

Abstract

8051 PROGRAM HC-PM51-V5

- It adopts USB2.0 interface, plug and play
- Support JTAG (4-wire) offline burning
- Support SWD (double line) offline burning
- Support ISP offline burning
- The chip can be encrypted
- Strict protection of customer source program
- Support machine burning
- Support offline button free automatic burning
- Support firmware upgrade
- It supports loading and saving files in *. Hex, *. Bin, *. HCF



HC-PM51-V5

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1 Software Installation

Please refer to 《TL0001 Driver Install Manual》 and 《TL0401 8051 PROGRAM HC-PM51-V5 Install Manual》。

2 Hardware Connection

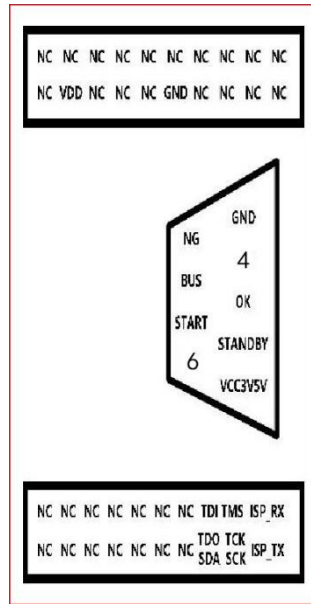


Figure 2-1 HC-PM51-V5 hardware pin diagram

Accessories:

- A shielded USB A-type male to USB B-type male data cable
- A 15V DC power adapter

JTAG simulation burn pin:

VDD, GND, TCK, TDO, TMS, TDI。

SWD simulation burn pin:

VDD, GND, SCK, SDA。

ISP burn pin:

VDD, GND, TX, RX。

Machine pin:

NG, BUS, START, GND, OK, STANDBY, VCC3V5V。

3 Mass Production

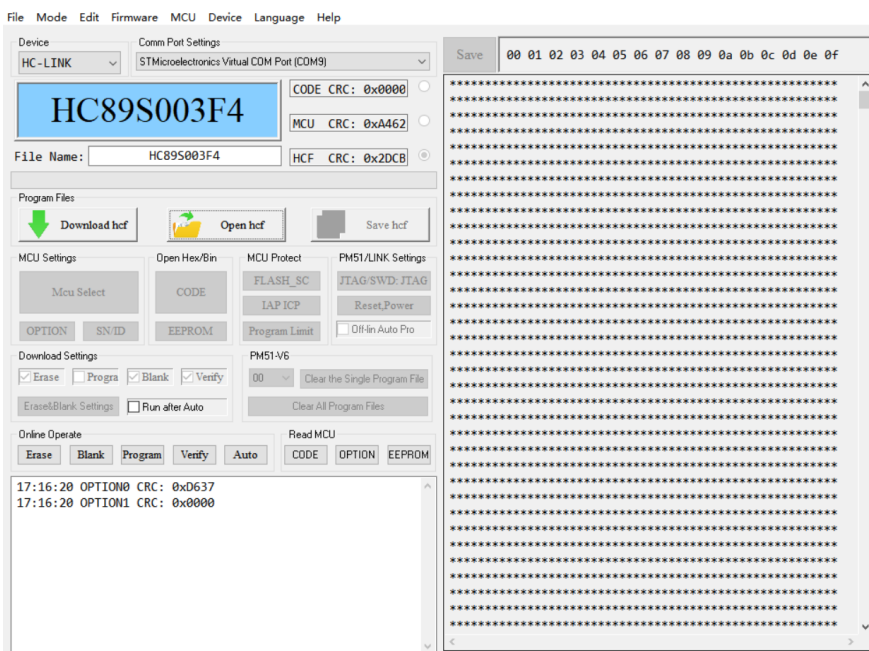


Figure 3-1 main interface of mass production mode software

3.1 Open Program File

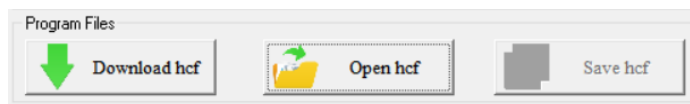


Figure 3.1-1 click "Open hcf" to load the configured burning file

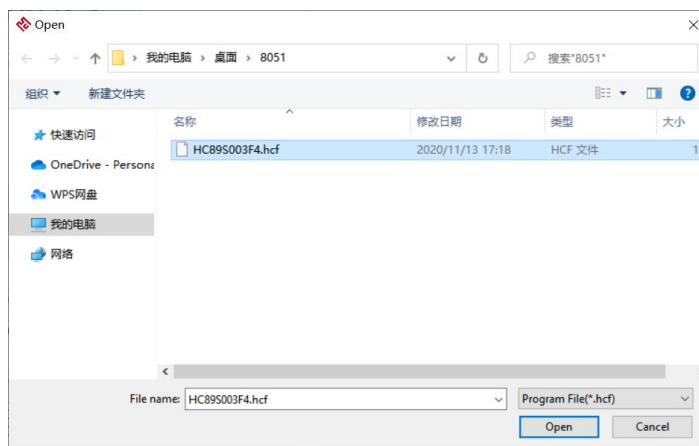


Figure 3.1-2 open the file dialog box, select the burning file to be loaded, and click the "open (o)" button

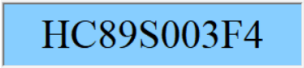


Figure 3.1-3 confirm chip model

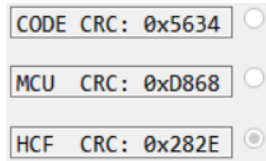


Figure 3.1-4 confirmation of code CRC, MCU CRC and HCF CRC

3.2 Download Program File

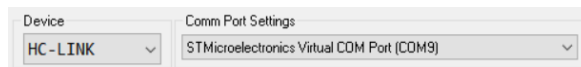


Figure 3.2-1 hc-pm51-v5 is connected to the computer through USB cable. Select "hc-pm51" to confirm the device port

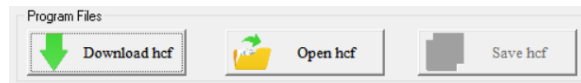


Figure 3.2-2 software main interface, click "download HCF" button to start downloading burning files

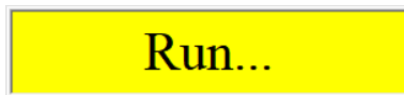


Figure 3.2-3 burning file downloading, please wait patiently

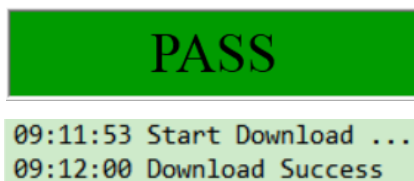


Figure 3.2-4 successful download of burning file

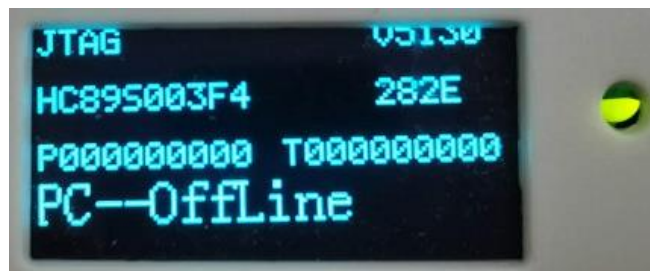


Figure 3.2-5 hc-pm51-v5 display screen confirms chip model and CRC, and LED lights up green

3.3 Manual Program

1. Referring to "2 hardware connection", connect hc-pm51-v5 with the burning pin of the chip through DuPont wire or directly through the burning adapter board. Please refer to "6 burning adapter board" for the description of burning adapter board.

2. Power on hc-pm51-v5 through 15V DC power adapter.

3. Press the white button on the front of hc-pm51-v5 and wait for the burning to complete.

4. the burning is successful, the LED indicator is green, the buzzer sounds, and the display screen shows "pass".

3. if the burning fails, the LED indicator is red, the buzzer sounds twice, and the display screen displays the burning error message.

Display characters	The meaning of representation
Self_test_fail	Self test error
Error_nochip	No chip detected
Error_chipID	Chip ID error
PC--OnLine	Online operation mode
PC--OffLine	Offline operation mode
Nosupport_chip	Unsupported chip signal
Error_EE	EE data error
Error_verify	Flash data error
Error_Power	External power detection error
Error_rBlank	Error in receiving data of space checking instruction
Error_rVerify	Error in receiving data of verification instruction
Error_rCheck	MCU check sum error
Error_inISP	Error in entering ISP command to receive data
Error_tHands	Handshake command timeout
Error_tErase	Erase instruction timeout
Error_rErase	Error in receiving data of erase instruction
Error_tProgram	Burn command timeout
Error_rProgram	Error in receiving data of burning instruction
Error_tHardwar	Hardware configuration instruction timeout
Error_rHardwar	Hardware configuration command received data error
Error_tProtect	Protection configuration command timeout
Error_rProtect	Protection configuration instruction accept data error
Error_tGuest	Customer information instruction timeout
Error_rGuest	Customer information command accept data error
Error_tOutisp	Quit ISP command timeout
Error_rOutisp	Exit ISP instruction receive data error
Error_Limit	Burn times overflow instruction
PASS	Burning successful command

Table 3.3-1 HC-PM51-V5 display prompt information

3.4 Read CODE CRC

After the chip has been set with ICP read protection, it can not read the burned program code. Users can click the "option" button of "Read MCU" in the main interface.



Figure 3.2-1 read chip option

```

13:40:52 Start Read OPTION ...
13:40:52 SN_DATA[HEX]:0000000000000000
13:40:52 ID_DATA[HEX]:0000000000000000
13:40:52 CHIP_ID[HEX]:F537740000260038
13:40:52 CODE CRC: 0x8EA6
13:40:52 Read OPTION Success
    
```

Figure 3.4-2 read chip option successfully, code CRC is 0x5634, which is consistent with code CRC in burning file

3.5 Machine Program

Burn signal	Effective level	Burner interface	Jinchuangt u machine	Merico machine	Lu's machine
VDD	3.3V\5V	PIN1	PIN1	PIN1	PIN9
GND	GND	PIN5	PIN2	PIN2	PIN5
BUSY	"H"	PIN8	PIN3	PIN5	PIN1
OK	"H"	PIN3	PIN4	PIN4	PIN3
NG	"H"	PIN9	PIN5	PIN3	PIN2
START	"L"	PIN7	PIN9	PIN9	PIN4

Table 3.5-1 HC-PM51-V5 common machine burning pin comparison table, other machines please refer to "2 hardware connection" machine pin diagram

4 R&D Mode

Engineering mode	JTAG / SWD mode	ISP_V01/ISP_V02 mode
Hardware connection	JTAG: VDD, GND, TCK, TDO, TMS, TDI SWD: VDD, GND, SCK, SDA	VDD, GND, ISP_TX, ISP_RX
Chip settings	support	Option cannot set rvcfg (second reset vector)
Loading code	X KB	X-4 KB
Chip protection	support	Flash is not supported_SC and ICP (ICP compulsory protection)
Communication mode	JTAG/SWD	ISP
Burn settings	support	I won't support it
Online operation	support	Not supported (please use hc-isp software)
Read chip	support	I won't support it
Offline burning ISP firmware	support	"
Restore factory settings	support	"
Calibration settings	Currently only hc89s003f4 is supported	I won't support it

Table 4-1 JTAG / SWD mode and ISP_V01/ISP_V02 Comparison table of V02 model difference

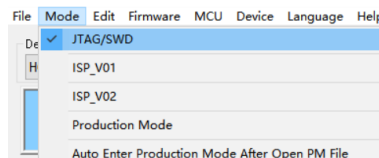


Figure 4-1 menu bar switch to JTAG / SWD mode (according to actual needs)

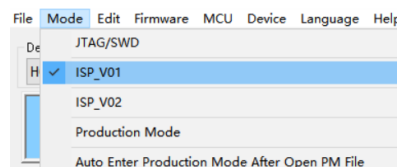


Figure 4-2 menu bar switching to ISP_V01 mode (according to actual needs)

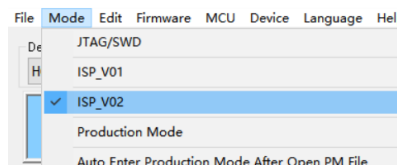


Figure 4-3 menu bar switching to ISP_V02 mode (according to actual needs)

4.1 Select MCU

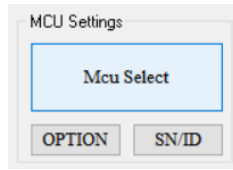


Figure 4.1-1 select MCU interface

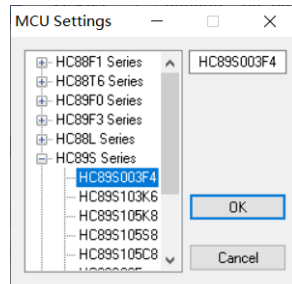


Figure 4.1-2 chip model selection dialog box, select chip model and click "OK" button to exit

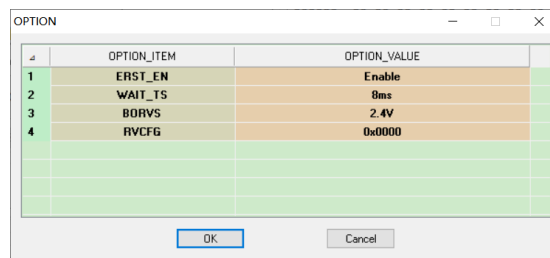


Figure 4.1-3 option settings. Please refer to the chip data manual for details

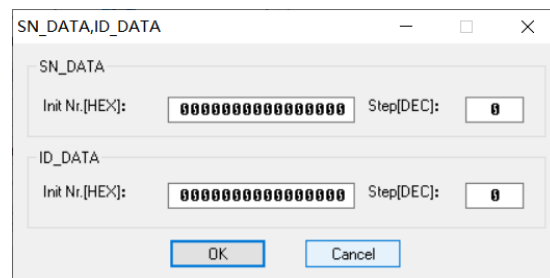


Figure 4.1-4 SN_DATA、ID_Please refer to the chip data manual for details

4.2 Load CODE/EEPROM

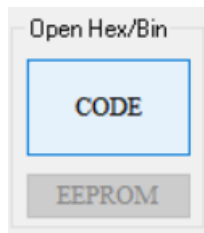


Figure 4.2-1 Load CODE/EEPROM

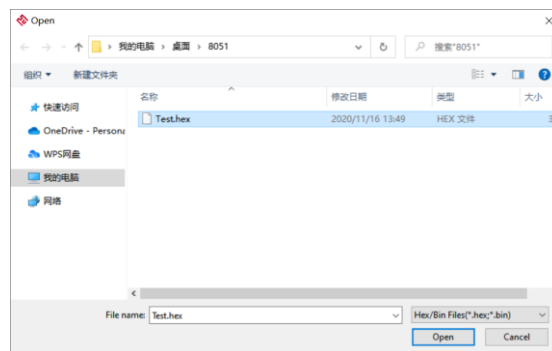


Figure 4.2-2 file open dialog box, select the target *. Hex file generated by keil software

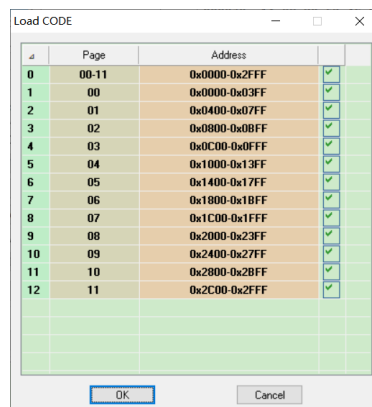


Figure 4.2-3 select which address codes to load (without special requirements, it is recommended not to modify this configuration, all codes are loaded by default)

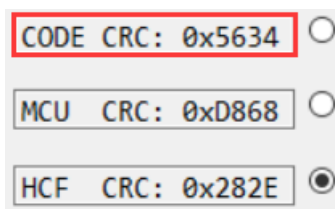


Figure 4.2-4 CRC window to confirm whether "code CRC" is consistent with code CRC in keil software output window

4.3 MCU Protection

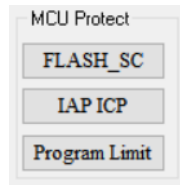


Figure 4.3-1 chip protection interface

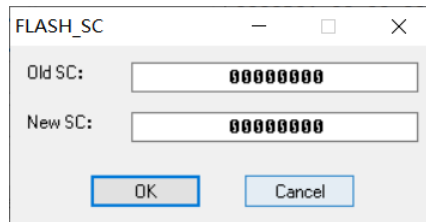


Figure 4.3-2 flash_SC configuration dialog box, hexadecimal input, please refer to the chip data manual for details

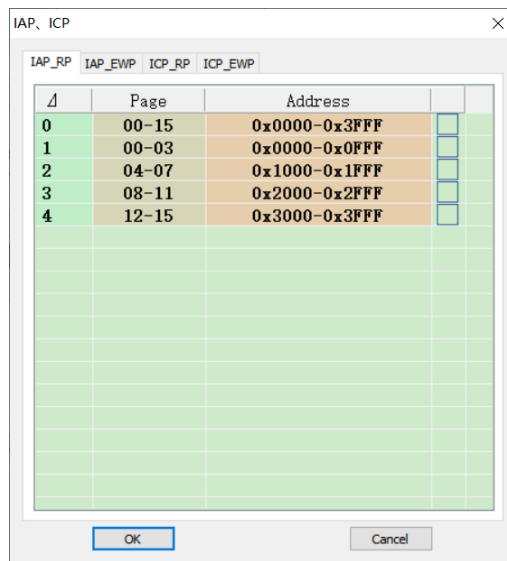


Figure 4.3-3 IAP and ICP configuration dialog box, please refer to chip data manual for details

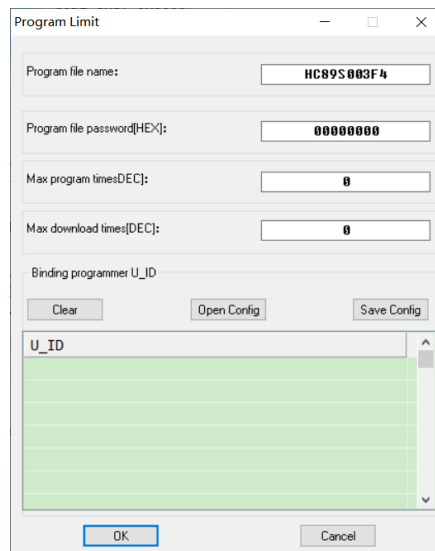


Figure 4.3-4 "burn limit" setting

"Burning file name":

After the burning file is downloaded to the burner, the project file name displayed on the burner display screen.

"Burn file anti change password [hex]":

Hc-pm51 software will switch to the mass production mode after loading the burning file. This mode does not allow customers to modify the configuration. It needs to switch to JTAG / SWD / ISP mode to modify. This password needs to be verified when switching mode. Hex means hexadecimal.

"Chip burn limit [Dec]":

The maximum number of times to burn a chip is Dec, and 0 is no limit.

"File download limit"

The maximum allowable number of times to download the burners for burning files is Dec, and 0 means that the downloading times are not limited.

"Binding device u_ID":

Burning files are only allowed to be downloaded to these burners in the list. You can query the device u through the "device" menu bar_ID".

4.4 Select JTAG/SWD

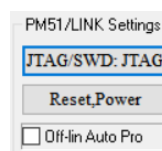


Figure 4.4-1 pm51 / link setting, JTAG / SWD communication mode selection button

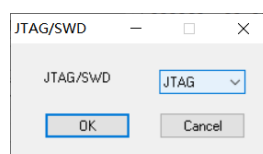


Figure 4.4-2 JTAG / SWD communication mode selection dialog box

4.5 Program Voltage

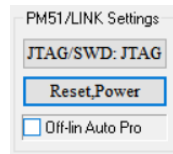


Figure 4.5-1 pm51 / link setting, reset and power setting buttons

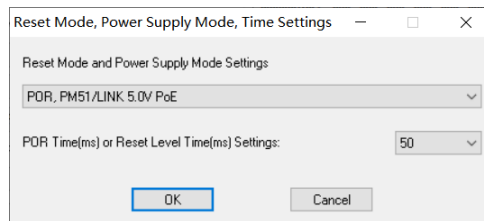


Figure 4.5-2 dialog box of reset mode, power supply mode selection, power down time / reset level duration (MS)

If there is a large capacitance on the board, please adjust the power down time / reset level duration (MS) according to figure 4.5-2

4.6 Offline Auto Program



Figure 4.6-1 setting of offline burning. When the chip is connected with the burner, it will be automatically burned. There is no need to press the key, so it is easy to operate. If there is a large capacitance on the board, please adjust the power down time / reset level duration (MS) according to figure 4.5-2

4.7 Program Settings

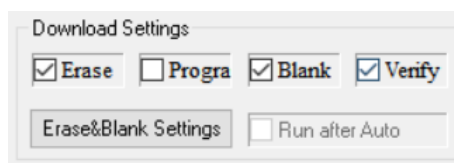


Figure 4.7-1 burning settings

Configure whether to "erase", "burn" and "verify"
Erase can be set to "full erase" or "erase by page"

Power on after automatic operation: use hc-link-v4, click the "auto" button, and power on the chip after successful online burning

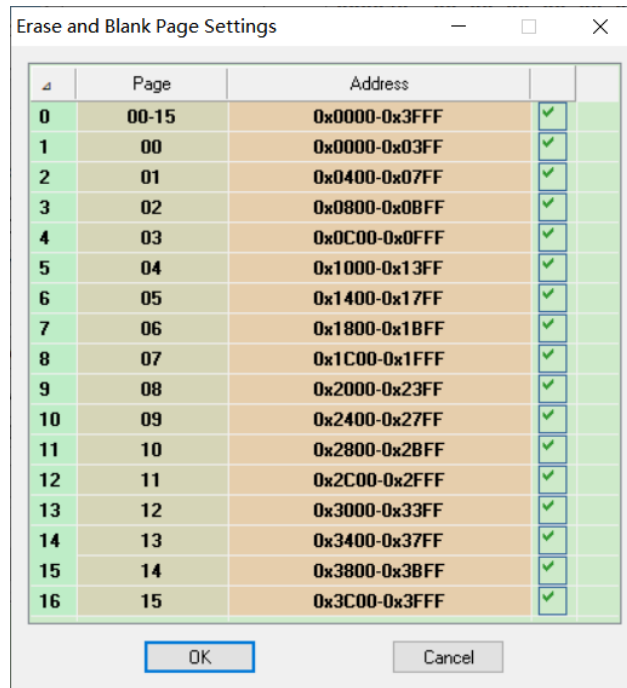


Figure 4.7-2 setting of erasing blank page

4.8 Save Program File

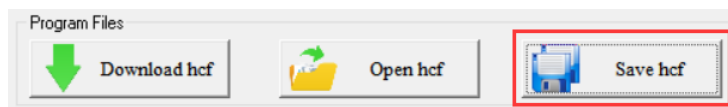


Figure 4.8-1 "save HCF" button in main interface



Figure 4.8-2 save file dialog box, select the save path and click the "save (s)" button to save the burned file to the local disk

4.9 Download And Program

Please refer to "3.2 download burning file", "3.3 manual burning", "3.4 read code CRC", "3.5 machine burning".

4.10 Online Operation

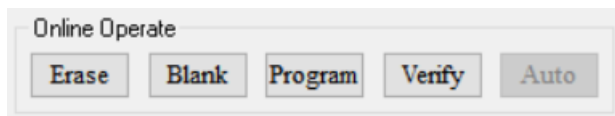


Figure 4.10-1 online operation, single operation of erasing, checking, burning and verifying

4.11 Read MCU

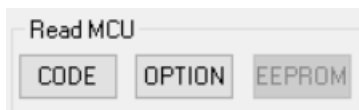


Figure 4.11-1 reads the chip code, option and EEPROM. After the chip is set with read protection, the read code data window displays all 0

4.12 Edit

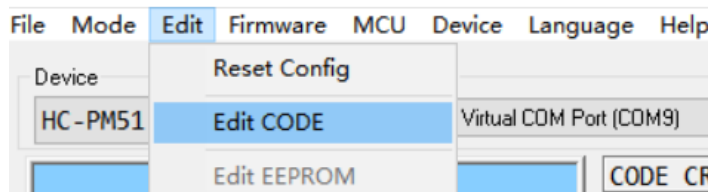


Figure 4.12 - 1 restore the default configuration, edit code and edit EEPROM

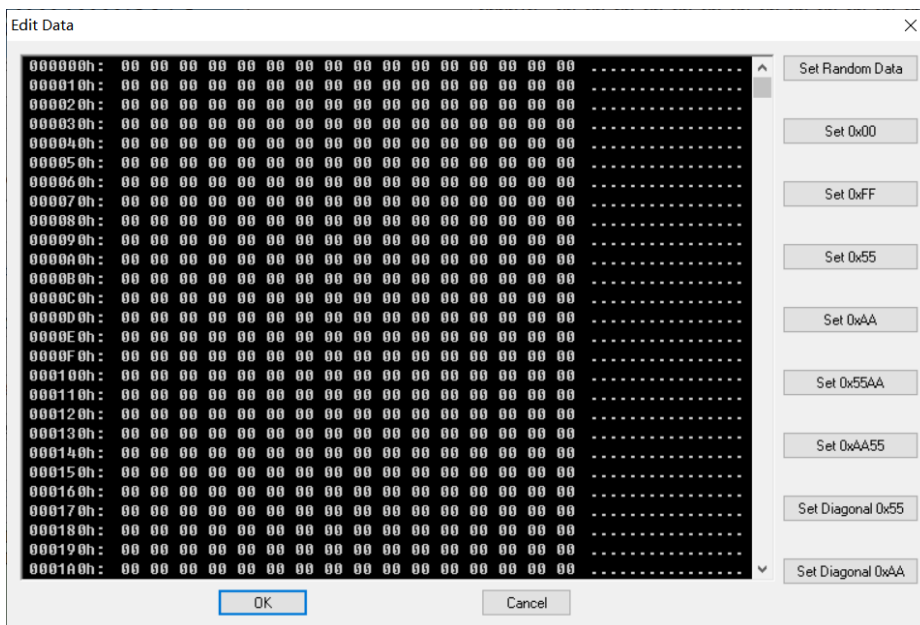


Figure 4.12-2 edit data dialog box, the data in the black window can be modified directly, and copy and paste operations are supported

4.13 Offline Program ISP Firmware

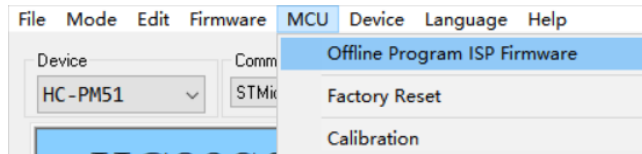


Figure 4.13-1 check this configuration when offline burning ISP firmware

4.14 Restore Factory Settings

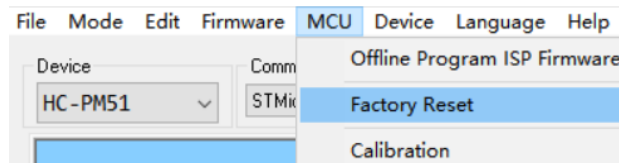


Figure 4.14-1 restore factory settings

Only "full erase" can be selected for erasing, which is applicable to the following two situations:

1. When the chip burning ISP firmware offline wants to use JTAG / SWD burning port again
2. Forget flash_SC, when you want to burn again

4.15 Calibration Settings

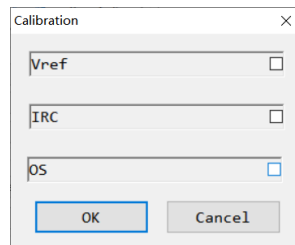


Figure 4.15-1 calibration settings dialog box

4.16 Query Device U_ID

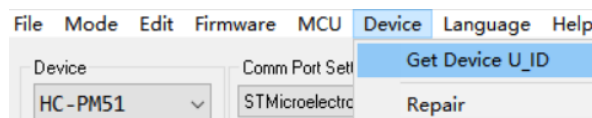


Figure 4.16-1 Query Device U_ID

14:46:59 U_ID: 56 FF 71 06 66 72 54 53 59 38 22 87

Figure 4.16-2 Query Device U_ID

5 Software And Firmware Update

5.1 Software Update

Each time the upper computer software is opened, it will automatically connect to the Xinsheng official website. If the official website software is updated, the upper computer software will automatically pop up the software update prompt window, and the user can go to the Xinsheng official website (<http://www.holychip.cn>) Download the latest software.

5.2 Firmware Update

When downloading burning files in 3.2, the upper computer software will automatically check whether the firmware of the lower computer is the latest version. If the firmware does not match, the upper computer software will prompt the user to update the firmware.

Before firmware update, please connect the USB of hc-pm51-v5 to the computer. Refer to figure 3.2-1 to check whether the device port is correctly selected.

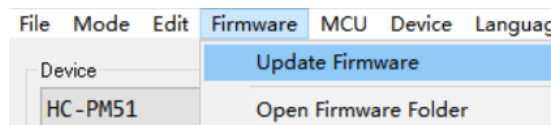


Figure 5-1 menu bar "firmware", "update firmware"

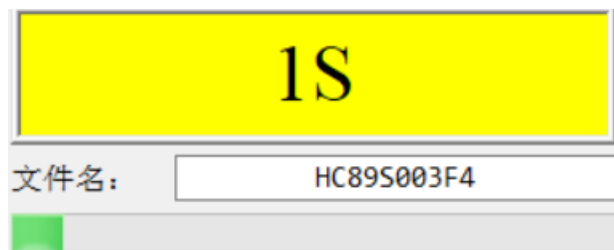


Figure 5-2 firmware update, running

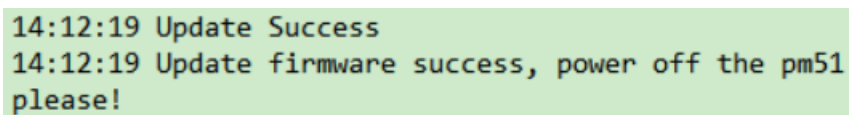


Figure 5-3 firmware update is successful. Please wait patiently for hc-pm51-v5 hardware reset, and the burner firmware is updated successfully after the buzzer "drops"

6 Program Socket Board

1. The red wire in the wiring diagram indicates that the user needs to connect the two pins of the red wire with a 0 ohm resistor.
2. Users can also weld all the pins on the adapter board with a row of pins, and use the jumper cap to short circuit according to the schematic diagram when burning different models.

Users can use this burning adapter board to connect the burners to chips with any pin position.

When using, please insert the double row female socket on the adapter board into the adapter of the burner (pay attention to the direction of the concave and convex port), and insert the chip socket adapter into the 48pin locking seat on the adapter board.

The mapping principle and schematic diagram of adapter board pin position are as follows: The p1-p48 pins of the locking seat are respectively connected with the pins 1-48 screen printed on the adapter plate. For example: P1 pin of locking base is connected with three pins with screen printing of 1, p2-p48 and pins with screen printing of 2-48, and so on.

VDD, GND, TCK, TMS, TDI, TDO, TX and Rx on the adapter board are respectively connected with VDD, GND, TCK / sck, TMS, TDI, TDO / SDA, TX and Rx on the burner.

The TDI / TX and TDO / RX pins on the adapter board can be connected to the corresponding TDI, TX, TDO and Rx pins on the burner according to the JTAG / ISP dual channel code pulling switch. For example: when the switch is pulled to JTAG, the TDI / TX pin on the adapter board is connected with the TDI pin on the burner, and the TDO / RX pin on the adapter board is connected with the TDO on the burner; when the switch is pulled out to ISP, the TDI / TX pin on the adapter board is connected with the TDI pin on the burner, and the TDO / RX pin on the adapter board is connected with the TDO pin on the burner.

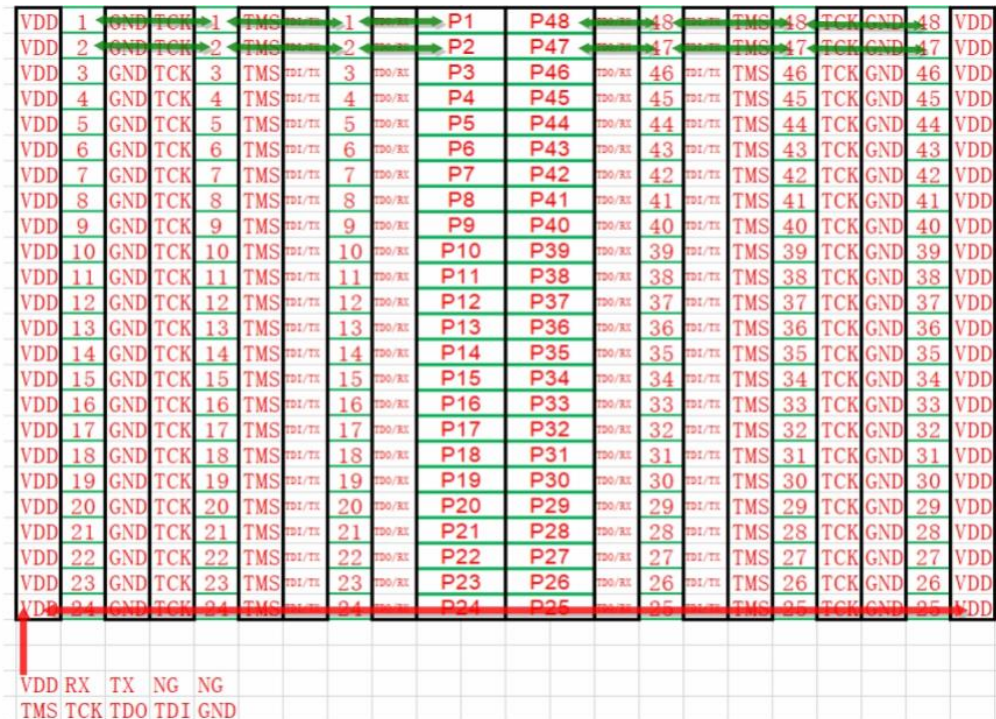
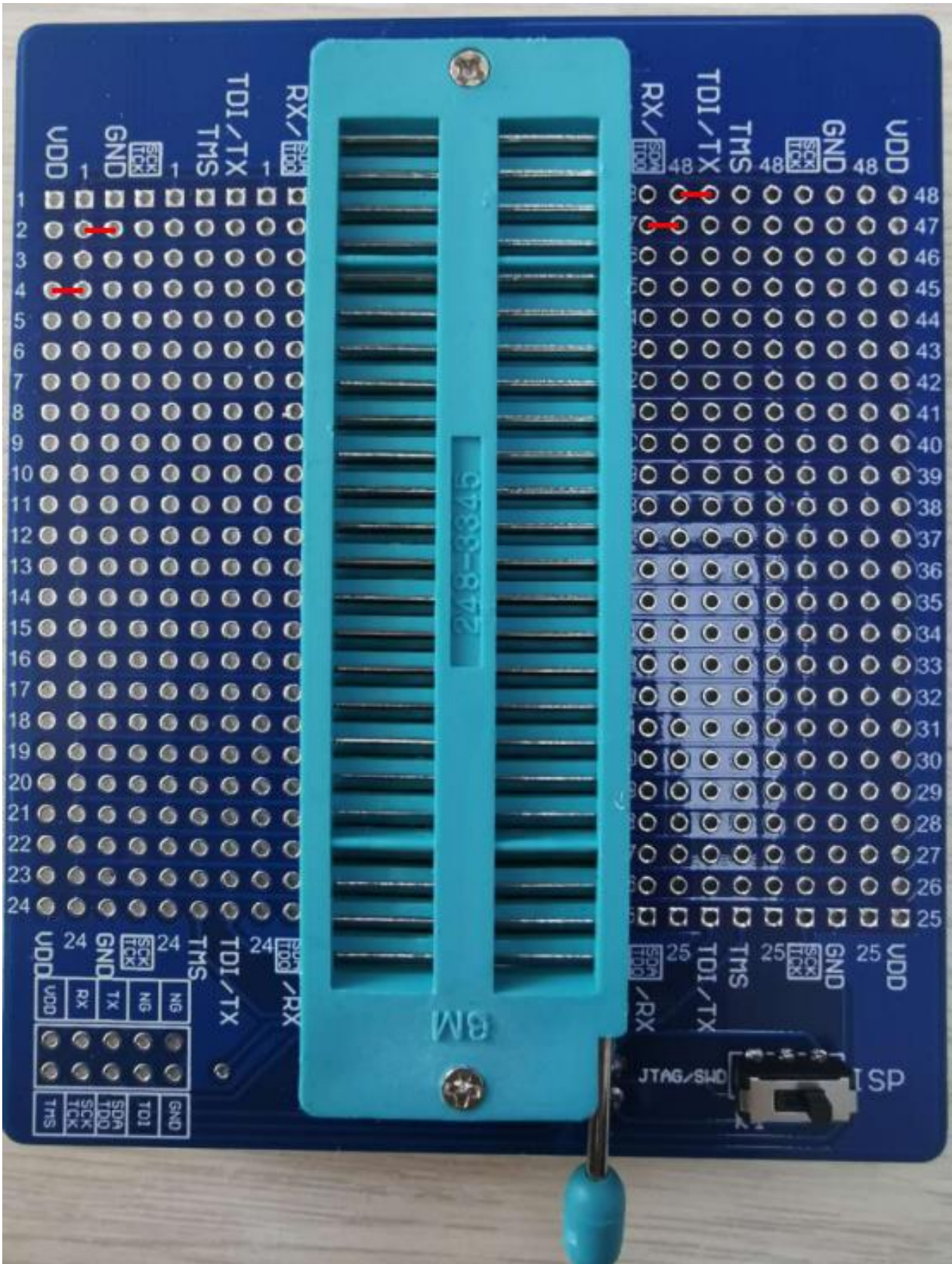


Figure 6-1 schematic diagram of burning adapter board

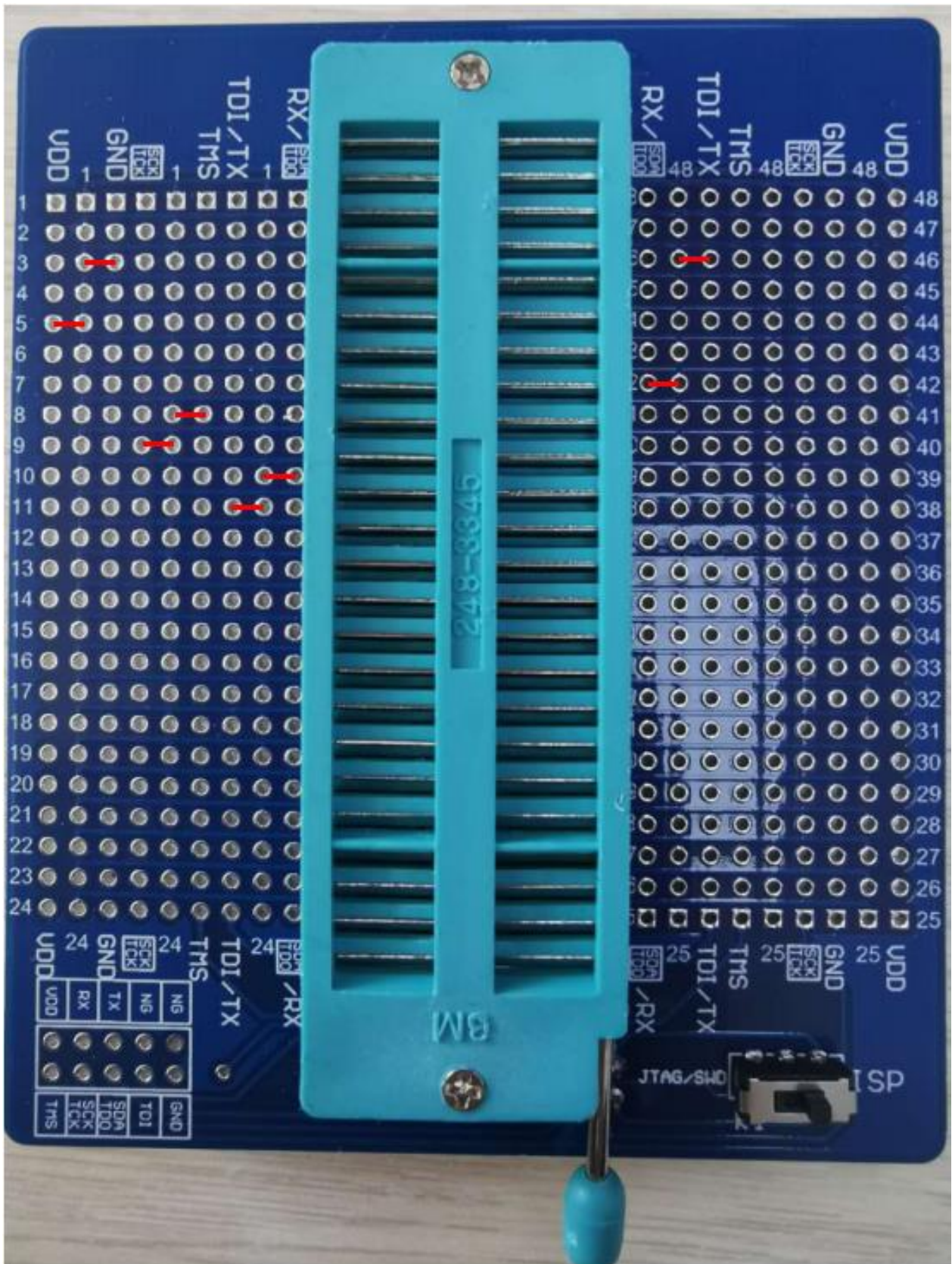
6.1 HC89S001P-SOP8-ISP



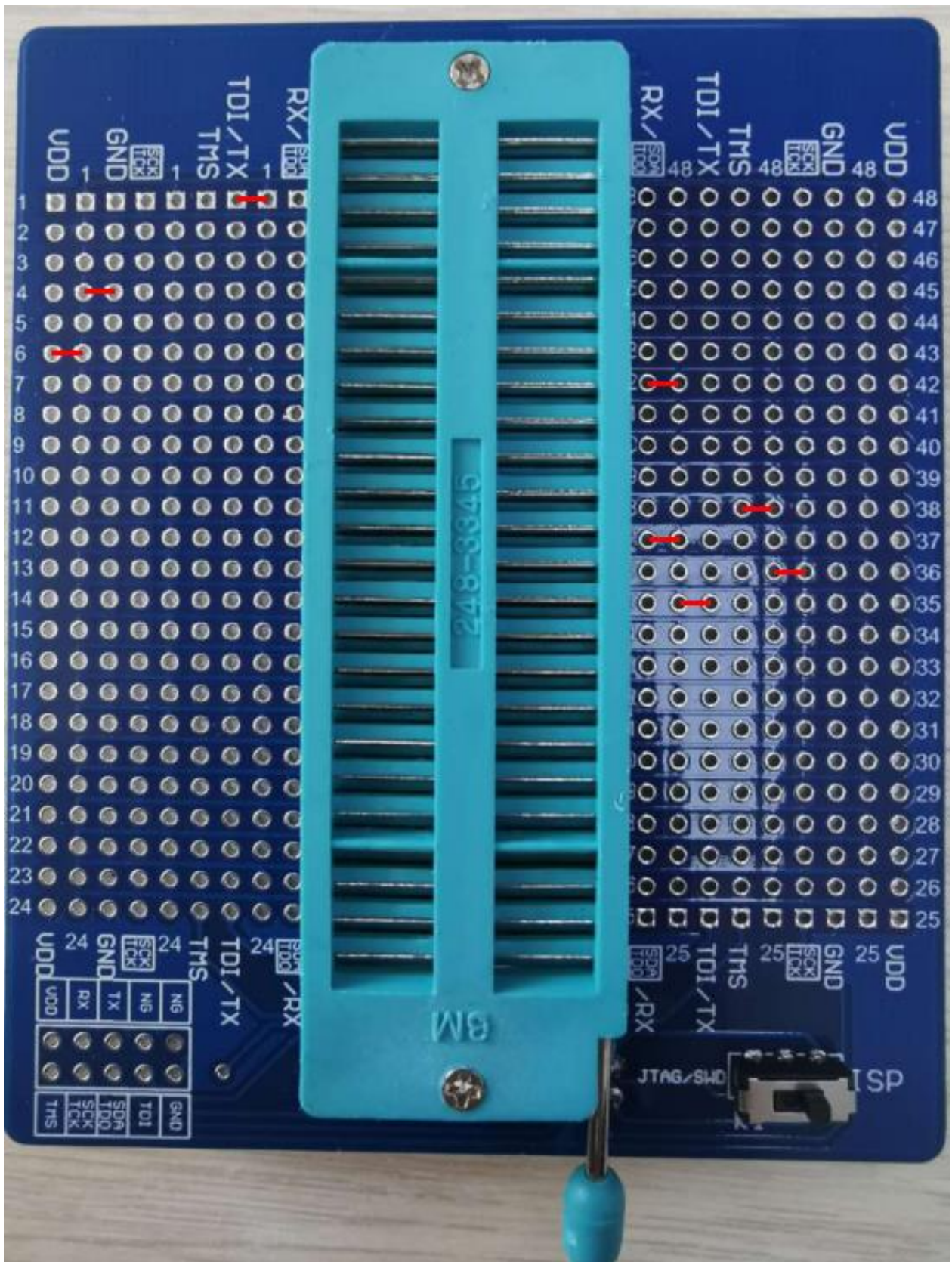
6.2 HC89S003F4-TSSOP20-ISP&JTAG



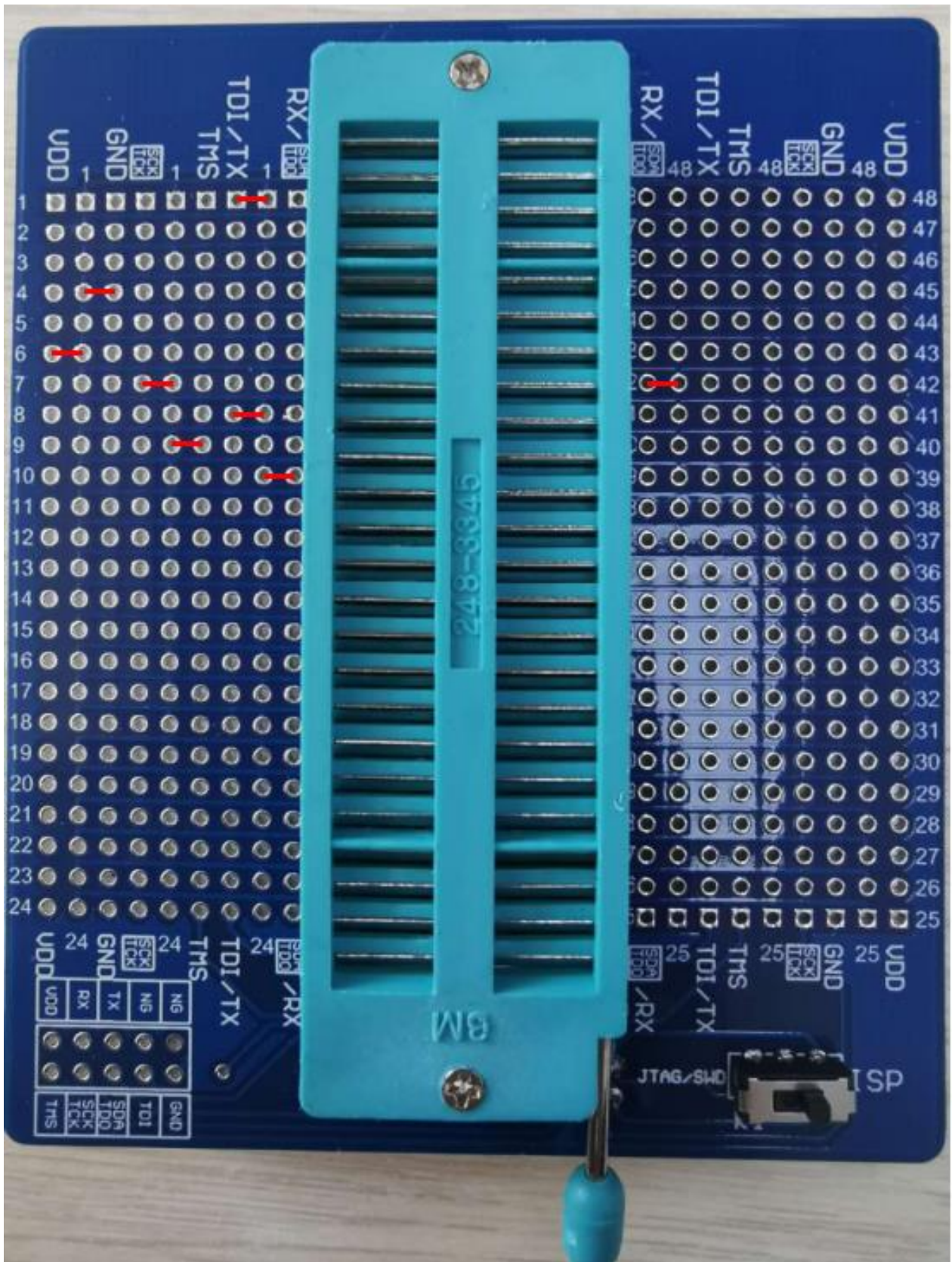
6.3 HC89S003F4-QFN20-ISP&JTAG



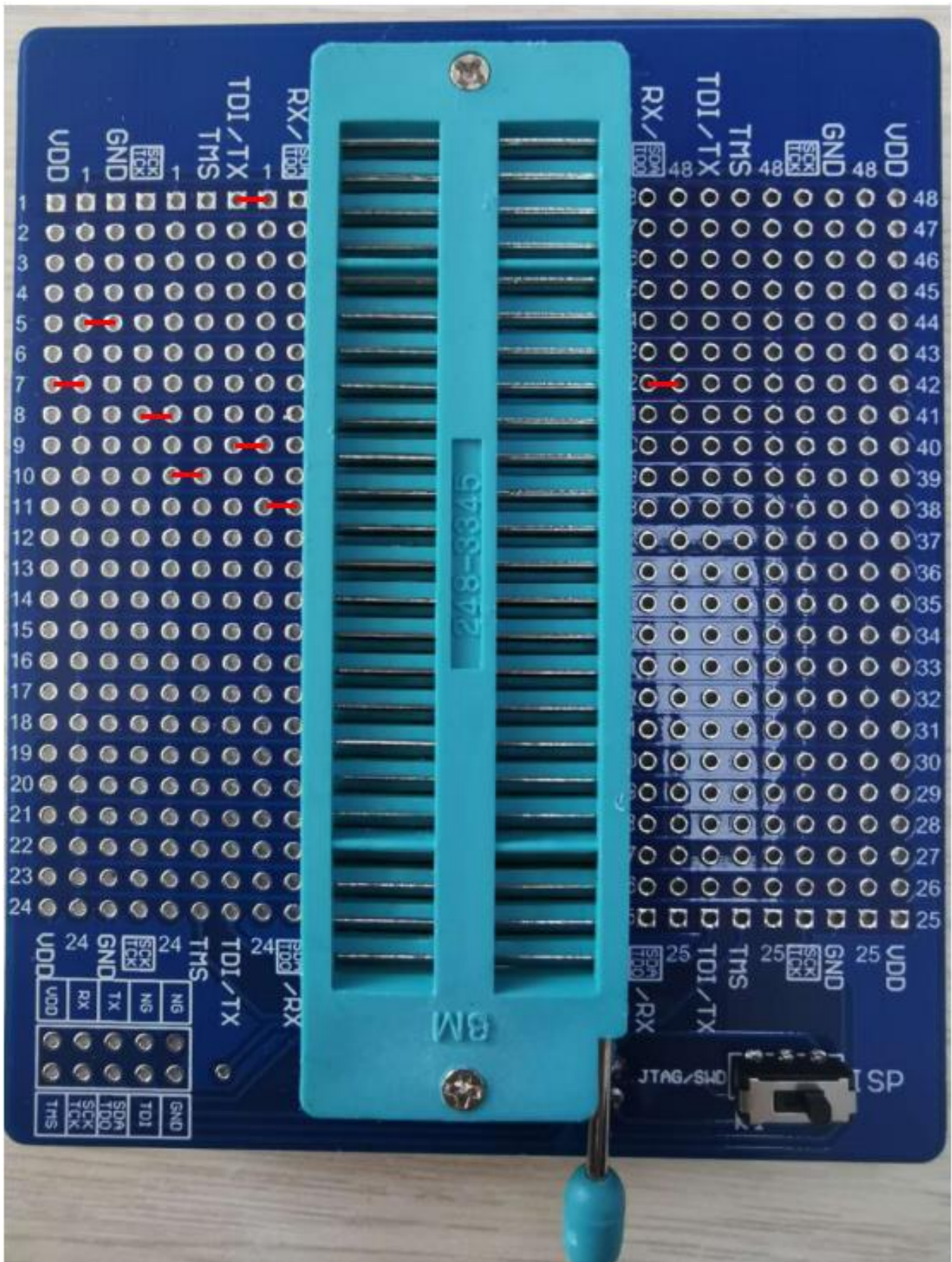
6.4 HC89S103K6-LQFP32-ISP&SWD&JTAG



6.5 HC89S105K8-LQFP32-ISP&JTAG



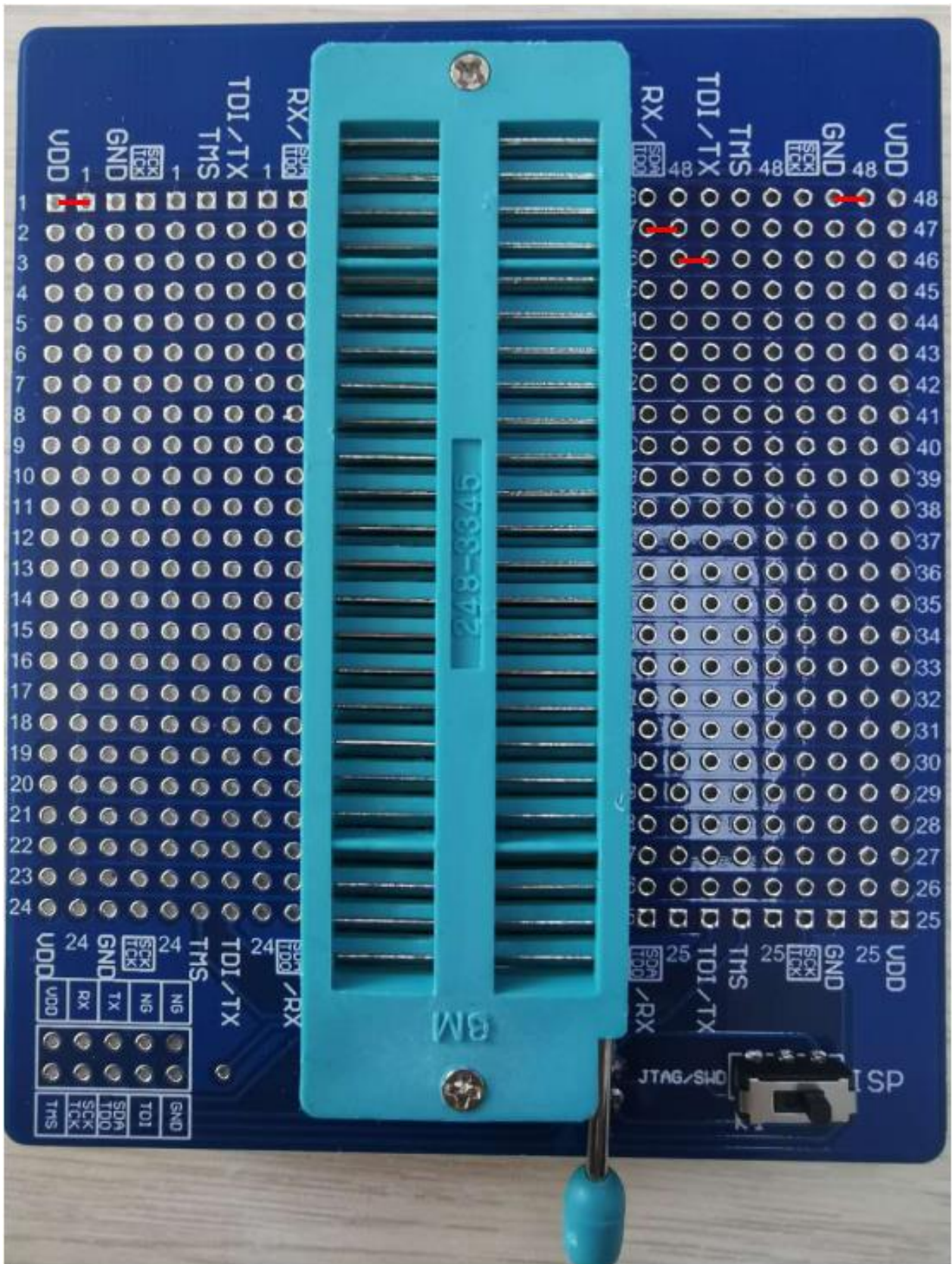
6.6 HC89S105S8-LQFP44-ISP&JTAG



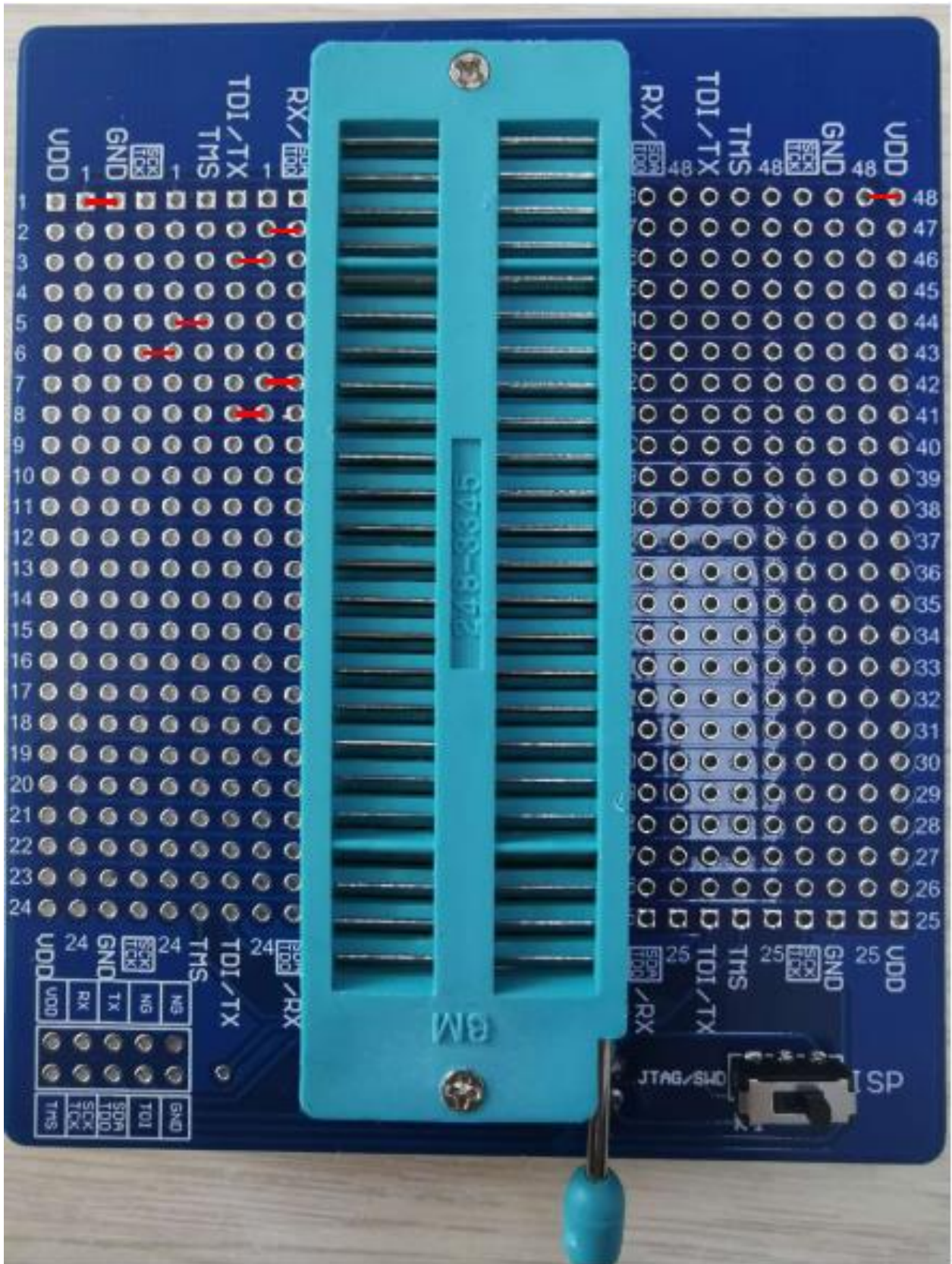
6.7 HC89S105C8-LQFP48-ISP&JTAG



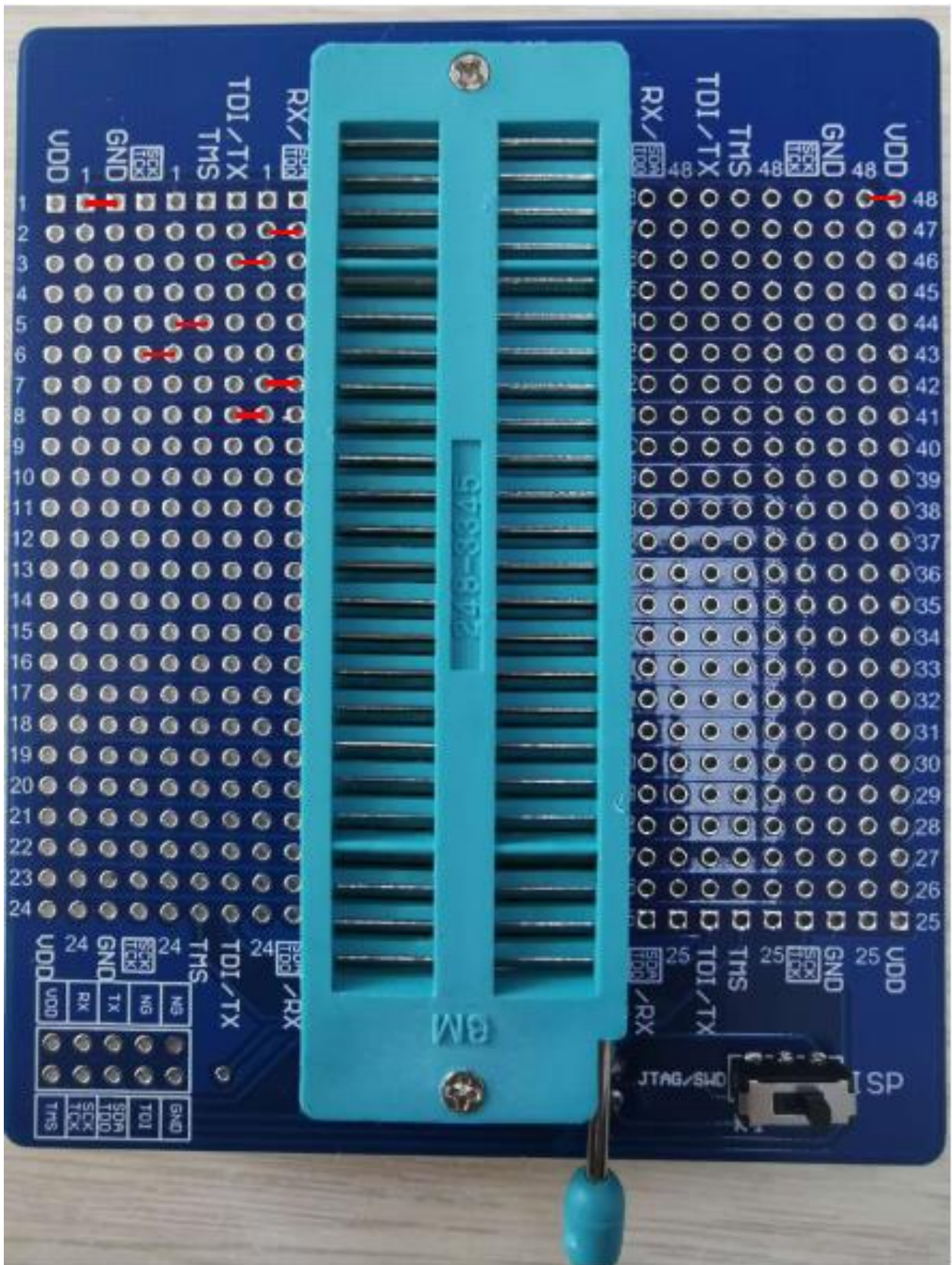
6.8 HC89F0411P-SOP8-ISP



6.9 HC89F0421-SOP16-ISP&JTAG



6. 10 HC89F0431-SOP20/TSSOP20-ISP&JTAG



6.11 HC89F0431-QFN20-JTAG



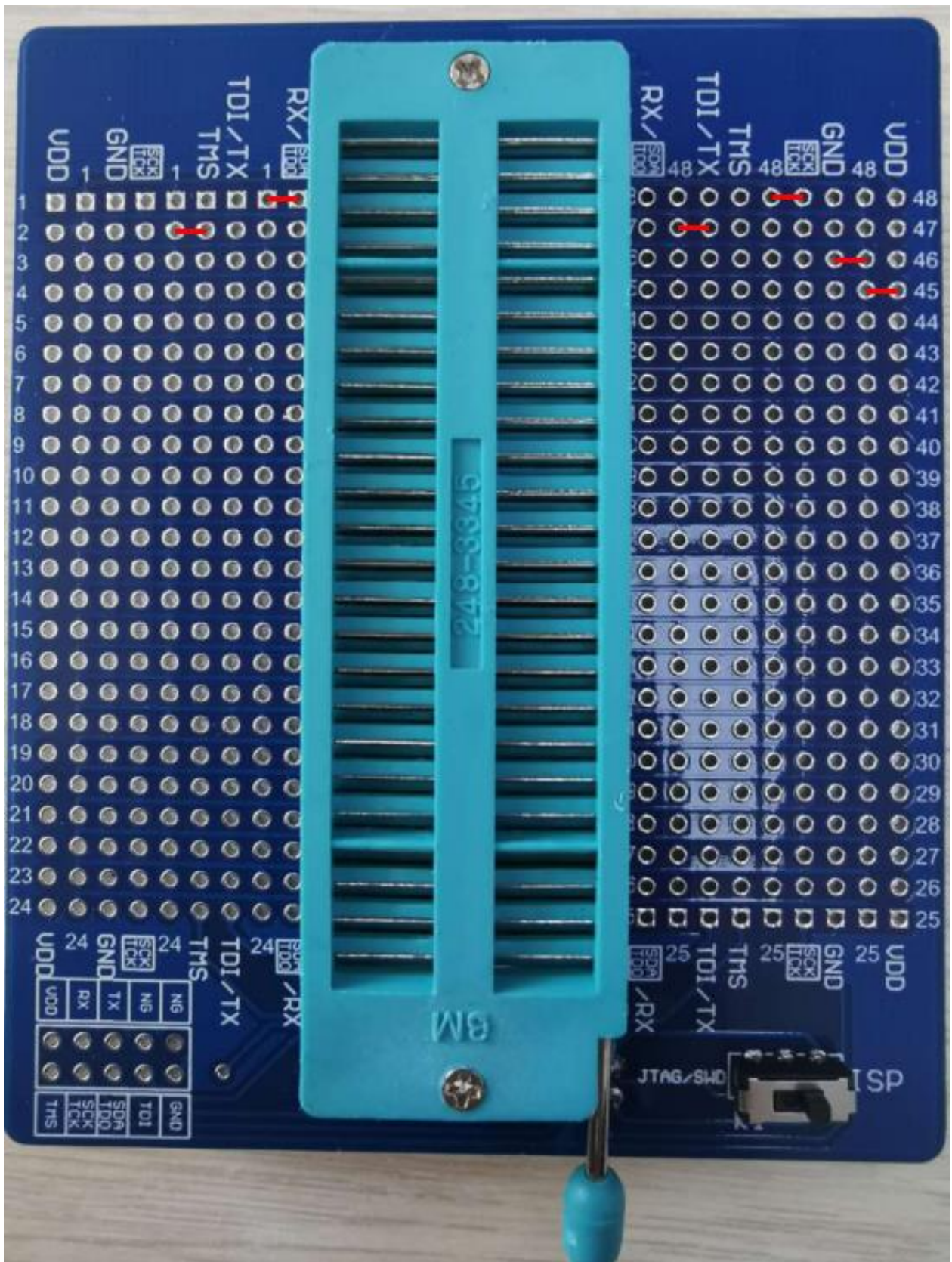
6. 12 HC89F0531-SOP20/TSSOP20-SWD&JTAG



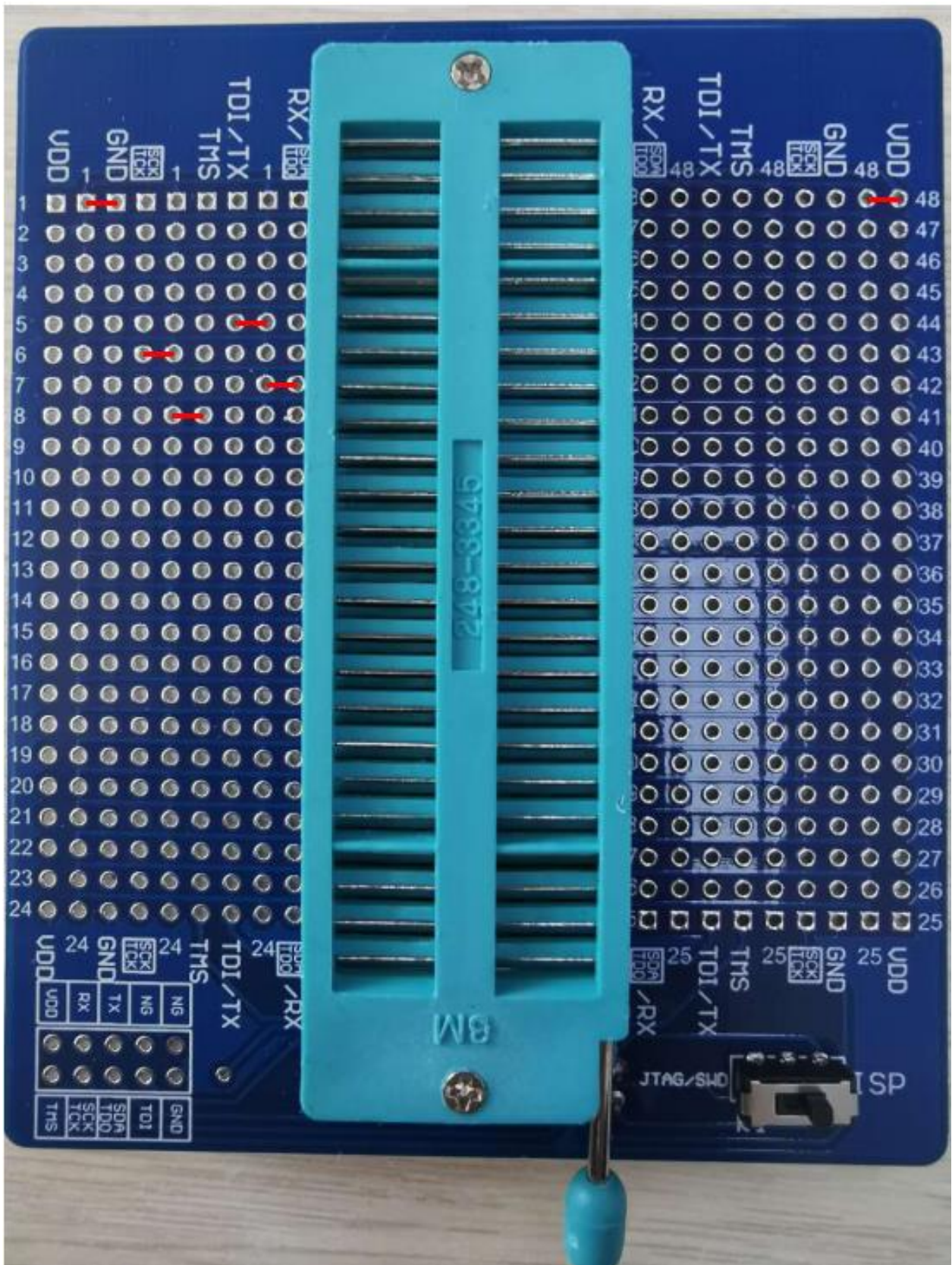
6. 13 HC89F0531-SSOP24-SWD&JTAG



6. 14 HC89F0531-QFN24-SWD&JTAG



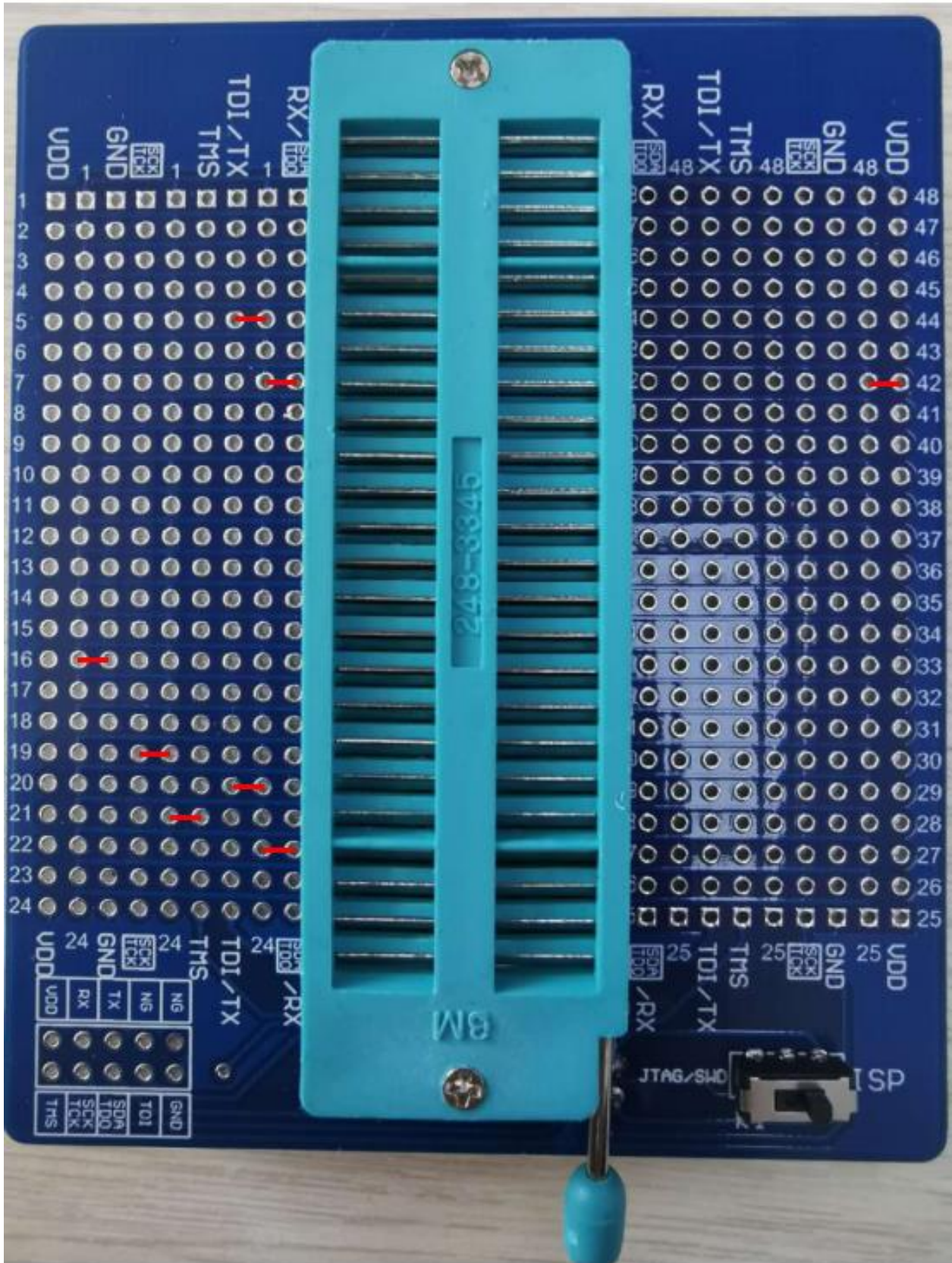
6. 15 HC89F0541-SOP28/SSOP28-SWD&JTAG



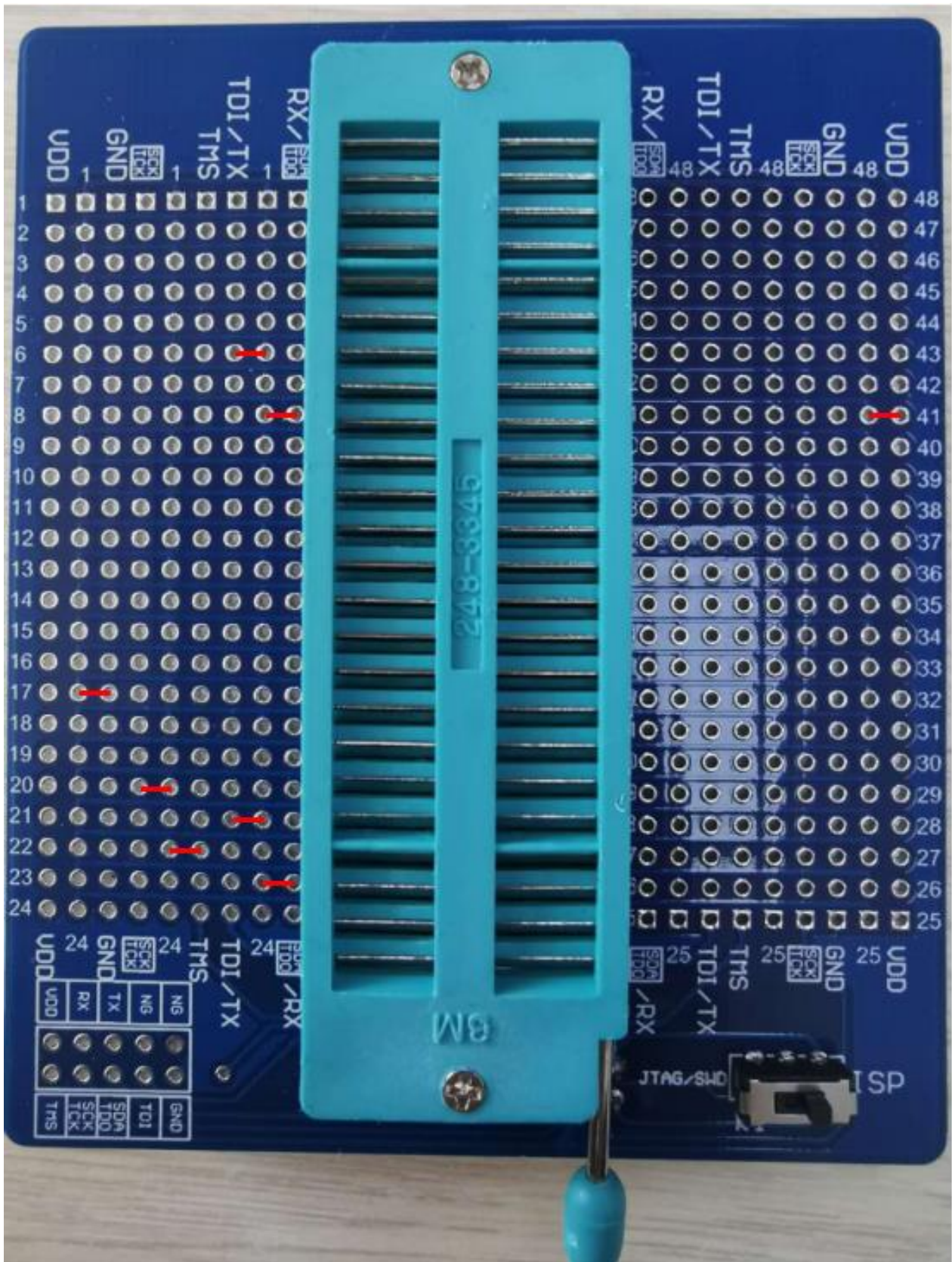
6. 16 HC89F0541-LQFP32/QFN32-SWD&JTAG



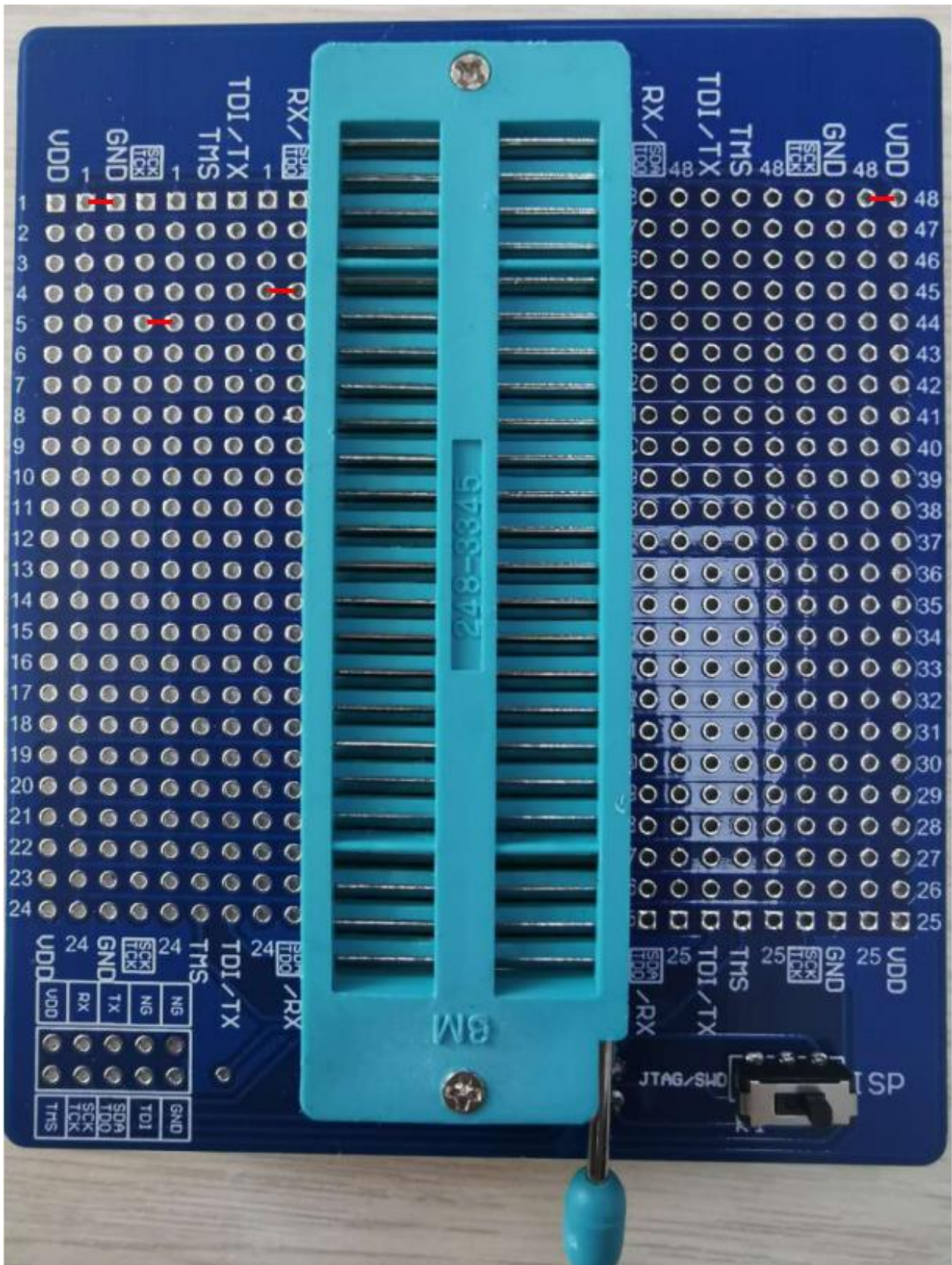
6. 17 HC89F0650-LQFP44-ISP&JTAG



6. 18 HC89F0650-LQFP48-ISP&JTAG



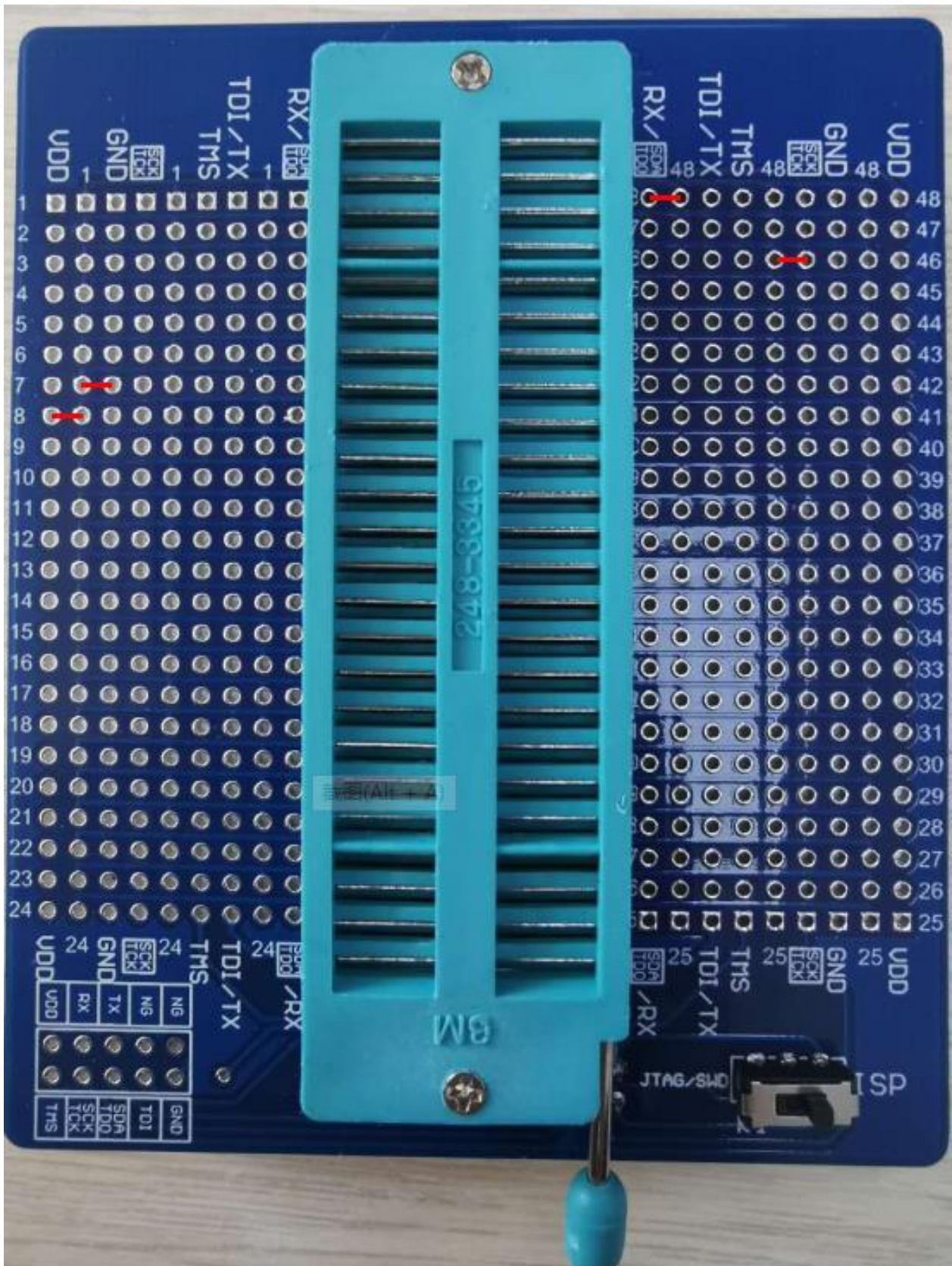
6. 19 HC8M602-SOP16-SWD



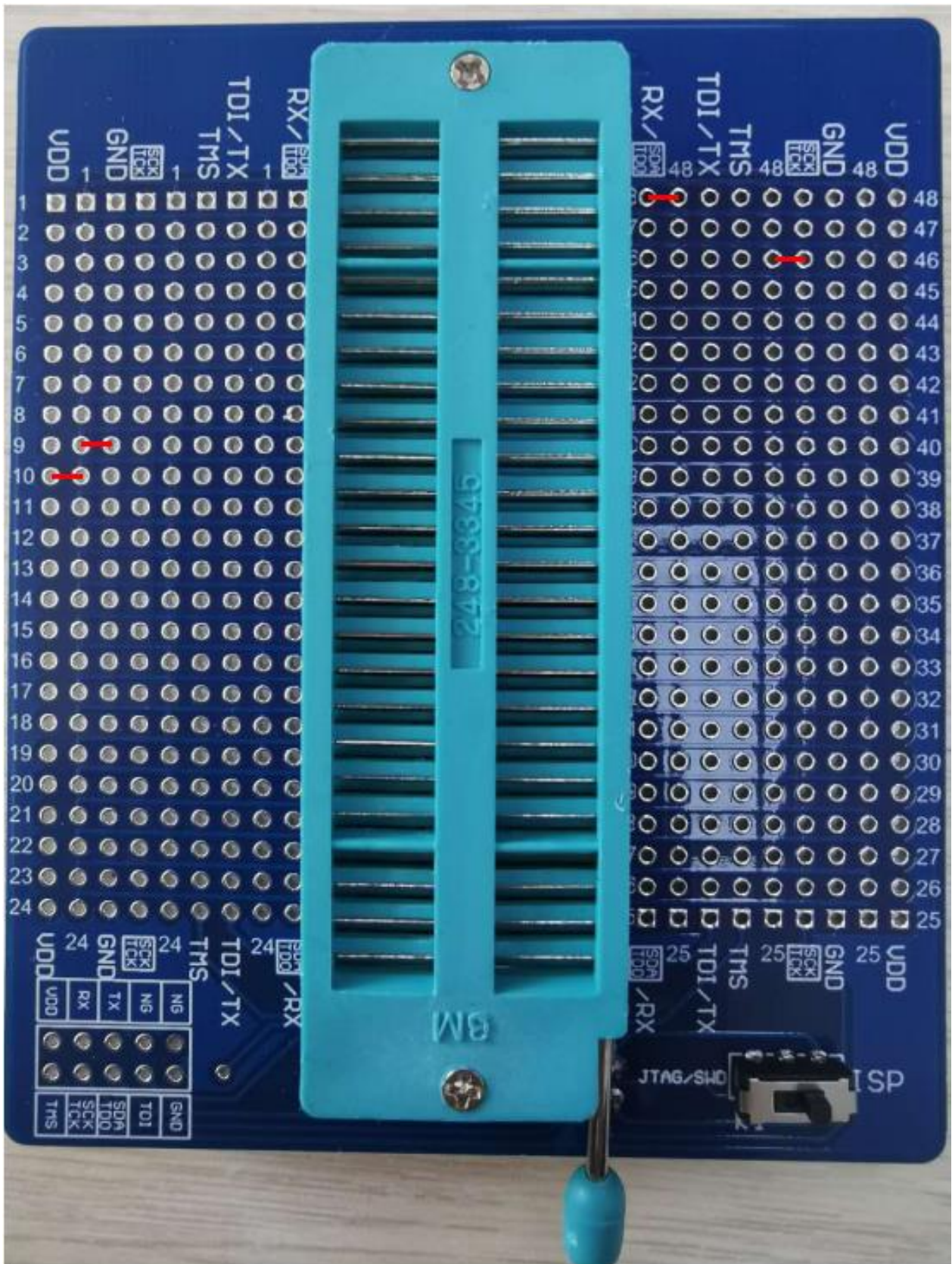
6. 20 HC89F301-SOP16-SWD



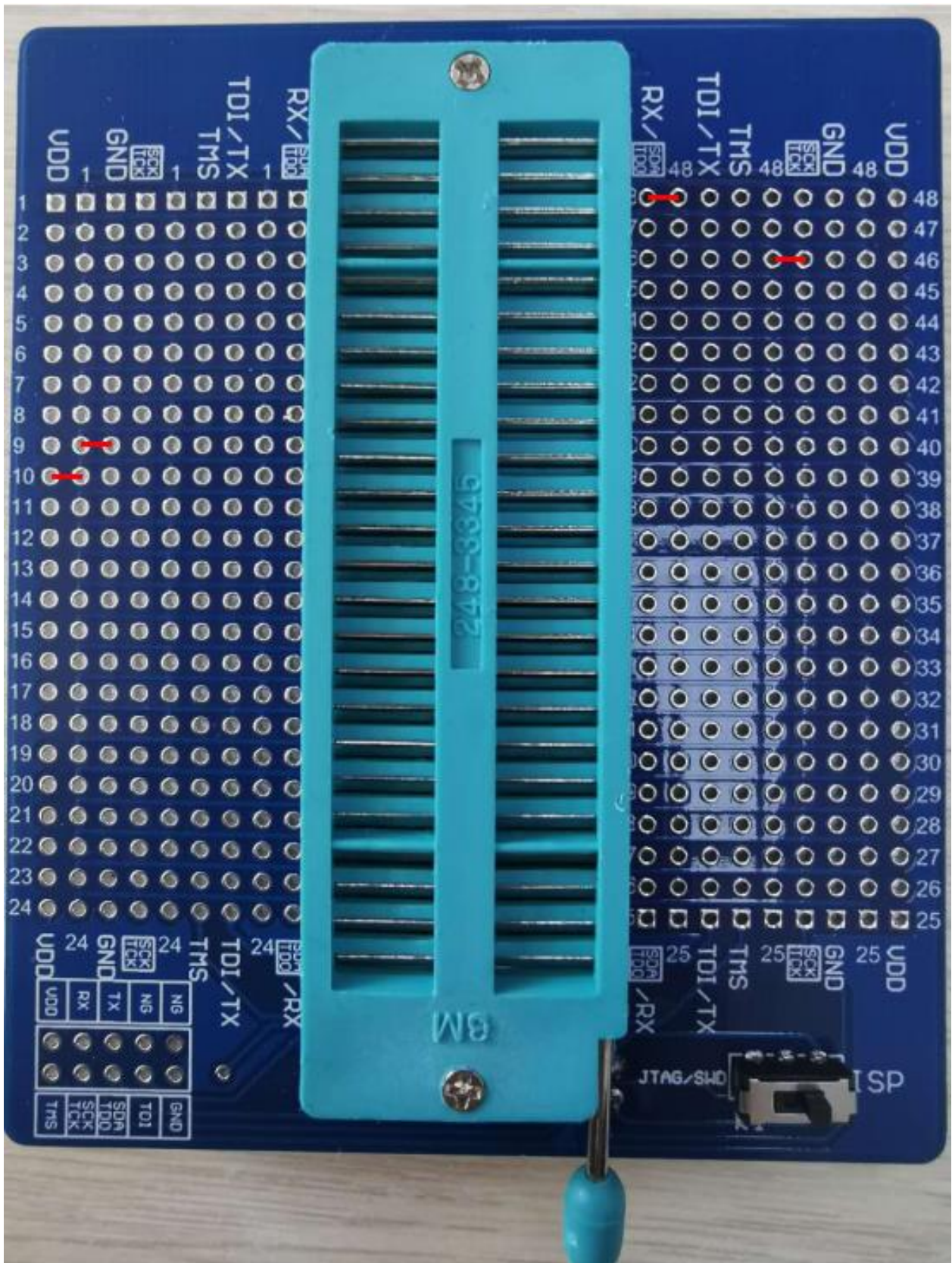
6. 21 HC89F301B-SOP16-SWD



6. 22 HC89F302-SOP20/DIP20-SWD



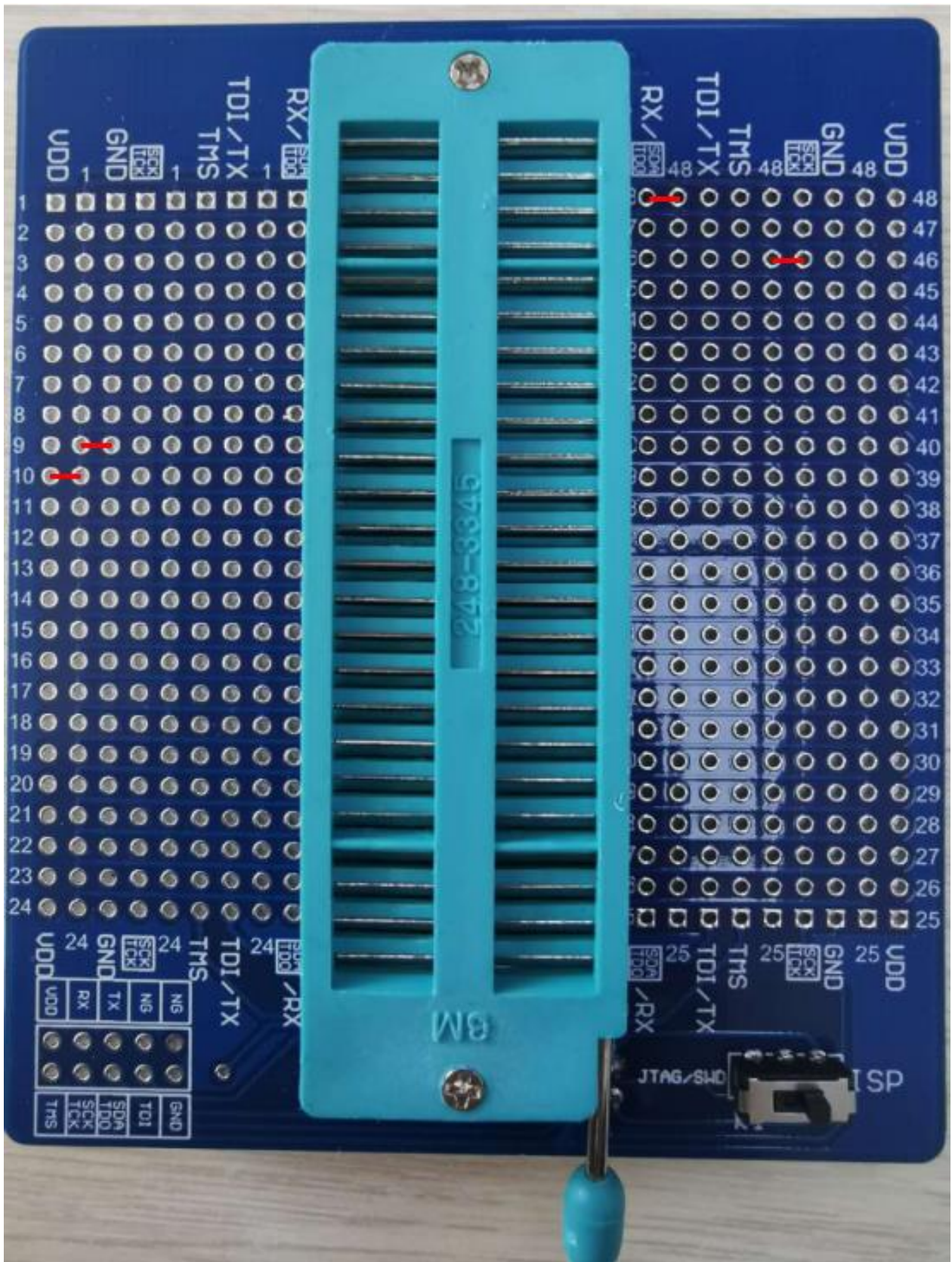
6. 23 HC89F302-SOP24-SWD



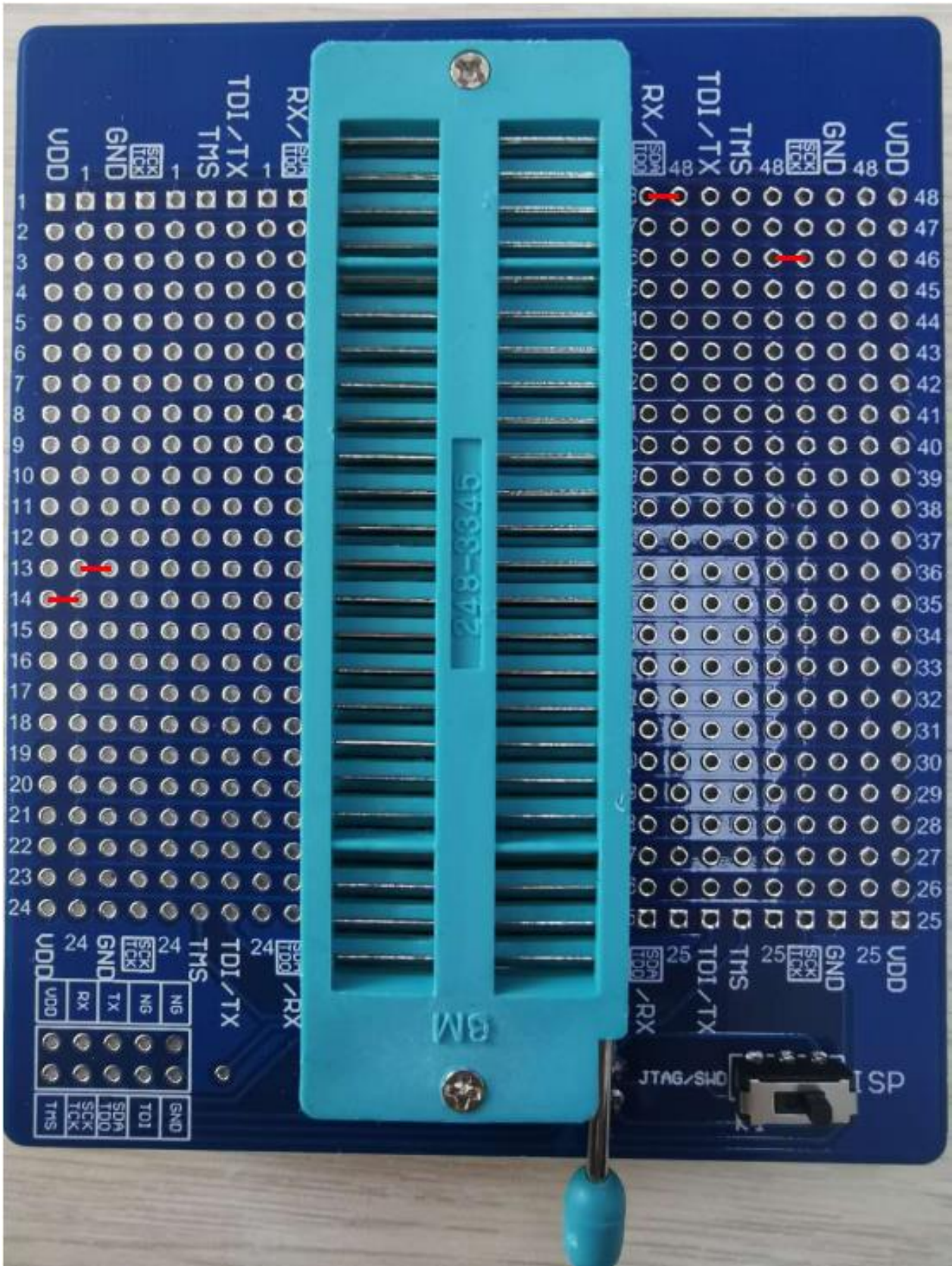
6. 24 HC89F302B-SOP20/DIP20-SWD



6. 25 HC89F302B-SOP24-SWD



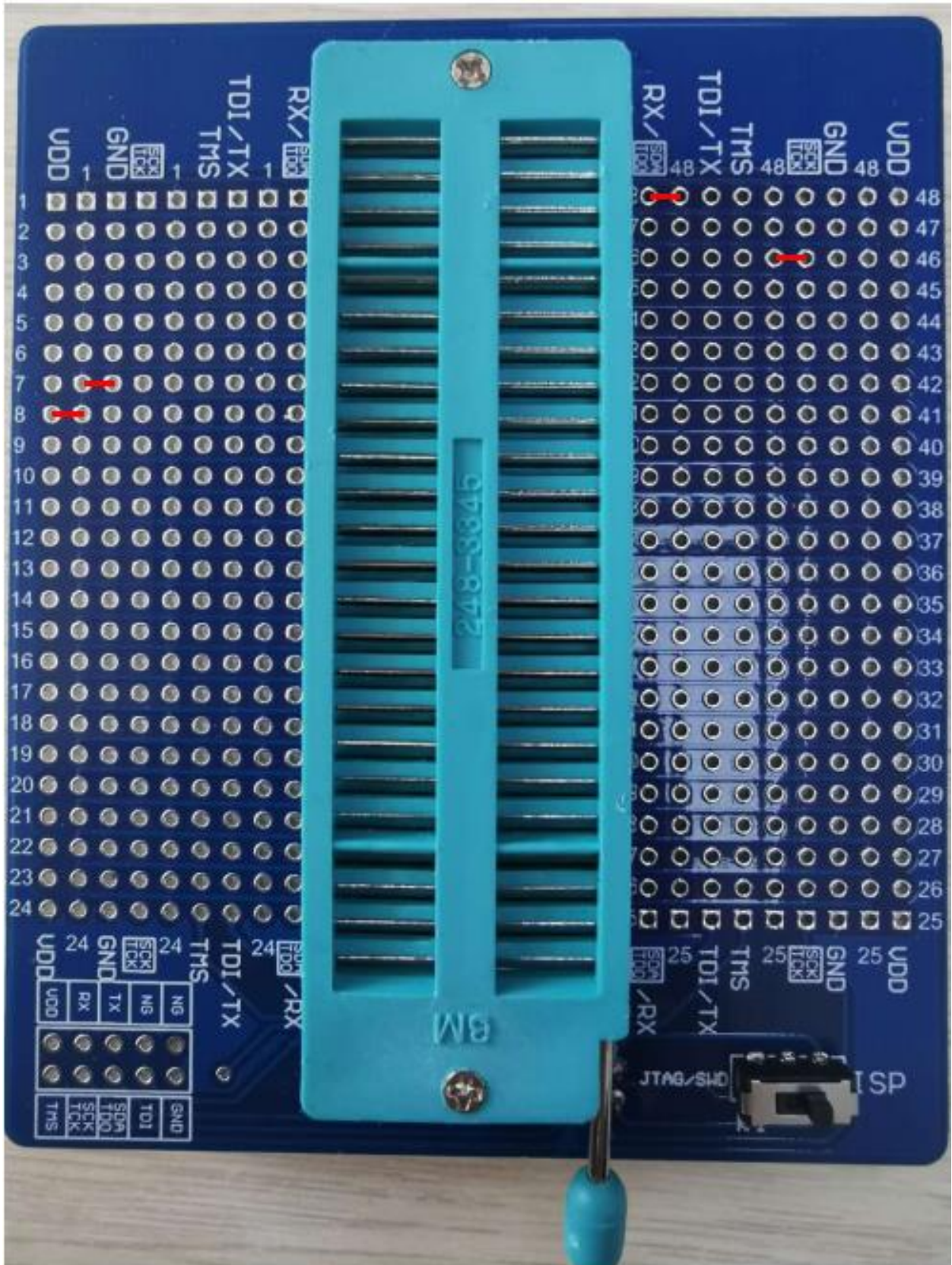
6. 26 HC89F303-SOP28-SWD



6. 27 HC89F303B-SOP28-SWD



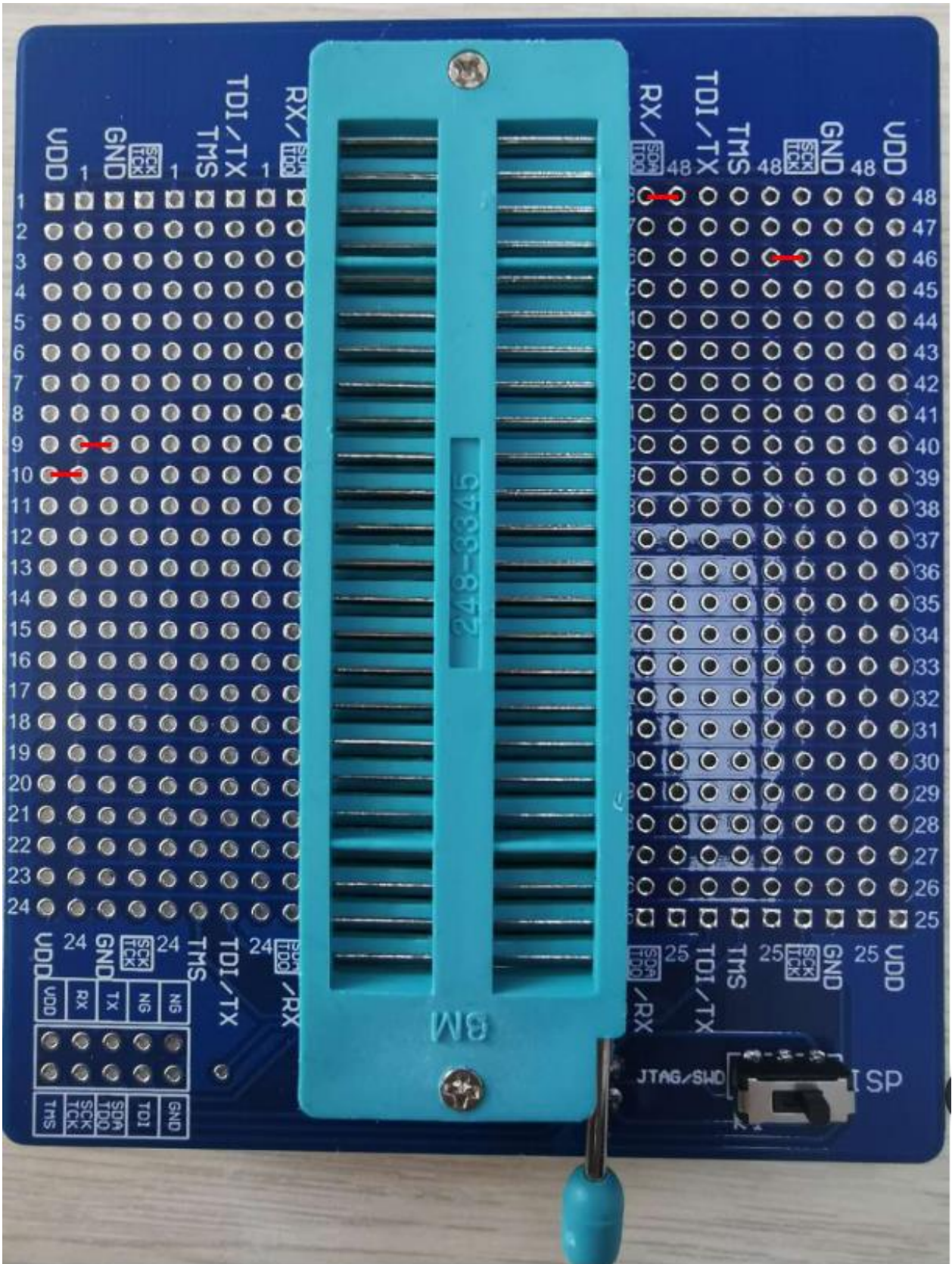
6. 28 HC89F3421-SOP16-SWD



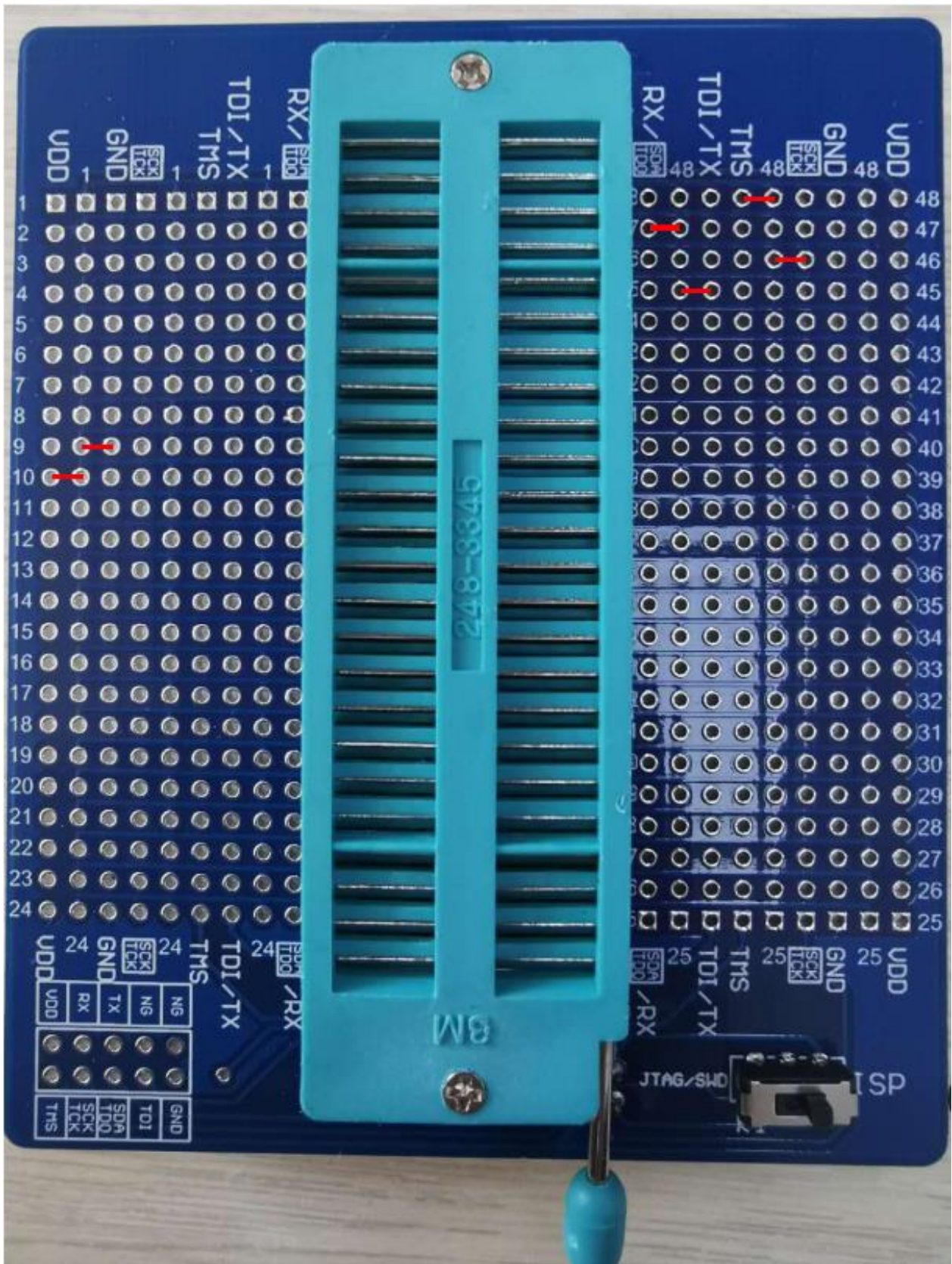
6. 29 HC89F3421-SOP16-JTAG



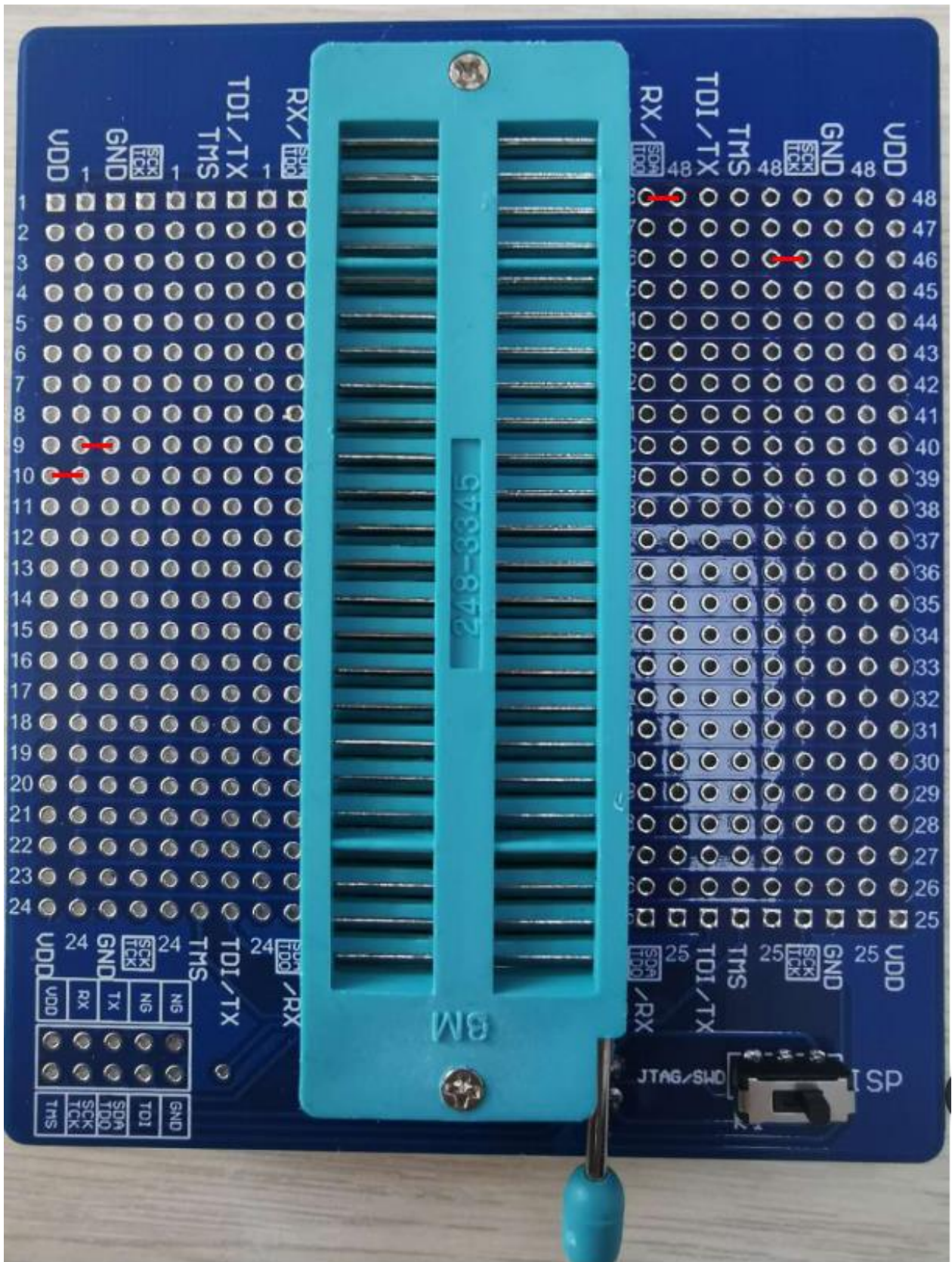
6. 30 HC89F3531-SOP20/DIP20-SWD



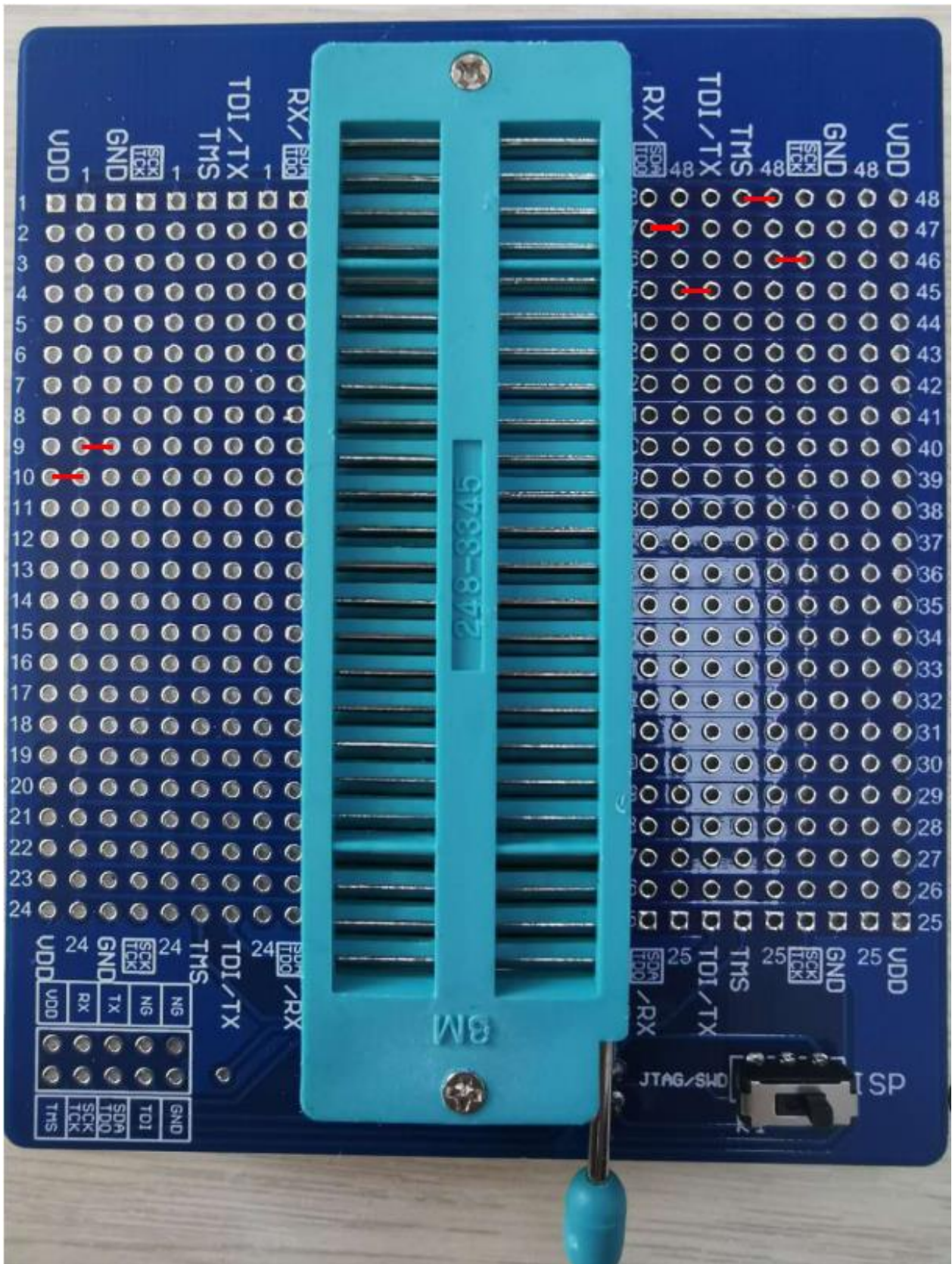
6. 31 HC89F3531-SOP20/DIP20-JTAG



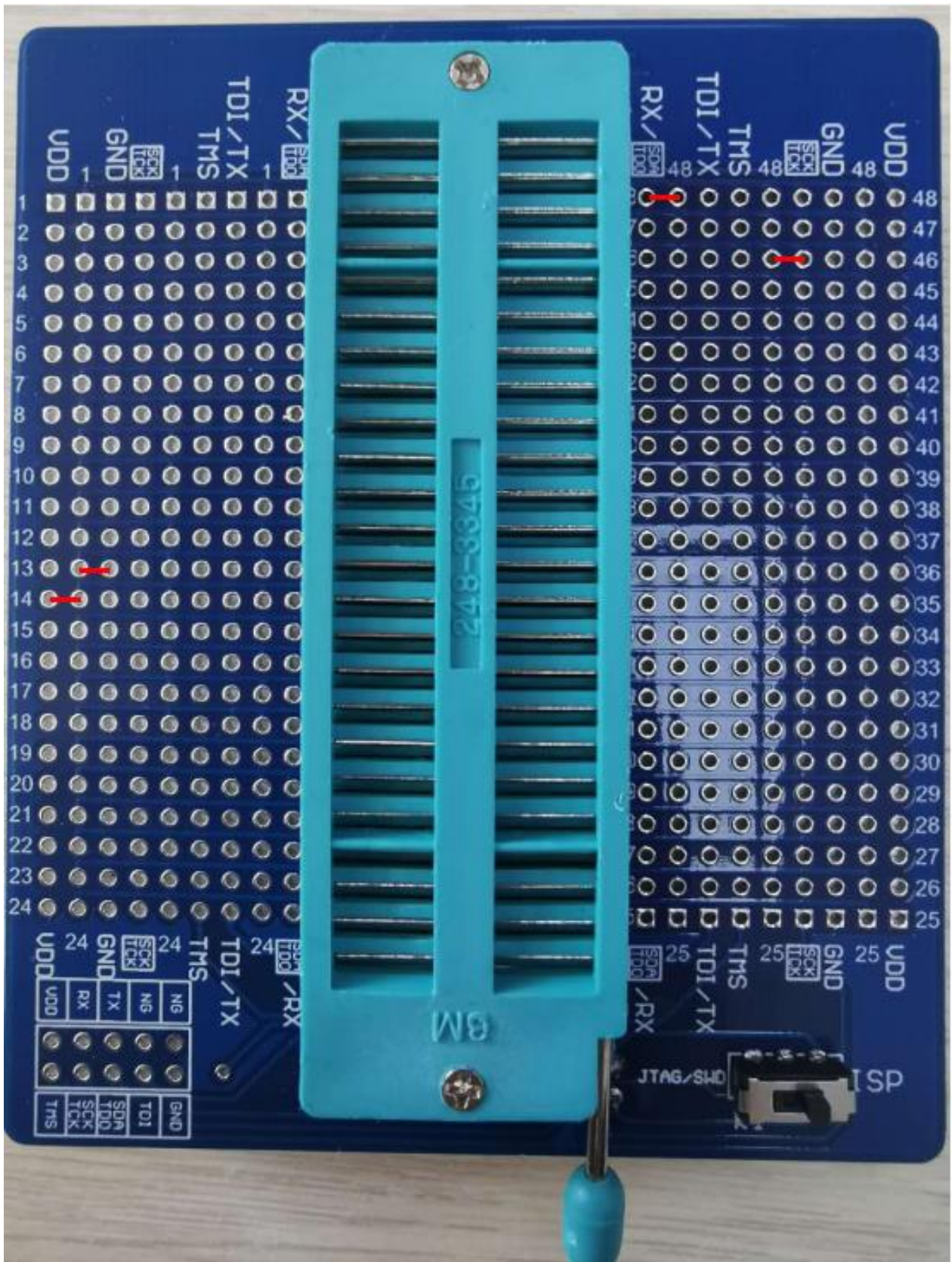
6. 32 HC89F3531-SOP24-SWD



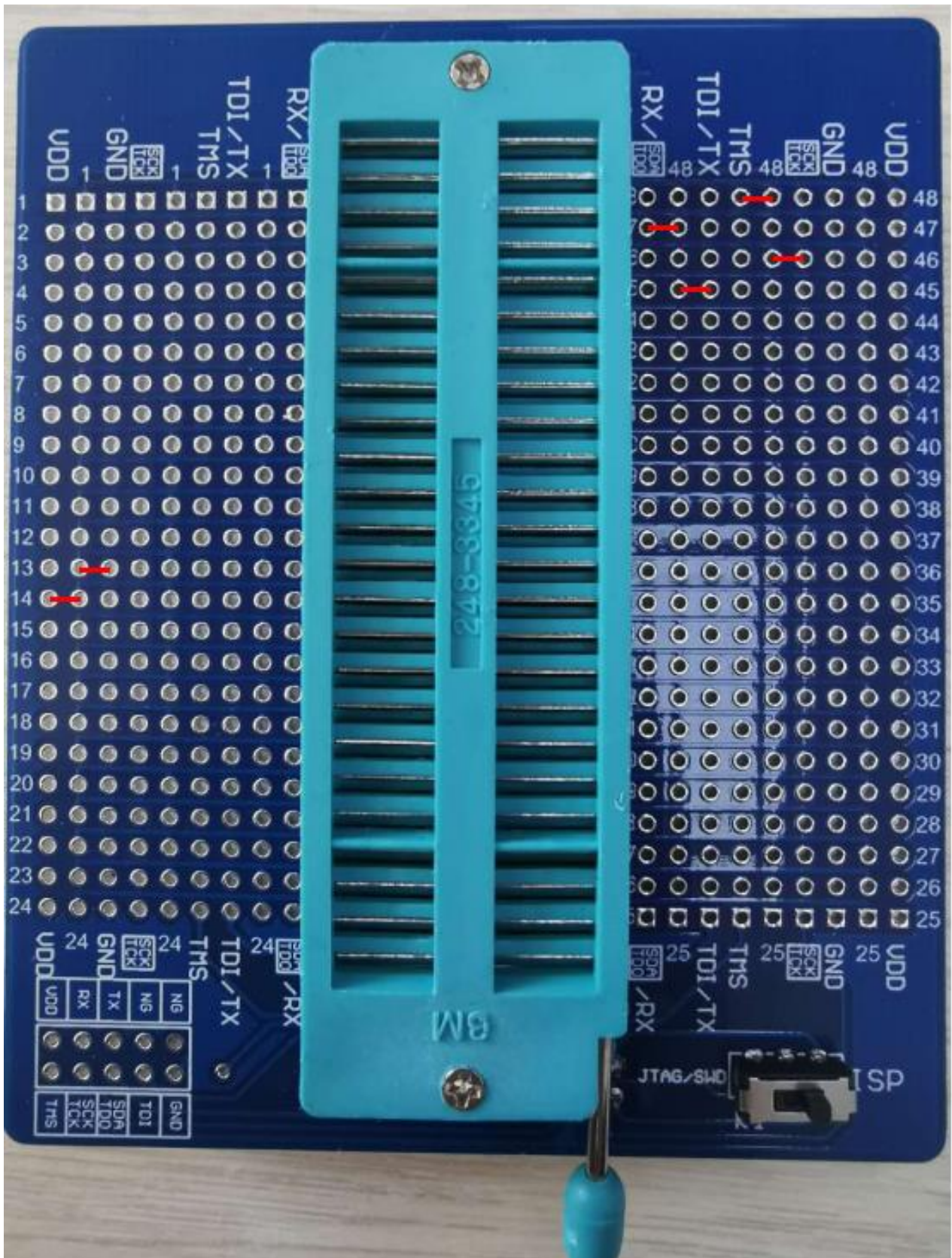
6. 33 HC89F3531-SOP24-JTAG



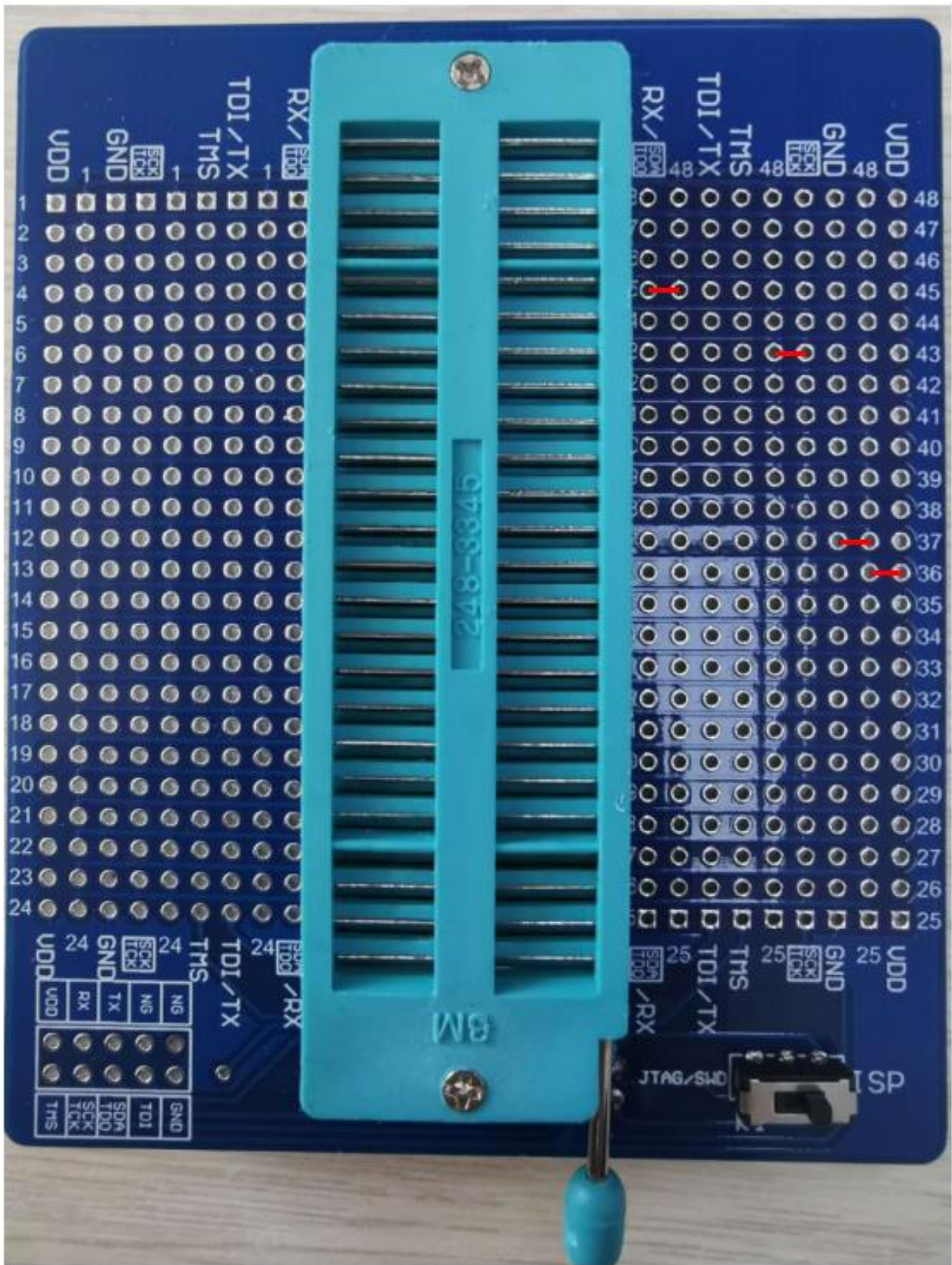
6. 34 HC89F3541-SOP28-SWD



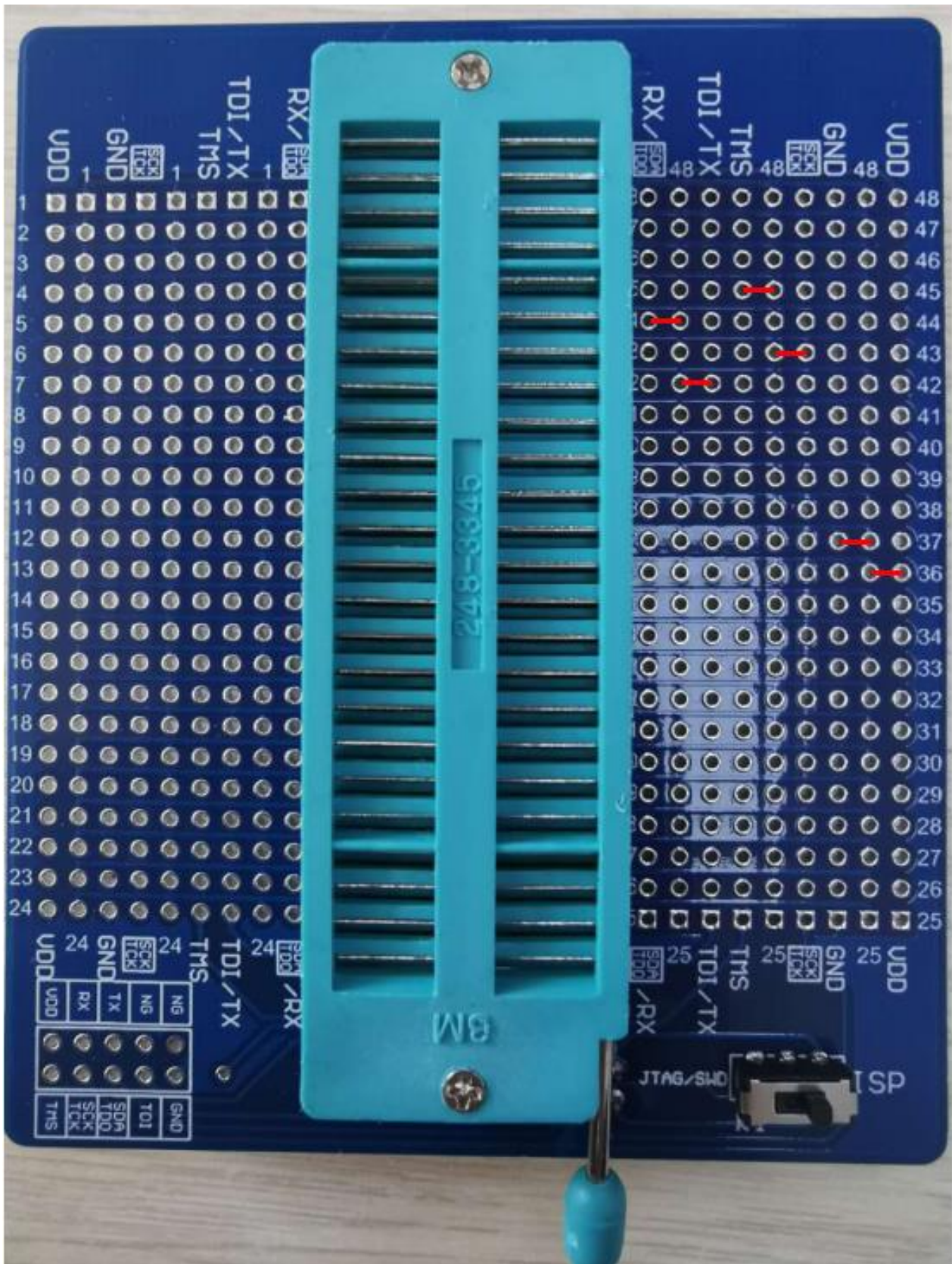
6. 35 HC89F3541-SOP28-JTAG



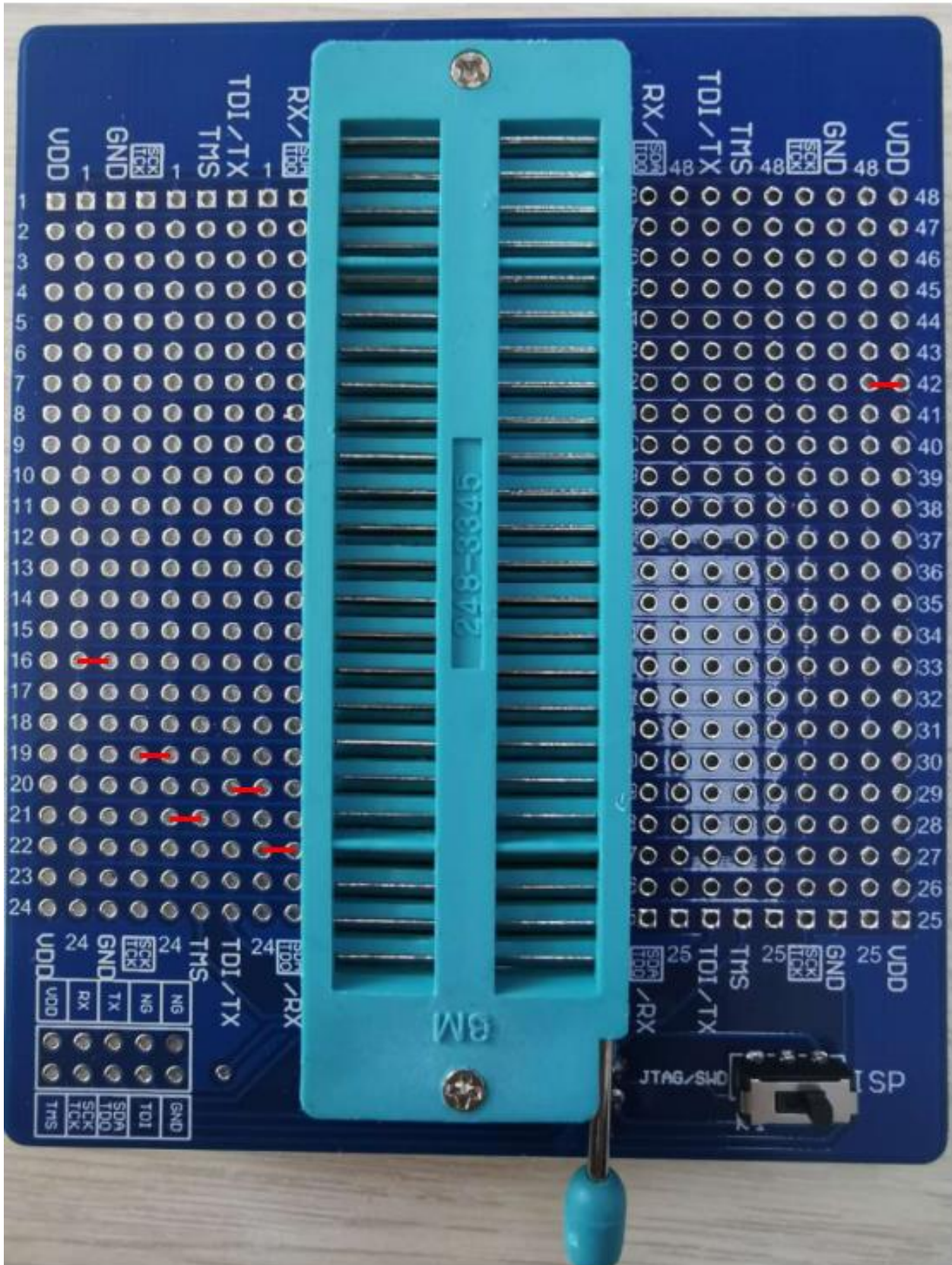
6. 36 HC89F3541-LQFP32-SWD



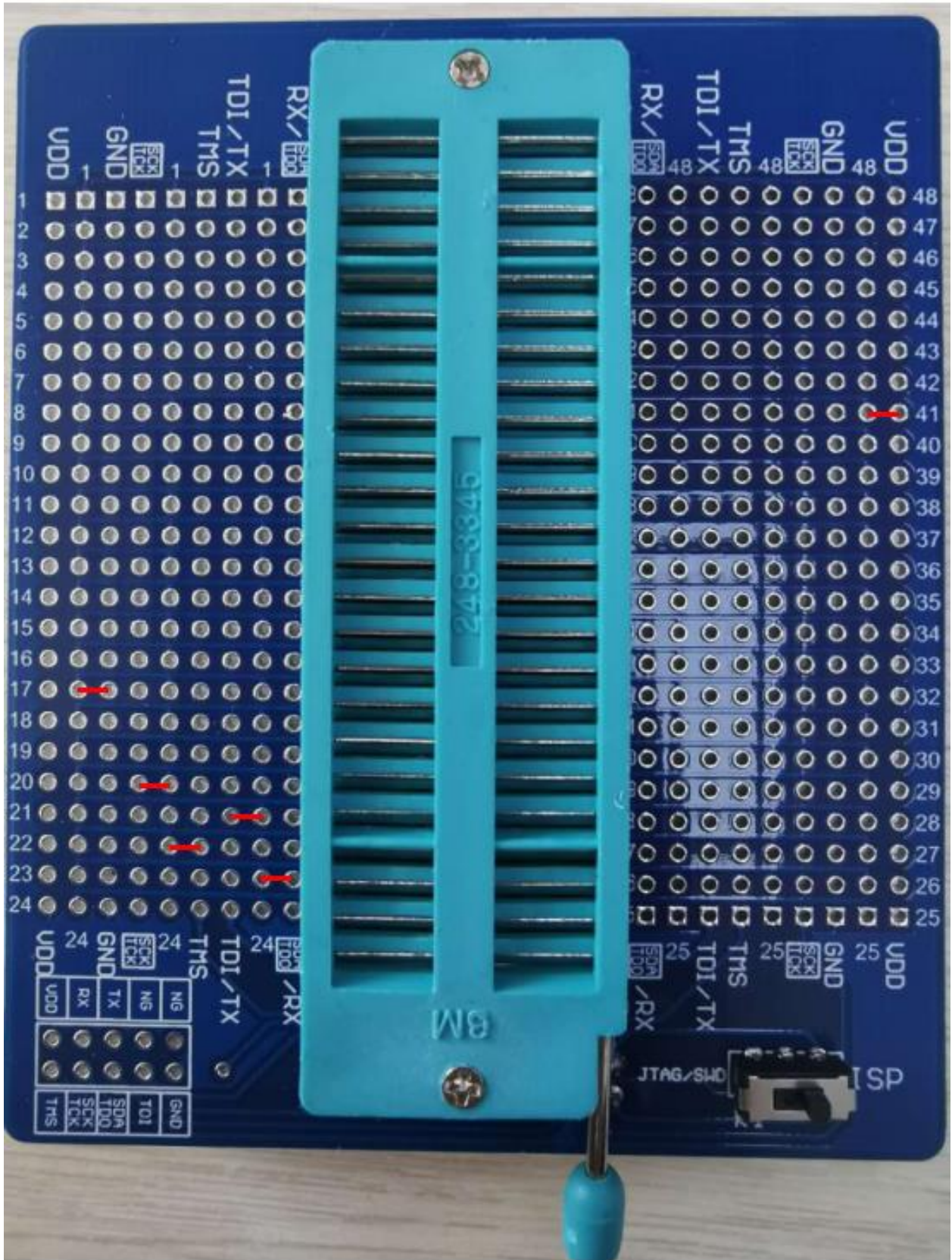
6. 37 HC89F3541-LQFP32-JTAG



6. 38 HC89F3650-LQFP44-JTAG



6. 39 HC89F3650-LQFP48-JTAG



7 Version Description

Version	Date	Describe
Ver1.00	2020/11/6	First edition

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