SiBRAIN

STANDARD

MIKROE

Index

Revision history:

Revision Number:	Revision Date:	Summary of changes:	Authors:
0.10	January, 2019	Initial draf of the document	U.C.
0.50	December, 2020	Thorough revision and redefinition of the standard	S.T, N.J.
1.00	June, 2021	Initial release	S.T, N.J.

INTRODUCTION

The ***SiBRAIN™*** *standard defines mainboard sockets and add-on boards used for interfacing microcontrollers or microprocessors with development boards, programmers and peripheral modules. The standard specifies functional and esthetic requirements that need to be followed in the process of development.*

The large number of mutually compatible ***SiBRAIN add-on boards*** *is the key value of this standard. The SiBRAIN standard defines the physical layout, as well as communication and power supply pins used, the size and shape of SiBRAIN add-on boards and the conventions for silkscreen marking.*

SiBRAIN add-on boards require a compatible ***SiBRAIN socket****. A universal socket enables easy development of applications with a great number of various SiBRAIN boards, each one carrying a different microcontroller or microprocessor with various possibilities and connectivity such as CAN, Ethernet, etc.*

Created by Mikroelektronika, SiBRAIN is an open standard - anyone can implement SiBRAIN in their hardware design, as long as the requirements are met that as set forth in this document which covers SiBRAIN add-on boards, socket standard and design guidelines.
More information at ***www.mikroe.com/sibrain***

SiBRAIN SOCKET STANDARD

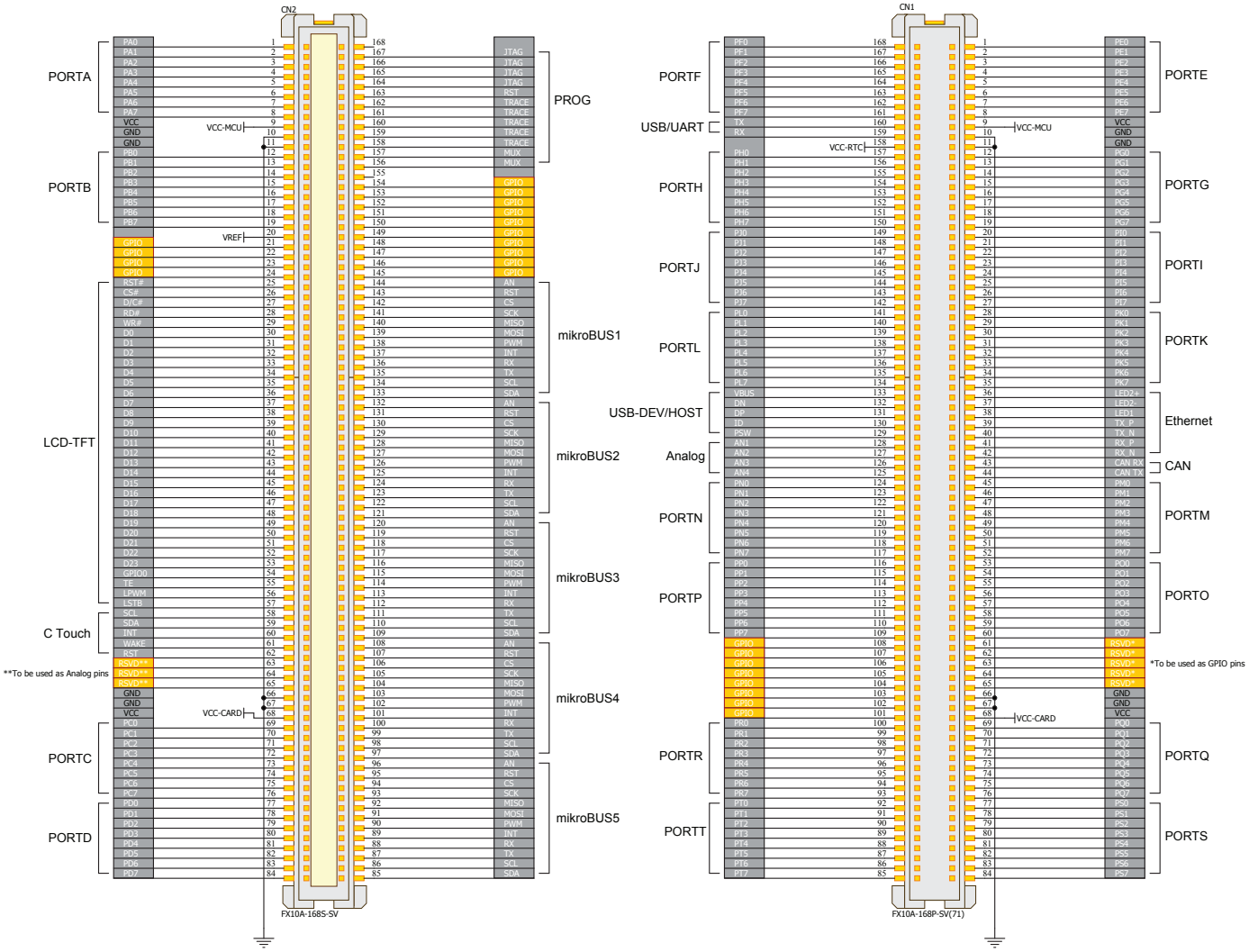
The SiBRAIN socket comprises a pair of 168 pins high-speed connectors with a predetermined pin configuration and silkscreen markings. The connectors are FX10A-168P-SV female, and FX10A-168S-SV male by Hirose Electric Co Ltd or equivalent. The left connector on the socket is female, and the right one is male so that the *SiBRAIN ADD-ON boards* can't be inserted incorrectly.

The pinout consists of **9 different** groups of signals, and power pins.

Those groups of pins are:

- **PORT pins**: pins that are routed to a specified PORT.
- **Display Board pins**: pins that are routed to the Display Board connector.
- **mikroBUS™ pins**: pins that are routed to the 5 individual mikroBUS™ sockets.
- **USB-UART pins**: TX and RX pins of the UART meant to go to a USB-UART module on a host board.
- **USB device/host pins**: pins that are routed to the USB device/host section.
- **Ethernet pins**: pins that are routed to a Ethernet connector.
- **CAN pins**: RX and TX pins of a CAN module.
- **ANALOG pins**: pins that are routed to the ADC pins of the MCU
- **Additional GPIO pins**: pins that are used when the *SiBRAIN* host board needs GPIO pins that are not shared with any of the mikroBUS™ sockets.

Pinout Specification

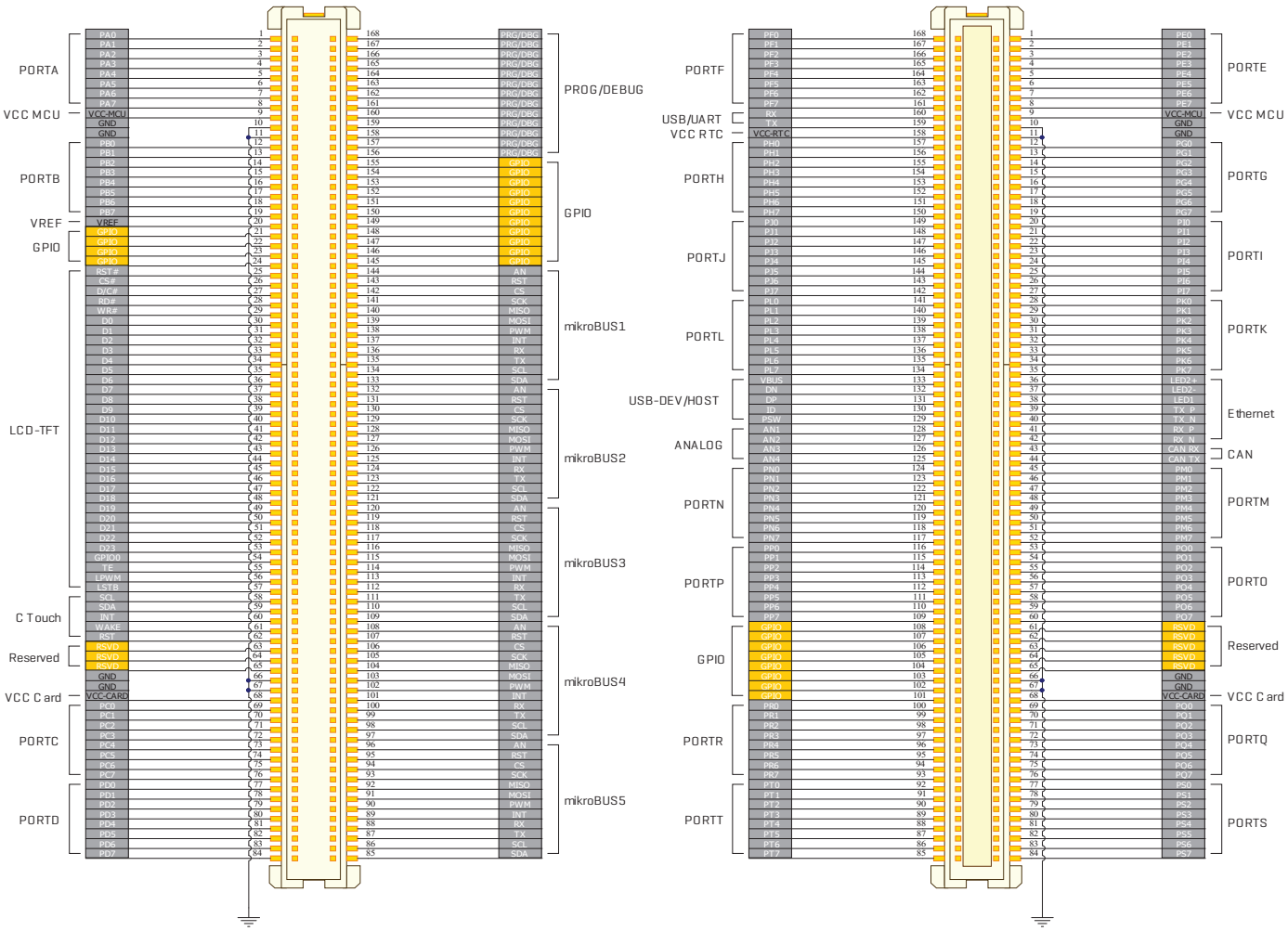


Ports are labeled by default as 8 bit, but if the microcontroller or microprocessor is 16 bit or 32 bit, then they will be grouped and connected to appropriate PORT.

- **Example**: A,B,C,D becomes A/L, A/H, B/L, B/H for 16 bit MCUs/MPUs or A/4, A/3, A/2, A/1 for 32 bit MCUs – A/4 being most significant and A/1 being least significant.

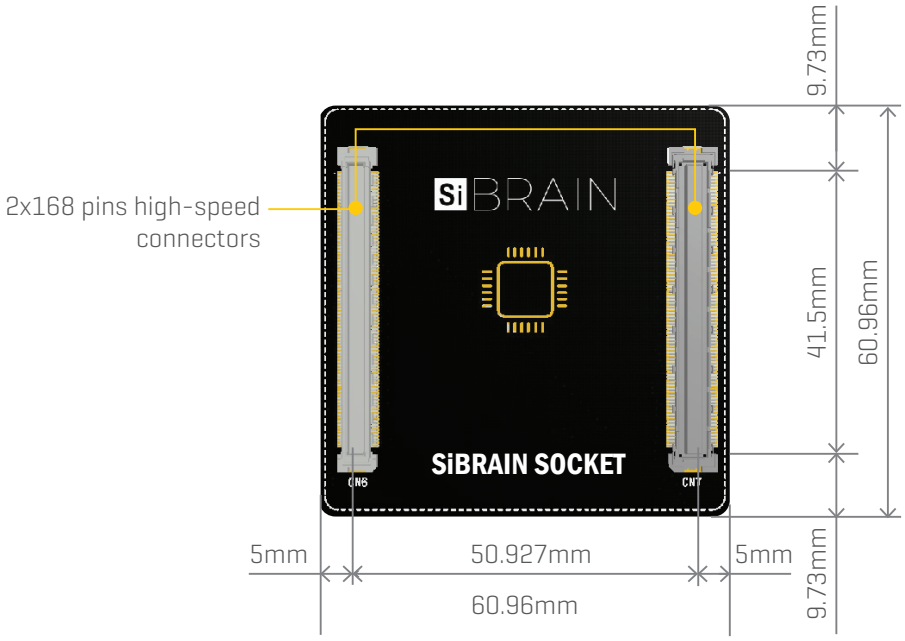
NOTE: *In special cases, in order to provide optimal functionality, position of some ports may vary.*

Some GPIO pins that are not connected to anything except perhaps to the PORT pins, can be used as additional GPIO pins, are optional, and can be for general purpose use(marked yellow).

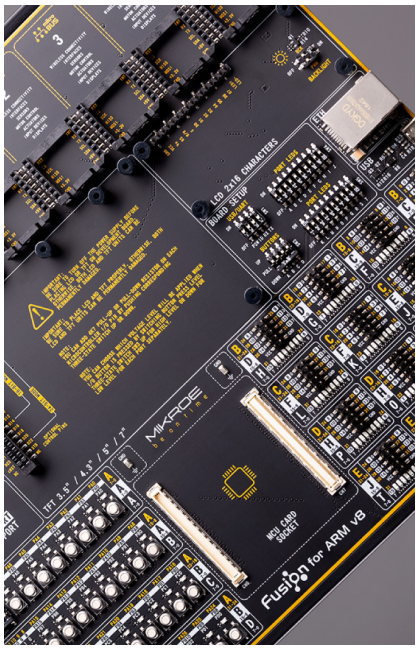


PCB Silkscreen markings

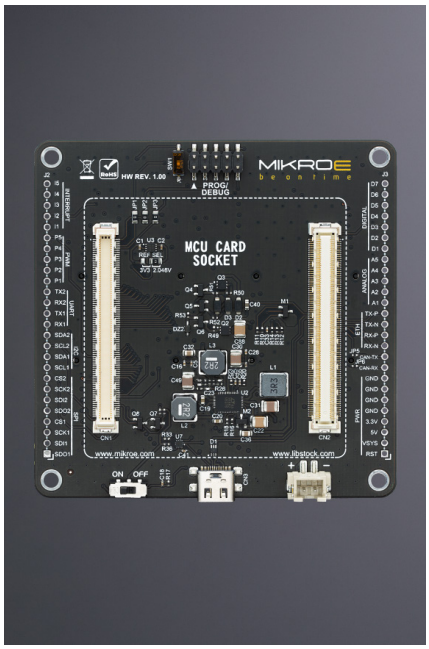
There are two silk colors: yellow and white. Distance between centers of connectors on the SiBRAIN socket: 50.927mm (2005mils).



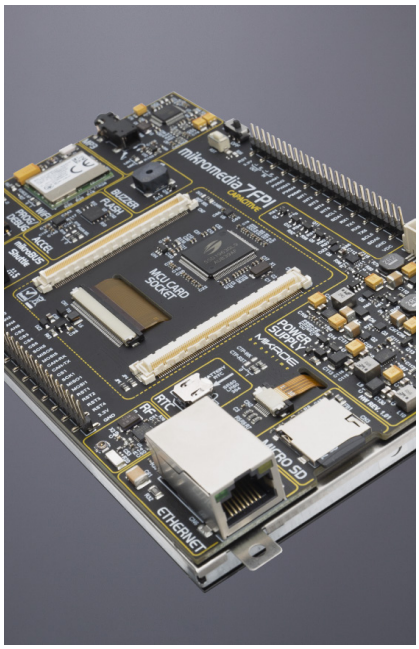
It fits all different board types, here are some examples:



Fully featured development board



Compact development board



Smart display development board

SiBRAIN
ADD-ON BOARD STANDARD

SiBRAIN add-on boards include a microcontroller, or microprocessor, a pair of 168 pins high-speed connectors with a proprietary pin configurations compatible with the *SiBRAIN* socket, and optionally a CAN transceiver and Ethernet PHY IC. The connectors are the FX10A-168P-SV female, and FX10A-168S-SV male by Hirose Electric Co Ltd or equivalent. The left connector on the add-on board is male, and the right one is female so that the *SiBRAIN* can't be inserted incorrectly.

The pinout consists of **9 different groups of signal**, and power pins.

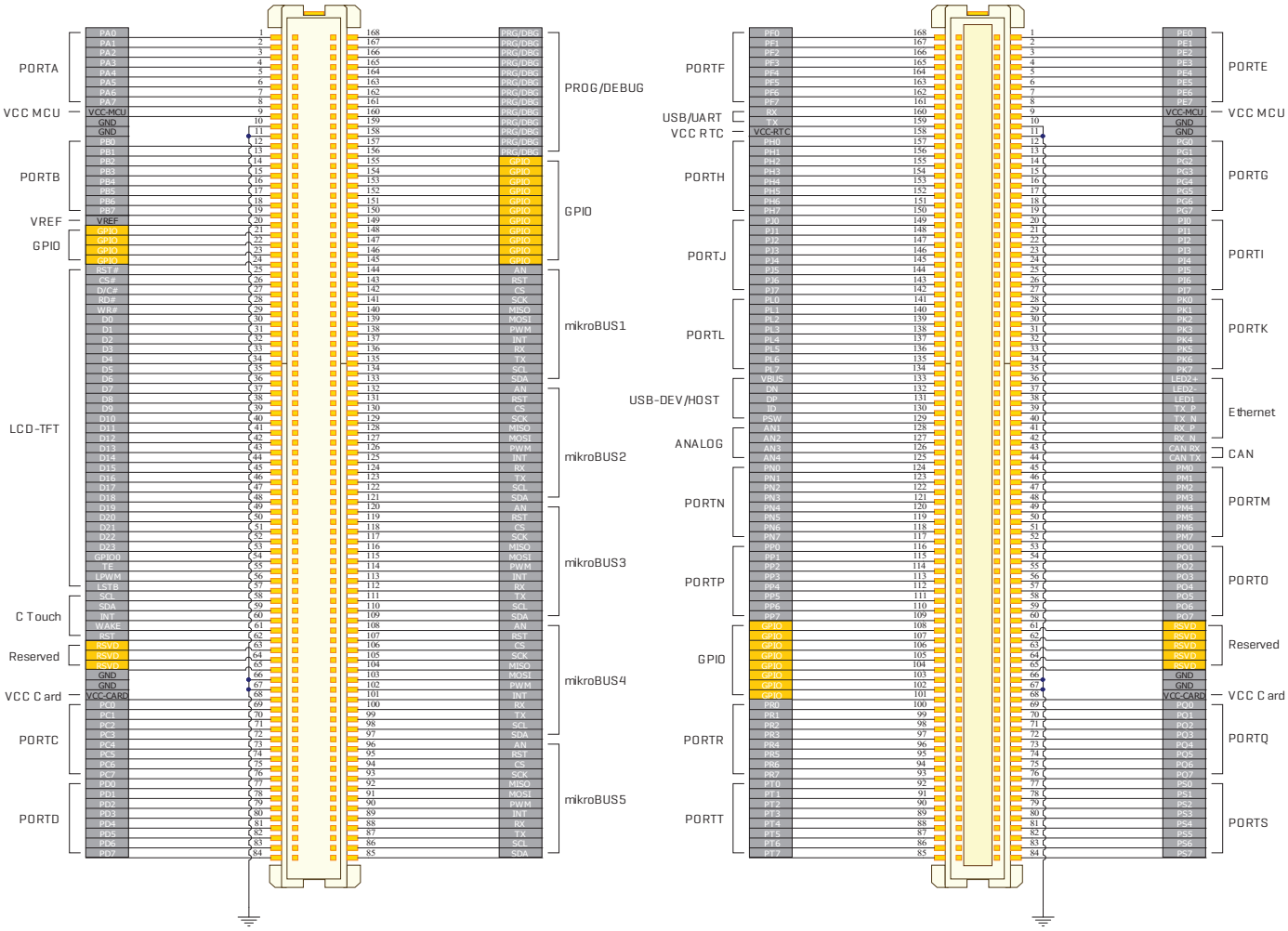
Those groups of pins are:

- **PORT pins**: pins that are routed to a specified PORT.
- **Display pins**: pins that are routed to the Display Board connector.
- **mikroBUS™ pins**: pins that are routed to the 5 individual mikroBUS™ sockets.
- **USB-UART pins**: TX and RX pins of the UART meant to go to a USB-UART module on a host board.
- **USB device/host pins**: pins that are routed to the USB device/host section.
- **Ethernet pins**: pins that are routed to a Ethernet connector.
- **CAN pins**: RX and TX pins of a CAN module.
- **ANALOG pins**: pins that are routed to the ADC pins of the MCU
- **Additional GPIO pins**: pins that are used when the *SiBRAIN* is used with the host board that needs GPIO pins that are not shared with any of the mikroBUS™ sockets.

Pinout Specification

The pinout on a SiBRAIN™ add-on board corresponds with the microcontroller or microprocessor, on this board, and not the target mainboard. As such, some pins are left unused. Four (4) cases should be considered. Ports are labeled by default as 8 bit, but if the MCU/MPU is 16 bit or 32 bit, then they will be grouped and connected to appropriate PORT.

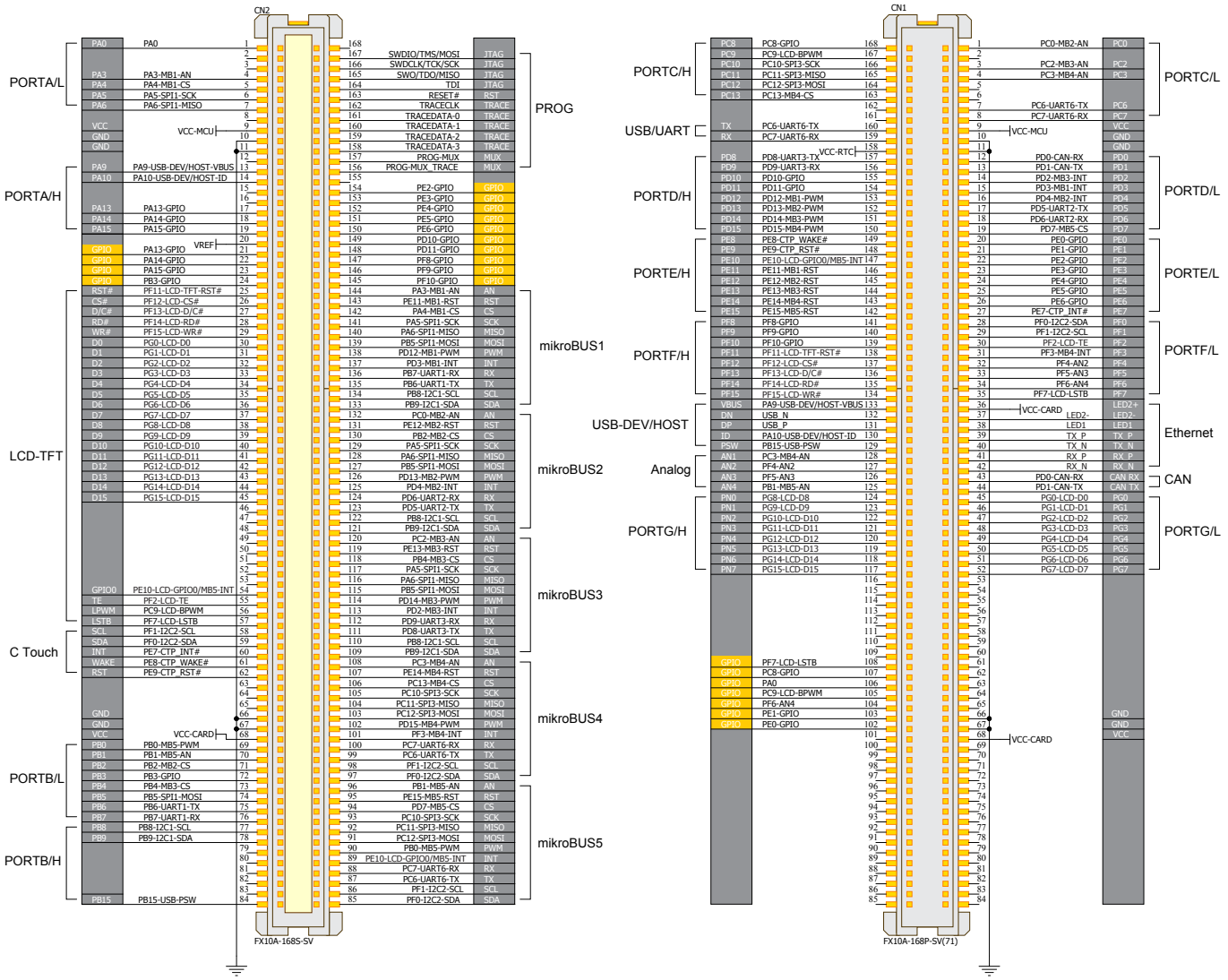
- **Example**: A,B,C,D becomes A/L, A/H, B/L, B/H for 16 bit MCUs/MPUs or A/4, A/3, A/2, A/1 for 32 bit MCUs – A/4 being most significant and A/1 being least significant.



The GPIO and Analog pins shown in YELLOW are dedicated pins to be used by host board that needs GPIO pins or analog inputs and that are not shared with any of mikroBUS™ sockets.

NOTE: *In special cases, in order to provide optimal functionality, position of some ports may vary.*

Here is an example of a STM32F407VG card.



There are multiple power rails on the card. VCC-MCU, VCC-RTC, VCC-CARD and VREF.

- VCC-MCU is to be used only for powering the MCU.
- VCC-RTC is to be used only for the RTC pin if the MCU is equipped with it, otherwise don't use it.
- VREF is to be used only as the reference voltage for the ADC if the MCU has that option.
- VCC-CARD is to be used only for ETH-PHY and multiplexers.

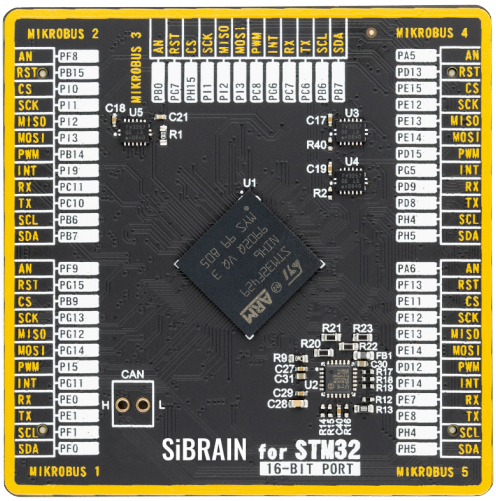
As seen in the picture above, unused ports have to be deleted from the schematic.

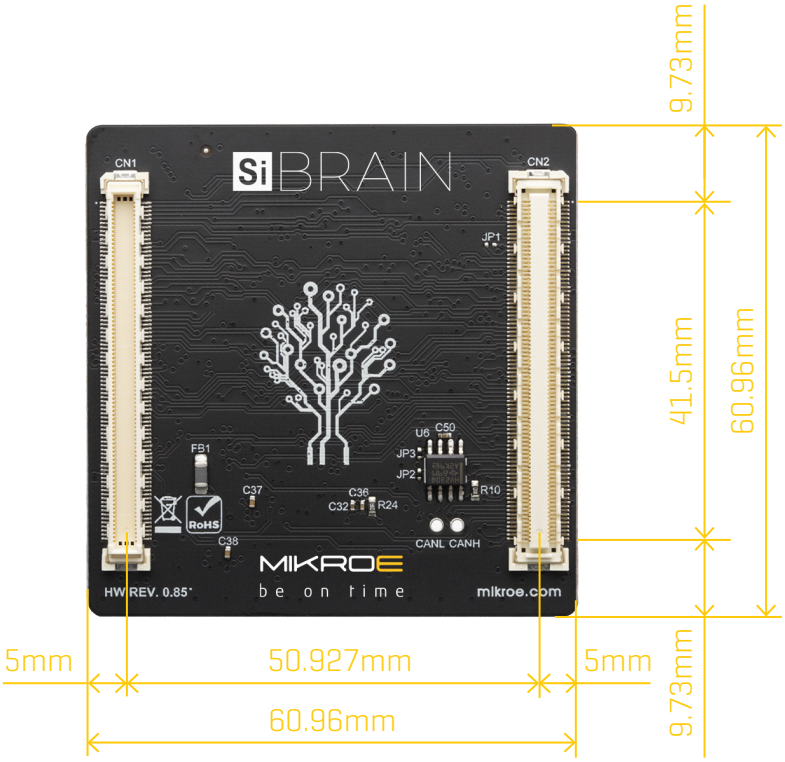
Dimensions, placement & PCB silkscreen markings

Dimensions of *SiBRAIN* module is **60.96x60.96mm (2400x2400mils).**

Distance between centers of connectors on the *SiBRAIN* module: **50.927mm (2005mils).**

Images of the SiBRAIN Layout are below:



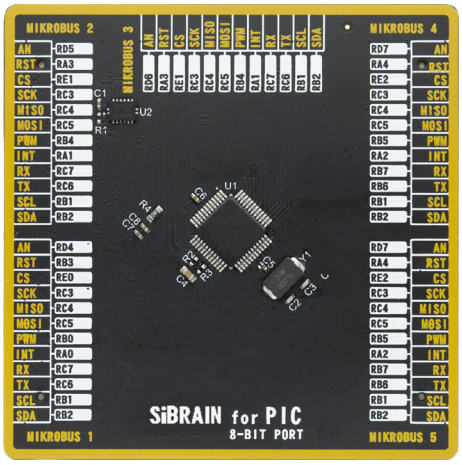


The MCU port names in the white boxes, text in black, have to match the pins on the mikroBUS ports. Note the positions of the Ethernet PHY IC, multiplexers and MCU on the card.

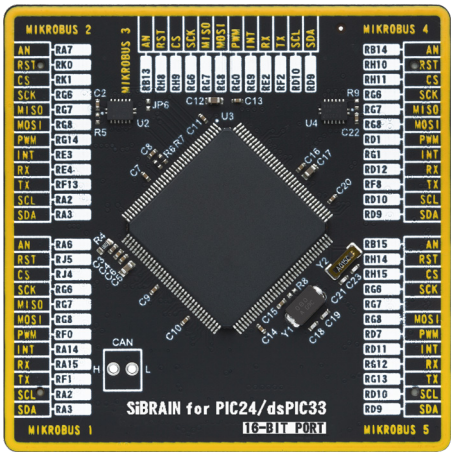
If the tree logo on the back obscures components (such as decoupling capacitors for a BGA MCU) it has to be modified in order to not interfere with them. This can be accomplished by deleting sections of the tree. If a greater percentage than 50% needs to be removed, the tree needs to be resized in order for it to remain at least 50% from its original look. Resizing can be done by creating a union from it and then resize the union. The position of **recycle bin**, **RoHS** and **HW REV** is already determined and should not be changed.

The port size should be marked as in the picture below:

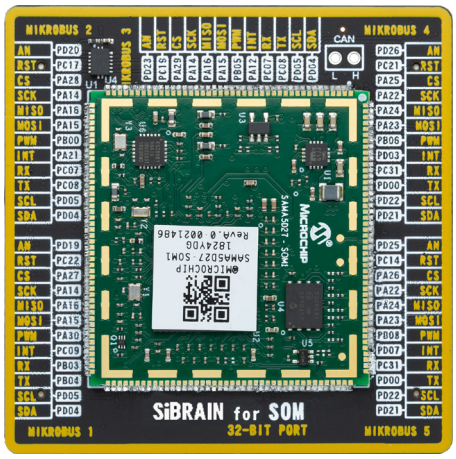
8-BIT PORT



16-BIT PORT



32-BIT PORT

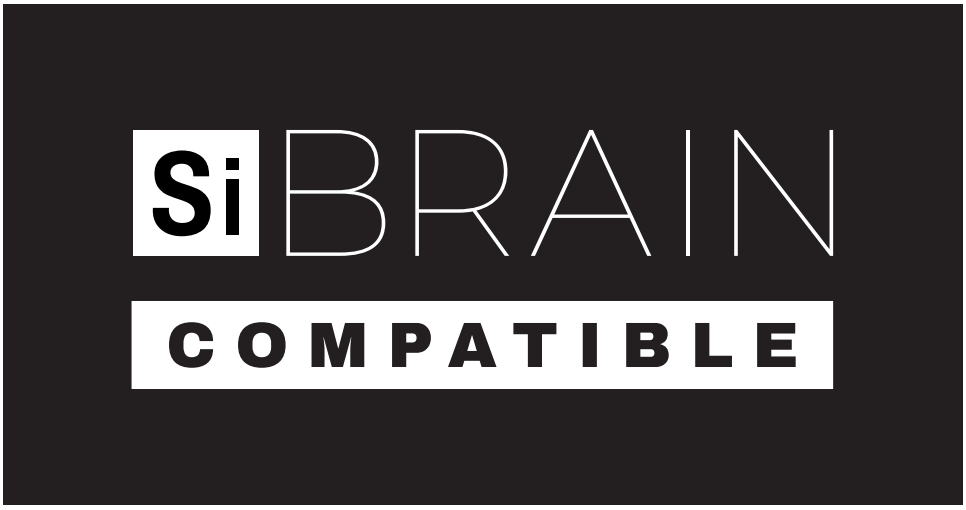


SiBRAIN COMPATIBLE LOGO USAGE

All SiBRAIN add-on boards not designed by Mikroelektronika require a SiBRAIN compatible logo.

In case of a **light background**, use the logo below:

In case of a **dark background**, use the logo below:



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