

## 【1. 適用範囲 SCOPE】

本仕様書は、0.5mm ピッチ FFC 対基板用コネクタについて規定する。

This product specification covers the performance requirements for 0.5mm PITCH FFC TO BOARD CONNECTOR series.

## 【2. 製品名称及び型番 PRODUCT NAME AND PART NUMBER】

	製品名称 Product Name	製品型番 Material Number
コネクタ側 Connector Side	ハウジングアッセンブリ グランド端子付き Housing Assembly with Ground(RA Type)	501864-**31
	501864-**31 テーピング梱包 Embossed Tape Package for 501864-**31	501864-**91
	ハウジングアッセンブリ(グランド端子無し) Housing Assembly (RA Type)	501864-**41
	501864-**41 テーピング梱包 Embossed Tape Package for 501864-**41	501864-**92
プラグ側 Plug Side	プラグジャケット(小ラッチ) Plug Jacket (Small Latch)	501783-**09
	プラグジャケットカバー(小ラッチ) Plug Jacket Cover (Small Latch)	501784-**08 501784-**09
	プラグジャケット(大ラッチ) Plug Jacket (Large Latch)	503150-**09
	プラグジャケットカバー(大ラッチ) Plug Jacket Cover (Large Latch)	503151-**09

\*\* : 極数 (図面参照)  
CIRCUITS(Refer to the drawing)

## ・ジャケット、ジャケットカバー対応表 CORRESPONDENCE TABLE

製品名称(テーピング梱包) Product Name(Embossed Tape Package)	プラグジャケット Plug Jacket	プラグジャケットカバー Plug Jacket Cover
501864-3091	501783-3009	501784-3008
501864-3092		501784-3009
501864-4091	501783-4009	501784-4008
501864-5091	503150-5009	503151-5009

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REVISION DESCRIPTION	REVISED	0.5MM PITCH FFC TO BOARD CONNECTOR -LEAD FREE-						
CHANGE NO.	640427							
REVISED BY	NINOUE01	DATE	2020/04/21	DOC TYPE	DOC TYPE DESCRIPTION	DOC PART	SERIES	
REV APPR BY	SHOSHIKAWA	DATE	2020/07/01	PS	ENGINEERING SPECIFICATION WORD	001	501864	
INITIAL RELEASE			CUSTOMER		DOCUMENT NUMBER		REVISION	SHEET
INITIAL DRWN	MTAKASAKI	DATE	2008/12/08	GENERAL MARKET	PS-501864-004	G	1 OF 20	
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## 【3. 定 格 RATINGS】

項 目 Item	規 格 Standard	
最大許容電圧 Rated Voltage(MAXIMUM)	50V <sup>*3</sup>	[AC(実効値 rms)/DC]
最大許容電流 Rated Current (MAXIMUM)	0.5A <sup>*3</sup>	
使用温度範囲 <sup>*1</sup> Ambient Temperature Range	-40°C ~+105°C <sup>*2*3*4</sup>	

- \* 1: 基板実装後の無通電状態は、使用温度範囲が適用されます。  
Non-operating connectors after reflow must follow the operating temperature range condition.
- \* 2: 通電による温度上昇分を含む。  
This includes the terminal temperature rise generated by conducting electricity.
- \* 3: 適合 FFC も本使用温度範囲を満足すること。  
Applicable FFC must also meet the specified temperature range.
- \* 4: 8-4 を参照のこと。  
Refer to Note 8-4.

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【4. 性能 PERFORMANCE】

4-1. 電気的性能 Electrical Performance

項目 Item		条件 Test Condition	規格 Requirement
4-1-1	接触抵抗 Contact Resistance	適合 FFC ハーネスを嵌合させ、開放電圧 20mV 以下、短絡電流 10mA 以下にて測定する。 (JIS C5402-2-1)  Mate applicable FFC Harness, measured at the open circuit voltage 20mV MAXIMUM and short circuit 10mA MAXIMUM. (JIS C5402-2-1)	40 milliohm MAXIMUM
4-1-2	絶縁抵抗 Insulation Resistance	適合 FFC ハーネスを嵌合させ、隣接するターミナル間及びターミナル、アース間に、DC500V を印加し測定する。 (JIS C5402-3-1/MIL-STD-202 試験法 302)  Mate applicable FFC Harness, measured by applying DC 500V between adjacent terminal or terminal and ground. (JIS C5402-3-1/MIL-STD-202 Method 302)	50 megaohm MINIMUM
4-1-3	耐電圧 Dielectric Strength	適合 FFC ハーネスを嵌合させ、隣接するターミナル間及びターミナル、アース間に、AC250V(実効値)を 1 分間印加する。 (JIS C5402-4-1/MIL-STD-202 試験法 301)  Mate applicable FFC Harness, applying AC250V (rms) between adjacent terminal or terminal and ground for 1 minutes. (JIS C5402-4-1/MIL-STD-202 Method 301)	製品機能を損なう異常なきこと No damage on function

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4-2. 機械的性能 Mechanical Performance

項目 Item		条件 Test Condition	規格 Requirement	
4-2-1	挿入・抜去力 Insertion Force/ Withdrawal Force	ロックを解除した状態にて、毎分 25±3 mm の速さで挿入・抜去を行う。 Insert and withdraw connectors, at the speed rate of 25±3 mm per minute without lock function.	第 7 項参照 Refer to paragraph 7	
4-2-2	強制抜去力 Compulsion Withdrawal Force	適合 FFC ハーネスを嵌合させ、ロックを解除せずに毎分 25±3 mm の速さで軸方向に引き抜く。 Mate applicable FFC Harness, lock the FFC Harness, apply axial pull out force at the speed rate of 25±3 mm per minute.	9.8 N{ 1.0 kgf} MINIMUM	

4-3. その他 Environmental Performance and Others

項目 Item		条件 Test Condition	規格 Requirement	
4-3-1	繰り返し挿抜 Repeated Insertion /Withdrawal	無通電状態にて 1 分間に 10 回以下の速さで、適合 FFC ハーネスの挿入、抜去の動作を 20 回繰り返す。 Insert and withdraw applicable FFC Harness to 20 cycles, at the speed rate of less than 10 cycles per minute in the power-off state.	接触抵抗 Contact Resistance	60 milliohm MAXIMUM
4-3-2	温度上昇 Temperature Rise	適合 FFC ハーネスを嵌合させ、最大許容電流を通電し、コネクタの温度上昇分を測定する。 Mate applicable FFC Harness, measure the temperature rise of contact when the maximum AC rated current is passed.	温度上昇 Temperature Rise	30 °C MAXIMUM

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項目 Item		条件 Test Condition	規格 Requirement	
4-3-3	耐振動性 Vibration	適合 FFC ハーネスを嵌合させ、DC1mA 通電状態にて、嵌合軸を含む互いに垂直な 3 方向に掃引サイクル 10 Hz~55 Hz~10 Hz /分、全振幅 1.5mm の振動を各 2 時間加える。 (JIS C 60068-2-6 /MIL-STD-202 試験法 201)  Mate applicable FFC Harness, add to each 2 hours with ratio sweep 10 Hz-55 Hz-10 Hz per minute and total amplitude 1.5 mm vibration at 3 directions mutually vertical including fitting axis in DC 1 mA electricity state. (JIS C 60068-2-6 /MIL-STD-202, Method 201)	外観 Appearance	製品機能を損なう異常なきこと No damage on function
			接触抵抗 Contact Resistance	60 milliohm MAXIMUM
			瞬断 Discontinuity	1.0 microsecond MAXIMUM
4-3-4	耐衝撃性 Mechanical Shock	適合 FFC ハーネスを嵌合させ、DC1mA 通電状態にて、嵌合軸を含む互いに垂直な 6 方向に、490m/s <sup>2</sup> {50G}の衝撃を各 3 回加える。 (JIS C60068-2-27 / MIL-STD-202 試験法 213)  Mate applicable FFC Harness, add to each 3 times with impact of 490m/s <sup>2</sup> {50G} at 6 directions mutually vertical including fitting axis in DC 1 mA electricity state. (JIS C60068-2-27 / MIL-STD-202Method 213)	外観 Appearance	製品機能を損なう異常なきこと No damage on function
			接触抵抗 Contact Resistance	60 milliohm MAXIMUM
			瞬断 Discontinuity	1.0 microsecond MAXIMUM
4-3-5	耐熱性 Heat Resistance	適合 FFC ハーネスを嵌合させ、105±2℃の雰囲気中に 96 時間放置する。 試験後、1~2 時間室温に放置する。 (JIS C60068-2-2/MIL-STD-202 試験法 108)  Mate applicable FFC Harness, exposing for 96 hours in the atmosphere of 105+/-2 degree C. After the test, allowed to stand at room temperature for 1 to 2 hours. (JIS C60068-2-2/MIL-STD-202 Method 108)	外観 Appearance	製品機能を損なう異常なきこと No damage on function
			接触抵抗 Contact Resistance	60 milliohm MAXIMUM

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項目 Item		条件 Test Condition	規格 Requirement	
4-3-6	耐寒性 Cold Resistance	適合 FFC ハーネスを嵌合させ、-40±3°C の雰囲気中に 96 時間放置する。 試験後、1～2 時間室温に放置する。 (JIS C60068-2-1)  Mate applicable FFC Harness and expose to -40+/-3 degree C for 96 hours. Upon completion of the exposure period, the test specimens shall be conditioned at ambient room conditions for 1 to 2 hours. (JIS C60068-2-1)	外観 Appearance	製品機能を損なう異常なきこと No damage on function
			接触抵抗 Contact Resistance	60 milliohm MAXIMUM
4-3-7	耐湿性 Humidity	適合 FFC ハーネスを嵌合させ、60±2°C 相対湿度 90～95% の雰囲気中に 96 時間放置する。 試験後、1～2 時間室温に放置する。 (MIL-STD-202 試験方法 103)  Mate applicable FFC Harness, exposing for 96 hours in an atmosphere of 60+/-2 degree C, relative humidity 90 to 95%. After the test, allowed to stand at room temperature for 1 to 2 hours. (JIS C60068-2-78/MIL-STD-202 Method 103)	外観 Appearance	製品機能を損なう異常なきこと No damage on function
			接触抵抗 Contact Resistance	60 milliohm MAXIMUM
			耐電圧 Dielectric Strength	4-1-3 項 満足のこと Must meet 4-1-3
			絶縁抵抗 Insulation Resistance	20 megaohm MINIMUM
4-3-8	温度サイクル Temperature Cycling	適合 FFC ハーネスを嵌合させ、-40±3°Cに 30 分、+105±2°Cに 30 分、これを 1 サイクルとし、5 サイクル繰り返す。但し、温度移行時間は、5 分以内とする。試験後 1～2 時間室温に放置する。 (JIS C60068-2-14)  Mate applicable FFC Harness, exposing to 105+/-2 degree C and -40+/-3 degree C temperature extremes for 30 minutes each including a 0-5 minutes transition time. The above-mentioned condition is repeated 5 cycles. After the test, allowed to stand at the room temperature for 1 to 2 hours before checking functionality. (JIS C60068-2-14)	外観 Appearance	製品機能を損なう異常なきこと No damage on function
			接触抵抗 Contact Resistance	60 milliohm MAXIMUM

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項目 Item		条件 Test Condition	規格 Requirement	
4-3-9	塩水噴霧 Salt Spray	<p>適合 FFC ハーネスを嵌合させ、35±2℃にて、重量比 5±1%の塩水を 48 時間噴霧し、試験後常温で水洗いした後、室温で乾燥させる。 (JIS C60068-2-11/MIL-STD-202 試験方法 101)</p> <p>Mate applicable FFC Harness, exposing to the atmosphere where salt mist is diffused in. Other condition is written below. NaCl solution : 5+/-1% by weight Temperature : 35+/-2 degree C Duration : 48 hours After the test, they should be washed well by water and dried at room temperature before checking functionality. (JIS C60068-2-11/MIL-STD-202 Method 101)</p>	外観 Appearance	割れ、著しい腐食等 製品機能を損なう異常なきこと No damage on function
			接触抵抗 Contact Resistance	60 milliohm MAXIMUM
4-3-10	亜硫酸ガス SO <sub>2</sub> Gas	<p>適合 FFC ハーネスを嵌合させ、40±2℃、50±5ppm の亜硫酸ガス中に 24 時間放置する。</p> <p>Mate applicable FFC Harness, exposing to the atmosphere is written below. Gas Concentration : SO<sub>2</sub>=50+/-5ppm Temperature : 40+/-2 degree C Duration : 24h</p>	接触抵抗 Contact Resistance	60 milliohm MAXIMUM
4-3-11	耐アンモニア性 NH <sub>3</sub> Gas	<p>適合 FFC ハーネスを嵌合させ、濃度 28%のアンモニア水から発生させたアンモニアガス中に 40 分間放置する。(1L に対して 25mL の割合)</p> <p>Mate applicable FFC Harness, allow to stand for 40 minutes in a container filled with NH<sub>3</sub>gas (from density 28% ammonia water). (It is a rate of 25 mL to 1L)</p>	接触抵抗 Contact Resistance	60 milliohm MAXIMUM

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項目 Item		条件 Test Condition	規格 Requirement	
4-3-12	はんだ付け性 Solderability	端子先端より 0.3mm、金具先端より 0.3mm の位置まで、245±3°Cのはんだに 3±0.5 秒浸す。 Dip the position of 0.3mm from terminal tip and 0.3mm from fitting nail tip into 245 +/-3 degree C solder for 3+/-0.5 seconds.	濡れ性 Solder Wetting	浸漬面積の 95%以上 95% of immersed area must show no voids, pin holes
4-3-13	はんだ耐熱性 Resistance to Soldering- Heat	赤外線リフロー時 Infrared Reflow Method 第 5 項参照 Refer to the paragraph 5	外観 Appearance	端子ガタ割れ等 製品機能を損なう 異常なきこと No damage on function
		手はんだ時 Soldering iron method 端子先端より 0.3mm、金具先端より 0.3mm の位置まで 350±10°Cのはんだゴテにて 5 秒加熱する。 但し、異常な加圧のないこと。 Heat the position of 0.3mm from terminal tip and 0.3mm from fitting nail tip for 5 seconds with 350+/-10 degree C soldering iron. However, without too much pressure to the terminal pin and fitting nail.		

( ) : 参考規格  
Reference Standard

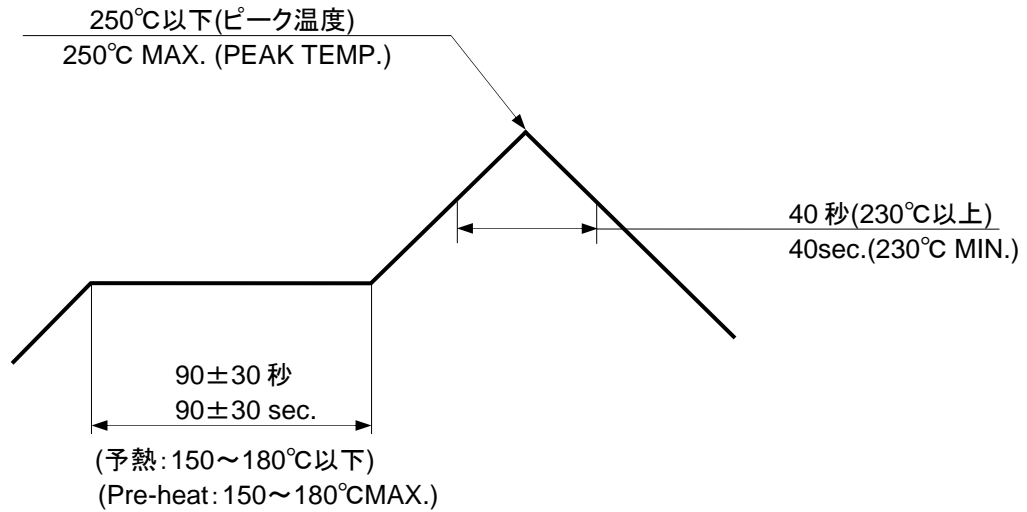
各項目の評価サンプルは、第5項のリフロー条件にて実装しております。  
また、はんだペーストは、無鉛はんだ(Sn-3Ag-0.5Cu)を使用しています。  
The board samples of the specification test were reflowed under the reflow profile of paragraph 5.  
Cream soldering paste: Sn-3Ag-0.5Cu

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【5. 推奨温度プロファイル REFLOW CONDITION】



温度条件グラフ  
TEMPERATURE CONDITION GRAPH

はんだ接合部の基板表面にて測定  
(Temperature is measured at the soldering area on the surface of the print circuit board)

注記: 本リフロー条件に関しては、温度プロファイル、はんだペースト、大気、N<sub>2</sub>リフロー、基板などにより条件が異なりますので事前に実装評価(リフロー評価)を必ず実施願います。実装条件によっては、製品性能に影響を及ぼす場合があります。

NOTE: Please investigate the mounting condition (reflow soldering condition) on your own devices beforehand. The mounting conditions may change due to the soldering temperature, soldering paste, air reflow machine, Nitrogen reflow machine, and the type of printed circuit board. The different mounting conditions may have an influence on the product's performance.

【6. 外観形状、寸法及び材質 PRODUCT SHAPE, DIMENSIONS AND MATERIALS】

図面参照 Refer to the drawing.

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**【7. 挿入／抜去力 INSERTION FORCE / WITHDRAWAL FORCE】**

下記のFFCを使用した場合のテストデータです。(参考)

This test data in case of used the following FFC (Reference)

FFC : 住友電気工業株式会社 製

FFC : SUMITOMO ELECTRIC INDUSTRIES, LTD.

厚さ(導体部) : 0.305mm ~ 0.310mm

Thickness (CONDUCTOR AREA) : 0.305mm ~ 0.310mm

Shield 材質 : アルミテープ

Shield material : Aluminum tape

<501864-\*\*91>

(N=5)

極数 Circuits	回数 Times	単位 UNIT	挿入力 Insertion Force			抜去力 Withdrawal Force		
			平均値 AVE.	最大値 MAX.	最小値 MIN.	平均値 AVG.	最大値 MAX.	最小値 MIN.
30	初回 1st	N	16.37	17.3	15.4	10.20	10.9	8.9
	10回目 10th	N	13.46	14.6	11.9	7.58	8.3	6.8
	20回目 20th	N	13.43	14.7	11.5	7.64	8.6	6.7
40	初回 1st	N	20.45	22.4	19.2	11.89	13.3	11.1
	10回目 10th	N	16.11	18.9	15.1	8.95	9.7	8.4
	20回目 20th	N	16.02	18.3	14.8	9.17	10.0	8.5
50	初回 1st	N	23.35	24.3	22.7	14.34	16.5	10.7
	10回目 10th	N	20.31	20.6	19.6	11.10	12.1	9.3
	20回目 20th	N	19.80	20.2	19.3	11.12	12.2	9.6

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REVISED BY	NINOUE01	DATE	2020/04/21	DOC TYPE	DOC TYPE DESCRIPTION		DOC PART	SERIES	
REV APPR BY	SHOSHIKAWA	DATE	2020/07/01	PS	ENGINEERING SPECIFICATION WORD		001	501864	
INITIAL RELEASE				CUSTOMER		DOCUMENT NUMBER		REVISION	SHEET
INITIAL DRWN	MTAKASAKI	DATE	2008/12/08	GENERAL MARKET		<b>PS-501864-004</b>		<b>G</b>	10 OF 20
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<501864-\*\*92>

(N=5)

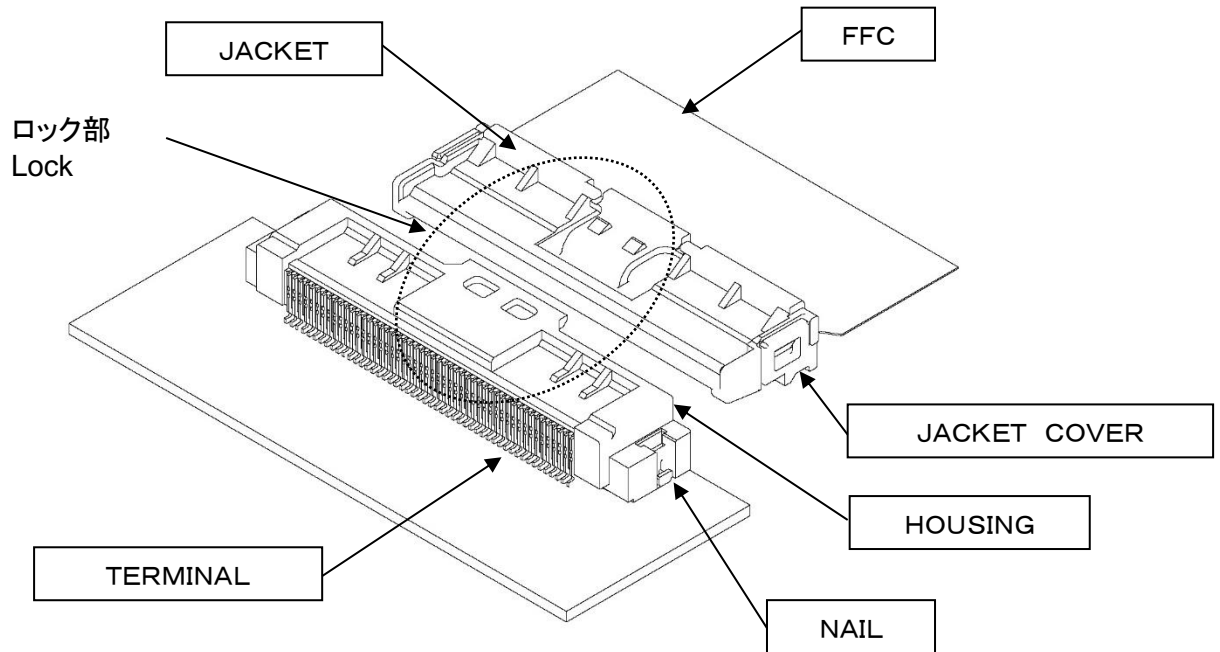
極数 Circuits	回数 Times	単位 UNIT	挿入力 Insertion Force			抜去力 Withdrawal Force		
			平均値 AVE.	最大値 MAX.	最小値 MIN.	平均値 AVG.	最大値 MAX.	最小値 MIN.
30	初回 1st	N	12.99	13.5	12.4	9.51	10.4	8.3
	10回目 10th	N	11.24	11.4	10.7	7.86	9.6	6.3
	20回目 20th	N	11.23	11.7	10.5	8.94	11.9	7.3

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【8. 注意事項 NOTES】

8-1. 各部の名称 DESCRIPTION OF EACH PART



8-2. 基板への実装に関して MOUNTING ON THE PC BOARD

基板への実装は実装機にて実施願います。もし、手半田する場合は、TERMINAL及びNAIL等に触れない様に願います。(半田付け不良等の原因となる可能性が有ります。)

The mounting of the PC board is handled by the moulder. If to manually solder, please be cautious to not touch the Terminal and Fitting Nail.(It will create the possibility to cause solderability failure.)

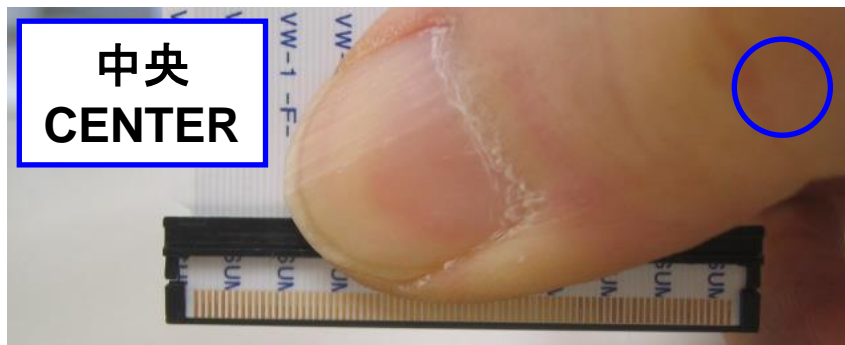
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**8-3. コネクタ嵌合に関して MATING THE CONNECTOR**

コネクタを嵌合する際は、JACKETとJACKET COVERの全体もしくは中央を掴んで挿入を実施ください。

When mating the connector, hold the JACKET AND JACKET COVER together at either a whole or the center portion of them to insert.

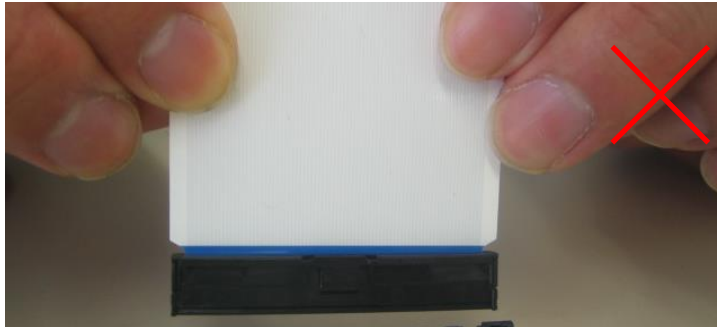


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以下のような嵌合は回復不可能な機能不全や製品破壊につながりますので実施しないで下さい。  
 The following method of mating will cause either irreversable functionality failure or product breaking, so please do not mate this way.

- ・FFCのみを掴まないでください。  
Please do not hold the FFC part only



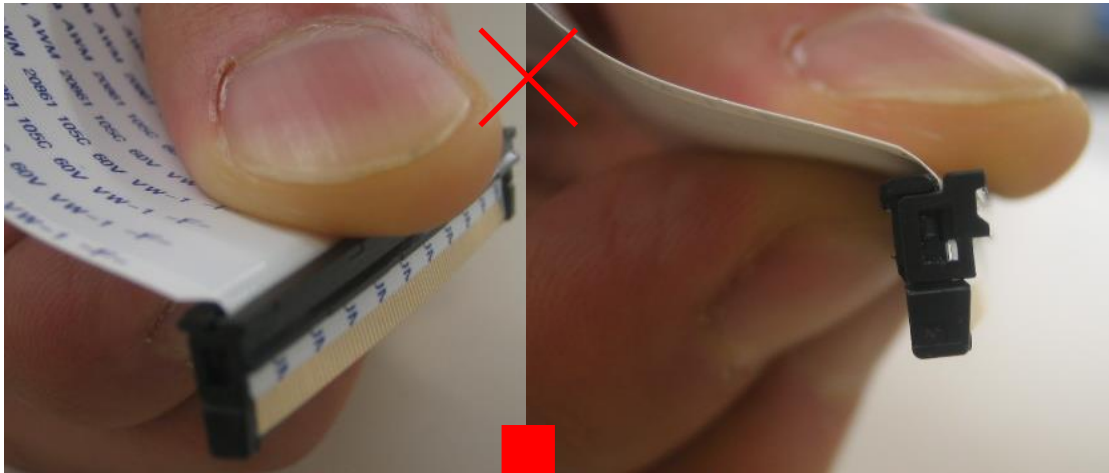
- ・JACKETとJACKET COVERの 端部のみを掴まないでください。  
Please do not hold the JACKET AND edge of the JACKET COVER only



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- ・FFCを折り曲げるように掴まないでください。  
Please do not hold the FFC like bending it.

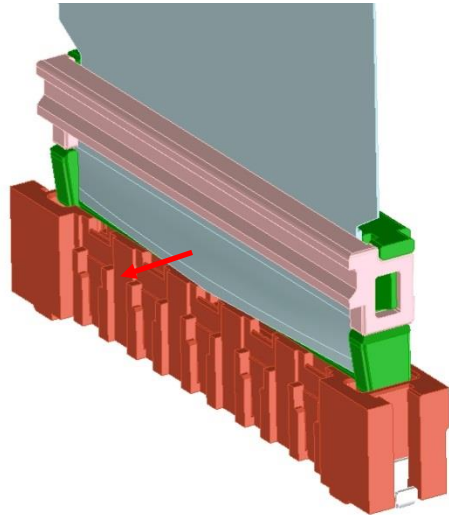


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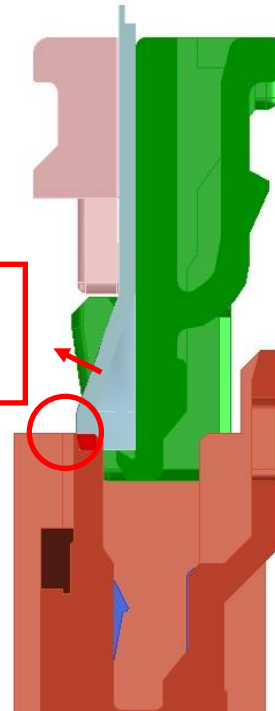
REVISION DESCRIPTION	REVISED			<b>0.5MM PITCH FFC TO BOARD CONNECTOR -LEAD FREE-</b>			
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- ※ FFCが極端に浮くと、嵌合時にHOUSINGと干渉し座屈する可能性があります。
  - ※ If FFC warps too much, it will touch with the Header housing when mated,
- and may possibly cause buckling.

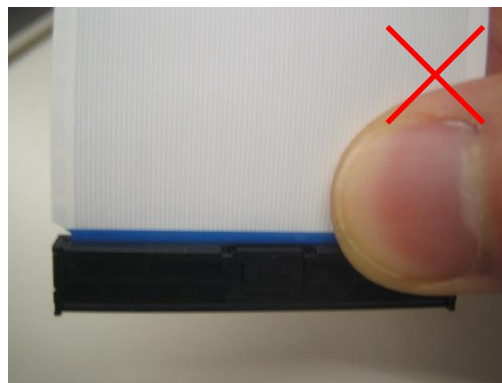
**FFC の極端な浮き  
TO WARPED FFC**



**干渉  
TOUCH**



- ・JACKETとJACKET COVERの片端のみを掴まないでください。
  - 斜め嵌合となり、不良につながります。
- Please do not hold one side of the JACKET and the JACKET COVER only as shown below.  
It will be mated in the slant direction and will cause failure

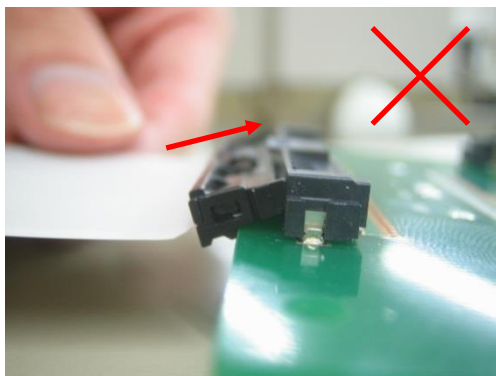
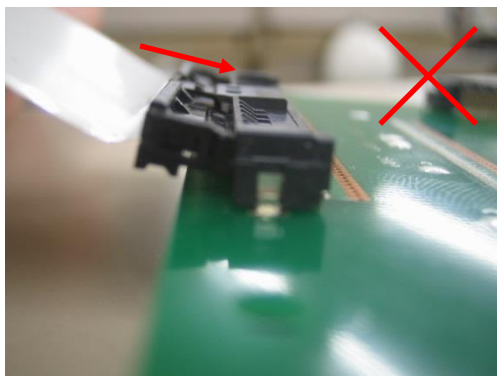
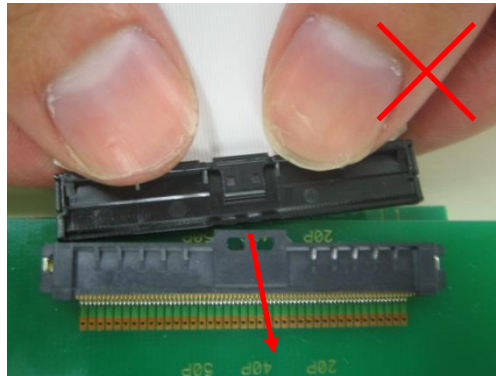
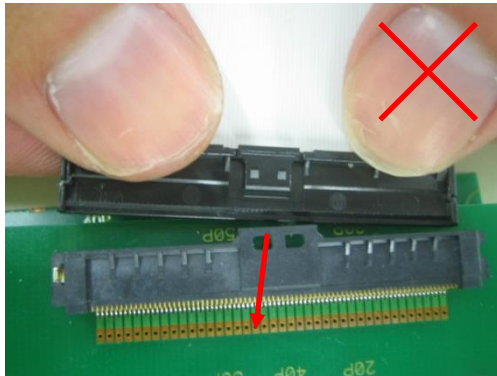


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・斜め嵌合は不良につながりますので実施しないでください。  
Mating inconsistently will cause failure, so please do not do this.

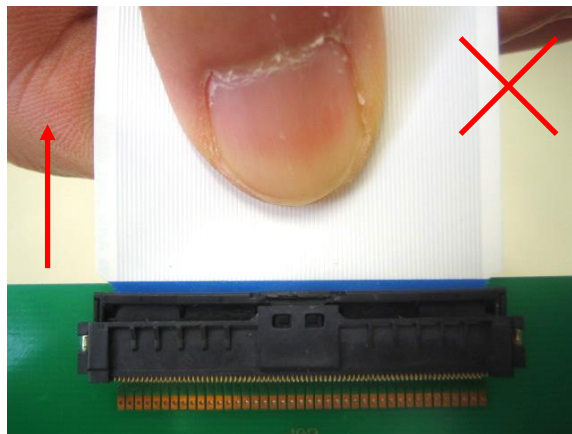
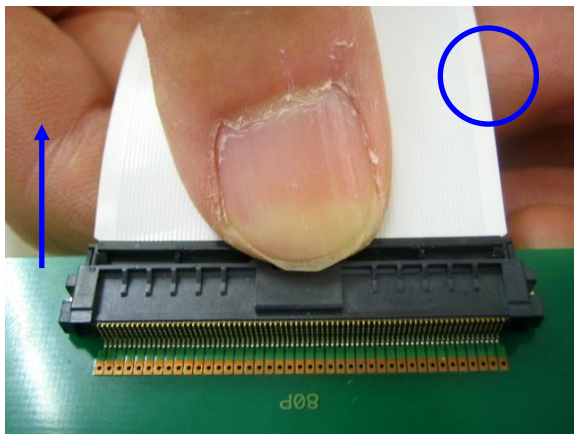


・嵌合状態 及び 嵌合時のFFC引き回し作業においてロック部に無理な負荷が掛かるような使用は避けてください。  
Please be cautious not to put excess load at the lock part after mating and when FFC is pulled and extracted.

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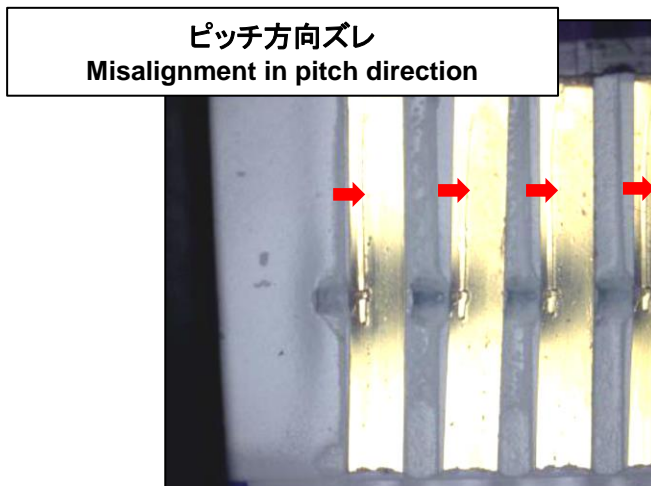
コネクタの嵌合を取り外す際は、必ずロック解除して実施ください。  
Please be sure to release the lock when unmating the connector.



**8-4. ご使用の FFC に関して**

御社での FFC 選定時には以下を必ずご確認ください、実機での評価/可否判断をお願いします。  
高温環境での不具合回避には FPC の使用をご検討ください。  
When actually using it with connector, please do the evaluation and the confirmation with an actual equipment to evade the following case where reliability cannot be filled.  
Because an FPC resists heat than FFC; in some cases use the FPC.(high-temperature environment case etc)

FFC に規定された定格温度が FFC 単体前提の場合が御座います。  
この場合、コネクタと組み合わせての実使用において、高温環境で FFC 基材と導体間の接着層が劣化し接着力が低下、その後の温度変動によるコネクタ/FFC の収縮により、導体自体のピッチ方向ズレが発生し、長期的には接点脱落、不導通に至る事例が確認されております。  
The adhesive line of FFC is deteriorated by high temperature heat.  
Then contact conductor of FFC may move.

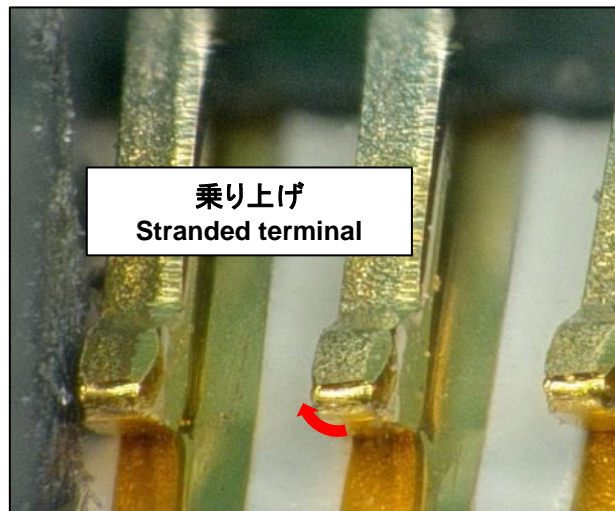
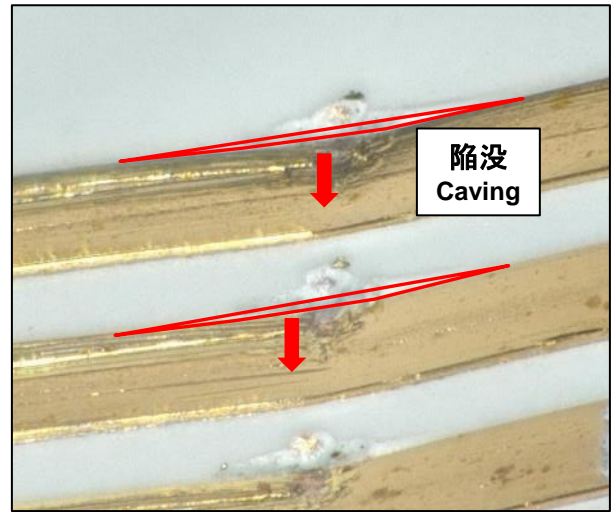
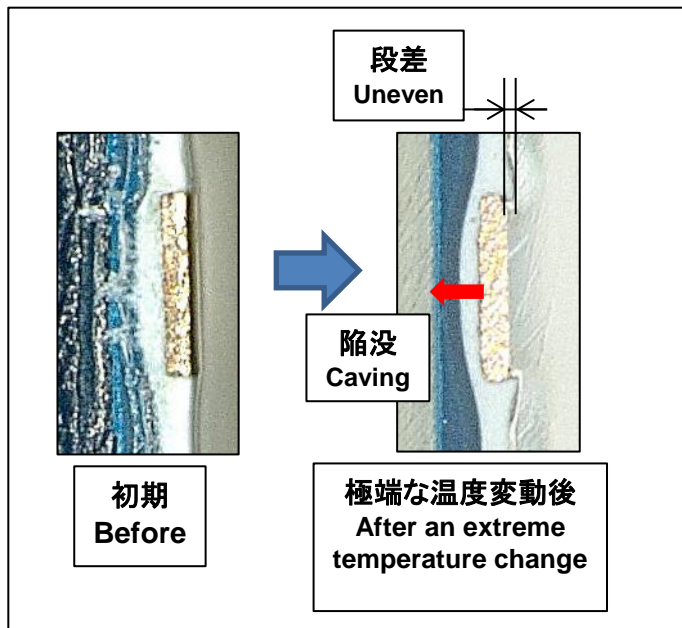


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また、同様に高温環境で接着層/基材/補強板が軟化してつぶれ、導体部が陥没、基材と導体の境目に段差が発生し、熱サイクルなど温度変動が極端な場合に、初期段階でコネクタ接点が乗り上げて不導通に至る事例も確認されております。

In addition, a pad of FFC is crushed and may become instantaneous interruption and the non-conduction.



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REV.	REV. RECORD	DATE	EC NO.	WRITTEN BY :	CHECKED BY :
A	RELEASED	'08/12/05	J2009-1485	M.TAKASAKI	M.HAYASHI
B	REVISED	'09/02/09	J2009-1918	N.YOSHIKAWA	M.HAYASHI
C	REVISED	'13/09/03	J2014-0398	N.KONDO	K.TAKAHASHI
D	REVISED	'13/10/03	J2014-0607	N.KONDO	K.TAKAHASHI
E	REVISED	'15/03/24	J2015-1226	N.ASANUMA	K.TAKAHASHI
F	REVISED	'15/09/24	J2016-0303	M.TAKAHASHI04	K.TAKAHASHI
G	REVISED	'20/07/01	640427	N.INOUE	H.SHIMOYAMA

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