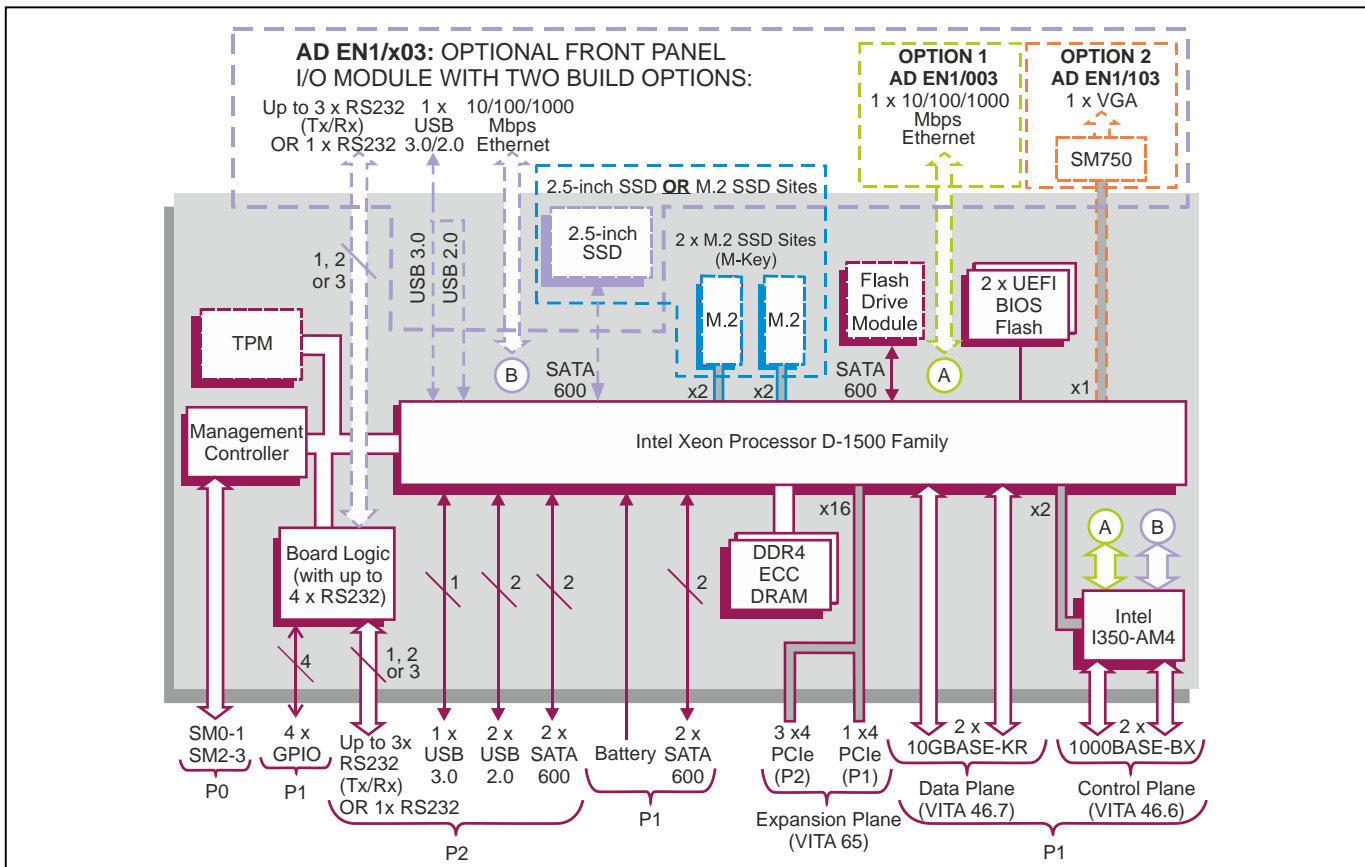## 3U VPX™ board based on Intel® Xeon® Processor D-1500 Family

Key Features

TR G4x/msd is optimized for Size, Weight and Power (SWaP) rugged server applications which need excellent processing, memory and storage capabilities. Multi-processor systems can easily be constructed using the built-in Gigabit and 10 Gigabit Ethernet ports. TR G4x/msd is targeted towards long life-cycle rugged server applications across a range of military, aerospace, transportation and test markets.

- Intel® Xeon® Processor D-1500 Family:
  - → 8-core, 12-core or 16-core processing options

- 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

Block diagram of the TR G4x/msd board.

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™ profiles supporting 10GBASE-KR on Data Plane:
  - → MOD3-PAY-2F4F2U-16.2.10-8
  - → MOD3-PAY-2F1F2U-16.2.1-8

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 34 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 2 x M.2 SSD sites on-board supporting:
  - → 2242, 2260 and 2280 format modules
  - → x2 PCIe interface (M-key)
  - → NVM Express® (NVMe™) logical device interface
  - → RAID 0, 1, 5 and 10 modes
  - → subject to the optional on-board 2.5-inch solid-state disk drive not fitted

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
- supports a Non-Transparent Bridge (NTB) port for multi-processing configurations
- 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)

Optional Board Security Packages

- Trusted Platform Module (TPM):
  - → compliant to TCG v1.2
- proprietary hardware/software board security

Optional Built-In Test (BIT) Support

- Power-on BIT, Initiated BIT, Continuous BIT

Software Support

- supports Linux® and Windows®

Firmware Support

- UEFI boot firmware (BIOS):
  - → UEFI 2.4 support
  - → EDK II support
  - → includes Compatibility Support Module
- support for Serial Over LAN (SOL)
- 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 8-core processor (2.0 GHz) with 32 Gbytes DRAM:
  - → +5V @ 7.0A
  - → +3.3V @ 1.2A; +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

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