Generation 8 (GR740 Based) SBC

Generation 8 Single Board Computer

Version #: 1.3.4

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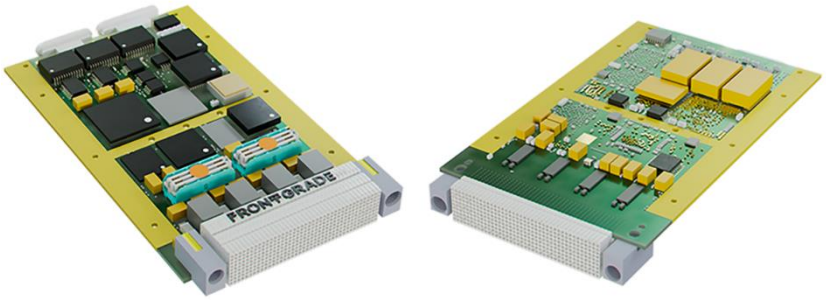
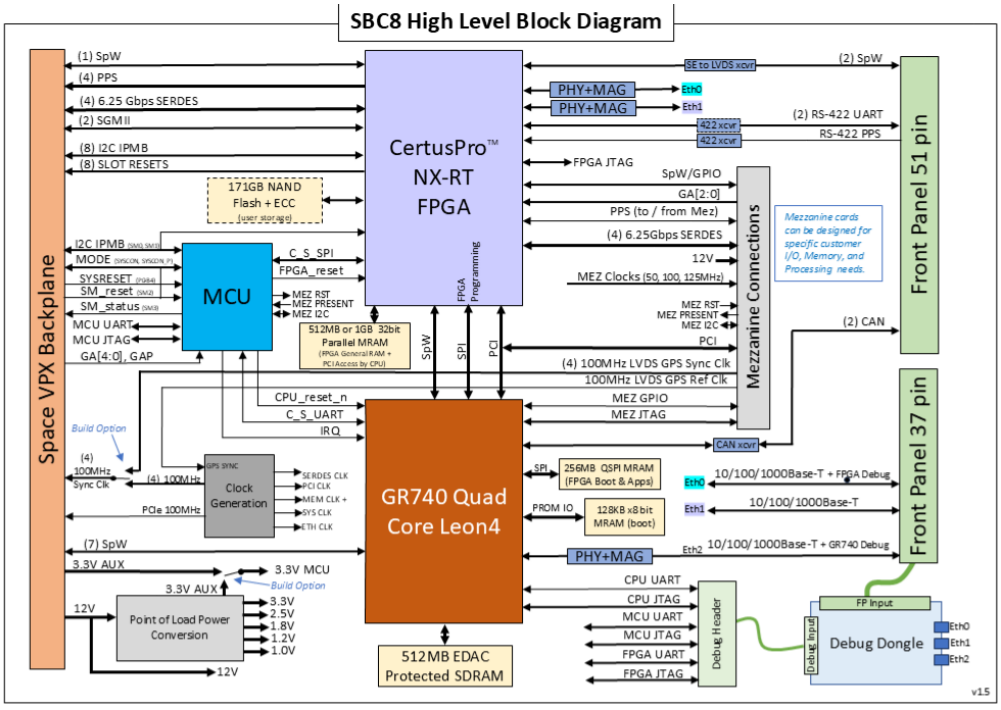


Introduction

The Frontgrade™ SBC8 Single Board Computer is a perfect mix of high-performance processing, interface flexibility, and low power, in a SWaP optimized design that is ideal for your space processing or C&DH needs now and into the future. This compact 3U SpaceVPX design is small, lightweight, and power efficient while offering the processing power and flexibility you need to succeed in today's competitive space markets.

The Frontgrade SBC8 design features the latest Radiation Hardened and field tested Quad Core LEON4FT SPARC V8 processor (GR740) that provides up to 1800 DMIPS of processing power and pairs that with our latest Low Power, High Performance Radiation Tolerant CertusPro-NX-RT FPGA. SBC8 provides 512MB of Reed-Solomon EDAC protected SDRAM directly connected to the GR740 processor along with 256MB Dual-QSPI MRAM - providing directly connected persistent RAM storage to user applications. Additional 512MB-1GB of local expansion persistant-RAM (MRAM) is available via PCI DMA transactions from the GR740 through the Frontgrade CertusPro-NX-RT FPGA. All told, the SBC8 implements a robust memory architecture based on highly reliable, space assured, memories yielding a total of 512MB volatile SDRAM and up to 1.25GB of non-volatile MRAM. SBC8 also optionally includes up to 171GB of EDAC Corrected Non-Volatile User Data Storage.

Additionally, SBC8 features a VITA 88.0 XMC+ Mezzanine interface to allow you to use the same base SBC for all your missions but have the flexibility to add custom mezzanine CCAs to tailor front panel interfaces and processing to each individual mission's requirements. This not only allows for the flexibility you need but allows for reuse of your valuable software code base as you move from mission to mission.



Distribution Statement A: Approved for public release. Distribution is unlimited.

Features

Performance

- GR740 Quad Core Radiation Hardened SoC from Industry Leader Frontgrade Gaisler
  - 2MB Level2 cache SDRAM Interface
  - High Speed Processing up to 1700 DMIPS (250MHz system clock @ 1.84DMIPS/MHz/Core)
  - Excellent Fight Heritage and Code Base
  - SW Compatibility: VxWorks, Linux, RTEMS
  - JTAG, Ethernet and SpaceWire debug links with GRMON and TSIM3 capabilities

Memory

Customize the SBC8 Memory Configuration to your specific needs with options of 512MB or 1GB of FPGA connected MRAM and the option to include 171GB of NAND Flash with BCH EDAC.

- 512MB of EDAC Corrected SDRAM
- 128KB SEU Immune MRAM (Processor Boot Memory)
- 256MB QSPI MRAM with ECC (FPGA Boot and App Storage)
- 512MB or 1GB of High Speed, Non-Volatile, 32-bit Parallel MRAM with ECC accessible over PCI from the CPU
- Up to 171GB of ECC Corrected User Accessible Non-Volatile Memory (NAND)

Front Panel Interfaces

The SBC8 Front Panel offers options of SpW, Ethernet, UART, or CAN interfaces for communications to the Spacecraft Bus and other devices as well as PPS and GPS clock inputs for mission synchronization.

- 2x SpW
- 3x 10/100/1000Base-T Ethernet Ports
  - 2x FPGA connected with 1 that also operates as an Ethernet Debug Port
  - 1x CPU connected (user + debug)
- 2x RS-422 UARTs
- 2x CAN
- PPS Input (RS-422)

Backplane Panel Interfaces

SBC8 is primarily targeted for use as a System Controller, so it adheres to a SpaceVPX Controller Backplane profile, but can be used as peripheral with all the available Backplane IO.

- 8x SpW
- 4 lanes multi-purpose SERDES (6.25Gbps)
- 2 lanes of SGMII SERDES
- 8x I2C for IPMB
- 8x Slot Resets for other boards in the chassis
- 4x PPS Outputs
- 4x 100MHz Sync Clk Outputs (can come from on board clock or GPS Reference clock implemented on a Mezzanine)
- PCIe 100MHz Clk Output
- SpaceVPX Controller (Slot Profile: SLT3-CON-8T-14.6.2 Module Profile: MOD3-CON-8T8U-16.6.2-1-16.12)
- 12V Power Input (with optional 3.3V Aux usage)

Mezzanine Interfaces

A distinguishing feature of the SBC8 is its ability to adapt to your specific mission via custom mezzanines. Gone are the days of needing new SBC designs for every mission. Instead, maintain the same base SBC allowing maximum reuse of your investment in software and add features you need to make the next mission a success.

- PCI
- 4 lanes multi-purpose SERDES (6.25Gbps)
- SpW (can also be used as 4x LVDS GPIO or 8 SE GPIO)
- 1x GR740 GPIO
- PPS to/from Mez
- 4x Differential 100MHz Sync Clk from Mez + 1x Differential from Mez to Clock Network Manager
- 50MHz, 100MHz and 125MHz Clocks to Mez
- Mezzanine JTAG (to program FPGAs on Mez) – can be used as GPIO

Mass & Thermal

- Mass: <0.65kg, standard 3U VPX form factor
- -25°C to +65°C operational
- Power consumption: 12.8W Typical