

## **HBM-004 Bluetooth headset**

### **Purpose explanation & Working principle**

#### **A. Purpose explanation:**

HBM-004 headset design is compliant with Bluetooth specification V 1.1, which works in ISM band 2.402GHZ to 2.480GHZ. This headset can communicate with audio gateway device built in Bluetooth chip. At the moment it is more popular in mobile hand free application, such as connecting with Bluetooth mobile: Ericsson T39, T68, Nokia 6310, 8910 & Motorola R270.

#### **B. Working principle:**

This headset is consist of Bluetooth module, codec IC & charger IC, function & working principle are described as below:

##### **a. CSR Bluetooth module**

The module comprises radio, baseband & PCM interface:

###### **1. Radio:**

- (1) TX: BC02 (U1) pin TX\_A & TX\_B feed output power 3 dbm balance ISM band signal, Balun (T1) transfers it to unbalance signal (loss 1 db), and then it is connecting with antenna to radiate ISM band signal via band pass filter (F1).
- (2) RX: Antenna decouples signal from Bluetooth audio gateway device, then feeds this signal to filter (F1), We use the differential RF input, the input signal will from TX\_A & TX\_B pass to the internal LNA of BC02.
- (3) VCO: VCO comprises 16MHZ crystal circuit & loop filter, provides signal to TX & RX.

###### **2. Baseband:**

- (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 Bluestack firmware, headset profile & AP (MMI) via Serial peripheral interface.
- (2) Serial peripheral interface:  
Serial peripheral interface comprises U1 pin SPI\_CLK, SPI\_CS, SPI\_MOSI, SPI\_MISO.

SPI\_MOSI, SPI\_MISO. Headset firmware or test program can be downloaded into flash memory via Serial peripheral interface connecting to desktop (laptop) printer port.

(3) UART interface:

UART interface comprises U1 pin UART\_TX, UART\_RX, UART\_CTS & UART\_RTS. When headset would like to be entered test or debugging mode, headset must use UART interface to connect to desktop (laptop) COM port.

(4) PIO port:

PIO port comprises U1 pin PIO (0)-PIO (9) and AIO (0)-AIO (1).

PIO port output controls headset status when headset key is pressed.

AIO (0) is as battery voltage detection port.

3. PCM interface:

PCM interface comprises U1 pin PCM\_CLK, PCM\_SYNC, PCM\_IN & PCM\_OUT. Headset audio signal can be processing PCM encoding & decoding via PCM interface connecting to codec IC.

b. Codec IC

1. Codec IC (U3) pin TI+, TI-, TIG amplifies the signal from headset microphone. The amplified signal will connect to U3 pin DT, encoding it to be PCM signal, and then send the PCM signal to U1 pin PCM\_IN.
2. Codec IC (U3) pin DR decodes PCM signal from U1 pin PCM\_OUT. The decoded audio signal connects to U3 pin PO+, PO-, PI, & RO-. U3 pin PO+, PO-, PI, & RO amplify the audio signal. And then send the amplified signals to speaker.

c. Charge IC

1. The Charge IC (U7) is powered by DC power adapter via charge Jack (J1).
2. Charge IC (U7) pin 7 CC (charge-control output) is source-follower output that drives an external P-channel MOSFET (U8) for current and voltage regulation.