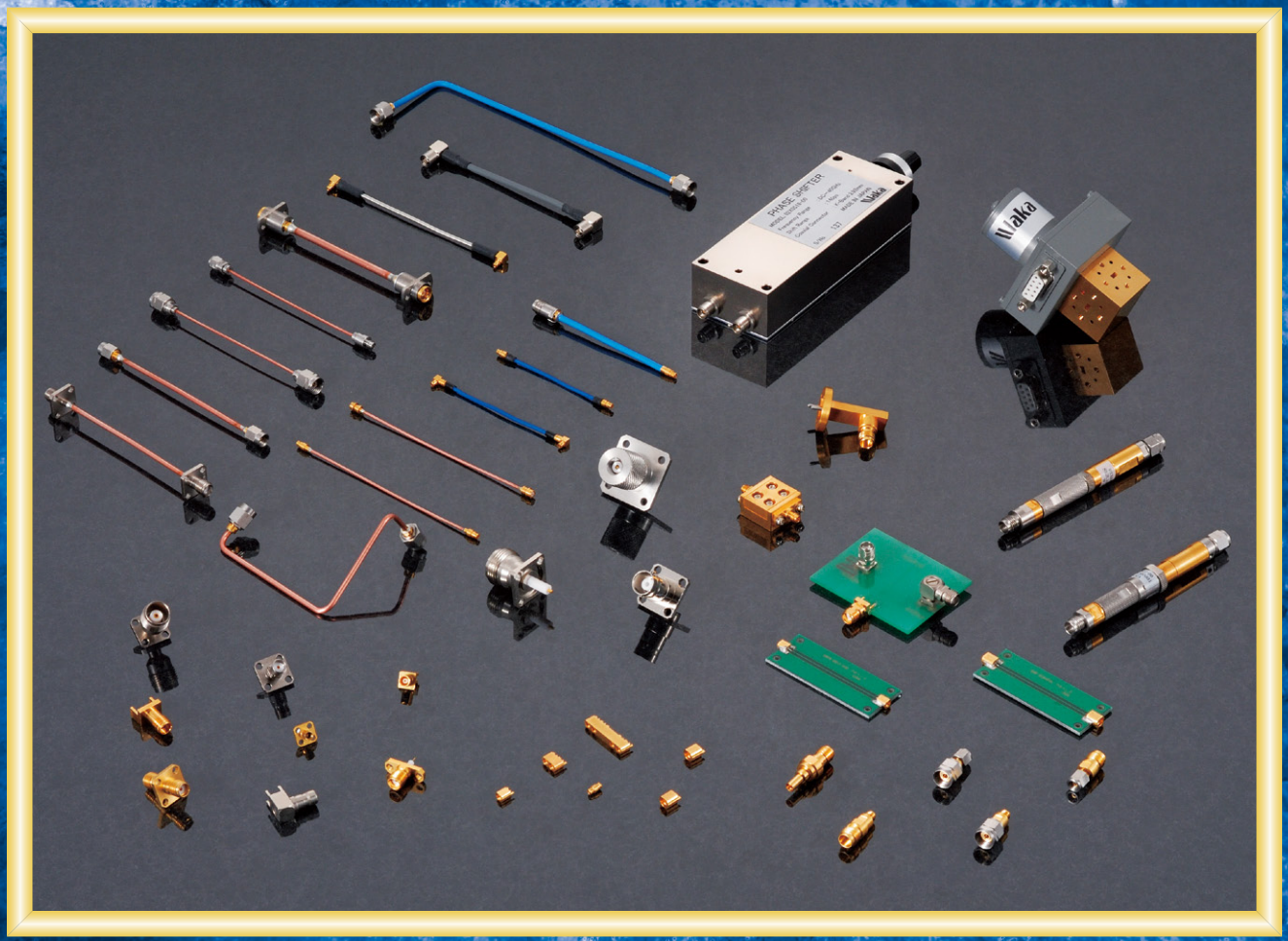
WAKA MANUFACTURING Co., Ltd.

Vol.9

# Micro wave Coaxial Components Catalog

## High-Frequency Coaxial Products

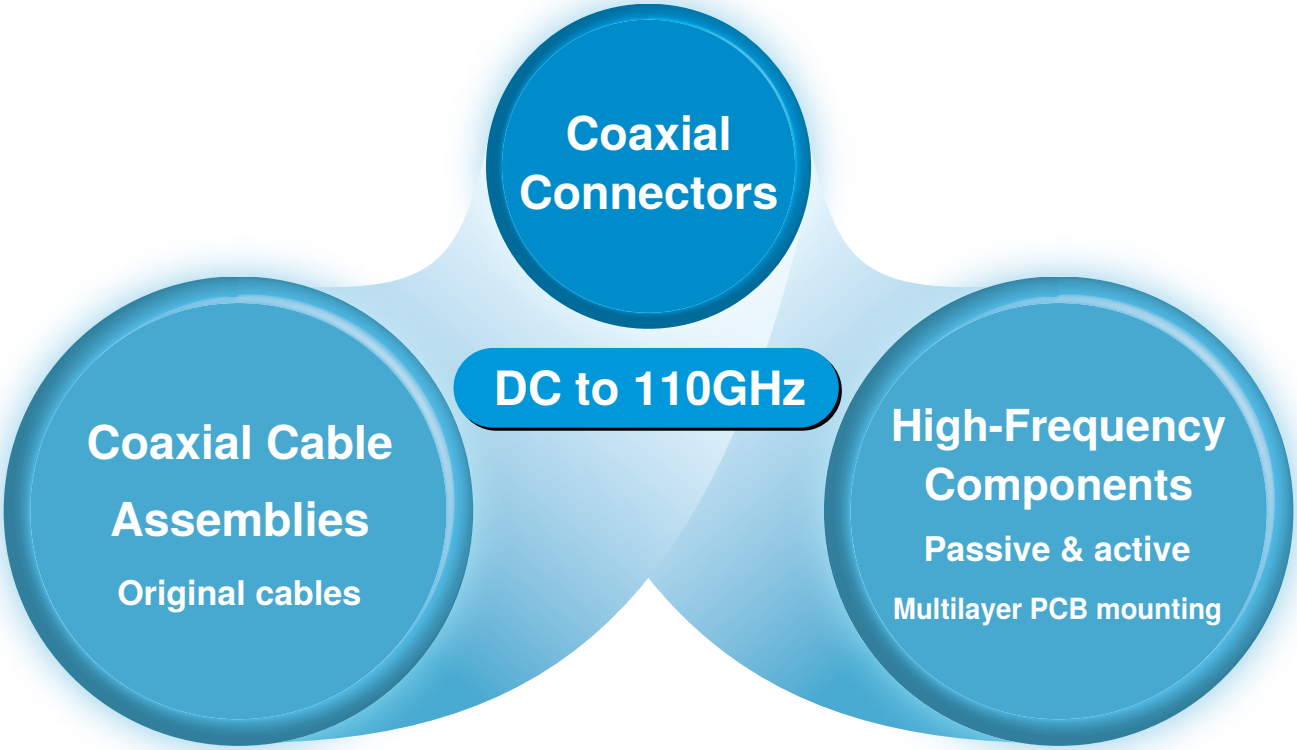


Waka

WAKA MANUFACTURING Co.,Ltd.

## High-Frequency Coaxial Product Development

**Building on our track record in developing and manufacturing coaxial connectors, Waka Manufacturing continues to deliver highly original products for millimeter-wave and other high-frequency bands.**




## Global Operations

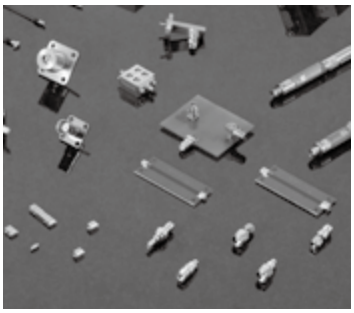
**With a firm footing in every field that uses microwaves, we deliver integrated production and solution proposals both in Japan and overseas.**



# CONTENTS


PAGE

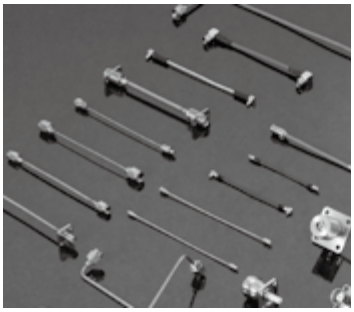
## Connectors



- Millimeter-Wave Connectors ..... 1
  1.0mmW, 1.85mmV, 2.92mmK
  **e Type, SMPM, SMP, PCB mounting examples**
- Microwave 50Ω ..... 5
  SMA, WPL, BMA, PLB, N, SMB, MCX, MMCX
  TNC, BNC, BNC Type
- Microwave 75Ω ..... 12
  W3B, F
- Adapters ..... 13
- Connector Interface Drawings ..... 15

## Cables

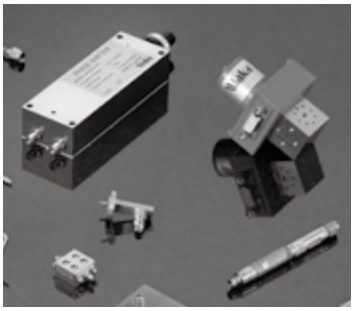
Cable ,Cable Assy



- Cables ..... 17
  **Semi-rigid cable, semi-flexible cable, flexible cable**
- Cable Assemblies ..... 20
  **Features, applications, performance data**
- How to Order ..... 23
  **Notes**
- Standard Cable Assemblies ..... 25
  **Soft-rigid cable, handy-forming cable**

## Components

RF Components



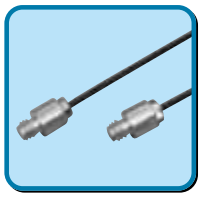
- Attenuators, Terminations ..... 27
- Phase Shifters ..... 27
  **Phase shifters, phase adjusters**
- Filters ..... 31
  BPF, LPF
- Coax-to-Waveguide Adapters ..... 33
- Subsystems ..... 34

- Index ..... 35
- FAX Information ..... 36


* Abbreviations in tables SUS: Stainless steel (SUS303) BS:Brass Pv:Passivate Au:Gold plating Ni:Nickel plating
* Frequency ranges shown for each connector series do not apply to every part number.
* Our products are RoHS compliant as a rule; however, some adapters and components are not. See the index (P35) or contact us.
* Cable-type connectors are supplied as cable assemblies.
* For details, see our website or contact our sales department.
  http://www.waka.co.jp TEL：03-5228-3161

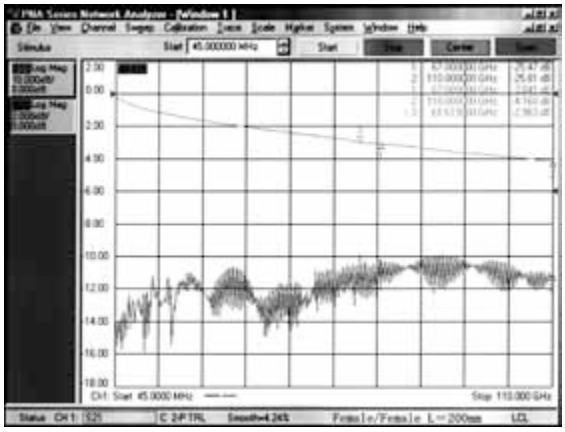
# 1.0mm W Connector DC to 110GHz

## Features



1. IEEE-287 compliant
2. Original, high-precision design for excellent RF performance
3. Low V.S.W.R. up to 110GHz (wideband)
4. High-performance adapters (P13) Matched electrical length lineup Mates with: 1.85mm V

■ RF characteristics



W/J W/J SX-12 # 0200

## Receptacle Jack



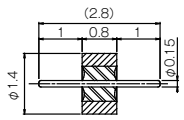
01R0229-10

| | Material | Plating |
|---|---|---|
| Center cond.: | BeCu | Au |
| Outer cond.: | SUS | Pv |

* Glass bead sold separately

Related parts

Glass Bead




01S0742-00

## Cable Type Supplied as cable assemblies.



W/P



W/J

**Applicable cables**

Semi-rigid : SX-09, SX-12 (P17)

* To order cable assemblies, see P23.

## Specifications (Reference)

| Item | Specification |
|---|---|
| Characteristic impedance | 50Ω |
| Return loss | 18dB |
| Insertion loss | 0.6dB |
| Contact resistance | 4mΩ |
| Coupling nut tightening torque | 3.45kg-cm |
| Coupling proof torque | 6.9kg-cm |
| Center contact retention force | Min28g |

# 1.85mm V Connector DC to 65GHz

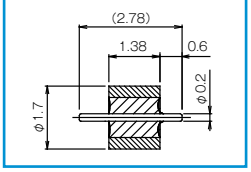
## Features



1. Original design optimized for impedance matching
2. Common internal structure
3. Wide variety of types
4. Solderless center-conductor connection (low-reflection cable assemblies)
5. High-performance adapters (P13) Matched electrical length lineup Mates with: 1.0mm W, SMPM, 2.92mm K

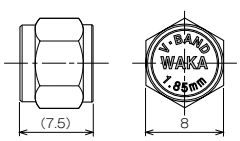
Related parts

Glass Bead




01S0743-00

Dust cap




01K1872-10

## Receptacle

Jack



01R0089-10



01R0088-10



01R0051-10

Plug



01R0087-10



01R0086-10

| | Material | Plating |
|---|---|---|
| Center cond.: | BeCu | Au |
| Outer cond.: | SUS | Pv |

* Glass bead sold separately

## Cable Type Supplied as cable assemblies.



V/P



V/FP



V/J



V/4J



V/2J

**Applicable cables**

Semi-rigid : SX-09, SX-12, SX-22 (P17)

Soft-rigid / Handy-forming (P25, P26)

* DC to 62GHz when SX-22 is used
* To order cable assemblies, see P23.

# 2.92mm K Connector DC to 45GHz

## Features



1. Original design optimized for impedance matching
2. Common internal structure
3. Wide variety of types
4. Solderless center-conductor connection (low-reflection cable assemblies)
5. High-performance adapters (P13) Matched electrical length lineup Mates with: 1.85mm V

## Receptacle

Jack


01R0073-10


01R0072-10


01R0060-10

Plug


01R0081-10


01R0080-10

| | Material | Plating |
|---|---|---|
| Center cond.: | BeCu | Au |
| Outer cond.: | SUS | Pv |

* Glass bead sold separately

## Cable Type

Supplied as cable assemblies.


K/P


K/FP


K/J


K/4J


K/2J

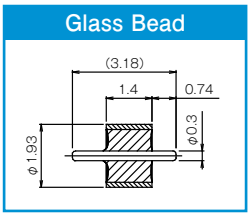
**Applicable cables**

Semi-rigid : SX-09, SX-12, SX-22 (P17)
Semi-flex : SXL-22 (P18)
Soft-rigid / Handy-forming (P25, P26)

* To order cable assemblies, see P23.

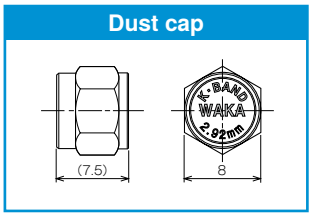
## Related parts

Glass Bead



01S0745-00

Dust cap



01K1871-10

# Millimeter-Wave Cable Assembly (e Type)

## Overview



A millimeter-wave cable assembly that achieves a low price through VE (value engineering) design without significantly compromising basic performance.

## Features

1. Cost reduction through VE design of materials and structure
2. Stable RF performance
3. Cable assembly specifications can be customized

## Specifications (Reference)

| Type | 1.85mmV/P-P e Type | | | 2.92mmK/P-P e Type | | |
|---|---|---|---|---|---|---|
| Part No. | 02YA333# □□□□ | 02YA334# □□□□ | M2NVMVM# □□□□ | 02YA335# □□□□ | 02YA336# □□□□ | M2NKMKM# □□□□ |
| Applicable cables | Semi-rigid cable | | Handy-forming cable | Semi-rigid cable | | Handy-forming cable |
| Cable part No. | SX-22 | SX-12 | SP-20M gray | SX-22 | SX-12 | SP-20M gray |
| Frequency range | DC to 60GHz | | | DC to 40GHz | | |
| V.S.W.R. | 1.2 (at 20GHz) | 1.25 (at 20GHz) | 1.2 (at 20GHz) | 1.2 (at 26GHz) | 1.4 (at 26GHz) | 1.2 (at 26GHz) |
| | 1.4 (at 40GHz) | 1.5 (at 40GHz) | 1.4 (at 40GHz) | 2.0 (at 40GHz) | | |
| | 2.0 (at 60GHz) | | | | | |
| Insertion loss (L=100mm) | 1.24dB | 1.8dB | 1.24dB | 1.02dB | 1.8dB | 1.02dB |

* Specify the cable length (overall length in mm) with the last four digits of the part number.

# SMPM Connector DC to 65GHz

## Overview



**Miniature push-on connector compliant with MIL-STD-348A. A series for smaller, faster optical transmission equipment (40Gbps, 100Gbps).**

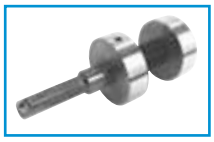
## Features

1. Plug receptacles available in up to 4-gang versions
2. Glass-sealed type for housing mounting
3. Supports a variety of cable assemblies
4. Removal tools available in various types
5. High-performance adapters (P13)
   Matched electrical length lineup
   Mates with: 1.85mm V

**Removal tools**



For cables



For adapters

## In-Series Adapter



02R0216-00

SMPM/J-J

| Material | Plating |
|---|---|
| BeCu | Au |

## Receptacle Plug

■ Edge-mount type



01R0213-00



02R0224-00



04R0225-00

| Material | Plating |
|---|---|
| BS | Au |

■ Glass-sealed type



01R0251-00

| Material | Plating |
|---|---|
| Kovar | Au |

## Cable Type Supplied as cable assemblies.



SMPM/J



SMPM/LJ

| Applicable cables | |
|---|---|
| **Semi-rigid :** | SX-09, SX-12, SX-22 (P17) |
| **Semi-flex** | : SXL-12, SXL-22 (P18) |

*** To order cable assemblies, see P23.**

# SMP Connector DC to 40GHz

## Features

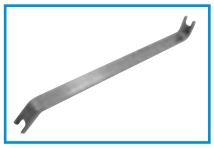


**Miniature push-on connector compliant with MIL-STD-348A. A series for more compact optical transmission and communication equipment (10Gbps).**

## Features

1. Glass-sealed type for housing mounting
2. Supports a variety of cable assemblies
3. Various removal tools available

**Removal tools**



For cables

## Conversion Adapter



02R0242-00

SMP/J-SMA/J

## Receptacle Plug

■ Edge-mount type



01R0231-00

| Material | Plating |
|---|---|
| BS | Au |

■ Glass-sealed type



01R0252-00

| Material | Plating |
|---|---|
| Kovar | Au |

## Cable Type Supplied as cable assemblies.



SMP/J



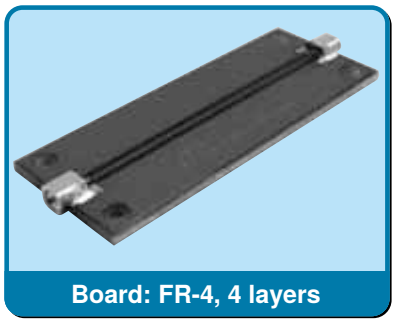
SMP/LJ

| Applicable cables | |
|---|---|
| **Semi-rigid :** | SX-12, SX-22 (P17) |
| **Semi-flex** | : SXL-12 (P18) |

*** To order cable assemblies, see P23.**

## PCB Mounting Examples

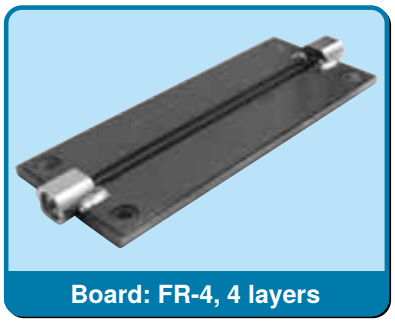
■ SMPM receptacle mounting



Board: FR-4, 4 layers

**Frequency: DC to 40GHz**
**V.S.W.R.: 1.3 max.**
**Insertion loss: 0.5dB max.**
**(excluding board loss)**

■ SMP receptacle mounting



Board: FR-4, 4 layers

**Frequency: DC to 30GHz**
**V.S.W.R.: 1.3 max.**
**Insertion loss: 0.5dB max.**
**(excluding board loss)**

## Overview

**Based on electromagnetic simulation, we connect coaxial connectors to printed circuit boards under optimum conditions.**
**Proven with all our millimeter-wave connector series.**

*** Please contact us with your requirements.**

## Reference Data

■ Frequency bands and connectors

| Name (Band) | Range (GHz) | Connector |
|---|---|---|
| W | 75–111 | 1.0mmW |
| V | 40–75 | 1.85mmV SMPM |
| Ka | 26–40 | 2.92mmK SMP |
| K | 18–26 | S·SMA |
| Ku | 12–18 | SMA WPL BMA |
| X | 8–12 | PLB |
| C | 4–8 | MCX MMCX |
| S | 2–4 | N,TNC BNC,SMB W3B |
| L | 0.5–1.5 | F |

■ Coaxial connector formulas

**1. Characteristic impedance**

$$Zo=\frac{59.9586}{\sqrt{\varepsilon}}\ln\left(\frac{D}{d}\right) \quad [\Omega]$$

**2. Capacitance**

$$C=\frac{2\pi\varepsilon\varepsilon_0}{\ln\left(\frac{D}{d}\right)} \quad [\text{farad/m}]$$

**3. Inductance**

$$L=\frac{\mu\mu_0}{2\pi}\ln\left(\frac{D}{d}\right) \quad [\text{henry/m}]$$

**4. Velocity factor (wavelength shortening)**

$$\xi=\frac{1}{\sqrt{\varepsilon}}\times 100 \quad [\%]$$

**5. Delay time**

$$\tau=\frac{\sqrt{\varepsilon}}{c}=\frac{\sqrt{\varepsilon}}{2.9979\times 10^8} \quad [\text{sec/m}]$$

**6. Higher-order mode (cutoff frequency)**

$$f_c=\frac{190.86}{(d+D)\sqrt{\varepsilon}} \quad [\text{GHz}]$$

# SMA Connector DC to 18GHz

## Feature 1: Improved right-angle connector

**By redesigning the internal structure, including the center conductor, the usable frequency range – traditionally a weak point – has been greatly extended and performance improved.**

## Feature 2: PCB end-launch type

**Receptacle mounted on the edge of a PCB (printed circuit board), straddling the board.**
**Available for a range of PCB thicknesses.**
**Please contact us for special board thicknesses.**

## Receptacle Jack



01K1961-00

| Material | Plating |
|---|---|
| SUS | Au |

Up to 18GHz



01K1445-00

| Material | Plating |
|---|---|
| SUS | Ni |

Up to 26.5GHz

## Receptacle Jack



01K2116-00

| Spacing |
|---|
| S:0.95mm |

| Material | Plating |
|---|---|
| BS | Au |



01K1845-00

| Spacing |
|---|
| S:1.3mm |

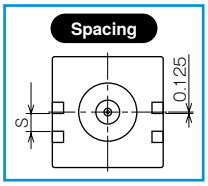
| Material | Plating |
|---|---|
| BS | Au |



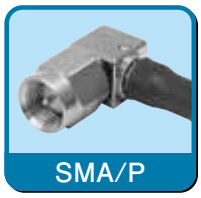
01K2088-00

| Spacing |
|---|
| S:1.9mm |

| Material | Plating |
|---|---|
| BS | Au |




## Cable Type



SMA/P

| Applicable cables |
|---|
| Semi-flex: SXL-36 |

| Material | Plating |
|---|---|
| SUS | Au |

Up to 18GHz

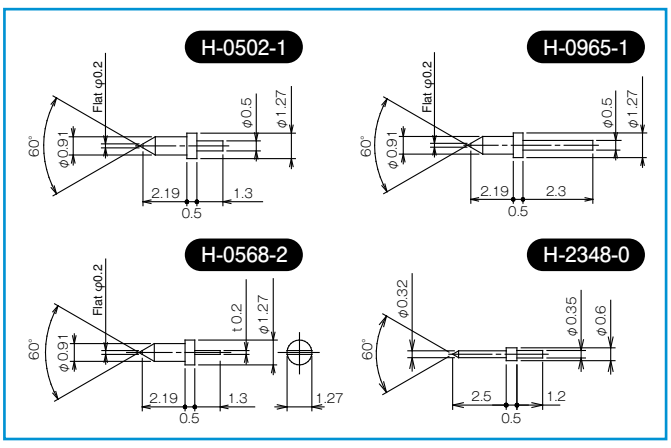
## Feature 3: Contact pin variations

**Center conductors come in various tip shapes to suit the application.**
**Products with detachable tab terminals are also available.**



**Terminal shapes**
- **Round pin φ1.27, thin pin φ0.25**
- **Flat tab t=0.15, D-cut**
- **Center slot, etc.**

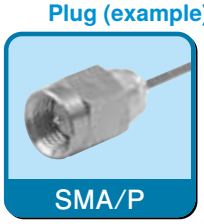
■ Tab terminals



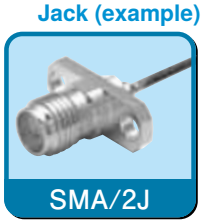

## Feature 4: Wide range of applicable cables

**Connectors are available for a wide variety of RF coaxial cables, with an especially rich lineup for thin cables.**

Plug (example) Jack (example)



SMA/P



SMA/2J

## Applicable Cables (P17–19)

**Semi-rigid : SX-09, SX-12, SX-22, SX-36**
**Semi-flex : SXL-12, SXL-22, SXL-36**
**Flexible : RG series, 1.5D, 2.5D, 3D**
**Soft-rigid / Handy-forming (P25, P26)**

**Frequency characteristics of cable assemblies vary with the cable.**

## Receptacle Jack


01K0580-20

Material Plating
SUS Pv
Dimension
L1 : 4.3mm


01K0881-10

Material Plating
SUS Pv
Dimension
L1 : 7.65mm
L2 : 4.0mm


01K1174-10

Material Plating
SUS Pv
Dimension
L1 : 4.4mm
L2 : 3.2mm


01K0670-10

Material Plating
SUS Pv
Tab terminal
H-0502-1
Dimension
L2 : 4.0mm


01K1577-10

Material Plating
SUS Pv
Dimension
L1 : 2.3mm


01K0899-10

Material Plating
SUS Pv
Dimension
L1 : 7.65mm
L2 : 4.0mm


01K0628-10

Material Plating
SUS Pv
Dimension
L1 : 4.4mm
L2 : 3.2mm


01K0820-10

Material Plating
SUS Pv
Tab terminal
H-0502-1
Dimension
L2 : 4.0mm


01K1070-10
Up to 10GHz

Material Plating
SUS Ni
Tab terminal
H-0502-1
Dimension
L2 : 4.0mm


01K1498-00
Up to 26.5GHz

Material Plating
SUS Ni
Dimension
L1 : 4.1mm


01K2014-00

Material Plating
BS Au
□7.2mm
Dimension
L3 : 1.8mm


01K2015-00

Material Plating
BS Au
□5mm
Dimension
L3 : 1.3mm


01K1905-00

Material Plating
BS Au
□5.17mm
Dimension
L3 : 3.0mm

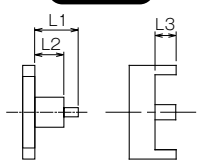

01K1435-00
Up to 10GHz

Material Plating
SUS Ni
□5.08mm
Dimension
L3 : 3.8mm


01K2286-00

Material Plating
SUS Au
Dimension
L1 : 2.85mm
L2 : 1.85mm

Dimension




## Receptacle Plug


01K0791-00

Material Plating
SUS Pv
Dimension
L1 : 6.6mm
L2 : 0.6mm


01K0681-10

Material Plating
SUS Pv
Dimension
L1 : 6.0mm
L2 : 4.0mm


01K1077-10

Material Plating
SUS Pv
Dimension
L1 : 2.5mm


01K0682-10

Material Plating
SUS Pv
Tab terminal
H-0502-1
Dimension
L2 : 4.0mm


01K1076-10

Material Plating
SUS Pv
Dimension
L1 : 2.5mm


01K0984-10

Material Plating
SUS Pv
Dimension
L1 : 4.4mm
L2 : 3.2mm

## Cable Type Supplied as cable assemblies.


SMA/4J

Material
SUS/BS
Plating
Au/Ni


SMA/2J

Material
SUS/BS
Plating
Au/Ni


SMA/J

Material
SUS/BS
Plating
Pv/Au/Ni

*** Material and plating are shown for the housing (jacks) and the coupling nut (plugs).**

*** To order cable assemblies, see P23.**


SMA/P

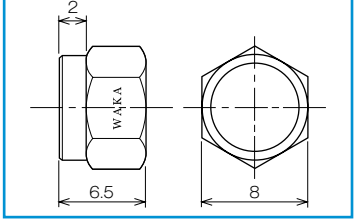
Material
SUS/BS
Plating
Pv/Au/Ni


SMA/LP

Material
SUS/BS
Plating
Pv/Au/Ni

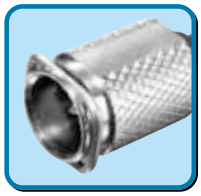
**Related parts**

**Dust cap**




01K1548-10

# WPL Connector DC to 18GHz [Waka original] (patent pending)



**Mate-and-lock connector**
**(push-on + 90° turn)**
**SMA-derived model**

## Overview

**A coaxial connector whose electrical interface has the same structure and dimensions as SMA, with a redesigned shell and coupling that add a mating-lock function.**

## Features

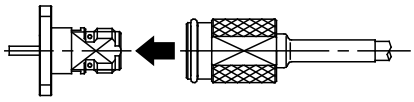
1. **Shorter mating time**
2. **No torque wrench or other tools required**
3. **Unlike threaded types, does not work loose**
4. **Frequency characteristics equivalent to SMA**
5. **WPL/J mates directly with SMA/P**

## Mating and Unmating

■ Mating

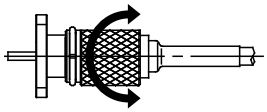
**Align the H-cut of the receptacle with the knurl-cut of the plug coupling**

**Push!**



**Once the plug is fully inserted, turn the coupling 90° (either direction).**

**Lock!**



## Unmating

**Turn the coupling back 90° and pull the plug out.**

## Receptacle Jack


01K2493-10


01K2526-10


01K2525-00


01K2550-00


01K2580-00

## Cable Type Supplied as cable assemblies.


WPL/P

**Applicable cables**
**Semi-rigid :** SX-22(P17)
**Semi-flex** : SXL-22(P18)

*** To order cable assemblies, see P23.**

## Adapter


02K2646-00 WPL/J-J


02K2518-00 WPL/J-J


02K2521-00 WPL/P-P

## Conversion Adapter (to SMA)


02K2501-00 SMA/P-WPL/J


02K2517-00 WPL/P-SMA/J


02K2516-00 WPL/P-SMA/P

## Specifications (Reference) (Rec): Receptacle

| Item | Specification |
|---|---|
| Characteristic impedance | 50Ω |
| Operating frequency range | DC to 18GHz * |
| V.S.W.R. | ≦1.2 at 18GHz (Rec) |
| Insertion loss | ≦0.15dB at 18GHz (Rec) |
| Insulation resistance | DC500V Min 5000MΩ (Rec) |
| Dielectric withstanding voltage | AC1000V.rms at Sea Level |
| Contact resistance | AC50mA：Max3mΩ |
| Coupling nut retention force | Min50N |
| Mating cycles | 500 cycles |
| Operating temperature range | –55 to 125°C |
| Applicable cables | Semi-rigid, semi-flex * |

*** Semi-flex: frequency range DC to 10GHz (semi-flexible cable)**

## BMA Connector DC to 18GHz



Coaxial connector with floating function
Rated to 18GHz

### Features

1. Highly stable mating
2. No wrench or other tools required for mating
3. Multiple connectors can be mated at once

### Applications

Communication base stations, broadcasting equipment

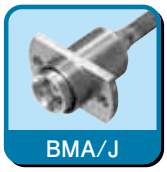
### Receptacle Plug




For panel mounting

| | | Material | Plating |
|---|---|---|---|
| Shell | : | SUS | Pv |
| Contact | : | BeCu | Au |
| Dielectric | : | PTFE | |

### Cable Type Supplied as cable assemblies.




Applicable cables
Semi-rigid : SX-36 (P17)

* To order cable assemblies, see P23.

### Specifications (Reference)

| Item | Specification |
|---|---|
| Characteristic impedance | 50Ω |
| Operating frequency range | DC to 18GHz |
| V.S.W.R. | ≦1.2 at 18GHz |
| Mating cycles | 500 cycles |
| Operating temperature range | −55 to 125°C |

## PLB Connector DC to 12.4GHz [Waka original]







Push-on mating type

### Features

1. No wrench or other tools required for mating
2. Center contact diameter: φ1.27
   (same as SMA connector)

### Specifications (Reference)

| Item | Specification |
|---|---|
| Characteristic impedance | 50Ω |
| Operating frequency range | DC to 12.4GHz |
| V.S.W.R. | ≦1.2 at 12.4GHz |
| Engage/disengage force | Max6kg |
| Mating cycles | 500 cycles |
| Operating temperature range | −55 to 125°C |

### Receptacle

Jack










Plug




| | | Material | Plating |
|---|---|---|---|
| Shell | : | BS | Ni/Au |
| | | SUS | Pv/Au |
| Contact | : | BeCu | Au |
| Dielectric | : | PTFE | |

### Cable Type Supplied as cable assemblies.













Applicable cables
Semi-rigid : SX-22, SX-36 (P17)
Semi-flex : SXL-22, SXL-36 (P16)

* To order cable assemblies, see P23.

# N Connector DC to 4GHz

## Overview

**Widely used as an interface connector for communication and measuring equipment. Waterproof types are also available.**

## Features

**Wide lineup rated to 18GHz**

**1. Cable-type jack**




**V.S.W.R. DC to 4GHz: <1.1**
**4 to 8GHz: <1.15**
**8 to 18GHz: <1.25**

| | | Material | Plating |
|---|---|---|---|
| Shell | : | SUS | Pv |
| Contact | : | BeCu | Au |

**2. Adapter**




N/J-J

## Receptacle Jack




| Material | Plating |
|---|---|
| BS | Ni |

## Dust Cap







## Cable Type Supplied as cable assemblies.







Up to 18GHz

**Applicable cables**
**Semi-rigid :** SX-36 (P17)













Up to 4GHz

**Applicable cables**
**Semi-rigid :** SX-22, SX-36 (P17)
**Semi-flex :** SXL-22, SXL-36 (P18)
**Flexible :** RG-55, 58, 142 RG-174, 188, 316 3D (P19)

*** To order cable assemblies, see P23.**

# SMB Connector DC to 4GHz

## Overview

**Push-on connector for internal wiring of communication and measuring equipment.**

## Features

**Wide product lineup**

**1. VE products made by press forming**

Jack







Up to 2GHz

**2. Non-magnetic (medical) cable assemblies**







## Receptacle

Jack







Plug




| Material | Plating |
|---|---|
| BS | Ni |

## Cable Type Supplied as cable assemblies.










Up to 2GHz

**Applicable cables**
**Flexible:** 1.5D (P19)

*** To order cable assemblies, see P23.**

# MCX Connector DC to 6GHz

## Overview

**Miniature push-on connector for internal equipment wiring.**
**IEC 61169-36 compliant**

## Features

**1. Full range of connectors for cable assemblies**
**2. Non-magnetic (medical) versions available**

■ Non-magnetic versions

Jack


01K2448-00


MCX/LP

## Receptacle

Jack


01K2153-00

Plug


01K2419-00

| Material | Plating |
|---|---|
| BS | Au |

## Cable Type

Supplied as cable assemblies.


MCX/P


MCX/LP


MCX/J

**Applicable cables**

**Semi-rigid :** SX-22, SX-36 (P17)
**Flexible** : RG-174, 188, 316, 178, 196 (P19)

*** To order cable assemblies, see P23.**

# MMCX Connector DC to 6GHz

## Overview

**Miniature push-on connector for internal equipment wiring.**

## Features

**1. Even smaller than the MCX connector**
**2. Full range of connectors for cable assemblies (fits a variety of cables)**

## Receptacle

Jack


01K1680-00


01K2356-00


01K2202-00

| Material | Plating |
|---|---|
| BS | Au/Ni |

## Cable Type

Supplied as cable assemblies.


MMCX/P


MMCX/LP

**Applicable cables**

**Semi-rigid :** SX-22 (P17)
**Flexible** : RG-178, 196 (P19)

*** To order cable assemblies, see P23.**

# TNC Connector DC to 4GHz

## Overview

**Retains the basic dimensions of the BNC connector while using a threaded coupling.**
**The design improves connection stability and reduces signal leakage.**

### Receptacle Jack


01K1323-00

| Material | Plating |
|---|---|
| BS | Ni |

### Cable Type Supplied as cable assemblies.


TNC/P


TNC/J

**Applicable cables**

**Semi-rigid :** SX-22, SX-36 (P17)
**Semi-flex :** SXL-22, SXL-36 (P18)
**Flexible :** 1.5D, 3D (P19)

*** To order cable assemblies, see P23.**

# BNC Connector DC to 4GHz

## Overview

**A compact, easy-to-handle coaxial connector with bayonet-lock mating.**
**Available in 75Ω as well as 50Ω versions.**

### Receptacle Jack


01K0002-60


01K0238-30

| Material | Plating |
|---|---|
| BS | Ni |

### Cable Type Supplied as cable assemblies.


BNC/P


BNC/4J

**Applicable cables**

**Semi-rigid :** SX-22, SX-36 (P17)
**Semi-flex :** SXL-22, SXL-36 (P18)
**Flexible :** 1.5D, 3D, 5D, RG-59 (P19)

*** To order cable assemblies, see P23.**

# BNC Type Up to 0.4GHz

## Overview

**A low-cost version intended for electrical connection rather than full BNC RF performance.**
**Available in many variations, including types with a switch (S/W) function or a board-standing angle bracket.**

### Receptacle Jack

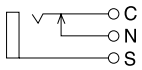

01K0312-00

| Material | Plating |
|---|---|
| ZDC | Ni |


01K1079-00


01K1081-00

**With S/W**





1811K059-50


01K1621-10

**Board-standing angle bracket**

# W3B Connector 75Ω DC to 3GHz [Waka original]

## Overview

**An original connector series designed for 75Ω, with a center conductor of the same diameter as the 50Ω SMB connector.**

## Specifications (Reference)

| Item | Specification |
|---|---|
| Characteristic impedance | 75Ω |
| V.S.W.R. | DC to 3GHz 1.3 |
| Insulation resistance | DC500V Min 1000MΩ |
| Dielectric withstanding voltage | 1000V rms at Sea Level |
| Contact resistance | AC 100mA Max 6mΩ |
| Withdrawal force | Max6.4kg |
| Mating life | 500cycles |

**These specifications are typical. Please contact us for details.**

## Receptacle Jack


01K2223-00


01K2222-00

| Material | Plating |
|---|---|
| BS | Ni |

## Cable Type Supplied as cable assemblies.


W3B/P


W3B/LP

**Applicable cables**
**Flexible:** 1.5C (P19)

*** To order cable assemblies, see P23.**

# F Connector 75Ω DC to 1GHz

## Overview

**The most common product series for connecting broadcast signals.**
**In recent years, higher operating frequencies have been required for satellite broadcasting and similar uses.**
**A wide lineup is available, including connectors rated to 2GHz.**

## Receptacle Jack


01K1754-10


01K1792-00

Up to 2GHz

| Material | Plating |
|---|---|
| ZDC | Ni |


01K2417-00

**End-launch type**

| Material | Plating |
|---|---|
| BS | Ni |

## Cable Type Supplied as cable assemblies.


F/P

| Material | Plating |
|---|---|
| BS | Ni |

**Applicable cables**
**Flexible:** 3C, 4C-FB, RG-59V (P19)

*** To order cable assemblies, see P23.**

## Ultra-Precision Millimeter-Wave Adapters

* For detailed specifications, see our website or contact us.

- A variety of high-performance adapters are available.
- Some conversion adapter series have matched electrical lengths:
  1.0mmW ⟷ 1.85mmV
  1.85mmV ⟷ 2.92mmK
  1.85mmV ⟷ SMPM

| SELECTION CHART | | 1.0mm W | | 1.85mm V | | 2.92mm K | | SMPM | |
|---|---|---|---|---|---|---|---|---|---|
| | | P | J | P | J | P | J | P | J |
| 1.0mm W | P | | | 1 | 3 | | | | |
| | J | | | 4 | 2 | | | | |
| 1.85mm V | P | 1 | 4 | 5 | 6 | 8 | 9 | 15 | 16 |
| | J | 3 | 2 | 6 | 7 | 10 | 11 | 17 | 18 |
| 2.92mm K | P | | | 8 | 10 | 12 | 13 | | |
| | J | | | 9 | 11 | 13 | 14 | | |
| SMPM | P | | | 15 | 17 | | | | |
| | J | | | 16 | 18 | | | | 19 |


1 02R0234-00 W/P-V/P


2 02R0235-00 W/J-V/J


3 02R0233-00 W/P-V/J


4 02R0236-00 W/J-V/P


5 02R0093-10 V/P-P


6 02R0094-10 V/P-J


7 02R0095-10 V/J-J


7 02R0142-10 V/J-J


8 02R0167-10 V/P-K/P


9 02R0165-10 V/P-K/J


10 02R0168-10 V/J-K/P


11 02R0166-10 V/J-K/J


11 02R0071-10 V/J-K/J


12 02R0090-10 K/P-P


13 02R0092-10 K/P-J


14 02R0091-10 K/J-J


14 02R0070-10 K/J-J


15 02R0217-00 V/P-SMPM/P


16 02R0219-00 V/P-SMPM/J


17 02R0218-00 V/J-SMPM/P


18 02R0220-00 V/J-SMPM/J


19 02R0216-00 SMPM/J-J

## RF Adapters

* For detailed specifications, see our website or contact us.

| SELECTION CHART | | SMP | | SMA | | WPL | | N | | TNC | | BNC | | SMB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | P | J | P | J | P | J | P | J | P | J | P | J | P | J |
| SMP | P | | | | | | | | | | | | | | |
| | J | | | | 1 | | | | | | | | | | |
| SMA | P | | | 2 | 4 | 5 | 6 | 10 | 11 | | 12 | 13 | 14 | | |
| | J | | 1 | 4 | 3 | 9 | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| WPL | P | | | 5 | 9 | 7 | 9 | | | | | | | | |
| | J | | | 6 | | 9 | 8 | | | | | | | | |
| N | P | | | 10 | 15 | | | 23 | 25 | | 26 | 27 | 28 | | |
| | J | | | 11 | 16 | | | 25 | 24 | 29 | 30 | 31 | 32 | | |
| TNC | P | | | | 17 | | | | 29 | | | | | | |
| | J | | | 12 | 18 | | | 26 | 30 | | 33 | | | | |
| BNC | P | | | 13 | 19 | | | 27 | 31 | | | | | | |
| | J | | | 14 | 20 | | | 28 | 32 | | | | 34 | | |
| SMB | P | | | | 21 | | | | | | | | | | |
| | J | | | | 22 | | | | | | | | | | |


1 02R0242-00 SMP/J-SMA/J


2 02K2053-10 SMA/P-P


2 02K2054-00 SMA/P-P


3 02K2055-10 SMA/J-J


3 02K2056-00 SMA/J-J


3 02R0009-00 SMA/J-J


4 02K2057-10 SMA/P-J


4 02K2115-00 SMA/P-J


4 02K2117-00 SMA/P-J


4 *1 P/O type 02K0907-00 SMA/P-J


5 02K2516-00 SMA/P-WPL/P


6 02K2501-00 SMA/P-WPL/J


7 02K2521-00 WPL/P-P


8 02K2646-00 WPL/J-J


8 02K2518-00 WPL/J-J


9 *2 02K2517-00 WPL/P-J


10 02K2058-00 SMA/P-N/P


11 02K2059-00 SMA/P-N/J


11 02R0113-00 SMA/P-N/J


12 02K2224-00 SMA/P-TNC/J


13 02K2225-00 SMA/P-BNC/P

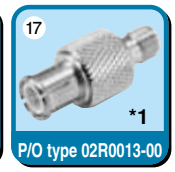

14 02K2126-00 SMA/P-BNC/J

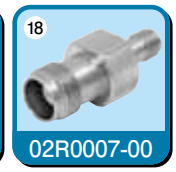

15 02K2061-00 SMA/J-N/P


16 02K2062-00 SMA/J-N/J


16 02R0046-10 SMA/J-N/J


17 02K2063-00 SMA/J-TNC/P

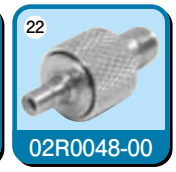

17 *1 P/O type 02R0013-00 SMA/J-TNC/P


18 02R0007-00 SMA/J-TNC/J


19 02K2065-00 SMA/J-BNC/P


20 02K2125-00 SMA/J-BNC/J


21 02R0049-00 SMA/J-SMB/P


22 02R0048-00 SMA/J-SMB/J


23 02K2066-00 N/P-P


24 02K1430-10 N/J-J

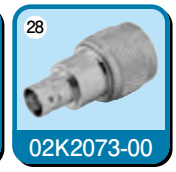

24 02R0246-00 N/J-J


25 02K2069-00 N/P-J


25 02K2070-00 N/P-J


26 02K2226-00 N/P-TNC/J


27 02K2072-00 N/P-BNC/P


28 02K2073-00 N/P-BNC/J


29 02K2074-00 N/J-TNC/P


30 02K2227-00 N/J-TNC/J


31 02K2228-00 N/J-BNC/P


32 02K2229-00 N/J-BNC/J


33 02K2076-00 TNC/J-J


34 1821K079-00 BNC/J-J

*1 P/O (push-on) type
④ : SMA/P side
⑰ : TNC/P side

*2 ⑨ adapter can also be used as WPL/P-SMA/J.

## Economy Adapters

* For detailed specifications, see our website or contact us.

**Low-cost adapters intended for electrical connection.**

| SELECTION CHART | | TNC | | BNC | | F | | RCA | |
|---|---|---|---|---|---|---|---|---|---|
| | | P | J | P | J | P | J | P | J |
| TNC | P | | | | ⑨ | | | | |
| | J | | | ③ | | | | | |
| BNC | P | | ③ | ① | ② | | ④ | | ⑤ |
| | J | ⑨ | | ② | ⑥ | ⑩ | ⑦ | ⑧ | |
| F | P | | | | ⑩ | | | | ⑪ |
| | J | | | ④ | ⑦ | | | ⑫ | |
| RCA | P | | | | ⑧ | | ⑫ | | |
| | J | | | ⑤ | | ⑪ | | | |


1 1821K093-00 BNC/P-P


2 1821K092-00 BNC/P-J


3 02K0545-00 TNC/J-BNC/P


4 1811K053 BNC/P-F/J


5 1821K086 BNC/P-RCA/J


6 02K0239-00 BNC/J-J


7 1821K117 BNC/J-F/J


8 1821K119 BNC/J-RCA/P


9 02K2656-00 TNC/P-BNC/J

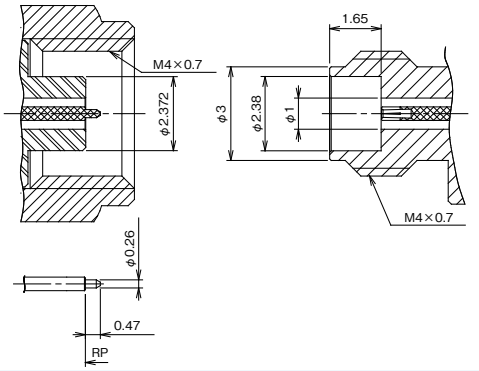

10 1821K091 BNC/J-F/P


11 02K0546-00 F/P-RCA/J


12 02K0052-00 F/J-RCA/P

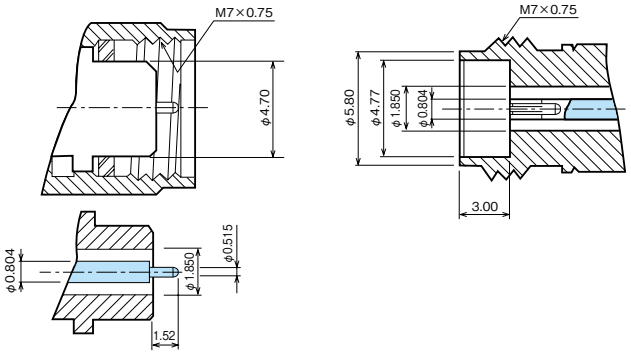
## 1.0mm **W**

DC to 110GHz



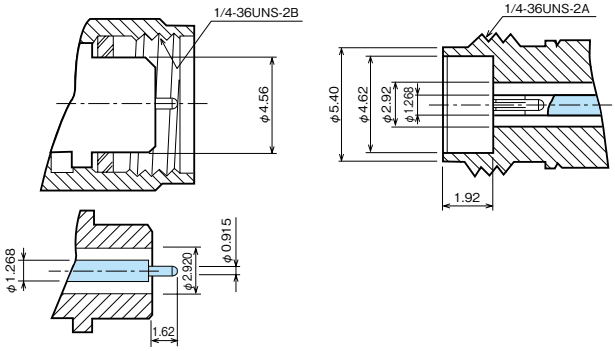

## 1.85mm **V**

DC to 65GHz



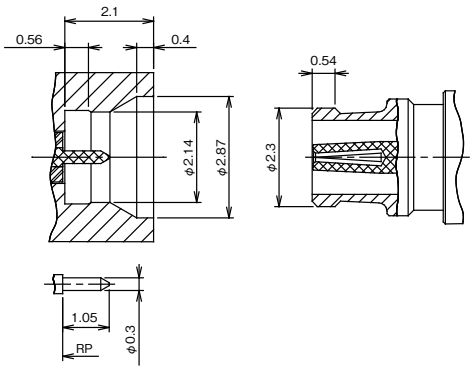

## 2.92mm **K**

DC to 45GHz



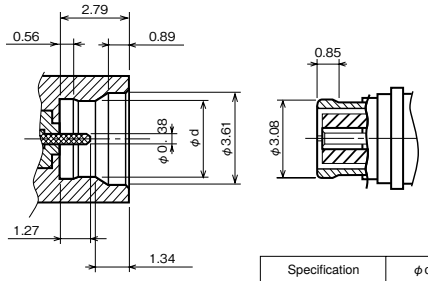

## SMPM

DC to 65GHz




## SMP

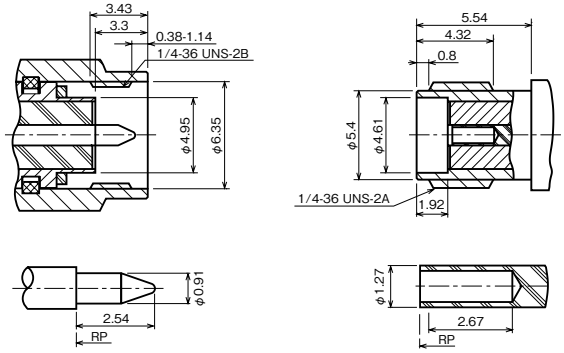
DC to 40GHz




| Specification | φd |
|---|---|
| full detent. | 2.95 |
| limited detent. | 3.05 |
| smooth bore. | 3.18 |

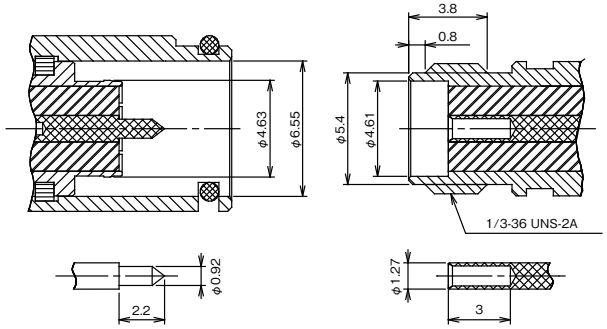
## SMA

DC to 18GHz



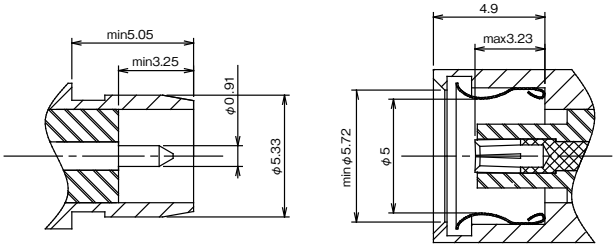

## WPL

DC to 18GHz



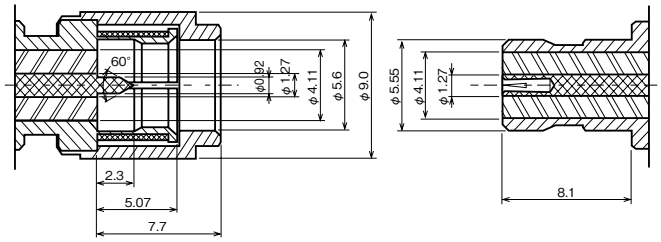

## BMA

DC to 18GHz



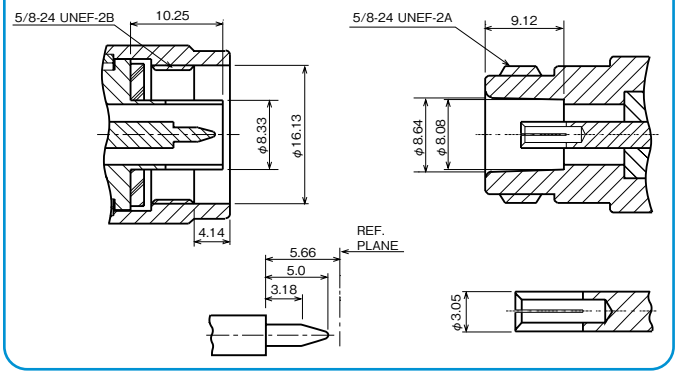
## PLB

DC to 12.4GHz



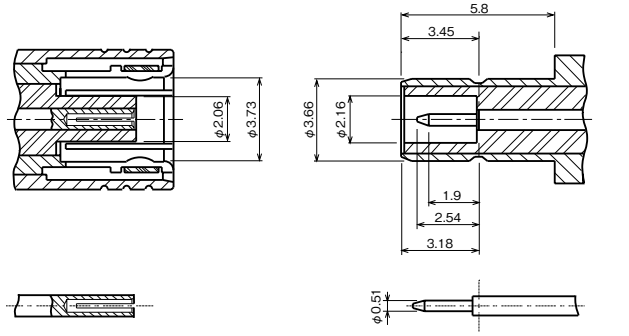

## N

DC to 4GHz



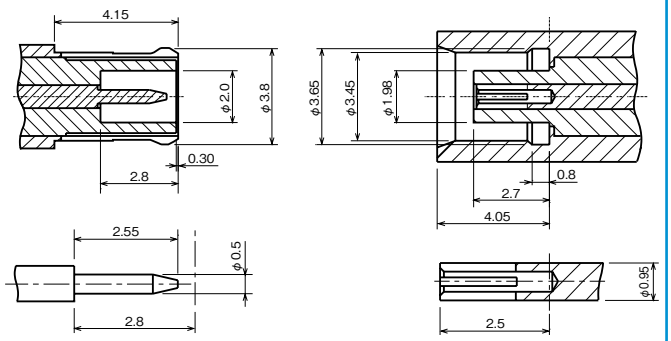

## SMB

DC to 4GHz



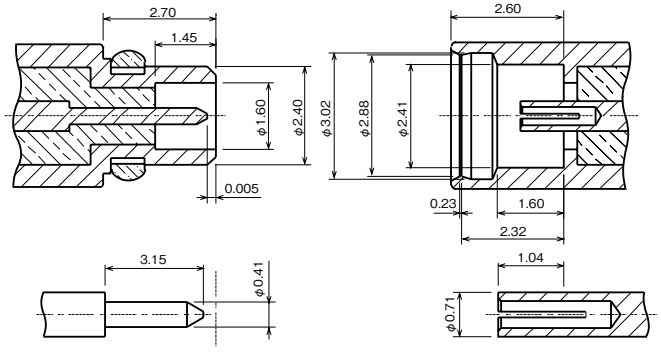

## MCX

DC to 6GHz



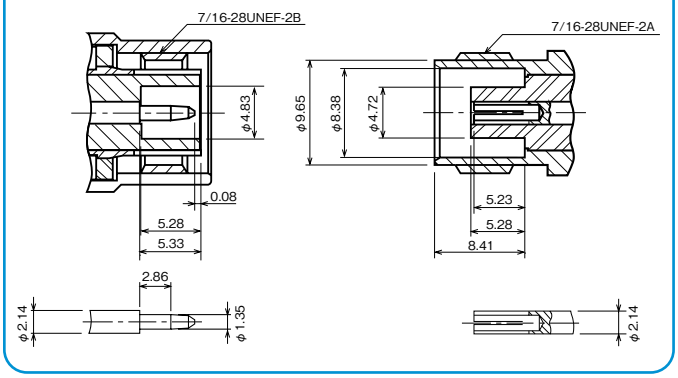

## MMCX

DC to 6GHz



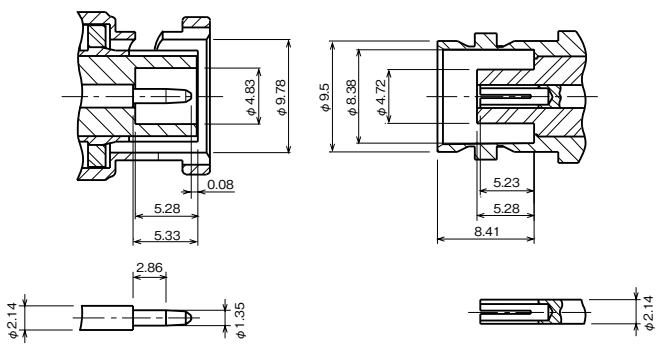

## TNC

DC to 4GHz



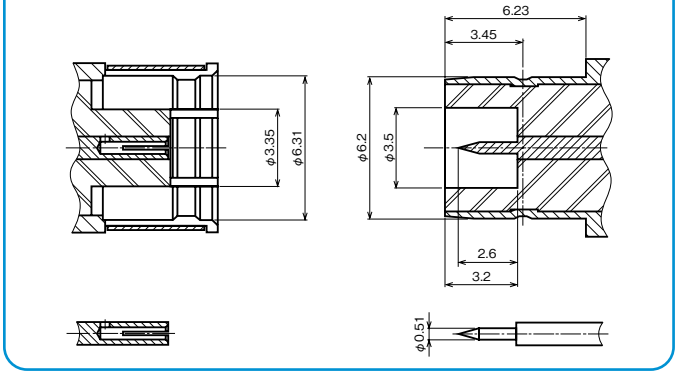

## BNC

DC to 4GHz




## W3B

DC to 3GHz

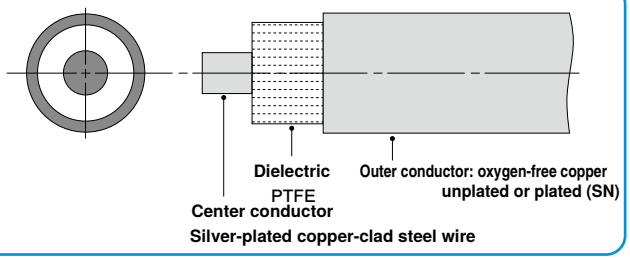


# Semi-Rigid Cable

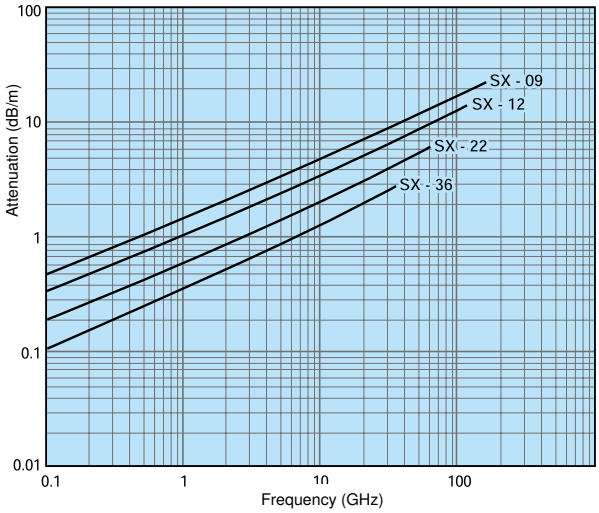
## Features

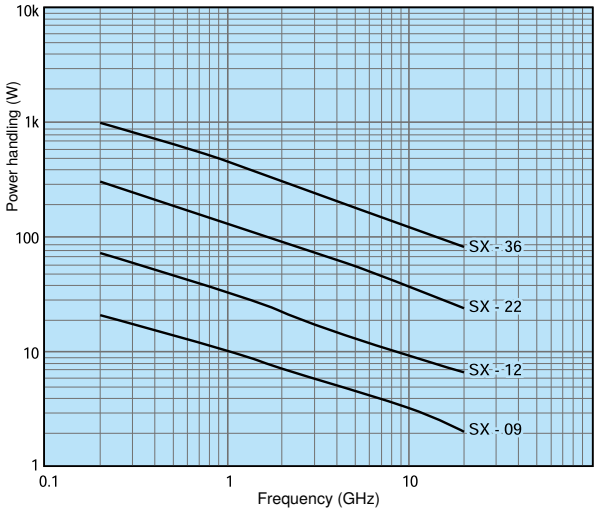
1. High-performance coaxial cable with a seamless oxygen-free copper tube outer conductor (designed and manufactured in-house)
2. Structure with minimal variation in characteristic impedance
3. Two dielectric types: standard and low-loss

## Construction




## Attenuation and Power Handling




## Specifications

| Semi-Rigid Cable | Standard type | | | | Low-loss type | |
|---|---|---|---|---|---|---|
| | SX-36 (0.141") | SX-22 (0.085") | SX-12 (0.047") | SX-09 (0.034") | SP-36 | SP-22 |
| Characteristic impedance (Ω) | 50±0.5 | 50±1.0 | 50±2.0 | 50±2.5 | 50±1.0 | 50±1.0 |
| Outer conductor O.D. (mm) | 3.581±0.025 | 2.197±0.025 | 1.194±0.025 | 0.864±0.025 | 3.571±0.03 | 2.202±0.02 |
| Center conductor O.D. (mm) | 0.919±0.017 | 0.511±0.013 | 0.287±0.012 | 0.203±0.012 | 0.930±0.01 | 0.510±0.01 |
| Dielectric O.D. (mm) | 2.985±0.051 | 1.676±0.051 | 0.940±0.025 | 0.660±0.025 | 2.75±0.03 | 1.50±0.03 |
| Capacitance (pF/m) | 95 | 95 | 95 | 95 | 86 | 85 |
| Dielectric withstanding voltage (VRMS) | 5000 | 2500 | 2000 | 2000 | 3000 | 2000 |
| Corona inception voltage (VRMS) | 2000 | 1500 | 1000 | 750 | 5000 | 2500 |
| Higher-order mode cutoff (GHz) | 33 | 62 | 117 | 157 | 33 | 66 |
| Velocity factor (%) | 70 | 70 | 70 | 70 | 70 | 70 |
| Min. bend radius (mm) | 6.5 | 3.0 | 3.2 | 3.2 | 6.5 | 3.0 |
| Weight (g/m) | 46.0 | 20.0 | 6.7 | 3.9 | 46 | 20 |
| Max. operating temperature (°C) | 125 | 125 | 125 | 125 | 125 | 125 |

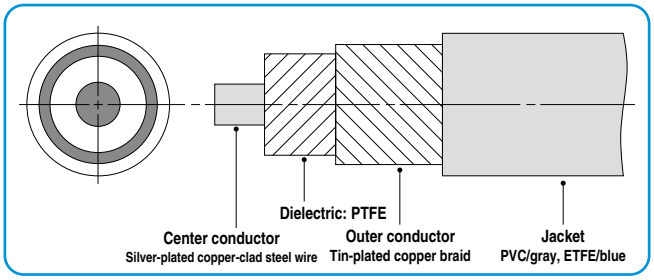
| Attenuation / Power (dB/m)/(W) (20°C, sea level) | Frequency (GHz) | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.5 | 0.24/600 | 0.42/180 | 0.70/45 | 1.05/14 | 0.3 | 0.55 |
| | | 1.0 | 0.34/450 | 0.60/130 | 1.05/32 | 1.50/10 | 0.33 | 0.58 |
| | | 5.0 | 0.84/180 | 1.41/54 | 2.40/13 | 3.40/4.5 | 0.77 | 1.29 |
| | | 10.0 | 1.25/120 | 2.06/36 | 3.50/9 | 4.90/3.2 | 1.12 | 1.83 |
| | | 20.0 | 1.90/70 | 3.04/20 | 5.00/6.5 | 7.00/2 | 1.65 | 2.59 |
| | | 30.0 | 2.45 | 3.85 | 6.35 | 8.70 | 2.09 | 3.17 |
| | | 40.0 | | 4.57 | 7.45 | 10.20 | | 3.66 |
| | | 50.0 | | 5.25 | 8.45 | 11.55 | | 4.09 |
| | | 60.0 | | 5.85 | 9.40 | 12.80 | | 4.48 |

# Semi-Flexible Cable

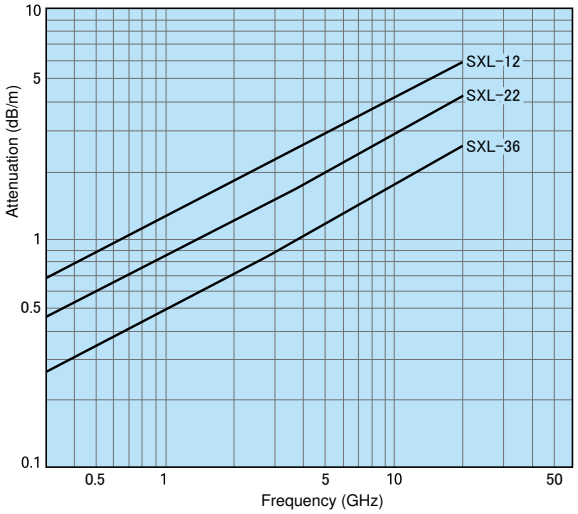
## Features

1. High-performance coaxial cable that can be formed without tools
2. Two dielectric types: standard and low-loss
3. Available with or without a jacket, in a choice of jacket materials

## Construction




## Attenuation




■ Jacket types

**e.g. SXL-36□□**

**No suffix: No jacket**
**F: ETFE (blue), 90°C (UL)**
**FP: PVC (gray), 105°C (UL)**

*** The standard jacket is FP.**
*** Applicable connectors are the same regardless of jacket type.**

## Specifications

| Semi-Flexible Cable | Standard type | | | Low-loss type | |
|---|---|---|---|---|---|
| | SXL-36, 36F, 36FP | SXL-22, 22F, 22FP | SXL-12F | SPL-36 | SPL-22 |
| Characteristic impedance (Ω) | 50±1.0 | 50±1.0 | 50±2 | 50±1.0 | 50±1.0 |
| Outer conductor O.D. (mm) | 3.50±0.1 | 2.1±0.1 | 1.15±0.1 | 3.30±0.1 | 2.10±0.1 |
| Center conductor O.D. (mm) | 0.930±0.010 | $0.511^{+0.010}_{-0.005}$ | $0.287^{+0.010}_{-0.005}$ | 0.930±0.010 | 0.560+0.01/−0.005 |
| Dielectric O.D. (mm) | $2.90^{+0.08}_{-0.06}$ | $1.58^{+0.04}_{-0.06}$ | $0.9^{+0.05}_{-0.03}$ | 2.70±0.04 | 1.63±0.03 |
| Capacitance (pF/m) | 98 | 98 | 98 | 89 | 86 |
| Dielectric withstanding voltage (VRMS) | 3000 | 3000 | 3000 | 3000 | 3000 |
| Corona inception voltage (VRMS) | 2000 | 1500 | 1000 | 2000 | 1500 |
| Higher-order mode cutoff (GHz) | 35 | 62 | 113 | 39 | 66 |
| Velocity factor (%) | 70 | 70 | 70 | 75 | 75 |
| Min. bend radius (mm) | 8.0 | 5.0 | 3.0 | 8.0 | 5.0 |
| Weight (g/m) | 44.4 | 17 | 5.5 | 32 | 15 |

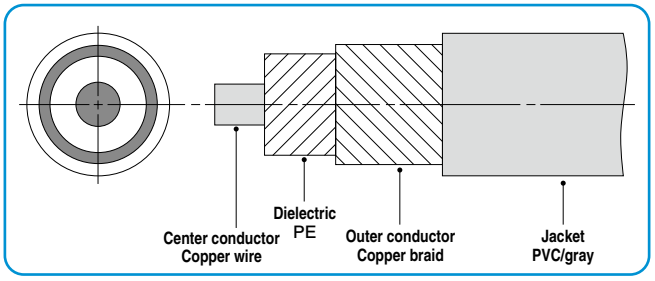
| | | | | | | |
|---|---|---|---|---|---|---|
| Attenuation (dB/m) (20°C, sea level) | Frequency (GHz) | 0.5 | 0.2 | 0.4 | 0.90 | 0.38 | 0.57 |
| | | 1.0 | 0.45 | 0.79 | 1.27 | 0.41 | 0.63 |
| | | 5.0 | 1.11 | 1.83 | 2.92 | 0.94 | 1.50 |
| | | 10.0 | 1.74 | 2.71 | 4.30 | 1.36 | 2.19 |
| | | 20.0 | 2.44 (18GHz) | 3.85 (18GHz) | 6.00 (18GHz) | 1.95 | 3.08 |

# Flexible Cable

## Overview

**We procure a wide range of coaxial cables and terminate them with connectors.**
**We select and propose the optimum cable to suit your required characteristics and connectors.**

## Construction




## Specifications

| Flexible Cable | 3D-2V | 2.5D-2V | 1.5D-2V | 1.5D-QEV |
|---|---|---|---|---|
| Characteristic impedance (Ω) | 50±2.0 | 50±2.0 | 50±2.0 | 50±2.0 |
| Outer conductor O.D. (mm) | 3.7 | 3.3 | 2.1 | 2.1 |
| Center conductor O.D. (mm) | 7/0.32 | 0.8 | 7/0.18 | 7/0.18 |
| Dielectric O.D. (mm) | 3.0 | 2.7 | 1.6 | 1.6 |
| Capacitance (pF/m) | 100 | 100 | 100 | 100 |
| Dielectric withstanding voltage (VRMS) | 1000 | 1000 | 1000 | 1000 |

| | | | | | |
|---|---|---|---|---|---|
| Attenuation (dB/m) (20°C, sea level) | Frequency (GHz) | 0.044 (10MHz) | 0.050 (10MHz) | 0.085 (10MHz) | 0.085 (10MHz) |
| | | 0.220 (200MHz) | 0.235 (200MHz) | | |
| | | 1.4 (4GHz) | | | |

★ Dielectric: cross-linked PE

## Flexible Cable List

| Item Code | Imp. [Ω] | Inner conductor Strands/dia. | Inner conductor Constr. | Dielectric O.D. [mm] | Dielectric Material | Outer conductor O.D. [mm] | Outer conductor Constr. | Jacket O.D. [mm] | Jacket Material |
|---|---|---|---|---|---|---|---|---|---|
| 1.5C-2V | 75 | 0.26 | CW | 1.6 | PE | 2.1 | C | 2.9 | PVC |
| 2.5C-2V | 75 | 0.4 | Cu | 2.4 | PE | 3.0 | C | 4.0 | PVC |
| 3C-2V | 75 | 0.5 | Cu | 3.1 | PE | 3.8 | C | 5.4 | PVC |
| 3C-2W | 75 | 0.5 | Cu | 3.1 | PE | 4.5 | CC | 6.5 | PVC |
| 5C-2V | 75 | 0.8 | Cu | 4.9 | PE | 5.6 | C | 7.4 | PVC |
| 5C-2W | 75 | 0.8 | Cu | 4.9 | PE | 6.3 | CC | 8.3 | PVC |
| RG-59/U | 73 | 0.643 | CW | 3.7 | PE | 4.5 | C | 6.2 | PVC |
| 1.5D-2V | 50 | 7/0.18 | Cu | 1.6 | PE | 2.1 | C | 2.9 | PVC |
| 1.5D-QEW | 50 | 7/0.18 | Cu | 1.6 | PE | 2.9 | CC | 3.4 | PVC |
| 2.5D-2V | 50 | 0.8 | Cu | 2.7 | PE | 3.3 | C | 4.3 | PVC |
| 3D-2V | 50 | 7/0.32 | Cu | 3.0 | PE | 3.7 | C | 5.3 | PVC |
| 3D-2W | 50 | 7/0.32 | Cu | 3.0 | PE | 4.4 | CC | 6.4 | PVC |

| Item Code | Imp. [Ω] | Inner conductor Strands/dia. | Inner conductor Constr. | Dielectric O.D. [mm] | Dielectric Material | Outer conductor O.D. [mm] | Outer conductor Constr. | Jacket O.D. [mm] | Jacket Material |
|---|---|---|---|---|---|---|---|---|---|
| 5D-2V | 50 | 1.4 | Cu | 4.8 | PE | 5.5 | C | 7.3 | PVC |
| 5D-2W | 50 | 1.4 | Cu | 4.8 | PE | 6.2 | CC | 8.0 | PVC |
| RG-55/U | 53.5 | 0.813 | Cu | 2.9 | PE | 4.2 | TT | 5.0 | PE |
| RG-58/U | 53.5 | 0.813 | Cu | 2.9 | PE | 3.6 | T | 5.0 | PVC |
| RG-58A/U | 50 | 19/0.180 | T | 2.9 | PE | 3.6 | T | 5.0 | PVC |
| RG-142A/U | 50 | 0.991 | SCW | 2.9 | TFE | 4.2 | SS | 5.2 | FG |
| RG-174/U | 50 | 7/0.160 | CW | 1.5 | PE | 2.0 | T | 2.5 | PVC |
| RG-178B/U | 50 | 7/0.102 | SCW | 0.86 | TFE | 1.3 | S | 1.8 | FEP |
| C0-6P (AWG30) | 50 | 7/0.102 | SCW | 0.84 | FEP | 1.24 | S | 1.48 | TFE |
| RG-188A/U | 50 | 7/0.170 | SCW | 1.5 | TFE | 2.0 | S | 2.6 | TFE |
| RG-196A/U | 50 | 7/0.102 | SCW | 0.86 | TFE | 1.3 | S | 2.0 | TFE |
| RG-316/U | 50 | 7/0.170 | SCW | 1.5 | TFE | 2.0 | S | 2.4 | FEP |

**Cu: annealed copper wire**
**T: tin-plated annealed copper wire**
**CW: Copperweld wire**
**SCW: copper-plated Copperweld wire**
**SPCW: silver-plated copper-clad steel wire**

**C: single annealed copper braid**
**T: single tin-plated copper braid**
**S: single silver-plated copper braid**
**CC: double annealed copper braid**
**TT: double tin-plated copper braid**

**PE: solid polyethylene**
**TFE: polytetrafluoroethylene (Teflon)**
**FEP: fluorinated ethylene propylene**
**ETFE: ethylene tetrafluoroethylene copolymer**
**PVC: polyvinyl chloride**
**FG: glass fiber braid**

## Features

### Waka's Coaxial Cable Assemblies

1. Integrated production in our own factories
   High-mix, low-volume orders are handled with short lead times.
   (Orders accepted from a single piece)

2. Uniform product finish
   Based on our pursuit of manufacturing technology such as soldering skills and automated 3D bending.

3. In-house cable manufacturing
   Highly reliable cable assemblies also come from controlling the cable itself.

4. Commitment to improved strength
   The strength of the connector neck is ample by design and is continually being improved.

5. Unique standard products not found elsewhere
   Our own cable development yields original products that meet customer needs.




Omi Factory (Nagano): connector and cable assembly




Matsumoto Factory (Nagano): material processing, production tooling (machining, molding, pressing)

* Production in Asia under consideration

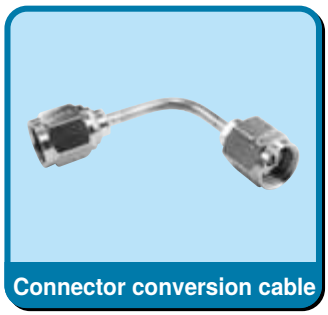
## Connector / Cable Compatibility Chart

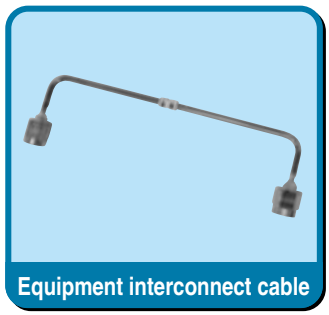
| | Semi-Rigid Cable | | | | | | Semi-Flexible Cable | | | | | Flexible Cable | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SX-36 | SX-22 | SX-12 | SX-09 | SP-36 | SP-22 | SXL-36 | SXL-22 | SXL-12 | SPL-36 | SPL-22 | 3D(3C) | 2.5D | 1.5D(1.5C) | RG |
| 1.0mmW | | | ○ | ○ | | | | | | | | | | | |
| 1.85mmV | | ○ | ○ | ○ | | ○ | | | | | | | | | |
| 2.92mmK | | ○ | ○ | ○ | | ○ | | ○ | | | | | | | |
| SMPM | | ○ | ○ | ○ | | | | ○ | ○ | | | | | | |
| SMP | | ○ | ○ | | | | | | ○ | | | | | | |
| SMA | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| WPL | | ○ | | | | | | ○ | | | | | | | |
| BMA | ○ | | | | | | | | | | | | | | |
| PLB | ○ | ○ | | | | | ○ | ○ | | | | | | | |
| N | ○ | ○ | | | ○ | | ○ | ○ | | ○ | | ○ | | | ○ |
| SMB | | | | | | | | ○ | | | | | ○ | ○ | ○ |
| MCX | ○ | ○ | | | | | | | | | | | | | ○ |
| MMCX | | ○ | | | | | | ○ | | | | | | | ○ |
| TNC | ○ | ○ | | | | | ○ | ○ | | | | ○ | | ○ | ○ |
| BNC | | ○ | | | | | ○ | ○ | | | | ○ | ○ | ○ | ○ |
| W3B | | | | | | | | | | | | | | (○) | |
| F | | | | | | | | | | | | (○) | | (○) | (○) |

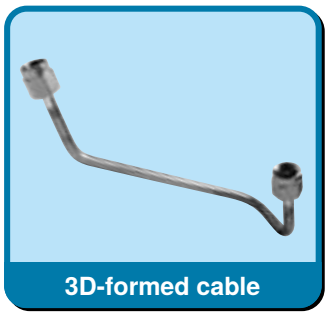
Please contact us for combinations not shown in this table.

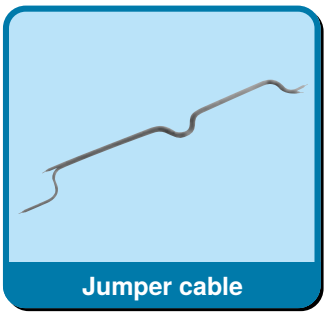
## Features

### 1. Semi-Rigid Cable Assemblies (Examples)


Connector conversion cable


Equipment interconnect cable


3D-formed cable


Jumper cable

## Delay Lines







* Photos are examples for reference.

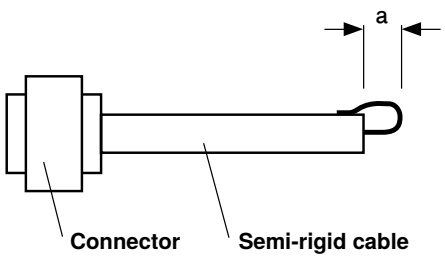
**By selecting cables with uniform characteristic impedance, we meet required delay times with high accuracy and achieve excellent V.S.W.R. and other characteristics. Ideal as delay-time references for radar and for array-antenna switch boxes.**

■ Cable specifications

| Connector | Cable | Delay tolerance | Cable length |
|---|---|---|---|
| 1.85mm V | SX-36 | 5 psec | < 0.2m |
| 2.92mm K | SX-22 | 10 psec | < 0.5m |
| SMA | SX-12 * | 20 psec | < 1 m |

**Other combinations are available on request. * SX-12 is available up to 2m.**

## Coaxial Probe




**This millimeter-wave coaxial probe was developed for measuring materials such as low-loss dielectrics and superconductors. An ultra-thin semi-rigid cable is fitted with a micro loop and a 2.92mm K or 1.85mm V millimeter-wave connector. V.S.W.R. is 1.2.**

| Connector | Part No. | Cable | Loop dia. (a) [mm] |
|---|---|---|---|
| 1.85mm V | 01R0078, 01R0077, 01R0066 | SX-12 | 0.5 |
| 2.92mm K | 01R0058, 01R0059, 01R0064 | SX-12 | 0.5 |

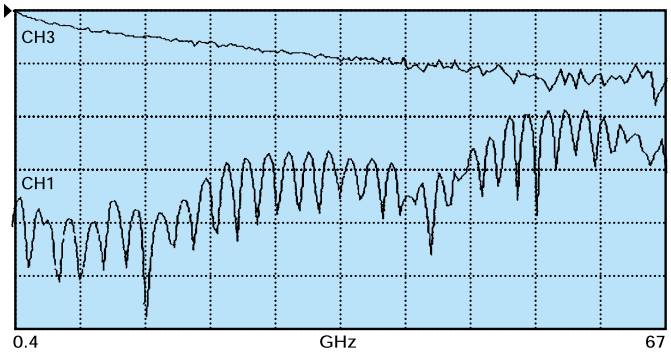
## Frequency Characteristics

### Measured Data Examples

**1.85mmV [V/P-V/J,SX-12]**

CH1:S11 ▶REF=0.000dB 10,000dB/DIV
CH3:S21 ▶REF=0.000dB 0,500dB/DIV

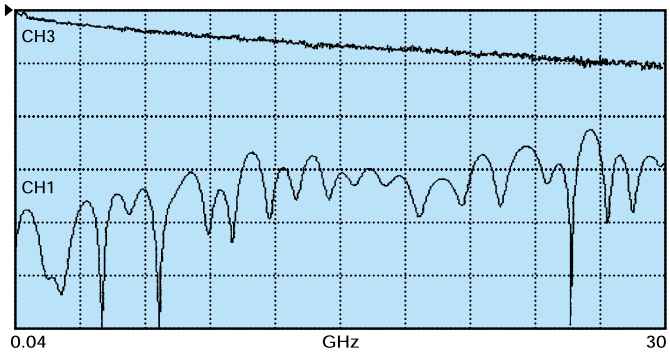
L=50mm




**SMA [SMA/P-SMA/P,SX-22]**

CH1:S11 ▶REF=0.000dB 10,000dB/DIV
CH3:S21 ▶REF=0.000dB 0,500dB/DIV

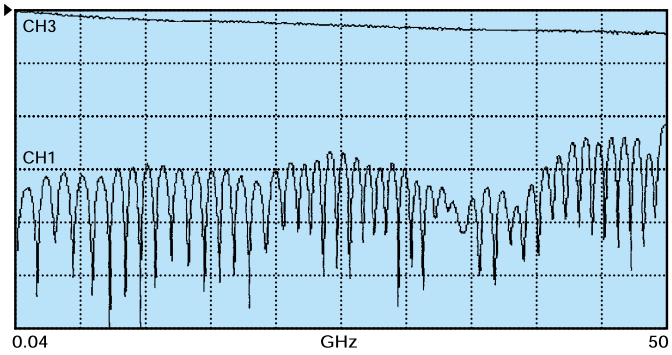
L=110mm (two 5R bends)




**2.92mmK [K/P-K/P,SX-22]**

CH1:S11 ▶REF=0.000dB 10,000dB/DIV
CH3:S21 ▶REF=0.000dB 1,000dB/DIV

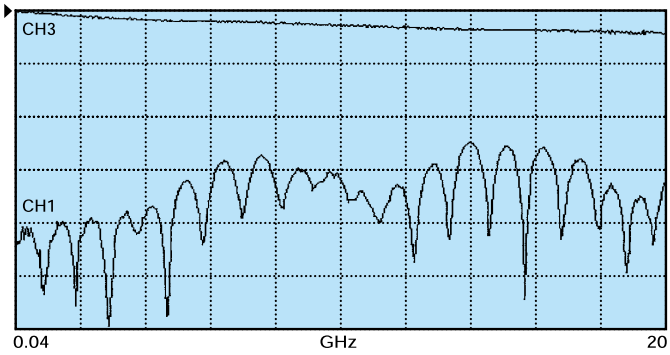
L=100mm




**SMA [SMA/P-SMA/P,SXL-22]**

CH1:S11 ▶REF=0.000dB 10,000dB/DIV
CH3:S21 ▶REF=0.000dB 1,000dB/DIV

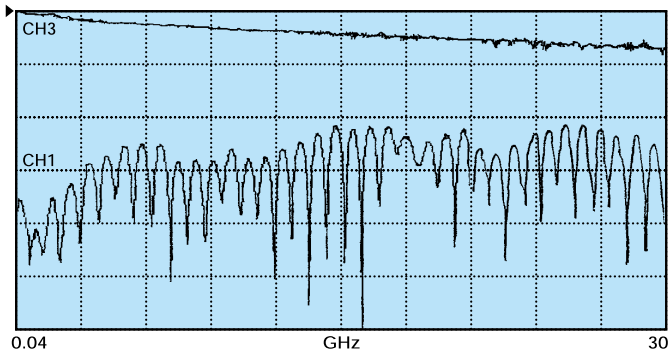
L=100mm




**2.92mmK [K/P-K/P,SXL-22]**

CH1:S11 ▶REF=0.000dB 10,000dB/DIV
CH3:S21 ▶REF=0.000dB 1,000dB/DIV

L=100mm




■ VSWR → RL conversion table

| VSWR | RL | VSWR | RL | VSWR | RL |
|---|---|---|---|---|---|
| 1.01 | 46.06 | 1.21 | 20.44 | 1.41 | 15.38 |
| 1.02 | 40.08 | 1.22 | 20.07 | 1.42 | 15.21 |
| 1.03 | 36.60 | 1.23 | 19.73 | 1.43 | 15.04 |
| 1.04 | 34.15 | 1.24 | 19.40 | 1.44 | 14.87 |
| 1.05 | 32.25 | 1.25 | 19.08 | 1.45 | 14.71 |
| 1.06 | 30.71 | 1.26 | 18.78 | 1.46 | 14.56 |
| 1.07 | 29.41 | 1.27 | 18.49 | 1.47 | 14.41 |
| 1.08 | 28.29 | 1.28 | 18.21 | 1.48 | 14.26 |
| 1.09 | 27.31 | 1.29 | 17.94 | 1.49 | 14.12 |
| 1.10 | 26.44 | 1.30 | 17.69 | 1.50 | 13.97 |
| 1.11 | 25.65 | 1.31 | 17.44 | 1.51 | 13.84 |
| 1.12 | 24.94 | 1.32 | 17.20 | 1.52 | 13.70 |
| 1.13 | 24.28 | 1.33 | 16.97 | 1.53 | 13.57 |
| 1.14 | 23.68 | 1.34 | 16.75 | 1.54 | 13.44 |
| 1.15 | 23.12 | 1.35 | 16.53 | 1.55 | 13.32 |
| 1.16 | 22.60 | 1.36 | 16.33 | 1.56 | 13.20 |
| 1.17 | 22.12 | 1.37 | 16.13 | 1.57 | 13.08 |
| 1.18 | 21.66 | 1.38 | 15.93 | 1.58 | 12.96 |
| 1.19 | 21.23 | 1.39 | 15.74 | 1.59 | 12.84 |
| 1.20 | 20.82 | 1.40 | 15.56 | 1.60 | 12.73 |

## How to Order

■ No bending and no special requirements for connector material or plating

Designation

| Connector 1 | Connector 2 | Cable | # | Assembly length |
|---|---|---|---|---|

**Connector 1** **Connector 2** Connector name and plug or jack

* For connector names, see "Cable Type" under each connector (P1–P12).
* Photos are examples only.


Connector name /P


Connector name /LP


Connector name /J


Connector name /2J


Connector name /4J

**Cable** Coaxial cable used

* For cable details, see the cable pages (P17–P19).
* Check available combinations in the "Connector / Cable Compatibility Chart" on P20.

**Assembly length**

* Specify the length with reference to "Assembly Length Reference" on P24.
* Overall length is given as a four-digit number in mm.

Example

| SMA/LP | SMA/4J | SXL-36FP | # | 0500 |
|---|---|---|---|---|
| SMA right-angle plug | SMA 4-hole flange jack | Semi-flex φ3.6mm PVC sheath (gray) | | Length: 500mm |

* This part-number system does not cover every combination. Please check with us at the planning stage.
* Please also let us know your operating frequency.

■ Ordering custom cable assemblies

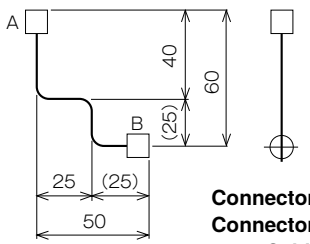
* Specify the following items for the product you need; we will manufacture to those conditions.
  Connector 1, connector 2, part names, plug or jack, material, plating, cable name, dimensions, operating frequency range, required specifications, other special requirements, and end-preparation dimensions if one end is to be left unterminated
* RF test data can be supplied with the delivery on request (at additional cost).
* For bent semi-rigid cables, please provide a drawing (sketch).
* We may need to consult with you separately regarding your requirements.

Items to specify and sketch method

- Connector name
- Cable name
- Dimensions
- Operating frequency
- V.S.W.R.
- Insertion loss

Please specify as shown in the sketch at right. Indicate connector-to-connector dimensions as shown there.

(Sketch)

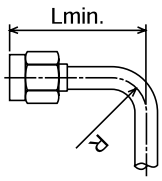
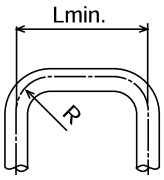
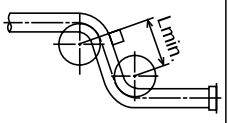
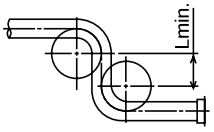



Connector A: _____
Connector B: _____
Cable: _____

# Notes

## 1. Bend Dimensions (when bending semi-rigid cable)

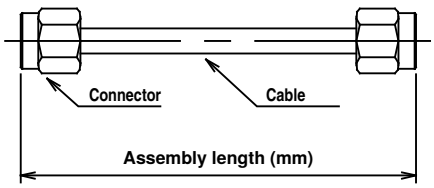
Consultation available (Sales Dept. 03-5228-3161)

| Cable \ Bend shape | | | R bend | U bend | Continuous R (<90°) | Continuous R (=90°) |
|---|---|---|---|---|---|---|
| | | |  |  |  |  |
| SMA | SX-36 | (R:8) (R:10) | L : 20.0 | L : 26.0 | L : 7.5 | L : 7.5 |
| SMA | SX-22 (R:5) | | L : 20.0 | L : 25.0 | L : 5.0 | L : 5.0 |
| SMA | SX-12 (R:3.5) | | L : 26.0 | L : 26.0 | L : 5.0 | L : 5.0 |
| 1.85mm V・2.92mm K | SX-22 | (R:10) | L : 30.0 | L : 28.0 | L : 7.0 | L : 7.0 |
| 1.85mm V・2.92mm K | SX-22 | (R:5) | L : 25.0 | L : 25.0 | L : 6.0 | L : 6.0 |
| 1.85mm V・2.92mm K | SX-12 | (R:10) | L : 32.0 | L : 28.0 | L : 7.0 | L : 7.0 |
| 1.85mm V・2.92mm K | SX-12 | (R:5) | L : 27.0 | L : 25.0 | L : 5.0 | L : 5.0 |

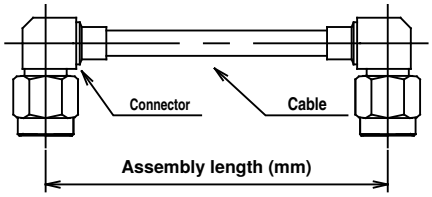
**R-bend values are typical for plugs. Please contact us for details.**

## 2. Assembly Length Reference

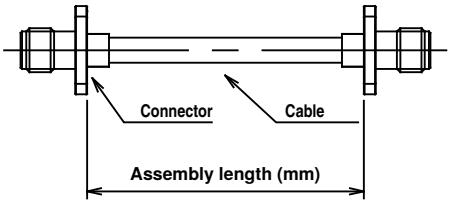
Between connector ends




L type: between center conductors




Fixed flange: between flange faces

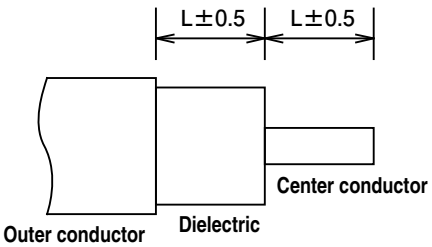



## 3. Dimensional Tolerances

■ Semi-rigid / semi-flex overall length

| Length range | Tolerance |
|---|---|
| L≦100 | ±3 |
| 100<L≦300 | ±5 |
| 300<L≦500 | ±10 |
| 500<L≦1000 | ±15 |
| 1000<L | ±30 |

■ End-preparation dimensions (semi-rigid, no bends)



# Soft Rigid Cable (original cable for measurement)

## Overview

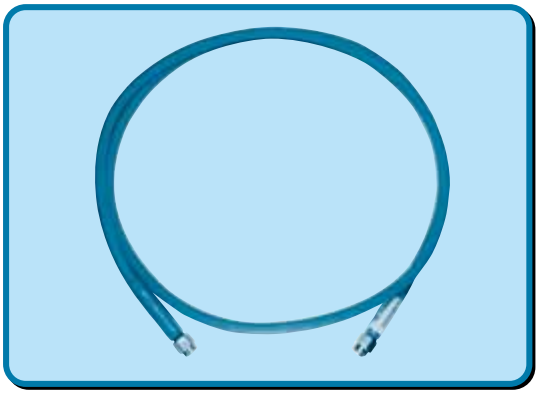
**A new type of cable based on low-loss semi-rigid cable, with added flexibility.**

## Features

1. **RF performance**
   **Insertion loss and V.S.W.R. equivalent to SP-22**
   **High phase stability against bending**
2. **Flexibility**
   **Flexible: 360° bend at R40mm, 500 cycles or more**
   **Also offers shape stability**
3. **Lightweight**
   **1m assembly with SMA/P on both ends: 42g**
4. **Short lead time**
   **Standard lead time: within 3 weeks (please inquire)**
   **Immediate delivery possible, depending on stock**
5. **Economical**
   **Cable and connectors both made in-house**
   **Outstanding cost performance**

## Applications

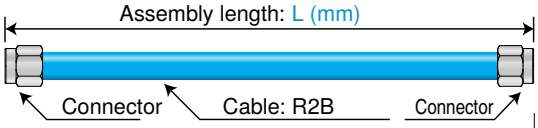
1. **RF measurement (between instrument and DUT)**
   **(phased-array antennas, aerospace equipment, etc.)**
2. **Interconnection of high-speed data/telecom equipment**
   **(up to 5m)**
   **(optical communication, optical device equipment, etc.)**



■ Part number

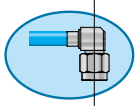
Example: soft-rigid (SP-20R), SMA/P on both ends, L = 1m

| R | 2 | B | A | M | A | M | # | 1 | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cable type | | | Connector | | Connector | | | L (mm) | | | |

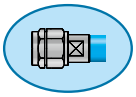



| | |
|---|---|
| A = SMA | M = Plug |
| K = 2.92mmK | L = L-type Plug |
| V = 1.85mmV | |

SMA, K and V jacks are also available as custom items



SMA/L type
(L dimension for L type)



1.85mm V connector

* Standard lengths
300・500・700・1000・1500・
2000・3000・4000・5000(mm)

## Specifications (Reference)

| Item | R2B AM AM # 1000 | R2B AM AL # 1000 | R2B KM KM # 1000 | R2B VM VM # 1000 |
|---|---|---|---|---|
| **Applicable cables** | R2B (SP-20R) | | | |
| **Characteristic impedance** | 50Ω | | | |
| **Typ. insertion loss at 10GHz** | 1.8dB | 1.8dB | 1.8dB | 1.8dB |
| **Typ. insertion loss at 18GHz** | 3.0dB | 3.0dB | 3.0dB | 3.0dB |
| **Typ. insertion loss at 40GHz** | – | – | 3.9dB | 3.9dB |
| **Typ. insertion loss at 65GHz** | – | – | – | 4.9dB |
| V.S.W.R. | 1.2 (at 18GHz) | | 1.35 (at 40GHz) | 1.35 (at 65GHz) |
| **Outer conductor** | **Seamless oxygen-free copper tube** | | | |
| **Center conductor** | **Silver-plated copper-clad steel wire** | | | |
| **Dielectric** | **Low-loss PTFE** | | | |
| **Outer sheath** | **Polyolefin** | | | |
| **Operating (storage) temperature** | **–55 to 105°C** | | | |
| **Outer sheath O.D.** | φ6.3mm | | | |
| **Outer sheath color** | **Blue** | | | |
| **Connectors** | SMA/P | SMA/LP | 2.92mmK/P | 1.85mmV/P |
| **Min. bend radius** | 40mm | | | |

# Handy Forming Cable (original cable for fixed wiring)

## Overview

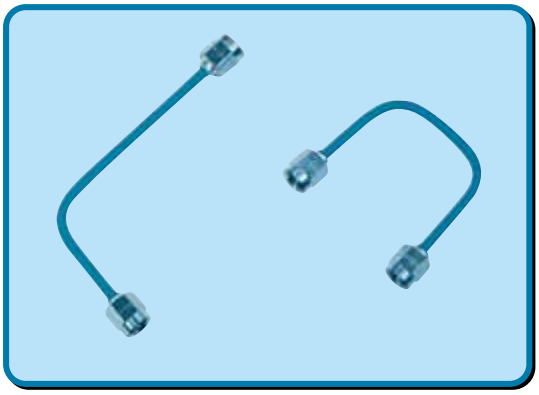
**A new type of cable: low-loss semi-rigid cable made softer so that customers can bend it by hand with relative ease.**

## Features

1. RF performance
   Insertion loss and V.S.W.R. equivalent to SP-22 and SP-36
   High phase stability against ambient temperature changes
2. Softness
   Easily formed by hand; holds its shape
   Bending force about half that of conventional semi-rigid cable
   * Note: cannot be bent and straightened repeatedly.
3. No bending drawings required
   Saves the effort of preparing drawings and ordering many variants
   (the customer does the bending)
4. Short lead time
   Standard lead time: within 3 weeks (please inquire)
   Immediate delivery possible, depending on stock
5. Economical
   Cable and connectors both made in-house
   Outstanding cost performance

## Applications

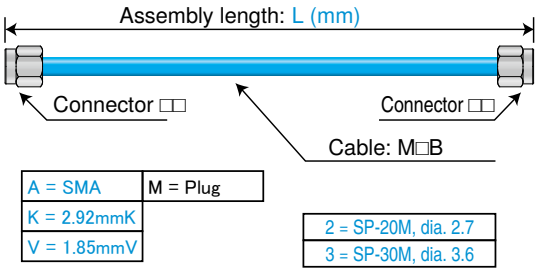
**Internal and external wiring for communication and measuring equipment (base stations, semiconductor test sets, etc.)**



■ Part number

Example: handy-forming (SP-30M), SMA/P on both ends, L = 1m

| M | 3 | B | A | M | A | M | # | 1 | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cable type | | | Connector | | Connector | | | L (mm) | | | |




* Standard lengths: 50 to 500 in 50mm steps, then 1000, 1500, 2000 (mm)
Please order SMA cables in quantities of five or more.

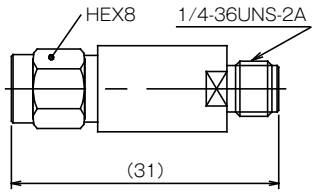
## Specifications (Reference)

| Item | M3B AM AM # 1000 | M2B AM AM # 1000 | M2B KM KM # 1000 | M2B VM VM # 1000 |
|---|---|---|---|---|
| Applicable cables | M3B (SP-30M) | M2B (SP-20M) | | |
| Characteristic impedance | 50Ω | | | |
| Typ. insertion loss at 10GHz | 1.1dB | 1.8dB | 1.8dB | 1.8dB |
| Typ. insertion loss at 18GHz | 1.8dB | 3.0dB | 3.0dB | 3.0dB |
| Typ. insertion loss at 40GHz | – | – | 3.9dB | 3.9dB |
| Typ. insertion loss at 65GHz | – | – | – | 4.9dB |
| V.S.W.R. | 1.2 (at 18GHz) | | 1.35 (at 40GHz) | 1.5 (at 65GHz) |
| Outer conductor | Seamless oxygen-free copper tube | | | |
| Center conductor | Silver-plated copper-clad steel wire | | | |
| Dielectric | Low-loss PTFE | | | |
| Outer sheath | Polyolefin | | | |
| Operating (storage) temperature | –55 to 105°C | | | |
| Outer sheath O.D. | φ3.6mm | φ2.7mm | | |
| Outer sheath color | Blue | | | |
| Connectors | SMA/P | | 2.92mmK/P | 1.85mmV/P |
| Min. bend radius | 10mm | 5mm | | |

## Attenuator




SMA/P-J

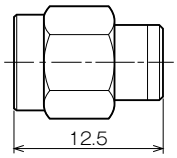



| Part No. | Attenuation | Frequency range | V.S.W.R. | Power |
|---|---|---|---|---|
| 02K2084-00 | 1±0.3dB | DC to 3GHz | 1.2max | 1.0Watt |
| 02K2084-10 | 2±0.3dB | | | |
| 02K2084-20 | 3±0.3dB | | | |
| 02K2084-30 | 4±0.3dB | | | |
| 02K2084-40 | 5±0.4dB | | | |
| 02K2084-50 | 6±0.5dB | | | |
| 02K2084-60 | 7±0.5dB | | | |
| 02K2084-70 | 10±0.5dB | | | |
| 02K2084-80 | 15±0.7dB | | | |
| 02K2084-90 | 20±1.0dB | | | |

## Termination



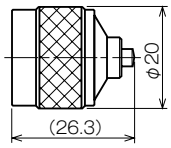

SMA/P







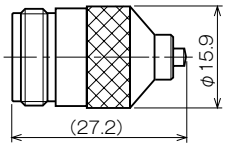
N/P







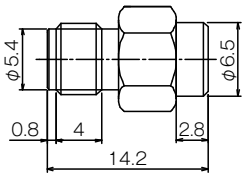
N/J







SMA/J




| Part No. | Frequency range | V.S.W.R. | Power |
|---|---|---|---|
| 01K2333-00 | DC to 6GHz | 1.15max | 1Watt |
| 01K2334-00 | DC to 18GHz | 1.22max | |
| 01K2335-00 | DC to 6GHz | | |
| 01K2336-00 | DC to 18GHz | | |
| 01K2141-00 | DC to 10GHz | 1.5max | |
| 01K2142-00 | | | |

## Phase Shifter

### Overview

**A mechanical delay line ideal for phase calibration of ultra-high-speed digital transmission circuits.**
**The delay can be varied by 140ps over the DC to 60GHz frequency range.**
**Available as a dial type and as a PC-controllable system unit driven by a stepping motor.**

### Features

1. **Low loss and low V.S.W.R. over a wide band**
2. **Flat group delay up to the upper frequency limit**
3. **Excellent 100Gbps pulse response with no jitter or other distortion**
4. **Special ball screw eliminates backlash**
5. **Settable with a resolution of 0.00666ps per step (phase system with PC control)**

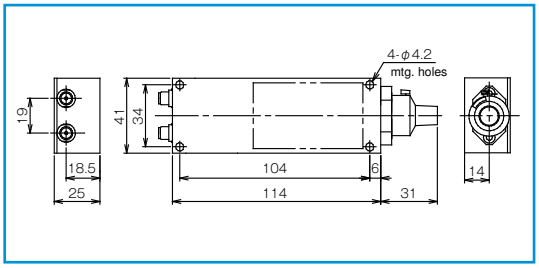
### Applications

1. **Physical-layer testing of optical communication circuits**
2. **Phase calibration of radar and phased-array antennas**
3. **Delay adjustment of devices**

■ Dial-type shifter [02X0518-00]




■ Dimensions

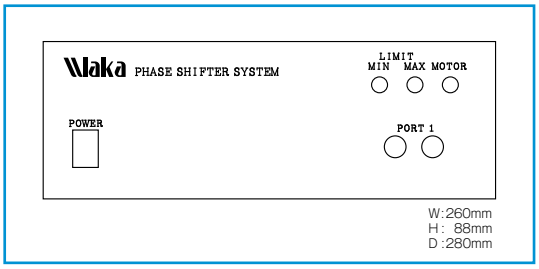



■ Phase system [01X0557-00]

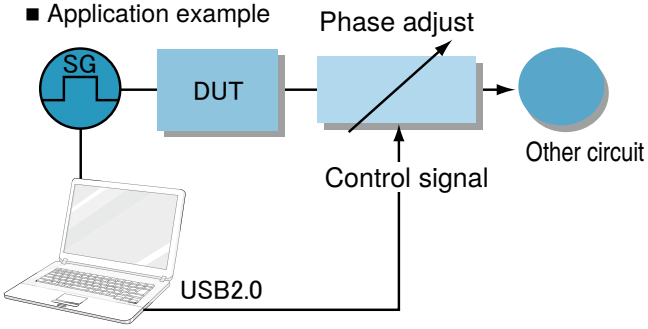
Settable with 0.00666ps resolution per step



■ Dimensions




■ Application example

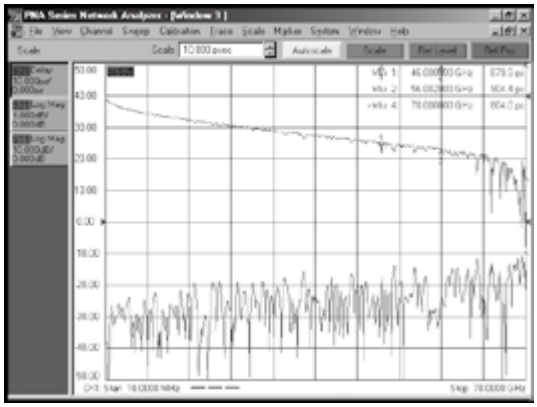



► **Phase system controlled with LabVIEW**
► **Supports Windows 2000/XP/Vista/7**
► **Supports LabVIEW 7.1/8.x/2009/2010**

*** LabVIEW is a trademark of National Instruments Corporation (USA).**

■ RF characteristics of phase shifter

02X0518-00 **(DC to 40GHz 140ps)**



## Specifications (Reference)

| | Phase shifter | | Phase system | |
|---|---|---|---|---|
| **Part No.** | 02X0518-00 | 02X0508-00 | 01X0557-00 | 01X0556-00 |
| **I/O connectors** | 2.92mmK/J | 1.85mmV/J | 2.92mmK/J | 1.85mmV/J |
| **Drive mechanism** | **φ3mm adjustment shaft with vernier dial** | | **5-phase stepping motor** | |
| **Variable delay (ps)** | 140 | 140 | 140 | 140 |
| **Frequency range (GHz)** | **DC to 40** | **DC to 60** | **DC to 40** | **DC to 60** |
| **Variable phase (deg/GHz)** | 50.4 | 50.4 | 50.4 | 50.4 |
| **Delay repeatability** | ±0.1ps | ±0.1ps | ±0.1ps | ±0.1ps |
| *** V.S.W.R. (DC to 20GHz)** | 1.15 | 1.2 | 1.15 | 1.2 |
| *** V.S.W.R. (20 to 40GHz)** | 1.3 | 1.3 | 1.3 | 1.3 |
| *** V.S.W.R. (40 to 60GHz)** | – | 1.4 | – | 1.4 |
| *** Insertion loss (DC to 20GHz)** | 1.0dB | 1.4dB | 1.0dB | 1.4dB |
| *** Insertion loss (20 to 40GHz)** | 1.3dB | 2.3dB | 1.3dB | 2.3dB |
| *** Insertion loss (40 to 60GHz)** | – | 3.0dB | – | 3.0dB |

*** Values at maximum variable length.**

# Phase Adjuster

## Overview

**A phase adjuster for the microwave and millimeter-wave bands. Its coaxial structure makes mounting and adjustment easy. Mounting brackets can be made to custom specifications on request.**

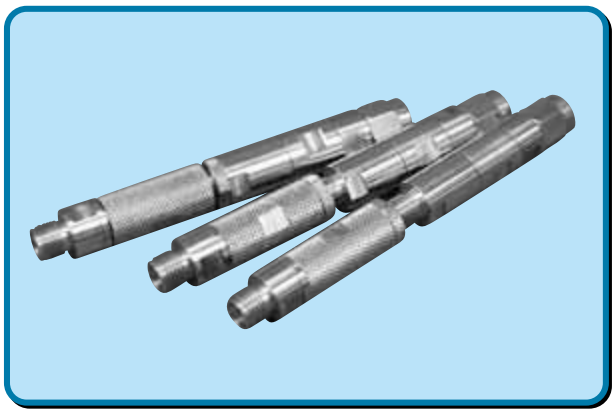
## Features

**1. 60ps variable delay over an 18mm travel range**
**2. Stable frequency characteristics throughout the travel range**

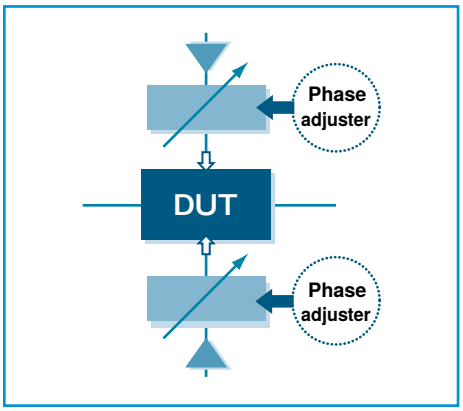
## Applications

**Timing alignment of differential input signals (e.g. for optical communication), etc.**

## Product Examples



■ Example: phase adjustment of an optical modulator

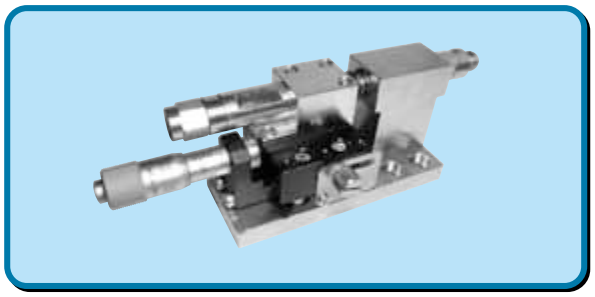



## Specifications (Reference)

| Model | A18S | A45K | A45V | A60V |
|---|---|---|---|---|
| Part No. | 02X0445-00 | 02X0450-00 | 02X0450-10 | 02X0527-00 |
| I/O connectors | SMA/P-J | 2.92mmK/P-J | 1.85mmV/P-J | |
| Overall length (mm) | (86 to 104) | | (89 to 108) | |
| Drive mechanism | Trapezoidal screw | | | |
| Variable delay (ps) | 60 | | | |
| Frequency range (GHz) | DC to 18 | DC to 40 | | DC to 60 |
| Variable delay (ps/turn) | 1.666/turn | | | |
| Impedance (Ω) | 50 | | | |
| V.S.W.R. | 1.3 (at 18GHz) | 1.4 (at 40GHz) | | 1.5 (at 60GHz) |
| * Insertion loss (DC to 18GHz) | 0.7 dB | | | 1.0 dB |
| * Insertion loss (18 to 40GHz) | | 1.0 dB | | 1.3 dB |
| * Insertion loss (40 to 60GHz) | | | | 1.5 dB |

* Values at maximum variable length.

## Application Example



**A unit fitted with a micrometer for fine adjustment.**
**Phase adjuster used: 02X0450-00, DC to 40GHz**

**Adjustment accuracy: 0.01mm (physical length)**
**Variable range: 20ps**

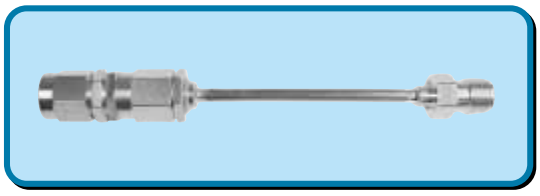
# Phase Adjuster (Trimmer Type)

## Features

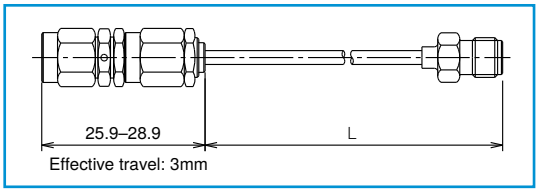
1. **Mounts on semi-rigid cable (SX-22, SX-36) to adjust the electrical length.**
2. **Ideal for fine adjustment of electrical length that is hard to achieve through cable length alone.**
3. **Can be used to calibrate electrical length, for example in internal equipment wiring.**

## Product Examples

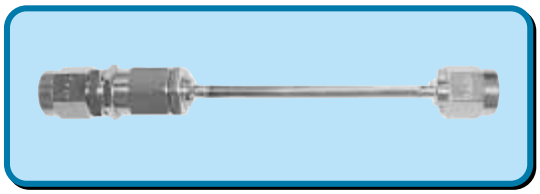
■ SMA/P – Phase trimmer – SMA/J



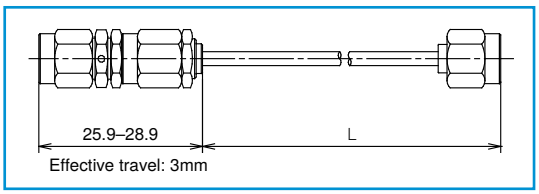
■ Dimensions




■ SMA/P – Phase trimmer – SMA/P



■ Dimensions




## Specifications (Reference)

| Part No. | 02YB336#0□□□ | 02YB337#0□□□ | 02YB541#0□□□ | 02YB542#0□□□ |
|---|---|---|---|---|
| I/O connectors | SMA/P – Phase trimmer – SMA/J | | SMA/P – Phase trimmer – SMA/P | |
| Frequency range (GHz) | DC to 18 | | | |
| Impedance (Ω) | 50 | | | |
| V.S.W.R. | 1.3 | | | |
| Insertion loss (dB) | 1.0 | | | |
| Variable range (ps) | 9 (3.0mm travel) | | | |
| Operating temp. range (°C) | –40 to +105 | | | |
| Applicable cables | Semi-rigid φ2.2<br>SX-22 | Semi-rigid φ3.6<br>SX-36 | Semi-rigid φ2.2<br>SX-22 | Semi-rigid φ3.6<br>SX-36 |

*** Dimension L (cable length) can be selected between 50mm and 300mm.**

# Band-Pass Filter (BPF)

## Overview

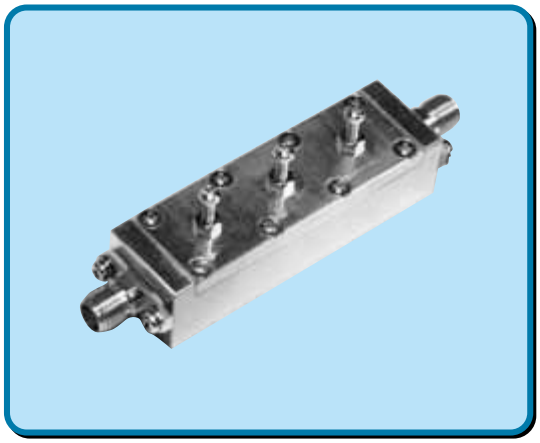
**Filters for the microwave and millimeter-wave bands that apply our coaxial connector technology.
We design the optimum filter for your application.
(high attenuation of 30dB or more, second-harmonic suppression, group delay characteristics, etc.)**

## Features

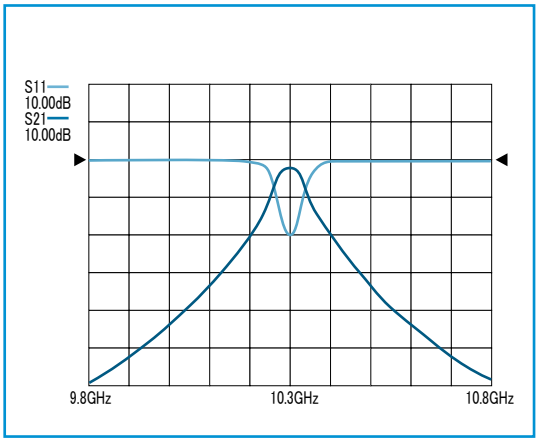
1. Center frequencies from 1 to 80GHz
2. Compact size
3. Low loss thanks to coaxial connector technology

## Product Examples

■SBF10



■ Measured data (SBF10)




## Specifications (Reference)

| Model | SBF10 | SBF16 | SBF26 | SBF54 | SBF75 |
|---|---|---|---|---|---|
| Center frequency (GHz) | 10.3 | 16 | 25.7 | 53.5 | 75 |
| –3dB bandwidth (%) | 1 | 28 | 8 | 0.1 | 10 |
| Return loss (dB) at center freq. | MIN 20 | MIN 10 | MIN 10 | MIN 10 | MIN 10 |
| Insertion loss (dB), passband | MAX 2 | MAX 1.2 | MAX 1.5 | MAX 7 | MAX 3 |
| Impedance (Ω) | 50 | | | | |
| Attenuation (dB), low side | 30 | | | | |
| Attenuation (dB), high side | 30 | | | | |
| I/O connectors | SMA/J | SMA/J | 2.92mmK/P | 1.85mmV/J | 1.0mmW/J |
| * Dimensions (mm) | 13×16×53 | 10×13×56 | 13×16×28 | 20×20×28 | 10×18×17 |
| Main application | Optical transmission | Defense | Optical transmission | Optical transmission | Radar development |

* Approximate dimensions (H×W×D), excluding connectors and adjustment screws.

# Low-Pass Filter (LPF)

## Overview

Coaxial-type filters for the microwave and millimeter-wave bands. Cutoff frequency and other specifications can be customized.
Types with semi-rigid cables attached directly to both ends of the filter are also available.

## Features

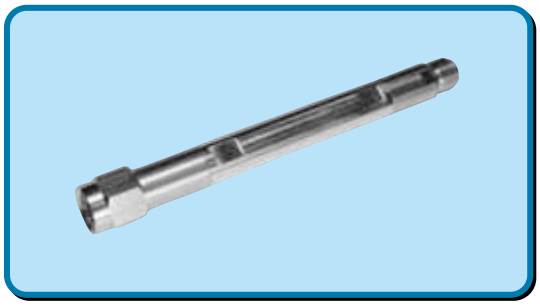
1. Wide range of cutoff frequencies (1 to 80GHz)
2. Low loss in the passband
3. Can be designed to suppress second and third harmonics

## Applications

Oscilloscopes, spectrum analyzers and other measuring instruments that require wideband characteristics

## Product Examples

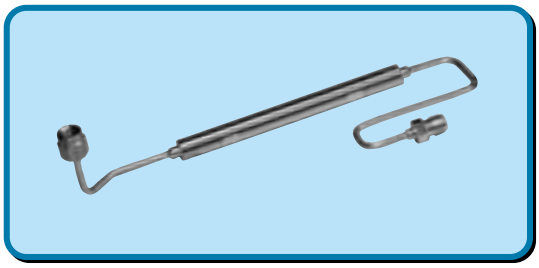
■TLF1-11



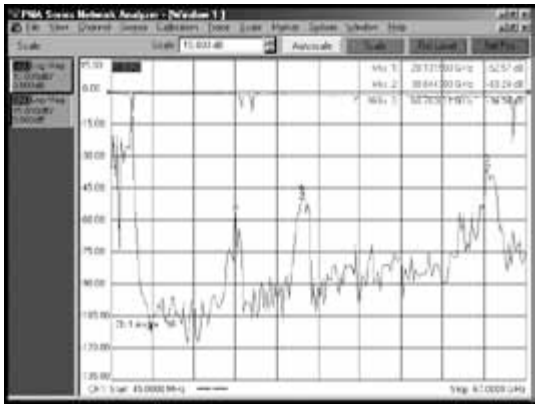
■TLF60-13



■ In-line low-pass filter, 3.5GHz LPF



■ Measured data (3.5GHz LPF)



## Specifications (Reference)

| Model | TLF1-11 | TLF3-11 | TLF16-13 | TLF60-13 | TLF80-13 |
|---|---|---|---|---|---|
| Cutoff frequency (GHz) | 1 | 3 | 16 | 60 | 80 |
| Return loss (dB) | 17 | | | 14 | |
| Insertion loss (dB) | MAX 1.0 | | | MAX 1.5 | |
| Impedance (Ω) | 50 | | | | |
| I/O connectors | SMA/P-J | | | 1.85mmV/P-J | |
| Shape | Coaxial cylindrical | | | | |
| Overall length (mm) | 195 | 85 | 40 | 30 | 28 |

# V-Band Coaxial-to-Waveguide Adapter

## Overview

**A coaxial-to-waveguide adapter is a component that converts a coaxial line to a waveguide line.**

## Features

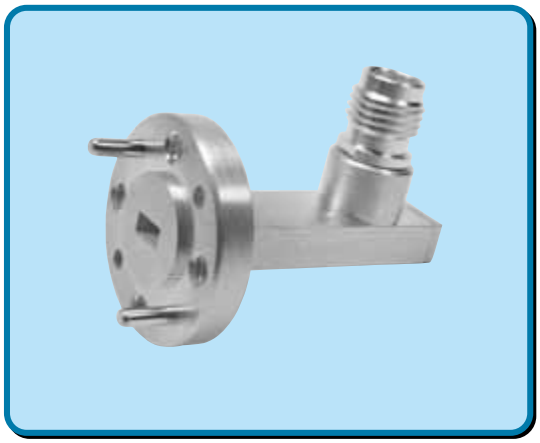
**1. Short lead time and low price**
**2. Lightweight, compact design for easy mounting**
**3. Excellent characteristics in the 60GHz band**

## Applications

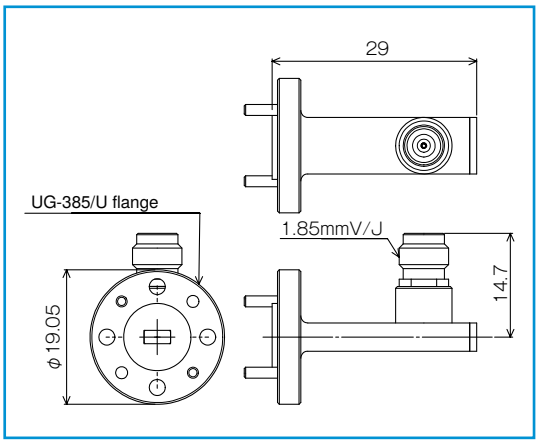
**WirelessHD products, IEEE 802.15.3c products, automotive radar systems, high-speed wireless LAN, defense, aviation and space, development fixtures**

## Product

■01X0543-00



■ Dimensions




## Specifications (Reference)

■ Electrical performance

| Item | Specification |
|---|---|
| **Frequency range** | **50 to 65GHz** |
| V.S.W.R. | **1.5 max.** |
| **Insertion loss** | **0.6dB max.** |
| **Operating temperature range** | **25°C±20°C** |

■ Mechanical performance

| Item | Specification |
|---|---|
| **Connector** | 1.85mmV/J |
| **Flange** | UG-385/U |
| Waveguide | WR-15 |
| **Overall length** | **29mm (excluding pins)** |

# Subsystems

## Overview

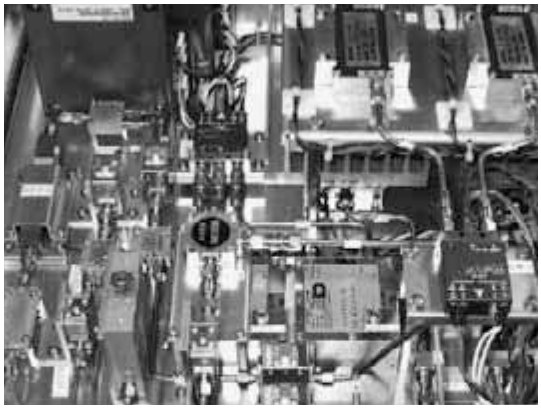
We take on custom orders such as transmit/receive test systems, designing and building them to customer needs even in small quantities.
We have supplied government agencies and manufacturers of communication and measuring equipment.

## Features

1. Total proposals covering RF circuit design and mechanical design
2. Frequencies up to 110GHz supported
3. Phase and delay characteristics optimized by designing and adjusting cable lengths

## Product Examples

■ A: Switch matrix

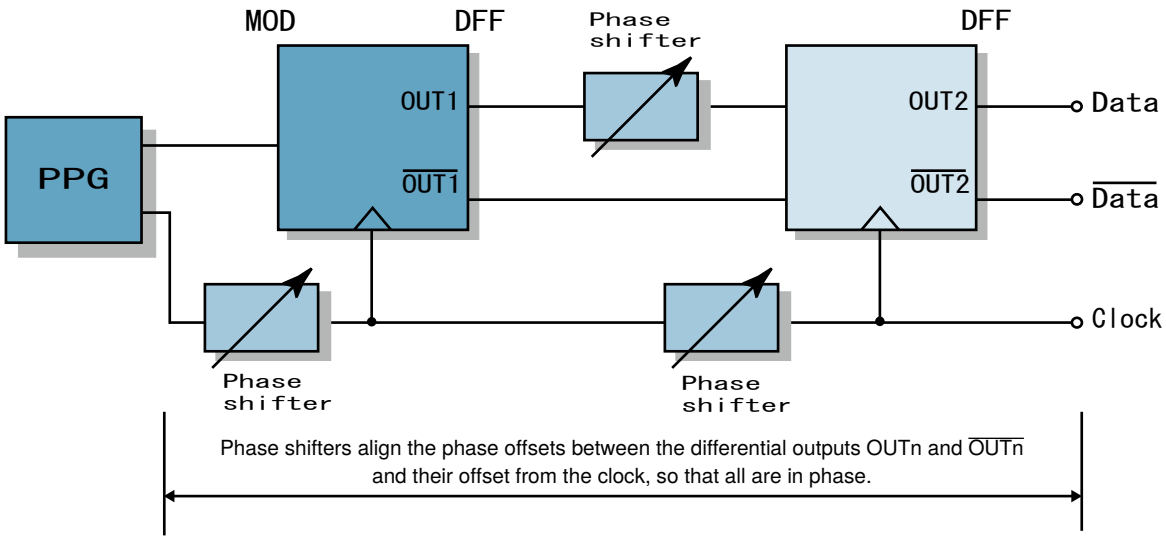


■ B: Up-converter



## Application Example

### Transmit Modulation Block Diagram



# INDEX


| Waka No. | Page | Type | Interface | RoHS |
|---|---|---|---|---|
| 01K0002 | 11 | Receptacle | BNC/J | ○ |
| 01K0238 | 11 | Receptacle | BNC/J | ○ |
| 01K0312 | 11 | Receptacle | BNC/J | ○ |
| 01K0361 | 9 | Receptacle | SMB/J | ○ |
| 01K0522 | 9 | Receptacle | SMB/J | ○ |
| 01K0580 | 6 | Receptacle | SMA/J | ○ |
| 01K0628 | 6 | Receptacle | SMA/J | ○ |
| 01K0670 | 6 | Receptacle | SMA/J | ○ |
| 01K0681 | 6 | Receptacle | SMA/P | ○ |
| 01K0682 | 6 | Receptacle | SMA/P | ○ |
| 01K0791 | 6 | Receptacle | SMA/P | ○ |
| 01K0820 | 6 | Receptacle | SMA/J | ○ |
| 01K0881 | 6 | Receptacle | SMA/J | ○ |
| 01K0899 | 6 | Receptacle | SMA/J | ○ |
| 01K0984 | 6 | Receptacle | SMA/P | ○ |
| 01K1000 | 9 | Receptacle | SMB/P | ○ |
| 01K1070 | 6 | Receptacle | SMA/J | ○ |
| 01K1076 | 6 | Receptacle | SMA/P | ○ |
| 01K1077 | 6 | Receptacle | SMA/P | ○ |
| 01K1079 | 11 | Receptacle | BNC/J w/ SW | ○ |
| 01K1081 | 11 | Receptacle | BNC/J w/ SW | ○ |
| 01K1147 | 8 | Receptacle | PLB/J | ○ |
| 01K1150 | 8 | Receptacle | PLB/J | ○ |
| 01K1174 | 6 | Receptacle | SMA/J | ○ |
| 01K1323 | 11 | Receptacle | TNC/J | ○ |
| 01K1355 | 8 | Receptacle | PLB/J | ○ |
| 01K1435 | 6 | Receptacle | SMA/J | ○ |
| 01K1445 | 5 | Receptacle | SMA/J | ○ |
| 01K1498 | 6 | Receptacle | SMA/J | ○ |
| 01K1577 | 6 | Receptacle | SMA/J | ○ |
| 01K1592 | 8 | Receptacle | PLB/P | ○ |
| 01K1621 | 11 | Receptacle | BNC/J | ○ |
| 01K1672 | 9 | Receptacle | SMB/J | ○ |
| 01K1680 | 10 | Receptacle | MMCX/J | ○ |
| 01K1754 | 12 | Receptacle | F/J | ○ |
| 01K1792 | 12 | Receptacle | F/J | ○ |
| 01K1845 | 5 | Receptacle | SMA/J | ○ |
| 01K1905 | 6 | Receptacle | SMA/J | ○ |
| 01K1950 | 9 | Receptacle | N/J | ○ |
| 01K1961 | 5 | Receptacle | SMA/J | ○ |
| 01K2014 | 6 | Receptacle | SMA/J | ○ |
| 01K2015 | 6 | Receptacle | SMA/J | ○ |
| 01K2088 | 5 | Receptacle | SMA/J | ○ |
| 01K2116 | 5 | Receptacle | SMA/J | ○ |
| 01K2141 | 27 | Termination | | ○ |
| 01K2142 | 27 | Termination | | ○ |
| 01K2153 | 10 | Receptacle | MCX/J | ○ |
| 01K2202 | 10 | Receptacle | MMCX/J | ○ |
| 01K2222 | 12 | Receptacle | W3B/J | ○ |
| 01K2223 | 12 | Receptacle | W3B/J | ○ |
| 01K2286 | 6 | Receptacle | SMA/J | ○ |
| 01K2333 | 27 | Termination | | ○ |
| 01K2334 | 27 | Termination | | ○ |
| 01K2335 | 27 | Termination | | ○ |
| 01K2336 | 27 | Termination | | ○ |
| 01K2356 | 10 | Receptacle | MMCX/J | ○ |
| 01K2417 | 12 | Receptacle | F/J | ○ |
| 01K2419 | 10 | Receptacle | MCX/P | ○ |
| 01K2448 | 10 | Receptacle | MCX/J | ○ |
| 01K2455 | 8 | Receptacle | BMA/P | ○ |
| 01K2457 | 8 | Receptacle | BMA/J | ○ |
| 01K2493 | 7 | Receptacle | WPL/J | ○ |
| 01K2525 | 7 | Receptacle | WPL/J | ○ |
| 01K2526 | 7 | Receptacle | WPL/J | ○ |
| 01K2550 | 7 | Receptacle | WPL/J | ○ |
| 01K2580 | 7 | Receptacle | WPL/J | ○ |
| 01R0051 | 1 | Receptacle | V/J | ○ |
| 01R0060 | 2 | Receptacle | K/J | ○ |
| 01R0072 | 2 | Receptacle | K/J | ○ |
| 01R0073 | 2 | Receptacle | K/J | ○ |
| 01R0080 | 2 | Receptacle | K/P | ○ |
| 01R0081 | 2 | Receptacle | K/P | ○ |
| 01R0086 | 1 | Receptacle | V/P | ○ |

| Waka No. | Page | Type | Interface | RoHS |
|---|---|---|---|---|
| 01R0087 | 1 | Receptacle | V/P | ○ |
| 01R0088 | 1 | Receptacle | V/J | ○ |
| 01R0089 | 1 | Receptacle | V/J | ○ |
| 01R0213 | 3 | Receptacle | SMPM/P | ○ |
| 01R0229 | 1 | Receptacle | W/J | ○ |
| 01R0231 | 3 | Receptacle | SMP/P | ○ |
| 01R0251 | 3 | Receptacle | SMPM/J | ○ |
| 01R0252 | 3 | Receptacle | SMP/P | ○ |
| 01X0543 | 33 | Coax-to-waveguide adapter | | ○ |
| 01X0556 | 28 | Phase system | | |
| 01X0557 | 28 | Phase system | | |
| 02K0052 | 14 | Adapter | RCA/P-F/J | ○ |
| 02K0239 | 14 | Adapter | BNC/J-BNC/J | ○ |
| 02K0545 | 14 | Adapter | BNC/P-TNC/J | |
| 02K0546 | 14 | Adapter | F/P-RCA/J | |
| 02K0907 | 14 | Adapter | SMA/P-SMA/J | ○ |
| 02K1430 | 14 | Adapter | N/J-N/J | ○ |
| 02K2053 | 14 | Adapter | SMA/P-SMA/P | ○ |
| 02K2054 | 14 | Adapter | SMA/P-SMA/P | ○ |
| 02K2055 | 14 | Adapter | SMA/J-SMA/J | ○ |
| 02K2056 | 14 | Adapter | SMA/J-SMA/J | ○ |
| 02K2057 | 14 | Adapter | SMA/P-SMA/J | ○ |
| 02K2058 | 14 | Adapter | SMA/P-N/P | ○ |
| 02K2059 | 14 | Adapter | SMA/P-N/J | ○ |
| 02K2061 | 14 | Adapter | SMA/J-N/P | ○ |
| 02K2062 | 14 | Adapter | SMA/J-N/J | |
| 02K2063 | 14 | Adapter | SMA/J-TNC/P | ○ |
| 02K2065 | 14 | Adapter | SMA/J-BNC/P | ○ |
| 02K2066 | 14 | Adapter | N/P-N/P | ○ |
| 02K2069 | 14 | Adapter | N/P-N/J | ○ |
| 02K2070 | 14 | Adapter | N/P-N/J | ○ |
| 02K2072 | 14 | Adapter | N/P-BNC/P | ○ |
| 02K2073 | 14 | Adapter | N/P-BNC/J | ○ |
| 02K2074 | 14 | Adapter | N/J-TNC/P | |
| 02K2076 | 14 | Adapter | TNC/J-TNC/J | ○ |
| 02K2084 | 27 | Attenuator | | ○ |
| 02K2115 | 14 | Adapter | SMA/P-SMA/J | ○ |
| 02K2117 | 14 | Adapter | SMA/P-SMA/J | ○ |
| 02K2125 | 14 | Adapter | SMA/J-BNC/J | ○ |
| 02K2126 | 14 | Adapter | SMA/P-BNC/J | ○ |
| 02K2224 | 14 | Adapter | SMA/P-TNC/J | ○ |
| 02K2225 | 14 | Adapter | SMA/P-BNC/P | ○ |
| 02K2226 | 14 | Adapter | N/P-TNC/J | ○ |
| 02K2227 | 14 | Adapter | N/J-TNC/J | ○ |
| 02K2228 | 14 | Adapter | N/J-BNC/P | ○ |
| 02K2229 | 14 | Adapter | N/J-BNC/J | ○ |
| 02K2501 | 7,14 | Adapter | SMA/P-WPL/J | ○ |
| 02K2516 | 7,14 | Adapter | WPL/P-SMA/P | ○ |
| 02K2517 | 7,14 | Adapter | WPL/P-SMA/J | ○ |
| 02K2518 | 7,14 | Adapter | WPL/J-WPL/J | ○ |
| 02K2521 | 7,14 | Adapter | WPL/P-WPL/P | ○ |
| 02K2646 | 7,14 | Adapter | WPL/J-WPL/J | ○ |
| 02K2656 | 14 | Adapter | TNC/P-BNC/J | ○ |
| 02R0007 | 14 | Adapter | SMA/J-TNC/J | ○ |
| 02R0009 | 14 | Adapter | SMA/J-SMA/J | ○ |
| 02R0013 | 14 | Adapter | TNC/P-SMA/J | |
| 02R0046 | 14 | Adapter | SMA/J-N/J | ○ |
| 02R0048 | 14 | Adapter | SMA/J-SMB/J | ○ |
| 02R0049 | 14 | Adapter | SMA/J-SMB/P | ○ |
| 02R0070 | 13 | Adapter | K/J-K/J | ○ |
| 02R0071 | 13 | Adapter | V/J-K/J | ○ |
| 02R0090 | 13 | Adapter | K/P-K/P | ○ |
| 02R0091 | 13 | Adapter | K/J-K/J | ○ |
| 02R0092 | 13 | Adapter | K/P-K/J | ○ |
| 02R0093 | 13 | Adapter | V/P-V/P | ○ |
| 02R0094 | 13 | Adapter | V/P-V/J | ○ |
| 02R0095 | 13 | Adapter | V/J-V/J | ○ |
| 02R0113 | 14 | Adapter | SMA/P-N/J | |
| 02R0142 | 13 | Adapter | V/J-V/J | ○ |
| 02R0165 | 13 | Adapter | V/P-K/J | ○ |
| 02R0166 | 13 | Adapter | V/J-K/J | ○ |
| 02R0167 | 13 | Adapter | V/P-K/P | ○ |
| 02R0168 | 13 | Adapter | V/J-K/P | ○ |

| Waka No. | Page | Type | Interface | RoHS |
|---|---|---|---|---|
| 02R0216 | 3,13 | Adapter | SMPM/J-SMPM/J | ○ |
| 02R0217 | 13 | Adapter | V/P-SMPM/P | ○ |
| 02R0218 | 13 | Adapter | V/J-SMPM/P | ○ |
| 02R0219 | 13 | Adapter | V/P-SMPM/J | ○ |
| 02R0220 | 13 | Adapter | V/J-SMPM/J | ○ |
| 02R0224 | 3 | Receptacle | SMPM/P | ○ |
| 02R0233 | 13 | Adapter | W/P-V/J | ○ |
| 02R0234 | 13 | Adapter | W/P-V/P | ○ |
| 02R0235 | 13 | Adapter | W/J-V/J | ○ |
| 02R0236 | 13 | Adapter | W/J-V/P | ○ |
| 02R0242 | 3,14 | Adapter | SMP/J-SMA/J | ○ |
| 02R0246 | 9,14 | Adapter | N/J-N/J | ○ |
| 02X0445 | 29 | Phase adjuster | | ○ |
| 02X0450 | 29 | Phase adjuster | | ○ |
| 02X0508 | 28 | Phase shifter | | ○ |
| 02X0518 | 27 | Phase shifter | | ○ |
| 02X0527 | 29 | Phase adjuster | | ○ |
| 02YB336 | 30 | Phase trimmer | | ○ |
| 02YB337 | 30 | Phase trimmer | | ○ |
| 02YB541 | 30 | Phase trimmer | | ○ |
| 02YB542 | 30 | Phase trimmer | | ○ |
| 04R0225 | 3 | Receptacle | SMPM/P | ○ |
| 1811K053 | 14 | Adapter | BNC/P-F/J | |
| 1811K059 | 11 | Receptacle | BNC/J | ○ |
| 1821K079 | 14 | Adapter | BNC/J-BNC/J | ○ |
| 1821K086 | 14 | Adapter | BNC/P-RCA/J | ○ |
| 1821K091 | 14 | Adapter | F/P-BNC/J | ○ |
| 1821K092 | 14 | Adapter | BNC/P-BNC/J×2 | |
| 1821K093 | 14 | Adapter | BNC/P-BNC/P | |
| 1821K117 | 14 | Adapter | BNC/J-F/J | |
| 1821K119 | 14 | Adapter | BNC/J-RCA/P | ○ |
| M2BAMAM | 26 | Cable | SMA/P-SMA/P | ○ |
| M2BKMKM | 26 | Cable | K/P-K/P | ○ |
| M2BVMVM | 26 | Cable | V/P-V/P | ○ |
| M3BAMAM | 26 | Cable | SMA/P-SMA/P | ○ |
| R2BAMAL | 25 | Cable | SMA/P-SMA/LP | ○ |
| R2BAMAM | 25 | Cable | SMA/P-SMA/P | ○ |
| R2BKMKM | 25 | Cable | K/P-K/P | ○ |
| R2BVMVM | 25 | Cable | V/P-V/P | ○ |


Waka
RoHS
2002/95/EC

*** RoHS Directive**

Short for Restriction on Hazardous Substances, the EU regulation on hazardous substances. In force since July 1, 2006, it restricts the use of six substances in electrical and electronic equipment handled in the EU: lead, mercury, cadmium, hexavalent chromium, PBB (polybrominated biphenyls) and PBDE (polybrominated diphenyl ethers).

*** RoHS compliant** (RoHS)

Indicates that, under EU Directive 2002/95/EC, the use of lead, cadmium, mercury, hexavalent chromium, PBB and PBDE is restricted except in exempted applications.
Compliance of other products is under review; for the current status, contact our sales staff or inquire via our website.

http://www.waka.co.jp

# FAX Information FAX No.03-5228-3376

## TO:

| | |
|---|---|
| WAKA MANUFACTURING Co., Ltd. Sales Dept.<br>Attn.: | ☐ Quotation ☐ Literature request<br>☐ Inquiry ☐ Message |

### Connector

| | | |
|---|---|---|
| Product name & part No. | Comments | |
| Quantity | Frequency GHz | Other conditions |
| Delivery date | VSWR max. | |
| Target price | Insertion loss max. | |

### Cable Assy, Filter

| | | |
|---|---|---|
| Product name & part No. | Comments | |
| Quantity | Frequency GHz | Dimensions (sketch) See the sketch method on P23 |
| Delivery date | VSWR max. | |
| Target price | Insertion loss max. | |
| Other conditions | | |

## FROM:

| | |
|---|---|
| Company name | |
| Department | Name |
| Company address (postal code) | Tel: |
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| | E-mail: |



Tokyo
Head Office




Omi Factory




Matsumoto Factory

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The contents of this catalog are current as of August 2011.
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The characteristics and specifications of the products in this catalog are reference values.
For continued use of the listed products, please request a "delivery specification" from our sales representative.

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