CFP22000 Series

MCU-Voice with Real-Time Clock (RTC)

Features

- Single power supply 2.4V – 5.2V
- 4-bit ADPCM, 5-bit ADPCM & 8-bit PCM synthesis.
- 7K-22KHz max. of playing speed for ADPCM synthesizer
- 12K-32KHz max. of playing speed for PCM synthesizer
- Provides 3~340 seconds voice@ S.R.= 6KHz & 4-bit ADPCM
- Max. of two current type DAC audio outputs
- One PWM output to direct driving a speaker
- Programmable 2-channel tone melody generator
- 16 levels of digital volume control
- Powerful and easy instructions are provided
- Built in a high quality speech synthesizer
- On-chip RC oscillator
- Power saving STOP & HALT modes
- I/O State Change wake-up option for all of I/O port
- Support 32K crystal oscillator share with two pins of PA

General Description

CFP22000 is a series of 3 to 340 seconds single chip voice synthesizer IC with RTC which contains a PWM direct drive circuit or AUD output for transistor application. In addition, this chip also provides high sink current port pins, multi external interrupt pins function, and multi oscillator options. CFP22000 series offers one of the best cost/performance ratios in the toy or industry for controller.
It also supplies high-sink current port pins, multi-external wake-up pins function and multi-oscillator options. The CFP22000 series can support 32K crystal oscillator for timer with low operating current. In addition, this CFP22000 series family IC leads users into an easy-to use development environment that shorten developer's period and fasten time-to-market. Moreover, fantastic sound effects can be generated by users easily without writing complex programs. This CFP22000 series family offers the best cost/performance ratios for toy, consumer, and industry use.

Selection Table

Part No.	CFP22007	CFP22021	CFP22032	CFP22043	CFP22064	CFP22085
Voice Cap. (second)	7	21	32	43	64	85
I/O	8	12	12	12	12	12
Max. of PWM outputs	1	1	1	1	1	1
Max. of DAC outputs		2	2	2	2	2

Part No.	CFP22128	CFP22150	CFP22170	CFP22256	CFP22300	CFP22340
Voice Cap. (second)	128	150	170	256	300	340
I/O	16	16	16	16	16	16
Max. of PWM outputs	1	1	1	1	1	1
Max. of DAC outputs	2	2	2	2	2	2

Note：

1. The voice capacity is based on sampling rate of 6KHz and 4-bit ADPCM

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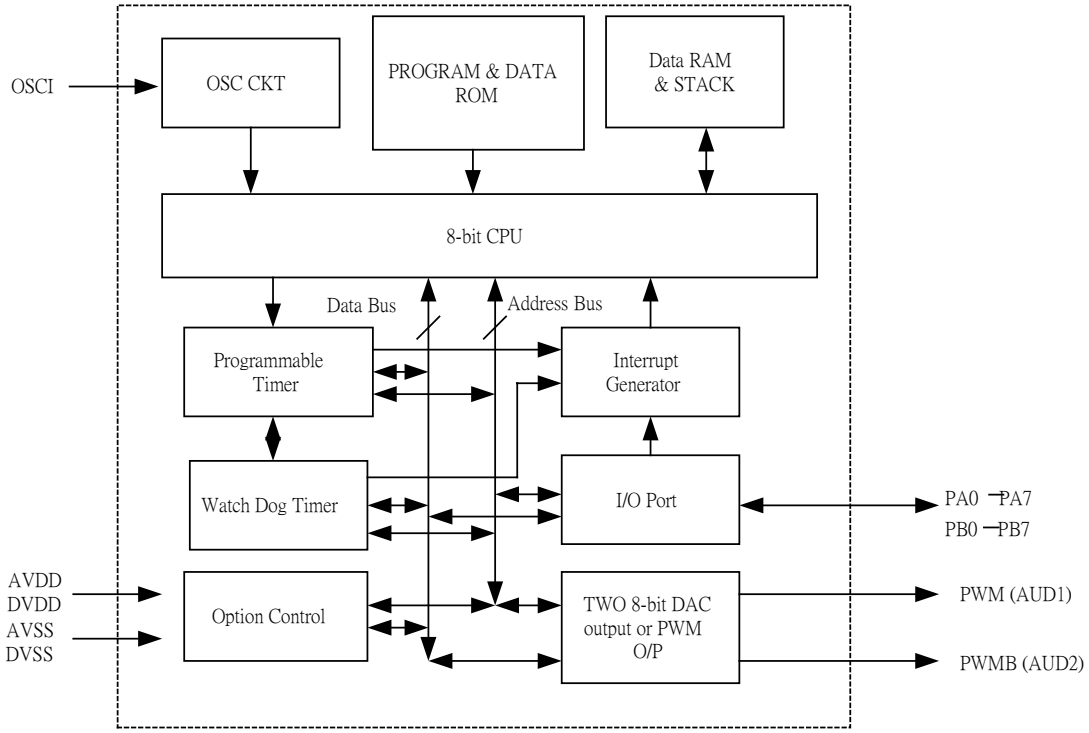
Block Diagram



Pad Assignment

Pin Name	I/O	Internal	Description
DVSS	—	—	Digital negative power supply
AVSS	—	—	Analog negative power supply
PA0 – PA3	I/O	NMOS Open Drain	Keyboards scan output in matrix mode. Normal I/O pins in direct mode. For output mode, they are open drain output; For input mode, they are without pull-high resistor.
PA4 – PA7	I/O	CMOS with pull-high	Keyboards scan output in matrix mode. Normal I/O pins in direct mode. For output mode, they are CMOS output; For input mode, they are with pull-high resistor.
PB0 – PB7	I/O	CMOS with pull-high	Keyboards scan input in direct/matrix mode. PB0 – PB3 pins are for all series. PB4 – PB7 pins are for CFP22128 — CFP22340 only.
AVDD, DVDD	—	—	Analog & Digital Positive power supply.
OSCI	I	—	In RC mode, it connects an external oscillator resistor between OSCI and VDD. As well, the pin can be used as an external clock input.
PWM (AUD1) PWMB (AUD2)	O	CMOS or Open Drain	Current type output or PWM type output by mask option. For current type output, it must drive an external transistor and only for CFP22021 — CFP22340. For PWM type output, it can drive a speaker directly. (8 ohm – 32 ohm) The AUD1 output is provided to CFP22021 — CFP22340, and the AUD2 output is provided to CFP22021 — CFP22340 only.

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Absolute Maximum Rating

Symbol	Rating	Unit
V_{DD}~V_{SS}	V_{SS} -0.5 ~ V_{DD} +0.5	V
VIN (for input)	V_{SS}-0.3 < VIN < V_{DD}+0.3	V
VOUT (for all outputs)	V_{SS} < V_{OUT} < V_{DD}	V
T (operating)	-10 ~ +60 (Note 1)	℃
T (storage)	-55 ~ +125	℃

Note :

1. The data is according to company's internal engineering test flow.

Electrical Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
		VDD	Condition				
VDD	Operating Voltage	—	Fsys=2MHz	2.4	—	5.2	V
			Fsys=4MHz	2.4	—	5.2	V
			Fsys=6MHz	3	—	5.2	V
			Fsys=8MHz	3.5	—	5.2	V
ISTB1	Standby Current,No load,No output	3.0V	System HALT, 32768 Crystal Off	—	1	2	μA
ISTB1	Standby Current,No load,No output	4.5V	System HALT, 32768 Crystal Off		1.5	3	μA
ISTB2	Standby Current,No load,No output	3.0V	System HALT, 32768 Crystal On	—	5	10	uA
IDD1	Operating Current (RC OSC) No load,No output	3.0V	Fsys=4MHz	—	2	3	mA
IDD1	Operating Current (RC OSC). No load,No output	4.5V	Fsys=4MHz		5	7	mA
VIL1	Input Low Voltage for I/O	3.0V	—	0	—	0.3VDD	V
VIH1	Input High Voltage for I/O	3.0V	—	0.7VDD	—	VDD	V
VRES	Power reset voltage	—	VDD ≤ VRES, System re-start	1.6	1.8	2.0	V
IOL	I/O Sink Current	3.0V	VOL=0.1VDD	4	8	—	mA
IOH	I/O source Current	3.0V	VOH=0.9VDD	1.5	3	—	mA
RPH	Pull-High Resistance	3.0V	VIL=0V	80	150	250	KΩ
FSYS1	Fsys=2MHz (RC OSC)	3.0V	Rosc=300KΩ	1.8	2	2.2	MHz
	Fsys=4MHz (RC OSC)		Rosc=150KΩ	3.6	4	4.4	
	Fsys=6MHz (RC OSC)		Rosc=100KΩ	5.4	6	6.6	
	Fsys=8MHz (RC OSC)		Rosc=75KΩ	7.2	8	8.8	
IDAC	DAC Output Current	3.0V	Vol=12,Dac value is FF	2	3		mA
IDAC	DAC Output Current	4.5V	Vol=12,Dac value is FF	3	5		mA

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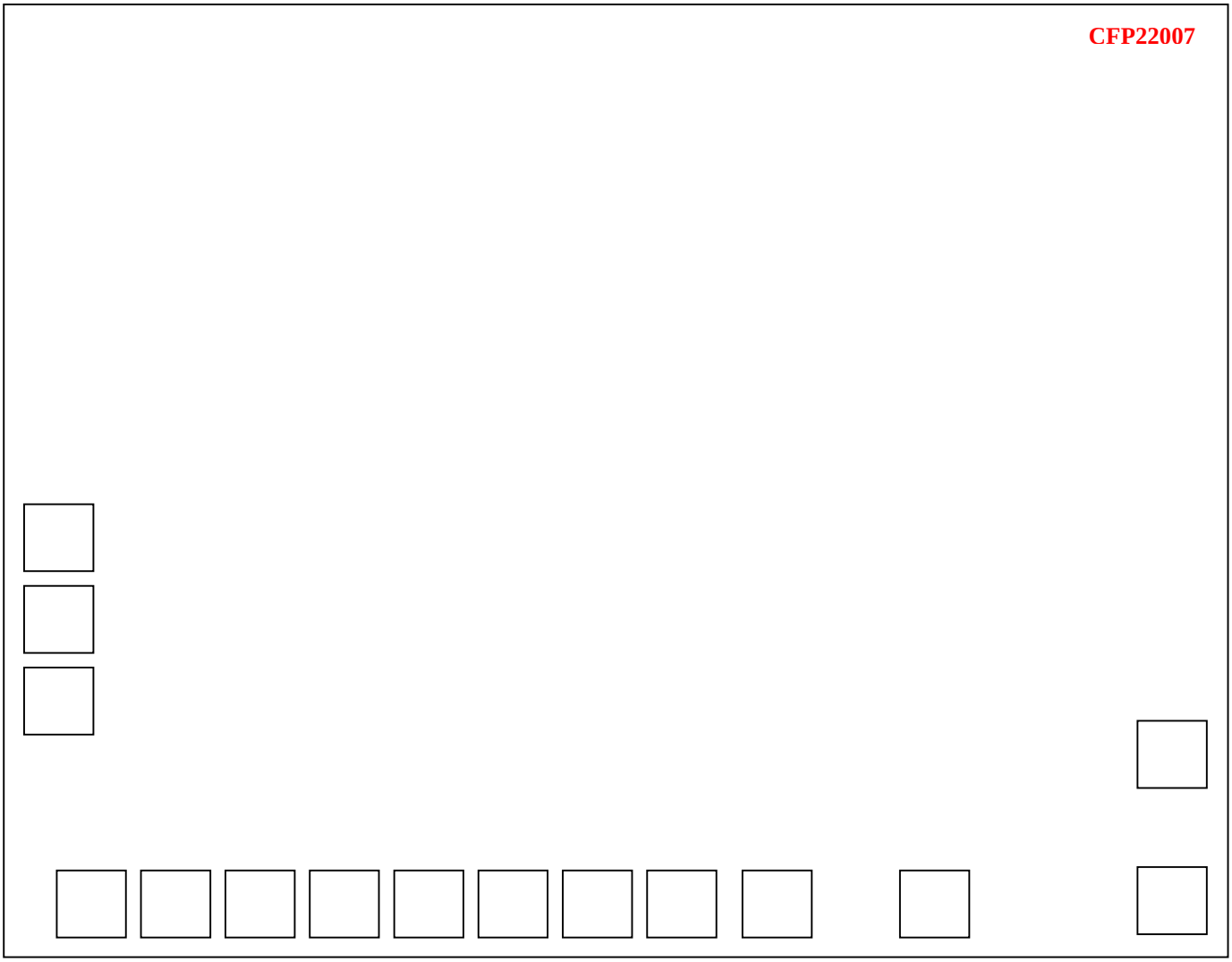
Pad Diagram

1.CFP22007



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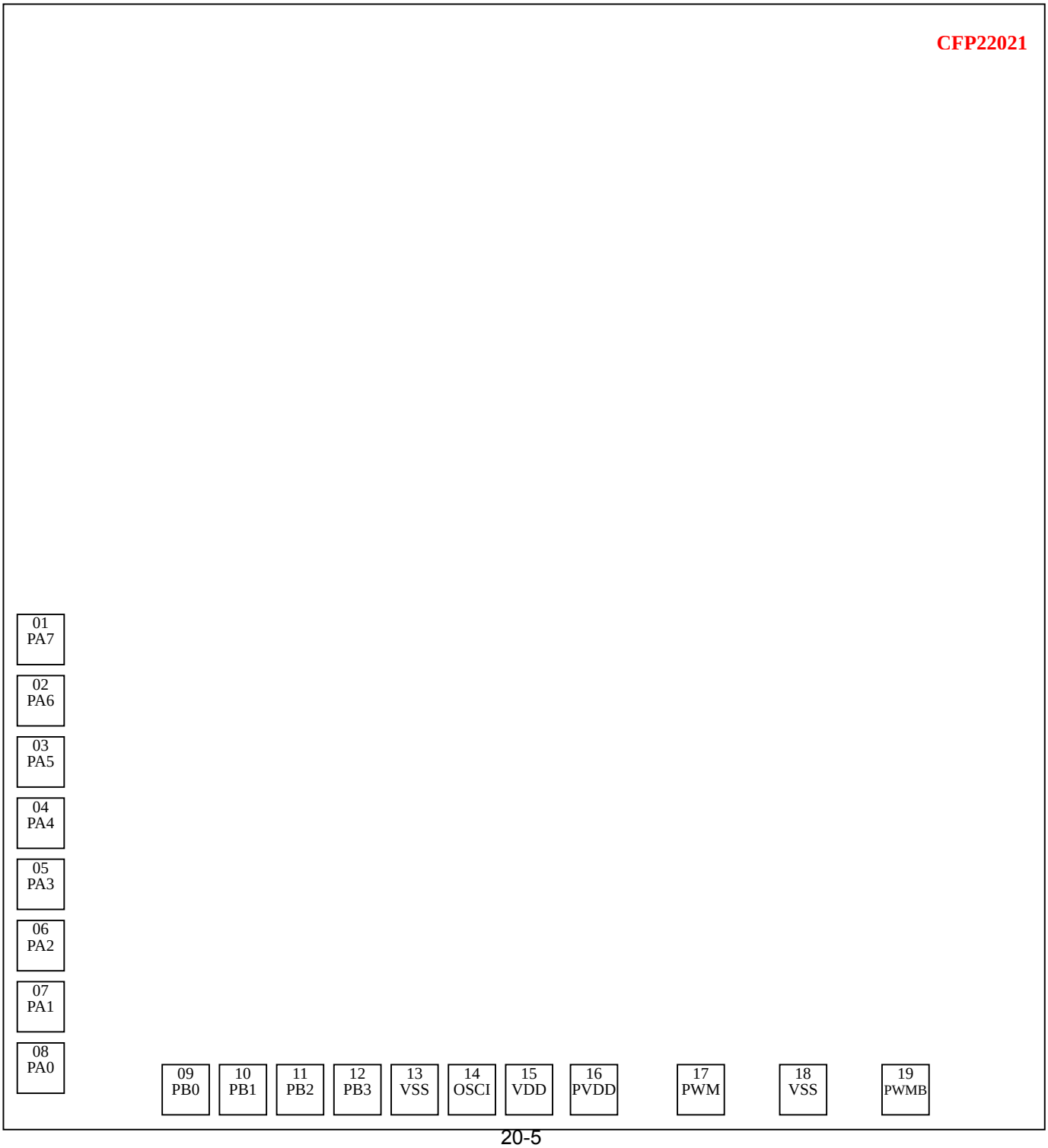
2. CFP22021



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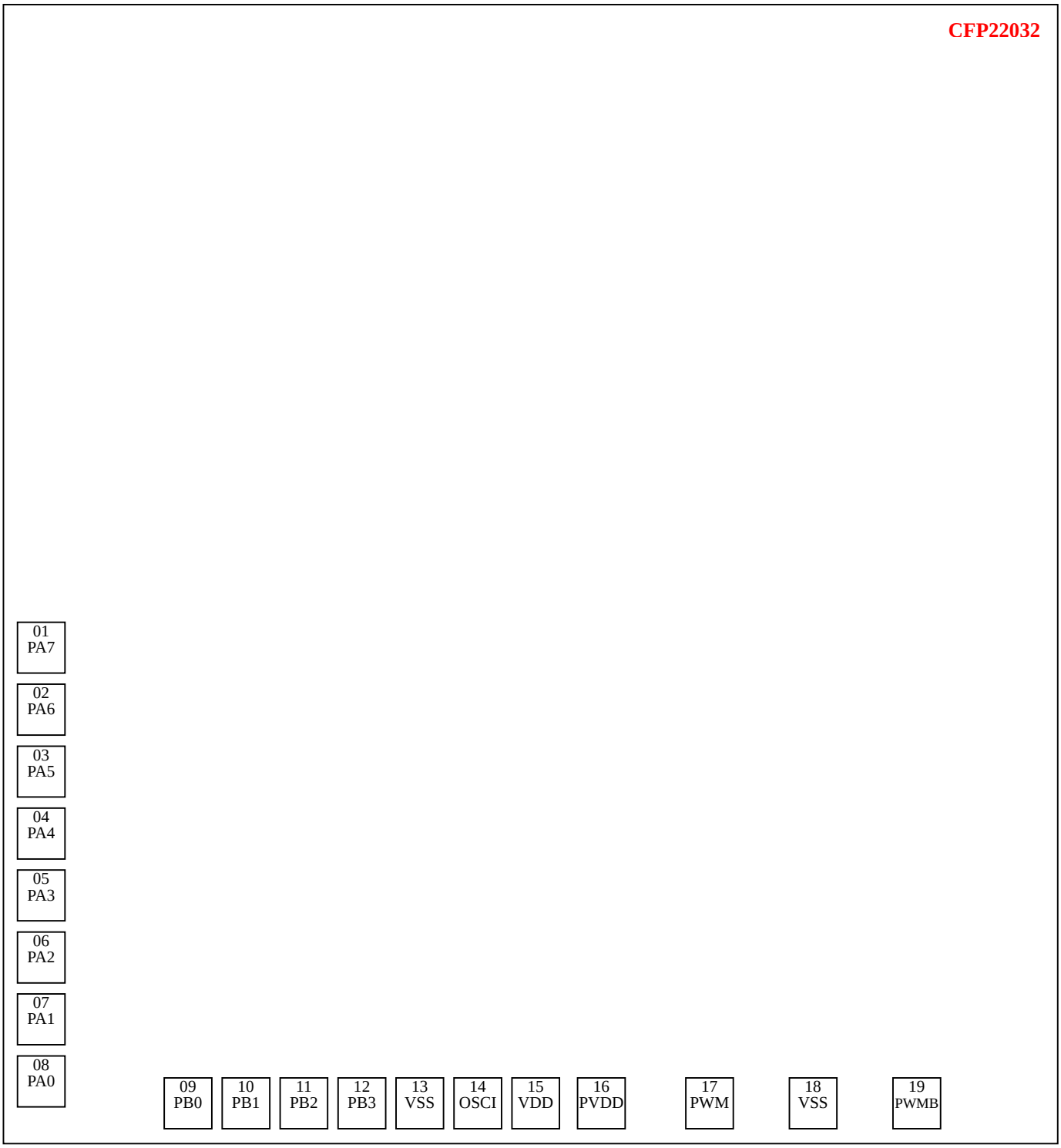
3. CFP22032



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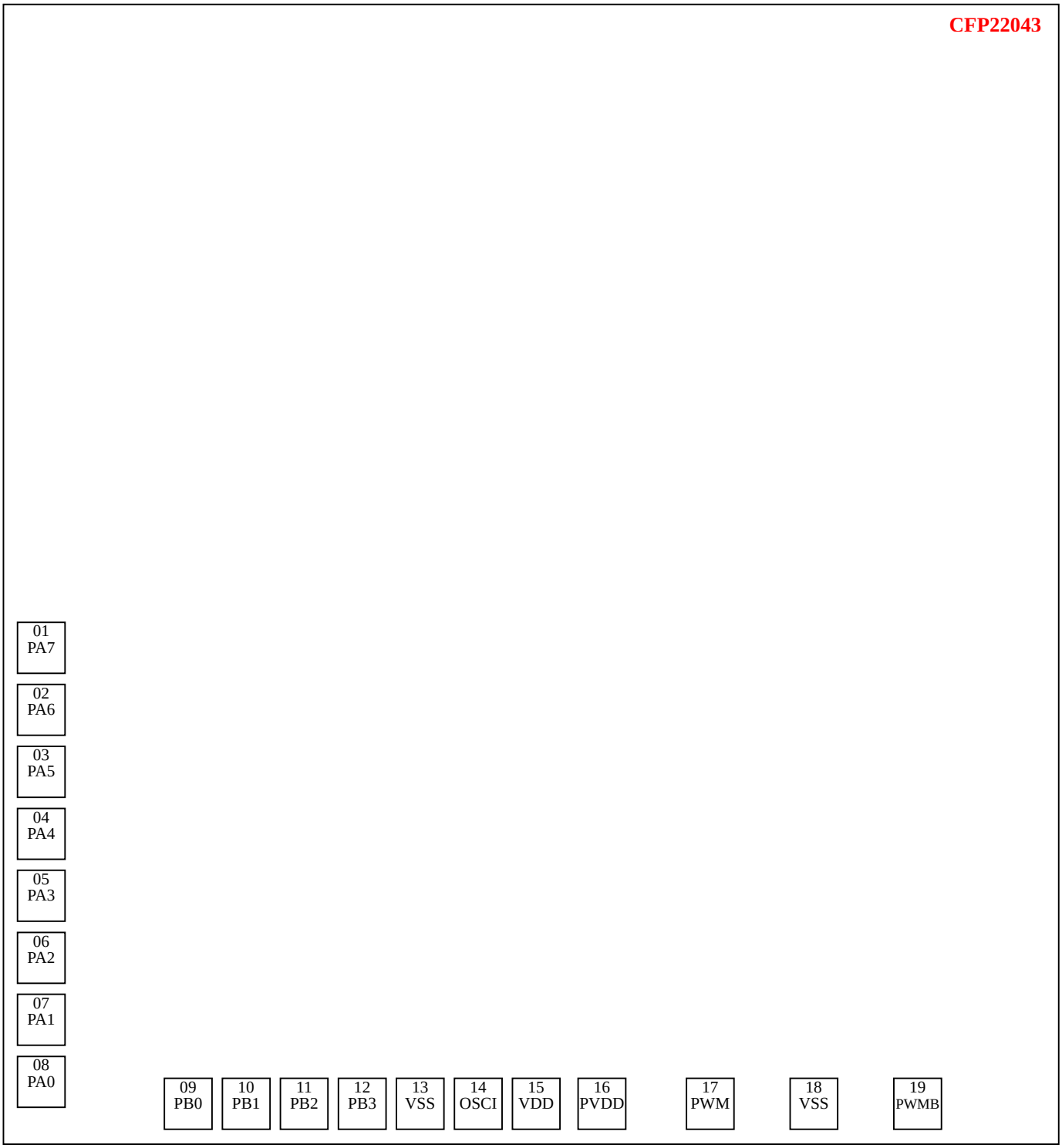
CFP22043



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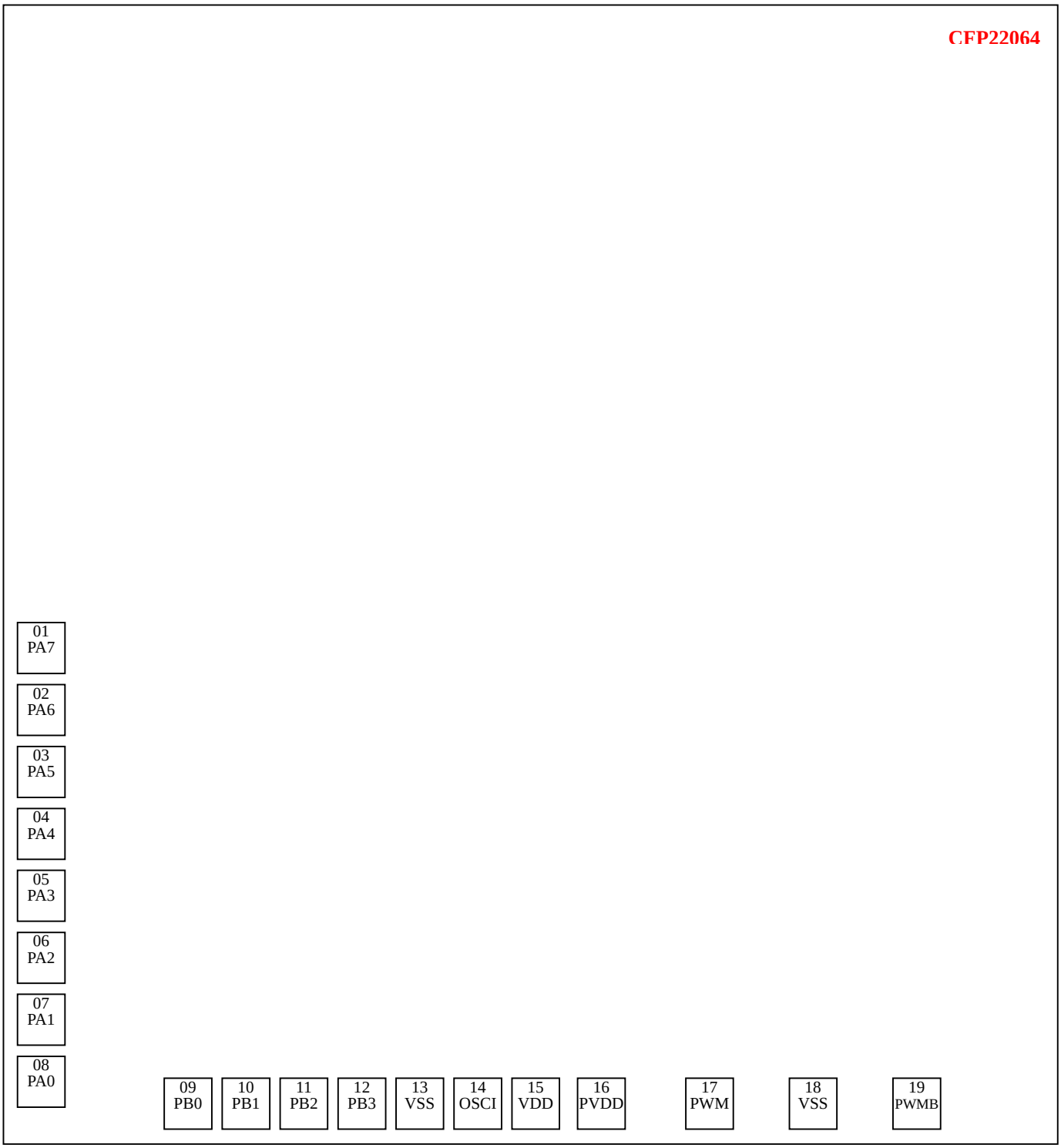
5. CFP22064



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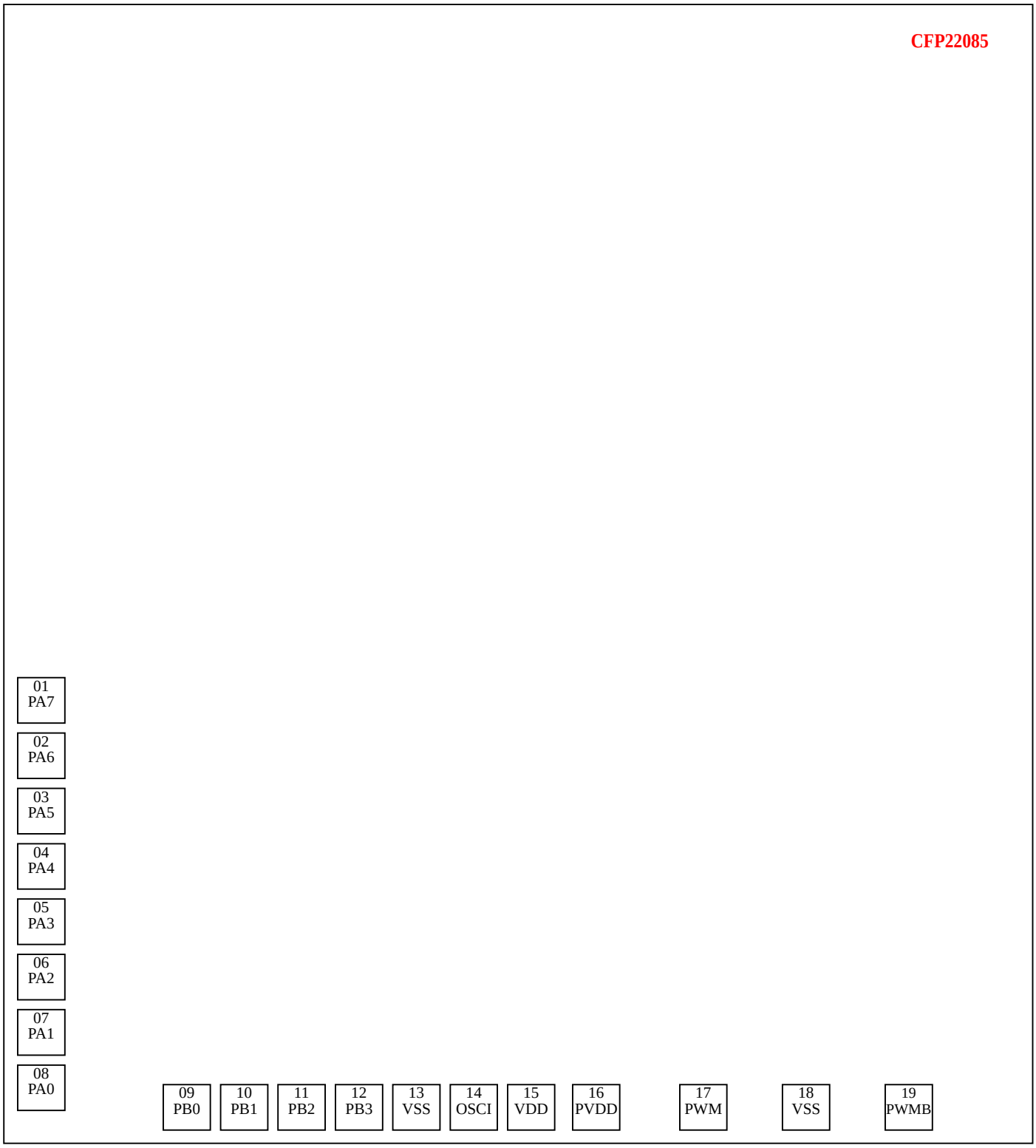
6. CFP22085



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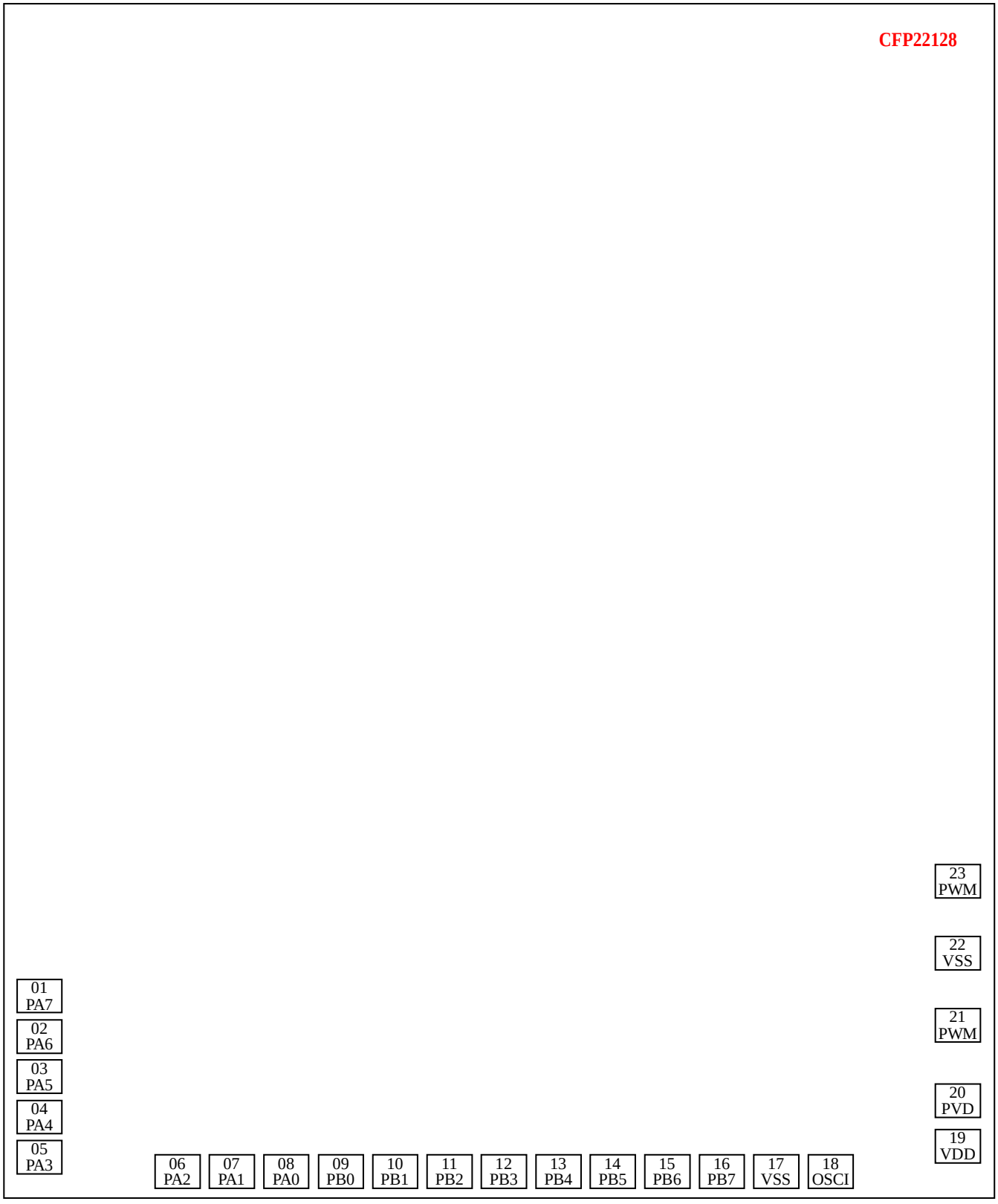
7. CFP22128



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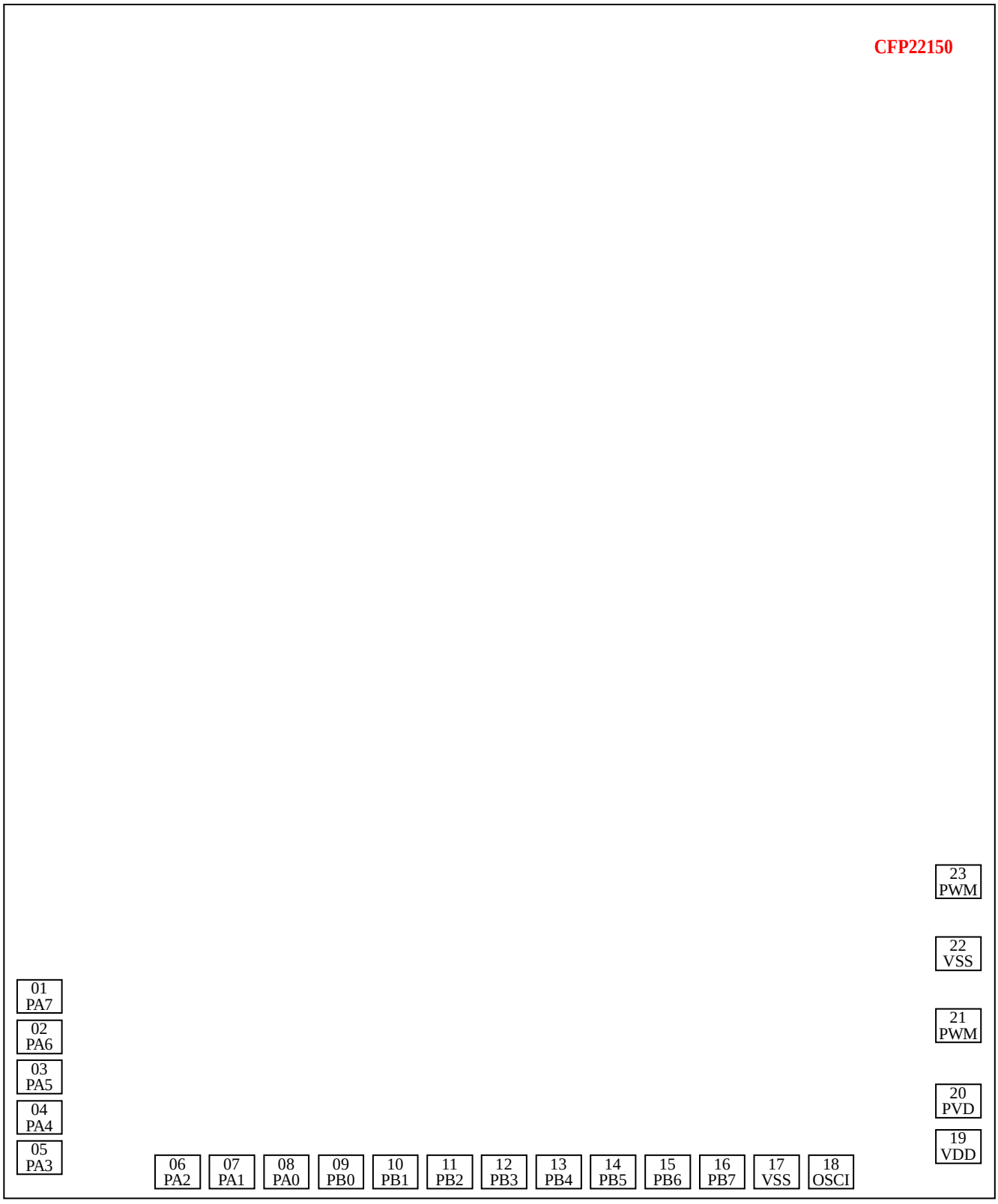
8. CFP22150



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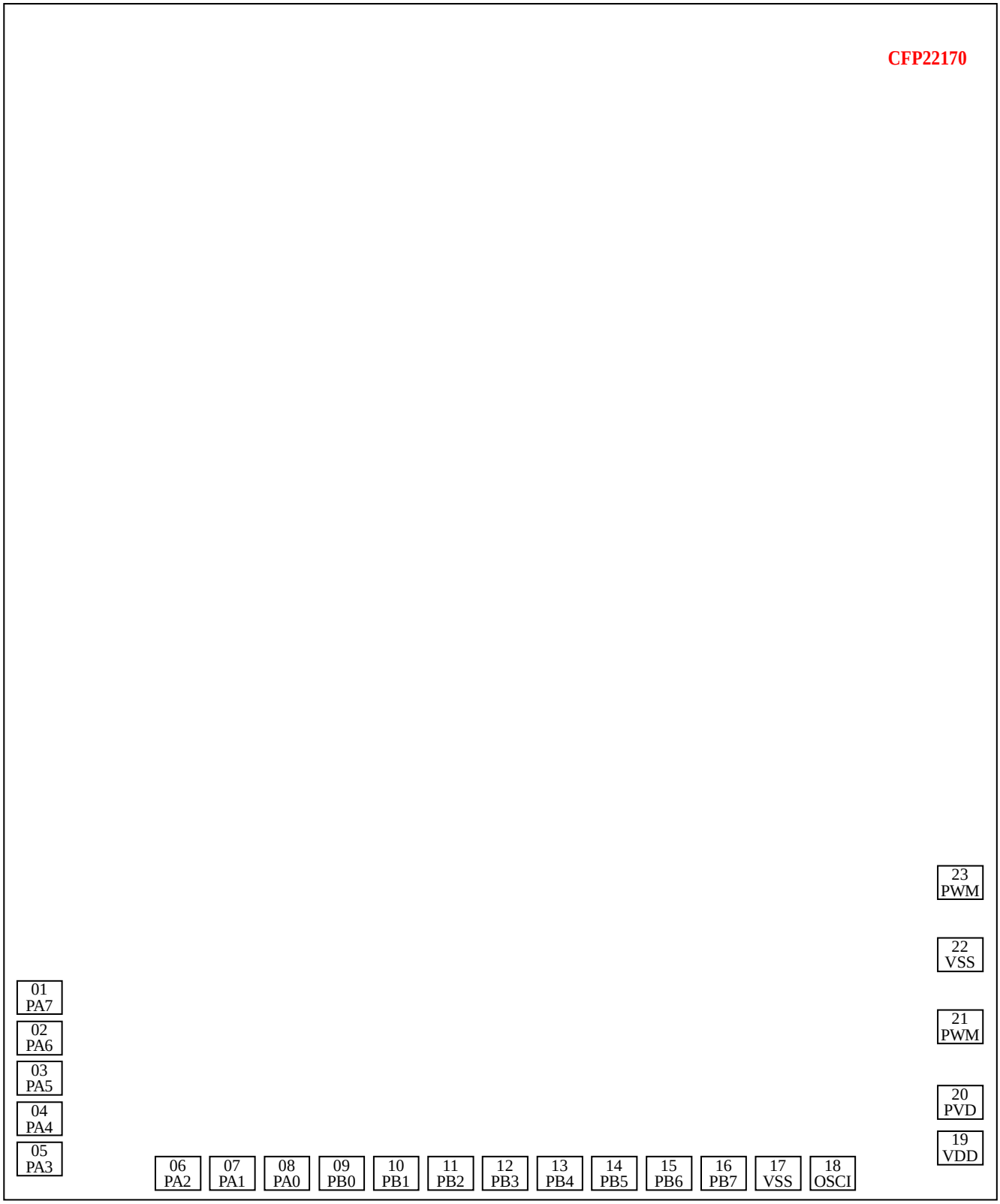
9. CFP22170



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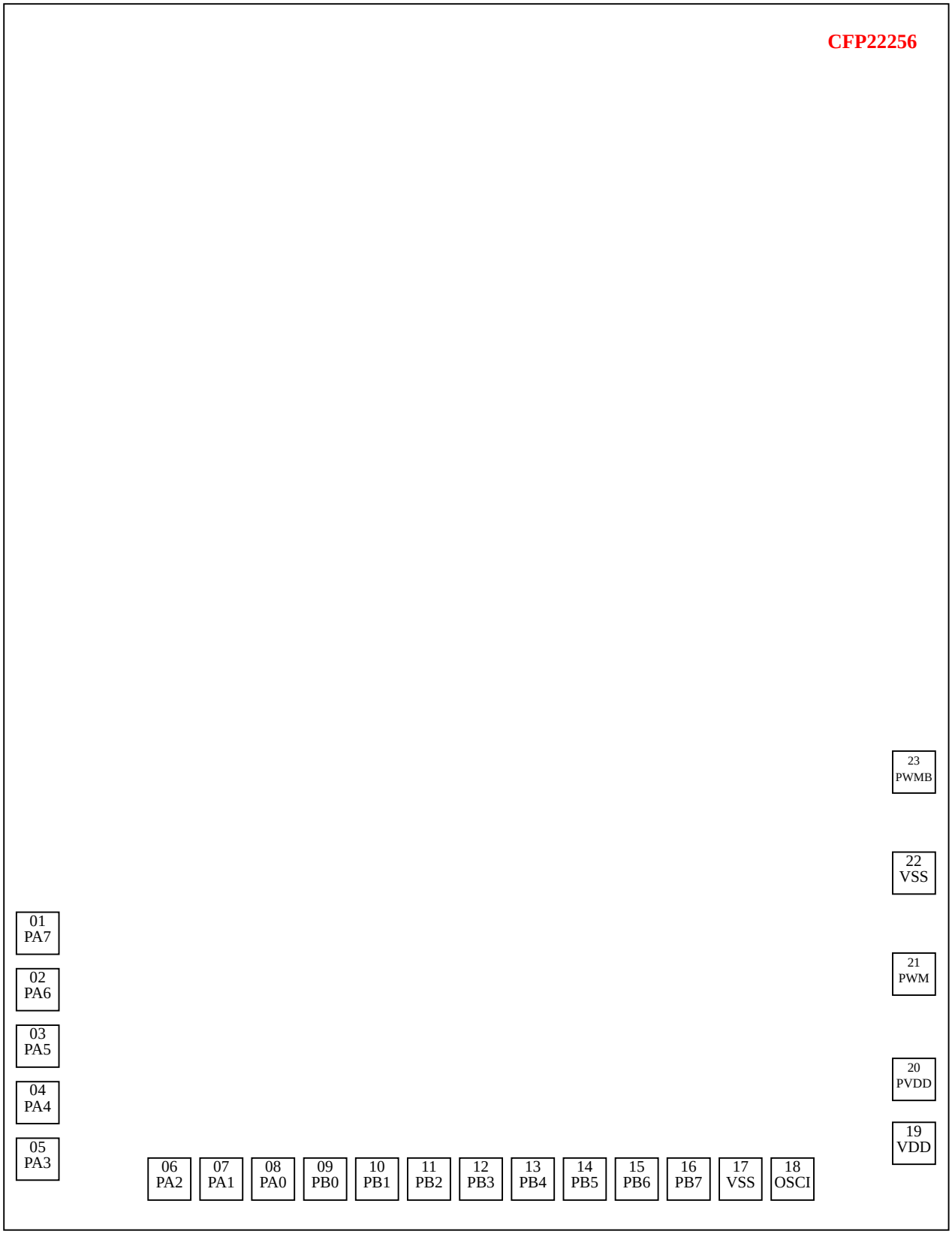
10. CFP22256



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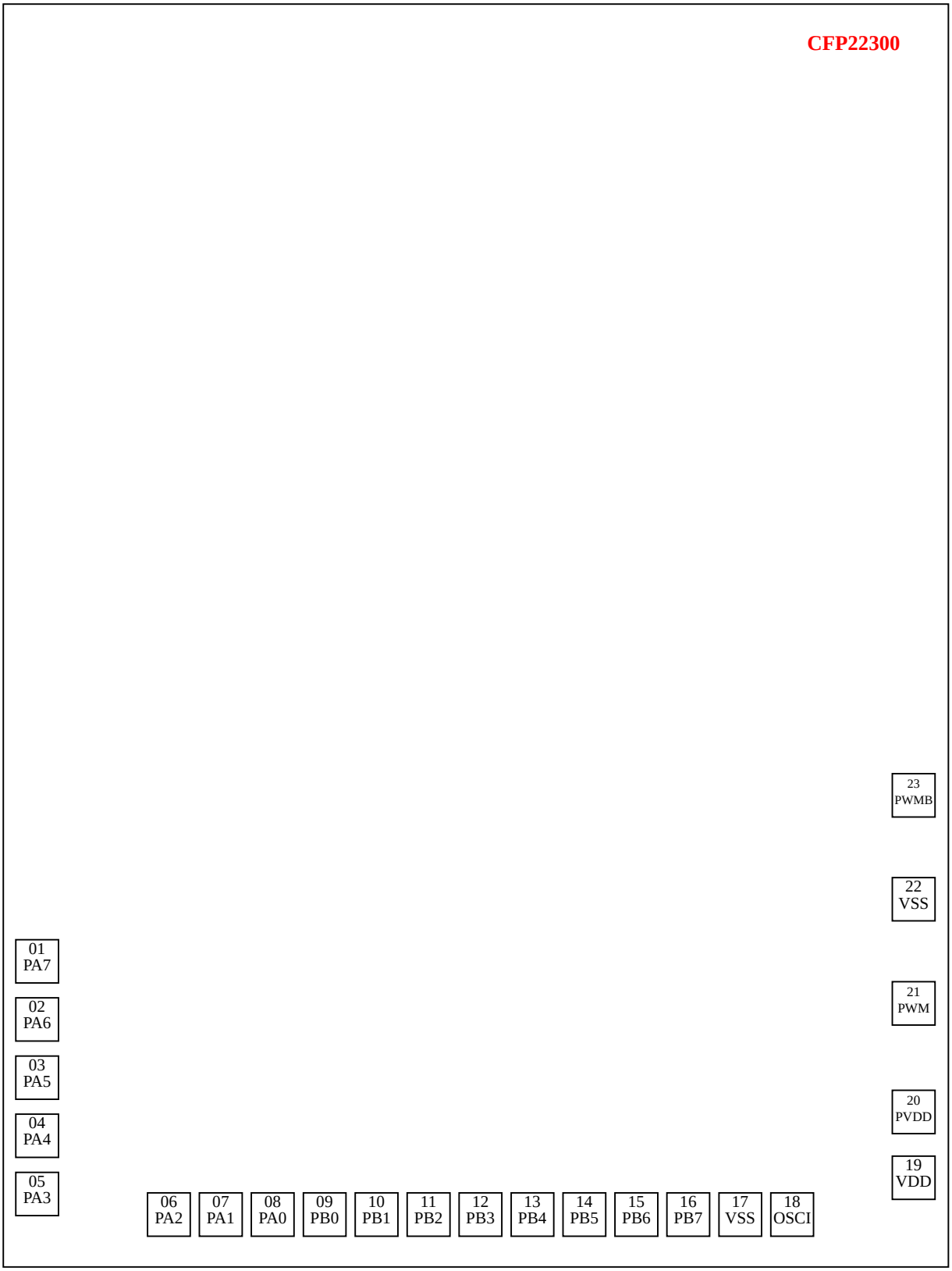
11. CFP22300



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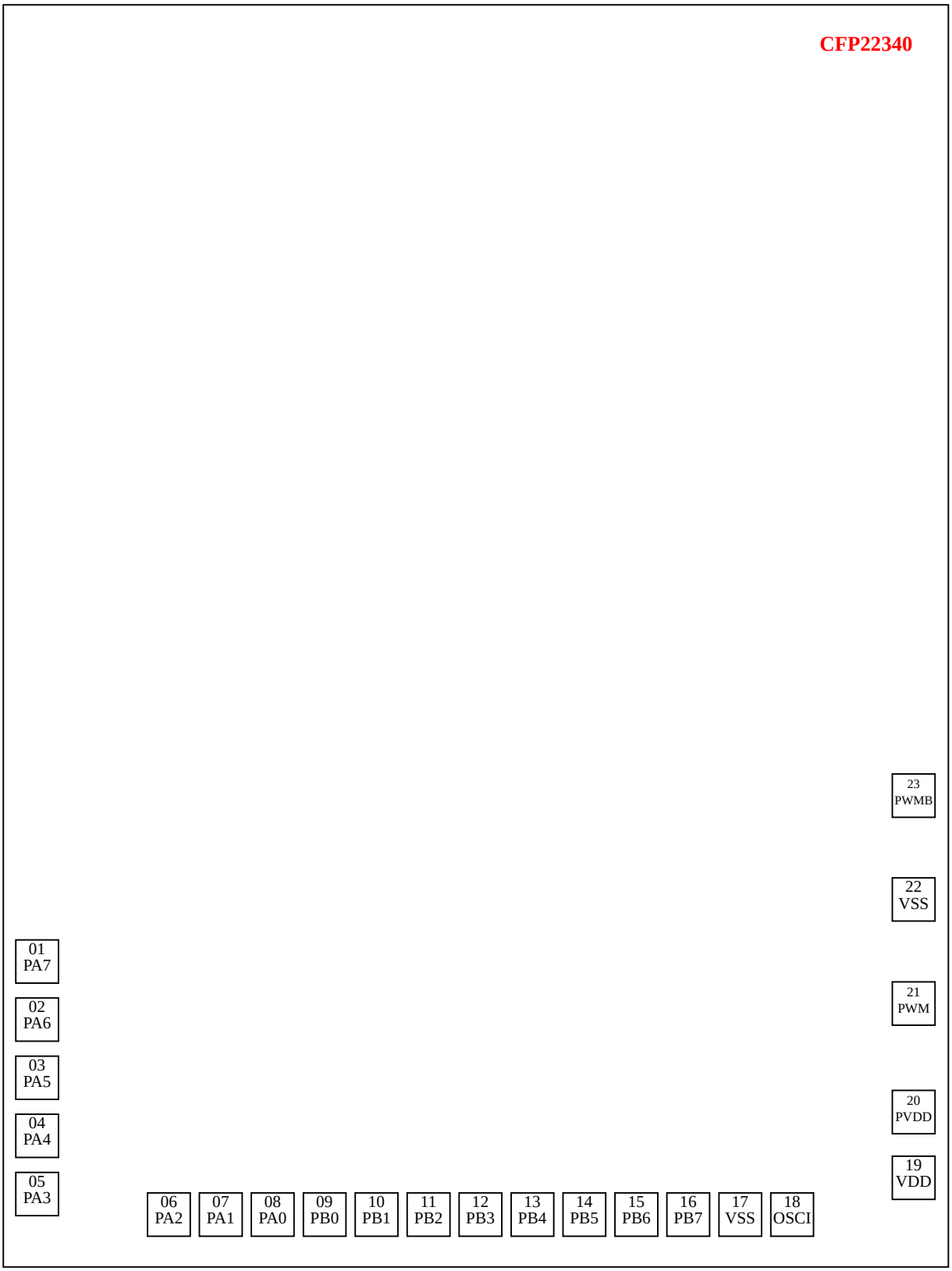
12. CFP22340



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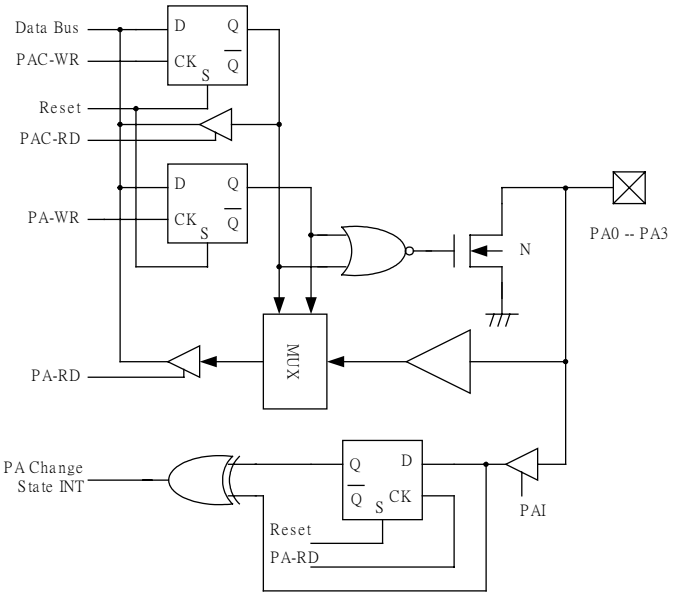
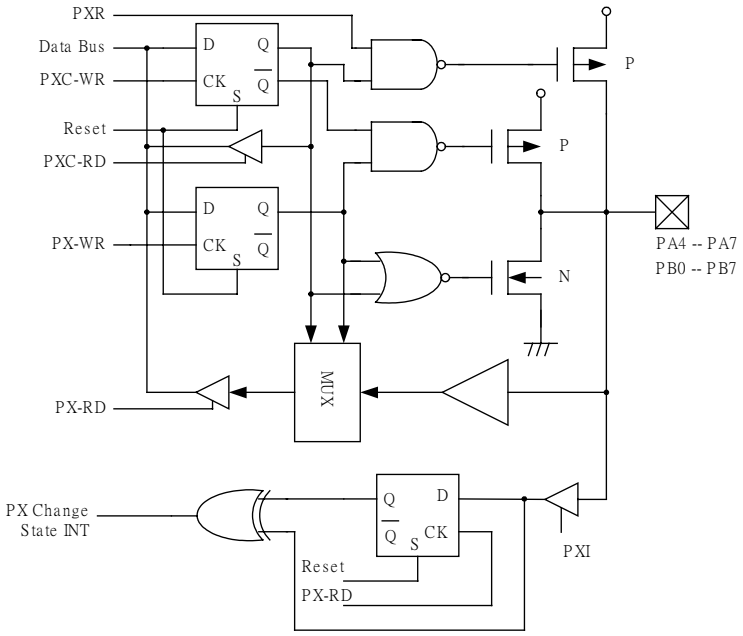
I/O Port structure

For the PA0~PA3, they are defined as NMOS open drain output only when PAC is set as output mode.



For the others of the Port A, they can be configured as follows：



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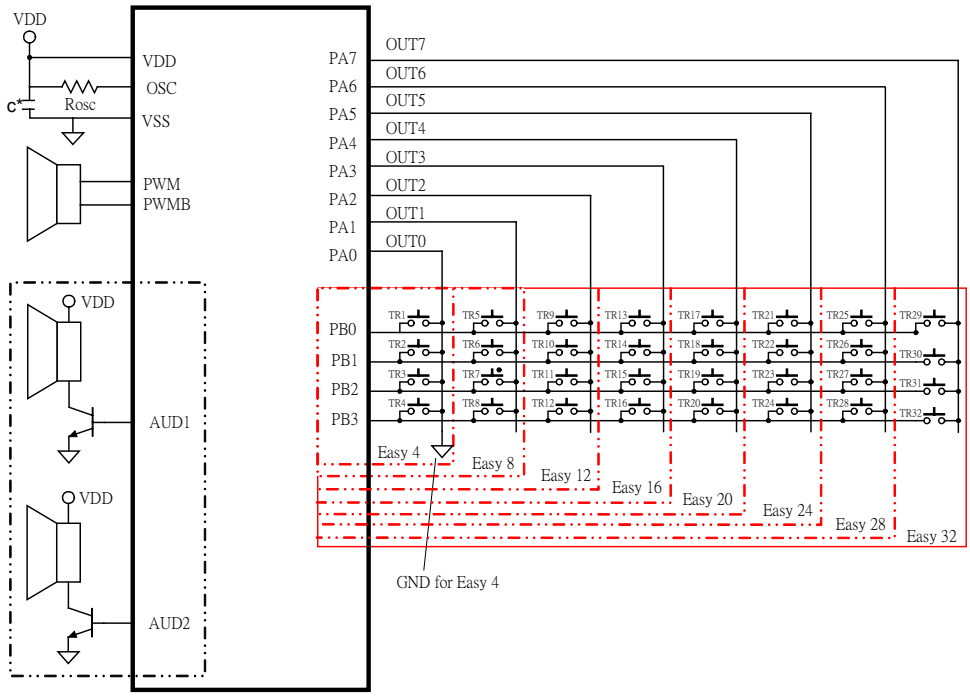
Application Circuit 1 (CFP22007~CFP22085)



Note：

1. The AUD1 and AUD2 is shared with PWM and PWMB.

2. The capacitor “c” is suggested as 0.1μF.

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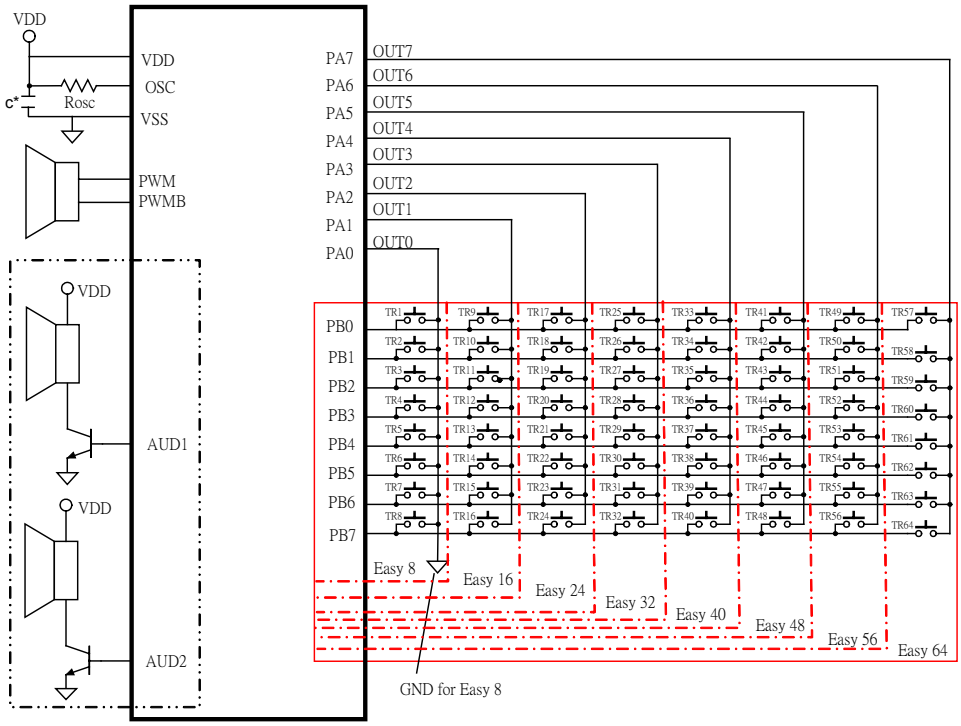
Application Circuit 2 (CFP22128~CFP22340)



Note：

1. The AUD1 and AUD2 is shared with PWM and PWMB.
2. The capacitor “c” is suggested as 0.1μF.

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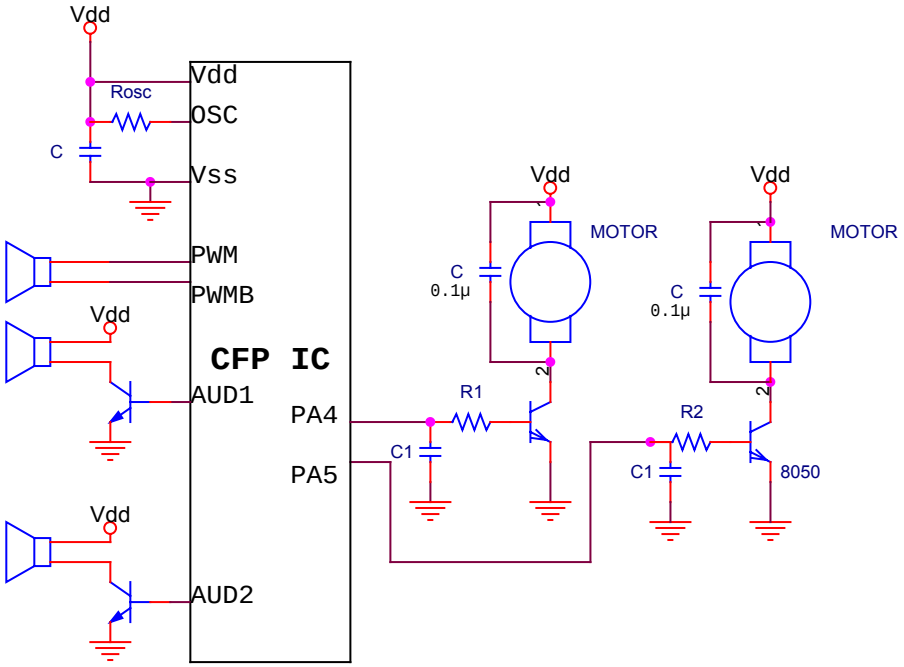
Application Circuit 3



Note：

1. The AUD1 and AUD2 is shared with PWM and PWMB.
2. The capacitor “c” is suggested as 0.1μF.
3. The capacitor “C1” is suggested as 47μF.

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Revision History

Date	Reversion #		Page
2005.4.15	0.1	Original	----
2005.6.2	0.2	1. Update operating current SPEC. 2. Add PWM Sink current SPEC. 3. Add PWM Source current SPEC.	3.
2005.10.31	0.3	1. Updata body name 2. Update Operating voltage SPEC 3. Update Standby current SPEC 4. Update Operating current SPEC 5. Update I/O source current SPEC 6. Update pull-high-Resistance SPEC 7. Add IDAC(Dac output current) 8. Add Pad Diagram 9. Add motor application circuit	1 3 3 3 3 3 3 3 15
2006.8.28	1.0	1. Remove CFP22003,22014,22018 2. Add CFP22021, 22150, 22300 3. Add note to Absolute Maximum Rating	20

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