Talon RTR 2746

200 MS/sec RF/IF rugged rackmount recorder

Built for lab and field environments

- Intended for military, airborne, and UAV applications requiring a rugged system
- Real-time aggregate recording rates of up to 3.2 GB/sec
- Up to 243 TB of front-panel removable solid state storage
- SystemFlow GUI with Signal Viewer analysis tool

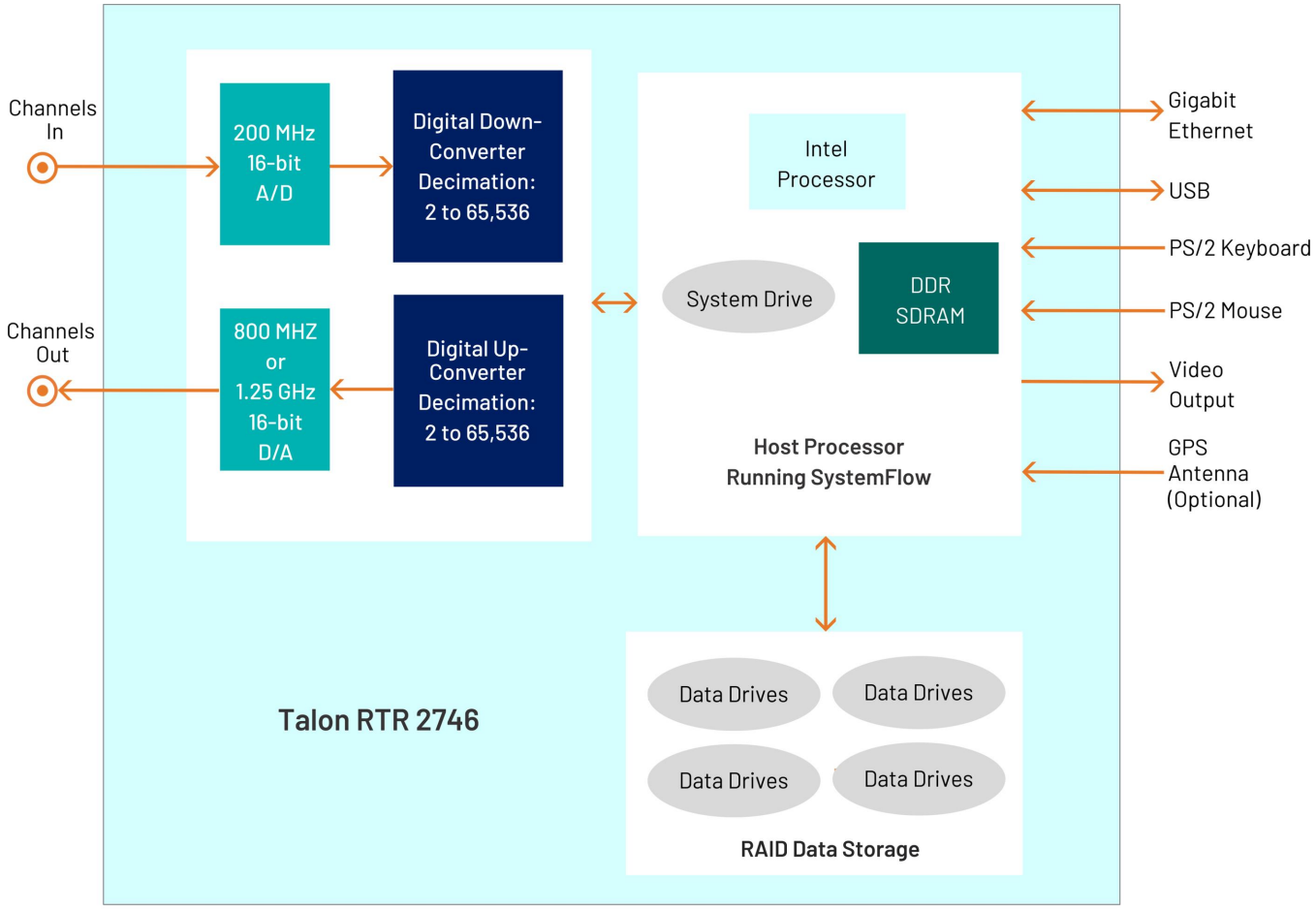
The Talon® RTR 2746 is a turnkey, multiband recording and playback system, which is built for lab and field environments. Designed to withstand high vibration and operating temperatures, the RTR 2746 is intended for military, airborne, and UAV applications requiring a rugged system. With scalable A/Ds, D/As, and SSD (Solid-State Drive) storage, the RTR 2746 can be configured to stream data to and from disk at rates as high as 3.2 GB/sec.

The RTR 2746 uses Mercury's high-powered Virtex-6-based Cobalt® boards, which provide flexibility in channel count with optional digital downconversion capabilities. Optional 16-bit, 1.25 GHz D/A converters with digital upconversion allow real-time reproduction of recorded signals.

A/D sampling rates, DDC decimations and bandwidths, D/A sampling rates, and DUC interpolations are among the GUI-selectable system parameters, providing a fully programmable system capable of recording and reproducing a wide range of signals. Optional GPS time and position stamping allows the user to record this critical signal information.

FEATURES

- Operates under conditions of shock and vibration
- 4U 19-inch rugged rackmount PC server chassis
- Windows® workstation with Intel® processor
- 200 MHz max. 16-bit A/D sampling for recording - up to eight channels
- 80 MHz recording/playback signal bandwidths
- Capable of record/playback of IF frequencies to 700 MHz
- Real-time aggregate recording rates of up to 3.2 GB/sec
- Removable SSD drives
- Up to 243 terabytes of storage to NTFS RAID disk array
- RAID levels of 0, 5, and 6
- SystemFlow® GUI with signal viewer analysis tool
- C-callable API for integration of recorder into application
- File headers include time stamping and recording parameters
- DDC decimation and DUC interpolation range from 2 to 65,536
- Optional GPS time and position stamping



RUGGED AND FLEXIBLE ARCHITECTURE

Because SSDs operate reliably under conditions of shock and vibration, the RTR 2746 performs well in ground, shipborne, and airborne environments. The hot-swappable SSDs provide storage capacity of up to 243 TB. The drives can be easily removed or exchanged during or after a mission to retrieve recorded data.

The RTR 2746 is configured in a 4U 19-inch rack-mountable chassis, with hot-swap data drives, front panel USB ports, and I/O connectors on the rear panel. All recorder chassis are connected via Ethernet and can be controlled from a single GUI either locally or from a remote PC.

Multiple RAID levels, including 0, 5, 6, provide a choice for the required level of redundancy. Systems are scalable to accommodate multiple chassis to increase channel counts and aggregate data rates.

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.

To learn more about SystemFlow software, contact Mercury at techsales@mrcy.com.

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.

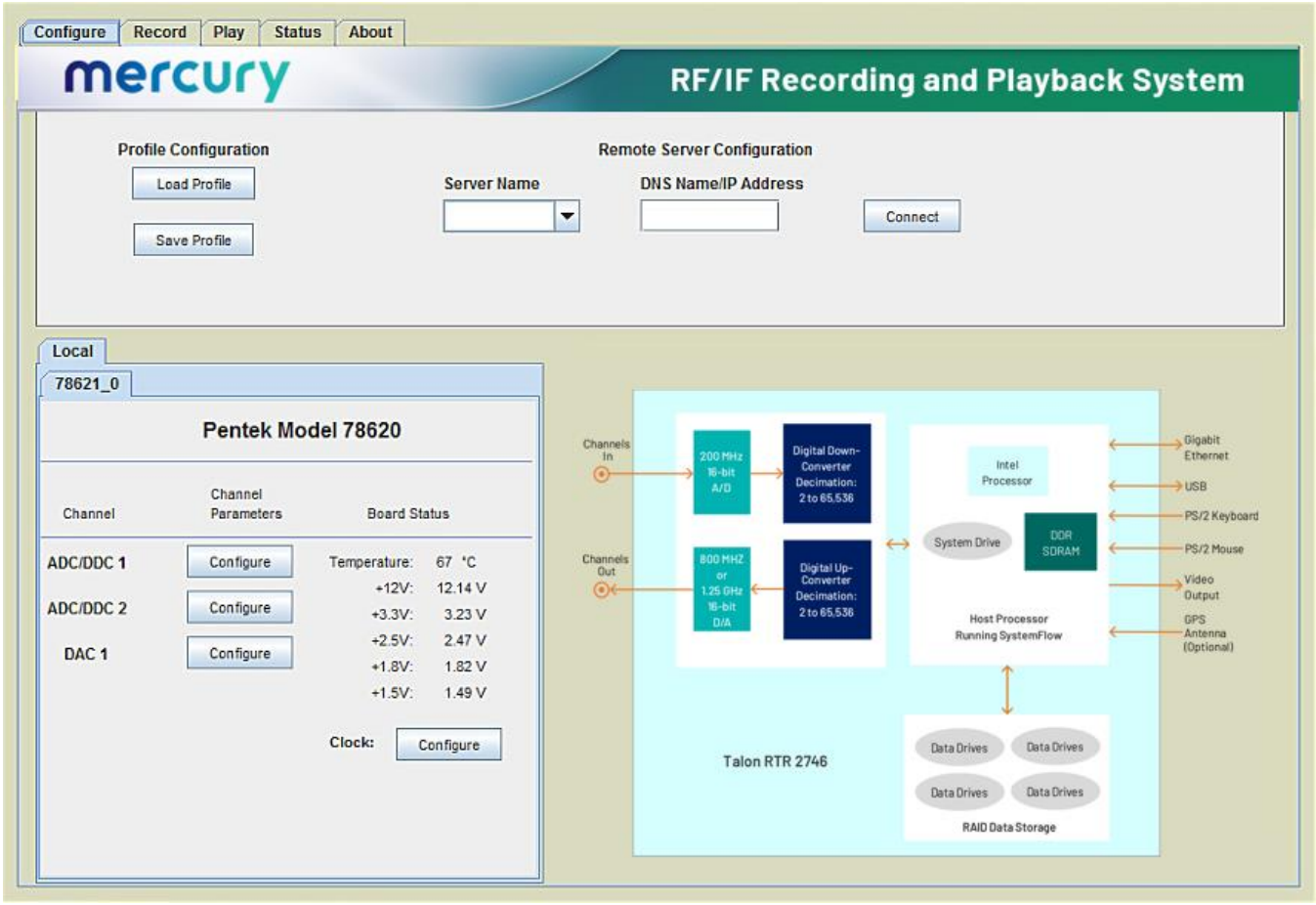
The Simulator can simulate the operating environment of all the different Talon recorder models. The Simulator also demonstrates the SystemFlow Signal Viewer by playing recorded signals to simulate the appearance of live signals being digitized and recorded by a Talon analog signal recorder.

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

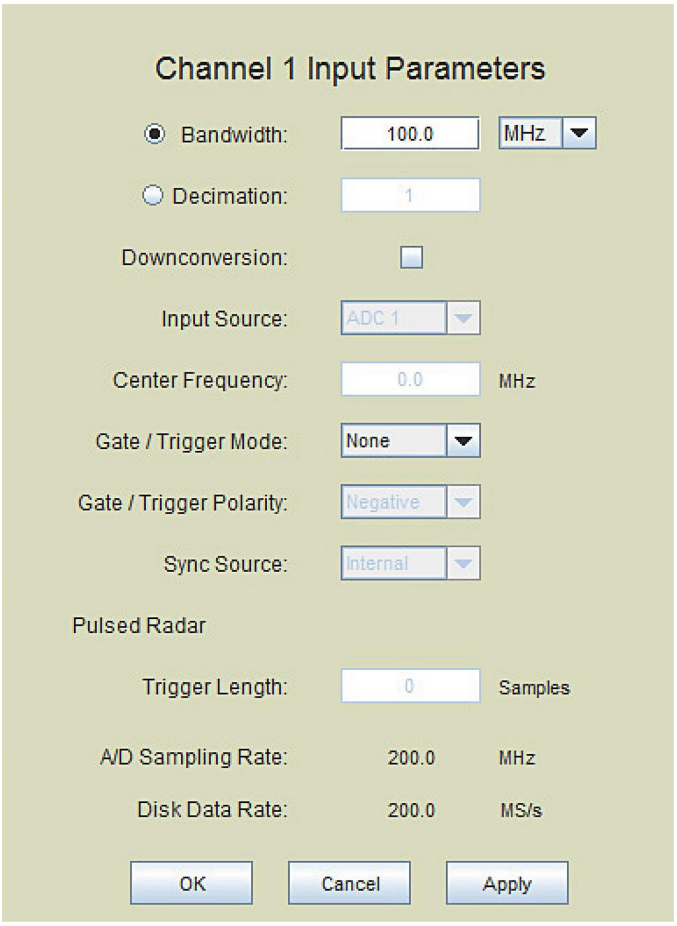
SYSTEMFLOW GUI

The RTR 2746 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.



SYSTEMFLOW HARDWARE CONFIGURATION INTERFACE

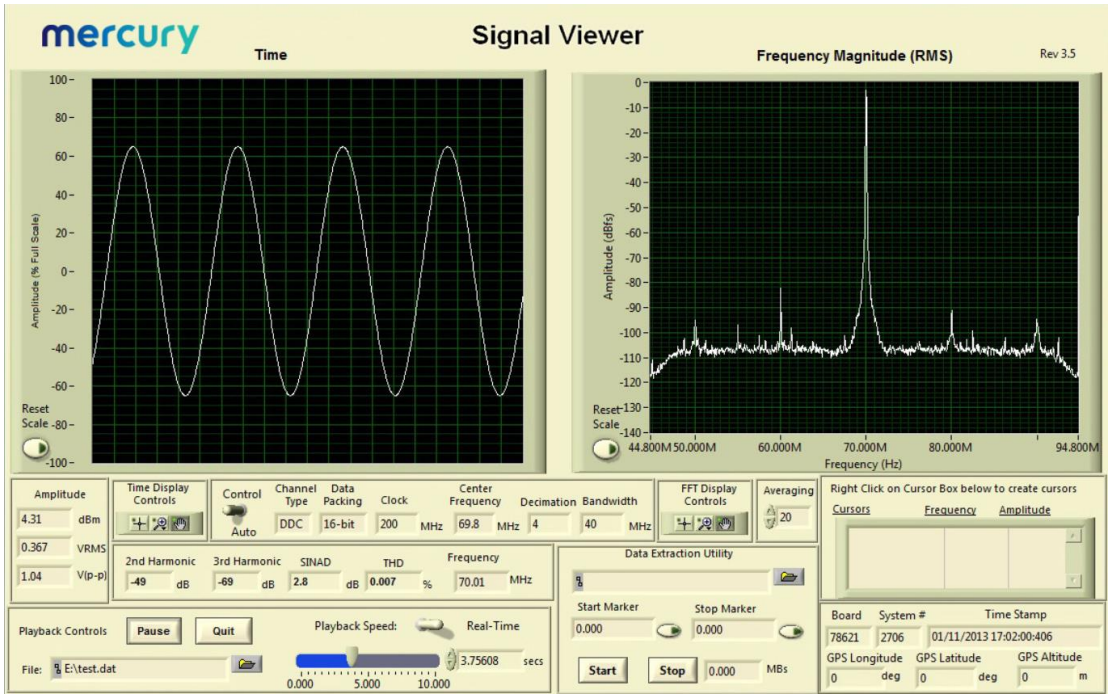
The RTR 2746 configuration screens provide a simple and intuitive means for setting up the system parameters. The ADC configuration screen, shown below, allows user entries for input source, center frequency, decimation, and gate and trigger information. All parameters contain limit-checking and integrated 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

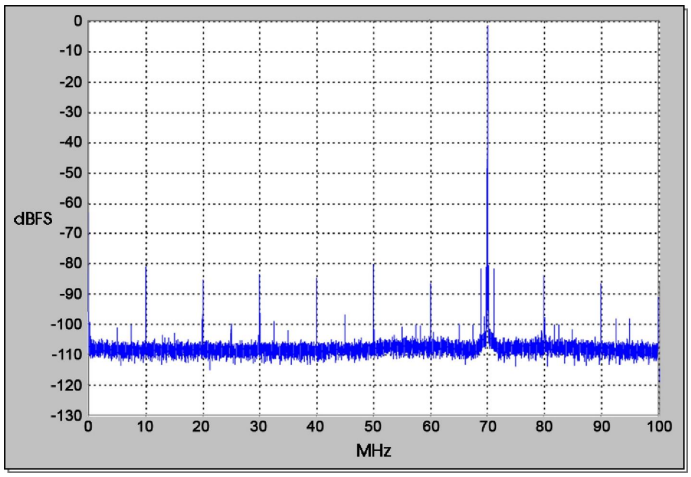
SystemFlow includes a complete API (Application Programming Interface) supporting control and status queries of all operations of the Talon recorder from a custom application.

High-level C-language function calls and the supporting device drivers allow users to incorporate the RTR 2746 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)
```

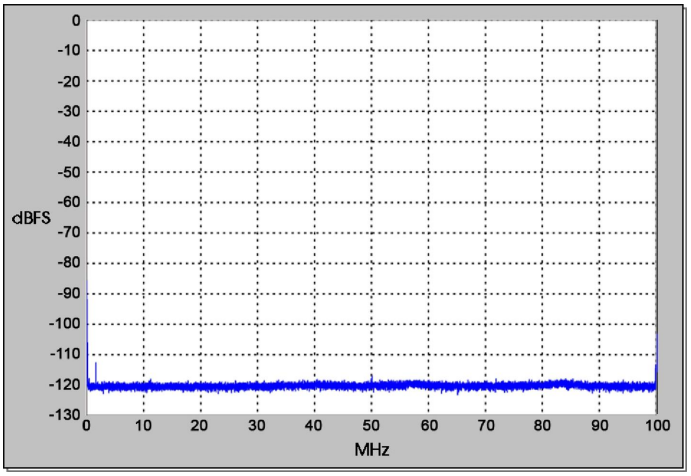
A/D PERFORMANCE

Spurious Free Dynamic Range



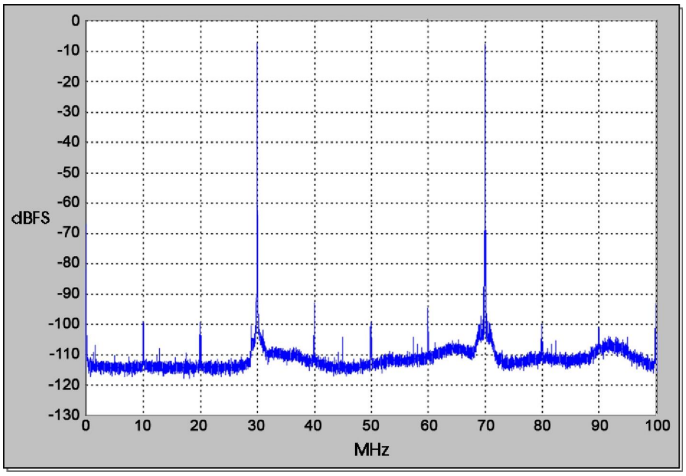
f_{in} = 70 MHz, f_s = 200 MHz, Internal Clock

Spurious Pick-up



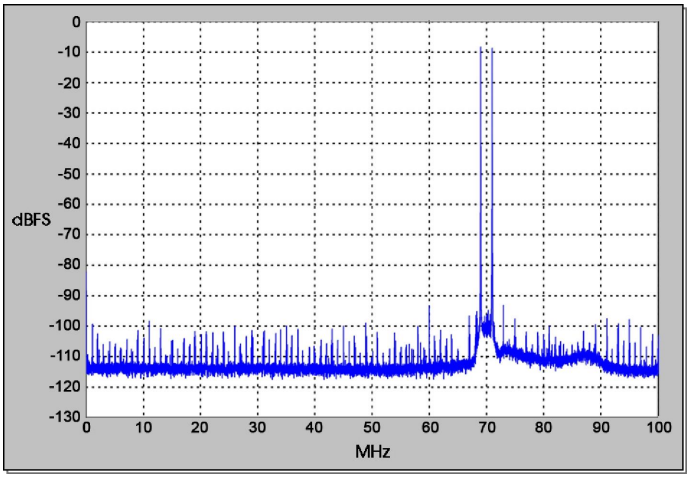
f_s = 200 MHz, Internal Clock

Two-Tone SFDR



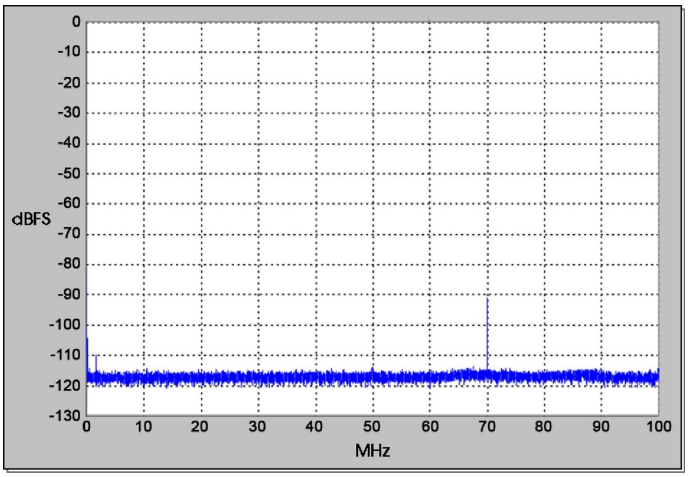
f_1 = 30 MHz, f_2 = 70 MHz, f_s = 200 MHz

Two-Tone SFDR



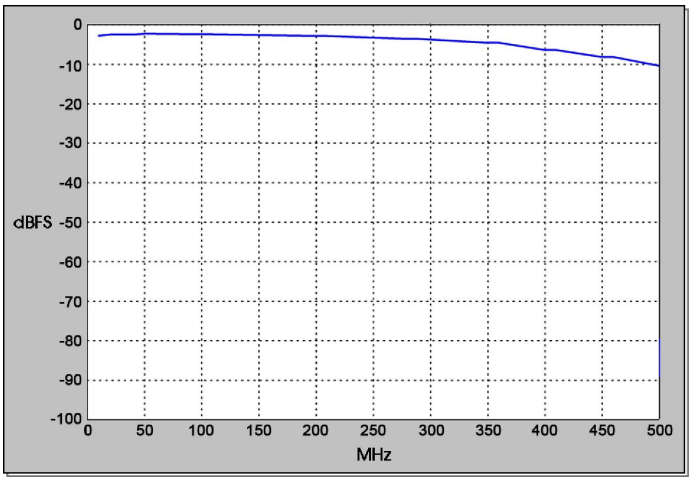
f_1 = 69 MHz, f_2 = 71 MHz, f_s = 200 MHz

Adjacent Channel Crosstalk



f_{in} Ch2 = 70 MHz, f_s = 200 MHz, Ch1 shown

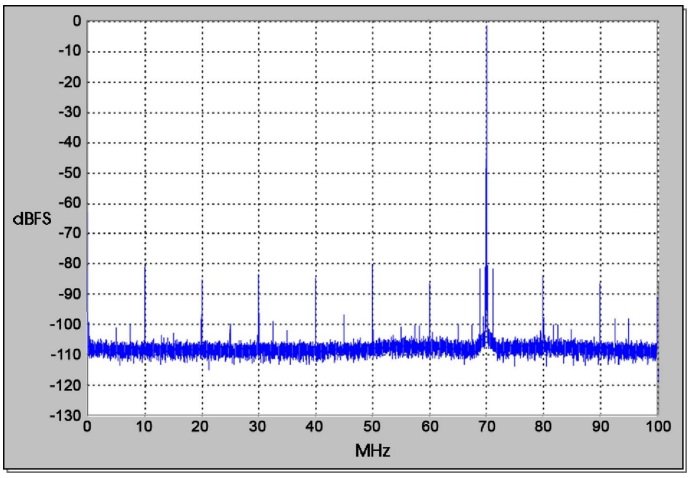
Input Frequency Response



f_s = 200 MHz, Internal Clock

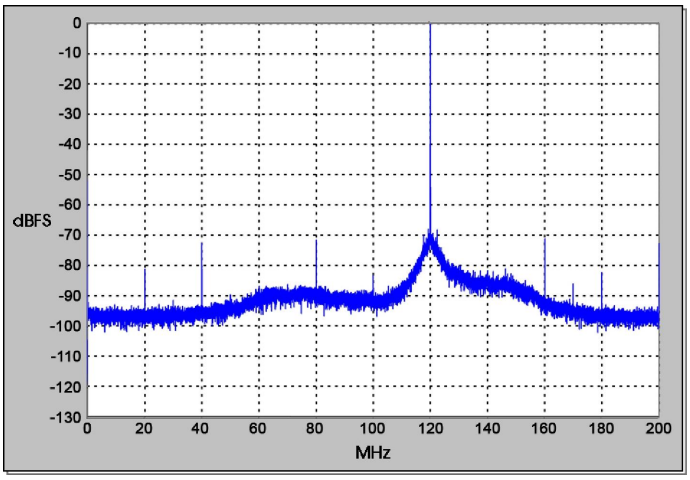
D/A PERFORMANCE

Spurious Free Dynamic Range



f_{out} = 70 MHz, f_s = 200 MHz, Internal Clock

Spurious Free Dynamic Range



f_{out} = 120 MHz, f_s = 400 MHz, External Clock

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 243.3 TB
- Drive Type: SATA III SSDs
- Supported RAID Levels: (standard) 0
  - Option -285: RAID 5
  - Option -286: RAID 6

Analog Signal Inputs

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

Transformer Type: Coil Craft WBC4-6TLB

Full Scale Input: +8 dBm into 50 ohms

3 dB Passband: 300 kHz to 700 MHz

A/D Converters

Type: Texas Instruments ADS5485

Sampling Rate (f_s):10 MHz to 200 MHz

Resolution: 16 bits

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

Anti-Aliasing Filters: External, user-supplied

Digital Downconverter

Type: Virtex-6 FPGA Mercury DDC IP Core

Decimation (D): 2 to 65,536

IF Center Frequency Tuning: DC to f_s, 32 bits

DDC Usable Bandwidth: $0.8*f_s/D$

Analog Signal Outputs

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

Full Scale Output: +4 dBm into 50 ohms

3 dB Passband: 300 kHz to 700 MHz

Digital Upconverter and D/As

Type: Texas Instruments DAC5688 and Mercury-installed interpolation IP core

Interpolation: 2 to 65,536

Input Data Rate: 250 MHx max.

Output IF: DC to 400 MHz

Output Signal: Analog, real or quadrature

Output Sampling Rate: 800 MHz max. with 2, 4, or 8 interpolation

Resolution: 16 bits

Clock Sources

Selectable from onboard programmable VCXO, external or LVDS clocks

External Clocks

Type: Female SSMC connector, sine wave, 0 to +10 dBm, AC-coupled, 50 ohms, 10 to 200 MHz

Multi-Recorder Sync/Gate Bus

26-pin connector, dual clock/ sync/gate input/output LVDS buses; one sync/gate input TTL signal

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 -208	8-Channel record
Option -221	1-Channel playback
Option -222	2-Channel playback
Option -224	4-Channel playback
Option -228	8-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
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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