Junkosha

Creating Unsurpassed Value

JUNFLON® MWX

JUNFLON® Microwave Coaxial Cable Assemblies

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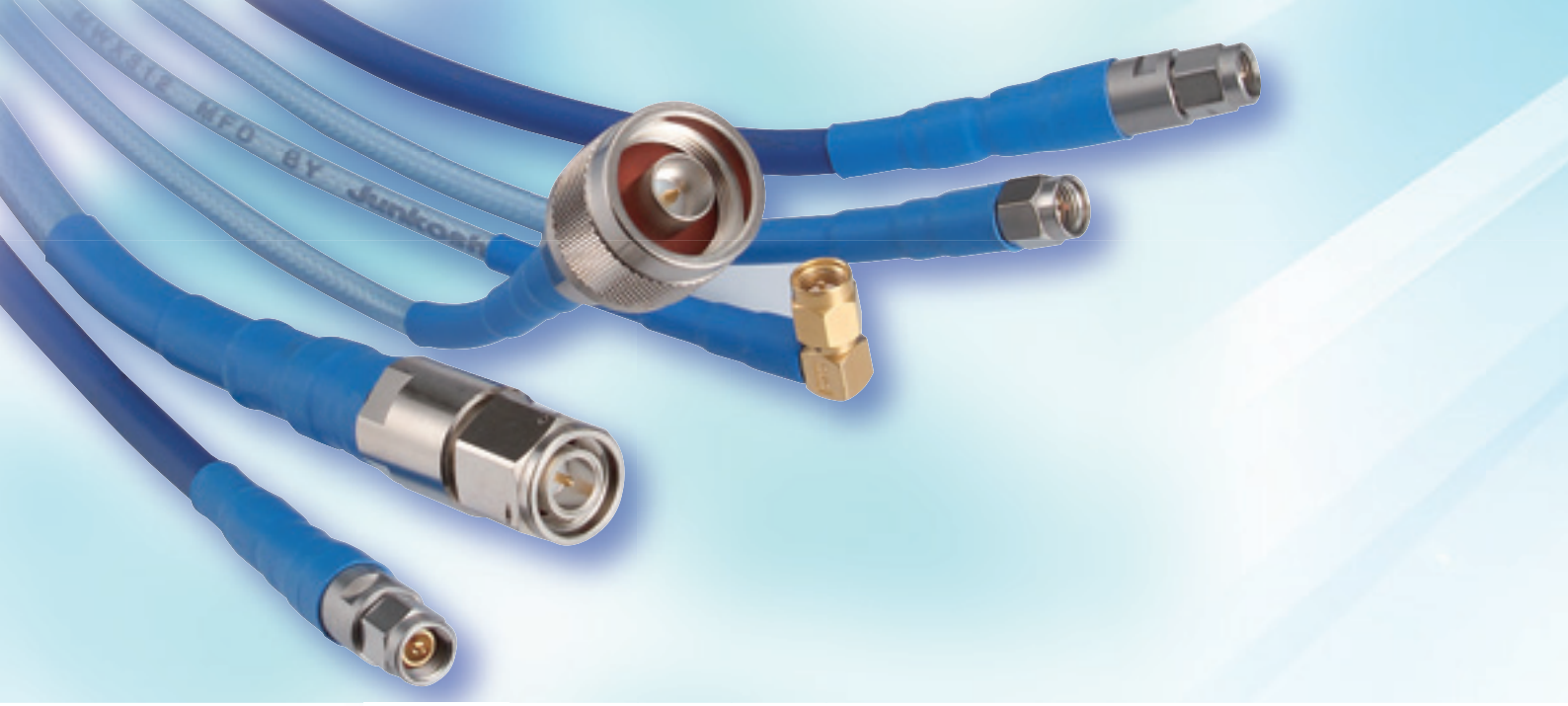

JUNFLON Microwave Coa

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Junflon®
Microwave Coaxial Cable Assemblies

Junflon® Microwave Coaxial Cable Assemblies (MWX) are flexible signal transmission lines that take advantage of the remarkable properties of fluoropolymers. They have been demonstrated in applications up to 67 GHz range.

MWX feature low insertion loss and low VSWR; less signal leakage and interference due to high shielding effectiveness; and higher density packaging applications.

Junkosha offers highly reliable product line up for micro/millimeter wave applications to meet customers' needs.

x i a l C a b l e A s s e m b l i e s

Features of MWX

Series	Application	Phase stability				Insertion loss		Durability	Flexibility
		type	temperature range	static bending	temperature change	mechanical bending	temperature		
MWX0	Measurement	phase stability	-30~+85℃	◎	◎	◎	◎	◎	○
MWX1		heat-resistant	-65~+125℃	○	△	◎	△	◎	○
MWX2		flexibility	-30~+85℃	○	△	○	△	○	◎
MWX3(*1)	Internal and external wiring		-65~+125℃	△	○	△	○	△	△
MWX4(*2)	fixed wiring	low insertion loss	-30~+85℃	—	—	○	—	—	—
MWX5		normal	-30~+85℃	—	—	○	—	—	—

(*1) Continuous operating temperature range for MWX315: -30 to +85℃

(*2) Continuous operating temperature range for MWX461: -65 to +125℃

MWX3 Series Cable assemblies for equipment wiring

- MWX3 Series 34
  - ~18.5 GHz
    - MWX311 36
    - MWX312 38
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    - MWX314 42
  - ~26.5 GHz
    - MWX321 44
  - ~40.0 GHz
    - MWX341 46
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JUNFLON® MWX series are fully complied with RoHS directive including connectors.

Formable MWX4,5 Series for fixed wiring

- MWX4 Series
  - ~18.0 GHz
    - MWX411 52
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MWX0 Series Phase Stability

The MWX0 series offer excellent phase stability against temperature fluctuations from -30 to +85℃ and bending. They are ideal for connecting Vector Network Analyzers for precision measurements.

Major applications

- Vector network analyzers;
- RF and high-speed digital testers

MWX1 Series Wide Temperature

The MWX1 series offer excellent durability of connector and cable bending in wide temperature range from -65 to +125℃ for microwave measurements.

Major applications

- Microwave measurements requiring a wide range of temperatures, such as device evaluations
- Inspections requiring high durability

MWX2 Series Flexible

The MWX2 series offer flexibility and low repulsion to reduce stress loads to measured objects with excellent phase stability against bending in intensive use of microwave measurement. Cables are offered in wide range of the frequencies of 26.5, 40, 50, and 67 GHz with various connectors.

Major applications

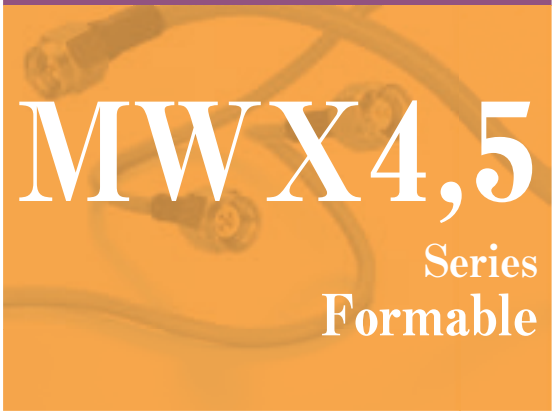
- Microwave/millimeter-wave measurements
- Micro-device measurements requiring high flexibility

MWX3 Series Equipment Wiring

The MWX3 series offer excellent phase stability against temperature fluctuations as low as -65 to high as +125℃ by using a porous PTFE dielectric material.
Seven types of cables are offered in maximum frequencies of 18.5, 26.5, and 40 GHz and insertion loss values.

Major applications

- Electronic equipment for communication satellites and ground stations; electronic devices for aircraft equipment; air traffic control equipment
- Electronic equipment for ships; equipment highly susceptible to signal leaks and interference



MWX4,5 Series Formable

The MWX4 and 5 series offer formability of the easy wiring, ideal for internal and external wiring of applications which require high frequencies up to 67 GHz, with lower insertion loss than semi-rigid cables. A broad range of other connectors are available to meet your specific needs.

Major applications

- Fixed wiring for communication devices at base stations
- Fixed wiring in R&D-use circuit boards

List of Cable Specifications

MWX0 Series Cable assemblies with high phase stability for measuring instruments

Frequency	Cable type	Typical insertion loss (dB/m)		VSWR		Cable outer diameter (mm)	Mass (g/m)	Minimum bending radius (mm)	Continuous operating temperature (℃)	Assembly length (mm)(*1)		Described in
		18.5 GHz	Maximum frequency	per connector	both ends of assy.					Min	Max	
26.5 GHz	MWX021	1.6	2.0	1.153	1.33	8.5	122	30	-30～+85	700	1500	P10
50.0 GHz	MWX051	2.7	4.6	1.21	1.46	6.6	76	30		700	1500	P12
67.0 GHz	MWX061	3.5	7.3	1.21	1.46	6.6	73	30		700	1500	P14

MWX1 Series Cable assemblies with a wide temperature range for measuring

Frequency	Cable type	Typical insertion loss (dB/m)		VSWR		Cable outer diameter (mm)	Mass (g/m)	Minimum bending radius (mm)	Continuous operating temperature (℃)	Assembly length (mm)(*1)		Described in
		18.5 GHz	Maximum frequency	per connector	both ends of assy.					Min	Max	
26.5 GHz	MWX121	1.2	1.3	1.153	1.33	6.6	80	30	-65～+125	200	5000	P18

MWX2 Series Flexible cable assemblies for measuring instruments

Frequency	Cable type	Typical insertion loss (dB/m)		VSWR		Cable outer diameter (mm)	Mass (g/m)	Minimum bending radius (mm)	Continuous operating temperature (℃)	Assembly length (mm)(*1)		Described in
		18.5 GHz	Maximum frequency	per connector	both ends of assy.					Min	Max	
26.5 GHz	MWX221	1.2	1.4	1.153	1.33	6	64	20	-30～+85	200	5000	P24
	MWX221 (armored type)(*2)					12.5	212	20		700	5000	P24
40.0 GHz	MWX241 (armored type)(*2)	1.8	2.8	1.197	1.43	9.5	137	20		700	5000	P26
	MWX241 (non-armored type, custom-made)					4.1	35	20		200	5000	P26
50.0 GHz	MWX251 (armored type)(*2)	2.1	3.7	1.197	1.43	9.5	129	20		700	1500	P28
67.0 GHz	MWX261 (armored type)(*2)	2.9	5.6			7.7	90	20		700	1500	P30

MWX3 Series Cable assemblies for equipment wiring

Frequency	Cable type	Typical insertion loss (dB/m)		VSWR		Cable outer diameter (mm)	Mass (g/m)	Minimum bending radius (mm)	Continuous operating temperature (℃)	Assembly length (mm)(*1)		Described in
		18.5 GHz	Maximum frequency	per connector	both ends of assy.					Min	Max	
18.5 GHz	MWX311	3.2	–	1.182	1.40	2.7	18.5	10	-65～+125	100	10000	P36
	MWX312	2.0	–	1.182	1.40	4.1	42	20		100	20000	P38
	MWX313	1.8	–	1.182	1.40	4.7	52	30		100	20000	P40
	MWX314	1.0	–	1.182	1.40	7.7	125	40		200	40000	P42
18.0 GHz	MWX315	–	0.8	1.182	1.40	8.6	155	30	-30～+85	500	5000	P48
26.5 GHz	MWX321	1.8	2.4	1.202	1.44	4.7	52	30	-65～+125	100	20000	P44
40.0 GHz	MWX341	2.1	3.3	1.197	1.43	4.0	40	20		100	10000	P46

Formable MWX4,5 Series for fixed wiring

Frequency	Cable type	Typical insertion loss (dB/m)		VSWR		Cable outer diameter (mm)	Remark	Minimum bending radius (mm)	Continuous operating temperature (℃)	Assembly length (mm)(*1)		Described in
		18.0 GHz	Maximum frequency	per connector	both ends of assy.					Min	Max	
18.0 GHz	MWX411	2.2	–	1.182	1.40	2.5	Semi-rigid cable φ2.2 equivalent	15	-30～+85	100	5000	P52
	MWX412	1.4	–	1.182	1.40	4.0	Semi-rigid cable φ3.6 equivalent	20		100	5000	P52
40.0 GHz	MWX441	2.9	4.3	1.224	1.50	2.4	Semi-rigid cable φ2.2 equivalent	15		100	5000	P52
67.0 GHz	MWX461	5.5	12.0	1.732	3	1.33	Semi-rigid cable φ1.2 equivalent	5	-65～+125	40	2000	P52
18.0 GHz	MWX511	3.1	–	1.182	1.40	3.0	Semi-flexible cable φ2.1 equivalent	10	-30～+85	100	5000	P52
	MWX512	2.0	–	1.182	1.40	4.4	Semi-flexible cable φ3.45 equivalent	15		100	5000	P52

*1) Please contact us if your assembly requirements are non-standard length.
*2) Armored type: Armored with a protection sheath to reduce damage caused by mechanical movement.

MWX0 Series
Cable assemblies with high phase stability for measuring instruments

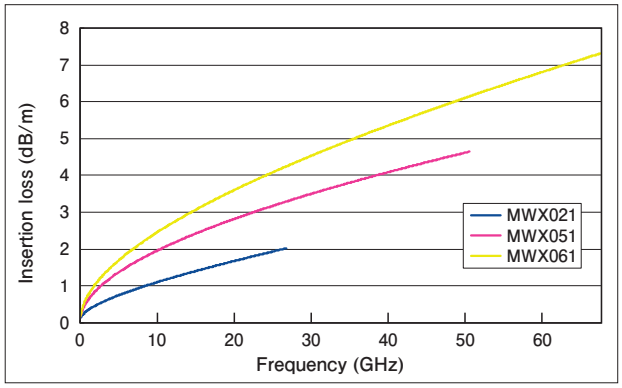
The MWX0 series cable assemblies offer excellent phase stability against temperature fluctuations and against bending. They are ideal for connecting vector network analyzers for precision measurements (Continuous operating temperature range from -30 to +85 ℃)

How to select

1.Simple criteria for connector selection

- Choose a suitable connector for your measuring instrument.
- The smaller the connector, the higher the maximum operating frequency.
- The larger the connector, the higher the power rating.

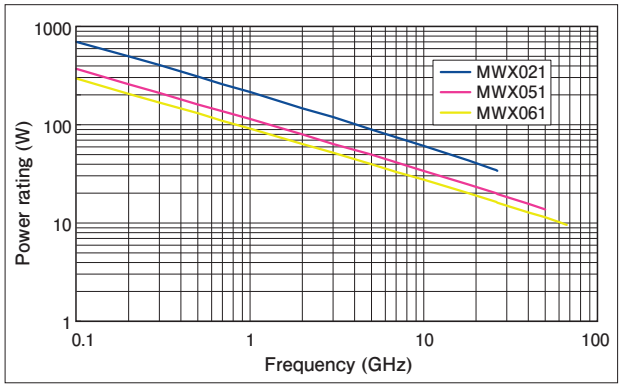
MWX0 series typical insertion loss



2.Power rating

The diagram to the below shows the relationship between frequency and power rating. The values are calculated at 25 ℃ and at sea level. The power rating will need to be corrected for different ambient temperatures and altitude. Power ratings may decrease, depending on the connector selected.

Power rating of MWX0 series at sea level



*The above figures are measured values for reference only.

Connector compatibility

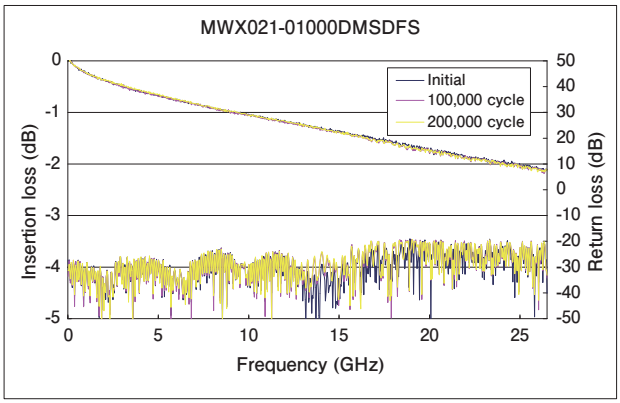
Cable type	Cable maximum operating frequency (GHz)	Compatible connector					
		26.5 GHz		50.0 GHz		67.0 GHz	
		3.5 mm (m)	3.5 mm (f)	2.4 mm (m)	2.4 mm (f)	1.85 mm (m)	1.85 mm (f)
MWX021	26.5 GHz	●	●				
MWX051	50.0 GHz			●	●		
MWX061	67.0 GHz					●	●

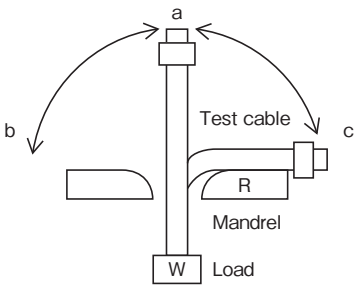
*Armored type: Armored with protection sheath to reduce damage caused by mechanical movement.

Cable design

Center conductor	Dielectric	1st outer conductor	2nd outer conductor	Sheath	Armored	Sheath
Silver plated copper	Low density PTFE	Silver plated copper tape	Silver plated copper braid	Fluoropolymer	SUS spring	Polyester fiber

Bending test data



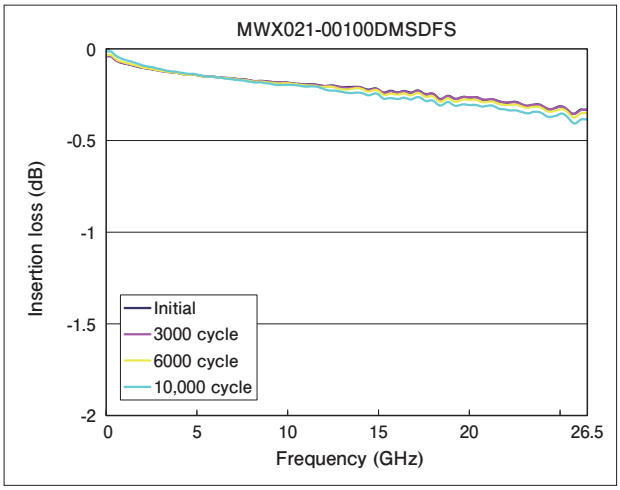


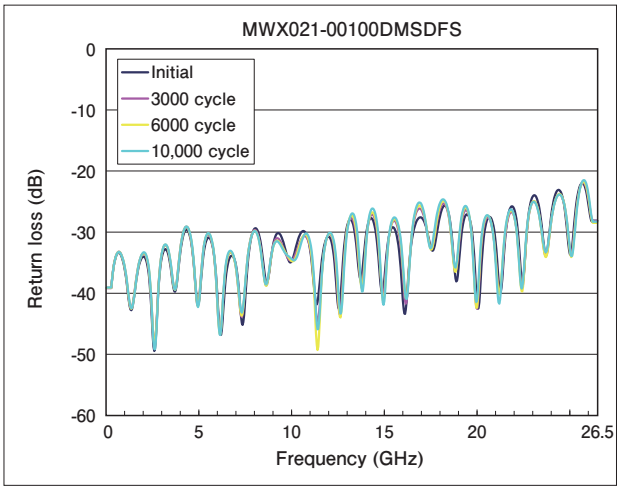
Bending angle: 90° right/left
Test load: 0g
Bending speed: 30 cycles/min
Bending radius: 120mm

Bending test method

Connector plug / unplug cycle test

The result of insertion loss and return loss after 10,000 cycle plug / unplug test. At MWX021-00100DMSDMS, plugged to 3.5 mm (f) type connector.





*The above figures are measured values for reference only.

MWX021

DC~26.5 GHz

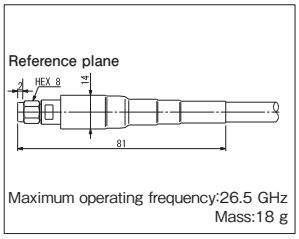
Basic Cable Properties

Electrical properties	
Maximum operating frequency	26.5 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	85 pF/m
Propagation delay (typ.)	4.21 nsec/m
Shortening coefficient of wavelength (typ.)	79 %
Higher mode frequency (typ.)	28 GHz
VSWR (per connector/both ends of assy.)	1.153/1.33

Mechanical properties	
Cable outer diameter	8.5 mm
Minimum bending radius (inner side)	30 mm
Cable mass (typ.)	122 g/m
Continuous operating temperature range	-30~+85 ℃
Armored side pressure	196 N/cm

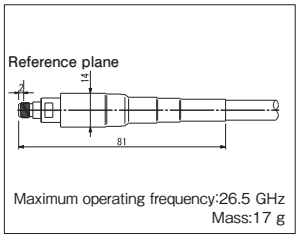
Connector

3.5 mm (m) straight (Code:DMS)



Maximum operating frequency:26.5 GHz
Mass:18 g

3.5 mm (m) straight (Code:DFS)



Maximum operating frequency:26.5 GHz
Mass:17 g

Order form example

●Example 1

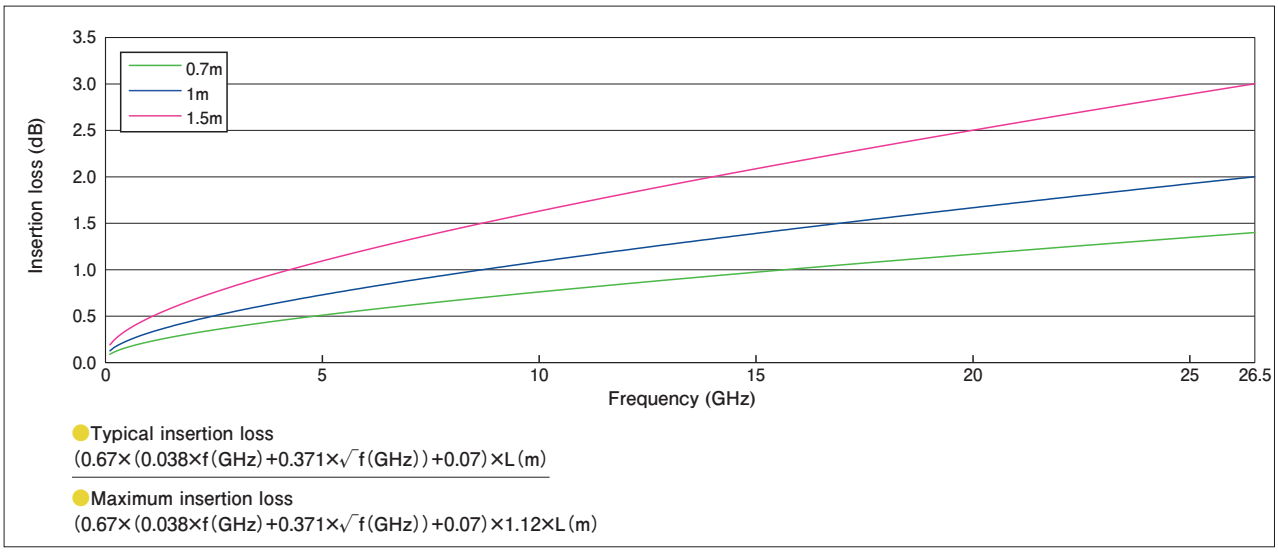
Assembly length : 1000 mm
Connector Ⅰ : 3.5 mm (f) straight
Connector Ⅱ : 3.5 mm (m) straight

Catalog No.:
MWX021-01000DFSDMS/B
(See P.20"Connector combination codes")

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX021 Technical Data

Cable typical insertion loss

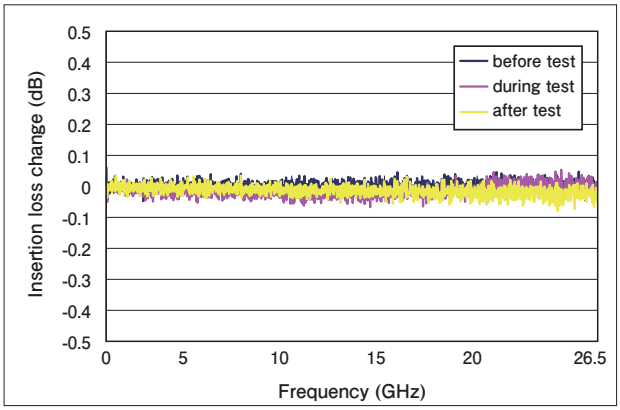


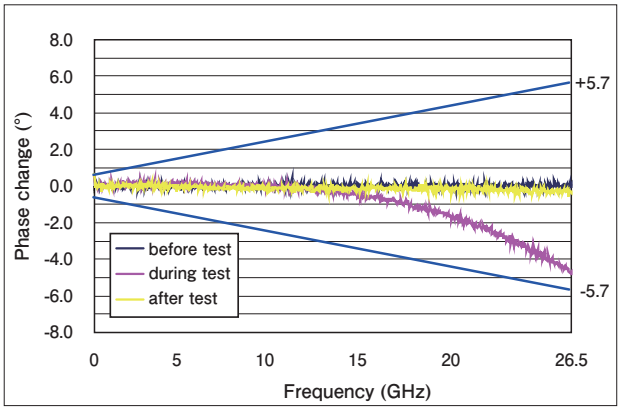
●Typical insertion loss
(0.67×(0.038×f(GHz)+0.371×√f(GHz))+0.07)×L(m)

●Maximum insertion loss
(0.67×(0.038×f(GHz)+0.371×√f(GHz))+0.07)×1.12×L(m)

Static bending data (insertion loss, phase)

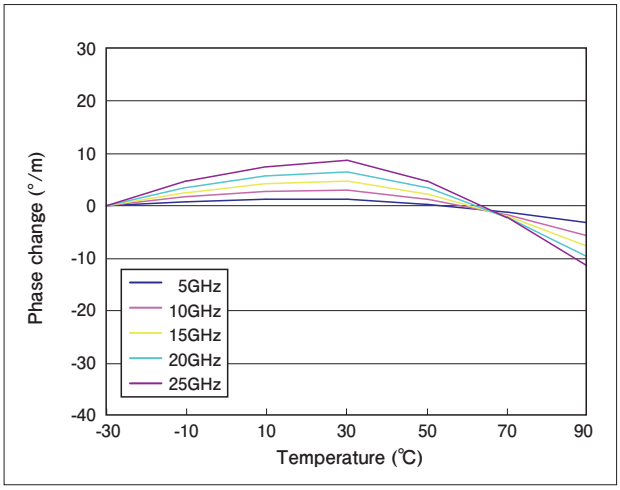
Bending radius: 30 mm





*Guaranteed value within ±5.7°at 26.5 GHz (In shipping value)
*The cable was wrapped 360° around a mandrel.

MWX021 Phase change vs. temperature



The cable was measured in chamber every 20 ℃ from -30 to 90 ℃, 1 hour after the temperature changed. Figure shows the excellent phase stability over the temperature changes.

*The above figures are measured values for reference only.

MWX051

DC～50.0 GHz

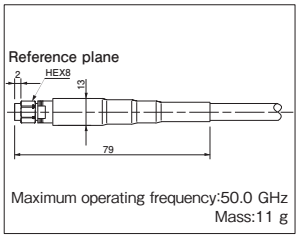
Basic Cable Properties

Electrical properties	
Maximum operating frequency	50 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	85 pF/m
Propagation delay (typ.)	4.19 nsec/m
Shortening coefficient of wavelength (typ.)	79 %
Higher mode frequency (typ.)	61 GHz
VSWR (per connector/both ends of assy.)	1.21/1.46

Mechanical properties	
Cable outer diameter	6.6 mm
Minimum bending radius (inner side)	30 mm
Cable mass (typ.)	76 g/m
Continuous operating temperature range	-30～+85 ℃
Armored side pressure	196 N/cm

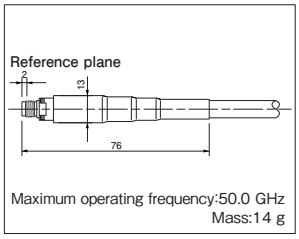
Connector

2.4 mm (m) straight (Code:LMS)



Maximum operating frequency:50.0 GHz
Mass:11 g

2.4 mm (f) straight (Code:LFS)



Maximum operating frequency:50.0 GHz
Mass:14 g

Order form example

●Example 1

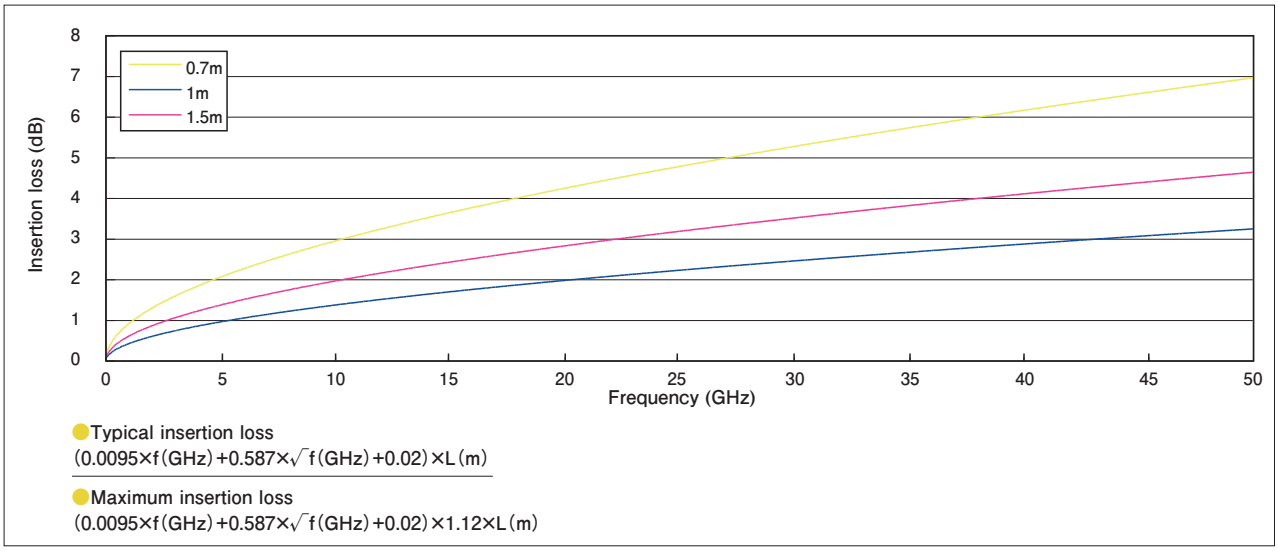
Assembly length : 1000 mm
Connector Ⅰ : 2.4 mm (f) straight
Connector Ⅱ : 2.4 mm (m) straight

Catalog No.:
MWX051-01000LFSLMS/B
(See P.20"Connector combination codes")

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX051 Technical Data

Cable typical insertion loss



●Typical insertion loss

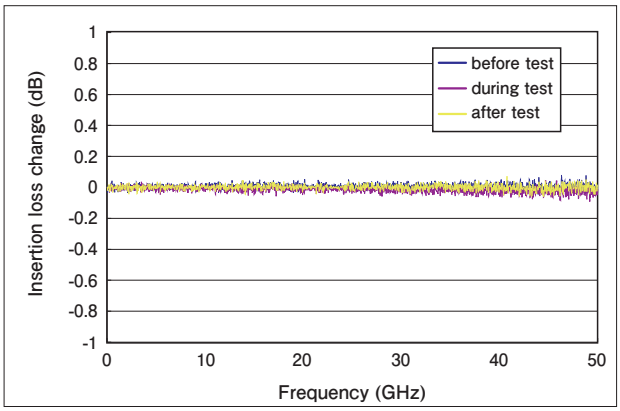
$(0.0095\times f(GHz)+0.587\times\sqrt{f(GHz)}+0.02)\times L(m)$

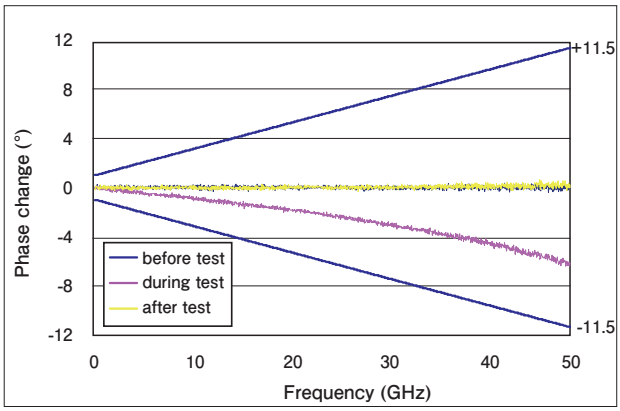
●Maximum insertion loss

$(0.0095\times f(GHz)+0.587\times\sqrt{f(GHz)}+0.02)\times 1.12\times L(m)$

Static bending data (insertion loss, phase)

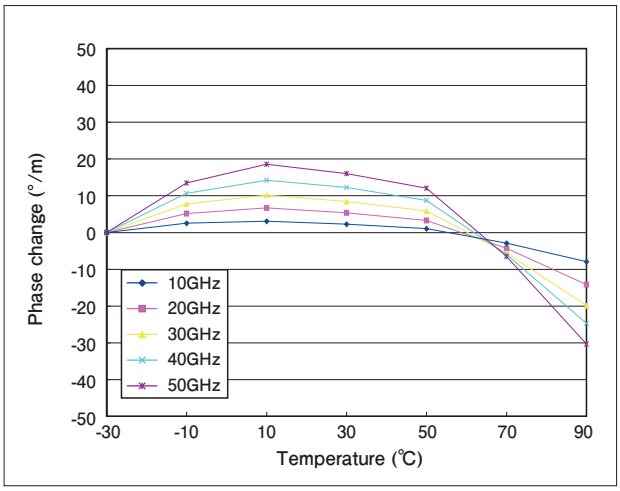
Bending radius: 30 mm





*Guaranteed value within ±11.5°at 50 GHz (In shipping value)
*The cable was wrapped 360° around a mandrel.

MWX051 Phase change vs. temperature



The cable was measured in chamber every 20 ℃ from -30 to 90 ℃, 1 hour after the temperature changed. Figure shows the excellent phase stability over the temperature changes.

*The above figures are measured values for reference only.

MWX061

DC～67.0 GHz

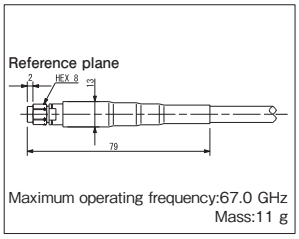
Basic Cable Properties

Electrical properties	
Maximum operating frequency	67 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	90 pF/m
Propagation delay (typ.)	4.35 nsec/m
Shortening coefficient of wavelength (typ.)	77 %
Higher mode frequency (typ.)	68 GHz
VSWR (per connector/both ends of assy.)	1.21/1.46

Mechanical properties	
Cable outer diameter	6.6 mm
Minimum bending radius (inner side)	30 mm
Cable mass (typ.)	73 g/m
Continuous operating temperature range	-30～+85 ℃
Armored side pressure	196 N/cm

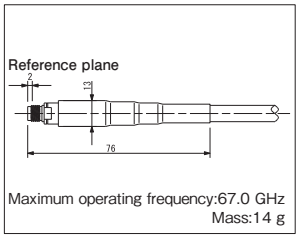
Connector

1.85 mm (m) straight (Code:VMS)



Maximum operating frequency:67.0 GHz
Mass:11 g

1.85 mm (f) straight (Code:VFS)



Maximum operating frequency:67.0 GHz
Mass:14 g

Order form example

●Example 1

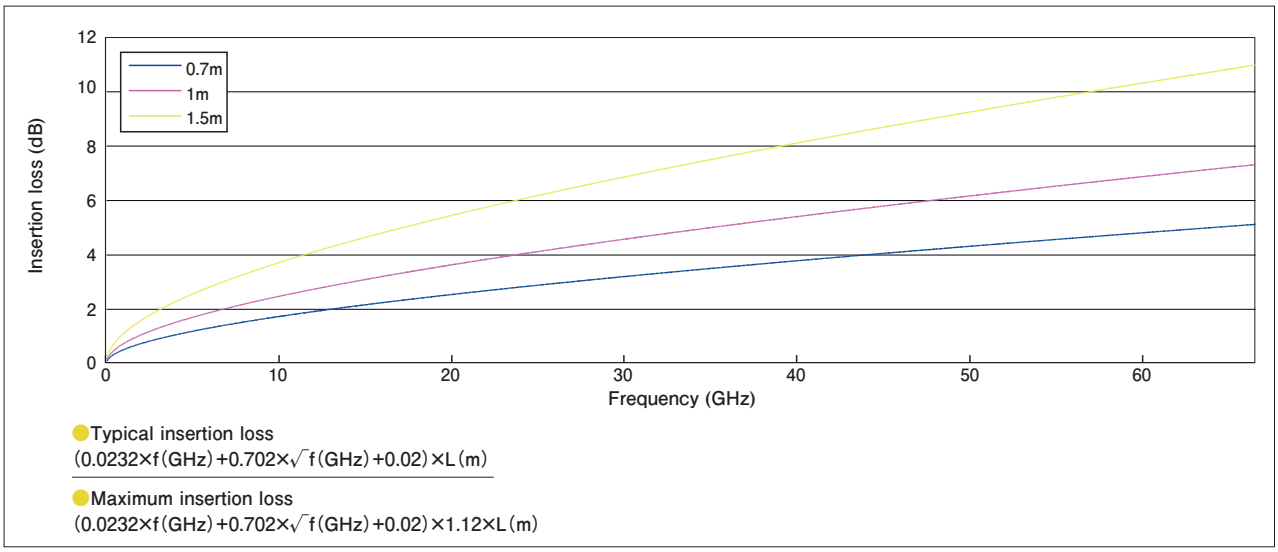
Assembly length : 700 mm
Connector Ⅰ : 1.85 mm (f) straight
Connector Ⅱ : 1.85 mm (m) straight

Catalog No.:
MWX061-00700VFSVMS/B
(See P.20"Connector combination codes")

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX061 Technical Data

Cable typical insertion loss

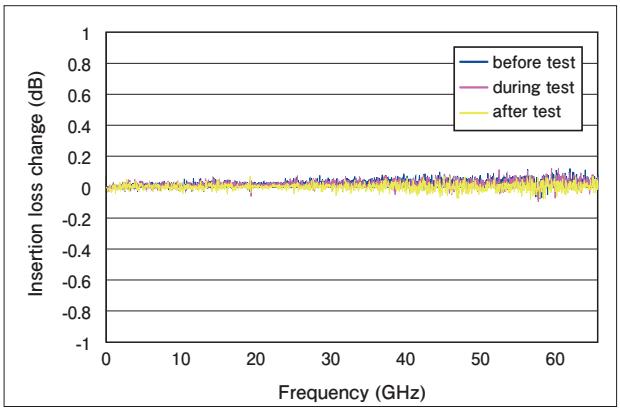


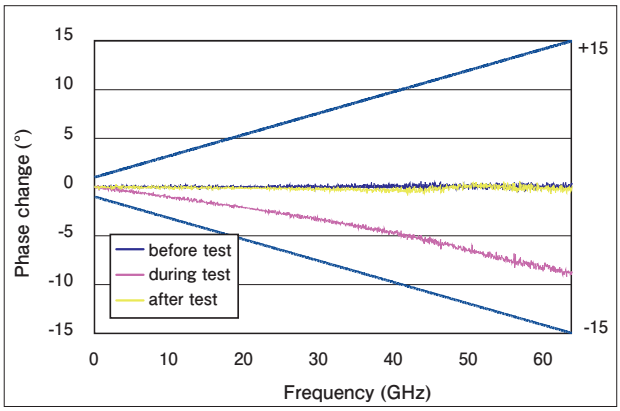
●Typical insertion loss
$(0.0232\times f(GHz)+0.702\times\sqrt{f(GHz)}+0.02)\times L(m)$

●Maximum insertion loss
$(0.0232\times f(GHz)+0.702\times\sqrt{f(GHz)}+0.02)\times 1.12\times L(m)$

Static bending data (insertion loss, phase)

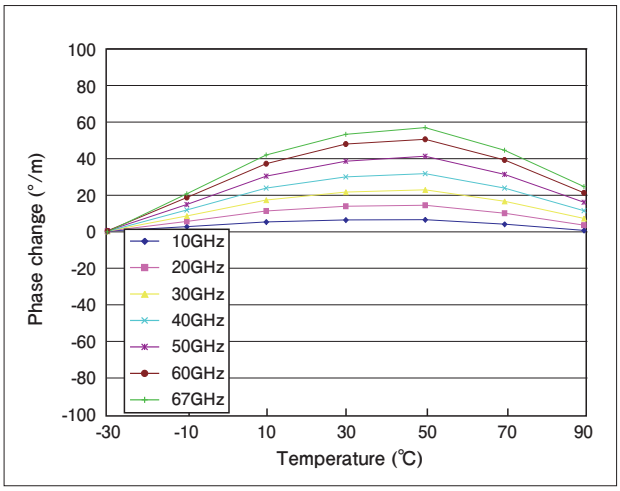
Bending radius: 30 mm





*Guaranteed value within ±15°at 67 GHz (In shipping value)
*The cable was wrapped 360° around a mandrel.

MWX061 Phase change vs. temperature



The cable was measured in chamber every 20 ℃ from -30 to 90 ℃, 1 hour after the temperature changed. Figure shows the excellent phase stability over the temperature changes.

*The above figures are measured values for reference only.

MWX1 Series
Cable assemblies with a wide temperature range for measuring instruments

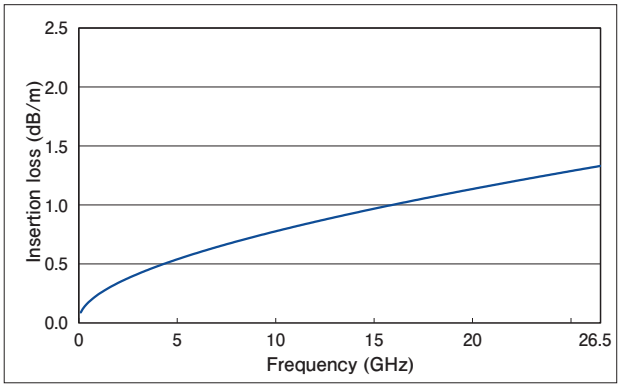
Useful across a wide temperature range of microwave measurements High-durability connector and bending resistance cable (Continuous operating temperature range from -65 to +125 ℃)

How to select

1.Simple criteria for connector selection

- Choose a suitable connector for your measuring instrument.
- The smaller the connector, the higher the maximum operating frequency.
- The larger the connector, the higher the power rating.

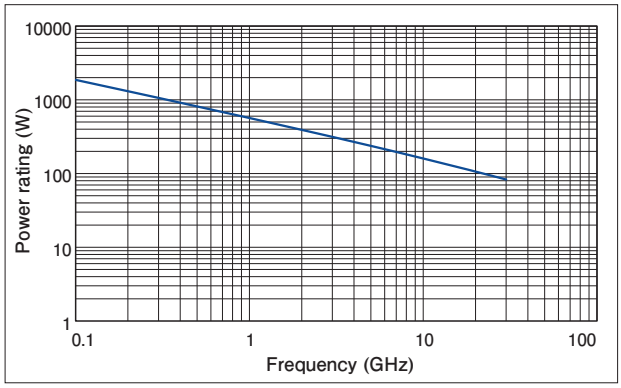
MWX1 series typical insertion loss



2.Power rating

The diagram to the below shows the relationship between frequency and power rating. The values are calculated at 25 ℃ and at sea level. The power rating will need to be corrected for different ambient temperatures and altitude. Power ratings may decrease, depending on the connector selected.

Power rating of MWX1 series at sea level

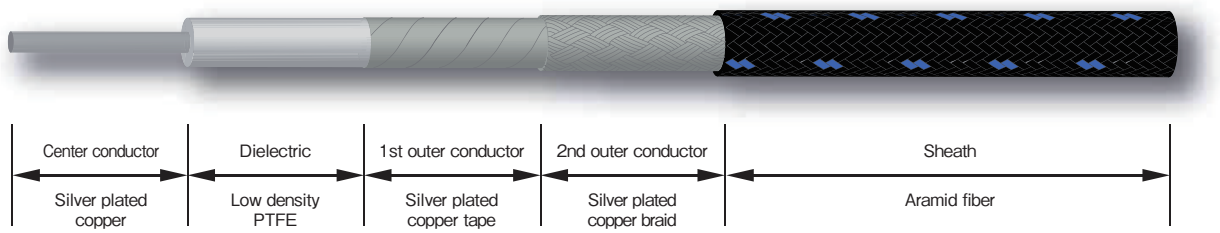


*The above figures are measured values for reference only.

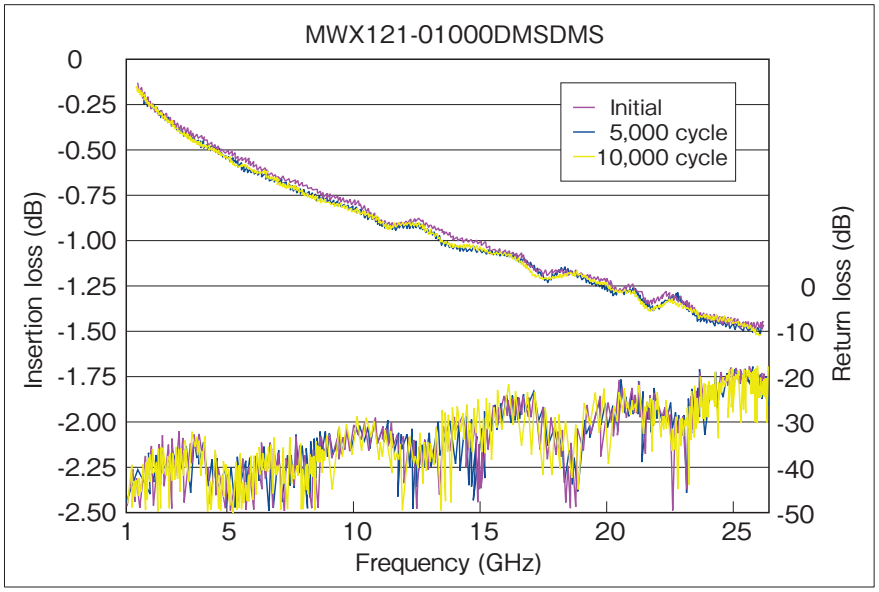
Connector compatibility

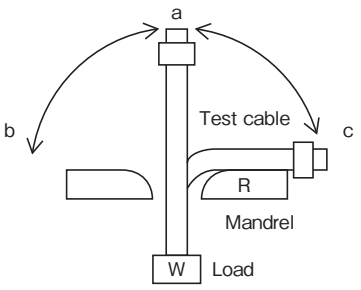
Cable type	Cable maximum operating frequency (GHz)	Compatible connector			
		18.0 GHz	18.5 GHz	26.5 GHz	
		N(m)	SMA(m)	3.5 mm(m)	3.5 mm(f)
MWX121	26.5 GHz	●	●	●	●

Cable design



Bending test data

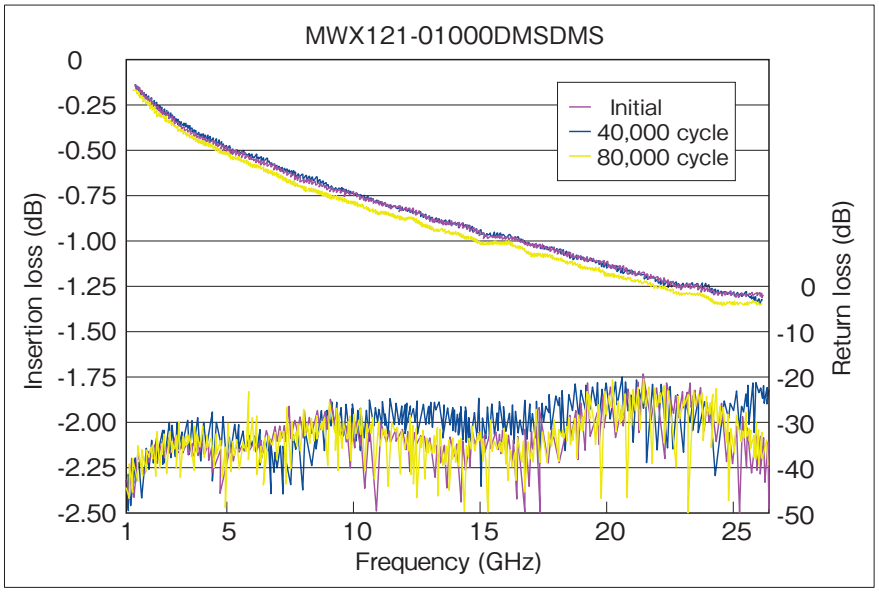




Bending angle : 90°right/left
Test load : 500 g
Bending speed : 20 cycles/min
Bending radiusR : 30 mm

Fig.1 Bending test method

Rolling flex test data



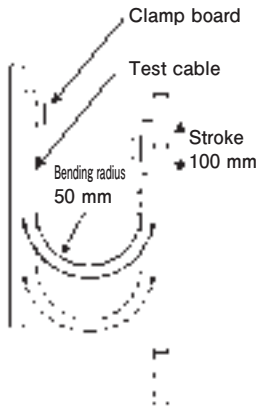


Fig.2 Rolling flex test method

*The above figures are measured values for reference only.

MWX121

DC~26.5 GHz

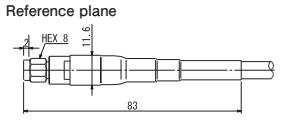
Basic Cable Properties

Electrical properties	
Maximum operating frequency	26.5 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	88 pF/m
Propagation delay (typ.)	4.28 ns/m
Shortening coefficient of wavelength (typ.)	78 %
Higher mode frequency (typ.)	27.0 GHz
VSWR (per connector/both ends of assy.)	1.153/1.33

Mechanical properties	
Cable outer diameter	6.6 mm
Minimum bending radius (inner side)	30 mm
Cable mass (typ.)	80 g/m
Continuous operating temperature range	-65~+125 ℃

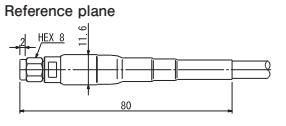
Connector

SMA (m) straight (Code:AMS)



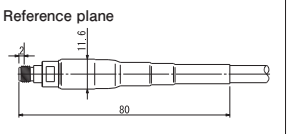
Maximum operating frequency:18.5 GHz
Mass:14 g

3.5 mm (m) straight (Code:DMS)



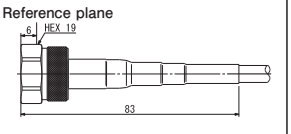
Maximum operating frequency:26.5 GHz
Mass:13 g

3.5 mm (f) straight (Code:DFS)



Maximum operating frequency:26.5 GHz
Mass:12 g

N (m) straight (Code:NMS)



Maximum operating frequency:18.0 GHz
Mass:36 g

Order form example

●Example 1

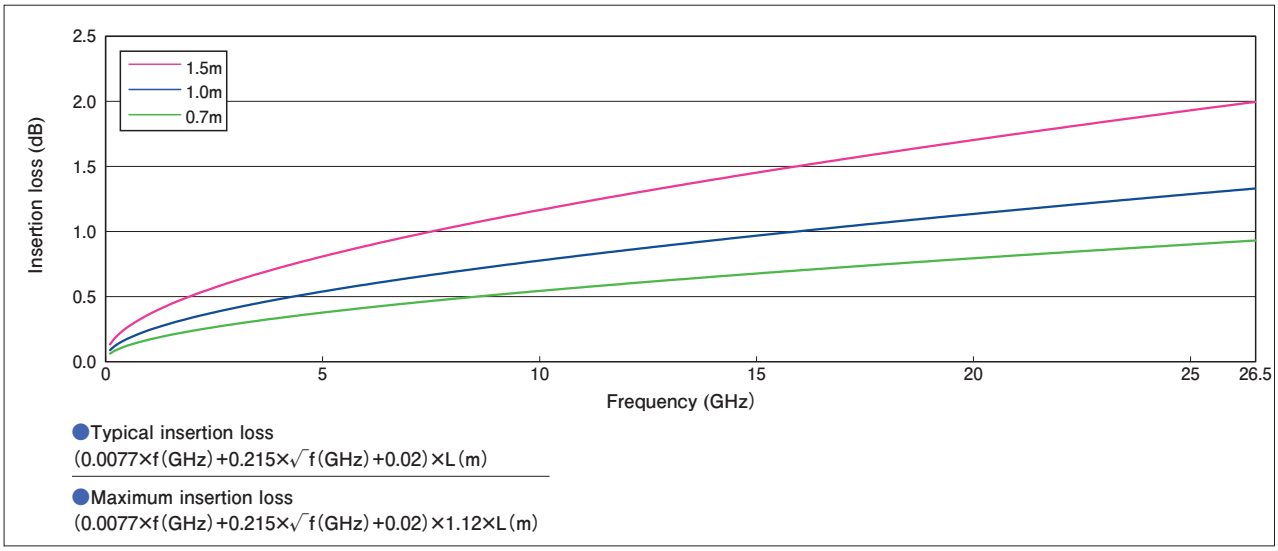
Assembly length : 1000 mm
Connector Ⅰ : 3.5 mm (f) straight
Connector Ⅱ : 3.5 mm (m) straight

Catalog No.
MWX121-01000DFSDMS
(See P.20"Connector combination codes")

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX121 Technical Data

Cable typical insertion loss



●Typical insertion loss

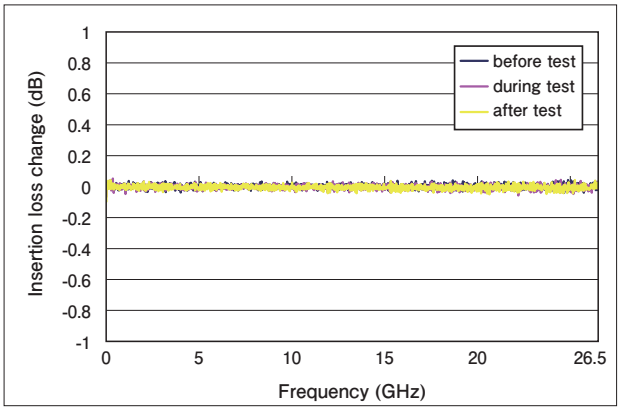
$(0.0077\times f(GHz)+0.215\times\sqrt{f(GHz)}+0.02)\times L(m)$

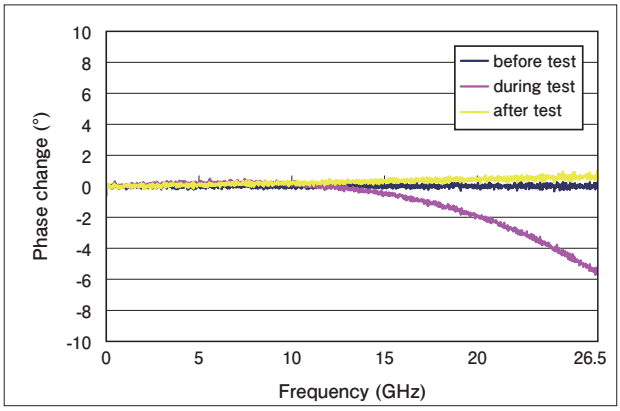
●Maximum insertion loss

$(0.0077\times f(GHz)+0.215\times\sqrt{f(GHz)}+0.02)\times 1.12\times L(m)$

Static bending data (insertion loss, phase)

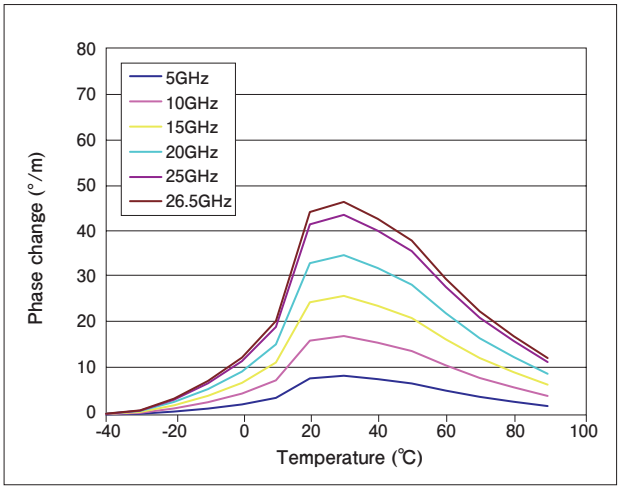
Bending radius: 30 mm





*The cable was wrapped 360° around a mandrel.

MWX121 Phase change vs. temperature

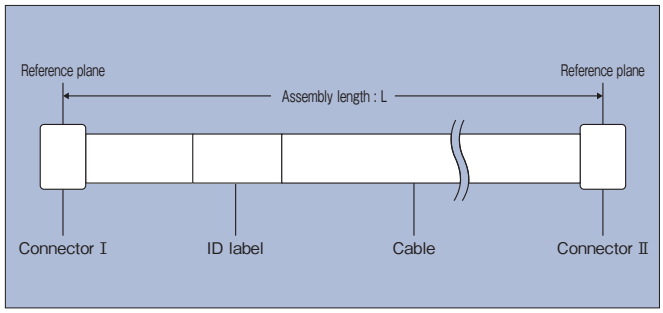


*The above figures are measured values for reference only.

MWX0,1 Series

Placing orders

Catalog number



Note 1) The unit of assembly length is mm.
Shown as a five-digit number. If the number consists of fewer than five digits, remember to add zero (s) to the left of the first digit to make it five digits.
The assembly length is measured based on the reference planes, not on the connector ends, shown at the figure to the left.

Note 2) Armored-type cables will have a "/B" appended to the connector combination code.
No appended to the connector combination code when cables are not armored type.

Example 1)

MWX121-02000 DMS DMS

Cable·····MWX121
Assembly length·····2000 mm
Connector Ⅰ ···3.5 mm (m) straight
Connector Ⅱ ···3.5 mm (m) straight

Example 2)

MWX021-01000 DMS DMS /B

Cable·····MWX021
Assembly length·····1000 mm
Connector Ⅰ ···3.5 mm (m) straight
Connector Ⅱ ···3.5 mm (m) straight
Armored·····Armored-type

Connector combination codes

Connector Ⅱ \ Connector Ⅰ			SMA	N	3.5 mm	3.5 mm	2.4 mm	2.4 mm	1.85 mm	1.85 mm
			m	m	m	f	m	f	m	f
			AMS	NMS	DMS	DFS	LMS	LFS	VMS	VFS
SMA	m	AMS	AMSAMS	AMSNMS	AMSDMS	AMSDFS	—	—	—	—
N	m	NMS	—	NMSNMS	DMSNMS	DFSNMS	—	—	—	—
3.5 mm	m	DMS	—	—	DMSDMS	DFSDMS	—	—	—	—
3.5 mm	f	DFS	—	—	—	DFSDFS	—	—	—	—
2.4 mm	m	LMS	—	—	—	—	LMSLMS	LFSLMS	—	—
2.4 mm	f	LFS	—	—	—	—	—	LFSLFS	—	—
1.85 mm	m	VMS	—	—	—	—	—	—	VMSVMS	VFSVMS
1.85 mm	f	VFS	—	—	—	—	—	—	—	VFSVFS

Please provide a catalog number when placing an order.
m : male (plug)
f : female (jack)

Delivery time of MWX0,1 Series

Delivery time

MWX0 and MWX1 series will be shipped within 7 business days after received order.

*Leadtime may be effected by larger order volume.

MWX2 Series
Flexible cable assemblies for measuring instruments

Cable assemblies developed for intensive use in microwave/milli meter-wave measurements, with high phase stability against bending (Continuous operating temperature range from -30 to +85 ℃).

Flexibility and low repulsion reduce loads on measured objects.

Four cable types are available for max. 26.5, 40, 50, 67 GHz use.

How to select

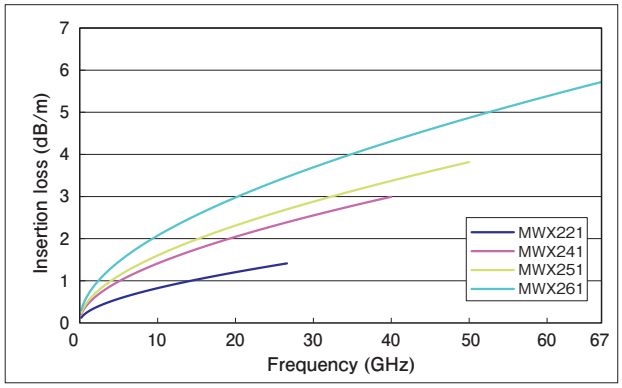
1.Simple criteria for connector selection

- Choose a suitable connector for your measuring instrument.
- The smaller the connector, the higher the maximum operating frequency.
- The larger the connector, the higher the power rating.

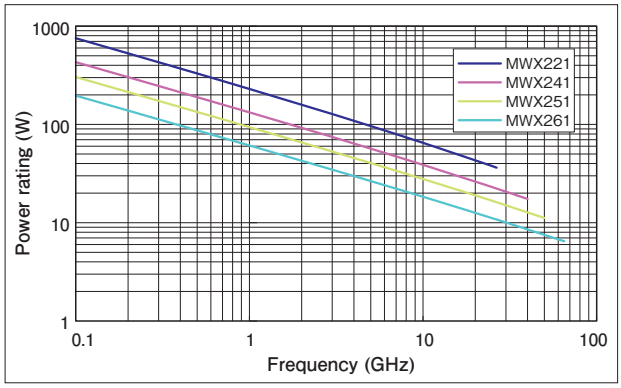
2.Power rating

The diagram to the below shows the relationship between frequency and power rating. The values are calculated at 25 ℃ and at sea level. The power rating will need to be corrected for different ambient temperatures and altitude. Power ratings may decrease, depending on the connector selected.

MWX2 series typical insertion loss



Power rating of MWX2 series at sea level



*The above figures are measured values for reference only.

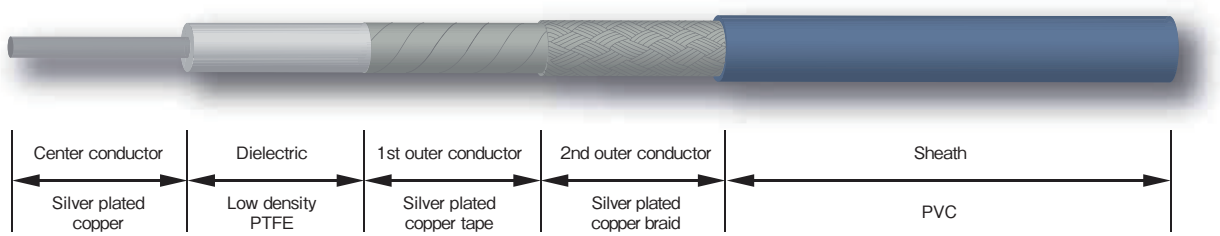
Connector compatibility

Cable type	Cable maximum operating frequency (GHz)	Compatible connector													
		18.5 GHz		18.0 GHz		26.5 GHz			40.0 GHz			50.0 GHz		67.0 GHz	
		SMA (m)	SMA (m) swept	N (m)	N (m) swept	3.5 mm (m)	3.5 mm (f)	3.5 mm (m) swept	2.92 mm (m)	2.92 mm (f)	2.92 mm (m) swept	2.4 mm (m)	2.4 mm (f)	1.85 mm (m)	1.85 mm (f)
MWX221	26.5 GHz	●	●	●	●	●	●	●							
MWX221 (armored type)		●		●		●	●								
MWX241 (armored type)	40.0 GHz	●		●					●	●					
MWX241 (non-armored type, custom-made)		●		●					●	●	●				
MWX251 (armored type)	50.0 GHz											●	●		
MWX261 (armored type)	67.0 GHz													●	●

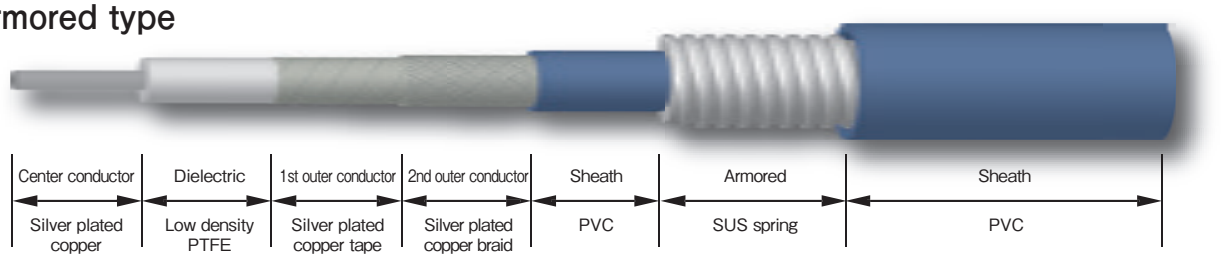
*Armored type: Armored with a protection sheath to reduce damage caused by mechanical movement.

Cable design

Non-armored type



Armored type



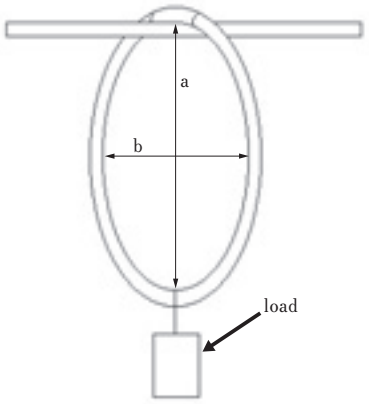
Flexibility data

Test method

Test cable
MWX221, MWX021, MWX121

Test condition
temperature : 24 ℃
test load : 454 g
diameter of bar : ϕ16 mm

A test cable measuring 1,000 mm in length was formed into a circle with an internal diameter of 300 mm. Both ends were overlapped and secured with tape measuring 50 mm in width. The circularly formed test cable was then suspended, with the overlapping end section at the top and a weight positioned at the bottom. Circularity was measured after five seconds. (Circularity is expressed as the ratio a/b.)



Test result

Test cable	sample 1	sample 2	sample 3	average
MWX221	1.887	2.049	2.011	1.982
MWX021	1.532	1.404	1.482	1.473
MWX121	1.552	1.564	1.595	1.570

*The above figures are measured values for reference only.

MWX221

DC~26.5 GHz

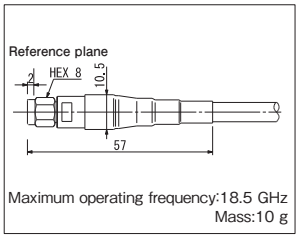
Basic Cable Properties

Electrical properties	
Maximum operating frequency	26.5 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	88 pF/m
Propagation delay (typ.)	4.4 ns/m
Shortening coefficient of wavelength (typ.)	76 %
Higher mode frequency (typ.)	27.5 GHz
VSWR (per connector/both ends of assy.)	1.153/1.33

Mechanical properties	Standard type	Armored type
Cable outer diameter	6.0 mm	12.5 mm
Minimum bending radius (inner side)	20 mm	20 mm
Cable mass (typ.)	64 g/m	212 g/m
Continuous operating temperature range	-30~+85 ℃	-30~+85 ℃
Armored side pressure	—	196 N/cm

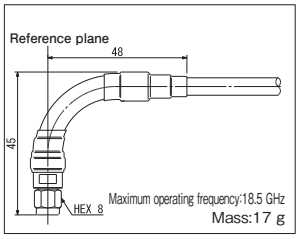
Connector

SMA (m) straight (Code:AMS)



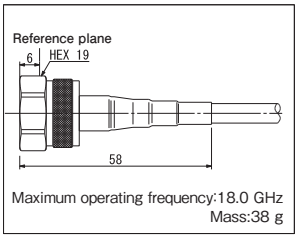
Maximum operating frequency:18.5 GHz
Mass:10 g

SMA (m) swept (Code:AMW)(*1)



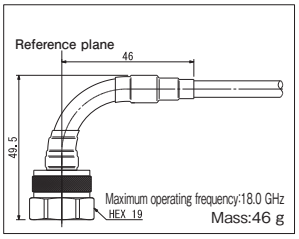
Maximum operating frequency:18.5 GHz
Mass:17 g

N (m) straight (Code:NMS)



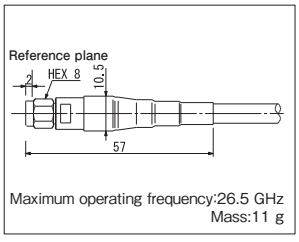
Maximum operating frequency:18.0 GHz
Mass:38 g

N (m) swept (Code:NMW)(*1)



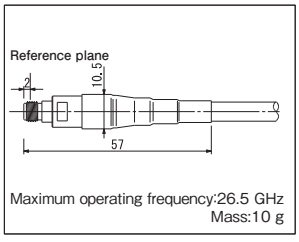
Maximum operating frequency:18.0 GHz
Mass:46 g

3.5 mm (m) straight (Code:DMS)



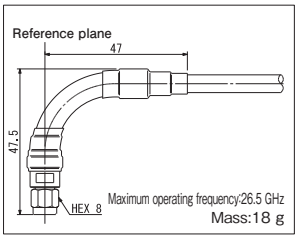
Maximum operating frequency:26.5 GHz
Mass:11 g

3.5 mm (f) straight (Code:DFS)



Maximum operating frequency:26.5 GHz
Mass:10 g

3.5 mm (m) swept (Code:DMW)(*1)



Maximum operating frequency:26.5 GHz
Mass:18 g

(*1) Swept is not available to armored type.

Order form example

●Example 1

Assembly length : 1000 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : 3.5 mm (m) straight

Catalog No.:
MWX221-01000AMSDMS
(See P.32 "Connector combination codes")

●Example 2 MWX221 Armored type

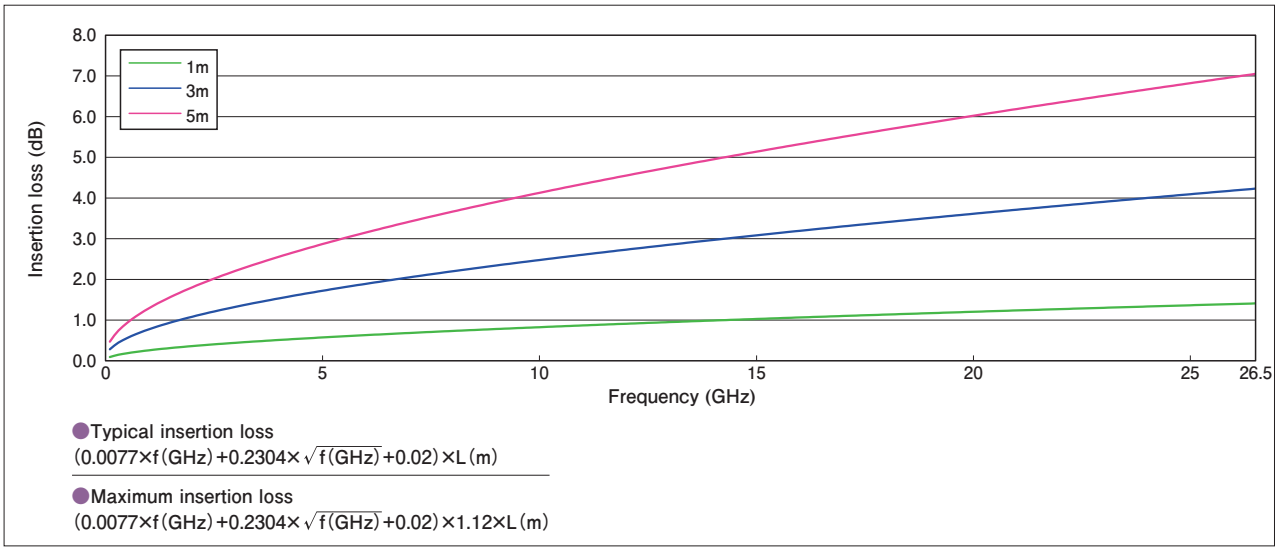
Assembly length : 1500 mm
Connector Ⅰ : N (m) straight
Connector Ⅱ : N (m) straight

Catalog No.:
MWX221-01500NMSNMS/B

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX221 Technical Data

Cable typical insertion loss



●Typical insertion loss

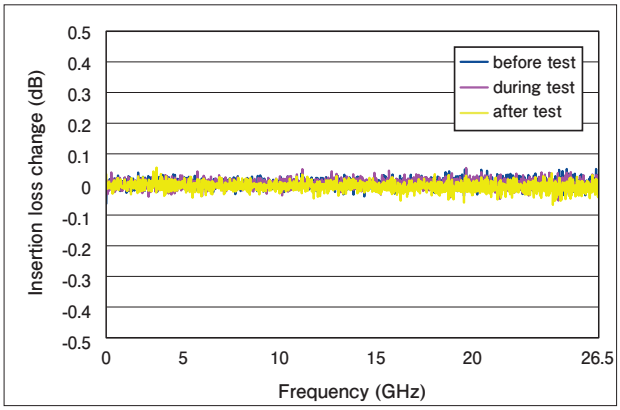
$(0.0077\times f(GHz)+0.2304\times\sqrt{f(GHz)}+0.02)\times L(m)$

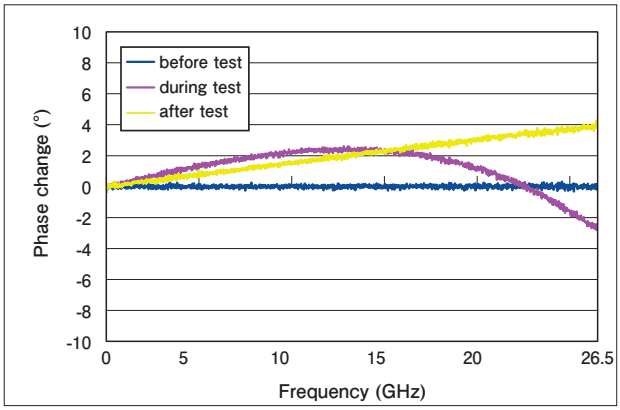
●Maximum insertion loss

$(0.0077\times f(GHz)+0.2304\times\sqrt{f(GHz)}+0.02)\times 1.12\times L(m)$

Static bending data (insertion loss, phase)

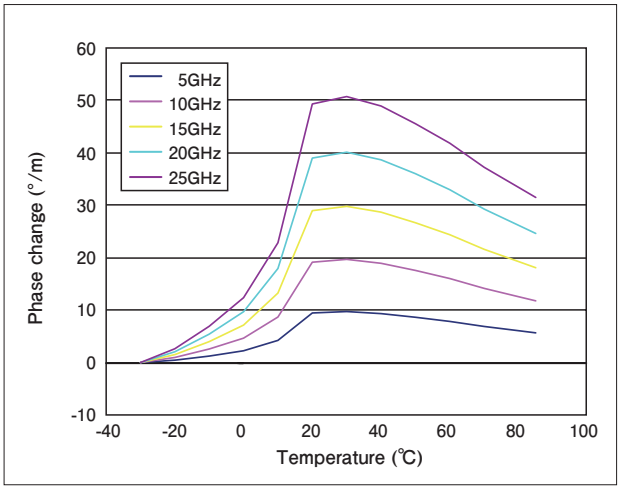
Bending radius: 20 mm





*The cable was wrapped 360° around a mandrel.

MWX221 Phase change vs. temperature



Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX241

DC~40.0 GHz

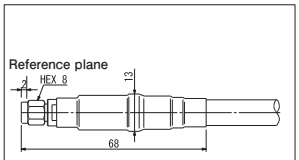
Basic Cable Properties

Electrical properties	
Maximum operating frequency	40.0 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	88 pF/m
Propagation delay (typ.)	4.35 ns/m
Shortening coefficient of wavelength (typ.)	77 %
Higher mode frequency (typ.)	40.5 GHz
VSWR (per connector/both ends of assy.)	1.197/1.43

Mechanical properties	Standard type (armored type)	Non-armored type/Custom-made
Cable outer diameter	9.5 mm	4.1 mm
Minimum bending radius (inner side)	20 mm	20 mm
Cable mass (typ.)	137 g/m	35 g/m
Continuous operating temperature range	-30~+85 ℃	-30~+85 ℃
Armored side pressure	—	196 N/cm

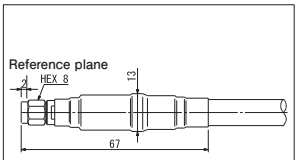
Connector

SMA (m) straight (Code:AMS)



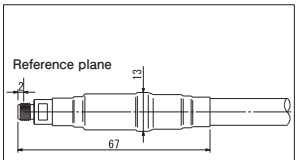
Maximum operating frequency:18.5 GHz
Mass:12 g

2.92 mm (m) straight (Code:KMS)



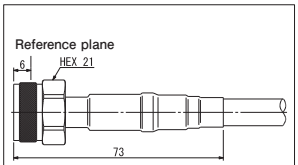
Maximum operating frequency:40.0 GHz
Mass:10 g

2.92 mm (f) straight (Code:KFS)



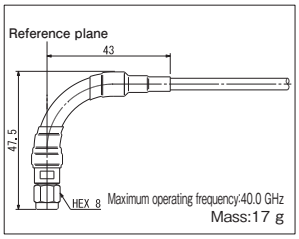
Maximum operating frequency:40.0 GHz
Mass:10 g

N (m) straight (Code:NMS)



Maximum operating frequency:18.0 GHz
Mass:42 g

2.92 mm (m) swept (custom-made)(*1)



Maximum operating frequency:40.0 GHz
Mass:17 g

(*1) Swept is not available to armored type.

Order form example

● Example 1 MWX241 Armored type (standard)

Assembly length : 1000 mm
Connector Ⅰ : 2.92 mm (m) straight
Connector Ⅱ : 2.92 mm (m) straight

Catalog No.:
MWX241-01000KMSKMS/B
(See P.32 "Connector combination codes")

● Example 2 MWX241 Armored type (standard)

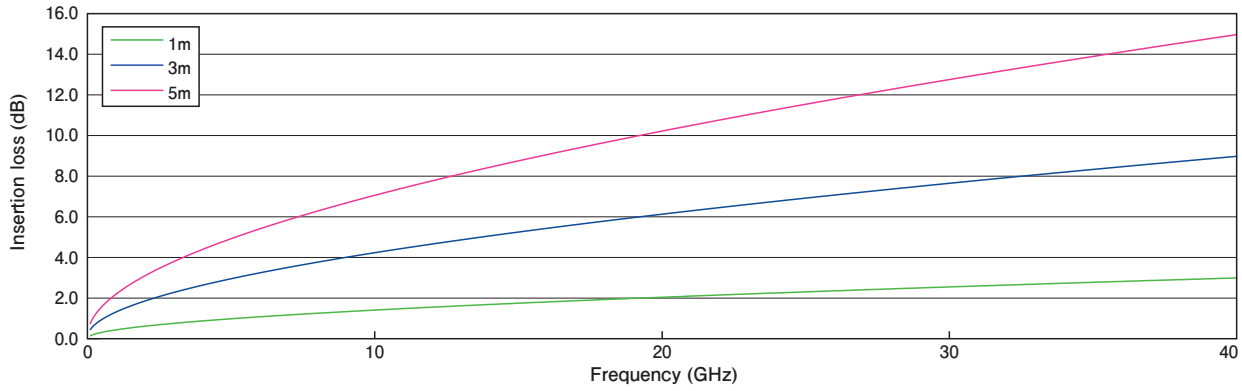
Assembly length : 1500 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : N (m) straight

Catalog No.:
MWX241-01000AMSNMS/B

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX241 Technical Data

Cable typical insertion loss



●Typical insertion loss

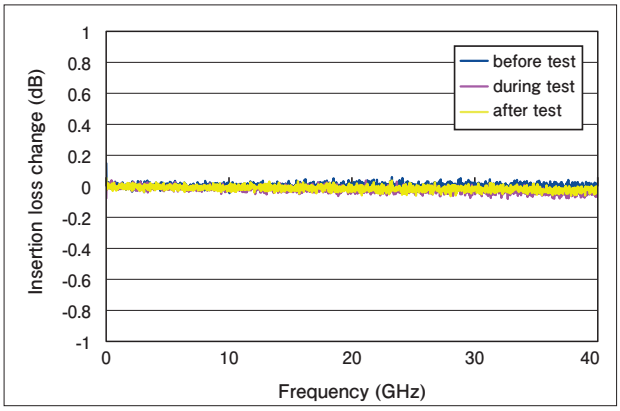
$(0.0095\times f(GHz)+0.41\times\sqrt{f(GHz)}+0.02)\times L(m)$

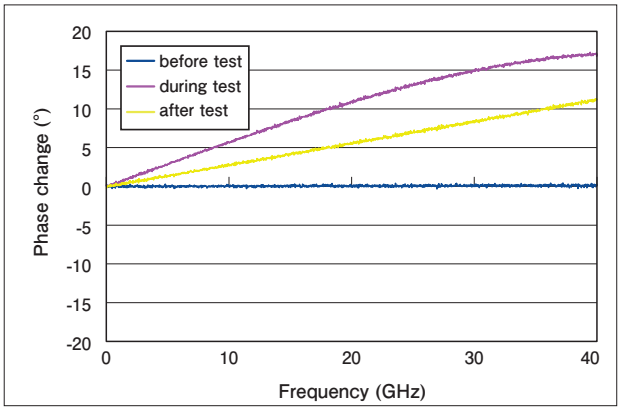
●Maximum insertion loss

$(0.0095\times f(GHz)+0.41\times\sqrt{f(GHz)}+0.02)\times 1.12\times L(m)$

Static bending data (insertion loss, phase)

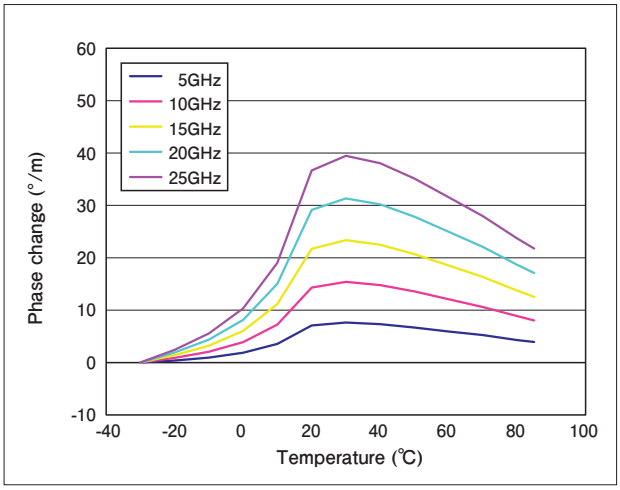
Bending radius: 20 mm





*The cable was wrapped 360° around a mandrel.

MWX241 Phase change vs. temperature



Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX251

DC~50.0 GHz

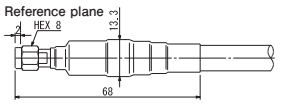
Basic Cable Properties

Electrical properties	
Maximum operating frequency	50.0 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	88 pF/m
Propagation delay (typ.)	4.36 nsec/m
Shortening coefficient of wavelength (typ.)	77 %
Higher mode frequency (typ.)	50.3 GHz
VSWR (per connector/both ends of assy.)	1.197/1.43

Mechanical properties	
Cable outer diameter	9.5 mm
Minimum bending radius (inner side)	20 mm
Cable mass (typ.)	129 g/m
Continuous operating temperature range	-30~+85 ℃
Armored side pressure	196 N/cm

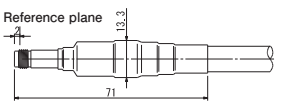
Connector

2.4 mm (m) straight (Code:LMS)



Maximum operating frequency:50.0 GHz
Mass:13 g

2.4 mm (f) straight (Code:LFS)



Maximum operating frequency:50.0 GHz
Mass:13 g

Order form example

●Example 1

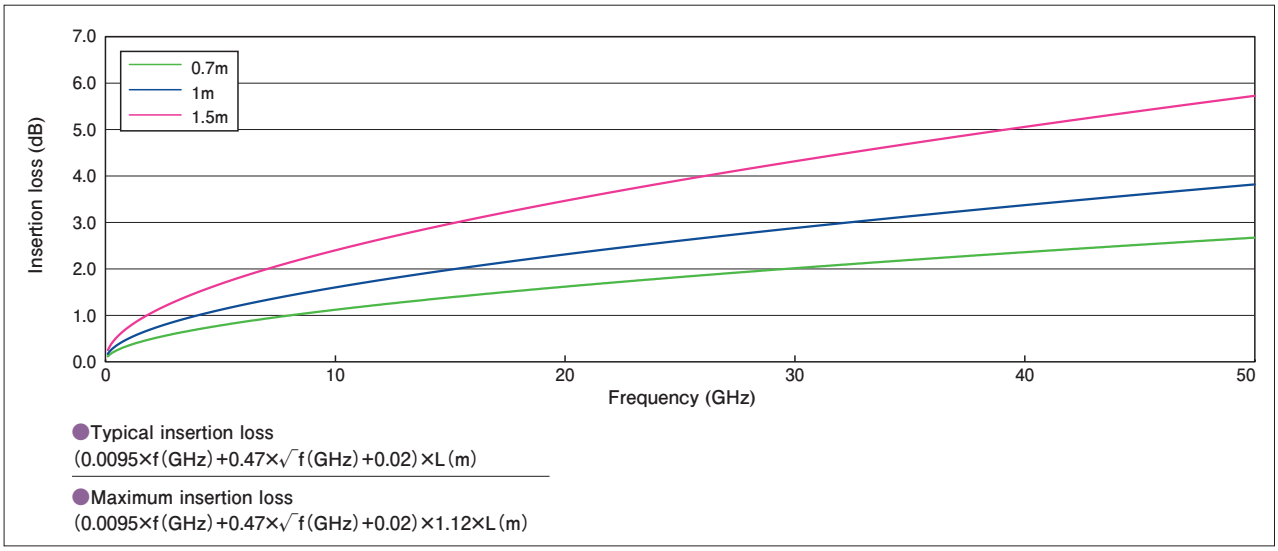
Assembly length : 1000 mm
Connector Ⅰ : 2.4 mm (m) straight
Connector Ⅱ : 2.4 mm (m) straight

Catalog No.:
MWX251-01000LMSLMS/B
(See P.32 "Connector combination codes")

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX251 Technical Data

Cable typical insertion loss

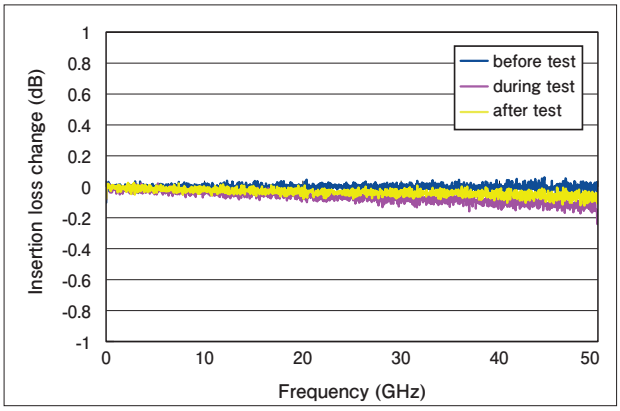


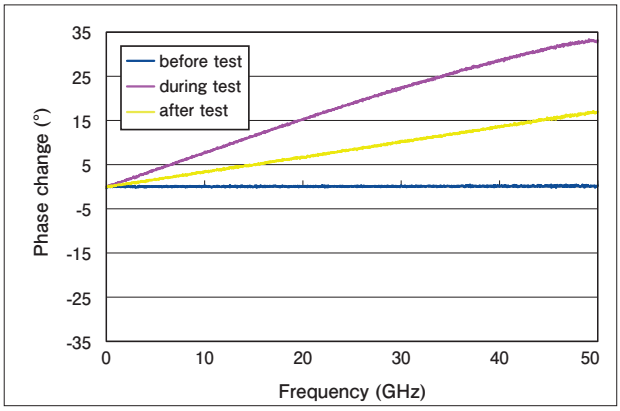
●Typical insertion loss
$(0.0095\times f(GHz)+0.47\times\sqrt{f(GHz)}+0.02)\times L(m)$

●Maximum insertion loss
$(0.0095\times f(GHz)+0.47\times\sqrt{f(GHz)}+0.02)\times 1.12\times L(m)$

Static bending data (insertion loss, phase)

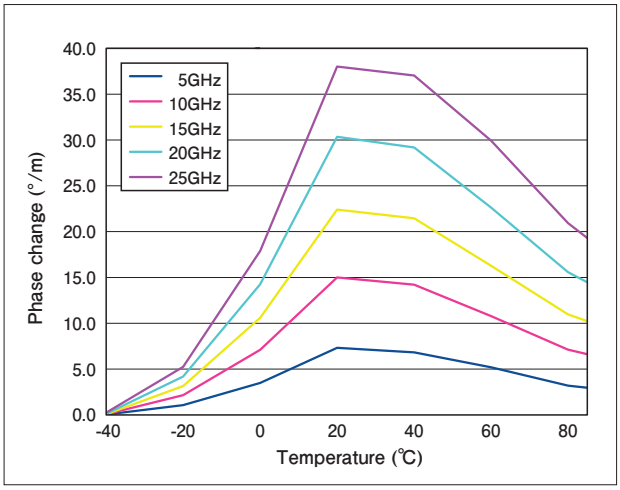
Bending radius: 20 mm





*The cable was wrapped 360° around a mandrel.

MWX251 Phase change vs. temperature



Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX261

DC~67.0 GHz

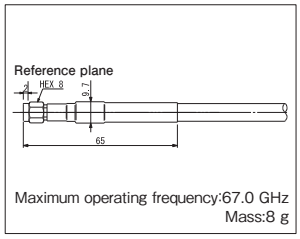
Basic Cable Properties

Electrical properties	
Maximum operating frequency	67.0 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	90 pF/m
Propagation delay (typ.)	4.38 nsec/m
Shortening coefficient of wavelength (typ.)	76 %
Higher mode frequency (typ.)	67.0 GHz~
VSWR (per connector/both ends of assy.)	1.197/1.43

Mechanical properties	
Cable outer diameter	7.7 mm
Minimum bending radius (inner side)	20 mm
Cable mass (typ.)	75 g/m
Continuous operating temperature range	-30~+85 ℃
Armored side pressure	196 N/cm

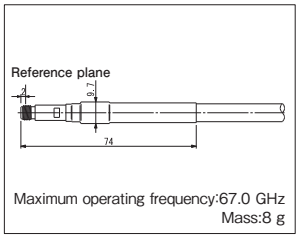
Connector

1.85 mm (m) straight (Code:VMS)



Maximum operating frequency:67.0 GHz
Mass:8 g

1.85 mm (f) straight (Code:VFS)



Maximum operating frequency:67.0 GHz
Mass:8 g

Order form example

●Example 1

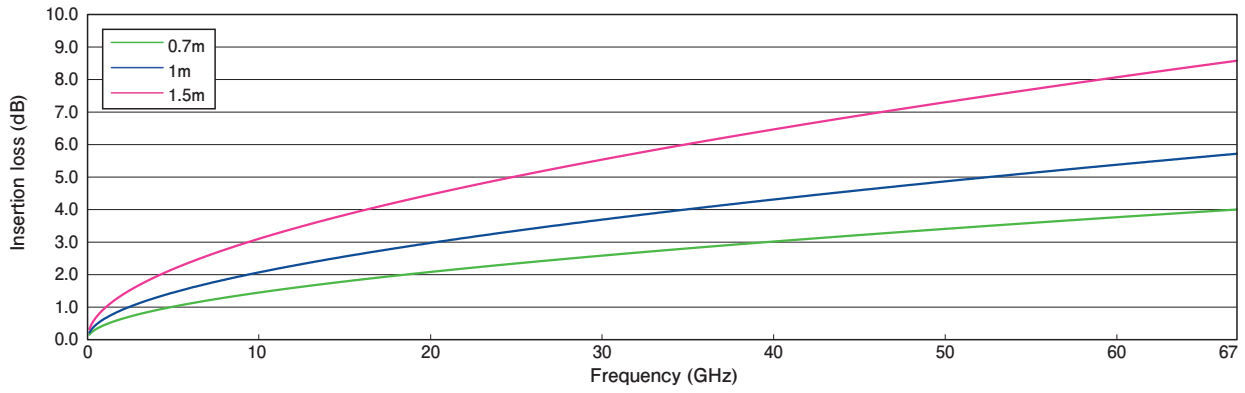
Assembly length : 1000 mm
Connector Ⅰ : 1.85 mm (m) straight
Connector Ⅱ : 1.85 mm (m) straight

Catalog No.:
MWX261-01000VMSVMS/B
(See P.32 "Connector combination codes")

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX261 Technical Data

Cable typical insertion loss

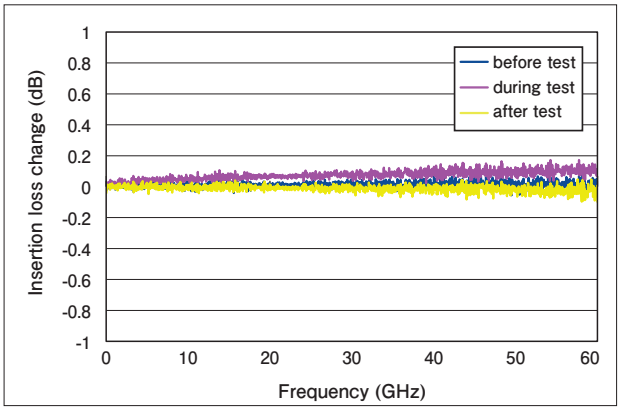


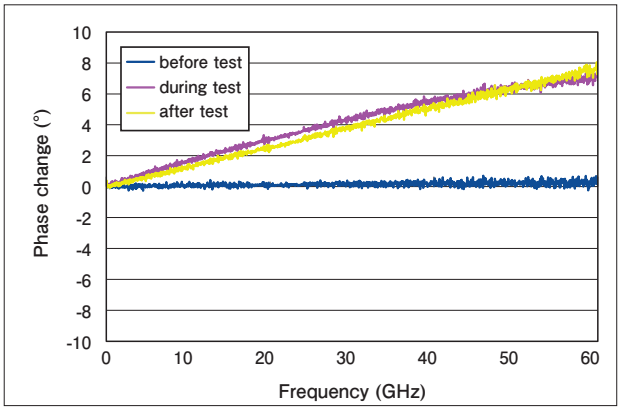
●Typical insertion loss
$(0.0095\times f(GHz)+0.6148\times\sqrt{f(GHz)}+0.02)\times L(m)$

●Maximum insertion loss
$(0.0095\times f(GHz)+0.6148\times\sqrt{f(GHz)}+0.02)\times 1.12\times L(m)$

Static bending data (insertion loss, phase)

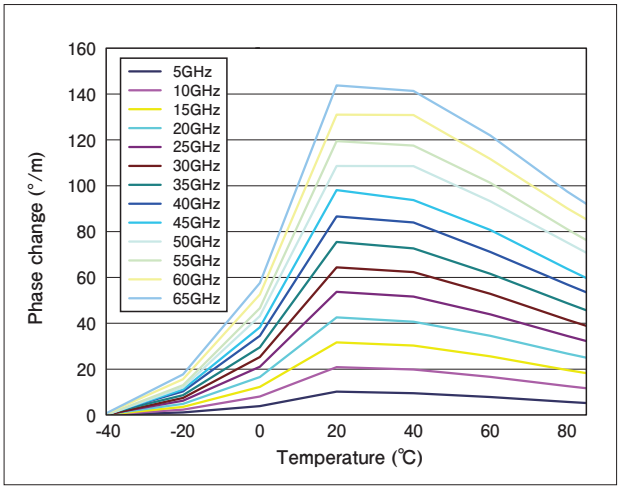
Bending radius: 20 mm





*The cable was wrapped 360° around a mandrel.

MWX261 Phase change vs. temperature



Option

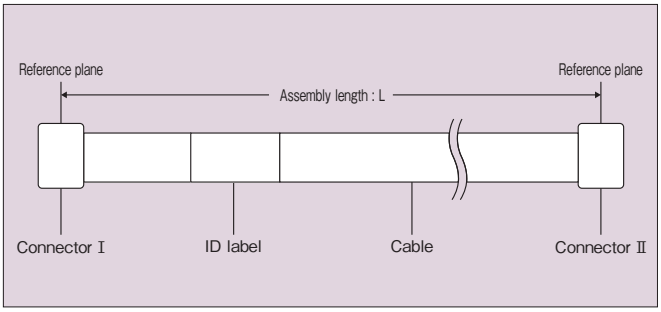
●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX2 Series

Placing orders

Catalog number



Note 1) The unit of assembly length is mm.
Shown as a five-digit number. If the number consists of fewer than five digits, remember to add zero (s) to the left of the first digit to make it five digits.
The assembly length is measured based on the reference planes, not on the connector ends, shown at the figure to the left.

Note 2) Armored-type cables will have a "/B" appended to the connector combination code.
No appended to the connector combination code when cables are not armored type.

Example 1)

MWX221-01000 DMS DMS

Cable·····MWX221
Assembly length·····1000 mm
Connector Ⅰ ···3.5 mm (m) straight
Connector Ⅱ ···3.5 mm (m) straight

Example 2)

MWX241-02000 KMS KMS /B

Cable·····MWX241
Assembly length·····2000 mm
Connector Ⅰ ···2.92 mm (m) straight
Connector Ⅱ ···2.92 mm (m) straight
Armored·····Armored-type

Connector combination codes

Connector Ⅰ / Connector Ⅱ			SMA	SMA swept	N	N swept	3.5 mm	3.5 mm	3.5 mm swept	2.92 mm	2.92 mm	2.4 mm	2.4 mm	1.85 mm	1.85 mm
			m	m	m	m	m	f	m	m	f	m	f	m	f
			AMS	AMW	NMS	NMW	DMS	DFS	DMW	KMS	KFS	LMS	LFS	VMS	VFS
SMA	m	AMS	AMSAMS	AMSAMW	AMSNMS	AMSNMW	AMSDMS	AMSDFS	AMSDMW	AMSKMS	AMSKFS	—	—	—	—
SMA swept	m	AMW	—	AMWAMW	AMWNMS	AMWNMW	AMWDMS	AMWDFS	AMWDMW	—	—	—	—	—	—
N	m	NMS	—	—	NMSNMS	NMSNMW	DMSNMS	DFSNMS	DMWNMS	KMSNMS	KFSNMS	—	—	—	—
N swept	m	NMW	—	—	—	NMWNMW	NMWDMS	NMWDFS	NMWDMW	—	—	—	—	—	—
3.5 mm	m	DMS	—	—	—	—	DMSDMS	DFSDMS	DMSDMW	—	—	—	—	—	—
3.5 mm	f	DFS	—	—	—	—	—	DFSDFS	DFSDMW	—	—	—	—	—	—
3.5 mm swept	m	DMW	—	—	—	—	—	—	DMWDMW	—	—	—	—	—	—
2.92 mm	m	KMS	—	—	—	—	—	—	—	KMSKMS	KFSKMS	—	—	—	—
2.92 mm	f	KFS	—	—	—	—	—	—	—	—	KFSKFS	—	—	—	—
2.4 mm	m	LMS	—	—	—	—	—	—	—	—	—	LMSLMS	LFSLMS	—	—
2.4 mm	f	LFS	—	—	—	—	—	—	—	—	—	—	LFSLFS	—	—
1.85 mm	m	VMS	—	—	—	—	—	—	—	—	—	—	—	VMSVMS	VFSVMS
1.85 mm	f	VFS	—	—	—	—	—	—	—	—	—	—	—	—	VFSVFS

Please provide a catalog number when placing an order.
m : male (plug)
f : female (jack)

Delivery time of MWX2 Series

Stocks of MWX221

We have following items in stock. We can ship these items immediately.

MWX221-00500AMSAMS (L:500 mm, Connector:both ends SMA (m))

MWX221-01000AMSAMS (L:1000 mm, Connector:both ends SMA (m))

MWX221-00500DMSDMS (L:500 mm, Connector:both ends 3.5 mm (m))

MWX221-01000DMSDMS (L:1000 mm, Connector:both ends 3.5 mm (m))

Delivery time of the other items

MWX2 series will be shipped within 7 business days after received order.

*Leadtime may be effected by larger order volume.

MWX3 Series
Cable assemblies for equipment wiring

The MWX3 series cable assemblies use a porous PTFE dielectric material to ensure excellent phase stability against temperature fluctuations.
(Continuous operating temperature range: -65 °C to 125 °C (-30 °C to 85 °C for MWX315))
We offer seven types of cables with varying maximum operating frequencies (18.5 GHz, 26.5 GHz, 40 GHz) and insertion loss values.

How to select

1.Simple criteria for cable selection

- Insertion loss:The larger the cable outer diameter, the lower the insertion loss.
- Frequency range:The smaller the cable, the higher the higher mode frequency.
- Power rating:The larger the cable outer diameter, the higher the power rating.
- Flexibility:The smaller the cable, the better the flexibility.
- Mass:The smaller the cable, the lighter the cable.

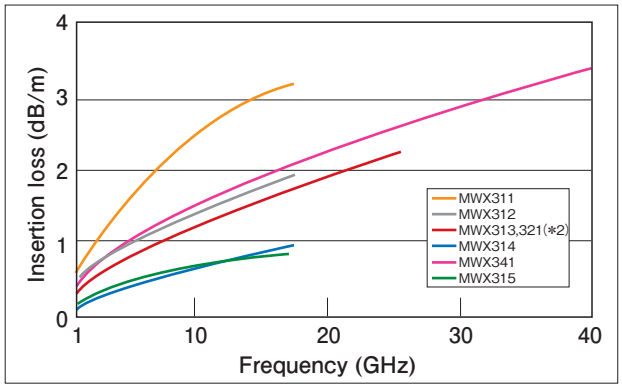
2.Simple criteria for connector selection

- Choose a suitable connector for your measuring instrument.
- The smaller the connector, the higher the maximum operating frequency.
- The larger the connector, the higher the power rating.

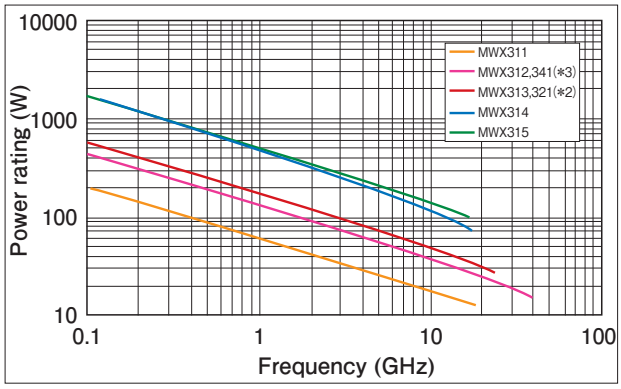
3.Power rating

The diagram to the below shows the relationship between frequency and power rating. The values are calculated at 25 ℃ and at sea level. The power rating will need to be corrected for different ambient temperatures and altitude. Power ratings may decrease, depending on the connector selected.

MWX3 series typical insertion loss

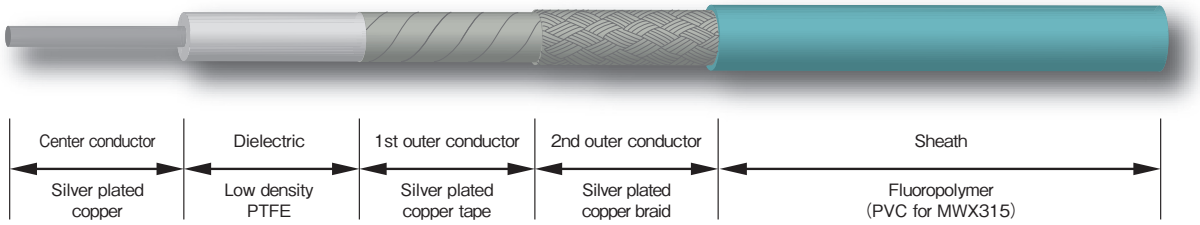


Power rating of MWX3 series at sea level



(*1) The above figures are measured values for reference only.
(*2) MWX313:~18.5 GHz, MWX321:~26.5 GHz
(*3) MWX312:~18.5 GHz, MWX341:~40.0 GHz

Cable design



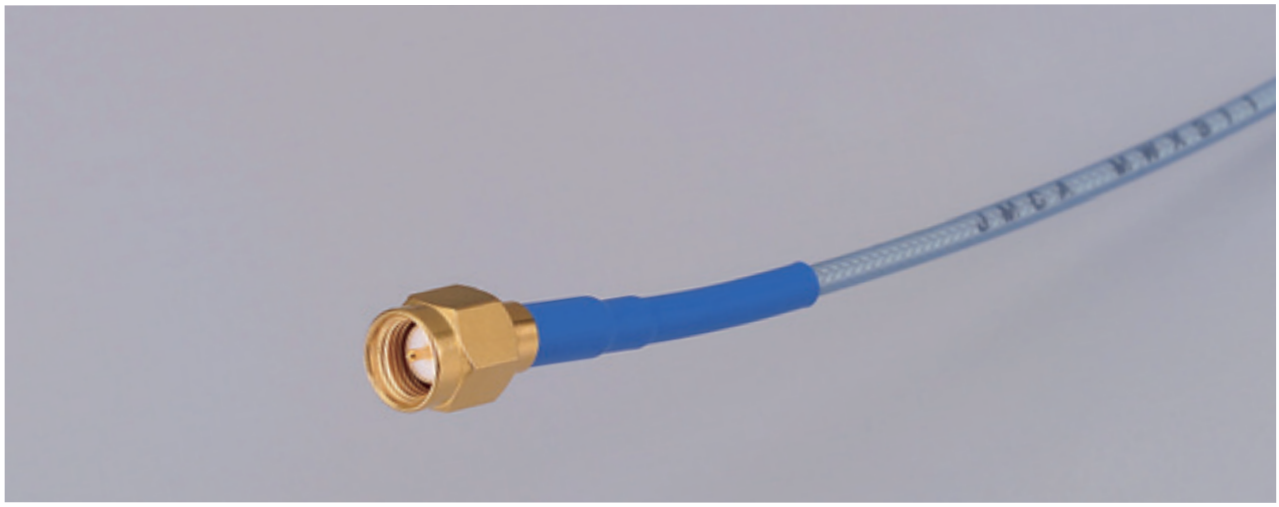
Connector compatibility

Cable type	Cable maximum operating frequency (GHz)	Compatible connector							
		10.0 GHz	15.0 GHz	18.5 GHz				26.5 GHz	40.0 GHz
		SMA (m) right angle	TNC (m)	SMA (m)	SMA (f)	SSMA (m)	N (m)	3.5 mm (m)	SMA (m)
MWX311	18.5 GHz	●		●	●	●			
MWX312		●	●	● (*4)	●		●		
MWX313		●	●	● (*4)	●		●	● (18.5 GHz)	
MWX314			● (18.5 GHz)	●			●		
MWX315	18.0 GHz			● (18.0 GHz)			● (18.0 GHz)		
MWX321	26.5 GHz			● (26.5 GHz)(*5)				●	
MWX341	40.0 GHz								● (*6)

(*4) Phase Matching Connector is also available upon the requirement.
(*5)(*6) Those SMA(m) connectors are uniquely developed by Junkosha, which specified to be used for 26.5 GHz and 40 GHz.

MWX311

DC~18.5 GHz



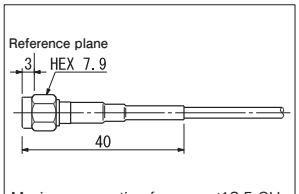
Basic Cable Properties

Electrical properties	
Maximum operating frequency	18.5 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	86 pF/m
Propagation delay (typ.)	4.25 nsec/m
Shortening coefficient of wavelength (typ.)	79 %
Higher mode frequency (typ.)	75.0 GHz
VSWR (per connector/both ends of assy.)	1.182/1.40

Mechanical properties	
Cable outer diameter	2.7 mm
Minimum bending radius (inner side)	10 mm
Maximum tensile strength	29.4 N (3 kgf)
Cable mass (typ.)	18.5 g/m
Continuous operating temperature range	-65~+125 ℃

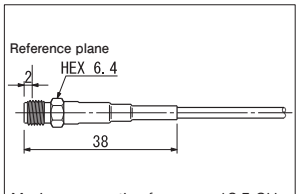
Connector

SMA (m) straight (Code:AMS)



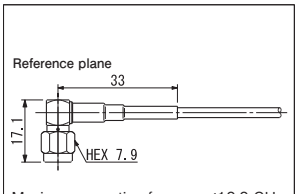
Maximum operating frequency:18.5 GHz
Mass:3 g

SMA (f) straight (Code:AFS)



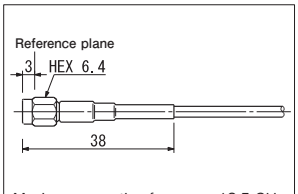
Maximum operating frequency:18.5 GHz
Mass:3 g

SMA (m) right angle (Code:AMR)



Maximum operating frequency:10.0 GHz
Mass:5 g

SSMA (m) straight (Code:SMS)



Maximum operating frequency:18.5 GHz
Mass:3 g

Order form example

●Example 1

Assembly length : 1000 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : SMA (m) straight

Catalog No.:
MWX311-01000AMSAMS
(See P.50 "Connector combination codes")

●Example 2

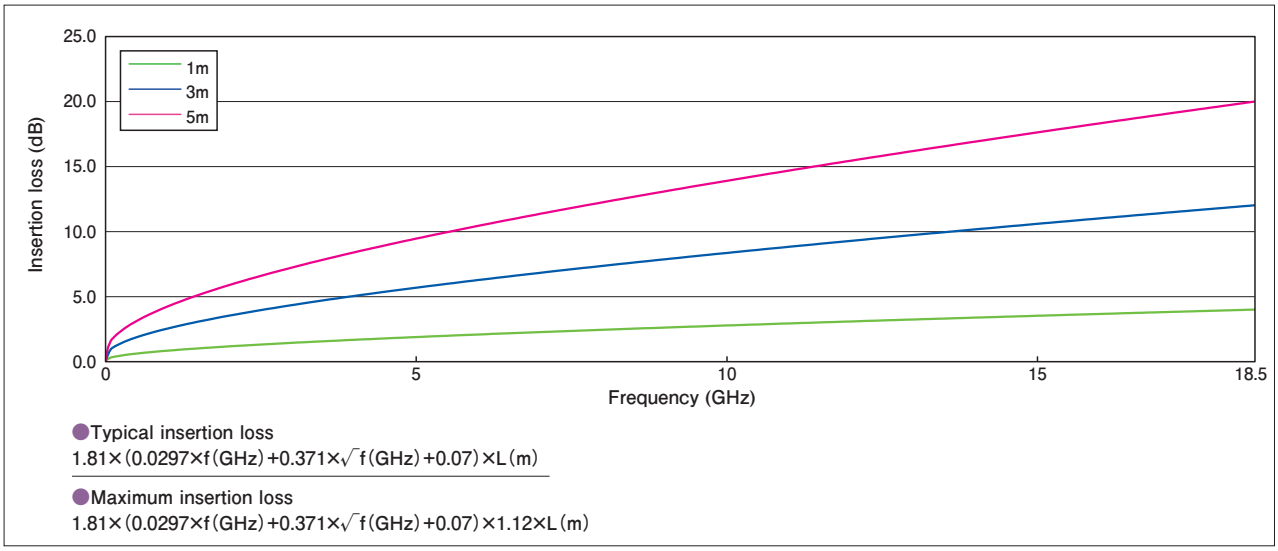
Assembly length : 1500 mm
Connector Ⅰ : SMA (f) straight
Connector Ⅱ : SMA (m) right angle

Catalog No.:
MWX311-01500AFSAMR

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX311 Technical Data

Cable typical insertion loss



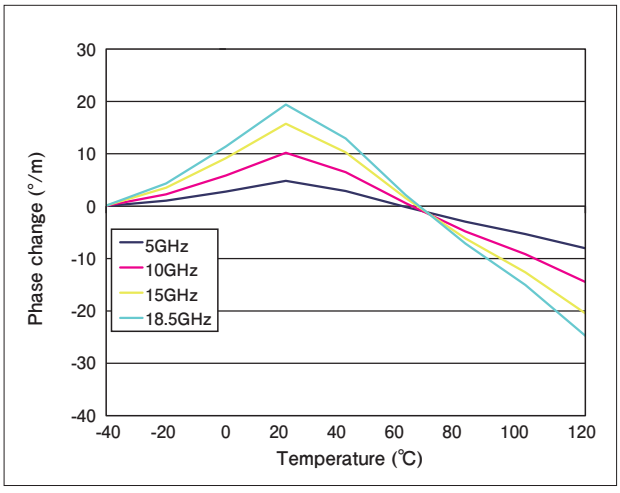
●Typical insertion loss

$1.81\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times L(m)$

●Maximum insertion loss

$1.81\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times 1.12\times L(m)$

MWX311 Phase change vs. temperature



Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX312 DC~18.5 GHz

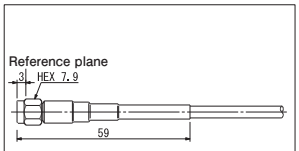
Basic Cable Properties

Electrical properties	
Maximum operating frequency	18.5 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	82 pF/m
Propagation delay (typ.)	4.10 nsec/m
Shortening coefficient of wavelength (typ.)	81 %
Higher mode frequency (typ.)	44.0 GHz
VSWR (per connector/both ends of assy.)	1.182/1.40

Mechanical properties	
Cable outer diameter	4.1 mm
Minimum bending radius (inner side)	20 mm
Maximum tensile strength	98 N (10 kgf)
Cable mass (typ.)	42 g/m
Continuous operating temperature range	-65~+125 ℃

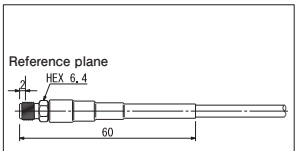
Connector

SMA (m) straight (Code:AMS)(*1)



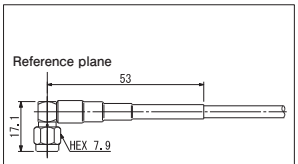
Maximum operating frequency:18.5 GHz
Mass:3 g

SMA (f) straight (Code:AFS)



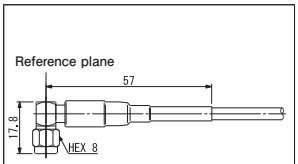
Maximum operating frequency:18.5 GHz
Mass:3 g

SMA (m) right angle (Code:AMR)



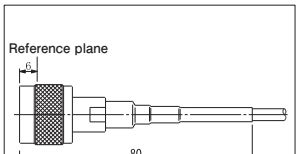
Maximum operating frequency:10.0 GHz
Mass:5 g

SMA (m) right angle (Code:AMH)



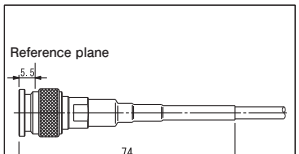
Maximum operating frequency:18.0 GHz
Mass:12 g

N (m) straight (Code:NMS)



Maximum operating frequency:18.5 GHz
Mass:39 g

TNC (m) straight (Code:CMS)



Maximum operating frequency:15.0 GHz
Mass:21 g

(*1) Phase Matching Connector is also available upon the requirement.

Order form example

●Example 1

Assembly length : 1200 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : SMA (m) straight

Catalog No.:
MWX312-01200AMSAMS
(See P.50 "Connector combination codes")

●Example 2

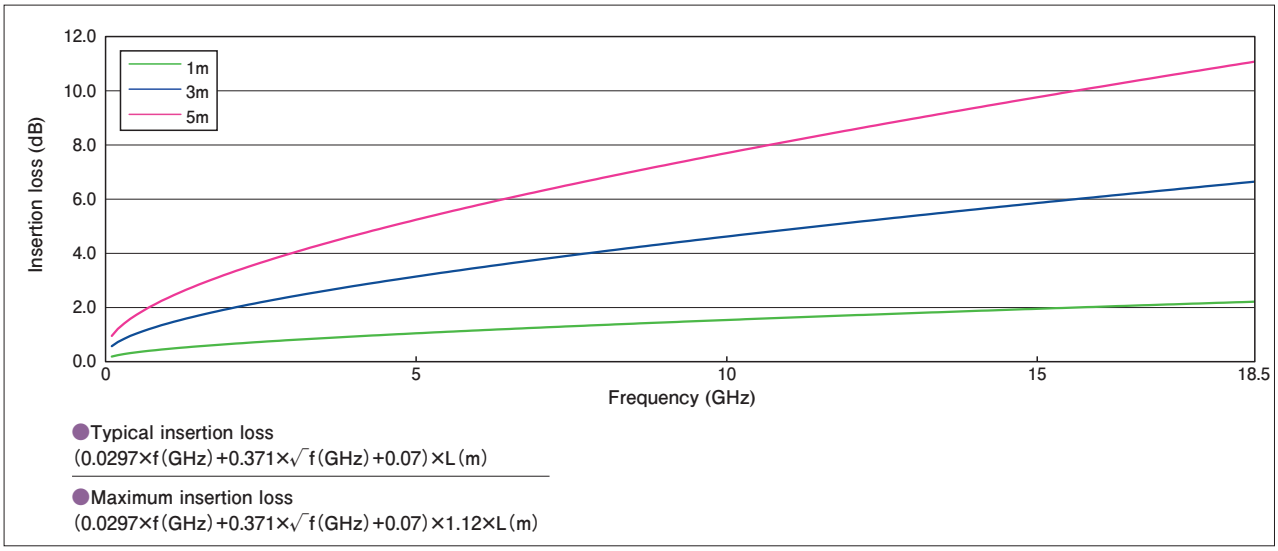
Assembly length : 1000 mm
Connector Ⅰ : SMA (f) straight
Connector Ⅱ : N (m) straight

Catalog No.:
MWX312-01000AFSNMS

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX312 Technical Data

Cable typical insertion loss



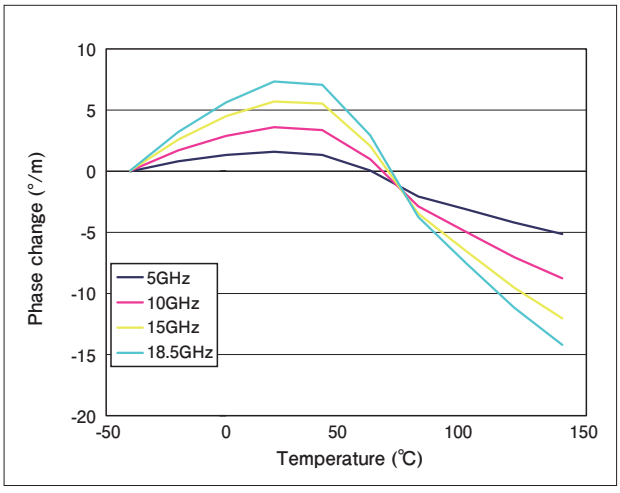
●Typical insertion loss

$(0.0297 \times f(GHz) + 0.371 \times \sqrt{f(GHz)} + 0.07) \times L(m)$

●Maximum insertion loss

$(0.0297 \times f(GHz) + 0.371 \times \sqrt{f(GHz)} + 0.07) \times 1.12 \times L(m)$

MWX312 Phase change vs. temperature



Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX313 DC~18.5 GHz

Basic Cable Properties

Electrical properties	
Maximum operating frequency	18.5 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	80 pF/m
Propagation delay (typ.)	4.05 nsec/m
Shortening coefficient of wavelength (typ.)	82 %
Higher mode frequency (typ.)	37.0 GHz
VSWR (per connector/both ends of assy.)	1.182/1.40

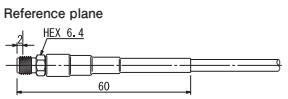
Mechanical properties	
Cable outer diameter	4.1 mm
Minimum bending radius (inner side)	30 mm
Maximum tensile strength	98 N (10 kgf)
Cable mass (typ.)	52 g/m
Continuous operating temperature range	-65~+125 ℃

Connector

SMA (m) straight (Code:AMS)(*1)

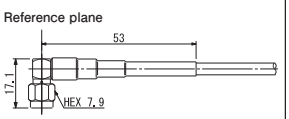
Maximum operating frequency:18.5 GHz
Mass:3 g

SMA (f) straight (Code:AFS)



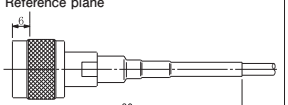
Maximum operating frequency:18.5 GHz
Mass:3 g

SMA (m) right angle (Code:AMR)



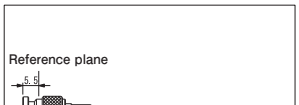
Maximum operating frequency:10.0 GHz
Mass:5 g

N (m) straight (Code:NMS)



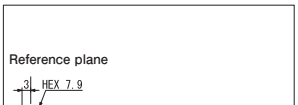
Maximum operating frequency:18.5 GHz
Mass:39 g

TNC (m) straight (Code:CMS)



Maximum operating frequency:15.0 GHz
Mass:21 g

3.5 mm (m) straight (Code:DMS)



Maximum operating frequency:18.5 GHz
Mass:13 g

(*1) Phase Matching Connector is also available upon the requirement.

Order form example

●Example 1

Assembly length : 1000 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : SMA (m) straight

Catalog No.:
MWX313-01000AMSAMS
(See P.50 "Connector combination codes")

●Example 2

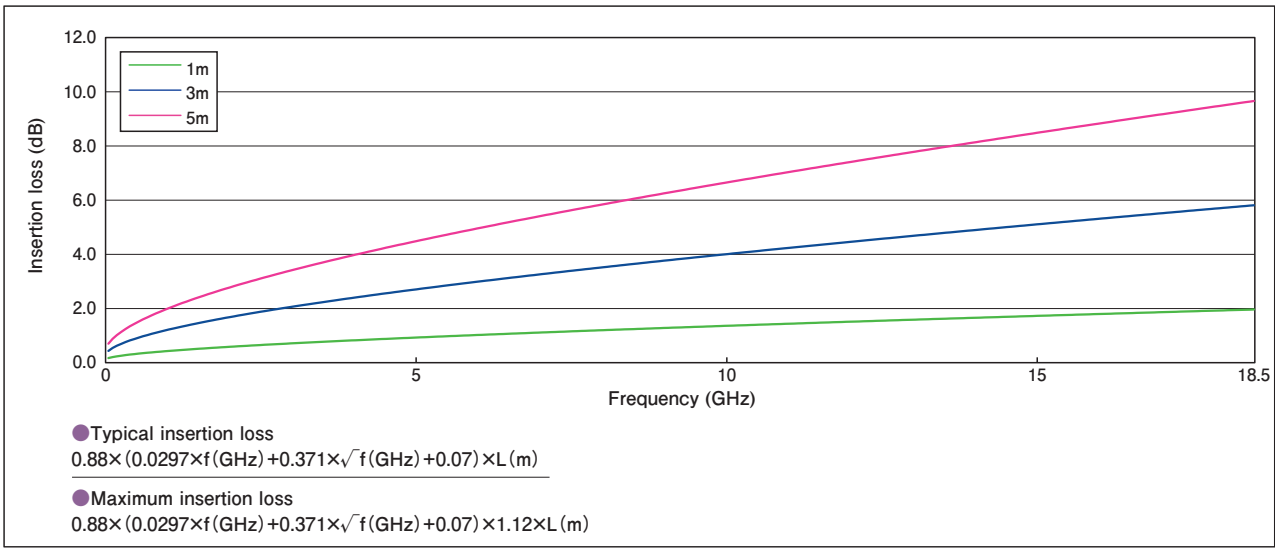
Assembly length : 1500 mm
Connector Ⅰ : SMA (f) straight
Connector Ⅱ : SMA (m) right angle

Catalog No.:
MWX313-01500AFSAMR

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX313 Technical Data

Cable typical insertion loss



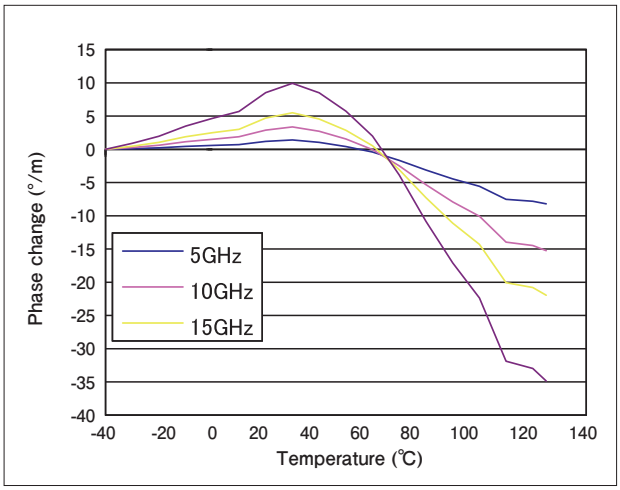
●Typical insertion loss

$0.88\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times L(m)$

●Maximum insertion loss

$0.88\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times 1.12\times L(m)$

MWX313 Phase change vs. temperature

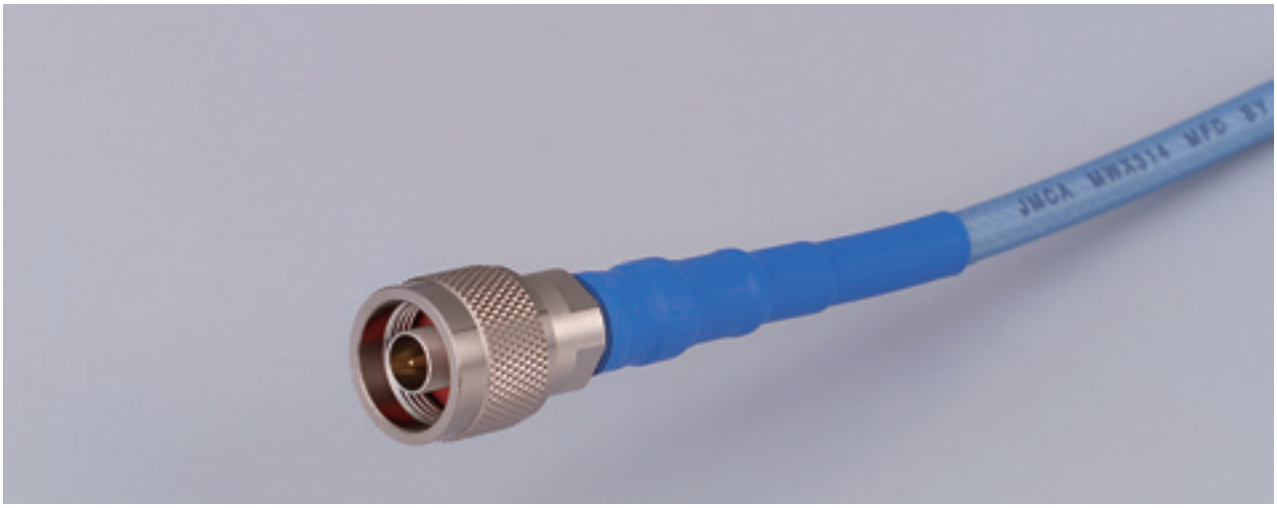


Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX314 DC~18.5 GHz



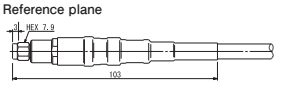
Basic Cable Properties

Electrical properties	
Maximum operating frequency	18.5 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	78 pF/m
Propagation delay (typ.)	3.95 nsec/m
Shortening coefficient of wavelength (typ.)	84 %
Higher mode frequency (typ.)	19.0 GHz
VSWR (per connector/both ends of assy.)	1.182/1.40

Mechanical properties	
Cable outer diameter	7.7 mm
Minimum bending radius (inner side)	40 mm
Maximum tensile strength	294 N (30 kgf)
Cable mass (typ.)	125 g/m
Continuous operating temperature range	-65~+125 ℃

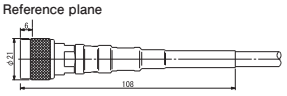
Connector

SMA (m) straight (Code:AMS)



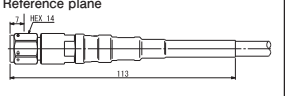
Maximum operating frequency:18.5 GHz
Mass:39 g

N (m) straight (Code:NMS)



Maximum operating frequency:18.5 GHz
Mass:53 g

TNC (m) straight (Code:CMS)



Maximum operating frequency:18.5 GHz
Mass:42 g

Order form example

●Example 1

Assembly length : 1000 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : SMA (m) straight

Catalog No.:
MWX314-01000AMSAMS
(See P.50 "Connector combination codes")

●Example 2

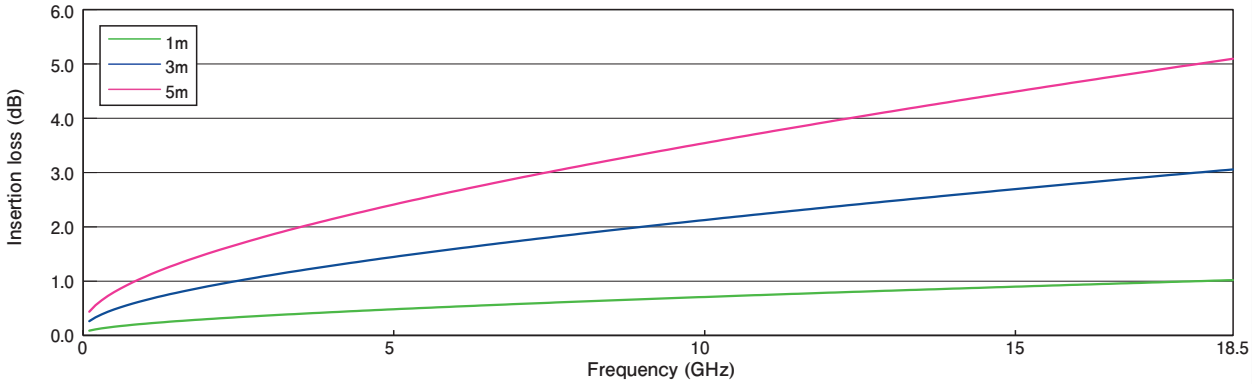
Assembly length : 1500 mm
Connector Ⅰ : N (m) straight
Connector Ⅱ : N (m) straight

Catalog No.:
MWX314-01500NMSNMS

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX314 Technical Data

Cable typical insertion loss



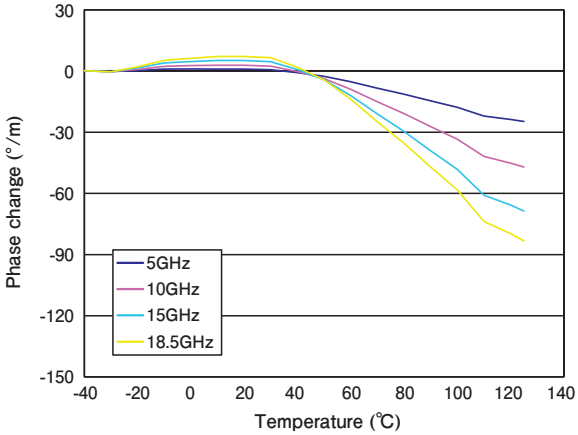
●Typical insertion loss

$0.46\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times L(m)$

●Maximum insertion loss

$0.46\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times 1.12\times L(m)$

MWX314 Phase change vs. temperature



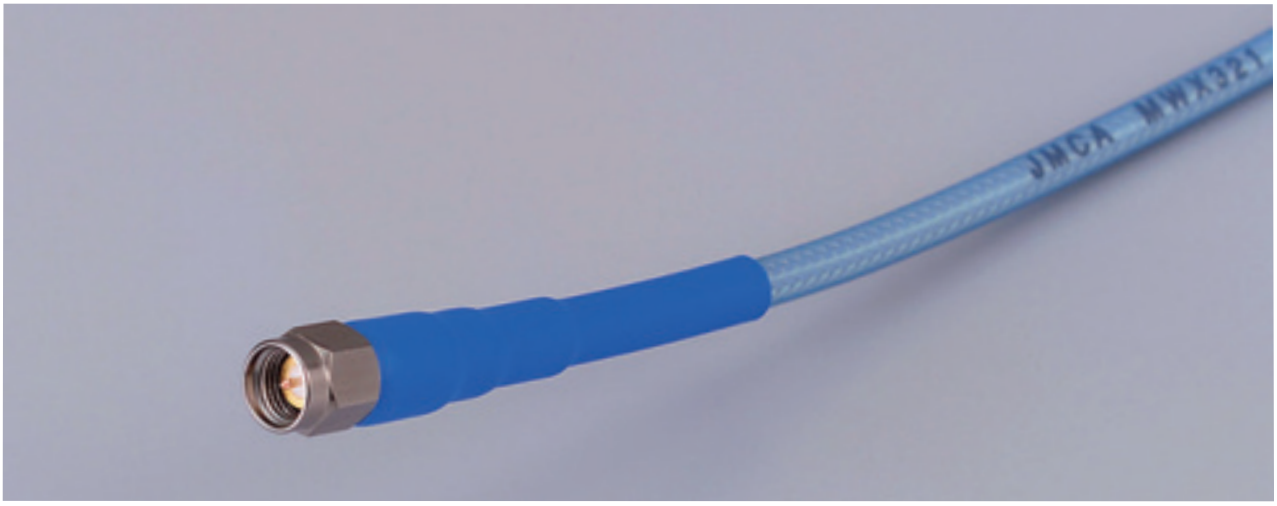
Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX321

DC~26.5 GHz



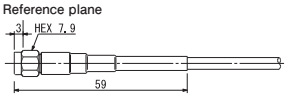
Basic Cable Properties

Electrical properties	
Maximum operating frequency	26.5 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	80 pF/m
Propagation delay (typ.)	4.05 nsec/m
Shortening coefficient of wavelength (typ.)	82 %
Higher mode frequency (typ.)	37.0 GHz
VSWR (per connector/both ends of assy.)	1.202/1.44

Mechanical properties	
Cable outer diameter	4.7 mm
Minimum bending radius (inner side)	30 mm
Maximum tensile strength	98 N (10 kgf)
Cable mass (typ.)	52 g/m
Continuous operating temperature range	-65~+125 ℃

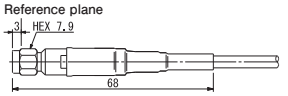
Connector

SMA (m) straight (Code:AMS)



Maximum operating frequency:26.5 GHz
Mass:3 g

3.5 mm (m) straight (Code:DMS)



Maximum operating frequency:26.5 GHz
Mass:13 g

Order form example

●Example 1

Assembly length : 1100 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : SMA (m) straight

Catalog No.:
MWX321-01100AMSAMS
(See P.50 "Connector combination codes")

●Example 2

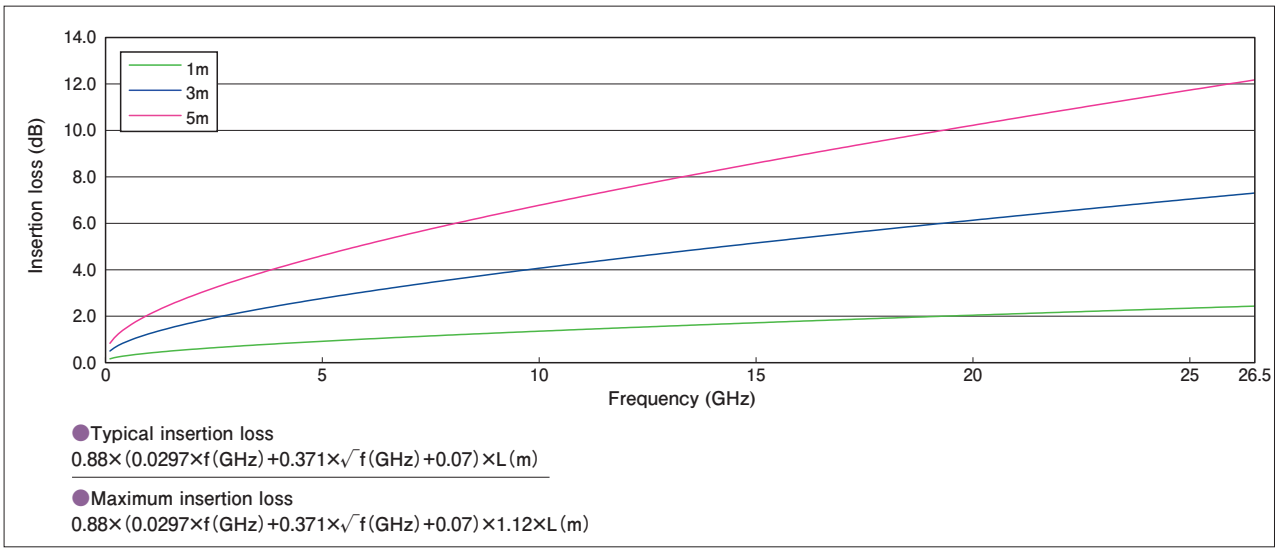
Assembly length : 1500 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : 3.5 mm (m) straight

Catalog No.:
MWX321-01500AMSDMS

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX321 Technical Data

Cable typical insertion loss



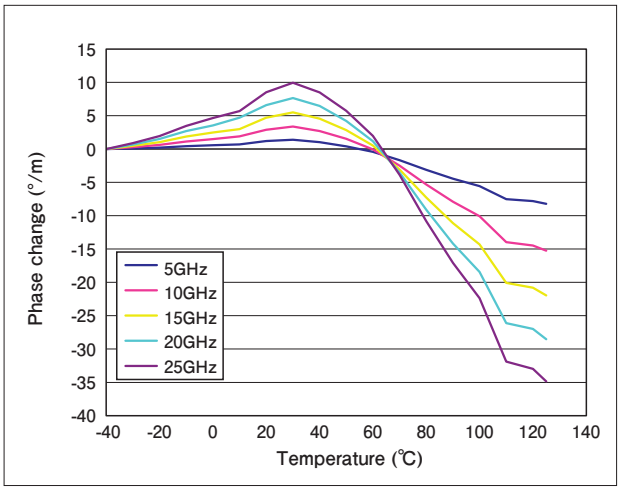
●Typical insertion loss

$0.88\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times L(m)$

●Maximum insertion loss

$0.88\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times 1.12\times L(m)$

MWX321 Phase change vs. temperature

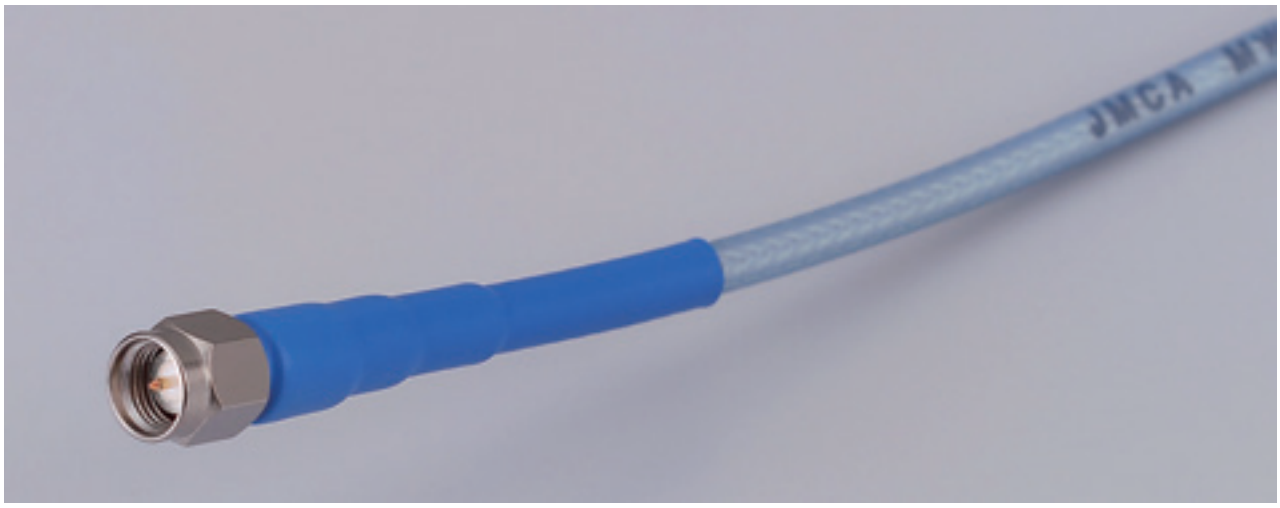


Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX341 DC~40.0 GHz



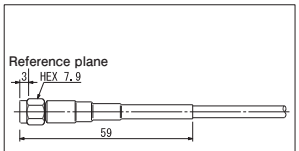
Basic Cable Properties

Electrical properties	
Maximum operating frequency	40.0 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	80 pF/m
Propagation delay (typ.)	4.05 nsec/m
Shortening coefficient of wavelength (typ.)	82 %
Higher mode frequency (typ.)	46.0 GHz
VSWR (per connector/both ends of assy.)	1.197/1.43

Mechanical properties	
Cable outer diameter	4.0 mm
Minimum bending radius (inner side)	20 mm
Maximum tensile strength	98 N (10 kgf)
Cable mass (typ.)	40 g/m
Continuous operating temperature range	-65~+125 ℃

Connector

SMA (m) straight (Code:AMS)



Maximum operating frequency:40.0 GHz
Mass:3 g

Order form example

●Example 1

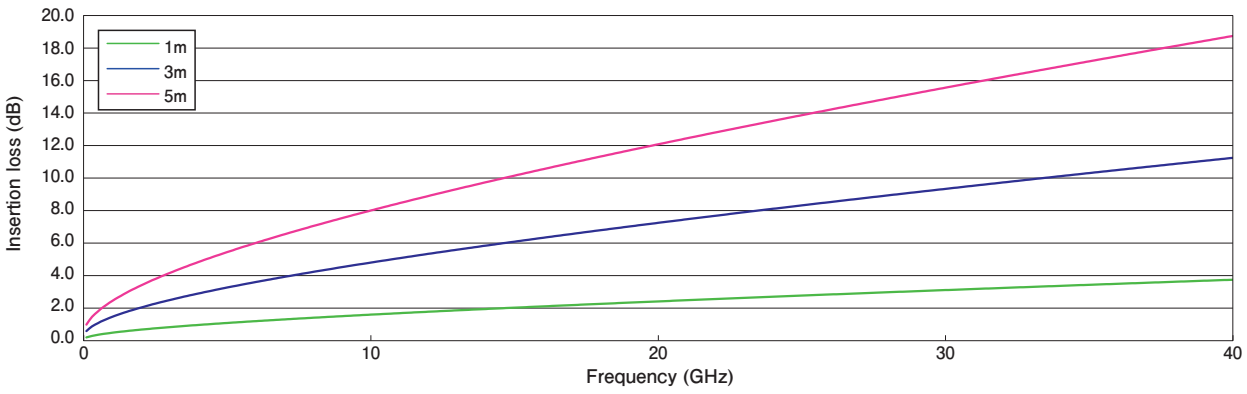
Assembly length : 1200 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : SMA (m) straight

Catalog No.:
MWX341-01200AMSAMS
(See P.50 "Connector combination codes")

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX341 Technical Data

Cable typical insertion loss



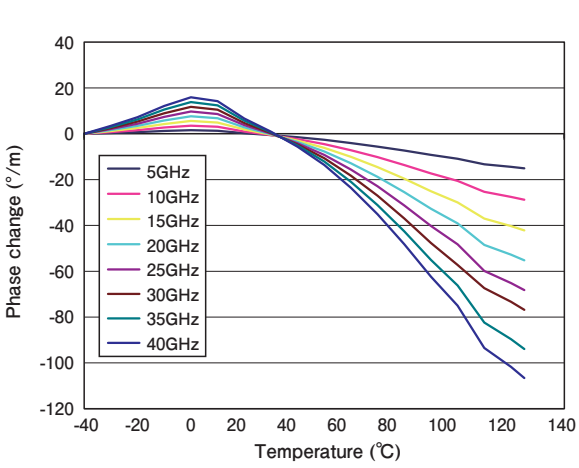
●Typical insertion loss

$1.04\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times L(m)$

●Maximum insertion loss

$1.04\times(0.0297\times f(GHz)+0.371\times\sqrt{f(GHz)}+0.07)\times 1.12\times L(m)$

MWX341 Phase change vs. temperature



Option

●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX315 DC~18.0 GHz

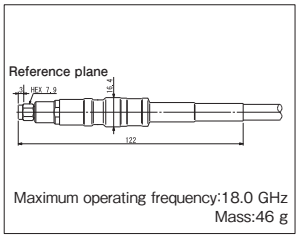
Basic Cable Properties

Electrical properties	
Maximum operating frequency	18.0 GHz
Characteristic impedance	50±1 Ω
Capacitance (typ.)	88 pF/m
Propagation delay (typ.)	4.3 nsec/m
Shortening coefficient of wavelength (typ.)	77 %
Higher mode frequency (typ.)	18.5 GHz
VSWR (per connector/both ends of assy.)	1.182/1.40

Mechanical properties	
Cable outer diameter	8.6 mm
Minimum bending radius (inner side)	30 mm
Maximum tensile strength	255 N (26 kgf)
Cable mass (typ.)	155 g/m
Continuous operating temperature range	-30~+85℃

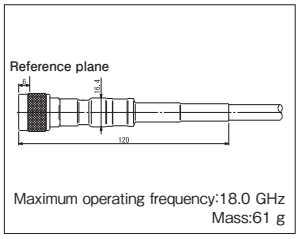
Connector

SMA (m) straight (Code:AMS)



Maximum operating frequency:18.0 GHz
Mass:46 g

N (m) straight (Code:NMS)



Maximum operating frequency:18.0 GHz
Mass:61 g

Order form example

●Example 1

Assembly length : 1000 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : SMA (m) straight

Catalog No.:
MWX315-01000AMSAMS
(See P.50 "Connector combination codes")

●Example 2

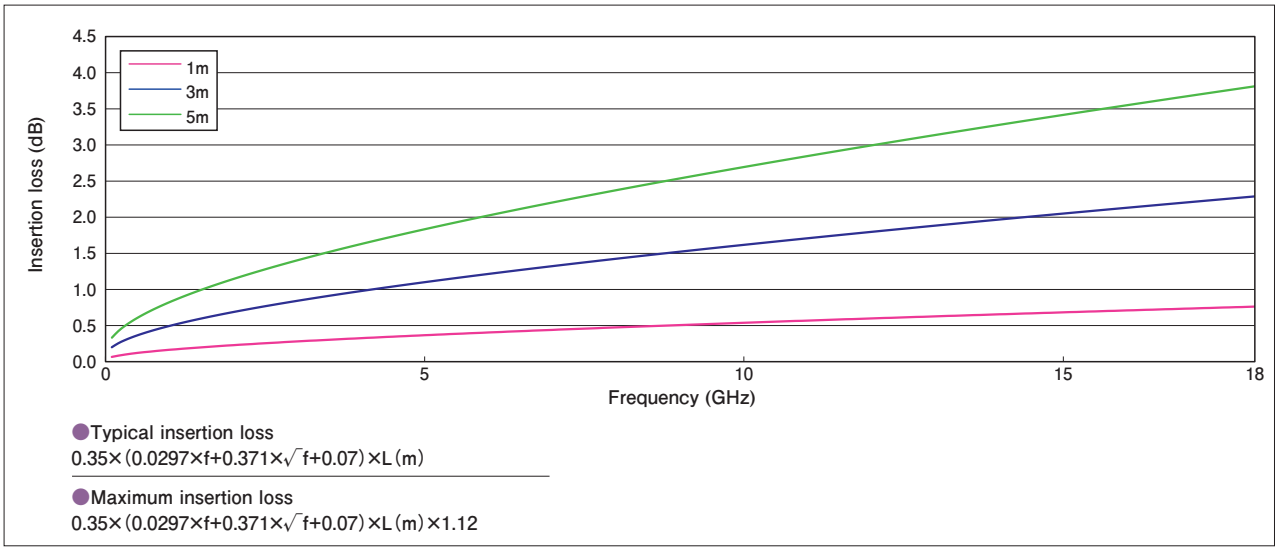
Assembly length : 1500 mm
Connector Ⅰ : SMA (m) straight
Connector Ⅱ : N (m) straight

Catalog No.:
MWX315-01500AMSNMS

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

MWX315 Technical Data

Cable typical insertion loss



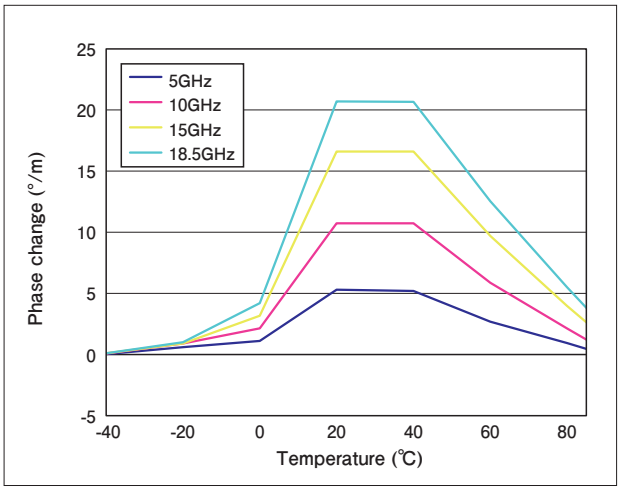
●Typical insertion loss

$0.35\times(0.0297\times f+0.371\times\sqrt{f}+0.07)\times L\,(m)$

●Maximum insertion loss

$0.35\times(0.0297\times f+0.371\times\sqrt{f}+0.07)\times L\,(m)\times 1.12$

MWX315 Phase change vs. temperature



Option

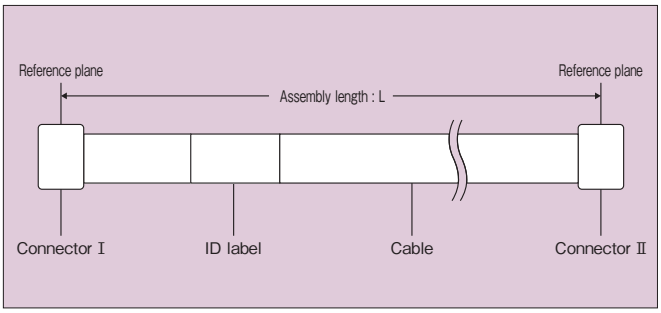
●We have the capacity to deliver products with matched phases for customers who require this characteristic.

*The above figures are measured values for reference only.

MWX3 Series

Placing orders

Catalog number



Note 1) The unit of assembly length is mm.
Shown as a five-digit number. If the number consists of fewer than five digits, remember to add zero (s) to the left of the first digit to make it five digits.
The assembly length is measured based on the reference planes, not on the connector ends, shown at the figure to the left.

Example) MWX312-01500AFSAMS

Cable·····MWX312 type
Assembly length·····1500 mm
Connector Ⅰ ·····SMA (f) straight
Connector Ⅱ ·····SMA (m) straight

Connector combination codes

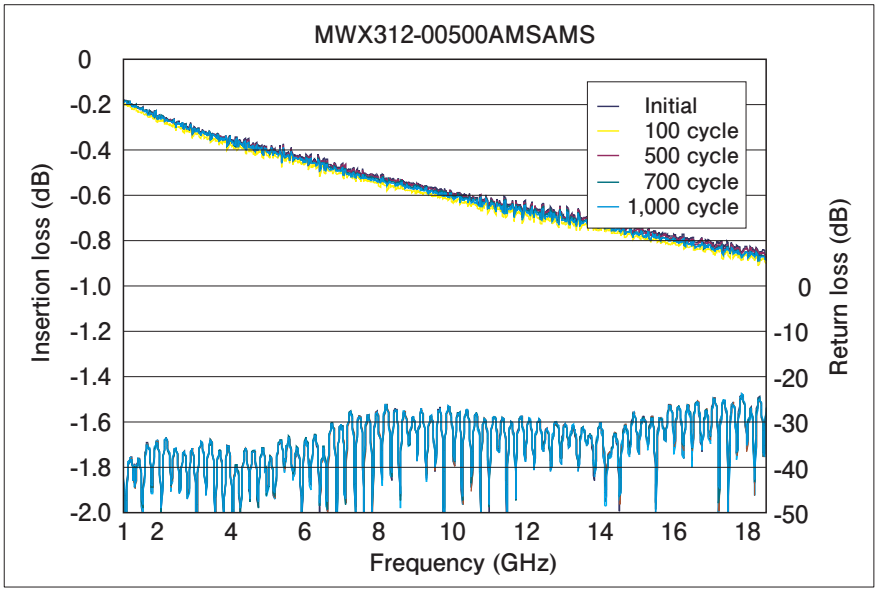
Connector Ⅱ \ Connector Ⅰ			SMA	SMA	SMA right angle	SMA right angle (18.0 GHz type)	SSMA	N	TNC	3.5 mm
			m	f	m	m	m	m	m	m
			AMS	AFS	AMR	AMH	SMS	NMS	CMS	DMS
SMA	m	AMS	AMSAMS	AFSAMS	AMRAMS	AMHAMS	AMSSMS	AMSNMS	AMSCMS	AMSDMS
SMA	f	AFS	—	AFSAFS	AFSAMR	AFSAMH	AFSSMS	AFSNMS	AFSCMS	AFSDMS
SMA right angle	m	AMR	—	—	AMRAMR	AMHAMR	AMRSMS	AMRNMS	AMRCMS	AMRDMS
SMA right angle (18.0 GHz type)	m	AMH	—	—	—	AMHAMH	—	AMHNMS	AMHCMS	—
SSMA	m	SMS	—	—	—	—	SMSSMS	—	—	—
N	m	NMS	—	—	—	—	—	NMSNMS	CMSNMS	DMSNMS
TNC	m	CMS	—	—	—	—	—	—	CMSCMS	CMSDMS
3.5 mm	m	DMS	—	—	—	—	—	—	—	DMSDMS

Please provide a catalog number when placing an order.

m : male (plug)
f : female (jack)

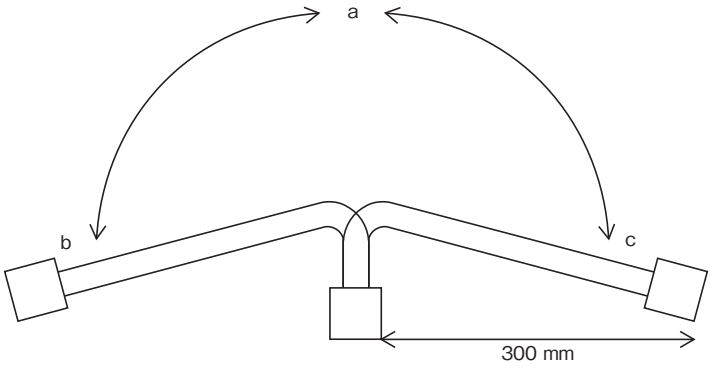
JUNFLON® MWX series are fully complied with RoHS directive including connectors.

Bending test data of MWX312



Test method

The connector on one end of test cable (MXW312-00500AMSAMS, measuring 500 mm in length and with SMA (m) connectors on both ends) was fixed in place. The connector on the other end was moved in the sequence a → b → c, after which initial insertion loss and return loss values were compared to those after the test.



*The above figures are measured values for reference only.

Formable MWX4,5 Series for fixed wiring

DC~18.0 GHz
DC~40.0 GHz
DC~67.0 GHz

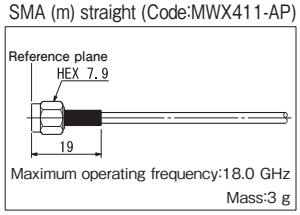
Basic Cable Properties

Electrical properties	MWX411	MWX412	MWX441	MWX461	MWX511	MWX512
Maximum operating frequency	18.0 GHz	18.0 GHz	40.0 GHz	67.0 GHz	18.0 GHz	18.0 GHz
Characteristic impedance (typ.)	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω	50 Ω
Capacitance (typ.)	85 pF/m	85 pF/m	90 pF/m	95 pF/m	97 pF/m	95 pF/m
Propagation delay (typ.)	4.3 ns/m	4.4 ns/m	4.3 ns/m	4.7 ns/m	4.7 ns/m	4.7 ns/m
Shortening coefficient of wavelength (typ.)	78 %	76 %	78 %	70 %	71 %	71 %
Higher mode frequency (typ.)	64.0 GHz	36.0 GHz	76.0 GHz	108 GHz	63.0 GHz	34.0 GHz
VSWR (per connector/both ends of assy.)	1.182/1.40	1.182/1.40	1.224/1.50	1.732/3	1.182/1.40	1.182/1.40

Mechanical properties	MWX411	MWX412	MWX441	MWX461	MWX511	MWX512
Cable outer diameter	2.5 mm	4.0 mm	2.4 mm	1.33 mm	3.0 mm	4.4 mm
Minimum bending radius (inner side)	15 mm	20 mm	15 mm	5 mm	10 mm	15 mm
Cable mass (typ.)	19 g	41 g	17 g	4.6 g	19 g	41 g
Continuous operating temperature range	-30~+85 ℃	-30~+85 ℃	-30~+85 ℃	-65~+125 ℃	-30~+85 ℃	-30~+85 ℃
Remark	Semi-rigid cable ϕ2.2 equivalent	Semi-rigid cable ϕ3.6 equivalent	Semi-rigid cable ϕ2.2 equivalent	Semi-rigid cable ϕ1.2 equivalent	Semi-flexible cable ϕ2.1 equivalent	Semi-flexible cable ϕ3.45 equivalent

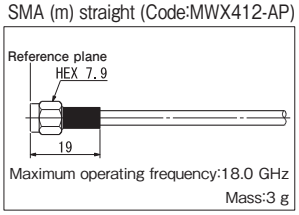
Connector

SMA (m) straight (Code:MWX411-AP)



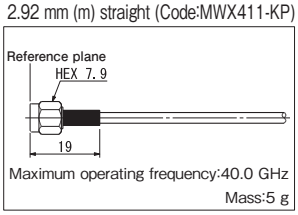
Maximum operating frequency:18.0 GHz
Mass:3 g

SMA (m) straight (Code:MWX412-AP)



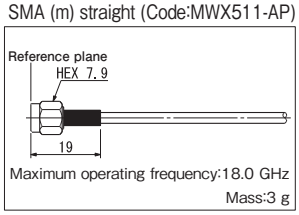
Maximum operating frequency:18.0 GHz
Mass:3 g

2.92 mm (m) straight (Code:MWX411-KP)



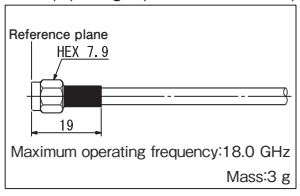
Maximum operating frequency:40.0 GHz
Mass:5 g

SMA (m) straight (Code:MWX511-AP)



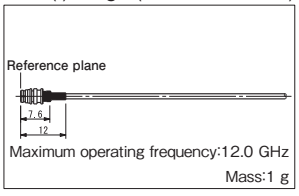
Maximum operating frequency:18.0 GHz
Mass:3 g

SMA (m) straight (Code:MWX512-AP)



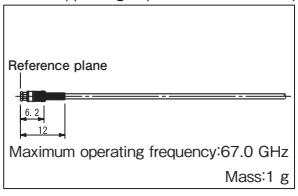
Maximum operating frequency:18.0 GHz
Mass:3 g

SMP (f) straight (Code:MWX461-SJ)



Maximum operating frequency:12.0 GHz
Mass:1 g

SMPM (f) straight (Code:MWX461-MJ)



Maximum operating frequency:67.0 GHz
Mass:1 g

Order form example

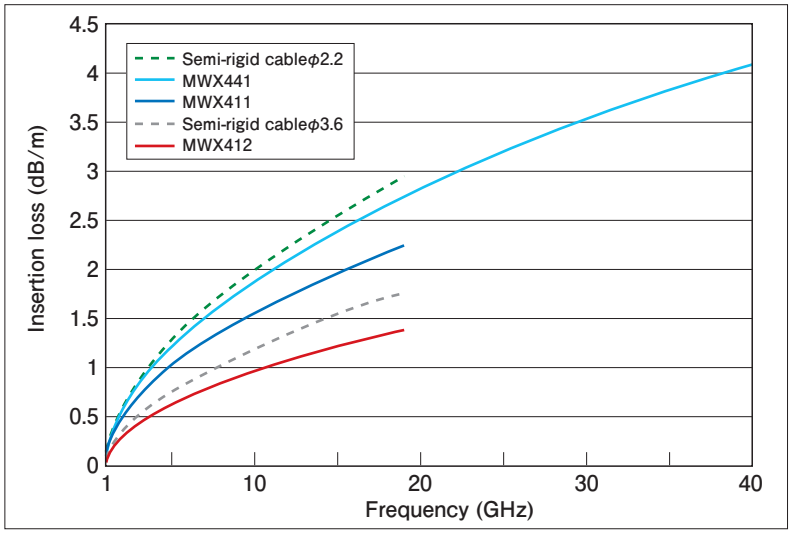
Example 1

Cable	: MWX441
Assembly length	: 200 mm
Connector Ⅰ	: 2.92 mm (m) straight
Connector Ⅱ	: 2.92 mm (m) straight

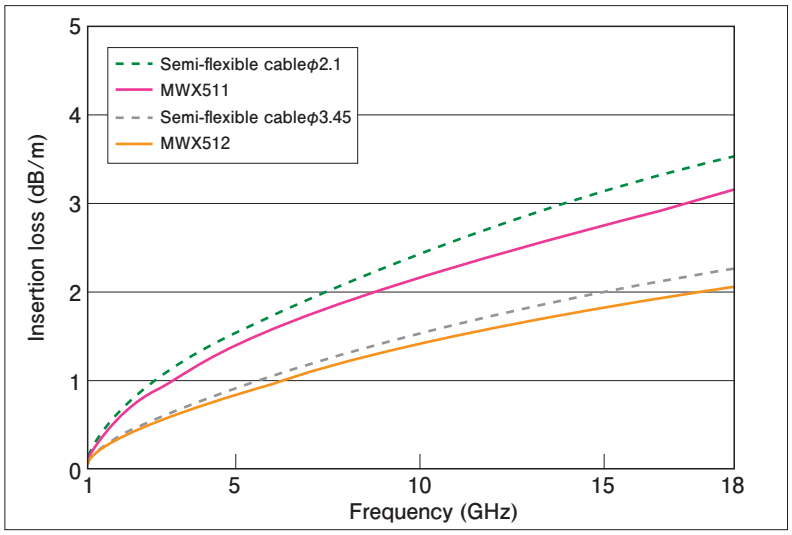
Catalog No.:
MWX441-KP-KP L=200 mm

JUNFLON® MWX series are fully complied with RoHS directive including connectors.

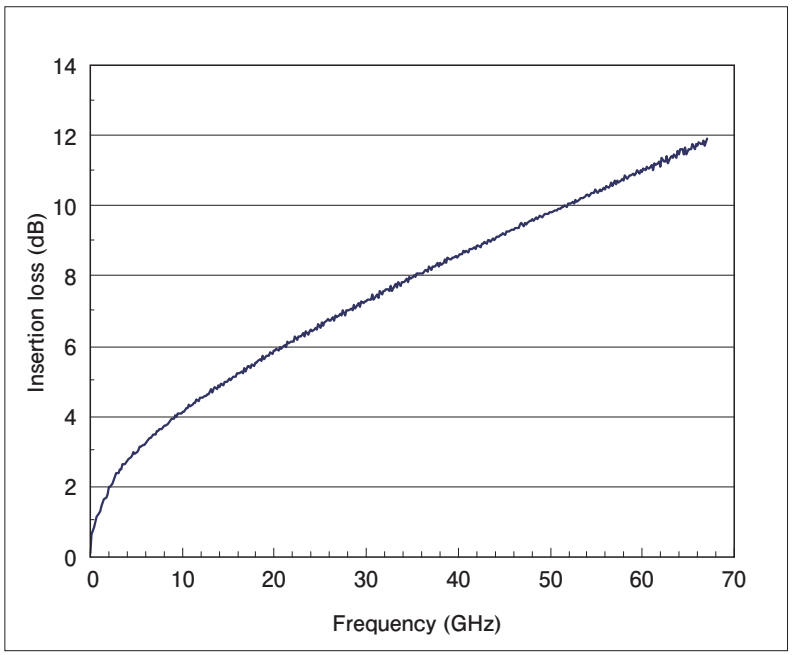
Comparison of typical insertion loss (MWX4 series vs. semi-rigid cable)



Comparison of typical insertion loss (MWX5 series vs. semi-flexible cable)



Typical insertion loss (MWX461 L=1000mm)

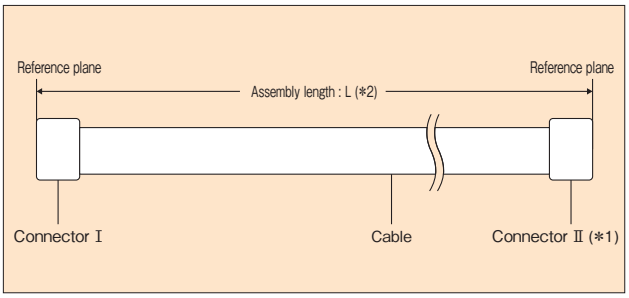


*The above figures are measured values for reference only.

MWX4,5 Series

Placing orders

Catalog number



*1) MWX411, 412, 511, and 512 come with the standard SMA (m) connector. The product code for the connector is "AP." The standard connector for MWX411 is a 2.92 mm (m) straight type. The product code for this connector is "KP." For MW461, the product code for the SMP (f) straight connector is "SJ." The product code for the SMPM (f) straight connector is "MJ."

*2) Assembly length is measured from the end of one connector to the end of the other connector.

Example) MWX511 - AP-AP L=1000mm

Cable·····MWX511 type

Connector Ⅰ·····SMA (m) straight

Connector Ⅱ·····SMA (m) straight

Assembly length·····1000 mm

Delivery times for formable cable assemblies

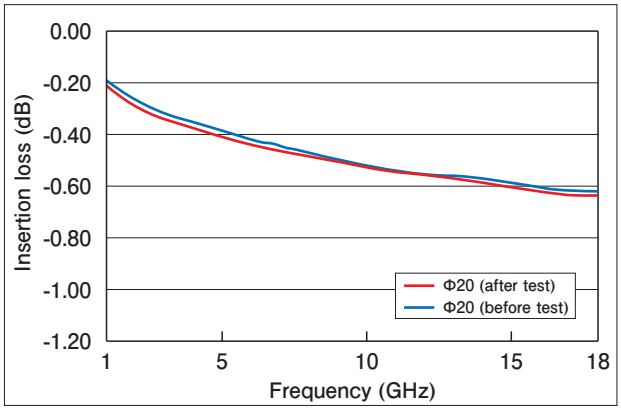
MWX4 and MWX5 series will be shipped within 12 business days after received order.

*Leadtime may be effected by larger order volume.

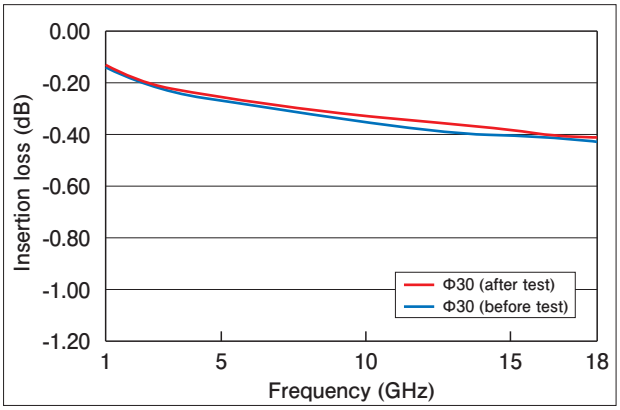
Formable MWX4,5 Series Technical Data 1

Static bending data (insertion loss)

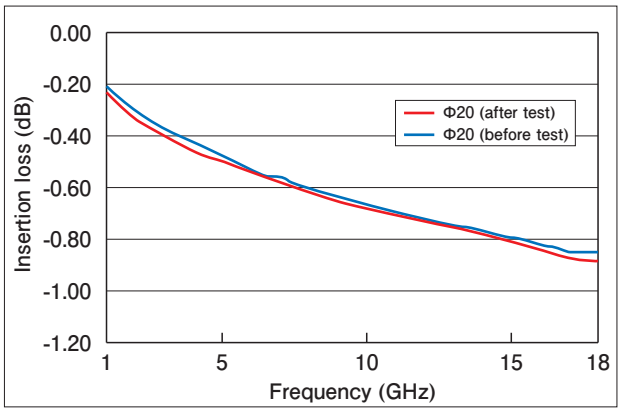
MWX411



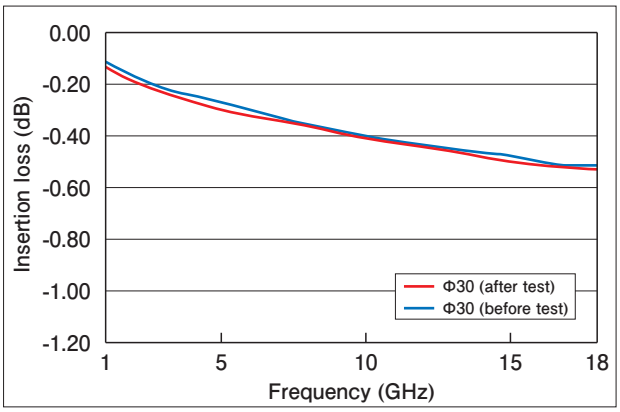
MWX412



MWX511



MWX512



Measurement method

The initial value was measured with the test cable connected to the measuring instrument.
The after-test value was measured with the cable wrapped 360°around a mandrel at a position approximately 50 mm from the measuring instrument.

Test conditions
Mandrel diameter
・MWX411,MWX511 : 20 mm
・MWX412,MWX512 : 30 mm
・Test cable length : 300 mm

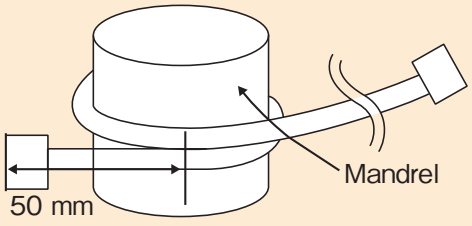


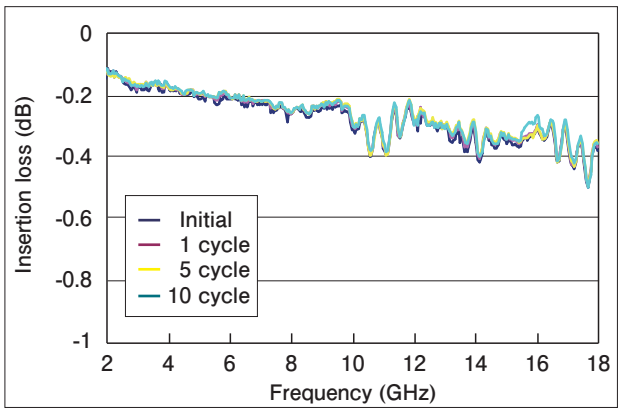
Fig.1 Schematic description of the static bending test

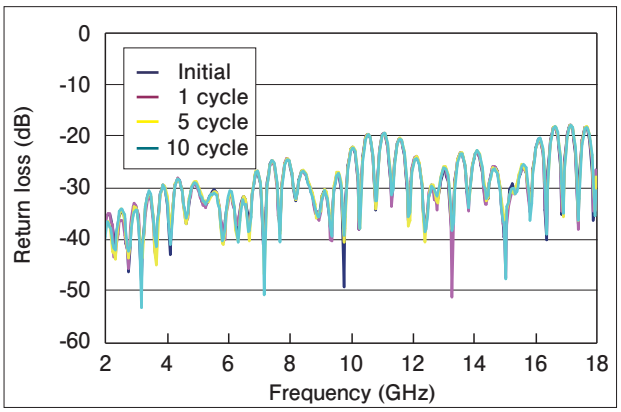
*The above figures are measured values for reference only.

Formable MWX4,5 Series Technical Data 2

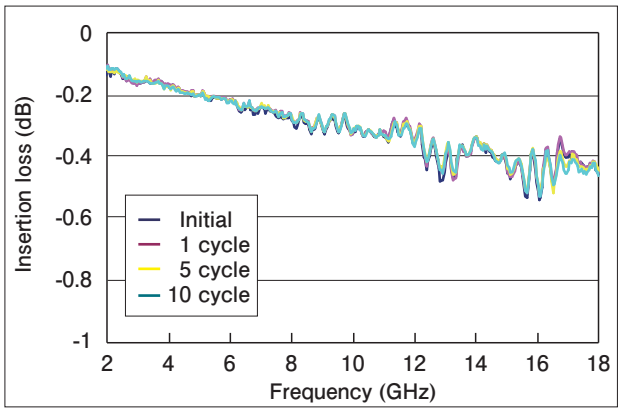
Repeated Bending Data (insertion loss, return loss)

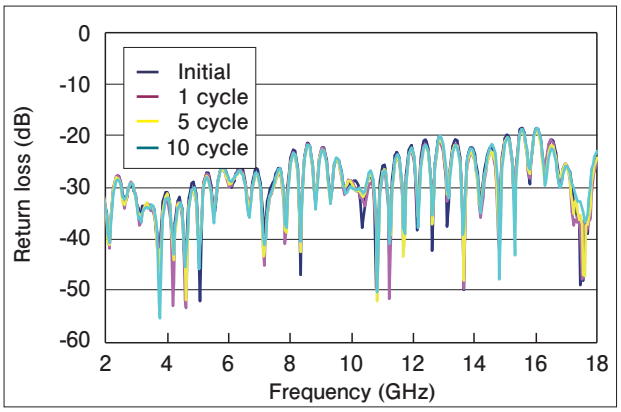
MWX412





MWX512





Test method

The initial value was measured with the test cable connected to the measuring instrument.

The result after 10 cycle test was measured with the cable wrapped 180° around a mandrel.

Test conditions

Mandrel diameter

・MWX412 : 40 mm

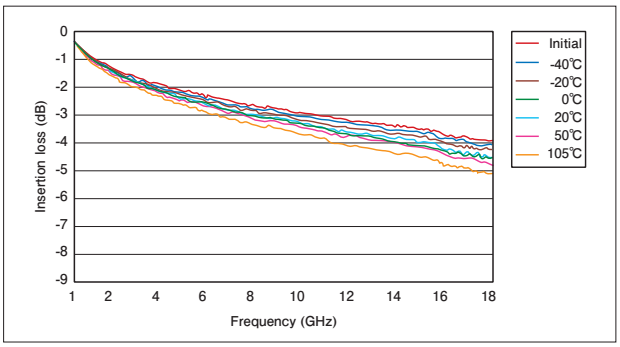
・MWX512 : 30 mm

Test cable length : 200 mm

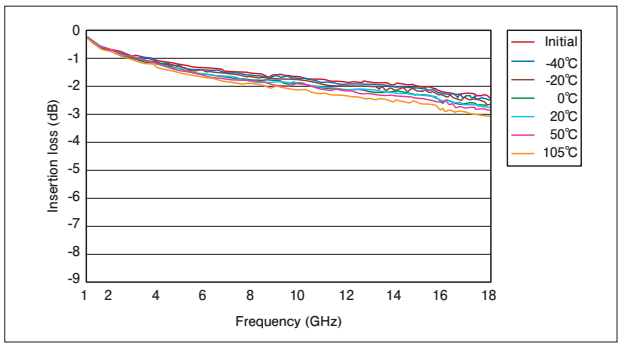
Formable MWX4 Series Technical Data 3

Temperature characteristics (insertion loss)
Test cable: 2 m

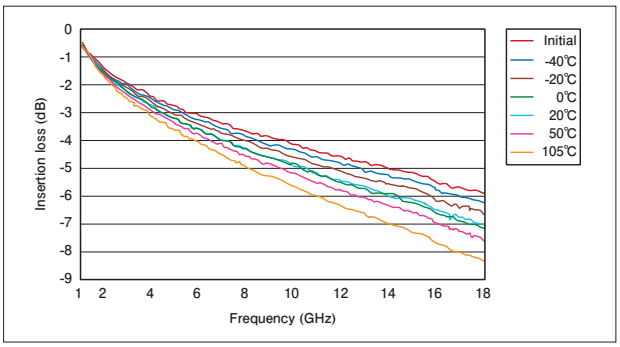
MWX411



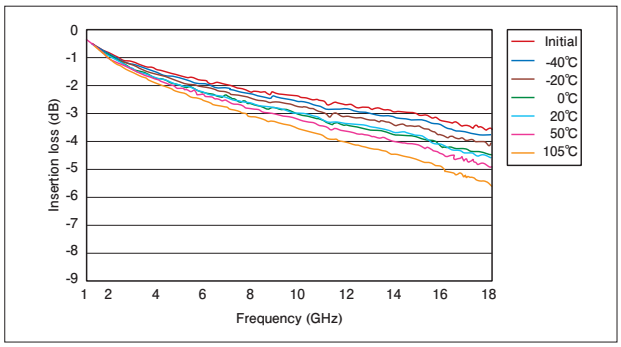
MWX412



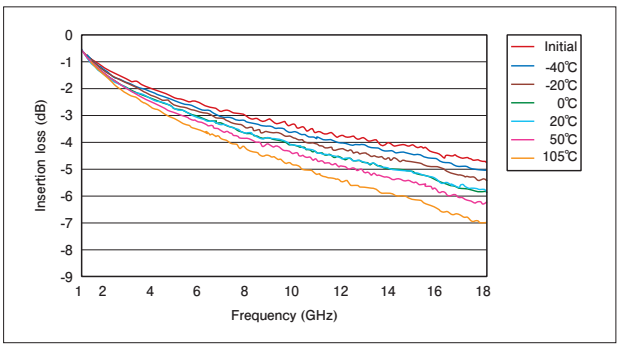
Semi-flexible cable ϕ2.1



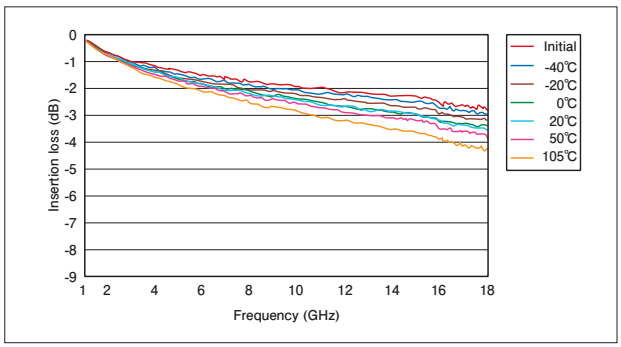
Semi-flexible cable ϕ3.45



Semi-rigid cable ϕ2.2



Semi-rigid cable ϕ3.6



*The above figures are measured values for reference only.

MWX Common Properties

Connector insertion loss (dB/connector)

Connector type	Connector insertion loss	Frequency (GHz)						
		1.0 GHz	10.0 GHz	18.5 GHz	26.5 GHz	40.0 GHz	50.0 GHz	67.0 GHz
SSMA (m) straight	0	0	0	0	–	–	–	–
SMA (m) straight	0	0	0	0	0	0	–	–
SMA (f) straight	0	0	0	0	–	–	–	–
SMA (m) right angle	$0.04\sqrt{f}$	0.04	0.13	0.17(*1)	–	–	–	–
SMA (m) swept	$0.01\sqrt{f}$	0.01	0.03	0.04	–	–	–	–
TNC (m) straight	$0.04\sqrt{f}$	0.04	0.13	0.17	–	–	–	–
N (m) straight	$0.02\sqrt{f}$	0.02	0.06	0.09	–	–	–	–
N (m) swept	$0.03\sqrt{f}$	0.03	0.09	0.13	–	–	–	–
SMP (f) straight	$0.09\sqrt{f}$	0.09	0.28	–	–	–	–	–
SMPM (f) straight	$0.09\sqrt{f}$	0.09	0.28	0.39	0.46	0.57	0.64	0.74
3.5 mm (m) straight	0	0	0	0	0	–	–	–
3.5 mm (f) straight	0	0	0	0	0	–	–	–
3.5 mm (m) swept	$0.01\sqrt{f}$	0.01	0.03	0.04	0.05	–	–	–
2.92 mm (m) straight	0	0	0	0	0	0	–	–
2.92 mm (f) straight	0	0	0	0	0	0	–	–
2.92 mm (m) swept	$0.01\sqrt{f}$	0.01	0.03	0.04	0.05	0.06	–	–
2.4 mm (m) straight	$0.012\sqrt{f}$	0.01	0.04	0.05	0.06	0.08	0.08	0.10
2.4 mm (f) straight	$0.012\sqrt{f}$	0.01	0.04	0.05	0.06	0.08	0.08	0.10
1.85 mm (m) straight	$0.035\sqrt{f}$	0.04	0.11	0.15	0.18	0.22	0.25	0.29
1.85 mm (f) straight	$0.035\sqrt{f}$	0.04	0.11	0.15	0.18	0.22	0.25	0.29

(*1) Maximum operating frequency of SMA (m) right angle : 18 GHz

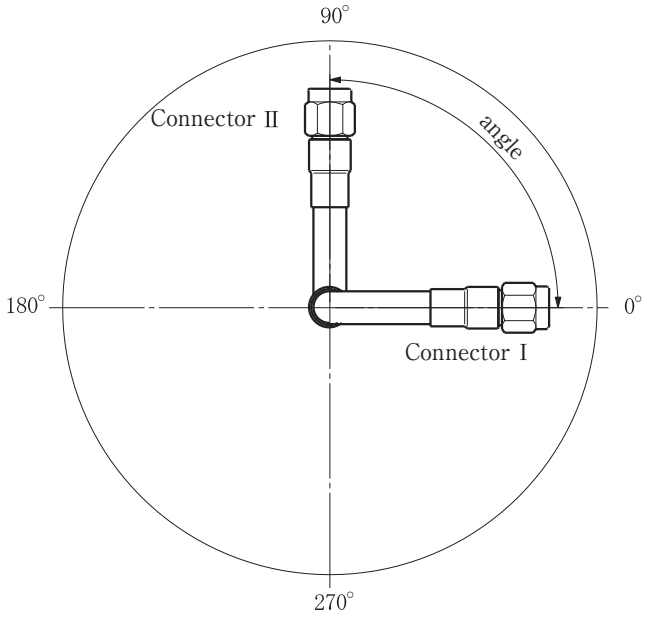
Tolerances for assembly length

Tolerance values are shown below.

Please contact us if your tolerance requirements for phase matching are more stringent.

Assembly length (mm)	Tolerance (mm)
L≦1000	±10
1000<L≦2000	±20
2000<L≦5000	±50
5000<L	±100

About customer-specified swept and right-angle connectors



The angle of Connector Ⅱ relative to Connector Ⅰ when Connector Ⅰ is assumed to be at 0° (as viewed from the direction of Connector Ⅰ) is indicated by three digits following the catalog number. (The indication is omitted if the angle is 0°.)

Example: If Connector Ⅱ is at an angle of 90° when viewed from the direction of Connector Ⅰ:

MWX312-01000AMRAMR-090

Technical Data

Return loss – VSWR conversion table

Return loss dB	Voltage Standing Wave Ratio VSWR	Reflection coefficient
60	1.002	0.001
50	1.006	0.003
40	1.020	0.010
35	1.036	0.018
30	1.065	0.032
29	1.074	0.035
28	1.083	0.040
27	1.094	0.045
26	1.106	0.050
25	1.119	0.056
24	1.135	0.063
23	1.152	0.071
22	1.173	0.079
21	1.196	0.089
20	1.222	0.100
19	1.253	0.112
18	1.288	0.126
17	1.329	0.141
16	1.377	0.158
15	1.433	0.178
14	1.499	0.200
13	1.577	0.224
12	1.671	0.251
11	1.785	0.282
10	1.925	0.316

VSWR – Return loss conversion table

Voltage Standing Wave Ratio VSWR	Return loss dB	Reflection coefficient	Propagation loss dB
1.01	46.1	0.005	0.0001
1.02	40.1	0.010	0.0004
1.03	36.6	0.015	0.0010
1.04	34.2	0.020	0.0017
1.05	32.3	0.024	0.0025
1.06	30.7	0.029	0.0037
1.07	29.4	0.034	0.0050
1.08	28.3	0.038	0.0063
1.09	27.3	0.043	0.0080
1.10	26.4	0.048	0.0100
1.15	23.1	0.070	0.0213
1.20	20.8	0.091	0.0361
1.25	19.1	0.111	0.0538
1.30	17.7	0.130	0.0740
1.35	16.5	0.149	0.0975
1.40	15.6	0.167	0.1228
1.45	14.7	0.184	0.1496
1.50	14.0	0.200	0.1773
1.60	12.7	0.231	0.2382
1.70	11.7	0.259	0.3016
1.80	10.9	0.286	0.3706
1.90	10.2	0.310	0.4388
2.00	9.5	0.333	0.5104
3.00	6.0	0.500	1.2494
4.00	4.4	0.600	1.9382

dB table

Power ratio P_2/P_1	dB Dp	Current ratio/ Voltage ratio, $I_2/I_1, V_2/V_1$	dB Di·Dv
x0.01	−20dB	x0.01	−40dB
x0.1	−10dB	x0.1	−20dB
x1	0dB	x1	0dB
x2	3.0dB	x2	6.0dB
x3	4.8dB	x3	9.5dB
x4	6.0dB	x4	12.0dB
x5	7.0dB	x5	14.0dB
x6	7.8dB	x6	15.6dB
x7	8.5dB	x7	16.9dB
x8	9.0dB	x8	18.1dB
x9	9.5dB	x9	19.1dB
x10	10dB	x10	20dB
x100	20dB	x100	40dB
x1,000	30dB	x1,000	60dB

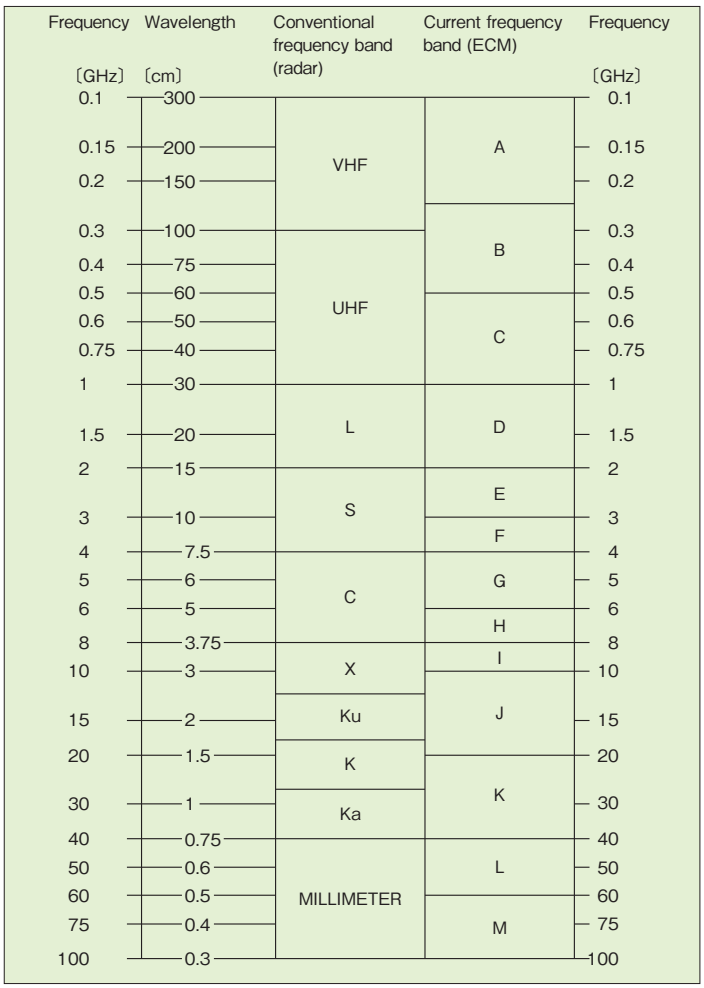
Power:$Dp=10\log_{10}P_2/P_1$[dB]

Current:$Di=20\log_{10}I_2/I_1$[dB]

Voltage:$Dv=20\log_{10}V_2/V_1$[dB]

●Power level "dBm" represents the absolute value with respect to the standard 0[dBm] for 1[m/W]. P[mW] is given by $10\log_{10}$P[dBm].

Frequency band name and code



1.$VSWR=(1+\rho)/(1-\rho)=(1+10^{-RL/20})/(1-10^{-RL/20})$

2.Return loss $RL(dB)=-20\log\rho$

$=-20\log(VSWR-1)/(VSWR+1)$

3.Reflection coefficient

$\rho=(VSWR-1)/(VSWR+1)=10^{-RL/20}$

4.Propagation loss $\alpha(dB)=-10\log(1-\rho^2)$

$=-10\log(1-((VSWR-1)/(VSWR+1))^2)$

Relationship between frequency and wavelength

$f=c/\lambda$ where $c=2.998\times10^8$[m/s]

Relationship between phase change θ[°], frequency f [GHz], cable length L[mm] and propagation delay τ[nsec]

$L=0.8328\times\theta\div\sqrt{\varepsilon_r}\div f$

$\theta=1.201\times L\times\sqrt{\varepsilon_r}\times f$

$\theta=360\times f\times\tau$

where εr is the specific dielectric constant of the cable insulator.

Air:$\varepsilon r=1$,Dense PTFE:$\varepsilon r\fallingdotseq2.1$

*The above figures are measured values for reference only.

For Sales and Service Information Call:

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Edmonton | Vancouver | Raleigh

Across North America

Call Toll Free at 1-855-826-3781

info@gapwireless.com

※The data are measured, not guaranteed values. ※To allow continuing product improvements, specifications are subject to change without notice.
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Junkosha Inc.

● Customer Service Center
Ochanomizu Kyoun Bldg. 12F 2-2 Kandasurugadai, Chiyoda-ku, Tokyo, Japan 〒101-0062
TEL:81／3-3518-6550 FAX:81／3-3518-6523

● Yamanashi Operations Center
811-1 Ishibashi, Sakaigawa-cho, Fuefuki-shi, Yamanashi-ken, Japan 〒406-0842
TEL:81／55-266-5400 (main switchboard) FAX:81／55-266-5405

● Front office Tokyo, Kanagawa, Saitama, Yamanashi, Aichi, Osaka, Hyogo, Fukuoka

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