GORE® PHASEFLEX®

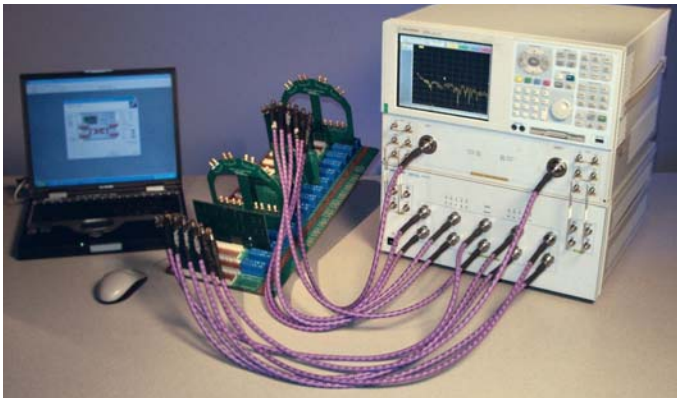
MICROWAVE/RF TEST ASSEMBLIES

Reduce total cost of test with durable, reliable performance

For test applications that require precise, repeatable measurements, GORE® PHASEFLEX® Microwave/RF Test Assemblies provide excellent phase and amplitude stability with flexure. The rugged, lightweight construction of these assemblies delivers reliable performance with longer service life and reduced equipment downtime, which results in lower costs for testing in laboratory, production, and field test environments.

Typical Applications

- Bench-top testing
- High throughput RF production testing
- Portable analyzers
- Test rack systems
- Vector network analyzers (VNAs)
- Scalar network analyzers
- Antenna ranges
- Anechoic chambers
- Nearfield scanners
- Wireless telecommunication module testing
- Electromagnetic compliance testing
- Automated test equipment



Courtesy, Agilent Technologies, Inc.

Benefits of GORE® PHASEFLEX® Microwave/RF Test Assemblies

- Consistent, repeatable measurements with stable electrical performance up to 110 GHz
- Longer service life with durable construction that resists crushing, twisting, and kinking
- Enhanced phase and amplitude stability with flexure and temperature
- Increased throughput and reduced downtime with durable and reliable performance

Rugged Construction Delivers Longer Service Life

With an internally ruggedized construction, GORE® PHASEFLEX® Microwave/RF Test Assemblies maintain measurement repeatability while withstanding demanding conditions such as continuous flexing, temperature cycling, broad temperature ranges, and frequent connect and disconnect. The consistent performance and reliability of these test assemblies increases the interval between time-consuming calibrations of the test system, which in turn increases throughput, and reduces the total cost of test.

Unlike conventionally designed RF test assemblies, GORE® PHASEFLEX® Microwave/RF Test Assemblies maintain excellent phase and amplitude stability with flexure. The unique cable construction allows a small bend radius without affecting performance (see Figure 1). Some cables have a minimum bend radius as small as 0.5 inches.

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GORE® PHASEFLEX® Microwave/RF Test Assemblies offer excellent electrical and mechanical performance (see Tables 2 and 3 for product specifications). Assemblies are available in 12, 24, 36, 48, and 60 inch lengths. These predetermined lengths correspond to 34.5, 61.0, 91.4, 121.9 and 154.4 millimeters. Special Purpose Test Assemblies are also available (see Table 4 and Table 5 for product specifications).

Features for GORE® PHASEFLEX® Microwave/RF Test Assemblies include:

- torque, crush, and kink resistance
- abrasion resistance
- dust/moisture resistance
- performance over a wide temperature range
- chemical resistance
- high connector pull strength

Precise and Repeatable Measurements

The exceptional phase and amplitude stability of GORE® PHASEFLEX® Microwave/RF Test Assemblies ensures accurate and repeatable measurements. Although all of these assemblies exceed specifications for phase and amplitude stability, additional testing is performed on assemblies using cable types 0U, 0T, 0D, 0Z, and 0F to guarantee their phase and amplitude performance with flexure (see Table 1 for typical and guaranteed performance).

Table 1: Test Assemblies with Guaranteed Phase and Amplitude Stability with Flexure[1]

Gore Cable Type	Phase Stability with Flexure (±°)		Amplitude Stability with Flexure (± dB)	
	Typical Value	Maximum Value	Typical Value	Maximum Value
0U	2.0	4.7	0.05	0.15
0T	3.0	6.6	0.05	0.15
0D	5.0	9.6	0.05	0.15
0Z	6.0	11.8	0.05	0.15
0F	8.0	15.6	0.05	0.10

[1] The maximum value for guaranteed phase and amplitude stability was established using the following test method. The assembly was terminated with a short circuit and tested on a calibrated system. The VNA was normalized. A mandrel of 2.25 in radius was placed adjacent to the left or right side of the assembly, approximately at its midpoint. The assembly was coiled 360° around the mandrel and held in this position for one full sweep. Maximum deviation over the frequency range of analysis was recorded. The assembly was then returned to its initial straight position, and the VNA was normalized again. The mandrel was placed on the opposite side of the assembly and the test was repeated. All of the assemblies above are tested using this test method.

Phase Matching

Upon request, phase or time delay matching can be specified for GORE® PHASEFLEX® Microwave/RF Test Assemblies with frequencies through 67 GHz. Gore can provide absolute and relative time delay matching to sub-picosecond tolerances. According to the applications performance requirements, cable assemblies may be specified to meet absolute or relative matching values.

- **Absolute match:** One or more assemblies having a specific time delay or phase length target value ± some tolerance value. This type of specification allows replacement or addition of individual cables in a matched set.
- **Relative match:** Two or more assemblies whose time delay or phase length fall within a specified match window. Relative matching ensures consistent matching within a set of cables, but an assembly from one set may not necessarily be matched with cable assemblies in another set.

Figure 1: The anatomy of GORE® PHASEFLEX® Microwave/RF Test Assemblies

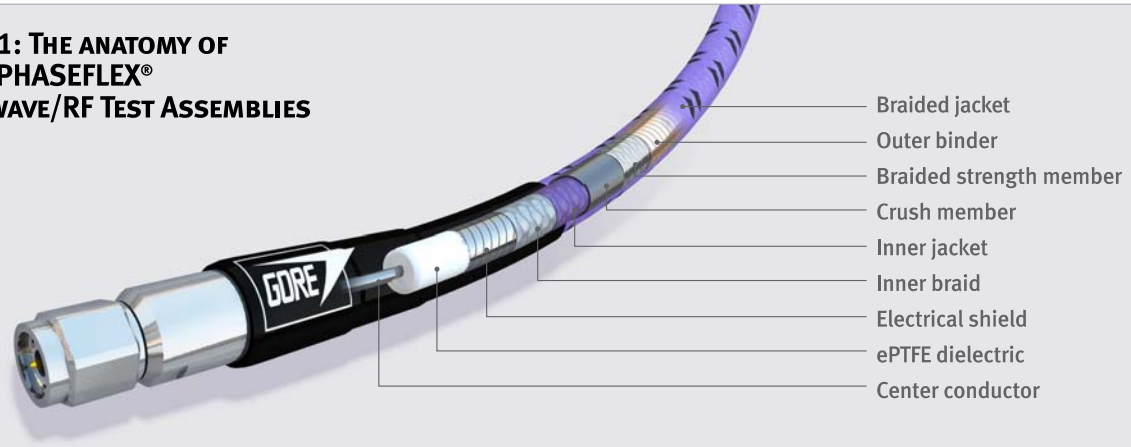

Table 2: Test Assembly Specifications up to 18 GHz[1]

	Gore Cable Type	0Y	0H	0X	0S	0U	0Q	0P	0M
Electrical Properties	Maximum Frequency (GHz)	3	18	18	18	18	18	18	18
	Typical VSWR	1.05:1	1.19:1	1.19:1	1.19:1	1.19:1	1.22:1	1.24:1	1.28:1
	Typical Insertion Loss (dB)	0.48	2.15	1.13	1.36	1.36	0.80	1.00	0.75
	Impedance (Nominal) (Ohms)	75	50						
	Typical Phase Stability (degree)	±0.5	±2.0	±2.0	±2.0	±2.0	±8.0	±6.0	±15.0
	Typical Amplitude Stability (dB)	‹ ±0.05							
	Dielectric Constant (Nominal)	1.4							
	Velocity of Propagation (Nominal) (%)	85							
	Shielding Effectiveness[2] (dB through 18 GHz)	› 100							
	Time Delay (Nominal) ns/cm (ns/in)	0.04 (0.103)							
Mech./Env. Properties	Center Conductor	Solid	Stranded	Solid	Stranded	Stranded	Solid	Stranded	Solid
	Outer Diameter mm (in)	7.5 (0.295)	5.3 (0.210)	7.7 (0.305)	7.7 (0.305)	7.7 (0.305)	10.2 (0.400)	10.2 (0.400)	10.7 (0.420)
	Nominal Weight g/m (oz/ft)	144.4 (1.55)	68.9 (0.74)	147.6 (1.6)	147.6 (1.6)	147.6 (1.6)	275.6 (2.96)	275.6 (2.96)	295.3 (3.17)
	Minimum Bend Radius mm (in)	25.4 (1.0)	12.7 (0.5)	25.4 (1.0)	25.4 (1.0)	25.4 (1.0)	38.1 (1.5)	38.1 (1.5)	38.1 (1.5)
	Typical Flex Cycles[3]	50,000	100,000	50,000	100,000	100,000	10,000	15,000	10,000
	Temperature Range (°C)	-55 to 125							
	Crush Resistance kg/linear cm (lb/linear in)	113.4 (250)	85 (187)	113.4 (250)					

Table 3: Test Assembly Specifications up to 67 GHz[1]

	Gore Cable Type	0W	0R	0T	0K	0D	0Z	0F
Electrical Properties	Maximum Frequency (GHz)	26.5	26.5	26.5	40	40	50	67
	Typical VSWR	1.17:1	1.17:1	1.17:1	1.30:1	1.30:1	1.26:1	1.30:1
	Typical Insertion Loss (dB)	1.43	1.71	1.71	2.65	3.35	3.78	5.84
	Impedance (Nominal) (Ohms)	50						
	Typical Phase Stability (degree)	±3.0	±3.0	±3.0	±5.0	±5.0	±6.0	±8.0
	Typical Amplitude Stability (dB)	‹ ±0.05						
	Dielectric Constant (Nominal)	1.4						
	Velocity of Propagation (Nominal) (%)	85						
	Shielding Effectiveness[2] (dB through 18 GHz)	› 100						
	Time Delay (Nominal) ns/cm (ns/in)	0.04 (0.103)						
Mech./Env. Properties	Center Conductor	Solid	Stranded	Stranded	Solid	Solid	Solid	Solid
	Outer Diameter mm (in)	7.7 (0.305)	7.7 (0.305)	8.0 (0.315)	6.1 (0.240)	6.1 (0.240)	6.1 (0.240)	5.8 (0.230)
	Nominal Weight g/m (oz/ft)	147.6 (1.6)	147.6 (1.6)	147.6 (1.6)	98.4 (1.05)	101.7 (1.1)	101.7 (1.1)	88.6 (0.95)
	Minimum Bend Radius mm (in)	25.4 (1.0)						
	Typical Flex Cycles[3]	50,000	100,000	100,000	50,000	20,000	20,000	20,000
	Temperature Range (°C)	-55 to 125				-55 to 75		
	Crush Resistance kg/linear cm (lb/linear in)	113.4 (250)						

[1] The electrical specifications in this table are based on a 0.91m (36 in) assembly length and maximum frequency with straight connectors.
[2] Per MIL-STD-1344, method 3008.
[3] When bent ± 90° at a radius that is twice the minimum bend radius, test assembly performs reliably through the stated flex cycles.