Test Port Cable Assemblies

DATA SHEET / 2Z-002

StabilityVNA™
Maury Microwave

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// DECEMBER 2021

Test Port Cable Assemblies

Features and Benefits

- > Industry's best phase stability with flexure improves measurement accuracy and ensures repeatable and reliable measurements
- > Superior flexibility and anti-skid band ensures the cables can be arbitrarily positioned with no spring-back or stress on DUT
- > Increased crush resistance and flex cycles enhances longevity and can lead to years of uninterrupted use
- > Color-coded connectors reduce potential for connection mistakes
- > The best amplitude and phase stability reduces measurement uncertainty and increases confidence in measurements
- > Standard lengths and connector configurations in stock; custom lengths and configurations available

Available Models - Cable Assemblies

Connector	Model Number	Connector Type 1	Connector Type 2	Cable Length		Frequency Range (GHz)
				Inches	CM	
1.85mm	SV-185-FM-25	NMD 1.85mm - Female	NMD 1.85mm - Male	25	63.5	DC - 67
	SV-185-FF-25		1.85mm - Female			
	SV-185-FM-38		NMD 1.85mm - Male	38	96.5	
	SV-185-FF-38		1.85mm - Female			
	SV-185-FM-48		NMD 1.85mm - Male	48	121.9	
	SV-185-FF-48		1.85mm - Female			
2.4mm	SV-24-FM-25	NMD 2.4mm - Female	NMD 2.4mm - Male	25	63.5	DC - 50
	SV-24-FF-25		2.4mm - Female			
	SV-24-FM-38		NMD 2.4mm - Male	38	96.5	
	SV-24-FF-38		2.4mm - Female			
	SV-24-FM-48		NMD 2.4mm - Male	48	121.9	
	SV-24-FF-48		2.4mm - Female			
2.92mm	SV-292-FM-25	NMD 2.92mm - Female	NMD 2.92mm - Male	25	63.5	DC - 40
	SV-292-FF-25		2.92mm - Female			
	SV-292-FM-38		NMD 2.92mm - Male	38	96.5	
	SV-292-FF-38		2.92mm - Female			
	SV-292-FM-48		NMD 2.92mm - Male	48	121.9	
	SV-292-FF-48		2.92mm - Female			
2.4mm to 2.92mm	SV-24292-FM-25	NMD 2.4mm - Female	NMD 2.92mm - Male	25	63.5	DC - 40
	SV-24292-FF-25		2.92mm - Female			
	SV-24292-FM-38		NMD 2.92mm - Male	38	96.5	
	SV-24292-FF-38		2.92mm - Female			
	SV-24292-FM-48		NMD 2.92mm - Male	48	121.9	
	SV-24292-FF-48		2.92mm - Female			
3.5mm	SV-35-FM-25	NMD 3.5mm - Female	NMD 3.5mm - Male	25	63.5	DC - 26.5
	SV-35-FF-25		3.5mm - Female			
	SV-35-FM-38		NMD 3.5mm - Male	38	96.5	
	SV-35-FF-38		3.5mm - Female			
	SV-35-FM-48		NMD 3.5mm - Male	48	121.9	
	SV-35-FF-48		3.5mm - Female			

Stability Specifications

StabilityVNA™ Cable Type	Frequency	Length	Typical Phase Stability with Flexure	Typical Amplitude Stability with Flexure
SV-185	67 GHz	25"	±4.0°	±0.05 dB
		38"	±5.0°	±0.07 dB
SV-24	50 GHz	25"	±2.0°	±0.02 dB
		38"	±4.0°	±0.03 dB
SV-292	40 GHz	25"	±2.0°	±0.02 dB
		38"	±3.0°	
SV-35	26.5 GHz	25"	±2.0°	±0.02 dB
		38"		

Electrical Specifications

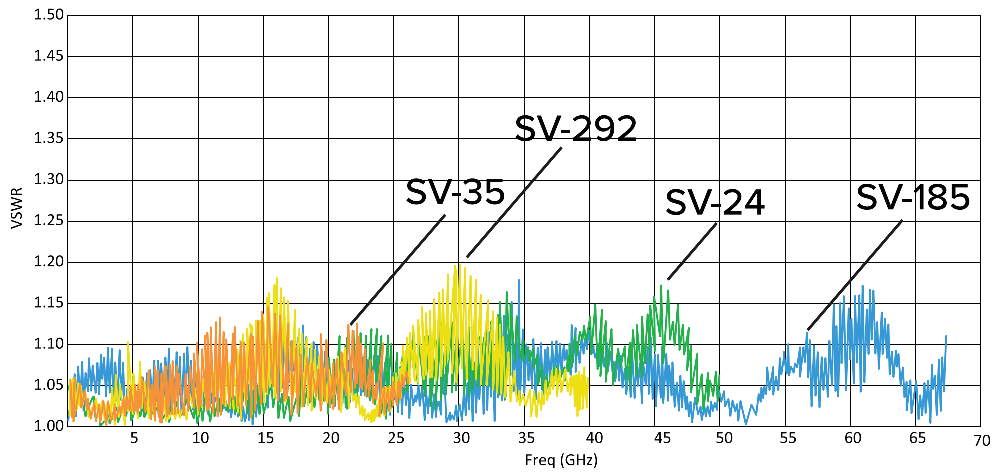
StabilityVNA™ Cable Type	SV-185			SV-24			SV-292 and SV-24292			SV-35		
Maximum Frequency	67 GHz			50 GHz			40 GHz			26.5 GHz		
Typical Insertion Loss (cable only)	1.79 dB/ft			1.00 dB/ft			0.89 dB/ft			0.72 dB/ft		
VSWR (typical)	1.35:1			1.25:1			1.25:1			1.18:1		
VSWR (maximum)	1.40:1			1.35:1			1.32:1			1.25:1		
Cable Length (in)	25	38	48	25	38	48	25	38	48	25	38	48
Typical Insertion Loss (dB)	4.36	6.35	7.88	2.70	3.79	4.62	2.41	3.37	4.11	1.95	2.73	3.32
Max Insertion Loss (dB)	4.69	6.68	8.21	2.98	4.07	4.90	2.66	3.62	4.37	2.16	2.93	3.53
Typical Phase Stability (degree)	4.0	5.0	7.0	2.0	4.0		2.0	3.0		2.0		3.0
Max Phase Stability (degree)	7.0	9.0		3.5	8.0		3.0	6.0		2.7	5.5	
Typical Amplitude Stability (dB)	0.05	0.07		0.02	0.03		0.02		0.03	0.02		0.03
Max Amplitude Stability (dB)	0.15	0.20		0.08	0.10	0.13	0.08	0.10		0.08	0.10	
Impedance (nominal)	50 ohm											
Velocity of Propogation	74% (nominal)											
Shielding Effectiveness	>100 dB (DC - 18 GHz)											
Time Delay (nominal)	1.34 ns/ft (4.5 ns/m)											

Mechanical Specifications

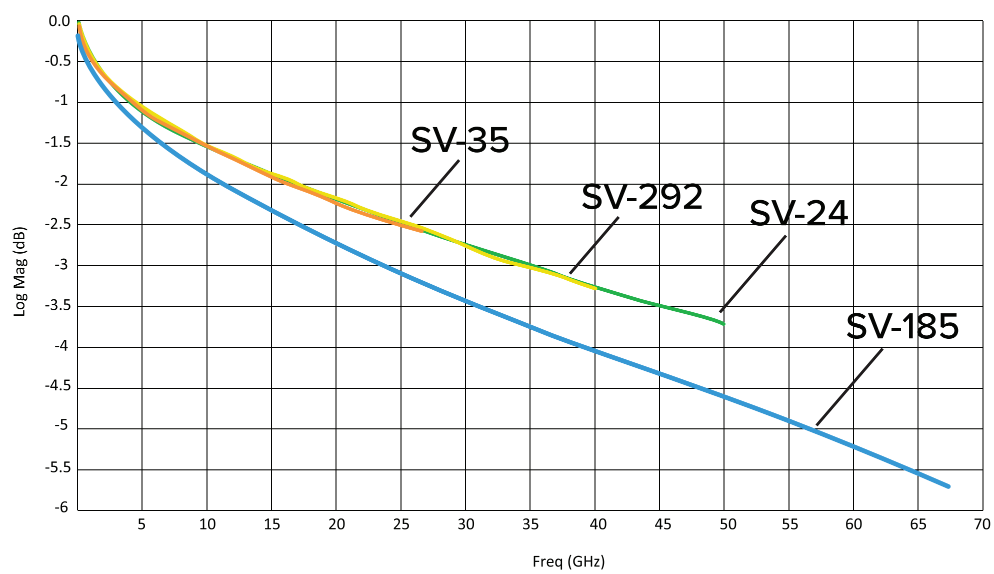
StabilityVNA™ Cable Type	SV-185			SV-24			SV-292 and SV-24292			SV-35		
Cable Outer Diameter (nominal)	0.6 in (15.1mm)											
Cable Length (in)	25	38	48	25	38	48	25	38	48	25	38	48
Nominal Weight	11.1 oz/ft (315g/m)	13.6 oz/ft (385g/m)	16.1 oz/ft (455g/m)	11.1 oz/ft (315g/m)	13.6 oz/ft (385g/m)	16.1 oz/ft (455g/m)	11.1 oz/ft (315g/m)	13.6 oz/ft (385g/m)	16.1 oz/ft (455g/m)	11.1 oz/ft (315g/m)	13.6 oz/ft (385g/m)	16.1 oz/ft (455g/m)
Flex Life Cycles (typical)	>50,000											
Min. Bend Radius	2.00 in (50mm)											
Crush Resistance	>839 lbsf/in (150 kgf/cm)											
Operating Temperature Range	64.4°F to 82.4°F (18°C to 28°C)											

Maury StabilityVNA™ Cable Assembly Typical Performance

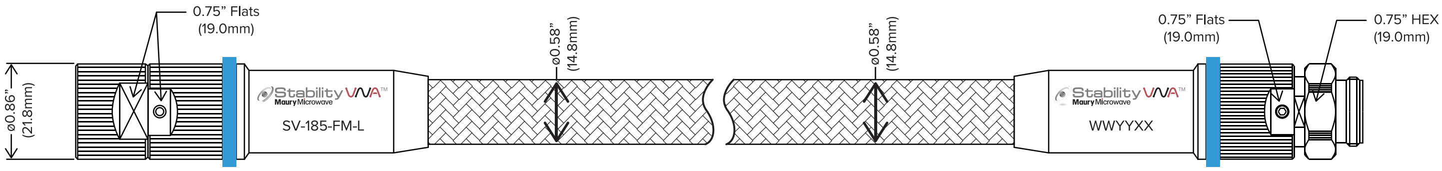
Maury StabilityVNA™ 38" Cable Assembly Typical VSWR

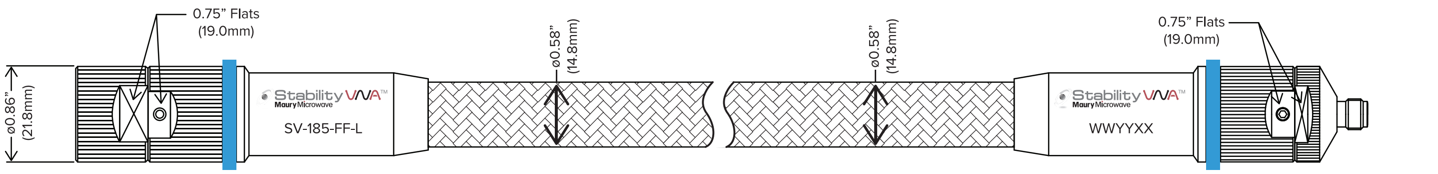


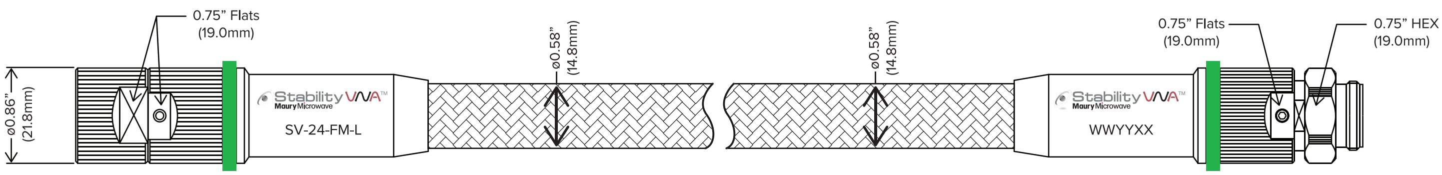
Maury StabilityVNA™ 38" Cable Assembly Typical Insertion Loss

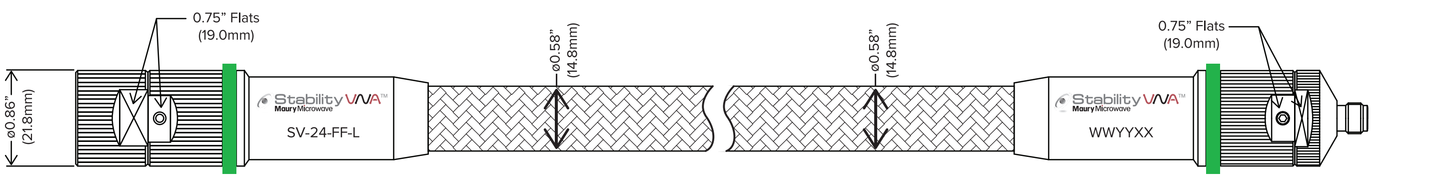


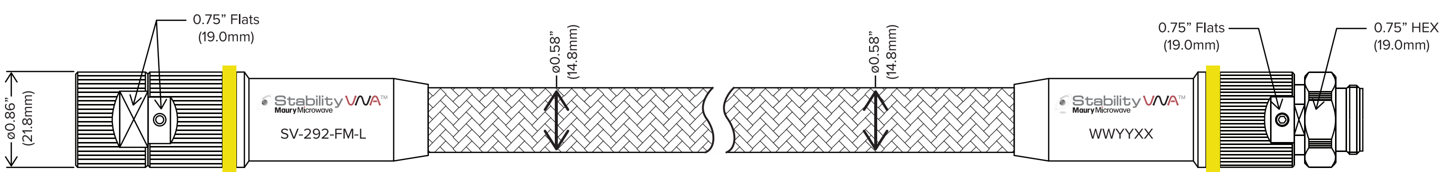
StabilityPlus™ Dimensions

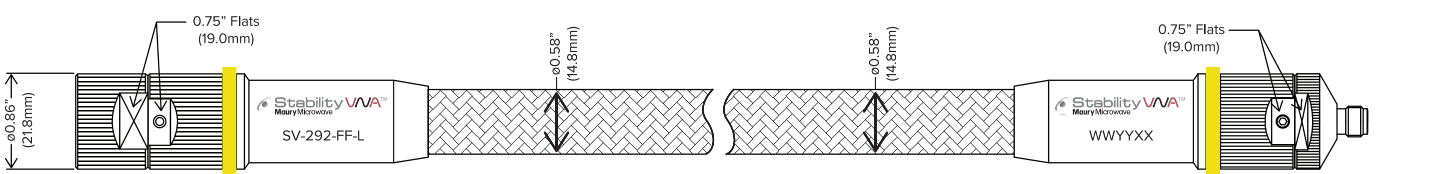


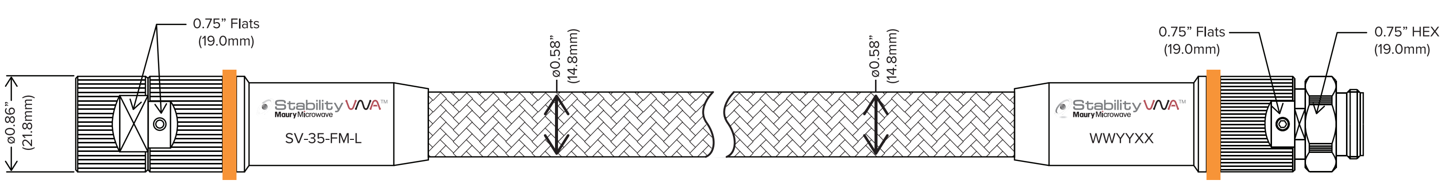


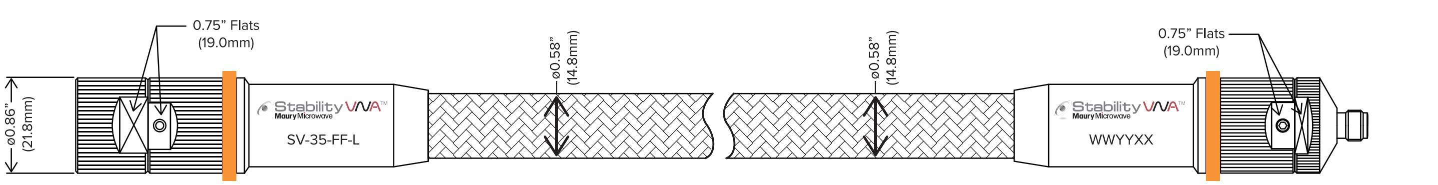












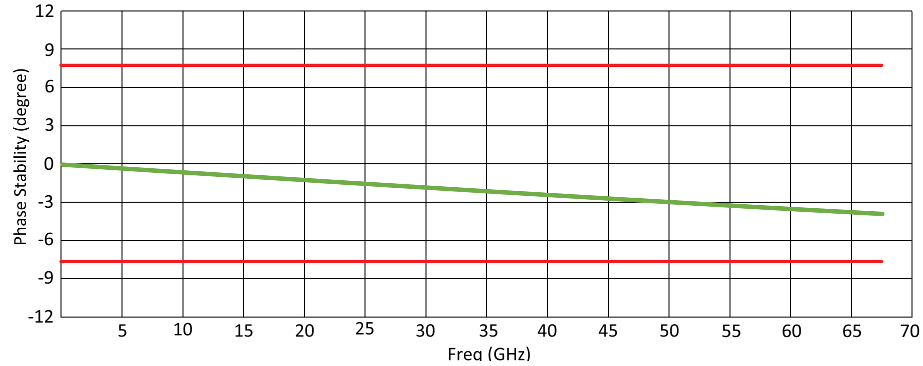
Phase Stability

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 180° 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 180° 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.

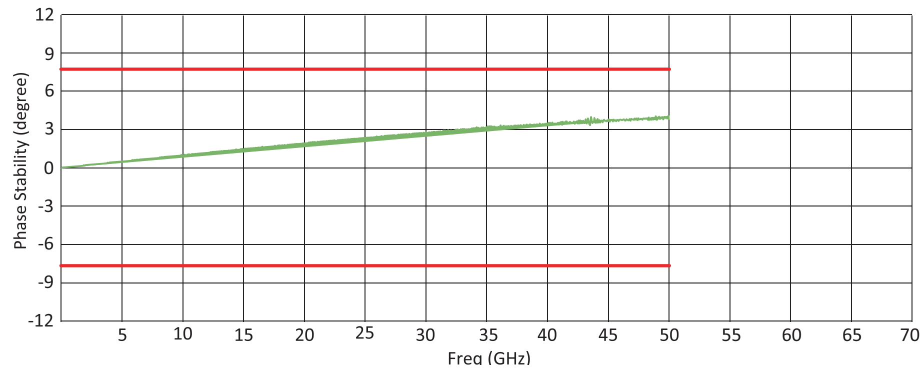
The plots on the right show the recorded worst-case phase variation.

Spec — Typical Phase Variation

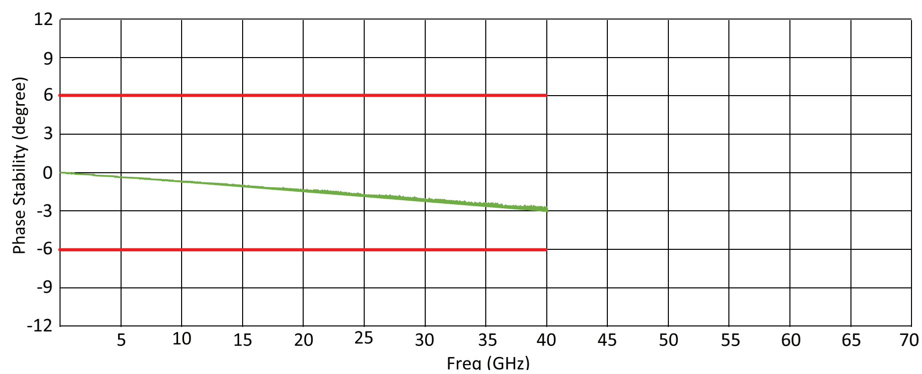
Exemplary data for SV-185-FM-38



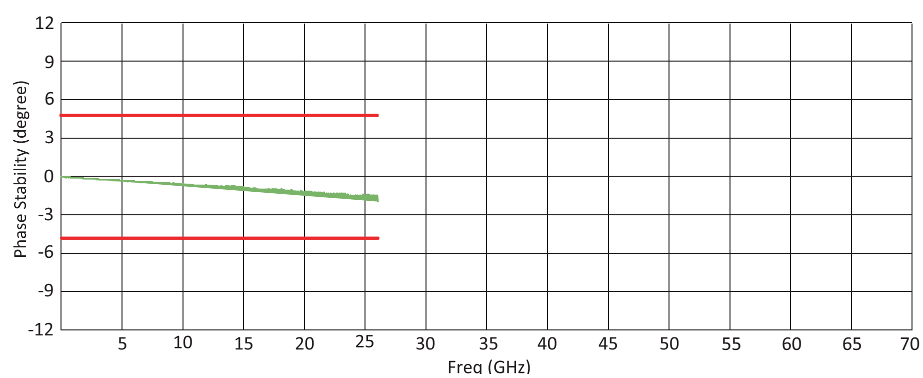
Exemplary data for SV-24-FM-38



Exemplary data for SV-292-FM-38



Exemplary data for SV-35-FM-38



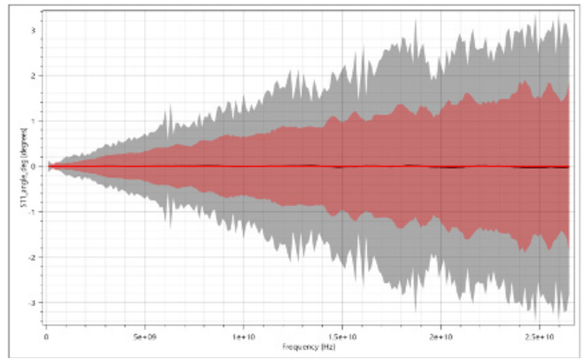
S-parameter measurements with uncertainty

A cable's *phase stability with flexure* specification is a metric used to communicate the impact of cable movement on a DUT measurement. It implies that lower specifications lessen the impact on the measurement (i.e. a cable with a 2° phase stability with flexure specification will have a lesser impact on a measurement than a cable with a 5° phase stability). However, the methods used to determine this specification may not be consistent across manufacturers, and likely do not represent the actual cable movement range of a user.

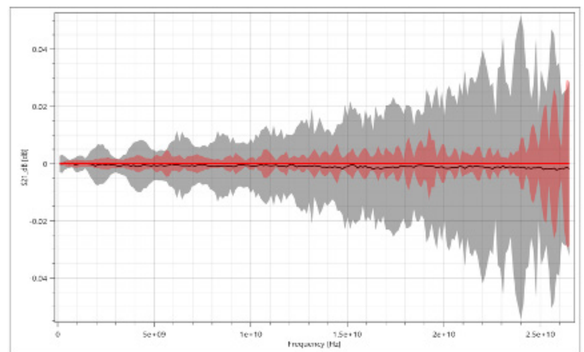
A better metric to understand a cable's impact on a DUT measurement is "uncertainty contribution". The cable's impact on measurement uncertainty can be calculated by moving the cable through a user's actual range of motion and recording the S-parameters across the movement. This technique has been thoroughly documented by the European Association of National Metrology Institutes (EURAMET)* and has been made commercially available in Maury's Insight^{TM}** calibration and measurement software platform.

The plots on the right show typical S-parameter measurements with uncertainty boundaries on different types of DUTs. The boundaries shown only consider the cable's direct contribution on measurement uncertainty.

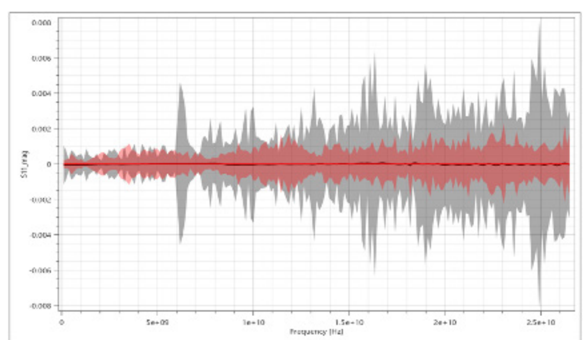
** https://www.maurymw.com/pdf/I-CAL-GUI-012.pdf*
*** https://www.maurymw.com/Precision/Insight_Software.php*



S11_phase measured on a short circuit termination SV-35-FM-38 shown in red; leading global competitor shown in grey



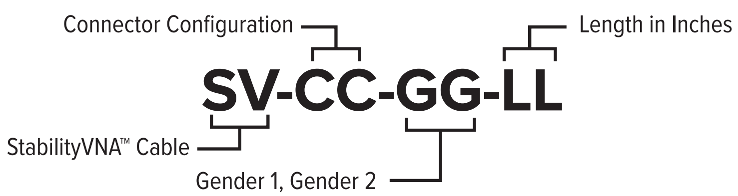
S21_mag measured on a short circuit termination SV-35-FM-38 shown in red; leading global competitor shown in grey



S11_mag measured on a short circuit termination SV-35-FM-38 shown in red; leading global competitor shown in grey

Ordering Instructions for StabilityVNA™ Cable Assemblies

Standard StabilityVNA™ Cable Assemblies



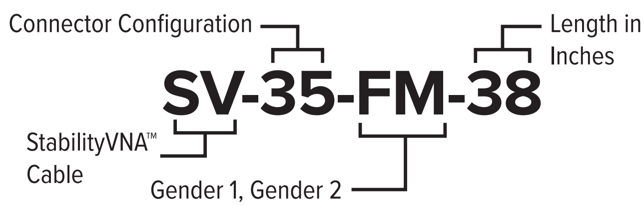
CC	GG	LL (Standard Lengths)
35 (3.5mm) 292 (2.92mm) 24 (2.4mm) 185 (1.85mm)	FM (NMD Female to NMD Male) FF (NMD Female to Standard Female)	25 38 48

NOTE: Custom lengths and configurations available

EXAMPLE:

The following is a StabilityVNA™ cable assembly with 3.5mm NMD Female to NMD Male connectors, and 38 inches overall length.

Configuration Sample



EXAMPLE:

The following is a StabilityVNA™ cable assembly with 2.4mm NMD Female connector on one end and 2.92mm NMD Male connector on the other end, and 38 inches overall length.

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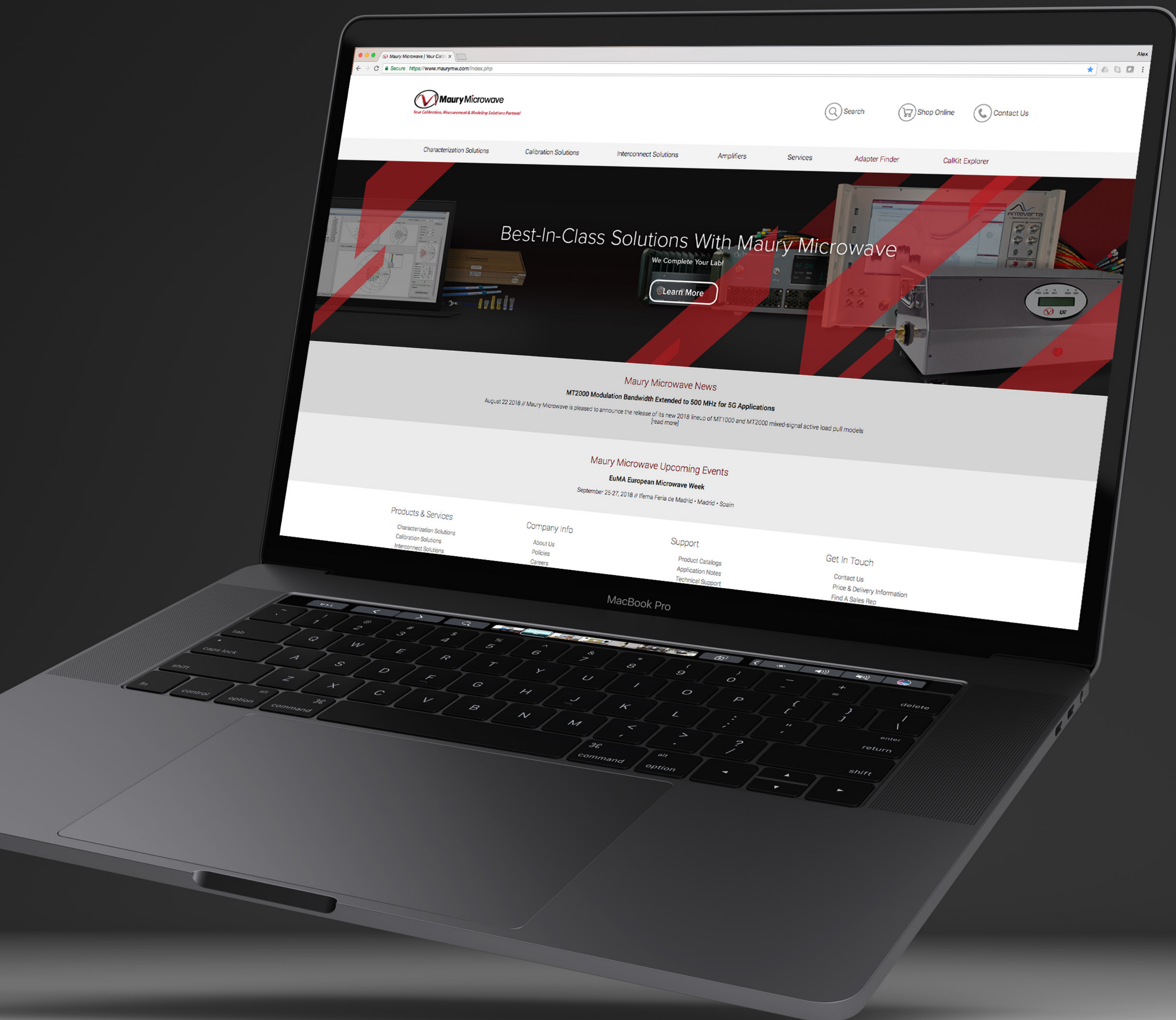
OUR PRODUCTS



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Maury Microwave is AS9100D & ISO 9001:2015 Certified.

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