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**Flexible Flat Conductor (FFC) Cables on .100 Inch Centerline**

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**1. SCOPE**

## 1.1. Content

This specification covers performance, tests and quality requirements for TE Connectivity (TE) contacts and connectors used with round (discrete) wire and flexible flat conductor (FFC) cables on .100 inch centerline.

## 1.2. Qualification

When tests are performed on subject product line, procedures specified in 109 Series Test 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. TE Documents

- 109-1: General Requirements for Test Specifications
- 109 Series: Test Specifications as indicated in Figure 1
- 108-40002: Product Specification
- 114-16003: Application Specification
- 114-16015: Application Specification
- 501-131: Test Report

**3. REQUIREMENTS**

## 3.1. Design and Construction

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

## 3.2. Materials

- Contact: Phosphor bronze
- Housing: Thermoplastic, flame retardant, black, UL94V-0

## 3.3. Ratings

- Voltage: 300 volts AC rms
- Current: Signal applications only, 2 amperes single circuit, FFC (.003 x .050 conductor)
- Temperature: -65 to 105°C

3.4. Performance and Test Description

Product is designed to meet electrical, mechanical and environmental performance requirements specified in Figure 1. All tests are performed at ambient environmental conditions per Test Specification 109-1 unless otherwise specified.

3.5. Test Requirements and Procedures Summary

| Test Description        | Requirement   | Procedure  |
|-------------------------|---|--|
| Examination of product. | Meets requirements of product drawing and Application Specifications 114-16003 and 114-16015. | Visual, dimensional and functional per applicable quality inspection plan. |

ELECTRICAL

| Termination resistance, dry circuit. | 25 milliohms maximum for gold plating.<br>45 milliohms maximum for tin plating.   | Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum.<br>See Figures 3, 4 and 5.<br>AMP Spec 109-6-1. |               |     |           |     |       |     |       |   |
|--------------------------------------|---|--|---------------|-----|-----------|-----|-------|-----|-------|---|
| Dielectric withstanding voltage.     | <table border="1"> <thead> <tr> <th>Test Voltage</th> <th>Altitude Feet</th> </tr> </thead> <tbody> <tr> <td>720</td> <td>Sea Level</td> </tr> <tr> <td>480</td> <td>25000</td> </tr> <tr> <td>330</td> <td>50000</td> </tr> </tbody> </table> No breakdown or flashover. | Test Voltage   | Altitude Feet | 720 | Sea Level | 480 | 25000 | 330 | 50000 | Test between adjacent contacts of mated connector assemblies.<br>AMP Spec 109-29-1. |
| Test Voltage                         | Altitude Feet   |  |               |     |           |     |       |     |       |   |
| 720                                  | Sea Level   |  |               |     |           |     |       |     |       |   |
| 480                                  | 25000   |  |               |     |           |     |       |     |       |   |
| 330                                  | 50000   |  |               |     |           |     |       |     |       |   |
| Insulation resistance.               | 5000 megohms minimum.   | Test between adjacent contacts of mated connector assemblies.<br>AMP Spec 109-28-4.  |               |     |           |     |       |     |       |   |

Figure 1 (cont)

MECHANICAL

|                         |  |   |
|-------------------------|--|---|
| Vibration, random.      | No discontinuities greater than 1 microsecond.<br>See Note (a).  | Subject mated connectors to 20.71 G's rms.<br>See Figure 6.<br>AMP Spec 109-21-5,<br>Test level F,<br>Duration 20 minutes.  |
| Physical shock.         | No discontinuities greater than 1 microsecond.<br>See Note (a).  | Subject mated connectors 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.<br>See Figure 6.<br>AMP Spec 109-26-9.         |
| Connector mating force. | 15 ounces maximum per contact, standard pressure.<br>36 ounces maximum per contact, high pressure.<br>20 ounces maximum per contact, PCB edge connector. | Measure force necessary to mate connector assemblies with locking latches a distance of .150 inch from point of initial contact using free floating fixtures at rate of .5 inch per minute.<br>AMP Spec 109-42,<br>Condition A. |

| Test Description              | Requirement   | Procedure   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
|-------------------------------|---|---|---------------|-----|-------------|-----|-----|----|------|----|-----|----|-----|----|-----|----|-----|----|-----|---|
| Connector unmating force.     | 1.5 ounces minimum per contact, standard pressure.<br>3 ounces minimum per contact, high pressure.<br>1.5 ounces maximum per contact, PCB edge connector.   | Measure force necessary to unmate connector assemblies with locking latches removed or released at rate of .5 inch per minute.<br>AMP Spec 109-42, Condition A.                                       |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Contact retention.            | Contacts shall not dislodge from normal locking position in housing.  | Apply axial load of 3 pounds to contacts.<br>AMP Spec 109-30.   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Crimp tensile.                | <table border="1"> <thead> <tr> <th>Wire Size</th> <th>Crimp Tensile</th> </tr> <tr> <th>AWG</th> <th>Lbs Minimum</th> </tr> </thead> <tbody> <tr> <td>FFC</td> <td>5.0</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>1.0</td> </tr> <tr> <td>32</td> <td>0.7</td> </tr> </tbody> </table> | Wire Size   | Crimp Tensile | AWG | Lbs Minimum | FFC | 5.0 | 22 | 11.0 | 24 | 7.0 | 26 | 4.0 | 28 | 2.7 | 30 | 1.0 | 32 | 0.7 | Determine crimp tensile at rate of 1 inch per minute.<br>AMP Spec 109-16. |
| Wire Size                     | Crimp Tensile   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| AWG                           | Lbs Minimum   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| FFC                           | 5.0   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| 22                            | 11.0  |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| 24                            | 7.0   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| 26                            | 4.0   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| 28                            | 2.7   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| 30                            | 1.0   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| 32                            | 0.7   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Figure 1 (cont)               |   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Durability.                   | See Note (a).   | Mate and unmate connector assemblies for 100 cycles for 30 $\mu$ m gold, 50 cycles for 15 $\mu$ m gold, and 50 cycles for 100 $\mu$ m tin at maximum rate of 150 cycles per hour.<br>AMP Spec 109-27. |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Solderability.                | Solderable area shall have minimum of 95% solder coverage.  | Subject contacts to solderability.<br>AMP Spec 109-11-1.  |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| ENVIRONMENTAL                 |   |   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Thermal shock.                | See Note (a).   | Subject mated connectors to 5 cycles between -65 and 105°C.<br>AMP Spec 109-22.   |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Humidity-temperature cycling. | See Note (a).   | Subject mated connectors to 10 humidity-temperature cycles between 25 and 65°C at 95% RH.<br>AMP Spec 109-23-4, Condition B.  |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Mixed flowing gas.            | See Note (a).   | Subject mated connectors to environmental class III for 20 days.<br>AMP Spec 109-85-3.  |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |
| Temperature life.             | See Note (a).   | Subject mated connectors to temperature life at 105°C for 500 hours.<br>AMP Spec 109-43.  |               |     |             |     |     |    |      |    |     |    |     |    |     |    |     |    |     |   |

- (a) 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   | 6   | 7   | 8   |
|                                     | Test Sequence (b) |      |      |      |     |     |     |     |
| Examination of product              | 1,9               | 1,5  | 1,5  | 1,5  | 1,8 | 1,3 | 1,3 | 1,3 |
| Termination resistance, dry circuit | 3,7               | 2,4  | 2,4  | 2,4  |     |     |     |     |
| Dielectric withstanding voltage     |                   |      |      |      | 3,7 |     |     |     |
| Insulation resistance               |                   |      |      |      | 2,6 |     |     |     |
| Vibration                           | 5                 |      |      |      |     |     |     |     |
| Physical shock                      | 6                 |      |      |      |     |     |     |     |
| Connector mating force              | 2                 |      |      |      |     |     |     |     |
| Connector unmating force            | 8                 |      |      |      |     |     |     |     |
| Contact retention                   |                   |      |      |      |     |     |     | 2   |
| Crimp tensile                       |                   |      |      |      |     | 2   |     |     |
| Durability                          | 4                 |      |      |      |     |     |     |     |
| Solderability                       |                   |      |      |      |     |     | 2   |     |
| Thermal shock                       |                   |      |      |      | 4   |     |     |     |
| Humidity-temperature cycling        |                   |      |      | 3(d) | 5   |     |     |     |
| Mixed flowing gas                   |                   |      | 3(c) |      |     |     |     |     |
| Temperature life                    |                   | 3(c) |      |      |     |     |     |     |

- (a) See Para 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Precondition samples with 5 cycles durability.
- (d) Tin only.

Figure 2

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 Group 1 shall consist of 5 samples of standard pressure receptacle with 15 microinch gold plating and 5 samples of solder tabs and pins with 100 microinch tin plating.

Test Group 2 shall consist of 5 samples of standard pressure receptacle with 15 microinch gold plating and 5 samples with 100 microinch tin plating.

Test Group 3 shall consist of 5 samples each of standard and high pressure receptacles with 15 and 30 microinch gold plating and standard pressure receptacle with 50 microinch gold plating.

Test Group 4 shall consist of 5 samples of standard pressure receptacle with 100 microinch tin plating.

Test Groups 5 and 7 shall each consist of 5 samples of solder tabs with 100 microinch tin plating.

Test Group 6 shall consist of 5 samples each of standard pressure receptacle and pins with 100 microinch tin plating.

Test Group 8 shall consist of 5 samples each of standard pressure receptacle and pins with 100 microinch tin plating.

All test groups shall be mated as required to AMPMODU\* headers with same finish as specified.

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 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 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.

4.4. 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.

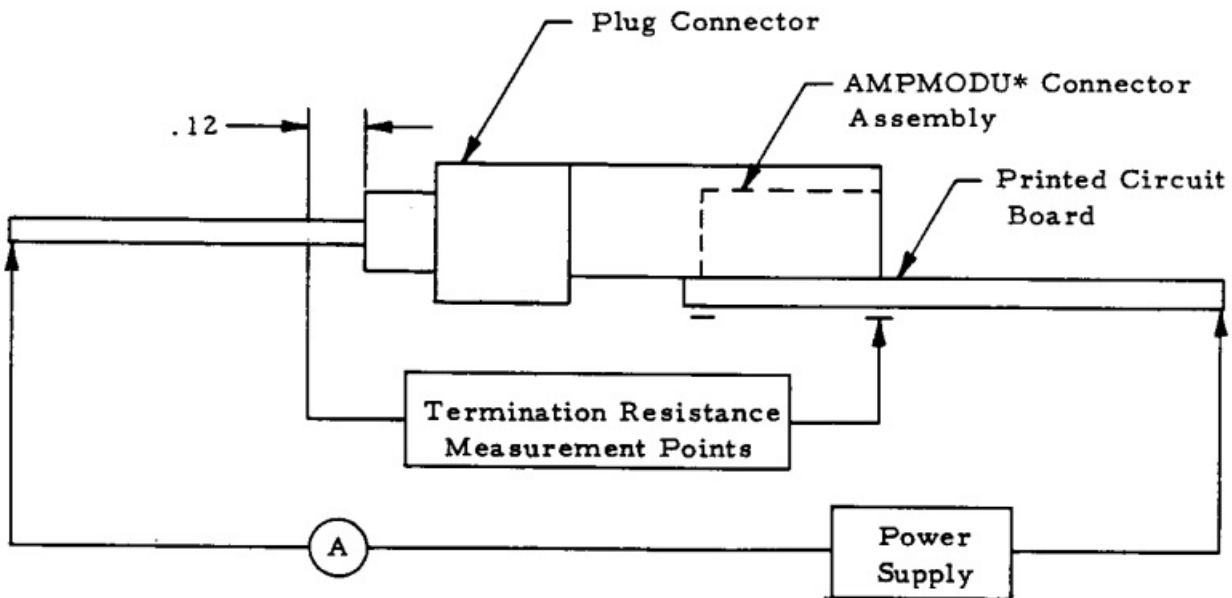


Figure 3  
Termination Resistance Measurement Points  
(Connector to AMPMODU connector assembly)

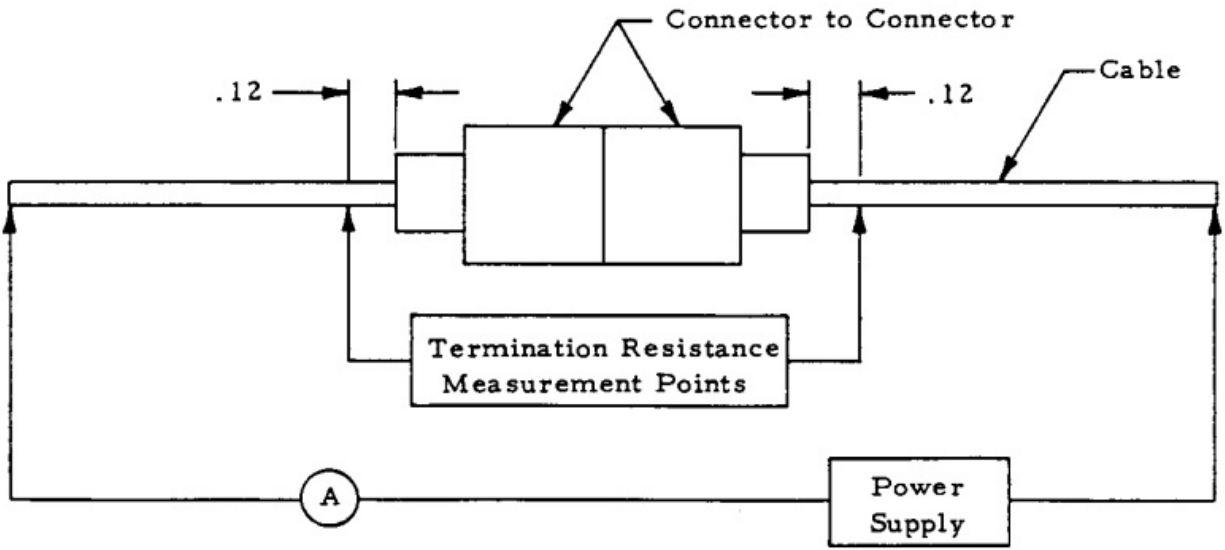


Figure 4  
Termination Resistance Measurement Points  
(Connector to connector assembly)

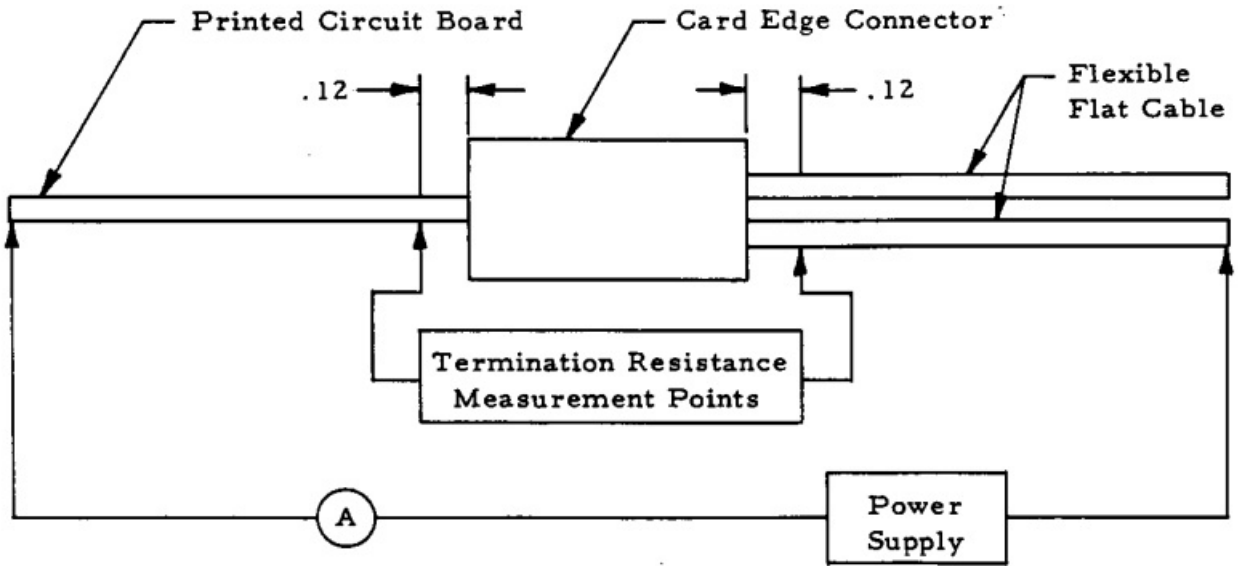


Figure 5  
Termination Resistance Measurement Points  
(Connector to printed circuit board)

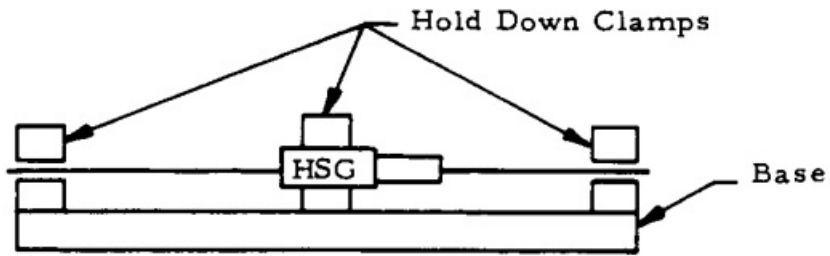


Figure 6  
Vibration and Physical Shock Mounting Fixture