# AMPMODU* Mod I Standard Pressure Interconnection System

## 1. SCOPE

### 1.1. Content

This specification covers the procedure, test requirements and quality assurance provisions for the AMPMODU* Mod I standard pressure interconnection system. Connector is a two piece configuration of which the receptacle may be mounted directly on a printed circuit board or snapped into a flame retardant housing. Plug or post half of the connector may be inserted into a printed circuit board, or furnished in a flame retardant housing.

### 1.2. Connector Assembly Definition

A. Board mount receptacle and a .031 x .062 post.
B. Board mount post and a crimp, snap-in receptacle.

### 1.3. Connector Configuration, Housing and Contact Spacing

A. Receptacle contacts mounted directly on a printed circuit board .125 centerline minimum.

B. Receptacle contacts used on .156 contact centers in an insulator housing which is mounted directly on a printed circuit board.

C. Receptacle contacts crimped to wire range #18 through 26 AWG in an insulator housing on a .156 centerline.

D. Post contacts mounted directly on a printed circuit board .125 centerline minimum.

E. Post contacts on .156, .200, .250 and .312 centerlines in an insulated header which is snapped into a panel or mounted directly on a printed circuit board.

### 1.4. Qualification

When tests are performed on the subject product line, the procedures specified in AMP 109 series specifications 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. 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. AMP Specifications

A. 109-1: General Requirements for Test Specification
B. 109 Series: Test Specifications as indicated in Figure 1. (Comply with MIL-STD-202, MIL-STD-1344 and EIA RS-364)
C. 114-25000: Contact, Receptacle, AMPMODU Mod I, Application of
D. 114-25004: AMPMODU Mod I, II and IV Female Contact, Application of
E. 114-25011: Post, AMPMODU Mod I and II, Application of

### 2.2. Military Standard

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

### 2.3. Military and Federal Specifications

A. MIL-G-45204: Gold Plating, Electrodeposited
B. MIL-I-45208: Inspection System Requirements
C. MIL-M-20693: Molding Plastic, Polyamide
D. MIL-T-10727: Tin Plating, Electrodeposited
E. QQ-B-613: Brass, Leaded and Non-Leaded
F. QQ-B-750: Phosphor Bronze
G. QQ-N-290: Nickel Plating, Electrodeposited

## 3. REQUIREMENTS

### 3.1. Design and Construction

Connectors and contacts shall be of the design, construction and physical dimension specified on the applicable product drawing.

### 3.2. Materials

A. Terminals: Phosphor bronze or copper-nickel-tin
B. Posts: Brass
C. Housings: Nylon 6/6, UL 94 V-2

3.3. Ratings

A. Current: 5 amperes maximum per contact, see Para 3.5.(a)
B. Operating Temperature: -65° to 105°C

3.4. Performance and Test Description

Contact and connector assemblies shall be designed to meet the 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 and AMP Spec 114-25000, 114-25004 and 114-25011. | Visual, dimensional and functional per applicable inspection plan. |
| | ELECTRICAL | |
| Termination Resistance, Rated Current | 12.0 milliohms maximum for phosphor bronze contacts; 20.0 milliohms maximum for copper-nickel-tin contacts.<br>Wire Size, AWG / Test Current, amperes:<br>26 — 2.0<br>24 — 3.0<br>22 — 5.0<br>20 — 5.0<br>18 — 5.0<br>stake to board — 5.0 | Measure potential drop of mated contacts assembled in housing, see Figures 3 and 4; AMP Spec 109-25, calculate resistance. |
| Termination Resistance, Dry Circuit (Low Level) | 12.0 milliohms maximum for phosphor bronze contacts; 20.0 milliohms maximum for copper-nickel-tin contacts. | Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum, see Figures 3 and 4; AMP Spec 109-6, cond A. |

Figure 1 (cont)

| Test Description | Requirement | Procedure |
|---|---|---|
| Crimp Resistance | Wire Size, AWG / Test Current, amperes / Resistance, milliohms maximum Initial / Final<br>26 / 2 / 4.5 / 6.5<br>24 / 3 / 4.0 / 6.0<br>22 / 5 / 3.0 / 5.0<br>20 / 5 / 2.0 / 3.0<br>18 / 5 / 1.7 / 2.5 | Measure as indicated in Figure 3. Record measurements after temperature of wire has stabilized. Calculate crimp resistance; AMP Spec 109-25. |
| Dielectric Withstanding Voltage | Test Voltage (rms) Centerline .125 / .156 / .250 — Altitude Feet<br>750 / 1200 / 1500 — Sea Level<br>300 / 450 / 500 — 50,000<br>275 / 275 / 300 — 70,000<br>No breakdown or flashover. | Test between adjacent contacts of mated connector assemblies; AMP Spec 109-29-1. |
| Insulation Resistance | 5,000 megohms minimum initial. | Test between adjacent contacts of mated connector assembly; AMP Spec 109-28-4. |
| Current Cycling (a) | Crimp resistance, see Figure 3. | Subject mated contacts to 50 cycles at 125% rated current for 30 minutes "ON" - 15 minutes "OFF" AMP Spec 109-51, cond B test method 3. |
| MECHANICAL | | |
| Vibration (b) | No discontinuities greater than 1 microsecond. | Subject mated connectors to 10 G's, 10-500 Hz with 100 ma current applied; AMP Spec 109-21-2, cond B. |
| Physical Shock (b) | No discontinuities greater than 1 microsecond. | Subject mated connectors to 50 G's sawtooth in 11 milliseconds; 3 shocks in each direction applied along the 3 mutually perpendicular planes total 18 shocks; AMP Spec 109-26-7, cond G. |

Figure 1 (cont)

| Test Description | Requirement | Procedure |
|---|---|---|
| Mating Force | 16.0 ounces maximum initial for standard pressure contacts. | Measure force necessary to mate connector assembly after third mating, a distance of .235 from point of initial contact, incorporating free floating fixtures at a rate of 0.5 inch/minute; AMP Spec 109-42, cond A, calculate force per contact. |
| Unmating Force | 1.0 ounce minimum final per contact for standard pressure contacts. | Measure force necessary to unmate connector assembly at a rate of 0.5 inch/minute; AMP Spec 109-42, cond A, calculate force per contact. |
| Contact Retention | 5 pounds minimum after 5 insertions and withdrawals of the contact in the housing. | Apply axial load of 5 pounds to crimped contacts; AMP Spec 109-30, except grip wire. |
| Contact Engaging Force | 16.0 ounces maximum for standard pressure contacts. | Measure force to engage using gage 1, as indicated in Figure 7, AMP Spec 109-35, engagement depth .390 ± .010. |
| Contact Separating Force | 1.0 ounce minimum for standard pressure contacts. | Size 3 times using gage 1, as indicated in Figure 7, insert gage 2 and measure force to separate; AMP Spec 109-35, separation depth .390 ± .010. |
| Crimp Tensile | Wire Size, AWG / Crimp Tensile, pounds minimum<br>26 — 4<br>24 — 7<br>22 — 11<br>20 — 17.5<br>18 — 25 | Determine crimp tensile at a rate of 1 inch/minute; AMP Spec 109-16. |

Figure 1 (cont)

| Test Description | Requirement | Procedure |
|---|---|---|
| Durability | Termination resistance, dry circuit; individual contact separation force; no mechanical damage. | Mate and unmate at a rate of 150 cycles per hour for the number of cycles specified; AMP Spec 109-27.<br>Plating<br>Type — Microinches — Cycles<br>Std Pres — 100 tin — 75<br>Std Pres — 15 gold — 75<br>Std Pres — 30 gold — 200 |
| Post Retention (Snap-in Header) | Post shall not dislodge from its normal position in the snap-in housing. | Apply an axial load of 10 pounds to each post at a rate of 1 inch per minute; AMP Spec 109-30. |
| Snap-In Housing Retention | Housing shall not dislodge from the test panel. | Apply an axial load of 10 pounds as indicated in Figure 5 at a rate of 0.5 inch per minute; AMP Spec 109-49. |
| Solderability | Contact tails shall have a solder coverage of 95% minimum. | AMP Spec 109-11-1, except copper-nickel-tin alloy 725 per AMP Spec 109-11-2. |
| ENVIRONMENTAL | | |
| Thermal Shock (b) | Dielectric withstanding voltage; 12 milliohms maximum termination resistance, dry circuit for phosphor bronze contacts; 20 milliohms maximum for copper-nickel-tin contacts. | Subject mated connectors to 5 cycles between -65° and 105°C; AMP Spec 109-22. |
| Temperature-Humidity Cycling | 1000 megohms final insulation resistance; 12 milliohms maximum, dry circuit for phosphor bronze contacts; 20 milliohms maximum for copper-nickel-tin contacts. | Subject mated connectors to 10 temperature-humidity cycles between 25° and 65°C at 95% RH; AMP Spec 109-23, method III, cond B, with 5 cold shocks at -10°C. |

Figure 1 (cont)

| Test Description | Requirement | Procedure |
|---|---|---|
| Corrosion, Salt Spray | Termination resistance, dry circuit and rated current; 12 milliohms maximum for phosphor bronze; 20 milliohms maximum for copper-nickel-tin contacts. | Subject mated connectors to 5% salt concentration for 48 hours; AMP Spec 109-24, cond B. |
| Corrosion, Industrial Gas | Termination resistance, dry circuit and rated current; 12 milliohms maximum for phosphor bronze; 20 milliohms maximum for copper-nickel-tin contacts. | Subject mated connectors to 500 hours of flowing gas. Gas shall consist of 200 ppb each of hydrogen sulfide, sulfur dioxide and nitrogen dioxide. |
| Temperature Life (b) (snap in header only) | 1000 megohms final insulation resistance. | Subject mated connectors to temperature life, AMP Spec 109-43, test level 3, test duration C. |

(a) Maximum rated current that can be carried by this product is limited by maximum operating temperature of housings, which is 105°C, and temperature rise of contacts, which is 30°C. Variables which shall be considered for each application are: wire size, connector size, contact material, and ambient temperature.

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

Figure 1 (end)

3.6. Connector and Contact Tests and Sequences

| Test or Examination | Test Group (a) | | | |
|---|---|---|---|---|
| | Standard Pressure | | Evaluation | |
| | 1 | 2 | 3 | 4 |
| | Test Sequence (b) | | | |
| Examination of Product | 1 | 1 | 1 | 1 |
| Termination Resistance, Rated Current | 4, 14 | 5, 12, 15 | | |
| Termination Resistance, Dry Circuit | 3, 6, 11, 13 | 4, 11, 14 | | |
| Crimp Resistance | | | | 2, 4 |
| Dielectric Withstanding Voltage | | 6 | | |
| Insulation Resistance | | 7, 10 | | |
| Current Cycling | | | | 3 |
| Vibration | 8 | | | |
| Physical Shock | 9 | | | |
| Mating Force | | 3 | | |
| Unmating Force | | 8 | | |
| Contact Retention | | 16 | | |
| Contact Engaging Force | 2 | | | |
| Contact Separating Force | 7 | | | |
| Crimp Tensile | | | | 5 |
| Durability | 5 | | | |
| Post Retention (d) | | 17 | | |
| Snap-In Header Retention (d) | | 18 | | |
| Solderability | | | 2 | |
| Thermal Shock | 10 | | | |
| Temperature-Humidity Cycling | | 9 | | |
| Corrosion, Salt Spray (c) | 12 | | | |
| Corrosion, Industrial Gas (c) | | 13 | | |
| Temperature Life (d) | | 2 | | |

(a) See Para 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Tin products shall not be exposed to these tests.
(d) Snap-in Header only.

Figure 2

## 4. QUALITY ASSURANCE PROVISIONS

### 4.1. Qualification Testing

A. Sample Section

Connector housings and contacts shall be prepared in accordance with applicable Instruction Sheets. They shall be selected at random from current production. Test group 1 shall consist of 36 board mounted samples per group test level. This consists of 6 each post and receptacles of each type plating configuration and mounted to a total of 6 boards per group test level. Test group 3 shall consist of 30 receptacles and 30 posts of each type plating configuration for solderability only. Test group 4 shall consist of 30 receptacles crimped to each wire size (AWG 18, 20, 22, 24 and 26) and 30 posts of each plating configuration. Test group 2 shall consist of 36 samples per group crimped to nominal wire size of each plating configuration. The combinations of plating are specified in Figure 6. All test measurements shall consist of 30 random readings.

B. Test Sequence

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

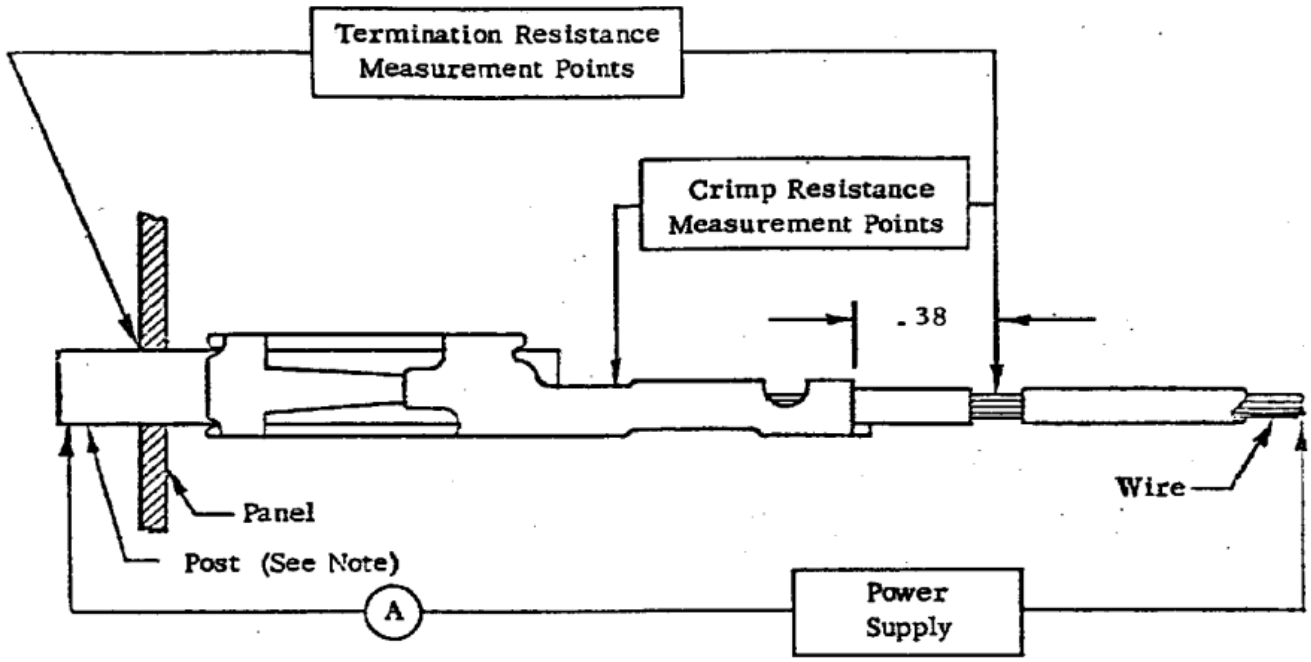
C. Acceptance

(1) All samples tested in accordance with this specification shall meet the stated tolerance limit.

(2) 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.

### 4.2. Quality Assurance Requirements

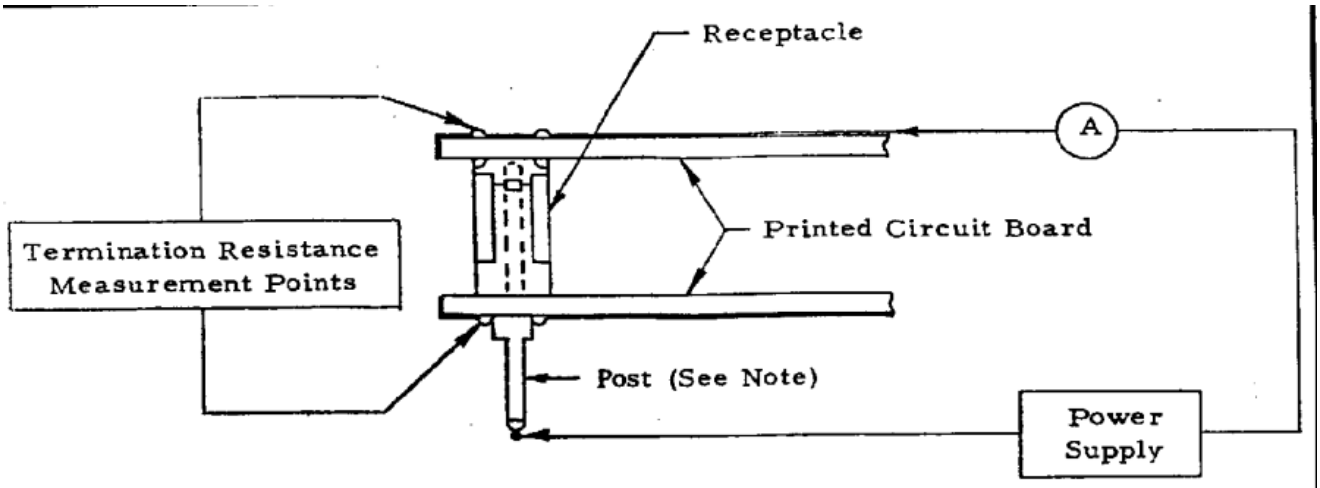
Product manufacture shall be controlled by an inspection system at least equivalent to the requirements of MIL-I-45208 to assure the delivered product to be within 1.0 AQL when inspected in accordance with MIL-STD-105, Normal Sampling, Inspection Level II.




Note: Post plating shall be identical to receptacle plating when conducting tests, see Figure 6.

Figure 3

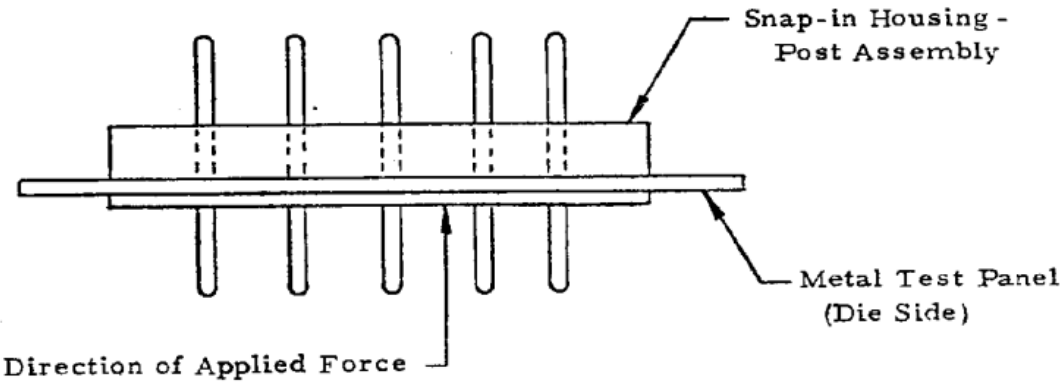
Termination and Crimp Resistance Measurement Points for Crimped Receptacles




Note: Post plating shall be identical to receptacle plating when conducting tests, see Figure 6.

Figure 4

Termination Resistance Test Circuit for a Board Mounted Receptacle




Notes: 1. Nylon housing shall be inserted into punched side of the metal test panel.
2. Force is applied to bottom of housing through opening in panel nearest to center portion of housing.

Figure 5

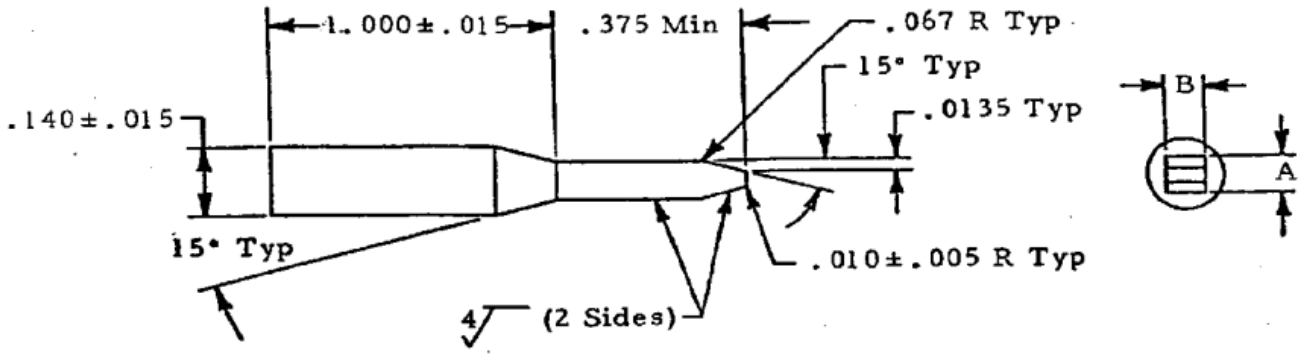
Snap-in Housing Retention in Metal Test Panel

| Test Group | Plating Configuration of Receptacle Contacts (a) (Thickness in Microinches) |
|---|---|
| 1A | 30 Au Select/50 Ni |
| 1B | 15 Au Select/50 Ni |
| 1C | Pre-tin |
| 1D | 30 Au Inlay/50 Ni (Cu-Ni-Sn) |
| 2A (Snap-in Header) | Pre-tin |
| 2B | 100 Sn/30 Ni |
| 2C | 30 Au Select/50 Ni |
| 2D | 15 Au Select/50 Ni |
| 3A | 30 Au/50 Ni (Receptacle) |
| 3B | 30 Au Select/50 Ni (Receptacle) |
| 3C | 15 Au Select/50 Ni (Receptacle) |
| 3D | 30 Au Inlay/50 Ni (Receptacle) |
| 3E | Pre-tin (Receptacle) |
| 3F | 30 Au/50 Ni (Post) |
| 3G | 15 Au/50 Ni (Post) |
| 3H | 100 Sn/30 Ni (Post) |
| 4A | Pre-tin |
| 4B | 30 Au Select/50 Ni |
| 4C | 100 Sn/30 Ni |

(a) Plating of mating post is 30 Au/50 Ni, 15 Au/50 Ni and 100 Sn/30 Ni.

Figure 6

Plating Configuration




Notes:
1. Tolerances: ± .005 or ± 2° as applicable, unless otherwise specified.
2. Material: Tool steel, AISI type 02 per AMP Specification 100-15.
3. Heat treat: Rockwell C50-55.
4. Gage surface shall be clean of contaminants or lubricants.

| Gage Number | A | B |
|---|---|---|
| 1 | $.032^{+.0000}_{-.0001}$ | .062 ± .003 |
| 2 | $.030^{+.0001}_{-.0000}$ | .062 ± .003 |

Figure 7

Contact Engaging and Separating Force Gages