

# 1 Description of Functional Blocks

## 1.1 Bluetooth chip

### 1.1.1 General

- Plug-and-play Bluetooth class 1 System-in-a-Package (SiP)
- Includes all baseband and radio functionality, from HCI up to antenna, needs only external antenna and reference clock.
- Fully compliant to Bluetooth Radio Specification version 1.2.
- Small dimensions (7 x 8 x 1.3 mm typical) in HVQFN like package with full BGB204 HVQFN compatible footprint

### 1.1.2 Description

The bluetooth chip combines the Bluetooth RF part, protocol stack, Link Controller (LC), Link Manager (LM), and Host Controller Interface (HCI) firmware of the Bluetooth system specification in one SiP with embedded software. Together with an antenna and a reference clock this device forms a complete Bluetooth solution. In most cases this SiP will be attached to a host, for example a GSM baseband controller or a PC processor.

The bluetooth chip is designed to be used for wireless links operating in the globally available ISM band, between 2402 and 2480 MHz. The radio part is composed of a fully integrated, state-of-the-art near-zero-IF transceiver chip, an antenna filter for out-of-band blocking, a TX/RX switch, TX and RX baluns, and a basic amount of supply decoupling.

The device is a “Plug-and-Play” package that needs only 3 additional decoupling components next to an antenna and reference clock for proper operation. Robust design allows for untrimmed components, giving a cost-optimized solution. Demodulation is done in open-loop mode to reduce the effects of reference frequency breakthrough on reception quality. An advanced offset compensation circuit compensates for VCO drift and RF frequency errors during open-loop demodulation, under control by the baseband processor. The circuit is integrated on a laminate substrate. It is connected to the main PCB through a HVQFN48 compatible footprint.

The RF port has a normalized 50  $\Omega$  impedance and can be connected directly to an external antenna with a 50  $\Omega$  transmission line. A high-dynamic range RSSI allows near-instantaneous assessment of radio link quality, and is used for output power-control purposes. Frequency selection is done internally by a conventional synthesizer.

The Baseband part and the RF interface of the SiP is designed to operate at 1.8V. The RF part of the SiP is designed to operate from 2.75 V nominal supplies. Separate ground connections are provided for reduced parasitic coupling between different stages of the circuit. There is a basic amount of RF supply decoupling incorporated into the circuit.

The industry standard ARM7TDMI microcontroller with low power consumption is integrated together with a flash memory and a SRAM. There are no provisions for external controllers to directly access on-chip data memory. Communication with an external host, for example a PC, GSM or PDA, is handled via the Host Controller Interface.

Industry standard interfaces such as PCM, UART, USB, and I2C are supported by on-chip hardware.

## 1.2 Antenna

### 1.2.1 Specifications

| Frequency Range (MHz) | Peak Gain (XZ-V) | Average Gain (XZ-V) | VSWR   | Impedance   |
|-----------------------|------------------|---------------------|--------|-------------|
| 2400~2500             | 3.0 dBi typ.     | 1.0 dBi typ.        | 2 max. | 50 $\Omega$ |

## 1.3 Voice band codec

### 1.3.1 Description

The IC is the 1.8V single power supply VOICE codec for Bluetooth Applications. The codec digital transmit and receive filter characteristics meet G.712 standards. Next to the voice codec features it provides a general purpose ADC and a Temperature sensor.

### 1.3.2 Hardware features

- +1.8V single power supply
- Low power consumption
- On-chip DRT filter meets G.712 standards
- 13-bit precision linear coding
- On-chip low noise microphone supply
- On chip head phone driver (16 $\Omega$  BTL: 16mW)
- Very wide range volume control
- PCM/IOM interface
- Slave mode operation only
- Uses PCM channel 0 and 1
- I<sup>2</sup>C interface
- Device address 1110001
- Slave mode operation only
- Data rate up to 400kbit/s
- 7-bit addressing
- General purpose ADC
- 1.4V internal tunable reference
- 8-bit resolution
- Fully integrated temperature sensor
- 5 steps, 30°C per step.
- Power on reset
- Operating temperature range: -40° C to 85° C

## 1.4 Charger And Dc-Dc Converter

The IC series are highly integrated charge and power management devices targeted at space-limited bluetooth applications. The IC offer integrated power FET and current sensor for

charge control, reverse blocking protection, high accuracy current and voltage regulation, charge status, charge termination, and a highly efficient and low-power dc-dc converter in a small package.

### 1.5 Low-Dropout Regulator (LDO)

The LP2985 is a 150 mA, fixed-output voltage regulator designed to provide ultra low-dropout and low noise in battery powered applications.

### 1.6 Reference Clock

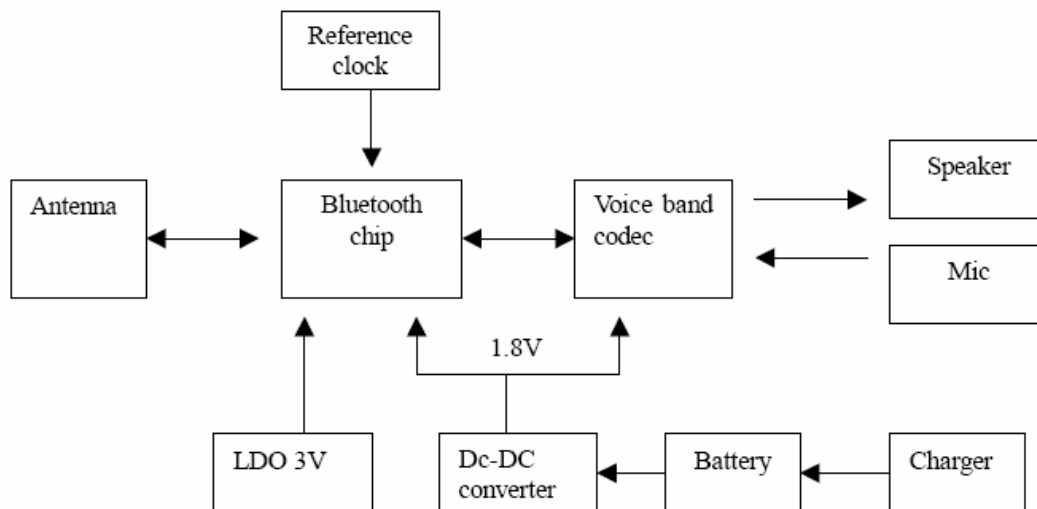
- ◆ Low-power low power clock crystal oscillator for low power mode, accepting 3.2, 32, and 32.768kHz.
- ◆ Low-power system clock crystal oscillator with programmable on-chip capacitors for frequency adjustment with large pulling range accepting the frequency 12, 13, 24 and 26 MHz.

### 1.7 Speaker\Mic\ Battery

**Speaker:** 71db

**Mic:**  $-42 \pm 2$ db

**Battery:** 140mAH



Device Block diagram