

## ■ Introduction

Easy-to-use NAND analyzer system, provides effective solutions for operation verification of NAND memory given by various vendors, access time measurement, error analysis, detailed error cause analysis and measurement of ECC performance, etc.

The system consists of a mother board with FPGA (Altera Cyclone III); a daughter board with TSOP socket for NAND; and Windows-based analysis software.

## ■ Features

### 1. Mother board (Sp3991)

- Altera Cyclone III has been deployed.
- NAND controller in configuration ROM
- USB 2.0 for PC connection
- Connection with 2 daughter boards, 4 NAND can be measurable in the same time
- Customization is possible for more NAND measurement in the same time

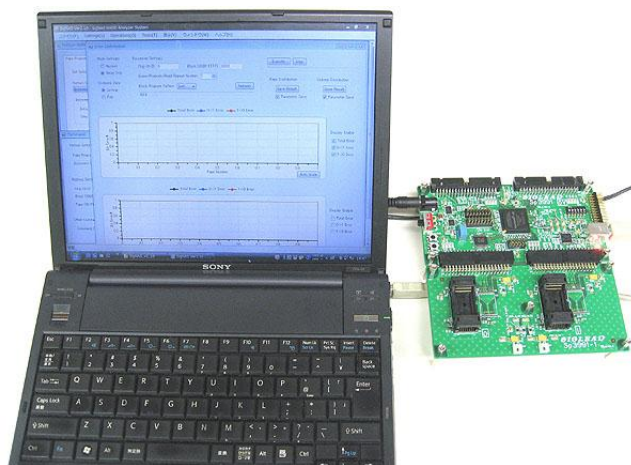
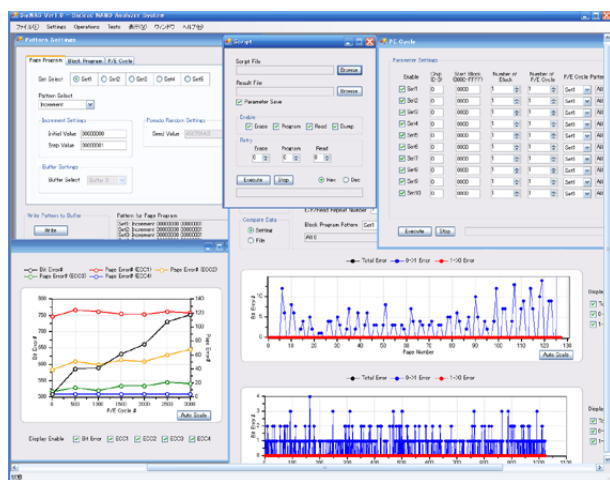
### 2. Daughter board

- TSOP48pin socket is deployed for NAND memory
- For 1 daughter board, it is possible to deploy 2 NAND
- Other type socket (BGA etc.) is available by option

### 3. Analysis software

An easy-to-use GUI enables: (part of features)

- NAND interface timing setting
- NAND device ID information and status check
- Bad block scan, management
- Access time measurement
- P/E cycle dependence of access time
- To send command (Erase, Program, Read)
- Program pattern setting (Increment, Pseudo Random, Page Stripe, etc.)



- Dump of read data and save to file
- P/E cycle (cycle number and program pattern programmable)
- Script execution (Siglead Script Language; SSL)
- Error rate measurement (Bit ER, Page ER after ECC)
- ECC power setting (code length and correctable bit number)
- Data retention measurement (time vs bit error)
- Program disturb measurement (P/E cycle vs bit error)
- Error distribution (page/column dependence)

## ■ Operable NAND devices

- ONFI 3.0-based devices (SLC / MLC / TLC)
- NAND IF : Asynchronous / Synchronous / Toggle DDR
- Package : TSOP 48pin, BGA 63/100/132/152pin
- Correct operation of latest NAND have been verified. (Toshiba 19nm, Micron/Intel 20nm, Samsung 21nm)
- In case that device doesn't work, please contact us, system adjustment can be tried to make it work

## ■ Support

- 1 year technical support (telephone and email)
- 1 year free version-up/bug-fix of analysis software
- For the support after 1 year since purchase, an extra support contract is needed

## ■ Deliverables

Deliverables of SigNAS consists of the following parts. Immediate analysis can be done at the date of delivery.

- Mother board (Sp3991)
- Daughter board with 2 TSOP socket
- Analysis software
- NAND controller circuit and firmware (implemented in configuration ROM)
- Operation manual

The content might change without a previous notice due to the improvement

Please contact us for further works such as customization and peripheral circuit design

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