PDK5S-P-003
Program Writer
User Manual

Version 0.06 – October 30,2018

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Revision History:

Revision	Date	Description
0.00	2016/07/20	1st version
0.01	2016/08/15	Modify explanation of making the Connecting Board
0.02	2016/09/13	1. Update typesetting 2. Add explanation of 4.1 JUMPER
0.03	2017/06/13	1. Add new description of Buzzer sound
0.04	2017/11/24	1. Update partial pictures 2. Amend 2.6 Read & Search 3. Add section 2.7 Convert PDK 4. Amend chapter 4 5. Update the LCM signal table of chapter 7 6. Add 8.2 On-line writing
0.05	2018/03/19	1. Update the address and telephone number of PADAUK Technology co., Ltd. 2. Update Partial pictures 3. Add description of O/S check or Blank check 4. Update and add the description of MTP On-line (On-board) writing
0.06	2018/10/30	1. Add section 9.3 Special notes of voltage while On-board or Multi-Chip-IC writing (OTP / MTP)

1. About 5S-P-003 Writer

1.1. The front
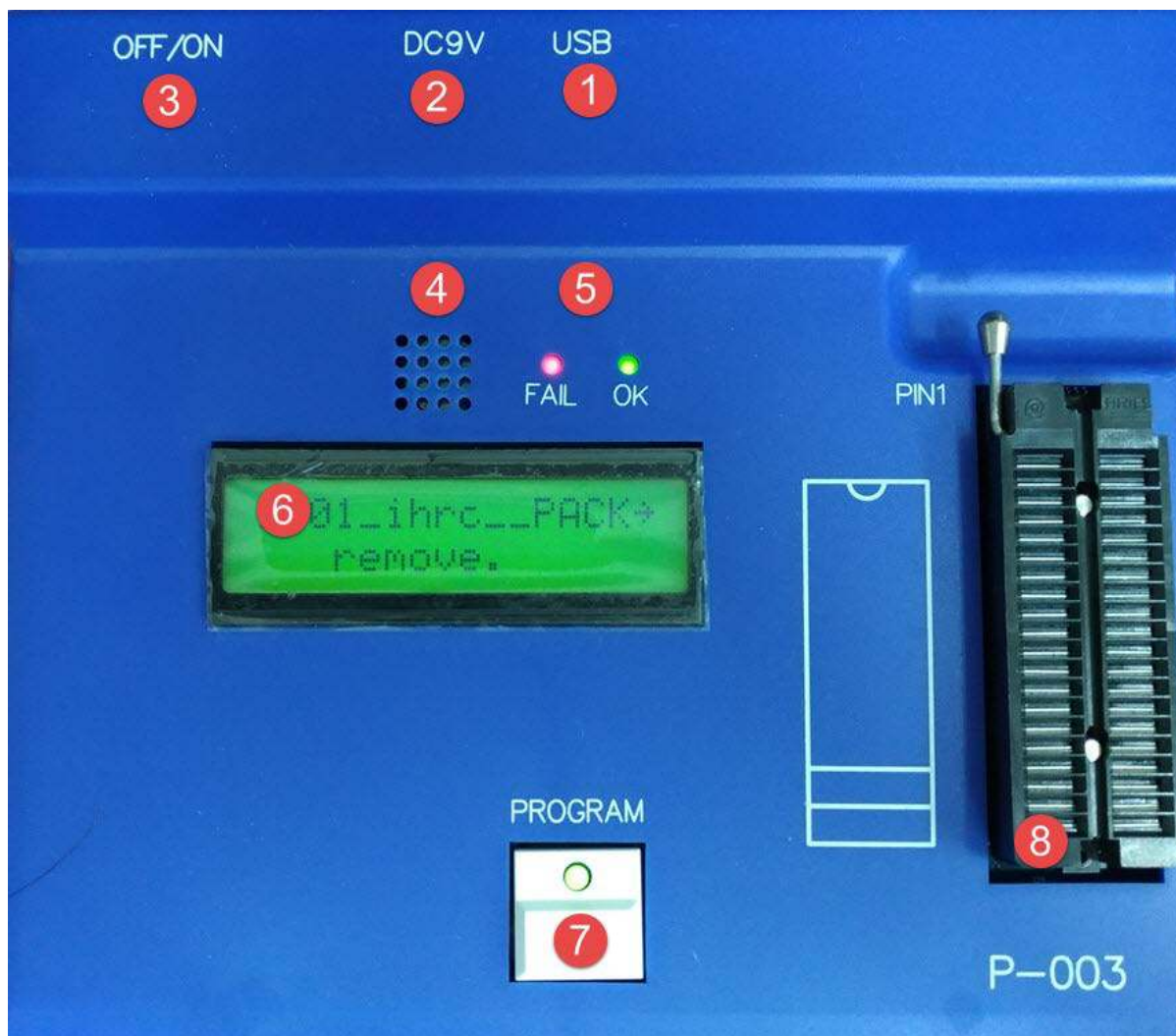
(1) USB interface: Connect to PC.

(2) Power interface: Please use the exclusive power converter of Program Writer accessories. (Do not use other power converters to avoid damaging the Program Writer)

(3) Power Switch: OFF/ON.

(4) Buzzer: Be used as alarm while failed to write.

(5) LED (OK & NG) lamp: Display the result of writing.

(6) LCM displayer: Display the information and result of writing.

(7) Program button: Start writing.

(8) Textool: Suitable for DIP package (available for 28 PIN at most).

1.2. The back

(1) JUMPER (JP1~JP16): Different IC or package would coordinate with different JUMPER position. Please refer to chapter 4.

(2) JUMPER (JP7): When it comes to non-standard or unusual package, you need to use JP7 to transform relevant information. About Connecting Board making, please refer to chapter 5.

(3) Forced update mode button: Forcing update the current version, please refer to section 3.1

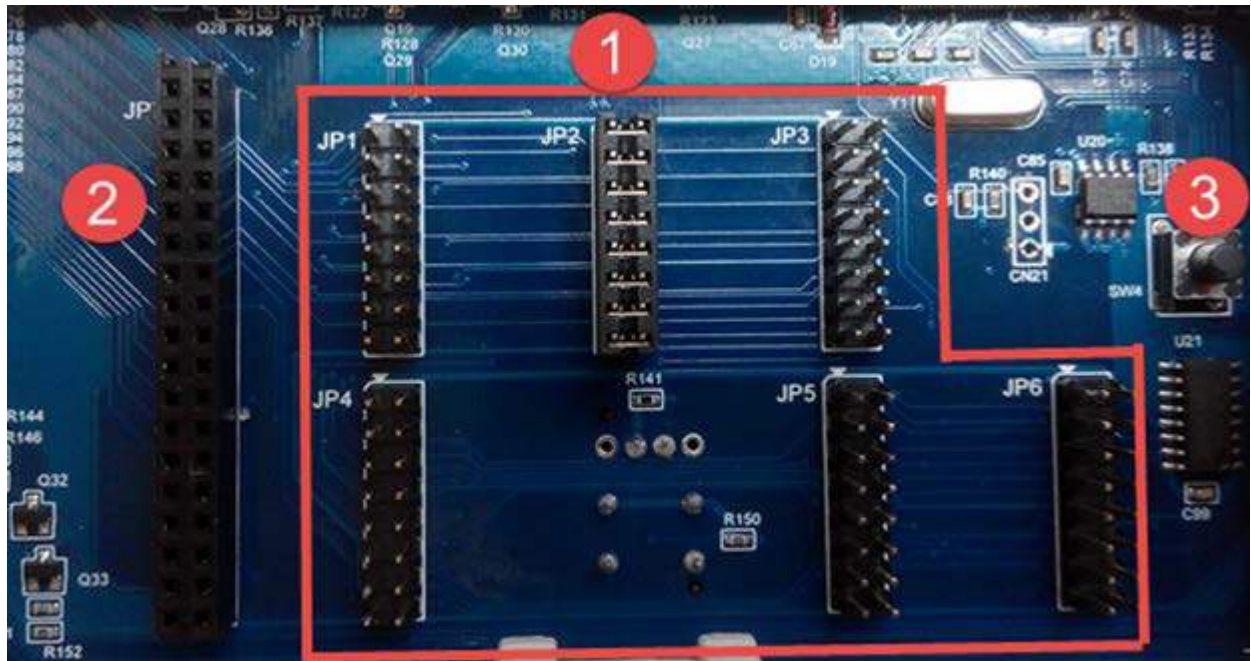## 1.3. The side face

(1) USB interface: Connect to PC.

(2) Power interface: Please use the exclusive power converter of Program Writer. (Do not use other power converters to avoid damaging the Program Writer)

(3) Power Switch: OFF/ON.

(4) Semi-automatic writing connection port: About the connection method, please refer to chapter 6.

1.4. Accessories of Program Writer

(1) The exclusive power converter.

(2) The USB cable.

1.5. Writing application software and User Manual

You can download the latest version of the application software at the following address (including the latest version of the Program Writer)

http://www.padauk.com.tw/en/technical/index.aspx?kind=27

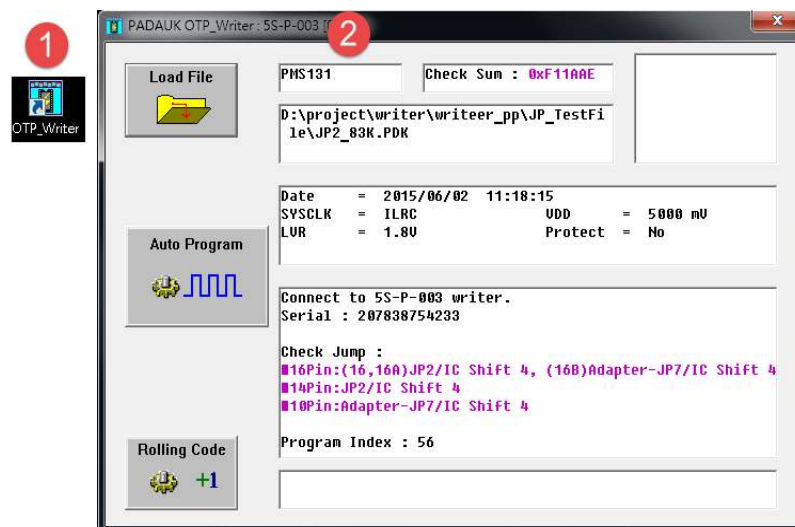Or enter the home page of www.paduak.com.tw, obtain latest Program Writer version from home page > technology application > technology development tool > Program Writer. Please refer to the chapter 3.

2. Functional Description

(A) Engineering type

(B) Simple type

No matter simple type or engineering type, they have the equal corresponding function.

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2.1. Steps of loading File

(1) Load PDK file from PC to Program Writer.

(2) Related information of PDK file would be displayed after loading successfully. (i.e. Check Sum, file name …)

```
PMS131              Check Sum : 0xF11AAE

D:\project\writer\writeer_pp\JP_TestFile\JP2
 _83K.PDK


Date    = 2015/06/02  11:18:15
SYSCLK  = ILRC              VDD     = 5000 mV
LVR     = 1.8V              Protect = No
```

(3) After loading successfully, the JUMPER position and IC placement would be prompted.

```
Download OK

Check Jump  :
■S16/D16: JP2
■1J16A:   JP7 (QFN3*3)
■S14:     JP2 / IC Shift 1
■M10:     JP2 / IC Shift 3
■S08:     JP2 / IC Shift 4
■U06:     JP7 (SOT23-6)
```

(4) The LCM also displays the messages and prompts synchronously.

```
Chip =     PMS131
P/16A->JP2, 16B/
```

(5) Users could also unplug the USB cable and write in alone mode after the file loaded successfully.

(6) Users should make sure that JUMPER & IC had been put in the correct position before starting 『Blank Check』、『Verify』、『Read & Search』 and 『Auto Program』 actions.

(7) About JUMPER & IC placement position, please refer to 『JUMPER Description』.

(8) When JUMPER & IC have been placed, the Program Writer's LCM displays "IC ready".

```
    0 OK     0 NG
IC ready.
```

2.2. Blank Check

Check whether the IC content is blank or not.

2.3. Verify

Check whether the IC and the .PDK file have the same content.

2.4. Auto Program

Start writing automatically.

- It is equal to press the Program Writer's PROGRAM button.
- The actions include: Programmable check → Program → Verify → Protect and so on.
- When write successfully, the Program Writer displays 『 <<< IC O.K. >>> 』 on the LCM.
- Examples of writing (including the position of JUMPER and IC placement).

Take the follow PDK file and IC for examples.

File	IC	Jumper	IC Shift	Note
JP2_83K.PDK	PMS131-DIP16	JP2	4	
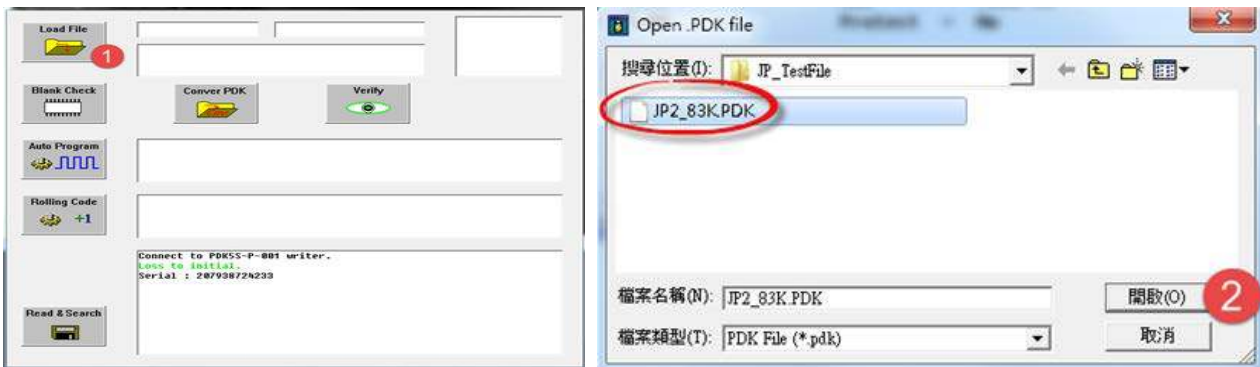
(1) Click on 『Load File』
(2) Choose JP2_83K.PDK, click on 『打开』
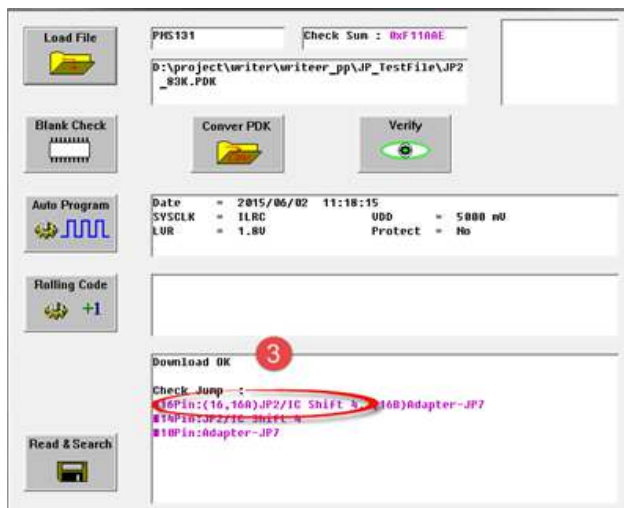
(3) Confirm Download OK (notice the message)

(4) Confirm the information displayed on LCM.

(5) Insert JUMPER into JP2 according to the information of (3) or (4).

(6) Place IC according to the information of (3) or (4). 『IC Shift: 4 』- means shift four blank space from the top.

(7) Make sure the information 『IC Ready』displayed on LCM.
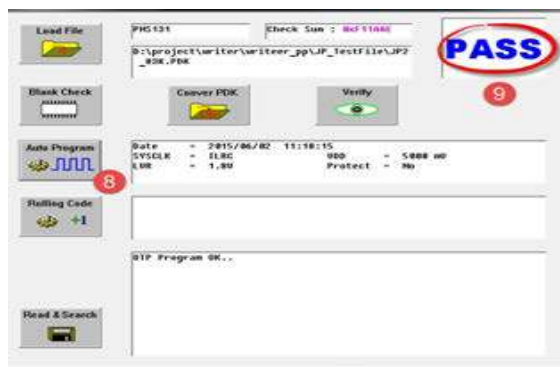
(8) Click on 『Auto Program』to start writing.

(9) Make sure the writing result is 『PASS』

(10) Make sure the information 『<<<   IC O.K. >>>』 displayed on LCM.

2.5. Rolling Code

Start the relevant settings about Rolling Code, settings include:

(1) Initial value.

（2）Incremental value.
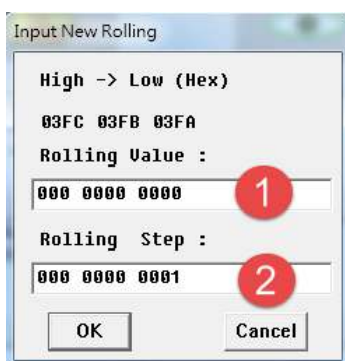
● This function only valid while the Rolling Code grammar has been set in the loading PDK file

● Please refer to the IDE User Manual to learn about the ways of setting Rolling Code.
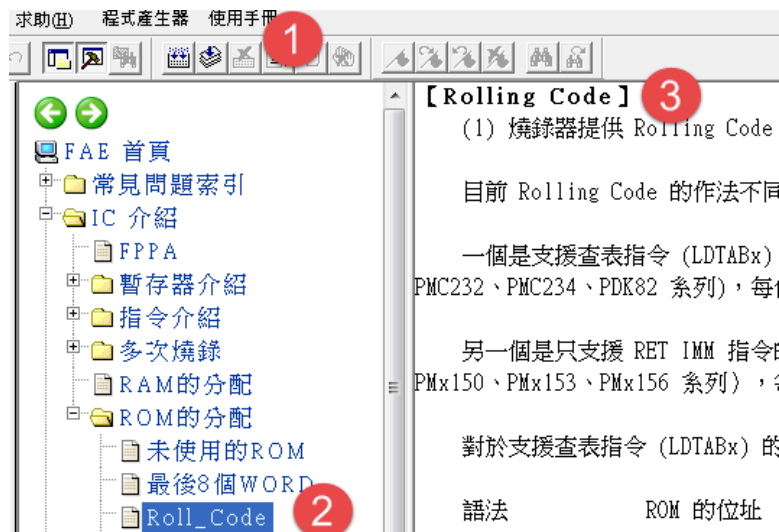
(1) Click on 『Application Note』

(2) Click on 『IC introduction』 → 『ROM distribution』 → 『Roll_Code』 .

(3) Look up the ways of Rolling Code.

2.6. Read & Search

Search for PC's PDK file which has the same CHECK-SUM.

2.7. Convert PDK

(1) Confirm the PDK file is the one need to convert.

(2) Start converting PDK file.

3. Version Update

You can download the latest version of the application software and Manual (including the latest version of the Program Writer) at the following address:

http://www.padauk.com.tw/en/technical/index.aspx?kind=27

Or by www.paduak.com.tw website home page > technology application > technology development tool > Program Writer obtains.

After download the application software, you can install it. Then, you should make sure the Program Writer is connected to PC when update its version. Besides, the Program Writer will update automatically at the first execution.

3.1. Automatic update

While execute the application software, the auto-updating application software including the Program Writer version.
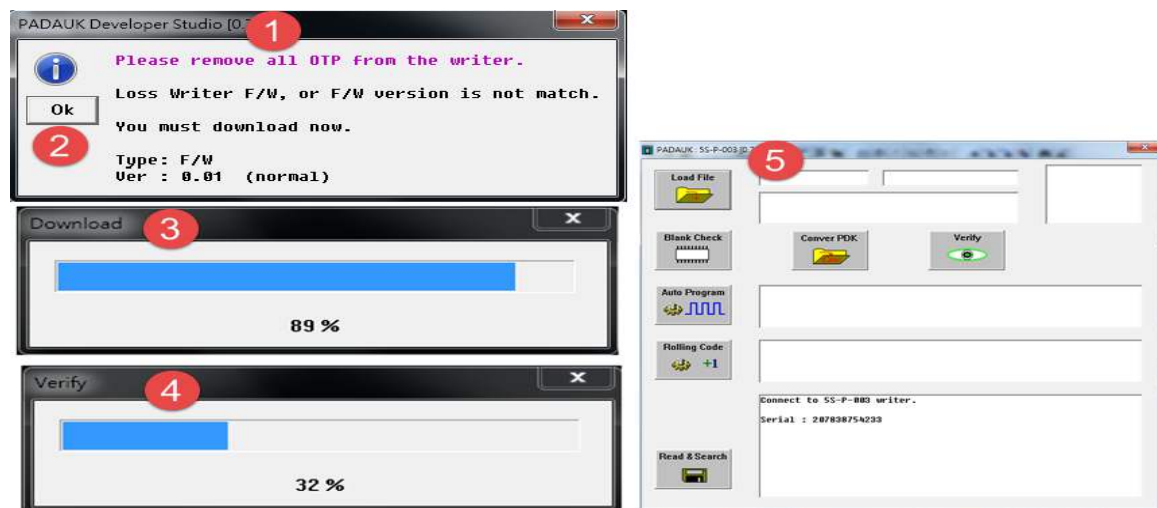
(1) The prompting of Program Writer version update

(2) Click on 『OK』 to start updating

(3) Download the new version in Program Writer.

(4) Verify the new version.

(5) Connect to PC automatically after finish

NOTICE: Please update manually if there is no auto- update when the first time to execute the application software.

3.2. Manual update

(1) Press on forced update mode button.

(2) Restart power and enter Boot loader mode. The LCM displays the following information:
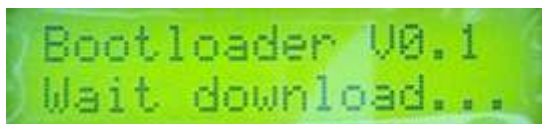
(3) Execute the application software and forcing update the Program Writer version included by application software.

4. JUMPER Description

4.1. Examples

After PDK file is loaded to Program Writer, the window displays the IC's information concerning Jumper position and the number of needed spaces. As shown in the following picture: (Take PMS154B as an example)
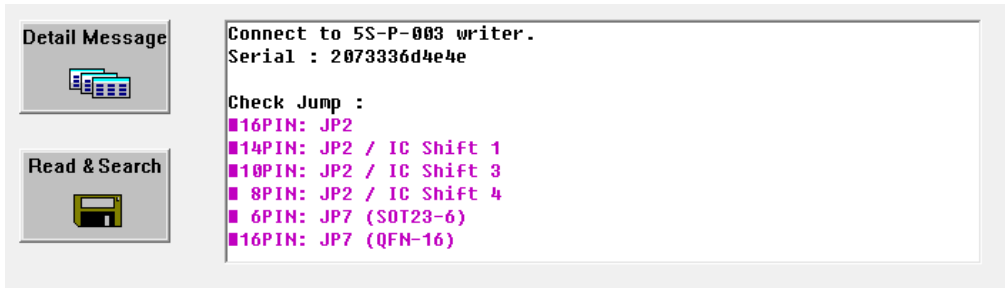
- SOP16/DIP16 standard package: Jumper is placed in "JP2" position which on the back of Writer and IC is placed in Textool (no shifts). As shown in the following pictures:
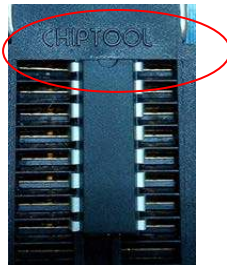
X → 『no shifts』

- SOP14 standard package: Jumper is placed in "JP2" position which on the back of Writer; IC is placed from the second space of Textool. As shown in the following pictures:
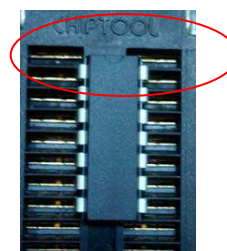
Shift 1 → 『Shift one space from the top』

Note: As for non-standard and unusual IC package, need be connected to JP7 through Connecting Board. Please refer to 『Connecting Board Making』 to learn about Connecting Board. .

5. Connecting Board Making Description

JP7 can support various customizing package pin based on Connecting Board.

The making and rules of the Connecting Board as follows:

(1) Define the information of package pin in program.

(2) Make the Connecting Board.

(3) For developed PDK files, adding the information of package pin please refer to section 5.5.

5.1. Define the data of exclusive use packaged pin

Define the data of exclusive use packaged pin in program. Here is grammar:

.writer package …., (A total of twelve sets of values)

For example: **.writer package** 16, 5, 11, 9, 10, 8, 7, 6, 14, 0x00F0, 0x00F4, 0.

Grammar instruction

Group Count	Name	Introduction	Remarks
1	Pin Count	(the number of pin)	Up to 28 pins
2	VDD	VDD pin number	
3	PA0	PA0 pin number	Note 1
4	PA3	PA3 pin number	
5	PA4	PA4 pin number	
6	PA5	PA5pin number	
7	PA6	PA6 pin number	
8	PA7	PA7 pin number	Note 1
9	GND	GND pin number	
10	Mask1	Package the left pin mask value, each bit represents a pin BIT0→1st pin, BIT2→2nd pin, BITn (n=0..13)　0/1: bypass/ O/S test Set 0:this pin not do O/S test Set 1:this pin do O/S test	Note 2
11	Mask2	Package the right pin mask value, each bit represents a pin; BIT0→m pin, BIT2→ (m-1)pin, BITn (n=0..13)　0/1: bypass/ O/S test Set 0:this pin not do O/S test Set 1:this pin do O/S test	m: The number of pin Note 2
12	Shift	IC is corresponding to the blank space number need to shift from the top of SOCKET.	

Note 1: If the pin does not exist, fill in 32 representing NC (no connect)

Note 2: If the pin does not exist or cannot do O/S test (i.e. Special multi-chip package pin), set the corresponding bit value to zero.

5.2. Connecting Board making

The JP7 last 8 pins are writing pins, as shown in the following figure:
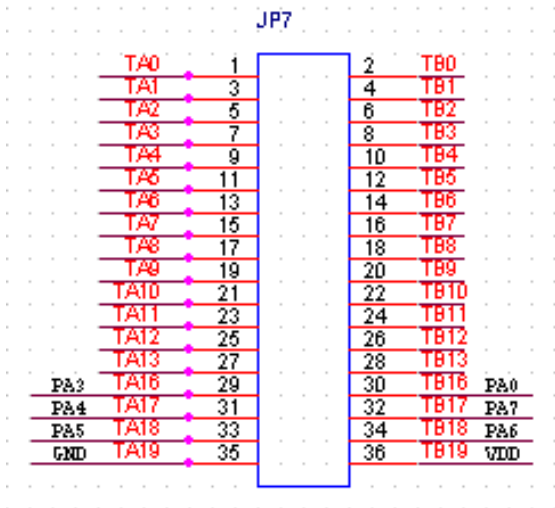
While making a Connecting Board, please decide the IC placement position (generally assumed that the first pin of IC is aligned with the upper left first pin of the Socket.) and connect the last 8 pins of Connecting Board with the corresponding pin of IC, as shown in the following figure:
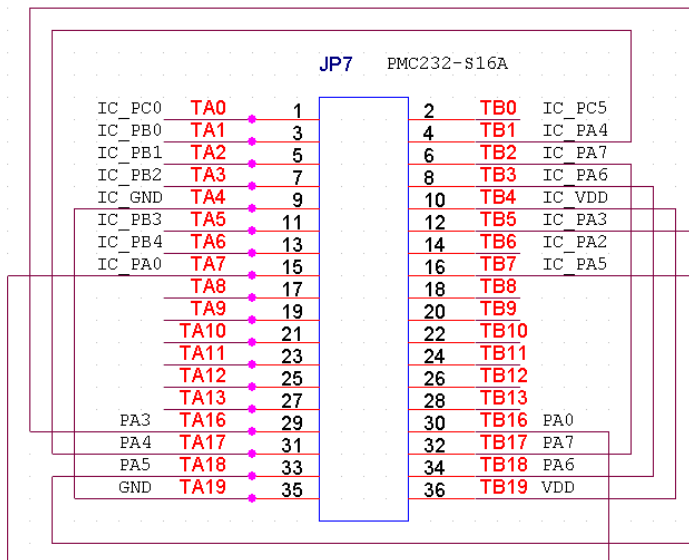
5.3. Case 1

Take PMx131 MSOP-10 for example:

IC	Package	Jumper	IC Shift	Note
PMx131	MSOP10	JP7		Please connect JP7 with Connecting Board.(Note1)

The PMx131 MSOP-10 package as follows:
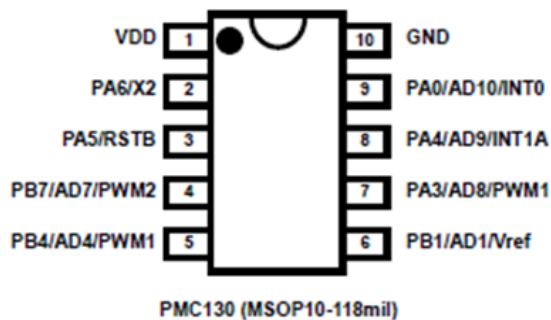
PMC130 (MSOP10-118mil)

1. You can use the following instruction to define the exclusive package pin:

.writer package 10, 1, 9, 7, 8, 3, 2, 32, 10, 0x003F, 0x003F, 4

Group count	Name	Description	Value	Remarks
1	Pin Count	The number of package pin	**10**	
2	VDD	VDD pin serial number	**1**	
3	PA0	PA0 pin serial number	**9**	
4	PA3	PA3pin serial number	**7**	
5	PA4	PA4pin serial number	**8**	
6	PA5	PA5pin serial number	**3**	
7	PA6	PA6 pin serial number	**2**	
8	PA7	PA7 pin serial number	**32**	32 indicates that PA7 does not exist
9	GND	GND pin serial number	**10**	
10	Mask1	Package the left pin mask value	**0x003F**	All pin should test O/S.
11	Mask2	Package the right pin mask value	**0x003F**	All pin should test O/S.
12	Shift	The blank space IC need to be shifted	**4**	IC first pin align to the upper left fifth pin of Socket

2. Make the Connecting Board
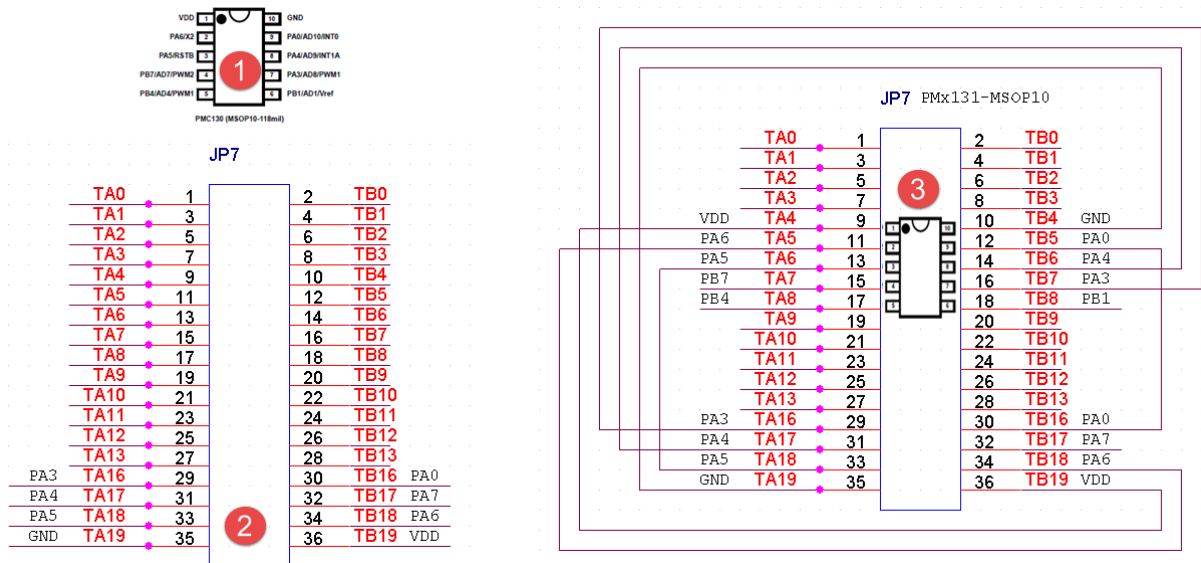
(1) Confirm the package pin of PMx131 MSOP-10

(2) Confirm the JP7 pin in the back of Writer

TA16-PA3	TB16-PA0
TA17-PA4	TB17-PA7
TA18-PA5	TB18-PA6
TA19-GND	TB19-VDD

(3) Put IC in SOCKET →put IC from the fifth space of SOCKET

According to the data below, connecting『VDD 、GND 、PA0 、PA3 、PA4 、PA6 、PA7』with IC's corresponding pins.

TA16 (PA3) ----------TB7(IC-PA3)

TA17 (PA4) ----------TB6(IC-PA4)

TA18 (PA5) ----------TA6(IC-PA5)

TA19 (GND) ----------TB4(IC-GND)

TB16 (PA0) ----------TB5(IC-PA0)

TB17 (PA7) ----------NC

TB18 (PA6) ----------TA5(IC-PA6)

TB19 (VDD) ----------TA4(IC-VDD)

NOTICE: If the thirteenth group number (shift) is changed to 0, it means that the first pin of IC aligns the upper left first pin of Socket, at the same time all connection of corresponding IC pins have to be changed.

5.4. Case 2 (Customized package pin)

Customized package pins are shown in the following picture:

```
//////////////////////////
//  Customer Package
//////////////////////////
//  1 X           16 GND
//  2 X           15 X
//  3 PB5         14 X
//  4 PB6         13 X
//  5 PB7         12 PA0
//  6 VDD         11 PA4
//  7 PA7         10 PA3
//  8 PA6          9 PA5
//////////////////////////
//           ?P VDD PA0 PA3 PA4 PA5 PA6 PA7 GND  mask1   mask2  shift
.writer package 16, 6, 12, 10, 11, 9,  8,  7, 16, 0x00FC, 0x00F1, 0
```

1. You can use the following instruction to define the exclusive package pin:

   .writer package 16, 6, 12, 10, 11, 9, 8, 7, 16, 0x00FC, 0x00F1, 0

Group Count	Name	Description	Value	Remark
1	Pin Count	the number of pin	**16**	
2	VDD	VDD pin serial number	**6**	
3	PA0	PA0pin serial number	**12**	
4	PA3	PA3pin serial number	**10**	
5	PA4	PA4 pin serial number	**11**	
6	PA5	PA5 pin serial number	**9**	
7	PA6	PA6 serial number	**8**	
8	PA7	PA7 pin serial number	**7**	
9	GND	GND pin serial number	**16**	
10	Mask1	Package the left pin mask value	**0x00FC**	Bypass pin 1, 2.
11	Mask2	Package the right pin mask value	**0x00F1**	Bypass pin 15, 14, 13
12	Shift	The blank space IC need to be shifted	**0**	The first pin of IC aligns the upper left first pin of Socket
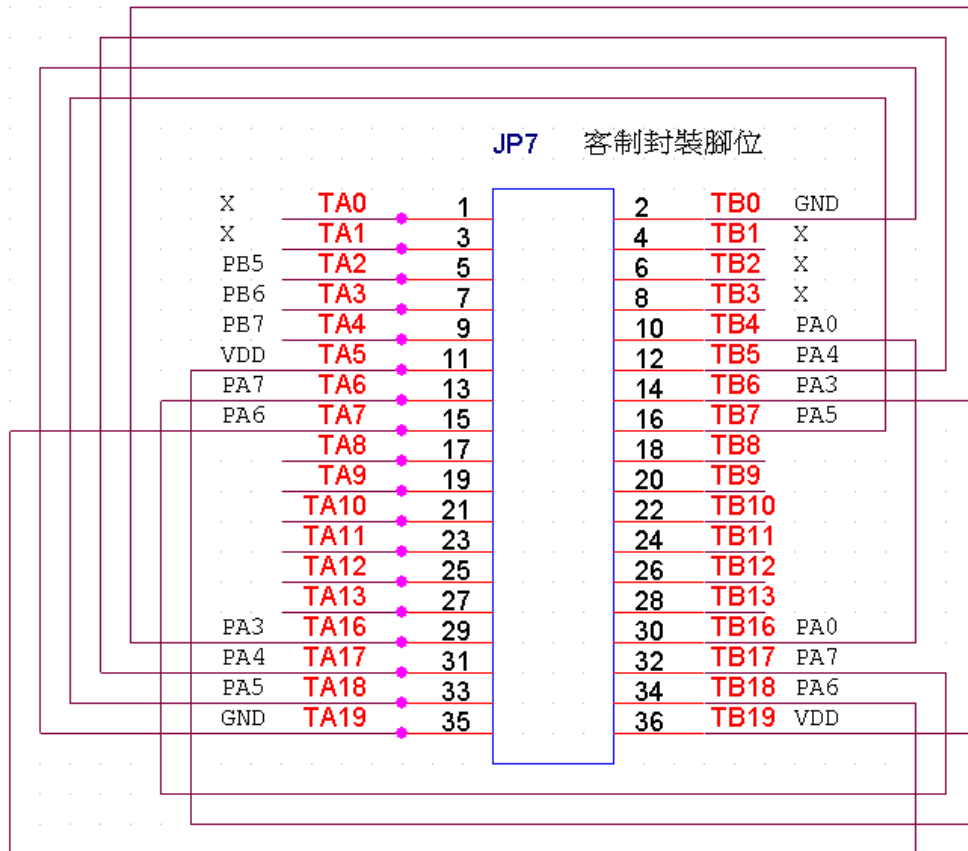
(1) Confirm the package pins.

(2) Confirm the JP7 pins on the back of Writer (TA16~TA19, TB16~TB19).

TA16-PA3	TB16-PA0
TA17-PA4	TB17-PA7
TA18-PA5	TB18-PA6
TA19-GND	TB19-VDD

(3) Put IC in the SOCKET → put IC from the top of Socket (no space).

According to the following table ,complete the connection between 『VDD、GND、PA0、PA3、PA4、PA6、

PA7』and IC's corresponding pins.

TA16 (PA3) ----------TB6(IC-PA3)

TA17 (PA4) ----------TB7(IC-PA4)

TA18 (PA5) ----------TA6(IC-PA5)

TA19 (GND) ----------TB0(IC-GND)

TB16 (PA0) ----------TB4(IC-PA0)

TB17 (PA7) ----------TA6(IC-PA7)

TB18 (PA6) ----------TA7(IC-PA6)

TB19 (VDD) ----------TA5(IC-VDD)

5.5. The way to add package pin information to PDK file

For the developed PDK file, the way to add package pin information as follows:
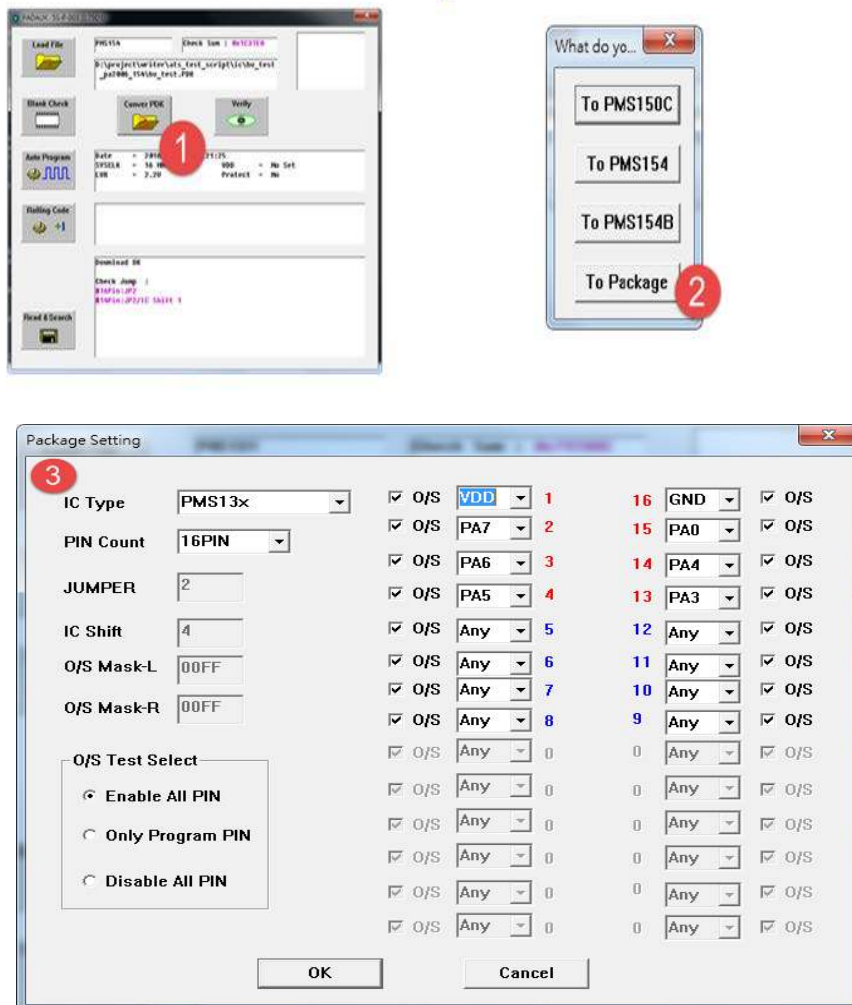
(1) Click on 『Convert PDK』

(2) Choose 『To Package』

(3) Insert the information of package pin, please refer to section 5.1 for format.

(4) Click on 『OK』

(5) Confirm again.

(6) Save as a new file.

PDK 5S-P-003
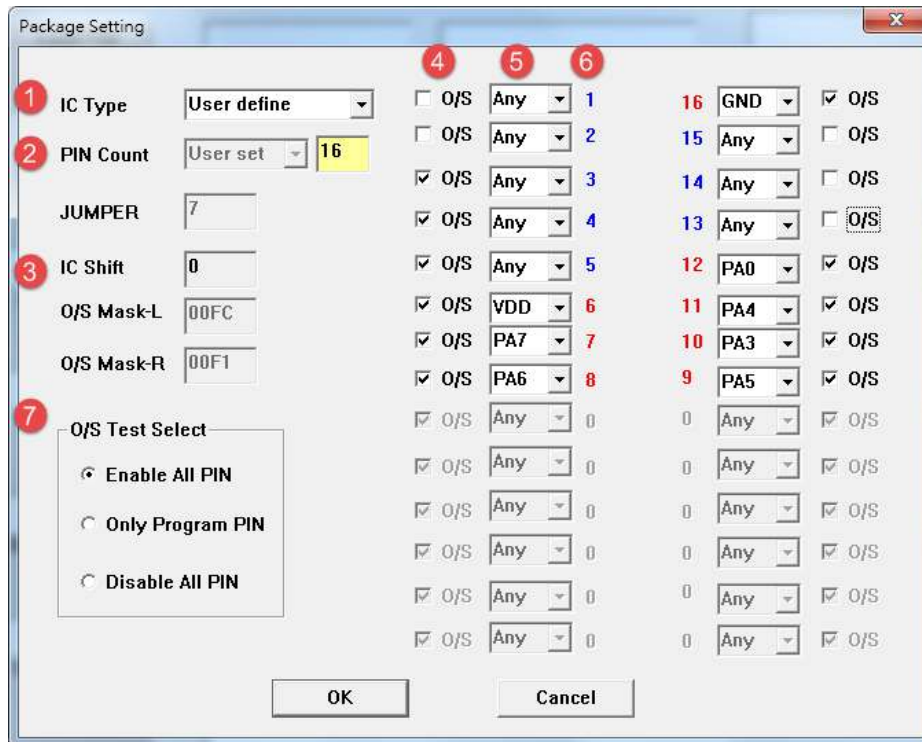# Program Writer

5.6. The description of package setting details

(1) IC Type: Specify the supported IC type.

(2) PIN Count: Only when the IC type is 'User define', users could set PIN Count freely. The input range is 6~28.

(3) IC Shift: Set the space needed shift when you place IC in socket; Input range is 0 ~10, default value is 0.

(4) O/S check: Check the pin whether need O/S test or not, tick the pin that need Open/Short test.

(5) Settings of writing pin: Set writing pin , non-writing pin choose 『Any』. All writing pin must be specified.

(6) Pin number: Automatic change by the pin count.

(Writing pins are represented by red; pins which are not been written are represented by blue; others are represented by gray.)

(7) O/S Test Select：Select the pin need to do Open/Short Test.

Enable All PIN: Check all pin.

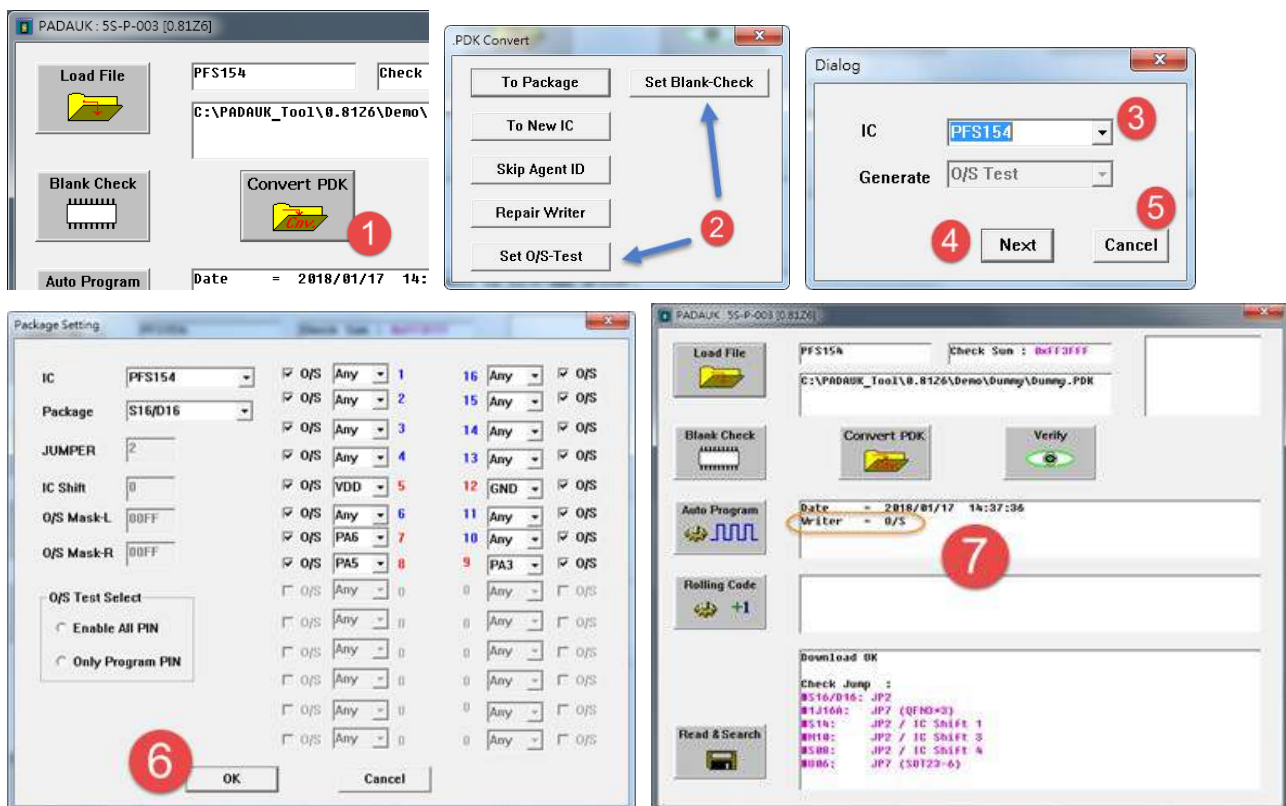Only Program PIN: Only check writing pin.

Disable All Pin: No check.

6. Semi-automatic Writing Handler Connection Description

CN1 - Semi-automatic Writing Handler connection port.

Pin	Name	Attribute	Descriptions
1	5V		Power D+5V
2	GND		Ground
3	BUSY	OUTPUT / High Active	Notify Semi-automatic Writing Handler, the Writer is writing IC
4	OK	OUTPUT / High Active	Notify Semi-automatic Writing Handler, the IC has been written successfully
5	NG	OUTPUT / High Active	Notify Semi-automatic Writing Handler, the IC has been written failed
6	START PROGRAM	INPUT / Low Active Active time >200ms	Semi-automatic Writing Handler send information to notify Writer start to write.

7. Set O/S Test and Blank Check

This chapter explains how to set writer which only do chips' O / S test or blank check. Steps as follows:

(1) Click on 『Convert PDK』

(2) Click on 『Set O/S-Test』 or 『Set Blank-Check』 to go to the menu.

(3) Choose IC type (i.e. PFS154).

(4) Click on 『Next』 to go to next step.

(5) Or click on 『Cancel』.

(6) Enter package setting. Please refer to section 5.6 to get relative descriptions. Click on 『OK』after complete setting.

(7) Automatically download the configuration file to the Writer.

After complete the above steps, users can cooperate with semi-automatic equipment just do chips' O/S tests or blank checks.

NOTICE: Blank Check including O/S test.

8. Writer LCM Information and Buzzer Sound Table

● Writer LCM information:

LCM information	Descriptions	Exclusions and Solutions
Wait : Load File	.PDK file was not loaded	Load .PDK file after connect to USB
IC ready.	IC is prepared	
remove.	IC has been removed	
IC O/S test fail xP? O/S: Px Hi xP? O/S: Px Lo xP? O/S: G→Px xP? O/S: Px→V xP? O/S: Px→G	IC open/short test failed	Please replace IC or remove and put it again or check Jumper , Connecting Board and Settings again.
Do Check... Do Erase.. Do Program... Do Verify... Do Adjust IHRC.. Do Protect...	IC is being checked IC is being erased (MTP only) IC is being written IC is being verified IC is being adjusted IC is being protected	
<<< IC O.K. >>>	Writing completed	
Not the IC.	IC type and .PDK file do not match	Please replace the IC
IC not matched.	IC's content does not match	Please replace the IC
IC not work(xx)	Writing failed and cannot work	Please replace the IC
IC verify fail.	IC verified failed.	Please replace the IC
Over program cnt	Over write count	Please replace the IC

IC not blank.	IC not blank	Please replace the IC
IC Blank	Blank IC	
Loss PC Rolling.	Rolling code synchronization failed	Reconnect USB and rerun writing software
Over PGM limit	Over the writing limit of Writer	Reload the .PDK file
Version not matched.	IC version does not match	Please update the latest writing version
No support.	PDK files is not supported	

● **Buzzer sound table：**

Buzzer sound	Introduction	Exclusion and Solutions
1 long beep	Writing failed	Check IC and exclude the possible situation
3 long beep ,3 short beep	The IC writing signal has been interrupted abnormally; IC has been removed; IC has been forced out by Semi-automatic Writing Handler	Checking the settings of Semi-automatic Writing Handler writing time

9. Appendix Descriptions

9.1 The difference between 5S-P-003 and 3S-P-002

Project	5S-P-003	3S-P-002	Notes
All pin do O/S test	support	nonsupport	
Writing time	acceleration		note1
PDK loading time	acceleration		note1
Jumper naming	JPx	CNxx	note2
LCM prompts jumper / IC position	support	nonsupport	
Phase out IC（ex: P232/P234）	nonsupport	support	

Note 1: IC acceleration ratio is related to IC type.

Note 2: Please refer to the relevant table to learn about the connection between Jumper(JPx)and

IC type/package.

9.2 Special notes of MTP On-board writing

MTP series enable to support On-board writing.

Take PFS154 as an example (please refer to PFS154 data sheet to learn about other MTP chip writing wire)

There are five wires of on-board writing, one clock wire ICPCK and one data wire ICPDA, and three other power wires are VDD, GND and writing voltage VPP. In the follow wiring table of on-board writing, the ☆ of wiring table may be resistor or capacitor, and the conditions of wiring circuit as follows:

PIN	Resistance	Capacitance
V_{DD} / GND	---	Capacitance must be less than or equal to 0.1 UF
PA3 / PA5 / PA6	Resistance must bigger than or equal to 10KΩ	Capacitance must be less than or equal to 220pF

At the same time, set O/S test to writing pin particularly according to section 5.5.

Notice:

(1) The voltage is as high as 8V (PA5/VPP) when writing. Please confirm the peripheral parts could withstand the voltage.

(2) VDD cannot be limited to 5.0V or below to 5.0 V. If must connect 5.1V Zener diodes to VDD, please select 『MTP On-board VDD limitation』 on the writer interface
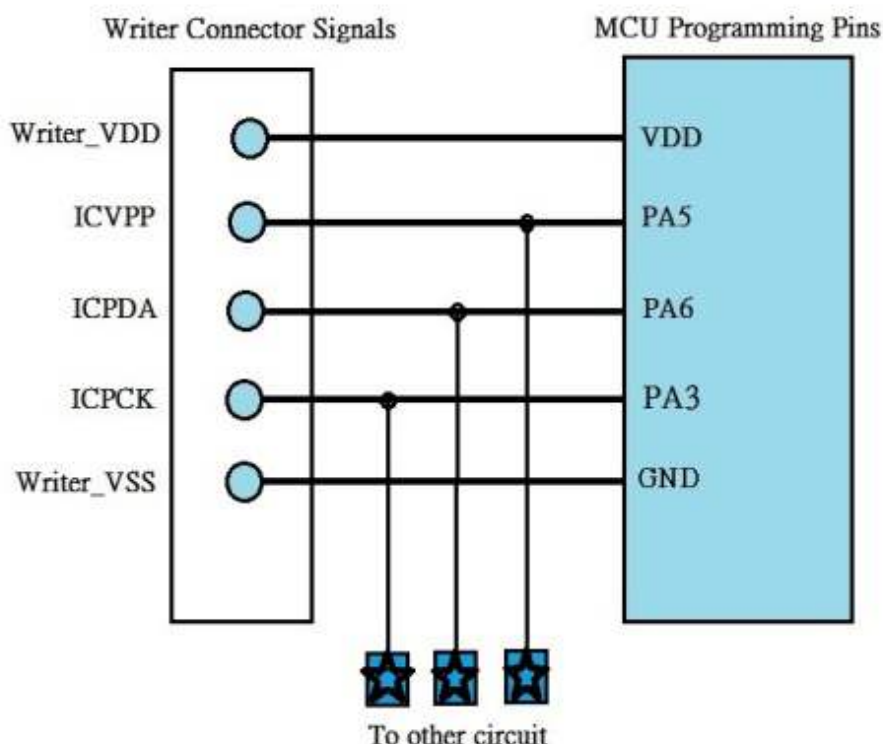
The ticking steps of MTP On-board VDD limitation:

(1) Click on 『Convert PDK 』

(2) Click on 『To Package 』

(3) Click on 『MTP On-board VDD limitation 』
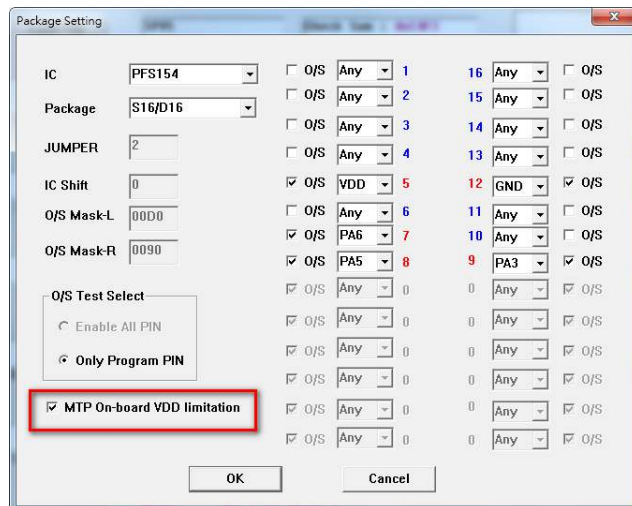
9.3 Special notes of voltage while On-board or Multi-Chip-IC writing (OTP / MTP)

(1) When programming, VPP may be higher than 11V, and VDD maximum supply current is not over 20mA.

(2) VDD may be higher than 7.5V for PDKxx/P2xx series ICs; for other series ICs, VDD may be higher than 6.5V.

(3) The voltage of other program pins (except GND) is the same as VDD.

If you have On-board writing or Multi-Chip (ex: MOS, EEPROM, and 2.4G), be sure to pay attention to above notification. Please follow the instruction in Section 9.2, especial for MTP voltage limitation.