USB Type-C Connector

Rev. 4
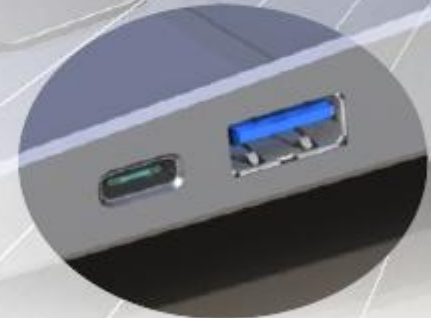**2015.06.07**

Why We Need USB Type-C ?

- **Entirely New Design**

  Robust enough for laptops and tablets

  Slim enough for mobile phones

  Reversible plug orientation

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
GND	TX1+	TX1−	Vbus	CC1	D+	D−	SBU1	Vbus	RX2−	RX2+	GND
GND	RX1+	RX1−	Vbus	SBU2	D−	D+	CC2	Vbus	TX2−	TX2+	GND
B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1

- **Future Scalability**

  Scalable power charging: **3A** for standard cable

  USB power delivery function: **100W(5A,20V)** for DC charge.

  Functional Extensions **(4 channels high speed pair)**
  ➡ HDMI, Displayport, Thunderbolt, etc..

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USB Type-C – Additional Characteristics

Mechanical specs (preliminary):

- Receptacle opening: **~8.3mm x ~2.5mm**

- Durability: **10,000 cycles**

- Improved EMI and RFI mitigation features

- Power delivery capacity: 3A for standard cables

  5A for connectors

Functional capabilities:

- USB 2.0: LS/FS/HS

- USB 3.1: Gen1 (5Gbps)/**Gen2 (10Gbps)**

- Enhanced power delivery options

  – Extended 5V current ranges plus USB PD

- Docking support

  – USB PD-based interface configuration option

USB 3.1
Type-C

USB 3.1
Standard-A

USB 3.1
Micro-B

*This sketch reference from IDF14

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USB Power Delivery Information
(reference from IDF14)

Device category	Profile	Voltage @ Current	Power
Hand-held devices, today's peripherals	**PROFILE 1**	5V @ 2A	**10W** Default start-up profile
Tablets, netbooks, most peripherals	**PROFILE 2**	5V @ 2A 12V @ 1.5A	**18W**
Thinner notebooks, larger peripherals	**PROFILE 3**	5V @ 2A 12V @ 3A	**36W**
Larger notebooks, hubs, docks	**PROFILE 4**	5V @ 2A 12V @ 3A 20V @ 3A	**60W** Limit for Micro-A/B
Workstations, hubs, docks	**PROFILE 5**	5V @ 2A 12V @ 5A 20V @ 5A	**100W** Limit for Standard A/B Type C (connector)

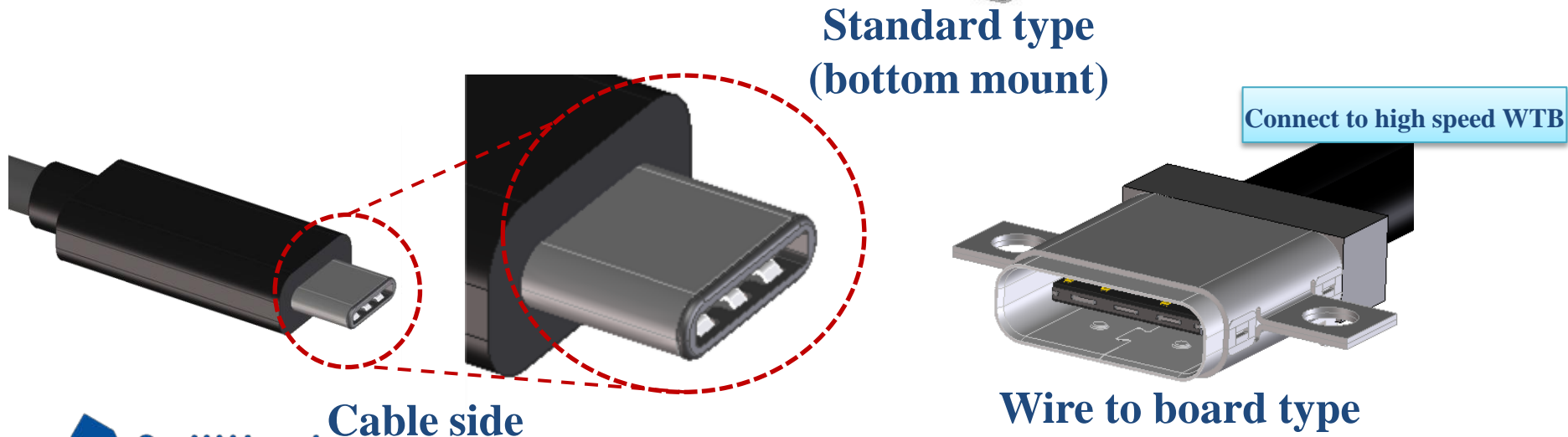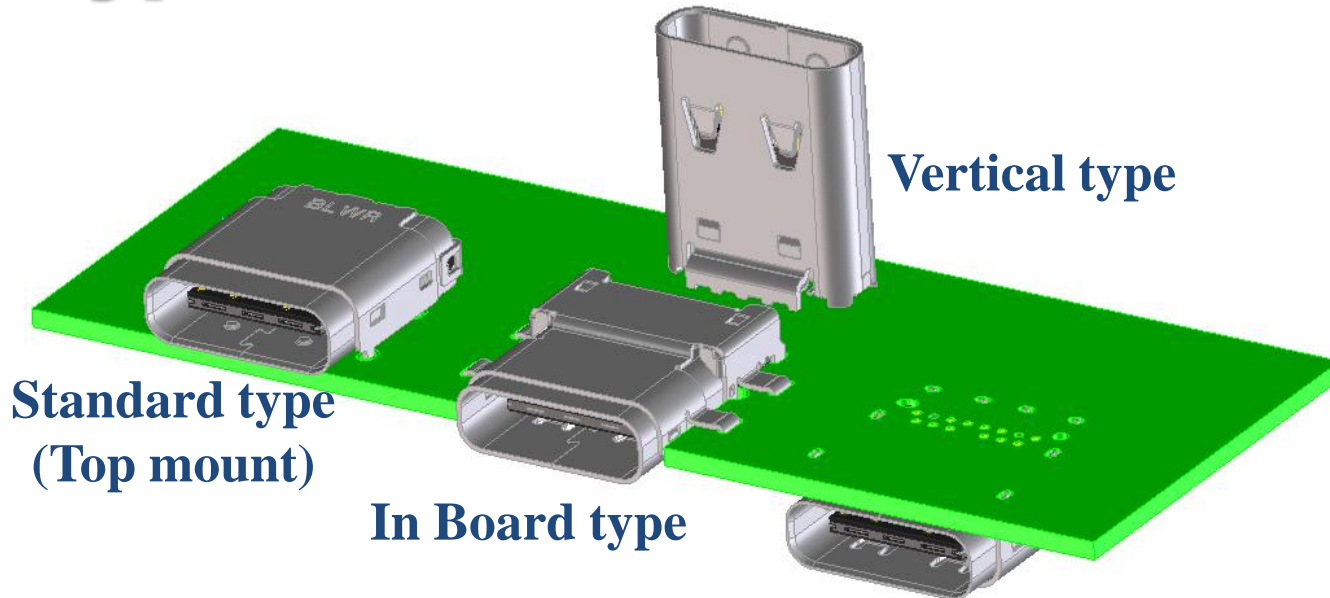Requires new detectable cables for >1.5A or >5V

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USB 3.1: SuperSpeed USB @ 10Gbps
(reference from IDF14)

- **Support attach of much higher performance peripherals**
  - AV Display beyond 1080p and multi-displays
  - SSD, RAID HDD or Hybrid HDD

- **Blazing fast data sync**
- **Enable multi-function, single port connections**
  - SuperSpeed Hubs with fatter system pipe supporting multiple SuperSpeed downstream devices
  - Display Dock enabling mix of SuperSpeed-based AV, webcam, storage, etc. over a single connection

USB AV @ 5Gbps

Embedded Hub

Power Delivery →

SSD

← USB Data →
@ 5Gbps

Power Delivery →

← USB Data →
@ 10Gbps

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USB Type-C Product Information

Vertical type

**Standard type
(Top mount)**

In Board type

**Standard type
(bottom mount)**

Connect to high speed WTB

Cable side

Wire to board type

Outside Dimension

| A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
GND	TX1+	TX1−	Vbus	CC1	D+	D−	SBU1	Vbus	RX2−	RX2+	GND
GND	RX1+	RX1−	Vbus	SBU2	D−	D+	CC2	Vbus	TX2−	TX2+	GND
B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1

Pitch=0.5mm
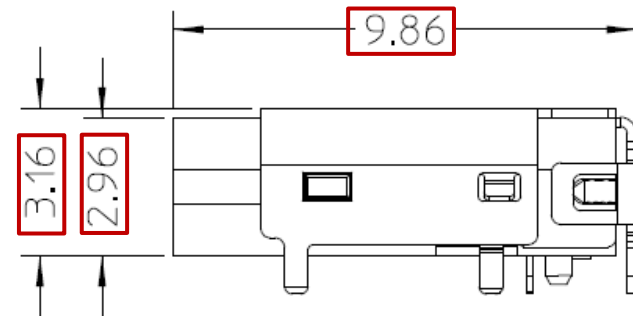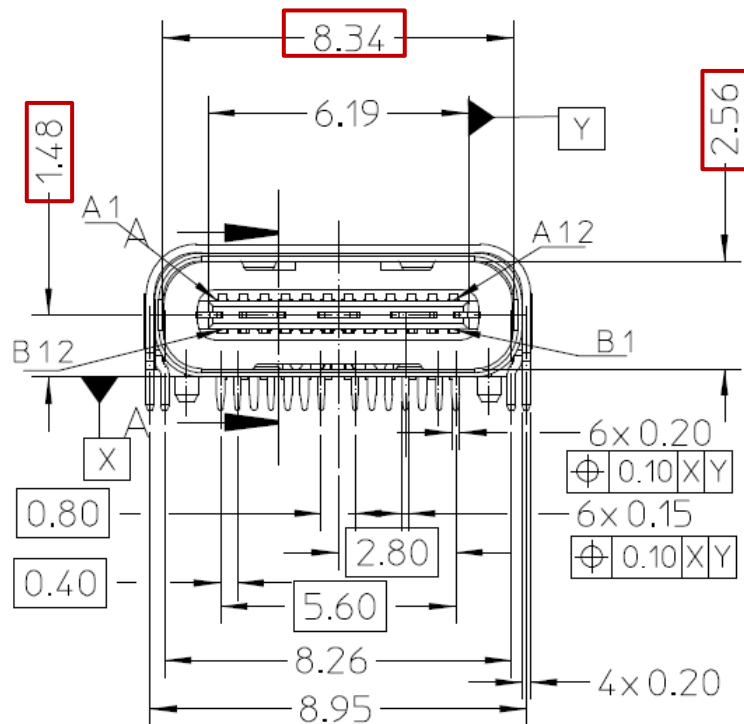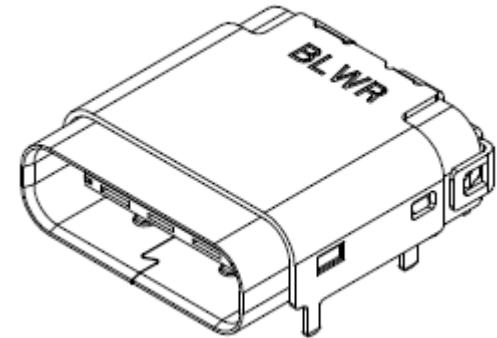
Receptacle Side Product Information
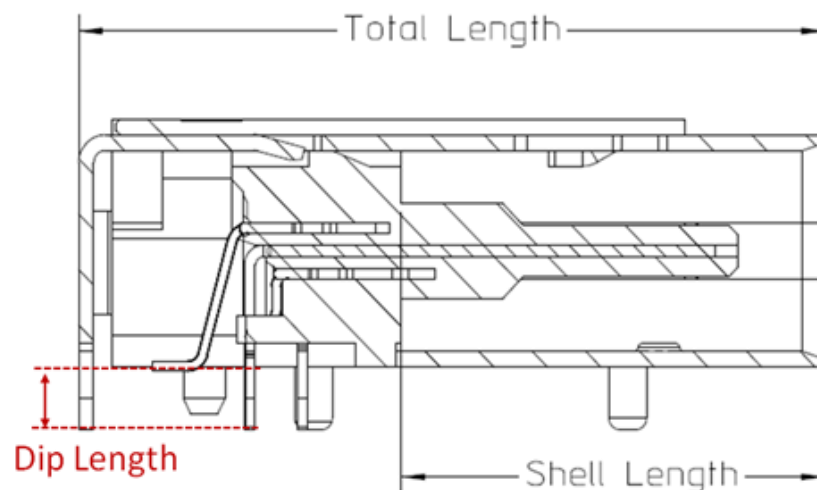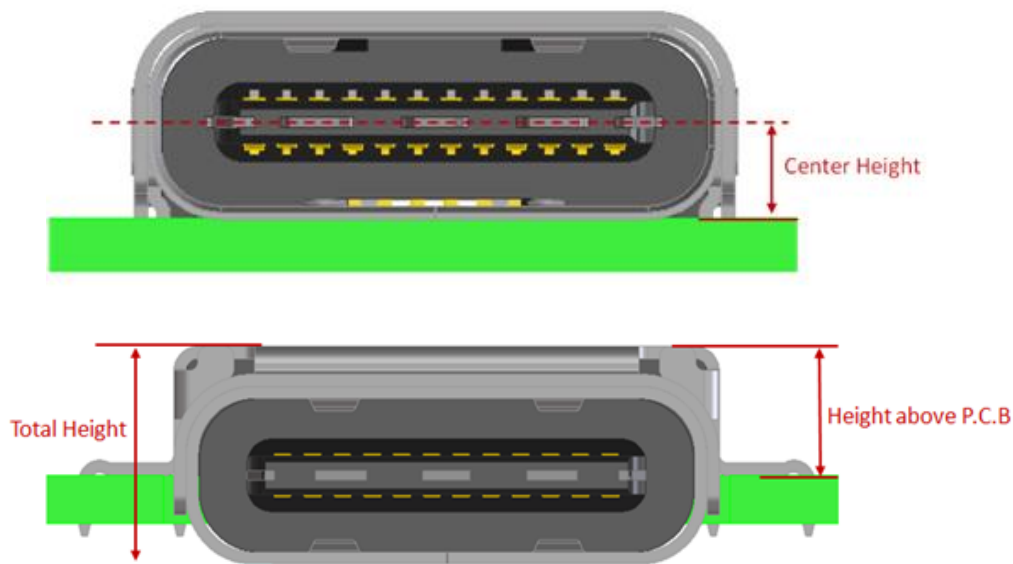
P/N	USB Version	Connector Sitting Form	Mounting Type	Footprint Type	Height above P.C.B	Total Height	Center Height	Shell Length	Total Length	Dip Length
80211-102*	USB 3.1	On-Board Type	R/A	Hybrid	3.16 mm	3.16 mm	1.48 mm	5.60 mm	9.86 mm	0.80 mm
80211-182*	USB 3.1	On-Board Type	R/A	Hybrid	3.16 mm	3.16 mm	1.48 mm	5.60 mm	9.86 mm	1.80 mm
80211-502*	USB 3.1	On-Board Type	R/A	Hybrid	3.16 mm	3.16 mm	1.48 mm	5.60 mm	8.81 mm	0.80 mm
80211-582*	USB 3.1	On-Board Type	R/A	Hybrid	3.16 mm	3.16 mm	1.48 mm	5.60 mm	8.81 mm	1.80 mm
80231-102*	USB 3.1	In-Board Type	R/A	Dual SMT	2.32mm	3.16 mm	0.75 mm	6.20 mm	10.00 mm	N/A
80232-102*	USB 3.1	In-Board Type	R/A	Hybrid	1.57 mm	4.00 mm	-0.50 mm	6.20 mm	11.19 mm	0.80 mm
80233-102*	USB 3.1	In-Board Type	R/A	Hybrid	2.83 mm	3.72 mm	0.75 mm	6.20 mm	12.05 mm	0.80 mm
80241-102*	USB 2.0	In-Board Type	R/A	SMT	1.58 mm	3.16 mm	0 mm	5.00 mm	7.50 mm	N/A
80242-102*	USB 2.0	In-Board Type	R/A	SMT	2.05 mm	3.16 mm	0.47 mm	4.80 mm	8.33 mm	N/A
80243-102*	USB 3.1	In-Board Type	R/A	Dual SMT	2.31 mm	3.16 mm	0.68 mm	4.70 mm	10.70 mm	N/A

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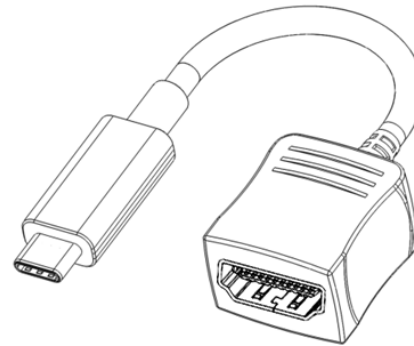# More Application Example

Wire Harness Solution
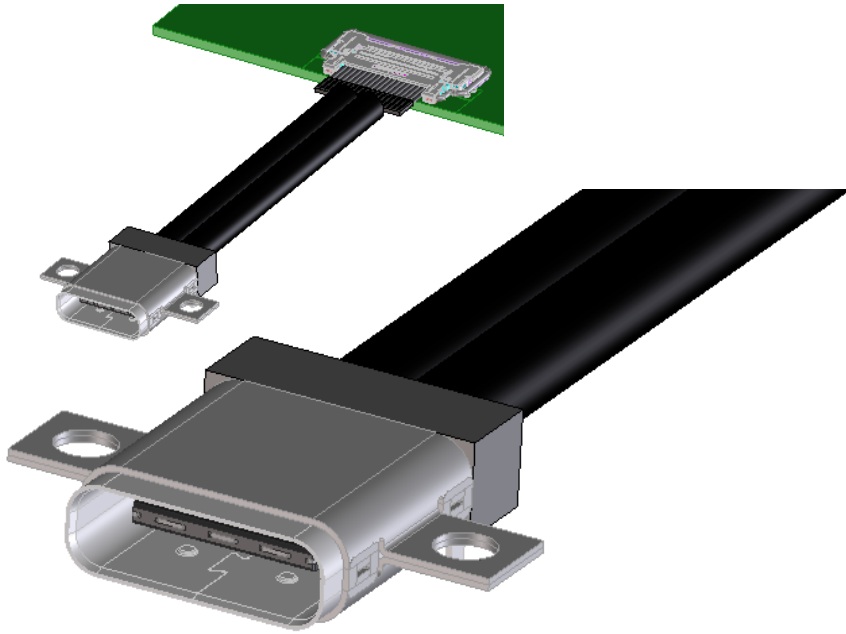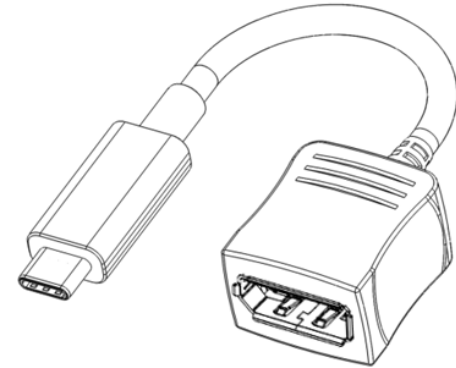

Wire to board solution
Type-C to high speed WTB
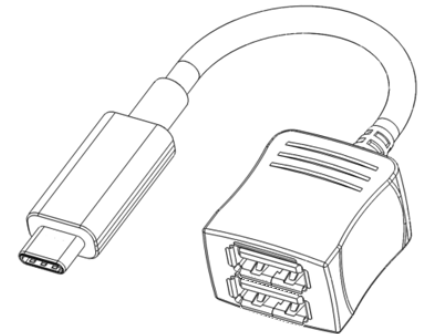**Type-C to high speed BTB**

Cable Adapter Solution

Type-C to HDMI

Type-C to Display port
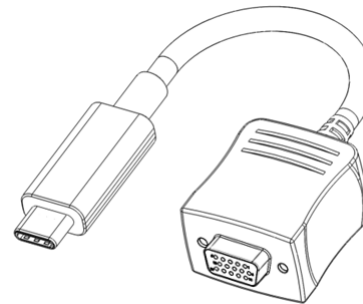
Type-C to D-sub

Type-C to dual port USB

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Current Application Example:

USB Type-C standard cable application list:

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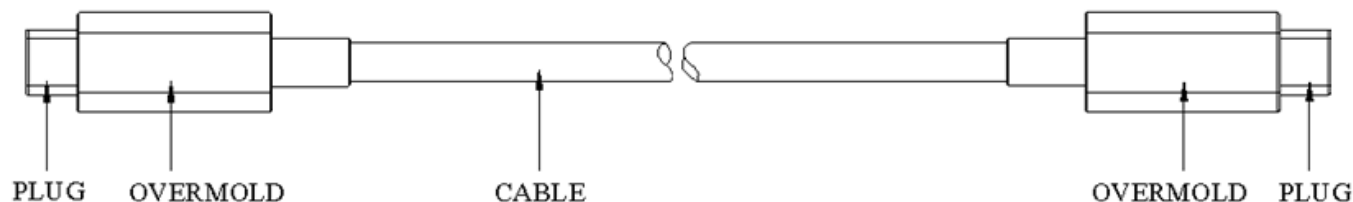
Cable Ref	Plug 1	Plug 2	USB Version	Cable Length	Current Rating	USB Power Delivery (BMC)	USB Type-C Electronically Marked
CC2-3	C	C	USB 2.0	≤ 4 m	3 A	Supported	Optional
CC2-5					5 A		Required
CC3G1-3	C	C	USB 3.1 Gen1	≤ 2 m	3 A	Supported	Required
CC3G1-5					5 A		
CC3G2-3	C	C	USB 3.1 Gen2	≤ 1 m	3 A	Supported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

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- Confidential -

Current Application Example:

USB Type-C legacy cable application list:

PLUG   OVERMOLD   CABLE   OVERMOLD   PLUG
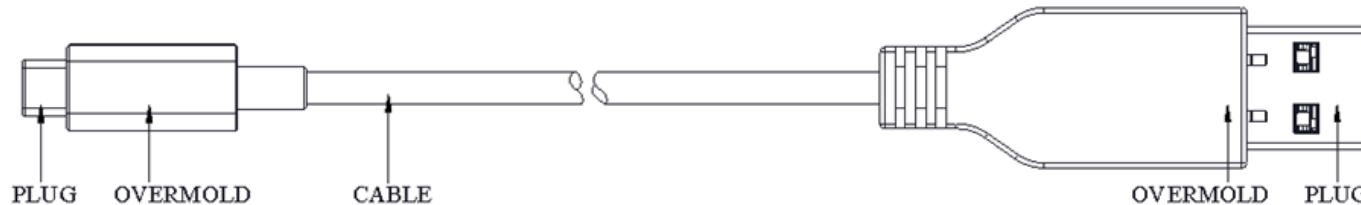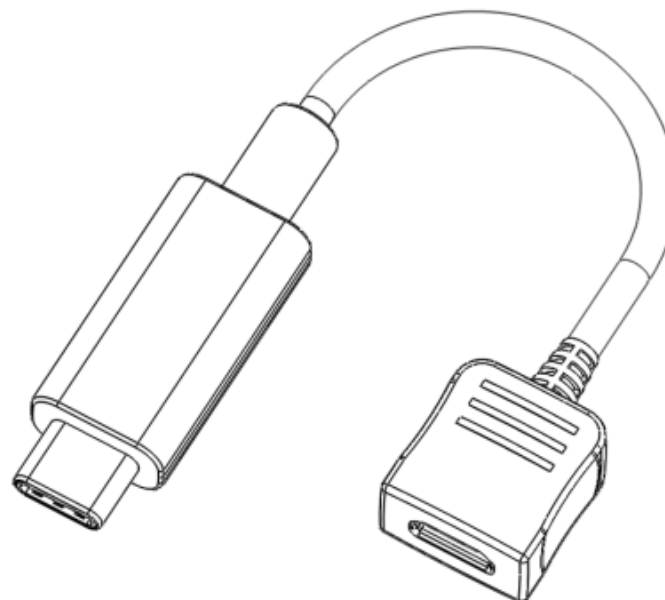
Cable Ref	Plug 1	Plug 2	USB Version	Cable Length	Current Rating	USB Power Delivery (BFSK)[1]	USB Type-C Electronically Marked
AC2-3	A^4	C^2	USB 2.0	≤ 4 m	3 A	Optional	N/A
AC2-5					5 A	Supported	Required
AC3G2-3	A^4	C^2	USB 3.1 Gen2	≤ 1 m	3 A	Optional	N/A
AC3G2-5					5 A	Supported	Required
CB2-3	C^3	B^4	USB 2.0	≤ 4 m	3 A	Optional	Optional
CB2-5					5 A	Supported	Required
CB3G2-3	C^3	B^4	USB 3.1 Gen2	≤ 1 m	3 A	Optional	Required
CB3G2-5					5 A	Supported	
CmB2	C^3	Mini-B	USB 2.0	≤ 4 m	500 mA	N/A	N/A
CµB2-3	C^3	Micro-B^4	USB 2.0	≤ 2 m	3 A	Optional	Optional
CµB3G2-3	C^3	Micro-B^4	USB 3.1 Gen2	≤ 1 m	3 A	Optional	Required

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Current Application Example:

Legacy Adapter Information
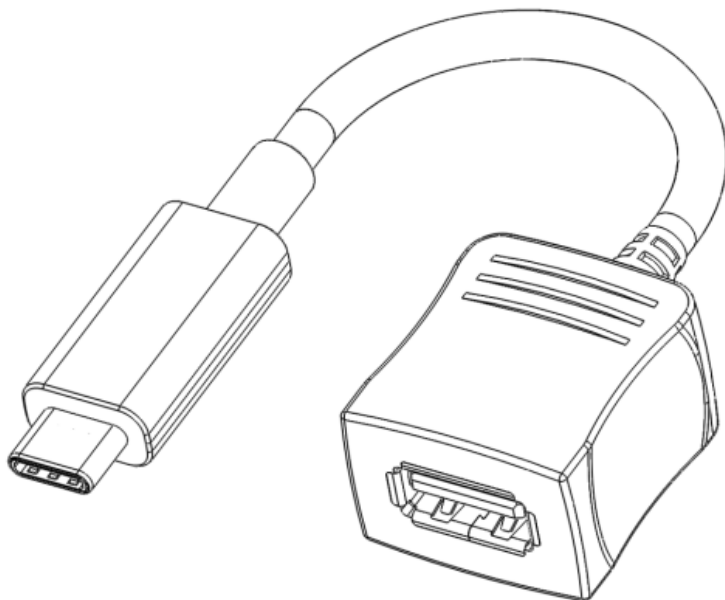
Type-C to USB 3.1 Type A

Type-C to USB 2.0 Micro-B

Adapter Ref	Plug	Receptacle	USB Version	Cable Length	Current Rating	USB Power Delivery (BFSK)	USB Type-C Electronically Marked
CµBR2-3	C[1]	Micro-B[3]	USB 2.0	≤ 0.15 m	3 A	N/A	N/A
CAR3G1-3	C[2]	A[3]	USB 3.1 Gen1	≤ 0.15 m	3 A	N/A	Optional

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www.bellwether-corp.com

Design Benefit

- Bellwether USB type C passes **USB 3.1 Gen 2 (10Gbps)**

- **Versatile mounting type and center high**
  (Vertical/ In-board/Top mount/Bottom mount)

- **Provide total solution** including connector, adapter and cable with different application

- What information do we need for USB type C selection?
  * Application (Connector/ Cable/ Adaptor)
  * Cable length (1m/2m/4m)
  * Mechanical (Top mount/ In-Board/ Vertical)
  *Current/Voltage (3A/5A and 5V/12V/20V)
  *Signal Transmission spec (USB2.0/ USB 3.1 gen1/gen2)

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Q & A