



## AMPMODU MOD IV&V, WIRE TO BOARD, STANDARD, INTERMEDIATE AND HIGH-PRESSURE CONTACTS

### 1. SCOPE

#### 2.1. Content

This specification covers performance, tests and quality requirements for AMPMODU\* Mod IV & V interconnection system. This miniature system consists of standard, intermediate and high-pressure receptacle contacts crimped onto either solid or stranded wire and then inserted into a Mod IV housing. This system is designed to mate with AMPMODU Mod II .025-inch square posts or headers.

#### 2.2. 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.

### 3. APPLICABLE DOCUMENTS AND FORMS

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



#### 3.1. TE Documents

- [109-1](#): General Requirements for Test Specifications
- [114-25003](#) and [114-25016](#): Application Specification
- [501-313](#): Qualification Test Report
- [502-1055](#): Engineering Report
- [502-153763](#): Engineering Report
- [502-153766](#): Engineering Report – Contact retention force test

#### 3.2. Reference Document

- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

#### 3.3. Reference Document

- UL Certificate: [E28476\\_19861028](#) 
- CSA Certificate: [164196\\_1103740](#) 

### 4. REQUIREMENTS

#### 4.1. Design and Construction

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

#### 4.2. Materials

##### A. Contact:

- (1) CuNiSi
- (2) Copper-tin-phosphor bronze
- (3) Phosphor bronze

##### B. Housing: Flame retardant thermoplastic, UL94V-O

#### 4.3. Ratings

Voltage	Current	Temperature
250 vac	See Figure 4	-65°C to 105°C

#### 4.4. Test Requirements and Procedures Summary

Product is designed to meet electrical, mechanical and environmental performance requirement specified in figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing and TE Spec 114-25003 and 114-25016.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination resistance.	12 milliohms maximum for CuNiSi and phosphor bronze. 20 milliohms maximum for copper-tin-phosphor bronze.	EIA 364-23. Subject mated contacts assembled in housing to 50 mv maximum open circuit at 100 ma maximum. See Figure 3.
Insulation resistance.	5000 megohms minimum initial. 40 megohms minimum final.	EIA 364-21. Test between adjacent contacts of unmated samples.
Dielectric withstanding voltage.	Test Voltage (rms) 0.100&0.125 0.150 Altitude CL CL Feet 750 1000 Sea Level 300 400 50,000 275 275 70,000 No breakdown or flashovers	EIA 364-20. Test between adjacent contacts of unmated connector samples.
Current cycling.	See Note (b).	EIA 364-55. Subject mated contacts to 50 cycles of 125% rated current for 30 minutes "ON" and 15 minutes "OFF".
Temperature rise vs current.	30°C maximum temperature rise at specified current.	EIA 364-70, Method 1. Measure temperature rise vs current. See Figure 4.

Figure 1 (cont.)

REV B

ELECTRICAL (cont.)					
Crimp resistance.	Wire Size (AWG)	Test Current (amperes)	Resistance (milliohms max)		EIA 364-6.
			Initial	Final	
	20	3.0	2.0	3.0	
	22	3.0	3.0	5.0	
	24	3.0	4.0	6.0	
	26	2.0	4.5	6.5	
	28	1.5	5.0	7.0	
	30	1.0	11.0	13.0	
	32	1.0	13.0	15.0	
See Note (b).					
MECHANICAL					
Vibration, sinusoidal.	No discontinuities of 1 microsecond or longer duration. See Note (a).			EIA 364-28D Test Condition IV. Subject mated samples to 20 G's between 10-2000-10 Hz traversed in 20 minutes. 4 hours in each of 3 mutually perpendicular planes. See Figure 5.	
Physical shock.	No discontinuities of 1 microsecond or longer duration. See Note (a).			EIA 364-27B Method G. 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. See Figure 5.	
Durability.	See Note (a).			EIA 364-9. Mate and unmate samples <u>Standard Pressure:</u> 200 cycles for 30μ" gold plating, 75 cycles for 15μ" gold plating and 25 cycles for 100 μ" tin plating at a max. rate of 600 cycles per hour. <u>Intermediate Pressure:</u> 150 cycles for 30μ" gold plating, 75 cycles for 15μ" gold plating and 25 cycles for 100 μ" tin plating at a maximum rate of 150 cycles per hour. <u>High Pressure:</u> 50 cycles for 30μ" gold plating and 25 cycles for 100 μ" tin plating at a maximum rate of 150 cycles per hour.	

Figure 1 (cont.)

MECHANICAL (cont.)																		
Mating force.	<u>Standard Pressure:</u> 9 ounces maximum per contact. <u>Intermediate Pressure:</u> 16 ounces maximum per contact. <u>High Pressure:</u> 20 ounces maximum per contact.	EIA 364-13, Condition A. Measure force necessary to mate samples at distance of 0.230 inch from point of initial contact with housing face at maximum rate of 1 inch per minute.																
Unmating force.	<u>Standard Pressure:</u> 1.5 ounces minimum per contact. <u>Intermediate Pressure:</u> 2 ounces minimum per contact. <u>High Pressure:</u> 3 ounces minimum per contact.	EIA 364-13, Condition A. Measure force necessary to unmate samples at maximum rate of 1 inch per minute.																
Crimp tensile.	<table><tr><th>Wire Size (AWG)</th><th>Crimp Tensile (Pounds minimum)</th></tr><tr><td>20</td><td>17.5</td></tr><tr><td>22</td><td>11.0</td></tr><tr><td>24</td><td>7.0</td></tr><tr><td>26</td><td>4.0</td></tr><tr><td>28</td><td>2.7</td></tr><tr><td>30</td><td>1.2</td></tr><tr><td>32</td><td>1.0</td></tr></table> See Note (b).	Wire Size (AWG)	Crimp Tensile (Pounds minimum)	20	17.5	22	11.0	24	7.0	26	4.0	28	2.7	30	1.2	32	1.0	EIA 364-8B. Determine the crimp tensile at the rate of 1 inch per minute cross head speed
Wire Size (AWG)	Crimp Tensile (Pounds minimum)																	
20	17.5																	
22	11.0																	
24	7.0																	
26	4.0																	
28	2.7																	
30	1.2																	
32	1.0																	
Contact retention.	Contacts shall not dislodge from normal locking position.	EIA 364-29. Apply Axial load of 3 pounds to each contact wire at the rate of 1 inch per minute.																
Contact engaging force.	<u>Standard Pressure:</u> 8 ounces maximum per contact. <u>Intermediate Pressure:</u> 13 ounces maximum per contact. <u>High Pressure:</u> 20 ounces maximum per contact. See Note (b).	EIA 364-37. Measure force using gage 1 at rate of 1 inch per minute. Engagement depth shall be 0.230± 0.005 inches. See figure 6.																

Figure 1 (cont.)

MECHANICAL (cont.)		
Contact separating force.	<u>Standard Pressure:</u> 1 ounce minimum per contact. <u>Intermediate Pressure:</u> 1.5 ounce minimum per contact. <u>High Pressure:</u> 3 ounce minimum per contact. See Note (b).	EIA 364-37. Size 3 times using gage 1. Insert gage 2 and measure the force to separate at rate of 1 inch per minute. Separation depth shall be 0.230±0.005 inches. See figure 6.
ENVIRONMENTAL		
Thermal Shock	See Note (a)	EIA 364-32, Condition II. Subject unmated samples to 5 cycles between -65°C and 105°C.
Humidity-temperature cycling.	See Note (a).	EIA 364-31, Method III. Subject unmated samples to 10 cycles between 25 and 65°C at 95% RH.
Temperature life.	See Note (a).	EIA 364-17, Condition 4-C. Subject mated samples to temperature life at 105°C for 500 hours.
Mixed flowing gas.	See Note (a).	EIA 364-65, Class IIA. Subject mated samples with 15 µin/0.38µm gold plating to environmental class IIA for 14 days.
		EIA 364-65, Class IIIA. Subject mated samples with 30 µin gold plating to environmental class IIIA for 20 days.

- (a) Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence in Figure 2.
- (b) Details of test contained in Engineering Report 502-1055.

Figure 1  
(end)

#### 4.5. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)			
	1	2	3	4
	Test Sequence (b)			
Examination of product	1,9	1,9	1,8	1,3
Termination resistance	3,7	2,7		
Insulation resistance			2,6	
Dielectric withstanding voltage			3,7	
Temperature rise vs current		3,8		
Vibration	5	6(c)		
Physical shock	6			
Durability	4			
Mating force	2			
Unmating force	8			
Contact retention				2
Thermal shock			4	
Humidity-temperature cycling			5	
Temperature life		5		
Mixed flowing gas		4(d)		

- (a) See Para 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% loadings per TE Specification 102-6.
- (d) Precondition samples with 10 cycles durability

Figure 2

## 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. Each test group shall consist of minimum of 5 connectors. A minimum of 30 randomly selected contacts distributed between the 5 connectors shall be measured. Contacts shall be crimped in accordance with TE Specification 114-25003 and 114-25016. Test group 1 shall consist of gold-plated contacts for minimum and maximum connector sizes crimped to wire. Test group 2 shall consist of gold-plated contacts crimped to 20 AWG wire. Test group 3 shall consist of gold-plated contacts.

## B. Test Sequence

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

### 3.2. Requalification Testing

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

### 3.3. Acceptance

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

### 3.4. Quality Conformance Inspection

Applicable TE 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.

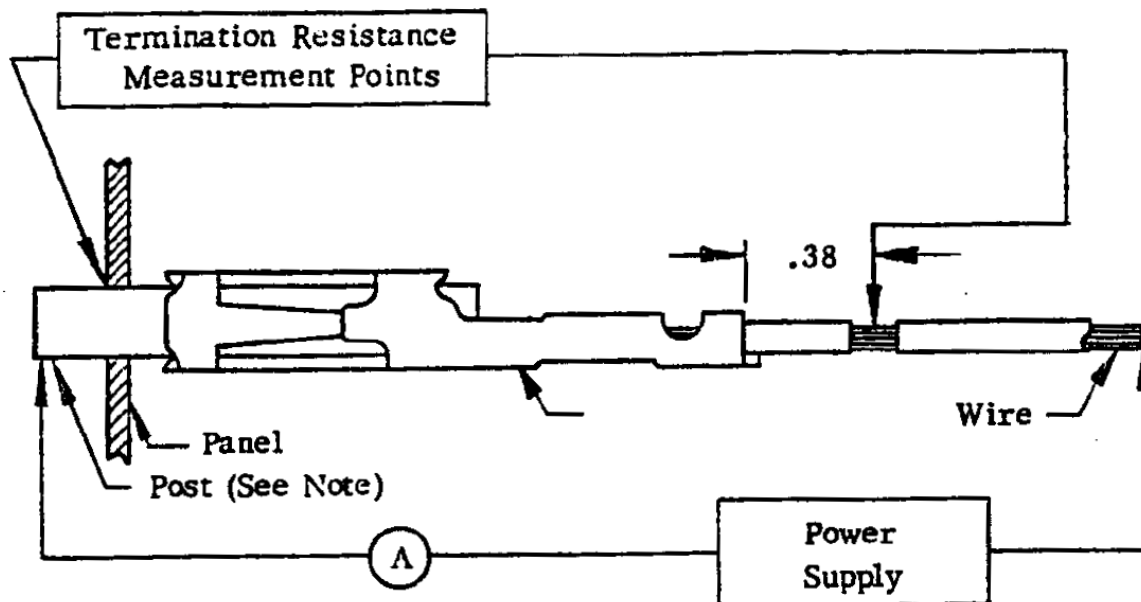


Figure 3  
Termination Resistance Measurement Points

# CURRENT vs T-RISE

AMPMODU MOD IV

UTL

(95% Confidence, 99% Reliability)

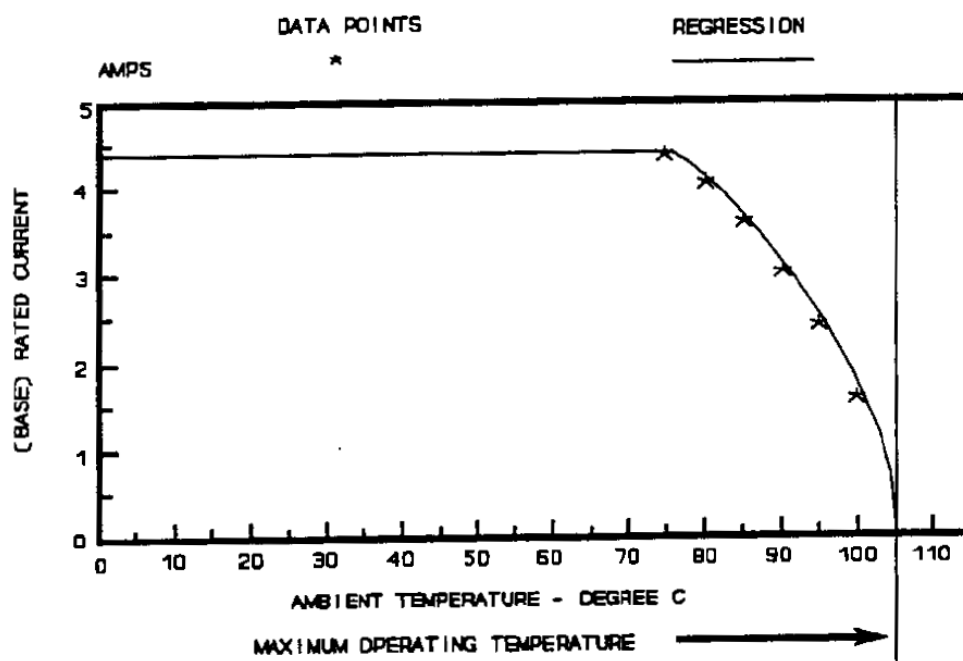


Figure 4A  
Current Carrying Capability

Percent Connector Loading	Wire Size AWG						
	32	30	28	26	24	22	20
Single Contact	0.642	0.683	0.728	0.781	0.842	0.914	1.000
50	0.377	0.401	0.428	0.459	0.495	0.537	0.587
100	0.293	0.311	0.332	0.356	0.384	0.416	0.456



## NOTE

To determine acceptable current carrying capacity for percentage connector loading and wire gage indicated, use Multiplication Factor (F) from above chart and multiply it times Base Rated Current for a single circuit at maximum ambient operating temperature as shown in Figure 4A.

Figure 4B  
Current Rating



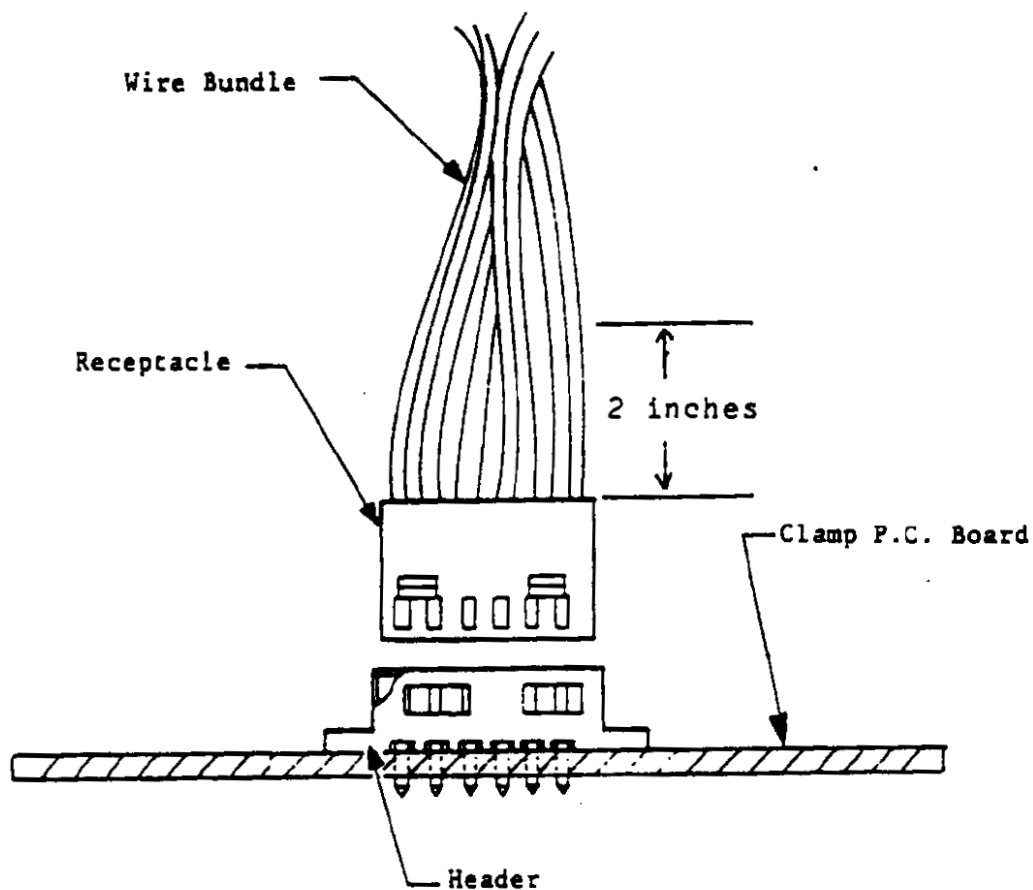
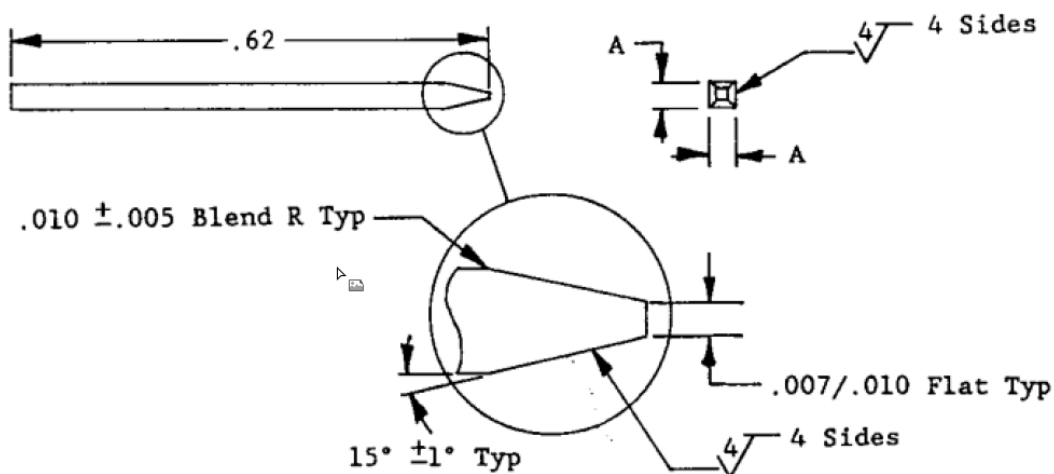


Figure 5  
Vibration & Physical Shock Mounting Fixture

To be ground in lengthwise direction only



Note:

1. Tolerance shall be  $\pm 0.005$  or  $\pm 2^\circ$  C as applicable, Unless otherwise specified.
2. Material shall be tool steel. AISI type 01 per TE specification TEC-100-3
3. Heat treat to Rockwell C60-62
4. Gage surface shall be clean of contaminate or lubricants

#### Gage Number A Dimension

1	.0260	$+.0000$ $-.0001$
2	.0240	$+.0001$ $-.0000$

Figure 6  
Engaging and Separating Gages  
(All dimensions are in inches)