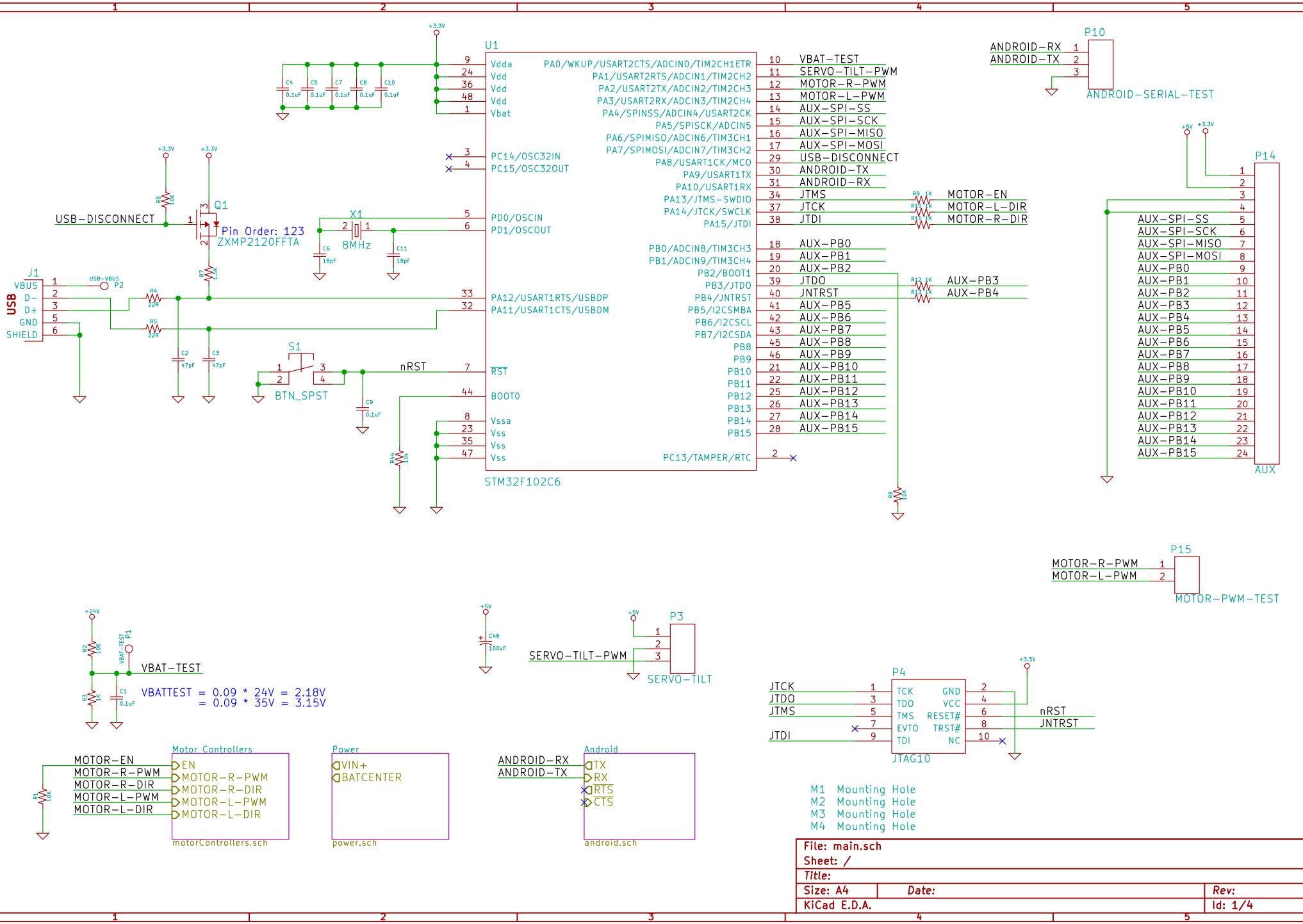
U1
STM32F102C6
Vdda
Vdd
Vdd
Vdd
Vbat
Vssa
Vss
Vss
Vss
PC14/OSC32IN
PC15/OSC32OUT
PD0/OSCIN
PD1/OSCOUT
RST
BOOT0
PA12/USART1RTS/USBDP
PA11/USART1CTS/USBDM
PA0/WKUP/USART2CTS/ADCIN0/TIM2CH1ETR
PA1/USART2RTS/ADCIN1/TIM2CH2
PA2/USART2TX/ADCIN2/TIM2CH3
PA3/USART2RX/ADCIN3/TIM2CH4
PA4/SPINSS/ADCIN4/USART2CK
PA5/SPISCK/ADCIN5
PA6/SPIMISO/ADCIN6/TIM3CH1
PA7/SPIMOSI/ADCIN7/TIM3CH2
PA8/USART1CK/MCO
PA9/USART1TX
PA10/USART1RX
PA13/JTMS-SWDIO
PA14/JTCK/SWCLK
PA15/JTDI
PB0/ADCIN8/TIM3CH3
PB1/ADCIN9/TIM3CH4
PB2/BOOT1
PB3/JTDO
PB4/JNTRST
PB5/I2CSMBA
PB6/I2CSCL
PB7/I2CSDA
PB8
PB9
PB10
PB11
PB12
PB13
PB14
PB15
PC13/TAMPER/RTC
VBAT-TEST
SERVO-TILT-PWM
MOTOR-R-PWM
MOTOR-L-PWM
AUX-SPI-SS
AUX-SPI-SCK
AUX-SPI-MISO
AUX-SPI-MOSI
USB-DISCONNECT
ANDROID-TX
ANDROID-RX
JTMS
JTCK
JTDI
JTDO
JNTRST
AUX-PB0
AUX-PB1
AUX-PB2
AUX-PB3
AUX-PB4
AUX-PB5
AUX-PB6
AUX-PB7
AUX-PB8
AUX-PB9
AUX-PB10
AUX-PB11
AUX-PB12
AUX-PB13
AUX-PB14
AUX-PB15
nRST
Q1
Pin Order: 123
ZXMP2120FFTA
X1
8MHz
J1
USB
VBUS
D-
D+
GND
SHIELD
USB-VBUS
P2
S1
BTN_SPST
P10
ANDROID-SERIAL-TEST
P14
AUX
P15
MOTOR-PWM-TEST
P3
SERVO-TILT
P4
JTAG10
TCK
TDO
TMS
EVTO
TDI
GND
VCC
RESET#
TRST#
NC
VBAT-TEST
VBATTEST = 0.09 * 24V = 2.18V
= 0.09 * 35V = 3.15V
Motor Controllers
MOTOR-EN
MOTOR-R-PWM
MOTOR-R-DIR
MOTOR-L-PWM
MOTOR-L-DIR
motorControllers.sch
Power
VIN+
BATCENTER
power.sch
Android
TX
RX
RTS
CTS
android.sch
M1 Mounting Hole
M2 Mounting Hole
M3 Mounting Hole
M4 Mounting Hole
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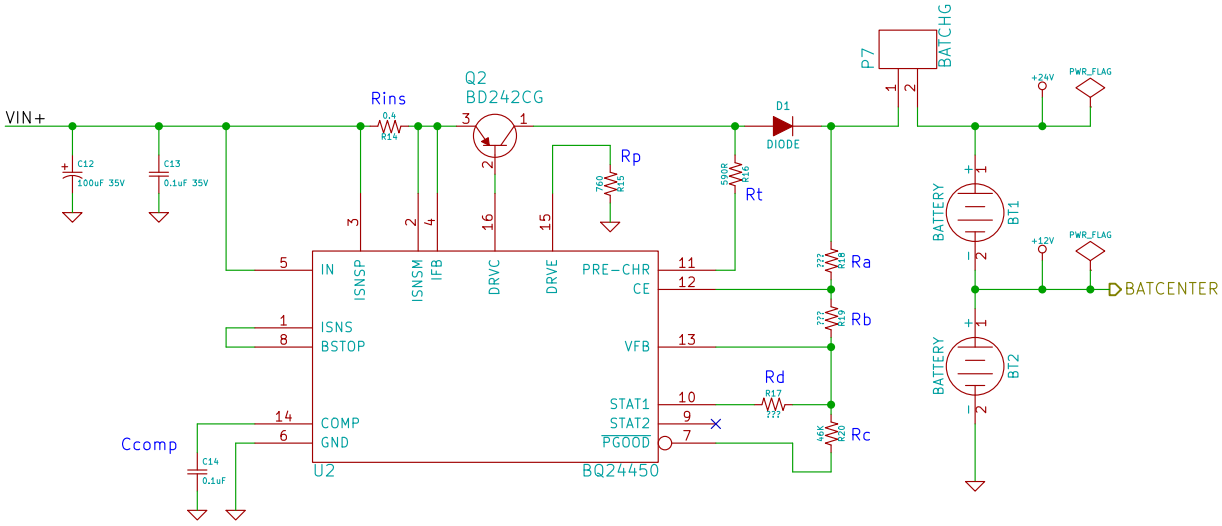
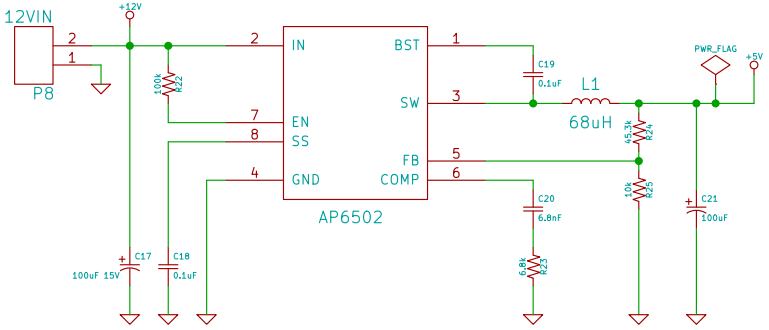
KiCad E.D.A.
Id: 1/4





L = (Vout * (Vin − Vout)) / (Vin * dIL * fsw)
L = (5V * (12V − 5V)) / (5V * 0.3 * 340kHz)
L = 35 / 510,000 = 68uH

Float Charge = 13.5 – 13.8V per cell = 27 – 27.6V
Cycle use charge = 14.6 – 15.0V per cell = 29.2 – 30V
Vth = 10.5V per cell = 21V

Imax charge = 2100mA
NOTE: Compontent selection will not allow
this so we will choose a much smaller value 500mA?

BD242CG hfemin = 20

Rc = 2.3V / 50uA = 46k prefered

Vfloat = 2.3V * (Ra + Rb + Rc) / Rc
-> Ra + Rb = (27.3 * 46k / 2.3) – 46k
-> Ra + Rb = 500k

Vboost = Vref * (Ra + Rb + Rc//Rd) / Rc//Rd
-> 29.6 = 2.3 * (500k + 46k//Rd) / 46k//Rd
-> 12.87 = (500k / 46k//Rd) + 1
-> 11.87 = 500k / 46k//Rd
-> 46k//Rd = 42,124.5
-> (46k * Rd) / (46k + Rd) = 42,124.5
-> 46k * Rd = 1,937,727,000 + (42,124.5 * Rd)
-> 3,875.5 * Rd = 1,937,727,000
-> Rd = 499,994 = 500k prefered

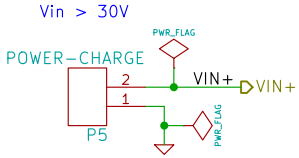
Vth = Vref * (Ra + Rb + Rc//Rd) / (Rb + Rc//Rd)
-> 21 = 2.3 * (Ra + Rb + 42,124.5) / (Rb + 42,124.5)
-> (9.13 * Rb) + 384,615 = 500k + 42,124.5
-> 9.13 * Rb = 157,509.5
-> Rb = 17,251.86 = 16.9k prefered

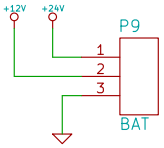
Ra + Rb = 500k
-> Ra = 483,100 = 487k prefered

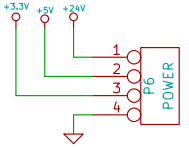
Ipre = (Vin – Vpre – Vdext – Vbat) / Rt
-> 10mA = (30 – 2 – 0.7 – 21) / Rt
-> 10mA * Rt = 6.3
-> Rt = 630 = 649 prefered

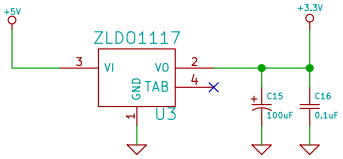
Imax = Vilim / Risns
-> 0.5 = 250mV / Risns
-> Risns = 0.5

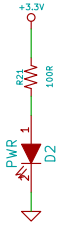
Rp = (Vinmin – 2) / Imax * hfemin
-> Rp = (30 – 2) / 500mA * 20
-> Rp = 1,120 = 1.1k prefered











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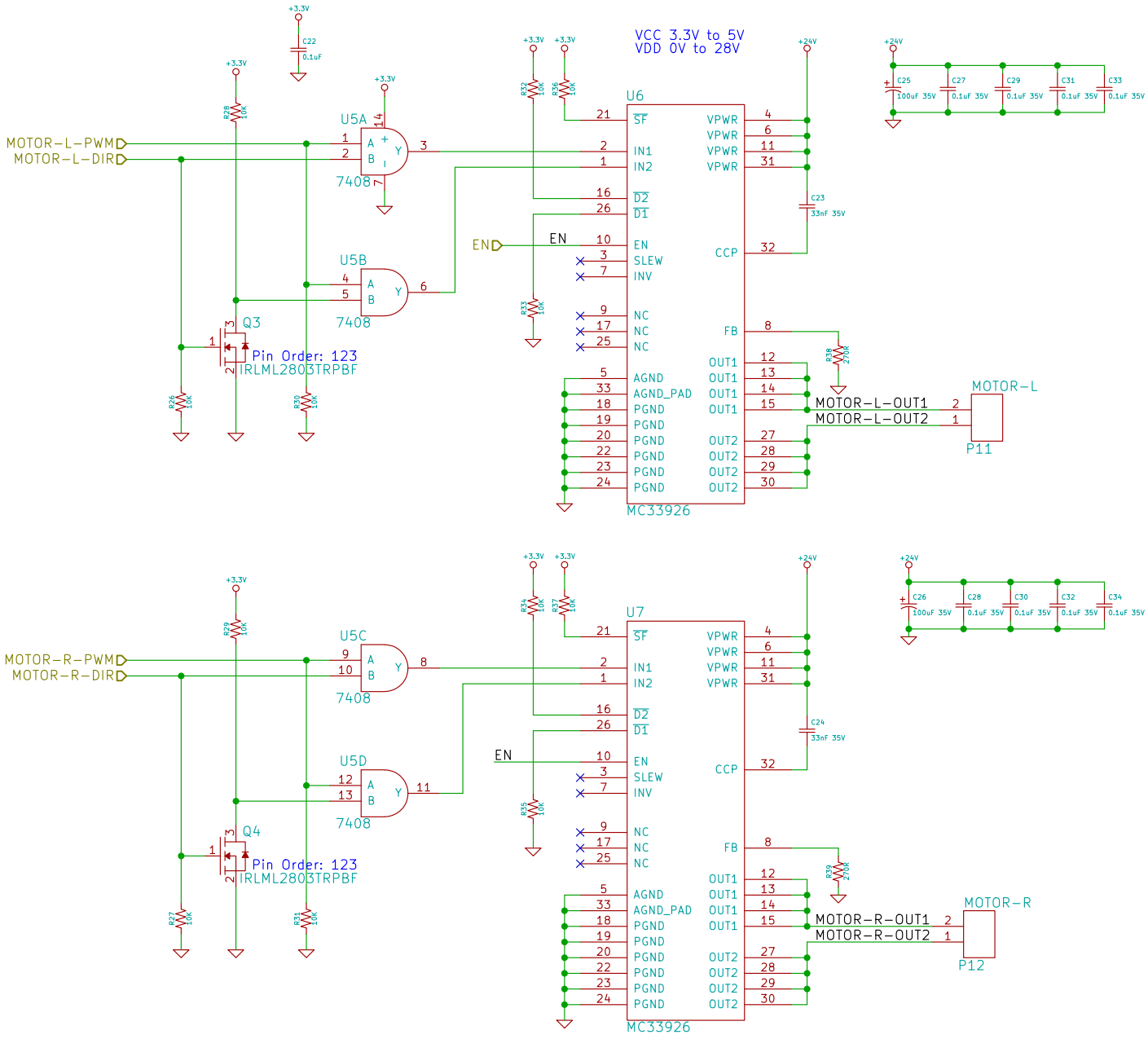
KiCad E.D.A.		Id: 2/4



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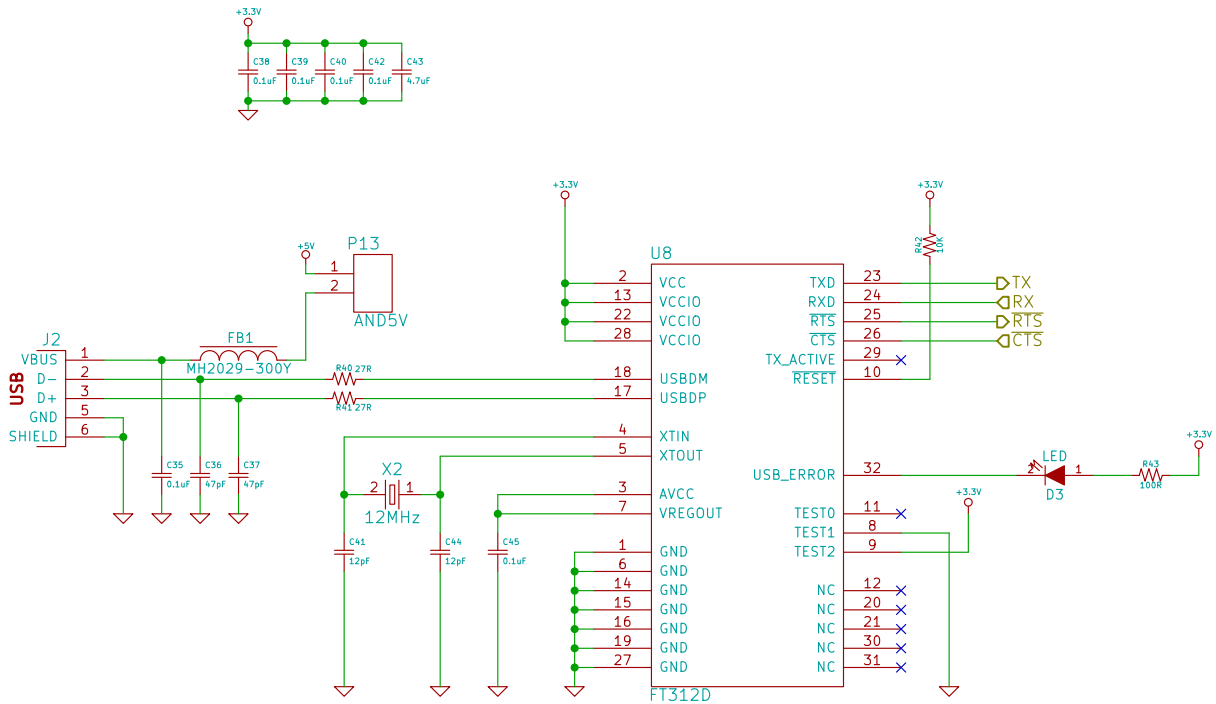
KiCad E.D.A.		Id: 3/4



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KiCad E.D.A.		Id: 4/4