



# **BF7264B+ NAND Analyzer**



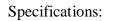
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## **Feature:**

This option is supported in BF6264B, BF7264B, and BF7264B+  $\circ$ 



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



 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

| Сар  | ture Cursor   |     |  |         |              |                            |           |                   |  |       |
|------|---|-----|--|---------|--------------|----------------------------|-----------|-------------------|--|-------|
| ect  | Protocol Protocol Analyzer Hide Waveforms-                    | Run | Search All Field To bottom W   |         | to text      | 0                          |           |                   |  |       |
| Tine | astamp (h:m:s.ms.us.ns dur)                                   | cz  | Command (b)  | Row (h) | Col./Feature | Data (h)                   | Frequency | Information       | Detail   |       |
|      |   |     |  |         |              |                            |           | *** Capture Start |  |       |
|      | 10:11:41.259.962.088 0 (Nov-10-2020                           | 1   | Unknown Cmd (A2)   | -       |              |                            |           |                   | [Raw Data]   |       |
|      | 10:11:41.259.962.144 56.66ns                                  | 1   | Read #1(00)  | 000300  | 0000         |                            |           |                   | 0 1 2 3 4 5 6 7<br>000h DE 5A 05 05 45 8F E7 CB              |       |
|      | 10:11:41.259.962.558 413.29n#                                 | 1   | Read #2(30)  |         |              |                            |           |                   | 008h ES 35 85 7D FD F9 F9 ED                                 |       |
|      | 10:11:41.259.962.608 49.99ns                                  | 1   | BUSY START   |         |              |                            |           |                   | 010h FF OF BD ED EF SF SF CF                                 |       |
| -    | 10:11:41.259.996.578 33.96us                                  | 1   | BUSY END   | -       |              |                            |           | tR = 33.96us      | 018h BF AE 37 37 0F 25 44 60                                 |       |
|      | 10:11:41.259.998.194 1.61us                                   | 1   | Two-Plane Random Data Output #1(00)  | 000300  | 0000         |                            |           |                   | 020h 07 4A D5 CD 0D 6E 7D 78<br>028h 08 40 20 00 92 9C B8 90 | .J    |
|      | 10:11:41.259.998.611 416.62ns                                 | 1   | Two-Plane Random Data Output #2(05)  |         | 0000         |                            |           |                   | 030h 3A B2 B8 63 03 1D 37 75                                 |       |
| _    | 10:11:41.259.998.811 199.98ns                                 | 1   | Two-Plane Random Data Output #3(E0)  |         |              | 9E 80 C2 B7 97 83 85 C7    | 237 MHz   | RE:474 MB/s       | 038h 81 C3 93 89 CA 12 DA D2                                 |       |
| _    | 10:11:41.260.039.107 40.29us                                  | 1   | Unknown Cmd (A2)   |         |              |                            |           |                   | 040h E2 F3 FE 76 67 6E 6E 6C                                 |       |
| -    | 10:11:41.260.039.160 53.32ns                                  | 1   | Read #1(00)  | 008184  | 0000         |                            |           |                   | 048h 7A 40 40 7A 79 79 79 69<br>050h 4A C8 6B 6F 23 22 0A 40 |       |
|      | 10:11:41.260.039.577 416.62ns                                 | 1   | Read #2(30)  |         |              |                            |           |                   |  | [[    |
|      | 10:11:41.260.039.623 46.66ns                                  | 1   | BUSY START   |         |              |                            |           |                   | 060h 4F 44 00 00 51 A3 B5 E8                                 |       |
| _    | 10:11:41.260.061.005 21.38us                                  | 1   | Read Status (70)   |         |              | 80 80                      |           | RE:               | 068h BC BC F1 DF DF FF 9D 24                                 |       |
|      | 10:11:41.260.073.603 12.59um                                  | 1   | BUSY END   |         |              |                            |           | tR = 33,97us      |  | 1.11  |
| _    | 10:11:41.260.075.203 1.59us                                   | 1   | Two-Plane Random Data Output #1(00)  | 008184  | 0000         |                            |           |                   | 078h 58 38 9F 3E 5F FC 17 58<br>080h 78 3E 53 7A 35 CS 95 55 |       |
| _    | 10:11:41.260.075.620 416.62ns                                 | 1   | Two-Plane Random Data Output #2(05)  |         | 0000         |                            |           |                   | 098h B2 B0 32 37 37 37 B7 BF                                 |       |
| _    | 10:11:41.260.075.820 199.98ns                                 | 1   | Two-Plane Random Data Output #3(E0)  |         |              | DE 5A 05 05 45 8F E7 CB    |           | 821               | 090h 90 88 10 10 F6 C9 E0 80                                 |       |
| _    | 10:11:41.260.239.987 164.16us                                 | 1   | Unknown Cmd (A2)   |         |              |                            |           |                   |  |       |
| _    | 10:11:41.260.240.043 56.66ns                                  | 1   | Read #1(00)  | 009C16  | 0000         |                            |           |                   | 0A0h 75 5F 5F 77 70 71 B7 EF<br>0A8h E0 C2 E9 21 4A 30 3A 3A |       |
|      | 10:11:41.260.240.457 413.29ns                                 | 1   | Read #2(30)  |         |              |                            |           |                   | OBOh 3A FB EA 4A 5E 47 4B 6B                                 |       |
| _    | 10:11:41.260.240.507 49.99ns                                  | 1   | BUSY START   |         |              |                            | -         | _                 | 0B8h 3B 21 70 38 3F BE 1B B8                                 | /!p87 |
|      | 10:11:41.260.251.919 11.41us                                  |     | Read Status (70)   | -       |              | 80 80                      |           | RE:               | OCOh E1 09 C7 E9 E5 E9 EB F9                                 |       |
|      | 10:11:41.260.274.357 22.43us                                  | 1   | BUSY END   |         |              |                            |           | tR = 33.84us      | 0C8h CC E5 EB F1 62 2C 24 20<br>0D0h A0 8A AA 84 85 80 34 47 |       |
| _    | 10:11:41.260.276.100 1.74us                                   | -   | Two-Plane Random Data Output #1(00)  | 009016  | 0000         |                            |           |                   |  |       |
| _    | 10:11:41.260.276.513 413.29ns                                 | 1   | Two-Plane Random Data Output #2(05)  |         | 0000         |                            |           |                   | 0E0h 2A 7A 33 32 63 AA E6 AE                                 | *z32c |
| _    | 10:11:41.260.276.716 203.31ns                                 | 1   | Two-Plane Random Data Output #3(E0)  | -       |              | 74 76 52 70 70 70 63 CC    | 124 MHz   | RE:248 MB/#       | 0E8h CF 18 F2 DB F3 43 02 43                                 |       |
| _    | 10:11:41.260.379.443 102.72us                                 | 1   | Unknown Cmd (A2)   |         |              | 10 10 10 10 10 10 03 00111 | and Ana   | Par = ++ +1D/ 8   | 0F0h 87 CF DF FF F6 BE 2C 02<br>0F8h 5A 7E 7E 1C 3D 3D 3D 39 |       |
|      | 10:11:41.260.379.499 56.66ns                                  | 1   | Read #1(00)  | 008C38  | 0000         |                            |           |                   | 100h 01 E5 EF 87 E5 4F F5 66                                 |       |
| -    | 10:11:41.260.379.913 413.29ns                                 | 1   | Read #2(30)  |         |              |                            |           |                   | 108h 93 E6 FB EA 99 E9 CA 88                                 |       |
| _    | 10:11:41.260.379.963 49.99ns                                  | 1   | BUSY START   |         |              |                            |           |                   | 110h B2 98 C0 C8 CD DB 63 48                                 |       |
| -    | 10:11:41.260.392.898 12.93us                                  | 5   | Read Status (70)   |         |              | 80 80                      |           | RE;               | 110h 18 1F 5F 3F E4 A1 FA 77<br>120h F3 21 05 3D 3C 0C 8B A8 |       |
| _    | 10:11:41.260.413.753 20.85us                                  | -   | BUSY END   |         |              |                            |           | tR = 33.78us      | 120h F3 21 05 3D 3C 0C 8B A8<br>128h AB 2A E0 B9 FE FA 9E D6 |       |
| -    | 10:11:41.260.415.542 1.78us                                   |     | Two-Plane Random Data Output #1(00)  | 008C38  | 0000         |                            |           | SR = 33.7018      | 130h 90 91 9F 9F 9D 1E 1C 1E                                 |       |
| -    | 10:11:41.260.415.959 416.62ns                                 |     | Two-Plane Random Data Output #2(05)  | 000030  | 0000         |                            |           |                   | 138h 23 89 88 A9 C8 C9 CD EF                                 |       |
| -    | 10:11:41.260.415.959 416.6288<br>10:11:41.260.416.159 199.988 |     | Two-Plane Random Data Output #2(05)<br>Two-Plane Random Data Output #3(E0) | -       | 0000         | BF BF E2 E2 C2 A0 BB FD    | 237 MHz   | RE: 474 MB/#      | 140h EE 05 01 14 F9 EE E7 62                                 |       |
| _    | 10:11:41.260.519.959 103.79us                                 |     | Two-Flane Kandon Data Output #3(E0)<br>Unknown Cmd(A2)                     |         |              | De De La La Va AV DD ID    | e3/ mns   | Par 1/1 10/8      | 148h 40 02 5A 3F DB FC 92 A4<br>150h 8E 9D CF CF 9F CF 4D 75 |       |
| _    | 10:11:41.260.519.959 103.7908                                 |     | Read #1(00)  | 000906  | 0000         |                            |           |                   | 158h 7C BD FF 8E 1E CF 1F 6C                                 |       |
| -    |   |     | Read #1(00)<br>Read #2(30)   | 000906  | 0000         |                            |           |                   | 160h 09 C8 BC 18 1C 1C 4C 04                                 |       |
|      | 10:11:41.260.520.425 413.29ns                                 |     | [ Kead #2(30)  |         |              |                            |           | 1                 | Detail Navigator Hafe Items                                  | 0 00  |

# command parsing

- 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  |
|   |      |
|   |      |
|   |      |
|   |      |
|   |      |
|   |      |
|   |      |
|   |      |

| Statistics                  | Txns | Bytes |   |
|-----------------------------|------|-------|---|
| <ul> <li>Address</li> </ul> |      |       |   |
| 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  |       | _ |
| •                           |      |       | Þ |



### 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 wavefroms

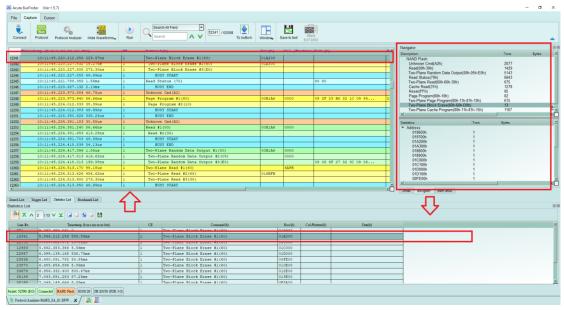
| ✔ Trigger On    |  |
|-----------------|--|
| CMD/ADDR/DATA   |  |
| Busy time check |  |
| VCC1(A0) Drop   |  |
| VCC2(A1) Drop   |  |
|                 |  |

| Voltage Range Settings                    | ×   |
|---|-----|
| 4 V<br>3.5 V<br>3.5 V                     |     |
| 3 V<br>2.5 V<br>2 V                       |     |
| 1.5 V<br>1 V                              |     |
| 0.5 V<br>0 V                              |     |
| Voltage Check Range: 0.6 V < VDD1 < 3.5 V | _   |
| ©Default ✔OK ★Canc                        | :el |



## 7. Report area

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



#### 8. NAND Settings

| Protocol Settings                |                           |            |  | ×                       |
|----------------------------------|---------------------------|------------|--|-------------------------|
| eMMC 5.1<br>NAND Flash           | Sample Rate 2.4 G         | Hz 🔻       | Device Information   |                         |
| MIPI RFFE                        | Primary Protocol Analyzer |            | Vendor   | Toshiba-TH58TVG7T2HBA4C |
| RS232<br>SD 3.0<br>SD 4.0<br>SPI | Custom NAND               |            | Startup mode: DDR; tREA >= 20ns; tDQSQ<br>Trigger On<br>CMD/ADDR/DATA<br>Busy time check<br>VCC1(A0) Drop<br>VCC2(A1) Drop | >= 1.0ns                |
|                                  |                           |            | Filter   |                         |
|                                  | SD 3.0                    | SD channel | Data Length > 4096   | ▼ bytes                 |
|                                  | O eMMC                    |            | Data Lengtri > 4096  | bytes                   |
|                                  | O I/O                     |            | Option   |                         |
|                                  |                           |            | VCC detect channel   |                         |
|                                  |                           |            | A0 A1  |                         |
|                                  |                           |            | Remove READ STATUS Command(Bus   | sy State)               |
|                                  |                           |            | Set Row Addressing   |                         |
|                                  | Default                   |            |  | ✓ OK X Cancel           |

 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.

| NAND Flash Channel Sett | ings     |                |            | ×           |
|-------------------------|----------|----------------|------------|-------------|
| Channels                |          |                |            |             |
| Probe Select            |          |                |            |             |
| LA Probe (Slot A)       |          | O NAND Prob    | e (Slot B) |             |
| Device Width            | ● x8     | ○ x16          |            |             |
| Quick Setup             |          |                |            |             |
| ○ User Defined          |          |                |            |             |
| I/O 0 (LSB)             |          | A0             |            | •           |
|                         | I/O [/   | 47:A0]         |            |             |
| CLE A8                  | CE1#     | A12            | R/B1#      | A13         |
| ALE A9                  | CE2#     | A15            | 🗘 R/B2#    | A16         |
| RE# (W/R#) A10          | CE3#     | A17            |            | A18         |
| WE# (CLK) A11           | 单 🔲 CE4# | A19            | € R/B4#    | A20         |
| DQS A14                 | Invert R | E#(W/R#)<br>QS | Don't ca   |             |
| Threshold               |          |                |            |             |
| 0.90V                   |          | Quick Setup    |            | *           |
|                         |          |                |            |             |
|                         |          |                |            |             |
| Default                 |          |                | <b>~</b> ( | OK 🗙 Cancel |

# 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 fie 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.

| Vendors Settings  |         |            |       |       | ×        |
|---|---------|------------|-------|-------|----------|
| Vendors   | (       | Custom     |       |       | •        |
| Toshiba-TH_UserDefined<br>Samsung-K9XXXXXXX<br>Micron-3D NAND |         |            |       |       |          |
|   | E       | dit        |       | Refre | sh       |
| Configuration   |         |            |       |       |          |
| The flash startup mode  |         |            |       |       |          |
| ✓ Toggle / ONFI DDR Mo  | de      |            |       |       |          |
| Option  |         |            |       |       |          |
| tREA >= 15ns  |         | tDQSQ >= ( | ).5ns |       |          |
| 0   | Default |            | ~     | ок    | X Cancel |



Manufacturer=Samsung PartNo=K9XXXXXXX VCF/RE-1 X1G-M SyncMode=T StartupDDR=T Param\_REA\_1, 16. , . Param\_tDQSQ=1, 0.5. , Param\_tDQ

Manufacturer, PartNo, #CE/RB, X16, SyncMode, StartupDDR, Param\_tREA,

Param\_tDQS, Row\_Addressing, Cmd represent keywords, which must be entered and

| 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_Addressing        | Default parameters of Set Row Addressing function  |
| Cmd                   | The contents of command are separated by commas, and are explained as follows:                     |
|                       | 1. The full command name   |

cannot be modified. The instructions are as follows:



| 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



N to indicate that the command is not allowed to be Some specific instructions are inserted, and the third flag is Y, which means that the instruction is allowed to be inserted into some multi-level instructions. For example, Read Status 70h can be inserted between 11h and 81h of Two-Plane Page Program 80h, 11h, 81h, 10h.

- **5.** Trigger on: Can set CMD/ADDR/DATA, Busy time check, Voltage drop trigger conditions.
- **6. Filter:** Each data frame can specify the size of the record, and the data larger than the set value will not be recorded.
- 7. Other option:
  - a. 2 sets of voltage detection function

#### b. Remove READ STATUS Command(Busy State)

After this function is enabled, the repeated Not Ready Polling of read status command will be removed. The default is to check; otherwise it will occupy too many report lines and not being easy to view. T

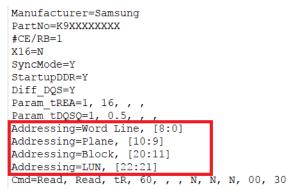
c. Set Row Addressing

| Set Row Addre  | ssing |         |       |     |    |       |    |    |    |      |   | ×     |
|----------------|-------|---------|-------|-----|----|-------|----|----|----|------|---|-------|
|                |       |         |       |     |    |       |    |    |    |      |   |       |
| Word Line      |       |         |       |     |    |       |    |    | אן |      | • |       |
| Plane          | ×٦    |         |       |     |    |       |    |    | -  |      |   |       |
|                |       |         |       |     |    |       |    |    | ¬× |      |   |       |
| Block          |       |         |       |     |    |       |    |    |    |      |   |       |
| LUN            | אך ×  |         |       |     |    |       |    |    |    |      |   |       |
| I              |       |         |       |     |    |       |    |    |    |      |   |       |
| Row Addressing | 1     |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         | I/O 2 |     |    |       |    |    |    |      |   |       |
| Row 1st cycle  |       | W1      | W2    | W3  | W4 | W5    | W6 | W7 |    |      |   |       |
| Row 2nd cycle  |       | P0      | P1    | B0  | B1 | B2    | B3 | B4 |    |      |   |       |
| Row 3rd cycle  | B5    | B6      | B7    | B8  | B9 | L0    | L1 |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       |         |       |     |    |       |    |    |    |      |   |       |
|                |       | Default |       |     |    | Reset |    |    |    | 🗸 ОК | × | ancel |
|                |       |         |       | 2 2 |    |       |    |    |    |      |   |       |



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:



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

|                | BusFinder  |  |                                     |           |                |                         |           |           |  | - 0                      | ×    |
|----------------|--|--|-------------------------------------|-----------|----------------|-------------------------|-----------|-----------|--|--------------------------|------|
| 檔案             | 撷取 游標  |  |                                     |           |                |                         |           |           |  |                          |      |
| <b>夏</b><br>連線 | 開設<br>通知<br>調報<br>第定 Protocol Analyzer   | Hide Waveforms.  |                                     |           | ●<br>到末尾 儲     | <b>花成文字檔</b> 堆叠示波器      |           |           |  | Tunnin                   | 10 🔺 |
| Timest         | amp  | CE   | Command(h)                          | Row(h)    | Col./Feature() | i) Data(h)              | Frequency | Informati | 細節   |                          |      |
| 8              | 3.279.085.668 56.66ns  | 1  | Page Program #1(80)                 | 0ABF10    | 0000           | F4 22 C9 CE DC 61 1F 35 |           |           | 0A BE 12   |                          |      |
| 9              | 3.279.096.097 10.42us  | 1  | Page Program #2(10)                 |           |                |                         |           |           | Row Address  |                          |      |
| 0              | 3.279.096.120 23.33ns  | 1  | BUSY START                          |           |                |                         |           |           | [8:0]Word Line = 012h                              |                          |      |
| 1              | 3.279.096.677 556.61ns   | 1  | Read Status (70)                    |           |                | 80 80                   |           |           | [10:9]Plane = 3h                                   |                          |      |
| 2              | 3.279.411.942 315.26us   | 1  | BUSY END                            |           |                |                         |           | tPROG     | [20:11]Block = 157h                                |                          |      |
| 3              | 3.279.412.026 83.32ns  | 1  | Read Status (70)                    |           |                | E0 E0                   |           | RDY;A     | [22:21]LUN = 0h                                    |                          |      |
| 4              | 3.279.690.864 278.83us   | 1  | Read #1(00)                         | 0A967C    | 26B2           |                         |           |           |  |                          | -    |
| 5              | 3.279.691.281 416.62ns   | 1  | Read #2(30)                         |           |                |                         |           |           | C2 7A EA EO 74 BO AE 8E                            | 06 81 E7 5               |      |
| 6              | 3.279.691.304 23.33ns  | 1  | BUSY START                          |           |                |                         |           |           | D1 B5 9F 6C 3E E0 44 47                            | D7 46 AE 0               |      |
| 7              | 3.279.691.961 656.60ns   | 1  | Read Status (70)                    |           |                | 80 80                   |           |           | B0 AC 2A 33 D9 E7 47 D8                            | E2 E2 18 4               |      |
| 8              | 3.279.748.049 56.08us  | 1  | Read Status (70)                    | _         |                | E0 E0                   |           | RDY;A     | CB E7 40 3A 32 FB 2A CE                            | FB BA AD 3               |      |
| 9              | 3.279.748.169 119.98ns   | 1  | BUSY END                            |           |                |                         |           | tR =      | F8 15 01 38 5D CC 77 51                            | 59 El B4 E               |      |
| 0              | 3.279.749.945 1.77us   | 1  | Two-Plane Random Data Output #1(00) | 0A967C    |                |                         |           |           | 2F 0B 09 EE FA 24 41 44                            | 45 D4 ED 3               |      |
| 1              | 3.279.750.358 413.29ns   | 1  | Two-Plane Random Data Output #2(05) |           | 26B2           |                         |           |           | 43 61 CA F4 8A C5 11 A0                            | A9 1C F4 E               |      |
| 2              | 3.279.750.562 203.31ns   | 1  | Two-Plane Random Data Output #3(E0) |           |                | 3B 3B B2 B9 A7 24 A5 36 |           |           | C6 42 14 E3 8D 1E F0 A3                            | 80 F4 BF E               |      |
| 3              | 3.279.808.066 57.50us  | 1  | Unknown Cmd(A2)                     |           |                |                         |           |           | D9 79 7A 5B D8 C8 DC DE                            | FC 84 54 4               |      |
| 4              | 3.279.808.119 53.32ns  | 1  | Page Program #1(80)                 | 0ABE12    | 0000           | C2 7A EA EO 74 BO AE 8E |           |           | 72 FA 5B DE 2E 1A 20 B7                            | EE A0 D6 9               |      |
| 5              | 3.279.818.548 10.42us  | 1  | Page Program #2(10)                 |           |                |                         |           |           | 75 70 DC 65 09 92 F2 B8                            | 62 31 EF E               |      |
| 6              | 3.279.818.572 23.33ns  | 1  | BUSY START                          |           |                |                         |           |           | EA 66 0B 73 12 A9 6A E8                            | 84 24 A3 H               |      |
| 7              | 3.279.819.131 559.94ns   | 1  | Read Status (70)                    |           |                | 80 80                   |           |           | 98 3D 8E A7 2F 23 75 CF                            | C4 56 96 0               |      |
| 8              | 3.280.075.073 255.94us   | 1  | BUSY END                            |           |                |                         |           | tPROG     | 5F 88 AD C9 AA 35 FF 3D                            | 81 8F 8D 0               |      |
| 9              | 3.280.075.159 86.65ns<br>4.223.527.854 943.45ms  | 1  | Read Status (70)<br>Unknown Cmd(A2) |           |                | E0 E0                   |           | RDY;A     | 77 1A EE 0E 6E 83 A5 25<br>05 01 9D 8F 8F 3C 82 5F | C3 D5 66 I<br>5B 4C DF 4 |      |
| 0              |  | 1  |                                     | 0.00001.0 | 0000           |                         |           |           |  |                          |      |
| 1              | 4.223.527.908 53.32ns<br>4.223.528.324 416.62ns  | 1  | Read #1(00)<br>Read #2(30)          | 00BE12    | 0000           |                         |           |           | 72 78 3C 4A 59 DB EC A0<br>C9 C6 DA 48 CC FE EF 57 | 3E CA 98 E<br>04 8A B5 5 |      |
| 2              | 4.223.528.348 23.33ns  | 1  | BUSY START                          |           |                |                         |           |           | 17 07 C0 83 1E 1F 1B A7                            | 37 DB DE (               |      |
| 3              | 4.223.528.348 23.33ns<br>4.223.529.761 1.41us  | 1  | Read Status (70)                    |           |                | 80 80                   |           |           | 08 74 A4 A9 73 BC 62 B0                            | FF B8 3A #               |      |
| 4              | 4.223.529.761 1.41us<br>4.223.562.138 32.37us  | 1  | BUSY END                            | -         |                | 00 00                   |           | tR =      | DF D5 C0 8E 3D CD E7 10                            | 71 1D 5B 9               |      |
| 6              | 4.223.562.178 39.99ns  | 1  | Read Status (70)                    |           |                | E0 E0                   |           | RDY : A   | 7E 28 10 EE FF 4F 0C 4F                            | FC 42 CA C               |      |
| 7              | 4.223.564.074 1.89us   | 1  | Two-Plane Random Data Output #1(00) | 00BE12    | 0000           | NO NO                   |           | BUATR.    | 34 1F 3C 47 E8 50 11 02                            | 8A C8 2F 7               |      |
| 8              | 4.223.564.487 413.29ns   | 1  | Two-Plane Random Data Output #2(05) | 003012    | 0000           |                         |           |           | 9C 29 E1 35 D8 E1 AF 3F                            | E8 48 9B 0               |      |
| 2              | 4.223.564.691 203.31ns   | 1  | Two-Plane Random Data Output #3(E0) |           |                | 24 34 DF FC 83 95 86 84 | 116 MHz   |           | 39 91 97 B5 DD 89 2D EF                            | 5F 44 25 I               |      |
| 0              | 4.225.130.914 1.56ms   | 1  | Unknown Cmd (A2)                    |           |                | 24 54 51 10 05 55 00 04 | and Milz  |           | 77 A7 B4 E7 A6 AE EA 76                            | 9E 06 DD #               |      |
| 1              | 4.225.130.967 53.32ns  | 1  | Page Program #1(80)                 | 00BD0A    | 0000           | 6A C4 1A 9B 7D 09 F9 0A | 236 MHz   |           | 17 08 DD 5A 68 2E DF 88                            | 66 1D 2B #               |      |
| 2              | 4.225.169.384 38.41us  | 1  | Page Program #2(10)                 |           |                |                         | See Suite |           | BE 64 40 33 11 9A E6 8F                            | A8 48 1A 7               |      |
| 3              | 4.225.169.407 23.33ns  | 1  | BUSY START                          |           |                |                         |           |           | 99 D7 D8 75 F2 36 57 FF                            | BF 6D F9 4               |      |
| 4              | 4.225.169.967 559.94ns   | 1  | Read Status (70)                    |           |                | 80 80                   |           |           | SD 00 58 DD CR 52 DD CD                            | E0 00 00 0               |      |
| s              |  |  |                                     |           |                |                         |           | *** C -   |  |                          |      |
|                |  | -  |                                     | -         |                |                         |           | P.        | 細節 統計 Hide Items                                   |                          |      |
| T. 012.4       | E:0) E3#88 NAND Flash 00:00:06   | COLUMN AND STREET ADDRESS ADDR | m 1.00]                             |           |                |                         |           |           |  |                          |      |
| 85:213 (J      | LOUI COMME NAND FIRE (0000006  | LOUGELER COLORADOR (01   | 36 3.0)                             |           |                |                         |           |           |  |                          |      |
| -              | 晶定分析-untitled1.BFW* 🗶 🖉 🝶  | n  |                                     |           |                |                         |           |           |  |                          |      |
| mina           | when the second se | UL   |                                     |           |                |                         |           |           |  |                          |      |

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.



| Set Row Addressing ×   |
|--|
| Word Line W8 W7 W6 W5 W4 W3 W2 W1 W0   Plane P1 P0 *   Block B9 B8 B7 B6 B5 B4 B3 B2 B1 B0 *   UN L1 L0 Image: Bit Count Settings X   Row Addressing Name New X   Bit Count 8 Preview Bit Count 8   Row 3rd cycle N7 N6 N5 N4 N3   N7 N6 N5 N4 N3 N2 N1 N0 |
|  |
| OEfault Reset ✓ OK X Cancel  |

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           P1         P0           Block         B9           B8         B7           B6         B5           B1         B0 |   |
| ○ Default Reset ✓ OK X 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.

| Trigger Settings | × |
|------------------|---|
| Command          |   |
| 80h              |   |

# 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.

