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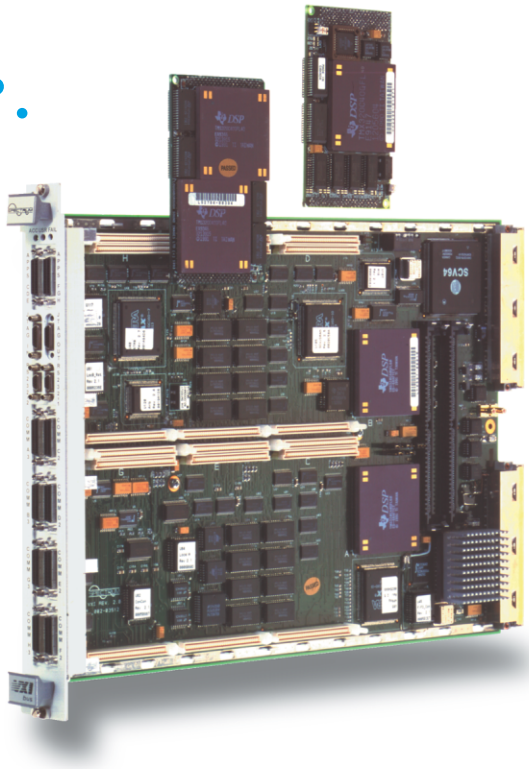
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Agilent SCMVX008

TI-Based VXI DSP Module
Distributed Product

Product Overview



- **Two 60 MHz TI TMS320C40 DSPs**
- **Six TIM-40 mezzanine card slots**
- **Eight C40 comm ports on front panel**
- **Local bus support**
- **VXI shared memory**
- **Two application specific connectors**
- **JTAG connection**
- **Standard C40 software development**
- **Single-slot, C-size, VXI module**

Concentrated computing power with high performance I/O

When your data acquisition and signal processing tasks demand concentrated computing power, the Agilent SCMVX008 is the answer.

Use the SCMVX008 when your acquisition or processing task is more than your system controller can handle. Add TIM-40* type DSP modules to the SCMVX008 to handle even bigger jobs in the future.

DSP SYSTEMS WORLDWIDE SPECTRUM

* The Texas Instrument Module (TIM-40) for the C40 is a widely accepted mezzanine card standard generated by Texas Instruments.

Agilent Technologies
Innovating the HP Way

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Processing power

The SCMVX008 brings one of the most popular digital signal processors in the world to VXI. This C-size single-slot VXI module contains two of Texas Instrument's high performance 60 MHz TMS320C40 digital signal processors. These are 32-bit resolution, general purpose, floating point DSP chips, ideal for application in communications, signal analysis, process control, data acquisition, and test. On this board each C40 comes standard with a total of 1 MB of 0 wait state SRAM memory.

Expanded processing power

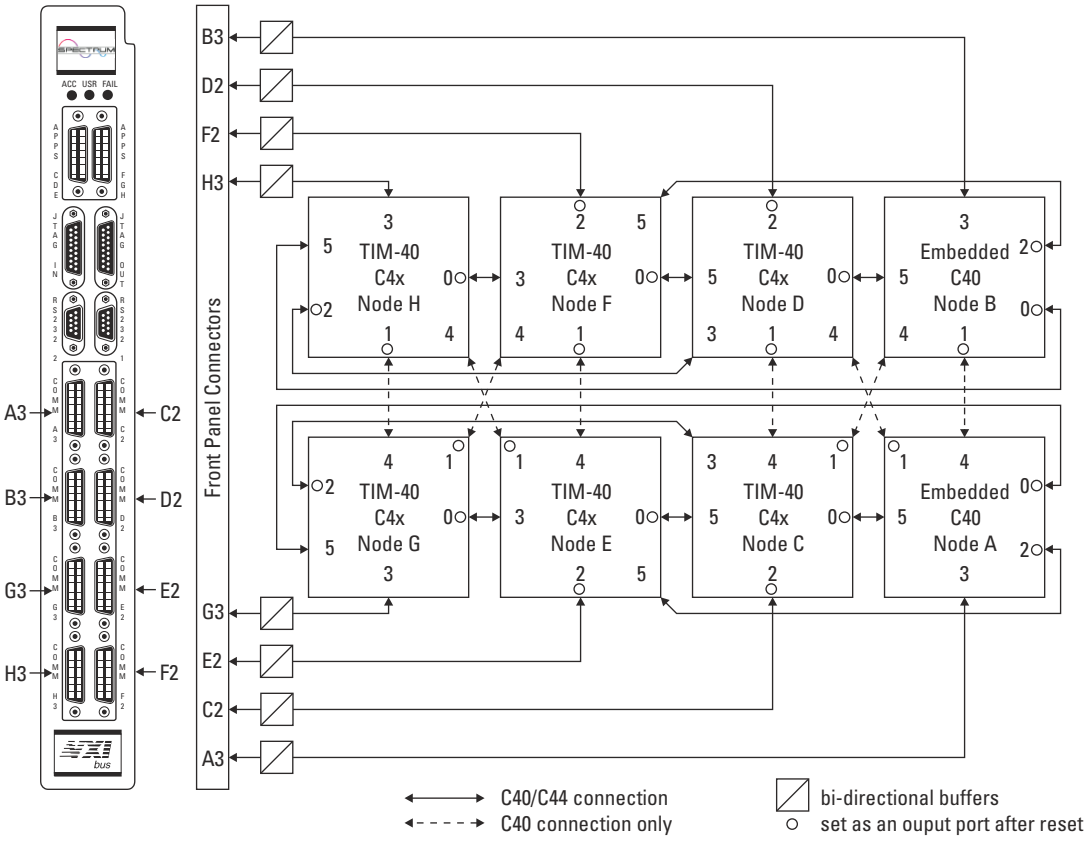
Increase the computing power in your SCMVX008 by using its six expansion slots to add processors. Each slot holds a TIM-40 type mezzanine card. Different cards have different combinations of DSP, memory, and I/O capabilities. By mixing and matching TIM-40 modules you can build a processing system suited to your application.

The Options and Accessories section at the end of this datasheet has a complete explanation of the options available to you for expanding the computing power of the SCMVX008.

DSP-to-DSP communication

The TMS320C40 DSP is noted for the DSP-to-DSP communication flexibility provided by its six high-speed communication ports. The layout of the SCMVX008 uses that flexibility to move data efficiently among multiple DSPs. Each C40 and TIM-40 node in the module is connected to its five nearest neighbors and to one of the eight buffered C40 comm port connectors on the module front panel, see Figure 1.

Figure 1: Agilent SCMVX008 C40 comm port connections



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High performance I/O

Processing power is wasted without fast, flexible data I/O. The SCMVX008 module has a selection of data ports to assure fast input of raw data and efficient output of processed data.

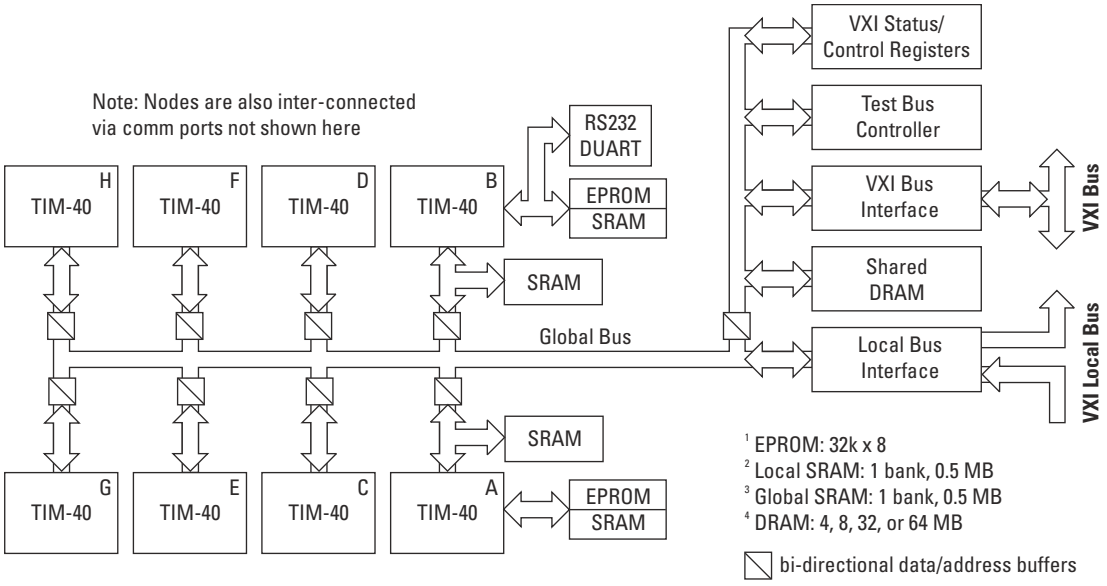
Use the VXI Local Bus port for fastest data transfer to and from other VXI modules, see Figure 2. Agilent's implementation of this module-to-module bus enables data transfer rates as high as 100 MB/s. The SCMVX008 achieves input rates of 60 MB/s.

Increase data throughput rate by broadcasting Local Bus data to multiple DSP nodes at once. Every C40 and TIM-40 node in the SCMVX008 is connected to the VXI Local Bus port via its global bus connection. You can broadcast to all nodes at once or to selected node subsets only.

Use the VXI bus port to transfer processed data to and from the host and other VXI modules. This is a particularly efficient data path when used in conjunction with the VXI shared RAM capability of the SCMVX008. You can also use this port to download programs to the C40s and to communicate with the host and other VXI modules.

Share data directly with external C40 comm port compatible resources via the eight C40 comm ports on the SCMVX008 front panel, see Figure 1. Use these ports to expedite direct, high speed, DSP-to-DSP I/O when your application demands multiple SCMVX008's. Or, connect directly to non-VXI resources. These connectors also provide direct links to non-VXI resources.

Figure 2:
Agilent SCMVX008 block diagram



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Special I/O

The SCMVX008 has special purpose I/O. Two application specific connectors on the front panel provide direct access to the TIM-40 nodes. Each node has eight pins that can be used by mezzanine cards designed to use them as inputs or outputs, to pass analog signals or digital data (see four channel tuner with DAC (Option 040) description in Options and Accessories Section).

The SCMVX008 also supports RS232 communication to one of the embedded C40's.

VXI shared memory

VXI shared memory facilitates data transfer to the host or other VXI modules. Order as much as your processing needs demand. Select as little as 4 MB, or as much as 64 MB.

Software

Develop software for the SCMVX008 using standard C40 software tools.

TI offers a proven, mature set of development tools for their TMS320 DSP family. This first-class combination of software and support is utilized by a broad range of third parties. TI's C4X Assembler/Linker and ANSI C compiler (TI TMS320C4X code generation tools, release 4.70 and higher) are available for PCs and HP-UX* workstations, enabling users to develop DSP applications in standard ANSI C. The compiler makes use of chip features such as parallel instructions, optimized multi-pass data addressing, and the repeat block instruction to ensure the code produced is as efficient as possible. TI's assembly language tools support coding in mixed assembler and C for greater control over code efficiency.

Download prototype code via standard JTAG connectors. Or, if your development environment is a VXI embedded PC or workstation, download prototype code over the VXI backplane via the Test Bus Controller. The SCMVX008 supports full JTAG functionality including single step execution.

Host DSP communication is supported with a complete VXI I/O library (part of the SCM04008 I/O Library and JTAG kit) that runs on either SICL or VISA. The library is HP-UX, Windows NT®, and WIN95 compatible.

Windows NT is a U.S. registered trademark of Microsoft Corporation.

HP-UX 9.*, 10.0 and 10.01 for HP 9000 Series 700 and 800 computers are X/Open Company UNIX 93 branded products.

* HP-UX 10.10 and 10.20 for HP 9000 Series 700 and 800 computers are X/Open Company UNIX 95 branded products.

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Agilent options and accessories

The SCMVX008 has several options and accessories to enhance its functionality.

Option 011
TMS320C40 TIM-40 card

Use this option to increase the number of C40s in your SCMVX008 module. Each Option 011 TIM-40 card adds a single, 60 MHz TMS320C40 DSP with 1.5 MBytes of 0 ws SRAM.

Option 011 comes standard with a global bus connection so the processor can access the VXI Local bus, VXIbus, VXI shared RAM and other DSPs. All six C40 comm ports are brought off the card to facilitate direct DSP-to-DSP communication.

This card includes a 32KB PEROM that acts as an IDROM to comply with the Texas Instrument TIM-40 specification and as a boot ROM to assist downloading software from a host. The PEROM is user programmable.

You can add six Option 011 C40's to a single SCMVX008.

Option 012
Dual TMS320C44 TIM-40 card

Use this card to increment the DSPs in your SCMVX008 by two using only one TIM-40 slot. Each option 012 holds two, 60 MHz TMS320C44 DSPs. The C44 has the same functionality as the C40 but is enough smaller that two can fit on one TIM-40 card. Each C44 has 1 MB of 0 ws SRAM divided equally between their two busses.

Option 012 comes standard with one processor connected to the global bus connector so the card can access the Local bus, VXIbus, VXI shared RAM and other DSPs. Six of the eight available C44 comm ports are brought off the card to facilitate direct DSP to DSP communication. The remaining two connect the C44's (see Figure 4).

This card includes a 32KB PEROM that acts as an IDROM to comply with the Texas Instrument TIM-40 specification and as a boot ROM to assist downloading software from a host. The PEROM is user programmable.

Figure 3: Option 011 block diagram

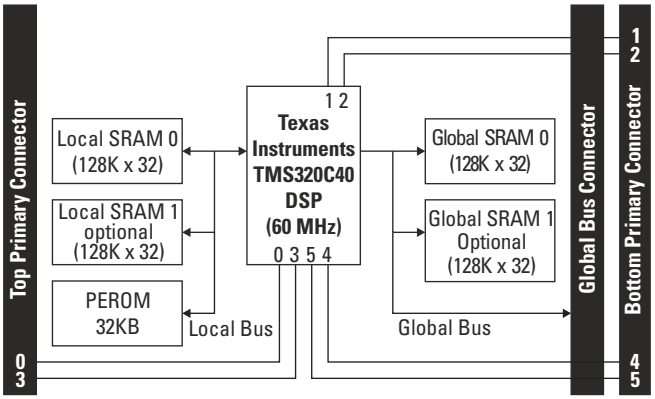
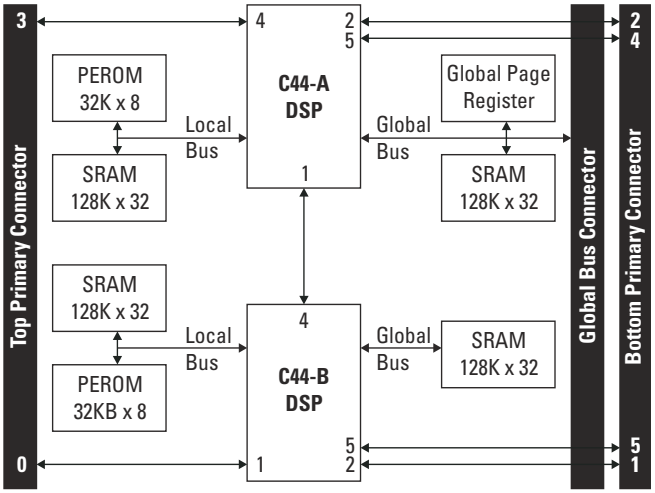


Figure 4: Option 012 block diagram



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Option 040
Four-channel tuner with DACs

This card provides four independent channels of digital quadrature mixing with digital LOs followed by decimation filtering for use in digital radio applications.

Each channel is independently tunable so the card can select four specific signals for demodulation, once a segment of spectrum is downconverted and digitized by other VXI modules. Tuning resolution for each channel is <1 Hz.

Programmable bandwidth filtering in Option 040 enhances demodulation by maximizing signal-to-noise ratio. Filter bandwidths can be programmed between 176 kHz and 86 Hz on data sampled at 20.48 MSa/s.

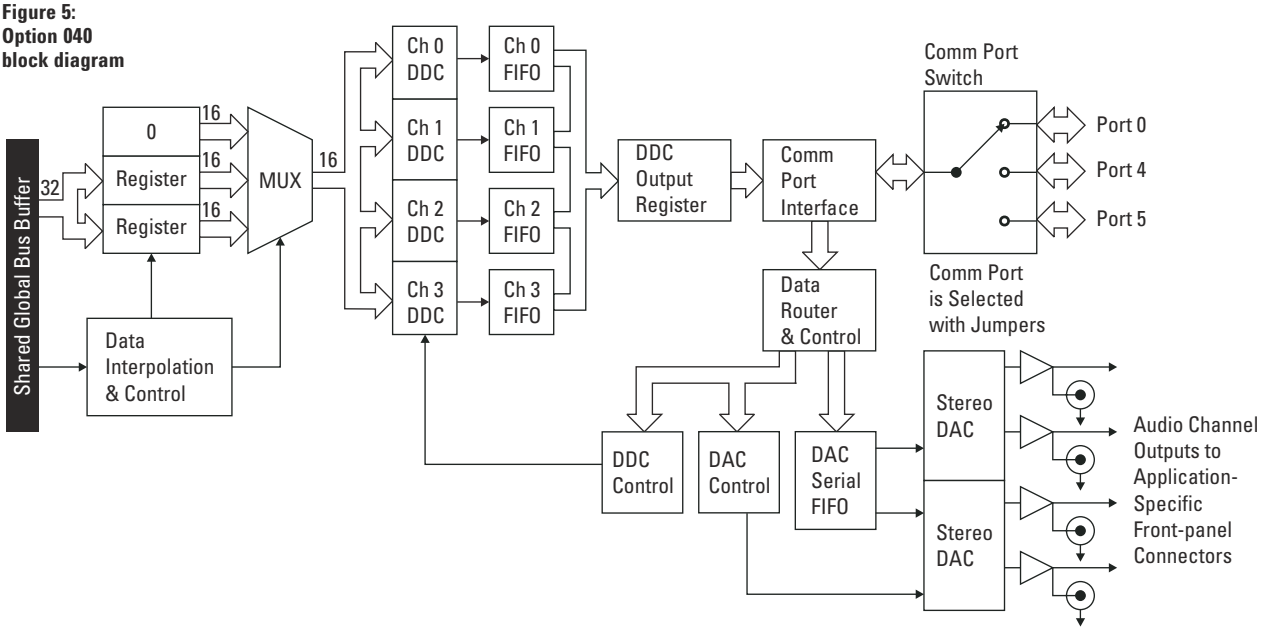
Decimation, also a standard feature, assures the lowest possible data rate without sacrificing signal information. The decimation factor is programmable from 64 to 131,072 in steps of four.

Because of the digital quadrature mixing, all four channels supply digital I/Q data that is perfect for processing digital modulation formats. Demodulation can then be performed by a C40 (see Figure 6).

Once a C40 has demodulated the signals, return them to the four channel DAC on the Option 040 module. The DAC outputs are routed through the application-specific connectors on the SCMVX008 front panel. Connect the outputs to speakers and listen to the demodulated signals. Or keep the signals in digital form and send them to the host for further processing or storage.

You can add six Option 040 four channel tuners and DACs to a single SCMVX008.

Figure 5:
Option 040
block diagram



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Option 140
Demodulation software

Use this software with the Option 040 four channel tuner and DACs TIM-40 card. Option 140 provides programmatic control of the LOs, filters, and DACs on the DDC, and provides AM, FM, and SSB routines to demodulate the signals selected by the tuners.

Because the Option 040 tuner card has no processor or conventional memory this software must run on a C40 connected to a comm port (0, 4, or 5) of the Option 040 TIM-40 module.

Use the source code shipped with Option 140 software as example code to create your own control and demodulation downloadable.

Agilent SCM04008
VXI I/O library and JTAG kit

This kit provides the VXI device driver and interface libraries required to interface the SCMVX008 and its TIM-40 cards to the host controller.

The driver and interface libraries support operations such as control (reset, initialize, open, close), DSP code download, module I/O, and test. Both Agilent SICL and VXI*plug&play* VISA standards are supported providing a standard interface to higher-level application software.

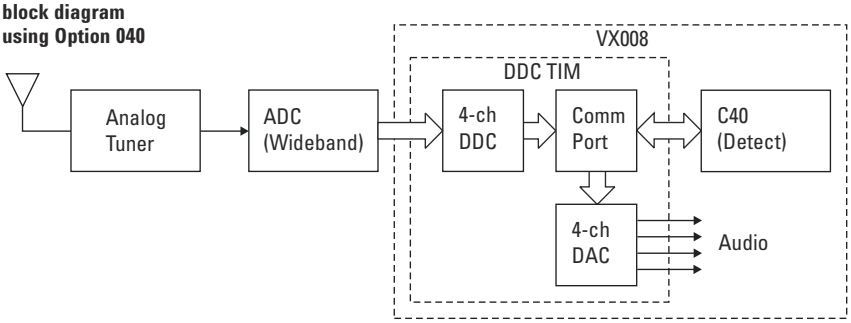
The kit includes the I/O library and drivers, VXI manual, TI TMS320C4x users manual, XDS cable conversion board and VXI JTAG chain cable for downloading and debugging code during code development.

A system library provides developers with a suite of C4x callable functions to exercise the full functionality of the SCMVX008. This low-level C4x library optimizes data transfers and simplifies the task of configuring and controlling the SCMVX008. Support functionality includes: VXI bus routines (DMA, configuration and VXI master transfers), Local Bus routines (bus configuration and data transfer), RS232 communication, and user-defined LED control.

Utility software is also included in this kit. The software provides easy to use PEROM programming utilities (EEPROM Tools) for programming the boot ROMs, example software (with source code), and built in test software to verify board level functionality at power up.

One of these kits must be ordered with the SCMVX008.

Figure 6:
Digital receiver block diagram using Option 040



Agilent SCM01545
Debug kit (DOS)

This kit provides SCMVX008 specific tools to aid software development.

The debug kit includes an XDSC40 emulator board, DB40 debugger software, and an XDSC40 users manual to enable downloading and debugging C40 code from an external PC via the front panel JTAG connector.

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Ordering information

Agilent SCMVX008	TI based DSP Module
Option 011	TMS320C40 TIM-40 Card
Option 012	Dual TMS320C44 TIM-40 Card
Option 040	Four-Channel Tuner with DACs
Option 140	AM, FM, SSB Demodulation Software
Option 082	4 MB DRAM VXI Shared Memory
Option 083	8 MB DRAM VXI Shared Memory
Option 085	32 MB DRAM VXI Shared Memory
Option 086	64 MB DRAM VXI Shared Memory
Option OB1	Additional Manual
SCM04008	I/O Library
SCM01545	Debug Kit
SCM00010	C4X Comm Port Cable Kit
SCM00012	JTAG Chain Cable
A2636-6160	RS232 Cable (30 inch)

Warranty

This product is distributed, warranted, and supported by Agilent Technologies. It is manufactured by Spectrum Signal Processing, Inc.

The Agilent SCMVX008 comes with a 1-year warranty. During that period, the unit will either be replaced or repaired, at Agilent's option, and returned to the customer without charge.

Related Agilent Literature

E3238 Signals Development System Configuration Guide
literature number 5988-0562EN

E3238 Signals Development System Product Overview
literature number 5968-2075E

E3238 Signals Development System Technical Specifications
literature number 5963-6609E

Test Systems and VXI Products Catalog
literature number 5980-0307E

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