

The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

## Sliver Mini Power Connectors

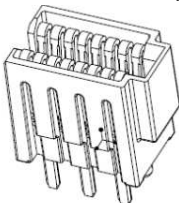
### 1. SCOPE

#### 1.1. Content

This specification defines performance, test and quality requirements for the Sliver 2.0 Card Edge mini power connectors.

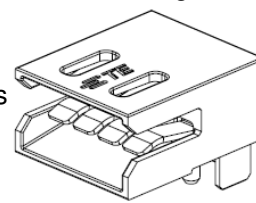
##### 1. Vertical version

For perpendicular plug in cards



##### 2. Right Angle version

For parallel card applications



#### 1.2. Qualification

When tests are performed on the subject product line, procedures specified in testing requirements and procedures shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

#### 1.3. Qualification Test Results for Vertical Version

Successful qualification testing on the subject product line was completed on September 20<sup>th</sup>, 2019. The qualification test report number is 501-32405. This documentation is on file and available from Engineering Practices and Standards. Additional test results can be found in 502-32083.

#### 1.4. Qualification Test Results for Right Angle Version

Successful qualification testing on the subject product line was completed on Aug 25, 2021. The qualification test report number is 501-32xxx. This documentation is on file and available from Engineering Practices and Standards. Additional test results can be found in 502-32xxx.

### 2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

#### 2.1. TE Documents

- [114-130013](#): Application Specification
- [501-32405](#): Qualification Test Report (Vertical)
- [502-32083](#): Additional Testing Report (Vertical)
- 502-32141: Additional Testing Report (Vertical) (Additional Copper content in mating Boards)
- [501-160257](#): Qualification Test Report (Right Angle)

#### 2.2. Industry Documents

- EIA-364 Electrical Connector/Socket Test Procedures Including Environmental Classifications
- IPC/ECA J-STD-002 Solderability

#### 2.3. Reference Document

- [109-197](#) Test Specification (TE Test Specification vs EIA and IEC Test Methods)
- [102-950](#) Qualification of Separable Interface Connectors

### 3. REQUIREMENTS

#### 3.1. Design and Construction

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

#### 3.2. Ratings

- Voltage: See Figure 1
- Current: See Figure 1
- Operating Temperature: -55°C to 105°C

| Voltage Rating<br>(Volts AC) | Estimated Current Rating<br>(amperes at 40°C temperature rise) |                               |
|------------------------------|----------------------------------------------------------------|-------------------------------|
|                              | Vertical                                                       | Right Angle                   |
| 48V                          | 50 A (25 amperes per contact)                                  | 40 A-(20 amperes per contact) |

**Figure #1**

#### 3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

| TEST DESCRIPTION                    | REQUIREMENT                                                   | PROCEDURE                                                                                                                                                                     |
|-------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Examination of Product      | Meets requirements of product drawing.                        | EIA-364-18.<br>Visual examination and dimensional (C of C) inspection per product drawing.                                                                                    |
| Final Examination of Product        | Meets visual requirements.                                    | EIA-364-18.<br>Visual examination                                                                                                                                             |
| <b>ELECTRICAL</b>                   |                                                               |                                                                                                                                                                               |
| Low Level Contact Resistance (LLCR) | 1 mΩ maximum initial<br>ΔR 1 mΩ maximum                       | EIA-364-23.<br>Max. open voltage 20 mV. Max current 100 mA DC.                                                                                                                |
| Contact Resistance at Rated Current | 2.0 mΩ maximum                                                | EIA-364-06                                                                                                                                                                    |
| Insulation Resistance               | 1 GΩ Min                                                      | EIA-364-21.<br>Test voltage 500V DC. Duration 5 seconds min.                                                                                                                  |
| Dielectric Withstanding Voltage     | Maximum leakage current of 2.0 mA. No breakdown or flashover. | EIA-364-20, Condition I<br>Test Voltage: 1100 VAC                                                                                                                             |
| <b>MECHANICAL</b>                   |                                                               |                                                                                                                                                                               |
| Random Vibration                    | No discontinuity ≥ 1 microsecond.                             | EIA 364-28, Test Method VII, Test Condition Letter D. Subject mated specimens to 3.10 G RMS between 20 to 500 Hz. Fifteen minutes in each of 3 mutually perpendicular planes. |

| TEST DESCRIPTION                    | REQUIREMENT                                               | PROCEDURE                                                                                                                                                                                                                                                  |
|-------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mechanical Shock                    | No discontinuity $\geq 1$ microsecond. See note.          | EIA 364-27, Test condition A, Subject mated specimens to 50 G half-sine shock. Three shocks applied in each direction of 3 mutually perpendicular axis. 18 total shocks.                                                                                   |
| Mating/Un-Mating Force              | Minimum of 3 N for both mating and un-mating force values | EIA 364-13<br>Axial Tension/Compression machine such as an Instron Tensile Tester.<br>Max rate 25.4 mm/min                                                                                                                                                 |
| Durability                          | See note.                                                 | EIA 364-9. Mate and un-mate specimens to within .050". 200 mate/un-mate cycles. Add in cards shall be replaced after 100 cycles.                                                                                                                           |
| <b>ENVIRONMENTAL</b>                |                                                           |                                                                                                                                                                                                                                                            |
| Solderability                       | 95% minimum wetting                                       | IPC/ECA J-STD-002 Test A1                                                                                                                                                                                                                                  |
| Resistance to Reflow Soldering Heat | See note.                                                 | TEC-109-201 Method-A, Condition B. subject SMD connector to 3X reflow curve 260°C peak.                                                                                                                                                                    |
| Thermal Shock                       | See note.                                                 | EIA 364-32, Method A, Test Condition VII. Subject mated specimens to 5 cycles between -55°C and 105°C with 30 minute dwells at temperature extremes and 1 minute maximum transition time between temperatures.                                             |
| Humidity/Temperature Cycling        | See note.                                                 | EIA 364-31, Method IV. Subject mated specimens to 10 cycles (10 Days) between 25°C and 65°C at 80% to 100% Relative Humidity.                                                                                                                              |
| Temperature Life                    | See note.                                                 | EIA 364-17, Method A. Test Subject mated specimens to 105°C for 1000 hours.                                                                                                                                                                                |
| Mixed Flowing Gas                   | See note.                                                 | EIA 364-65, Class IIA (4 gas). Subject board mounted specimens to environmental Class IIA for 14 days. One-half of the specimens (receptacle only) unmated for 7 days followed by 7 days mated. The remaining one-half of the specimens mated for 14 days. |

| TEST DESCRIPTION         | REQUIREMENT                                                                                                                                         | PROCEDURE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Rise Testing | <p>Maximum of 40°C above Ambient T-rise.</p> <p>Note: Rated Current</p> <p>Vertical = 25 amps per contact</p> <p>Rt Angle = 20 amps per contact</p> | <p>EIA 364-70 Test Method 3, Test Condition II.</p> <p>The test specimen(s) shall be energized to generate a temperature rise equal to approximately 30% of the specified requirement. The current shall then be increased in gradual increments and the temperature rise shall be measured and recorded along with the corresponding current after stabilization has been achieved. Incremental increases shall be repeated until the specified temperature rise has been achieved or exceeded. Perform Contact resistance once temperature has stabilized.</p> |


**NOTE**

*Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.*

### 3.4. Product Qualification and Requalification Test Sequence

| Test or Examination                 | Test Group (a)    |          |      |       |       |
|-------------------------------------|-------------------|----------|------|-------|-------|
|                                     | 1                 | 2 (c)    | 3    | 4 (c) | 5 (c) |
|                                     | Test Sequence (b) |          |      |       |       |
| Initial examination of product      | 1                 | 1        | 1    | 1     | 1     |
| Low Level Contact Resistance        | 4,6,9             | 4,7,9,11 |      |       |       |
| Contact Resistance at Rated Current |                   | 5(e)     |      |       |       |
| Insulation resistance               |                   |          | 2,6  |       |       |
| Withstanding voltage                |                   |          | 3,7  |       |       |
| Random vibration                    | 7                 | 10       |      |       |       |
| Mechanical shock                    | 8                 |          |      |       |       |
| Durability                          | 5                 |          |      |       |       |
| Connector Mating Force              | 2,10              | 2        |      |       | 2,5   |
| Connector Un-Mating Force           | 3,11              | 3        |      |       | 3,6   |
| Connector solderability             |                   |          |      | 2     |       |
| Resistance to reflow soldering heat |                   |          |      |       | 4     |
| Thermal shock                       |                   |          | 4(d) |       |       |
| Humidity/temperature cycling        |                   |          | 5    |       |       |
| Temperature life                    |                   | 8        |      |       |       |
| Temperature Rise                    |                   | 5(d),12  |      |       |       |
| Mixed flowing gas                   |                   | 6        |      |       |       |
| Final examination of product        | 12                | 13       | 8    | 3     | 7     |



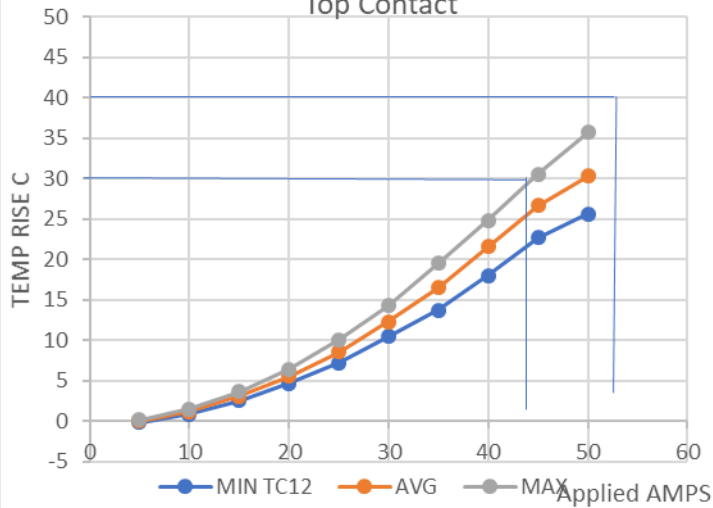
#### NOTE

- Samples shall be prepared in accordance with applicable instructions and shall be selected at random from current production. Unless otherwise stated all test groups shall consist of a minimum of 10 connectors of which all contacts shall be tested.
- Numbers indicate sequence in which tests are performed.
- Groups 4 and 5 shall consist of 6 connectors. Group 2 shall consist of 8 connectors.
- Connectors for these tests shall be preconditioned by 10 mating and un-mating cycles.
- Contact resistance at rated current shall be performed after temperature has stabilized during temperature rise testing.

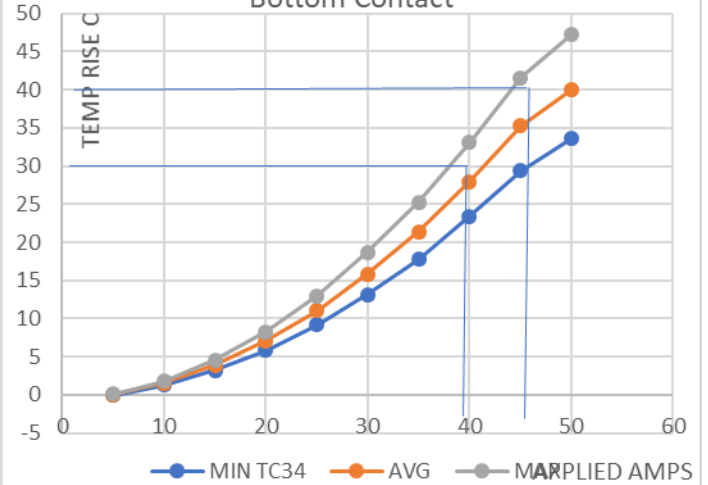
Appendix: Right Angle Connector Test (Group 2) temperature profile for Testing of 3 different test GROUPS for Temperature Rise for applied Current. Data is from Test Reports: Ref. WE-20201540 and WE-20201541

- TEST Samples 3: 15uin gold (2 layers 2 oz copper inner layers boards)
- TEST Samples 4: 15uin PdNi EIA spec Boards (2 layers 2 oz copper)
- TEST Samples 8: 15uin PdNi contacts with double thickness copper PCB layers (4 layers 2 oz inner layers copper)

Temp Rise for applied Current TD 1 and 2  
Top Contact



Temp Rise for applied Current TD 3 and 4  
Bottom Contact



Group 3 contact is plated with  
15uin. Au

Group 4 contact is plated with  
15uin. PdNi with Au Flash

Max curve is the bottom contact temp

Min curve is the top contact temp.

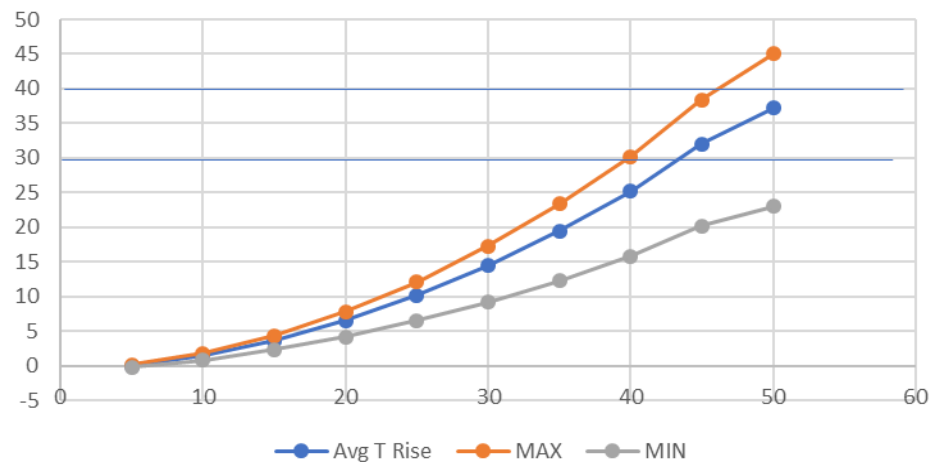
Group 3 and 4 tests used  
Mating and Main PCB  
that had 2 layers of 2oz  
copper layers to conduct  
current

Max curve is the bottom contact data

Min curve is the top contact data

Group 8 test used Mating  
and Main PCB that had  
4 layers of 2oz copper to  
conduct current

Temp Rise for Applied Current Group 4



TEMP RISE FOR APPLIED CURRENT GP 8

