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**AMPLIMITE\* HD-20 PCB Mounted Connector**

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**1. SCOPE**

## 1.1. Content

This specification covers performance, tests and quality requirements for the following AMPLIMITE\* printed circuit board mounted connectors:

- HD-20 right angle front metal shell for both standard temperature processing and surface mount compatible processing.
- HD-20 straight posted all plastic and front metal shell.
- HD-20 right angle and straight posted full metal shell.

## 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 TE Connectivity (TE) 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.

- 109-1: General Requirements for Test Specifications
- 109 Series: Test Specifications as indicated in Figure 1
- 109-197: TE Test Specifications vs EIA and IEC Test Methods
- 114-40010: Application Specification (Right Angle Front Metal Shell)
- 114-40013: Application Specification (Right Angle Full Metal Shell)
- 114-40023: Application Specification (Straight Posted Front Metal Shell)
- 501-168: Qualification Test Report

**3. REQUIREMENTS**

## 3.1. Design and Construction

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

## 3.2. Materials

- Contact: Copper alloy, gold and/or tin-lead plated
- Housing: Glass filled nylon or polyester, UL 94V-0 rating, 94V-2 rating for all plastic HDJ
- Shell: Steel, tin or zinc plated, if applicable

## 3.3. Ratings

- Voltage:
  - 250 volts AC rms or DC per Underwriters Laboratories
  - 125 volts AC rms or DC per CSA
- Current: See Figure 4 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. All tests are performed at ambient temperature unless otherwise specified.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing and applicable Application Specification.	Visual, dimensional and functional per applicable Quality Inspection plan.
<b>ELECTRICAL</b>		
Termination resistance, dry circuit.	15 milliohms maximum initial. 20 milliohms maximum final.	TE Spec 109-6-1. Subject mated contacts assembled in housings to 50 mv open circuit at 100 ma maximum. See Figure 3.
Insulation resistance.	5000 megohms minimum initial. 1000 megohms minimum final within 5 hours after testing.	TE Spec 109-28-4. Test between adjacent contacts of unmated assemblies.
Dielectric withstanding voltage.	1 kvac dielectric withstanding voltage. 1 minute hold. 1 milliamper maximum leakage current.	TE Spec 109-29-1. Test between adjacent contacts of unmated assemblies.
Temperature rise vs current.	30°C maximum temperature rise at specified current. 70°C maximum ambient.	TE Spec 109-45-1. Measure temperature rise vs current. See Figure 4.
<b>MECHANICAL</b>		
Solderability.	Solderable area shall have a minimum of 95% solder coverage.	TE Spec 109-11-1. Subject tin-lead plated contact posts to solderability.
Vibration, random.	No discontinuities greater than 1 microsecond. See Note (a).	TE Spec 109-21-5, Level F, 20 minute duration. Subject mated connectors to 20 G's rms with 100 ma current applied. See Figure 3.
Physical shock.	No discontinuities greater than 1 microsecond. See Note.	TE Spec 109-26-1. Subject mated connectors to 50 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction along 3 mutually perpendicular planes, 18 total shocks. See Figure 3.

Figure 1 (continued)

Test Description	Requirement	Procedure																										
Durability.	See Note.	TE Spec 109-27. Mate and unmate assemblies for 100 cycles for gold flash assemblies and 500 cycles for 30 μin gold plated assemblies at a maximum rate of 200 cycles per hour.																										
Mating force.	<table border="1"> <thead> <tr> <th rowspan="2">Size</th> <th rowspan="2">Positions</th> <th colspan="2">Lbs Maximum</th> </tr> <tr> <th>W/O Ground Indents</th> <th>With Ground Indents</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>9</td> <td>4.5</td> <td>30</td> </tr> <tr> <td>2</td> <td>15</td> <td>7.5</td> <td>33</td> </tr> <tr> <td>3</td> <td>25</td> <td>12.5</td> <td>37</td> </tr> <tr> <td>4</td> <td>37</td> <td>18.5</td> <td>40</td> </tr> <tr> <td>5</td> <td>50</td> <td>25.0</td> <td>44</td> </tr> </tbody> </table> <p>Note: Grounding indents are on the plugs.</p>	Size	Positions	Lbs Maximum		W/O Ground Indents	With Ground Indents	1	9	4.5	30	2	15	7.5	33	3	25	12.5	37	4	37	18.5	40	5	50	25.0	44	TE Spec 109-42, Condition A. Measure force necessary to mate connector assemblies using free floating fixtures at a rate of 1 inch per minute.
Size	Positions			Lbs Maximum																								
		W/O Ground Indents	With Ground Indents																									
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Unmating force.	<table border="1"> <thead> <tr> <th rowspan="2">Size</th> <th rowspan="2">Positions</th> <th colspan="2">Lbs Maximum</th> </tr> <tr> <th>W/O Ground Indents</th> <th>With Ground Indents</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>9</td> <td>4.5</td> <td>30</td> </tr> <tr> <td>2</td> <td>15</td> <td>7.5</td> <td>33</td> </tr> <tr> <td>3</td> <td>25</td> <td>12.5</td> <td>37</td> </tr> <tr> <td>4</td> <td>37</td> <td>18.5</td> <td>40</td> </tr> <tr> <td>5</td> <td>50</td> <td>25.0</td> <td>44</td> </tr> </tbody> </table> <p>Note: Grounding indents are on the plugs.</p>	Size	Positions	Lbs Maximum		W/O Ground Indents	With Ground Indents	1	9	4.5	30	2	15	7.5	33	3	25	12.5	37	4	37	18.5	40	5	50	25.0	44	TE Spec 109-42, Condition A. Measure force necessary to unmate connector assemblies at rate of 1 inch per minute.
Size	Positions			Lbs Maximum																								
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1	9	4.5	30																									
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<b>ENVIRONMENTAL</b>																												
Thermal shock.	See Note.	TE Spec 109-22. Subject mated connectors to 100 cycles between -55 and 105°C.																										
Humidity-temperature cycling.	See Note.	TE Spec 109-23-4, Condition B. Subject mated connectors to 10 humidity-temperature cycles between 25 and 65°C at 95% RH.																										
Temperature life.	See Note.	TE Spec 109-43. Subject mated connectors to temperature life at 105°C for 500 hours.																										
Mixed flowing gas.	See Note.	TE Spec 109-85-3. Subject mated connectors to environmental class III for 20 days. Precondition connectors with 10 durability cycles.																										

**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 Tests and Sequences

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

**NOTE** (a) See paragraph 4.1.A.  
 (b) Numbers indicate sequence in which tests are performed.

Figure 2

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#### 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, 3 and 5 shall each consist of 5 mated connector pairs with no grounding indents and shall be mounted to a printed circuit board. Test group 5 shall be manufactured using 30  $\mu$ m gold finish. Two wires shall be used in each crimp. Test group 4 shall consist of 5 unmated connectors using only a single wire of the appropriate wire gage. Connectors shall be mounted to a printed circuit board. Test group 6 and 7 shall each consist of 5 unmated connectors. No mounting required. Test group 8 shall consist of 5 mated connector pairs for positions 9 and 37. Connectors shall have grounding indents. No mounting is required.

###### 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 original testing sequence as determined by development/product, quality and reliability engineering.

##### 4.3. Acceptance

Acceptance is based on verification that 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. Certification

This product has been recognized under the Component Recognition Program of Underwriter's Inc., Electrical File Number E-28476 and it has been Certified by the Canadian Standards Association Number LR-16455.

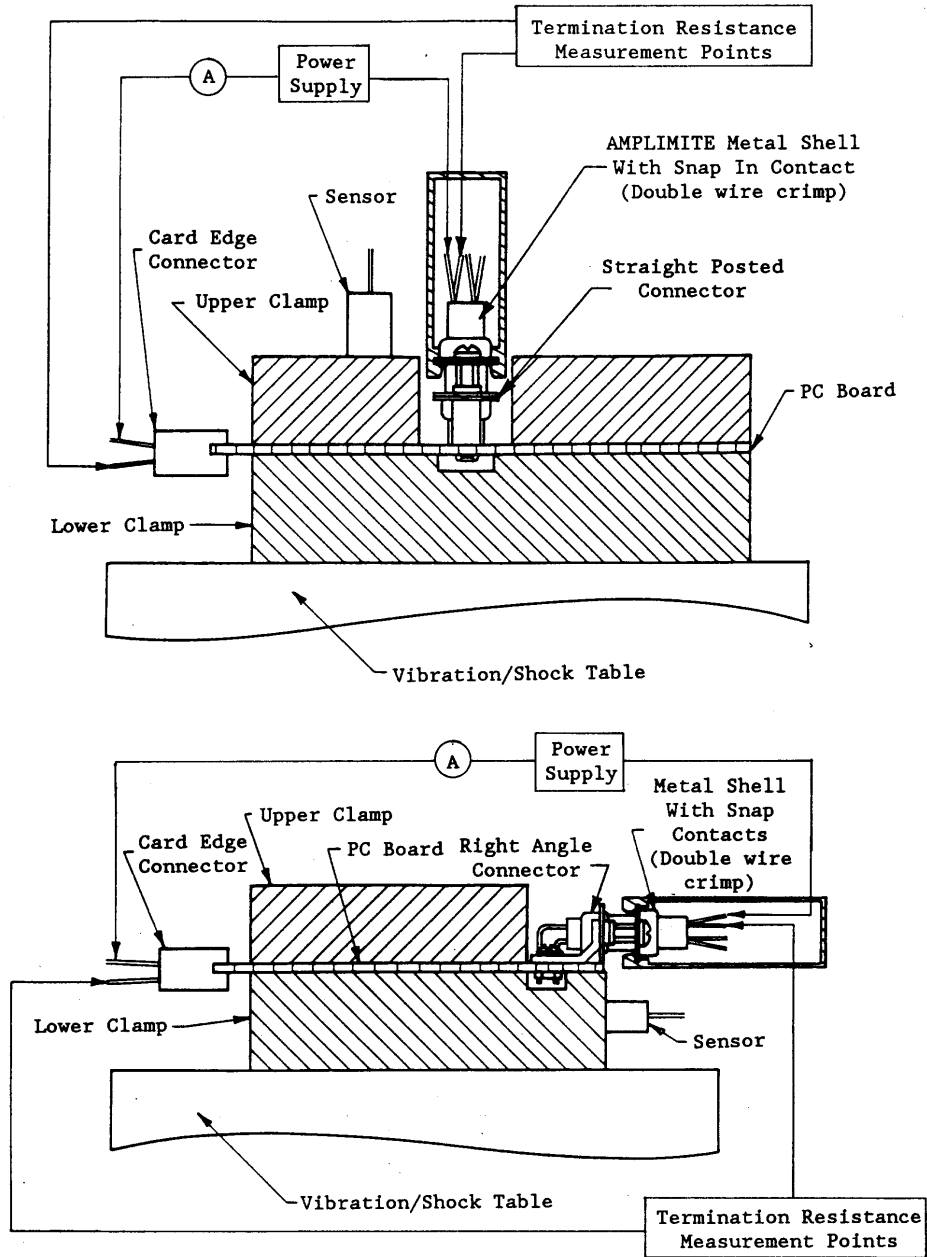


Figure 3  
Mounting and Clamping Locations for Vibration and Physical Shock

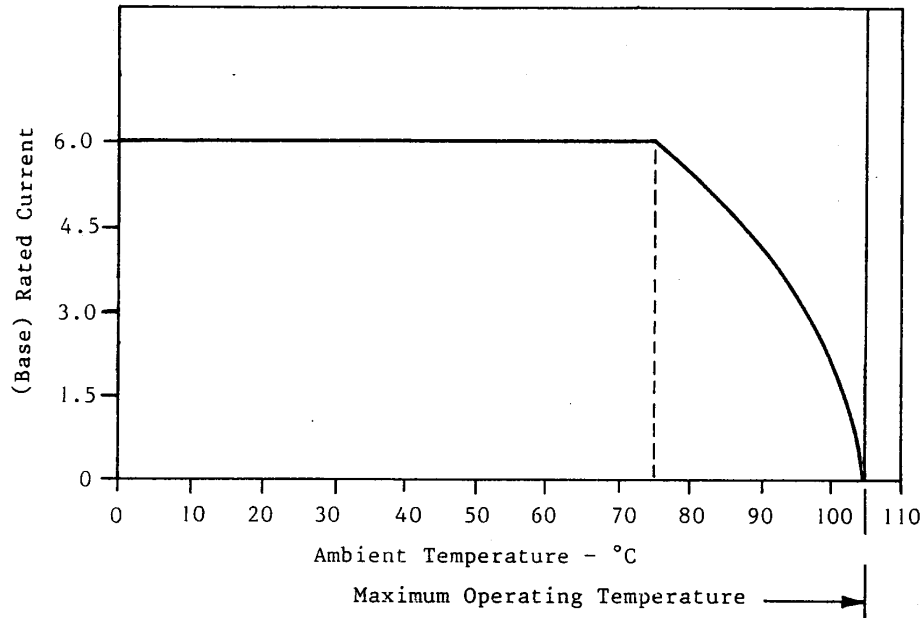


Figure 4A  
Current Carrying Capability

Contact Loading	Wire Size AWG		
	18	24	28
Single Contact	1.0	.71	.48
100%	.30	.20	.15

**NOTE**

To determine the acceptable current carrying capacity for the 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 the maximum ambient operating temperature as shown in Figure 4A.

Figure 4B  
Current Rating