# EDS-G509 Series
# Quick Installation Guide

**Moxa EtherDevice™ Switch**

**Version 5.2, January 2021**

# MOXA®

## Package Checklist

The Moxa EDS-G509 is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- 1 EDS-G509 EtherDevice Switch
- RJ45 to DB9 console port cable
- Protective caps for unused ports
- Wall Mounting Kit (optional—must be ordered separately)
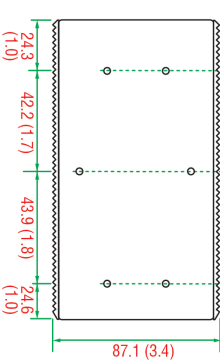- Quick installation guide (printed)
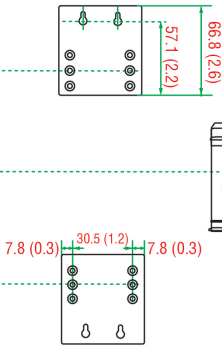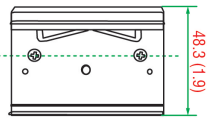- Warranty card

## Mounting Dimensions
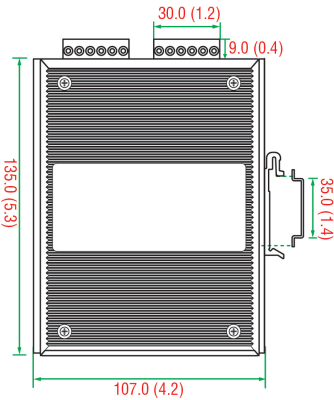


Side View
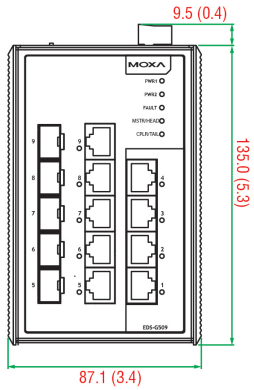
Front View



Rear View

Wall Mounting Kit

Din-Rail Kit

Unit = mm (inch)

## Panel Views of EDS-G509

### Front Panel View
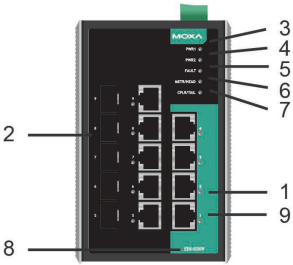
**Front Panel:**

1. 1 to 4: 10/100/1000 BaseT(X) port
2. 5 to 9: 10/100/1000 BaseT(X) or 100/1000Base SFP slot combo ports
3. PWR1: LED for power input 1
4. PWR2: LED for power input 2
5. FAULT: LED indicator
6. MSTR/HEAD LED
7. CPLR/TAIL LED
8. Model Name
9. 10/100/1000BaseT(X) LED indicator (Amber: 10/100M Green: 1000M)

### Top Panel View
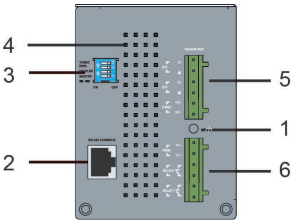
**Top Panel:**

1. Grounding screw
2. RS-232 console port
3. DIP switches for Ring Master, Ring Coupler, and Turbo Ring
4. Heat dissipation orifices
5. 6-pin terminal block for DI 1, DI 2, and PWR 2
6. 6-pin terminal block for PWR1, Relay 1, and Relay 2

### Rear Panel View

**Rear Panel:**

1. Grounding screw
2. Terminal block
3. Screw holes for Wall Mounting Kit
4. DIN-Rail kit

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## DIN-Rail Mounting

The aluminum DIN-Rail attachment plate should already be fixed to the back panel of the EDS-G509 when you take it out of the box. If you need to reattach the DIN-Rail attachment plate to the EDS-G509, make sure the stiff metal spring is situated towards the top, as shown in the following figures.
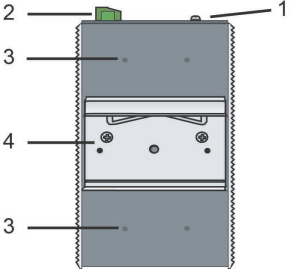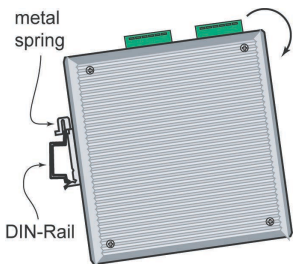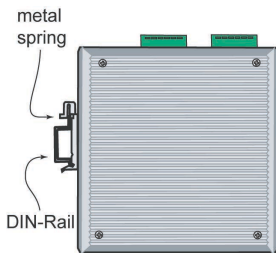
**STEP 1**—Insert the top of the DIN-Rail into the slot just below the stiff metal spring.

**STEP 2**—The DIN-Rail attachment unit will snap into place as shown in the following illustration.



To remove the EDS-G509 from the DIN-Rail, simply reverse Steps 1 and 2 above.

## Wall Mounting (Optional)

For some applications, you will find it convenient to mount the Moxa EDS-G509 on the wall, as shown in the following illustrations:

**STEP 1**—Remove the aluminum DIN-rail attachment plate from the rear panel of the EDS-G509, and then attach the wall-mounting plates with M3 screws, as shown in the figure at the right.
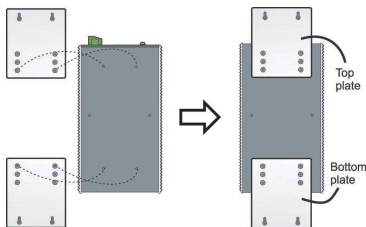


**STEP 2**—Mounting the EDS-G509 on the wall requires 4 screws. Use the EDS-G509, with wall-mounting plates attached, as a guide to mark the correct locations of the 4 screws. The heads of the screws should be less than 6.0 mm in diameter, and the shafts should be less than 3.5 mm in diameter, as shown in the figure on at right.
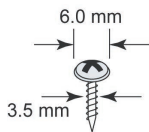


**NOTE** Before tightening the screws into the wall, make sure the screw head and shank size are suitable by inserting the screw through one of the keyhole-shaped apertures of the wall-mounting plates.

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

**STEP 3**—Once the screws are fixed to the wall, insert the four screw heads through the wide parts of the keyhole-shaped apertures, and then slide the EDS-G509 downwards, as indicated in the figure at the right. Tighten the four screws for more stability.
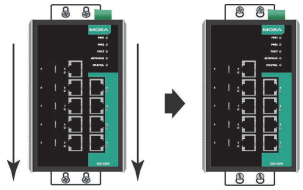
## Wiring Requirements

⚠️ **WARNING**

Do not disconnect modules or wires unless power has been switched off or the area is known to be non-hazardous. The devices may only be connected to the supply voltage shown on the type plate. The devices are designed for operation with a Safety Extra-Low Voltage. Thus, they may only be connected to the supply voltage connections and to the signal contact with the Safety Extra-Low Voltages (SELV) in compliance with IEC950/ EN60950-1/ VDE0805.

⚠️ **ATTENTION**

This unit is a built-in type. When the unit is installed in another piece of equipment, the equipment enclosing the unit must comply with fire enclosure regulation IEC 60950-1/EN60950-1 (or similar regulation).

⚠️ **ATTENTION**

**Safety First!**

Be sure to disconnect the power cord before installing and/or wiring your Moxa EtherDevice Switch.

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.

Please read and follow these guidelines:

- 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 through 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 sharing similar electrical characteristics can be bundled together
- You should separate input wiring from output wiring
- We advise that you label the wiring to all devices in the system.

## Grounding the Moxa EDS-G509

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 Relay Contact

The EDS-G509 has two sets of relay outputs—relay 1 and relay 2. Each relay contact uses two contacts of the terminal block on the EDS-G509's top panel. 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 illustrate the meaning of the two contacts used to connect the relay contact.
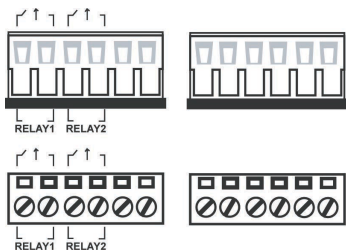


**FAULT:** The two sets of relay contacts of the 6-pin terminal block connector are used to detect user-configured events. The two wires attached to the fault contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the fault circuit remains closed.

## Wiring the Redundant Power Inputs

The EDS-G509 has two sets of power inputs—power input 1 and power input 2. The top two contacts and the bottom two contacts of the 6-pin terminal block connector on the EDS-G509's top panel are used for the two digital inputs. The top and front views of one of the terminal block connectors are shown here.



**STEP 1:** Insert the negative/positive DC wires into the V-/V+ terminals, respectively.
**STEP 2:** To keep the 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 the EDS-G509's top panel.
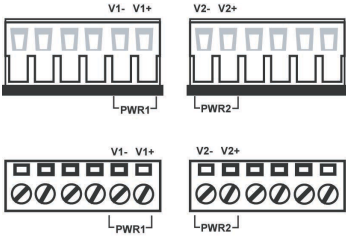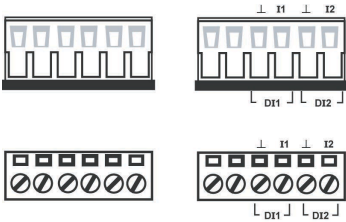
## Wiring the Digital Inputs

The EDS-G509 has two sets of digital inputs, DI 1 and DI 2. Each DI consists of two contacts of the 6-pin terminal block connector on the EDS-G509's top panel, which are used for the two DC inputs. The top and front views of one of the terminal block connectors are shown here.



**STEP 1:** Insert the negative (ground)/positive DI wires into the ⏚/I1 terminals, respectively.
**STEP 2:** To keep the DI 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 the EDS-G509's top panel.

## Communication Connections

Each EDS-G509 switch has 3 types of communication port:

- 1 RJ45 console port (RS-232 interface)
- 4 10/100/1000BaseTX Ethernet ports
- 5 combination 10/100/1000T(X)/1000BaseSFP ports

### RS-232 Connection

The EDS-G509 has one RS-232 (10-pin RJ45) console port, located on the top panel. Use either an RJ45-to-DB9 (see the cable following wiring diagrams) to connect the EDS-G509's console port to your PC's COM port. You may then use a console terminal software, such as Moxa PComm Terminal Emulator, to access the EDS-G509's serial console. (Baudrate: 115200 bps, no parity, 8 data bit, 1 stop bit)

**RJ45 (10-pin) Console Port Pinouts**

| Pin | Description |
|-----|-------------|
| 1 | – |
| 2 | DSR |
| 3 | RTS |
| 4 | – |
| 5 | TxD |
| 6 | RxD |
| 7 | GND |
| 8 | CTS |
| 9 | DTR |
| 10 | – |
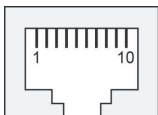
**RJ45 (10-pin) to DB9 (F) Cable Wiring**

| Moxa EtherDevice Server (RJ45 Connector) | Cable Wiring | COM Port (Female DB9 Connector) |
|---|---|---|
| DCD | 1 ———————— 1 | DCD |
| DSR | 2 ———————— 6 | DTR |
| RTS | 3 ———————— 7 | CTS |
| GND | 4/7 ———————— 5 | GND |
| TxD | 5 ———————— 3 | RxD |
| RxD | 6 ———————— 2 | TxD |
| CTS | 8 ———————— 8 | RTS |
| DTR | 9 ———————— 4 | DSR |

RJ45 Plug Pin 1
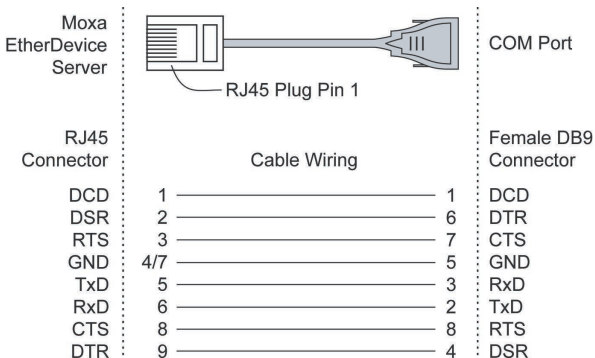
## 10/100/1000BaseT(X) Ethernet Port Connection

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**

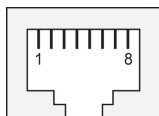| Pin | MDI | MDI-X |
|-----|--------|--------|
| 1 | BI_DA+ | BI_DB+ |
| 2 | BI_DA- | BI_DB- |
| 3 | BI_DB+ | BI_DA+ |
| 4 | BI_DC+ | BI_DD+ |
| 5 | BI_DC- | BI_DD- |
| 6 | BI_DB- | BI_DA- |
| 7 | BI_DD+ | BI_DC+ |
| 8 | BI_DD- | BI_DC- |
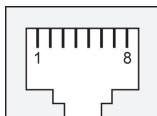
**RJ45 (8-pin) to RJ45 (8-pin) Straight-Through Cable Wiring**

| Switch Port | Straight-Through Cable | | NIC Port |
|---|---|---|---|
| **RJ45** | RJ45 Plug Pin 1 | | **RJ45** |
| **Connector** | **Cable Wiring** | | **Connector** |
| Tx+ | 3 | 3 | Rx+ |
| Tx- | 6 | 6 | Rx- |
| Rx+ | 1 | 1 | Tx+ |
| Rx- | 2 | 2 | Tx- |
| DD+ | 4 | 4 | DC+ |
| DD- | 5 | 5 | DC- |
| DC+ | 7 | 7 | DD+ |
| DC- | 8 | 8 | DD- |
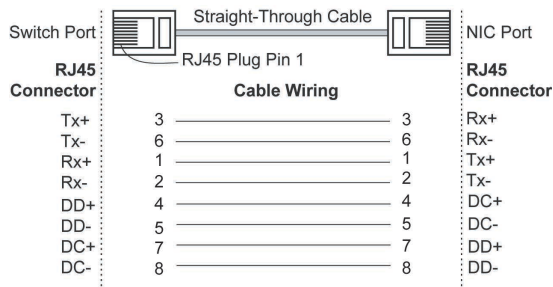
**RJ45 (8-pin) to RJ45 (8-pin) Cross-Over Cable Wiring**

| Switch Port (NIC Port) | Cross-Over Cable | | Switch Port (NIC Port) |
|---|---|---|---|
| **RJ45** | RJ45 Plug Pin 1 | | **RJ45** |
| **Connector** | **Cable Wiring** | | **Connector** |
| (Rx+) Tx+ | 3 | 1 | Rx+ (Tx+) |
| (Rx-) Tx- | 6 | 2 | Rx- (Tx-) |
| (Tx+) Rx+ | 1 | 3 | Tx+ (Rx+) |
| (Tx-) Rx- | 2 | 6 | Tx- (Rx-) |
| (DD+) DC+ | 4 | 7 | DD+ (DC+) |
| (DD-) DC- | 5 | 8 | DD- (DC-) |
| (DC+) DD+ | 7 | 4 | DC+ (DD+) |
| (DC-) DD- | 8 | 5 | DC- (DD-) |
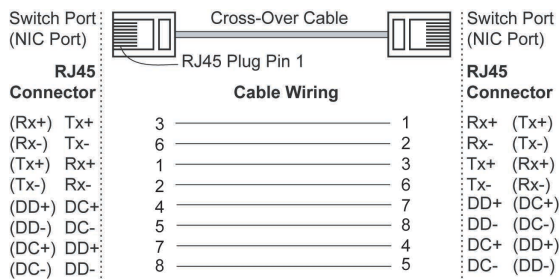
## 100BaseFX or 1000BaseSFP Fiber Port

The Gigabit Ethernet ports on the EDS-G509 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 (50/125 µm, 400 MHz * km) | |
| | 0 to 275 m, 850 nm (62.5/125 µm, 200 MHz * km) | |
| 1000BaseLX | 0 to 1100 m, 1310 nm (50/125 µm, 800 MHz * km) | |
| | 0 to 550 m, 1310 nm (62.5/125 µm, 500 MHz * km) | |

**Single mode:**

| | |
|---|---|
| 1000BaseLH | 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 (50/125 µm, 800 MHz * km)

               0 to 4 m, 1300 nm (62.5/125 µm, 500 MHz * km)

**Single mode:**

100BaseFX    0 to 40 km, 1310 nm (9/125 µm, 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).
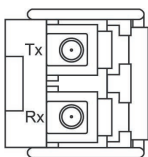
**LC-Port Pinouts**     **LC-Port to LC-Port Cable Wiring**
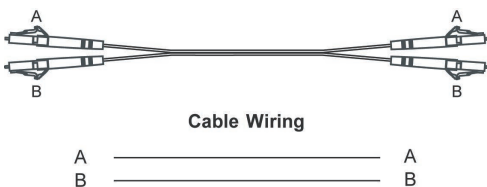


> ⚠️ **ATTENTION**
>
> This is a Class 1 Laser/LED product. To avoid causing serious damage to your eyes, do not stare directly into the Laser Beam.

## Turbo Ring DIP Switch Settings

EDS-G509 series are plug-and-play managed redundant Ethernet switches. The proprietary Turbo Ring protocol was developed by Moxa to provide better network reliability and faster recovery time. Moxa Turbo Ring's recovery time is less than 300 ms (**Turbo Ring**) or less than 50 ms @ 250 switches (**Turbo Ring V2**)—compared to a 3- to 5-minute recovery time for commercial switches—decreasing the possible loss caused by network failures in an industrial setting.

There are 4 Hardware DIP Switches for Turbo Ring on the top panel of EDS-G509 that can help setup the Turbo Ring easily within seconds. If you do not want to use a hardware DIP switch to setup the Turbo Ring, you can use a web browser, telnet, or console to disable this function.

> **NOTE** Please refer to the *Turbo Ring DIP Switch* section and *Using Communication Redundancy* section in the User's Manual for more detail information about the settings and usage of *Turbo Ring* and *Turbo Ring V2*.

### EDS-G509 Series DIP Switches
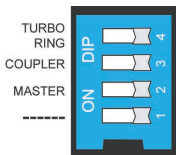


The default setting for each DIP Switch is OFF. The following table explains the effect of setting the DIP Switch to the ON position.

### "Turbo Ring" DIP Switch Settings

| DIP 1 | DIP 2 | DIP 3 | DIP 4 |
|---|---|---|---|
| Reserved for future use. | ON: Enables this EDS as the Ring Master. | ON: Enables the default "Ring Coupling" ports. | ON: Activates DIP switches 1, 2, 3 to configure "Turbo Ring" settings. |
| | OFF: This EDS will not be the Ring Master. | OFF: Do not use this EDS as the ring coupler. | OFF: DIP switches 1, 2, 3 will be disabled. |

### "Turbo Ring V2" DIP Switch Settings

| DIP 1 | DIP 2 | DIP 3 | DIP 4 |
|---|---|---|---|
| ON: Enables the default "Ring Coupling (backup)" port. | ON: Enables this EDS as the Ring Master. | ON: Enables the default "Ring Coupling" port. | ON: Activates DIP switches 1, 2, 3 to configure "Turbo Ring V2" settings. |
| OFF: Enables the default "Ring Coupling (primary)" port. | OFF: This EDS will not be the Ring Master. | OFF: Do not use this EDS as a ring coupler. | OFF: DIP switches 1, 2, 3 will be disabled. |

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**NOTE** You must enable the Turbo Ring function first before using the DIP switch to activate the Master and Coupler functions.

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**NOTE** If you do not enable any of the EDS-G509 switches to be the Ring Master, the Turbo Ring protocol will automatically choose the EDS-G509 with the smallest MAC address range to be the Ring Master. If you accidentally enable more than one EDS-G509 to be the Ring Master, these EDS-G509 switches will auto-negotiate to determine which one will be the Ring Master.

## LED Indicators

The front panel of the Moxa EDS-G509 contains several LED indicators. The function of each LED is described in the following table:

| LED | Color | State | Description |
|---|---|---|---|
| **PWR1** | AMBER | On | Power is being supplied to power input P1. |
| | | Off | Power is **not** being supplied to power input P1. |
| **PWR2** | AMBER | On | Power is being supplied to power input P2. |
| | | Off | Power is **not** being supplied to power input P2. |
| **FAULT** | RED | On | When the corresponding PORT alarm is enabled, and a user-configured event is triggered. |
| | | Off | When the corresponding PORT alarm is enabled and a user-configured event is not triggered, or when the corresponding PORT alarm is disabled. |
| **MSTR/HEAD** | GREEN | On | When the EDS-G509 is set as the Master of the Turbo Ring, or as the Head of the Turbo Chain. |
| | | Blinking | The EDS-G509 has become the Ring Master of the Turbo Ring, or the Head of the Turbo Chain, after the Turbo Ring or the Turbo Chain is down. |
| | | Off | When the EDS-G509 is not the Master of this Turbo Ring or is set as the Member of the Turbo Chain. |
| **CPLR/TAIL** | GREEN | On | When the EDS-G509 coupling function is enabled to form a back-up path, or when it's set as the Tail of the Turbo Chain. |
| | | Blinking | When the Turbo Chain is down. |
| | | Off | When the EDS-G509 disables the coupling function. |
| **10/100/1000M** | 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. |
| | 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. |

## Specifications

| Technology | |
|---|---|
| Standards | IEEE802.3, 802.3u, 802.3x, 802.1D, 802.1w, 802.1Q, 802.1p, 802.1X, 802.3ad, 802.3z |
| Protocols | IGMPv1/v2, GMRP, GVRP, SNMPv1/v2c/v3, DHCP Server/Client, DHCP Option 66/67/82, BootP, TFTP, SNTP, SMTP, RARP, RMON, HTTP, HTTPS, Telnet, SSH, Syslog, Modbus/TCP, SNMP Inform, LLDP, IEEE 1588 PTP, IPv6 |
| MIB | MIB-II, Ethernet-like MIB, P-BRIDGE MIB, Q-BRIDGE MIB, Bridge MIB, RSTP MIB, RMON MIB Group 1,2,3,9 |
| Flow Control | IEEE802.3x flow control/back pressure |
| **Interface** | |
| RJ45 Ports | 10/100/1000BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection |
| Fiber Ports | optional 1000BaseSX/LX/LHX/ZX (LC connector) |
| Console Port | RS-232 (10-pin RJ45) |
| LED Indicators | PWR1, PWR2, FAULT, 10/100M (TP port), 1000M, MSTR/HEAD and CPLR/TAIL |
| Alarm Contact | Two relay outputs with current carrying capacity of 1A @ 24 VDC |
| Digital Input | Two inputs with the same ground, but electrically isolated from the electronics • For state "1": +13 to +30 V • For state "0": -30 to +3 V • Max. input current: 8 mA |

**Optical Fiber—100 or 1000Base SFP modules**

| | Gigabit Ethernet | | | | | | |
|---|---|---|---|---|---|---|---|
| | SFP-SX | SFP-LSX | SFP-LX | SFP-LH | SFP-LHX | SFP-ZX | SFP-EZX |
| Wavelength | 850 nm | 1310 nm | 1310 nm | 1310 nm | 1310 nm | 1550 nm | 1550 nm |
| Max. Tx | -4 dBm | -1 dBm | -3 dBm | -2 dBm | 1 dBm | 5 dBm | 5 dBm |
| Min. Tx | -9.5 dBm | -9 dBm | -9.5 dBm | -8 dBm | -4 dBm | 0 dBm | 0 dBm |
| Rx Sensitivity | -18 dBm | -19 dBm | -20 dBm | -23 dBm | -24 dBm | -24 dBm | -30 dBm |
| Link Budget | 8.5 dB | 10 dB | 10.5 dB | 15 dB | 20 dB | 24 dB | 30 dB |
| Typical Distance | 550 m[a] | 2 km[b] | 10 km[c] | 30 km[c] | 40 km[c] | 80 km[c] | 110 km[c] |
| Saturation | 0 dBm | -3 dBm | -3 dBm | -3 dBm | -3 dBm | -3 dBm | -3 dBm |

a. 50/125 µm, 400 MHz * km or 62.5/125 µm, 500 MHz * km @ 850 nm multi-mode fiber optic cable
b. 62.5/125 µm, 750 MHz * km @ 1310 nm multi-mode fiber optic cable
c. 9/125 µm single-mode fiber optic cable

|  | **Fast Ethernet** | | |
|  | **SFP-M** | **SFP-S** | **SFP-L** |
| Wavelength | 1300 nm | 1310 nm | 1550 nm |
| Max. Tx | -18 dBm | 0 dBm | 0 dBm |
| Min. Tx | -8 dBm | -5 dBm | -5 dBm |
| Rx Sensitivity | -34 dBm | -34 dBm | -34 dBm |
| Link Budget | 26 dB | 29 dB | 29 dB |
| Typical Distance | 4 km[a] | 40 km[b] | 80 km[b] |
| Saturation | 0 dBm | -3 dBm | -3 dBm |

a. 50/125 μm or 62.5/125 μm, 800 MHz * km @ 1300 nm
multi-mode fiber optic cable
b. 9/125 μm single-mode fiber optic cable

**Power**

| Input Voltage | 12/24/48 VDC,<br>18 to 30 VAC (47 to 63 Hz), redundant inputs |
| Input Current (@24V) | 0.92 A |
| Connection | Two removable 6-pin terminal blocks |
| Overload Current Protection | Present |
| Reverse Polarity Protection | Present |

**Mechanical**

| Casing | IP30 protection, metal case |
| Dimensions (W x H x D) | 87.1 x 135 x 107 mm (3.43 x 5.31 x 4.21 in) |
| Weight | 1.41 kg |
| Installation | DIN-Rail, Wall Mounting Kit (optional kit) |

**Environment**

| Operating Temperature | 0 to 60°C (32 to 140°F), standard models<br>-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 | UL 508 |
| Hazardous Location | UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Class I, Zone 2, Ex nC nL IIC T4 |
| EMI | FCC Part 15, EN55032; class A |
| EMS | EN55024<br>EN61000-4-2 (ESD), Level 3<br>EN61000-4-3 (RS), Level 3<br>EN61000-4-4 (EFT), Level 2<br>EN61000-4-5 (Surge), Level 3<br>EN61000-4-6 (CS), Level 3<br>EN61000-4-8<br>EN61000-4-11 |
| Shock | IEC60068-2-27 |
| Free Fall | IEC60068-2-32 |
| Vibration | IEC60068-2-6 |
| **WARRANTY** | 5 years |