

AMP Micro-MaTch Miniature Connector Assembly

1. SCOPE .

1.1 Content

This specification covers the general description and performance requirements of the AMP Micro-MaTch Miniature Connector System, which includes a complete product-line of board to board and wire to board interconnections

1.1.1 Qualification

When tests are performed on subject product, procedures specified in this Product Specification shall be used. All inspections shall be performed using applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS.

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

2.1 AMP Documents

R041-1664	Test report	Wire-To-Board connector
R041-1665	Test report	Paddle-Board connector
R041-1666	Test report	Female On Board SMC connector
R041-1846	Test report	Female On Board SMD connector
R041-1847	Test report	Female In Board SMD connector
501-19005	Test report	Crimp-On Snap-In (COSI) connector
501-19094	Test report	lead-free wave soldering-heat (IDC-connection Paddle-Board)
501-19093	Test report	lead-free wave soldering-heat (Wave-solder connectors)
501-19092	Test report	lead-free reflow soldering-heat (SMD connectors)
114-19016	Application Specification	Micro-MaTch Miniature Connector System
114-19027	Application Specification	Micro-MaTch Female SMC Connector
114-19051	Application Specification	Micro-MaTch Crimp-on Snap-in Male on Wire connector

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DATE 28/10 /98

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DATE 30/10/98

EC EH10-xxxx-yy

2.2 DIN-specifications.

DIN 17662 Wrought copper alloys (tin-bronze); chemical composition
DIN 17670 Plate, sheet and strip of wrought copper and copper alloys: mechanical properties

2.3 I.E.C. Specifications

I.E.C. 512 Connectors used for frequencies below 3 MHz (Mc/s)
I.E.C 68 Basic environmental testing procedures for electric components and electronic equipment.

2.4 EIAJ Specification.

RCX-0102/101,102: Test methods of soldering of Surface Mount Devices

3. PRODUCT DESCRIPTION

3.1 Design and Construction:

Products shall be of design, construction and physical dimensions as specified on the applicable product drawings.

All connector types of the Micro-MaTch Miniature connector System are available from 4 to 20 positions (only even numbers)

Centerline distance between contacts is 1,27 mm (0,50") or a multiple of this case of selectively loaded connectors, which are available for all versions.

3.2 Material and Finish:

Contacts: Phosphor Bronze according DIN specifications, tinplated over nickel underlayer.

Housings: General: Polyester (PBT) 20% Glass filled
SMD-versions:P.A.4.6;30% Glassfilled
UL 94 V-0 rated
Colour: Red

3.3 Connector types

The system consists of the following connector types:

3.3.1 **Female-on-board connector**

Top entry and side entry, consisting of a number of contact springs, press-fit in moulded housings

3.3.2 **Female-on-board connector**

Top entry/Surface Mount Compatible (SMC) consisting of a number of contact springs, press-fit in a moulded housing. The connector is inserted into the PC board after the soldering operation and contacts the PC board surface by means of an additional spring member with an extremely sharp tip. For firm retention of the connector in the PC board each individual contact features a compliant pin section fitting in the corresponding hole.

EC EH10-XXXX-05

3.3.3 Male-on-board connector

Male-on-board connector assembly, consisting of a number of contact pins, press-fit in a moulded housing.

3.3.4 Male-on-wire connector

Male-on-wire connector assembly, consisting of a number of contact with slotted beam section, press-fit in a moulded housing, The connector features a cable cover, pre-loaded on the housing.

3.3.5 Paddle board connector

Paddle board connector assembly, consisting of a number of contact with slotted beam section, press-fit in a moulded housing. The connector features a cable cover, pre-loaded on the housing. After the application of the cable, the connector assembly is soldered in the PC board thus providing a reliable and cost-effective permanent connection of ribbon cable to the PC-board.

3.3.6 Female-on-board SMD connector.

Top entry, consisting of a number of contact springs press-fit in moulded housings.

3.3.7 Female-in board SMD connector.

Bottom entry, consisting of a number of contact springs, press-fit in moulded housings. The housing is partly falling in the PCB, causing a low built-in height.

3.3.8 Male on wire COSI (Crimp On Snap In) connector

The cosi connector is a male-on-wire connector designed for discrete wires. Contacts can be terminated to the wire with a semi-automatic stripper crimper or with a dedicated handtool, and manually inserted into the housing.

3.4 Application

With the connector versions, mentioned in section 3, the following interconnections can be realised

- Wire-to-board connection with the cable parallel to the PC board.
- Wire-to-board connection with the cable perpendicular to the PC board .
- Board-to-board connection with two parallel boards (sandwich configuration)
- Board-to-board connection with the perpendicular PC boards (mother/daughter board configuration)
- Wire-to-board and/or Board-to-board connections with the connector system positioned on the solder side of the PC board -for instance Surface Mount Application-
- Permanent connections of ribbon cable to PC board, using the Paddle board connector version.
- Wire-to board connection with discrete wires.

Note: The Micro-MaTch male-on-wire connector is specifically designed to be disengaged from its counterpart by pulling the cable in the appropriate direction.

3.5 Ribbon cable and wire Specification

3.5.1 Ribbon cable specification

The AMP Micro-MaTch connectors with IDC (insulation displacement connector) are designed for the application of ribbon cable with the following dimensions and properties:

- cable style :AWG 28, UL style 2651
- conductor spacing :1,27 mm (0,50")
- conductor diameter :solid 0,30 mm
stranded 7*0,12-0,13 mm
- insulation type : semi rigid PVC
- insulation diameter : 0,9 mm ± 0,1 mm

3.5.2 COSI- cable specification

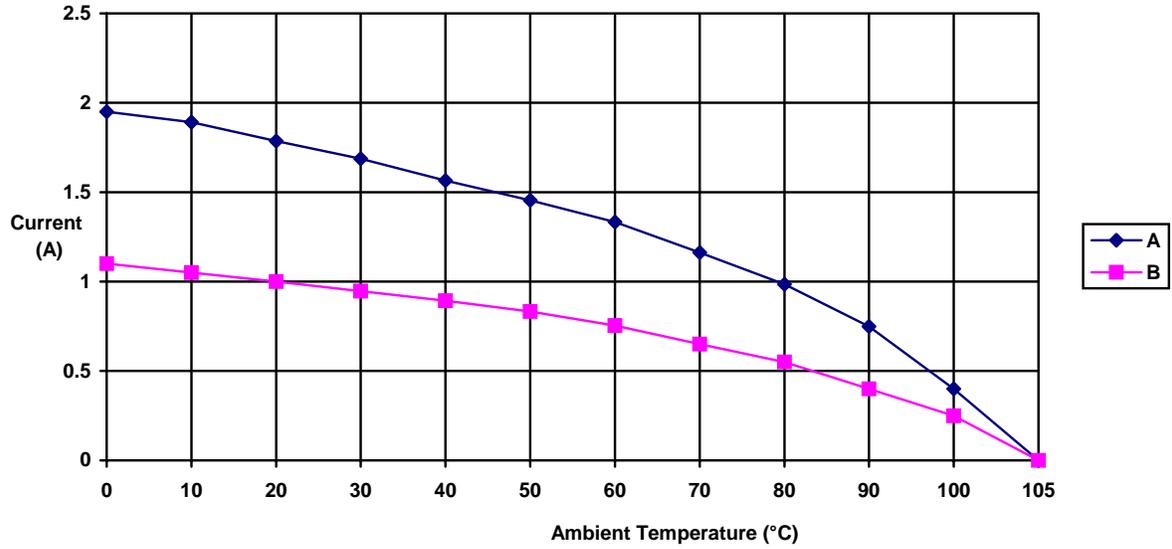
The Micro-MaTch COSI connector is designed for untwisted discrete wires in the range from 20-28 AWG.

- Maximum insulation diameter for wires between 20-24 AWG is \varnothing 0.76 mm
- Maximum insulation diameter for wires between 24-28 AWG is \varnothing 1.27 mm

3.6 Performance and Test description

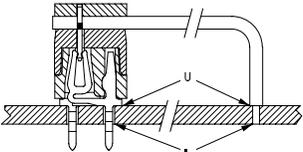
Ratings:

- Temperature: continuous operation throughout an ambient temperature range of -40°C to 105°C.
- Followed test procedure: IEC 512-3
- Current rating: For current carrying capacity see derating curves
- Voltage rating: 100 Volts DC or alternating current peak.
- Test conditions: Unless specifically stated, tests and examinations required by this specification shall be executed under any combination of conditions as specified in IEC 68-1, clause 5.3

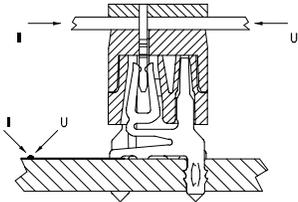
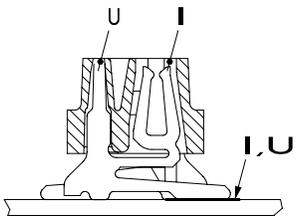
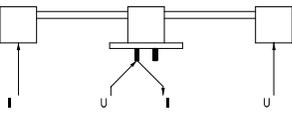


A valid for	SMC Female Top Entry with Male On Wire	B valid for:	Female Top Entry with Male On Board
	Female Side Entry with Male On Wire		Female Top Entry with Male On Wire
	SMD Female Top Entry with Male On Wire		Female Side Entry with Male On Board
	Paddle board		SMD inboard with Male On Wire
	Crimp on Snap In		

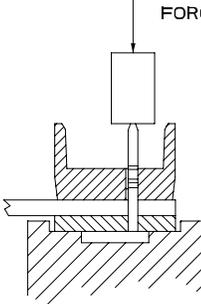
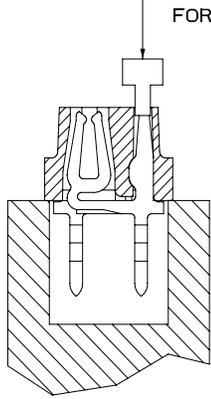
VISUAL			
	Test description	Performance Requirements or Severity	Procedures
3.6.1.	Examination of product	Meets requirements of product drawing and applicable AMP spec. 114-19016, 114-19051 or 114-19027.	Visual, dimensional and functional per applicable inspection plan. In acc. with IEC 512-2 test 1a. Magnification 10 x.
3.6.2.	Solderability for through hole versions	Solderbath temp 235°C. Ageing 3-16 hrs at 155°C Max. 5% dewetting	In acc. with IEC 68-2-20 Test Ta
3.6.3.	Resistance to soldering heat for through hole versions	Solderbath temp. 265°C Dip duration: 10 seconds Mount connectors in a PC-Board as intended to be applied. Requirement: No detrimental effects.	In acc. with: Tyco Test Spec 109-202 Method § 4.3.B.
3.6.4.	Solderability for SMD	Appearance of the specimen shall be inspected after the test with 10x magnification of any damage such as pinholes, void or rough surface.	Provisional standards of EIA of JAPAN. RCX-0102/101 (Test methods of soldering or surface mounting devices) Para 2.4.2. (Reflow soldering method)
3.6.5.	Resistance to Soldering Heat for SMD	3 cycles of 260°C peak reflow soldering simulation curve. Test severity shall not include moisture soak. Requirement: No detrimental effects.	In acc. with: Tyco Test Spec 109-201 Reflow curve § 3.4.B.2.

ELECTRICAL			
Para.	Test description	Performance Requirements or Severity	Procedures
3.6.6.	Insulation resistance	Test voltage 100V DC- or AC-peak. Duration: 1 minute. Requirement: 1000 MΩ min.	In acc. with IEC 512-2 test 3a.
3.6.7.	Voltage proof	Test voltage: 500 VAC. Duration: 1 minute Requirement: No break-down or flash-over	In acc. with IEC 512-2 test 4a.
3.6.8.	Termination resistance  <p>Measuring points Termination resistance</p>	Maximum open voltage 20 Millivolts. Maximum current 100 Milliampers. Termination resistance consists of bulk cable + bulk connectors and contact resistance. Requirement: 10 Milliohms max. (excluding bulk cable)	In acc. with IEC 512-2 test 2a. Under dry circuit conditions. All contacts measured.

ELECTRICAL (continued)

<p>3.6.9.</p>	<p>Termination resistance SMC types</p> 	<p>Max. open voltage 20 mV Max. current 100 mA Termination resistance consists of IDC slot resistance + contact resistance + bulk connectors + resistance contact member Pcbboard + PCB path. Requirement: 10 mΩ max. (exclude bulk resistance)</p>	<p>In acc. With IEC 512-2 test 2a Under dry circuit conditions All contacts measured.</p>
<p>3.6.10.</p>	<p>Termination resistance SMD types</p> 	<p>Max. open voltage 20 mV Max. current 100 mA Termination resistance consists of bulk resistance of contact + solder connection. Requirement: 10 mΩ max.</p>	<p>In acc. With IEC 912 test 2a Under dry circuit conditions All contacts measured.</p>
<p>3.6.11.</p>	<p>Termination resistance paddle board.</p> 	<p>Max. open voltage 20 mV Max. current 100 mA Termination resistance consists of IDC slot resistance + contact bulk resistance Requirement: 10 mΩ max.</p>	<p>In acc. With IEC 512-2 test 2a Under dry circuit conditions All contacts measured.</p>

MECHANICAL

	Test description	Performance Requirements or Severity	Procedures
<p>3.6.12</p>	<p>Contact retention in housing.</p>	<p>Requirements: 10 N min. per contact.No dislodge from housing.</p>  <p>Contact retention in housing male on wire connector</p>	<p>In acc. with IEC 512-8 test 5b. (COSI: 512-8 test15a)</p>  <p>Contact retention in housing female connector</p>
<p>3.6.13</p>	<p>Mechanical operation</p>	<p>Number of operations: 20 Frequency: 10 times/min. Minimum time between 2 operations: 1 sec.</p>	<p>In acc. with IEC 512-5 test 9a.</p>

MECHANICAL (continued)

3.6.14	Axial strength of wire termination	min. 10N/contact rate 25 mm/min	In acc with IEC 512-8 Test 16d
3.6.15	Tensile strength of cable termination.	min. force 10N/contact	soldered connector/ cable assembly is loaded with force, perpendicular to board surface
3.6.16	Engaging and separating force	Engaging max 5N/contact Separating 1 N/contact for standard Micro-MaTch. Separating force for Micro-MaTch COSI 0,7N/contact	In acc. with IEC 512-7 test 13a (COSI 13b)
3.6.17	Vibration	10-55 Hz sweep rate: 1 oct./min. /0,75 mm 10 cycles (45 minutes) in each direction. Requirements: No physical damage No discontinuity >1 μ sec.	In acc. with IEC 512-4 test 6d. In acc. with IEC 68-2-6 test Fc.procedure 8.2.1
3.6.18	Push-in push out forces in a PCB	Push out force 13 N min per contact	At push in forces connectors must be supported by a part of the application tooling. The push out force to be determined by pushing onto the posts Speed 5mm/minute.
3.6.19	Connector insertion force in PCB (only Paddle board)	Max 5N per contact	Terminated paddleboard connector is inserted into PC board with appropriate hole pattern
3.6.20	Connector extraction force out of PCB (only paddleboard)	Min force 0,5 N per contact (depends on hole size and board material)	Terminated paddleboard connector is extracted from PC board.

ENVIRONMENTAL

Para.	Test description	Performance Requirements or Severity	Procedures
3.6.21	Damp heat cyclic	25/ 55°C 12/12 hours. unmated total 6 cycles.	In acc. with IEC 512-6 test 11m.
3.6.22	Dry heat under cyclic current loading	Temp. 70°C, test current 125 % of rated current (par 3.6.) 500 cycles. 45 min ON/15 min OFF.	In acc. with IEC 512-5 test 9e.
3.6.23	Dry heat test	Temperature 105°C Duration: 16 hours.	In acc. with IEC 512-6 test 11l. (COSI:IEC 68-2-2 test Ba)
3.6.24	Cold test	Temperature: - 40 ° Duration 2 hrs, unmated	In acc. with IEC 512-5 test 11j.
3.6.25	Rapid change of temperature	-40/+105°C 15 min/15 min, 10 cycles mated.	In acc. with IEC 512-6, test 11d.

3.7

Test sequence

3.7.1 Female Top/Side Entry in combination with Male on Wire/Male On Board connector.

Tests	Measurements	Paragraph
<u>Testgroup 1</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.8
3. Climatic sequence		
a) Dry heat		3.6.22
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.22
4.	Termination resistance	3.6.8
5. Visual examination		3.6.1
<u>Testgroup 2</u>		
1. Visual examination		3.6.1
2. Engaging force		3.6.16
3.	Termination resistance	3.6.8
4. Separating force		3.6.16
5. Mechanical operation and		3.6.13
6. engaging force last cycle		3.6.10
7.	Termination resistance	3.6.8
8. Damp heat cyclic, 6 cycles		3.6.21
9.	Termination resistance	3.6.8
10. Separating force		3.6.10
11. Visual examination		3.6.1
<u>Testgroup 3:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.8
3. Rapid change of temperature		3.6.25
4.	Termination resistance	3.6.8
5. Vibration		3.6.17
6.	Termination resistance	3.6.8
7. Visual examination		3.6.1
<u>Testgroup 4:</u>		
1. Visual examination		3.6.1
2. Solderability		3.6.2
3. Visual examination		3.6.1
<u>Testgroup 5:</u>		
1. Visual examination		3.6.1
2. Resistance to soldering heat		3.6.3
3. Visual examination		3.6.1
<u>Testgroup 6:</u>		
1. Visual examination		3.6.1
2. Axial strength of wire termination (half the lot)	Termination strength in Newtons	3.6.14
3. Rapid change of temperature		3.6.25
4. Axial strength of wire termination (rest of the lot)	Termination strength in Newtons	3.6.14
<u>Testgroup 7:</u>		
1. Visual examination		3.6.1
2. Contact retention in housing	Push-out force in Newtons	3.6.12

Tests	Measurements	Paragraph
3. Visual examination		3.6.1
<u>Testgroup 8:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.8
3. Dry heat under cyclic current loading		3.6.22
4.	Termination resistance	3.6.8
5. Visual examination		3.6.1
<u>Testgroup 9:</u>		
1. Visual examination		3.6.1
2. Pre-conditioning (24 hrs at lab. conditions)		
3.	Insulation resistance	3.6.6
4. Voltage proof		3.6.7
5. Climatic sequence		
a) Dry heat		3.6.22
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.22
	Insulation resistance	3.6.6
6.		3.6.7
7. Voltage proof		3.6.25
8. Rapid change of temperature	Insulation resistance	3.6.6
9.		3.6.7
10. Voltage proof		3.6.1
11. Visual examination		

3.7.2 Additional tests for the female top entry SMC with Male On Wire/Board connector

Tests	Measurements	Paragraph
<u>Testgroup 1</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.9
3. Climatic sequence		
a) Dry heat		3.6.22
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.22
4.	Termination resistance	3.6.9
5. Visual examination		3.6.1
<u>Testgroup 2</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.9
3. Mechanical operation		3.6.13
4.	Termination resistance	3.6.9
5. Damp heat cyclic, 6 cycles		3.6.13
6.	Termination resistance	3.6.9
7. Visual examination		3.6.1
<u>Testgroup 3:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.9
3. Rapid change of temperature		3.6.25
4.	Termination resistance	3.6.9
5. Visual examination		3.6.1

<u>Testgroup 4:</u>		
1. Visual examination		3.6.1
2. Push-in and push out forces in a PCB		3.6.18
3. Visual examination		3.6.1
<u>Testgroup 5:</u>		
1. Visual examination		3.6.1
2. Dry heat under cyclic current loading	Termination resistance	3.6.9
3. Dry heat under cyclic current loading		3.6.22
4. Visual examination	Termination resistance	3.6.9
5. Visual examination		3.6.1
<u>Testgroup 6:</u>		
1. Visual examination		3.6.1
2. Contact retention in housing	Push out forces in Newtons	3.6.12
3. Visual examination		3.6.1

3.7.3 Additional tests for Paddle board connector

Tests	Measurements	Paragraph
<u>Testgroup 1</u>		
1. Visual examination		3.6.1
2. Climatic sequence	Termination resistance	3.6.11
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
3. Visual examination	Termination resistance	3.6.11
		3.6.1
<u>Testgroup 2:</u>		
1. Visual examination		3.6.1
2. Rapid change of temperature	Termination resistance	3.6.11
3. Rapid change of temperature		3.6.25
4. Visual examination	Termination resistance	3.6.11
5. Visual examination		3.6.1
<u>Testgroup 3:</u>		
1. Visual examination		3.6.1
2. Solderability		3.6.2
3. Visual examination		3.6.1
<u>Testgroup 4:</u>		
1. Visual examination		3.6.1
2. Resistance to soldering heat	Termination resistance	3.6.11
3. Resistance to soldering heat		3.6.3
4. Visual examination	Termination resistance	3.6.11
5. Visual examination		3.6.1
<u>Testgroup 5:</u>		
1. Visual examination		3.6.1
2. Axial tensile strength of wire termination	Termination strength in Newtons	3.6.15
3. Visual examination		3.6.1

Tests	Measurements	Paragraph
<u>Testgroup 6:</u>		
1. Visual examination		3.6.1
2. Connector insertion force	Push-in force in Newtons	3.6.19
3. Connector extraction force	Push-out forces in Newtons	3.6.20
4. Visual examination		3.6.1
<u>Testgroup 7:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.11
3. Dry heat under cyclic current loading		3.6.22
4.	Termination resistance	3.6.11
5. Visual examination		3.6.1

3.7.4 Additional tests for Female SMD (Top Entry and in-board) with Male on Wire/Board.

Tests	Measurements	Paragraph
<u>Testgroup 1</u>		
1. Visual examination		3.6.1
2. Pre-conditioning (24 hrs at lab. conditions)		
3.	Termination resistance	3.6.10
4.	Insulation resistance	3.6.6
5. Voltage proof		3.6.7
6. Climatic sequence		
a) Dry heat		3.6.23
b) Damp heat cyclic, first cycle		3.6.21
c) Cold		3.6.24
d) Damp Heat cyclic, remaining 5 cycles		3.6.21
7.	Termination resistance	3.6.10
8.	Insulation resistance	3.6.6
9. Voltage proof		3.6.7
10. Rapid change of temperature		3.6.25
11.	Termination resistance	3.6.10
12.	Insulation resistance	3.6.6
13. Voltage proof		3.6.7
14. Visual examination		3.6.1
<u>Testgroup 2: (in-board only)</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.11
3. Mechanical operation		3.6.25
4.	Termination resistance	3.6.10
5. Damp heat cyclic, 6 cycles		3.6.
6.	Termination resistance	3.6.10
7. Visual examination		3.6.1
<u>Testgroup 3:</u>		
1. Visual examination		3.6.1
2.	Termination resistance	3.6.10
3. Rapid change of temperature		3.6.25
4.	Termination resistance	3.6.10
5. Vibration		3.6.17
6.	Termination resistance	3.6.10
7. Visual examination		3.6.1

Tests	Measurements	Paragraph
<u>Testgroup 4:</u> 1. Visual examination 2. Contact retention in housing 3. Visual examination	Push out force in Newtons	3.6.1 3.6.12 3.6.1
<u>Testgroup 5:</u> 1. Visual examination 2. Solderability 3. Visual examination		3.6.1 3.6.4 3.6.1
<u>Testgroup 6:</u> 1. Visual examination 2. Resistance to soldering heat 3. Visual examination		3.6.1 3.6.5 3.6.1

3.7.5 Additional tests for COSI Male on Wire with Female top entry.

Tests	Measurements	Paragraph
<u>Testgroup 1</u> 1. Visual examination 2. 3. Climatic sequence a) Dry heat b) Damp heat cyclic, first cycle c) Cold d) Damp Heat cyclic, remaining 5 cycles 4. 5. Visual examination	Termination resistance Termination resistance	3.6.1 3.6.8 3.6.23 3.6.21 3.6.24 3.6.21 3.6.8 3.6.1
<u>Testgroup 2</u> 1. Visual examination 2. Engaging/separating force 3. 4. Mechanical operation 5. Engaging/separating force 6. 7. Damp heat cyclic 8. Engaging/separating force 9. 10. Visual examination	Termination resistance Termination resistance Termination resistance	3.6.1 3.6.16 3.6.8 3.6.13 3.6.16 3.6.8 3.6.21 3.6.16 3.6.8 3.6.1
<u>Testgroup 3:</u> 1. Visual examination 2. 3. Rapid change of temperature 4. 5. Vibration 6. Visual examination	Termination resistance Termination resistance Termination resistance	3.6.1 3.6.8 3.6.25 3.6.8 3.6.17 3.6.8 3.6.1
<u>Testgroup 4:</u> 1. Visual examination 2. Contact retention in housing		3.6.1 3.6.12

QUALITY ASSURANCE PROVISIONS

4.1 Qualification testing:

4.1.1 Sample selection:

Samples shall be released in accordance with applicable instruction sheets. They shall be selected at random from production. At least 5 connectors of the 6 positions or at least 30 contacts shall be used for each testgroup.

4.1.2 Test sequence

Qualification inspection shall be verified by testing samples as specified in spec. 108-19052 Par 3.7.

4.2 Requalification testing

If changes significantly affecting form, fit or function are made to the product or the manufacturing process, product assurance shall co-ordinate requalification 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 requirement of par 3.6. Failures attributed to equipment, test set-up or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted to qualification. Testing to confirm corrective action is required before submittal.

4.4 Quality Conformance Inspection

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