



**ALLION**<sup>®</sup>  
*Engineering Services*

# USB-IF Power Delivery Compliance Program Overview

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March 2016





# Agenda

-  **Power Delivery Compliance Test** →
-  **PD E-Marker Issues On Compliance Testing** →
-  **PD Only Silicon Issues On Compliance Testing** →

# Power Delivery Compliance Test

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# Power Delivery Test Equipment

- **MQP USB-PDT**
  - **Graphic USB:** 4.77 (Mar 14 2016 Version)



- **Ellisys EX-350**
  - **Examiner:** 5921 (Mar 18 2016 Version)
  - Need other sources for the following tests
    - » Transmitter Eye Diagram Test
    - » Receive Interference Rejection Test



# Power Delivery Test Item - MQP

- MQP USB-PDT

## E-Marker

Cable General | Cable ID (SOP) | Cable SVIDs Modes (SOP) | Test Parameters | Cable Test Selector

SOP' Tests

- CAB-PHY-TX-EYE (+BIT)
- CAB-PHY-RX-INT-RE
- CAB-PHY-RX-BUSIDL
- CAB-PHY-TERM
- CAB-PHY-MSG

CAB\_PROT\_DISCOV

SOP" Tests

- CAB-DP-PHY-TX-EYE (+BIT)
- CAB-DP-PHY-RX-INT-RE
- CAB-DP-PHY-RX-BUSIDL
- CAB-DP-PHY-TERM
- CAB-DP-PHY-MSG

## PD Only Silicon

Gen | Gen (cont) | Source | Sink | ID (SOP) | SVIDs (SOP) | Test Parameters | Test Selector

PHY tests

- BMC-PHY-TX-EYE (+BIT)
- BMC-PHY-RX-INT-RE
- BMC-PHY-RX-BUSIDL
- BMC-PHY-TERM
- BMC-PHY-MSG

Protocol Tests

- BMC-PROT-SEQ-GETCAPS
- BMC-PROT-SEQ-CHKCAB-P-PC
- BMC-PROT-SEQ-NOMRK-P-PC
- BMC-PROT-SEQ-CHKCAB-CP-AC
- BMC-PROT-SEQ-NOMRK-CP-AC
- BMC-PROT-SEQ-SWAP-REJ (optional)
- BMC-PROT-SEQ-DRSWAP
- BMC-PROT-SEQ-VCSWAP
- BMC-PROT-DISCOV
- BMC-PROT-BIST-NOT-5V-SRC
- BMC-PROT-REV-NUM

Power Tests

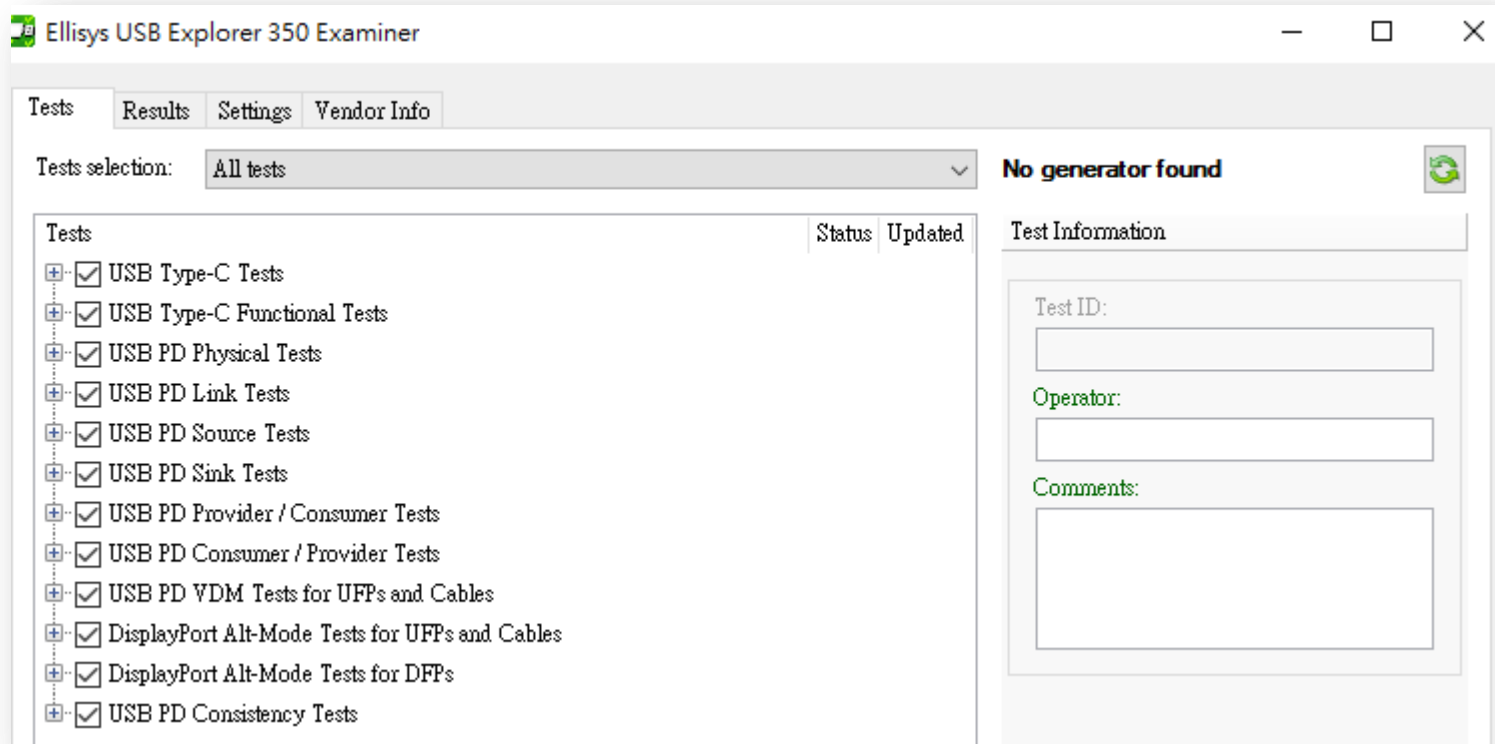
- BMC-POW-SRC-LOAD-P-PC
- BMC-POW-SRC-LOAD-CP-ACC
- BMC-POW-SRC-TRANS-P-PC
- BMC-POW-SRC-TRANS-CP-ACC
- BMC-POW-SNK-TRANS-C-CF
- BMC-POW-SNK-TRANS-PC

Set All PHY Tests      Set All PROT Tests      Set All POWER Tests



# Power Delivery Test Item - Ellisys

- **Ellisys EX-350**



# E-Marker Cable Compliance Testing Material

- **Compliance Test Materials**

- **Vendor Info File** => Created by PDVendorInfoFileGenerator

- » **Current version: 0.9.16.0**

- » No idea how to write?

*We're here to help!*

- **Completed Cable Product Registration Form**

**Company Information**

Member Company Name\* **Vendor ID USB-IF Assigned is Decimal**

**Product Information**

PD E-marker Vendor XID (XID of certified E-marker Silicon used in the cable under test): \_\_\_\_\_

PD E-marker Vendor TID (TID of certified E-marker Silicon used in the cable under test): \_\_\_\_\_

Cable Under Test XID: **XID USB-IF Assigned is Decmal**

Current Rating\*:  500mA  3A  5A

Signaling Rate\*  480Mbps  5Gbps  10Gbps

Cable Length\* \_\_\_\_\_

SOP" Support\*:  Yes  No      SOP' Support\*:  Yes  No



# PD E-Marker Issues On Compliance Testing

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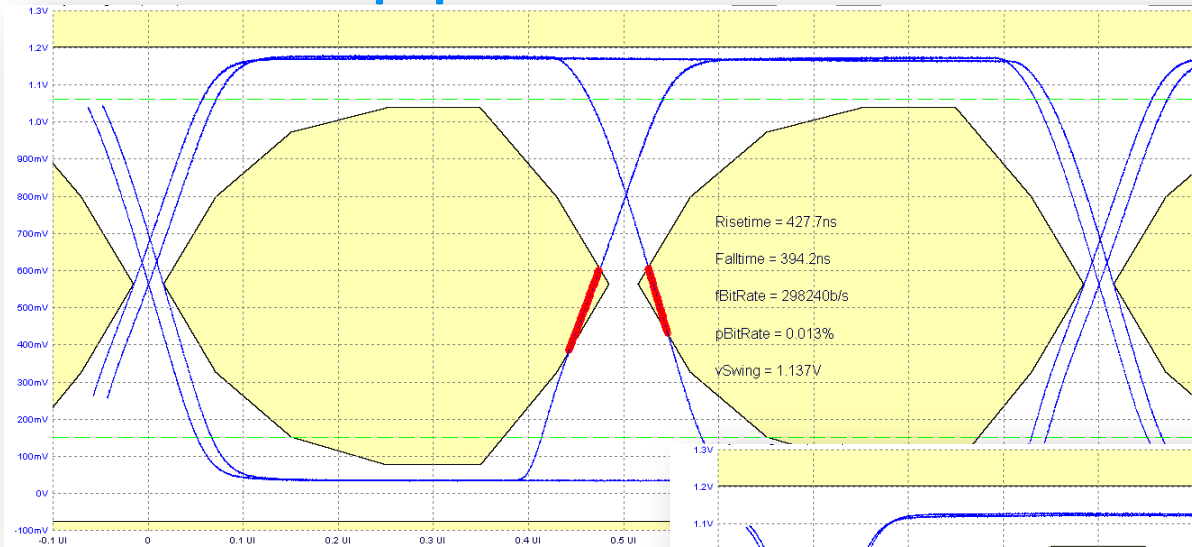




# PD E-Marker Issue (#1)

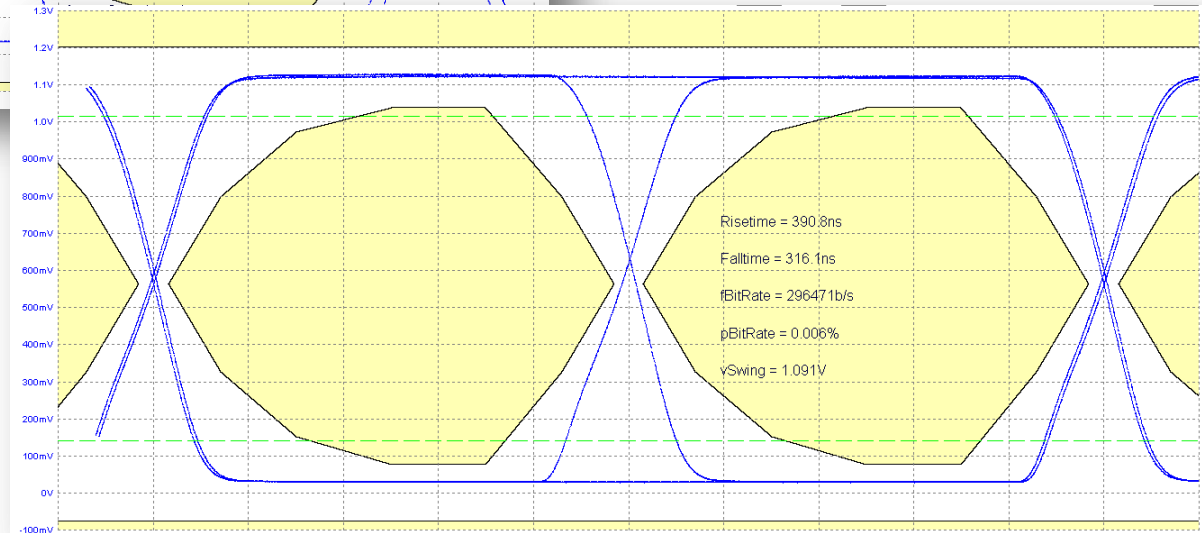
- Cable Transmitter Eye Diagram Test

- Test Equipment: MQP USB-PDT



*Before*

*After*



# PD E-Marker Issue (#2)

- **Cable Receive Interference Rejection Test**

- **Test Equipment:** MQP USB-PDT
- The related CTS spec. will be confirmed after getting E-Marker IC certified
- Follow the [“Grace Period after the Introduction of a New Test”](#)

**Goal: Confirm UUT recognises multiple BIST Test Data messages with Tx Group 2 Noise**

...Suppressing multiple event reporting...

11434/13363 BIST Test messages were not responded to with GoodCRC [BMC\_PHY\_RX\_INT\_REJ\_2]

FAIL

	Nominal Signal	Group 1 Signal	Group 2 Signal	Group 3 Signal
High Level (nom)	1100 mV	1200 mV	790 mV	1290 mV
Low Level (nom)	25mV	0 mV	-250mV	250mV
Bit Rate	300 kb/s	270 kb/s	330 kb/s	330 kb/s
**Noise Period	-	608 ns	608 ns	608 ns
**Noise Amplitude	0 mV p/p	100 mV p/p	100 mV p/p	100 mV p/p
Rise/Fall Time	735 ns	735 ns	735 ns	735 ns

# PD E-Marker Issue (#3)

- **Cable PHY Level Message Test**

- **Test Equipment:** MQP USB-PDT
- The related CTS spec. will be defined after getting E-Marker IC certified
- Follow the [“Grace Period after the Introduction of a New Test”](#)

**Goal: Confirm correct response to a Soft Reset**

Events

#761- PD Sequence Start (Soft Reset)  
764

Event #761 PD Message - Soft Reset (from Tester) (SOP')

Event #762 PD Message - GoodCRC (from Cable or UUT) (SOP')

Event #763 PD Message - Accept (from Cable or UUT) (SOP')

The response time (67.00 us) for this message is incorrect. From the end of the GoodCRC responding to any SOP' or SOP'' message, to the start of any other SOP' or SOP'' message must be no less than tCableMessage min (750us). [Not defined] **FAIL**

Event #764 PD Message - GoodCRC (from Tester) (SOP')

(Previous Goal succeeded)



# PD E-Marker Issue (#4)

- **Cable Bus Idle Detection Test**

- **Test Equipment:** MQP USB-PDT
- The related CTS spec. will be defined after getting E-Marker IC certified
- Follow the [“Grace Period after the Introduction of a New Test”](#) policy for applying for a waiver (End product: 18 months)

```
Test: CAB-PHY-RX-BUSIDL

Goal: Initialise Cable Test.

Event #54436                               Connected

(Previous Goal succeeded)

Goal: Confirm Cable responds to single SOP' BIST Test Data message

Event #54443           PD Message - BIST (from Tester) (SOP')
Event #54444           PD Message - GoodCRC (from Cable or UUT) (SOP')

(Previous Goal succeeded)

Goal: Confirm Cable does not respond to a message when masked by non-Bus Idle

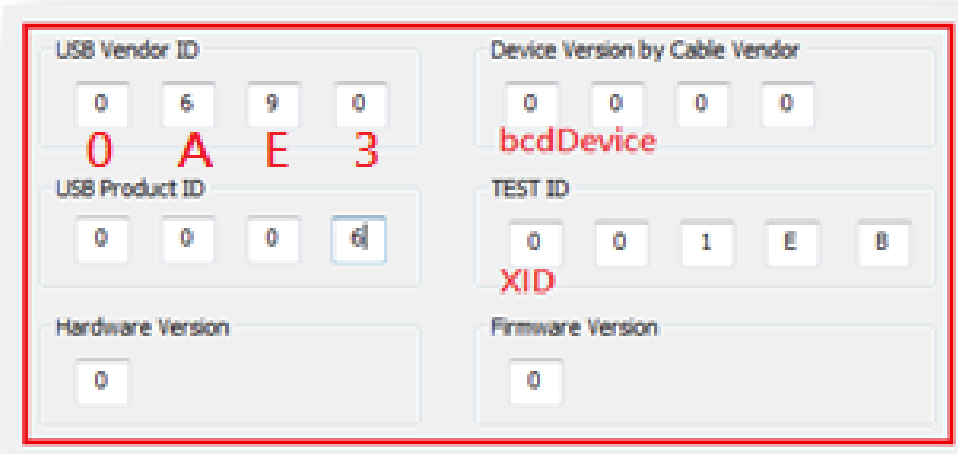
Event #54447           PD Message - BIST (from Tester) (SOP')
Event #54448           PD Message - GoodCRC (from Cable or UUT) (SOP')
The Idle time (339.60 us) between packets is incorrect. A GoodCRC should follow a message within
tTransmit max (195us) [PROT_PROC_GOODCRC_UUT_1]                                FAIL
UUT responded to message later than tTransmit max [PROT_PROC_GOODCRC_UUT_1]    FAIL
                                                                              (repeat)
```

# PD E-Marker Issue (#5)

- **Cable ID Checks or TD.PD.VNDI.E1 VDM Identify**

- **Test Equipment:** MQP USB-PDT or Ellisys EX-350
- Transfer all IDs USB-IF assigned or vendors specified from Decimal to Hex and then program to E-Marker IC

**Example:** Allion Labs' VID: 2787 for Decimal => 0AE3 for Hex



USB Vendor ID: 0 6 9 0  
**0 A E 3**

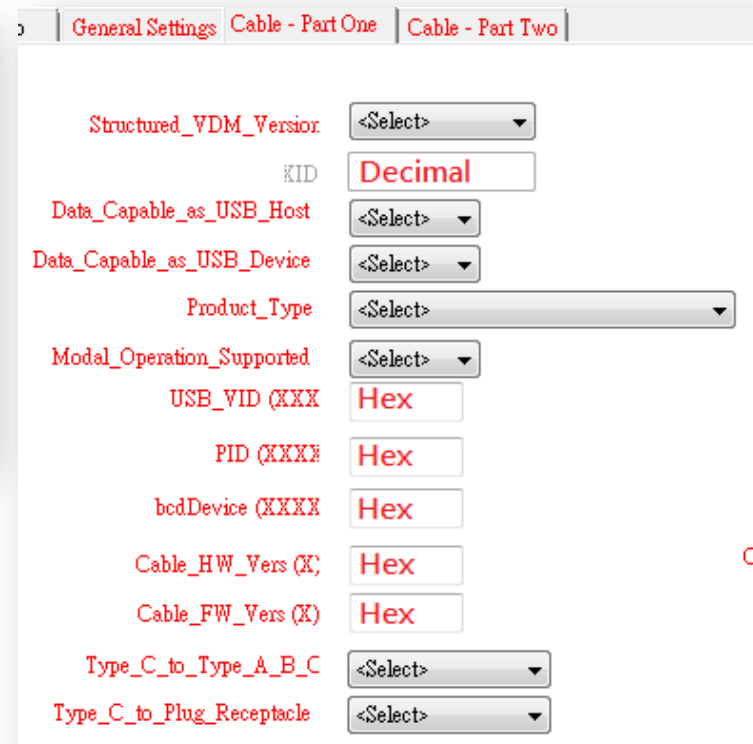
USB Product ID: 0 0 0 6

Device Version by Cable Vendor: 0 0 0 0  
**bcdDevice**

TEST ID: 0 0 1 E 0  
**XID**

Hardware Version: 0

Firmware Version: 0



General Settings | Cable - Part One | Cable - Part Two

Structured\_VDM\_Version: <Select>

KID: **Decimal**

Data\_Capable\_as\_USB\_Host: <Select>

Data\_Capable\_as\_USB\_Device: <Select>

Product\_Type: <Select>

Modal\_Operation\_Supported: <Select>

USB\_VID (XXX): **Hex**

PID (XXXX): **Hex**

bcdDevice (XXXX): **Hex**

Cable\_HW\_Vers (X): **Hex**

Cable\_FW\_Vers (X): **Hex**

Type\_C\_to\_Type\_A\_B\_C: <Select>

Type\_C\_to\_Plug\_Receptacle: <Select>



# PD Only Silicon Issues On Compliance Testing

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# PD Only Silicon Issue (#1)

- **TD.PD.VNDI.E8 Accepts PR\_Swap as Sink**

- **Test Equipment:** Ellisys EX-350
- This test verifies that the UUT will accept PR\_SWAP as sink as indicated in the vendor-supplied information.
- **Vendor Info File:**

```
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)
Accepts_PR_Swap_As_Src      : No
Accepts_PR_Swap_As_Snk     : No
Requests_PR_Swap_As_Src    : No
Requests_PR_Swap_As_Snk    : No
```

- **Trace File**

PsRdy	OUT	No data	OK	2,274 083 530	
→ PsRdy packet	OUT	No data	OK	2,274 083 530	10
↕ GoodCrc packet	IN	No data	OK	2,274 630 011	11
Power-Role Swap > Accepted	OUT	No data	OK	2,473 690 941	
→ Power-Role Swap	OUT	No data	OK	2,473 690 941	
→ Power-Role Swap packet	OUT	No data	OK	2,473 690 941	12
↕ GoodCrc packet	IN	No data	OK	2,474 235 280	13
← Accept	IN	No data	OK	2,474 882 787	
← Accept packet	IN	No data	OK	2,474 882 787	14
↕ GoodCrc packet	OUT	No data	OK	2,475 410 285	15

# PD Only Silicon Issue (#2)

- Source Dynamic Load Test, Consumer/Provider Accepting Swap
  - **Test Equipment:** MQP USB-PDT
  - This test verifies that the static and dynamic electrical capabilities of a Source meet the requirements for each PDO offered, and that the procedure for requesting an increase in current functions correctly.
  - **PDOs:** 5V/3A, 12V/3A, 20V/3A

## PDO #1

B19:10 Voltage	100	5.00 V
B9:0 Max Current	300	3.00 A

## PDO #2

B19:10 Voltage	240	12.00 V
B9:0 Max Current	300	3.00 A

## PDO #3

B19:10 Voltage	400	20.00 V
B9:0 Max Current	300	3.00 A

# PD Only Silicon Issue (#2) – Cont.

- Current Load on 5V

*Good Behavior*



- Current Load on 12V: Cannot Source !!!

*Bad Behavior*





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## Type-C PD IOT

Casper Lee

March 2016





# Overview

 **USB Type-C Interoperability Testing Methodology**

 **Type-C Power Role Verification**

 **Allion Type-C Test Tools Introduction**

 **Case Study**

# USB Type-C Interoperability Testing Methodology

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# The Type-C Functionality Architecture



# Testing Methodology of USB Type-C

Host/Source Device/Sink			Power Role				Data Role					Cable							
			P/C	C/P	P Only	C Only	DFP	USB	UFP			DRP	Passive Cable		Active Cable		Adaptor Cable		
									Dongle (ALT Mode)				E-Marker	W/O E-Marker	Re-timer	Re-driver	DP	HDMI	
									DP	HDMI	VGA								SOP'
Power Role	P/C		△	○	⊙	○	⊙	○	△	△	△	⊙	⊙	⊙	○	○	○	△	△
	C/P		⊙	△	○	○	⊙	⊙	○	○	○	⊙	○	○	○	○	○	△	△
	P Only		⊙	○	△	○	⊙	△	△	△	△	⊙	○	○	○	○	○	△	△
	C Only		○	○	○	△	○	△	△	△	△	⊙	○	○	○	○	○	△	△
Data Role	DFP		⊙	△	⊙	△	△	○	○	○	○	⊙	○	○	○	○	○	○	○
	UFP	USB		△	○	△	○	○	△	△	△	△	⊙	○	○	○	○	○	○
		Dongle (ALT Mode)	DP	△	○	△	○	○	△	△	△	△	⊙	○	○	○	○	○	○
			HDMI	△	○	△	○	○	△	△	△	△	⊙	○	○	○	○	○	○
			VGA	△	○	△	○	○	△	△	△	△	⊙	○	○	○	○	○	○
DRP		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	
Cable	Passive Cable	E-Marker	SOP'	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙						
			SOP''''	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙						
		W/O E-Marker	○	○	○	○	○	○	○	○	○	○							
	Active Cable	Re-timer		○	○	○	○	○	○	○	○	○							
		Re-driver		○	○	○	○	○	○	○	○	○							
	Adaptor Cable	DP		△	△	△	△	⊙	○	○	○	○	⊙						
		HDMI		△	△	△	△	⊙	○	○	○	○	⊙						

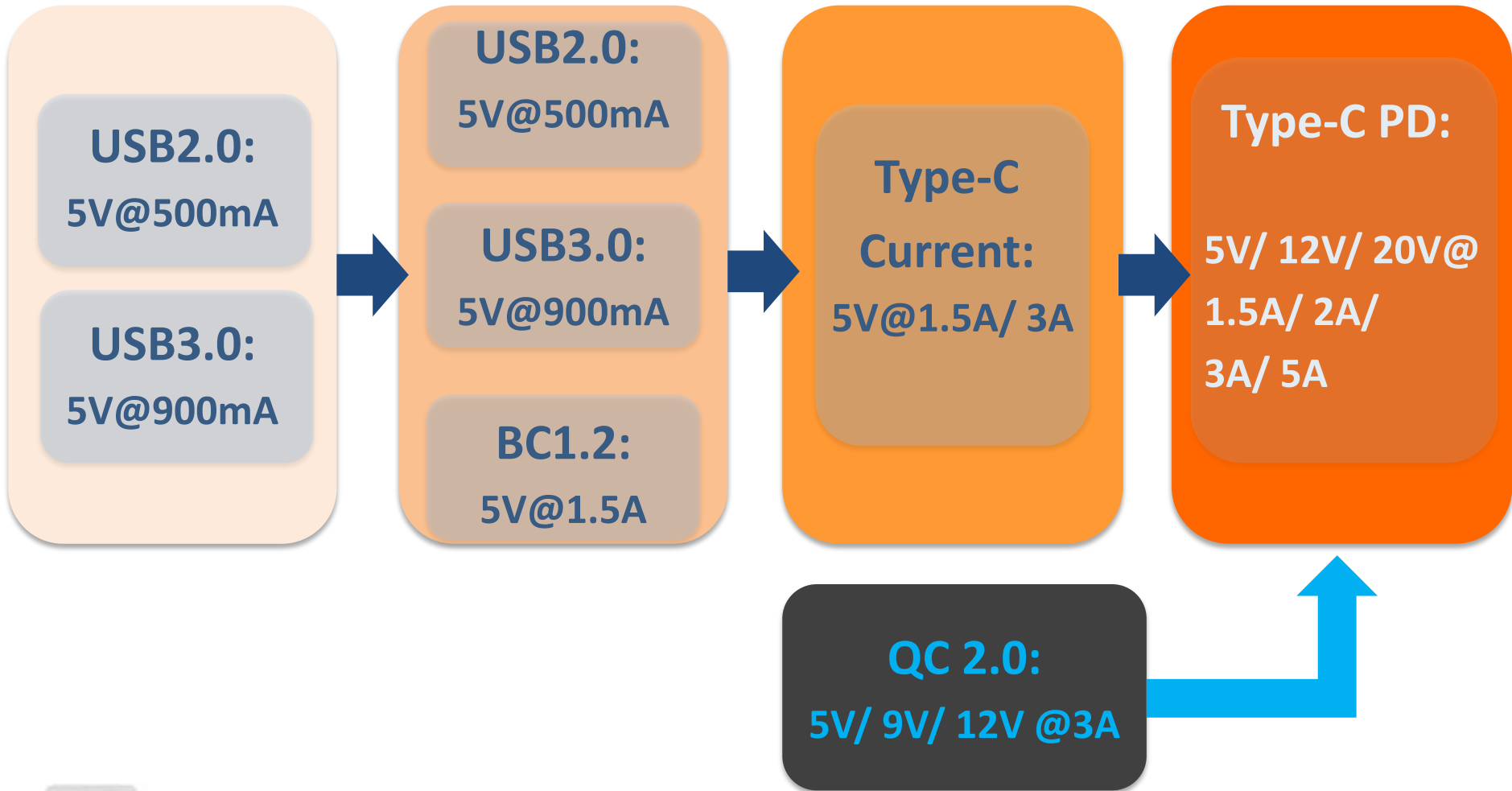
# Type-C Power Role Verification

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# The Evolution of USB Power Charging



# USB PD Power Spec Overview

## PD 2.0

### USB Power Delivery Profiles

Source capabilities organized as profiles

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

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

- Source and Sink capabilities within a given product are not required to be the same

## PD 3.0

The voltages and currents a Source with a PDP of x Watts shall support are as defined in Table 10-2.

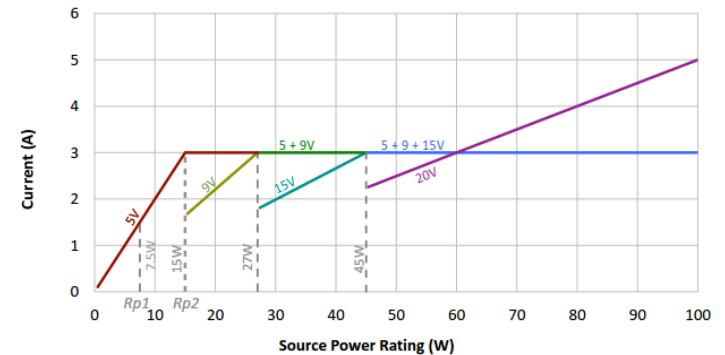
Table 10-2 Normative Voltages and Currents

PDP (W)	Current at 5V (A)	Current at 9V (A)	Current at 15V (A)	Current at 20V (A)
$0.5 \leq x \leq 15$	$x \div 5$			
$15 < x \leq 27$	3	$x \div 9$		
$27 < x \leq 45$	3	3	$x \div 15$	
$45 < x \leq 60$	3	3	3	$x \div 20$
$60 < x \leq 100$	3	3	3	$x \div 20^1$

<sup>1</sup> Requires a 5A cable.

Figure 10-1 illustrates the maximum current and power rails that a Source shall support at each voltage for a given PDP.

Figure 10-1 Source Power Rule Illustration



# USB Type-C Test Matrix for Power

## Consumer

Source (Target Charger)/ Sink		Google	Apple	Apple	Letv	Letv	Xiaomi(小米)	LG	HUAWEI	Nokia	ASUS
		Chromebook 2015	Macbook MF855TA/A	MacBook 12	超級手機 Max (X900+)	超級手機 樂1 (X600)	Mi-4c	GOOGLE Nexus 5X	GOOGLE Nexus 6P	N1	ZenPad S 8.0
Google	Chromebook 2015										
Apple	Macbook MF855TA/A										
Apple	MacBook 12										
Letv	超級手機 Max (X900+)										
Letv	超級手機 樂1 (X600)										
Xiaomi(小米)	Mi-4c										
LG	GOOGLE Nexus 5X										
HUAWEI	GOOGLE Nexus 6P										
Nokia	N1										
ASUS	ZenPad S 8.0										

Provider

# Adaptor Spec Identification

Adaptor Info		AC Adaptor Model Name	AC Adaptor Type	Output
Google	Chromebook 2015	PA-1600-23	AC with Type-C Cable	5V/ 12V/ 20V= 3A
Apple	Macbook MF855TA/A	A1540	Type-C Receptacle with Type-C to C Cable	14.5V=2.0A (USB PD)/ 5.2V=2.4A
Apple	MacBook 12	A1540	Type-C Receptacle with Type-C to C Cable	14.5V=2.0A (USB PD)/ 5.2V=2.4A
Letv	超級手機 Max (X900+)	A78-120100	Type-A Receptacle with Type-A to C Cable	5V=2.0A/ 9V=1.2A/ 12V=1.0A
Letv	超級手機 樂1 (X600)	A95-502000	Type-A Receptacle with Type-A to C Cable	5V=2A
Xiaomi(小米)	Mi-4c	MRY-03-EB	Type-A Receptacle with Type-A to C Cable	5V=2A/ 9V=1.2A/ 12V=1A
LG	GOOGLE Nexus 5X	MCS-N04WR	Type-C Receptacle with Type-C to C Cable	5.0V=3.0A
HUAWEI	GOOGLE Nexus 6P	HW-050300U00	Type-C Receptacle with Type-C to C Cable	5V=3A
Nokia	N1	NSA12UH-050200	Type-A Receptacle with Type-A to C Cable	5V=2.0A
ASUS	ZenPad S 8.0	PA-1070-07	Type-A Receptacle with Type-A to C Cable	5.2V=1.35A

# Device Charging Spec Identification

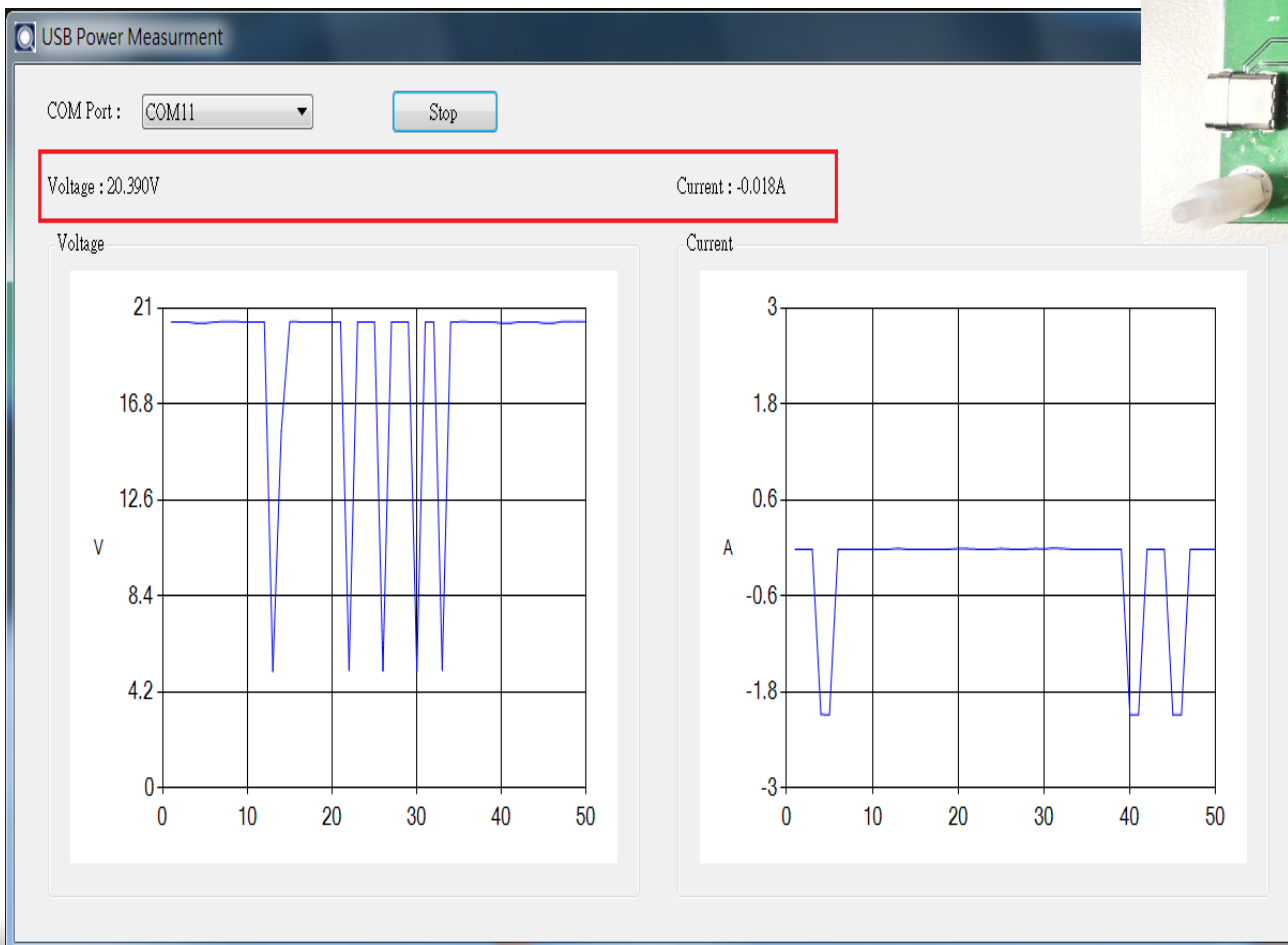
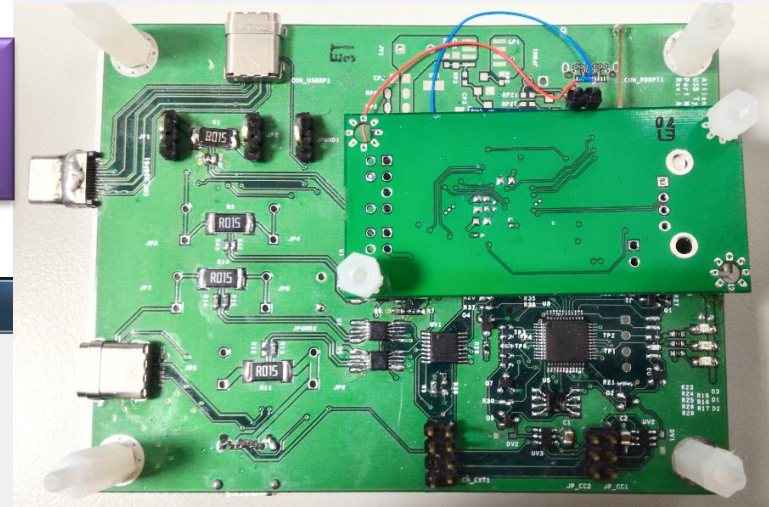
- Check bundled charger Voltage & Current
  - Use **ALLION** USB Type-C test tool and USB PD sniffer to get the device charging Spec

With Bundle AC			
Check the Voltage and Current			
Google	Chromebook 2015	20V,1.16A	➔ USB-C PD Spec
Apple	Macbook MF855TA/A	14.6V,1.9A	
Apple	MacBook 12	14.5V,1.88A	
Letv	超級手機 Max (X900+)	5V,1.5A	➔ BC 1.2 Spec
Letv	超級手機 樂1 (X600)	5.1V,1.514A	
Xiaomi	Mi-4c	9V,1A	➔ BC 1.2/QC 2.0 Spec
LG	GOOGLE Nexus 5X	5V,1.5A	➔ USB-C PD Spec
HUAWEI	GOOGLE Nexus 6P	5V,2.5A	
Nokia	N1	5V,1.45A	➔ BC 1.2 Spec
ASUS	ZenPad S 8.0	5V,1.1A	



# Voltage & Current Identification for Provider/Consumer

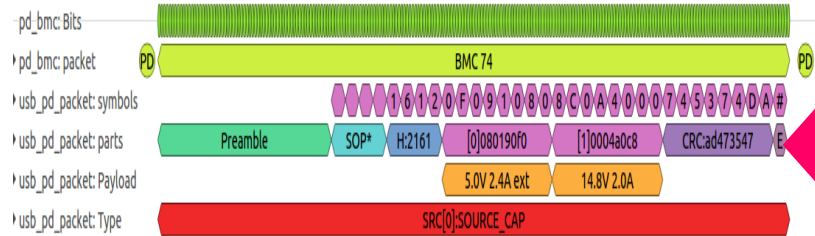
Device voltage & current monitoring  
(Use **Allion Type-C Digital Power Meter**)



**Voltage : 20.39V**  
**Current : -0.018A**

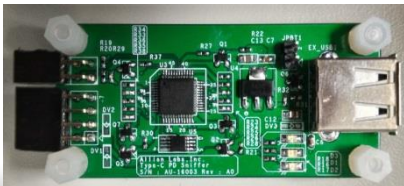
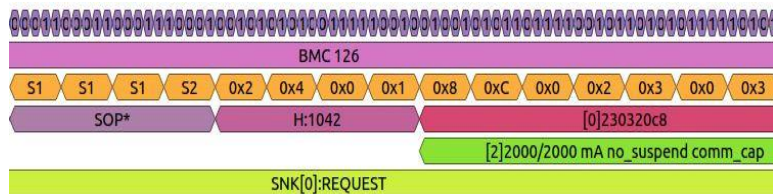
# Capture Source / Sink Capability

## Source Capability Capture (Use Allion Sniffer)



Adaptor Info		AC Adaptor Model Name	AC Adaptor Type	Output
Google	Chromebook 2015	PA-1600-23	AC with Type-C Cable	5V/ 12V/ 20V= 3A
Apple	Macbook MF855TA/A	A1540	Type-C Receptacle with Type-C to C Cable	14.5V=2.0A (USB PD)/ 5.2V=2.4A
Apple	MacBook 12	A1540	Type-C Receptacle with Type-C to C Cable	14.5V=2.0A (USB PD)/ 5.2V=2.4A

## Sink Capability Request (Use Allion Sniffer)



With Bundle AC		
Google	Chromebook 2015	
Check the Voltage and Current		20V, 1.16A
Apple	Macbook MF855TA/A	
Check the Voltage and Current		14.6V, 1.9A
Apple	MacBook 12	
Check the Voltage and Current		14.5V, 1.88A

# Test Result

Source ( Down Side column)	Google Chromebook 2015	Apple Macbook MF855TA/A	Apple MacBook 12	Letv 超級手機 Max (X900+)	Letv 超級手機樂1 (X600)	Xiaomi(小米) Mi-4c	LG GOOGLE Nexus 5X	HUAWEI GOOGLE Nexus 6P	Nokia N1	ASUS ZenPad S 8.0
Sink (Right Side column)										
Google Chromebook 2015		20V,1.4A	20V,891mA	0V,0A	0V,0A	5V,450mA	5V,1.4A	5V,629mA	0V,0A	5V,800mA
Apple Macbook MF855TA/A	15V,2A		14.7V,1A	0V,0A	0V,0A	5V,1.38A	5V,1A	4.9V,609mA	0V,0A	0V,0A
Apple MacBook 12	13.3V,1.83A	14V,1.88A		0V,0A	0V,0A	5V,990mA	4.88V,1.57A	5V,1.4A	0V,0A	0V,0A
Letv 超級手機 Max (X900+)	5V,400mA	4.97V,430mA	5V,420mA		5V,1.4A	8.2V,920mA	5V,1.7A	5.1V,1A	4.9V,414mA	5V,1A
Letv 超級手機樂1 (X600)	5V,1A	5V,1A	5V,465mA	5V,1.35A		4.7V,370mA	5V,1A	5.1V,927mA	5V,450mA	5V,2.4A
Xiaomi(小米) Mi-4c	4.8V,450mA	4.78V,422mA	5V,455mA	8V,900mA	4.7V,1.3A		4.86V,1.83A	5V,676mA	4.7V,776.5mA	5V,460mA
LG GOOGLE Nexus 5X	5V,3A	5.2V,2.87A	5.2V,2.8A	5V,1.37A	5V,1.5A	4.8V,1.2A		5V,2.1A	5V,1.5A	5V,1A
HUAWEI GOOGLE Nexus 6P	4.8V,3.3A	5V,2.2A	5.2V,2.8A	0V,0A	0V,0A	5V,1.26A	4.87V,1.6A		0V,0A	5V1.3A
Nokia N1	5V,0A	5V,450mA	5V,450mA	5V,969mA	5V,1.5A	4.7V,1.14A	5V,1.45A	4.9V,946mA		5V,445mA
ASUS ZenPad S 8.0	5V,1A	5V,1A	5V,390mA	5V,1.33A	5V,1.5A	4.7V,1.26A	5V,1.5A	5V,1.29A	5V,450mA	

# Allion Type-C Test Tools Introduction

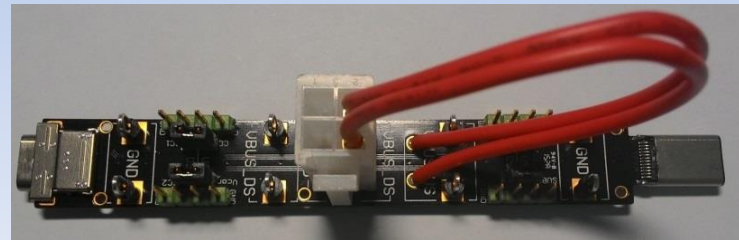
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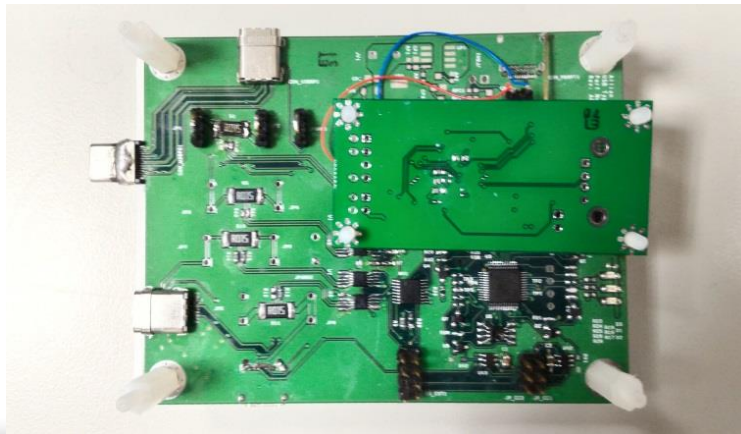


# Design Background

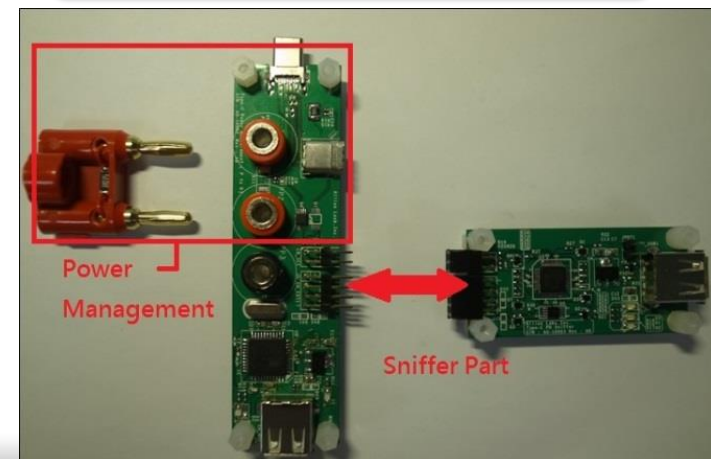
- **Google PD analyzer (Sniffer Function) :**  
capture CC Pins Communication log
- **Wilder Type-C PD coupon (Power Measurement) :**  
measure Vbus Voltage & Current



## Combination Solution



## Modularized Solution



# Allion Type-C Digital Power Meter

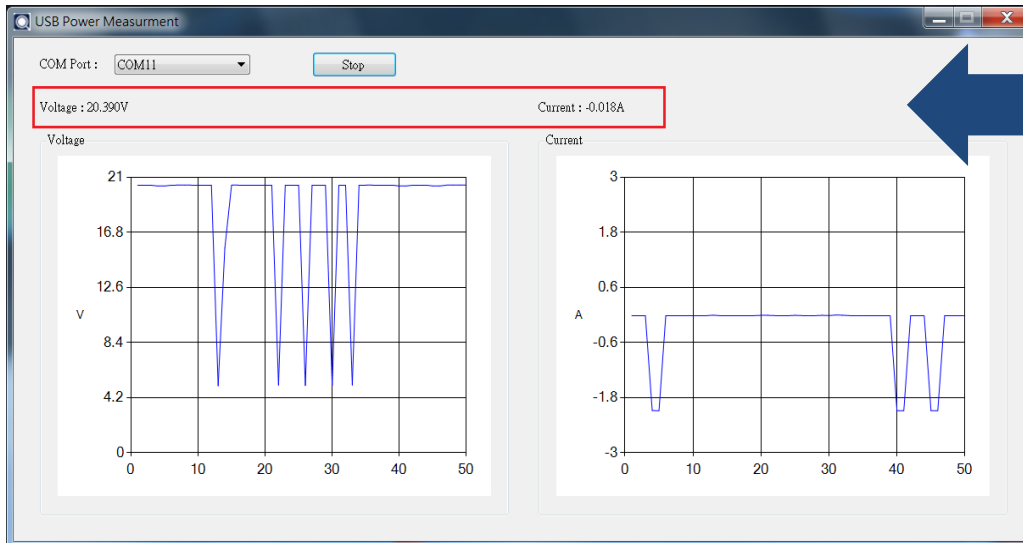
## Plug to Receptacle



## Receptacle to Receptacle



## Allion Power Measurement Application



The real-time voltage/ current with csv Log

### • Voltage :

Can be monitored on 5V/9V/12V/15V/20V as Max.

(Optional Voltage and current can also be monitored)

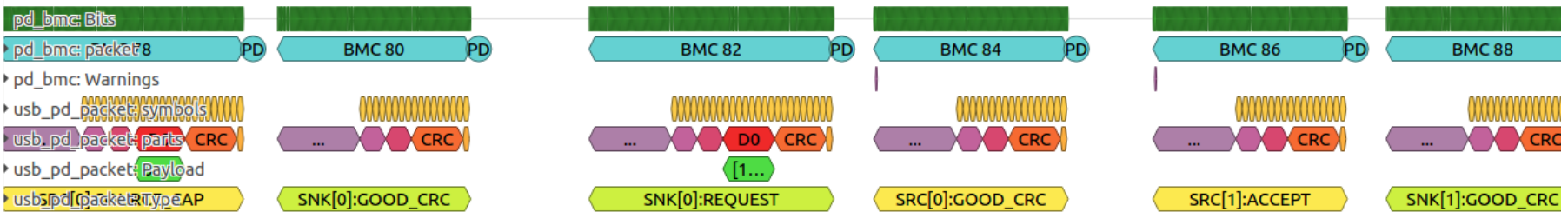
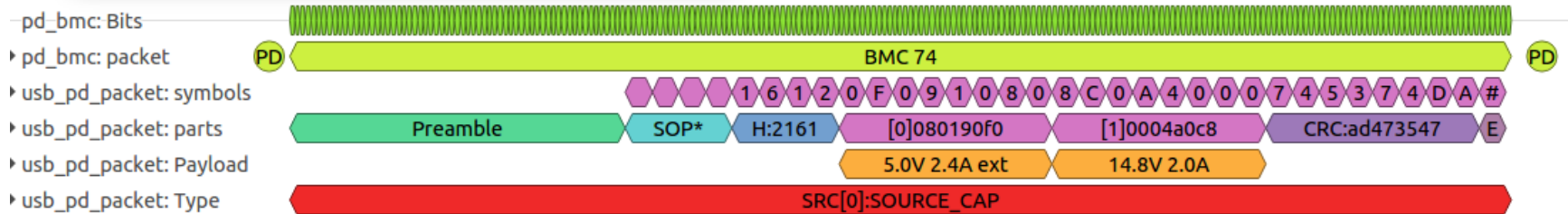
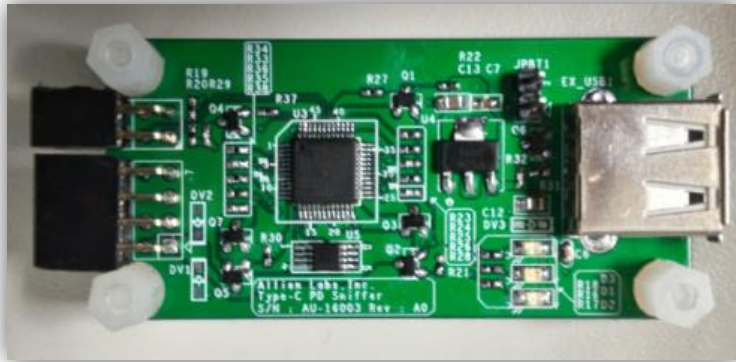
### • Current:

The “+” / “-” mean the Current charge (Plug→Receptacle or Receptacle→Plug)



# Allion Type-C PD Sniffer

- Use the Sniffer to record and analyze the PD protocol



# Case Study

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# Case A: Power Role / Data Role Swap Functionality

**Condition:** two devices are connected with each other

**Observation:** in case of the role function confusion , the role can be changed by UI implement

An Example of LG Google Nexus 5X and HUAWEI Google Nexus 6P connection:

**With the role swap capability, the UI “USB connection mode” on mobile phone is convenient for customer to identify the role function as they wanted.**

Power Role : to charge or to be charged

Data Role : host or device

## The USB Connection Mode

### Use USB for

- Charging  
Just charge this device
- Power supply  
Charge the other connected device
- File transfers  
Transfer files to Windows or Mac (MTP)
- Photo transfer (PTP)  
Transfer photos or files if MTP is not supported (PTP)
- MIDI  
Use device for MIDI input

# Case B. Inconsistent Results of USB Charging Compatibility Test

**Condition:** two devices are connected with each other

**Issue:** AC difference between each device

LG	GOOGLE Nexus 5X	Chromebook 2015	Macbook MF855TA/A	MacBook 12	超級手機 Max (X900+)	超級手機 樂 1 (X600)	Mi-4c	GOOGLE Nexus 5X	GOOGLE Nexus 6P	N1	ZenPad S 8.0
Check the Voltage and Current		5V,3A	5.2V,2.87A	5.2V,2.8A	5V,1.37A	5V,1.5A	4.8V,1.2A	5V,1.5A	5V,799mA	5V,1.5A	5V,1A
HUAWEI	GOOGLE Nexus 6P	Chromebook 2015	Macbook MF855TA/A	MacBook 12	超級手機 Max (X900+)	超級手機 樂 1 (X600)	Mi-4c	GOOGLE Nexus 5X	GOOGLE Nexus 6P	N1	ZenPad S 8.0
Check the Voltage and Current		4.8V,3.3A	5V,2.2A	5.2V,2.8A	0V,0A	0V,0A	5V,1.26A	4.87V,1.6A	5V,2.5A	0V,0A	5V1.3A

①

③

②

## 1. Letv x900/ Letv x600

Huawei 6P cannot charge both Letv devices because Rd / Rp detection fail.  
Huawei 6p won't provide 5V .

## 2. Nokia N1

There was no Rd be implemented on N1. Huawei 6p cannot charge it.

## 3. Mi-4c& ZenPadS8

The Mi-4c and ZenPadS8 can be charged by both Nexus Mobile, because they have Rd Pull-down.





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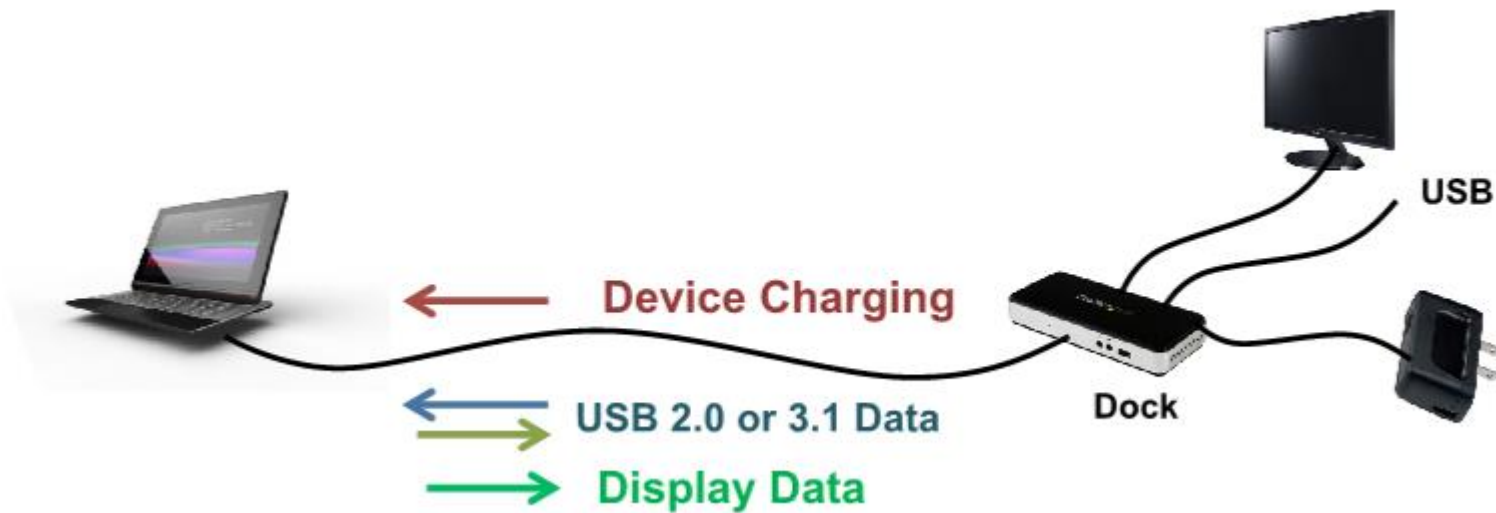
## USB Type-C Test Service



March 2016


Jessica Lu

# USB Type-C Service



**USB 3.1 / 2.0 Type-C Test**  
**USB Power Delivery Test**  
**ALT Mode DP to Type-C**  
**ALT Mode MHL to Type-C**  
**Display Interface Certification**  
**Type-C/Display/Dock Interoperability**  
**Type-C to Legacy Dongle Verification**



A close-up photograph of two hands shaking in a firm grip. The hands are wearing dark suit jackets and white dress shirts. The background is blurred, showing other people in a professional setting.

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