

User manual

ZBM-2400

Plug in type ZigBee module

ATCB ID: ATCB012366

FCC ID: CO9ZBM2400

IC: 10396A - ZBM2400



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1 Introduction

ZBM-2400 is a ZigBee module that comply with IEEE802.15.4 standard, implement with ZigBee protocol & communication API, its industrial quality suitable for related wireless transmission application, low power, mesh networking, easy to use and user friendly。ZBM-2400 module was designed at 2.4GHz frequency band, using DSSS frequency modulation, stable and meets EMC & EMI standards。

The ZigBee module's FCC ID: CO9ZBM2400 & IC ID:10396A-ZBM2400 was shown on the label, if the module is put inside a product, the outer casing should have an exterior label indicated:

“Contains FCC ID: CO9ZBM2400 & IC ID:10396A-ZBM2400”

- Frequency range: 2.400GHz ~ 2.480GHz, total 16 channels
- Receiver sensitivity: -104dBm
- Max. Out put power: +6dBm
- Max. transmission range: 1200 meters (LOS)
- Low consuming power: Receiving at 34 mA, transmitting at: 170 mA @ +6 dBm, sleep mode: 1uA
- Supply voltage range: 2.0 -3.6 VDC
- Digital signal strength indication: RSSI
- Working temperature range: -20 ~ +65 °C;
- Strong Mesh networking;
- Transmission parameter setting: OTA;
- CSMA-CA anti-collisions detection;
- Transparent transmission

1.1 Scope

This manual describes the ZBM2400 specification, parameters, pin assignment, communication protocol, instruction sets, in order to guide the user how to design a target PCB.

2 Specification of ZBM-2400

	Item	Data	Remark
Hardware parameters	Working frequency	2.400~2.480GHz	
	Max. transmission power	6dBm	
	Lowest receiving sensitivity	-104dBm	PER<0.1%
	Transmission range	1200m	LOS
	Transmission rate	1200bps~115200bps	
	Modulation type	O-QPSK	
	Transmission current	<175mA@20dBm	
	Receiving current	<35mA	
	Sleeping current	<1uA	
	Operation voltage	2.0~3.6V	
	Interface	UART	TTL level
	Connector pins	Dual 11Pin single line	2.0mm gauge
	Antenna	u.FL/Chip	
	Size	32mm×24.3mm	
	Working temperature	-20 ~ + 65 °C	
	Working humidity	10%~90%	relative
	MCU FLASH	256K	
	MCU RAM	8K	
	ADC ports	2 ports	Reserved
	DIO	7 channel	Reserved

2.1 Pin assignment

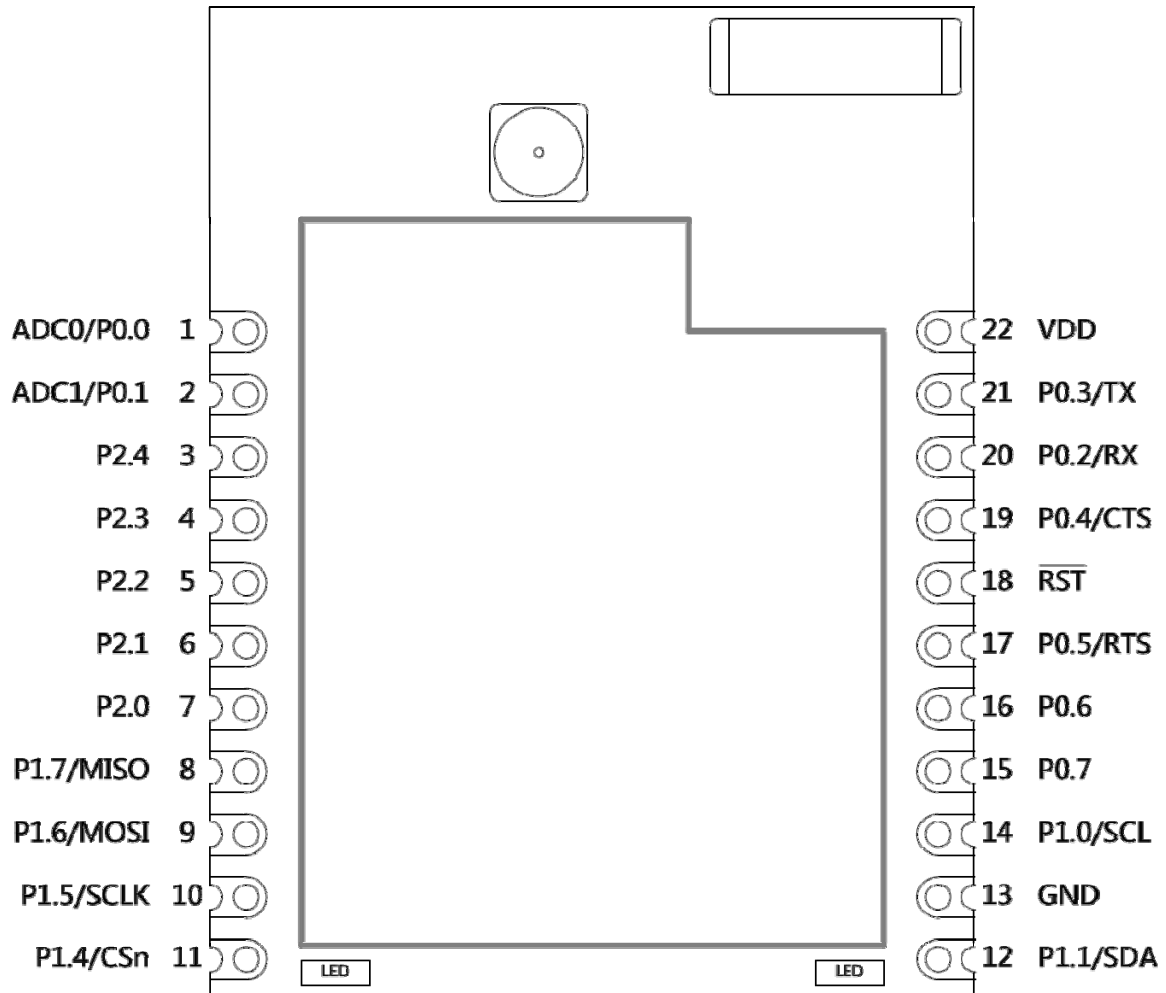


图 1 PANC ZM100 顶视图

Pin no.	Mark	Type	Description
1	ADC0/P0.0	AI	Voltage I/P (0V~VDD)
2	ADC1/P0.1	AI	Voltage I/P (0V~VDD)
3	P2.4	DIO	Reserved
4	P2.3	DIO	Reserved
5	P2.2	DIO	Reserved
6	P2.1	DIO	Reserved

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Pin no.	Mark	Type	Description
7	P2.0	DO	To LED, transmission fail indication
8	P1.7/MISO	DO	To LED, transmission indication
9	P1.6/MOSI	DO	To LED, Receiver indication
10	P1.5/SCLK	DO	To LED, Signal strength indication
11	P1.4/CSn	DO	To LED, working status
12	P1.1/SDA	DIO	Reserved
13	GND	G	Reserved
14	P1.0/SCL	DIO	Reserved
15	P0.7	DIO	Reserved
16	P0.6	DIO	Reserved
17	P0.5/RTS	DIO	Reserved
18	RST	DI	Reset, low active
19	P0.4/CTS	DIO	Reserved
20	P0.2/RX	DI	UART receive for module (3.3V)
21	P0.3/TX	DO	UART transmit from module (3.3V)
22	VDD	P	Input power (3.3V)

Abbreviations list:

DI=Digital Input.

DO=Digital Output

DI/O=Digital bi-directional input/output pin.

DO/D=Digital Open Drain.

AI=Analog input pin

AO=Analog output pin

RF=RF signal I/O pin

P=Power pin

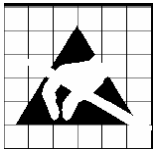
G=Ground pin

2.2 Hardware characteristics & specifications

Serial port	Baud rate	1200~115200
	Parity check	N/8/1
	Max. Series length	102 characters
	Overhead	5
	XOR	1-character XOR
	Support command mode	API instruction mode
		API data mode Transparent mode
Network	Max. number of nodes	65536 (0 ~ 65535)
	Scope of node number	0 ~ 65533 (0: for Master 65534: Data return 65535: broadcast)

3 ZBM-2400 Maximum rating

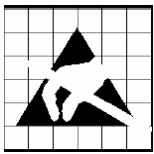
Item	Condition	Minimum	Type	Max.	Unit
Any port I/P voltage		-0.3		3.6	V
Max. VCC to GND current				500	mA
Any port max. I/P current				100	mA
Any port max. OI/P current				100	mA
Storage temperature		-55		+125	°C
*Note: Do not exceed the max. rating listed above, otherwise permanent damage will be occurred.。					



Warning! ESD sensitive, proper preparation for anti-ESD is required when installing the module.

4 ZBM-2400 Normal working condition

Item	Condition	Min	Typical	Max.	Unit
Supply voltage		2.0	3.3	3.6	V
Working temperature		-40		85	°C
Working humidity		10%		90%	



Warning! Lower supply voltage will cause lower O/P power.

5 ZBM-2400 Communication protocol

5.1 Transparent transmission mode

To enter transparent mode command:

AT command	To mode	parameter	Return value
--N-	Transparent mode	N = 0 ~ 65533, 65535, in decimal	N/A
===	To API mode	N/A	N/A

When use this mode, all the characters send from master will be received from client.

5.2 API Mode

API mode, also called binary mode, its command include:

Head (1)	LQI (1)	Destination (2)	Load length (1)	load (0 – 102)	Check sum (XOR) (1)
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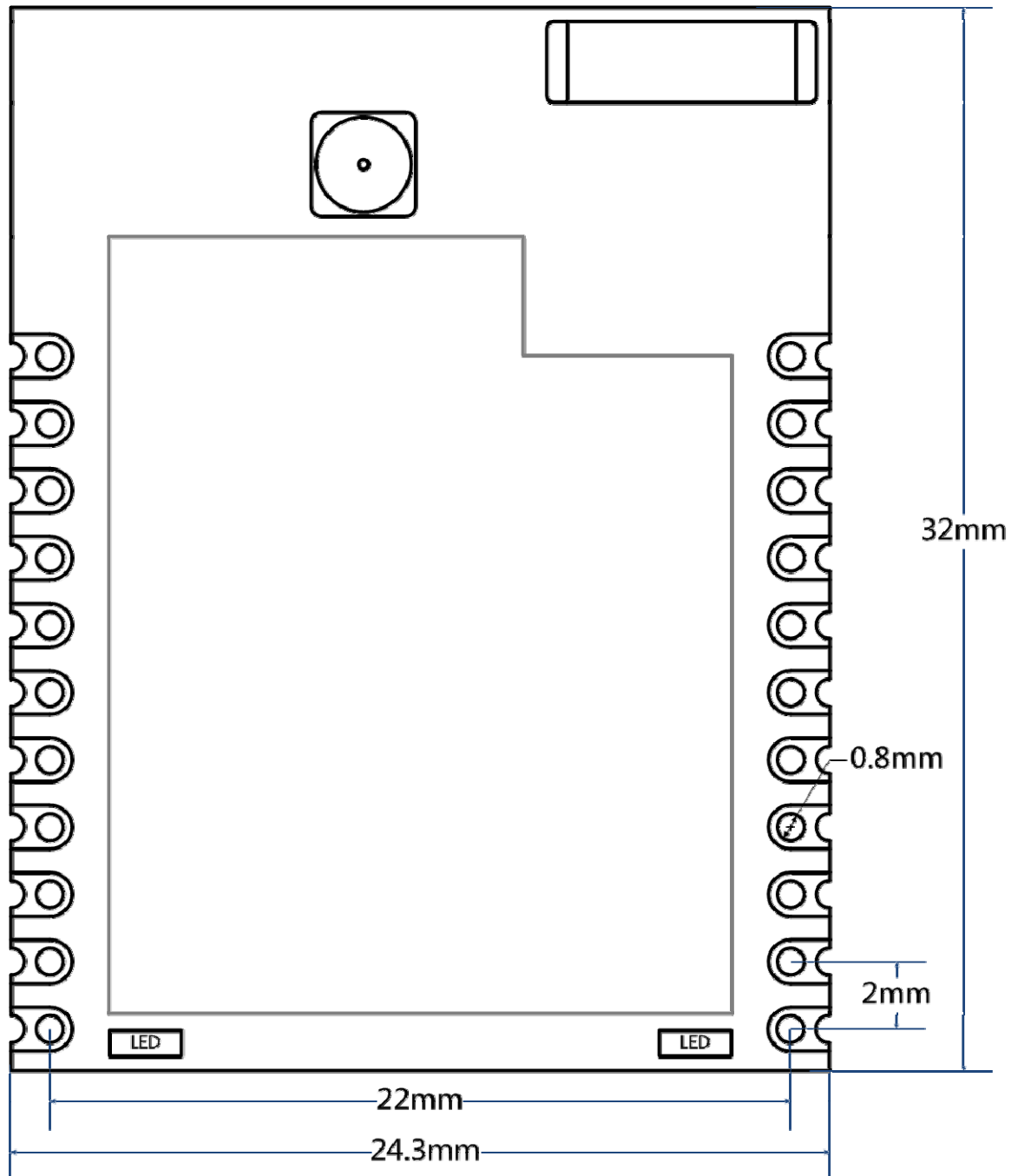
These command should be send from target CPU, for master clocks system transmission, destination will be 65535(0xFFFF) means broadcast. Load will be time and date information.

6 Related terms and abbreviation

ADC	Analog to Digital Converter
AMR	Automatic Meter Reading
CFB	Cipher Feedback Mode
CMOS	Complementary Metal Oxide Semiconductor
CPU	Central Processor Unit
DES	Data Encryption Standard
FCC	Federal Communication Committee
FSK	Frequency Shift Keying
IDE	Integrated Development Environment
IF	Intermediate Frequency
ISM	Industrial Scientific Medical
ISR	Interrupt Service Routine
LOS	Line of Sight
LPF	Loop Filter
LQI	Link Quality Indicator
LSB	Least Significant Bit
MAC	Medium Access Layer
MSB	Most Significant Bit
PCB	Printed Circuit Board
PHY	Physical Layer
POR	Power On Reset
RAM	Random Access Memory
RF	Radio Frequency
RSSI	Received Signal Strength Indicator
RTC	Real-Time Clock
RX	Receive
SFR	Special Function Register
SPI	Serial Peripheral Interface
SRAM	Static Random Access Memory
SRD	Short Range Device
TQFP	Thin Quad Flat Pack
TX	Transmit
UART	Universal Asynchronous Receiver/Transmitter

7 ZBM-2400 Module mechanic specifications

7.1 ZBM-2400 Size



7.2 Re-flow temperature specifications

Recommend soldering base on IPC/JEDEC J-STD-020B standard。

	Ideal (°C)	Maximum (°C)
Maximum Re-flow Temperature	215	230

7.3 Recommend soldering

Recommend soldering base on IPC/JEDEC J-STD-020B standard。

	Alloy Composition	Solidus (°C)	Liquid's (°C)	Shear MPa
Johnson Alloy #806	In/48Sn (e)	118	118	

8 Example of installation

When put the module on the target PCB to perform ZigBee wireless transmission. Plug the module into socket with correct direction shown below. The DIP-SW #1 & #4 should be set to on position and DIP-SW #2 & #3 should be set to off position. Make sure no ESD discharge happened.

ZigBee
module



Put the
end up
which chip
antenna
mounted.



When power on, the green LED on the module will be flashing (power), then the red LED also flashing (data received), about 7 seconds later, the clock will be synced to master clock.

9 Warning:

1. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
2. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Avertissement: (Français)

1. Les changements(monnaies) ou des modifications non expressément approuvées par le parti(la fête) responsable de la conformité pourraient annuler l'autorité de l'utilisateur pour opérer(exploiter) l'équipement.
2. Ce dispositif respecte la partie 15 des Règles(Autorités) de FCC. L'opération est soumise aux deux conditions suivantes :
(1) Ce dispositif ne peut pas causer l'interférence nuisible et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.