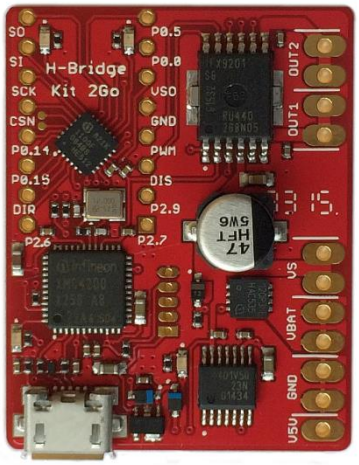
H-Bridge Kit 2Go

Evaluation Board for DC Motor Control with the IFX9201



About this document

Scope and purpose

This board user manual provides a basic introduction to the hardware of the H-Bridge Kit 2Go.

The H-Bridge Kit 2Go is a complete low cost system solution for driving small brushed DC motors. It contains a 32bit microcontroller including debug interface, an on board 5V voltage regulator, reverse polarity protection for the power supply and an integrated H-Bridge capable of driving up to 6A peak, the IFX9201SG

Intended audience

This board user manual is intended for anyone interested in evaluating DC motor control with the IFX9201.

Table of Contents

1 Overview

The H-Bridge Kit 2Go is based on the Infineon microcontroller kit XMC 2Go. For any information on the XMC 2Go as well as for downloading the software drivers and tools please visit http://www.infineon.com/xmc2go .

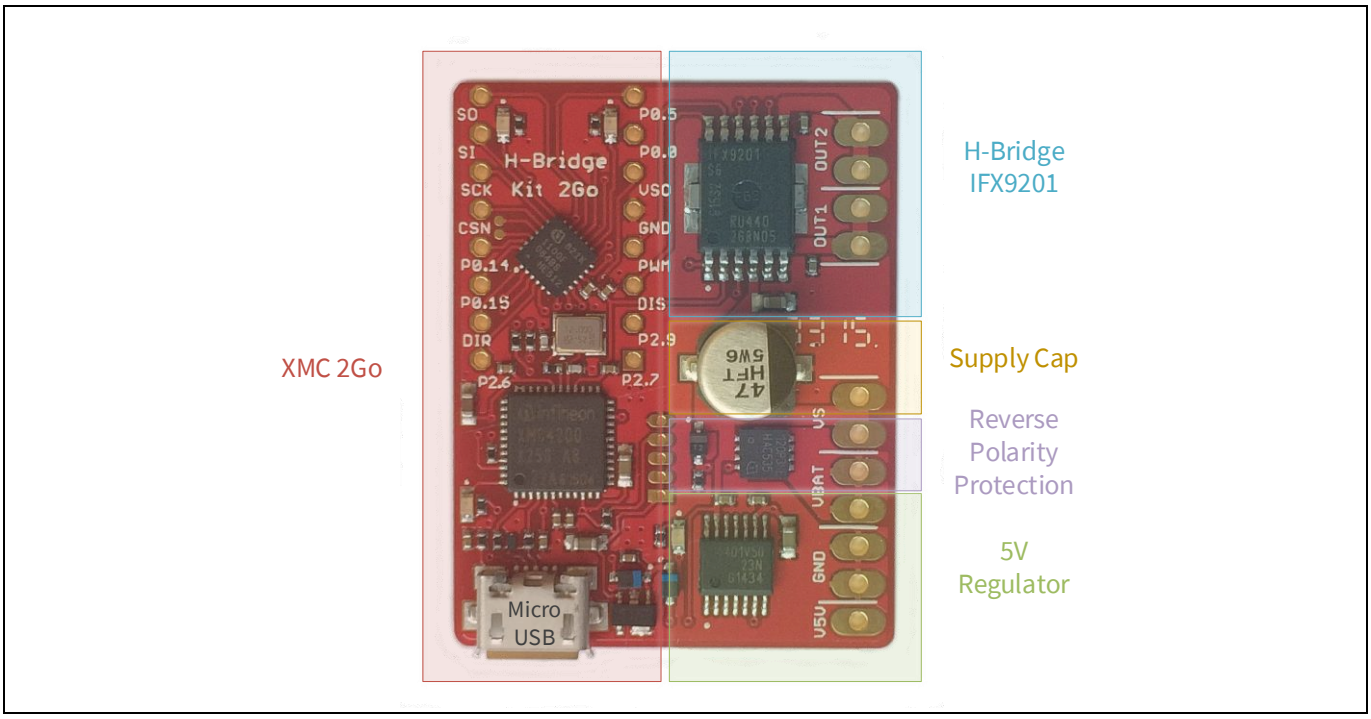


Figure 1 Top View H-Bridge Kit 2Go

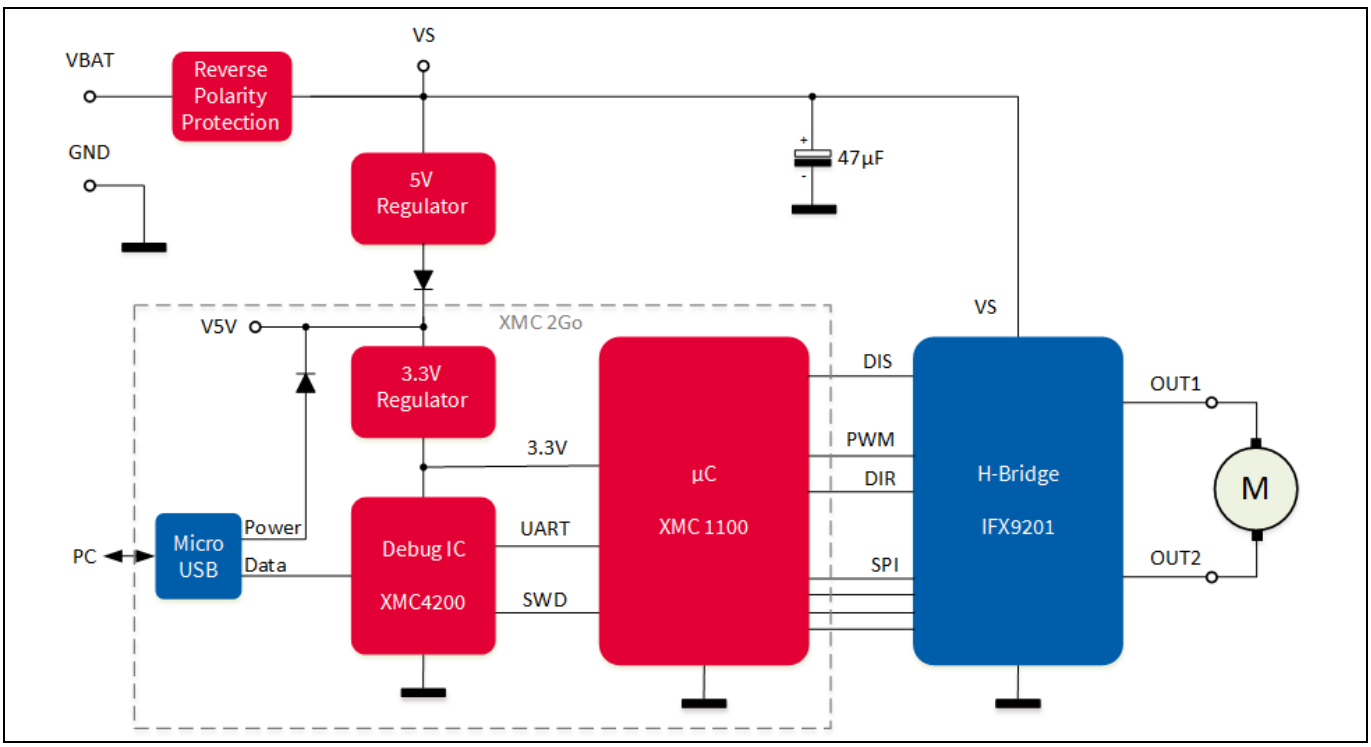


Figure 2 Block Diagram H-Bridge Kit 2Go

2 Getting Started

2.1 Power Supply

For providing the power to drive a DC motor the H-Bridge Kit 2Go needs an external power supply connected to VBAT. To protect the board from accidentialy reverted supply voltages the H-Bridge Kit 2Go is equipped with a reverse polarity protection circuit

As with the XMC 2Go the microcontroller can be supplied by the PC via the Micro USB port. To enable standalone operation without a connection to the PC the H-Bridge Kit 2Go also features an on board 5V voltage regulator which acts a pre-regulator for the 3.3V regulator of the microcontroller.

***Attention:** The 5V regulator is a linear voltage regulator and can get very hot depending on the input voltage!*

VBAT can range from 5V to to a maximum of 36V without damaging the board. However, since the power dissipation of the 5V regulator strongly increases with the input voltage it is recommended to keep VBAT below 15V or to provide additional cooling by attaching a heat sink to the back side of the board.

Another option when applying a higher VBAT is to provide 5V externally at the V5V input of the board. This will relieve the on board regulator and enable operation up to 36V, the maximum supply voltage of the IFX9201.

2.2 Selecting a DC motor

The IFX9201 can drive small DC motors with peak currents of up to 6A. The achievable continuous drive current is lower and depends on supply voltage, switching frequency and the cooling conditions. Realistic continuous drive currents for this kit are in the range of 1A to 2A. Many motors for toys, RC models or robotics fall in this range.

2.3 Connecting the Kit

To get started with the Kit just connect a suitable DC Motor and the power supply as shown in Figure 3.

The power pads are spaced with a 2.54 mm pitch. Each power signal (except V5V) is occupying two pads. Therefore it is possible to use either 2.54 mm or 5.08 mm spaced connectors or screw terminals.

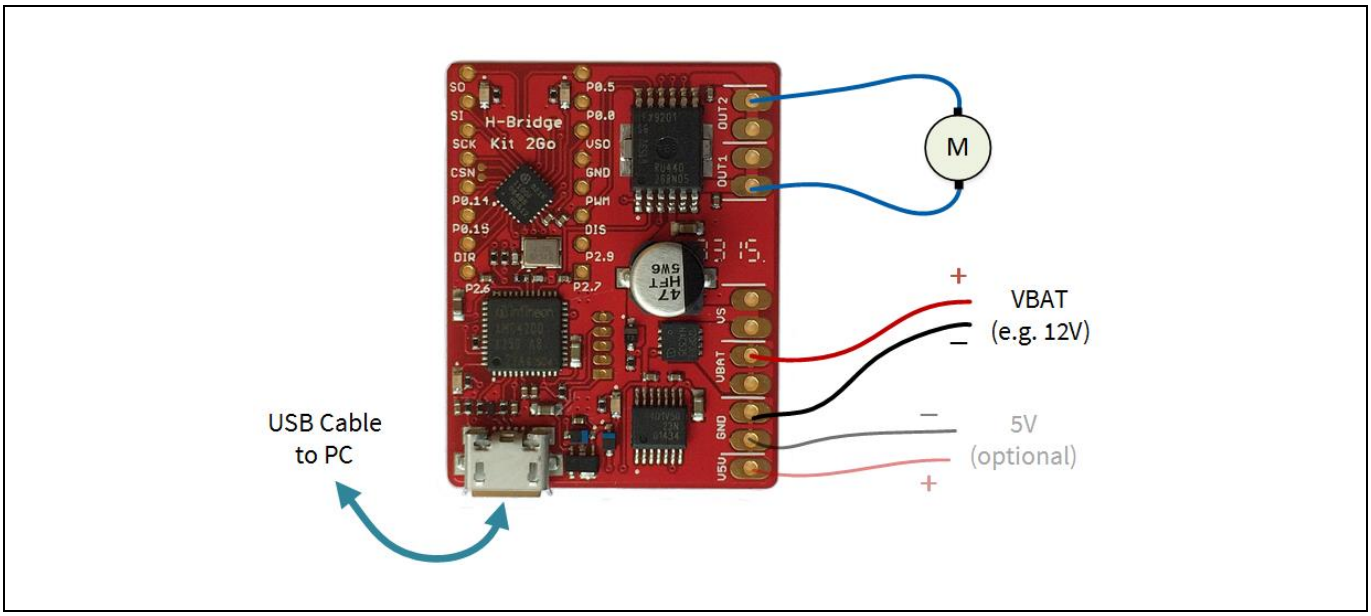


Figure 3 Connecting Motor, Supply and USB Cable

2.4 Software

The kit comes pre-programmed with a simple example routine that applies a 1 kHz PWM signal to the motor ramps the speed of the motor up and down by increasing and decreasing the PWM duty cycle. When reaching a duty cycle of 0% it reverts the rotation direction of the motor and starts again with ramping the motor speed up and down.

The source code for this program example can be downloaded at http://www.infineon.com/h-bridge-kit-2go.

The program was generated using the Infineon code development platform DAVE™ (Version 4). For information on this tool how to use it and for downloading please visit http://www.infineon.com/dave.

2.5 Port Assignment

When writing your own routines for driving the IFX9201 please refer to the IFX9201 data sheet and the following port assignment of XMC microcontroller ports.

Table 1 XMC1100 Port Assignment to IFX9201 Signals

Port	IFX9201 Signal	Comment
P0.6	SO	SPI serial output
P0.7	SI	SPI serial input
P0.8	SCK	SPI clock input
P0.9	CSN	SPI chip select (low active)
P2.0	DIR	Direction input to define direction of the motor current
P2.10	PWM	Pulse width modulation input
P2.11	DIS	Disable. Disables the outputs (all MOSFETS off)

3 Hardware Description

3.1 Schematics

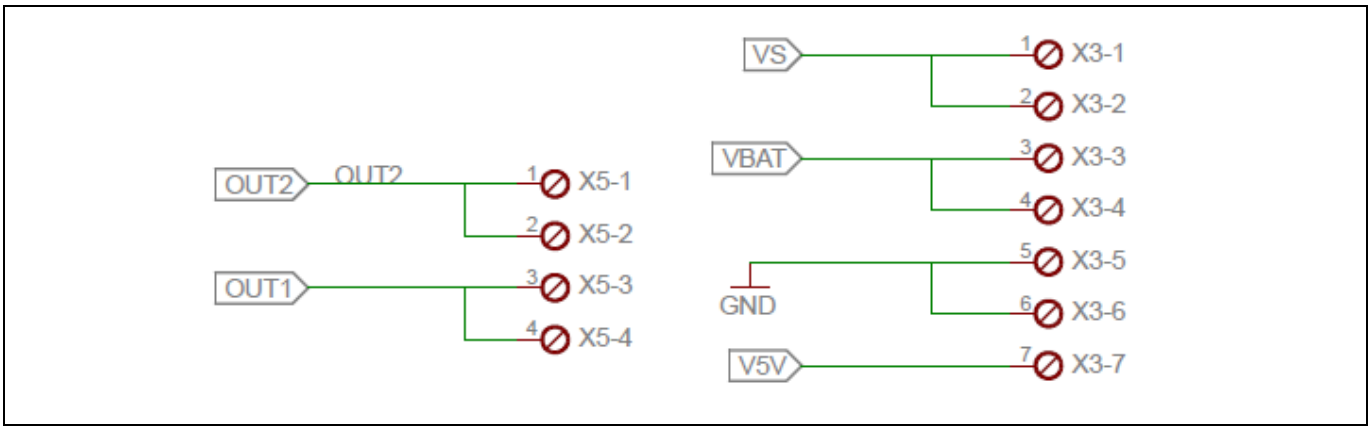


Figure 4 Power Connectors

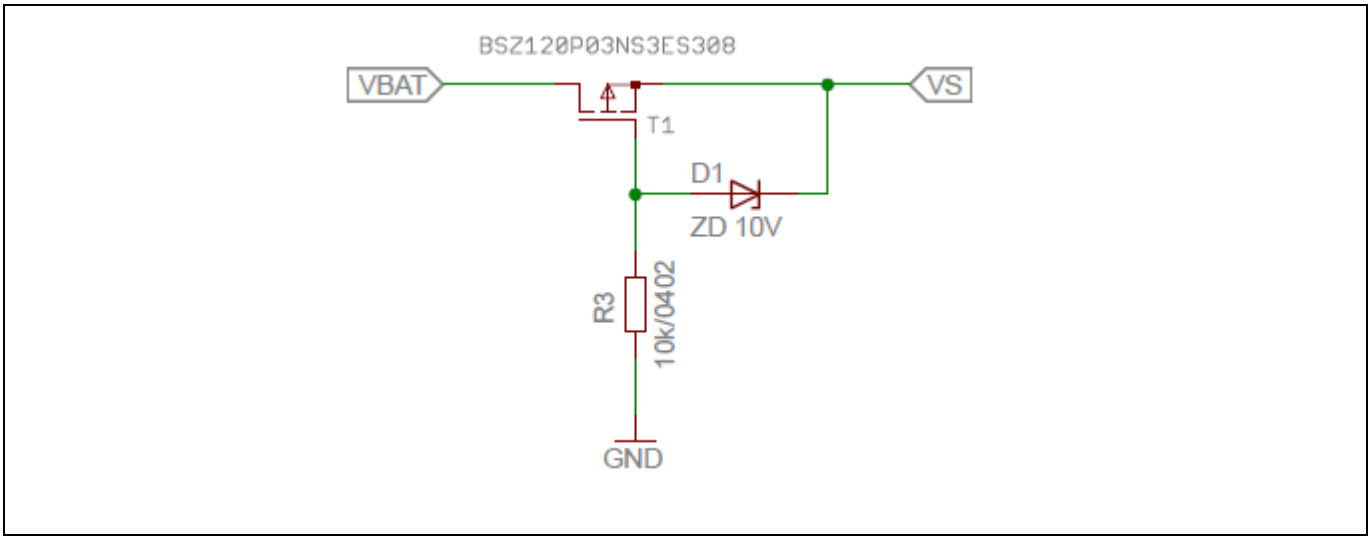


Figure 5 Reverse Polarity Protection

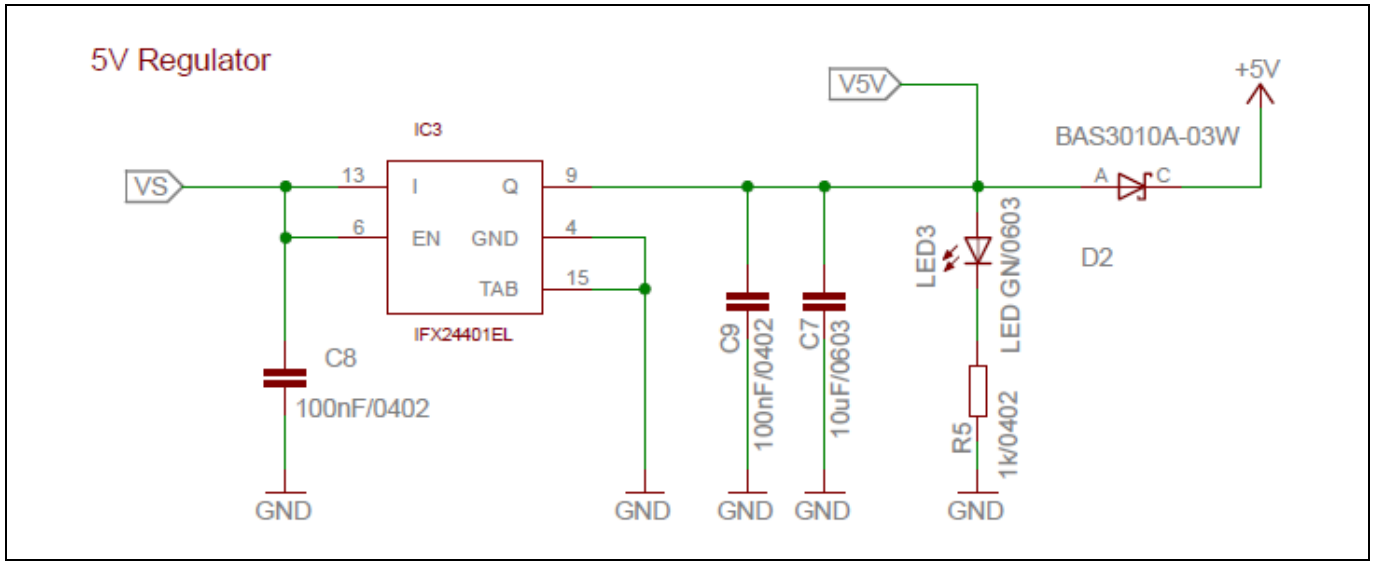


Figure 6 5V Regulator

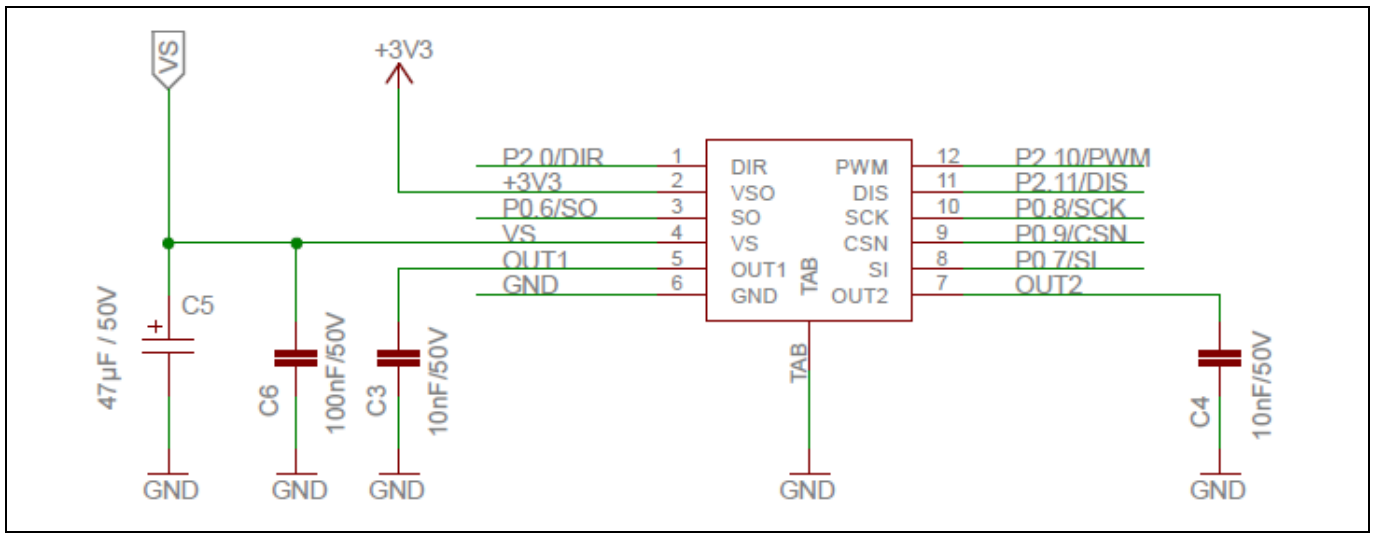


Figure 7 IFX9201 and Peripherals

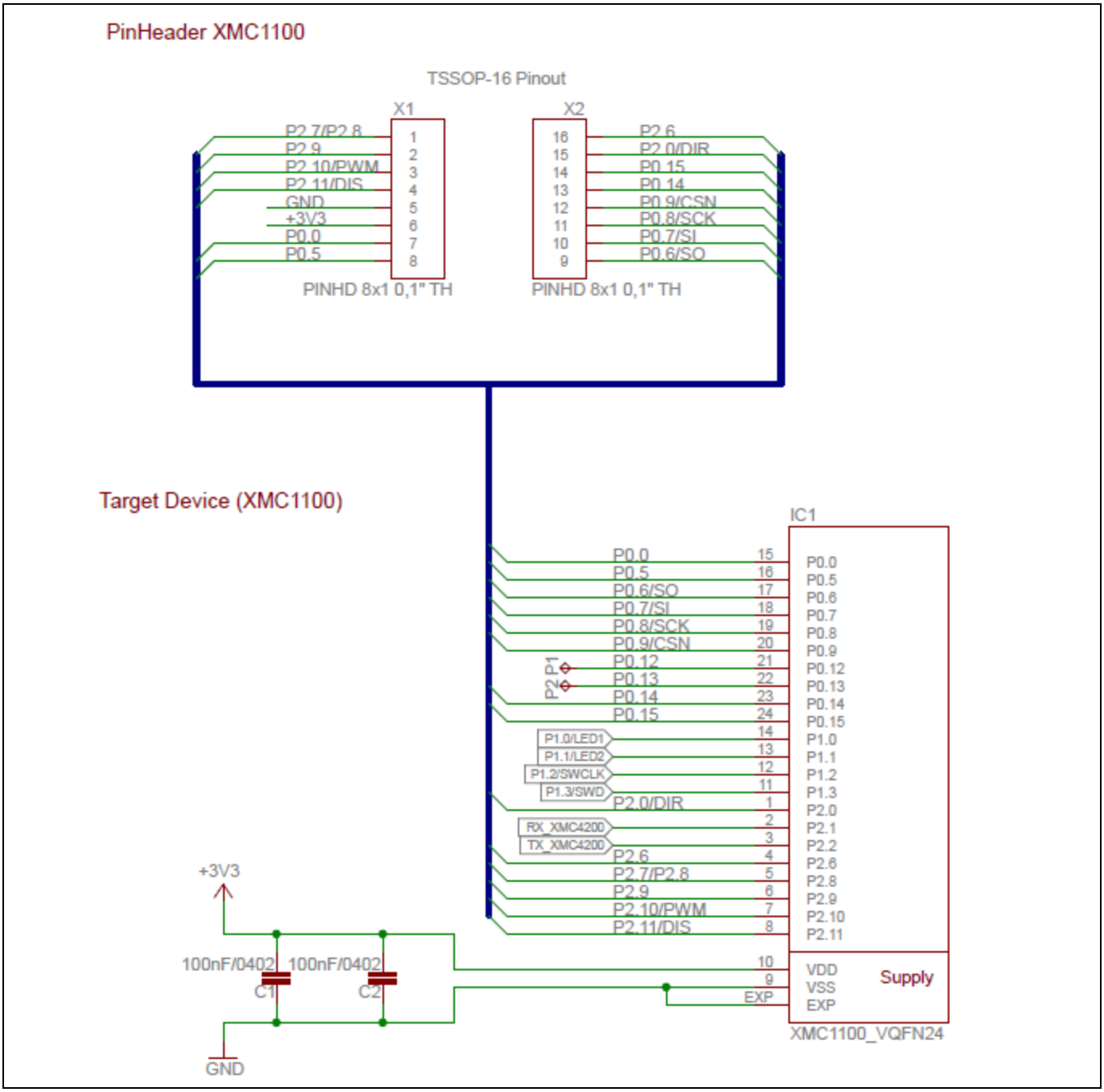


Figure 8 XMC1100 and Pin Header

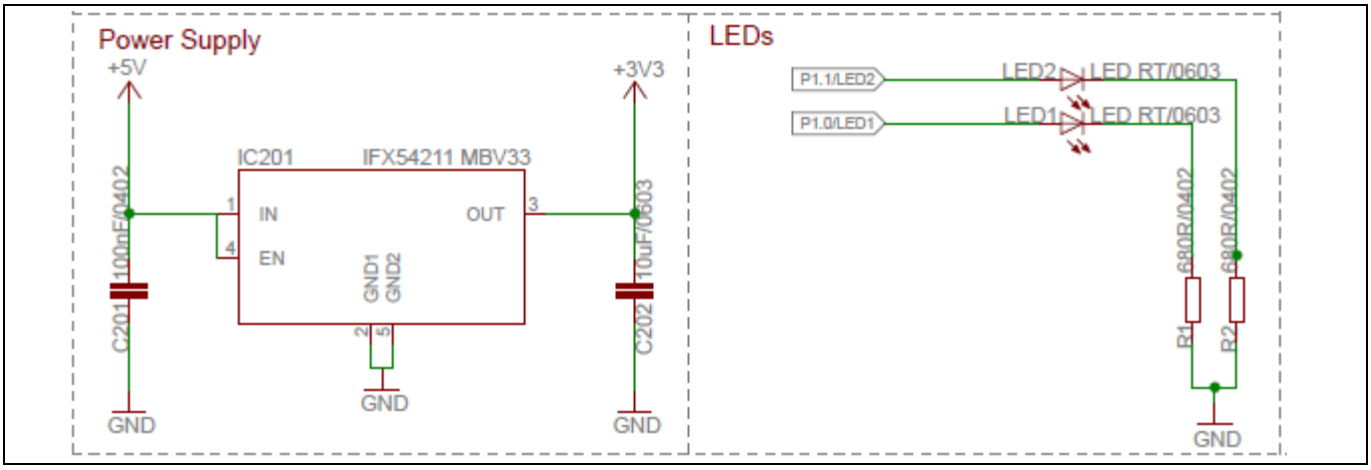


Figure 9 3.3V Regulator and User LEDs

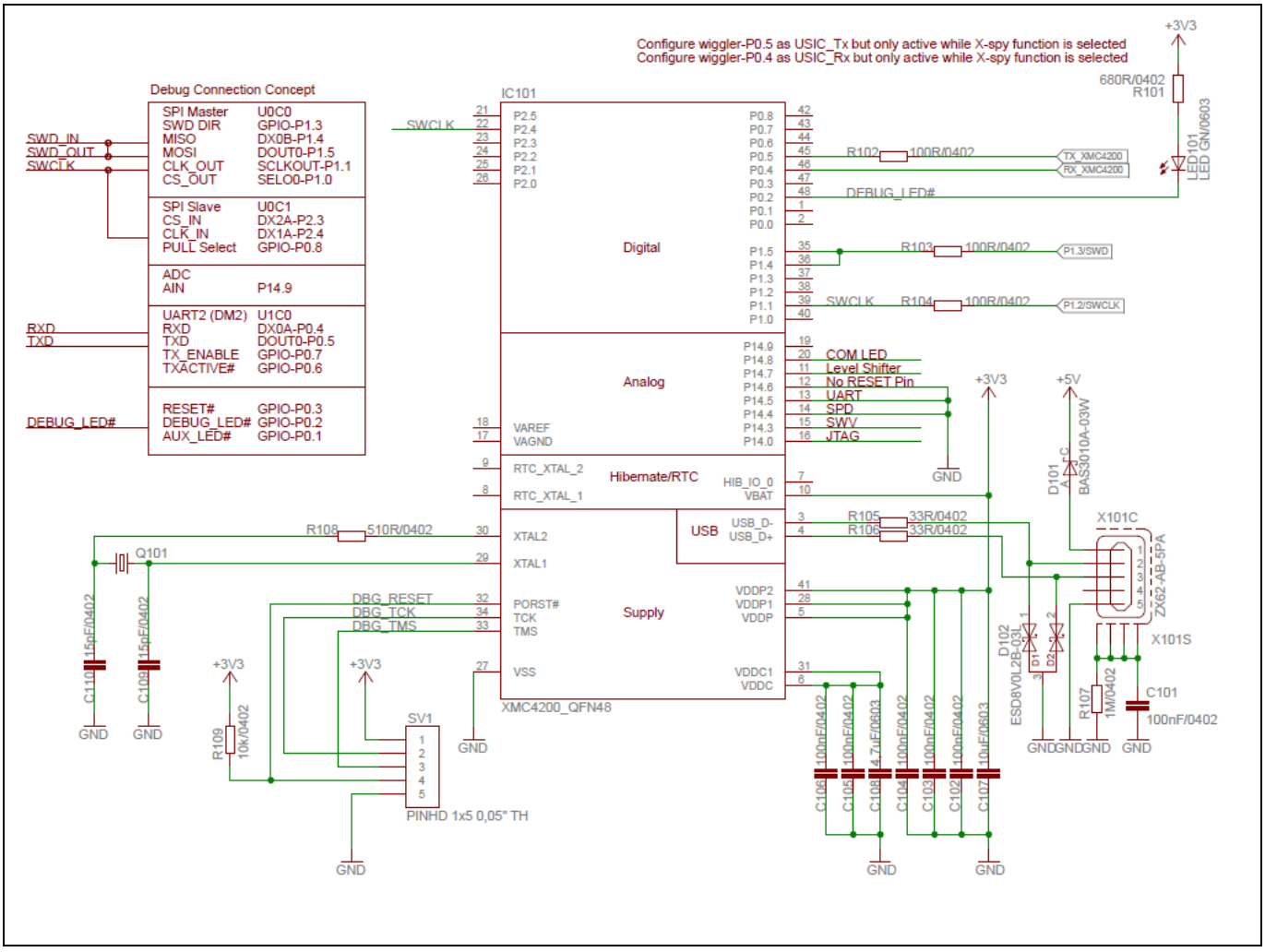


Figure 10 On Board Debugger including UART to USB Bridge

3.2 Layout

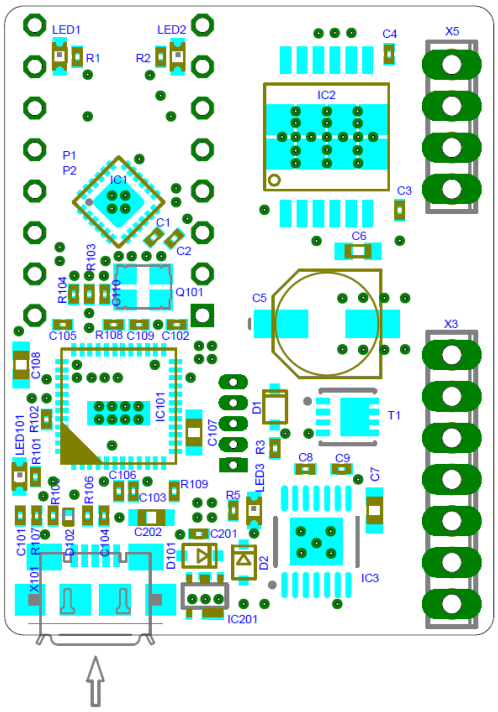


Figure 11 Component Placement

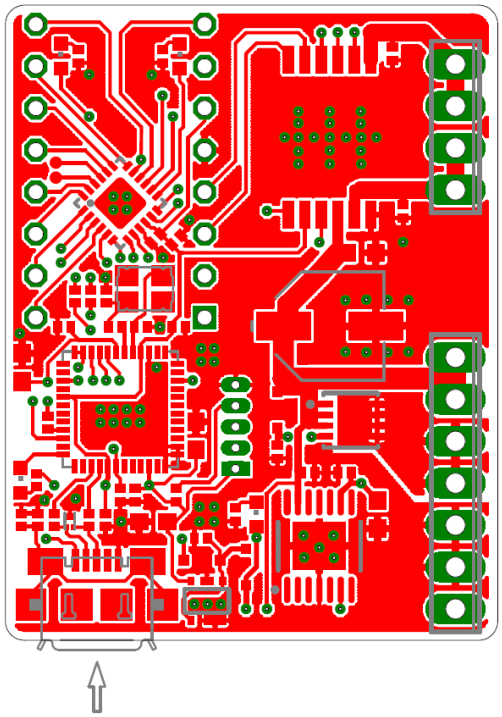


Figure 12 Top Layer

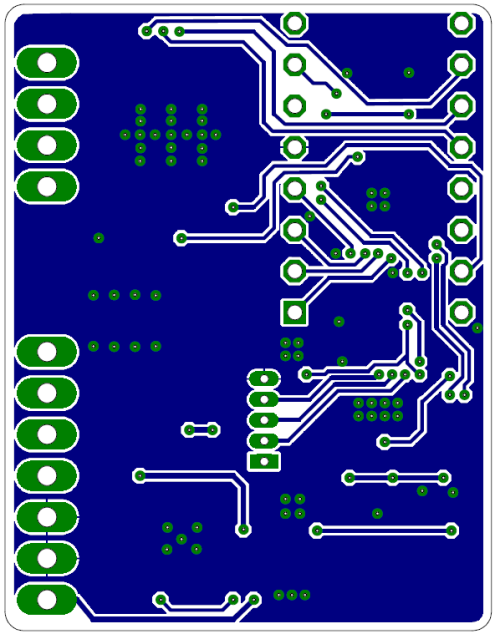


Figure 13 Bottom Layer

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Document reference
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