

T(P)GR-3208T

10 10/100/1000T L2+ (w/8 PoE at/af) Vehicle and EN50155 NAT Router Switch

- E-mark certificate for vehicle
- EN50155 certificate (TVI model)
- ITxPT* labeled w/ignition function, delay shut down, standby green mode, Inventory service
- MQTT broker & publisher
- WAN port supports NAT, firewall, RIP/OSPF
- mDNS and DNS primary/secondary server and client
- OPEN API* document format for Restful API, Complete CLI, Auto topology drawing
- Galvanic PoE isolation; Support IEEE802.3at/af up to 30W per port; PoE budget 80W
- PoE management incl. PD detection, auto reboot and scheduling
- Ignition PoE timer function with variants from 30sec. to 60min. by Web or CLI (-IGN model)
- Cyber security IEC62443-4-2 root of trust, 256bits encryption, SSH/SSL, HTTPS, Ingress ACL, Radius, TACACS+
- Advanced L2 functionality including Enhanced G. 8032 ring, MSTP, RSTP, DHCP Server & Option 82 relay, IGMP, VLAN, QoS, LACP, LLDP
- 24V input voltage with galvanic isolation between input power and all Ethernet ports
- RTC feature powered from golden capacitor; firmware stored in eMMC
- Inrush current prevention; polarity reverse protection,
- Optional bypass in case of power failure (-BT model) (24TVI models)



OVERVIEW

Lantech T(P)GR-3208T is a high-performance router switch designed for rail/metro and vehicle 24V input systems with 10 10/100/1000TX w/8 PoE 802.3af/at Ethernet ports (PoE model). It provides L2 management, NAT, OSPF, RIP and advanced security functions for onboard network deployment. WebGUI, and complete CLI settings make configuration easy. The Restful API* can greatly improve central management efficiency for various applications including fleet management and AIOT. The advanced cybersecurity mechanism can prevent hackers from hacking or attacking. EN50155, ITxPT* and Emarking certificates ensure the design to be met with world-class criteria.

ITxPT label* for delay shut down, inventory service, standby green mode

It supports Module inventory, Time service and MQTT broker. When the engine of the vehicle turns off, the switch is able to extend the work from 30sec to 60mins.

The switch must be able to provide SRV and TXT records to back office, and exports the data in xml file format

The consumption power under sleep mode meets the standard of ITxPT. (-IGN model)

MQTT – Publisher & Broker

MQTT is a publish-subscribe-based messaging protocol and works on top of the TCP/IP protocol. An MQTT system

comprises one broker and several clients, where clients can either be publishers or subscribers. The publishers send data to the broker in the form of MQTT packets, which consist of a "topic" and "payload", then the broker distributes the "payload" to the subscribers based on which "topics" they have subscribed.

WAN & Firewall supported

The switch supports Static IP address, PPPoE (V4&V6), DHCP client, NAT and routing functions, including static route, dynamic route (RIP/OSPF) as well as basic firewall functions with Port forwarding, DMZ, Filtering, Remote admin and DDoS protection.

mDNS (Multicast DNS) feature

mDNS (Multicast DNS) enables hosts in the LAN to discover and communicate with each other in compliance with the DNS protocol without a traditional DNS server.

Support OPEN API* document format for Restful API for better switch performance;

The switch supports OPEN API* document format for Restful API that uses JSON format to access and use data for GET, PUT, POST and DELETE types to avoid traditional SNMP management occupying CPU utilization.

PoE budget up to 80W for 8 Ports with PD detection, auto reboot, scheduling

Lantech TPGR-3208T supports PoE budget 80W w/ advanced PoE management including PoE detection and scheduling. PoE detection can detect if the connected PD hangs then restart the PD; PoE scheduling allows pre-set power feeding schedule upon routine timetable. Each PoE port can be Enabled/disabled, get the voltage, current, Watt, and temperature info displayed on WebUI, CLI, SNMP or OpenAPI*.

Ignition PoE timer function on IGN model

The TPGR-3208T-IGN has a programmed timer by port to shut down each PoE port, with variants from 30 seconds to 60 minutes, eliminating the additional relay wire to shut down PoE ports and allowing for remote configuration to change the PoE timer time anytime, anywhere.

Certified cybersecurity development process with IEC 62443-4-1, and IEC 62443-4-2 compliance with physical tamper resistance and detection for integrity and authenticity of the boot process**

Lantech OS2 pro platform is designed with a high standard of cybersecurity to prevent threats from network attacks. To ensure the safety and reliability of communication networks, Lantech software development is certified with IEC 62443-4-1 security process standards and the switch is also compliant to IEC 62443-4-2**. The switch uses roots of trust to verify the integrity and authenticity of the firmware, software, and configuration data needed for the switch's boot process.

802.1X security by MAC address

MAC-based port authentication is an alternative approach to 802.1x for authenticating hosts connected to a port. By authenticating based on the host's source MAC address, the host is not required to run a user for the 802.1x protocol. The RADIUS server that performs the authentication will inform the switch if this MAC can be registered in the MAC address table of switch.

RADIUS and TACACS+

The switch supports RADIUS and TACACS+ to handle authentication, authorization, and accounting (AAA) services for network access control.

Enhanced G.8032 ring, 8 MSTI MSTP

Lantech T(P)GR-3208T features enhanced G.8032 ring which can be self-healed in less than 20ms for single ring topology protection covering multicast packets. It also supports various ring topologies that covers enhanced ring and basic ring by easy setup than others. It supports MSTP that allows each spanning tree for each VLAN for redundant links with 8 MSTI.

DHCP option 82 & Port based, Mac based DHCP, Option66, DHCP Snooping

DHCP server can assign dedicated IP address by MAC or by port (Port based for single switch), it also can assign IP address by port for multiple switches with single DHCP option82 server. DHCP Snooping is supported. DHCP Option66 server can offer IP address of TFTP server to DHCP client for VOIP application.

IGMPv3, MLD snooping, query, GMRP, static multicast forwarding and multicast Ring protection

The unique multicast protection under enhanced G.8032 ring can offer immediate self-recovery instead of waiting for IGMP

table timeout. It also supports IGMP v3 with Query mode for multimedia, GMRP, router port, MLD snooping and static multicast forwarding binding by ports for video surveillance applications.

Support RTC (Real Time Clock) with longevity Golden Capacitor; Factory reset pin; CPU watchdog

Our switch supports RTC which is powered by a golden capacitor, ensuring accurate real-time event logs. Unlike traditional batteries, golden capacitors offer superior reliability, and longevity, without a need to change battery. Factory reset pin can restore the setting back to factory default and built-in watchdog design can automatically reboot the switch when CPU is found dead.

Reliable eMMC for better power efficiency and reliability

The T(P)GR-3208T utilizes eMMC for firmware storage. The eMMC with integrated controller that offloads and simplifies the task for the main processor. Its standard interface simplifies the design process while delivering improved power efficiency and enhanced reliability, thereby extending the storage's lifespan. increasing the lifespan of the storage.

Miss-wiring avoidance, Node failure protection, Loop protection

The T(P)GR-3208T also embedded several features for stronger and reliable network protection in an easy and intuitive way. When the pre-set ring configuration failed or looped by miss-wiring, Lantech T(P)GR-3208T is able to alert with the LED indicator and disable ring automatically. Node failure protection ensures the switches in a ring to survive after power breakout is back. The status can be shown in NMS when each switch is back. This feature prevents the broken ring and keep ring alive without any re-configuration needed. Loop protection is also available to prevent the generation of broadcast storm when a dumb switch is inserted in a closed loop connection.

User-friendly GUI, Editable configuration text file, Auto topology drawing, Enhanced Environmental Monitoring

The user-friendly UI, innovative auto topology drawing and topology demo makes T(P)GR-3208T much easier to get hands-on. The complete CLI enables professional engineer to configure setting by command line. The configuration file of Lantech T(P)GR-3208T can be exported in text file so that it can be edited and configured back to switch with ease for mass deployment. It supports enhanced environmental monitoring for actual input voltage, current, ambient temperature and total power load.

USB port for backup, restore configuration and upgrade firmware

The built-in USB port can upload/download the firmware, export and import configuration.

Redundant dual power input design (24VI-24TVI model); EN50155 verification with high ESD and inrush current prevention and polarity reverse protection; E-marking & ITxPT* certificate; ISO 16750-2 compliant

The Lantech T(P)GR-3208T is designed with dual power inputs that accept 9V~36VDC for vehicle use, and 16.8V-56VDC for 24TVI train model. It features high reliability and robustness coping with extensive EMI/RFI phenomenon, environmental vibration and shocks usually found in onboard networks. The redundant power input design prevents inrush current and safeguards against polarity reversal. The galvanic isolation design can isolate power transients that commonly exist in onboard networks. It is labeled with ITxPT* public transport

standards & E marked and also compliant with ISO 16750-2 P5A (12V system DC14V 87V/0.5Ω/400ms; 24V system DC28V 174V/2Ω/350ms) which protects the switch from being damaged by high voltage that could be found at vehicle cranky start.

Optional bypass relay prevents power loss

The optional bypass relay is set to bypass the switch to the next one when power is off in order to protect the network from

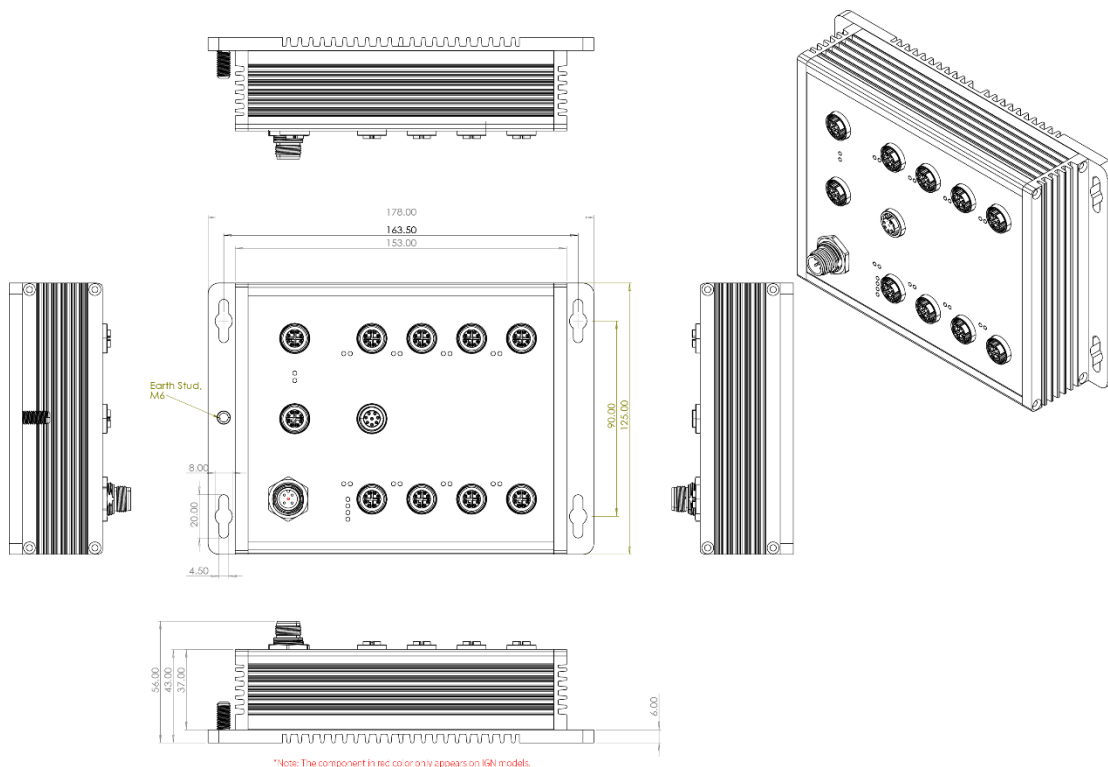
crashing. Lantech bypass caters to remaining in bypass mode until the switch is completely booting up when power is back to avoid another network loss. Smart bypass can be activated when switch encounters power failure. (-BT model) (only for 24TVI models)

FEATURES & BENEFITS

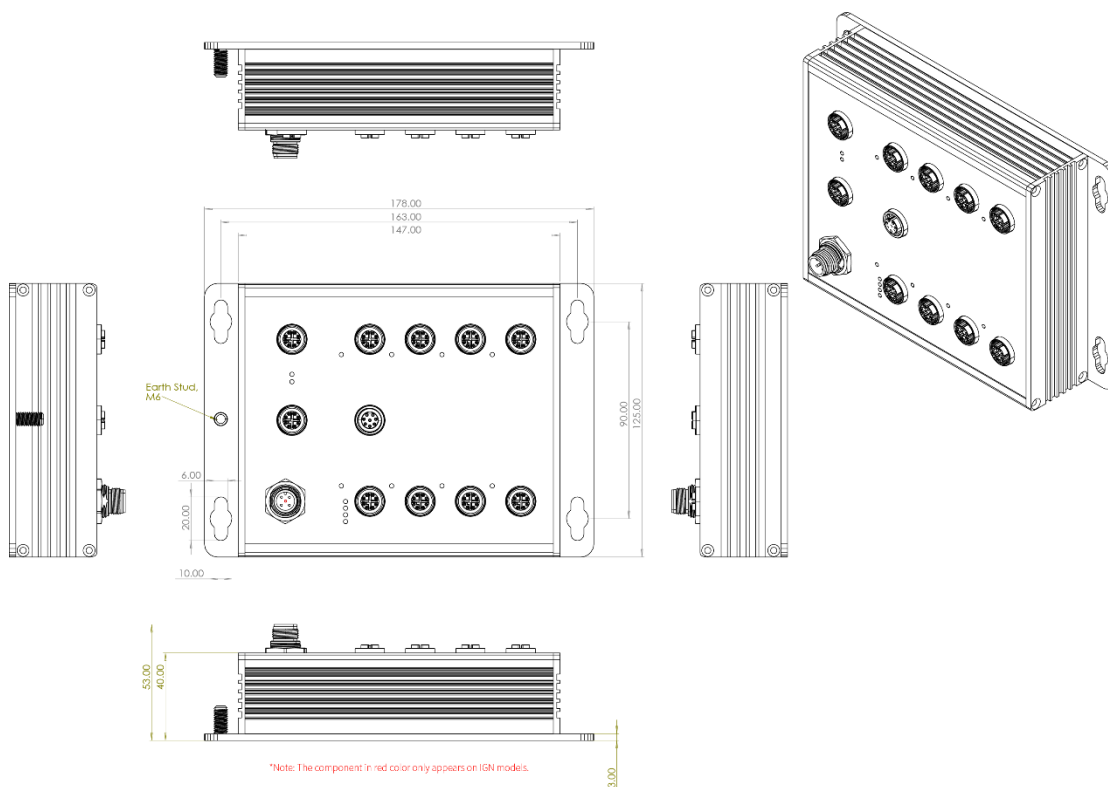
- 10 10/100/1000T (Total 10 Ports Switch)
- Support 10K bytes jumbo frames
- Dual 9-36VDC power input for 24VI model; dual 16.8~56VDC power input for 24TVI model; PoE budget 80W
- Back-plane (Switching Fabric): 20 Gbps
- 16K MAC address table
- PoE management including PoE detection and scheduling for PD power devices. (PoE models)
- Efficient PoE configuration when ignition off (-IGN & PoE models)
- mDNS (Multicast DNS) feature
- Support OPEN API* document format for Restful API
- Support MQTT – Publisher & Broker
- User-friendly UI, auto topology drawing, topology demo, complete CLI for a professional setting
- Enhanced G.8032 Ring protection in 20ms for single ring
 - Support various ring/chain topologies, including enhanced ring and basic ring
 - Enhanced G.8032 ring configuration with ease
 - Cover multicast and data packets protection
- Supports IEEE 802.1p Class of Service, per port provides 8 priority queues Port base, Tag Base and Type of Service Priority
- IEEE 802.1d STP, IEEE 802.1w RSTP, 802.1s MSTP VLAN redundancy with 8 MSTI
- 4K 802.1Q VLAN, port-based VLAN, GVRP
- Supports IEEE 802.1ab LLDP, Cisco CDP; LLDP info can be viewed via Web/ Console
- DHCP server / client / DHCP Option 82 relay / DHCP Option 82 server/relay Port based DHCP server; DHCP Snooping; DHCP option 66
- Bandwidth Control
 - Ingress packet filter
 - Broadcast/multicast packet filter control
- Miss-wiring avoidance
 - LED indicator
- Node failure protection
 - Ensure the switches in a ring to survive after power breakout is back
- The status can be shown in NMS when each switch is back
- System Event Log, SNMP Trap for alarm support; 32 RMON counters
- Security
 - SSL/SSH v2/INGRESS ACL L2/L3
 - Port Security: MAC address entries/Filter/static MAC-Port binding
 - Remote Admin: IP address security management to prevent unauthorized intruder.
 - Login Security: IEEE802.1X/RADIUS/TACACS+
 - HTTPS for secure access to the web interface
- Static multicast forwarding forward reversed IGMP flow with multicast packets binding with ports for IP surveillance application
- IGMP router port to assign query in ring for reversed multicast video flow
- IGMPv1,v2,v3 with Query mode for multimedia; GMRP
- Configuration backup and restoration
 - Supports editable configuration file for system quick installation
 - USB port for upload/download configuration by USB dongle
- TFTP/ HTTP firmware upgrade
- Watchdog design to auto reboot switch CPU is found dead
- RTC (Real Time Clock) feature
- eMMC for firmware storage
- Inrush current prevention; polarity reverse protection
- Supports ±4000 VDC (Contact) and ±8000 VDC (Air) Ethernet ESD protection
- IP67/IP54 with Wall-mount design
- EN50155, E-marking & ITxPT* certificate for vehicle application
- Bypass protection** - Bypass failed switch caused by power failure of switch to protect network intactness (-BT model) (only for 24TVI models)

DIMENSIONS (unit=mm)

PoE models



Non-PoE models



SPECIFICATION

Hardware Specification		PoE: Link/Act (Green);	
Standards	IEEE802.3 10Base-T Ethernet IEEE802.3u 100Base-TX IEEE802.3ab 1000Base-T Ethernet IEEE802.3x Flow Control and Back Pressure IEEE802.3ad Port trunk with LACP IEEE802.1d Spanning Tree IEEE802.1w Rapid Spanning Tree IEEE802.1s Multiple Spanning Tree IEEE802.3ad Link Aggregation Control Protocol (LACP) IEEE802.1AB Link Layer Discovery Protocol (LLDP) IEEE802.1X User Authentication (Radius) IEEE802.1p Class of Service IEEE802.1Q VLAN Tag IEEE802.3at/af Power over Ethernet (PoE model)	Operating Humidity	5% ~ 95% (Non-condensing)
Switch Architecture	Back-plane (Switching Fabric): 20Gbps	Operating Temperature	-40°C~70°C / -40°F~167°F
Transfer Rate	14,880pps for Ethernet port 148,800pps for Fast Ethernet port 1,488,000pps for Gigabit Ethernet port	Storage Temperature	-40°C~85°C / -40°F~185°F
Mac Address	16K MAC address table	Power Supply	9-36VDC (24VI) 16.8-56VDC (24TVI)
Jumbo frame	10KB	PoE Budget	80W at 24VDC Higher PoE budget can be applied upon request. **
Connectors	10/100/1000T: 9 x M12 8-pole X-coded 10/100/1000T 1x router/LAN configurable (port#9) Power Input connector: 1 x M12 4-pole Male A-coded (5-pole -IGN model) Reset/Console/USB: 1 x M12 8-pole A-code	PoE pin assignment	M12 port #1-#8 supports IEEE 802. 3at/af End-point. Per port provides up to 30W
Network Cable	10Base-T: 2-pair UTP/STP Cat. 3, 4, 5/ 5E/ 6 cable EIA/TIA-568 100-ohm (100m) 100Base-TX: 2-pair UTP/STP Cat. 5/ 5E/ 6 cable EIA/TIA-568 100-ohm (100m) 1000Base-TX: 2-pair UTP/STP Cat. 5/ 5E/ 6 cable EIA/TIA-568 100-ohm (100m)	Power Consumption	7W (w/o PoE load)
LED	Per unit: Power 1 (Green), Power 2 (Green), FAULT (Red); RM(Green) Ethernet port: Link/Activity (Green), Speed (Amber);	Case Dimension	IP67/IP54: Aluminum case 178mm(W)x125mm(H)x56mm(D) (PoE models) 178mm(W)x125mm(H)x53mm(D) (Non-PoE models)
		Weight	1.03kgs (PoE model) 933g (Non-PoE model)
		Installation	Wall Mount / Din Rail mount**
		EMI & EMS	FCC Class A, CE EN55032 Class A, CE EN55024, CE EN61000-4-2, CE EN61000-4-3, CE EN61000-4-4, CE EN61000-4-5, CE EN61000-4-6, CE EN61000-4-8, CE EN61000-6-2, CE EN61000-6-4
		Verifications	EN50155/EN50121-3-2/EN50121-4 EN45545-1, EN 45545-2 Fire & Smoke
		Stability Testing	EN61373 (Shock and Vibration)
		Vehicle Certificate	E24 marking (UN ECE R10) ITxPT labeled*
		Vehicle Compliance	UN ECE R118
		MTBF	360,540 hrs
		Warranty	5 years
		Bypass**	One pair bypass module on uplink ports to pass to

	next switch in case of power failure and CPU hang (-BT model) (only for 24TVI models)		802.1X access control/MAC-Port binding INGRESS ACL L2/L3 SSL/ SSH v2 for Management HTTPS for secure access to the web interface
Software Specification			
Management	SNMP v1 v2c, v3/ Web/Telnet/CLI/ OPEN API* document format for Restful API	IGMP	Support IGMP snooping v1,v2,v3; 1024 multicast groups; IGMP router port ; IGMP query; GMRP, MLD snooping
SNMP MIB	MIBII MIB SNMP MIB, IF MIB RMON MIB, Bridge MIB, LLDP MIB Private MIB	Static MAC-Port bridge	Static multicast forwarding forward reversed IGMP flow with multicast packets binding with ports for IP surveillance application
Enhanced G.8032 ring	Support ITU G.8032 v2/2012 for Ring protection in less than 20ms for self-heal recovery (single ring enhanced mode) Support various ring/chain topologies Includes basic single ring and enhanced ring Enhanced G.8032 ring configuration with ease Cover multicast & data packets protection	WAN Port	<ul style="list-style-type: none"> ■ PPPoE ■ DHCP client
PoE Management	<ol style="list-style-type: none"> 1. PoE Detection to check if PD is hang up then restart the PD 2. PoE Scheduling to On/OFF PD upon routine time table 	L3 routing functions	Static route RIP/OSPF
Per Port PoE Status	On/ Off, voltage, current, watts, temperature	Firewall	Port forwarding DMZ Filtering Remote admin DDoS protection NAT
PoE configurable on ignition standby mode (-IGN)	System Shutdown Duration, PoE Disable Duration (-IGN model)	Bandwidth Control	Support ingress packet filter. Ingress filter packet type combination rules are Broadcast/Multicast/Flooded Unicast packet, Broadcast/Multicast packet, Broadcast packet only and all types of packet. The packet filter rate can be set an accurate value through the pull-down menu for the ingress packet filter.
User-friendly UI	<ul style="list-style-type: none"> ■ Auto topology drawing ■ Topology demo ■ Complete CLI for professional setting 	Flow Control	Supports Flow Control for Full-duplex and Back Pressure for Half-duplex
Port Trunk with LACP	LACP Port Trunk: 8 Trunk groups	System Log	Supports System log record and remote system log server
LLDP	Supports LLDP to allow switch to advise its identification and capability on the LAN	Protection	<ul style="list-style-type: none"> ■ Miss-wiring avoidance ■ Node failure protection ■ Loop protection
CDP	Cisco Discovery Protocol for topology mapping	SNMP Trap	Up to 10 trap stations; trap types including: <ul style="list-style-type: none"> ● Device cold start ● Authorization failure ● Port link up/link down ● Topology change (ITU ring) ● Power failure ● Environmental abnormal
VLAN	Port Based VLAN IEEE 802.1Q Tag VLAN (256 entries)/ VLAN ID (Up to 4K, VLAN ID can be assigned from 1 to 4096.) GVRP	DHCP	Provide DHCP Client/ DHCP Server/DHCP Option 82 (Server and relay) /Port-based DHCP; DHCP Snooping; DHCP option 66
IPv6/4	Present	DNS/mDNS	Provide DNS Client feature and support Primary and Secondary DNS server, multicast DNS
RSTP/MSTP	Supports IEEE802.1d Spanning Tree and IEEE802.1w Rapid Spanning Tree, IEEE802.1s Multiple Spanning Tree 8 MSTI	SNTP	Supports SNTP to synchronize system clock in Internet
Quality of Service	The quality of service determined by port, Tag and IPv4 Type of service, IPv4 Differentiated Services Code Points - DSCP	MQTT	Broker, Publisher
Class of Service	Support IEEE802.1p class of service, per port provides 8 priority queues	Firmware Update	Supports TFTP firmware update, TFTP backup and restore; HTTP firmware upgrade
Remote Admin	Supports 10 IP addresses that have permission to access the switch management and to prevent unauthorized intruder.	Configuration upload and download	Supports editable configuration file for system quick installation Support factory reset pin to restore all settings back to factory default USB port for upload/download configuration by USB dongle
Login Security	Supports IEEE802.1X Authentication/RADIUS/TACACS		
Port Mirror	Support 3 mirroring types: "RX, TX and Both packet"		
Network Security	Support 10 IP addresses that have permission to access the switch management and to prevent unauthorized intruder.		

*Future Release
**Optional

ORDERING INFORMATION

All model packages include M12 caps. For coating add -C to model name; for optional bypass add -BT (one pair) to end of model names. (only for 24TVI models)

- **TPGR-3208T-54-24VI** **P/N: 8351-140**
10 10/100/1000T w/8 PoE at/af L2+ NAT router Switch w/ PoE galvanic isolation; 9~36VDC dual input; -40°C to 70°C; IP54 rated
- **TPGR-3208T-54-24VI-IGN** **P/N: 8351-1401**
10 10/100/1000T w/8 PoE at/af L2+ NAT router Switch w/ PoE galvanic isolation & ignition; 9~36VDC dual input; -40°C to 70°C; IP54 rated

- **TPGR-3208T-54-24TVI** **P/N: 8351-1402**
10 10/100/1000T w/8 PoE at/af L2+ NAT router Switch w/ PoE galvanic isolation; 16.8~56VDC dual input; -40°C to 70°C; IP54 rated
- **TGR-3208T-54-24VI** **P/N: 8351-1403**
10 10/100/1000T L2+ NAT router Switch w/ galvanic isolation; 9~36VDC dual input; -40°C to 70°C; IP54 rated
- **TGR-3208T-54-24VI-IGN** **P/N: 8351-1404**
10 10/100/1000T L2+ NAT router Switch w/ galvanic isolation & ignition; 9~36VDC dual input; -40°C to 70°C; IP54 rated
- **TGR-3208T-54-24TVI** **P/N: 8351-1405**
10 10/100/1000T L2+ NAT router Switch w/ galvanic isolation; 16.8~56VDC dual input; -40°C to 70°C; IP54 rated
- **TPGR-3208T-67-24VI** **P/N: 8351-14001**
10 10/100/1000T w/8 PoE at/af L2+ NAT router Switch w/ PoE galvanic isolation; 9~36VDC dual input; -40°C to 70°C; IP67 rated
- **TPGR-3208T-67-24VI-IGN** **P/N: 8351-14011**
10 10/100/1000T w/8 PoE at/af L2+ NAT router Switch w/ PoE galvanic isolation & ignition; 9~36VDC dual input; -40°C to 70°C; IP67 rated
- **TPGR-3208T-67-24TVI** **P/N: 8351-14021**
10 10/100/1000T w/8 PoE at/af L2+ NAT router Switch w/ PoE galvanic isolation; 16.8~56VDC dual input; -40°C to 70°C; IP67 rated
- **TGR-3208T-67-24VI** **P/N: 8351-14031**
10 10/100/1000T L2+ NAT router Switch w/ galvanic isolation; 9~36VDC dual input; -40°C to 70°C; IP67 rated
- **TGR-3208T-67-24VI-IGN** **P/N: 8351-14041**
10 10/100/1000T L2+ NAT router Switch w/ galvanic isolation & ignition; 9~36VDC dual input; -40°C to 70°C; IP67 rated
- **TGR-3208T-67-24TVI** **P/N: 8351-14051**
10 10/100/1000T L2+ NAT router Switch w/ galvanic isolation; 16.8~56VDC dual input; -40°C to 70°C; IP67 rated

OPTIONAL ACCESSORIES

Software package

- **OS2 pro – IEC62443-4-2**..... **P/N: 9000-127**
OS2 pro software platform IEC-62443-4-2 Cybersecurity features

M12 Connector & Cable

Connector

- **ECONM12-04D(M)-C-180** 4 pin M12 (Male) D-coded 180 degree crimp type connector for data
- **ECONM12-08X(M)-SPEEDCON** 8 pin M12 (Male) X-coded 180 degree crimp type connector for data, Ethernet CAT6A (10G), shielded, SPEEDCON

Cable

- **ECAB124030MJS** 4 pin M12 (Male) D-coded 180 degree RJ45 STP cable for data, 300cm
- **ECABM12X83MSTP** 8 pin M12 (Male) X-coded 180 degree RJ45 STP cable for data, shielded, 300cm
- **ECONM12-5P(F)70CM CABLE** 5 pin M12 (Female) A-coded 90 degree cable for power supply, 70cm

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