



# **BF7264B eMMC5.1 analyzer**

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**Feature:**

This option is supported in BF6264B, BF7264B, and BF7264B+ ◦

**Specifications:**

**1. BF7264B , 32Gb RAM , eMMC 5.1 probes**



**2. Supports eMMC 5.1**

Up to eMMC 5.1 HS400

| Standard* | Introduced | Sequential Read (MB/s) | Sequential Write (MB/s) | Random Read (IO/s) | Random Write (IOPS) |
|-----------|------------|------------------------|-------------------------|--------------------|---------------------|
| eMMC 5.1  | 2015       | 250                    | 125                     | 11,000             | 13,000              |
| eMMC 5.0  | 2013       | 250                    | 90                      | 7,000              | 13,000              |
| eMMC 4.5  | 2012       | 140                    | 50                      | 7,000              | 2,000               |

### 3. Can display eMMC protocol packet data in tabular form, including command parsing

| Time/Temp (h:m:s.ms us:ns d:ms) | Event                  | Data                      | Information                | Current state                  | Error message | Bus       | Clock         | CMD Duration | Data Duration | 詳細                                  |
|---------------------------------|------------------------|---------------------------|----------------------------|--------------------------------|---------------|-----------|---------------|--------------|---------------|-------------------------------------|
| 34821                           | 15:04:40.513.388.768 1 | CMD06 SWITCH              | 46 03 B9 03 01 11          |                                |               | 20.8264 M | Nccr: 2802    | 2.25977us    |               | CMD06 SWITCH                        |
| 34822                           | 15:04:40.513.391.651 2 | Resp06 Rib                | 06 00 00 08 00 CB          | Tran                           |               |           | Nccr: 12      | 2.25977us    |               | [25:24] Access= Write Bits(3)       |
| 34823                           | 15:04:40.513.391.988 3 | Busy start                |                            |                                |               |           |               |              |               | [23:16] Index= HS_TIMING(185)       |
| 34824                           | 15:04:40.513.694.467 3 | Busy end                  |                            |                                |               |           |               |              |               | [15:12] Selected Driver Strength(0) |
| 34825                           | 15:04:40.513.806.553 1 | CMD13 SEND_STATUS         | 4D 00 01 00 00 53          |                                |               | 20.8264 M | Nccr: 8593    | 2.25644us    |               | [11:8] Timing Interface= HS400(3)   |
| 34826                           | 15:04:40.513.810.349 3 | Resp13 Rl                 | 0D 00 00 09 00 3F          | Tran                           |               |           | Nccr: 32      | 2.25644us    |               | [2:0] Cmd Set= 1                    |
| 34827                           | 15:04:40.533.313.985 1 | CMD06 SWITCH              | 46 03 A1 01 01 53          |                                |               | 165.534 M | Nccr: Over... | 283.305ns    |               |                                     |
| 34828                           | 15:04:40.533.314.469 4 | Resp06 Rib                | 06 00 00 08 00 CB          | Tran                           |               |           | Nccr: 33      | 279.972ns    |               |                                     |
| 34829                           | 15:04:40.533.314.509 3 | Busy start                |                            |                                |               |           |               |              |               |                                     |
| 34830                           | 15:04:40.534.239.393 9 | Busy end                  |                            |                                |               |           |               |              |               | [CRC7] = 00h (8b:11h)               |
| 34831                           | 15:04:40.534.306.219 6 | CMD13 SEND_STATUS         | 4D 00 01 00 00 53          |                                |               | 165.534 M | Nccr: Over... | 279.972ns    |               | [Raw Data]                          |
| 34832                           | 15:04:40.534.306.693 4 | Resp13 Rl                 | 0D 00 00 09 00 3F          | Tran                           |               |           | Nccr: 32      | 283.305ns    |               | 0 1 2 3 4 5 6 7                     |
| 34833                           | 15:04:40.534.451.645 1 | CMD06 SWITCH              | 46 03 21 01 01 D9          |                                |               | 165.534 M | Nccr: 23980   | 279.972ns    |               | 0h 46 03 B9 03 01 11 F....          |
| 34834                           | 15:04:40.534.452.325 4 | Resp06 Rib                | 06 00 00 08 00 CB          | Tran                           |               |           | Nccr: 33      | 279.972ns    |               |                                     |
| 34835                           | 15:04:40.534.452.365 3 | Busy start                |                            |                                |               |           |               |              |               |                                     |
| 34836                           | 15:04:40.534.469.590 1 | Busy end                  |                            |                                |               |           |               |              |               |                                     |
| 34837                           | 15:04:40.534.571.813 1 | CMD13 SEND_STATUS         | 4D 00 01 00 00 53          |                                |               | 168.438 M | Nccr: 20079   | 283.305ns    |               |                                     |
| 34838                           | 15:04:40.534.572.286 4 | Resp13 Rl                 | 0D 00 00 09 00 3F          | Tran                           |               |           | Nccr: 31      | 283.305ns    |               |                                     |
| 34839                           | 15:04:40.534.694.107 1 | CMD06 SWITCH              | 46 03 38 08 01 4F          |                                |               | 168.438 M | Nccr: 20471   | 283.305ns    |               |                                     |
| 34840                           | 15:04:40.534.694.587 4 | Resp06 Rib                | 06 00 00 08 00 CB          | Tran                           |               |           | Nccr: 33      | 283.305ns    |               |                                     |
| 34841                           | 15:04:40.534.694.631 4 | Busy start                |                            |                                |               |           |               |              |               |                                     |
| 34842                           | 15:04:40.534.707.813 1 | Busy end                  |                            |                                |               |           |               |              |               |                                     |
| 34843                           | 15:04:40.534.813.509 1 | CMD13 SEND_STATUS         | 4D 00 01 00 00 53          |                                |               | 165.534 M | Nccr: 19638   | 279.972ns    |               |                                     |
| 34844                           | 15:04:40.534.813.982 4 | Resp13 Rl                 | 0D 00 00 09 00 3F          | Tran                           |               |           | Nccr: 32      | 283.305ns    |               |                                     |
| 34845                           | 15:04:40.558.468.036 2 | CMD23 SET_BLOCK_COUNT     | 57 00 00 00 08 8F          |                                |               | 168.438 M | Nccr: Over... | 283.305ns    |               |                                     |
| 34846                           | 15:04:40.558.468.516 4 | Resp23 Rl                 | 17 00 00 09 00 1D          | Tran                           |               |           | Nccr: 32      | 283.305ns    |               |                                     |
| 34847                           | 15:04:40.558.500.203 3 | CMD18 READ_MULTIPLE_BLOCK | 52 00 00 00 00 E1          |                                |               | 165.534 M | Nccr: 5198    | 279.972ns    |               |                                     |
| 34848                           | 15:04:40.558.500.683 4 | Resp18 Rl                 | 12 00 00 09 00 D3          | Tran                           |               |           | Nccr: 33      | 279.972ns    |               |                                     |
| 34849                           | 15:04:40.559.352.171 8 | Read, 512 bytes           | FA B8 00 10 8E D0 8C 00... | SC=1 WaitTime:851.208us        |               | HS400     |               |              | 1.64317u      |                                     |
| 34850                           | 15:04:40.559.354.014 1 | Read, 512 bytes           | 1E 00 00 00 00 00 00 00... | SC=2 WaitTime:199.98ns         |               |           |               |              | 1.64317u      |                                     |
| 34851                           | 15:04:40.559.355.861 1 | Read, 512 bytes           | 53 3D 7D 55 C3 CC C7 9E... | SC=3 WaitTime:203.313ns        |               |           |               |              | 1.63984u      |                                     |
| 34852                           | 15:04:40.559.357.711 1 | Read, 512 bytes           | 33 71 E7 15 2C 34 5B E9... | SC=4 WaitTime:209.979ns        |               |           |               |              | 1.63984u      |                                     |
| 34853                           | 15:04:40.559.359.557 1 | Read, 512 bytes           | D7 3D 2F 71 93 98 05 38... | SC=5 WaitTime:206.646ns        |               |           |               |              | 1.64317u      |                                     |
| 34854                           | 15:04:40.559.361.407 1 | Read, 512 bytes           | DC DA B2 28 1A 01 2D 7E... | SC=6 WaitTime:206.646ns        |               |           |               |              | 1.64317u      |                                     |
| 34855                           | 15:04:40.559.363.257 1 | Read, 512 bytes           | 63 E7 99 B5 6F 3C 22 A2... | SC=7 WaitTime:206.646ns        |               |           |               |              | 1.64317u      |                                     |
| 34856                           | 15:04:40.559.365.107 1 | Read, 512 bytes           | EA A8 B1 70 B3 E1 50 F5... | SC=8 WaitTime:206.646ns        |               |           |               |              | 1.64317u      |                                     |
| 34857                           | 15:04:40.563.939.219 4 |                           |                            | WaitMax:851.208us Min:199.98ns |               |           |               |              |               | Sector I                            |
| 34858                           | 15:04:40.563.939.219 0 | CMD06 SWITCH              | 46 03 B3 4A 01 05          |                                |               | 165.534 M | Nccr: Over... | 283.305ns    |               |                                     |
| 34859                           | 15:04:40.563.939.702 4 | Resp06 Rib                | 06 00 00 08 00 CB          | Tran                           |               |           | Nccr: 33      | 279.972ns    |               |                                     |
| 34860                           | 15:04:40.563.939.742 3 | Busy start                |                            |                                |               |           |               |              |               |                                     |

4. Use 32Gb RAM as the buffer to stream all eMMC data into the SSD HD in order to record all data flow from Low Power Mode to High Speed Mode.

5. “Data Filter” filters unwanted data to save memory.

6. “Search” searches specific data.

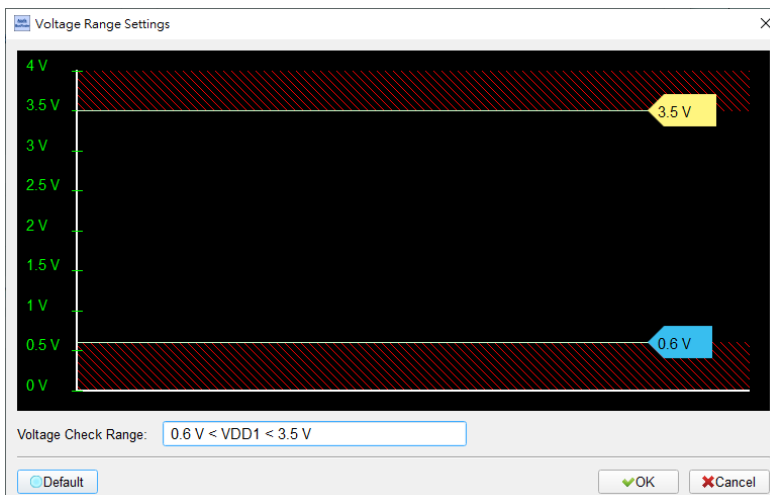
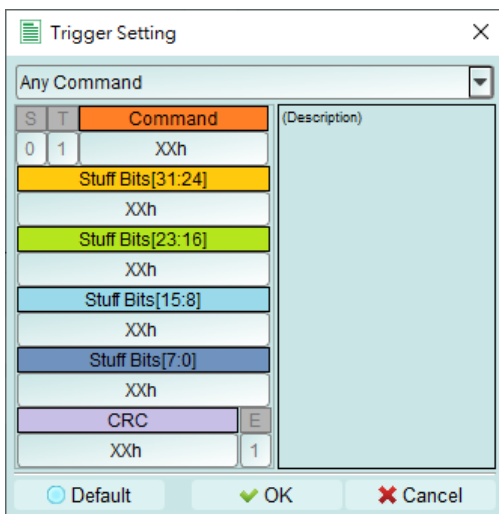
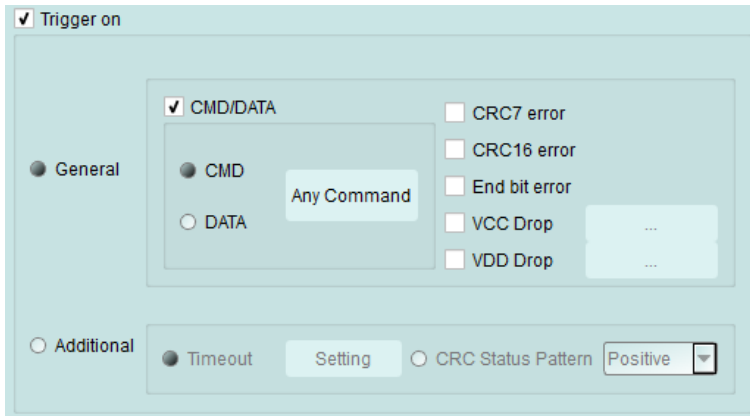
7. “CRC Packet” displays and counts CRC

8. eMMC command statistics include numbers of packets, individual command, different data length, and errors

| Navigator          |        |           | Statistics |       |
|--------------------|--------|-----------|------------|-------|
| Description        | Txns   | Bytes     | Txns       | Bytes |
| Command            | 14442  | 693216    | CMD00      | 4     |
| Data               | 539533 | 276233832 | CMD08      | 7     |
| Error              | 21     |           | CMD55      | 5     |
| ▼ Sector Count     |        |           | CMD01      | 29    |
| CMD17              | 55     | 28160     | CMD02      | 2     |
| CMD18              | 7021   | 275227264 | CMD03      | 2     |
| CMD24              | 3      | 1536      | CMD09      | 2     |
| CMD25              | 40     | 344064    | CMD13      | 114   |
| Wait Data Time(ns) |        |           | CMD07      | 2     |
| Busy Time(ns)      |        |           | CMD06      | 69    |
|                    |        |           | CMD16      | 1     |
|                    |        |           | CMD17      | 55    |
|                    |        |           | CMD18      | 7021  |
|                    |        |           | CMD12      | 30    |
|                    |        |           | CMD52      | 2     |
|                    |        |           | CMD05      | 4     |
|                    |        |           | CMD21      | 8     |
|                    |        |           | CMD23      | 7042  |
|                    |        |           | CMD25      | 40    |
|                    |        |           | CMD24      | 3     |

## 9. eMMC command trigger

- a. Trigger parameters include commands and data in order to cover all kinds of packets.
- b. Command or 16 byte Data.
- c. CRC7, CRC16, End Bit Error.
- d. Data to Data timeout, CRC Status timeout, CRC Status pattern, Busy timeout.
- e. VCC drop, VCCQ2 drop.
- f. The Trigger-Out port is to trigger a DSO to capture waveforms.



### Timeout Trigger

Trigger on Data timeout after CMD/DATA

Trigger when wait Data time > 5 ns

Trigger on Data IDLE timeout before CRC status

Trigger when wait CRC Status time > 5 ns

Trigger on Busy timeout after CRC Status

Trigger when Busy time > 5 ns

The trigger function will be turned on only after receiving the following command

Cmd 17    Cmd 18    Cmd 24    Cmd 25

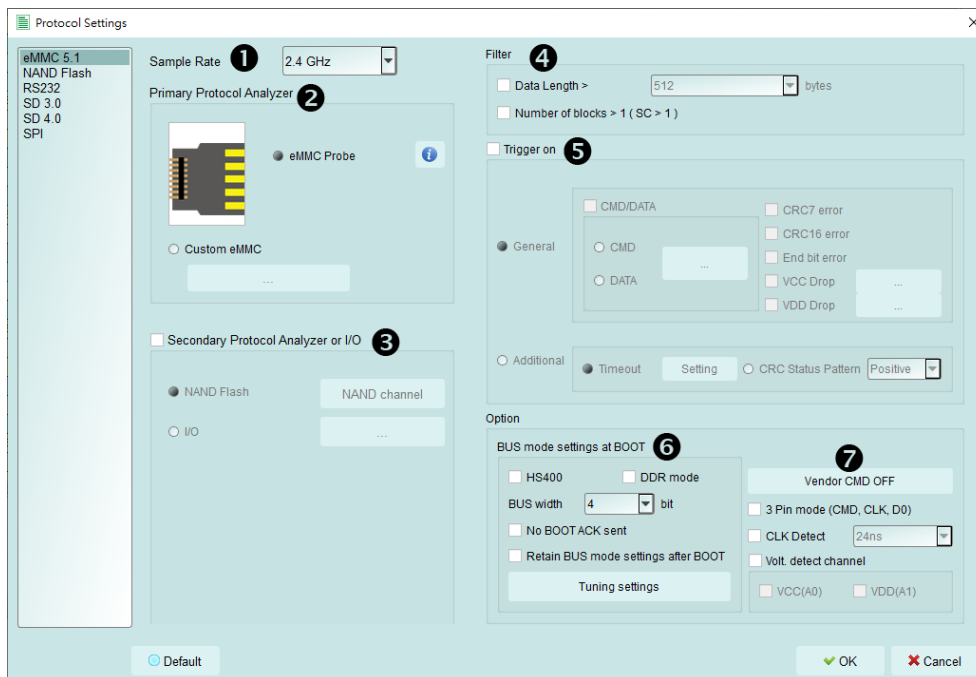
Default       

## 10. Report area

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

| Timestamp (hh:mm:ss.nnn) | Event             | Data              | Information        | Current stat | Error message | Bus       | Clock            | CMD  |
|--------------------------|-------------------|-------------------|--------------------|--------------|---------------|-----------|------------------|------|
| 10:59:27.441.734.215     | CHD06 SWITCH      | 46 03 B9 01 3D    |                    |              |               | 165.534 M | Wcor: 20988      | 279  |
| 10:59:27.441.734.512     | Busy start        |                   |                    |              |               |           |                  | 283  |
| 10:59:27.441.734.496     | Resp06 Rlb        | 06 00 00 08 00 CB |                    |              |               |           |                  | 283  |
| 10:59:27.441.949.411     | Busy end          |                   | BusyTime:213.89µs  |              |               |           |                  | 283  |
| 10:59:27.442.020.443     | CHD13 SEND_STATUS | 4D 00 01 00 00 33 |                    |              |               | 165.534 M | Wcor: Over: 279  | 283  |
| 10:59:27.442.020.497     | Resp13 Rl         | 0D 00 00 09 00 3F |                    |              |               |           | Wcor: 12         | 283  |
| 10:59:27.442.102.244     | CHD06 SWITCH      | 46 03 B7 06 01 5D |                    |              |               | 20.8264 M | Wcor: Over: 2.25 | 283  |
| 10:59:27.442.189.249     | Busy start        |                   |                    |              |               |           |                  | 2.25 |
| 10:59:27.442.189.727     | Resp06 Rlb        | 06 00 00 08 00 CB |                    |              |               |           |                  | 2.25 |
| 10:59:27.470.346.947     | Busy end          |                   | BusyTime:2.16132ms |              |               |           |                  | 2.25 |
| 10:59:27.470.417.473     | CHD13 SEND_STATUS | 4D 00 01 00 00 53 |                    |              |               | 20.8264 M | Wcor: Over: 2.25 | 2.25 |
| 10:59:27.470.420.210     | Resp13 Rl         | 0E 00 00 09 00 3F |                    |              |               |           | Wcor: 12         | 2.25 |
| 10:59:27.470.554.263     | CHD06 SWITCH      | 46 03 B9 03 01 31 |                    |              |               | 20.7813 M | Wcor: 2732       | 2.25 |
| 10:59:27.470.557.143     | Busy start        |                   |                    |              |               |           |                  | 2.25 |
| 10:59:27.470.557.002     | Busy end          |                   | BusyTime:308.342µs |              |               |           |                  | 2.25 |
| 10:59:27.470.610.430     | CHD13 SEND_STATUS | 4D 00 01 00 00 53 |                    |              |               | 20.8264 M | Wcor: 7477       | 2.25 |
| 10:59:27.470.622.224     | Resp13 Rl         | 0D 00 00 09 00 3F |                    |              |               |           | Wcor: 32         | 2.25 |
| 10:59:27.499.789.076     | CHD06 SWITCH      | 46 03 A1 01 01 53 |                    |              |               | 165.534 M | Wcor: Over: 283  | 283  |
| 10:59:27.499.789.173     | Busy start        |                   |                    |              |               |           |                  | 283  |
| 10:59:27.499.789.356     | Resp06 Rlb        | 06 00 00 08 00 CB |                    |              |               |           |                  | 283  |
| 10:59:27.500.789.992     | Busy end          |                   | BusyTime:1920.81µs |              |               |           |                  | 283  |
| 10:59:27.500.784.520     | CHD13 SEND_STATUS | 4D 00 00 00 00 53 |                    |              |               | 165.438 M | Wcor: Over: 283  | 283  |
| 10:59:27.500.784.996     | Resp13 Rl         | 0D 00 00 09 00 3F |                    |              |               |           | Wcor: 32         | 279  |

## 11. eMMC settings



1. **Sample Rate:** Choose the sampling rate to use. To enable the Secondary Protocol Analyzer – NAND Flash option, the sampling rate must be set below 1GHz,
2. **Primary Protocol Analyzer:** Can choose to use the probe type, can also customize the channel / trigger level,
3. **Secondary Protocol Analyzer or I/O:** An additional set of specified logic analysis can be opened to analyze the remaining available pins at the same time,
4. **Filter:** Each Data Frame can specify the size of the collection, and data larger than the set value will not be recorded
5. **Trigger on:** CMD, DATA, ERROR, Voltage, Timeout, CRC Status trigger conditions can be set
6. **Startup:** It needs to be set to the mode of the current acquisition, the mode of the test object is running, and has the Tuning function.
7. **Other options:**
  - a. **Vendor CMD:** Can change the name of the command group by itself, with or without information,
  - b. **3 Pin mode:** After connecting CLK, CMD, D0, the protocol flow and status agreement can be analyzed,
  - c. Mainly used for test objects with difficult wiring or non-data errors,
  - d. **CLK Detect:** Can detect whether CLK has action,
  - e. **Two sets of voltage detection function**

## FAQ

### 1. What eMMC version is supported?

A : Support eMMC 5.1 HS400 / HS200 / CMD Queue.

### 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 active probe to reduce the interference of the object to be measured and improve the signal quality.

### 3. Is Tx supported?

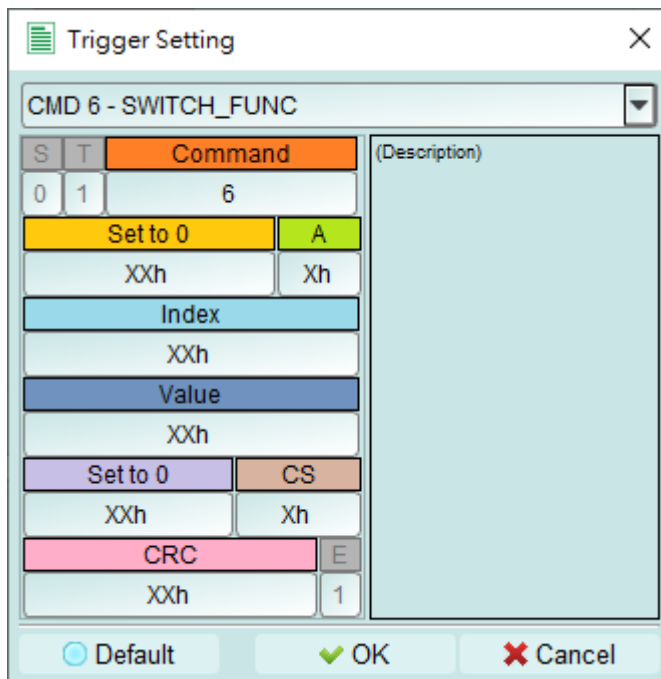
A: No

### 4. Precautions during measurement

Please make sure to connection according to the “Probe and test object connection” on page 9.

### 5. Can I specify an eMMC packet as the trigger point function?

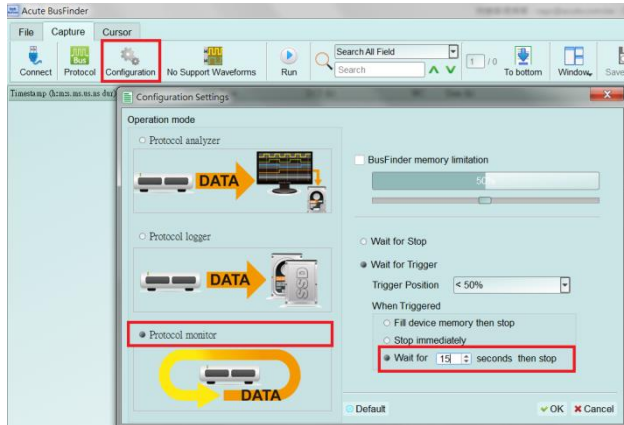
A: You can specify specific eMMC packet or Error to trigger.





**6. Is it possible to set an eMMC 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

