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**Connector, Z-PACK\*, 2 mm FB, Signal and Power**

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**1. SCOPE**

## 1.1. Content

This specification covers performance, tests and quality requirements for the Z-PACK\* 2mm FB connector system. This connector system is a backplane bus system which interconnects printed circuit boards using pin and receptacle connectors. Connectors employ a four row 2mm centerline configuration. Being through hole devices, pin and receptacle contacts have either solder or press fit leads.

## 1.2. Qualification

When tests are performed on the subject product line, procedures specified in 109 Series Test 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. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between requirements of this specification and the product drawing, the 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 Connectivity (TE) Documents

- 109-1: General Requirements for Test Specifications
- 109 Series: Test Specifications as indicated in Figure 1
- 501-334: Qualification Test Report

**3. REQUIREMENTS**

## 3.1. Design and Construction

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

## 3.2. Materials

- Contact:
  - Signal/power pin: Phosphor bronze, gold over palladium nickel over nickel plating
  - Signal receptacle: Copper nickel zinc, gold over palladium nickel over nickel plating
  - Power receptacle: Beryllium copper, gold over palladium nickel over nickel plating
- Housing: High temperature thermoplastic, liquid crystal polymer

3.3. Ratings

- Voltage: 30 volts alternating current
- Current:
  - Power: 3 amperes per contact
  - Signal: See Figure 5 for applicable current carrying capability
- Temperature: -55 to 125°C
- Maximum Initial Contact Resistance: See Figure 1

| Row | Maximum Initial Contact Resistance (mΩ) |       |
|-----|---|-------|
|     | Signal                                  | Power |
| A   | 25                                      | 10    |
| B   | 35                                      | 10    |
| C   | 40                                      | 10    |
| D   | 45                                      | 10    |

Figure 1

3.4. Performance and Test Description

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

3.5. Test Requirements and Procedures Summary

| Test Description                 | Requirement   | Procedure   |
|----------------------------------|---|---|
| Examination of product.          | Meets requirements of product drawing.                                    | Visual, dimensional and functional per applicable quality inspection plan.  |
| <b>ELECTRICAL</b>                |   |   |
| Termination resistance.          | See Figure 1<br>ΔR 10 milliohms maximum.                                  | TE 109-6-6.<br>Subject mated contacts assembled in housing to 20 mv maximum open circuit at 100 ma maximum. See Figure 4. |
| Insulation resistance.           | 5000 megohms minimum initial.<br>100 megohms minimum final.               | TE Spec 109-28-4.<br>Test between adjacent contacts of mated samples.   |
| Dielectric withstanding voltage. | 1000 vac.   | TE Spec 109-29-1.<br>Test between adjacent contacts of mated samples. Test a minimum of 5 contacts per sample.            |
| Temperature rise vs current.     | 30°C maximum temperature rise at specified current. Signal contacts only. | TE Spec 109-45-1.<br>Measure temperature rise vs current. See Figure 5.   |

Figure 2 (continued)

| Test Description              | Requirement   | Procedure  |
|-------------------------------|---|--|
| <b>MECHANICAL</b>             |   |  |
| Vibration, sinusoidal.        | No discontinuities of 1 microsecond or longer duration.<br>See Note.  | TE Spec 109-21-4.<br>Subject mated samples to frequency range of 10-2000-10 Hz and amplitude of 0.06 inch or 20 G's. 12 cycles.<br>See Figure 6.   |
| Physical shock.               | No discontinuities of 1 microsecond or longer duration.<br>See Note.  | TE Spec 109-26-1.<br>Subject mated samples to 50 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.<br>See Figure 6. |
| Durability.                   | See Note.   | TE Spec 109-27.<br>Mate and unmated samples for 250 cycles (100 cycles for right angle headers) at maximum rate of 100 cycles per hour with 30 second rest in unmated condition.                                     |
| Mating force.                 | Signal modules:<br>0.70 Newtons maximum per contact.<br>Power modules:<br>2.40 Newtons maximum per contact. | TE Spec 109-42, Condition A.<br>Measure force necessary to mate samples at maximum rate of .5 inch per minute.   |
| Unmating force.               | Signal modules:<br>0.12 Newton minimum per contact.<br>Power modules:<br>0.30 Newton minimum per contact.   | TE Spec 109-42, Condition A.<br>Measure force necessary to unmated samples at maximum rate of .5 inch per minute.  |
| <b>ENVIRONMENTAL</b>          |   |  |
| Thermal shock.                | See Note.   | TE Spec 109-22.<br>Subject unmated samples to 5 cycles between -55 and 125°C.  |
| Humidity-temperature cycling. | See Note.   | TE Spec 109-23-3, Condition B.<br>Subject unmated samples to 10 cycles between 25 and 65°C at 95% RH.  |

Figure 2 (continued)

| Test Description   | Requirement | Procedure  |
|--------------------|-------------|--|
| Temperature life.  | See Note.   | TE Spec 109-43.<br>Subject mated samples in Test Group 2 to temperature life at 70°C for 1000 hours with electrical load of 1 ampere for signal modules and 1.5 amperes for power modules. |
| Mixed flowing gas. | See Note.   | TE Spec 109-43.<br>Subject mated samples in Test Group 5 to temperature life at 105°C for 500 hours.   |

**NOTE** *Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence in Figure 3.*

Figure 2 (end)

3.6. Product Qualification and Requalification Test Sequence

| Test or Examination             | Test Group (a)    |         |         |     |      |
|---------------------------------|-------------------|---------|---------|-----|------|
|                                 | 1                 | 2       | 3       | 4   | 5(g) |
|                                 | Test Sequence (b) |         |         |     |      |
| Examination of product          | 1,9               | 1,5     | 1,5     | 1,8 | 1,9  |
| Termination resistance          | 3,7               | 2,4     | 2,4     |     | 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                 |         |         |     |      |
| Thermal shock                   |                   |         |         | 4   |      |
| Humidity-temperature cycling    |                   |         |         | 5   |      |
| Temperature life                |                   | 3(f)(h) |         |     | 5(l) |
| Mixed flowing gas               |                   |         | 3(e)(m) |     | 4(d) |

- NOTE**
- (a) See paragraph 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 Test Specification 109-151.
  - (d) Precondition samples with 10 cycles durability.
  - (e) Precondition samples with 25 cycles durability.
  - (f) Precondition samples with 250 cycles durability.
  - (g) Signal connectors only.
  - (h) 70°C for 1000 hours, see Figure 2.
  - (l) 105°C for 500 hours, see Figure 2.
  - (m) Precondition samples with 5 cycles of durability (right angle headers only).

Figure 3

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

1. Signal connectors.

Signal connector housings and contacts shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall consist of 5 connectors each of the largest available size. All tests requiring individual contact measurements shall be conducted on 30 contacts randomly selected over the 5 connectors. Test groups 1, 2 and 3 shall be mounted on printed circuit boards designed to accommodate vibration and physical shock fixturing providing a series circuit for all contacts with access to measure termination resistance.

2. Power connectors.

Power connector housings and contacts shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall consist of 5 connectors each of the largest available size. All tests requiring individual contact measurements shall be conducted on 30 contacts randomly selected over the 5 connectors. Test groups 1 and 2 shall be mounted on printed circuit boards designed to accommodate vibration and physical shock fixturing providing a series circuit for all contacts with access to measure termination resistance.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 3.

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 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

The applicable 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.

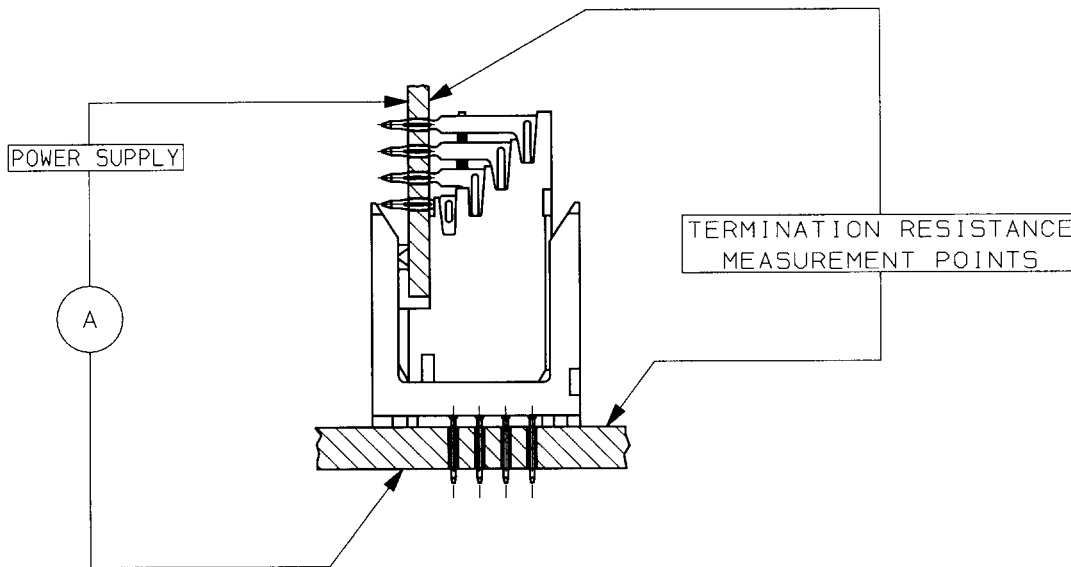


Figure 4  
Contact Resistance Measurement Points

BASE CURRENT vs TEMPERATURE RISE  
MATED SIGNAL HEADERS AND RECEPTACLES

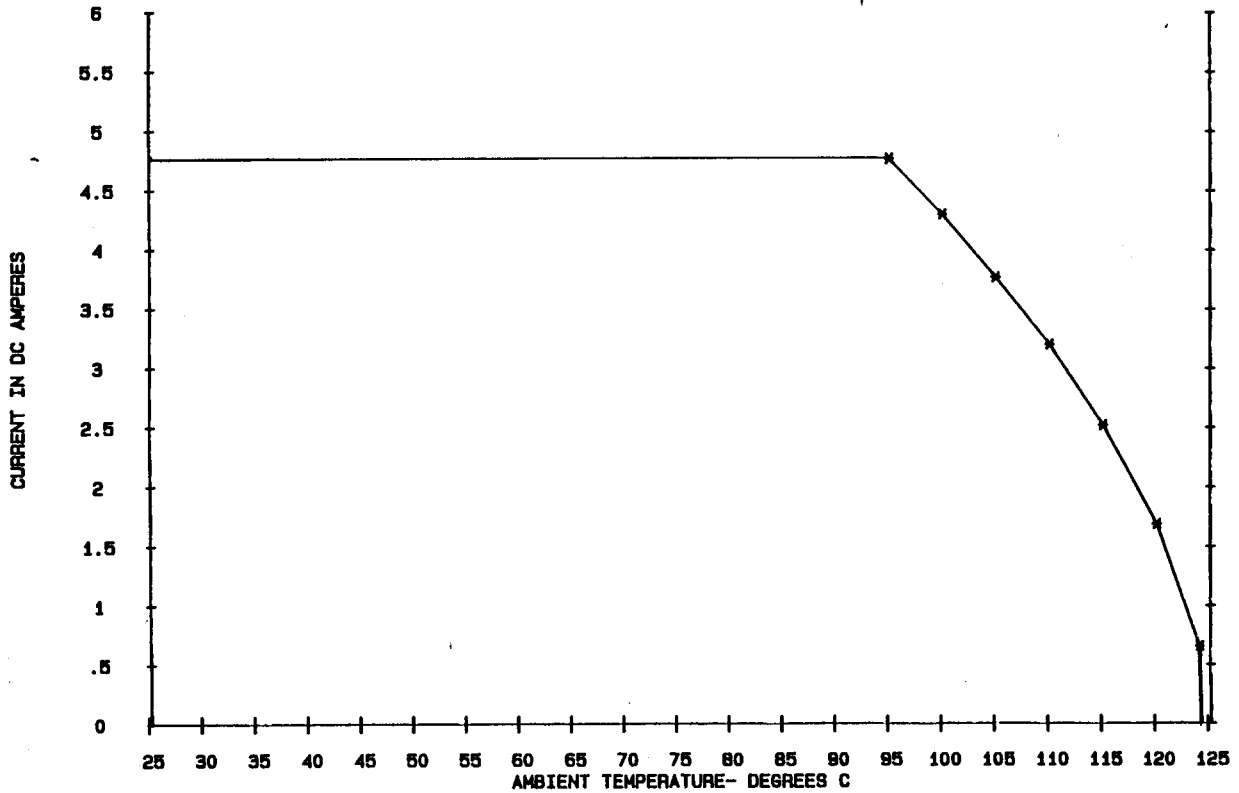


Figure 5A  
Current Carrying Capability

| Multiplication Factors |           |
|------------------------|-----------|
| Loading Density        | F-Factors |
| Single Circuit         | 1.00      |
| 50% Loaded (by rows)   | 0.362     |
| 100% Loaded            | .260      |

**NOTE**

To determine acceptable current carrying capacity for percentage connector loading, use the Multiplication Factor (F) from the above chart and multiply it times Base Rated Current for a single circuit at maximum ambient operating temperature as shown in Figure 5A.

Figure 5B  
Current Rating

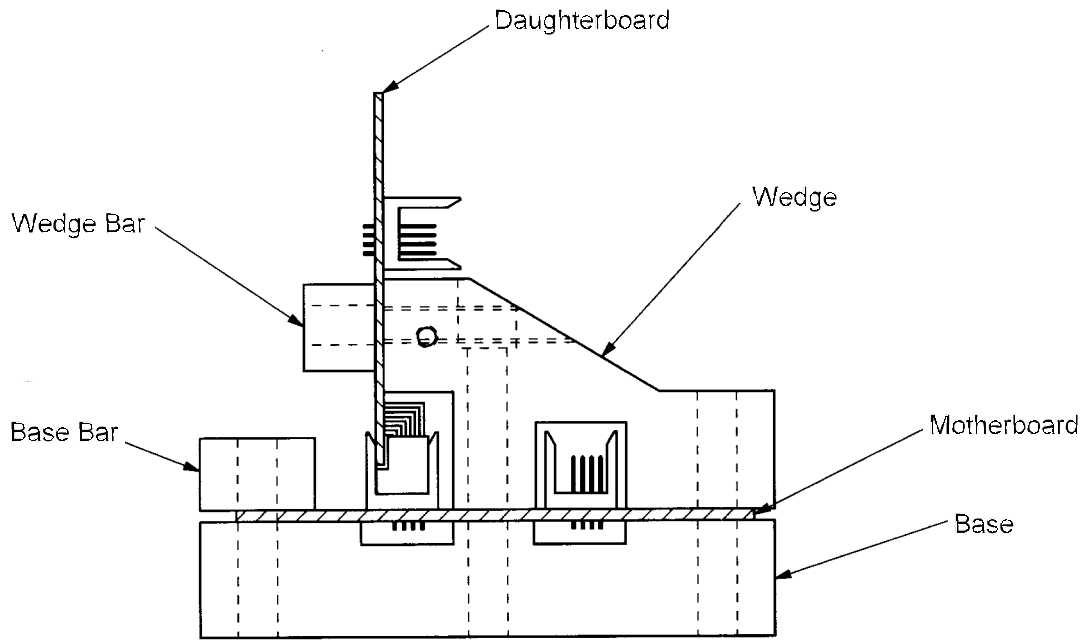


Figure 6  
Vibration & Physical Shock Mounting Fixture