

2mm Pitch, Multi functional Connector System. (Floating [Board-to-Board], Swing-Lock [Wire-to-Board], Short Pin)

DF59 Series



■ Features

1. Floating Structure (Board-to-Board)

The Board-to-Board connector can be used to connect multiple boards together in a co-planar arrangement and features a “Stress free contact” that floats $\pm 0.5\text{mm}$ in the X, Y and Z dimensions.

2. Swing Lock Structure (Wire-to-Board)

The DF59 features a “swing-lock” mechanism that employs both a positive and friction lock. This helps to prevent the cable assembly from unmating by severe wiring and mechanical stress.

3. Short-Circuit Pin Connector

The Short-Circuit Pin connector allows the termination of an open circuit. Typically used at the end of a series of connected circuit boards.

4. Multi Function Design

The DF59 has the ability to function as either a Board-to-Wire or Board-to-Board System. The PCB mounted receptacle is designed to mate with the B-to-W, B-to-B, and Short Circuit Pin connectors. This multi function ability allows versatility while keeping connectors to a minimum.

5. Performance and Space Savings

The DF59 series offers high performance in a compact, space saving design; featuring a 2mm pitch and coupled with a mated height of only 2.48mm with AWG#22 cable. The single position floating plugs DF59S and DF59SN are specifically designed to save space, and can be mounted in high density applications.

6. Contact Design

The terminal design features two points contact to ensure a highly reliable connection.

7. High Operating Temperature

DF59's are rated at temperatures up to 105 °C.

8. Common Applicator

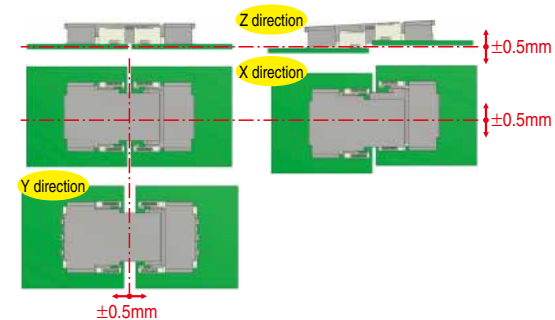
Crimping can be performed using the applicator (AP105-DF11-22S) for the existing series DF11-22S C F(A), by replacing the die with the one for DF59 series.

* For crimping quality standards and crimping conditions, crimping needs to be performed in accordance with the specific conditions of DF59-22PCFA.

◆ Floating Structure in Three Axial Directions (Board-to-Board Structure)



DF59 floating amount $\pm 0.5\text{mm}$ (X,Y, Z directions)



DF59S/SN floating amount

$\pm 0.5\text{mm}$ (X,Y direction), $\pm 0.2\text{mm}$ (Z direction)

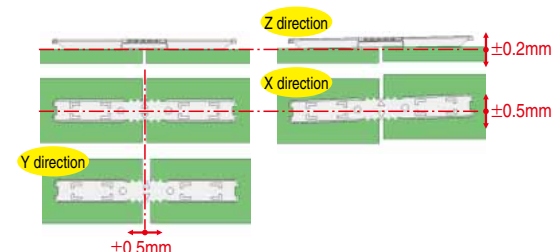


Fig.1

◆ Swing-Lock Structure (Board-to-Wire Structure)

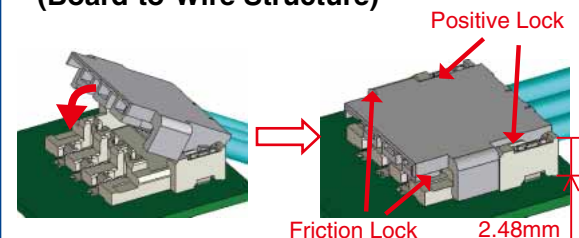


Fig.2

◆ Short Pin Connector

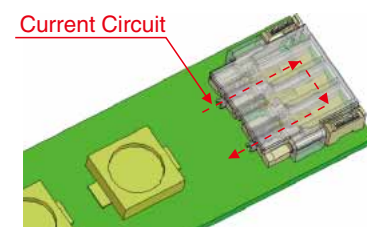


Fig.3

Product Specifications

Ratings	Current rating	3A	Operating Temperature Operating Humidity Range	-35-105°C 20-80%	(Note 1)
	Voltage rating	AC/DC 230V AC/DC 350V (Without the central contact)	Storage Temperature Range Storage Humidity Range	-10-60°C 40-70%	(Note 2) (Note 2)

Items	Specifications	Conditions
1. Insulation resistance	Over 1000MΩ	Measured at DC 500V
2. Withstanding voltage	No flashover or breakdown	AC650V / minute.
3. Contact resistance	50mΩ max. (DF59-*P-2FC/SP, DF59S/SN-1P-FC) 30mΩ max. (DF59-*P-2C)	Under 6V DC, must be Measured by 100mA (DC or 1000Hz)
4. Vibration	No electrical discontinuity over 1μs.	Frequency 10-55Hz, single amplitude 0.75mm, 3 directions, 10 cycles each
5. Shock	No electrical discontinuity over 1μs.	Acceleration 490 m/s ² , 11ms; duration, sine half-wave 3 cycles in each of the 3 axis.
6. Humidity	■ Contact resistance 50mΩ max. (DF59-*P-2FC/SP, DF59S/SN-1P-FC) 30mΩ max. (DF59-*P-2C) ■ Insulation resistance 1000MΩ min.	Temperature 40 ± 2°C, humidity 90-95%, left for 96 hours
7. Temperature cycle	■ Contact resistance 50mΩ max. (DF59-*P-2FC/SP, DF59S/SN-1P-FC) 30mΩ max. (DF59-*P-2C) ■ Insulation resistance 1000MΩ min.	(-55°C: 30 min. → 5-35°C: 2-3 min. → 85°C: 30 min. → 5-35°C: 2-3 min.) 5 cycles
8. Operating Life	■ Contact resistance 50mΩ max. (DF59-*P-2FC/SP, DF59S/SN-1P-FC) 30mΩ max. (DF59-*P-2C)	■ Number of insertion and withdrawal force 30 times (DF59-*P-2FC/C) 10 times (DF59-*P-2SP, DF59S/SN-1P-FC)
9. Resistance to soldering heat	No solubility of resin which affect the item's performance.	Reflow: Depends on recommended temperature profile. Hand soldering: Soldering iron temperature 350 ± 10°C, 3 sec.

(Note 1) Including temperature rise caused by current flow.

(Note 2) The term "storage" refers to products stored for long period of time prior to mounting and use.

Operating temperature and humidity range covers connectors after installation, storage, shipment or during transportation.

Materials

Items		Parts	Materials	Treatment	UL Specification
Receptacle	DF59	Insulator	LCP	Natural	UL94V-0
		Contact	Phosphor bronze	Gold plated	_____
	DF59S	Contact	Phosphor bronze	Tin plated	
Floating plug	DF59	Insulator	PBT	White	UL94V-0
		Contact	Brass	Gold plated	_____
	DF59S	Insulator	LCP	Natural	UL94V-0
		Contact	Brass	Tin plated	_____
	DF59SN	Insulator	LCP	Natural	UL94V-0
		Contact	Brass	Tin plated	_____
Short pin		Insulator	PBT	White	UL94V-0
		Contact	Brass	Gold plated	_____
Crimp case		Insulator	PBT	White	UL94V-0
Crimp contact		Contact	Phosphor bronze	Gold plated	_____

Ordering Information

Please refer to the ordering information below for each connector type

Receptacle

DF 59 # - * S - 2 V

① ② ③ ④ ⑤ ⑥ ⑦

① Series Name: DF	⑤ Type of connector S: Receptacle
② Series No.: 59	
③ None: Standard S: Single contact type (Applied connector DF59S/SN-1P-FC)	⑥ Pitch: Standard 2mm (4mm: Without the central contact) Single contact type Blank
④ Number of contacts: 2, 3, 4 (Standard) 1 (Single contact type)	⑦ Termination form V: SMT straight type

Floating plug

DF 59 # - * P - 2 FC

① ② ③ ④ ⑤ ⑥ ⑦

① Series Name: DF	⑤ Type of connector P: Plug
② Series No.: 59	
③ None: Standard S: Single contact type SN: Single contact slim type	⑥ Pitch: Standard 2mm (4mm: Without the central contact) Single contact type Blank Single contact slim type Blank
④ Number of contacts: 2, 3, 4 (Standard) 1 (Single contact type, Single contact slim type)	⑦ Termination form FC: Floating

Short pin

DF 59 - * P - 2 SP

① ② ③ ④ ⑤ ⑥

① Series Name: DF	⑤ Pitch: 2mm
② Series No.: 59	⑥ Termination form SP: Short Circuit pin
③ Number of contacts: 2, 3	
④ Type of connector P: Plug	

Crimp Socket

DF 59 - * P - 2 C

① ② ③ ④ ⑤ ⑥

① Series Name: DF	⑤ Pitch: 2mm
② Series No.: 59	⑥ Termination form C: Crimp Housing
③ Number of contacts: 2, 3, 4	
④ Type of connector P: Plug	

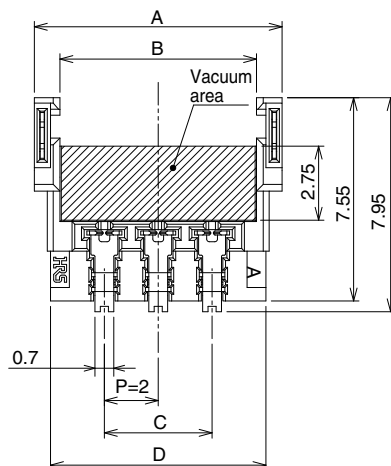
Crimp contact

DF 59 - 22 PCFA

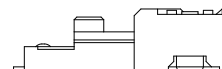
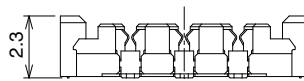
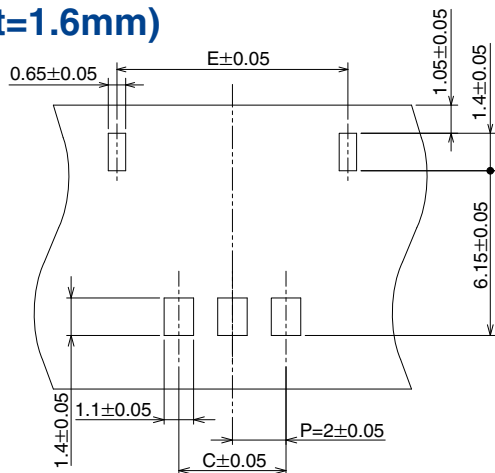
① ②

① Applicable Wire Size 22: AWG#22	② Form Type/Package Type PCFA: Crimp plug contact = Reel PCA: Crimp plug contact = Bulk Crimp contacts are required on the DF59-*P-2C part.
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■Straight Receptacle (SMT)



◆Recommended PCB Dimensions (t=1.6mm)



[Specification No.]

(51): Gold plating, emboss packaging

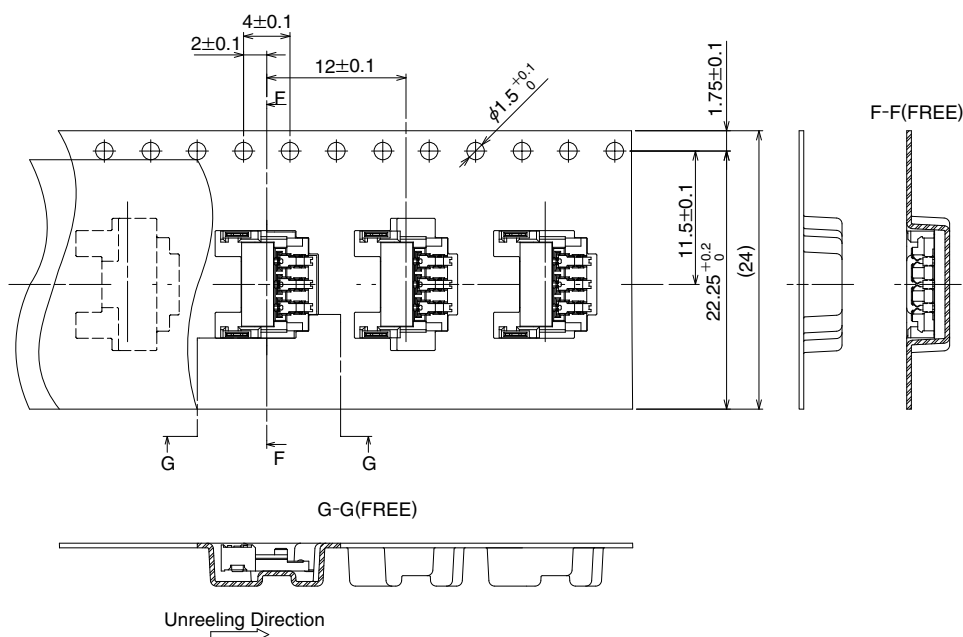
Unit : mm

Part No.	HRS No.	No. of contacts	A	B	C	D	E
DF59-2S-2V(51)	667-0001-0 51	2	7.2	5.3	2.0	6.0	6.62
DF59-3S-2V(51)	667-0002-3 51	3	9.2	7.3	4.0	8.0	8.62
DF59-4S-2V(51)	667-0003-6 51	4	11.2	9.3	6.0	10.0	10.62
DF59-2S-4V(51)	667-0021-8 51	2*	9.2	7.3	4.0	8.0	8.62

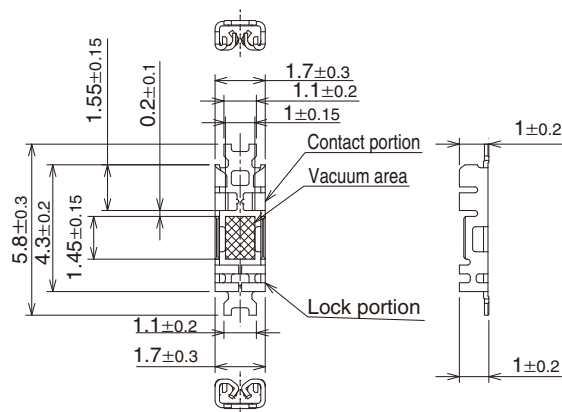
* DF59-2S-4V(51) is made by removing the middle pin of DF59-3S-2V(51) at the factory.

(Note) Please order in full reel quantities. (2,000 pcs/reel)

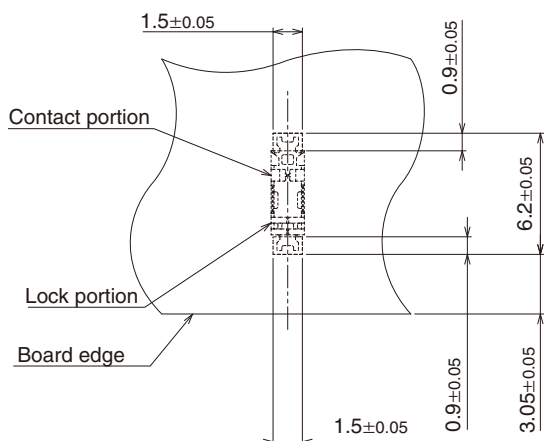
●Carrier Tape Dimensions



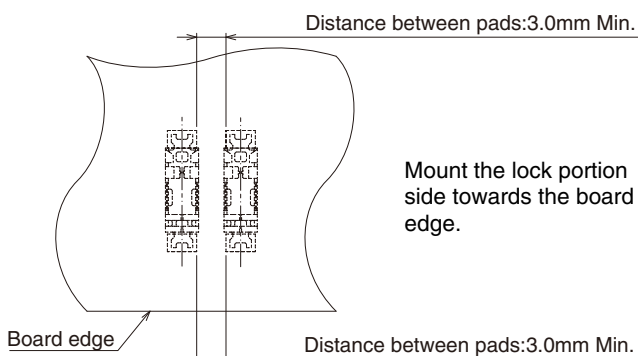
Single Contact Type Straight Receptacle (SMT)



Recommended PCB Dimensions (t=1.6mm)



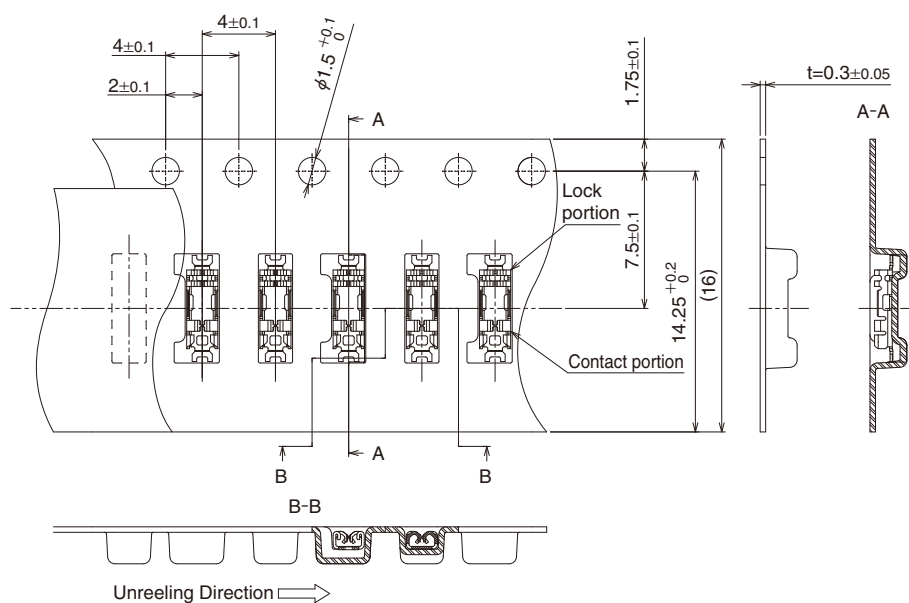
Recommended PCB Layout for parallel positioning



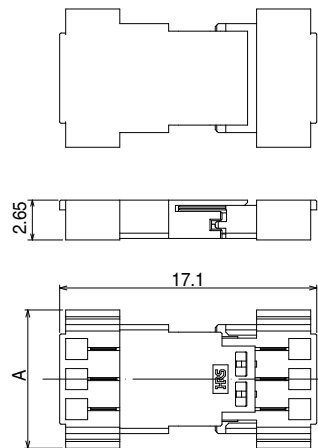
Part No.	HRS No.	[Specification No.]
DF59S-1S-V(21)	667-0024-6 21	(21): Tin plating, emboss packaging

(Note) Please order in full reel quantities. (10,000 pcs/reel)

Carrier Tape Dimensions



■ Floating plug



[Specification No.]
(50): Gold plating,
tray packaging

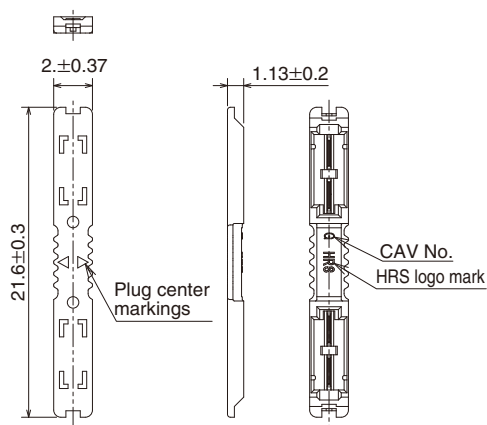
Unit : mm

Part No.	HRS No.	No. of contacts	A	B	Packaged Quantity/Tray
DF59-2P-2FC(50)	667-0006-4 50	2	7.2	2.0	50
DF59-3P-2FC(50)	667-0007-7 50	3	9.2	4.0	
DF59-4P-2FC(50)	667-0008-0 50	4	11.2	6.0	
DF59-2P-4FC(50)	667-0020-5 50	2*	9.2	4.0	

*DF59-2P-4FC(50) is made by removing the middle pin of DF59-3P-2FC(50) at the factory.

(Note) Please order in full tray quantities. (50 pcs/tray)

■ Single contact type floating plug



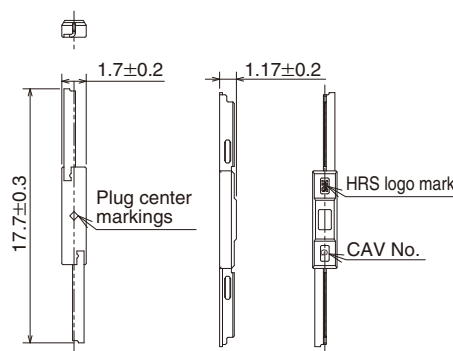
Part No.	HRS No.
DF59S-1P-FC(21)	667-0023-3 21

[Specification No.]

(21): Tin plating, emboss packaging

(Note) Please order in full reel quantities. (10,000 pcs/reel)

■ Single contact slim type floating plug



Part No.	HRS No.
DF59SN-1P-FC(21)	667-0028-7 21

[Specification No.]

(21): Tin plating, emboss packaging

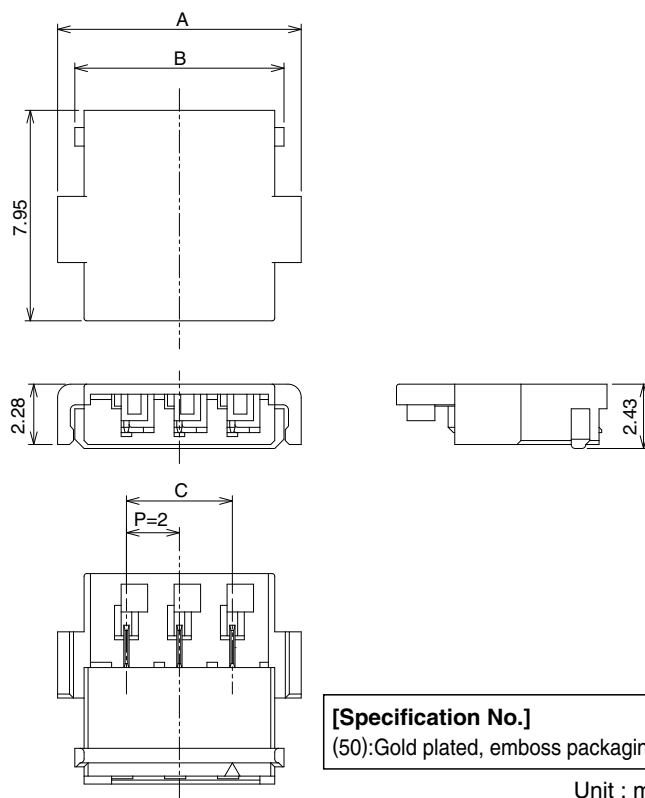
(Note) Please order in full reel quantities. (10,000 pcs/reel)

(Note) Use the special (DF59SN-1P-FC/IN-TOOL) tool for connector insertion.

◆ Insertion Tool

Part No.	HRS No.
DF59SN-1P-FC/IN-TOOL	667-0040-2 00

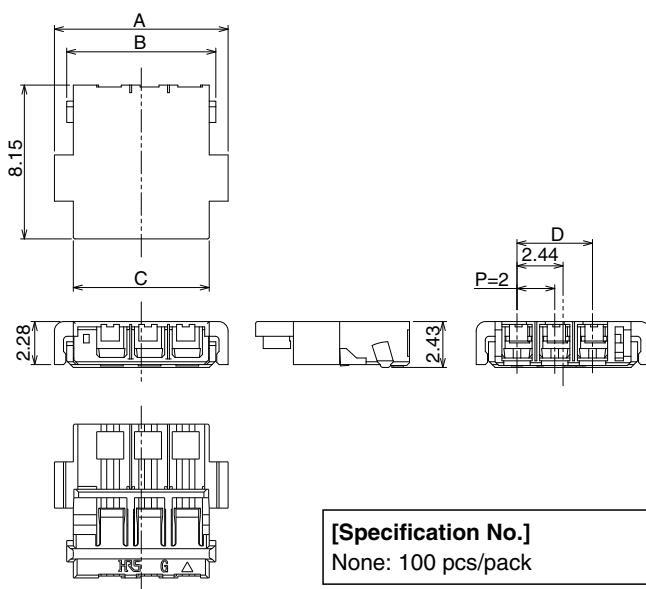
Short pin



Part No.	HRS No.	No. of contacts	A	B	C	Packaged Quantity/Tray
DF59-2P-2SP(50)	667-0017-0 50	2	7.2	5.9	2.0	100
DF59-3P-2SP(50)	667-0018-3 50	3	9.2	7.9	4.0	

(Note) Please order in full tray quantities. (100 pcs/tray)

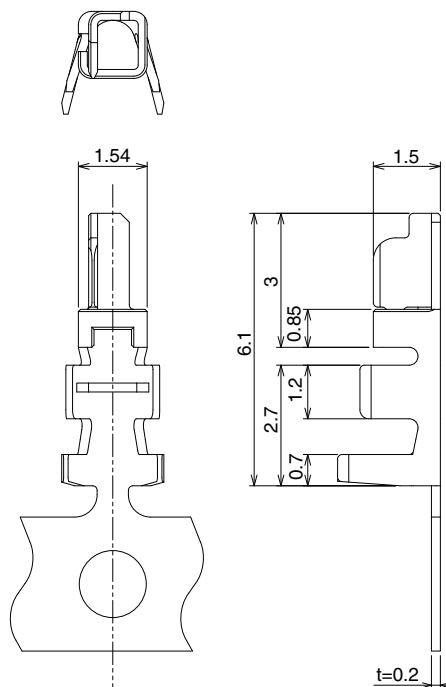
Crimp Socket



Part No.	HRS No.	No. of contacts	A	B	C	D
DF59-2P-2C	667-0011-4 00	2	7.2	5.9	5.2	2.0
DF59-3P-2C	667-0012-7 00	3	9.2	7.9	7.2	4.0
DF59-4P-2C	667-0013-0 00	4	11.2	9.9	9.2	6.0

(Note) Please order in full pack quantities. (100 pcs/pack)

■ Crimp contact



Part No.	HRS No.	By Type	Quantity	Treatment
DF59-22PCFA	667-0016-8 00	Reel contact (Note 1)	10,000 contacts / reel	Gold plated
DF59-22PCA	667-0022-0 00	Bulk contact (Note 2)	100 contacts / pack	

(Note1) Please order reel contacts by full reel quantities. (10,000 pcs/reel)

(Note2) Please order loose piece contacts in full pack. (100 pcs/pack)

● Applicable Wire (Tin plated soft copper wire)

Conductor Size (Wire Constitution)	Jacket Diameter
AWG#22 (17 / ϕ 0.16mm)	UL1061 (ϕ 1.26mm)
	UL3265(ϕ 1.38mm)

(Note) Please contact your nearest Hirose Sales Representative for information regarding compatible wire Remarks: Please consult with our sales representative when using wires other than applicable wire.

● Recommended Wire

UL1061, UL3265

● Strip Length

1.7-2.3mm

◆ Applicable Crimping Tool

Types	Part No.	HRS No.	Applicable Contact
Applicator	AP105-DF59-22P	901-4619-8 00	DF59-22PCFA
Press Unit	CM-105	901-0005-4 00	-
Hand Tool	HT801/DF59-22P	902-4638-9 00	DF59-22PCA
Extraction Tool	DF-C-PO(B)	550-0179-2 00	DF59-22PCFA DF59-22PCA

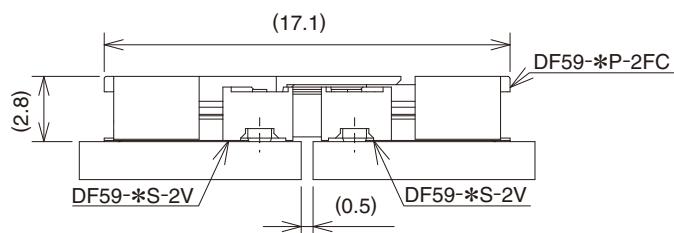
It is possible to use tooling from the AP105-DF11-22S applicator. Certain parts will need the be changed out. Please contact Hirose for details.

Note: Customers are strongly encouraged to utilize HRS application tooling or tooling created by a Hirose tooling partner. Hirose assumes no liability for customers using tooling from non-recognized sources.

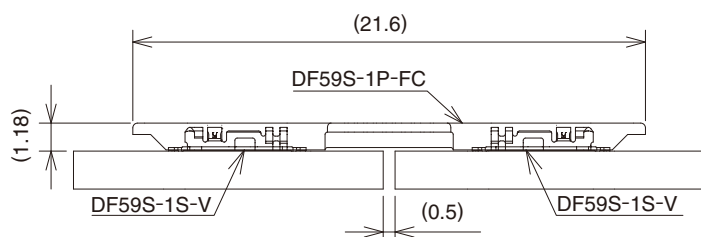
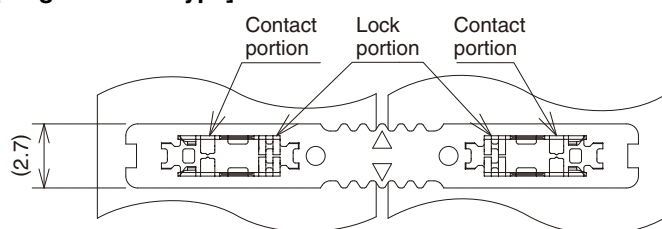
◆ Mating Dimensions

● Board-to-board connection (floating plug)

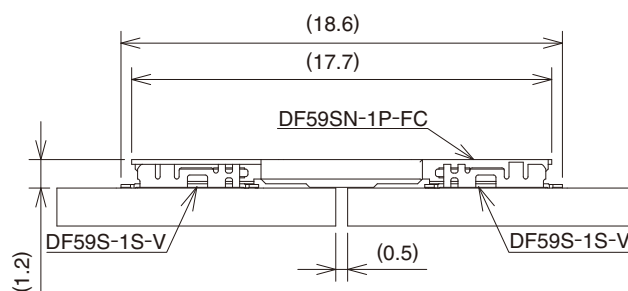
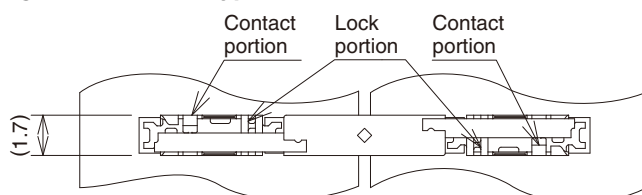
[Standard]



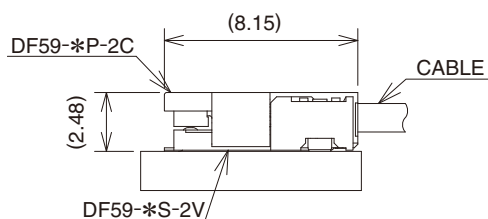
[Single contact type]



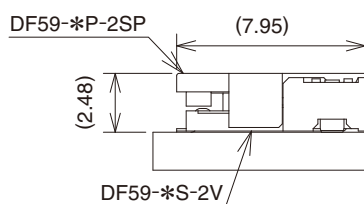
[Single contact slim type]



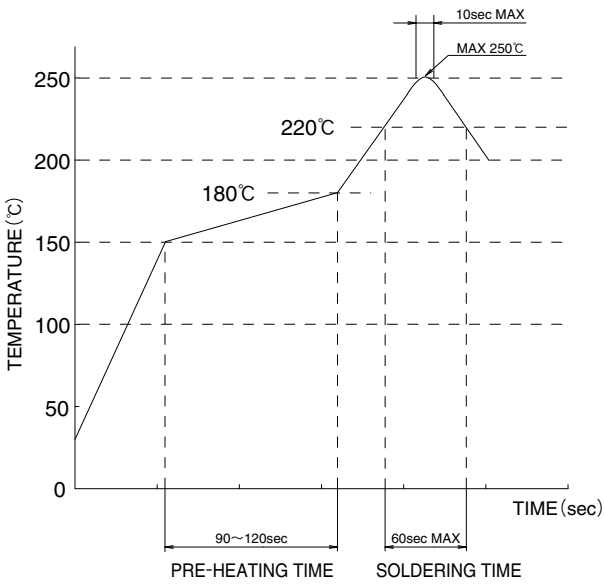
● Wire-to-board connection



● Short-circuit pin connection



◆ Operating Precautions

1. Recommended Temperature Profile (Lead-free soldering possible)	 [Applicable Conditions] 1. Peak Temperature: MAX 250°C 2. Heated Area: 220°C or above, within 60 sec. 3. Pre-heating Area: 150-180°C, 90-120 sec. 4. Number of Times: within 2 times *Measured at contact lead area Please be noted that the reflow condition may vary depending on soldering paste type, manufacturer of soldering material, board size, as well as conditions of other mounting materials. (*1) Above temperature profile is our recommended value.
2. Recommended Hand Solder Conditions	Soldering iron temperature: $350 \pm 10^{\circ}\text{C}$, soldering time: within 3 seconds
3. Recommended Screen Thickness, Open Ratio (Pattern Area Ratio)	Thickness 0.1 mm, Open ratio: 100%
4. Warpage of PC board	Maximum of 0.02mm at the connector center, with both ends of the connector as reference points.
5. Cleaning Condition	Cleaning with IPA is possible. (Cleaning is not recommended. In case of cleaning, please evaluate if it causes a decrease in the performance which includes mechanical operation and environmental resistance.)
6. Precautions	■ When inserting crimp-type (solderless) terminals to crimping (solderless) sockets, to maintain reliable performance, please do not insert obliquely. ■ DO NOT mate/un-mate a non-terminated plug with a non-mounted receptacles. This may lead to damage or deformation of the contacts. ■ Please note that pulling on the wires or cable during un-mating may cause damage. ■ DO NOT apply flux to the contact terminals when hand soldering the receptacle to the board. Flux can wick into the electrical contact areas and may lead to connection failures. ■ Slight discoloration on the insulating materials will not affect form, fit or function of the connectors. ■ For operating suggestions on insertion and removal, please refer to the "DF59 Insertion and Removal Manual", "DF59S Insertion and Removal Manual", "DF59SN Insertion and Removal Manual" ■ Please refer to the documents "Cable assembly procedure", "Crimp condition" and "Crimp quality standard" for the cable assembly procedures.

MEMO :

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