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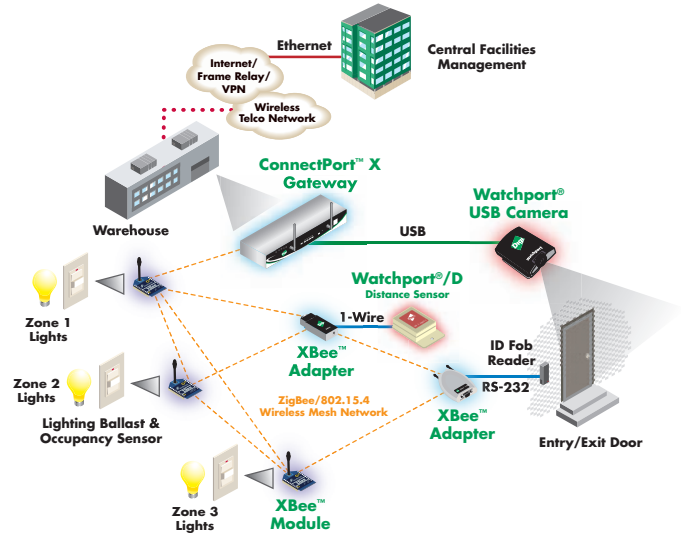
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# XBee™ Adapters

ZigBee®/802.15.4 Device Adapters for Drop-in Networks

XBee adapters provide easy ZigBee/802.15.4 wireless connectivity to sensors, controllers and other devices used for remote monitoring and control. All XBee adapters can be used with Digi's ConnectPort™ IP gateways to build wireless Drop-in Networks.



## Features/Benefits

- ZigBee/802.15.4 wireless mesh connectivity for all types of end-point devices
- Compatible with Digi's ConnectPort X family of IP gateways for LAN/WAN connectivity
- Multiple interface options provide broad device support: Serial, USB, 1-Wire, Digital I/O, Analog I/O
- Small form factor for easy handling and installation
- Flexible powering options include external power, N-Cell battery or both for power redundancy
- Two versions available: XBee and XBee-PRO™ (longer range)

## Overview

ZigBee/802.15.4 technology enables low-cost, low-power networking of sensors, controllers and other such devices in self-configuring, self-healing wireless mesh networks. Digi's XBee adapters are used to retrofit existing devices for ZigBee/802.15.4 connectivity. Available with multiple interface options, these adapters deliver the benefits of ZigBee/802.15.4 mesh networking off-the-shelf, without the development time required when using an embedded solution. As part of Digi's Drop-in Networks product family, XBee adapters can be used with ConnectPort X gateways to "drop-in" end-to-end device networks without the need for a wired network infrastructure.

Each Digi XBee adapter contains a ZigBee/802.15.4 wireless module for network connectivity and a physical interface for device connectivity. Available interfaces include RS-232 (powered power harvesting), RS-485, USB, 1-Wire, Digital I/O and Analog I/O. Each is offered in a small form factor with various powering options that include external power supply, N-cell battery, both external and battery power for redundancy, or parasitic power drawn from the connected device. Two performance levels of XBee adapters are available: XBee and XBee-PRO. The PRO version provides greater transmit power and approximately three-times the range of the regular version.

### Compatibility Note:

Two sets of XBee and XBee-PRO adapters are offered: Series 1 and Series 2. Though overall performance and product specifications are largely similar, the two series are built on distinct and non-compatible technology platforms. Thus, users must standardize on one series or the other for operability. The same is true for compatibility with the ConnectPort X gateways. Series 1 XBee adapters are compatible only with Series 1 gateways, while Series 2 XBee adapters are compatible only with Series 2 gateways. Series 1 XBee specifications appear on page 2 of this datasheet. Series 2 XBee specifications are on page 3.



## Features/Specifications - Series 1 XBee Adapters

### FEATURES

#### General

- Frequency: 2.4 GHz (ISM)
- Antenna options: Integrated whip antenna

#### Performance: XBee

- Indoor/Urban range: Up to 100 ft (30 m)
- Outdoor RF line of sight range: Up to 300 ft (100 m)
- Transmit power output: 1 mW (0 dBm)
- RF data rate: 250,000 bps
- Receiver sensitivity: -92 dBm (1% PER)

#### Performance: XBee-PRO

- Indoor/Urban range: Up to 300 ft (100 m)
- Outdoor RF line of sight range: Up to 1 mile (1.6 km)
- Transmit power output: 60 mW (18 dBm)\*, 100 mW EIRP\*
- RF data rate: 250,000 bps
- Receiver sensitivity: -100 dBm (1% PER)

#### Networking and Security

- Network topologies: Point-to-Point, Point-to-Multipoint, Peer-to-Peer, Mesh
- Number of channels:  
XBee: 16 - 5 MHz channels (Direct Sequence Spread Spectrum)  
XBee-PRO: 12 Direct Sequence Channels (software selectable)
- Filtration options: PAN ID, Channel, Source/Destination Addresses

#### LEDs

- Power: Glows green when external power is supplied (not active when battery powered to limit power drain)
- Associate: Glows when unit is connected and associated on an RF network

#### Controls

- Device reset (internal push button)
- Identification (internal push button): Relays identification to ConnectPort X gateway

### INTERFACES

#### Serial

- RS-232 (DB-9M)
- RS-232PH (DB-9M); power harvesting version
- RS-485 (6-position wire terminal block)
  - Switch selectable between RS-422 half duplex, RS-422 full duplex and RS-485
- 1-Wire (RJ-45)

#### USB

- USB 2.0 Full Speed (with ESD protection); connects to host via captive 2-meter cable

### ENVIRONMENTAL

#### XBee 232, 485, 1-Wire, Analog I/O and Digital I/O

- Operating temperature: Externally powered: -40C to 85C  
Battery powered: -18C to 55C

#### XBee USB

- Operating temperature: -40° C to 85° C

#### XBee 232PH

- Operating temperature: 0° C to 65° C

### DIMENSIONS

#### XBee 232, 485, 1-Wire, Analog I/O and Digital I/O

Width: 1.68 in (4.26 cm)  
Height: 0.99 in (2.53 cm)  
Length: 3.87 in (9.84 cm)  
Weight: 2.29 oz (6.50 g)

#### XBee USB and 232PH

Width: 1.80 in (4.57 cm)  
Height: 0.83 in (2.10 cm)  
Length: 2.87 in (7.29 cm)  
Weight: 1.60 oz (45.36 g)

### REGULATORY APPROVALS

- FCC Part 15.247 - Pending
- Industry Canada (IC) - Pending
- Europe (CE) - Pending
- EN55022, Class A - Pending
- UL60950 - Pending
- CAN/CSA C22.2 No. 60950 - Pending
- EN60950 - Pending
- RoHS compliant

### POWER REQUIREMENTS

#### XBee 232, 485, 1-Wire, Analog I/O and Digital I/O

- Externally powered: 9-30 VDC, locking connector
- Battery powered: 3 internal N cell batteries

#### XBee USB

- Bus powered: +5V from USB bus
- Power consumption during normal operation:
  - XBee: 70mA
  - XBee-PRO: 70 mA (Rx) and 250 mA (Tx)
- Power consumption during suspend mode:
  - XBee and XBee-PRO: 200 uA

#### XBee 232PH

- Internal battery provides power when unit is operating and recharges from the serial port when in sleep mode
- Requires a sleep/wake duty cycle as part of its normal operation.
- Requires a fully functional serial port conforming to the RS232c standard for optimal operation.
- Sleep/wake duty cycle requirements will vary based on the current output of serial port
- Serial ports with more than 14VDC output (rare) are not supported and may cause malfunction
- Serial ports that provide hard power of 5 to 14VDC on one or more pins will allow the device to operate continually without a sleep/wake cycle

### MODEL.....PART NUMBERS

| Model/Interface                           | XBee        | XBee-PRO    |
|---|-------------|-------------|
| XBee/XBee-PRO RS-485                      | XA-A14-CS3R | XA-A14-CS3P |
| XBee/XBee-PRO RS-232                      | XA-A14-CS2R | XA-A14-CS2P |
| XBee/XBee-PRO 1-Wire                      | XA-A14-CS1R | XA-A14-CS1P |
| XBee/XBee-PRO Analog I/O                  | XA-A14-CS5R | XA-A14-CS5P |
| XBee/XBee-PRO Digital I/O                 | XA-A14-CS4R | XA-A14-CS4P |
| XBee/XBee-PRO USB                         | XA-A14-CE1R | XA-A14-CE1P |
| XBee/XBee-PRO RS-232PH (power harvesting) | XA-A14-CE2R | XA-A14-CE2P |

Series 1 XBee Adapters are compatible only with Series 1 ConnectPort X gateways.

\* When operating in Europe: XBee-PRO adapters must be configured to operate at a maximum TX power output level (power output level is set using the PL command). Additionally, European regulations stipulate an EIRP power maximum of 12.86 dBm (1 mW).

## Features/Specifications - Series 2 XBee Adapters

### FEATURES

#### General

- Frequency: 2.4 GHz (ISM)
- Antenna options: Integrated whip antenna

#### Performance

- Indoor/Urban range: Up to 100 ft (30 m)
- Outdoor RF line of sight range: Up to 300 ft (100 m)
- Transmit power output: 1 mW (0 dBm)
- RF data rate: 250,000 bps
- Receiver sensitivity: -95 dBm (1% PER)

#### Networking and Security

- Network topologies: Point-to-Point, Point-to-Multipoint, Peer-to-Peer, Mesh
- Number of channels: 16 - 5 MHz channels (Direct Sequence Spread Spectrum)
- Filtration options: PAN ID, Channel, 2<sup>64</sup> (64-bit) addresses

#### LEDs

- Power: Glows green when external power is supplied (not active when battery powered to limit power drain)
- Associate: Glows when unit is connected and associated on an RF network

#### Controls

- Device reset (internal push button)
- Identification (internal push button): Relays identification to ConnectPort X gateway

### INTERFACES

#### Serial

- RS-232 (DB-9M)
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- USB 2.0 Full Speed (with ESD protection); Connects to host via captive 2-meter cable

### DIMENSIONS

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Width: 1.68 in (4.26 cm)  
 Height: 0.99 in (2.53 cm)  
 Length: 3.87 in (9.84 cm)  
 Weight: 2.29 oz (6.50 g)

#### XBee USB and 232PH

Width: 1.80 in (4.57 cm)  
 Height: 0.83 in (2.10 cm)  
 Length: 2.87 in (7.29 cm)  
 Weight: 1.60 oz (45.36 g)

### POWER REQUIREMENTS

#### XBee 232, 485, 1-Wire, Analog I/O and Digital I/O

- Externally powered: 9-30 VDC, locking connector
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#### XBee USB

- Bus powered: +5V from USB bus
- Power consumption during normal operation:
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#### XBee 232, 485, 1-Wire, Analog I/O and Digital I/O

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#### XBee USB

- Operating temperature: -40° C to 85° C

#### XBee 232PH

- Operating temperature: 0° C to 65° C

### REGULATORY APPROVALS

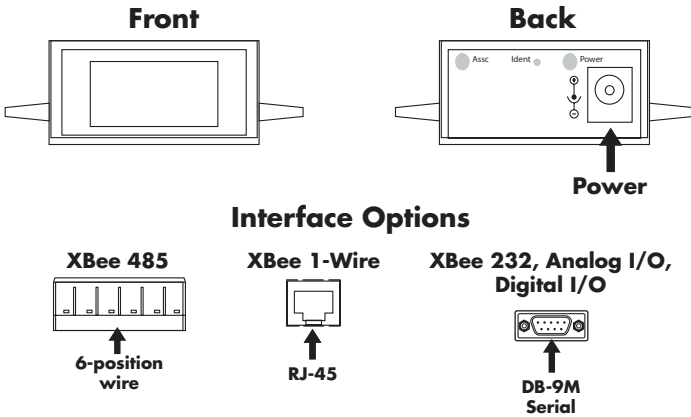
- FCC Part 15.247 - Pending
- Industry Canada (IC) - Pending
- Europe (CE) - Pending
- EN55022, Class A - Pending
- UL60950 - Pending
- CAN/CSA C22.2 No. 60950 - Pending
- EN60950 - Pending
- RoHS compliant

### MODEL.....PART NUMBERS

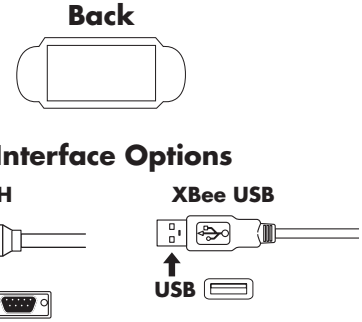
| Model/Interface                           | XBee        | XBee-PRO         |
|---|-------------|------------------|
| XBee/XBee-PRO RS-485                      | XA-B14-CS3R | Available Sep 07 |
| XBee/XBee-PRO RS-232                      | XA-B14-CS2R | Available Sep 07 |
| XBee/XBee-PRO 1-Wire                      | XA-B14-CS1R | Available Sep 07 |
| XBee/XBee-PRO Analog I/O                  | XA-B14-CS5R | Available Sep 07 |
| XBee/XBee-PRO Digital I/O                 | XA-B14-CS4R | Available Sep 07 |
| XBee/XBee-PRO USB                         | XA-B14-CE1R | Available Sep 07 |
| XBee/XBee-PRO RS-232PH (power harvesting) | XA-B14-CE2R | Available Sep 07 |

Series 2 XBee Adapters are compatible only with Series 2 ConnectPort X gateways.

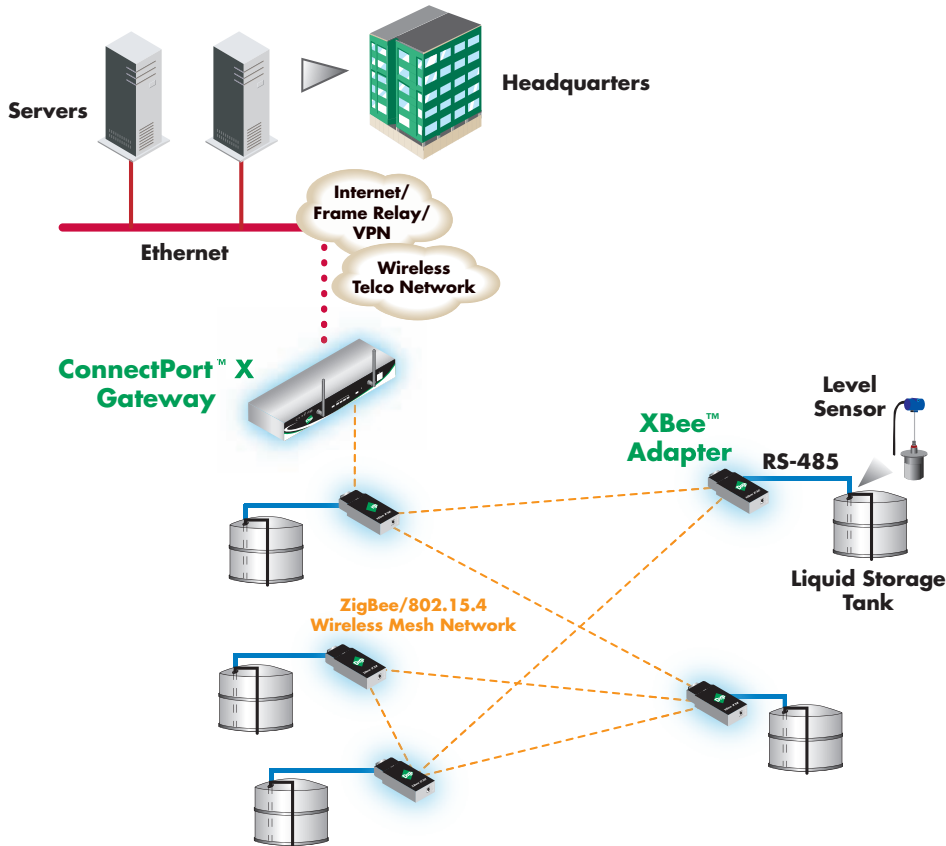
**XBee 232, 485, 1-Wire, Analog I/O, Digital I/O**



**XBee USB, 232PH**



**Drop-in Network for Tank Level Monitoring**



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