XNS102CV Serials Product Manual

SOC 2.4GHz Transceiver

General Description

The XNS102CV is an IO-Type,fully static,OTP-based SOC 2.4GHz Transceiver. It is designed for operation in the world wide ISM frequency band at 2.400~2.483GHz,integrating radio frequency (RF) transmitter and receiver, frequency synthesizer, crystal oscillator, baseband GFSK modem, and so on,supporting one to multiple network and communication with ACK.TX power, frequency channel, and data rate can be set by SPI. Multiple external components are integrated into the chip.

The SOC employs RISC architecture and most the instructions are executed in one cycle except that few instructions are two cycles that handle indirect memory access. 2KW OTP program memory and 128 bytes data SRAM are inside,one hardware 16-bit timer,two hardware 8-bit timers with PWM generation(Timer2、Timer3) and one hardware 11-bit timers with PWM generation(PWMG0) is also included, XNS102CV also support one hardware comparator and VDD/2 bias voltage generator for LCD display application.

Main Features

1、 SOC

- Clock sources: internal high speed RC oscillator、internal low speed RC oscillator
- One hardware 16-bit timer
- Two hardware 16-bit timer
- One hardware 11-bit PWM generator
- Support fast wake-up
- Built-in half VDD bias voltage generator to provide maximum 3*10 dots LCD display
- 3 levels of LVR reset： 2.75V, 2.5V, 2.2V
- 9 IO pins,and optional pull-high resister
- Different IO driving capability to meet different application requirement
- 1 external interrupt pins
- Every pin can be configured to enable wake-up function
- Operating voltage range：~4MHz@VDD≧2.5V; ~2MHz@VDD≧2.2V
- 2KW OTP program memory
- 128Bytes data RAM
- Most instructions are 1T execution cycle
- Programmable stack pointer and adjustable stack level
- All data memories are available for use as an index pointer

2、RF Module

- Operating in the world wide ISM frequency band at 2.400~2.483GHz

- Supporting automatic reply and automatic retransmission
- 1Mbps 250kbps optional data rate in air
- Programmable Output Power from -5dBm to 13dBm
- Excellent Receiver sensitivity -87dBm@1Mbps ,-91dBm@250Kbps
- Low power consumption,high performance,few external components

3、Operating conditions

- Operating voltage range：2.2V ~3.3V
- Operating temperature：-20℃ ～ 70℃
- Storage temperature: -40℃ ~ 125℃
- Junction temperature: 150℃

Package information:

XNS102CV-S16: SOP16（width 150mil）

RoHS (Green)

Applications

TV and STB remote controls、Wireless Mouse and keyboard、Toys and wireless audio、Wireless gamepads、Active RFID、Smart home automation

Revision	Date	Description	Related documents
V1.0	2016.03	Draft	《XN297L datasheet 》 《PMS154 datasheet V004 _CN》

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1 Block Diagram

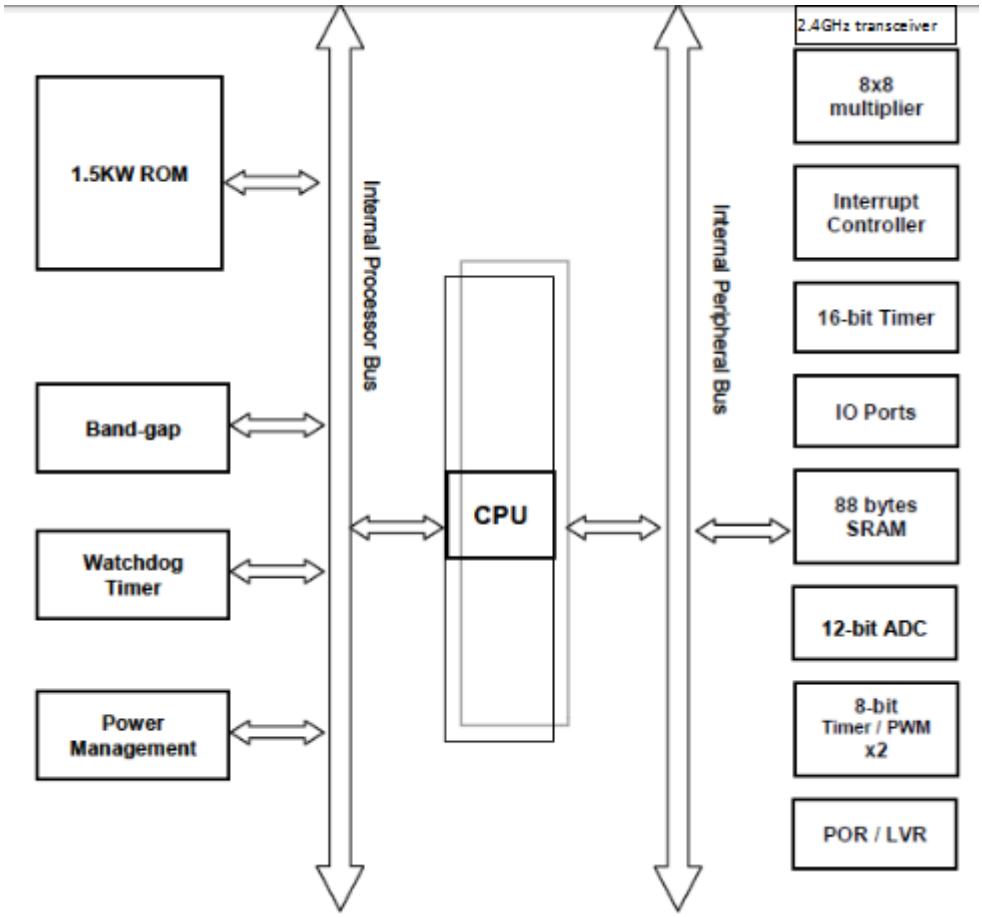


Chart1 XNS102CV SOC block diagram

2 Pin Definition and Functional Description

2.1 Pin Definition

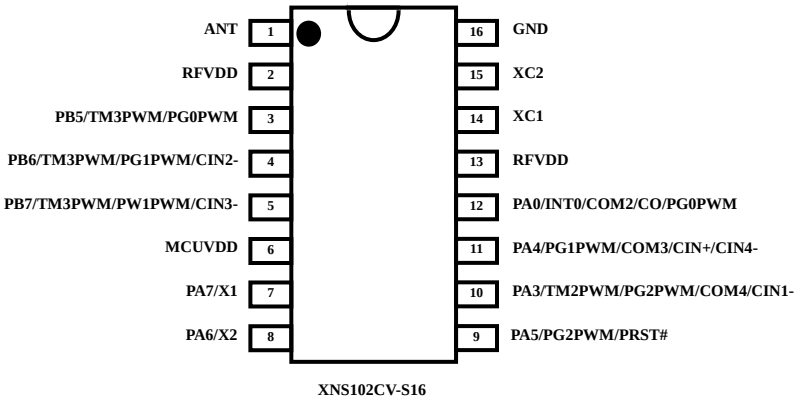


Figure 2.1 XNS102CV pins

2.2 Functional Description

Program writing pins：PIN 6 / PIN8 / PIN9 / PIN10 / PIN11 / PIN16

Table 2.2 functional description

NO	Pin name	Pin&Buffer Type	Description
1	ANT	AIO	Antenna interface
2	RFVDD	P	RF power supply
3	PB5 / TM3PWM/ PG0PWM	IO ST / CMOS /Analog	The Pin can be used as： 1. Bit 5 of part B,It can be configured as digital input,two-state output with pull-up resister by software independently. 2. Output of 8-bit timer3（TM3). 3. Output of 11-bit PWM generator PWMG0. When this pin is configured as analog input,please use bit 5 of register pbdier to disable the digital input to prevent current leakage.This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 5 pbdier register is”0”

NO	Pin name	Pin&Buffer Type	Description
4	PB6 / TM3PWM/ PG1PWM/ CIN2-	IO ST / CMOS /Analog	The Pin can be used as： 1. Bit 6 of part B,It can be configured as digital input,two-state output with pull-up resister by software independently. 2. Output of 8-bit timer3（TM3). 3. Minus input source 2 of comparator. When this pin is configured as analog input,please use bit 6 of register pbdier to disable the digital input to prevent current leakage.This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 6 pbdier register is"0"
5	PB7 / TM3PWM/ PG1PWM/ CIN3-	IO ST / CMOS /Analog	The Pin can be used as： 1. Bit 7 of part B,It can be configured as digital input,two-state output with pull-up resister by software independently. 2. Output of 8-bit timer3（TM3). 3. Minus input source 3 of comparator. When this pin is configured as analog input,please use bit 7 of register pbdier to disable the digital input to prevent current leakage.This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 7 pbdier register is"0"
6	MCU VDD	P	SOC Positive power
7	PA7 / X1	IO ST / CMOS/ Analog	The Pin can be used as： 1. Bit 7 of part A,It can be configured as digital input,two-state output with pull-up resister by software independently. 2. X1 when crystal oscillator is used. When this pin is configured as crystal oscillator function , please use bit 7 of register pbdier to disable the digital input to prevent current leakage.This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 7 pbdier register is"0"

NO	Pin name	Pin&Buffer Type	Description
8	PA6 / X2	IO ST / CMOS Analog	The Pin can be used as： 1. Bit 6 of part A,It can be configured as digital input,two-state output with pull-up resister by software independently. 2. X2 when crystal oscillator is used. When this pin is configured as crystal oscillator function ,please use bit 6 of register pbdier to disable the digital input to prevent current leakage.This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 6 pbdier register is"0"
9	PA5 / PRSTB/ PG2PWM	IO ST / CMOS	The Pin can be used as： 1. Bit 5 of port A.It can be configured as input with pull-up resister or open drain output pin. 2. Hardware reset This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 5 of padier register is "0". Please put 33Ωregister in series to have high noise immunity when this pin is in input mode
10	PA3 / TM2PWM/ PG2PWM/ COM4 / CIN1-	IO ST / CMOS /Analog	The Pin can be used as： 1. Bit 1 of part A,It can be configured as digital input,two-state output with pull-up resister by software independently. 2. Output of 8-bit timer2（TM3). 3. Minus input source 1 of comparator. 4. COM4 to provide (1/2 VDD)for LCD display When this pin is configured as analog input,please use bit 3 of register pbdier to disable the digital input to prevent current leakage.This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 3 pbdier register is"0"

NO	Pin name	Pin&Buffer Type	Description
11	PA4 / CIN+ / COM3 / CIN4-/ PG1PWM	IO ST / CMOS/ Analog	The Pin can be used as： 1. Bit 4 of part A,It can be configured as digital input,two-state output with pull-up resister by software independently. 2. Plus input source of comparater. 3. Minus input source 4 of comparator. 4. COM3 to provide (1/2 VDD)for LCD display When this pin is configured as analog input,please use bit 4 of register pbdier to disable the digital input to prevent current leakage.This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 4 pbdier register is"0"。
12	PA0 / INT0 / PG0PWM/ CO / COM2	IO ST / CMOS /Analog	The Pin can be used as： 1. Bit 0 of part A,It can be configured as digital input,two-state output with pull-up resister by software independently. 2. Output of comparater. 3. External interrupt line 0.Both rising edge and falling edge are accepted to request interrupt service. 4. COM2 to provide (1/2 VDD)for LCD display 5. Output of 11-bit PWM generator PWMG0 When this pin is configured as analog input,please use bit 0 of register pbdier to disable the digital input to prevent current leakage.This pin can be used to wake-up system during sleep mode;however,wake-up function is also disabled if bit 0 pbdier register is"0"。
13	RFVDD	P	RF Positive power
14	XC1	AI	RF Crystal 1
15	XC2	AO	RF Crystal 2 *Note
16	GND	G	Ground
Notes：IO：Input/Output； ST：Schmitt Trigger； AI / AO: Analog input/output； CMOS：CMOS voltage level			

*Note Must use 16 MHZ crystals.matching capacitance should be adjusted according to the crystals . Crystals accuracy requirement: 250 k communication mode±20ppm, 1 M communication mode±40ppm

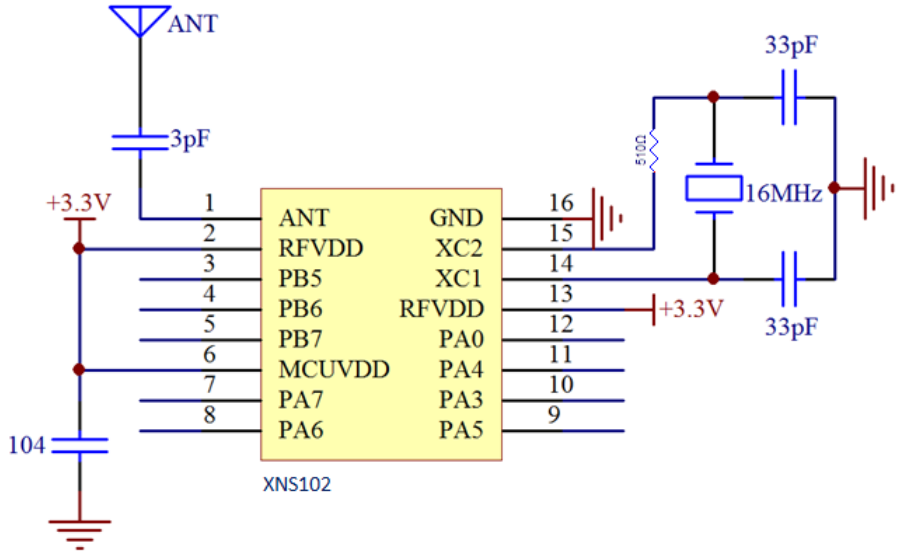
2.3 Inter Connection

Table 2.3 inter connection

RF	MCU	Description
MISO	PB1	Inner bonding
MOSI	PB2	Inner bonding
SCK	PB3	Inner bonding
CSN	PB4	Inner bonding
IRQ	PB0	Inner bonding

3 Apllication examples

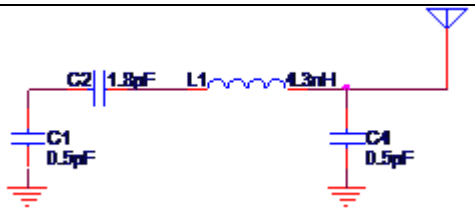
3.1 Fewer external components



*Notes Some crystal in low temperature，need connect 510Ω resistance in serials to improve the stability of the output frequency.

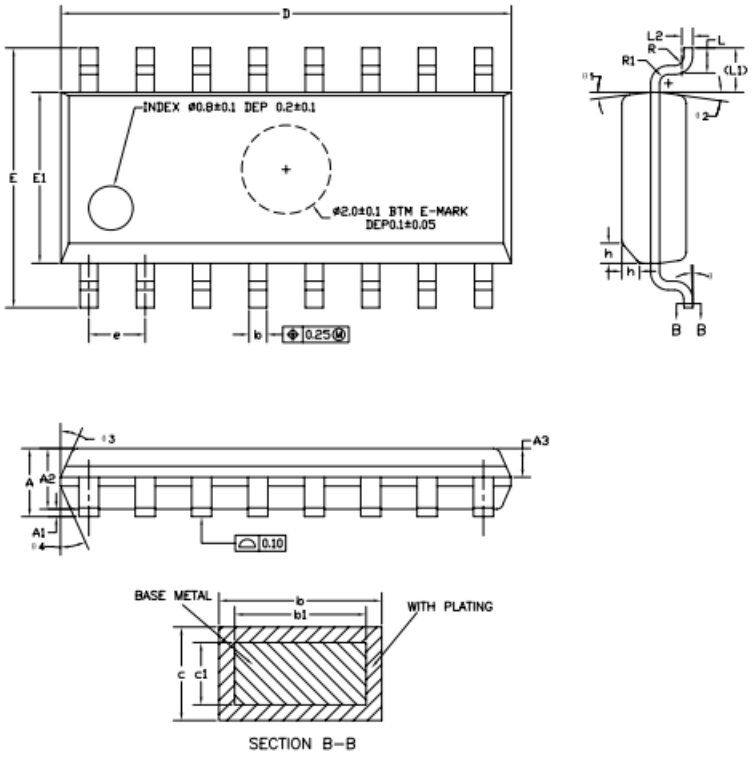
3.2 SCH for Safety Certification

At 5dB output power，RF external components matching as shown in the figure below（the left side is Pin ANT），every harmonic allowance is more than 3 db in safety certification.



In the car package, for example, use 250 KBPS communication data rate, stable communication distance approximately 40 m and 50 m

4 Package Size



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

	SYMBOL	MIN	NOM	MAX
	A	1.35	1.60	1.75
	A1	0.10	0.15	0.25
	A2	1.25	1.45	1.65
	A3	0.55	0.65	0.75
⚠	b	0.36	–	0.51
	b1	0.35	0.40	0.45
⚠	c	0.17	–	0.25
⚠	c1	0.17	0.20	0.23
	D	9.80	9.90	10.00
	E	5.80	6.00	6.20
	E1	3.80	3.90	4.00
	e	1.27BSC		
	L	0.45	0.60	0.80
	L1	1.04REF		
	L2	0.25BSC		
	R	0.07	–	–
	R1	0.07	–	–
	h	0.30	0.40	0.50
	θ	0°	–	8°
	θ 1	6°	8°	10°
	θ 2	6°	8°	10°
	θ 3	5°	7°	9°
	θ 4	5°	7°	9°

Figure 3.1 XNS102CV package size