

UTC006 – MicroTCA Carrier Hub (MCH), Double Module, PCIe Gen 3 Expansion

MCH, PCIe Gen 3 Expansion



KEY FEATURES

- Double module, full size per AMC.0 and MTCA.4
- Quad ports for PCIe Gen 3 expansion (x4, x8, or x16)
- Unified 1 GHz quad-core CPU for MCMC (MicroTCA Carrier Management Controller), Shelf Manager, Clocking, and Fabric management
- Automatic fail-over with redundant UTC006s
- 1GbE base switch with dual 100/1000/10G uplink
- Full Layer 3 managed Ethernet switch
- PLL synthesizer for generating any clock frequency disciplined to GPS/SyncE/IEEE1588
- IPMI 2.0 compliant
- HPM.1 compliant

Benefits of Choosing VadaTech

- Versatile MCH for PCIe Gen3 with 4x, x8, or x16 ports to external devices
- Interfaces with standard industry cables, copper or fiber options
- Crossbar clock matrix for low jitter, cleanest signals
- On-board high performance PLL synthesizer for generating any clock frequency
- VadaTech's Scorpionware® Shelf Management Software included at no additional cost
- Sophisticated clocking features enabling GPS/IEEE1588/SyncE/NTP Grand Master Clock
- Virtual JTAG capability for remote programming and debugging
- Full ecosystem of front and rear boards, enclosures, specialty modules, and test/dev products from one source
- AS9100 and ISO9001 certified company

The VadaTech UTC006 is a double module MCH with 4 ports for PCIe Gen 3 expansion (x4, x8, or x16). The MCH comes in the MTCA.4 format with the ability to support an RTM geared for High Energy Physics and other applications requiring rear I/O. The MCMC manages the Power Modules, Cooling Units, and up to 12 AMCs within the chassis. It also manages the PCIe Gen3 switch as well as the standard GbE with 10GbE uplink Base Channel switch. The Ethernet switch is managed with an enterprise grade Layer 3 switching/routing stack and they support Synchronous Ethernet.

The firmware in the UTC006 is HPM.2 compliant which allows for easy upgrades. It provides Master JTAG services to the AMCs via the JSM. The MCH has advanced clocking features including grand master clock and high-quality clock distribution/synthesis.

IPMI CARRIER MANAGER / SHELF MANAGER / PROTOCOL ANALYZER

The UTC006 utilizes the same proven standards-compliant IPMI management stack that has been utilized successfully in our previous generation MCH products. It supports carrier manager, shelf manager, and protocol analyzer operations to help facilitate a seamless chassis integration experience. The IPMI stack enables a rich feature set including:

- IPMI Version 2.0 with IPMI v1.5 compatibility
- SDR, FRU, and SEL storage interfaces (SEL stored in MRAM for high-speed/non-volatile/no-wear-out access)
- Intelligent temperature, voltage, and current sensing
- Shelf cooling policy
- Shelf activation and power management / Automatic fail-over/redundancy management
- Alarm controls
- Event notification and flexible alerting policies
- Backplane E-Keying
- CLI, SNMP, RMCP+, HTTP, and HPI
- IPMB Protocol Analyzer GUI for use on PC
- ScorpionWare GUI system manager integration tool on PC available separately

BASE CHANNEL ETHERNET SWITCH

The UTC006 provides includes as standard a GbE base channel switch which includes two 10GbE uplink 100/1000/10G RJ45 ports. This switch is fully Layer 3 managed enabling a comprehensive enterprise-grade routing and switching feature set. It supports Synchronous Ethernet (SyncE) and IEEE1588.

FAT PIPES FABRICS

The UTC006 provides for PCIe fat pipes fabric options:

- PCIe Gen3 Switch with front 4x SFF-8644 expansion/uplink ports
 - Speed setting for 2.5/5/8 Gbps per lane
 - Virtual Switch/Multiple domain/Non-transparent port support to enable partitioning of the system with multiple root complexes
 - Includes an extra internal port which enables the GPS precision time-stamping engine (accessible from an AMC root complex board)
 - 1024 Gbps aggregate bandwidth / non-blocking / cut-through architecture

FABRIC CLOCK OPTION

The UTC006 has the capability to provide a 100 MHz HCSL PCIe Gen3-compliant fabric clock to each AMC. This option enables the recommended synchronous PCIe clocking approach within the chassis when used in combination with the PCIe fabric.

GPS AND GENERAL PURPOSE CLOCKS

The μ TCA specification defines a set of clocks for telecom and non-telecom applications. The VadaTech UTC006 has the most sophisticated clocking distribution in the market to meet the most stringent requirements such as wireless infrastructure, high speed A/D, etc. The UTC006 supports the following GPS and general-purpose clocking features:

- μ TCA.4-compliant low-jitter/low-skew backplane crossbar clock routing matrix for CLK1/CLK2/CLK3 for all AMCs
- Clock disciplining with arbitrary clock frequency output and holdover (Stratum-3 option) including 1PPS regeneration and holdover
- Flexible integration and synchronization between GPS, IEEE1588 / SyncE, and NTP clocking enabling Grand Master clock functionality
- 'Any Frequency' high-quality clock generation/jitter cleaning for up to two user clocks
- Supports hitless automatic clock failover for improved reliability
- Optional built-in GPS receiver enables direct time/clock synchronization to the GPS satellite constellation

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The UTC006 supports flexible front panel clock port ordering options:

- Two DC-coupled LVCMOS Inputs/Outputs, or two AC-coupled Sine-wave Inputs, or one of each
- Built-in GPS receiver for time/location/clock synchronization plus a DC-coupled LVCMOS Input/Output

GPS RECEIVER ENABLED FEATURES

The UTC006 can be ordered with a GPS Receiver option. The receiver disciplines an on-board high-quality DPLL which is phase/frequency aligned to the atomic clocks in the GPS satellite constellation. The on-board clock synthesis/jitter cleaning capability can be utilized to convert this frequency into any frequency desired while still remaining locked to the GPS atomic clocks.

When the GPS Receiver option is purchased the UTC006 has the capability to re-transmit the incoming GPS data via Ethernet to other nodes in the network in the Trimble TSIP binary protocol format. This GPS data is also sent out the front panel GPS RS-232 serial port in the standard NMEA format for use by external equipment. When the GPS Receiver option is purchased along with the PCIe Fat Pipes fabric, the MCH also provides a precision PCIe Time-stamping Engine capability to a PrAMC PCIe Root Complex on the backplane. This engine appears as a PCIe device to the AMC card and a device driver is available which will allow the AMC card to read all GPS status including position, velocity, status, etc, in addition to precision timestamps, time trigger, and time event interrupt functionalities.

IEEE1588 PTP AND NTP GRAND MASTER CLOCK

The UTC006 can provide Ethernet time services to the chassis networks on both the GbE fabric. It can be subordinate to an external PTP or NTP master server or when the GPS receiver option is purchased can act as a Grand Master clock utilizing the precision timing information provided via the GPS receiver and on-board disciplined oscillator.

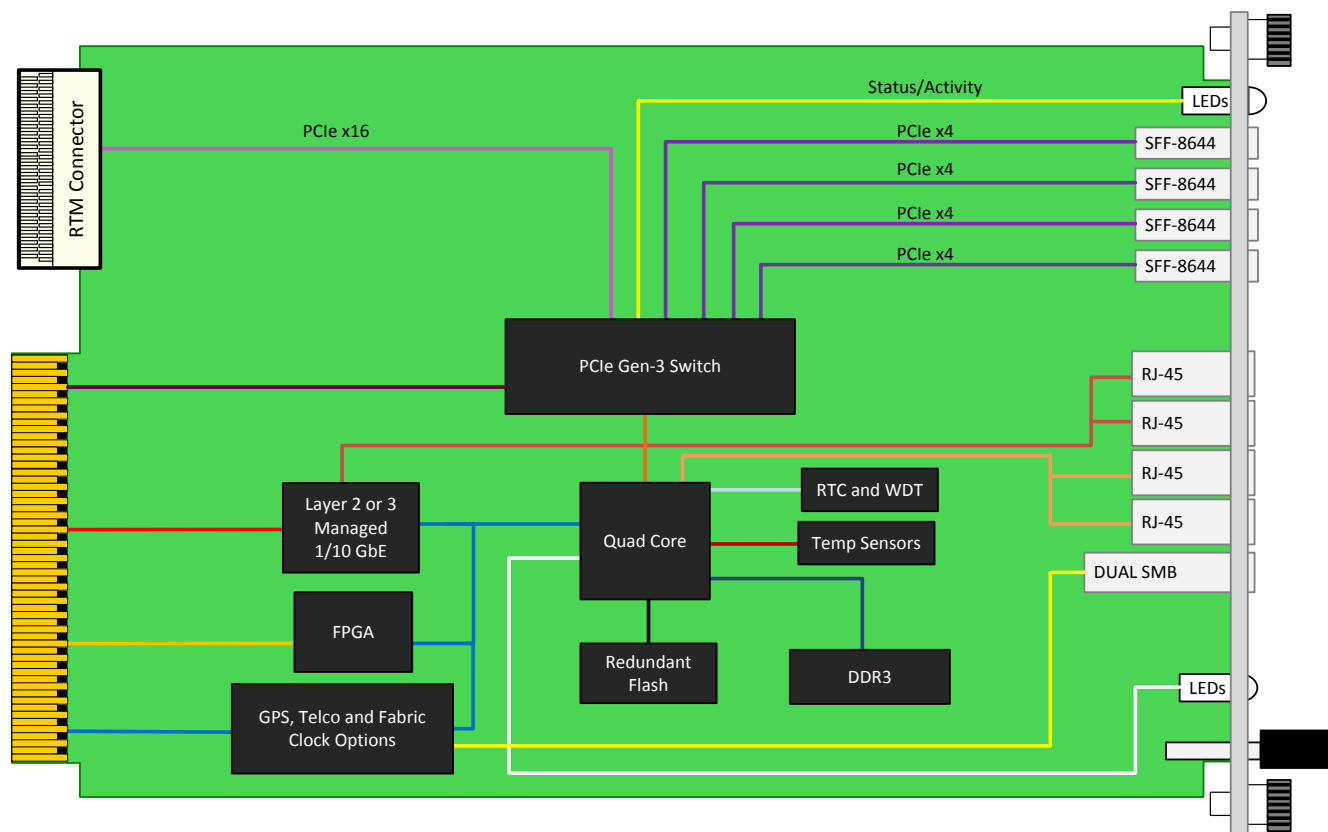
SYNCHRONOUS ETHERNET

The UTC006 provides a Synchronous Ethernet (SyncE) on the GbE fabric port. With this feature, ports on the 1G Ethernet switch can be designated as master or slave ports and the Ethernet fabrics within the chassis can be synchronized from end-to-end with external equipment. This feature utilizes advanced telecom-grade network synchronization PLLs to provide exceptional SyncE performance.

JTAG MASTER / JTAG VIA ETHERNET VIRTUAL PROBE

The UTC006 provide JTAG Master Capability to send out configuration data streams via the chassis JTAG Switch Module (JSM) to configure arbitrary JTAG Slave devices on AMC cards. Virtual Probe services are also available to provide JTAG via Ethernet for Xilinx FPGAs. This allows for standard development tools such as Xilinx iMPACT / ChipScope to treat the MCH/JSM combination as if it was a standard JTAG probe. This approach frees the developer from having to attach JTAG probes directly to the AMC or JSM which can be difficult when systems are already fully assembled. It also allows for remote debugging across long distances when required without the need to install additional JTAG equipment on-site.

BLOCK DIAGRAM



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SPECIFICATIONS

Architecture		
Physical	Dimensions	Width 5.85 in. (148.5 mm)
		Depth: 7.11" (180.6 mm)
Type	Controller	µTCA Carrier Hub (MCH)
Standards		
µTCA	Type	µTCA.0 Revision 1
AMC	Type	AMC.0 Revision 1
ATCA	Type	PICMG 3.0 Revision 2.0
Module Management	IPMI	IPMI Version 2.0
	HPM	HPM.1 Revision 1.0
Configuration		
Power	UTC006	Option load dependent (as the MCMC and Shelf only < 4 W)
Environmental	Temperature	Operating temperature: -5° to 55° C (air flow requirement of >200 LFM), industrial and military versions also available (See environmental spec sheet)
		Storage Temperature: -40° to +85° C
	Vibration	1G, 5 to 500 Hz on each axis
	Shock	30Gs each axis
	Relative Humidity	5 to 95 percent, non-condensing
Front Panel	Interface Connectors	RS-232 console port (RJ-45) for serial console and option for GPS NMEA serial data in/out
		Out-of-band LAN 10/100 from MCMC/Shelf Manager (RJ-45)
		Two in-band 100/1000/10G from Base Switch Fabric (RJ-45)
		Two CLK IN/OUT (SMB); CLK IN becomes GPS ANT IN with GPS receiver option
		Quad SFF-8644 for PCIe Gen 3 expansion
	LEDs	IPMI Management Control: Blue, Red, Amber, Green
		LNK/ACT, OOB PCIe error, ACTIVE MCMC, GPS receiver status, Clock: Ref Good, Freq Lock, Phase Lock, additional LEDs per each fat pipes fabric type
	Mechanical	Hot-swap switch input with +/-15KV ESD protection
	Temperature Sensor	Multiple temperature sensors on-board
Other		
MTBF	MIL Hand book 217-F @ TBD Hrs	
Certifications	Designed to meet FCC, CE and UL certifications where applicable	
Standards	VadaTech is certified to both the ISO9001:2000 and AS9100B:2004 standards	
Warranty	Two (2) years	

INTEGRATION SERVICES AND APPLICATION-READY PLATFORMS

VadaTech has a full ecosystem of ATCA and µTCA products including chassis platforms, shelf managers, AMC modules, Switch and Payload Boards, Rear Transition Modules (RTM), Power Modules, and more. The company also offers integration services as well as pre-configured Application-Ready Platforms. Please contact VadaTech Sales for more information.

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ORDERING OPTIONS

UTC006 – 000 – D0F – G0J

D = Front Panel Clocking ¹

- 0 = None (*Backplane clocking only*)
- 1 = Dual LVCMOS Clock In/Out
- 2 = Sine Wave In + LVCMOS In/Out
- 3 = Built-in GPS receiver + LVCMOS In/Out
- 4 = Dual Sine Wave In

F = Clock Holdover Stability

- 0 = Standard (XO)
- 1 = Stratum-3 (TCXO)

G = JTAG Virtual Probe

- 0 = None
- 1 = Included

J = Temperature & Coating

- 0 = Commercial, no coating (-5 to +55° C)
- 1 = Commercial Humiseal 1A33 Polyurethane (-5 to +55° C)
- 2 = Commercial, 1B31 Acrylic (-5 to +55° C)
- 3 = Industrial, no coating (-20 to +70° C)
- 4 = Industrial, Humiseal 1A33 Polyurethane (-20 to +70° C)
- 5 = Industrial, 1B31 Acrylic (-20 to +70° C)
- 6 = Military, Humiseal 1A33 Polyurethane (-40 to +85° C) ²
- 7 = Military, 1B31 Acrylic (-40 to +85° C) ²

Notes:

- 1) Backplane M-LVDS clock routing and related PLL clocking features are provided regardless of the front panel clock option. When GPS (D=3) is selected, additional GPS-related features become available such as precision GPS time-stamping via PCIe, GPS data transmission via Ethernet, and GPS serial NMEA data 'Y' cable is provided.
- 2) At the edge of the module for conduction-cooled.

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