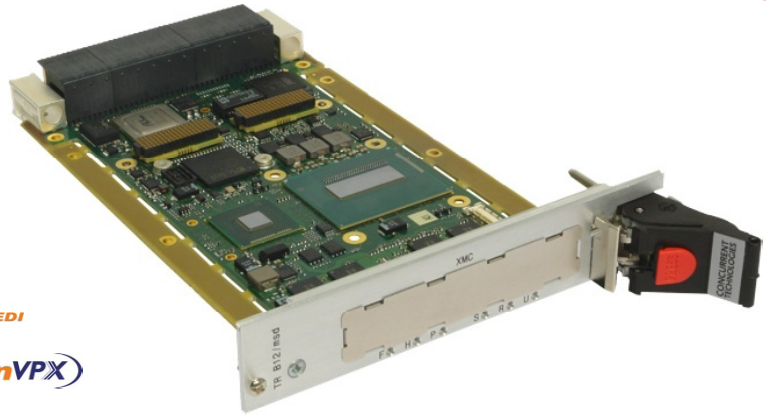
VPX
(OpenVPX)

TR B12/msd
N - Series

4th Generation Intel® Core™ Processor Single Board Computer



VPX
VPX REDI
OpenVPX

APPLICATIONS

The TR B12/msd is a PC-compatible high performance 3U VPX processor board supporting the 4th generation Intel® Core™ processor and the Intel® QM87 PCH with up to 16 Gbytes of DDR3L-1600 ECC DRAM. The TR B12/msd features an optional XMC site and a range of I/O interfaces including four SATA600 channels, dual 1000Base-BX, serial and USB2.0/USB3.0 interfaces. The board provides a flexible PCI Express® (Gen 1, Gen 2 and Gen 3) backplane fabric interface for use in systems defined by OpenVPX (VITA 65). For rugged applications VPX-REDI Type 1 and VPX-REDI Type 2 conduction-cooled version is available. The board is suitable for a range of applications within industrial control, transport, aerospace, security and defense applications. To simplify integration many standard operating systems are supported.

HIGHLIGHTS

- 3U VPX (VITA 46.0) N-Series single board computer:
  - air-cooled
  - 0°C to +55°C operating temperature
  - use in commercial (non-rugged) applications
  - 3U VPX 1.0 inch slot
  - optional rear transition module available
- I/O interfaces compatible with several OpenVPX profiles
- 4th generation Intel® Core™ processor:
  - includes Intel® Advanced Vector Extensions 2.0
  - includes Intel® AES New Instructions
- Up to 16 Gbytes soldered DDR3L-1600 DRAM with ECC
- Configurable control plane fabric interface (VITA 46.6) supports:
  - 2 x SerDes (1000Base-BX) ports or 1 x SerDes plus 1 x Gigabit Ethernet ports or 2 x Gigabit Ethernet ports
- Configurable PCI Express® (PCIe) data plane fabric interface (VITA 46.4) supports:
  - 2 x4 PCIe ports, 4 x2 PCIe ports or a 1 x8 PCIe port
  - support for Gen 1, Gen 2 and Gen 3
  - compatible with OpenVPX module profiles
  - single non-transparent port
  - compatible with the FR 331/x06 VPX Switch
- Up to 4 x SATA600 mass storage interfaces
- Support for onboard SATA Flash Drive Module
- Up to 4 x serial interfaces and up to 3 x USB interfaces
- IPMI (Intelligent Platform Management Interface)
- Watchdog and long duration timers
- Up to 3 x independent graphics interfaces
- Optional high definition stereo audio
- Optional front panel providing inclusive I/O:
  - 1 x USB3.0, 3 x RS232, 1 x Gigabit Ethernet, 1 x DisplayPort
- Optional XMC module interface (with front/rear I/O):
  - XMC module interface (2 x4 or 1 x8 PCI Express® Gen 2)
- Optional board security packages
- Optional Built-In Test (BIT) supports:
  - Power-on BIT, Initiated BIT, Continuous BIT
- Optional Rear Transition Modules
- Ruggedized conduction-cooled VPX-REDI versions (RCx-Series):
  - conduction-cooled to VITA 48.2, conformally coated
  - -40°C to +85°C operating temperature (at card edge)
- Support for Linux®, Windows® 8, Windows® Embedded Standard 8, Windows® 7, Windows® Embedded Standard 7, QNX® and VxWorks®

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Specification

VPX Single Board Computer

- 3U VPX SBC (N-Series) utilizing the 4th generation Intel® Core™ processor:
  - → air-cooled
  - → optional Rear Transition Modules
- compatible with several OpenVPX module profiles
- for ruggedized VPX-REDI (RCx-Series) versions:
  - → conduction-cooled to VITA 48.2
  - → -40°C to +85°C at card edge
  - → conformally coated
  - → see TR B1x/3sd-RCx datasheet

Central Processor

- 4th generation Intel® Core™ processor:
  - → 4-core 1.7 GHz (35W) Intel® Core™ i7-4700EQ cpu
  - → 4-core 2.4 GHz (47W) Intel® Core™ i7-4700EQ cpu
  - → includes Intel® Advanced Vector Extensions 2.0
  - → includes Intel® AES New Instructions
- utilizes the Intel® QM87 Platform Controller Hub

DRAM

- up to 16 Gbytes soldered DDR3L-1600 ECC DRAM:
  - → single bit error correction
  - → dual channel architecture
  - → accessible from processor or VPX fabric

XMC Interface

- 1 x XMC site, in a single VPX slot (VITA 42.0):
  - → front panel I/O and build options for P2 rear I/O
  - → 1 x8 or 2 x4 PCI Express® Gen 2 (VITA 42.3) XMC (Switched Mezzanine Card) interface
  - → +5V or +12V powered (build option)
- XMC site is not usable with the Front I/O Module

XMC P2 I/O with Additional P2 I/O Options

- P2 factory build options, option 1 (full rear XMC I/O) or option 2, 3 or 4 (extra I/O and partial XMC I/O)
- P2 option 1 supports the following interface:
  - → full rear XMC I/O providing P2w1-X24s+X8d+X12d
- P2 option 2 supports the following interfaces:
  - → partial rear XMC I/O providing P2w7-X8d+X12d
  - → Intel® High Definition Audio (requires suitable codec fitted to the Rear Transition Module)
- P2 option 3 supports the following extra interfaces:
  - → partial rear XMC I/O providing P2w11-X12d
  - → up to 3 x RS232 (Tx/Rx) or 1 x RS232 full modem
  - → 1 x USB3.0 port
  - → 2 x SATA600 interfaces
  - → 1 x DVI-D interface (up to 1920 x 1200 @ 60Hz)
  - → analog audio (with codec): stereo line in/out or stereo headphones and microphone
- P2 option 4 supports the following interfaces:
  - → same as option 3 except 3 x GPIO signals are provided instead of the analog audio
- XMC rear I/O supports VITA 46.9 pin-mapping

Ethernet Interfaces

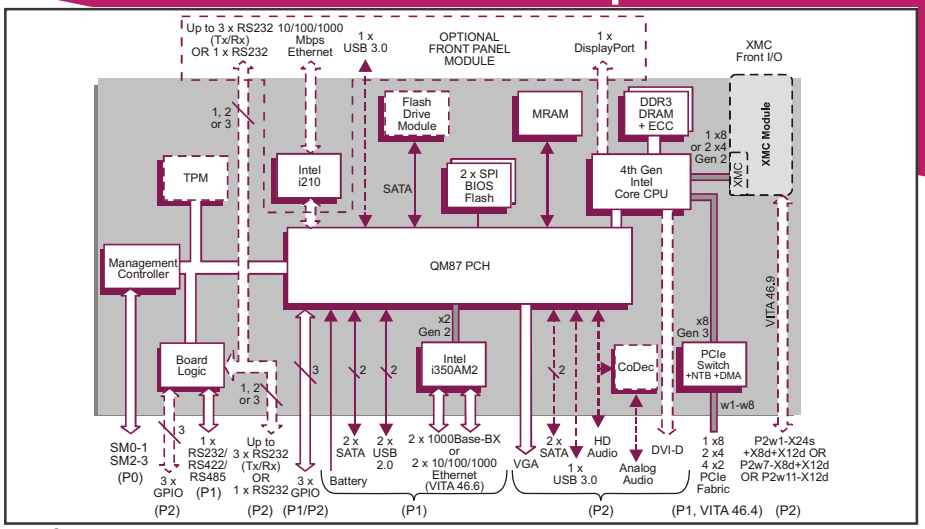
- configurable control plane fabric (VITA 46.6)
- P1 factory build option for 2 x 1000 Mbps IEEE802.3z SerDes (1000Base-BX) ports:
  - → with software switchable option for 1 x 10/100/1000 Mbps Ethernet port (with magnetics) plus 1 x SerDes port
- alternative factory build options for 2 x 10/100/1000 Mbps Ethernet ports:
  - → one port with and one port without magnetics or
  - → both ports with magnetics or without magnetics
- implemented by Intel® i350AM2 Ethernet controller

Graphics Interfaces

- 3 x independent graphics interfaces supported:
  - → DisplayPort interface via the Front I/O Module
  - → DVI-D interface via P2 (XMC build option 3 and 4)
  - → analog VGA interface via P2
- support for Microsoft® DirectX 11
- support for OpenGL 2.0 under Windows® and Linux

Optional Security Packages

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



Serial Ports

- 1 x RS232 (full) or 3 x RS232 (Tx/Rx) ports via P2 (XMC build option 3 and 4), also via the Front I/O Module:
  - → the RS232 port's type/routing is user selectable
- 1 x RS232/422/485 port accessed via P1:
  - → supporting Tx/Rx CTS/RTS in RS232 only
- 16550 compatible UARTs

Mass Storage Interfaces

- 2 x SATA600 interfaces via P1
- 2 x SATA600 interfaces via P2 (XMC build option 3 and 4)
- transfer rate up to 600 Mbytes/s
- optional SATA Flash Drive Module

VPX Backplane Interface

- P0, P1 and P2 support OpenVPX configuration
- configurable PCI Express® (PCIe) fabric interface (VITA 46.4) supports:
  - → 2 x4 PCIe, 4 x2 PCIe ports, or a 1 x8 PCIe port
  - → support for Gen 1, Gen 2 and Gen 3
  - → compatible with OpenVPX module profiles
- supports a Non-Transparent Bridge (NTB) port for multi-processing configurations
- 4 channel DMA engine for fast data block moves
- support for PCIe backplane common clock options via REFCLK (VITA 65-R2012)
- supported by Fabric Interconnect Networking Software (FIN-S):
  - → see SW FNS/nnn datasheet

Other Peripheral Interfaces

- PC RTC; long duration timer; watchdog timer
- CPU temperature monitor; voltages monitor; accessed via System Management interface
- analog VGA via P2 (up to 2048 x 1536 @ 75Hz)
- 2 x USB2.0 interfaces via P1
- 3 x GPIO signals via P1 and P2
- 3 x GPIO signals via P2 (XMC build option 4)

Optional Front I/O Module

- the optional Front I/O Module supports:
  - → 10/100/1000 Mbps Ethernet port via RJ45, implemented by Intel® i210 Ethernet controller
  - → 1 x USB 3.0 port
  - → up to 3 x RS232 (Tx/Rx) ports via an RJ45 or 1 x RS232 full modem via RJ45, user selectable
  - → 1 x DisplayPort interface (resolution dependent on device drivers)
- the module is only available with the air-cooled boards (N-Series), note: the XMC site is not available when this module is fitted

Optional Built-In Test (BIT) Support

- Power-on BIT, Initiated BIT, Continuous BIT

Software Support

- support for Linux®, Windows® 8, Windows® Embedded Standard 8, Windows® 7, Windows® Embedded Standard 7, QNX® and VxWorks®

Firmware Support

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

System Management

- IPMI via SM0-1 and SM2-3
- on-board BMC (Baseboard Management Controller)

Non-Volatile Memory

- 8 Mbytes of BIOS Flash EPROM, dual devices:
  - → main/backup device enabled via a switch
- 128Kbytes MagnetoResistive RAM (MRAM)

Safety

- PCB (PWB) manufactured with flammability rating of 94V-0

Electrical Specification

- typical current consumption (2.4GHz CPU with 8 Gbytes DRAM):
  - → +5V @ 7.1A
  - → +3.3V @ 2.0A
  - → +3.3V AUX @ 0.6A
- +12V AUX and -12V AUX routed to XMC site

Environmental Specification

- operating temperature (air-cooled):
  - → VITA 47 Class AC1, 0°C to +55°C
- storage temperature:
  - → VITA 47 Class C1, -40°C to +85°C
- operating altitude:
  - → 0 to 15,000 feet (0 to 4,572 meters)
- relative humidity (operating/storage):
  - → 5% to 95%, non condensing

Mechanical Specification

- 3U VPX form-factor (VITA 46.0, VITA 48.0)
- 3.9 inches x 6.3 inches (100mm x 160mm)
- optional slot widths:
  - → 1.0-inch (IEEE 1101.10 as per VITA 46.0)
  - → 1.0-inch (VITA 48.0 as per VITA 65)
- connectors to VITA 46.0 for P0, P1 and P2
- operating mechanical:
  - → shock - VITA 47 Class OS1, 20g
  - → random vibration - 0.002g²/Hz

Optional VPX Switch

- SBC compatible with FR 331/x06 VPX Switch

ORDERING INFORMATION

Order Number	Product Description (Hardware)
TR B12/msd-yz	4th generation Intel Core processor, N-Series
where m = front panel width style	
where s = processor variant	

For the order number suffix (d-yz) options please contact your local sales office:

where d = DRAM size
d = up to 16 Gbytes DRAM

where yz = I/O Configuration
yz = rear I/O configuration

For further information on the VPX (N-Series) and VPX-REDI (RCx-Series) boards please contact your local sales office.

Datasheet Code 1709/0613