GORE™ Microwave Assemblies

HIGH PERFORMANCE TEST & MEASUREMENT

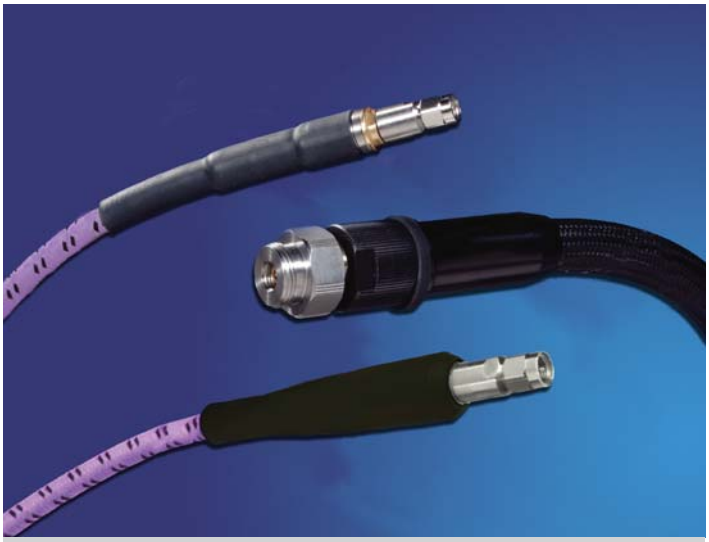
High Performance Test & Measurement Assemblies

W. L. Gore & Associates offers cable assemblies specially designed for microwave/RF and high speed digital test equipment including vector network analyzers (VNA), scalar network analyzers, and other high performance automated equipment.

GORE™ VNA Microwave/RF Test Assemblies set the industry standard for high performance test applications through 67 GHz. The performance is so remarkable that most VNA are purchased with GORE™ VNA Microwave Test Assemblies. Typical GORE™ VNA Microwave Test Assembly applications include: vector network analyzers, lab environment testing, and anywhere critical measurements are required.

GORE™ PHASEFLEX® Microwave/RF Test Assemblies combine the electrical advantages of our expanded PTFE dielectric with an integrated environmental protection system. These ruggedized assemblies offer excellent durability while remaining exceptionally lightweight and flexible. GORE™ PHASEFLEX® Microwave Test Assemblies are the cost-effective solution for test applications. Typical applications using GORE™ PHASEFLEX® Microwave Test Assemblies include: production floor testing, antenna ranges, thermal vacuum chambers, anechoic chambers, nearfield scanners, and test labs.

Properties	GORE™ VNA assemblies	GORE™ PHASEFLEX® assemblies
Frequency range (GHz)	DC-67	DC-67
Phase stability- typ* (°)	+/- 2.0	+/- 2.0
Amplitude stability- typ* (dB)	+/- 0.03	+/- 0.03
Crush resistance (lb/linear in.)	800	250
Minimum bend radius	2.25 in. (57mm) (self restricting)	1.0 in. (25.4mm)
Temperature (°C)	Lab conditions	-55 to +85
Standard lengths (in.)	25, 38	24, 36, 48
Custom lengths	Yes (up to 10 ft.)	Yes
Flex life (cycles)	100,000	100,000
Phase matching	No	Available
Replaceable interface	No	Available
Connectors	VNA test port/ NMD style	Precision



GORE™ Microwave Test Assemblies set the industry standard for high performance test applications

KEY FEATURES

- Phase and loss stability with flexure
- Crush and torque resistant
- Flexible
- Off-the-shelf standard assemblies

KEY BENEFITS

- Accurate measurements with longer calibration intervals
- Long service life
- Easy to use and configure to device under test
- Minimize down time

* GORE™ PHASEFLEX® Test Assembly measurements for 24" assembly at 18 GHz. GORE VNA Microwave Test Assembly measurements for 25" assembly at 18 GHz.

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HIGH PERFORMANCE TEST & MEASUREMENT

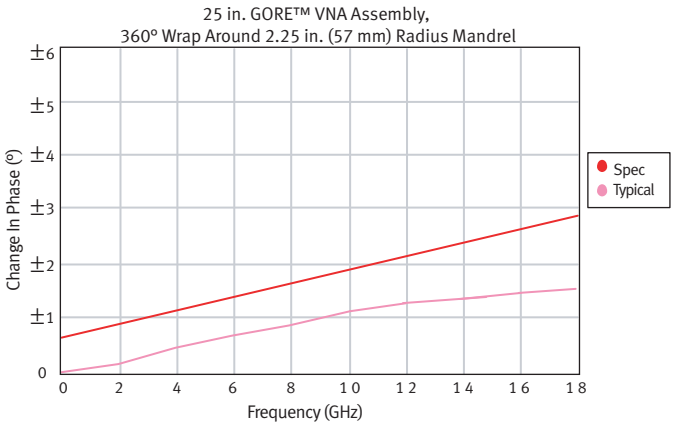
GORE™ VNA MICROWAVE TEST ASSEMBLIES

GORE™ VNA Microwave Test Assemblies provide the ultimate in performance for precision test applications through 67 GHz, where constant and/or highly repetitive movements occur, as with a vector network analyzer. Extremely precise phase and amplitude stability versus flexure provides the highest accuracy and the greatest time interval between recalibrations.

A unique, patented armor system provides a high degree of limpness and low springback while assuring long flex life. These assemblies employ NMD-style ruggedized connectors for direct attachment to VNA test ports and allow the use of test port compatible adapters for best durability and stability. GORE™ VNA Microwave Test Assemblies are modular making cost-effective refurbishment practical, even after 100,000 operations. One week turnaround for standard length assemblies (25 in. and 38 in.) is available for all frequencies. Custom assembly lengths, up to 120 in., are available with longer lead times.

PHASE AND AMPLITUDE STABILITY

GORE™ Cables ensure that your measurements are accurate and repeatable, extending the time interval between calibrations. We expect you to flex the cable during normal use and provide you with assemblies which suit your practical needs while remaining stable. Page 8 shows typical and maximum guaranteed phase and amplitude stability for the various standard length GORE™ VNA Microwave Test Assemblies.



FLEXIBILITY

GORE™ VNA Microwave Test Assemblies have an autolimiting bend radius of 2.25 in. (57.2 mm). Springback is virtually zero, unless the autolimiting bend radius is intentionally violated.

GORE™ Cables are extremely flexible and very limp. You can drape an assembly over your finger and it will assume a 180° arc, near the restricted bend radius.

FEATURES AND BENEFITS

Features	Benefits
High frequency options	Performance to 67 GHz
Phase & loss stability during flexure	Accurate measurements
Crush & torque resistant	Long service life
Restricted bend radius	Long service life
High pull strength	Long service life
Modular construction	Refurbishable for long life
Ruggedized NMD port connectors	VNA port compatible
No springback	Easy bench handling
Highly flexible	Easy to configure to device under test (DUT) needs
Variety of connector options/ adapters	Simplifies set-up: fewer adapters needed
One week lead time	Minimize down time

RUGGEDIZATION

We have flexed our assemblies 90° to their autolimiting bend radius and then reverse bent them 180°, for more than 100,000 cycles (200,000 bends). The same assemblies were then torqued 50,000 times, 25,000 clockwise applications and 25,000 counterclockwise applications. The assemblies still met specification.

The assembly will withstand 40 lb (18 kg) of accidental pull without permanent degradation of electrical characteristics. You can also exert up to 7 lb (3 kg) of pull during use without exceeding electrical stability specifications.

Ruggedized features include:

- NMD style ruggedized connectors
- Torque resistance
- Crush resistance greater than 800 lb/linear inch
- Over 100,000 flexures at minimum bend radius

GORE™ Microwave Assemblies

HIGH PERFORMANCE TEST & MEASUREMENT

ASSEMBLY TYPES

The ruggedized connectors are designed to mate with standard network analyzer systems allowing mode-free broadband coaxial measurements from DC to the maximum frequency. Various standard connector options are available. SMA, 3.5mm, and 2.92 mm connectors are mechanically intermateable with one another. Likewise 2.4mm and 1.85mm connectors are mechanically intermateable with each other.

FB Microwave Test Assemblies

- Ruggedized 7 mm, Precision N, and 3.5 mm connectors.
- Designed to mate with port of analyzers.
- Mode-free measurements up to 18 or 26.5 GHz.

FD Microwave Test Assemblies

- Ruggedized 2.92 mm (K style) connectors.
- Designed to mate with ruggedized 2.92 mm port of analyzers.
- Mode-free measurements up to 40 GHz.

FE Microwave Test Assemblies

- Ruggedized 2.4 mm connectors.
- Designed to mate with ruggedized 2.4 mm port of analyzers.
- Mode-free measurements up to 50 GHz.

FF Microwave Test Assemblies

- Ruggedized 1.85 mm (V style) connectors.
- Designed to mate with ruggedized 1.85 mm port of analyzers.
- Mode-free measurements up to 67 GHz.

CABLE CROSS SECTION

1. Standard test interfaces available from DC to 67 GHz.
2. Metal spacer provides gripping area for assembly connection.
3. Anti-skid friction band prevents slippage when testing components on a smooth surface.
4. Strain relief boot prevents damage to the cable-connector termination.
5. Abrasion resistant polymer braid covers flexible armor for easy handling.

TESTING

Prior to shipment every GORE™ VNA Microwave Test Assembly is tested for return loss, insertion loss, phase stability, and loss stability up to its maximum operating frequency. Rigorous testing methods designed to simulate worst case conditions are described on page 8. Each assembly and its test data are individually serialized for complete traceability.

CONNECTOR OPTIONS- GORE™ VNA ASSEMBLIES

Connector type		Description	Fmax (GHz)	FB (26.5 GHz)	FD (40 GHz)	FE (50 GHz)	FF (67 GHz)
End A	Precision N	Pin	18	0AH	0AH	0AH	
	7 mm	Hermaphroditic	18	0HD	0HD	0HD	
	3.5 mm	Ruggedized port socket	26.5	0HA			
	2.92 mm	Ruggedized port socket	40		0BS		
	2.4 mm	Ruggedized port socket	50			0BN	
	1.85 mm	Ruggedized port socket	67				0CN
End B	Precision N	Pin	18	0AH	0AH	0AH	
	Precision N	Socket	18	0AL	0AL	0AL	
	7 mm	Hermaphroditic	18	0HD	0HD	0HD	
	3.5 mm	Ruggedized DUT pin	26.5	0HB	0HB	0HB	
	3.5 mm	Socket	26.5	0HC	0HC	0HC	
	2.92 mm	Ruggedized DUT pin	40		0HR	0HR	
	2.92 mm	Socket	40		0HQ	0HQ	
	2.4 mm	Ruggedized DUT pin	50			0BM	
	2.4 mm	Socket	50			0BL	
	1.85 mm	Ruggedized DUT pin	67				0CM
	1.85 mm	Socket	67				0CL

Note: Ruggedized ports are connectors that attach to the VNA test port. Gore also supports SMP, SMPM, GSSS, and GORE™ 100 push-on interfaces. Consult Gore for connectors.

GORE™ Microwave Assemblies

HIGH PERFORMANCE TEST & MEASUREMENT

GORE™ PHASEFLEX® MICROWAVE TEST ASSEMBLIES

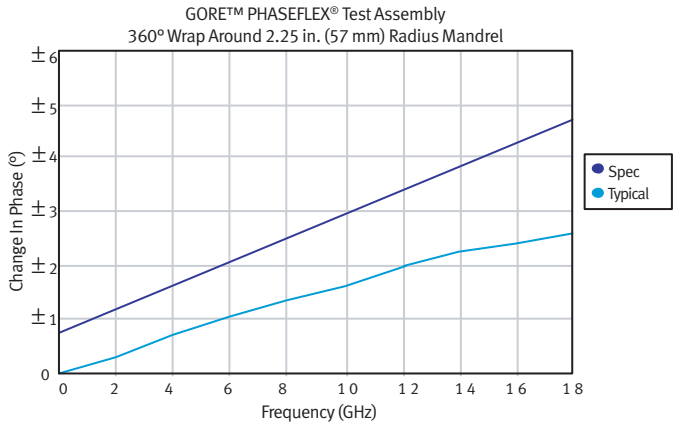
Not all applications require the precision of GORE™ VNA Microwave Test Assemblies, but phase and amplitude stability are still essential for proper performance. For these types of applications, we offer GORE™ PHASEFLEX® Microwave Test Assemblies. GORE™ PHASEFLEX® Microwave Test Assemblies are a family of internally ruggedized microwave coaxial assemblies with excellent phase and amplitude stability. With the ruggedization designed into the cable, the assemblies have excellent durability while remaining exceptionally lightweight and flexible.

GORE™ PHASEFLEX® Microwave Test Assemblies are intended for production test applications or where the test area is not located in the vicinity of the equipment. GORE™ PHASEFLEX® Microwave Test Assemblies are also well-suited for VNA setups where high power measurements, utilizing couplers and attenuators, are performed.

Phase matching is available for any assembly up to 67 GHz. Replaceable interface options are available on the 18 GHz cables (part number EJ/0U). Standard assemblies are available to ship within 2-3 business days; see page 5 for options.

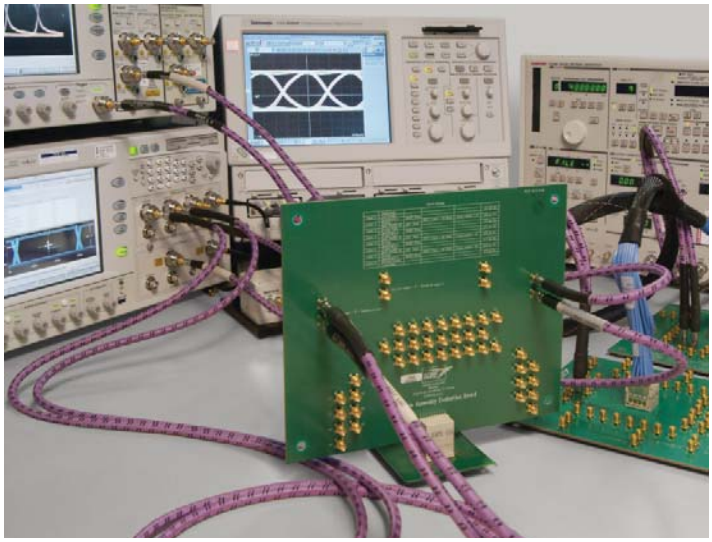
PHASE AND AMPLITUDE STABILITY

Performance of GORE™ PHASEFLEX® Microwave Test Assemblies permit accurate and repeatable measurements while limiting the need to perform time consuming calibrations between measurements. Typical and maximum phase and amplitude stability for standard length GORE™ PHASEFLEX® Microwave Test Assemblies is shown on page 8.



FLEXIBILITY

GORE™ PHASEFLEX® Microwave Test Assemblies are highly flexible, yet do not suffer from the typical performance degradation associated with flexing semi-rigid and traditionally designed flexible assemblies. The internally ruggedized design allows for a 1 in. (25.4 mm) minimum bend radius for these assemblies without affecting cable performance. Springback for GORE™ PHASEFLEX® Microwave Test Assemblies is virtually zero.



FEATURES AND BENEFITS

Features	Benefits
Off-the-shelf standard assemblies	Minimize down time
Phase & amplitude stability with flex	Longer calibration intervals
Flexible	Easy to use
Crush, torque & kink resistant	Longer life
Ergonomic boots	Facilitate connect/disconnect
Phase matching options	Suited for parallel or comparative measurements
Replaceable interface options/adapters	Reduces risk of assembly damage , longer field service life
Fluid, dust & dirt proof	Longer life

RUGGEDIZATION

We flexed the GORE™ PHASEFLEX® Microwave Test Assemblies 90° then reverse bent them 180°. The stranded center conductor cables performed beyond 100,000 cycles (200,000 bends). The same assemblies were then torqued 50,000 times, 25,000 clockwise and 25,000 counterclockwise. The assemblies still met specification.

Ruggedized features include:

- Torque resistance
- Crush resistance 250lb/linear inch
- Tight bend radius (minimum 1 in./25.4 mm)
- Performance over a wide temperature range
- Ergonomically friendly strain-relief boot
- Abrasion resistant
- Chemically inert and resistant
- Lightweight fiber braided jacket
- High connector pull strength

GORE™ Microwave Assemblies

HIGH PERFORMANCE TEST & MEASUREMENT

ASSEMBLY TYPES

GORE™ PHASEFLEX® Microwave Test Assemblies incorporate a patented internally ruggedized cable design and are available either with or without an ergonomic strain-relief boot behind the connector. Assemblies using the ergonomic boot use cable part numbers EJ, EK, EL, EM, and EN. Assemblies without a boot have a standard shrink tubing and use cable part numbers 0U, 0T, 0D, 0Z, and 0F.

For most test applications Gore recommends using an assembly with the boot because they are easier for the operator to handle. These assemblies use part numbers EJ, EK, EL, EM or EN. The boot's nominal outer diameter is 0.6 in. (15.2 mm)

However, Gore recommends using an assembly without a boot if:

- Operating temperature is over 85 °C (cable part numbers 0T or 0U).
- On-center spacing is less than 0.6 in. (15.2 mm) (part numbers 0U, 0T, 0D, 0Z or 0F).

The connectors are designed to mate with the network analyzer and a device under test to provide a mode-free broadband measurement through their maximum rated frequency. Various standard connector options are shown on page 6.

Gore also offers assemblies with performance through 110 GHz. Contact Gore for more information about GORE™ PHASEFLEX® 110 GHz Test Assemblies.

EJ/0U Microwave Test Assemblies

- Replaceable interface and adapters as connector options.
- SMA, TNCA, Precision N, 7 mm and precision 3.5 mm connectors.
- Designed to mate with the test ports of network analyzers.
- Mode-free measurements up to 18 GHz.
- Standard assembly lengths of 24, 36, and 48 in.

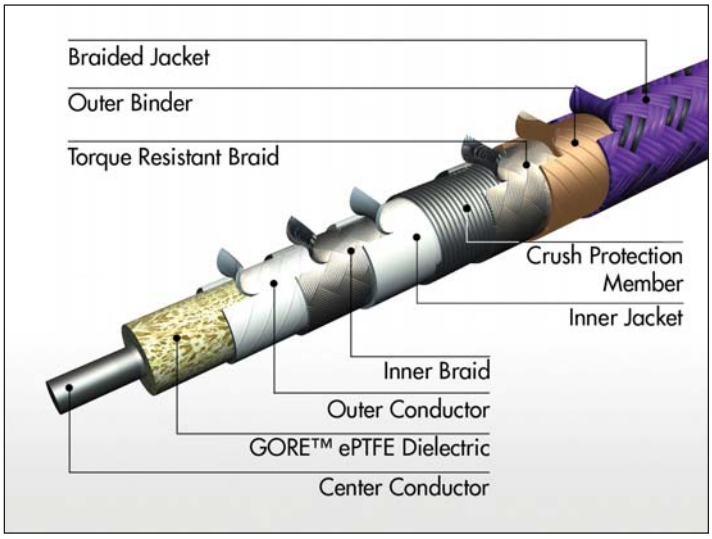
EK/0T Microwave Test Assemblies

- Precision 3.5 mm connectors.
- Designed to mate with the 3.5mm port of network analyzers.
- Mode-free measurements up to 26.5 GHz.
- Standard assembly lengths of 24, 36, and 48 in.

EL/0D Microwave Test Assemblies

- Precision 2.92 mm (K style) connectors.
- Designed to mate with the 2.92mm port of network analyzers.
- Mode-free measurements up to 40 GHz.
- Standard assembly lengths of 24 and 36 in.

CABLE CROSS SECTION



EM/0Z Microwave Test Assemblies

- Precision 2.4 mm connectors.
- Designed to mate with the 2.4mm port of network analyzers.
- Mode-free measurements up to 50 GHz.
- Standard assembly lengths of 24 and 36 in.

EN/0F Microwave Test Assemblies

- Precision 1.85 mm (V style) connectors.
- Designed to mate with the 1.85 mm port of network analyzers.
- Mode-free measurements up to 67 GHz.
- Standard assembly length of 24 in.

TESTING

Prior to shipment, every GORE™ PHASEFLEX® Microwave Test Assembly is tested for return loss, insertion loss, phase stability, and loss stability up to its maximum operating frequency. Rigorous testing methods designed to simulate worst case conditions are described on page 8. Each assembly and its test data are individually serialized for complete traceability.

GORE™ Microwave Assemblies

HIGH PERFORMANCE TEST & MEASUREMENT

CONNECTOR OPTIONS- GORE™ PHASEFLEX® ASSEMBLIES

Connector type		Description	Fmax (GHz)	EJ/0U (18 GHz)	EK/0T (26.5 GHz)	EL/0D (40 GHz)	EM/0Z (50 GHz)	EN/0F (67 GHz)
SMA		Pin	18	R01				
SMA		Box right angle pin	18	R71				
SMA		Socket	18	R02				
TNCA		Pin	18	C01				
TNCA		Box right angle pin	18	C71				
TNCA		Socket	18	C02				
Precision N		Pin	18	Q01				
Precision N		Box right angle pin	18	Q71				
Precision N		Socket	18	Q02				
7 mm		Hermaphroditic	18	K00				
3.5 mm		Pin	26.5	D01	D01			
3.5 mm		Socket	26.5	D02	D02			
3.5 mm		Ruggedized port socket	26.5	0HA	0HA			
3.5 mm		Ruggedized DUT pin	26.5		0HB			
2.92 mm		Pin	40			0CQ	0CQ	
2.92 mm		Socket	40			0CP	0CP	
2.4 mm		Pin	50				0CJ	
2.4 mm		Socket	50				0CK	
1.85 mm		Pin	67					0CB
1.85 mm		Socket	67					0CA
Intermediate interface^			18	601				
Replaceable adapters	SMA	Pin adapter	18	701				
	SMA	Socket adapter	18	702				
	TNCA	Pin adapter	18	801				
	TNCA	Socket adapter	18	802				
	Type N	Pin adapter	18	901				
	Type N	Socket adapter	18	902				
	7 mm	Adapter	18	401				
	3.5 mm	Pin adapter	18	0CG				
	3.5 mm	Ruggedized DUT pin	18	0GA				
	3.5 mm	Socket adapter	18	0CH				

Note: Ruggedized ports are connectors that attach to the VNA test port.
Gore also supports SMP, SMPM, GSSS, and GORE™ 100 push-on interfaces. Consult Gore for other configurations or higher frequency needs.
^ Requires a replaceable adapter to mate to your equipment/device.

GORE™ Microwave Assemblies

HIGH PERFORMANCE TEST & MEASUREMENT

GORE QUALITY GUARANTEE

Gore offers a one year service life warranty for our test cable assemblies. Every GORE™ Microwave Assembly is 100% tested, inspected, and certified to meet the acceptance requirements. Each assembly is guaranteed to meet those requirements and to be free from defects in materials and/or workmanship at the time of delivery. Defect or failure claims may be filed up to one year beyond the original ship date.

CONNECTOR OPTIONS

Ruggedized test port connectors provide the user with greater stability and durability compared to conventional connectors, when used on VNA test equipment. Repeatability and stability under mechanical load (torque and bending movement) are features which minimize drift and maximize the interval between calibrations and the quality of measurements. GORE™ Test Port Connectors are carefully machined to close tolerances and fine surface finishes. High performance engineered plastics are utilized for dielectric supports, assuring good concentricity and durability.

The NMD series of connectors have an auxiliary, large thread, and bearing surface for mating with conventional connectors of the same type and for attaching either pin or socket adapters. This design protects the connection from accidentally being altered or broken when torque is applied during connection and disconnection at the test point.

Many applications use the test cable as a test port extension. GORE™ Connectors allow the use of adapters to other, non-precision connectors with the same performance benefits as when using the adapters directly on the VNA test port.

GORE™ VNA Microwave Test Assembly connectors are designed to make full use of all mating options. The connectors designed to mate with the VNA test port are identified as “End A-Ruggedized Port Socket” in the description column. Likewise, the selection of “Ruggedized DUT Pin” on the “End B” of the cable duplicates the connector found on the VNA. It may be attached directly to the device under test (DUT), if it is a compatible connector, or by means of an appropriate adapter. The selection of “Socket” for the “End B” allows for direct connection to the DUT if it is the appropriate connector.

The precision connectors, found on GORE™ PHASEFLEX® Microwave Test Assemblies, mate non-destructively with connectors conforming to the applicable standard and are tested to ensure electrical performance. Their robust construction is suitable for most applications, but does not offer the same level of precision as the test port connectors.

SMP AND SMPM ADAPTERS

SMP and SMPM interfaces are increasing in popularity for high density, high speed, and blindmate applications. The superior RF performance of Gore’s adapters, in combination with our stable and repeatable microwave test assemblies, provide the perfect solution for higher density and higher frequency needs. The individual adapters of a mated adapter pair are designed to be phase and amplitude matched to support adapter swap-out after calibration, without sacrificing accuracy. The adapter approach is ideal, because as the SMP and SMPM interfaces wear out, the adapters can be replaced, avoiding any damage to the robust test assembly. SMP and SMPM interfaces are compatible and intermateable with GPO™ and GPPO™ connectors, respectively.

P/N: 100-123-XXXX (Choose last four digits from table)	SMP		SMPM	
	Pin (FD)	Socket	Pin (FD)	Socket
SMA pin	0287	0288	0297	0298
SMA socket	0286	0285	0296	0295
3.5 mm pin	0142	0143	0137	0138
3.5 mm socket	0141	0140	0136	0135
2.4 mm pin	0017	0018	0022	0023
2.4 mm socket	0016	0015	0021	0020
1.85 mm pin	NA	NA	0098	0099
1.85 mm socket	NA	NA	0097	0096

SELECTING A PART NUMBER

Gore part numbers consist of 12 alphanumeric characters. These characters have specific meaning.

1 2	3 4 5	6 7 8	9 10 11 . 12
Cable Type	Connector A	Connector B	Assembly Length

1. Prefix characters 1 and 2 define the cable type (EJ, EK, FB, FD, etc.).
2. Characters 3, 4, and 5 define connector “A” to be used on one end of the assembly. Characters 6, 7, and 8 define connector “B” to be used on the second end of the assembly. To determine these characters, refer to the Connector Options table.
3. Characters 9, 10, 11, and 12 define the assembly length in inches and tenths. Lengths requiring only one or two digits (6 or 24 inches, for example) should be preceded by zeros in the unused positions (006, 024). If your length is a whole-inch increment, a “0” should be placed in position 12. For quick delivery of EJ and EK assemblies, select one of our standard assembly lengths: 24, 36, or 48 in.; for EL and EM assemblies: 24 and 36 in.; and for EN assemblies: 24 in. Standard lengths of FB, FD, FE, and FF assemblies are 25 and 38 in. Custom assembly lengths are available upon request; consult Gore.

GORE™ Microwave Assemblies

HIGH PERFORMANCE TEST & MEASUREMENT

CABLE SPECIFICATIONS FOR STANDARD LENGTH ASSEMBLIES

Cable type	Max frequency (GHz)	Length (in.)	Typical insertion loss (dB)*	Max insertion loss (dB)	Max VSWR	Typical phase stability (±°)	Max phase stability (±°)	Typical amplitude stability (±dB)	Max amplitude stability (±dB)	Outer diameter (in. nominal)	Min bend radius (in. nominal)	Flex life (cycles)
EJ/0U	18	24	1.08	1.20	1.35:1	2.0[4]	4.7[4]	0.03[4]	0.08[4]	0.305	1.0	100,000
EJ/0U	18	36	1.50	1.65	1.35:1	2.0[4]	4.7[4]	0.05[4]	0.15[4]	0.305	1.0	100,000
EJ/0U	18	48	1.92	2.10	1.35:1	2.0[4]	4.7[4]	0.05[4]	0.15[4]	0.305	1.0	100,000
EK/0T	26.5	24	1.36	1.52	1.45:1	3.0[4]	6.6[4]	0.03[4]	0.08[4]	0.315	1.0	100,000
EK/0T	26.5	36	1.88	2.08	1.45:1	3.0[4]	6.6[4]	0.05[4]	0.15[4]	0.315	1.0	100,000
EK/0T	26.5	48	2.40	2.64	1.45:1	3.0[4]	6.6[4]	0.05[4]	0.15[4]	0.315	1.0	100,000
EL/0D	40	24	2.23	3.06	1.43:1	5.0[4]	9.6[4]	0.05[4]	0.08[4]	0.240	1.0	20,000
EL/0D	40	36	3.35	4.32	1.43:1	5.0[4]	9.6[4]	0.05[4]	0.15[4]	0.240	1.0	20,000
EM/0Z	50	24	2.52	3.50	1.43:1	6.0[4]	11.8[4]	0.05[4]	0.08[4]	0.240	1.0	20,000
EM/0Z	50	36	3.78	4.92	1.43:1	6.0[4]	11.8[4]	0.05[4]	0.15[4]	0.240	1.0	20,000
EN/0F	67	24	4.39	4.80	1.50:1	8.0[4]	15.6[4]	0.05[4]	0.10[4]	0.230	1.0	20,000
FB	18	25	0.88	1.24	1.29:1	2.0[3]	2.8[3]	0.03[3]	0.08[3]	0.6	2.25	100,000
FB	18	38	1.34	1.73	1.29:1	3.5[3]	5.2[3]	0.05[3]	0.15[3]	0.6	2.25	100,000
FB	26.5	25	1.09	1.56	1.29:1	3.0[3]	3.9[3]	0.03[3]	0.08[3]	0.6	2.25	100,000
FB	26.5	38	1.64	2.17	1.29:1	4.5[3]	7.4[3]	0.05[3]	0.15[3]	0.6	2.25	100,000
FD	40	25	2.33	3.17	1.38:1	2.0[1]	3.7[1]	0.03[1]	0.08[1]	0.6	2.25	50,000
FD	40	38	3.54	4.53	1.38:1	4.0[1]	7.3[1]	0.05[1]	0.15[1]	0.6	2.25	50,000
FE	50	25	2.62	3.62	1.43:1	2.5[1]	4.5[1]	0.03[1]	0.08[1]	0.6	2.25	50,000
FE	50	38	4.00	5.16	1.43:1	4.5[1]	9.0[1]	0.05[1]	0.15[1]	0.6	2.25	50,000
FF	67	25	5.00	6.50	1.50:1	4.0[1]	8.5[1]	0.05[1]	0.10[1]	0.6	2.25	50,000
FF	67	38	7.30	8.50	1.50:1	6.0[2]	10.5[1]	0.08[2]	0.15[2]	0.6	2.25	50,000

Typical Amplitude and Phase Stability Test Methods

[1] The assembly is terminated with a short circuit and tested on a calibrated system. A mandrel of 2.25 in. radius is placed adjacent to, and approximately half down, the length of the assembly. The mandrel can be placed on either side (right or left) of the assembly. The assembly is bent 180° around the mandrel, forming a "U" shape. The assembly is held in this position for one full sweep. Maximum deviation over the frequency range of analysis is noted. The assembly is then returned to its initial straight position, and the VNA is re-normalized. The mandrel is placed on the opposite side of the assembly and the manipulation and observations described above are repeated.

The assembly is disconnected from the VNA, rotated axially approximately 90°, and reconnected to the same VNA port. After re-normalizing the VNA, the test steps are repeated. Thus, the assembly is bent throughout two perpendicular planes; in each plane the assembly is bent in two opposing directions. The maximum deviation for the assembly is defined as the maximum of the deviations encountered in the four directions of movement.

[2] Using two short test cable assemblies as test port extensions, a full two port calibration is performed. The assembly under test is connected to the port extensions such that it forms a "U" shape, with a 2.25 in. radius mandrel placed at the center of the "U." The assembly is disconnected from port extension 2, coiled 360° clockwise around the mandrel, and reconnected to port extension 2. The assembly is held in this position for one full sweep. Maximum electrical deviation (relative to initial "U" shape) over the frequency of analysis is noted. The assembly is disconnected at port extension 2 and returned to its initial "U" shape. The assembly is then coiled counterclockwise around the mandrel, and reconnected to port extension 2. The assembly is held in this position for one full sweep. Maximum deviation (relative to initial "U" shape) over the frequency of analysis is noted.

The assembly is disconnected from the VNA, rotated axially approximately 90°, and reconnected to the same port extensions. After re-normalizing the VNA, the test steps above are repeated. Thus, the assembly is bent throughout two perpendicular planes; in each plane the assembly is coiled in two opposite directions. The maximum deviation for the assembly is defined as the maximum of the deviations encountered in the four directions of movement.

[3] The assembly is terminated with a short circuit and tested on a calibrated system. A mandrel of 2.25 in. radius is placed adjacent to, and approximately half down, the length of the assembly. The mandrel can be placed on either side (right or left) of the assembly. The assembly is coiled end-to-end about the mandrel; for 25" and 38" assembly lengths this is approximately 1 and 1 3/4 coils, respectively, around the mandrel. The assembly is held in this position for one full sweep. Maximum deviation over the frequency range of analysis is noted. The assembly is then returned to its initial straight position, and the VNA is re-normalized. The mandrel is placed on the opposite side of the assembly and the manipulation and observations described above are repeated.

The assembly is disconnected from the VNA, rotated axially approximately 90°, and reconnected to the same VNA port. After re-normalizing the VNA, the test steps are repeated. Thus, the assembly is bent throughout two perpendicular planes; in each plane the assembly is bent in two opposing directions. The maximum deviation for the assembly is defined as the maximum of the deviations encountered in the four directions of movement.

[4] The assembly is terminated with a short circuit and tested on a calibrated system. The VNA is normalized. A mandrel of 2.25 in. radius is placed adjacent to, and approximately half way down the length of the assembly. The mandrel can be placed on either side (right or left) of the assembly. The assembly is coiled 360° around the mandrel. The assembly is held in this position for one full sweep. Maximum deviation over the frequency range of analysis is noted. The assembly is then returned to its initial straight position, and the VNA is re-normalized. The mandrel is placed on the opposite side of the assembly and the manipulation and observations described above are repeated.

* For replaceable interfaces add 0.15 to loss and 0.05 to VSWR.

W. L. Gore & Associates, Inc.

North America
1 (800) 445-GORE (4673)

Europe
+49 9144 6010
+44 1382 561511

International
1 (302) 292-5100

China: Beijing
+86 10 6510 2980

China: Shanghai
+86 21 6247 1999

China: Shenzhen
+86 755 8359 8262

gore.com

More international phone numbers can be found at gore.com/phone

Japan
+81 33 570 8712

Korea
+82 2 393-3411

Taiwan
+886 2 8771 7799

Singapore
+65 6 733 2882

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