

Cobb Technology

USB 3.1 & USB C Cables





➤ USB 3.1 Technical Data

➤ Type C Technical Data

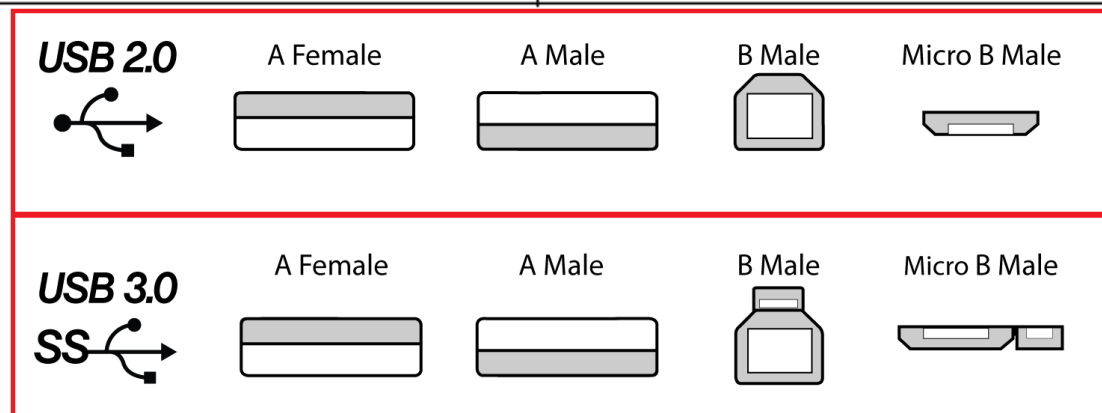
➤ USB Comparison

USB Ver.	General	Speed	Bandwidth	Current (A)	Voltage
1.0	Low-Speed	1.5 Mbps	183.1 KB/s	500mA/100mA	4.75~5.25V
1.1	High-Speed	12 Mbps	1.43 MB/s	500mA/100mA	4.75~5.25V
2.0	Full-Speed	480 Mbps	57.22 MB/s	500mA/100mA	4.75~5.25V
3.0	Super-Speed	5 Gbps	596.05 MB/s	900mA/150mA	4.75~5.25V
3.1	Super-Speed+	10Gbps	1.1 GB/s	3A/5A	5V/12V/20V

➤ USB Specification List

Table 5-1. Plugs Accepted By Receptacles

Receptacle (Standard or PD)	Plugs Accepted (Standard or PD)
USB 2.0 Standard-A	USB 2.0 Standard-A or USB 3.1 Standard-A
USB 3.1 Standard-A	USB 3.1 Standard-A or USB 2.0 Standard-A
USB 2.0 Standard-B	USB 2.0 Standard-B
USB 3.1 Standard-B	USB 3.1 Standard-B or USB 2.0 Standard-B
USB 2.0 Micro-B	USB 2.0 Micro-B
USB 3.1 Micro-B	USB 3.1 Micro-B or USB 2.0 Micro-B
USB 2.0 Micro-AB	USB 2.0 Micro-B or USB 2.0 Micro-A
USB 3.1 Micro-AB	USB 3.1 Micro-B, USB 3.1 Micro-A, USB 2.0 Micro-B, or USB 2.0 Micro-A



➤ USB 3.1 Association Definition

5.6.1.2.1 Mated Connector Impedance for Gen 2 Speed

The recommended mated connector impedance is needed to maintain signal integrity. The differential impedance of a mated connector should be $90\ \Omega \pm 10\ \Omega$ as seen from a 40 ps (20%-80%) risetime of a differential TDR. The impedance profile of a mated connector should fall within the limits shown in Figure 5-21. The impedance profile of the mated connector is defined from the receptacle footprints through the plug cable termination area. In a case where the plug is directly attached to a device PCB, the mated connector impedance profile includes the path from the receptacle footprints to the plug footprints.

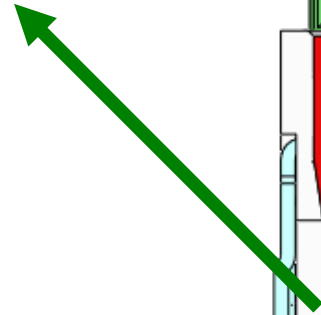
The normative cable assembly requirements are specified in Section 5.6.1.3.2.

Receptacle: $90\ \Omega \pm 10\ \Omega$

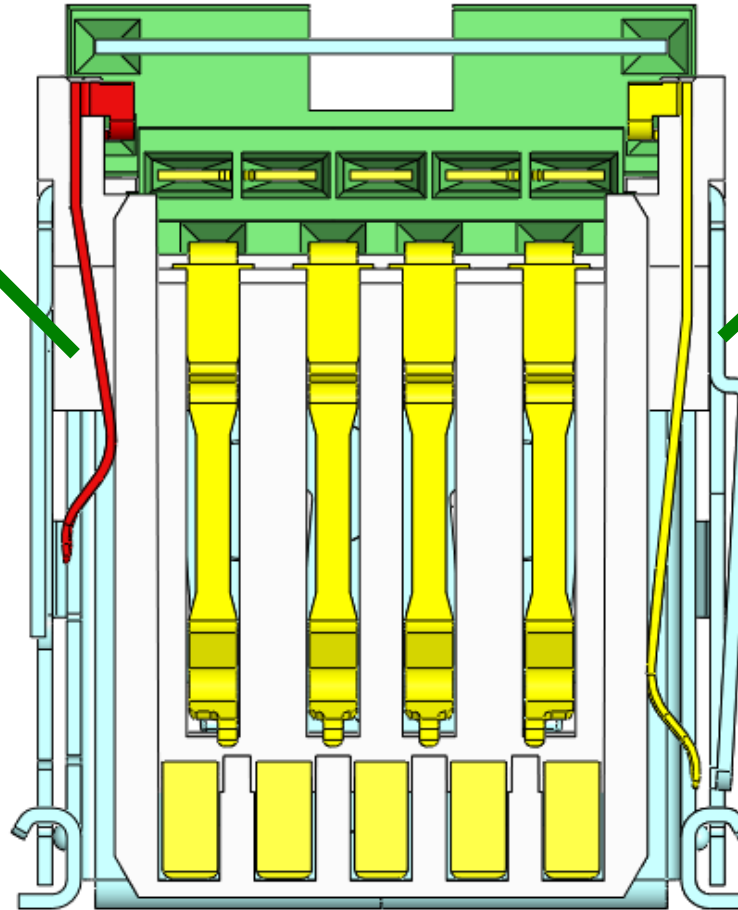
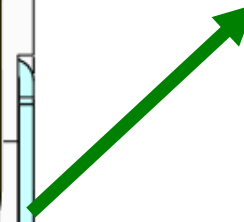
Plug: $90\ \Omega \pm 15\ \Omega$

➤ USB 3.1 (PD) Design

Power Detect Pin



Insertion Detect Pin



➤ USB 3.1(PD) Pin Assignment

Pin Number ¹	Signal Name	Description	Mating Sequence
1	V _{BUS}	Power	Third
2	D-	Differential pair as defined in <i>[USB2.0]</i>	Fourth
3	D+		
4	GND	Ground for power return	Third
10 ²	PD DETECT 1	Contact in PD receptacle to detect a PD plug	Last
11 ²	PD DETECT 2	Contact in PD receptacle to detect a PD plug	Last
12 ³ ,13	INSERTION DETECT	Receptacle only. Detects insertion of a plug into the receptacle. Optional except for cold socket applications.	Second
Shell	Shield	Connector metal shell	First
<p>Note 1: Pin numbers not included in this table do not have contacts present. Pin numbering is consistent with location across multiple USB connector types.</p> <p>Note 2: Implementation of PD DETECT shall include:</p> <ul style="list-style-type: none"> a) either pin 10 or pin 11. b) both pin 10 and pin 11. <p>Note 3: Pin 12, if present, shall be connected to Shield.</p>			

➤ USB 3.1(PD)

3.6.1 Low Level Contact Resistance (EIA 364-23B)

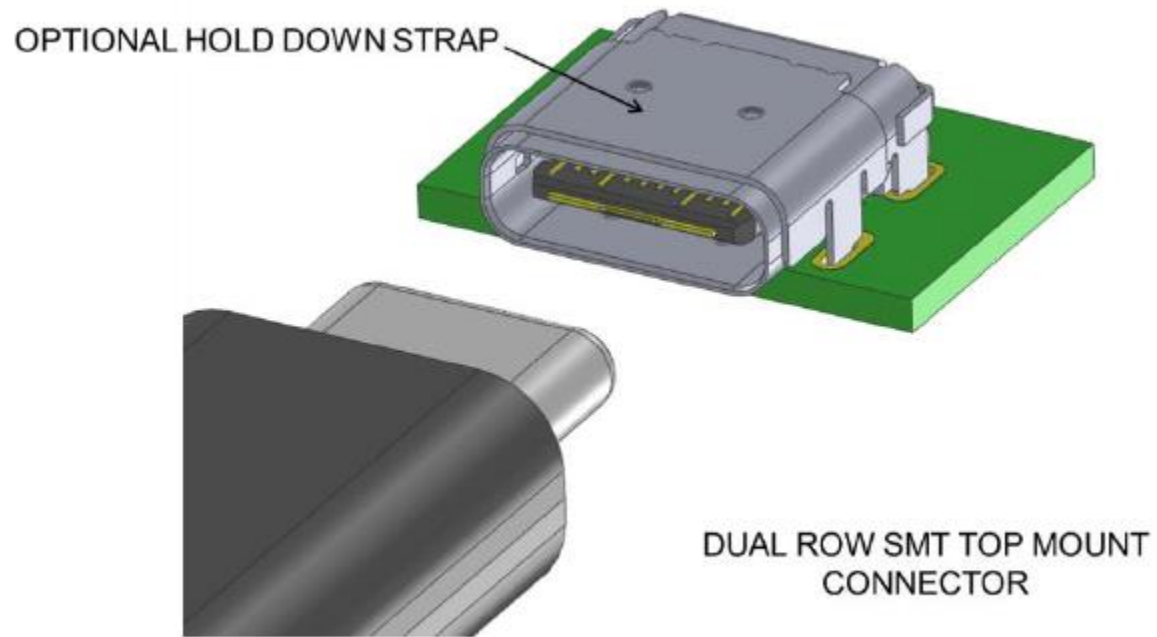
The following requirement applies to the power contacts of a 3A PD cable assembly:

- 20m Ω (Max) initial for V_{BUS} and GND contacts.
- Maximum change (delta) of +10m Ω after environmental stresses.
- Measure at 20mV (Max) open circuit at 100mA.

The following requirement applies to the power contacts of a 5A PD cable assembly:

- 20m Ω (Max) initial for V_{BUS} and GND contacts.
- Maximum change (delta) of +10m Ω after environmental stresses.
- Measure at 20mV (Max) open circuit at 100mA.

➤ USB Type C



➤ USB Type C - SPEC

Table 2-1 Summary of power supply options

Mode of Operation	Nominal Voltage	Maximum Current	Notes
<u>USB 2.0</u>	5 V	500 mA	Default Current, based on definitions in the base specifications
<u>USB 3.1</u>	5 V	900 mA	
<u>USB BC 1.2</u>	5 V	Up to 1.5 A	Legacy charging
<u>USB Type-C Current @ 1.5 A</u>	5 V	1.5 A	Supports higher power devices
<u>USB Type-C Current @ 3.0 A</u>	5 V	3 A	Supports higher power devices
<u>USB PD</u>	Configurable up to 20 V	Configurable up to 5 A	Directional control and power level management

The USB Type-C receptacle is specified for current capability of 5 A whereas standard USB Type-C cable assemblies are rated for 3 A. The higher rating of the receptacle enables systems to deliver more power over directly attached docking solutions or using appropriately designed chargers with captive cables when implementing [USB PD](#). Also, USB Type-C cable assemblies designed for [USB PD](#) and appropriately identified via electronic marking are allowed to support up to 5 A.

➤ USB Type C - SPEC

Table 3-1 USB Type-C Standard Cable Assemblies

Cable Ref	Plug 1	Plug 2	USB Version	Cable Length	Current Rating	USB Power Delivery (BMC)	USB Type-C Electronically Marked
CC2-3	C	C	USB 2.0	≤ 4 m	3 A	Supported	Optional
CC2-5					5 A		Required
CC3G1-3	C	C	USB 3.1 Gen1	≤ 2 m	3 A	Supported	Required
CC3G1-5					5 A		
CC3G2-3	C	C	USB 3.1 Gen2	≤ 1 m	3 A	Supported	Required
CC3G2-5					5 A		

Gen 1: 5 Gps.....USB 3.0 Gen 2: 10 Gps.....USB 3.1

Table 4-10 DFP CC Termination (Rp) Requirements

DFP Advertisement	Current Source to 1.7 - 5.5 V	Resistor pull-up to 4.75 - 5.5 V	Resistor pull-up to 3.3 V ± 5%
Default USB Power	80 μA ± 20%	56 kΩ ± 20%	36 kΩ ± 20%
1.5 A @ 5 V	180 μA ± 8%	22 kΩ ± 5%	12 kΩ ± 5%
3.0 A @ 5 V	330 μA ± 8%	10 kΩ ± 5%	4.7 kΩ ± 5%

➤ USB Type C - SPEC

Table 3-2 USB Type-C Legacy Cable Assemblies

Cable Ref	Plug 1	Plug 2	USB Version	Cable Length	Current Rating	USB Power Delivery (BFSK) ¹	USB Type-C Electronically Marked
AC2-1.5	A	C ²	USB 2.0	≤ 4 m	1.5 A	Optional	N/A
AC2-5					5 A	Supported	Required
AC3G2-1.5	A	C ²	USB 3.1 Gen2	≤ 1 m	1.5 A	Optional	N/A
AC3G2-5					5 A	Supported	Required
CB2-1.5	C ³	B	USB 2.0	≤ 4 m	1.5 A	Optional	Optional
CB2-5					5 A	Supported	Required
CB3G2-1.5	C ³	B	USB 3.1 Gen2	≤ 1 m	1.5 A	Optional	Required
CB3G2-5					5 A	Supported	
CmB2	C ³	Mini-B	USB 2.0	≤ 4 m	500 mA	N/A	N/A
CuB2-1.5	C ³	Micro-B	USB 2.0	≤ 2 m	1.5 A	Optional	Optional
CuB2-3					3 A	Supported	
CuB3G2-1.5	C ³	Micro-B	USB 3.1 Gen2	≤ 1 m	1.5 A	Optional	Required
CuB3G2-3					3 A	Supported	

➤ USB Type C - SPEC

Table 3-3 USB Type-C Legacy Adapter Assemblies

Adapter Ref	Plug	Receptacle	USB Version	Cable Length	Current Rating	USB Power Delivery (BFSK)	USB Type-C Electronically Marked
CμBR2-1.5	C ¹	Micro-B	USB 2.0	≤ 0.15 m	1.5 A	N/A	N/A
CAR3G1-1.5	C ²	A	USB 3.1 Gen1	≤ 0.15 m	1.5 A	N/A	Optional

Notes:

1. USB Type-C plugs associated with the “B” end of a legacy adapter are required to have Rp termination incorporated into the plug assembly – see Section 4.5.3.2.2.
2. USB Type-C plugs associated with the “A” end of a legacy adapter are required to have Rd termination incorporated into the plug assembly – see Section 4.5.3.2.1.

➤ USB Type C

Table 3-12 USB Type-C to [USB 3.1](#) Standard-A Cable Assembly Wiring

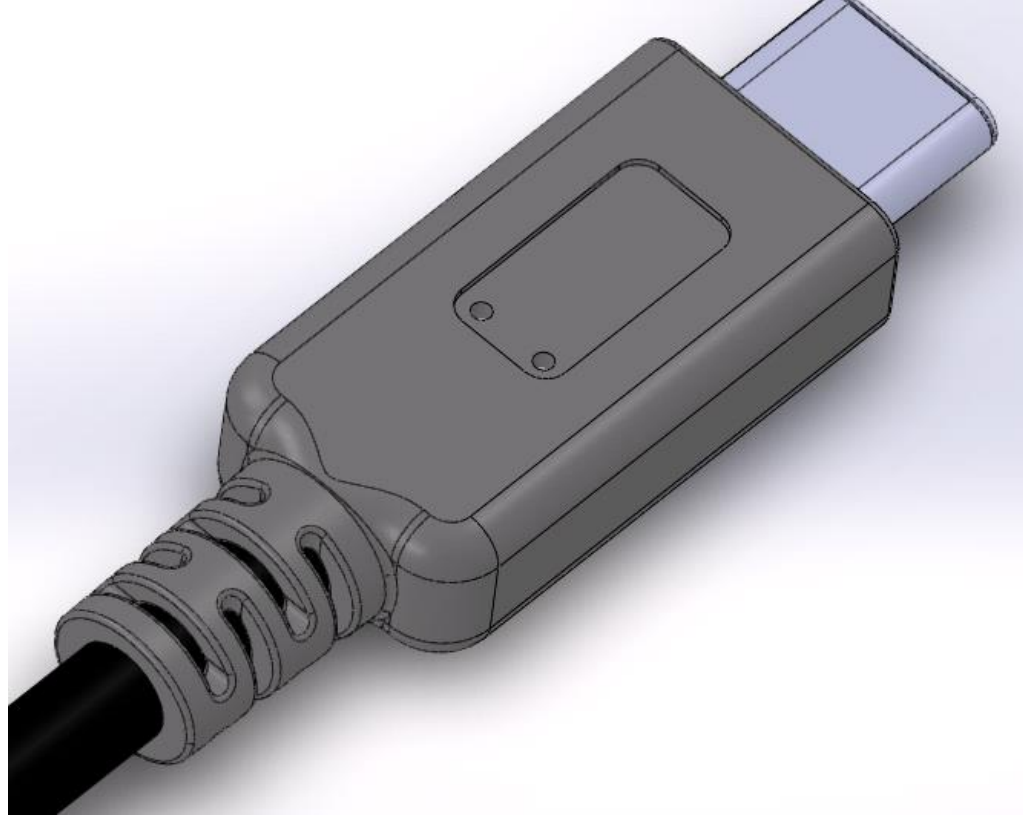
USB 3.1 C Type to USB 3.1 Plug Micro B Type
USB 3.1 C Type to USB 3.1 Plug A Type
USB 3.1 C Type to USB 3.1 Plug B Type
USB 2.0 C Type to USB 2.0 Plug Micro B Type
USB 2.0 C Type to USB 2.0 Plug A Type
USB 2.0 C Type to USB 2.0 Plug B Type
N/A
USB 2.0 C Type to USB 2.0 Plug Mini B Type

USB Type-C Plug		Wire		USB 3.1 Standard-A plug	
Pin	Signal Name	Wire Number	Signal Name	Pin	Signal Name
A1, B1, A12, B12	GND	1 7, 10	GND_PWRrt1 SDP1_Drain, SDP2_Drain	4 7	GND GND_DRAIN
A4, B4, A9, B9	VBUS	2	PWR_VBus1	1	VBUS
A5	CC				
B5	VCONN				
A6	Dp1	3	UTP_Dp	3	D+
A7	Dn1	4	UTP_Dn	2	D-
A2	SSTXp1	5	SDPp1	6	StdA_SSRX+
A3	SSTXn1	6	SDPn1	5	StdA_SSRX-
B11	SSRXp1	8	SDPp2	9	StdA_SSTX+
B10	SSRXn1	9	SDPn2	8	StdA_SSTX-
Shell	Shield	Braid	Shield	Shell	Shield

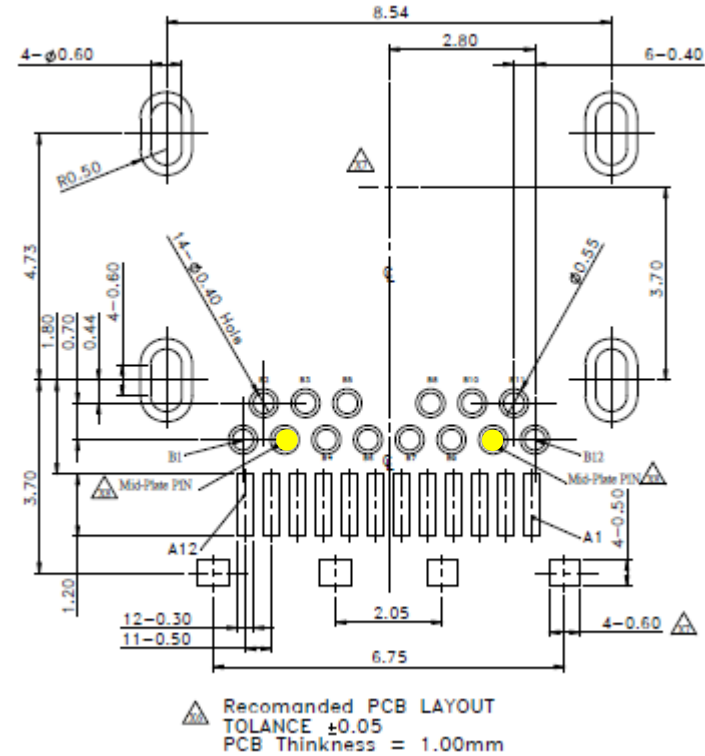
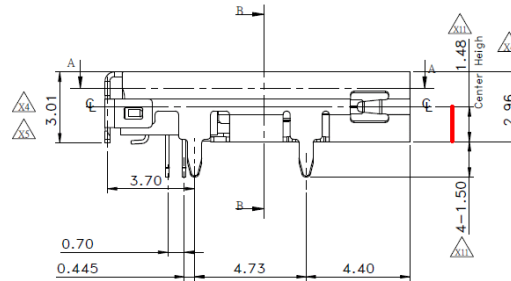
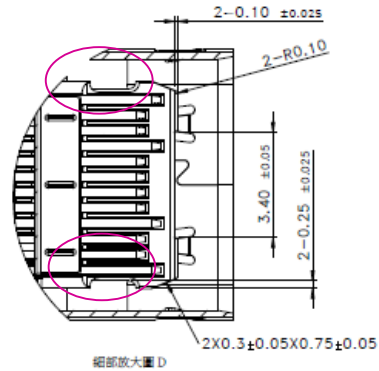
Definition by Association:

USB 2.0 pin assignment

➤ USB Type C Cable



➤ USB Type C



1) 24 Pins (12 Pin at each side).




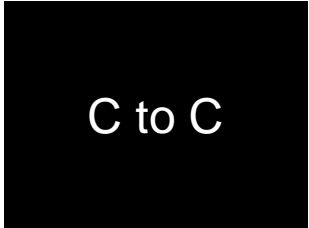
2) Structure to lock with latch at cable side.

3) Center Height 1.48 mm.

4) Mid-Mount Pin (Ground).


USB 3.1 Gen 2

Length

 <p>C-3.1A</p> <p>1 M</p>	 <p>C-3.1B</p> <p>1 M</p>	 <p>C- 3.1micro B</p> <p>0.5 M</p>	 <p>C-C 3.1</p> <p>TBD</p>
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USB 3.1 Gen 1

Length

 <p>5 cm</p>	<p>C-3.0 AF</p>
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USB 2.0

Length

 <p>C-2.0A</p> <p>1 M</p>	 <p>C-2.0B</p> <p>1 M</p>	 <p>C- 2.0microB</p> <p>1 M</p>	 <p>C- 2.0 miniB</p> <p>1 M</p>
 <p>1 M</p>	<p>C- C 2.0</p>		



- 1) USB Type C to USB 2.0 micro BF
- 2) USB Type C to VGA/HDMI/DVI
- 3) USB Type C to DisplayPort
- 4) USB Type C to 1G Lan
- 5) USB Type C to D-Sub 9 Pin
- 6) USB Type C to D-Sub 25 Pin
- 7) USB Type C to Audio
- 8) USB Type C to Audio + Charging
- 9) USB Type C to SATA



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