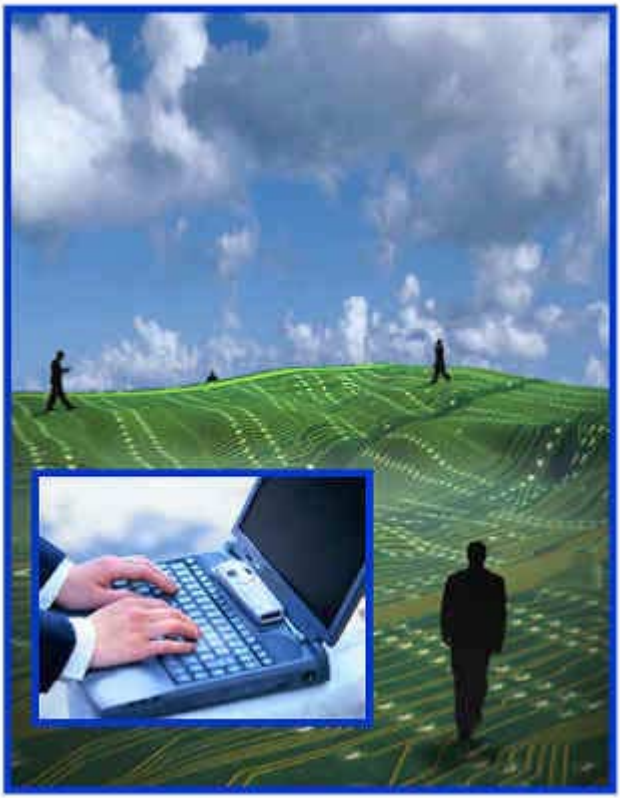
stonestreet one



Bluetooth™ Developer's Kit

Version 2.0

Stonestreet One, Inc.
7980 New LaGrange Rd
Louisville, KY 40222-4767
Phone: (502) 339-2999
Fax: (502) 326-0484
http://www.stonestreetone.com

Table of Contents

1. Introduction

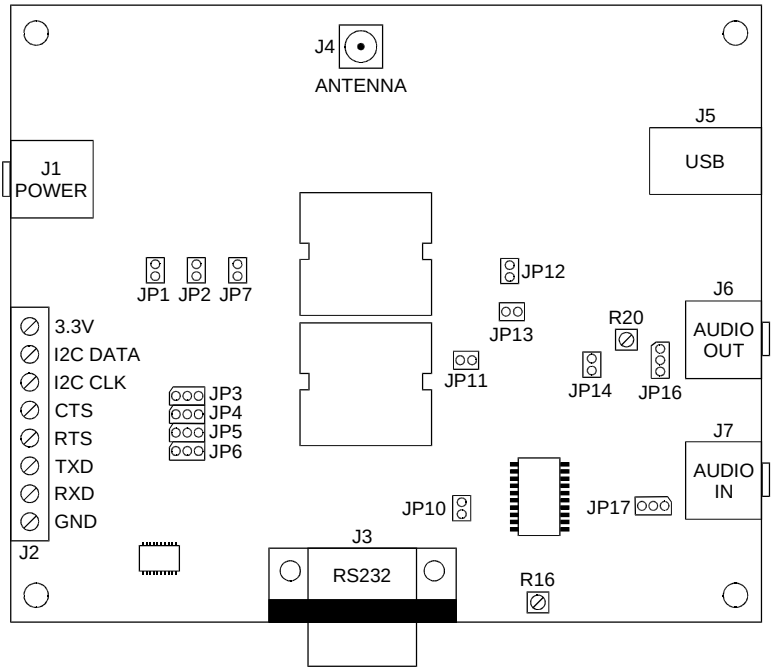
The Bluetooth Developer's Kit by Stonestreet One is a hardware platform that was designed to be a cost effective means to assist in the development of products and software based on the Bluetooth technology. The kit is designed around an integrated Bluetooth Module developed by Ericsson Components, and provides all of the necessary hardware to quickly develop Proof-Of-Concept solutions. The Ericsson module incorporated on the board was developed to comply with the Bluetooth Specification version 1.0b. Supplying 0dBm output power, this module was designed to provide a reliable communication link with up to a 10-meter separation between Master and Slave.

The kit provides hardware to support connections that can be used to exchange both digital data and voice audio information. Multiple communication interfaces are provided to access the Bluetooth module. A UART, RS-232 and USB interface provide access to the Ericsson Host Controller Interface (HCI). The USB or PCM interface is used to provide digitized analog information to and from the Bluetooth module when used in voice audio applications. When PCM data is required, the kit provides all of the hardware to interface common analog devices, such as microphones and speakers.

2. Description of Bluetooth Developer's Kit

The Bluetooth Developer's Kit by Stonestreet One is designed to allow connectivity of electronic devices through Ericsson's ROK 101 007/2 Bluetooth Module. The kit contains a regulated power supply, radio module, USB, UART, RS-232, I2C, and PCM Audio connections. Refer to Figure 1 for jumper and connection placement.

Figure 1 – *Developer's Kit Layout and Device Location*



3. Power Supply

Power is applied to this board through the 2 mm power jack labeled J1. A 12VDC, 1.5A wall mounted supply is provided with the kit. This supply will accept an input range from 100-240 VAC at either 50Hz or 60Hz. The supply voltage is regulated on-board to 3.3VDC and is used to supply power to the components on the board. The regulator circuit accepts an input voltage range from 4.75VDC to 12VDC and provides up to 800mA of current.

Access to the regulated 3.3VDC supply is provided via J2 and can be used to supply power for additional circuitry required by the customer's implementation. J2-1 is directly connected to +3.3VDC output of the regulator and J2-8 provides a connection to ground. Care must be taken not to exceed the 100mA rating of F1, which limits the amount of power available for user-supplied circuitry.

4. HCI Command Interface

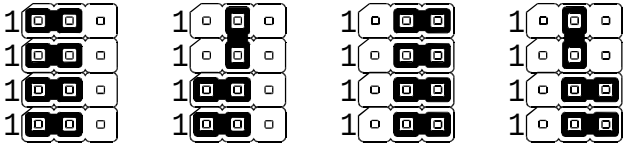
Communication with the Bluetooth HCI controller can be performed via the RS232/UART interface or the USB interface. After a reset of the Bluetooth module, communication with the HCI controller can be performed over either interface. However, the Bluetooth module will only support the interface on which the first HCI command is received. To switch interfaces, the Bluetooth module must be reset.

5. UART/RS-232 Interface

A UART and RS232 interface is provided for communication with the HCI controller of the Bluetooth module. The RS232 interface is accessed via a standard DB9 female connector (J3) and can be directly connected to a PC using a standard serial cable. The UART interface is accessed via a terminal block (J2) and accepts 3.3VDC TTL levels only. Series resisters of 10Ω provide some protection against over-voltage at this port, but the use of 5VDC levels will damage the unit. This interface is convenient for direct connections to a microcontroller or other TTL level serial devices. Both UART and RS232 are comprised of a 5-wire interface (RxD, TxD, CTS, RTS and GND). The CTS/RTS signals are used for flow control and must be properly set to communicate with the Bluetooth device. **Note**: A 3-wire serial interface (RxD, TxD and

GND) can be implemented by shorting JP3-2 to JP4-2. Refer to Figure 2 for various jumper settings.

-Figure 2 – *JP3-JP6 Jumper Settings*



UART 5-Wire | UART 3-Wire | RS232 5-Wire | RS232 3-Wire

6. USB Interface

The kit provides a high-speed (12Mbs) USB interface for communicating with the HCI controller of the Bluetooth Module. It has the full functionality of a USB slave and is compliant to the USB 1.1 specification. The USB connection is made via J5 and must be attached using a USB cable certified for high speed. The developer's kit provides jumpers JP11 and JP13 to control the operation of the USB port. Jumper JP13 is used to enable/disable the operation of the USB interface. When JP13 is installed, the USB interface is enabled for high-speed operation and can be detected by a USB master. When disabled, the USB port will appear removed from the bus and will not be detected by a USB master.

Figure 3 – ***JP13 Jumper Setting***

USB Enabled | USB Disabled

Two additional USB control lines are provided to aid in the development of PC notebook devices. Jumper JP11 provides access to the Detach and Wakeup signals used to signal the power management systems of a notebook computer. When the notebook enters sleep mode to conserve power, the Detach signal is used to notify the Bluetooth device of its current state. When the Bluetooth device receives an incoming connection, the Wakeup signal is asserted to bring the notebook out of suspend mode in order to handle the new connection.

7. PCM/Audio Interface

The Bluetooth device is capable of transmitting voice audio between devices. The developer's kit provides a codec that converts analog audio into a digital format and delivers the data to the Bluetooth device for transport. The digital data consists of 13-bits of linear information in 2's compliment format. The codec also receives digital audio information from the Bluetooth device and converts the data to an analog signal. A 1.544MHz clock is provided to the codec via an onboard oscillator. This clock is required by the codec to support internal functions. The Bluetooth device is configured as the PCM master and provides both clock and sync signals to the codec. Jumper JP14 can be installed to place the codec in power-down mode and JP10 is used to enable/disable an internal 3rd Order High-Pass Filter.

Figure 4 – *JP10and JP14 Jumper Setting*

JP10-Filter Enabled

JP10-Bypass Filter

JP14-Codec ON

JP14-Codec OFF

A. Audio Input

The audio input circuit provides for either line level input or will support a ceramic microphone. When a ceramic microphone is used, JP17 is used to supply power to the microphone condenser. Connect positions 1 and 2 of JP17 to power a microphone and connect positions 2 and 3 of JP17 when line levels are used. When a microphone is used, a preamp is provided to generate enough signal gain to get a sufficient audio signal to the codec. The preamp gain is controlled via R16, and can be adjusted to provide from unity to 23dB of signal gain. When line levels are used, there should be sufficient gain at the codec when unity gain is set. Added gain from the preamp may produce some clipping of the signal.

Figure 5 – *JP17 Jumper Setting*

Line Level Microphone

B. Audio Output

The audio output circuit provides for a slight adjustment of the output gain and is designed to drive a 300Ω load. The output gain is adjusted via R20 and can provide up to 6dB of gain. The output can produce either a single ended signal, referenced to ground, or a differential signal.

Jumper JP16 is used to select the output format.

Figure 6 – *JP16 Jumper Setting*

Differential Single Ended

8. Miscellaneous Connections

An I^2C interface is provided for access with compatible devices and is accessed via the terminal block J2. Ericsson specific HCI commands are provided to access devices attached to this bus. The implementation of this bus is user definable.

Jumper JP12 provides access to the Reset pin of the Bluetooth device. While JP12 is installed, the Bluetooth device is held in reset.

Figure 7 – *JP12 Jumper Setting*

Normal Bluetooth Operation

Bluetooth Device in Reset

9. Specifications

Radio

Ericsson Module ROK 101 007, 0dBm with included antenna.

Antenna & Connector

Upright SMA female. 2.4 GHz ¼ wave antenna with SMA male connector provided.

Serial Ports

RS-232 serial port with 9-pin right angle D-type female connector.

UART connection via a terminal block.

Note:

Only one of the serial ports can be active at a time.

USB

B-type USB connector.

I^2C

I^2C Clock and Data via a terminal block.

Audio

3.5 mm jack for microphone/line-in.
3.5 mm jack for speaker/line-out.

Note:

The speaker output is designed to drive a 600 Ohm load.

Audio CODEC

MC145483,13-bit linear PCM Codec-Filter with two's complement data format.

Power

Power supply provided has AC input voltage range of 100VAC to 240VAC Universal, AC input frequency of 50 Hz to 60 Hz, and is a switching desk-top power supply.

Mechanical Dimensions

4.0625 inches x 3.3125 inches

Weight

Approximately 4 ounces.