



Low Profile Mini AMP-IN\* Header (Crimp Type)

1. SCOPE

1.1. Content

This specification defines performance, tests, and quality requirements for 2mm and 2.5mm pitch, low profile miniature AMP-IN\* header. The applicable part numbers are shown in Figure 1 and Figure 2.

Product Base Number	Description
172781	Low Profile Mini AMP-IN* (30 – 26 AWG)
172782	Low Profile Mini AMP-IN* (26 – 22 AWG)
See Figure 2	2 mm Pitch Header Housing
See Figure 2	2.5 mm Pitch Header Housing

Figure 1

Position	Header Housing Part Number	
	2 mm Pitch	2.5 mm Pitch
2	172890-2	172520-2
3	172890-3	172520-3
4	172890-4	172520-4
5	172890-5	172520-5
6	172890-6	172520-6
7	172890-7	172520-7
8	172890-8	172520-8
9		172520-9
10		1-172520-0
11		1-172520-1
12	1-172890-2	1-172520-2
13		1-172520-3
14		1-172520-4
15		1-172520-5
16		1-172520-6
17		1-172520-7
18		1-172520-8
19		1-172520-9
20		2-172520-0

Figure 2

## 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 8 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

## 2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

### 2.1. TE Connectivity (TE) Documents

114-5062	Application Specification – Crimping of Low Profile, Mini AMP-IN* Terminals
501-5005	Qualification Test Report

### 2.2. Industry Documents

MIL-STD-202	Department of Defense Test Method Standard: Electronic and Electrical Component Parts
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### 2.3. Reference Documents

108-143075	Supplemental Product Specification – Customer Restricted
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### 2.4. Revision Summary

Revisions to this product specification include:

- ◆ Added Paragraph 2.3 (Reference Documents)

## 3. REQUIREMENTS

### 3.1. Design and Construction

Product shall be of the design, construction, and physical dimensions specified on the applicable product drawing. Connector housing shall have a locking detent on the upper part that secures the contact in position.

### 3.2. Definition of the Terms

- A. Contact: A contact is an electrically conductive, metallic member usually encapsulated in a connector housing cavity, and used for electrical contact termination.
- B. Header Housing: The header housing is an electrically insulating plastic molded component member that encapsulates the contacts.
- C. Header Assembly: The header assembly is an assembly of a header housing and contacts that are primarily crimped on the wires of applicable sizes and loaded in the housing cavities.

### 3.3. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

- A. Contacts: Pre-tinned brass (P/N 172781-1, 172781-2); Brass tin PL (P/N 172781-3, 172781-4, 172782-5, 172782-7); High heat resistance copper alloy tin PL (P/N 1-172782-2)
- B. Header Housing: 6/6 Nylon UL94V-0

3.4. Ratings

- A. Voltage: 250 VAC/DC
- B. Current: The current rating shall be as follows according to the size of the wires connected. See Figure 3.

Wire Size	Current (maximum)
30 AWG	2 A
28 AWG	2 A
26 AWG	2.5 A
24 AWG	3.0 A
22 AWG	4.0 A

Figure 3

- C. Temperature: -40°C to 105°C (includes ambient temperature plus the temperature rise caused by energized current)

3.5. Wire Ranges

See Figure 4 for applicable wire sizes and insulation diameter ranges.

Wire Characteristic	Product Base Number	
	172781	172782
Wire Size	0.05 – 0.15 mm <sup>2</sup> [30 – 26 AWG]	0.12 – 0.35 mm <sup>2</sup> [26 – 22 AWG]
Insulation Diameter Range	1.1 – 1.4 mm	1.3 – 1.5 mm

Figure 4

3.6. Printed Circuit Board Requirements

The header assembly is applicable for termination on a printed circuit board with the characteristics specified in Figure 5.

Board Characteristic	Product Part Number	
	172781-1 172781-3 172782-3 172782-5 1-172782-2	172781-2 172781-4 172782-7
Thickness of the Board	1.6 ± 0.1 mm	1.6 ± 0.1 mm
Diameter of Holes	0.8 ± 0.1 mm	1.0 +0.05/-0.1 mm
Material	Copper Clad, Paper Base Phenolic Board, conforming to JIS-PP3	Copper Clad, Paper Base Phenolic Board, conforming to JIS-PP3

Figure 5

The recommended hole diameter is dependent on the number of positions and recommendations in Figure 6 should be followed. For PCB hole diameters for P/N 172781-2, 172781-4, and 172782-7, use 0.9 mm, 1.0 mm, and 1.05 mm for any number of contact positions.

Hole Diameter	Number of Positions								
	2	3	4	5	6	7	8	9	≥10
0.7 mm	X	X	X	X	X	X	X	X	
0.8 mm	X	X	X	X	X	X	X	X	X
0.9 mm					X	X	X	X	X

Figure 6

3.7. Performance and Test Description

Product is designed to meet the electrical, mechanical, and environmental performance requirements specified in Figure 8. Unless otherwise specified, all tests shall be performed at ambient environmental conditions as specified in Figure 7.

Temperature	15°C – 35°C
Relative Humidity	45% – 75%
Atmospheric Pressure	86.6 – 106.6 kPa

Figure 7

3.8. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Visual and Dimensional Inspection	Header shall be free from functional defects such as cracks, breakage, damages, rattling and loose of parts, rust, deformation and fusion etc.	Visually and tactually inspect to see if the functional defects such as cracks, breakage, damages, rattling and loose of parts, rust, fusion and deformation are present.
<b>Electrical</b>		
Termination Resistance	3 mΩ (maximum)	Measure the millivolt drop between points A and C (R <sub>AC</sub> ) of the sample terminal as shown in Figure 9. Measure the bulk resistance of a 75 mm long wire (R <sub>BC</sub> ). The resistance of the wire crimp (R <sub>AB</sub> ) can be obtained by calculation using the formula shown in Figure 9.
Insulation Resistance	1000 MΩ (minimum)	Test Method 302 of MIL-STD-202, Condition B (500VDC±10%) Measure insulation resistance by applying the test potential between the adjacent contacts.
Dielectric Strength	No abnormalities shall be evident after withstanding test potential of 500 VAC for 1 minute.	Test Method 301 of MIL-STD-202 Measure dielectric strength by applying test potential of 500V AC between the adjacent contacts with the close observation for occurrence of insulation breakdown or surface discharge.

Figure 8 (continued)

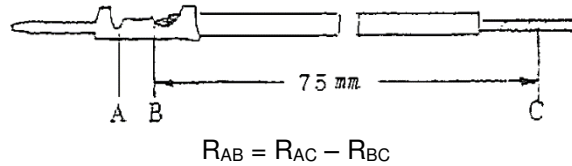
Mechanical			
Crimp Tensile Strength	<b>Wire Range [mm<sup>2</sup> (AWG)]</b>	<b>Tensile Strength (minimum) [N]</b>	Apply an axial pull-off load between the contact and wire of 100mm (approx.) in length. Crimp tensile strength is determined when the wire is broken or is pulled off from the wire crimp.  Operation Speed: 100 mm/min
	0.05 [30]	7.8	
	0.08 [28]	12.7	
	0.13 [26]	19.6	
	0.2 [24]	29.4	
	0.3 [22]	49.0	
Contact Loading Force	11.8 N (maximum)		Measure and record the force required to load the contact in header position.
Contact Retention Force	19.6 N (minimum)		Load the crimped contact into the cavity position and apply an axial pull-off load to the wire with the speed at a rate of 100mm a minute. Contact retention force is determined when the contact is dislodged from the header position.  Operation Speed: 100 mm/min
Header Insertion / Extraction Force	For all P/N except P/N 1-172782-2:		Fasten header assembly on the head of tensile testing machine and operate the head to travel so that the connector contacts are inserted into the mounting holes. Repeat insertion and extraction movement for 5 cycle and measure the force required at the initial and 5th cycle. For this measurement, correct alignment of contact ends with the mounting holes is essential.  Operation Speed: 100 mm/min
	<b>Event</b>	<b>Force</b>	
	1 <sup>st</sup> Insertion	3.9 N (maximum)	
	1 <sup>st</sup> Extraction	0.2 N (minimum)	
	5 <sup>th</sup> Insertion	3.4 N (maximum)	
	5 <sup>th</sup> Extraction	0.1 N (minimum)	
	For P/N 1-172782-2 only:		
	<b>Event</b>	<b>Force</b>	
1 <sup>st</sup> Insertion	6.0 N (maximum)		
5 <sup>th</sup> Insertion	4.8 N (maximum)		
Environmental			
Solderability	More than 95% of the tested surface shall appear fresh and sufficiently working coverage of solder.	After immersing soldering ends of contacts into flux (Alpha 100, GX-5 or GX-7) for 5 to 10 seconds, dip the contact ends into the soldering tub for 3±0.5 seconds which is filled with heated solder controlled at 230±5°C. (Solder: 60% tin and 40% lead)	
Resistance to Soldering Heat	No deformation which is detrimental to connector functions shall be evident.	Apply contact-loaded header assembly on printed circuit board with the contact ends entered into the mounting holes, and immerse the sample over the soldering tub for 10±0.5 seconds which is controlled at 260±5°C.	



**NOTE**

Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the product qualification and re-qualification test sequence given in Figure 10.

**Figure 8 (end)**



**Figure 9**

3.9. Product Qualification and Re-Qualification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)					
	1	2	3	4	5	6
	TEST SEQUENCE (b)					
Visual and Dimensional Inspection	1	1	1	1	1	1
Termination Resistance			4			
Insulation Resistance			2			
Dielectric Strength			3			
Crimp Tensile Strength	2					
Contact Loading Force		2				
Contact Retention Force			5			
Header Insertion/Extraction Force						2
Solderability				2		
Resistance to Soldering Heat					2	



**NOTE**

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.

**Figure 10**

**4. QUALITY ASSURANCE PROVISIONS**

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable instruction sheets by using the wires specified in Figure 11 in accordance with the application specification 114-5062 and shall be selected at random from current production. No sample shall be reused, unless otherwise specified.

More than 10 sets of header assemblies for each sample group shall be used for the tests.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 10.

Wire Size	Diameter of Wire Strand	Number of Strands	Insulation Diameter	Applicable Specification for the Wire
0.05 mm <sup>2</sup> [30 AWG]	0.10 mm	7	1.1 mm	UL1007
0.09 mm <sup>2</sup> [28 AWG]	0.13 mm	7	1.2 mm	UL1007
0.14 mm <sup>2</sup> [26 AWG]	0.16 mm	7	1.3 mm	UL1007
0.22 mm <sup>2</sup> [24 AWG]	0.16 mm	11	1.4 mm	UL1007
0.31 mm <sup>2</sup> [22 AWG]	0.18 mm	12	1.5 mm	JCS246

**Figure 11**

**4.2. Re-Qualification Testing**

If changes that significantly affecting form, fit, or function are made to the product or manufacturing process, product assurance shall coordinate re-qualification testing consisting of all or part of the original testing sequence as determined by development/product, quality, and reliability engineering.

**4.3. Acceptance**

Acceptance is based on verification that the product meets the requirements of Figure 8. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens re-submitted for qualification. Testing to confirm corrective action is required before re-submittal.

**4.4. Quality Conformance Inspection**

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

It is recommended that the operator confirm locking condition of the contact by pulling the crimped wire with a force of 1.2 kg when the crimped contact is loaded in the housing cavity. If the contact is dislodged by this test, reload the contact into the cavity and ensure locking by depressing the housing lance (detent on the upper part of the housing). After reloading the contact, pull the wire again with 1.2 kg force load to ensure contact is locked in position.