

## JetNet 5628G Series

### IEC61850-3 24+4G Modular Managed Ethernet Switch



- 3 exchangeable modular slots for adding up to 24 10/100-TX or 18 100Base-FX
- 4 On-Board Gigabit RJ45/SFP combo ports
- Exceeds IEC 61850-3, IEEE1613 Power Substation Standards
- Non-Blocking backplane, 16K MAC table for wire speed bidirectional switching
- Korenix MSR pattern aggregates up to 12 x 100M Rings plus 2 Gigabit Rings
- 802.1s Multiple Spanning Tree Protocol, RSTP for complex network
- 256 Tag based VLANs segregate IEC 61850 GOOSE message streams from each other
- Advanced Private VLAN and Q-in-Q Features
- 8 QoS priority for prioritizing the control and management packet from SCADA
- IGMP Snooping, GMRP, Rate Control for multicast message management
- Supports SNMP, LLDP and JetViewPro i2NMS software for auto topology visualization and efficient group management
- Secure system by 802.1x, IP/MAC Access Control List, SSH/HTTPS
- DHCP Option 82, DHCP Server for IP address assignment
- IEEE 1588 Precision Time Protocol for precise time synchronization
- 85-264VAC, 88-370VDC, 24/48VDC power input

## Overview

JetNet 5628G is an IEC61850-3 Modular Managed Ethernet Switch, equipped with 4 on-board Gigabit RJ45 / MINI GBIC combo ports and 3 modular slot design, for allowing adding up to 24 copper and 18 fiber ports. As a result, it delivers maximum flexibility and simple interface exchangeability for various network connection needs while reducing the device units and costs.

With the 4 gigabit combo ports users can trunk up to 8G uplink bandwidth and/or form two independent gigabit rings. These dual gigabit rings allow JetNet 5628G to perform as an access-level switch in the power substations ensuring the high bandwidth data transmission.

JetNet 5628G, a special design for substation automation and industrial control room, is compliant with the IEC61850-3, IEEE1613 high level environmental certifications. JetNet 5628G has the capability of forwarding Data, GOOSE, SCADA message without any loss or collision. Different power input types and connectors, including 85-264VAC, 88-370VHDC and 24/48VLDC power inputs are available for flexible use in field power constructions.

With the exclusive MultiRing technology, users can aggregate up to 12 fast Ethernet and 2 gigabit rings into a single switch and ensure network reliability in applications with increased bandwidth and expanded system.



The switch supports up to 9.2Kbytes Jumbo Frame forwarding for efficiently transmitting large files in industrial environments. JetNet 5628G incorporates LLDP function and perfectly works with the Korenix patented JetView Pro i<sup>2</sup>NMS for allowing administrators to automatically discover devices and efficiently manage the industrial network performance in power substations. Furthermore, it fulfills and even

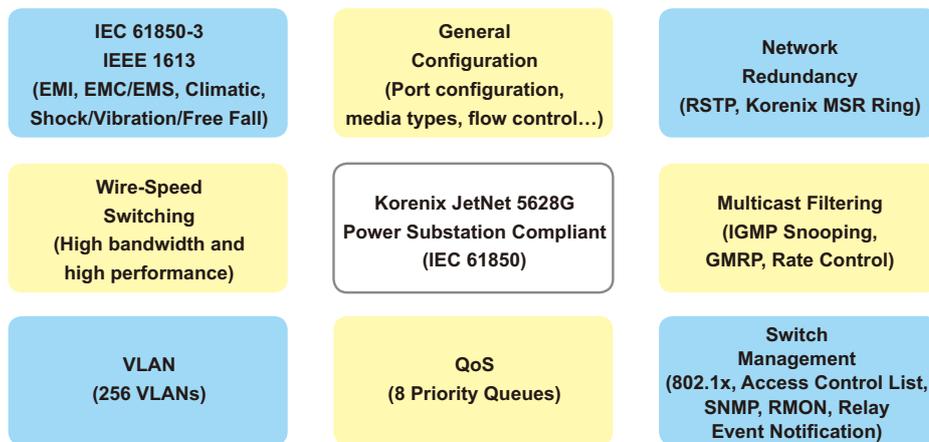
exceeds the high-end management requirements of IEC61850 substation standards by providing doubled performance and efficient traffic transmission through superb management features, including 8 QoS Priority, 256 Tag VLAN groups, 16K MAC address table, IGMP Snooping, DHCP Server/Option 82, LACP, SNMPv3...etc.

## IEC61850-3 / IEEE1633 Compatibility

In substation environments, there are many EMI & Environmental Phenomena, such as the electric, magnetic, interference high energy power surge, uncontrolled temperature & humidity...etc. When it comes to the Ethernet for substation automation, the utility companies generally advise you to comply to the IEC61850-3 standard and IEC1613 standard. IEC61850-3 is standardized for the design of

substation automation.

It defines the standard for the "Communication Networks and Systems in Substations". IEC61850-3 defines the "General Requirements" for relevant equipments. The IEC1613 defines the "Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations".

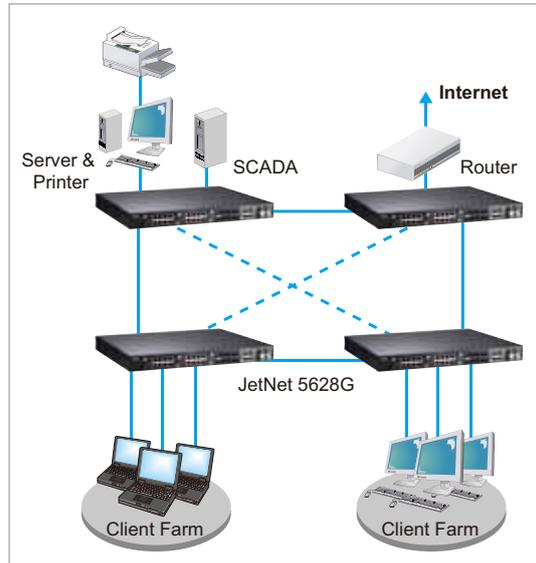


## High Bandwidth and Performance

JetNet 5628G series support 24 fast Ethernet ports plus 4 gigabit combo ports as well as wire speed forwarding and up to 9,216 bytes jumbo frame.

The 24+4G combo port design provides benefits and advantages when planning your industrial network architecture.

- Acting as the access switch, 100M speed is still the major and popular in industrial environment.
- Acting as the distribution switch, 4 Gigabit Combo ports are designed for network redundancy, connecting public server or uplink path...
- 2 Gigabit ports are for forming independent ring, or connecting multiple switches with RSTP protection.
- 2 ports for ring and the others for connecting to public servers with higher bandwidth.
- The upper connection can be aggregated with up to 8G bandwidth in full duplex mode by LACP.
- 4 Combo Ports Design to save stock of storing different kinds of transceivers.



## Multiple Super Ring (MSR™) Technology

The JetNet 5628G supports the new generation ring technology – MSR™ which includes various new

technologies for redundancy applications and structures of different networks.



Rapid Super Ring	Rapid Dual Homing	MultiRing	TrunkRing
<ul style="list-style-type: none"> <li>■ Ring Master auto-select</li> <li>■ Seamless restoration</li> <li>■ Ring Failure alarms/LED</li> <li>■ Failed ring port together with Ring Master</li> <li>■ Up to 5ms Recovery Time</li> <li>■ Backward compatible with legacy Super Ring</li> </ul>	<ul style="list-style-type: none"> <li>■ Multiple Uplink Paths</li> <li>■ One to One upper, Many to One upper, One to Many upper switches</li> <li>■ Seamless Restoration</li> <li>■ Korenix Patent protected</li> </ul>	<ul style="list-style-type: none"> <li>■ Couple 2 rings with shared unit</li> <li>■ Multiple up to 12 100M Rings &amp; 4G for 2 Gigabit rings</li> <li>■ Korenix Patent protected</li> </ul>	<ul style="list-style-type: none"> <li>■ Integrate Port Trunk/LACP with MSR, RSR</li> <li>■ Load balancing of ring Ports</li> <li>■ Backup with each other</li> <li>■ Korenix Patent protected</li> </ul>

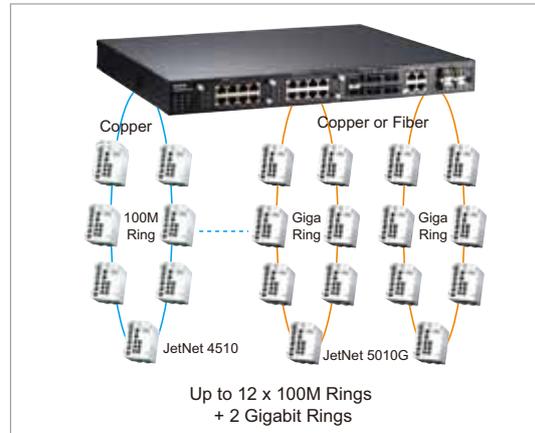
## Maximum 12+2G Rings Aggregation Capability

Korenix JetNet 5628G supports MultiRing which allows aggregating multiple Rapid Super Rings. With the MultiRing technology all the Fast Ethernet and Gigabit Ethernet ports can be part of the ring ports.

Besides, up to 12 100M Rings can be formed and 2 Gigabit Rings can be aggregated to single access switch.



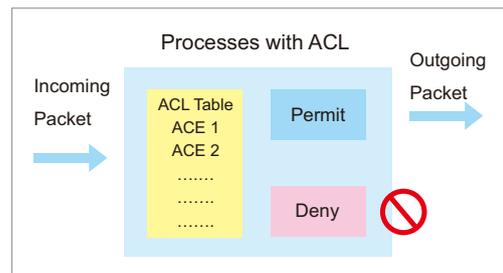
Traditional ring switches, which only allow one ring setting or one ring traffic pass-through, need additional links or settings to connect multiple rings. When there are several ring requests in your network, the setting and environment becomes complex. Unlike these traditional ring switches, with MultiRing feature the lower rings can connect to the JetNet 5628G directly.



## Advanced Security by Layer 2/4 Access Control List

In substation automation or industrial control room installation, multiple types of advanced security features are required and must be implemented. The secured Access Control List (ACL) makes it easy to limit certain devices communicating with the other addressed devices and by the specific protocol. Example rules include (1) administrator to multiple stations, (2) stations to stations and (3) stations to public servers...etc.

The ACLs provide "Permit" and "Deny" rules for any or the specific host. The IP address, MAC address and port ID are the destinations allowed to be applied the rules. The protocol ID, QoS tag, TCP flag... are



the operations which users prefer to control. The JetNet 5628G is equipped with one layer 2+ switch fabric which provides flexible ACLs for the specified subjects and operations within the same LAN.

## Link Layer Discovery Protocol

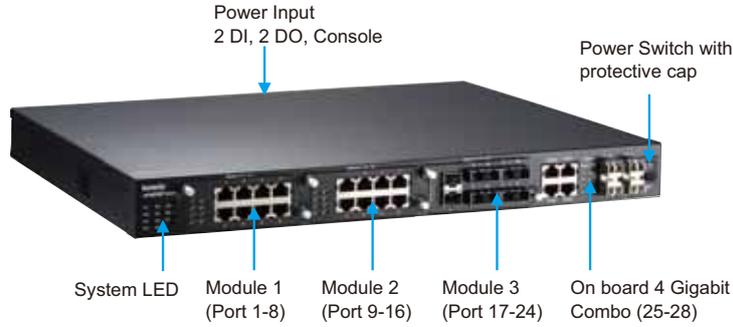
The Link Layer Discovery Protocol (LLDP) was formally ratified as IEEE 802.1AB-2005. LLDP is the Layer 2 protocol that allows the network device/station to advertise connectivity & management information, the identity & major capabilities. It receives and establishes network management information on the local same network.

In industrial environments, most vendors provide their own discovering protocols, window utility or other tools to manage their switches. The LLDP protocol fixes the interoperability among them. With LLDP supported, users can easily browse the network devices and establish the network management information schema about the stations.

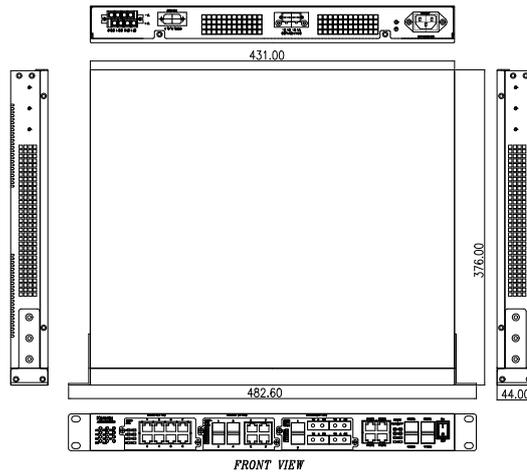
Supporting SNMP, LLDP and JetView protocol, the JetNet 5628G series can be easily discovered, port and ring status can be displayed by JetView Pro, Korenix designed Network Management System or other NMS which support SNMP and LLDP. The software can help administrators efficiently and effectively manage the surveillance network.



## JetNet 5628G Appearance

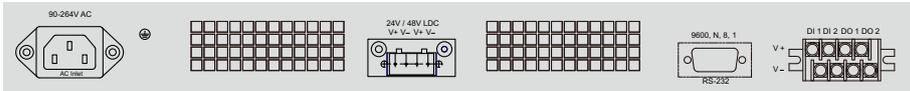


## Dimensions (Unit = mm)



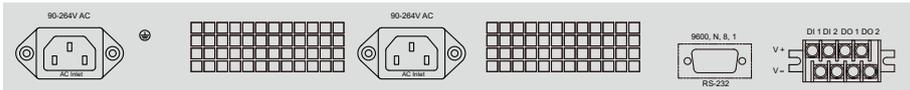
### JetNet 5628G IEC61850-3 24+4G Modular Managed Ethernet Switch

Power Input: 1 x 85-264VAC/88-370VDC + 2 x 24/48VDC



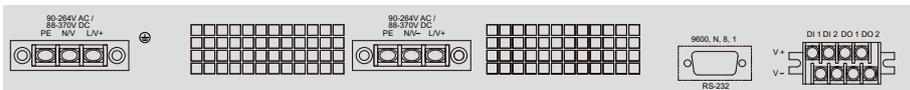
### JetNet 5628G-2AC IEC61850-3 24+4G Modular Managed Ethernet Switch with Dual AC input

Power Input: 2 x 85-264VAC/88-370VDC, Standard three-pronged AC plug



### JetNet 5628G-2HDC IEC61850-3 24+4G Modular Managed Ethernet Switch with Dual 88-370VDC input

Power Input: 2 x 85-264VAC/88-370VDC, 3 pin Terminal Block



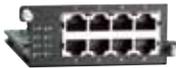
## Flexible Module Design

The JetNet 5628G provides several types of Fast Ethernet modules. There are 8 10/100Base-TX ports, 4 10/100Base-TX plus 4 100Base-FX and 4 100Base-FX/SC ports plus 2 100Base-FX SFP modules. By turning off the power at the front on the switch it's becoming possible to insert the modules or exchange the module types.

The modular design is more flexible for purchasing, provides less storage of stock and field installations. Once the distance is over 100 meters, users can exchange modules without replacing the device. When purchasing the JetNet 5628G, please confirm the media type and the port volume.

### Naming Rule: JNM5-ABBCC/ABBCC

JNM5	A: Port Volume	BB: RJ-45/Fiber	CC: Type of Fiber Connector
<b>5: JetNet 5xxx Series Module</b>	2: 2 Ports 4: 4 Ports 8: 8 Ports	TX: RJ45 M: Multi mode S: Single Mode	SC: SC Connector SFP: SFP socket



**JNM5-8TX:**  
8 ports 10/100Base-TX module



**JNM5-2SFP/4MSC:**  
2 ports 100Base-FX + 100Base-FX/SC Multi-mode

**JNM5-2SFP/4SSC:**  
2 ports 100Base-FX + 100Base-FX/SC Single-mode

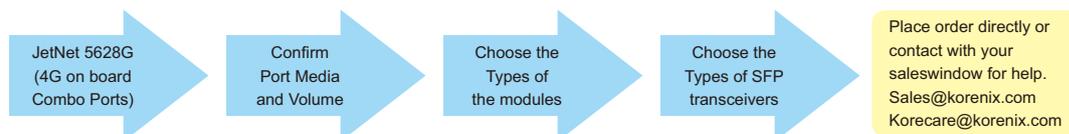


**JNM5-4TX/4SFP:** 4 ports 10/100Base-TX + 4 100FX-SFP

### The examples:

Fast Ethernet module	On Board	Example
JNM5-4TX/4SFP x 1	4 10/100/1000 or 4G SFP	4 x 100M copper + 4 x 100M SFP + 4G, 8 x 100M copper + 4 x 100M SFP, 6 x 100M copper + 4 x 100M SFP + 2G ...etc.
JNM5-8TX x 1	4 10/100/1000 or 4G SFP	8 x 100M copper + 4G Combo, 12 x 100M copper, 10 x 100M copper + 2G combo ...etc.
JNM5-2SFP/4MSC	4 10/100/1000 or 4G SFP	6 x 100M Fiber + 4G Combo, 4 x 100M copper + 6 100M Fiber ...etc.
JNM5-8TX x 2 + JNM5-4TX/4SFP x 1	4 10/100/1000 or 4G SFP	20 x 100M copper + 4 x 100M SFP + 4G combo 22 x 100M copper + 4 x 100M SFP + 2G combo ...etc.

### Purchasing Progress



## Specification

### Technology

#### Standard:

IEEE 802.3 10Base-T Ethernet  
 IEEE 802.3u 100Base-TX Fast Ethernet  
 IEEE 802.3ab 1000Base-TX  
 IEEE 802.3z Gigabit Ethernet Fiber  
 IEEE 802.3x Flow Control and Back-pressure  
 IEEE 802.1p class of service  
 IEEE 802.1Q VLAN  
 IEEE 802.1s Multiple Spanning Tree Protocol  
 IEEE 802.1D-2004 Rapid Spanning Tree Protocol (RSTP)  
 IEEE802.3ad LACP  
 IEEE802.1X Port based Network Access Control  
 IEEE802.1AB Link Layer Discovery Protocol  
 IEEE 1588v1 Precision Time Protocol (PTP)

### Performance

#### Switch Technology:

Store and Forward Technology, 12.8Gbps Switch Fabric.  
**System Throughput:** 14,880pps for 10M Ethernet, 148,800pps for 100M Fast Ethernet, 1,488,100 for Gigabit Ethernet

**Transfer packet size:** Typical: 64 bytes to 1536 bytes,

**Jumbo Frame Enabled:** Up to 9,216bytes.

**MAC Address:** 16K MAC

**Packet Buffer:** 32Mbits

**Relay Alarm:** Dry Relay output with 1A@24V ability

### Management

**Configuration:** Cisco-Like CLI, JetView, Web, HTTPS, SSH, Backup/Restore, DHCP Client, Warm reboot, Reset to default, Admin password, MAC address table display, Static MAC, Aging time

**Port Configuration:** Port Enable/Disable, Flow Control, Speed/Duplex, Status and Port Statistic

**Port Trunk:** Static Trunk and 802.3ad LACP, Up to 6 Trunk Group, 8 ports per trunk

**LACP:** IEEE 802.3ad Link Aggregation Control Protocol, Short/Long LACP Timeout

**Port Mirroring:** Online traffic monitoring on multiple selected ports

**Jumbo Frame:** Enable/Disable with Adjustable MTU size

**SNMP:** SNMP v1, v2c, v3 and Traps.

**SNMP MIB:** MIB-II, Ethernet-like, P-Bridge, Q-Bridge, Bridge, RSTP, RMON Group 1,2,3,9 and Private MIB

**LLDP:** Link Layer Discovery Protocol to advertise system/port identity and capability on the local network

**VLAN:** IEEE802.1Q VLAN, GVRP. Up to 255 Tag VLAN, 4K Configurable VLAN ID

**Private VLAN:** Direct client ports in isolated/community VLAN to promiscuous port in Primary VLAN

**Q-in-Q:** Double VLAN Tag in an Ethernet frame

**Quality of Service:** 8 physical priority queues per port, IEEE802.1p COS and Layer 3 TOS/DiffServ

**IGMP Snooping:** IGMP Snooping V1/V2/V3 for multicast filtering and IGMP Query, up to 256 Multicast Groups

**GMRP:** GARP Multicast Registration Protocol

**Rate Control:** Ingress filtering for Broadcast, Multicast, Unknown DA or All packets, step by 64kbps.

**IEEE1588 Precision Time Protocol (PTP):** Synchronize time from the PTP server

**NTP:** Network Time Protocol to synchronize time from Internet

**Embedded Watchdog:** Embedded hardware watchdog timer to auto reset system when switch system failure

**802.1x:** Port\_based Network Access Control

**Radius:** Login by Radius account/password, Key for Radius Server Authentication

**Access Control List (ACL):** Deny/Permit ACL Security policy for specific IP/MAC address and TCP/UDP port

**DHCP Server:** Can assign 255 IP address, support IP and MAC binding

DHCP Option 82 Relay DHCP Request to different IP subnet

**E-mail Warning:** Automatic warning by pre-defined events System Log: Supports both Local mode and Server mode

**Alarm Events:** Power and Ports Failure, DI state, DO state, Ping Failure, Login Fail, Time Synchronize Fail, Super Ring Topology Change

### Network Redundancy

**Multiple Spanning Tree Protocol:** IEEE802.1s MSTP, each MSTP instance can include one or more VLANs. Rapid Spanning Tree Protocol: IEEE802.1D-2004 Rapid Spanning Tree Protocol. Compatible with Legacy STP and IEEE802.1w.

**Multiple Super Ring (MSR)<sup>TM</sup>:** New generation Korenix Ring Redundancy Technology, Includes Rapid Super Ring, Rapid Dual Homing, TrunkRing, MultiRing and backward compatible with legacy Super Ring

**Rapid Dual Homing (RDH)<sup>TM</sup>:** Multiple uplink paths to one or multiple upper switch

**TrunkRing<sup>TM</sup>:** Integrate port aggregate function in ring path to get higher throughput ring architecture

**MultiRing<sup>TM</sup>:** Couple or multiple up to 12 100M rings and 2 Gigabit Rings in a single switch

**Legacy Super Ring:** Backward compatible in client mode

### Interface – On Board

#### Number of Fixed On-Board Gigabit Ports:

10/100/1000Base-TX: 4 x RJ-45, combo with SFP

1000Base-X: 4 x SFP with Hot Swappable, DDM (Digital Diagnostic Monitoring) SFP supported

#### Diagnostic LED:

5628G/5628G-2AC/5628G-2HDC:

AC/HDC Power 1/2(Green), LDC Power 1/2 (Green), RDY(Ready) (Green), Digital Input 1/2(Green), Ring Master (Green), Digital Output 1/2(Red), Ring Fail (Red) Gigabit Copper/SFP (Port 25-28): Link/Activity (Green/ Green Blinking)

5628G-R:

AC/HDC Power 1/2(Green), Digital Output (Red), Ring Status (Green/Amber), Port 1-28 LED (Green)

#### Cables:

10Base-T: 2-pair UTP/STP Cat. 3, 4, 5 cable (100m)

100 Base-TX: 2/4-pair UTP/STP Cat. 5 cable (100m)

1000 Base-T: 4-pair UTP/STP Cat. 5 cable (100m)

**Power Switch:** Easy to power off the switch when exchanging the module

**RS232 Console:** DB9 Connector, Pin3: TxD, Pin2: RxD, Pin5:GND



**Digital Input:** 2 sets of Digital Input (N/A in 5628G-R)  
Logic Low (0): 0-10VDC/Logic High(1): 11-30VDC  
**Alarm:** 1/2 sets of Dry Relay outputs with 1A@24V for configurable events

#### Interface – Module JNM5-8TX

**Number of Ports in Modules:** 8 x 10/100Base-TX, Auto MDI/MDI-X, Auto Negotiation

#### JNM5-4TX/4SFP

**Number of Ports in Modules:** 4 x 10/100Base-TX, Auto MDI/MDI-X, Auto Negotiation  
SFP: 4 x 100M Base-FX SFP Socket

#### JNM5-2SFP/4MSC

**Number of Ports in Modules:** 2 x 100Base-FX SFP plus 4 x 100Base-FX Multi mode SC Transceiver

**SFP:** 2 x 100M Base-FX SFP Socket

#### 100Base-FX Multi Mode SC Transceiver

Multi-mode SC duplex connector

Central Wavelength: 1310 nm

Output Optical Power:

62.5/125 um fiber: -20 ~ -14 dBm

50/125 um fiber: -23.5 ~ -14 dBm

Minimum Input Optical Power (Sensitivity): -31 dBm

Single power supply: 3.3V

Power Consumption: Per Port max. 2 Watt (4V x 50mA)

Typical Distance: 2KM

#### JNM5-2SFP/4SSC:

**Number of Ports in Modules:** 2 x 100Base-FX SFP plus 4 x 100Base-FX Single mode SC Transceiver

**SFP:** 2 x 100M Base-FX, LC Type

#### 100Base-FX Single Mode SC Transceiver (30KM)

Single-Mode SC duplex connector

Central Wavelength: 1310 nm

Output Optical Power:

9/125 um fiber: -15 ~ -8 dBm

Minimum Input Optical Power (Sensitivity): -34 dBm

Single power supply: 3.3V

Power Consumption: Per port max. 2 Watt (4V x 50mA)

Typical Distance: 30KM

**Port ID:** Port ID of Slot 1 start from port 1 to 8, slot 2 start from port 9 to 16, slot 3 start from port 17 to 24

#### Port LED:

Link/Activity of connected port (Green/Green Blinking)

**Note:** When the operating temperature is higher than 55 °C, choose Wide Temperature SFP(-40~85 °C) instead of normal temperature SFP transceiver

#### Power Requirements

##### Power:

AC: 85-264VAC

HDC (High Voltage DC Input): 88-370VDC

LDC (Low Voltage DC input): 24/48VDC (5628G only)

AC/HDC share the same power source module

**Power Consumption:** Max. 50 Watts, by modules

##### Power Connector:

JetNet 5628G: 1 x Standard 3-pronged AC plug +4 pin LDC Terminal Block

JetNet 5628G-2AC: 2 x Standard 3-pronged AC plug

JetNet 5628G-2HDC: 2 x 3 pin HDC Terminal Block

JetNet 5628G-R: 6(2x3) pin HDC Terminal Block

LDC pin: V+, V-, V+, V-

HDC pin: PE, V-/N, V+/L; accept both AC/HDC

#### Mechanical

##### Installation:

19-inch, 1U Rack Mount, Ethernet Ports on the Front (5628G/5628G-2AC/5628G-2HDC)

19-inch, 1U Rack Mount, Ethernet Ports on the Rear (5628G-R)

**Module:** Exchangeable after power off the switch  
Case: Metal case

Dimension: 44mm(H) x 431mm (W) x 375mm (D)

**Weight:** 7 kg with package

#### Environmental

##### Operating Temperature & Humidity

**Dry Heat:** 85°C, 16hrs

**Cold:** -40°C, 16hrs; Cold Start requires 100VAC

**Damp Heat:** 50°C, 95% Humidity (non-condensing), 4 Cyclic, 96hrs

Above tests follows IEC 61850-3 clause 5.2&5.3, IEC 60870-2-2 and IEEE 1613 clause 4.1

**Korenix Stress Test:** -40 ~70°C with 95% Humidity, 3 Cyclic, 51hrs

**Storage Temperature:** -40 ~ 85°C

**Operating Humidity:** 5% ~ 95%

**Hi-Pot:** 1.5KV for AC power and Port

#### Regulatory Approvals

**Power Substation:** IEC 61850-3, IEEE 1613

**EMI:** FCC Class A, CE/EN55022. Class A

##### EMS:

EN61000-4-2(ESD),

EN61000-4-3(RS),

EN61000-4-4(EFT),

EN61000-4-5(Surge),

EN61000-4-6(CS),

EN61000-4-8(RF Magnetic),

EN61000-10(Damped oscillator),

EN61000-4-11(Voltage Dips),

EN61000-4-16(Conducted command disturbances),

EN61000-4-17(Ripper on DC power),

EN61000-4-18(Damped oscillatory wave),

EN61000-4-29(Voltage Dips)

IEEE cl.5.3 Voltage Dip, IEEE 1613 cl.6.3 Impulse Voltage,

IEEE 1613 cl.6.2 High Voltage Test

**Safety:** UL, cUL, EN60950 (Pending)

**Shock:** IEC 61850-3 clause 5.5, IEC 60870-2-2 table 3

**Vibration:** IEC 61850-3 clause 5.5, IEC 60870-2-2 table 3

**Free Fall:** IEC 61850-3 clause 5.5, IEC 60870-2-2 table 3

**MTBF:** Above 200,000 Hours, MIL-HDBK-217F GB standard

**Warranty:** 5 years

## Ordering Information

■ **JetNet 5628G IEC61850-3 24+4G Modular Managed Ethernet Switch**

Power Input: 1 x 85-264VAC/88-370VDC + 2 x 24/48VDC

■ **JetNet 5628G-2AC IEC61850-3 24+4G Modular Managed Ethernet Switch with Dual AC input**

Power Input: 2 x 85-264VAC/88-370VDC, Standard 3 pronged AC plug

■ **JetNet 5628G-2HDC IEC61850-3 24+4G Modular Managed Ethernet Switch with Dual 88-370VDC input**

Power Input: 2 x 85-264VAC/88-370VDC, 3 pin Terminal Block

	PWR 1	PWR 2	AC/HDC Connector	LDC 1	LDC 2
<b>5628G</b>	85~264VAC/ 88-370VDC		Standard 3 pronged AC plug	24/48VDC	24/48VDC
<b>5628G-2AC</b>	85~264VAC/ 88-370VDC	85~264VAC/ 88-370VDC	Standard 3 pronged AC plug		
<b>5628G-2HDC</b>	85~264VAC/ 88-370VDC	85~264VAC/ 88-370VDC	3 pin Terminal Block		

**Accessories:**

JetNet 5628G Series (4G Combo on board, No Fast Ethernet modules, no SFP transceivers)

Rack Mount Kit, Quick Installation Guide, Document CD, Console Cable, Power code

**Additional Modules:**

JNM5-8TX: 8 ports 10/100Base-TX module

JNM5-2SFP/4MSC: 2 ports 100Base-FX + 100Base-FX/SC Multi-mode

JNM5-2SFP/4SSC: 2 ports 100Base-FX + 100Base-FX/SC Single-mode

JNM5-4TX/4SFP: 4 ports 10/100TX + 4 100FX-SFP Socket

## Optional Accessories

100Base-FX Multi-Mode SFP Transceiver

100Base-FX Single-Mode SFP Transceiver

100Base-FX BIDI/WDM Single-Mode SFP Transceiver

Gigabit Multi-Mode SFP Transceiver

Gigabit Single-Mode SFP Transceiver

Gigabit BIDI/WDM Single-Mode SFP Transceiver

