Quick Start Guide

This quick start guide describes how to install and use the Hardened Ethernet Extender. This is the Hardened Ethernet Extender of choice for harsh environments constrained by space.

Installation

ED3538T (Transmitter): This is a PoL (Power over Link) transmitter. Data and power can be delivered at the same time through one pair copper wire to turn on and communicate with ED3538R (Receiver) via RJ-11 phone jack or 2-pin Terminal Block interface.

ED3538R (Receiver): This is a PoL (Power over Link) Receiver. ED3538R (Receiver) can be powered either by ED3538T (Transmitter) through one pair copper wire or power supply. The Ethernet port supports IEEE802.3at PoE/PSE for fulfilling PoE/PD application.

- Removes the device power before installation.
- Removes the device power before any I/O and DIP switch configuration.
- Do not connect ED3538T and ED3538R to the same power source. Devices may be damaged due to power loop back through the PoL linked via copper wire.

PoL (Power over Link) Mode Enable Installation
- Ensures all power sources are disconnected from ED3538T and ED3538R.
- Ensures ED3538T PoL (Power over Link) DIP switch is in **On** position (Up position).
- Sets ED3538T Type DIP switch to Perf (Performance, Up position) to acquire better Line Speed (but poor noise immunity). Or sets Type DIP switch of ED3538T to Std (Standard, Down position) to acquire standard Line Speed (but better noise immunity).
- Checks if ED3538R Mode is set to Rmt on DIP switch (Remote, Up position).
- Connects one end of the one pair copper wire to RJ-11 phone jack or 2-pin Terminal Block interface of the ED3538T and the other end to RJ-11 phone jack or 2-pin Terminal Block interface of the ED3538R.
- Connects power source to ED3538T.
- Data and power can be delivered from ED3538T, and at the same time through one pair copper wire to turn on and communicate with ED3538R.

<Note> The equipment is designed for building installation and not intended to be connected to exposed (outside plant) networks including campus environment or equivalent.
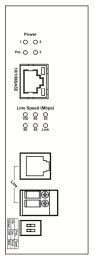
PoL (Power over Link) Mode Disable Installation
- For longer distance (e.g. over 1.4km) extension application, ED3538R may not be able to receive power from ED3538T. A separate power may be applied on ED3538R.
- Ensures all power sources are disconnected from ED3538T and ED3538R.
- Ensures ED3538T PoL (Power over Link) DIP switch is in **Off** position (Down position).
- Sets ED3538T Type DIP switch to Perf (Performance, Up position) to acquire better Line Speed (but poor noise immunity). Or sets Type DIP switch of ED3538T to Std
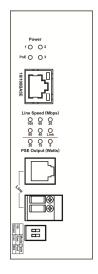
(Standard, Down position) to acquire standard Line Speed (but better noise immunity).
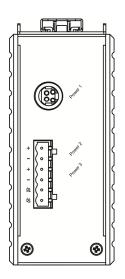
- Connects power source to ED3538T.
- Checks if ED3538R Mode is set to Rmt on DIP switch (Remote, Up position).
- Connects power source to ED3538R.
- Connects one end of the one pair copper wire to RJ-11 phone jack or 2-pin Terminal Block interface of the ED3538T and the other end to RJ-11 phone jack or 2-pin Terminal Block interface of the ED3538R.
- Data can be transmitted between ED3538T and ED3538R via copper wire.

Physical Description

The Port Status LEDs and Power Inputs

ED3538T   ED3538R

- DC Terminal Block Power Inputs: 2.5A @ 48VDC (Peak current 3.26A). There are two pairs of power inputs can be used to power up this Ethernet Extender. Redundant power supplies function is supported. You only need to have one power input connected to run the Ethernet Extender.
- DC JACK Power input: 2.5A @ 48VDC (Peak current 3.26A).

Power supply suggestion	30 watts application
SDR-120-48 / DR-120-48 (120W 48VDC)	For one pair
SDR-240-48 (240W 48VDC)	For three pairs
SDR-480-48 (480W 48VDC)	For seven pairs

Power Input Assignment			
Power1		48VDC	DC Jack
Power2	+	T:46-57V / R:46-57V DC	Terminal Block
	−	Power Ground	
Power3	+	T:46-57V / R:46-57V DC	
	−	Power Ground	
⏚		Earth Ground	

DIP Switch	Down	Up
ED3538T		
PoL	Disable Power over Link	Enable Power over Link
Type	Std (Standard) Standard line speed Better noise immunity	Perf (Performance) Better line speed Poor noise immunity
ED3538R		
Mode	Loc (Local) Set ED3538R to Local Mode	Rmt (Remote) Set ED3538R to Remote Mode
Type	Std (Standard) Standard line speed Better noise immunity	Perf (Performance) Better line speed Poor noise immunity

LEDs	State	Indication	
Power 1/2/3	Steady	Power received	
	Off	Power off	
PoL	Steady	Power Ethernet extension interface function is enabled	
	Off	No power is transmitted over Ethernet extension interface	
PoE	Steady	Powered device (PD) is connected	
	Off	Powered device (PD) is disconnected	
Link	Steady	A valid Extender connection established	
	Fast Flashing	Data transmission or receiving	
	Slow Flashing	Extender port under negotiation mode	
	Off	Extender interface connection is not established	
Line Speed	Steady	Displays the link speed in Mbps	
PSE Output	Steady	PoE power can be transmitted for PD	
	All off	No PoE power can be transmitted for PD	
	Green	Steady	A valid Ethernet connection established
		Flashing	Data transmission or receiving
		Off	Non-Ethernet connection is established
	Yellow	Steady	Link speed at 100Mbps
		Off	Link speed at 10Mbps

Power over Link (PoL) Enabled		
Distance	Data Rate	ED3538R PoE Output
300M	100Mbps	30.0W
400M	90Mbps	15.4W
600M	60Mbps	14.0W
800M	45Mbps	9.5W
1000M	35Mbps	7.0W
1200M	20Mbps	5.0W

Power over Link (PoL) Disabled Power Supply Applied on ED3538R		
Distance	Data Rate	ED3538R PoE Output
1400M	15Mbps	30.0W
1600M	10Mbps	30.0W
1800M	3Mbps	30.0W
Up to 2200M	1Mbps	30.0W

<Note> The Reference Performance is tested on 24AWG Telephone wire (0.5mm diameter, 1-pair wire, Cable impedance: 100ohm).
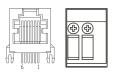
10/100Base-TX and Ethernet Extender Connectors

10/100Base-TX Connection
The following lists the pinouts of
10/100Base-TX RJ-45 port.

Pin	Regular Port	PoE Port
1	Output Transmit Data +	Output Transmit Data +
2	Output Transmit Data -	Output Transmit Data -
3	Input Receive Data +	Input Receive Data +
4		Positive (VCC+)
5		Positive (VCC+)
6	Input Receive Data -	Input Receive Data -
7		Negative (VCC-)
8		Negative (VCC-)

Ethernet Extender Connection
The RJ-11 and Terminal Block port pinouts
Pin 3: Tip, Pin 4: Ring.
Use a telephone line to connect two
RJ-11 or Terminal Block ports between
two Hardened Ethernet Extenders.

Functional Description

- Meets EN61000-6-2 & EN61000-6-4 EMC Generic Standard Immunity for industrial environment.
- Ethernet port: Supports IEEE802.3/802.3u/802.3x. Auto-negotiation: 10/100Mbps, full/half-duplex; Auto MDI/MDIX.
- Auto data rate negotiation for Ethernet extension interface.
- Six speeds with speed indicator LEDs on front panel of unit, up to 100Mbps @ about 300meters (984ft.), down to 1Mbps @ about 2,200meters (7,218ft.).
- Supports Power over Ethernet application up to 1,200meters (3,937ft.) for Max. 5 watts power consumed PoE powered devices.
- Power consumption:
  - **Enable** Power over Link (PoL) function: Max. 65Watts
  - **Disable** Power over Link (PoL) function: ED3538T: Max. 5W. ED3538R: Max. 35W with PoE output, Max. 5W without PoE output.
- Power Supply: Redundant T:46-57V / R:46-57V DC Terminal Block power inputs and 48VDC Latched DC JACK interface.
- Operating temperature range @ -40℃ to 75℃ (-40℉ to 167℉). Tested for functional operation @ -40℃ to 85℃ (-40℉ to 185℉).
- Supports Din-Rail or Panel Mounting installation.

Preface

This manual describes how to install and use the Hardened Ethernet Extender. The Hardened Ethernet Extender introduced here provides one channel for Ethernet over existing voice grade copper wire.

The Hardened Ethernet Extender fully complies with IEEE802.3 10Base-T and IEEE802.3u 100Base-TX standards.

In this manual, you will find:

- Product overview
- Features on the Hardened Ethernet Extender
- Illustrative LED functions
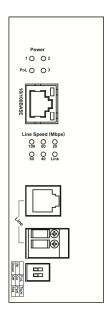- Installation instructions
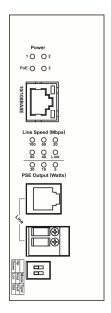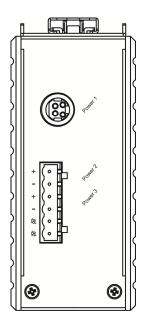- Specifications

Table of Contents

Introduction

The Hardened Ethernet Extender provides one channel for Ethernet over existing voice grade copper wire. This Hardened Ethernet Extender solution is perfectly fitted in the industrial applications or rugged environment.

Product Overview

ED3538T   ED3538R

Product Features

- Meets EN61000-6-2 & EN61000-6-4 EMC Generic Standard Immunity for industrial environment.
- Ethernet port: Supports IEEE802.3/802.3u/802.3x. Auto-negotiation: 10/100Mbps, full/half-duplex; Auto MDI/MDIX.
- Auto data rate negotiation for Ethernet extension interface.
- Six speeds with speed indicator LEDs on front panel of unit, up to 100Mbps @ about 300meters (984ft.), down to 1Mbps @ about 2,200meters (7,218ft.).

- Supports Power over Ethernet application up to 1,200meters (3,937ft.) for Max. 5 watts power consumed PoE powered devices.
- Power consumption:
    - **Enable** Power over Link (PoL) function: Max. 65Watts
    - **Disable** Power over Link (PoL) function: ED3538T: Max. 5W. ED3538R: Max. 35W with PoE output, Max. 5W without PoE output.
- Power Supply: Redundant T:46-57V / R:46-57V DC Terminal Block power inputs and 48VDC Latched DC JACK interface.
- Operating temperature range @ -40℃ to 75℃ (-40°F to 167°F). Tested for functional operation @ -40℃ to 85℃ (-40°F to 185°F).
- Supports Din-Rail or Panel Mounting installation.

Packing List

When you unpack this product package, you will find the items listed below. Please inspect the contents, and report any apparent damage or missing items immediately to our authorized reseller.

- The Hardened Ethernet Extender
- User's Manual
- AC to DC Power Adaptor and Power Cable (optional)

One-Channel Hardened Ethernet Extender

Ports

The Hardened Ethernet Extender provides TX ports and one Ethernet Extender port.

For the TX ports, it uses RJ-45 connector and auto senses the speed of 10/100Mbps.

For the Ethernet Extender port, it uses RJ-11 and Terminal Block connectors and auto senses the speed of Link (below 20)/20/40/60/80/100Mbps.

Ethernet Extender Mode Settings

Ethernet Extender mode settings are made very simple by means of a DIP (Dual Inline Package) switch on the top panel of the Hardened Ethernet Extender.

DIP Switch

DIP Switch	Down	Up
ED3538T		
PoL	Disable Power over Link	Enable Power over Link
Type	Std (Standard) Standard line speed Better noise immunity	Perf (Performance) Better line speed Poor noise immunity
ED3538R		
Mode	Loc (Local) Set ED3538R to Local Mode	Rmt (Remote) Set ED3538R to Remote Mode
Type	Std (Standard) Standard line speed Better noise immunity	Perf (Performance) Better line speed Poor noise immunity

Front Panel & LEDs

LED Indicators

The LED indicators give you instant feedback on status of the Hardened Ethernet Extender:

LEDs	State	Indication
Power 1/2/3	Steady	Power received
	Off	Power off
PoL	Steady	Power Ethernet extension interface function is enabled
	Off	No power is transmitted over Ethernet extension interface
PoE	Steady	Powered device (PD) is connected
	Off	Powered device (PD) is disconnected
Link	Steady	A valid Extender connection established
	Fast Flashing	Data transmission or receiving
	Slow Flashing	Extender port under negotiation mode
	Off	Extender interface connection is not established
Line Speed	Steady	Displays the link speed in Mbps
PSE Output	Steady	PoE power can be transmitted for PD
	All off	No PoE power can be transmitted for PD
	Green	Steady	A valid Ethernet connection established
		Flashing	Data transmission or receiving
		Off	Non-Ethernet connection is established
	Yellow	Steady	Link speed at 100Mbps
		Off	Link speed at 10Mbps

Power over Link (PoL) Enabled		
Distance	Data Rate	ED3538R PoE Output
300M	100Mbps	30.0W
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600M	60Mbps	14.0W
800M	45Mbps	9.5W
1000M	35Mbps	7.0W
1200M	20Mbps	5.0W

Power over Link (PoL) Disabled Power Supply Applied on ED3538R		
Distance	Data Rate	ED3538R PoE Output
1400M	15Mbps	30.0W
1600M	10Mbps	30.0W
1800M	3Mbps	30.0W
Up to 2200M	1Mbps	30.0W

<Note> The Reference Performance is tested on 24AWG Telephone wire (0.5mm diameter, 1-pair wire, Cable impedance: 100ohm).

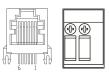#### 10/100Base-TX and Ethernet Extender Connectors

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3	Input Receive Data +	Input Receive Data +
4		Positive (VCC+)
5		Positive (VCC+)
6	Input Receive Data -	Input Receive Data -
7		Negative (VCC-)
8		Negative (VCC-)

Ethernet Extender Connection
The RJ-11 and Terminal Block port pinouts
Pin 3: Tip, Pin 4: Ring.
Use a telephone line to connect two
RJ-11 or Terminal Block ports between
two Hardened Ethernet Extenders.

Installation

This chapter gives step-by-step installation instructions for the Hardened Ethernet Extender.

Selecting a Site for the Equipment

As with any electric device, you should place the equipment where it will not be subjected to extreme temperatures, humidity, or electromagnetic interference. Specifically, the site you select should meet the following requirements:
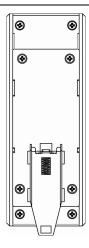
- The Surrounding Air temperature should be between -40 to 75 degrees Celsius.
- The relative humidity should be less than 95 percent, non-condensing.
- Surrounding electrical devices should not exceed the electromagnetic field (RFC) standards.
- Make sure that the equipment receives adequate ventilation. Do not block the ventilation holes of the equipment.
- The power outlet should be within 1.8 meters of the product.

DIN Rail Mounting

Fix the DIN rail attachment plate to the back panel of the Hardened Ethernet Extender.

Installation: Place the Hardened Ethernet Extender on the DIN rail from above using the slot. Push the front of the Hardened Ethernet Extender toward the mounting surface until it audibly snaps into place.

Removal: Pull out the lower edge and then remove the Hardened Ethernet Extender from the DIN rail.

Connecting to Power

Redundant DC Terminal Block Power Inputs or 48VDC DC Jack:

Redundant DC Terminal Block Power Inputs

There are two pairs of power inputs can be used to power up this device. You only need to have one power input connected to run the Hardened Ethernet Extender.
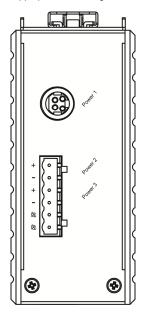
Step 1: Connect the DC power cord to the plug-able terminal block on the Hardened Ethernet Extender, and then plug it into a standard DC outlet.

Step 2: Disconnect the power cord if you want to shut down the Hardened Ethernet Extender.

48VDC DC Jack

Step 1: Connect the supplied AC to DC power adapter to the receptacle on the topside of the Hardened Ethernet Extender.

Step 2: Connect the power cord to the AC to DC power adapter and attach the plug into a standard AC outlet with the appropriate AC voltage.

Power Input Assignment			
Power1		48VDC	DC Jack
Power2	+	T:46-57V / R:46-57V DC	Terminal Block
	−	Power Ground	
Power3	+	T:46-57V / R:46-57V DC	
	−	Power Ground	
⏚		Earth Ground	

Specifications

Applicable Standards	IEEE802.3 10Base-T, IEEE802.3u 100Base-TX
Fixed Ports	10/100Mbps Ethernet ports with RJ-45 connectors
	1 x Ethernet Extender port with RJ-11 and Terminal Block connectors
Speed 10Base-T 100Base-TX Ethernet Extender	 10/20Mbps for half/full-duplex 100/200Mbps for half/full-duplex Link (Below 20), 20, 40, 60, 80, 100Mbps
Switching Method	Store-and-Forward
Forwarding rate	14,880/148,810pps for 10/100Mbps
Cable 10Base-T 100Base-TX Ethernet Extender	 4-pair UTP/STP Cat. 3, 4, 5 up to 100m 4-pair UTP/STP Cat. 5 up to 100m Telephone wires
LED Indicators	Per Unit (3 LEDs)- Power1, Power2, Power3
	ED3538T- PoL; Line Speed (Mbps): Link, 20, 40, 60, 80, 100 ED3538R- PoE; Line Speed (Mbps): Link, 20, 40, 60, 80, 100; PSE Output (Watts): 5, 15, 30
Dimensions	50mm (W) x 110mm (D) x 135mm (H) (1.97" (W) x 4.33" (D) x 5.31" (H))
Weight	0.77Kg (1.7lbs.)
Power	Terminal Block: T:46-57V / R:46-57V DC DC Jack: 48VDC, External AC/DC required Terminal Block & DC Jack Power Inputs: 2.5A @ 48VDC (Peak current 3.26A)
Power Consumption	Enable PoL: Max. 65Watts
	Disable PoL: ED3538T: Max. 5W ED3538R: Max. 35W with PoE output Max. 5W without PoE output

Operating Temperature	-40℃ ~ 75℃ (-40℉ ~ 167℉)
	Tested for functional operation @
	-40℃ ~ 85℃ (-40℉ ~ 185℉)
Storage Temperature	-40℃ ~ 85℃ (-40℉ ~ 185℉)
Humidity	5 ~ 95%, non-condensing
EMI	FCC Part 15, Class A
	EN61000-6-4: EN55022, EN61000-3-2, EN61000-3-3
EMS	EN61000-6-2:
	EN61000-4-2 (ESD Standard)
	EN61000-4-3 (Radiated RFI Standards)
	EN61000-4-4 (Burst Standards)
	EN61000-4-5 (Surge Standards)
	EN61000-4-6 (Induced RFI Standards)
	EN61000-4-8 (Magnetic Field Standards)
Environmental Test Compliance	IEC60068-2-6 Fc (Vibration Resistance)
	IEC60068-2-27 Ea (Shock)
	IEC60068-2-32 Ed (Free Fall)