Interconnection System, AMPMODU*, 2 Piece

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for AMPMODU* 2 piece interconnection system. The receptacle half of the 2 piece configuration uses standard or short-point-of-contact terminals which are housed in a flame retardant insulator. Plug or post half of the connector system also uses a flame retardant insulator loaded with .025 inch square posts of either a compliant pin type or standard solder type. Compliant pin post connectors can be press-fit into printed circuit boards having either plated through or unplated holes. If used with unplated holes, only the mechanical tests for the compliant pin shall be considered.

1.2. Qualification

When tests are performed on subject product line, procedures specified in AMP 109 series specifications 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 extent specified herein. Unless otherwise specified, latest edition of the document applies. In the event of conflict between requirements of this specification and product drawing, 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

A. 109-1: General Requirements for Test Specifications
B. 109 Series: Test Specifications as indicated in Figure 1. (Comply with MIL-STD-202, MIL-STD-1344 and EIA RS-364)

2.2. Federal Standards

A. QQ-N-290: Nickel Plating, Electrodeposited
B. QQ-B-750: Phosphor Bronze

2.3. Military Standard

MIL-STD-105: Sampling Procedure and Tables for Inspection by Attributes

2.4. Military Specifications

A. MIL-G-45204: Gold Plating, Electrodeposited
B. MIL-I-45208: Inspection System Requirements
C. MIL-M-14: Molded Plastic and Molded Plastic Parts, Thermosetting
D. MIL-M-20693: Molded Plastic, Polyamide
E. MIL-P-46174: Plastic Molded Material, Polyphenylene Sulfide
F. MIL-T-10727: Tin Plating, Electrodeposited

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Materials

A. Terminal: Copper alloy
B. Housing:
(1) Glass filled thermoplastic, UL94V-0
(2) Thermoset, UL94V-0

3.3. Ratings

A. Current: 3 amperes maximum per contact
B. Operating temperature:
(1) -65 to 105°C for glass filled nylon housing
(2) -65 to 125°C for diallyl phthalate and polyphenylene sulfide housings

3.4. Performance and Test Description

Product is designed to meet electrical, mechanical and environmental performance requirements specified in Figure 1.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing.	Visual, dimensional and functional per applicable inspection plan.
ELECTRICAL		
Termination resistance, dry circuit (low level).	8 milliohms maximum for compliant pin to printed circuit board. 12 milliohms maximum for standard header. 20 milliohms maximum when measurements are combined.	AMP 109-6-1. Subject mated contacts assembled in housing to 50 mv maximum open circuit at 100 ma maximum. See Figure 3.
Termination resistance, rated current.	12 milliohms maximum for standard header. 20 milliohms when measurement includes compliant pin to printed circuit board. 3 amperes maximum.	AMP Spec 109-25. Measure potential drop of mated contacts assembled in housing. Calculate resistance. See Figure 3.
Insulation resistance.	5000 megohms minimum initial.	AMP Spec 109-28-4. Test between adjacent contacts of mated samples.

Figure 1 (cont)

Test Description	Requirement	Procedure
Dielectric withstanding voltage.	Test Voltage ac (rms) Altitude .100 ℄ (feet) 750 Sea level 300 50000 275 70000	AMP Spec 109-29-1. Test between adjacent contacts of mated samples.
MECHANICAL		
Solderability.	Contacts shall have minimum of 95% solder coverage.	AMP Spec 109-11-2. Subject contacts to solderability.
Vibration.	No discontinuities of 1 microsecond or longer duration. See Note (a).	AMP Spec 109-21-3. Subject mated samples to 15 G's, 10-2000 Hz with 100 ma current applied.
Physical shock.	No discontinuities of 1 microsecond or longer duration. See Note (a).	AMP Spec 109-26-9. Subject mated samples to 100 G's sawtooth shock pulses of 6 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.
Durability.	Mating/unmating forces. Termination resistance, dry circuit.	AMP Spec 109-27. Mate and unmate samples for 200 cycles for 30 μin gold plating and 75 cycles for 15 μin gold plating at maximum rate of 150 cycles per hour.
Post retention in housing.	Post shall not dislodge from its normal position.	AMP Spec 109-30. Apply axial load of 3 pounds per contact.
Contact engaging force.	6 ounces maximum per contact.	AMP Spec 109-35. After sizing 3 times, measure force necessary to engage gage 1 to a depth of .205 ± .010 inch. See Figure 6.
Contact separating force.	.75 ounce minimum per contact.	AMP Spec 109-35. After sizing 3 times using gage 1, insert gage 2 to a depth of .205 ± .010 inch and measure force necessary to separate. See Figure 6.
Mating force.	8 ounces maximum per contact.	AMP Spec 109-42, Condition A. After third mating, measure force necessary to mate samples a distance of .205 ± .010 inch from point of initial contact using free floating fixtures at rate of .5 inch per minute. Calculate force per contact.

Figure 1 (cont)

Test Description	Requirement	Procedure
Unmating force.	.75 ounce minimum per contact.	AMP Spec 109-42, Condition A. After third mating, measure force necessary to unmate samples at rate of .5 inch per minute. Calculate force per contact.
Torque.	Post shall not deform or dislodge from printed circuit board.	AMP Spec 109-64, Condition E. Apply rotational twist of 2 inch ounces to post following placement on printed circuit board.
Insertion force, compliant pin header.	40 pounds maximum per contact for hole dimensions specified in Figure 4.	Measure force necessary to insert pin header into printed circuit board with plated through holes. Divide force by number of contacts.
Retention, compliant pin.	Post shall not dislodge from printed circuit board.	Apply axial load of 10 pounds to press-fit pins.
ENVIRONMENTAL		
Thermal shock.	Dielectric withstanding voltage. Termination resistance, dry circuit. See Note (a).	AMP Spec 109-22. Subject mated samples to 5 cycles between temperatures specified in Para 3.3.B.
Humidity-temperature cycling.	1000 megohms insulation resistance. Termination resistance, dry circuit.	AMP Spec 109-23-4, Condition B. Subject mated samples to 10 cycles between 25 and 65°C at 95% RH with cold shock.
Corrosion, salt spray.	Termination resistance, dry circuit. Termination resistance, rated current.	AMP Spec 109-24. Subject mated samples to 5% salt concentration for 48 hours.

(a) Shall remain mated and show no evidence of damage, cracking or chipping.

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Examination of product	1	1	1	1	1
Termination resistance, dry circuit	3,7,13	4, 10,13	3,7(c)		
Termination resistance, rated current	4,14	5,14			
Insulation resistance		7,12			
Dielectric withstanding voltage		6,9			
Solderability				2	
Vibration	10		5		
Physical shock	11				
Durability	6				
Post retention in housing					2
Contact engaging force		2			
Contact separating force		3			
Mating force	2,9				
Unmating force	5,8				
Torque			8		
Insertion force, compliant pin header			2		
Retention, compliant pin			9		
Thermal shock		8	4		
Humidity-temperature cycling		11	6		
Corrosion, salt spray	12				

(a) See Para 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Compliant pin contact resistance only.

Figure 2

AMP

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Samples shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Test groups 1 and 2 shall consist of 2 solder-to-board headers and 2 compliant pin headers of each plating thickness and mated to their respective receptacle connectors. Each of these connector systems shall be 40 positions or longer of which 20 random readings shall be taken. Test group 3 shall consist of 2, 40 position or larger compliant pin headers of each plating configuration and press-fit into .093 inch thick printed circuit boards with plated through holes as specified in Figure 4. Twenty random readings shall be taken. Test group 4 shall consist of 30 receptacles and solder-to-board posts of each plating configuration. Test group 5 shall consist of 1, 40 or longer position header of both the compliant pin and solder-to-board type, any plating configuration can be used.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 2.

4.2. Quality Conformance Inspection

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

4.3. Quality Assurance Requirements

Product manufacture shall be controlled by an inspection system at least equivalent to the requirements of MIL-I-45208 to assure the delivered product to be within 1.0 AQL when inspected in accordance with MIL-STD-105, Normal Sampling, Inspection Level II.

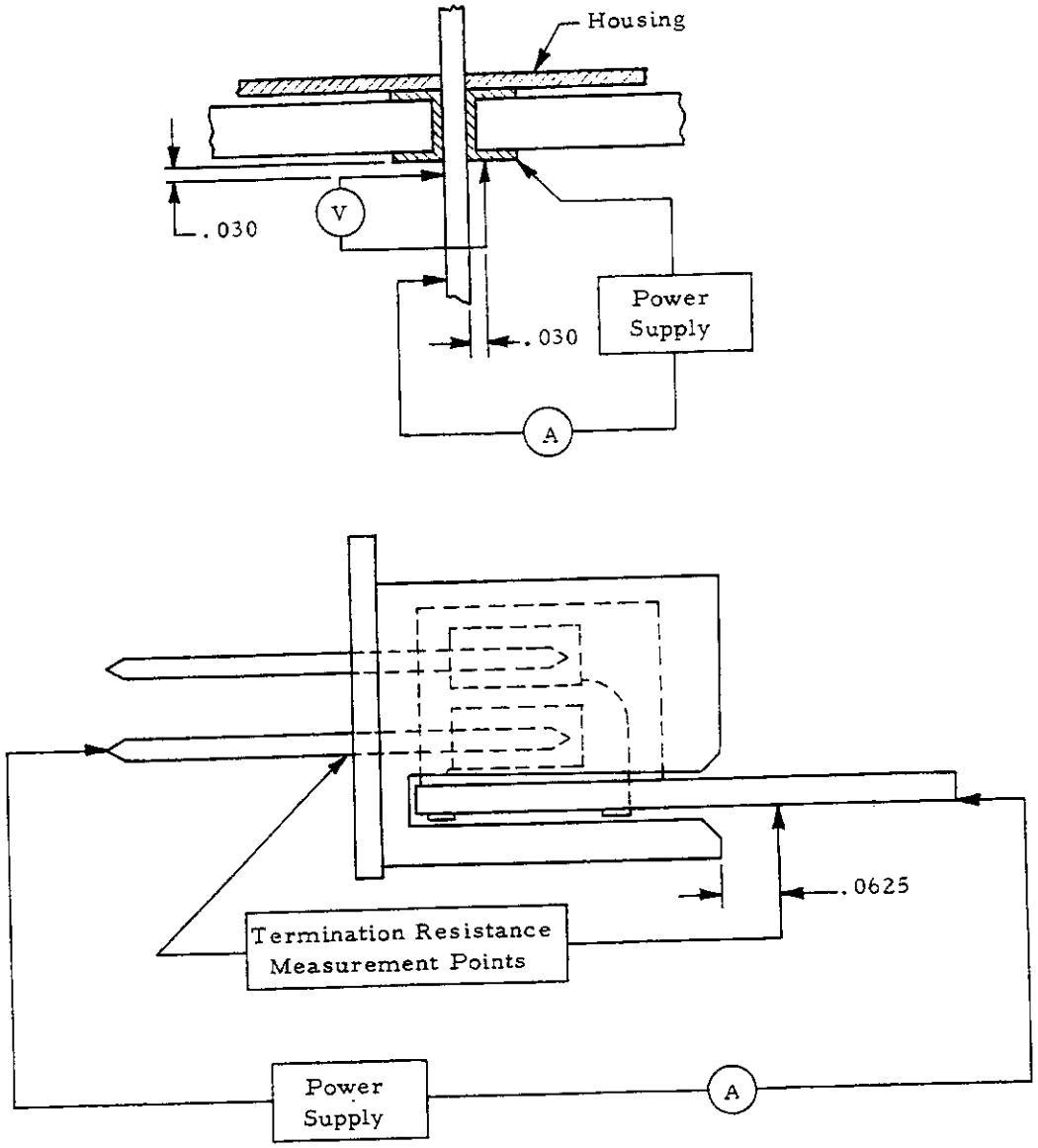


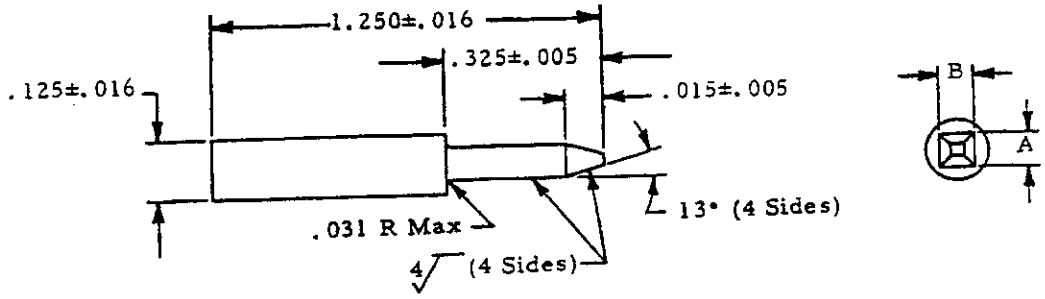
Figure 3
Termination Resistance Measurement Points

Hole Type	Drilled Hole Diameter ± .001	Diameter After Copper Plating	Diameter After Tin-Lead Plating	Circuit Pad Minimum	After Reflow of Tin-Lead Plating
A	.0452	.040 minimum	.037 to .043	.062	.037 minimum
Z	.0452	Not plated through		.065	NA

Figure 4
Printed Circuit Board Holes

Type	Plating Configuration (Thickness in μin)
Receptacle Connector	30 Au/50 Ni
	30 Au Select/50 Ni
	30 Au Duplex/50 Ni
	15 Au Duplex/50 Ni
Header, Solder-To-Board	30 Au Duplex/50 Ni
	15 Au Duplex/50 Ni
Header Compliant Pin	30 Au Duplex/50 Ni
	30 Au Mating End/50 Ni 15 Au Wire Wrap/50 Ni
	15 Au Duplex/50 Ni

Figure 5
Plating Configuration



Note: (a) Tolerance: ± .005 or ± 2° as applicable, unless otherwise specified.
(b) Material: Tool steel, AISI type 02 per AMP Specification 100-15.
(c) Heat treat: Rockwell C 50-55.
(d) Gage surface shall be clean of contaminants or lubricants.

Gage Number	"A" Dimension	"B" Dimension
1	.0260 +.0000/-.0001	.0260 +.0000/-.0001
2	.0240 +.0001/-.0000	.0240 +.0001/-.0000

Figure 6
Force Gages