

108-5070

NUMBER

Customer  
ReleaseAMP SECURITY  
CLASSIFICATION

## DESIGN OBJECTIVES

The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, AMP (Japan), Ltd. makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, AMP (Japan), Ltd. may change these requirements based on the results of additional testing and evaluation. Contact AMP Engineering for further details.

In case when "product specification" is referred to in this document, it should be read as "design objectives" for all times as applicable.

## 1. Scope:

This specification covers general requirements for MATE-N-LOK Pin Header Assembly of the following part numbers.

Product Part Number	Number of Positions	Product Part Number	Number of Positions
350209	2	350212	8
350210	3	380991	10
350211	4	350213	12
380999	6	350214	16

Table 1

## 2. Design Feature of the Product:

The product component nomenclature and application are as illustrated in the Figure 1.

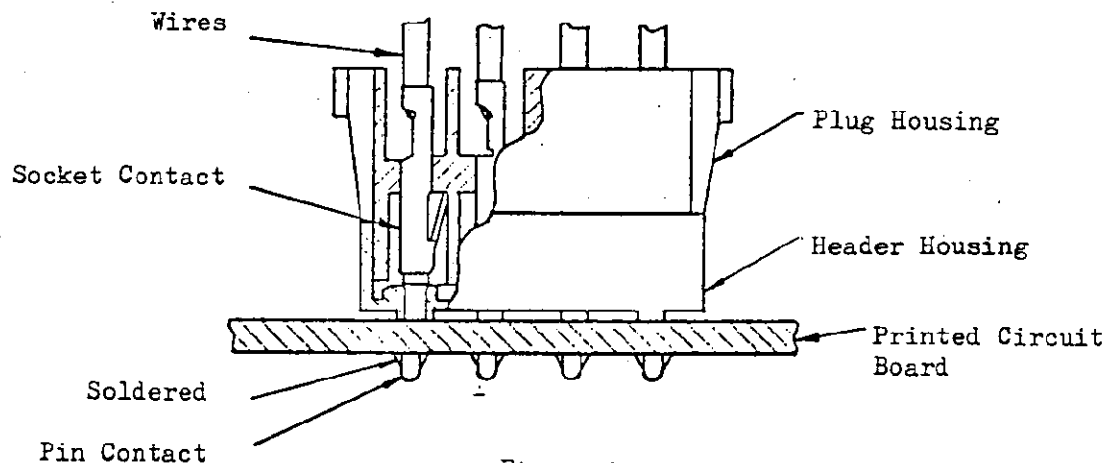



Figure 1

## 3. Materials Used:

3.1 Housing : As per specified in the applicable product drawings.

3.2 Contact : As per applicable product drawings.

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C	Revised per RFA-566	<i>[Signature]</i>	1-25-74			
B	Revised per RFA-534	<i>[Signature]</i>	7-20-74			LOC J A NO 108-5070 REV C1
A	Revised per RFA74-159	<i>[Signature]</i>	8-19-74	APP	<i>[Signature]</i> 11-27-73	
O	Released	<i>[Signature]</i>				SHEET 1 OF 11 NAME Design Objectives MATE-N-LOK P.C.B. Pin Header Assy
LTR	REVISION RECORD	DR	CHK	DATE		

## 4. Surface Treatment:

4.1 Surface treatment of the product is as per specified in the applicable product drawing.

## 4.2 Coloring of the Housings:

Coloring of the housings is as per specified in the applicable product drawings.

## 5. Construction, Feature and Dimensions:

## 5.1 Construction, Feature and Dimensions:

Construction, feature and dimensions shall conform to the applicable product drawings.

## 5.2 Thickness of the Printed Circuit Board:

Thickness of the applicable printed circuit board shall be  $1.57 \pm 0.15\text{mm}$ .

## 5.3 Wire Range:

Applicable wire range shall be as specified in the product drawings. However, this specification does not cover the requirements for application on AWG #30, ( $0.05\text{mm}^2$ ) and AWG #28( $0.08\text{mm}^2$ ) wires.

## 5.4 Maximum Current Rating:

The maximum continuous current rating for this product shall be 20A on AWG #14, ( $2.0\text{mm}^2$ ) wire and 5A on AWG #26( $0.13\text{mm}^2$ ) wire.

## 5.5 Voltage Rating:

Voltage rating for this product shall be 250V maximum between adjacent contacts.

## 6. Performance:


## 6.1 Initial Performance:

## 6.1.1 Appearance:

The contacts and housings shall not show any evidence of cracks, breakage, dirt and discoloration which is detrimental to the function of the product.

## 6.1.2 Termination Resistance:

When tested in accordance with the test method specified in Para. 8.1, the **low level** resistance per mated pair of contacts shall be  $2.5\text{m}\Omega$  max.

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**6.1.3 Solderability:**

When tested in accordance with the test method specified in Para. 8.2, the soldered surface of the contact shall show smooth, fresh and uniform coverage of solder in more than 95% of the total area, there shall be no pin holes, voids and rough points concentrated in the spot not exceeding 5% area of the total soldered surface.

**6.1.4 Soldering Heat Resistibility:**

When tested in accordance with the test method specified in Para. 8.3, no detrimental evidence such as unsteadiness of pin contact and deformation and discoloration of the housing blocks, shall appear by the effect of soldering heat.

**6.1.5 Insulation Resistance:**

When tested in accordance with the test method specified in Para. 8.4, the insulation resistance between the adjacent contacts and between the contact and the ground shall be not less than 1,000MΩ.

**6.1.6 Dielectric Strength:**


When tested in accordance with the test method specified in Para. 8.5, there shall be no insulation break-down in the tested housing.

**6.1.7 Connector Mating/Unmating Force:**

When tested in accordance with the test method specified in Para. 8.6, the insertion/extraction force per contact shall meet the values, specified in Table 2.

Insertion Force Max.                      kg.	Extraction Force Min.                      kg.
1.5	0.5

Table 2

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### 6.1.8 Crimp Tensile Strength (Socket Contact):

When tested in accordance with the test method specified in Para. 8.7, the crimp tensile strength shall meet the values specified in Table 3.

Wire Size (mm <sup>2</sup> ) (AWG)		Tensile Strength (kg)
0.13	(#26)	2.0
0.3	(#22)	4.5
0.5	(#20)	7.0
0.75	(#18)	9.0
1.25	(#16)	12.0
2.0	(#14)	16.0

Table 3

### 6.2 Environmental Performance:

#### 6.2.1 Heat Resistibility:

When tested in accordance with the test method specified in Para. 8.9, the connector assembly shall meet the requirements on appearance specified in Para. 6.1.1, and **low level** resistance shall not exceed 3mΩ.

#### 6.2.2 Thermal Shock:


When tested in accordance with the test method specified in Para. 8.10, the connector assembly shall meet the requirements on appearance specified in Para. 6.1.1, and **low level** resistance shall not exceed 3mΩ.

#### 6.2.3 Salt Spray:

When tested in accordance with the test method specified in Para. 8.11, the connector assembly shall meet the requirements on appearance specified in Para. 6.1.1, and **low level** resistance shall not exceed 3mΩ.

#### 6.2.4 Humidity:

When tested in accordance with the test method specified in Para. 8.12, the connector assembly shall meet the requirements on appearance specified in 6.1.1, and insulation resistance shall be not less than 100MΩ, and **low level** resistance shall not exceed 3mΩ.

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### 6.2.5 Vibration:

When tested in accordance with the test method specified in Para. 8.13, the connector assembly shall meet the requirements on appearance specified in Para. 6.1.1, and low level resistance shall not exceed 3.5mΩ. And there shall be no electrical discontinuity greater than 1 micro second during the test.

### 6.3 Durability:

#### 6.3.1 Repeated Insertion/Extraction Force:

When tested in accordance with the test method specified in Para. 8.14, the insertion/extraction force per contact after repetition of cycles shall meet the values specified in Table 4.

After 50 Cycles of Insertion/Extraction	
Insertion Force (Max.)	Extraction Force (Min.)
1.2kg	0.2kg

Table 4

### 7. Quality Assurance Provisions:

#### 7.1 Environmental Testing Conditions:

Unless otherwise specified, the performance tests shall be conducted under any combination of the following atmospheric conditions.


Room Temperature	15 - 35°C
Relative Humidity	45 - 75%
Barometric Pressure	650 - 800mmHg.

#### 7.2 Testing Wire and Current:

The wire used for the tests shall be of AWG #14(2.0mm<sup>2</sup>) excepting for the tests of crimp tensile strength and low frequency vibration.

#### 7.3 Test Samples:

Unless otherwise specified, the tested sample shall not be reused. The quality of the printed circuit board used for the test shall be of one side copper clad, equivalent or superior to Class XXX-PC of NEMA specification, in the thickness of 1.57±0.15mm.

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## 8. Test Method:

## 8.1 Low Level Termination Resistance:

The low level resistance of the mated pair of contacts assembled in the housing shall be measured by probing resistance value between Y - Y' in Figure 2, using a milliohmmeter at open circuit voltage of 20mV and test current of 10mA, and the resistance value shall be calculated by deducting the resistance value of crimped 75mm wire.

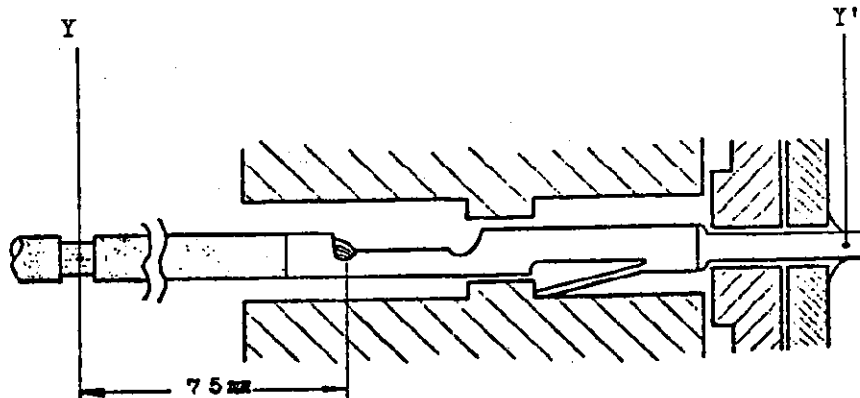


Figure 2

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## 8.2 Solderability:

The solderability test is conducted in accordance with the Test Method 208 of MIL-STD-202, excepting with the use of any of the following types of soldering flux. Tested surface shall be closely examined under a stereo-microscope for proper soldered condition.

- (1) FINE FLUX LF 5016-6, Manufacturer, Matsuo Solder K.K.
- (2) FINE FLUX 5031 (for applying on terminal point), Manufacturer, Matsuo Solder K.K.

## 8.3 Soldering Heat Resistibility:

The test shall be conducted in accordance with Test Condition B, Test Method 210 of MIL-STD-202 at  $260^{\circ}\pm 5^{\circ}\text{C}$ , in  $10 \pm 1$  sec. duration. The contact ends shall be immersed in the solder tab to a depth saving 1.6mm clearance from the housing surface.

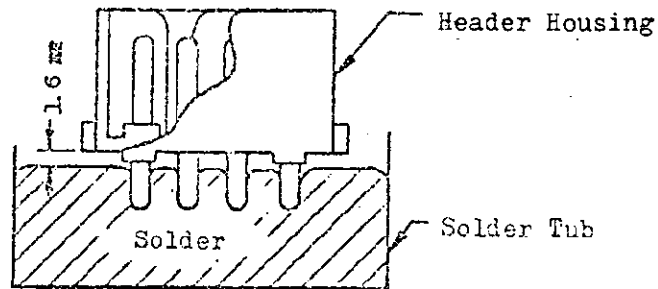


Figure 4

## 8.4 Insulation Resistance:

Insulation resistance shall be tested in accordance with Condition B, Test Method 302 of MIL-STD-202 at  $500\text{V} \pm 10\%$ , by measuring insulation resistance values between the adjacent contacts and between the contact and the ground by use of a 500V insulation ohmmeter.

## 8.5 Dielectric Strength:

Dielectric strength shall be tested in accordance with Test Method 301 of MIL-STD-202, by applying testing voltage of 1.5KV for 1 minute onto between the adjacent contacts in the mated pair of housings.

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### 8.6 Connector Mating/Unmating Force:

Solder the pin-mounted header housing onto the printed circuit board, and fasten it on the stable stand. To this connector half, apply the socket mounted plug housing to mate with by operating the tester head travelling at a rate of 100mm per minute. Initial insertion and extraction force are determined by measuring force required to mate and unmate the halves of connector assemblies. The measurement is done without locking legs in action. Insertion and extraction force per pole is obtained by dividing total value of insertion/extraction force by the number of poles.

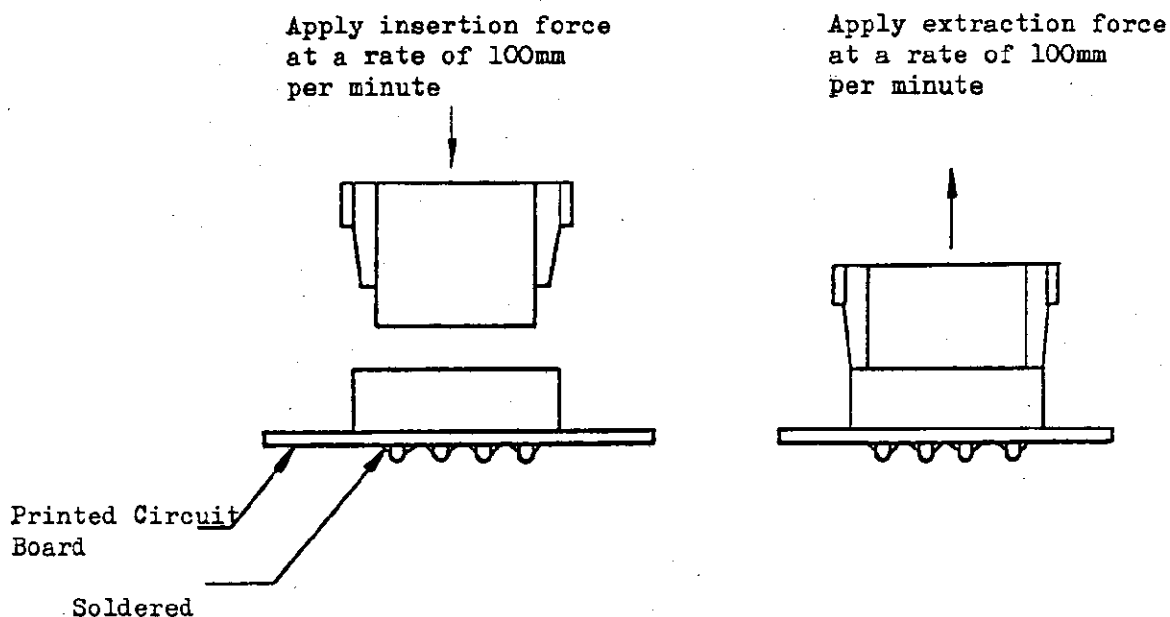


Figure 5

### 8.7 Crimp Tensile Strength:

Place the sample contact crimped to a 150mm long wire in a standard tensile testing machine and apply an axial load to pull off the wire, with the speed at a rate of 100mm per minute. The tensile strength shall be determined when the wire is broken or pulled out of wire crimp of the terminal.

### 8.8 Heat Resistibility:

Place the sample product in the thermal test chamber where temperature of  $80 \pm 2^{\circ}\text{C}$  is maintained. After conditioning for 30 minutes in the chamber, take it out to room temperature and after inspecting the sample for any abnormalities, measure the low level resistance. When test sequence has been completed, the sample shall be subject to thermal shock test, as specified in Para. 8.10.

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## 8.9 Thermal Shock Test:

When the test per Para. 8.9 is completed, the sample shall be subject to undergo the thermal test in accordance with Test Condition A, Test Method 107C of MIL-STD-202D. The low level resistance shall be measured after taking out from the oven and cooled in the room temperature for 30 minutes, and having been checked for any evidence of abnormalities.

## 8.10 Salt Spray:

Salt spray test shall be conducted in accordance with Condition B, Test Method 101C of MIL-STD-202D. The sample shall be cooled in the room temperature after conditioning, and low level resistance shall be measured after visually inspected for evidence of abnormalities in the sample.

## 8.11 Humidity:

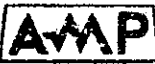
The mated pair of connector assemblies shall be placed in a closed test chamber for 72 hours where the temperature of  $40 \pm 2^{\circ}\text{C}$  and relative humidity of 90 - 95% is maintained, and after exposing the sample shall be removed and reconditioned in the normal room temperature and normal humidity for 30 minutes, low level resistance shall be measured in accordance with the test method specified in Para. 8.1, and insulation resistance per Para. 8.5, and for appearance inspection per Para. 6.1.1.

## 8.12 Vibration(Low Frequency):

Conduct the vibration test in accordance with Test Method 201A of MIL-STD-202D. After conditioning the sample shall be exposed in the room temperature and relative humidity for 30 minutes, and measure the low level resistance per Para. 8.1, after visual inspection for evidence of any abnormalities. The connector assembly shall be monitored during the test for occurrence of electrical discontinuity greater than 1 microsecond. The wire used for this test shall be of AWG #22(0.3mm<sup>2</sup>), and the test current shall be 0.1 - 1A DC.

## 8.13 Repeated Insertion/Extraction Force:

After repeating 50 cycles of insertion and extraction in accordance with Para. 8.7, the repeated insertion/extraction force shall be measured.

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9. Special Instruction for Application:

9.1 Wire:


The wire applicable for crimping on the socket contact shall be of soft annealed copper stranded wire only, and no other wires such as solid, aluminium, and hard copper wires shall be applied.

9.2 Cleaning Solvent for Printed Circuit Board:

Avoid using any cleaning solvent which is detrimental to connector housing block. Refer to the applicable connector housing drawing for the identification of material used.

9.3 Mounting Pin Header on Printed Circuit Board:

When mounting pin header on printed circuit board, it is necessary to apply header tynes vertically to fit to PCB holes orderly to prevent them from flowing up over the mounting positions, and after having them aligned with the mounting holes, push them in until they bottom at the normal depth in the holes.

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10. Testing Items and Sequence:														
Testing Items		Applicable Paragraph	Test Sample Group											
			A	B	C	D	E	F	G	H	I	J	K	
Initial Performance	Appearance	6.1.1	X	X	X	X	X	X	X	X		X	X	X
	Low Level Resistance	6.1.2							X		X	X	X	
	Insulation Resistance	6.1.6												
	Dielectric Strength	6.1.7	X	↓										
	Retention Force of Pin	6.1.3		X	↓									
	Solderability	6.1.4			X	↓								
	Soldering Heat Resistibility	6.1.5				X	↓							
	Connector Mating/Unmating Force	6.1.8					X	↓						
	Crimp Tensile Strength	6.1.9						X						
Environmental Performance	Heat Resistibility	6.2.1							X	↓				
	Thermal Shock	6.2.2								X	↓			
	Salt Spray	6.2.3									X	↓		
	Humidity	6.2.4										X	↓	
	Vibration (Low Frequency)	6.2.5											X	
Durability Perf.	Repeated Insertion & Extraction Force	6.3.1					X							
	Insulation Resistance	6.3.1							↓	↓	↓	X	↓	
	Low Level Resistance	6.1.2							X	X	X	X	X	
	Appearance	6.1.1							X	X	X	X	X	

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