USB Type-C ENGINEERING CHANGE NOTICE

Title: 4-axis Continuity Test
Applied to: USB Type-C Specification Release 1.0, August 11, 2014

Brief description of the functional changes:
Update 4-axis test to better qualify Type-C connectors.

Benefits as a result of the changes:
Defines a fixed force application for continuity testing. Since the previous method applied a single force on the cable, variations in overmold would cause variance in the forces applied to the connection rather than applying a specific moment force. In addition, vertical Type-C receptacles need a lower force requirement when in a free state, as the application is expected to provide support as required for the particular usage model.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
Vertical receptacles will be able to pass the testing for certification. Known forces will be used for testing components.

An analysis of the hardware implications:
N/A

An analysis of the software implications:
N/A

An analysis of the compliance testing implications:
The compliance test specification already defines the testing as proposed in this ECR.

Actual Change

(a). Section 3.8.1.6, Pages 94-95

From Text:

3.8.1.6 4-Axis Continuity Test

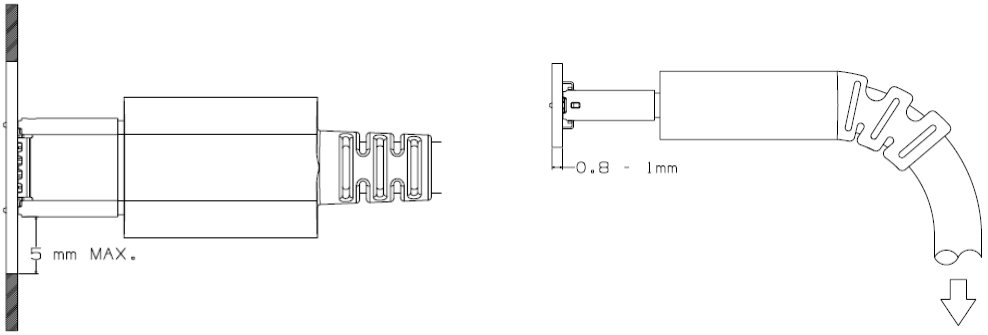
The USB Type-C connector family shall be tested for continuity under stress using the test configurations shown in Figure **Error! No text of specified style in document.**-1. Plugs shall be supplied in a cable assembly with a representative overmold. A USB Type-C receptacle shall be mounted on a 2-layer printed circuit board (PCB) between 0.8 mm and 1.0 mm thickness. The PCB shall be clamped on either side of the receptacle no further than 5 mm away from the solder tails. The PCB shall initially be placed in a horizontal plane, and an 8 N tensile force shall be applied to the cable in a downward direction, perpendicular to the axis of insertion, for a period of at least 10 seconds. For receptacle designs that do not have a full length shell, the test shall be done with the connector and associated hardware mounted as in the final product configuration.

The continuity across each contact shall be measured throughout the application of the tensile force. Each non-ground contact shall also be tested to confirm that it does not short to the shell during the stresses. The PCB shall then be rotated 90 degrees such that the cable is still inserted horizontally and the 8 N tensile force shall be applied again in the downward direction and continuity measured as before. This test is repeated for 180 degree and 270 degree rotations. Passing parts shall not exhibit any discontinuities or shorting to the shell greater than 1 µs duration in any of the four orientations.

One method for measuring the continuity through the contacts is to short all the wires at the end of the cable pigtail and apply a voltage through a pull-up to each of VBUS, USB D+, USB D−, SBU, CC, and USB SuperSpeed pins, with the GND pins connected to ground.

Alternate methods are allowed to verify continuity through all pins.

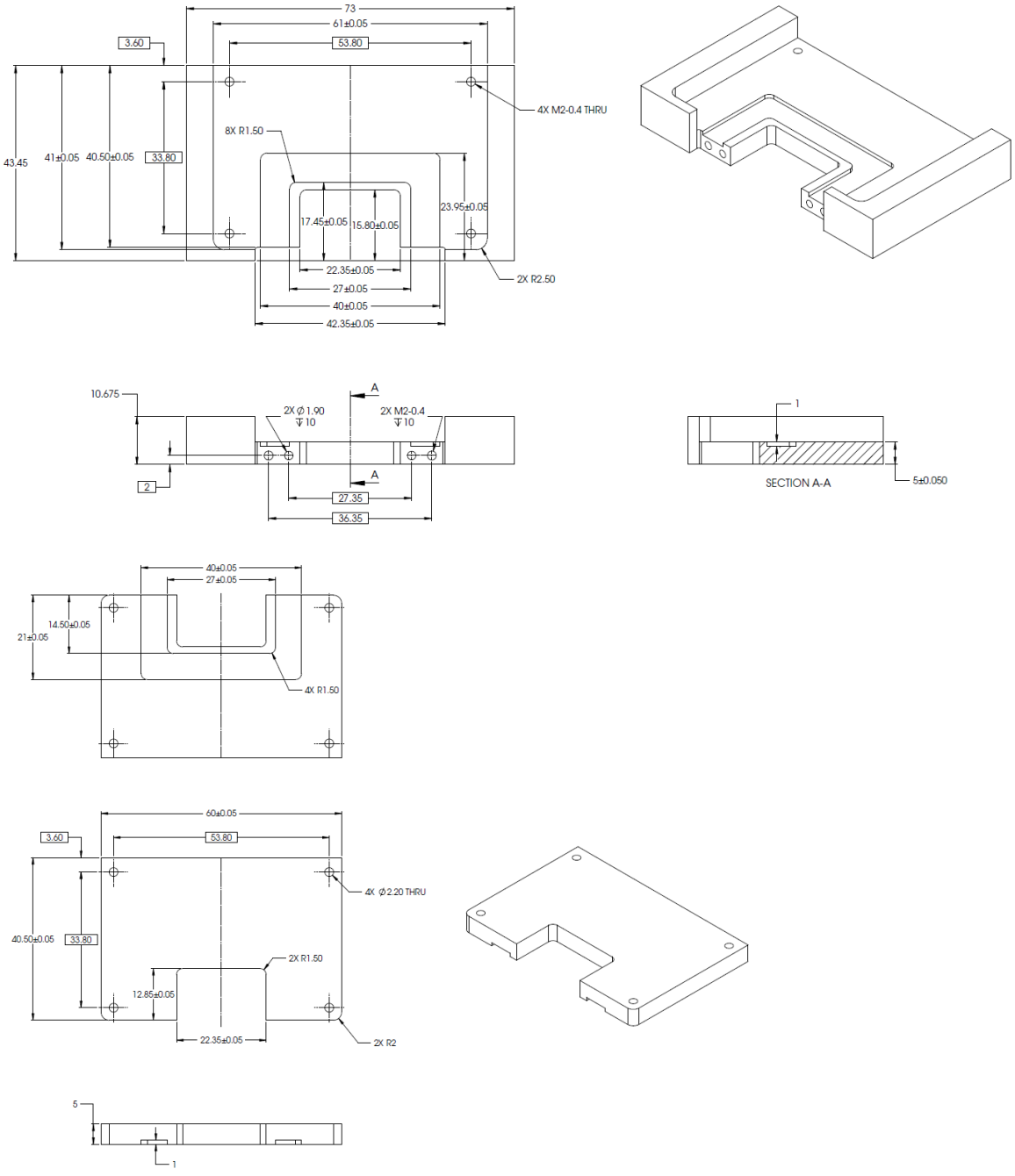
Figure Error! No text of specified style in document.**-1 4-Axis Continuity Test**



To Text:

3.8.1.6 4-Axis Continuity Test

The USB Type-C connector family shall be tested for continuity under stress using a test fixture shown in **Error! Reference source not found.** or equivalent.



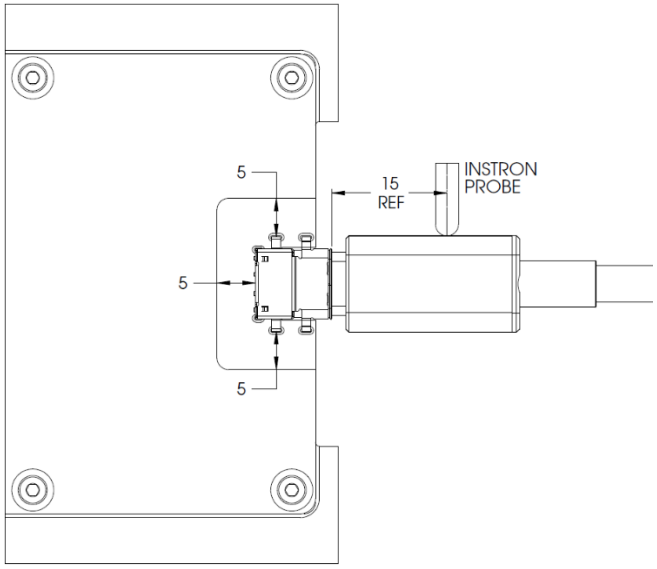


Figure 3-60. Example of 4-AxIs Continuity Test Fixture

Plugs shall be supplied with a representative overmold or mounted on a 2-layer printed circuit board (PCB) between 0.8 mm and 1.0 mm thickness as applicable. A USB Type-C receptacle shall be mounted on a 2-layer PCB between 0.8 mm and 1.0 mm thickness. The PCB shall be clamped on three sides of the receptacle no further than 5 mm away from the receptacle outline. The receptacle PCB shall initially be placed in a horizontal plane, and a perpendicular moment shall be applied to the plug with a 5 mm ball tipped probe for a period of at least 10 seconds at a distance of 15 mm from the mating edge of the receptacle shell in a downward direction, perpendicular to the axis of insertion. See Table 3-xx for the force and moment to be applied.

Table 3-xx Force and Moment Requirements

Receptacle configuration with respect to mounting surface	Force at 15 mm from receptacle shell mating edge (N)	Moment with respect to receptacle shell mating edge (Nm)
Right angle	20	0.30
Vertical	8	0.12

The continuity across each contact shall be measured throughout the application of the tensile force. Each non-ground contact shall also be tested to confirm that it does not short to the shell during the stresses. The PCB shall then be rotated 90 degrees such that the cable is still inserted horizontally and the tensile force in Table 3-xx shall be applied again in the downward direction and continuity measured as before. This test is repeated for 180 degree and 270 degree rotations. Passing parts shall not exhibit any discontinuities or shorting to the shell greater than 1 µs duration in any of the four orientations.

One method for measuring the continuity through the contacts is to short all the wires at the end of the cable pigtail and apply a voltage through a pull-up to each of VBUS, USB D+, USB D−, SBU, CC, and USB SuperSpeed pins, with the GND pins connected to ground.

Alternate methods are allowed to verify continuity through all pins.