10BASE-T1S to USB Dongle User's Manual

EVBUM2876

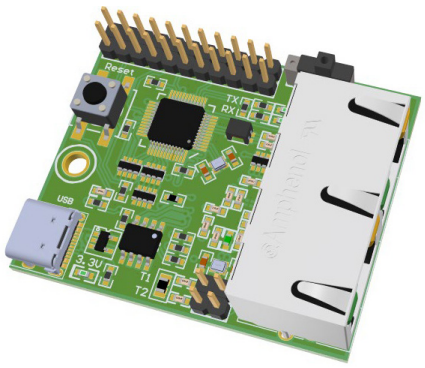


Figure 1. USB to 10BASE−T1S Picture

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.

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 Convertor May be Disabled Via Switch
- Two Multipurpose LEDs
- User−Friendly GUI
- USB−C Connector

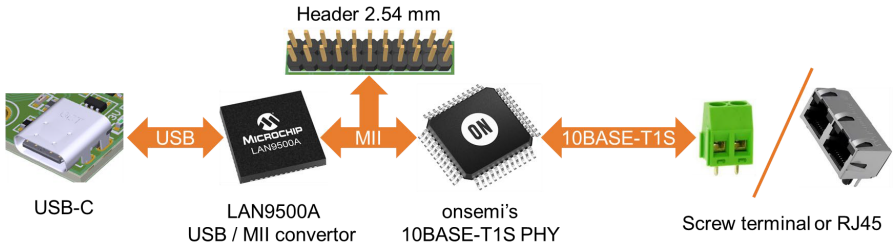


Figure 2. Basic Block Diagram

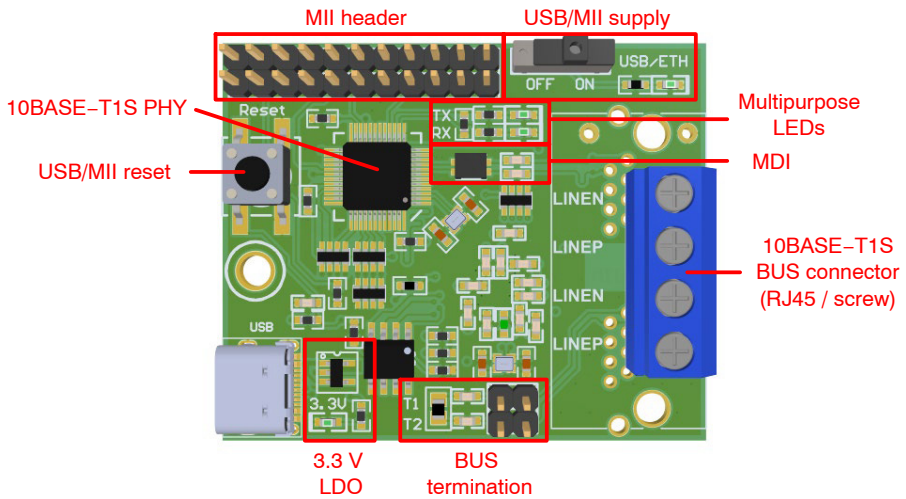
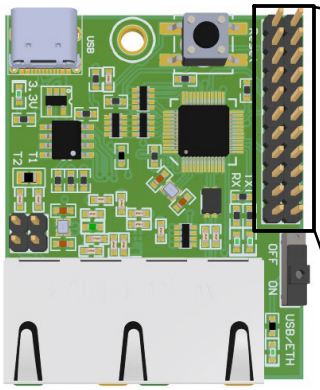


Figure 3. 10BASE−T1S to USB Top View

MII Header

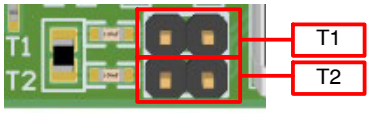
All MII signals from the PHY are routed out to the pin header, as are the 3.3 V connections that supply the PHY. These signals can be used to control the PHY if the USB/MII converter is deactivated via the USB/MII switch.



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

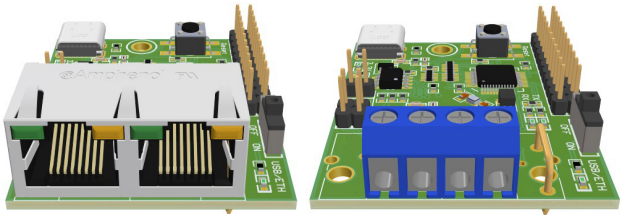
10BASE−T1S Bus Termination

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

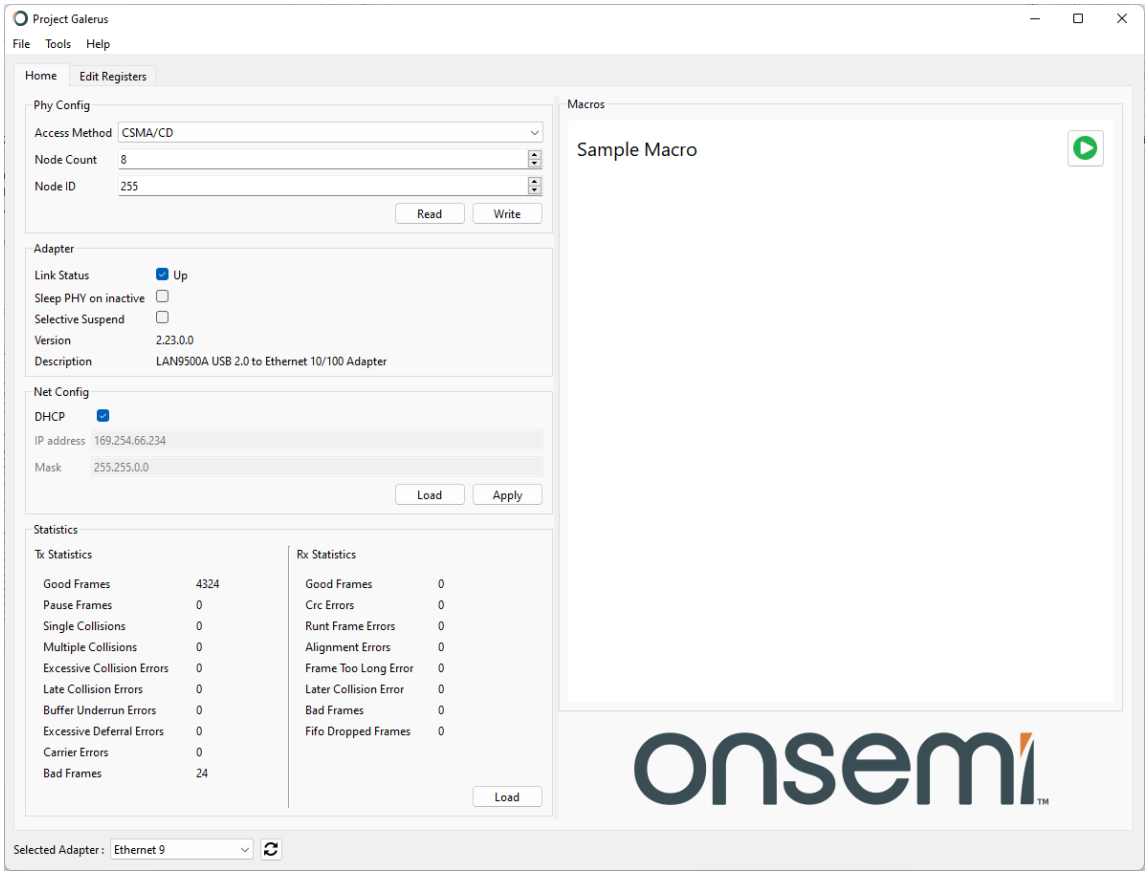


10BASE−T1S Bus Connectors

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.



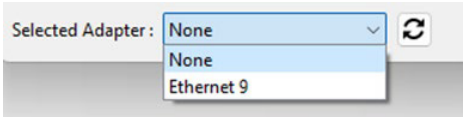
GRAPHICAL USER INTERFACE (GUI)



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.

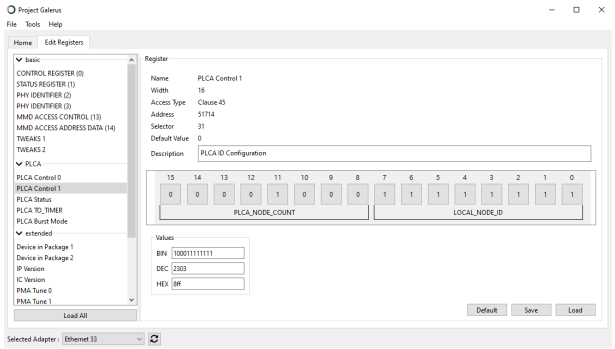
EDIT REGISTERS TAB

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

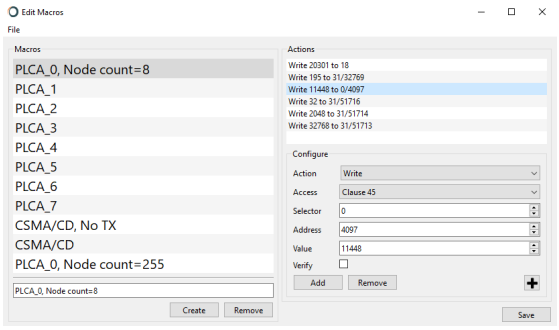
This window can be accessed via the menu bar of the main application (Tools −> Macros). It allows you to create and edit macros for quick register configuration.

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

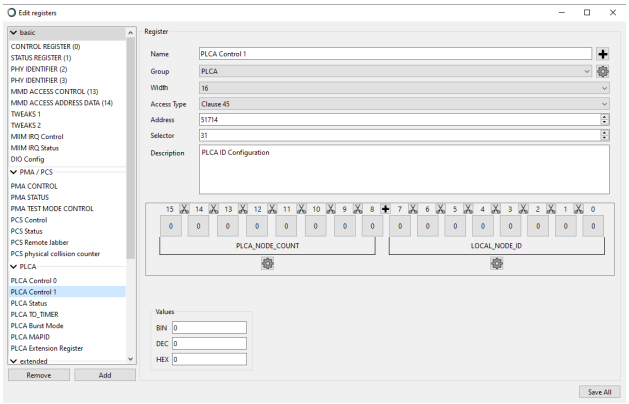
Writes the value to the PHY register. If verify is activated, the value is read back and compared with the written value. If two values do not match, an error is displayed. The other fields are the same as for the Read action.

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).

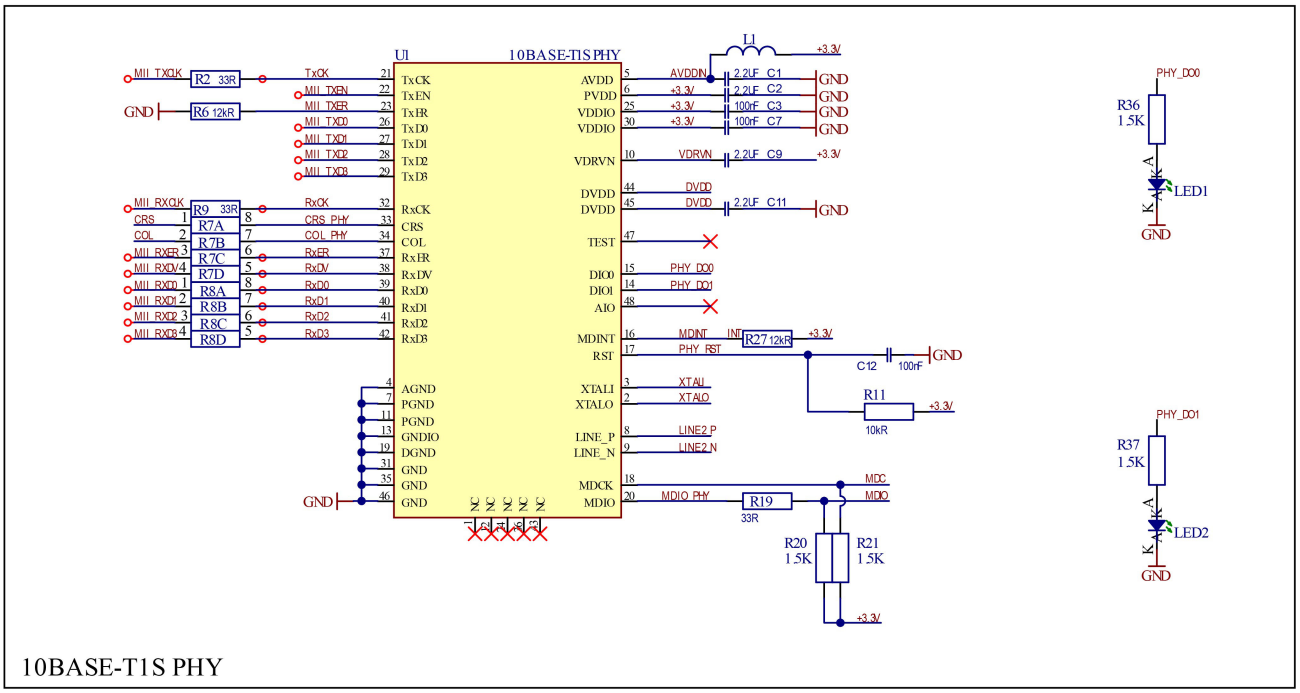
Clicking bit buttons or editing value line edits is changing default value of selected register.

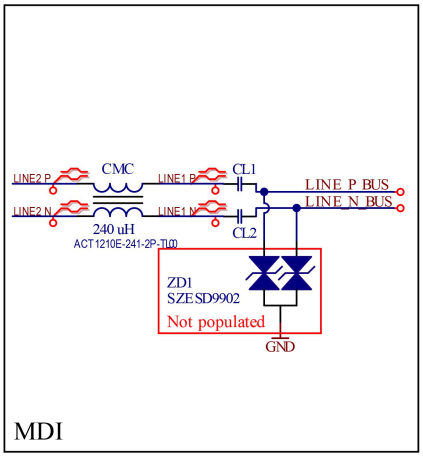
Clicking settings buttons under the bit buttons will open configuration of given bit field.

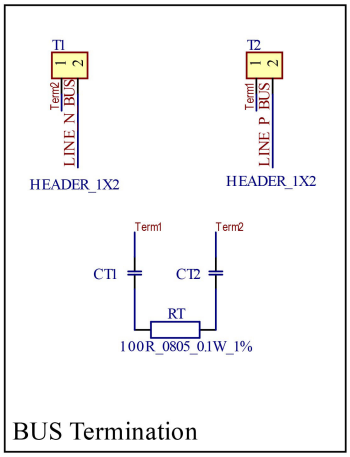
Clicking plus and cut buttons in between bit buttons will expand or cut bitfields.

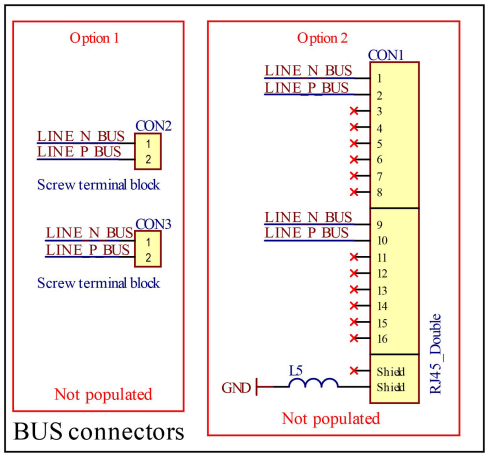
No changes are written until “Save All” button is selected.

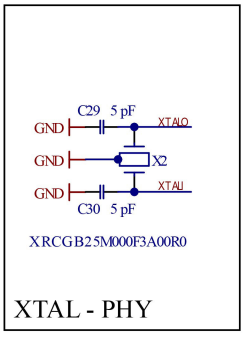
SCHEMATICS AND ASSEMBLY DRAWINGS

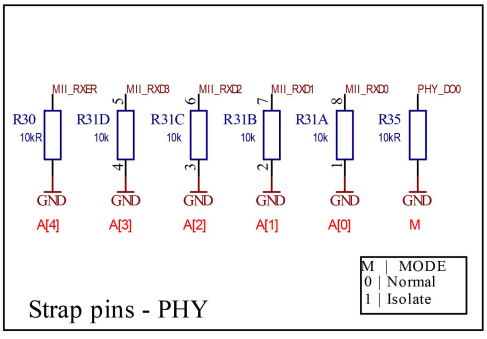


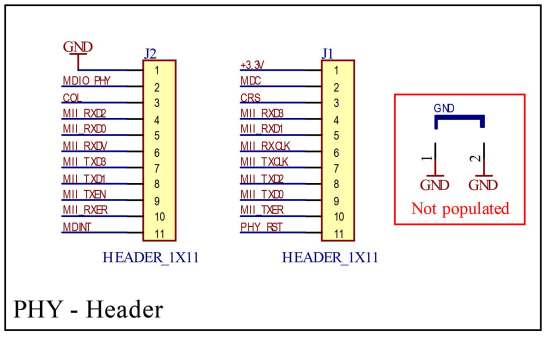


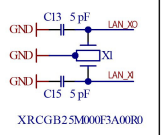




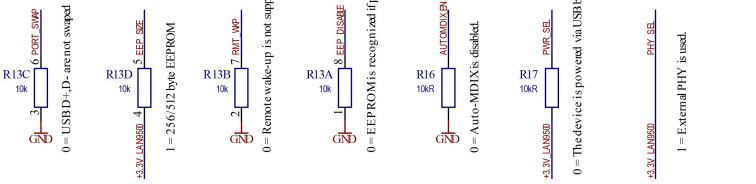




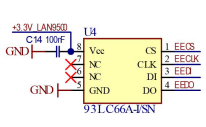




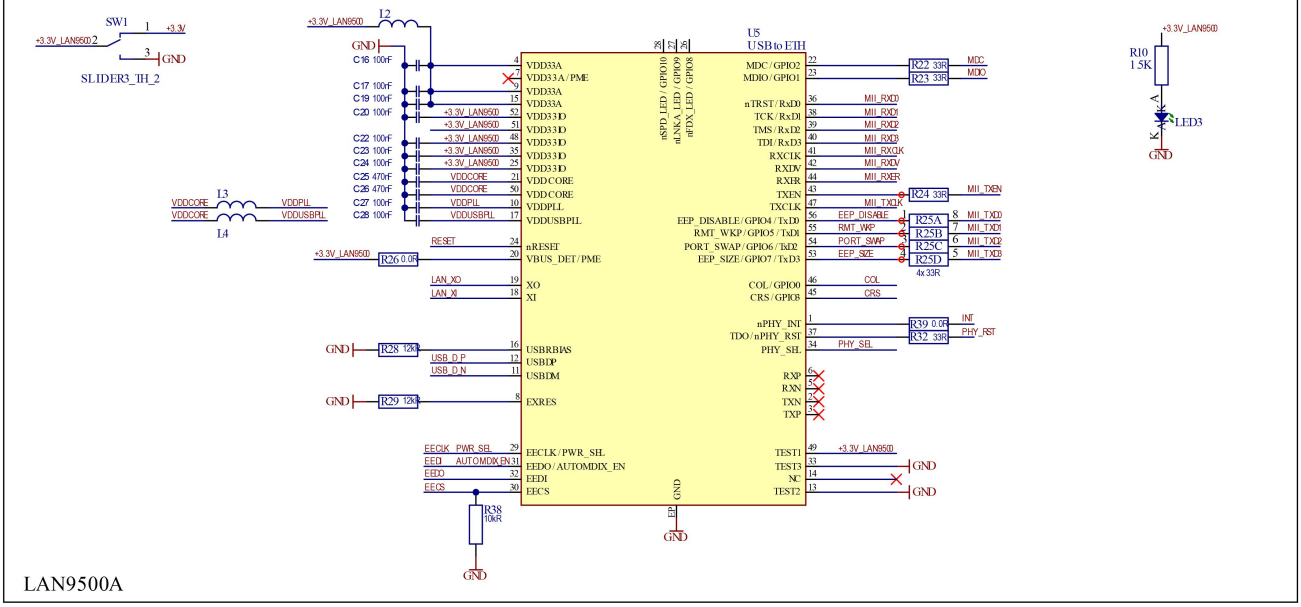
XTAL - LAN9500A



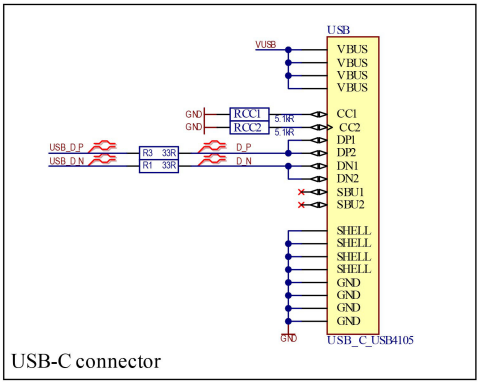
Strap pins - LAN9500A



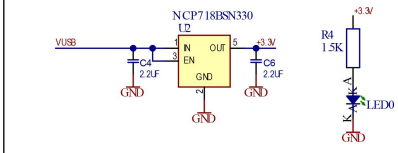
EEPROM 512 x 8bit



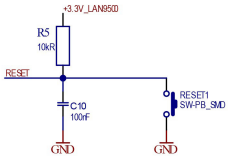
LAN9500A



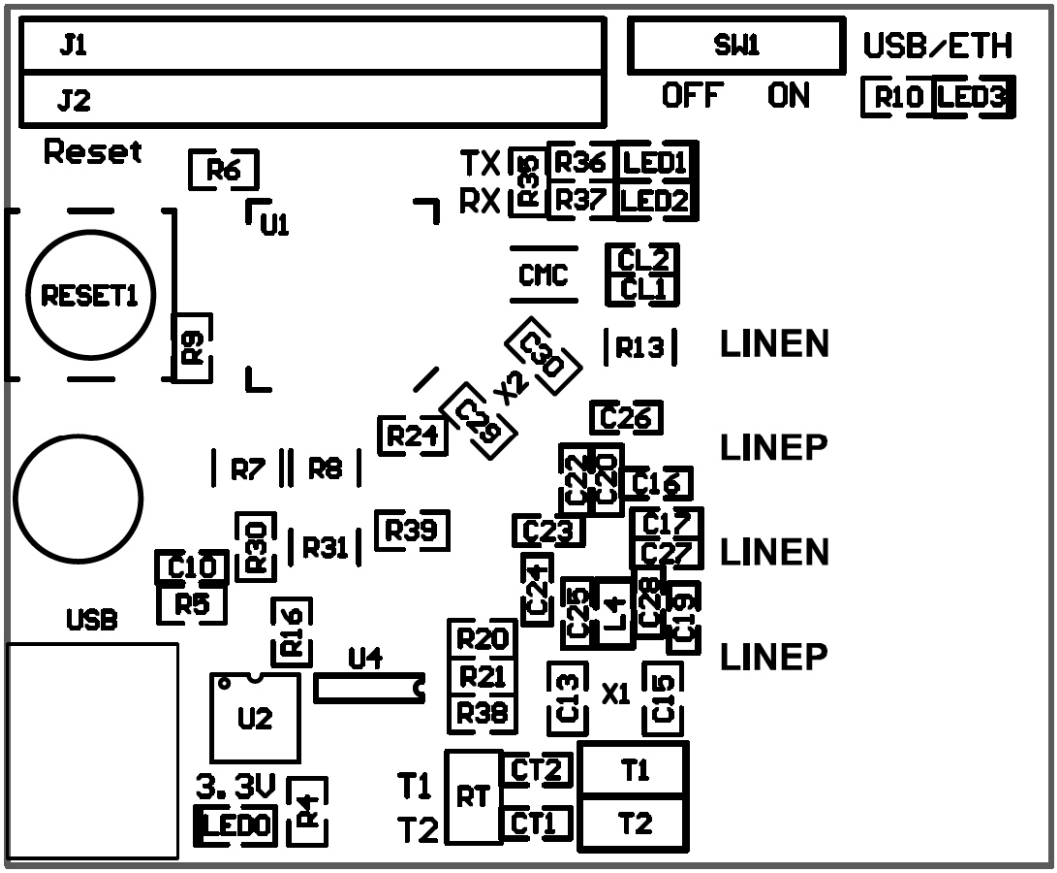
USB-C connector

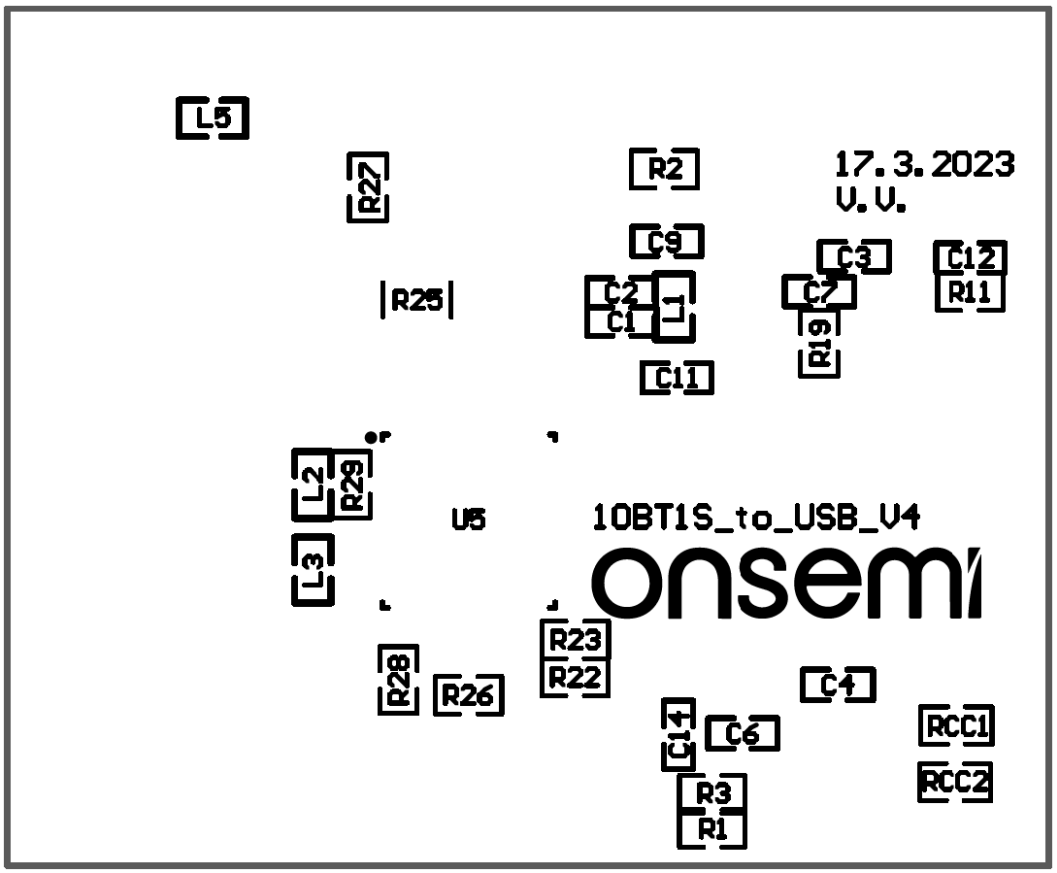


Power Supply



Reset


J1
J2
SW1
OFF ON
USB/ETH
R10 LED3
Reset
R6
U1
TX
RX
R35
R36 LED1
R37 LED2
RESET1
R9
CMC
C12
C11
R13
LINEN
C30
X2
C29
R24
C26
LINEP
R7 R8
C22
C20
C16
C17
C27
LINEN
R30
R31
R39
C23
C10
R5
C24
C25
L4
C28
C19
LINEP
USB
R16
U4
R20
R21
R38
C13
X1
C15
U2
3.3V
LED0
R4
T1
T2
RT
CT2
CT1
T1
T2


L5
R27
R2
17.3.2023
V.V.
C9
C3
C12
R11
R25
C2
C1
L1
C7
R19
C11
L2
R29
U5
10BT1S_to_USB_V4
onsemi
L3
R23
R22
R28
R26
C4
C14
C6
RCC1
RCC2
R3
R1

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