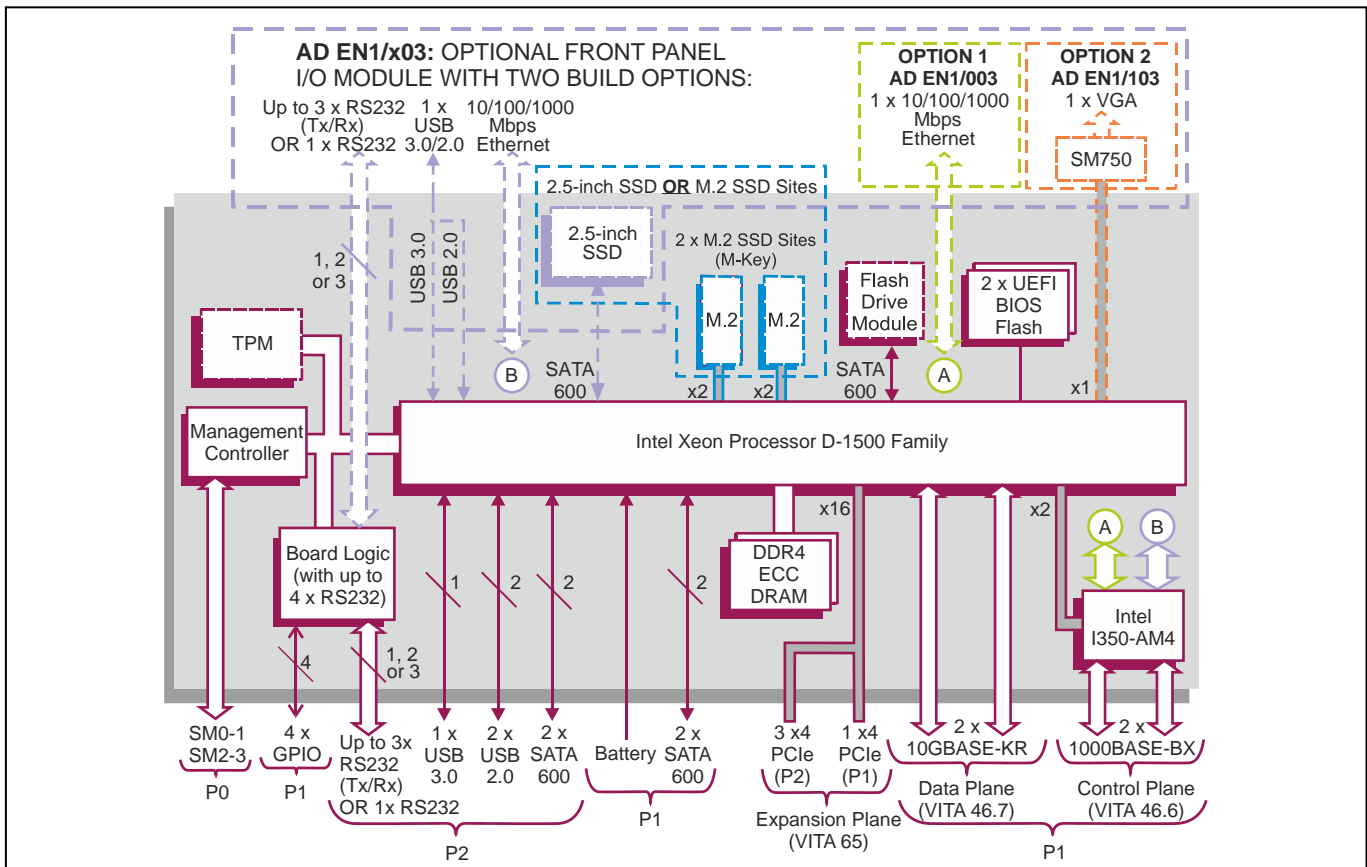## 3U VPX™ board based on Intel® Xeon® Processor D-1500 Family

Key Features

TR G4x/msd is designed for Size, Weight and Power (SWaP) optimized rugged server applications. It features a processor with up to 16-cores, large memory capacity, local storage options and support for virtualization. Separate control and data planes allow secure multi-processor based solutions to be constructed.

- Intel® Xeon® Processor D-1500 Family

- Up 64 Gbytes DDR4 memory for server grade applications

- Direct attached storage options including:
  - → Flash Drive Module
  - → up to two M.2 modules or a 2.5-inch drive

- 10 Gigabit and Gigabit Ethernet connectivity

- PCI Express® connections for point to point expansion

- Long life-cycle support

Specification

VPX Embedded Computer Board

- air-cooled 3U VPX computing board utilizing the Intel® Xeon® processor D-1500 family:
  - → optional Rear Transition Module (RTM)
- OpenVPX™ profile supporting 10GBASE-KR on Data Plane compatible with:
  - → SLT3-PAY-2F2U-14.2.3

Central Processor

- 8-core Intel® Xeon® processor D-1539:
  - → 12 Mbytes Cache, 1.6 GHz
- 8-core Intel® Xeon® processor D-1548:
  - → 12 Mbytes Cache, 2.0 GHz
- 12-core Intel® Xeon® processor D-1559:
  - → 18 Mbytes Cache, 1.5 GHz
- 16-core Intel® Xeon® processor D-1577:
  - → 24 Mbytes Cache, 1.3 GHz
- Intel® Advanced Vector Extensions 2
- Intel® AES New Instructions
- server class processing cores in a System-on-a-Chip package

DRAM

- up to 64 Gbytes soldered DDR4 ECC DRAM:
  - → single bit error correction and dual bit error detection
  - → peak bandwidth of up to 29 Gbytes/s
  - → dual channel architecture
- accessible from processor or VPX Expansion Plane

Serial Ports

- up to 4 x user selectable RS232 serial ports
- the first RS232 port via P2 supports either:
  - → Tx/Rx CTS/RTS, DTR/DSR
  - → or Tx/Rx
- the second RS232 port via the Front I/O Module supports either:
  - → Tx/Rx, CTS/RTS, DTR/DSR, DCD
  - → or Tx/Rx
- when enabled, the third and fourth RS232 (Tx/Rx) ports are either individually or both switched to the P2 connector or the Front I/O Module (replacing the first and second ports' modem signals)
- 16550 compatible UARTs

Mass Storage Interfaces

- 5 x SATA600 interfaces:
  - → 2 x SATA via P1
  - → 2 x SATA via P2
  - → 1 x SATA routed to an optional on-board Flash Drive Module for operating system and application storage
  - → 1 x SATA routed to an optional on-board 2.5-inch solid-state disk drive (subject to the optional Front I/O Module fitted and subject to the optional M.2 SSD sites not fitted)
- option for up to 2 x M.2 Flash modules on-board:
  - → 2230, 2242, 2260 and 2280 format modules
  - → x2 PCIe interface (M-key)
  - → NVM Express® (NVMe™) logical device interface
  - → subject to the optional on-board 2.5-inch solid-state disk drive not fitted
  - → requires AD 260/001 M.2 Flash module carrier

Other Peripheral Interfaces

- PC RTC, long duration timer, watchdog timer
- up to 4 x USB ports:
  - → 2 x USB 2.0 ports via P2
  - → 1 x USB 3.0 port via P2
  - → 1 x USB 3.0/2.0 port via the Front I/O Module
- 4 x GPIO signals via P1

Graphics Interface

- an on-board graphics interface is not provided
- if graphics interface required, either:
  - → use the optional Front I/O Module (with VGA)
  - → or use an Expansion Plane PCI Express port via backplane to a graphics processor module

Optional Front I/O Module

- the optional Front I/O Module supports:
  - → 1 x 10/100/1000 Mbps Ethernet port via an RJ45
  - → 1 x USB 3.0 and 1 x USB 2.0 ports via a USB Type-A connector
  - → up to 3 x RS232 (Tx/Rx) ports via an RJ45 or 1 x RS232 full modem via RJ45, user selectable
- build option for either:
  - → 1 x 10/100/1000 Mbps Ethernet port via an RJ45
  - → or 1 x VGA graphics interface supporting up to 1920 x 1080 @ 60Hz
- module is only available for use with TR G4x/msd air-cooled boards (N-Series and E-Series):
  - → fits into the board's front panel aperture
- see datasheet's block diagram on front page

VPX Control Plane, One Gigabit Ethernet

- VPX Control Plane supports 2 x 1000 Mbps IEEE802.3z SerDes (1000BASE-BX) ports (VITA 46.6):
  - → supports IEEE 1588 "Deterministic Network Timing" (contact sales office for supported operating systems)

VPX Data Plane, Ten Gigabit Ethernet

- VPX Data Plane interface provided by 2 x 10 Gigabit Ethernet interfaces (VITA 46.7):
  - → supports 10GBASE-KR

VPX Expansion Plane, PCI Express

- configurable PCI Express® (PCIe®) VPX Expansion Plane interface (VITA 65) supports:
  - → 1 x4 PCIe port via P1 connector
  - → 3 x4 PCIe ports via P2 connector
  - → the 16 lanes can be configured as 4 x4 ports, 2 x8 ports or 1 x16 port
  - → compatible with OpenVPX module profiles
- PCIe interface supports Gen 1, Gen 2 and Gen 3
- 4 channel DMA engine for fast data block moves
- ports can be configured by the VPX Switch Configuration Tool, see separate datasheet

System Management

- IPMI via SM0-1 and SM2-3:
  - → CPU temperature and voltage monitor accessed via System Management interface
- Baseboard Management Controller (BMC)

Board Security Features

- option for Trusted Platform Module (TPM 2.0)
- option for Sanitization Utility Software Package
- option for proprietary board-level security features

Optional Built-In Test (BIT) Support

- Power-on BIT, Initiated BIT, Continuous BIT

Software Support

- supports Linux®, Windows® and VxWorks®

Firmware Support

- UEFI boot firmware (BIOS):
  - → UEFI 2.4 support
  - → EDK II support
  - → includes Compatibility Support Module
  - → implements Secure Boot
- LAN boot firmware included

Non-Volatile Memory

- 16 Mbytes of BIOS Flash EEPROM, dual devices for redundancy

Safety

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

Electrical Specification

- typical current consumption for 12-core processor (1.5 GHz) with 64 Gbytes DRAM:
  - → +5V @ 6.8A
  - → +3.3V @ 1.1A; +3.3V AUX @ 0.3A

Environmental Specification

- operating temperature:
  - → VITA 47 Class AC1, 0°C to +55°C (N-Series)
- extended operating temperature (selected CPU):
  - → -25°C to +70°C (E-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)
- relative humidity:
  - → 5% to 95%, non-condensing
- option for rugged conduction-cooled (VITA 48.2) VPX-REDI (RCx-Series) version:
  - → see TR G4x/3sd-RCx datasheet

Mechanical Specification

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

Related Products

- Development systems, switches, carriers and rear transition modules are available. Contact Concurrent Technologies for more details

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

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