



Features:

Bluetooth 3.0+EDR Stereo Audio module



Version: 1.0

Jan 2013

- Bluetooth 3.0+EDR compliant
- Typical +2dBm Class 2 output power
- Receiver Sensitivity: GFSK typical -91dBm, $\pi/4$ PSK typical -92dBm, 8DPSK typical -84dBm
- Audio DAC: 94dB SNR
- Build in Max. 250mAH Li-ion battery charging circuit
- HSP, A2DP, AVRCP profile support
- SBC decode for Bluetooth audio streaming
- Voice prompt
- Build in Line in interface
- EQ control
- Size: 23mm x 14mm

Product Description:

The WLIS04-ST is a highly integrated Bluetooth 3.0+EDR stereo module, designed for high data rate, short-range wireless communication in the 2.4 GHz ISM band. With ISSC Bluetooth stack and profile, the WLIS04-ST provides a low power and ultra-low cost Bluetooth 3.0+EDR solution for wireless voice/audio applications.

Applications:

- High quality stereo speaker and HiFi
- High quality wireless stereo audio receiver

**Outline Dimension & Pin Definition:**

| Pin No. | I/O | Name | Description |
|---------|-----|---------|---|
| 1 | P | P30 | GPIO, default pull-high input Line-in detection, 1: no line-in detected; 0: line-in detected |
| 2 | I/O | P20 | GPIO, default pull-high input System Configuration, H: Application; L: Baseband(IBDK Mode) |
| 3 | I/O | P00 | GPIO, default , pull-low input. Slide Switch Detector |
| 4 | I/O | P04 | GPIO, default pull-high input Audio AMP Enable/NFC detect |
| 5 | AO | SPKR | R-channel analog headphone output, single-ended application only |
| 6 | AO | AOHPM | Headphone common mode output/sense input |
| 7 | AO | SPKL | L-channel analog headphone output, single-ended application only |
| 8 | P | VDDAO | Positive power supply dedicated to CODEC output amplifiers |
| 9 | P | GND | Ground |
| 10 | NC | | |
| 11 | NC | | |
| 12 | NC | | |
| 13 | AI | AIR | Stereo analog line in, R-channel |
| 14 | AI | AIL | Stereo analog line in, L-channel |
| 15 | I/O | RST_N | System Reset Pin |
| 16 | P | GND | Ground |
| 17 | P | ADAP_IN | Power adaptor input |
| 18 | P | BAT_IN | Battery input |
| 19 | P | SYS_PW | System Power Output |
| 20 | I/O | SK1/P35 | Default SAR input for battery detection This pin can be re-defined as GPIO3_5 |
| 21 | P | BK_OUT | Buck feedback sense pin |
| 22 | P | GND | Ground |
| 23 | P | MFB | Multi-Function Push Button key Combined Play/Panse key when A2DP enabled. |
| 24 | P | LED1 | LED Driver 1 |
| 25 | P | LED2 | LED Driver 2 |
| 26 | I/O | P02 | GPIO, default pull-high input PLAY/PAUSE button |
| 27 | I/O | P27 | GPIO, default pull-high input Foward button |



| | | | |
|----|-----|---------|---|
| 28 | I/O | P05 | GPIO, default pull-high input REW button |
| 29 | O | HCI_TXD | HCI TX data |
| 30 | I | HCI_RXD | HCI RX data |
| 31 | I/O | P16 | GPIO, default pull-high input Volume down button |
| 32 | I/O | P01 | GPIO, default pull-high input Volume up button |
| 33 | I/O | P03 | GPIO, default pull-high input, RX_IND |
| 34 | P | GND | Ground |

Electrical Characteristics:

Absolute Maximum Ratings

| Rating | | Min | Max | Max |
|-----------------------|--|-------|-------|-----|
| Operation Temperature | | -20°C | +70°C | °C |
| Core supply voltage | VDD_CORE, VCC_RF, AVDD_SAR, AVDD_PLL | 1.7V | 1.98V | V |
| Codec supply voltage | VDD_AUDIO | | 3.3 | V |
| I/O voltage | VDD_IO | | 3.3 | V |
| Supply voltage | BK_VDD | | 4.7 | V |
| | 3V1_VIN | | 5 | V |
| | BAT_IN | | 4.3 | V |
| | ADAP_IN | | 6 | V |
| | LED[1:0] | | 5 | V |
| | Power switch | | 6 | V |

Recommended Operate Condition:



| Symbol | Parameter | Min | Typical | Max | Unit |
|------------------------|-----------------------------|------|---------|------|------|
| V _{DD18} | Digital core supply voltage | | | | |
| | SAR ADC supply voltage | 1.62 | 1.8 | 1.92 | V |
| | CODEC supply voltage | | | | |
| V _{DDIO} | I/O supply voltage | 2.5 | 2.7 | 3.3 | V |
| | RF supply voltage | | | | |
| T _{OPERATION} | Operating temperature range | -20 | +25 | +70 | °C |
| T _{stg} | Storage temperature | -40 | | +125 | °C |
| V _{LDO} | LDO supply voltage | 1.8 | | 3.3 | V |
| V _{BAT_IN} | Input voltage for SAR ADC | 0.9 | | 3.3 | V |

Audio DAC:

| Test Condition: T= 25°C, V _{dd} =2.8V, 1KHz sine wave input, Bandwidth= 20~20KHz | | | | | | |
|---|--|---------|------|------|-----------------|----|
| Parameter | Condition | Min. | Typ. | Max. | Unit | |
| Output Level | Full scale | | 2.1 | | V _{pp} | |
| Resolution | | 16 | | | bits | |
| Output Sampling Rate | | 8 | | 48 | KHz | |
| SNR | f _{in} =1KHz B/W=20~20KHz A-weighted THD+N < 0.01% 0dBFS signal Load=100KΩ | 8KHz | | 94 | | dB |
| | | 16KHz | | 94 | | dB |
| | | 32KHz | | 94 | | dB |
| | | 44.1KHz | | 94 | | dB |
| | | 48KHz | | 94 | | dB |
| Max Output Power | R _L =16Ohm | | 35 | | mW | |
| | R _L =32Ohm | | 17 | | mW | |



| | | | | | |
|------------------------------|---|-----|-----|------|-----|
| THD+N | 16Ohm load | | | 0.05 | % |
| | 100K Ω load | | | 0.01 | % |
| Digital Gain | | -54 | | 4.85 | dB |
| Digital Gain Resolution | | | 6 | | dB |
| Analog Gain | | -28 | | 3 | dB |
| Analog Gain step | | | 1 | | dB |
| Output resistance | R_L | 8 | 16 | | Ohm |
| Output capacitance | C_p | | | 500 | pF |
| Crosstalk between channels | L vs. R, measured at -10dBFS@1KHz input | | -90 | -80 | dB |
| Analog supply voltage (AVDD) | | 1.8 | 2.8 | 3.0 | V |

Battery Charger:

| Charging Mode (BAT_IN rising to 4.2V) | | Min | Typ | Max | Unit |
|---|-----------------|-----|-------|-----|--------------------|
| Operation Temperature | | -20 | | 70 | $^{\circ}\text{C}$ |
| Input Voltage (V_{in}) Note: It needs more time to get battery fully charged when $V_{in}=4.5\text{V}$ | | 4.5 | | 6 | V |
| Battery trickle charge current (BAT_IN < trickle charge voltage threshold) | | | 0.1C | | mA |
| Trickle charge voltage threshold | | | 3 | | V |
| Maximum battery charge current | Headroom > 0.7V | | 350 | | mA |
| | Headroom = 0.3V | | 150 | | mA |
| Minimum battery charge current | Headroom > 0.7V | | 1 | | mA |
| | Headroom = 0.3V | | 1 | | mA |
| Battery charge termination current, % of fast charge current | | | 10 | | % |
| Battery recharge hysteresis (Note1) | | | 100 | | mV |
| Battery recharge current (Note2) Note: C \rightarrow Battery capacity | | | 0.25C | | mA |



Note1: When charging complete and the adapter is still in, the battery voltage will slowly drop down.

when the voltage drop is larger than 100mV from the full voltage, the re-charging cycle will start.

Note2: If the battery voltage during plug in is larger than 4V, the charging current will be limited to 0.25C to avoid the battery voltage overshoot.

FCC:

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device is intended only for OEM integrators under the following conditions:

According to FCC Part 15 Subpart C Section 15.212, the radio elements of the modular transmitter must have their own shielding. However, due to there is no shielding for this Bluetooth Module, this module is granted as a Limited Modular Approval.

As long as above conditions above are met, further transmitter test will not be required.

However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions cannot be met (for example: certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID:OZJWLIS-04ST " any similar wording that expresses the same meaning may be used.



BQB:

The Bluetooth SIG Hereby Recognizes

WLINK TECHNOLOGY (HK) CO., LIMITED

Member Company

Audio BT module

Qualified Design Name

Qualified Design ID(s): B020890

Specification Name: 3.0

Product Type: End Product

Model Number: WLIS04-ST

BQE Name: Totti Huang

Listing Date: 24 April 2013

Assessment Date: 24 April 2013

Hardware Version Number: V2

Software Version Number: V2

This certificate acknowledges the *Bluetooth*[®] Specifications declared by the member were achieved in accordance with the *Bluetooth* Qualification Process as specified within the *Bluetooth* Specifications and as required within the current PRD



Mechanical specification:

