

Inhaltsverzeichnis

| | |
|----------------------------------|-----------|
| 1 Mainboard | 2 |
| 1.1 MCU | 2 |
| 1.2 Debug | 6 |
| 1.3 Funk | 8 |
| 1.4 Buttons | 10 |
| 1.5 Bluetooth | 12 |
| 1.6 Charge | 14 |
| 1.7 Battery Protection | 16 |
| 1.8 Voltage Regulator | 18 |
| 2 GPS-Board | 20 |

1 Mainboard

1.1 MCU

Der Prozessor wurde hauptsächlich wegen seinem Reichtum an UART-Modulen ausgewählt. Wir benötigen hier drei Stück: GPS, Bluetooth und Debugging über UART-to-USB chip. Außerdem haben wir bereits Erfahrung mit Cortex-M0-Prozessoren wie diesem im Unterricht gesammelt.

Der Controller ist in einem LQFP64 Gehäuse verpackt, das ohne Probleme per Hand gelötet werden kann.

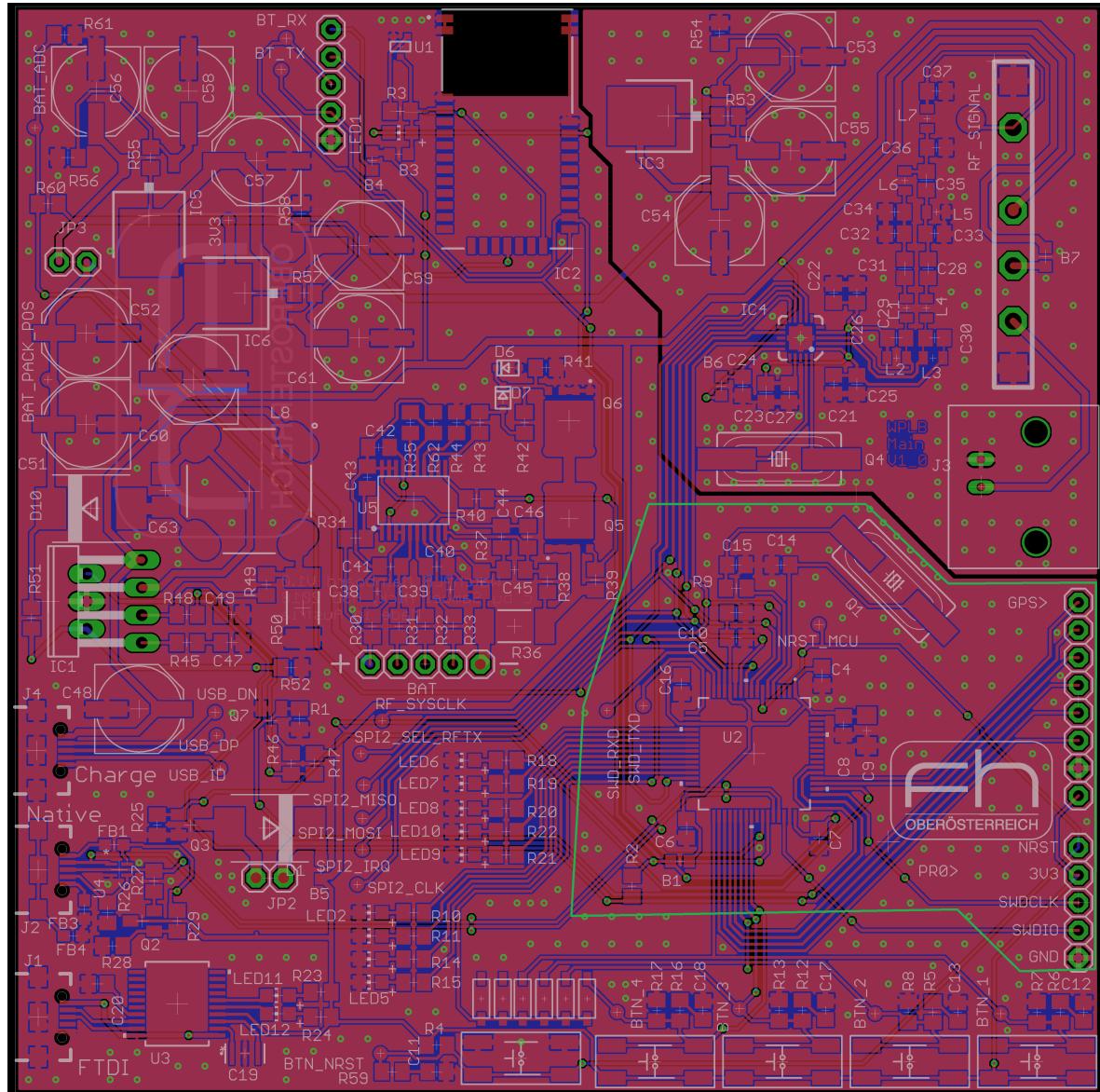


Abbildung 1: Hauptplatine, Baugruppe MCU grün umrahmt

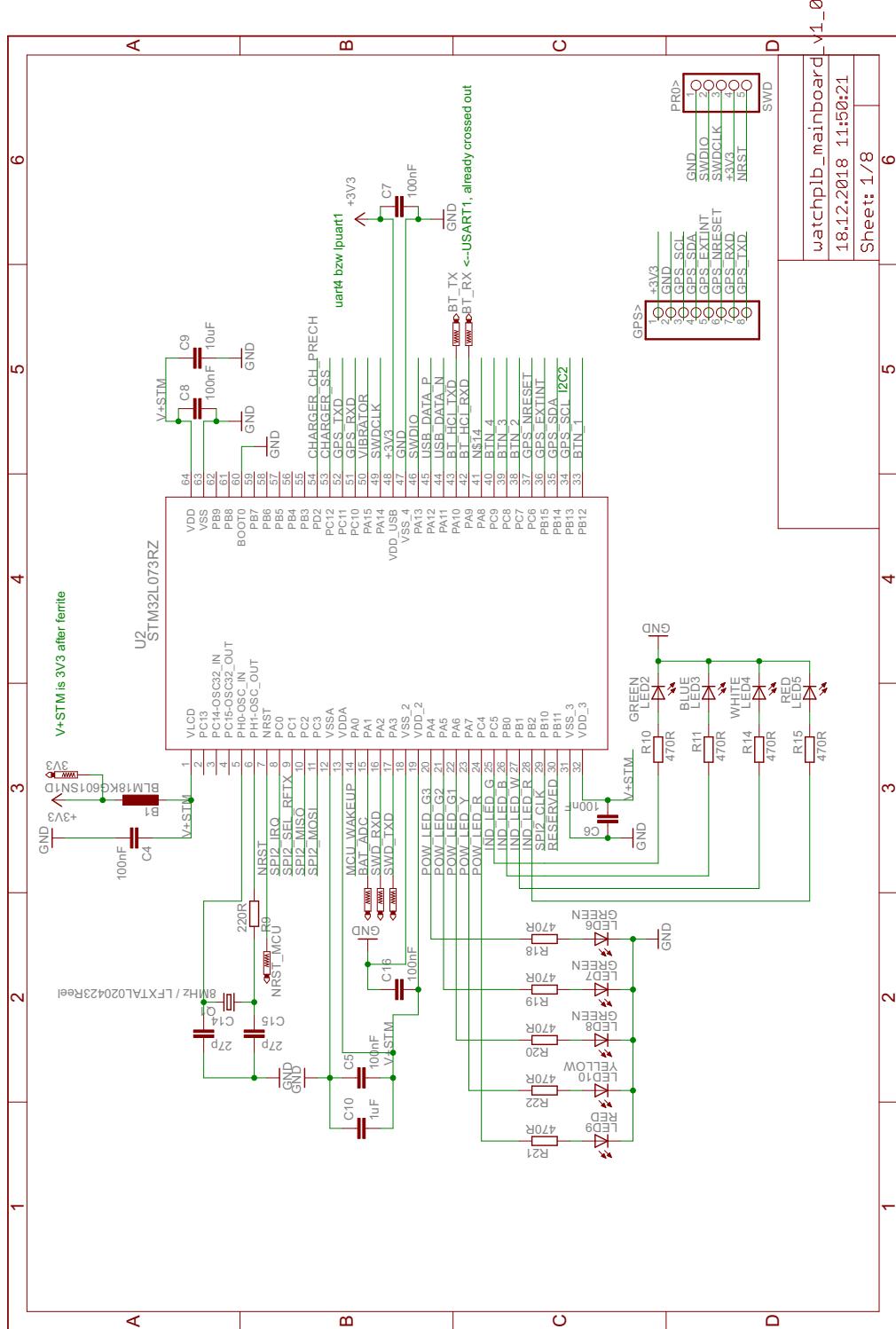


Abbildung 2: Schaltplanteil Mikrocontroller STM32L073RZ



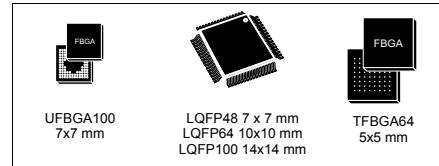
STM32L073x8 STM32L073xB STM32L073xZ

Ultra-low-power 32-bit MCU Arm®-based Cortex®-M0+, up to 192KB Flash, 20KB SRAM, 6KB EEPROM, LCD, USB, ADC, DACs

Datasheet - production data

Features

- Ultra-low-power platform
 - 1.65 V to 3.6 V power supply
 - -40 to 125 °C temperature range
 - 0.29 µA Standby mode (3 wakeup pins)
 - 0.43 µA Stop mode (16 wakeup lines)
 - 0.86 µA Stop mode + RTC + 20 KB RAM retention
 - Down to 93 µA/MHz in Run mode
 - 5 µs wakeup time (from Flash memory)
 - 41 µA 12-bit ADC conversion at 10 kspS
- Core: Arm® 32-bit Cortex®-M0+ with MPU
 - From 32 kHz up to 32 MHz max.
 - 0.95 DMIPS/MHz
- Memories
 - Up to 192 KB Flash memory with ECC (2 banks with read-while-write capability)
 - 20KB RAM
 - 6 KB of data EEPROM with ECC
 - 20-byte backup register
 - Sector protection against R/W operation
- Up to 84 fast I/Os (78 I/Os 5V tolerant)
- Reset and supply management
 - Ultra-safe, low-power BOR (brownout reset) with 5 selectable thresholds
 - Ultra-low-power POR/PDR
 - Programmable voltage detector (PVD)
- Clock sources
 - 1 to 25 MHz crystal oscillator
 - 32 kHz oscillator for RTC with calibration
 - High speed internal 16 MHz factory-trimmed RC (+/- 1%)
 - Internal low-power 37 kHz RC
 - Internal multispeed low-power 65 kHz to 4.2 MHz RC
 - Internal self calibration of 48 MHz RC for USB
 - PLL for CPU clock
- Pre-programmed bootloader
 - USB, USART supported
- Development support
 - Serial wire debug supported
- LCD driver for up to 4x52 or 8x48 segments



- Support contrast adjustment
- Support blinking mode
- Step-up converter on board
- Rich Analog peripherals
 - 12-bit ADC 1.14 Msps up to 16 channels (down to 1.65 V)
 - 2 x 12-bit channel DACs with output buffers (down to 1.8 V)
 - 2x ultra-low-power comparators (window mode and wake up capability, down to 1.65 V)
- Up to 24 capacitive sensing channels supporting touchkey, linear and rotary touch sensors
- 7-channel DMA controller, supporting ADC, SPI, I2C, USART, DAC, Timers
- 11x peripheral communication interfaces
 - 1x USB 2.0 crystal-less, battery charging detection and LPM
 - 4x USART (2 with ISO 7816, IrDA), 1x UART (low power)
 - Up to 6x SPI 16 Mbits/s
 - 3x I2C (2 with SMBus/PMBus)
- 11x timers: 2x 16-bit with up to 4 channels, 2x 16-bit with up to 2 channels, 1x 16-bit ultra-low-power timer, 1x SysTick, 1x RTC, 2x 16-bit basic for DAC, and 2x watchdogs (independent/window)
- CRC calculation unit, 96-bit unique ID
- True RNG and firewall protection
- All packages are ECOPACK®2

Table 1. Device summary

| Reference | Part number |
|-------------|--|
| STM32L073x8 | STM32L073V8 |
| STM32L073xB | STM32L073VB, STM32L073RB, STM32L073CB |
| STM32L073xZ | STM32L073VZ, STM32L073RZ, STM32L073CZ |

September 2017

DocID027096 Rev 4

1/143

This is information on a product in full production.

www.st.com

Abbildung 3: Kurze Zusammenfassung der Features des STM32L073RZ auf der ersten Seite des Datenblattes

1.2 Debug

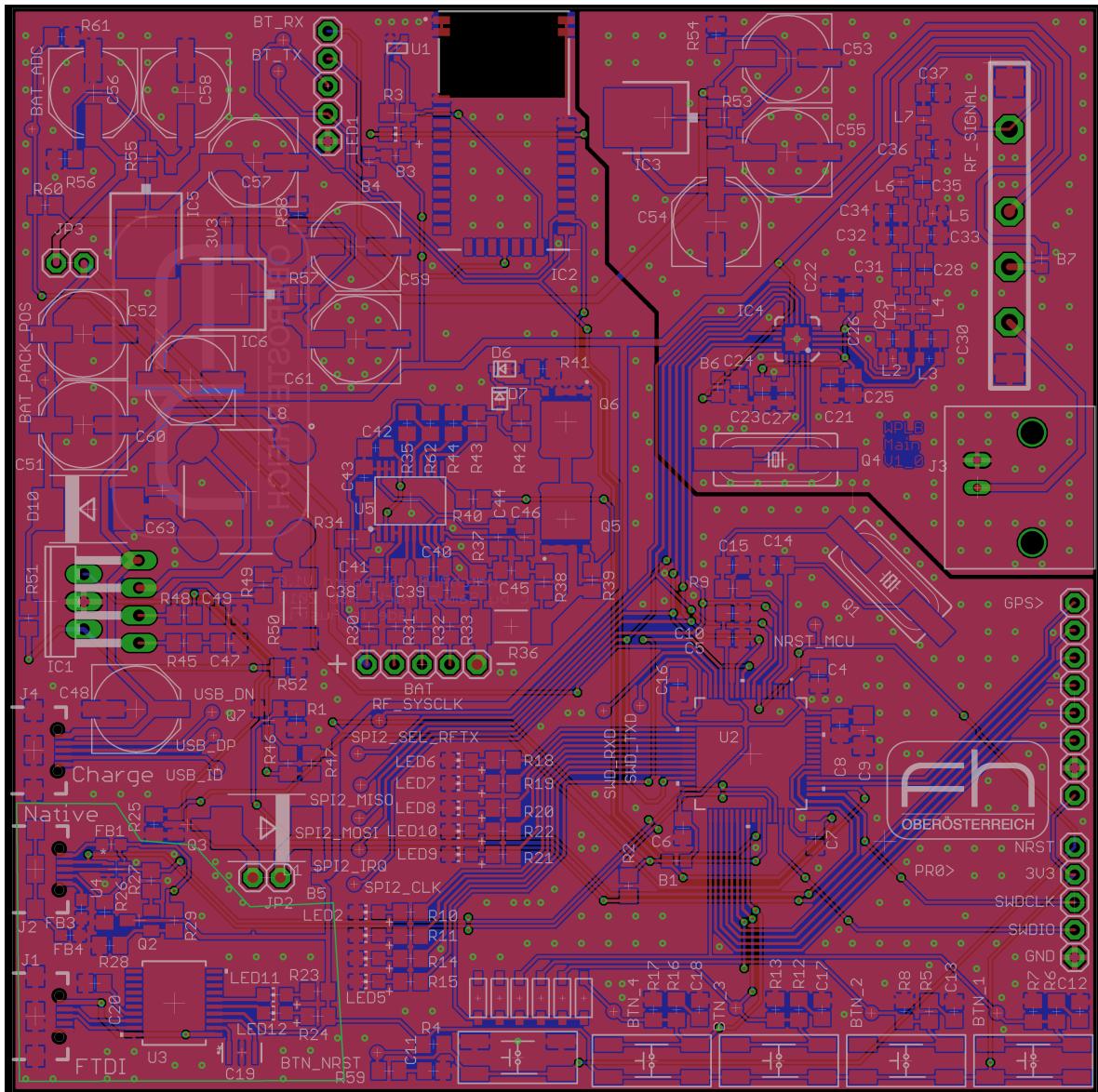


Abbildung 4: Hauptplatine, Baugruppe Debug grün umrahmt

USB Virtual COM Port

with USB-to-UART Chip
with USB integrated in STM32

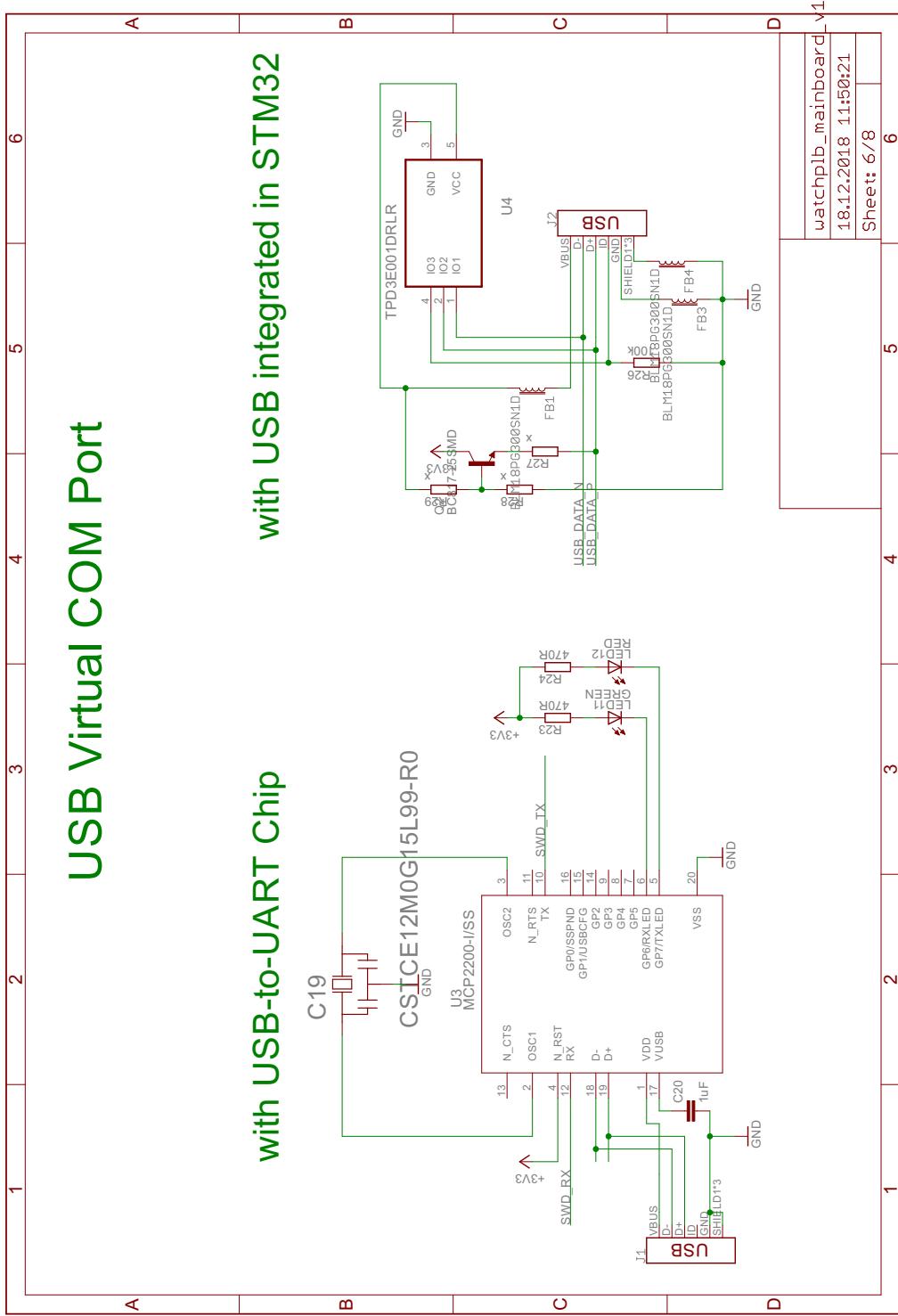


Abbildung 5: USB-To-UART und USB des STM

18.12.2018 11:50:53 C:\Users\samuel\Documents\watchPI\Mainboard\watchplib_mainboard_v1_0.sch (Sheet: 6/8)

1.3 Funk

Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter

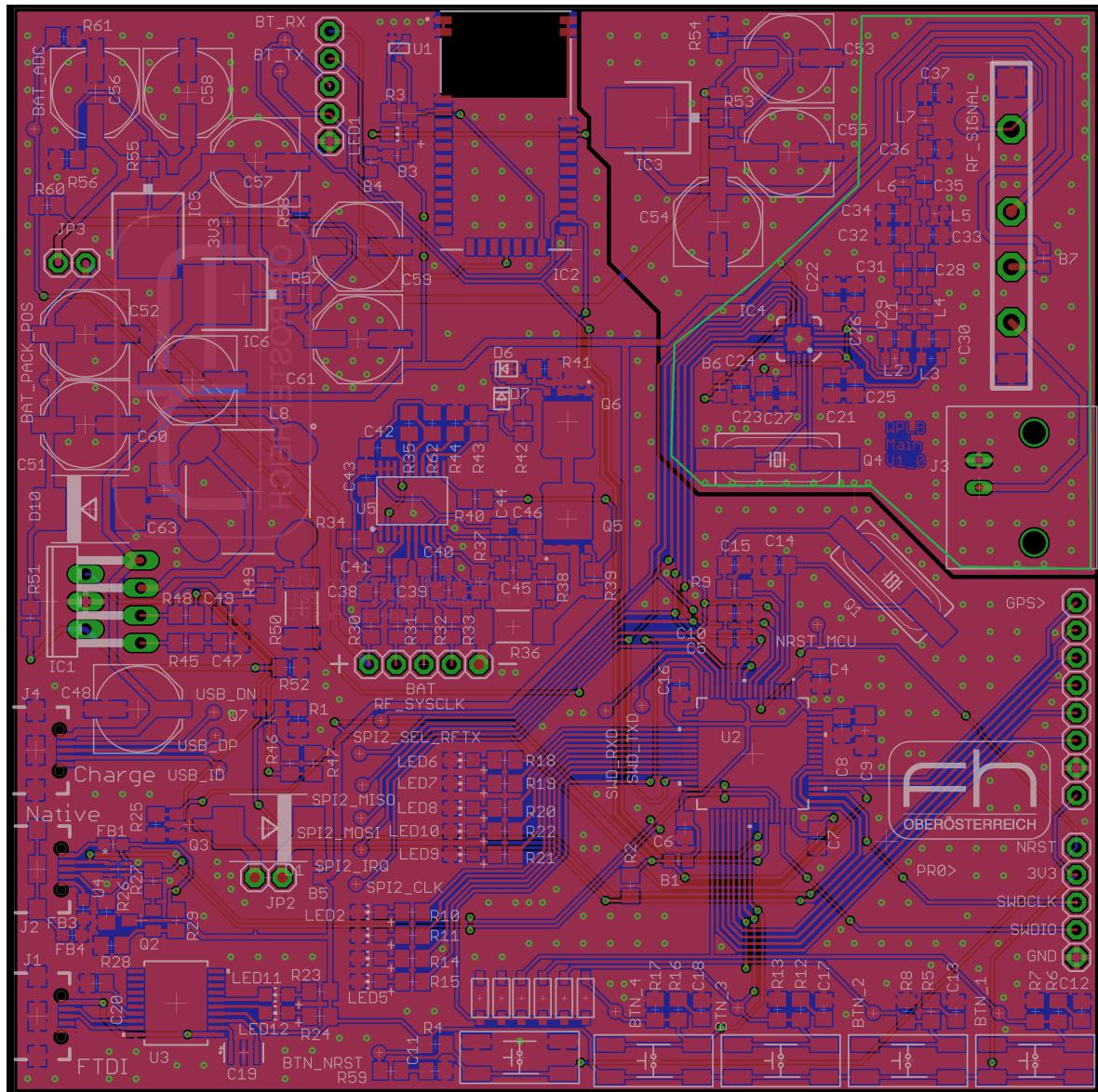


Abbildung 6: Hauptplatine, Baugruppe Funk grün umrahmt

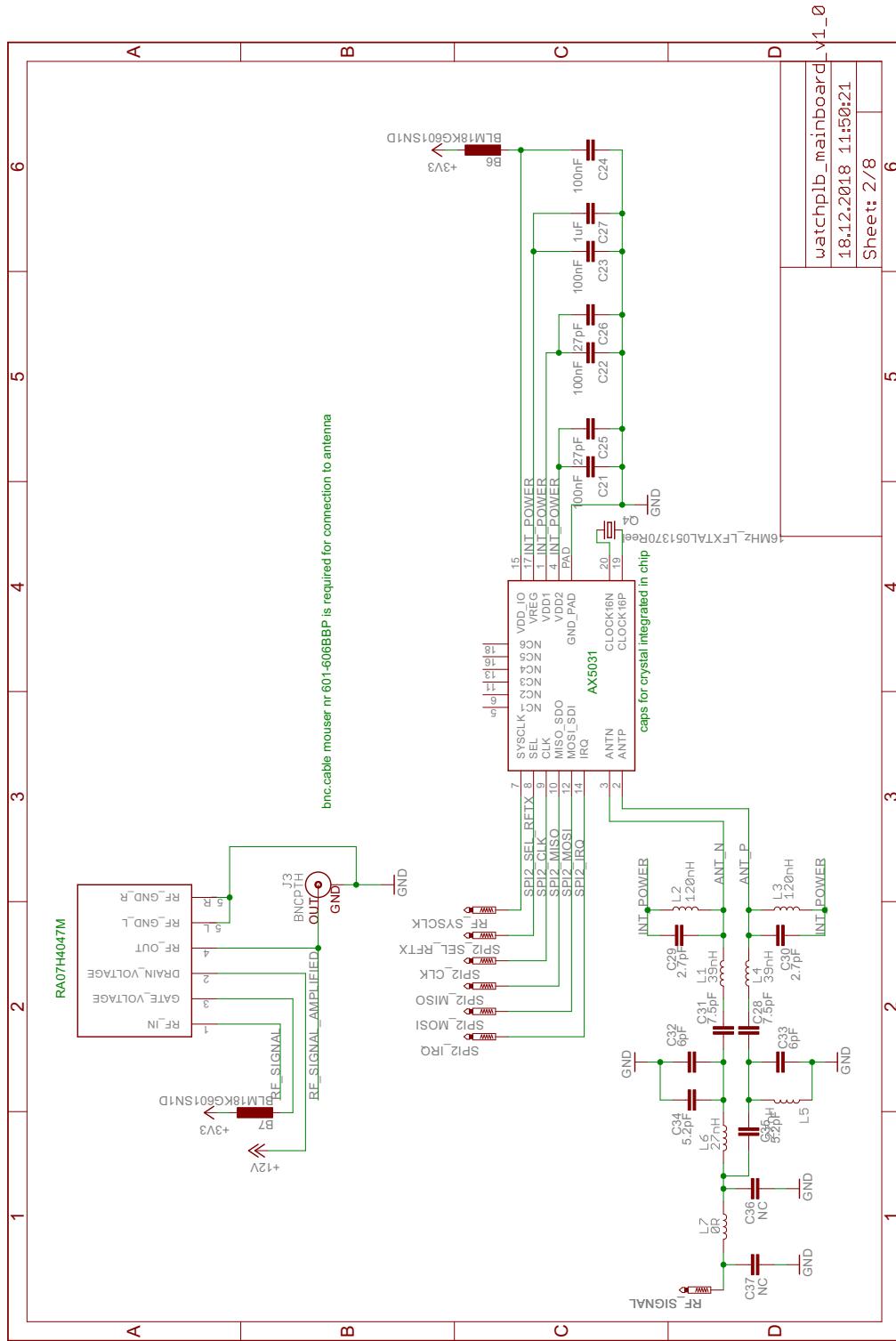


Abbildung 7: Funk

18.12.2018 11:50:53 C:\Users\samuel\Documents\watchp1b_Mainboard\watchp1b_mainboard_v1_0.sch (Sheet: 2/8)

1.4 Buttons

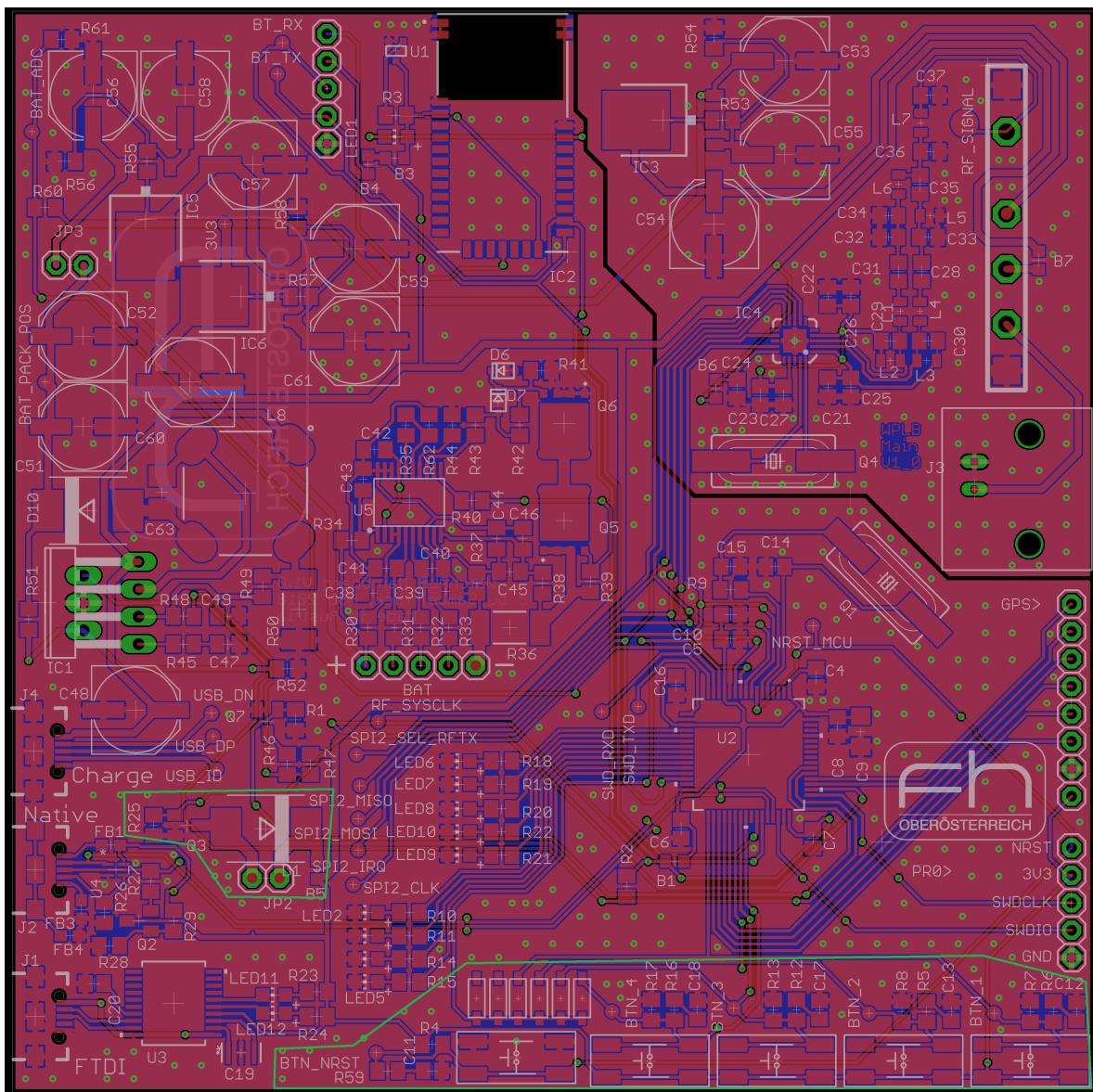
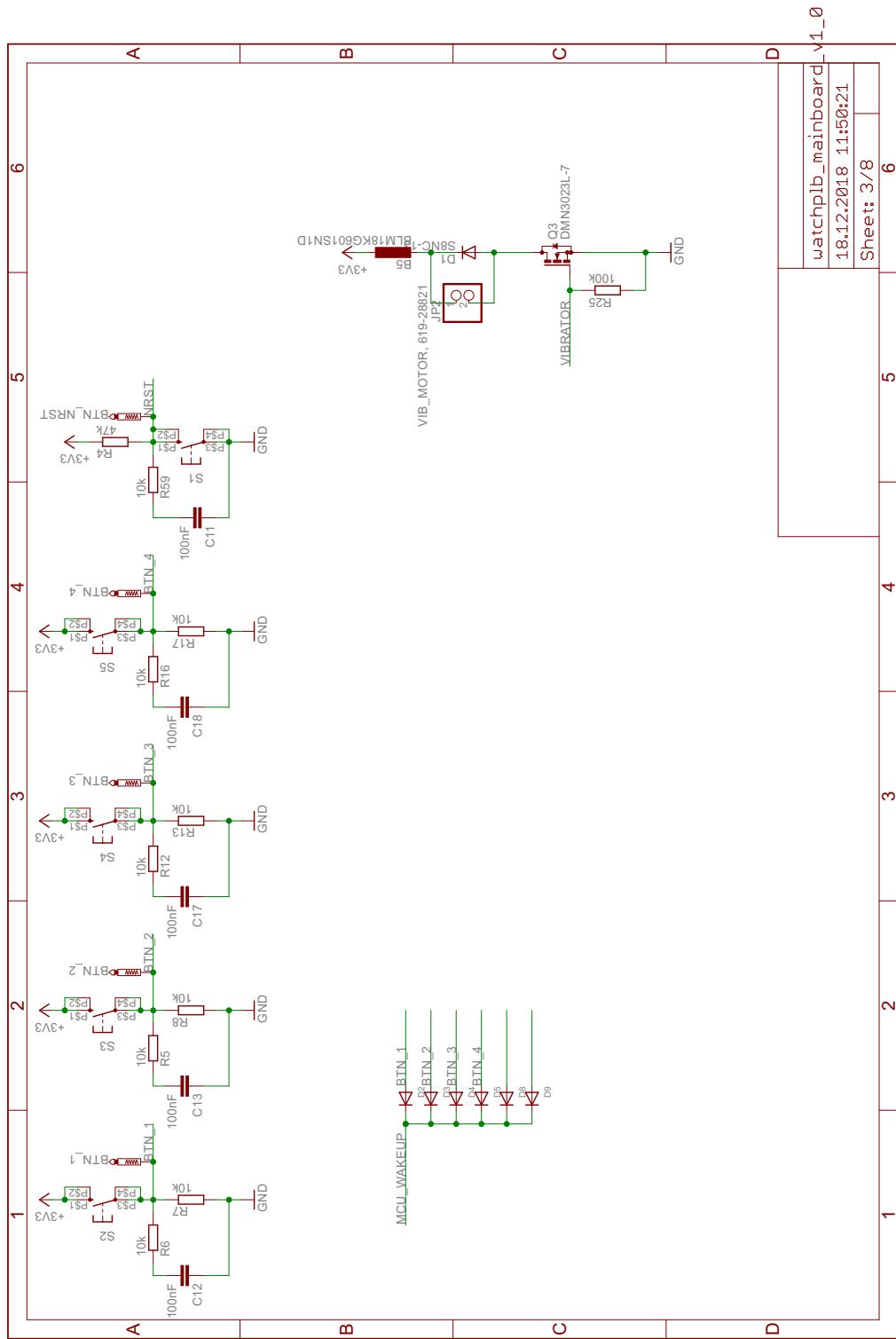


Abbildung 8: Hauptplatine, Baugruppe Buttons grün umrahmt



18.12.2018 11:50:53 C:\Users\samuel\Documents\watchPI\Mainboard\watchPI_mainboard_v1_0.sch (Sheet: 3/8)

Abbildung 9: Taster, WakeUp, Vibrationsmotor

1.5 Bluetooth

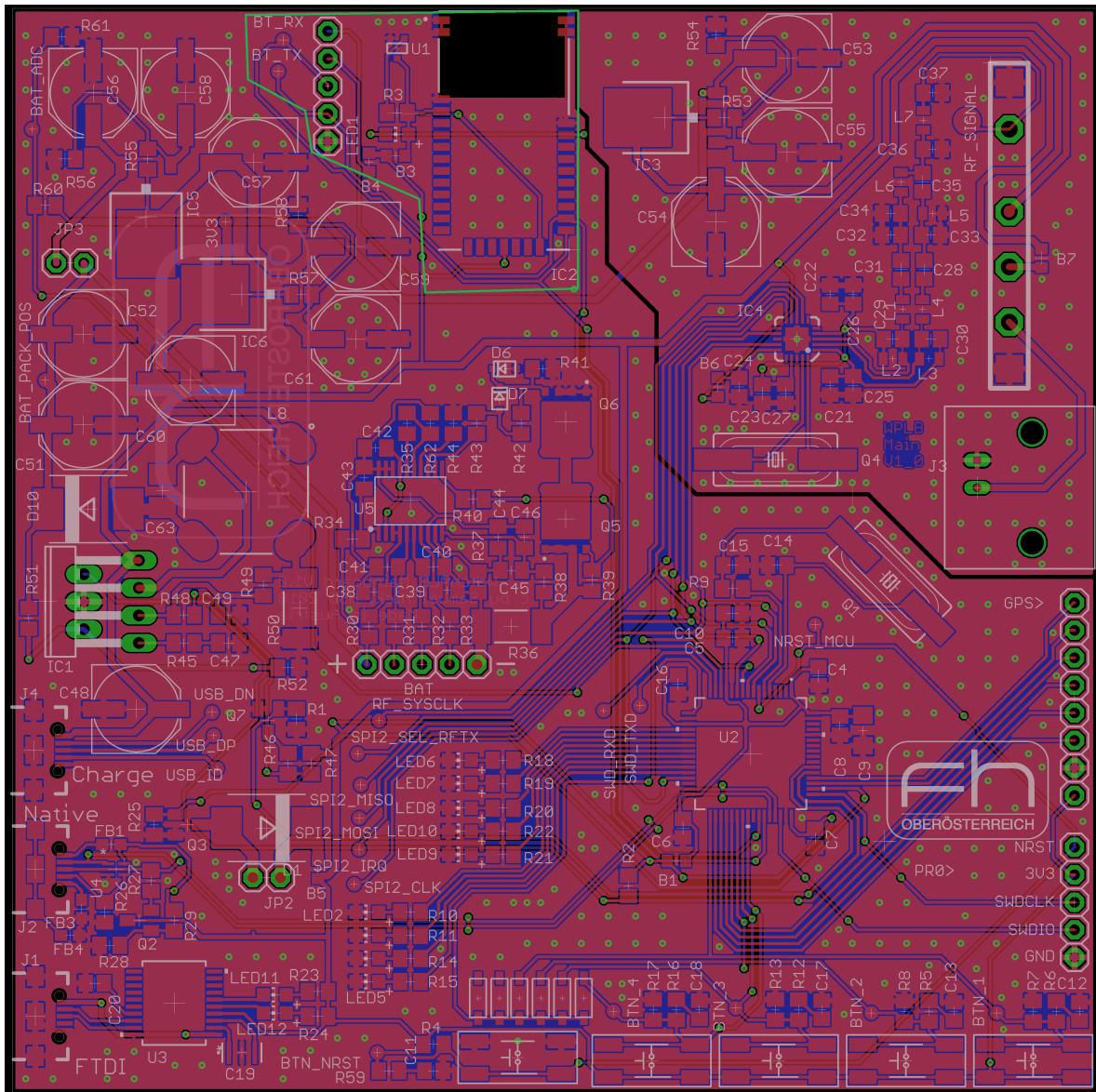


Abbildung 10: Hauptplatine, Baugruppe Bluetooth grün umrahmt

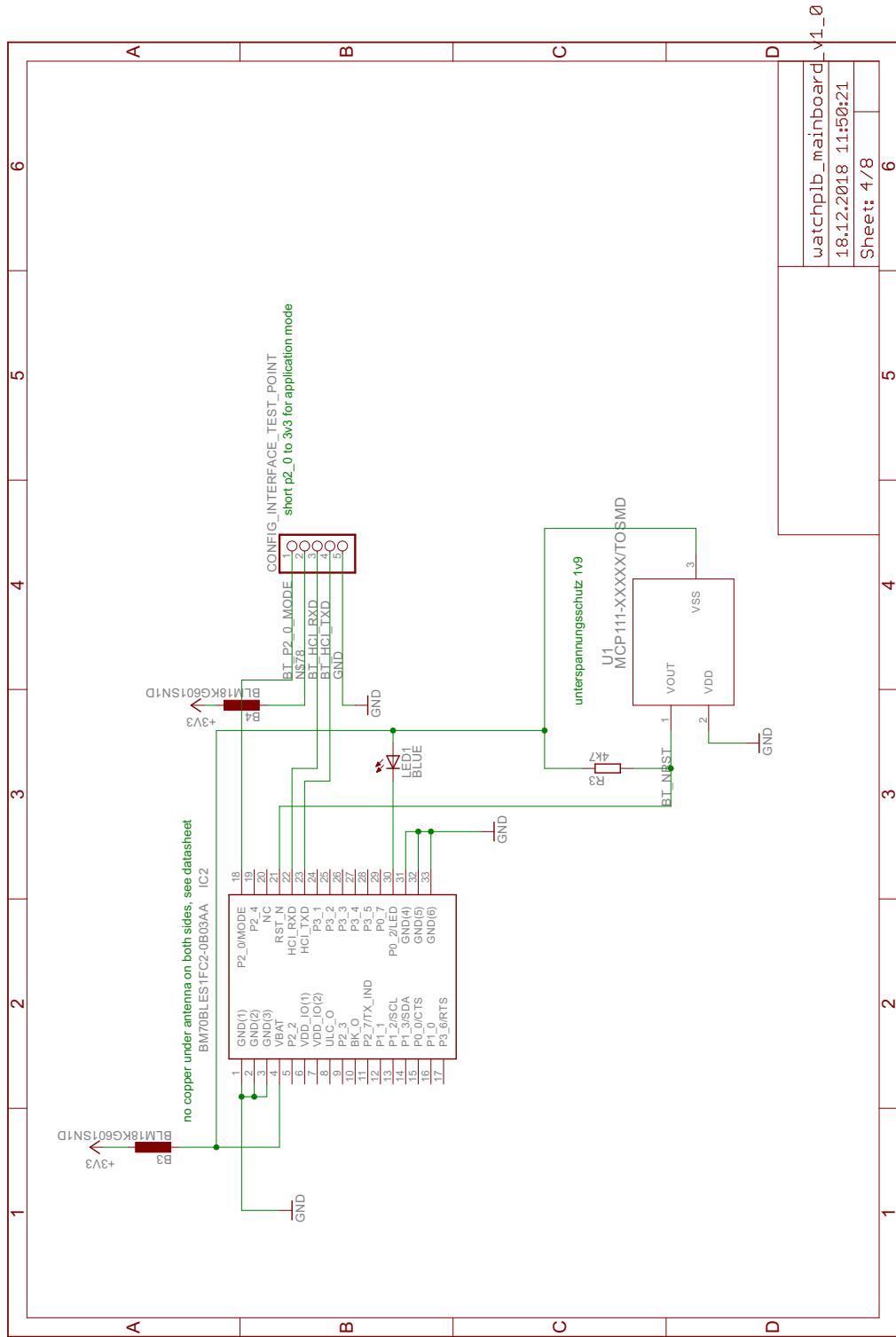
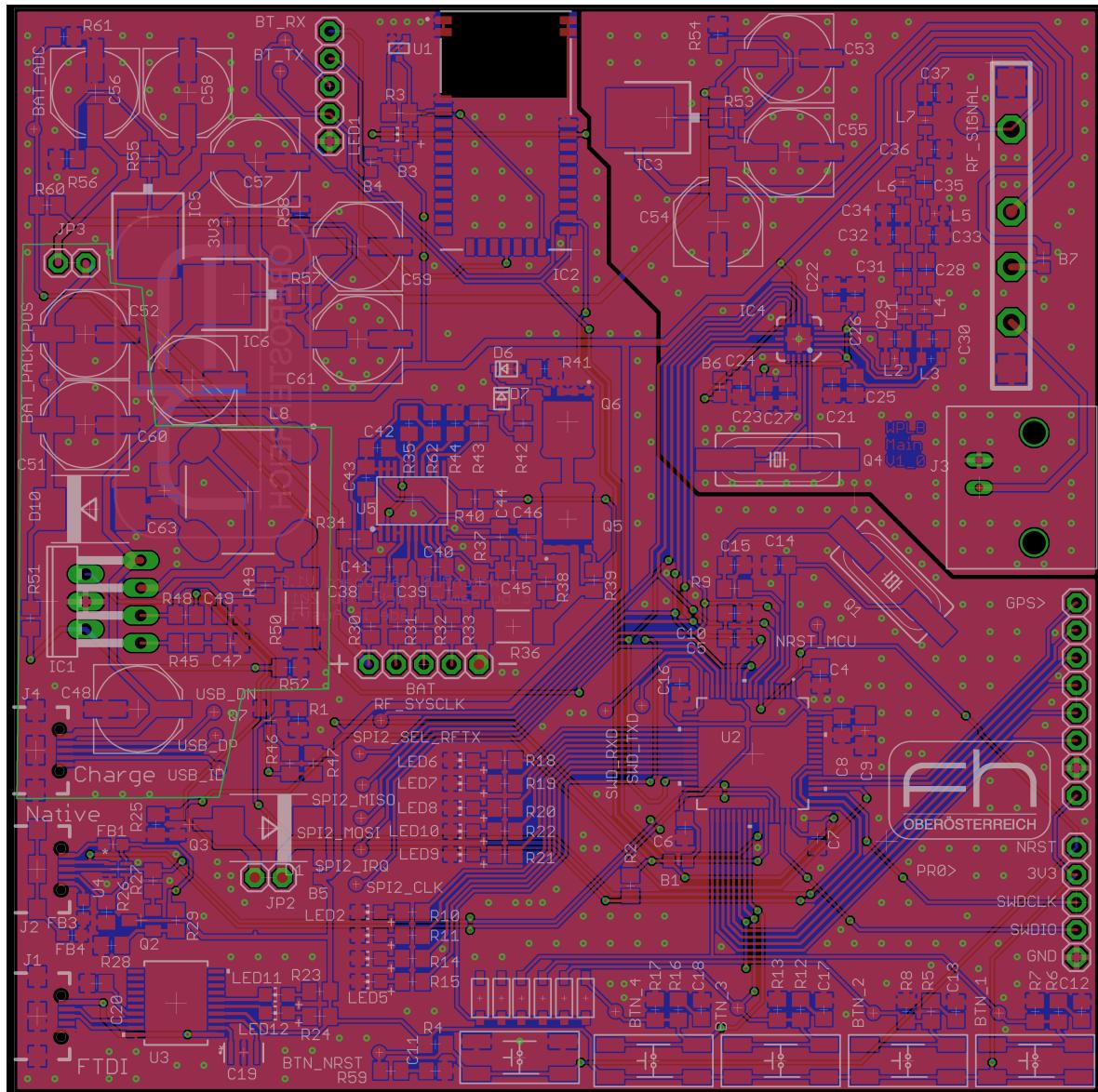


Abbildung 11: Bluetooth-Modul

1.6 Charge

Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter



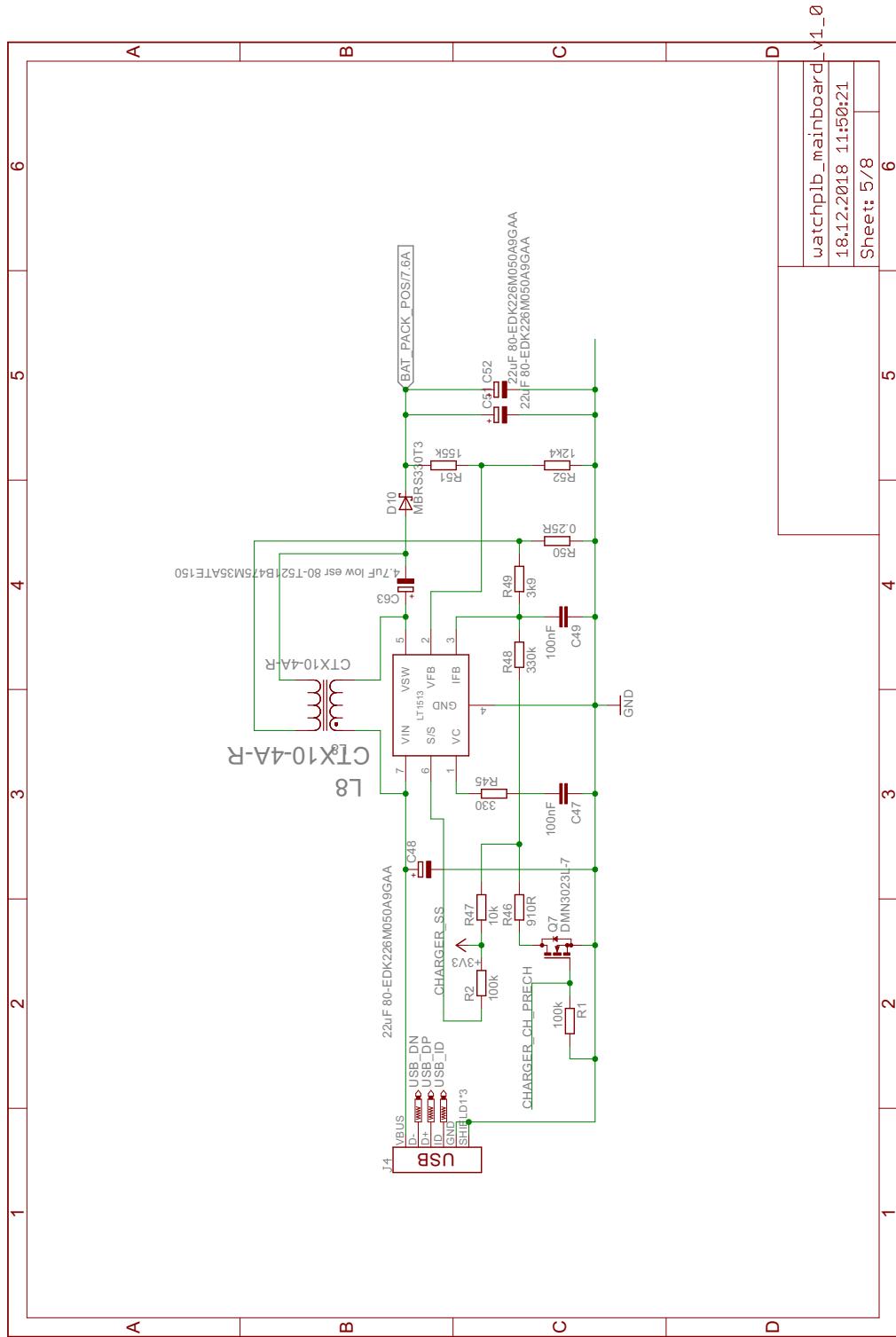


Abbildung 13: Akkuladeschaltung

18.12.2018 11:50:53 C:\Users\samuel\Documents\watchPi\Mainboard\watchPi_mainboard_v1_0.sch (Sheet: 5/8)

1.7 Battery Protection

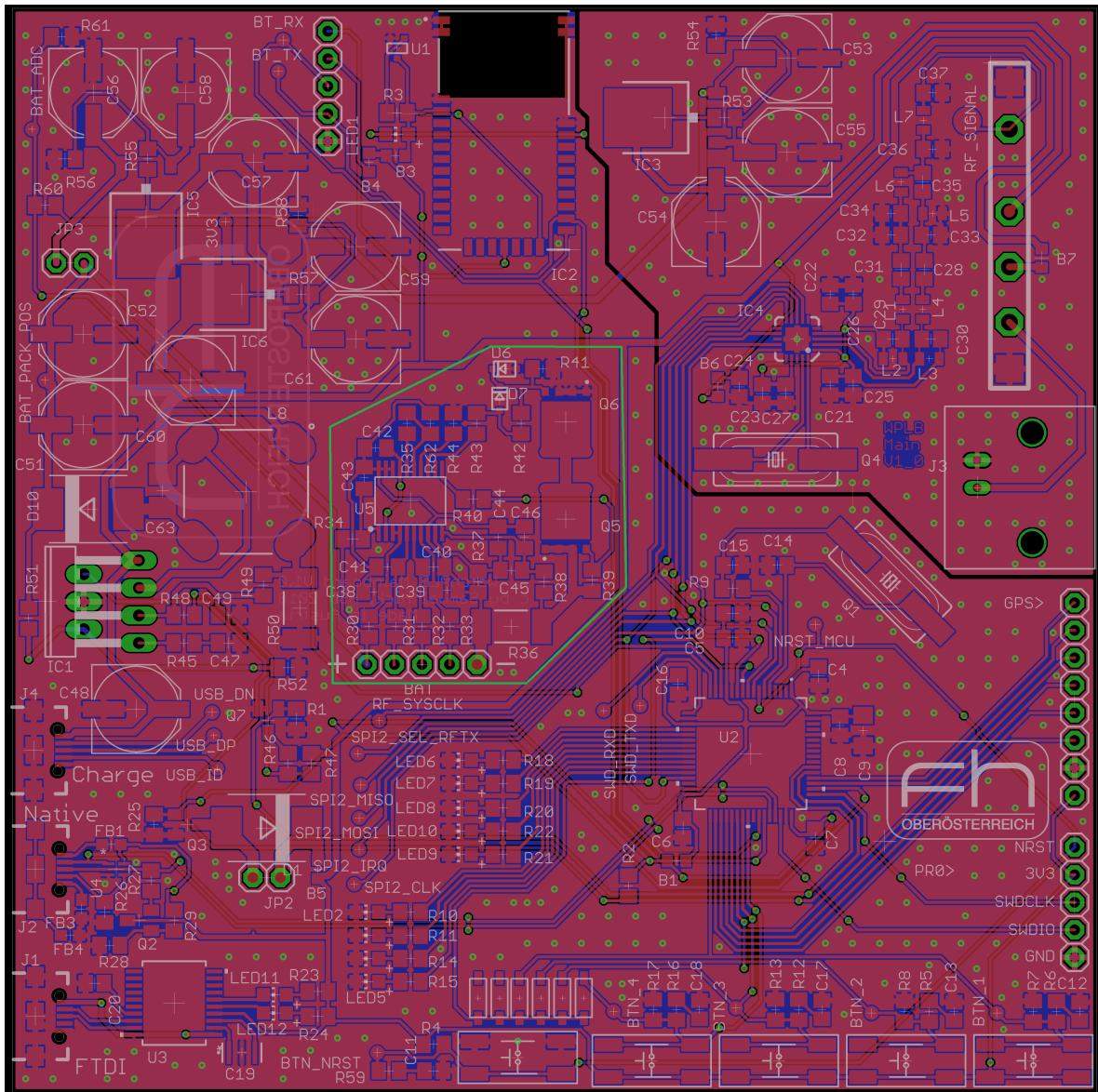


Abbildung 14: Hauptplatine, Baugruppe Battery Protection umrahmt

Battery Protection

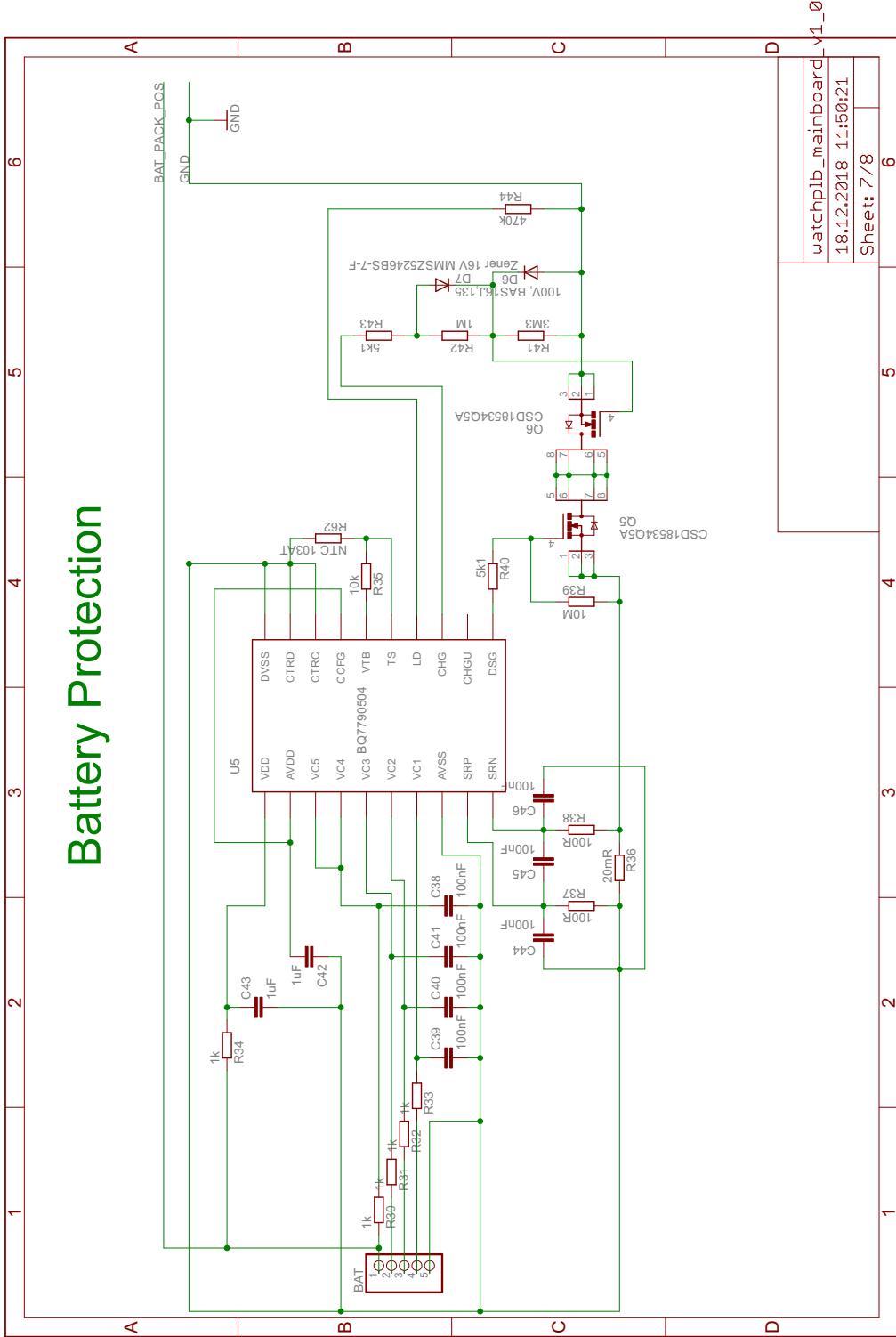


Abbildung 15: Lithium-Ionen-Akku Schutzschaltung

1.8 Voltage Regulator

Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter
Platzhalter

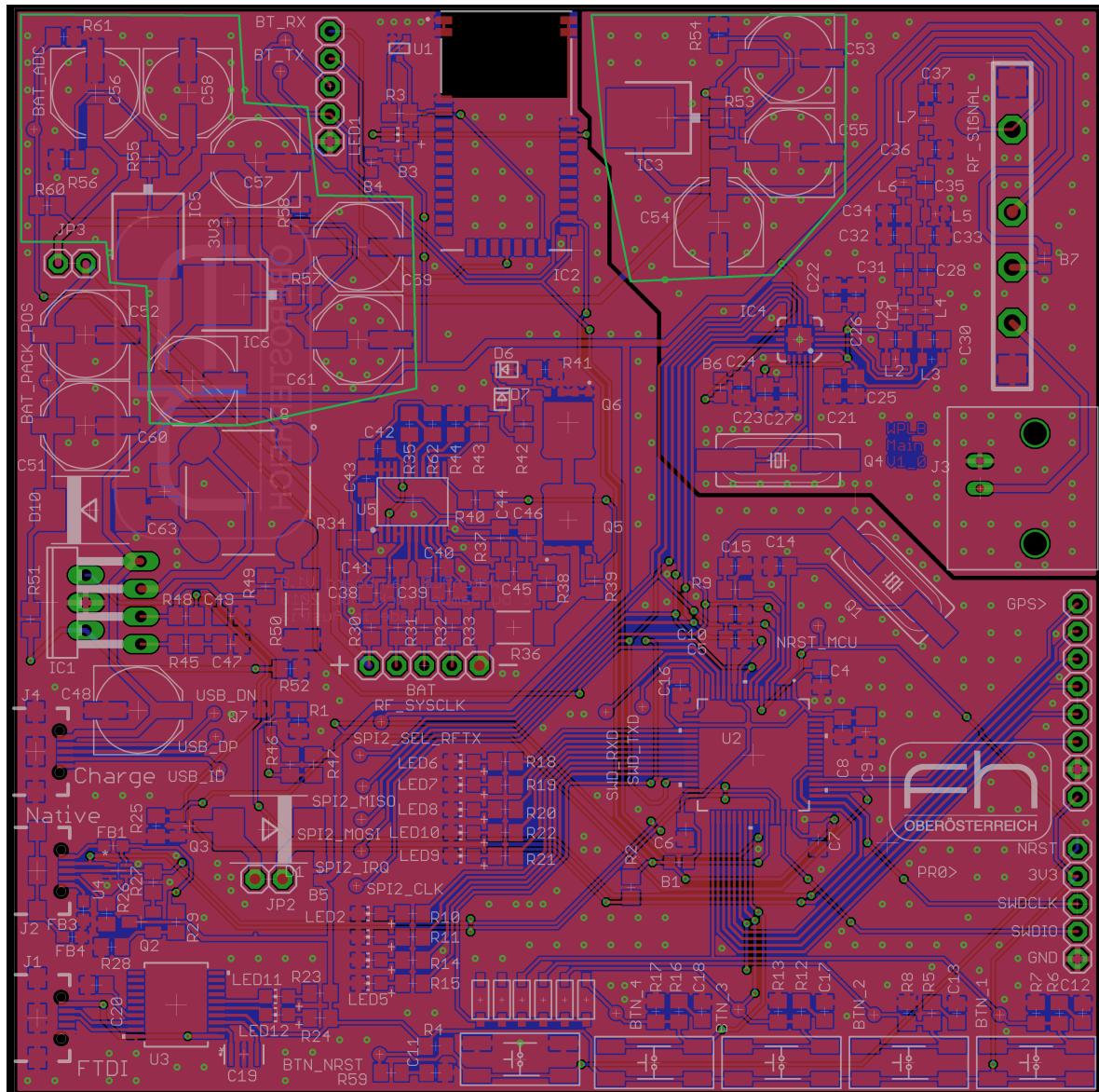


Abbildung 16: Hauptplatine, Baugruppe VREG umrahmt

Linear Voltage Regulators

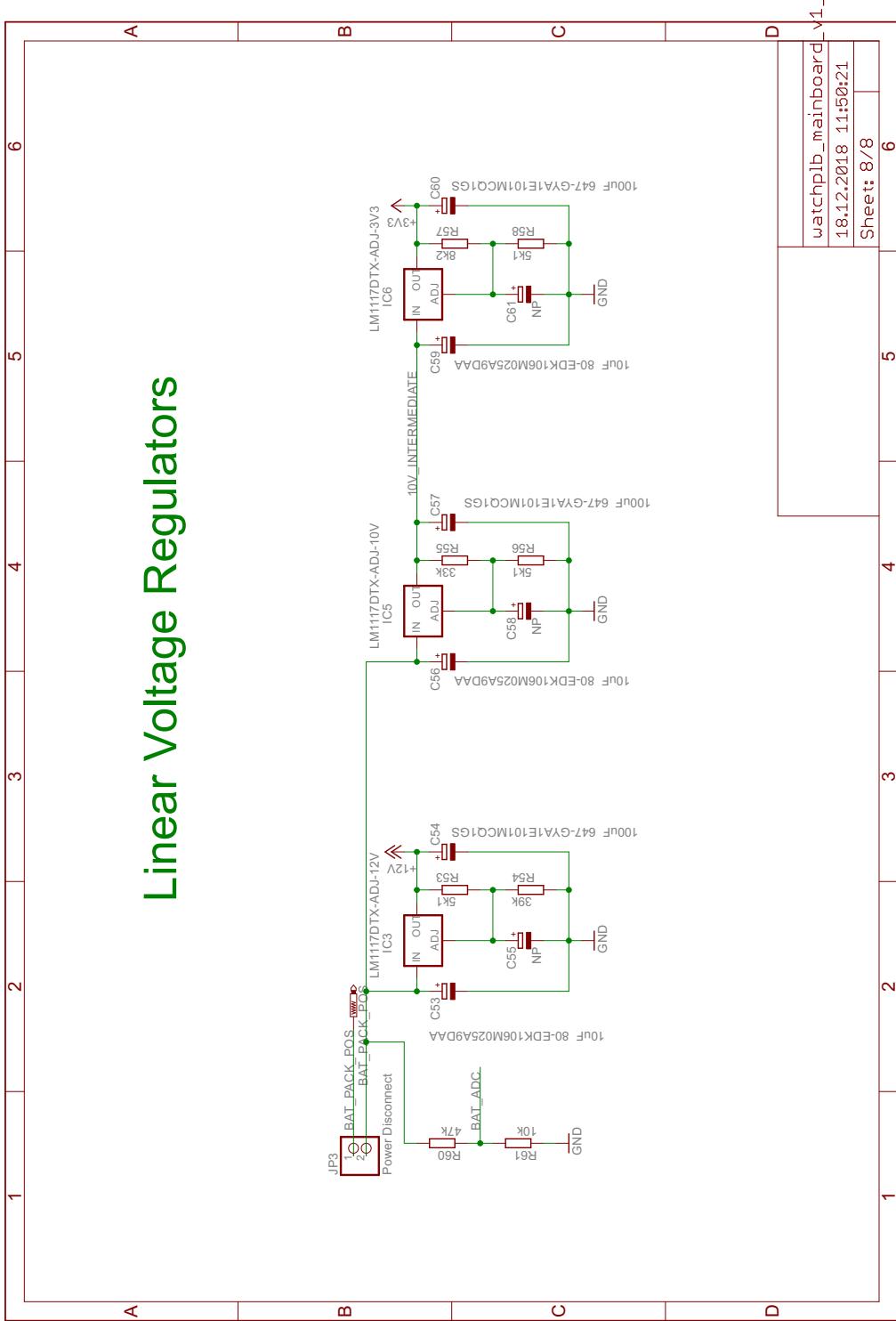


Abbildung 17: Spannungsregler

18.12.2018 11:50:53 C:\Users\samuel\Documents\watchPI\B\eeagle\Mainboard\watchPI_mainboard_v1_0.sch (Sheet: 8/8)

2 GPS-Board

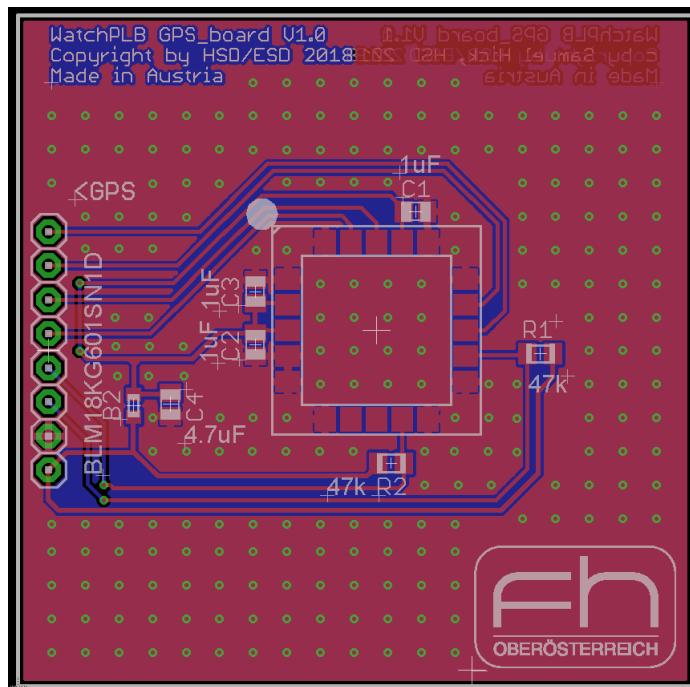


Abbildung 18: Platine des GPS-Moduls

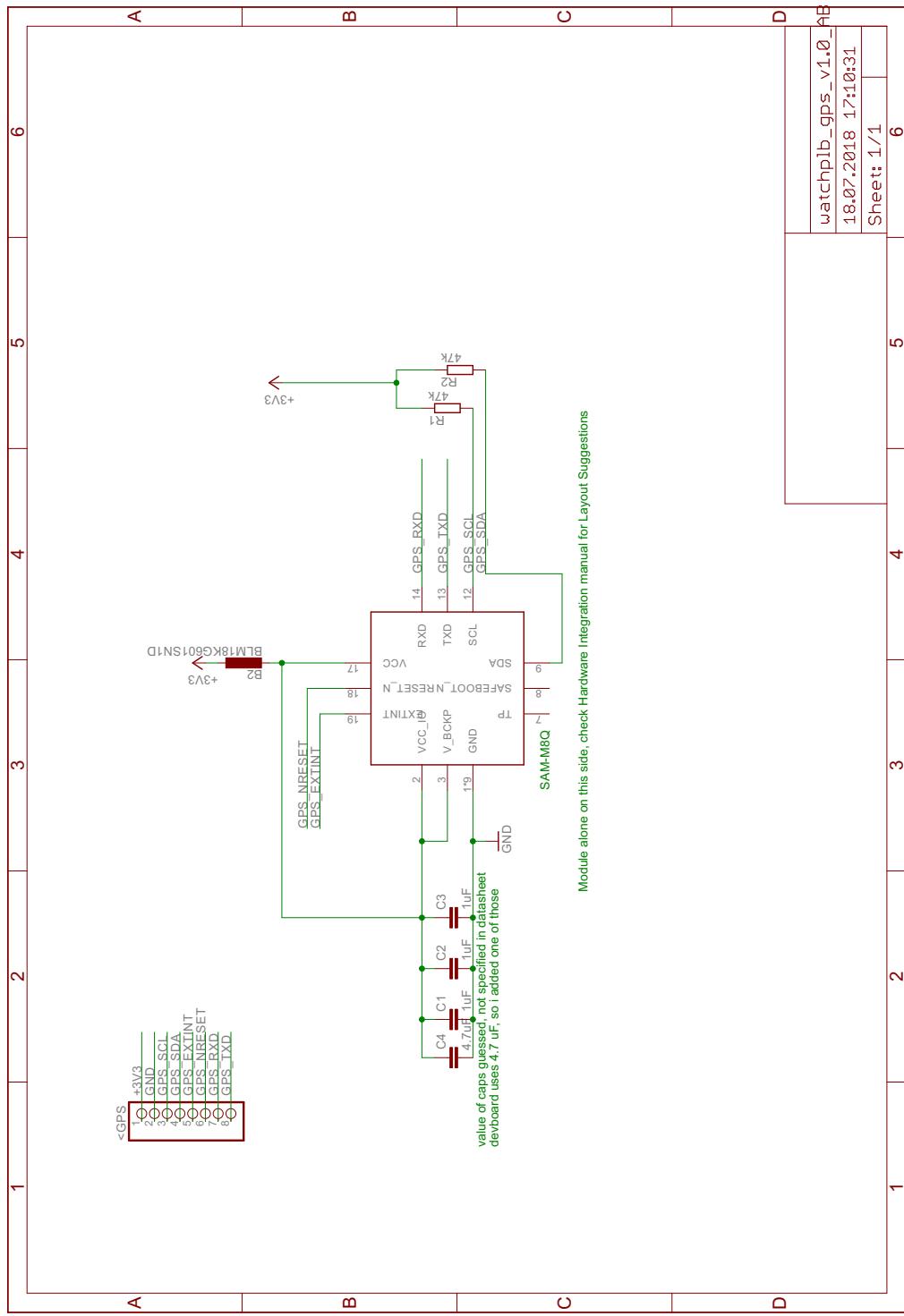


Abbildung 19: GPS-Modul

08.01.2019 11:31:03 C:\Users\samuel\Documents\watchplib_gps_v1.0_AB.sch (Sheet: 1/1)