



**YMB1801**  
**IO Type 8 bit OTP MCU**  
**with charging and NMOS**  
***Datasheet***

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# YMB1801

## IO Type 8 bit OTP MCU with charging and NMOS

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### Revision History

Revision	Date	Description
0.00	2023/10/11	Preliminary version

### Usage Warning

User must read all application notes of the IC by detail before using it. Please download the related application notes from the following link:

<http://www.padauk.com.tw/en/technical/index.aspx>

### 1. General Description

The YMB1801 series mainly includes two parts:

- PMB180 MCU
- NMOS

Among them, PMB180 is a built-in 1.25KW OTP data memory and 64-byte data memory, a hardware comparator for comparing the signal or internal reference voltage  $V_{\text{internal-R}}$  or internal bandgap reference voltage Band-gap between two pins. PMB180 also provides three hardware timers: a 16-bit timer, an 8-bit timer (can be output in PWM mode), and a set of 3 sets of 11-bit PWM timers/generators (LPWMG0, LPWMG1 and LPWMG2), support Mini-C/ASM language, easy to program. For details on the use of the PMB 180, please refer to the "PMB180 Specification" on the official website of PADAUK Technology.

The main storage space of YMB1801 are as follows:

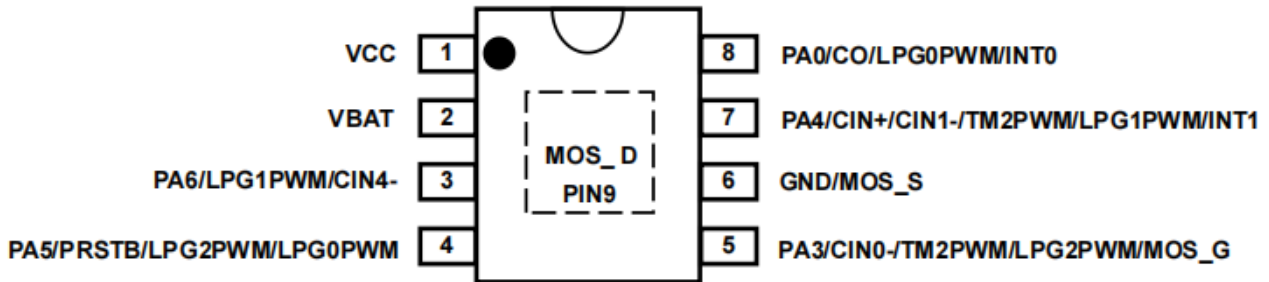
- OTP ROM (Word) : 1.25KW
- SRAM (Byte) : 64

### 2. Application

- toys
- home appliances
- LED lighting products
- General electronics



### 3. Ordering/ Package Information



YMB1801-ES08A (ESOP8A-150mil)

**Note: PA3 and MOS\_G share a pin, PIN9 MOS\_D(E-PAD)**

Pin Name	Input / Output				Special features				
	I / O	Pull-high	Wake-up	Open drain output	Comparator	PWM	Reset	MOS	Writing
PA0	√	√				PG0			
PA3/MOS-G	√	√			CIN0-	TM2 PG2		√	
PA4	√	√	√		CIN+ CIN1-	TM2 PG2			√
PA5	√	√	√			PG0 PG2	√		
PA6	√	√	√		CIN4-	PG1			√
MOS-D								√	
V <sub>BAT</sub>									√
VCC									
GND/MOS-S								√	√

### 4. Device Characteristics

The main electrical characteristic parameters of MOSFET are as follows( $T_J = 25\text{ }^\circ\text{C}$ ):

Parameter	description	Min	Typ	Max	Test conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	20V	-	-	$V_{GS}=0V, I_D=250\mu A$
$I_D$	Drain current			1A	Continuous (1)
				1.5A	Non-Continuous (1)
$R_{DS(on)} (CP)$	Static Drain-to-Source On-Resistance		41m $\Omega$	54m $\Omega$	$V_{GS} = 4.5V, I_D = 1A$ (2)
				54m $\Omega$	75m $\Omega$
$R_{DS(on)} (FT)$	Static Drain-to-Source On-Resistance		58.5 m $\Omega$	85 m $\Omega$	$V_{GS} = 2.5V, I_D = 2A$ (2)
$V_{GS(th)}$	Gate Threshold Voltage	0.5V	0.75V	1.0V	$V_{DS}=V_{GS}, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	-	-	1 $\mu A$	$V_{DS} = 20V, V_{GS} = 0V$
$I_{GSS}$	Gate-to-Source Leakage Current	-	-	$\pm 100nA$	$V_{DS} = 0V, V_{GS} = \pm 12V$
$T_J, T_{STG}$	Operating and storage temperature	-55 $^\circ\text{C}$ to 150 $^\circ\text{C}$ Max			

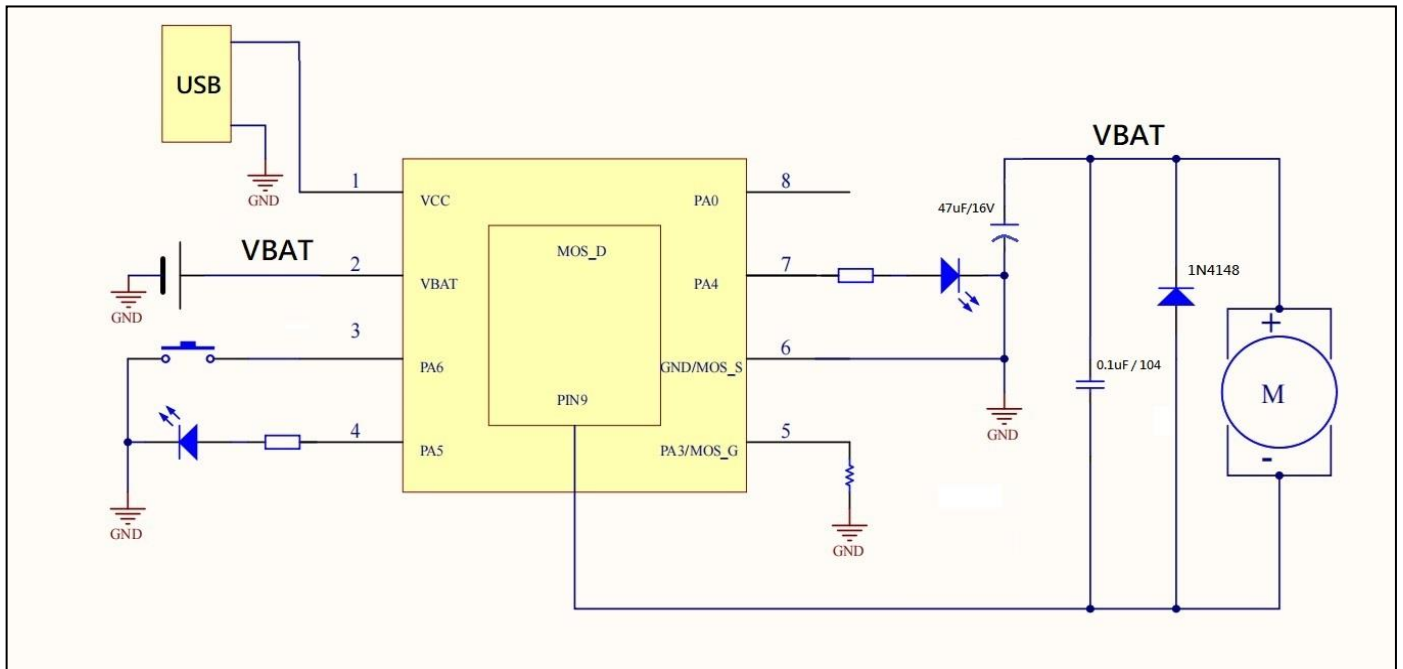
#### Notes:

- (1) The above parameter characteristics are affected by the packaging patch and PCBA heat dissipation, and the heat dissipation effect of the chip affects the performance and life of the product.
- (2) The above parameter characteristics are affected by packaging, patch, and PCBA heat dissipation. Actual performance may degrade during assembly.

### 5. Typical Application

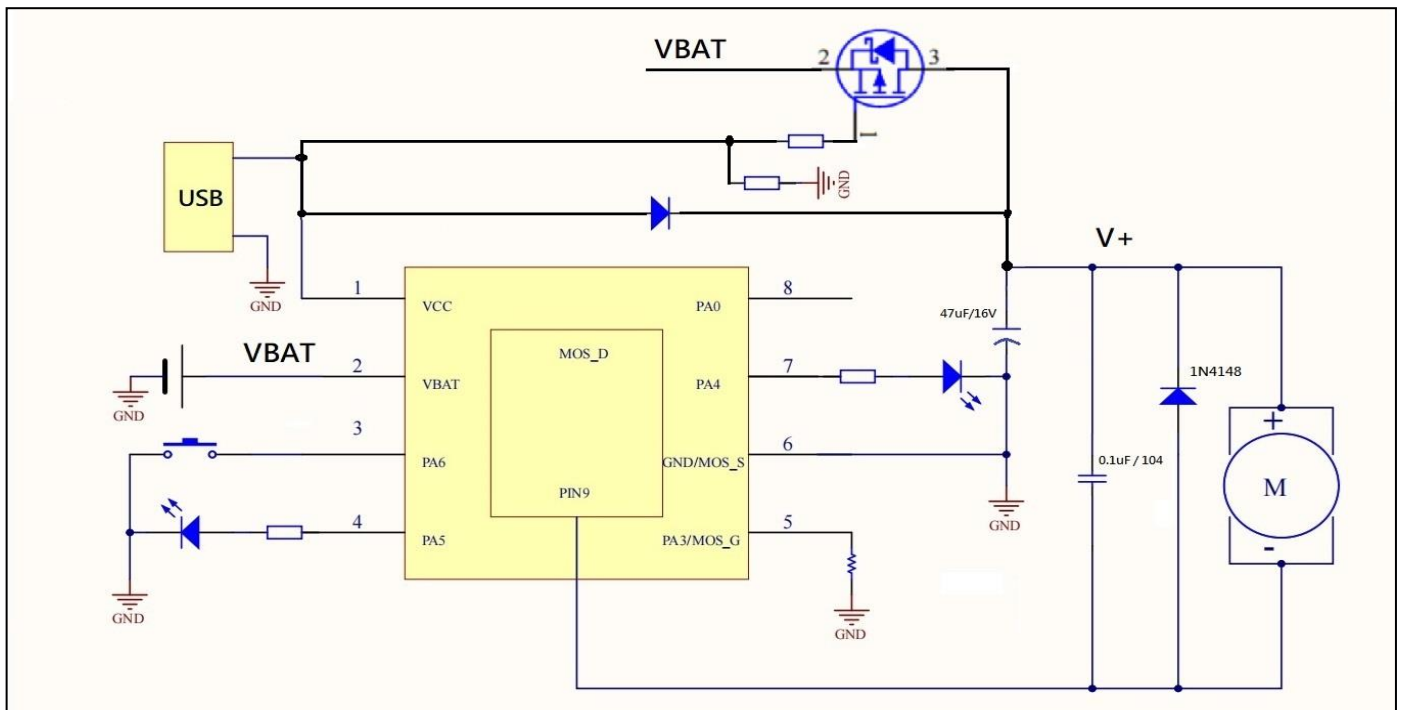
The typical application circuit diagram of YMB1801 is as follows, which is for user reference only.

**Load (motor/LED light) stop circuit diagram during charging:**



Typical application circuit diagram 1

**Load (motor/LED light) working circuit diagram during charging:**



Typical application circuit diagram 2



## 6. Precautions

Precautions for the use of YMB1801:

1. The 9th Pin of YMB1801-ES08A is located at the bottom of the package. And it is the drain of NMOS, which has the function of carrying large current and heat dissipation so special attention should be paid to the wiring and heat dissipation effect during PCB layout. When soldering the YMB1801, special attention should be paid to the connection and conduction of the 9th pin, and no false soldering or floating connection is allowed.
2. For the PCB layout guide of E-PAD products, please refer to the APN019 application manual on PADAUK Technology's official website.  
<http://www.padauk.com.tw/en/technical/index.aspx?kind=9>
3. Discharging/charging the lithium battery with a large current at the same time in the application circuit may cause serious ripple disturbance to the voltage of the lithium battery. This may cause the YMB1801 charging module to malfunction, and the charging state flag may be unstable. When YMB1801 charges the lithium battery, it is recommended that the software turn off NMOS. Such as typical application circuit diagram 1.
4. When the product must be able to turn on the load during charging the lithium battery due to product functional requirements, it is necessary to add components and circuits to the application circuit, such as the typical application circuit diagram 2.
5. The PA3 of the MCU is co-pinned with the GATE of the NMOS. When applying, a pull-down resistor needs to be connected externally to avoid the malfunction of the NMOS during the power-on reset of the MCU.
6. If you have any questions about using the product, please consult the FAE of PADAUK Technology.

### 7. Programming Writing

There are 4 pins for using the writer to program: PA4, PA6, V<sub>BAT</sub> and GND.

Please use 5S-P-003 or later version to program YMB1801 real chip. (3S-P-002 or elder versions do not support programming YMB1801)

#### Add package information and OS settings to the writing file

Method 1: Add the command set by sealing in the original program code:

```
.writer package 8, 2, 0, 0, 7, 0, 3, 0, 6, 0x0006, 0x0006, 0, 0x04 //P003B
.writer package 8, 0, 0, 0, 7, 2, 3, 0, 6, 0x0006, 0x0006, 0, 0x14 //P003 PA5 and VDD exchange
```

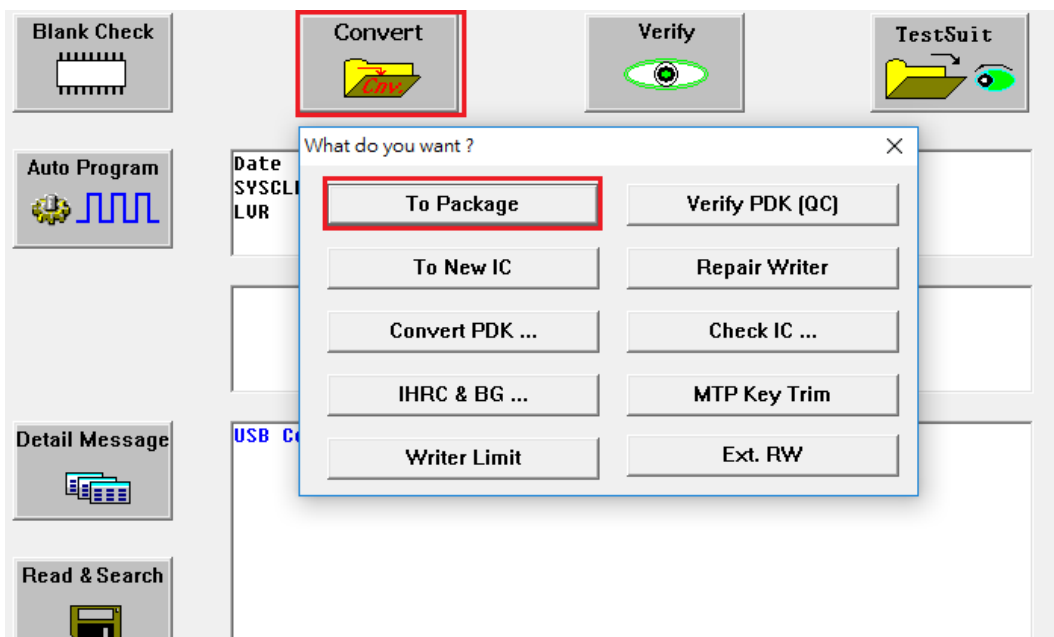
Method 2: After the user downloads the PDK file to be recorded on the Load File page of the Writer software, he can follow the following steps to enter the Package Setting page: Convert > To Package > Select to write the PDK file > Package Setting, as shown in the figure below.

1. IC selects **User Define**, after which JP information will automatically jump to JP7:
2. The number of PIN pins is 8, depending on the writing situation.
3. Add the corresponding recording pin number and position of YMB1801-ES08A on the right.
4. The user needs to set Open/Short to test only the writing foot: tick O/S Test **Only Program PIN**.

Note: **Please select this setting**, otherwise it may affect the normal progress of Writing.

5. Select OK and archive.

Finally, the IC is placed on the top grid on the front of the recorder, and the chip PIN1 is on the first foot on the upper left of the textool.



Convert PDK

Package Setting

IC: User define 3

Package: User set 2

JUMPER: 7 PIN 8

IC Shift: 0

O/S Mask-L: 0006

O/S Mask-R: 0006

O/S Quick Selector

Enable All PIN 4

Only Program PIN

On-board Program

VBAT / PA5 Swap on JP7 adapter

<input type="checkbox"/> O/S	VCC5	1	8	N/A	<input type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	VBAT	2	7	PA4	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	PA6	3	6	GND	<input checked="" type="checkbox"/> O/S
<input type="checkbox"/> O/S	N/A	4	5	N/A	<input type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S

OK Cancel

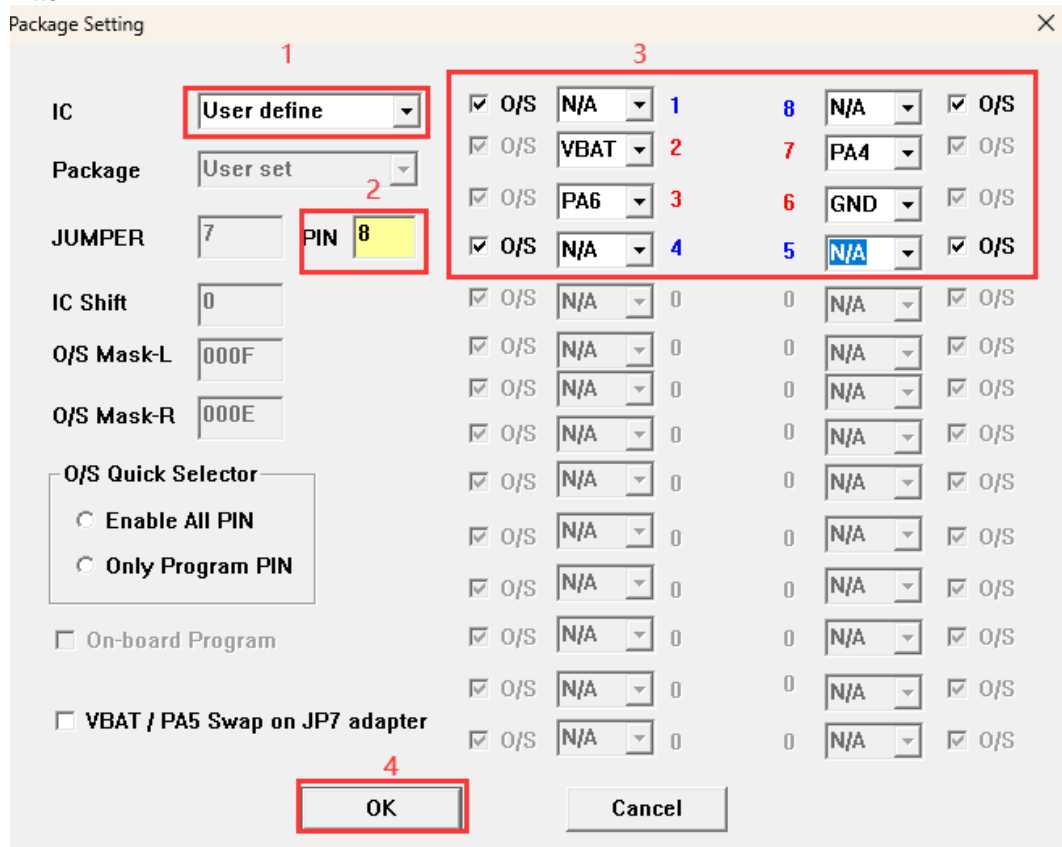
5

### Using 5S-P-003B to write YMB1801

For 5S-P-003B to write YMB1801, Use jumper7 to adapt program signal connection. The connection of signal depend on the IC package. Please refer to. Chapter 5 of the Writer user manual to find example and make the jumper-7 adaptive board for target IC package. User can get the user manual from the following linker web page.

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

1. Use the .writer package 8, 2, 0, 0, 7, 0, 3, 0, 6, 0x0006, 0x0006, 0, 0x04 commands for package setting.
2. Load PDK from GUI, insert JP7 and then input IC on the socket without shift. After LCDM displays IC ready, it can be written.



**Package Setting**

IC: User define (1)

Package: User set

JUMPER: 7      PIN: 8 (2)

IC Shift: 0

O/S Mask-L: 000F

O/S Mask-R: 000E

O/S Quick Selector

Enable All PIN

Only Program PIN

On-board Program

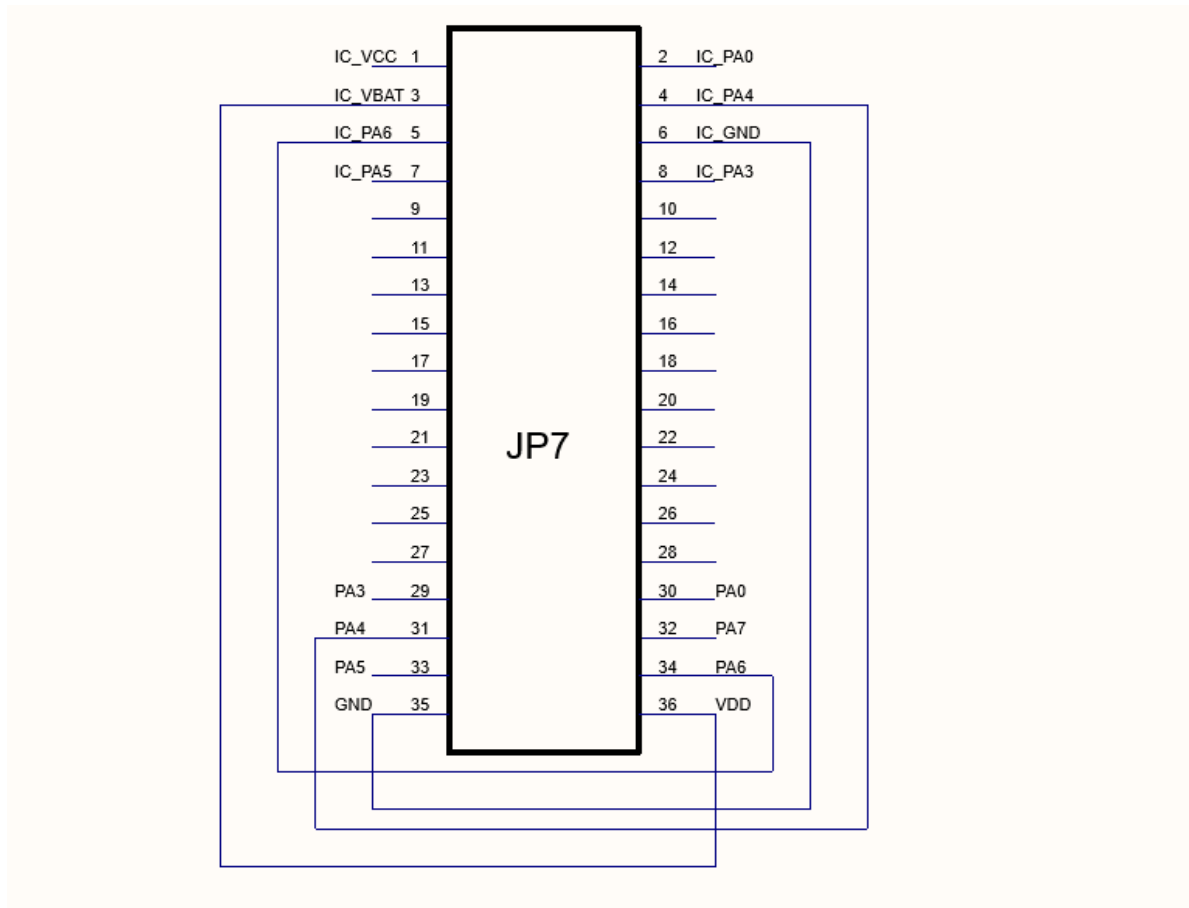
VBAT / PA5 Swap on JP7 adapter

<input checked="" type="checkbox"/> O/S	N/A	1	8	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	VBAT	2	7	PA4	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	PA6	3	6	GND	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	4	5	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S
<input checked="" type="checkbox"/> O/S	N/A	0	0	N/A	<input checked="" type="checkbox"/> O/S

OK (4)      Cancel

YMB1801-ES08A in P003B package setting

For example, make JP7 writer signal connection of YMB1801-ES08A, as the following:



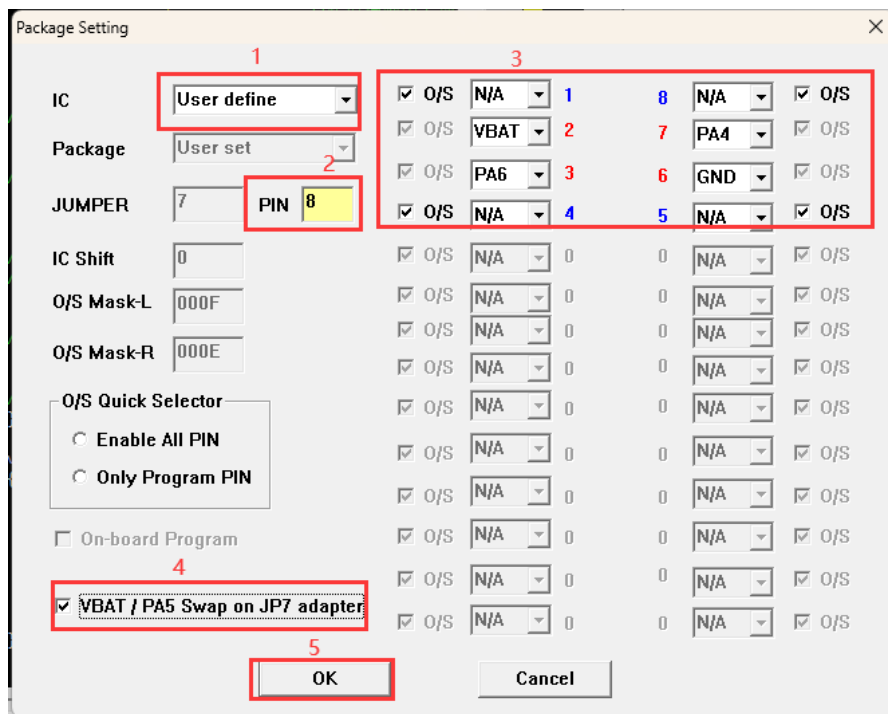
schematic diagram of Jumper7 for P003B

### Using 5S-P-003 to write YMB1801

5S-P-003 and 5S-P-003B writing YMB1801 in the likely way. But user should be take care the following thing.

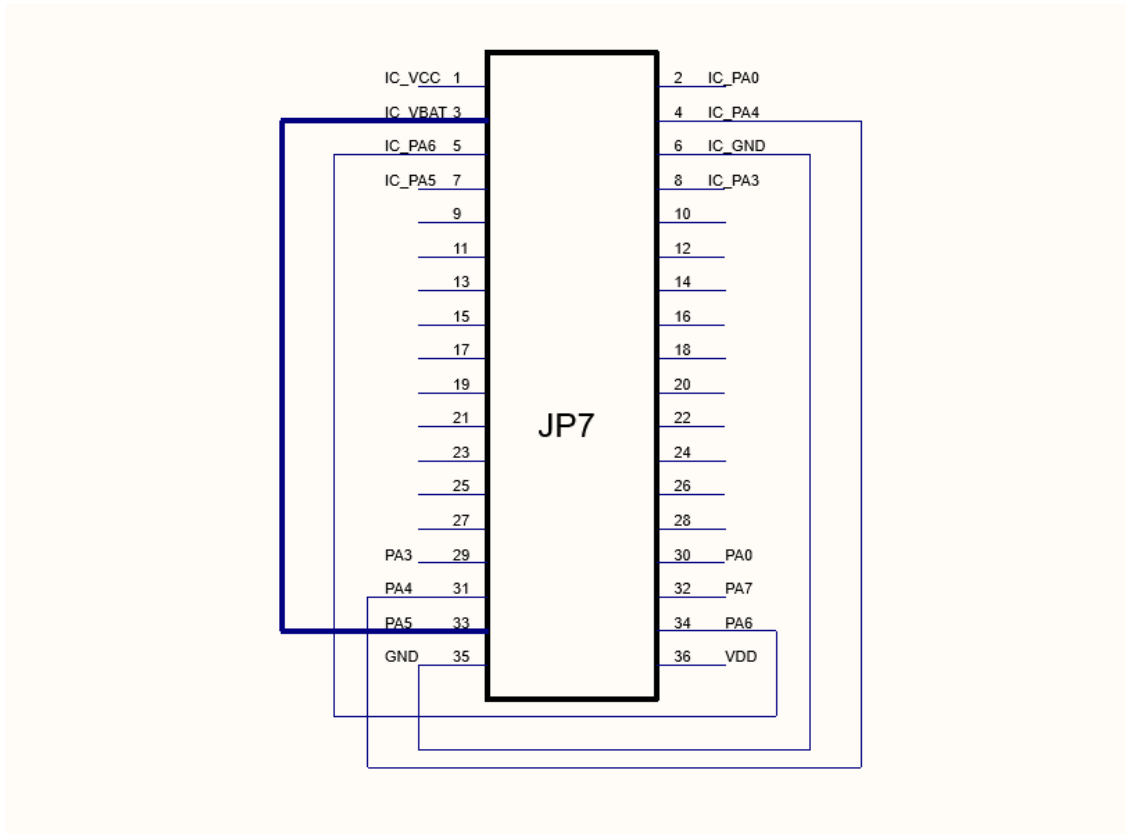
1. Use the .writer package 8, 0, 0, 0, 7, 2, 3, 0, 6, 0x0006, 0x0006, 0, 0x14 commands for package setting
2. Convert the PDK file from GUI

Enter the writing interface from the IDE, then click "Convert" -> "To Package". In the "Package Setting" interface, select the "user defined", then click "**VBAT /PA5 Swap on JP7 adapter**". After confirming information about the IC pin, save and use the newly generated PDK file. Please refer to picture for specific operation steps.



YMB1801-ESOP10 in P003 package setting

For example, make JP7 writer signal connection of YMB1801-ES08A, as the following:

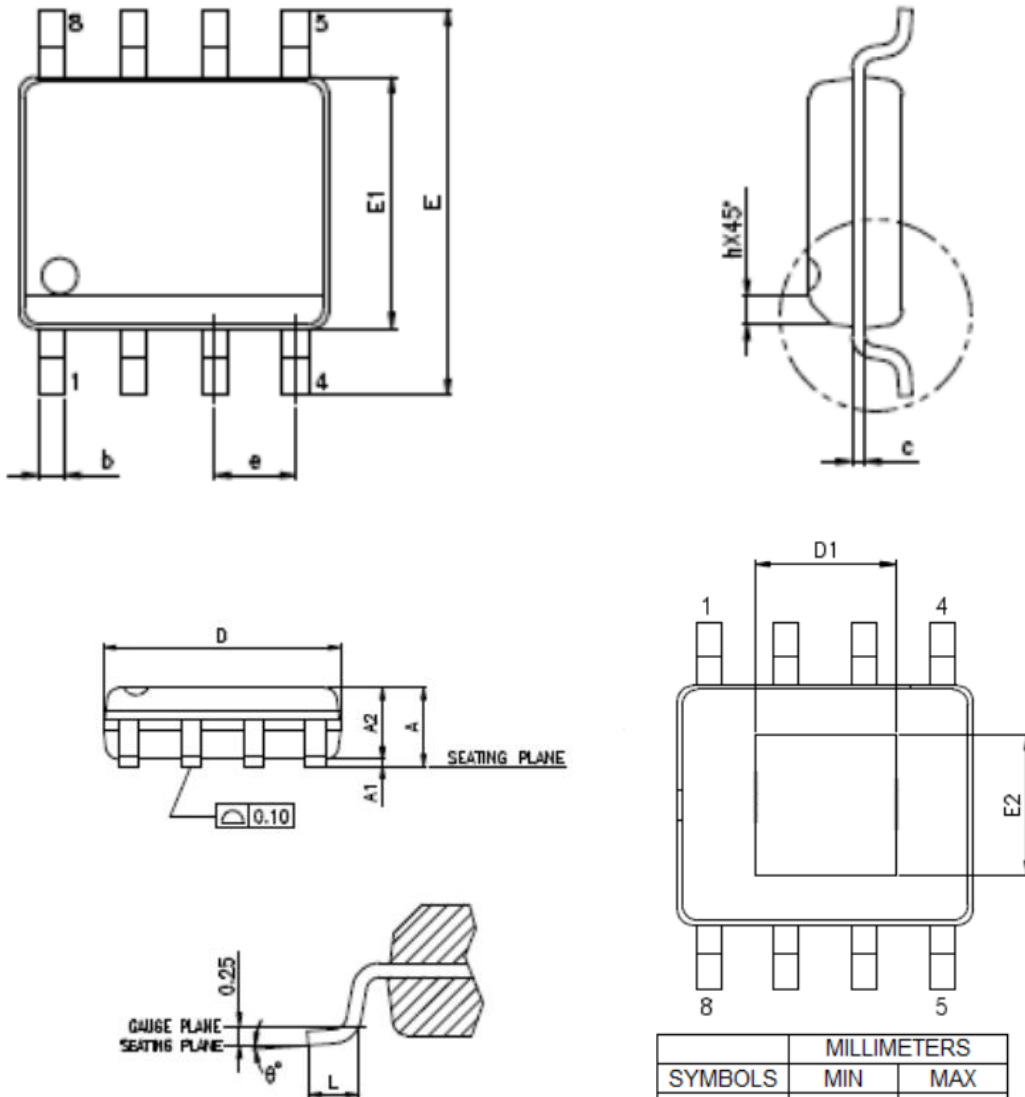


schematic diagram of Jumper7 for P003



### 8. Package information

8.1. ESOP8A (Pitch=1.27 mm=0.05 inch, Body Width=3.9 mm=150 mil)



MILLIMETERS		
SYMBOLS	MIN	MAX
A	-	1.75
A1	0.10	0.25
A2	1.25	-
b	0.31	0.51
c	0.10	0.25
D	4.90 BSC	
E	6.00 BSC	
E1	3.90 BSC	
e	1.27 BSC	
L	0.40	1.27
h	0.25	0.50
$\theta^\circ$	0	8
D1	3.20	3.40
E2	2.10	2.50

1. E-PAD dimensions are for reference only
2. E-PAD : Refer to PMC-APN-019 E-PAD product PCB layout guideline