SMP-LOCK®: THE ULTIMATE SECURE CONNECTION

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The number of RF connector interfaces available for use in the space OEM industry is very limited. The most common and widespread interface is SMA. For higher operating frequency up to 30 GHz, OEMs typically use the SMA2.9 (also named K), and for high power applications, TNC connectors are selected. Recently since around 2005, the SMP interface (also called GPO) has gained a lot of popularity for phased array radars thanks to its small size and ease of use.

The space industry is requesting more and more to decrease the cost of interconnect without compromising on quality. When analyzing the cost related to a payload, we observe that the supplying cost is important for our customers. However, these costs remain low compared to the final equipment price. Given the stability of the space market with unchanged global volumes and end users not ready to lower their quality expectations, it is challenging for manufacturers to find effective ways to decrease the cost of connectors. Also, the raw material and processing costs tend to increase over time and the complementary productivity gain possibilities are becoming rare considering the small volumes.

Radiall focused on lessening our customers' costs by offering them an easy connection innovative solution. Fortified by its legacy in defense and civilian aerospace, Radiall developed a new connector interface: the SMP-LOCK. "SMP" insofar as our connector is compliant with the SMP dimensions and LOCK insofar as we propose a quick locking system which is integrated on the connector. Actually, we offer an interface well known and mastered by our clients which can be a SMA and SMA2.9 alternative as it can work up to 40 GHz, with only an innovative locking system added. Here is below (Fig 1) description of the mating sequence and key discrepancies with standard SMP connector: groove on the male side (receptacle), locking sleeve on the plug. You can push the locking sleeve manually with your fingers or with adequate tools (Fig 2) when access becomes too much complicated.

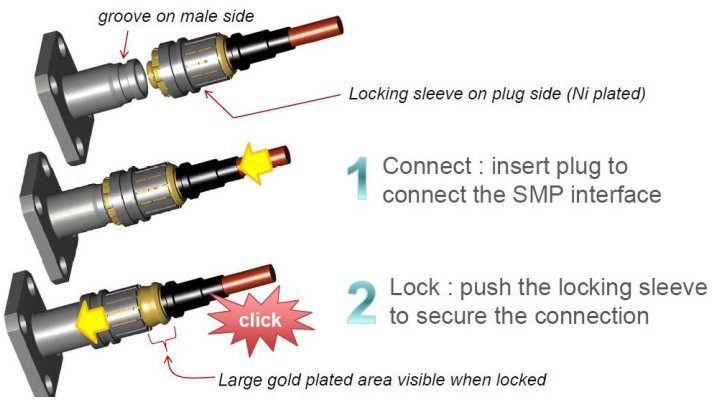

Fig1 : Mating sequence of SMP-LOCK connectors

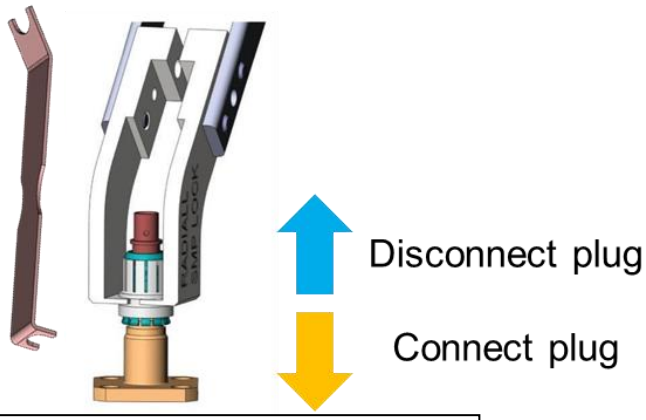

Fig 2 : Tools to connect and disconnect

Thus, no torque wrench needed anymore, no torque checking operations, nor torque witness hanging. This connector avoids the risks of damaging a more than k€ equipment by screwing a cable assembly, takes advantage of the SMP sliding connection and blind mate capability which allow the user to connect without any risk of damage even if not perfectly aligned . It also puts an end to the very severe integration sequences setting up obligation to access to the desired connector (need of the torque wrench space). Table 1 summarize the key characteristics and advantages of this new interface

SMP interface	High frequency DC-40 GHz Smaller size than SMA, SMA2.9 or BMA
Embedded EMI ring	Excellent RF performance Improved RF leakage
Limited detent retention force	Lower connection / disconnection forces Less mechanical stress Longer life cycle (durability 500 cycles)
Locking sleeve on plug	Greater strength of locking mechanism Withstands the more severe vibration and drop tests
Groove on receptacles	Minor change on male interface with no additional cost
2 steps connection	Easy to use during test phase Audible click when locked

Table 1 : Key characteristics of SMP-LOCK

With this innovative solution we allow our customers to achieve tremendous savings in their integration costs, thanks to the quick lock connection (time saving) and thanks to the “easy to use” concept (decreasing the risk of damages to the equipment).

Finally, with SMP-Lock connectors, users will have the possibility to increase density of RF channels, first because this is smaller than current standard like SMA, and then because torque wrench is no more required to connect female to male connectors.

This interface has already been selected for a space program (Iridium constellation), efficiency has been demonstrated and confirmed by end users. Radiall develops a range of passive RF products in the frame of a CNES program, connectors, attenuators, terminations, cable assemblies, switches…., all these products will be qualified up to 22 GHz by end of 2016, which should help to consider this interface as the best solution for all communication payload models.