

www.microwavejournal.com/articles/43516-selecting-the-right-rf-cable-assembly

Selecting the Right RF Cable Assembly

[Smiths Interconnect, Stuart, Fla.](#)

March 11, 2025

RF cabling is utilized in many mission-critical radar, communication and navigation system applications that may be ground-, sea- or space-based. To ensure that the correct RF cable assembly is chosen for your application, a number of factors need to be considered. The SpaceNXT™ QT RF cable assemblies equipped with the new Mini-Lock connectors from Smiths Interconnect provide superior solutions that address all these important considerations.

EXCELLENT PERFORMANCE

Performance is often the first thing users think about when assessing the needs of the application. When considering performance, many aspects should be included. SpaceNXT QT/Mini-Lock cable assemblies can operate up to 110 GHz with very low insertion loss and VSWR values. This makes these assemblies ideal for a wide variety of applications. The patent-pending technology that Smiths Interconnect uses avoids common electrical bead resonance and other RF issues found at very high frequencies. These RF cable assemblies provide excellent performance in harsh environments with an operating temperature range of -65°C to 165°C. They are made with low loss fluoropolymer dielectric and constructed with materials that meet the outgassing requirements of NASA/ESA when tested per ASTM E595. Phased matched pairs and sets are available with a standard tolerance of ± 1 degree per GHz or ± 2.8 picoseconds. **Figure 1** shows the input VSWR response of a cable assembly from 11 MHz to 110 GHz. As the graph in **Figure 1** shows, the VSWR stays below 1.2:1 to around 80 GHz, maintaining values below 1.4:1 until just below 110 GHz.

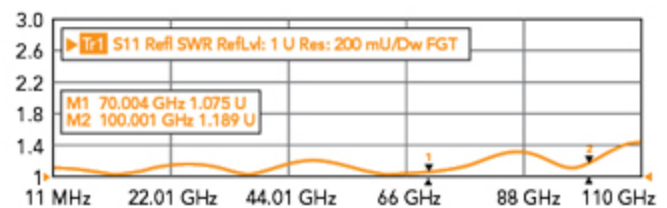


Figure 1 Typical VSWR versus frequency for SpaceNXT QT cable.



Figure 2 Mini-Lock mating connectors.

THE ULTIMATE RELIABILITY

In mission-critical applications, RF cable assemblies must be properly connected, remain connected when mated and be capable of withstanding multiple matings and dematings without degradation. SpaceNXT™ QT/Mini-Lock cable assemblies have an audible click

when properly installed. The connectors have a pull strength of more than 50 lbs., meaning the cable would likely break before the connection would be lost. In addition, they have been qualified to meet MIL-STD-202G, Method 204 (vibration standards) and MIL-STD-202G, Method 213, Condition I (shock standards). They incorporate an ethylene tetrafluoroethylene (ETFE) material for maximum radiation resistance. Should an application require multiple connections, the Mini-Lock connectors can be mated and demated more than 100 times without degradation. In addition, the dependability of the connectors and cable assemblies is backed with reliability data and lot traceability. An example of a mating connector and a cable assembly is shown in **Figure 2**. The connection mechanism of the high frequency Mini-Lock connector can be seen in action in an instructional video.¹

EASE OF INTEGRATION

In addition to excellent performance and ultimate reliability, an RF cable assembly needs to be easy to integrate. The Mini-Lock connector has a quick-lock mechanism for blind-mate connections with low insertion force, enabling faster integration with reduced labor costs. Since there is no coupling nut, there is no requirement for a torque wrench. This makes the small, lightweight connectors ideal for use in tight spaces or high-density applications. **Figure 3** shows an end view of the Mini-Lock connector with the quick-lock mechanism and the connector mounted to the cable.

PROVEN SUPPLIER

The final consideration when determining the best solution for an application is the pedigree of the supplier. Products from Smiths Interconnect have been trusted for use in hundreds of defense, commercial and scientific programs on land, at sea and in space. An example of an actual application is the Mars Rover Program shown in **Figure 4**. RF cable assemblies continue to be involved in many mission-critical GEO/MEO/LEO satellite systems, radar systems, electronic warfare, uncrewed vehicles and many other demanding applications. With long-standing relationships with the world's leading companies and organizations, Smiths Interconnect's capabilities have been used from application concept to deployment/launch and have included design reviews, qualification testing, special process documentation, lot traceability and custom packaging. To ensure success, only select RF cable assemblies that provide excellent performance, have the ultimate reliability, are easy to integrate and are readily available from proven suppliers should be considered for your future applications. Smiths Interconnect SpaceNXT™ QT/Mini-Lock cable assemblies are the ideal solution trusted by industry leaders around the world.

Smiths Interconnect is a leading provider of high-reliability connectivity products and solutions serving segments of aerospace and defense, medical, semiconductor test and industrial markets. It designs and manufactures technically differentiated electronic components, microwave, optical and RF products and sub-systems that connect, protect and control critical applications.

Reference



Figure 3 Mini-Lock connector with quick-lock mechanism.



Figure 4 Mars Rover.

1. "High Frequency Mini-Lock Connector," Smiths Interconnect, Web: [youtube.com/watch?v=IxFDNck_nr4](https://www.youtube.com/watch?v=IxFDNck_nr4).

Smiths Interconnect
Stuart, Fla.
[smithsinterconnect.com](https://www.smithsinterconnect.com)