

## UTC041 – $\mu$ TCA.3 Conduction Cooled MicroTCA Carrier Hub (MCH), PCIe Gen 3

$\mu$ TCA.3 MCH, PCIe Gen 3



### KEY FEATURES

- Single module, extended size per AMC.0
- Unified 1GHz quad-core CPU for MCMC (MicroTCA Carrier Management Controller), Shelf Manager, Clocking, and Fabric management
- Automatic fail-over with redundant UTC041s
- 1GbE base switch with dual 100/1000/10G uplink
- Non-blocking PCIe Gen 3
- Low-jitter M-LVDS clock distribution crossbar matrix
- PLL synthesizer for generating any clock frequency disciplined to GPS/IEEE1588

### Benefits of Choosing VadaTech

- 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/NTP Grand Master Clock
- Virtual JTAG capability for remote programming and debugging
- Full system supply from industry leader
- AS9100 and ISO9001 certified company

The VadaTech UTC041 is the most feature-rich conduction cooled MicroTCA Carrier Hub (MCH) in the market. Its management software is based on VadaTech's robust Carrier Manager and Shelf Manager which have been deployed for years with proven results. The MCMC manages the Power Modules, Cooling Units, and up to 12 AMCs within the chassis. It also manages PCIe Gen3 Fat Pipe switches as well as the standard GbE with 10GbE uplink Base Channel switch. The UTC041 panel with no PCIe Fabric is 4HP with PCIe option it is 8HP.

The UTC041 runs Linux on its centralized quad-core CPU and is hot-swappable/fully redundant when used in conjunction with a second instance of the module.

The firmware is HPM.2 compliant which allows for easy upgrades. It provides Master JTAG services to the AMCs via the JSM.

The UTC041 has advanced clocking features including grand master clock and high-quality clock distribution/synthesis.

## IPMI CARRIER MANAGER / SHELF MANAGER / PROTOCOL ANALYZER

The UTC041 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 analyser 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 UTC041 provides includes as standard a GbE base channel switch which includes two 10GbE uplink 100/1000/10G RJ45 ports. This switch supports Synchronous Ethernet (SyncE) and IEEE1588.

## FAT PIPES FABRICS

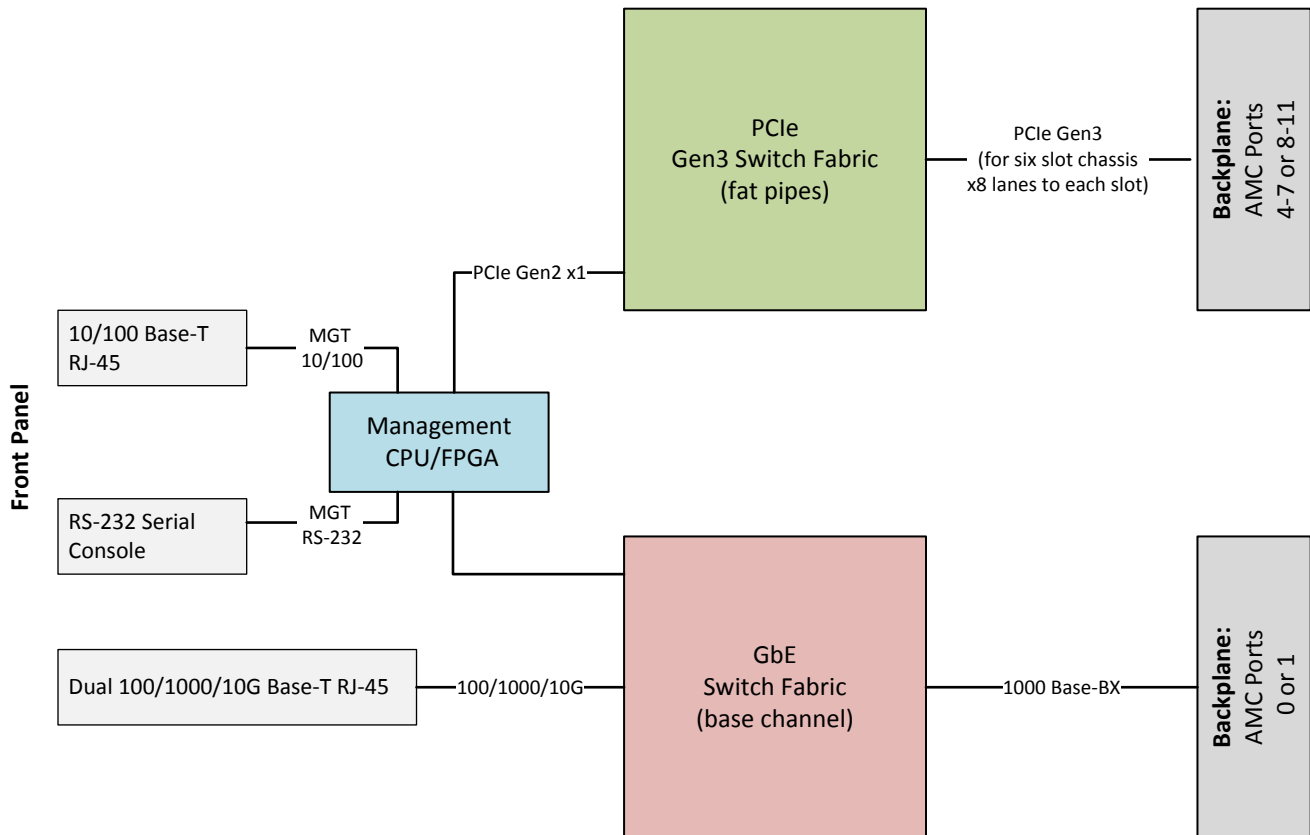
The UTC041 provides the following fat pipes fabric capability:

- PCIe Gen3 Switch
  - Automatic speed negotiation for 2.5/5/8Gbps 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)
  - 1024Gbps aggregate bandwidth / non-blocking / cut-through architecture

## FABRIC CLOCK OPTION

The UTC041 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.

## GENERAL CONNECTIVITY



## GPS AND GENERAL PURPOSE CLOCKS

The  $\mu$ TCA specification defines a set of clocks for telecom and non-telecom applications. The VadaTech UTC041 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 UTC041 supports the following GPS and general-purpose clocking features:

- $\mu$ 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

The UTC041 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 UTC041 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 UTC041 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.

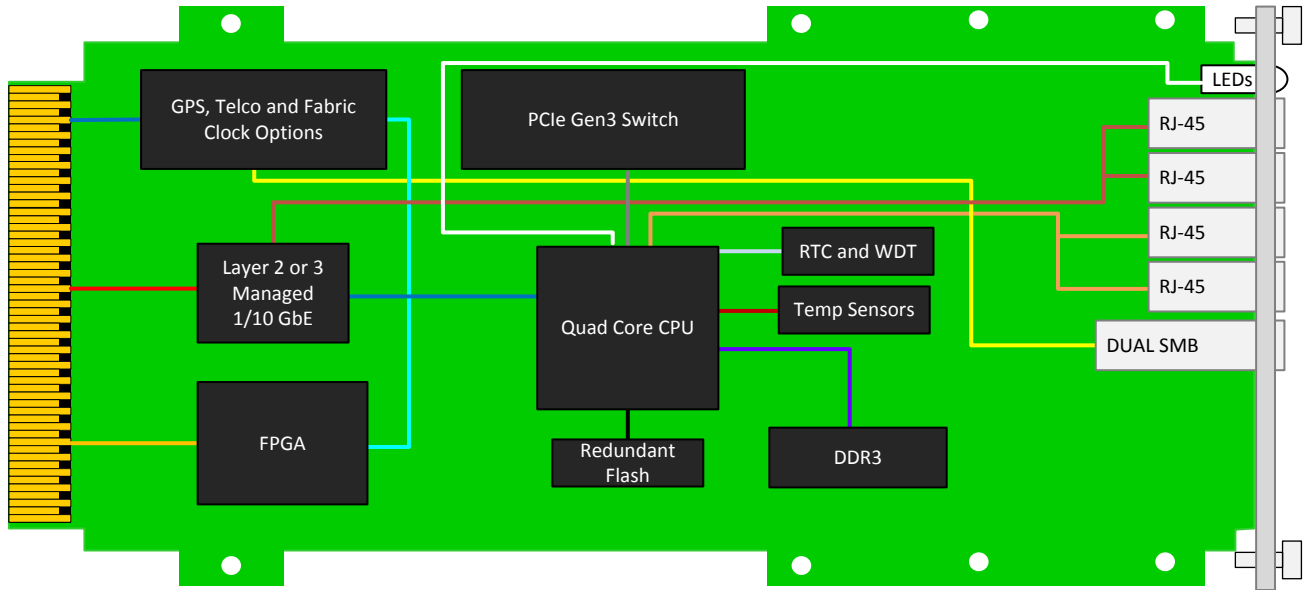
## IEEE1588 PTP AND NTP GRAND MASTER CLOCK

The UTC041 can provide Ethernet time services to the chassis networks on both the GbE fabrics. 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.

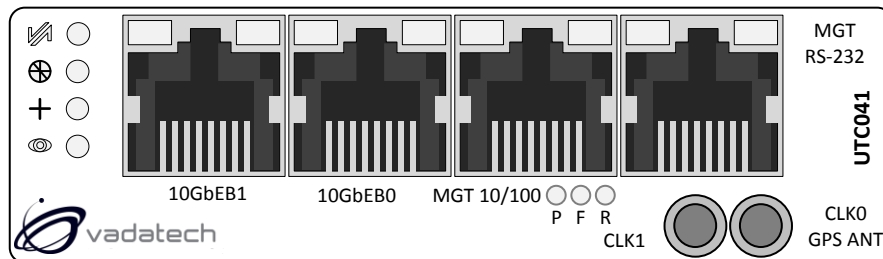
## JTAG MASTER / JTAG VIA ETHERNET VIRTUAL PROBE

The UTC041 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 specific vendors such as Xilinx and Altera. This allows for standard development tools such as Xilinx iMPACT/ChipScope and Altera Programmer/SignalTap 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



## FRONT PANEL



## SPECIFICATIONS

Architecture		
Physical	Dimensions	Width: 2.89" (73.5 mm) Depth: 7.11" (180.6 mm)
	Type	Controller
$\mu$ TCA Carrier Hub (MCH) – Conduction Cooled		
Standards		
$\mu$ TCA	Type	$\mu$ TCA.3
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	UTC041	45W with PCIe Fabric (without PCIe Fabric, GbE only 20W)
Environmental	Temperature	Operating temperature: -40° to 80° C (performance restrictions may apply) (See <a href="#">environmental spec sheet</a> ) Storage Temperature: -45° to +95° C
	Vibration	MIL-STD-810E Method 514.4 Procedure 1, Cat. 4 propeller, Cat. 5 Jet aircraft Cat. 6 helicopter
	Shock	MIL-STD-810 Method 516.4 Procedure 1 20g, ½ sine, 11 msec
	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
	LEDs	IPMI Management Control: Blue, Red, Amber, Green Link and Activity LEDs for each RJ-45 Clock: Ref Good, Frequency Lock, Phase Lock
	Mechanical	Dual wedge lock
	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  $\mu$ TCA 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

### UTC041 – A00 – D0F – G0J

#### A = Fabric <sup>1</sup>

- 0 = None
- 1 = PCIe Gen3 with Virtual Domain

#### D = Front Panel Clocking <sup>2</sup>

- 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
- 5 = GPS receiver + Sine Wave In

#### G = JTAG Virtual Probe

- 0 = None
- 1 = Included

#### F = Clock Holdover Stability

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

#### 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) <sup>3</sup>
- 7 = Military, 1B31 Acrylic (-40 to +85° C) <sup>3</sup>

#### Notes:

- 1) A base channel GbE included.
- 2) 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.
- 3) At the edge of the module.

## RELATED PRODUCTS



VT872 1/2 ATR, 6 AMC  
Conduction Cooled Chassis



AMC720C PrAMC Intel Xeon E3-1125  
Conduction Cooled



AMC526C Dual ADC, Virtex-7  
Conduction Cooled

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