Moxa EtherDevice Switch

EDS-G308
Hardware Installation Guide

First Edition, July 2008

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Overview

The EDS-G308 series is equipped with 8 Gigabit Ethernet ports and up to 2 fiber optic ports, making it ideal for applications that demand high bandwidth. The EDS-G308 series provides an economical solution for your industrial Gigabit Ethernet connection, and the built-in relay warning function alerts maintainers when power failures or port breaks occur. The EDS-G308 series includes 2 models: one with an operating temperature range of 0 to 60°C, and the other one with an extended operating temperature range of -40 to 75°C. These 2 models have passed a 100% burn-in test to ensure that they fulfill the special needs of industrial automation control. The EDS-G308 series can be easily installed with DIN-Rail mounting as well as distribution boxes.

NOTE Throughout this Hardware Installation Guide, we use **EDS** as an abbreviation for Moxa EtherDevice Switch:

EDS = Moxa EtherDevice Switch

Package Checklist

Your EDS is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- Moxa EtherDevice™ Switch
- Hardware Installation Guide
- Moxa Product Warranty booklet
- Protective caps for unused ports

Features

High Performance Network Switching Technology

- 10/100/1000BaseT(X) (RJ45), auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection, 100/1000 BaseSFP slot.
- IEEE 802.3/802.3u/802.3ab/802.3z/802.3x.
- Store and Forward switching process type, 1024 address entries.

Industrial Grade Reliablity

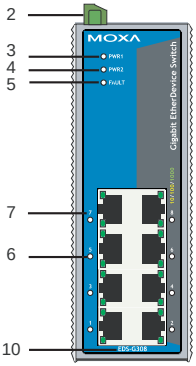
- Power failure, port break alarm by relay output
- Redundant dual AC/DC power inputs

Rugged Design

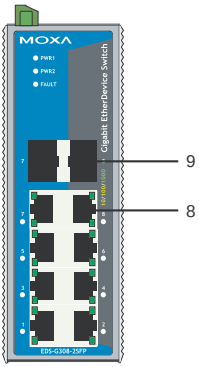
- Operating temperature range of 0 to 60°C, or extended operating temperature of -40 to 75°C for (-T) models
- IP30, rugged high-strength case
- DIN-Rail or panel mounting ability
- Redundant dual 12/24/48VDC or 18 to 30 VAC at 47 to 63Hz Power inputs

Panel Layout of EDS-G308/EDS-G308-2SFP

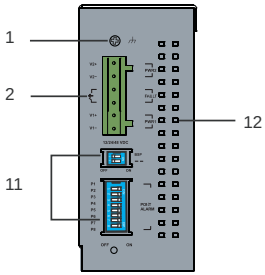
EDS-G308
Front Panel View



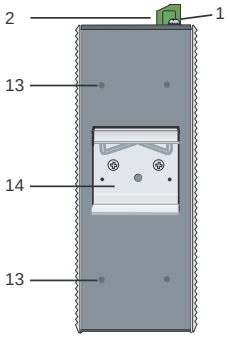
EDS-G308-2SFP
Front Panel View



Top Panel View

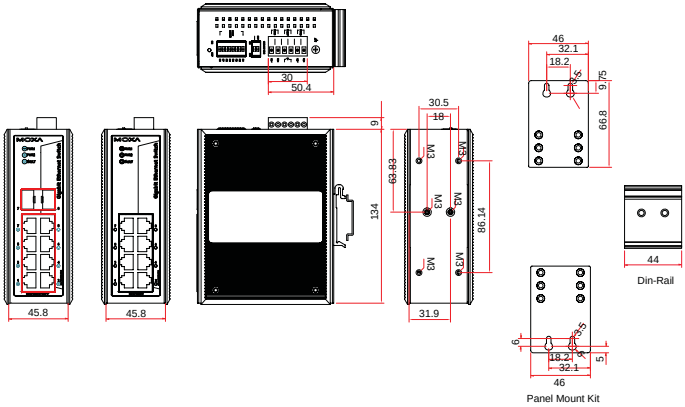


Rear Panel View



1. Grounding screw
2. Terminal block for power input (PWR1, PWR2) and relay output
3. Power input PWR1 LED
4. Power input PWR2 LED
5. Fault LED
6. TP port's 10/10/1000 Mbps LED
7. Port number
8. 10/100/1000BaseT(X) Port
9. 100/1000Base SFP slot
10. Model Name
11. DIP switches
12. Heat dissipation orifices
13. Screw hole for wall mounting kit
14. DIN-Rail Kit

Mounting Dimensions (unit = mm)

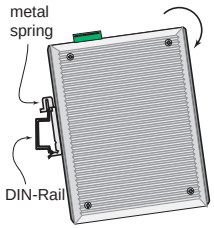


DIN-Rail Mounting

The aluminum DIN-rail attachment plate should already be fixed to the back panel of the EDS when you take it out of the box. If you need to reattach the DIN-rail attachment plate, make sure the stiff metal spring is situated towards the top, as shown in the figures below.

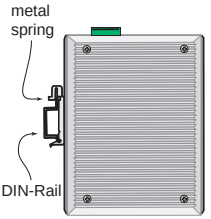
STEP 1:

Insert the top of the DIN-rail into the slot just below the stiff metal spring.



STEP 2:

The DIN-rail attachment unit will snap into place as shown below.



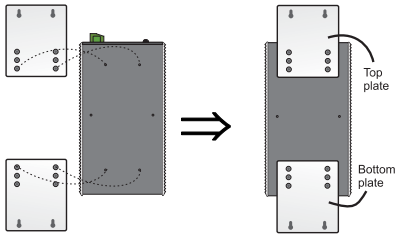
To remove the DIN-rail from the EDS, simply reverse Steps 1 and 2.

Wall Mounting (optional)

For some applications, you will find it convenient to mount the EDS on the wall, as illustrated below.

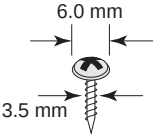
STEP 1:

Remove the aluminum DIN-rail attachment plate from the EDS's rear panel, and then attach the wall mount plates, as shown in the figure.



STEP 2:

Mounting the EDS on the wall requires 4 screws. Use the switch, with wall mount plates attached, as a guide to mark the correct locations of the 4 screws. The heads of the screws should be less than 6.0 mm in diameter, and the shafts should be less than 3.5 mm in diameter, as shown in the figure at the right.

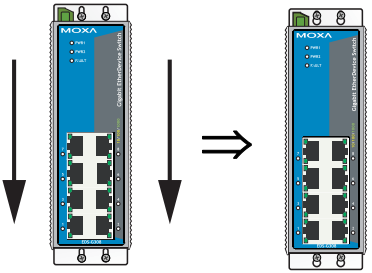


NOTE Before tightening screws into the wall, make sure the screw head and shank size are suitable by inserting the screw into one of the keyhole-shaped apertures of the Wall Mounting Plates.

Do not screw the screws in all the way—leave about 2 mm to allow room for sliding the wall mount panel between the wall and the screws.

STEP 3:

Once the screws are fixed in the wall, insert the four screw heads through the large parts of the keyhole-shaped apertures, and then slide the EDS downwards, as indicated. Tighten the four screws for added stability.



Wiring Requirements

WARNING

Safety First!

Turn the power off before disconnecting modules or wires. The proper power supply voltage is listed on the product label. Check the voltage of your power source to make sure you are using the correct voltage. Do NOT use a voltage greater than what is specified on the product label.

These devices must be supplied by an AELV source as defined in the Low Voltage Directive 2006/95/EC and 2004/108/EC.

WARNING

Safety First!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

You should also pay attention to the following items:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.
  NOTE: Do not run signal or communications wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring with similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separated.
- It is strongly advised that you label wiring for all devices in the system when necessary.

Grounding Moxa EtherDevice Switch

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

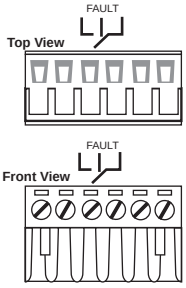
ATTENTION

This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.

Wiring the Alarm Contact

The Alarm Contact consists of the two middle contacts of the terminal block on the EDS's top panel. You may refer to the next section for detailed instructions on how to connect the wires to the terminal block connector, and how to attach the terminal block connector to the terminal block receptor.

In this section, we explain the meaning of the two contacts used to connect the Alarm Contact.



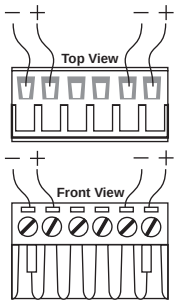
FAULT: The two middle contacts of the 6-contact terminal block connector are used to detect both power faults and port faults. The two wires attached to the Fault contacts form an open circuit when:

1. EDS has lost power from one of the AC/DC power inputs.
   OR
2. The PORT ALARM DIP switch for one of the ports is set to ON, but the port is not connected properly.

If neither of these two conditions is satisfied, the Fault circuit will be closed.

Wiring the Redundant Power Inputs

The top two contacts and the bottom two contacts of the 6-contact terminal block connector on the EDS's top panel are used for the EDS's two AC/ DC inputs. Top and front views of one of the terminal block connectors are shown here.



STEP 1: Insert the negative/positive AC/ DC wires into the V-/V+ terminals.

STEP 2: To keep the AC/ DC wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.

STEP 3: Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on EDS's top panel.

ATTENTION

Before connecting the EDS to the AC/DC power inputs, make sure the AC/DC power source voltage is stable.

Communication Connections

EDS-G308 models have 8 10/100/1000BaseT(X) Ethernet ports, or 6 10/100/1000BaseT(X) and 2 comb ports- 10/100/1000T(X) /1000BaseSFP.

10/100/1000BaseT(X) Ethernet Port Connection

The 10/100/1000BaseT(X) ports located on Moxa EtherDevice Switch's front panel are used to connect to Ethernet-enabled devices. Most users will choose to configure these ports for Auto MDI/MDI-X mode, in which case the port's pinouts are adjusted automatically depending on the type of Ethernet cable used (straight-through or cross-over), and the type of device (NIC-type or HUB/Switch-type) connected to the port.

In what follows, we give pinouts for both MDI (NIC-type) ports and MDI-X (HUB/Switch-type) ports. We also give cable wiring diagrams for straight-through and cross-over Ethernet cables.

10 /100Base T(x) RJ45 Pinouts

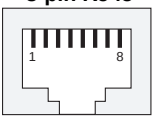
MDI Port Pinouts

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
6	Rx-

MDI-X Port Pinouts

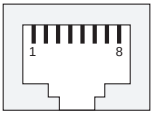
Pin	Signal
1	Rx+
2	Rx-
3	Tx+
6	Tx-

8-pin RJ45

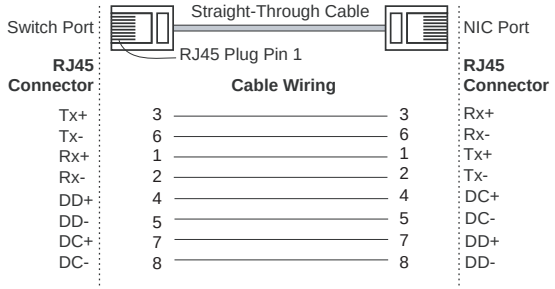


1000BaseT RJ45 Pinouts

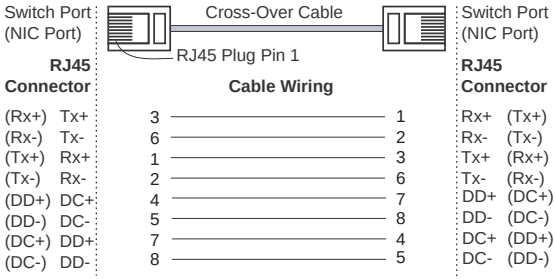
Pin	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-



RJ45 (8-pin) to RJ45 (8-pin) Straight-Through Cable Wiring



RJ45 (8-pin) to RJ45 (8-pin) Cross-Over Cable Wiring



100 BaseFX or 1000BaseSFP Fiber Port

The gigabit Ethernet ports on theEDS-G308 series are SFP slots, which require 100BaseFX SFP or Gigabit mini-GBIC fiber transceivers to work properly. Moxa provides complete transceiver models for various distance requirements.

Multi mode:

1000BaseSX	0 to 550 m, 850 nm (50/125µm, 400MHz*km)
	0 to 275 m, 850 nm (62.5/125µm, 200MHz*km)
1000BaseLX	0 to 1100 m, 1310 nm (50/125µm, 800MHz*km)
	0 to 550 m, 1310 nm (62.5/125µm, 500MHz*km)

Single mode:

1000BaseLX	0 to 10 km, 1310 nm (9/125µm, 3.5 PS/(nm*km))
1000BaseLHX	0 to 40 km, 1310 nm (9/125µm, 3.5 PS/(nm*km))
1000BaseZX	0 to 80 km, 1550 nm (9/125µm, 19 PS/(nm*km))

Multi mode:

100BaseFx	0 to 5 km, 1300 nm (50/125µm, 800MHz*km)
	0 to 4 m, 1300 nm (62.5/125µm, 500MHz*km)

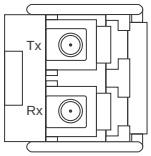
Single mode:

100BaseFx	0 to 40 km, 1310 nm (9/125µm, 3.5 PS/(nm*km))

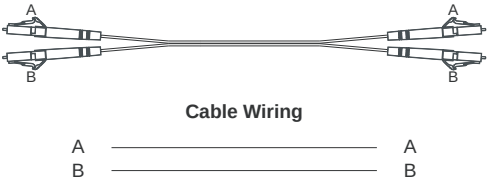
The concept behind the LC port and cable is quite straightforward. Suppose you are connecting devices I and II. Unlike electrical signals, optical signals do not require a circuit in order to transmit data. Consequently, one of the optical lines is used to transmit data from device I to device II, and the other optical line is used to transmit data from device II to device I, for full-duplex transmission.

Remember to connect the Tx (transmit) port of device I to the Rx (receive) port of device II, and the Rx (receive) port of device I to the Tx (transmit) port of device II. If you make your own cable, we suggest labeling the two sides of the same line with the same letter (A-to-A and B-to-B, as shown below, or A1-to-A2 and B1-to-B2).

LC-Port Pinouts



LC-Port to LC-Port Cable Wiring



ATTENTION

This is a Class 1 Laser/LED product. To avoid causing serious damage to your eyes, do not stare directly into the Laser Beam.

Redundant Power Inputs

Both power inputs can be connected simultaneously to live AC/DC power sources. If one power source fails, the other live source acts as a backup, and automatically supplies all of the EDS's power needs.

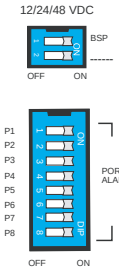
Alarm Contact

The Moxa EtherDevice Switch has one Alarm Contact located on the top panel. For detailed instructions on how to connect the Alarm Contact power wires to the two middle contacts of the 6-contact terminal block connector, see the **Wiring the Alarm Contact** section on page 6. A typical scenario would be to connect the Fault circuit to a warning light located in the control room. The light can be set up to switch on when a fault is detected.

The Alarm Contact has two terminals that form a Fault circuit for connecting to an alarm system. The two wires attached to the Fault contacts form an open circuit when (1) EDS has lost power from one of the AC/DC power inputs, or (2) one of the ports, for which the corresponding PORT ALARM DIP switch is set to ON, is not properly connected.

If neither of these two conditions occurs, the Fault circuit will be closed.

DIP Switch Settings



The default setting for each DIP switch is OFF. The following table explains the effect of setting the DIP switches to the ON positions.

DIP Switch	Setting	Description
---		Serves no function (reserved for future use).
BSP	ON	Enables broadcast storm protection
	OFF	Disables broadcast storm protection
PORT Alarm	ON	Enables the corresponding PORT Alarm. If the port's link fails, the relay will form an open circuit and the fault LED will light up.
	OFF	Disables the corresponding PORT Alarm. The relay will form a closed circuit and the Fault LED will never light up.

ATTENTION

To actively update DIP switch settings, power off and then power on the EDS.

LED Indicators

The front panel of the Moxa EtherDevice Switch contains several LED indicators. The function of each LED is described in the table below.

LED	Color	State	Description
PWR1	AMBER	On	Power is being supplied to power input PWR1
		Off	Power is **not** being supplied to power input PWR1
PWR2	AMBER	On	Power is being supplied to power input PWR2
		Off	Power is **not** being supplied to power input PWR2
FAULT	RED	On	When the corresponding PORT alarm is enabled, and the port's link is inactive.
		Off	When the corresponding PORT alarm is enabled and the port's link is active, or when the corresponding PORT alarm is disabled.

10/100M	AMBER	On	TP port's 10/100 Mbps link is active
		Blinking	Data is being transmitted at 10/100 Mbps
		Off	TP Port's 10/100 Mbps link is inactive
1000M	GREEN	On	TP port's 1000 Mbps link is active
		Blinking	Data is being transmitted at 1000 Mbps
		Off	TP Port's 1000 Mbps link is inactive

Auto MDI/MDI-X Connection

The Auto MDI/MDI-X function allows users to connect the EDS's 10/100/1000BaseT(X) ports to any kind of Ethernet device, without paying attention to the type of Ethernet cable being used for the connection. This means that you can use either a straight-through cable or cross-over cable to connect the EDS to Ethernet devices.

Triple Speed Functionality and Switching

The EDS's 10/100/1000 Mbps RJ45 switched port auto negotiates with the connected device for the fastest data transmission rate supported by both devices. The EDS is a plug-and-play device, so software configuration is not required at installation or during maintenance.

The half/full duplex mode for the RJ45 switched ports is user dependent and changes (by auto-negotiation) to full or half duplex, depending on which transmission speed is supported by the attached device.

Auto-Negotiation and Speed Sensing

The EDS's RJ45 Ethernet ports independently support auto-negotiation for transmission speeds of 10 Mbps, 100 Mbps, and 1000 Mbps, with operation according to the IEEE802.3 standard.

This means that some nodes could be operating at 10 Mbps, while at the same time, other nodes are operating at 100 Mbps or 1000Mbps.

Auto-negotiation takes place when an RJ45 cable connection is made, and then each time a LINK is enabled. The EDS advertises its capability for using 10 Mbps, 100 Mbps, or 1000 Mbps transmission speeds, with the device at the other end of the cable expected to advertise similarly. Depending on what type of device is connected, this will result in agreement to operate at a speed of 10 Mbps, 100 Mbps, or 1000 Mbps.

If an EDS's RJ45 Ethernet port is connected to a non-negotiating device, it will default to 10 Mbps speed and half-duplex mode, as required by the IEEE802.3 standard.

Specifications

Specifications and Pin Assignments

Technology

Standards	IEEE 802.3 for 10BaseT, IEEE 802.3u for 100BaseT(X) and 100Base FX, IEEE 802.3ab for 1000BaseT, IEEE 802.3z for 1000BaseSX/LX/LHX/ZX
Flow Control	EEE 802.3x flow control, back pressure flow control

Interface

RJ45 Ports	10/100/1000BaseT(X) auto negotiation speed
Fiber Ports	100BaseFX or 1000BaseSFP slot
LED Indicators	PWR1, PWR2, FAULT, 10/100M/1000M
DIP Switch	Port/power break alarm, broadcast storm protection
Alarm Contact	One relay output with current carrying capacity of 1A @ 24 VDC

Optical Fiber: 100 or 1000Base SFP modules

	Gigabit Ethernet			
	SFP-SX	**SFP-LX**	**SFP-LHX**	**SFP-ZX**
Wavelength	850nm	1310nm	1310nm	1550nm
Max.TX	-4 dBm	-3 dBm	1 dBm	5 dBm
Min.TX	-9.5 dBm	-9.5 dBm	-4 dBm	0 dBm
RX Sensitivity	-18 dBm	-20 dBm	-24 dBm	24 dBm
Link Budget	8.5 db	10.5 dB	20 dB	24 dB
Typical Distance	550 m[a] 275 m[b]	1100 m[c] 550 m[d] 10 km[e]	40 km[e]	80 km[f]
Saturation	0 dBm	-3 dBm	-3 dBm	-3 dBm

a. 50/125 µm, 400 MHz*km fiber optic cable
b. 62.5/125 µm, 200 MHz*km fiber optic cable
c. 50/125 µm, 800 MHz*km fiber optic cable
d. 62.5/125 µm, 500 MHz*km fiber optic cable
e. 9/125 µm, 3.5 PS/(nm*km) fiber optic cable
f. 9/125 µm, 19 PS/(nm*km) fiber optic cable

	100Base Ethernet	
	Multi Mode	**Single Mode**
Wavelength	1300 nm	1310 nm
Max.TX	-10 dBm	0 dBm
Min.TX	-20 dBm	-5 dBm
RX Sensitivity	-32 dBm	-34 dBm
Link Budget	12 dB	29 dB
Typical Distance	5 km[a] 4 km[b]	40 km[c]
Saturation	-6 dBm	-3 dBm

g. 50/125µm, 800 MHz*km fiber optic cable
h. 62.5/125µm, 500 MHx*km fiber optic cable
i. 9/125µm, 3.5 PS/(nm*km) fiber optic cable

Power	
Input Voltage	12/24/48 VDC (9.6 to 60 VDC), 18 to 30VAC (47 to 63 Hz), redundant dual inputs
Input Current @ 24VDC	0.35A
Connection	One removable 6-pin terminal block
Overload Current Protection	Present
Reverse Polarity Protection	Present
Mechanical	
Casing	IP30 protection, metal case
Dimension (W x H x D)	53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)
Weight	850g
Installation	DIN-rail, Wall Mounting (optional kit)
Environmental	
Operating Temperature	0 to 60°C (32 to 140°F) -40 to 75°C (-40 to 167°F) for -T models
Storage Temperature	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)
Regulatory Approvals	
Safety	UL508(Pending)
Hazardous Location	UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Class I, Zone 2, Ex nC nL IIC T4 (Pending)
EMI	FCC Part 15, CISPR (EN55022) class A
EMS	EN61000-4-2 (ESD), Level 3 EN61000-4-3 (RS), Level 3 EN61000-4-4 (EFT), Level 3 EN61000-4-5 (Surge), Level 3 EN61000-4-6 (CS), Level 3 EN61000-4-8 EN61000-4-11 EN61000-4-12
Shock	IEC60068-2-27
Free Fall	IEC60068-2-32
Vibration	IEC60068-2-6
WARRANTY	5 years

Technical Support Contact Information
www.moxa.com/support

Moxa Americas:
Toll-free: 1-888-669-2872
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