

Model  
2589

3.6 GS/sec Ultra Wideband RF/IF,  
1/2 ATR

Talon RTX  
Extreme Recorder

Small Form  
Factor

## Features

- Ultra wideband recording with 3.6 GHz 12-bit A/D
- Selectable 1.8 GHz dual-channel mode
- Records RF/IF frequencies to 2.8 GHz
- Sustained real-time record rates up to 4 GB/s
- **Rugged** 1/2 ATR MIL-spec chassis for harsh mechanical and thermal environments
- **Environmentally sealed**
- Internally conduction-cooled
- Fully sealed for RF emissions with EMI power line filter
- MIL-STD circular connectors
- Compact and lightweight: 18lb (8 kg)
- **QuickPac® drive packs** allow quick removal of all data storage via the front panel
- Can offload data from QuickPac drive packs via an optional **data offload system**, allowing the Talon recorder to remain deployed in the field
- Ideal for UAVs, military vehicles, aircraft pods and outdoor environments
- 12 to 28 VDC power supply
- Optional GPS receiver for precise time and position stamping
- **SystemFlow®** GUI, SystemFlow® API, and Signal Viewer analysis tools
- Optional **telnet remote connection** to recorder



## General Information

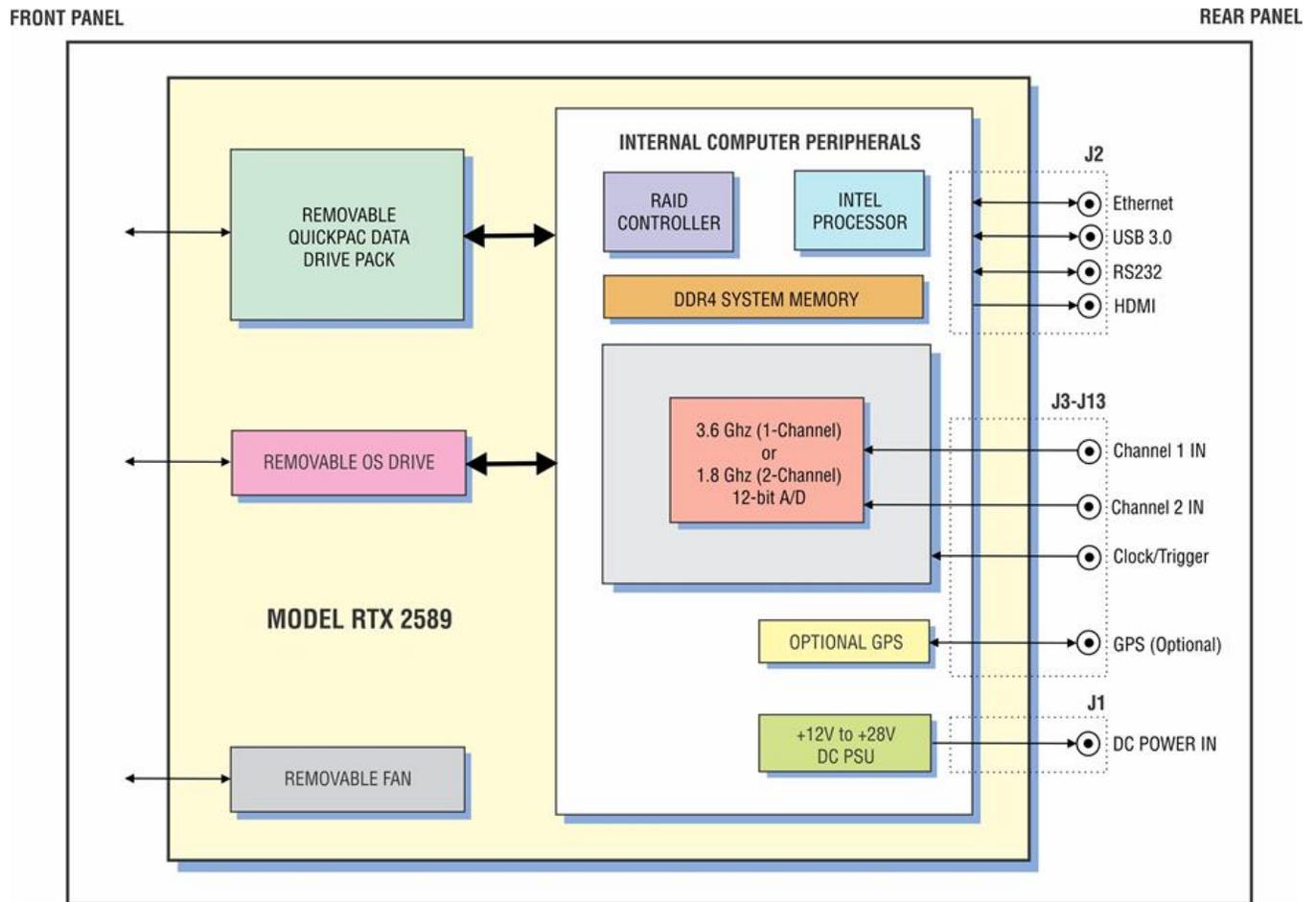
Pentek's Talon® RTX Small Form Factor (SFF) recorders provide the performance of large rackmount recorders in the smallest footprint available in Pentek's Talon Recording System product line. Housed in an extremely rugged 1/2 ATR form factor, these recorders provide high-performance processing, high speed data storage, and large solid state storage capacity.

Optimized for SWaP (size, weight and power), Talon RTX SFF recorders are packaged in a 1/2 ATR chassis, measuring 7.688" H x 4.880" W x 14.125" D and weighing only 18 pounds (8 kg). These recorders are capable of sustained real-time recording speeds up to 4 GB/s and can hold up to 61 TB of SSD storage. Power consumption has been greatly reduced in this package. A standard system will draw approximately 125 W at full operation.

The Model RTX 2589 uses a Texas Instruments ADC12D1800 12-bit, 3.6 GHz A/D converter to provide ultra-wide bandwidth recording of RF/IF signals. The A/D can be configured as a single channel 3.6 GHz A/D or two 1.8 GHz A/Ds. Selectable sample rates and data packing modes allow the user to capture large swaths of the RF spectrum in real-time at sustained record rates as high as 4 GB/s.

The ADC12D1800 has a full power input bandwidth of 1.75 GHz in single-channel mode and 2.8 GHz in dual-channel mode. It is complemented with a digital downconverter that provides selectable decimations up to 512 to improve SNR while zooming in on signals throughout the RF spectrum.

## 2589 Block Diagram



### Extremely Rugged Design

Designed to operate in the toughest environments, the recorder chassis keeps all electronics sealed from the outside environment and removes heat by conducting to forced-air cooling channels. Designed to operate from  $-40^{\circ}$  to  $+55^{\circ}$  C, these recorders can operate in most thermal environments, making them ideal for UAVs, aircraft pods, tight equipment bays, military vehicles and most outdoor environments.

The sealed  $\frac{1}{2}$  ATR chassis uses MIL-STD circular connectors for I/O to control RF emissions while protecting the recorder's electronics from humidity, water, dust, sand and salt fog. In addition to meeting MIL-STD 461 specifications for radiated RF emissions, conducted emission military specifications are met by design with a built-in conducted emissions filter.

Designed to handle high levels of shock and vibration, this extremely rugged chassis supports Pentek's extensive line of I/O front-ends, providing multichannel, wide bandwidth RF recording and a variety of digital interface recording options. An optional GPS receiver provides precise time stamping of recordings and can track and record the GPS position of the system during operation.

## QuickPac Drive Packs

The Pentek QuickPac drive packs add a valuable convenience to the RTX SFF 1/2 ATR recorder by providing the ability to quickly remove all data storage from the recorder via the front panel. With up to 61 TB of solid-state data storage capacity, QuickPac drive packs can be easily removed from the recorder by loosening a set of captive thumb screws. A separate operating system drive can be removed as well, allowing users to extract all non-volatile memory from the system in just a few seconds.

QuickPac drive packs include a high insertion cycle connector to provide an extremely durable data storage drive for Talon recorders. Spare QuickPac drive packs can replace full ones in seconds to minimize mission downtime. QuickPac drive packs filled with mission data can be taken to the lab where data can be retrieved, post-processed and archived with a Talon offload system.



## Sealed Chassis with Cooling Design

The Talon RTX SFF chassis seals the internal electronics from the outside environment by providing an inner plenum that is designed to extract heat from the internal electronics via conduction. The plenum is supplemented by a removable fan that is used to pull air from the front of the chassis and exhaust it through the rear. Only the fan is exposed to the outside environment, assuring the electronics are protected in the sealed chassis. The removable fan pulls air from the front of the chassis across heat sinks that are welded to the inner plenum of the chassis.

The welded heat sinks are attached directly to all heat-generating electronics within the sealed chassis, providing a conduction-cooled path to the inner plenum. This assures optimal cooling while maintaining a sealed design. The inner plenum can be replaced to provide other cooling options, such as liquid or conduction cooling.

## Data Offload System

The Talon Model 2580 is a data offload system for Talon RTX SFF (Small Form Factor) 1/2 ATR recorders. This is an optional product that is ordered separately.

The Talon RTX SFF recorder's QuickPac drive pack can be quickly removed from the recorder's front panel by loosening six thumb screws and then inserted in the slot on the 2580 front panel. Data stored on the removable Talon QuickPac drive pack can be accessed and off-loaded for analysis, allowing the Talon recorder to remain deployed in the field.

A monitor, keyboard, and mouse can be attached to the 2580, and data can be analyzed or offloaded via removable SATA drives, DVD, Ethernet and USB ports. For more details, refer to the [2580 datasheet](#).



Talon Model 2580  
Offload System



Talon RTX  
SFF Recorder



## Rear Panel I/O

The Talon RTX SFF rear panel I/O provides circular connectors for power and computer I/O. Bulkhead mounted SMA connectors for RF signals, GPS, clocks and triggers are sealed with gaskets for moisture and RF emissions protection. Optical I/O is provided via an optional rear panel connection.

## SystemFlow Overview

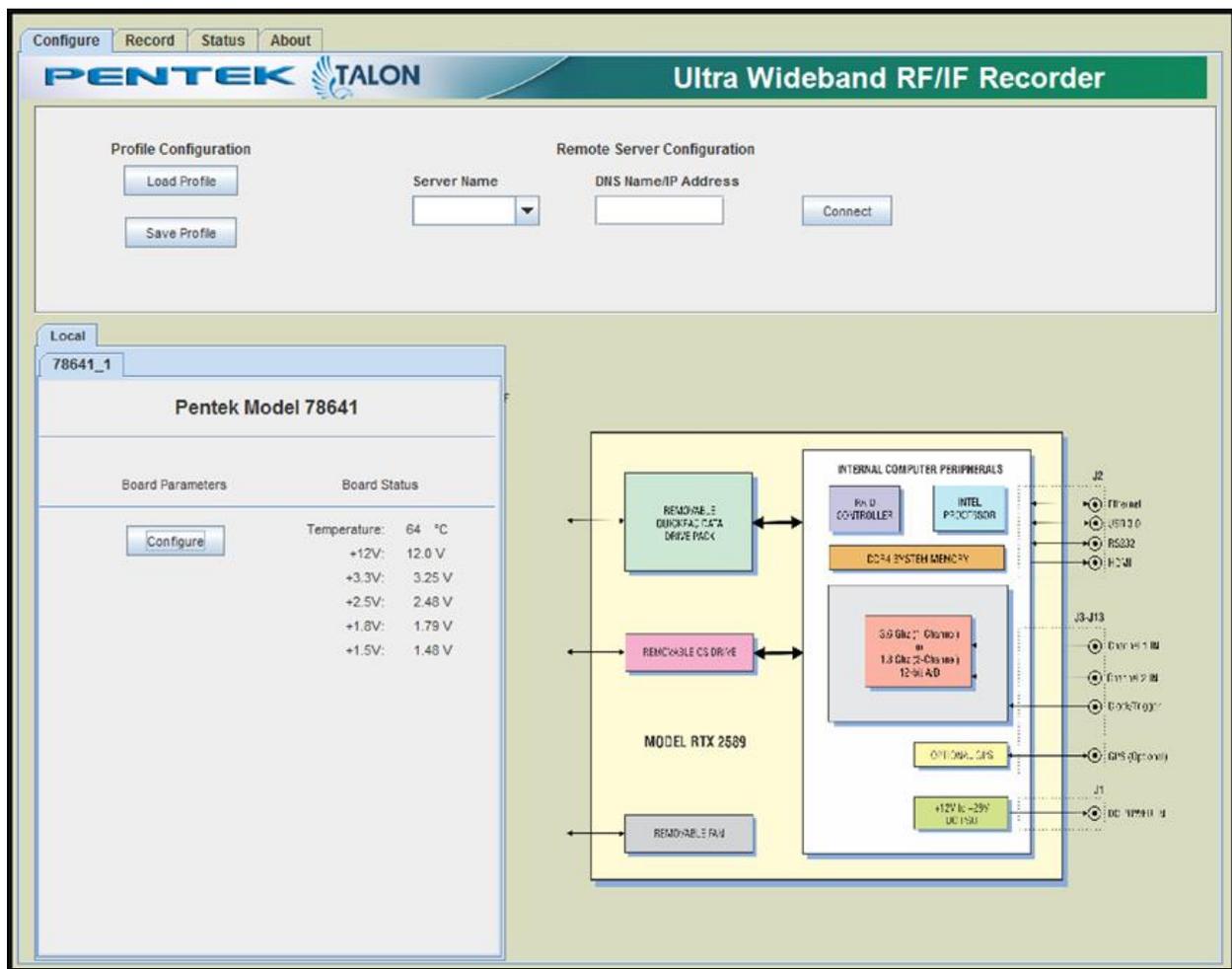
All Talon recorders include the Pentek SystemFlow<sup>®</sup> recording software. SystemFlow software provides three ways for users to configure and control a Talon recorder:

- 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 and all allow for easy access to recorded files.

## SystemFlow Main Interface

The RTX 2589 GUI shows a block diagram of the system and provides the user with a control interface for the recording system. It includes Configure, Record, Playback, and Status screens, each with intuitive controls and indicators. The user can easily move between screens to configure parameters, control and monitor a recording, and play back a recorded stream.



## 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 RTX 2589 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, standalone 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)

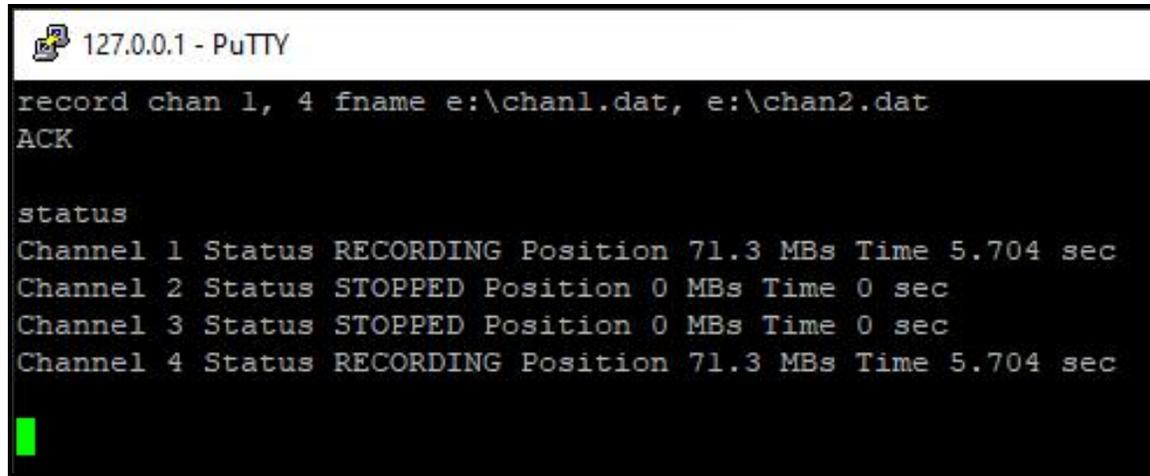
```

## 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:



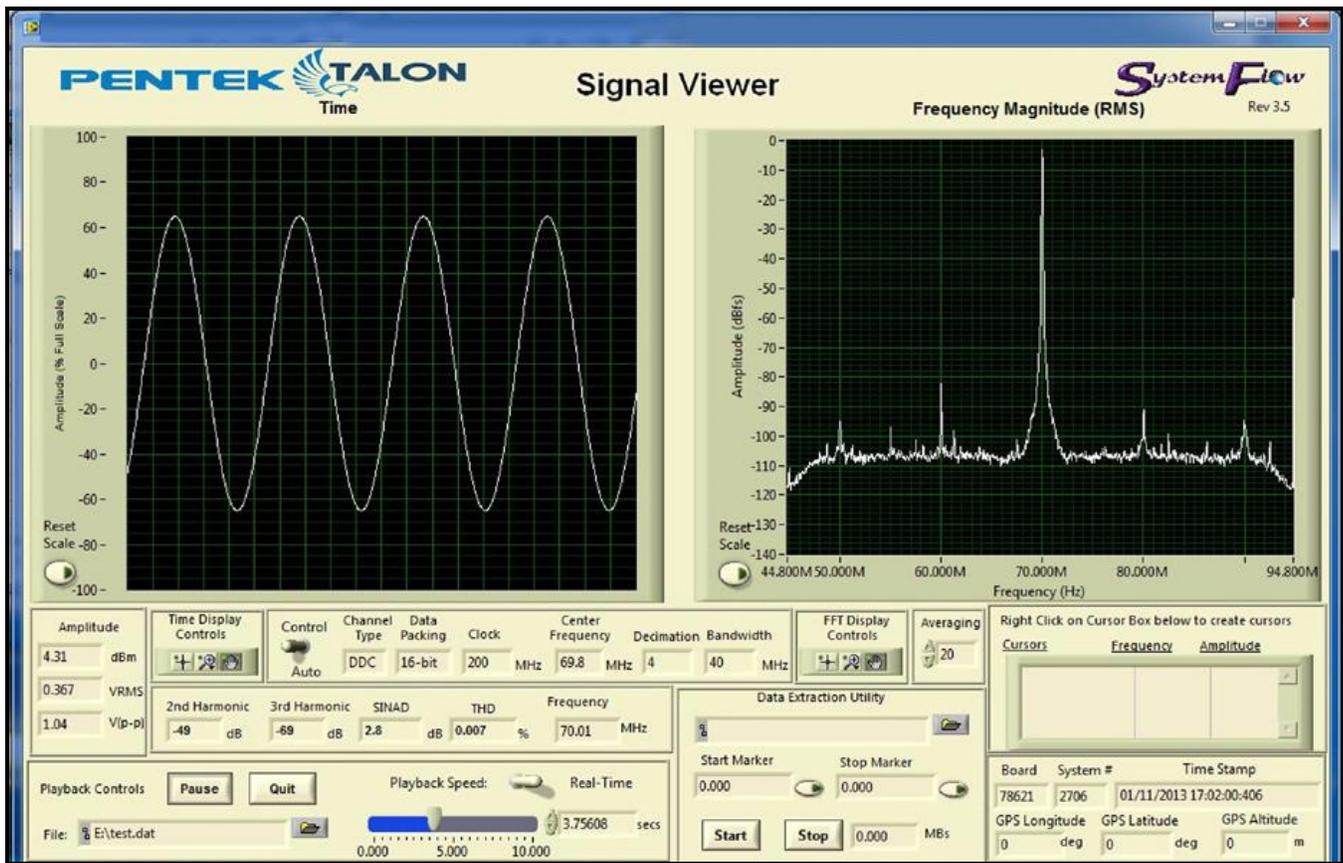
```
127.0.0.1 - PuTTY
record chan 1, 4 fname e:\chan1.dat, e:\chan2.dat
ACK

status
Channel 1 Status RECORDING Position 71.3 MBs Time 5.704 sec
Channel 2 Status STOPPED Position 0 MBs Time 0 sec
Channel 3 Status STOPPED Position 0 MBs Time 0 sec
Channel 4 Status RECORDING Position 71.3 MBs Time 5.704 sec
```

## 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

### Physical Characteristics

**Dimension:** 7.688" H x 4.880" W x 14.125" D (195 mm H x 124 mm W x 359 mm D)

**Weight:** 18 lb (8 kg)

**Storage:** One removable QuickPac with up to 30.72 TB total storage

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

One removable Operating System SSD (M.2 form factor - 250 GB standard)

### Front Panel I/O

One removable QuickPac (Thumbscrew removable)

One removable Operating System SSD (Thumbscrew removable)

One removable System Fan (Thumbscrew removable)

### Rear Panel I/O

**Chassis power connector:** Glenair 805-005-07M12-2PA

**Mating cable power connector:** Glenair 805-002-16M12-2SA

### Computer I/O

**Chassis Computer I/O Connector:** Glenair 805-003-07M19-85SA

**Signals, 1 each:** HDMI, USB 3.0, Ethernet (RJ 45), RS232 (optional)

**Mating cable computer I/O Connector:** Glenair 802-002-16M19-85PA

**RF:** 11x SMA (female SMA bulkhead-mounted with gaskets)

### Analog Signal Inputs

**Connectors:** Female bulkhead SMA connectors

**Input Type:** Single-ended, non-inverting

**Full Scale Input:** +4 dBm into 50 ohms

**Coupling:** Transformer-coupled

**Analog Input Transformers**

**Bandwidth:** 4.5 kHz to 3.0 GHz

### A/D Converters

**Type:** Texas Instruments ADC12D1800

**Sampling Rate:**

Single-channel mode: 500 MHz to 3.6 GHz

Dual-channel mode: 150 MHz to 1.8 GHz

Resolution: 12 bits

**Maximum Usable Input Frequency**

Single-channel mode: 1.75 GHz

Dual-channel mode: 2.8 GHz

**Anti-Aliasing Filters:** External, user-supplied

### Digital Downconverters

**Decimation:** 8, 16 to 512 in Single-Channel Mode, 4, 8 to 256 in Dual-Channel Mode

**IF Center Frequency Tuning:** DC to  $f_s$ , 32 bits

**LO SFDR:** >120 db

**DDC Usable Bandwidth:**  $0.8 * f_s / D$

### Sampling Clock Source

Internal fixed-frequency or programmable oscillator (selectable by option); in single-channel mode, the sample rate is 2x the clock frequency; in dual-channel mode, the sample rate equals the clock frequency

### Frequency Reference

Accepts external 10 MHz reference at 0 to +4 dBm to phase-lock the clock oscillator

### Processor and Memory

**Processor:** Intel Core i7, 7700K, 7th Generation, Quad Core, 4.2 GHz

**DRAM:** 8 GB DDR 4, optional 16 to 32 GB

### Cooling

Conduction-cooled to inner air channel

Removable fan inserted in air channel to pull air across sealed heat sinks

Optional direct conduction cooling and other methods available

### Power

+12 to +28 VDC (+24 VDC nominal) 125 Watts power consumption typical, 170 W maximum

### Environmental

**Operating Temp:** -40° to +55° C

**Storage Temp:** -65° to +85° C

**Altitude:** 60,000 feet

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

**Vibration:** MIL-STD-810 Method 514.5

**Shock:** MIL-STD-810 Method 516.5

**EMI/EMC:** MIL-STD-461 - CE101, CE102, CS101, RE101, RE102, RS101

**Sand and Dust:** MIL-STD-810 Method 510

Specifications are subject to change without notice.

## Pricing and Availability

To learn more about our products or to discuss your specific application please contact [your local representative](#) or Pentek directly:

Pentek, Inc.

One Park Way

Upper Saddle River, NJ 07458 USA

Tel: +1 (201) 818-5900

Email: [sales@pentek.com](mailto:sales@pentek.com)

## Ordering Information

Click [here](#) for more information.

Sample Clock Options	
Option -910	User-Programmable Sample Clock
Option -911	1.5/3.0 GHz sample clock
Option -912	1.6/3.2 GHz sample clock
Option -913	1.2/2.4 GHz sample clock
Option -914	1.36/2.72 GHz sample clock
Option -915	1.8/3.6 GHz sample clock
<b>Note:</b> Custom fixed-frequency sample clocks available upon request.	
Option -910 User-Programmable Sample Clock	
Dual-channel mode sample clock range:	150 MHz - 945 MHz 970 MHz - 1134 MHz 1213 MHz - 1417.5 MHz
Single-channel mode sample clock range:	500 MHz - 1890 MHz 1940 MHz - 2268 MHz 2426 MHz - 2835 MHz
Storage Options	
Option -410	3.84 TB SSD storage capacity
Option -415	7.68 TB SSD storage capacity
Option -420	15.36 TB SSD storage capacity
Option -430	30.72 TB SSD storage capacity
RAID Configurations	
Standard	RAID Level 0
Option -285	RAID Level 5
Option -286	RAID Level 6
<b>Note:</b> Record and playback interfaces not available together.	
Additional Options	
Option -261	GPS time and position stamping
Standard	8 GB DDR system memory
Option -309	16 GB DDR system memory
Option -310	32 GB system memory
Contact Pentek for compatible Option combinations. Storage and General Options may change, contact Pentek for latest information.	

## Accessory Products

Power Cable	
Part Number:	2186-102
Length:	3 feet
MIL-STD Connector:	Glenair 805-002-16M12-2SA
Leads:	Two 14-gauge wires, unterminated

Power Connector	
Part Number:	2186-103
MIL-STD Connector:	Glenair 805-002-16M12-2SA

Power Connector Backshell	
Part Number:	2186-104
Backshell:	Glenair 370MS038M1006-6

Computer I/O Breakout Cable	
Part Number:	2186-202
Length:	3 feet
MIL-STD Connector:	Glenair 802-002-16M19-85PA
Breakout connectors (1 each):	HDMI female, USB 3.0 female, RJ45 female, RS232 female (optional), LVDS female (optional), power button, reset button

Computer I/O Connector	
Part Number:	2186-203
MIL-STD Connector:	Glenair 802-002-16M19-85PA

Computer I/O Connector Backshell	
Part Number:	2186-204
Backshell:	Glenair 370MS038M1410-8

1/2 ATR Tray	
Part Number:	8380-258
Dimensions	15" L x 5.01" W x 1.223" H
Material:	.063 6061-T6 aluminum
Finish:	Chem Film per MIL-DTL-5541F, Type 1, Class 3

Spare QuickPac Drive Pack	
Part Number:	8336
Capacities:	Option -615: 7.6 TB
	Option -620: 15.3 TB
	Option -625: 30.7 TB

Model 2580	Data Offload System for Talon RTX SFF Recording Systems
Option -267	Dual 10 GigE Offload
Option -268	40 GigE Offload
Option -269	100 GigE Offload
Option -309	16 GB System Memory
Option -310	32 GB System Memory
Option -311	64 GB System Memory

## Lifetime Applications Support

Pentek offers the worldwide military embedded computing community shorter development time, reliable, rugged solutions for a variety of environments, reduced costs, and mature software development tools. We offer free lifetime support from our engineering staff, which customers can depend on through phone and email, as well as software updates. Take advantage of Pentek's 30 years of experience in delivering high-performance radar, communications, SIGINT, EW, and data acquisition MIL-Aero solutions worldwide.