

SMP-LOCK®
THE ULTIMATE SECURE CONNECTION





SMP-LOCK®, the ultimate secure connection

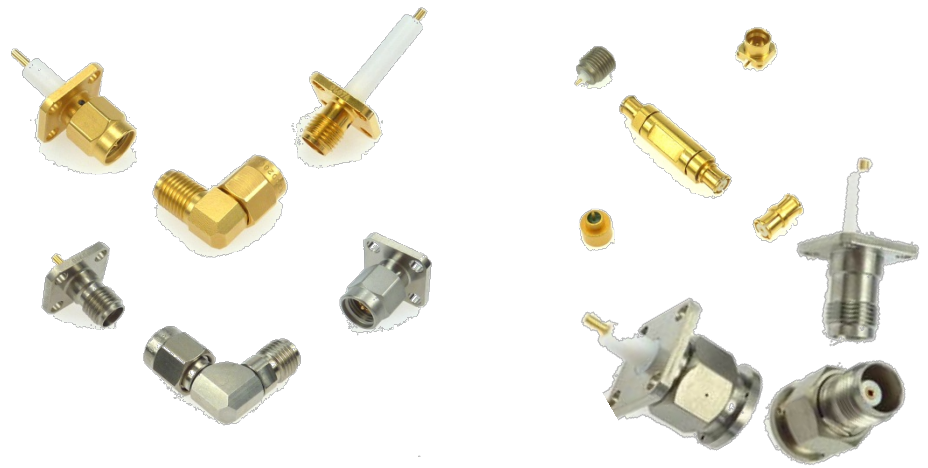
Introduction

How does it work ? Features & benefits

Qualifications

New developments

Introduction



- Customers' feedback

- SMA is too big, too heavy and its integration is too complicated
- Satisfied by the SMP RF performance and the SMP size
- Express concern about SMP mechanical retention under shock and vibration
- For the space industry, SMP is more commonly utilized for internal board-to-board applications with more traditional external connections
- The use of cable assemblies with such snap-on interface can introduce risks, for example, inopportune disconnection caused by the environment (often during tests or equipment handling)
- With snap-on interface, there can be uncertainty after the integration to know if the connectors have been well mated or not

Introduction

- Therefore, Radiall expands SMP series with SMP-LOCK® connectors
 - In 2010, design effort to add a user-friendly locking mechanism to SMP interface
 - Without compromise on electrical performance
 - With limited impact on the overall size of the connector for the objective to increase the density compared with SMA/SMA 2.9

Introduction

- How has it been introduced in the Space industry ?
 - TENDER FROM IRIDIUM CONSTELLATION: Looking for a quick connection
 - Radiall philosophy is to always offer multi-market industrial solutions
 - => It allows Radiall to share R&D resources, to benefit from first heritage in order to begin with self-confidence
 - Limited risk:
 - Robustness of the locking design could be evaluated while maintaining the SMP line
 - it also allowed Radiall to work from a basis of well known and mastered components

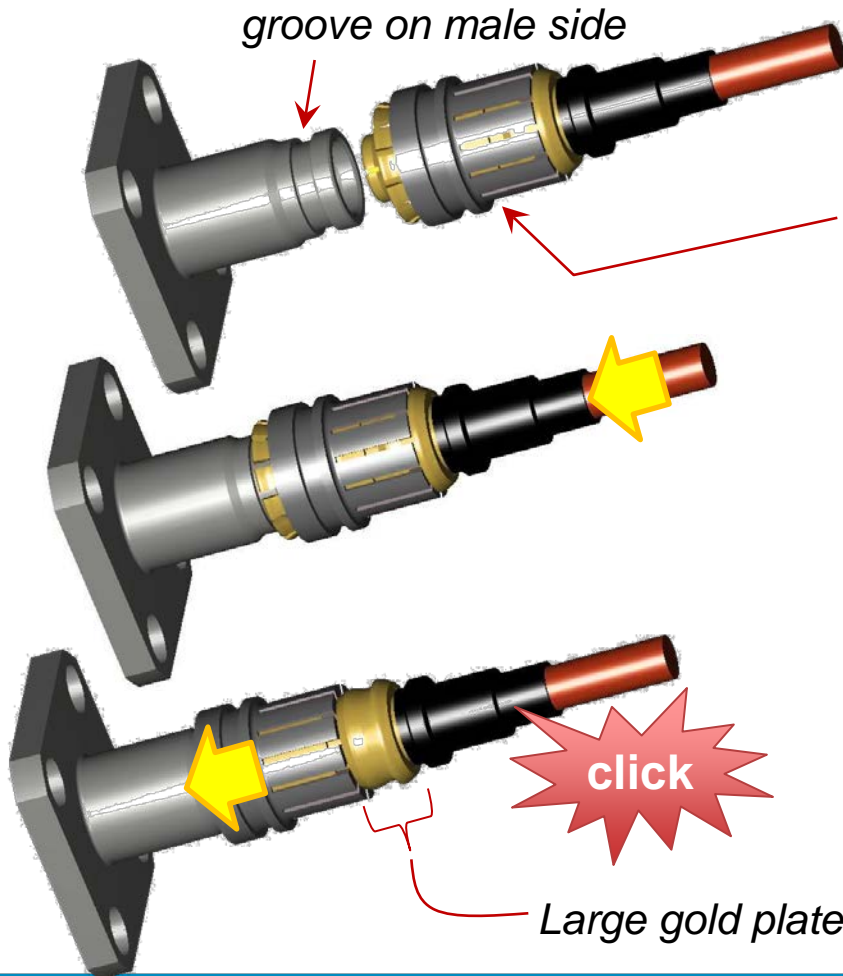


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HOW DOES IT WORK ?

Features & benefits

How does it work ? Mating sequences



- 1 Connect : insert plug to connect the SMP interface
- 2 Lock : push the locking sleeve to secure the connection

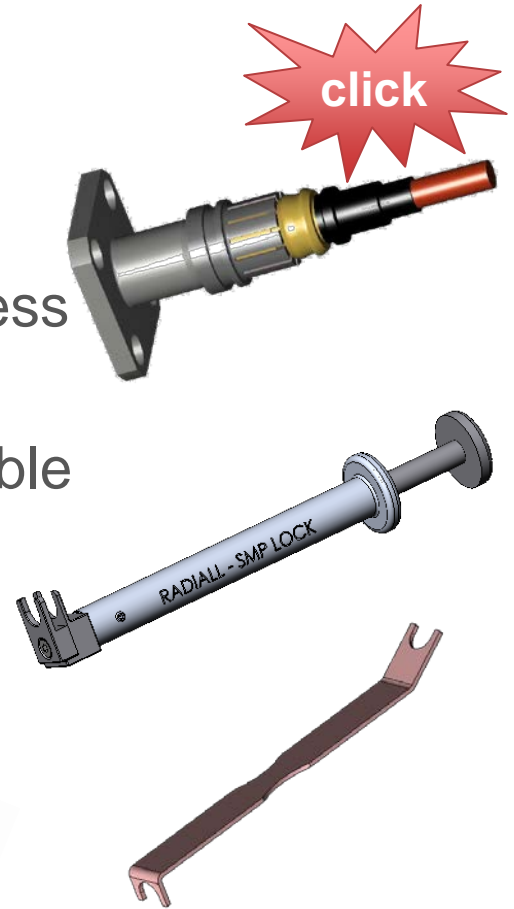
Features & benefits

- Easy to use
 - Audible click when locking
 - A visible to the naked eye locking witness
 - No need for torque wrench anymore
 - Various tools with customization available



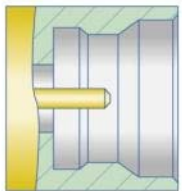
Disconnect plug

Connect plug

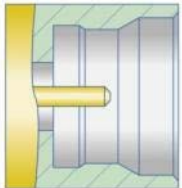


Features & benefits => retention

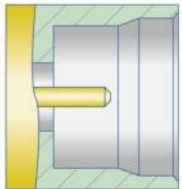
SMP



Full detent
Plug retention >22N

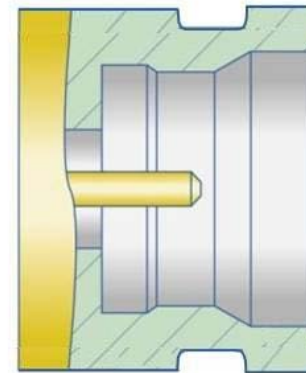


Limited detent
Plug retention >9N



Smooth bore
Plug retention >2N

SMP-LOCK®



Limited detent
Plug unlocked >9N
Plug locked >450N



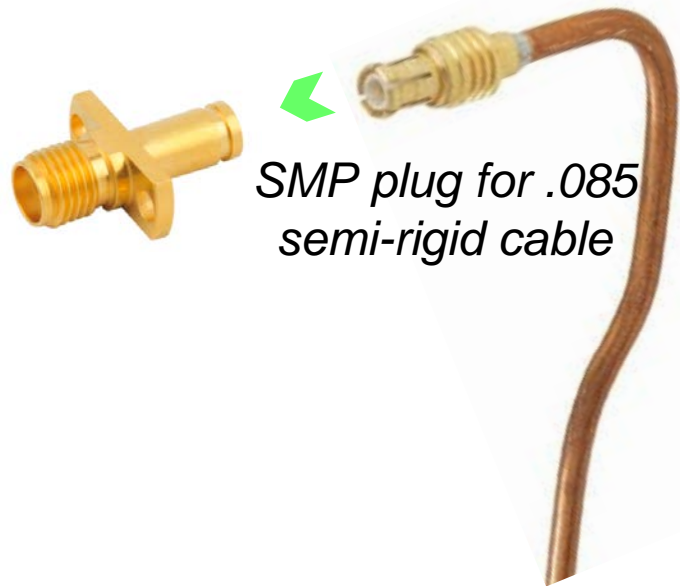
Only 1 part number to specify!



3 part numbers to manage

Features & benefits

- Minor change on male receptacle : groove added, open design
- Standard SMP plugs and adapters can be mated with all SMP-LOCK® receptacles (and vice versa)

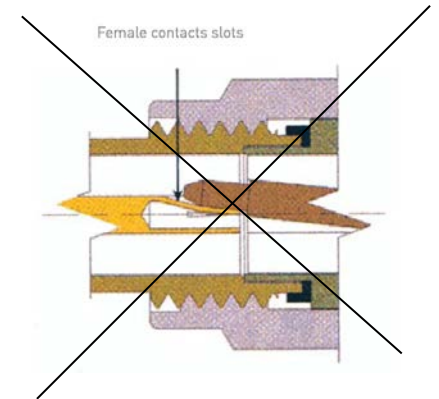


SMP-Spring adapter



Features & benefits

- SMP interface has been qualified according to Mil, up to 40 GHz in 2001, significant heritage on the space industry, ESCC – EPPL part 2 since 2006
- Smaller and lighter than SMA/ SMA 2.9 => it enables increased density
- SMP tolerates misalignment when connecting without the risk to damage sockets



Features & benefits

- Significant reduction of risk to damage equipment and other surrounding connectors/cable assemblies during integration
- There is no need to respect a cable mating sequence
- Easy disconnection without disconnecting supplementary harness to access it

Features & benefits

- Eliminate all the damaging risks during integration
- Quick connection : only a few seconds compared to few minutes
- Secure connection: Reliable and easy-to-use positive-locking system
- Significant Global cost reduction



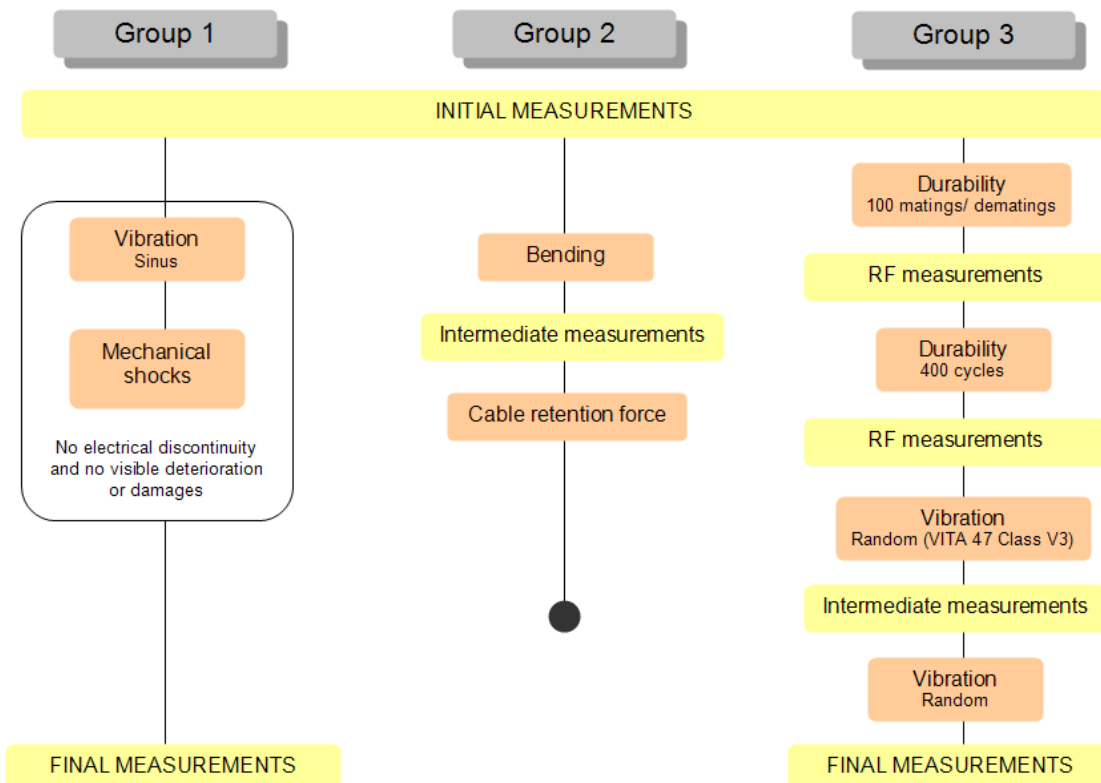


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QUALIFICATION

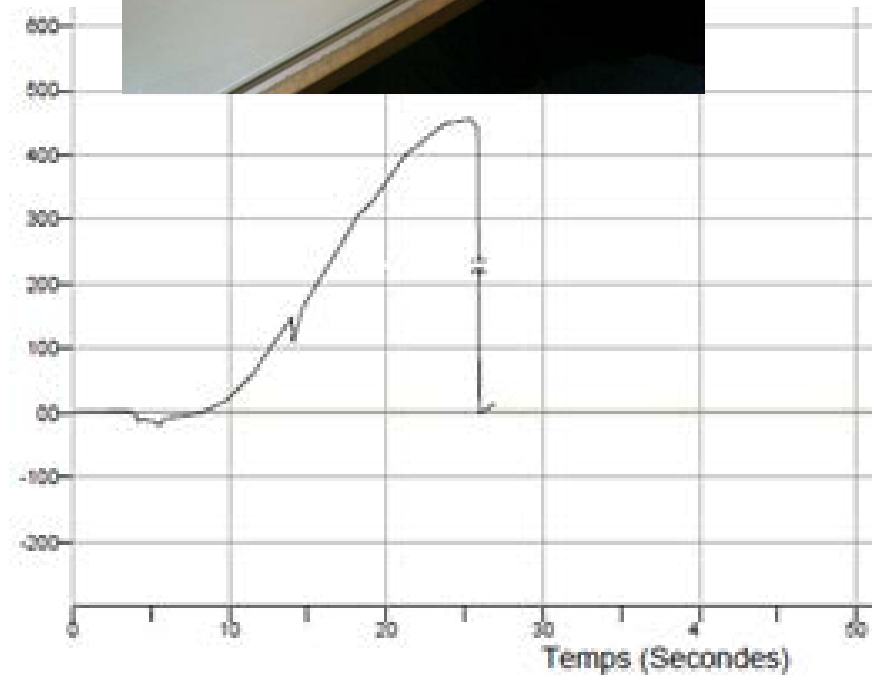
Qualification test plan-Mil

- SMP-LOCK® qualification focused on the locking system



Other tests

- Retention force
 - Tested until the cable broke (450 N)
 - Retention of locking mechanism > 800 N



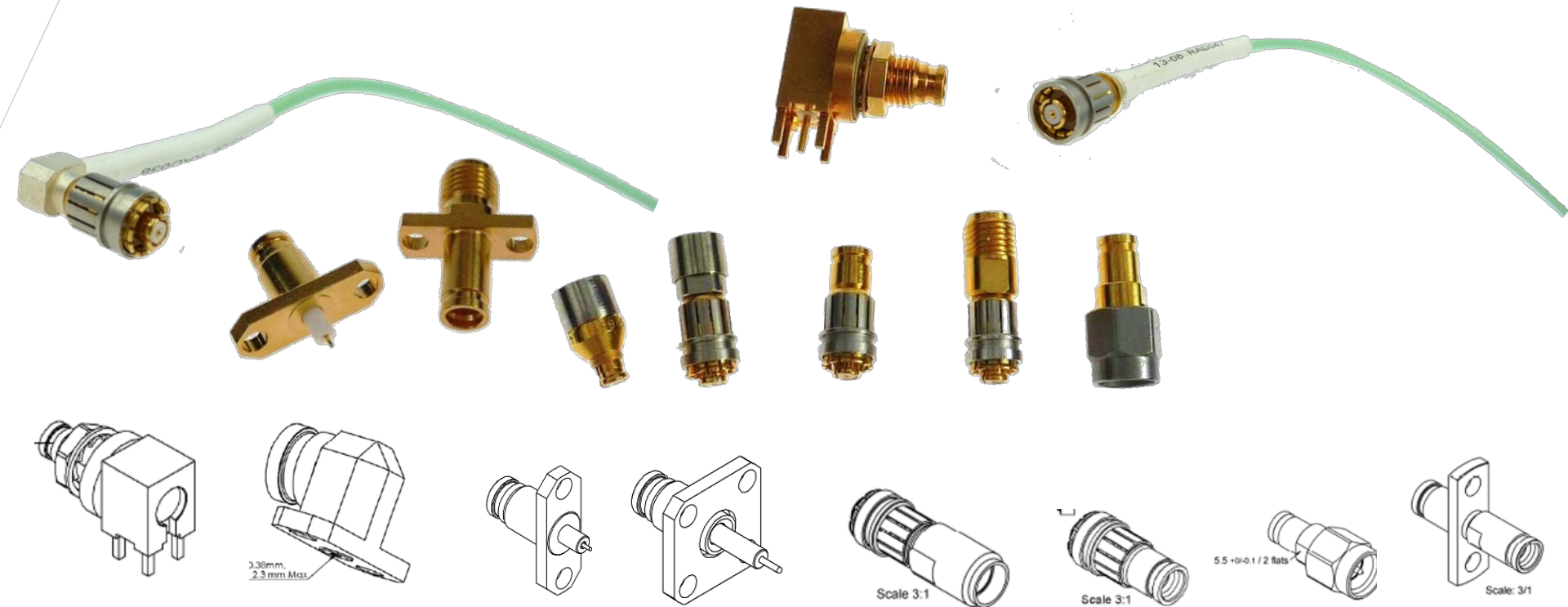
Qualification : Space environment

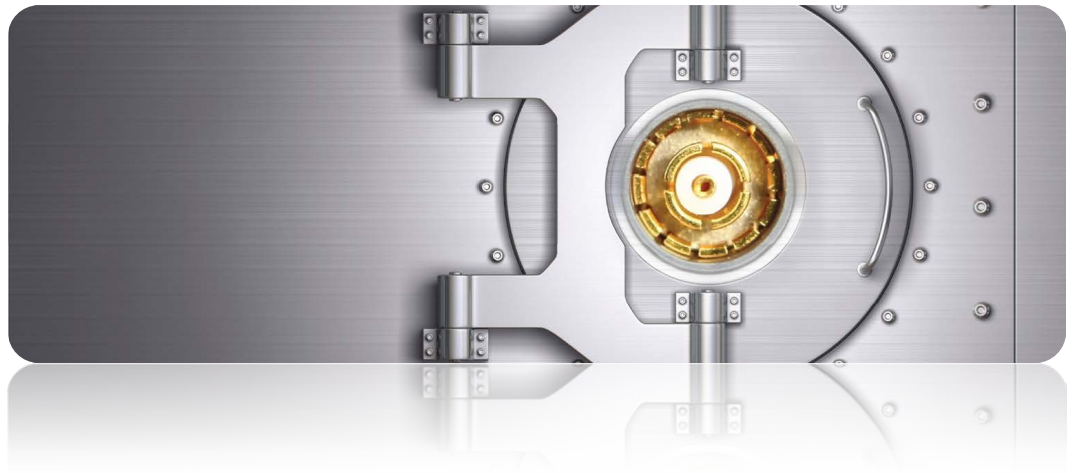
- Main test summary (25 samples)
 - Frequency 2 GHz, compliance up to 40 GHz certificated
 - 500 cycles -50°C / +150°C
 - Random vibration > 30 grms
 - Shock 800 g
 - Power handling : 4 W at 1,6 GHz
 - Multipactor : 15 W peak at 1,1 Ghz
- Integration tests (by TAS)



Developed products

- Various connectors for equipments, adapters, straight and right angle connectors for SHF2.4MS cable and one termination





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NEW DEVELOPMENTS

New developments

- THD SAT programme: CNES founded in collaboration with TAS
- Objective:
 - => to have a complete range of space qualified products available up to 22 GHz
 - Availability beginning in 2017

New developments

- Attenuators



- Termination



- Adapters and connectors for equipments



- SHF3MS cable assemblies



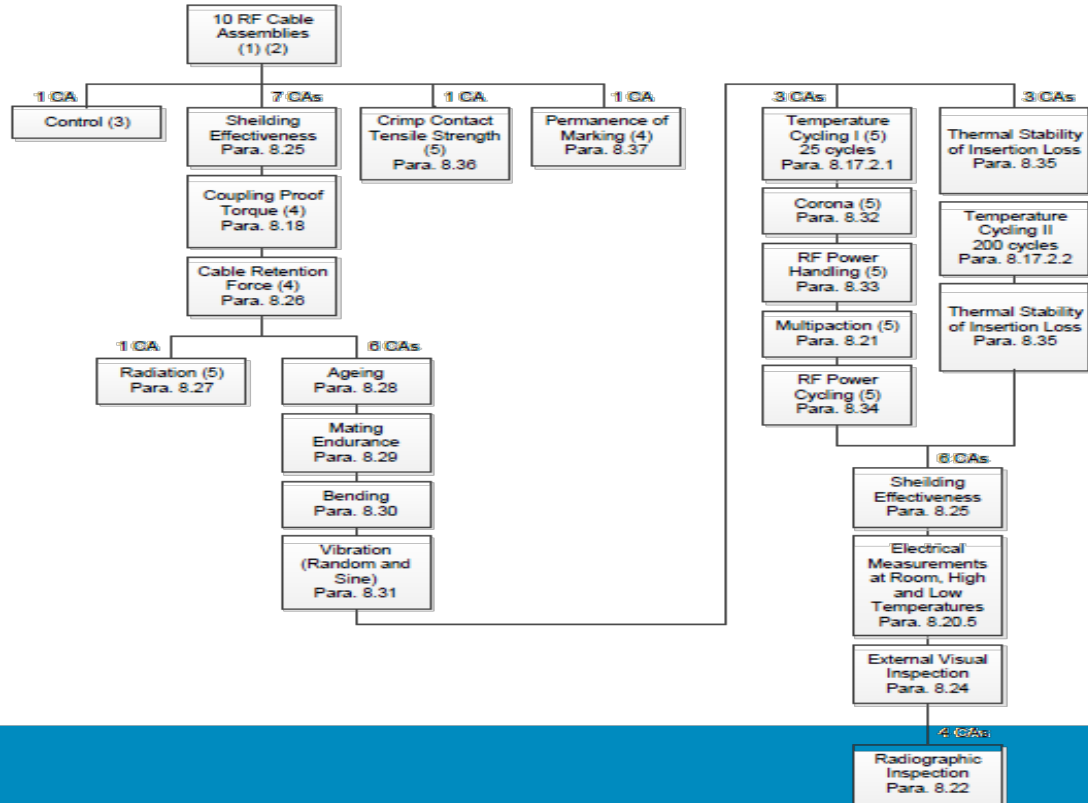
- Switch

New developments

- To define a reliable measurement method
 - Required because VSWR expected is less than 1.2 up to 22 GHz (RL min 21 dB)
- A real challenge because :
 - SMP interface is not a precision interface
 - SMP calibration kit is not used a lot
 - Analyzing need, benchmarking, sharing and exchanging with experts (customers, competitors)

New developments

- Qualification according to ESCC 3402 – 3403 – TAS/CNES spec
- Qualification Test Plan summary: CA according to ESCC 3408 draft specification



New developments

- Qualification : Key parameters
 - Frequency band : DC – 22 GHz (32 GHz when feasible)

Envelope: Grms = 38.5	
20 to 60 Hz	+6dB/Octave
60 to 400 Hz	2g ² /Hz
400 to 800 Hz	-6dB/Octave
800 to 1000 Hz	0.5g ² /Hz
1000 to 2000 Hz	-6dB/Octave

- Random vibration :

- Sine vibration :

- Vibration Amplitude:
- 5Hz to 26Hz: 11mm (peak)
 - 26Hz to 100Hz: 30g

- Thermal cycling: 200 cycles – 60°C + 150°C (for CA)
- Radiation test for CA : 120 MRAD minimum

- Conclusion : SMP-LOCK is really the best quick-lock and secure connection !
- Thanks to CNES/TAS
- Questions ?
- Visit our booth
- “Our most important connection is with you”
- Thanks

