Agilent U1083A-002

Acqiris SVM1500 High-Speed 6U VME/VXS Digitizer

10-bit, 2 ch, 2 GS/s

Agilent Technologies

Main Features

- **6U single slot VME/VXS (VITA 41)**
- **Dual-channel synchronous 10-bit 2 GS/s ADC**
- **Two Xilinx® Virtex-4 FPGAs (SX55 and FX100) for real-time signal processing and data flow control**
- **Two on-board DDR2 SDRAM banks, 32 Mwords, each 64-bit wide (512 MB total)**
- **Tundra TSI148 VME bus interface VME64x and 2eSST compliant**
- **VXS VITA 41.0 compliant, 8x 3.125 Gbps serial I/O links on P0 connector**
- **Two Front Panel SFP slots for up to 3.125 Gbps fiber or copper transceivers**
- **Auxiliary I/O mezzanine with multipurpose 12-bit 65-MS/s ADC, 12-bit 130-MS/s DAC and 14 digital I/O ports on front panel**
- **External clock or 10-MHz reference**
- **External trigger input**
- **High-speed digital I/O on P0 and P2 user-defined I/O**
- **Firmware Development Kit containing FPGA interface cores, software, and reference design**
- **FPGA-based VXS and optical data link interfaces for easier adaptation to different protocols**
- **Local FLASH memory able to store multiple FPGA bitstreams for complex, multimode applications**
- **Device drivers for Windows®, Wind River VxWorks and Linux**

High-Resolution, High-Sample-Rate Data Conversion with Real-Time Processing

Based on a modular platform, the Agilent Acqiris SVM1500 features a dual-channel 10-bit 2-GS/s ADC coupled with a processing engine capable of up to 300 GigaMAC/s.

Based on a scalable, modular architecture, the VME/VXS board family comes with two Xilinx Virtex-4 FPGAs, one SX55 targeted at digital signal processing, and one FX100 for data flow control. The embedded FLASH memory allows the platform to be easily reconfigured to perform user defined applications.

This architecture makes the new platform ideal for wide-band, high-dynamic-range demanding applications such as electronic warfare (EW) ESM applications, radar digital receiver, telecommunications, and semiconductor testing, where high sample rate, high data-processing capabilities, and high throughput are mandatory.

The SVM1500 incorporates proprietary data conversion chipsets, designed for the specific purpose of optimizing high-speed ADC and DAC performances.

The SVM1500 uses two single-channel, 10-bit, 2-GS/s ADC mezzanines supporting the full capabilities and performance of the state-of-the-art E2V AT84AS008 ADC.
The board supports eight 3.125 Gbps serial links on the VXS backplane and two optical links on the front panel supporting up to 3.125 Gbps. It includes a fully compliant VME64x interface with support for 2eSST protocol, providing a substantial aggregate data bandwidth of more than 3.5 GB/s.

A comprehensive firmware development kit (FDK), software drivers, and application examples make it easier to develop your applications.

Data-Flow-Optimized Architecture

The VME/VXS board family has been designed to optimize both internal and external data throughput.

Associated with other members of the family, the SVM1500 allows building complete systems with fewer resources.

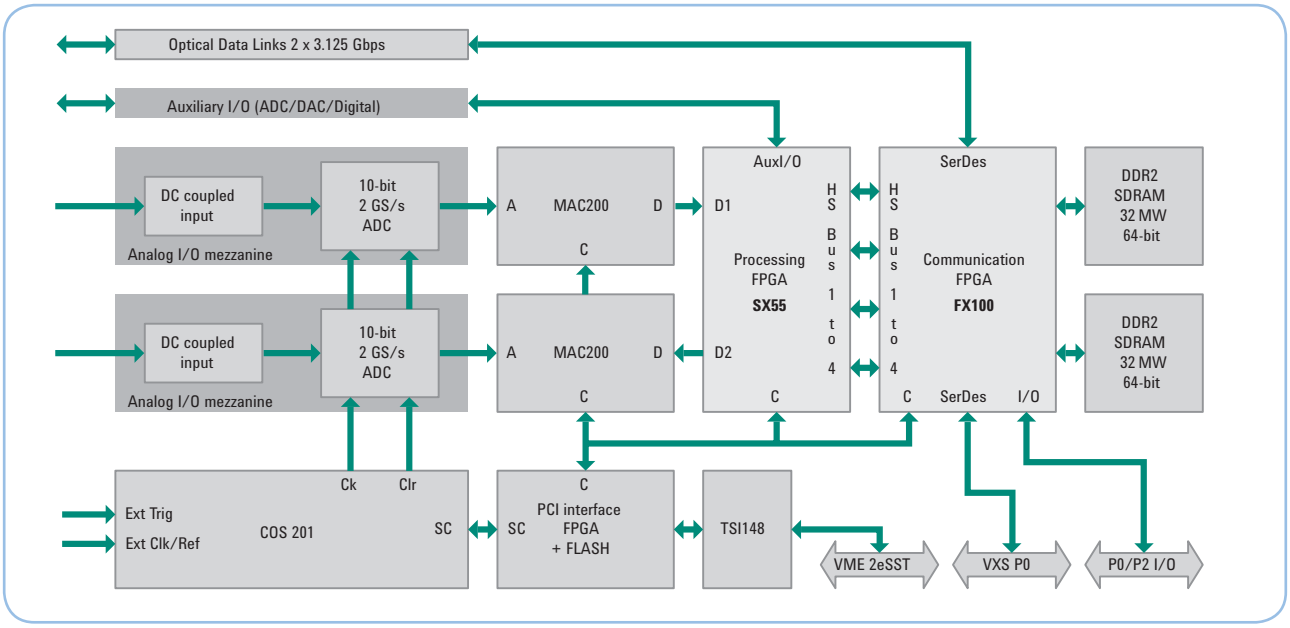


Figure 1: SVM1500 architecture

Easy Customer Application Development

Firmware development kit

The VME/VXS board family comes with an optional firmware development kit (FDK) to make application development easier on the SX55 and FX100 FPGAs. The FDK includes a set of cores to easily interface to the underlying hardware, a base design for each family member to provide very simple, ready-to-use designs, and a test-bench environment for design and simulation.

An embedded FLASH memory can store up to seven bitstreams for each FPGA for complex, multi-mode applications.

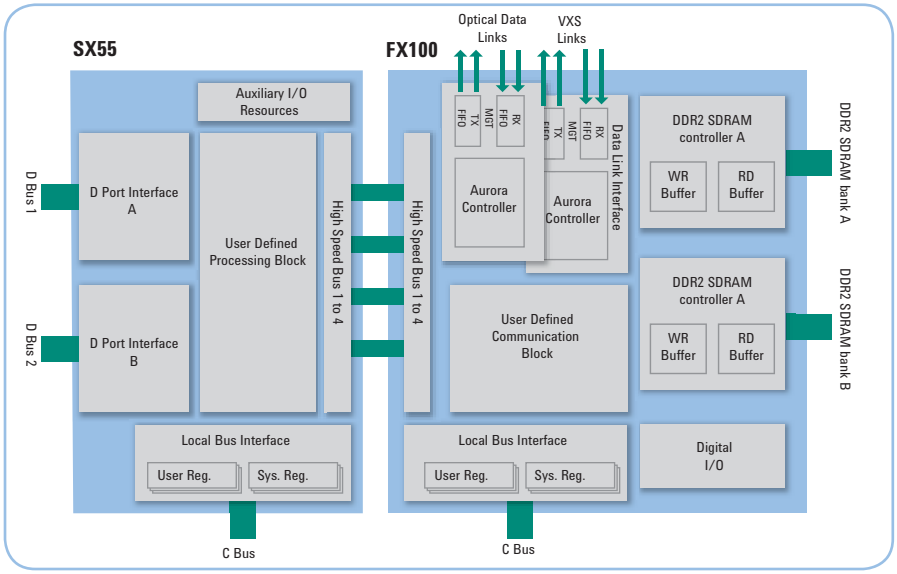


Figure 2: Firmware development kit architecture

Software drivers and examples

The SVM1500, as other members of the family, comes with software drivers and applications examples for Wind River VxWorks (Pentium® and PPC), Linux (Pentium and PPC) and Windows (Pentium).

Extended Functionality

Clock and clock distribution

The SVM1500 features an external clock or 10-MHz reference input with very low added jitter that provides direct access to the digitizer's on-board COS201 clock distribution circuit. Moreover, a very-low-phase-noise PLL is used to generate the internal clock at fixed frequencies. A sophisticated internal clock distribution scheme to all internal resources allows for fine control of processing and I/O synchronization.

Trigger

The external trigger circuitry includes a switchable 50 Ω/1 M Ω front end coupled with a very-high-speed comparator chip and a 12-bit DAC for threshold adjustment.

Analog mezzanines

The SVM1500 includes two 10-bit, 2-GS/s ADC analog mezzanines based on the E2V AT84AS008 ADC with DC-coupled analog front end.

JTAG

The SVM1500 features a JTAG connector that can be used for on board firmware debug using ChipScope probe (requires option U1091A-CB1).

Auxiliary I/O mezzanine

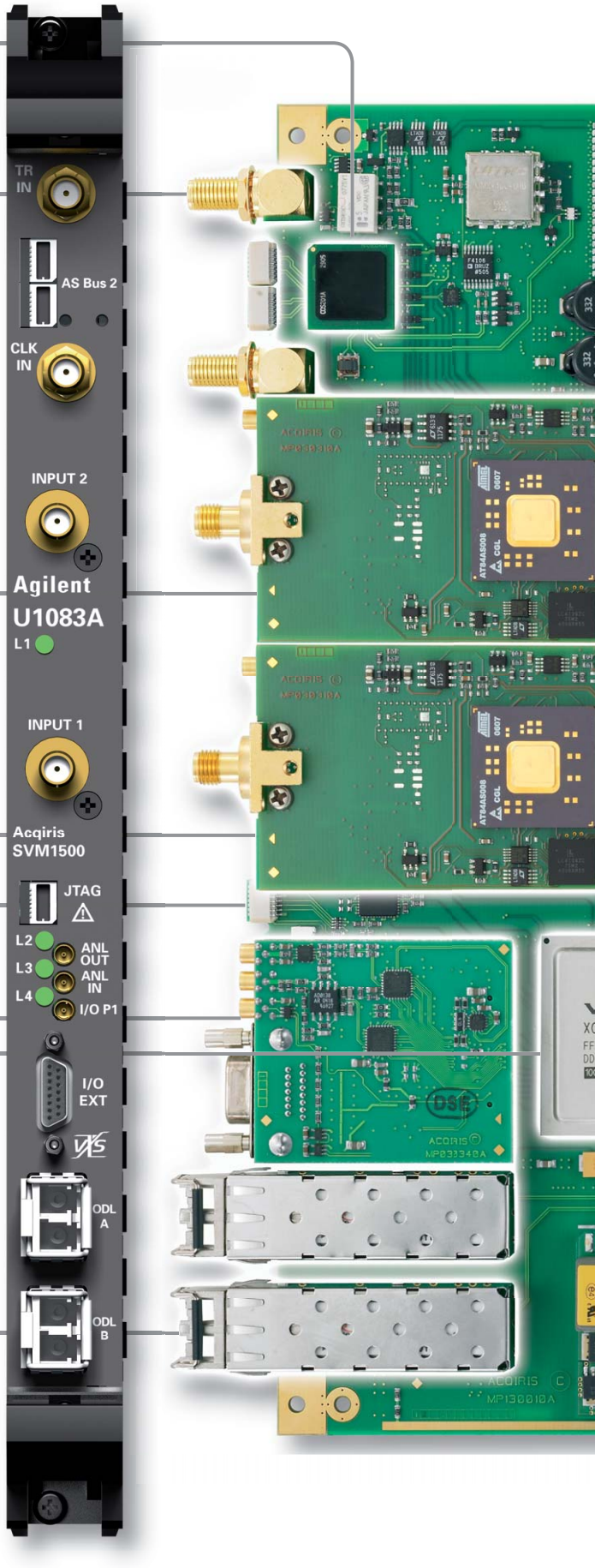
The SVM1500 features a custom auxiliary I/O mezzanine to support control and command functions. It includes one 12-bit 65 MS/s ADC, one 12-bit 130 MS/s DAC, and 14 digital I/Os.

On-board processing FPGA

The SVM1500 offers on-board, high-performance, real-time data processing by means of two very large FPGAs, one Xilinx Virtex-4 SX55 and one Xilinx Virtex-4 FX100. The SX55 FPGA is capable of executing 512 multiplications/accumulation (18x18) at up to 450 MHz, leading to an impressive processing power of 230 GigaMAC/s, while offering more than 55,000 logic cells and up to 5 Mbits of on-chip RAM.

Optical data links

Two SFP front-panel optical transceivers provide for data transfer at rates of up to 3.125 Gbps per link, supporting Aurora protocol.



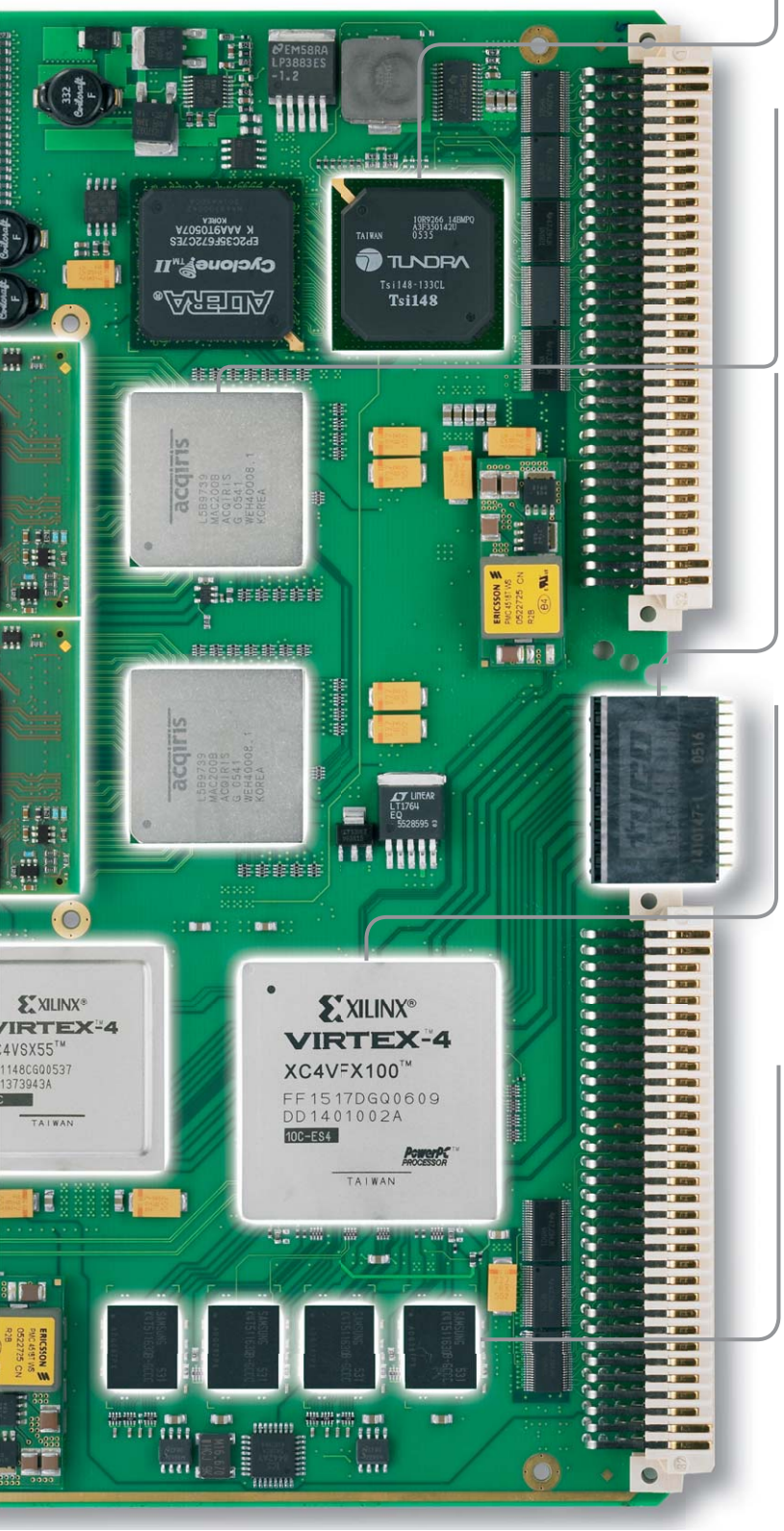


Figure 3: Agilent U1083A-002 dual-channel digitizer

VME 2eSST interface

The SVM1500 is fully VME64x and 2eSST compliant. Designed to benefit from fast data interfaces, it can be integrated with other state-of-the-art VME boards.

Fast data throughput with large memories

The MAC200 memory and acquisition controller, is a digital CMOS integrated circuit. A high-speed data multiplexer/demultiplexer with on-board memory, it is designed for the capture and memorization of 10-bit or 20-bit digital data, at speeds of up to 2 GS/s or generation of 20-bit data streams at up to 1.2 GS/s.

VXS VITA 41 interface

The VXS VITA 41.0 standard gives the SVM1500 the very-high-data-throughput capability needed in EW, Radar, or ATE equipment. The eight serial links available on the P0 connector support up to 3.125 Gbps each, for an aggregate throughput of up to 2.5 GBytes/s. Protocols such as RapidIO, PCI-EXPRESS®, Infiniband or Gigabit Ethernet, as defined in the VITA 41 dot-standards, can be supported through off-the-shelf FPGA IP cores.

On-board communication controller FPGA

The Xilinx Virtex-4 FX100 FPGA is capable of executing up to 160 multiplications / accumulation (18x18) at up to 450 MHz, leading to an impressive processing power of 70 GigaMAC/s while offering more than 94,000 logic cells and up to 6.7 Mbits of on-chip RAM. Moreover, the FX100 includes two PPC cores and four 10/100/1000 Ethernet MAC blocks. The on-board FPGA-based Signal Processing Unit allows the platforms to be easily reconfigured to perform user-defined, on-board, real-time signal processing.

Large memory

The Xilinx Virtex-4 FX100 interfaces to two banks of DDR2-533 SDRAM, 32 MWords, each 64-bit wide, for a total of 512 MB. Full-speed read or write operations are allowed at up to 1.2 GS/s on each channel.

Acqiris High-Speed VME/VXS Data Converters
Model SVM1500

Dual-channel, 10-bit 2 GS/s digitizer

Signal input

Bandwidth (-3 dB)
3 GHz

Input voltage
± 0.5 V DC

Coupling
DC

VSWR (typ.)
< 1.5 DC to 3 GHz

Connectors
SMA, gold-plated

Impedance
50 Ω ± 1% at DC

Digital conversion

Sample rate
External clock: Up to 2 GS/s
Internal clock: 2 GS/s

Channels
Two

Resolution
10 bits (1:1024)

System performance

Sampling rate 2 GS/s

SFDR (typ.)
> 50 dB at 1 GHz

SNR (typ.)
> 45 dB at 1 GHz

ENOB (typ.)
> 6.9 at 1 GHz

Two tone intermodulation distortion (IMD)
> 50 dB at 1 GHz

Clock or reference input

Input amplitude
> 500 mV pk-pk into 50 Ω

Maximum input voltage
±2 V DC

Ext. reference frequency
10 MHz ± 0.3 %

Ext. clock frequency
from 500 MHz to 2 GHz

Connector
SMA, gold-plated

Time base

Clock accuracy
Better than ±2 ppm

Sampling jitter (internal)
< 1 ps RMS integrated over 10 ms

Generation modes
Continuous / Software Triggered

Trigger (external)

Sensitivity
Sensitivity > 5% Full Scale
DC to 1 GHz at 50 Ω
DC to 300 MHz at 1 MΩ

Impedance
50 Ω ±1%, 1 MΩ at DC

Connector
SMA, gold-plated

Full scale
±5 V

Modes
Edge, positive and negative

Auxiliary I/O

Digital signals
14 I/O configurable as 7 LVDS pairs
µDB15 connector

One digital I/O LVTTL 3.3V,
5V tolerant, MMCX, gold-plated
connector (I/O P1)

Analog input
12-bit 65 MS/s ADC
± 1 V DC 50 Ω input
MMCX, gold-plated connector

Analog output
12-bit 130 MS/s DAC
± 1 V DC into 50 Ω
MMCX, gold-plated connector

Optical data links

Transceiver
Transceiver: 2 x Small Form Pluggable
Multimode 850 nm

Connector
LC™ Duplex

Throughput
3.125 Gbps/link

Host interface

VME
Full VME64x and 2eSST compliant

VXS
8 x serial links on P0
3.125 Gbps/link
Aggregate: up to 25 Gbps

Digital IO
12 LVDS pairs on P0
20 LVDS pairs on P2
One SPI interface on P2

Supported host and OS[1]

Single board computers
Kontron :
PowerNode3, PowerEngine (Linux, VxWorks)
PentXM, PentXM2 (Linux)
Concurent Technologies: VP337 (Linux)
VP426 (WinXP)
GE Fanuc:
V7812 (WinXP)

Interfaces
GE Fanuc Bus Adapter 810 (WinXP)

General and physical

Power consumption
< 75 W typ.

Dimensions
6U VME standard
233.35 mm x 160 mm x 20.02 mm

Safety
Complies with EN61010-1
Front panel complies with IEEE1101.10
CE Certification and Compliance

Current requirements (typ.)[2]

+12 V	0.02 A
+5 V	7.3 A
+3.3 V	8.4 A
-12 V	0.005 A

EMC immunity
Complies with EN61326-1
Industrial Environment

Warranty
1 year

EMC Emissions
Complies with EN61326-1 Class A for radiated emissions

Environmental

Operating temperature
0° to 55°C

Non operating temperature
-40° to 85°C

Required airflow
>2 m/s at sea level

Vibration
5-100 Hz PSD +3 dB/octave
100-1000 Hz 0.04 g2
1000-2000 Hz PSD -6 dB/octave

Shock
20 G, half-sine pulse

Relative humidity
5 to 95% (non-condensing)

Altitude
-1,000 to 15,000 Ft

1) For other configurations, please contact factory.

2) SVM1500 sampling at 2 GS/s, FPGA with base design. Depending on FPGA customer usage.

Contacts

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Ireland	1890 924 204
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Ordering Information

Model	Description
U1083A-002	Dual-channel, 10-bit 2 GS/s SVM1500 digitizer module
U1083A-FDK	Firmware development kit for VME-VXS platform
Accessories	
U1092A-CB1	MMCX to BNC, 1 m cable
U1091A-CB1	Chipscope cable and connector

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Product specifications and descriptions in this document subject to change without notice.

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