# IPR-AG2404XSM-8C

## 16x GbE RJ45 + 8x Combo (GbE RJ45 + 100/1000Base-X SFP) + 4x 1G/2.5G/10G SFP+



- *Static Routing, RIP v1, RIP v2, OSPF v2, VRRP v2/v3*
- *IEC62439-3 Clause 5 High-Avail-Seamless-Redundancy (HSR)*
- *IEC62439-3 Clause 4 Parallel-Redundancy-Protocol (PRP)*
- *Supports μ-Ring, ERPS, APS, MSTP, RSTP, STP for Redundant Cabling*
- *Supports Maximum up to 14 μ-Rings in One Device*
- *EN62368-1, EN50121-4, EN61000-6-2/4, CE and FCC Certified*
- *4KV Surge Protection for RJ45 and SFP Ports*

Preliminary

The IPR-AG2404XSM-8C Series are IEC 61850-3 compliant Layer 3 industrial 10-Gigabit Ethernet switches, engineered with an enhanced hardened design to meet the strict reliability requirements of critical and centralized automation systems.

This series features a fixed configuration with 28 Gigabit Ethernet ports, consisting of 16 Gigabit copper ports and 8 combo ports(RJ45 or SFP), along with 4 10G/1G SFP+ uplink ports for high-speed backbone connections or to establish PRP/HSR seamless redundant network topologies.

The IPR-AG2404XSM-8C Series are ideal for smart grid, utility, and substation automation networks, providing a robust, time-synchronized, and cyber-secure backbone for mission-critical power infrastructure.

## Features

- Redundant isolated high voltage 100/220/240VAC(85-264VAC), 100/110/125/135VDC (88-370VDC) or 24/48VDC (24-72VDC)
- 2.25K VDC Hi-pot isolation protection for Ethernet ports and power
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Ring Protection Switching (ERPS) for network redundancy
- Provides 14 instances each can support μ-Ring, u-Chain or Sub-Ring for flexible networking applications
- μ-Ring redundancy, recovery time <20ms in 250 devices
- IEC62439-3 Clause 4 (PRP) and Clause 5 (HSR) compliant
- Supports EMS Management

## Specifications

| | | |
|---|---|---|
| **Standard** | IEEE 802.3 | 10Base-T 10Mbit/s Ethernet |
| | IEEE 802.3u | 100Base-TX, 100Base-FX, Fast Ethernet |
| | IEEE 802.3ab | 1000Base-T Gbit/s Ethernet over twisted pair |
| | IEEE 802.3z | 1000Base-X Gbit/s Ethernet over Fiber-Optic |
| | IEEE 802.3ae | 10 Gbit/s Ethernet over fiber |
| | IEEE 802.1D | STP (Spanning Tree Protocol) |
| | IEEE 802.1W | RSTP (Rapid Spanning Tree Protocol ) |
| | IEEE 802.1S | MSTP (Multiple Spanning Tree Protocol) |
| | ITU-T G.8032 / Y.1344 | ERPS (Ethernet Ring Protection Switching) |
| | ITU-T G.8031 / Y.1342 | APS (Automatic Protection Switching) |

# IEC 61850-3 Layer 3 10G Ethernet Switch

| | | |
|---|---|---|
| **Standard** | IEC62439-2 | Media Redundancy Protocol (MRP) |
| | IEC62439-3 | Clause 4 (PRP) |
| | IEC62439-3 | Clause 5 (HSR) |
| | IEEE 802.1Q | Virtual LANs (VLAN) |
| | IEEE 802.1X | Port based and MAC based Network Access Control, Authentication |
| | IEEE 802.3ac | Max frame size extended to 1522Bytes |
| | IEEE 802.3ad | Link aggregation for parallel links with LACP (Link Aggregation Control Protocol) |
| | IEEE 802.3X | Flow control for full duplex |
| | IEEE 802.1ad | Stacked VLANs, Q-in-Q |
| | IEEE 802.1p | LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization |
| | IEEE 802.1ab | Link Layer Discovery Protocol (LLDP) |
| **VLAN ID** | 4094 IEEE 802.1Q VLAN ID | |
| **Switch Architecture** | Back-plane (Switching Fabric): 128Gbps (Full wire-speed) | |
| **Throughput** | 95.2Mpps | |
| **Data Processing** | Store and Forward | |
| **Network Connector** | **10GbE SFP+:**<br>4x 1G/2.5G/10G SFP+ socket, Supports DDMI<br>**RJ45:**<br>16x 100/1000Base-T, supports Auto negotiation speed, Auto MDI/MDI-X function<br>**GbE Combo Ports:**<br>8x 10/100/1000Base-T RJ-45, Supports Auto negotiation speed, Auto MDI/MDI-X function or 100/1000Base-X SFP socket, Supports DDMI | |
| **Console** | USB Type-C or RS-232(RJ45) | |
| **Reset** | Recessed reset button | |
| **Network Cable** | UTP/STP Cat.5e cable or above<br>EIA/TIA-568 100-ohm (100meter) | |
| **Protocols** | CSMA/CD | |
| **Reverse Polarity** | Protection for input power | |
| **Overload Current** | Protection Supported | |
| **Power Supply** | Redundant 2x High AC/DC input power (-HH model)<br>Redundant 2x DC input power (-DD model)<br>High AC/DC input power(H) : Isolated 110/220 VAC (85~264VAC), 100/110/125/135VDC (88~370VDC), Terminal Block (Barrier Strip with Dust Cover)<br>DC input power (D) : Isolated 24/48VDC (24~76VDC), Terminal Block (Barrier Strip with Dust Cover) | |
| **Power Consumption** | TBD | |
| **LED** | System: Power 1 (Green), Power 2 (Green), Act /Alarm (Green/Amber), Ring Master (Green) | |
| | **P17~P24** Combo: 10/100 Link/Active (Green), 1000 Link/Active (Amber)<br>**P1~P16** UTP: 10/100 Link/Active (Green), 1000 Link/Active (Amber)<br>**P25~28** SFP Slot: 1G/2.5G/5G Link/Active (Amber), 10G Link/Active (Blue) | |
| **Jumbo Frame** | 9KB | |
| **MAC Address Table** | 16K | |
| **Memory Buffer** | 1.5M Bytes for packet buffer | |
| **Device Memory** | 4G Bytes eMMC, 2G Bytes RAM | |
| **Warning Message** | System Syslog, SMTP / e-mail event message, alarm relay | |
| **Alarm Relay Contact** | Relay outputs with current carrying capacity of 1A @24VDC, 2-Pin removable terminal block | |
| **Digital Input** | 1x isolated input : 13~30VDC for state 1, -30~3VDC for state 0 | |
| **Operating Temperature** | -40 ~ 85°C | |
| **Operating Humidity** | 5% to 95% (Non-condensing) | |
| **Storage Temperature** | -40 ~ 85°C | |
| **Housing** | Rugged Metal, IP30 Protection and Fanless | |
| **Dimensions** | 331 x 440 x 44mm (D x W x H)) | |
| **Weight** | TBD | |
| **Installation Mounting** | 19" rack mount | |
| **MTBF** | TBD | |
| **Warranty** | 5 years | |

| Certification | |
|---|---|
| EMC | CE (EN55032, EN55035) |
| EMI (Electromagnetic Interference) | FCC Part 15 Subpart B Class A, CE |
| Railway Traffic | EN50121-4 |
| Immunity for Heavy Industrial Environment | EN61000-6-2 |
| Emission for Heavy Industrial Environment | EN61000-6-4 |
| EMS (Electromagnetic Susceptibility) Protection Level | EN61000-4-3 (RS) Level 3, Criteria A |
| | EN61000-4-4 (Burst) Level 3, Criteria A |
| | EN61000-4-5 (Surge) Level 3, Criteria B |
| | EN61000-4-6 (CS) Level 3, Criteria A |
| | EN61000-4-8 (PFMF, Magnetic Field) Field Strength: 300A/m, Criteria A |
| Safety | EN62368-1 |
| Hi Pot Protection | DC 2.25KV for power to chassis ground, Ethernet port to chassis ground |
| 4KV Surge Protection | Supported for RJ45 and SFP ports |
| Shock | IEC 60068-2-27 |
| Freefall | IEC 60068-2-32 |
| Vibration | IEC 60068-2-6 |

## Software Specifications

| L3 | |
|---|---|
| IPv4/v6 Static Routing | Supported |
| RIP v1/v2 Dynamic Routing | Supported |
| OSPF v2, OSPF v3 Dynamic Routing | Supported |
| L3 Redundancy | VRRP v2/v3 |
| **Topology** | |
| VLAN | IEEE 802.1q VLAN, up to 4094 802.1Q VLAN ID |
| | IEEE 802.1q VLAN, up to 4094 Groups |
| | IEEE 802.1ad Q-in-Q |
| | MAC-based VLAN, up to 256 entries |
| | IP Subnet-based VLAN, up to 128 entries |
| | Protocol-based VLAN (Ethernt, SNAP, LLC), up to 128 entries |
| | VLAN Translation, up to 256 entries |
| | Private VLAN for port isolation |
| | GVRP (GARP VLAN Registration Protocol) |
| | MVR (Multicast VLAN Registration) |
| | Voice VLAN |
| Link Aggregation (Port Trunk) | Static (IEEE 802.3ad LACP), Maximum trunk group : 14group |
| | Dynamic (IEEE 802.3ad LACP), Maximum trunk group : 14group |
| | Per group up-to 8 port |
| Spanning Tree | IEEE 802.1D STP, IEEE 802.1W RSTP, IEEE 802.1S MSTP |
| Multiple μ-Ring | Up to 14 instances each support μ-Ring, μ-Chain or Sub-Ring for flexible networking applications |
| | Recovery time <20ms |
| | The maximum number of device is allowed 250 nodes in a Ring. |
| Loop Protection | Supported |
| ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection) | Recovery time <50ms |
| | Single Ring, Sub-Ring, Multiple ring topology |
| ITU-T G.8031 / Y.1342 EPS (Ethernet Protection Switching) | Supported |

| | |
|---|---|
| **QoS Features** | |
| Class of Service | IEEE 802.1p 8 active priorities queues per port |
| Traffic Classification QoS | IEEE 802.1p based CoS |
| | IP Precedence based CoS |
| | IP DSCP based CoS |
| | QCL (QoS Control List): Frame Type, Source/Destination MAC, VLAN ID, PCP, DEI, Protocol, Source IP, IP Fragment, DSCP, TCP/UDP port number |
| Bandwidth Control for Ingress | Per port based |
| Bandwidth Control for Egress | Per port based |
| | Per queue / Per port shaper |
| DiffServ (RF 2474) Remarking | |
| Storm Control | For Unicast, Broadcast and Multicast |
| **IP Multicasting Features** | |
| IGMP / MLD Snooping | IGMP Snooping v1, v2, v3 / MLD Snooping v1, v2 |
| | Port Filtering Profile |
| | Throttling, Fast Leave |
| | Maximum Multicast Group : up to 1022 entries |
| | Query / Static Router Port |
| **Security Features** | |
| IEEE 802.1X | Port-Based |
| | MAC-Based |
| ACL | Number of rules : up to 256 entries |
| | for L2 / L3 / L4<br>L2 : Mac address SA/DA/VLAN<br>L3 : IP address SA/DA, Subnet<br>L4 : TCP/UDP |
| RADIUS | Authentication & Accounting |
| TACACS+ | Authentication, Authorization and Accounting |
| HTTPS, HTTP | Supported |
| SSL / SSH v2 | Supported |
| User Name Password Authentication | Local Authentication |
| | Remote Authentication (via RADIUS / TACACS+) |
| Management Interface Access Filtering | Web, Telnet / SSH, CLI RS-232 console |
| **Management Features** | |
| CLI | Cisco® like CLI |
| Web UI | Supported |
| Telnet | Server |
| SNMP | V1, V2c, V3 |
| sFlow | Supported |
| Modbus/TCP | Supports management and monitoring |
| SW & Configuration Upgrade | SFTP, TFTP, HTTPS, HTTP, FTP |
| | Redundant firmware in case of upgrade failure |
| FTP Client | Supports for upload/download configuration |
| RMON | RMON I (1, 2, 3, 9 group), RMON II |
| MIB | RFC1213 MIB II, Private MIB |
| UPnP | Supported |
| DHCP v4 | Server, Client, Relay, Relay option 82, Snooping |
| ARP Inspection | Supported |
| IP Source Guard | Supported |
| Port Mirroring | Supported |
| Event Syslog | Syslog server (RFC3164) (Support 4 server) |
| Warning Message | System syslog, e-mail |
| DNS | Client, Proxy |

| | |
|---|---|
| **IEEE 1588 PTP v2** | Supports 5 operating mode in each port: Ordinary-boundary, peer to peer transparent clock ,end to end transparent clock, master and slave |
| **NTP V4.0, SNTP** | Client |
| **LLDP (IEEE 802.1ab)** | Link Layer Discovery Protocol |
| | LLDP-MED |
| **IPv6 Features** | |
| **IPv6 Management** | Telnet Server/ICMP v6 |
| **SNMP over IPv6** | Supported |
| **HTTP over IPv6** | Supported |
| **SSH over IPv6** | Supported |
| **IPv6 Telnet** | Supported |
| **IPv6 NTP, SNTP** | Client |
| **IPv6 TFTP** | Supported |
| **IPv6 QoS** | Supported |
| **IPv6 ACL** | Number of rules: up to 256 entries |
| | for L2 / L3 / L4<br>L2 : Mac address SA/DA/VLAN<br>L3 : IP address SIP, Subnet (32bit)<br>L4 : TCP/UDP |
| **Other Features** | Determine the cable length and lowering the power for ports with short cables<br>Lower the power for a port when there is no link |

*Future release

## Ordering Information

| Model Name | Managed | Total Ports (Maximum) | GbE | | 10GbE | Input Power | | Certification | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10/100/1000 Base-T(X) RJ45 | Combo Ports (RJ45 + SFP) | 1G/2.5G/ 10G SFP+ | 100~240VAC / 100~135VDC | 24/48 VDC | EN62368-1 | CE FCC | EN50121-4 EN61000-6-2 EN61000-6-4 |
| IPR-AG2404XSM-8C-HH | V | 28 | 16 | 8 | 4 | 2 | | V | V | V |
| IPR-AG2404XSM-8C-DD | V | 28 | 16 | 8 | 4 | | 2 | V | V | V |

## Optional Accessories

### ■ Auto Backup Kit

| | |
|---|---|
| BUK1-USB | Backup kit for USB Type-C Console Managed Switch |

### ■ Industrial SFP Transceiver

The ISFP series of industrial grade SFP modules have been fully tested with all CTC Union industrial grade Ethernet switches for guaranteed compatibility and performance. Best performance can be guaranteed, even in mission-critical applications. (Please see CTC Union's Industrial SFP datasheets for more items and detailed information.)

| | |
|---|---|
| ISFP-M9000-85-D(E) | Industrial SFP 10GBase-SR MM, 300meter, wave length 850nm LC, DDMI, -10~70°C (-40~85°C) |
| ISFP-S9010-31-D(E) | Industrial SFP 10GBase-LR SM, 10km, 1310nm, 6.4dB, LC, DDMI, -10~70°C (-40~85°C) |
| ISFP-M7000-85-D(E) | Industrial SFP GbE 1000Base-SX, M/M, 500 meter,wave length 850nm, 7.5dB, LC, DDMI, -10~70°C (-40~85°C) |
| ISFP-S7020-31-D(E) | Industrial SFP 1000Base-LX, S/M, 20km, wave length 1310nm, 15dB, LC, DDMI, -10~70°C (-40~85°C) |
| ISFP-T7T00-00-(E) | Industrial SFP 10/100/1000Base-T UTP 100meter, -10~70°C (-40~85°C) |
| ISFP-M5002-31-D(E) | Industrial SFP 155M 100Base-FX, MM, 2km, wave length 1310nm, 12dB, LC, DDMI, -10~70°C (-40~85°C) |
| ISFP-S5030-31-D(E) | Industrial SFP 155M 100Base-FX, SM, 30km, 1310nm, 19dB, LC, DDMI, -10~70°C (-40~85°C) |

### ■ Industrial Power Supply

| | |
|---|---|
| XDR-240E-48 | Industrial Power, Input 85 ~ 264VAC/120 ~ 370VDC, Output 48VDC, 240W, -40 ~ 70°C (For DC type ) |