Preliminary

IPS-M2404S

3x Modular slot plus 4x 100/1000Base-X SFP Managed Switch

IPS-M2404S is a Layer 2 industrial managed switches, hot-swappable modules can provide up to 28 ports of Gigabit Ethernet connectivity with copper or SFP fiber optic connectors that is designed to meet the demands of power substation system and is fully compliant with the requirement of IEC 61850-3 and IEEE 1613. IPS-M2404S provide a variety of redundant functions to increase the reliability of your network communications, including Ethernet redundant and isolated redundant power supplies. The IPS-M2404S Ethernet switch to use in large scale industrial networks offering accurate information, high performance and high reliability which is increasingly the normal on intelligent power substation applications.

Features

- 3x Modular slot plus 4x 100/1000Base-X SFP
- Optional Module:
  - IPM-GS800 8x 100/1000Base-X SFP
  - IPM-GT800 8x 10/100/1000Base-TX
  - IPM-T800 8x 10/100Base-TX
- Hot swap module for non-stop operating
- Redundant isolated low voltage 24/48VDC, or/and isolated High voltage AC/DC (110/220 VAC/VDC) power inputs
- **Supports negative voltage power input (for example in telecom system)**
- Wide Operating Temperature -40~85°C
- Rugged metal, IP30 protection & Fanless design
- IEC 61850-3, IEEE1613 certified for power substation
- UL60950-1, EN60950-1, CE, FCC, Rail Traffic EN50121-4 certified
- Heavy industrial grade EMS, EMI, EN61000-6-2, EN61000-6-4 certified
- 2.25K VDC Hi-pot isolation protection for Ethernet ports and power
- Supports IEEE1588 PTP V2 for precise time synchronization to operate in Ordinary-Boundary, Peer to Peer Transparent Clock, End to End Transparent Clock, Master, Slave mode by each port
- Support GOOSE Message that complies with IEC61850 standard to achieve zero packet loss
- STP, RSTP, MSTP, ITU-T G.8032 Ethernet Ring Protection Switching (ERPS) for network redundancy
- Provides 5 instances each can support µ-Ring, µ-Chain or Sub-Ring for flexible networking applications (Please see CTC Union µ-Ring white paper for more details and more topology application)
- µ-Ring redundancy, recovery time <50ms in 250 devices
- DHCP Server/Client/Relay/Snooping/Snooping option 82/Relay option 82
- QoS, Traffic classification QoS, CoS, bandwidth control for Ingress and Egress, Storm Control, DiffServ
- IEEE802.1q VLAN, MAC based VLAN, IP subnet based VLAN, Protocol based VLAN, VLAN translation, GVRP, MVR
- Dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- IGMP snooping V1/V2/V3, IGMP Filtering/ Throttling, IGMP query, IGMP proxy reporting, MLD snooping V1/V2
- Flexibility security: Port based and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Software upgrade via TFTP and HTTP, redundant firmware to avoid in case of upgrade failure
- RMON, MIB II, Port mirroring, Event syslog, DNS, NTP, SNTP, IEEE802.1ab LLDP
- Supports IPv6 Telnet server /ICMP v6
- CLI, Web based management, SNMP v1/v2c/v3, Telnet server for management
- Supports Modbus/TCP protocols for management
- Provides SmartConfig for quick and easy mass Configuration*
- Supports SmartView for Centralized Management*
- Supporting Central EMS for management of up to 50 SmartView Server, and maximum up to 25,000 device*

*please see Catalog chapter 1-Software Management for more details

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 802.1d	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)

Standard	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based and MAC based Network Access Control, Authentication
	IEEE802.3ac	Max frame size extended to 1522Bytes
	IEEE 802.3ad	Link aggregation for parallel links with LACP(Link Aggregation Control Protocol)
	IEEE802.3X	Flow control for full duplex
	IEEE 802.1ad	Stacked VLANs, Q-in-Q

Standard	IEEE 802.1p	LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization
	IEEE 802.1ab	Link Layer Discovery Protocol (LLDP)
	IEEE 802.3az	EEE (Energy Efficient Ethernet)
VLAN ID	4094 IEEE802.1Q VLAN VID	
Switch Architecture	Back-plane (Switching Fabric): 56 Gbps (Full wire-speed)	
Data Processing	Store and Forward	
Network Connector	**Chassis:** 3x Modular slot plus 4x 100/1000Base-X SFP **Module:** IPM-GS800 8x 100/1000Base-X SFP IPM-GT800 8x 10/100/1000Base-TX UTP IPM-T800 8x 10/100Base-TX UTP (Hot swap interface for non-stop operating) **SFP** : Supports 100/1000M SFP module with DDMI **UTP** : Supports auto negotiation speed, auto MDI/MDI-X function	
Console	RS-232 (RJ-45)	
Network Cable	UTP/STP above Cat. 5e cable	
	EIA/TIA-568 100-ohm (100m)	
Protocols	CSMA/CD	
Reverse Polarity Protection	Support for Input power	
Overload Current Protection	Supported	
CPU Watch Dog	Supported	
Power Supply	Redundant 2x High Voltage AC/DC input power (-HH model) Redundant 2x Low Voltage DC Input power (-LL model) Redundant 1x Low Voltage DC and 1x High Voltage AC/DC input power (-HL model) Low Voltage DC (L): Isolated 24/48V (18~60VDC), Removable Terminal Block High voltage AC/DC (H): Isolated 110/220VAC (88VAC~264VAC), isolated 110/220DC (88~300VDC) Supports negative voltage power input (for example application in telecom system)	
Power Consumption	TBD	
LED	Per unit: Power 1 (Green), Power 2 (Green), Act /Alarm (Green/Red), Ring Master (Green)	
	P1~P24 Per RJ-45 port: 10/100 Link/Active (Green) 1000 Link/Active (Amber) Per SFP Fiber port: 100Base-X Link/Active (Green) 1000Base-X Link/Active (Amber)	

Jumbo Frame	14K Byte
MAC Address Table	32K
Memory Buffer	4M Bytes for packet buffer
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
Operating Temperature	-40 ~ 85°C
Operating Humidity	5% to 95% (Non-condensing)
Storage Temperature	-40 ~ 85°C
Housing	Rugged Metal, IP30 Protection, Fanless
Dimensions	315 x 440 x 44 mm (D x W x H)
Weight	TBD
Installation Mounting	19" rack mount
MTBF	TBD
Warranty	5 years
Certification	
EMC	CE
EMI (Electromagnetic Interference)	FCC Part 15 Subpart B Class A, CE
Railway Traffic	EN50121-4
Power Substation	IEC 61850-3, IEEE 1613
Immunity for Heavy Industrial Environment	EN61000-6-2
Emission for Heavy Industrial Environment	EN61000-6-4
EMS (Electromagnetic Susceptibility) Protection Level	EN61000-4-2 (ESD) Level 4, Criteria B
	EN61000-4-3 (RS) Level 4, Criteria A
	EN61000-4-4 (Burst) Level 4, Criteria A
	EN61000-4-5 (Surge) Level 4, Criteria B
	EN61000-4-6 (CS) Level 4, Criteria A
	EN61000-4-8 (PFMF Magnetic Field) Level 5, Criteria A
Safety	UL60950-1, EN60950-1
Hi pot protection	DC 2.25KV for power to chassis ground, Ethernet port to chassis ground
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-32
Vibration	IEC 60068-2-6

Software Specifications

Topology	
VLAN	IEEE 802.1q VLAN,up to 4094 802.1Q VLAN VID
	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
	GVRP (GARP VLAN Registration Protocal)
	MVR (Multicast VLAN Registration)
Link Aggregation (Port Trunk)	Static (Hash with SA, DA, IP, TCP/UDP port), up to 14 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 14 trunk group
	Per group up-to 8 port
Spanning Tree	IEEE802.1d STP, IEEE802.1w RSTP, IEEE802.1s MSTP
Multiple µ-Ring	Up to 5 instances each support µ-Ring, µ-Chain or Sub-Ring for flexible networking applications. Recovery time <50ms The maximum number of device is allowed 250 in a Ring. (Please see CTC Union µ-Ring white paper for more details and more topology application)
Loop Protection	Supported
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection)	Recovery time <50ms
	Single Ring, Sub-Ring, Multiple ring topology

QoS Features	
Class of Service	IEEE802.1p 8 active priorities queues for per port
GOOSE Message	Complies with IEC61850 standard to achieve zero packet loss
Traffic Classification QoS	IEEE802.1p based CoS
	IP Precedence based CoS
	IP DSCP based CoS
	QCL(QoS Control List): Frame Type, Source/Destination MAC, VLAN ID, PCP, DEI
	QCE(QoS Control Entry): 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, 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 L2 : Mac address SA/DA/VLAN L3 : IP address SA/DA, Subnet L4 : TCP/UDP
RADIUS authentication & accounting	
TACACS+ authentication & accounting, TACACS+ 3.0	
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 Based Management	
Telnet	Server
SNMP	V1, V2c, V3
Modbus/TCP	Support for management and monitoring
SW & Configuration Upgrade	TFTP, HTTP Redundant firmware in case of upgrade failure
RMON	RMON I (1, 2, 3, 9 group), RMON II
MIB	RFC1213 MIB II, Private MIB
UPnP	Supported
DHCP	TFTP, HTTP Redundant firmware in case of upgrade failure
IP Source Guard	Supported
Port Mirroring	Supported
Event Syslog	Syslog server (RFC3164) (Support 1 server)

Warning Message	System syslog, e-mail, alarm relay
DNS	Client, Proxy
IEEE1588 PTP V2	Supports 5 operating mode in each port : Ordinary-Boundary, Peer to Peer Transparent Clock, End to End Transparent Clock, Master, Slave
NTP, 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 L2 : Mac address SA/DA/VLAN L3 : IP address SA/DA, Subnet L4 : TCP/UDP
Other Features	
Green Ethernet	Supports IEEE802.3az EEE (Energy Efficient Ethernet) Management to optimize the power consumption Determine the cable length and lowering the power for ports with short cables Lower the power for a port when there is no link LED Power Management : Adjustment LEDs intensity
Cable Diagnostic	Measuring UTP cable normal or broken point distance

Application

Figure 1 : IPS-Series in Power Substation Application

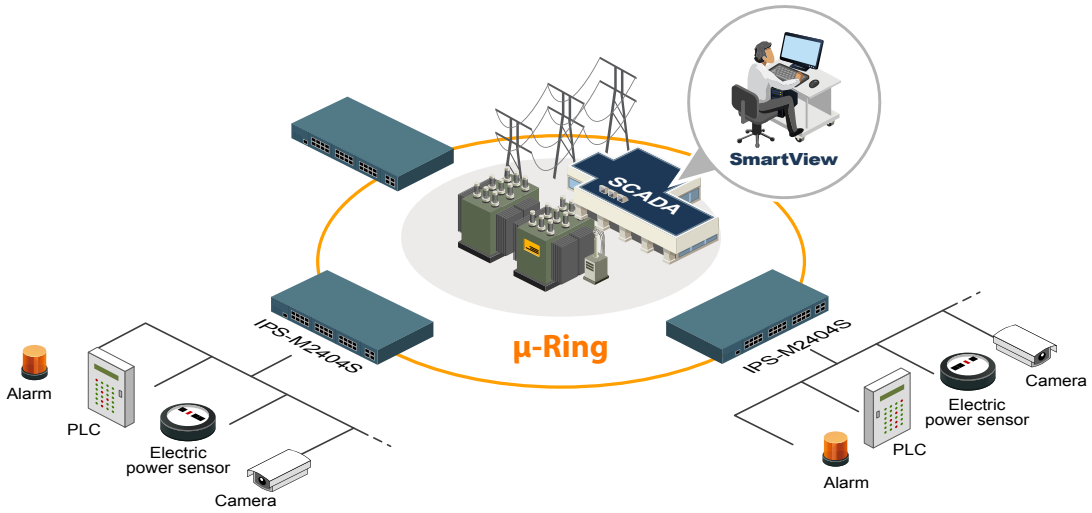
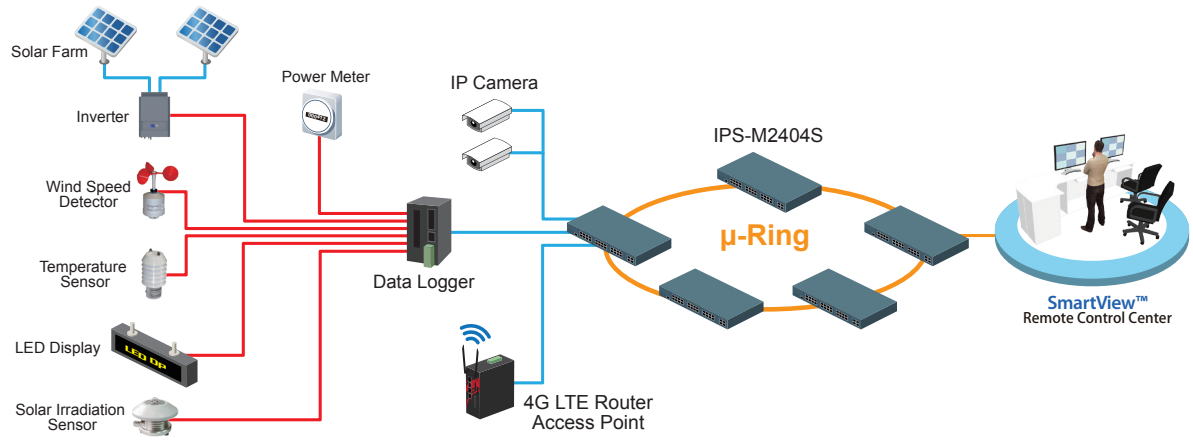


Figure 2 : Hardened Switches in Solar Plant



Ordering Information (Chassis)

Model Name	Managed	Total Port (Maximum)	Module Slot	Extension Port	Input Power		Certification				
				100/1000 Base-X SFP	(Low Volt) 24/48VDC,-48VDC	(High Volt) 110/220V AC/DC	IEC61850-3 IEEE1613	Safety UL60950-1 EN60950-1	EN50121-4	EN61000-6-2 EN61000-6-4	CE FCC
IPS-M2404S-HH	V	28	3	4		2	V	V	V	V	V
IPS-M2404S-HL	V	28	3	4	1	1	V	V	V	V	V
IPS-M2404S-LL	V	28	3	4	2		V	V	V	V	V

Model Naming Rule

IPS – M – 24 – 04S – HH

- IPS: Industrial Power Substation Switch
- M: Modular
- 24: Modular Maximum 24 port
- 04S: 4x GbE SFP
- HH : H + H
  LL : L + L
  HL : H + L
  (H: Isolated 110/220VAC or 110/220VDC
  L: Isolated 24/48VDC)

Ordering Information (Module)

IPM-GS800

IPM-GT800

IPM-T800

Model Name	Managed	Total Port	UTP Port		Fiber	Certification				
			10/100/1000 Base-T(X)	10/100 Base-TX	100/1000 Base-X SFP	IEC61850-3 IEEE1613	Safety UL60950-1 EN60950-1	EN50121-4	EN61000-6-2 EN61000-6-4	CE FCC
IPM-GS800	V	8			8	V	V	V	V	V
IPM-GT800	V	8	8			V	V	V	V	V
IPM-T800	V	8		8		V	V	V	V	V

Model Naming Rule

IPM – GT – 800

- IPM: Industrial Power Substation Module
- GT: GbE UTP
  T: FE UTP
  GS: GbE SFP
- 800: 8 Port

Package List

- IPS-M2404S device
- Console cable (RJ45 to DB9)
- CD (SmartConfig, MIB file, Manual)
- Quickly installation guide
- Rack mount ear with screws
- Power cord (for-H model)

Optional Accessories

Industrial SFP Transceiver

The ISFP series of industrial grade SFP modules have been fully tested with the product for guaranteed compatibility and performance. The best performance can be guaranteed even in mission-critical applications. (Please see CTC Union's Industrial SFP datasheet for more details and more items.)

ISFP-M7000-85-D(E)	Industrial SFPGbE 1000Base-SX, M/M, 500 meter,wave length 850nm, DDMI, -10~70℃ (-40~85℃)
ISFP-S7020-31-D(E)	Industrial SFP 1000Base-SX, S/M, 20km, wave length 1310nm, DDMI, -10~70℃ (-40~85℃)
ISFP-T7T00-00-(E)	Industrial SFP 1000Base-SX, UTP 100meter, -10~70℃ (-40~85℃)
ISFP-M5002-31-D(E)	Industrial SFP 155M 100Base-FX, MM, 2km, wave length 1310nm, 12dB, LC, DDMI, -10~70℃ (-40~85℃)
ISFP-S5030-31-D(E)	Industrial SFP 155M 100Base-FX, SM, 30km, 1310nm, 19dB, LC, DDMI, -10~70℃ (-40~85℃)

SFP Naming Rule

ISFP – S – 7 – 040 – 31 – D – E

- ISFP: Industrial SFP Transceiver
- S: M: Multi Mode; S: Single Mode; T: UTP
- 7: 9: 10G; 7: GbE; 5: FE
- 040: Distance
  T00: (UTP)
  000: (500m)
  002: (2km)
  020: (20km)
  040: (40km)
- 31: Wavelength
  00: UTP
  85: 850nm
  31:1310nm
  55:1550nm
  WA: TX/1310nm (Bidi mode A)
  WB: TX/1550nm (Bidi Mode B)
- D: D: DDMI; Blank: Non DDMI
- E: E:-40~85°C; Blank:0~70°C