

# Enabling COTS for space radiation environment by optimized processes for characterization and testing

## Summary

Profile type	Company's country	POD reference
<b>Technology offer</b>	<b>Germany</b>	<b>TODE20240521012</b>
Profile status	Type of partnership	Targeted countries
<b>PUBLISHED</b>	<b>Research and development cooperation agreement</b>	<b>• World</b>
Contact Person	Term of validity	Last update
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## General Information

### Short summary

A German research institute has developed improved processes to perform radiation qualification of Commercial Off-The-Shelf (COTS) components for use in space. Advantages include a faster and more cost-effective testing and thus a higher reliability. Public or private partners are sought for research or technical cooperation agreements. Especially sought are producers and users of COTS components and partners with expertise in New Space, SmallSats and conventional satellite applications.

### Full description

Commercial off-the shelf (COTS) components are becoming more and more important in space missions. However, COTS parts are often avoided while preference is given to high-reliability (HiRel) components. These undergo extensive testing using qualified processes. COTS components lack this process qualification. As a consequence of this technology gap, COTS have a reputation of potentially being unreliable.

A German research institute has developed optimized processes for radiation characterization and functional testing of COTS components for use in space. The processes developed built upon standards that are currently used to qualify high-reliability (HiRel) components. In the course of an ongoing project, a wide range of COTS components shall be made available for space applications.

As a first step a list of suitable components was compiled reflecting the needs of users or agencies. For this purpose, the so-called "spin-in" method was used. In other words, technologies that have already proven themselves in industry but have not been adapted for space requirements were investigated. These were then tested with respect to their radiation sensitivity using methods to get to significant results efficiently omitting any unnecessary costs.

Systematic irradiation tests to characterize COTS components under extreme conditions that are representative of their application in space were conducted. One goal was to reduce the risk of failure through a pre-selection of several components for the same functionality without strongly increasing the price.

The process under development shall be less expensive than a full-scale test and should be able to make statements about radiation hardness of COTS components while at the same time showing significant reliability. The project also aims to exploit "early-warning-signs" for high radiation sensitivity and finding benefits of testing board level designs if the individual components sensitivity is not known.

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#### Advantages and innovations

- COTS components can be purchased faster and cheaper
  - Higher Reliability of radiation results
  - Can contribute to the faster and more cost-efficient development of space missions using COTS components (ESA-development target: 30% by 2023 compared to 2018)
  - Supports the integration of new technologies through COTS components
  - Availability of state-of-the-art testing facilities and measuring tools. The irradiation facilities include three Co-60 gamma irradiation facilities (point geometry; dose rate: 10  $\mu$ Gy/s to 2 Gy/s), two neutron generators (Energy: 2.5 and 14 MeV; neutron flux: up to  $3 \cdot 10^{10}$  n/s in 4 ), a 450 keV X-Ray facility, one laser for SEE investigations (wavelength: 1064 nm, pulse length: 9ps, energy: up to 200  $\mu$ J/pulse), one exclusive proton irradiation beam line (energy: 39 MeV to 2 GeV) and the possibility for Co-60 high dose irradiations (MGy).
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Technical specification or expertise sought

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Stage of development

**Available for demonstration**

IPR Status

**Secret know-how**

IPR Notes

Sustainable Development goals

- **Goal 9: Industry, Innovation and Infrastructure**

## Partner Sought

### Expected role of the partner

The German research institute seeks cooperation with companies, research institutions or public entities having expertise in the above-mentioned technology field. Manufacturers and users of COTS for use in space are of special interest, as are potential partners with expertise in New Space, SmallSats and conventional satellite applications.

In the case of research agreements, cooperation based on a joint EU-funded project or contract research is preferred. The role of the partner would be to identify potential fields of collaboration and technology gaps and possibly enter into a proposal consortium with other partners to carry out joint research activities.

In the case of a technical cooperation agreement, the aim is to utilize the know-how generated and use it to jointly enable the use of further COTS components in space. Role of the partner would be to contribute the respective COTS component and collaborate in the testing and subsequent scientific work.

### Type of partnership

**Research and development cooperation agreement**

### Type and size of the partner

- **Other**
- **Big company**
- **SME 11-49**
- **SME <=10**
- **SME 50 - 249**

## Dissemination

### Technology keywords

- **02011004 - Satellite Navigation Systems**
- **02011005 - Space Exploration and Technology**
- **10001005 - Radiation Protection**
- **09001002 - Analyses / Test Facilities and Methods**

### Targeted countries

- **World**

### Market keywords

- **03004002 - Components testing equipment**
- **01005004 - Microwave and satellite components**
- **01005001 - Satellite services/carriers/operators**
- **01005003 - Microwave service facilities**

### Sector groups involved

- **Aerospace and Defence**