



# COTS Units Alternative Grade Parts Opportunities and Challenges

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*10/20/22*



## COTS using Alternative Grade Parts

- Opportunity and Challenges

## Parts Screening and Qualification

## Radiation

## Security

## Contamination/Prohibited Materials

# COTS UNITS USING ALTERNATIVE GRADE PARTS



- COTS units built with alternative grade parts
  - Alternative grade parts are Automotive or Commercial grade
  - Standard space parts adhere to EEE-INST-002 – Levels 1, 2, or 3
- Opportunity: COTS units alternative grade parts
  - Cost less: 5 to 15 times less per unit
  - 6 to 18 months shorter lead times
- Challenges:
  - Getting acceptance by MA community
  - Parts are not specifically designed for space radiation environment
  - Security & DFAR: foreign parts, firmware, and software
  - Contamination and Prohibited materials

Customer's budget constraints requires utilizing COTS units built with alternative grade parts: How do we manage and accept the risks?

- No accepted industry process on how to manage and accept risk of using Alternative Grade parts in COTS units
- Some proposed concepts to manage/accept risks
  - Design benign spacecraft environment
  - Test out infant mortality
  - HALT/HASS testing
  - Use On-Orbit Heritage – currently difficult due to lack of insight to on-orbit anomalies

What criteria would make the reduced screening and qualification acceptable?

- Few test facilities for high energy particle testing
  - Difficult to evaluate radiation risk without the data
- Alternate Part Manufacturers are not testing parts
  - COTS unit suppliers are paying for testing parts, but resulting data is not shared
  - Bottleneck at the high energy particle test facilities
  - Compared to European (ESA) companies, US companies not as willing to share radiation test data
    - Some suggest it is cultural differences
    - Is there something systemic that can be implemented in the US?

What agency should manage the critical resource to reduce the bottlenecks?

- COTS units can have foreign made parts, along with foreign designed firmware and software
  - European COTS suppliers have higher TRL components
  - European COTS suppliers tend to be lower cost and shorter schedules
  - Commercial Spacecraft primes select European COTS suppliers which use foreign Alternative Grade parts and their proprietary firmware and software
- What accounts for European COTS suppliers being ahead of US COTS suppliers using alternative parts?
- Can firewalls be used to reduce the risk of foreign parts and foreign SW?

What can stakeholders do to increase competitiveness of US COTS Suppliers?

- Alternative Grade parts can use pure tin on leads
- Other materials which can be used are cadmium and silicone
- If COTS suppliers have substantial space experience and M&P infrastructure, these risks are usually mitigated by the supplier
- If COTS suppliers experience is supplying mostly terrestrial based systems, the prime's SMEs will need to "catch" prohibited material or sources of contamination