### Features

1. **A Low mated height of 0.94 or 1.2 mm (maximum of 1.0 or 1.3 mm)**
   - When connected this series delivers a world class low mated height of 1.0 or 1.3 mm (see Figure 1).

2. **Minimal mounting area required**
   - The receptacle requires a footprint of only 3.4 mm², which is the same footprint as our W.FL and W.FL2 series. In addition, the same land patterns can be used. (Note: The X.FL series has no mating compatibility with the W.FL2 and W.FL series.)

3. **Ultra lightweight**
   - The world's smallest and lightest class of coaxial connectors
     - Receptacle: 3.2 mg
     - Right angle plug: 22.0 mg (068), 14.4 mg (040), and 15.7 mg (032)
     - Plug receptacle: 5.5 mg

4. **High frequency transmission**
   - This series offers the high performance needed to meet the requirements of many different miniature devices, featuring a DC to 6 GHz capacity. X.FL-LP(P)-068 supports up to 12 GHz.

5. **Automatic board placement**
   - This product is available in embossed packaging; this allows the plug and receptacles to be automatically mounted.

6. **The use of ultra-fine coaxial (fluorinated resin insulated) cables**
   - The use of ultra-fine coaxial (fluorinated resin insulated) cables on these connectors offer the ability to complete connections in small, confined spaces with a smooth, easy operation.

7. **Simple connector mating / unmating**
   - Dedicated tools are available to ensure that proper mating/unmating of this connector takes place.

### Product Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications (for each plug type)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X.FL-LP-040</td>
</tr>
<tr>
<td>1. Contact resistance</td>
<td>(Center) Maximum of 20 mΩ</td>
</tr>
<tr>
<td></td>
<td>(Outer) Maximum of 10 mΩ</td>
</tr>
<tr>
<td>2. V.S.W.R. (#)</td>
<td>1.3 or less (DC to 3 GHz)</td>
</tr>
<tr>
<td></td>
<td>1.4 or less (3 to 6 GHz)</td>
</tr>
<tr>
<td>3. Insulation resistance</td>
<td>Minimum of 500 MΩ , 100 V DC</td>
</tr>
<tr>
<td>4. Withstanding voltage</td>
<td>200 V AC, 1 minute</td>
</tr>
</tbody>
</table>

*V.S.W.R. Measurement System (plug type)*

The above V.S.W.R. specification values were measured using the measurement system shown below.

Note 1: Cable type connectors were measured with SMA conversion adapters attached to both ends of the harness product of a suitable 100 cm cable.

Note 2: Board type connectors were mounted to a 50 glass epoxy board and measurements were conducted with SMA conversion adapters attached.
X.FL Series® Low-Profile, Ultraminiature Lightweight SMT Coaxial Connectors - 0.94 or 1.2 mm Mated Height

Cable Assembly (Plug)

- X.FL-LP-040 (Applicable cable: outer diameter Ø0.81 or Ø0.64)
- X.FL-LP-032 (09) (Applicable cable: outer diameter Ø0.5)
- X.FL-LP (P) -068 (Applicable cable: outer diameter Ø1.13)

Material / Finishes

<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
<th>Finish and remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell</td>
<td>Phosphor bronze</td>
<td>Gold plated</td>
</tr>
<tr>
<td>Insulator</td>
<td>LCP resin</td>
<td>Black, UL94V-0</td>
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<td>Female contact</td>
<td>Phosphor bronze</td>
<td>Gold plated</td>
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<tr>
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<td>Phosphor bronze</td>
<td>Partially gold plated</td>
</tr>
<tr>
<td>Insulator</td>
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<tr>
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</tr>
</tbody>
</table>

Cable Guide

<table>
<thead>
<tr>
<th>Description</th>
<th>Cable Type</th>
<th>Center Conductor</th>
<th>Dielectric Diameter</th>
<th>Outer Conductor</th>
<th>Jacket Diameter</th>
<th>Nominal Impedance</th>
<th>Nominal attenuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø0.81 mm Coaxial Cable</td>
<td>04</td>
<td>7/0.05 (36 AWG) Silver plated annealed copper wire</td>
<td>Ø0.40 FEP</td>
<td>Single-layer braided wire Tin plated</td>
<td>Ø0.81 FEP</td>
<td>50</td>
<td>5.6dB/m</td>
</tr>
<tr>
<td>Ø0.64 mm Coaxial Cable</td>
<td>044</td>
<td>7/0.05 (36 AWG) Silver plated annealed copper wire</td>
<td>Ø0.44 PFA</td>
<td>Fiber or paper covered copper winding wire Tin plated</td>
<td>Ø0.64 PFA</td>
<td>50</td>
<td>5.85dB/m</td>
</tr>
<tr>
<td>Ø0.5 mm Coaxial Cable</td>
<td>032</td>
<td>7/0.04 (38 AWG) Silver plated copper alloy wire</td>
<td>Ø0.32 PFA</td>
<td>Fiber or paper covered copper winding wire Tin plated</td>
<td>Ø0.5 PFA</td>
<td>50</td>
<td>6.13dB/m</td>
</tr>
<tr>
<td>Ø1.13 mm Coaxial Cable</td>
<td>068</td>
<td>7/0.08 (32 AWG) Silver plated annealed copper wire</td>
<td>Ø0.68 FEP</td>
<td>Single-layer braided wire Tin plated</td>
<td>Ø1.13 FEP</td>
<td>50</td>
<td>3.7dB/m</td>
</tr>
</tbody>
</table>
## How to Specify Plug Cable Assembly

The dimensions of a cable assembly of the X.FL series should be specified as follows:

- [Double-Ended Cable Assembly]
- [Single-Ended Cable Assembly]

### Product Number Structure

Refer to the charts below for determining specific part number characteristics. Please select connectors listed in this catalog when placing orders and be sure to check the latest delivery specifications at the time of ordering the product.

### Used Plug: X.FL-LP-040

- Ø0.81 Coaxial Cable
  - Double-Ended: X.FL - 2LP - 04K [TV - A - (L)]
  - Single-Ended: X.FL - LP - 04K [TV - A - (L)]

### Ø0.64 Coaxial Cable

- Double-Ended: X.FL - 2LP - 044N [TS - A - (L)]

### Ø0.5 Coaxial Cable

Plug: X.FL-LP-032 (09) Ø0.5 coaxial cable

- Double-Ended: X.FL - 2LP9 - 032H [TS - A - (L)]
- Single-Ended: X.FL - LP9 - 032H [TS - A - (L)]
X.FL Series® LOW-PROFILE, ULTRAMINIATURE LIGHTWEIGHT SMT COAXIAL CONNECTORS - 0.94 or 1.2 MM MATED HEIGHT

Plug: X.FL-LP (P)-068 φ1.13 coaxial cable

**Double-Ended**

```
X.FL - 2LP P - 068W TV - A - (L)
```

**Single-Ended**

```
X.FL - LP P - 068W TV - A - (L)
```

<table>
<thead>
<tr>
<th>Series name: X.FL series</th>
<th>Cable color: 1: Grey, 2: Black, 3: White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly type: LP: Single-ended, 2LP: Double-ended</td>
<td>Cable outer conductor: TV: Tin plated braided wire</td>
</tr>
<tr>
<td>Connection type: Batch connection type</td>
<td>Total length L (mm) L length in mm</td>
</tr>
<tr>
<td>Cable type: 068W: φ1.13 coaxial cable</td>
<td></td>
</tr>
</tbody>
</table>

| **Standard Tolerances for (L)** |
|------------------|------------------|
| L (mm) | Standard Tolerances (mm) |
| 35 ≤ L ≤ 200 | ±4 |
| 200 < L ≤ 500 | ±8 |
| 500 < L ≤ 1000 | ±12 |
| 1000 < L | ±1.5% |

Note: Minimum available length (L) is 35 mm.

**Recommended PCB Mounting Pattern (°1)**

*°1) The pattern is the same as the W.FL and W.FL2 connectors.*

---

**Receptacles**

![Receptacles Image](image)

**Embosed Carrier Tape Dimensions (JIS-C-0806 compliant)**

```
L (mm) Standard Tolerances (mm)
35 ≤ L ≤ 200 ±4
200 < L ≤ 500 ±8
500 < L ≤ 1000 ±12
1000 < L ±1.5%
```

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HRS No</th>
<th>Packaging</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X.FL-R-SMT-1 (80)</td>
<td>CL331-0701-6-80</td>
<td>Reel packaging 10,000 pieces per reel</td>
<td></td>
</tr>
</tbody>
</table>

**Plug Receptacles**

![Plug Receptacles Image](image)

**Recommended PCB Mounting Pattern**

![Recommended PCB Mounting Pattern](image)

---

**Embosed Carrier Tape Dimensions (JIS-C-0806 compliant)**

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L (mm) Standard Tolerances (mm)
35 ≤ L ≤ 200 ±4
200 < L ≤ 500 ±8
500 < L ≤ 1000 ±12
1000 < L ±1.5%
```

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<tr>
<th>Part No.</th>
<th>HRS No</th>
<th>Packaging</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X.FL-PR-SMT1-2 (80)</td>
<td>CL331-0713-7-80</td>
<td>Reel packaging 10,000 pieces per reel</td>
<td></td>
</tr>
</tbody>
</table>

---

**Reel Dimensions**

![Reel Dimensions Image](image)
**Conversion Adapters**

- **SMA Conversion Adapter (Mating portion - X.FL side: jack - SMA side: plug)**

  ![Image of SMA Conversion Adapter (Mating portion - X.FL side: jack - SMA side: plug)](image)

  Note: The X.FL side mating portions has a lower lock retention force than the regular product, so that the adapter cannot be used for purposes other than performance measurements.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HRS No</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMP-X.FLJ</td>
<td>CL311-0435-1</td>
<td>☐</td>
</tr>
</tbody>
</table>

- **SMA Conversion Adapter (Mating portion - X.FL side: plug - SMA side: jack)**

  ![Image of SMA Conversion Adapter (Mating portion - X.FL side: plug - SMA side: jack)](image)

  Note: The X.FL side mating portions has a lower lock retention force than the regular product, so that the adapter cannot be used for purposes other than performance measurements.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HRS No</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMJ-X.FLP</td>
<td>CL311-0436-4</td>
<td>☐</td>
</tr>
</tbody>
</table>

- **SMA Conversion Adapter (Mating portion - X.FL side: plug (w/o lock) - SMA side: jack)**

  ![Image of SMA Conversion Adapter (Mating portion - X.FL side: plug (w/o lock) - SMA side: jack)](image)

  Note: This connector is used by compressing the mating portion of X.FL side onto the X.FL-R-S M T-1 portion.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HRS No</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRMJ-X.FLP-ST3</td>
<td>CL311-0450-5</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Tool**

- **Plug Mating Tool (Space-Saving Type)**

  This tool is used for mating a plug.

  ![Image of Plug Mating Tool (Space-Saving Type)](image)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HRS No</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>W.FL-LP-IN</td>
<td>CL331-0323-2</td>
<td>☐</td>
</tr>
</tbody>
</table>

- **Plug Mating and Unmating Tool**

  This is a combination tool that has both of the mating and unmating tool at either end.

  ![Image of Plug Mating and Unmating Tool](image)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>HRS No</th>
<th>RoHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X.FL-LP-IN.OUT1</td>
<td>CL331-0715-2</td>
<td>☐</td>
</tr>
</tbody>
</table>
## Usage Precautions

### 1. Plugs

#### (1) Mating / un-mating

1. To un-mate a connector, use the unmating side of the plug mating and unmating tool X.FL-LP-IN.OUT1 as shown in the following figure.

   ![How to un-mate a plug](image)

   Never un-mate the plug by pulling the cable. It may cause a failure of the connector.

2. To mate a connector, use the mating side of the plug mating and unmating tool X.FL-LP-IN.OUT1 or the plug mating tool W.FL-LP-IN. Align the mating axes between both of the connectors and check that the shell is properly aligned. The connector should be inserted perpendicularly as much as possible. (See the following figure)

   ![How to mate a plug](image)

   Do not attempt to insert the connector at an extreme angle. It may cause the connector to fail.

#### (2) Allowable load to a cable that is mated

After the connector is mated, do not apply a load to the cable in excess of the values indicated in the figure below.

2 N or less (X.FL-LP-040,X.FL-LP(P)-068)
1 N or less (X.FL-LP-032)

(while wiring after mating)

When the cable is routed in such a direction that lifts the cable, it is recommended that cushioning should be placed on the plug to prevent the connector from un-mating (see the example below).

#### (3) Precautions

Do not mate or unmate a connector with an excessive prying force. It may cause a failure of the connector.
### 2. Plug Receptacles

#### (1) Mating

This product should be mated by hand. Do not apply an excessive load or over handle during the mating process. It may cause the connector to fail.

**[Mating procedure]**

1. Before inserting the connector, bring the mating surface of the plug receptacle (X.F.L-P-R-S.M.T1-2) into gentle contact with that of the receptacle (X.F.L-R-SMT-1) and slide them back and forth around so that the mating axes are aligned.

   ![Align the mating axes](image)

2. Also make sure the PCBs the parts are mounted on are not allowed to move relative to each other. When the connector has been slightly mated with the receptacle, the connector will not move from any side-to-side or front-to-back forces applied to it.

   ![Mold surface](image)

3. Push the connector down perpendicularly until you feel it click.

   ![Female terminal](image)

4. If the mating axes are not aligned, it will fail to make a complete connection. When there has been a failure to make a connection due to misaligned mating axes, please check that the female terminal contacts on the plug receptacle have not been damaged.

#### (2) Unmating

When unmating a connector, it is desirable to pull the connector in the direction perpendicular to the surface on which the connector is mounted. However, unmating the FPC in a perpendicular direction can be difficult when an FPC is detached from a thin printed circuit board.

When you find it difficult to unmate the connector, detach it to an oblique direction as shown in the left figure below. Avoid detaching the connector in a way as shown in the right figure.

#### (3) Precautions

Do not mate or unmate a connector with an excessive prying force. It may cause a failure of the connector.
X.FL Series® Low-Profile, Ultraminiature Lightweight SMT Coaxial Connectors - 0.94 or 1.2 mm Mated Height

(4) Notes for mounting
Avoid mounting multiple connectors of this type on the same circuit board. (If it is unavoidable to mount multiple connectors, take necessary measures for use, such as separating the circuit board between the connectors.) When the connector is mounted on an FPC, insufficient stiffness may lead to land pattern separation or solder separation. It is recommended that the FPC should be lined with a stiffening film.

(5) Precautions
1. Do not mate or unmate a connector with an excessive prying force. It may cause a failure of the connector.
2. The connector may become disconnected if it is dropped, or extreme stress is applied to the FPC. To prevent this from happening, fix the connector in place by holding it with an added portion of the case or some type of cushioning material.

3. Reflow conditions of receptacles and plug receptacles

(1) Recommended reflow temperature profile [reference]

<table>
<thead>
<tr>
<th>Time (second)</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>240</td>
<td>10 seconds or less</td>
</tr>
<tr>
<td>220</td>
<td>50 seconds or less</td>
</tr>
<tr>
<td>190</td>
<td>120 seconds or less</td>
</tr>
</tbody>
</table>

Soldering profile for lead free solder (reference)

1. The temperatures indicated are the surface temperatures on the printed circuit board at the points of contact with the terminals.
2. Reflow soldering should be performed at a peak temperature of 250°C or less at the surface of the printed circuit board.
3. The temperature profile varies depending on conditions such as the size of the printed circuit board, the solder paste type, and solder thickness.

(2) Recommended metal mask thickness 0.1mm~0.12mm

(3) Reflow cycles 2 times

4. Operating Environment and Storage Conditions

(1) Operating environment
This product was designed under the assumption that it would be used in a normal operating environment.
Use of this connector under adverse environmental conditions may lead to discoloration or other kinds of degradation. Use of the connector in regions having exposure to excessive amounts of fine particles and dust, high densities of sulfur dioxide, hydrogen sulfide, nitrogen dioxide or other corrosive gasses (e.g., exhaust gas from automobiles or factories), is not advised.
Environments having a large difference in temperature, such as a place near a heater.

(2) Storage conditions
Store the product in Hirose Electric’s packaging or similar packaging conditions.
Temperature: -10 to +40°C, humidity: 85% or less (recommended storage conditions)
Use the product within six months from delivery.
Products for which the storage period has expired must be tested for solderability before the use.

HIROSE ELECTRIC CO., LTD.
6-3, Nakagawa Chuoh-2-Chome, Tsuzuki-Ku, Yokohama-Shi 224-8540, JAPAN
TEL: +81-45-620-3526  Fax: +81-45-591-3726
http://www.hirose.com
http://www.hirose-connectors.com

The characteristics and the specifications contained herein are for reference purpose. Please refer to the latest customer drawings prior to use. The contents of this catalog are current as of date of 1/2014. Contents are subject to change without notice for the purpose of improvements.