

Model  
2654

26 GHz Sentinel Intelligent Signal  
Scanner

Talon RTR  
Rugged Recorder

Rackmount

## Features

- Search and capture system using Pentek's [Sentinel™ Intelligent Signal Scanner](#)
- Captures RF signals from 1 GHz to 26 GHz
- Capture and scan bandwidths up to 500 MHz
- Selectable threshold triggered or manual record modes
- 12 bit A/Ds with 57.5 dB SNR & 72 dB SFDR
- Built-in DDC with selectable decimations of 4, 8, and 16
- 4U chassis with front panel removable SSDs
- Storage capacities to 245 TB
- RAID levels 0, 5, and 6
- Windows® workstation with Intel Core™ i7 processor
- [SystemFlow®](#) GUI with virtual oscilloscope, spectrum analyzer, and spectrogram displays



## General Information

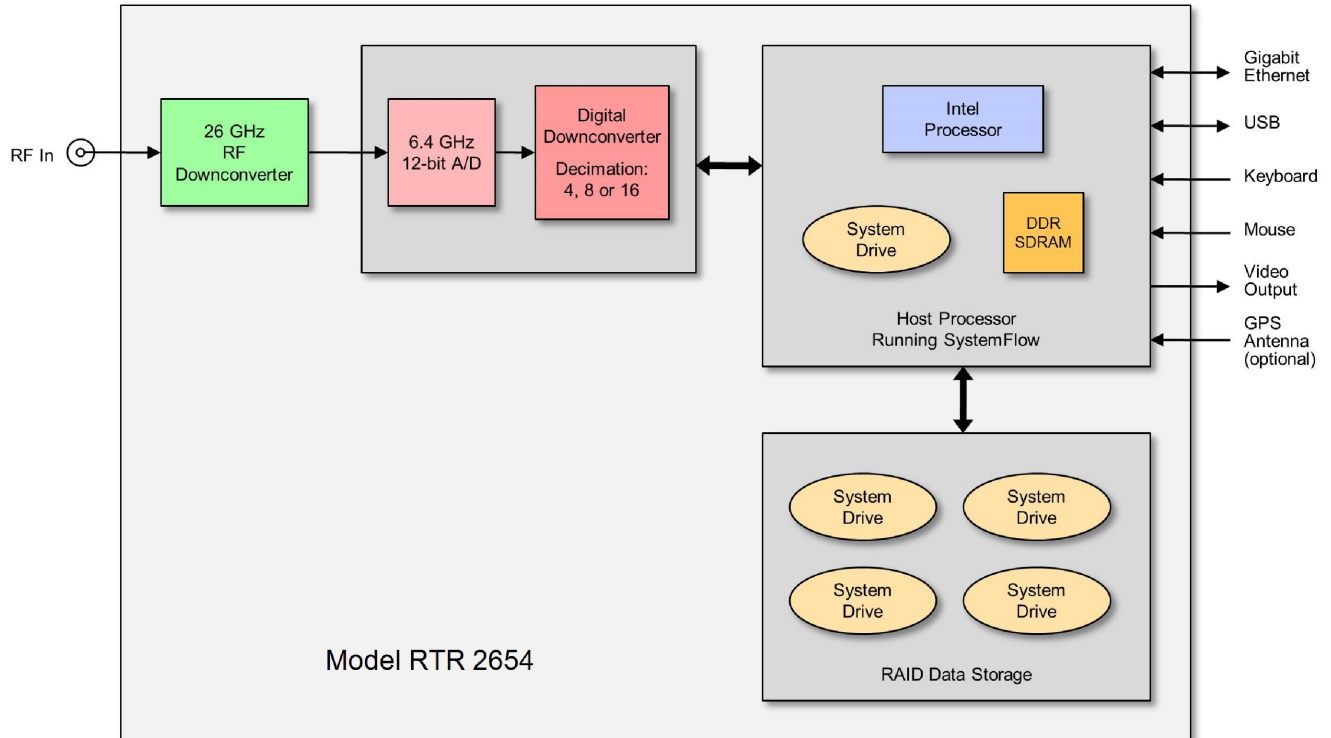
The Talon® RTR 2654 combines the power of a Pentek Talon Recording System with a 26 GHz RF tuner and Pentek's [Sentinel](#) intelligent signal scanning software. The RTR 2654 provides SIGINT engineers the ability to scan the RF spectrum from 1 GHz to 26 GHz for signals of interest and monitor or record bandwidths up to 500 MHz wide.

A spectral scan facility allows the user to scan the spectrum, while threshold detection allows the system to automatically lock onto and record signal bands. Scan results are displayed in a [waterfall plot](#) and can also be recorded to allow users to look back at some earlier spectral activity.

Once a signal of interest is detected, the real-time recorder can capture and store hundreds of terabytes of data to disk, allowing users to store data spanning multiple days.



## 2654 Block Diagram



## Hardware Features

The Pentek Model 78141 Kintex® UltraScale™ board used in the RTR 2654 provides 6.4 GHz A/D converters that are used to sample the 500 MHz bandwidth of the 26 GHz tuner. The A/Ds are clocked at a 2.8 GHz sample rate and are coupled with an FPGA-based DDC with selectable decimations of 4, 8, and 16 to provide flexible bandwidth captures and improve scan resolution.

All system components are integrated into a 4U rackmount chassis. Front panel removable SSDs, configured as a RAID, are hot-swappable and configurable for redundancy and performance. An optional GPS receiver and built-in PLLs allow all devices in the RF chain to be locked in phase and correlated to GPS time. GPS position information can optionally be recorded, allowing the recorder's position to be tracked while acquiring RF signals.

## Sentinel Features

Pentek's Sentinel™ recorders add intelligent signal monitoring and detection for Talon real-time recording systems. The intuitive GUI allows users to monitor the entire spectrum or select a region of interest, while a selectable resolution bandwidth allows the user to trade sweep rate for a finer resolution and better dynamic range. Scan settings can be saved as profiles to allow for quick setup in the field.

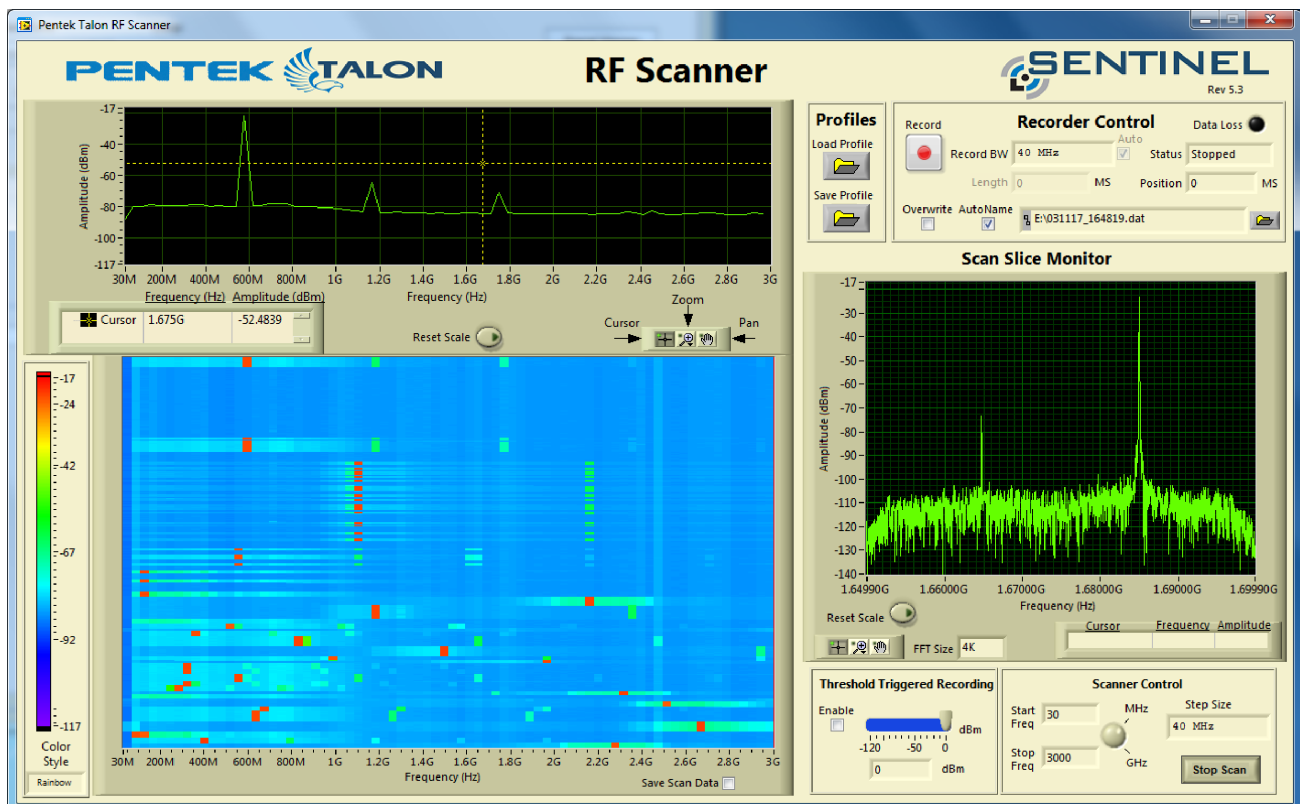
RF energy in each band of the scan is detected and presented in a waterfall display. Any RF band can be selected for real-time monitoring or recording. In addition to manually selecting a band for recording, a recording can be automatically started by configuring signal strength threshold levels to trigger a recording.

The Sentinel hardware resources are controlled through enhancements to Talon's SystemFlow® software package that includes a virtual oscilloscope, virtual spectrum analyzer and spectrogram displays. These provide a complete suite of analysis tools to complement the Sentinel hardware resources.

## RF Scanner GUI

An RF Scanner GUI allows complete control of the system through a single interface. Start and stop frequencies of a scan can be set by the user as well as the resolution bandwidth. All user parameters can be saved as profiles for easy setup in the field.

Frequency slices from the waterfall display can be selected and monitored, allowing the user to zoom into bands of interest. Threshold triggering levels can be set to record signals that exceed a specified energy. Recordings can also be manually started and stopped from the RF Scanner GUI.



## SystemFlow Software

The RTR 2654 includes the SystemFlow Recording Software. SystemFlow features a Windows-based GUI (Graphical User Interface) that provides a simple means to configure and control the recorder.

Custom configurations can be stored as profiles and later loaded when needed, allowing the user to select preconfigured settings with a single click.

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

Built on a Windows workstation, the RTR 2654 allows the user to install post-processing and analysis tools to operate on the recorded data. The RTR 2654 records data to the native NTFS file system, providing immediate access to the recorded data.

Data can be off-loaded via gigabit Ethernet ports or USB 3.1 ports. Additionally, high-speed network interface cards like 10g, 40g or 100g Ethernet can be added to increase the speed of data offload.



## 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.

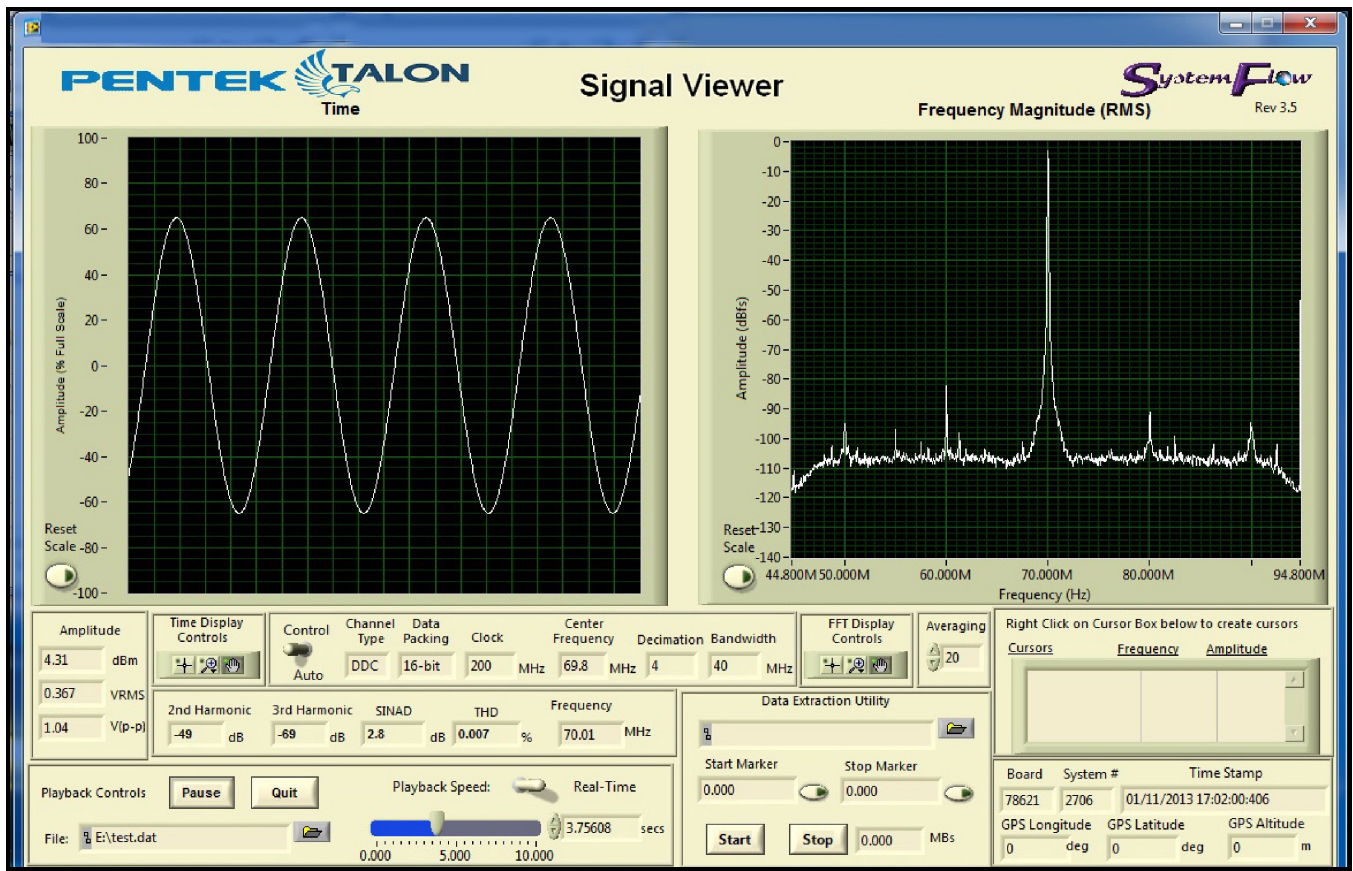
### Features

- 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

## 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.



## Specifications

### RF Tuner

#### Receiver Analog:

**Frequency Range:** 1 GHz to 26 GHz

**Tuning Resolution:** 1 kHz steps

**Internal Frequency Accuracy:**  $\pm 1.0$  ppm (-20 to +60°C), options available

**External Reference Input Frequency:** 10 MHz

**External Reference Input Level:** 0 dBm  $\pm 3$  dBm

**RF input:** 50 ohms nominal

**VSWR:** 3:1 max., <2.0:1 typical at tuned frequency

**Preselection:** 9 suboctave fixed bands <9.5 GHz; 2 tracking filters >9.5 GHz

**Noise figure (measured at 30 dB Gain):** 14 dB typical, 16 dB maximum, 1 to 26 GHz

**Maximum RF input without damage:** +10 dBm

**In-Band Input Third-Order Intercept Point:** +0 dBm typical, -10 dBm min

**Input Second-Order Intercept Point:** +30 dBm min, +40 dBm typical

**IF center frequency:** 1000 MHz (other options available)

**IF bandwidth (-3dB):** 500/250/125 MHz nom. (user selectable)

**Gain:** +60 dB nominal above RF input

**Gain control (selectable):** Manual 60 dB range nom.; AGC,  $\pm 3$ dB nom. For output levels -20 to 0 dBm

**Image rejection:** 60 dB min (>70 dB typical)

**IF rejection:** 65 dB min (>80 dB typical)

**LO Level at RF Input:** -75 dBm maximum (<-85 dBm typical)

**Integrated Phase Jitter (10KHz to 10MHz):** 0.5\* rms typical (<18GHz), 0.9\* rms typical (>18GHz)

**Tuner Tuning Speed (Random Step):** 100 usec typical, 800usec max. to within 1 KHz

**Tuner Tuning Speed (F1-F2 Scan):** 50usec typical, 200usec max. , to within 1 KHz (F2>F1, NT-118)

**Internally Generated Spurious:** -100 dBm equivalent RF input typical

**Single Tone Spurious (-40 dBm RF Input Level):** -50dBc max. (<-60dBc typical)

### PC Workstation

**Operating System:** Windows

**Processor:** Intel Core i7 processor

**SDRAM:** 16 GB

#### RAID

**Storage:** 245 TB

**Supported RAID Levels:** 0, 5 and 6

### A/D Converter

**Type:** Texas Instruments ADC12DJ3200

**Sampling Rate:** Up to 3200 MHz

**Resolution:** 12 bits

**SNR:** 57.5 dB $f_s$  typical at 1 GHz

**SFDR:** -72 dB $f_s$  typical at 1 GHz

**2nd Harmonic:** -72 dB $f_s$  typical at 1 GHz

**3rd Harmonic:** -72 dB $f_s$  typical at 1 GHz

**SINAD:** 55.7 dB $f_s$  typical at 1 GHz

**ENOB:** 9 bits typical at 1 GHz

**Integrated DDC:** Selectable decimations of 4, 8 and 16

### Physical and Environmental

#### Dimensions

Height: 4U"

Width: 19"

Depth: 21"

**Weight:** Approximately 50 lbs.

**Operating Temp:** +5° to +45° C

**Storage Temp:** -40° to +85° C

**Relative Humidity:** 5 to 95%, non-condensing

**Power Requirements:** 100 to 240 VAC, 50 to 60 Hz, -400 W

Specifications are subject to change without notice.

## Ordering Information

Click [here](#) for more information.

General Options	
Option -261	GPS time and position stamping
Option -264	IRIG-B time stamping
Option -267	Dual 10GbE Offload
Option -268	Dual 40GbE Offload
Option -285	RAID 5 Configuration
Option -286	RAID 6 Configuration
Option -311	64 GB System Memory
Storage Options	
Option -415	7.6 TB SSD storage
Option -420	15.4 TB SSD storage
Option -430	30.7 TB SSD storage
Option -460	61 TB SSD storage
Option -485	122.8 TB SSD storage
Option -490	245.7 TB SSD storage
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 Support

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