

# iES28TG-L2

**Intelligent 28 Port Configurable Gigabit Ethernet Switch with 10G Uplink Ports  
IEC 61850, IEEE 1613, EN50155, KEMA Certified Ed 2**

## Product Overview



**iES28TG-L2 is a highly redundant and scalable Layer 2 with Basic Routing functionality managed Gigabit Ethernet switch with 4 modular slots including 10GBase-X SFP Ports in one of the slots. Modular chassis design makes network planning easy by providing flexibility as a network grows and by developing modules based on newer standards. It is designed to withstand the harshest environments of transmission and distribution substations and rolling stock applications. The switch is IEC 61850 Ed.2, IEEE 1613, and EN 50155 certified.**

**The iES28TG-L2 provides redundancy support through functions such as STP/RSTP/MSTP assuring protection of all mission critical network applications. The iES28TG-L2 can be managed via the Web UI, iManage Software Suite, Telnet, SSH, and Console (CLI) / SSH v2.**

**The switch provides advanced DOS/DDOS auto prevention. IEEE 1588 PTPv2 provides precision time synchronization.**

**The iES28TG-L2 is made of IP-40 galvanized steel and has a wide operating temperature range from -40°C to +85°C, which is suitable for the harshest of environments without use of fans.**



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# Features

Table 1. Features

Feature	
<b>Supports:</b>	<ul style="list-style-type: none"><li>• STP / RSTP / MSTP</li><li>• LLDP (Link Layer Discovery Protocol)</li><li>• Modbus TCP</li><li>• VLAN Priority—supports priority-tagged frames to be received by specific IEDs</li><li>• HTTPS / SSH v2</li><li>• SNTP for synchronizing the switch’s clock</li><li>• PTP clock synchronization</li></ul>
IGMP v2 / v3 (IGMP Snooping)	
SNMP v1 / v2c /v3 & RMON	
ACL, AAA (RADIUS), and NAS 802.1x (User Authentication)	
9.6K Bytes Jumbo Frame	
Multiple alarm notification methods	
Configurable by Web browser, Telnet, Console(CLI), iManage software running on Windows 10, NT/2000/XP/2003/VISTA/7	
Rack and panel mounting	



# Product Specifications

**Table 2. Technical Specification**

Description	Specification
<b>Slot 1 - (Ports 1-8)</b>	2 or 4 X 10Base-FL Ports, 8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
<b>Slot 2 - (Ports 9-16)</b>	2 or 4 X 10Base-FL Ports, 8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
<b>Slot 3 - (Ports 17-24)</b>	2 or 4 X 10Base-FL Ports, 8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
<b>Slot 4 - (Ports 25-28)</b>	2 or 4 X 1000Base-X SFP Ports, 2 or 4 X 1000LX/SX Ports, 2 or 4 X 10GBase-X SFP Ports
<b>RS-232 Serial Console Port</b>	RS-232 in RJ45 connector with console cable: 115200 bps, 8, N, 1
<b>Warning / Monitoring System</b>	Relay output for fault event alarming 2 alarm warning methods for system events supported: <ul style="list-style-type: none"> <li>• SYSLOG with server / client structure; recording and viewing events in the System Event Log</li> <li>• SMTP for notification via email</li> </ul> Event selection per port
<b>Alarm</b>	Relay output to carry capacity of 1 A at 24 VDC
<b>Technology</b>	
<b>MAC Table</b>	8K
<b>Priority Queues</b>	8
<b>Processing</b>	Store-and-Forward
<b>Switch Properties</b>	Switching latency: 7 $\mu$ s Switch capacity: 128 Gbps Max. Number of Available VLANs: 4096 IGMP multicast groups: 32 for each VLAN Port rate limiting: User Defined
<b>Jumbo frame</b>	9.6K
<b>Security Features</b>	<ul style="list-style-type: none"> <li>• STP/RSTP/MSTP</li> <li>• Device Binding and Remote Control security</li> <li>• Access Control List (ACL) for every port</li> <li>• Authentication, Authorization and Accounting (AAA)</li> <li>• RADIUS Authentication management</li> <li>• Port based network access control (NAS) 802.1x</li> <li>• QoS for achieving efficient bandwidth utilization</li> <li>• Private VLAN with Port Isolation Configuration</li> <li>• VLAN (802.1 Q) for segregation and securing network traffic</li> <li>• SNMPv3 authentication and privacy encryption</li> <li>• HTTPS / SSH v2 enhanced network security</li> <li>• Web and CLI authentication and authorization</li> </ul>



Description	Specification
<b>Software Features</b>	<ul style="list-style-type: none"><li>• Web or CLI based Management (Console or Telnet / SSH v2)</li><li>• DHCP Server / Relay</li><li>• VLAN (802.1Q) for segregating and securing network traffic</li><li>• Supports SNMPv1/v2/v3</li><li>• Traffic Prioritization—Storm Control and Quality of Service (QoS) including DSCP-Based QoS Ingress Port Classification</li><li>• Multicast traffic—IGMP Snooping (IGMP v1/v2 / v3) and unregistered IPMCv4 Flooding</li><li>• Warnings (Syslog and SMTP) and Fault Alarm (power failure)</li><li>• Monitoring and Diagnostics—MAC Table and Port Statistics (ports monitoring including for SFP ports, system information, issuing PING packets for troubleshooting IP connectivity issues)</li><li>• SNTP for synchronizing of clocks over network</li><li>• Supports PTP Client (Precision Time Protocol) clock synchronization</li><li>• Basic Routing<ul style="list-style-type: none"><li>○ Static Routing</li><li>○ RIPv2</li><li>○ VRRP</li></ul></li></ul>
<b>Network Redundancy</b>	<ul style="list-style-type: none"><li>• RSTP (IEEE 802.1 D /w)</li><li>• MSTP (RSTP/ STP compatible)</li><li>• Fast Recovery and Dual Port Recovery</li></ul>
<b>Physical Characteristics</b>	
<b>Enclosure</b>	IP-40 Galvanized Steel
<b>Dimensions (W x D x H)</b>	479.3 (W) x 363.7 (D) x 44.3 (H) mm (18.87 x 14.32 x 1.74 inches)
<b>Weight (g)</b>	9000 g
<b>Power</b>	
<b>Input Power</b>	Redundant Power Supplies: Dual Input 9-36VDC, Dual Input 36-75VDC, or Dual Input 110-370VDC or 90-264VAC
<b>Power Consumption (Typ.)</b>	46 Watts max.
<b>Overload Current Protection</b>	Present



**Table 3. Compliance Specifications**

Type	Standards
<b>Electromagnetic Emissions</b>	FCC Part 15, CISPR (EN 55022) class A, EN 50155 (EN 50121-3-2, EN 55011, EN 50121-4)
<b>Electromagnetic Immunity</b>	EN 61000-4-2 (ESD), EN 61000-4-3 (RS), EN 61000-4-4 (EFT), EN61000-4-5 (Surge), EN 61000-4-6 (CS), EN 61000-4-8, EN61000-4-11
<b>Industry Standards</b>	KEMA Certified Ed 2 (TIC 1030-14) IEC 61850-3 (2013); IEEE 1613
	IEC 61850 Ed. 2
<b>Safety Standards</b>	EN 60950-1
<b>Operating Environment</b>	-40°C to +85°C (-40° to 185°F) (no fans) EN 60068-2-21
<b>Storage Environment</b>	-40°C to +85°C (-40° to 185°F) EN 60068-2-14
<b>Operating Humidity</b>	5% to 95% Non-condensing E60068-2-30
<b>Shock</b>	IEC 60068-2-27
<b>Free Fall</b>	IEC 60068-2-32
<b>Vibration</b>	IEC 60068-2-6
<b>Warranty</b>	5 years

**Table 4. Standards and Management**

Description	Specification
<b>IEEE Standards</b>	IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-TX and 100Base-FX IEEE 802.3ab for 1000Base-T IEEE 802.z for 1000Base-X IEEE 802.3x for Flow control IEEE 802.3ad for LACP (Link Aggregation Control Protocol) IEEE 802.3ae for 10 Gigabit Ethernet IEEE 802.1D - 1998 Spanning Tree Protocol (STP) IEEE 802.1D – 2004 /w Rapid Spanning Tree Protocol (RSTP) IEEE 802.1Q – 2014 Bridged Networks IEEE 802.1-2010 Port Based Network Access Control IEEE 802.1AB – 2016 Station and Media Access Connectivity discovery (LLDP) IEEE 802.1AX Link Aggregation

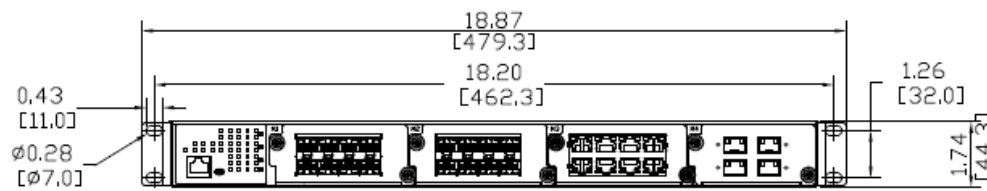
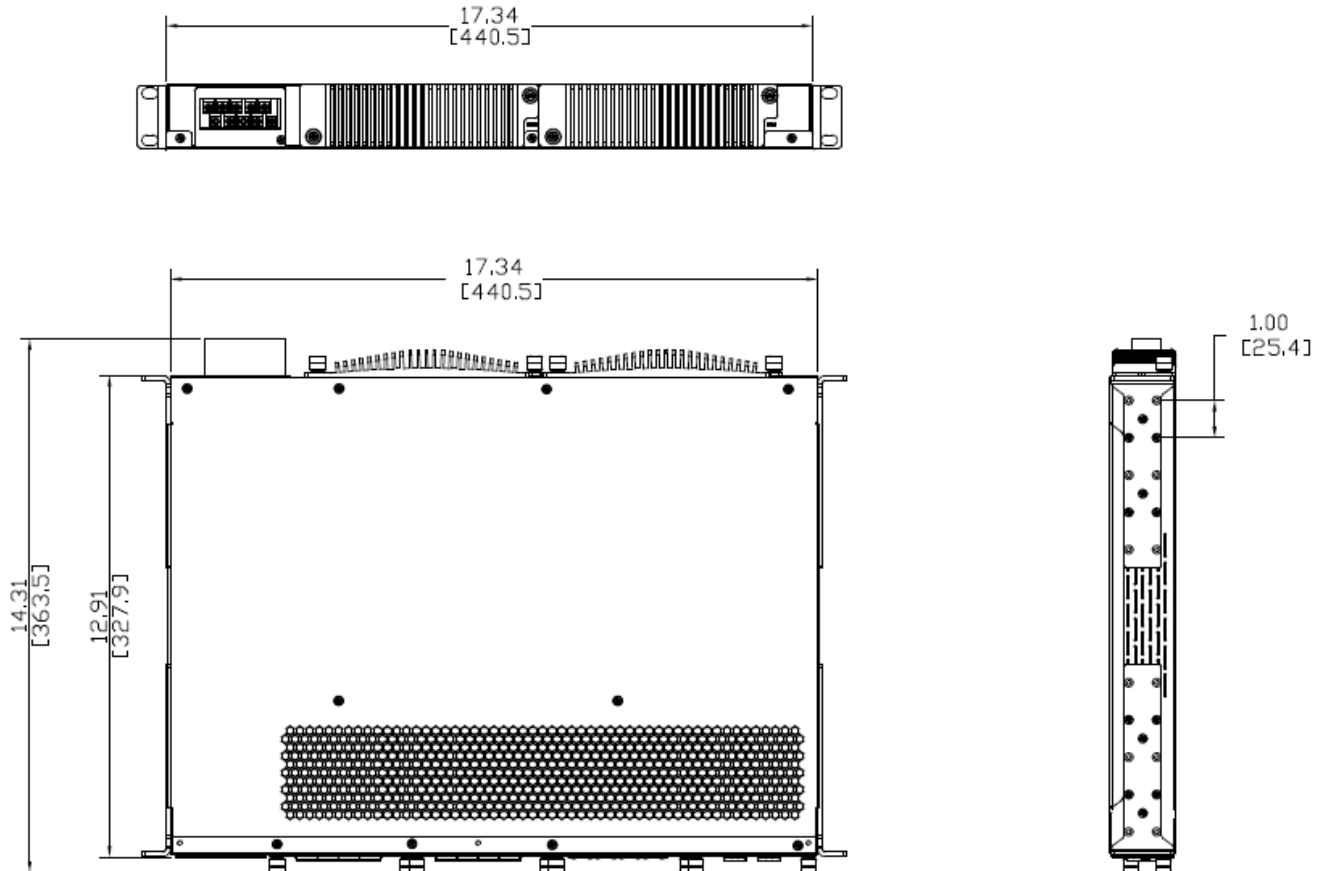


Description	Specification		
<b>RFC Compliance</b>	<ul style="list-style-type: none"><li>• RFC 768: UDP</li><li>• RFC 783: TFTP</li><li>• RFC 791: IPv4</li><li>• RFC 792: ICMP</li><li>• RFC 793: TCP</li><li>• RFC 854: Telnet</li><li>• RFC 959: FTP</li><li>• RFC 1157: SNMPv1</li></ul>	<ul style="list-style-type: none"><li>• RFC 1901,1902-1907 SNMPv2</li><li>• RFC 2273-2275: SNMPv3</li><li>• RFC 2571: SNMP Management</li><li>• RFC 1166: IP Addresses</li><li>• RFC 1643: Ethernet Interface MIB</li><li>• RFC 1757: RMON</li><li>• RFC 2068: HTTP</li><li>• RFC 2990 QoS</li></ul>	<ul style="list-style-type: none"><li>• RFC 2131, 2132: DHCP</li><li>• RFC 2236: IGMP v2</li><li>• RFC 3376: IGMP v3</li><li>• RFC 2474: DiffServ Precedence</li><li>• RFC 3046: DHCP Relay Agent Information Option</li><li>• RFC 3580: 802.1x RADIUS</li><li>• RFC 4250-4252 SSH Protocol</li></ul>



# Dimensions

All dimensions are shown in inches.



**8GSFP    8GSFP    8GRJ45    10G**  
**Module    Module    Module    Module**  
**Mount Option "RR"**



**8GSFP    8GSFP    8GRJ45    10G**  
**Module    Module    Module    Module**  
**Mount Option "RF"**



# Ordering Information

Base	Power Supply 1	Power Supply 2	Mount	Power Terminals	Slot 1 (Ports 1-8)	Slot 2 (Ports 9-16)	Slot 3 (Ports 17-24)	Slot 4 (Ports 25-28)	Conformal Coating	Description
iES28TG-L2	HV	HV	R	F	28L2-8GRJ45	28L2-8GSFP	28L2-BLK	28L2-4TGSFP	C1	
iES28TG-L2										Layer 2 Switch core assembly and packaging
	XX	XX								None
	LV	LV								Input 9-36VDC
	MV	MV								Input 36-75VDC
	HV	HV								Input 110-370VDC or 90-264VAC
			R							Rack Mounting
			P							Panel Mounting
			N							No Mounting Hardware
				F						Power Terminals in the Front with Ethernet Ports/Display Rear opposite Ethernet Ports
				R						Power Terminals in the Rear opposite Ethernet Ports/Display Front with Ethernet Ports
									C1	Conformal Coating

iS5Com #	Slots 1-3 Description
28L2-BLK	Blank Module Slot 1-3
28L2-8GRJ45	MODULE - 8 X 10/100/1000Base-T(X) RJ45
28L2-2MMSTFL	MODULE - 2 X 10Base-FL Multimode ST
28L2-4MMSTFL	MODULE - 4 X 10Base-FL Multimode ST
28L2-8GSFP	MODULE - 8 X 100/1000Base-X SFP (Blank no optical transceivers**)
28L2-2MMSC2	MODULE - 2 X 100FX Multimode SC, 2km, 1310nm
28L2-4MMSC2	MODULE - 4 X 100FX Multimode SC, 2km, 1310nm
28L2-2MMST2	MODULE - 2 X 100FX Multimode ST, 2km, 1310nm
28L2-4MMST2	MODULE - 4 X 100FX Multimode ST, 2km, 1310nm
28L2-2SMSC15	MODULE - 2 X 100FX Singlemode SC, 15km, 1310nm
28L2-4SMSC15	MODULE - 4 X 100FX Singlemode SC, 15km, 1310nm
28L2-2SMST15	MODULE - 2 X 100FX Singlemode ST, 15km, 1310nm
28L2-4SMST15	MODULE - 4 X 100FX Singlemode ST, 15km, 1310nm
28L2-2SMSC40	MODULE - 2 X 100FX Singlemode SC, 40km, 1310nm
28L2-4SMSC40	MODULE - 4 X 100FX Singlemode SC, 40km, 1310nm
28L2-2SMST40	MODULE - 2 X 100FX Singlemode ST, 40km, 1310nm
28L2-4SMST40	MODULE - 4 X 100FX Singlemode ST, 40km, 1310nm
28L2-2SMSC60	MODULE - 2 X 100FX Singlemode SC, 60km, 1310nm

iS5Com #	Slot 4 Description
28L2-BLK4	Blank Module Slot 4
28L2-2GSFP	MODULE - 2 X 1000Base-X SFP (Blank no optical transceivers**)
28L2-4GSFP	MODULE - 4 X 1000Base-X SFP (Blank no optical transceivers**)
28L2-2GMMSC	MODULE - 2 X 1000SX Multimode SC, 550m, 850nm
28L2-4GMMSC	MODULE - 4 X 1000SX Multimode SC, 550m, 850nm
28L2-2GMMST	MODULE - 2 X 1000SX Multimode ST, 550m, 850nm
28L2-4GMMST	MODULE - 4 X 1000SX Multimode ST, 550m, 850nm
28L2-2GSMSC10	MODULE - 2 X 1000LX Singlemode SC, 10km, 1310nm
28L2-4GSMSC10	MODULE - 4 X 1000LX Singlemode SC, 10km, 1310nm
28L2-2GSMST10	MODULE - 2 X 1000LX Singlemode ST, 10km, 1310nm
28L2-4GSMST10	MODULE - 4 X 1000LX Singlemode ST, 10km, 1310nm
28L2-2GSMSC40	MODULE - 2 X 1000LX Singlemode SC, 40km, 1310nm
28L2-4GSMSC40	MODULE - 4 X 1000LX Singlemode SC, 40km, 1310nm
28L2-2GSMST40	MODULE - 2 X 1000LX Singlemode ST, 40km, 1310nm
28L2-4GSMST40	MODULE - 4 X 1000LX Singlemode ST, 40km, 1310nm
28L2-2GSMSC70	MODULE - 2 X 1000LX Singlemode SC, 70km, 1550nm
28L2-4GSMSC70	MODULE - 4 X 1000LX Singlemode SC, 70km, 1550nm
28L2-2GSMST70	MODULE - 2 X 1000LX Singlemode ST, 70km, 1550nm





iS5Com #	Slots 1-3 Description
28L2-4SMSC60	MODULE - 4 X 100FX Singlemode SC, 60km, 1310nm
28L2-2SMST60	MODULE - 2 X 100FX Singlemode ST, 60km, 1310nm
28L2-4SMST60	MODULE - 4 X 100FX Singlemode ST, 60km, 1310nm
28L2-2SMSC80	MODULE - 2 X 100FX Singlemode SC, 80km, 1550nm
28L2-4SMSC80	MODULE - 4 X 100FX Singlemode SC, 80km, 1550nm
28L2-2SMST80	MODULE - 2 X 100FX Singlemode ST, 80km, 1550nm
28L2-4SMST80	MODULE - 4 X 100FX Singlemode ST, 80km, 1550nm
28L2-2SMSC100	MODULE - 2 X 100FX Singlemode SC, 100km, 1550nm
28L2-4SMSC100	MODULE - 4 X 100FX Singlemode SC, 100km, 1550nm
28L2-2SMST100	MODULE - 2 X 100FX Singlemode ST, 100km, 1550nm
28L2-4SMST100	MODULE - 4 X 100FX Singlemode ST, 100km, 1550nm
28L2-2GMMSC	MODULE - 2 X 1000SX Multimode SC, 550m, 850nm
28L2-4GMMSC	MODULE - 4 X 1000SX Multimode SC, 550m, 850nm
28L2-2GMMST	MODULE - 2 X 1000SX Multimode ST, 550m, 850nm
28L2-4GMMST	MODULE - 4 X 1000SX Multimode ST, 550m, 850nm
28L2-2GSMSC10	MODULE - 2 X 1000LX Singlemode SC, 10km, 1310nm
28L2-4GSMSC10	MODULE - 4 X 1000LX Singlemode SC, 10km, 1310nm
28L2-2GSMST10	MODULE - 2 X 1000LX Singlemode ST, 10km, 1310nm
28L2-4GSMST10	MODULE - 4 X 1000LX Singlemode ST, 10km, 1310nm
28L2-2GSMSC40	MODULE - 2 X 1000LX Singlemode SC, 40km, 1310nm
28L2-4GSMSC40	MODULE - 4 X 1000LX Singlemode SC, 40km, 1310nm
28L2-2GSMST40	MODULE - 2 X 1000LX Singlemode ST, 40km, 1310nm
28L2-4GSMST40	MODULE - 4 X 1000LX Singlemode ST, 40km, 1310nm
28L2-2GSMSC70	MODULE - 2 X 1000LX Singlemode SC, 70km, 1550nm
28L2-4GSMSC70	MODULE - 4 X 1000LX Singlemode SC, 70km, 1550nm
28L2-2GSMST70	MODULE - 2 X 1000LX Singlemode ST, 70km, 1550nm
28L2-4GSMST70	MODULE - 4 X 1000LX Singlemode ST, 70km, 1550nm

iS5Com #	Slot 4 Description
28L2-4GSMST70	MODULE - 4 X 1000LX Singlemode ST, 70km, 1550nm
28L2-2TGSFP	MODULE - 2 X 10GBase-X SFP (Blank no optical transceivers**)
28L2-4TGSFP	MODULE - 4 X 10GBase-X SFP (Blank no optical transceivers**)
28L2-BLK4	Blank Module Slot 4

**Example of Order Description:**

**IES28TG-L2-HV-HV-RF-28L2-8GRJ45-28L2-8GSFP-28L2-BLK-28L2-4TGSFP-C1**

Intelligent 28 Port L2 Gigabit Ethernet Switch IEC 61850, IEEE 1613, (Power Supply 1) Input 110-370VDC or 90-264VAC, (Power Supply 2) Input 110-370VDC or 90-264VAC, (Mount and Power Terminals) Rack Mounting and Power Terminals in the Front with Ethernet Ports/Display Rear opposite Ethernet Ports, (Slot 1 (Ports 1-8)) MODULE - 8 X 10/100/1000Base-T(X) RJ45, (Slot 2 (Ports 9-16)) MODULE - 8 X 100/1000Base-X SFP (Blank no optical transceivers\*\*), (Slot 3 (Ports 17-24)) Blank Module Slot 1-3, (Slot 4 (Ports 25-28)) MODULE - 4 X 10GBase-X SFP (Blank no optical transceivers\*\*), C1- added for conformal coating

NOTE: \*\*SFPs are to be ordered separately.