



# Pentek RTS 2504 Real-Time System Overview

## Introduction

For more than 20 years, Pentek has been delivering leading-edge data acquisition and digital signal processing solutions to customers to satisfy the demands of high-performance real-time applications.

The RTS 2504 is just one member of the growing RTS family of modular system-level products. Designed for flexibility and scalability, they are available in a range of different configurations to meet the specific requirements of each customer.

RTS systems satisfy two product objectives:

First, they are complete, ready-to-use acquisition and recording instruments, controlled by a virtual control panel on the connected host PC.

Second, they are development platforms for real-time signal acquisition and processing, FPGA algorithm development, software radio, digital signal processing, and wideband signal recording and playback.

Starting development of a custom embedded system with a fully functional platform not only simplifies tasks for both hardware and software teams, it also reduces schedule and technology risks, and helps reduce project costs.

This document is presented in four sections:

**Section 1** is a general description of the standard RTS 2504 system, which is a full-featured, typical system meeting the needs of many customers.

**Section 2** lists the key specifications for this standard system.

**Section 3** details the specific hardware and software components for this standard system.

**Section 4** presents contact information, and web links to additional details.



# 1. General Description: Pentek RTS 2504 and SystemFlow

Pentek RTS 2504 is a fully integrated dual channel software radio transceiver system with recording and playback capabilities. The system includes Pentek hardware, third-party hardware, and the Pentek SystemFlow software suite.

## Hardware

The Pentek hardware components for the standard RTS 2504 are the Pentek Model 7140 Dual Digital Up/Down Converter PMC/XMC module mounted on the Pentek Model 4205 VME PowerPC I/O Processor, which is equipped with an Ethernet port and a Fibre Channel interface.

These boards and integrated within a VME card cage and designated as the Pentek Model 2504-001.

An Ethernet link connects this real-time hardware to a third-party PC workstation for control, status, and file transfer functions. The third-party Fibre Channel disk drive array attached to the Model 4205 Processor records and plays back data at an aggregate rate of 160 MBytes/sec.

## Software

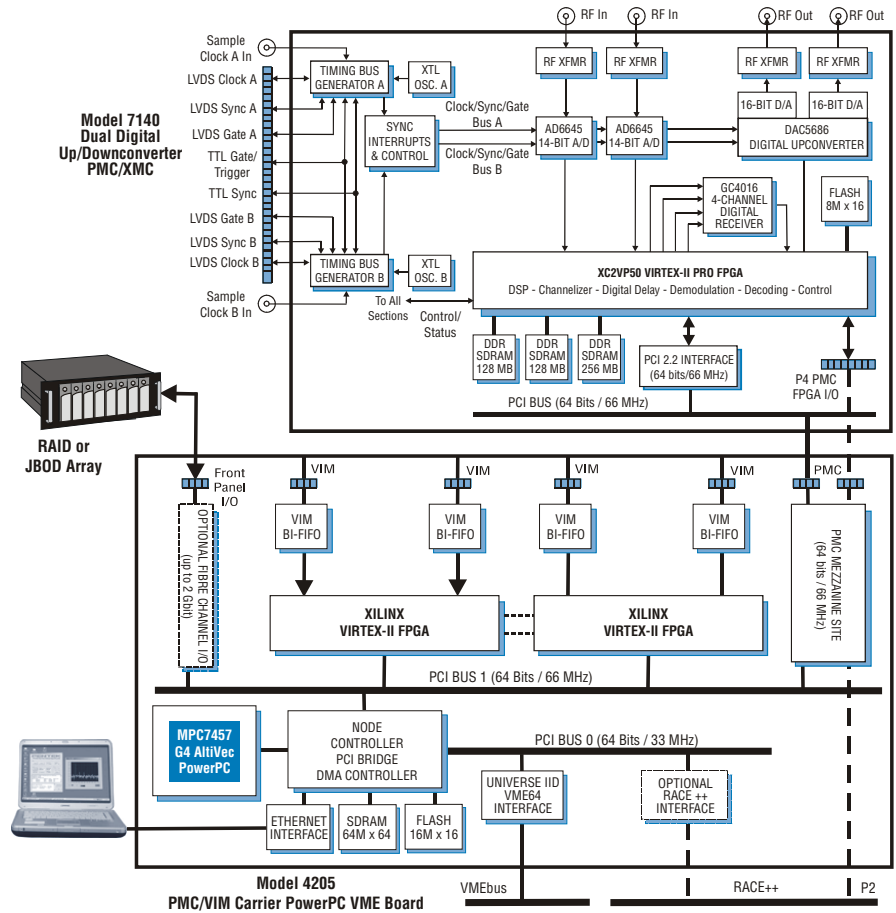
Pentek's SystemFlow software suite supports RTS systems with real-time acquisition and recording and playback software for the G4 PowerPC processor, and Windows or Linux drivers and application software for the host PC.

SystemFlow also provides a complete virtual instrument graphical user interface (GUI) for full control and configuration of all hardware parameters along with preview, recording and playback functions.

SystemFlow includes a powerful File Manager that supports operator-named files fully annotated with recording parameters, and a LabVIEW Signal Viewer that displays live or recorded signals in both time and frequency domains and calculates critical signal parameters.

In addition to these instrumentation features, SystemFlow provides a complete development tool suite so engineers can customize software functions on the workstation PC and on the real-time PowerPC. This makes RTS system ideal as a development platform for application-specific requirements.

All RTS systems include system configuration services, software installation and testing, extensive documentation, and customer training by engineers at Pentek's facility.



## 2. System Features and Specifications: Pentek RTS 2504

The standard Pentek Model 2504-001 hardware package, the Pentek SystemFlow software, plus a third-party Fibre Channel disk drive and host PC workstation comprise a system that delivers the following system-level features and specifications:

- Complete ready-to-use recording/playback instrument out of the box
- Two 14-bit A/D converters with sampling rate to 105 MHz
- Four channel digital downconverter (DDC) with decimation from 32 to 16,384
- Digital up converter (DUC) with interpolation to x16 and output sampling rates to 320 MHz
- Two 16-bit D/A converters with sampling rate to 320 MHz in DUC mode and to 500 MHz in baseband mode
- Dual clock, gate and trigger sections that allows separate timing for A/D and D/A
- Synchronous sampling and data collection trigger across both A/D and D/A channels
- 2 Gbit/sec copper Fibre Channel interface
- 588 Gbytes of 2 Gbit/sec JBOD Fibre Channel disk storage, desktop chassis
- 160 MB/sec maximum Fibre Channel disk recording/playback rate
- 100 baseT Ethernet interface to workstation PC
- RS-232C serial interface to workstation PC
- 7 slot portable VMEbus card cage, 500 watt power supply, dual fans
- All system cabling: Ethernet, RS-232C, Fibre Channel, Sync Bus, and power cords
- Workstation GUI instrumentation control panel for Record/Playback/Viewing operations, configuring all hardware parameters, file management and transfers
- File Manager allows creation and deletion of customer-named files on the Fibre Channel drive
- Recorded files include annotated recording parameters stored in file headers
- Transfer of files between the Fibre Channel drive and the workstation PC file system
- LabVIEW Signal Viewer for displaying live signals or recorded signals
- eCos real-time operating system with C-compiler and debugger
- ReadyFlow Board Support Package for 4205 I/O Processor and 7140 PMC module
- PowerPC API for developing custom real-time data acquisition, recording and playback functions
- Workstation API for developing custom interface to user application or GUI using socket-based commands between workstation and real-time system and to LabVIEW Signal Viewer
- Source code for all PowerPC software and Pentek-developed Windows software
- Documentation for all system- and board-level features and components
- Software installation on customer-furnished Windows PC workstation
- Half-day customer training at Pentek facility
- One-year warranty on entire system

### 3a. System Hardware: Pentek RTS 2504-001

The standard Pentek RTS 2504-001 system includes all of the hardware items and system configuration tasks listed below. For more details, click on the hypertext links for web access to full documentation.

Qty	Mfr	Model-Opt	Description
1	Pentek	<a href="#">4205</a> -006 -057	G4 PowerPC VME Processor, 512 MB SDRAM, 2 MB L3 Cache, 32 MB FLASH, 1 K FIFOs, XC2V1000 FPGAs Front Panel 2 Gbit/sec Fibre Channel Interface 1 GHz MPC7457 Processor
1	Pentek	<a href="#">7140</a> -050 -100	Dual Channel Digital Up/Down Converter PMC Module Virtex XC2VP50 FPGA 105 MHz A/D Converters
1	Pentek	<a href="#">8204</a> -064	7 Slot Desktop VMEbus Card Cage, 500W, Dual Fans No P0 Connector
1	Pentek	8215 -504	System Configuration and Integration Services Install 7140 PMC module on 4205 Install 4205/7140 in 8204 card cage Install all required VMEbus backplane jumpers Install and configure Fibre Channel drives within JBOD housing Install Fibre channel cable connecting 4205 to JBOD Install SystemFlow software on customer-furnished PC Install serial port cable connecting 4205 to PC Install Ethernet cable connecting 4205 to PC Configure network settings for 4205 for socket communications Configure serial port for 4205 Redboot command Test all system hardware and verify software operation Half-day customer training at Pentek facility

### 3b. Fibre Channel Drive

The RTS2504-001 system above requires the Fibre Channel JBOD disk array listed below.

1	Pentek	8332 -250 -550	JBOD 2 Gbit/sec Fibre Channel Desktop Disk Drive chassis 4 disk drives, each 147 GB, 588 GB Total 1 Year JBOD Maintenance
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### 3c. SystemFlow Software

The RTS2504-001 system above requires the SystemFlow Software package listed below.

- |   |                             |   |
|---|-----------------------------|---|
| 1 | Pentek <a href="#">4990</a> | SystemFlow RTS Software Suite for Windows and PowerPC |
|   | -504                        | for RTS2504   |

### 3d. Workstation PC

The RTS 2504-001 system above requires a PC with the minimum requirements listed below:

- Processor: Pentium 4 or higher equivalent
- Processor Clock: 1.2 GHz minimum
- Operating System: Windows 98SE, Windows NT, or Windows 2000
- System DRAM: 512 MB minimum
- Free Disk Space: 2 GB minimum

The workstation PC can be supplied by the customer or provided by Pentek, based on customer preference. In either case, all software components are installed, configured and tested with the hardware system, as part of the deliverables.

Any standard PC accessories including mouse, keyboard, and monitor are not required by Pentek for the system integration effort. However, if they are provided, we will configure and test the system using those supplied accessories.

### 3e. Optional GateFlow FPGA Design Kits

For customers wishing to extend the standard factory functions in the FPGAs on the Model 7140 Dual Channel Digital Up/Down Converter PMC Module or the Model 4205 G4 PowerPC VME Processor, Pentek offers the GateFlow FPGA Design Kit. It includes complete projects for the Xilinx ISE Foundation Tool suite (available from Xilinx) containing VHDL source code, pin definitions, and utilities for each board.

Building on the existing FPGA structures for device interfaces, bus interfaces, data formatting, timing and synchronization functions, saves valuable development time for FPGA designers.

- |                             |                                     |
|-----------------------------|-------------------------------------|
| Pentek <a href="#">4953</a> | Pentek GateFlow FPGA Design Kit     |
| -205-010                    | for the XC2V1000s on the Model 4205 |
| -140-052                    | for the XC2VP50 on the Model 7140   |

Note that the Model 4205 in the standard RTS 2504-001 has XC2V1000 FPGAs, but this board can be ordered with XC2V3000 FPGAs instead. A GateFlow Design Kit is also available for this version.

### 3f. Optional Custom Design Services

Pentek offers development services for custom algorithms, signal processing, timing, or data formatting for FPGA, PowerPC or host workstation environments. Contact the factory with your specific requirements.

## 4. Contacts and Additional Information

If you have any questions, please feel free to contact your local Pentek representative to discuss your needs. A complete contact list is available from our website:

[www.pentek.com/contact/Contact.cfm](http://www.pentek.com/contact/Contact.cfm)

You may also contact Pentek directly to discuss your needs with a knowledgeable factory systems engineer.

Mario Schiavone  
Director of Sales  
Pentek, Inc.  
One Park Way  
Upper Saddle River, NJ 07458  
Tel: 201-818-5900 ext 229  
Fax: 201-818-5904  
Email: [sales@pentek.com](mailto:sales@pentek.com)

Pentek Web Site: [www.pentek.com/](http://www.pentek.com/)

### Links for Additional Information

[SystemFlow Overview](#)

[SystemFlow Product Information](#)

[RTS Overview](#)

[RTS 2504 Product Information](#)

[RTS 2504 Data Sheet](#)

[Model 4205 Processor Product Information](#)

[Model 4205 Processor Data Sheet](#)

[Model 7140 PMC Transceiver Product Information](#)

[Model 7140 PMC Transceiver Data Sheet](#)

[Model 4953 GateFlow FPGA Design Kit](#)