



Quality | Reliability | Honesty | Responsibility

USB Type C Total Solutions

Derek Yip

6/10/2015

Agenda

- USB Development History
- USB Type-C Overview and Specification
- Tech-Top Product Series and Roadmap



USB Development History



USB Development History

Generation	Bandwidth	USB Category	Power	Date
USB 1.0	1.5 Mbps	Low Speed	500 mA	1996/1
USB 1.1	12 Mbps	Full Speed	500 mA	1998/9
USB 2.0	480 Mbps	High Speed	500 mA	2000/4
USB 3.0	5 Gbps	Super Speed Gen1	900 mA	2008/11
USB 3.1	10 Gbps	Super Speed Gen2	900 mA	2013/8



USB Development History

Generation	Bandwidth	USB Category	Power	Date
USB 1.0	1.5 Mbps	Low Speed	500 mA	1996/1
USB 1.1	12 Mbps	Full Speed	500 mA	1998/9
USB 2.0	480 Mbps	High Speed	500 mA	2000/4
USB 3.0	5 Gbps	Super Speed Gen1	900 mA	2008/11
USB 3.1	10 Gbps	Super Speed Gen2	900 mA	2013/8
↳ Type-C v1.0	10 Gbps	SuperSpeed Gen2	1.5A/3A/5A	2014/8
↳ Type-C v1.1	10 Gbps	SuperSpeed Gen2	3A/5A	2015/4



USB Type-C Overview and Specification



USB Type-C Key Features

- **Major Features of USB Type-C**
 - Compact Size: Similar to the existing USB 2.0 Micro-B
 - Charging: Type-C provides power up to 100W
 - Expansion: Room to expand future functionalities
 - Easy of Use: 24-pin **Reversible** connector
- **Functional Capabilities**
 - USB 2.0: LS/FS/HS
 - USB 3.1: Gen1 (5Gbps)/Gen2 (10Gbps)
 - Docking Support



USB Type-C Key Features

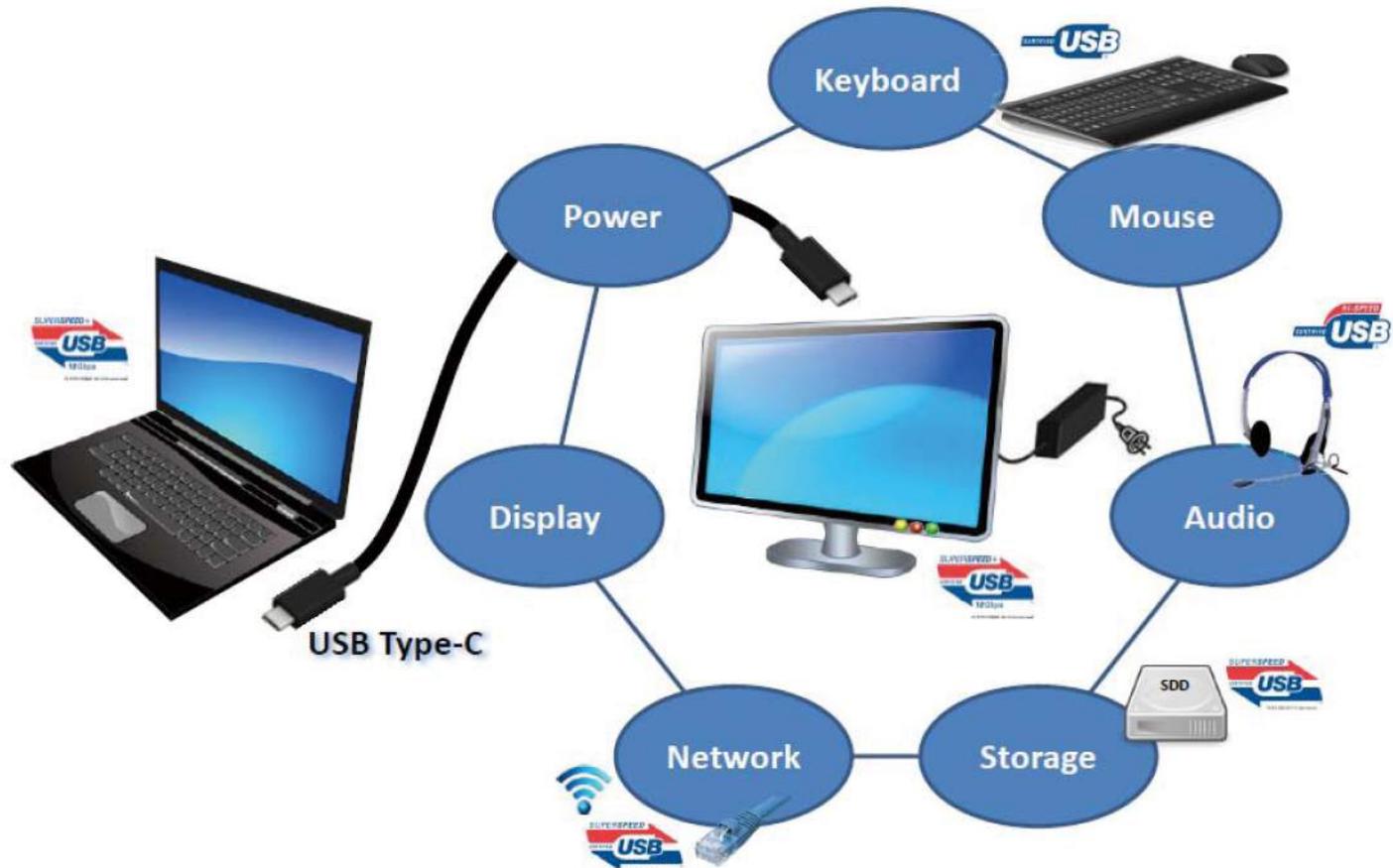
- **Mechanical Specification**

- Connector Size: 8.3 mm x 2.5 mm
- Durability: 10,000 cycles
- Improved EMI and RFI mitigation features
- Support Power Delivery capacity:
 - 3A for standard cables
 - 5A for connectors



USB Type-C Ecosystem

The Single Connector Platform Model



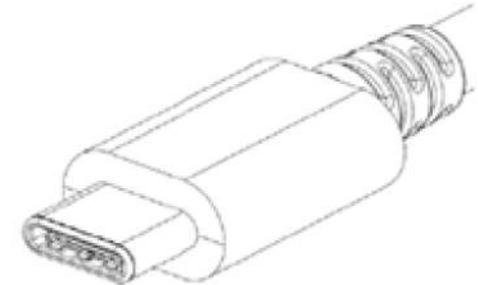
Signal Assignment

Looking into the product receptacle:



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

Looking into the cable or product plug:



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

Latest Type-C Devices *(as of 3/27/2015)*



- 1 Top Left:
Apple New Macbook
- 2 Top Right:
Google Chromebook Pixel
- 3 Left:
Nokia N1

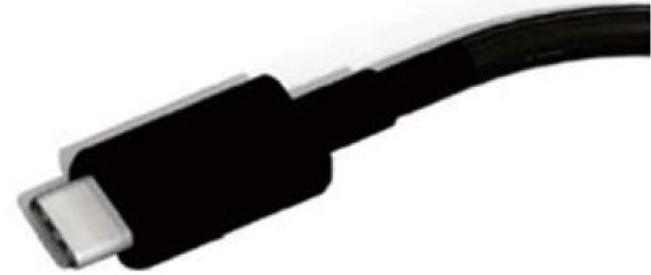
Latest Type-C Devices *(as of 3/27/2015)*



- ¹ Top Left:
LaCie's USB Type-C Portable Hard Drive
- ² Top Right:
SanDisk's Dual Drive Type-C Flash Drive

USB Type-C Standard Cable Assemblies

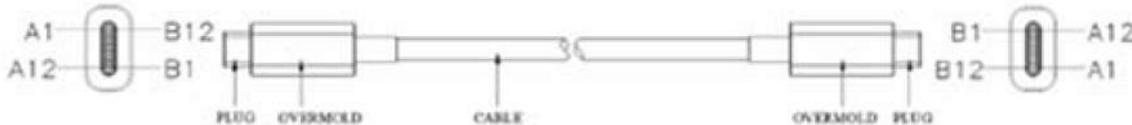
Two USB Type-C to Type-C cables defined



USB 3.1 Type-C to Type-C Cable Assembly



USB 2.0 Type-C to Type-C Cable Assembly



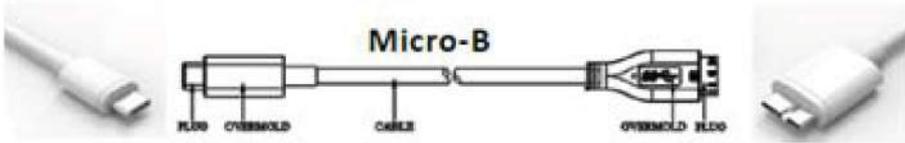
USB Type-C Standard Cable Assemblies

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		

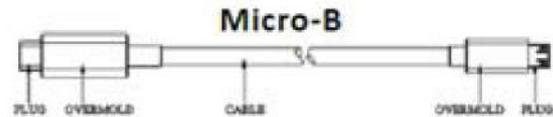
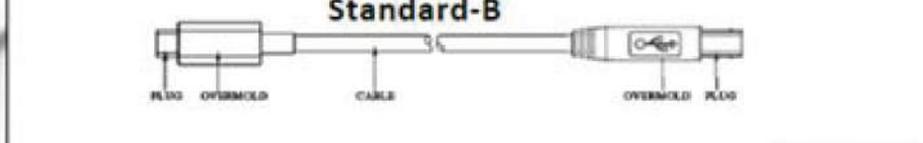
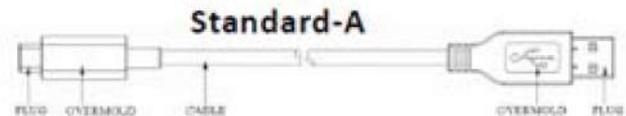


USB Type-C Legacy Cable Assemblies

USB Type-C to USB 3.1 Cable Assemblies:



USB Type-C to USB 2.0 Cable Assemblies:



USB Type-C Legacy Cable Assemblies

Cable Ref	Plug 1 ⁴	Plug 2 ⁴	USB Version	Cable Length	Current Rating	USB Type-C Electronically Marked ³
AC2-3	USB 2.0 Standard-A	USB 2.0 Type-C ¹	USB 2.0	≤ 4 m	3 A	Optional
AC2-5	USB 2.0 PD Standard-A				5 A	Required
AC3G2-3	USB 3.1 Standard-A	USB Full-Featured Type-C ¹	USB 3.1 Gen2	≤ 1 m	3 A	Optional
AC3G2-5	USB 3.1 PD Standard-A				5 A	Required
CB2-3	USB 2.0 Type-C ²	USB 2.0 Standard-B	USB 2.0	≤ 4 m	3 A	Optional
CB2-5		USB 2.0 PD Standard-B			5 A	Required
CB3G2-3	USB Full-Featured Type-C ²	USB 3.1 Standard-B	USB 3.1 Gen2	≤ 1 m	3 A	Optional
CB3G2-5		USB 3.1 PD Standard-B			5 A	Required
CmB2	USB 2.0 Type-C ²	USB 2.0 Mini-B	USB 2.0	≤ 4 m	500 mA	Optional
CμB2-3	USB 2.0 Type-C ²	USB 2.0 PD Micro-B	USB 2.0	≤ 2 m	3 A	Optional
CμB3G2-3	USB Full-Featured Type-C ²	USB 3.1 PD Micro-B	USB 3.1 Gen2	≤ 1 m	3 A	Optional



USB Type-C Legacy Adapters

Only two USB Type-C to Legacy adapters are defined and allowed.

USB Type-C to USB Standard-A Receptacle Adapter



Intended for legacy “thumb drive” use with new host platforms

USB Type-C to USB 2.0 Micro-B Receptacle Adaptor

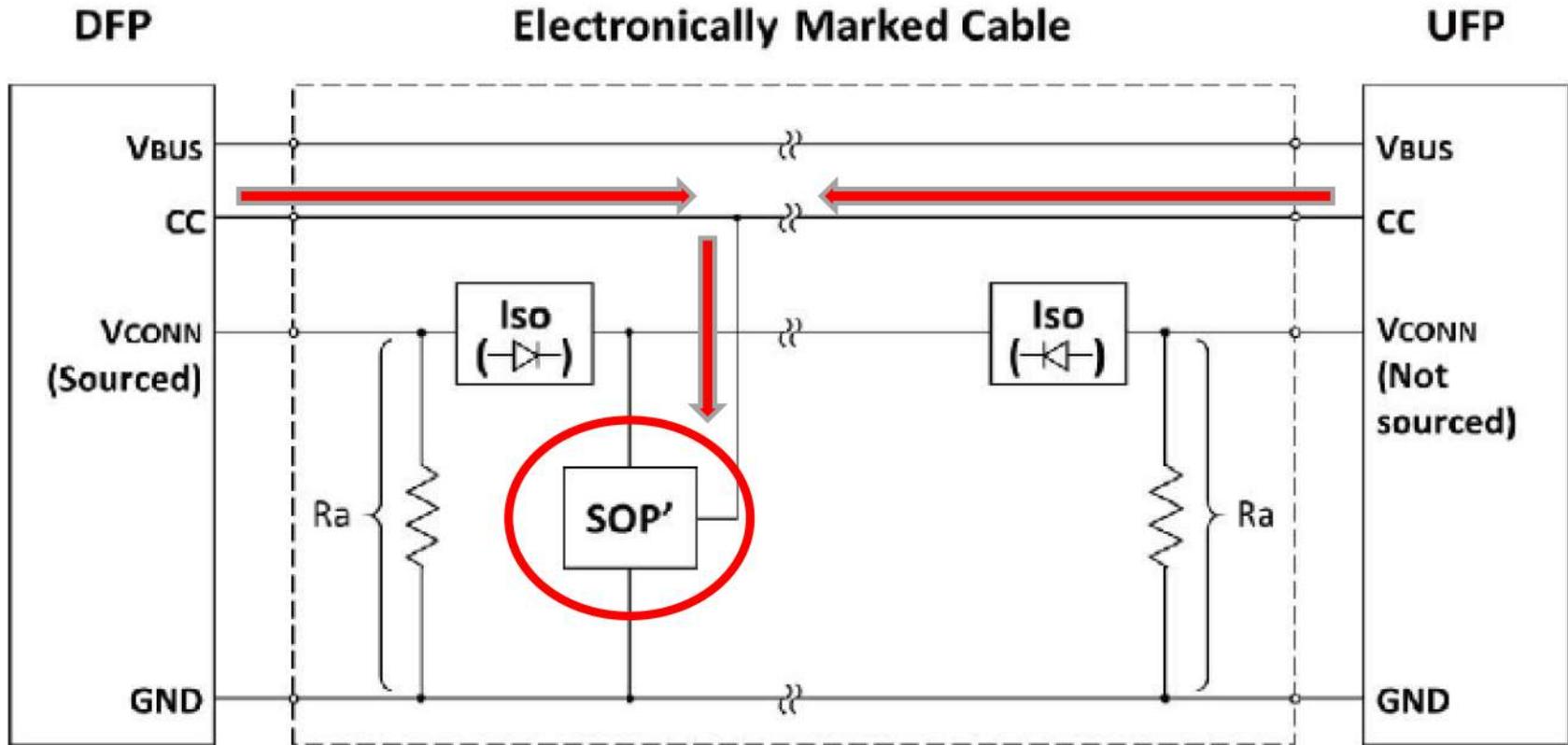


Intended for adapting existing Micro-B chargers to new devices

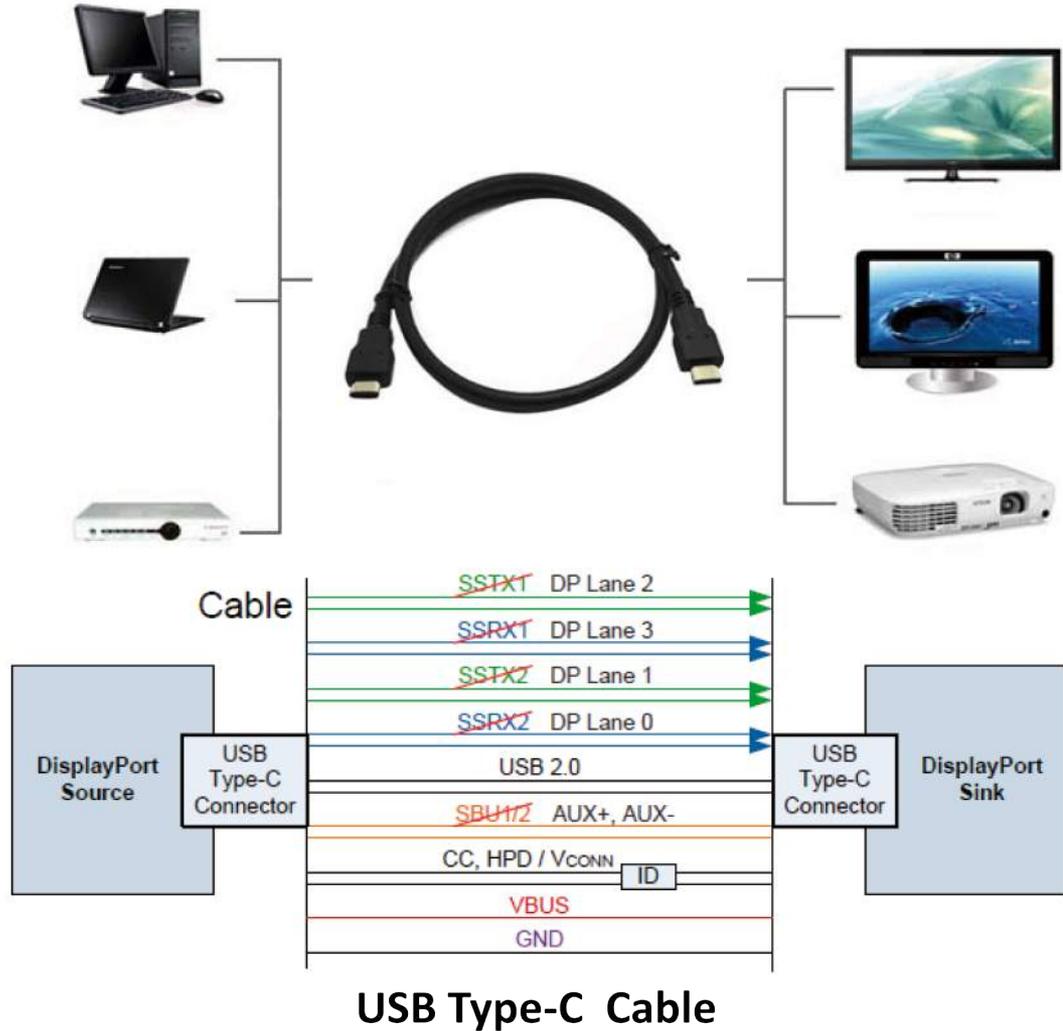
Adapter Ref	Plug	Receptacle ³	USB Version	Cable Length	Current Rating	USB Legacy Receptacle Type	USB Type-C Electronically Marked
CμBR2-3	USB 2.0 Type-C ¹	USB 2.0 Micro-B	USB 2.0	≤ 0.15 m	3 A	PD Receptacle Not Allowed	Optional
CAR3G1-3	USB Full-Featured Type-C ²	USB 3.1 Standard-A	USB 3.1 Gen1	≤ 0.15 m	3 A	PD Receptacle Not Allowed	Optional



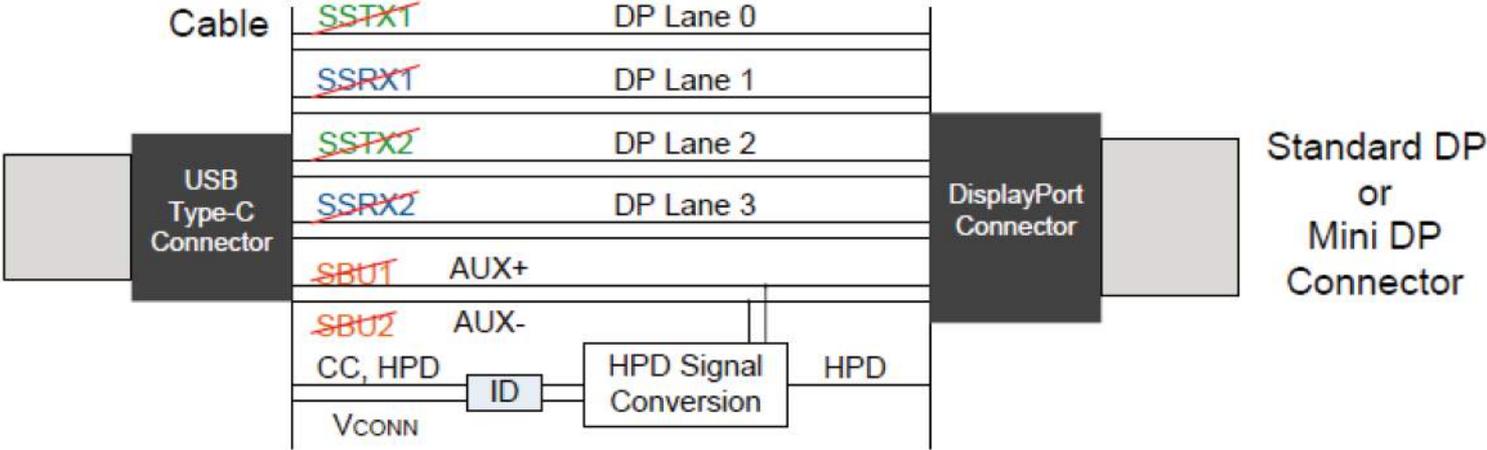
Electronically Marked Cable



USB Type-C Alternate Mode (DisplayPort)



USB Type-C Alternate Mode (DisplayPort)



USB Type-C to DisplayPort Adapter Cable



Tech-Top Product Series and Roadmap



Type C Product Series

- **C to C Cables**

- 2.0 (480Mbs)
- 3.1 Gen1 (5Gbps)
- 3.1 Gen2 (10Gbps)

- **A to C Cables**

Legacy hosts to connect Type C devices

- 2.0 (480Mbs)
- 3.1 Gen1 (5Gbps)
- 3.1 Gen2 (10Gbps)

- **C to Micro B Cables**

Type C hosts to connect Legacy devices such portable hard drives

- 2.0 (480Mbs)
- 3.1 Gen1 (5Gbps)
- 3.1 Gen2 (10Gbps)

- **C to Lightning Cables (MFi)**

Still waiting for MFi's permission to proceed



Type C Product Series

- **Passive Adapters**

Use in conjunction with Legacy USB cables

- C plug to A receptacle adapter 3.1 Gen1 (5Gbps)
- C plug to A receptacle adapter cable 3.1 Gen1 (5Gbps)
- C plug to micro B 2.0 receptacle adapter (480Mbps)
- C plug to micro B 2.0 receptacle adapter cable (480Mbps)

- **Alternate Mode Cables**

- C to DisplayPort Cable *(Type C plug to DP plug)*

- **Active Adapters**

- Type C to HDMI Adapter (w/ HDMI receptacle) *for NB such as Macbook*
- Type C to VGA Adapter (w/ D-Sub receptacle) *for NB such as Macbook*

- **Hubs**



Type C Product Series

- **Active Cables**
 - C-C Cables
 - 3.1 Gen1 (5Gbps)
 - 3.1 Gen2 (10Gbps)
 - A-C Cables
 - 3.1 Gen1 (5Gbps)
 - 3.1 Gen2 (10Gbps)
 - C-microUSB Cable
 - 3.1 Gen1 (5Gbps)
 - A-microUSB Cable
 - 3.1 Gen1 (5Gbps)
- **Active Optical Cables**
 - C-C Cable 3.1Gen2 (10Gbps)



USB Type-C Product Roadmap

Type-C Legacy Products

- USB A-C Cable (2.0 & 3.1Gen1)
- USB C-microB Cable (2.0)
- USB C-A Adapter (3.1Gen1)
- USB C-A Adapter Cable (3.1Gen1)

Type-C Legacy Products

- USB C-microB Cable (3.1Gen1)
- USB C-microB Adapter (2.0)
- USB C-microB Adapter Cable (2.0)

Type-C Standard Cables

- USB C-C Cable (3.1Gen1/Gen2)
- USB A-C Cable (3.1Gen2)

Type-C Hub Related Products

Type-C PD Cables (5A)

- Type C Active Cable (3.1Gen2)
- Type-C Active Optical Cable (AOC)

Type-C Alternate Modate Cables

- USB C-DisplayPort Cable

Type-C Active Adapters

- USB C-HDMI Adapter
- USB C-VGA Adapter

Type C to Lightning Cables (MFi)

- Type C Active Cable (3.1Gen1)

Q1

Q2

Q3

Q4



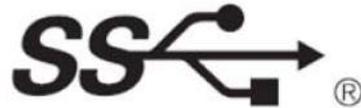
Finally, Our Friendly Reminders.....



Trident USB Logo & Compliance Logo

→ *These logos can not be used unless the products are certified!*

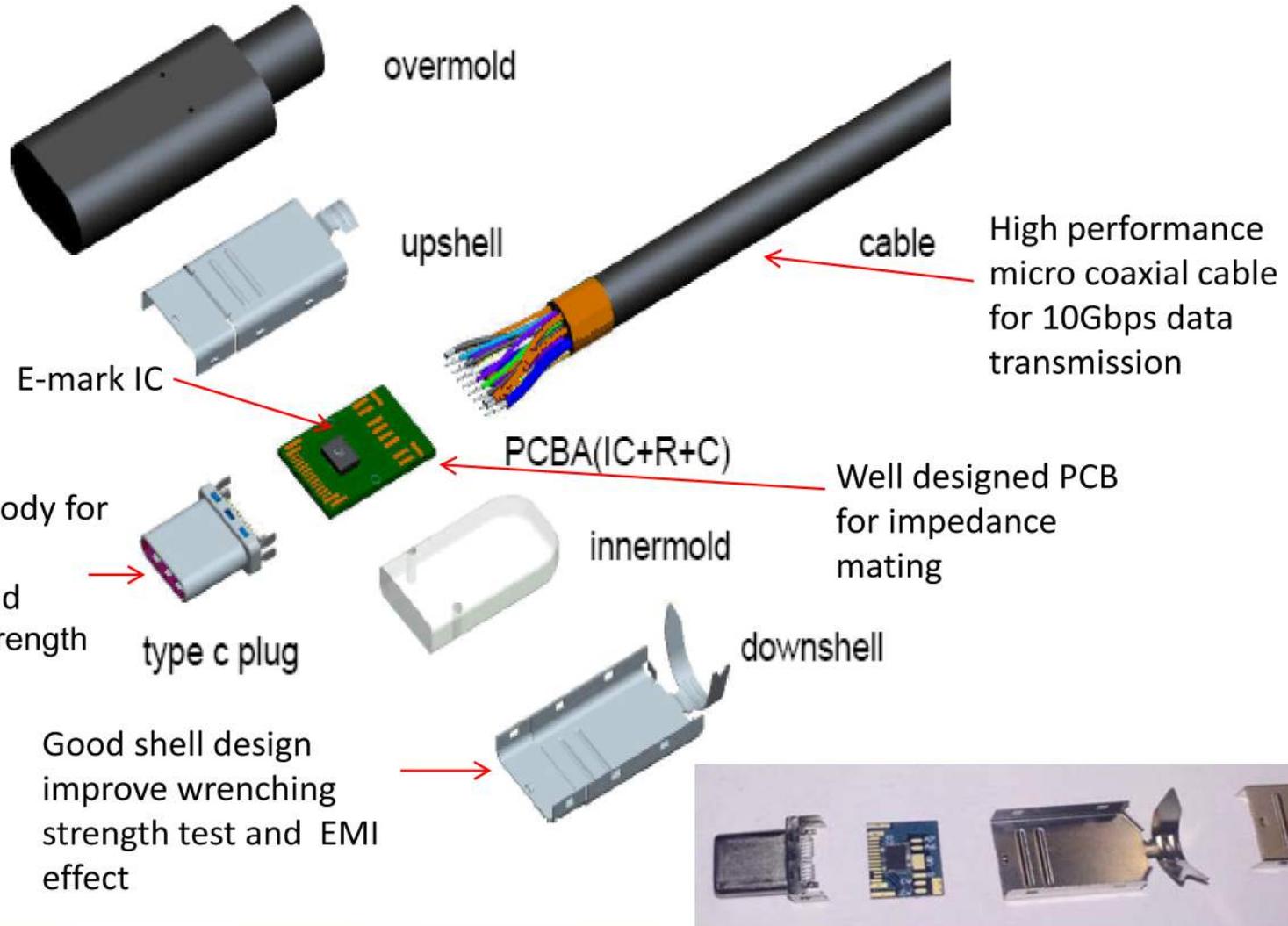
SuperSpeed USB
Trident Logo



SuperSpeed USB
10 Gbps Trident Logo



Cable Assembly Exploded Drawing



Drawn plug body for better 4-Axis Continuity and Wrenching Strength Test

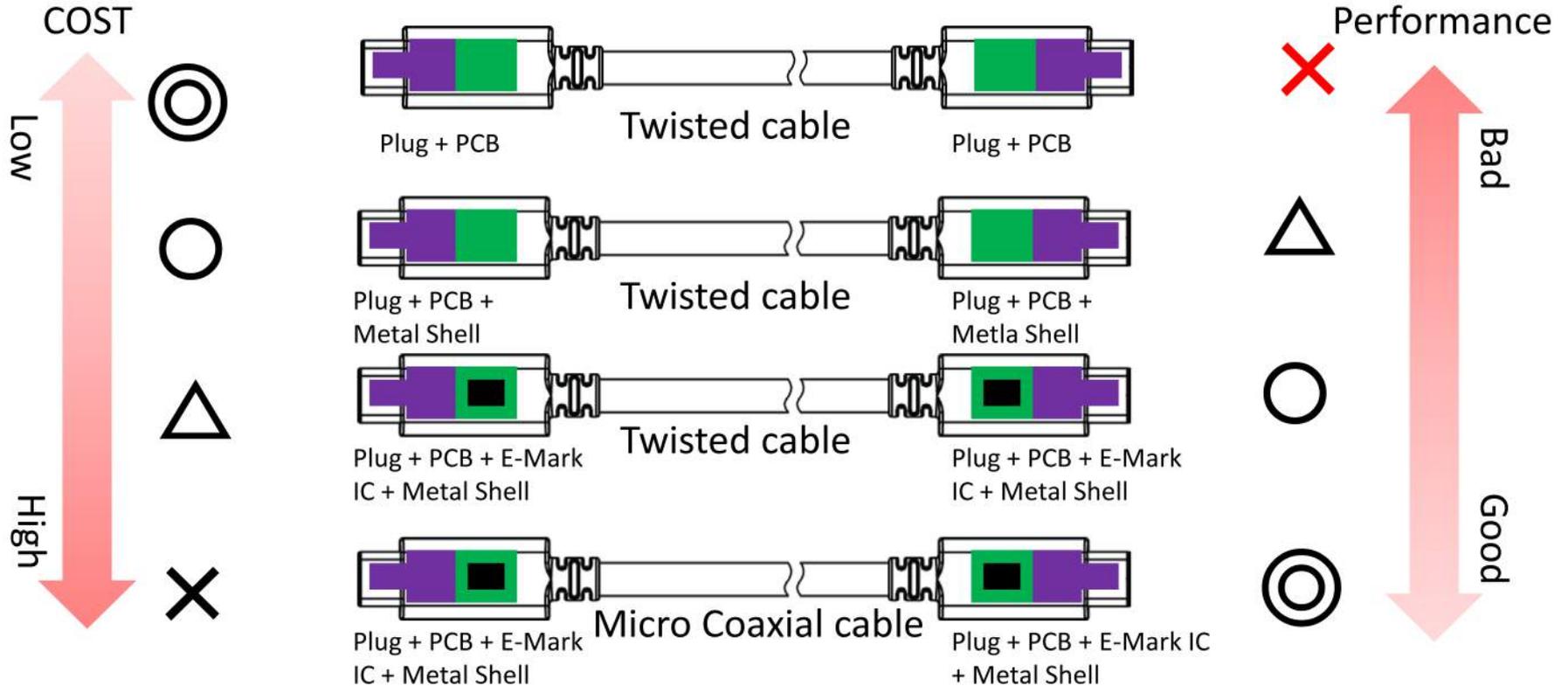
Good shell design improve wrenching strength test and EMI effect

High performance micro coaxial cable for 10Gbps data transmission

Well designed PCB for impedance mating



A Variety of C-C Cables in the Market



Remark:

- 1) Whether PCB is impedance controlled affects the cost a lot.
- 2) The cost of "Drawn Plug Body" is much higher.



Any Questions

