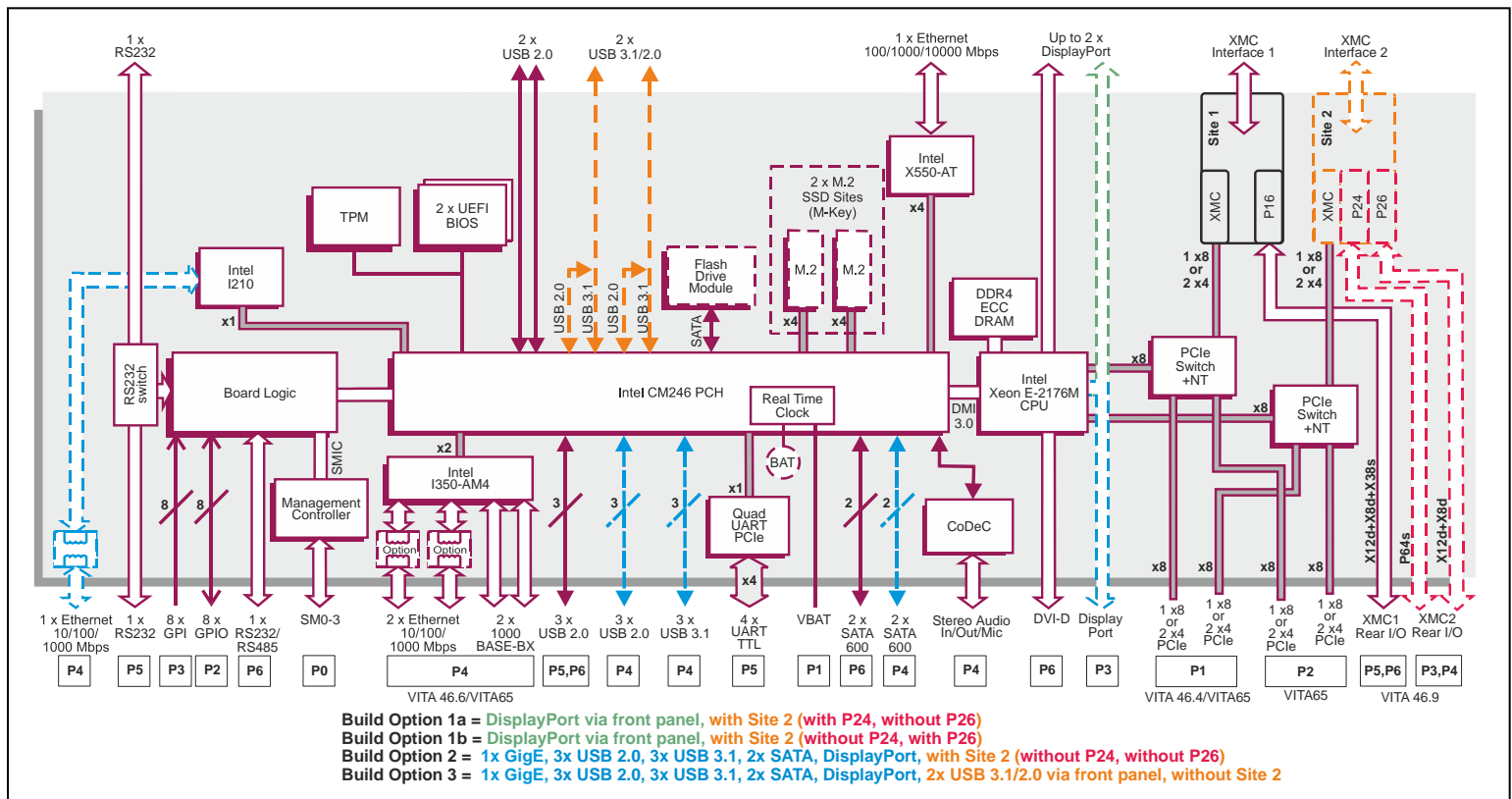# 6U VPX™ Processor Board

Key Features

VR E7x/msd is a 6U VPX™ board based on a 6-core Intel® Xeon® processor E-2176M (formerly known as Coffee Lake-H). It includes a wide range of I/O, display, storage and expansion options for command and control applications in the defense, industrial, scientific and aerospace markets.

- High performance 6-core processor
- Up to 32 Gbytes DRAM with built in error correction for reliable operation
- Single or dual XMC sites for local expansion
- Direct attached storage options:
  - on-board Flash Drive Module
  - two M.2 sites for high speed storage
- Optional Built-In-Test and enhanced security packages
- Air-cooled and conduction-cooled options

Build Option 1a = DisplayPort via front panel, with Site 2 (with P24, without P26)
Build Option 1b = DisplayPort via front panel, with Site 2 (without P24, with P26)
Build Option 2 = 1x GigE, 3x USB 2.0, 3x USB 3.1, 2x SATA, DisplayPort, with Site 2 (without P24, without P26)
Build Option 3 = 1x GigE, 3x USB 2.0, 3x USB 3.1, 2x SATA, DisplayPort, 2x USB 3.1/2.0 via front panel, without Site 2

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VPX Embedded Computer Board

- air-cooled 6U VPX™ computing board utilizing an Intel® Xeon® processor based on Coffee Lake-H
- single or dual XMC sites (build options)
- optional Rear Transition Module (RTM)
- rugged conduction-cooled (VITA 48.2) VPX-REDI™ (RCx-Series) versions:
  → see VR E7x/msd-RCx datasheet

Central Processor

- 6-core Intel® Xeon® processor E-2176M:
  → 12 Mbytes Smart Cache, 2.7 GHz (45W)
  → Intel® UHD Graphics 630
- range of performance/power factory build options
- utilizes the Intel® CM246 Platform Controller Hub

DRAM

- 16 or 32 Gbytes soldered DDR4 ECC DRAM:
  → single bit error correction
  → dual channel architecture
- accessible from processor and VPX fabric

Single or Dual XMC Sites

- both XMC sites commonly support:
  → front panel I/O aperture
  → 1 x8 or 2 x4 PCI Express® (PCIe®)
  → PCIe Gen 1, Gen 2 and Gen 3
  → VITA 46.9 compliant I/O pin-out
- XMC connector type (build option) determines the maximum PCIe operational speed:
  → up to Gen 2, VITA 42 XMC (color black)
  → up to Gen 3, VITA 61 XMC 2.0 (color white)
- XMC VPWR +5V or +12V (build option)
- build option 1a or 1b (dual XMC sites):
  → option 1a - site 2 rear I/O, P24 = P64s
  → option 1b - site 2 rear I/O, P26 = X12d+X8d
- build option 2 (dual XMC sites):
  → site 2 without rear I/O, without P26 and P24
- build option 3 (single XMC, site 1)
- options 2 and 3 support extra I/O, see table below
- all options - site 1 rear I/O, P16 = X12d+X8d+X38s

Ethernet Interfaces

- support Wake-On-LAN
- support Precision Time Protocol (IEEE 1588)
- refer to table below for range of Ethernet interfaces

Serial Interfaces

- refer to table below for serial interfaces
- 1 x RS232 (COM2) can be switched by user between the front panel or a VPX wafer
- 1 x RS232/422/485 (COM1):
  → supporting transmit control in RS485 mode
- RS232 modem control signals are supported
- 16550 compatible UARTs

Graphics Interfaces

- up to three independent graphics interfaces
- refer to table below for graphics interfaces
- DisplayPort™ supports up to 1920 x 1200 via front or 3840 x 2160 via rear (@ 60Hz):
  → resolution is dependent on the device driver
- DVI-D interface supports up to 1920 x 1200 @ 60Hz
- support for Microsoft® DirectX 12
- support for OpenGL 4.4: Windows® and Linux®
- support for OpenCL 2.0

Mass Storage Interfaces

- 2 x M.2 SSD sites on-board supporting:
  → Type 2230, 2242, 2260 and 2280 devices
  → x4 PCIe interface (M-key)
  → NVM Express® (NVMe™) logical device interface
  → RAID 0 and 1 modes
- optional on-board SATA Flash Drive Module
- refer to table below for rear I/O SATA600 interfaces:
  → RAID 0, 1, 5 and 10 modes

Stereo Audio

- Intel® High Definition Analog Audio interface (on-board CoDeC) supporting stereo line input, line output and microphone

Other Peripheral Devices

- long duration timer and watchdog timer
- PC Real Time Clock
- CPU temperature, board temperature and voltage sensors accessed via System Management interface
- refer to table below for range of I/O interfaces

VPX Data/Expansion Plane PCIe Interface

- configurable PCIe fabric interfaces (VITA 46.4, VITA 65), each fabric supporting:
  → 2 x8 or 4 x4 PCIe (Gen 1, Gen 2, and Gen 3)
  → compatible with OpenVPX™ module profiles
- supports up to two non-transparent ports with DMA for multi-processing applications
- PCIe ports can be configured by the VPX Switch Configuration Tool, see separate datasheet

VPX Control Plane Ethernet Interfaces

- 2 x 10/100/1000 Mbps Ethernet interfaces:
  → with or without magnetics (build option)
- 2 x 1000BASE-BX interfaces (VITA 46.6, VITA 65)

Board Security Packages

- Trusted Platform Module (TPM 2.0)
- option for proprietary board-level security features

Firmware Support

- UEFI 2.7 boot firmware (BIOS):
  → implements Secure Boot
- implements Intel® Boot Guard
- optional Fast Boot solution using the Intel® Firmware Support Package (FSP)
- LAN boot firmware included

Software Support

- support for Linux®, Windows® and VxWorks®
- implements Microsoft® Secure Boot

Optional Built-In Test (BIT) Support

- Power-on BIT, Initiated BIT, Continuous BIT

Non-Volatile Memory

- dual 16 Mbytes of BIOS SPI Flash EPROM
- 8 Kbytes User EEPROM

Safety

- PCB (PWB) manufactured with flammability rating of UL94V-0

System Management

- System Management interface:
  → implements SM0-1 and SM2-3 hardware
  → supports IPMI 2.0
  → support for IPMI Over LAN
  → support for Serial Over LAN
- on-board System Management Controller

Electrical Specification

- typical current figure for processor (45W) with 32 Gbytes DRAM:
  → VS3 +5V @ 7.8A, voltage +5%/-2.5%
- 3V3_AUX @ 600mA maximum, voltage +5%/-2%

Environmental Specification

- operating temperature:
  → 0°C to +55°C (N-Series)
- extended operating temperatures based upon processor's performance/power factory build option:
  → -25°C to +70°C (E-Series)
  → -40°C to +70°C (K-Series)
- non-operating temperature:
  → VITA 47 Class C1, -40°C to +85°C
- operating altitude:
  0 to 15,000 feet (0 to 4,572 meters)
- 5% to 95% Relative Humidity, non-condensing:
  → K-Series includes humidity sealant

Mechanical Specification

- 6U VPX form-factor (VITA 46.0) 9.2 inches x 6.3 inches (233mm x 160mm)
- slot widths:
  → 0.8-inch (VITA 46.0)
  → 1.0-inch (VITA 48.0 as per VITA 65)
- connectors to VITA 46.0, P0 through to P6
- operating mechanical:
  → shock - VITA 47 Class OS1, 20g
  → vibration - 0.002g²/Hz

Legacy Computing Board Compatibility

- upgrade path for the popular VR E1x/msd computing board

Build Option	Front I/O						Rear I/O												
	XMC Site	Display Port**	USB 2.0/ 3.1 Gen1	USB 2.0**	Serial COM2**	Ten GigE	XMC1 P16	XMC2 P2n	Display Port	USB 3.1 Gen1	USB 2.0	Serial COM2	Serial COM1	Serial TTL	One GigE	SATA 600	DVI-D	Stereo Audio	GPI/ GPIO
1a	2	2	-	2	select	1	P16	P24	-	-	3	select	1	4	-	2	1	1	8/8
1b	2	2	-	2	select	1	P16	P26	-	-	3	select	1	4	-	2	1	1	8/8
2	2	1	-	2	select	1	P16	P2n NF	1	3	6	select	1	4	1	4	1	1	8/8
3	1	1	2	2	select	1	P16	-	1	3	6	select	1	4	1	4	1	1	8/8
Notes	a) I/O with ** are routed via a 60-way HD connector						b) NF = Not Fitted			c) COM2 select allows user to switch between front or rear									

Please contact your local Concurrent Technologies sales office for further details on board build options and accessories.