

New!

# Model RTR 2546

# 200 MS/sec RF/IF Rugged SFF Recorder



### Features

- Designed to operate under conditions of shock and vibration
- Housed in a small chassis measuring 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 30 terabytes of SSD storage to NTFS RAID solid state disk array
- Windows® workstation with high performance Intel® Core™ i7 processor
- SystemFlow® GUI with Signal Viewer analysis tool
- File headers include time stamping and recording parameters
- Optional GPS time and position stamping

### General Information

Optimized for SWaP (size, weight and power,) the Pentek Talon® RTR Small Form Factor (SFF) product line provides the 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 30.6 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 110-240 VAC, drawing under 150 W and typically around 100 W. SFF Models have the option for a 6-30 VDC 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.

### SystemFlow Software

All Talon Rugged Small Form Factor recorders include the Pentek SystemFlow recording software. SystemFlow features a

Windows-based GUI (Graphical User Interface) that provides a simple means to configure and control the recorder. A user API is also included to allow custom recorder control interfaces to be easily built.

SystemFlow provides signal viewing and analysis tools that allow the user to monitor the signal prior to, during, and after a recording session. These tools include a virtual oscilloscope, spectrum analyzer and spectrogram displays.

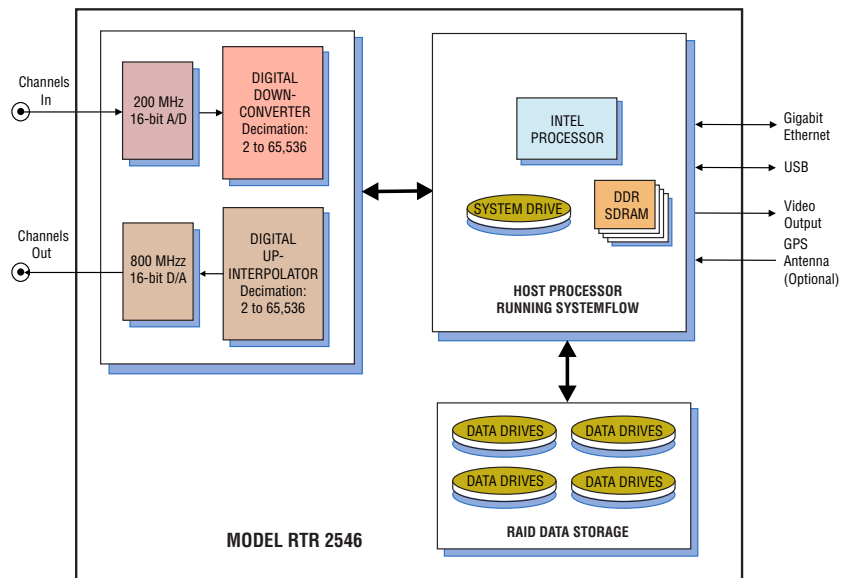
Built on a Windows Professional workstation, all Talon SFF recorders allow the user to install post-processing and analysis tools to operate on the recorded data. The system records data to the native NTFS file system, providing immediate access to the recorded data files.

### Rugged Chassis with SSD Storage

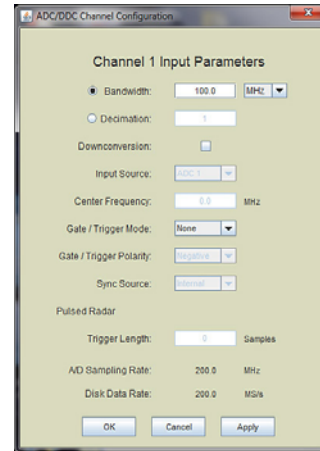
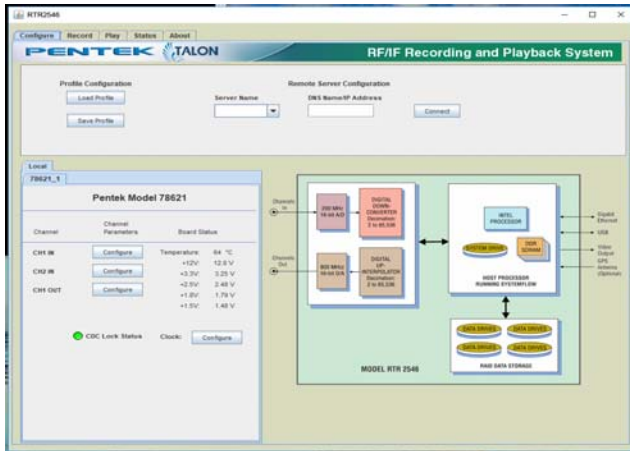
The SFF system is configured with hot-swappable SSDs, front-panel USB ports, and I/O connectors on the rear panel. It is built in an extremely rugged steel and aluminum chassis and is tested for shock and vibration. The SSDs provide storage capacities of up to 30.6 TB. Drives can be easily removed or 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. ➤



► SystemView Graphical User Interface

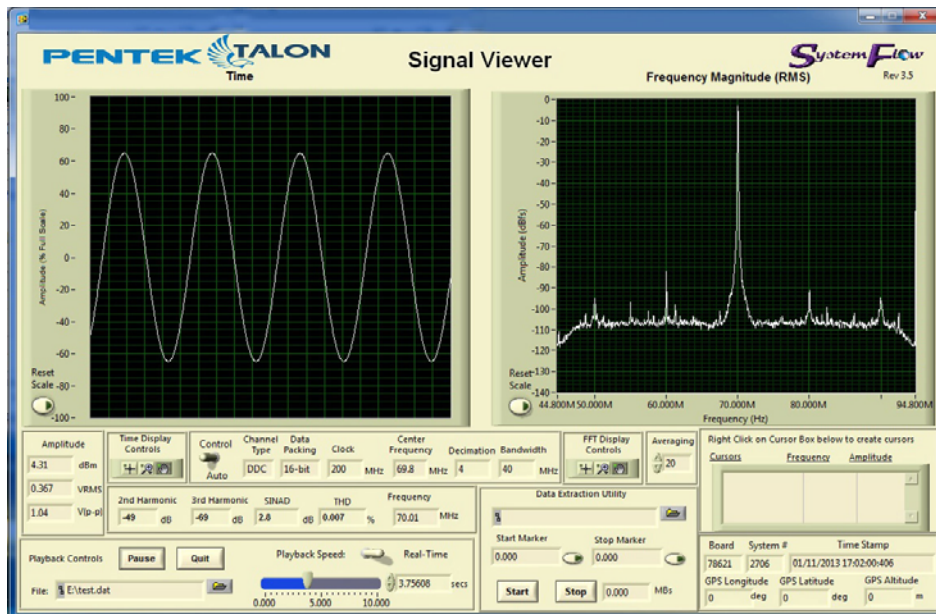


SystemFlow Recorder Interface

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, playback a recorded signal and monitor board temperature and voltage levels. The signal viewer, integrated into the recording GUI, allows the user to monitor 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.



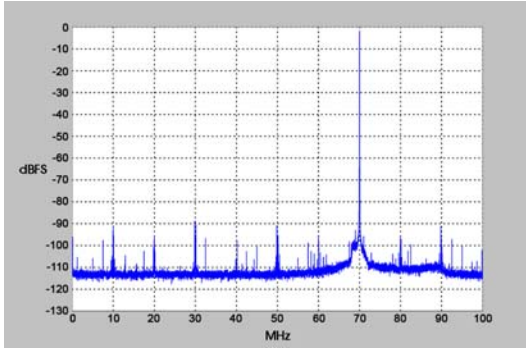
SystemFlow Signal Viewer

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. ►

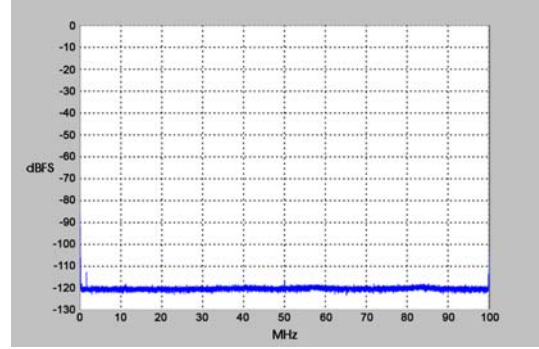
► A/D Performance

Spurious Free Dynamic Range



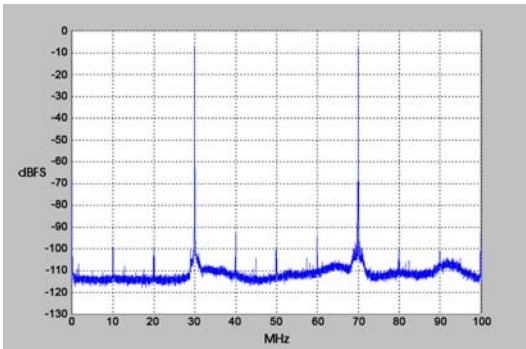
$f_{in} = 70 \text{ MHz}$ ,  $f_s = 200 \text{ MHz}$ , Internal Clock

Spurious Pick-up



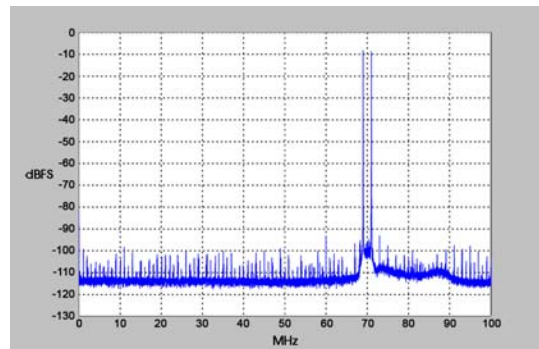
$f_s = 200 \text{ MHz}$ , Internal Clock

Two-Tone SFDR



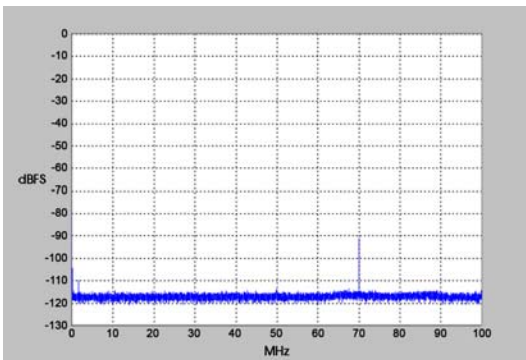
$f_1 = 30 \text{ MHz}$ ,  $f_2 = 70 \text{ MHz}$ ,  $f_s = 200 \text{ MHz}$

Two-Tone SFDR



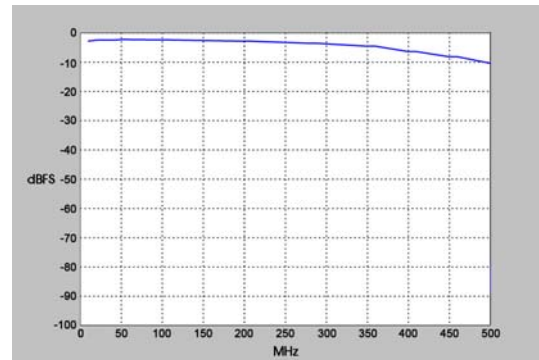
$f_1 = 69 \text{ MHz}$ ,  $f_2 = 71 \text{ MHz}$ ,  $f_s = 200 \text{ MHz}$

Adjacent Channel Crosstalk



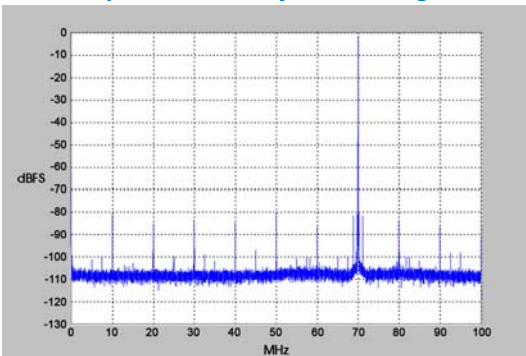
$f_{in \text{ Ch2}} = 70 \text{ MHz}$ ,  $f_s = 200 \text{ MHz}$ , Ch 1 shown

Input Frequency Response



$f_s = 200 \text{ MHz}$ , Internal Clock

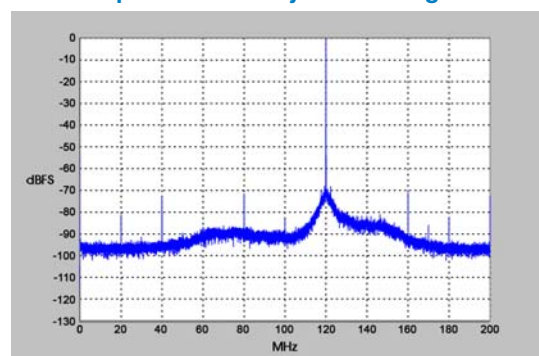
Spurious Free Dynamic Range



$f_{out} = 70 \text{ MHz}$ ,  $f_s = 200 \text{ MHz}$ , Internal Clock

D/A Performance

Spurious Free Dynamic Range



$f_{out} = 120 \text{ MHz}$ ,  $f_s = 400 \text{ MHz}$ , External Clock

**Specifications**

**PC Workstation (standard configuration)**

**Operating System:** Windows workstation  
**Processor:** Intel i7 7700K (7th Gen) quad core processor  
**Clock Speed:** 4.2 GHz  
**Operating System Drive:** 250 GB SSD  
**SDRAM:** 8 standard, 16 or 32 GB optional  
**RAID**

**Total Storage:** 3.8 TB – 30.6 TB  
**Supported RAID Levels:** 0, 5 and 6  
**Drive Bays:** Hot-swap, removable, front panel

**Rear Panel I/O**

Four USB 3.0 ports  
 Two Gigabit RJ45 ports  
 Two HDMI and One DVI ports  
 Audio and PS2 ports  
 USB 3.0 Type-C port  
 Two Wi-Fi antenna ports

**Front Panel I/O**

Two USB 2.0 ports  
 Power and recessed RESET buttons  
 LED indicators for power and HDD access

**Analog Signal Inputs**

Transformer-coupled, female SSMC connectors  
**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 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:** TI 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**

**Size:** 5.25" H x 8.5" W x 14.0" D

**Weight:** 17 lb (7.7 kg)

**Operating Temp:** 0° to +50° C

**Storage Temp:** -40° to +85° C

**Relative Humidity:** 5 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, 150 W max.

**Model RTR 2546 Ordering Information and Options**

**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  
**Option -415** 7.6 TB SSD Storage  
**Option -420** 15.3 TB SSD Storage  
**Option -430** 30.6 TB SSD Storage

**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 Operating System Drive  
**Option -630** 6 to 30 VDC Power Supply

**Contact Pentek for compatible Option combinations**  
**Storage and Channel-count Options may change, contact Pentek for the latest information**

*Specifications subject to change without notice*