3U VPX UAV Computer

The 3U VPX UAV Computer is a dual slot, 64-bit QorIQ-based computing system with a wide variety of inputs and outputs as well as multi-function interfaces. The 3U VPX UAV Computer host board uses an NXP QorIQ T2080 processor and provides four Gigabit Ethernet channels (2 x 1000BaseT and 2 x 1000BaseBX), NAND flash memory, NOR flash memory and Non-Volatile Memory (NVRAM). 512 KByte of Magnetoresistive Random AccessMemory (MRAM) NVRAM is standard.

One companion 3U VPX Board and one companion XMC Adapter provide multiple I/O options. As standard, the companion Multi-Function 3U VPX Board provides a dual-redundant MIL-STD-1553B channel, multiple ARINC 429 channels (eight Tx and sixteen Rx), four RS-232/422/485 channels. The companion Serial and Digital I/O XMC Adapter provides sixteen duplex RS-422 Serial I/O channels routed to the backplane connector, as well as eight LED signals. 2 MByte of Parallel Non-Volatile NVRAM is optional.

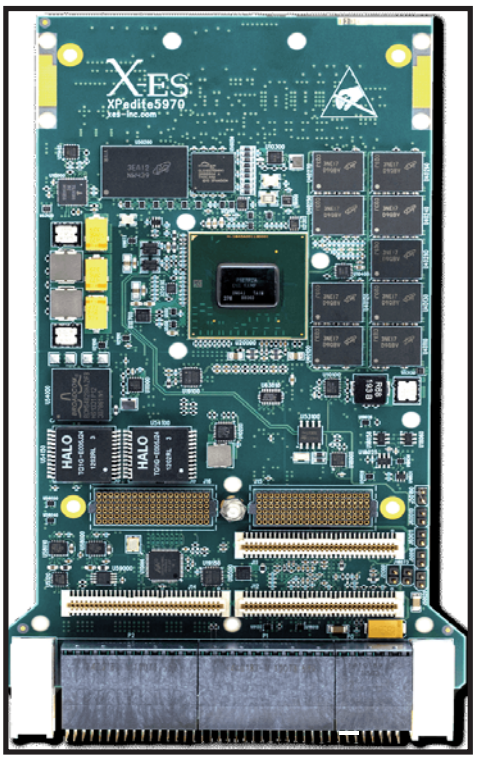
The 3U VPX Computer is compatible with selected 3U VPX backplanes and complies with ANSI/VITA 46.0-2019.

The 3U VPX Computer has multiple memory and CPU speed configurations and is available in commercial grade air-cooled, industrial grade air-cooled, as well as ruggedised grade with both air-cooled and conduction-cooled versions.

Architecture

The 3U VPX Computer consists of a 3U VPX Single Board Computer (SBC), having a QorIQ T2080 processor with a XMC/PMC site, plus one companion 3U VPX board and one companion XMC adapter. These companion boards and adapters are used to provide multiple I/O interfaces and options. The I/O signals are connected to the 3U VPX P0 and P2 connectors on the backplane.

For networking, two 10/100/1000BASE-T channels are routed to P1 and P2 and two 10/100/1000BASE-BX channel are routed to P1.



3U VPX
UAV Computer SBC

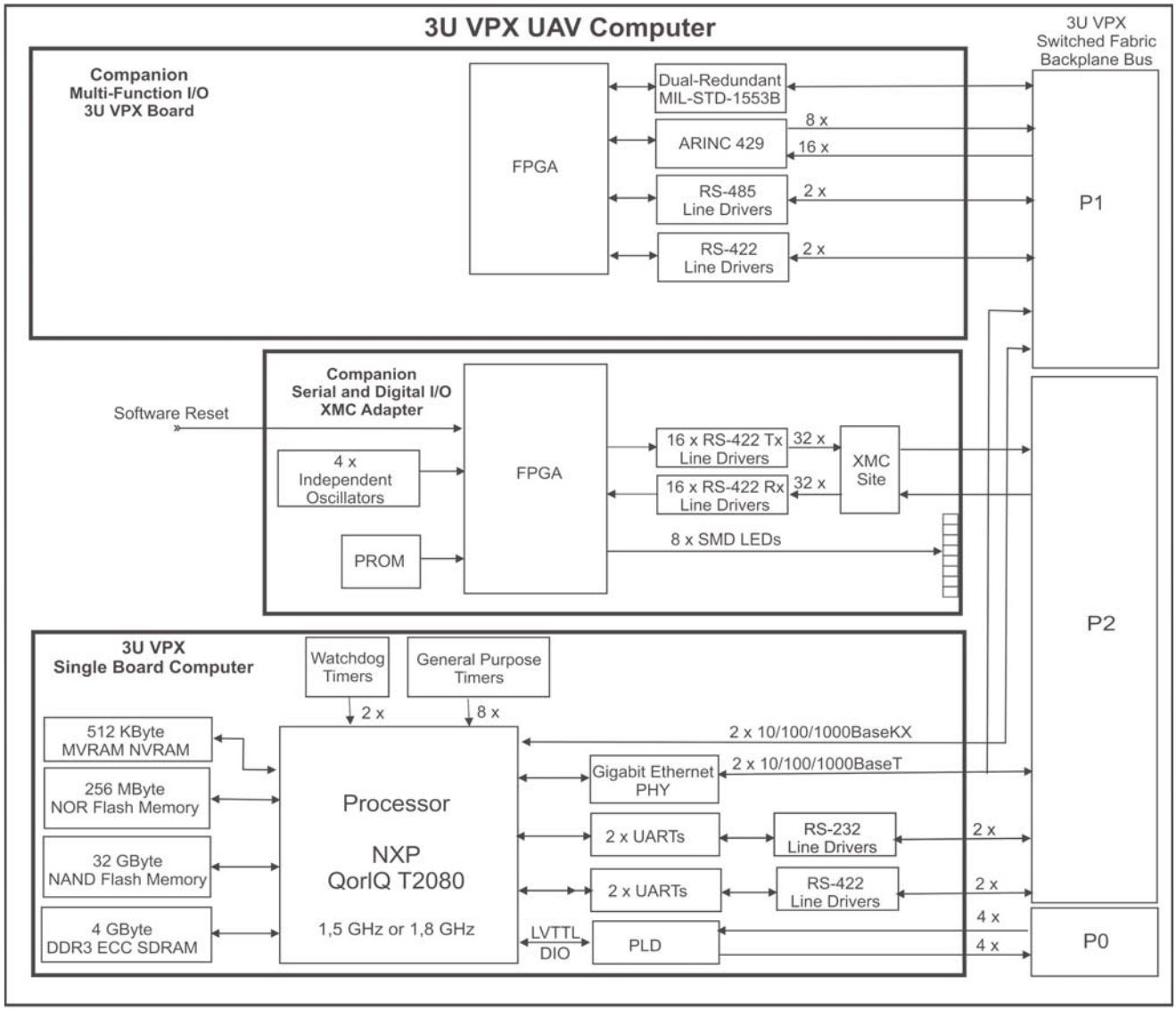
3U VPX
Multi-Function I/O Board

Images for illustrative purposes

Serial and Digital I/O
XMC Adapter

3U VPC UAV Computer Component Boards and Mezzanine Adapter

3U VPX UAV Computer



3U VPX UAV Computer Block Diagram

3U VPX UAV Computer

System-Level

3U VPX UAV Computer

Features

- NXP QorIQT20800 processor at 1,5 GHz or 1,8 GHz
- eight virtual (four dual-threaded) e6500 cores
- 64-bit Virtual Path Cross-Connect (VPX) switched fabric backplane bus
- 4 GByte of DDR3 ECC SDRAM
- 256 MByte of NOR Flash Memory
- 32 GByte of NAND Flash Memory
- 512 KByte of MVRAM NVRAM
- 1 x dual-redundant MIL-STD-1553B channel (Bus Controller, Remote Terminal and Bus Monitor)
- 8 x Tx ARINC 429 channels
- 16 x Rx ARINC 429 channels
- 2 x RS-232 channels from SBC routed to backplane connector P2
- 2 x RS-485 channels from Multi-Function I/O 3U VPX Board routed to backplane connector P2
- 18 x RS-422 channels routed to backplane connector
- 4 x Digital Input lines routed to backplane connector
- 4 x Digital Output lines routed to backplane connector
- 4 x Gigabit Ethernet channels over copper media to backplane connector
  - 2 x 10/100/1000BaseT
  - 2 x 10/100/1000BaseBX
- 2 x Watchdog Timers
- 8 x General PurposeTimers
- 8 x SMD LED Signals on Serial and Digital I/O XMC Adapter
- 20 x Test Signals on Header from Serial and Digital I/O XMC Adapter (optional)
- 2 x SATA ports
- 2 x USB 2.0 ports
- IC bus

Specifications	
Processor	NXP QorIQ T2080 processor with eight virtual cores at up to 1,8 GHz
RAM Memory	4 GByte of DDR3 ECC SDRAM Memory
Flash Memory	256 MByte of NOR Flash Memory 32 GByte of NAND Flash Memory
Non-Volatile Memory	512 KByte of MVRAM NVRAM
Gigabit Ethernet LAN	4 x Gigabit Ethernet channels over copper media, routed to backplane connectors 2 x 10/100/1000-BaseT 2 x 10/100/1000-BaseBX
Watchdog Timer	2 x Watchdog Timers (Programmable Avionic Style)
Timers	8 x General Purpose Timers

3U VPX UAV Computer

Specifications (continued)

Formfactor	3U VPX (ANSI/VITA 46.0-2019)
Backplane Connectors	MULTIGIG RT 2-R 112-pin connector x 2 (P1, P2) MULTIGIG RT 2-R 56-pin connector x 1(P0)
Software Reset	Software Reset for Processor
MIL-STD-1553B	1 x dual-redundant channel, Bus Controller, Remote Terminal and Bus Monitor 2 x dual-redundant channels, Bus Controller, Remote Terminal and Bus Monitor (optional)
ARINC 429	8 x transmit (Tx) channels, routed to backplane connector P2 16 x receive (Rx) channels, routed to backplane connector P2
Serial I/O	2 x RS-232 channels, routed from SBC to backplane connector P2 2 x RS-422 channels, routed from SBC to backplane connector P2 2 x RS-485 channels, routed from Multi-Function I/O 3U VPX Board to backplane connector P2 16 x RS-422 channels, routed from User Serial and Digital I/O XMC Adapter to backplane connector P1
Digital I/O	8 x LVTTL Digitial I/O lines, routed from SBC to backplane connector P2
Clocks	2 MHz, 10 MHz, 20 MHz and 40 MHz routed on companion Serial and Digital I/O XMC Adapter
LEDs	8 x SMD LED Signals on companion Serial and Digital XMC I/O Adapter
Test Signals	20 x Test Signals routed to Header on companion Serial and Digital XMC I/O Adapter
Test Interface	JTAG Header
Software	VxWorks V653 Operating System and Software Driver Support for Gentoo Linux

Physical Characteristics

	Dimensions	Cooling	Mass
Physical	100 mm high x 160,0 mm deep ≈40 mm wide	Air	900 g +/- 50 g
	100 mm high x 160,0 mm deep ≈40 mm wide	Conduction	1 000 g +/- 50 g

Power Characteristics

Power Consumption	Typical : 40 Watt Maximum : 50 Watt with QorIQ T2080 Processor @ 1,8 GHz

3U VPX UAV Computer

Reliability

MTBF	Figures according to MIL-HDBK-217F, Parts Stress Method		
	Commercial Grade	Ground Benign, Controlled, 25 C	120 000 hours
	Industrial Grade	Ground, Mobile, 45 C	21 000 hours
		Naval, Sheltered, 40 C	39 000 hours
		Airborne, Inhabited Cargo, 55 C	20 000 hours
		Airborne, Uninhabited Cargo, 70 C	8 000 hours
		Airborne, Rotary Wing, 55 C	8 000 hours
		Airborne, Inhabited Fighter, 55 C	15 000 hours
		Airborne, Uninhabited Fighter, 70 C	4 000 hours
	Ruggedised Grade	Ground, Mobile, 45 C	25 000 hours
		Naval, Sheltered, 40 C	47 000 hours
		Airborne, Inhabited Cargo, 55 C	24 000 hours
		Airborne, Uninhabited Cargo, 70 C	10 000 hours
		Airborne, Rotary Wing, 55 C	10 000 hours
		Airborne, Inhabited Fighter, 55 C	18 000 hours
		Airborne, Uninhabited Fighter, 70 C	5 000 hours

Environmental Specifications

	Commercial Grade	Industrial Grade	Ruggedised Grade
Temperature **- Operating** **- Storage**	0 C to +55 C -40 C to +85 C	-40 C to +70 C -55 C to +85 C	-40 C to +85 C -55 C to +125 C
Humidity	0% to 90%	0% to 95%	0% to 95%
Shock	20 g peak for 11 ms	30 g peak for 11 ms	40 g peak for 11 ms
Vibration **- Sine** **- Random**	2 g (peak) 10 Hz to 100 Hz 0,002 g²/Hz 5 Hz to 2 kHz	5 g (peak) 5 Hz to 2 kHz 0,04 g²/Hz 5 Hz to 2 kHz	10 g (peak) 5 Hz to 2 kHz 0,1 g²/Hz 5 Hz to 2 kHz

Part Selector

Part Designation	Cooling	Grade
CCII/UAVC/3UVPX/001/COM	Air	Commercial
CCII/UAVC/3UVPX/001/IND	Air	Industrial
CCII/UAVC/3UVPX/001/RGD	Air	Ruggedised
CCII/UAVC/3UVPX/001/CC	Conduction	Ruggedised