

# MWX2 Series

## Flexible cable assemblies for measuring instruments

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

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

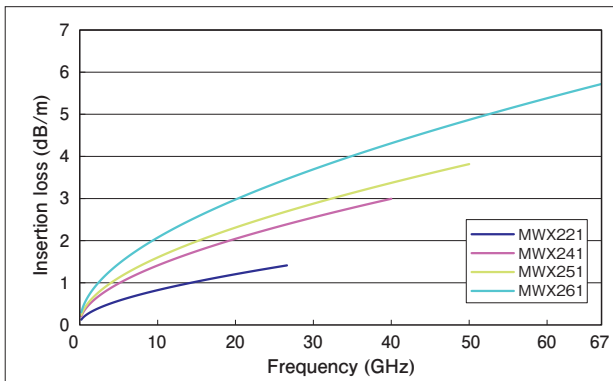
#### 1. Simple criteria for connector selection

- 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.

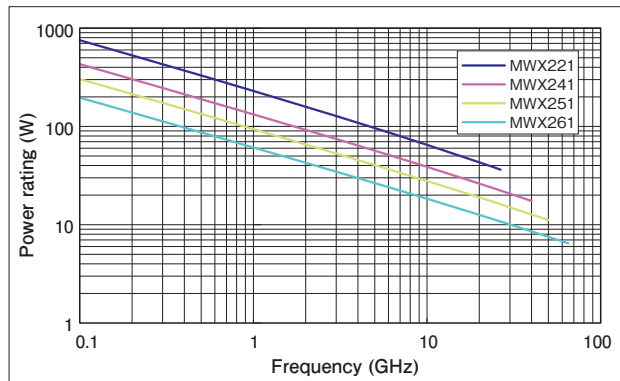
#### 2. Power rating

The diagram to the below shows the relationship between frequency and power rating. The values are calculated at 25 °C 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.

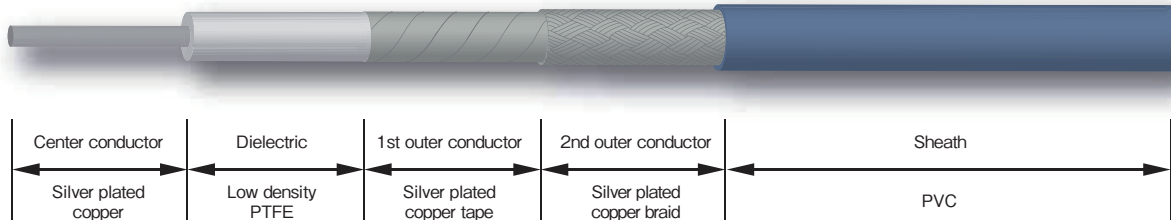
### Connector compatibility

| 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                                |                      |               |          |             |            |            |                  |             |             |                   |            |            |             | ●           | ● |

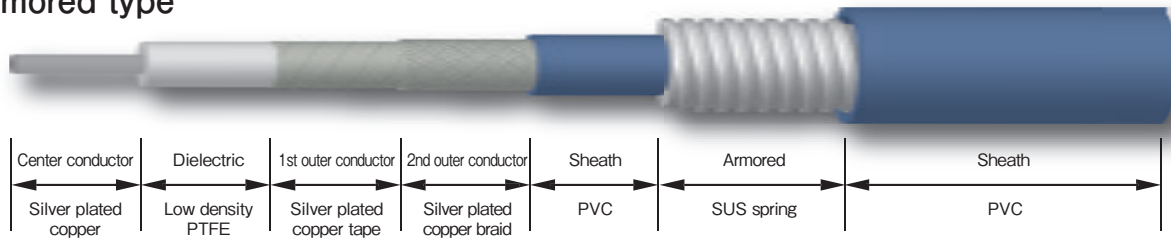
\*Armored type: Armored with a protection sheath to reduce damage caused by mechanical movement.

# Cable design

## Non-armored type



## Armored type



# Flexibility data

## Test method

### Test cable

MWX221, MWX021, MWX121

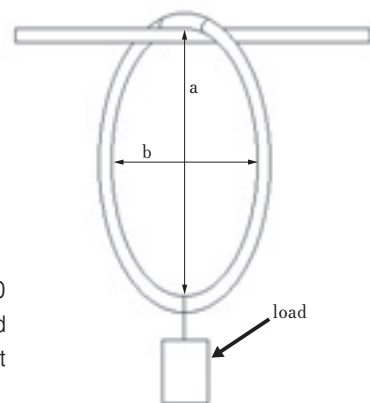
### Test condition

temperature : 24 °C

test load : 454 g

diameter of bar :  $\phi 16$  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



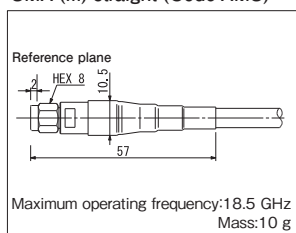
## Basic Cable Properties

| 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 |

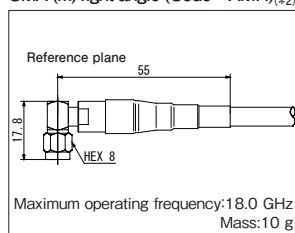
| Mechanical properties                  | Standard type | Armored type |
|--|---------------|--------------|
| Cable outer diameter                   | 6.0 mm        | 12.5 mm      |
| Minimum bending radius (inner side)    | 20 mm         | 20 mm        |
| Cable mass (typ.)                      |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

## Connector

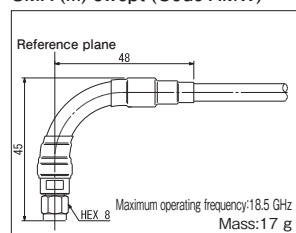
SMA (m) straight (Code:AMS)



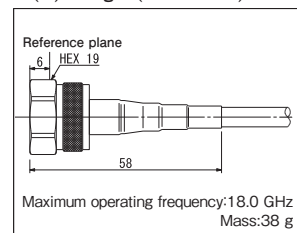
SMA (m) right angle (Code : AMH)<sup>(\*)</sup>



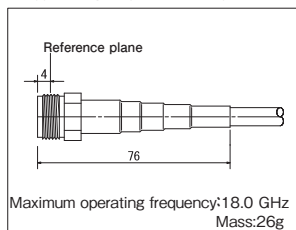
SMA (m) swept (Code:AMW)<sup>(\*)</sup>



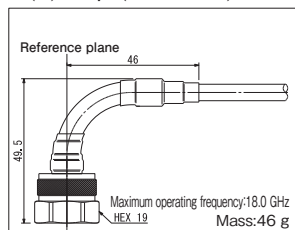
N (m) straight (Code:NMS)



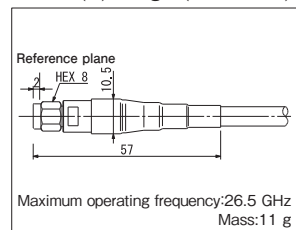
N (f) straight (Code:NFS)



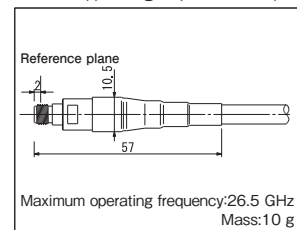
N (m) swept (Code:NMW)<sup>(\*)</sup>



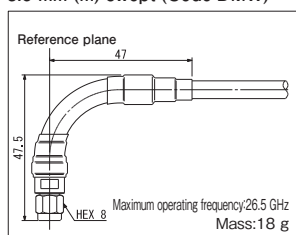
3.5 mm (m) straight (Code:DMS)



3.5 mm (f) straight (Code:DFS)



3.5 mm (m) swept (Code:DMW)<sup>(\*)</sup>



### 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

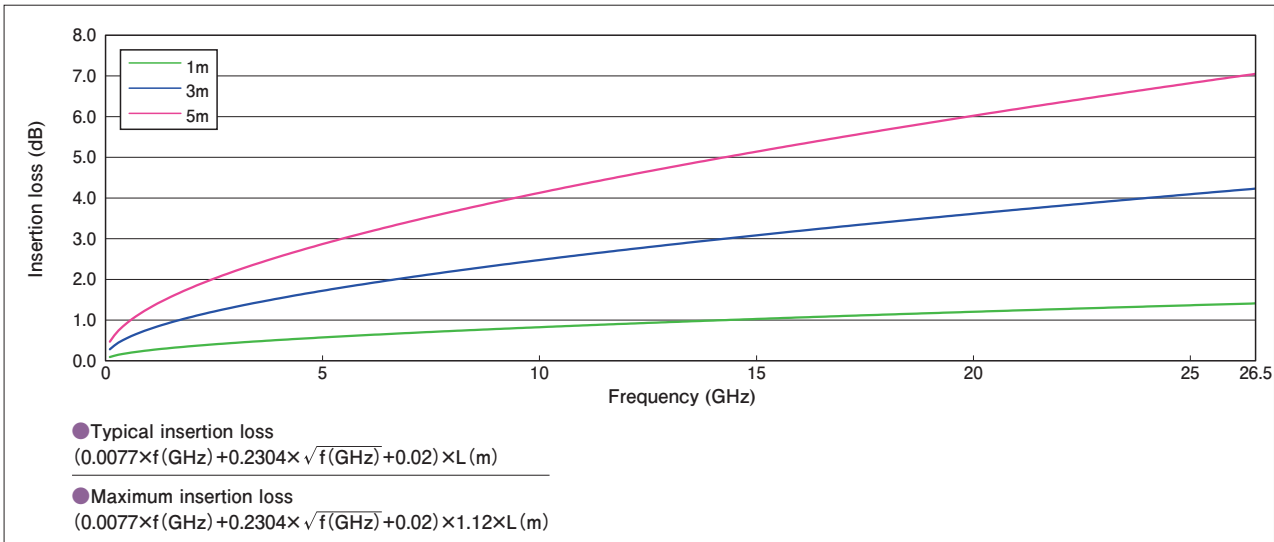
Assembly length : 1500 mm  
 Connector I : N (m) straight  
 Connector II : N (m) straight

Catalog No.:  
**MWX221-01500NMSNMS/B**

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

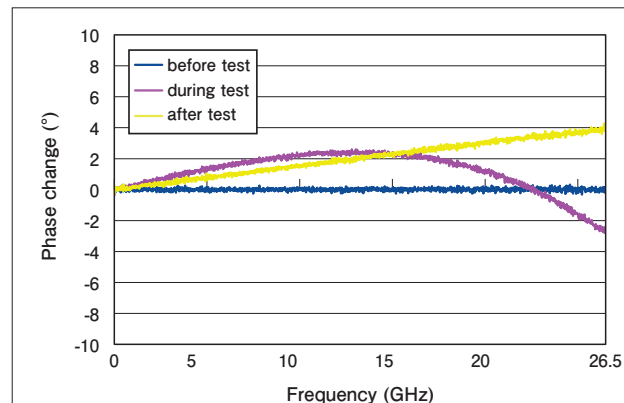
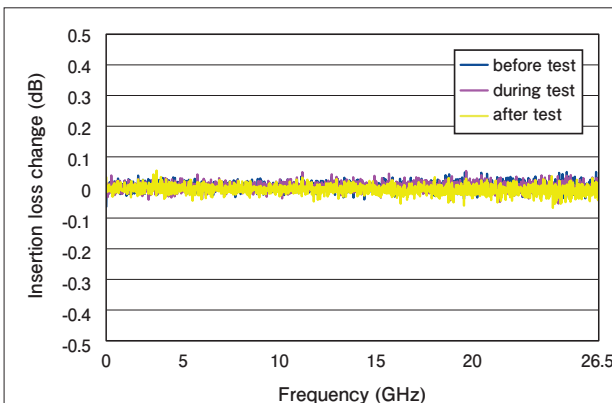
# MWX221 Technical Data

## Cable typical insertion loss



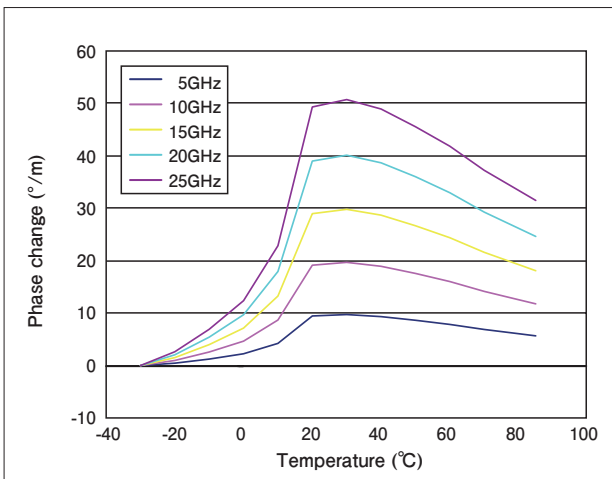
## Static bending data (insertion loss, phase)

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



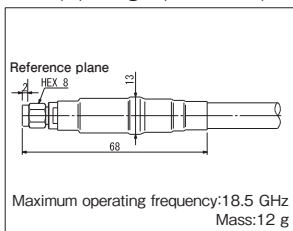
## Basic Cable Properties

| 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 |

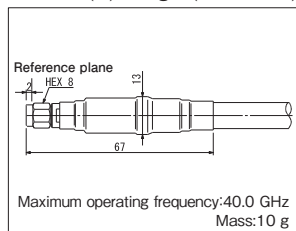
| Mechanical properties                  | Standard type (armored type) | Non-armored type/Custom-made |
|--|------------------------------|------------------------------|
| Cable outer diameter                   | 9.5 mm                       | 4.1 mm                       |
| Minimum bending radius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

## Connector

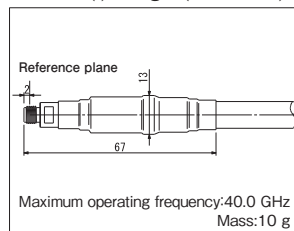
SMA (m) straight (Code:AMS)



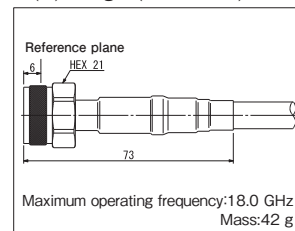
2.92 mm (m) straight (Code:KMS)



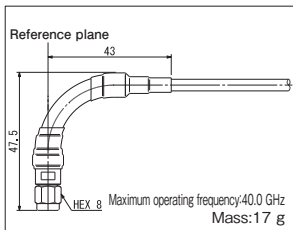
2.92 mm (f) straight (Code:KFS)



N (m) straight (Code:NMS)



2.92 mm (m) swept (custom-made)<sup>(\*)</sup>



(\*) 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")

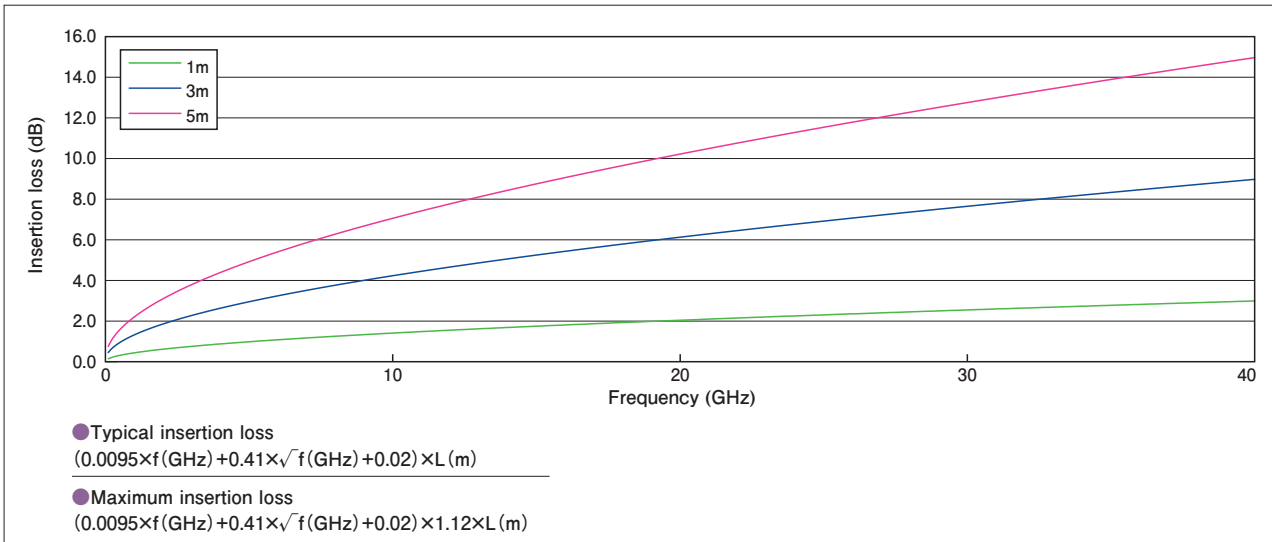
● Example 2 MWX241 Armored type (standard)

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

Catalog No.:  
MWX241-01000AMSNMS/B

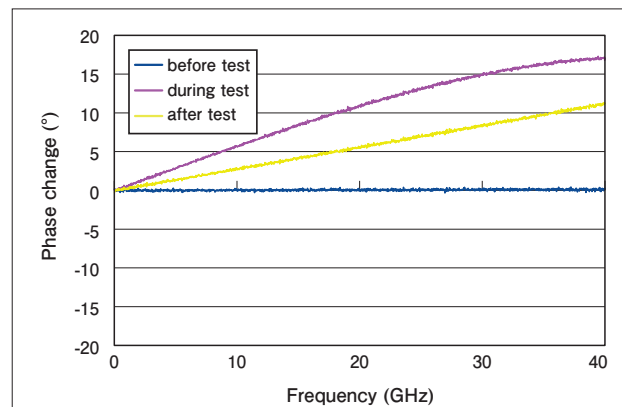
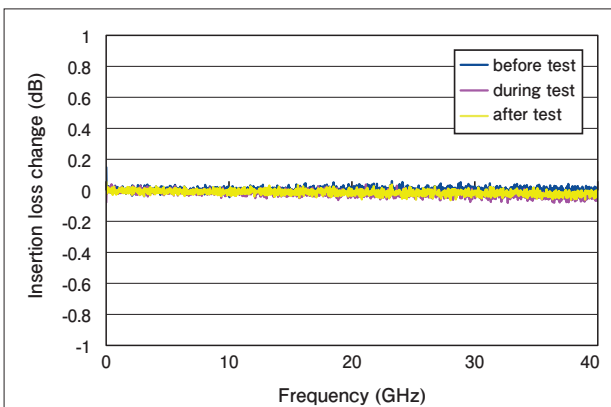
# MWX241 Technical Data

## Cable typical insertion loss



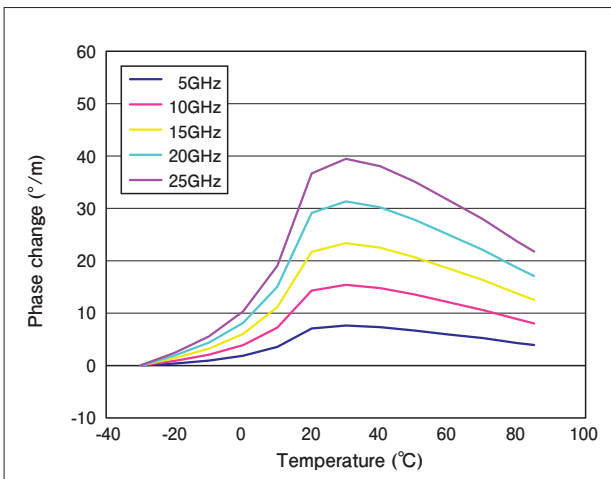
## Static bending data (insertion loss, phase)

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



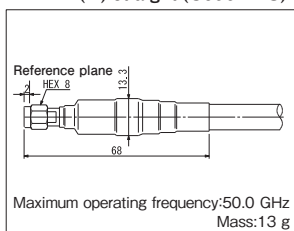
## Basic Cable Properties

| 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  |

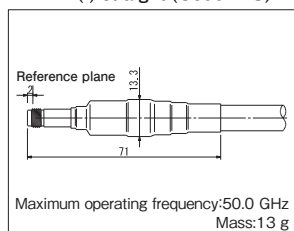
| Mechanical properties                  |            |
|--|------------|
| Cable outer diameter                   | 9.5 mm     |
| Minimum bending radius (inner side)    | 20 mm      |
| Cable mass (typ.)                      | 129 g/m    |
| Continuous operating temperature range | -30~+85 °C |
| Armored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

## Connector

2.4 mm (m) straight (Code:LMS)



2.4 mm (f) straight (Code:LFS)



### Order form example

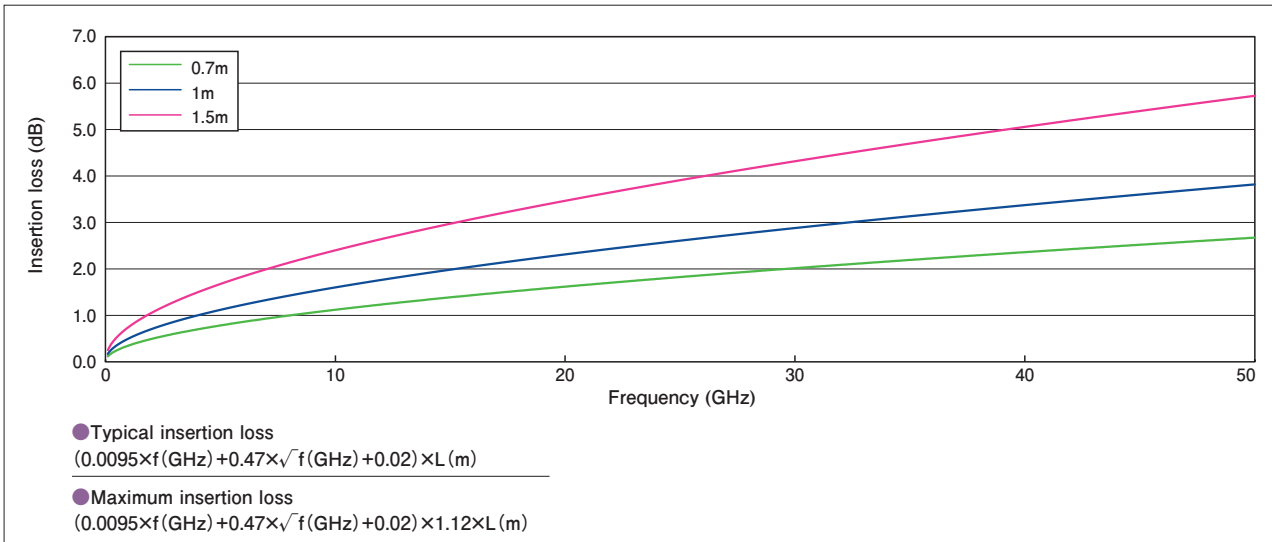
● Example 1

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")

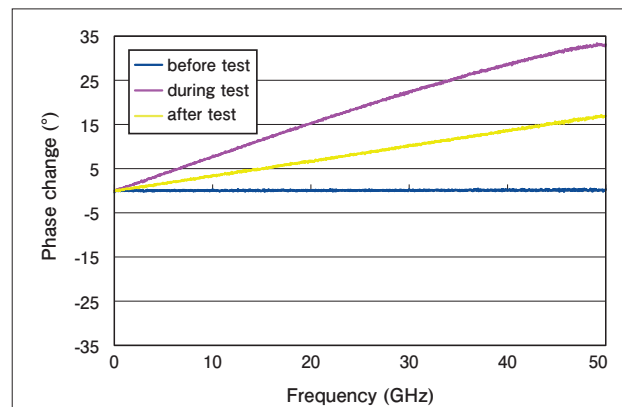
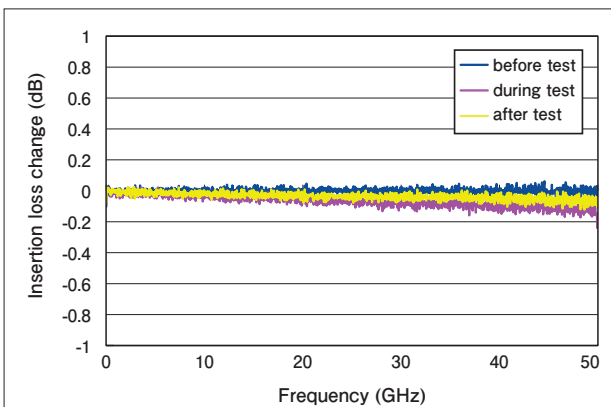
# MWX251 Technical Data

## Cable typical insertion loss



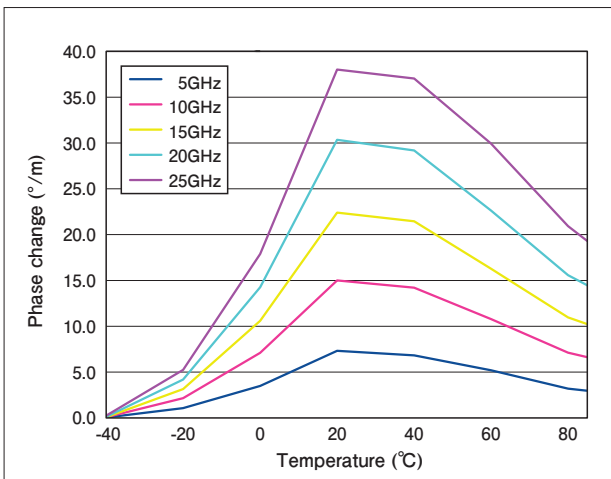
## Static bending data (insertion loss, phase)

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



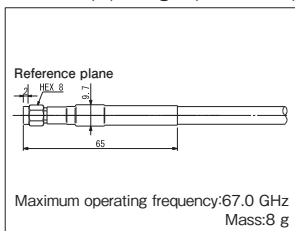
## Basic Cable Properties

| 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  |

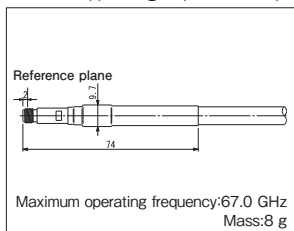
| Mechanical properties                  |            |
|--|------------|
| Cable outer diameter                   | 7.7 mm     |
| Minimum bending radius (inner side)    | 20 mm      |
| Cable mass (typ.)                      | 75 g/m     |
| Continuous operating temperature range | -30~+85 °C |
| Armored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

## Connector

1.85 mm (m) straight (Code:VMS)



1.85 mm (f) straight (Code:VFS)

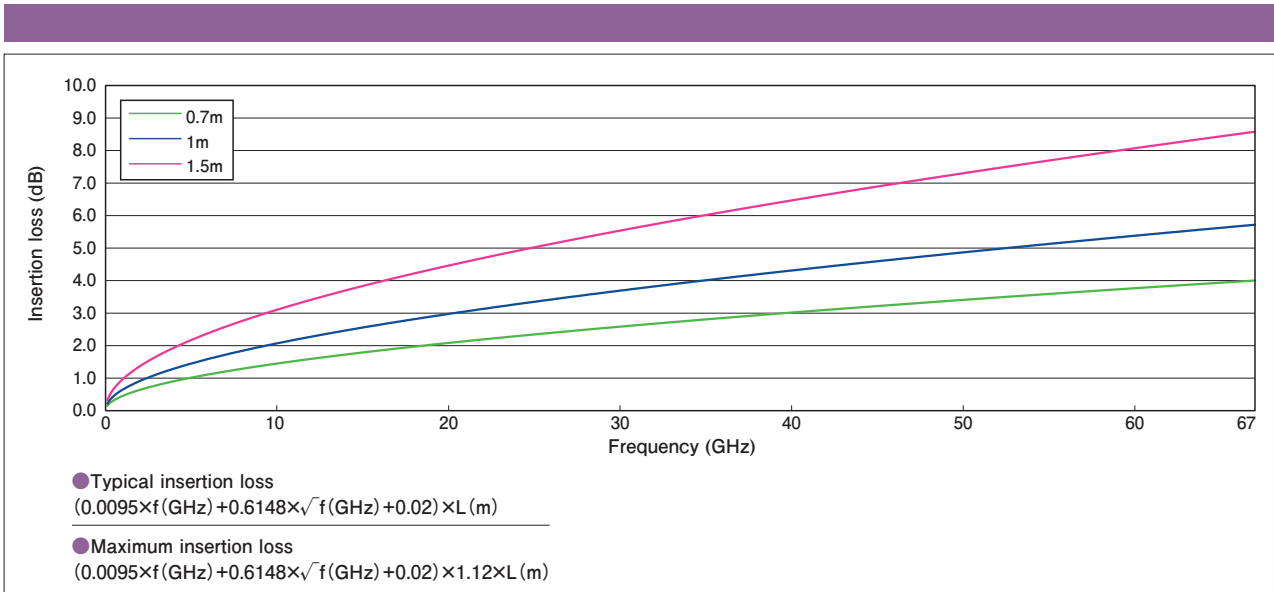


### Order form example

● 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")

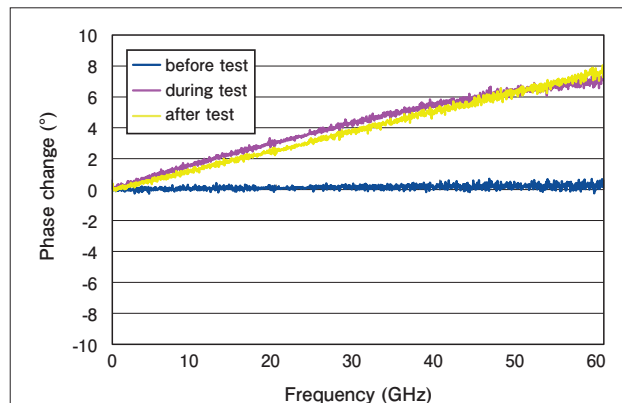
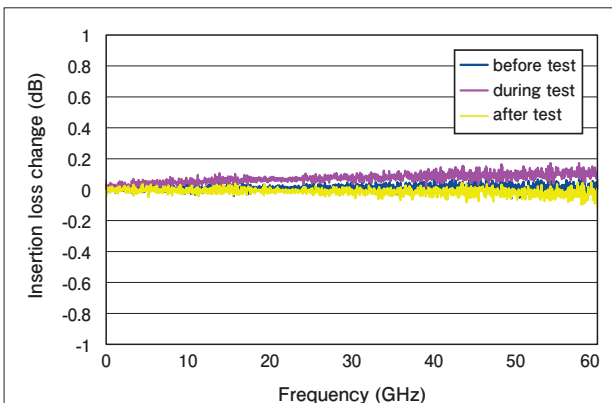
# MWX261 Technical Data

## Cable typical insertion loss



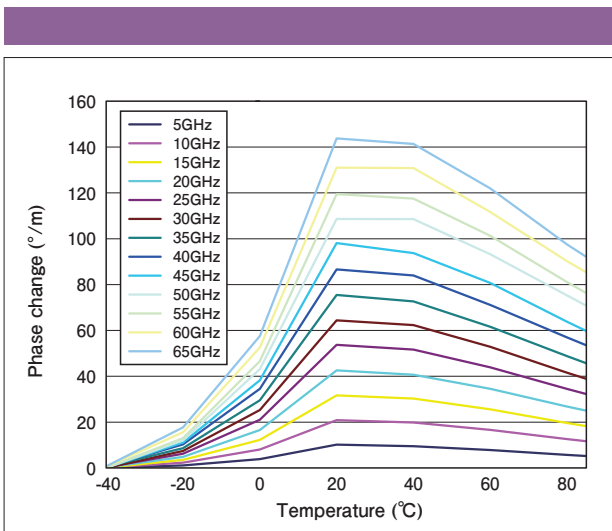
## Static bending data (insertion loss, phase)

Bending radius: 20 mm



\*The cable was wrapped 360° around a mandrel.

## MWX261 Phase change vs. temperature



## Option

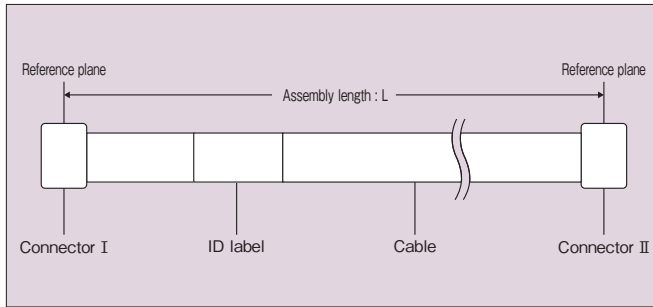
- We have the capacity to deliver products with matched phases for customers who require this characteristic.

\*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    | AMSANMS | AMSANMW | AMSADMS | AMSADFS | AMSADMW      | AMSAMKMS | AMSAMKFS | —      | —      | —       | —       |
| SMA swept                  | m | AMW | —      | AMWAMW    | AMWNMS  | AMWNMW  | AMWDMS  | AMWDFS  | AMWDMW       | —        | —        | —      | —      | —       | —       |
| N                          | m | NMS | —      | —         | NMSNMS  | NMSNMW  | DMSNMS  | DFSANMS | DMWNMS       | KMSNMS   | KFSNMS   | —      | —      | —       | —       |
| N swept                    | m | NMW | —      | —         | —       | NMWNMW  | NMWDMS  | NMWDFS  | NMWDMW       | —        | —        | —      | —      | —       | —       |
| 3.5 mm                     | m | DMS | —      | —         | —       | —       | DMSDMS  | DFSADMS | DMSADMW      | —        | —        | —      | —      | —       | —       |
| 3.5 mm                     | f | DFS | —      | —         | —       | —       | —       | DFSDFS  | DFSADMW      | —        | —        | —      | —      | —       | —       |
| 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)