5S-ICE

User Manual

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Table of content

Revision History:

Revision	Date	Description
0.01	2017/05/23	1st version
0.02	2018/11/05	1. Updated company address & Tel No. 2. Amend section 2.1 3. Amend section 2.4.(8) 4. Amend section 3.3.(3) 5. Add chapter 4. 5S-I-S02B emulator

1. 5S-ICE family emulator

1.1. Foreword

PADAUK Technology provides the simulation tools of 5S-I-Sxx family emulator to support 1 FPPA IC simulation. 5S-I-Sxx family emulator should be combined with IDE software which is also developed by PADAUK Technology for normal simulation.

1.2. Support IC series

5S-I-Sxx support the function to simulate the following IC series:

◆   PMC series 1FPPA product

◆   PMS series 1FPPA product

1.3. Accessories in 5S-ICE

5S-I-Sxx emulator and its accessories:

◆   5S-I-Sxx (In-Circuit Emulator) * 1

◆   USB cable * 1

1.4. Software downloading

The 5S-I-Sxx application software IDE can be downloaded from the following PADAUK Technology website:

http://www.padauk.com.tw/tw/technical/index.aspx?kind=13

When the 5S-I-Sxx application software IDE has been downloaded, Please unzip it and install it in your computer. Use USB cable to connect the 5S-I-Sxx and the USB interface of the computer. Then, open FPPA IDE to start the simulation work.

2. 5S-I-S01 Standard single-core emulator

2.1 Introduction of 5S-I-S01 emulator

As the standard single-core emulator, 5S-I-S01 is built with a variety of protective circuits (output over-current detection, negative voltage detection, over-voltage detection, output voltage abnormality detection, and circuit disconnected protection) to detect ICE internal damage due to abnormal external connection.

The 5S-I-S01 can also be conveniently powered directly through a USB cable for simulation. It does not need to be powered through another set of DC9V power adaptor, but it also retains a power adaptor interface of 9V, which is suitable for the situation that large output current is required.
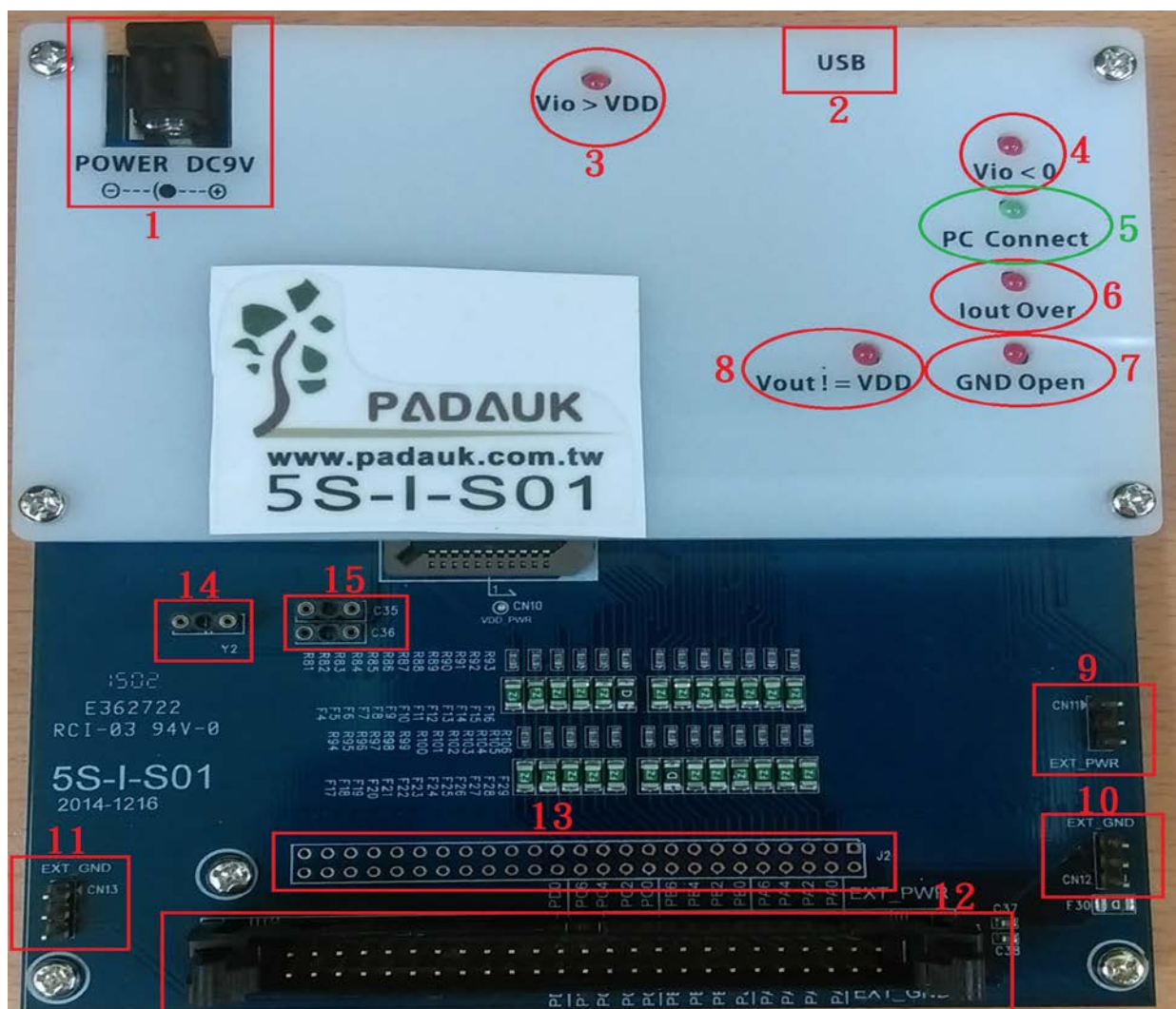
2.2 Appearance of 5S-I-S01

Fig.1: Front of 5S-I-S01

Fig.2: Top of 5S-I-S01

2.3 Description for 5S-I-S01 appearance

(1) Power interface:

DC9V power adapter

(When the emulator power needs to output large current, it is recommended to connect the power adapter of DC9V.)

(2) Mini-USB connector:

Connect PC to provide ICE power and data transfer.

(3) Abnormal LED indicator (Vio > VDD):

When the IO pin detects a input voltage exceeding VDD, the LED will be on. Please check whether the external signal is normal.

(4) Abnormal LED indicator (Vio < 0):

When the IO pin detects a negative input voltage, the LED will be on. Please check whether the external signal is normal.

(5) PC Connect LED indicator (PC Connect):

ICE state	PC Connect LED indicator
ICE powered on and failed to test the USB driver	LED off
ICE powered on and test the USB driver successfully	LED Flicker in 0.5Hz frequency
ICE is powered on and has downloaded emulation programs through IDE software	LED Flicker in 1.5Hz frequency

(6) Abnormal LED indicator (Iout Over):

This LED will be on when ICE output power consumes more than 50~60mA. Please check whether the external signal is normal.

(7) Abnormal LED indicator (GND Open):

When the GND of ICE has a large current passing by, the duplex fuse on ICE will jump off the GND line and turn on this LED. Please check whether the external signal is normal.

(It usually occurs on AC resistance/capacitance circuit, the current loop is from AC circuit board ➔ ICE ➔ USB ➔ PC ➔ GND ➔ AC circuit board.)

(8) Abnormal LED indicator (Vout != VDD):

When the dropout voltage between ICE internal output power and external input power is too large, this LED will be on. Please check whether the external signal is normal.

(9) ICE power output interface (CN11):

CN11 is a common connection pin of 3Pin, which is provided by ICE with a positive power (+V) output interface. The text is marked as EXT_PWR.
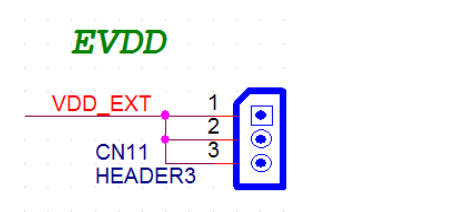

Fig.3: CN11 schematic diagram

(10) ICE power ground output interface (CN12):

CN12 is a common connection pin of 3Pin, which is powered by ICE (0V) output interface (external common ground interface). The text is marked as EXT_GND.
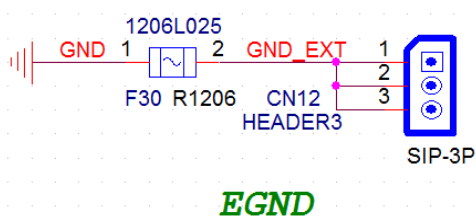

Fig.4: CN12 schematic diagram

(11) ICE power ground output interface (CN13):

CN13 is a common connection pin of 3Pin, which is powered by ICE (0V) output interface (external common ground interface). The text is marked as EXT_GND.
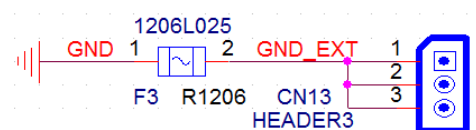

Fig.5: CN13 schematic diagram

(12) ICE_IO output interface (J3):

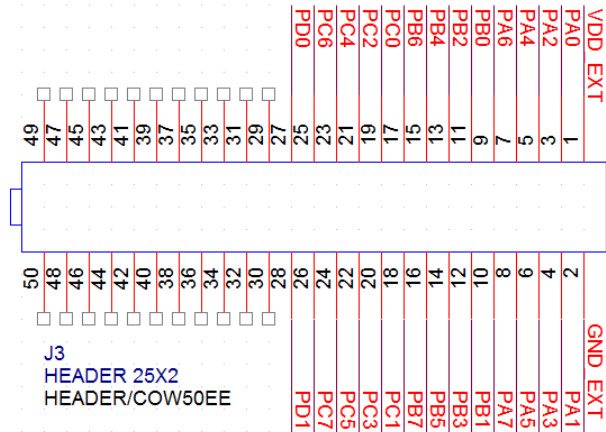Simulation chip's IO output pin interface.

Fig.6: J3 schematic diagram

(13) ICE_IO measurement contacts (J2):

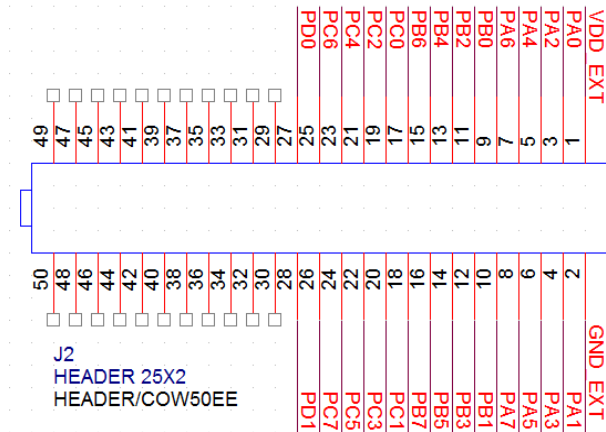Simulation chip's IO output measurement pin, for signal detection.

Fig.7: J2 schematic diagram

(14) External Crystal Oscillator interface (Y2):

When an external crystal oscillator is used in the simulation Chip, the crystal must be connected to this interface.

(15) External Crystal Oscillator capacitance interface (C35; C36):

When the external crystal oscillator is used in the simulation Chip, the external capacitor is connected to this interface.
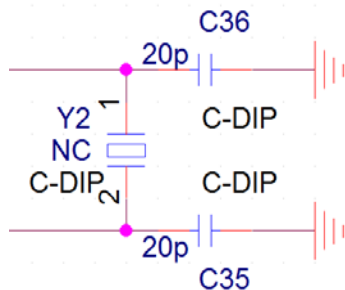

Fig.8: External Crystal& capacitor Y2, C35&C36

2.4 Notes for using 5S-I-S01

(1) 5S-I-S01 can be powered by USB alone.

(2) The minimum working voltage of the 5S-I-S01 can be 1.9V, but if below 2.4V, the accuracy of the ADC will be affected.

(3) PA6 / PA7 of 5S-I-S01 and external high-speed Crystal or external low-speed Crystal belong to different joints. It can reduce various problems of vibration.

external high-speed Crystal: 500 KHz ~ 16 MHz, must be external
external low-speed Crystal: 32KHz, already welded

(4) When 5S-I-S01 at SYSCLK=EOSC/1, the capacitance (C36) at XIN port must not be omitted, otherwise it will cause some phenomena of instability.

(5) When switching from external high speed Crystal to IHRC/n, user must enable IHRC module firstly.

```
$ CLKMD EOSC/2, ...;
...
CLKMD.En_IHRC   =   1;
nop;
$ CLKMD IHRC/2, En_IHRC, ..;
```

(6) 5S-I-S01 does not support LVR Reset/PA5 Reset, nor does it have the function of Fast Boot-up, so the time required for the Reset between Watchdog Reset/Code Reset and IC will be different. It is recommended not to do any functions about Reset to avoid these problems.

(7) In the debugging mode of 5S-I-S01, if SYSCLK is between IHRC/2 and IHRC/16, PWM output remains unchanged.

On the contrary, SYSCLK will be temporarily changed to IHRC/4 and cause the output frequency of PWM to change (but PWM Duty remains unchanged).

(8) When in the debugging mode of 5S-I-S01, SP and CLKMD are not allowed to be modified.

2.5 5S-I-S01 simulation power setting

The operating power supply of 5S-I-S01 has three settings:

(1) ICE internal settings adjusted.

(2) VDD ICE internal settings are adjusted and output to external VDD.

(3) ICE external VDD input voltage as ICE reference power.

When the IDE detects a new ICE connection, the ICE power switch can be controlled in the way of the following picture shows:
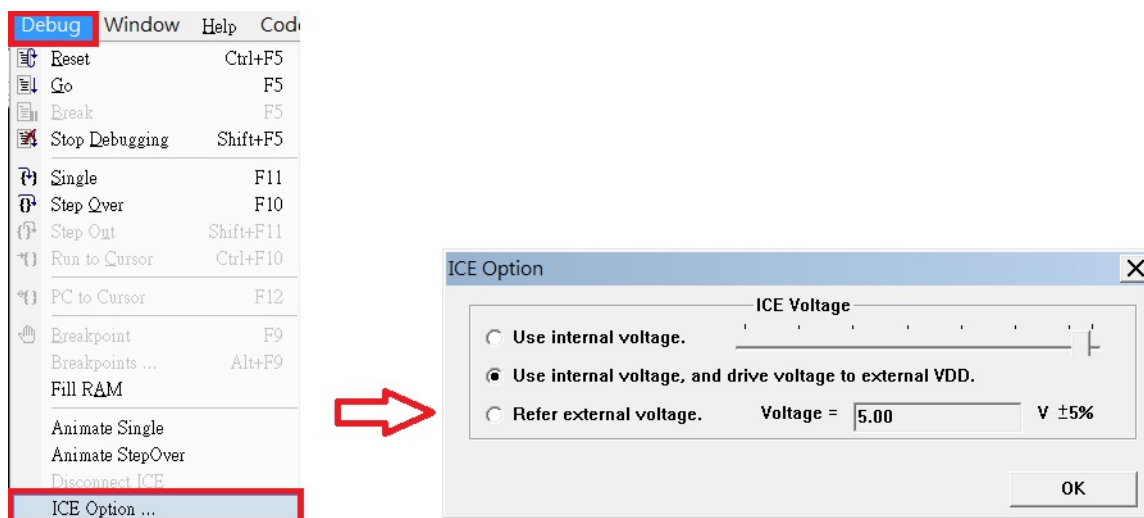

Fig.9: ICE simulation power setup menu

2.6 Simulation compatibility

Please refer to Chapter 9 of each IC's datasheet.

2.7 Simulator troubleshooting

(1) When ICE and USB are not stable online, "Storage fail from XXX" messages frequently appearing on the computer, please check whether the USB Cable is too long.

(2) Please remove all ICE and Writer and close the IDE when ICE and USB are connected abnormal and retry is invalid, and then reconnect. If it still does not work, please shut it down and start again.

(3) When ICE detects instability in use, FreeRun is frequently found to stop automatically, or other abnormal conditions, please check:

A. Whether the operating power of ICE is too low and SYSCLK is too fast.

B. Whether the IO pin has negative voltage or higher than VDD voltage input.

3. 5S-I-S02 simple type single-core emulator

3.1 Introduction of 5S-I-S02 emulator

The 5S-I-S02 is a simple type single-core simulator provided by PADAUK Technology. The design of 5S-I-S02 is characterized by more exquisite and less space, etc. 5S-I-S02 is fully compatible with the emulation function of 5S-I-S01.
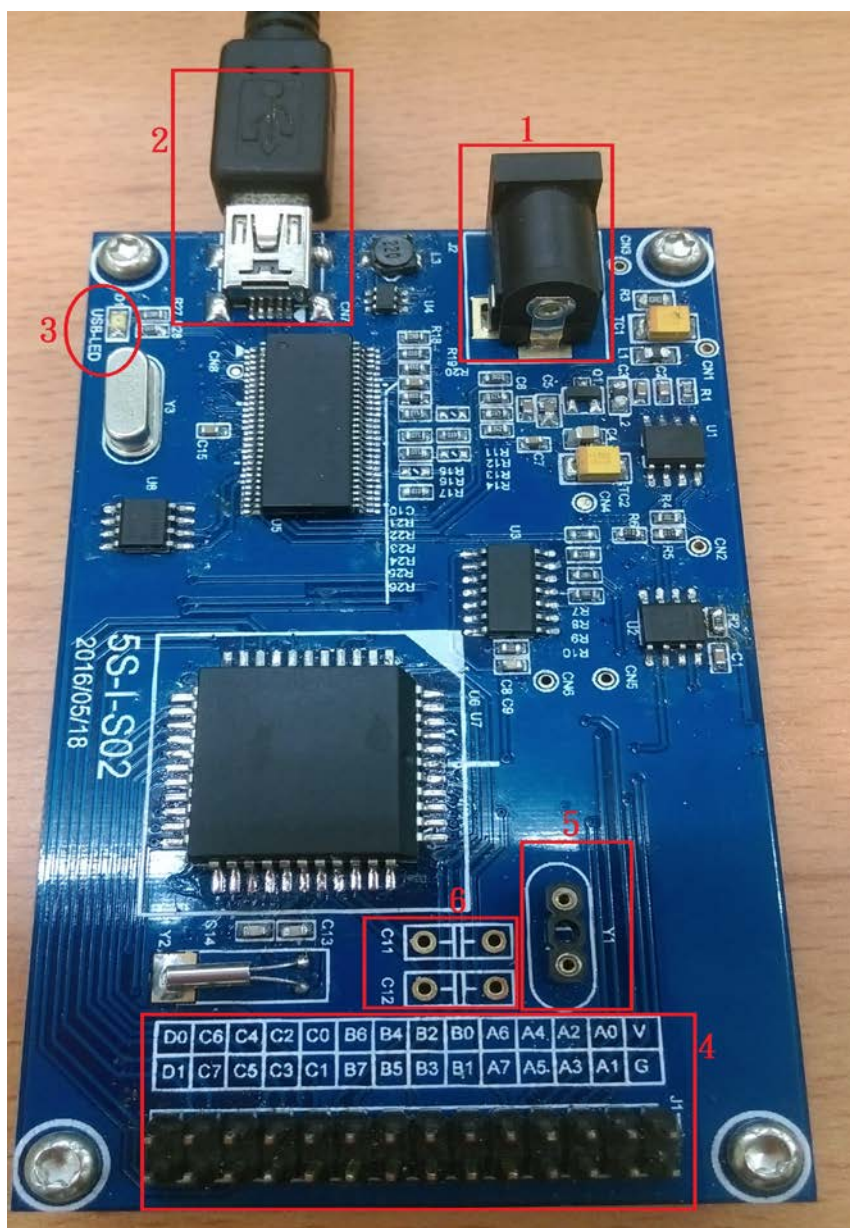
3.2 Appearance of 5S-I-S02

Fig.10: Front of 5S-I-S02

3.3 Description for 5S-I-S02 appearance

(1) Power interface:

DC9V power adapter

(When the emulator power needs to output large current, it is recommended to connect the power adapter of DC9V.)

(2) Mini-USB connector:

Connect PC to provide ICE power and data transfer.

(3) PC Connect LED indicator (PC Connect):

The led flicker when ICE connects to a PC via a USB cable and the driver is listed normally.

(4) ICE_IO output interface (J1):

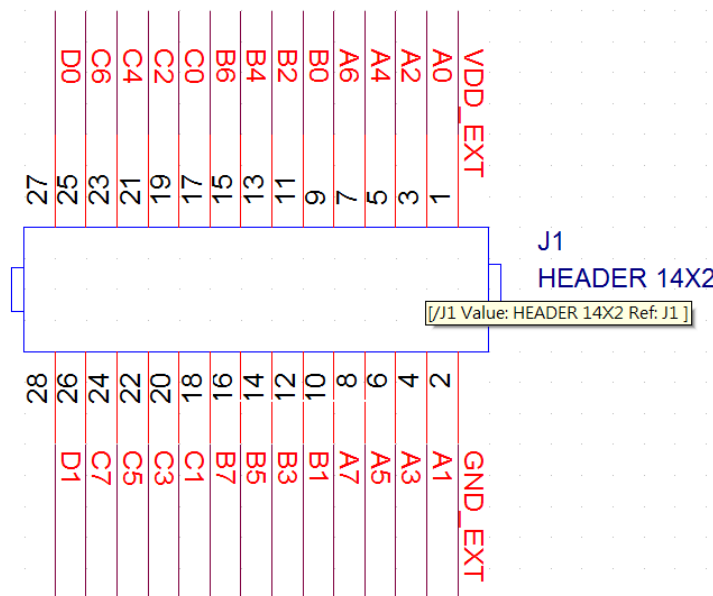Simulation chip's IO output pin interface.

Fig.11: J1 schematic diagram

(5) External Crystal Oscillator interface (Y1):

When an external crystal oscillator is used in the simulation Chip, the crystal must be connected to this interface.

(6) External Crystal Oscillator capacitance interface (C11&C12) :

When the external crystal oscillator is used in the simulation Chip, the external capacitor is connected to this interface.
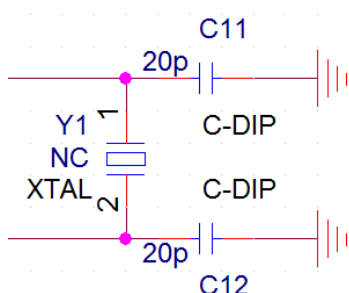

Fig.12: External Crystal & capacitor Y1, C11&C12

4. 5S-I-S02B upgraded version of the simple type single-core emulator

4.1 Introduction of 5S-I-S02B emulator

The 5S-I-S02B is an upgraded version of simple type single-core emulator provided by PADAUK Technology.

Based on the 5S-I-S02, the 5S-I-S02B has added two items: ICE power/ground output interface and ICE_IO measurement contacts. Other functions are consistent with the 5S-I-S02.

4.2 Appearance of 5S-I-S02B

Fig.13: Front of 5S-I-S02B

4.3 Description for 5S-I-S02B appearance

(1) ICE power output interface (J3):

J3 is a common connection pin of 4Pin, which is provided by ICE with a positive power (+V) output interface. The text is marked as Ext_V.

Please refer to section 2.3. (9) for the schematic diagram of J3.

(2) ICE power ground output interface (J4):

J4 is a common connection pin of 4Pin, which is powered by ICE (0V) output interface (external common ground interface). The text is marked as EXT_G.

Please refer to section 2.3. (10) for the schematic diagram of J4.

(3) ICE_IO measurement contacts (J5):

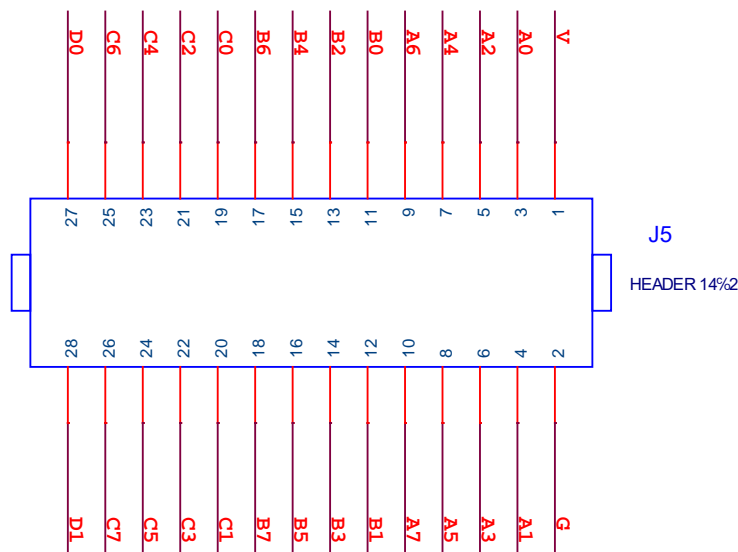Simulation chip's IO output measurement pin, for signal detection.

Fig.14: J5 schematic diagram

Other appearance and functions are consistent with 5S-I-S02.