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**Connector, Miniature Rectangular (MR)**

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**1. SCOPE****1.1. Content**

This specification covers performance, tests and quality requirements for the AMP\* miniature rectangular (MR) connectors. These connectors offer a wide range of uses for sophisticated commercial equipment.

**1.2. Qualification**

When tests are performed on the subject product line, procedures specified in Test Specification 109 series 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. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between requirements of this specification and product drawing, the product drawing shall take precedence. In the event of conflict between requirements of this specification and the referenced documents, this specification shall take precedence.

**2.1. TE Connectivity (TE) 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)
- C. Corporate Bulletin 401-76: Cross-reference between AMP Test Specifications and Military or Commercial Documents
- D. 114-1014: Application Specification
- E. 501-344: 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. Grommets: Flexible PVC
- B. Housings: Nylon, 6/6, UL94V-0
- C. Pins: Phosphor bronze, pre-tin
- D. Sockets: Phosphor bronze, pre-tin

**3.3. Ratings**

- A. Voltage: 250 vac
- B. Current: See Figure 4 for applicable current carrying capability
- C. Temperature: -55 to 85°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 AMP Specification 109-1.

**3.5. Test Requirements and Procedures Summary**

Test Description	Requirement	Procedure												
Examination of product.	Meets requirements of product drawing and AMP Spec 114-1014.	Visual, dimensional and functional per applicable quality inspection plan.												
<b>ELECTRICAL</b>														
Termination resistance.	5 milliohms maximum initial. $\Delta R$ 5 milliohms maximum.	AMP 109-6-6. Subject mated contacts assembled in housing to 20 mv maximum open circuit at 100 ma maximum. See Figure 3.												
Insulation resistance.	1500 megohms minimum initial. 100 megohms minimum final.	AMP Spec 109-28-4. Test between adjacent pins and sockets of mated samples.												
Dielectric withstanding voltage.	2.5 kvac at sea level. 1.3 milliamperes maximum leakage current.	AMP Spec 109-29-1. Test between adjacent pins and sockets of mated samples.												
Temperature rise vs current.	30°C maximum temperature rise at specified current.	AMP Spec 109-45-1. Measure temperature rise vs current. See Figure 4.												
<b>MECHANICAL</b>														
Crimp tensile.	<table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th>Wire Size AWG</th> <th>Crimp Tensile Pounds Minimum</th> </tr> </thead> <tbody> <tr> <td>26</td> <td>5.0</td> </tr> <tr> <td>24</td> <td>9.5</td> </tr> <tr> <td>22</td> <td>15</td> </tr> <tr> <td>20</td> <td>25</td> </tr> <tr> <td>18</td> <td>35</td> </tr> </tbody> </table>	Wire Size AWG	Crimp Tensile Pounds Minimum	26	5.0	24	9.5	22	15	20	25	18	35	AMP Spec 109-16. Determine crimp tensile at a maximum rate of 1 inch per minute.
Wire Size AWG	Crimp Tensile Pounds Minimum													
26	5.0													
24	9.5													
22	15													
20	25													
18	35													
Vibration, sinusoidal.	No discontinuities of 1 microsecond or longer duration. See Note.	AMP Spec 109-21-1. Subject mated samples to 10-55-10 Hz traversed in 1 minute with .06 inch maximum excursion. 2 hours in each of 3 mutually perpendicular planes. See Figure 5.												

Figure 1 (cont)

Test Description	Requirement	Procedure
Physical shock.	No discontinuities of 1 microsecond or longer duration. See Note.	AMP Spec 109-26-7. Subject mated samples to 50 G's sawtooth shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 5.
Durability.	See Note.	AMP Spec 109-27. Manually mate and unmate samples and panel for 25 cycles.
Contact retention.	Contact shall not dislodge from housing.	AMP Spec 109-30. Apply axial load of 10 pounds to crimped contacts gripping wire.
Contact insertion force.	1.75 pounds maximum per contact.	AMP Spec 109-41. Measure force necessary to insert contact into housing.
Mating force.	1 pound maximum per contact.	AMP Spec 109-42, Condition A. Measure force necessary to mate samples at maximum rate of .5 inch per minute.
Unmating force.	.25 pound minimum per contact.	AMP Spec 109-42, Condition A. Measure force necessary to unmate samples at maximum rate of .5 inch per minute.
<b>ENVIRONMENTAL</b>		
Thermal shock.	See Note.	AMP Spec 109-22. Subject mated samples to 25 cycles between -55 and 85°C.
Humidity-temperature cycling.	See Note.	AMP Spec 109-23-3, Condition B. Subject mated samples to 10 cycles between 25 and 65°C at 95% RH.
Temperature life.	See Note.	AMP Spec 109-43. Subject mated samples to temperature life at 85°C for 300 hours.

**NOTE**

*Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence in Figure 2.*

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	1,9	1,9	1,8	1,4	1,3
Termination resistance	3,7	2,7			
Insulation resistance			2,6		
Dielectric withstanding voltage			3,7		
Temperature rise vs current		3,8			
Crimp tensile					2
Vibration	5	6(c)			
Physical shock	6				
Durability	4				
Contact retention				3	
Contact insertion force				2	
Mating force	2				
Unmating force	8				
Thermal shock			4		
Humidity-temperature cycling		4(d)	5		
Temperature life		5			

**NOTE**

- (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% loaded and energized per AMP Specification 109-151.
- (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. Test group 1 shall consist of 5 connector assemblies from both the maximum and minimum sizes utilizing a minimum of 30 contacts. Test group 2 shall consist of a minimum of 3 connector assemblies of the maximum size utilizing a minimum of 30 contacts. Test group 3 shall consist of 5 connector assemblies utilizing a minimum of 30 contacts. Test group 4 shall consist of a minimum of 30 pins and 30 socket contacts. Test group 5 shall have a minimum of 30 data points for each wire size.

**B. Test Sequence**

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

#### 4.2. Requalification Testing

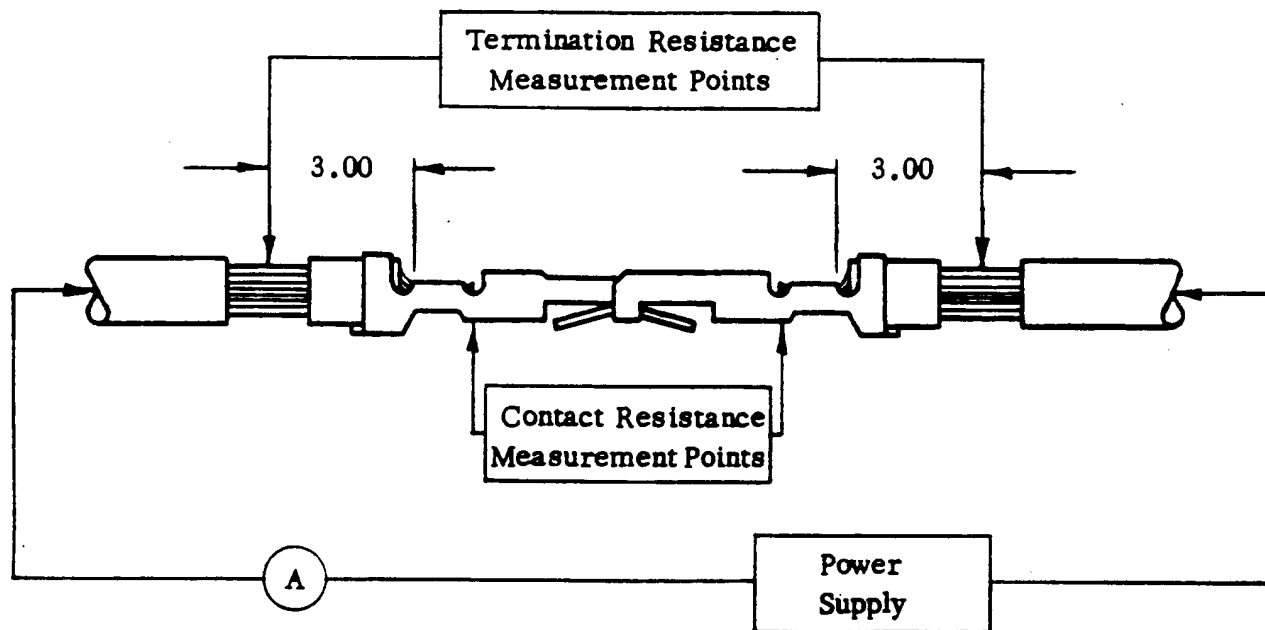
If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

#### 4.3. Acceptance

Acceptance is based on 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 before resubmittal.

#### 4.4. Quality Conformance Inspection

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



#### NOTE

- (a) A 1 foot minimum length of continuous lead for heat dissipation.
- (b) Termination resistance equals millivolts divided by test current less resistance of 6 inches of wire.

Figure 3  
Termination Resistance Measurement Points

Base Rated Current For Single Circuit With Maximum Wire

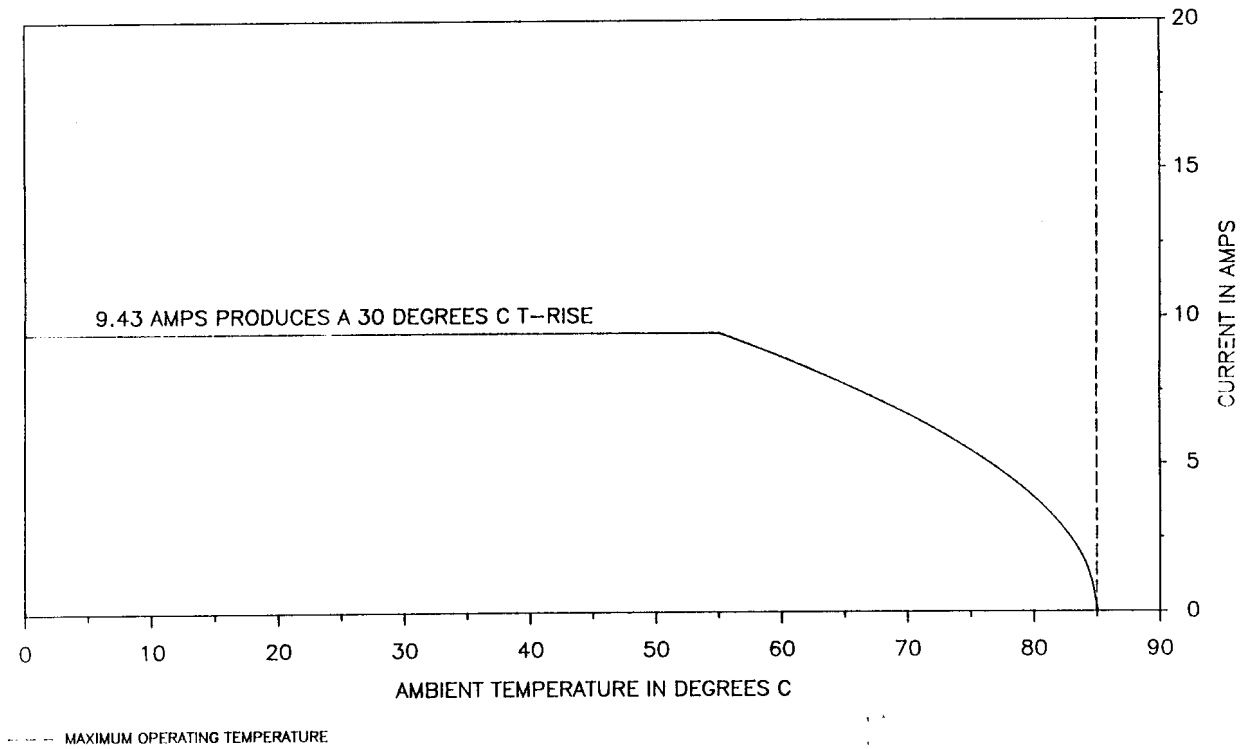


Figure 4A  
Current Carrying Capacity

Percent Connector Loading 36 Position	Wire Size AWG				
	26	24	22	20	18
Single Contact	.512	.582	.69	.82	1.0
50	.259	.30	.35	.42	.51
100	.203	.21	.25	.30	.37

**NOTE**

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

Figure 4B  
Current Rating

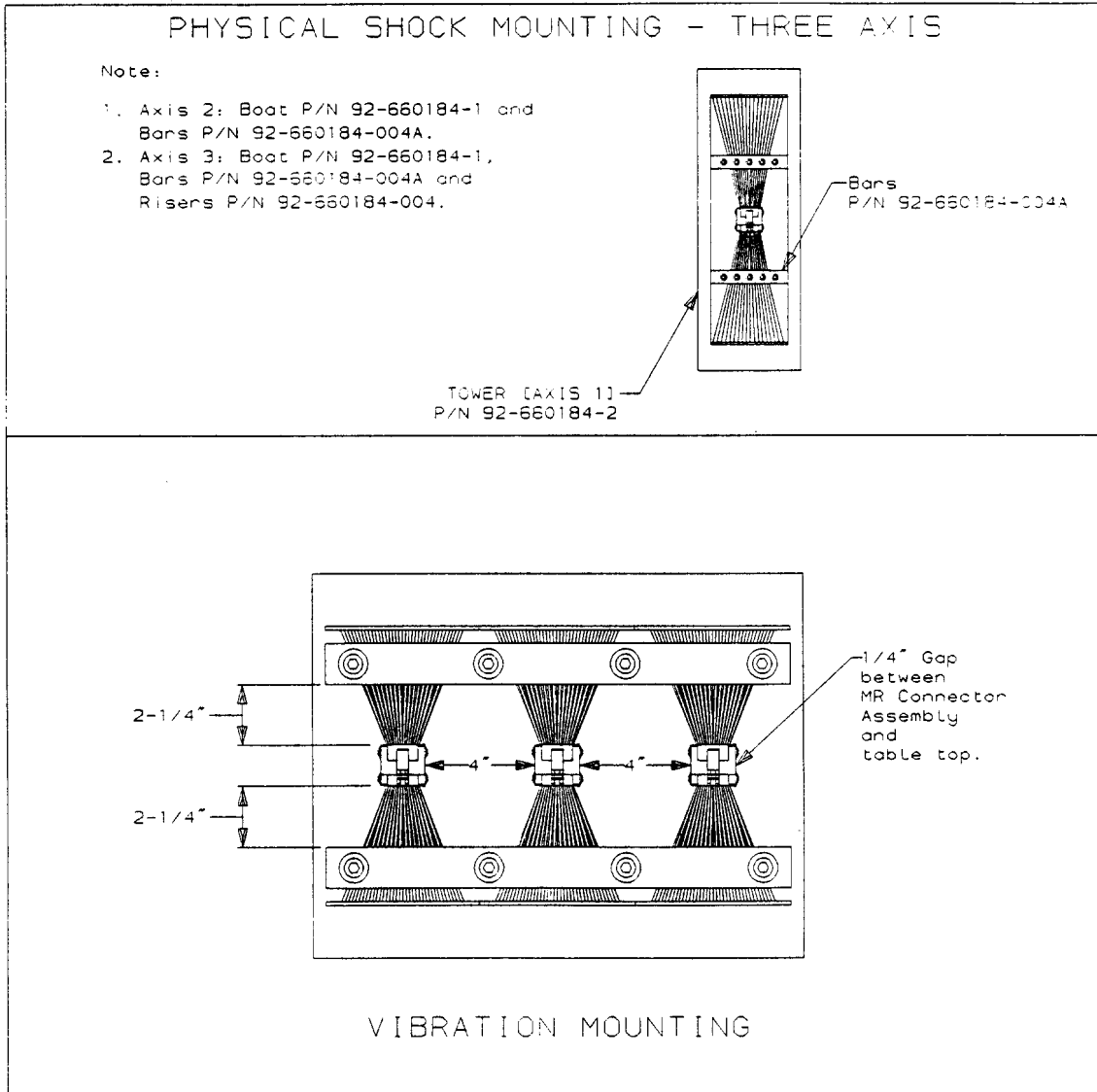


Figure 5  
Vibration & Physical Shock Mounting Fixture