

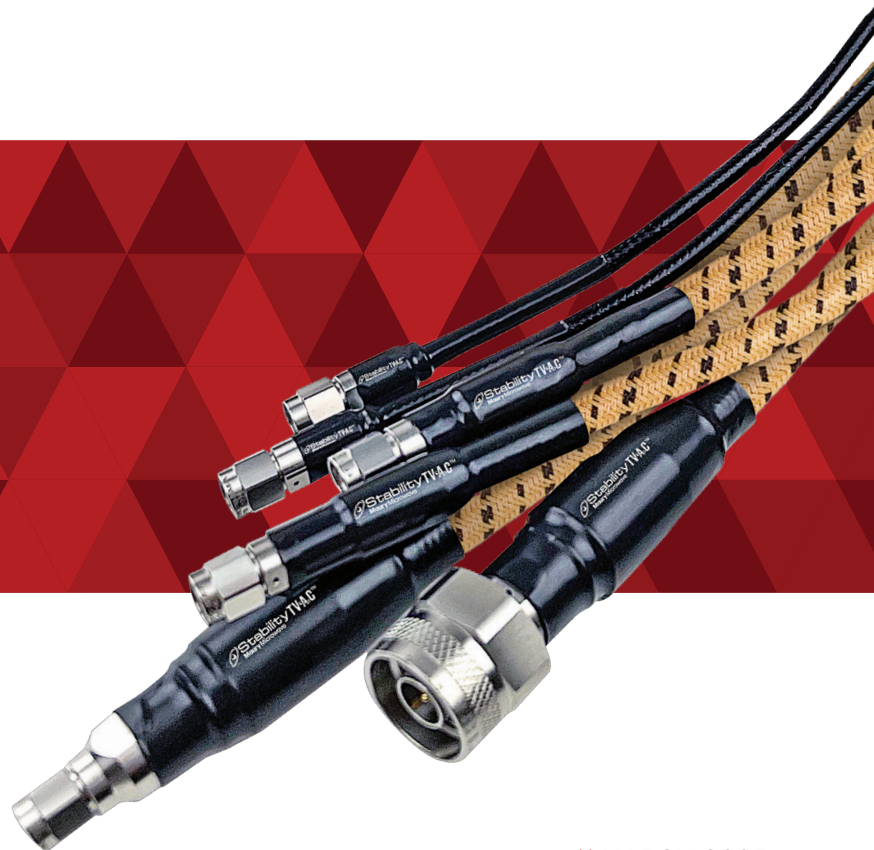
StabilityTVAC™ Cable Assemblies

DATA SHEET / 2Z-012



MODELS:

TV-292 // 2.92mm StabilityTVAC™ cables
TV-292-LP // 2.92mm Low-Profile StabilityTVAC™ cables
TV-SMA // SMA StabilityTVAC™ cables
TV-SMA-LP // SMA Low-Profile StabilityTVAC™ cables
TV-TNCA // TNCA StabilityTVAC™ cables
TV-TNCA-LP // TNCA Low-Profile StabilityTVAC™ cables
TV-N-LL // Type N Low-Loss StabilityTVAC™ cables
TV-N-LL-LP // Type N Low-Loss Low-Profile StabilityTVAC™ cables
TV-SMA-LL // SMA Low-Loss StabilityTVAC™ cables
TV-SMA-LL-LP // SMA Low-Loss Low-Profile StabilityTVAC™ cables
TV-TNC-LL // TNC Low-Loss StabilityTVAC™ cables
TV-TNC-LL-LP // TNC Low-Loss Low-Profile StabilityTVAC™ cables



StabilityTVAC™ Cable Assemblies



Features and Benefits

- > Low outgassing
- > Vented connectors
- > Thermally conditioned
- > Phase stable with flexure
- > High power handling
- > Low insertion loss

Typical Applications

- > TVAC test chambers

Description

Thermal Vacuum (TVAC) chambers are used by space component manufacturers to test components, sub-systems and even entire satellites under space-like conditions. It is essential that the T&M components, including cable assemblies, used to test the device-under-test (DUT) inside the chamber be specifically designed to accommodate the effects of pressure and temperature created within the TVAC chamber.

Outgassing is the process whereby varying temperature and vacuum conditions cause materials to release free volatiles, which can deposit on other components in a test system and cause significant contamination. StabilityTVAC™ assemblies use low outgassing materials which meet the requirements of ASTM E-595 with a TML < 1% and CVCM < 0.1%.

Changes in vacuum conditions force air in and out of cable assemblies, which can cause damage if not properly accounted for. Standard connectors require a slower change in pressure or risk damage. StabilityTVAC™ uses vented connectors which allow air to escape much faster, thereby empowering cable assemblies to stabilize and be used with minimal delays, and tests to be performed using rapid pressurization/depressurization cycles.

Like most mechanical components, cable assemblies expand and contract when presented with varying temperatures, which can cause changes in performance and even a permanent degradation. StabilityTVAC™ cable assemblies are thermally conditioned, going through aging and stabilization to relieve mechanical stresses for reliable performance over temperature.

Electrical Specifications

StabilityTVAC™ Cable Type	TV-292	TV-292-LP	TV-SMA	TV-SMA-LP	TV-TNCA	TV-TNCA-LP
Maximum Frequency	40 GHz		26.5 GHz		18 GHz	
VSWR (typical)	1.25					
VSWR (maximum)	1.30					
Typical Insertion Loss (cable only)	0.672 dB/ft		0.537 dB/ft		0.436 dB/ft	
Impedance (nominal)	50 ohm					
Phase Stability vs Flexure (typical)	±4.5°		±2°			
Amplitude Stability vs Flexure (typical)	±0.05 dB					
Phase Stability vs Temp	≤ 600 ppm					
Velocity of Propagation	82% (nominal)					
Shielding Effectiveness	> 90 dB (DC - 18 GHz)					
Time Delay (nominal)	1.24 ns/ft (4.07 ns/m)					
Dielectric Withstanding Voltage	750V					

Mechanical Specifications

StabilityTVAC™ Cable Type	TV-292	TV-292-LP	TV-SMA	TV-SMA-LP	TV-TNCA	TV-TNCA-LP
Center Conductor Material	Silver Plated Copper					
Maximum Outer Diameter (Connector)	0.35 in (9mm)	0.35 in (9mm)	0.35 in (9mm)	0.35 in (9mm)	0.622 in (15.8mm)	0.622 in (15.8mm)
Maximum Outer Diameter (Cable)	0.256 in (6.5mm)	0.15 in (3.8mm)	0.256 in (6.5mm)	0.15 in (3.8mm)	0.256 in (6.5mm)	0.15 in (3.8mm)
Nominal Weight (Cable)	.34 oz/ft (32 g/m)					
Min. Static Bend Radius (Inch)	1.283 in	0.748 in	1.283 in	0.748 in	1.283 in	0.748 in
Min. Dynamic Bend Radius (Inch)	2.56 in	1.5 in	2.56 in	1.5 in	2.56 in	1.5 in
Flex Life Cycles	>500					
Crush Resistance	250 lbf/in (44 kgf/cm)	27 lbf/in (4.8 kgf/cm)	250 lbf/in (44 kgf/cm)	27 lbf/in (4.8 kgf/cm)	250 lbf/in (44 kgf/cm)	27 lbf/in (4.8 kgf/cm)
Operating Temperature Range	-67°F to 329°F (-55°C to 165°C)					
RoHS/REACH	Yes					
Outgassing	TML<1%, CVCM< 0.1%					

Max Insertion Loss/Attenuation

Freq (GHz)	TV-292 (db/100 ft)	TV-292-LP (db/100 ft)	TV-SMA (db/100 ft)	TV-SMA-LP (db/100 ft)	TV-TNCA (db/100 ft)	TV-TNCA-LP (db/100 ft)
0.5	6.8		6.8			
1	9.7		9.7		9.7	
1.5	12		12		12	
2	13.9		13.9		13.9	
3	17.1		17.1		17.1	
4	19.8		19.8		19.8	
5	22.2		22.2		22.2	
6	24.4		24.4		24.4	
8	28.4		28.4		28.4	
10	31.9		31.9		31.9	
11	33.6		33.6		33.6	
12	35.1		35.1		35.1	
12.4	35.8		35.8		35.8	
13.5	37.4		37.4		37.4	
15	39.6		39.6		39.6	
18	43.6		43.6		43.6	
24	50.9		50.9		-	
26.5	53.7		53.7		-	
40	67.2		-		-	

Average Power Handling

(1:1 VSWR, 25 C, Sea Level, Cable Only)

Freq (GHz)	TV-292 Watts (Max)	TV-292-LP Watts (Max)	TV-SMA Watts (Max)	TV-SMA-LP Watts (Max)	TV-TNCA	TV-TNCA-LP
0.5	726		726		726	
1	511		511		511	
1.5	415		415		415	
2	359		359		359	
3	291		291		291	
4	251		251		251	
5	224		224		224	
6	203		203		203	
8	175		175		175	
10	156		156		156	
11	148		148		148	
12	141		141		141	
12.4	139		139		139	
13.5	133		133		133	
15	126		126		126	
18	114		114		114	
24	98		98		-	
26.5	93		93		-	
40	74		-		-	

Electrical Specifications

StabilityTVAC™ Cable Type	TV-N-LL	TV-N-LL-LP	TV-SMA-LL	TV-SMA-LL-LP	TV-TNC-LL	TV-TNC-LL-LP
Maximum Frequency	18 GHz				12.4 GHz	
VSWR (typical)	1.25					
VSWR (maximum)	1.30					
Typical Insertion Loss (cable only)	0.205 dB/ft				0.167 dB/ft	
Impedance (nominal)	50 ohm					
Phase Stability vs Flexure (typical)	±2°					
Amplitude Stability vs Flexure (typical)	±0.05 dB					
Phase Stability vs Temp	≤ 600 ppm					
Velocity of Propagation	82% (nominal)					
Shielding Effectiveness	> 90 dB (DC - 18 GHz)				> 90 dB (DC – 12.4 GHz)	
Time Delay (nominal)	1.24 ns/ft (4.07 ns/m)					
Dielectric Withstanding Voltage	1500V		1000V			

Mechanical Specifications

StabilityTVAC™ Cable Type	TV-N-LL	TV-N-LL-LP	TV-SMA-LL	TV-SMA-LL-LP	TV-TNC-LL	TV-TNC-LL-LP
Center Conductor Material	Silver Plated Copper					
Maximum Outer Diameter (Connector)	0.820 in (20.83mm)		0.35 in (9mm)		0.622 in (15.8mm)	
Maximum Outer Diameter (Cable)	0.433 in (11.0mm)	0.307 in (7.8mm)	0.433 in (11.0mm)	0.307 in (7.8mm)	0.433 in (11.0mm)	0.307 in (7.8mm)
Nominal Weight (Cable)	1.37 oz/ft (128 g/m)					
Min. Static Bend Radius (Inch)	2.16 in	1.535 in	2.16 in	1.535 in	2.16 in	1.535 in
Min. Dynamic Bend Radius (Inch)	4.33 in	3.15 in	4.33 in	3.15 in	4.33 in	3.15 in
Flex Life Cycles	>500					
Crush Resistance	250 lbf/in (44 kgf/cm)	27 lbf/in (4.8 kgf/cm)	250 lbf/in (44 kgf/cm)	27 lbf/in (4.8 kgf/cm)	250 lbf/in (44 kgf/cm)	27 lbf/in (4.8 kgf/cm)
Operating Temperature Range	-67°F to 329°F (-55°C to 165°C)					
RoHS/REACH	Yes					
Outgassing	TML<1%, CVCM< 0.1%					

Max Insertion Loss/Attenuation

Freq (GHz)	TV-N-LL (db/100 ft)	TV-N-LL-LP (db/100 ft)	TV-SMA-LL (db/100 ft)	TV-SMA-LL-LP (db/100 ft)	TV-TNC-LL (db/100 ft)	TV-TNC-LL-LP (db/100 ft)
0.5	3.16		3.16		3.16	
1	4.5		4.5		4.5	
1.5	5.54		5.54		5.54	
2	6.42		6.42		6.42	
3	7.92		7.92		7.92	
4	9.2		9.2		9.2	
5	10.34		10.34		10.34	
6	11.38		11.38		11.38	
8	13.25		13.25		13.25	
10	14.91		14.91		14.91	
12	16.44		16.44		16.44	
12.4	16.73		16.73		16.73	
13.75	17.69		17.69		–	
14.5	18.2		18.2		–	
18	20.47		20.47		–	

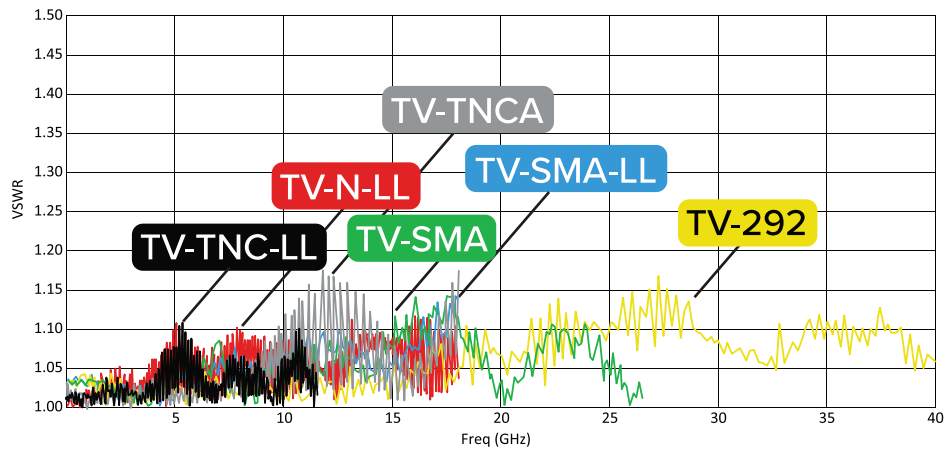
Average Power Handling

(1:1 VSWR, 25 C, Sea Level, Cable Only)

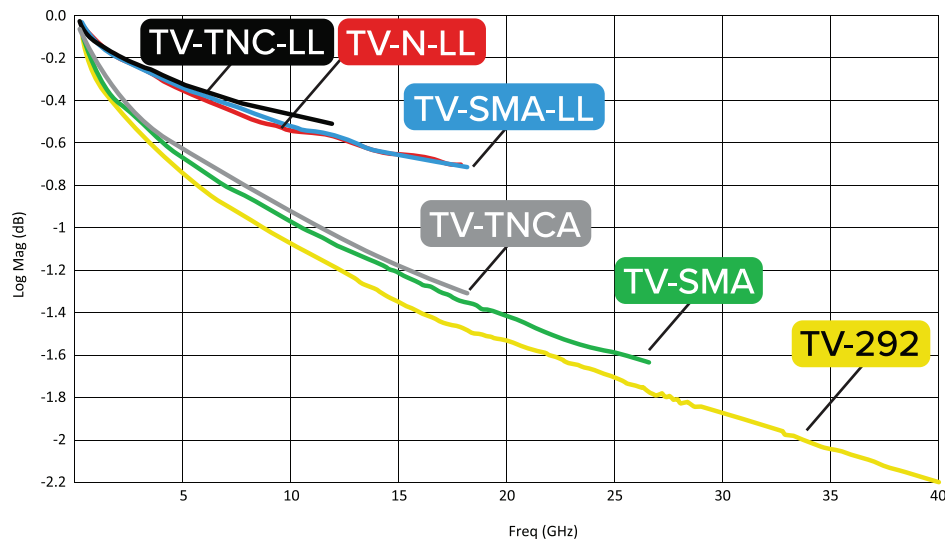
Freq (GHz)	TV-N-LL Watts (Max)	TV-N-LL-LP Watts (Max)	TV-SMA-LL Watts (Max)	TV-SMA-LL-LP Watts (Max)	TV-TNC-LL Watts (Max)	TV-TNC-LL-LP Watts (Max)
0.5	2579		2579		2579	
1	1812		1812		1812	
1.5	1472		1472		1472	
2	1269		1269		1269	
3	1029		1029		1029	
4	886		886		886	
5	789		789		789	
6	717		717		717	
8	615		615		615	
10	547		547		547	
12	496		496		496	
12.4	487		487		487	
13.75	461		461		–	
14.5	448		448		–	
18	398		398		–	

Maury StabilityTVAC™
Cable Assembly Typical
Performance

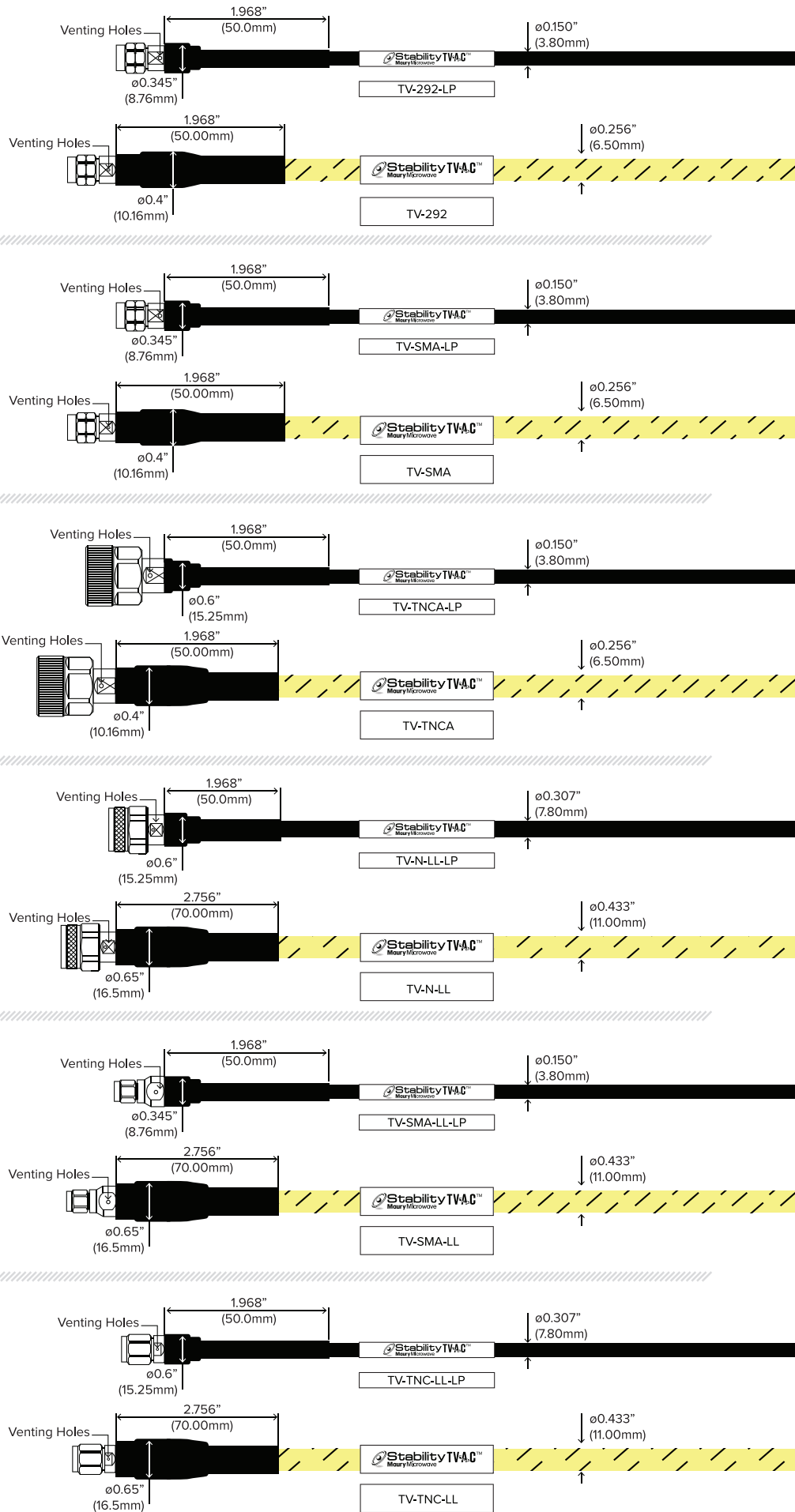
Maury StabilityTVAC™ 36" Cable
Assembly Typical VSWR



Maury StabilityTVAC™ 36" Cable
Assembly Typical Insertion Loss



StabilityTVAC™ Dimensions

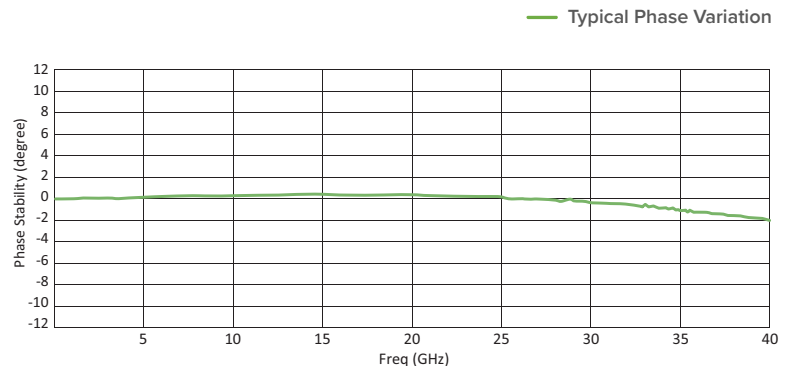


Phase Stability

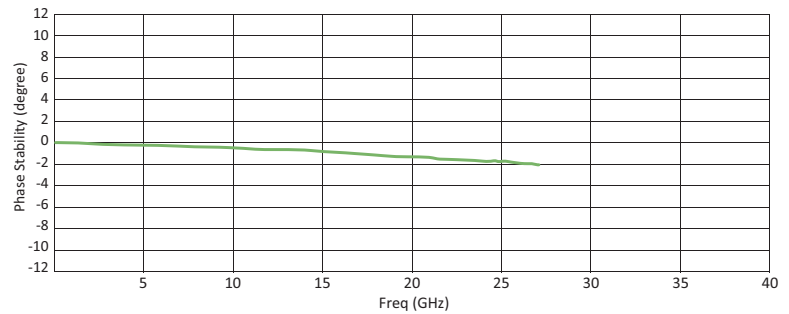
The maximum value for phase and amplitude stability was established using the following method. The cable was terminated with a short. With the cable in a straight position the VNA was normalized. The cable was coiled 360° around a mandrel 4 inches in diameter counter-clockwise and held in position for one sweep. The maximum deviation over the frequency range was recorded. The cable was then coiled 360° around the mandrel clockwise and held in position for one sweep and the maximum deviation was recorded. The cable was then returned to its original position for one sweep and the maximum deviation was recorded.

The plots on the right show the recorded worst-case phase variation.

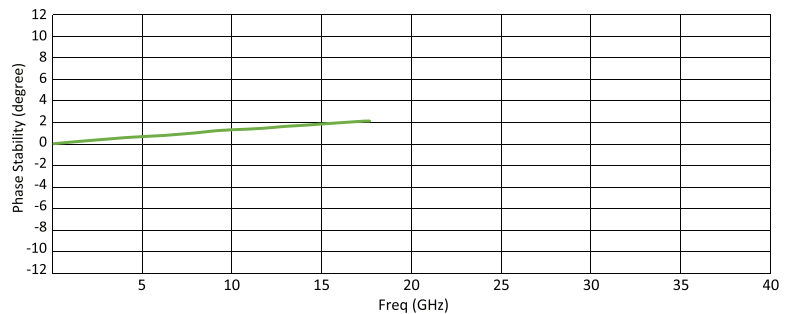
*Exemplary data for
TV-292*



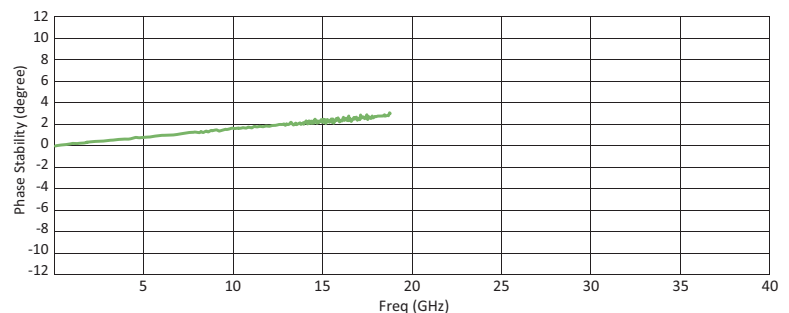
*Exemplary data for
TV-SMA*



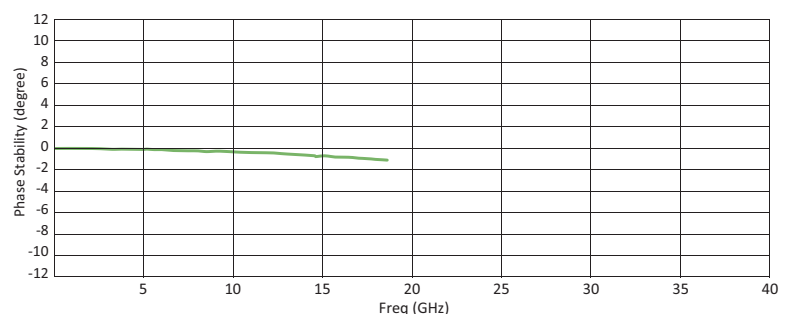
*Exemplary data for
TV-TNCA*



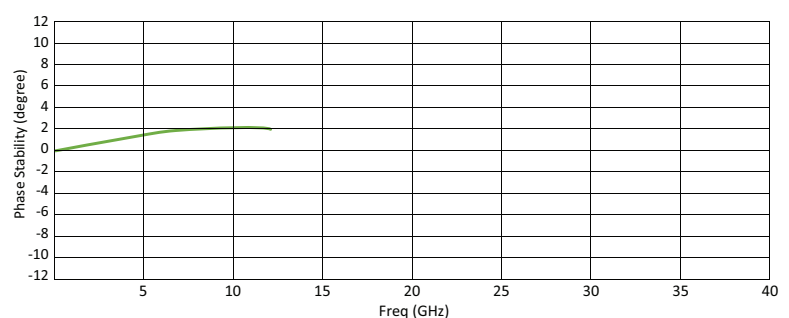
*Exemplary data for
TV-N-LL*



*Exemplary data for
TV-SMA-LL*



*Exemplary data for
TV-TNC-LL*



Ordering Instructions for
StabilityTVAC™ Cable Assemblies



CC	GG	LL	Optional
292 (2.92mm) SMA TNCA	MM (Male to Male) MF (Male to Female) FF (Female to Female)	Custom length	LP (Low Profile)

EXAMPLE:

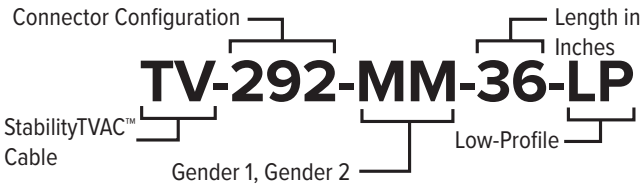
The following is a StabilityTVAC™ cable assembly with SMA male connectors on both ends, and 36 inches overall length.

Configuration Sample



EXAMPLE:

The following is a low-profile StabilityTVAC™ cable assembly with 2.92mm male connectors on both ends, and 36 inches overall length.



Ordering Instructions for Low-Loss
StabilityTVAC™ Cable Assemblies



CC	GG	LL	LL	Optional
N (Type N) SMA TNC	MM (Male to Male) MF (Male to Female) FF (Female to Female)	Custom length	Low-loss	LP (Low Profile)

EXAMPLE:

The following is a low-loss StabilityTVAC™ cable assembly with SMA male connectors on both ends, and 36 inches overall length.

Configuration Sample



EXAMPLE:

The following is a low-loss low-profile StabilityTVAC™ cable assembly with Type N male connectors on both ends, and 36 inches overall length.

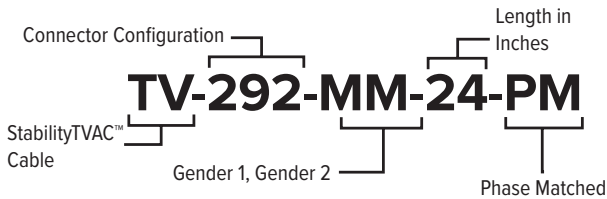


StabilityTVAC™ Cable Assemblies — Phase Matched

StabilityTVAC™ Phase-Matched Cable Assemblies have been designed for applications where strict phase equality between multiple paths are required. StabilityTVAC™ PM Cable Assemblies are matched within $\pm 0.5^\circ/\text{GHz}$ and available as sets of two or more assemblies. StabilityTVAC™ PM Cable Assemblies are offered in standard, low-profile and low-loss formats and maintain the mechanical and electrical characteristics of the original assembly. Phase-matched assemblies are available with 2.92mm, SMA, Type N, TNCA and TNC connectors and in all lengths.

Example:

To specify a StabilityTVAC™ Phase-Matched Cable Assembly set, add "PM" at the end of the TV model number, as shown in the example below. "PM" indicates standard configuration Phase-Matched sets.

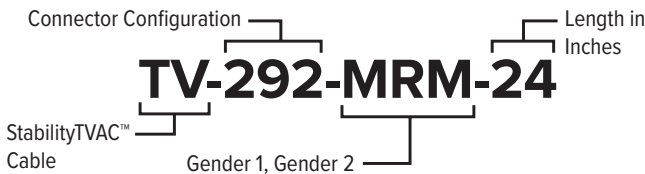


StabilityTVAC™ Cable Assemblies — Swept Right-Angle

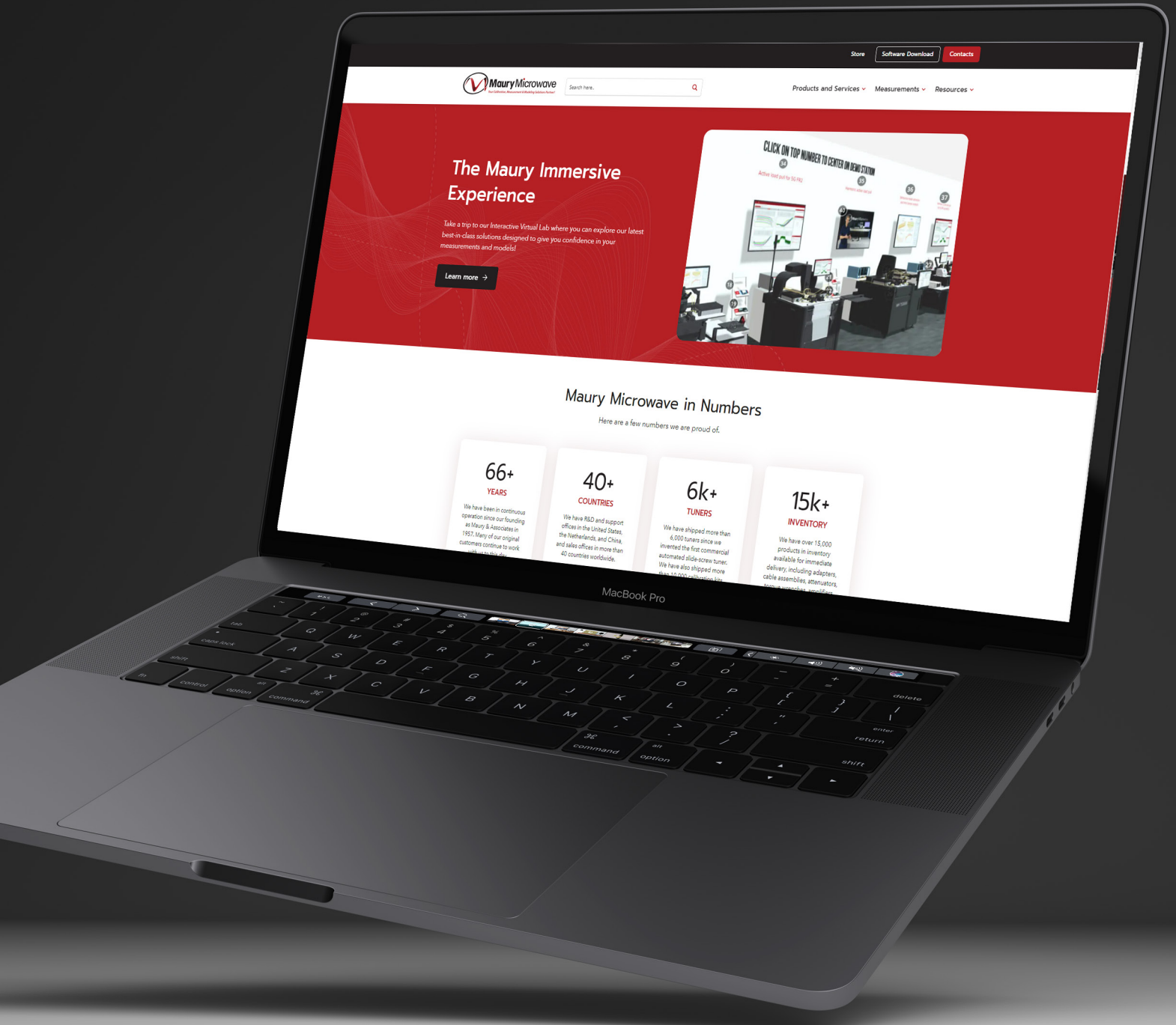
StabilityTVAC™ Cable Assemblies with swept right-angle connectors are designed for applications requiring a fixed and stable bend where traditional cable assemblies may be inconvenient. With a bend radius of 0.5 inches and a cable-to-connector length of 2 inches, right-angle connectors allow StabilityTVAC™ Cable Assemblies to retain the electrical and mechanical specifications of the traditional assembly while removing stresses related to hand-formed bends. StabilityTVAC™ assemblies with swept right-angle connectors are built on demand and are available with 2.92mm, SMA, Type N, TNCA and TNC connectors and in all lengths.

Example:

The following is a StabilityTVAC™ cable assembly with one 2.92mm male connector and one 2.92mm male swept right-angle connector, and 24 inches overall length.



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