Field Programmable Gate Arrays:
Off-the-shelf QML Components for Rapid Technology Insertion

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Evolution of SRAM FPGAs

- 1985  First 1K gates FPGAs introduced (2.0um, 5.0 volts)
- 1988  First FPGAs available to SMDs
- 1990  On-board distributed memory incorporated with second generation architecture
- 1996  Introduced 85K gates (0.35 um, 3.3 volts)
- 1997  500K system gates (0.25 um, 2.5 volts)
- 1998  3rd generation architecture (1M system gates); Radiation Hardened products introduced
- 2000  2M system gates
Abstract

• SRAM-based Field Programmable Gate Arrays (FPGAs) have become the technology of choice for many Aerospace and Defense system designer. This is true for new system development and for upgrading/retrofitting existing systems. These off-the-shelf re-programmable devices significantly design flexibility and can be re-configured as design and mission requirements change.
The Advantages of FPGAs

- Major advantages for many Aerospace and Defense applications
  - Shorter system development time
  - Design flexibility
  - Re-programmable technology
  - Standard off-the-shelf product
  - No NRE
  - Field upgrades easily made
Example of FPGA Technology Insertion: Raytheon/T.I.

- FPGAs designed into major second generation FLIR program (HIT)
- Performed trade study of ASICs vs. FPGAs
- Major considerations favoring FPGAs:
  - NRE costs
  - Development time
  - Required design reviews
  - Delivery of prototypes
  - Risks
Example of FPGA Technology Insertion: Raytheon/T.I.

- Multiple FPGAs used to provide numerous control functions
- Circuit boards laid out and pin configurations chosen prior to design completion
- Design changes made right up to production
- Design done sequentially and incrementally
- Field upgrades easily made
The QML Advantage

- Utilizes Best Commercial Practices
- Fully defined electrical and environmental performance
- Assured product “pedigree” and change control
- Hermetic and PEM devices
- Off-the-shelf ASIC solution
Summary

- FPGAs have many advantages over ASICs in Defense/Aerospace systems
- Flexibility of FPGAs allow for rapid insertion into new designs, upgrades/retrofits
- QML provides solutions to many of today’s design problems:
  - Temperature ranges
  - Package options
  - Reliability of supply