

3M™ Pak 50 Boardmount Socket, P50 series

3M™ Pak 50 Boardmount Plug, P50 series

**3M™ Pak 50 Boardmount Socket, P50 series  
P50-XXXS-XXX-EA**

**3M™ Pak 50 Boardmount Plug, P50 series  
P50-XXXP-XXX-EA**

**Product Specification 78-5102-0141-7**

**Revised 08-09-12**



**3M Electronic Solutions Division**

Interconnect Products  
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Steven A. Neu: Approved 08-09-12  
 Jim W. Wessman: Approved 08-09-12

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## 1.0 Scope

This document summarizes test methods, test conditions, and product performance requirements for 3M™ Pak 50 Boardmount Socket P50 Series mated to 3M™ Pak 50 Boardmount Plug P50 Series. In the event of performance data conflicts between this specification and any documents listed below, this specification supersedes those documents. Materials and finishes listed in the documents below apply and are included in this specification for reference only.

## 2.0 3M Customer Documents

78-5100-2049-4 Technical data sheet for Pak 50 Boardmount Plug P50 Series

78-5100-2050-2 Technical data sheet for Pak 50 Boardmount Socket P50 Series

## 3.0 Performance Testing

Unless otherwise specified, all tests shall be performed on P50-XXXS-XXX-EA sockets mated to P50-XXXP-XXX-EA plugs at ambient environmental conditions per EIA-364. Unless otherwise specified, all values and limits are typical of those obtained by qualification testing of the subject product. All specifications are subject to revision and change without notice from 3M.

## 4.0 Performance and Characteristics Overview

### 4.1 Ratings

Dielectric Withstanding Voltage: 500 VACrms at sea level

Current (AC or DC): 1 A

Temperature: -55°C to +85°C

Insulation resistance:  $>1 \times 10^9 \Omega$  at 500 VDC

### 4.2 Materials

Socket:

Material: Glass Filled Nylon

Flammability: UL 94V-0

Color: Black

Contact Material: Phosphor Bronze

Header:

Material: Glass Filled Nylon

Flammability: UL 94V-0

Color: Black

Contact Material: Phosphor Bronze

### 4.3 Finishes

Plating:

Underplating: Nickel

Wiping Area: 10  $\mu$ " [ .25  $\mu$ m ] Gold

Solder Tails: Gold Flash

Retaining Clips: Tin-Copper

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**4.4 Regulatory Compliance**

See Regulatory Information Appendix (RIA) in the “RoHS compliance” section of [www.3Mconnector.com](http://www.3Mconnector.com) for compliance information. See customer drawings for regulatory specifics on each connector.

**5.0 Electrical**

| Description or Parameter                  | Specification                                                                                                                                   | Test Method                                                                    | Results |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------|
| Dielectric Withstanding Voltage (DWV)     | No dielectric breakdown or arcing.                                                                                                              | Apply 650 VAC <sub>RMS</sub> Voltage for 1 minute between 2 adjacent contacts. | Pass    |
| Current Rating:<br>All Contacts in Series | Temperature Rise: < 40°C<br>Results:<br>0.5 A = 6°C Temp. Rise<br>0.8 A = 17°C Temp. Rise<br>0.9 A = 22°C Temp. Rise<br>1.0 A = 25°C Temp. Rise | Ambient: 22°C                                                                  | Pass    |
| Current Rating:<br>5 Contacts in Series   | Temperature Rise: < 40°C<br>Results:<br>1.0 A = 4°C Temp. Rise<br>1.5 A = 7°C Temp. Rise<br>1.8 A = 9°C Temp. Rise<br>2.0 A = 12°C Temp. Rise   | Ambient: 22°C                                                                  | Pass    |
| Current Rating:<br>1 Contacts in Series   | Temperature Rise: < 40°C<br>Results:<br>1.0 A = 4°C Temp. Rise<br>1.5 A = 5°C Temp. Rise<br>2.0 A = 7°C Temp. Rise                              | Ambient: 22°C                                                                  | Pass    |
| Low Level Contact Resistance (LLCR)       | Max R: <25 mΩ                                                                                                                                   | 4 Wire Measurement<br>Current: 100mA DC                                        | Pass    |
| Insulation Resistance (IR)                | 1000 MΩ min.                                                                                                                                    | Apply 500V DC for 1 minute between two adjacent contacts.                      | Pass    |

**6.0 Mechanical**

| Description or Parameter | Specification                                                     | Test Method                                                                                                                                                                | Test Standard or Method |
|--------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Physical Shock           | No damage or deformation.<br>No electrical discontinuity >1 μ sec | Acceleration: 490 m/sec <sup>2</sup><br>Shock Mode: half sine wave<br>Duration: 11 ms<br>3x in each X,Y,Z opposite direction<br>100mA DC applied to all contacts in series | Pass                    |

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|                                                 |                                                                       |                                                                                                                                                        |      |
|-------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| <b>Vibration</b>                                | No damage or deformation.<br>No electrical discontinuity >1 $\mu$ sec | Frequency: 10-55 Hz<br>Amplitude: 1.52 mm<br>Sweep time: 1 min<br>2 hours in each X,Y,Z opposite direction<br>100 mA applied to all contacts in series | Pass |
| <b>Insertion Force</b>                          | Insertion Force: < 186.2 N<br>(200 position)                          | Measure with mating connectors                                                                                                                         | Pass |
| <b>Withdrawal Force<br/>(Contact Retention)</b> | Withdrawal Force: < 39.2 N<br>(200 position)                          | Measure with mating connectors                                                                                                                         | Pass |
| <b>Durability<br/>(100 times)</b>               | No damage or deformation.<br>LLCR: 25 m $\Omega$ Max                  | 100 cycles at 400-600 cycles per hour                                                                                                                  | Pass |
| <b>Durability<br/>(500 times)</b>               | No damage or deformation.<br>LLCR: 25 m $\Omega$ Max                  | 500 cycles at 1000 cycles per hour                                                                                                                     | Pass |

**7.0 Physical**

| Description or Parameter | Specification                   | Test Method       | Result |
|--------------------------|---------------------------------|-------------------|--------|
| Visual                   | Conforms to the design drawings | Visual Inspection | Pass   |

**8.0 Environmental**

| Description or Parameter                    | Specification                                                                        | Requirement or Conditions                                                                                      | Test Standard or Method |
|---------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Temperature Life<br/>(Thermal Aging)</b> | LLCR: 40 m $\Omega$ Max<br>No Damage or Deformation                                  | Temperature: +85°C<br>Duration: 240 hours                                                                      | Pass                    |
| <b>Salt Spray</b>                           | No serious corrosion<br>LLCR: 25m $\Omega$ Max                                       | Temperature: +35°C<br>Duration: 48 hours<br>Concentration: 5%                                                  | Pass                    |
| <b>Thermal Shock</b>                        | No damage or deformation.<br>LLCR: 25 m $\Omega$ Max<br>( 5 cycles, -55°C to +85°C ) | 1. -55°C for 30 min<br>2. +25°C for 5 min<br>3. +85°C for 30 min<br>4. +25°C for 5 min<br>Repeat 1-4, 5 cycles | Pass                    |
| <b>Humidity</b>                             | No damage or deformation.<br>DWV: No breakdown or arcing<br>LLLCR: 25 m $\Omega$ Max | Humidity: 90-95% RH<br>Temperature: 40°C<br>Duration: 96 hrs                                                   | Pass                    |

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|                                |                                                   |                                                                                       |             |
|--------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------|-------------|
| <b>H<sub>2</sub>S Exposure</b> | <b>No serious corrosion.<br/>LLLCR: 25 mΩ Max</b> | <b>Temperature: 40°C<br/>Concentration: 3 ppm<br/>RH: 80%<br/>Duration: 48 hours</b>  | <b>Pass</b> |
| <b>SO<sub>2</sub> Exposure</b> | <b>No serious corrosion.<br/>LLLCR: 25 mΩ Max</b> | <b>Temperature: 40°C<br/>Concentration: 10 ppm<br/>RH: 80%<br/>Duration: 48 hours</b> | <b>Pass</b> |

## 9.0 Qualification Test Groups and Sequences

### 9.1 Sequenced Tests

| Test or Examination             | Test Group |      |      |      |      |      |
|---------------------------------|------------|------|------|------|------|------|
|                                 | A          | B    | C    | D    | E    | F    |
| Visual                          | 1          | 1    | 1    | 1    | 1    | 1    |
| Insulation Resistance           | 2          | 2    |      |      |      |      |
| Dielectric Withstanding Voltage | 3          | 3    |      |      |      |      |
| Low Level Contact Resistance    | 4          | 4, 8 | 3, 6 | 3, 5 | 3, 5 | 3, 5 |
| Total Insertion Force           | 5          |      |      |      |      |      |
| Total Withdrawal Force          | 6          |      |      |      |      |      |
| Thermal Shock                   | 7          |      | 4    |      |      |      |
| Vibration                       | 8          |      |      |      |      |      |
| Shock                           | 9          |      |      |      |      |      |
| Humidity                        |            | 5    | 5    |      |      |      |
| Durability (100)                |            | 6    | 2    | 2    | 2    | 2    |
| Salt Spray                      |            | 7    |      |      |      |      |
| SO <sub>2</sub> Exposure        |            |      |      | 4    |      |      |
| H <sub>2</sub> S Exposure       |            |      |      |      | 4    |      |
| Temperature Life                |            |      |      |      |      | 4    |

### 9.2 Independent Tests

- 1 Durability (500)
- 2 Dielectric Withstanding Voltage
- 3 Current Rating
- 4 Insulation Resistance
- 5 Mating Force / Contact
- 6 Unmating Force / Contact

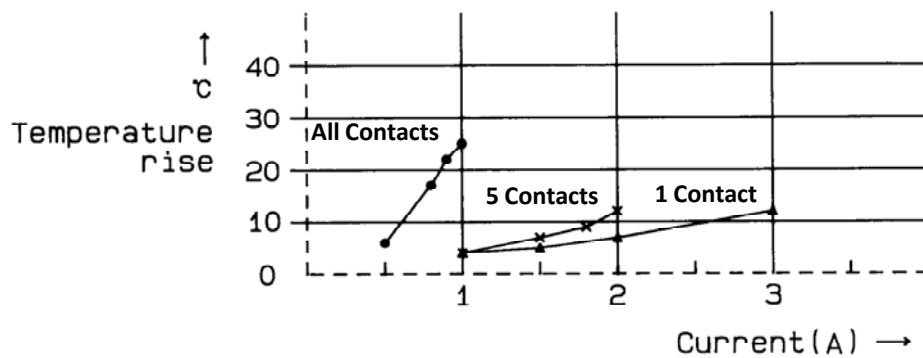
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**10. Figures****10.1 Temperature Rise Plot****11.0 Agency Listings****11.1 Underwriters Laboratories (UL)**

| Agency | File No. |
|--------|----------|
| UL     | E68080   |

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