

ACCEDE 2019

THALES ALENIA SPACE APPROACH WITH COTS SOLUTIONS FOR NEW SPACE

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**ACCEDE
COTS 2019**

SEVILLE - SPAIN 6-8 NOVEMBER

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Date: 06/11/2019

Ref: 0005-0011338912

Template: 83230347-DOC-TAS-EN-007

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COTS HERITAGE : FIRST HERITAGE

- **Beginning 2000**, before ECSS-Q-ST-60-13C release ,**commercial plastic microcircuits** were selected by Thales Alenia Space for **Class 1 or Class 2 programs** (ECSS-Q-ST-60C) **as alternative approach** when no technical solution existed with **Hi-Rel parts**.
- A detail specification for qualification and up-screening for plastic encapsulated microcircuits was released. The justification document summarized all data and risk analysis
 - Explanation of the need /Trade off with Hi-Rel.
 - Risk analysis before to launch qualification on the flight lot.
 - ✓ **Lead Finish : SnPb mandatory**
 - ✓ Manufacturer survey system: PCN, OBS, Technological Data and Reliability Data
 - ✓ Procurement : Single lot & traceability
 - ✓ Radiation : Single Event Effects, Total Dose
 - ✓ Technological qualification : Construction Analysis and Outgassing
 - **Screening : Similar to Class 1 ECSS-Q-ST-60-13C.**
 - **Environmental qualification (sampling): Similar to Class 1 ECSS-Q-ST-60-13C.**
 - Mounting qualification : Vibrations, Thermal Cycling.
- For additional procurement :
 - Construction analysis (C.A.) replaced by DPA 3 pieces
 - Single Event Effect test is not required if die mask revision remains unchanged from previous procured lot checked through C.A.
 - **Mounting qualification systematically done on each flight lot**

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COTS HERITAGE- IRIDIUM NEXT

Requirements : COTS close to ECSS-Q-ST-60-13C Class 2/Class 3

- An internal specification for “COTS acceptance” was released by Thales Alenia Space
- COTS solutions depending on :
 - **Volume and price**
 - Higher electrical performances compared to HiRel components
 - Temperature Range : minimum temperature range -40°C to 85°C
 - **Mature packages** TSSOP ;DPACK types ; SOIC-8 SOT-xx. **Pure Tin allowed**
 - Single lot
 - Family type
 - ☐ Active Parts : Microcircuits and Discrete from PPL Thales Group or AEC qualified
 - ☐ **Passive parts introduced (180 references)** : ceramic capacitors, chip resistors and RF Passive (Commercial and AECQ level).
- **LOT VALIDATION :**
 - Radiation
 - Construction analysis
 - Mounting qualification (per lot DC)
 - Reliability : **Data collection from manufacturer** or lot testing
- **Screening at board/Unit level**
- **More than 350 References COTS including some AECQ parts**

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COTS- NEWSPACE SATELLITES 1/2

➤ The COTS requirements are detailed in a new dedicated Standard Company released on 2018.

- **Prohibited COTS** families are listed
- **Manufacturer selection :**
 - COTS shall be selected from manufacturers with **high Volume Production lines.**
 - Manufacturer** shall be identified as **reliable supplier** ; Quality System , Responsive Behavior
- **Preferred COTS :**
 - Active COTS : **PED-Rad Tolerant Plastics**, AECQ, Enhanced products , PPL Thales or **Heritage**
 - Passive COTS allowed** shall be selected if possible to the maximum extend in AECQ version

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COTS- NEWSPACE SATELLITES 2/2

➤ The COTS requirements are detailed in a new dedicated Standard Company released on 2018.

- **Temperature range** as minimum -40°C/+85°C
- **Pure Tin according to JESD-201 class 2 allowed . If not, Risk Analysis & mitigation plan required.**
- **Lot homogeneity** (Single Date Code, assembly lot et when required diffusion lot for radiation)
- **Expected Traceability**
 - Diffusion and Assembly locations
 - Assembly lot
 - Diffusion lot (for radiation sensitive parts)
- **Packing**
 - Mechanical Protection
 - ESD protection,
 - Moisture protection
 - Label : Traceability as minimum Date Code, manufacturer lot.

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COTS- MITIGATION PLAN 1/2

Mitigation Plans have been established as consequence of a strong heritage

➤ Radiation Risk :

- **Single Event Effect** : Technology sensitivity
- **Total Dose** : Several lots tested

➤ Procurement risk :

- Authorized **distributors**
- **Delivery time** : Anticipation for AECQ and high volume needs
- Manufacturers **Survey System (follow-up of Obsolescence and Product Change Notifications)**
- PPL Thales

➤ Technological Risk :

- **Construction Analysis** : adapted to focus on the critical aspect of each technology.
- **Mounting Qualification** : For each new procurement, mounting qualification shall **not be systematically required** depending on:
 - Outgassing and Construction Analysis
 - Package** : **similarities** can be declared per supplier/assembly location for each package type with several sizes.

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COTS- MITIGATION PLAN 2/2

Mitigation Plans have been established as consequence of a strong heritage

➤ Acceptance Risk : **Parts Selection Team:**

- Thales Alenia Space Quality assurance expert / specialist on EEE parts, Radiation, Materials and Processes, Dependability are in charge of risk evaluations as support of EEE parts engineering.
- COTS acceptance is declared through a detailed Justification Document approved by experts.
 - Product characteristics
 - Traceability
 - Supply chain data :PCN management, Obsolescence data, Procurement information, Life Cycle
 - Manufacturer Reliability data
 - Evaluation done by Thales Alenia Space
- A summary sheet “Justification Document main - external “is automatically filled and provided to customers.
- **For each new procurement, Justification File is updated.**

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CONCLUSION

Thales Alenia Space policy on commercial EEE parts is a strong guarantee for New Space activities.

Supplier cooperation for data collection is mandatory to use commercial components in Space applications.

COTS- MITIGATION PLAN

THANK YOU

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