
AMPOWER* Wave Crimp System ACTION PIN* Header and Plug Connectors

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for AMPOWER* Wave Crimp System header and plug connectors. This family terminates insulated flat copper cable, measuring nominally 1 inch wide with .010 or .020 inch conductor thickness, in a single plug which mates to a circuit board header. The header is equipped with ACTION PIN* feature tails on .100 inch centers. This feature allows the header tails to make reliable contact with plated through holes in a .093 inch thick circuit board simply by pushing the tails into the holes instead of soldering them to the board. The header is available for vertical orientation only, allowing the mating axis to be perpendicular to the circuit board. The flat cable is available with either 1 or 2 conductors within the same dimensional envelope. Plug and header are polarized to preserve circuit polarity.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

The following documents constitute 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 Electronics Documents

- ! 109-1: Test Specification (General Requirements For Test Specifications)
- ! 109 Series: Test Specifications as indicated in Figure 1
- ! 114-49005: Application Specification (AMPOWER* Wave Crimp System)
- ! 501-210: Qualification Test Report (AMPOWER* Wave Crimp System ACTION PIN* Header and Plug Connectors)
- ! 92-9983-359-1: Printed circuit test board, 1 ounce
- ! 92-9983-359-3: Printed circuit test board, 5 ounce

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

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

3.3. Ratings

- ! Voltage: 250 volts AC
- ! Current: See Figure 2 for applicable current carrying capability
- ! Temperature: -55 to 105°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per Test Specification 109-1.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing and Application Specification 114-49005.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination resistance, dry circuit.	1 milliohm maximum initial. 2 milliohms maximum final.	AMP Spec 109-6-1. Subject mated contacts assembled in housing to 50 millivolts open circuit at 100 milliamperes maximum. See Figure 6.
Dielectric withstanding voltage.	One minute hold with no breakdown or flashover.	AMP Spec 109-29-1. 1500 volts AC (rms). First test between cable conductors. Then test between both conductors and 1.25 inch wide strip of conducting foil wrapped around the plastic housing of mated plug and header.
Insulation resistance.	5000 megohms minimum initial.	AMP Spec 109-28-4. Test between adjacent contacts of mated connector assemblies.
Temperature rise vs current.	30°C maximum temperature rise at specified current.	AMP Spec 109-45-1. Measure temperature rise vs current. See Figures 2 and 7.
MECHANICAL		
Sinusoidal vibration.	No discontinuities greater than 1 microsecond. See Note.	AMP Spec 109-21-2. Subject mated connectors to 10 G's between 10 to 500 to 10 Hz traversed in 15 minutes. Three hours in each of 3 mutually perpendicular planes. See Figure 5.

Figure 1 (continued)

Test Description	Requirement	Procedure
Physical shock.	No discontinuities greater than 1 microsecond. See Note.	AMP Spec 109-26-1. Subject mated connectors to 50 G's half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 5.
Mating force, plug and header.	20 pounds maximum.	AMP Spec 109-42, Condition A. Measure force necessary to mate connector assemblies with locking latches using free floating fixtures, moving from point of initial contact until latching is complete at a maximum rate of 1 inch per minute.
Unmating force, plug and header.	1 pound minimum.	AMP Spec 109-42, Condition A. Measure force necessary to unmate connector assemblies with locking latches removed at a maximum rate of 1 inch per minute.
Contact retention, header.	Contacts shall not dislodge.	AMP Spec 109-30. Apply axial load of 3 pounds to contacts in the unmating direction at a maximum rate of .5 inch per minute.
Contact retention, plug.	Cable strain relief integrity and function shall remain intact.	AMP Spec 109-30. Apply an axial load of 45 pounds to the contacts by pulling on the cable in the unmating direction at a maximum rate of 2 inches per minute and releasing.
Insertion force, header.	480 pounds maximum.	AMP Spec 109-41. Measure force necessary to insert header into a printed circuit board at a maximum rate of 1 inch per minute.
Extraction force, header.	48 pounds minimum.	AMP Spec 109-41. Measure force necessary to extract header from a printed circuit board using an axial pull at a maximum rate of 1 inch per minute.
Crimp tensile.	30 pounds minimum for .010 inch conductor. 40 pounds minimum for .020 inch conductor.	AMP Spec 109-16. Determine crimp tensile on half width cable at a maximum rate of 1 inch per minute.
Durability.	See Note.	AMP Spec 109-27. Manually mate and unmate connector assemblies for 100 cycles at maximum rate of 600 cycles per hour.

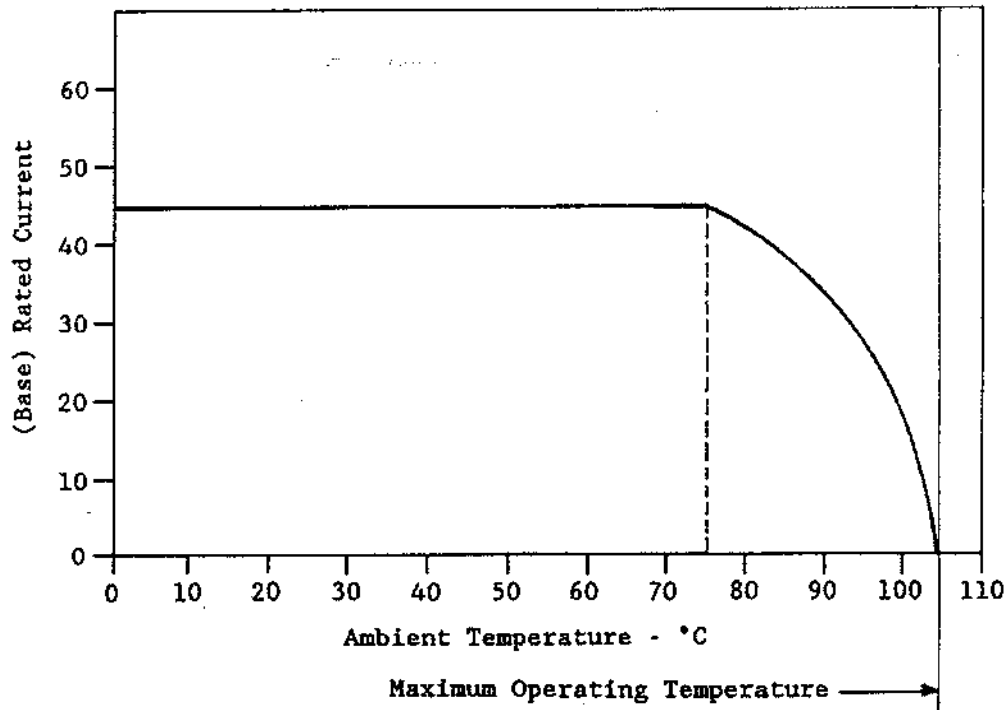
Figure 1 (continued)

Test Description	Requirement	Procedure
Housing lock strength.	25 pounds minimum.	AMP Spec 109-50. Determine strength of the housing locking mechanism with contacts present at a maximum rate of .5 inch per minute.
ENVIRONMENTAL		
Thermal shock.	See Note.	AMP Spec 109-22. Subject mated connectors to 25 cycles between -55 and 85°C.
Humidity/temperature cycling.	See Note.	AMP Spec 109-23-4. Subject mated connectors to 10 humidity/temperature cycles between 25 and 65°C at 95% RH.
Mixed flowing gas.	See Note.	AMP Spec 109-85-3. Subject mated connectors to environmental class III for 20 days.
Temperature life.	See Note.	AMP Spec 109-43. Subject mated connectors to temperature life at 140°C for 720 hours.

NOTE

Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests specified in the Test Sequence in Figure 3.

Figure 1 (end)



NOTE

Rated current for 1 conductor of .020, 2 conductor cable, both conductors energized. Header pushed into plated through holes of .093 X 3.5 X 12 inch printed circuit board with 5 ounce copper cladding, see Figure 7.

Figure 2A
Current Carrying Capability

Test Board Foil Weight (ounce)	Conductor Thickness			
	.010 Inch		.020 Inch	
	Solid	Split	Solid	Split
5	1.65	.82	2	1
2	1.45	.73	1.8	.9
1	1.35	.67	1.6	.78

NOTE

To determine acceptable current carrying capacity for printed circuit board and cable configuration indicated, use the Multiplication Factor (F) from the above chart and multiply it times the Base Rated Current at maximum ambient operating temperature as shown in Figure 2A. In Figure 2B, split and solid refer to 1 and 2 conductor cables. Ratings are per conductor with both conductors energized when split cable is used.

Figure 2B
Current Rating

3.6. Product Qualification And Requalification Test Sequence

Test or Examination	Test Group (a)					
	1	2	3	4	5	6
	Test Sequence (b)					
Examination of product	1,10	1,10	1,9	1,3	1,3	1,4
Termination resistance, dry circuit	3,7	2,8				
Dielectric withstanding voltage			3,7			
Insulation resistance			2,6			
Temperature rise vs current		3,9				
Sinusoidal vibration	5	7(c)				
Physical shock	6					
Mating force	2					
Unmating force	8					
Contact retention, header					2	
Contact retention, plug	9					
Insertion force, header						2
Extraction force, header						3
Crimp tensile				2		
Durability	4					
Housing lock strength			8			
Thermal shock			4			
Humidity/temperature cycling		5	5			
Mixed flowing gas		4(d)				
Temperature life		6				

NOTE

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Discontinuities shall not be measured, energize at 18°C level for 100% loading as determined in Test Specification 109-151.
- (d) Precondition samples with 10 durability cycles.

Figure 3

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample selection.

Connector housings and contacts shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Test groups 1, 2 and 3 shall consist of unmated plugs and headers. Plugs shall be terminated to short lengths of cable of specified conductor thickness. Headers shall be equipped with ACTION PIN feature contacts. Test group 4 shall consist of short lengths of cable of specified conductor thickness terminated to plug contacts without plug housing. Test groups 5 and 6 shall consist of headers only. Sample quantities, conductor thickness and part numbers for printed circuit test boards are shown in Figure 4. All samples shall be constructed using split cable; test groups 1, 3 and 4 shall have 12 inch cables, test group 2 shall have 24 inch cables. Ligatures shall be sheared. Approximately 1/2 inch of insulation shall be stripped from unterminated cable ends. Cable ends shall be notched and .17 inch diameter hole punched in each cable half next to the notch.

Test Group	Quantity	Conductor Thickness		PCB Part Number
		.010	.020	
1	16	8	8	92-9983-359-1
2	16	8	8	92-9983-359-1
				92-9983-359-5
3	8		8	
4	16	8	8	
5	8			
6	16			92-9983-359-1

NOTE

For test group 2, use 1 ounce copper printed circuit test board with .010 cable samples and 5 ounce copper printed circuit test board with .020 cable samples.

Figure 4

B. Test sequence.

Qualification inspection shall be verified by testing samples as specified in Figure 3.

4.2. Requalification Testing

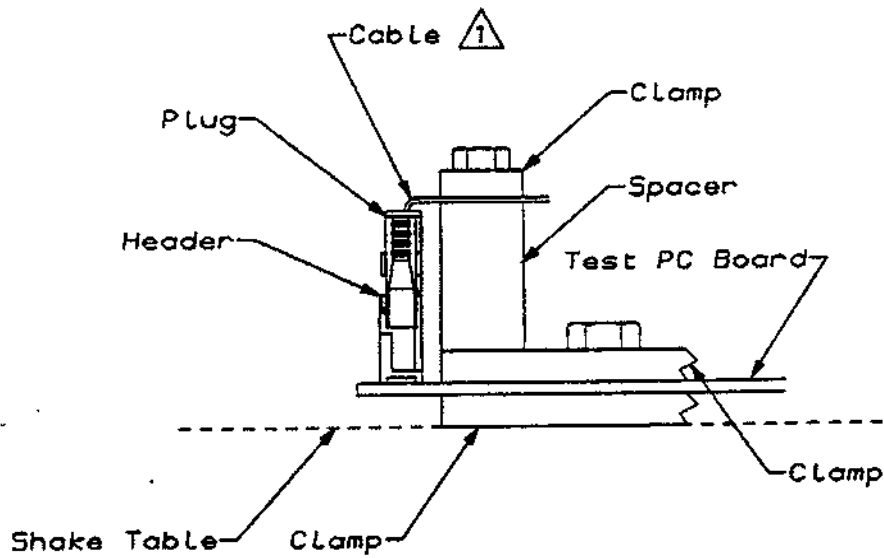
If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based upon verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required prior to resubmittal.

4.4. Quality Conformance Inspection

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



 Cable to be clamped within .5 inch.

Figure 5
Vibration and Physical Shock

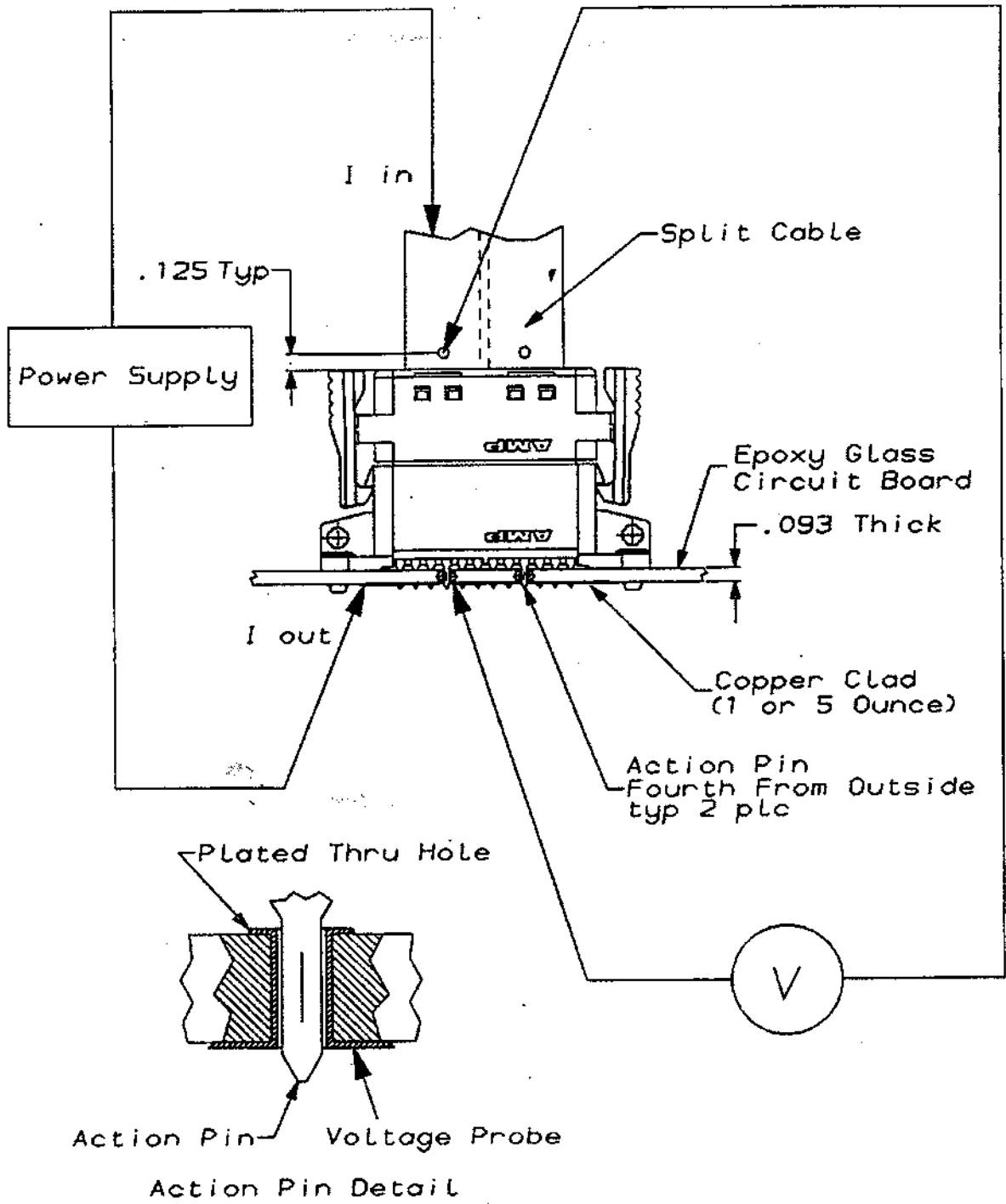


Figure 6
Resistance Measurement Points

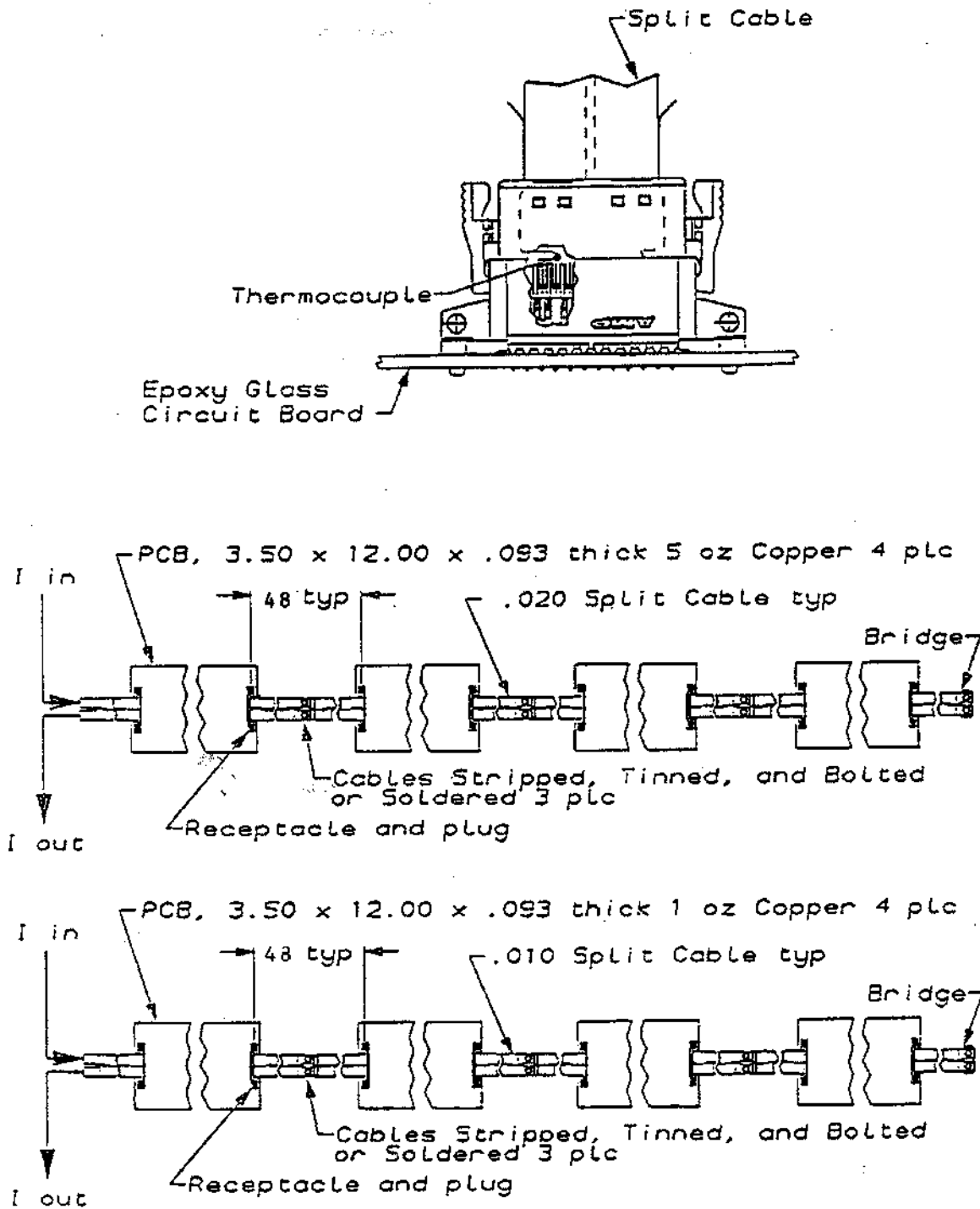


Figure 7
Temperature Measurement Points