

Talon RTR 2745

3.0 GS/sec Ultra Wideband RF rugged rackmount recorder

Recording system for ultra-wideband analog RF/IF signals

- Real-time record/playback rates up to 6.4 GB/sec
- Capable of capturing RF signal frequencies up to 3 GHz
- Up to 243 TB of front-panel removable solid state storage
- SystemFlow GUI with Signal Viewer analysis tool



The Talon RTR 2745 is a turnkey, wideband recording and playback system that provides real-time capture of RF and IF signals. With two 3 GHz A/D converters and built-in DDCs, the system is ideal for capturing the IF outputs of RF downconverters with record-only bandwidths as high as 600 MHz. Selectable DDC tuning frequencies allow the RTR 2745 to accommodate a broad range of IF outputs.

Complemented by two 2.8 GHz D/As, record/play sample rates can be selected to provide a matching high-bandwidth record and playback system. In this mode, with up to 243 terabytes of solid-state storage available, users can record high-bandwidth signals at 560 MHz for many continuous hours in real-time.

The 3 GHz A/D converters can be clocked at sample rates from 1.5 GHz to 3.0 GHz and provide 14 bits of resolution for sample rates below 2 GHz. Sample rates of 2 GHz and above provide 12 bits of A/D resolution.

RUGGED AND FLEXIBLE ARCHITECTURE

Built-in digital downconverters provide a fixed decimation of 4, with selectable tuning frequencies to $f_s/2$. This provides excellent flexibility when trying to match the IF of a selected wideband RF downconverter. Matching digital upconverters provide a fixed interpolation of 4 to allow for precise signal reproduction of recorded signals.

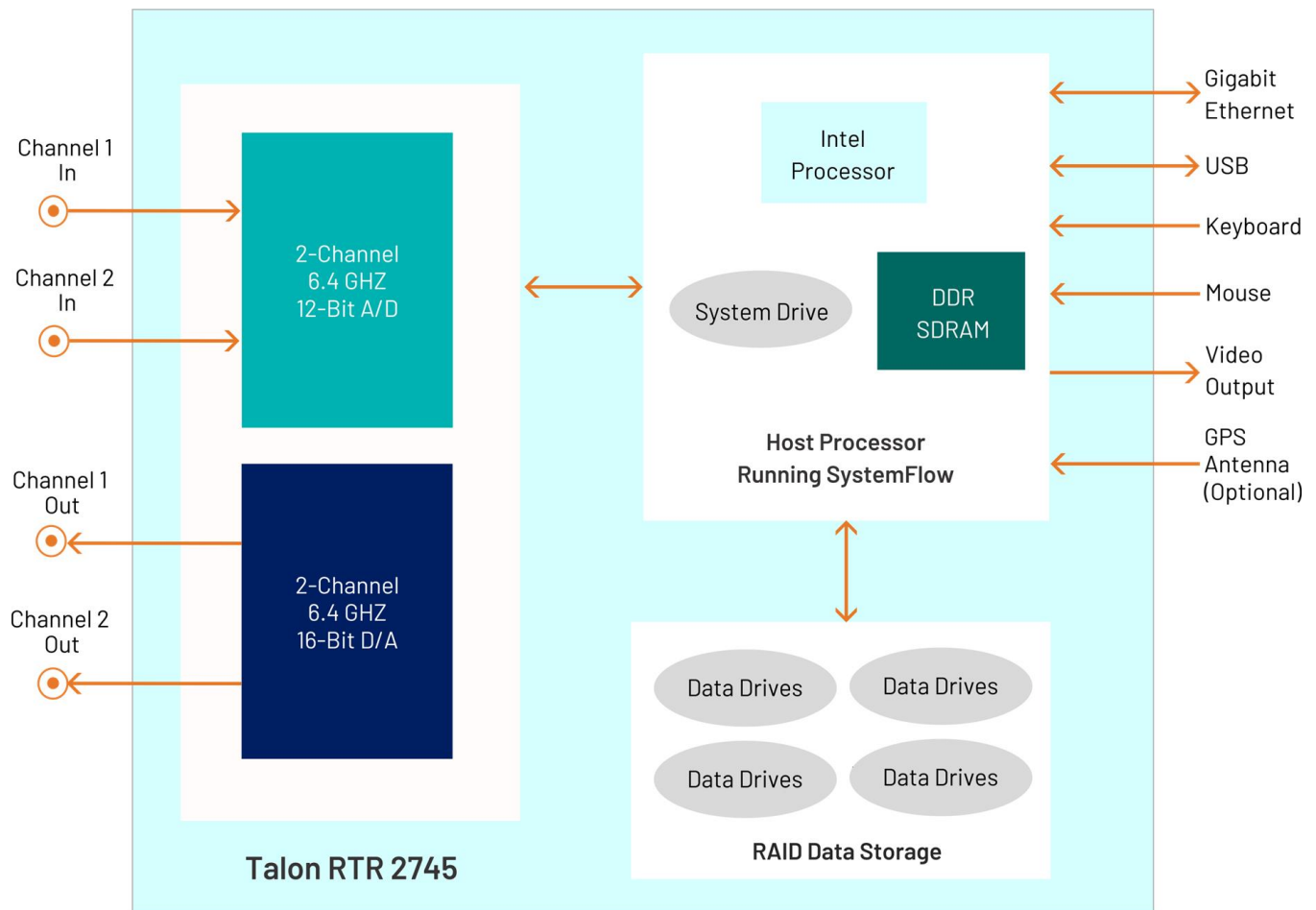
The 3 GHz A/Ds can operate without the digital downconverters to provide an extremely wide baseband capture. The system offers flexible sample rates ranging from 1.5 GHz to 3.0 GHz.

The RTR 2745 can stream data to disk at rates as high as 6.4 GB/sec, depending on storage option. An 8-bit packing mode is selectable when multichannel A/D sample rates exceed the real-time streaming rate to disk.

Talon RTR 2745

FEATURES

- Two 3.0 GHz 14 bit A/Ds
- Two 2.8 GHz 16-bit D/As
- Real-time record/playback rates up to 6.4 GB/sec
- Integrated DDCs and DUCs
- Capable of capturing RF signal frequencies up to 3 GHz
- Captures and reproduces IF bandwidths up to 560 MHz
- Captures baseband bandwidths up to 1.5 GHz
- 4U 19-inch rugged rackmount PC server chassis
- Windows® workstation with high-performance Intel® processor
- Removable SSD drives
- Up to 61 terabytes of storage in integrated NTFS RAID disk array
- Designed to operate under conditions of shock and vibration
- Selectable RAID levels of 0, 5, and 6
- SystemFlow® GUI with signal viewer analysis tool
- C-callable API for integration of recorder into application
- Optional GPS time and position stamping



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 GUI

The RTR 2745 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.

The screenshot displays the Mercury Ultra Wideband RF/IF Recorder GUI. At the top, there are navigation tabs for 'Configure', 'Record', 'Play', 'Status', and 'About'. Below the Mercury logo, the title 'Ultra Wideband RF/IF Recorder' is shown. The main interface is divided into several sections:

- Profile Configuration:** Includes 'Load Profile' and 'Save Profile' buttons.
- Remote Server Configuration:** Features input fields for 'Server Name' and 'DNS Name/IP Address', along with a 'Connect' button.
- Local:** A dropdown menu showing '78640_0'.
- Model 78740:** A detailed view of the device's status, including a table of channel parameters and board status.
- System Block Diagram:** A schematic showing the internal components of the Talon RTR 2745, including input/output channels, a host processor, system drive, DDR SDRAM, and RAID data storage.

Channel	Channel Parameters	Board Status
CH 1 IN	Configure	Temperature: 67 °C
CH 2 IN	Configure	+12V: 12.14 V
		+3.3V: 3.23 V
		+2.5V: 2.47 V
		+1.8V: 1.82 V
		+1.5V: 1.49 V
		Clock: Configure

SYSTEMFLOW HARDWARE CONFIGURATION INTERFACE

The RTR 2745 Configure screens provide a simple and intuitive means for setting up the system parameters. The configuration screen, shown below, allows user entries for input source,

sampling frequency, and gate and trigger information. All parameters contain limit-checking and integrated help.

The screenshot shows a configuration window titled "Channel 1 Input Parameters" with a light olive green background. It contains several settings:

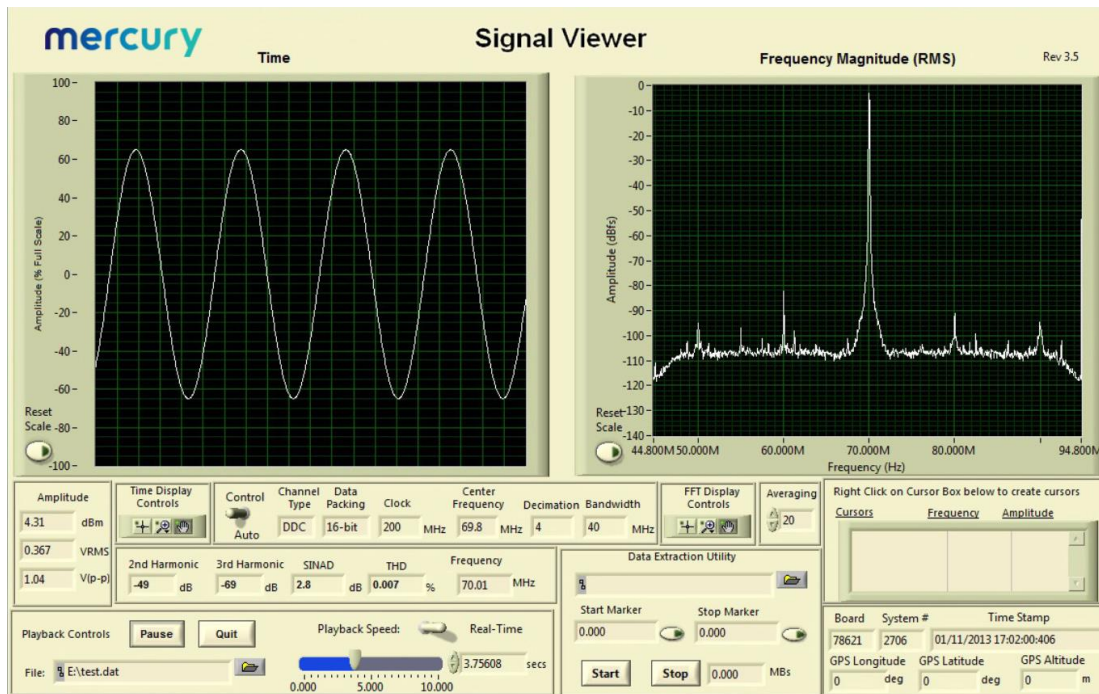
- Bandwidth:** A radio button is selected, with a text box containing "100.0" and a dropdown menu set to "MHz".
- Decimation:** A radio button is unselected, with a text box containing "1".
- Downconversion:** A checkbox is unselected.
- Input Source:** A dropdown menu is set to "ADC 1".
- Center Frequency:** A text box contains "0.0" followed by "MHz".
- Gate / Trigger Mode:** A dropdown menu is set to "None".
- Gate / Trigger Polarity:** A dropdown menu is set to "Negative".
- Sync Source:** A dropdown menu is set to "Internal".
- Pulsed Radar:** A section header.
- Trigger Length:** A text box contains "0" followed by "Samples".
- A/D Sampling Rate:** A text box contains "200.0" followed by "MHz".
- Disk Data Rate:** A text box contains "200.0" followed by "MS/s".

At the bottom of the window are three buttons: "OK", "Cancel", and "Apply".

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 2745 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: Up to 61.2 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: Transformer-coupled, rear panel female SSMC connectors

Transformer Type: Mini-Circuits TC1-1-13M

Full Scale Input: +6.6 dBm into 50 ohms

3 dB Passband: 4.5 MHz to 3 GHz

A/D Converters

Type: Texas Instruments ADC32RF45

Sampling Rate (f_s): 1.5 GHz to 3 GHz

Resolution: 14 bits below 2 GHz, 12 bits above 2 GHz

A/D Record Bandwidth: $f_s/2$ = Nyquist bandwidth

Anti-Aliasing Filters: External, user-supplied

Digital Downconverter

Type: Supplied in ADC32RF45

Decimation (D): 4

IF Center Frequency Tuning: DC to f_s , 32 bits

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

Analog Playback Outputs

Output Type: Transformer-coupled, rear panel female SSMC connectors

Transformer Type: Coil Craft WBC4-14L

Full Scale Output: +4 dBm into 50 ohms

3 dB Passband: 1.5 MHz to 1,200 MHz

Resolution: 16 bits

D/A Converters

Type: Texas Instruments DAC39J84

Sampling Rate: 1.5 GHz to 2.8 GHz

Resolution: 16 bits

Digital Upconverter

Type: Supplied in DAC39J84

Interpolation: 4

Sampling Clock

Clock Sources: Selectable from onboard frequency synthesizer or externally supplied clock

Synchronization: Onboard frequency synthesizer can be locked to a 10 MHz external reference clock.

External Clock: Rear panel female SSMC connector, sine wave, 0 to +10 dBm, AC-coupled, 50 ohms, 1.5 GHz to 3.0 GHz

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

Channel Configurations

Option -201	1-Channel record
Option -202	2-Channel record
Option -204	4-Channel record
Option -221	1-Channel playback
Option -222	2-Channel playback
Option -224	4-Channel playback

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
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Storage Options

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

General Options (append to all options)

Option -261	GPS time and position stamping
Option -264	IRIG-B time stamping
Option -268	40 GBE Interface

Contact Mercury for compatible option combinations. Storage and general options may change, so contact Mercury for the latest information.



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