



TEJAS[®]
NETWORKS

TJ1400P-M1

Industrial Gigabit Switch Series

TJ1400P-M1-4HPC-LS-IT-DC-DIN



TJ1400P-M1-8HP4S-M-IT-DC-DIN

TJ1400P-M1-4UP4T4S-M-IT-DC-DIN



TJ1400P-M1-8TC-M-IT-DC-DIN

TJ1400P-M1-8HPC-LS-IT-DC-DIN

Overview

The TJ1400P-M1 Industrial switch series is a set of Layer2+ and Carrier Ethernet switches designed to provide a wide range of capabilities to meet diverse deployment requirements that value continuous operation. The comprehensive Layer2 feature set and management capabilities provides excellent price/performance benefit.

Network Security is paramount today and TJ1400P-M1 ensures that with features like authentication of Clients via 802.1x for determining the authorized devices, and security features like IP Source Guard, ACLs, Storm Control the network is secured. Additional Layer3 functionality such as Static Routing and DHCP server add to the flexibility and may eliminate the need for co-located Layer3 equipment.

The Carrier Ethernet models provide additional features that can be used in Service Provider markets like Ethernet Ring Protection

(ERPS) and OAM tools like Connectivity Fault Management (CFM) and Performance Monitoring (Y.1731).

The switches support line-rate, non-blocking switching for predictable performance and are DC powered with dual redundant hot-swap feeds for resiliency in deployments. The switches are packaged in DIN form-factor and with their IP30 rated construction they can be deployed in extended temperature sheltered environments. Their fan-less construction is added benefit to reliability, no maintenance and noise-free deployment.

Power over Ethernet (PoE) capability with support for PoE+ on all ports allows some of these switches to be used to power co-located and connected equipment making it an excellent option for Surveillance and WiFi applications, indoor and outdoor.

Key Features and Benefits

Robust Industrial Design

The fanless operation allows the product to have high MTBF. The wide range of Industrial Operation Range (-40 degC to 75 degC) allows deployment in outdoor environments. The units are designed for harsh deployments with tolerance to high vibration, shock, EMI/EMC, and surge. With a DIN Mounting option it is compatible for Industrial Automation

Secure Network Access

Authentication of the devices that connect to the switch allows you to ensure that there is no unauthorized use of the network. This is especially true in deployments that are remote. The DHCP snooping and Dynamic ARP inspection features on the switch allow the device to reject devices trying to use an IP-address that is provided to another authorized device.

Layer2 Switching

Comprehensive Layer2 feature set with Spanning Tree Protocols to prevent loops, Link aggregation to allow for increased interconnect bandwidth, and VLAN support allows for virtualization of networks. Multicast snooping and forwarding are supported for efficient Video .

Layer3 Switching

The switches support Static Routing of IPv4 and IPv6 traffic allows aggregation at Layer3 as well. A built in DHCP server allows the switch to assign IP-addresses to endpoints and build a standalone IP-network. Upgrade of Metro models to support RIP and OSPF is possible. Please contact Tejas sales for such requirements.

Quality of Service

In converged networks multiple applications can be given their own priorities and bandwidth. Customer traffic can be limited and uplink traffic shaped as required. Note that shaping needs to ensure that adequate attention is given to the packet buffering available on the device.

Power over Ethernet

Some models offer Power over Ethernet (PoE) capability. The PoE capable switches can act as the Power Source Equipment (PSE) and deliver 30W (802.1at) of power to connected Power Devices (PD). Scheduling the powering of the devices is a feature that allows you to turn off the devices when not required. Support for 60W UPoE is also available.

Green Ethernet

Energy Efficient Ethernet (EEE) capability as per IEEE 802.3az on the ports allows the ports to go into a low-power inactive state and reduce power.

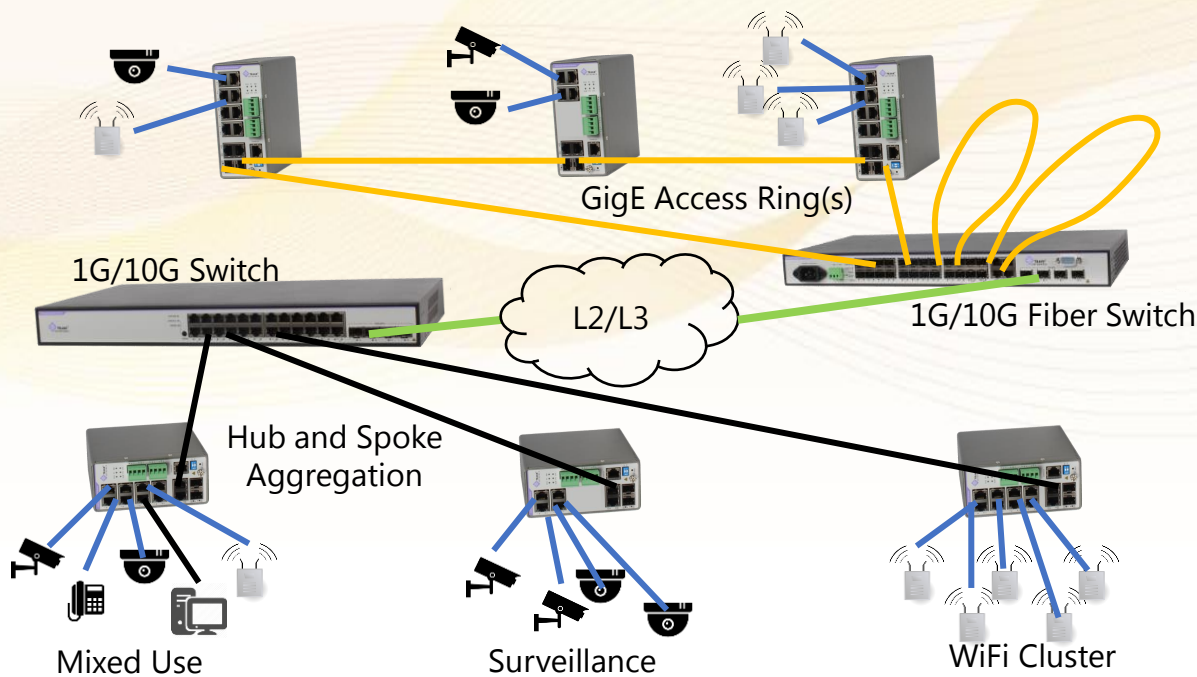
Flexible Deployments

All ports are Gigabit Ethernet ports with Auto Negotiation and MDIX support allowing for seamless interconnectivity of new and old equipment. Support of multiple uplinks allows for ring configurations for redundancy. Line rate forwarding allows high-capacity access equipment like 802.11ac Access Points. Optical ports allow for traffic to be collected at remote locations with the use of the appropriate SFP modules. Gigabit speeds reduce network latency. Jumbo frame support for Video applications

Secure Management

Management of the switch can be done locally using the console port or remotely using Secure access. A Graphical User Interface (GUI) provides easy access. Access to the switch CLI commands via RADIUS/TACACS+ ensures that all operations are authorized and logged. Traffic can also be selectively mirrored for analysis. Integration with NMS via SNMP/CLI and syslog is supported.

Sample Deployment Scenarios



Product models in this series

Aligned to the Naming convention followed in Tejas Ethernet Switches the Industrial grade models fit the nomenclature TJ1400P-M1-XXXXXX-IT-DC-DIN. The “Model-Type” is the identifier XXXXXXX used to indicate the specific orderable switch which is a combination of port capabilities and software described here

Model-ID XXXXXX	RJ45 Ports 10/100/1000	PoE Capable	PoE Budget	RJ45 Uplink	SFP Uplink	Software Feature Set
4HPC-LS	4	4 PoE+	120W	2 Combo (RJ45 / SFP)		Layer2+
8HPC-LS	8	8 PoE+	240W	2 Combo (RJ45 / SFP)		Layer2+
8TC-M	8	-	-	2 Combo (RJ45 / SFP)		Layer2+, CE
8HP4S-M	8	8 PoE+	240W	-	4	Layer2+, CE
4UP4T4S-M	8	4 UPoE	240W	-	4	Layer2+, CE

All the switches support a Console Port for local access. Furthermore, Two Digital Input (DI) pins and Digital Output (DO) pins can be used to sense external signals and actuate external relays

Power Supply

All the switches support Redundant DC feeds that are hot swappable. AC operation is supported with external AC to DC converters that are hot pluggable.

For non-PoE switches (TJ1400P-M1-8TC-M-IT-DC-DIN) the input DC voltage may be 12V/24V/48V. For models that support PoE capability, the switches operate on input voltage range of 48V to 57V DC. As PoE ports require slightly higher voltage, it is recommended that input voltage be >48V for PoE operation (802.3af, 15.4W) and >54V for PoE+ and UPoE operation (802.3at, 30W per pair).

Hardware Characteristics

Model-ID XXXXXXX	Dimension (HxWxD) mm	Weight gms	MTBF hours	Processor	DRAM	Flash
4HPC-LS	135x62x130	700	538,490	416MHz ARM	128 MB	32MB NOR
8HPC-LS	135x62x130	650	471,260	416MHz ARM	128 MB	32MB NOR
8TC-M	135x62x130	700	571,620	416MHz ARM	128 MB	32MB NOR
8HP4S-M	135x62x130	700	476,200	416MHz ARM	128 MB	32MB NOR
4UP4T4S-M	135x62x130	700	476,200	416MHz ARM	128 MB	32MB NOR

Switch Scalability

Model-ID XXXXXXX	Switching Capacity	Forwarding Rate	MAC Table	Packet Buffer	VLAN support	Max Frame Size
4HPC-LS	12 Gbps	8.928 Mpps	8K	512 KB	4096	9216 Bytes
8HPC-LS	20 Gbps	14.88 Mpps	8K	512 KB	4096	9216 Bytes
8TC-M	20 Gbps	14.88 Mpps	8K	512 KB	4096	9216 Bytes
8HP4S-M	24 Gbps	17.85 Mpps	8K	512 KB	4096	9216 Bytes
4UP4T4S-M	24 Gbps	17.85 Mpps	8K	512 KB	4096	9216 Bytes

Power Consumption

Model-ID XXXXXXX	No PoE Loading	Under Full PoE Load
4HPC-LS	5.62W	132.5 W (30W / port)
8HPC-LS	6.76W	220.8 W (30W / port)
8TC-M	6.24W	-
8HP4S-M	7.98W	235.4 W (30W / port)
4UP4T4S-M	7.98W	236.3 W (60W / port)

LED Indicators

LED	Color	State	Description
SYSTEM	Green	On	The switch is Ready
		Off	The switch is not ready
ALARM	Red	On	An abnormal condition (temperature, voltage) has been detected
		Off	Normal operation
P1	Green	On	Power1 input is powered correctly
		Off	Switch is not receiving power from Power1 input
P2	Green	On	Power2 input is powered correctly
		Off	Switch is not receiving power from Power2 input

LED	Color	State	Description
RJ45 LED top	Green	On	Port is connected and speed is 1000 Mbps
	Amber	On	Port is connected and speed is 10 Mbps
	-	Blinking	Port is transmitting and receiving packets
		Off	Port is disconnected or disabled
RJ45 LED Bottom	Green	On	Port is supplying PoE Power
	Amber	On	Abnormal State (overload) detected by switch
	-	Off	Port is not connected to PD or disabled
SFP Ports	Green	On	Port is connected and speed is 1000 Mbps
	Amber	On	Port is connected and speed is 10 Mbps
	-	Blinking	Port is transmitting and receiving packets
		Off	Port is disconnected or disabled

Environmental Range

Operating Temperature	-40 degC to +75 degC
Storage Temperature	-40 degC to +85 degC
Operating Altitude	Up to 3000 meters
Operating Humidity	0% to 95% non-condensing

Certifications and Compliances

Safety	CE, EN60950-1
EMI	FCC Part 15 Subpart B, Class A EN61000-6-4 compliant EN55022, EN55011
EMC	EN61000-4-2 for ESD : Electrostatic discharge EN61000-4-3 for RS : Radiated susceptibility EN61000-4-4 for EFT : Electrical Fast Transient EN61000-4-5 for Surge EN61000-4-6 for CS : Conducted susceptibility EN61000-4-8 for PFMF : Power frequency magnetic field
Vibration	IEC 60068-2-6 compliant
Shock	IEC 60068-2-27 compliant
Drop	IEC 60068-2-32 compliant
Railway Norms	EN50121-4, EN50155 complaint
Transportation	NEMA TS2
Sub-station	IEC61850-3, IEEE1613 compliant
Marine	DNV complaint

Networking and Software Features

Layer 3 Switching	
Static Routing	<ul style="list-style-type: none"> IPv4 Unicast Static Routing (up to 64 routes) IPv6 Unicast Static Routing (up to 64 routes)
Layer2 Switching	
Bridging	<ul style="list-style-type: none"> Dynamic Learning of MAC addresses with configurable Aging Timers Static MAC addresses that are not subject to aging
Spanning Tree Protocol (STP)	<ul style="list-style-type: none"> Standard Spanning Tree 802.1d Rapid Spanning Tree (RSTP) 802.1w Multiple Spanning Tree (MSTP) 802.1s (up to 8 instances)
Link Aggregation	<ul style="list-style-type: none"> Link bonding using statically defined Link Aggregation Groups Dynamic bonding using Link Aggregation Control Protocol (LACP) IEEE 802.3ad Up to 5 link aggregation groups each with up to 4 members
VLAN support	<ul style="list-style-type: none"> Port-based VLAN 802.1Q tag-based VLAN MAC-based VLAN Protocol-based VLAN Management VLAN Private VLAN Edge (PVE) Q-in-Q (double tag) VLAN Voice VLAN GARP VLAN Registration Protocol (GVRP) for propagating VLAN
UDLD	<ul style="list-style-type: none"> Unidirectional Link Detection to discover L2 mis-connections
IGMP Snooping	<ul style="list-style-type: none"> Supports snooping of IGMP v1/v2/v3 requests to deliver the bandwidth intensive IPv4 multicast traffic only to the requesters
MLD Snooping	<ul style="list-style-type: none"> Delivers IPv6 multicast packets only to the required receivers
IGMP Querier	IGMP querier is used to support a Layer 2 multicast domain of snooping switches in the absence of a multicast router
IGMP Proxy	IGMP snooping with proxy reporting or report suppression actively filters IGMP packets in order to reduce load on the multicast router
Multicast VLAN Registration (MVR)	It uses a dedicated manually configured VLAN, called the multicast VLAN, to forward multicast traffic over Layer 2 network in conjunction with IGMP snooping.
DHCP Relay	<ul style="list-style-type: none"> Relay of DHCP traffic to DHCP server in different VLAN. Works with DHCP Option 82

Security	
Secure Shell (SSH)	SSHv1 and SSHv2 are supported for secure remote access to the switch
Secure Socket Layer (SSL)	The browser based access to the switch is secured by encrypting the http traffic using SSL
802.1X	<ul style="list-style-type: none"> • IEEE802.1X: RADIUS authentication, authorization and accounting, MD5 hash, guest VLAN, single/multiple host mode and single/multiple sessions • Supports IGMP-RADIUS based 802.1X • Dynamic VLAN assignment
Private VLAN Edge	PVE (also known as protected ports) provides L2 isolation between clients in the same VLAN. Supports multiple uplinks
Port Security	Locks MAC addresses to ports, and limits the number of learned MAC address
IP Source Guard	Prevents illegal IP address from accessing specific port in the switch. Only IP-MAC address bindings that are verified are allowed
Dynamic ARP Inspection	The switch compares the ARP request received dynamically against the IP-MAC address bindings that are allowed and discards any illegal ARP requests.
RADIUS/TACACS+	The switch act as a RADIUS/TACACS+ client
Storm Control	Prevents traffic on a LAN from being disrupted by a broadcast, multicast, or unicast storm on a port
DHCP Snooping	The switch can snoop DHCP requests so it knows the responses from a trusted DHCP server and can use it to build IP-MAC bindings to enforce security policies
ACLs	Supports up to 64 entries. Drop or rate limitation based on: <ul style="list-style-type: none"> • Source-Destination MAC, VLAN ID or IP address, protocol, port, • Differentiated services code point (DSCP) / IP precedence • TCP/ UDP source and destination ports • 802.1p priority • Ethernet type • Internet Control Message Protocol (ICMP) packets • TCP flag
Loop Protection	Prevents unknown unicast, broadcast and multicast loops in Layer 2 switching configurations.

Quality of Service	
Queuing Hardware	Supports 8 Queues per Port
Scheduling Disciplines	<ul style="list-style-type: none"> • Strict Priority • Weighted Round Robin (WRR)
Classification	Queue assignment based on <ul style="list-style-type: none"> • Port based • 802.1p VLAN priority based • IPv4/IPv6 precedence / DSCP based • Differentiated Services (DiffServ) • Classification and re-marking ACLs
Bandwidth Control	<ul style="list-style-type: none"> • Ingress Policer and marking (per port, and per Queue) • Egress Shaper and Rate Control (per port, and per Queue)
Management	
HW Monitoring	High Temperature Detection and Alarm
HW Watchdog	CPU Hang events are detected and SW restarted
DHCP Server	The built-in DHCP Server can be enabled to give out IP addresses to connected hosts.
Remote Monitoring (RMON)	Embedded RMON agent supports RMON groups 1,2,3,9 (history, statistics, alarms, and events) for enhanced traffic management, monitoring and analysis
Port Mirroring	Traffic on a port can be mirrored to another port for analysis with a network analyzer or RMON probe. Up to N-1 (N is Switch's Ports) ports can be mirrored to single destination port. A single session is supported.
S-Flow	The switch allows traffic to be sampled and sent to a server for monitoring.
Auto Discovery (LLDP)	Using IEEE 802.1an, the network devices advertise their identities, capabilities, and neighbors on an IEEE 802ab local area network. The switch support LLDP-MED extensions for client capabilities
SW Upgrades	Dual Images are supported. Independent primary and secondary images for backup while upgrading

Firmware Upgrade	Firmware is upgradable via Web Browser or local console port
SNMP	SNMP version1, 2c and 3 with support for traps. For enhanced security, SNMP version 3 user-based security model (USM)
Syslog	The events generated by the switch can be selected to be sent to a syslog server for further analysis and persistent storage
CLI	An Industry standard (Cisco-like) Command Line Interface (CLI) is available to configure and operate the switches
GUI – Graphical User Interface	A Web-server is embedded in the device and the switch can also be operated from a use-friendly Browser based User Interface
NTP	The switch does not have a persistent Real-time Clock (RTC) and hence it uses Network Time Protocol (NTP) as per RFC 1305 to get clock information
Cable Diagnostics	The Electrical interfaces support cable diagnostics to identify the location of the fault
Optical Port Monitoring	The Optical characteristics of the SFP modules can be monitored
IPv6 Management	The Management interface and utilities are IPv6 compliant. The Node IP address can be IPv6 and the Management traffic can be IPv6 based.
Power over Ethernet (PoE) for models where applicable	
Port Configuration	Supports per-Port PoE configuration
PoE Scheduling	Allows the PoE Devices (PDs) to be turned on/off as required
Auto Checking	Allows the PoE Devices (PDs) to be rebooted if they do not respond to a ping from the switch
Power Delay	The switch allows the PD's to be switched on following a programmable delay after rebooting. This allows the network to be established prior to powering the PoE Devices.
Persistent Power	This feature allows the PD's to retain power in case the switch undergoes a reboot. This allows PoE Devices with built in storage to continue operation and sync up on network availability.
Carrier Ethernet Features (for models 8TC-M, 8HPC-M, 8HP4S-M)	
Linear Protection	Supports ITU-T G.8031 Ethernet Linear Protection Switching
Ring Protection	Supports ITU-T G.8032 Ethernet Ring Protection Switching
Ethernet OAM	Supports Operations, Administration & Management on the link
Service OAM	Supports IEEE 802.1ag Ethernet CFM (Connectivity Fault Management)
Perf. Monitoring	Supports ITU-T Y.1731 Performance Monitoring

Standards Support

Ethernet	IEEE 802.3
Physical Layer	IEEE 802.3u, 802.3z, 802.3ab
Flow Control	IEEE 802.3x
Framing/QoS	IEEE 802.1Q, 802.1ad, 802.1p, 802.1ac, 802.1v
Discovery	IEEE 802.1b
Bonding/Trunking	IEEE 802.1ad (LLDP)
PoE	IEEE 802.3af, 802.3at
Energy Efficient	IEEE 802.3az
STP	IEEE 802.1d (STP), 802.1w (RSTP), 802.1s (MSTP), 802.1D-2004
Security	IEEE 802.1x
OAM (-M models)	IEEE 802.3ah, 802.1ag
EVC Protection	ITU-T G.8031, G.8032
System Support	<p> RFC 768 UDP RFC 783 TFTP RFC 791 IP RFC 792 ICMP RFC 793 TCP RFC 826 ARP RFC 903 RARP RFC 854 Telnet RFC 906 TFTP Bootstrap RFC 951, 1542 BootP RFC 1027 Proxy ARP, RFC 1519 CIDR RFC 1591 DNS RFC 2131, 2132 DHCP RFC 1256 IPv4 ICMP Router Discovery (IRDP) IPv6 via RFC 2460, RFC 1981, RFC 4443, RFC 4861, RFC 4862 RFC 2068 HTTP server RFC 2030 SNTP, Simple Network Time Protocol RFC 2131 BOOTP/DHCP relay agent and DHCP server RFC 1492 TACACS+ RFC 2138 RADIUS Authentication RFC 2139 RADIUS Accounting RFC 3579 RADIUS EAP support for 802.1x RFC 5176 Dynamic Authorization Extensions to RADIUS </p>

Ordering Information

TJ1400P-M1-4HPC-LS-IT-DC-DIN	4 port Industrial Gigabit Ethernet PoE+ switch with Combo uplinks and Dual DC feed and DIN construction
TJ1400P-M1-8TC-M-IT-DC-DIN	8 port Industrial Carrier Ethernet GbE Switch with Combo uplinks, Dual DC feed, and DIN construction
TJ1400P-M1-8HPC-LS-IT-DC-DIN	8 port Industrial L2+ Managed GbE PoE+ Switch with Combo uplinks, Dual DC feed, and DIN construction
TJ1400P-M1-8HP4S-M-IT-DC-DIN	8 port Industrial Carrier Ethernet GbE PoE+ Switch with 4 SFP uplinks, Dual DC feed, and DIN construction
TJ1400P-M1-4UP4T4S-M-IT-DC-DIN	8 port Industrial Carrier Ethernet GbE (4 UPoE ports and 4 non-PoE) Switch with 4 SFP uplinks, Dual DC feed, and DIN construction

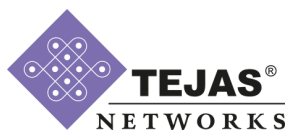
All switches ship with DIN-Rail Mounting Kit and Console Cable

Pluggable Interface Modules

The Optical Interfaces use Pluggable Optical modules compliant with IEEE Standards and the Multi Source Agreements (MSA). However, Tejas recommends that the Optical modules be ordered from Tejas as this ensures that the modules have been tested for Quality and functionality in Tejas equipment and their operation and performance is guaranteed. When a customer sources and installs optical modules without the consent of Tejas Networks, any network failure is not supported by Tejas.

The following pluggable Interface modules may be ordered

Gigabit Ethernet Pluggable SFP Modules	
TJ-SFP-1GE-T	IEEE 1000BASE-T, Cat 6 cable, RJ45
TJ-SFP-1GE-SX	IEEE 1000BASE-SX, 850nm, Multi-Mode OM3, 550m, 2xLC
TJ-SFP-1GE-LX	IEEE 1000BASE-LX, 1310nm, Single Mode, 10Km, 2xLC
TJ-SFP-1GE-LX-BI-U	IEEE 1000BASE-BX10, 1310nm-TX/1490nm-RX, 10Km, LC
TJ-SFP-1GE-LX-BI-D	IEEE 1000BASE-BX10, 1490nm-TX/1310nm-RX, 10Km, LC
TJ-SFP-1GE-LH	IEEE 1000BASE-LH, 1310nm, Single Mode, 40Km, 2xLC
TJ-SFP-1GE-ZX	IEEE 1000BASE-ZX, 1550nm, Single Mode, 80Km, 2xLC



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