

# Talon RTX 2586

200 MS/sec RF/IF  
small form factor 1/2 ATR recorder

Ideal for UAVs, military vehicles, aircraft pods, field environments

- Rugged 1/2 ATR MIL-spec chassis
- Compact and lightweight
- Sustained real-time record rates up to 4 GB/s
- RF/IF recording with phase coherent 200 MHz 16-bit A/Ds and DDCs



**Mercury's Talon® RTX Small Form Factor (SFF) recorders provide the performance of large rackmount recorders in the smallest footprint available in the Talon Recording System product line.**

Packaged 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.

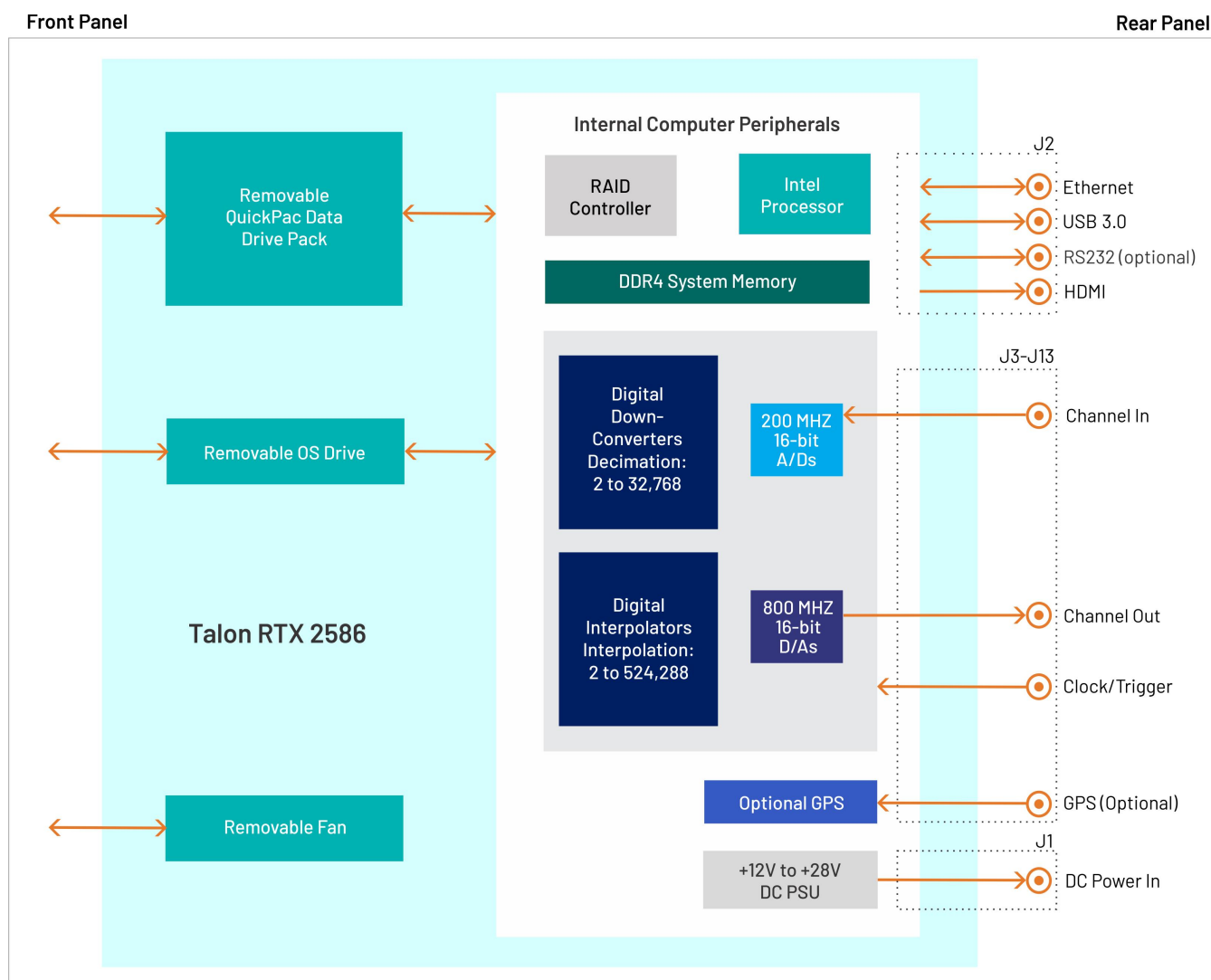
Optimized for SWaP (size, weight and power), Talon RTX SFF recorders are packaged in a 1/2 ATR footprint, measuring 7.688" H x 4.880" W x 14.125" D and weighing only 18 pounds (8 kg). These recorders are capable of sustained real-time recording speeds up to 4 GB/s and can hold up to 61.4 TB of SSD storage. A standard system will draw approximately 125 W at full operation.

The Talon RTX 2586 provides up to four phase-coherent channels of 200 MHz 16-bit A/Ds, allowing users the ability to capture up to 80 MHz of RF/IF signal bandwidth per channel with excellent dynamic range. It can sample RF/IF signals up to 700 MHz and provides digital downconverters with selectable decimation to 32k.

The RTX 2586 provides optional playback via 800 MHz 16-bit D/As with matching digital upconversion and interpolation.

## FEATURES

- 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: 18 lb (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 field environments
- RF/IF recording with phase coherent 200 MHz 16-bit A/Ds and DDCs
- Sustained real-time record rates up to 4 GB/s
- 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



## 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 field 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 Mercury'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 Mercury QuickPac drive packs add a valuable convenience to the RTX SFF  $\frac{1}{2}$  ATR recorder by providing the ability to quickly remove all data storage from the recorder via the front panel. With up to 61.4 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.

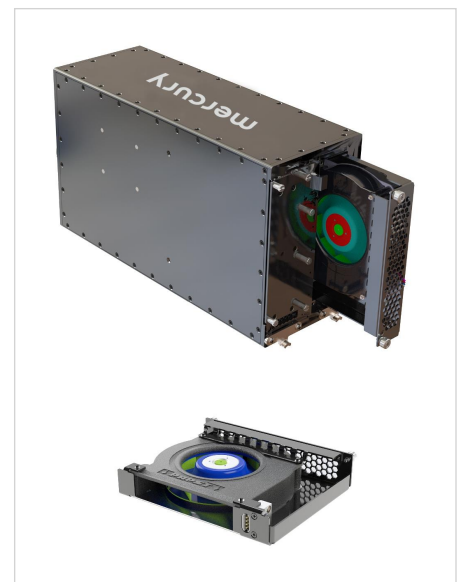
## SEALED CHASSIS WITH COOLING DESIGN

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.



Removable QuickPac data drive



Removable fan

## 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 offloaded 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 data offload system (top)

Talon SFF recorder with data drives partially removed (bottom)

## 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.



Example of Talon RTX recorder rear panel I/O

## SYSTEMFLOW OVERVIEW

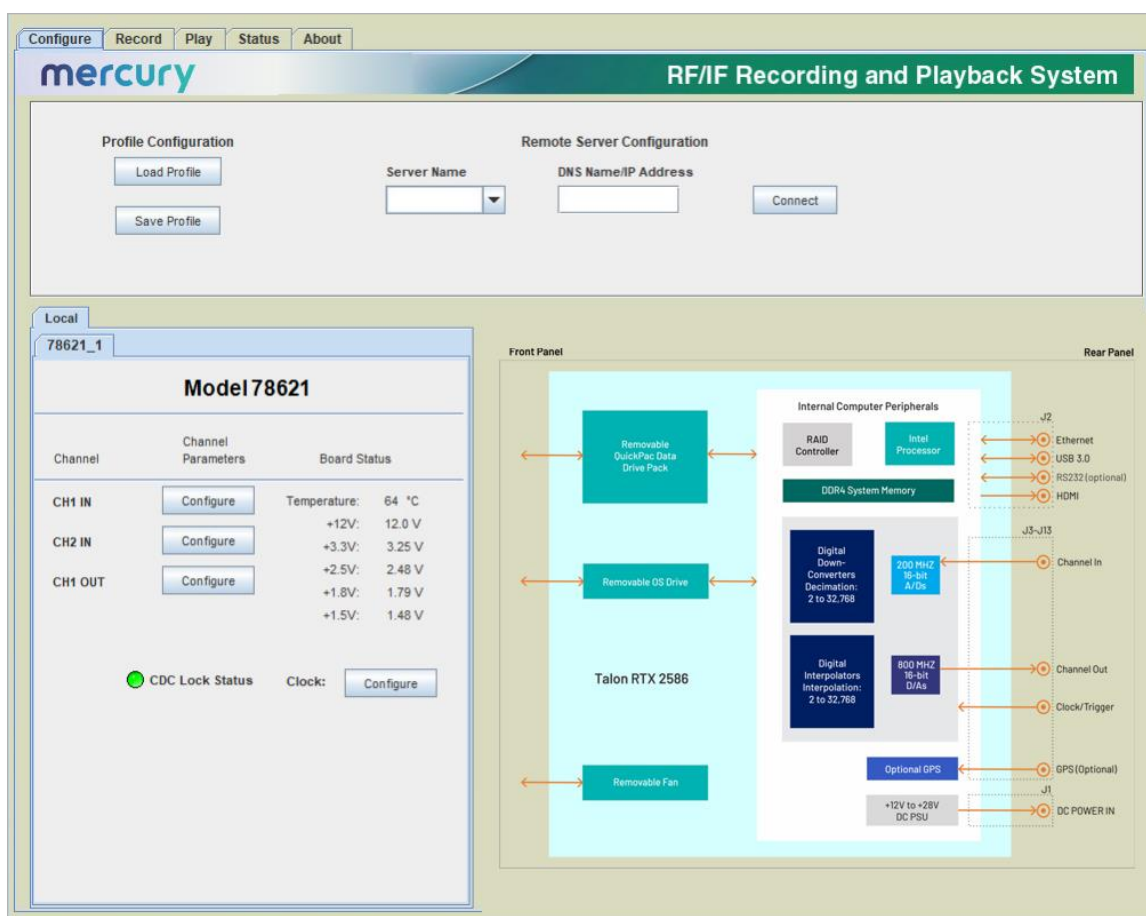
All Talon recorders include Mercury's SystemFlow<sup>®</sup> recording software. SystemFlow software provides three ways for users to configure and control a Talon recorder:

- 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. Additional high-level libraries, like Python, are available upon request.
- 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 GUI

The SystemFlow 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 2586 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. In addition to C, support is also provided for high level languages such as Python and C#. 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 Mercury'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. The 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:

```

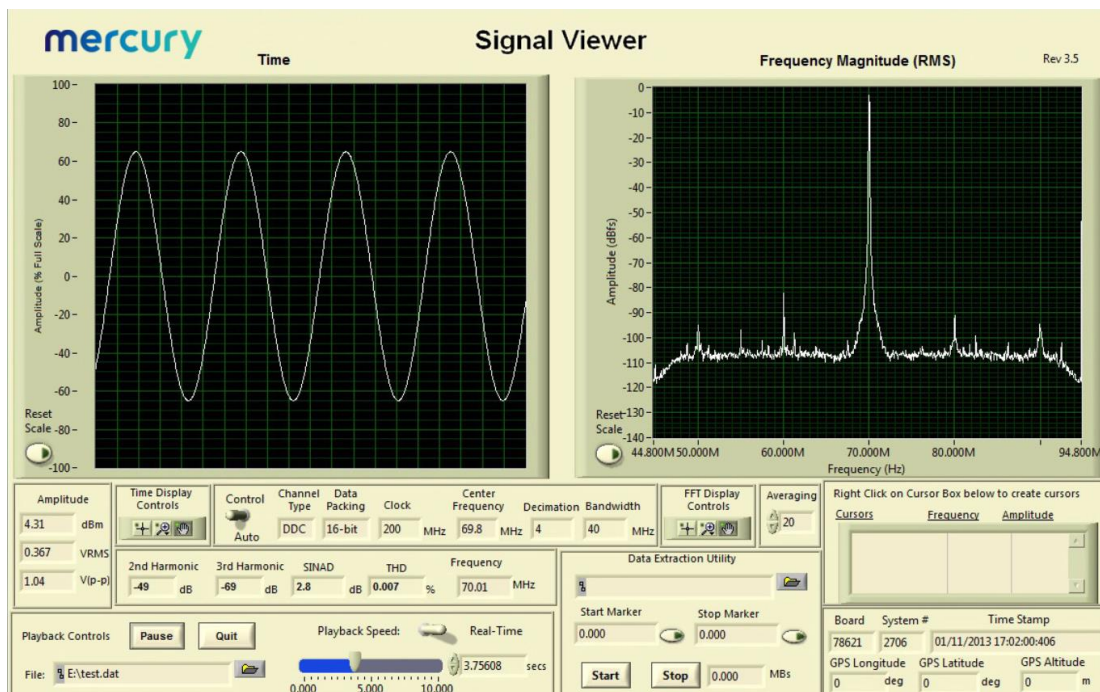
127.0.0.1 - PuTTY
record chan 1, 4 fname e:\chan1.dat, e:\chan2.dat
ACK

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 spectrogram, 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 drive pack with up to 61.4 TB total storage

SDRAM: (standard) 8 GB

- Option -309: 16 GB
- Option -310: 32 GB

### RAID

Total Storage: 3.8 TB – 61.4 TB

Drive Bays: Hot-swap, removable, front panel

Supported RAID Levels: (standard) 0

- Option -285: RAID 5
- Option -286: RAID 6

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

### Front Panel I/O

- One removable QuickPac drive pack (thumbscrew removable)
- One removable Operating System SSD
- 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)

### 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

### Analog Signal Inputs

Connectors: Female bulkhead SMA connectors

Input Type: Transformer Coupled (DC-coupled option available)

Transformer Type:  
Coil Craft WBC4-6TLB

Type: Texas Instruments ADS5485

Sampling Rate ( $f_s$ ): 10 MHz to 200 MHz

Resolution: 16 bits

SNR: 75 dBFS Typ. @ 70 MHz

SFDR: 87 dBc Typ. @ 70 MHz

Full Scale Input: +8 dBm into 50 ohms

3 dB Passband: 300 kHz to 700 MHz

Anti-Aliasing Filters: External, user-supplied

### Digital Downconverters

Decimation: 2 to 32,768

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

LO SFDR: >120 db

DDC Usable Bandwidth:  $0.8 \cdot f_s / D$

### Analog Signal Outputs

Connectors: Female bulkhead SMA connectors

Input Type: Transformer Coupled

Transformer Type:  
Coil Craft WBC4-6TLB

Full Scale Output: +4 dBm into 50 ohms

3 dB Passband: 300 kHz to 700 MHz

### D/A Converters

Type: Texas Instruments DAC5688

Input Data Rate to DAC5688: 250 MS/sec max.

Output Sampling Rate: 800 MHz max

Resolution: 16 bits

### Digital Upconverters

Interpolation: 2 to 524,288

Output IF: DC to 400 MHz

Bandwidth Range: Matches recording bandwidths

### Clock Sources

Source: selectable from onboard programmable VCXO, or external clock

External Clock Connector: Female bulkhead SMA connector

External Clock Signal Requirement:  
Sine wave 0 dBm to 10 dBm full scale

### External Trigger

External Trigger Connector: Female bulkhead SMA

External Trigger Signal Requirement:  
TTL

### 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

### Environmental

Operating Temp: -40° to +55° C (-20° C start-up)

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



## ORDERING INFORMATION

## 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	30.7 TB SSD storage capacity
Option -460	61.4 TB SSD storage capacity

## Memory Options

Standard	8 GB DDR system memory
Option -309	16 GB DDR system memory
Option -310	32 GB system memory

## RAID Configurations

Standard	RAID Level 0
Option -285	RAID Level 5
Option -286	RAID Level 6

## 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

**Note:** Record and playback interfaces not available together.

## Additional Options

Option -261	GPS time and position stamping
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Contact Mercury for compatible option combinations. Storage and general options may change, so contact Mercury for the 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

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