



Model 53611 COTS (left) and rugged version



### General Information

Model 53611 is a member of the Cobalt® family of high performance 3U VPX boards based on the Xilinx Virtex-6 FPGA. A multi-channel, gigabit serial interface, it is ideal for interfacing to serial FPDP data converter boards or as a chassis-to-chassis data link.

The 53611 is fully compatible with the VITA 17.1 Serial FPDP specification. Its built-in data transfer features make it a complete turnkey solution. For users who require application-specific functions, the 53611 serves as a flexible platform for developing and deploying custom FPGA processing IP.

In addition to supporting PCI Express over the 3U VPX backplane, the Model 53611 includes a general purpose connector for application-specific I/O.

### The Cobalt Architecture

The Pentek Cobalt Architecture features a Virtex-6 FPGA. All of the board's data and control paths are accessible by the FPGA, enabling factory-installed functions including data transfer and memory control. The Cobalt Architecture organizes the FPGA as a container for data processing applications where each function exists as an intellectual property (IP) module.

IP modules for DDR3 SDRAM memories, controllers for data routing and flow control, CRC support, advanced DMA engines, and

a PCIe interface complete the factory-installed functions and enable the 53611 to operate as a complete turnkey solution without the need to develop any FPGA IP.

### Extendable IP Design

For applications that require specialized functions, users can install their own custom IP for data processing. Pentek GateFlow® FPGA Design Kits include all of the factory-installed modules as documented source code. Developers can integrate their own IP with the Pentek factory-installed functions or use the GateFlow kit to completely replace the Pentek IP with their own.

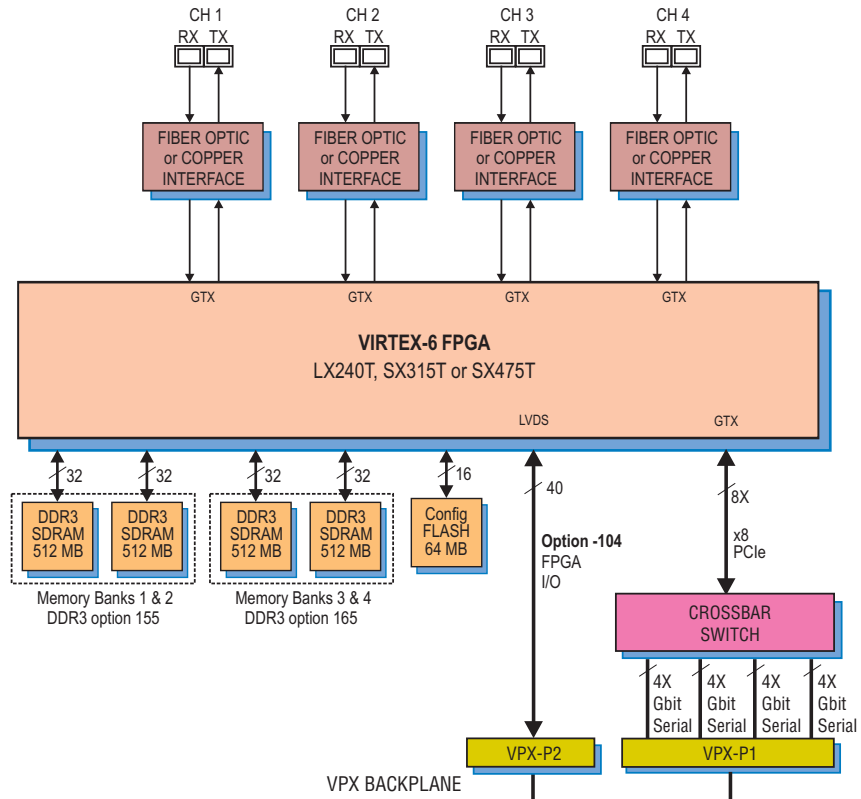
### Xilinx Virtex-6 FPGA

The Virtex-6 FPGA site can be populated with a variety of different FPGAs to match the specific requirements of the processing task. Supported FPGAs include: LX240T, SX315T, or SX475T. The SXT parts feature up to 2016 DSP48E slices and are ideal for modulation/demodulation, encoding/decoding, encryption/decryption, and channelization of the signals between transmission and reception. For applications not requiring large DSP resources, the lower-cost LXT FPGA can be installed.

Option -104 provides 20 pairs of LVDS connections between the FPGA and the VPX P2 connector for custom I/O. ➤

### Features

- Complete serial FPDP solution
- Fully compliant with VITA 17.1 specification
- Fiber optic or copper serial interfaces
- Up to 2 GB of DDR3 SDRAM
- PCI Express interface up to x8
- LVDS connections to the Virtex-6 FPGA for custom I/O
- 3U VPX form factor provides a compact, rugged platform
- Compatible with several VITA standards including: VITA-46, VITA-48 and VITA-65 (OpenVPX™ System Specification)
- Ruggedized and conduction-cooled versions available



► Serial FPDP Interface

The 53611 is fully compatible with the VITA 17.1 Serial FPDP specification. With the capability to support 1.0625, 2.125, 2.5, 3.125, and 4.25 Gbaud link rates and the option for multi-mode and single-mode optical interfaces, the board can work in virtually any system. Programmable modes include: flow control in both receive and transmit directions, CRC support, and copy/loop modes.

Memory Resources

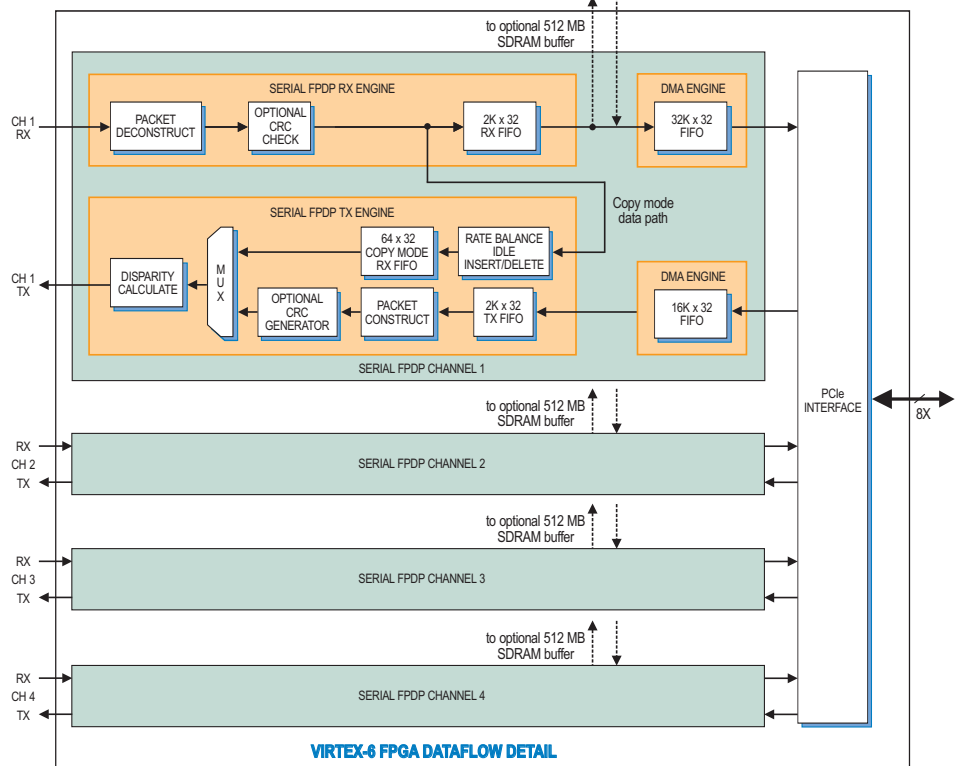
The 53611 architecture supports up to four independent memory banks of DDR3 SDRAM. Each memory is 512 MB deep and an integral part of the board’s DMA capabilities, providing FIFO memory space for creating DMA packets.

PCI Express Interface

The Model 53611 includes an industry-standard interface fully compliant with PCI Express Gen. 1 bus specifications. Supporting PCIe links up to x8, the interface includes eight DMA controllers. Each of the four sFPDP channels includes dedicated DMA engines for transmit and receive for efficient transfers to and from the board.

Crossbar Switch

The 53611 features a unique high-speed switching configuration. A fabric-transparent crossbar switch bridges numerous interfaces and components on the board using gigabit serial data paths with no latency. Programmable signal input equalization and output pre-emphasis settings enable optimization. Data paths can be selected as single (1X) lanes, or groups of four lanes (4X).



**Specifications**

**Front Panel Serial FPDP Inputs/Outputs**

**Number of Connectors:** 4

**Fiber Optic Connector Type:** LC

**Laser:** 850 nm (standard, other options available)

**Copper Connector Type:** Micro Twinax

**Fiber Optic or Copper Link Rates:**

1.0625, 2.125, 2.5, 3.125 or 4.25 Gbaud  
(copper rate depends on cable length)

**Fiber Optic or Copper Data Transfer**

**Rates:** 105, 210, 247, 309 or 420 MB/sec  
(depending on link rate) per serial FPDP port

**Field Programmable Gate Array:** Xilinx

Virtex-6 XC6VLX240T, XC6VSX315T, or XC6VSX475T

**Custom I/O**

**Option -104:** Provides 20 pairs of LVDS connections between the FPGA and the VPX P2 connector for custom I/O

**Memory**

**Option 155 or 165:** Two 512 MB DDR3 SDRAM memory banks, 400 MHz DDR

**PCI-Express Interface**

**PCI Express Bus:** Gen. 1: x4 or x8

**Environmental**

**Operating Temp:** 0° to 50° C

**Storage Temp:** -20° to 90° C

**Relative Humidity:** 0 to 95%, non-cond.

**Size:** 3.937 in. x 6.717 in. (100 mm x 170.6 mm)

**Model 8267**

The Model 8267 is a fully-integrated development system for Pentek Cobalt, Onyx and Flexor 3U VPX boards. It was created to save engineers and system integrators the time and expense associated with building and testing a development system that ensures optimum performance of Pentek boards.



**Ordering Information**

Model	Description
53611	Quad Serial FPDP Interface with Virtex-6 FPGA - 3U VPX

**Options:**

-062	XC6VLX240T FPGA
-064	XC6VSX315T FPGA
-065	XC6VSX475T FPGA
-104	LVDS FPGA I/O to VPX P2
-155	Two 512 MB DDR3 SDRAM Memory Banks (Banks 1 and 2)
-165	Two 512 MB DDR3 SDRAM Memory Banks (Banks 3 and 4)
-280	Copper serial interfaces
-281	Multi-mode optical serial interfaces

*Contact Pentek for availability of rugged and conduction-cooled versions*

Model	Description
8267	VPX Development System See 8267 Datasheet for Options

**VPX Families**

Pentek offers two families of 3U VPX products: the 53xxx and the 52xxx. For more information on a 52xxx product, please refer to the product datasheet. The table below provides a comparison of their main features.

**VPX Family Comparison**

	52xxx	53xxx
Form Factor	3U VPX	
# of XMCs	One XMC	
Crossbar Switch	No	Yes
PCIe path	VPX P1	VPX P1 or P2
PCIe width	x4	x8
Option -104 path	20 pairs on VPX P2	
Option -105 path	Two x4 or one x8 on VPX P1	Two x4 or one x8 on VPX P1 or P2
Lowest Power	Yes	No
Lowest Price	Yes	No

**► Serial FPDP VITA 17.1 Compliance**

The 71611 fully complies with the VITA 17.1 specification as follows:

**What Link Rate does the interface support?**

1.0625 Gbaud  2.125 Gbaud  2.5 Gbaud  3.125 Gbaud  4.25 Gbaud

**What Serial FPDP function does the interface support?**

Transmitter only  Receiver only  Transmitter & Receiver

**Does the Receiver support Flow Control (setting the STOP signal)?**

Always active  Not supported  Optional (selectable)

**Does the Transmitter support Flow Control (stopping data transmission on receipt of a STOP signal)?**

Always active  Not supported  Optional (selectable)

**If the Transmitter supports Flow Control, after transmitting a STOP signal, how many 32-bit words can be received before a Receive FIFO overflow occurs?**

Programmable

**Does the interface support CRC?**

Always active  Not supported  Optional (selectable)

**Does the Transmitter support Copy Master Mode (insertion of additional IDLE ordered sets)?**

Always active  Not supported  Optional (selectable)

**Does the Receiver support Copy Mode (retransmission of data)?**

Yes  No

**If Copy Mode is supported, what method is used for implementation (see VITA 17.1 Observation 6.1.4.4)?**

Method 1  Method 2

**Does the Receiver support Copy/Loop Mode (retransmission of data and setting Flow Control)?**

Yes  No

**What type of media is supported?**

Short Wave Laser  Long Wave Laser  Copper

**What type of media connectors are supported?**

LC  SC  ST  Micro Twinax

**Which fiber transmit data frames are supported in addition to Normal Data Fiber Frames (see VITA 17.1 Permission 7.3.3.1)?**

Sync without Data Fiber Frames  Sync with Data Fiber Frames

**Does the Serial FPDP Transmitter stop in response to the Serial FPDP Receiver sending NRDY True (see VITA 17.1 Observation 7.3.2.2)?**

Always  Never  Optional (selectable)

**Are status bits kept up to date when there is no data to transmit by sending empty Serial FPDP Normal Data Fiber (see VITA 17.1 Rule 7.3.3.8, Recommendation 7.3.3.2 and Suggestion 7.3.3.1)?**

Yes, empty frames transmitted  No, status is not updated when no data is transmitted