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SPECTRUM SIGNAL PROCESSING BY VECIMA

ePMC-8310

Texas Instruments TMS320C6416 DSP-based Multiprocessing Engine for Communications Applications

ePMC

flexComm

Benefits

- Provides a multiprocessing solution on Texas Instruments' highest performance DSP platform
- *quic*Comm™ software simplifies algorithm partitioning across multiple processors
- Provides high-speed, low latency, deterministic data flow between the DSPs and off-module resources as required in communications applications
- Modular architecture integrates seamlessly with Spectrum's SDR-3000, SDR-2000 and HCDR-1000 platforms, providing a tight integration between DSPs, general purpose processors (GPPs) and FPGAs

Applications

- Wireless infrastructure, wireless surveillance, military communications and military satellite communications including wireless test and measurement and satellite earth stations

Features

- Choice of 1 GHz or 600 MHz TMS320C6416 fixed-point DSP processors with a peak performance of 4800 to 8000 MIPS per processor depending on the processor speed
- Integrated Viterbi and Turbo co-processors
- Eight dedicated high-speed data paths to the DSPs, connected through a programmable router for data flow reconfigurability
- 32 MB of SDRAM per DSP
- 32-bit, 33 or 66 MHz PCI Bridge to host PCI bus
- 32-bit, 33 MHz local PCI bus primarily for control plane data
- Software support includes *quic*Comm, a multiprocessing enabler for Spectrum's *flex*Comm™ products.
- *quic*Comm is run in conjunction with Texas Instruments' DSP/BIOS, providing multiprocessing capabilities with a real-time operating system
- Single-width enhanced PMC (ePMC) form factor compatible with Spectrum's ePMC carriers and third-party PMC carriers

Description

The ePMC-8310 family of DSP modules utilize the 1 GHz or 600 MHz TMS320C6416 device from Texas Instruments and is Spectrum's highest performance DSP-based solution for multiprocessing applications (TMS320C6415 is available as a future option*). The ePMC-8311 is the standard configuration within the ePMC-8310 module family, and includes two C6416 DSPs. The built-in Viterbi and Turbo co-processors in the TMS320C6416 make this module well suited for 2G, 2.5G, and 3G base station development, 3G test and measurement and signals intelligence applications.

The architecture is simple yet extremely powerful when combined with Spectrum's ePMC-based carriers and I/O solutions. Separate control and data paths are provided, with a focus on providing data paths that are high-speed, deterministic and have a low latency. The high-speed data paths can come from up to eight different sources, and the routing of each path can be individually programmed. Spectrum's *quic*Comm software seamlessly integrates this module with other *flex*Comm offerings, creating powerful multiprocessing solutions for demanding communications applications.



*See future options section of this datasheet.

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Block Diagram

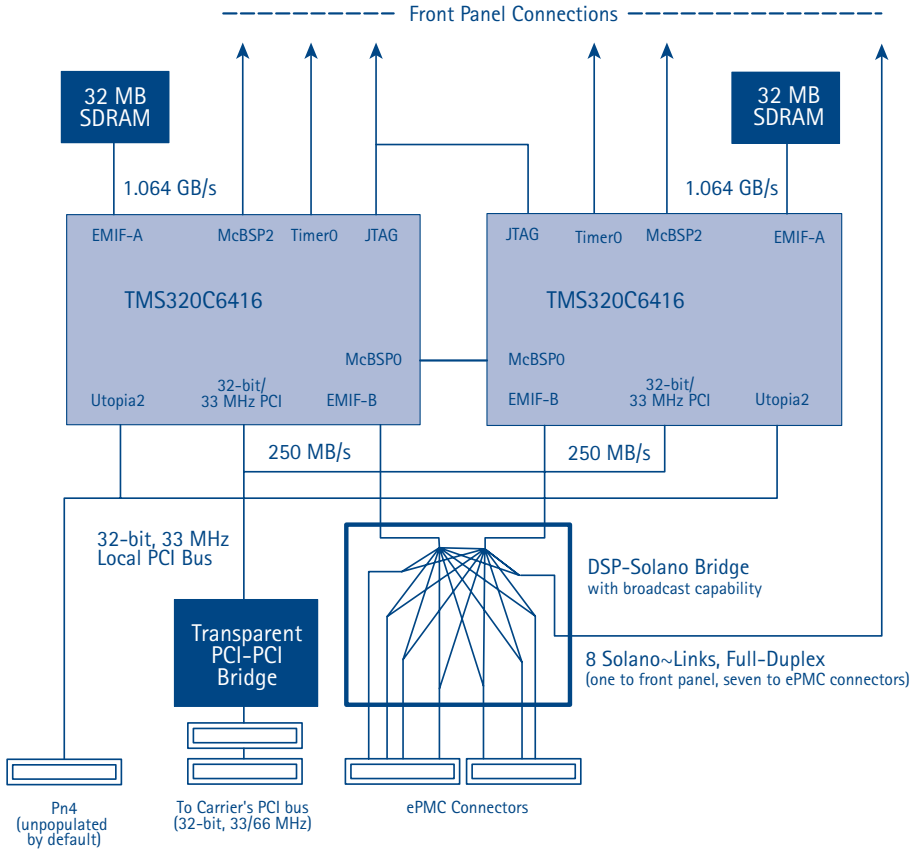


Figure 1. ePMC-8310 block diagram

Architecture

The architecture of the modules was designed for scalability; multiple modules from the ePMC-8310 family can be installed on ePMC carriers to create C64 cPCI carriers, C64 PCI/PCI-X carriers or C64 VME carriers based on this high-performance building block. The modules may include up to two TMS320C6416 processing nodes, each running at 1 GHz or 600 MHz with 32 MB of SDRAM, connected to each other and the outside world through a variety of interfaces.

Eight Solano links: Designed for high-speed, deterministic, low latency data movement, the eight Solano links each provide a full-duplex data path between the C64x DSPs and off-board I/O, GPPs, FPGAs, or other DSPs. For more details on the Solano Communications IC®, please refer to the Solano datasheet on the Spectrum website.

DSP-Solano Bridge: Designed to support data flow reconfigurability, the DSP-Solano Bridge provides a programmable interconnect between the 205 MB/s EMIF-B interfaces of the DSPs and the eight Solano links. The DSP-Solano Bridge is user programmable and is capable of connecting any DSP on the module with any other Solano links. In addition it supports multi-casting and broadcasting from any source.

PCI Bridge: Designed for control, setup and low-speed payload data, the local side is a 32-bit, 33 MHz interface. The host-side of the bridge can run at 33 MHz or 66 MHz.

McBSP, Timers, JTAG, and Utopia2: One McBSP serial port is routed between the DSPs, and each DSP brings one McBSP serial port to the front panel. One timer interface from each DSP is brought to the front panel, and the JTAG interfaces are brought out to a single front panel connector. The Utopia2 interface is routed to Pn4 (the Pn4 connector can be populated as an option for users requiring Utopia2).

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Software

[*quic*Comm Software Development Kit (SDK)]

*quic*Comm is a high-performance software development tool that provides an API for inter-processor and I/O-to-processor communications. *quic*Comm is run in conjunction with Texas Instruments DSP/BIOS.

*quic*Comm has been a standard on Spectrum's products since 2000, and therefore spans all of our processing technologies, including DSPs, GPPs and interfaces to FPGAs and I/O. *quic*Comm enables developers to create multiprocessing communications platforms, with a mixture of processing engines and I/O devices, with minimal headache and maximum code portability. *quic*Comm also provides board-level setup and programming interfaces.

Please see the *quic*Comm datasheet for more details about the benefits and features of *quic*Comm.

[Tornado II and the VxWorks RTOS]

Tornado II, the development toolset for the VxWorks real-time operating system (RTOS), runs on the carrier board's host controller. The ePMC-8310 modules support the carrier's supplied VxWorks Host SDK. You can purchase Tornado II and VxWorks from Spectrum to facilitate one-stop shopping and avoid any potential configuration problems.

[Debug and Compile Tools]

Spectrum builds on Texas Instruments' proven eXpressDSP™ software tools to provide system-level, multiprocessing tools and configuration utilities that enable application developers to work at a system level. The ePMC-8310 DSP modules support TI's Code Composer Studio™ Development Tools.

System-level Solutions

The ePMC-8310 module integrates seamlessly into Spectrum's existing SDR and HCDR architectures. Please visit Spectrum's website to view the online datasheet with additional diagrams of ePMC-8310 integrated with our SDR-3000, SDR-2000 and HCDR-1000 platforms.

[ePMC-8310 within SDR-3000]

SDR-3000 is a 6U CompactPCI solution that provides a tightly integrated communications platform for demanding multi-channel wireless infrastructure and surveillance applications. The ePMC-8310 mounts on the PRO-3500 and therefore has tight coupling to the FPGAs and GPPs. It also has tight coupling to A/D data, and channelized baseband data for running higher layers of a protocol stack while still maintaining a tight coupling to the physical layer code running on the DSPs. Data flow within SDR-3000 is packet-based and makes use of the concept of both physical and logical channels. The ePMC-8310 DSP module family is designed to support multiple logical channels within the DSP-Solano Bridge, allowing multiple instances of a modem to run on a single DSP while maintaining separate logical data streams into and out of the modems.

Please refer to the SDR-3000 datasheet and the individual component datasheets for more details.

[ePMC-8310 within SDR-2000]

SDR-2000 is a PCI/PCI-X architecture based on the PRO-2900 carrier board. The PRO-2900 provides two ePMC/XMC sites in a PCI-X slot with a server running Linux or Windows®. As with Spectrum's other carriers, mutli-channel systems can be created by combining multiple carriers with a variety of modules. Please refer to the SDR-2000 family of datasheets for more details.

[ePMC-8310 within HCDR-1000]

HCDR-100x is a VME architecture based on the PRO-1900/PRO-1901 carrier boards, which provide four ePMC sites and one PMC site in two VME slots. A flexible multi-channel receiver platform can be easily created by combining Spectrum's ePMC-based A/D converter, digital down converters, and ePMC-8310 modules on the PRO-1900/1901 carriers.

Please refer to the HCDR-100x datasheet and the individual component datasheets for more details.

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Specifications

The ePMC-8311 is the standard configuration for the ePMC-8310 family of C64x DSP modules

[general]	Processors	Two 1 GHz or 600 MHz TMS320C6416 fixed-point DSPs from Texas Instruments Memory 32 MB of SDRAM per DSP
[buses]	Local PCI Host PCI	32-bit, 33 MHz 32-bit, 33 or 66 MHz
[external interfaces]	Solano link Serial Ports JTAG Connection Timer Utopia2	One Solano link to front panel, seven to the carrier, each capable of high-speed full-duplex communications between the ePMC connectors and the Solano Communications ICs One McBSP serial port routed from each DSP site to the front panel Available for debug support via a 2x5 pin header accessible on the front panel One Timer interface routed from each DSP to the front panel Utopia2 interface from each DSP routed to Pn4 (Pn4 unpopulated by default)
[performance]	Peak Data Transfer Rates	205 MB/s sustained between EMIF-B interfaces of the DSPs and the eight Solano links
[host requirements]	Host Host Operating System	PRO-3500 6U cPCI, PRO-2900 PCI/PCI-X or PRO-1900/1901 VME carrier VxWorks for cPCI and VME, Windows/Linux for PCI/PCI-X
[development software]	*quic*Comm	The *quic*Comm software suite is available on both the host and target processors. *quic*Comm provides functions for: • Configuration and control of the Solano links • High-speed data transfers across the Solano links • Initiating PCI data transfers It also provides a complete set of examples
[other software]	Debug Support	Support for TI's Code Composer Studio via JTAG emulator is provided (JTAG emulator sold seperately)
[electrical]	Supply Voltage (DC) Current Consumption Power Consumption The User Should Budget	+5V +5% or -3% and +3.3V +5% or -3% (supplied by the PMC connector) 1.2A at 3.3V and 0.6A at 5.0V 4W at 3.3V and 3W at 5.0V for a total of approximately 7W 1.5A at 3.3V and 1.5V at 5.0V for a total of approximately 13W
[mechanical]	Size	149 mm (height) x 74 mm (width)
[environmental]	Operating Temperature RoHS	Operating temperature range of 0 to 50° C 5 of 6 compliant (Pb in solder exemption). For RoHS ordering information, other RoHS compliance options or certificates of compliance, please contact Spectrum Sales
[ordering information]	 650-00112 650-00141	For specific RoHS compliance of individual part numbers, please contact Spectrum Sales ePMC-8311 Dual C6416 600 MHz Module and Solano Inter-Connect Module (ICM) ePMC-8311 Dual C6416 1 GHz Module and Solano Inter-connect Module (ICM)
[custom configurations]		For custom configuration options, please contact Spectrum Sales. For further information about the ePMC-8310 module family and its applicability to your next high-performance communications project, please contact Spectrum Sales.
[future options]	 Processors	Future options may be implemented at the discretion of Vecima Networks Inc. or its subsidiaries based on market demand.** TMS320C6415 or TMS320C6416 in single-node

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