

USB Type-C ENGINEERING CHANGE NOTICE

Title: Alternative Receptacle Pin Dimensions

Applied to: USB Type-C Specification Release 1.1, April 3rd, 2015

Brief description of the functional changes proposed:
Adjust receptacle pad dimensions and tolerances for receptacles with non-conductive shells to provide a three-stage un-mating sequence. First: Signals Second: VBus Third: Ground

Benefits as a result of the proposed changes:
Avoids risk of permanent damage to silicon components in products that implement a non-conductive receptacle shell

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
Additional option to existing specification. Systems that currently confirm to the USB specification will remain compliant

An analysis of the hardware implications:
Design change for the contact pad dimensions in the receptacle

An analysis of the software implications:
None

An analysis of the compliance testing implications:
Measurements of the physical dimensions would need to be changed to comprehend the new permitted dimensions

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Actual Change Requested

(a). Section 3.2.1, Page 27

From Text:

8. The USB Type-C connector mating interface is defined so that the electrical connection may be established without the receptacle shell. To prevent excessive misalignment of the plug when it enters or exits the receptacle, the enclosure should have features to guide the plug for insertion and withdrawal when a modified receptacle shell is present. If the USB Type-C receptacle shell is modified from the specified dimension, then the recommended lead in from the receptacle tongue to the plug point of entry is 1.5 mm minimum when mounted in the system.

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8. The USB Type-C connector mating interface is defined so that the electrical connection may be established without the receptacle shell. To prevent excessive misalignment of the plug when it enters or exits the receptacle, the enclosure should have features to guide the plug for insertion and withdrawal when a modified receptacle shell is present. If the USB Type-C receptacle shell is modified from the specified dimension, then the recommended lead in from the receptacle tongue to the plug point of entry is 1.5 mm minimum when mounted in the system.

This specification allows receptacle configurations with a conductive shell, a non-conductive shell, or no shell. The following requirements apply to the receptacle contact dimensions shown in SECTION A-A and ALTERNATE SECTION A-A shown in Figure 3-1:

- If the receptacle shell is conductive, then the receptacle contact dimensions of SECTION A-A shown in Figure 3-1 shall be used. The contact dimensions of ALTERNATE SECTION A-A are not allowed.
- If the receptacle shell is non-conductive, then the receptacle contact dimensions of ALTERNATE SECTION A-A shown in Figure 3-1 shall be used. The contact dimensions of SECTION A-A are not allowed.
- If there is no receptacle shell, then the receptacle contact dimensions of either SECTION A-A or ALTERNATE SECTION A-A shown in Figure 3-1 may be used. If there is no receptacle shell and the receptacle is used in an implementation that does not effectively provide a conductive shell, then a receptacle with the contact dimensions of ALTERNATE

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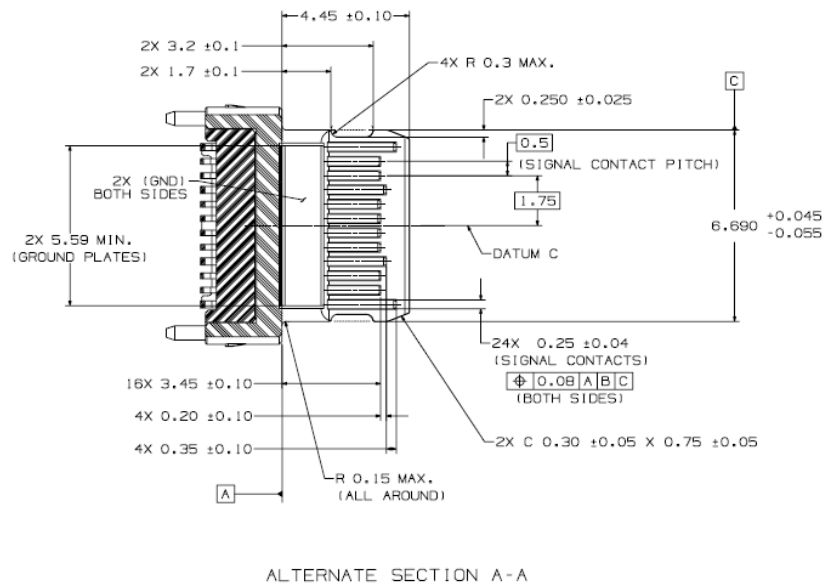
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SECTION A-A shown in Figure 3-1 should be used.

(b). Section 3.2.1, Figure 3-1, Page 28

At the bottom of the Figure on Page 28, add

ALTERNATE SECTION A-A dimensions for use if the receptacle shell is non-conductive or there is no receptacle shell. This configuration is not allowed for receptacles with a conductive shell. See text for full requirements.



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(c). Section 3.2.3, Table 3-4, Page 50

From Text:

Table 3-4 USB Type-C Receptacle Interface Pin Assignments

Pin	Signal Name	Description	Mating Sequence	Pin	Signal Name	Description	Mating Sequence
A1	GND	Ground return	First	B12	GND	Ground return	First
A2	SSTXp1	Positive half of first SuperSpeed TX differential pair	Second	B11	SSRXp1	Positive half of first SuperSpeed RX differential pair	Second
A3	SSTXn1	Negative half of first SuperSpeed TX differential pair	Second	B10	SSRXn1	Negative half of first SuperSpeed RX differential pair	Second
A4	VBUS	Bus Power	First	B9	VBUS	Bus Power	First
A5	CC1	Configuration Channel	Second	B8	SBU2	Sideband Use (SBU)	Second
A6	Dp1	Positive half of the USB 2.0 differential pair – Position 1	Second	B7	Dn2	Negative half of the USB 2.0 differential pair – Position 2	Second
A7	Dn1	Negative half of the USB 2.0 differential pair – Position 1	Second	B6	Dp2	Positive half of the USB 2.0 differential pair – Position 2	Second
A8	SBU1	Sideband Use (SBU)	Second	B5	CC2	Configuration Channel	Second
A9	VBUS	Bus Power	First	B4	VBUS	Bus Power	First
A10	SSRXn2	Negative half of second SuperSpeed RX differential pair	Second	B3	SSTXn2	Negative half of second SuperSpeed TX differential pair	Second
A11	SSRXp2	Positive half of second SuperSpeed RX differential pair	Second	B2	SSTXp2	Positive half of second SuperSpeed TX differential pair	Second
A12	GND	Ground return	First	B1	GND	Ground return	First

Notes:

1. Contacts B6 and B7 should not be present in the USB Type-C plug. The receptacle side shall support the [USB 2.0](#) differential pair present on Dp1/Dn1 or Dp2/Dn2. The plug orientation determines which pair is active. In one implementation, Dp1 and Dp2 may be shorted on the host/device as close to the receptacle as possible to minimize stub length; Dn1 and Dn2 may also be shorted. The maximum shorting trace length should not exceed 3.5 mm.
2. All VBUS pins shall be connected together within the USB Type-C plug and shall be connected together at the USB Type-C receptacle connector when the receptacle is in its mounted condition (e.g., all VBUS pins bussed together on the PCB).
3. All Ground return pins shall be connected together within the USB Type-C plug and shall be connected together at the USB Type-C receptacle connector when the receptacle is in its mounted condition (e.g., all ground return pins bussed together on the PCB).

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Table 3-4 USB Type-C Receptacle Interface Pin Assignments

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A2	SSTXp1	Positive half of first SuperSpeed TX differential pair	Second	B11	SSRXp1	Positive half of first SuperSpeed RX differential pair	Second
A3	SSTXn1	Negative half of first SuperSpeed TX differential pair	Second	B10	SSRXn1	Negative half of first SuperSpeed RX differential pair	Second
A4	VBUS	Bus Power	First	B9	VBUS	Bus Power	First
A5	CC1	Configuration Channel	Second	B8	SBU2	Sideband Use (SBU)	Second
A6	Dp1	Positive half of the USB 2.0 differential pair – Position 1	Second	B7	Dn2	Negative half of the USB 2.0 differential pair – Position 2	Second
A7	Dn1	Negative half of the USB 2.0 differential pair – Position 1	Second	B6	Dp2	Positive half of the USB 2.0 differential pair – Position 2	Second
A8	SBU1	Sideband Use (SBU)	Second	B5	CC2	Configuration Channel	Second
A9	VBUS	Bus Power	First	B4	VBUS	Bus Power	First
A10	SSRXn2	Negative half of second SuperSpeed RX differential pair	Second	B3	SSTXn2	Negative half of second SuperSpeed TX differential pair	Second
A11	SSRXp2	Positive half of second SuperSpeed RX differential pair	Second	B2	SSTXp2	Positive half of second SuperSpeed TX differential pair	Second
A12	GND	Ground return	First	B1	GND	Ground return	First

Notes:

1. Contacts B6 and B7 should not be present in the USB Type-C plug. The receptacle side shall support the [USB 2.0](#) differential pair present on Dp1/Dn1 or Dp2/Dn2. The plug orientation determines which pair is active. In one implementation, Dp1 and Dp2 may be shorted on the host/device as close to the receptacle as possible to minimize stub length; Dn1 and Dn2 may also be shorted. The maximum shorting trace length should not exceed 3.5 mm.
2. All VBUS pins shall be connected together within the USB Type-C plug and shall be connected together at the USB Type-C receptacle connector when the receptacle is in its mounted condition (e.g., all VBUS pins bussed together on the PCB).
3. All Ground return pins shall be connected together within the USB Type-C plug and shall be connected together at the USB Type-C receptacle connector when the receptacle is in its mounted condition (e.g., all ground return pins bussed together on the PCB).
- 3.4. If the contact dimensions shown in Figure 3-1 ALTERNATE SECTION A-A are used, then the VBus contacts (A4, A9, B4 and B9) mate second, and signal contacts (A2, A3, A5, A6, A7, A8, A10, A11, B2, B3, B5, B6, B7, B8, B10 and B11) mate third.

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(c). Section 3.2.3, Table 3-5, Page 51

From Text:

Table 3-5 USB Type-C Receptacle Interface Pin Assignments for USB 2.0-only Support

Pin	Signal Name	Description	Mating Sequence	Pin	Signal Name	Description	Mating Sequence
A1	GND	Ground return	First	B12	GND	Ground return	First
A2				B11			
A3				B10			
A4	VBUS	Bus Power	First	B9	VBUS	Bus Power	First
A5	CC1	Configuration Channel	Second	B8	SBU2	Sideband Use (SBU)	Second
A6	Dp1	Positive half of the USB 2.0 differential pair – Position 1	Second	B7	Dn2	Negative half of the USB 2.0 differential pair – Position 2	Second
A7	Dn1	Negative half of the USB 2.0 differential pair – Position 1	Second	B6	Dp2	Positive half of the USB 2.0 differential pair – Position 2	Second
A8	SBU1	Sideband Use (SBU)	Second	B5	CC2	Configuration Channel	Second
A9	VBUS	Bus Power	First	B4	VBUS	Bus Power	First
A10				B3			
A11				B2			
A12	GND	Ground return	First	B1	GND	Ground return	First

Notes:

1. The unused contacts shall not be physically depopulated in the USB Type-C receptacle. Unused contact locations shall be electrically isolated from power, ground or signaling (i.e., not connected).
2. Contacts B6 and B7 should not be present in the USB Type-C plug. The receptacle side shall support the [USB 2.0](#) differential pair present on Dp1/Dn1 or Dp2/Dn2. The plug orientation determines which pair is active. In one implementation, Dp1 and Dp2 may be shorted on the host/device as close to the receptacle as possible to minimize stub length; Dn1 and Dn2 may also be shorted. The maximum shorting trace length should not exceed 3.5 mm.
3. Contacts A8 and B8 (SBU1 and SBU2) shall be not connected unless required for a specified purpose (e.g., [Audio Adapter Accessory Mode](#)).
4. All VBUS pins shall be connected together within the USB Type-C plug and shall be connected together at the USB Type-C receptacle connector when the receptacle is in its mounted condition (e.g., all VBUS pins bussed together on the PCB).
5. All Ground return pins shall be connected together within the USB Type-C plug and shall be connected together at the USB Type-C receptacle connector when the receptacle is in its mounted condition (e.g., all ground return pins bussed together on the PCB).

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A5	CC1	Configuration Channel	Second	B8	SBU2	Sideband Use (SBU)	Second
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A8	SBU1	Sideband Use (SBU)	Second	B5	CC2	Configuration Channel	Second
A9	VBUS	Bus Power	First	B4	VBUS	Bus Power	First
A10				B3			
A11				B2			
A12	GND	Ground return	First	B1	GND	Ground return	First

Notes:

1. The unused contacts shall not be physically depopulated in the USB Type-C receptacle. Unused contact locations shall be electrically isolated from power, ground or signaling (i.e., not connected).
2. Contacts B6 and B7 should not be present in the USB Type-C plug. The receptacle side shall support the [USB 2.0](#) differential pair present on Dp1/Dn1 or Dp2/Dn2. The plug orientation determines which pair is active. In one implementation, Dp1 and Dp2 may be shorted on the host/device as close to the receptacle as possible to minimize stub length; Dn1 and Dn2 may also be shorted. The maximum shorting trace length should not exceed 3.5 mm.
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- 5-6. If the contact dimensions shown in Figure 3-1 ALTERNATE SECTION A-A are used then the VBus contacts (A4, A9, B4 and B9) mate second, and signal contacts (A5, A6, A7, A8, B5, B6, B7 and B8) mate third.