

# Full Upgrade to Cyber Security Network in Substation

## DS412

### Industrial 8G + 4GF Layer 2 Cyber Security Switch

The new DS412 is a full Gigabit L2 Managed Ethernet Switch. Equipped with 8-port 10/100/1000Base-T RJ-45 and 4-port 100/1000Base-X SFP connectivity, the switch provides reliable network with high performance. It supports critical cyber security features that meet IEC62443-4-2 criteria. Advanced management and redundancy features of DS412 guarantee the fastest network recovery, zero packet loss data transmission, and high level of network protection against the hackers' attacks. Besides, rugged design with IEC 61850-3/IEEE 1613/EN 50121-4 standard is the best choice for substation and railway wayside applications.



### Features & Benefit

#### Full Gigabit Switching and Ultra-high Throughput

- **12-port Full Gigabit** Ethernet with 8-port RJ-45 and 4-port SFP
- **16K** MAC address table
- **1.5MByte** packet buffer memory for H.264 burst
- **9K** bytes jumbo frame
- Stores and forwards with non-blocking switch fabric

#### ITU-T G.8032 v1/v2 ERPS Ring Redundancy

- An ITU standard Ring redundancy Protocol
- Provide sub-50ms protection and recovery switching for Ethernet traffic
- Interoperate with 3rd party industrial switch and still remain fast recovery time
- Interoperate with commercial switch instead of STP/RSTP
- Efficient network interconnection and topology with ERPS Chain, multiple chains

#### IEC62443-4-2 Level 3 / 4 Cyber Security

- Access Control List (ACL, MAC/IP/ARP filter)
- DHCP Snooping, IP Source Guard, Dynamic ARP Inspection, IEEE 802.1X/RADIUS, 802.1X MAB, SFTP
- 802.1Q VLAN, Private VLAN, GVRP, GMRP, QinQ
- HTTPS/SSH/SFTP, 256-bit encryption
- RADIUS/TACACS+ centralized password authentication

#### Management Features

- Various configuration paths, including WebGUI, CLI, SNMP and RMON
- IEEE **1588v1/v2 PTP** time management
- LLDP topology control
- USB for easy field configuration and firmware update
- Software utility interface for LAN devices management
- NMS for individual component monitoring

#### Rugged Design for Substation/Wayside

- **IEC 61850-3/ IEEE 1613** for Substation
- **EN50121-4** for railway trackside applications
- Top level **EMC protection** and excellent heat dissipation design for operating in **-40~85°C** environment



## Interfaces

### Integrated Power Connector

- 1 x 8-pin terminal block
- 4 pin for redundant power input
- 2 pin DI
- 2 pin DO
- Easy installation

### Gigabit Ethernet

- 8-port 100/1000MBase-T

### System LED

- 2 x Power
- 1 x System Status
- 1 x DI
- 1 x DO
- 1 x Ring Status

### DIN Clip

### Easy System Management

- USB for Configuration/Firmware update
- RS232 console



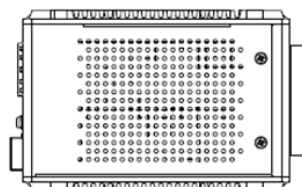
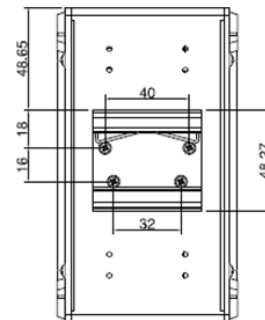
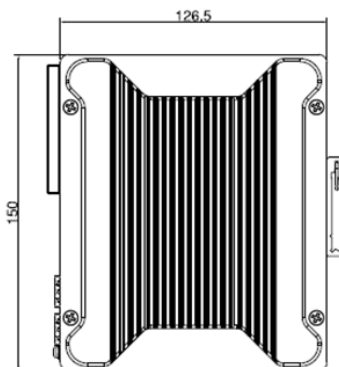
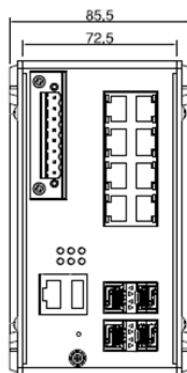
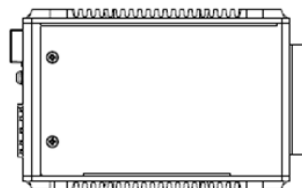
### Gigabit Fiber Ethernet

- 4-port 100/1000M SFP



## Dimensions

(mm)



Technology	
<b>Standard</b>	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet copper
	IEEE 802.3u 100Base-FX Fast Ethernet Fiber
	IEEE 802.3z Gigabit Ethernet Fiber
	IEEE 802.3x Flow Control and back-pressure
	IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
	IEEE 802.1p Class of Service (CoS)
	IEEE 802.1Q VLAN and GVRP
	ITU-T G.8032 Ethernet ring protection switching(ERPS)
	IEEE 802.1D-2004 Rapid Spanning Tree Protocol (RSTP)
	IEEE 802.1Q-2005 Multiple Spanning Tree Protocol (MSTP)
	IEEE 802.3ad Link Aggregation Control Protocol (LACP)
	IEEE 802.1X Port based Network Access Protocol
	IEEE 1588 Precision Time Protocol v1/v2
Performance	
<b>Switch Technology</b>	Store and Forward Technology with non-blocking Switch Fabric
<b>Number of MAC Address</b>	16K
<b>Packet Buffer Memory</b>	1.5MBytes
<b>Jumbo Frame</b>	9216 Bytes
<b>Transfer performance</b>	10Base-TX: 14,880pps, 100Base-TX/FX: 148,800pps, 1000Base-TX/FX: 1,488,100pps
<b>VLAN</b>	256 VLANs
<b>VLAN ID</b>	1~4094
<b>Class of Service</b>	8 Priority Queues per Port
<b>Watchdog</b>	Hardware-based 10 seconds timer
Interface	
<b>Ethernet Port</b>	8 x 10/100/1000Base-T RJ-45, Auto-Negotiation 4 x 100/1000Base SFP, DDM
<b>System LED</b>	2 x Power: Green On 1 x System Status: Ready: Green On, Firmware Updating: Green Blinking 1 x DO: Red On 1 x DI : Green On 1 x Ring: Off: Ring disabled, Green On: Ring normal (Not RPL Owner), Green Blinking: Ring normal (RPL Owner), Amber On: Ring abnormal, Amber Blinking: Ring port fail
<b>Ethernet Port LED</b>	Link (Green On), Active (Green Blinking), Speed 1000M(Amber On), Speed 100M(Off)
<b>SFP LED</b>	Link (Green On), Active (Green Blinking), Speed 1000M(Amber On), Speed 100M(Off)
<b>Reset</b>	System Reboot(2-6 Seconds)/Default Settings Reset(over 7 Seconds)
<b>Console</b>	1 x RS232 in RJ45 for System Configuration. Baud Rate:115200.n.8.1
<b>USB</b>	1 x USB for Configuration/Firmware Update
<b>Power Input, Digital Input, Digital Output</b>	8-Pin Removable Terminal Block Connector: 4 Pins for Redundant Power 4 Pins for DI, DO (Relay Alarm) 1x Digital Output: Dry Relay Output with 0.5A /24V DC 1x Digital Input: DI with Photo-Coupler Isolation High: DC 11~30V Low: DC 0~10V
Power Requirement	
<b>Input Voltage</b>	24VDC (10~60VDC)
<b>Reverse Polarity Protect</b>	Yes
<b>Input Current</b>	0.67A@24V
<b>Power Consumption</b>	Max 16.08W @24VDC full traffic, suggest to reserve 15% tolerance

Software	
<b>Management Interface</b>	CGI WebGUI, Command Line Interface (CLI), Telnet, SNMP
<b>User Management</b>	Radius client, TACACS+, Local multi-user with privilege
<b>Time Management</b>	NTP, IEEE 1588 Precision Time Protocol v1/v2
<b>Network Management</b>	IPv4/IPv6, SNMP v1/v2c/v3/Trap, MIBs, RMON,, DHCP server/client/Option 82, TFTP, System Log, SMTP
<b>Traffic Management</b>	VLAN, Private VLAN, GVRP, GMRP, QinQ Flow Control, Port Trunk/802.3ad LACP, Rate Control, Storm Control, CFM settings IGMP Snooping v1/v2/v3, QoS
<b>Security</b>	Access Control List (ACL, MAC/IP/ARP filter), IEEE 802.1X/RADIUS, 802.1X MAB, DHCP Snooping, IP Source Guard, Dynamic ARP Inspection, SFTP HTTPs/SSH secure login First login password management
<b>Redundancy</b>	Rapid Spanning Tree Protocol (RSTP)/Multiple Spanning Tree Protocol (MSTP) ITU-T G.8032 v1/v2 Ethernet Ring Protection Switching (ERPS)
<b>Diagnostic</b>	LLDP, Port Mirror, Ping, Port Statistic, Event Log

Mechanical	
<b>Installation</b>	DIN Rail
<b>Enclosure Material</b>	Steel Metal with Aluminum
<b>Dimension</b>	85.5 x 150 x 126.5 (W x H x D) without DIN Rail Clip
<b>Ingress Protection</b>	IP30
<b>Weight</b>	1.38KG

Environmental	
<b>Operating Temperature &amp; Humidity</b>	-40°C~85°C , 0%~95% Non- Condensing
<b>Storage Temperature</b>	-40°C~85°C
<b>Hi-Pot Insulation</b>	AC 1.5KV
<b>MTBF</b>	>500,000 hours
<b>Warranty</b>	5 years

Standard	
<b>Safety</b>	IEC60950-1 Compliance
<b>EMC</b>	EN61000-6-2/EN61000-6-4
<b>EMI</b>	CISPR 22, FCC part 15B Class A
<b>EMS</b>	EN61000-4-2 ESD, EN61000-4-3 RS, EN61000-4-4 EFT, EN61000-4-5, EN61000-4-6 CS, EN61000-4-8 Magnetic Field
<b>Railway</b>	EN50121-4
<b>Substation</b>	IEC 61850-3/ IEEE1613

## Ordering Information

Model Name	Description
<b>DS412</b>	Industrial 8G + 4GF Layer 2 Cyber Security Switch
	<b>Package List</b>
	1 x Product Unit (without SFP transceiver)
	1 x 8-pin Removable Terminal Connector
	1 x Attached Din Clip
	1 x Quick Installation Guide



Item	
MK-D1-2	Wall-mounting kit with 2 plates and 8 screws
CBL-RJ45F9-1.5M	Serial RS232 console cable RJ45 to DB9 Female 1.5Meter
SFPGEM05	SFP, 1000Mbps, LC, multi, 550M, 0~70°C
SFPGEM05T	SFP, 1000Mbps, LC, multi, 550M, -40~85°C
SFPGEM05D	SFP, 1000Mbps, LC, multi, DDM, 550M, 0~70°C
SFPGEM05DT	SFP, 1000Mbps, LC, multi, DDM, 550M, -40~85°C
SFPGEM2	SFP, 1000Mbps, LC, multi, 2KM, 0~70°C
SFPGEM2T	SFP, 1000Mbps, LC, multi, 2KM, -40~85°C
SFPGEM2D	SFP, 1000Mbps, LC, multi, DDM, 2KM, 0~70°C
SFPGEM2DT	SFP, 1000Mbps, LC, multi, DDM, 2KM, -40~85°C
SFPGES10	SFP, 1000Mbps, LC, single, 10KM, 0~70°C
SFPGES10T	SFP, 1000Mbps, LC, single, 10KM, -40~85°C
SFPGES10D	SFP, 1000Mbps, LC, single, DDM, 10KM, 0~70°C
SFPGES30	SFP, 1000Mbps, LC, single, 30KM, 0~70°C
SFPGES30T	SFP, 1000Mbps, LC, single, 30KM, -40~85°C
SFPGES30D	SFP, 1000Mbps, LC, single, DDM, 30KM, 0~70°C
SFPXGM03D	SFP+, 10Gbps, LC, multi, DDM, 300M, 0~70°C
SFPXGS10D	SFP+, 10Gbps, LC, single, DDM, 10KM, 0~70°C
SFPGES10-A	SFP, 1000Mbps, LC, single, 10KM, BiDi TX-1310nm RX-1550nm, 0~70°C
SFPGES10-B	SFP, 1000Mbps, LC, single, 10KM, BiDi TX-1550nm RX-1310nm, 0~70°C
SFPGES10T-A	SFP, 1000Mbps, LC, single, 10KM, BiDi TX-1310nm RX-1550nm, -40~85°C
SFPGES10T-B	SFP, 1000Mbps, LC, single, 10KM, BiDi TX-1550nm RX-1310nm, -40~85°C
SFPGES10D-A	SFP, 1000Mbps, LC, single, DDM, 10KM, BiDi TX-1310nm RX-1550nm, 0~70°C
SFPGES10D-B	SFP, 1000Mbps, LC, single, DDM, 10KM, BiDi TX-1550nm RX-1310nm, 0~70°C