

EZURiO

Bluetooth™ PC Card with embedded stack

Part Number: BISPC01BI

1. General Description

Ezurio's blu²ⁱ Bluetooth PC Card is designed for users who want the functionality of a Bluetooth PC Card, but without the need or ability to run a host Windows Bluetooth stack on their system. The blu²ⁱ Bluetooth PC Card is unique in providing a complete Bluetooth stack embedded within the card, appearing as a Serial Port to the host system.

The blu²ⁱ Bluetooth PC Card provides a fully integrated Class 1 Bluetooth solution that is qualified to Bluetooth Version 1.1. The Bluetooth functionality is accessed using a highly developed and extensive set of AT commands, which result in very fast design and integration cycles. The integrated stack also provides a significantly more robust solution than conventional cards that use a Windows host processor stack, providing options for both hard and soft reset. Auto-connect functionality built into the card can be used to ensure reconnection to other serial based devices. This makes the blu²ⁱ Bluetooth PC Card particularly suitable for streaming applications, such as connection to Bluetooth GPS receivers.

The blu²ⁱ Bluetooth PC Card is based on Cambridge Silicon Radio's BlueCore 02 chipset. The firmware integrated into the BC02 chipset implement the higher layer Bluetooth protocol stack, up to and including the Generic Access Profile (GAP), Service Discovery Profile (SDAP), Serial Port Profile (SPP), and Dial Up Networking Profile (DUN). Firmware upgrades are available to add Headset Profile (HSP), Hands Free Profile (HFP), File Transfer Profile (FTP) and Audio Gateway. A virtual processor is used within the BC02 to implement an AT command processor. The AT command set abstracts the Bluetooth protocol from the host application, saving many months of programming and integration time. It provides extremely short integration times for data oriented cable replacement and voice applications.

Support is provided for low power modes that make the blu²ⁱ Bluetooth PC Card particularly applicable to battery powered installations.

1.1 Applications

Bluetooth applications where no host Bluetooth stack is needed.

Applications requiring Auto-connect or Auto-reconnect.

- POS Equipment
- Medical Equipment
- Telematics
- Telemetry and GPS
- Industrial Automation
- Automotive
- Marine
- Ruggedised and handheld PC Applications



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2. Features

Feature	Implementation
Bluetooth Stack	Fully integrated – no need for a host Bluetooth stack
Bluetooth Transmission	Class 1
Bluetooth pre-qualified	Bluetooth 1.1 End Product
Range	100 metres typical (free space)
Frequency	2.400 – 2.485 GHz
Max Transmit Power	+6dBm
Min Transmit Power	+0dBm
Receive Sensitivity	Better than -90dB
Data Transfer rate	Up to 250Kbps
PC Card Interface	16 bit PCMCIA Version 7.1 compliant Type II
Serial parameters	Default 9600,n,8,1 - Configurable from 1,200bps to 961,200 bps. Support for DTR, DSR, DCD, RI, RTS, CTS
Size	103mm x 54.2mm x 5.0mm
Antenna extension	17mm
Weight	30g
Current consumption	Less than 40mA during data transfer in standard power mode. Lower powers are attainable with a configurable low power mode.
Low power sniff mode	2.5mA typ
Temperature Range	Normal operation: -40°C to +85°C
I/O Pins	3.3V, 5V tolerant
Supply Voltage	5.0V
Profiles	Server - SPP (Full), DUN, Audio Gateway, Headset, Handsfree Client - All RFCOMM based profiles
Field upgradeable	Over PCMCIA Interface
Protocols	Single point firmware is controlled and configured using AT Commands, multipoint firmware uses a simple packet based protocol and requires a host to enable the blu ²ⁱ Bluetooth PC Card to function effectively. Single point only allows a point to point connection whereas multipoint allows more than one simultaneous connection.
Reset	Software and Hardware PCMCIA Reset Reset via BREAK signal
Auto-connect	Automatic Bluetooth connection can be implemented with any other Bluetooth device using the Serial Port Profile (or a profile based on SPP, e.g. Dial Up Networking) Automatic on Power up Automatic after Link Loss

2.1 Electrical Specifications

2.1.1 Absolute Maximum ratings

Absolute maximum ratings for supply voltage and voltages on PCMCIA digital interface pins of the blu²ⁱ Bluetooth PC Card are listed below; exceeding these values will cause permanent damage.

Parameter	Min	Max	Unit
Peak current of power supply	0	150	mA
Voltage at digital pins	-0.3	5.5	V
Voltage at POWER pin	4.5	5.5	V

3. Electrical Characteristics

3.1 Power Consumption

The current drain from the PCMCIA host controller is dependent on various factors. The most significant factors are the UART Baudrate and the operating mode.

The UART baudrate has a bearing on power drain because as is normal for digital electronics, the power requirements increase linearly with increasing clocking frequencies. Hence higher baudrates result in a higher current drain.

Finally with regards to operating mode the significant modes are; idle, waiting for a connection, inquiring, initiating a connection, sniff and connected. With connected mode, it is also relevant to differentiate between no data being transferred and when data is being transferred at the maximum rate possible. The AT command Set document describes how to configure the blu²ⁱ Bluetooth PC Card for optimal power performance.

3.2 RF Performance

3.2.1 Transmit Power

Effective Transmit Power	min: 0dBm max	Max: +6dBm
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3.2.2 Receive Sensitivity

Receive Sensitivity	-86dBm (at 25°C)
Antenna Gain	+2dBi typ
Effective Receive Sensitivity	-88dBm (at 25°C)

4. PCMCIA Interface

4.1 CIS

All PCMCIA cards provide plug and play capability and that is achieved via the use of a Card Information Structure (CIS) which is a block of data describing the features of the card. The data is a series of tuples, each describing a feature.

The blu²ⁱ PCMCIA Adaptor contains the following CIS. It is reproduced here for designers who wish to validate or develop drivers for embedded systems. It specifies a PC Card which provides a standard 16550 UART requiring an interrupt line and 8 port addresses.

```
01 03 00 00 FF
20 04 79 02 00 95
21 02 02 01
22 04 00 02 0F 7F
15 21 07 01 54 44 4B 00 42 6C 75 65 74 6F 6F 74 68 20 62 6C 75 32 69 20 50 43 20 43 61
72 64 00 00 00 FF
1A 05 01 04 F8 00 0F
1B 0E C1 41 99 01 55 A3 60 F8 03 07 B0 FF FF 07
1B 05 02 08 A0 40 07
1B 0E C3 41 99 01 55 A3 60 F8 03 07 B0 FF FF 07
1B 05 04 08 A0 40 07
FF
```

The fifth tuple starting with 15 21 describes a text ID where you will see the embedded text "TDK" or which is the manufacturer ID and "Bluetooth blu²ⁱ PC Card" which is the product ID. In future version of the firmware, this will be replaced with "EZURIO". New designs of software should take into account this variation.

The standard Microsoft serial drivers work with this CIS. The checksum generated by the Microsoft Windows PnP subsystem is **5E1F**.

4.2 Interface Controller

The PCMCIA interface is implemented using an Oxford Semiconductor OX950B interface chip. Designers wishing to understand the range of PCMCIA registers accessible should consult the datasheet for this product, which is available at www.oxsemi.com.

5. Functional Description

The blu²ⁱ Bluetooth PC Card is a self-contained Bluetooth product and requires only power to implement full Bluetooth communication. The AT command set allows the blu²ⁱ Bluetooth PC Card to be used for a wide number of short range wireless applications, from simple cable replacement to complex multipoint applications, where multiple radio links are active at the same time.

The complexity and flexibility of configuration are made simple for the design engineer by the integration of a comprehensive set of AT commands, supplemented with a range of "S" registers which are used for non-volatile storage of system parameters. These are fully documented in the "blu²ⁱ AT Command Reference Manual – Version 1.5.0".

6. Integrated Firmware

6.1 General

The blu²ⁱ Bluetooth PC Card has been designed to provide the fastest route to market for designers who wish to use Bluetooth to wirelessly enable their products. To achieve this Ezurio has implemented a wide ranging set of AT commands that control all of the standard Bluetooth tasks. These remove the complexity of Bluetooth from the design engineer and allow the wireless link to be controlled by means of a simple set of commands.

For applications where multiple concurrent live connections need to be maintained a variant of firmware is available which is specifically targeted at multipoint operation.

For both applications a comprehensive range of windows based software and is available to speed up the design process. A low cost development kit is also available that can be used for prototyping both cable replacement and multipoint applications.

6.2 Profiles

Bluetooth has been designed to accommodate a very wide range of wireless applications. To enable these different applications the Bluetooth SIG (Special Interest Group) has defined a series of different profiles that define the way in which Bluetooth devices communicate with each other and perform basic functions. These provide a base line of interoperability for specific application scenarios, upon which more complex user applications can be developed.

The Bluetooth specification contains over 20 different profiles, many of which have been developed for specific applications. The blu²ⁱ Bluetooth PC Card firmware is provided with support for the profiles that are most commonly required for cable replacement applications.

The current profiles support includes:

- GAP Generic Access Profile. The base connection profile upon which others are based.
- SDP Service Discovery Profile. The profile to find other Bluetooth devices and the services they support.
- SPP Serial Port Profile. Emulation of a serial cable for cable replacement applications.
- DUN Dial Up Networking. Profile support for connection to an external PSTN, GSM, GPRS or VPN connection.
- Audio Gateway. The base element for Headset and Handsfree profile. A portion of these profiles must be implemented within the host system.
- HSP Headset Profile. Supports early implementations of headsets. Now largely replaced by the
- HFP Hands-free profile, which provide more control over the headset operation.
- FTP File Transfer Profile.

For other profile support, please contact Ezurio Ltd at blu2i@ezurio.com

6.3 AT Overview

The AT command set is well known by engineers and was developed to aid the integration of PSTN modems. It provides simple high level commands for complex functions that can easily be incorporated into programs or used within programming scripts.

Ezurio has used this familiar concept and extended it to Bluetooth to simplify the integration of Bluetooth for product designers. Rather than having to understand the many stages of setting up a Bluetooth connection or function, a single AT command is all that is required.

For example to connect to a Bluetooth device with an address 00809844EA13, all that is needed is to send the string

```
ATD00809844EA13
```

to the virtual UART of the blu²ⁱ Bluetooth PC Card. The blu²ⁱ Bluetooth PC Card will attempt to make a connection and return connect 00809844ea13,1101) or (NO CARRIER), depending on whether the connection was successful.

The scope of the AT command set developed by Ezurio is such that most Bluetooth functionality can be covered, greatly reducing development time.

To provide additional functionality a range of "S" registers has been implemented. These allow program settings to be stored to control the blu²ⁱ Bluetooth PC Card function and also give access to configuring and reading ports and status registers within the blu²ⁱ Bluetooth PC Card.

Full details of the AT command set are provided in the Blu2i AT Command Reference Manual.

6.3.1 AT features at a glance

6.3.1.1 General

- Configure the blu²ⁱ Bluetooth PC Card to automatically connect and transfer data, audio or a combination of data and audio to another serial device when both devices are powered.
- Automatically re-connect devices when a connection is dropped.
- Remotely access the AT parser of a remote blu²ⁱ unit from a master device to perform Over The Air (OTA) configuration.

6.3.1.2 UART

- Change the baud rate from 1200 to 961,200 baud.
- Use the DSR line to drop connections
- Configure as DTE or DCE
- Change escape sequence character
- Change the number of Stop bits and Parity
- Enable or disable echoes

6.3.1.3 Security

- Enable Authentication by requiring a PIN code for incoming AND / OR outgoing connections
- Enable data to be encrypted over the air for incoming AND / OR outgoing connections. The blu²ⁱ Bluetooth PC Card can be configured to be:
 - non-connectable and non-discoverable,
 - non-connectable but discoverable,
 - connectable but non-discoverable,
 - connectable and discoverable.
- Automatically store Paired devices in a trusted device database in the flash memory

6.3.1.4 Bluetooth

- Set the blu²ⁱ Bluetooth PC Card to be a master or slave
- Make a Bluetooth connection to a specified device
- Perform a full inquiry for other Bluetooth devices
- Query a remote device to check if a service is offered
- Fetch the friendly name of a remote device
- Increase or decrease the delay before the master abandons a connection attempt
- Change the device class code
- Set the device's friendly name
- Change the Inquiry scan time
- Change number of returned devices from an inquiry scan
- Obtain the RSSI value for a connection

6.3.1.5 Power Management

- Decrease or increase the output power to suit your connection range
- Configure the blu²ⁱ Bluetooth PC Card to work in Sniff and other low power modes.

6.4 Multipoint Firmware

The blu²ⁱ Bluetooth PC Card is shipped with firmware to support point to point connections using an AT interface. Alternative firmware can be loaded onto the blu²ⁱ Bluetooth PC Card to allow simultaneous connections to 3 slaves. It also allows connections to multiple profiles to one or more slaves. The interface to control this adopts a concept of channels instead of slave connections.

A blu²ⁱ Bluetooth PC Card with multipoint firmware can connect or accept connections to / from a number of blu²ⁱ Bluetooth PC Card or blu²ⁱ modules with AT firmware simultaneously

Further details are provided in the blu²ⁱ Multipoint Firmware Reference Manual.

6.5 OTA (Over the Air) Configuration

When the blu²ⁱ Bluetooth PC Card has its remote AT parser enabled, its settings can be remotely controlled by a master unit. This places the slave unit's AT parser in remote mode providing over the air configuration. This mode is of use for remote sensor applications, where no host processor is required to control the slave Bluetooth unit.

7. Low Power Modes

The current drain from the Vcc power input line is dependent on various factors. The most significant factors are the UART baud rate and the operating mode.

The UART baud rate has a bearing on power drain because as is normal for digital electronics, the power requirements increase linearly with increasing clocking frequencies. Hence higher baud rates result in a higher current drain.

Users should be aware that there is a constant component to the power consumption from the PCMCIA interface circuitry within the card. For details of the low power modes of the interface chip, refer to the PCMCIA specification and Oxford Semiconductors OX950B data sheet.

The significant operating modes of the Bluetooth portion of the card are; idle, waiting for a connection, inquiring, initiating a connection and connected. With connected mode, it is also relevant to differentiate between no data being transferred and when data is being transferred at the maximum rate possible.

The operating mode can best be described by stating the AT commands required to enter that mode. In addition, there are certain S Registers which have a direct impact on power consumption, which are described next.

The blu²ⁱ Bluetooth PC Card contains two LEDs which are configured to display connection status. Tests have shown that this LED can consume up to 5.3mA which is more than double the current draw when in Idle mode. Therefore S Registers 533 can be used to completely disable this indicator.

S Registers 508 to 511, which specify the page and inquiry scan intervals and windows, can be used to adjust the average current drain when in discoverable and or connectable modes. Registers 508 and 509 specify the interval and window for page scans and registers 510 and 511 specify the interval and window for inquiry scans. Register pairs 508/509 and 510/511 describe duty cycles when the blu²ⁱ Bluetooth PC Card goes into scan modes. It is while scanning that the highest current draw occurs. The average current draw is determined by simple arithmetic using the values stored in the 508/509 and 510/511 register pairs.

Typical current consumption is given in Section 4.1.

The current drain while waiting for a connection or discoverable mode is about 30 times higher than in idle mode. This is when the page/inquiry scan duty cycle is 100%. These modes give the quickest response to a page or inquiry request from a remote peer.

It is possible to reduce the duty cycle down to as low as 0.5% at the expense of response time. The response time can be specified via S Registers 508 and 510 for page and inquiry respectively, where the worst case response time can be as high as 2.5 seconds. Then the duty cycle can be varied by changing the value of S Registers 509 and 511 appropriately.

For example, if S Register 508 and 510 are both set to 1000ms and S Register 509 and 511 are both set to 11ms then the duty cycle is reduced to 1%, this means that average current drain at 5.0v will be 2% of 65mA plus the normal idle mode current, that is, it is as low as 2.75mA. However, in this case, it can take up to 1 second to establish a connection.

The connected state current consumption while a master or slave can be considerably reduced by enabling Sniff mode, described in detail in the next section.

7.1 Low Power Modes using Sniff

Bluetooth connections are master/slave in nature. A master sends packets and a slave has to acknowledge that packet in the next timeslot. Timeslots in Bluetooth are 625 microseconds wide. This implies that a master will always know when packets will be sent and received, which further means it is able to optimise power usage by switching on power hungry circuitry only when needed.

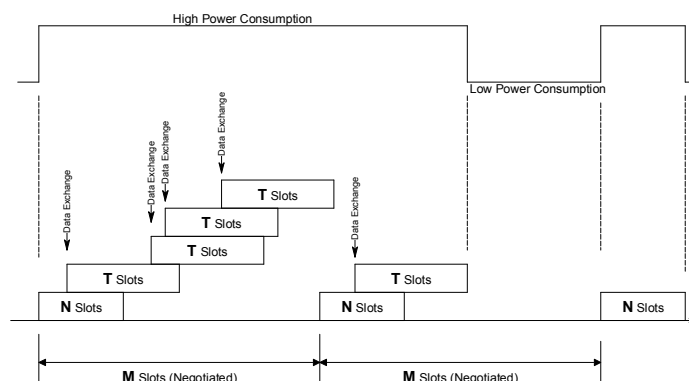
A slave on the other hand does NOT have prior knowledge of when a packet will be received and has to assume that a packet will be received from a master on every receive slot. This means that it has to leave its receiving circuitry on for most of the receive slot duration. The result of this is high power consumption as illustrated in the power table above, where a slave with no data transmission still consumes around 31mA whereas a master consumes only 6mA.

This problem was identified very early in the evolution of Bluetooth (especially since headsets spend all their time as a slave in a Bluetooth connection) and it was solved by having a mode called Sniff, with appropriate lower layer negotiating protocol.

Sniff mode during connection is basically an agreement between the slave and its master that data packets will only be exchanged for N timeslots every M slots. The slave can assume that it will never be contacted during N-M slots, and so can switch its power hungry circuitry off. The specification goes further by also specifying a third parameter called 'timeout' (T) which specifies 'extra' timeslots that the slave will agree to listen for after receiving a valid data packet. Put another way, if a data packet is received by the slave, then it knows that it MUST carry on listening for at least T more slots. If within that T slot time period another data packet is received, then the timer is restarted. This mechanism ensures low power consumption when there is no data transfer – at the expense of latency. When there is a lot of data to be transferred, it acts as if sniff mode were not enabled.

It is stated above that during sniff mode, a slave listens for N slots every M slots. The Bluetooth specification states that a master can have up to 7 slaves attached to it with all slaves having requested varying sniff parameters. It may therefore be impossible to guarantee that each slave gets the M parameter it requested. In light of this, the protocol for enabling sniff mode specifies that a requesting peer specify the M parameter as a minimum and maximum value. This will allow the master to interleave the sniff modes for all slaves attached.

For this reason, the sniff parameters are specified in the blu²¹ Bluetooth PC Card via four S registers. S Register 561 is used to specify 'N', S Register 562 is used to specify 'T' and S Registers 563/564 are used to specify minimum 'M' and maximum 'M' respectively. Although the specification defines these parameters in terms of timeslots, the S register values have to be specified in units of milliseconds and the firmware does the necessary translation to timeslots.



8. LED Indicators

The blu21 Bluetooth PCMCIA Card contains 3 status LEDs which indicate the operation of the card. Two of these are available under program control, and can be defined by setting the appropriate S registers.



Each LED indicates the following:

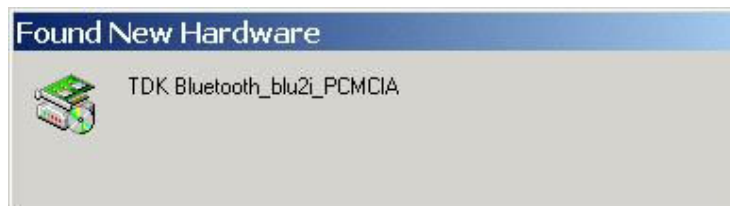
LED	Description	Function
1	Left LED	Dependant on S Register settings
2	Power	Permanently on when the device is powered
3	Right LED	Dependant on S Register settings

9. Application Examples

9.1.1 Installation

The blu2i Bluetooth PC Card can be used in any PCMCIA slot, where it appears as a COM port. The following example shows the installation process for Windows XP and 2000. Instructions for other operating systems are given in the Quick Start Guide.

Insert your blu2i Bluetooth PC Card into an empty PCMCIA slot. It will be automatically recognised by the operating system. Windows will detect it and start the Found New Hardware Wizard.



(because the blu2i firmware was registered with Microsoft before Ezurio was formed as a spin-out of TDK Systems, Windows will identify it as a TDK Bluetooth product)



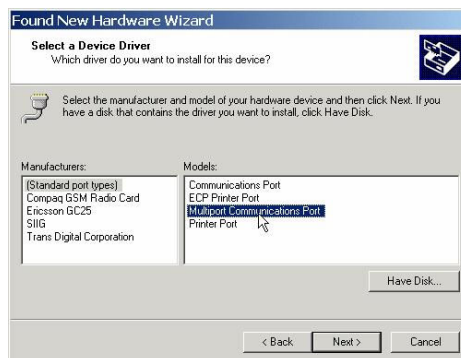
Click NEXT, and on the next screen select the option to display a list of known drivers. This will use the built-in serial port drivers that come with Windows 2000 and Windows XP.



When prompted for hardware type, choose Ports (COM & LPT).



Select (Standard port types) and Multiport Communications Port.



Windows will display a warning message, which can be ignored. It will then complete the installation process.



To complete the installation, click on the "Unplug or Eject Hardware Wizard" (the icon of a pc Card with the green arrow in your System Tray), select the Multiport Communications Port and click "Properties".

Click on the "Port Settings" tab and enter these values (or those appropriate to your application):

- Bits per second: 115,200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: Hardware

Click "OK" to use these values.

9.2 Modem signalling over Bluetooth

The RFCOMM protocol used in Bluetooth for implementing the serial port profile allows for the exchange of four modem signals. This information is contained in a special transparent message which contains bits identified as RTR, RTC, DV and IC which depending on the type of serial device being emulated maps to DTR or DSR, RTS, DCD and RI respectively. In addition, this message also includes the ability to convey a BREAK input from one end to the other.

To allow for the greatest flexibility and variability in how the modem control signals are used out in the real world, S Registers 551, 552 and 553 have been provided which allow for any of RTR,RTC,DV and IC to be mapped to any modem control/status line.

BREAK signal on RX line

If the host sends a break signal of duration greater than 100ms, then the blu²ⁱ Bluetooth PC Card is configured to treat that as a signal to perform a hardware reset.

This being the case it is not possible to convey a BREAK over Bluetooth to the peer device.

Reset

The blu²ⁱ Bluetooth PC Card can be reset by the host without the need of any I/O using a BREAK signal. The blu²ⁱ Bluetooth PC Card has been configured to reset when the RX line detects a break condition for durations greater than 100 milliseconds. A hard reset can also be achieved by asserting the RESET pin on the PCMCIA interface.

9.3 Pure Cable Replacement Mode

The blu²ⁱ Bluetooth PC Card has the capability of being preset into a pure 5-wire data cable replacement mode. The 5 wires being RX, TX, CTS, RTS and GND. This mode requires no changes to a host application since the Bluetooth connection is automatically set up on power up. If the connection is lost the blu²ⁱ Bluetooth PC Card will constantly retry until the connection is reinstated.

By implication, two devices are needed to replace a cable. One device is pre-configured to always be a master and the other, a slave.

Assuming the Bluetooth address of the master to be <bdaddr_m> and that of the slave to be <bdaddr_s>, the master blu²ⁱ Bluetooth PC Card is configured by sending it the following AT commands:

```
AT&F
ATS512=1
ATS504=1
ATS507=2
ATS530=2000
AT&W
AT+BTR<bdaddr_s>
```

The ATS507=2 setting puts the device in DSR drop mode only. This means that when the device needs to be reconfigured, deasserting the DSR line will ensure that the blu²ⁱ Bluetooth PC Card responds quickly to AT commands. This further means that in stand alone mode, the DSR input line MUST be asserted e.g. 0V in TTL signal mode.

The slave is configured by:

```
AT&F
ATS512=4
ATS0=-1
AT&W
AT+BTR<bdaddr_m>
```

Where <bdaddr_m> is optional. If it is not specified, then the slave unit will accept connections from any device. If specified then only connections from the device specified will be accepted.

If it is desired that the slave unit should not be discoverable (the master is by default not discoverable), then the configuration commands are:

```
AT&F
ATS512=3
ATS0=-1
```

AT&W
AT+BTR<bdaddr_m>

Where <bdaddr_m> is optional. If it is not specified, then the slave unit will accept connections from any device. If specified then only connections from the device specified will be accepted.

When the units are next power cycled, the slave unit will wait for the master to connect to it and the master will continually look for the slave. If a connection attempt fails, the master will wait for 2 seconds before reattempting a connection. This 2 second delay can be varied by issuing it an AT530 command with an appropriate value in the range 100ms to 15000ms.

9.4 Modem Control and Status Signals

A serial port has DTR, DSR, RTS, CTS, DCD and RI control lines. RTS and CTS are locally controlled to prevent local buffer overflow.

However the status of DTR, DRS, DCD and RI can be exchanged with the remote peer device. If for example, the DTR/DSR lines are to be exchanged between the two peers to simulate the performance of a physical cable, then it is possible to do so. Refer to the description for S Registers 551, 552 and 553 for more details.

10. Application Information

10.1 Antenna Position

The antenna within the blu²ⁱ Bluetooth PC Card has been designed to give optimum performance, yet provide the minimum protrusion from the PC card slot. The design assumes the existence of a metallic mass from either the PC or PDA; this is part of the antenna optimisation and provides a omni-directional response characteristic. Because of this optimisation the best performance will be obtained without the use of external PC Card extenders.

The blu²ⁱ Bluetooth PC Card should not be located in a sealed metal enclosure, as this will act as a Faraday cage and prevent the radio signal from penetrating.

11. Qualification

11.1 Bluetooth Qualification Process

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any application incorporating this blu²ⁱ Bluetooth PC Card. Manufacturers of the RF equipment are advised to convey the following safety information to users and operating personnel and to incorporate these guidelines into all manuals supplied with the product. Failure to comply with these precautions violates safety standards of design, manufacture and intended use of the product. Ezurio assumes no liability for customer failure to comply with these precautions.

11.2 Safety Information:

Switch off the Bluetooth device before boarding an aircraft. Make sure it cannot be switched on inadvertently. The operation of wireless appliances in an aircraft is forbidden by many airlines to prevent interference with communications systems. Applications that could result in use on aircraft should carry appropriate warnings.

11.3 Qualifications

11.3.1 RF approvals

The blu²ⁱ Bluetooth PC Card is listed as a Bluetooth Product in terms of the Bluetooth SIG Program Reference Document (PRD). This means that it can be integrated into end products without further testing or approval listing. The manufacturer must state the Ezurio part number and product reference in his literature in order to meet the requirements of the Bluetooth and regulatory approvals.

A list of the countries where the blu²ⁱ Bluetooth PC Card is approved will be provided by Ezurio as required. As a minimum the product is listed in Europe and USA. Ezurio assumes no liability for customer failure to comply with national RF approvals.

11.3.1.1 Radio.

R&TTE EN 300 328-2 V1.1.1 (2000-07)

EN 301 489-1 V1.3.1 (2001-09)

11.3.1.2 EMC Emissions.

FCC15B Class B

EN55022 Class B

11.3.1.3 EMC Immunity.

EN55024 Class

11.3.1.4 Environmental.

EN301 489-1 V1.3.1 (2001-09)

11.4 Safety and Regulatory Statements

11.4.1 Europe – EU Declaration of Conformity



DECLARATION OF CONFORMITY

In accordance with Annex IV of the EU directive 1999/5/EC

Notified Body consulted: Phoenix Test-Lab

ID-Number of Notified Body: 0700

declare under our responsibility that the blu²ⁱ PC Card

complies with the appropriate essential requirements of the Article 3 of the R&TTE and the other relevant provisions, when used for its intended purpose.

Health and Safety requirements contained in Article 3 (1) a)

EN 60 950: 1992 Safety of information technology equipment + Amendment A1:1993, Amendment A2:1993, Amendment A3:1995, Amendment A4:1997, Amendment A11:1997

EN 50371: Generic standard to demonstrate the compliance of low-power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (10 MHz - 300 GHz) – General public

Protection requirements with respect to electromagnetic compatibility Art.3 (1) b)

EN 301489-17 V1.1.1 (09-2000), Electromagnetic Compatibility and radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for wideband data HiperLAN equipment

Means of the efficient use of the radio frequency spectrum

EN 300328-2 V1.2.1 (11-2001), Radio Equipment and Systems (RES); Wideband transmission systems; Technical characteristics and test conditions for data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques. Part 2: Harmonized EN covering essential requirements under article 3(2) of the R&TTE directive.

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11.4.2 FCC and Industry Canada Statements

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.

12. Environmental

12.1 Operating temperatures

Parameter	Min	Typ	Max	Unit
Operating temp (standard product)	-40	25	+85	°C

12.2 Storage temperature

Parameter	Min	Max	Unit
Storage temp	-40	+125	°C

12.3 Reliability

Parameter	Test	Comment
Thermal Shock	200 cycles -40°C /+85°C 30 min	1 cycle/hour
Vibration	Continuous operation at 60 Hz, 2mm stroke	15g max sine wave, 12 hours
Shock	50G 11ms Half Sine Wave	6 axis x 3 cycles each axis
Moisture Resistance		
High Temp Storage	85°C, 360 hours	
Low Temp Storage	-40°C, 240 hours	
High Temp/Humidity Operation	60°C, 90%RH, 360 hours	
Thermal shock	-40 to 60°C in 30min	200 cycles with continuous operation
Electro Static Discharge	EN55024:1998 & IEC61000-4-3	
Drop Test	75cm to concrete, 3 axis x 2 cycles per corner	

13. Physical Dimensions

13.1 Labelling

The label contains the Part number and the unique Bluetooth address of the blu²ⁱ Bluetooth PC Card.

13.2 Ordering Information

The part number for the blu²ⁱ Bluetooth PC Card is BISPC01BI

14. Related Documents

- blu2i AT Command Set Version 1.5.0 Reference Manual
- blu2i Firmware Release Notes Version 1.5.0
- blu2i Multipoint Firmware Reference Manual
- blu2i Bluetooth PC Card - Quick Start Guide
- BISM Bluetooth Serial Module – FAQ (contains useful programming examples)
- Blu2i Application Scenarios
- BISM Developer’s Kit User Guide (for development with Ezurio’s integrated modules)
- Bluetooth Core 2.0 Specification – www.bluetooth.org

15. Datasheet Revision History

Version	Date	Changes
1.0	17 th March	Revised as Ezurio Data Sheet with additional information

16. Disclaimers

EZURIO'S BLUETOOTH PRODUCTS ARE NOT AUTHORISED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE MANAGING DIRECTOR OF EZURIO LTD.

The definitions used herein are:

- a) Life support devices or systems are devices which (1) are intended for surgical implant into the body, or (2) support or sustain life and whose failure to perform when properly used in accordance with the instructions for use provided in the labelling can reasonably be expected to result in a significant injury to the user.
- b) A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Ezurio does not assume responsibility for use of any of the circuitry described, no circuit patent licenses are implied and Ezurio reserves the right at any time to change without notice said circuitry and specifications.

16.1 Data Sheet Status

This data sheet contains data relating to the production version of the product. Ezurio Ltd reserves the right to change the specification without notice in order to improve the design and supply the best possible product, but will endeavour to ensure full backwards compatibility.

16.2 Warranty

Ezurio warrants that its products shall conform to Ezurio's published specifications and remain free from defects in materials and workmanship under normal, proper and intended use for a period of two (2) years from date of purchase, provided that proof of purchase be furnished with any returned equipment.

If during the warranty period any component part of the equipment becomes defective by reason of material or workmanship, and Ezurio is immediately notified of such defect, Ezurio shall at its option supply a replacement part or request return of equipment, freight prepaid, to its designated facility for repair. In the event no trouble is found on products returned for repair, Ezurio reserves the right to charge the customer its standard published repair charge.

This warranty shall not apply to any products that have been subject to misuse, bending, twisting, neglect, alteration, improper installation, testing or unauthorized repair performed by anyone other than a Ezurio designated repair facility. Any non-warranty repairs or maintenance shall be at Ezurio's standard rates in effect at the time.

This warranty is in lieu of all other warranties, whether expressed, implied, or statutory, including but not limited to, implied warranties or merchantability and fitness for a particular purpose. In no event shall Ezurio be liable, whether in contract, in part, or on any other basis, for any damage sustained by its customers or any other person arising from or related to loss of use, failure or interruption in the operation of any products, or delay in maintenance, or for incidental, consequential, in direct, or special damages or liabilities, or for loss of revenue, loss of business, or other financial loss arising out of or in connection with the sale, lease, maintenance, use, performance, failure, or interruption of these products.