Panchip Microelectronics Co., Ltd.

PAN186

Datasheet

2.4GHz Wireless Transceiver SoC

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REVISION HISTORY

Version	Date	Description	Related Documents
v1.0	May. 2019	Initial	-

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Abbreviation

ADC	Analog-to-Digital Converter
RF	Radio Frequency
GFSK	Gauss frequency Shift Keying
ISM	Industrial Scientific Medical
MCU	Microcontroller Unit
MTP	Multi-time programming
RAM	Random Access Memory
ROM	Read-Only Memory
PWM	Pulse Width Modulation
LVR	Low voltage reset
WDT	Watchdog Timer

1 General Description

The PAN186 is a SoC chip which integrates 8-bit MCU, 8-bit ADC and 2.4G wireless transceiver circuit. It is very suitable for remote control applications (for example, remote control, toy car, etc.), it is a very cost-effective SoC chip.

The PAN186 embeds up to 3KW MTP ROM and 256 bytes RAM. It also comes equipped with a variety of peripheral devices including 8-channel 8-bit ADC, Timers, clock source, counter, hardware comparator, Low Voltage Reset (LVR), Pulse Width Modulation (PWM), and up to 10 GPIO, and so forth. The PAN186 is able to meet the needs of high integration, high interference immunity, high reliability and ultra low power consumption..

The RF transceiver of PAN186 is designed for operation in the world wide ISM frequency band from 2.400 to 2.483GHz. The PAN186 adopts an embedded baseband protocol engine. Moreover, it supports both normal mode and ACK mode. The data rate supports 2Mbps/1Mbps/250Kbps. And the effective communication rate in 1Mbps mode can reach 200Kb/s.

1.1 Key Features

Featrues of the PAN186 include:

- MCU
    - 8-bit high performance reduced instruction set CPU
    - 89 efficient instructions
    - Most instructions are single-cycle (1T) instructions
    - Programmable stack pointer and stack depth
- Memory
    - 3KW MTP ROM Program Memory
    - 256 bytes RAM Data Memory
- Peripherals
    - Up to 10 GPIO
    - Two 8-bit timers with PWM function
    - One hardware 16-bit timer
    - Up to 8-channel 8-bit ADC
    - One 11-bit PWM generators with three channels and One counter
    - Bandgap circuit provides 1.2V reference voltage
    - LVR
- RF
    - Radio
        - Frequency band: 2.400~2.483GHz
        - Data rate: 2Mbps, 1Mbps, 250kbps
        - GFSK modulation

- Receiver
  - ➢ -83dBm sensitivity at 2Mbps
  - ➢ -87dBm sensitivity at 1Mbps
  - ➢ -91dBm sensitivity at 250Kbps
- Transmitter
  - ➢ Programmable output power: 11, 9, 5, -1, -10 or -23dBm
  - ➢ 18mA at 2dBm output power
  - ➢ 30mA at 9dBm output power
- RF Synthesizer
  - ➢ Fully integrated synthesizer
  - ➢ Accept low cost ±60ppm 16MHz crystal for the data rate of 1Mbps and 2Mbps
  - ➢ Accept low cost ±20ppm 16MHz crystal for the data rate of 250Kbps
- Protocol engine
  - ➢ Support 1 to 32 or 64 byte payload length
  - ➢ Support automatic reply and automatic retransmission
  - ➢ 6 data pipes receiver for 1:6 star networks
- Power Manage
  - Integrated voltage regulator
  - 2.2V to 3.3V supply range
- Package
  - SOP16
- Operating Condition
  - Operating temperature: -40~85℃

1.2 Typical Applications

- Toy car
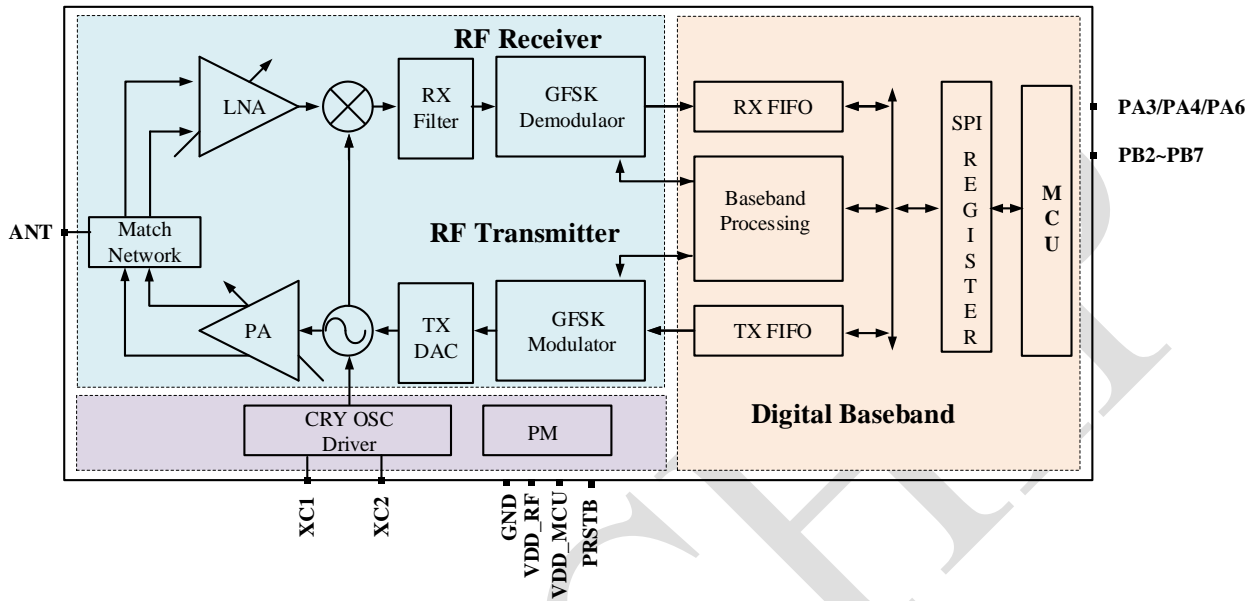- Remote control

2 Block Diagram

Figure 2-1 PAN186 Block Diagram

3 Pin Information

3.1 Pin Assignment

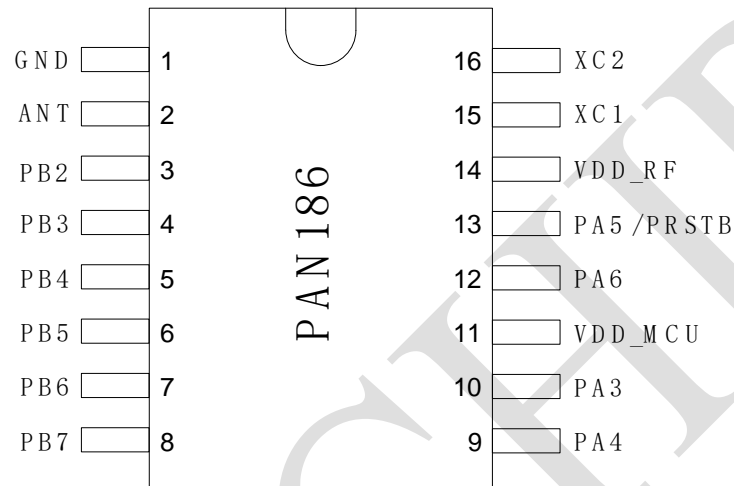PAN186 with SOP16 pin package pin-out is shown in Figure 3-1.

Figure 3-1 PAN186 Pin Assignment for SOP16 Package

3.2 Pin Descriptions

Table 3-1 PAN186 Pin Description for SOP16 Package

Pin number	Symbol	IO type	Description
1	GND	P	Ground pin
2	ANT	I/O	Antenna pin
3	PB2	I/O	Port B bit 2
	AD2	I	ADC analog input channel 2
	COM2	I/O	COM2 port
	TM2PWM	O	Timer2 PWM output pin
	PG2PWM	O	11-bit counter PWMG2 output pin
4	PB3	I/O	Port B bit 3
	AD3	I	ADC analog input channel 3
	PG2PWM	O	11-bit counter PWMG2 output pin
5	PB4	I/O	Port B bit 4
	AD4	I	ADC analog input channel 4
	TM2PWM	O	Timer2 PWM output pin
	PG0PWM	O	11-bit counter PWMG2 output pin
6	PB5	I/O	Port B bit 5
	AD5	I	ADC analog input channel 5

	COM3	I/O	COM3 port
	INT0	I	External interrupt source 0, both rising and falling edges can trigger an interrupt.
	TM3PWM	O	Timer3 PWM output pin
	PG0PWM	O	11-bit counter PWMG0 output pin
	PG2PWM	O	11-bit counter PWMG2 output pin
7	PB6	I/O	Port B bit 6
	AD6	I	ADC analog input channel 6
	COM4	I/O	COM4 port
	CIN4-	I	Comparator negative input source 4
	TM3PWM	O	Timer3 PWM output pin
	PG1PWM	O	11-bit counter PWMG1 output pin
	PG0PWM	O	11-bit counter PWMG0 output pin
8	PB7	I/O	Port B bit 7
	AD7	I	ADC analog input channel 7
	CIN5-	I	Comparator negative input source 5
	TM3PWM	O	Timer3 PWM output pin
	PG1PWM	O	11-bit counter PWMG1 output pin
9	PA4	I/O	Port A bit 4
	AD9	I	ADC analog input channel 9
	CIN+	I	Comparator positive input source
	CIN1-	I	Comparator negative input source 1
	INT1	I	External crystal pin 1
	PG1PWM	O	11-bit counter PWMG1 output pin
10	PA3	I/O	Port A bit 3
	AD8	I	ADC analog input channel 8
	CIN0-	I	Comparator negative input source 0
	TM2PWM	O	Timer2 PWM output pin
	PG2PWM	O	11-bit counter PWMG2 output pin
11	VDD_MCU (VDD&AVDD)	P	Supply power
12	PA6	I/O	Port A bit 6
	X2	O	External crystal pin 2
13	PA5	I/O	Port A bit 5. When PA5 is used as an output pin, it is an open-drain output. In this case, an external pull-up resistor must be connected.
	PRSTB	I	Hardware reset pin
	PG2PWM	O	11-bit counter PWMG2 output pin
14	VDD_RF	P	RF supply power
15	XC1	I	Crystal input pin
16	XC2	O	Crystal output pin

Note: Burning pins: PA6 (PIN12), PRSTB (PIN13), PA3 (PIN10), VDD (PIN11), GND

3.3 Internal Connection

Table 3-2 RF and MCU Internal Connection Pin Instructions

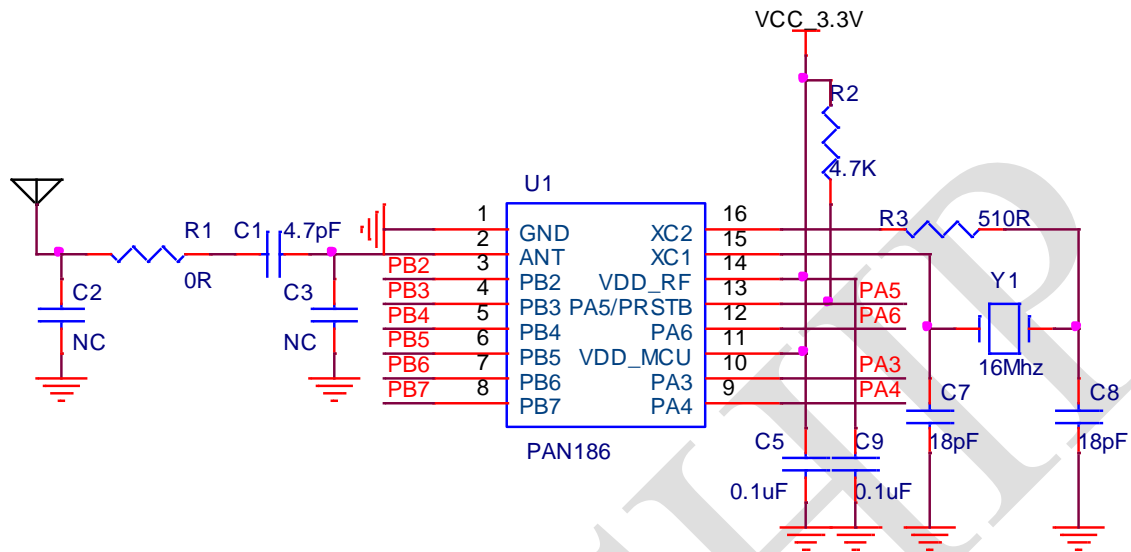| Pin No	RF	MCU
I S	CSN	PB1
I S	SCK	PB0
I S	MOSI	PC1
I S	MISO	PC0
I S	IRQ	PA0

4 Reference Schematic Diagram

Figure 4-1 PAN186 Reference Schematic Diagram

5 Package Dimensions
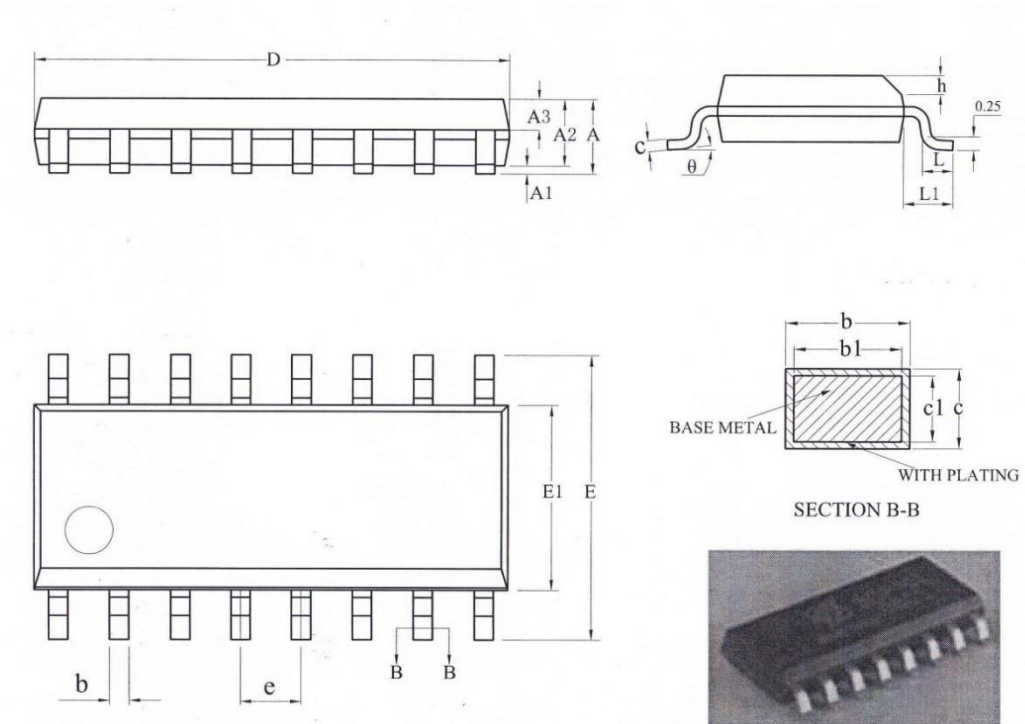

Figure 5-1 PAN186 Package View

Table 5-1 Package Detail Parameters

Symbol	MIN.(mm)	TYP.(mm)	MAX.(mm)
A	-	-	1.75
A1	0.10	-	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	-	0.47
b1	0.38	0.41	0.44
c	0.20	-	0.24
c1	0.19	0.20	0.21
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	-	0.50
L	0.50	-	0.80
L1	1.05REF		
Ø	0	-	8°

6 Precautions

(1) This product is a CMOS device and should be protected against static electricity during storage, transportation and use.

(2) Grounding when device is in use.

(3) Reflow temperature can not exceed 260℃.

7 Storage Conditions

(1) Products should be stored in sealed packages: when the temperature is less than 30 degrees and the humidity is less than 90%, it can last for 12 months.

(2) After the package is opened, the components will be used in the reflow process or other high-temperature processes. The following conditions must be met:

  1) Completed within 72 hours and the factory environment is less than 30°C≤ 60% RH.

  2) Stored in 10% RH environment.

  3) Exhaust at 125°C for 24 hours to remove internal water vapor before used.

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