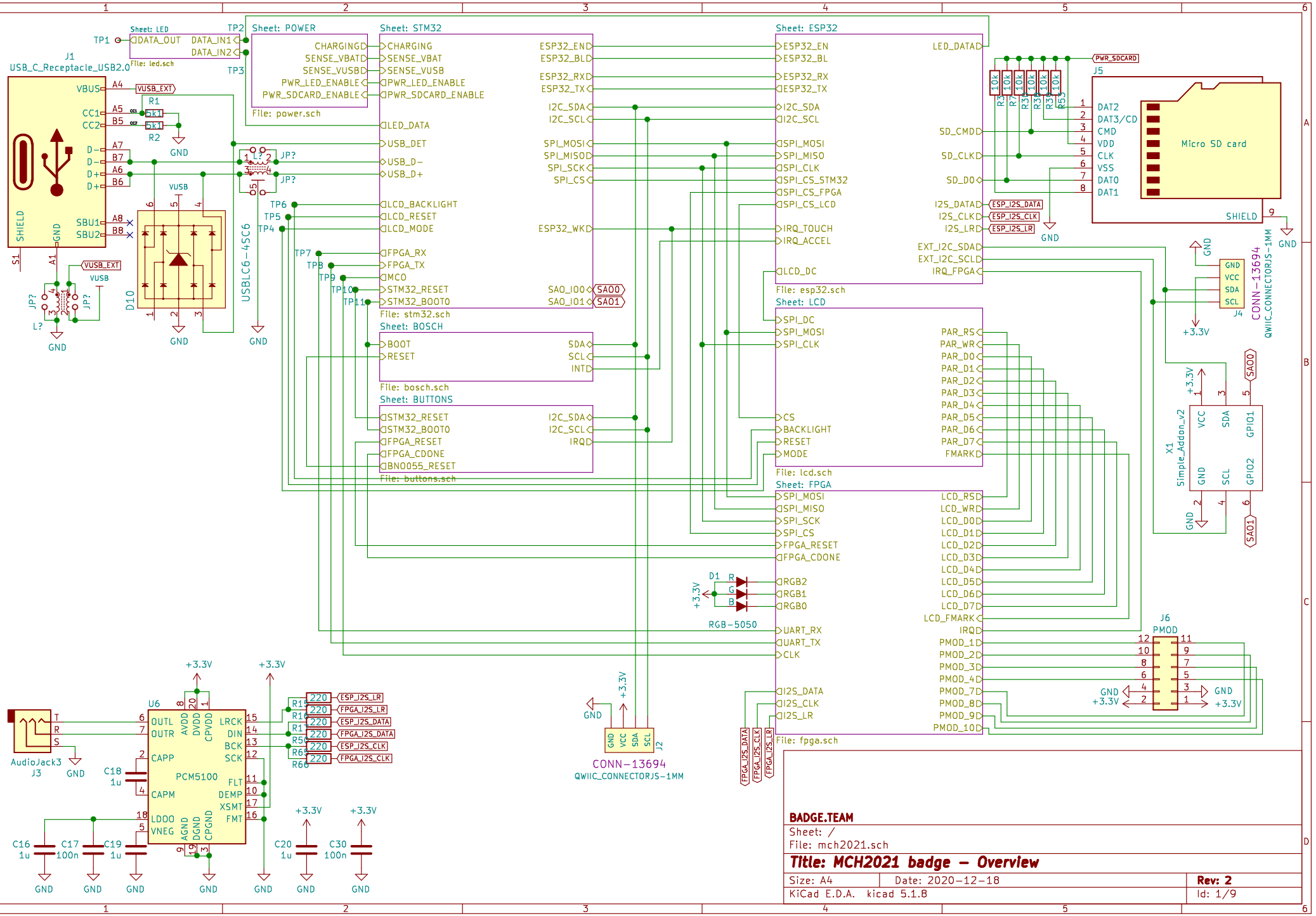
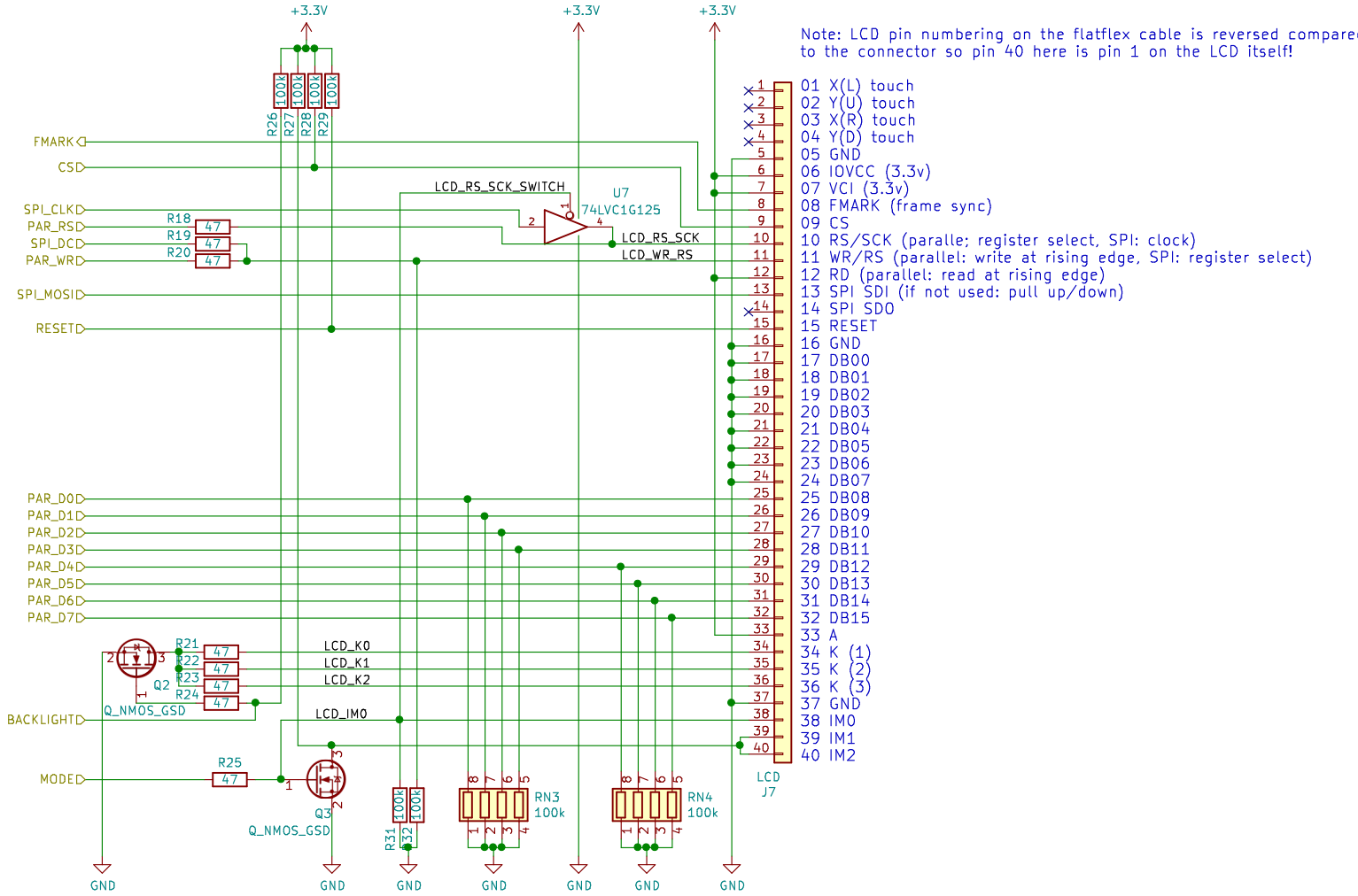

Sheet: LED
DATA_OUT
DATA_IN1
DATA_IN2
File: led.sch
TP1
TP2
TP3
J1
USB_C_Receptacle_USB2.0
VBUS
CC1
CC2
D-
D-
D+
D+
SHIELD
GND
SBU1
SBU2
A4
A5
B5
A7
B7
A6
B6
A8
B8
S1
A1
VUSB_EXT
R1
5k1
R2
5k1
GND
VUSB
D10
USBLC6-4SC6
JP?
L?
Sheet: POWER
CHARGING
SENSE_VBAT
SENSE_VUSB
PWR_LED_ENABLE
PWR_SDCARD_ENABLE
File: power.sch
Sheet: STM32
CHARGING
SENSE_VBAT
SENSE_VUSB
PWR_LED_ENABLE
PWR_SDCARD_ENABLE
LED_DATA
USB_DET
USB_D-
USB_D+
LCD_BACKLIGHT
LCD_RESET
LCD_MODE
FPGA_RX
FPGA_TX
MCO
STM32_RESET
STM32_BOOT0
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
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
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
SAO0
SAO1
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
LED_DATA0
SD_CMD
SD_CLK
SD_D0
I2S_DATA
I2S_CLK
I2S_LR
EXT_I2C_SDA
EXT_I2C_SCL
IRQ_FPGA
ESP_I2S_DATA
ESP_I2S_CLK
ESP_I2S_LR
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
RGB2
RGB1
RGB0
UART_RX
UART_TX
CLK
I2S_DATA
I2S_CLK
I2S_LR
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_7
PMOD_8
PMOD_9
PMOD_10
File: fpga.sch
PWR_SDCARD
J5
Micro SD card
DAT2
DAT3/CD
CMD
VDD
CLK
VSS
DAT0
DAT1
SHIELD
10k
R3
R7
R3
R3
R3
R53
J4
CONN-13694
QWIIC_CONNECTORJS-1MM
GND
VCC
SDA
SCL
+3.3V
X1
Simple_Addon_v2
GPIO1
GPIO2
J6
PMOD
D1
RGB-5050
R
G
B
J2
CONN-13694
QWIIC_CONNECTORJS-1MM
U6
PCM5100
OUTL
OUTR
CAPP
CAPM
LDOO
VNEG
AVDD
DVDD
CPVDD
AGND
DGND
CPGND
LRCK
DIN
BCK
SCK
FLT
DEMP
XSMT
FMT
C16
C17
C18
C19
C20
C30
1u
100n
R15
R16
R1
R5
R6
R66
220
AudioJack3
J3
T
R
S
BADGE.TEAM
Sheet: /
File: mch2021.sch
Title: MCH2021 badge – Overview
Size: A4
Date: 2020-12-18
Rev: 2
KiCad E.D.A. kicad 5.1.8
Id: 1/9

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!

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

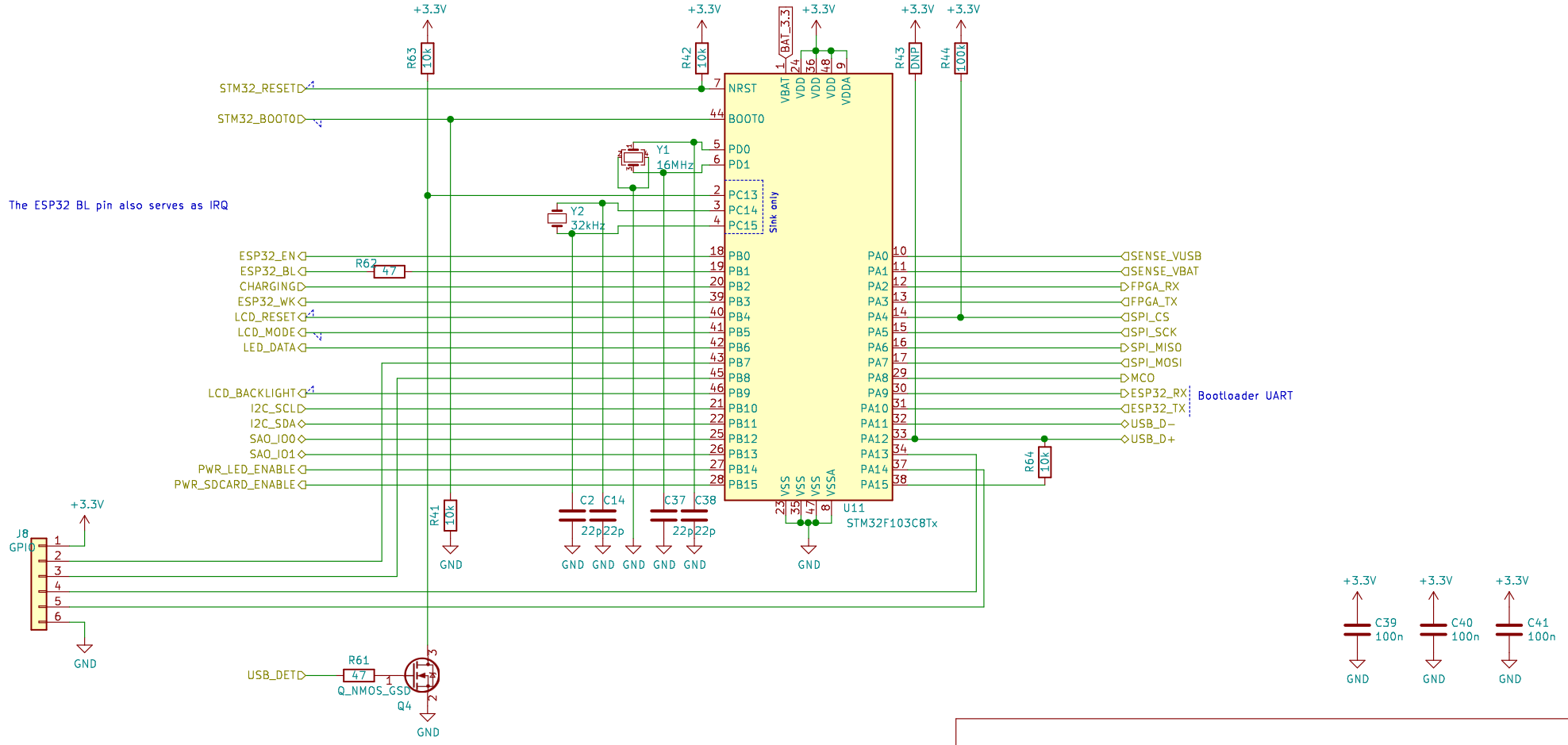
BADGE.TEAM

Sheet: /LCD/
File: lcd.sch

Title: MCH2021 badge – LCD

Size: A4	Date: 2020-12-13	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 2/9

STM32 microcontroller



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

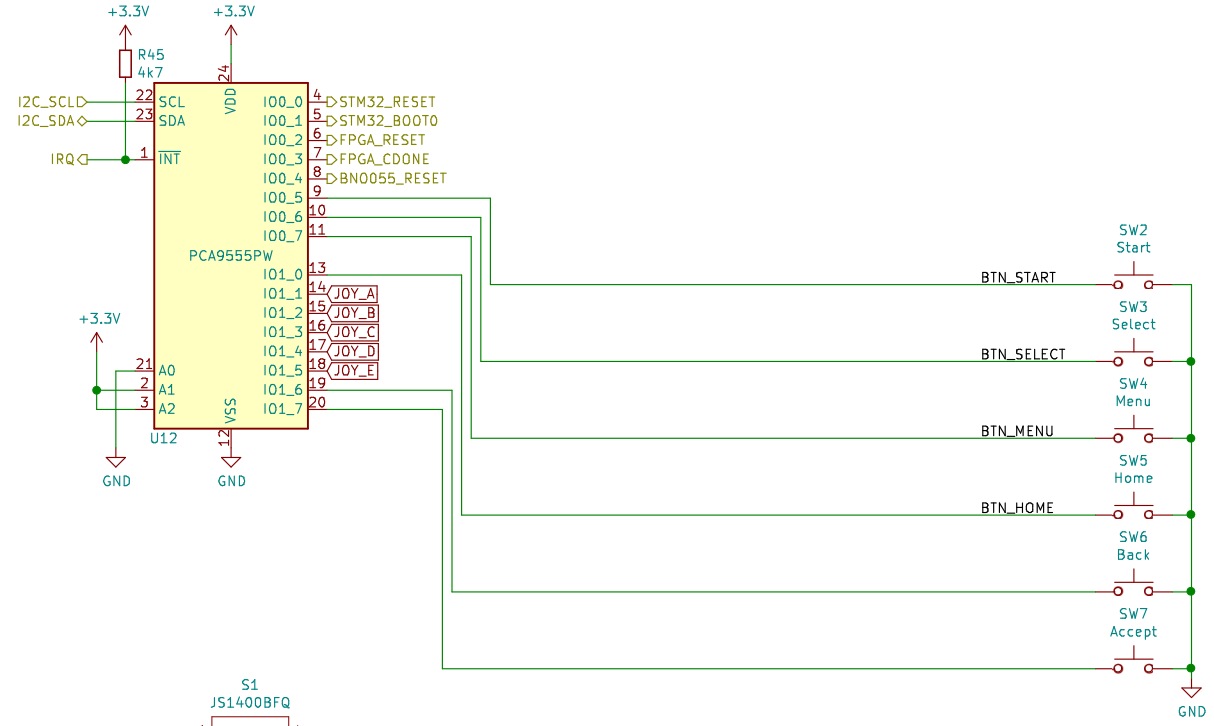
BADGE.TEAM

Sheet: /STM32/
File: stm32.sch

Title: MCH2021 badge – STM32 microcontroller

Size: A4	Date: 2020-12-13	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 3/9

MPR121 touch button interface

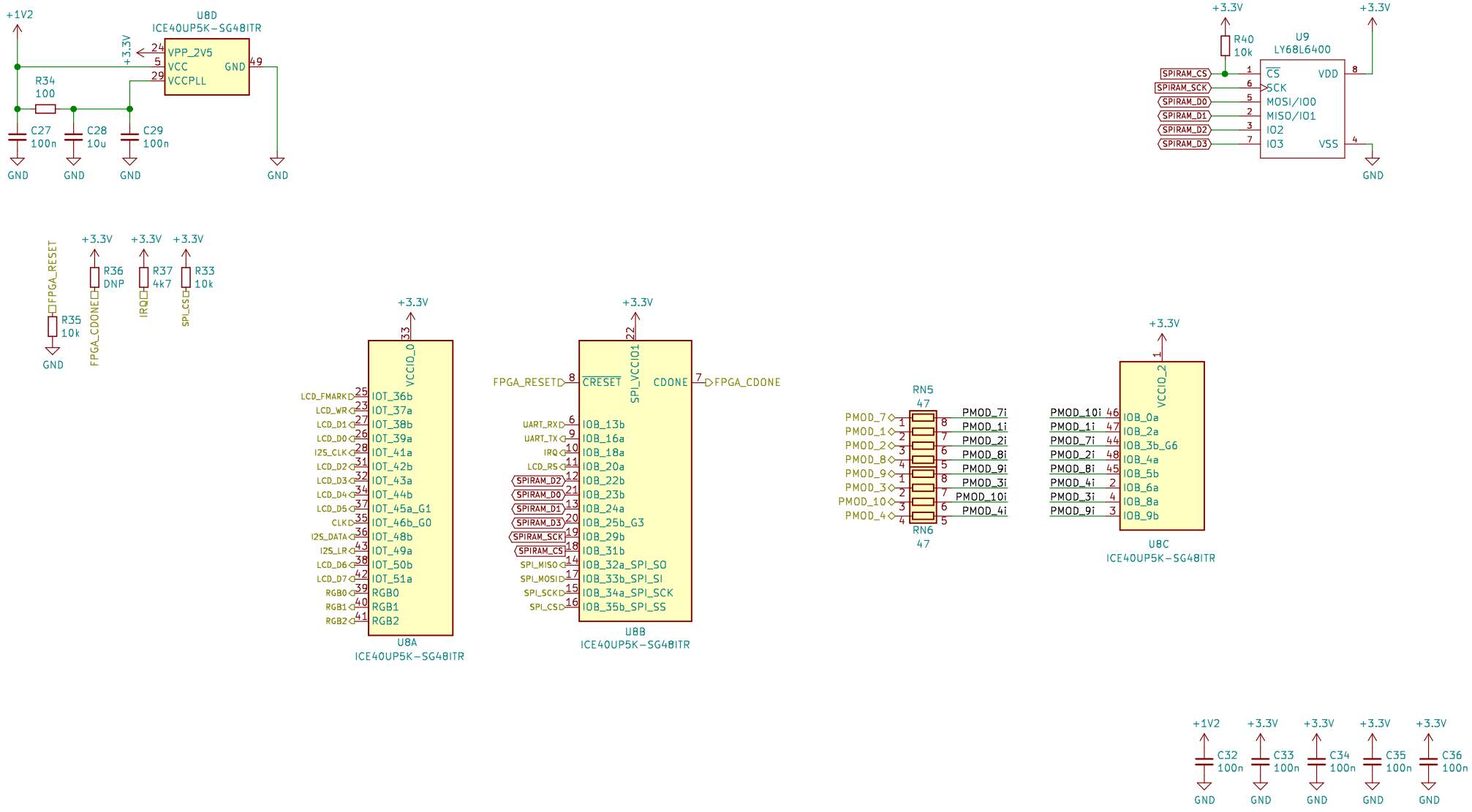


BADGE.TEAM

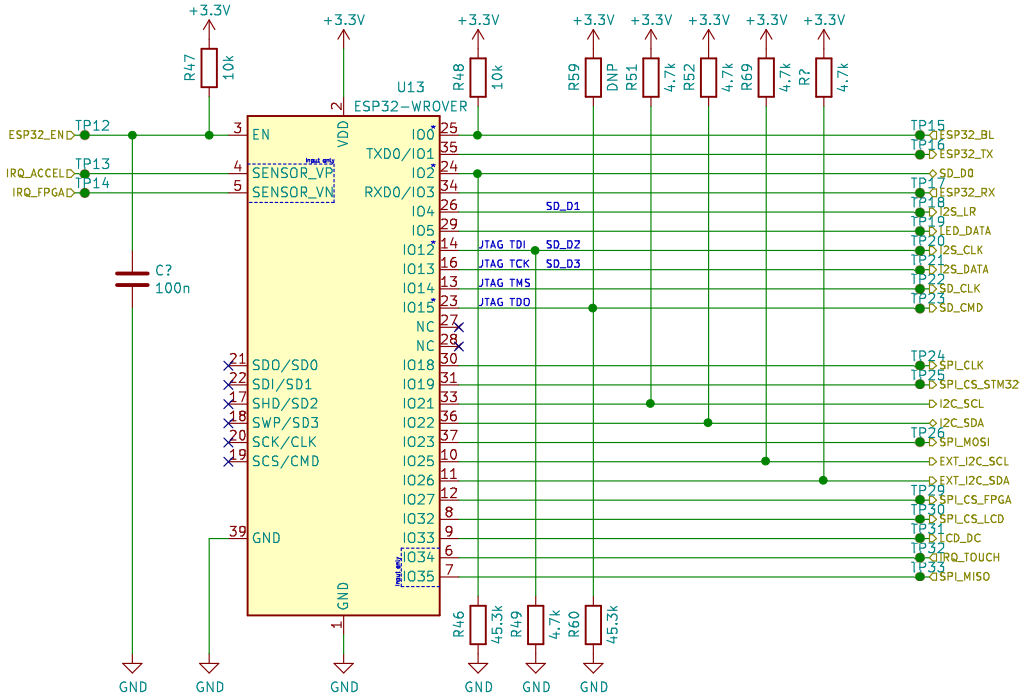
Sheet: /BUTTONS/
File: buttons.sch

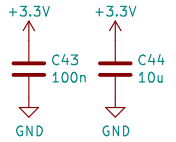
Title:

Size: A4	Date: 2020-12-13	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 4/9


+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
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
I2S_CLK
LCD_D2
LCD_D3
LCD_D4
LCD_D5
CLK
I2S_DATA
I2S_LR
LCD_D6
LCD_D7
U8A
ICE40UP5K-SG48ITR
SPI_VCCIO1
CRESET
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
U8B
ICE40UP5K-SG48ITR
RN5
47
RN6
47
PMOD_7
PMOD_1
PMOD_2
PMOD_8
PMOD_9
PMOD_3
PMOD_10
PMOD_4
PMOD_7i
PMOD_1i
PMOD_2i
PMOD_8i
PMOD_9i
PMOD_3i
PMOD_10i
PMOD_4i
VCCIO_2
IOB_0a
IOB_2a
IOB_3b_G6
IOB_4a
IOB_5b
IOB_6a
IOB_8a
IOB_9b
U8C
ICE40UP5K-SG48ITR
C32
100n
C33
100n
C34
100n
C35
100n
C36
100n
BADGE.TEAM
Sheet: /FPGA/
File: fpga.sch
Title:
Size: A4
Date: 2020-12-13
Rev: 2
KiCad E.D.A. kicad 5.1.8
Id: 5/9

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 1.8v, pull-down for 3.3v
IO 15: Pull down for silent bootloader

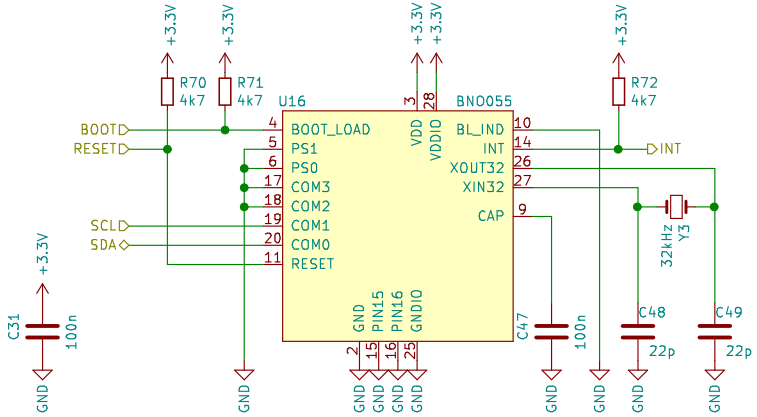
BADGE.TEAM

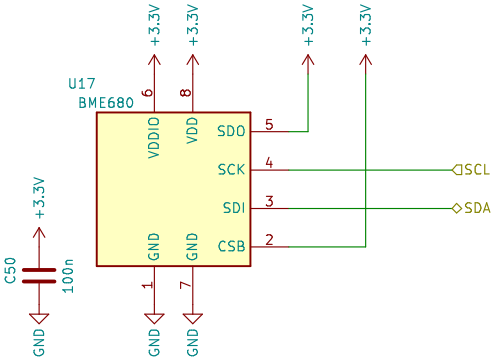
Sheet: /ESP32/
File: esp32.sch

Title: MCH2021 badge - ESP32 microcontroller

Size: A4	Date: 2020-12-13	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 6/9

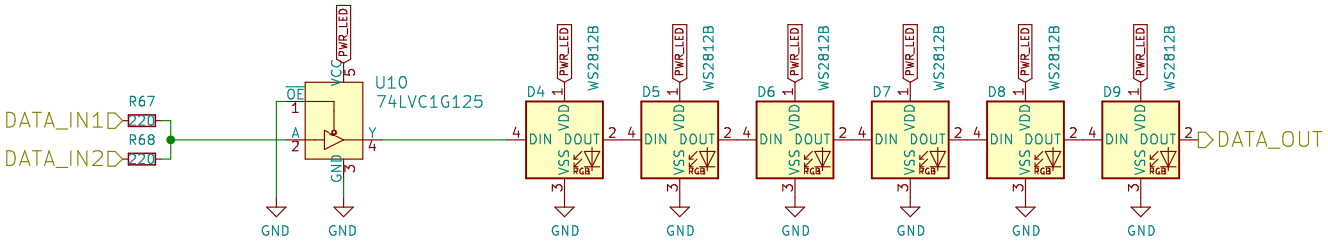
BOSCH BNO055 & BME680 SENSORS

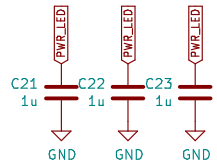




BADGE.TEAM		
Sheet: /BOSCH/		
File: bosch.sch		
Title: MCH2021 badge – BOSCH		
Size: A4	Date: 2020-12-13	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 7/9

WS2812B LEDs





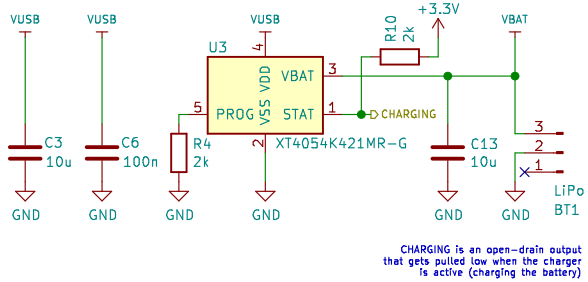
BADGE.TEAM

Sheet: /LED/
File: led.sch

Title:

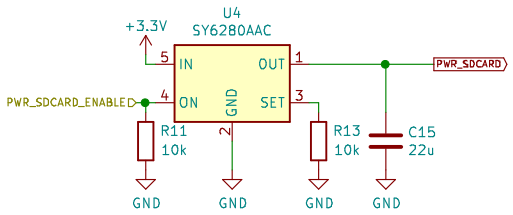
Size: A4	Date: 2020-12-13	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 8/9

Battery & battery charger



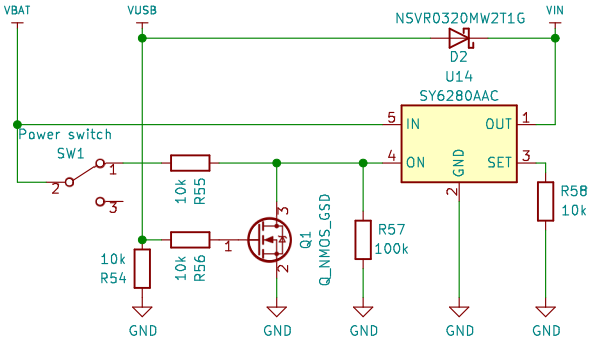
Switched power: 3.3v for SDCARD

Iset = 0.68A = 6800 / 10kOhm



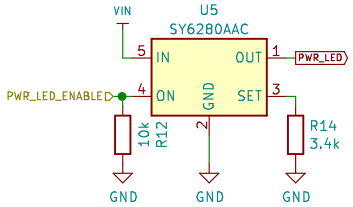
Note:
All control signals are hierarchical labels while all power rails are global

Power switch

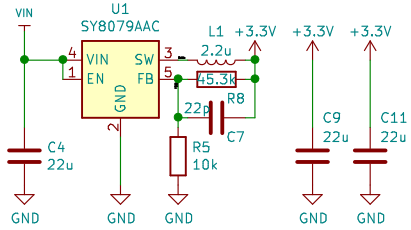


Switched power: Vin for LEDs

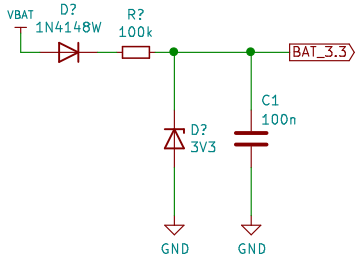
Iset = 2A = 6800 / 3.4kOhm



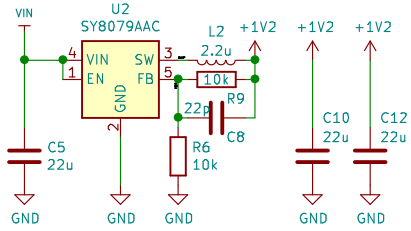
3.3v voltage regulator



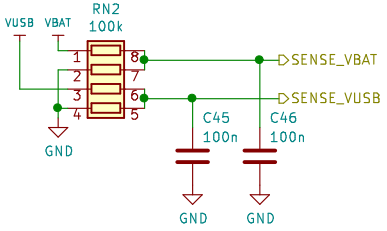
3.3v voltage regulator for RTC backup



1.2v voltage regulator



Voltage sensing



BADGE.TEAM

Sheet: /POWER/
File: power.sch

Title: MCH2021 badge – Power management

Size: A4	Date: 2020-12-13	**Rev: 2**
KiCad E.D.A. kicad 5.1.8		Id: 9/9