C112

Freescale™ QorIQ™ T4 6U VPX SBC

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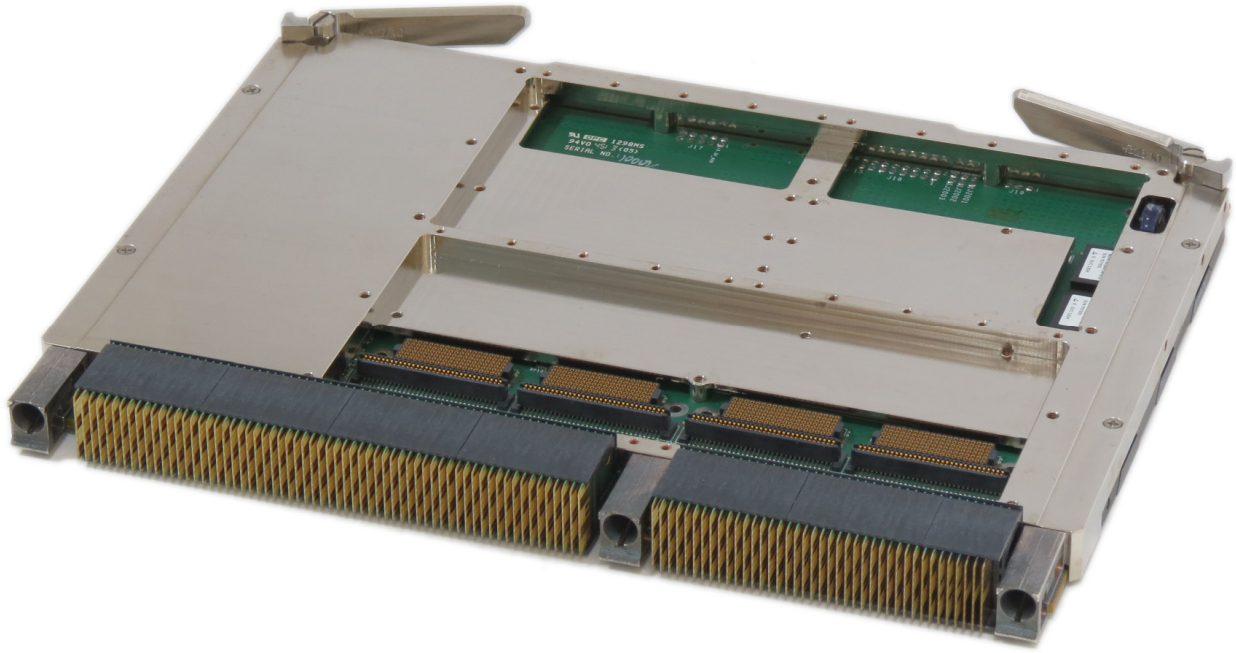

- Rugged 6U VPX Single-Slot SBC
- Freescale QorIQ Multicore SOC Processor
  - 12/8/4 e6500 Dual Thread Cores (T4240/T4160/T4080)
  - Altivec Unit
  - Secure Boot and Trust Architecture 2.0
- 4 GB DDR3 with ECC
- 256 MB NOR Flash Memory
- 16 GB SATA Flash Drive
- Versatile Board I/O
  - USB
  - SATA
  - GbE
  - Serial
  - Discrete
  - MIL-STD-1553
- 2 PMC/XMC Slots
- WWDT, ETR, RTC, Temp. Sensors
- VxWorks®, Linux®, INTEGRITY® Support
- OpenVPX Compliant
- 2LM Compliant Option per VITA 48.2
- Conduction and Air-Cooled Versions
- Vibration and Shock Resistant

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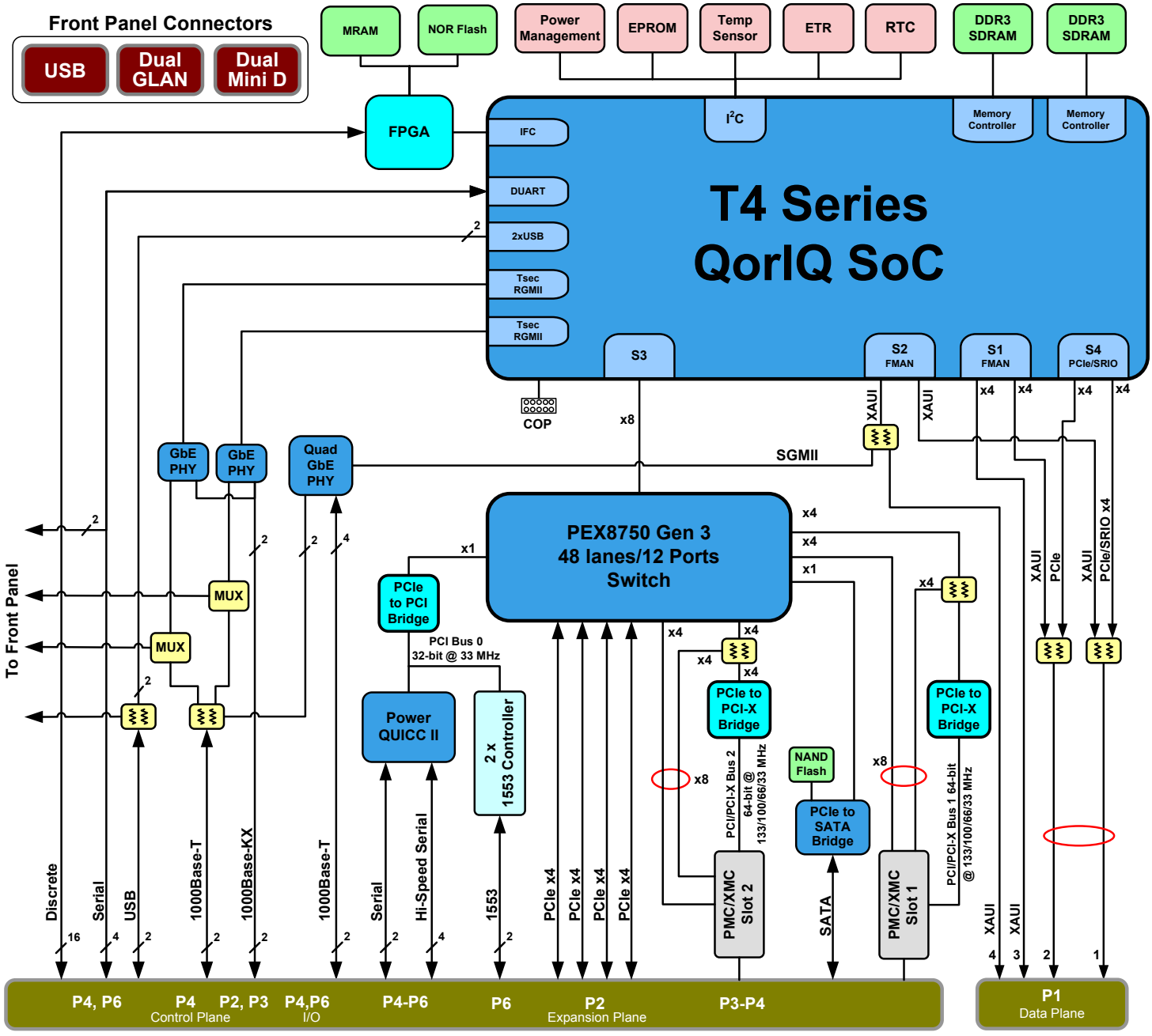
The C112 is Aitech's latest generation VPX PowerPC SBC, based on Freescale's new QorIQ T4 Series SoC multi-core, multi-thread processors.

The wide variety of on-board I/O and large memory resources, including on-board mass storage, in combination with the powerful SoC processor, make the C112 the right SBC for many applications, right out of the box. The two industry standard PMC/XMC slots provide flexibility and expandability, along with the availability, convenience, and cost benefits of COTS.

For improved security assurance, the C112 also includes the latest QorIQ Secure Boot and Trust Architecture 2.0.

To support Two Level Maintenance and provide ESD protection, the conduction-cooled C112 is available with a secondary side cover to supplement the full heatsink on the primary side.

C112 mechanical and electrical designs guarantee its operation over the full range of rugged application environments.



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Board Architecture

Processor	Freescale T4 Series QorIQ SOC: 12 (T4240), 8 (T4160), or 4 (T4080) dual-threaded cores with integrated memory, bus, and I/O controllers. Includes on-chip 32k/32k L1 per core, and 2 MB shared L2 caches per cluster (cluster = 4 cores).
PCIe Switch	The PCIe Gen3 switch manages connections between the QorIQ SOC, PMC/XMC sites, 1553 controllers, PowerQUICC (serial controller), and the VPX Expansion Plane
VPX Fabric	4-port/4-lane (x4) serial switch fabric on P1 supports four ports (DP1-DP4) configurable as XAUI/SRIO or PCIe (see *Ordering Information*)
Board Resources	• Watchdog Timers (Windowed + Standard) • Secure Boot and Trust Architecture 2.0 • Real Time Clock • Elapsed Time Recorder • Temperature Sensors • 8 Counters/Timers

Memory Resources

RAM	4 GB of DDR3L SDRAM with ECC operates at 1600 MT/s, configured in dual channels
Flash Disk	Optional 16 GB SATA Flash Disk
Boot Flash	256 MB NOR Flash - 64 MB allocated for Boot; 192 MB available to user
NVRAM	512 kB high speed MRAM with unlimited writes & long term data retention

I/O

	Backplane I/O		Front Panel I/O
	Fabric Option 1	**Fabric Option 2 & 3**	
USB 2.0	2 (1)		1 (1)
SATA 2.0	1		
Ethernet - Gigabit: 10Base-T/100Base-TX/1000Base-T	2 (2)	4	2 (2, 3)
Ethernet - Gigabit: 1000Base-KX		2 (2)	-
Serial Ports – High speed Multi-protocol synchronous/asynchronous ports supporting common serial communications protocols (UART, USART, SDLC, HDLC, etc.). Software configurable as RS-232/422/485	4		-
Serial Ports – Standard: RS-232/422 Asynchronous UARTs. Software configurable as RS-232/422.	6		2 (4)
MIL-STD-1553B BC or Multi RT operation with Concurrent Bus Monitor. Controllers support 66 MHz operation & DMA engine	Up to 2 (see *Ordering Information)*		-
Discrete I/O Lines Individually software configurable as input (with optional interrupts) or output, and as SE (1 line per channel) or Diff RS-422 (2 lines per channel)	16		-

Notes:
(1) On air-cooled boards one of the USB interfaces is routed to a front panel connector at the expense of one USB interface at the VPX backplane connectors.
(2) Each of these Ethernet interfaces can be individually routed, under software control, either to a front panel connector or to the VPX backplane connectors.
(3) Automatically configured as Base-T or Base-KX depending on actual interface that is connected.
(4) Wired in parallel to two serial ports at the VPX backplane connectors.

PMC/XMC Slots

PMC 1 & 2	64-bit PCI/PCI-X @ 133/100/66/33 MHz, universal site supports 3.3 V and 5 V PCI I/O signaling levels PMC I/O routing is per VITA 46.9
XMC 1 & 2	Connects to CPU subsystem through PCIe x8 port, supporting x8, x4, x2, and x1 bus widths XMC I/O routing is per VITA 46.9, except as noted in the Backplane Fabric Options table below

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Software

Operating Systems	WindRiver VxWorks®, Linux®, and Green Hills INTEGRITY® are supported
Drivers	Operating system specific device drivers for board resources are available

Mechanical

Form Factor & Dimensions	Air-cooled 6U VPX per ANSI/VITA 48.1-2010 Conduction-cooled 6U VPX per ANSI/VITA 48.2-2010
Voltage Keying per VITA 46.0-2007	Universal keying for VPWR = 5 V configuration 0° keying for VPWR = 12 V configuration
Weight	Air-cooled: <800 g (1.8 lbs); Conduction-cooled: <1600 g (3.6 lb); Conduction-cooled with 2LM Cover: <1800 g (4.0 lb)

Power

Processor	VPWR (+5 V/+12 V) (2)	+3.3 V Aux	+12 V Aux (3)	-12 V Aux (3)	Total
T4080	8.2 A/TBD	0.05 A	0 A	0 A	41.2 W
T4160	9.5 A/TBD	0.04 A	0 A	0 A	47.7 W
T4240	11.3 A/TBD	0.08 A	0 A	0 A	56.8 W

Notes:
(1) Power measured under VxWorks with all CPU cores/threads operating.
(2) The C112 can operate from VPWR +5 V or +12 V – see *Ordering Information* (with +12 V VPWR a +5 V backplane supply is still needed)
(3) ±12V Aux are required for PMC/XMC only.
(4) Actual power consumption depends on configuration and assembly options.

Environmental

Specs per VITA 47	Air-Cooled			Conduction-Cooled	
	Commercial	**Rugged**	**Military**	**Rugged**	**Military**
Operating Temp.	AC1 (0 to +55 °C) (2)	AC3 (-40 to +70 °C) (2)	AC4 (-40 to +85 °C) (1,2)	CC3 (-40 to +70 °C) (3)	CC4 (-40 to +85 °C) (1,3)
Non-Operating Temp.	C1 (-40 to +85 °C)	C3 (-50 to +100 °C)	C4 (-55 to +125 °C)	C3 (-50 to +100 °C)	C4 (-55 to +125 °C)
Vibration	V1	V2	V2	V3	V3
Operating Shock	OS1	OS1	OS1	OS2	OS2
Altitude	15,000 ft.	35,000 ft.	70,000 ft.	35,000 ft.	70,000 ft.
Relative Humidity (4)	0 - 90%	0 - 100%			
Conformal Coating	N/A	Acrylic (Silicone and Urethane Optional)			

Notes:
(1) **-55 °C available, contact an Aitech representative for more information**
(2) Operating ambient air temperature (with sufficient airflow)
(3) Operating card edge temperature
(4) Non-condensing

Accessories

TM112	Rear Transition Module (RTM) providing convenient access to C112 I/O interfaces via standard connectors and to all PMC/XMC I/O via headers. Supports both air and conduction-cooled C112 mounted in commercial air-cooled chassis. Refer to the TM112 datasheet for further information.

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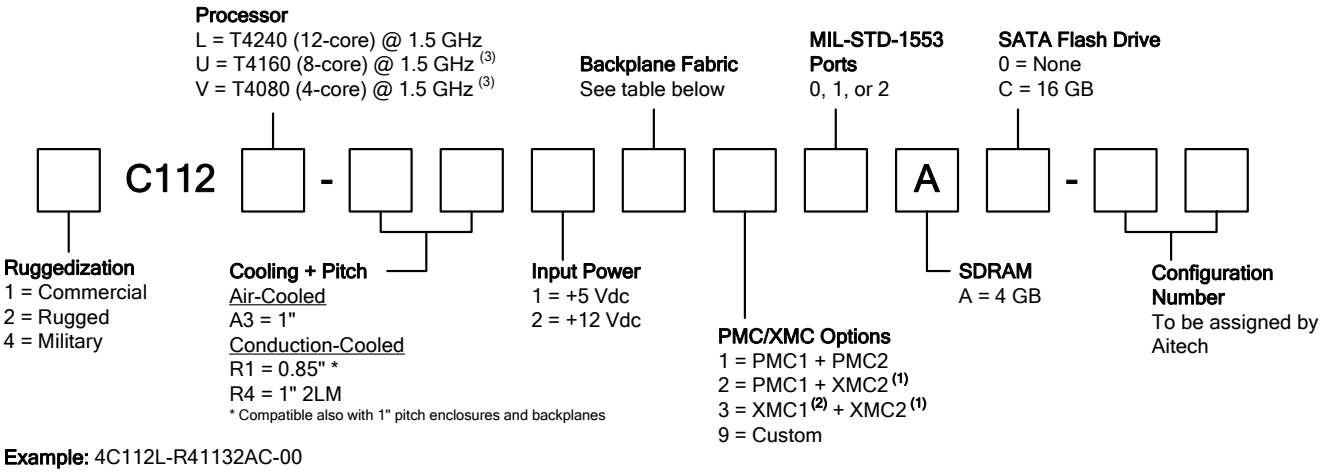
Ordering Information



Example: 4C112L-R41132AC-00

Fabric Option #	P1 (Data Plane)				P2 (Expansion Plane)	P4 (Control Plane)				P4/P6 (I/O)	VITA 65 Profile Name
	4-lane	4-lane	4-lane	4-lane		1000Base-KX		1000Base-T			
	DP1	DP2	DP3	DP4		CPutp1	CPutp2	CPtp1	CPtp2	Gb Port	
1	XAUI	XAUI	XAUI (3)	XAUI (3)	4 PCIe x4	2 (4, 5)				0	MOD6-PAY-4F2T-12.2.2-n
2 (1)	PCIe	PCIe (3)	XAUI (3)	0	4 PCIe x4	1 (5)	1 (5)	1	1	2	MOD6-PAY-2F2U2T-12.2.5-n
3 (1)	SRIO	PCIe (3)	XAUI (3)	0	4 PCIe x4	1 (5)	1 (5)	1	1	2	MOD6-PAY-2F2U2T-12.2.5-n
9	Custom										

Notes:
(1) With Fabric Options 2 & 3, all XMC2 I/O is routed to the backplane except for XMC2 A/B/D/E17 and A/B/D/E19 (pins are used for GLAN3).
(2) All XMC1 I/O is routed to the backplane except for XMC1 A17 and B17 (pins are used for SP7 differential clock lines).
(3) When choosing T4160 or T4080 QorIQ SoC, these interfaces will not be available.
(4) Each port supports Base-T and Base-KX PHY layers. Port type is auto-configured depending on the actual interface that is connected.
(5) On air-cooled boards, these ports may be routed, under software control, as Base-T ports to front panel connectors, and will not be available at the backplane.

Contact Aitech

Contact your Aitech sales representative for additional product information, and for inquiries regarding customized configurations of the C112 and additional software support.

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