (INTEGRITY) Value Starter Kit 1U
		901-00052 SDR-4021 (VxWorks) Value Starter Kit 1U System	901-00051 SDR-4011 (VxWorks) Value Starter Kit 1U System