10BASE-T1S Media Gateway

User Manual

CHANGES

Date	Description	Created By	Review By
28.12.2024	Initial release	PK	MM
09.02.2024	First draft	PK	

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1 About

This document describes the usage of the **10BASE-T1S Media Gateway**.

Product number: 10BASET1S-MG
Product page: https://www.machsystems.cz/en/products/embedded-networking/gateways-and-bus-converters/10base-t1s-media-gateway

Figure 1: 10BASE-T1S Media Gateway

2 Introduction

The **10BASE-T1S Media Gateway** features one 10BASE-T1S port, one Fast Ethernet port, a CAN channel with CAN FD support, and a USB 2.0 port. The device realizes a half-duplex physical-layer conversion of 10BASE-T1S to full duplex 10/100BASE-TX, and features DSUB-9M and RJ-45 connectors.

The media gateway can be used as a 10BASE-T1S - Ethernet switch (media converter) enabling a bi-directional communication between the 10BASE-T1S port and the standard Ethernet port, or as an Ethernet-CAN(/FD) gateway providing a data bridge between the 10BASE-T1S port (as well as the 100BASE-TX port) and the CAN(/FD) channel. Gateway function for bridging a 10BASE-T1S network and a CAN/CAN FD bus can be easily configured over the embedded web server.

The 10BASE-T1S port supports both CSMA and PLCA modes and allows for point-to-point and multi-drop network topologies. The port configuration, such as mode, beacon transmission (PLCA coordinator), Node ID / Node count, and bus termination, can be easily set by on-board DIP switches.

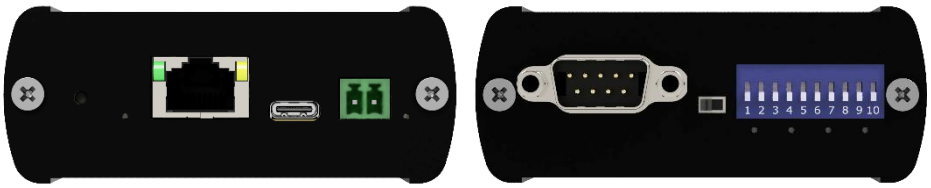


Figure 2: Front and rear side

3 Features

- Media conversion 10BASE-T1S to 10/100BASE-TX
- CAN channel with CAN FD support
- Embedded web server for configuration and status information
- Configuration:
  - CSMA / PLCA
  - Node ID / Node Count
  - Coordinator / Follower selection
- T1S termination can be enabled by switch
- USB 2.0 VCP
- User-programmable MCU (C language SDK available)
- Can be used as Ethernet to CAN(/FD) or USB to CAN(/FD) interface
- Digital output and analogue input
- USB or externally powered
- Aluminium enclosure
- DIN rail mounting possibility

4 Technical Specification

General	
Web	Web interface for configuration and status information
Gateway Function	Data between 10BASE-T1S network and CAN/CAN FD bus can be forwarded in both directions
Firmware	Upgradable over web
Communication channels	
Automotive Ethernet	10BASE-T1S (IEEE 802.3cg) End-node termination can be switched on and off by on-board switch
CAN	CAN-HS channel with CAN FD support (ISO 11898-1:2015; CAN2.0A/B; ISO CAN FD)
USB	USB 2.0 VCP
Electrical	
Power	USB-powered over USB Type-C External 7 - 30 V DC power input (polarity and surge protection) over a 2-pin terminal block
Consumption	150 mA @ 12V
Transceivers	10BASE-T1S: LAN8670 10/100BASE-TX: LAN9355 CAN: MCP2562FD
LEDs	5x Dual-colour LED 2x ETH LEDs (RJ-45 connector) 1x Power LED
Buttons and switches	10x DIP switches 1x Switch (T1S termination) 1x Push button
I/O	1x Analogue input (0-30 V) 1x Digital output (low-side, 2 A)
MCU	STM32H7 (1 MB Flash, 564 KB RAM)
Mechanical	
Connectors	10BASE-T1S, CAN bus and power: D-SUB 9 Male 100BASE-TX: RJ-45 Power: 2-pin removable terminal block USB: USB Type-C
Dimensions (L x W x H)	88 x 82 x 33 mm
Weight	142 g
Operating temperature	-20 to 70 °C
Enclosure	Aluminium profile
Protection	IP20
Placement	Table (adhesive pads included) DIN-rail mount (sold separately)

Table 1 Technical specification

5 Device Description

5.1 Overview

The Media Gateway features four connectors, eight LEDs, ten DIP switches, one switch for T1S termination and one push button.

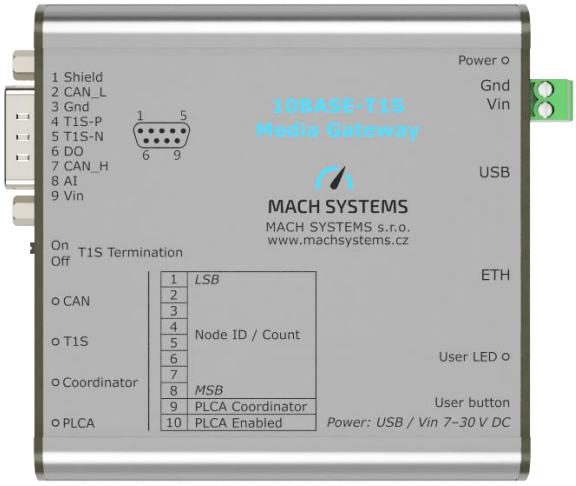


Figure 3: Top view

5.2 Block Diagram

The block diagram is depicted in Figure 4.

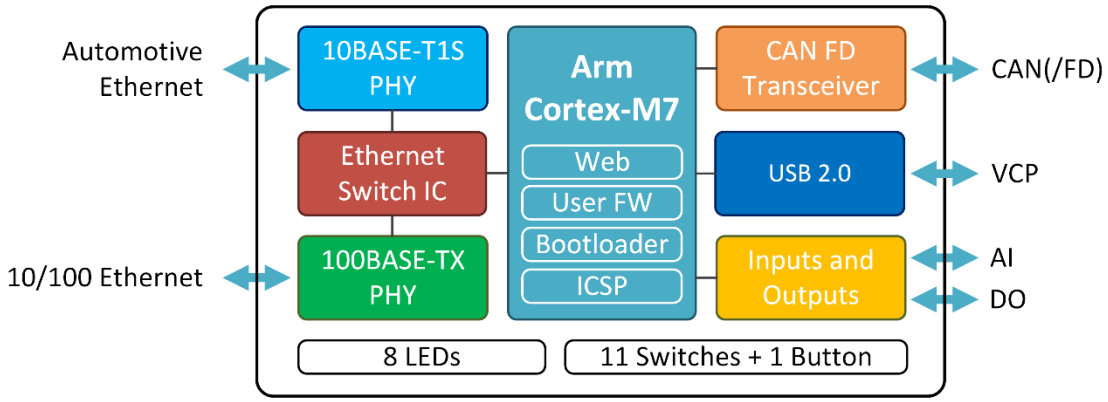


Figure 4: Block diagram

5.3 Power

The 10BASE-T1S Media Gateway can be powered over USB, or externally via a 2-pin terminal block or via the DSUB connector. The external power range is 7 - 30 V DC. All grounds are connected.

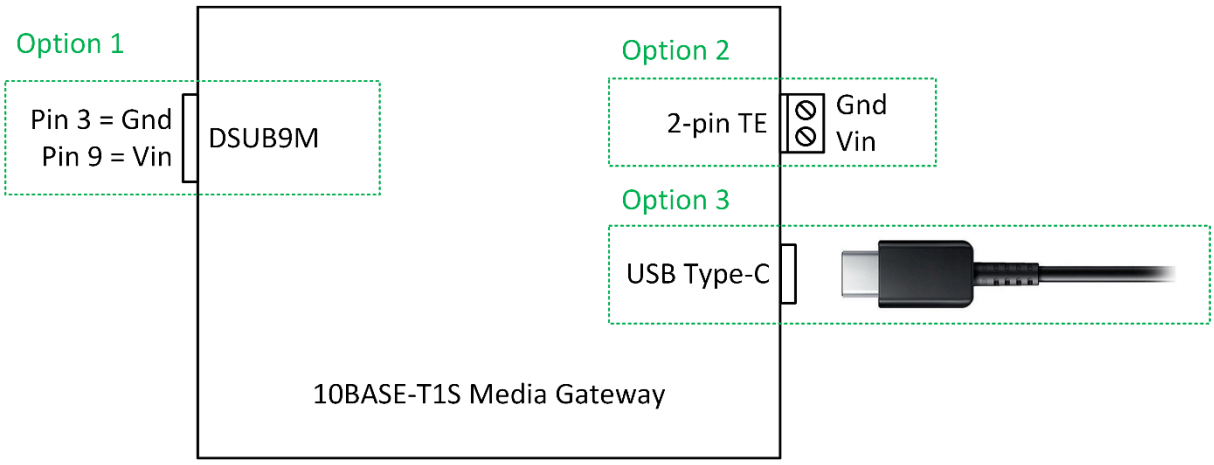


Figure 5: Power options

Figure 6 depicts the internal power block. When the external power is connected, there is no power drawn from USB.

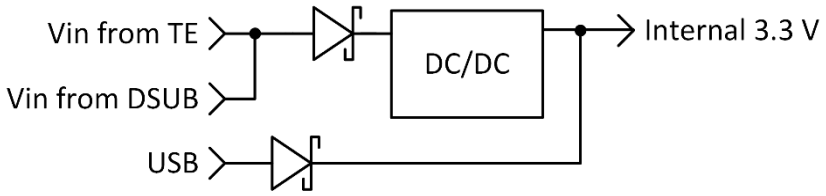
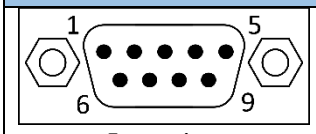


Figure 6: Power diagram

5.4 Connectors

5.4.1 D-SUB

The 9-pin DSUB9M is used for 10BASE-T1S channel, CAN(/FD), I/O and power.



Front view

Pin	Name	Description
1	Shield	Shielding connected to the conductive enclosure and connectors
2	CAN_L	CAN Low
3	Gnd	Ground
4	T1S-P	T1S Positive
5	T1S-N	T1S Negative
6	DO	Open-drain output (max. 35 V, 1A)
7	CAN_H	CAN High
8	AI	Analogue input 0-30 V
9	Vin	Power input

Table 2 D-SUB9 male connector - pin assignment

5.4.2 2-pin Terminal Block

The 2-pin terminal block (TE Connectivity p/n: 284512-2) can be optionally used for power input.

Removable mating connector p/n: 284506-2
Note: The mating connector is included in the scope of delivery.

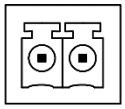
	Pin	Name	Description
 1 2 Front view	1	Vin	Power input positive (7 – 30 V DC)
	2	Gnd	Power input negative

Table 3 TE power - pin assignment

5.4.3 USB

USB Type-C connector uses the standard USB 2.0 pinout and can be used for firmware upload or as a virtual COM port (see **Chyba! Nenalezen zdroj odkazů.**).

5.5 Switches

There are 10 DIP switches for PLCA configuration. Collision avoidance mechanism is described in 0. The value of DIP switches is relevant only if PLCA is enabled (DIP 10). The function of DIP 1-8 depends on the value of DIP 9 (Node ID/Count).

Note: the configuration can also be overridden over web interface.

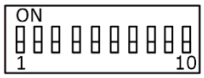
	No.	Name	Description
 Front view	1..8	Node ID/Count	Node Id or Node count function depends on switch 9. The count is represented in binary LSB first form. (If only DIP switch 1 is enable it means ID / Node count = 1). The function depends on DIP 9. When coordinator is selected the function of this switch is Node count (The node ID is automatically set to 0). When the Follower node is selected the selected function is Node ID. *Note: Relevant when PLCA is enabled.*
	9	Coordinator / Follower	On: Coordinator node Off: Follower node *Note: Relevant when PLCA is enabled.*
	10	PLCA enable	On: PLCA enabled Off: PLCA disabled
		T1S termination	Left = Termination enabled Right = Termination disabled

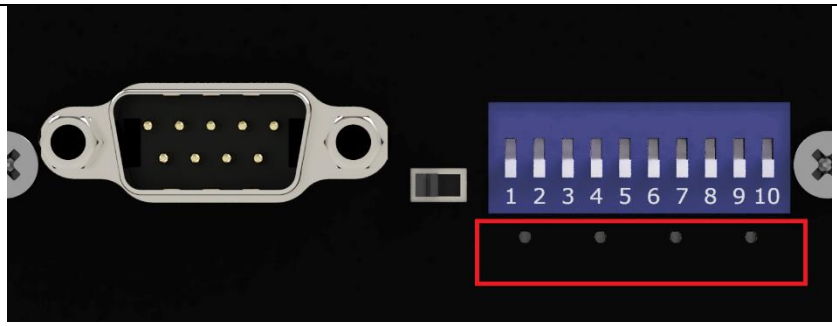
Table 4 Switches

5.6 LEDs

The 10BASE-T1S Media Gateway contains 8 status LEDs in total.

5.6.1 Front Side

4 LEDs are on the front panel below the DIP switches.

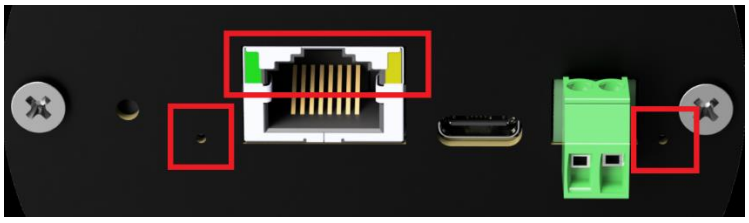


LED Name	Note
CAN Activity / Error	Green on: CAN channel on Green blinking: CAN activity Red blinking: Error frame received Red on: CAN bus error
T1S Activity	Green blinking: T1S activity Red blinking: T1S error Off: no activity
T1S Coordinator	On: T1S port is configured as coordinator Off: T1S port is configured as follower Red blinking: Wrong configuration
T1S PLCA	Green on: PLCA enable Red blinking: PLCA error Off: PLCA disable

Table 5 Status LEDs on front panel

5.6.2 Rear Side

4 LEDs are on the rear panel.



LED Name	Note
User LED	User specific function
RJ-45 Left LED	Green On: 100BASE-TX link Orange On: 10BASE-T link Off: No link
RJ-45 Right LED	Orange blinking: Ethernet activity Off: No Ethernet activity
Power LED	Green on: The device is powered Off: The device is not powered

Table 6 Status LEDs on rear panel

5.7 User Button

The push button (a tactile switch) shall be used for firmware update. If the button is held during device's power-up, the device enters the boot mode. After that, the button can be released and the firmware can be updated – see 6.4.4. To enter the normal operation, the device should be powered off and on.

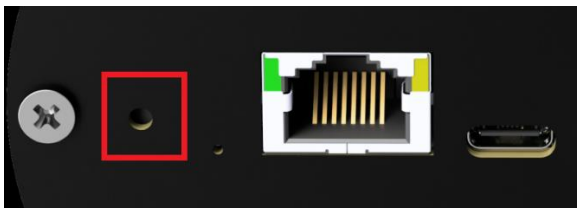


Figure 7: User button

5.8 CAN Bus Termination

There are no internal CAN bus termination resistors inside the device. Therefore, the user has to make sure the CAN bus is properly terminated at both ends of the network.

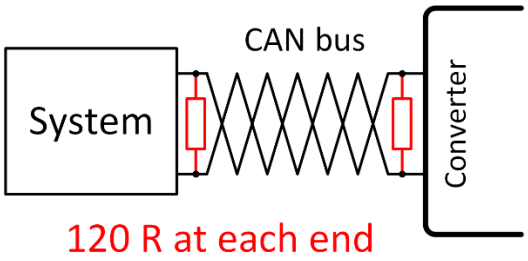


Figure 8: CAN bus termination

5.9 Galvanic Isolation

The device does **not** have any galvanic isolation. All ground signals are connected. The user has to make sure there are no ground loops in his setup.

6 Usage

6.1 Quick Start

The **10BASE-T1S Media Gateway** can be easily used like this:

- **Connect your cable** to the D-SUB connector (10BASE-T1S) and the standard Ethernet port (RJ-45 connector)
- **If PLCA shall be used, configure the following by the built-in DIP switches:**
  - Enable the PLCA by the corresponding DIP switch
  - Set the node role Follower/Coordinator by the corresponding DIP switch
  - Set the node ID/count by the corresponding DIP switches
- **Power the device – either over:**
  - USB
  - 2-pin terminal block
  - D-SUB
- **For detailed status information and advanced configuration, access the device's embedded web server** (default IP: 192.168.1.100)

6.2 Media Gateway

The 10BASE-T1S Media Gateway can realize the connection between a half-duplex 10BASE-T1S Ethernet port, 10BASE-T/100BASE-TX port, and CAN(/FD) bus. The Ethernet-CAN(/FD) Gateway functionality, that also includes the 10BASE-T1S - CAN(/FD) bridge, is described in 6.4.4 CAN Configuration.

The conversion from 10BASE-T1S to 10/100BASE-TX is done through the internal Ethernet switch. Because the 10BASE-T1S network is half-duplex, access to the physical medium is managed by the CSMA/CD mechanism or the Physical Layer Collision Avoidance (PLCA). The 10BASE-T1S PHY supports multidrop mixing segments up to at least 25m with up to at least 8 PHYs – Half-duplex point-to-point link segments up to at least 15m. All Ethernet packets received from any of the Ethernet ports are handled by the Ethernet switch.

6.3 PLCA

Physical Layer Collision Avoidance (PLCA) improves a CSMA/CD to prevent collisions among half-duplex stations, enhancing network efficiency. Each node within the network segment, or collision domain, receives a unique Local ID. Transmit opportunities are granted sequentially based on these IDs. The node with Local ID = 0 acts as the PLCA coordinator, transmitting periodic synchronizing BEACON signals onto the physical media. Other nodes, referred to as PLCA followers, synchronize with the coordinator's beacon signal. Nodes detect their assigned transmit opportunities by counting the number of opportunities since the last BEACON transmission. They may then transmit or yield. After each transmission, the opportunity passes to the next node. PLCA ensures fairness in multi-drop topologies, preventing one node from monopolizing transmission.

In multi-drop environments where PLCA allows only one transmit opportunity per node per cycle, can some applications face significant delays when sharing the channel with nodes transmitting large packets. Burst mode allows nodes to transmit more than one packet during its transmit opportunity. This preventing latency from exceeding acceptable limits. Configuration options, including Maximal Burst Count and Burst Timer, allow to customize burst transmission behaviour, ensuring efficient use of the network while meeting latency requirements.

6.4 Embedded Web Server

A build-in webserver is available on the device enabling to access the device from web browser. This can be used for configuration and control of the device. This chapter describes the web interface in detail.

Default IP address: **192.168.1.100**.

There is a navigation panel on top:

Figure 9: Webserver top menu

At the bottom of all the pages, there is a link to a help page that shortly describes all the available pages.

Note: The web interface has been tested with the Chrome browser. Use of the web interface with other browsers is not recommended and may lead to unexpected behaviour.

6.4.1 Device Settings Page

The device settings page lists the basic information about the device, such as product number, serial number, MAC address, firmware version and HW info.

Figure 10: Device Information

Further, the IP configuration can be viewed and modified: IP address and mask, TCP port used for protocol communication, default gateway. Settings are automatically saved to non-volatile memory when you click the “Save” button but that they **only** take effect on power up**.** The device can be restarted by Reboot button.

Last buttons in this section are for entering the USB and Web bootloaders. Entering the USB bootloader disables the web server until the device is restarted. Web bootloader is another web page on the device that allows firmware update over web browser (see below). If anything goes wrong, the device can still be flashed over USB from the STM32CubeProgrammer application.

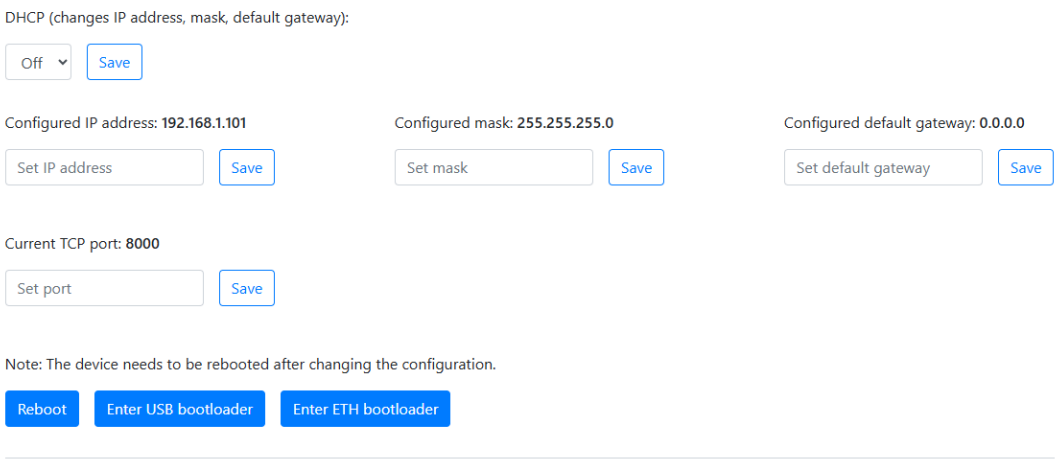


Figure 11: TCP Communication Configuration

6.4.2 10BASE-T1S Configuration

Some settings are configurable by the built-in DIP switches, but the web interface can override that. The advanced setting like burst count, maximal burst time and TO timer can be changed only here or by the communication protocol. Note that the settings are written always into the non-volatile memory only. Configuration options are described below in more detail.

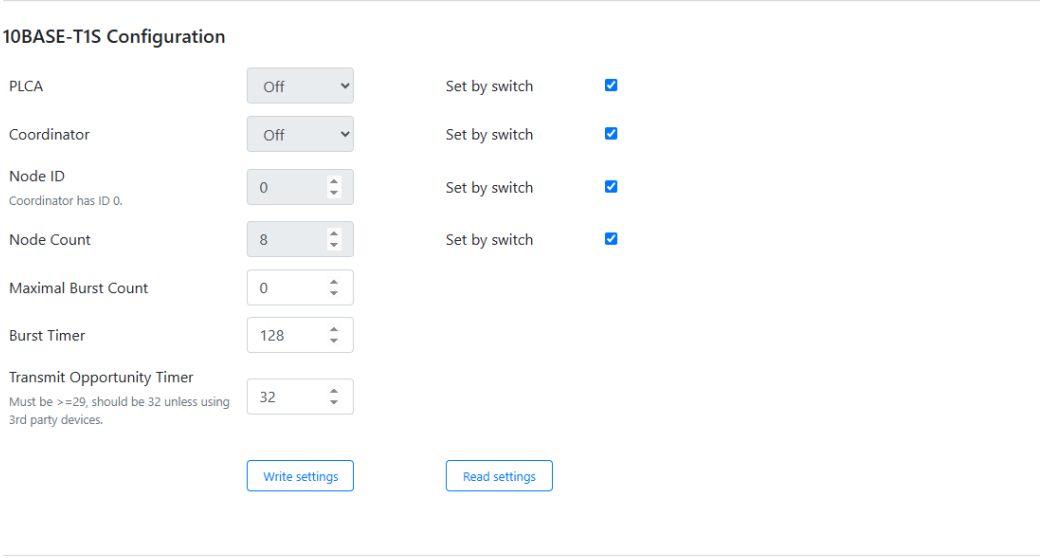


Figure 12 10BASE-T1S PLCA configuration

Parameter	Description
PLCA	Enable the Physical Layer Collision Avoidance which operates in conjunction with a CSMA/CD to actively avoid collisions among half-duplex nodes and allowing for greater network utilization.
Coordinator	Select if the node is in coordinator or follower role. The role of the coordinator is to transmit a periodic synchronizing BEACON onto the physical media. The follower follows the synchronization of the coordinator. There can only be one coordinator in network.
Node ID	Select the ID of node. The coordinator has always the Node ID of 0.
Node Count	Specifies the number of nodes in network.

Maximal Burst Count	Configures the maximum number of additional packets allowed to transmit in each of the node's transmit opportunities.
Burst Timer	Configures the amount of time the node may transmit (COMMIT) to maintain a hold on its current transmit opportunity after transmitting a packet to allow the MAC to transmit an additional packet.
Transmit opportunity timer	The time allocated for each transmission opportunity must be uniform across all nodes within the PLCA collision domain to ensure synchronization among them. The default transmission opportunity timer value is 3.2 µs (equivalent to a value of 32, the values are input in tenths of a microsecond). Altering this value should only be done under special circumstances.

Table 7 10BASE-T1S PLCA configuration description

6.4.3 Ethernet Diagnostic

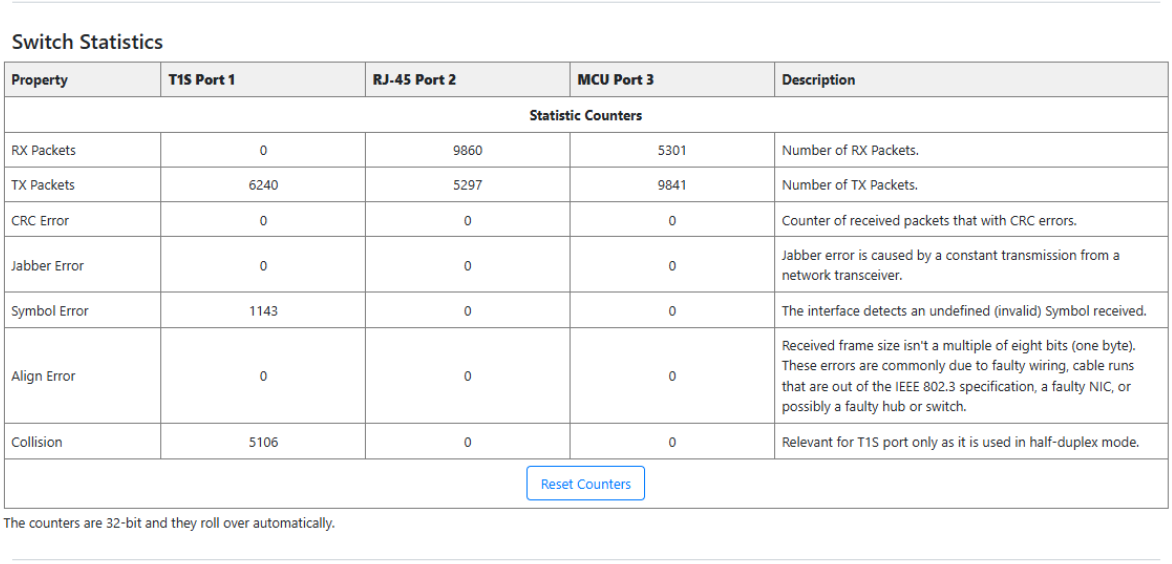
The Ethernet diagnostic page is divided into two tables. The first table displays 10BASE-T1S statistics, including signal quality and various error metrics. Error flags indicate that an event has occurred, and they can be reset if triggered. Additionally, this section enables users to run cable tests or configure the test mode.

10BASE-T1S Diagnostic

Property		Description
Signal Quality	?	Signal quality indicator: 0. worse than class A SQI (unstable link) 1. class A SQI (unstable link) 2. class B SQI (unstable link) 3. class C SQI (good link) 4. class D SQI (good link; bit error rate < 1e-10) 5. class E SQI (good link) 6. class F SQI (very good link) 7. class G SQI (very good link)
Connection Error flags		
5B Decode Error	?	This flag indicates the 5B decoder encountered an unknown or reserved 5B codeword that could not be decoded.
End-of-Stream Delimiter Error	?	This flag indicates the reception of an End-of-Stream Delimiter Error (ESDERR) or End-of-Stream Jabber (ESDJAB) symbol.
Transmit Collision Status	?	Physical collision on the network was detected. This does not include logical collisions due to normal operation of PLCA.
Unexpected Carrier Sense	?	When operating in ACMA mode, this flag will indicate carrier sense during this PHY's transmit slot when ACMA is asserted
Transmit Jabber Status	?	This flag indicates the occurrence of a transmit jabber condition. A jabber condition occurs when the PHY detects that the PCS has remained in the transmit state longer than 2 ms. When a jabber condition is detected, the transmitter is disabled for the duration of 16 ms.
Reset Connection Error Flags		
PLCA flags		
BEACON Received Before Transmit Opportunity	?	This flag indicates the detection of a BEACON before the node's assigned transmit opportunity. This condition could indicate the configuration of multiple PLCA coordinators on the segment. Other conditions that may cause this to occur include a PLCA coordinator with an incorrectly configured maximum node count resulting in a PLCA cycle that is too short, or a PLCA Local ID that is configured beyond the PLCA cycle.
Unexpected BEACON Received	?	When configured as the PLCA coordinator in charge of transmitting the periodic coordinating BEACONs, this flag indicates the detection of an unexpected BEACON on the segment. This condition may be due to the configuration of multiple PLCA coordinators on the segment.
Receive in Transmit Opportunity	?	This flag indicates the detection of another node transmitting in this node's local assigned transmit opportunity. This could indicate multiple nodes being assigned the same Local ID.
PLCA Symbols Detected	?	This flag indicates the detection of PLCA BEACON symbols when PLCA is not enabled. This condition may indicate the local node is operating with PLCA disabled on a segment with PLCA enabled nodes.
Reset PLCA Flags		
Testing		
T1 test mode	No Mode	Can be used to generate Test symbols on the 10BASE-T1S channel.
Cable Test	Test result: ? Run Cable Test	Cable test can diagnose open circuit or short circuit on T1 cable.

Figure 13 10BASE-T1S diagnostic table

The second table presents the Ethernet switch statistics. The switch inter-connects the 10BASE-T1S port, MCU, and 10/100BASE-TX port. The counters are 32-bit and will roll over when they reach their maximum value.



Switch Statistics

Property	T1S Port 1	RJ-45 Port 2	MCU Port 3	Description
Statistic Counters				
RX Packets	0	9860	5301	Number of RX Packets.
TX Packets	6240	5297	9841	Number of TX Packets.
CRC Error	0	0	0	Counter of received packets that with CRC errors.
Jabber Error	0	0	0	Jabber error is caused by a constant transmission from a network transceiver.
Symbol Error	1143	0	0	The interface detects an undefined (invalid) Symbol received.
Align Error	0	0	0	Received frame size isn't a multiple of eight bits (one byte). These errors are commonly due to faulty wiring, cable runs that are out of the IEEE 802.3 specification, a faulty NIC, or possibly a faulty hub or switch.
Collision	5106	0	0	Relevant for T1S port only as it is used in half-duplex mode.

Reset Counters

The counters are 32-bit and they roll over automatically.

Figure 14 Ethernet switch diagnostic

6.4.4 CAN Configuration

The first section allows to configure the CAN bus parameters like mode, baud rates and sample points. When the data baud rate of 8M is selected, the arbitration baud rate should be set to 1M. For the data baud rate of 4M, the data sample point is rounded to lower multiple of 5 %. For the data baud rate of 8M, data sample point is rounded to lower multiples of 10%.

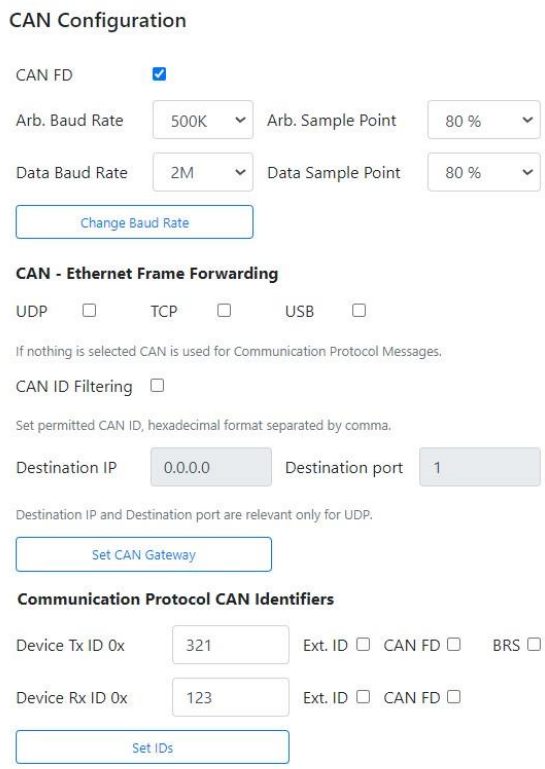


Figure 15: CAN Configuration

CAN bus can be routed to the devices connected over Ethernet or USB. The set of the CAN to Ethernet forwarding can be found in the second section. In the first row, you can set up the protocol by which the messages are transmitted. The message format and the way how to send the CAN message by these protocols are described in the 10BASE-T1S Media Gateway Communication Protocol Specification [1]. If no protocol is selected the CAN messages are used for device configuration.

The CAN frame forwarding can be restricted to permitted CAN IDs set up in CAN ID Filtering, following a format consisting of a hexadecimal number with a leading "0x" separated by commas.

6.4.5 I/O Read and Write

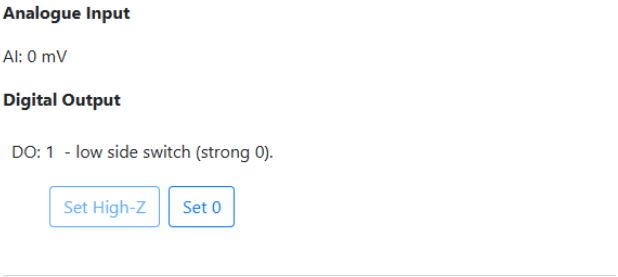


Figure 16: I/O Status

Input values are in millivolts and are automatically updated (read from device) every second. There may be some inaccuracy in the analogue readings.

Digital output is a low-side switch (open-drain) and can be set to 0 (shorts the pin to GND) or set to 1 (released).

6.5 Firmware Update

The device comes with an embedded web bootloader.

Further, the STM32H7 contains a system bootloader that is pre-programmed in ROM during manufacture. It supports loading over USB (**System bootloader**); it is not normally used.

Please note that Web bootloader has reserved the first flash sector (0x8000000 to 0x801FFFF). Binary firmware is loaded at address 0x8020000 onwards.

6.5.1 Web Bootloader

With web bootloader, new firmware can be easily uploaded to the device with only a web browser. No additional software is needed. Recommended web browser for firmware upload is Google Chrome. After entering the web bootloader, the page in Figure 17: Web bootloader is shown. Users can select a file with firmware and upload it, switch to the system bootloader or go back to the application. The file with firmware must be in binary format (.bin).

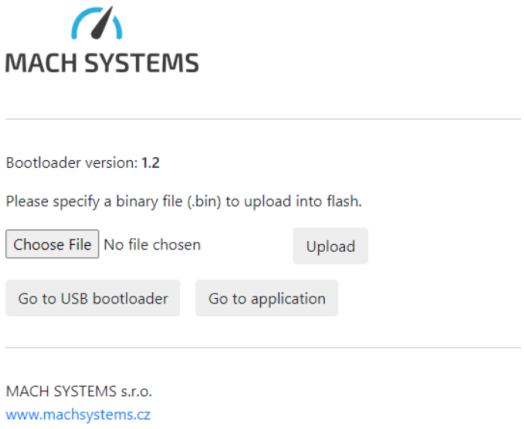
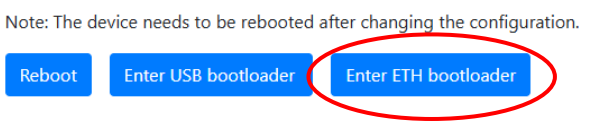


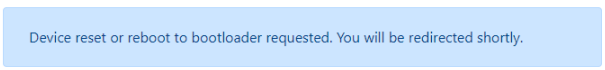
Figure 17: Web bootloader

There are four ways to enter the Web bootloader:

- **Internet browser:** See above for description on the web server, that is running on the device. Simplest way to enter the bootloader is by clicking “Enter ETH bootloader” on the website title page:



Intermediate loading page will be shown:



Device will then reboot to bootloader and user is redirected to its page. Binary file can be loaded.

- **Transmit a protocol message:** Web bootloader can be started using MACH SYSTEMS's communication protocol with appropriate message ID (0xFE). See Communication Protocol Specification for more information.

- **By user button:** The steps for booting into the bootloader are following.
  - Disconnect the USB and the external power supply so that the device is powered off
  - Press and hold the User button on the side panel
  - Connect the power supply - either USB or external
  - The device will enter the web bootloader
  - Release the button
  - Connect the Ethernet cable
  - Firmware can be flashed
- **Programmatically from application:** If the user wants to develop a custom device firmware, he can jump to the address of web bootloader (0x8000000) from his firmware.

6.5.2 System Bootloader

The STM32 system bootloader allows to flash the MCU over USB, and shall be used in special case **only** when agreed with MACH SYSTEMS.

The STM32CubeProgrammer application is used to flash firmware into the device. The application is available from [2]. The application shall be installed before plugging the device into the computer.

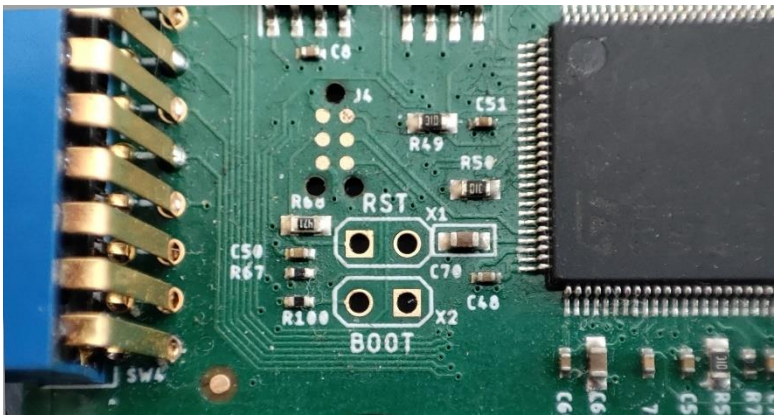


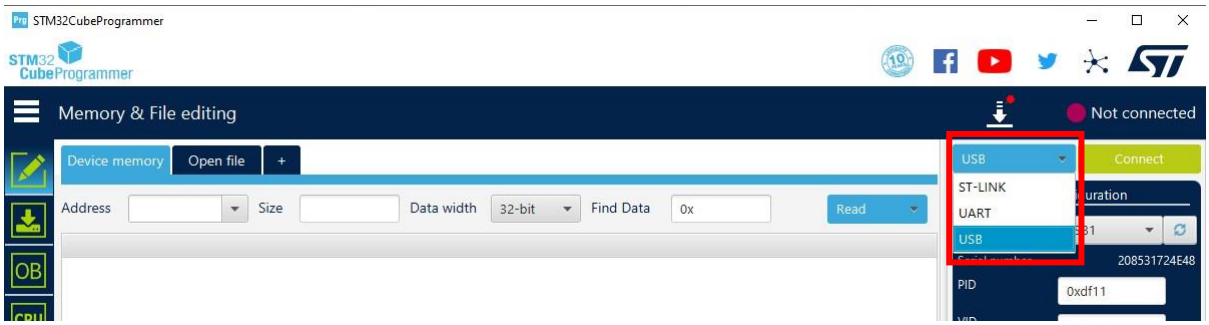
Figure 18 Boot-enabled pads

The device contains a system bootloader which is pre-programmed in ROM during manufacture. The steps for **entering the bootloader**:

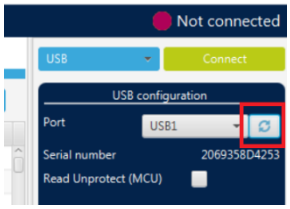
- Disconnect the USB and the external power supply so that the device is powered off
- Open the enclosure
- Short the BOOT pads together (a pair of tweezers can be used)
- The device will enter the System bootloader
- Connect the USB cable
- Release the boot pads
- Firmware can be flashed
- Close the enclosure

Steps for firmware update:

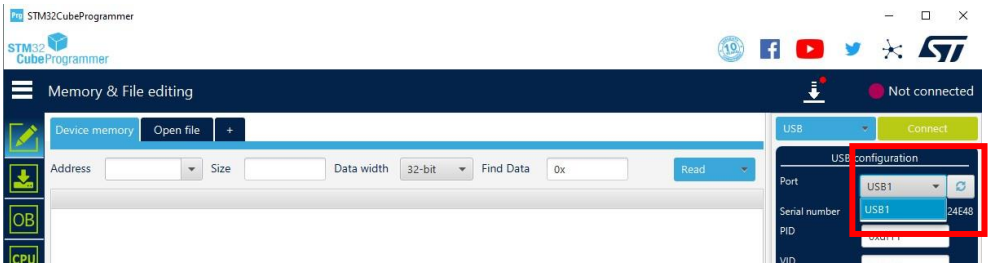
1. Open the *STM32CubeProgrammer* application (see download link above)
2. Turn the device off
3. Enter the system bootloader as described above
4. In the *STM32CubeProgrammer*:
    a. Select the USB interface from drop-down



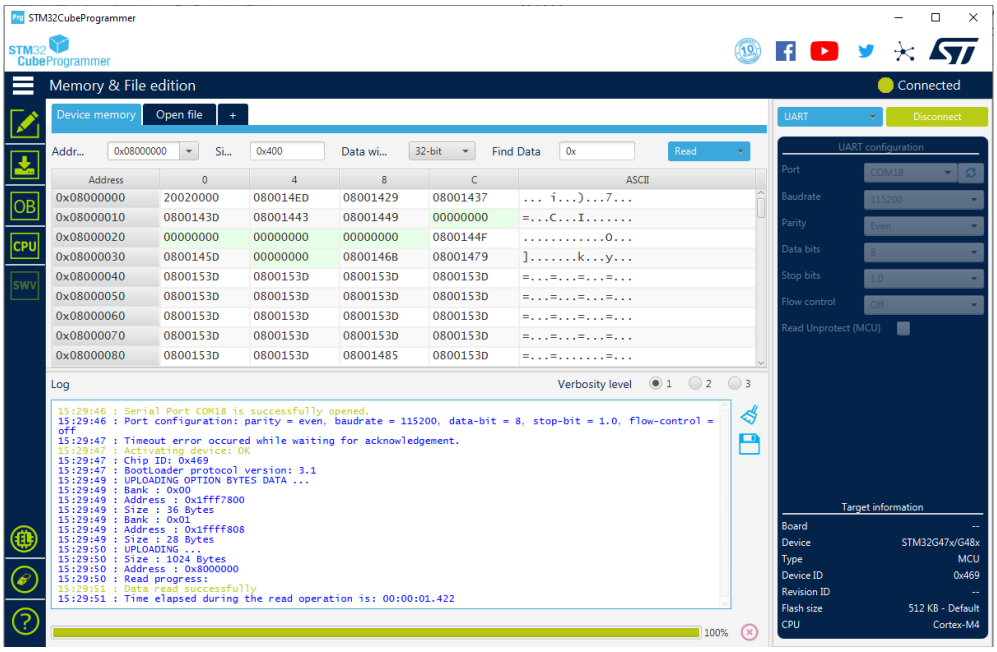
    b. Click on the refresh arrows button to see available ports



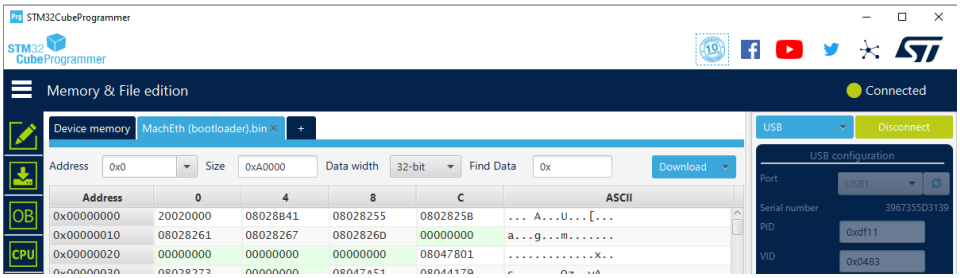
    c. Select the correct port



    d. Click connect. You will see a screen similar to this one. The device's bootloader is connected to the PC.



5. In order to flash a new firmware, open an .elf file by „Open file“ button and press the „Download“ button. A .bin file can be used also but the Address of 0x8000000 has to be chosen manually.



The device shall be powered off in order to exit the bootloader mode.

7 Legal Information

7.1 Usage Warning

WARNING FOR ALL USERS

WARNING! - YOUR USE OF THIS DEVICE MUST BE DONE WITH CAUTION AND A FULL UNDERSTANDING OF THE RISKS!

THIS WARNING IS PRESENTED TO INFORM YOU THAT THE OPERATION OF THIS DEVICE MAY BE DANGEROUS. YOUR ACTIONS CAN INFLUENCE THE BEHAVIOR OF A DISTRIBUTED EMBEDDED SYSTEM, AND DEPENDING ON THE APPLICATION, THE CONSEQUENCES OF YOUR IMPROPER ACTIONS COULD CAUSE SERIOUS OPERATIONAL MALFUNCTION, LOSS OF INFORMATION, DAMAGE TO EQUIPMENT, AND PHYSICAL INJURY TO YOURSELF AND OTHERS. A POTENTIALLY HAZARDOUS OPERATING CONDITION IS PRESENT WHEN THE FOLLOWING TWO CONDITIONS ARE CONCURRENTLY TRUE: THE PRODUCT IS PHYSICALLY INTERCONNECTED TO A REAL DISTRIBUTED EMBEDDED SYSTEM; AND THE FUNCTIONS AND OPERATIONS OF THE REAL DISTRIBUTED EMBEDDED SYSTEM ARE CONTROLLABLE OR INFLUENCED BY THE USE OF THE CAN NETWORK. A POTENTIALLY HAZARDOUS OPERATING CONDITION MAY RESULT FROM THE ACTIVITY OR NON-ACTIVITY OF SOME DISTRIBUTED EMBEDDED SYSTEM FUNCTIONS AND OPERATIONS, WHICH MAY RESULT IN SERIOUS PHYSICAL HARM OR DEATH OR CAUSE DAMAGE TO EQUIPMENT, DEVICES, OR THE SURROUNDING ENVIRONMENT.

WITH THIS DEVICE, YOU MAY POTENTIALLY:

- CAUSE A CHANGE IN THE OPERATION OF THE SYSTEM, MODULE, DEVICE, CIRCUIT, OR OUTPUT.
- TURN ON OR ACTIVATE A MODULE, DEVICE, CIRCUIT, OUTPUT, OR FUNCTION.
- TURN OFF OR DEACTIVATE A MODULE, DEVICE, CIRCUIT, OUTPUT, OR FUNCTION.
- INHIBIT, TURN OFF, OR DEACTIVATE NORMAL OPERATION.
- MODIFY THE BEHAVIOR OF A DISTRIBUTED PRODUCT.
- ACTIVATE AN UNINTENDED OPERATION.
- PLACE THE SYSTEM, MODULE, DEVICE, CIRCUIT, OR OUTPUT INTO AN UNINTENDED MODE.

ONLY THOSE PERSONS WHO:

(A) ARE PROPERLY TRAINED AND QUALIFIED WITH RESPECT TO THE USE OF THE DEVICE,

(B) UNDERSTAND THE WARNINGS ABOVE, AND

(C) UNDERSTAND HOW THIS DEVICE INTERACTS WITH AND IMPACTS THE FUNCTION

AND SAFETY OF OTHER PRODUCTS IN A DISTRIBUTED SYSTEM AND THE APPLICATION FOR WHICH THIS DEVICE WILL BE APPLIED, MAY USE THE DEVICE.

PLEASE NOTE THAT YOU CAN INTEGRATE THIS PRODUCT AS A SUBSYSTEM INTO HIGHER-LEVEL SYSTEMS. IN CASE YOU DO SO, MACH SYSTEMS s.r.o. HEREBY DECLARES THAT MACH SYSTEMS s.r.o.'s WARRANTY SHALL BE LIMITED TO THE CORRECTION OF DEFECTS, AND MACH SYSTEMS s.r.o. HEREBY EXPRESSLY DISCLAIMS ANY LIABILITY OVER AND ABOVE THE REFUNDING OF THE PRICE PAID FOR THIS DEVICE, SINCE MACH SYSTEMS s.r.o. DOES NOT HAVE ANY INFLUENCE ON THE IMPLEMENTATIONS OF THE HIGHER-LEVEL SYSTEM, WHICH MAY BE DEFECTIVE.

7.2 Disposal and Recycling Information

When this product reaches its end of life, please dispose of it according to your local environmental laws and guidelines.

7.3 Declaration of Conformity

MACH SYSTEMS

EU Declaration of Conformity (DoC)

We

Company Name	MACH SYSTEMS s.r.o.		
Postal Address	Pocernicka 272/96	**City**	Prague
Postcode	108 00	**Country**	Czech Republic

declare that the DoC is issued under our sole responsibility and belongs to the following product:

10BASE-T1S Media Gateway

Objects of the declaration:

Product	Product Number
10BASE-T1S Media Gateway	10BASET1S-MG

The objects of the declaration described above is in conformity with the relevant Union harmonisation legislation:

2014/30/EU: EMC Directive
2011/65/EU + 2015/863/EU: RoHS 2 + amendment

The following harmonised standards and technical specifications have been applied:

EN 61326-1:2022-11
EN IEC 63000
EN 61000-6-3:2020

Signed for and on behalf of: MACH SYSTEMS s.r.o.

Place of issue: Prague, Czech Republic

Date of issue: December 28th 2024

Signature: _____

Name, function: Miroslav Machacek, Managing Director

MACH SYSTEMS s.r.o.
www.machsystems.cz

7.4 Patents, Copyrights and Trademarks

8 References

[1] “10BASE-T1S Media Gateway Communication Protocol Specification,” [Online]. Available: https://www.machsystems.cz/en/support.

[2] “STM32CubeProgrammer Web Site,” [Online]. Available: https://www.st.com/en/development-tools/stm32cubeprog.html.

9 Ordering Information

Product Number	Description
10BASET1S-MG	10BASE-T1S Media Gateway *(removable 2-pin terminal block included)*
DIN-BRACKET-UNI	Universal bracket for mounting many types of enclosures on a DIN rail

Table 8 Product Numbers

10 Contact

MACH SYSTEMS s.r.o.

www.machsystems.cz

info@machsystems.cz

Czech Republic

Company registration: 29413893

EU VAT number: CZ29413893