MICROSENS

Data Sheet

Ethernet Micro Switch 10G

Features

MICROSENS presents an innovation for Fiber To The Office (FTTO) networks. The new *Micro Switch 10G* opens the future into the world of 10 Gigabit Ethernet networks. This manageable switch meets the demand for applications with extremely high data throughput like the integration of high-speed WLAN Access Points or high-resolution video cameras. The extremely compact device excels through its minimal space requirements which allow to install it in a wide variety of different installation environments.

Two 10 Gigabit uplink ports allow the implementation of resilient networks. High performance WLAN Access Points can be effectively connected via the additional NBase-T downlink port supporting up to 5G transmission rate and PoE++ sourcing. Four directly accessible 10/100/1000Base-T ports are available for the connection of standard equipment like PCs, VoIP-phones or network-printers etc.

Features

- Fanless 10 Gigabit Ethernet Switch
- 2x 1/10G uplink ports for SFP/SFP+ transceivers
- 1x 1/2.5/5GBase-T downlink port, PoE++ sourcing up to 60W (802.3af/at/bt)
- 4x 10/100/1000Base-T local ports, PoE+ sourcing up to 30W (802.3af/at)
- Ethernet Ring Protection Switching (ERPS) G.8032v2
- Docker virtualization environment for custom device and management automation*
- Self-protection: dedicated security circuit to secure the boot sequence
- Easy to install into any standard 45 mm electrical installation system
- Form factor compatible with the well-established MICROSENS Micro Switch families

Characteristics

10 Gigabit Ethernet Switch

- Fanless 10 Gigabit Ethernet Switch
- Layer-2+ store-and-forward, full wire-speed, non-blocking
- Max. 16K MAC addresses, automatic learning and aging
- Jumbo frames (max. 10KBytes)

Network Management

- Support of common management standards
- Web manager (https, http, custom certificates)
- Industry standard CLI via SSH, Telnet
- Console interface
- SNMP v1/v2c*/v3 Transport Security Model (TSM)
- Software integration with MICROSENS NMP as central management solution for network and device configuration
- Docker virtualization environment as platform for custom automation*

Security

- Selectable user authentication modes: Local DB, RADIUS, TACACS+
- Access permissions configurable for users and groups
- Port-based Network Access Control
  - MAC Locking
  - MAC via RADIUS, IEEE 802.1X
  - IEEE 802.1X Supplicant, incl. MD5, PEAP, PEAP-MSCHAP v2, TTLS, TLS
- Access Control Lists*
- Storm Control*
- DHCP Snooping, ARP Inspection, PPPoE Snooping*

Redundancy*

- Spanning Tree: STP, RSTP, MSTP
- Ethernet Ring Protection Switching (ERPS), G.8032 v2
- MICROSENS Redundant Ring Protocol

Firmware Management

- Update via Web UI, FTP, FTPS, SFTP
- Configuration import and export

Power over Ethernet (PoE+/++)

- 4x IEEE 802.3af/at PoE+ PSE (max. 30 W/Port)
- 1x IEEE 802.3af/at/bt PoE++ PSE (max. 60 W)
- Max. PoE-Budget: 120 W

Connectors

Uplink
- 2x SFP/SFP+ slot, 1/10GBase-X

Downlink
- 1x RJ-45 port, 1/2.5/5GBase-T

Local ports
- 4x RJ-45 port, 10/100/1000Base-T

Power Supply
- 3-pin screw pluggable connector for solid or stranded wires
- Additional grounding (PE) with 6,3 mm flat-pin lug

Console Port
- USB-C connector

Installation

- Snap-in installation 45 mm (without screw fastening)
- Compatible to common electrical installation systems via adapter frames
- Comprehensive installation accessories available

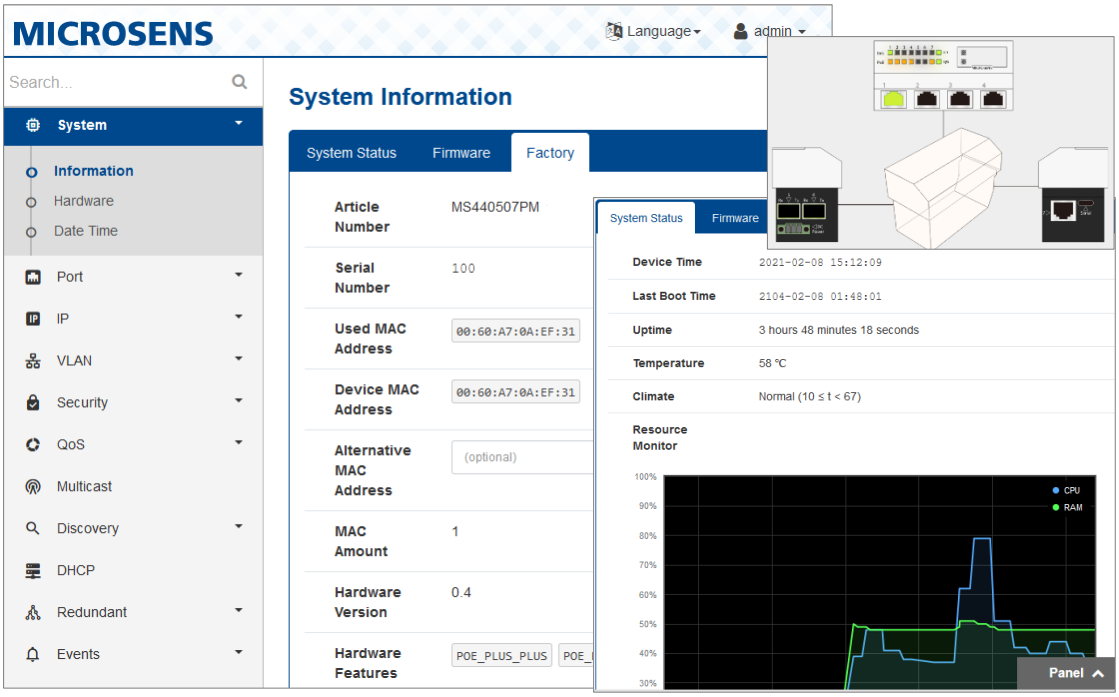
Mechanical

- Horizontal Mounting
- Dimensions: 90 mm x 45 mm x 62 mm (L x W x H, without connections)
- Mounting Depth: 35 mm

Operating Conditions

- Temperature
  Operation: 0..35 °C
  Storage: -20..85 °C
- Rel. Humidity: 10..90 %, non-cond.

Firmware Features



Provision of Inventory Information

- Factory and Inventory data
- Custom defined device info

System

- Integrated Thermal Protection
- Activate/de-activate Energy EEE (IEEE 802.3az)
- Configuration changes
- Alternative MAC Address
- Led Mode

IP Stack

- Dual Stack (IPv4, IPv6)
- DHCP Options 66/67
- Ping, Trace Route
- Secondary IPv4 Address*
- Hostname
- DNS*

SFP

- SFP/SFP+ Digital Diagnostics

Ethernet Port Features

- Cable Tester*
- Loop Protection
- Port Enable/Disable
- Port Alias
- Port Roles Local, Uplink, Downlink
- Speed Negotiation
- Jumbo Frame Support
- Port Mirroring

PoE-Power Management

- PoE Available Max Power configuration
- PoE enable/disable
- PoE+ PSE Enable
- PoE++ PSE Enable
- Emergency Port

Switch / MAC

- MAC Table
- MAC Filter
- SNMP Access
- MAC Limit per Port
- MAC Limit per VLAN*
- Configurable MAC Aging Time

RMON Statistics

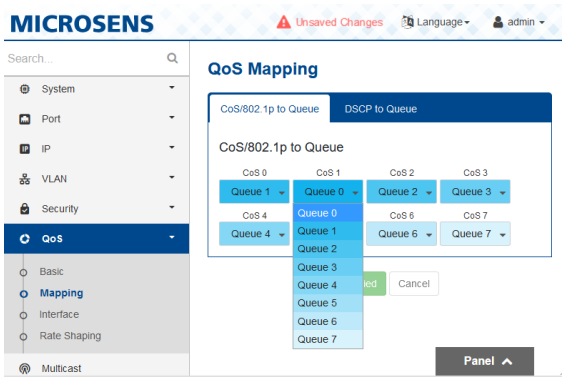
- RMON counters
- Port Utilization

Virtual LANs (VLANs)

- Port VLANs, Tagged VLANs
- Up to 4094 VLANs
- VLAN Filter
- Configurable Port Modes:
  - Access, Hybrid, Trunk
- Multiple VLAN Reservation Protocol (MVRP)*
- Stacked VLANs (Q-in-Q)*
- Priority Override*
- Voice VLAN*
- STP/RSTP VLAN*
- Unauthorized VLAN*
- Management VLAN
- Force Port Default VID*

Quality of Service (QoS)

- 8 Priority Queues per Port
- Prioritization Scheme*
- Layer1 Priority
- Layer2 Priority (802.1p)
- Layer3 Priority (IPv4 / IPv6)
- Egress Rate Shaping*
- Ingress Rate Shaping*



Spanning Tree Protocols

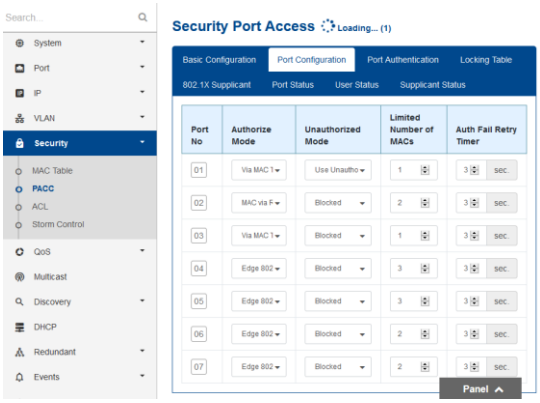
- Spanning Tree (STP)*
- Rapid Spanning Tree (RSTP)*
- Multiple Spanning Tree (MSTP)*
- BPDU Guard*

Ring Protocols*

- MICROSENS Redundant Ring Protocol (MS Ring)
- Ethernet Ring Protocol (ITU G.8032 ERPS v2)

Port Access Control

- IEEE 802.1X Authentication
- IEEE 802.1X Supplicant
- RADIUS MAC Authentication
- MAC locking
- MAC learning
- Limited number of MACs
- Limited number of MACs per VLAN
- Learned MAC time out*
- Dynamic VLAN*
- Wake-on-Lan support*
- Network Edge Authentication*
- Authentication Fail Retry Timer*



Multicast (IGMP-/MLD-Snooping)

- IGMP Snooping per VLAN
- MLD snooping per VLAN
- IGMP Querier*
- Static Multicast Router Port*

DHCP

- DHCP Snooping
- IP-MAC Binding Table
- DHCP Filtering*
- DHCP Flooding Detection*
- DHCP Relay Agent incl. support of Option 82*
- Dynamic ARP Inspection*

Network Time Protocol (NTP)

- NTP Client

Link Layer Discovery Protocols (LLDP, CDP)

- LLDP operation
- LLDP-MED*
- CDP operation*
- CDP Voice VLAN*

Access Control Lists (ACL)*

- Access Control Lists (ACL)
- Dynamic ACL via RADIUS

Command Line Interface (CLI)

- Context Sensitive Help*
- Show Config of device
- Show Status of device
- Create Snapshot*
- Live Syslog
- Telnet
- Secure Shell (SSH)
- Welcome Message*

Login Access Protection

- Unlimited number of Users
- General access rights
- Disable Insecure Interfaces*
- User Permissions
- Public key encrypted passwords*
- View Model for SNMP V1, V2c*
- Firewall with Black and White List*
- Authentication, Authorization
  - TACACS+
  - RADIUS

Web Interface (WEB)

- User Authentication
- HTTPS
- Custom SSL Certificates*
- Animated Device Visualization
- Firmware Update
- Online Documentation
- SNMP MIB download
- Event Display
- RESTful API
- Supported Browsers:
  Mozilla Firefox, Microsoft Edge

Simple Network Management Protocol (SNMP)

- SNMPv1/v2c
- SNMPv1/v2c Security
- SNMPv3*
- SNMP Transport Security Model (TSM)
- Trap/Inform (SNMPv1/v2c/v3)
- Enterprise specific Notifications*
- Enterprise and Standard MIBs*
- Integrated SNMP Browser*

Link Aggregation Control Protocol (LACP)

- Static Link Aggregation*
- Dynamic Link Aggregation*
- Load Balancing and Trunking

File Management

- File transfer protocols (FTP)
- Secure File Transfer Protocol (FTPS)*
- FTP-over-SSL*
- FTP Server Support
- Secure firmware update
- Configuration export and import
- Compare configuration
- Temporary configuration
- Save configuration

Event Logging

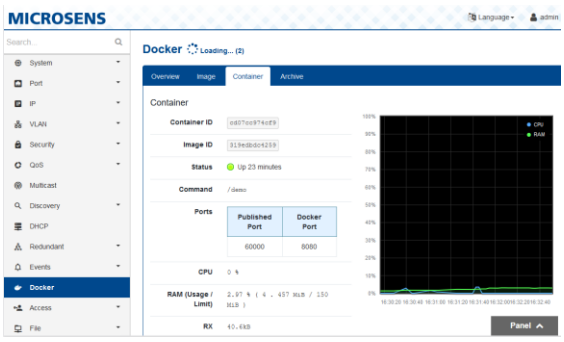
- Syslog to CLI
- Local Logfile*
- Log Filters
- Recent Logs

Diagnostic Functions

- Ping, Trace Route
- Port Mirroring
- Test Event
- DNS_Lookup*
- Led Test
- ARP Cache

Automation

- Docker Virtualization Environment for custom device and management automation*



Miscellaneous

- Broadcast Storm Control*

IEEE / RFC Standards

RFC Standards

RFC 791	IPv4
RFC 792	ICMP
RFC 826	ARP
RFC 1155	SNMPv1
RFC 1156	SNMPv1
RFC 1157	SNMP
RFC 1157	SNMPv1
RFC 1158	MIBII
RFC 1213	MIBII
RFC 1493	Bridge MIB
RFC 1573	IF MIB
RFC 1901	SNMPv2
RFC 1905	SNMPv2
RFC 1906	SNMPv2
RFC 2131	DHCP
RFC 2233	IF MIB
RFC 2460	IPv6
RFC 2462	Address Configuration
RFC 2463	ICMPv6
RFC 2464	IPv6
RFC 2574	USM
RFC 2575	VACM
RFC 2674	Q-Bridge MIB
RFC 2819	RMON MIB
RFC 2863	IF MIB
RFC 2865	RADIUS
RFC 2866	Accounting
RFC 2868	Tunnel Attributes
RFC 3315	DHCPv6
RFC 3411	SNMPv3
RFC 3412	SNMPv3
RFC 3414	USM
RFC 3415	VACM
RFC 3484	IPv6
RFC 3513	IPv6
RFC 3584	SNMPv3
RFC 4330	NTP
RFC 4541	IGMP
RFC 5424	SYSLOG

IEEE Standards

IEEE 802.1AB	Link Layer Discovery Protocol (LLDP)
IEEE 802.1d	Spanning Tree
IEEE 802.1p	Class of Service
IEEE 802.1Q	VLAN Tag
IEEE 802.1s	Multiple Spanning Tree
IEEE 802.1w	Rapid Spanning Tree
IEEE 802.1X	User Authentication (Radius)
IEEE 802.3	10Base-T
IEEE 802.3ab	1000Base-T
IEEE 802.3ad	Link Aggregation Control Protocol (LACP)
IEEE 802.3ad	Port trunk with LACP
IEEE 802.3ae	10Gbase-SR/LR
IEEE 802.3at/af/bt	Power over Ethernet
IEEE 802.3az	Green IT
IEEE 802.3bz	5Gbase-T
IEEE 802.3u	100Base-T
IEEE 802.3x	Flow Control and Back Pressure

Technical Specifications

Switch

Type	Gigabit Ethernet Switch Layer 2+, IEEE 802.3 compliant
Performance	Store-and-forward Full wire-speed, non-blocking on all ports
Switching Capacity	84 Gbps
Jumbo Frames	max. 10.240 Bytes
Flow Control	Pause Frames (IEEE 802.3x), configurable

Embedded Controller

CPU	ARM 7
RAM	512 MB
Flash Memory	1 GB

Twisted-Pair Ports (local)

Port number	1-4
Type	Gigabit Ethernet, Triple Speed 10/100/1000Base-T
Connector	RJ-45 port, shielded
Cable type	Twisted-Pair cable, Category 5e, impedance 100 Ohm, length max. 100 m
Pin out	Auto MDI/MDI-X, Auto Polarity
Power-over-Ethernet	Power Sourcing Equipment (PSE) IEEE 802.3af/at max. 30 W

Twisted-Pair Port (downlink)

Port number	7
Type*	Gigabit Ethernet, Triple Speed 1/2.5/5GBase-T
Connector	RJ-45 port, shielded
Cable type	Twisted-Pair cable, Category 6, impedance 100 Ohm, length max. 100 m
Pin out	Auto MDI/MDI-X, Auto Polarity
Power-over-Ethernet	Power Sourcing Equipment (PSE 802.3af/at/bt) max. 60 W

Fiber Port (uplink)

Port number	5-6
Type	2x SFP/SFP+ slot, 1/10GBase-R (Dual Speed), support of SFP digital diagnostics function
Connector	LC typ. (depending on SFP)

Security

Secure storage of configuration data	SHA-512 encryption to make user passwords irreversible.
Min. encryption key length	- Asymmetric: 1024 Bit - Symmetric: 128 Bit
HASH Algorithm	Equal or later than SHA 256
Not included encryption	DES, DSA, 3DES
Self protection	Use of a built-in dedicated secure boot circuit

Displays

Type	16 LEDs
Link	Twisted pair ports 1..4 and 7 *Off:* Link down *Green:* Link up, port open *Red:* Link up, blocked *Blinking:* Port is sending or receiving data
PoE	Twisted pair ports 1..4 and 7 *Off:* PoE+/PoE++ inactive *Green:* PoE+ on, port supplying power *Orange:* PoE+/PoE++ on, port not supplying power *Red:* PoE error *Blue:* PoE++ on, port is supplying power
On	*Off:* Device unpowered *Green:* Device powered
Sys	*Off:* *System not ready* *Green:* *System in operation* *Other:* see 'Factory default button' in 'Control Panel'

Control Panel

HW-Reset button	Erase memory and MAC table, reinitialise all connections; current configuration remains unchanged
Factory default button	Pressing the 'Factory defaults' triggers the following actions:
2 s → *Blue:*	Switch requesting IP address from Switch IP Configuration Tool or NMP.
10 s → *Blue blinking:*	Switch is resetting to factory defaults, IP configuration remains unchanged.
20 s → *Magenta blinking:*	Switch is resetting to factory defaults, IP configuration is reset.
30 s → green	Switch is aborting the selected recovery function (see above), the entire configuration remains unchanged.

Power Supply

Input	50..57 VDC (54 VDC typ.)
Power Consumption	Typ. 13 W (without PoE) max. 135 W (incl. PoE) (full power only with suitable installation conditions)
Connectors	3 pin screw connector, PE/-/+
Grounding (PE)	6,3 mm flat-pin plug

Standards*

CE	2014/30/EU (EMC)
	2011/65/EU (RoHS)
Safety	EN 62368-1
Emitted interference	EN 55032 (Class B)
Immunity	EN 55024 EN 55035 EN 61000-6-2

Reliability

MTBF (Method)	269.549h@25°C (SR332)

Environmental Conditions

Temperature	Operation	0..35 °C
	Storage	-20..+85 °C
Rel. Humidity	10..90%, non-condensing	

Mechanical

Dimensions	90 mm x 45 mm x 62 mm (w x d x h, without connectors)
Mounting depth	35 mm
Weight	Approx. 280 g
Mounting	Horizontal

Documentation

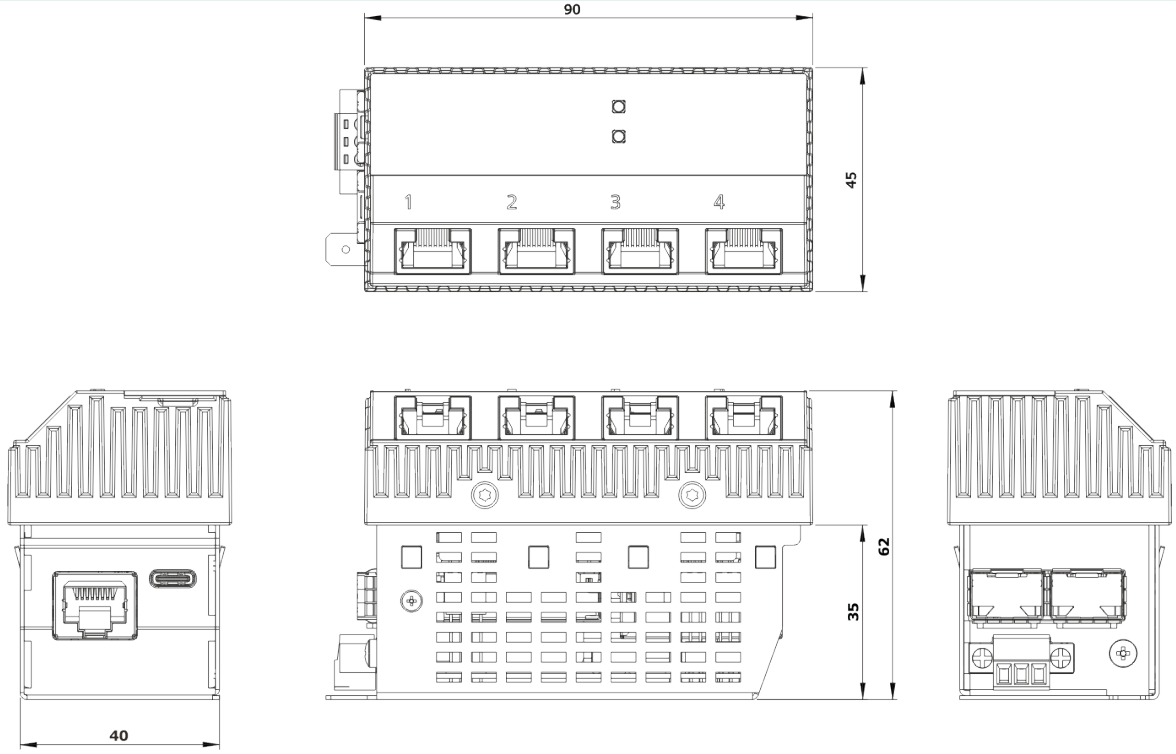
Quick Start Guide	Flyer, included in delivery unit; Download from microsens.de
User Manual	Download from microsens.com
CLI Reference Manual	- Included in device firmware for local download - Download from microsens.de
MIB-File	Included in device firmware for local download

Delivery / Contents

Standard Packaging

Package unit	1 pcs.
Dimensions	127 mmx 68 mmx 75 mm (w x d x h)
Weight	Approx. 350 g
Contents	1x Micro Switch 1x Power supply plug 1x Printed Quick Start Guide Included in device firmware: 1x CLI-Reference manual 1x MIB-File

Mechanical Dimensions / [mm]



Ordering Designation

Designation	Article Number
10 Gigabit Micro Switch	
Micro Switch 10G 2x Uplink SFP/SFP+ (1/10GBase-X) 1x Downlink RJ-45 (1/2.5/5GBase-T), PoE (PSE 802.3af/at/bt*) 4x Local port RJ-45 (10/100/1000Base-T, PoE (PSE 802.3af/at) 1x DC power input 50..57 V DC	**MS440507PM**

* Under test and will be supported.

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