PhaseRel

Armored Bench Test Cable Assemblies

Better Value for RF & Microwave Components

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RF ONE

PhaseRel Armored Bench Test Cable Assemblies to 110 GHz

PhaseRel (armored PL series) from RF ONE features excellent phase and amplitude stability with flexure. The internally ruggedized construction ensures reliable performance with longer service life and reduced total cost in laboratory, production and field tests.

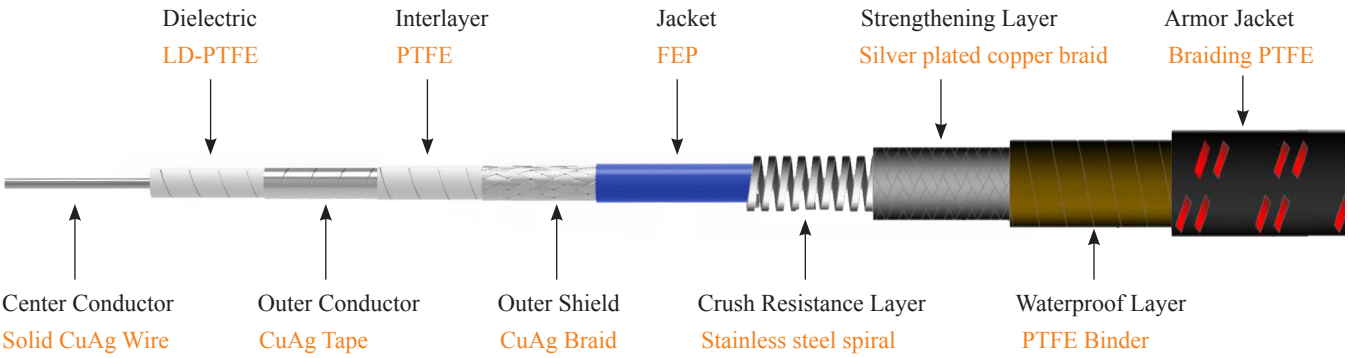
Benefits of PhaseRel Cables

- Excellent phase and amplitude stability with flexure and temperature
- Precise and repeatable measurements
- Highly flexible and longer flex life
- Operating to 110GHz, 67GHz, 50GHz, 40GHz, 26.5GHz, 18GHz etc.
- Specially designed connectors, delivering minimizing VSWR
- Strain relief design and multi-layer armors against crush and abrasion
- Dust and moisture proof

Typical Applications

- Test cables for VNA and RF/Microwave instruments
- Bench-top, RF production testing
- Wafer probing
- Automatic test equipment systems

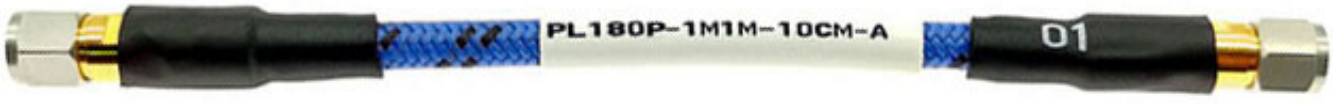
Cable Construction



Standard Cable Assembly Specifications

Part Number	PL180P-1M1M-L-A	PL230P-185M185M-L-A	PL360P-24M24M-L-A	PL380P-292M292M-L-A	PL520P-35M35M-L-A	PL520P-SMAMSMAM-L-A	PL520P-NMNM-L-A
Maximum Frequency	110 GHz	67 GHz	50 GHz	40 GHz	26.5 GHz	26.5 GHz	18 GHz
VSWR Max	1.45	1.4	1.35	1.3	1.3	1.3	1.25
Insertion Loss Max	14.4 dB	7.1 dB	4.0 dB	2.8 dB	1.7 dB	1.7 dB	1.5 dB
Impedance	50 Ohm						
Phase Stability	<±12°	<±7°	<±5°	<±5°	<±5°	<±5°	<±5°
Amplitude Stability vs Shaking	<±0.2 dB	<±0.15 dB	<±0.15 dB	<±0.15 dB	<±0.1 dB	<±0.1 dB	<±0.1 dB
Temperature Phase Stability (-40℃ to +85℃)	<1500ppm	<1500ppm	<1300ppm	<680ppm	<550ppm	<550ppm	<550ppm
Velocity of Propagation	82%	74%	76%	82%	83%	83%	83%
Shielding Effectiveness	>100 dB (DC-18 GHz)						
Min.Bending Radius Static	20mm	32mm	32mm	32mm	39mm	39mm	39mm
Min. Bending Radius Repeated	40mm	64mm	64mm	64mm	78mm	78mm	78mm
Overall Diameter	3.8 mm	6.4 mm	6.4 mm	6.4 mm	7.8 mm	7.8 mm	7.8 mm
Flex Life	>20000 cycles						
Crush Resistance	>1000 N/cm						
Temperature range	-50℃ to +85℃						

1. Insertion loss refers to the loss of 1 meter cable assembly at its max operating frequency.
2. L in the Part Number refers to the length of cable assembly, custom lengths and other connectors available.
3. Phase stability data is based on one meter cable assembly wrapped 360 degree at its dynamic bend radius, with two straight connectors at max frequency.



Max Insertion Loss (dB/meter)

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

Freq (GHz)	PL180P-1M1M-L-A	PL230P-185M185M-L-A	PL360P-24M24M-L-A	PL380P-292M292M-L-A	PL520P-35M35M-L-A	PL520P-SMAMSMAM-L-A	PL520P-NMNM-L-A
1	1.1	0.63	0.44	0.32	0.23	0.23	0.23
2	1.6	0.90	0.62	0.46	0.33	0.33	0.33
4	2.3	1.29	0.88	0.65	0.47	0.47	0.47
6	2.8	1.60	1.09	0.80	0.57	0.57	0.57
8	3.3	1.86	1.26	0.93	0.67	0.67	0.67
12	4.0	2.31	1.55	1.15	0.82	0.82	0.82
18	5.0	2.88	1.92	1.43	1.02	1.02	1.02
26.5	6.1	3.56	2.35	1.76	1.25	1.25	-
40	7.6	4.48	2.92	2.20	-	-	-
50	8.6	5.09	3.28	-	-	-	-
67	10.0	6.02	-	-	-	-	-
90	11.8	-	-	-	-	-	-
110	13.1	-	-	-	-	-	-

Average Power Handling (Watts)

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

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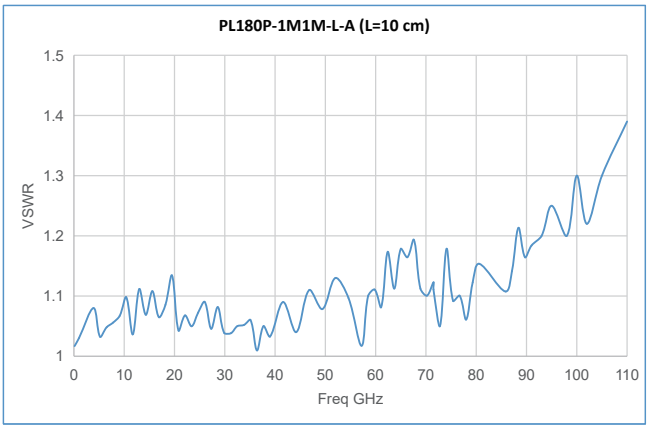
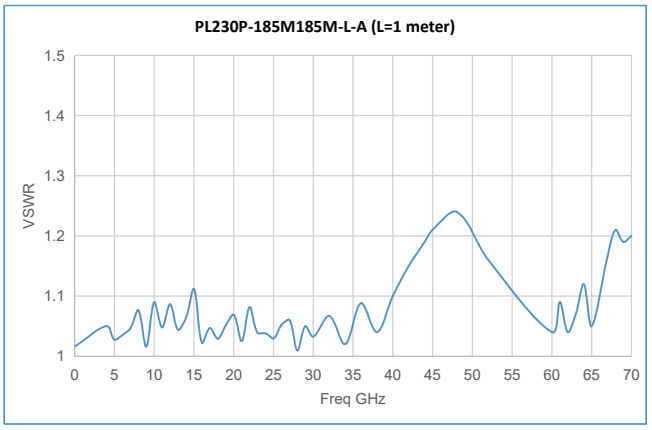
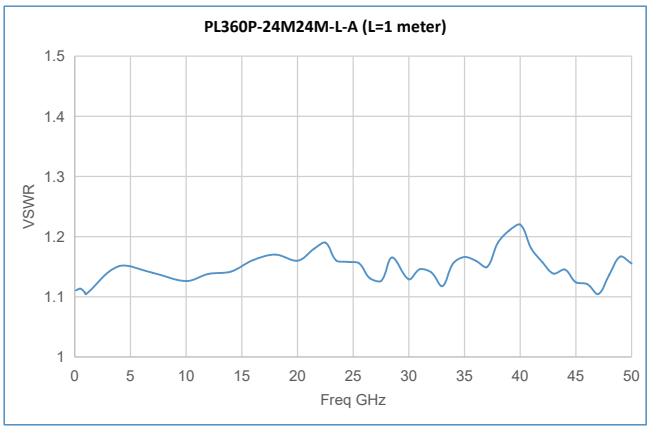
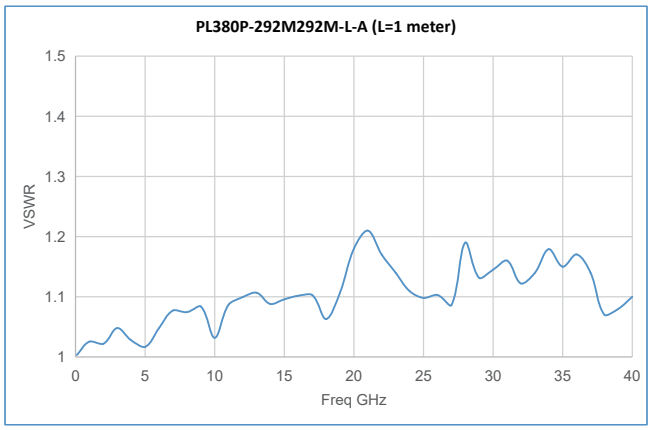
1	33	271	409	511	875	875	875
2	24	190	288	359	615	615	615
4	19	132	202	251	431	431	431
6	14	107	165	203	350	350	350
8	12	92	142	175	302	302	302
12	10	74	115	141	244	244	244
18	8	59	93	114	197	197	197
26.5	6	48	76	93	160	160	-
40	5	38	61	74	-	-	-
50	5	34	55	-	-	-	-
67	4	29	-	-	-	-	-
90	3	-	-	-	-	-	-
110	3	-	-	-	-	-	-

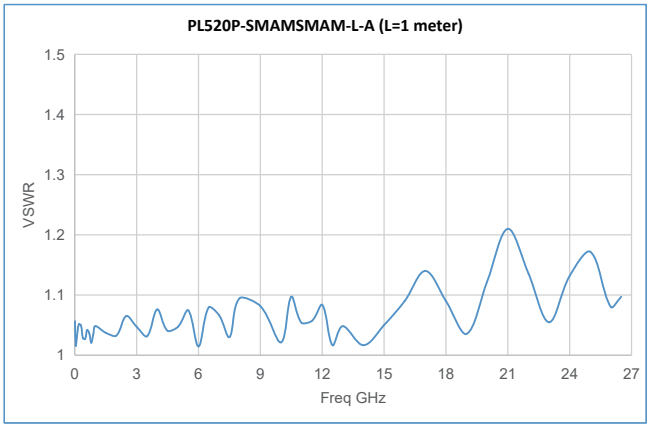
PhaseRel Cable Assembly Typical VSWR

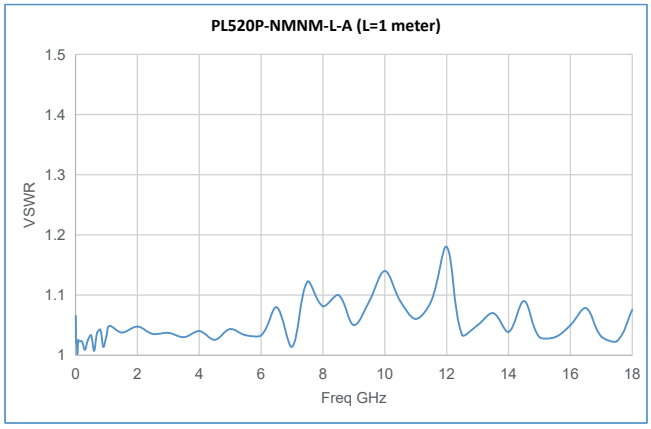












Phase Stability Test with Flexure

Phase stability vs. flexure is a measure of the phase change as a result of cable flexing. The phase stability can be affected by the following factors:

- Cable material and construction
- Assembly technique
- Cable bend radius and bend angle
- The number of flexures

RF ONE performs the test of Phase Stability of Cable Assembly in below procedures.

1. Initial Test

1) Connect the two ports of cable under test(CUT) with VNA, the cable is held in an initial unwrapped position and is measured in the phase and attenuation.

2) Normalize VNA in the phase.

2. Test with cable wrapped 360 degree clockwise

1)Disconnect the CUT cable and wrap it 360 degree clockwise around a mandrel(diameter is ten times of cable outer diameter).

2) The CUT cable is held in such position for measurement, record the max phase and attenuation change over frequency range.

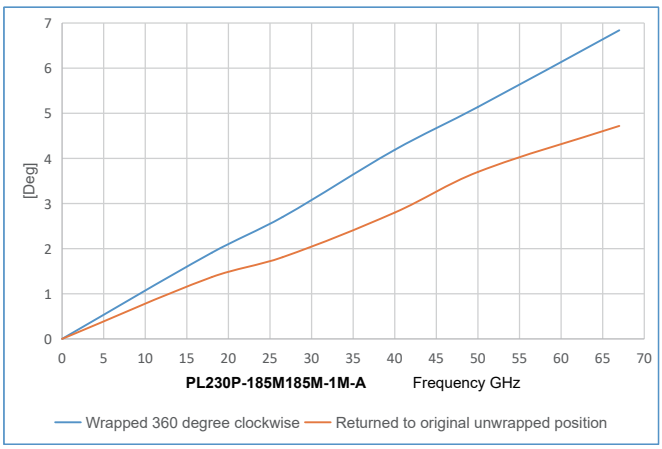
3. Test with cable returned to original unwrapped position

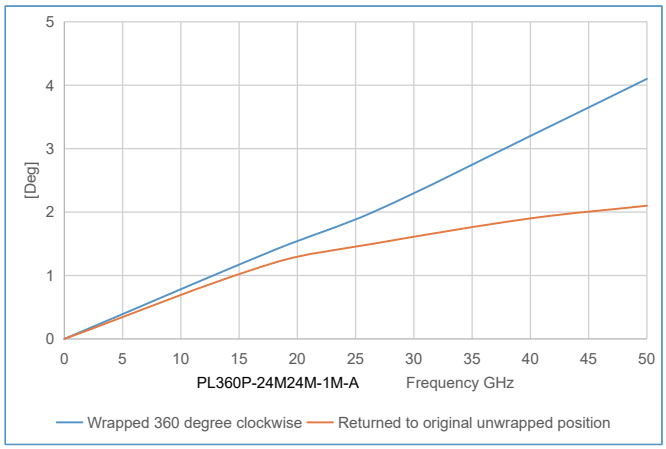
1) Disconnect the CUT cable and return it to its original unwrapped position.

2) The CUT cable is held in such position for measurement, record the max phase change.

3) The worst-case phase variation in the above procedure is recorded as the phase stability value.

Test Data on Phase Stability with Flexure





Note: Phase stability specs of other models can be found at Page 3.

Phase-Matched Cable Assembly Sets

Nowadays the microwave systems are in increased need for phase matched coaxial cable assemblies, with applications in Phased Array Radars, Multi-Beam Antenna Arrays, Multi-Channel Amplifiers and Environmental, Production or Lab Testing etc.

Normally two specifications are used for phase matched cables assemblies:

1. Time Delay Match

Measure the time delay of each cable assembly by VNA, mark the time delay data typically at the middle point of the frequency range.

For example, we provide a group of 10 pcs PhaseRel PL230P-185M185M-1M-A cable assembly matched as DC-67GHz, time delay +/-2 ps.

2. Electrical Length Match in Degrees at a Specified Frequency

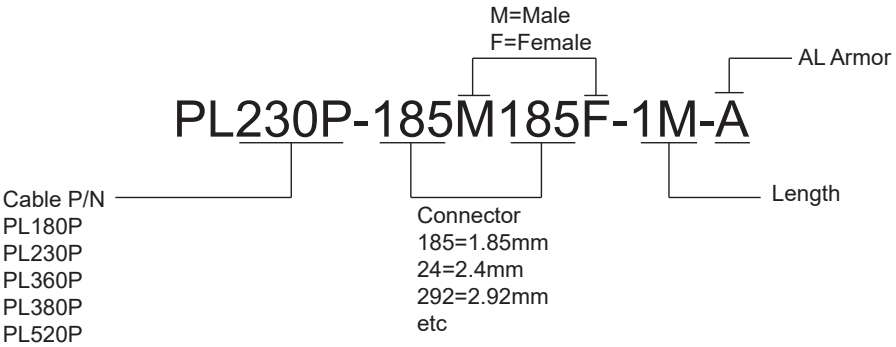
Measure the phase of each cable assembly by VNA across the required frequency range.

For example, a set of 4 pcs PhaseRel PL520P-SMAMSMAM-1M-A cable assembly matched as DC-26.5GHz, +/-5 degree.

When phase or delay matched cable assemblies are needed, please specify the below requirements, Our sales engineer will make recommendation accordingly.

1) Frequency of operation
2) Required phase match or delay match in ± ps or in ± degree@ x GHz
3) Quantity of cable assemblies in one set which are to be matched
4) Length of cable assemblies
5) Connectors of the assemblies in one set or pair

How to Order PhaseRel



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