



1-Port CAT5 USB 2.0 Extender User Manual

Break the USB distance barrier! Now you can place USB devices up to 330 feet (100 meters) from the computer.

Extends beyond the standard 1.5-foot (5-m) cable limit for USB peripheral devices.



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This equipment generates, uses, and can radiate radio-frequency energy, Class B Digital Device. This equipment has been tested and found to comply with the limits for a Class B computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or telephone reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
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Normas Oficiales Mexicanas (NOM)
Electrical Safety Statement
INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. Specifications

Compliance — FCC Class B, IC Class B, EMC EN-61000-4-2 8 kV Contact, 16 kV Air

Current Available to USB Device at Remote Unit — 500 mA

Maximum USB Devices Supported — (14) USB devices or (3) USB hubs with (11) USB devices

Range — 330 ft. (100 m) over CAT5e (or better) cable

USB Device Support — High-speed devices (480 Mbps): USB 2.0,
Full-speed devices (12 Mbps): USB 2.0 and 1.1,
Low-speed devices (1.5 Mbps): USB 2.0 and 1.1

USB Host Support — EHCI (USB 2.0) and OHCI/UHCI (USB 1.1)

USB Hub Support — Any single-chain can include up to (3) USB hubs plus (1) IC401A USB Extender

Connectors — Local Extender Unit: (1) USB Type B, (1) RJ-45;
Remote Extender Unit: (1) USB Type A, (1) RJ-45

Indicators — Local Extender Unit: (4) front-panel LEDs: Power, Link, Host, and Activity;
Remote Extender Unit: (4) front-panel LEDs: Power, Link, Host, and Activity

Temperature Tolerance — Operating: +32 to +122° F (0 to +50° C);
Storage: -4 to +158° F (-20 to +70 °C)

Humidity Tolerance — Operating: 20 to 80% relative humidity, noncondensing;
Storage: 10 to 90% relative humidity, noncondensing

Power — Input: 100/240 VAC, 50–60 Hz, 600 mA maximum;
Output: 5 VDC, 3 A;
AC adapter connector: 1.7-mm center-positive jack

Size — Local Extender Unit: 3.9"H x 3"W x 1"D (10 x 7.6 x 2.6 cm);
Remote Extender Unit: 3.9"H x 3"W x 1"D (10 x 7.6 x 2.6 cm)

System Shipping Weight — 2 lb. (0.9 kg)

2. Overview

2.1 Introduction

The 1-Port CAT5 USB 2.0 Extender increases the distance from your computer to a wide variety of USB devices—from printers, scanners, hard drives, and audio devices to touchscreens, Web cams, and game controllers. USB devices can be located up to 100 meters (330 feet) from the computer. The extender is composed of two individual units: the Local Extender (LEX) unit and the Remote Extender (REX) unit.

The instructions in this guide assume a general knowledge of computer installation procedures, familiarity with cabling requirements, and some understanding of USB devices.

NOTE: Notes provide additional information that could be useful.

CAUTION: Cautions provide important information about an operational requirement.

2.2 Features

- Extends USB 2.0 high-speed and USB 1.1 (low-speed, full-speed) devices up to 330 feet (100 m) over CAT5 cable.
- Operates with USB 2.0 high-speed host controllers and USB 1.1 classic hosts.
- Supports all USB device types: Control, Interrupt, Bulk, and Isochronous at up to 480 Mbps.
- True plug-and-play, ready to operate right out of the box. No new driver installation required.
- Supports all major operating systems, including Windows®, Mac® OS, and Linux®.
- Provides (1) remote USB 2.0 port. Number of devices can be increased using additional USB hubs.
- AC power adapter at remote extender unit supplies standard 500 mA to USB port.
- Power adapter at local extender unit is not required for normal operation.

2.3 What's Included

Your 1-Port CAT5 USB 2.0 Extender includes the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

- (1) Local Extender unit (LEX)
- (1) Remote Extender unit (REX)
- (1) AC power adapter for Remote Extender unit
- (1) 6-foot (1.8-m) USB 2.0 cable
- This user's manual
- A quick start guide

NOTE: You can purchase an additional AC power adapter for the local unit if your USB port cannot supply the required 500-mA current. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com for details.

2.4 Other Requirements

To complete the installation, you will also need the following items that are not included with the product:

- USB 1.1 or 2.0 compatible computer (host computer) with a USB compliant operating system.
- USB 1.1 or 2.0 compatible device.
- CAT5 Unshielded Twisted Pair (UTP) cable with two RJ-45 connectors (if using surface cabling),

OR,

CAT5 cabling with two information outlets and two CAT5 patch cords with RJ-45 connectors (if using premise cabling).

NOTE: All references to CAT5 cable in this document represent the minimum requirement of solid core CAT5 unshielded twisted-pair cable. You can substitute Category 5e or better or STP cable.

2.5 Hardware Description

2.5.1 The Local Extender (LEX) Unit

The LEX unit connects to the computer using a standard USB cable. Power for this unit is provided by the USB on the host computer. Figures 2-1 and 2-2 show the front and back panels of the LEX. Table 2-1 describes their components.

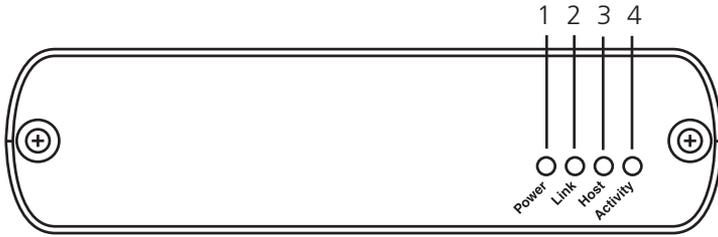


Figure 2-1. Front view: local unit.

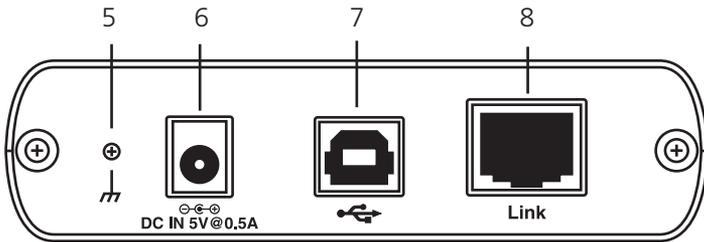


Figure 2-2. Back view: local unit.

Table 2-1. Local (LEX) Unit Components.

Number	Component	Description
1	Power LED (Blue)	LED turns on when power is supplied. Off when no power is supplied.
2	Link LED (Green)	Indicates a valid link is established between the LEX and the REX units over CAT5 cabling.
3	Host LED (Green)	Indicates that the extender system is properly enumerated on the host PC.
4	Activity LED (Amber)	Indicates activity when data transmission is active between the LEX and REX units. LED blinks intermittently with or without a USB device connected. When the LEX and REX are in suspend mode, the LED is off.
5	Ground	Optional ground connection to housing of unit. Accepts an M2 type screw.
6	Power Port (optional)	Not required in normal operation. You can connect an optional 5-V power supply to the LEX unit to provide power if the USB port on the host PC cannot deliver 500 mA to the unit.
7	USB Type B connector	Connects the LEX unit to the host computer.
8	Link Port (RJ-45)	Accepts an RJ-45 connector for CAT5 (or better) cabling.

2.5.2 The Remote Extender (REX) Unit

The REX unit provides USB Type A ports for standard USB devices. The REX unit allows you to connect one (1) USB device directly. Additional devices may be connected by attaching USB hubs to the REX unit. The REX unit is powered by an external AC adapter and can supply up to 500 mA to each USB port.

Figures 2-3 and 2-4 show the front and back panels of the REX. Table 2-2 describes their components.

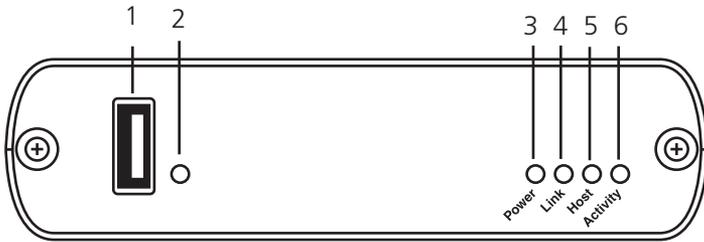


Figure 2-3. Front view: remote unit.

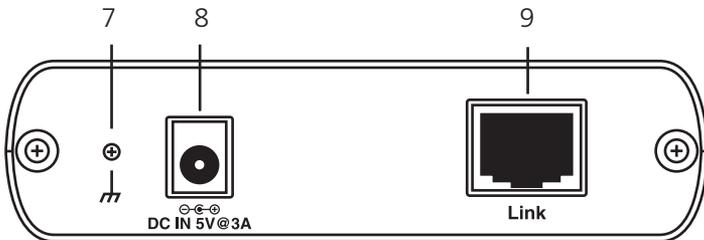


Figure 2-4. Back view: remote unit.

Table 2-2. Remote (REX) Unit Components.

Number	Component	Description
1	Device Port (USB Type A)	Accepts USB devices.
2	Device LED (Green/Orange)	Indicates when a USB device is connected to the device port. Solid green when device is plugged in and active. Off when device is in Suspend mode or REX unit is powered off. Orange when the REX unit detects an overcurrent condition, and the attached USB device attempts to draw more than 500 mA current.
3	Power LED (Blue)	LED turns ON when power is supplied. OFF when no power is supplied.
4	Link LED (Green)	ON when a valid link is established between the LEX unit and REX unit over CAT5 cabling. OFF when there is no link between the LEX and REX units.
5	Host LED (Green)	Indicates that the extender system is properly enumerated on the host PC.
6	Activity LED (Amber)	Indicates activity when data transmission is active between the LEX and REX units. LED blinks intermittently with or without a USB device connected. When the LEX and REX are in suspend mode, the LED is off.
7	Ground	Optional ground connection to housing of unit. Accepts an M2 type screw.
8	Power Port	Connects to the AC power supply. Required at REX for proper operation.
9	Link Port (RJ-45)	Accepts RJ-45 connector for CAT5 (or better) cabling.

2.6 Typical Installation

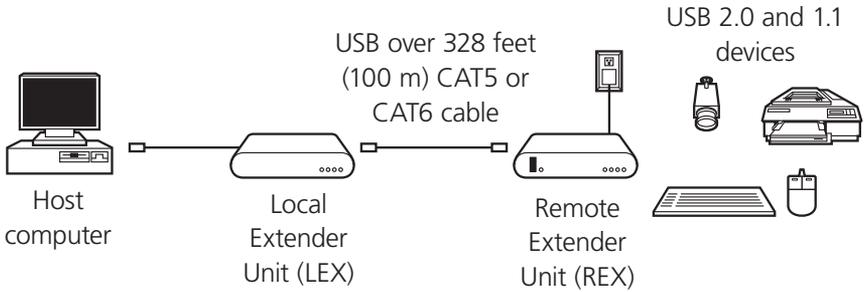


Figure 2-5. USB extension up to 328 feet (100 m) using CAT5 (or better) cable.

Chapter 3: Installation

3. Installation

Before you can install the extender, you need to prepare your site:

1. Determine where the computer is to be located and set up the computer.
2. Determine where you want to locate the USB device(s).
3. If you are using surface cabling, the extender supports a maximum distance of 330 feet (100 m).

OR

If you are using premise cabling, ensure CAT5 cabling is installed between the two locations, with CAT5 information outlets located near both the computer and the USB device(s), and the total length, including patch cords, is no more than 330 feet (100 m).

3.1 Installing the Local Extender (LEX) Unit

1. Place the LEX unit near the computer.
2. Install the supplied USB cable between the LEX and USB port on the host computer.

3.2 Installing the Remote Extender (REX) Unit

1. Place the REX unit near the USB device(s) in the desired remote location.
2. Plug the power adapter into a suitable AC outlet.
3. Connect the power adapter to the REX unit.

3.3 Connecting the Local Extender (LEX) Unit to the Remote Extender (REX) Unit

NOTE: For proper operation, we recommend that you use only CAT5 or better, Unshielded Twisted Pair (UTP) cabling to connect the LEX unit to the REX unit. The cabling must have a straight-through conductor configuration with no crossovers and must be terminated with 8-conductor RJ-45 connectors at both ends. The combined length of any patch cords using stranded conductors must not exceed 32.8 feet (10 m).

With Surface Cabling:

1. Plug one end of the CAT5 cabling (not included) into the Link port (RJ-45) on the LEX unit.

2. Plug the other end of the CAT5 cabling into the Link port (RJ-45) on the REX unit.

With Premise Cabling:

1. Plug one end of a CAT5 patch cord (not included) into the Link port (RJ-45) on the LEX unit.
2. Plug the other end of the patch cord into the CAT5 information outlet near the host computer.
3. Plug one end of the second CAT5 patch cord (not included) into the Link port (RJ-45) on the REX unit.
4. Plug the other end of the second patch cord into the CAT5 information outlet near the USB device.

3.4 Checking the Installation

1. On the LEX and REX units, check that the Power, Host, and Link LEDs are on and that the Activity LED is blinking. If the Link LED is permanently off, then the cabling between the LEX and REX unit is not installed properly or is defective.
2. For Windows users (2000, XP, Vista, Windows 7), open Device Manager to confirm that the extender has installed correctly. Expand the entry for Universal Serial Bus controllers by clicking the + sign. If the extender has been installed correctly, you should find it listed as a "Generic USB Hub."
3. For Mac OS X users, open the System Profiler to confirm that the extender has installed correctly. In the left hand column under Hardware, select "USB" and inspect the right hand panel. If the extender has been installed correctly, you should find it listed as a "Hub" under the USB High-Speed Bus/USB Bus.
4. If the extender is not detected correctly or fails to detect, consult Section 4, Troubleshooting.

NOTE: To open System Profiler in OS X: Open the Finder, select Applications, then open the Utilities folder and double click on the System Profiler icon.

To open Device Manager in Windows 2000 or XP: Right-click "My Computer," then select: Properties >> Hardware tab >> Device Manager.

To open Device Manager in Windows Vista or Windows 7:

Open the Start menu, right-click on "Computer," then select: Manage >> Device Manager.

3.5 Connecting a USB Device

1. Install any software required to operate the USB device(s). Refer to the documentation for the USB device(s), as required.
2. Connect the USB device to the device port on the REX unit.
3. Check that the device is detected and installed properly in the operating system.

3.6 Compatibility

The extender complies with USB 1.1 and USB 2.0 specifications governing the design of USB devices. However, we do not guarantee that all USB devices are compatible with the extender, because there are a number of different configurations that may impact the operation of USB devices over extended distances.

4. Troubleshooting

Table 4-1 provides troubleshooting tips. The topics are arranged in the order in which they should be executed in most situations. If you are unable to resolve the problem after following these instructions, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

4.1 Troubleshooting Tips

Table 4-1. Problems/Causes/Solutions.

Problem	Cause	Solution
All LEDs on LEX unit are off.	The LEX unit is not receiving enough power from the USB port or the (optional) LEX AC adapter.	<ol style="list-style-type: none"> 1. Ensure that the USB connection between the LEX and host computer is properly installed. 2. Move the USB connector to another USB port on the host computer.
All LEDs on REX unit are off.	The REX unit is not receiving enough power from the AC adapter.	<ol style="list-style-type: none"> 1. Ensure that the AC power adapter is properly connected to the REX unit. 2. Check that the AC adapter is connected to a live source of electrical power. Check that the REX power LED is illuminated.
Link LEDs on LEX unit and REX unit are off.	There is no connection between the LEX unit and the REX unit.	<ol style="list-style-type: none"> 1. Ensure CAT5 cable is connected between the LEX unit and the REX unit. Use CAT5 or better cable, UTP with a straight-through connector and no crossovers, and 8-pin RJ-45 connectors at both ends. 2. Connect a short CAT5 patch cord between the LEX unit and the REX unit to determine if the original CAT5 cable is defective.
Extender units were working, but the Host LED on the LEX/REX units are suddenly blinking.	The REX unit is in suspend mode. The operating system may put the extender in suspend mode when the computer is put into a Suspend/Standby state or when no USB devices are attached.	<ol style="list-style-type: none"> 1. Recover/Resume the operating system from Suspend/Standby mode (see your operating system's documentation). 2. Attach a USB device to the extender.

Table 4-1 (Continued). Problems/Causes/Solutions.

Problem	Cause	Solution
All LEDs on both the LEX unit and the REX unit are on, but the USB device does not operate correctly or is detected as an "Unknown Device" in the operating system.	<ul style="list-style-type: none"> • The USB device is malfunctioning. • The computer does not recognize the USB device. • The application software for the device is not operating. • The extender is malfunctioning. 	<ol style="list-style-type: none"> 1. Disconnect the extender from the computer. 2. Connect the USB device directly to the USB port on the computer. 3. If the device does not operate properly, consult the user documentation for the device. 4. Update your system BIOS, chipset, or USB Host controller drivers from your system/motherboard manufacturer's Web site. 5. If the device operates properly when directly connected to the computer, connect another device (of a different type) to the extender to the computer. 6. If the second device does not operate, the extender may be malfunctioning. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com. 7. If the second device does not operate properly, the first device may not be compatible with the extender.
USB device is attached to the REX USB port, but the REX device LED is off.	A USB device must have the appropriate driver installed on the computer operating system.	<ol style="list-style-type: none"> 1. Install the required USB device driver on the computer operating system before attaching the USB device to the REX unit. See your USB device manufacturer's Web site for details. 2. Consult your USB device documentation and power your USB device with the additional (USB device manufacturer supplied) power supply (if available).
Device LED is orange and units are no longer functioning.	An overcurrent condition has occurred because the USB device draws more power than can be supplied per USB specification (500 mA).	Power cycle the REX.
Host and Link LEDs on the LEX/REX units blink intermittently.	Firmware mismatch between the LEX and the REX.	<ol style="list-style-type: none"> 1. Use a different LEX/REX pair that has the same firmware revision. 2. Upgrade the LEX/REX firmware. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com for assistance.

4.2 Contacting Black Box

If you determine that your 1-Port CAT5 USB 2.0 Extender is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

4.3 Shipping and Packaging

If you need to transport or ship your 1-Port CAT5 USB 2.0 Extender:

- Package it carefully. We recommend that you use the original container.
- If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.

Appendix. Technical Glossary

Category 5 (CAT5) Network Cabling — Category 5 cable is commonly also referred to as CAT5. This cabling is available in either solid or stranded twisted-pair copper wire variants and as UTP (Unshielded Twisted Pair) or STP (Shielded Twisted Pair). UTP cables are not surrounded by any shielding, making them more susceptible to electromagnetic interference (EMI). STP cables include shielding over each individual pair of copper wires and provides better protection against EMI. Category 5 has been superseded by CAT5e cabling, which includes improved data integrity to support high-speed communications.

USB Cables — USB cables have two distinct connectors. The Type A connector is used to connect the cable from a USB device to the Type A port on a computer or hub. The Type B connector is used to attach the USB cable to a USB device.

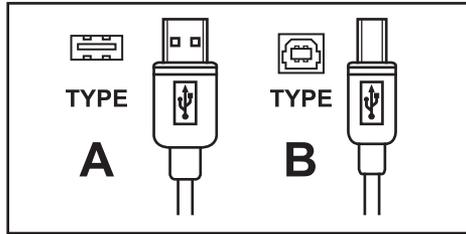


Figure 6-1. USB connectors.

RJ-45 — The Registered Jack (RJ) physical interface is what connects the network cabling (CAT5) to the LEX unit and REX unit. You may use either the T568A scheme (Table 6-1) or the T568B scheme (Table 6-2) for cable termination. The 1-Port CAT5 USB 2.0 Extender uses all four pairs of the cable. RJ-45 connectors are sometimes also referred to as 8P8C connectors.

RJ-45 Pin Positioning

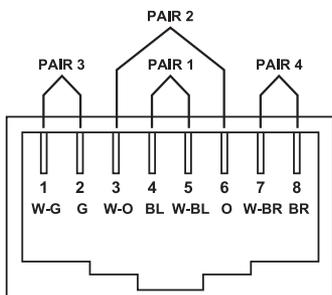


Figure 6-2. RJ-45 connector using T568A wiring.

Table 6-1. T568A wiring.

Pin	Pair	Wire	Cable Color
1	3	1	White/Green
2	3	2	Green
3	2	1	White/Orange
4	1	2	Blue
5	1	1	White/Blue
6	2	2	Orange
7	4	1	White/Brown
8	4	2	Brown

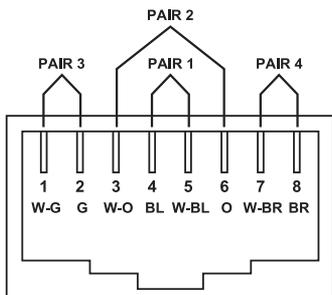


Figure 6-2. RJ-45 connector using T568B wiring.

Table 6-1. T568B wiring.

Pin	Pair	Wire	Cable Color
1	2	1	White/Orange
2	2	2	Orange
3	3	1	White/Green
4	1	2	Blue
5	1	1	White/Blue
6	3	2	Green
7	4	1	White/Brown
8	4	2	Brown

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