

VPX3-1220

3U VPX 7th Gen Intel® Xeon® Single Board Computer

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Key Features

- Intel “Kaby Lake Xeon” 7th Gen processor
- Quad-Core (8-thread) E3-1505L v6 CPU with Turbo
- Up to 32 GB DDR4 with ECC
- Up to 32 GB SATA NAND flash
- Supports XMC expansion mezzanine
- Available in air-cooled and conduction-cooled versions
- Supports Linux (Fedora and Red Hat Enterprise Linux (RHEL)), VxWorks, Microsoft Windows Embedded

Applications

- General computing and mission processing
- Graphics processing driving up to 3 digital displays
- [High Performance Embedded Computing \(HPEC\)](#) systems
- Multi-SBC systems for advanced processing and ISR applications

Overview

The [VPX3-1220](#) from Curtiss-Wright Defense Solutions is a high-performance, single board computer (SBC) featuring the 7th Generation Intel Kaby Lake Xeon processor. Pin-compatible with our previous generations of Intel SBCs, the VPX3-1220 offers high powerful Intel processing in the smallest 3U form factor, and is specifically designed with low power technologies to meet today’s size, weight and power (SWaP) challenges.

The Intel Xeon processor offers quad-core (8-thread) performance at up to 2.2 GHz. With up to 32 GB of dual-channel, high-speed ECC-protected DDR4 memory, the VPX3-1220 provides up to 34 GB/s memory throughput, maximizing the capabilities of the processor. The processor also features AVX and AVX2 SIMD extensions, accelerating math-intensive algorithms. The Intel Xeon processor includes an enhanced Intel HD Graphics P630 GPU, offering Gen 9 discrete GPU performance with OpenGL® for graphics-intensive applications. It also serves as a 24-core GPGPU, with performance up to 403 GFLOPS and OpenCL™ support for data processing-intensive applications. The Kaby Lake processor also has dedicated hardware codec support for H.264/H.265/HEVC, accelerating media-intensive processing for up to 4K image streams.

The VPX3-1220 is designed for lower-power applications with moderate to high performance requirements, and features an E3-1505L v6 25W Xeon processor at 2.2 GHz. Turbo operation increases performance up to 3.0 GHz.

With up to 32 GB of high speed SATA flash memory and 64 KB user NVRAM, the VPX3-1220 is ideal for handling complex applications with demanding sensor processing requirements, or high speed data processing, logging and storage needs. Users can add a Curtiss-Wright XMC-554 storage mezzanine for up to 2 TB of additional storage in a single slot.

The VPX3-1220 also features high speed PCI Express® (PCIe) Gen3 connectivity. The VPX backplane supports eight lanes of configurable PCIe fabric, offering NTB capabilities and supporting 8-lane, 4-lane, and 2-lane port widths. A local XMC mezzanine site supports an independent 8-lane PCIe Gen3 bus directly to the processor. These features make the VPX3-1220 an ideal building block when architecting systems requiring processor expansion or when connecting multiple processor boards together to create a high performance embedded system for Intelligence, Surveillance and Reconnaissance (ISR) processing.

The VPX3-1220 is supported with an extensive suite of industry-standard operating systems such as Linux® (Fedora™ and Red Hat® Enterprise Linux (RHEL)), VxWorks®, and Microsoft® Windows® Embedded.



Features and Specifications

Form factor

- 3U OpenVPX, supporting MOD3-PAY-2F2T, 2F2U
- VITA 46-, VITA 48-, and VITA 65-compliant

Processor

- Intel's 7th Gen "Kaby Lake Xeon" processor
 - + Quad-core (8 thread) E3-1505L v6 (25W TDP) @ 2.2 GHz with Turbo up to 3.0 GHz
 - + 8 MB Intel Smart Cache
 - + Intel Streaming SIMD Extensions (SSE 4.1/4.2)
 - + Intel Advanced Vector Extensions (AVX2) floating-point
 - + Intel Virtualization Technology (VT-d)
 - + Intel HD Graphics P630

Platform Controller Hub (PCH)

- Intel C238 Workstation PCH chipset

SDRAM memory

- DDR4 operating at 2,400 MT/s
- 8 GB single channel with ECC
- 16 or 32 GB dual channel with ECC

Non-volatile memory

- 8, 16, or 32 GB SATA NAND (SLC) flash
- 64 KB user NVRAM
- 16 MB SPI flash for BIOS functions

Backplane fabrics

- High speed PCIe Gen3 connectivity
 - + 8-lane PCIe fabric supporting 1 x 8-lane, 2 x 4-lane or 4 x 2-lane configurations with support for a NTB port
 - + Support for PCIe Gen1 (2.5 GT/s), Gen2 (5.0 GT/s) and Gen3 (8.0 GT/s)

One XMC mezzanine site

- 8-lane PCIe Gen3 to XMC direct from the CPU
- Backplane Pn6 I/O mapping of X24s+X8d+X12d per VITA 46.9
- Maximum electrical power = 30 watts
- Qualified thermal power = 15 watts

Quad Gigabit Ethernet (GbE) ports

- Quad independent GbE controllers supporting dual BASE-T or quad BASE-X (SerDes) interfaces
- A mixed mode with 1x BASE-T and 2x BASE-X is also available

Flexible I/O supporting combinations of

- 2 x RS-232 serial channels
- 2 x RS-422/485 serial channels
- 8 x Discrete I/O (5V tolerant)
- 3 x USB 2.0 ports
- 2 x SATA 3.0 ports
- 3 x DVI or DisplayPort™ graphics ports with audio supported in DisplayPort mode

Security features

- Trusted Platform Module (TPM 2.0)
- Intel vPro™ Technology

Software support

- Linux (Fedora, RHEL)
- Wind River VxWorks
- Microsoft Windows 10 IoT Enterprise

Built-in Test

- Power-on BIT (PBIT), User Initiated BIT (IBIT), Continuous BIT (CBIT)

Power

- +5V (Vs3) main power, +3.3V_AUX also required

Power consumption will vary based on operational loading. Values below are guidelines for operation with four cores at room temperature (25°C) – [contact Curtiss-Wright](#) for more details on power consumption.

TABLE 1 Power consumption	
CPU LOADING	VPX3-1220 @ 2.2 GHZ
Idle	15 watts
Typical	29 watts
Max	49 watts

Note: Power consumption is exclusive of optional mezzanine power

Environmental

- Air-cooled: available in Level 0 and Level 100
- Conduction-cooled: available in Level 200 and Level 300 (VPX REDI™ LRM)

Weight

- Air-cooled (Level 0 and Level 100): 325 g
- Conduction-cooled (Level 200): 450 g

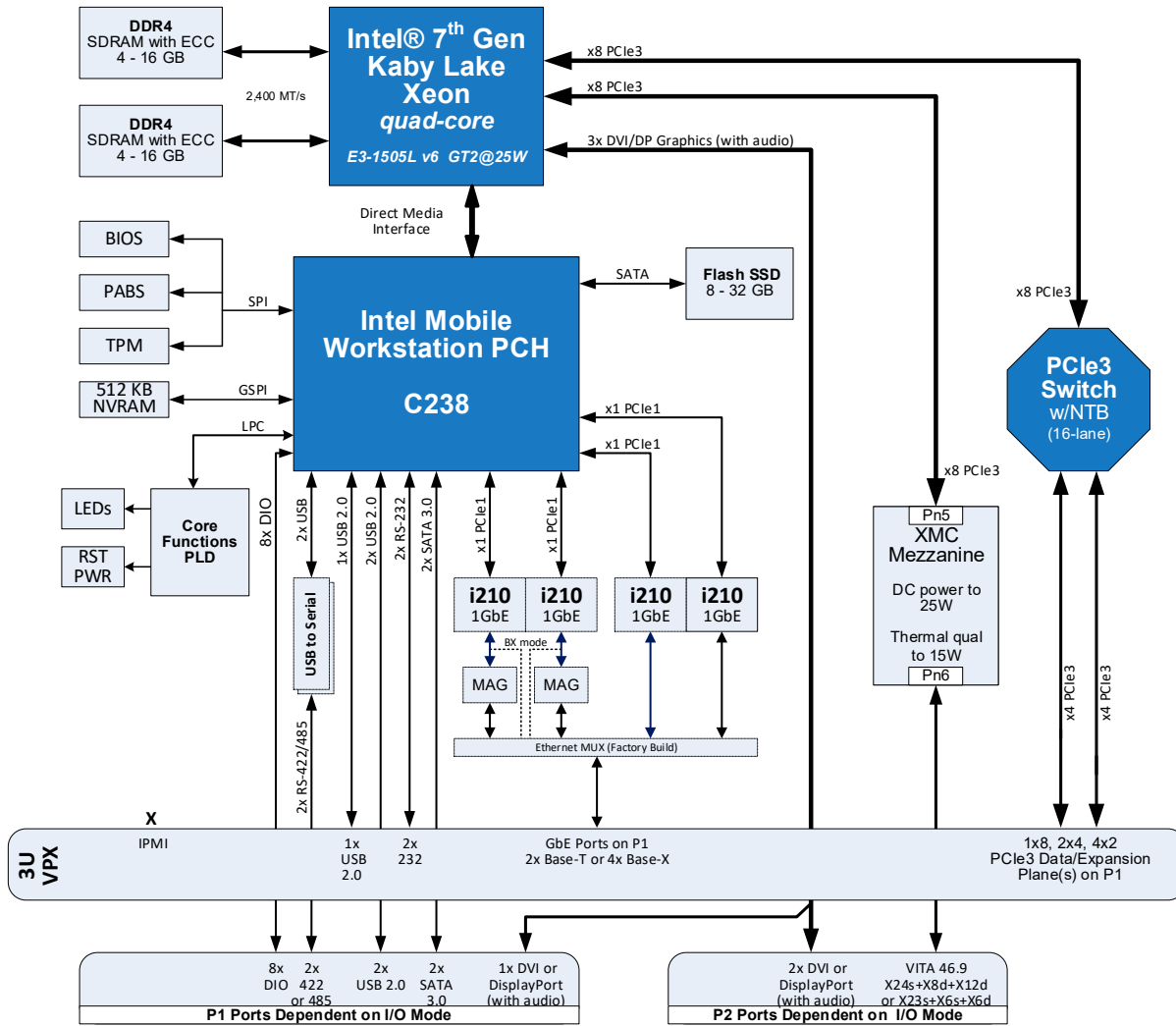


Figure 1: VPX3-1220 block diagram

VPX Module Format

The Versatile Performance Switching (VPX) module format, governed by the VITA 46 specification and the associated VITA 48 Ruggedized Enhanced Design Implementation (REDI), was established to address the fundamental requirement to provide open architecture modules that incorporate the high speed serial interconnect technology required for high performance computing. The VPX standard was developed by the leading providers of rugged, embedded, commercial off-the-shelf (COTS) modules to incorporate high-speed serial interconnects, as well as incorporate numerous improvements learned after years of integrating VME and CompactPCI® (cPCI) modules.

- 3U and 6U Eurocard form factors, preserving legacy VME chassis mechanical designs
- Support for high-speed serial interfaces, with separate fabrics for control, data and expansion planes

- Support of higher power modules and improved cooling
- Improved logistics with two-level maintenance and module keying

The VPX module format provides many benefits to integrators of high-performance, multi-processor systems for general purpose computing, ISR and radar processing, and signal intelligence applications. In particular, 40 Gbps fabrics and PCIe Gen3 interconnects offer fast connections between processing modules, supporting both parallel processing and sequential (pipelined) processing architectures.

VPX3-1220 Features

Powerful 7th Generation Intel Xeon CPU

The Intel Kaby Lake Xeon processor is based on Intel's industry-leading silicon technology and the latest micro-architecture enhancements. This 7th Generation processor builds on the tremendous success of the revolutionary micro-architecture and marks the next step in Intel's continual cadence for delivering contemporary technology to the aerospace and defense industry. Intel's Xeon delivers unmatched performance at the manageable power levels required to support today's SWaP sensitive designs.

The VPX3-1220 processor includes the following features:

- Quad-core (8 thread) E3-1505L v6 @ 2.2 GHz with Turbo up to 3.0 GHz
- Integrated two-channel memory controller with ECC
- 8 MB Intel Smart Cache
- Intel Streaming SIMD Extensions (SSE 4.1/4.2)
- Intel Advanced Vector Extensions (AVX2) floating-point
- Intel Virtualization Technology (VT-d)
- Intel AES New Instructions (AES-NI)
- Intel HD Graphics P630

Intel AVX2 optimized math libraries

The VPX3-1220 supports Intel's AVX2 Advanced Vector Extensions for accelerated math/vector processing.

Power consumption and CPU tuning

The VPX3-1220 provides extremely flexible and dynamic methods of controlling power consumption. From statically parking cores in the BIOS to dynamically adjusting CPU clocks at run time, the VPX3-1220's performance can be tailored to meet a wide range of processing and power requirements.

The VPX3-1220 has a maximum operating frequency of 2.2 GHz with turbo operation to 3.0 GHz. Turbo modes can be disabled for more deterministic operations.

Intel Platform Controller Hub (PCH)

The VPX3-1220 features the Intel C238 Workstation PCH chipset. This highly integrated PCH handles much of the flow of information between the board's I/O interfaces and the Intel Xeon Processor.

Dual Data Rate (DDR4) SDRAM

The VPX3-1220 has two independent DDR4 memory controllers supporting independent banks of 72-bit DDR4 SDRAM (64-bit plus ECC) operating at 2,400 MT/s. Modules with 8 GB capacity operate with a single memory channel and modules with 16 or 32 GB capacity operate with dual memory channels.

To preserve data integrity, the SDRAM is provided with ECC circuitry that detects and corrects all single-bit data errors, detects all double-bit errors, and detects all 3-bit and 4-bit errors within the same nibble. The SDRAM is accessible from the processor as well as from the XMC mezzanine, the Ethernet and PCIe interfaces.

Flash memory

The module is configured with 8, 16, or 32 GB of SATA NAND flash memory, as well as 16 MB SPI flash for BIOS functions. Using SLC technology to enhance reliability, the flash will retain data for a minimum of 20 years at +85°C. Read performance of the flash array is optimized in order to minimize system boot up time for applications such as avionics mission computers, where fast restarts after power interruptions are critical.

For absolute security against inadvertent flash programming or corruption, a hardware jumper is provided to disable writing to flash. The firmware provides flash programming functions with support for downloading flash images over Ethernet.

Fabric ports

The module provides eight lanes of PCIe to the VPX Expansion and Data Planes, used primarily to connect at the highest possible speeds to adjacent VPX modules. Supporting a flexible configuration of 1x 8-lane, 2x 4-lane, or 4x 2-lane ports, the PCIe ports operate at Gen1 (2.5 GT/s), Gen2 (5.0 GT/s) or Gen3 (8.0 GT/s) speeds, for a throughput of up to 7.9 GB/s for extremely fast data transfers. When connecting multiple SBCs together, a Non-Transparent Bridge (NTB) can be configured on any port. Common uses of the PCIe fabric ports are to connect the SBC to sensor or signal acquisition modules, or to augment the SBC processor with a powerful graphics module or dedicated GPGPU or FPGA offering additional computational power.

To simplify using PCIe as an SBC-to-SBC fabric interface, Curtiss-Wright has developed software libraries which offers software developers several APIs to use, including socket and TCP/IP interfaces.

XMC site

The module is equipped with one mezzanine site capable of supporting a VITA 42 XMC module. The XMC site supports x8 lanes of PCIe Gen1, Gen2 or Gen3 rates directly from the CPU. Gen1 and Gen2 rates are supported with the standard VITA 42 connectors, and support for Gen3 is with optional VITA 61 connectors. [Contact Curtiss-Wright](#) for VITA 61 ordering options.

Full Pn6 I/O mapping is provided per VITA 46.9 as X24s+X8d+X12d, providing 24 single-ended and 20 pairs of high speed differential I/O from the mezzanine site to the VPX backplane connector.

To optimize the thermal transfer from XMC modules to the base card, the conduction-cooled VPX3-1220 thermal frame incorporates both the primary and secondary thermal interfaces as defined by VITA 20-2001.

Quad Gigabit Ethernet interfaces

The VPX3-1220 provides up to four independent Ethernet ports using Intel i210 devices, which can be factory configured as either dual BASE-T or quad BASE-X (SerDes) ports. A mixed mode is also available, with one BASE-T and two BASE-X ports. When configured as BASE-T, the Ethernet ports support tri-speed 10/100/1000BASE-T operation, enabling full gigabit performance as well as legacy 10/100 compatibility, and supporting auto-negotiation and auto-MDI/MDIX.

Each Ethernet port occupies a separate PCIe domain for multi-enclave systems.

The Ethernet controllers integrate a number of features designed to minimize processor loading due to Ethernet traffic. These include dedicated DMA engines, support for jumbo packets up to 9KB, efficient buffer management schemes, checksum calculation for IP, TCP, and UDP, and interrupt coalescence.

Serial ports

The module provides two RS-232 and two RS-422 serial channels to the VPX backplane. The serial ports support asynchronous communications with baud rates independently configurable from 300 to 115200 KBaud. The RS-422 ports can also operate in RS-485 mode for multi-drop applications.

Discrete Digital I/O (DIO)

The module provides up to 8 independent discrete digital I/O signals. All DIOs are individually programmable as inputs or outputs. Each DIO is capable of triggering an interrupt upon a change of state, programmable to detect either rising or falling edge. All DIOs are 5V-tolerant.

USB ports

The module provides up to three USB 2.0 ports from the PCH. VBUS power (+5V) is provided for all USB ports.

Two SATA ports

The module provides up to two SATA 3.0 interfaces on the rear VPX backplane. Each interface incorporates several performance-enhancing features such as:

- Independent DMA channel with 2K FIFO
- Independent command fetch, scatter/gather, and command executions

An additional SATA port is used internally for SATA NAND flash.

Display interfaces

The module's CPU supports Intel HD Graphics P630, which includes a 350 MHz base clock with up to 1 GHz performance, and 24 graphics execution units with up to 403 GFLOPS performance. The module provides up to three DVI or DisplayPort ports to the backplane. In DisplayPort mode, embedded audio is also supported.

Depending on the operating system, up to three independent display ports can operate simultaneously.

Temperature sensors

The module provides temperature sensors to measure board and processor temperatures. There is a sensor at each edge of the card and sensors built into the CPU, and the card edge sensors can be read by software.

Security Features

Trusted Platform Module (TPM) support

The module includes a Trusted Platform Module (TPM 2.0) device. The TPM can be used to create a secure computing environment, ensuring only trusted and signed BIOS and software can execute on the board.

Intel vPro Technology

The VPX3-1220 processor includes Intel vPro Technology, which supports a set of security and manageability capabilities built into the processor aimed at addressing several critical areas of IT security. Support for vPro Technology varies from operating system to operating system, and may be used when developing and protecting application software.

Software Support

The module is supported by a suite of firmware, OSs, RTOS board support packages (BSP), communication libraries and signal processing libraries. Many of these software elements are common across a wide range of Curtiss-Wright products, maximizing re-use of your software investment across multiple projects and over many generations of technology.

Built-In Test (BIT)

Built-In Test (BIT) is a library of diagnostic routines to support Power-On BIT (PBIT), Initiated BIT (IBIT), and Continuous BIT (CBIT) for health management of the module. BIT operations are supported through BIOS and software APIs, and can be accessed in customer developed applications.

- Built-In Test PBIT for power-up self-test
- IBIT for user-initiated self-test
- CBIT for continuous self-test

Operating system software

The module is supported by a number of popular operating systems, each tailored to excel in specific application areas. Operating system support covers all facets of developing and running application code for the board. The following 64-bit operating systems are currently supported for the VPX3-1220:

- Linux Fedora Core 24 (pre-installed from the factory)
- Wind River VxWorks 7
- Microsoft Windows 10 IoT Enterprise
- CentOS®, Red Hat Enterprise Linux (RHEL) 7.5

For information regarding additional operating systems support, please [contact Curtiss-Wright](#).

Software drivers supporting on-board hardware accelerators are also available for most popular operating systems:

- OpenGL for graphics performance
- OpenCL for computational GPGPU performance
- Built-in graphics acceleration for Microsoft Windows

Optimizing PCIe Communications

Curtiss-Wright has partnered with Dolphin Interconnect Solutions to provide a PCI Express (PCIe) Fabric Communications Library supporting high-speed, low-latency peer-to-peer communications using direct PCIe connections. This software library hides the complexities and technical details of programming directly to PCIe devices, and presents an easy to use software API to applications developers wishing to send high-speed messages and bulk data between computing nodes.

Dolphin eXpressWare Use Cases

Two-board configuration

The simplest host-to-host architectural model is to directly connect two or more boards together. A simple example of this is shown in Figure 2, featuring an 8-lanes PCIe Gen3 connection. Typical board-to-board throughput can exceed 5.5 GB/s.

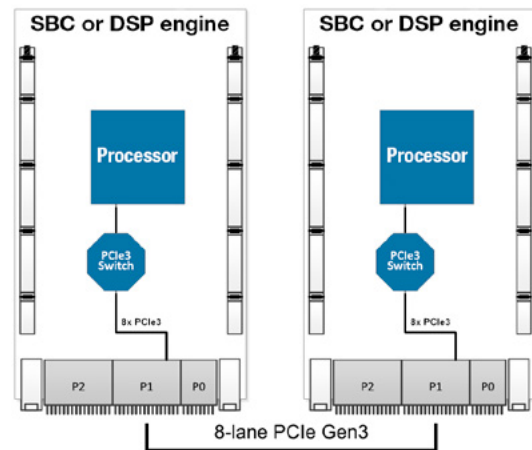


Figure 2: Two-Board 8-Lane Direct Connection

Three-board configuration

In daisy-chain arrangement, a three-board configuration can be setup with 4-lane PCIe connections, as shown in Figure 3. This configuration provides a direct connection between all boards, allowing any board to communicate to any other board directly. Typical board-to-board throughput can hit 3 GB/s.

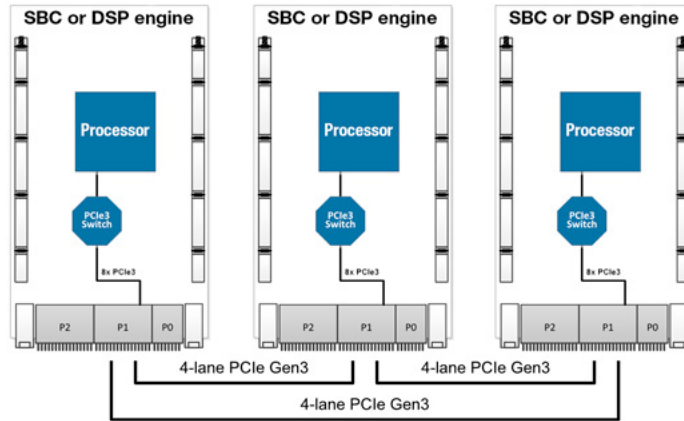


Figure 3: Three-Board 4-Lane Daisy-Chain

Central Switch Topology

For more than three processors, a central switch topology permits every board to communicate to all other boards. In the example shown in Figure 4, six SBCs are connected to the Curtiss-Wright VPX3-663 central switch.

See more information about our [Dolphin PCIe Fabric Communications Library](#).

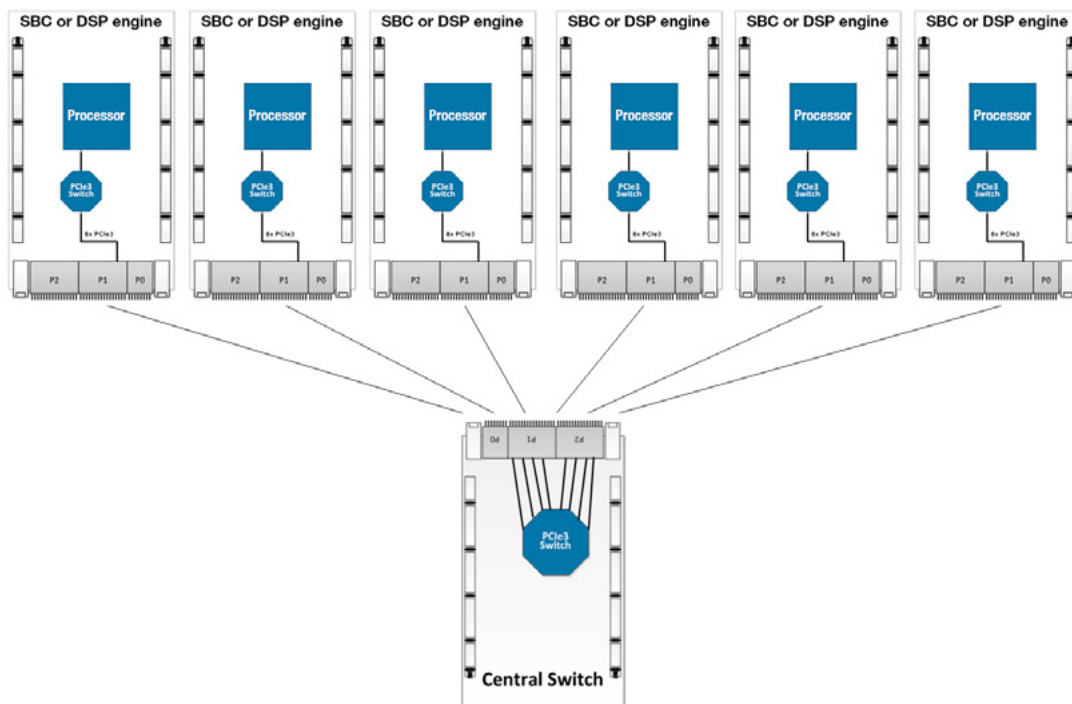


Figure 4: Central Switch Topology

Rear Transition Module

For building systems in the lab environment, Curtiss-Wright provides a Rear Transition Module (RTM) that plugs into the back side of the VPX3-1220's backplane and provides access to most of the board connections on industry standard connectors. For available RTM models, please refer to the ordering information.



Figure 5: VPX3-1220 rear transition module

Ruggedization Levels

To cost-effectively address a diverse variety of applications, the VPX3-1220 is available in a range of ruggedization levels and mechanical formats. Air-cooled cards are available at Level 0 (0 to 50°C) and Level 100 (-40 to +71°C) and conduction-cooled cards are available at Level 200 (-40 to +85°C). Full details of Curtiss-Wright's standard Ruggedization Guidelines can be found on the [Curtiss-Wright](https://www.curtisswright.com) website.

Conduction-cooled modules are also offered with VITA 48 2-level maintenance covers to create a truly field-serviceable LRM.

Power Consumption

Power consumption of an Intel SBC can vary greatly, depending on the processor configuration and loading characteristics. Curtiss-Wright has extensive background in characterizing Intel SBCs and can provide detailed processor loading and power consumption data to better understand the power vs. performance trade-offs when designing systems around the VPX3-1220 module.

Designed for low power, the VPX3-1220 supports Intel's low power 7th Gen Kaby Lake Xeon processor, ranging from 3 to 25 watts (max TDP), with an entire board power consumption between 12 and 49 watts.

Although power consumption increases as operating temperature rises, Intel processors may hit a thermal limit, after which they will throttle the processor performance to reduce operational power. The VPX3-1220 is designed to operate at full processor power and speed across the entire operational temperature range (ie: does not throttle). The measurements below were documented at 25°C room temperature in an air-cooled environment.

The VPX3-1220 BIOS provides a rich set of controls to statically or dynamically control CPU core parking, CPU clock speed, and Turbo Mode operation.

The following power measurements represent a few common operating configurations for the VPX3-1220. These power figures are actual measured values taken while executing a test application generating CPU processing loads and data traffic representative of a typical customer application. Please contact Curtiss-Wright for a complete set of power measurements under many more operating conditions.

- System Idle = 12 watts
- 2-core @ 800 MHz, 100% CPU, no GPU = 18 watts
- 2-core @ 800 MHz, 50% CPU, 70% GPU (max turbo 1.0 GHz) = 32 watts
- 4-core @ 2.2 GHz, 100% CPU, no GPU = 36 watts
- 4-core @ 2.2 GHz, 50% CPU, 70% GPU (max turbo 1.0 GHz) = 43 watts
- 4-core @ 2.2 GHz, 100% CPU, 100% GPU (max turbo 1.0 GHz) = 49 watts

Ordering Information

The VPX3-1220 is ordered with the following part number convention. Not all possible configurations are offered – see Ordering Configurations below or [contact Curtiss-Wright](#) for additional configurations

TABLE 2		Ordering Information
PART NUMBER	DESCRIPTION	
VPX3-1220-A0vwxyz	Air-cooled AC-L0, 0 to 50°C	
VPX3-1220-A1vwxyz	Air-cooled AC-L100, -40 to +71°C	
VPX3-1220-C2vwxyz	Conduction-cooled CC-L200, -40 to +85°C card edge	
v: Mechanical format	1: 0.8" pitch 3: 0.85" pitch 4: 1.0" pitch front panel and metalwork 6: 2.0" pitch	
w: Control plane	Control Plane fabric and P2 mapping mode (see Table 3 below) A: 2F2T = 2 x 1000BASE-T, full XMC mapping as X24s+X8d+X12d B: 2F2U = 4 x 1000BASE-X, full XMC mapping as X24s+X8d+X12d C: 2F2T = 2 x 1000BASE-T, partial XMC mapping as X23s+X6s+X6d with 2 x DVI D: 2F2U = 4 x 1000BASE-X, partial XMC mapping as X23s+X6s+X6d with 2 x DVI E: 2F2T = 2 x 1000BASE-T, partial XMC mapping as X23s+X6s+X6d with 2 x DisplayPort F: 2F2U = 4 x 1000BASE-X, partial XMC mapping as X23s+X6s+X6d with 2 x DisplayPort M: 2F2U = 2 x 1000BASE-X + 1x 1000BASE-T, full XMC mapping as X24s+X8d+X12d	
x: Memory configuration	DRAM / Flash 8: 8 GB SDRAM in 1 ch, 8 GB Flash C: 16 GB SDRAM in 2 ch, 16 GB Flash D: 16 GB SDRAM in 2 ch, 32 GB Flash E: 32 GB SDRAM in 2 ch, 32 GB Flash	
y: Processor and software	Processor and software configurations 4: Kaby Lake Xeon E3-1505L v6, 4-core, P630, 25W, Linux pre-loaded	
z: I/O Mode	P1 I/O Mode (see Table 4 below)	

TABLE 3		Control Plane Fabric and P2 Mapping Mode			
MAPPING MODE	GbE	XMC I/O MAPPING	DVI PORTS	DISPLAYPORT	
A	2 x BASE-T	X24s+X8d+X12d	0	0	
B	4 x BASE-X				
C	2 x BASE-T	X23s+X6s+X6d	2	0	
D	4 x BASE-X				
E	2 x BASE-T	X23s+X6s+X6d	0	2	
F	4 x BASE-X				

TABLE 4		P1 I/O Mode					
I/O MODE	GPIO	RS-232	RS-422	USB 2.0	SATA 3.0	DVI	DP
0	4	2	2	3	1	-	-
1	4	2	-	1	1	1	-
8	4	2	1	3	2	-	-
A	8	2	1	3	1	-	-
K	4	2	-	1	1	-	1

Ordering configurations

A summary of popular ordering configurations is shown below. Only I/O mode 1 is shown (final model number digit), as this is a popular I/O model. For other models or configurations, [consult Curtiss-Wright](#) for availability.

MEMORY (GB)		ETHERNET PORTS	RUGGEDIZATION		
DRAM	FLASH		AIR-COOLED		CONDUCTION-COOLED
			LEVEL 0	LEVEL 100	LEVEL 200
8	8	BASE-T	VPX3-1220-A04A841	VPX3-1220-A14A841	VPX3-1220-C21A841
		BASE-X	VPX3-1220-A04B841	VPX3-1220-A14B841	VPX3-1220-C21B841
16	16	BASE-T	VPX3-1220-A04AC41	VPX3-1220-A14AC41	VPX3-1220-C21AC41
		BASE-X	VPX3-1220-A04BC41	VPX3-1220-A14BC41	VPX3-1220-C21BC41
16	32	BASE-T	VPX3-1220-A04AD41	VPX3-1220-A14AD41	VPX3-1220-C21AD41
		BASE-X	VPX3-1220-A04BD41	VPX3-1220-A14BD41	VPX3-1220-C21BD41
32	32	BASE-T	VPX3-1220-A04AE41	VPX3-1220-A14AE41	VPX3-1220-C21AE41
		BASE-X	VPX3-1220-A04BE41	VPX3-1220-A14BE41	VPX3-1220-C21BE41

MEMORY (GB)		ETHERNET PORTS	RUGGEDIZATION		
DRAM	FLASH		AIR-COOLED		CONDUCTION-COOLED
			LEVEL 0	LEVEL 100	LEVEL 200
8	8	BASE-T	VPX3-1220-A04C841	VPX3-1220-A14C841	VPX3-1220-C21C841
		BASE-X	VPX3-1220-A04D841	VPX3-1220-A14D841	VPX3-1220-C21D841
16	16	BASE-T	VPX3-1220-A04CC41	VPX3-1220-A14CC41	VPX3-1220-C21CC41
		BASE-X	VPX3-1220-A04DC41	VPX3-1220-A14DC41	VPX3-1220-C21DC41
16	32	BASE-T	VPX3-1220-A04CD41	VPX3-1220-A14CD41	VPX3-1220-C21CD41
		BASE-X	VPX3-1220-A04DD41	VPX3-1220-A14DD41	VPX3-1220-C21DD41
32	32	BASE-T	VPX3-1220-A04CE41	VPX3-1220-A14CE41	VPX3-1220-C21CE41
		BASE-X	VPX3-1220-A04DE41	VPX3-1220-A14DE41	VPX3-1220-C21DE41

TABLE 7		Accessories
PART NUMBER	DESCRIPTION	
RTM3-1220-000x	<ul style="list-style-type: none"> › Rear Transition Module for VPX3-1220 with P2 mapping mode A › Provides breakout connectors and cables for most board I/O › Select Rear Transition Module product number 'x' based on VPX3-1220 I/O mode 	
RTM3-1220-0BXx	<ul style="list-style-type: none"> › Rear Transition Module for VPX3-1220 with P2 mapping mode B › Provides breakout connectors and cables for most board I/O › Includes dual SFP for GbE Base-X to Base-T conversion › Select Rear Transition Module product number 'x' based on VPX3-1220 I/O mode 	
RTM3-1220-1DPx	<ul style="list-style-type: none"> › Transition Module for VPX3-1220 with P2 mapping modes C & E › Provides breakout connectors and cables for most board I/O › Includes RIM with dual DP/DVI outputs (RTM+RIM occupies 2 slots width) › Select Rear Transition Module product number 'x' based on VPX3-1220 I/O mode 	
RTM3-1220-1DXx	<ul style="list-style-type: none"> › Rear Transition Module for VPX3-1220 with P2 mapping modes D & F › Provides breakout connectors and cables for most board I/O › Includes dual SFP for GbE Base-X to Base-T conversion › Includes RIM with dual DP/DVI outputs (RTM+RIM occupies 2 slots width) › Select Rear Transition Module product number 'x' based on VPX3-1220 I/O mode 	

TABLE 8		Software
PART NUMBER	DESCRIPTION	
DSW-1220-6250-FED6	Fedora 25 64-bit BSP for VPX3-1220. Includes driver source code.	
DSW-1220-0700-VXW6	Wind River VxWorks 7 64-bit BSP for VPX3-1220.	
DSW-1220-6750-RHL6	Red Hat Enterprise Linux (RHEL) 7.5 64-bit BSP for VPX3-1220. Includes driver source code.	
DSW-1220-6840-RHL6	Red Hat Enterprise Linux (RHEL) 8.4 64-bit BSP for VPX3-1220. Includes driver source code.	
MNT-1220-LNX	Annual maintenance and Software Upgrade Program (SUP) for VPX3-1220 Linux (Fedora and RHEL)	
MNT-1220-VXW	Annual maintenance and Software Upgrade Program (SUP) for VPX3-1220 Wind River VxWorks	
DSW-1220-6001-LSD6	Dolphin PCIe Fabric Software for VPX3-1220 SBC for Linux operating systems <ul style="list-style-type: none"> › Supports Dolphin SuperSockets, TCP/IP, MPI and SISC I API interfaces › Licensed for applications development on the VPX3-1220 for one project, per site › License also includes 4 x run-time licenses (RTL) 	
RTL-1220-6001-LSD6	Run-Time License for Dolphin PCIe Fabric Software for DSW-1220-6001-LSD6	
MNT-1220-6001-LSD6	Annual Software Upgrade Program (SUP) for Dolphin PCIe Fabric Software DSW-1220-6001-LSD6	
DSW-1220-0701-VSD6	Dolphin PCIe Fabric Software for VPX3-1220 SBC for Linux operating systems <ul style="list-style-type: none"> › Supports Dolphin SISC I API interface › Licensed for applications development on the VPX3-1220 for one project, per site › License also includes 4 x run-time licenses (RTL) 	
RTL-1220-0701-VSD6	Run-Time License for Dolphin PCIe Fabric Software for DSW-1220-0701-VSD6	
MNT-1220-0701-VSD6	Annual Software Upgrade Program (SUP) for Dolphin PCIe Fabric Software DSW-1220-0701-VSD6	