

Miniature RF switch for compact redundancy ring

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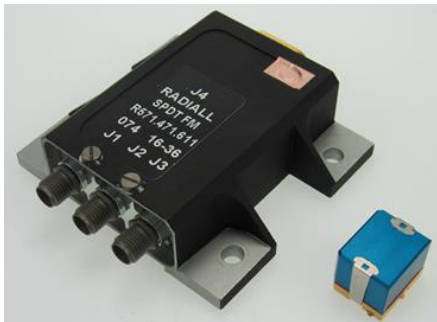
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H2020 project founded by European commission

SELECTOR's project is founded by European commission, proposal aims to develop Miniature Electro Mechanical Relay (MEMR), a high miniaturization, Surface-Mount Technology (SMT)-compatible, electromechanical switch for the **space** sector. MEMR can be used within reconfigurable microwave space subsystems in line with satellite evolution toward more digital satellites, which allow high data capacity. Very High Throughput Satellite (VHTS) is the solution to decrease the cost per bit (€/Gbps) of satellite telecommunications. The satellite payload is constituted of a digital core and the digital transparent processor (DTP), which is surrounded by frequency converter units. The number of frequency converter channels in VHTS systems has increased from a few dozens of equipment to several hundred, compared to standard satellite architecture. As a result, in order to remain competitive without compromising reliability, **stronger cost and mass constraints** are enforced on such equipment.

Redundancy rings are mandatory to achieve an operational lifetime of more than 15 years; however, they are increasingly **difficult to implement at a reasonable cost and weight**.

The targeted **demonstrator**, a VHTS requirement, is a **Ka band compact redundancy ring based on SMT to minimize cost and improve integration**. The proposal relies on the upgrade of the commercial version to comply with the space environment. A factor of 10 gain in mass is anticipated, compared to standard electromechanical switches.



Radiall Objectives: To deliver space grade MEMR components complying with space constraints and its associated compact redundancy ring application

To achieve above objectives, Radiall engineering team focused on the following MEMR innovative improvements:

- *Waterproof (IP 67), to avoid any pollution during cleaning phases*
- *Microwave performance (DC- 32 GHz)*
- *Gain in mass compared to existing*

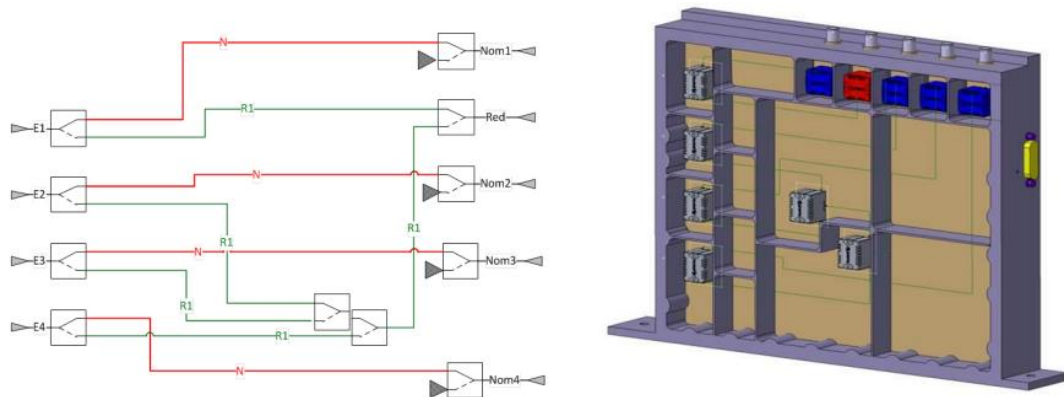
- *Improve isolation (< - 45dB)*
- *Harsh environment (random vibrations 50G rms 10 to 2000 Hz, mechanical shocks up to 3000g)*

From TAS point of view, here are the SELECTOR project benefits:

- *Use of a new component: Micro Electro Mechanical Relay (MEMR) SMT compatible*
- *Enable highly demanding connectivity within reconfigurable new generation processed telecom payload*
- *Compatibility with RF on PCB technology, keeping mass and volume at minimum as compared to standard RF harness complex connectivity matrices*

H2020 SELECTOR main results

- *Patented RF harness connectivity architecture*
- *Example of redundancy matrix (4:5) addressing wideband requirements from C to Ka band.*



The purpose of the presentation during the SPCD 2022 will be to show how we have overcome the technical challenges, in order to propose a new innovative offer for the space market.