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**HPI CONNECTOR, 2.0mm PITCH, LOCKING TYPE**

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**1. SCOPE**

This specification covers the requirements for product performance, test methods and quality assurance provisions for High Performance Interconnect (HPI) Connectors, 2.0mm Pitch, Locking Type.

The applicable product descriptions and part numbers are as follows:

Part Number	Part Description
1735447	HPI 2.0 Receptacle Housing, with lock, 3~16 Position
2041423	HPI 2.0 Receptacle Housing, with lock, Low profile, 3~16 Position
1735446	2mm Pitch HPI Post Header, Vertical, with lock, 3~16 Position

**2. APPLICABLE DOCUMENTS**

The following documents form a part of this specification to the extent specified herein. 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 TYCO Specifications**

- |    |            |   |
|----|------------|---|
| A. | 109-1      | Test Specification, General Requirements for Test Methods |
| B. | 109 series | Test Specification  |
| C. | 501-51084  | Qualification Test Report                                 |

### 3. REQUIREMENTS

#### 3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

#### 3.2 Materials

- A. Housing
  - Material : Thermoplastics, Natural
  - Flame Class Rating : UL 94V-0
- B. Contact
  - Material : Copper Alloy
  - Finish : Bright Tin Plated Over  
Nickel Under-plate All Over

#### 3.3 Ratings

- Voltage : 3A, 100 VAC/DC  
1A, 250 VAC/DC
- Operating Temperature : -25°C to +85°C
- Current : AWG #24 – 3.0A  
AWG #26 – 2.0A  
AWG #28 – 1.5A  
AWG #30 – 1.0A

##### 3.3.1 Applicable wires

- A. Wire size: AWG #30 -- #24 ( $0.05\text{mm}^2 - 0.22\text{mm}^2$ )
- B. Insulation diameter: 0.9mm – 1.5mm

Note: The compatibility of wires for termination must be evaluated accordingly by the category from each manufacturer, brand, tradenames and product catalogue numbers

##### 3.3.2 Applicable Printed Circuit Board

- A. Board thickness: 1.0mm – 1.6mm
- B. Hole diameter: 0.8mm – 0.9mm

### 3.4 Performance Requirements and Test Descriptions

The product is designed to meet the electrical, mechanical and environmental performance requirements as specified in Figure 1. All tests are performed at ambient environmental conditions per Tyco specification 109-1 unless otherwise specified.

### 3.5 Test Requirements and Procedure Summary

Para	Test Items	Requirements		Procedure
3.5.1	Conformity of product physical requirements	Shall conform to the Product Drawing and Application Specification		Visually inspected per applicable quality inspection plan
Electrical Requirements				
3.5.2.1	Contact Resistance	10 m $\square$ Max. (Initial) 20 m $\square$ Max. (Final)		Subject mated contacts assembled in housing to 20mV Max open circuit at 10mA Max
3.5.2.2	Dielectric Strength	Connector must withstand test potential of 1000 VAC for 1 minute. Current leakage: 5.0mA max.		Measure by applying test potential between adjacent contacts, and between the contacts and ground in the mated connector assembly.
3.5.2.3	Insulation Resistance	1000 M $\square$ Min.(Initial) 500 M $\square$ Min.(Final)		Measure by applying test potential between adjacent contacts, and between the contacts and ground in the mated connector assembly.
Mechanical Requirements				
3.5.3.1	Connector Mating/Un-mating Force	See Figure 2		Subject terminated connector and header to mating and un-mating (to measure the force required to engage and disengage) at a rate of 25mm/min.
3.5.3.2	Individual Pin Insertion/Extraction Force	Insertion Force	Extraction Force	Subject terminated contact and pin to mate and un-mate to measure the force required to engage and disengage at the rate of 25mm/min.
		0.7kgf MAX	0.10kgf MIN (Initial)  0.08kgf MIN (Final)	

Para	Test Items	Requirements	Procedure
3.5.3.3	Tensile Strength of Wire Termination	AWG #24 – 3.0kgf min. AWG #26 – 2.0kgf min. AWG #28 – 1.0kgf min. AWG #30 – 0.8kgf min.	Apply an axial pull-off load to terminated wire of contact at a rate of 100mm/min in the axial direction
3.5.3.4	Contact Retention Force	1.5 kgf min. per contact	Apply axial load to terminated contact at a rate of 100mm/min.
3.5.3.5	Post Retention Force	1.0kgf min. per contact	Apply axial pull-off load to post contact mounted on housing and measure the force required to dislodge post from housing
3.5.3.6	Durability (repeated mating/un-mating)	Termination resistance (low level) shall be met	Subject connector assembly to 50 cycles of repeated mating/un-mating at a rate of 10cycles/min
3.5.3.7	Vibration Sinusoidal Low Frequency	No electrical discontinuity greater than 1 $\mu$ s. Termination resistance (low level) shall be met	Subject mated connectors to 10-55-10Hz traverse in 1 minute at 1.52mm amplitude; 2 hrs in each of the 3 mutually perpendicular planes. MIL-STD-202, Method 201, Condition A
3.5.3.8	Solderability	The contact solder tails should be covered by a continuous new solder coating for minimum 95% of affected area	Subject contacts to solderability testing, as specified solder transfer at 245 $\pm$ 5°C for 3 $\pm$ 0.5s MIL-STD-202, Method 208
3.5.3.9	Latch Retention Force	The mated connector should withstand a force of 3kgf MIN and should not be unmated, break off or damage.	Subject mated connectors to axial load at un-mating direction at the rate of 25mm/min.

Para	Test Items	Requirements	Procedure
<b>Environmental Requirements</b>			
3.5.4.1	Resistance to Wave Soldering Heat	No physical damage shall occur	Subject product mounted on printed circuit board to solder bath at $260\pm 5^{\circ}\text{C}$ for $3\pm 1\text{s}$  MIL-STD-202, Method 210 except as indicated above when testing by manual soldering iron, apply it as $350\pm 10^{\circ}\text{C}$ for 1-2 without forcing pressure to affect the time contact
3.5.4.2	Thermal Shock	Contact resistance (low level) shall be met. Must meet requirement of 3.5.2.2 & 3.5.2.3	Subject mated connector assembly to 25 cycle at $-55\pm 3^{\circ}\text{C}$ for 30min; $+85\pm 2^{\circ}\text{C}$ for 30min  MIL-STD-202, Method 107, Condition A
3.5.4.3	Humidity-Temperature cycle	Insulation resistance (final) 500 M $\Omega$ Min.  Termination resistance (low level) shall be met.  Dielectric strength shall be met	Subject mated connectors to steady state humidity at $40^{\circ}\text{C}$ and 90-95%RH for 240hrs  MIL-STD-202, Method 103, Condition B
3.5.4.4	Temperature Life (Heat Aging)	Termination resistance (low level) shall be met	Subject mated connector assemblies to temperature life at $85\pm 2^{\circ}\text{C}$ for 240hrs
3.5.4.5	Salt Spray	Termination resistance (low level) shall be met	Subject mated/unmated connectors to $5\pm 1\%$ salt concentration for 48hrs.  MIL-STD-202, Method 101, Condition B

Figure 1

**Figure 2 Initial & 50th cycle Mating/Unmating Force**

Initial & 50 <sup>th</sup> cycle			
Circuit Position	Mating Force (kgf max)	Un-mating Force (kgf min)	
		Without Latch	
		Initial	Final
2	2.5	0.8	0.6
3	3.0	0.8	0.6
4	3.5	1.0	0.8
5	4.0	1.0	0.8
6	4.5	1.2	1.0
7	5.0	1.2	1.0
8	5.5	1.4	1.2
9	6.0	1.4	1.2
10	6.5	1.6	1.4
11	7.0	1.6	1.4
12	7.5	1.8	1.6
13	8.0	1.8	1.6
14	8.5	2.0	1.8
15	9.0	2.0	1.8
16	9.5	2.0	1.8

Figure 2

### 3.6. Product Qualification and Re-qualification test

Test or Examination	Test Group									
	A	B	C	D	E	F	G	H	I	J
	Test Sequence(a)									
Examination of Product	1, 7	1, 9	1, 5	1, 5	1, 5	1, 5	1, 5	1, 3	1, 3	1,3
Contact Resistance		2, 8	2, 4	2, 4	2, 4	2, 4	2, 4			
Dielectric withstanding Voltage	3, 6									
Insulation Resistance	2, 5									
Mating Force		3, 7								
Unmating Force		4, 6								
Durability		5								
Vibration			3							
Solderability									2	
Latch Retention Force										2
Resistance to Soldering Heat								2		
Thermal Shock				3						
Humidity Temperature Cycling	4				3					
Temperature Life						3				
Salt Spray							3			

Figure 3

NOTE: (a) Numbers indicate sequence in which tests are performed.

(b) Discontinuities shall not take place in this test group, during tests.

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## **4.0 QUALITY ASSURANCE PROVISIONS**

### **4.1 Qualification Testing**

#### **A. Test Specimens**

The test specimens to be used for testing shall be conforming to the requirements of the applicable product drawings. Unless otherwise specified, no samples shall be re-used.

#### **B. Test Condition**

Unless otherwise specified, all tests shall be performed under any combination of the following test conditions:

Temperature: 15 - 30°C

Relative Humidity: 45 – 75%

Atmospheric Pressure: 650-800mmHg

### **4.2 Re-Qualification Testing**

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

### **4.3 Acceptance**

Acceptance is based upon verification that product meets requirements of Figure 1. Failures attributed to equipment, test set-up or operator deficiencies shall not disqualify product. When product failure occurs, corrective action shall be taken and samples re-submitted for qualification. Testing to confirm corrective action is required before re-submittal.

### **4.4 Quality Conformance Inspection**

Applicable Tyco quality inspection plan will specify sampling acceptable quality level to be used.

Dimensional and functional requirements shall be accordance with applicable product drawing and specification.