Talon RTR 2742

Ultra wideband RF/IF rugged rackmount recorder

Recording system for ultra-wideband analog RF/IF signals

- Sample rates up to 6 GHz
- Record up to 2.4 GHz wide bandwidth signals
- Up to 244 TB of front-panel removable solid state storage
- SystemFlow GUI with Signal Viewer analysis tool

Talon RTR 2742 is a turn-key record and playback system for ultra-wideband analog RF/IF signals. Using two 12-bit, 6.4 GHz A/D converters, this system can achieve sustained recording of 2.4 GHz bandwidth signals at rates up to 6 GBytes per second. It can be configured as a one- or two-channel system and can record real samples or complex I+Q digitally down-converted samples.

Complemented by a 16-bit, 6.4 GHz D/A converter, the RTR 2742 is capable of playing back analog signal bandwidths up to 1.28 GHz. Built-in digital down- and up-converters provide flexible bandwidth and tuning frequency selection for both record and playback.

The RTR 2742 includes a 12-bit 6.4 GHz A/D that can be clocked at rates from 1.6 to 6 GHz in single-channel mode. Data can be truncated and packed as 8-bit samples, to support continuous recording up to the maximum sample rate. The D/A is capable of reproducing signals with up to 1.28 GHz of instantaneous bandwidth and includes a wide range of interpolations.

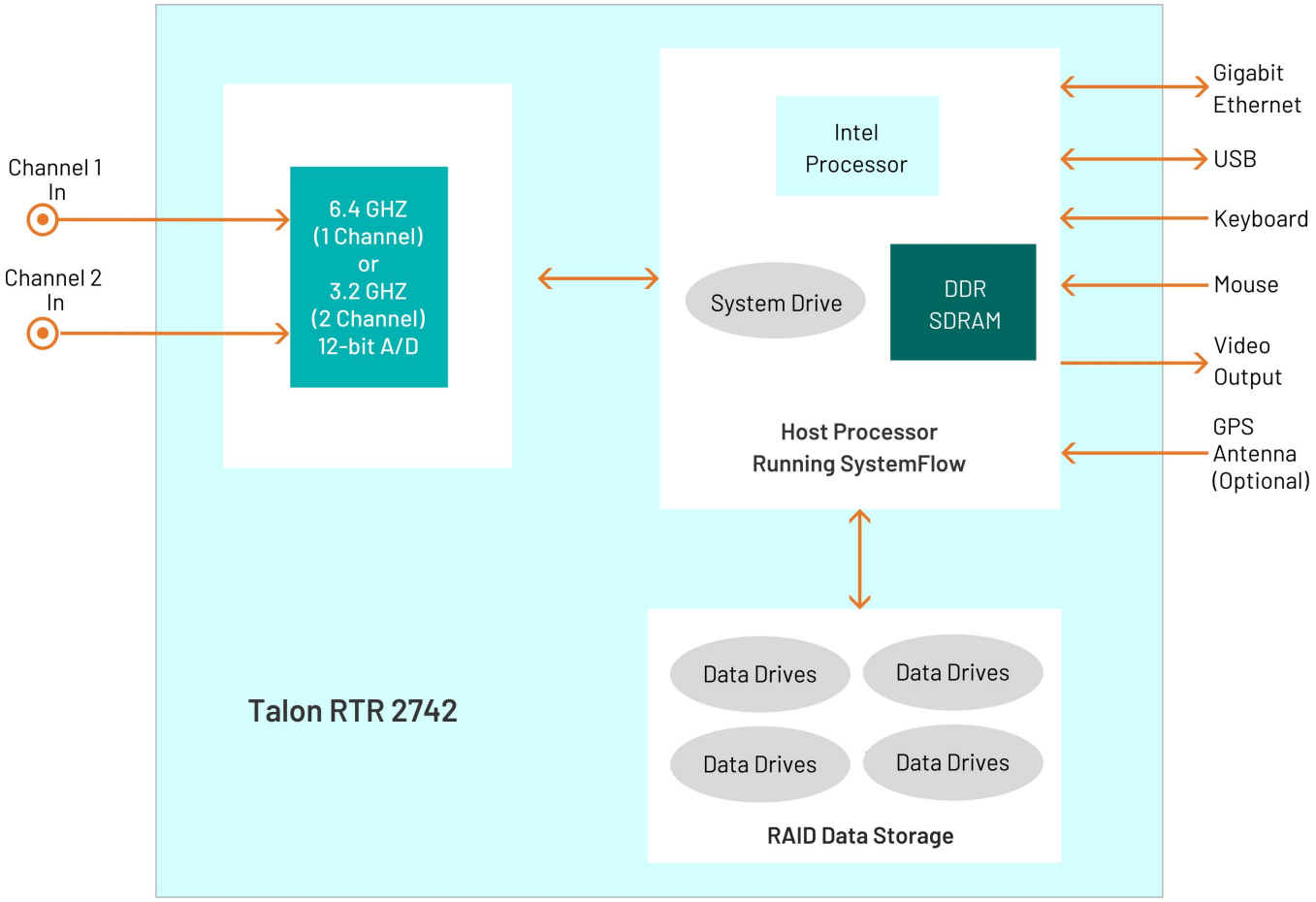
FEATURES

- Sample rates up to 6 GHz
- Real-time sustained recording rates up to 6 GB/sec
- Integrated DDCs and DUCs
- Record up to 2.4 GHz wide bandwidth signals
- Playback up to 1.28 GHz wide bandwidth signals
- Up to 244 TB of front-panel removable solid state storage
- 4U 19-inch industrial grade server chassis
- SystemFlow GUI with Signal Viewer analysis tool
- C-callable API for integration

RUGGED AND FLEXIBLE ARCHITECTURE

The RTR 2742 is configured in a 4U 19-inch rugged rackmount chassis, with hot-swappable data drives, front panel USB ports, and I/O connectors on the rear panel. Systems are scalable to accommodate multiple chassis to increase channel counts and aggregate data rates. All recorder chassis are connected via Ethernet and can be controlled from a single GUI either locally or from a remote PC.

Because SSDs operate reliably under conditions of vibration and shock, the RTR 2742 performs well in ground, shipborne, and airborne environments. The hot-swappable SSDs provide storage capacity of up to 244 TB. The drives can be easily removed or exchanged during or after a mission to retrieve recorded data. RAID levels 0, 5, and 6 provide a choice for the required level of redundancy.



OPERATIONAL MODES

The RTR 2742 uses JESD204B A/D and D/A converters that are limited to a set of operational modes. These modes are defined below:

RECORD MODES

Single-Channel Mode	Dual-Channel Mode
8-bit packed real, f_S = 1600 - 6000 MHz	8-bit packed real, f_S = 800 - 3000 MHz
16-bit packed real, f_S = 1600 - 3000 MHz	16-bit packed real, f_S = 800 - 1500 MHz
	16-bit packed complex DDC, f_S = 800 - 3000 MHz (dec = 4)
	16-bit packed complex DDC, f_S = 1300 - 3200 MHz (dec = 8 or 16)

PLAYBACK MODES

Single-Channel Mode	Dual-Channel Mode
8-bit packed real, f_S = 1600 - 3200 MHz	16-bit packed real, f_S = 400 - 1250 MHz
16-bit packed real, f_S = 400 - 1600 MHz	16-bit packed real, f_S = 800 - 2500 MHz (int = 2)
16-bit packed real, f_S = 800 - 3200 MHz (int = 2)	16-bit packed real, f_S = 1600 - 3200 MHz (int = 4)
16-bit packed real, f_S = 1600 - 3200 MHz & 5240 - 6400 MHz (int = 4)	16-bit packed complex DUC, f_S = 1200 - 3200 MHz (int = 6)
16-bit packed complex DUC, f_S = 800 - 1600 MHz (int = 2)	16-bit packed complex DUC, f_S = 1600 - 3200 MHz (int = 8)
16-bit packed complex DUC, f_S = 1600 - 3200 MHz (int = 4)	16-bit packed complex DUC, f_S = 2000 - 3200 MHz & 5240 - 5750 MHz (int = 10)
16-bit packed complex DUC, f_S = 1200 - 3200 MHz (int = 6)	16-bit packed complex DUC, f_S = 2400 - 3200 MHz & 5240 - 6400 MHz (int = 12)
16-bit packed complex DUC, f_S = 1600 - 3200 MHz & 5240 - 6400 MHz (int = 8)	16-bit packed complex DUC, f_S = 3200 MHz & 5240 - 6400 MHz (int = 16)
16-bit packed complex DUC, f_S = 2000 - 3200 MHz & 5240 - 6400 MHz (int = 10)	16-bit packed complex DUC, f_S = 5240 - 6400 MHz (int = 18)
16-bit packed complex DUC, f_S = 2400 - 3200 MHz & 5240 - 6400 MHz (int = 12)	16-bit packed complex DUC, f_S = 5240 - 6400 MHz (int = 24)
16-bit packed complex DUC, f_S = 3200 MHz & 5240 - 6400 MHz (int = 16)	
16-bit packed complex DUC, f_S = 5240 - 6400 MHz (int = 18)	
16-bit packed complex DUC, f_S = 5240 - 6400 MHz (int = 24)	

SYSTEMFLOW SOFTWARE

All Talon recorders include the Mercury SystemFlow® recording software. SystemFlow software enables users to configure and control a Talon recorder:

- The SystemFlow GUI provides a point-and-click user interface. 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 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 GUI and API can be run from a remote connection over Gigabit Ethernet. Recorders can be set up to run autonomously by implementing scripts using the API interface.

Talon systems record all data to the native NTFS file system, allowing for quick and easy access to the data from any computer. A simple header that holds the recording parameters is added to the beginning of each file. An optional GPS receiver allows the user to precisely timestamp files and optionally track the recorder's position throughout a mission.

SYSTEMFLOW SIMULATOR

To learn more about SystemFlow software, contact Mercury at techsales@mrcy.com. The SystemFlow Simulator allows you to learn how to use a Talon recorder's SystemFlow software interface before you acquire a recorder or while you are waiting for delivery of a recorder.

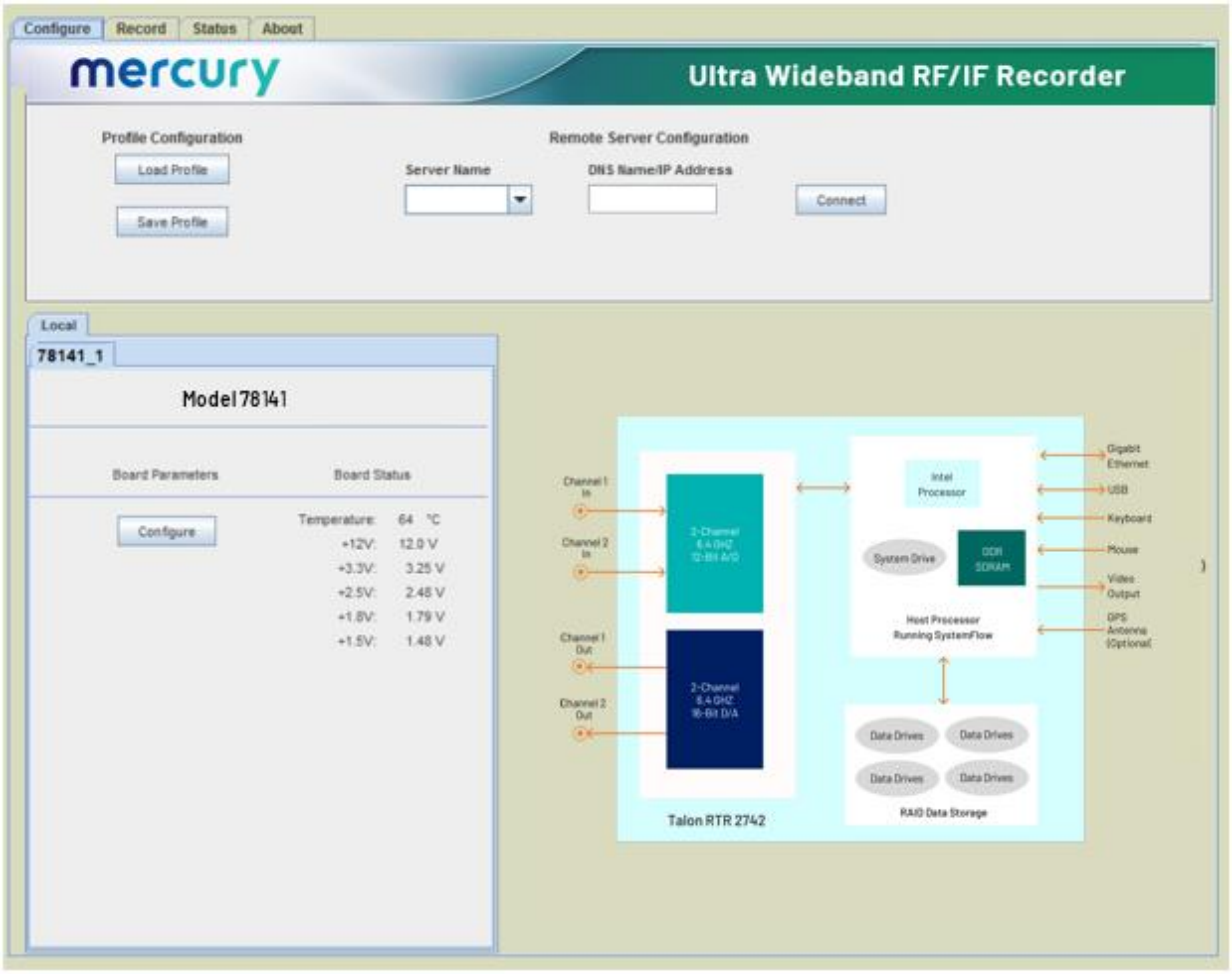
The Simulator can simulate the operating environment of all the different Talon recorder models. The Simulator also demonstrates the SystemFlow Signal Viewer by playing recorded signals to simulate the appearance of live signals being digitized and recorded by a Talon analog signal recorder.

Features

- Provides real-time recording system simulation
- Allows engineers to write and test their application (built using the SystemFlow API) before receiving the recorder hardware
- Demonstrates SystemFlow signal and file viewer tool
- 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

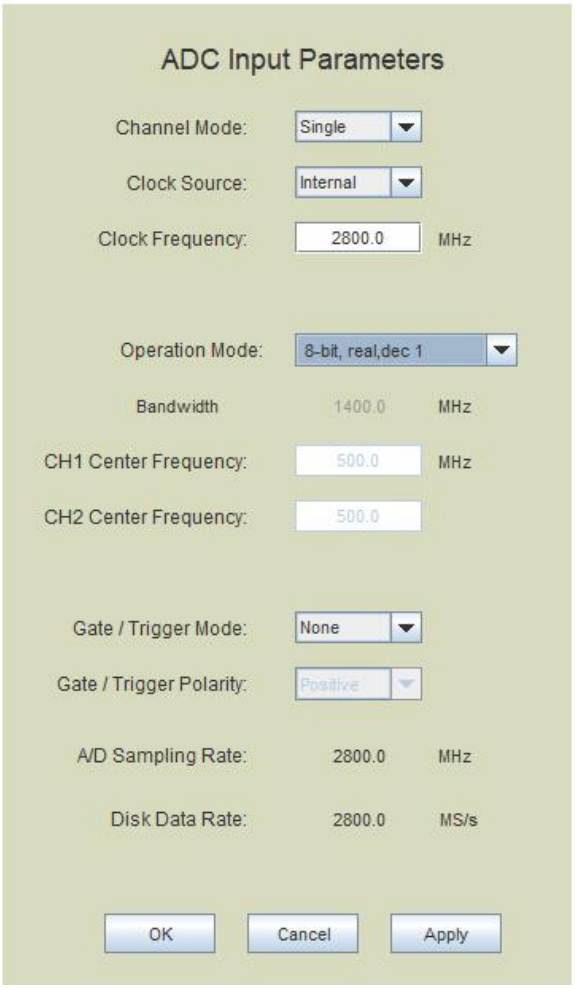
SYSTEMFLOW RECORDER INTERFACE

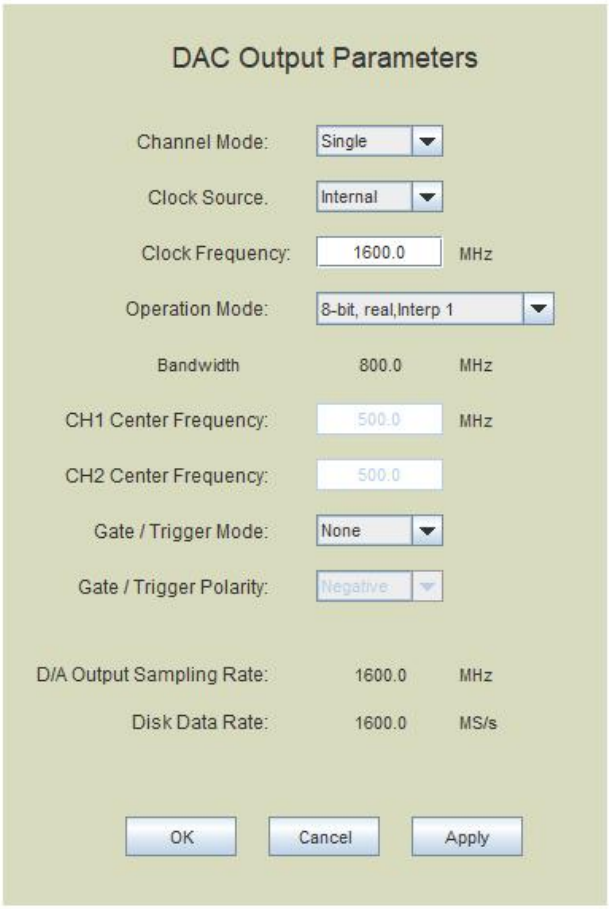
The RTR 2742 GUI provides the user with a control interface for the recording system. It includes Configuration, Record, Playback and Status screens, each with intuitive controls and indicators. The user can easily move between screens to set configuration parameters, control and monitor a recording, play back 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 signals recorded on disk.



SETTING SYSTEM PARAMETERS

The RTR 2742 configuration GUI provides a simple and intuitive means for setting up the system parameters such as channel mode, clock frequency, downconversion, and gate/trigger mode. All parameters contain limit-checking and integrated help.

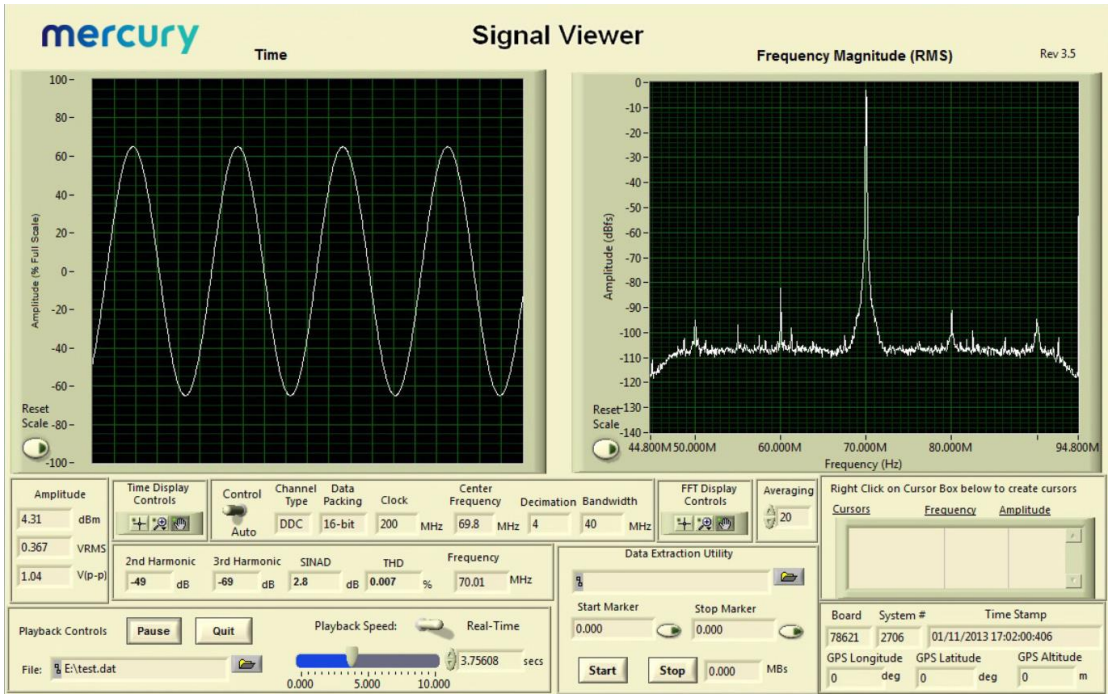




SIGNAL VIEWER

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.



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 RTR 2742 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)
```

SPECIFICATIONS

PC Workstation

Operating System: Windows®

Processor: Intel Core i7 processor (or better)

SDRAM: (standard) 8 GB

- Option -309: 16 GB
- Option -310: 32 GB
- Option -311: 64 GB

RAID

- Storage: 7.6, 15.3, 30.7, 61, 122.8, or 244 TB
- Supported RAID Levels: (standard) 0
  - Option -285: RAID 5
  - Option -286: RAID 6
- Drive Type: SATA III or NVME SSDs

Analog Signal Inputs

Input Type: Two rear panel SSMC connectors, IN 1 & IN 2

Full Scale Input: +1.0 dBm into 50 ohms

Maximum Power Input: 12 dBm

Input Impedance: 50 ohms

Coupling: Transformer-coupled

Transformer Type: Marki Microwave BALH-0006SMG

3dB Passband: 0.5 MHz to 6000 MHz

A/D Converters

Type: Texas Instruments ADC12DJ3200

Sampling Rate: Up to 6 GHz

Resolution: 12 bits

Anti-Aliasing Filters: External, user-supplied

Analog Signal Outputs

Output Type: Two rear panel SSMC connectors, OUT 1 & OUT 2

Full Scale Output: +7.5 dBm into 50 ohms

Output Impedance: 50 ohms

Coupling: Transformer-coupled

Transformer Type: Mini-Circuits TCM3-452X-1+

3dB Passband: 20 MHz to 4000 MHz

D/A Converters

Type: Texas Instruments DAC38RF82

Sampling Rate: Up to 6 GHz

Resolution: 14 bits

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 10 dBm to phase-lock the clock oscillator

Physical and Environmental

4U Long Chassis: 19" W x 21" D x 7" H

Weight: 50 lb, approx.

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, 500 W max.

ORDERING INFORMATION

RAID Configurations	
Standard	RAID 0 configuration
Option -285	RAID 5 configuration
Option -286	RAID 6 configuration

Memory Options	
Standard	8 GB system memory
Option -309	16 GB system memory
Option -310	32 GB system memory
Option -311	64 GB system memory

Storage Options	
Option -415	7.6 TB SSD storage capacity
Option -420	15.3 TB SSD storage capacity
Option -430	30.7 SSD storage capacity
Option -460	61.4 TB SSD storage capacity
Option -485	122.8 TB SSD
Option -490	243.3 TB SSD

Other Options	
Option -261	GPS time and position stamping
Option -264	IRIG-B time stamping
Option -267	Dual 10 GbE offload
Option -268	40 GbE offload
Option -625	Removable operating system drive
Option -680	28V DC power supply

Contact Mercury for compatible option combinations.

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