



**BF7264B+ MIPI M-PHY analyzer**  
**UFS2.1**

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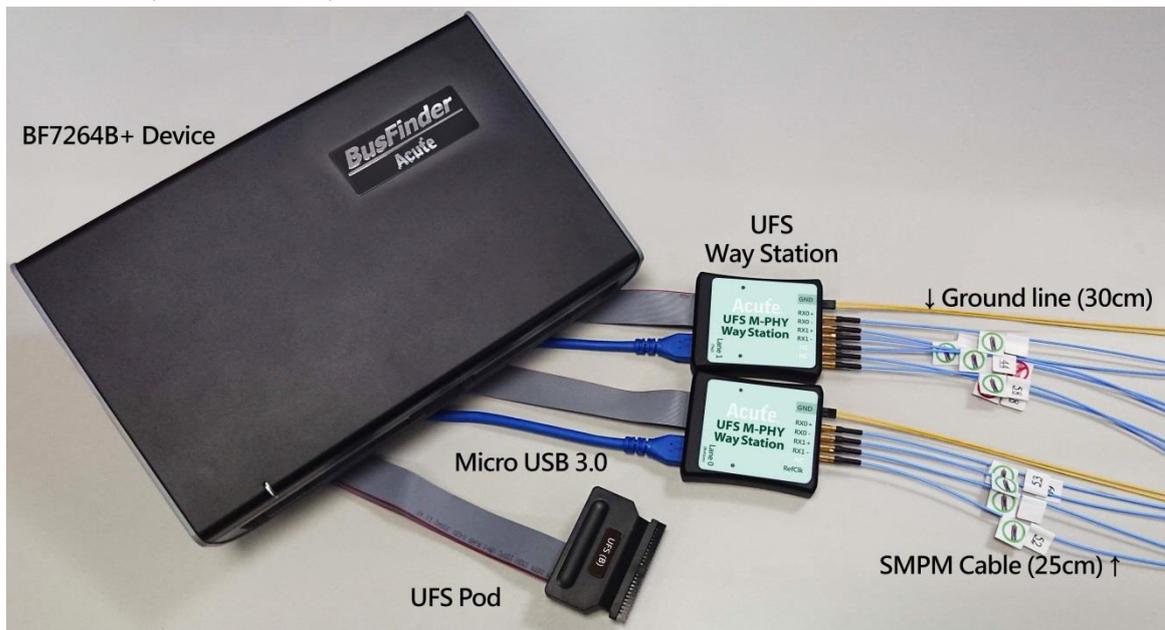
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**Feature:**

The BF7264B+ is the Solution of UFS. It provides the protocol analyzer function of MIPI M-PHY UFS2.1 (supports UFS3.1 commands).

Specifications:

**1. BF7264B+, 32Gb RAM, MIPI M-PHY UFS2.1 Probes**



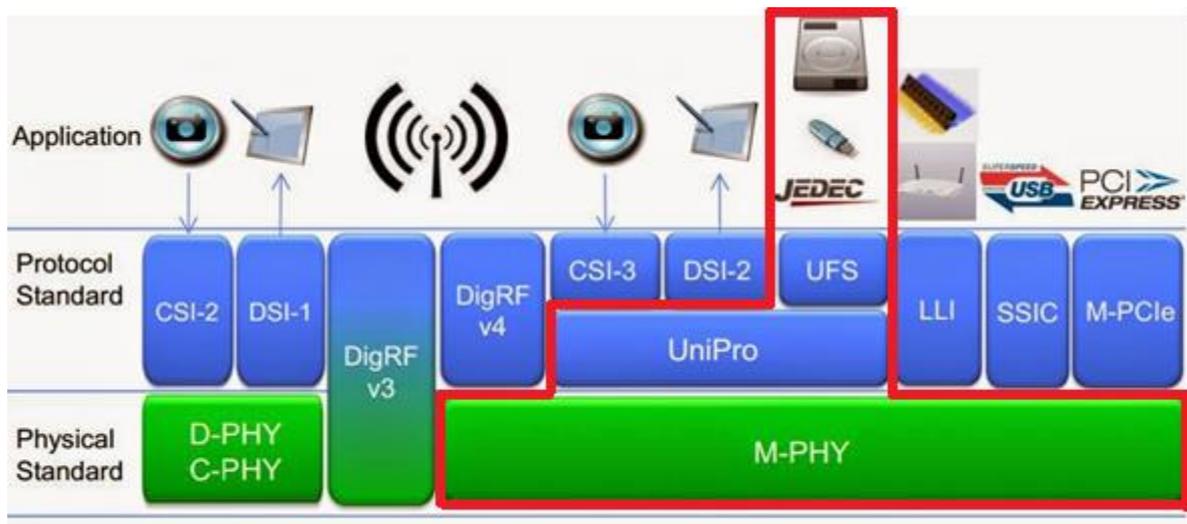
**2. Fully supports MIPI M-PHY UFS2.1, and support UFS3.1 commands.**

MIPI M-PHY 3.0, Up to 5.8Gbps ( Gear 3, Rate A / B ), 2 Lanes

MIPI Unipro 1.8

JEDEC UFS 2.1

JEDEC UFS 3.1 commands



**3. Can simultaneously display Unipro or UFS protocol packet data in tabular form, including command parsing**



4. Use 32Gb RAM as the buffer to stream all M-PHY data into the SSD HD in order to record all data flow from PWM Mode to High Speed Mode.
5. “Data Filter” filters unwanted data to save memory.
6. “Search” searches specific data.
7. “CRC Packet” displays and counts CRC
8. Unipro / UFS command statistics include numbers of packets, individual command, different data length, and errors

The image displays two side-by-side screenshots of the Acute software interface, each showing a 'Navigator' window and a 'Statistics' window.

**Left Screenshot (Unipro):**

- Navigator:** Shows a tree view under 'Unipro'. The 'AFC TC0' item is selected, showing 66591 Txns and 66591 Bytes. Other items include L2 (83257 Txns), L1.5 (1252 Txns), L1 (310 Txns), and Error Packets (13 Txns).
- Statistics:** Shows details for 'AFC TC0': Host (66311 Bytes) and Device (280 Bytes).

**Right Screenshot (UFS):**

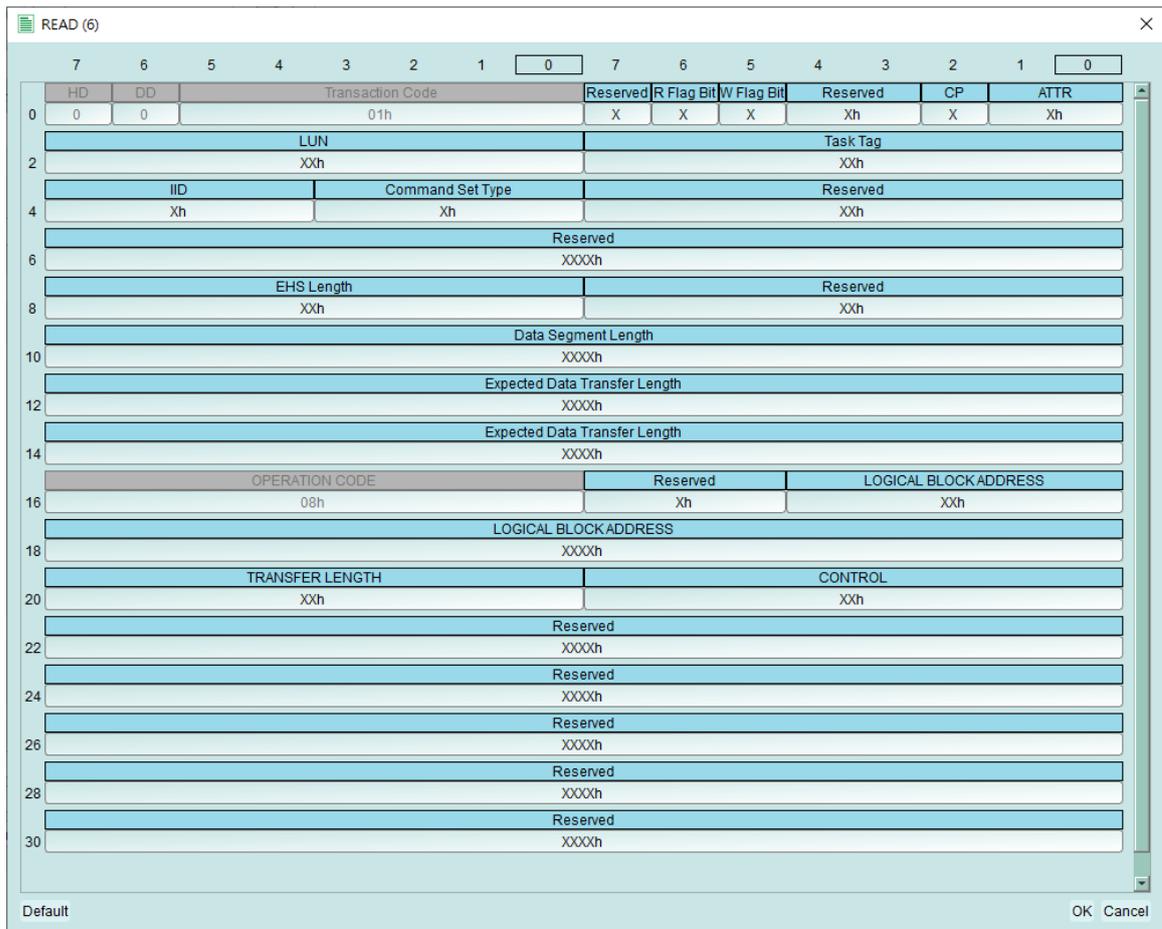
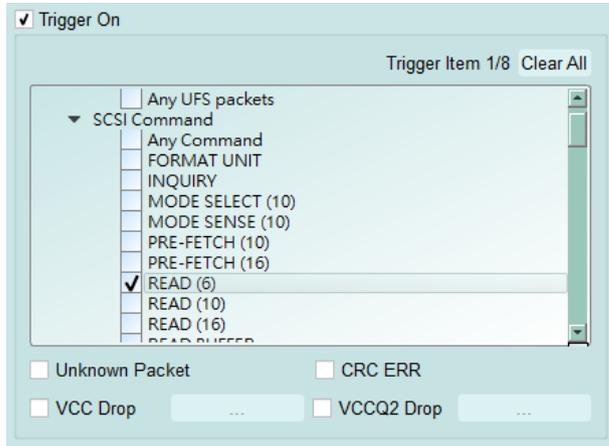
- Navigator:** Shows a tree view under 'UFS'. The 'UFS Protocol' item is selected, showing 655 Txns and 655 Bytes. Other items include SCSI Command (148 Txns), LUN (799 Txns), and TRANSFER LENGTH (129 Txns).
- Statistics:** Shows details for 'UFS Protocol': NOP OUT (2 Txns), NOP IN (2 Txns), RESPONSE (147 Txns), READ(10) DATA(DATA IN) (496 Txns), REQUEST SENSE RESPONSE DATA(DATA IN) (7 Txns), and INQUIRY RESPONSE DATA(DATA IN) (1 Txns).

Unipro

UFS

## 9. Command trigger

- Trigger parameters include commands and data in order to cover all kinds of packets.
- CRC Error, Unknown packet
- VCC drop, VCCQ2 drop
- The Trigger-Out port is to trigger a DSO to capture waveforms



## 9. Advanced usage of the report area

a. Dual report correlation: Unipro and UFS reports are related to each other.

Double-click to track the corresponding data in another report area.

ex: Click the Unipro area report to link to the UFS corresponding report.

Timestamp (h:m:s.ms.us.ns dur)	Host	Device	Timestamp	Host	Device	Task	Tag	Data
1280	16:15:03.796.342.673 13.33..	Filler(2x)	2					
1281	16:15:03.796.342.703 29.99..	AFC TCO CReq=0	3	16:15:03.783.717.515 0 (Ma..	MOP OUT		00	00 00 00 0
1282	16:15:03.796.342.729 26.66..	Filler(2x)	4	16:15:03.783.938.943 221.4..		MOP IN	00	20 00 00 0
1283	16:15:03.796.342.756 26.66..	AFC TCO CReq=0	5	16:15:03.792.935.467 8.59ms	CMD (TEST UNIT READY)		01	01 00 00 0
1284	16:15:03.796.342.783 26.66..	Filler(2x)	6	16:15:03.792.940.406 4.91us		RESPONSE	01	21 00 00 0
1285	16:15:03.796.342.813 29.99..	AFC TCO CReq=0	7	16:15:03.793.956.611 1.01ms	CMD (TEST UNIT READY)		02	01 00 00 0
1286	16:15:03.796.342.839 26.66..	AFC TCO CReq=0	8	16:15:03.793.960.591 4.36us		RESPONSE	02	21 00 00 0
1287	16:15:03.796.342.893 53.32..	AFC TCO CReq=0	9	16:15:03.793.985.555 24.67..	CMD (READ (10))		03	01 40 00 0
1288	16:15:03.796.342.906 13.33..	EOF EVEN	10	16:15:03.794.209.246 223.6..		DATA IN	03	22 00 00 0
1289	16:15:03.796.342.919 13.33..	AFC TCO CReq=0	11	16:15:03.794.238.410 29.16..		RESPONSE	03	21 09 00 0
1290	16:15:03.796.342.933 13.33..	Filler(6x)	12	16:15:03.794.310.372 71.96..	CMD (READ (10))		04	01 40 00 0
1291	16:15:03.796.342.976 43.66..	Filler(4x)	13	16:15:03.794.372.383 62.01..		DATA IN	04	22 00 00 0
1292	16:15:03.796.343.029 53.32..	AFC TCO CReq=0	14	16:15:03.794.401.543 29.16..		RESPONSE	04	21 00 00 0
1293	16:15:03.796.343.056 26.66..	AFC TCO CReq=0	15	16:15:03.796.251.568 1.85ms	CMD (READ (10))		05	01 40 00 0
1294	16:15:03.796.343.086 29.99..	AFC TCO CReq=0	16	16:15:03.796.313.495 61.92..		DATA IN	05	22 00 00 0
1295	16:15:03.796.343.112 26.66..	Filler(6x)	17	16:15:03.796.342.659 29.16..		RESPONSE	05	21 00 00 0
1296	16:15:03.796.343.306 193.3..	AFC TCO CReq=0	18	16:15:03.796.362.107 19.44..	CMD (READ (10))		06	01 40 00 0
1297	16:15:03.796.343.352 26.66..	Filler(2x)	19	16:15:03.796.424.391 62.28..		DATA IN	06	22 00 00 0
1298	16:15:03.796.343.359 26.66..	AFC TCO CReq=0	20	16:15:03.796.453.551 29.16..		RESPONSE	06	21 00 00 0
1299	16:15:03.796.343.386 26.66..	Filler(2x)	21	16:15:03.796.491.171 37.61..	CMD (READ (10))		07	01 40 00 0
1300	16:15:03.796.343.412 26.66..	AFC TCO CReq=0	22	16:15:03.796.553.098 61.92..		DATA IN	07	22 00 00 0
1301	16:15:03.796.343.442 29.99..	Filler(4x)	23	16:15:03.796.592.262 29.16..		RESPONSE	07	21 00 00 0
1302	16:15:03.796.362.107 18.66..	Data Frame TCO	24	16:15:03.796.592.558 10.29..	CMD (READ (10))		08	01 40 00 0
1303	16:15:03.796.362.354 246.6..	EOF EVEN	25	16:15:03.796.655.115 62.55..		DATA IN	08	22 00 00 0
1304	16:15:03.796.362.381 26.66..	Filler(4x)	26	16:15:03.796.684.275 29.16..		RESPONSE	08	21 00 00 0
1305	16:15:03.796.363.270 89.9..	AFC TCO CReq=0	27	16:15:03.797.375.309 691.0..	CMD (READ (10))		09	01 40 00 0
1306	16:15:03.796.363.324 53.32..	Filler(6x)	28	16:15:03.797.450.942 75.63..		DATA IN	09	22 00 00 0
1307	16:15:03.796.363.350 26.66..	AFC TCO CReq=0	29	16:15:03.797.480.105 29.16..		DATA IN	09	22 00 00 0
1308	16:15:03.796.363.407 56.66..	Filler(4x)	30	16:15:03.797.509.266 29.16..		DATA IN	09	22 00 00 0
1309	16:15:03.796.424.391 60.98..	Data Frame TCO	31	16:15:03.797.538.430 29.16..		DATA IN	09	22 00 00 0
1310	16:15:03.796.426.281 1.88us	EOF EVEN	32	16:15:03.797.567.593 29.16..		DATA IN	09	22 00 00 0
1311	16:15:03.796.426.307 26.66..	Data Frame TCO	33	16:15:03.797.596.754 29.16..		DATA IN	09	22 00 00 0
1312	16:15:03.796.426.681 373.2..	AFC TCO CReq=0	34	16:15:03.797.625.918 29.16..		DATA IN	09	22 00 00 0
1313	16:15:03.796.426.707 26.66..	Filler(2x)	35	16:15:03.797.655.081 29.16..		DATA IN	09	22 00 00 0
1314	16:15:03.796.426.734 26.66..	AFC TCO CReq=0	36	16:15:03.797.684.242 29.16..		DATA IN	09	22 00 00 0
1315	16:15:03.796.426.764 29.99..	Filler(2x)	37	16:15:03.797.713.405 29.16..		DATA IN	09	22 00 00 0
1316	16:15:03.796.426.781 26.66..	AFC TCO CReq=0	38	16:15:03.797.742.566 29.16..		DATA IN	09	22 00 00 0
1317	16:15:03.796.426.817 26.66..	Filler(2x)	39	16:15:03.797.771.730 29.16..		DATA IN	09	22 00 00 0
1318	16:15:03.796.426.844 26.66..	AFC TCO CReq=0	40	16:15:03.797.800.893 29.16..		DATA IN	09	22 00 00 0
1319	16:15:03.796.426.871 26.66..	AFC TCO CReq=0	41	16:15:03.797.830.054 29.16..		DATA IN	09	22 00 00 0
1320	16:15:03.796.426.827 56.66..	AFC TCO CReq=0	42	16:15:03.797.859.218 29.16..		DATA IN	09	22 00 00 0
1321	16:15:03.796.426.854 26.66..	AFC TCO CReq=0	43	16:15:03.797.888.381 29.16..		DATA IN	09	22 00 00 0
1322	16:15:03.796.427.011 56.66..	Filler(4x)	44	16:15:03.797.917.542 29.16..		DATA IN	09	22 00 00 0
1323	16:15:03.796.428.201 1.18us	EOF EVEN	45	16:15:03.797.946.705 29.16..		DATA IN	09	22 00 00 0

b. Statistics list: Quickly categorize and track the location of data with statistical functions.

**Open the Statistics List**

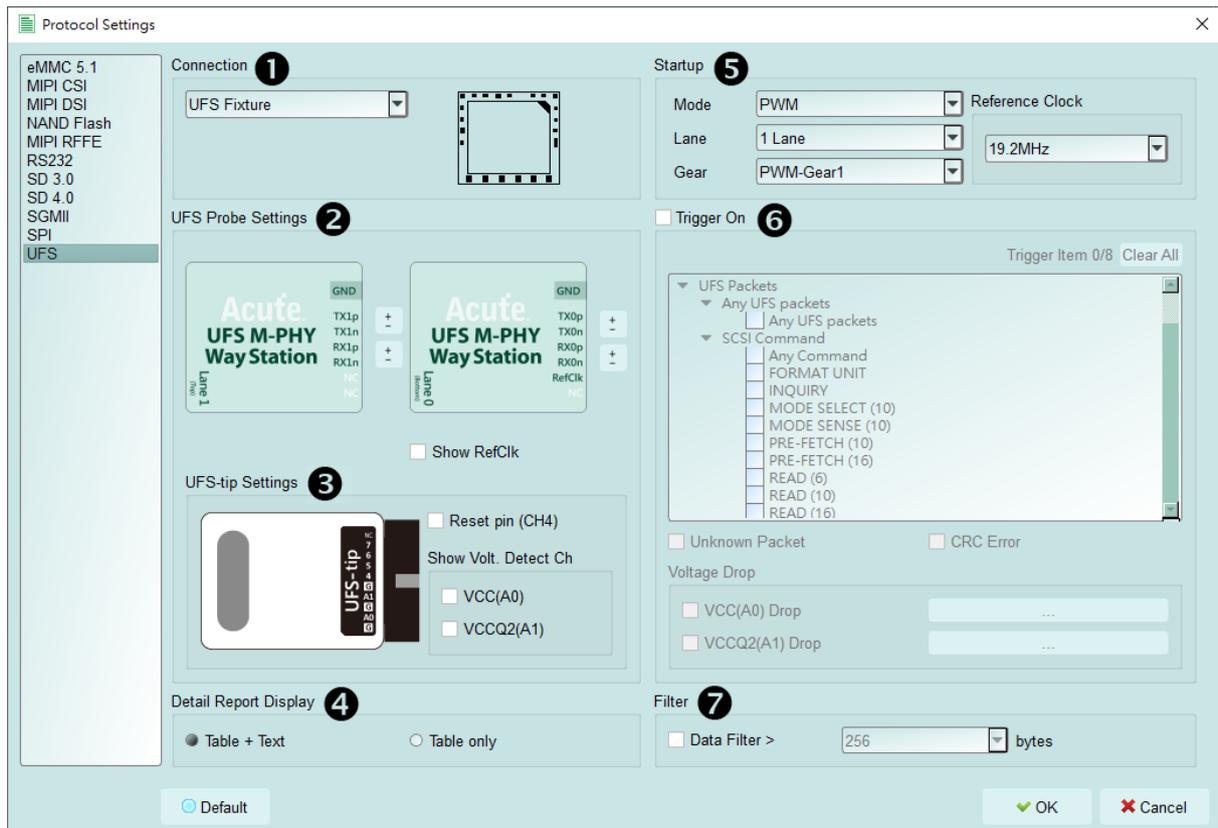
Line No.	Timestamp	Host	Device	LNK	Task Tag	..Data Segment Len..	Original Block Ad..	TL (Transfer Length)	Data
257	2.833.827.315 0			00	17	0000			01 40 00 1..
275	2.841.782.943 3.95ms			00	1F	0000			01 40 00 1..
293	2.843.335.151 1.55ms			01	16	0000			01 40 01 2..
311	2.844.730.048 1.35ms			02	2D	0000			01 40 02 2..
329	2.846.089.925 1.35ms			03	34	0000			01 40 03 3..
347	2.847.449.333 1.36ms			04	3B	0000			01 40 04 3..

The screenshot displays the Acute BusFinder interface in demo mode. The main window shows a list of transactions with columns for Timestamp, Host, Device, and LUN. A 'Navigator' panel on the right provides a summary of UFS statistics, including SCSI Command counts and Transfer Length Reserved values. Below this, a 'Statistics List' panel shows a table of specific UFS statistics. Red boxes and arrows illustrate the process of tracing from these high-level statistics back to the original SCSI data in the main log.

Timestamp (hh:mm:ss.ms.us.ms dur)	Host	Device	Timestamp	Host	Device	LUN
11:29:31.594.240.424.52.01.		Start of Burst	2:534.041.770.214.45us			
11:29:31.594.752.536.542.2.		Start of Burst	2:534.111.270.69.45us			
11:29:31.594.752.543.67.60ms		Data Frame TCD	2:534.426.705.317.43us			
11:29:31.594.752.552.81.55ms		Filler (2x)	2:534.645.047.216.34us			
11:29:31.594.753.003.51.11.		EOF EVEN	2:535.441.350.756.33us			
11:29:31.594.753.009.6.66ms		Filler (4x)	2:535.647.220.205.53us			
11:29:31.594.753.024.314.4.		Filler (4x)	2:535.744.493.97.26us			
11:29:31.594.753.026.2.21ms		AFC TCO CReq=0	2:536.062.902.318.41us			
11:29:31.594.753.037.11.11.		AFC TCO CReq=0	2:536.276.064.213.16us			
11:29:31.594.753.059.22.21.		Filler (6x)	2:536.410.970.534.90us			
11:29:31.594.753.047.4.68ms		Data Frame TCD	2:537.023.105.212.13us			
11:29:31.594.753.049.85.32.		EOF EVEN	2:537.829.439.806.33us			
11:29:31.594.753.047.6.66ms		Filler (4x)	2:538.034.361.204.52us			
11:29:31.594.753.052.22.21.		AFC TCO CReq=0	2:538.536.432.802.66us			
11:29:31.594.753.052.92.22.		AFC TCO CReq=0	2:539.038.024.201.83us			
11:29:31.594.753.052.13.33.		AFC TCO CReq=0	2:539.486.686.440.66us			
11:29:31.594.753.061.8.89ms		Filler (2x)	2:539.694.728.208.06us			
11:29:31.594.753.064.4.46ms		AFC TCO CReq=0	2:540.752.949.21.00ms			
11:29:31.594.753.074.8.89ms		Filler (2x)	2:541.798.047.51.00ms			
11:29:31.594.753.088.13.33.		Filler (6x)	2:541.888.868.518.65us			
11:29:31.594.753.076.479.8.		Data Frame TCD	2:541.823.555.34.78us			
11:29:31.594.753.077.89.99.		EOF EVEN	2:541.829.353.8.79us			
11:29:31.594.753.033.6.66ms		Filler (6x)	2:541.967.513.39.15us			
11:29:31.594.753.059.85.55.		AFC TCO CReq=0	2:541.872.424.4.91us			
11:29:31.594.753.059.19.99.		AFC TCO CReq=0	2:541.962.178.89.75us			
11:29:31.594.753.041.2.21ms		Filler (6x)	2:542.217.430.258.29us			
11:29:31.594.753.041.19.99.		Filler (6x)	2:542.224.723.7.29us			
11:29:31.594.823.555.34.59.		Data Frame TCD	2:542.270.017.45.25us			
11:29:31.594.823.615.89.99.		EOF EVEN	2:542.375.741.105.72us			
11:29:31.594.823.622.6.66ms		Filler (6x)	2:542.383.034.7.29us			
11:29:31.594.823.643.321.0.		Filler (6x)	2:542.448.363.45.32us			

The process of tracing from UFS statistic data to Unipro original data

## 10. UFS Settings



1. **Connection:** You need to select the connection method between BusFinder and the test object
2. **UFS Probe Settings:** Exchange p/n of the same Lane. RefClk Option can observe whether RefClk is operating..
3. **UFS-tip Settings:**
  - a. To enable the UFS Reset pin option, you need to connect the reset pin to the UFS-tip CH4 position of the UFS Probe. When the protocol analysis receives the Reset signal, it will reset the Power mode and return to the PWM mode.
  - b. After the Show Volt. Detect Ch is turned on, the detected voltage value will be displayed when the voltage changes
4. **Detail Report Display:** Add the detail report by using text description.
5. **Startup:** It needs to be set the mode of the DUT at the moment of capturing data and Reference clock(19.2 / 26 / 38.4 / 52 MHz). (It doesn't matter if the RefClk is not connected, but its frequency must be set)
6. **Trigger On:** can set Unipro / UFS packets, a total of 8 groups, and Unknown Packet, CRC Error trigger options, another two sets of voltage detection can be used,
7. **Filter:** After opening, it will filter out the data behind the packet greater than the set value

## FAQ

### 1. What UFS version is supported, any limitation for differential ports?

A: MIPI M-PHY 3.0, Up to 5.8Gbps ( Gear 3, Rate A / B ), 2 Lanes

MIPI Unipro 1.8

JEDEC UFS 2.1

JEDEC UFS 3.1 commands

### 2. Will the signal quality be affected during measurement?

A: The measurement of the external instrument will inevitably have some load effect. We use the SMPM Coaxial Cable connection to reduce the interference of the object to be measured and improve the signal quality.

### 3. Is Tx supported?

A: No

### 4. Precautions during measurement

#### a. Wiring problem:

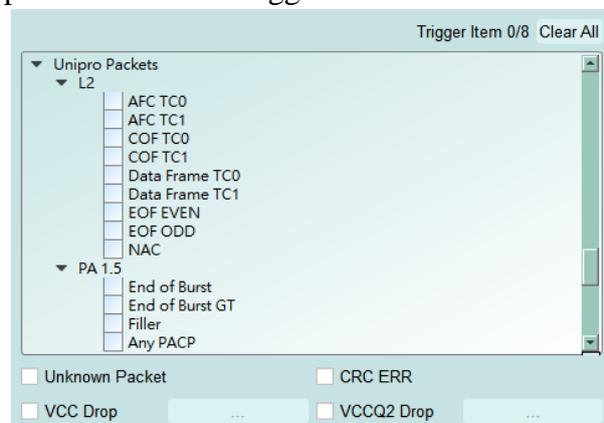
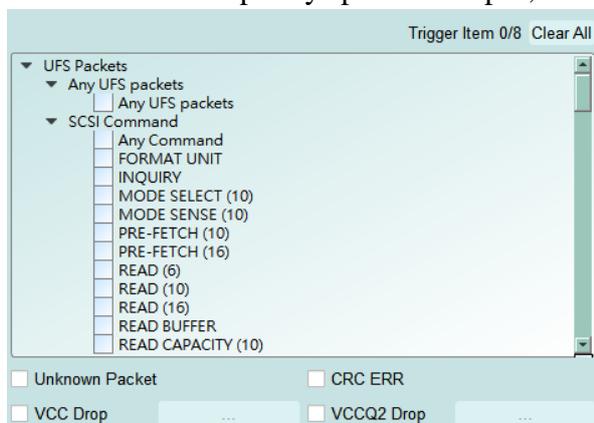
Please make sure to connection according to the “Probe and test object connection” on page 10. If the PWM is normal during measurement, but you cannot see any HS data or you can only go to 1 Lane and not 2 Lane, you should first check whether the wiring is wrong.

#### b. Reference clock setting method:

There are four options for Ref CLK 19.2MHz (default) / 26MHz / 38.4MHz / 52MHz in Settings. If it is not clear what the Ref CLK is used, refer to the following method. If the PWM is normal but the HS Data is wrong, please try to adjust the Ref CLK to others and try again.

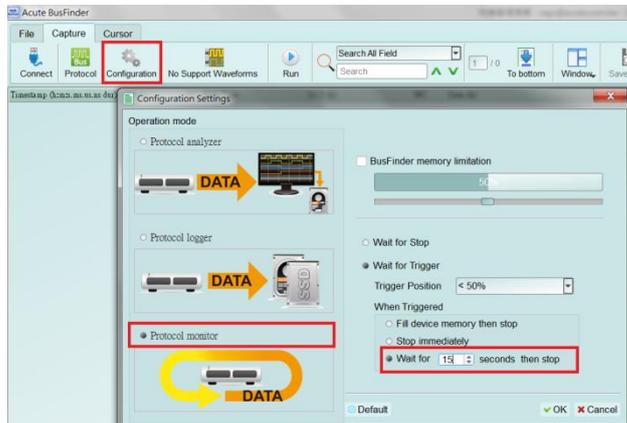
### 5. Can I specify a Unipro, UFS packet as the trigger point function?

A: You can specify specific Unipro, UFS packet or Error to trigger.



**6. Is it possible to set a Unipro, UFS starting point, and specify how much time to capture Data?**

A: You can set the starting condition to the trigger item and adjust to the data monitor mode in the working mode menu. And specify the length of acquisition time.

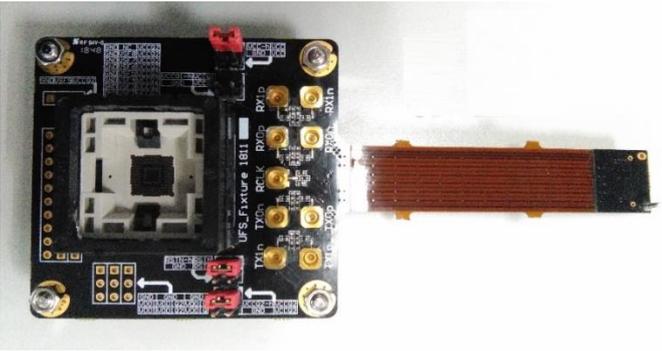
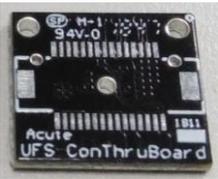
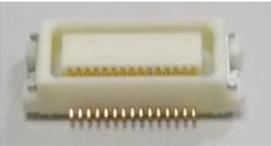


## Probe and test object connection

### a. Connect using UFS Fixture (connector)

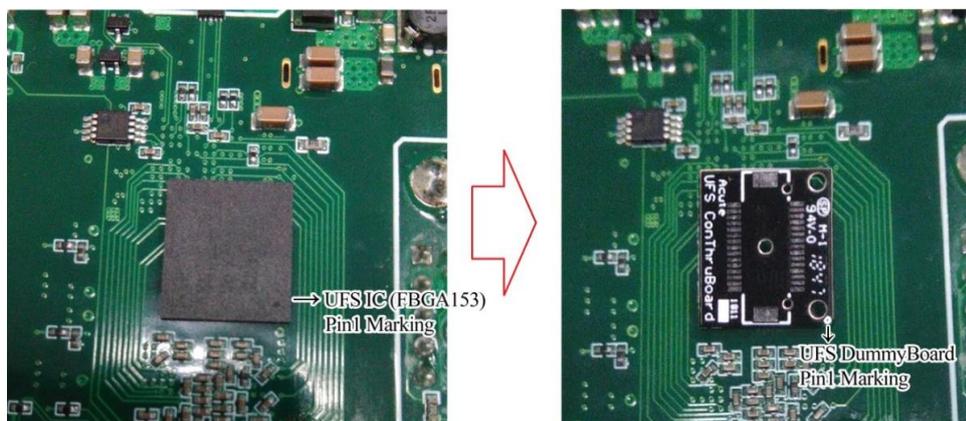
If the Host has multiple sets of connectors, it is convenient to replace the Host and UFS Chip, and directly use the SMPM Cable to connect to the Way Station without jumpers.

Since the connector uses a flexible cable to extend the signal, it is only suitable for applications where the peripheral components of the UFS Chip do not interfere.

Components	
1. Con Fixture	
2. Con Dummy Board	 <b>0.3mm tin balls need to be planted on the back</b>
3. Connector DF17-30DS-0.5V (HiRose Connector)	

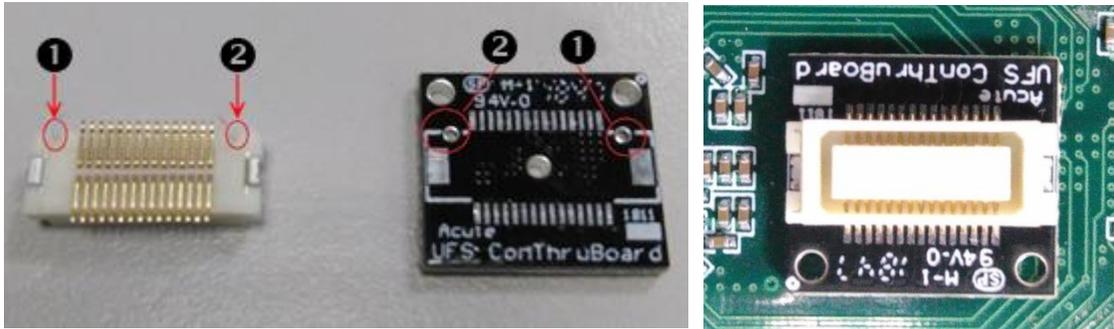
Step1: Remove the UFS chip on your DUT, and then rebuild the solder ball on UFS chip.

Step2: Welding the connector to the position where the UFS Chip has been removed.

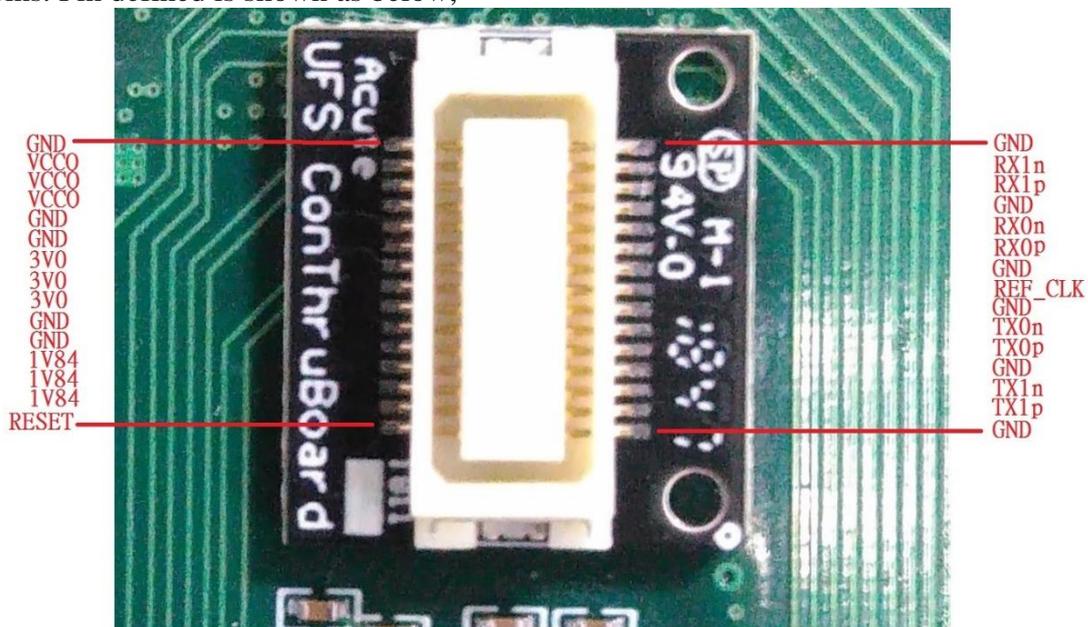


**(Pay attention to the direction of Pin1 when welding the connector.)**

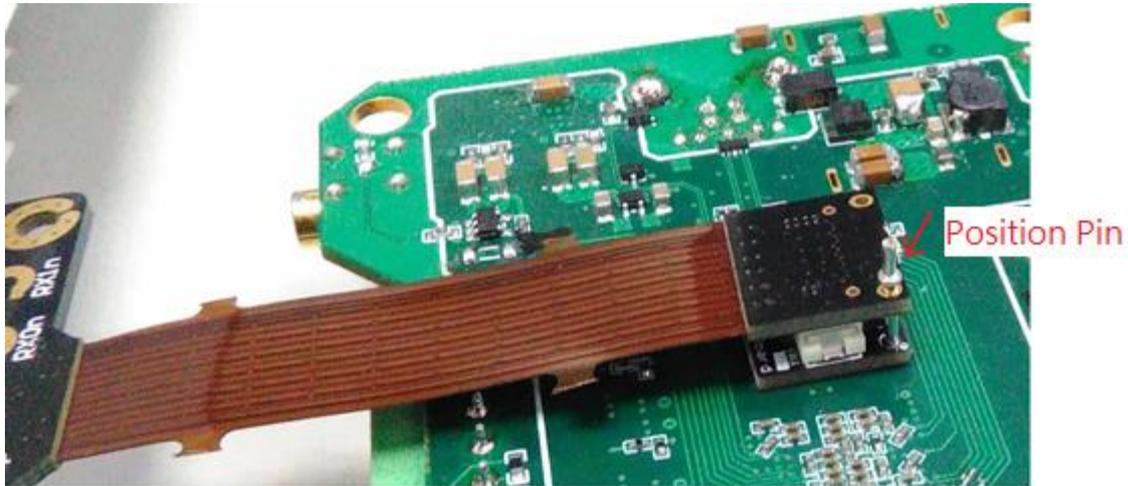
**Step3:** Place the connector (DF17-30DS-0.5V) on the small board of the connector. Before welding, please pay attention to the mistake proofing between the connector and the board.



**Step4:** After the welding is completed, confirm whether there is a short circuit between the pins. Pin defined is shown as below,



Step5: Connect the Con Fixture, please pay attention to the mistake proofing between the board and the Fixture.



Step6: Put the unplugged UFS Chip into the Con Fixture UFS Socket (FBGA153 Socket), and finish.

**b. Use Interposer with End-tip connection**

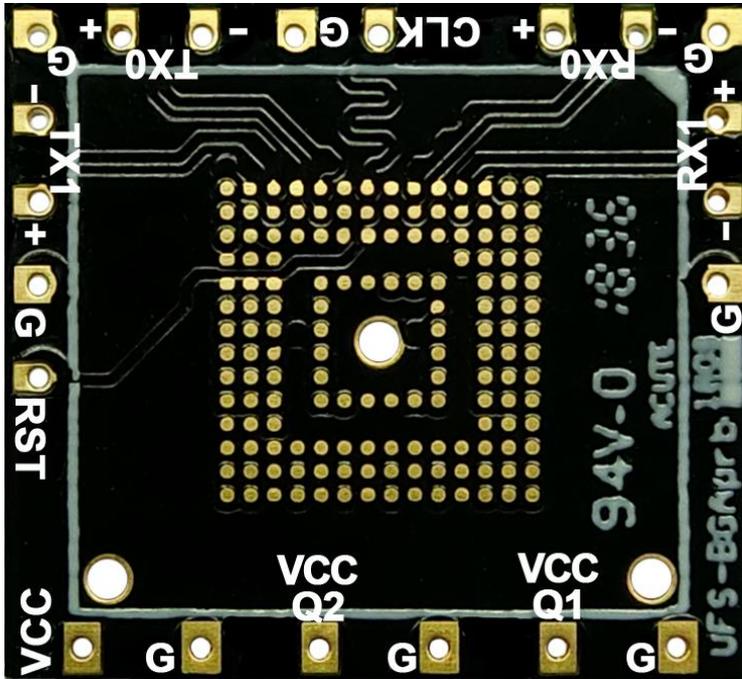
If the components around the original UFS Chip interfere, UFS Fixture cannot be used and there is no test point around the UFS Chip can jumper on, you need to remove the UFS Chip and reball the interposer on the board, and then reball the UFS chip again.

Connect End- from the test point. use the SMPM cable to connect to the Way Station.

If there are test points left on the board to be tested, they can be used directly

Components			
Interposer	<p style="text-align: center;">Front</p>	<p style="text-align: center;">Back</p>	
End-tip (FPC)		End-tip Connector (FPC)	

Combined	
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(Interposer Pin Define)

**C. Connect using End-tip**

If the board has a test point that can be jumpered, it can be used directly. After the End-tip is connected to the test, there is no need to use a booster board.

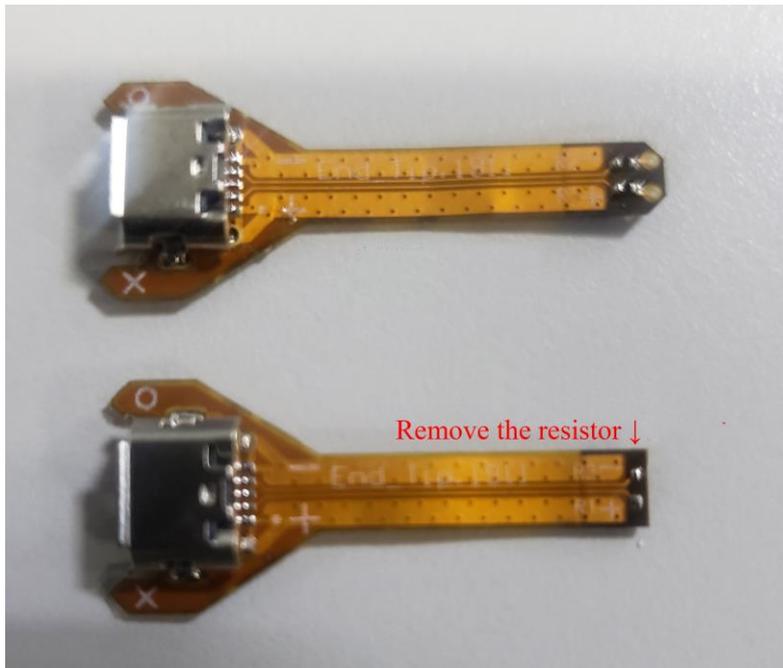
The UFS standard terminal soft board resistance is 250ohm, which can be used directly under normal circumstances.

If you want to shorten the jumper distance to improve signal quality, you can use the following resistance bridge method.

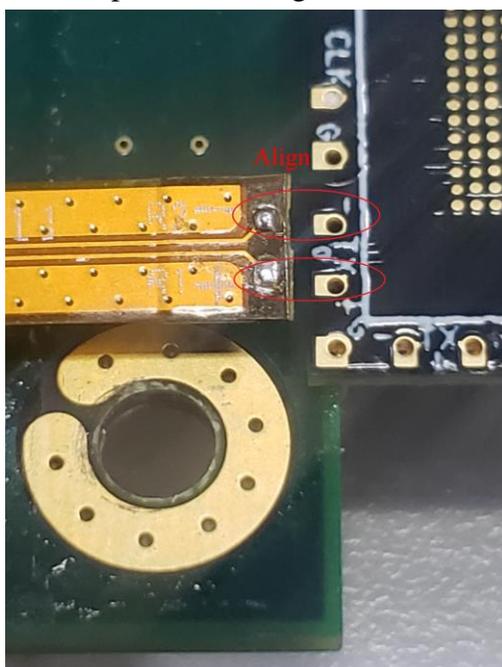
To use the resistance bridging method without jumpers (as shown in the figure below), the End-tip needs to be modified.

Modification process:

Step1: Remove the resistor, cut off the head, and reserve 2 welding point.



Step2: After the modification, aligning the P / N welding point between the End-tip and the interposer. Welding the resistor 250ohm (4 groups of data + 1 CLK), and the Gnds.



In this way, the shortest distance makes the signal quality better than the End-tip jumper connection.



## Way Station connection

1. Please install UFS Probe in Slot B of BusFinder 7264B+
2. Each Way Station has a USB type B interface, please use the corresponding USB cable to install it to the BusFinder front panel. When installing, please check the installation according to the top/bottom of the Way Station nameplate mark.

