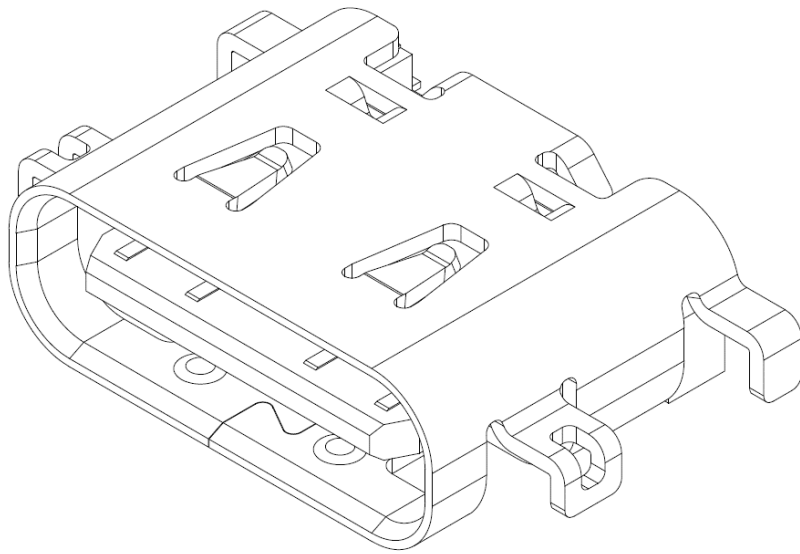


# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
|----------------------------|--|-----------------|----|----------------|----------|-----------------|----|
| <b>Part Number</b>         | USB4510  | <b>Rev</b>      | A1 | <b>Date</b>    | 09/05/23 |                 |    |
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# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
|----------------------------|--|-----------------|----|----------------|----------|-----------------|----|
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## 1.0 SCOPE

This specification covers performance, tests and quality requirements for USB Type C Receptacle USB4510.

## 2.0 PRODUCT NAME AND PART NUMBER

USB Type C Receptacle USB4510.

## 3.0 PRODUCT SHAPE, DIMENSIONS AND MATERIAL

Please refer to drawing

## 4.0 RATINGS

4.1 Current rating: 5.00A collectively for VBUS pins (i.e., pins A4, A9, B4, and B9)

6.25A collectively for GND pins (i.e., pins A1, A12, B1, and B12)

1.25A for VCONN (i.e., A5/B5)

0.25A for all other pins, per pin

4.2 Voltage rating ..... 48V DC

4.3 Power rating ..... 240W

4.4 Operating Temperature Range ..... -25°C to +85°C

## 5.0 TEST AND MEASUREMENT CONDITIONS

Product is designed to meet electrical, mechanical and environmental performance requirements specified below. All tests are performed in ambient conditions unless otherwise specified.

## 6.0 PERFORMANCE

| Test No | Item                   | Test Condition   | Requirement   |
|---------|------------------------|--|---|
| 6.0.1   | Examination of Product | Visual, dimensional and functional inspection as per quality plan. | Product shall meet requirements of product drawing and specification. |
|         | Reseating              | Manually plug/unplug 3 times                                       | No physical damage  |

# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
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## 6.1 Electrical Performance

| Test No | Item                         | Test Condition   | Requirement   |
|---------|------------------------------|--|---|
| 6.1.1   | Low Level Contact Resistance | The low level contact resistance measurement is made from the solder tail of the receptacle to the soldering point of the plug. When measured at 20mV Max. open circuit at 100mA. Mated test contacts must be in a connector housing. In accordance with EIA-364-23, Test Condition B  | 40mΩ max (initial)  |
| 6.1.2   | Insulation Resistance        | Both unmated and Mated connectors, apply 100V DC for 1 minute at sea level between adjacent terminal or ground. In accordance with EIA-364-21.   | 100 MΩ Min (initial)  |
| 6.1.3   | Dielectric Strength          | Mate connectors, apply 100V AC (RMS) for 1 minute at sea level. In accordance with EIA-364-20.   | No Breakdown  |
| 6.1.4   | Contact current rating       | A current of 5 A shall be applied collectively to VBUS pins (i.e., pins A4, A9, B4, and B9) and 1.25 A shall be applied to the VCONN pin (i.e., B5) as applicable, terminated through the corresponding GND pins (i.e., pins A1, A12, B1, and B12). A minimum current of 0.25 A shall also be applied individually to all the other contacts, as applicable. | The temperature rise shall not exceed 30°C at the outside surface of the shell. |

# PRODUCT SPECIFICATION

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## 6.2 Mechanical Performance

| Test No | Item                         | Test Condition  | Requirement  |
|---------|------------------------------|---|--|
| 6.2.1   | Mating/Un-mating Force       | Mate/Un-mated at a speed of 12.5mm/min. In accordance with EIA-364-13.  | Mating force: within 5N to 20N (initial).<br>Un-Mating force: within 8N to 20N up to 30cycles, within 6N to 20N after 10,000cycles |
| 6.2.2   | Durability                   | 10,000 cycles at a cycle rate 500± 50per hour. In accordance with EIA-364-09.   | Un-Mating force: within 6N to 20N<br>Contact resistance: 50mΩ max<br>Dielectric Strength: no breakdown                             |
|         | Durability (Preconditioning) | 50 cycles at a cycle rate 500± 50 per hour In accordance with EIA-364-09.   | -  |
| 6.2.3   | Vibration                    | EIA 364-28 Test Condition VII, Test Letter D 15 minutes in each of 3 mutually perpendicular directions. Both mating halves should be rigidly fixed so as not to contribute to the relative motion of one contact against another. The method of fixturing should be detailed in the test report | No evidence of physical damage and no discontinuity longer than 1 microsecond.<br>Contact resistance: 50mΩ max.                    |
| 6.2.4   | 4-Axis Continuity            | Shall be tested for continuity under stress using a test fixture  | No evidence of physical damage and no discontinuity longer than 1 microsecond.   |

# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
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## 6.3 Environmental Performance and Others

| Test No | Item                                 | Test Condition  | Requirement  |
|---------|--------------------------------------|---|--|
| 6.3.1   | Cyclic Temperature and Humidity Test | Cycle the connector between 25 °C ±3 °C at 80 % ±3% RH and 65 °C ±3 °C at 50 % ±3% RH. Ramp times should be 0.5 hour and dwell times should be 1.0 hour. Dwell times start when the temperature and humidity have stabilized within the specified levels. Perform 24 such cycles.                       | Contact Resistance: 50mΩ Max.  |
| 6.3.2   | Salt Spray                           | Subject mated connectors to 5±1% salt-solution concentration, 35±2°C for 24 hours. In accordance with EIA-364-26, Test Condition B.   | Shall meet visual requirements, no detrimental corrosion allowed in contact area and base metal exposed. |
| 6.3.3   | Thermal Shock                        | Temperature range from -55°C~+85°C. Start from -55°C. After 30 min. change to +85°C, change time is no more than 5min. Total 10 cycles. Test reference standard: EIA 364-32, test condition I   | No physical damage. Contact Resistance (Low Level) 50m max.  |
| 6.3.4   | Solderability                        | Solder pot temperature: 250±5°C for 3~5 seconds. In accordance with EIA-364-52.   | 95% of immersed area must show no voids, pin holes.  |
| 6.3.5   | Temperature life                     | 105° C without applied voltage for 120 hours. EIA-364-17, method A  | Contact resistance: 50mΩ max   |
|         | Temperature Life (preconditioning)   | 105° C without applied voltage for 72 hours. EIA-364-17, method A   | -  |
| 6.3.6   | Mixed flowing gas                    | EIA 364-65, Class II A<br>Samples should be placed in an environmentally controlled 'test chamber' that is monitored by a gas analyzing system for controlled concentrations of the specified gas mixture. Test coupons shall also be used and the weight gain reported. Test duration is 7 days.       | Contact resistance: 50mΩ max   |
| 6.3.7   | Thermal disturbance                  | Cycle the connector or socket between 15 °C ±3 °C and 85 °C ± 3 °C, as measured on the part. Ramps should be a minimum of 2 °C per minute, and dwell times should ensure that the contacts reach the temperature extremes (a minimum of 5 minutes). Humidity is not controlled. Perform 10 such cycles. | Contact resistance: 50mΩ max   |

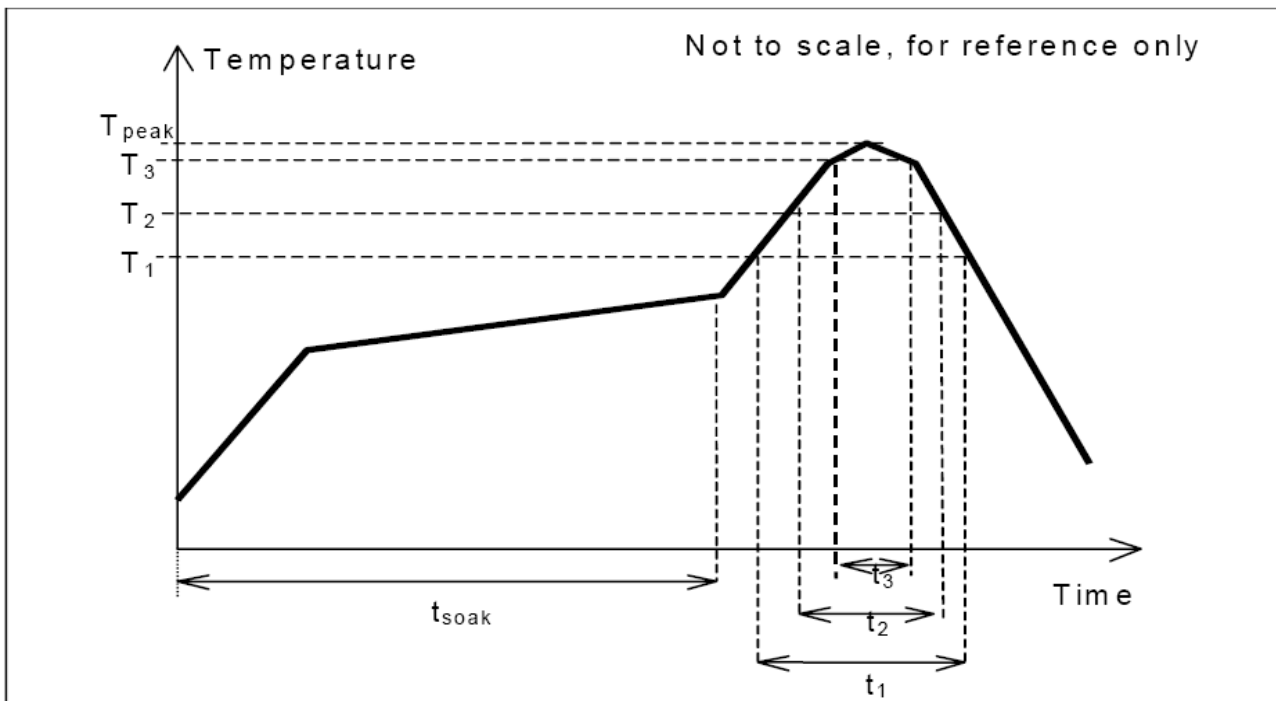
# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
|----------------------------|--|-----------------|----|----------------|----------|-----------------|----|
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## 7.0 RESISTANCE TO INFRARED REFLOW SOLDERING HEAT

| Parameter                                  | Reference  | Specification  |
|--|------------|----------------|
| Average temperature gradient in preheating |            | 2.5°C/s        |
| Soak time                                  | $T_{soak}$ | 2-3 minutes    |
| Timeabove217°C                             | $T_1$      | 60             |
| Timeabove230°C                             | $T_2$      | 50             |
| Timeabove250°C                             | $T_3$      | 5              |
| Peak temperature in reflow                 | $T_{peak}$ | 255°C(-0/+5°C) |
| Temperature gradient in cooling            |            | -5°C/s max     |

### Lead Free Process



This profile is the minimum requirement for evaluating soldering heat resistance of components. Heat transfer method used for reflow soldering is hot air convection. The actual air temperatures used to achieve the specified profile is higher and largely dependent on the reflow equipment.

# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
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## 8.0 PRODUCT QUALIFICATION AND TEST SEQUENCE

Note: each group test needs 5pcs samples.

| Test No          | Description                  | Requirement                           |
|------------------|------------------------------|---------------------------------------|
| <b>Group A-1</b> |                              |                                       |
| 6.0.1            | Examination                  | Visual inspection; No physical damage |
| 6.1.1            | LLCR                         | 40mΩ Max all contacts                 |
| 6.2.2            | Durability (preconditioning) | 50 cycles; No physical damage         |
| 6.3.5            | Temperature Life             |                                       |
| 6.1.1            | LLCR                         | 50mΩ Max all contacts                 |
| 6.0.1            | Reseating                    | No physical damage                    |
| 6.1.1            | LLCR                         | 50mΩ Max all contacts                 |
| 6.0.1            | Examination                  | Visual inspection; No physical damage |
| <b>Group A-2</b> |                              |                                       |
| 6.0.1            | Examination                  | Visual inspection; No physical damage |
| 6.1.1            | LLCR                         | 40mΩ Max all contacts                 |
| 6.2.2            | Durability (preconditioning) | 50 cycles; No physical damage         |
| 6.3.3            | Thermal Shock                |                                       |
| 6.1.1            | LLCR                         | 50mΩ Max all contacts                 |
| 6.3.1            | Humidity                     |                                       |
| 6.1.1            | LLCR                         | 50mΩ Max all contacts                 |
| 6.0.1            | Reseating                    | No physical damage                    |
| 6.1.1            | LLCR                         | 50mΩ Max all contacts                 |
| 6.0.1            | Examination                  | Visual inspection; No physical damage |
| <b>Group A-3</b> |                              |                                       |
| 6.0.1            | Examination                  | Visual inspection; No physical damage |
| 6.1.1            | LLCR                         | 40mΩ Max all contacts                 |

# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
|----------------------------|--|-----------------|----|----------------|----------|-----------------|----|
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|                  |                                    |  |
|------------------|------------------------------------|--|
| 6.2.2            | Durability (preconditioning)       | 50 cycles; No physical damage                  |
| 6.3.5            | Temperature Life (preconditioning) |  |
| 6.1.1            | LLCR                               | 50mΩ Max all contacts                          |
| 6.2.3            | Vibration                          | Discontinuity less than 1μs                    |
| 6.1.1            | LLCR                               | 50mΩ Max all contacts                          |
| 6.0.1            | Examination                        | Visual inspection; No physical damage          |
| <b>Group A-4</b> |                                    |  |
| 6.0.1            | Examination                        | Visual inspection; No physical damage          |
| 6.1.1            | LLCR                               | 40mΩ Max all contacts                          |
| 6.2.2            | Durability (preconditioning)       | 50 cycles; No physical damage                  |
| 6.3.5            | Temperature Life (preconditioning) |  |
| 6.1.1            | LLCR                               | 50mΩ Max all contacts                          |
| 6.3.6            | Mixed Flowing Gases                |  |
| 6.1.1            | LLCR                               | 50mΩ Max all contacts                          |
| 6.3.7            | Thermal Disturbance                |  |
| 6.1.1            | LLCR                               | 50mΩ Max all contacts                          |
| 6.0.1            | Reseating                          | No physical damage                             |
| 6.1.1            | LLCR                               | 50mΩ Max all contacts                          |
| 6.0.1            | Examination                        | Visual inspection; No physical damage          |
| <b>Group A-7</b> |                                    |  |
| 6.0.1            | Examination                        | Visual inspection; No physical damage          |
| 6.1.3            | DWV                                | No breakdown or flashover                      |
| 6.1.1            | LLCR                               | 40mΩ Max all contacts                          |
| 6.2.2            | Durability (preconditioning)       | No physical damage                             |
| 6.2.1            | Insertion Force                    | Within the range of 5N to 20N.                 |
| 6.2.1            | Extraction force                   | Within the range of 8N to 20N. Initial Reading |
| 6.2.2            | Durability                         | 25cycles, No physical damage                   |



# PRODUCT SPECIFICATION

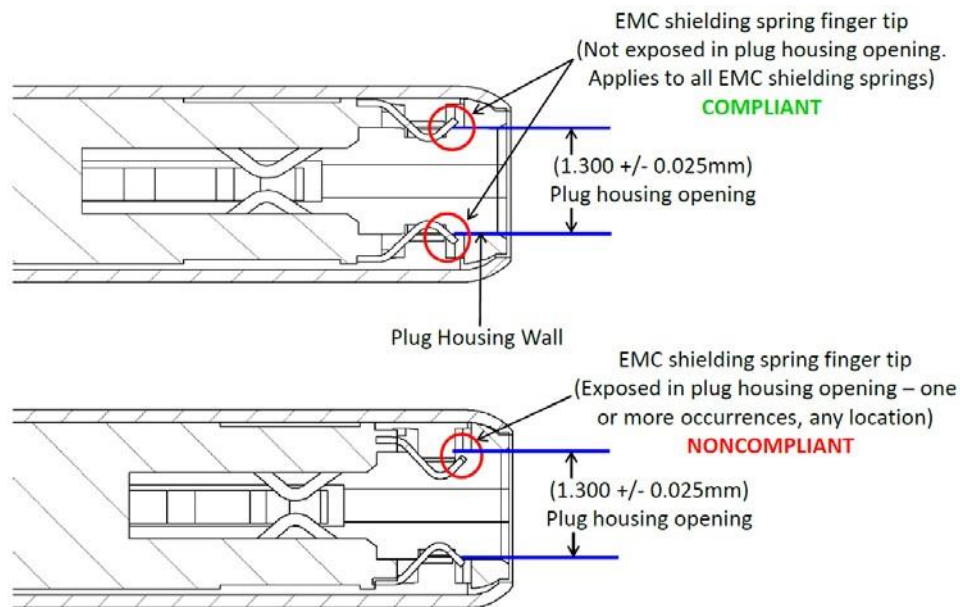
|                            |  |                 |    |                |          |                 |    |
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|                  |                       |  |
|------------------|-----------------------|--|
| 6.2.1            | Extraction force      | Within: a) 33% of initial reading & b) 8N to 20N   |
| 6.2.2            | Durability            | Perform 2468cycles and then rotate the plug or socket 180° and then perform 2500cycles. rotate the plug or socket 180° and then perform 2500cycles. rotate the plug or socket 180° and then perform 2500cycles. No physical damage |
| 6.2.1            | Extraction force      | Within the range of 6N to 20N.   |
| 6.1.1            | LLCR                  | 50mΩ Max all contacts  |
| 6.1.3            | DWV                   | No breakdown or flashover  |
| 6.1.2            | Insulation Resistance | 100 MΩ Max.  |
| 6.0.1            | Examination           | Visual inspection; No physical damage  |
| <b>Group B-1</b> |                       |  |
| 6.0.1            | Examination           | Visual inspection; No physical damage  |
| 6.2.4            | 4-Axis Continuity     | Discontinuity less than 1μs  |
| 6.0.1            | Examination           | Visual inspection; No physical damage  |
| <b>Group B-5</b> |                       |  |

| Test                            |              |  | Common Requirements   |
|---------------------------------|--------------|--|---|
| Title                           | EIA 364 Test | Severity or Condition of Test                  |   |
| Critical Dimensions             | 18           | According to USBIF requirement                 | All dimensions for component level qualification and overmold only for cable and adaptor assemblies.  |
| EMC Shielding Spring Inspection | n/a          | Visual inspection for compliance with Figure 1 | No EMC shielding spring finger tip of the USB Full-Featured Type-C plug or USB 2.0 Type-C plug shall be exposed in the plug housing opening of the unmated Type-C plug. |

# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
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**Figure 1 EMC Shielding Spring Tip Requirements**

|                  |                        |  |
|------------------|------------------------|--|
| <b>Group B-6</b> |                        |  |
| 6.0.1            | Examination            | Visual inspection; No physical damage      |
| 6.1.4            | Contact Current Rating | The Temperature Rise shall not exceed 30°C |
| 6.0.1            | Examination            | Visual inspection; No physical damage      |
|                  |                        |  |

# PRODUCT SPECIFICATION

|                            |  |                 |    |                |          |                 |    |
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## Revision details:

| Revision | Information   | Page | Release Date |
|----------|---|------|--------------|
| A        | Specification released.                                     | -    | 26/07/2021   |
| A1       | - Voltage rating increased to 48Vdc<br>- Added power rating | 2    | 09/05/2023   |
|          |   |      |              |
|          |   |      |              |