



BF7264B+ NAND Analyzer

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Feature:

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

Specifications:

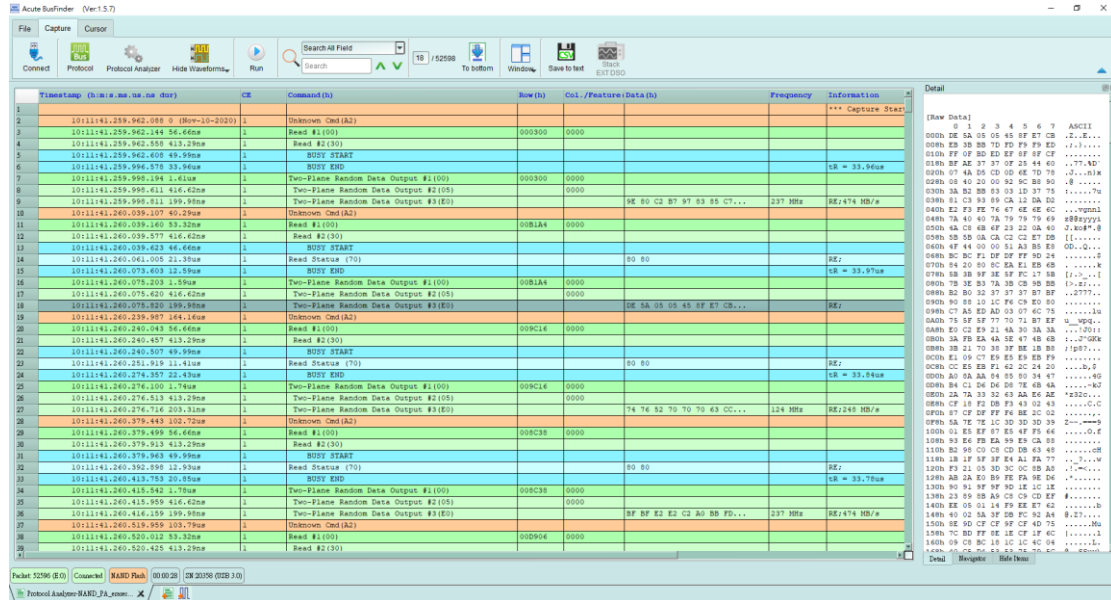
1. BF7264B+ , 32Gb RAM , NAND Flash probes



**2. Support ONFI 4.1 (NV-DDR3) , Mode 8 / Toggle DDR 2.0
~267MHz**

Timing Mode Specific Values (Modes 8-10)				
	Mode 8	Mode 9	Mode 10	Unit
	3.75	3	2.5	ns
	-267	-333	400	MHz

3. Display NAND Flash protocol packet in tabular form, including command parsing



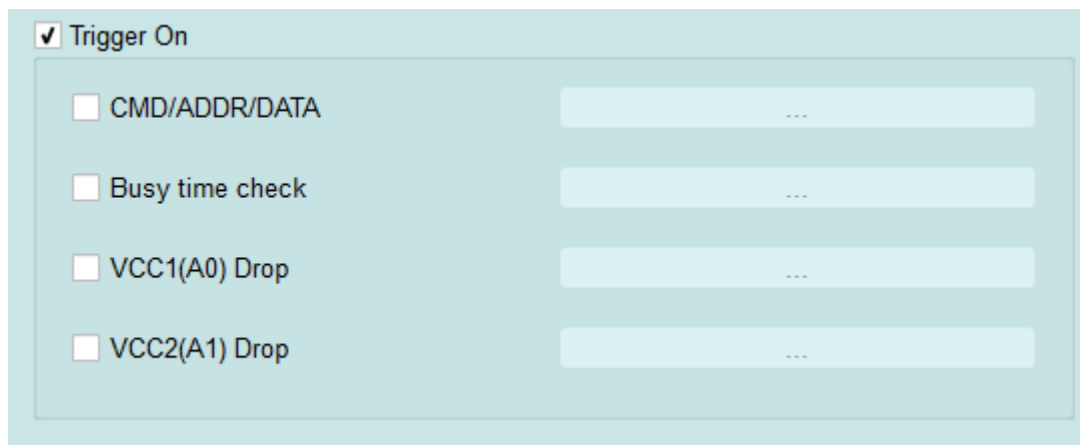
1. Use 32Gb RAM as the buffer to stream all NAND Flash data into the SSD HD in order to record all data flow from low speed mode to high speed mode.
2. Data Filter function filters unwanted data to save.
3. Search function searches specific data.
4. Erase Count function count the times of block to erase.
5. NAND command statistics include number of packets, individual command.

Discription	Txns
NAND Flash	
Unknown Cmd(A2h)	2077
Read(00h-30h)	1429
Two-Plane Random Data Output(00h-05h-E0h)	5143
Read Status(70h)	6843
Two-Plane Read(60h-60h-30h)	675
Cache Read(31h)	1278
Reset(FFh)	85
Page Program(80h-10h)	82
Two-Plane Page Program(80h-11h-81h-10h)	615
Two-Plane Block Erase(60h-60h-D0h)	13
Two-Plane Cache Program(80h-11h-81h-15h)	1167
Unknown Cmd(71h)	589

Address	Txns	Bytes
019600h	1	
019700h	1	
01A200h	1	
01A300h	1	
018800h	1	
018900h	1	
01C000h	1	
01C100h	1	
01D000h	1	
01D100h	1	
00FE00h	1	
00FF00h	1	
010E00h	1	
010F00h	1	
012E00h	1	
012F00h	1	
013E00h	1	
013F00h	1	
0E5A00h	1	
0E5B00h	1	
0E4C00h	1	
0F4D00h	1	

6. NAND trigger

- a. Trigger parameters include commands and data in order to cover all kinds of packets.
- b. Trigger Command/Address/Data
- c. Busy Time Check
- d. VCC1 drop and VCC2 drop
- e. The Trigger-Out port is to trigger a DSO to capture waveforms



7. Report area

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

The screenshot shows the Acute BufferFinder interface. The main window displays a list of captured data packets with columns for time, command, and data. A red box highlights a specific row. On the right, a 'Navigator' pane shows a 'Statistics' list with columns for 'Address' and 'Bytes'. Red arrows indicate the relationship between the data in the main window and the statistics list.

Address	Bytes
019600h	1
019700h	1
01A000h	1
01A300h	1
01B000h	1
01B900h	1
01C000h	1
01C200h	1
01C100h	1
01D000h	1
01E100h	1
00FE00h	1

8. NAND Settings

The screenshot shows the 'Protocol Settings' dialog box for NAND Flash. It includes sections for 'Sample Rate' (set to 2.4 GHz), 'Primary Protocol Analyzer' (NAND Probe), 'Device Information' (Vendor: Toshiba-TH58TVG7T2HBA4C), and 'Filter' (Data Length > 4096 bytes). There are also options for 'Secondary Protocol Analyzer or I/O' (SD 3.0, eMMC, I/O) and 'Trigger On' events.

1. Sample Rate: Choose the sampling rate to use. To enable the Secondary Protocol Analyzer – SD 3.0 or eMMC option, the sampling rate must be set below 1 GHz.

2. **Primary Protocol Analyzer:** Can choose to use the probe type, or also customize the channel / trigger level.

Channels

Probe Select

LA Probe (Slot A) NAND Probe (Slot B)

Device Width x8 x16

Quick Setup
 User Defined

I/O 0 (LSB) A0

I/O [A7:A0]

CLE	A8	CE1#	A12	R/B1#	A13
ALE	A9	<input type="checkbox"/> CE2#	A15	R/B2#	A16
RE# (W/R#)	A10	<input type="checkbox"/> CE3#	A17	R/B3#	A18
WE# (CLK)	A11	<input type="checkbox"/> CE4#	A19	R/B4#	A20
DQS	A14	<input type="checkbox"/> Invert RE#(W/R#)	<input type="checkbox"/> Don't care R/B		
		<input type="checkbox"/> Invert DQS	<input type="checkbox"/> Single R/B#		

Threshold

0.90V Quick Setup

Default

a. Invert RE#(W/R#) / Invert DQS

This function is used to measure at DDR mode. Since RE or DQS is a pair of differential signals, it needs to be checked if it is connected to another signal like RE(W/R) or DQS#. To tell the software that it is connected to the reverse RE and DQS signal.

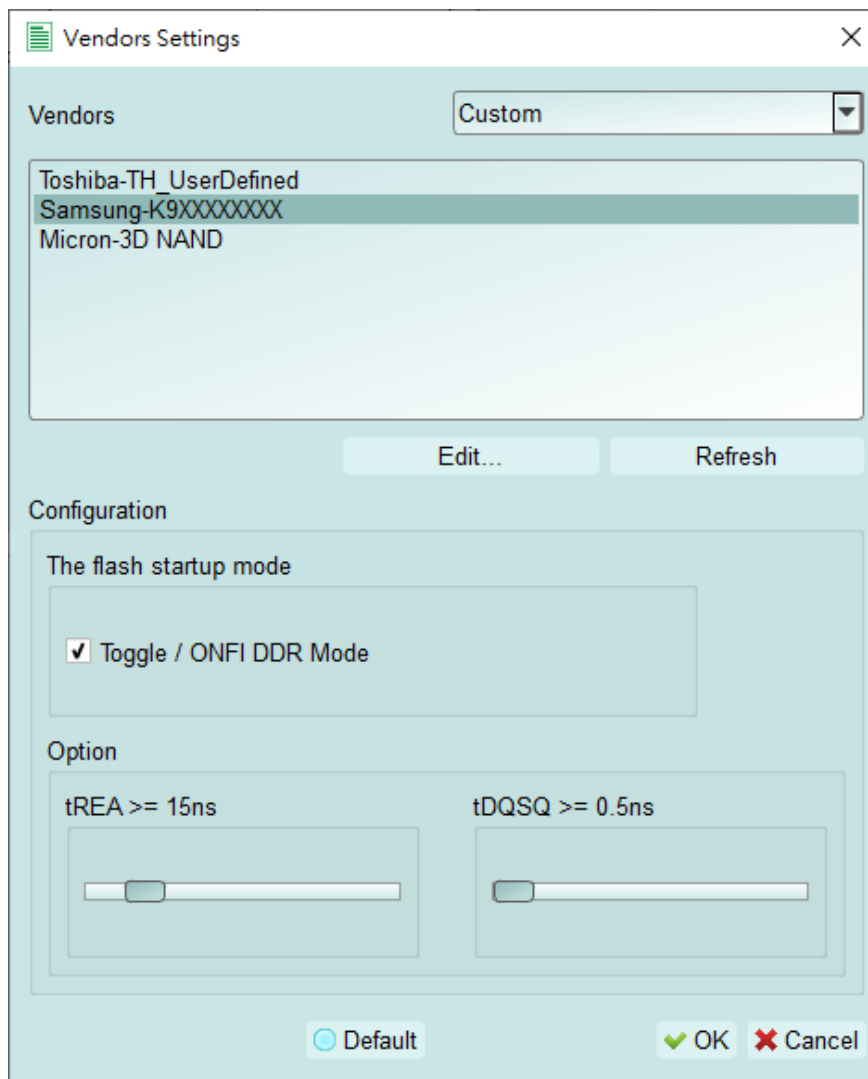
b. Don't care R/B

Check to ignore the R/B signal, which means that users don't need to connect the R/B signal.

c. Single R/B#

At the Multi-CE measurement, the busy time is displayed from the polling of Read Status command when checked; from R/B signal when unchecked.

- 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. Vendor:** Choose the NAND Flash brand and model. If there is no suitable model to choose from, you can choose the Custom item to customize the NAND Command Set. There is a sample file in the working directory of the software; you can press the Edit button to edit. After editing, press Refresh to refresh the list. Finally, select the NAND Flash you want to use and press OK.




```

Manufacturer=Samsung
PartNo=K9XXXXXXXX
#CE/RB=1
X16=N
SyncMode=Y
StartupDDR=Y
Param_tREA=1, 16, , ,
Param_tDQS=1, 0.5, , ,
Row_Addresssing=Word Line, [8:0]
Row_Addresssing=Plane, [10:9]
Row_Addresssing=Block, [20:11]
Row_Addresssing=LUN, [22:21]
Cmd=Read, Read, tR, 60, , , N, N, N, 00, 30
Cmd=Read for Copy Back, CB Read, tR, 60, , , N, N, N, 00, 35
Cmd=Intelligent Copy-Back Read, Inte. CB Read, tDCBSYR2, 5000, , , N, N, N, 00, 3A
Cmd=Cache Read, Cache Read, tDCBSYR, 90, , , N, N, N, 31
Cmd=Read Start for Last Page Cache Read, Read Start for LPC Read, tDCBSYR, 90, , , N, N, N, 3F
Cmd=Page Program, Page Prog., tPROG, 5000, , , N, N, N, 80, 10
Cmd=Cache Program, Cache Prog., tPROG, 5000, , , N, N, N, 80, 15
Cmd=Copy-Back Program, CB Prog., tPROG, 5000, , , N, N, N, 85, 10
Cmd=Intelligent Copy-Back Program, Inte. CB Prog., tCBSY2, 500, , , N, N, N, 8C, 15
Cmd=Block Erase, BErase, tBERS, 10000, , , N, N, N, 60, D0
Cmd=Random Data Input, Rand DI, N, N, N, 85
Cmd=Random Data Output, Rand DO, N, N, N, 05, E0
Cmd=Two-Plane Read, TP Read, tR, 60, , , N, N, N, 60, 60, 30
Cmd=Two-Plane Read for Copy-Back, TPCB Read, tR, 60, , , N, N, N, 60, 60, 35
Cmd=Two-Plane Intelligent Copy-Back Read, TP Inte. CB Read, tDCBSYR2, 5000, , , N, N, N, 60, 60, 3A
Cmd=Two-Plane Random Data Output, TP Rand. DO, N, N, N, 00, 05, E0
Cmd=Two-Plane Cache Read, TPC Read, tR, 60, , , N, N, N, 60, 60, 33
Cmd=Two-Plane Page Program, TPP Prog., tDBSY, 1, tPROG, 5000, N, Y, N, 80, 11, 81, 10
Cmd=Two-Plane Copy-Back Program, TPCB Prog., tDBSY, 1, tPROG, 5000, N, Y, N, 85, 11, 81, 10
Cmd=Copy-Back Program with 2KB Data, 2KB Data CB Prog., tDBSY, 1, tPROG, 5000, N, Y, N, 85, 11, 85, 10
Cmd=Two-Plane Intelligent Copy-Back Program, TP Inte. CB Prog., tDBSY, 1, tCBSY2, 500, N, N, N, 8C, 11, 8C, 15
Cmd=Two-Plane Cache Program, TPC Prog., tDBSY, 1, tPROG, 5000, N, Y, N, 80, 11, 81, 15
Cmd=Two-Plane Block Erase, TPBErase, tBERS, 10000, , , N, N, N, 60, 60, D0
Cmd=Read ID, Read ID, , , , , N, N, N, 90
Cmd=Read Status, Read Stat., , , , , Y, N, Y, 70
Cmd=Read EDC Status, Read EDC Stat., , , , , Y, N, N, 7B
Cmd=Chip1 Status, Cpl Stat., , , , , Y, N, Y, F1
Cmd=Chip2 Status, Cp2 Stat., , , , , Y, N, Y, F2
Cmd=Set Feature, Set F., tFEAT, 1, , , , N, N, N, EF
Cmd=Get Feature, Get F., tFEAT, 1, , , , N, N, N, EE
Cmd=Reset, Reset, tRST, 10/30/500, , , Y, N, Y, FF

```

Manufacturer, PartNo, #CE/RB, X16, SyncMode, StartupDDR, Param_tREA, Param_tDQS, Row_Addresssing, Cmd represent keywords, which must be entered and cannot be modified. The instructions are as follows:

Keyword	Instructions
Manufacturer	NAND Flash vendor
PartNo	NAND Flash IC model
#CE/RB	The CE/RB set , only 1/2/4 can be input
X16	Use 8 or 16 data channels, only Y/N can be input, Y means 16 channels are used; N uses 8 channels.
SyncMode	Only Y/N can be input, Y: supports synchronization mode; N: does not support synchronization mode.
StartupDDR	To tell the SW is at DDR mode
Param_tREA/Param_tDQS	Set the delay time for Data Out reading.
Row_Addresssing	Default parameters of Set Row Addresssing function
Cmd	The contents of command are separated by commas, and are explained as follows:
	1. The full command name

	2. Abbreviated instruction name
	3. Name of the first group of Busy Time Check. If not, fill it out.
	4. The first set of Busy Time Check values. The unit is us. If not, fill it out.
	5. Name of the second group of Busy Time Check. If not, fill it out.
	6. The second set of Busy Time Check values. The unit is us. If not, fill it out.
	7. The first flag. This flag represents whether the command can be used in the Busy state.
	8. The second flag. The flag represents whether the instruction is allowed to be inserted by some specific instructions.
	9. The third flag. This flag represents whether the instruction is allowed to be inserted into certain multi-level instructions.
	10. Command value. You can fill in 1-4 command codes, separated by commas.

e.g.

Cmd=Read, Read, tR, 60, , , N, N, N, 00, 30

Cmd=Read Status, Read Stat., , , , Y, N, Y ,70

Cmd=Two-Plane Page Program, TPP Prog., tDBSY, 1, tPROG, 5000,
N, Y, N, 80, 11, 81, 10

Read Status / Two-Plane Page Program: The full command name.

Read Stat. / TPP Prog. : Abbreviated instruction name.

Busy Time check (tDBSY, 1, tPROG, 5000) : It means that tDBSY is 1us, tPROG is 5000us, and if Busy Time exceeds this value, the information will be displayed in the report window. If this value is not filled in, the Busy Time will not be checked. Please enter a blank and add a comma at this time, the string of tDBSY or tPROG is not fixed and can be defined by the user.

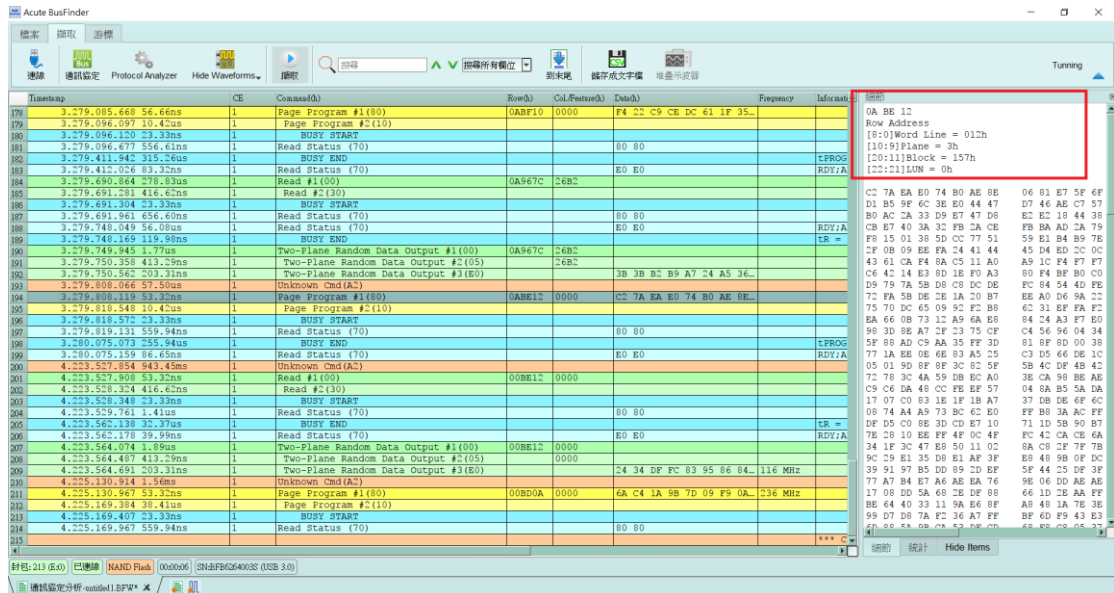
Flags: Taking Cmd=Read Status, Read Stat., Y, N, Y, 70 as an example, the first flag is Y to indicate that the command can be used in the Busy state, and the second flag is

This function is mainly used to subdivide Row Address into Page Address, Word Line, Plane Address, Block Address, LUN Address... The default value will be created in the NAND Command Set table, as shown in the red box in the figure below:

```

Manufacturer=Samsung
PartNo=K9XXXXXXX
#CE/RB=1
X16=N
SyncMode=Y
StartupDDR=Y
Diff_DQS=Y
Param_tREA=1, 16, , ,
Param_tDQSQ=1, 0.5, , ,
Addressing=Word Line, [8:0]
Addressing=Plane, [10:9]
Addressing=Block, [20:11]
Addressing=LUN, [22:21]
Cmd=Read, Read, tR, 60, , , N, N, N, 00, 30
    
```

The Row Address Details will be displayed in Details when this function needs to be turned on, and it is turned off by default.



Because the customer's NAND Flash model may not be supported, the UI also provides the function for customers to input by themselves, and can add/delete the items above.



Items can be dragged from the top to set the bits to the Addressing table below
Or when the lower yellow box appears, you can directly click on the upper Items
to automatically return to the lower yellow box.

Set Row Addressing
✕

Word Line

W6
W5
W4
W3
W2
W1
W0
✕

Plane
P1
P0
✕

Block
B9
B8
B7
B6
B5
B4
B3
B2
B1
B0
✕

LUN
L1
L0
✕

Row Addressing

	I/O 0	I/O 1	I/O 2	I/O 3	I/O 4	I/O 5	I/O 6	I/O 7
Row 1st cycle	W8	W7						
Row 2nd cycle								
Row 3rd cycle								

⊙ Default
Reset
✔ OK
✕ Cancel

Remarks:

Report background color description:

1. When NAND read command, 1st Command displays green, and after 2nd Command displays light green.
2. When the NAND program command is used, the 1st Command is yellow, and the 2nd Command is light yellow.
3. Unknown command will be displayed in orange.
4. Other commands will be displayed in light blue.

FAQ

1. Which version of NAND Flash specification does it support?

A : ONFI 4.1 (NV-DDR3), Mode 8 / Toggle DDR 2.0, although the specification speed is about 267 MHz, the BF series products support a maximum speed of 300 MHz.

2. Will it affect the signal quality during measurement?

A : The external instrument measurement will inevitably have a partial load effect. We use the active probe connection method to reduce the interference of the object to be measured and improve the signal quality.

3. Does it support for the transmission function?

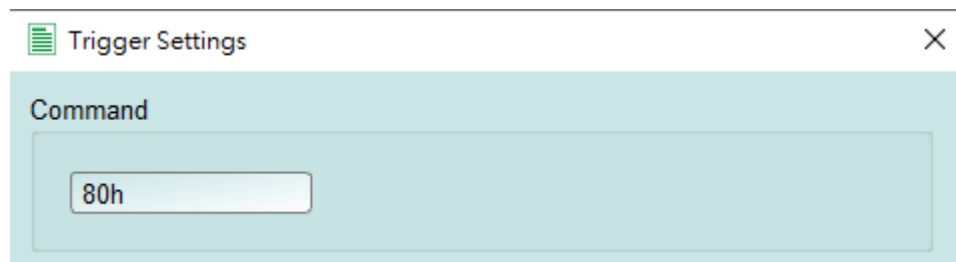
A : No.

4. Precautions during measurement

A: Please make sure to connection according to the “Probe and test object connection” on page 17.

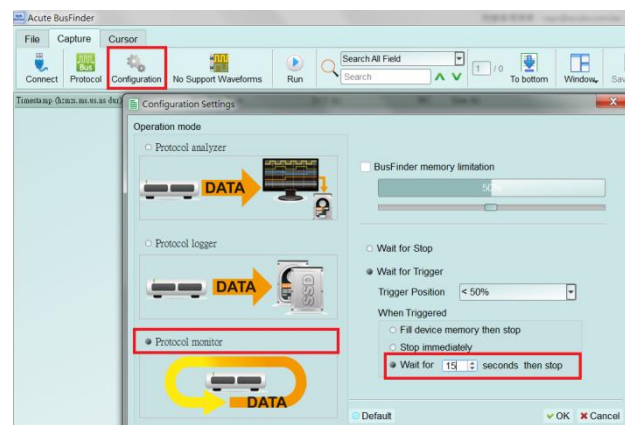
5. Can I specify a NAND Flash command as the trigger point

A : Yes, you can input a specific NAND Flash command value to trigger.



6. Is it possible to set a NAND Flash command 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.

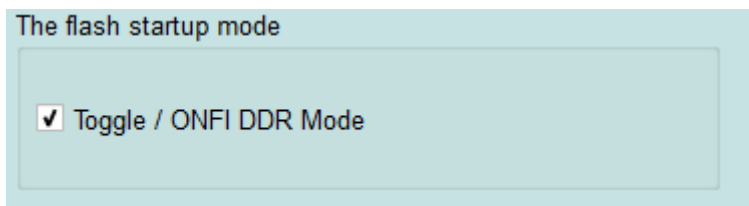


7. How to know whether the NAND Flash is connected correctly?

A : It is recommended to capture the Read ID command waveform to confirm whether the connecting is correct.

8. What happens when the program command is given but the software analysis is empty of NAND Flash data in?

A : To confirm that the connecting is correct, and check whether it has entered the DDR mode, if it entered the DDR mode, you can check the Toggle/ONFI DDR Mode.



Probe and test object connection

Through the flying lead cable connection, if this connection method is adopted, the more ground wires are connected, the better the signal quality can be obtained.



Use tip connection directly, this connection method can get the best signal quality. This picture is only a schematic diagram and does not really connect the NAND Flash DUT.

