BAE SYSTEMS

PROCESSORS

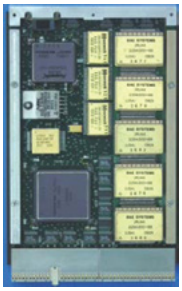
BAE SYSTEMS' CURRENT PROCESSORS AND SINGLE BOARD COMPUTERS

Our current generation product, the RAD750® single board computer, is TRL-9, widely adopted, and has achieved the equivalent of 100 years of space operation in January 12, 2013.

It is currently flying on prominent national missions such as Advanced Extremely High Frequency (AEHF), Mars Science Laboratory (Curiosity Rover), Mars Reconnaissance Orbiter, Lunar Reconnaissance Orbiter, Solar Dynamics Observatory, and NextSat, Juno, and others. It is planned for future flight in national programs such as GPS and the Geostationary Satellite Server GOES weather satellites.

With a flexible architecture and wide range of processing options, the RAD750 microprocessor is available in single-board computer formats including CompactPCI™ 3U, 6U-160, 6U-220, and custom form factors. Options include a radiation-hardened 128K x 72 bit L2Cache and Golden Gate Bridge ASIC. The Golden Gate Bridge ASIC provides embedded 1553 and SpaceWire interfaces. All generations of our Bridge ASICs contain a resident Embedded Micro-Controller for housekeeping functions and assisting the RAD750 with I/O or memory operations. The different standard RAD750 processor board options are illustrated in Figure 1.

100 YEARS OF SPACE OPERATION...



RAD750 3U

- TRL-9 since 2005
- 128 MB DRAM with SECDED and nibble ECC

Typically used for:

- Shorter missions
- Less stringent radiation environments
- Small satellites

RAD750 6U-160

- TRL-9 since 2010
- 52 MB SRAM with ECC
- 4 MB EEPROM with ECC

Typically used for:

- Longer mission lengths
- More stringent radiation environments

RAD750 6U-220

- TRL-9 since 2009
- 36 MB SRAM for CPU with ECC
- 8 MB SRAM for SpaceWire with ECC
- 4 MB EEPROM with ECC
- SpaceWire router (4 port) ASIC
- MIL-STD-1553

Figure 1: TRL-9 RAD750 Processor Board Options

BAE SYSTEMS' NEXT-GENERATION PROCESSORS

The RAD5545™ multi-core processor –the first member of the new RAD5500™ product family –will provide a 10X performance increase over the heritage RAD750®.

Integrated cache and advanced bridge functions further reduce SWaP (Size, Weight, and Power). The licensed QorIQ® Power Architecture™ platform from Freescale Semiconductor facilitates portability of heritage software.

Through the QorIQ Power Architecture system-on-a-chip platform combined with 45nm SOI technology from the IBM Trusted Foundry, the BAE Systems product line evolves, from the RAD6000™ in the mid '90s, to the RAD750 in the early 2000s, to a new family of RAD5500 System on Chip processors. The order of magnitude improvement in processing capability with each generation meets the processing needs of future missions with the availability and reliability expected from BAE Systems' products.

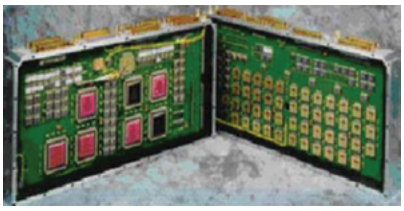
Early adoption of the RAD5500 is supported by a commercially available software development platform, familiar operating systems, and a mature software development environment with advanced debug support. The RAD5500 processor platform includes boards with features such as VPX high speed connectors, DDR2/DDR3 memory, serialize/deserialize (SERDES) and SpaceWire IO.

10X PERFORMANCE INCREASE...

PROCESSOR HISTORY

BAE Systems Space Products & Systems is known for its space processor products that span three generations, flying on numerous space missions in multiple environments.

BAE Systems has been developing radiation-hardened space electronics for over two decades with electronics operating in space since 1995. It all began with 16-bit Generic VHSIC Space borne Computer (GVSC) 1750A architecture processors launched on MTSAT and NSTAR. We migrated from the 1750A to the RAD6000 based on the commercial IBM RISC/System 6000 architecture and radiation-hardened for space. Shown in Figure 2 from top to bottom are the GVSC processor card from the Cassini mission, the RAD6000 processor card for the Mars Rovers Spirit and Opportunity, and the RAD750 card for the Deep Impact mission.



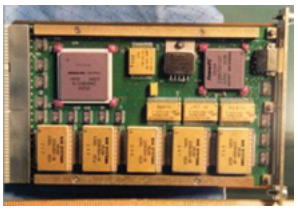


Figure 2: Three generations of BAE Systems space processors