

BADGE.TEAM

Sheet: /
File: mch2021.sch

Title: MCH2021 badge – Overview

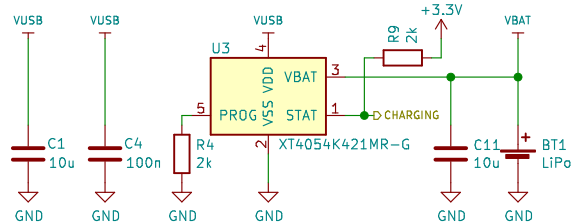
Size: A4 Date: 2020-08-10
KiCad E.D.A. kicad 5.1.6

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Battery & battery charger

The diagram illustrates a battery and battery charger circuit for the XT4054K421MR-G IC. The IC is a yellow rectangle with pins labeled 1 through 5. Pin 1 is labeled 'CHARGING' and is connected to a green line. Pin 2 is labeled 'XT4054K421MR-G' and is connected to GND. Pin 3 is labeled 'STAT' and is connected to a green line. Pin 4 is labeled 'V55 VDD' and is connected to GND. Pin 5 is labeled 'PROG' and is connected to GND. The circuit includes two USB inputs (VUSB) connected to capacitors C1 (10u) and C4 (100n), which are connected to GND. A resistor R4 (2k) is connected between the two VUSB lines. A resistor R9 (2k) is connected between the CHARGING pin and the +3.3V line. The +3.3V line is connected to the STAT pin and the VBAT pin. The VBAT pin is connected to a battery (BT1 LiPo) and a capacitor C11 (10u), which is connected to GND. The battery is labeled 'BT1 LiPo' and has a '+' sign. The text 'CHARGING is an open-drain output that gets pulled low when the battery is active (charging the battery)' is written in blue at the bottom right.

CHARGING is an open-drain output that gets pulled low when the battery is active (charging the battery)



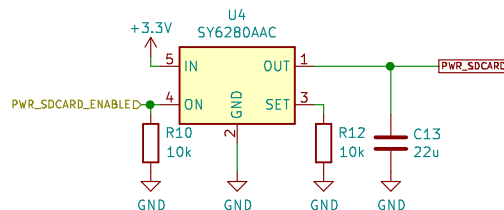
CHARGING is an open-drain output that gets pulled low when the charger is active (charging the battery)

Switched power: 3.3v for SDCARD

$I_{set} = 0.68A = 6800 / 10k\Omega m$

The diagram shows the SY6280AAC chip (U4) configured as a voltage-controlled switch. The chip's pins are connected as follows:

- Pin 5 (IN):** Connected to a 3.3V supply.
- Pin 4 (ON):** Connected to the PWR_SDCARD_ENABLED signal through a 10kΩ resistor (R10).
- Pin 2 (GND):** Connected to ground.
- Pin 3 (SET):** Connected to ground through a 10kΩ resistor (R12).
- Pin 1 (OUT):** Connected to the PWR_SDCARD output line, which also has a 22μF capacitor (C13) connected to ground.

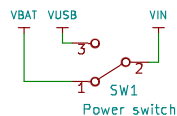
$$I_{set} = 0.68A = 6800 / 10k\Omega_{hm}$$


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

Power switch

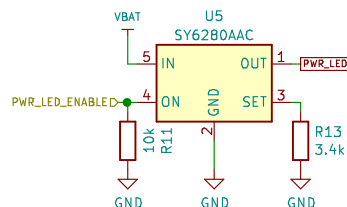
The diagram shows a circuit for a power switch labeled SW1. It has three input terminals at the top: VBAT, VUSB, and VIN. VBAT is connected to a green wire that goes down and then right to terminal 1 of the switch. VUSB is connected to terminal 3 of the switch. VIN is connected to terminal 2 of the switch. The switch is represented by a red line with three circular terminals labeled 1, 2, and 3. Below the switch is the label 'SW1' and 'Power switch'.

The power switch never really turns the badge off. Instead it lets you choose to bypass the battery when powering the badge from USB. This increases charging speed and turns the badge off completely when USB is not connected

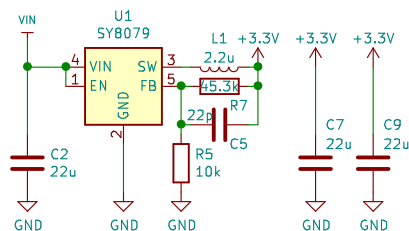


The power switch never really turns the badge off. Instead it lets you choose to bypass the battery when powering the badge from USB. This increases charging speed and turns the badge off completely when USB is not connected.

Switched power: Vin for LEDs

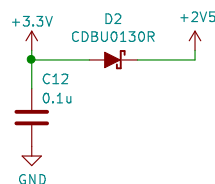
$$I_{set} = 2A = 6800 / 3.4k\Omega$$


3.3v voltage regulator

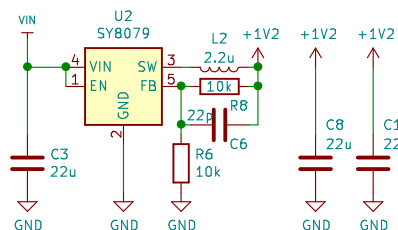


2.5v voltage regulator

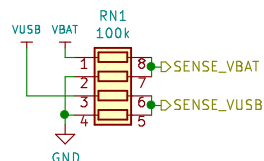
The diagram shows a circuit for a 2.5V voltage regulator. It consists of a 3.3V input, a diode (D2, CDBU0130R), a capacitor (C12, 0.1uF), and a 2V5 output. The diode is connected in series with the output, and the capacitor is connected in parallel with the output. The output is labeled +2V5.



1.2v voltage regulator

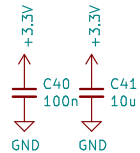
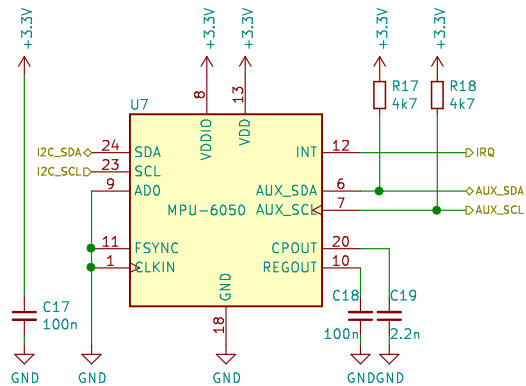


Voltage sensing



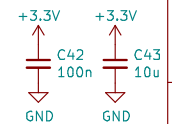
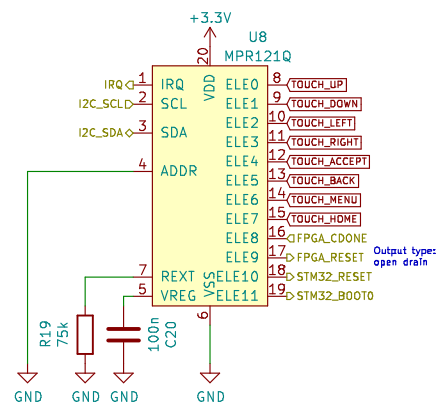
BADGE.TEAM		
Sheet: /POWER/ File: power.sch		
Title: MCH2021 badge – Power management		
Size: A4	Date: 2020–08–08	Rev: 1
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MPU6050 accelerometer and gyroscope



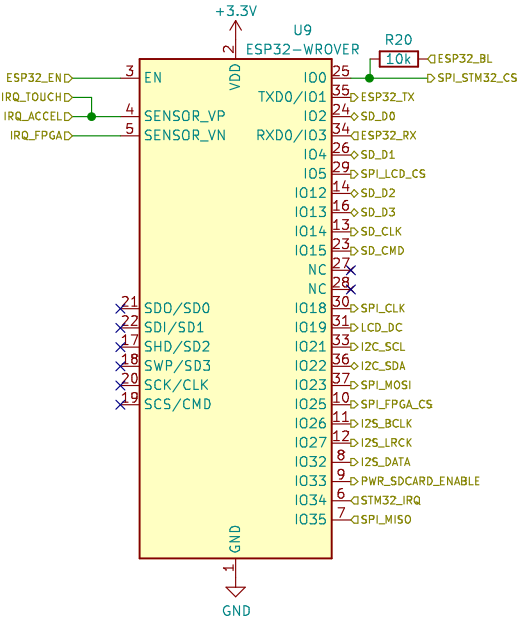
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Size: A4		Date:	
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MPR121 touch button interface



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ESP32 microcontroller

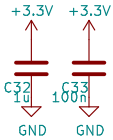
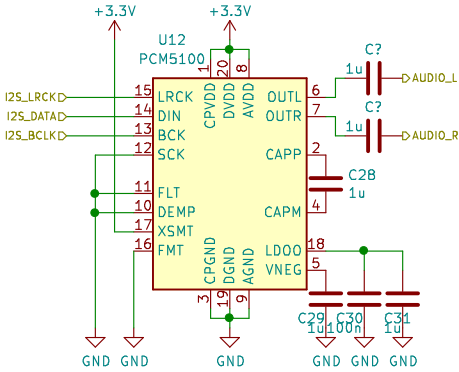


A



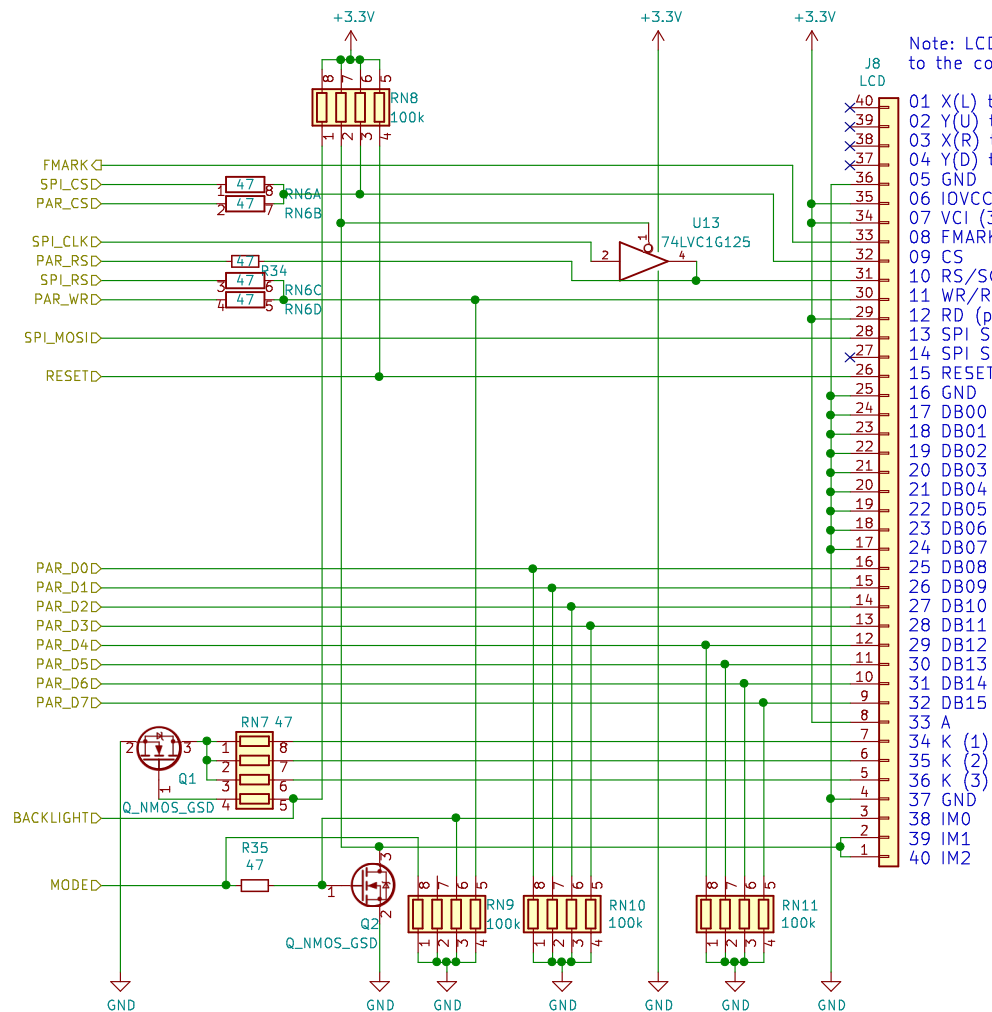
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I2S Audio DAC



Sheet: /AUDIO/		
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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!

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

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

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Sheet: /LCD/

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Title: MCH2021 badge - LCD

Size: A4

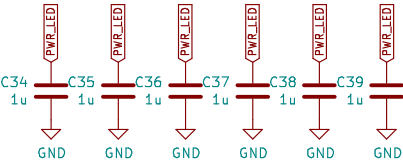
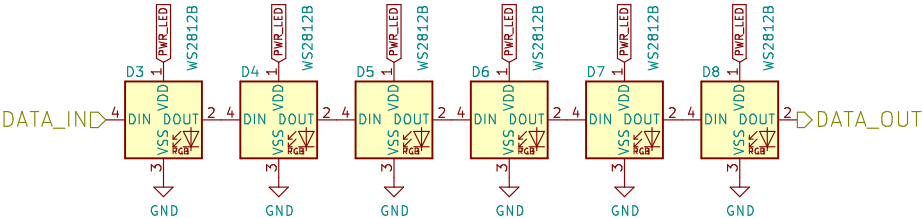
Date: 2020-08-09

Rev: 1

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WS2812B LEDs



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