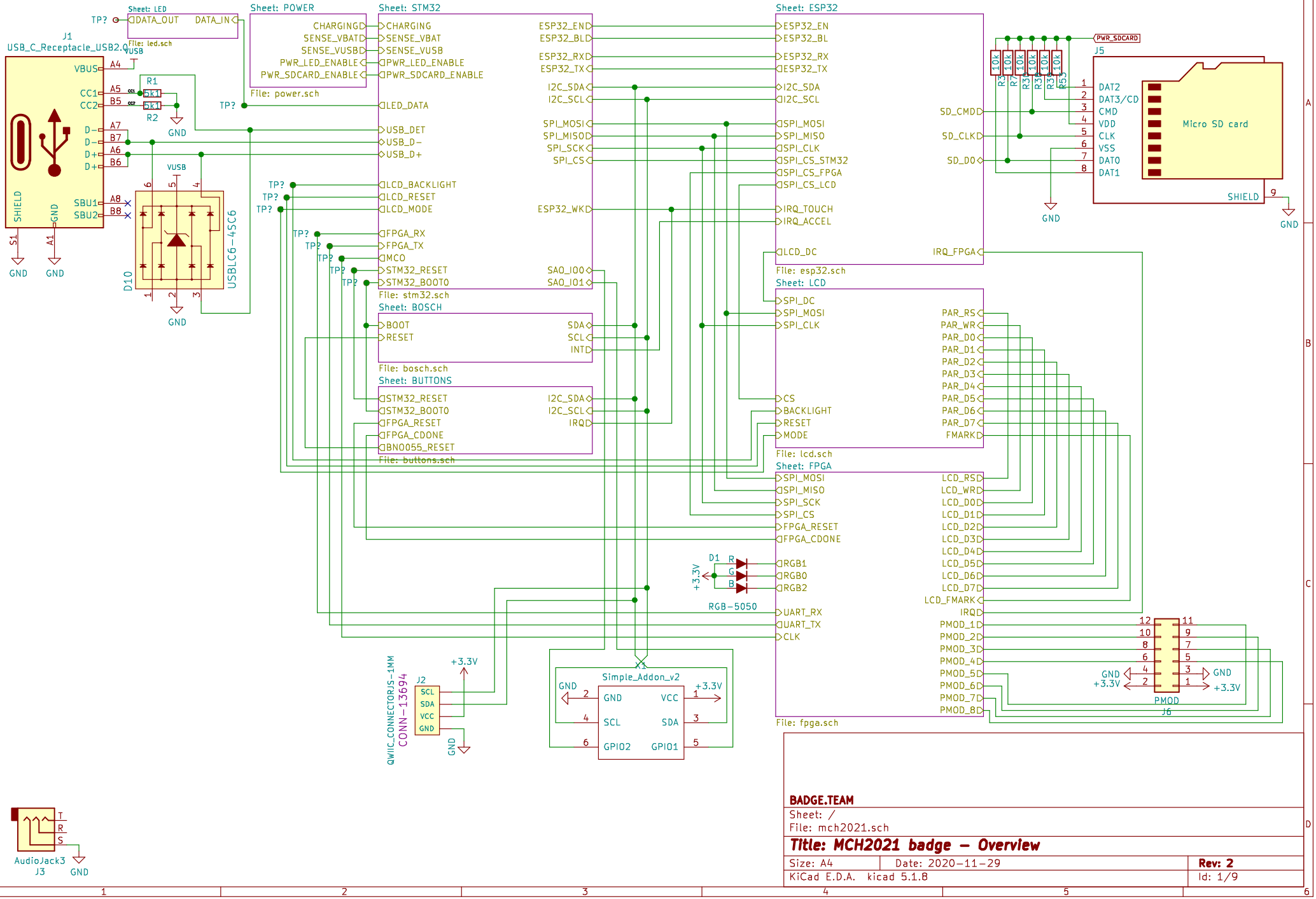
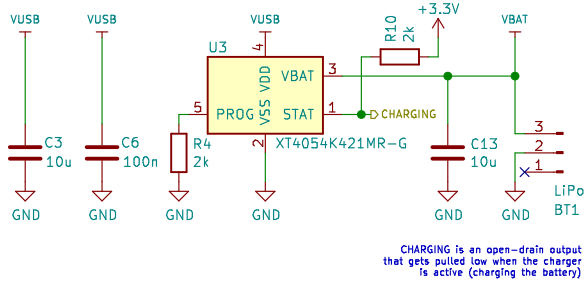
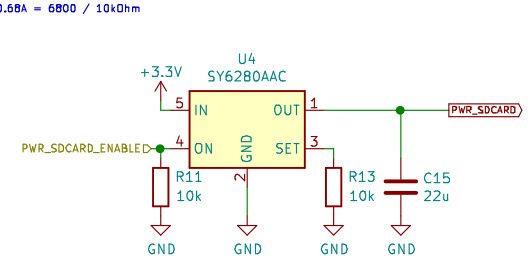

Sheet: LED
DATA_OUT
DATA_IN
File: led.sch
Sheet: POWER
CHARGING
SENSE_VBAT
SENSE_VUSB
PWR_LED_ENABLE
PWR_SDCARD_ENABLE
File: power.sch
Sheet: STM32
LED_DATA
USB_DET
USB_D-
USB_D+
LCD_BACKLIGHT
LCD_RESET
LCD_MODE
FPGA_RX
FPGA_TX
MCO
STM32_RESET
STM32_BOOT0
ESP32_EN
ESP32_BL
ESP32_RX
ESP32_TX
I2C_SDA
I2C_SCL
SPI_MOSI
SPI_MISO
SPI_SCK
SPI_CS
ESP32_WK
SAO_IO0
SAO_IO1
File: stm32.sch
Sheet: BOSCH
BOOT
RESET
SDA
SCL
INT
File: bosch.sch
Sheet: BUTTONS
STM32_RESET
STM32_BOOT0
FPGA_RESET
FPGA_CDONE
BNO055_RESET
I2C_SDA
I2C_SCL
IRQ
File: buttons.sch
Sheet: ESP32
ESP32_EN
ESP32_BL
ESP32_RX
ESP32_TX
I2C_SDA
I2C_SCL
SPI_MOSI
SPI_MISO
SPI_CLK
SPI_CS_STM32
SPI_CS_FPGA
SPI_CS_LCD
IRQ_TOUCH
IRQ_ACCEL
LCD_DC
IRQ_FPGA
File: esp32.sch
Sheet: LCD
SPI_DC
SPI_MOSI
SPI_CLK
CS
BACKLIGHT
RESET
MODE
PAR_RS
PAR_WR
PAR_D0
PAR_D1
PAR_D2
PAR_D3
PAR_D4
PAR_D5
PAR_D6
PAR_D7
FMARK
File: lcd.sch
Sheet: FPGA
SPI_MOSI
SPI_MISO
SPI_SCK
SPI_CS
FPGA_RESET
FPGA_CDONE
RGB1
RGB0
RGB2
UART_RX
UART_TX
CLK
LCD_RS
LCD_WR
LCD_D0
LCD_D1
LCD_D2
LCD_D3
LCD_D4
LCD_D5
LCD_D6
LCD_D7
LCD_FMARK
IRQ
PMOD_1
PMOD_2
PMOD_3
PMOD_4
PMOD_5
PMOD_6
PMOD_7
PMOD_8
File: fpga.sch
J1
USB_C_Receptacle_USB2.0
VBUS
CC1
CC2
D-
D-
D+
D+
SHIELD
GND
SBU1
SBU2
R1
5k1
R2
5k1
D10
USBLC6-4SC6
S1
A1
J2
QWIIC_CONNECTORJS-1MM
CONN-13694
SCL
SDA
VCC
GND
X1
Simple_Addon_v2
GPIO2
GPIO1
D1
RGB-5050
J5
PWR_SDCARD
Micro SD card
DAT2
DAT3/CD
CMD
VDD
CLK
VSS
DAT0
DAT1
SD_CMD
SD_CLK
SD_D0
10k
J6
PMOD
J3
AudioJack3
T
R
S
+3.3V
GND
TP?
BADGE.TEAM
Sheet: /
File: mch2021.sch
Title: MCH2021 badge – Overview
Size: A4
Date: 2020-11-29
Rev: 2
KiCad E.D.A. kicad 5.1.8
Id: 1/9

Battery & battery charger

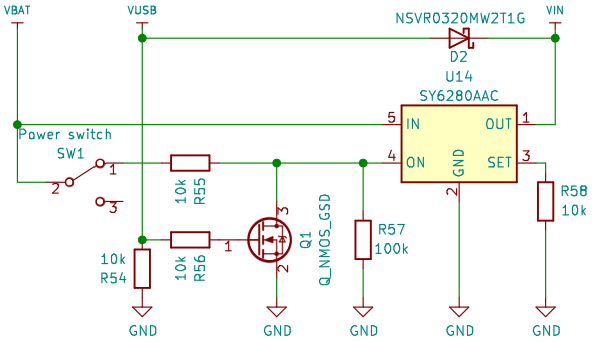


Switched power: 3.3v for SDCARD

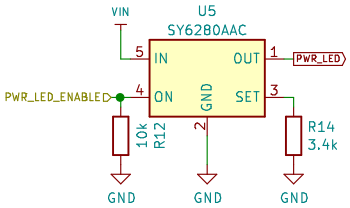


Note:
All control signals are hierarchical labels while all power rails are global

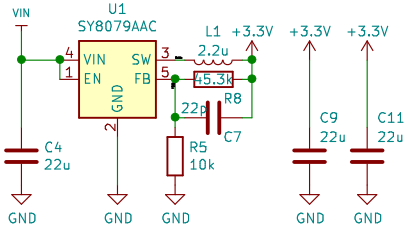
Power switch



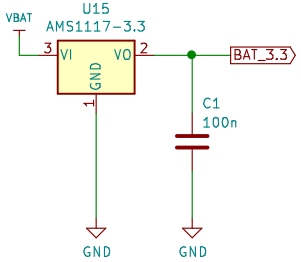
Switched power: Vin for LEDs



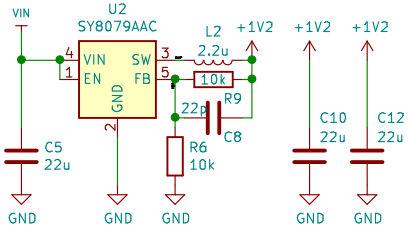
3.3v voltage regulator



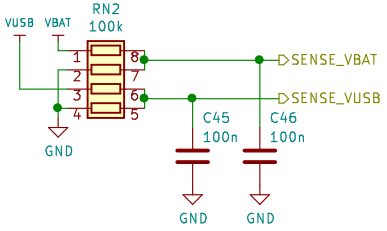
3.3v voltage regulator for RTC backup



1.2v voltage regulator



Voltage sensing



BADGE.TEAM

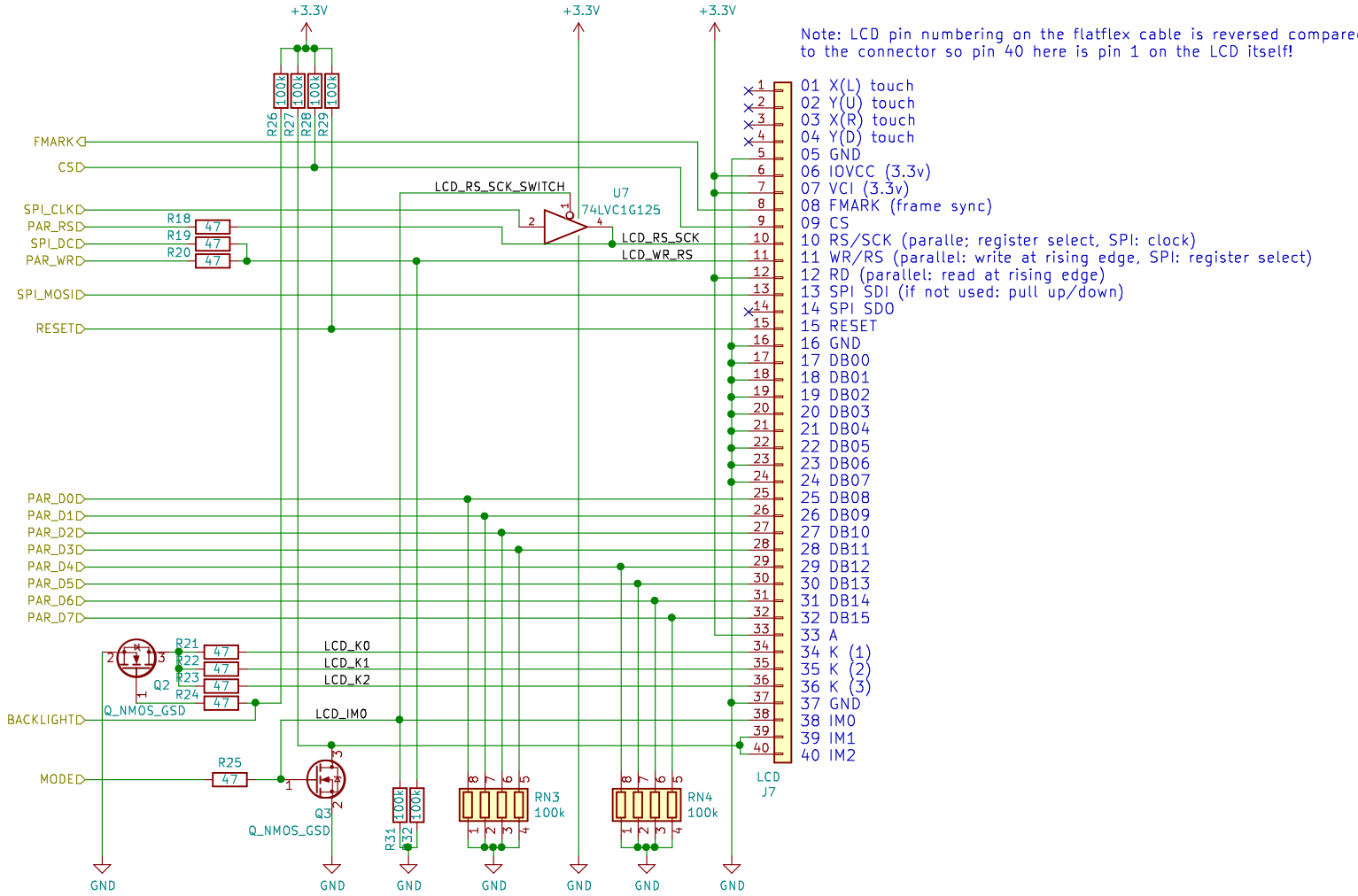
Sheet: /POWER/
File: power.sch

Title: MCH2021 badge – Power management

Size: A4	Date: 2020-11-29	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 2/9

LCD

Type: Z240IT008
Controller: ILI9341
Size: 2.4 inch



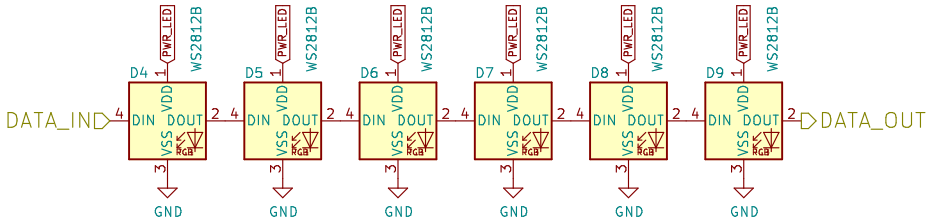
Note: LCD pin numbering on the flatflex cable is reversed compared to the connector so pin 40 here is pin 1 on the LCD itself!

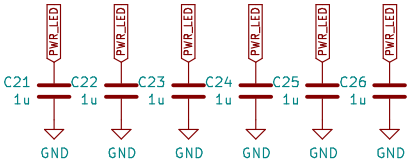
1	01 X(L) touch
2	02 Y(U) touch
3	03 X(R) touch
4	04 Y(D) touch
5	05 GND
6	06 IOVCC (3.3v)
7	07 VCI (3.3v)
8	08 FMARK (frame sync)
9	09 CS
10	10 RS/SCK (paralle; register select, SPI: clock)
11	11 WR/RS (parallel: write at rising edge, SPI: register select)
12	12 RD (parallel: read at rising edge)
13	13 SPI SDI (if not used: pull up/down)
14	14 SPI SDO
15	15 RESET
16	16 GND
17	17 DB00
18	18 DB01
19	19 DB02
20	20 DB03
21	21 DB04
22	22 DB05
23	23 DB06
24	24 DB07
25	25 DB08
26	26 DB09
27	27 DB10
28	28 DB11
29	29 DB12
30	30 DB13
31	31 DB14
32	32 DB15
33	33 A
34	34 K (1)
35	35 K (2)
36	36 K (3)
37	37 GND
38	38 IM0
39	39 IM1
40	40 IM2

SPI: IM0 = 0, IM1 = 1, IM2 = 1
PAR: IM0 = 1, IM1 = 0, IM2 = 0

BADGE.TEAM
Sheet: /LCD/
File: lcd.sch
Title: MCH2021 badge – LCD
Size: A4 | Date: 2020-11-29 | **Rev: 2**
KiCad E.D.A. kicad 5.1.8 | Id: 3/9

WS2812B LEDs



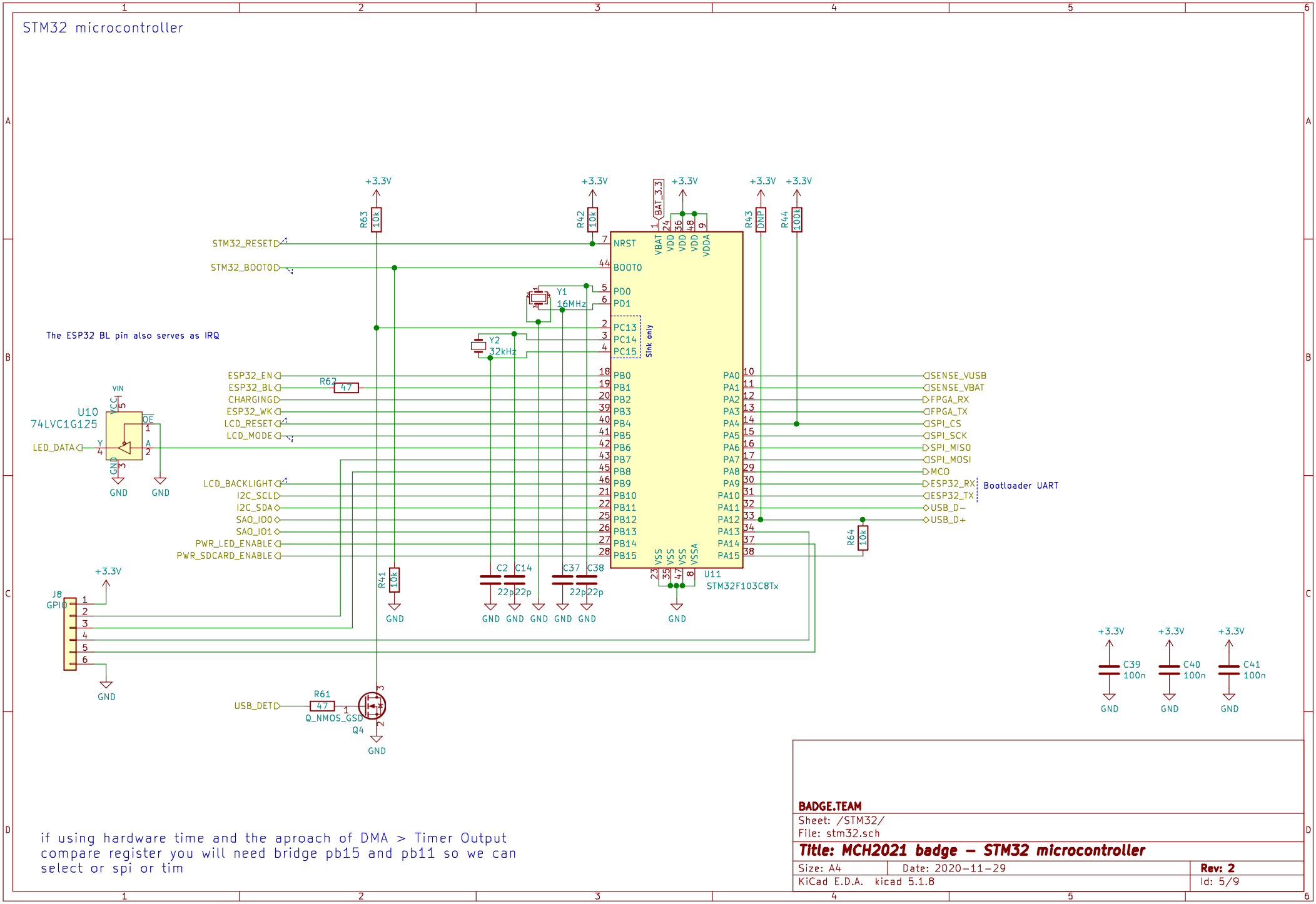


BADGE.TEAM

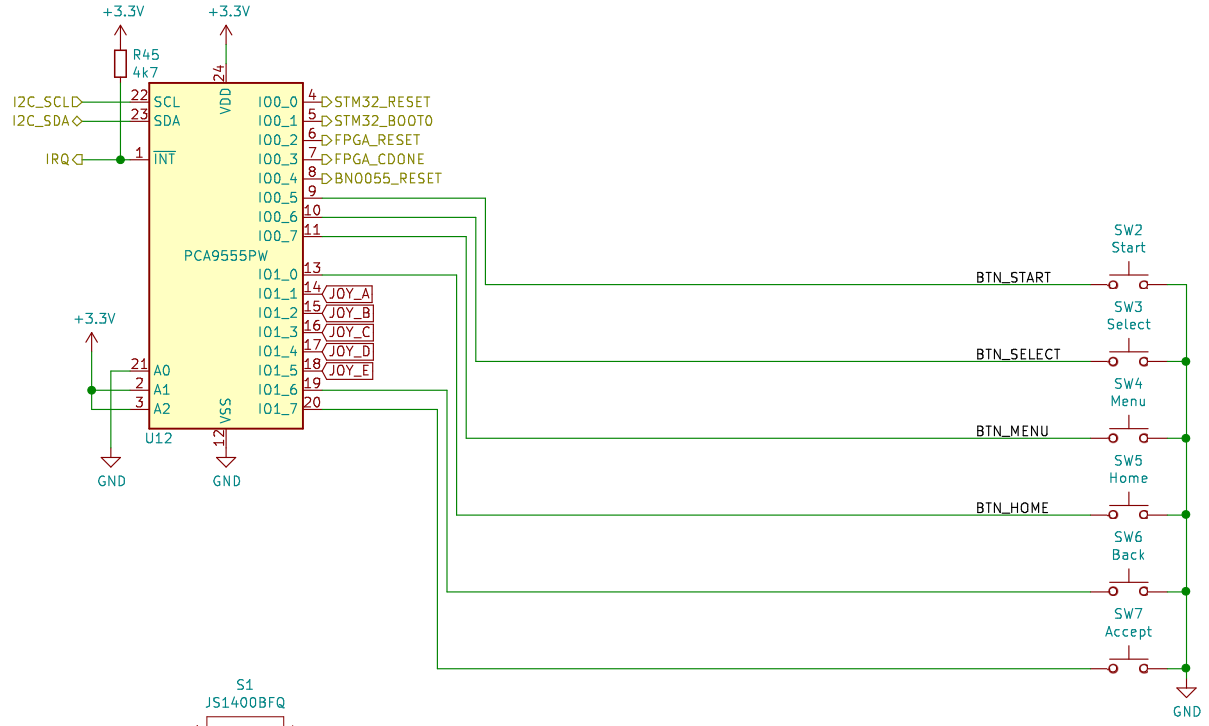
Sheet: /LED/
File: led.sch

Title:

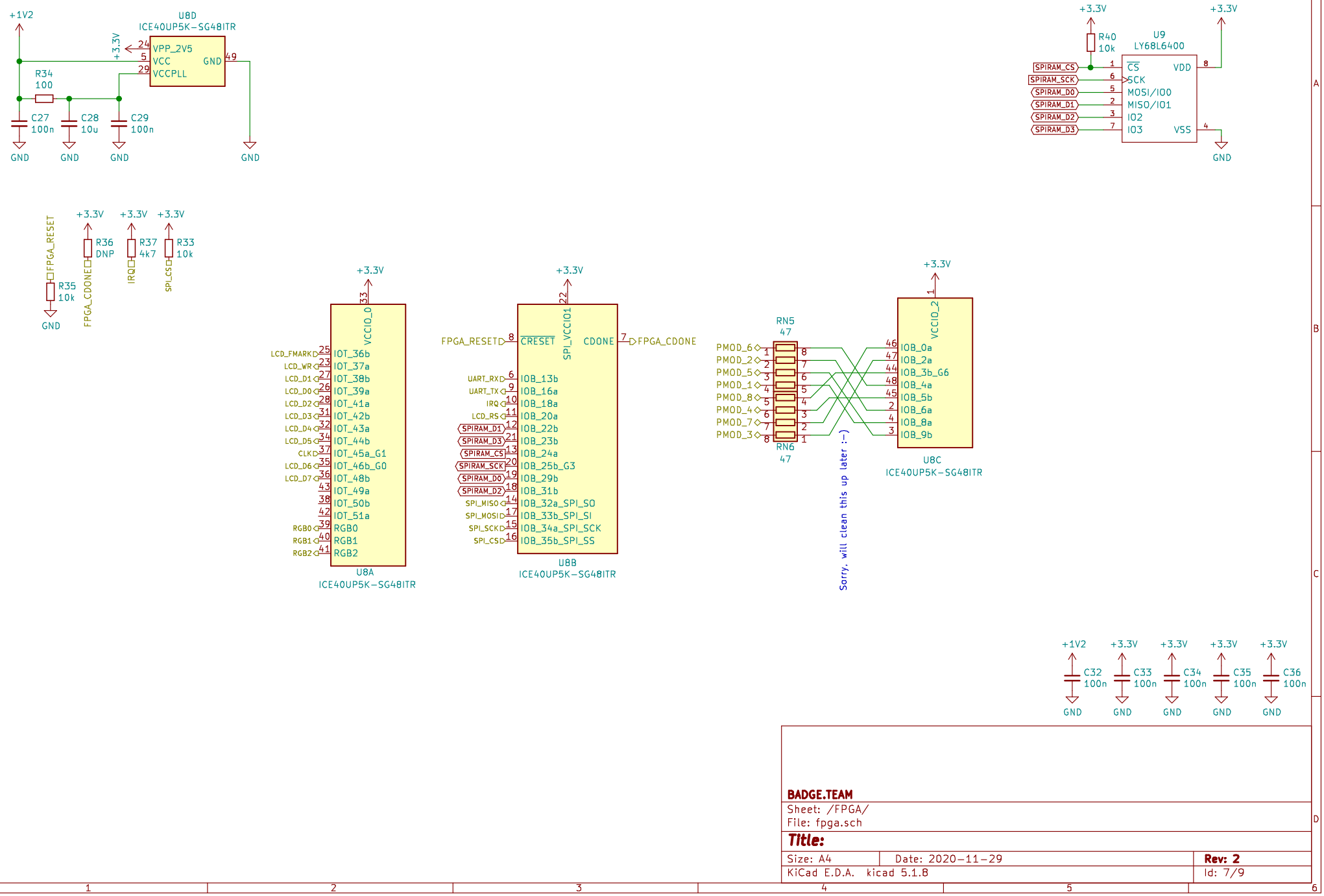
Size: A4	Date: 2020-11-29	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 4/9


STM32 microcontroller
The ESP32 BL pin also serves as IRQ
U10
74LVC1G125
U11
STM32F103C8Tx
Y1
16MHz
Y2
32kHz
J8
GPIO
Q4
Q_NMOS_GSD
Sink only
Bootloader UART
STM32_RESET
STM32_BOOT0
ESP32_EN
ESP32_BL
CHARGING
ESP32_WK
LCD_RESET
LCD_MODE
LED_DATA
LCD_BACKLIGHT
I2C_SCL
I2C_SDA
SAO_IO0
SAO_IO1
PWR_LED_ENABLE
PWR_SDCARD_ENABLE
USB_DET
SENSE_VUSB
SENSE_VBAT
FPGA_RX
FPGA_TX
SPI_CS
SPI_SCK
SPI_MISO
SPI_MOSI
MCO
ESP32_RX
ESP32_TX
USB_D−
USB_D+
+3.3V
GND
R41 10k
R42 10k
R43 DNP
R44 100k
R61 47
R62 47
R63 10k
R64 10k
C2 22p
C14 22p
C37 22p
C38 22p
C39 100n
C40 100n
C41 100n
if using hardware time and the aproach of DMA > Timer Output compare register you will need bridge pb15 and pb11 so we can select or spi or tim
BADGE.TEAM
Sheet: /STM32/
File: stm32.sch
Title: MCH2021 badge – STM32 microcontroller
Size: A4
Date: 2020−11−29
Rev: 2
KiCad E.D.A. kicad 5.1.8
Id: 5/9

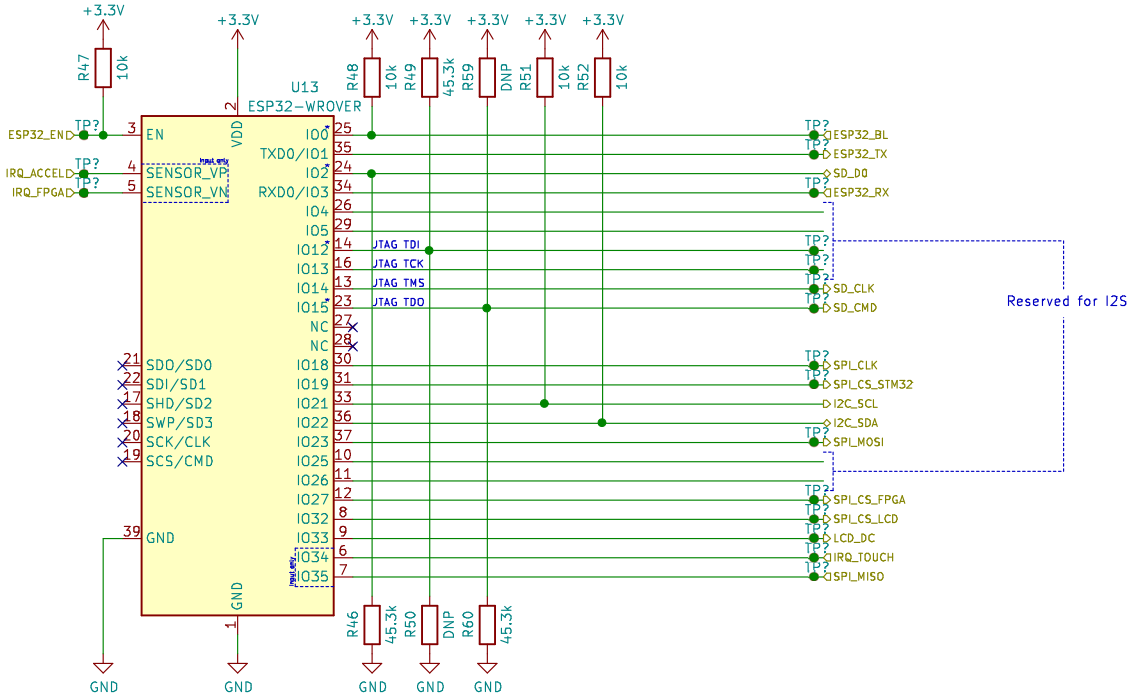
MPR121 touch button interface

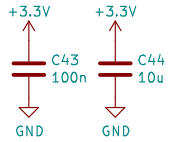


BADGE.TEAM		
Sheet: /BUTTONS/		
File: buttons.sch		
Title:		
Size: A4	Date: 2020-11-29	Rev: 2
KiCad E.D.A. kicad 5.1.8		Id: 6/9


+1V2
U8D
ICE40UP5K-SG48ITR
+3.3V
VPP_2V5
VCC
VCCPLL
GND
R34
100
C27
100n
C28
10u
C29
100n
GND
+3.3V
R40
10k
U9
LY68L6400
SPIRAM_CS
SPIRAM_SCK
SPIRAM_D0
SPIRAM_D1
SPIRAM_D2
SPIRAM_D3
CS
SCK
MOSI/IO0
MISO/IO1
IO2
IO3
VDD
VSS
FPGA_RESET
R35
10k
R36
DNP
FPGA_CDONE
R37
4k7
IRQ
R33
10k
SPI_CS
U8A
ICE40UP5K-SG48ITR
VCCIO_0
IOT_36b
IOT_37a
IOT_38b
IOT_39a
IOT_41a
IOT_42b
IOT_43a
IOT_44b
IOT_45a_G1
IOT_46b_G0
IOT_48b
IOT_49a
IOT_50b
IOT_51a
RGB0
RGB1
RGB2
LCD_FMARK
LCD_WR
LCD_D1
LCD_D0
LCD_D2
LCD_D3
LCD_D4
LCD_D5
CLK
LCD_D6
LCD_D7
U8B
ICE40UP5K-SG48ITR
SPI_VCCIO1
CRESET
CDONE
FPGA_CDONE
IOB_13b
IOB_16a
IOB_18a
IOB_20a
IOB_22b
IOB_23b
IOB_24a
IOB_25b_G3
IOB_29b
IOB_31b
IOB_32a_SPI_SO
IOB_33b_SPI_SI
IOB_34a_SPI_SCK
IOB_35b_SPI_SS
UART_RX
UART_TX
IRQ
LCD_RS
SPI_MISO
SPI_MOSI
SPI_SCK
SPI_CS
RN5
47
RN6
47
PMOD_6
PMOD_2
PMOD_5
PMOD_1
PMOD_8
PMOD_4
PMOD_7
PMOD_3
U8C
ICE40UP5K-SG48ITR
VCCIO_2
IOB_0a
IOB_2a
IOB_3b_G6
IOB_4a
IOB_5b
IOB_6a
IOB_8a
IOB_9b
Sorry, will clean this up later :-)
+1V2
C32
100n
C33
100n
C34
100n
C35
100n
C36
100n
GND
BADGE.TEAM
Sheet: /FPGA/
File: fpga.sch
Title:
Size: A4
Date: 2020-11-29
Rev: 2
KiCad E.D.A. kicad 5.1.8
Id: 7/9

ESP32 microcontroller





* Bootstrapping pins
IO 0:Low for UART DL mode, pull high for normal boot
IO 2: Pull down to select UART DL mode when GPIO 0 is LOW
IO 12: Selects internal flash/ram voltage. Pull-up for 3.3v, pull-down for 1.8v
IO 15: Pull down for silent bootloader

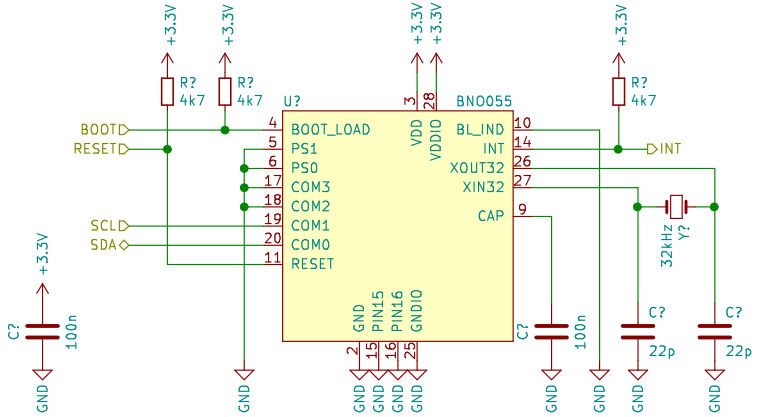
BADGE.TEAM

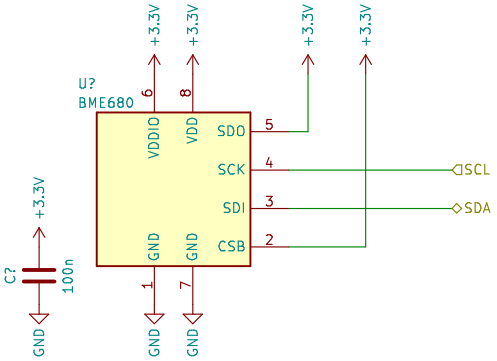
Sheet: /ESP32/
File: esp32.sch

Title: MCH2021 badge - ESP32 microcontroller

Size: A4	Date: 2020-11-29	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 8/9

BOSCH BNO055 & BME680 SENSORS





BADGE.TEAM		
Sheet: /BOSCH/		
File: bosch.sch		
Title: MCH2021 badge – BOSCH		
Size: A4	Date: 2020-11-29	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 9/9