

Talon RTX 2589

3.6 GS/sec ultra wideband 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
- Sustained real-time record rates up to 4 GB/s
- Compact and lightweight
- Wideband RF/IF recording with 3.6 GHz 12-bit A/D and DDCs
- QuickPac® drive packs allow quick removal of all data storage



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. 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 61.4 TB of SSD storage. Power consumption has been greatly reduced in this package. A standard system will draw approximately 125 W at full operation.

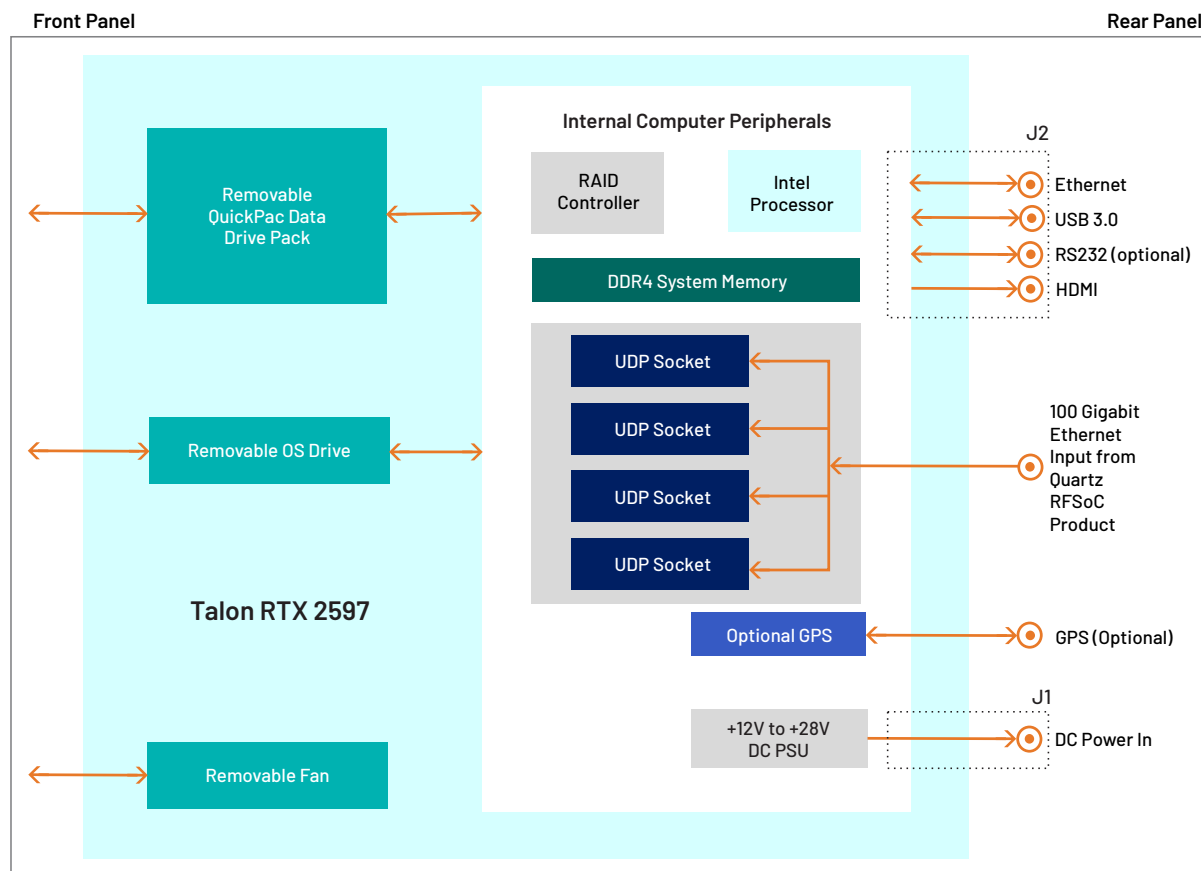
The Model RTX 2589 uses a Texas Instruments ADC12D1800 12-bit, 3.6 GHz A/D converter to provide ultra-wide bandwidth recording of RF/IF signals. The A/D can be configured as a single channel 3.6 GHz A/D or two 1.8 GHz A/Ds. Selectable sample rates and data packing modes allow the user to capture large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

Talon RTX 2589

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: 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
- 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° 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.

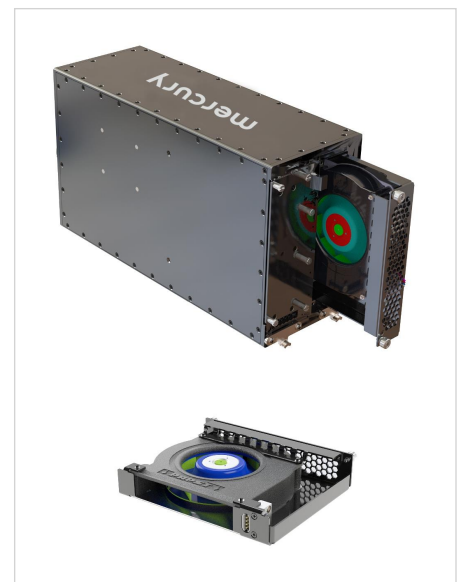
SEALED CHASSIS WITH COOLING DESIGN

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

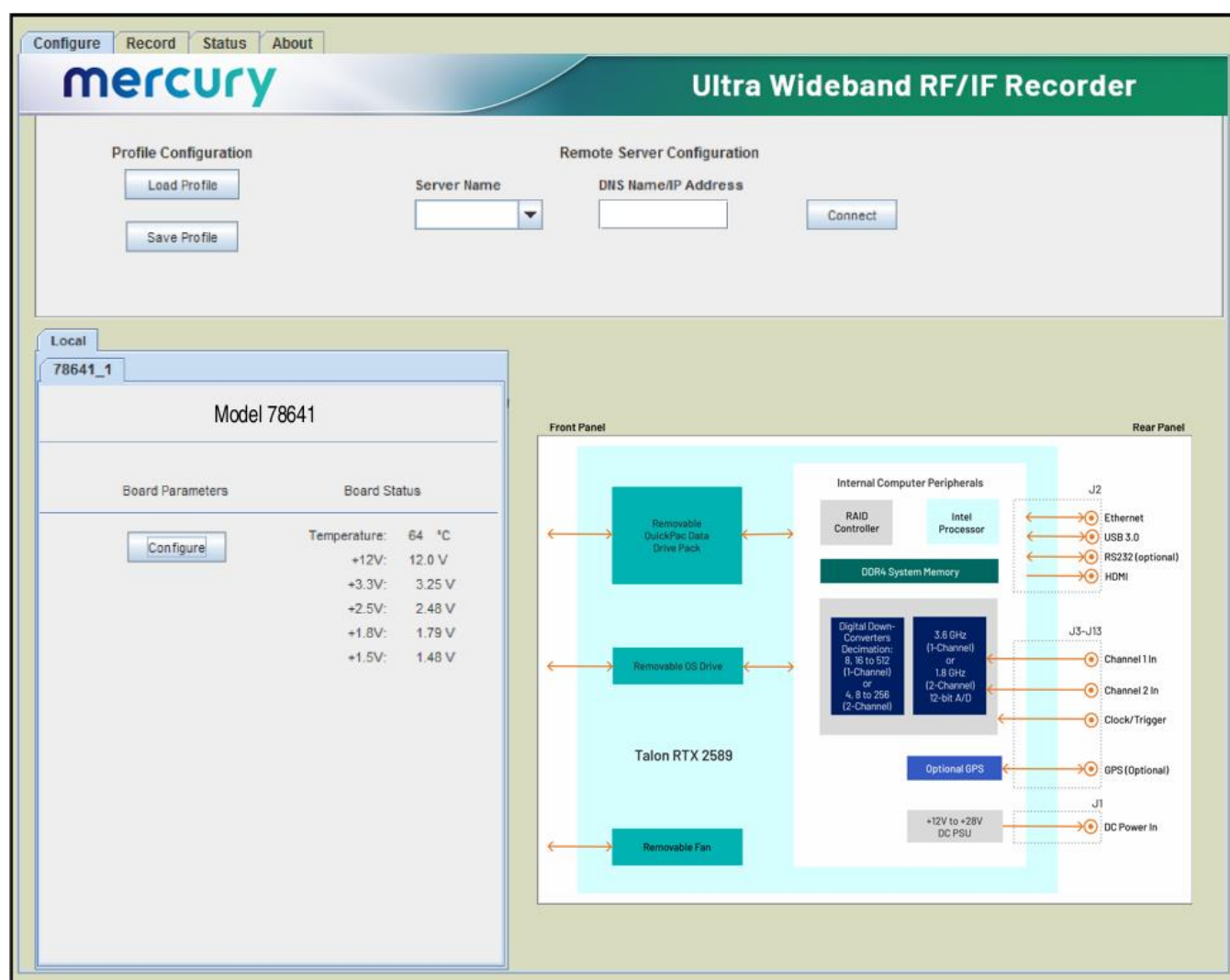
All Talon recorders include Mercury's SystemFlow[®] recording software. SystemFlow software provides three ways for users to configure and control a Talon recorder:

- 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 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. 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

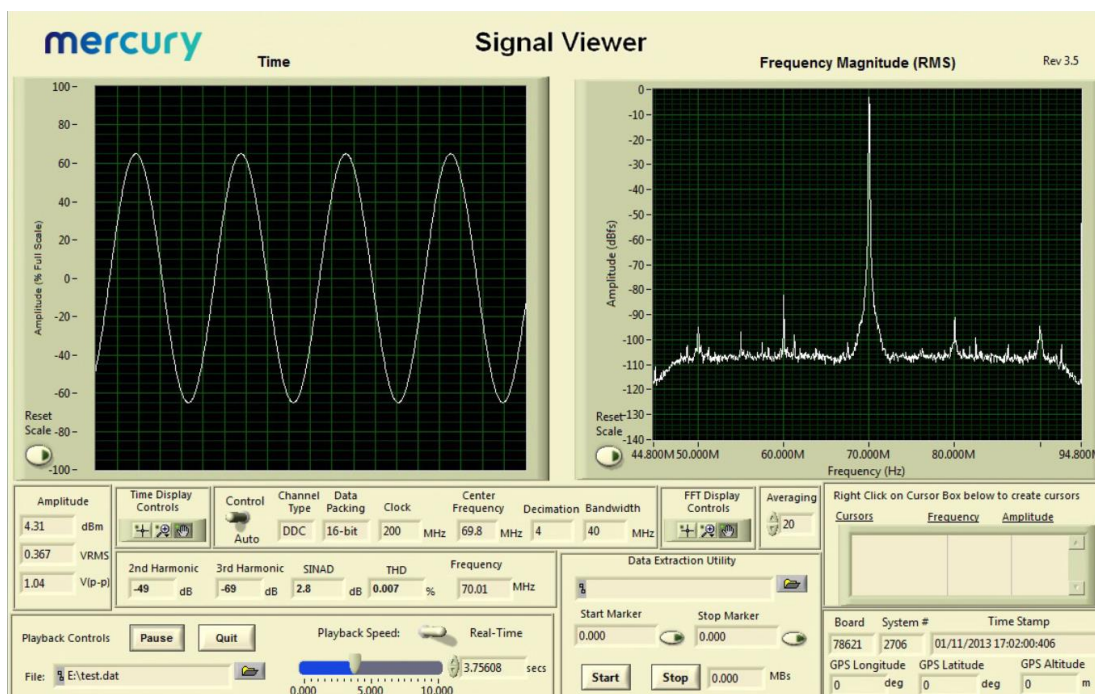
status
Channel 1 Status RECORDING Position 71.3 MBs Time 5.704 sec
Channel 2 Status STOPPED Position 0 MBs Time 0 sec
Channel 3 Status STOPPED Position 0 MBs Time 0 sec
Channel 4 Status RECORDING Position 71.3 MBs Time 5.704 sec

```

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: 22 lb (10 kg)

Storage: One removable QuickPac with up to 61 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
- One removable Operating System SSD
- One removable System Fan

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: $0.8 \cdot f_s/D$

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

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

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

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

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
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Model 2580 Data Offload System for Talon RTX SFF Recording Systems

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 SUPPORT FOR TALON PRODUCTS

Mercury offers worldwide customers 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 our 40 years of experience in delivering high-performance radar, communications, SIGINT, EW, and data acquisition MIL-Aero solutions worldwide.

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