

## 4<sup>th</sup> Generation Intel® Core™ i7/i5 processor supporting 2 PMC/XMC sites and a PMC expansion carrier



### APPLICATIONS

VP F1x/msd is a 6U VME board based on a 4th generation Intel® Core™ processor for high performance applications with enhanced graphics capabilities. A choice of either a 4-core or 2-core processor device is available to suit application needs. VP F1x/msd is designed to enable customers using existing VP 91x/x1x or VP 717/x8x VME boards to transition to a new design for longer life cycles. It offers the maximum level of backwards compatibility given the component changes

to enable continued manufacture. For reliable storage, there are customer selectable options including on-board CFast™, application Flash and a 2.5-inch drive mounting kit as well as SATA based storage via the rear connectors. VP F1x/msd is suitable for a range of applications within the defense, industrial control, telecoms, scientific and transportation markets and is available in extended temperature and rugged variants.

### HIGHLIGHTS

- 4<sup>th</sup> generation Intel® Core™ processor:
  - 4-core or 2-core processor
  - includes Intel® Advanced Vector Extensions 2 (AVX2)
  - includes Intel® AES New Instructions (AES-NI)
- Up to 32 Gbytes of soldered DDR3L-1600 DRAM with ECC
- 2 x PMC/XMC module interfaces:
  - 32/64-bit, 33/66 MHz PCI™, up to 100 MHz PCI-X™
  - XMC module interface, x8 PCI Express® (Gen 1, Gen 2)
  - expansion carrier for 2 more PMC sites
- Up to 3 x external SATA300 interfaces
- Options for an on-board 2.5-inch mass storage drive (SATA600) and an on-board CFast™ module (SATA300)
- 3 x 10/100/1000 Mbps Ethernet interfaces, with optional Gigabit Ethernet for VME64x backplane (VITA 31.1)
- 3 x serial channels and up to 7 x USB 2.0 interfaces
- 1 x VGA interface and up to 2 x DVI-D interfaces
- 8 Mbytes of BIOS Flash EPROM, dual devices
- 64 Mbytes of Application Flash memory for VxWorks
- VME64x interface:
  - A32/A24/A16/D64/D32/D16/D8(E0), MBLT modes
  - support for fast hardware byte-swapping
- Watchdog timer; Long Duration Timer
- Optional support for:
  - Built-In Test (BIT) firmware and software
  - board-level security package
  - Trusted Platform Module (TPM)
  - rear I/O via Rear Transition Module (RTM)
- Extended temperature versions (E and K-Series):
  - E: -25°C to +70°C
  - K: -40°C to +85°C, humidity sealant
- Rugged conduction-cooled versions (RC-Series):
  - -40°C to +85°C (at card edge), conformally coated
  - conduction-cooled to IEEE 1101.2
- Support for Linux®, Windows® and VxWorks®

## Central Processor

- 4<sup>th</sup> generation Intel® Core™ CPU:
  - 4-core Intel® Core™ i7-4700EQ CPU up to 3.4 GHz, 6M Last Level cache
  - 2-core Intel® Core™ i5-4422E CPU up to 2.9 GHz, 3M Last Level cache
  - Intel® Advanced Vector Extensions 2 (AVX2)
  - Intel® AES New Instructions (AES-NI)
- utilizes the Intel® QM87 Platform Controller Hub

## DRAM

- up to 32 Gbytes soldered DDR3L-1600 ECC DRAM (16 Gbytes maximum, Intel Core i5 CPU):
  - single bit error correction
  - peak bandwidth of 25.6 Gbytes/s
  - dual channel architecture
- accessible from processor or VME bus

## Mass Storage Interfaces

- options for up to 3 x external SATA interfaces:
  - 2 x SATA300 via P2
  - 1 x SATA300 via P0
- 2 x SATA interfaces for optional on-board:
  - CFast™ module, SATA300 interface
  - 2.5-inch SATA600 drive (uses PMC/XMC Site 2)

## Ethernet Interfaces

- two Gigabit Ethernet interfaces via rear panel:
  - accessed via optional P0
  - onboard magnetics
  - implemented by Intel® i350-AM2 LAN controller via x1 PCI Express® Gen 2 port
- support for VITA 31.1:
  - Gigabit Ethernet for VME64x backplanes
- one Gigabit Ethernet interface via front panel:
  - accessed via RJ45 connector
  - implemented by Intel® i210 LAN controller

## PMC/XMC Interfaces

- 2 x PMC shared sites supporting:
  - 32/64-bit, 33/66 MHz PCI bus
  - 64-bit PCI-X bus up to 100 MHz
  - 3.3V or 5V PCI signaling
- 2 x XMC (Switched Mezzanine Card) sites:
  - support x8 PCI Express (Gen 1, Gen 2)
  - XMC Site 1 can also support 2 x4 PCI Express
  - both powered from +5V supply
- PMC/XMC Site 1 I/O via front panel and via P2:
  - P64s via P2 or factory build option to provide P40s plus VGA and DVI-D via P2
- PMC/XMC Site 2 I/O via front panel and via optional P0:
  - P64s via P0 or factory build option to provide P32s plus other I/O (see Note 1.1 & Note 1.2)
- expansion to optional dual PMC carrier board:
  - PCI-33 expansion (gives dual 32-bit/33 MHz)
  - or XMC site 2 PCIe (gives dual 64-bit/66 MHz)

## Serial Interfaces

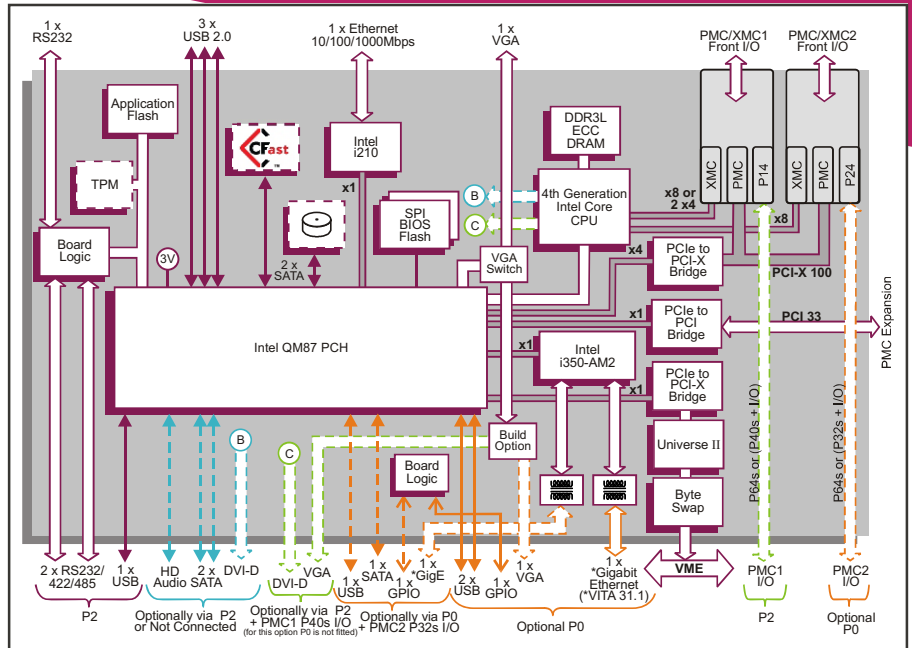
- 3 x serial channel interfaces:
  - 1 x RS232 accessed via 26-way high density connector on front panel
  - 2 x RS232/422/485 accessed via P2
- 16550 compatible UARTs

## Graphics Interfaces

- up to 2 x DVI-D interfaces (build options) via P2:
  - up to 1920 x 1200
  - 1 x interface uses I/O pins for PMC/XMC Site 1
- analog VGA interface user switchable via front panel or via rear using either P2 or P0:
  - analog, up to 1920 x 1200
  - front panel access via 26-way high-density connector
- VGA interface via rear, P2 or P0, is defined by a factory build option:
  - when P0 connector fitted then VGA signals default via P0 and are not available via P2
  - VGA via P2 uses I/O pins for PMC/XMC Site 1
- all interfaces support 32-bit color depth
- support for Microsoft® DirectX 11, OpenGL 2.0, Windows® and Linux®

## Stereo Audio

- option for Intel® High Definition stereo audio interface via P2



## Other Peripheral Interfaces

- PC-compatible Real Time Clock
- up to 7 x USB 2.0 interfaces:
  - 3 x USB via 26-way front panel connector
  - 1 x USB via P2
  - 2 x USB via P0
  - option for an additional USB via P0 (see Note 1.2)
- 1 or 2 x GPIO signals via P0 (see Note 1.2)
- watchdog timer
- 1 x 32-bit Long Duration Timer with processor interrupt capability

## Flash EPROM

- 8 Mbytes of BIOS Flash EPROM, dual devices:
  - main/backup device enabled via switch
- 64 Mbytes of Application Flash memory for VxWorks applications

## Software Support

- support for Linux®, Windows® and VxWorks®

## Optional Built-In Test (BIT) Support

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

## Optional Board Security Packages

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

## Firmware Support

- Insyde® Software InsydeH20™ BIOS:
  - includes Compatibility Support Module
  - based upon Intel® Platform Innovation Framework for EFI
- comprehensive Power-On Self-Test (POST)
- LAN boot firmware included

## VME Interface

- P1 and P2 connectors compatible with VME64x
- implemented using IDT® Universe II™ device
- VME Master/Slave
- A32/A24/A16/D64/D32/D16/D8(E0)/MBLT
- fast hardware byte swapping
- auto system controller detect
- full interrupter / interrupt handler support
- bus error interrupt hardware

## Electrical Specification

- +5V @ 8.8A (typical with 2.4 GHz Intel Core i7-4700EQ processor and 16 Gbytes DRAM)
- +12V, -12V and +3.3V not required
- +12V and -12V routed to both PMC/XMC sites and PMC expansion connector

## Safety

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

## Environmental Specification

- operating temperatures:
  - 0°C to +55°C (N-Series)
  - -25°C to +70°C (E-Series: selected CPU)
  - -40°C to +70°C (K-Series: selected CPU)
  - -40°C to +85°C (K-Series: selected CPU)
- non-operating temperature: -40°C to +85°C
- 5% to 95% Relative Humidity, non condensing:
  - K-Series includes humidity sealant
- rugged versions, see separate datasheet:
  - conduction-cooled: VP F1x/msd-RC

## Mechanical Specification

- 6U form-factor
- single slot, 0.8-inch (20.3mm)
- utilizes 160-way connectors for P1 and P2
- optional P0 connector
- IEEE 1101.10 VME64x handles, alternatively with option for VME32 handles
- shock: 20g, 11ms, 1/2 sine
- vibration: 0.38mm pk at 5Hz-36Hz; 36Hz-2000Hz at 2g, 0.38mm peak displacement
- front and rear plug compatibility with the popular VP 91x/x1x and VP 717/08x families:

### Note 1:

The optional P0 connector supports factory build options for either:

- 1.1) PMC/XMC Site 2 P64s I/O, 1 x VGA, 1 x GPIO, 2 x USB and 1 x Ethernet interfaces
- or
- 1.2) PMC/XMC Site 2 P32s I/O, 1 x VGA, 1 x SATA, 2 x GPIO, 3 x USB and 2 x Ethernet interfaces (VITA 31.1)