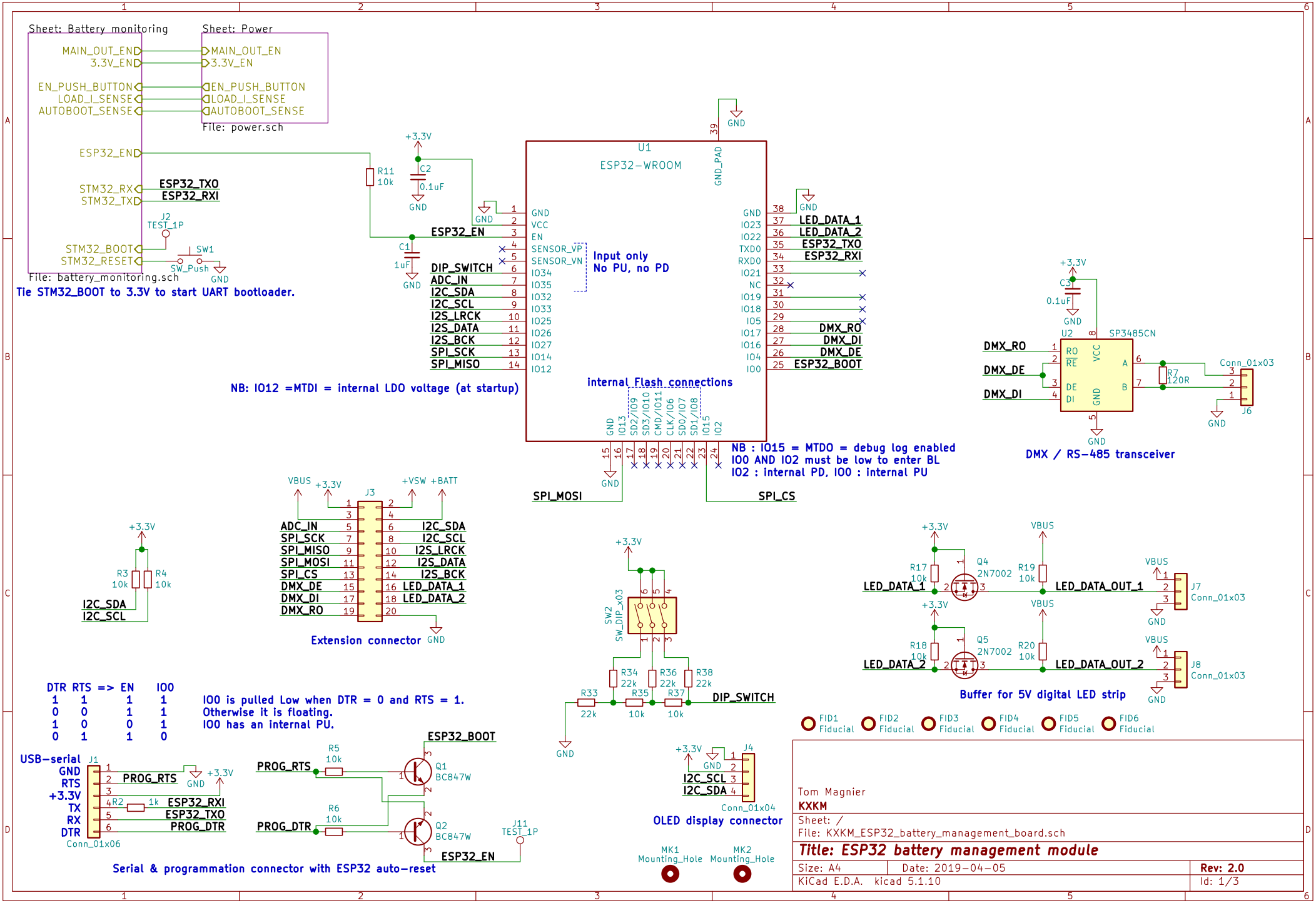
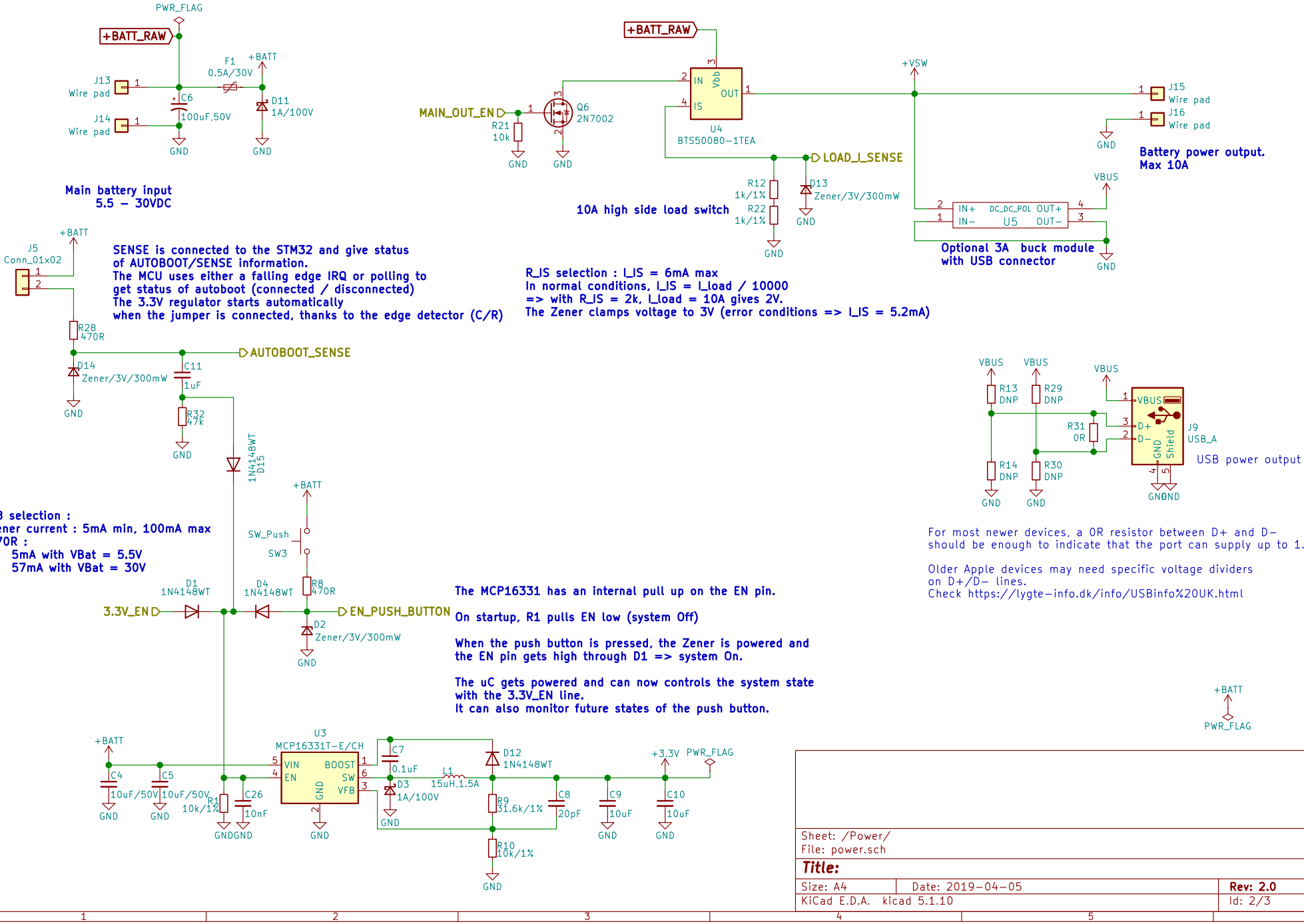
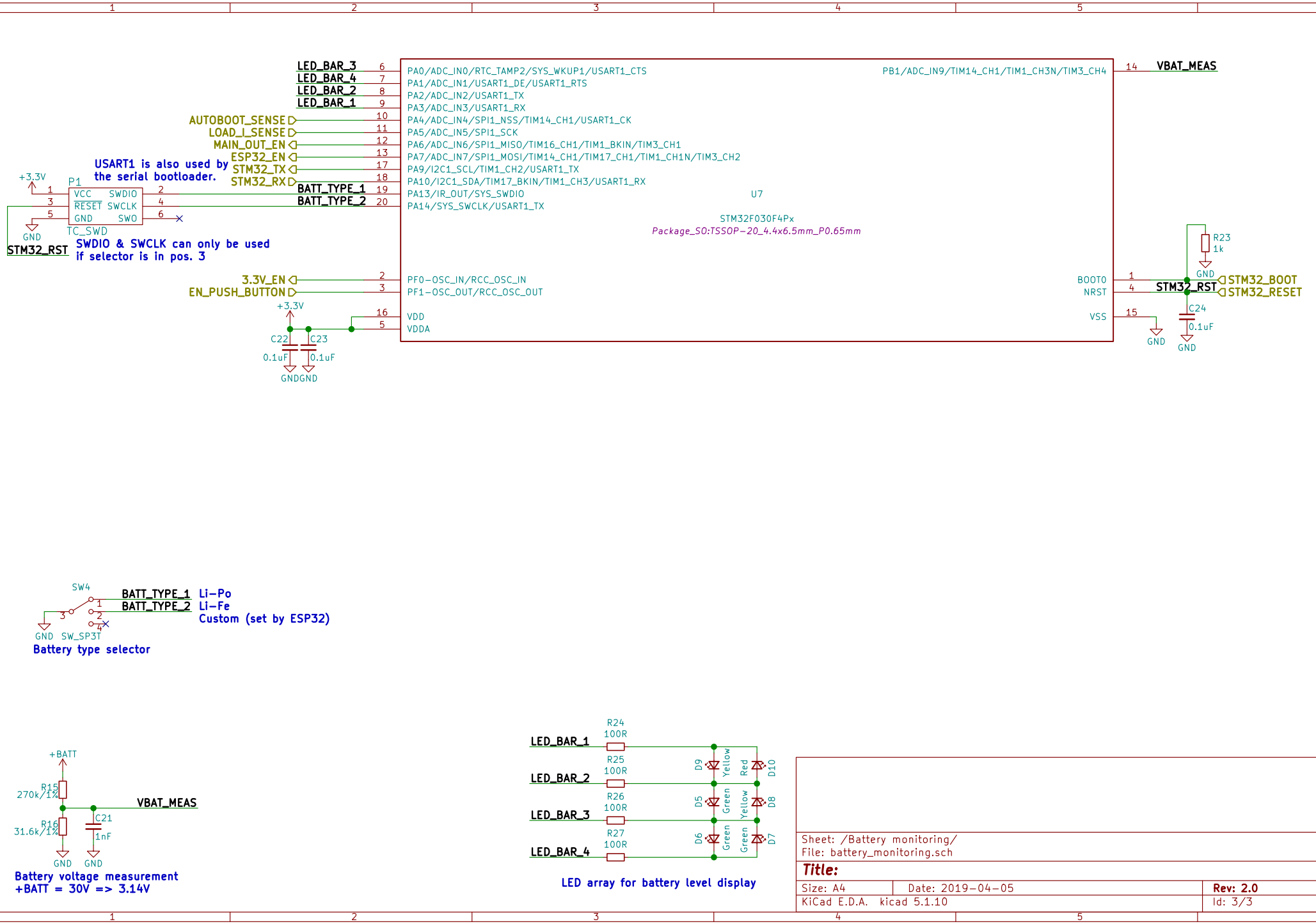

Sheet: Battery monitoring
Sheet: Power
MAIN_OUT_EN
3.3V_EN
EN_PUSH_BUTTON
LOAD_I_SENSE
AUTOBOOT_SENSE
File: power.sch
ESP32_EN
STM32_RX
STM32_TX
ESP32_TXO
ESP32_RXI
J2
TEST_1P
STM32_BOOT
STM32_RESET
SW1
SW_Push
File: battery_monitoring.sch
Tie STM32_BOOT to 3.3V to start UART bootloader.
R11
10k
C2
0.1uF
C1
1uF
U1
ESP32-WROOM
GND_PAD
Input only
No PU, no PD
DIP_SWITCH
ADC_IN
I2C_SDA
I2C_SCL
I2S_LRCK
I2S_DATA
I2S_BCK
SPI_SCK
SPI_MISO
LED_DATA_1
LED_DATA_2
ESP32_TXO
ESP32_RXI
DMX_RO
DMX_DI
DMX_DE
ESP32_BOOT
NB: IO12 =MTDI = internal LDO voltage (at startup)
internal Flash connections
NB : IO15 = MTDO = debug log enabled
IO0 AND IO2 must be low to enter BL
IO2 : internal PD, IO0 : internal PU
SPI_MOSI
SPI_CS
U2
SP3485CN
DMX / RS-485 transceiver
R7
120R
Conn_01x03
J6
R3
10k
R4
10k
I2C_SDA
I2C_SCL
J3
VBUS
+VSW
+BATT
Extension connector
SW2
SW_DIP_x03
R33
22k
R34
22k
R35
10k
R36
22k
R37
10k
R38
22k
DIP_SWITCH
R17
10k
R18
10k
R19
10k
R20
10k
Q4
2N7002
Q5
2N7002
LED_DATA_OUT_1
LED_DATA_OUT_2
J7
J8
Buffer for 5V digital LED strip
DTR RTS => EN IO0
1 1 1 1
0 0 1 1
1 0 0 1
0 1 1 0
IO0 is pulled Low when DTR = 0 and RTS = 1.
Otherwise it is floating.
IO0 has an internal PU.
USB-serial
J1
Conn_01x06
PROG_RTS
PROG_DTR
R5
10k
R6
10k
Q1
BC847W
Q2
BC847W
J11
TEST_1P
Serial & programmation connector with ESP32 auto-reset
J4
Conn_01x04
OLED display connector
FID1 Fiducial
FID2 Fiducial
FID3 Fiducial
FID4 Fiducial
FID5 Fiducial
FID6 Fiducial
MK1
Mounting_Hole
MK2
Mounting_Hole
Tom Magnier
KXKM
Sheet: /
File: KXKM_ESP32_battery_management_board.sch
Title: ESP32 battery management module
Size: A4
Date: 2019-04-05
Rev: 2.0
KiCad E.D.A. kicad 5.1.10
Id: 1/3


PWR_FLAG
+BATT_RAW
F1
0.5A/30V
+BATT
J13
Wire pad
C6
100uF,50V
D11
1A/100V
J14
Wire pad
GND
GND
Main battery input
5.5 – 30VDC
+BATT_RAW
MAIN_OUT_EN
R21
10k
Q6
2N7002
U4
BTS50080-1TEA
IN
Vbb
OUT
IS
LOAD_I_SENSE
R12
1k/1%
R22
1k/1%
D13
Zener/3V/300mW
10A high side load switch
+VSW
J15
Wire pad
J16
Wire pad
Battery power output.
Max 10A
VBUS
U5
DC_DC_POL
IN+
IN–
OUT+
OUT–
Optional 3A buck module
with USB connector
J5
Conn_01x02
SENSE is connected to the STM32 and give status
of AUTOBOOT/SENSE information.
The MCU uses either a falling edge IRQ or polling to
get status of autoboot (connected / disconnected)
The 3.3V regulator starts automatically
when the jumper is connected, thanks to the edge detector (C/R)
R28
470R
AUTOBOOT_SENSE
D14
Zener/3V/300mW
C11
1uF
R32
47k
1N4148WT
D15
R_IS selection : I_IS = 6mA max
In normal conditions, I_IS = I_load / 10000
=> with R_IS = 2k, I_load = 10A gives 2V.
The Zener clamps voltage to 3V (error conditions => I_IS = 5.2mA)
R13
DNP
R29
DNP
R31
0R
R14
DNP
R30
DNP
J9
USB_A
USB power output
For most newer devices, a 0R resistor between D+ and D–
should be enough to indicate that the port can supply up to 1.5A.
Older Apple devices may need specific voltage dividers
on D+/D– lines.
Check https://lygte-info.dk/info/USBinfo%20UK.html
R8 selection :
Zener current : 5mA min, 100mA max
470R :
5mA with VBat = 5.5V
57mA with VBat = 30V
SW_Push
SW3
R8
470R
D1
1N4148WT
D4
1N4148WT
3.3V_EN
EN_PUSH_BUTTON
D2
Zener/3V/300mW
The MCP16331 has an internal pull up on the EN pin.
On startup, R1 pulls EN low (system Off)
When the push button is pressed, the Zener is powered and
the EN pin gets high through D1 => system On.
The uC gets powered and can now controls the system state
with the 3.3V_EN line.
It can also monitor future states of the push button.
U3
MCP16331T-E/CH
VIN
EN
BOOST
SW
VFB
GND
C4
10uF/50V
C5
10uF/50V
R1
10k/1%
C26
10nF
C7
0.1uF
D3
1A/100V
L1
15uH,1.5A
D12
1N4148WT
R9
31.6k/1%
R10
10k/1%
C8
20pF
C9
10uF
C10
10uF
+3.3V
PWR_FLAG
Sheet: /Power/
File: power.sch
Title:
Size: A4
Date: 2019-04-05
Rev: 2.0
KiCad E.D.A. kicad 5.1.10
Id: 2/3


LED_BAR_3
LED_BAR_4
LED_BAR_2
LED_BAR_1
AUTOBOOT_SENSE
LOAD_I_SENSE
MAIN_OUT_EN
ESP32_EN
STM32_TX
STM32_RX
BATT_TYPE_1
BATT_TYPE_2
USART1 is also used by the serial bootloader.
+3.3V
P1
VCC
RESET
GND
SWDIO
SWCLK
SWO
TC_SWD
STM32_RST
SWDIO & SWCLK can only be used if selector is in pos. 3
3.3V_EN
EN_PUSH_BUTTON
C22
C23
0.1uF
0.1uF
GNDGND
PA0/ADC_IN0/RTC_TAMP2/SYS_WKUP1/USART1_CTS
PA1/ADC_IN1/USART1_DE/USART1_RTS
PA2/ADC_IN2/USART1_TX
PA3/ADC_IN3/USART1_RX
PA4/ADC_IN4/SPI1_NSS/TIM14_CH1/USART1_CK
PA5/ADC_IN5/SPI1_SCK
PA6/ADC_IN6/SPI1_MISO/TIM16_CH1/TIM1_BKIN/TIM3_CH1
PA7/ADC_IN7/SPI1_MOSI/TIM14_CH1/TIM17_CH1/TIM1_CH1N/TIM3_CH2
PA9/I2C1_SCL/TIM1_CH2/USART1_TX
PA10/I2C1_SDA/TIM17_BKIN/TIM1_CH3/USART1_RX
PA13/IR_OUT/SYS_SWDIO
PA14/SYS_SWCLK/USART1_TX
U7
STM32F030F4Px
Package_SO:TSSOP-20_4.4x6.5mm_P0.65mm
PF0-OSC_IN/RCC_OSC_IN
PF1-OSC_OUT/RCC_OSC_OUT
VDD
VDDA
PB1/ADC_IN9/TIM14_CH1/TIM1_CH3N/TIM3_CH4
VBAT_MEAS
BOOT0
NRST
VSS
R23
1k
C24
0.1uF
STM32_BOOT
STM32_RESET
SW4
SW_SP3T
Li-Po
Li-Fe
Custom (set by ESP32)
Battery type selector
+BATT
R15
270k/1%
R16
31.6k/1%
C21
1nF
VBAT_MEAS
Battery voltage measurement
+BATT = 30V => 3.14V
R24
100R
R25
100R
R26
100R
R27
100R
D9
D10
D5
D8
D6
D7
Yellow
Red
Green
Yellow
Green
Green
LED array for battery level display
Sheet: /Battery monitoring/
File: battery_monitoring.sch
Title:
Size: A4
Date: 2019-04-05
Rev: 2.0
KiCad E.D.A. kicad 5.1.10
Id: 3/3