0.5 mm and 1 mm Pitch, 2.55 mm Height FPC/FFC Connectors

FH28 Series



Features

1. Highly reliable connection and robust structure

Multi-polarized connectors, reinforced body structure and high FPC retention produced by the following features: Reliable connection created by its unique FPC/FFC positioning mechanism

Prevents accidental disengagement with the design of its proprietary structure

2. Simplified operations

The flip lock structure makes it easier to engage/disengage the actuator and reduces the required force needed to operate. A clear tactile click is delivered upon the successful completion of the mating process.

3. Increased FPC/FFC retention force

Vertical retention force for the FPC/FFC is 2.5 times stronger than our 0.5 mm pitch connector the FH12 series. Horizontal retention force for the FPC/FFC is 2 times stronger than our 0.5 mm pitch connector the FH12 series

*To realize the horizontal retention force values, the use of the FPC positioning tabs are required. FPC without the positioning tabs will comply with the specifications rated on the FH12 series.

4. Accepts standard 0.3 mm thick FPC/FFC

It accepts 0.3 mm thick products that are easy to manufacture and have superb insertion performance.

5. Fully molded structure aids PCB layout

The bottom of this connector is enclosed by a fully molded structure that protects the contacts and removes any restrictions from PCB patterning and design.

Supports automatic pick-n-place mounting Offered in tape and reel packaging that is compatible with

automatic machine mounting. (2,000 pieces per reel)

7. Halogen-free

All materials and substances used to produce this product comply with Halogen-free standards.*Defined according to IEC61249-2-21. Br: 900 ppm maximum, Cl: 900 ppm maximum, Br+Cl: 1,500 ppm maximum

8. Multiple packing options

The standard packaging is 2,000 pieces per reel, but it is also offered in a 500 piece reel. (The outer diameter of the reel will be ϕ 330 mm in this case.)



The FPC positioning mechanism and FPC tabs help to guide and hold the FPC prior to engaging the actuator



Can also be used with straight sided, non-tabbed FPC/FFC



Product Specifications

Ratings	Rated Current 0.5 A (Note 1) Rated Voltage AC 50 Vrms	Operating Temperature Range -40 \sim +85°C (Note 2) Operating Humidity Range Relative humidity 90% or less (no condensation shouldbe present)		$\begin{array}{l} \mbox{Storage Temperature Range} \\ -10 \sim +50 \mbox{°C} \mbox{ (Note 3)} \\ \mbox{Storage Humidity Range} \\ \mbox{Relative humidity 90\% or less (no condensation should be present)} \end{array}$		
Adaptive FPC/FFC contact specifications	t= 0.3 ±0.05 Gold p	ating				
Item	Specific	cation		Conditions		
1. Insulation Resistance	Minimum of 500 $M\Omega$		Measured with I	DC 100 V		
2. Withstanding Voltage	No flashover or break	down	AC 150 Vrms is	applied for one minute.		
3. Contact Resistance	Maximum of 50 mΩ *including FPC/FFC	conductor resistance	Measured at 1mA (DC or 1,000Hz)			
4. Durability	Contact Resistance: No damaged, cracked	Maximum of 50 mΩ d or looseness of parts	20 mating cycles			
5. Vibration Resistance	Contact Resistance: N	nuity of 1 μ s or greater Maximum of 50 m Ω and looseness of parts		Frequency: 10 to 55Hz Single amplitude of 0.75mm for 10 cycles in 3 axial directions		
6. Shock Resistance	No electric discontinu Contact Resistance: N No damaged, cracked			981m/s², 6ms duaration, sine half-wave cles in each of the 3 axis		
7. Humidity Resistance of Steady State	Contact Resistance: N Insulation Resistance No damaged, cracked		96 hours at temperature: $40^\circ C$ and humidity: 90 to 95%			
8. Temperature Cycles	Contact Resistance: N Insulation Resistance No damaged, cracked		inimum of 50 MΩ Time: $30 \rightarrow 2$ to $3 \rightarrow 30 \rightarrow 2$ to 3 minutes			
9. Solder Heat Resistance	Should not have exter parts	rnal deformity or loose	Reflow: according to the Recommended Temperature Profile Hand solder: 350 $\pm5^\circ\!\!C$ for 5 seconds			

(Note 1) When energizing rated current to all contacts, use 70% of rated current.

(Note 2) Includes temperature rise caused by current flow.

(Note 3) The term "storage" here refers to products stored for a long period prior to board mounting and use. The operating temperature and humidity range covers the non-energized condition of connectors after board mounting and the temporary storage.

Materials

Component	Materials	Color/Finish	Remarks
Inculator	LCP	Gray	
Insulator	LCP	Black	UL94V-0
Contact	Phosphor bronze	Gold plating	
Metal fitting	Brass	Pure tin plating	

Product Number Structure

Refer to this page when determining product specifications by model types. Please place orders with part numbers listed in this catalog. The characteristics and specifications of the product described in this catalog are reference values. Please make sure to check the latest delivery specifications at the time of product use.

FH 28 D - 50 (25) S B - 0.5 SH (05)

		5	6 7 8 9 0		
1	Series Name: FH	6	Contact arrangement: Single (single row)		
2	Series No.: 28 C Eccentric direction: BlankStandard type (without eccer BEccentric type (contacts on the opposite side of polar				
8	None, D: Standard type E: Long reinforcing fitting type H: Space-saving type	8	Contact Pitch: 0.5 mm, 1 mm		
4	Standard type: The number of contacts Eccentric type: Number of contacts in 0.5mm housing	9	Mounting direction, SHSMT horizontal mounting type		
6	Standard type: Blank Eccentric type: Actual number of pins	1	 Specification: (05)Gold plating, 2,000 pieces per reel (10) Specification:Partial gold plating, 2,000 pieces per reel (07)Gold plating (for 40 contact only.), 2,000 pieces per reel (98)Gold plating, 500 pieces per reel 		

Connector Dimensions



[Standard type] 0.5 mm pitch product

Notes 1 The coplanarity of the metal fitting and contact is 0.1 MAX.

- $|2\rangle$ The contact lead position shows the dimension from the E surface of the case bottom.
- 3 This product is sold in embossed, tape and reel packaging. For details on this product please refer to the "Packaging Specifications"located on page 9.
- Recesses in part structure may be added to improve molding characteristics. 4 Black marks may appear in the mold resin, but they will not negatively affect the performance of these connectors.
- 5 The color of the plating may change after the reflow process, but it will not negatively affect the performance of these connectors.

Connector dimension table [Standard type]

Connector dimension table [Standard type]									
Part No.	HRS No.	No. of Contacts	А	В	С	D			
FH28-10S-0.5SH(**)	CL586-1861-4-**	10	4.5	9.9	5.57	9.58			
FH28-15S-0.5SH(**)	CL586-1868-3-**	15	7	12.4	8.07	12.08			
FH28D-20S-0.5SH(**)	CL586-1823-5-**	20	9.5	14.9	10.57	14.58			
FH28D-28S-0.5SH(**)	CL586-1835-4-**	28	13.5	18.9	14.57	18.58			
FH28D-30S-0.5SH(**)	CL586-1827-6-**	30	14.5	19.9	15.57	19.58			
FH28-40S-0.5SH(**)	CL586-1803-8-**	40	19.5	24.9	20.57	24.58			
FH28-45S-0.5SH(**)	CL586-1848-6-**	45	22	27.4	23.07	27.08			
FH28D-50S-0.5SH(**)	CL586-1808-1-**	50	24.5	29.9	25.57	29.58			
FH28D-55S-0.5SH(**)	CL586-1821-0-**	55	27.0	32.4	28.07	32.08			
FH28-60S-0.5SH(**)	CL586-1811-6-**	60	29.5	34.9	30.57	34.58			
FH28D-64S-0.5SH(**)	CL586-1813-1-**	64	31.5	36.9	32.57	36.58			
FH28D-68S-0.5SH(**)	CL586-1819-8-**	68	33.5	38.9	34.57	38.58			
FH28D-74S-0.5SH(**)	CL586-1828-9-**	74	36.5	41.9	37.57	41.58			

(Note 1) This product is sold in embossed, tape and reel packaging. This product is sold in full reel quantities of either 2,000 or 500 piece reels. Please place orders by full reel quantities.

Connector Dimensions

[Standard type] 1 mm pitch product



Notes 1 The lead flatness of metal fitting and contact is 0.1 MAX.

- $\boxed{2}$ The contact lead position shows the dimension from the E surface of the case bottom.
- 3 This product is sold in embossed, tape and reel packaging. For details on this product please refer to the "Packaging Specifications" located on page 9.
- 4 Recesses in part structure may be added to improve molding characteristics Black marks may appear in the mold resin, but they will not negatively affect the performance of these connectors.
- 5 The color of the plating may change after the reflow process, but it will not negatively affect the performance of these connectors.

Linit[.] mm

Connector dimension table [Standard type]

		-				Onit. min
Part No.	HRS No.	No. of Contacts	А	В	С	D
FH28D-20(10)SB-1SH(**)	CL586-1863-0-**	10	9	14.9	10.57	14.58
FH28D-30(15)SB-1SH(**)	CL586-1860-1-**	15	14	19.9	15.57	19.58
FH28-40(20)SB-1SH(**)	CL586-1832-6-**	20	19	24.9	20.57	24.58
FH28D-50(25)SB-1SH(**)	CL586-1817-2-**	25	24	29.9	25.57	29.58
FH28-60(30)SB-1SH(**)	CL586-1818-5-**	30	29	34.9	30.57	34.58
FH28D-64(32)SB-1SH(**)	CL586-1852-3-**	32	31	36.9	32.57	36.58
FH28D-68(34)SB-1SH(**)	CL586-1812-9-**	34	33	38.9	34.57	38.58

(Note 1) This product is sold in embossed, tape and reel packaging. This product is sold in full reel quantities of either 2,000 or 500 piece reels. Please place orders by full reel quantities.

Connector Dimensions

[Space-saving type]



Notes 1 The lead flatness of metal fitting and contact is 0.1 MAX.

- $|2\rangle$ The contact lead position shows the dimension from the E surface of the case bottom.
- 3 This product is sold in embossed, tape and reel packaging. For details on this product please refer to the "Packaging Specifications" located on page 9.
- Recesses in part structure may be added to improve molding characteristics 4 Black marks may appear in the mold resin, but they will not negatively affect the performance of these connectors.
- 5 The color of the plating may change after the reflow process, but it will not negatively affect the performance of these connectors.

Connector dimension table [Space-saving type]

Connector dimension table [Space-saving type]							
Part No.	HRS No.	No. of Contacts	А	В	С	D	
FH28H-80S-0.5SH(**)	CL586-1805-3-**	80	39.5	44.9	40.57	45.7	

(Note 1) This product is sold in embossed, tape and reel packaging. This product is sold in full reel quantities of either 2,000 or 500 piece reels. Please place orders by full reel quantities.

Recommended PCB layout and metal mask dimensions for 0.5 mm pitch products



Recommended FPC/FFC dimensions for 0.5 mm pitch products



Notes $\fbox{1}$ The stiffener needs to be a minimum of 0.188 (7.5 mil) thick.

Recommended PCB layout, metal mask and FPC dimensions for 0.5 mm pitch products

Part No.	HRS No.	No. of Contacts	F	G	н	J
FH28-10S-0.5SH(**)	CL586-1861-4-**	10	5.5	7.1	10.6	7
FH28-15S-0.5SH(**)	CL586-1868-3-**	15	8	9.6	13.1	9.5
FH28D-20S-0.5SH(**)	CL586-1823-5-**	20	10.5	12.1	15.6	12.0
FH28D-28S-0.5SH(**)	CL586-1835-4-**	28	14.5	16.1	19.6	16.0
FH28D-30S-0.5SH(**)	CL586-1827-6-**	30	15.5	17.1	20.6	17.0
FH28-40S-0.5SH(**)	CL586-1803-8-**	40	20.5	22.1	25.6	22.0
FH28-45S-0.5SH(**)	CL586-1848-6-**	45	23	24.6	28.1	24.5
FH28D-50S-0.5SH(**)	CL586-1808-1-**	50	25.5	27.1	30.6	27.0
FH28D-55S-0.5SH(**)	CL586-1821-0-**	55	28.0	29.6	33.1	29.5
FH28-60S-0.5SH(**)	CL586-1811-6-**	60	30.5	32.1	35.6	32.0
FH28D-64S-0.5SH(**)	CL586-1813-1-**	64	32.5	34.1	37.6	34.0
FH28D-68S-0.5SH(**)	CL586-1819-8-**	68	34.5	36.1	39.6	36.0
FH28D-74S-0.5SH(**)	CL586-1828-9-**	74	37.5	39.1	42.6	39.0
FH28H-80S-0.5SH(**)	CL586-1805-3-**	80	40.5	42.1	46.7	42.0

² The W dimension needs to be a minimum of 0.5 mm.

Recommended PCB layout and metal mask dimensions for 1 mm pitch products

Recommended metal mask thickness: t= 0.15



Recommended FPC/FFC dimensions for 1mm pitch products



Note 1 The stiffener needs to be a minimum of 0.188 (7.5 mil) thick. Note 2 The W dimension needs to be a minimum of 0.5 mm.

Recommended PCB layout, metal mask and FPC dimensions for 1 mm pitch products

						Unit: mm
Part No.	HRS No.	No. of Contacts	F	G	Н	J
FH28D-20(10)SB-1SH(**)	CL586-1863-0-**	10	10.5	12.1	15.6	12
FH28D-30(15)SB-1SH(**)	CL586-1860-1-**	15	15.5	17.1	20.6	17
FH28-40(20)SB-1SH(**)	CL586-1832-6-**	20	20.5	22.1	25.6	22
FH28D-50(25)SB-1SH(**)	CL586-1817-2-**	25	25.5	27.1	30.6	27
FH28-60(30)SB-1SH(**)	CL586-1818-5-**	30	30.5	32.1	35.6	32
FH28D-64(32)SB-1SH(**)	CL586-1852-3-**	32	32.5	34.1	37.6	34
FH28D-68(34)SB-1SH(**)	CL586-1812-9-**	34	34.5	36.1	39.6	36

FH28 Series FPC/FFC Material Configuration (Recommended Specifications)

1. Single-Sided FPC



FPC : Flexible Printed Circuit

Layer	Materials		Thickness (μ m)
Cover lay film	Polymide	1mil	(25)
Cover adhesive			(25)
Surface treatment	Under nickel plating 1~5	μ m+gold plating 0.2 μ m	3
Copper foil	Cu	1oz	35
Base adhesive	Heat stiffene	r adhesive	25
Base film	Polymide	1mil	25
Stiffener adhesive	Heat stiffene	r adhesive	30
Reinforcing film	Polymide	7mil	175
	Total		293

2. Double-sided FPC

FPC : Flexible Printed Circuit

	Layer	Materials	Thickness (µm)
\/////////////////////////////////////	Cover lay film	Polymide 1mil	(25)
	Cover adhesive		(25)
	Surface treatment	Under nickel plating 1~5 $\mu {\rm m}+$ gold plating 0.2 $\mu {\rm m}$	3
	Through hole copper	Cu	15
	Copper foil	Cu 1/2oz	18
	Base adhesive	Heat stiffener adhesive	18
	Base film	Polymide 1mil	25
▲	Base adhesive	Heat stiffener adhesive	18
TANANANANANANANANANANANANANANANANANANAN	Copper foil	Cu 1/2oz	(18)
	Cover adhesive	Heat stiffener adhesive	25
	Cover lay film	Polymide 1mil	25
	Stiffener adhesive	Heat stiffener adhesive	50
	Reinforcing film	Polymide 4mil	100
* Bemove the conner foil on the back of double-	sided EPC to avoid	Total	297

* Remove the copper foil on the back of double-sided FPC to avoid damage due to FPC bending.



FFC : Flexible Flat Cable

Layer	Materials	Thickness (μ m)
Polyester film		12
Adhesive	Polyester thermal plasticity	30
Annealed copper foil (Gold plated with under nickel plating)		35
Adhesive	Polyester type	30
Polyester		12
Adhesive	Polyester type	30
 Reinforcing film	Polyester type	188
	Total	295

Nominal thickness tolerance is approximately $\pm 20 \mu$ m.

1. These specifications are an example of the material configuration of an FPC/FFC (t= 0.3 ± 0.05) used on the FH28 series.

2. Please contact the FPC/FFC manufacturer for the material configurations of their FPC/FFC.

■Packaging Specifications

[Common specifications for FH28 Series]

•Embossed Carrier Tape Dimensions (with a maximum tape width of 24 mm)



Standard type (FH28, FH28D)

•Embossed Carrier Tape Dimensions (with a minimum tape width of 32 mm)



Standard type (FH28, FH28D)



Reel Dimensions



Packaging specification dimensions [standard type] for 0.5 mm pitch products

									Unit: mm
Part No.	HRS No.	No. of Contacts	К	L	M	N	Q	S	Т
FH28-10S-0.5SH(**)	CL586-1861-4-**	10	24		11.5	10.3	5.5	25.4	29.4
FH28-15S-0.5SH(**)	CL586-1868-3-**	15	24		11.5	12.8	8	25.4	29.4
FH28D-20S-0.5SH(**)	CL586-1823-5-**	20	24		11.5	15.3	10.5	25.4	29.4
FH28D-28S-0.5SH(**)	CL586-1835-4-**	28	32	28.4	14.2	19.3	14.5	33.4	37.4
FH28D-30S-0.5SH(**)	CL586-1827-6-**	30	32	28.4	14.2	20.3	15.5	33.4	37.4
FH28-40S-0.5SH(**)	CL586-1803-8-**	40	44	40.4	20.2	25.3	20.5	33.4	37.4
FH28-45S-0.5SH(**)	CL586-1848-6-**	45	44	40.4	20.2	27.8	23	45.4	49.4
FH28D-50S-0.5SH(**)	CL586-1808-1-**	50	44	40.4	20.2	30.3	25.5	45.4	49.4
FH28D-55S-0.5SH(**)	CL586-1821-0-**	55	44	40.4	20.2	32.8	28.0	45.4	49.4
FH28-60S-0.5SH(**)	CL586-1811-6-**	60	56	52.4	26.2	35.3	30.5	57.4	61.4
FH28D-64S-0.5SH(**)	CL586-1813-1-**	64	56	52.4	26.2	37.3	32.5	57.4	61.4
FH28D-68S-0.5SH(**)	CL586-1819-8-**	68	56	52.4	26.2	39.3	34.5	57.4	61.4
FH28D-74S-0.5SH(**)	CL586-1828-9-**	74	56	52.4	26.2	43.3	42.3	57.4	61.4

Packaging specification dimensions [standard type] for 1 mm pitch products

									Unit: mm
Part No.	HRS No.	No. of Contacts	К	L	M	Ν	Q	S	Т
FH28D-20(10)SB-1SH(**)	CL586-1863-0-**	10	24		11.5	15.3	10.5	25.4	29.4
FH28D-30(15)SB-1SH(**)	CL586-1860-1-**	15	32	28.4	14.2	20.3	15.5	33.4	37.4
FH28-40(20)SB-1SH(**)	CL586-1832-6-**	20	44	40.4	20.2	25.3	20.5	45.4	49.4
FH28D-50(25)SB-1SH(**)	CL586-1817-2-**	25	44	40.4	20.2	30.3	25.5	45.4	49.4
FH28-60(30)SB-1SH(**)	CL586-1818-5-**	30	56	52.4	26.2	35.3	30.5	57.4	61.4
FH28D-64(32)SB-1SH(**)	CL586-1852-3-**	32	56	52.4	26.2	37.3	32.5	57.4	61.4
FH28D-68(34)SB-1SH(**)	CL586-1812-9-**	34	56	52.4	26.2	39.3	34.5	57.4	61.4

■Packaging specification dimensions [Space-saving type]

										Unit: mm	
Part No.	HRS No.	No. of Contacts	К	L	М	Ν	Q	R	S	Т	
FH28H-80S-0.5SH(**)	CL586-1805-3-**	80	56	52.4	26.2	46.3	45.3	40.5	57.4	61.4	

Recommended soldering profile



Applicable Conditions

Reflow type	: Far red/hot air reflow
Reflow furnace atmosphere	e : Atmosphere
Soldering	: Cream type
	Sn/3.0Ag/0.5Cu
	(M705-221CM5-32-10.5 made
	by Senju Metal Industry Co.)
Testing PCB	: Glass epoxy 55×150×1.6 mm

Land/metal mask dimensions Our recommendation conditions

This solder profile is based on the conditions provided above.

Please check the mounting conditions before use, conditions such as solder paste types, manufacturer, PCB size and any other soldering materials may alter the performance of such materials.

RS

11

Operation Methods of Connector and Precautions



Cautions when mating FFFC/FPC with positioning tabs

Operation Methods Precautions for use 1. Position for insertion PC/FFC must not over lap Do not close the actuator until the FPC/FFC has been Insert the cable into the gap (.....) between the side walls placed into its correct position. If it is sitting on the guides >) on both sides of the cable insertion port' and the 'guide and the actuator closes onto it, it can cause damage and putting the tab of the cable on the gap. alter its performance. Incorrectly placed onto the left guide Incorrectly placed onto the right guide 2. Cautions during insertion/mating 1 Do not insert the FPC/FFC at an skewed angle (as shown), this type of action may cause the corner of the Normal insertion cable to get hooked and deform its contacts. Skwed insertion Do not close the actuator with the cable sitting on either guide. Insert the cable straight into the connector opening and hook the cable tab onto the guide. Pull the cable towards yourself with a slight force after mannan insertion, and close the actuator after confirming that the cable tab is completely secured. If it cannot be pulled to out, the cable can be determined to be inserted into the correct position. Recommended mating method In case you accidentally close the lock with the cable sitting on the guides, do not move the cable around to make it seat. Open the actuator immediately and reposition the Insert the cable cable as explained in "1. Position for insertion" noted straight from the above. diagonally left side 2 Pull the cable lightly to yourself and check if the tab is secured. Pulling direction (3) Close the actuator

12