Mini-fit TPA2, Wire to Board
INTERCONNECT SYSTEMS

See section 2.1 for series numbers

Receptacle w/ TPA

Female Crimp Terminal

TPA Retainer

Receptacle Housing

Standard Header

Vertical Header

Right Angle Header

Mini-fit TPA2, Wire to Board CONTACT INTERFACE RELIABILITY

DOCUMENT NUMBER:
1727180001-TS

CREATED / REVISED BY:
TGREGORI

CHECKED BY:
TGREGORI

APPROVED BY:
RHODGE

TEMPLATE FILENAME: PRODUCT_SPEC_SIZE_A\(V.1\).DOC
1.0 SCOPE
This Test Summary covers the performance results for the MINI-FIT TPA2 Wire-To-Board, 4.20mm pitch dual row and single row connector series using brass and phos bronze terminals with Tin plating terminated with 16 to 24 AWG wire using Molex crimp technology. The TPA Retainer (terminal position assurance) is intended to ensure the crimp terminals are fully seated and to prevent incidence of terminal back-out due to partially seated terminals.

2.0 PRODUCT DESCRIPTION

2.1 NAMES AND SERIES NUMBER(S)

<table>
<thead>
<tr>
<th>Description</th>
<th>Series Number</th>
<th>UL (600 V)</th>
<th>CSA (250 V)</th>
<th>IEC (250 V)</th>
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<tbody>
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<td>Mini-Fit TPA2, Receptacle Hsg, Dual Row</td>
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<td>Mini-Fit TPA2, TPA Retainer</td>
<td>172709</td>
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MATES TO

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<th>UL (600 V)</th>
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<th>IEC (250 V)</th>
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<td>Right Angle Hdr, Dual Row</td>
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<td>Right Angle Hdr, Dual Row, Glow Wire Capable</td>
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<td>Right Angle Hdr, Dual Row, Reflow Capable</td>
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<tr>
<td>Right Angle Hdr, Single and Dual Row</td>
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<td>172648</td>
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<td>Test Plug</td>
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2.2 DIMENSIONS, MATERIALS, PLATING AND MARKINGS
See the appropriate sales drawings for the information on dimensions, materials, plating and markings.

2.3 SAFETY AGENCY APPROVALS
UL File Number: E29179
CSA: LR19980
IEC 61984 Certification: Tested to and found in compliance with IEC 61984. NRTL type examination certificate available from Molex upon request. Contact Molex Safety Agency team for questions regarding certification on specific part numbers.

2.4 PRODUCT SPECIFICATION TITLE AND DOCUMENT NUMBER
Title: Product Specification Mini-Fit TPA2 Connector System
Document No: PS-172718-0000

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS
See sales drawings and the other sections of this specification for the necessary referenced documents and specifications.
4.0 TEST SEQUENCES

Laboratory conditions, test sequences and sample selection are in accordance with EIA-364.
### 5.0 MECHANICAL PERFORMANCE RESULTS

#### RIGHT ANGLE

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>TREATMENT</th>
<th>REQUIREMENT</th>
<th>MEAN</th>
<th>MIN.</th>
<th>MAX.</th>
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</thead>
<tbody>
<tr>
<td>Mate Force Per Circuit (brass)</td>
<td>Initial</td>
<td>14.7 N MAX</td>
<td>2.45 N</td>
<td>2.06 N</td>
<td>3.80 N</td>
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<td>Unmate Force Per Circuit (brass)</td>
<td>Initial</td>
<td>14.7 N MAX</td>
<td>3.51 N</td>
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<td>Mate Force Per Circuit (phos bronze)</td>
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<td>Unmate Force Per Circuit (phos bronze)</td>
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<td>14.7 N MAX</td>
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<td>6.46 N</td>
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#### VERTICAL

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<th>MAX.</th>
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<td>Unmate Force Per Circuit (brass)</td>
<td>Initial</td>
<td>14.7 N MAX</td>
<td>5.41 N</td>
<td>4.03 N</td>
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<td>Mate Force Per Circuit (phos bronze)</td>
<td>Initial</td>
<td>14.7 N MAX</td>
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<td>4.66 N</td>
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<tr>
<td>Unmate Force Per Circuit (phos bronze)</td>
<td>Initial</td>
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## 5.0 MECHANICAL PERFORMANCE RESULTS (cont.)

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<tr>
<td>Terminal Insertion Force (brass)</td>
<td>Initial</td>
<td>15 N MAX</td>
<td>2.35 N</td>
<td>1.75 N</td>
<td>3.73 N</td>
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<tr>
<td>Terminal Insertion Force (phos bronze)</td>
<td>Initial</td>
<td>15 N MAX</td>
<td>2.71 N</td>
<td>2.38 N</td>
<td>3.35 N</td>
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<tr>
<td>Terminal Retention Force (brass)</td>
<td>Initial</td>
<td>30 N MIN</td>
<td>60.84 N</td>
<td>54.93 N</td>
<td>63.38 N</td>
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<tr>
<td>Terminal Retention Force (phos bronze)</td>
<td>Initial</td>
<td>30 N MIN</td>
<td>64.89 N</td>
<td>59.84 N</td>
<td>70.19 N</td>
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<tr>
<td>Thumb Latch Operation Force (V-0)</td>
<td>Initial</td>
<td>16 N MAX</td>
<td>10.51 N</td>
<td>9.14 N</td>
<td>11.70 N</td>
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<tr>
<td>Thumb Latch Operation Force (V-2)</td>
<td>Initial</td>
<td>16 N MAX</td>
<td>8.02 N</td>
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<td>Thumb Latch Yield Strength (V-0)</td>
<td>Initial</td>
<td>60 N MIN</td>
<td>72.88 N</td>
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<td>Thumb Latch Yield Strength (V-2)</td>
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<td>45 N MIN</td>
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### 6.0 ELECTRICAL / ENVIRONMENTAL PERFORMANCE RESULTS

(Note that measured LLCR values are for one mated interface minus bulk resistance)

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<th>DESCRIPTION</th>
<th>TREATMENT</th>
<th>REQUIREMENT</th>
<th>MEAN</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
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<tbody>
<tr>
<td></td>
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<td>10 mΩ MAX</td>
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<td>After Durability (pre-conditioning)</td>
<td>20 mΩ Δ MAX</td>
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<td>20 mΩ Δ MAX</td>
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#### RIGHT ANGLE – PHOS BRONZE

<table>
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<th>DESCRIPTION</th>
<th>TREATMENT</th>
<th>REQUIREMENT</th>
<th>MEAN</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Initial</td>
<td>10 mΩ MAX</td>
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<tr>
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<td>After Durability (pre-conditioning)</td>
<td>20 mΩ Δ MAX</td>
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<td>After Temp Life</td>
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#### VERTICAL – BRASS

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<th>REQUIREMENT</th>
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<tbody>
<tr>
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<td>After Durability (pre-conditioning)</td>
<td>20 mΩ Δ MAX</td>
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<td>After Temp Life</td>
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<td>After Reseating</td>
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#### VERTICAL – PHOS BRONZE

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<td>0.15 mΩ</td>
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Group 1 - Receptacle TPA2 mated to R/A Header - BRASS

n=102

Cumulative Percent (%)
Group 1 - Receptacle TPA2 mated to R/A Header - PHOS BRONZE

n=102

-5.00 -4.00 -3.00 -2.00 -1.00 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 20.00

LCR Δ (mΩ)

Cumulative Percent (%)
Group 1 - Receptacle TPA2 mated to Vertical Header - BRASS

![Graph showing the cumulative percent (%) of different conditions over cycles.](image)

**ECR/ECN INFORMATION**

**EC No:**

**DATE:** 2017 / 07 / 12

**DOCUMENT NUMBER:** 1727180001-TS

**CREATED / REVISED BY:** TGREGORI

**CHECKED BY:** TGREGORI

**APPROVED BY:** RHODGE

**TEST SUMMARY FOR MINI-FIT TPA2 WIRE TO BOARD CONTACT INTERFACE RELIABILITY**

**TEMPLATE FILENAME:** PRODUCT_SPEC[SIZE_A](V.1).DOC

**SHEET No.** 10 of 26
TEST SUMMARY FOR MINI-FIT TPA2 WIRE TO BOARD CONTACT INTERFACE RELIABILITY
### 6.0 ELECTRICAL / ENVIRONMENTAL PERFORMANCE RESULTS (cont.)
(Note that measured LLCR values are for one mated interface minus bulk resistance)

#### RIGHT ANGLE – BRASS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>REQUIREMENT</th>
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<th>MINIMUM</th>
<th>MAXIMUM</th>
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<td>After Durability (pre-conditioning)</td>
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<td>After Thermal Shock</td>
<td>20 mΩ Δ MAX</td>
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<td>-0.05 mΩ</td>
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<td>After Humidity</td>
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<td>After Reseating</td>
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#### RIGHT ANGLE – PHOS BRONZE

<table>
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<td>After Durability (pre-conditioning)</td>
<td>20 mΩ Δ MAX</td>
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<td>After Thermal Shock</td>
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<td>0.64 mΩ</td>
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#### VERTICAL – BRASS

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<tbody>
<tr>
<td>Initial</td>
<td>10 mΩ MAX</td>
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<td>After Durability (pre-conditioning)</td>
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<td>-0.04 mΩ</td>
<td>0.39 mΩ</td>
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<tr>
<td>After Thermal Shock</td>
<td>20 mΩ Δ MAX</td>
<td>0.33 mΩ</td>
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<td>After Humidity</td>
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#### VERTICAL – PHOS BRONZE

<table>
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<th>ITEM</th>
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<th>MEAN</th>
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<th>MAXIMUM</th>
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<tbody>
<tr>
<td>Initial</td>
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<td>2.36 mΩ</td>
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<td></td>
</tr>
<tr>
<td>After Durability (pre-conditioning)</td>
<td>20 mΩ Δ MAX</td>
<td>0.10 mΩ</td>
<td>-0.07 mΩ</td>
<td>0.28 mΩ</td>
<td></td>
</tr>
<tr>
<td>After Thermal Shock</td>
<td>20 mΩ Δ MAX</td>
<td>0.26 mΩ</td>
<td>-0.05 mΩ</td>
<td>0.68 mΩ</td>
<td></td>
</tr>
<tr>
<td>After Humidity</td>
<td>20 mΩ Δ MAX</td>
<td>0.42 mΩ</td>
<td>0.04 mΩ</td>
<td>1.67 mΩ</td>
<td></td>
</tr>
<tr>
<td>After Reseating</td>
<td>20 mΩ Δ MAX</td>
<td>0.37 mΩ</td>
<td>0.00 mΩ</td>
<td>1.14 mΩ</td>
<td></td>
</tr>
</tbody>
</table>
Group 2 - Receptacle TPA2 mated to R/A Header - BRASS

Cumulative Percent (%)

- Pre-Condition Durability
- Post Thermal Shock
- Post Cyclic Temp and humidity
- Post Reesting
Group 2 - Receptacle TPA2 mated to Vertical Header - BRASS

n=102

- Post Pre-Condition Durability
- Post Thermal Shock
- Post Cyclic Temp and humidity
- Post Resealing

Cumulative Percent (%)
Group 2 - Receptacle TPA2 mated to Vertical Header - PHOS BRONZE

n=102

- Post Pre-Condition Durability
- Post Thermal Shock
- Post Cyclic Temp and humidity
- Post Reseating

Cumulative Percent (%)
## 6.0 ELECTRICAL / ENVIRONMENTAL PERFORMANCE RESULTS (cont.)
(Note that measured LLCR values are for one mated interface minus bulk resistance)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CONTACT RESISTANCE (Low Level)</th>
<th>RIGHT ANGLE – BRASS</th>
<th>RIGHT ANGLE – PHOS BRONZE</th>
<th>VERTICAL – BRASS</th>
<th>VERTICAL – PHOS BRONZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>REQUIREMENT</td>
<td>MEAN</td>
<td>MINIMUM</td>
<td>MAXIMUM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initial</td>
<td>10 mΩ MAX</td>
<td>2.48 mΩ</td>
<td>2.12 mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After Durability (pre-conditioning)</td>
<td>20 mΩ Δ MAX</td>
<td>0.11 mΩ</td>
<td>-0.09 mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After Vibration</td>
<td>20 mΩ Δ MAX</td>
<td>2.39 mΩ</td>
<td>2.08 mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After Vibration</td>
<td>20 mΩ Δ MAX</td>
<td>2.31 mΩ</td>
<td>2.08 mΩ</td>
</tr>
</tbody>
</table>
Group 3 - Receptacle TPA2 mated to R/A Header - BRASS

- Post Pre-Condition Durability
- Post Pre-Condition Temperature Life
- Post Vibration

Cumulative Percent (%)
Group 3 - Receptacle TPA2 mated to R/A Header - PHOS BRONZE

TEST SUMMARY FOR
MINI-FIT TPA2 WIRE TO BOARD
CONTACT INTERFACE RELIABILITY

n=102

Cumulative Percent (%)
Group 3 - Receptacle TPA2 mated to Vertical Header - BRASS

n=102

Cumulative Percent (%)
TEST SUMMARY

Group 3 - Receptacle TPA2 mated to Vertical Header - PHOS BRONZE

n=102

Cumulative Percent (%)
### ELECTRICAL / ENVIRONMENTAL PERFORMANCE RESULTS (cont.)

(Note that measured LLCR values are for one mated interface minus bulk resistance)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>REQUIREMENT</th>
<th>MEAN</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>RIGHT ANGLE – BRASS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>10 mΩ MAX</td>
<td></td>
<td>2.51 mΩ</td>
<td>2.13 mΩ</td>
<td>3.23 mΩ</td>
</tr>
<tr>
<td>After Durability</td>
<td>20 mΩ Δ MAX</td>
<td></td>
<td>0.07 mΩ</td>
<td>-0.20 mΩ</td>
<td>0.38 mΩ</td>
</tr>
<tr>
<td></td>
<td><strong>RIGHT ANGLE – PHOS BRONZE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>10 mΩ MAX</td>
<td></td>
<td>2.69 mΩ</td>
<td>2.24 mΩ</td>
<td>3.08 mΩ</td>
</tr>
<tr>
<td>After Durability</td>
<td>20 mΩ Δ MAX</td>
<td></td>
<td>0.07 mΩ</td>
<td>-0.13 mΩ</td>
<td>0.39 mΩ</td>
</tr>
<tr>
<td></td>
<td><strong>VERTICAL – BRASS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>10 mΩ MAX</td>
<td></td>
<td>2.26 mΩ</td>
<td>2.11 mΩ</td>
<td>2.46 mΩ</td>
</tr>
<tr>
<td>After Durability</td>
<td>20 mΩ Δ MAX</td>
<td></td>
<td>0.18 mΩ</td>
<td>-0.02 mΩ</td>
<td>0.37 mΩ</td>
</tr>
<tr>
<td></td>
<td><strong>VERTICAL – PHOS BRONZE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>10 mΩ MAX</td>
<td></td>
<td>2.37 mΩ</td>
<td>2.23 mΩ</td>
<td>2.54 mΩ</td>
</tr>
<tr>
<td>After Durability</td>
<td>20 mΩ Δ MAX</td>
<td></td>
<td>0.20 mΩ</td>
<td>-0.05 mΩ</td>
<td>0.78 mΩ</td>
</tr>
<tr>
<td>Dielectric Withstanding Voltage</td>
<td>2200 VAC</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>No breakdown or flashover</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PASS</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
TEST SUMMARY

Group 7 - Receptacle TPA2 mated to R/A Header - BRASS

n=102

Cumulative Percent (%)
Group 7 - Receptacle TPA2 mated to R/A Header - PHOS BRONZE

n=102

Cumulative Percent (%)
Group 7 - Receptacle TPA2 mated to Vertical Header - BRASS

![Graph showing cumulative percent (%) for UCR δ (mΩ)]

**Title:** TEST SUMMARY FOR MINI-FIT TPA2 WIRE TO BOARD CONTACT INTERFACE RELIABILITY

**Sheet No.:** 25 of 26
Group 7 - Receptacle TPA2 mated to Vertical Header - PHOS BRONZE

n=102

Cumulative Percent (%)