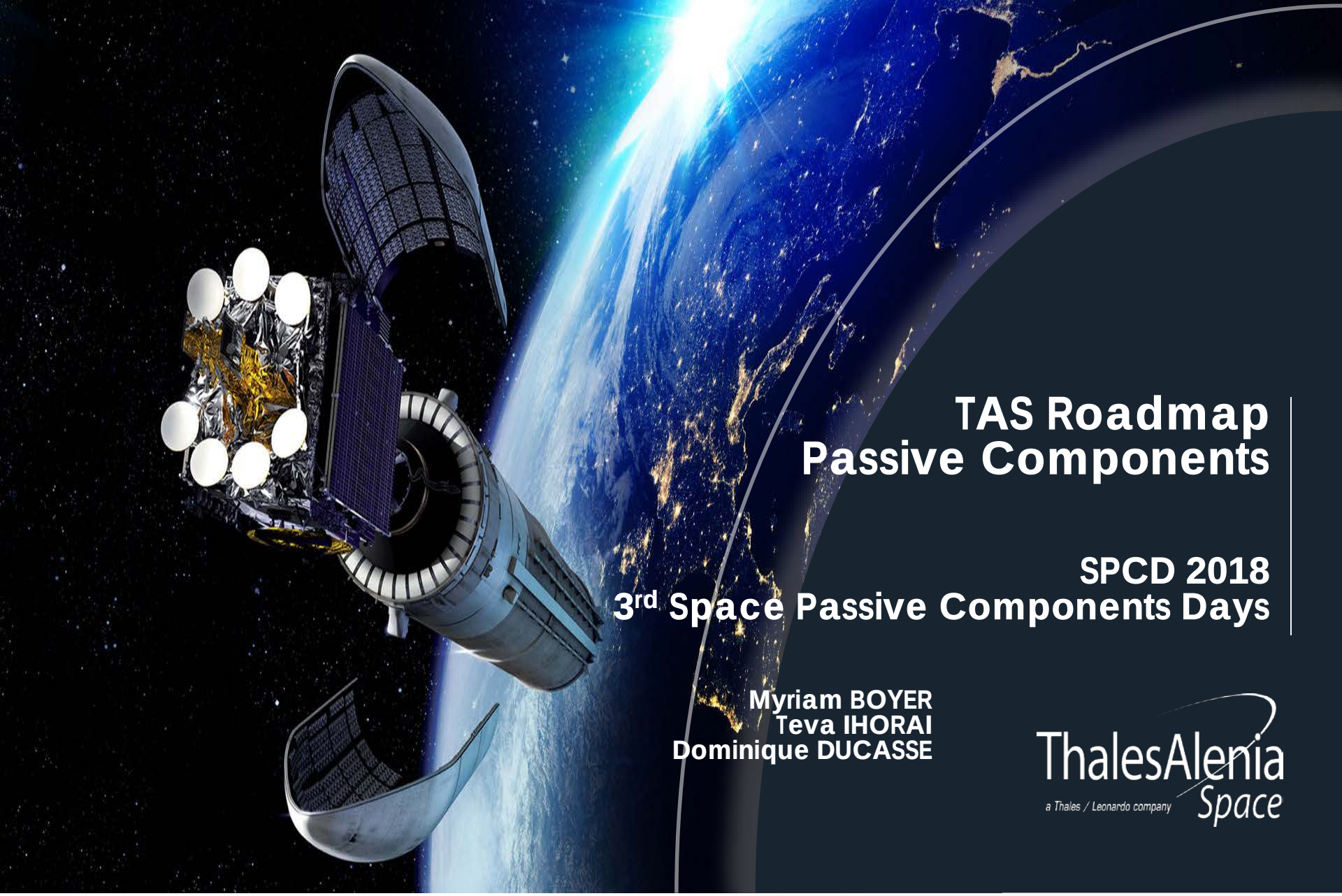


TAS Roadmap Passive Components

SPCD 2018
3rd Space Passive Components Days

Myriam BOYER
Teva IHORAI
Dominique DUCASSE

ThalesAlenia Space
a Thales / Leonardo company

TAS Road Map / Passive Components - Summary

Common requirements for Passive Components

Capacitors / Resistors

Magnetics

Crystals / Oscillators

Connectors

RF Passive Components

TAS Road Map / Passive Components

- Common requirements for passive parts
  - *Main requirements coming from Equipment & Payload Road Map*

  – Equipment/ Payload/ design flexibility

  – Higher density & integrated solutions

  – Increase of dissipated power & operating temperature

  – Cost & lead time reductions

  – To promote collaboration with European Suppliers

Capacitors / Resistors

Flexibility / Performance

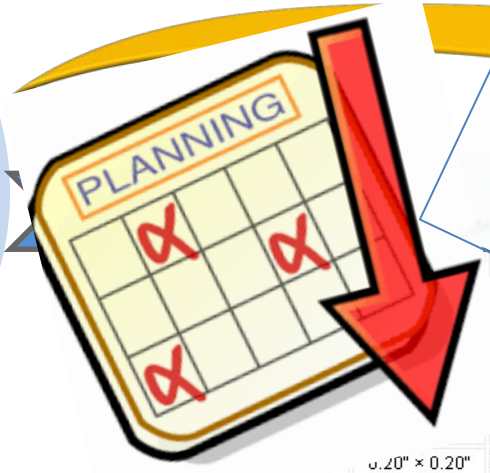
Teams Efficiency / Communication

2018 - 2020

2021 - 2023

Higher density & more integrated solutions

- Chip size reduction 0302 / 0402
- New technology on Board or Hybrid Line
- Polymer Tantalum (SnPb or Gold terminations)



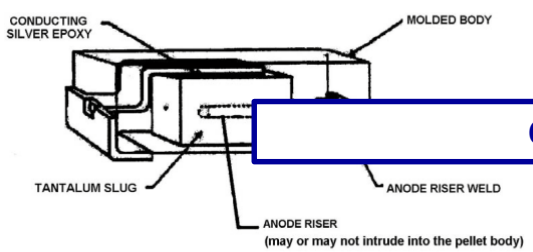
- Chip size reduction 0201
- Automatic Process suitable with Pure Tin Terminations components

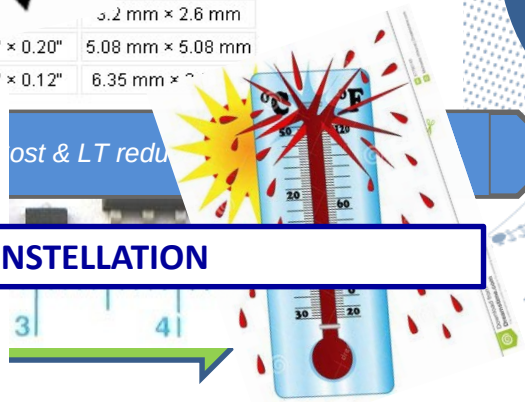
- Extend Temperature range = 175°C
- Miniaturize actual Film / Tantalum capacitors
- Extend Rated power on resistors with smaller size

	1.0 mm × 0.5 mm	
	1.6 mm × 0.8 mm	
	3.2 mm × 1.25 mm	
	5.0 mm × 2.5 mm	
	5.2 mm × 2.6 mm	
	5.20" × 0.20"	5.08 mm × 5.08 mm
2512	0.25" × 0.12"	6.35 mm × [illegible]

Cost & LT reduction

- Grade 2 / C introduction
- ⇒Known spa manufacturer
- ⇒ Automotiv suppliers : Ev JD Construct Upgrading so analyzed





CONSTELLATION

Components Cohabitation = COTS / Grade 1

Introduction of COTS solutions for specific applications

Magnetics

Flexibility / Performance

Teams Efficiency / Communication

2019 - 2020

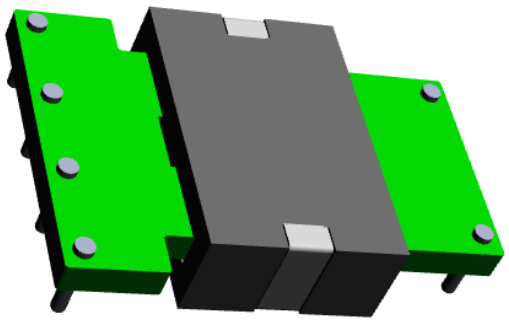
2021 - 2023

- ✓ **Components designed to be flexible with stable performances**
- ✓ **Components designed to be compliant with automatic assembly processes**

Increase of dissipated power & operating temperature

Higher density & more integrated solutions

Cost & LT reduction



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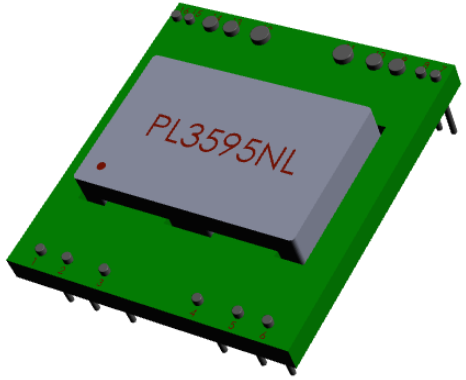


- **Magnetics solutions wit operation time and wide ra customization (planar, RM,**
- **Standard series with lim customization**
- **SMD solutions preferred / small size reduced manufacturing lead time**

Introduction of COTS for specific applications

Crystals & Oscillators

Flexibility / Performance

Teams Efficiency / Communication

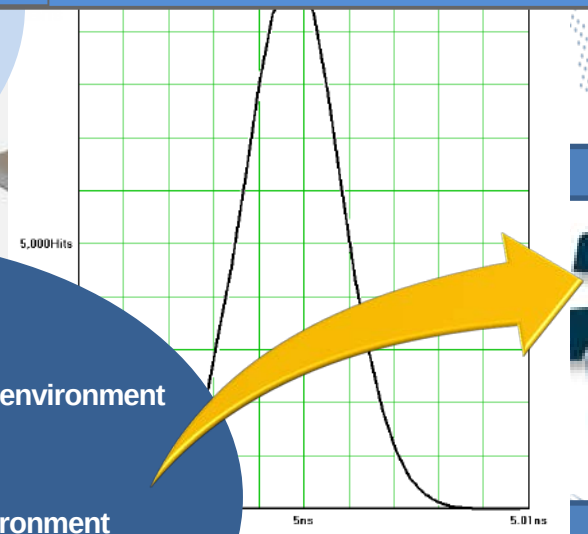
2019 - 2020 → **2021 - 2023**

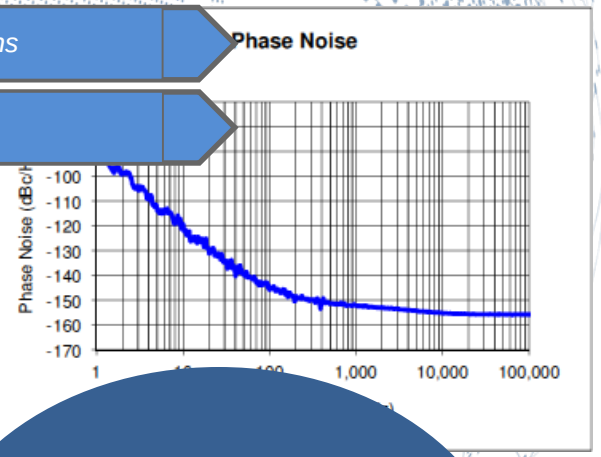
- ✓ **Components designed to have a high frequency stability**
- ✓ **Components designed to be compliant with Space environment:**
  - **Vacuum**
  - **Mechanical environment**
  - **Thermal environment**

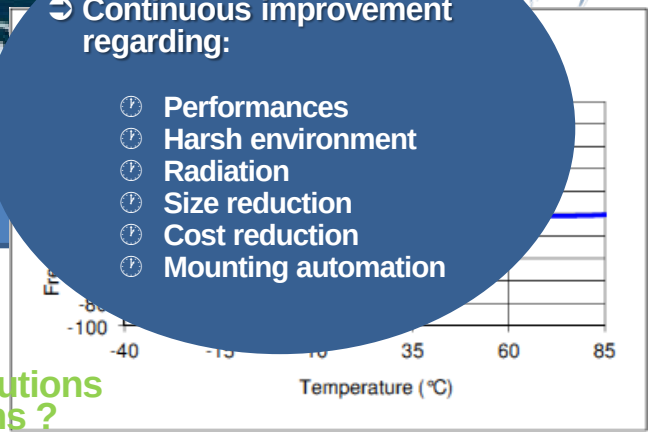
Increase of performances (phase noise, jitter, ageing precision)

Higher density & more integrated solutions

Cost & LT reduction







- **OCXO : Low phase noise**
  Very high stability Vs environment
  Rad. Tolerant
- **XO : Precision**
  Jitter
  Good stability Vs environment
  Rad. Tolerant
- **Crystal resonators :**
  Aging +- 0.5ppm
  Frequency stability
  Mounting automation

➲ **Continuous improvement regarding:**

- **Performances**
- **Harsh environment**
- **Radiation**
- **Size reduction**
- **Cost reduction**
- **Mounting automation**

Introduction of COTS solutions for specific applications ?

Connectors

Flexibility / Performance

Teams Efficiency / Communication

2019 - 2020

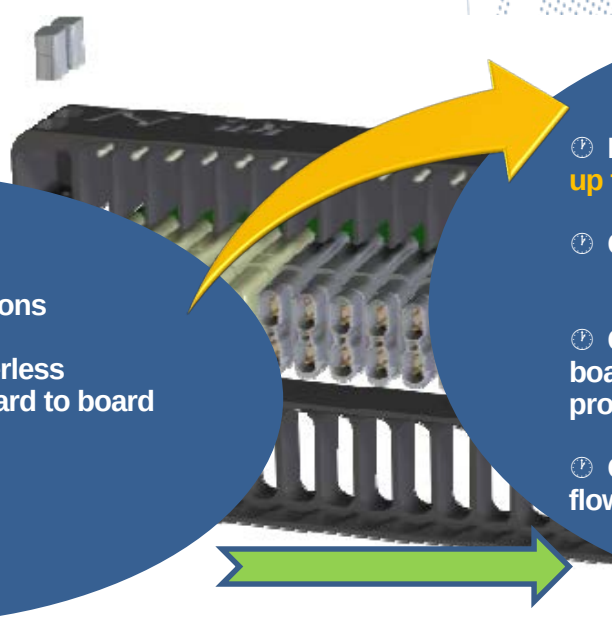
2021 - 2023

- ✓ **High density solutions**
- ✓ **Reliable interconnection solutions**
- ✓ **High performances**

Modular/Flexible Power - Signal connectors

Solderless solutions, connectors easy to mount and to repair at unit level

Fast locking & plugging solutions (Cost reductions)



- **Connectors with SMD terminations**
- **Interposer solutions with solderless terminations (spring probe) for board to board applications**
- **High data rate connectors**

- **Interposer solutions (RF application up to 20GHz)**
- **Connectors with Pressfit terminations**
- **Connectors board to unit / device to board with solderless terminations (spring probe)**
- **Optical solutions for very high speed flow of data**

Introduction of COTS solutions for specific applications

RF Passive Components

Flexibility / Performance

Teams Efficiency / Communication

2019 - 2020 → **2021 - 2023**

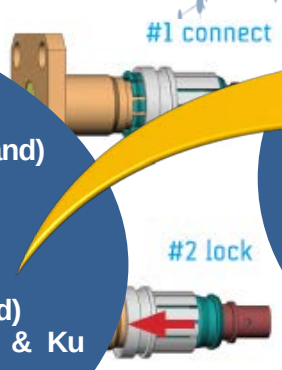
- ✓ **Components designed to be Glitch free**
- ✓ **Components designed to achieve a Shielding effectiveness of 75dBi**

Increase of Frequency at Payload and Equipment level

Increase of Power at Payload and Equipment level

Fast locking & Integrated solutions

- 2.4 connectors (up to 50GHz)
- High power TNC connectors (300W / C band)
- SMP-Lock connectors (DC – 22GHz)
- RF Passive components with SMP-L connectors (DC – 22GHz)
- High power coaxial ISO (360W / L & S band)
- Power dividers with integrated ISO (X & Ku band)
- Surface mount ISO/CIRC (X & Ku band)



- 1.85 connectors (up to 65GHz)
- High power connectors (L, S & C band)
- SMP-Lock connectors (DC – 32GHz)
- RF Passive components with SMP-L connectors (DC – 32GHz)
- High power coaxial ISO (L, S & C band)
- Power dividers with integrated ISO (Ka band)
- Surface mount ISO/CIRC (Ka band)
- Surface mount Switches

Thanks for your Attention