

Proving reliable performance with extremely small, flexible assemblies that survive routing in tight spaces

Standard semi-rigid cable assemblies commonly used in the industry are stiff and difficult to route in confined spaces, which can lead to frequent cable failure. And, they are difficult to replace – a problem that often requires costly configuration drawings and challenging installation procedures that are time-consuming.

Greater Flexibility with Stable Performance through Testing

Gore evaluated the flexibility and signal integrity of GORE® Microwave/RF Assemblies, Type 4L (size 0.047 inches) to determine whether performance changed or remained stable, specifically insertion loss and VSWR (Figure 1). Using a Performance Network Analyzer (PNA), Gore tested their 12-inch assembly to determine the baseline. Next, the midpoint of the assembly was flexed at a 90-degree angle around a mandrel set to a 0.10-inch radius, and performance was recorded. The assembly was returned to its initial straight position with the PNA normalized, and the test was repeated next to the connector.

Results showed that GORE® Microwave/RF Assemblies, Type 4L successfully maintained low insertion loss and reliable VSWR up to 18 GHz during flexure (Figures 2 and 3). These assemblies also maintained electrical and mechanical integrity when flexed next to the connector – a common failure point for semi-rigid assemblies during installation. With this level of performance, Type 4L maintains a consistent impedance of 50 ± 1 ohms that meets industry standards, yet with a tighter tolerance (Figure 4).

Figure 1: Test Simulation

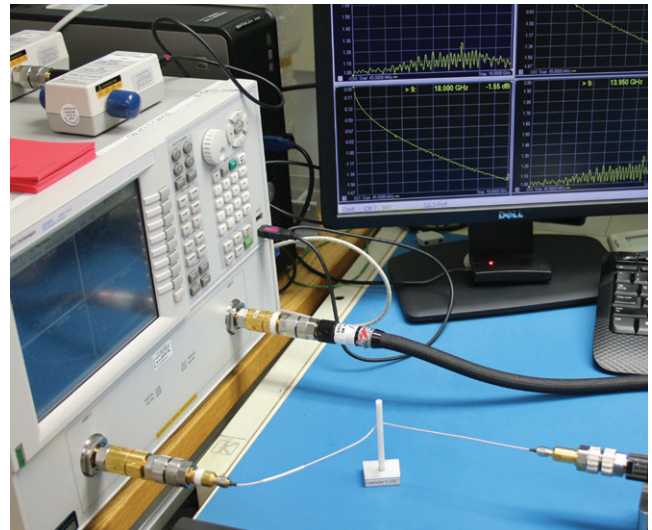
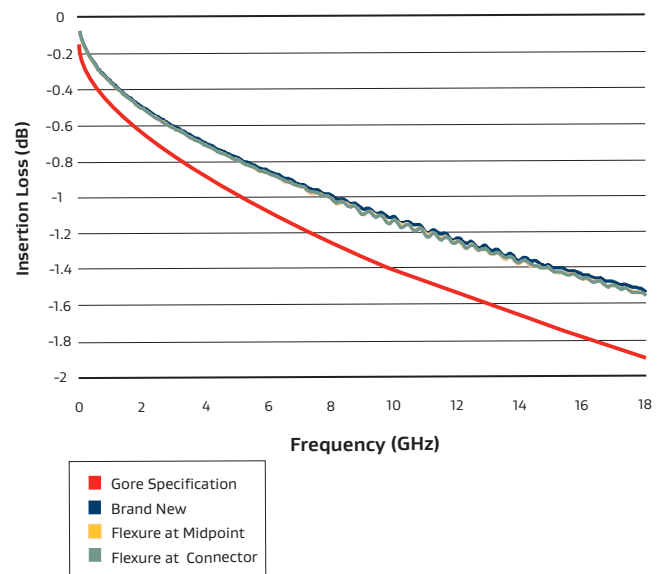


Figure 2: Insertion Loss Stability with Flexure at 18 GHz



GORE® Microwave/RF Assemblies

Technical Note

Figure 3: VSWR Stability with Flexure at 18 GHz

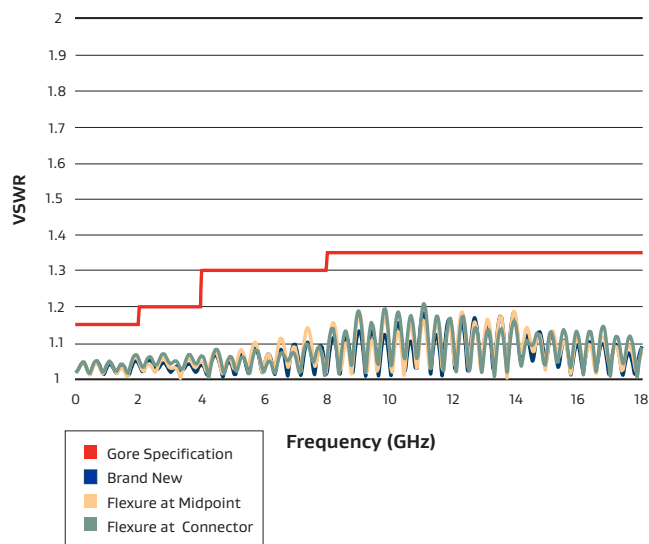


Figure 4: Controlled Impedance with Flexure

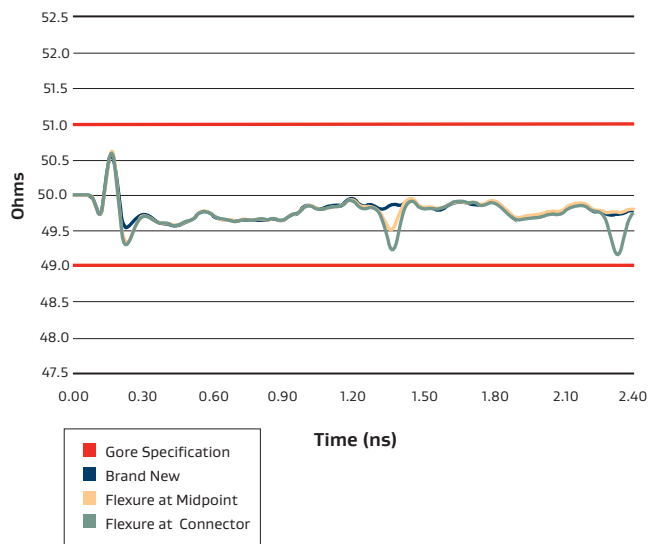
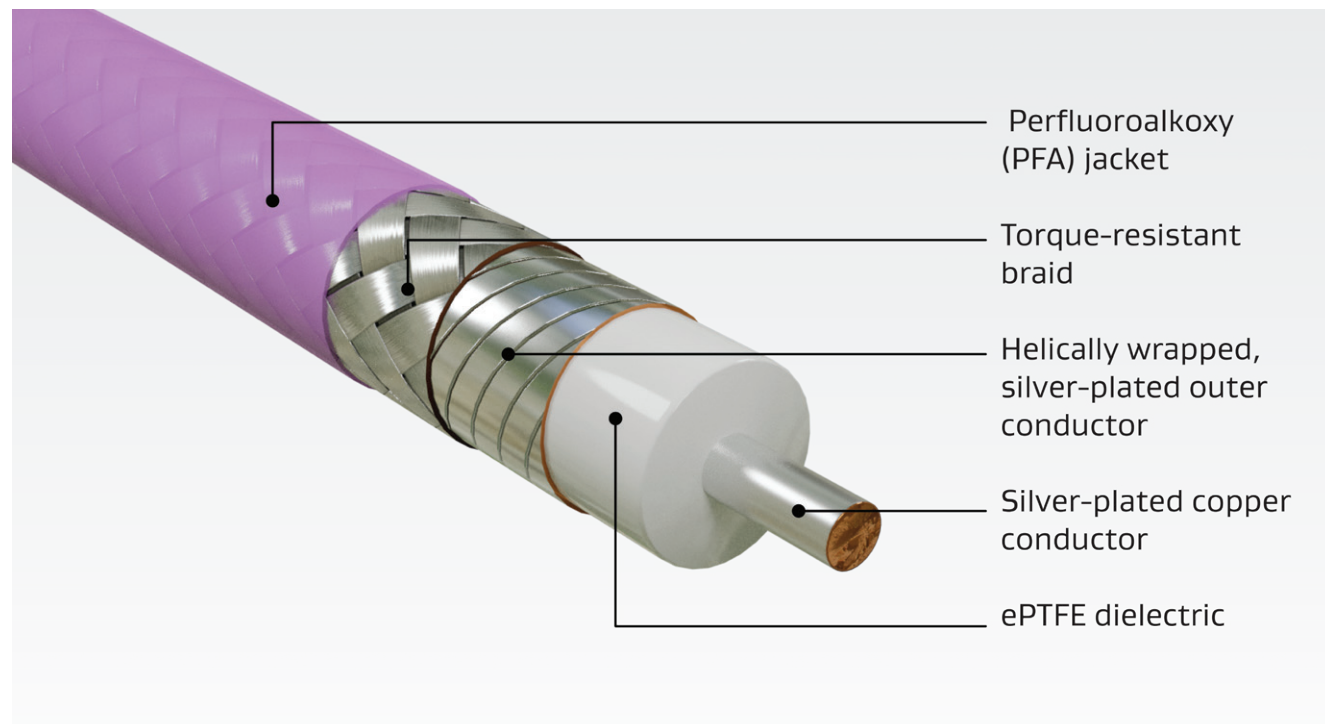


Figure 5: High-Density Construction of GORE® Microwave/RF Assemblies, Type 4L



GORE® Microwave/RF Assemblies, Type 4L have a tight bend radius as small as 0.10 inches for easy routing in very small configurations such as inside-the-box systems (Table 1). In addition, they have a high-density construction that is more durable compared to semi-rigid assemblies (Figure 5).

With proven flexibility, GORE® Microwave/RF Assemblies, Type 4L withstand the rigors of handling and installation while delivering reliable signal integrity for longer service life and lower total costs — making them an ideal replacement for semi-rigid assemblies.

Table 1: Cable Assembly Properties

Electrical

Property	Type 4L
Typical Attenuation at 18 GHz (db/ft [dB/m])	1.54 (5.04)
Impedance (Ohms)	50 ± 1
Velocity of Propagation (Nominal) (%)	85
Shielding Effectiveness (dB through 18 GHz)	> 100

Mechanical / Environmental

Property	
Dielectric Material	ePTFE
Nominal Outer Diameter (in [mm])	0.047 (1.2)
Nominal Weight (oz/ft [g/m])	0.06 (5.6)
Minimum Bend Radius (in [mm]) ^a	0.10 (2.5)

a. Performance is based on a controlled, one-time bend around a mandrel.

Typical Applications

- Antenna arrays
- Backplane interconnects
- Between-the-box connections
- Board-to-board systems
- Environmental test chambers
- Evaluation boards
- Inside-the-box systems
- Module-to-module interconnects
- Systems integration
- Test bench systems
- Thermal vacuum chambers

Ordering Information

For more information or to request a quote for GORE® Microwave/RF Assemblies, Type 4L, please contact a Gore representative at gore.com/contact. Alternatively, visit Gore’s online tools to build your assembly and calculate various parameters.

The **GORE® Microwave/RF Assembly Builder** is a step-by-step tool that allows you to configure and request a quote for an assembly with different connector options, assembly lengths, and frequencies. For more information, visit gore.com/rfcablebuilder.

The **GORE® Microwave/RF Assembly Calculator** is an online tool that calculates and compares the insertion loss, VSWR, and other parameters for various cable types. For more information, visit tools.gore.com/gmcacalc.

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