Model 2546	200 MS/sec RF/IF	Talon RTR Rugged Recorder	Small Form Factor

Features

- Housed in a small chassis: 5.25" H x 8.5" W x 14" D
- Weighs 17 lb (7.7 kg)
- Shock and vibration-resistant SSDs perform well in vehicles, ships and aircraft
- 200 MHz 16-bit A/Ds
- 800 MHz 16-bit D/As
- Real-time aggregate recording rates of up to 1.6 GB/sec
- DDC decimation and DUC interpolation range from 2 to 65,536
- 80 MHz record and playback signal bandwidths
- Recording and playback of IF signals up to 700 MHz
- Up to 61 terabytes of SSD storage to NTFS RAID solid state disk array
- Windows® workstation with high-performance Intel® processor
- SystemFlow® GUI with Signal Viewer analysis tool
- File headers include time stamping and recording parameters
- Optional GPS time and position stamping

TALON RTR RUGGED RECORDER

General Information

Optimized for SWaP (size, weight and power), the Pentek Talon® RTR Small Form Factor (SFF) product line provides performance and storage capacity previously only possible in much larger rackmountable chassis. Measuring 5.25" H x 8.5" W x 14" D and weighing only 17 pounds (7.7 kg), this small package can hold up to 61 TB of SSD storage. Configured with four 200 MS/sec 16-bit A/Ds, the RTR 2546 is capable of recording the full four-channel bandwidth at a 1.6 GB/sec sustained rate to disk. An 800 MHz 16-bit D/A allows for real-time full-bandwidth signal reproduction.

Built-in digital downconverters and upconverters allow for IF signals to be converted to baseband and reproduced at the original IF frequency. A/D sampling rates, DDC decimations and bandwidths, D/A sampling rates, and DUC interpolations are among the GUI-selectable system parameters, providing a fully programmable system capable of recording and reproducing a wide range of signals.

An ATX power supply accepts 110 to 240V AC, drawing under 170 W and typically around 115 W. SFF models have the option for a 12 to 28V DC power supply. Eight front panel data drives can be easily removed along with a front panel removable OS drive to allow all non-volatile memory to be removed from the system in seconds. An optional GPS receiver allows for precise GPS time and position stamping.

Rugged Chassis with SSD Storage

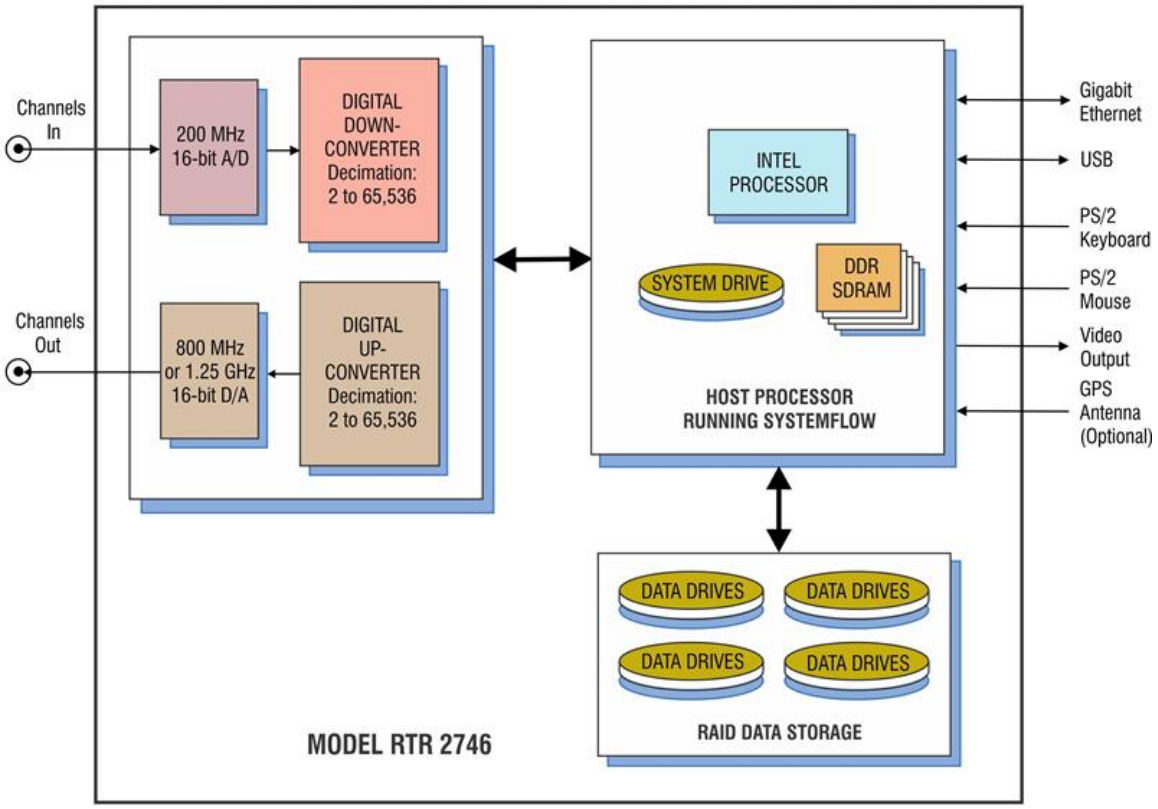
The SFF system is configured with hot-swappable SSDs, front-panel USB ports, and I/O connectors on the rear panel. It is built in an extremely rugged steel and aluminum chassis and is tested for shock and vibration.

The SSDs provide storage capacities of up to 61 TB. Drives can be easily removed or exchanged during or after a mission to retrieve recorded data. Multiple RAID levels, including 0, 5, and 6, provide a choice for the required level of redundancy.

A push of a button unlatches each of the data drives and the OS drive. Drives are mounted on sleds and can be easily transferred to an offload system while the recorder stays in the field.

PC and signal I/O is available on the rear panel with standard connectors.

2546 Block Diagram



SystemFlow Software

All Talon recorders include the Pentek SystemFlow® recording software. SystemFlow software provides three ways for users to configure and control a Talon recorder:

- The SystemFlow GUI provides an easy out-of-the-box experience which allows the operator to open the box and begin recording with a point and click user interface.
- The SystemFlow API provides a set of C-callable libraries that allow engineers to develop their own user interface to configure and control their Talon recorder.
- The SystemFlow Telnet interface provides a simple set of commands to configure and control the recorder. This eliminates the need for any software development and is most suitable for unmanned operation.

SystemFlow software allows the recorder to be set up to run autonomously by implementing scripts using the API or telnet interface. All three interfaces can be run from a remote connection over Gigabit Ethernet.

A simple header that holds the recording parameters is added to the beginning of the file. An optional GPS receiver allows the user to precisely timestamp files and optionally track the recorder's position throughout a mission. The system records all data to the native NTFS file system, allowing for quick and easy access to the data from any computer.

Click below to view a video about SystemFlow.

SystemFlow Simulator

To learn more about the SystemFlow Software, you can download and install the free SystemFlow Simulator to your desktop or laptop PC. The SystemFlow Simulator allows you to learn how to use the Talon recording system's SystemFlow software interface before you acquire a recorder or while you are waiting for delivery of a Talon recording system.

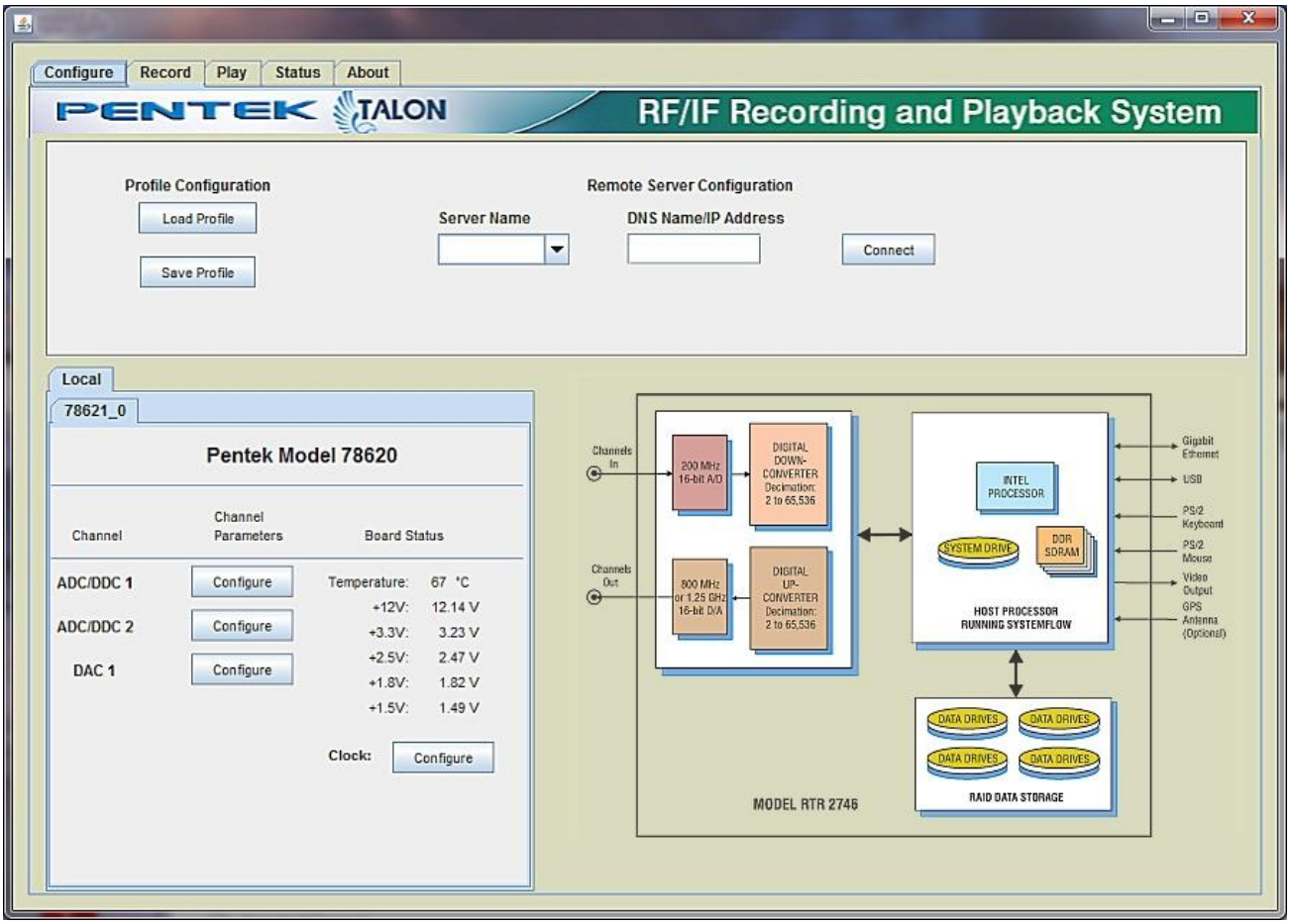
The Simulator can simulate the operating environment of all the different Talon recorder models. The Simulator also demonstrates the SystemFlow Signal Viewer by playing recorded signals to simulate the appearance of live signals being digitized and recorded by a Pentek analog signal recorder.

Features

- Provides real-time recording system simulation
- Demonstrates SystemFlow signal & file viewer tools
- Capable of simulating all Talon analog and digital recording systems
- Full Talon SystemFlow GUI
- Simulator can be used to develop Talon system profiles for use in the final system
- Can be used with the SystemFlow API to develop and test custom user interface

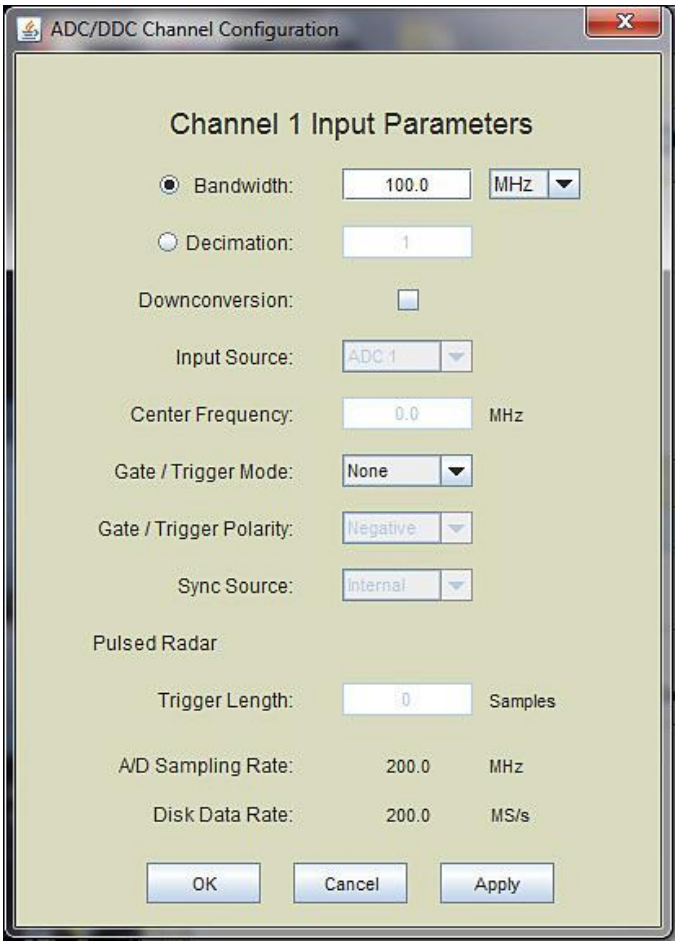
SystemFlow Recorder Interface

The RTR 2546 GUI provides the user with a control interface for the recording system. It includes Configuration, Record, Playback and Status screens, each with intuitive controls and indicators. The user can easily move between screens to set configuration parameters, control and monitor a recording, play back a recorded signal and monitor board temperature and voltage levels. The signal viewer, integrated into the recording GUI, allows monitoring of real-time signals or recorded signals on disk.



SystemFlow Hardware Configuration Interface

The RTR 2546's Configure screens provide a simple and intuitive means for setting up the system parameters. The DDC configuration screen shown here, allows user entries for input source, center frequency, decimation, as well as gate and trigger information. All parameters contain limit-checking and integrated help to provide an easier-to-use out-of-the-box experience.



SystemFlow API

SystemFlow includes a complete API (Application Programming Interface) supporting control and status queries of all operations of the Talon recorder from a custom application.

High-level C-language function calls and the supporting device drivers allow users to incorporate the RTR 2546 as a high-performance server front end to a larger system. This is supported using a socket interface through the Ethernet port, either to a local host or through an internet link for remote, stand-alone acquisition. Recorded NTFS files can be easily retrieved through the same connection.

Below is an example of controlling recording via the SystemFlow API.

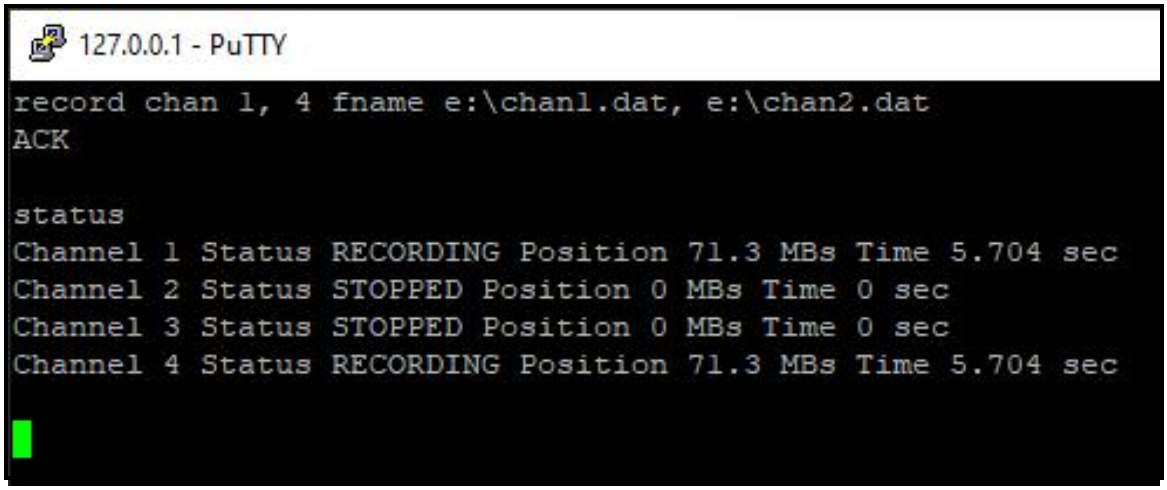
```
728         }
729         //transfer until end of disk
730         else if (transferType == TRANSFER_END_OF_DISK)
731         {
732             recordParams->transferTime    = 0;                    // must set to 0
733             recordParams->transferLength  = 0;                    // must set to 0
734         }
735
736         ////////////////////// Start the record //////////////////////
737         SetConsoleTextAttribute (hConsole, FOREGROUND_GREEN | FOREGROUND_INTENSITY );
738         printf("\nCase 6: RTS_Record\n");
739         SetConsoleTextAttribute (hConsole, wOldColorAttrs);
740
741         //trigger immediately
742         if(recordParams->trigger == RTS_TRIGGER_IMMEDIATELY)
743         {
744             //send record command
745             if ((error = RTS_Record(++msgNum,
746                                     serverInfo,
747                                     recordParams,
748                                     recordChanId,
749                                     fileName[0])) != RTS_SUCCESS)
750             {
751                 printf("Record Error # 0x%lx.\n", error);
752                 exitHandler(error);
753                 goto freeMem;
754             }
755
756             Sleep(500);
757         }
758
759         //wait for SW trigger
760         else if(recordParams->trigger == RTS_WAIT_FOR_SW_TRIGGER)
761         {
762             //send record command which set up record and start DMA
763             if ((error = RTS_Record(++msgNum,
764                                     serverInfo,
765                                     recordParams,
766                                     recordChanId,
767                                     fileName[0])) != RTS_SUCCESS)
```

SystemFlow Telnet

The Talon telnet facility is an optional feature that can be requested when ordering one of Pentek's Talon recording systems. The Talon telnet facility allows you to control a Talon recorder from a remote computer. You also can use the Talon recorder's SystemFlow Signal Viewer to remotely monitor real−time data.

Pentek's *Telnet Facility for Talon Recording Systems User's Guide* provides instructions for setting up telnet access and describes all the supported commands.

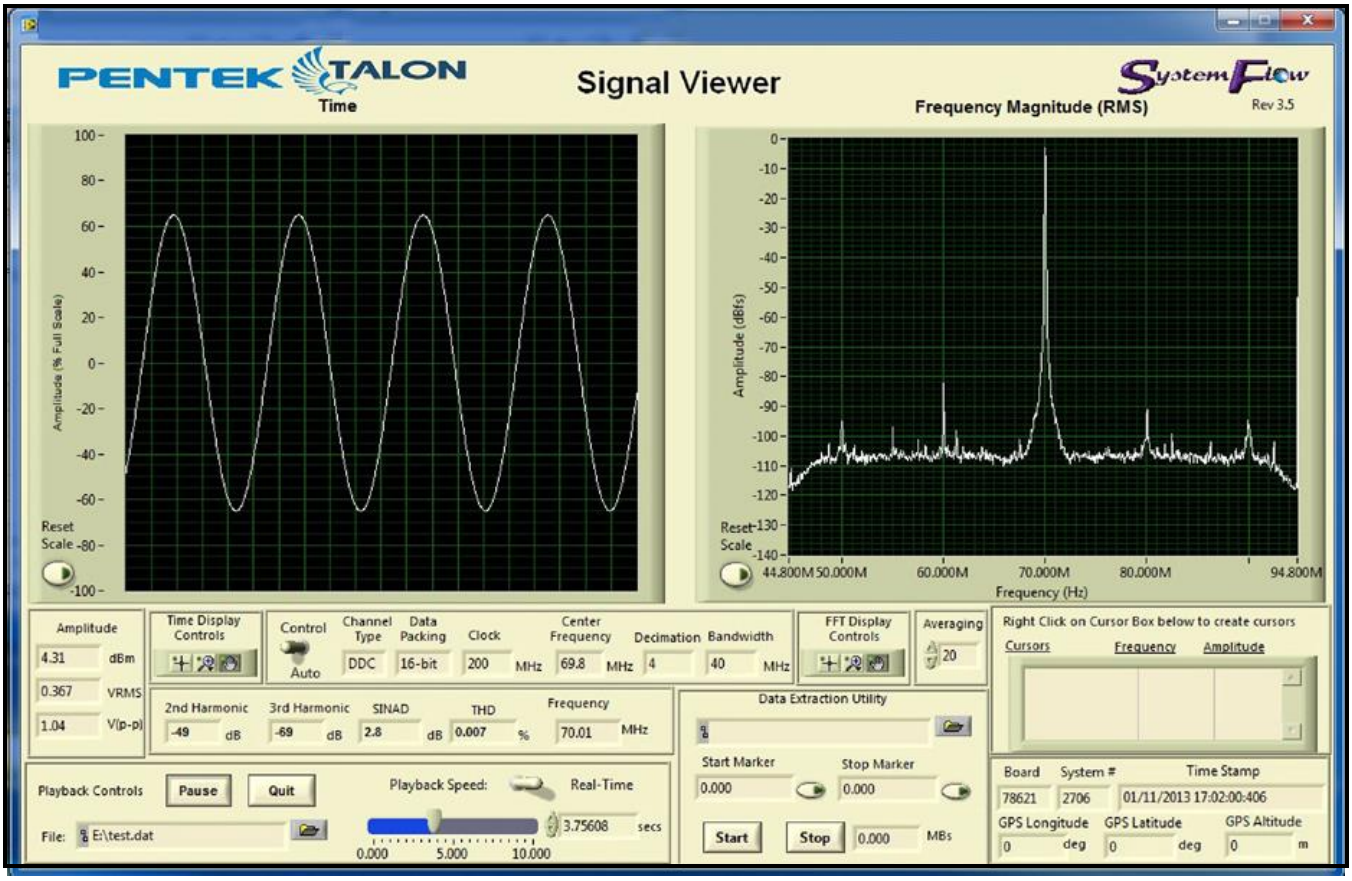
Below is an example of use of the "record" command:



Signal Viewer

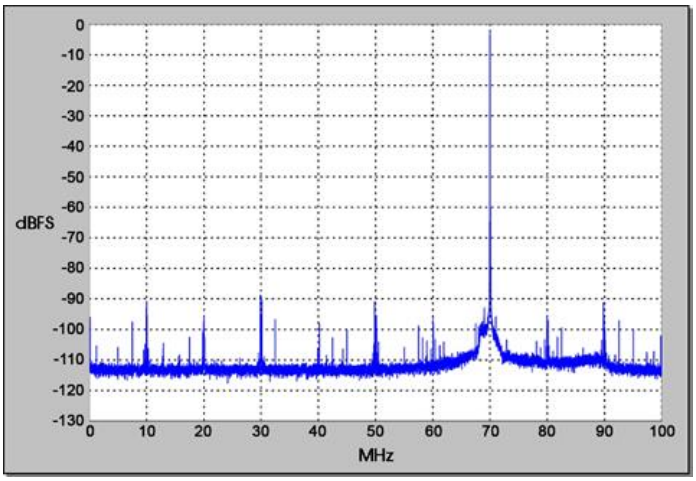
The SystemFlow Signal Viewer includes a virtual oscilloscope and spectrum analyzer for signal monitoring in both the time and frequency domains. It is extremely useful for previewing live inputs prior to recording, and for monitoring signals as they are being recorded to help ensure successful recording sessions. The viewer can also be used to inspect and analyze the recorded files after the recording is complete.

Advanced signal analysis capabilities include automatic calculators for signal amplitude and frequency, second and third harmonic components, THD (total harmonic distortion), and SINAD (signal to noise and distortion). With time and frequency zoom, panning modes, and dual, annotated cursors to mark and measure points of interest, the SystemFlow Signal Viewer can often eliminate the need for a separate oscilloscope or spectrum analyzer in the field.



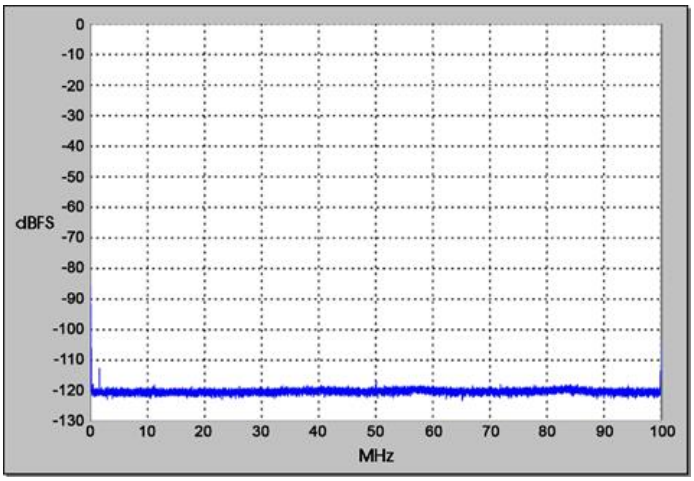
A/D Performance

Spurious Free Dynamic Range



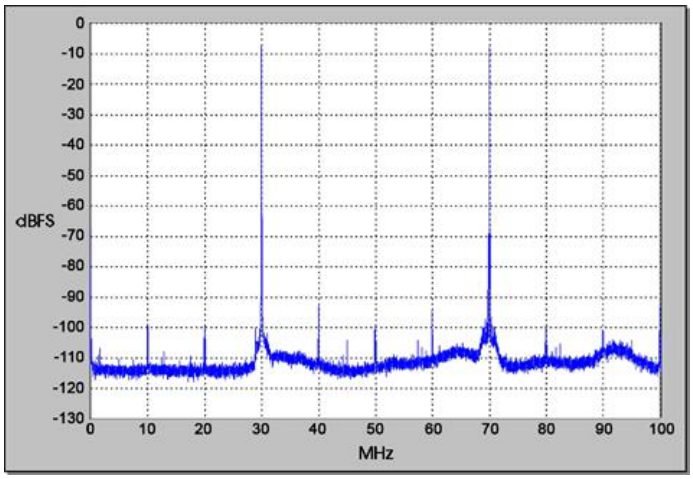
f_{in} = 70 MHz, f_s = 200 MHz, Internal Clock

Spurious Pick-up



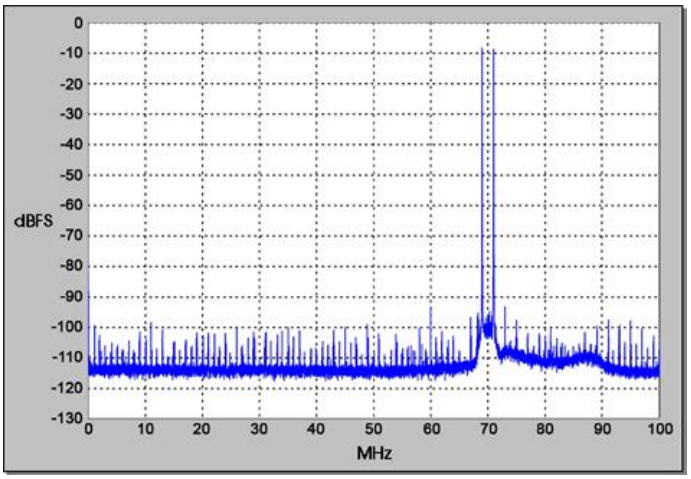
f_s = 200 MHz, Internal Clock

Two-Tone SFDR



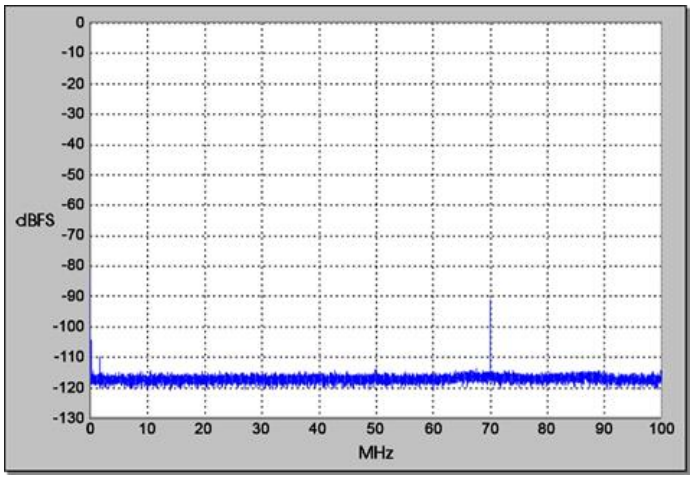
f_1 = 30 MHz, f_2 = 70 MHz, f_s = 200 MHz

Two-Tone SFDR



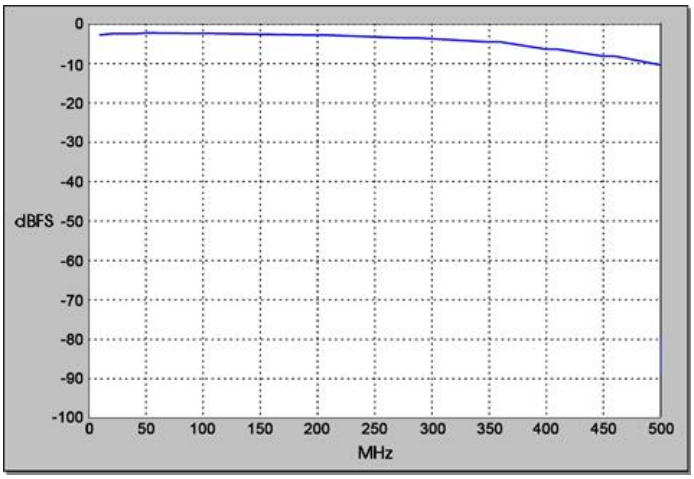
f_1 = 69 MHz, f_2 = 71 MHz, f_s = 200 MHz

Adjacent Channel Crosstalk



f_{in} Ch2 = 70 MHz, f_s = 200 MHz, Ch 1 shown

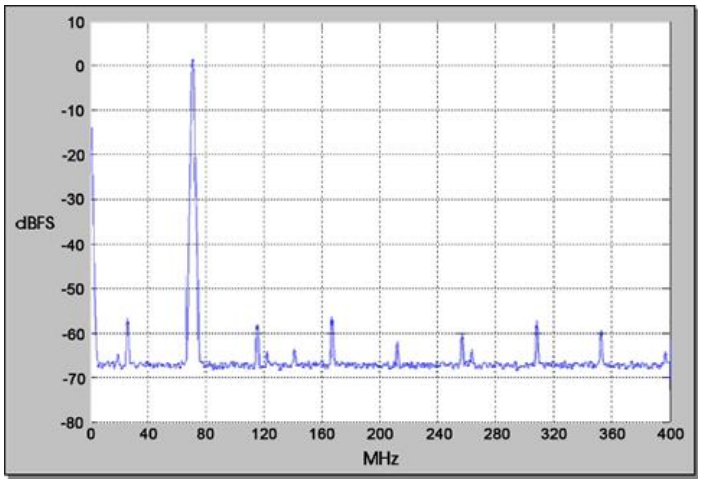
Input Frequency Response



f_s = 200 MHz, Internal Clock

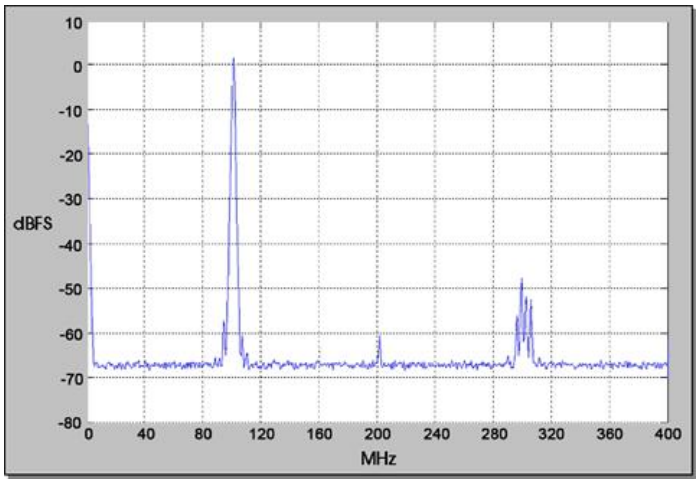
D/A Performance

Spurious Free Dynamic Range



f_{out} = 70 MHz, f_s = 800 MHz, Interpolation = 4, Internal Clock

Spurious Free Dynamic Range



f_{out} = 100 MHz, f_s = 800 MHz, Interpolation = 4, Internal Clock

Specifications

PC Workstation (standard configuration)

Operating System: Windows®
Processor: Intel® Core™ i7 processor
Operating System Drive: 250 GB SSD
SDRAM: 8 standard, 16 or 32 GB optional

RAID

Total Storage: 3.8 TB – 61 TB
Supported RAID Levels: 0, 5 and 6
Drive Bays: Hot-swap, removable, front panel

Rear Panel I/O

Four USB 2.0 ports
Two SMA antenna connectors (2T2R)
HDMI port
USB 3.1 Gen 1 port, USB 3.1 Gen 2 Type-A port
USB Type-C port
RJ-45 LAN port

Front Panel I/O

Two USB ports
Power and recessed RESET buttons
LED indicators for power and HDD access

Analog Signal Inputs

Quantity: 1, 2, 3, or 4
Connectors: Transformer-coupled, female SSMC
Transformer Type: Coil Craft WBC4-6TLB
Full Scale Input: +8 dBm into 50 ohms
3 dB Passband: 300 kHz to 700 MHz

A/D Converters

Type: Texas Instruments ADS5485
Sampling Rate (f_s):10 MHz to 200 MHz
Resolution: 16 bits
A/D Record Bandwidth: $f_s/2$ = Nyquist bandwidth
Anti-Aliasing Filters: External, user-supplied

Digital Downconverter

Type: Pentek DDC IP Core
Decimation (D): 2 to 65,536
IF Center Frequency Tuning: DC to f_s, 32 bits
DDC Usable Bandwidth: $0.8*f_s/D$

Analog Signal Outputs

Connectors: Transformer-coupled, female SSMC
Full Scale Output: +4 dBm into 50 ohms
3 dB Passband: 300 kHz to 700 MHz

Digital Upconverter, Interpolator and D/As

D/A Resolution: 16 bits
Output Signal: Analog, real or quadrature
Type: Texas Instruments DAC5688 and Pentek-installed IP core interpolator
Interpolation: 2 to 65,536
Input Data Rate to DAC5688: 250 MS/sec max.
Output Sampling Rate: 800 MHz max
Output IF: DC to 400 MHz
Bandwidth Range: Matches recording bandwidths

Clock Sources

Selectable from onboard programmable VCXO, external or LVDS clocks

External Clocks

Type: Female SSMC connector, sine wave, 0 to +10 dBm, AC-coupled, 50 ohms, 10 to 200 MHz

Physical and Environmental

Dimensions: 5.25" H x 8.5" W x 14.0" D
Weight: 17 lb (7.7 kg)
Operating Temp: 0° to +45° C
Storage Temp: –40° to +85° C
Relative Humidity: 10% to 95%, non-condensing
Operating Shock: 15 g max. (11 msec, half-sine wave)
Operating Vibration: 10 to 20 Hz: 0.02 inch peak, 20 to 500 Hz: 1.4 g peak acceleration
Power Requirements: 100 to 240 VAC, 50 to 60 Hz, 170 W max.

Ordering Information

Click here for more information.

Channel Configurations	
Option -201	1-channel recording
Option -202	2-channel recording
Option -203	3-channel recording
Option -204	4-channel recording
Option -221	1-channel playback
Option -222	2-channel playback
Option -224	4-channel playback
Storage Options	
Option -410	3.8 TB SSD storage capacity
Option -415	7.6 TB SSD storage capacity
Option -420	15.3 TB SSD storage capacity
Option -430	30.6 TB SSD storage capacity
Option -460	61 TB SSD storage capacity
Additional Options	
Option -261	GPS time and position stamping
Option -285	Raid 5 configuration
Option -286	Raid 6 configuration
Option -309	16 GB system memory
Option -310	32 GB system memory
Option -625	Removable OS drive
Option -630	12 to 28V DC power supply
Contact Pentek for compatible Option combinations. Storage and General Options may change, contact Pentek for latest information.	

Pricing and Availability

To learn more about our products or to discuss your specific application please contact your local representative or Pentek directly:

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Lifetime Applications Support

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