PRODUCT CATALOG

HIROSE ELECTRIC CO.,LTD.

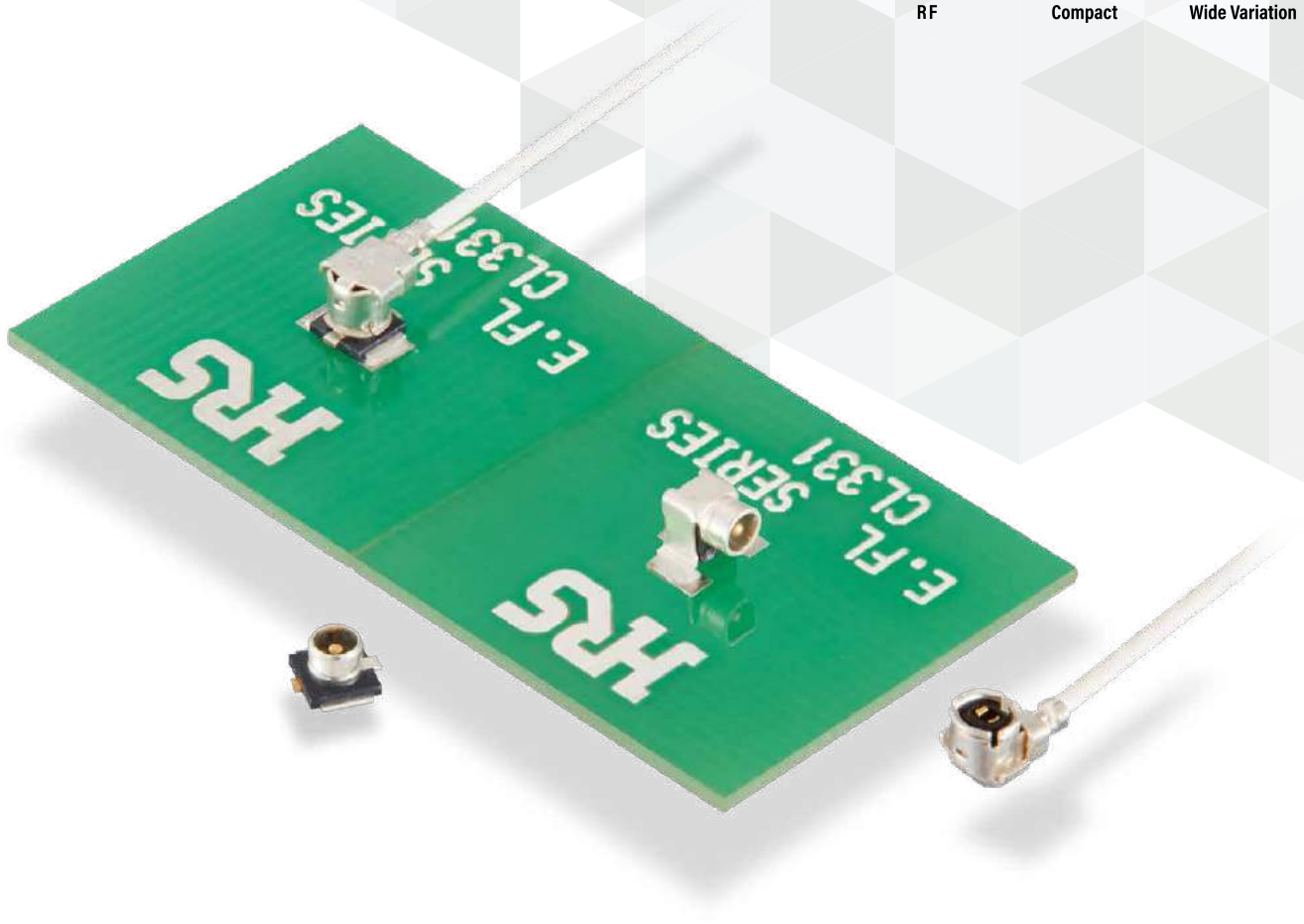
E.FL Series

Compact, Low Profile SMT Coaxial Connector

RF

Compact

Wide Variation



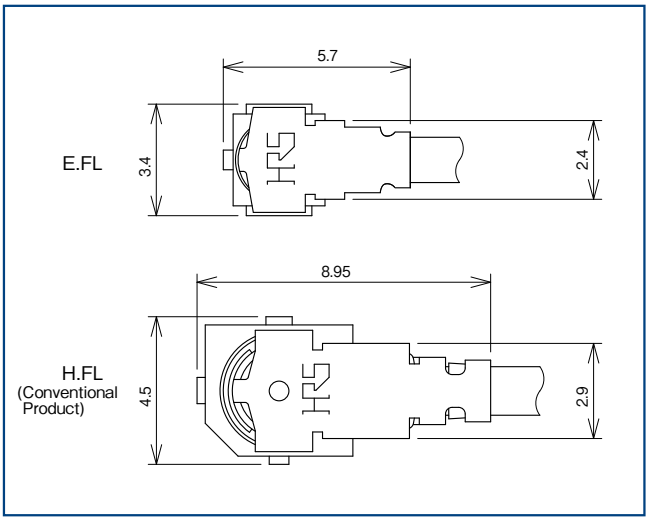
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Dec. 2021

Features

1. Small Size, Space-saving

Compared to our H.FL Series, the board occupied mounting space is reduced by about 49 to 56%.
PCB Mounting Space : 9.4mm^2



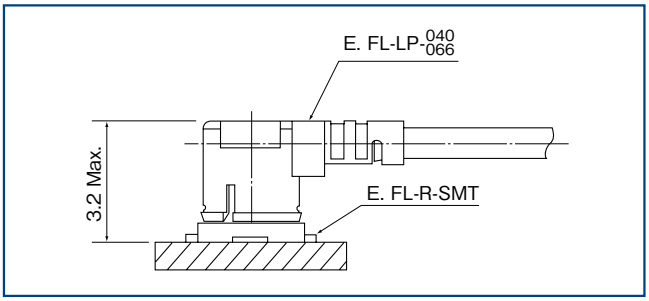
Size Comparison of H.FL Series and E.FL Series

2. Ultra-fine Coaxial (Fluorinated Resin Insulated) Cables

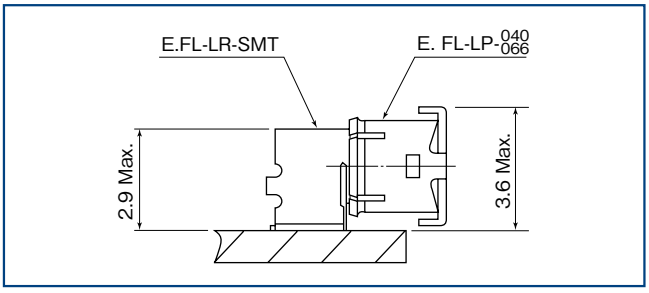
Compatible with easy-to-bend, ultra-fine ϕ0.81mm and ϕ1.32mm size coaxial cables for smooth and easy installment.

3. Low Profile

The maximum height from the board surface when the plug and straight receptacle are mated is 3.2mm Max.
When the plug and right angle receptacle are mated, the mated height from the board is 3.6mm Max.



E.FL-LP-$^{040}_{066}$ and E.FL-R-SMT



E.FL-LP-$^{040}_{066}$ and E.FL-R-SMT

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4. RF Performance

V.S.W.R. DC to 2GHz : 1.3 Max.

5. Supports Automatic Mounting

Tape and Reel packaging allows for pick-and-place mounting.

6. Clear, Tactile Lock

Compact connector with clear tactile lock enables reliable mating.

7. Environmental Compatibility

RoHS2 Compliant

Halogen Free
Chlorine and bromine above the standard values are not used for receptacle and plug harnesses.
*As defined by IEC61249-2-21
Br 900 ppm Max, Cl 900 ppm Max, and Br+Cl 1500 ppm Max.

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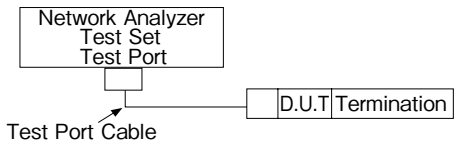
Product Specifications

Nominal Characteristic Impedance	50Ω	Operating Temperature	-40 to +90℃
Rated Voltage	60V AC	Operating Relative Humidity	90% Max.
Frequency Range	DC to 2GHz		

Item	Specifications	Conditions
Insulation Resistance	500MΩ Min.	100V DC
Withstanding Voltage	No flashover or insulation breakdown.	200V AC for 1 min.
Contact Resistance	Center : 20mΩ Max. Outer : 10mΩ Max.	10mA Max.
Female Contact Retention Force	0.15N Min.	Measured with ϕ 0.475 pin gauge
V.S.W.R.*	1.3 Max.	DC to 2GHz
Vibration	No electrical discontinuity of 1 μ s min.	Frequency : 10 to 100Hz, single amplitude of 1.5mm, acceleration of 59m/s^2, 1 hour in the direction of each of the 3 axis.
Humidity (Steady State)	Insulation Resistance : 10MΩ Min. (High Humidity) 500MΩ Min. (When Dry) No damage, cracks or parts dislocation.	96 hours at temperature of 40℃ and humidity of 95%.
Thermal Shock	No damage, cracks or parts dislocation.	Temperature : -40 → +5 to +35 → +90 → +5 to +35℃ Time : 30 → 5 → 30 → 5 minutes for 5 cycles
Mating Durability	Contact Resistance : 25mΩ Max. (Center) 15mΩ Max. (Outer)	50 times
Salt Spray	No significant corrosion	5% salt water solution, 48 hours

*V.S.W.R. Measurement System

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



Note 1 : Cable type connectors were measured with SMA connectors attached to the cable assembly at both ends of a compatible 10cm cable.
Note 2 : Board type connectors were mounted to a 50Ω board and measurements were conducted with SMA connectors attached.

Materials / Finish

Part	Materials		Finish	Flame Retardance
Shell	Phosphor Bronze		Silver Plated	—
Male Center Contact	Brass		Gold Plated	—
Female Center Contact	Phosphor Bronze		Gold Plated	—
Insulator	Plug	PBT	Black	UL94V-0
	Receptacle	LCP		

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Product Number Structure

Refer to the chart below when determining the product specifications from the product number.
Please select from the product numbers listed in this catalog when placing orders.

● Plug

E.FL - LP - 040 (01)
❶ ❷ ❸ ❹

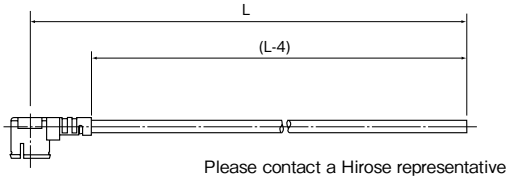
● Receptacle

E.FL - R - SMT (10)
❶ ❷ ❸ ❹

❶ Series Name	E.FL	❸ Compatible Cable or Board Mounting Method	Plug 040 : ϕ 0.81 Single Shield Cable 066 : ϕ 1.32 Double Shield Cable Receptacle SMT : Printed Circuit Board Surface Mount Type
❷ Connecter Type	LP : Right Angle Plug R : Straight Receptacle LR : Right Angle Receptacle	❹ Packing Types	(01) : Packing (100pcs per bag) (10) : Reel Packing (2,500pcs per reel) Note : Specification (10) is only available for the receptacle.

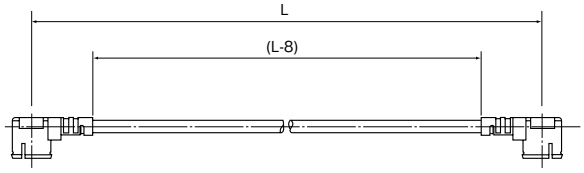
● How to Designate Plug Cable Assembly Dimensions

Single-ended Cable Assembly



Please contact a Hirose representative about cable end processing.

Double-ended Cable Assembly



Note : Designate the dimensions from the center of the connector for both single-ended and double-ended cable assemblies. (Please write length L in mm.)

● Cable Assembly Product Number Structure

E.FL - 2LP - 04N 1 - A - L
❶ ❷ ❸ ❹ ❺

❶ Series Name	E.FL	❸ Plug Type and Cable Type	04N : Plug E.FL-LP-040, ϕ 0.81 Cable 066N : Plug E.FL-LP-066N, ϕ 1.32 Cable
❷ Assembly Type	LP : Single Ended 2LP : Double Ended	❹ Cable Color	04N : 1 : White, 2 : Black 066N : 1 : Gray, 2 : Black
		❺ Total Length (mm)	L length (mm)

● Standard Tolerances for (L)

Total Length (mm)	Standard Tolerance (mm)
35 ≦ L ≦ 200	± 4
200 < L ≦ 500	± 8
500 < L ≦ 1000	± 12
1000 < L	± 1.5%

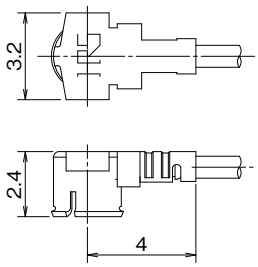
Note : The shortest length is L=35mm.

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Right Angle Plug

We accept cable assembly orders for the plug as well.





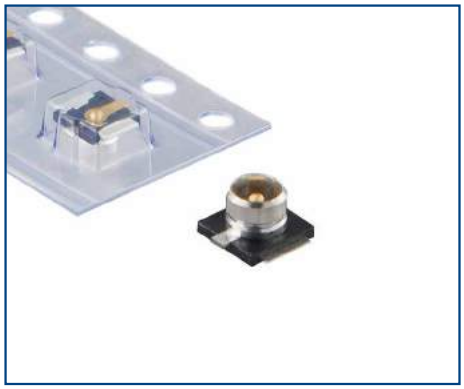
Cable Assembly State

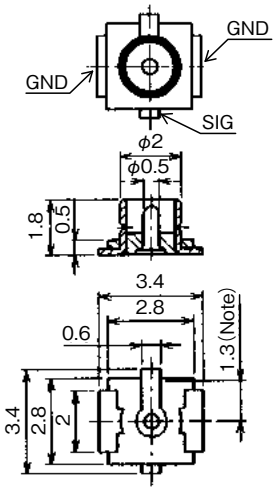
Part No.	HRS No.	Cable Type
E.FL-LP-040(01)	CL0331-0401-4-01	ϕ 0.81 Cable
E.FL-LP-066(01)	CL0331-0402-7-01	ϕ 1.32 Cable

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Receptacle

● Straight Receptacle

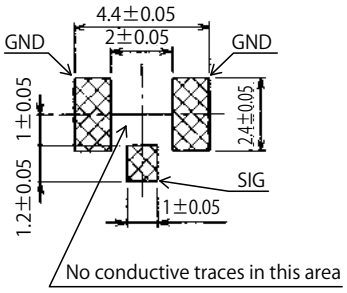




Note : Tolerance value of mold resin applied to center contact.

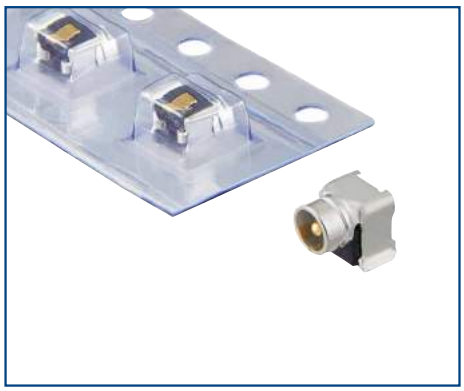
Part No.	HRS No.	Purchase Unit
E.FL-R-SMT(01)	CL0331-0421-1-01	100pcs per bag
E.FL-R-SMT(10)	CL0331-0421-1-10	2,500pcs per reel

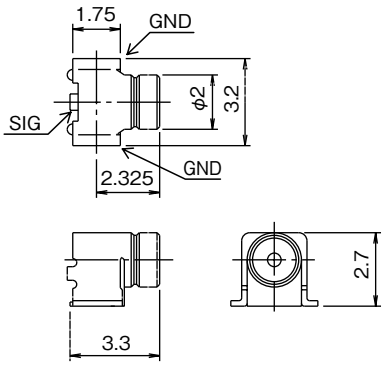
Recommended PCB Mounting Pattern



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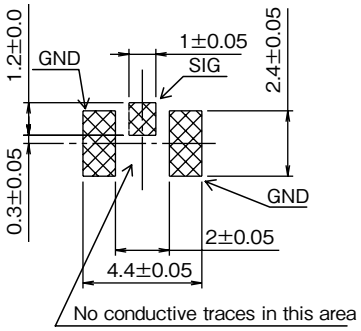
● Right Angle Receptacle





Part No.	HRS No.	Purchase Unit
E.FL-LR-SMT(01)	CL0331-0422-4-01	100pcs per bag
E.FL-LR-SMT(10)	CL0331-0422-4-10	2,500pcs per reel

Recommended PCB Mounting Pattern

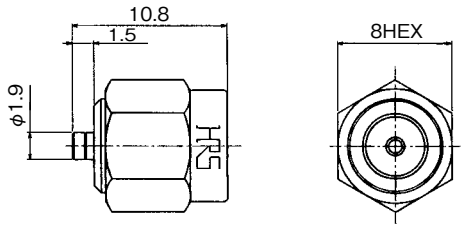


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Conversion Adapter

SMA Conversion Adapter (Mated Portion-E.FL Side : Jack, SMA Side : Plug)



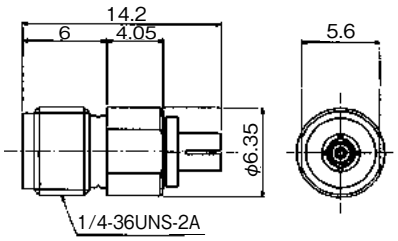


Part No.	HRS No.	Purchase Unit
HRMP-E.FLJ(40)	CL0311-0279-8-40	20pcs per bag

Note : Since the E.FL side mating portion has a weaker lock than standard products, it cannot be used for purposes other than performance measurement.

SMA Conversion Adapter (Mated Portion-E.FL Side : Plug, SMA Side : Jack)



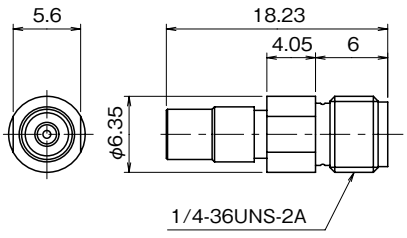


Part No.	HRS No.	Purchase Unit
HRMJ-E.FLP(40)	CL0311-0278-5-40	20pcs per bag

Note : Since the E.FL side mating portion has a weaker lock than standard products, it cannot be used for purposes other than performance measurement.

SMA Conversion Probe (Mated Portion-E.FL Side : Plug, SMA Side : Jack)





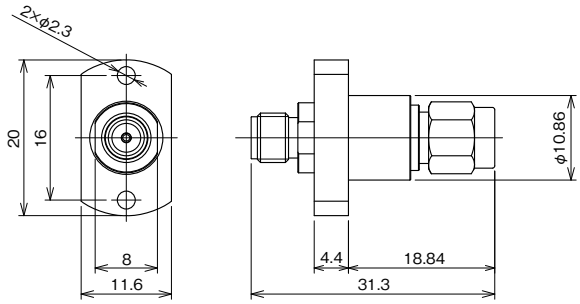
Part No.	HRS No.	Remarks	Purchase Unit
HRMJ-E.FLP-5(40)	CL0311-0294-1-40	for Mass Production Lines	20pcs per bag

Note : This connector is used by pressing the mating portion of the E.FL side with the mating portion of E.FL-R-SMT.

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SMA Conversion Adapter
(Mated Portion : SMA Jack (Measuring Device Connection Side) - SMA Plug)





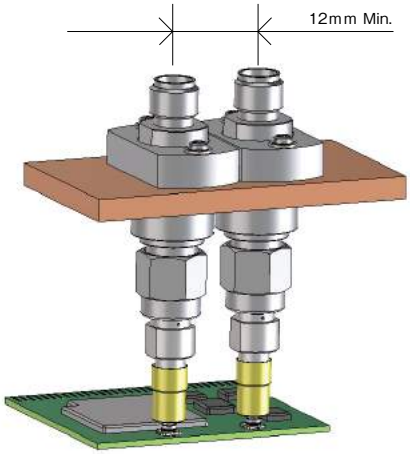
Part No.	HRS No.	Purchase Unit
HRM-PA-PJ(F)-1(40)	CL0323-0805-9-40	20pcs per bag

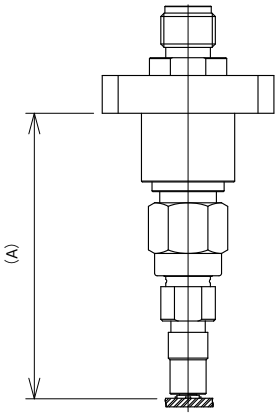
Note : HRMJ-E.FLP-5(40) aborbs misalignment when it is mated with the plug (coupling side) and the jack is connected to the measuring device.

Inspection Probe

HRMJ-E.FLP-5(40) and HRM-PA-PJ(F)1(40) Combination and Usage

Shortest Pitch when Adjacent





Flange to Board Surface	(A)
Recommendation for Measurement	32.8± 0.2
Starting Load	33.5

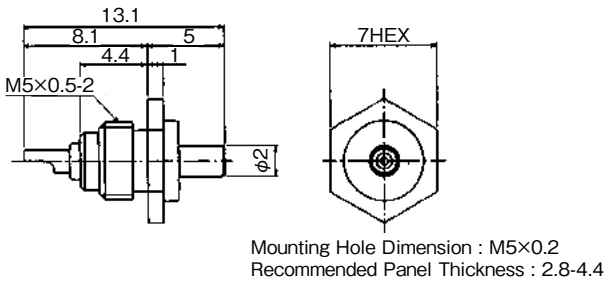
Note : For the inspection probe, be careful not to tilt the tip of the contact due to the tensile load of the connecting cable.

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Inspection Receptacle

Receptacle for testing the conduction, withstanding voltage, etc. of the cable assembly.





Mounting Hole Dimension : M5×0.2
Recommended Panel Thickness : 2.8-4.4

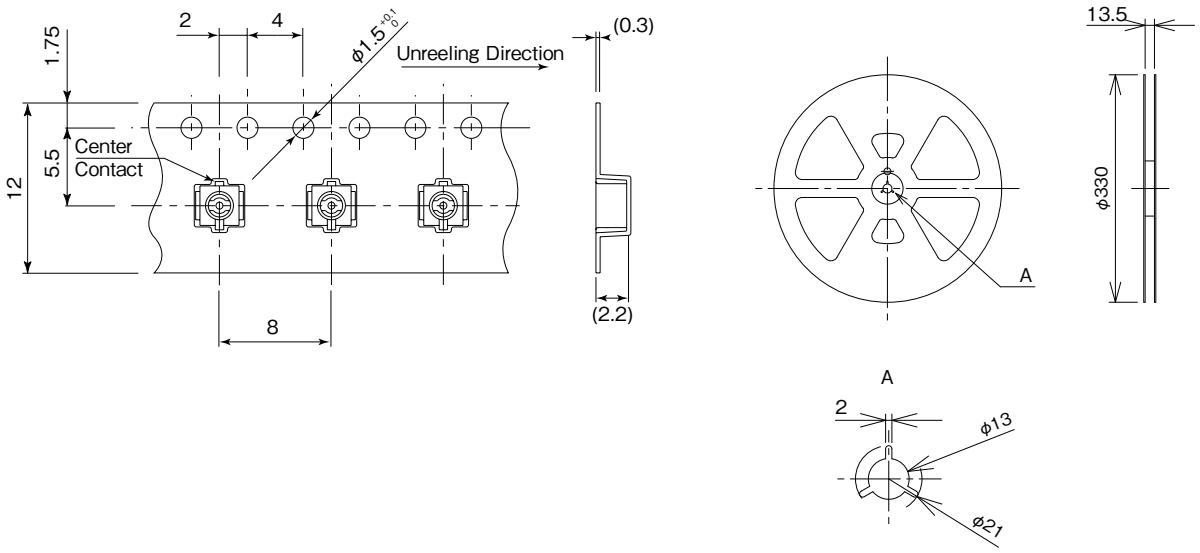
Part No.	HRS No.	Purchase Unit
E.FL-R-1	CL0331-0416-1-00	20pcs per bag

Note : Product cannot be used for purposes other than conduction or withstanding voltage inspection because there is no lock on the mated portion.

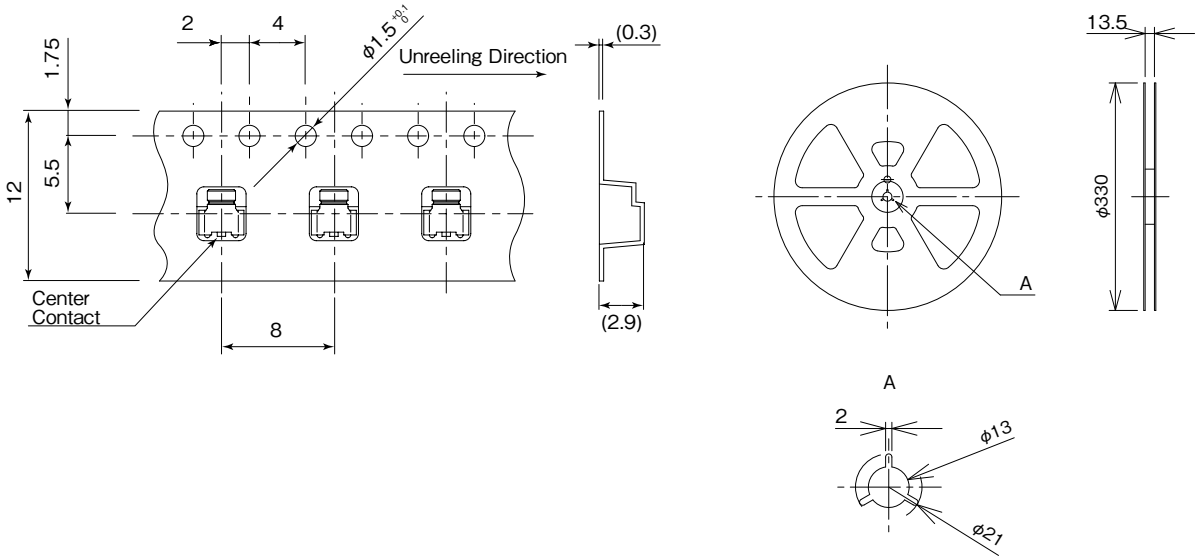
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Embossed Carrier Tape Dimensions (JIS C 0806/IEC 60286)

Straight Receptacle



Right Angle Receptacle

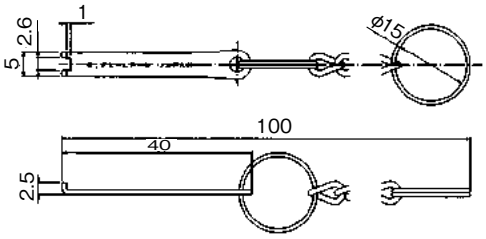


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Extraction Tool

Tool for Unmating.





Part No.	HRS No.	Purchase Unit
E.FL-LP-N	CL0331-0441-9-00	1pc per bag

Usage Precautions

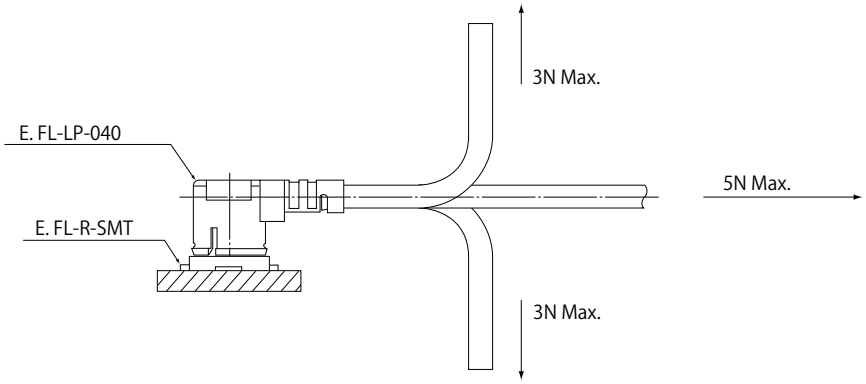
1. Plugs

(1) Mating/ Unmating

①To disconnect the connector, insert the extraction tool (E.FL-LP-N) under the connector flange. Pull in a perpendicular direction in line with the connector's mating axis. When removing the connector directly, hold the connector lid and pull out vertically in relation to the connector mating axis. Do not unmate the plug by pulling on the cable, this can damage the connector performance.

②When mating, align the mating axes between the receptacle and cable assembly, and insert the cable assembly downward and perpendicular into the receptacle. Do not insert the cable assembly at a slanted angle.

(2) Tolerable Load to a Cable After Mating

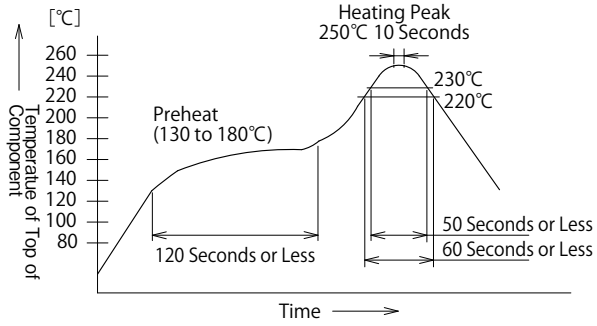


(3) Precautions

Do not use excessive prying to mate or un-mate the connectors as it may lead to damage.

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2. Receptacles

(1)Recommended Reflow Temperature Profile	 1. Temperature refers to the temperature of the PCB surface at the terminal leads. 2. Reflow soldering should be performed at a printed circuit surface temperature of 250℃ Max. 3. The temperature profile may vary depending on board size, solder used and solder thickness.
(2)Recommended Manual Soldering Conditions	Manual soldering : 350℃ for 5 seconds
(3)Recommended Metal Mask Thickness	0.1 to 0.12mm
(4)Reflow Cycles	2 times

3. Operating Environment and Storage Conditions

(1)Operation Environment

This product was designed for use in a normal environment.
Please be advised that using this product in the environments described below may result in discoloration and other types of degradation.
・Exposure to excessive amounts of fine particles and dust.
・Regions/areas with a high concentration of gases like sulfur dioxide, hydrogen sulfide and nitrogen dioxide.
・Areas with drastic temperature changes, such as locations near a heater.

(2)Storage Conditions

Store this product in Hirose's packaging or similar conditions.
Temperature : -10 to +40℃ Humidity : 85% or less (recommended storage conditions)
We recommend the product be used within six months from delivery.
Products that have been stored beyond the recommended storage period need to be tested for mounting and solderability before use.

(3)Silver Plating Discoloration

Discoloration occurs only on the plating surface. Since the contact portion is wiped, there is no effect on the electrical contact.

While Taking into Consideration

Specifications mentioned in this catalog are reference values.
When considering to order or use this product, please confirm the Drawing and Product Specifications sheets.
Use an appropriate cable when using the connector in combination with cables.
If considering usage of a non-specified cable, please contact your sales representative.
If assembly process is done by jigs & tools which are not identified by Hirose, assurance will not be given.
If considering usage for below mentioned applications, please contact your sales representative.
In cases where the application will demand a high level of reliability, such as automotive, medical instruments, public infrastructure, aerospace/ defense etc. Hirose must review before assurance of reliability can be given.

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