# XBee<sup>™</sup> 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<sup>™</sup> 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<sup>™</sup> (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 largley 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 1 XBee specifications appear on page 2 of this datasheet. Series 2 XBee specifications are on page 3.



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# 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:
- 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)

# М

# 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.

# 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

\* 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

#### 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

# ENVIRONMENTAL

# XBee 232, 485, 1-Wire,

# Analog I/O and Digital I/O

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# MODEL.....PART NUMBERS

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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.

# 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

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



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**Digi International**, the leader in device networking for business, develops reliable products and technologies to connect and securely manage local or remote electronic devices over the network or via the web. With over 20 million ports shipped worldwide since 1985, Digi offers the highest levels of performance, flexibility and quality.

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