The next generation PT test cables

Anoison wants to change the perception that top-quality test cables are always expensive. The Anoison PT test cable is designed for maximum ruggedness using a high-quality raw cable, connector, and smart armoring module. Thus, Anoison offers top-grade test cables at a more reasonable cost.

A great test cable must be durable. While most test cables in the market perform well in pulling and crushing, they often get damaged due to frequent twisting and bending at the cable end. Anoison has addressed this issue, and the PT cable can withstand frequent twisting and bending over the long term.

A great test cable should maintain stable physical and electrical performance over the long term, even after being bent many times during its working life. The Anoison PT cable can easily undergo 20,000 bending tests; PT18 even passes an extreme test of 100,000 bending cycles (we called it the “snake test”) while maintaining stable insertion loss (IL).

A great test cable should be versatile. Many people follow the trend of using costly bulky VNA cables without questioning why. While ruggedness is essential, using such large VNA cables for indoor testing only makes sense in specific situations.

Through extensive testing, Anoison has proven that the compact-style PT cable can cover all indoor test applications without compromising durability, stability, and versatility. The bulk of traditional VNA (OD 24mm) cables often do not work in small distance/high-density test environments where the minimum port center to port center is as small as 9.2mm, while the PT test cables are a perfect fit.

PT cables contain variable series up to 110GHz: PT-N/ PT-35/ PT-29/ PT-24/ PT-18/ PT-13/ PT-10. Special miniNMD connectors, which maintain the same interface and ruggedness as traditional NMD but are more compact, are also available for PT cables.

PT cables up to 70GHz

Features & benefits

- Excellent flexing endurance (”Snake” bending) performance(20K min.)
- Excellent Bending-on-Cable-End(5K min.) ability.
- Super Twist Resistance(8in.lbs * 5K min. times), NO damage!
- miniNMD connectors are available (figure 1).
- IEEE colored codes are available.

Figure 1. Traditional NMD VNA cable vs miniNMD PT cable

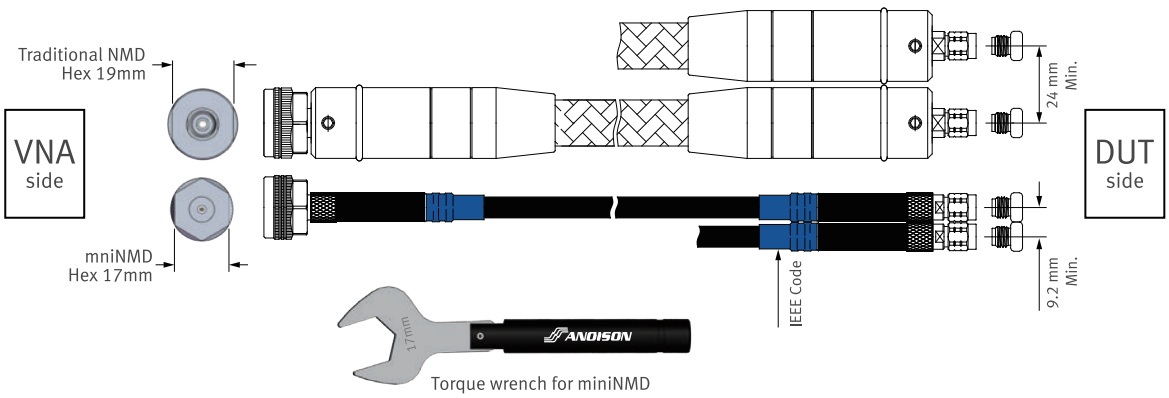


Table 1: Test Assembly Specifications Up to 70 GHz[1]

IEEE Color Code	Black	Orange	Yellow	Green	Blue
PT Series	PT-N	PT-35	PT-29	PT-24	PT-18
Connectors	N	3.5mm	2.92mm	2.4mm	1.85mm
Maximum Frequency(GHz)	18	26.5	40	50	70
Assembly length (inch/mm)	26/660.4	26/660.4	26/660.4	26/660.4	26/660.4
Typical VSWR	1.20	1.17	1.30	1.26	1.30
Typical Insertion Loss (dB)	1.4	1.6	2.25	2.5	4.3
Average power (W)	115	76	61	55	19
Impedance (Ohms)	50	50	50	50	50
Phase Stability(°) Typ./Max.[2]	±2.0/±4.0	±3.0/±4.5	±3.25/±4.95	±3.75/±6.0	±5.0/±9.5
Amplitude Stability(dB) Typ./Max.[2]	±0.04/±0.08	±0.05/±0.08	±0.05/±0.08	±0.04/±0.08	±0.05/±0.08
Center Conductor	Solid				
Maximum Outer Diameter	0.358 in. (9.1 mm)				
Nominal Weight	1.40 oz/ft (130 g/m)				
Minimun Bend Radius	1.26 in. (32 mm)				
Flex Life Cycles[3]	›20,000(“snake” bending) / ›5,000(cable end bending)				
Crush Resistance	›250 lb/in(44.6 kgf/cm)				
Temperature Range	-55°C to +125 °C				

1 The specifications in this table are based on a 26 in(660.4mm) assembly length and maximum frequency with straight connectors.

2 With a 90°, 57mm(2.25in) bend radius, after three 90° bends and return to straighten position.

3 “Snake bending test”: Whilst one connector was fixed, the other connector was moved back and forth in the direction of the cable axis. The moving speed is 110mm/S and movement amplitude is half the length, test assembly performs reliably through the stated flex cycles.
“Cable end bending”: When bent ± 90° on the cable end around a 25.4mm(1in.) radius mandrel, test assembly performs reliably through the stated flex cycles.

Figure 2. Assembly Typical Phase Stability(°)[1]

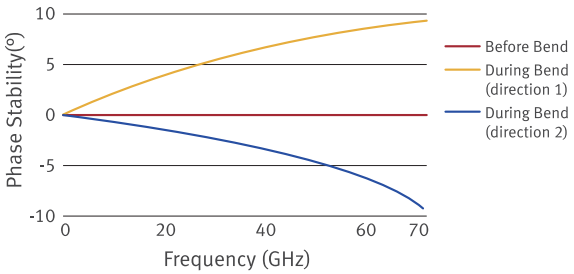
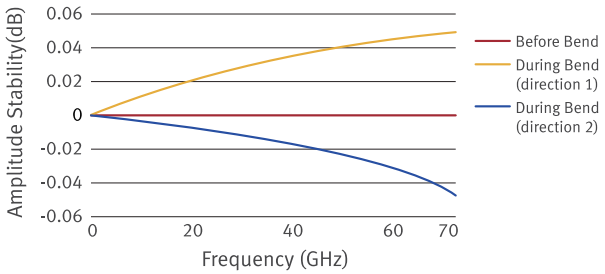


Figure 3. Assembly Typical Amplitude Stability(dB)[1]



1 The curves in above figures were based on PT-18M-18M-26 (with 1.85mm straight male connector in both side, assembly length 26inch/660.4mm). The cable was measured before bending and during bending in different directions, measurements were taken at 25°C in chamber.

■ Flexing endurance (”snake” bending) test

The cable assembly shall be placed on a horizontal table in an apparatus as figure 4.

Whilst one connector (A) was fixed, the other connector was moved back and forth in the direction of the cable axis, B—C—B, recorded as one cycle. The moving speed is 110mm/S and movement amplitude is half the length.

VSWR and IL(dB) were measured respectively at initial, 5000 cycle, 10000 cycle and 20000 cycle. See figure 5.

Figure 4. Flexing endurance (”snake” bending) test

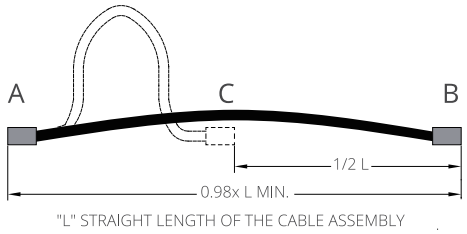
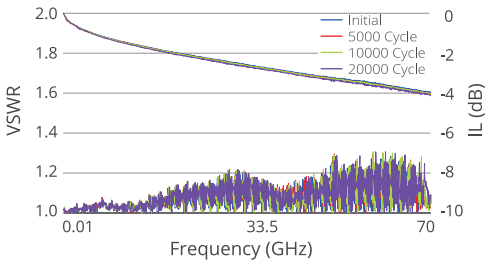


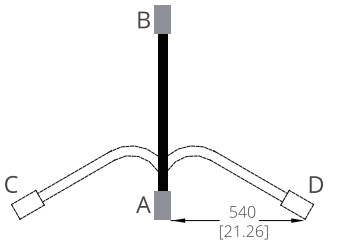
Figure 5. Flexing endurance test curve (70 GHz)



Cable end bending test

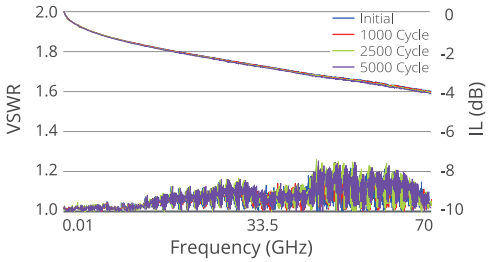
The connector on one end (A) was fixed in place, whilst the cable was bending at this connector end as figure 6.
The connector on the other end (B) was moved in the sequence: B— C— B— D— B, recorded as one cycle.
VSWR and IL(dB) were measured respectively at initial, 1000 cycle, 2500 cycle and 5000 cycle. See figure 7.

Figure 6. Cable end bending test



Bending ±90˚ around a 25.4mm (1 in.) radius mandrel

Figure 7. Cable end bending test curve (70 GHz)



Twist resistance test of PT cable 70 GHz

Anoison PT cable end side show a Super-Twist-Resistance, it could bear 5K times 8in. lbs twist torque force and never damage.

Figure 8. Twist Resistance Test

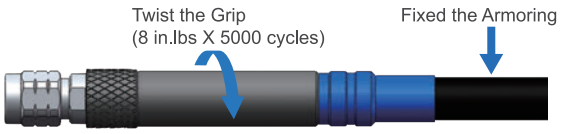
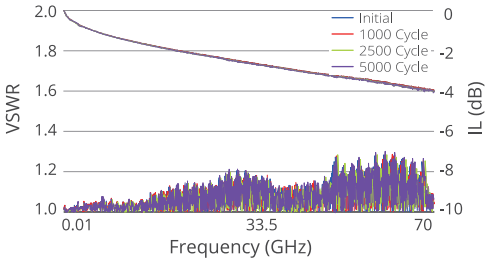


Figure 9. Twist resistance test curve (70 GHz)



PT cables 90GHz to 110GHz

Features & benefits

- Excellent flexing endurance (”Snake” bending) performance(10K min.)
- Excellent Bending-on-Cable-End(5K min.) ability.
- Super Twist Resistance(4in.lbs * 5K min. times), NO damage!
- Ruggedized 1mm female is available for 110GHz PT test cable (figure 10).
- IEEE colored codes are available.

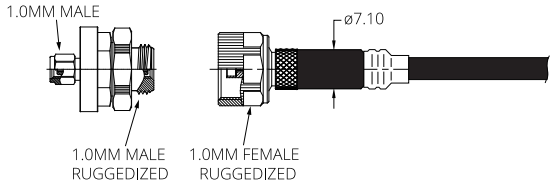


Figure 10. Ruggedized 1mm female for 110GHz PT test cable

Table 2: Test Assembly Specifications Up to 110 GHz [1]

IEEE Color Code	Gray	White
PT Series	PT-13	PT-10
Connector	1.35mm	1.0mm
Maximum Frequency(GHz)	90	110
Assembly length (inch/mm)	20/508	20/508
Typical VSWR	1.35	1.33
Typical Insertion Loss (dB)	7.8	9.5
Average power (W)	2	1
Impedance (Ohms)	50	50
Phase Stability(°) Typ./Max.[2]	±5.0/±6.5	±5.0/±6.5
Amplitude Stability(dB) Typ./Max.[2]	±0.05/±0.10	±0.05/±0.10
Center Conductor	Solid	
Maximum Outer Diameter	0.173 in. (4.4 mm)	
Nominal Weight	18.29g/ft (60g/m)	
Minimun Bend Radius	0.4 in. (10.2 mm)	
Flex Life Cycles[3]	›10,000("snake" bending) / ›5,000(cable end bending)	
Crush Resistance	›100 lb/in(17.7kgf/cm)	
Temperature Range	-55°C to +125 °C	

1 The specifications in this table are based on a 20 in(508mm) assembly length and maximum frequency with straight connectors.

2 With a 90°, 22.5mm bend radius, after three 90° bends and return to straighten position.

3 "Snake bending test": Whilst one connector was fixed, the other connector was moved back and forth in the direction of the cable axis. The moving speed is 78mm/S and movement amplitude is half the length, test assembly performs reliably through the stated flex cycles.
"Cable end bending": When bent ± 90° on the cable end around a 22.5mm radius mandrel, test assembly performs reliably through the stated flex cycles.

Figure 11. Assembly Typical Phase Stability(°) [1]

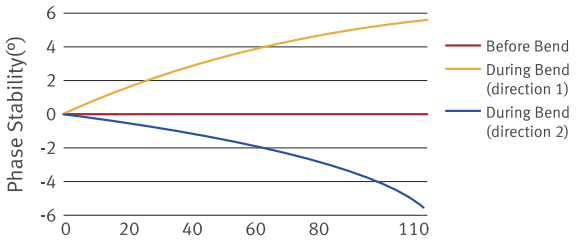
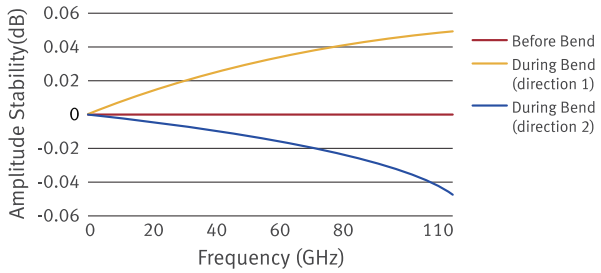


Figure 12. Assembly Typical Amplitude Stability(dB) [1]



1 The curves in above figures were based on PT-1M-1M-20 (with 1mm straight male connector in both side, assembly length 20inch/508mm). The cable was measured before bending and during bending in different directions, measurements were taken at 25°C in chamber.

■ Flexing endurance ("snake" bending) test

The cable assembly shall be placed on a horizontal table in an apparatus as figure 13.

Whilst one connector (A) was fixed, the other connector was moved back and forth in the direction of the cable axis, B—C—B, recorded as one cycle. The moving speed is 78mm/S and movement amplitude is half the length.

VSWR and IL(dB) were measured respectively at initial, 2500 cycle, 5000 cycle and 10000 cycle. See figure 14.

Figure 13. Flexing endurance (”snake” bending) test

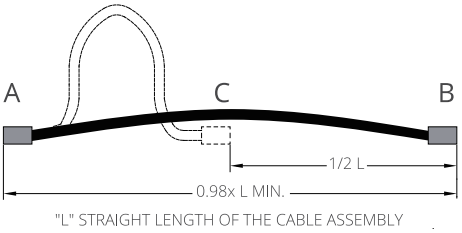
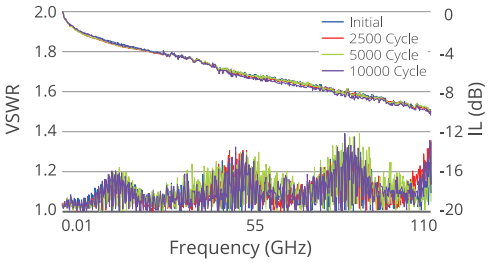


Figure 14. Flexing endurance test curve (110 GHz)



Cable end bending test

The connector on one end (A) was fixed in place, whilst the cable was bending at this connector end as figure 15.
The connector on the other end (B) was moved in the sequence: B— C— B— D— B, recorded as one cycle.
VSWR and IL(dB) were measured respectively at initial, 1000 cycle, 2500 cycle and 5000 cycle. See figure 16.

Figure 15. Cable end bending test

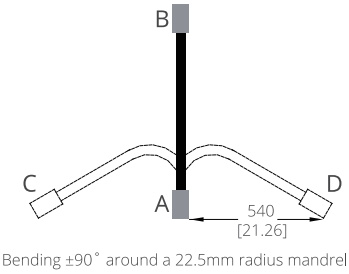
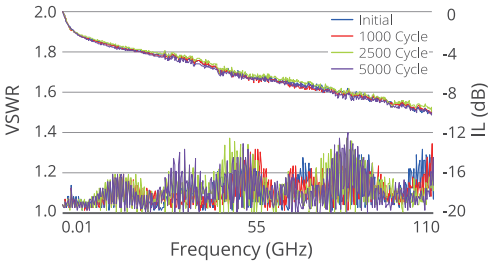


Figure 16. Cable end bending test curve (110 GHz)



Twist resistance test of PT cable 110 GHz

Anoison PT cable end side show a Super-Twist-Resistance, it could bear 5K times 4in. lbs twist torque force and never damage.

Figure 17. Twist Resistance Test of PT Cable (110 GHz)

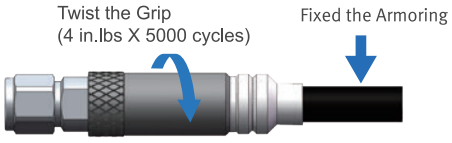
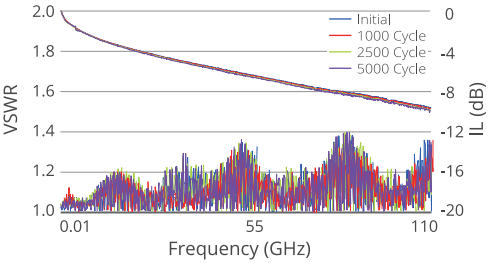


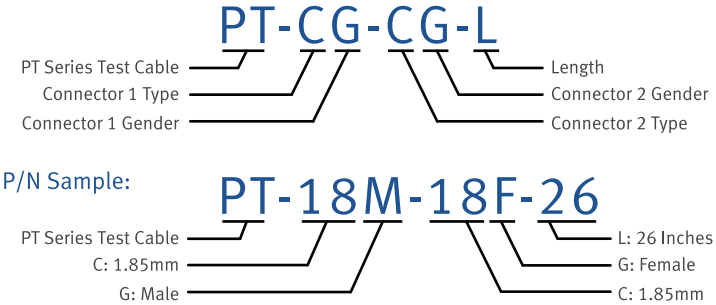
Figure 18. Twist resistance test curve (110 GHz)



Ordering Information for Test Assemblies

C (Connector Type)		G (Gender)	L (Length)
1 (1.0mm)	N (N Type)	M (Male)	26 inches
13 (1.35mm)	NMD18 (NMD1.85mm)	F (Female)	39 inches
18 (1.85mm)	NMD24 (NMD2.4mm)		custom cable length
24 (2.4mm)	NMD29 (NMD2.92mm)		
29 (2.92mm)	NMD35 (NMD3.5mm)		
35 (3.5mm)			

*For example, PT-18M-18F-26 is a PT Series Test cable assembly with 1.85mm male connector and 1.85mm Female connector, and the length is 26 inches.



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