

UTC041

MTCA.3 Conduction Cooled MicroTCA Carrier Hub (MCH)



UTC041

Key Features

- Single module, extended size per AMC.0
- Unified 1 GHz quad-core CPU for MicroTCA Carrier Management Controller (MCMC), Shelf Manager, Clocking, and Fabric management
- Automatic fail-over with redundant UTC041s
- 1GbE base switch with dual 100/1000/10G uplink
- Non-blocking PCIe Gen3 or 10GbE fabric
- Low-jitter M-LVDS clock distribution crossbar matrix
- PLL synthesizer for generating any clock frequency disciplined to GPS/SyncE/IEEE1588

Benefits

- Crossbar clock matrix for low jitter, cleanest signals
- Onboard 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 eases FPGA code development
- Full system supply from industry leader
- AS9100 and ISO9001 certified company



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UTC041

The VadaTech UTC041 is the most feature-rich conduction cooled MicroTCA Carrier Hub (MCH) on 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 or 10GbE XAUI fabric switch as well as the standard GbE with 10GbE uplink Base Channel switch.

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 unit panel size is 4 HP with no PCIe Fabric or 8 HP with the PCIe or 10GbE option.

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



Figure 1: UTC041

Block Diagram

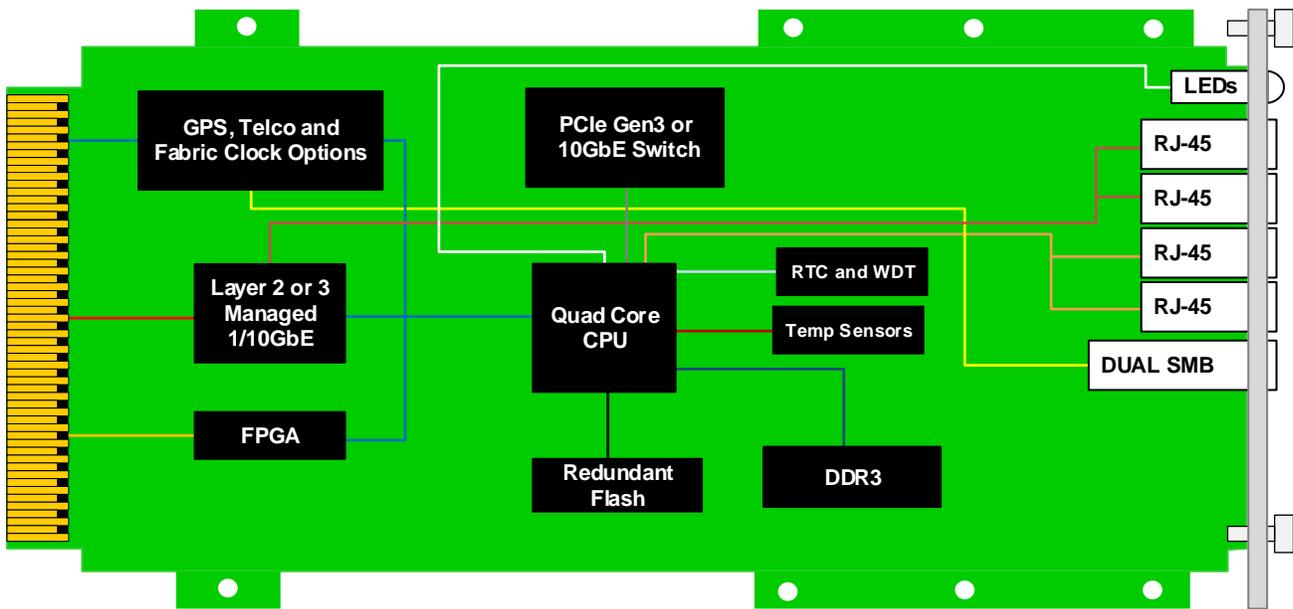


Figure 2: UTC041 Functional Block Diagram

Front Panel



Figure 3: UTC041 Front Panel

General Connectivity

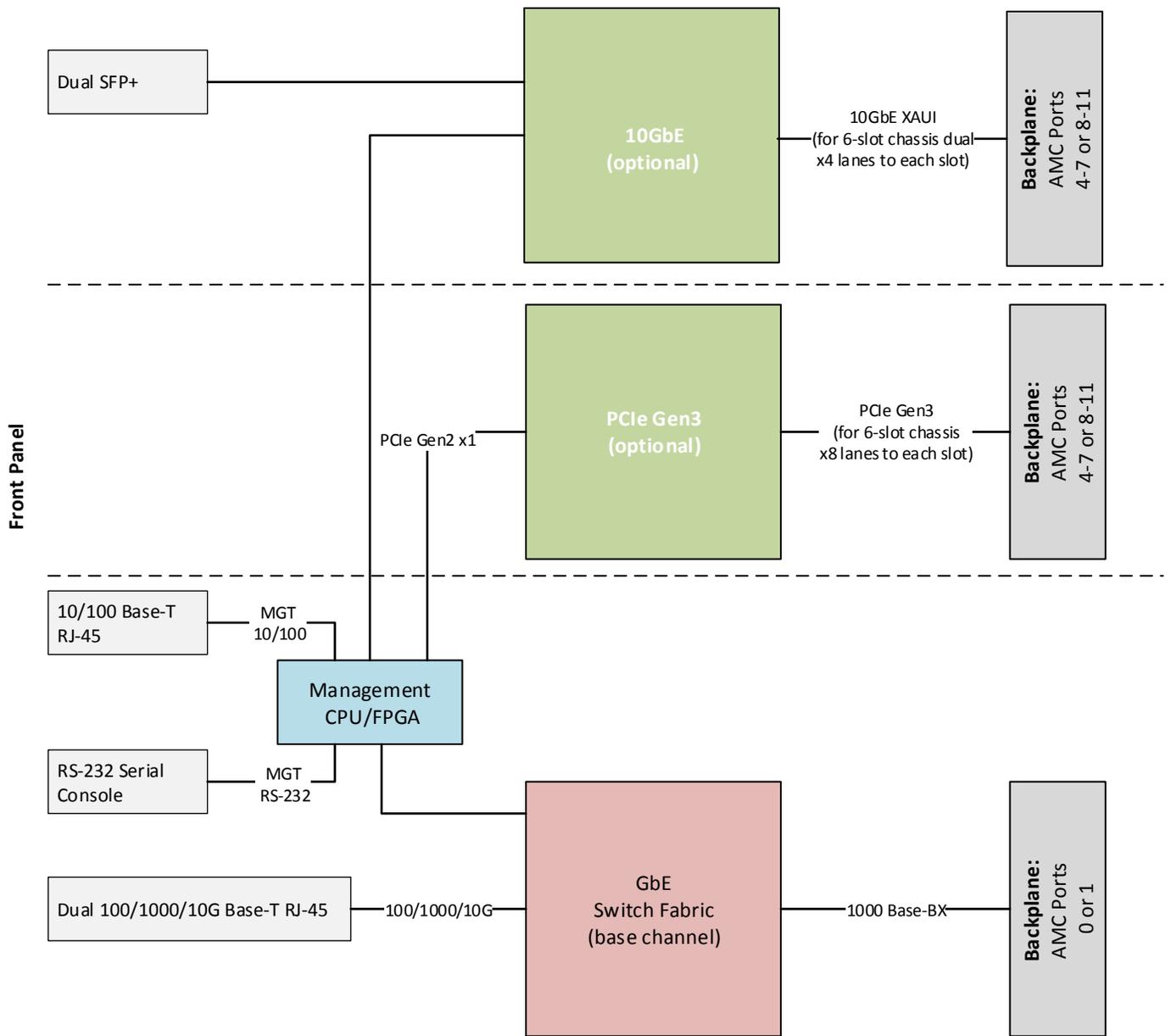


Figure 4: UTC041 Connectivity

Architecture

IPMI Carrier Manager, Shelf Manager and 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 analyzer operations to help facilitate a seamless chassis integration experience. The IPMI stack enables a rich feature set including:

- IPMI v2.0 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 includes as standard a GbE base channel switch which includes two 10GbE uplink 100/1000/10G RJ-45 Ports. This switch supports Synchronous Ethernet (SyncE) and IEEE1588.

Fat Pipe Fabrics

The UTC041 provides for PCIe or 10GbE fat pipe fabric options:

PCIe Gen3 Fabric Switch

- 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

10GbE Switch with front dual SFP+ expansion/uplink ports

- Full Layer 2 or 3 management enabling enterprise-grade switching and routing
- Supports Synchronous Ethernet (SyncE) and IEEE1588 to facilitate advanced system synchronization via Ethernet
- 320 Gbps aggregate bandwidth for mixed 10GbE/40GbE

10GbE Base Channel Switch

- Full Layer 2 or 3 management enabling enterprise-grade switching and routing
- Supports Synchronous Ethernet (SyncE) and IEEE1588 to facilitate advanced system synchronization via Ethernet

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.

GPS and General-Purpose Clocks

The MTCA 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:

- MTCA.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 UTC004 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 onboard high-quality DPLL which is phase/frequency aligned to the atomic clocks in the GPS satellite constellation. The onboard 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 Timestamping 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 onboard disciplined oscillator.

JTAG Master/JTAG via Ethernet Virtual Probe

The UTC041 provides 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.

Specifications

Architecture	
Physical	Dimensions Single module, extended-size Width: 2.89" (73.5 mm) Depth 7.11" (180.6 mm)
Type	Controller MicroTCA Carrier Hub – Conduction Cooled
Standards	
MTCA	Type MTCA.3
AMC	Type AMC.0
Module Management	IPMI IPMI v2.0 HPM v1.0
ATCA	Type PICMG 3.0 Revision 2.0
Configuration	
Power	UTC041 45W with PCIe Fabric (without PCIe Fabric, GbE only 20W)
Environmental	Temperature See Ordering Options Storage Temperature: -45° to +95°C
	Vibration Operating 9.8 m/s ² (1G), 5 to 500 Hz on each axis
	Shock 30Gs each axis
	Relative Humidity 5 to 95% 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 ISO9001:2015 and AS9100D standards
Warranty	Two (2) years, see VadaTech Terms and Conditions

INTEGRATION SERVICES AND APPLICATION-READY PLATFORMS

VadaTech has a full ecosystem of OpenVPX, ATCA and MTCA products including chassis platforms, shelf managers, AMC modules, Switch and Payload Boards, Rear Transition Modules (RTMs), 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.

Ordering Options

UTC041 – A00-D0F-G0J

A = Fabric*1	D = Front Panel Clocking*2	G = JTAG Virtual Probe
0 = No Fabric 1 = PCIe Gen3 with Virtual Domain 2 = 10GbE w/ 2x SFP+ Uplink	0 = 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 6 = Sine Wave In (up to 17dBm) +TTL/LVCMOS In	0 = No JTAG Virtual Probe 1 = JTAG Virtual Probe
	F = Clock Holdover Stability	J = Temperature Range and Coating
	0 = Standard (XO) 1 = Stratum-3 (TCXO)	0 = Commercial (–5° to +55°C), No coating 1 = Commercial (–5° to +55°C), Humiseal 1A33 Polyurethane 2 = Commercial (–5° to +55°C), Humiseal 1B31 Acrylic 3 = Industrial (–20° to +70°C), No coating 4 = Industrial (–20° to +70°C), Humiseal 1A33 Polyurethane 5 = Industrial (–20° to +70°C), Humiseal 1B31 Acrylic 6 = Extended, Humiseal 1A33 Polyurethane (–40 to +85°C)*3 7 = Extended, 1B31 Acrylic (–40 to +85°C)*3

Notes:

*1 A base channel GbE with 10GbE uplink switch is always included regardless of the fabric switch (fat pipes) option.

*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 Conduction cooled; temperature is at edge of module. Consult factory for availability.

Related Products

AMC720



- Intel® Xeon™ E3 processor
- Up to 16 GB of DDR3 w/ ECC and 32 GB Flash
- Conduction cooled version available

AMC526



- Single Module, Mid-size per AMC.0
- Xilinx Virtex-7 690T FPGA in FFG-1761 package
- Conduction cooled version available

VT872



- MTCA.3 Conduction Cooled System Platform
- 1/2 Short Air Transport Rack (ATR) per ARNIC404A, with NO internal fan (12.62" deep without handle)
- Up to 6 mid-size AMCs

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