






USB PD

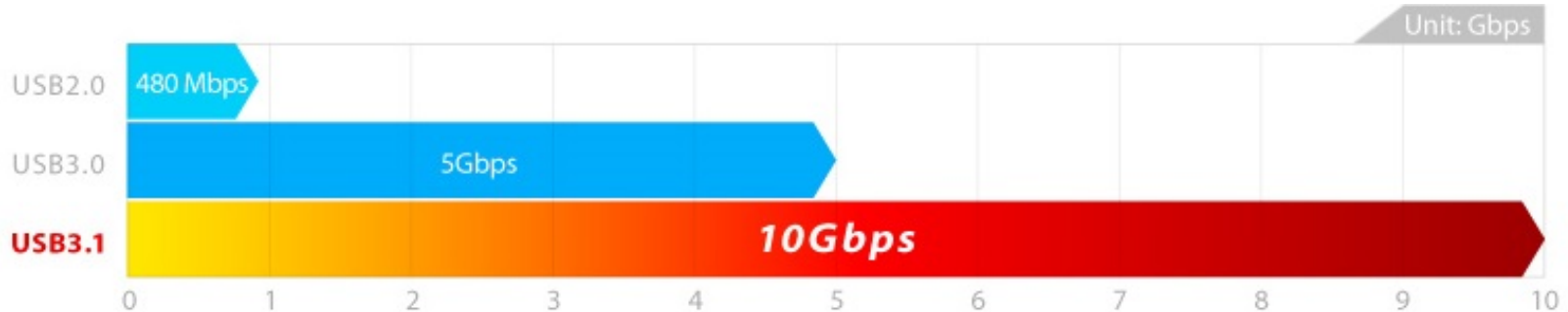
Reported: 台北工程部

Date: Aug 3th 2015

Update : Apr 19th 2016

- USB History
- USB BC1.2
- USB PD(Power Delivery)
- Type C
- MUX
- RN5U700 介紹
- 競爭對手資料
- 總結

	Generation	Mark	Bandwidth	Power	Launch
USB 1.0	Low speed		1.5 Mbps	5V /500mA	1996 .Jan
USB 1.1	Full speed		12 Mbps	5V /500mA	1998 .Sep
USB 2.0	High speed		480 Mbps	5V /500mA	2000 .Apr
USB 3.0	Super speed Gen1		5 Gbps	5V /900mA	2008 .Nov
USB 3.1	Super speed + Gen2		10 Gbps	5V /900mA	2013 .Aug



- USB 2.0 採用8b/10b 編碼原則，
也就是在傳10個bit時會有2 個bit的編碼耗損，
實際傳輸速度為 $480\text{Mb/s} \times 8 / 10 = 384\text{Mb/s} = 48\text{MB/s}$
- USB 3.0 採用8b/10b 編碼原則，
也就是在傳10個bit時會有2 個bit的編碼耗損，
實際傳輸速度為 $5\text{Gb/s} \times 8 / 10 = 4\text{Gb/s} = 500\text{MB/s}$
- USB 3.1 採用128b/132b 編碼原則，
也就是在傳132個bit時會有4 個bit的編碼耗損，
實際傳輸速度為 $10\text{Gb/s} \times 128 / 132 = 9.69\text{Gb/s} = 1212\text{MB/s}$

- 2009年，由全球行動通訊系統協會（Global System for Mobile Communications Association，GSMA），開放手機聯盟（Open Handset Alliance，OHA），USB-IF 約20家廠商共同制訂，以Micro USB 做為數據及充電的統一接口，這是USB BC 的開端。



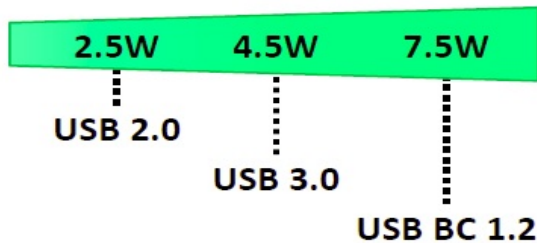


Taking a Great Idea ...

Broad international adoption of USB Battery Charging standard for mobile devices



- China, Europe drove standardization as a means to increase charger reuse and reduce electronic waste



Agreement reached on Micro-USB connector and the standard for the common mobile charger

CENELEC and the USB Implementers Forum reach agreement on memorandum of understanding

BRUSSELS – March 1, 2011– A Memorandum of Understanding (MoU) was signed today between the USB-IF and CENELEC, the European Committee for Electrotechnical Standardization.



	Charge voltage	Charge current	USB Data
SDP Standard Downstream Port 標準下行端口	4.75V~5.25V	500mA(USB2.0) 900mA(USB3.0)	Yes
CDP Charging Downstream Port 充電下行端口	4.75V~5.25V	1.5A	Yes
DCP Dedicated Charging Port 專用充電端口	2.0V~5.25V	1.5A	No



USB PD = 新的充電技術

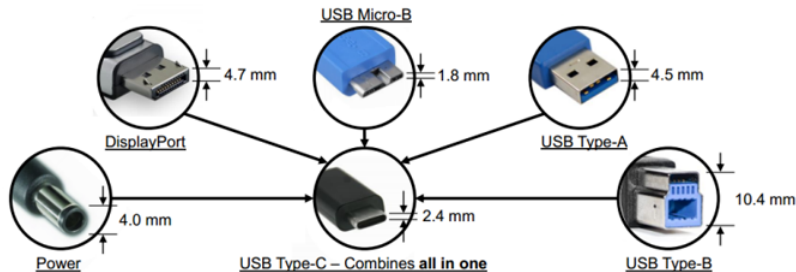
USB 2.0 PD icon:



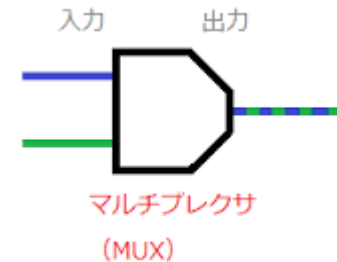
USB 3.0 PD icon:



TYPE C = USB C = 新的Connector 業界也有另一個稱呼叫做CC



MUX = Switch = 多工器



Taking a Great Idea and Making it Even Better





Source capabilities organized as profiles

Hand-held devices, today's peripherals	PROFILE 1 5V @ 2A	10W Default start-up profile	Requires new detectable cables for >1.5A or >5V
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	

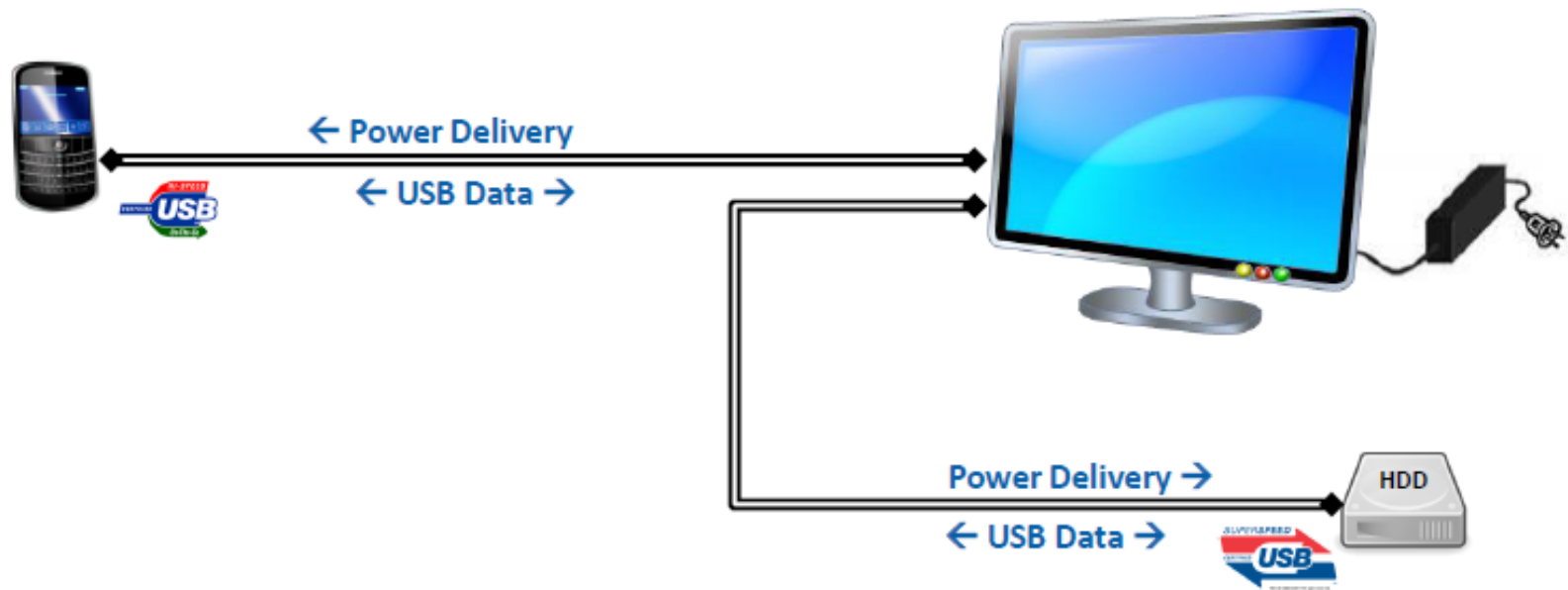
■ USB-PD Profile

Type	Version	Voltage	Current	Wattage	Application		
Old Regulation 	USB 2.0	5V	0.5A	2.5W			
	USB 3.0		0.9A	4.5W			
	USB BC 1.2 Battery Charging Spec		1.5A	7.5W			
New Regulation	USB 2.0 / 3.0 Type-C	5V	1.5A	7.5W			
			3.0A	15W			
New Regulation 	USB PD Power Delivery	12V	Profile 1	5V	2.0A	10W	
			Profile 2	12V	1.5A	18W	
			Profile 3		3.0A	36W	
		Profile 4	20V	3.0A	60W		
		Profile 5		5.0A	100W		

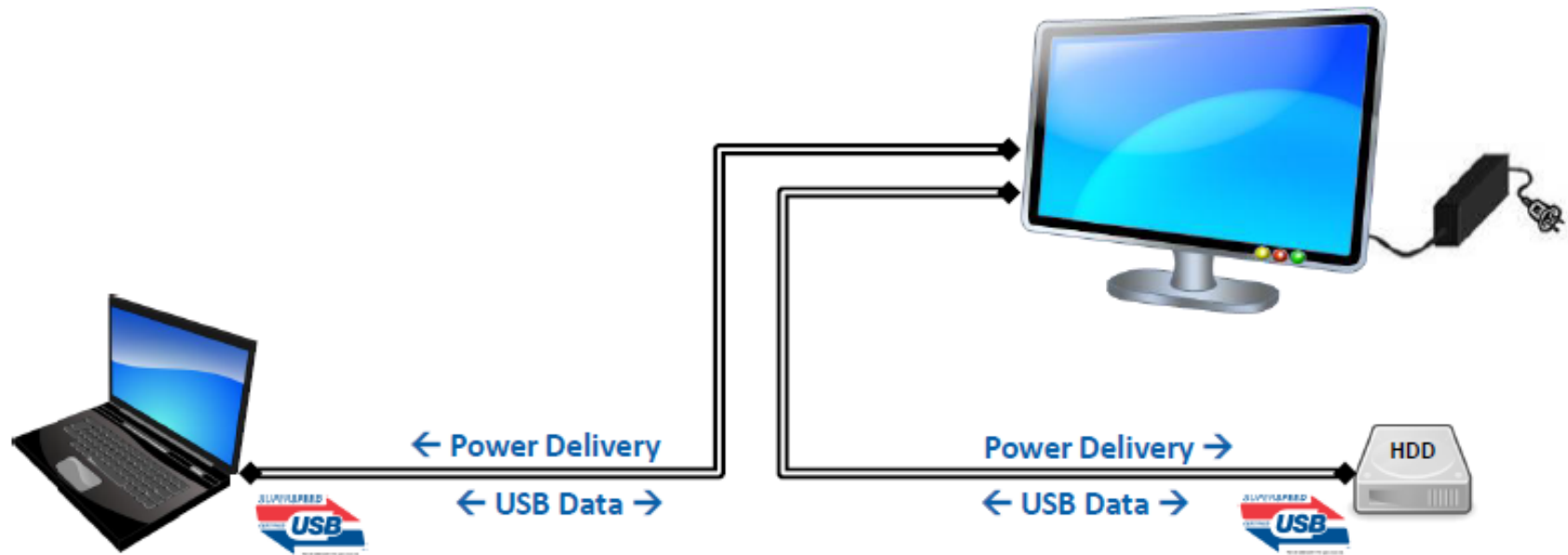
Voltage Often used in PC inside

Voltage Often used at PC adaptor

Display is power source and hub to hosts/devices connected to it
Phone or notebook is USB host driving display and other USB features
within or attached to the display



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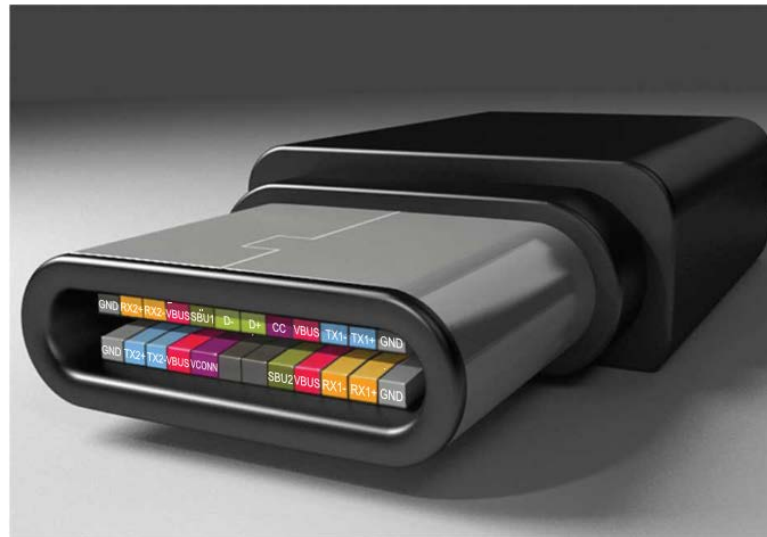


Figure 2-1 USB Type-C Receptacle Interface (Front View)

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

Figure 2-2 USB Full-Featured Type-C Plug Interface (Front View)

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



DFP (Downstream Facing Port)

Method of Pull-Up

- ① Passive element
 - ② Constant current source
- Either it is allowed.

UFP (Upstream Facing Port)

Method of Pull-Down

Only passive element is allowed.

Figure 4-5 Pull-Up/Pull-Down CC Model

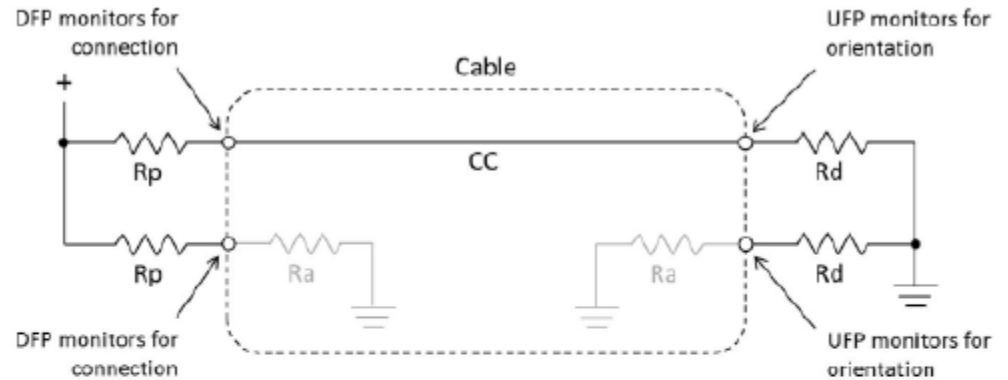
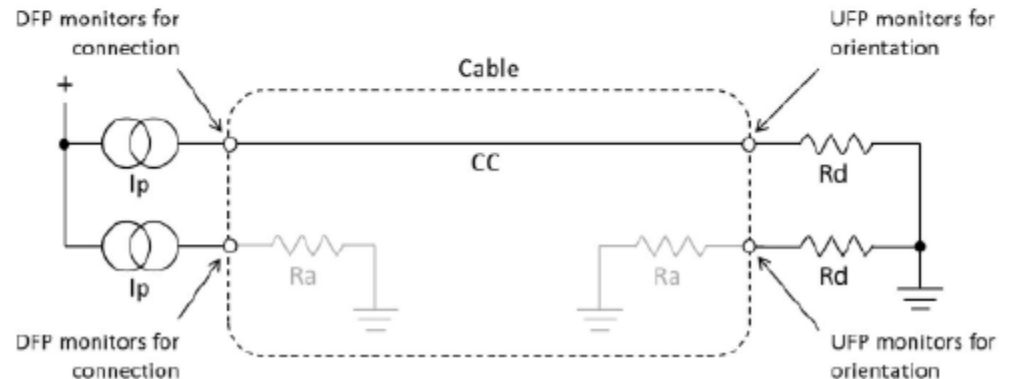


Figure 4-6 Current Source/Pull-Down CC Model





■ New Type-C Connector

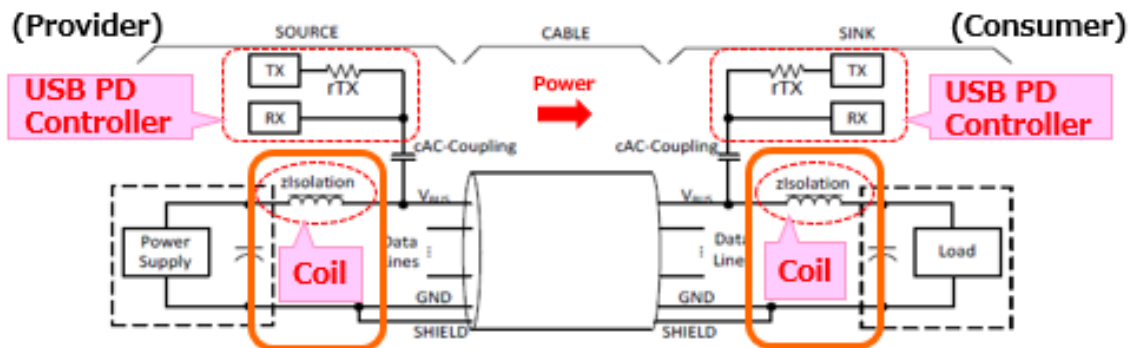
USB	Connector		I/F
USB-PD	Now	Type-A/B Micro-A/B/ AB	FSK Frequency Shift Keying
	New	Type-C	BMC Bi-Phase Mark Coding

99% Customers Applies
USB-PD with Type-C & BMC!!

■ Type-C Connector Picture

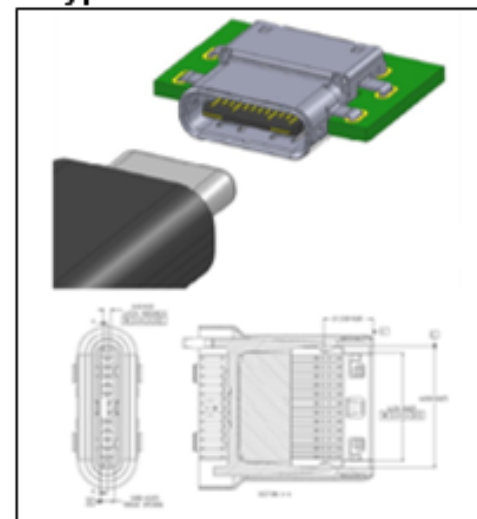


■ FSK Type



FSK Needs Coils on Vbus to Separate Signals.

■ Type-C Connection



Type-C is Reversible.



欲知詳情請洽...

AENEAS

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