Your Industrial Ethernet Solutions for Control and Automation

Gigabit Ethernet

Ethernet I/O / HMI

DCS / PLC / PAC

Video / Audio

MTL Instruments

MOXA

Modular Managed Ethernet Switches
# Modular Managed Ethernet Switches

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Scalable Gigabit Modular Platform

- Delivers Flexible Mixtures of Media and Bandwidth

Gigabit Turbo Ring

EDS-728

Gigabit Managed Ethernet Switch

EDS-828

24+4G-port Layer 3 Gigabit Modular Managed Ethernet Switch

LAN A

LAN B

LAN C

Video-over-IP

Server Farm

Gigabit Fiber Optic Cable (1000BaseSX/LX/LH/LX/ZX)

Fiber Optic Cable (100BaseFX)

Twisted Pair Cable (10/100BaseT(X) or 10/100/1000BaseT(X))
**What is a Layer 3 Switch?**

Layer 3 switches have optimized hardware to pass data as fast as Layer 2 switches, yet they use the IP address for making a switching decision at Layer 3, just like a router. The 802.1Q VLAN of a Layer 2 switch allows network operators to configure and maintain the network more effectively, but cross VLAN communication still relies on traditional Layer 3 routers. Both routers and Layer 3 switches use a routing protocol and routing table to determine the best path. However, compared to router that is usually software-based, Layer 3 switches are relatively faster and less expensive due to built-in switching hardware with optimized chips and full-wire speed IP frame forwarding performance suitable for VLAN interconnection. Moxa’s Layer 3 switch can be used to partition a large-scale LAN into multiple subnets for better network performance.

**Static Routing**

Instead of using a Layer 2 Ethernet switch MAC table, the EDS-828 series has a built-in IP routing table to support forwarding IP frames. Network administrators need to configure and maintain this IP routing table totally manually. Any change in the network topology will also require the network administrator to reconfigure the routing table.

**Routing Information Protocol (RIP)**

In addition to static routing, the EDS-828 has a built-in IP routing table that can be set up and updated dynamically by routing protocol. RIP is an often used routing protocol that uses the Bellman-Ford algorithm and “hop count” measurement to determine how packets should be routed from one network to another.

**Open Shortest Path First (OSPF)**

The EDS-828 series also supports OSPF, which uses “Link State” instead of “hop count” to determine the network route. OSPF is more complicated than RIP. However, compared to RIP, OSPF has faster network convergence and less network traffic. Both RIP and OSPF are usually referred to as Interior Gateway Protocols (IGP).

**Static versus Dynamic**

The EDS-828 built-in IP routing table can be updated and maintained both statically and dynamically. If the network is small and fixed, the network administrator may configure the IP routing table manually. However, any network topology change will require the network administrator to reconfigure the settings manually. If the network is extended or the network topology is changed frequently, using dynamic routing can efficiently enhance network stability and reduce the time it takes to effect network convergence. Dynamic routing protocol allows devices to detect and respond to network changes automatically. In this case, network administrators do not need to reconfigure the settings after the network changes.
Advanced Layer 2 Network Management

Gigabit Ethernet Redundant Ring and Ring Coupling Capability

Ethernet has become the default data communications medium for industrial automation applications. In fact, it’s not uncommon for the transfer of video, voice, and high-rate industrial application data to be integrated into one network. Moxa’s EDS-828/728 series Ethernet switches, which come equipped with a redundant Gigabit Ethernet protocol called Gigabit Turbo Ring, give system maintainers a convenient means of setting up a versatile yet stable Gigabit Ethernet network.

Port Trunking for Flexible Network Connections

IEEE 802.3ad (LACP, Link Aggregation Control Protocol) provides flexible network connections and a redundant path for critical devices. The EDS-828/728 Ethernet switches allow users to set up a wider communication path by aggregating up to four trunk groups in parallel. A maximum of eight ports can be assigned to one trunk group to optimize your network connection and redundant paths. When selected ports are grouped for trunking, LACP will exchange information to determine whether or not the ports selected in a group can be trunked together.

IEEE 802.1X Enhances User Authentication

The EDS-828/728 series Ethernet switches support IEEE 802.1X (Port-based Network Access Control) to enhance user authentication. When IEEE 802.1X is activated, only authorized users can access the port. Authentication is done using the local user database or an external RADIUS server.

HTTPS and SSH Enhance Network Security

In order to protect data from being intercepted, the EDS-828/728 Ethernet switches support the HTTPS and SSH protocols for transferring data over the Internet in an encrypted form. If you are changing the configuration of an Ethernet switch online, please make sure that it is done over HTTPS and SSH so that the data remains secure.

IGMP Snooping and GMRP for Filtering Multicast Traffic

The EDS-828/728 Ethernet switches support IEEE 802.1D-1998 GMRP (GARP Multicast Registration Protocol) and IGMP snooping to provide the ability to prune multicast traffic so that the traffic only travels to those end destinations that require this kind of traffic. As a result, the amount of traffic on the Ethernet LAN is reduced.


**VLAN Eases Network Planning**

VLANs can be used to overcome restrictions imposed by the physical network connections. In one respect, devices connected to different physical networks can be allowed to communicate easily by assigning them to the same VLAN. In addition, devices assigned to different VLANs will not be able to communicate with each other, providing extra security and protection from unwanted invasion or traffic. The EDS-828/728 Ethernet switches support 802.1Q VLAN and GVRP protocol, which can exchange the same interoperable parameters to keep consistent VLAN settings over the entire network.

**QoS Increases Determinism**

Quality of Service (QoS) provides a traffic prioritization capability to ensure that important data is delivered consistently and predictably. The EDS-828/728 series Ethernet switches can inspect IEEE 802.1p/1Q Layer 2 CoS tags, and even Layer 3 TOS information, to provide a consistent classification of the entire network. The QoS capability of the EDS-828/728 Ethernet switches improve your industrial network’s performance, and increase determinism for mission-critical applications.

**RMON for Efficient Network Monitoring and Proactive Capability**

RMON (Remote Network Monitoring) is an IETF (Internet Engineering Task Force) standard monitoring specification that allows various network agents and console systems to exchange network monitoring data. RMON provides you with comprehensive network fault diagnosis, planning, and performance-tuning information, and helps you manage your network in a more proactive manner. If configured correctly, RMON probes deliver information before problems occur, allowing you to take action before the problems affect users.

**Bandwidth Management Prevents Unpredictable Network Status**

The EDS-828/728 series Ethernet switches not only prevent broadcast storms, but can also configure the rate limiting of unicast/multicast/broadcast packets, and in this way gives administrators full control of limited bandwidth to prevent unpredictable faults.

**Port Mirroring for Online Monitoring**

In some cases, a network is so large that it is difficult to achieve the expected communications level. Industrial communications applications use more of a command-response style than the file-transfer style used in office network environments. This means that when first setting up an industrial Ethernet network, control engineers may need to use a second port to monitor the actual activity between their devices and computer host. The EDS-828/728 series’ mirroring port function helps ensure that the system behaves as expected.

**Automatic Warning by Event**

**Warning by e-mail or SNMP Trap**

The EDS-828/728 series Ethernet switches can send out a warning e-mail or SNMP trap when an exception is detected, providing system managers with real-time alarm messages.

**Warning by Relay Output**

The EDS-828/728 series Ethernet switches provide two relay outputs that can be set up to indicate events with different importance to notify or warn engineers in the field, so the engineer can use the appropriate emergency maintenance procedures to respond quickly to higher priority messages.

**DI to Integrate Other Important Sensors**

With two digital inputs, the EDS-828/728 series Ethernet switches can integrate sensors into its automatic alarm mechanism, sending warning messages to an IP network by e-mail notification.

**Network Management with Moxa SNMP OPC Server Software**

The Moxa SNMP OPC Server Pro software package can convert SNMP into OPC format. The vertical integration of SNMP management information into existing OPC-based SCADA-packages gives customers the ability to establish an Ethernet network management application that is integrated with existing visualization and control applications.

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**Modular Design, Maximum Flexibility**

**User Friendly LED Display**

**Angled LED Display** provides clear viewing from all vertical angles, making it easy to check the status of the switch and each port.

**Separate LED**S for the system and interface modules show clearly the current status of the system and each port.

**The Mode Switch** shows the modes selected for the interface module, giving you an easy way to view the status of all the ports at one glance.
Flexible Fast Ethernet Module

The EDS-828/728 series Ethernet switches let you install up to 24 fast Ethernet ports. Select from eight 4-port fast Ethernet modules with a combination of 10/100BaseT(X) (RJ45 connectors) and 100BaseFX (Single/Multi mode, SC/ST connectors). Long-haul single mode optical fiber can be used to provide 100 Mbps transmission over a distance of 40 km or 80 km.

Innovative Modular Design

Scalable Gigabit Modular Solution

100 Mbps of bandwidth is not enough to meet the requirements posed by industrial Ethernet applications that involve transmitting both voice and video. The EDS-828/728 series Ethernet switches, with their four Gigabit ports and Gigabit Turbo Ring, can give you a reliable and high performance backbone. Select from two different 2-port Gigabit modules to meet current needs or prepare for future demands.

Easy and Flexible Installation

DIN-Rail Mounting Kit

The rugged and user-friendly DIN-Rail kit, which is easily installed with a flat-head screw driver, has passed stringent industrial vibration, freefall, and shock tests.

Wall Mounting Kit

The wall mounting kit provides users with a handy option that meets the requirements of many different industrial applications.

<table>
<thead>
<tr>
<th>Model</th>
<th>Total Number of Ports</th>
<th>Gigabit Ethernet (10/100/1000 Mbps)</th>
<th>Fast Ethernet (10/100 Mbps)</th>
<th>Routing (Static, RIP V1/V2)</th>
<th>RSTP/STP</th>
<th>IGMP snooping/GMRP</th>
<th>Port Trunking/LACP</th>
<th>IEEE 802.1X/HTTPS/SSH</th>
<th>Port Lock</th>
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<th>ABC-01*</th>
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<tbody>
<tr>
<td>EDS-828</td>
<td>28</td>
<td>4</td>
<td>24</td>
<td>√</td>
<td>√</td>
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<td>EDS-728</td>
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*ABC-01 is an RS-232 RJ45-based automatic backup configurator for Moxa’s managed Ethernet switches. Please check page 11-1 for detailed information.
Overview

Managed Ethernet Switches

Unmanaged Ethernet Switches

Modular Ethernet Switches

Rackmount Ethernet Switches

Wireless Ethernet

Active Ethernet I/O

Peer-to-Peer I/O

Modular Remote I/O

Video Networking Products

Media Converters

Accessories

Ordering Information

Introduction

The EDS-828 is a high-performance Layer 3 Ethernet switch designed for network routing, and the improved hardware technology built into the EDS-828 replaces the software logic used by traditional routers, offering better performance, and making the switch ideal for large-scale local area networks (LANs). In addition to Layer 3 features, the EDS-828 also supports Layer 2 management features, including QoS, IGMP snooping/GMRP, VLAN, LACP, SNMPv1/v2c/v3, RMON supported, IEEE 802.1X, HTTPS, and SSH to enhance network security.

Features and Benefits

- Static routing and RIP V1/V2 to move data and information across networks
- Redundant Gigabit Turbo Ring and RSTP/STP (IEEE 802.1w/D)
- IGMP snooping and GMRP for filtering multicast traffic from industrial Ethernet protocols
- IEEE 802.1Q VLAN and GVRP protocol to ease network planning
- Port Trunking for optimum bandwidth utilization
- IEEE 802.1X, HTTPS, and SSH to enhance network security
- QoS-IEEE 802.1p/1Q and TOS/DiffServ to increase determinism
- Port Trunking for optimum bandwidth utilization
- IEEE 802.1X, HTTPS, and SSH to enhance network security
- QoS snooping/GMRP, VLAN, LACP, SNMPv1/v2c/v3, RMON, IEEE 802.1X, HTTPS, and SSH. In order to meet the demands of any industrial application, the EDS-828 uses a modular design that allows users to install up to 4 Gigabit Ethernet ports and 24 fast Ethernet ports, providing a high degree of flexibility for network expansion.

Layer 3 routing interconnects multiple LAN segments

- Static routing and RIP V1/V2 supported
- 4 Gigabit plus 24 fast Ethernet ports for copper and fiber
- Gigabit Turbo Ring and RSTP/STP (IEEE 802.1w/D) for Ethernet redundancy
- QoS, IGMP snooping/GMRP, VLAN, LACP, SNMPv1/v2c/v3, RMON supported
- IEEE 802.1X, HTTPS, and SSH to enhance network security

Specifications

Layer 3 Modular Managed Ethernet Switch System, EDS-82810G

Technology

Standards: IEEE 802.3 for 10BaseT,
IEEE 802.3u for 100BaseT(X) and 100Base FX,
IEEE 802.3ab for 1000BaseT(X),
IEEE 802.3z for 1000BaseSX/LX/LHX/ZX,
IEEE 802.3x for Flow Control
IEEE 802.1D for Spanning Tree Protocol,
IEEE 802.1Q for VLAN Tagging,
IEEE 802.1p for Class of Service,
IEEE 802.1x for Authentication,
IEEE 802.3ad for Port Trunk with LACP

Protocols: IGMPv1/v2 device, GMRP, GVRP, SNMPv1/v2c/v3, DHCP Server/Client, DHCP Option 82, BootP, TFTP, SMTP, RARP, RMON, RIP V1/V2, HTTP, HTTPS, Telnet, SSH, Syslog

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: IEEE 802.3x flow control, back pressure flow control

Switch Properties

Priority Queues: 4
Max. Number of Available Vlans: 64
VLAN ID Range: VID 1 to 4094
IGMP Groups: 256
**Interface**

**Fast Ethernet**
- 6 slots for any combination of 4-port interface module with 10/100BaseT(X) or 100BaseFX

**Gigabit Ethernet**
- 2 slots for any combination of 2-port interface module with 10/100/1000BaseT(X) or 1000BaseSFP slot

**Console**
- RS-232 (RJ45)

**System LED Indicators**
- STAT, PWR1, PWR2, FAULT, MASTER, COUPLER, T.RING

**Module LED Indicators**
- LNK/ACT, FDX/HDX, RING PORT, COUPLER PORT, SPEED

**Alarm Contact**
- Two relay outputs with current carrying capacity of 1A @ 24 VDC

**Digital Inputs**
- Two inputs with the same ground, but electrically isolated from the electronics.
  - +13 to +30V for state “1”
  - -30 to +3V for state “0”
  - Max. input current: 8 mA

**Power Requirements**

**Input Voltage**
- 24 VDC (12 to 45 VDC), redundant dual inputs

**Input Current (@ 24 V)**
- 0.96A

**Connection**
- Two removable 6-pin terminal blocks

**Overload Current Protection**
- Present

**Reverse Polarity Protection**
- Present

**Physical Characteristics**

**Casing**
- IP30 protection

**Dimensions (W x H x D)**
- 362.4 x 142.47 x 128 mm (14.27 x 5.61 x 5.04 in.)

**Weight**
- 1950 g

**Installation**
- DIN-Rail mounting, wall mounting (optional kit)

**Environmental Limits**

**Operating Temperature**
- 0 to 60°C (32 to 140°F)

**Storage Temperature**
- -40 to 85°C (~-40 to 185°F)

**Ambient Relative Humidity**
- 5 to 95% (non-condensing)

**Regulatory Approvals**

**Safety**
- UL508 (Pending), UL60950-1, CSA C22.2 No. 60950-1, EN60950-1 (Pending)

**Hazardous Location**
- UL/cUL Class I, Division 2, Groups A, B, C, and D (Pending); ATEX Class I, Zone 2, Ex nc IIC (Pending)

**Maritime**
- DNV (Pending), GL (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**
- IEC 60068-2-27

**Freefall**
- IEC 60068-2-32

**Vibration**
- IEC 60068-2-6

**MTBF**
- 160,000 hrs

**Database**
- Telcordia (Bellcore), GB

*Please check Moxa’s website for the most up-to-date certification status.

**Warranty**
- 5 years (see www.moxa.com/warranty for details)

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**Ordering Information**

**Step 1:** Select Ethernet switch system

**Step 2:** Select interface modules

![IM series (Gigabit or fast Ethernet)]

**Layer 3 Modular Managed Ethernet Switch System, EDS-82810G**

Layer 3 modular managed Ethernet switch system with 6 slots for 4-port fast Ethernet interface modules and 2 slots for 2-port Gigabit interface modules, up to 24+4G ports.

**Optional Accessories**

- ABC-01: Industrial RS-232, RJ45-based, automatic backup configurator
- EDS-SNMP OPC Server Pro: CD with EDS-SNMP OPC server software and manual
- DR-4524: 45W/2A DIN-Rail 24 VDC power supply, 85 to 264 VAC input
- DR-75-24: 75W/3.2A DIN-Rail 24 VDC power supply, 85 to 264 VAC input
- DR-120-24: 120W/5A DIN-Rail 24 VDC power supply, 88 to 132 VAC/176 to 264 VAC input by switch
- WK-32: Wall mounting kit for EDS-828/728 series
- RK-4U: 4U-high 19” rack mounting kit

*The EDS-82810G switch system is delivered without interface module. Please see page 1-11 for product information of IM series Gigabit and fast Ethernet interface modules.*
Introduction

The EDS-728 modular Gigabit Ethernet switch features a versatile modular design that allows different combinations of fiber and copper modules, creating a wide array of connection options ideal for any automation network. The modular design lets you install up to 4 Gigabit ports and 24 fast Ethernet ports. The EDS-728 is specially designed for redundant Gigabit network backbones and uses a modular configuration to provide a high degree of flexibility for network expansion. Top network performance, security, and reliability is assured through the EDS-728’s advanced management features, including QoS, IGMP snooping/GMRP, VLAN, LACP, SNMPv1/v2c/v3, RMON, IEEE 802.1X, HTTPS, and SSH. The EDS-728 also features industrial-grade construction, a console port for automatic configuration backup, and an angled LED troubleshooting panel that can be conveniently viewed from both horizontal and vertical orientations.

Features and Benefits

- Redundant Gigabit Turbo Ring and RSTP/STP (IEEE 802.1w/D)
- IGMP snooping and GMRP for filtering multicast traffic from industrial Ethernet protocols
- IEEE 802.1D VLAN and GVRP protocol to ease network planning
- QoS-IEEE 802.1q/1q and TOS/DiffServ to increase determinism
- Port Trunking for optimum bandwidth utilization
- IEEE 802.1X, HTTPS, and SSH to enhance network security
- SNMPv1/v2c/v3 supported
- IEEE 802.1Q VLAN and GVRP protocol to ease network planning
- QoS-IEEE 802.1q/1q and TOS/DiffServ to increase determinism
- Port Trunking for optimum bandwidth utilization
- IEEE 802.1X, HTTPS, and SSH to enhance network security
- ABC-01 (Automatic Backup Configurator) for system configuration backup

Specifications

Modular Managed Ethernet Switch System, EDS-72810G

IEEE 802.1w for Rapid STP,
IEEE 802.1Q for VLAN Tagging,
IEEE 802.1p for Class of Service,
IEEE 802.1x for Authentication,
IEEE 802.3ad for Port Trunk with LACP

Protocols: IGMP/v1/v2 device, GMRP, GVRP, SNMP/v1/v2c/v3, DHCP Server/Client, DHCP Option 82, BootP, TFTP, SMTP, RARP, RMON, HTTP, HTTPS, Telnet, SSH, Syslog

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: IEEE 802.3x flow control, back pressure flow control

Switch Properties

Priority Queues: 4
Max. Number of Available VLANs: 64
VLAN ID Range: VID 1 to 4094
IGMP Groups: 256
Industrial Ethernet Solutions for Control and Automation

Modular Managed Ethernet Switches

EDS-728

Interface

Fast Ethernet: 6 slots for any combination of 4-port interface module with 10/100BaseT(X) or 100BaseFX

Gigabit Ethernet: 2 slots for any combination of 2-port interface module with 10/100/1000BaseT(X) or 1000BaseSFP slot

System LED Indicators: STAT, PWR1, PWR2, FAULT, MASTER, COUPLER, T.RING

Module LED Indicators: LNK/ACT, FDX/HDX, RING PORT, COUPLER PORT, SPEED

Alarm Contact: Two relay outputs with current carrying capacity of 1A @ 24 VDC

Digital Inputs: Two inputs with the same ground, but electrically isolated from the electronics.
- +13 to +30V for state “1”
- -30 to +5V for state “0”
- Max. input current: 8 mA

Power Requirements

Input Voltage: 24 VDC (12 to 45 VDC), redundant dual inputs

Input Current (@ 24 V): 0.96A

Connection: Two removable 6-pin terminal blocks

Overload Current Protection: Present

Reverse Polarity Protection: Present

Physical Characteristics

Casing: IP30 protection

Dimensions (W x H x D): 362.4 x 142.47 x 128 mm (14.27 x 5.61 x 5.04 in.)

Weight: 1950 g

Installation: DIN-Rail mounting, wall mounting (optional kit)

Environmental Limits

Operating Temperature: 0 to 60°C (32 to 140°F)

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Regulatory Approvals

Safety: UL508 (Pending), UL60950-1, CSA C22.2 No. 60950-1, EN60950-1 (Pending)

Hazardous Location: UL/cUL Class I, Division 2, Groups A, B, C, and D (Pending); ATEX Class I, Zone 2, Ex nC IIC (Pending)

Maritime: DNV (Pending), GL (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: IEC 60068-2-27

Freefall: IEC 60068-2-32

Vibration: IEC 60068-2-6

MTBF: 160,000 hrs

Database: Telcordia (Bellcore), GB

* Please check Moxa’s website for the most up-to-date certification status.

Warranty

5 years (see www.moxa.com/warranty for details)

Ordering Information

**Step 1: Select Ethernet switch system**

**Step 2: Select interface modules**

* The EDS-72810G switch system is delivered without interface module. Please see page 1-11 for product information of IM series Gigabit and fast Ethernet interface modules.

**Modular Managed Ethernet Switch System, EDS-72810G**

Modular managed Ethernet switch system with 6 slots for 4-port fast Ethernet interface modules and 2 slots for 2-port Gigabit interface modules, up to 24+4G ports.

**Optional Accessories**

- ABC-01: Industrial RS-232, RJ45-based, automatic backup configurator
- EDS-SNMP OPC Server Pro: CD with EDS-SNMP OPC server software and manual
- DR-4524: 45W/2A DIN-Rail 24 VDC power supply, 85 to 264 VAC input
- DR-75-24: 75W/3.2A DIN-Rail 24 VDC power supply, 85 to 264 VAC input
- DR-120-24: 120W/5A DIN-Rail 24 VDC power supply, 88 to 132 VAC/176 to 264 VAC input by switch
- WK-32: Wall mounting kit for EDS-828/728 series
- RK-4U: 4U-high 19” rack mounting kit
IM Series
2-port Gigabit Ethernet and 4-port fast Ethernet interface modules for EDS-828/728 series Ethernet switches

Specifications

Gigabit Ethernet Interface Modules, IM-2G Series

Fiber Ports: 1000BaseSFP slot
* Please see page 2-23 for the product information of SFP-1G series Gigabit Ethernet SFP modules.

Power Requirements
Power Consumption:
- IM-2GTX: 2.96W
- IM-2GSFP: 3.042W

Physical Characteristics
Dimensions (W x H x D): 24 x 65.9 x 101.1 mm (0.94 x 2.59 x 3.98 in.)
Weight:
- IM-2GTX: 150 g
- IM-2GSFP: 148 g

Fast Ethernet Interface Modules, IM Series

Interface
LED Indicators: Port status
RJ45 Ports: 10/100/1000BaseT(X) auto negotiation speed and auto MDI/MDI-X connection
Fiber Ports: 100BaseFX ports (SC/ST connector)

Optical Fiber

<table>
<thead>
<tr>
<th></th>
<th>100BaseFX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Multi Mode</td>
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<tr>
<td>Wavelength</td>
<td>1300 nm</td>
</tr>
<tr>
<td>Max. TX</td>
<td>-10 dBm</td>
</tr>
<tr>
<td>Min. TX</td>
<td>-20 dBm</td>
</tr>
<tr>
<td>RX Sensitivity</td>
<td>-32 dBm</td>
</tr>
<tr>
<td>Link Budget</td>
<td>12 dB</td>
</tr>
<tr>
<td>Typical Distance</td>
<td>5 km a</td>
</tr>
<tr>
<td>Saturation</td>
<td>-6 dBm</td>
</tr>
</tbody>
</table>

a. 50/125 μm, 800 MHz·km fiber optic cable
b. 62.5/125 μm, 500 MHz·km fiber optic cable
c. 9/125 μm, 3.5 Ps/(nm·km) fiber optic cable
d. 9/125 μm, 19 Ps/(nm·km) fiber optic cable

Power Requirements
Power Consumption:
- IM-4TX: 2.5W
- IM-2MSC/2TX: 5W
- IM-2MST/2TX: 5W
- IM-1LSC/3TX: 4W
- IM-4MSC: 7.2W
- IM-4MST: 7.2W
- IM-4SSC: 7.2W

Physical Characteristics
Casing: IP30 protection
Dimensions (W x H x D): 40 x 127.8 x 100 mm (1.57 x 5.03 x 3.94 in.)
Weight (Gross Weight):
- IM-4TX: 215 g
- IM-2MSC/2TX: 245 g
- IM-2MST/2TX: 250 g
- IM-1LSC/3TX: 235 g
- IM-4MSC: 250 g
- IM-4MST: 270 g
- IM-4SSC: 270 g

MTBF
620,000 hrs
Database: MIL-HDBK-217F, GB 25°C
1 Modular Managed Ethernet Switches

IM Series

- **Dimensions (unit = mm)**
  - **Gigabit Ethernet Interface Modules**
  - **Fast Ethernet Interface Modules**

- **Ordering Information**

<table>
<thead>
<tr>
<th>Product Model</th>
<th>Port Interface</th>
<th>Gigabit Ethernet</th>
<th>Fast Ethernet</th>
<th>IM-2G Series</th>
<th>IM Series</th>
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<tr>
<td></td>
<td>10/100/1000BaseT(X)</td>
<td>1000BaseSFP*</td>
<td>10/100BaseT(X)</td>
<td>IM-2GTX</td>
<td>IM-4TX</td>
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* IM-2GSFP supports 2 1000BaseSFP slots. Please see page 2-23 for the product information of SFP-1G series Gigabit Ethernet SFP modules.