

BOOT1 BOOT0 Mode
x 0 Main flash
0 1 System memory
1 1 Embedded SRAM
Pattern1 Boot0(pin) = 1 and Boot1(pin) = 0

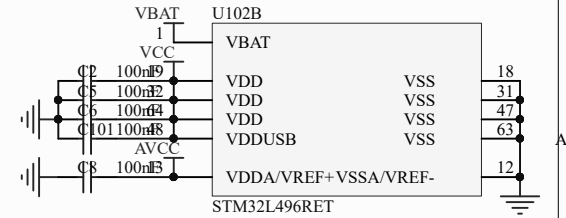
Programming / debug connector:
P_SW_CLK
P_SW_DIO
P_SWO
NRST

PA6 with internal pullup. RTC_INT
pulled up to Vbat. Diode protects PA6
from sinking current.

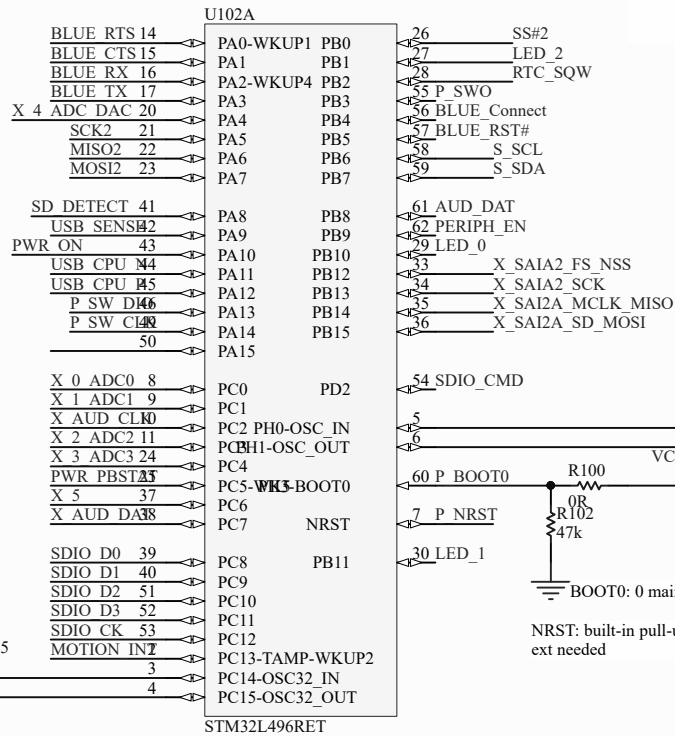
Motion int: must be on a counter and
edge detect

todo:
- pull down on power switch
- bluetooth connect on wake up
interrupt
X power low/high control

ADC:
PA0: ADC1_IN0
PA1: ADC1_IN1
PA2: ADC1_IN2
PA3: ADC1_IN3
PA4: ADC1_IN4
PA5: ADC1_IN5
PA6: ADC1_IN6
PA7: ADC1_IN7
PB0: ADC1_IN8
PB1: ADC1_IN9



BT:
- BLUE_TX is output
- BLUE_RTS is output
STM:
- RX is input
- CTS is input



SPI2: motion sensor:
SPI pins: PB 12, 13, 14, 15
Motion Interrupt: ??
Motion int: must be on a counter and
edge detect

I2C main bus: I2C1
SCL: PB8, SDA: PB9

STM32F401 has embedded pull up so DB pull-up not

USB_SENSE: must use 5V-tolerant pin (PA9 is
5V-tol)
USB powered but LTC off -> max 3.6V tolerance
-> use voltage divider

SPI1: SD card
SPI pins: PA4, PA5, PA7, PB4
SPI_SCK with SWO debug wire

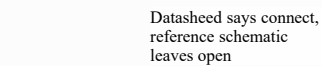
USART2: Bluetooth
Pin direction checked.

App note AN2867
CL: specified by manufacturer
ABS04W-32.768KHZ-6-D2-T5:
CL=6pF
Cs = 5pF (AN2867 gives as example)
CL = CL1xCL2/(CL1+CL2)+Cs
CL = CL1^2/2CL1+Cs
2(CL-Cs)=CL1=CL2
CL = 6pF
Cs = 5pF
CL1=CL2 = 2pF

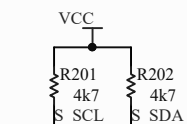
OLD 12MHZ crystal
App note AN2867
CL: specified by manufacturer
ABM10-166-12.000MHZ-T3: CL=8pF
Cs = 5pF (AN2867 gives as example)
CL = CL1xCL2/(CL1+CL2)+Cs
CL = CL1^2/2CL1+Cs
2(CL-Cs)=CL1=CL2
CL = 8pF
Cs = 5pF
CL1=CL2 = 6pF

New 16 MHz crystal
App note AN2867
CL: specified by manufacturer
ABM11-16MHZ-12: CL=12pF
Cs = 5pF (AN2867 gives as example)
CL = CL1xCL2/(CL1+CL2)+Cs
CL = CL1^2/2CL1+Cs
2(CL-Cs)=CL1=CL2
CL = 12pF
Cs = 5pF
CL1=CL2 = 14pF

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Size	Number	Revision
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Date:	31.03.2022	Sheet of
File:	D:\wearlab\Logic 1a stm.SchDoc	Drawn By:



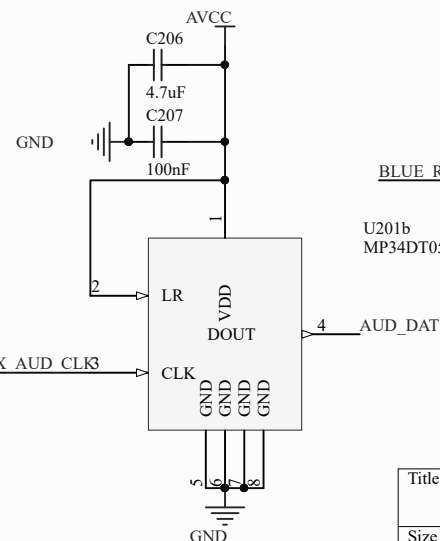
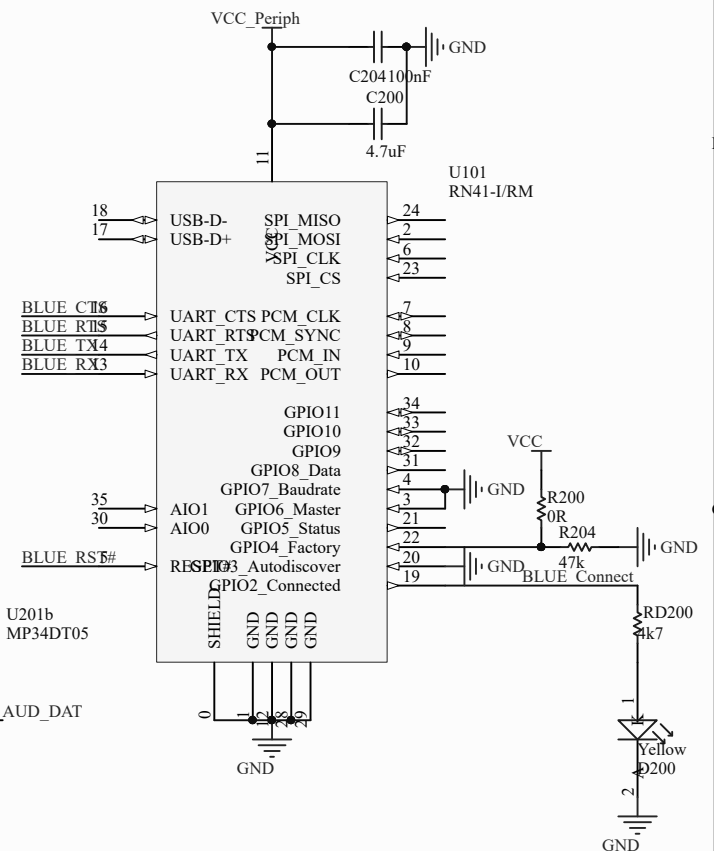
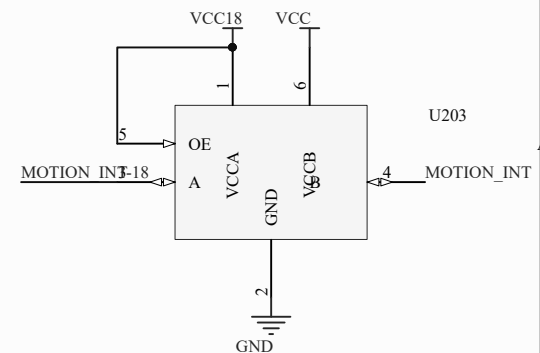
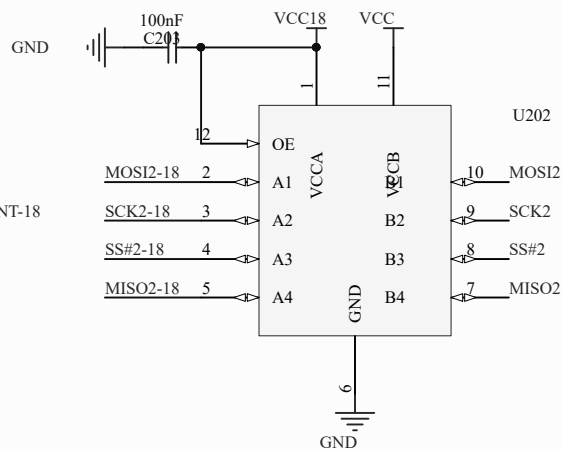
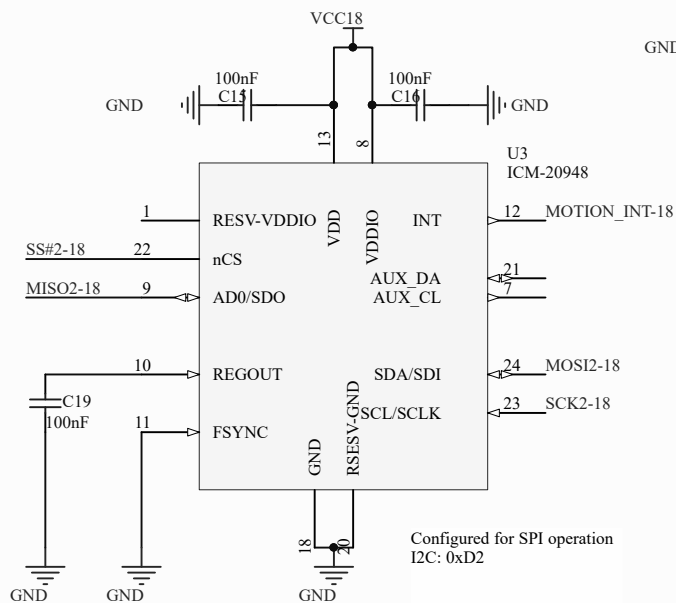
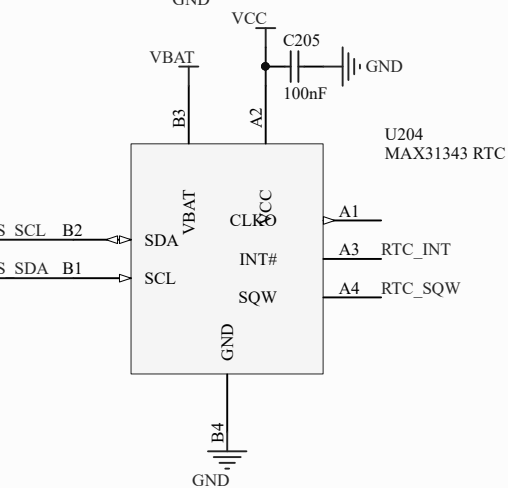
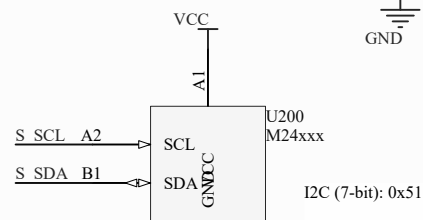
PU to avoid conflicts during ISP



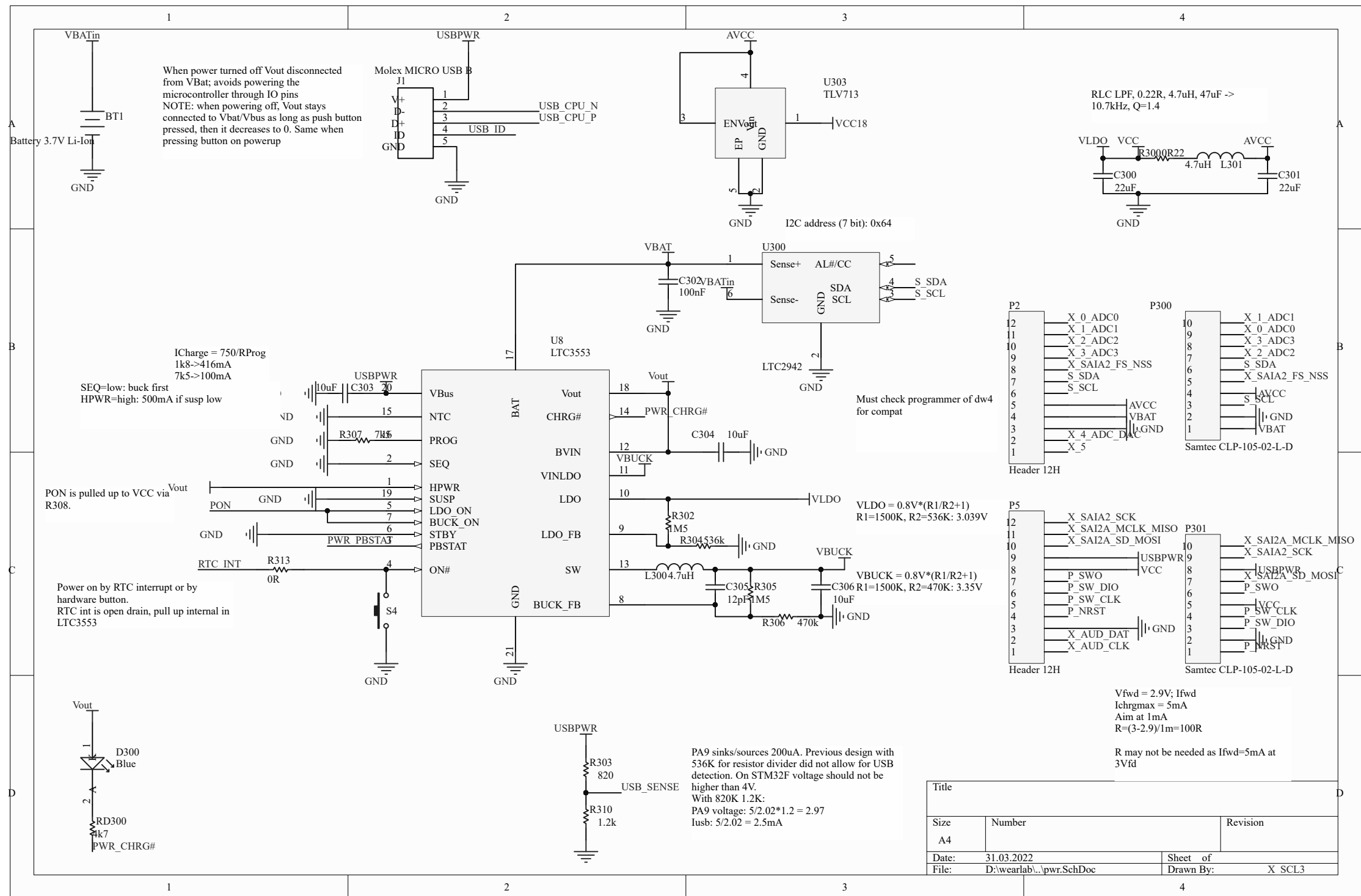
Freq<100kHz:
 $R_{min}=(V_{cc}-0.4V)/3mA$,
 $R_{max}=1000ns/C_{bus}$

Freq>100kHz:
 $R_{min} = (V_{cc} - 0.4V) / 3mA$
 $R_{max} = 300ns / C_{bus}$

Cbus = 10pF per device pin



Title		
Size A4	Number	Revision
Date:	31.03.2022	Sheet of
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Has to operate with Vbat: 3.4V-4.3V

== Falling edge detector on PWR_ON==

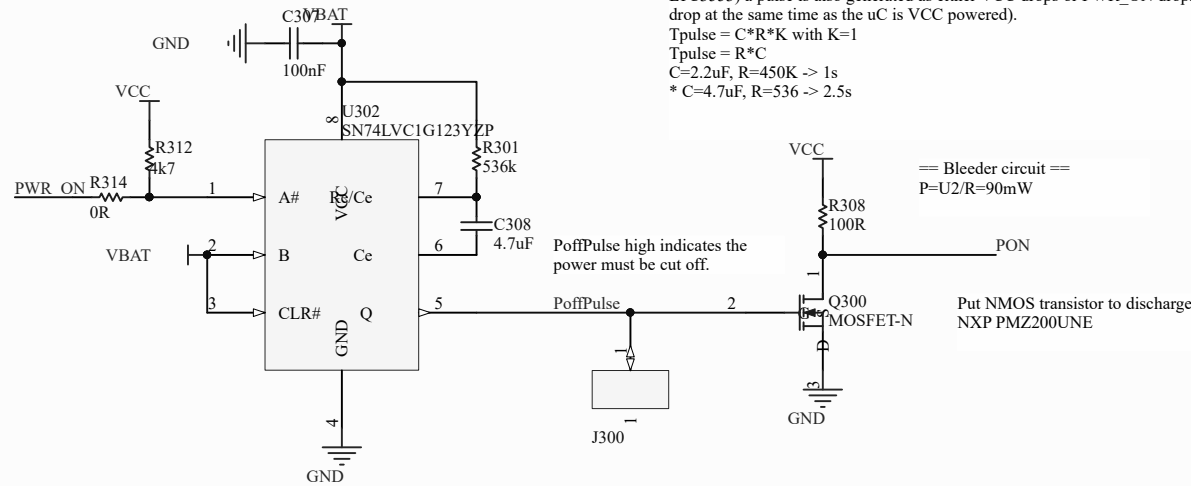
This generates a positive pulse on the falling edge of PWR_ON (CPU controlled) or when VCC drops (e.g. through HRST). PWR_ON is a uC digital out and is pulled up to keep the supply active when the CPU is unprogrammed, in reset, or undergoing programming. Consequently, if VCC falls due to other reasons (e.g. due to a long-press/HRST on the LTC3553) a pulse is also generated as either VCC drops or PWR_ON drops (generally both drop at the same time as the uC is VCC powered).

$T_{pulse} = C * R * K$ with $K=1$

$T_{pulse} = R * C$

$C=2.2\mu F$, $R=450K \rightarrow 1s$

* $C=4.7\mu F$, $R=536 \rightarrow 2.5s$



== Bleeder circuit ==
 $P=U^2/R=90mW$

Put NMOS transistor to discharge
NXP PMZ200UNE

ON semi NSR05F40NXT5G has

$V_f=0.1V$ 75C

$V_f=0.2V$ 25C

$V_f=0.3V$ -25C

Input voltage range: 3.4-4.3

Output voltage range: 2.5-4.0V

== Power circuit ==

There are 4 cases:

A. Power is off, pwron through extpwr or PB

B. Power is off, pwron through RTC interrupt

C. Power is on, pwroff through CPU (pull up/down pwron)

D. Power is on, pwroff through hrst (long-press pb)

== Power circuit ==

A. Power is off, pwron through extpwr or PB

- LTC turns on for 5 seconds; PON pulled high via R308.

- If cpu unprogrammed/being programmed: PWR_ON HiZ;

A# is VCC and no poffpulse.

- If cpu programmed: actively drives PWR_ON low.

== Power circuit ==

B. Power is off, pwron through RTC interrupt

Same as A: rtc interrupt is equivalent to button press.

== Power circuit ==

C. Power is on, pwroff through CPU (pull up/down pwron)

- CPU toggles high->low PWR_ON. PoffPulse of 2.5 second generated.

- PON driven to ground for 2.5 seconds; LTC turns off for 1 sec at least.

- VCC should be close to zero with bleeder R308. LTC PON threshold is 1.2V, so VCC must drop below 1.2V during 1 sec.

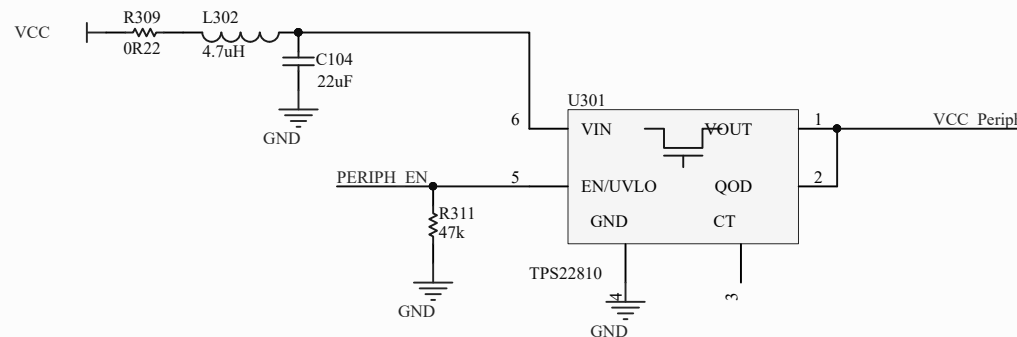
== Power circuit ==

D. Power is on, pwroff through hrst (long-press pb)

- LTC goes in hard reset: turns off for 1 second, and wait PB/extpwr. PON is ignored.

- VCC drops; PoffPulse triggers bleeder

Power switch TPS22810



Title		
Size	Number	Revision
A4		
Date:	31.03.2022	Sheet of
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