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XBee16PRMx
8 channel relay card + 8 DIO + 8 relay or DIO with Wireless (Xbee) interface
*Low cost Data Acquisition & Control products*

Product Datasheet 47

Features

- Wireless (XBeePro) card, with 8 relays + 8 DIO + 8 Relays or DIO channels (or a mixture, via user selectable links). Stackable design, suitable for use in Commercial, Industrial, Academic, Medical, Home Automation etc

- Transceiver range >100 metres (*line of sight). Broadcast or unique address options available. Robust secure RF DSSS Transmission protocol employing acknowledgement and multiple retries etc (not Ethernet/wireless hub compatible)

- Requires USB connected USBXBeeTx or USBXBeeTx-OEM transceiver module. Each USBXBeeTx module has a pre-programmed, unique USB serial number/Device ID. Supports bi-directional 'write/read' operation

- USBXBeeTx module is housed in a fully potted, ruggedized/insulated ABS case & connected/ powered via integral 3 metre USB cable

- Relays & PCB tracking are designed to handle 240VAC@10 amps. Relays are SPDT, Form C, changeover type, with N/O, COM and N/C contacts taken to 2 part screw terminal blocks - allows rapid connect/ disconnect of card from target system/wiring

- OS compatibility: Win2K/XP/Vista/7, Windows CE, Mac OSX and Linux. Example code downloads available for: LabVIEW, LabWindows CVI, VB, VC, C#, JAVA, Agilent VEE & Delphi + MAC Home Automation (open source) application/code

- Software interface & commanding is the same as our existing range of USB/Serial relay card products. If you have previously used our products, code written can be easily ported/ adapted for use with this product

- Simple ASCII/Hex text commands mean the module can be controlled from a wide variety of programming languages & with commands input from terminal emulation programs (such as Windows HyperTerminal). SW overhead & operate/release time 10mS

- Relay card requires external +5V DC/1A power supply. LED channel & 5VDC status indicators

- Protective perspex cover & base & DIN rail mount option available. Supplied with nylon feet (will take self tapping screws)

- CE & RoHS & BS9001:2000 compliant

- Free shipping (Worldwide)
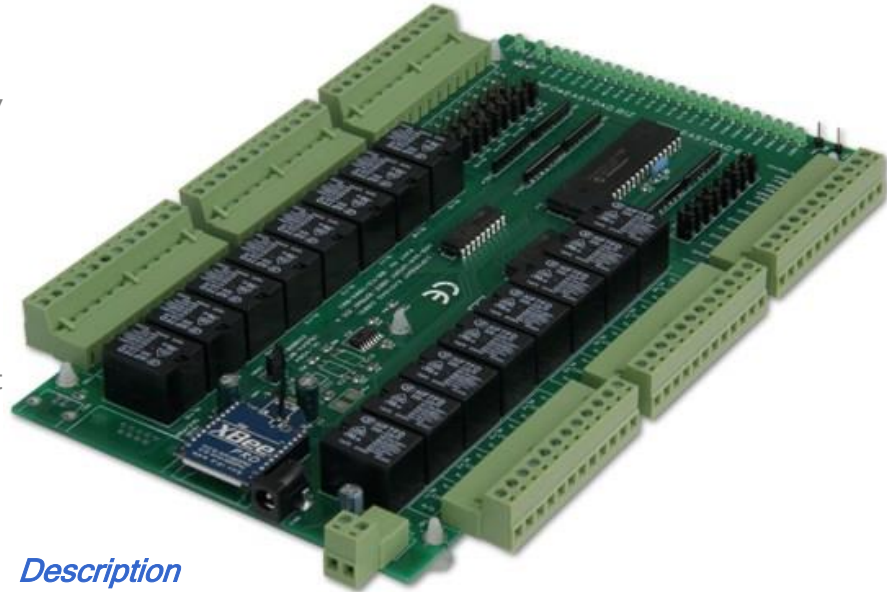
Description

General purpose wireless 8 channel relay card + 8DIO +8 Relays/DIO channel. Relays & PCB tracking are designed to handle 240VAC@10A.
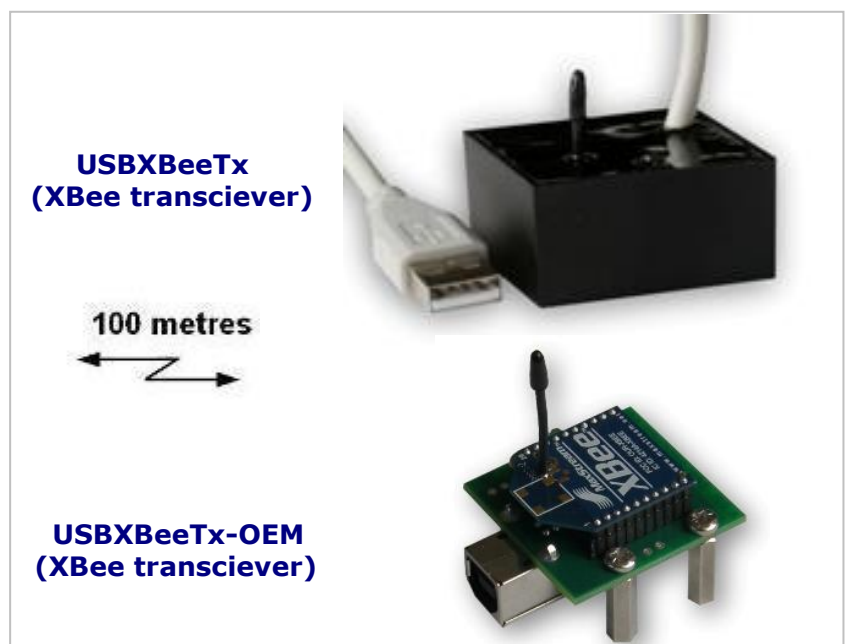
Uses XBeePro RF transceiver module – requires USBXBeeTx or USBXBeeTx-OEM transceiver module. Range >100M (LOS).

Relay & DIO control/activation is via simple ASCII/Hex characters. All relay contacts are connected to 2 part screw terminal blocks along each side of the card, allowing rapid connect/disconnect or swap-over in your target system.

5VDC power connection is made via 2.1mm DC jack socket or 2 way screw terminal block in one corner of the card.

The card is stackable, via corner fixing holes. Available with a Perspex cover and DIN rail mount option if required.

DIO channels are normal logic level signals (+5V max) and can supply up to 20mA per channel. DIO channels can be disconnected (isolated) from LED's via jumper links.

USBXBeeTx (XBee transciever)

100 metres

USBXBeeTx-OEM (XBee transciever)

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Specifications

USB Interface
USB 1 & 2 compatible (virtual COM port). Tx module cable approx 3M long See below for explanation of Com Port number assignment/re-allocation

Operating temp range
-20 to +80^{0}C

Power
USBXBeeTx is USB powered (5V @ 70mA). XBee8PRMx relay card, 5 to 15VDC @ 470 mA (with all relays active).

Connection type
Screw terminal block, 2 part (male/female) allowing rapid swap over/re-use of relay card

Activation time (inc SW/link delay)
10mS max (comms link = 9600 Baud)

Relays
See detailed spec below

Dimensions
XBee16PRMx:
Dimensions approx 245mm (L) 160mm (W) 18mm (H) (exc feet), Weight, 442g
USBXBeeTx Module:
Dimensions 40mm (D) 40mm (W) 20mm (H) (fully potted AB case), Weight 140g (inc 3M US cable).

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RF Tx/Rx Range*
USBXBeeTx/XBee8PRMx transceiver pair – line of sight range >100 Metres. Frequency Band = 2.4GHz.
Refer to XBee website Digi (https://www.digi.com/support for full details and list of Worldwide approvals.

XBee module type
Transceivers use the XBeePro module from the Digi XBee family of devices. These are designed to give 'transparent RF operation' that is, communications appear exactly as if connected by direct wired connection ('plug & communicate' wireless operation).

Broadcast/Unique addressing options
Transceiver pairs are sold as either 'Broadcast' or 'Unique PAN ID address' pairs. Unique PAN ID address range is 0 to FFFFH.
(See below for more info).

Specifications: Relays

Parameter	Specification (Power relays)
Rated operate voltage/current	5VDC/50mA
Must operate/release voltage	75%/10% of rated voltage
Contact ratings	120/240VAC/10A or 30VDC/8A
Contact resistance	100mΩ max
Operate/release time	10mS/5mS
Contact bounce period	0.6mS operate/ 7.2mS release
Contact material	AgSnO$_2$
Operational life (min)	Mechanical 10^7 / Electrical 10^5
Contact arrangement	SPDT, Form C

Order codes

XBee16PRMx-BC
8 channel relay card with XBeePro transceiver module. Address mode set to default 'Broadcast' (see below).

XBee16PRMx-UN
8 channel relay card with XBeePro transceiver module. Address mode set to a 'Unique' (see below).

USBXBeeTx-BC
USB transceiver module, fully potted with 3M USB cable. Address mode set to default 'Broadcast' (see below).

USBXBeeTx-UN
USB transceiver module, fully potted with 3M USB cable. Address mode set to a 'Unique' (see below).

USBXBeeTx-OEM-BC
USB transceiver module, fully potted with 3M USB cable. Address mode set to default 'Broadcast' (see below).
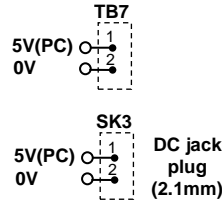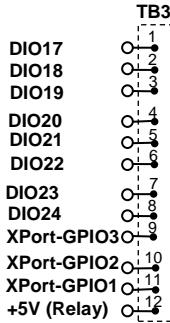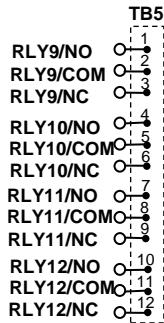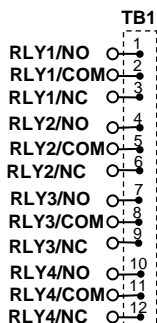
USBXBeeTx-OEM-UN
USB transceiver module, fully potted with 3M USB cable. Address mode set to a 'Unique' (see below).

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Connection details

External & screw terminal block connections to the relay cards are shown below:

TB1
- RLY1/NO — 1
- RLY1/COM — 2
- RLY1/NC — 3
- RLY2/NO — 4
- RLY2/COM — 5
- RLY2/NC — 6
- RLY3/NO — 7
- RLY3/COM — 8
- RLY3/NC — 9
- RLY4/NO — 10
- RLY4/COM — 11
- RLY4/NC — 12

TB5
- RLY9/NO — 1
- RLY9/COM — 2
- RLY9/NC — 3
- RLY10/NO — 4
- RLY10/COM — 5
- RLY10/NC — 6
- RLY11/NO — 7
- RLY11/COM — 8
- RLY11/NC — 9
- RLY12/NO — 10
- RLY12/COM — 11
- RLY12/NC — 12

TB3
- DIO17 — 1
- DIO18 — 2
- DIO19 — 3
- DIO20 — 4
- DIO21 — 5
- DIO22 — 6
- DIO23 — 7
- DIO24 — 8
- XPort-GPIO3 — 9
- XPort-GPIO2 — 10
- XPort-GPIO1 — 11
- +5V (Relay) — 12

TB7
- 5V(PC) — 1
- 0V — 2

SK3
- 5V(PC) — 1
- 0V — 2

DC jack plug (2.1mm)

PLEASE NOTE:

Note: The XBee16PRMx requires an external +5V/1A DC PSU.

TB2
- RLY5/NO — 1
- RLY5/COM — 2
- RLY5/NC — 3
- RLY6/NO — 4
- RLY6/COM — 5
- RLY6/NC — 6
- RLY7/NO — 7
- RLY7/COM — 8
- RLY7/NC — 9
- RLY8/NO — 10
- RLY8/COM — 11
- RLY8/NC — 12

TB6
- RLY13/NO — 1
- RLY13/COM — 2
- RLY13/NC — 3
- RLY14/NO — 4
- RLY14/COM — 5
- RLY14/NC — 6
- RLY15/NO — 7
- RLY15/COM — 8
- RLY15/NC — 9
- RLY16/NO — 10
- RLY16/COM — 11
- RLY16/NC — 12

TB4
- DIO9 — 1
- DIO10 — 2
- DIO11 — 3
- DIO12 — 4
- DIO13 — 5
- DIO14 — 6
- DIO15 — 7
- DIO16 — 8
- 0V — 9
- 0V — 10
- +5V (Relay) — 11
- +5V (Relay) — 12

DIO Chans 9 to 16:
These are user selectable via onboard links. They can be individually connected as either DIO channels or relays. (Default connection is to the relays)
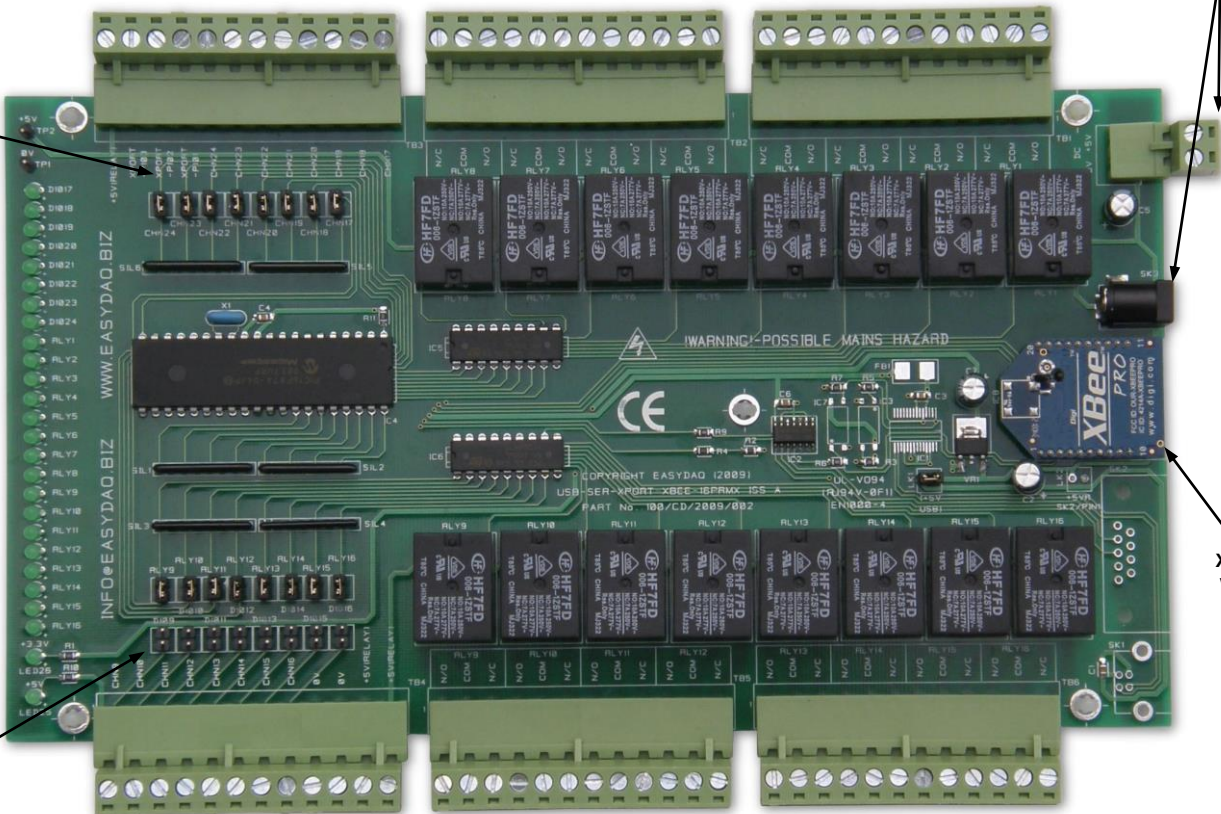
Links allow channels 17 to 24 to be isolated from the LED indicators giving the option of a direct DIO connection. (Default connection is to the LED indicators).

Relays 1 to 8 and DIO chans 17 to 24 are not user selectable.

+5V DC connection options
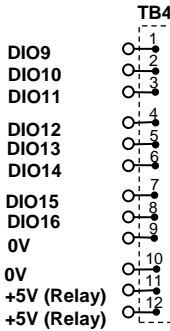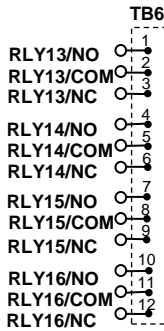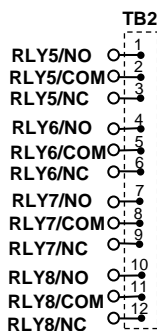
Links for Chans 17 to24 allow DIO chans to be isolated from LED's

Links for Chans 9 to16 allow Relay or DIO seleection

XBee module with integral aerial

Face view showing screw terminal connectors & LED locations

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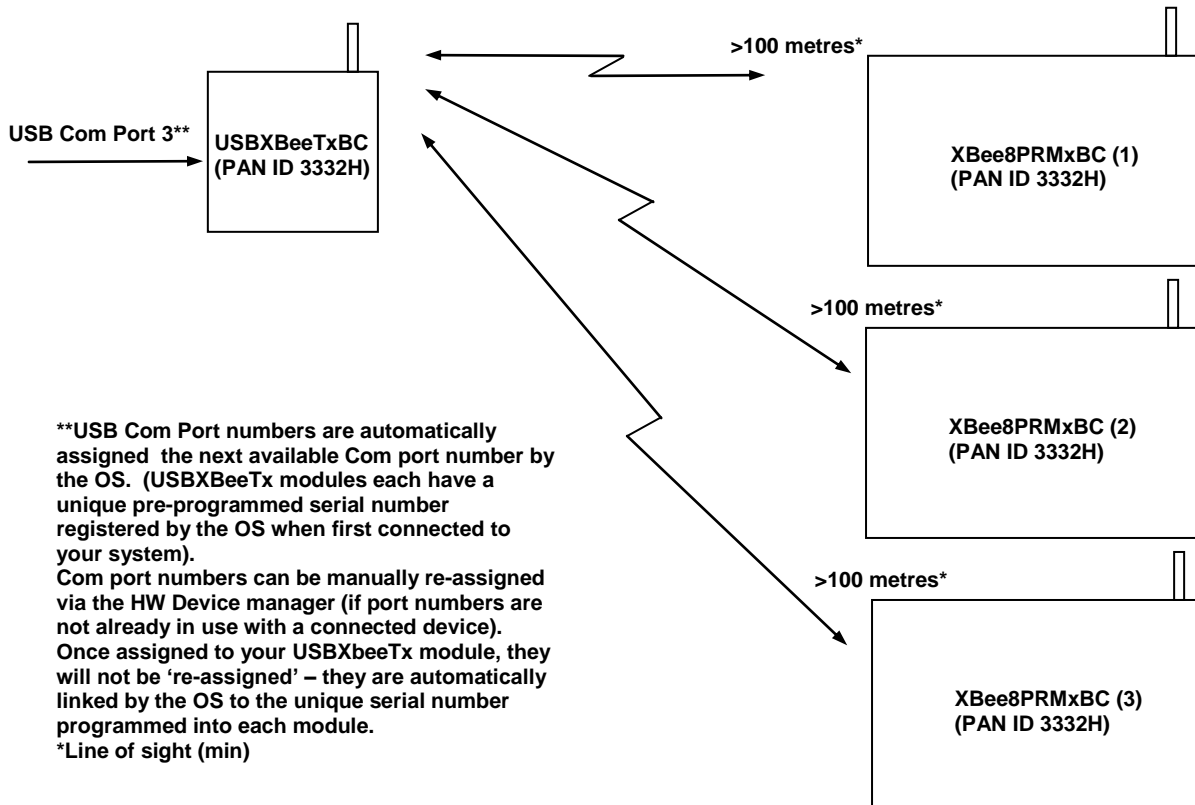Neat products, low cost, no frills

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Addressing options:

The XBeeTx/8PRMx pairs are sold with two Transceiver addressing options:

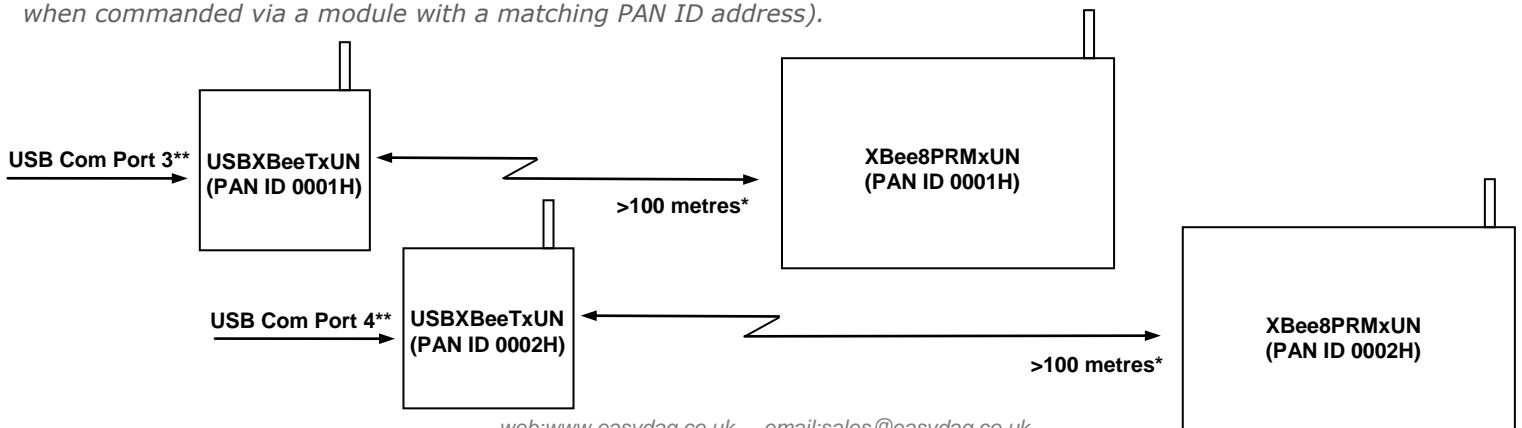## Default 'Broadcast' addressing mode (PAN ID = 3332H)

The XBeePro transceiver modules used in both the USBXBeeTx module and the XBee8PRMx relay card module are programmed with the default address (3332H). This addressing option allows one USBXBeeTx module to transmit data to/ read data from one or more XBee8PRMx relay card modules simultaneously.

For example, one USBXBeeTx module could be used to simultaneously switch on lights at opposite sides of a theatre, or unlock/ open doors remotely in several locations with locally connected XBee8PRMx relay cards.

USB Com Port 3** → USBXBeeTxBC (PAN ID 3332H)

>100 metres*

XBee8PRMxBC (1) (PAN ID 3332H)

>100 metres*

XBee8PRMxBC (2) (PAN ID 3332H)

>100 metres*

XBee8PRMxBC (3) (PAN ID 3332H)

**USB Com Port numbers are automatically assigned the next available Com port number by the OS. (USBXBeeTx modules each have a unique pre-programmed serial number registered by the OS when first connected to your system).
Com port numbers can be manually re-assigned via the HW Device manager (if port numbers are not already in use with a connected device). Once assigned to your USBXbeeTx module, they will not be 're-assigned' – they are automatically linked by the OS to the unique serial number programmed into each module.
*Line of sight (min)

Unique addressing mode (PAN ID = 0 to FFFFH)

A unique address is assigned to both the USBXBeeTx module and the XBee8PRMx relay card. (It is programmable & can be re-programmed or changed. Changing the unique address requires a separate module programming card and MaxStream software application). The XBeePro transceiver modules used in both the USBXBeeTx module and the XBee8PRMx relay card module are programmed with a unique address in the range 0 to FFFFH. This addressing option allows one USBXBeeTx module to transmit data to or read data from an XBee8PRMx relay card module pre-programmed with a matching PAN ID address.

For example, two different USBXBeeTx modules are required to control/read data from two separate Xee8PRMx cards located in separate parts of a factory or home automation system. They are assigned separate USB Com port numbers and must be individually addressed by the users controlling SW (they will not interfere with each other – they only respond when commanded via a module with a matching PAN ID address).

USB Com Port 3** → USBXBeeTxUN (PAN ID 0001H)

>100 metres*

XBee8PRMxUN (PAN ID 0001H)

USB Com Port 4** → USBXBeeTxUN (PAN ID 0002H)

>100 metres*

XBee8PRMxUN (PAN ID 0002H)

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Serial Port settings

Baud rate: 9600   Parity: 0
Data: 8 bits   Stop bits: 1
Handshaking: None

USB - Auto detection & com port assignment

This product uses the industry standard, FTDI Virtual Com Port chipset. When you connect it the USB port of a PC for the first time, it will be auto-detected and ask you to install the appropriate 32 or 64 bit drivers (downloadable from the 'downloads' section of our website). After installation, the card will appear as a 'Virtual' COM port and be automatically assigned a COM port number by your OS. Following installation, the COM port number can be manually re-assigned via the control panel if required. Following reboots or disconnects of the USB card, the same COM port number will be assigned. You can find the assigned COM port number via the Com Port settings of the Device Manager (under your PC's Control Panel). Note: Mac & Linux OS's do not require the VCP drivers to be installed; they are already installed as part of the standard OS build.

Command format

The card is initialised & commanded by sending a single ASCII character followed by a hex number (representing the required port status). The commands address each port of the PIC device (there are three 8 bit ports. ASCII character Hex equiv shown in brackets). You must first set the port direction (as either input or output). If a channel is set as an input, your software must send a read command (of that channel) followed by a read of the serial port. The card can also be commanded via HyperTerminal – see below.

Command summary:

ASCII A x (41H) = Read Port B   (Channels 1-8)
ASCII B x (42H) = Configure Port B (Channels 1-8)
ASCII C x (43H) = Write Port B   (Channels 1-8)

ASCII D x (44H) = Read Port C   (Channels 9-16)
ASCII E x (45H) = Configure Port C (Channels 9-16)
ASCII F x (46H) = Write Port C   (Channels 9-16)

ASCII G x (47H) = Read Port D   (Channels 17-24)
ASCII H x (48H) = Configure Port D (Channels 17-24)
ASCII J x (4AH) = Write Port D   (Channels 17-24)

Port B, C & D (Channels 1-8, 9-16 & 17-24) command detail:
ASCII 'B' (42H), X   Initialises the card (sets the port & channel I/O directions). Set direction of Port B, 1=Input, 0= output. (i.e. where X=10111111 (AFH) = sets bit 7 as an output, the rest as inputs).
ASCII 'C' (43H), X   Write data X to Port B (i.e. X=00000001 (01H), sets channel 1 to active). Valid data bytes are latched by the card until a further valid data byte is written to it.
ASCII 'E' (45H), X   Initialises the card (sets the port & channel I/O directions). Set direction of Port C
ASCII 'F' (46H), X   Write data X to Port C (i.e. X=00000001 (01H), sets channel 1 to active).
ASCII 'H' (48H), X   Initialises the card (sets the port & channel I/O directions). Set direction of Port D
ASCII 'K' (4AH), X   Write data X to Port D (i.e. X=00000001 (01H), sets channel 1 to active).

Using Windows HyperTerminal

In order to test operation, the card can be connected to a serial port and controlled from Windows HyperTerminal. Ensure port configuration is set as shown above, type (ASCII) characters shown above to achieve port direction and read or write command/data.

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Example downloads

Example driver files and executables are available from the 'downloads' button for the NET16PRMx webpage (http://www.easydaq.co.uk/). Example programs are currently only available for LabVIEW.

Uses existing USB & serial port software examples

This card uses the same software drivers & command interface that is used in our existing range of USB/Serial port relay & DIO card products, but using the TCP/IP comms protocol not USB/Serial). Therefore, if you have already used our USB or serial port products on a previous project, you may be able to re-use some or all of your code (or use a USB card in place of a serial port card).
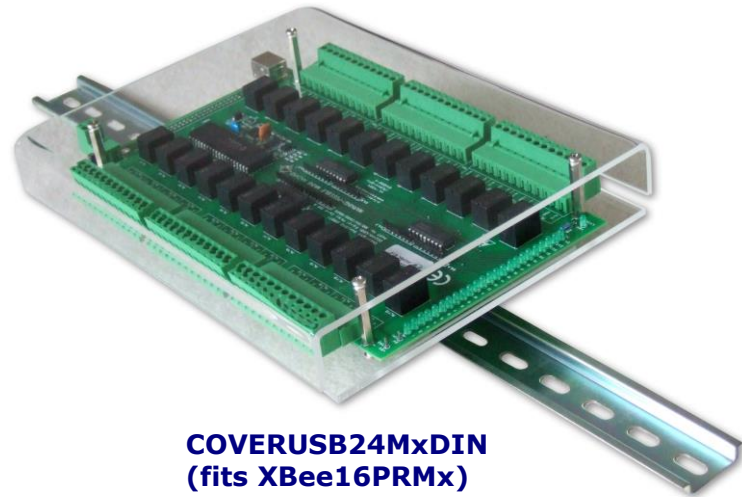
If you are a Mac or Linux user, please refer to this web link for additional information and low level details on how to address and command the cards (paste this link into your browser):

https://www.easydaq.co.uk/datasheets/Data%20Sheet%2034%20(Using%20Linux%20with%20EasyDAQ%20USB%20Products).pdf

XBee16PRMx
(requires +5V PSU)
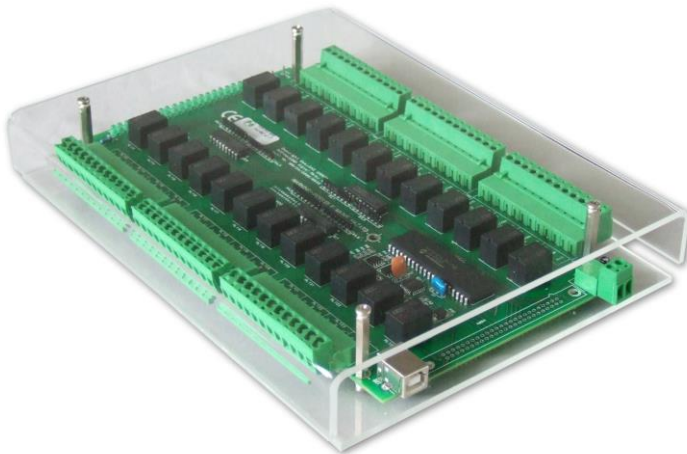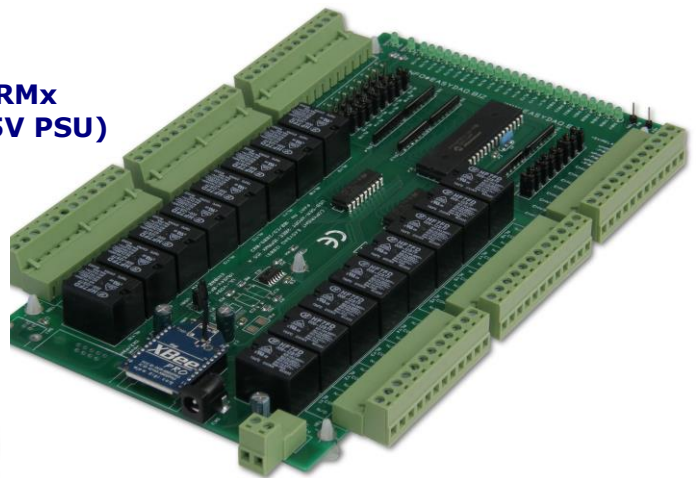
COVERUSB24Mx
(fits XBee16PRMx)

COVERUSB24MxDIN
(fits XBee16PRMx)

USBXBeeTx
(XBee transciever)

USBXBeeTx-OEM
(XBee transciever)