



**LG Innotek**

# **Description of Functional Blocks**

## **RBFS-B921A BT Ass'y Module**

**Rev A, Nov 2009**



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## 1. RF Receiver Block

### 1.1 Receiver Path

The receiver path uses a low IF scheme to down-convert the received bit signal for demodulation in the digital demodulator and bit synchronizer. The receiver path provides a high degree of linearity, an extended dynamic range, and high order on-chip channel filtering to ensure reliable operation in the noisy 2.4 GHz ISM band. The front-end topology, with built-in out-of-band attenuation, enables the device to be used in most applications with no off-chip filtering. For integrated handset operation where the Bluetooth function is integrated close to the cellular transmitter, minimal external filtering is required to eliminate the desensitization of the receiver by the cellular transmit signal.

#### 1.1.1 Digital Demodulator and Bit synchronizer

The digital demodulator and bit synchronizer takes the low IF received signal and performs an optimal frequency tracking and bit synchronization algorithm.

#### 1.1.2 Receiver Signal Strength Indicator

The BCM2046 radio provides an Receiver Signal Strength (RSSI) signal to the baseband so that the controller can take part in a Bluetooth power-controlled link by providing a metric of its own receiver signal strength to determine whether the transmitter should increase or decrease its output power.

## **2. RF Transmitter Block**

### **2.1 Transmitter Path**

The BCM2046 features a fully integrated zero IF transmitter. The baseband transmit data is digitally GFSK modulated in the modem block and up-converted to the 2.4 GHz ISM band in the transmitter path. The transmitter path consists of signal filtering, I/Q up-conversion, high-output power amplifier (PA), and RF filtering. It also incorporates new modulation schemes P/4-DQPSK for 2 Mbps and 8-DPSK for 3 Mbps to support enhanced data rate.

#### **2.1.1 Digital Modulator**

The digital modulator performs the data modulation and filtering required for the GFSK,  $\pi/4$ DQPSK, and 8-DPSK signal. The fully digital modulator minimizes any frequency drift or anomalies in the modulation characteristics of the transmitted signal and is much more stable than direct VCO modulation schemes.

#### **2.1.2 Digital Demodulator and Bit Synchronizer**

The digital demodulator and bit synchronizer takes the low IF received signal and performs an optimal frequency tracking and bit synchronization algorithm.

#### **2.1.3 Power Amplifier**

The integrated PA for the BCM2046 can transmit at a maximum power of +4dBm for class2 operation. The transmit power levels are for basic rate and EDR. Due to the linear nature of the PA, combined with some integrated filtering, no external filters are required for meeting Bluetooth and regulatory harmonic and spurious requirements. For integrated mobile handset applications, where Bluetooth is integrated next to the cellular radio, minimal external filtering can be applied to achieve near thermal noise levels for spurious and radiated noise emissions.

### 3. Bluetooth Baseband Core

The Bluetooth Baseband Core (BBC) implements all of the time critical functions required for high performance Bluetooth operation. The BBC manages the buffering, segmentation, and routing of data for all connections. It also buffers data that passes through it, handles data flow control, schedules SCO/ACL TX/RX transactions, monitors Bluetooth slot usage, optimally segments and packages data into baseband packets, manages connection status indicators, and composes and decodes HCI packets. In addition to these functions, it independently handles HCI event types, and HCI command types.

### 4. Microprocessor Unit

The BCM2046 microprocessor unit( $\mu$ PU) runs software from link control(LC) layer, up to the host controller interface(HCI). The microprocessor is based on ARM7TDMIS 32-bit RISC processor with embedded ICE-RT debug and JTAG interface units. The  $\mu$ PU also consists of 256KB of ROM memory for program storage and boot ROM, 48KB of RAM for data scratchpad and patch RAM code.

### 5. EEPROM Interface

The BCM2046 provides the Broadcom Serial Control(BSC) master interface; the BSC is programmed by the CPU to generate four different types of BSC transfers on the bus: read-only, write-only, combined read/write, and combined write-read. BSC supports both low-speed and fast mode devices. The BSC is compatible with I2C slave devices, except that multiple I2C masters are not supported, and flexible wait state insertion by either the master interface or slave devices are not supported. The EEPROM may contain configuration information concerning the customer application, including the following: Fractional-N information, BD\_ADDR, baud rate, USB enumeration information, SDP service record, and file system information used for code, code patches, or data. Bluetooth Module(RBFS-B921A) included 128Kbit EEPROM unit.

## 6. USB Interface


The USB device descriptor, configuration descriptor, and string descriptor are fully programmable if the default settings are not desired. This allows the end manufacturer to customize the descriptors that the BCM2046 uses to identify itself on the USB port, including the Vendor ID and Product ID. The custom USB descriptor information may be stored in external EEPROM so that it is available at boot time.

## 7. Crystal Interface and Clock Generation

The BCM2046 uses a fractional-N synthesizer to generate the radio frequencies, clock, and data packet timing. This enables it to operate from any of a multitude of frequency sources. This may either be an external source such as a TCXO or crystal interfaced directly to the device. The default frequency reference setting is a 26-MHz crystal or TCXO. Bluetooth Module(RBFS-B921A) included crystal unit.

**RECORD OF CHANGES**

<b>Revision No.</b>	<b>Date</b>	<b>Description</b>
A	Nov. 2009	Initial Release

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### **FCC compliance Information**

This device complies with part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference received.
2. This device must accept any interference received. Including interference that may cause undesired operation.

### **FCC WARNING**

This equipment may generate or use radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior Of the end product.

### **Contains Transmitter Module FCC ID: BEJRBFS-B921A**

**CAUTION:** This device and it's antenna(s) must not be co-located or operated in conjunction with any other antenna or transmitter. End users cannot modify this transmitter device. Any Unauthorized modification could void the user's authority to operate this device.