CIONLABS

MODULE Datasheet

DS-BC202HZ-01-26P

V1.0

2025/03/01

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Features

1.1 Overview

The BC202HZ-01-26P module is based on the Beken BK3633 chip. The BK3633 chip is a highly integrated wireless system on chip, which supports Bluetooth 5.4 Dual Mode and proprietary 2.4 GHz protocols. It integrates a high-performance RF transceiver, baseband, low-power processor, rich feature peripheral units, programmable protocol and profile to support a wide range of applications. The Flash program memory makes it suitable for customized applications.

Designed with an advanced technology process and integrated with a DC-DC switching regulator, the BK3633 features ultra-low power consumption and ultra-low leakage power. The embedded high-order interference suppression filter and fast automatic gain control logic make it work well in a high-interference environment.

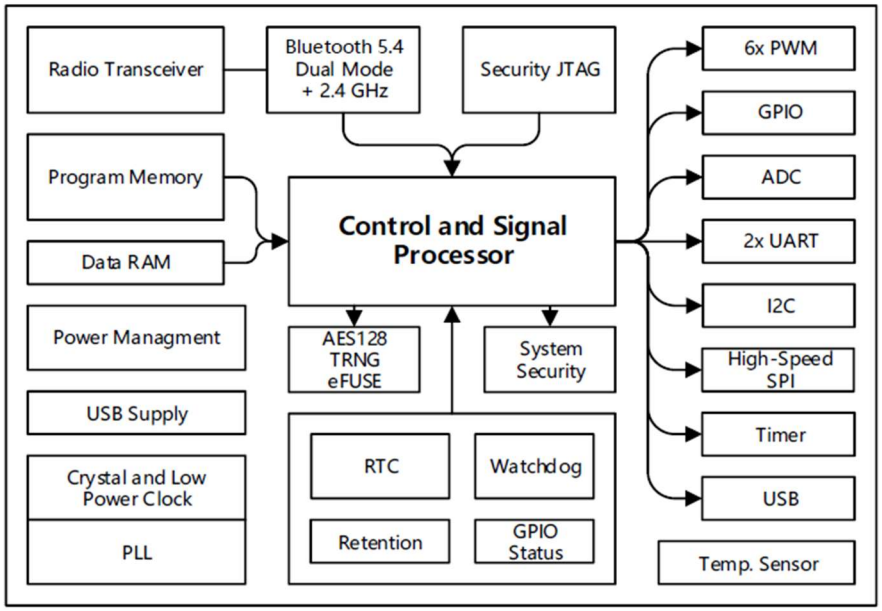


Figure 1 BK3633 Block Diagram

1.2 Features

- Bluetooth 5.4 Dual Mode and proprietary 2.4 GHz protocol
- Around 5 mA full operation current
- Around 1 μA deep sleep current with low-power running timer
- Bluetooth Angle of Arrival (AoA) and Angle of Departure (AoD)
- Antenna array with a maximum 16 antennas for precise indoor positioning

- Bluetooth Low Energy (LE) 125 kbps, 500 kbps, 1 Mbps and 2 Mbps
- Classic Bluetooth 1 Mbps
- Proprietary 2.4 GHz 250 kbps, 1 Mbps and 2 Mbps
- High output power up to 10 dBm and Bluetooth LE Power Control
- 32-bit RISC core with 80 KB data memory at up to 64 MHz speed
- SiP Flash: 512 KB or 1 MB
- 32-byte eFUSE
- Operating voltage: 0.9–1.5 V (boost), 2.0–3.6 V (buck)
- Clock
    - 16 MHz crystal reference clock with internal tuning load capacitance
    - 64 MHz digital PLL clock
    - 32 kHz ring oscillator
    - External 32 kHz crystal oscillator
    - MCU can run with any clock source with internal frequency divider
    - Dedicated audio PLL clock for I2S master clock
- Interface and peripheral units
    - Quad IO flash programming

Electrical Specifications

2.1 DC Characteristics

Name	Parameter (Condition)	Min	Typical	Max	Unit
VCCBAT	Battery supply	0.9	3.0	3.6	V
TEMP	Temperature	-40	+20	+125	°C
VIH	High level	VCC-0.3		VCC+0.3	V
VIL	Low level	VSS		VSS+0.3	V
VOH	High level (IOH=-0.25 mA)	VCC-0.3		VCC	V
VOL	Low level (IOL=0.25 mA)	VSS		VSS+0.3	V
IVDD	Deep sleep (1 kHz Timer)		0.9		µA
IVDD	Shutdown		100		nA
IVDD	Sleep current (RF OFF, 32 kHz clock, DIG Retention)		2		µA
IVDD	Active RX (3.3 V)		5.5		mA
IVDD	Active TX @ 0 dBm (3.3 V)		6.1		mA

2.2 RF Characteristics

Name	Parameter (Condition)	Min	Typical	Max	Unit
FOP	Operating frequency	2402		2480	MHz
FXTAL	Crystal frequency		16		MHz
RFSK	Air data rate	0.125	1	2	Mbps
PRF	Output power	-20	9.5	+10	dBm
BLE 1 Mbps data rate performance					
PBW	Modulation 20 dB bandwidth			1	MHz
PRF1	Out of band emission 2 MHz		-35		dB
PRF2	Out of band emission 3 MHz		-45		dB
Carrier Drift	Maximum carrier drift	-50	5	50	kHz
Drift Rate	Maximum drift rate		2.5	20	kHz/50µs

Δf1avg	Maximum modulation	225	255	275	kHz
Δf2min	Minimum modulation	185	213		kHz
Δf2avg/Δf1avg		0.8	0.92		
Max Input	30.8% PER		0		dBm
RXSENS	30.8% PER sensitivity		-96		dBm
C/ICO	Co-channel C/I		9		dB
C/I1ST	ACS C/I 1MHz		-3		dB
C/I2ND	ACS C/I 2MHz		-39		dB
C/I3RD	ACS C/I 3MHz		-49		dB
C/I1STI	ACS C/I Image channel		-32		dB
C/I2NDI	ACS C/I Image +1 MHz		-43		dB
Blocking	@ 30 MHz–2 GHz		5		dBm
Blocking	@ 2 GHz–2.399 GHz		-3		dBm
Blocking	@ 2.484 GHz–3 GHz		-2		dBm
Blocking	@ 3 GHz–12.75 GHz		5		dBm
Leakage	Leakage @ < 1 GHz		-71		dBm
Leakage	Leakage @ > 1 GHz		-56		dBm
RSSI	Dynamic range	-97		-62	dBm
RSSI	Resolution		1		dB

2.3 ADC Characteristics

Name	Condition	Min	Typical	Max	Unit
Conversion Clock (Fs)				16	MHz
Conversion Time			16		Cycle
VREF	Internal		0.5		V
Resolution			10		bits
No Missing Code			9		bits

Input Voltage Range		0		ADC_VREF* 2	V
Input Impedance			16/(Fs*Cs)		kOhm
Input Capacitance (Cs)			8		pF
Offset		-90		90	mV
DNL			1		bits
INL			2		bits
Offset Temperature Drift				0.2	LSB/°C
Gain Temperature Drift				0.01	%/°C
SNDR			60		dB
Dynamic Range			64		dB
Tstartup				1	µs
Current Consumption			750		µA

Pin Configuration

The pin configuration of the module are as below:

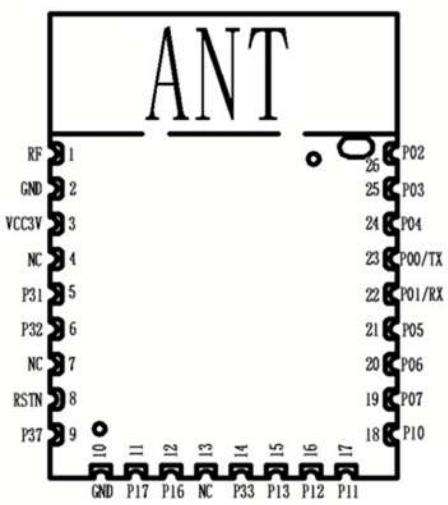


Figure 2 Pin Configuration

Foot position	The name of the symbol	I/O	Description of the function
1	RF	RF	RF signal port/NC
2	GND	GND	GND
3	VCC3V	Analog	Power, 3 V
4	NC	NC	NC
5	P31	Digital I/O	General purpose IO/ADC1
6	P32	Digital I/O	General purpose IO/ADC2
7	NC	NC	NC
8	RSTN	Analog	Active low pin reset
9	P37	Digital I/O	32 kHz Crystal input, and GPIO P37,and PWM
10	GND	GND	GND
11	P17	Digital I/O	General purpose IO//UART2_RXD
12	P16	Digital I/O	General purpose IO/UART2_TXD
13	NC	NC	NC
14	P33	Digital I/O	General purpose IO
15	P13	Digital I/O	General purpose IO/PWM3

16	P12	Digital I/O	General purpose IO/PWM2
17	P11	Digital I/O	General purpose IO/PWM1
18	P10	Digital I/O	General purpose IO/PWM0
19	P07	Digital I/O	General purpose IO/PWM4
20	P06	Digital I/O	General purpose IO/PMW5
21	P05	Digital I/O	General purpose IO
22	P01/RX	Digital I/O	GPIO1/UART1_RXD
23	P00/TX	Digital I/O	GPIO0/UART1_TXD
24	P04	Digital I/O	General purpose IO
25	P03	Digital I/O	General purpose IO/SDA
26	P02	Digital I/O	General purpose IO/SCL

Appearance size

The dimensions of the module are as below:

Module dimensions: 16.80mm ± 0.2mm(L) x 12.60 ± 0.2mm(W) x 2.4 ± 0.2mm (H)

PCB Thickness: 0.8mm (± 0.1mm)

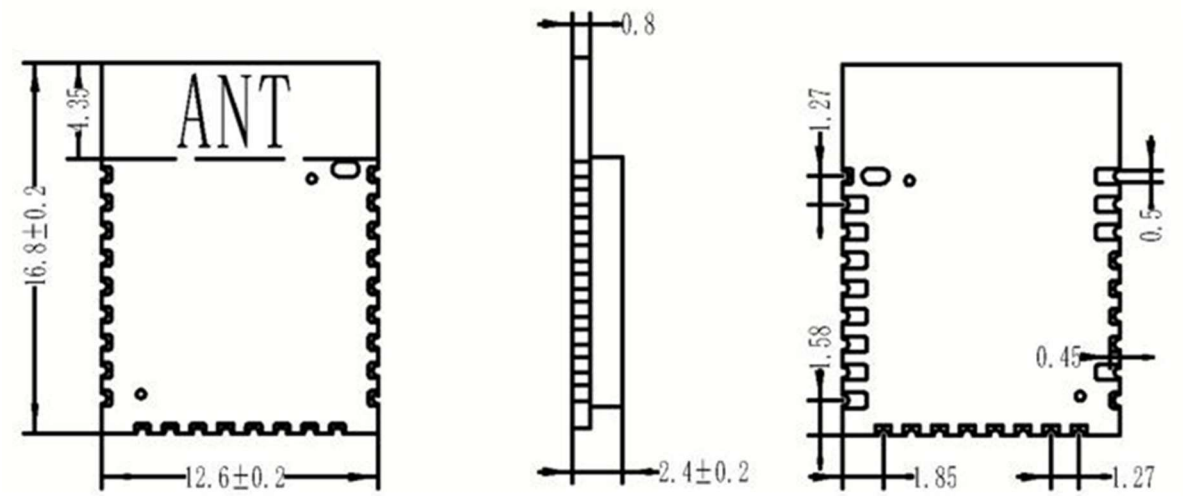
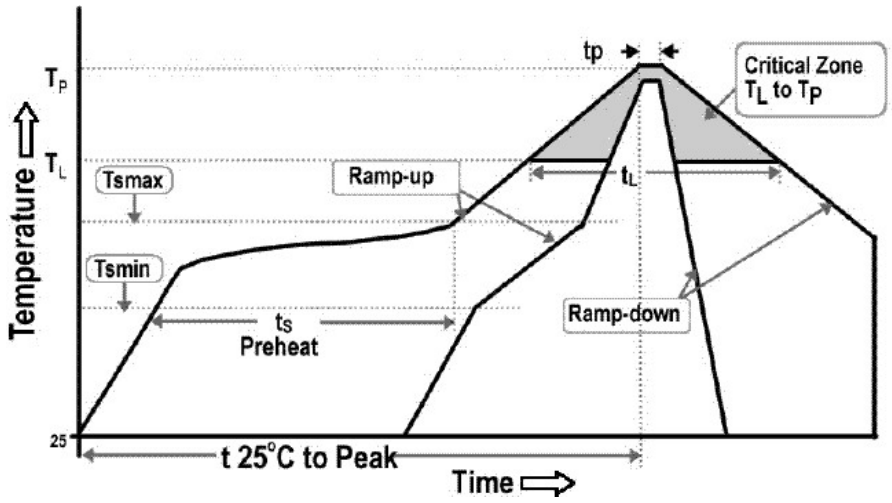


Figure 3 Module Dimensions

Solder Reflow Profile



Profile Feature		Specification
Average Ramp-Up Rate (tsmax to tp)		3 °C/second max.
Pre_heat	Temperature Min (Tsmin)	150 °C
	Temperature Max (Tsmax)	200 °C
	Time (ts)	60-180 seconds
Time Maintained above	Temperature (TL)	217 °C
	Time (tL)	60-150 seconds
Peak/Classification Temperature (Tp)		260 °C
Time within 5 °C of Actual Peak Temperature (tp)		20-40 seconds
Ramp-Down Rate		6 °C/second max.
Time 25 °C to Peak Temperature		8 minutes max.

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Cionlabs Private Limited
2nd Floor, Building 380,
9th Main, Sector 7, HSR Layout,
Bengaluru, Karnataka - 560102
http://www.cionlabs.com

Cionlabs Inc.
112 Capital Trail Suite A Newark DE 19711
United States