

HBU-001 Bluetooth USB Dongle

Purpose explanation & Working principle

A. *Purpose explanation:*

HBU-001 USB dongle design is compliant with Bluetooth specification V 1.1 and Compliant with USB General and Audio Class specifications Which works in ISM band 2.402GHZ to 2.480GHZ. This dongle is embedded with Audio Gateway profile. It supports pin-code input in order to pair with various Bluetooth headsets.

B. *Working principle:*

This dongle is consisting of Bluetooth module & codec IC, function & working principle are described as below:

a. CSR Bluetooth module

The module comprises radio, base band & PCM interface:

1. Radio:

- (1)TX: BC02 (U1of Module) pin TX_A & TX_B feed output power 0 dbm balance ISM band signal, Balun (T1 of Module) transfers it to unbalance signal (loss 1 db), and then it is connecting with power amplifier (U4) to radiate ISM band signal.
- (2)RX: Antenna decouples signal from Bluetooth headset or Bluetooth devices, then feeds this signal to the internal LNA of BC02.
- (3)VCO: VCO comprises 16MHZ crystal circuit & loop filter, Provides signal to TX & RX.

2. Base band:

- (1) External Memory port: They are also include address lines (A0~A18) and data bus (D0~D15). They are all connected to flash memory. Flash memory functions to provide residence to download Blue stack firmware, audio gateway profile & AP (MMI) via Serial peripheral interface.
- (2) Serial peripheral interface:
Serial peripheral interface comprises SPI_CLK, SPI_CSB, SPI_MOSI, and SPI_MISO. Audio gateway firmware or test

program can be downloaded into flash memory via Serial peripheral interface connecting to desktop (laptop) printer port.

(3) USB interface:

When the dongle would like to transfer data with other Bluetooth device.

(4) PIO port:

PIO port comprises PIO (0)-PIO (9).

PIO port output controls dongle status when key is pressed.

3. PCM interface:

PCM interface comprises PCM_CLK, PCM_SYNC, and PCM_IN & PCM_OUT. Audio signal can be processing PCM encoding & decoding via PCM interface connecting to codec IC.

b. Codec IC

1. Codec IC (U2) pin TI+, TI-, TIG amplifies the signal from AC97 audio codec IC (U9). The amplified signal will connect to U2 pin DT, encoding it to be PCM signal, and then send the PCM signal to BC02's PCM_IN.
2. Codec IC (U2) pin DR decodes PCM signal from BC02's PCM_OUT. The decoded audio signal connects to RO-, and then the audio will send to the AC97 audio codec IC (U9).

c. AC97 audio codec IC

1. The AC97 audio codec IC (U9) pin 21 amplifies the signal from codec IC (U2), encoding it to be PCM signal, and then send the PCM signal to USB controller IC (U6).
2. The AC97 audio codec IC (U9) pin 35, 36 decoded audio signals from USB controller IC (U6), then the audio signal send to the codec IC (U2).

d. USB controller IC

1. The USB controller IC (U6) is a universal serial bus (USB) peripheral interface device. Which require the streaming of digital audio data between the host PC and the speaker system via the USB connection.