

Firmware Features

- Wireless Data Communications Subsystem
- Embedded Bluetooth Serial Port Profile (SPP)¹
- Easy to use AT Command Interface Using UART¹
- OEM Programmable Configuration
- Remote Command And Control Available¹
- Multipoint / Piconet Capable
- 128-Bit Encryption Security
- Custom Firmware Available¹

Hardware Features

- Bluetooth v2.1
- 2.4GHz Class 2 Radio
- Range Exceeds 20m
- High Speed Data Rate Up To 3Mbps
- Programmable I/O Pins – 11 Digital, 2 Analog
- UART, USB, SPI, PCM, I2C interfaces
- Onboard Antenna
- 8Mbit Flash Memory

Description

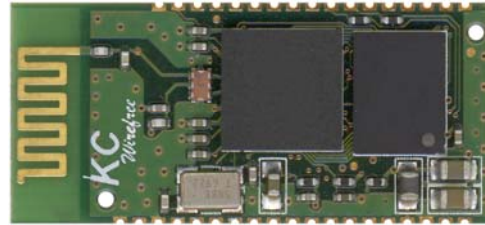
The KC-420x series modules are pre-engineered, pre-qualified, and highly tuned surface mount PCB modules that provide fully embedded, ready to use Bluetooth wireless technology. Multi-surface pads provide both bottom pads for high volume reflow soldering and edge pads for low volume hand soldering.

The KC-4201 offers the standard but powerful Bluetooth HCI programming interface. The onboard flash memory stores OEM programmable default settings, and pairing history.

The KC-4202 offers reprogrammable, embedded firmware for serial cable replacement deploying the Bluetooth Serial Port Profile (SPP). OEM specific parameters and settings can be easily loaded into these modules.

The KC-4203 is the same hardware module with pre-loaded customized versions of kcSerial firmware, or other Bluetooth data profiles.

¹ Features available on KC-4202 or KC-4203 models only



Applications

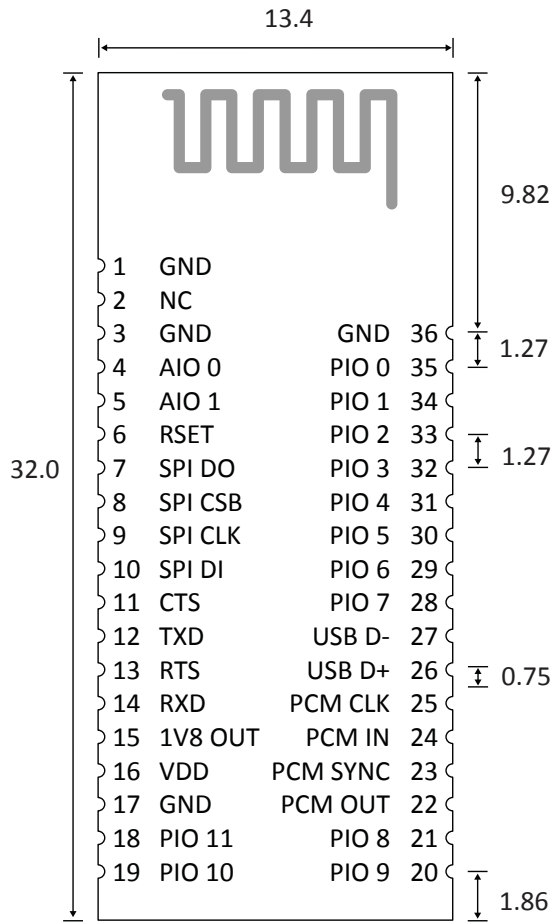
- Zero Installation Data Link
- Wireless Data Acquisition
- Remote Sensing
- Machine Data Uploads/Downloads
- Monitoring And Control
- Secure Mobile Financial Transactions
- Mobile Device Communications

Models

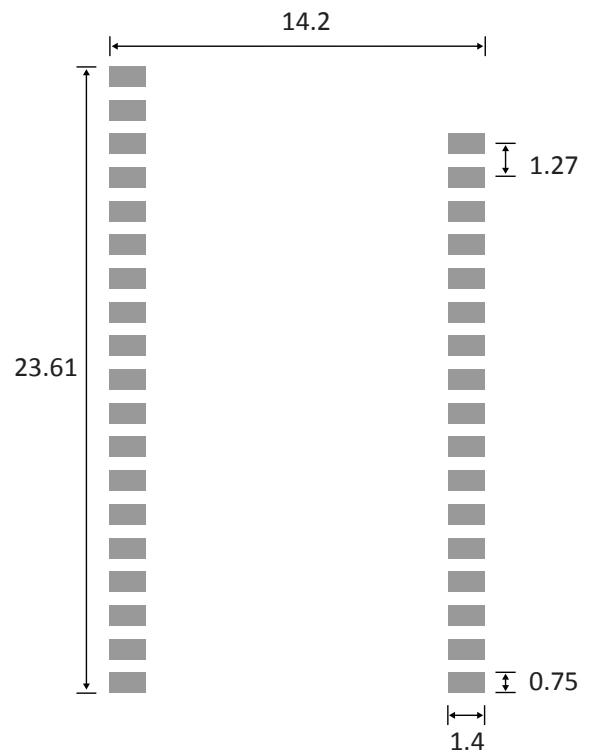
- KC-4201 – HCI Firmware
- KC-4202 – kcSerial Firmware
- KC-4203 – Custom kcSerial Firmware

Physical Dimensions

KC-4201-MOD Top View
(dimensions in mm)



KC-4201-MOD Landing Pattern
(dimensions in mm)



Pin Assignment

| Pin | Function | Type | Description |
|-----|----------|--------|-----------------------------------|
| 1 | GND | - | Ground |
| 2 | NC | - | Do Not Connect |
| 3 | GND | - | Ground |
| 4 | AIO [1] | I/O | Analog Programmable Input/Output |
| 5 | AIO [0] | I/O | Analog Programmable Input/Output |
| 6 | RESET | Input | Hardware Reset [Active Low] |
| 7 | SPI DO | Output | SPI Data Out |
| 8 | SPI CSB | Input | SPI Chip Select [Active Low] |
| 9 | SPI CLK | Input | SPI Clock |
| 10 | SPI DI | Input | SPI Data In |
| 11 | CTS | Input | UART Clear To Send [Active Low] |
| 12 | TXD | Output | UART Data Output |
| 13 | RTS | Output | UART Request To Send [Active Low] |
| 14 | RXD | Input | UART Data Input |
| 15 | 1V8 | Output | 1.8V Regulated Output Voltage |
| 16 | VDD | Input | 3.3V Regulated Input Voltage |
| 17 | GND | - | Ground |
| 18 | PIO [11] | I/O | Programmable Input/Output |
| 19 | PIO [10] | I/O | Programmable Input/Output |
| 20 | PIO [9] | I/O | Programmable Input/Output |
| 21 | PIO [8] | I/O | Programmable Input/Output |
| 22 | PCM OUT | Output | Synchronous Data Out |
| 23 | PCM SYNC | I/O | Synchronous Data Sync |
| 24 | PCM IN | Input | Synchronous Data In |
| 25 | PCM CLK | I/O | Synchronous Data Clock |
| 26 | USB DP | I/O | USB Data Positive |
| 27 | USB DN | I/O | USB Data Negative |
| 28 | PIO [7] | I/O | Programmable Input/Output |

Pin Assignment Cont.

| Pin | Function | Type | Description |
|-----|----------|------|---------------------------|
| 29 | PIO [6] | I/O | Programmable Input/Output |
| 30 | PIO [5] | I/O | Programmable Input/Output |
| 31 | PIO [4] | I/O | Programmable Input/Output |
| 32 | PIO [3] | I/O | Programmable Input/Output |
| 33 | PIO [2] | I/O | Programmable Input/Output |
| 34 | PIO [1] | I/O | Programmable Input/Output |
| 35 | PIO [0] | I/O | Programmable Input/Output |
| 36 | GND | - | Ground |

PRELIMINARY

Electrical Characteristics

| Absolute Maximum Ratings | Min | Max | Unit |
|---------------------------|------|-------|-------|
| Storage temperature range | -40 | +150 | °C |
| Supply voltage VDD | -0.4 | + 3.7 | Volts |
| Input voltage for I/O Pin | - | + 6.0 | Volts |

| Recommended Operating Conditions | Min | Max | Unit |
|---------------------------------------|-----|-----|-------|
| Temperature Range | -40 | 85 | °C |
| Supply Voltage VDD (3.3V Recommended) | 3.1 | 3.6 | Volts |
| Signal Pin Voltage (PIO & UART) | - | 5.5 | Volts |

(Conditions VDD= 3.3V and 25 °C)

| Digital Programmable I/O Pins Characteristics | Min | Max | Unit |
|---|------|------|-------|
| Input Voltage Low Logic | -0.4 | 0.8 | Volts |
| Input Voltage High Logic | 2.3 | 3.7 | Volts |
| Output Voltage Low Logic | - | 0.2 | Volts |
| Output Voltage High Logic | 3.1 | - | Volts |
| Output Current Low Logic | - | | mA |
| Output Current High Logic | - | | mA |
| Input Leakage Current | -1 | +1 | μA |
| Low to High Schmitt Trigger Threshold | 1.47 | 1.50 | Volts |
| High to Low Schmitt Trigger Threshold | 0.89 | 0.95 | Volts |
| Weak Internal Pull-Up | -5.0 | -0.2 | μA |
| Strong Internal Pull-Up | -100 | -10 | μA |
| Weak Internal Pull-Down | +0.2 | +5.0 | μA |
| Strong Internal Pull-Down | +10 | +100 | μA |
| Input Capacitance | 1.0 | 5.0 | pF |

Electrical Characteristics Cont.

| Analog Programmable I/O Pins Characteristics | Min | Max | Unit |
|--|-----|-----|----------|
| Resolution | | 8 | Bits |
| Sample Rate | | 700 | Per sec. |
| Voltage | 0 | VDD | V |

(Conditions VDD= 3.3V and 25 °C)

| Current Consumption | Avg | Unit |
|--|-----|------|
| ACL Data 115Kbps Data Transfer(Master) | 11 | mA |
| ACL Data 115Kbps Data Transfer(Slave) | 25 | mA |
| Connection, No Data Traffic (Master) | 4.6 | mA |
| Connection, No Data Traffic (Slave) | 17 | mA |
| Peak current | 90 | mA |
| Sniff Mode (40ms sniff) (Master) | 2.4 | mA |
| Sniff Mode (40ms sniff) (Slave) | 2.1 | mA |
| Sniff Mode (1.3s sniff) (Master) | 0.4 | mA |
| Sniff Mode (1.3s sniff) (Slave) | 0.4 | mA |
| Deep Sleep | 40 | μA |

| Selected RF Characteristics | Test Conditions | BT Spec | Typical | Unit |
|-----------------------------|-----------------|----------|---------|------|
| Maximum RF power | 50 Ω load | -6 to +4 | +5 | dBm |
| Sensitivity level | 0.1% BER | ≤ -70 | -85 | dBm |
| Power control range | | ≥ 16 | 35 | dB |
| Power control resolution | | - | 0.5 | dB |
| Antenna load | | | 50 | Ω |

Hardware Design

KC Wirefree modules provide UART and PIO hardware interfaces. This section illustrates a typical implementation, and does not consider all cases. Our engineers are available to review designs and answer any other design questions. Contact our engineering department directly by email: tech@kcwirefree.com

Application Notes

- RXD pin must be pulled high if not connected to a UART/RS-232 device.
- 10 μ F or larger capacitor filter for VDD input.
- All unused pins should be left not connected.
- Power supply should have less than 10mVrms noise between 0-10MHz.
- Regulator should have a fast response time < 20 μ s. It is essential that the power rail recover quickly.
- The area around the module should be free of any ground planes, power planes, trace routings, or metal. Minimum clearance is 5mm, but additional clearance allows improved range and throughput.
- Do not clean modules with Alcohol which can interact with no-clean solder flux residue.
- Do not use ultra sonic cleaning, which may cause interconnect damage.

UART Interface

The UART is compatible with the 16450 industry standard. Four signals are provided with the UART interface. The TXD and RXD pins are used for data while the CTS and RTS pins are used for flow control. The UART pins operate at TTL voltage level and must be translated to higher RS-232 voltage levels for communicating with PC hosts. A Maxim 3225 series or similar translator is recommend.

PIO Interface

PIO pins are programmable for weak pull-up, weak pull-down, strong pull-up, strong pull-down when configured as inputs. Two analog PIO pins are available providing 8bit samples at rates up to 700 samples/sec.

Hosts

The KC-420x modules can be connected to PC or MCU hosts using the UART interface. The HCI firmware on the KC-4201 provides the standard and powerful Bluetooth Host Control Interface. The kcSerial firmware on the KC-4202 module provides an easy to use AT style command interface using simple text commands and parameters.

Example Hardware Interface Connections

Illustration of a KC-4201-MOD module to PC connection.

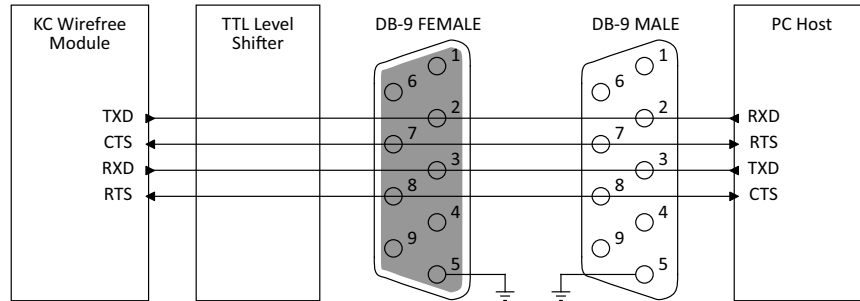
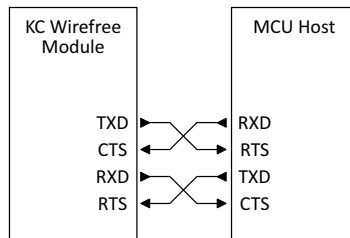
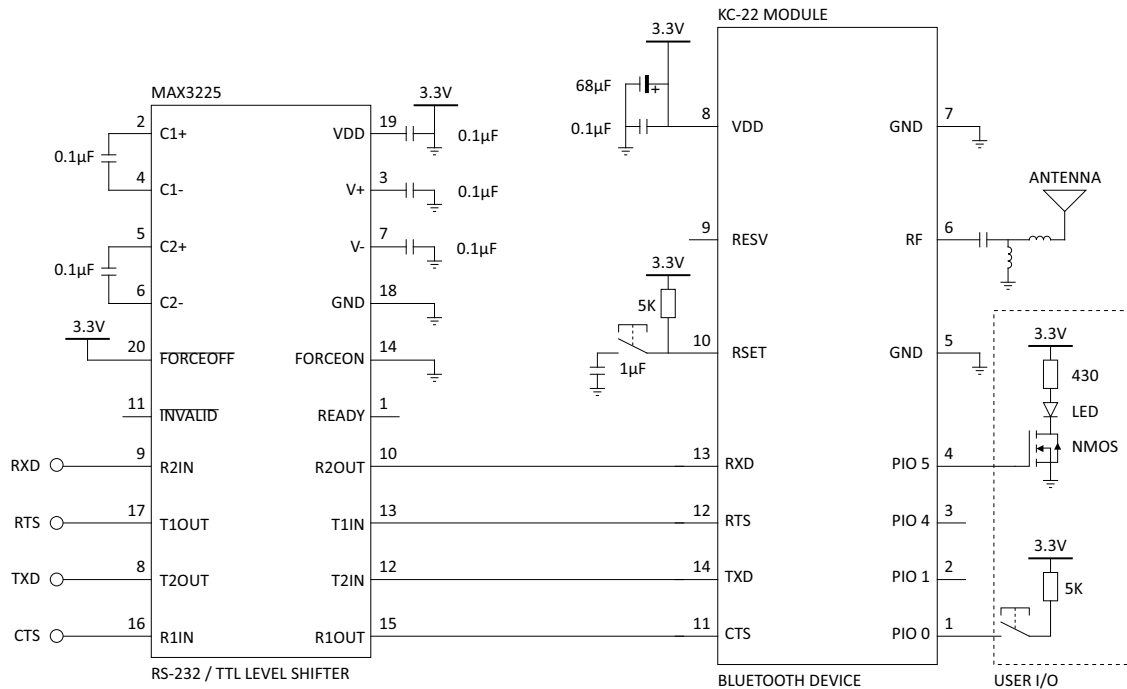


Illustration of a KC-4201-MOD module to MCU connection.



KC-4201-MOD sample circuit with a TTL voltage level shifter ready to connect to a PC RS-232.



Firmware Interface

The KC-4201 offers Bluetooth Host Control Interface (HCI).

The KC-4202 offers our kcSerial firmware which provides an easy to use AT command interface using the UART. The firmware interface allows persistent storage of configuration parameters such as device name, default baud rate, security PIN. Additionally kcSerial provides operational commands such as connections, security, read/write commands for I/O pins, and our remote command mode offering this same programming interface on the linked remote device as well.

Please refer to our *kcSerial User Guide* for additional information.

Pre Qualifications

Bluetooth

The Bluetooth firmware is registered with and licensed by Bluetooth SIG as a qualified design component.

Qualification Design ID: B013295

Bluetooth Version 2.1 + EDR

Qualified Profiles: BB, GAP, HCI, L2CAP, LM, RFCOMM, SDP, SPP

Further Bluetooth licensing is not required, but usage of Bluetooth registered trademarks must be licensed directly from Bluetooth SIG.

CE¹

The KC-420x complies with the following EMC Directives:

EN 300.328 V1.6.1 (2004-11)

FCC¹

The KC-420x meets the conducted and radiated emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Bluetooth spread spectrum transmitters.

Original Equipment Manufacturers may incorporate the KC-420x into products under this FCC ID transmitter license, which must be visible on the final product.

FCC ID: S22-KC4200

¹ Final Approval Pending

Datasheet Version October 2008

Product Series KC-420x-MOD

Version 1

Manufactured Taiwan

| Order Part Number | Description |
|-------------------|-----------------------------------|
| KC-4201-MOD | Bluetooth OEM Module, HCI FW |
| KC-4202-MOD | Bluetooth OEM Module, kcSerial FW |
| KC-4203-MOD | Bluetooth OEM Module, Custom FW |

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