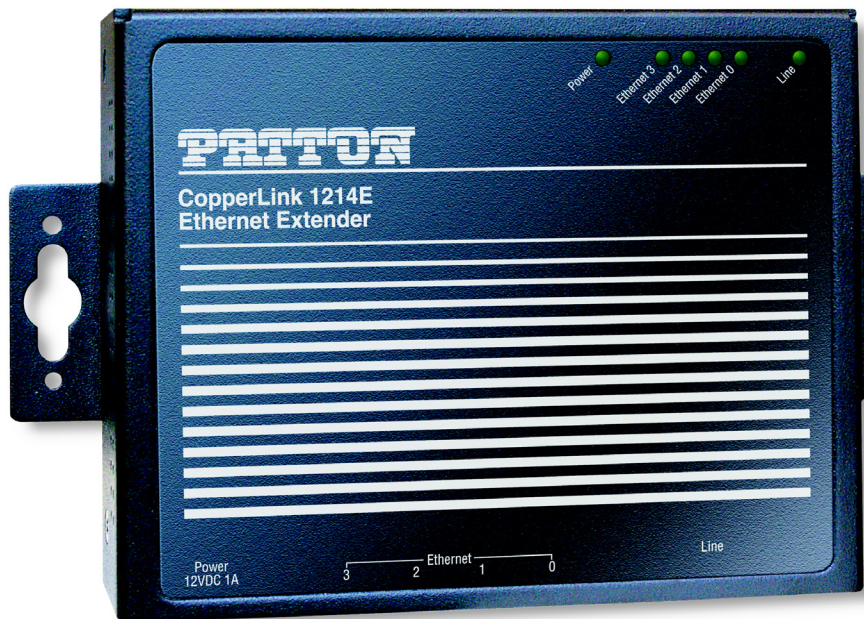


CopperLink Model 1214E **Extended Temperature Ethernet Extender**

User Manual



Important

This is a Class A device and is not intended for use in a residential environment.

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Part Number: **07MCL1214E-UM, Rev. D**
Revised: **February 10, 2015**

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The information in this document is subject to change without notice. Patton Electronics assumes no liability for errors that may appear in this document.

Warranty Information

Patton Electronics warrants all CopperLink components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of the shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If the product fails to perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall Patton Electronics be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. Patton Electronics specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

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About This Guide

This guide describes the CopperLink Model 1214E hardware, installation and basic configuration.

Audience

This guide is intended for the following users:

- Operators
- Installers
- Maintenance technicians

Structure

This guide contains the following chapters and appendices:

- [Chapter 1](#) on page 13 provides information about CL1214E features and capabilities
- [Chapter 2](#) on page 16 provides information about installing the CL1214E CopperLink interfaces
- [Chapter 3](#) on page 20 provides information about the CL1214E configuration and operation
- [Chapter 4](#) on page 24 provides information on contacting Patton technical support for assistance
- [Appendix A](#) on page 27 provides compliance information for the CL1214E
- [Appendix B](#) on page 29 provides specifications for the CL1214Es
- [Appendix C](#) on page 31 provides a table of replacements for parts and accessories
- [Appendix D](#) on page 33 provides an overview of terms within this manual
- [Appendix E](#) on page 35 provides a line range and reach chart for the CL1214E

For best results, read the contents of this guide *before* you install the CopperLink 1214E.

Precautions

Notes and cautions, which have the following meanings, are used throughout this guide to help you become aware of potential Router modem problems. *Warnings* relate to personal injury issues, and *Cautions* refer to potential property damage.

Note A note presents additional information or interesting sidelights.



The alert symbol and IMPORTANT heading calls attention to important information.



The alert symbol and CAUTION heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.



The shock hazard symbol and CAUTION heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock.



The alert symbol and WARNING heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.



The shock hazard symbol and WARNING heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock.

Safety When Working With Electricity



- Do not open the device when the power cord is connected. For systems without a power switch and without an external power adapter, line voltages are present within the device when the power cord is connected.
- For devices with an external power adapter, the power adapter shall be a listed *Limited Power Source*. The mains outlet that is utilized to power the device shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker in compliance with local regulatory requirements.
- For AC powered devices, ensure that the power cable used meets all applicable standards for the country in which it is to be installed.
- For AC powered devices which have 3 conductor power plugs (L1, L2 & GND or Hot, Neutral & Safety/Protective Ground), the wall outlet (or socket) must have an earth ground.
- For DC powered devices, ensure that the interconnecting cables are rated for proper voltage, current, anticipated temperature, flammability, and mechanical serviceability.
- WAN, LAN & PSTN ports (connections) may have hazardous voltages present regardless of whether the device is powered ON or OFF. PSTN relates to interfaces such as telephone lines, FXS, FXO, DSL, xDSL, T1, E1, ISDN, Voice, etc. These are known as “hazardous network voltages” and to avoid electric shock use caution when working near these ports. When disconnecting cables for these ports, detach the far end connection first.
- Do not work on the device or connect or disconnect cables during periods of lightning activity



This device contains no user serviceable parts. This device can only be repaired by qualified service personnel.



In accordance with the requirements of council directive 2002/96/EC on Waste of Electrical and Electronic Equipment (WEEE), ensure that at end-of-life you separate this product from other waste and scrap and deliver to the WEEE collection system in your country for recycling.



This device is NOT intended nor approved for connection to the PSTN. It is intended only for connection to customer premise equipment.



Electrostatic Discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures. Do the following to prevent ESD:

Always follow ESD prevention procedures when removing and replacing cards.

Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground.

To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

General Observations

- Clean the case with a soft slightly moist anti-static cloth
- Place the unit on a flat surface and ensure free air circulation
- Avoid exposing the unit to direct sunlight and other heat sources
- Protect the unit from moisture, vapors, and corrosive liquids

Typographical Conventions Used in this Document

This section describes the typographical conventions and terms used in this guide.

General Conventions

The procedures described in this manual use the following text conventions:

Table 1. General conventions

Convention	Meaning
Garamond blue type	Indicates a cross-reference hyperlink that points to a figure, graphic, table, or section heading. Clicking on the hyperlink jumps you to the reference. When you have finished reviewing the reference, click on the Go to Previous View button  in the Adobe® Acrobat® Reader toolbar to return to your starting point.
Helvetica bold type	Commands and keywords are in boldface font.
Helvetica bold-italic type	Parts of commands, which are related to elements already named by the user, are in boldface italic font.
Italicized Helvetica type	Variables for which you supply values are in <i>italic</i> font
Helvetica type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.
< >	Angle brackets indicate function and keyboard keys, such as <SHIFT>, <CTRL>, <C>, and so on.
[]	Elements in square brackets are optional.
{ a b c }	Alternative but required keywords are grouped in braces ({ }) and are separated by vertical bars ()
screen	Terminal sessions and information the system displays are in <code>screen</code> font.

Table 1. General conventions

Convention	Meaning
<i>node</i>	The leading IP address or nodename of a SmartNode is substituted with <i>node</i> in <i>boldface italic</i> font.
SN	The leading SN on a command line represents the nodename of the SmartNode
#	An hash sign at the beginning of a line indicates a comment line.

Chapter 1

General Information

Chapter contents

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CopperLink 1214E Overview

The Patton CopperLink 1214E modems provide high-speed LAN connections between peered Ethernet LANs, remote PCs, or any other network-enabled 10/100Base-T device.

Operating in pairs, one CL1214E is configured as the (L) Local unit located at one end of the LAN extension and the other CL1214E is configured as the (R) Remote unit at the other end. The CL1214E is configured as a L or R via the switch on the bottom of the unit. These units can automatically forward LAN broadcasts, multicasts, and frames across a 2-wire voice-grade twisted-pair link. The data is passed transparently (unmodified) through the 1214Es. The 1214Es automatically add and delete MAC addresses, only passing packets across the CopperLink link that are meant for the remote peered LAN. The CL1214E is fully compatible with the Model 2174. When using the 2174, like the CL1214E, one unit must be local, the other remote. For example, when CL1214E is set to local, the 2174 must be set to remote.

Key Features

The CopperLink 1214E includes the following features:

- Variable rate CopperLink extender, which is easy to configure
- Auto-MDIX Ethernet
- Configurable 10/100, Full/Half and Auto-Negotiating Ethernet
- Extends up to 4x 10/100Base-TX Ethernet beyond 328-foot (100-meter) limitation over a single twisted-pair, Cat 5e/6/7
- Symmetric or asymmetric settings via DIP switch
- Transparent operation
- LED indicators for Power, Link, Ethernet Link/Activity, Remote and Local

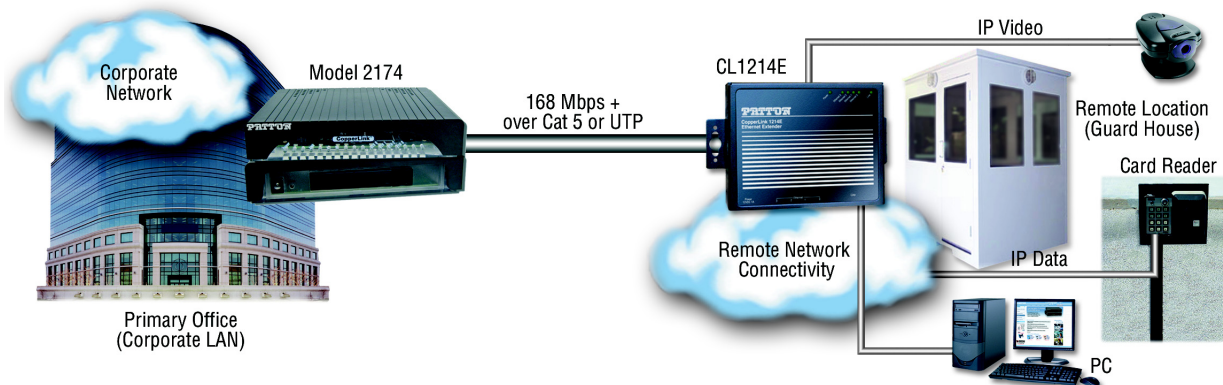


Figure 1. Typical application

The pair of CL1214E models work together to create a transparent extension between two peered Ethernet LANs using twisted pair (2-wire) or Cat5+. Figure 1 shows a typical point-to-point application.

CopperLink 1214E Front Panel

The CL1214E features six front panel LEDs that monitor power, the Ethernet signals, the CopperLink connection, and the remote/local setting. [Figure 2](#) shows the front panel location of each LED. [Table 2](#) below describes the LED functions.

Before applying power to the CL1214E, please review [Chapter 2, “Connecting Power”](#) on page 19 to verify that the unit is connected to the appropriate power source.

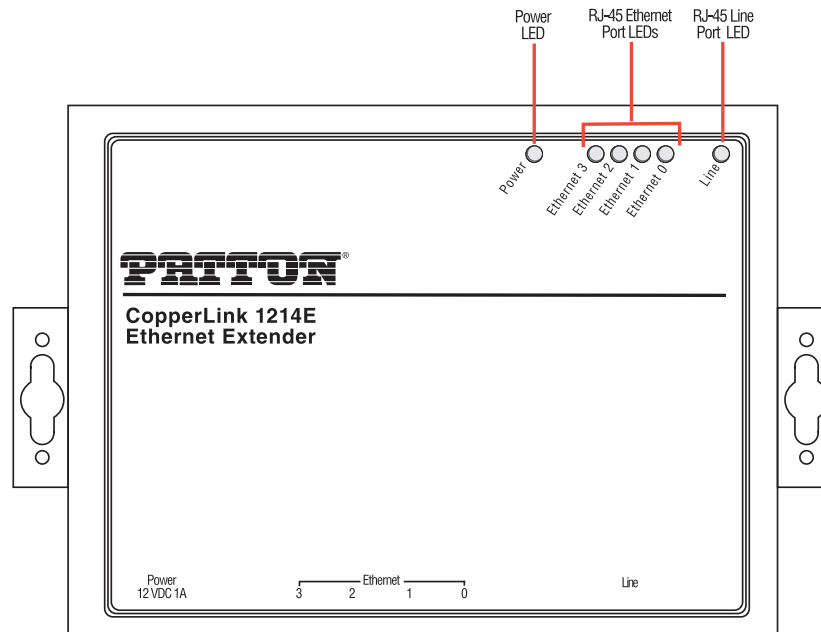


Figure 2. CL1214E front panel

Table 2. CL1214E LED description

LED	Indication	Description
Power	Green OFF	The device is powered on. The device is powered off.
Link	Green Blinking Green OFF	The port is connected. Data transceiving. No valid link on this port.
Ethernet (3, 2, 1, 0)	Green *Blinking Green	The port is connected. Data transceiving.

- * Once the unit connects to a power source, the Link LED will blink as the CL1214E automatically looks for the other unit in the pair.

Chapter 2

Installing the CL1214E

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Planning the Installation



CAUTION

The Interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

To install the CL1214E Ethernet Extender, do the following:

1. Connect the line interface between the units (refer to “[Connecting the Line Interface](#)” on page 18).

Note See [figure 3](#) for the rear panel arrangements

2. Connect the Ethernet interface (refer to “[Connecting the 10/100Base-T Ethernet Interface](#)” on page 19).
3. Connect the power plug (refer to “[Connecting Power](#)” on page 19).

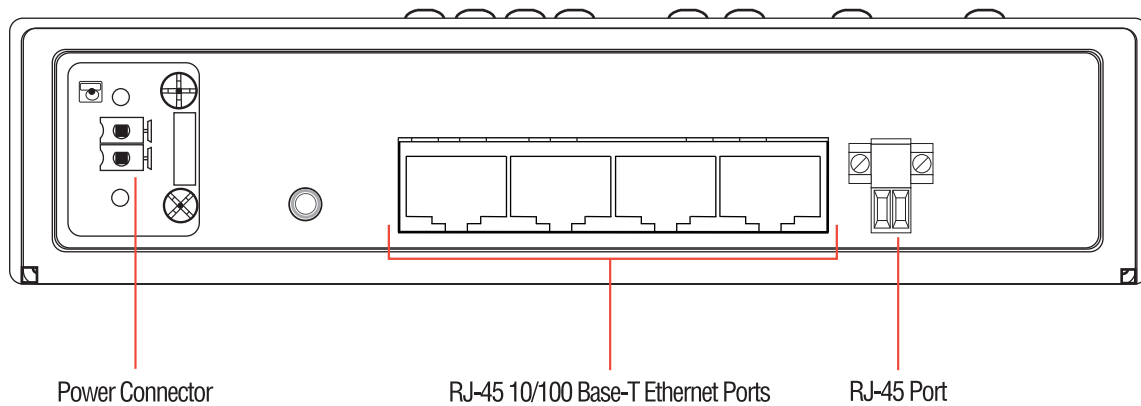


Figure 3. CL1214E rear panel options

Connecting the Line Interface

The CopperLink 1214E supports communication between two peer Ethernet LAN sites over a distance of up to 10,000 ft (3 km) over 24 AWG (0.5 mm) twisted-pair wire or Cat5+.

Note Actual distance and link performance may vary depending on the environment and type/gauge of wire used.

Note The CopperLink Model 1214E units work in pairs. One of the units must be configured as a (L) Local unit, and the other unit must be configured as a (R) Remote unit.

Connecting the Line Interface for CL1214E/EUI or CL1214E/TB

Follow the steps below to connect the CL1214E CopperLink interfaces.

1. To function properly, the two CL1214Es must be connected together using twisted-pair, unconditioned, dry, metal wire, between 19 (0.9mm) and 26 AWG (0.4mm). Leased circuits that run through signal equalization equipment are not acceptable.
2. The CL1214E is equipped with an RJ-45 interface jack (figure 4) or terminal block (figure 5) that can be used on the CopperLink interface. The CopperLink interface is a two-wire interface. Observe the signal/pin relationships on the CL1214E's CopperLink interface jack.

The RJ-45 connector on the CL1214E's twisted pair interface is polarity insensitive and is wired for a two-wire interface. The signal/pin relationship is shown in figure 4.

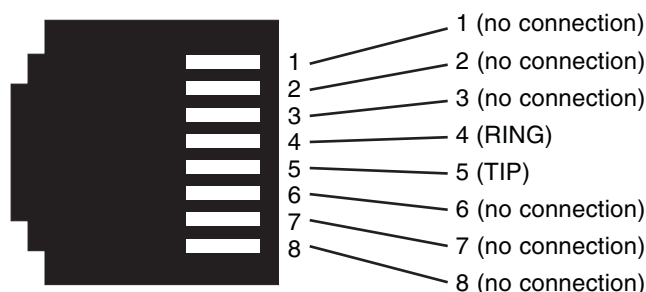


Figure 4. CL1214E (RJ-45) twisted pair line interface

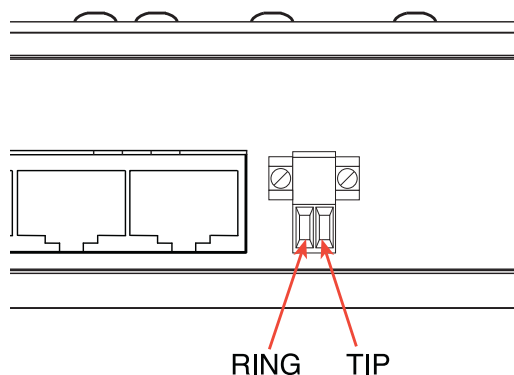


Figure 5. CL1214E (Terminal Block) twisted pair line interface

Connecting the 10/100Base-T Ethernet Interface



The Interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

The RJ-45 ports labeled **Ethernet** are the Auto-MDIX10/100Base-T interface. These ports are designed to connect directly to a 10/100Base-T device or network. [Figure 6](#) shows the signal/pin relationships on this interface. You may connect this port to a hub or PC using a straight through or crossover cable that is up to 328 ft long.

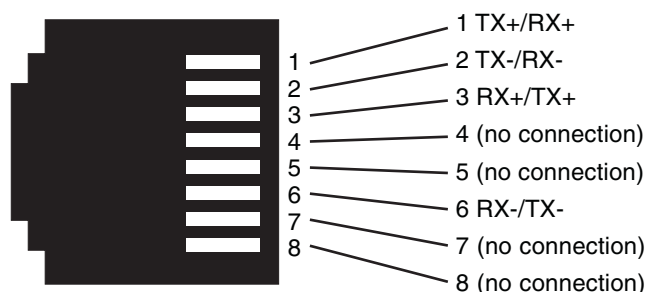


Figure 6. CL1214E 10/100Base-T RJ-45 Connector Pin-out

Connecting Power



The Interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

The CL1214E does not have a power switch, so it powers up as soon as it is plugged in.

An external AC or DC power supply is available separately. This connection is made via the barrel jack on the rear panel of the CL1214E. No configuration is necessary for the power supply (See [Appendix C on page 31](#) for domestic and international power supply and cord options).

DC power (supplied via the power supply jack to the 1214E) must meet the following requirements; DC power supplied must be regulated 12VDC $\pm 5\%$, 1.0A minimum. Center pin is +12V. The barrel type plug has a 2.5/5.5/10mm I.D./O.D./Shaft Length dimensions.

Chapter 3

Configuration and Operation

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Introduction

The CL1214E has eight DIP switches (S1) for configuring the unit for a wide variety of applications. This section describes switch locations and explains the different configurations.

Once the CL1214E's are properly installed, they should operate transparently. No user settings required.

Note Before applying power to the CL1214E, please review Chapter 2, “[Connecting Power](#)” on page 19 to verify that the unit is connected to the appropriate power source.

Configuring the Hardware DIP Switches

The DIP switches are externally accessible from the underside of the CL1214E. [Figure 7](#) shows the orientation of the DIP switches in the On and Off positions.

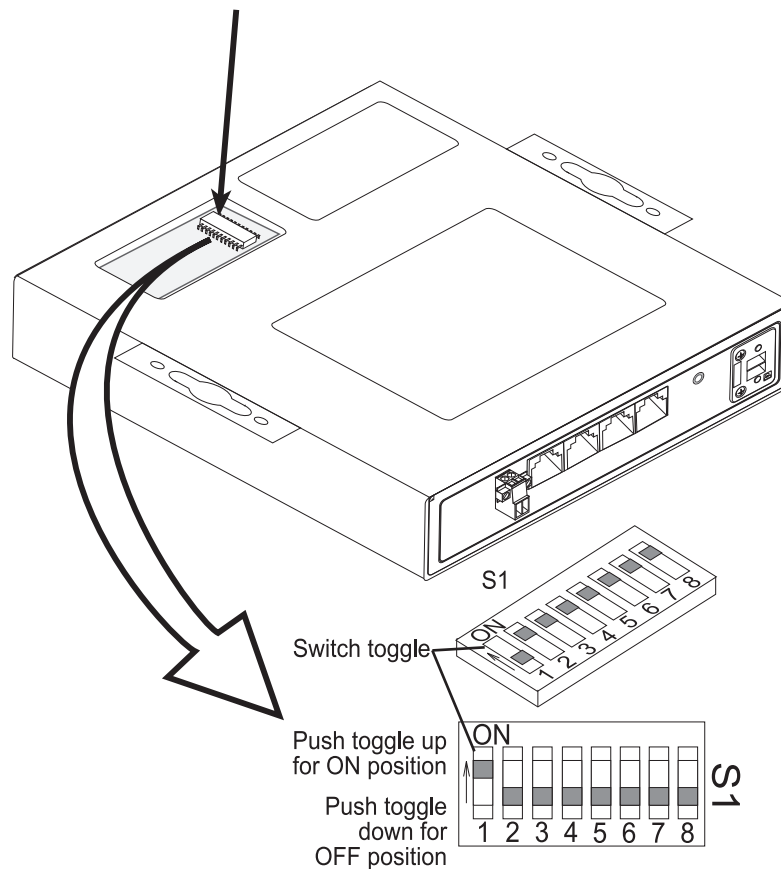


Figure 7. DIP switch orientation

Configuring DIP Switch S1

DIP Switch S1 is where you configure the CopperLink line. The following tables describe the configuration for the 1214E.

Table 3. S1 Summary

Position	Description
S1-1	Local/Remote Configuration
S1-2	Line Rate/Symmetry
S1-3	Line Rate/Symmetry
S1-4	Reserved
S1-5	SNR Margin
S1-6	Reserved
S1-7	Reserved
S1-8	Reserved

Switch S1-1: Local/Remote Configuration

Use Switch S1-1 to configure the unit as Remote or Local in the CL1214E.

Table 4. Local/Remote Unit Configuration

S1-1	Setting
ON	CPE/Remote
OFF	CO/Local

Switches S1-2 and S1-3: Symmetric/Asymmetric Operation

Use Switches S1-2 and S1-3 to configure the CopperLink line rate type-and operation.

Table 5. Symmetric/Asymmetric Selection Chart

S1-2	S1-3	Setting
OFF	OFF	High-Speed "Symmetric"
OFF	ON	High-Speed "Asymmetric"
ON	OFF	FastPath High-Speed "Asymmetric"
ON	ON	Long-Range "Asymmetric"

Note See [Appendix E on page 35](#) for line rate distances.

Switch S1-5: General Protection (Signal to Noise Ratio)

Use Switch S1-5 to configure line noise protection.

Table 6. Signal to Noise Ratio

S1-5	Setting
ON	6dB
OFF	9dB

- **6dB:** Original line noise protection with 6dB SNR
- **9dB:** Better line noise protection with SNR up to 9dB

Chapter 4

Contacting Patton for assistance

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Introduction

This chapter contains the following information:

- “[Contact information](#)”—describes how to contact Patton technical support for assistance.
- “[Warranty Service and Returned Merchandise Authorizations \(RMAs\)](#)”—contains information about the RAS warranty and obtaining a return merchandise authorization (RMA).

Contact information

Patton Electronics offers a wide array of free technical services. If you have questions about any of our other products we recommend you begin your search for answers by using our technical knowledge base. Here, we have gathered together many of the more commonly asked questions and compiled them into a searchable database to help you quickly solve your problems:

- Online support—available at www.patton.com
- E-mail support—e-mail sent to support@patton.com will be answered within 1 business day
- Telephone support—standard telephone support is available five days a week—from 8:00 am to 5:00 pm EST (1300 to 2200 UTC)—by calling +1 (301) 975-1007

Warranty Service and Returned Merchandise Authorizations (RMAs)

Patton Electronics is an ISO-9001 certified manufacturer and our products are carefully tested before shipment. All of our products are backed by a comprehensive warranty program.

Note If you purchased your equipment from a Patton Electronics reseller, ask your reseller how you should proceed with warranty service. It is often more convenient for you to work with your local reseller to obtain a replacement. Patton services our products no matter how you acquired them.

Warranty coverage

Our products are under warranty to be free from defects, and we will, at our option, repair or replace the product should it fail within one year from the first date of shipment. Our warranty is limited to defects in workmanship or materials, and does not cover customer damage, lightning or power surge damage, abuse, or unauthorized modification.

Out-of-warranty service

Patton services what we sell, no matter how you acquired it, including malfunctioning products that are no longer under warranty. Our products have a flat fee for repairs. Units damaged by lightning or other catastrophes may require replacement.

Returns for credit

Customer satisfaction is important to us, therefore any product may be returned with authorization within 30 days from the shipment date for a full credit of the purchase price. If you have ordered the wrong equipment or you are dissatisfied in any way, please contact us to request an RMA number to accept your return. Patton is not responsible for equipment returned without a Return Authorization.

Return for credit policy

- Less than 30 days: No Charge. Your credit will be issued upon receipt and inspection of the equipment.
- 30 to 60 days: We will add a 20% restocking charge (crediting your account with 80% of the purchase price).
- Over 60 days: Products will be accepted for repairs only.

RMA numbers

RMA numbers are required for all product returns. You can obtain an RMA by doing one of the following:

- Completing a request on the RMA Request page in the *Support* section at www.patton.com
- By calling +1 (301) 975-1007 and speaking to a Technical Support Engineer
- By sending an e-mail to returns@patton.com

All returned units must have the RMA number clearly visible on the outside of the shipping container. Please use the original packing material that the device came in or pack the unit securely to avoid damage during shipping.

Shipping instructions

The RMA number should be clearly visible on the address label. Our shipping address is as follows:

Patton Electronics Company

RMA#: xxxx

7622 Rickenbacker Dr.

Gaithersburg, MD 20879-4773 USA

Patton will ship the equipment back to you in the same manner you ship it to us. Patton will pay the return shipping costs.

Appendix A

Compliance Information

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Compliance

EMC

- EN55022, Class A
- EN55024

Low-Voltage Directive (Safety)

- IEC/EN60950-1, 2nd edition

PSTN

- This device is not intended nor approved for connection to the PSTN

Radio and TV Interference

The CL1214E Ethernet extender generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. The CL1214E Ethernet extender have been tested and found to comply with the limits for a Class A computing device in accordance with specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the CL1214E Ethernet extender does cause interference to radio or television reception, which can be determined by disconnecting the unit, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

CE Declaration of Conformity

Patton Electronics, Inc declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 2004/108/EC relating to electromagnetic compatibility, Directive 2006/95/EC relating to electrical equipment designed for use within certain voltage limits and Directive 2011/65/EU relating to RoHS compliance. The Declaration of Conformity may be obtained from Patton Electronics, Inc at www.patton.com/certifications.

The safety advice in the documentation accompanying this device shall be obeyed. The conformity to the above directive is indicated by CE mark on the device.

Authorized European Representative

D R M Green
European Compliance Services Ltd
Greyfriars Court
Paradise Square
Oxford, OX1 1BE, UK

Appendix B Specifications

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LAN Connection

Four RJ-45, 10/100Base-T, IEEE 802.3 Ethernet

CopperLink Connection

RJ-45

CopperLink Line Rate and CopperLink Distance

Line Rate

Up to 200 Mbps asymmetrical

Distance

Up to 9,842 ft (3 km)

Note Distances depend on line rate and line conditions

LED Status Indicators

Power, Local and Remote—Green

CopperLink—Link (Green)

Ethernet—Link (Green) and Activity (Flashing Green)

Power Supply

External UI (100-240 VAC)

Power consumption—400mA at 12 VDC

OR

Internal 12 VDC

Power consumption—400mA at 12 VDC

Physical

Dimensions: 6.22W x 1.25H x 4.75D inch (157W x 318H x 120D mm)

Operating temperature: 32–122°F (0–50°C)

Humidity: Up to 90% non-condensing

Appendix C **Factory Replacement Parts and Accessories**

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CopperLink 1214E Factory Replacement Parts and Accessories

Table 7. CL1214E Factory Replacement Parts and Accessories

Patton Model #	Description
CL1214E/CC/12	Extended Temperature CopperLink High Speed Auto Rate Extender Conformal Coated; RJ45; -12VDC Input
CL1214E/CC/EUI	Extended Temperature CopperLink High Speed Auto Rate Extender Conformal Coated; RJ45 Connector; 100-240VAC
CL1214E/CC/TB/12	Extended Temperature CopperLink High Speed Auto Rate Extender Conformal Coated; Terminal Block Connector; -12VDC Input
CL1214E/CC/TB/EUI	Extended Temperature CopperLink High Speed Auto Rate Extender Conformal Coated; Terminal Block Connector; 100-240VAC
CL1214E/EUI	Extended Temperature CopperLink High Speed Auto Rate Extender RJ45 Connector; 100-240VAC
CL1214E/TB/12	Extended Temperature CopperLink High Speed Auto Rate Extender Terminal Block Connector; -12VDC Input
CL1214E/TB/EUI	Extended Temperature CopperLink High Speed Auto Rate Extender Terminal Block Connector; 100-240VAC
CL1214E/EUI-2PK	High Speed CopperLink Ethernet Extender Kit (Local and Remote); RJ45 Line, 100-240VAC
CL1214E/TB/EUI-2PK	High Speed CopperLink Ethernet Extender Kit (Local and Remote); Terminal Block Line, 100-240VAC
Power Supplies	
PS-03671H1-002M	100-240VAC (12V, DC/2A) Wall mount power adapter (Modified)
Power Adapters	
12-130	European replacement plug
12-129	American replacement plug
12-131	United Kingdom plug
12-132	Australian/Chinese plug

Appendix D **Interface Pin Assignment**

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10/100Base-T Interface

RJ-45

- Pin 1: TX+
- Pin 2: TX-
- Pin 3: RX+
- Pin 6: RX-
- Pins 4, 5, 7, 8: No connection

CopperLink Interface

RJ-45

- Pin 4: Ring
- Pin 5: TIP
- Pins 1, 2, 3, 6, 7, 8: No connection

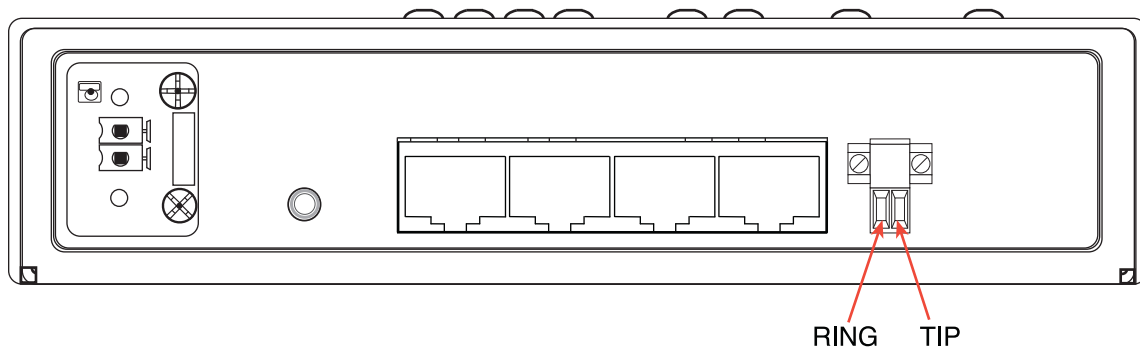


Figure 8. Terminal Block

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Appendix E **Line Rate and Reach**

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Line Rate and Reach Chart, Based on 24 AWG (0.5 MM).....36

Line Rate and Reach Chart, Based on 24 AWG (0.5 mm)

Table 8. Line Rate & Reach Chart Using Twisted-Pair (Long Range)

Mode (Long Range)	Distance in Feet		Mbps	
	ft	m/km	DS	US
Asymmetric S1-2 ON S1-3 ON	250 ft	76 m	67	16
	1000 ft	305 m	59	16
	2,000 ft	610 m	45	11
	3,000 ft	914 m	31	5
	5,000 ft	1.5 km	17	682 kbps
	10,000 ft	3 km	4	263 kbps

Note The actual distance and link performance may vary depending on the environment and type/gauge of wire used

Note DS = downstream, US = upstream

Note This chart applies to CL1214E Ethernet extenders with a twisted-pair line interface—CL1214E/EUI and CL1214E/TB

Table 9. Line Rate & Reach Chart Using Twisted-Pair (High Speed)

Mode (High Speed)	Distance in Feet		Mbps	
	ft	m/km	DS	US
Symmetric S1-2 OFF S1-3 OFF	250 ft	76 m	121	144
	1000 ft	305 m	73	103
	2,000 ft	610 m	45	37
	3,000 ft	914 m	46	10
	3,500 ft	1 km	30	4
Asymmetric S1-2 OFF Standard S1-3 ON S1-2 ON FastPath S1-3 OFF	250 ft	76 m	168	95
	1000 ft	305 m	126	54
	2,000 ft	610 m	60	21
	3,000 ft	914 m	42	6
	3,500 ft	1 km	35	1

Note The actual distance and link performance may vary depending on the environment and type/gauge of wire used.

Note DS = downstream, US = upstream

Note This chart applies to CL1214E Ethernet extenders with a twisted-pair line interface—CL1214E/EUI and CL1214E/TB