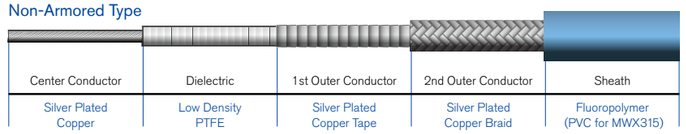
3 Series

Cable Assemblies for Equipment Wiring

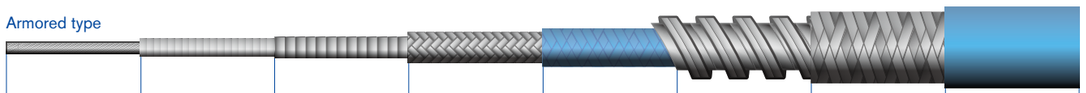
The 3 series cable assemblies use a Low Density PTFE dielectric material to ensure excellent phase stability against temperature fluctuations. (Continuous operating temperature range : -65 °C to 125 °C (-30 °C to 85 °C for 315))

Non-Armored Type



Center Conductor	Dielectric	1st Outer Conductor	2nd Outer Conductor	Sheath
Silver Plated Copper	Low Density PTFE	Silver Plated Copper Tape	Silver Plated Copper Braid	Fluoropolymer (PVC for MWX315)

Armored type

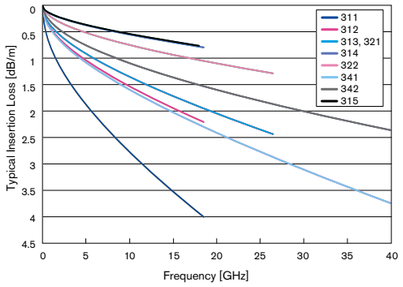


Center Conductor	Dielectric	1st Outer Conductor	2nd Outer Conductor	Sheath	Armored	Braid	Sheath
Silver Plated Copper	Low Density PTFE	Silver Plated Copper Tape	Silver Plated Copper Braid	Fluoropolymer (PVC for 315)	SUS Spiral Tube	SUS Wire	PVC

Lightweight Armored Type (for Fixed Wiring)

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 (PVC for 315)	SUS Spiral Tube	PVC

3 Series Typical Insertion Loss



* 313：~18.5 GHz, 321：~26.5 GHz
* 312：~18.5 GHz, 341：~40.0 GHz

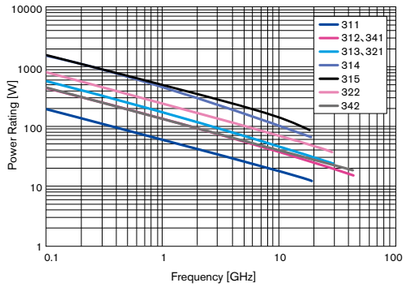
Simple Criteria for Cable Selection	
Insertion Loss	The larger the cable outer diameter, the lower the insertion loss.
Frequency Range	The smaller the cable, the higher mode frequency.
Power Rating	The larger the cable outer diameter, the higher the power rating.
Flexibility	The smaller the cable, the better the flexibility.
Mass	The smaller the cable, the lighter the cable.

Power Rating

The diagram to the right 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.

* The above figures are measured values for reference only.

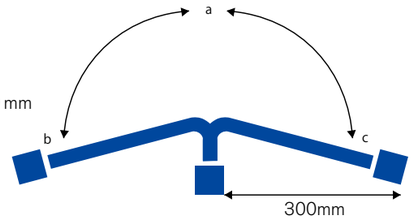
Power Rating of 3 Series at Sea Level



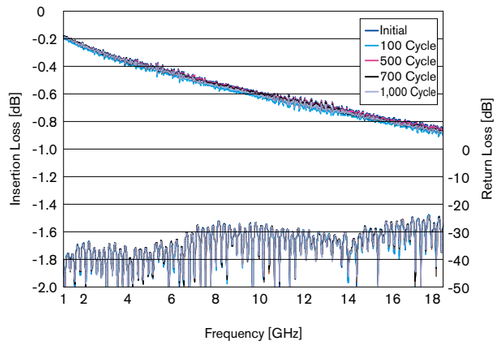
Bending Test Data of 312 (Camparison)

Test Method

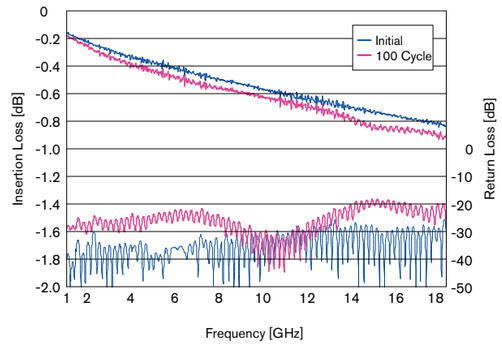
The connector on one end of test cable (MWX312-00500AMSAMS, measuring 500 mm in length and with SMA (m) connectors on both ends) was fixed in place.
The connector on the other end was moved in the sequence a → b → c, after which initial insertion loss and return loss values were compared to those after the test.



MWX312-00500AMSAMS



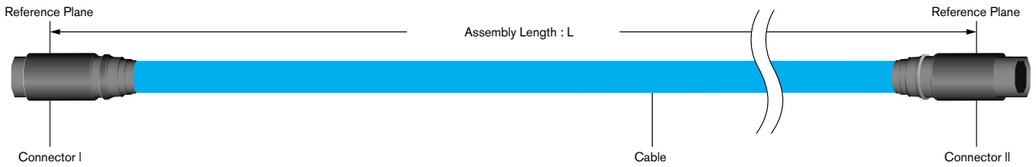
Previous Product



* The above figures are measured values for reference only.

3 Series

Placing Orders



Example 1

Cable : MWX312

Assembly Length : 1500 mm

Connector I : SMA (f) Straight

Connector II : SMA (m) Straight

Catalog No.

MWX312 - 01500 AFS AMS

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 2

Cable : MWX322

Assembly Length : 1000 mm

Connector I : 3.5mm (f) Straight

Connector II : 3.5mm (m) Straight

Armored : Armored Type

Catalog No.

MWX322 - 01000 DFS DMS /B

Armored-type cables will have a" /B" appended to the connector combination code.

Example 3

Cable : MWX342

Assembly Length : 1000mm

Connector I : 2.92mm (m) Straight

Connector II : 2.92mm (m) Straight

Armored : Light Weight Armored Type

Catalog No.

MWX342 - 01000 KMS KMS /A

Lightweight armored-type cables will have a" /A" appended to the connector combination code.

- The order of Connector I and Connector II is determined by the alphabetical order of the first letter of the Connector Code.
  In the case of DMS (3.5mm(m) and AMS (SMA(m), Connector I : AMS, Connector II : DMS
- The order of Connector I and Connector II when the first letter of the Connector Code is the same depends on the alphabetical order of the second and subsequent letters.
  In the case of DMS (3.5mm(m) and DFS (3.5mm(f), Connector I : DFS, Connector II : DMS

Connector Codes

Connector			3 Series												
			311	312	313	314	315	315/A	321	322	322/B	322/A	341	342	342/B	342/A
Type		Maximum Operating Frequency	18.5 GHz	18.5 GHz	18.5 GHz	18.5 GHz	18.0 GHz		26.5 GHz	26.5 GHz			40.0 GHz			40.0 GHz
SMA	(m) Right Angle	10.0 GHz	AMR	AMR	AMR				AMR							
TNC	(m) Straight	15.0 GHz		CMS	CMS	CMS	CMS		CMS	CMS	CMS	CMS				
N	(m) Straight	18.0 GHz		NMS*	NMS*	NMS*	NMS	NMS	NMS	NMS	NMS	NMS				
N	(m) Lightweight	18.0 GHz					NMS1	NMS1								
N	(m) Swept	18.0 GHz								NMW						
N	(f) Straight	18.0 GHz								NFS	NFS	NFS				
SMA	(m) Right Angle H	18.0 GHz		AMH						AMH						
SMA	(m) Straight	18.5 GHz	AMS	AMS	AMS	AMS	AMS	AMS	AMS	AMS	AMS	AMS	AMS*			
SMA	(m) Lightweight	18.5 GHz					AMS	AMS								
SMA	(m) Swept	18.5 GHz								AMW						
SMA	(f) Straight	18.5 GHz	AFS	AFS	AFS				AFS							
SSMA	(m) Straight	18.5 GHz	SMS						AFS							
3.5 mm	(m) Straight	26.5 GHz			DMS				DMS	DMS	DMS	DMS				
3.5 mm	(m) Swept	26.5 GHz								DMW						
3.5 mm	(f) Straight	26.5 GHz								DFS	DFS	DFS				
2.92 mm	(m) Straight	40.0 GHz												KMS	KMS	KMS
2.92 mm	(f) Straight	40.0 GHz												KFS	KFS	KFS
2.4 mm	(m) Straight	50.0 GHz												LMS	LMS	LMS
2.4 mm	(f) Straight	50.0 GHz												LFS	LFS	LFS

- The smallest frequency among the maximum operating frequencies of the connectors and cables to be used is the maximum operating frequency of the assembly.
- Please inquire separately for products with connector symbols in gray, as they require a longer delivery time.
- The maximum operating frequency of the 312, 313, and 314 N(m) Straight connectors is 18.5 GHz.
- The SMA(m) connector on the 341 supports 40.0 GHz.

- The lowest frequency among the maximum operating frequencies of the connectors and cables to be used is the maximum operating frequency of the assembly.
- For products with Connector Code in gray, please inquire separately as it takes time for delivery.

311

Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 18.5 GHz
- Temperature Range: -65 to 125°C
- Equipment Wiring
- Days to Ship: 10 Business Days
- RoHS Compliant

Property

Electrical Properties

Maximum Operating Frequency	18.5 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	86 pF/m
Propagation Delay (Typical)	4.25 ns/m
Velocity of Propagation (Typical)	79 %
Higher Mode Frequency (Typical)	75.0 GHz
VSWR (Typical)	1.40
Maximum Frequency Insertion Loss (18.5 GHz)	3.4 dB/m

Mechanical Properties

Cable Outer Diameter	2.7 mm
Minimum Bending Radius (Inner Side)	10 mm
Maximum Tensile Strength	29.4 N (3kgf)
Cable Mass (Typical)	18.5 g/m
Continuous Operating Temperature Range	-65~+125 °C
Assembly Length	100~10,000 mm

Order Form Example

Please provide the following information when placing an order.

Example 1

MWX311

Assembly Length: 1000mm
Connector Ⅰ : SMA (m) Straight
Connector Ⅱ : SMA (m) Straight

Catalog No.
MWX311-01000AMSAMS
a b c

Example 2

MWX311

Assembly Length: 1500 mm
Connector Ⅰ : SMA (f) Straight
Connector Ⅱ : SMA (m) Right Angle

Catalog No.
MWX311-01500AFSAMR
a b c

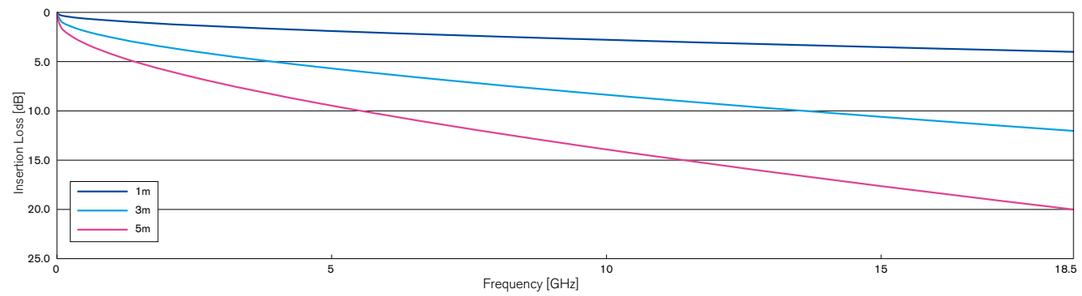
* See P. 3-4 "Connector Codes"

a. Cable
b. Assembly Length
c. Connector

Option ● We can deliver products with matched phases for customers who require this characteristic.

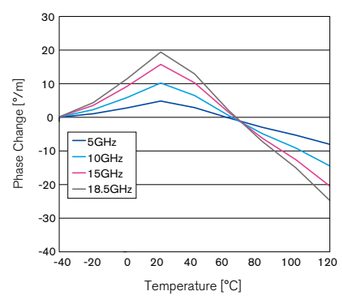
Technical Data

Cable Typical Insertion Loss



Typical Insertion Loss $1.55\times(0.0297\times f\,[GHz]+0.371\times\sqrt{f\,[GHz]}+0.07)\times L\,[m]$ **Maximum Insertion Loss** $1.55\times(0.0297\times f\,[GHz]+0.371\times\sqrt{f\,[GHz]}+0.07)\times 1.12\times L\,[m]$

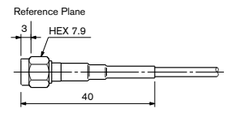
311 Phase Change vs. Temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

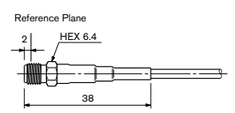
Connector

SMA (m) Straight (Code : AMS)



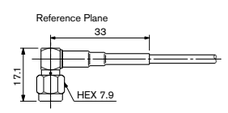
Maximum Operating Frequency : 18.5 GHz / Mass : 3g

SMA (f) Straight (Code : AFS)



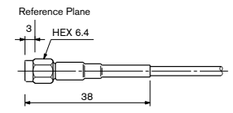
Maximum Operating Frequency : 18.5 GHz / Mass : 3g

SMA (m) Right Angle (Code : AMR)



Maximum Operating Frequency : 10.0 GHz / Mass : 5g

SSMA (m) Straight (Code : SMS)



Maximum Operating Frequency : 18.5 GHz / Mass : 3g

* Please see P.3-23 about "customer-specified swept and right angle connectors".

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

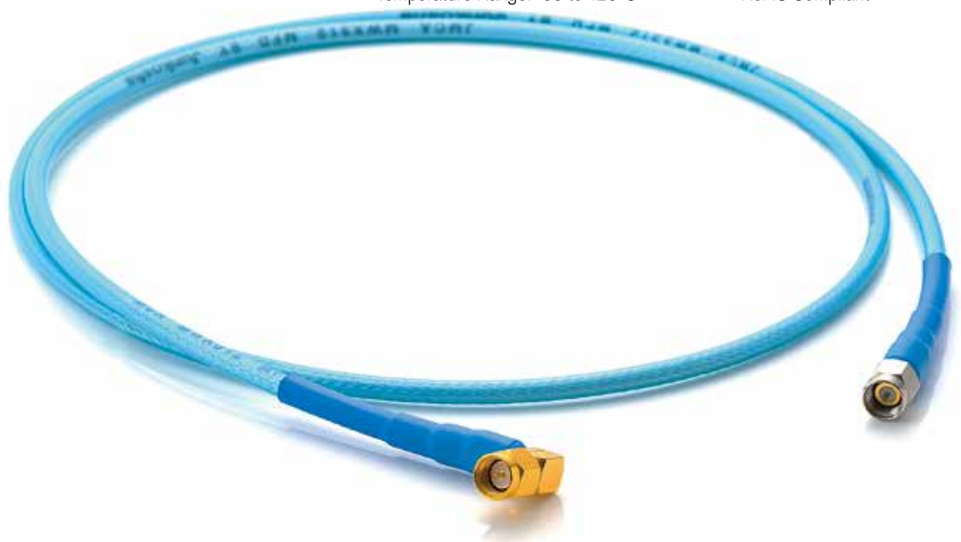
* The above figures are measured values for reference only.

3 Series Cable Assemblies for Equipment Wiring

312

Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 18.5 GHz
- Temperature Range: -65 to 125°C
- Equipment Wiring
- Days to Ship: 11 Business Days
- RoHS Compliant



Property

Electrical Properties

Maximum Operating Frequency	18.5 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	82 pF/m
Propagation Delay (Typical)	4.10 ns/m
Velocity of Propagation (Typical)	81 %
Higher Mode Frequency (Typical)	44.0 GHz
VSWR (Typical)	1.40
Maximum Frequency Insertion Loss (18.5 GHz)	2.2 dB/m

Mechanical Properties

Cable Outer Diameter	4.1 mm
Minimum Bending Radius (Inner Side)	20 mm
Maximum Tensile Strength	98 N (10 kgf)
Cable Mass (Typical)	42 g/m
Continuous Operating Temperature Range	-65~+125 °C
Assembly Length	100~20,000 mm

Order Form Example

Please provide the following information when placing an order.

Example 1
MWX312
Assembly Length: 1200 mm
Connector Ⅰ : SMA (m) Straight
Connector Ⅱ : SMA (m) Straight
Catalog No.
MWX312-01200AMSAMS
a b c

Example 2
MWX312
Assembly Length: 1000mm
Connector Ⅰ : SMA (f) Straight
Connector Ⅱ : N (m) Straight
Catalog No.
MWX312-01000AFSNMS
a b c

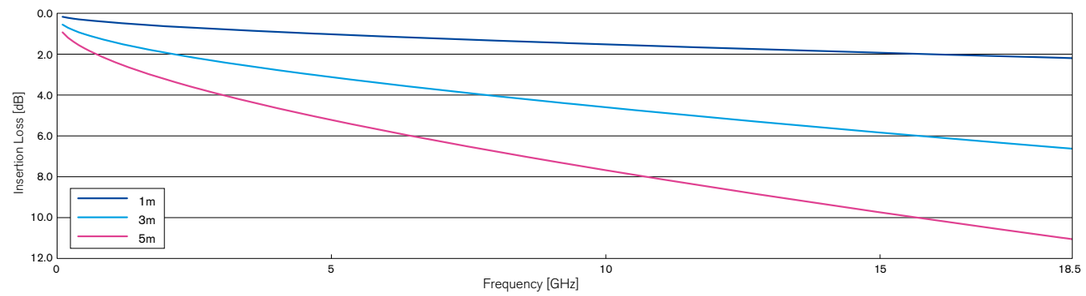
* See P. 3-4 "Connector Codes"

a. Cable
b. Assembly Length
c. Connector

Option ● We can deliver products with matched phases for customers who require this characteristic.

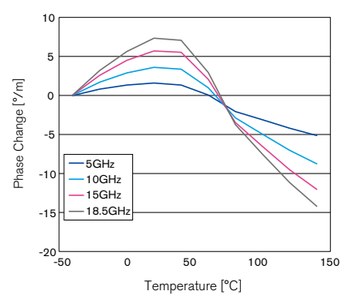
Technical Data

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

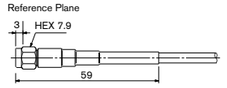
312 Phase Change vs. Temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

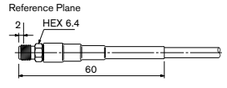
Connector

SMA (m) Straight (Code : AMS)



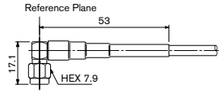
Maximum Operating Frequency : 18.5 GHz / Mass : 3g

SMA (f) Straight (Code : AFS)



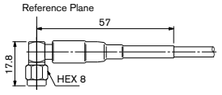
Maximum Operating Frequency : 18.5 GHz / Mass : 3g

SMA (m) Right Angle (Code : AMR)



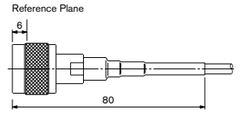
Maximum Operating Frequency : 10.0 GHz / Mass : 5g

SMA (m) Right Angle (Code : AMH)



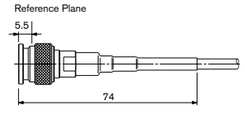
Maximum Operating Frequency : 18.0 GHz / Mass : 12g

N (m) Straight (Code : NMS)



Maximum Operating Frequency : 18.5 GHz / Mass : 39g

TNC (m) Straight (Code : CMS)



Maximum Operating Frequency : 15.0 GHz / Mass : 21g

* Please see P.3-23 about "customer-specified swept and right angle connectors".

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

* The above figures are measured values for reference only.

3 Series Cable Assemblies for Equipment Wiring

313

Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 18.5 GHz
- Temperature Range: -65 to 125°C
- Equipment Wiring
- Days to Ship: 11 Business Days
- RoHS Compliant

Property

Electrical Properties

Maximum Operating Frequency	18.5 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	80 pF/m
Propagation Delay (Typical)	4.05 ns/m
Velocity of Propagation (Typical)	82 %
Higher Mode Frequency (Typical)	37 GHz
VSWR (Typical)	1.40
Maximum Frequency Insertion Loss (18.5 GHz)	1.9 dB/m

Mechanical Properties

Cable Outer Diameter	4.7 mm
Minimum Bending Radius (Inner Side)	30 mm
Maximum Tensile Strength	98 N (10 kgf)
Cable Mass (Typical)	52 g/m
Continuous Operating Temperature Range	-65~+125 °C
Assembly Length	100~20,000 mm

Order Form Example

Please provide the following information when placing an order.

Example 1
MWX313
Assembly Length: 1000 mm
Connector Ⅰ : SMA (m) Straight
Connector Ⅱ : SMA (m) Straight
Catalog No.
MWX313-01000AMSAMS
a b c

Example 2
MWX313
Assembly Length: 1500 mm
Connector Ⅰ : SMA (f) Straight
Connector Ⅱ : SMA (m) Right Angle
Catalog No.
MWX313-01500AFSAMR
a b c

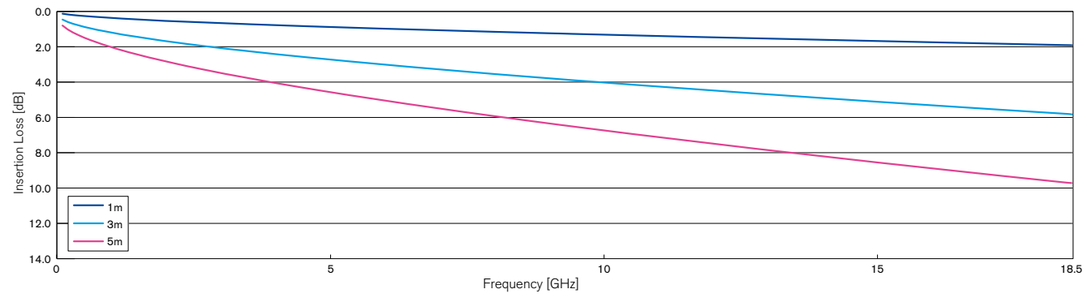
* See P. 3-4 "Connector Codes"

a. Cable
b. Assembly Length
c. Connector

Option
- We can deliver products with matched phases for customers who require this characteristic.

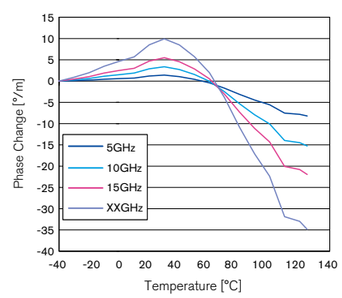
Technical Data

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

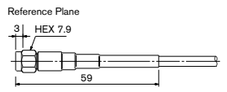
313 Phase Change vs. Temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

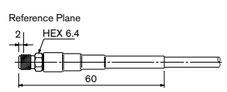
Connector

SMA (m) Straight (Code : AMS)



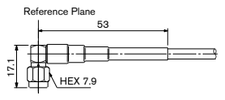
Maximum Operating Frequency : 18.5 GHz / Mass : 3g

SMA (f) Straight (Code : AFS)



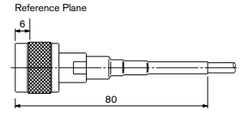
Maximum Operating Frequency : 18.5 GHz / Mass : 3g

SMA (m) Right Angle (Code : AMR)



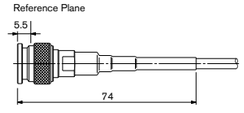
Maximum Operating Frequency : 10.0 GHz / Mass : 5g

N (m) Straight (Code : NMS)



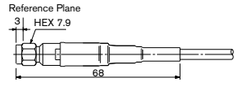
Maximum Operating Frequency : 18.5 GHz / Mass : 39g

TNC (m) Straight (Code : CMS)



Maximum Operating Frequency : 15.0 GHz / Mass : 21g

3.5mm (m) Straight (Code : DMS)



Maximum Operating Frequency : 18.5 GHz / Mass : 13g

* Please see P.3-23 about "customer-specified swept and right angle connectors".

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

* The above figures are measured values for reference only.

3 Series Cable Assemblies for Equipment Wiring

314

Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 18.5 GHz
- Temperature Range: -65 to 125°C
- Equipment Wiring
- Days to Ship: 11 Business Days
- RoHS Compliant

Property

Electrical Properties

Maximum Operating Frequency	18.5 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	78 pF/m
Propagation Delay (Typical)	3.95 ns/m
Velocity of Propagation (Typical)	84 %
Higher Mode Frequency (Typical)	19.0 GHz
VSWR (Typical)	1.40
Maximum Frequency Insertion Loss (18.5 GHz)	0.8 dB/m

Mechanical Properties

Cable Outer Diameter	7.7 mm
Minimum Bending Radius (Inner Side)	40 mm
Maximum Tensile Strength	294 N (30 kgf)
Cable Mass (Typical)	125 g/m
Continuous Operating Temperature Range	-65~+125 °C
Assembly Length	200~20,000 mm

Order Form Example

Please provide the following information when placing an order.

Example 1
MWX314
Assembly Length: 1000 mm
Connector Ⅰ : SMA (m) Straight
Connector Ⅱ : SMA (m) Straight
Catalog No.
MWX314-01000AMSAMS
a b c

Example 2
MWX314
Assembly Length: 1500mm
Connector Ⅰ : N (m) Straight
Connector Ⅱ : N (m) Straight
Catalog No.
MWX314-01500NMSNMS
a b c

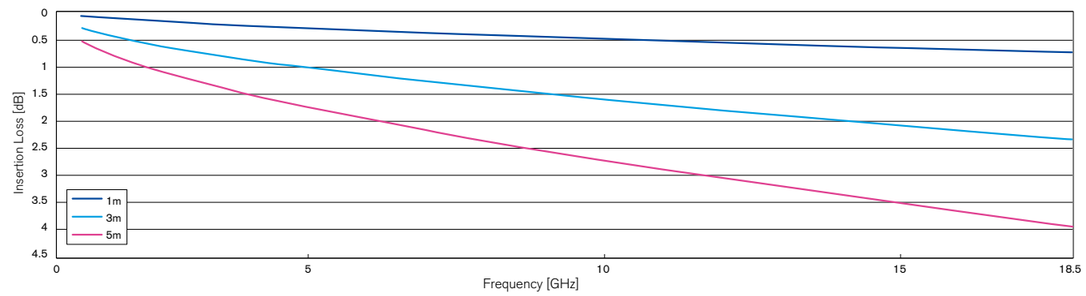
* See P. 3-4 "Connector Codes"

a. Cable
b. Assembly Length
c. Connector

Option
- We can deliver products with matched phases for customers who require this characteristic.

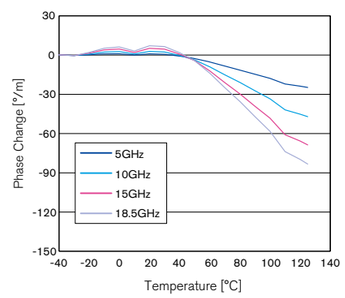
Technical Data

Cable Typical Insertion Loss



Typical Insertion Loss $0.36\times(0.0297\times f\,[GHz]+0.371\times\sqrt{f\,[GHz]}+0.07)\times L\,[m]$ **Maximum Insertion Loss** $0.36\times(0.0297\times f\,[GHz]+0.371\times\sqrt{f\,[GHz]}+0.07)\times 1.12\times L\,[m]$

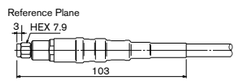
314 Phase Change vs. Temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

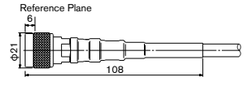
Connector

SMA (m) Straight (Code : AMS)



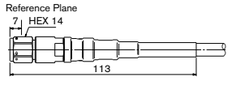
Maximum Operating Frequency : 18.5 GHz / Mass : 39g

N (m) Straight (Code : NMS)



Maximum Operating Frequency : 18.5 GHz / Mass : 53g

TNC (m) Straight (Code : CMS)



Maximum Operating Frequency : 18.5 GHz / Mass : 42g

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

* The above figures are measured values for reference only.

3 Series Cable Assemblies for Equipment Wiring

315

Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 18.0 GHz
- Temperature Range: -30 to 85°C
- Low Insertion Loss
- Equnipment Wiring
- Days to Ship: 11 Business Days
- RoHS Compliant

Property

Electrical Properties	
Maximum Operating Frequency	18.0 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	88 pF/m
Propagation Delay (Typical)	4.3 ns/m
Velocity of Propagation (Typical)	77 %
Higher Mode Frequency (Typical)	18.5 GHz
VSWR (Typical)	1.40
Maximum Frequency Insertion Loss (18.0 GHz)	0.76 dB/m

Mechanical Properties	Standard Type	Lightweight Armored Type (for Fixed Wiring)
Cable Outer Diameter	8.6 mm	17 mm
Minimum Bending Radius (Inner Side)	30 mm	40 mm
Cable Mass (Typical)	155 g/m	313 g/m
Continuous Operating Temperature Range	-30~+85 °C	-30~+85 °C
Armored Side Pressure	-	196 N/cm
Assembly Length	500~5,000 mm	500~5,000 mm

Order Form Example

Please provide the following information when placing an order.

Example 1

MWX315

Assembly Length: 1000mm
Connector Ⅰ : SMA (m) Straight
Connector Ⅱ : SMA (m) Straight

Catalog No.
MWX315-01000AMSAMS
a b c

Example 2

MWX315 Lightweight Armored Type

Assembly Length: 1000mm
Connector Ⅰ : SMA (m) Straight
Connector Ⅱ : SMA (m) Straight

Catalog No.
MWX315-01000AMSAMS/A
a b c d

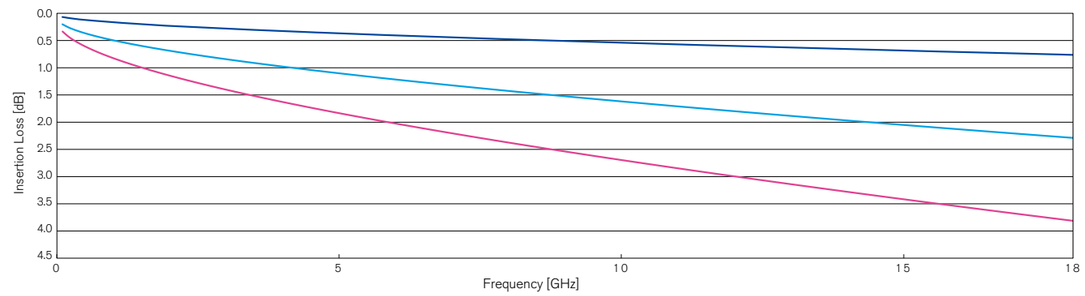
* See P. 3-4 "Connector Codes"

a. Cable
b. Assembly Length
c. Connector
d. Armored type

Option ● We can deliver products with matched phases for customers who require this characteristic.

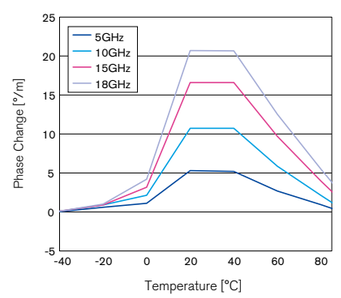
Technical Data

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] $\times 1.12$

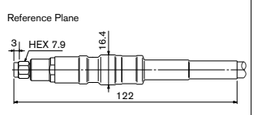
315 Phase change vs. temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

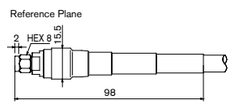
Connector

SMA (m) Straight (Code : AMS)



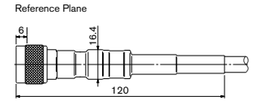
Maximum Operating Frequency : 18.0 GHz / Mass : 46g

Lightweight Type SMA (m) Straight (Code : AMS1)



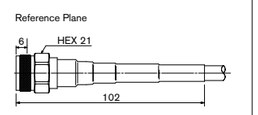
Maximum Operating Frequency : 18.0 GHz / Mass : 20g

N (m) Straight (Code : NMS)



Maximum Operating Frequency : 18.0 GHz / Mass : 61g

Lightweight TypeN (m) Straight (Code : NMS1)



Maximum Operating Frequency : 18.0 GHz / Mass : 50g

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

* The above figures are measured values for reference only.

321

Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 26.5 GHz
- Temperature Range: -65 to 125°C
- Equnipment Wiring
- Days to Ship: 11 Business Days
- RoHS Compliant

Property

Electrical Properties

Maximum Operating Frequency	26.5 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	80 pF/m
Propagation Delay (Typical)	4.05 ns/m
Velocity of Propagation (Typical)	82 %
Higher Mode Frequency (Typical)	37.0 GHz
VSWR (Typical)	1.44
Maximum Frequency Insertion loss (26.5 GHz)	2.4 dB/m

Mechanical Properties

Cable Outer Diameter	4.7 mm
Minimum Bending Radius (Inner Side)	30 mm
Maximum Tensile Strength	98 N (10 kgf)
Cable Mass (Typical)	52 g/m
Continuous Operating Temperature Range	-65~+125 °C
Assembly Length	100~20,000 mm

Order Form Example

Please provide the following information when placing an order.

Example 1

MWX321

Assembly Length: 1100 mm
Connector I : SMA (m) Straight
Connector II : SMA (m) Straight

Catalog No.
MWX321-01100AMSAMS
(a) (b) (c)

Example 2

MWX321

Assembly Length: 1500mm
Connector I : SMA (m) Straight
Connector II : 3.5mm (m) Straight

Catalog No.
MWX321-01500AMSDMS
(a) (b) (c)

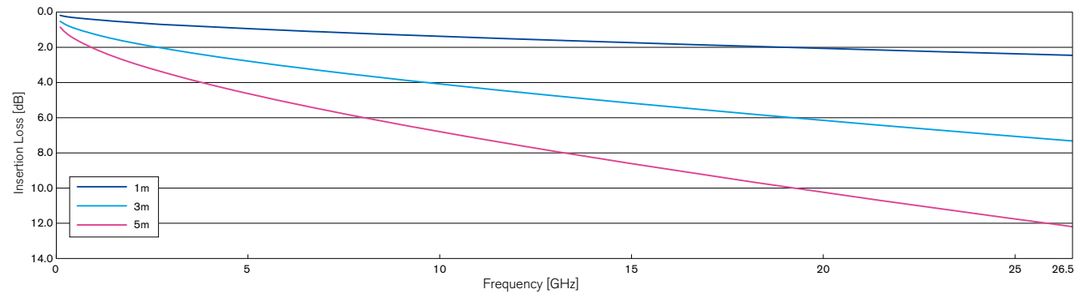
* See P. 3-4 "Connector Codes"

a. Cable
b. Assembly Length
c. Connector

Option ● We can deliver products with matched phases for customers who require this characteristic.

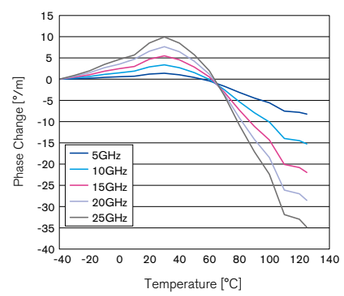
Technical Data

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

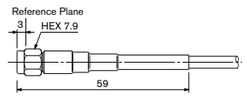
321 Phase Change vs. Temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

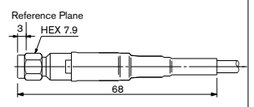
Connector

SMA (m) Straight (Code : AMS)



Maximum Operating Frequency : 26.5 GHz / Mass : 3g

3.5mm (m) Straight (Code : DMS)



Maximum Operating Frequency : 26.5 GHz / Mass : 13g

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

* The above figures are measured values for reference only.

3 Series Cable Assemblies for Equipment Wiring

322

Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 26.5 GHz
- Temperature Range: -65 to 125°C
- Low Insertion Loss
- Equnipment Wiring
- Days to Ship: 11 Business Days
- RoHS Compliant

Property

Electrical Properties	
Maximum Operating Frequency	26.5 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	88 pF/m
Propagation Delay (Typical)	4.38 ns/m
Velocity of Propagation (Typical)	76 %
Higher Mode Frequency (Typical)	27.5 GHz
VSWR (Typical)	1.33
Maximum Frequency Insertion Loss (26.5 GHz)	1.3 dB/m

Mechanical Properties	Standard Type	Armored Type	Lightweight Armored Type (for Fixed Wiring)
Cable Outer Diameter	5.2 mm	12.5 mm	11.0 mm
Minimum Bending Radius (Inner Side)	25 mm	25 mm	25 mm
Maximum Tensile Strength	98 N (10 kgf)	98 N (10 kgf)	98 N (10kgf)
Cable Mass (Typical)	60 g/m	208 g/m	155 g/m
Continuous Operating Temperature Range	-65~+125 °C	-30~+85 °C	-30~+85 °C
Armored Side Pressure	-	196 N/cm	196 N/cm
Assembly Length	200~20,000 mm	700~5,000 mm	500~20,000 mm

Order Form Example

Please provide the following information when placing an order.

* See P. 3-4 "Connector Codes"

Example 1
MWX322
Assembly Length: 1000 mm
Connector I : SMA (m) Straight
Connector II : N (m) Straight
Catalog No.
MWX322-01000AMSNMS
a b c

Example 2
MWX322 Armored Type
Assembly Length: 1000 mm
Connector I : 3.5mm (f) Straight
Connector II : 3.5mm (m) Straight
Catalog No.
MWX322-01000DFSDMS/B
a b c d

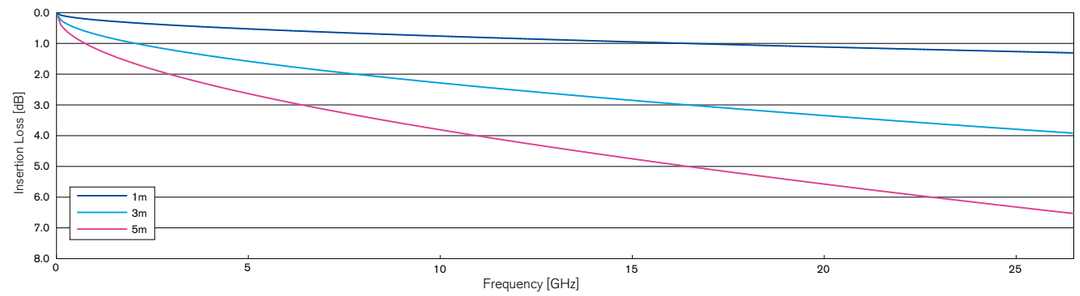
Example 3
MWX322 Lightweight Armored Type
Assembly Length: 1000mm
Connector I : SMA (m) Straight
Connector II : SMA (m) Straight
Catalog No.
MWX321-01000AMSAMS/A
a b c d

a. Cable
b. Assembly Length
c. Connector
d. Armored

Option ● We can deliver products with matched phases for customers who require this characteristic.

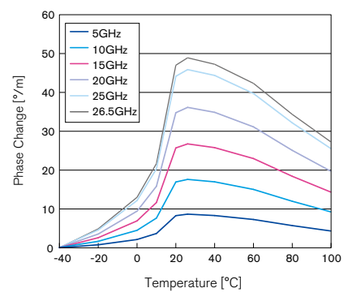
Technical Data

Cable Typical Insertion Loss



Typical Insertion Loss $(0.214\times\sqrt{f\,[GHz]}+0.007\times f\,[GHz]+0.01)\times L\,[m]$ **Maximum Insertion Loss** $(0.214\times\sqrt{f\,[GHz]}+0.007\times f\,[GHz]+0.01)\times 1.12\times L\,[m]$

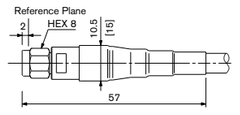
322 Phase Change vs. Temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

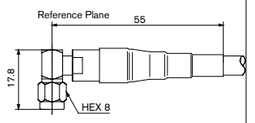
Connector

SMA (m) Straight (Code : AMS)



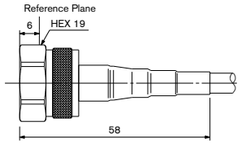
Maximum Operating Frequency : 18.5 GHz / Mass : 10g

SMA (m) Right Angle (Code : AMH) (*1) (*2)



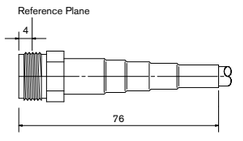
Maximum Operating Frequency : 18.0 GHz / Mass : 10g

N (m) Straight (Code : NMS)



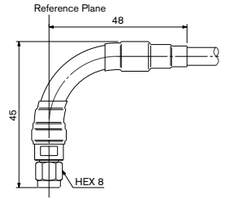
Maximum Operating Frequency : 18.0 GHz / Mass : 38g

N (f) Straight (Code : NFS)



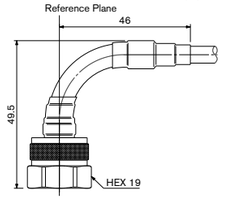
Maximum Operating Frequency : 18.0 GHz / Mass : 26g

SMA (m) Swept (Code : AMW) (*1) (*2)



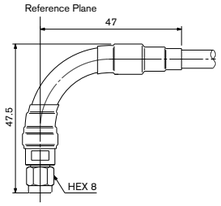
Maximum Operating Frequency : 18.5 GHz / Mass : 17g

N (m) Swept (Code : NMW) (*1) (*2)



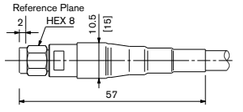
Maximum Operating Frequency : 18.0 GHz / Mass : 46g

3.5mm (m) Swept (Code : DMW)



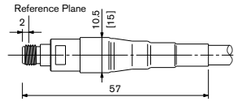
Maximum Operating Frequency : 26.5 GHz / Mass : 18g

3.5mm (m) Straight (Code : DMS)



Maximum Operating Frequency : 26.5 GHz / Mass : 11g

3.5mm (f) Straight (Code : DFS)



Maximum Operating Frequency : 26.5 GHz / Mass : 10g

* Please see P.3-23 about "customer-specified swept and right angle connectors".
* [ ] : Armored type size.

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

* The above figures are measured values for reference only.

3 Series Cable Assemblies for Equipment Wiring

341

Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 40.0 GHz
- Temperature Range: -65 to 125°C
- Equnipment Wiring
- Days to Ship: 11 Business Days
- RoHS Compliant

Property

Electrical Properties

Maximum Operating Frequency	40.0 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	80 pF/m
Propagation Delay (Typical)	4.05 ns/m
Velocity of Propagation (Typical)	82 %
Higher Mode Frequency (Typical)	46.0 GHz
VSWR (Typical)	1.44
Maximum Frequency Insertion Loss (40.0 GHz)	3.3 dB/m

Mechanical Properties

Cable Outer Diameter	4.0 mm
Minimum Bending Radius (Inner Side)	20 mm
Maximum Tensile Strength	98 N (10 kgf)
Cable Mass (Typical)	40 g/m
Continuous Operating Temperature Range	-65~+125 °C
Assembly Length	100~10,000 mm

Order Form Example

Please provide the following information when placing an order.

Example

MWX341

Assembly Length: 1200 mm
Connector I : SMA (m) Straight
Connector II : SMA (m) Straight

Catalog No.

MWX341-01200AMSAMS

a b c

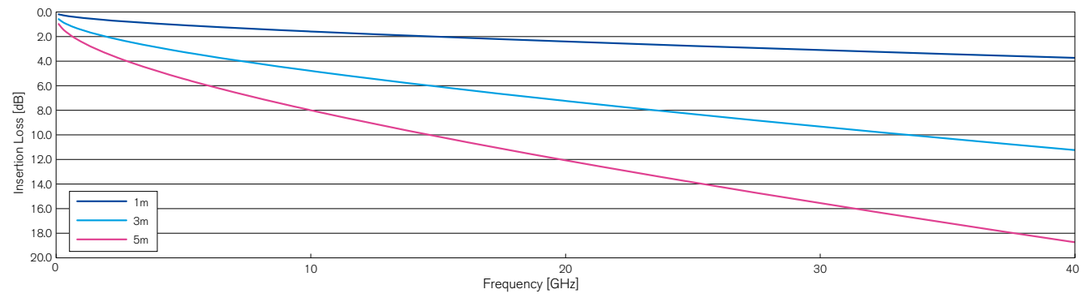
* See P. 3-4 "Connector Codes"

a. Cable
b. Assembly Length
c. Connector

Option ● We can deliver products with matched phases for customers who require this characteristic.

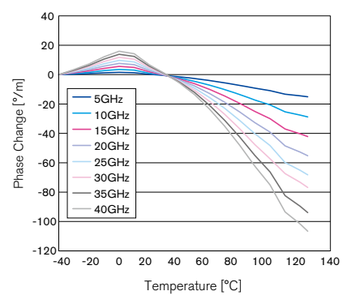
Technical Data

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

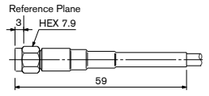
341 Phase Change vs. Temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

Connector

SMA (m) Straight (Code : AMS)



Maximum Operating Frequency : 40.0 GHz /
Mass : 3g

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

* The above figures are measured values for reference only.

3 Series Cable Assemblies for Equipment Wiring

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Features

- Phase Stability: Temperature Change
- Maximum Operating Frequency: 40.0 GHz
- Temperature Range: -65 to 125°C
- Equnipment Wiring
- Days to Ship: 11 Business Days
- RoHS Compliant
- Low Insertion Loss

Property

Electrical Properties	
Maximum Operating Frequency	40.0 GHz
Characteristic Impedance (Typical)	50±1 Ω
Capacitance (Typical)	87 pF/m
Propagation Delay (Typical)	4.35 ns/m
Velocity of Propagation (Typical)	76 %
Higher Mode Frequency (Typical)	40.5 GHz
VSWR (Typical)	1.43
Maximum Frequency Insertion Loss (40.0 GHz)	2.4 dB/m

Mechanical Properties	Standard Type	Armored Type	Lightweight Armored Type (for Fixed Wiring)
Cable Outer Diameter	3.9 mm	9.5 mm	8.0 mm
Minimum Bending Radius (Inner Side)	20 mm	20 mm	20 mm
Maximum Tensile Strength	98 N (10 kgf)	98 N (10 kgf)	98 N (10kgf)
Cable Mass (Typical)	35 g/m	137 g/m	98 g/m
Continuous Operating Temperature Range	-65~+125 °C	-30~+85 °C	-30~+85 °C
Armored Side Pressure	-	196 N/cm	196 N/cm
Assembly Length	200~10,000 mm	700~10,000 mm	500~10,000 mm

Order Form Example

Please provide the following information when placing an order.

* See P. 3-4 "Connector Codes"

Example 1
MWX342
Assembly Length: 1000 mm
Connector Ⅰ : 2.92mm (f) Straight
Connector Ⅱ : 2.92mm (m) Straight
Catalog No.
MWX342-01000KFSKMS
a b c

Example 2
MWX342 Armored type
Assembly Length: 1000mm
Connector Ⅰ : 2.4mm (f) Straight
Connector Ⅱ : 2.4mm (m) Straight
Catalog No.
MWX342-01000LFSLMS/B
a b c d

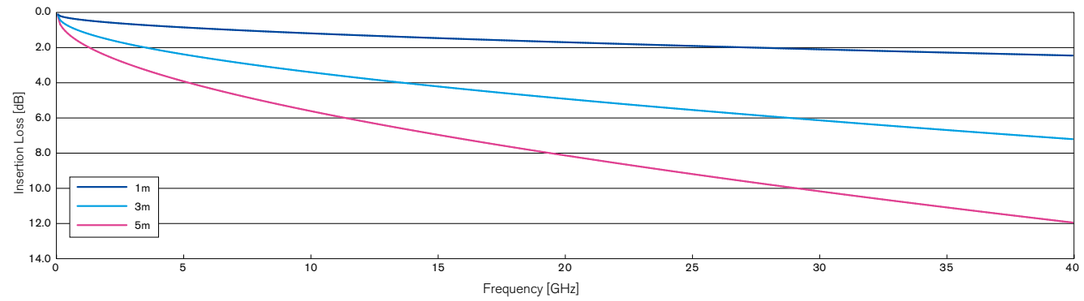
Example 3
MWX342 Lightweight Armored type
Assembly Length: 1000mm
Connector Ⅰ : 2.92mm (m) Straight
Connector Ⅱ : 2.92mm (m) Straight
Catalog No.
MWX342-01000KMSKMS/A
a b c d

a. Cable
b. Assembly Length
c. Connector
d. Armored

Option
- We can deliver products with matched phases for customers who require this characteristic.

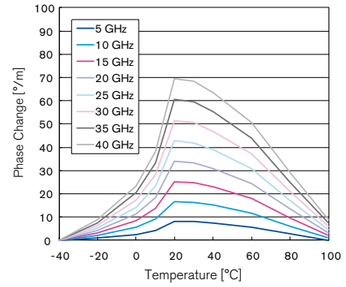
Technical Data

Cable Typical Insertion Loss



Typical Insertion Loss $(0.315\times\sqrt{f\,[GHz]}+0.009\times f\,[GHz]+0.02)\times L\,[m]$ **Maximum Insertion Loss** $(0.315\times\sqrt{f\,[GHz]}+0.009\times f\,[GHz]+0.02)\times 1.12\times L\,[m]$

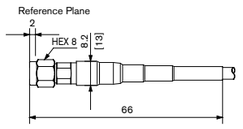
342 Phase Change vs. Temperature



The cable was measured in chamber every 20 °C from -40 °C, 1 hour after the temperature changed.

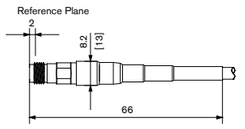
Connector

2.92mm (m) Straight (Code : KMS)



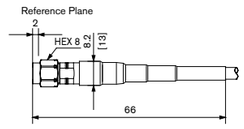
Maximum Operating Frequency : 40.0 GHz / Mass : 6g

2.92mm (f) Straight (Code : KFS)



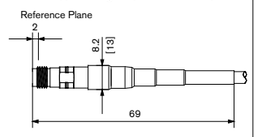
Maximum Operating Frequency : 40.0 GHz / Mass : 5g

2.4mm (m) Straight (Code : LMS)



Maximum Operating Frequency : 40.0 GHz / Mass : 6g

2.4mm (f) Straight (Code : LFS)



Maximum Operating Frequency : 40.0 GHz / Mass : 6g

*Refer to P0-4 Connector Code Table for othrer applicable connectors.

* The above figures are measured values for reference only.

Series Common Properties

Connector Insertion Loss [dB/connector]

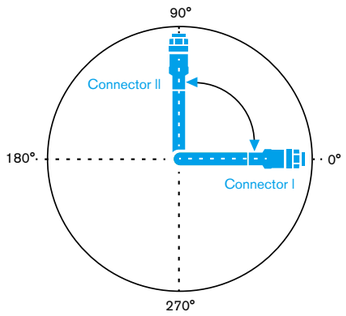
Connector Type	Connector Insertion Loss	Frequency [GHz]						
		1.0 GHz	10.0 GHz	18.5 GHz	26.5 GHz	40.0 GHz	50.0 GHz	67.0 GHz
SSMA (m) Straight	0.03√f	0.03	0.09	0.13	-	-	-	-
SMA (m) Straight	0.03√f	0.03	0.09	0.13	0.15	0.19	-	-
SMA (f) Straight	0.03√f	0.03	0.09	0.13	-	-	-	-
SMA (m) Right Angle	0.07√f	0.07	0.22	0.3	-	-	-	-
SMA (m) Swept	0.04√f	0.04	0.13	0.17	-	-	-	-
TNC (m) Straight	0.07√f	0.07	0.22	0.3	-	-	-	-
N (m) Straight	0.05√f	0.05	0.16	0.22	-	-	-	-
N (f) Straight	0.05√f	0.05	0.16	0.22	-	-	-	-
N (m) Swept	0.06√f	0.06	0.19	0.26	-	-	-	-
SMP (f) Straight	0.12√f	0.12	0.38	0.52	-	-	-	-
SMPM (f) Straight	0.12√f	0.12	0.38	0.52	0.62	0.76	0.85	0.98
3.5mm (m) Straight	0.03√f	0.03	0.09	0.13	0.15	-	-	-
3.5mm (f) Straight	0.03√f	0.03	0.09	0.13	0.15	-	-	-
3.5mm (m) Swept	0.04√f	0.04	0.13	0.17	0.21	-	-	-
2.92mm (m) Straight	0.03√f	0.03	0.09	0.13	0.15	0.19	-	-
2.92mm (f) Straight	0.03√f	0.03	0.09	0.13	0.15	0.19	-	-
2.92mm (m) Swept	0.04√f	0.04	0.13	0.17	0.21	0.25	-	-
2.4mm (m) Straight	0.042√f	0.04	0.13	0.18	0.22	0.27	0.3	-
2.4mm (f) Straight	0.042√f	0.04	0.13	0.18	0.22	0.27	0.3	-
1.85mm (m) Straight	0.065√f	0.065	0.206	0.28	0.33	0.41	0.46	0.53
1.85mm (f) Straight	0.065√f	0.065	0.206	0.28	0.33	0.41	0.46	0.53
1.0mm (m) Straight	0.065√f	0.065	0.206	0.28	0.33	0.41	0.46	0.53
1.0mm (f) Straight	0.065√f	0.065	0.206	0.28	0.33	0.41	0.46	0.53

Tolerances for Assembly Length

Tolerance values of 0, 1, 2 and 3 series 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

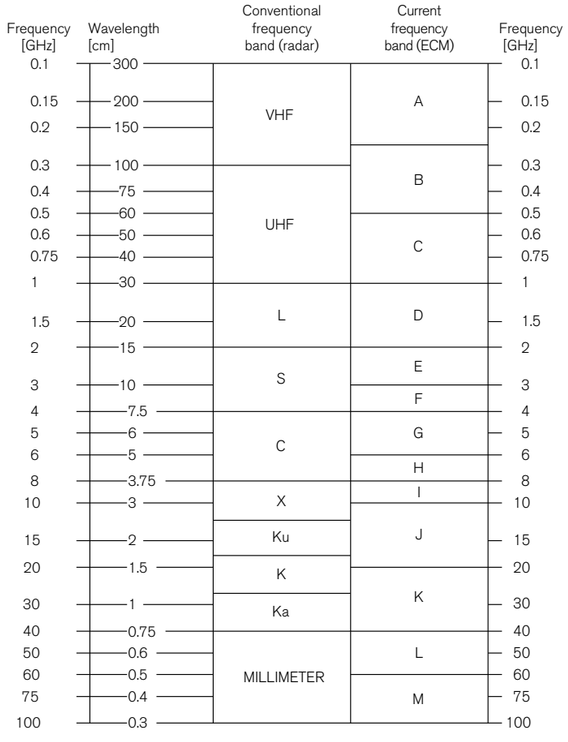
VSWR – Return Loss Conversion Table

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 P2/P1	dB Dp	Current Ratio/ Voltage Ratio I_2/I_1·V_2/V_1	dB Di·Dv
×0.01	-20dB	×0.01	-40dB
×0.1	-10dB	×0.1	-20dB
×1	0dB	×1	0dB
×2	3.0dB	×2	6.0dB
×3	4.8dB	×3	9.5dB
×4	6.0dB	×4	12.0dB
×5	7.0dB	×5	14.0dB
×6	7.8dB	×6	15.6dB
×7	8.5dB	×7	16.9dB
×8	9.0dB	×8	18.1dB
×9	9.5dB	×9	19.1dB
×10	10dB	×10	20dB
×100	20dB	×100	40dB
×1000	30dB	×1000	60dB

Frequency Band Name and Code



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

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

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

- Power level "dBm" represents the absolute value with respect to the standard 0[dBm] for 1[m/W]. P[mW] is given by 10log10P[dBm].

1. $VSWR = \frac{1+\rho}{1-\rho} = \frac{1+10^{-\frac{dB}{20}}}{1-10^{-\frac{dB}{20}}}$

2. Return Loss $RL\,(dB) = -20\log\rho$
$= -20\log\frac{VSWR-1}{VSWR+1}$

3. Reflection Coefficient $\rho = (VSWR-1)/(VSWR+1) = 10^{-\frac{dB}{20}}$

4. Propagation Loss $\alpha\,(dB) = -10\log(1-\rho^2)$
$= -10\log\left(1-\left(\frac{VSWR-1}{VSWR+1}\right)^2\right)$

Relationship between frequency and wavelength
$f = \frac{c}{\lambda}$ 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 : εr=1, Dense PTFE : εr ≒ 2.1

* The above figures are measured values for reference only.