

10BASE-T1S to USB Dongle User's Manual

EVBUM2876

Introduction

The 10BASE-T1S to USB dongle is designed for two different use cases.

One use case is to connect a PC to the 10BASE-T1S network. In this case, the USB/ETH switch should be in the ON position and the pin header can be used to connect an oscilloscope/logic analyzer, which allows monitoring of the MII interface traffic. After connecting the board to a PC via the USB-C port, the 10BASE-T1S to USB connection appears as another network connection that can be used by any software.

For desired PLCA and PHY configuration onsemi's GUI may be used.

The second use case is the evaluation of the 10BASE-T1S PHY from onsemi. In this case, the USB/ETH switch should be set to OFF and the pin header should be used to connect the MAC of a host (for example a microcontroller). The 3.3 V supply can be provided via the pin header or via an LDO controller if USB is connected.

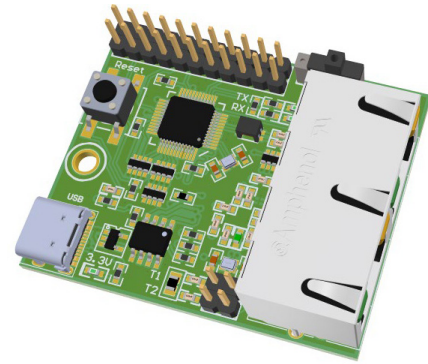


Figure 1. USB to 10BASE-T1S Picture

Features

- Easy Connection of PC to 10BASE-T1S Network
- Standard 2.54 mm Header with All MII Signals
- End Node Termination May be Connected Using Jumpers
- USB/MII Converter May be Disabled Via Switch
- Two Multipurpose LEDs
- User-Friendly GUI
- USB-C Connector

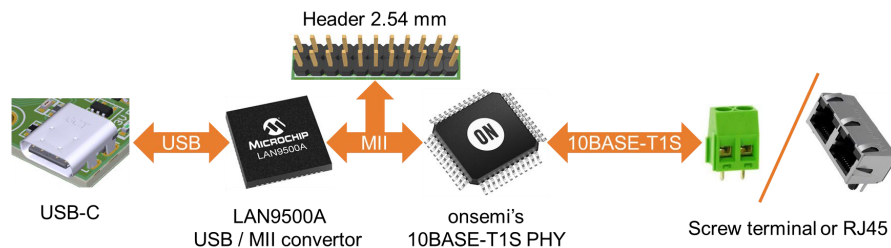


Figure 2. Basic Block Diagram

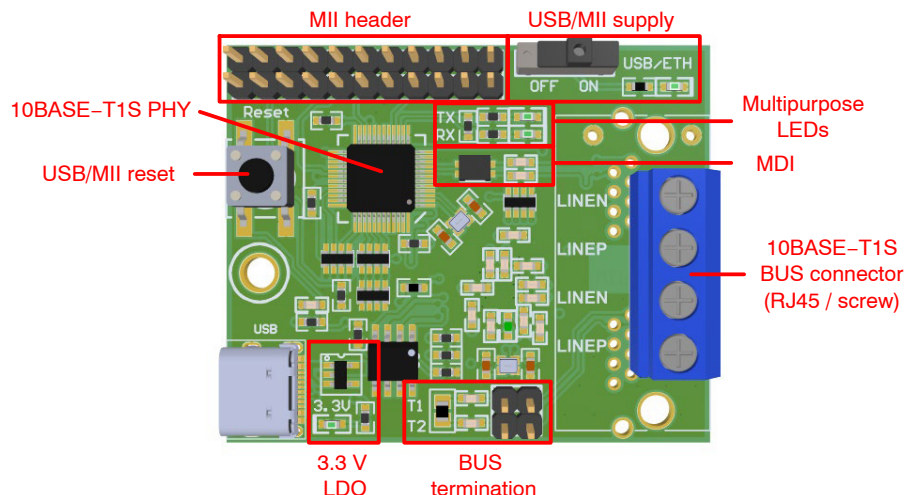
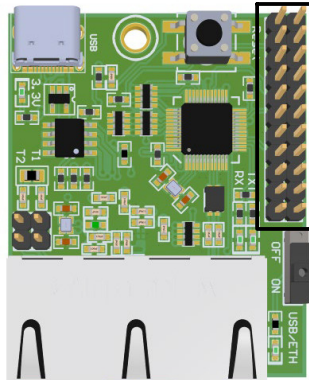


Figure 3. 10BASE-T1S to USB Top View

MII Header

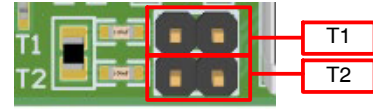
All MII signals from the PHY are routed out to the pin header, as are the 3.3 V connections that supply the PHY. These signals can be used to control the PHY if the USB/MII converter is deactivated via the USB/MII switch.



INT	RST
RX_ER	TX_ER
TX_EN	TX_0
TX_1	TX_2
TX_3	TX_CLK
RX_DV	RX_CLK
RX_0	RX_1
RX_2	RX_3
COL	CRS
MDIO	MDC
GND	3.3 V

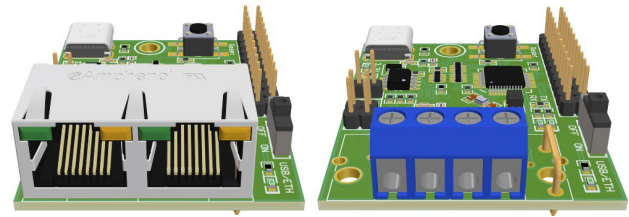
10BASE-T1S Bus Termination

There are two headers for jumpers. If the jumpers are set at positions T1 and T2, a $\sim 100\ \Omega$ termination is connected between LINEP and LINEN.

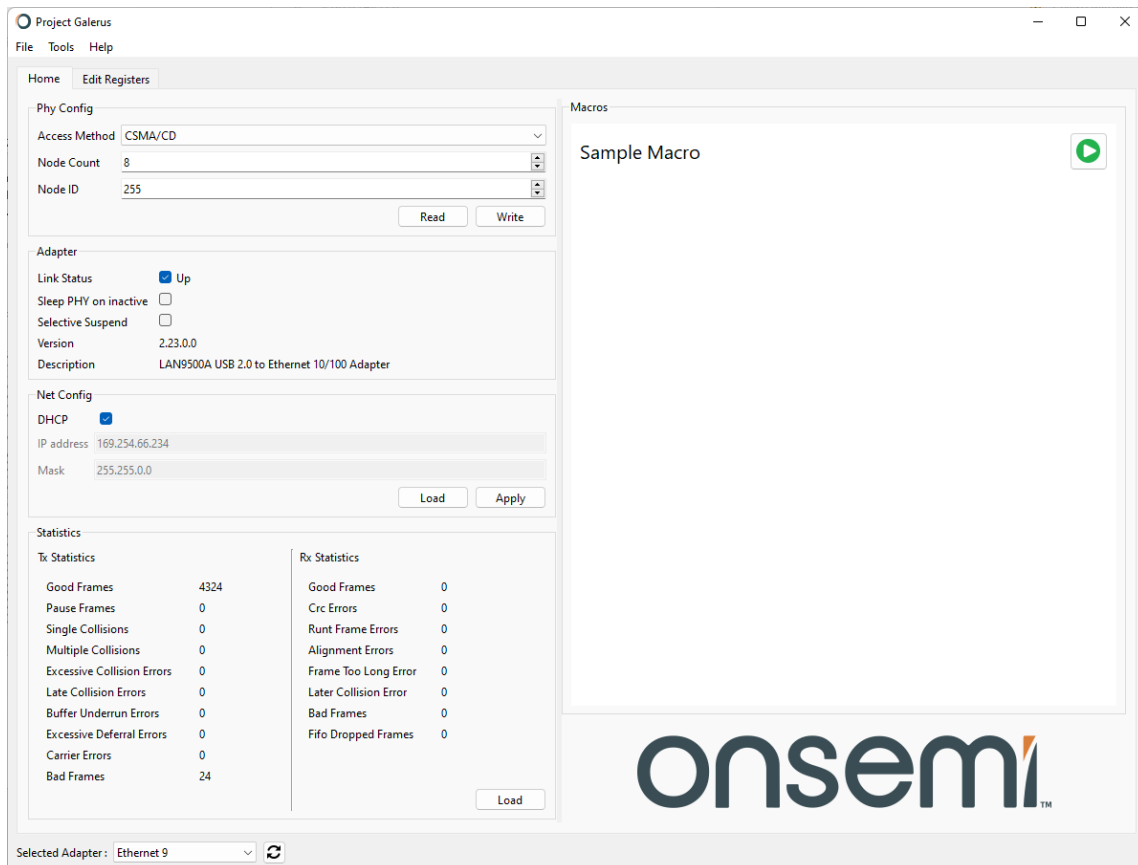


10BASE-T1S Bus Connectors

The 10BASE-T1S USB dongle can be equipped with two different pairs of bus connections: Screw connectors or RJ45. In both cases, these connector pairs are connected in parallel to the 10BASE-T1S PHY component on the PCB so that there is an electrical connection between the connectors.



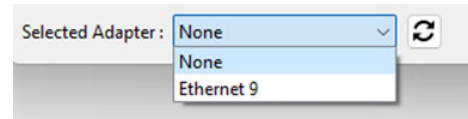
GRAPHICAL USER INTERFACE (GUI)



Adapter Selection

To work with the graphical user interface, select an adapter to be used. The list of adapters (bottom left corner of the main window) is updated regularly but can be forced to refresh by clicking a button nearby. Selecting the adapter unlocks the application tabs and loads the current configuration.

Adapter names are same as their names in the networking center section of the control panel.



MAIN WINDOW OVERVIEW

HOME TAB

PHY Config

Area for quick configuration of the PHY access method.

Adapter

Contains adapter information and allows you to set some basic adapter settings. For proper operation, the GUI must be started with the "Run as administrator" option.

Net Config

Contains adapter information and allows you to set some basic adapter settings. For proper operation, the GUI must be started with the "Run as administrator" option.

Statistics

Statistics provided by the adapter's MAC driver

Macros

List of all macros for setting the registers for predefined scenarios. The creation of macros is described in later sections. Each macro can be triggered by pressing the green Play button next to its name. If an error occurs during execution, a dialog describing the error appears.

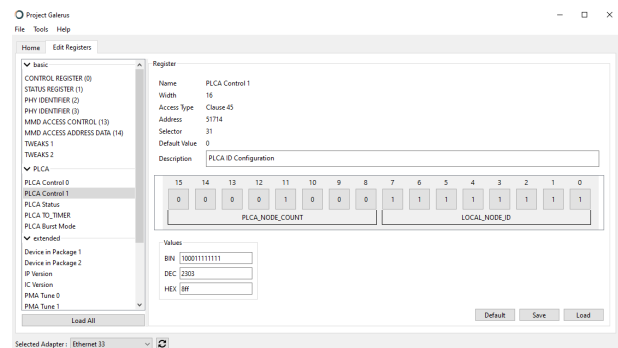
EDIT REGISTERS TAB

This tab allows configuration of the PHY registers. After selecting a register, its information and the activated functions are displayed.

The values of the individual bits can be changed by clicking on the bit buttons. If the bit is write-protected, the corresponding button is deactivated. Hovering the mouse pointer over the bit label displays a brief description of the respective configuration bit.

Values in a specific number base (BIN, DEC or HEX) can be changed by corresponding line edits. They respect the read-only bits and do not allow their value to be overwritten.

The register is only written after pressing the Save button. The register is read with the Load button. If write-protected bits are overwritten by the loading process, they can be set to zero using the Default button.



EDIT MACROS WINDOW

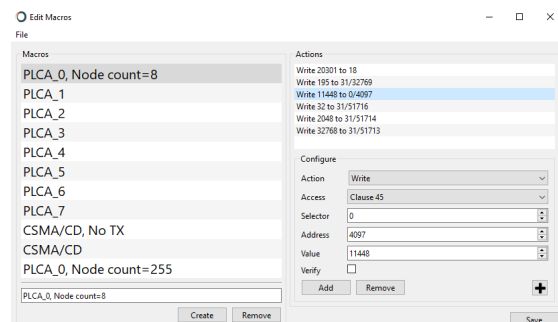
This window can be accessed via the menu bar of the main application (Tools -> Macros). It allows you to create and edit macros for quick register configuration.

Users can create a new macro by clicking on "Create". Macros can be renamed after selection by writing the new name in the "Macro name" input field.

After a macro has been selected, new actions can be added. The actions are executed in the same order in which they appear in the list. Three kinds of actions are available: Read, Write and Delay.

An action is created with the "Add" button and can be modified during selection. The possible configurations vary depending on the kind of action.

When editing is complete, the macros are saved to the default storage location using the "Save" button. If you exit the application without saving, the changes will not be saved by the application.



Action Read

Reads the value of a PHY register. If "compare" is checked, the returned value is compared with the entered value and if they do not match, an error is output. The button with the "plus" icon can be clicked to easily select a register. Clicking on bit buttons also edits the value field.

Action Write

Writes the value to the PHY register. If verify is activated, the value is read back and compared with the written value.

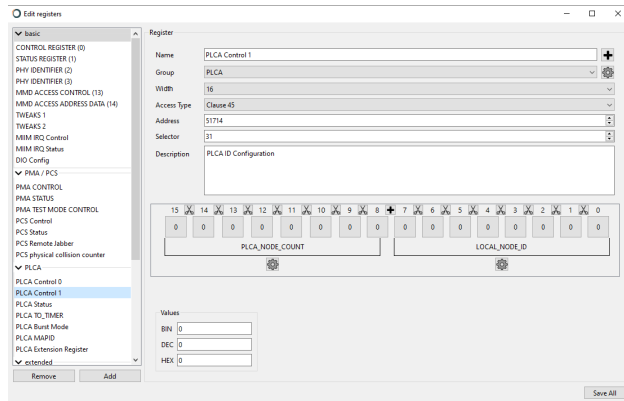
If two values do not match, an error is displayed. The other fields are the same as for the Read action.

Action Delay

Pauses the execution of macros for a certain time so that there is a delay until the next action is executed.

EDIT REGISTERS WINDOW

This window allows editing and creating of new registers. The window can be accessed from menu bar of the main application (Tools -> Registers). After selecting a register, its description can be changed.



Registers can be assembled into custom groups. Configuration of groups can be triggered by the settings button next to the Group field. If no group is present, a Default group will be created automatically.

By clicking the Plus button next to the name field, a selection window with a list of all registers is opened. By clicking Select or double clicking a register, edited register takes information from the selected register (except address, selector, and access type).

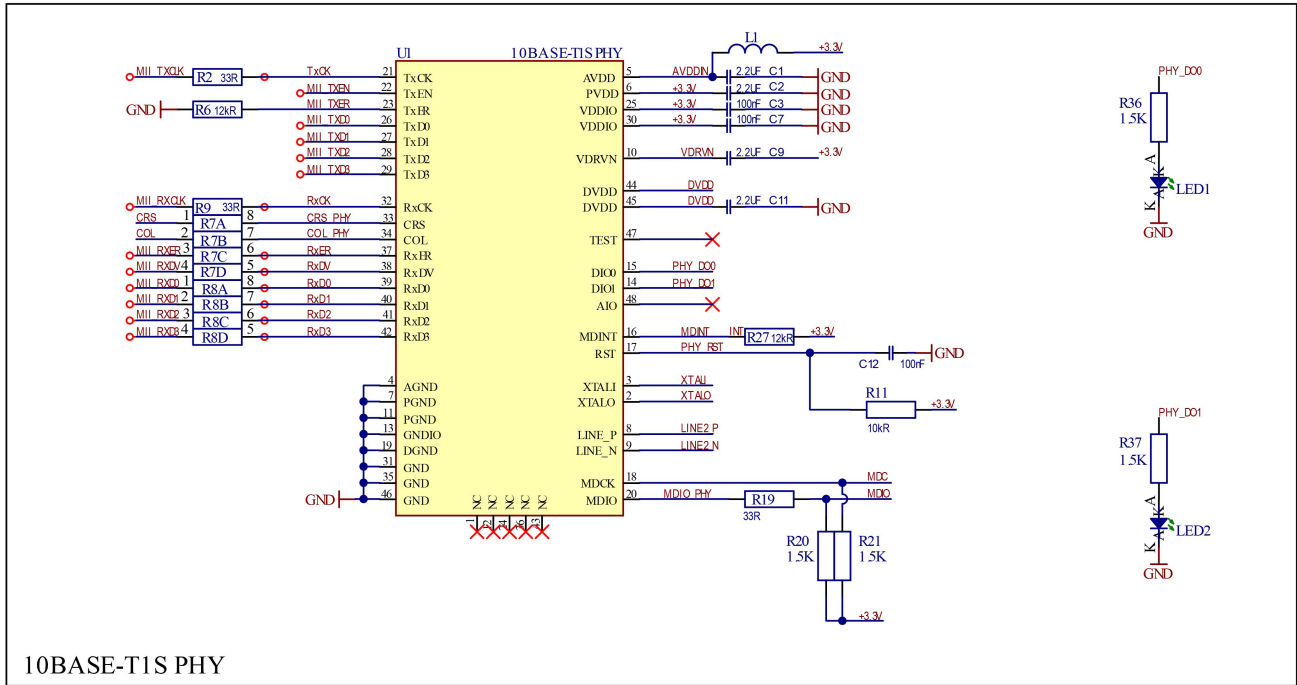
Clicking bit buttons or editing value line edits is changing default value of selected register.

Clicking settings buttons under the bit buttons will open configuration of given bit field.

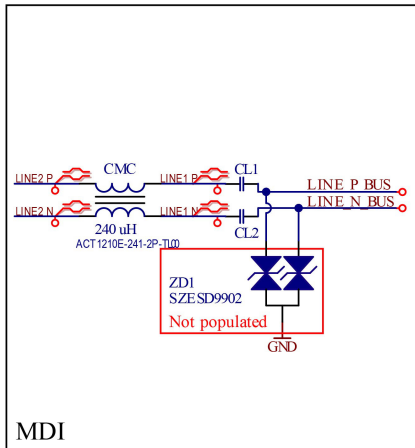
Clicking plus and cut buttons in between bit buttons will expand or cut bitfields.

No changes are written until "Save All" button is selected.

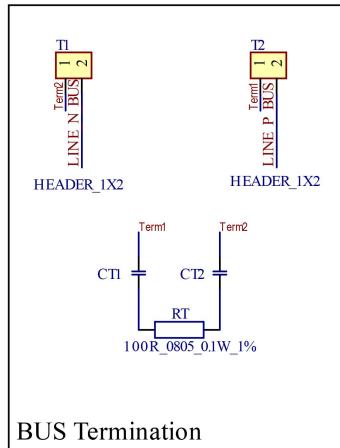
SCHEMATICS AND ASSEMBLY DRAWINGS



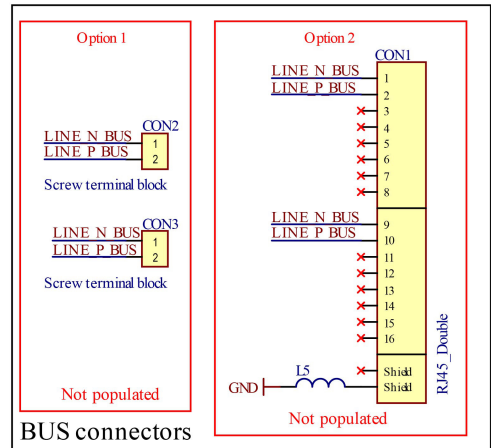
10BASE-T1S PHY



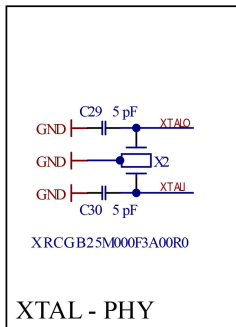
MDI



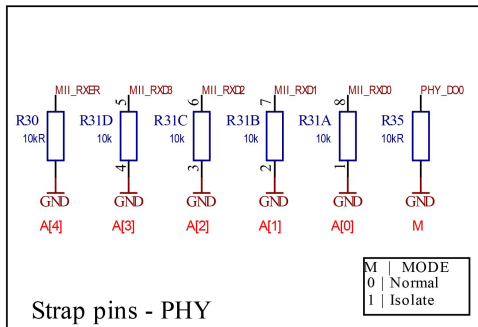
BUS Termination



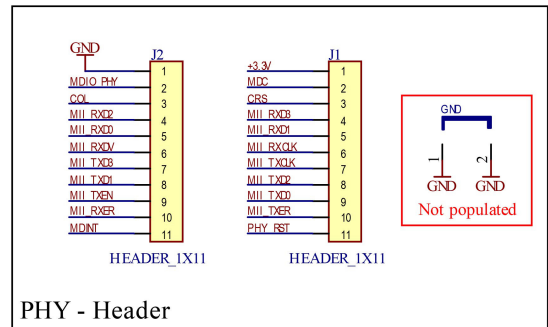
BUS connectors



XTAL - PHY

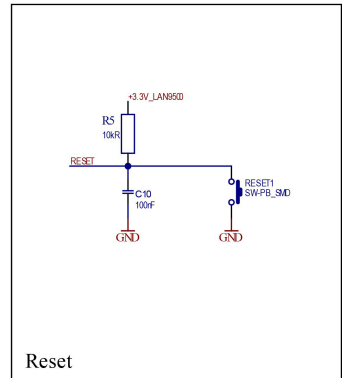
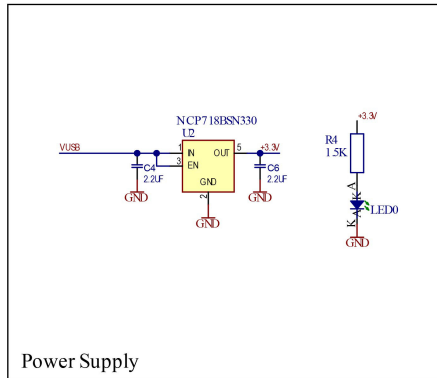
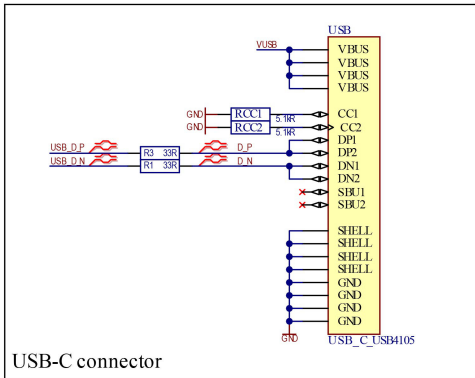
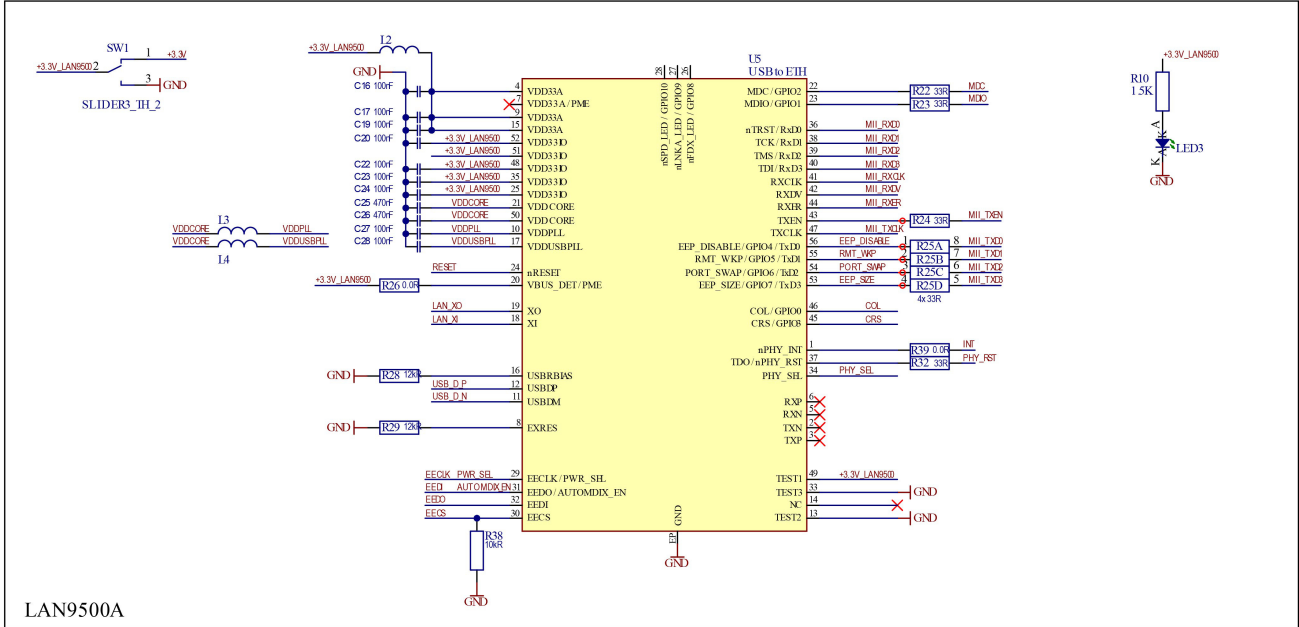
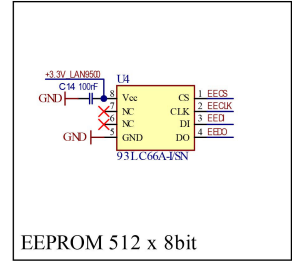
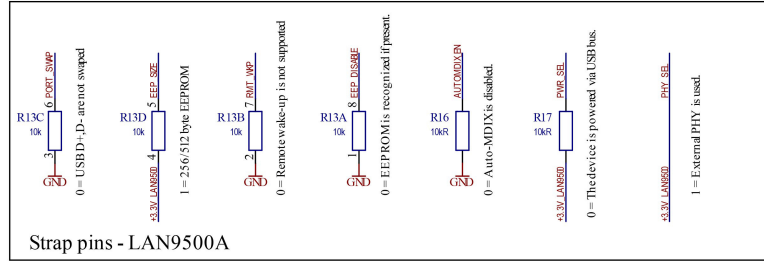
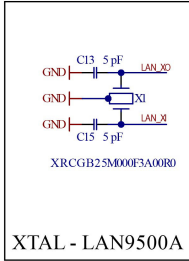


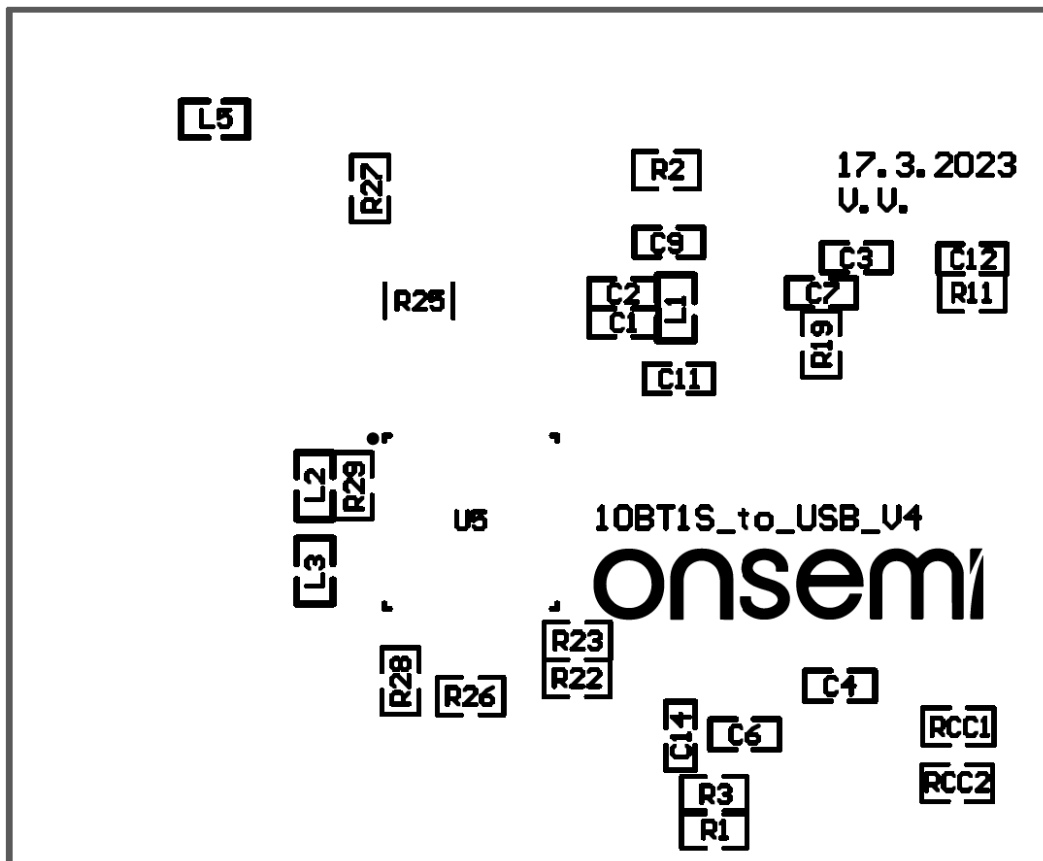
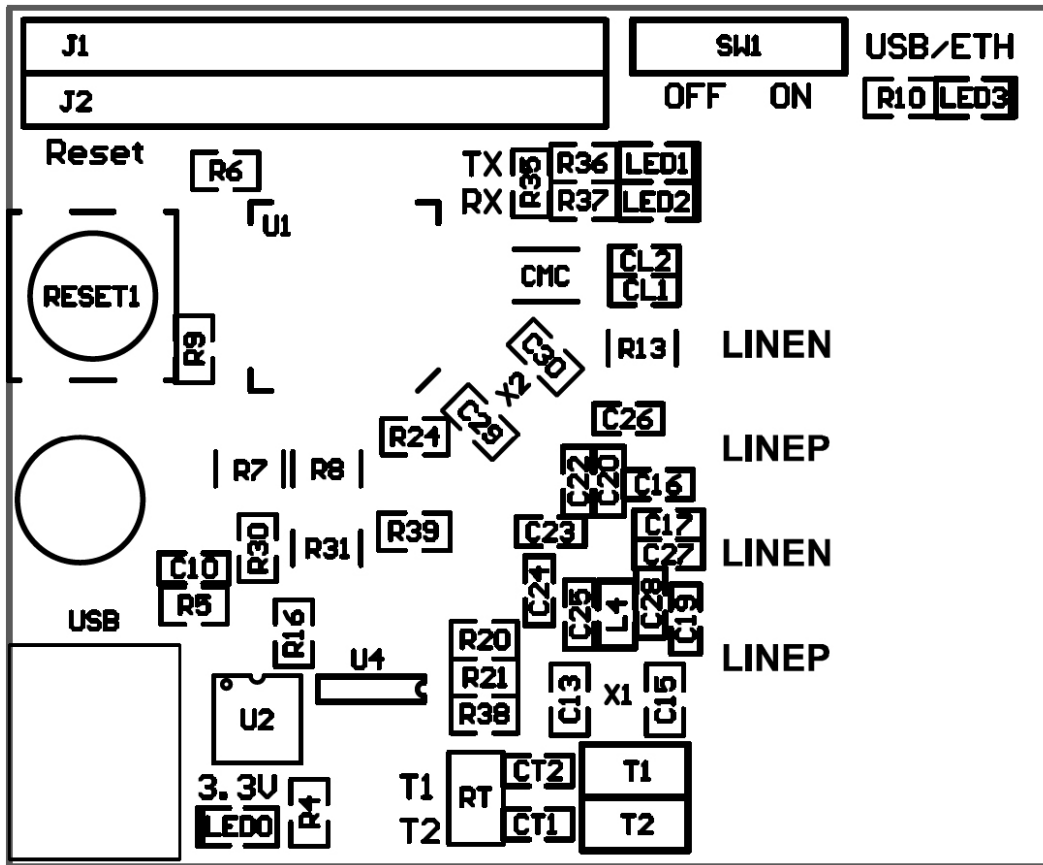
Strap pins - PHY



PHY - Header

EVBUM2876





onsemi, **onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

The evaluation board/kit (research and development board/kit) (hereinafter the "board") is not a finished product and is not available for sale to consumers. The board is only intended for research, development, demonstration and evaluation purposes and will only be used in laboratory/development areas by persons with an engineering/technical training and familiar with the risks associated with handling electrical/mechanical components, systems and subsystems. This person assumes full responsibility/liability for proper and safe handling. Any other use, resale or redistribution for any other purpose is strictly prohibited.

THE BOARD IS PROVIDED BY ONSEMI TO YOU "AS IS" AND WITHOUT ANY REPRESENTATIONS OR WARRANTIES WHATSOEVER. WITHOUT LIMITING THE FOREGOING, ONSEMI (AND ITS LICENSORS/SUPPLIERS) HEREBY DISCLAIMS ANY AND ALL REPRESENTATIONS AND WARRANTIES IN RELATION TO THE BOARD, ANY MODIFICATIONS, OR THIS AGREEMENT, WHETHER EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING WITHOUT LIMITATION ANY AND ALL REPRESENTATIONS AND WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, NON-INFRINGEMENT, AND THOSE ARISING FROM A COURSE OF DEALING, TRADE USAGE, TRADE CUSTOM OR TRADE PRACTICE.

onsemi reserves the right to make changes without further notice to any board.

You are responsible for determining whether the board will be suitable for your intended use or application or will achieve your intended results. Prior to using or distributing any systems that have been evaluated, designed or tested using the board, you agree to test and validate your design to confirm the functionality for your application. Any technical, applications or design information or advice, quality characterization, reliability data or other services provided by **onsemi** shall not constitute any representation or warranty by **onsemi**, and no additional obligations or liabilities shall arise from **onsemi** having provided such information or services.

onsemi products including the boards are not designed, intended, or authorized for use in life support systems, or any FDA Class 3 medical devices or medical devices with a similar or equivalent classification in a foreign jurisdiction, or any devices intended for implantation in the human body. You agree to indemnify, defend and hold harmless **onsemi**, its directors, officers, employees, representatives, agents, subsidiaries, affiliates, distributors, and assigns, against any and all liabilities, losses, costs, damages, judgments, and expenses, arising out of any claim, demand, investigation, lawsuit, regulatory action or cause of action arising out of or associated with any unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of any products and/or the board.

This evaluation board/kit does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and may not meet the technical requirements of these or other related directives.

FCC WARNING – This evaluation board/kit is intended for use for engineering development, demonstration, or evaluation purposes only and is not considered by **onsemi** to be a finished end product fit for general consumer use. It may generate, use, or radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment may cause interference with radio communications, in which case the user shall be responsible, at its expense, to take whatever measures may be required to correct this interference.

onsemi does not convey any license under its patent rights nor the rights of others.

LIMITATIONS OF LIABILITY: **onsemi** shall not be liable for any special, consequential, incidental, indirect or punitive damages, including, but not limited to the costs of requalification, delay, loss of profits or goodwill, arising out of or in connection with the board, even if **onsemi** is advised of the possibility of such damages. In no event shall **onsemi**'s aggregate liability from any obligation arising out of or in connection with the board, under any theory of liability, exceed the purchase price paid for the board, if any.

The board is provided to you subject to the license and other terms per **onsemi**'s standard terms and conditions of sale. For more information and documentation, please visit www.onsemi.com.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales