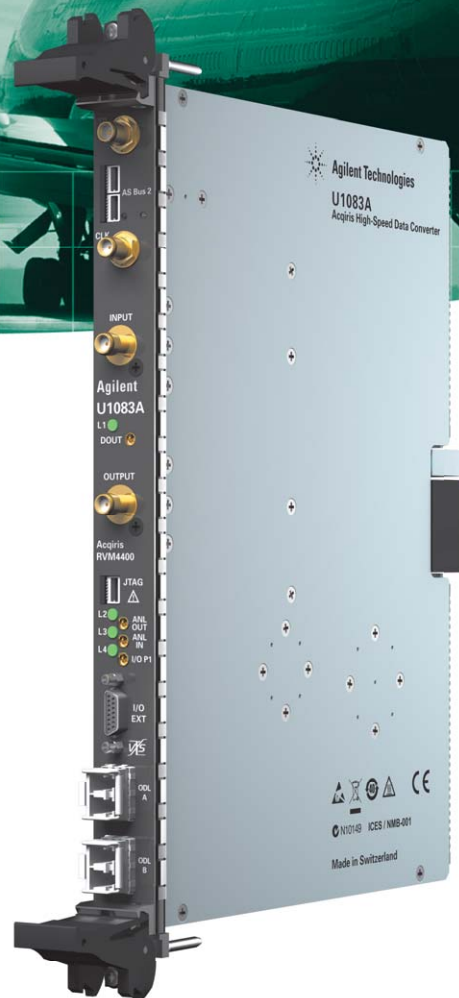




Agilent U1083A-003

Acqiris RVM4400 High-Speed 6U
VME/VXS ADC/DAC Module

10-bit ADC, 14-bit DAC, 1.2 GS/s





Main Features

- **6U single slot VME/VXS (VITA 41)**
- **Single channel 10-bit 1.2 GS/s ADC and Single channel 14-bit 1.2 GS/s DAC**
- **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 RVM4400 features a single channel 10-bit 1.2 GS/s ADC and a single channel 14-bit 1.2 GS/s DAC 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) ECM applications, radar digital receiver/transmitter, telecommunications, and semiconductor testing, where high sample rate, high data-processing capabilities, and high throughput are mandatory.

The RVM4400 incorporates proprietary data conversion chipsets, designed for the specific purpose of optimizing high-speed ADC and DAC performances.

The RVM4400 uses one single channel 10-bit 1.2 GS/s ADC mezzanine based on the E2V AT84AS008 ADC and one single channel 14-bit 1.2 GS/s DAC based on the Analog Devices AD9736 DAC. 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 RVM4400 allows building complete systems with fewer resources.

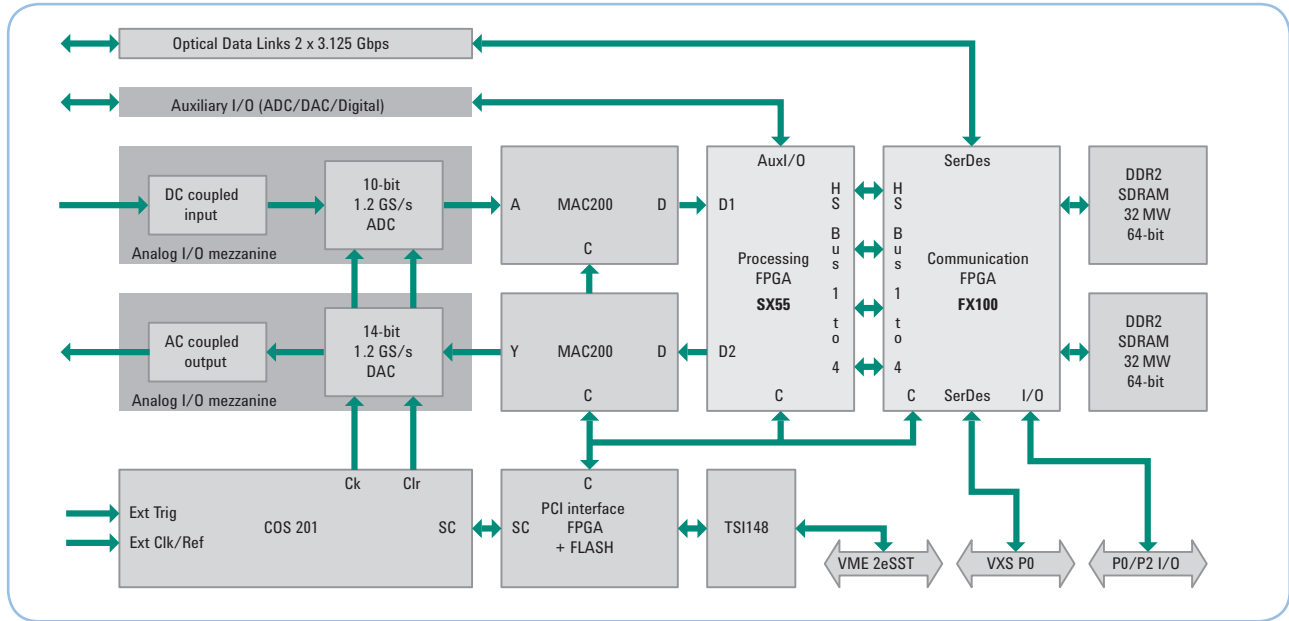


Figure 1: RVM4400 architecture

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.

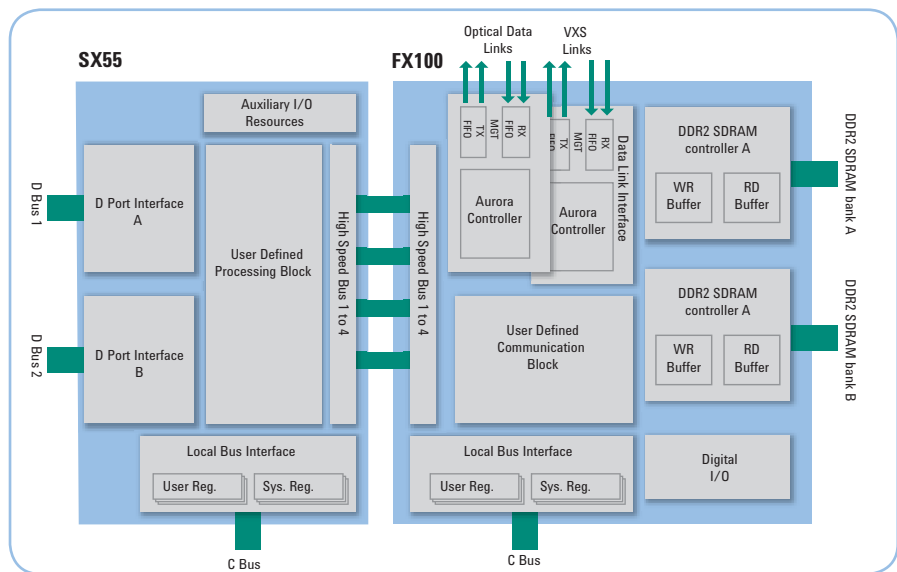


Figure 2: Firmware development kit architecture

Software drivers and examples

The RVM4400, 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 RVM4400 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 RVM4400 includes one 10-bit 1.2 GS/s ADC analog mezzanine based on the E2V AT84AS008 ADC and one 14-bit 1.2 GS/s DAC analog mezzanine based on the Analog Devices AD9736 DAC.

JTAG

The RVM4400 features a JTAG connector that can be used for on board firmware debug using ChipScope probe (requires option U1091A-CB1).

Auxiliary I/O mezzanine

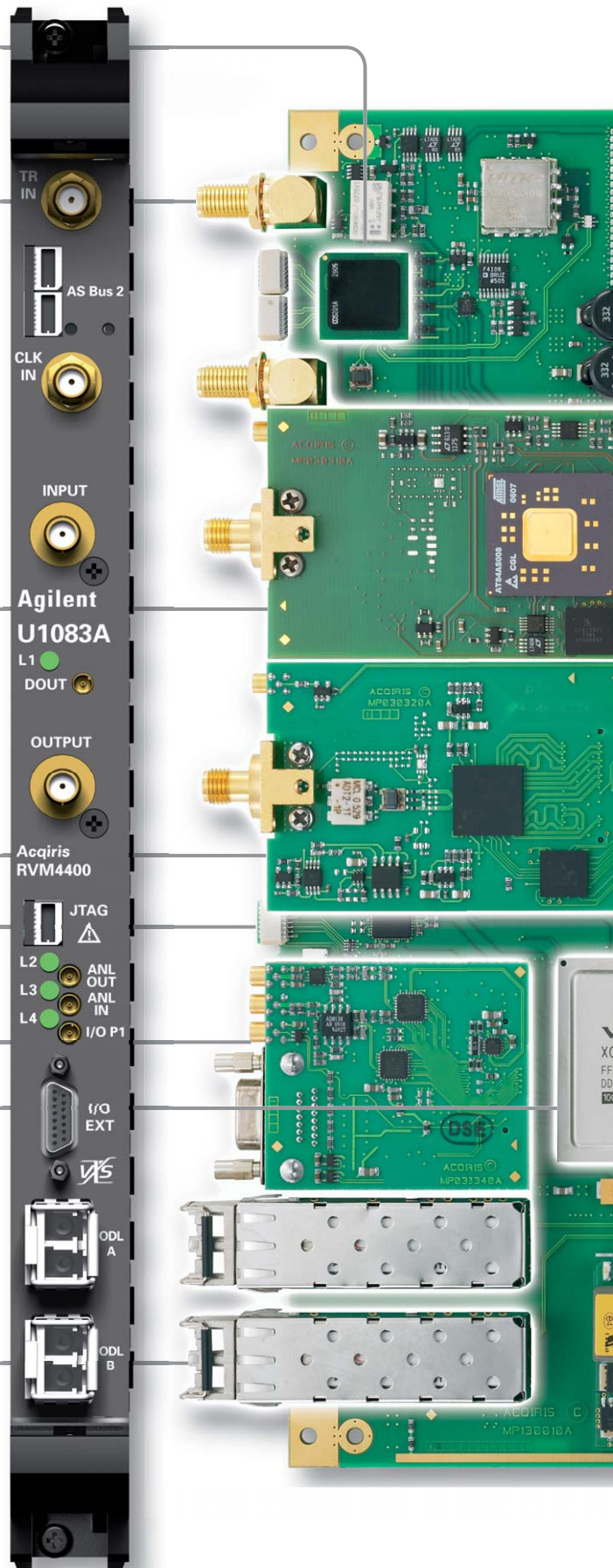
The RVM4400 features a custom auxiliary I/O mezzanine to support control and command functions. It includes one 12-bit 65 MS/s ADC, one 12-bit 130 MS/s DAC, and 14 digital I/Os.

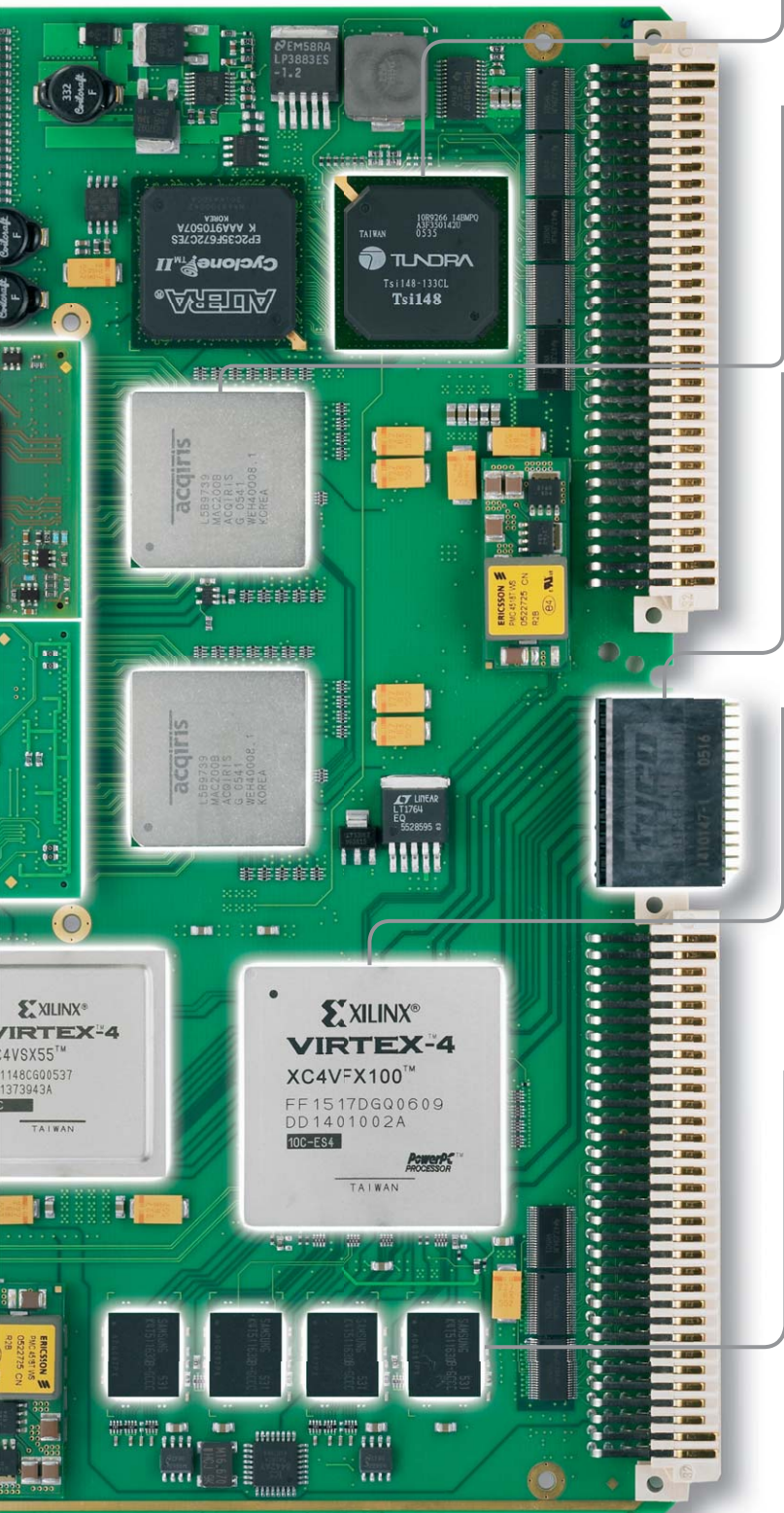
On-board processing FPGA

The RVM4400 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.





VME 2eSST interface

The RVM4400 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 RVM4400 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.

Figure 3: Agilent U1083A-003 ADC/DAC module

Acqiris High-Speed VME/VXS Data Converters

Model RVM4400

Single-channel 10-bit 1.2 GS/s ADC, single-channel 14-bit 1.2 GS/s DAC

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

Signal output

Bandwidth (-3 dB)

10 to 500 MHz

Output power

1.5 dBm typical to 50 Ω

Coupling

AC

Impedance

50 Ω ± 1% at 10 MHz

Connectors

SMA, gold-plated

Digital conversion

Sample rate

External clock: Up to 1.2 GS/s

Internal clock: 1 GS/s

Channels

One ADC, one DAC

Resolution

ADC: 10 bits (1:1024)

DAC: 14 bits (1:4096)

System performance ADC

Sampling rate 1.2 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

System performance DAC

Sampling rate 1.2 GS/s

SFDR (typ.)

> 50 dB at 500 MHz

SNR (typ.)

> 60 dB full bandwidth

Two tone intermodulation**distortion (IMD)**

> 50 dB at 500 MHz

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 840 MHz to 1.2 GHz
(limited by firmware design)

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 ±1% 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 LVTTTL 3.3V,
5V tolerant, MMCX gold plated
connector (I/O P1)

Default analog IOs

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

Option -DM1 analog IOs

Analog input

Dual 12-bit 150 MS/s ADC
± 1 V DC 50 Ω input
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 OS¹

Single board computers

Kontron :
PowerNode3, PowerEngine (Linux,
VxWorks)
PentXM, PentXM2 (Linux)
Concurrent Technologies: VP337 (Linux)
VP426 (WinXP)
GE Fanuc:
V7812 (WinXP)

Interfaces

GE Fanuc Bus Adapter 810 (WinXP)

General and physical

Power consumption

< 75 W

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	7.1 A
+3.3 V	8.6 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

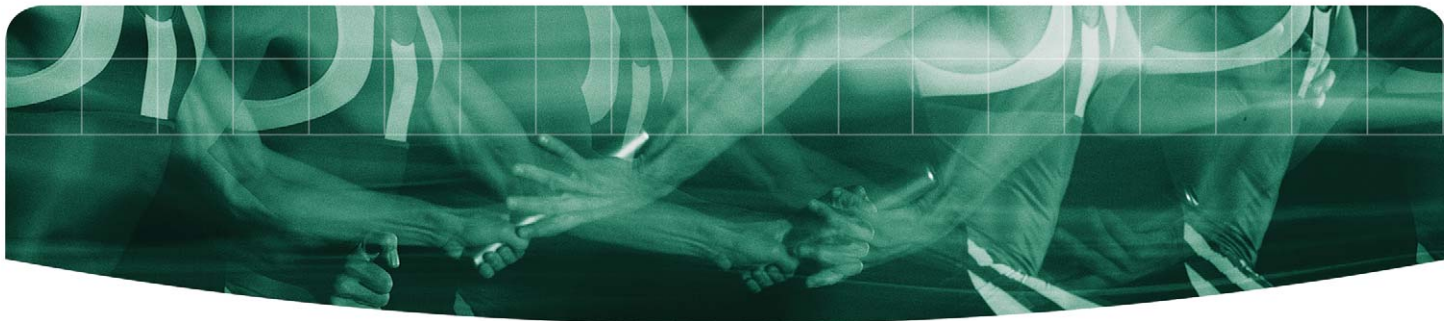
5 to 95% (non-condensing)

Altitude

-1,000 to 15,000 Ft

1) For other configurations, please contact factory.

2) RVM4400 sampling at 1.2 GS/s, 100 MHz repeat signal using FPGA with base design. Depending on FPGA customer usage.



Contacts

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Finland	358 (0) 10 855 2100
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	*0.125 €/minute
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Ireland	1890 924 204
Israel	972-3-9288-504/544
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Sweden	0200-88 22 55
Switzerland	0800 80 53 53
United Kingdom	44 (0) 118 9276201
Other European Countries:	www.agilent.com/find/contactus

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Ordering Information

Model	Description
U1083A-003	10-bit ADC - 14-bit DAC, 1.2 GS/s RVM4400 module
U1083A-FDK	Firmware development kit for VME-VXS platform

Options

U1083A-DM1	Dual ADC auxiliary IO mezzanine
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Accessories

U1092A-CB1	MMCX to BNC, 1 m cable
U1091A-CB1	Chipscope cable and connector

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