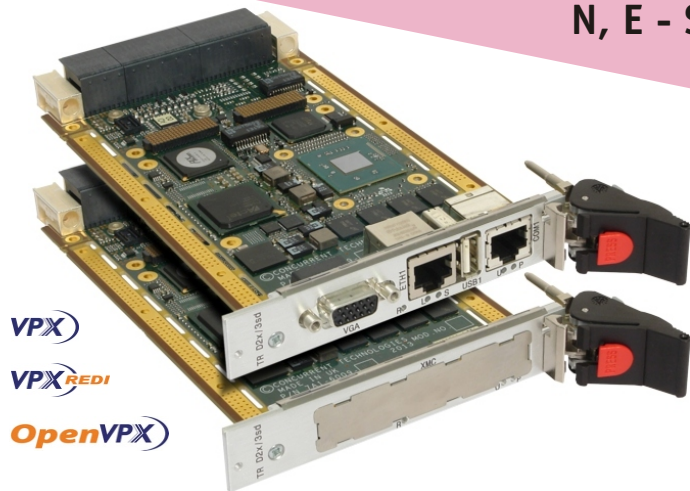


## Intel® Atom™ Processor Single Board Computer



### APPLICATIONS

TR D2x/msd is a 3U VPX single board computer based on the Intel® Atom™ processor E3800 product family and is offered with two processor options: single-core for lowest power consumption and quad-core for enhanced performance. A number of factory build options are available with enhanced and backward compatible I/O schemes for flexibility. With good performance relative to power consumption,

TR D2x/msd scores well in Size, Weight and Power (SWAP) metrics and is designed for deployment in a variety of applications within the aerospace, security, transportation, defense and other critical embedded markets. A number of optional software packages are offered including Fast Boot, Built-in Test (BIT) and a board level security package to prevent access to sensitive data.

### HIGHLIGHTS

- 3U VPX (VITA 46.0) single board computer:
  - supports forced air-cooled or fanless versions
  - use in commercial (non-rugged) applications
  - 3U VPX 0.8 inch slot or 1.0 inch slot
  - optional rear transition module available
- Intel® Atom™ processor E3800 product family:
  - 4-core 1.91 GHz (10W) Intel Atom processor E3845
  - 1-core 1.46 GHz (5W) Intel Atom processor E3815
- The 1-core board variant consumes less than 10W
- 4 Gbytes DDR3L DRAM with ECC
- I/O interfaces compatible with several OpenVPX profiles
- Rear plug compatible with the popular TR A40/x0x or TR 90x/x1x families
- 1 x 10/100/1000 Ethernet port (option for front or rear)
- 2 x SATA300 mass storage interface plus support for optional on-board SATA Flash Drive Module
- Configurable PCI Express® (PCIe) VITA 46.4 data plane fabric interface:
  - 8 x1 PCIe ports, 2 x4 PCIe ports, 1 x4 + 4 x1 PCIe ports (Gen 1 and Gen 2)
  - compatible with OpenVPX module profiles
  - supports one Non-Transparent Bridge (NTB) port
- Compatible with the FR 331/x06 Fabric Switch
- Configurable VITA 46.6 control plane fabric interface:
  - 2 x SerDes (1000BASE-BX) ports or 1 x SerDes plus 1 x Gigabit Ethernet ports or 2 x Gigabit Ethernet ports
- 3 x serial interfaces
- Up to 4 x USB 2.0 plus optional USB 3.0/2.0 interfaces
- Watchdog and long duration timers
- Tier 1 Chassis Manager and IPMC functionality as per draft VITA 46.11 specification
- Optional x4 PCIe XMC interface or fixed front panel I/O: 1 x USB, 1 x RS232, 1 x Gigabit Ethernet, 1 x VGA
- Optional Fast Boot software package, using the Intel® Firmware Support Package (Intel® FSP)
- Optional support for:
  - additional rear I/O: DVI-D, VGA, stereo audio and CANbus
  - Built-In Test (BIT) firmware and software
  - board-level security package
  - Trusted Platform Module (TPM)
  - software tools for the PCIe fabric interface
- Commercial versions (N-Series, E-Series):
  - N: 0°C to +70°C
  - E: -25°C to +70°C
- Ruggedized conduction-cooled VPX-REDI versions (RCx-Series)
- Support for Linux®, Windows® and VxWorks®

## VPX Single Board Computer

- air-cooled 3U VPX SBC utilizing the Intel® Atom™ processor E3800 product family
- compatible with several OpenVPX module profiles
- factory build options for rear I/O compatibility with TR A40/x0x or TR 90x/x1x
- optional rear transition module

## Central Processor

- Intel® Atom™ processor E3800 product family:
  - 4-core 1.91 GHz (10W) Intel® Atom™ processor E3845, 2M Last Level cache
  - 1-core 1.46 GHz (5W) Intel® Atom™ processor E3815, 512K Last Level cache

## DRAM

- 4 Gbytes soldered DDR3L ECC DRAM:
  - peak bandwidth of 10.6 Gbytes/s (4-core)
  - peak bandwidth of 8.52 Gbytes/s (1-core)
  - single channel architecture
- accessible from processor or VPX fabric

## XMC Interface (build option)

- 1 x XMC site, in a single VPX slot (VITA 42.0):
  - XMC (Switched Mezzanine Card) interface supported by x4 PCI Express® Gen 2 (VITA 42.3)
  - front panel I/O aperture
  - option for +5V or +12V VPWR
  - option for P2w-X20d or P2w-X20d+X24s rear I/O
- front panel build option does not support XMC site

## Front Panel I/O (build option)

- front panel I/O build option (no XMC site) supports:
  - 1 x 10/100/1000Mbps Ethernet (specific variants)
  - 1 x RS232 channel accessed via RJ45, full modem support (16550 compatible)
  - 1 x USB2.0 interface
  - 1 x VGA, user switchable via front panel or via P2
- only available with the air-cooled boards (N-Series)

## Graphics Interface

- DVI-D interface (build option) via P2:
  - resolutions up to 1920 x 1080 @ 60 Hz
- VGA interface, user switchable via front or P2:
  - resolutions up to 2048 x 1536 @ 75 Hz
  - factory build option via P2
- 1-core processor:
  - graphics base frequency is 400 MHz
- 4-core processor:
  - graphics base frequency is 542 MHz
  - graphics burst frequency is 792 MHz
- support for Microsoft® DirectX 11.1 on Windows®
- support for OpenGL 3.0 on Linux®

## Mass Storage Interfaces

- 2 x SATA300 interfaces via P1 connector
- optional SATA Flash Module, 8 Gbytes minimum

## Serial Interfaces

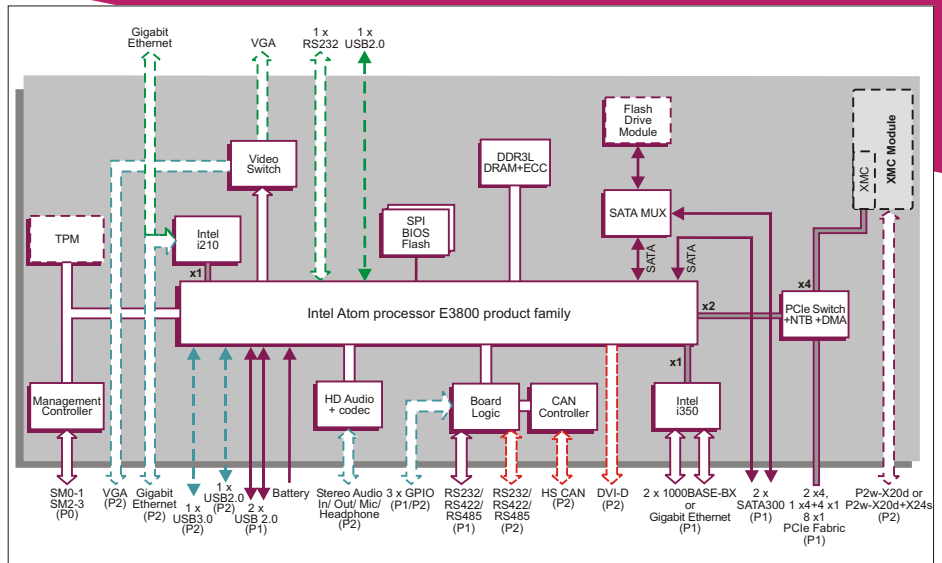
- 1 x RS232/422/485 COM channel accessed via P1:
  - supporting Tx/Rx, CTS/RTS in RS232 only
  - supporting Transmit Control in RS485 mode
- 1 x RS232/422/485 COM channel accessed via P2:
  - supporting CTS, RTS, DSR, DTR, DCD and RI
- 16550 compatible UARTs

## 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



## VPX Control Plane Ethernet Interfaces

- build option for 2 x 1000 Mbps IEEE802.3z SerDes (1000BASE-BX) ports via P1:
  - software switch option for 1 x SerDes port and 1 x 10/100/1000 Mbps Ethernet port
- alternative factory build options for 2 x 10/100/1000 Mbps Ethernet ports
- build options for on-board Ethernet magnetics

## VPX Data Plane PCI Express Interface

- P0, P1 and P2 support OpenVPX configuration
- configurable PCI Express® (PCIe) fabric interface:
  - 8 x1 PCIe ports, 2 x4 PCIe ports, 1 x4 + 4 x1 PCIe ports
  - support for Gen 1 and Gen 2
  - supports one Non-Transparent Bridge (NTB) port for multi-processing configurations
- 4 channel DMA engine for fast data block moves
- PCIe ports can be configured by the VPX switch configuration tool
- supported by Fabric Interconnect Networking software (FIN-S), see SW FNS/nnn datasheet

## Additional Ethernet Port

- option for 1 x 10/100/1000 Mbps Ethernet port via front panel or via P2

## Other Peripheral Interfaces

- PC Real Time Clock
- long duration timer; watchdog timer
- 2 x USB2.0 ports via P1 plus an option for a USB3.0 port and a USB2.0 port via P2
- 3 x GPIO signals via P1/P2
- optional stereo audio including onboard codec
- optional High Speed CANbus controller interface
- CPU temperature monitor; voltages monitor; accessed via System Management interface

## System Management

- Tier 1 Chassis Manager and IPMC functionality as per draft VITA 46.11 specification
- compatibility with standard off-the-shelf system management utilities based on IPMI Version 1.5

## Firmware Support

- Insyde Software InsydeH20™ BIOS
- optional Fast Boot solution using the Intel® Firmware Support Package (Intel® FSP)
- Intel® Platform Innovation Framework for EFI
- LAN boot firmware included

## Software Support

- support for Linux®, Windows® and VxWorks®

## Non-Volatile Memory

- dual 8 Mbytes of BIOS SPI Flash EPROM
- 8 Kbytes user EEPROM

## Electrical Specification

- typical power consumption is 9.4 W for the 1-core Intel Atom processor E3815 board
- +5V, +3.3V and +3.3V AUX are required
- +12V is not required
- +12V AUX and -12V AUX routed to XMC site

## Safety

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

## Environmental Specification

- operating temperature (all variants):
  - 0°C to +70°C (N-Series), exceeds VITA 47 Class AC1
- extended operating temperature:
  - -25°C to +70°C (E-Series)
- for airflow requirements and fanless operation refer to the Technical Reference Manual
- 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 (operating or non-operating):
  - 5% to 95%, non condensing
- ruggedized conduction-cooled (VITA 48.2) VPX-REDI (RCx-Series) versions:
  - see TR D2x/msd-RCx datasheet

## 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:
  - 0.8-inch (VITA 46.0)
  - 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 - 0.002g<sup>2</sup>/Hz

## Optional VPX Fabric Switch

- board is compatible with FR 331/306 VPX Fabric Switch

## ORDERING INFORMATION

Order Number	Product Description (Hardware)
TR D2x/msd-yz	Intel Atom processor E3800 family where x = processor core selection where m = front panel width style where s = processor speed variant

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

d = DRAM size

yz = rear I/O configuration

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