IGR-A1606SM-16PH

16x GbE RJ45 + 6x 100M/1G/2.5G SFP with 16x PoE 360W, 48VDC

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- *Compliant with the IEC 62443-4-2* industrial cybersecurity standards*
- *VRRP v2/v3, L3 IPV4/IPV6 Static Routing, RIP v1/v2 Dynamic Routing, OSPF v2/v3 Dynamic Routing*
- *Supports μ-Ring, ERPS, APS, MRP, MSTP, RSTP, STP for Redundant Cabling*
- *Auto Checking and Auto Reset When PoE PD Fail*
- *4KV Surge Protection for PoE, RJ45 and SFP Ports*
- *Supports Secure Boot*

NEW

The industrial cyber-hardened Layer 3 PoE switch IGR-A1606SM-16PH is one of our new generation designs and comes with 16 gigabit UTP ports, each complies with IEEE802.3af/at up to 30W PoE+ standard. Equipped with 6 100M/1G/2.5G SFP slots for fiber optic connectivity meet the requirements for extended transmission distance, fanless design, high MTBF, 4KV surge protection and supports wide temperature operation, 48VDC redundant power input, and is designed to comply with cybersecurity regulations. Suitable for heavy-duty applications in harsh environments such as industrial factory automation, data centers, smart transportation systems, military and utility market applications beyond environmental conditions commercial product specifications.

Features

- 48VDC (44~57VDC) redundant dual power input
- Provides 16-port IEEE 802.3af / 802.3at PoE+ output (30W per port, total 360W)
- Provides 5 ring instances that each can support μ-Ring, μ-Chain or Sub-Ring type for flexible uses. Supports up to 5 rings in one device (Please see CTC μ-Ring white paper for more details and more topology application)
- μ-Ring for redundant cabling, recovery time<20ms in 250 devices
- 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 802.3cb	2.5GBase-X
	IEEE 802.3af	PoE (Power over Ethernet)
	IEEE 802.3at	PoE+ (Power over Ethernet enhancements)
	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)
	IEEE 802.1Q	Virtual LANs (VLAN)
	IEEE 802.1X	Port based and MAC based Network Access Control, Authentication

Standard	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)
Switch Architecture	Back-Plane (Switching Fabric): 44Gbps (Full Wire-Speed)	
Forwarding Rate	32.736Mpps	
Data Processing	Store and Forward	
Flow Control	IEEE 802.3x for full duplex mode Back pressure for half duplex mode	
Network Connector	16x 10/100/1000Base-T RJ-45 + 6x 100M/1G/2.5G SFP	
	RJ-45 UTP port supports Auto negotiation speed, Auto MDI/MDI-X function	
	SFP port supports 100M/1G/2.5G speed with DDMI	
Storage Port	USB type A	
Console Port	USB type C	
PoE Standard & RJ-45 Pin Assignment	16x IEEE 802.3af /IEEE 802.3at 2 pairs PoE, PoE+, 30W/port End-Span, Alternative A mode. Positive (V+) : RJ-45 pin 1, 2. Negative (V-) : RJ-45 pin 3, 6.	
Network Cable	UTP/STP Cat. 5e cable or above	
	EIA/TIA-568 100-ohm (100meter)	
Protocols	CSMA/CD	
Reverse Polarity Protection	Supported for power input	
Overload Current Protection	Supported	
CPU Watch Dog	Supported	
Power Supply	Redundant Dual power input (Removable terminal block) 48VDC (44~57VDC) (50~57V input is recommended for IEEE802.3at PoE+ applications)	
Power Consumption	TBD	
PoE Power Budget	Maximum PoE Output power budget 30W/port, Total 360W	
LED	System: Power 1 (Green), Power 2 (Green), Alarm (Amber), CPU Act (Green), Ring Master (Yellow)	
	UTP: 10/100 Link/Active (Green), 1000 Link/Active (Amber)	
	SFP Slot: 100M/1G Link/Active (Green), 2.5G Link/Active (Amber)	
	PoE: ON (Green)	
Jumbo Frame	10KB	
MAC Address Table	16K	
Memory Buffer	12Mb 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	
Removable Terminal Block	Provides 1 terminal block for Alarm relay, redundant power PWR1 and PWR2	
Operating Temperature	-10 ~ 60°C (IGR-1606SM-16PH)	
	-40 ~ 75°C (IGR-1606SM-16PHE)	
Operating Humidity	5% to 95% (Non-condensing)	
Storage Temperature	-40 ~ 85°C	
Housing	Rugged Metal, IP30 Protection, Fanless	
Dimensions	135.6 x 100 x 160mm (D x W x H)	
Weight	TBD	
Installation Mounting	DIN Rail mounting or wall mounting (Optional)	
MTBF (MIL-HDBK-217)	TBD	
Warranty	5 years	
Certification		
Industrial Cybersecurity	IEC 62443-4-1, IEC 62443-4-2*	
EMC	CE (EN55032, EN55035)	

EMI (Electromagnetic Interference)	FCC Part 15 Subpart B Class A, CE
Railway Traffic	EN50121-4
EMS (Electromagnetic Susceptibility) Protection Level	EN61000-4-2 (ESD) Level 3, Criteria B
	EN61000-4-3 (RS) Level 3, Criteria A
	EN61000-4-4 (Burst) Level 3, Criteria A
	EN61000-4-5 (Surge) Level 3, Criteria B
EMS (Electromagnetic Susceptibility) Protection Level	EN61000-4-6 (CS) Level 3, Criteria A
	EN61000-4-8 (PFMF, Magnetic Field) Field Strength: 300A/m, Criteria A
Safety	EN62368-1
Surge Protection	4KV for PoE, UTP and Fiber ports
Shock	IEC 60068-2-27
Freefall	IEC 60068-2-31
Vibration	IEC 60068-2-6

*Future release

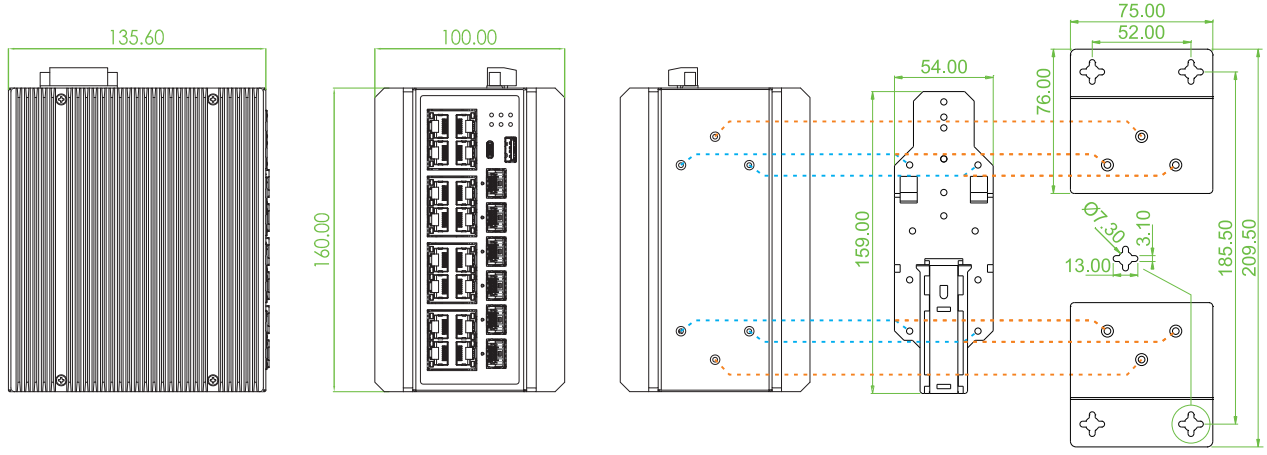
Software Specifications

L3 Routing	
IPv4/v6 Static Routing	Supported
RIP v1/v2 Dynamic Routing	Supported
OSPF v2/v3 Dynamic Routing	Supported
Layer 3 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 (Hash with SA, DA, IP, TCP/UDP port), up to 6 trunk group
	Dynamic (IEEE 802.3ad LACP), up to 6 trunk group
Spanning Tree	IEEE 802.1D STP, IEEE 802.1W RSTP, IEEE 802.1S MSTP
MRP (IEC62439-2)	Supported
Multiple μ-Ring	Up to 5 instances that each supports μ-Ring, μ-Chain or Sub-Ring type for flexible uses, and maximum up to 5 Rings
	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 network
ITU-T G.8031 / Y.1342 APS (Automatic Protection Switching)	Supported
QoS Features	
Class of Service	IEEE 802.1p 8 active priorities queues for 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	100~1,000,000 when the "Unit" is "kbps", and 1~1,000 when the "Unit" is "Mbps"

Bandwidth Control for Egress	100~1,000,000 when the "Unit" is "kbps", and 1~1,000 when the "Unit" is "Mbps"
	Per queue / 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 L2 : Mac address SA/DA/VLAN L3: IP address SA/DA, Subnet 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 USB console
Management Features	
CLI	Cisco® like CLI
Web UI	Supported
Telnet	Server
SNMP	V1, V2c, V3
sFlow	Supported
Modbus/TCP	Supports for 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, alarm relay
DNS	Client, Proxy
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 L2 : Mac address SA/DA/VLAN L3: IP address SIP, Subnet (32bit) L4: TCP/UDP
IPv6 Source Guard	Supported
DHCP v6	Relay, Snooping
Others Features	
Green Ethernet	Determine the cable length and lowering the power for ports with short cables
	Lower the power for a port when there is no link
Advanced PoE	
Management	PoE PD failure auto checking, and auto reset when PD fail PoE port on/off weekly scheduling PoE Configuration PoE Enable/Disable Power limit by classification Power feeding priority Total PoE power budget limitation: maximum 360W

Dimensions



Side View | Front View | Rear View | DIN-Rail Kit View | Wall-Mount Kit View (Optional Accessory)

Ordering Information

Model Name	Total Port	RJ45	SFP	PoE		Power Input	Certification			Operating Temperature
		10/100/1000 Base-T(X)	100M/ 1G/2.5G	IEEE802.3 at/af	Power Budget	Redundant	EN50121-4	EN 62368-1	CE FCC	
IGR-A1606SM-16PH	22	16	6	16	360W	48VDC	V	V	V	-10~60°C
IGR-A1606SM-16PHE	22	16	6	16	360W	48VDC	V	V	V	-40~75°C

Optional Accessories

■ Auto Backup Kit

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

■ Wall Mount Kit

IND-WMK04	Wall Mount kit for Industrial product (Wide) (2 pcs in 1 set, 76mm x 75mm x 2pcs)

■ 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-M8000-85-D(E)	Industrial SFP 2.5GbE, M/M, 300 meter, wavelength 850nm, 9dB, LC, DDMI, -10~70°C (-40~85°C)
ISFP-S8020-31-D(E)	Industrial SFP 2.5GbE, S/M, 20km, wavelength 1310nm, 13dB, 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-480E-48	Industrial Power, Input 85 ~ 264VAC/120 ~ 370VDC, Output 48VDC, 480W, -40 ~ 70°C