

Smart I/O DDR5 Tester

User Manual

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<Smart I/O DDR5 Tester >

Brief Introduction

<Smart I/O DDR5 Tester > has multiple functions, the combination of simple operation interface, software and Smart I/O DDR5 Error Tester Error Detector allows users to experience higher speed and accuracy while using.

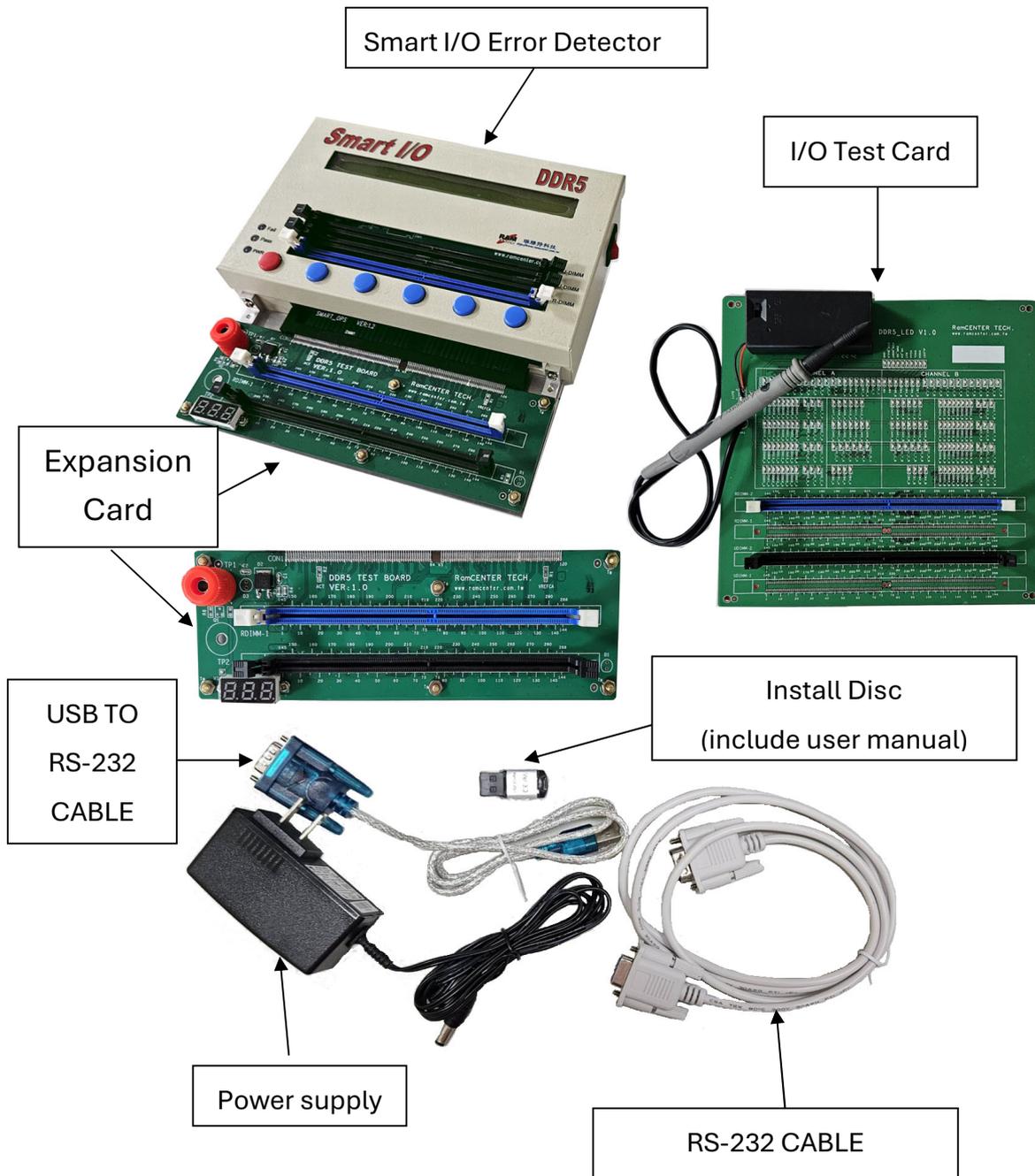
Function Description

<Smart I/O DDR5 Tester > provides the functions below:

1. Support DDR5 U-DIMM and R-DIMM module format
2. Able to run PCB cable Open/Short circuit functions on Smart I/O or through Windows system easily.
3. Provide a single module SPD recode function.
4. Wearable Error Detector allows you to use it anytime, anywhere.
5. Easy to operate with clear LCD functional interface.
6. Clear and easy understandable real-time display of memory module detecting status and measuring voltage
7. With RamCENTER I/O testing system software (Windows interface), you can run XMP EXPO for Overclocked Edition, Compilation of Manufacturing Information, Auto-generate Serial Code Recoding and Date Code.
8. RS-232 interface can be applied to RamCENTER I/O testing system (Windows interface) for other functional Expansion DIMM Sockets.
9. I/O testing card help corresponding Address and Date on the module when detecting OPEN/SHORT Circuit.

Package Contents

Please check the package contents. If there is any device shortage, please connect us.
The missing device will be delivered to you as soon as possible!



Information for first driver installation

For the computer without RS-232 cable and using the RS-232 To USB, please install the <HL-340.EXE>, from the installation software..

After installation, please move to Microsoft Management Console. The device *USB-SERIAL CH340* is under the Cable(COM and LPT). Choose COM1 if it is not the default.

If the picture on the right side occur, please check the driver of USB TO RS-232 port or the Cable option in management console for correct cable.



Installing USB TO RS-232 driver

The USB TO RS-232 cable is needed for installation. Install the <HL-340.EXE> from the installation Software.



※ The Com1 is the default for using the RS-232 cable. For using USB to RS-232 cable, check the COM cable in Computer Management.

Instruction Guide

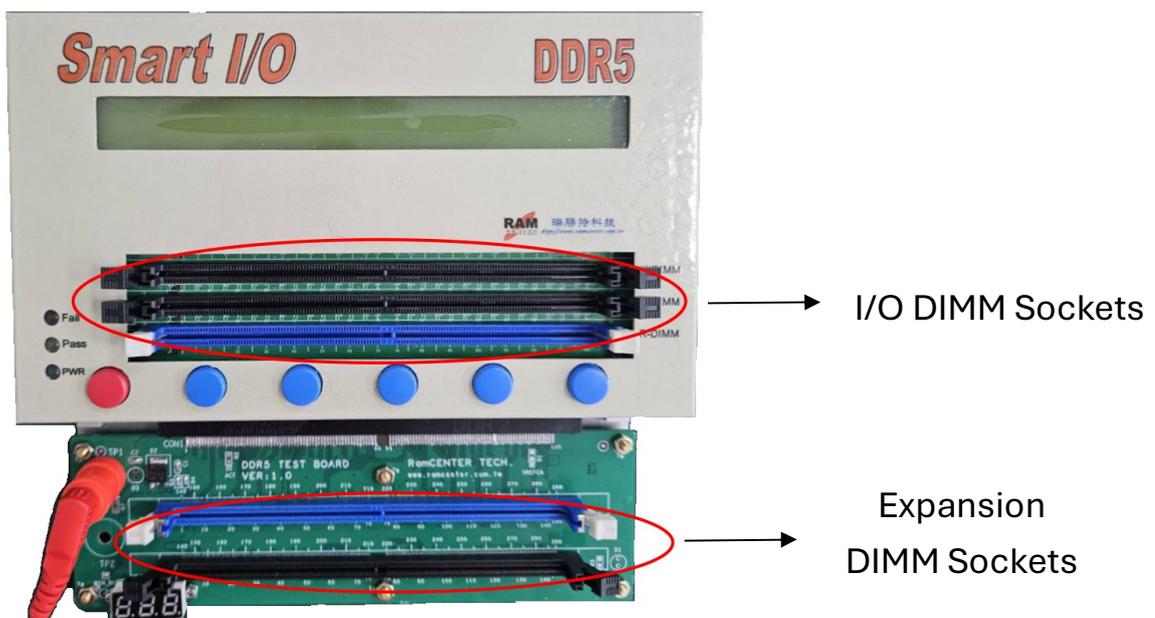
【Smart I/O DDR5 Tester】 has the 2 parts:

- A. Smart I/O DDR5 Tester
- B. Windows interface Smart I/O DDR5 Software

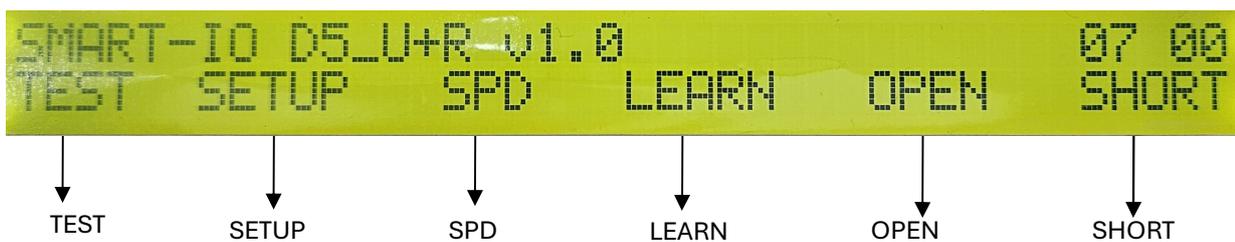
The following will make an instruction for each part.

Part A : Smart I/O DDR5 Tester

Smart I/O DIMM Sockets / Expansion DIMM Sockets



After powered up Smart I/O DDR5 Error Detector, 6 functions will be shown on the LCD screen. Please choose the button by contrasting the screen:



1. TEST : Test the condition of the module.
2. SETUP : Setting mode of < Power Short Circuit > 、 <Cable Open Circuit> 、 <Cable Short Circuit> 、 < SPD Recode > 、 < SPD Verify>
3. SPD : Single module SPD function.
4. LEARN : Expansion Sockets module learning mode.
5. OPEN : Module OPEN circuit testing.
6. SHORT : Module SHORT circuit testing.

Description of Error Detector Main Functions Page

※ To run TEST, OPEN, SHORT functions, insert an OK module into the “Expansion DIMM Socket”, press <LEARN> to start the learning, then chose for TEST, OPEN and SHORT or other functions.



※IO DDR5 Host port can run a single module READ, COPY, VERIFY functions. Expansion DIMM Socket support LEARN, TEST, OPEN, SHORT, READ, COPY, VERIFY functions.

1. TEST

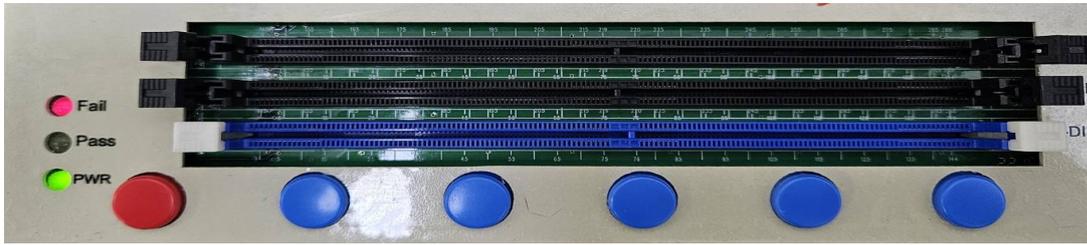
Insert the module into “Expansion DIMM Socket”, then press <TEST> to show the images below:



(3)



(4)



(5)



2. SETUP

Press <SETUP> on the home page to show the following image on Smart I/O screen:



3.SPД

Press <SPD> to run for a single module recording, and the screen will show the following image:



• .READ

Press <READ>, Smart I/O will read the SPD data from module, Smart I/O screen will show the following images:



```
READ DATA FROM MODULE (By SPD)
VERIFY DATA NOW...
```

```
READ DATA FROM MODULE (By SPD)
** READ OK **                AGAIN EXIT
```

When shown the images above, press <AGAIN> to READ again. There is no need to return to <SPD> function page to restart the process. Press <SPD> to return to function page while finishing reading.

If the module is not well inserted or SPD HUB is damaged, press <READ> to show the images below, press <AGAIN> to READ again. Press <Exit> to return to <SPD> function page while finishing reading.

```
READ DATA FROM MODULE (By SPD)
** READ FAIL:DATA FAIL      AGAIN EXIT
```

● COPY

Press <COPY> to copy SPD data to the module, the following images will be shown:

```
COPY DATA TO MODULE (By SPD)
COPY DATA NOW...
```

```
COPY DATA TO MODULE (By SPD)
VERIFY DATA NOW...
```

```
COPY DATA TO MODULE (By SPD)    04000002
** COPY OK **                    AGAIN EXIT
```

When the images above are shown, press <AGAIN> to <COPY> again. There is no need to return to <SPD> function page to restart the process. Press <SPD> to return to function page while finishing copying.

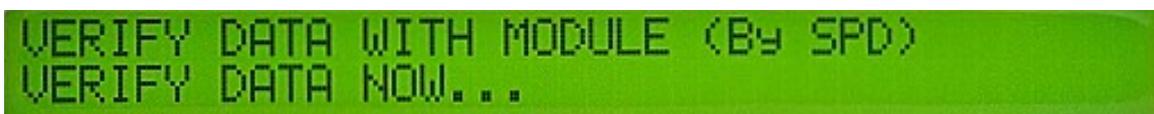
If the module isn't well inserted or SPD HUB is damaged, press <COPY> to show the images below, press <AGAIN> to copy again. Press <Exit> to return to <SPD> function page while finishing copying.



```
COPY DATA TO MODULE (By SPD)
** COPY FAIL:DATA FAIL      AGAIN EXIT
```

● *VERIFY*

Press <VERIFY>, Smart I/O DDR5 will verify SPD data from the module, and the following images will be shown:



```
VERIFY DATA WITH MODULE (By SPD)
VERIFY DATA NOW...
```



```
VERIFY DATA WITH MODULE (By SPD)
** VERIFY OK **              AGAIN EXIT
```

When the images above are shown, press <AGAIN> to <VERIFY> again. There is no need to return to <SPD> function page to restart the process. Press <SPD> to return to function page while finishing verifying.

If the module is not well inserted or SPD HUB is damaged, press <VERIFY> to show the images below, press <AGAIN> to verify again. Press <Exit> to return to <SPD> function page while finishing verifying.



```
VERIFY DATA WITH MODULE (By SPD)
** VERIFY FAIL:ADDRESS FAIL  AGAIN EXIT
```

● *VIEW-MODULE, TESTER, H_REG, and P_REG*

Pressing <VIEW> can display the SPD code in the Writer and module:

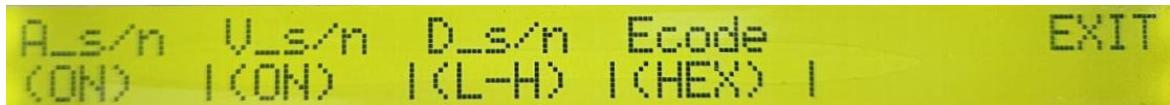
1. <MODULE >: Display the SPD code in the module.
2. <TESTER>: Display the SPD code in the Writer.
3. <H_REG>: Display the SPD HUB information in the module.
4. <P_REG>: Display the PMIC information in the module.



- SPD SETUP- A_s/n, V_s/n, D_s/n, and E_code

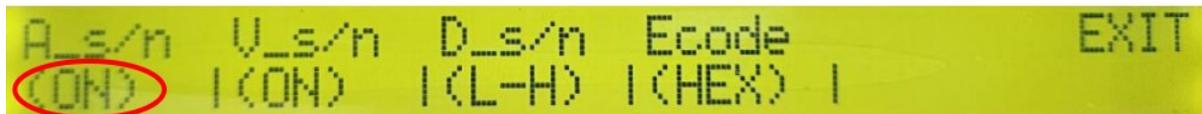
Following picture will appear when pressing <SETUP>. There are 4 modes that can be set.

Selecting <EXIT> can return to the homepage:



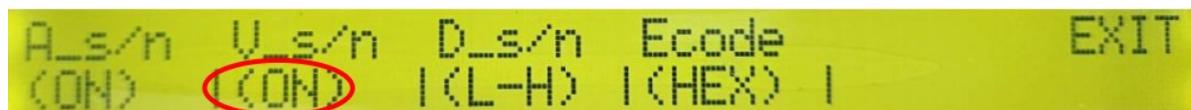
A_s/n=> <ON>: Auto setting serial number is on.

A_s/n=><OFF>: Auto setting serial number is off



V_s/n=> <ON>: Will verify all the SPD code information, including the serial number. The verification will fail if all the SPD codes are the same but the serial numbers are different.

V_s/n=><OFF>: Will verify all the SPD code information except the serial number. The verification will succeed even if the serial numbers are different, because the serial number is not in the verified condition.



D_s/n =>Can choose the arrangement of the serial number.

<H-L>: From high to low.

<L-H>: From low to high.

Ecode => Can choose the positional numeral system:

<HEX>: Hexadecimal

<DEC>: Decimal



4.

4. LEARN

Insert an OK module into “Expansion DIMM Socket”, press <Learn> to start learning then run for TEST, OPEN and SHORT functions.



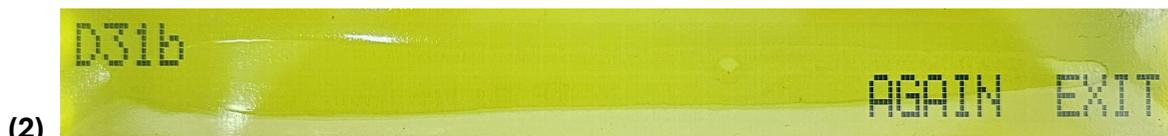
Press <DOWN> for the next page, <UP>, which is the first one on the left of <DOWN>, for the previous page. Selecting <EXIT> can return to the homepage when finishing the process.

5. OPEN

Insert the module into “Expansion DIMM Socket”, press <OPEN> to estimate if the module is having an OPEN Circuit.



If it is having an OPEN circuit, find out which Address or Date is wrong according to the shown information.

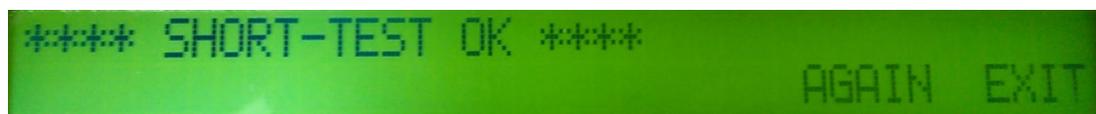


6. SHORT

Insert the module into “Expansion DIMM Socket”, press <SHORT> to see if the module is having a SHORT Circuit.



If it is not having a SHORT Circuit, the following image will be shown.



If it is having a SHORT Circuit, find out which is wrong according to the shown information.



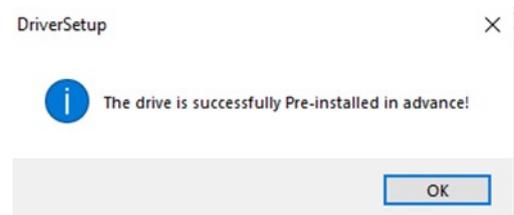
Use a probe to measure whether the voltage is normal



Part B : Windows interface Smart I/O DDR5 Software

Install USB to RS0232 driver

USB to RS-232 converter cable is needed when installing this driver.



Install <HL-340.EXE> from disc driver.

Install I/O DDR5 Tester Software

This software has an English and Tradionnal Chinese version. Choose the needed version from the <SETUP.EXE> from the installation USB to execute installation for Smart IO DDR5 Tester.

System Operation

The following image will be shown while entering Smart I/O DDR5 Tester software.



When entering the recoding system for the first time, users will be asked to set a code. After entering the system please log out then log in again.



When users log in, a code is required, all function will be available only with a correct code.



Please make sure the power of the Smart I/O is switched on before entering the system, if not, the image on the left will be shown:

According to different functions chosen on Windows homepage, the following will be explained them in 3 parts :

The screenshot shows the 'Smart I/O-DDR5' software interface. At the top, the menu bar includes 'File', 'Pinout', 'Tools', 'View', 'Window', and 'Help', with 'File' circled in red. Below the menu is a toolbar with various icons. The main window is divided into several sections:

- Byte0 Value:** A field showing '30' with a dropdown arrow.
- Number of Bytes in SPD Device:** A field with '30' and a dropdown arrow.
- Checksum:** Radio buttons for 'Checksum', 'CRC', and 'None', with 'CRC' selected.
- 0-511 Byte / 512-1023 Byte:** Two tabs for selecting the SPD data range.
- DDR5 SPD Information (DDR-5):** A detailed parameter list including:
 - Memory Type: DDR5 SDRAM
 - DIMM Type: Unbuffer-DIMM
 - Module Density: 16 GB
 - Module Ranks: 1 Ranks
 - Module Speed: 5600 MHz
 - Module Bus Width: 2 ch 64 bit(32/32)
 - Module Voltage: 1.1/1.1/1.8 V
 - SDRAM Density: 2 Gb
 - SDRAM Width: 8 bit
 - SDRAM Banks: 4 Banks 8 Groups
 - Number of Row: 16
 - Number of Col: 10
 - CL Support: 22 28 30 32 36 40 42 46
 - CL-tAA: 16422 ps (46T)
 - tRCD: 16422 ps (46T)
 - tRP: 16422 ps (46T)
 - tRAS: 32130 ps (90T)
 - CRC (0-509): C09B
 - Serial Number: 00000000
 - Part Number: 516S5600CL460S
 - DRAM ID: 80CE (SAMSUNG)
 - Module ID: 0000
- UDIMM Channel A and B:** Pinout diagrams for two channels, showing pins D0-D31, DM0-DM3, RS0-RS3, LS0-LS3, and CA0-CA12.
- Test Options:** A section with a 'Test' button and a list of test functions:
 - Power Test (selected)
 - Open Test (selected)
 - Short Test (selected)
 - Copy SPD (unselected)
 - VVerify SPD (unselected)
 - Tester Key Lock (unselected)
 - Auto S/N (unselected)
 - S/N no Verify (selected)
 - Auto S/N Encode(HEX) (selected)
 - Auto S/N Direction(Low to High) (selected)
 - SPD Write Protect (unselected)

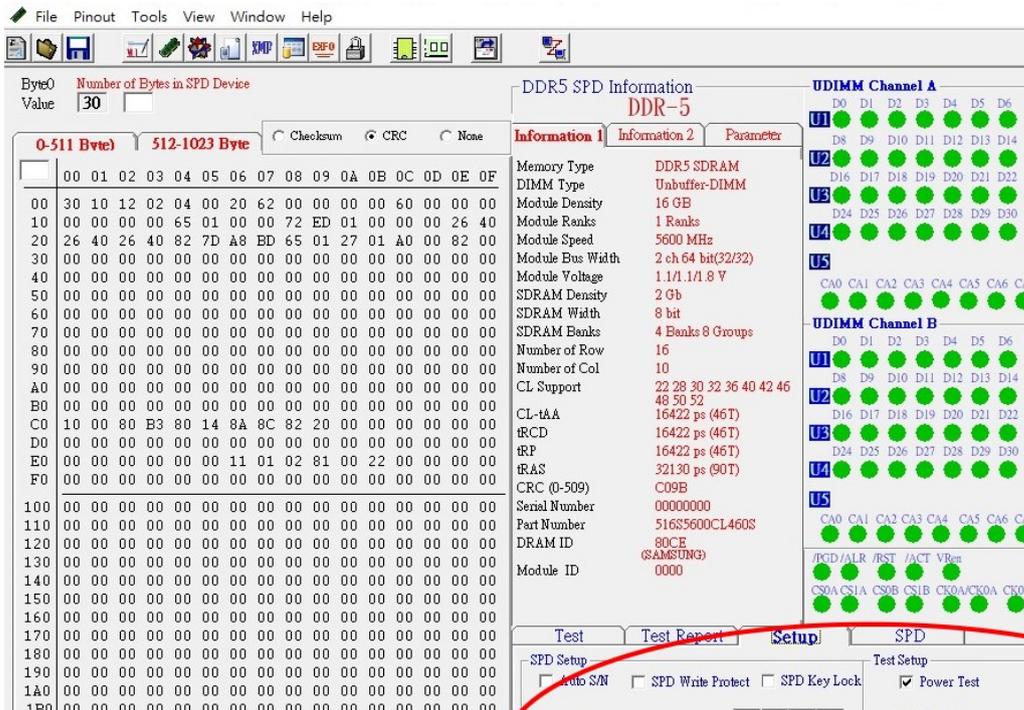
Part I Test Setting

IO Test Setup

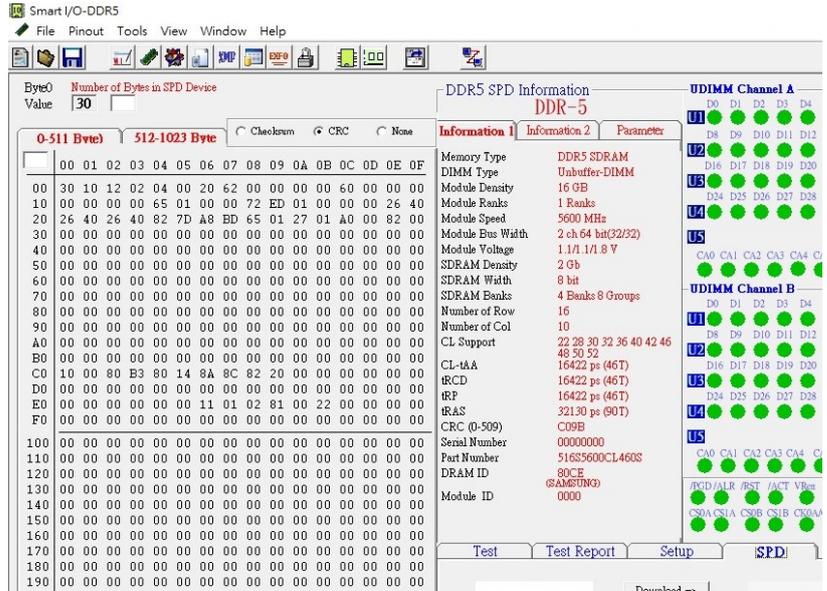
Choose different functions according to your needs:

<Power Short Circuit>, <Cable Open Circuit>, <Cable Short Circuit>, <SPD Record>, <SPD Verify>, <SPD Write Protect>, <SPD Key Lock>

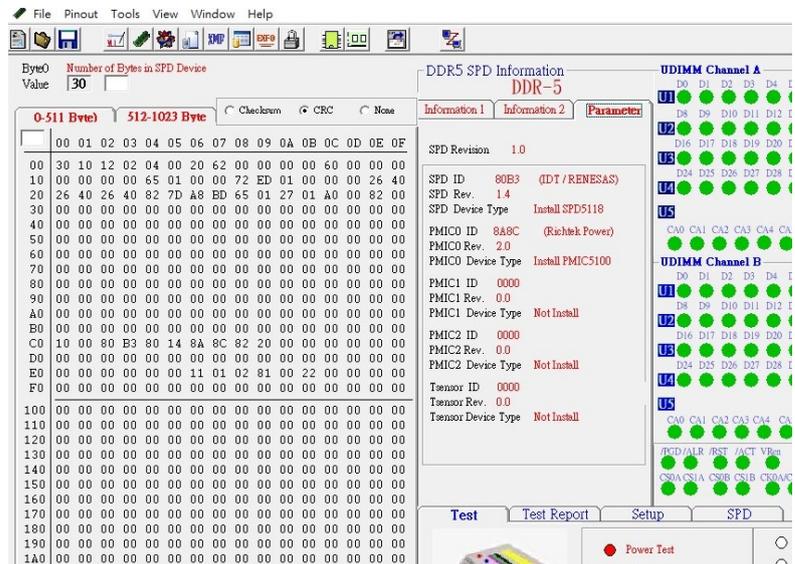
After setting, press <SETUP> to save then choose <TEST> for further testing instructions.



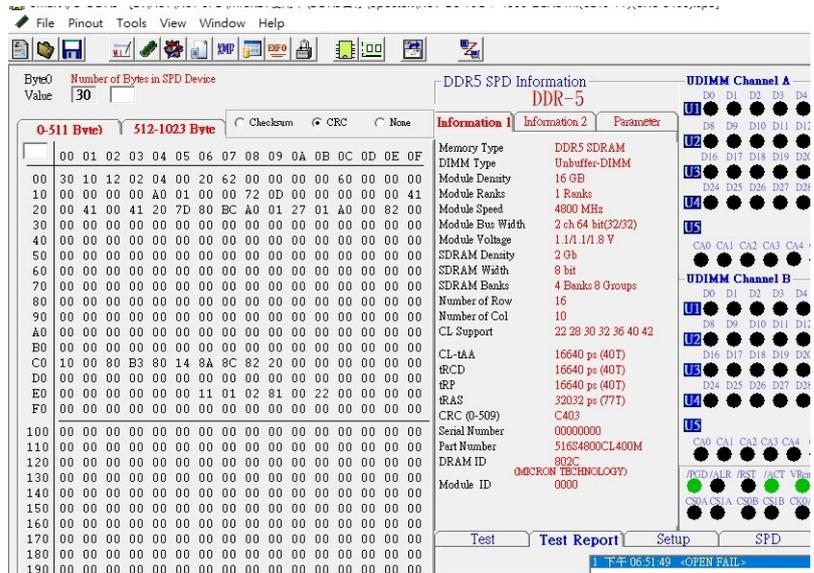
To run testing, insert an OK module into the “Expansion DIMM Socket”, press <LEARN> on Smart I/O DDR5 or click <LEARN> on the software to start the learning, then run for further instructions.



※ Press <TEST> to start testing.



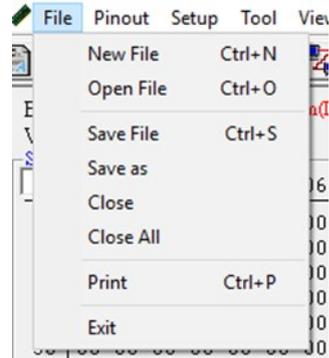
Choose <Test Report> to check the testing process records



Part II Toolbar Function

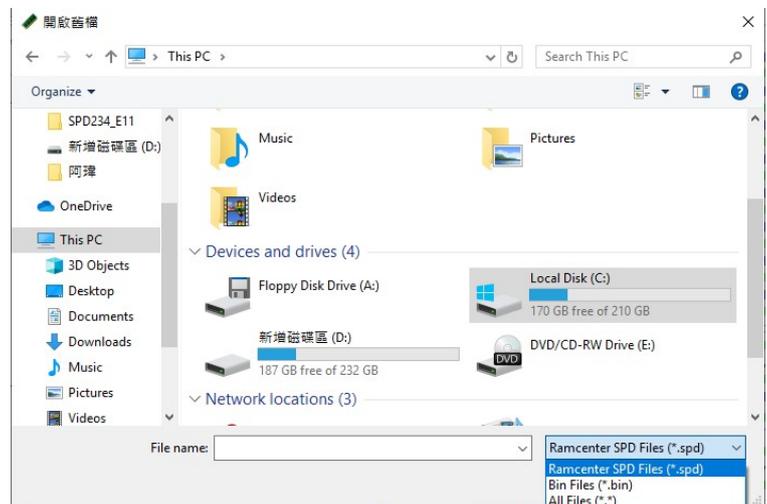
<File> Function

Description for the selected functions:



New File: After opening a new file, SPD data can be edit from the homepage.

Open File: Open a file, it supports for *.BIN and *SPD file format.



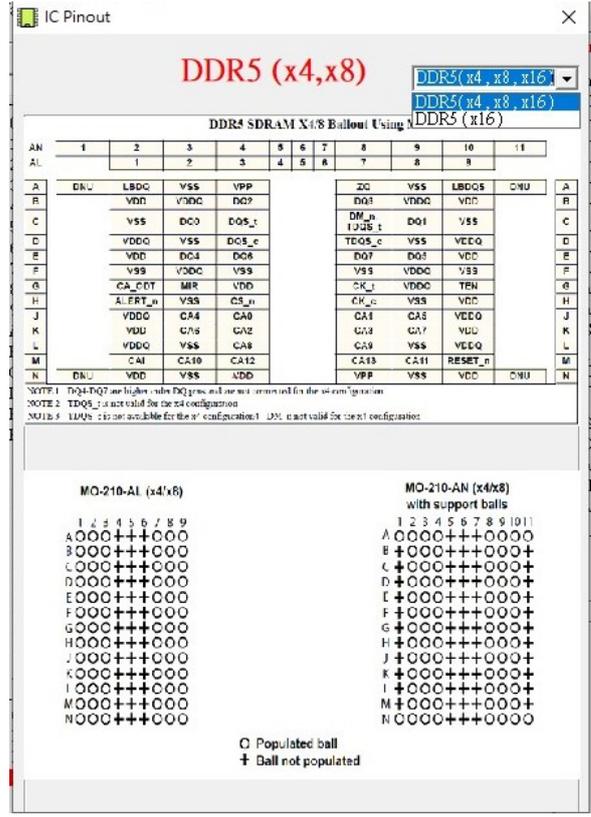
<Pinout> Function

IC Pinout and Module Pinout.

Module Pinout

DDR5-UDIMM288

PIN	NAME	PIN	NAME	PIN	NAME	PIN	NAME	PIN	NAME
1	VDD_EULR	12	D25a	85	A08b	127	RS2b	160	R81a
2	R_FU	44	VSS	80	VSS	128	VSS	176	VSS
3	R_FU	45	D03a	87	A09b	129	D20b	171	D14a
4	RESCL	46	VSS	88	A0Ab	130	VSS	172	VSS
5	RS7A	47	D78a	89	VSS	131	D11b	173	D15a
6	VSS	48	VSS	90	A02b	132	VSS	174	VSS
7	R_FU	49	D29a	91	A05b	133	D24b	175	D10a
8	VSS	50	VSS	92	VSS	134	VSS	176	VSS
9	D06a	51	D22a	93	C09b	135	D27b	177	D19a
10	VSS	52	VSS	94	VSS	136	VSS	178	VSS
11	D01a	53	D33a	95	RS1T	137	D03b	179	D02a
12	VSS	54	VSS	96	VSS	138	VSS	180	VSS
13	VSS	55	VSS	97	D12b	139	D13b	181	D23a
14	R80a	56	R84a	98	VSS	140	VSS	182	VSS
15	VSS	57	VSS	99	D17b	141	D29b	183	D22a
16	D04a	58	C00a	100	VSS	142	VSS	184	VSS
17	VSS	59	VSS	101	D00b	143	R_FU	185	D26a
18	D05a	60	A00a	102	VSS	144	R_FU	186	VSS
19	VSS	61	A01a	103	D01b	145	VSS	187	VSS
20	D01a	62	VSS	104	VSS	146	VSS	188	VSS
21	VSS	63	A04a	105	VSS	147	R_FU	189	VSS
22	D09a	64	A06a	106	R50b	148	ISA	190	R23a
23	VSS	65	VSS	107	VSS	149	R_FU	191	VSS
24	D01a	66	A08a	108	D04b	150	VSS	192	D00a
25	VSS	67	A10a	109	VSS	151	D05b	193	VSS
26	D12a	68	VSS	110	D06b	152	R_FU	194	D11a
27	VSS	69	A12a	111	VSS	153	VSS	195	VSS
28	D13a	70	R_FU	112	D08b	154	D02a	196	D34a
29	VSS	71	VSS	113	VSS	155	VSS	197	VSS
30	D16a	72	C03a	114	D09b	156	D03a	198	D35a
31	VSS	73	C05a	115	VSS	157	VSS	199	VSS
32	D17a	74	VSS	116	D11b	158	D04a	200	ALR
33	VSS	75	R_FU	117	VSS	159	VSS	201	VSS
34	RS2a	76	R_FU	118	D12b	160	D05a	202	CS1a
35	RS2a	77	VSS	119	VSS	161	VSS	203	VSS
36	VSS	78	C07b	120	D13b	162	D07a	204	A01a
37	D08a	79	C08b	121	VSS	163	VSS	205	A04a
38	VSS	80	VSS	122	D14b	164	D13a	206	VSS
39	D01a	81	R_FU	123	VSS	165	VSS	207	A05a
40	VSS	82	A12b	124	D17b	166	D11a	208	A07a
41	D04a	83	VSS	125	VSS	167	VSS	209	VSS
42	VSS	84	A10b	126	LS2b	168	LS1a	210	A09a



<T
ool
> Function

Smart I/O-DDR5

File Pinout Tools View Window Help

Manufacture Information

SPD Timing
SPD Wizards
XMP View(INTEL)
XMP Wizards(INTEL)
EXPO View(AMD)
EXPO Wizards(AMD)
SPD Write Protect

Byte0 Number Value 30

0-511 Byte

00	01	0
00	30	10
10	00	00

1. Manufacturing Information : Set the information and parameters for the module.

DDR5 Manufacturer Information

Module Information	Module Parameter	ID Re
Module ID (512-513)	00	00
Location (514)	00	
Date (515-516)	00	2024/7/27 weeks
Serial Number (517-520)	00	00
DRAM ID (552-553)	80	CE (SAMSUNG)
Part Number (521-550)	51685600CL460S	
Revision (551)	00	
Specific Data (555-590)		

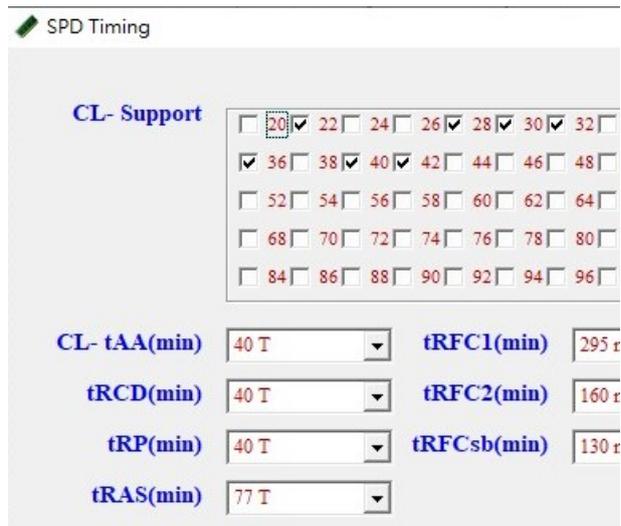
DDR5 Manufacturer Information

Module Information	Module Parameter	ID Re
DRAM Manufacture	Samsung (80CE)	SK Hynix (80AD)
	Speck (02B5)	Nanya (030B)
	Elpida (02FE)	PSC (04C8)
	JHICC (0C83)	CXMT (0A9)
Module Manufacture	RamCENTER (09A4)	Kingston (0198)
	Transcend (014F)	Patriot (040D)
	Team Group (04EF)	Innodisk (06F1)
	Ramsoel (0198)	POWEY (0C1C)
	Pezara (0770)	QuanXing (0C38)
SPD-HUB Manufacture	IDT/Renesas (80B3)	Montage Tech. (0632)
	Puya Semi. (09B5)	Rambus (069)
PMIC Manufacture		

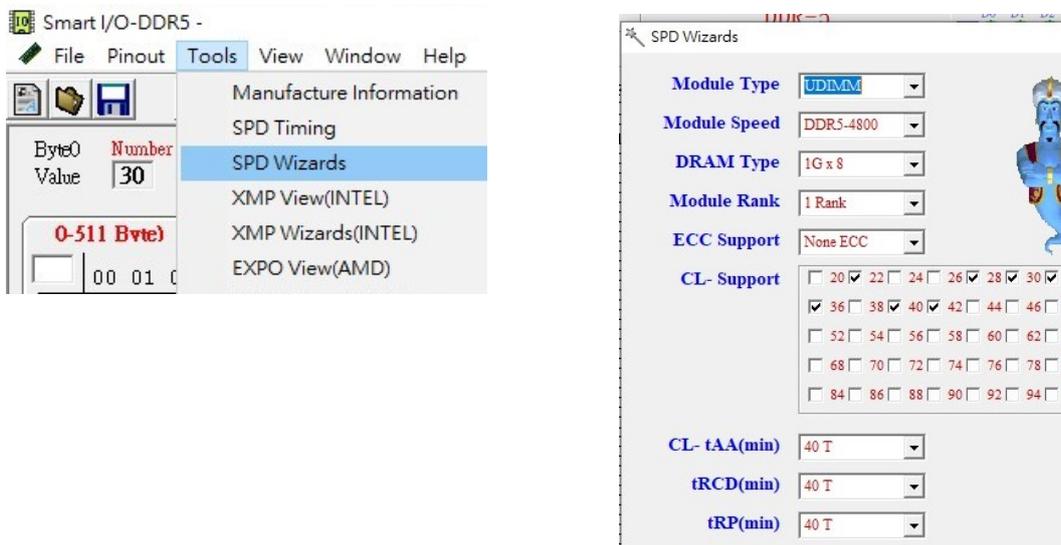
DDR5 Manufacturer Information

Module Information	Module Parameter	ID Re
SPD ID	80	B3 (IDT/RENESAS)
SPD Rev.	1.4	
SPD Type	Installed	SPD 5118
PMIC0 ID	8A	8C (Richtek Power)
PMIC0 Rev.	2.0	
PMIC0 Type	Installed	PMIC 5100
PMIC1 ID	00	00
PMIC1 Rev.	0.0	
PMIC1 Type	Not installed	PMIC 5000
PMIC2 ID	00	00
PMIC2 Rev.	0.0	
PMIC2 Type	Not installed	PMIC 5000
Tsensor ID	00	00
Tsensor Rev.	0.0	

2. SPD Timing : Change the timings of SPD.



3. SPD Wizards : Establish the needed specification for SPD by wizard.



There are 3 tabs for DDR5 module information in “DDR5 SPD information” in the mainpage.

The image shows three screenshots of the SPD Information interface, each with a different tab selected.

Information 1 Tab:

Parameter	Value
Memory Type(2)	Reserved
DIMM Type(B)	Unbuffered
Module Density(1F)	-----
Module Ranks(5)	Undefined
Module Speed(9)	Undefined
Interface Level(8)	TTL
SDRAM Density	16 Mb
SDRAM Width(D)	N/A
Refresh Time(C)	15.625us
Number of Row(3)	Undefined(B1)/
Number of Col(4)	Undefined(B1)/
CL Support(12)	Undefined
Trp(1B)	Undefined
Trrd(1C)	Undefined
Trcd(1D)	Undefined
Tras(1E)	Undefined
Checksum(3F)	00
JEDEC ID (40-47)	0000000000000000
Location(48)	00

Information 2 Tab:

Parameter	Value
Manufacture Location	---
Manufacture Date	---
Specific Data	-----

Parameter Tab:

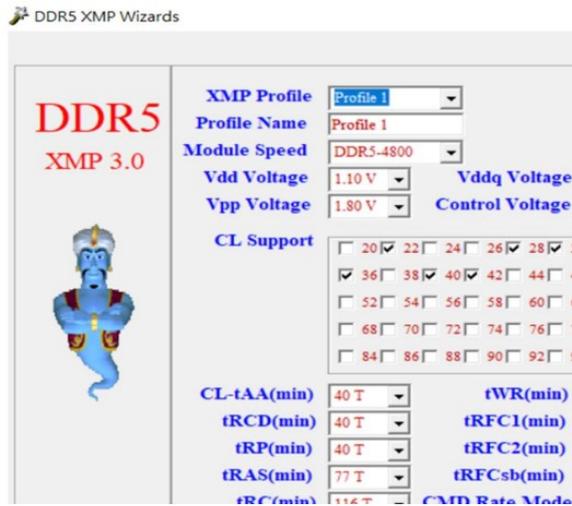
Parameter	Value
SPD Revision	00
SPD ID	0000
SPD Rev.	00
SPD Device Type	-----
PMIC0 ID	0000
PMIC0 Rev.	00
PMIC0 Device Type	-----
PMIC1 ID	0000
PMIC1 Rev.	00
PMIC1 Device Type	-----
PMIC2 ID	0000
PMIC2 Rev.	00
PMIC2 Device Type	-----
Tsensor ID	0000

3. XMP View(Intel): Show the information of XMP.

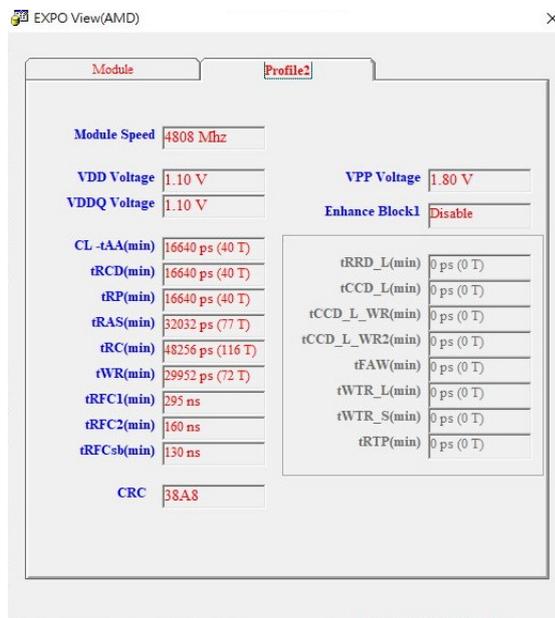
The image shows the XMP View interface with the following parameters:

Module	Profile1	Profile2
Profile Name	Profile 1	
Module Speed	5208 Mhz	
VPP Voltage	1.80 V	
VDD Voltage	1.10 V	
VDDQ Voltage	1.10 V	
Control Voltage	1.10 V	
CL Support	22 26 28 30 32 36 40 42 46 48	
CL -tAA(min)	16128 ns (42 T)	
tRCD(min)	16128 ns (42 T)	
tRP(min)	16128 ns (42 T)	
tRAS(min)	52256 ns (84 T)	
tRC(min)	48384 ns (126 T)	
tWR(min)	29952 ns (78 T)	
tRFC1(min)	295 ns	
tRFC2(min)	160 ns	

4. XMP Wizards(Intel): Establish the needed specification for XMP by wizard.

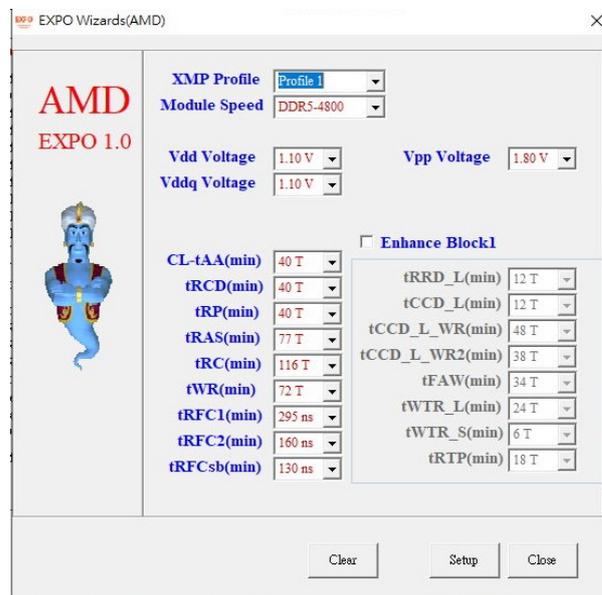


3. EXPO View(AMD): Show the information of EXPO.



4. EXPO Wizards(AMD): Establish the needed specification for EXPO by wizard.

Establish the needed



SPD Write Protect: Setting the writing protect for the block in needed

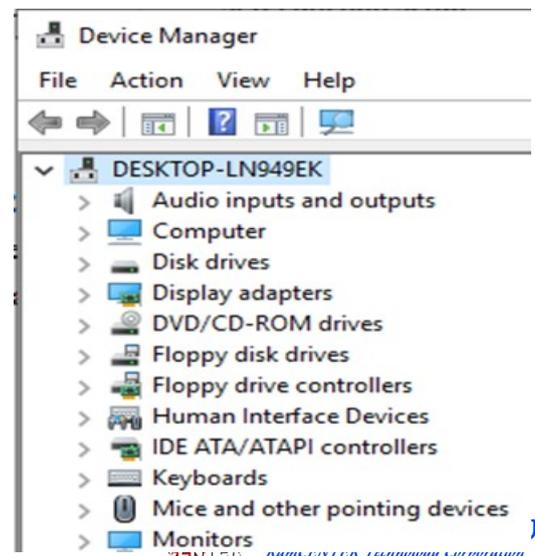
<View> Function



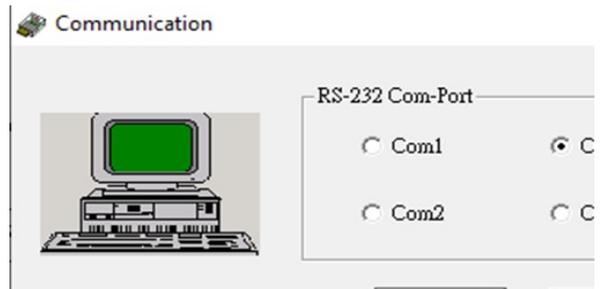
Password Setting : Besides the first code setting, the code may be changed here.



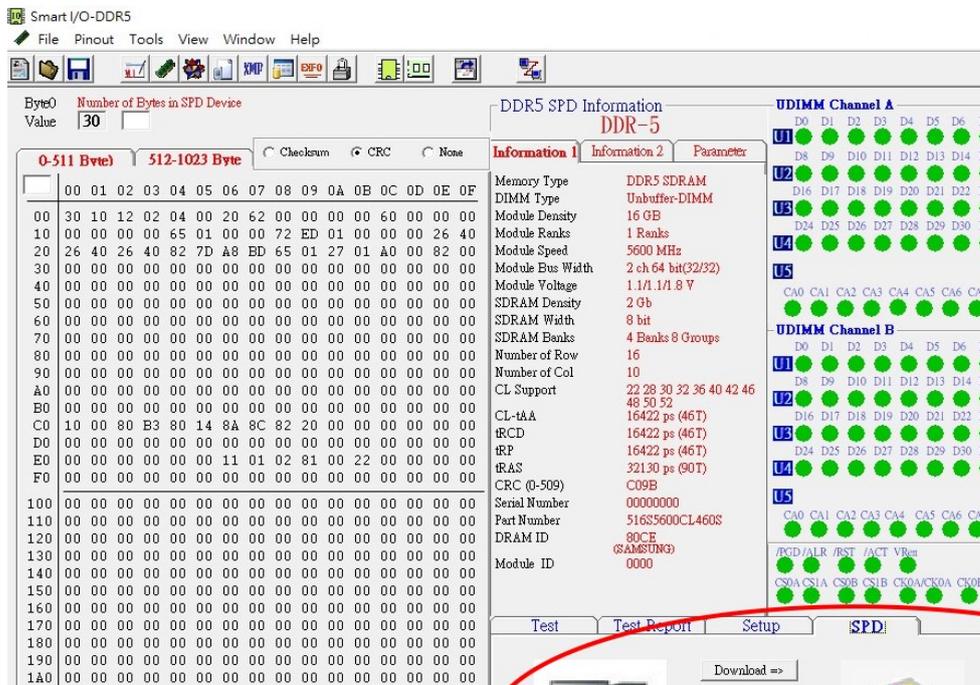
Communication: Choose the connecting port.



RS-232 cable is preset to be Com1. For USB to RS-232 converter cable, please check Device Manager for the COM port, as the following images show:



Part III SPD testing

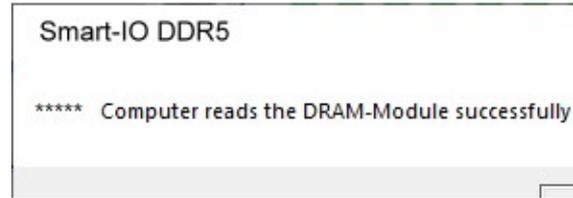
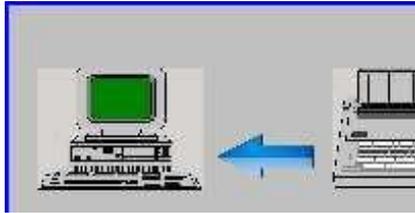


SPD functions on client:

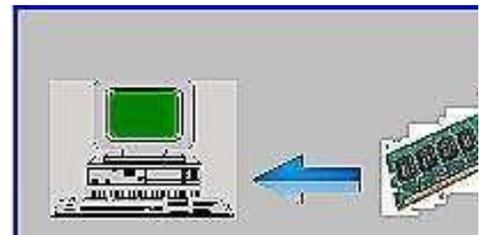
1. Download : Write in the SPD data from the module of Smart I/O shown on the client. The following images will be shown when writing success.



Read Tester: Load the SPD data which are saved in client and show the detail information on the computer screen. The following images will be shown when loading success.



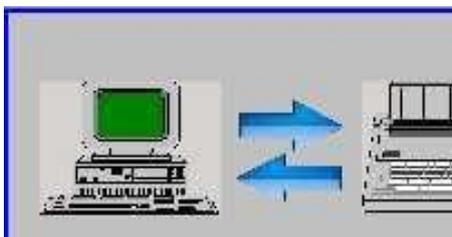
Load Module: Loading SPD data of module into PC Smart I/O and show the detail information. The following images when loading success.



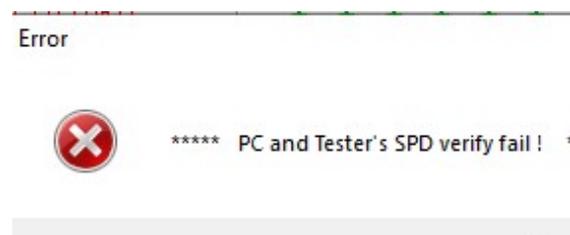
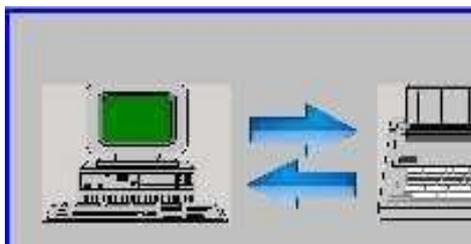
Error will be shown when the module is not well inserted or SPD HUB is damaged:



Verify: Verify if the SPD data on Smart I/O match to data on PC-side.

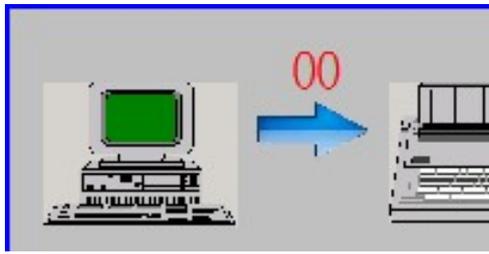


Verify Successfully

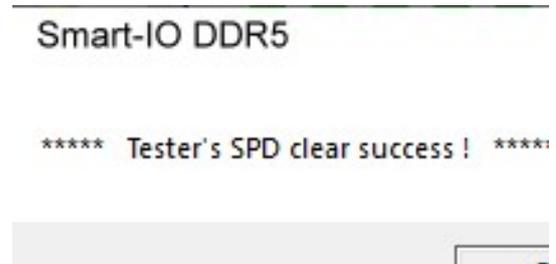


Verify Failure

Clear (00): Clear SPD data on Smart I/O.



Clearing



Clear success

IO Testing functions on the Smart I/O:

1. READ: Read the SPD data from module which is inserted in Smart I/O Error Detector and save the data in the host.
2. COPY: Copy SPD data from Smart I/O Error Detector to the module
3. VERIFY: Verify SPD data recorded from Smart I/O Error Detector with the SPD data from the module.
4. LEARN: Learn the mode of <Open Circuit> and <Short Circuit> on the module from Expansion Slot.

I/O Testing card:

I/O Testing card help corresponding Address and Date on the module while running OPEN/SHORT functions.

