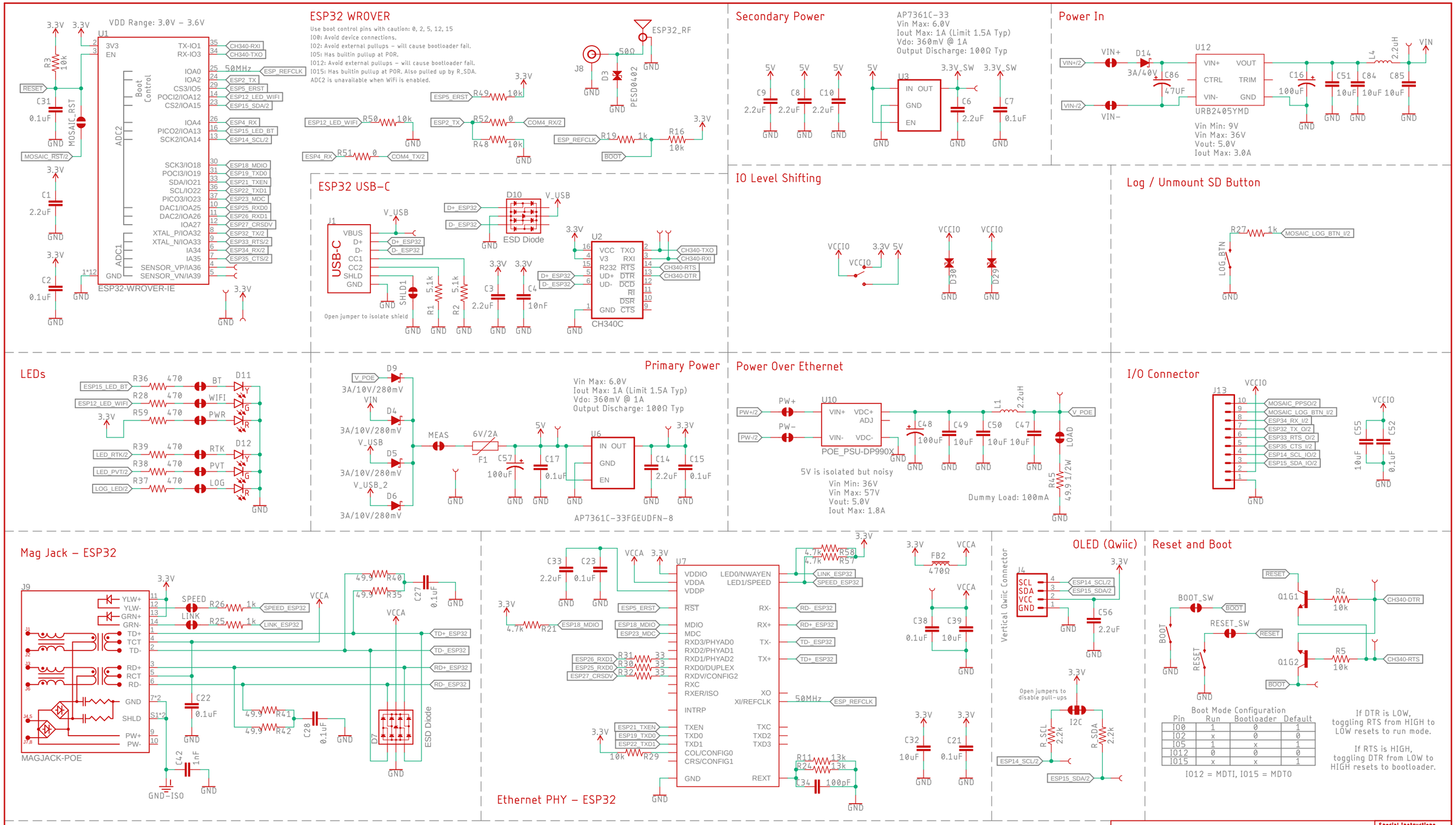

USB Track Impedance: Differential Pair
https://saturnpcb.com/saturn-pcb-toolkit/
Prepreg thickness: 8.3 mil (JLC7628). Er = 4.6
10.5 mil track with 9.5 mil gap (20 mil center to center) = 90 Ohms

RF Track Impedance: Coplanar Waveguide with Ground Calculations
Ground is on layer 2. Prepreg thickness: 0.2mm. Er = 4.6
12.5 mil track with 5 mil gap = 50 Ohms
https://chemandy.com/calculators/coplanar-waveguide-with-ground-calculator.htm

ESP32 GPIO0 – Ethernet PHY RMII Reference Clock (50MHz):
Take care of the signal integrity of REF_CLK in the hardware design.
Keep the trace as short as possible.
Keep it away from RF devices and inductor elements.

Ethernet Track Impedance: Differential Pair
https://saturnpcb.com/saturn-pcb-toolkit/
Prepreg thickness: 8.3 mil (JLC7628). Er = 4.6
9.0 mil track with 11.0 mil gap (20 mil center to center) = 100 Ohms
Each pair should match in length to better than 0.5mm

open hardware

sparkfun

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Special Instructions: No clean process

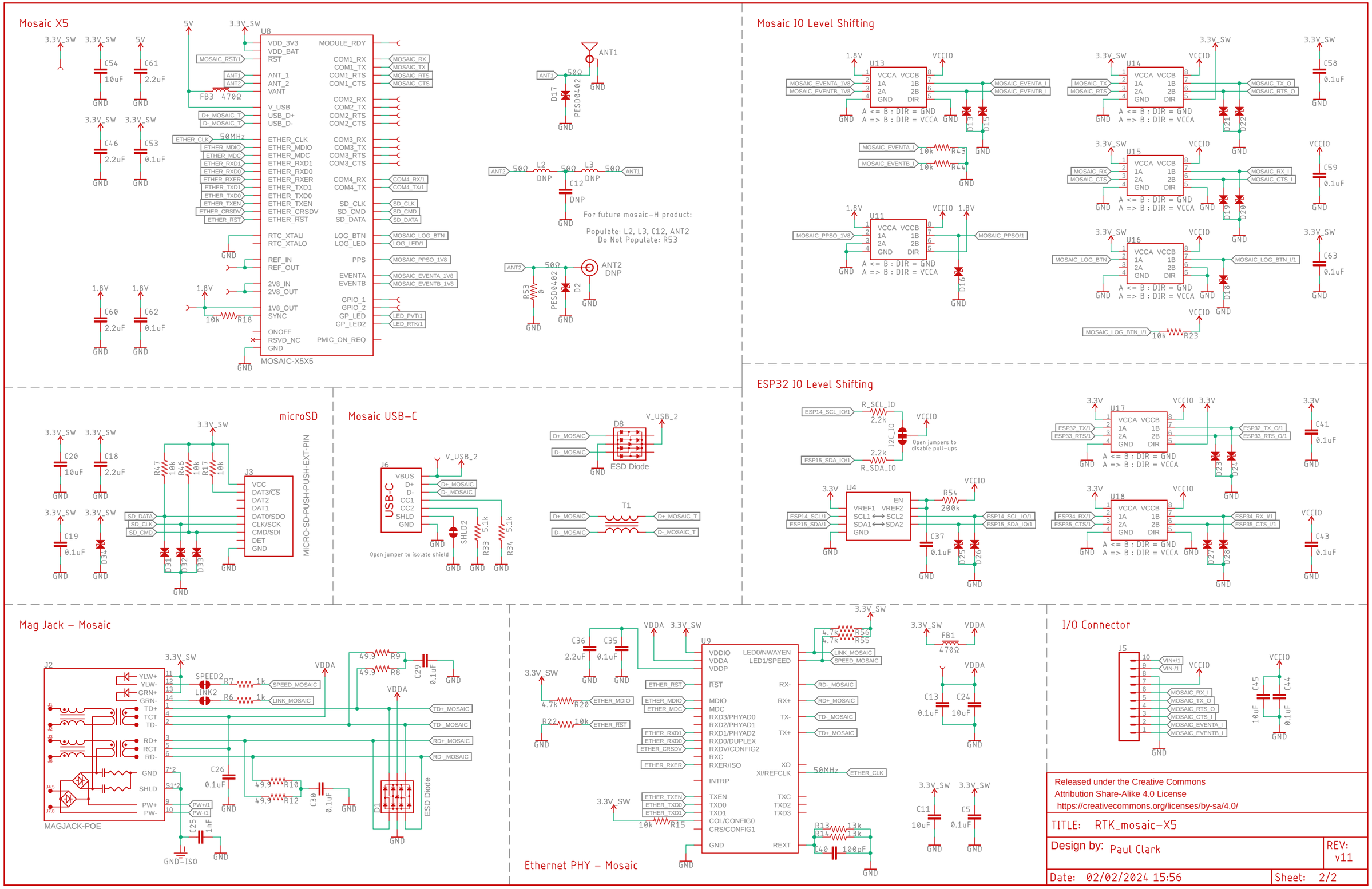
TITLE: RTK_mosaic-X5

Design by: Paul Clark

REV: v11

Date: 02/02/2024 15:56

Sheet: 1/2


Mosaic X5
U8
MOSAIC-X5X5
VDD_3V3
VDD_BAT
RST
ANT_1
ANT_2
VANT
V_USB
USB_D+
USB_D-
ETHER_CLK
ETHER_MDIO
ETHER_MDC
ETHER_RXD1
ETHER_RXD0
ETHER_RXER
ETHER_TXD1
ETHER_TXD0
ETHER_TXEN
ETHER_CRSDV
ETHER_RST
RTC_XTALI
RTC_XTALO
REF_IN
REF_OUT
2V8_IN
2V8_OUT
1V8_OUT
SYNC
ONOFF
RSVD_NC
GND
MODULE_RDY
COM1_RX
COM1_TX
COM1_RTS
COM1_CTS
COM2_RX
COM2_TX
COM2_RTS
COM2_CTS
COM3_RX
COM3_TX
COM3_RTS
COM3_CTS
COM4_RX
COM4_TX
SD_CLK
SD_CMD
SD_DATA
LOG_BTN
LOG_LED
PPS
EVENTA
EVENTB
GPIO_1
GPIO_2
GP_LED
GP_LED2
PMIC_ON_REQ
MOSAIC_RST/1
MOSAIC_RX
MOSAIC_TX
MOSAIC_RTS
MOSAIC_CTS
COM4_RX/1
COM4_TX/1
MOSAIC_LOG_BTN
LOG_LED/1
MOSAIC_PPSO_1V8
MOSAIC_EVENTA_1V8
MOSAIC_EVENTB_1V8
LED_PVT/1
LED_RTK/1
D+_MOSAIC_T
D-_MOSAIC_T
ETHER_CLK
50MHz
FB3 470Ω
C54 10uF
C61 2.2uF
C46 2.2uF
C53 0.1uF
C60 2.2uF
C62 0.1uF
R18 10k
ANT1
D17 PESD0402
ANT2
R53 0
D2 PESD0402
L2 DNP
L3 DNP
C12 DNP
For future mosaic-H product:
Populate: L2, L3, C12, ANT2
Do Not Populate: R53
Mosaic IO Level Shifting
U13
U14
U15
U11
U16
VCCA VCCB
1A 1B
2A 2B
GND DIR
A <= B : DIR = GND
A => B : DIR = VCCA
MOSAIC_EVENTA_I
MOSAIC_EVENTB_I
MOSAIC_TX_O
MOSAIC_RTS_O
MOSAIC_RX_I
MOSAIC_CTS_I
MOSAIC_PPSO/1
MOSAIC_LOG_BTN_I/1
R43 10k
R44 10k
R23 10k
C58 0.1uF
C59 0.1uF
C63 0.1uF
ESP32 IO Level Shifting
ESP14_SCL_IO/1
ESP15_SDA_IO/1
R_SCL_IO 2.2k
R_SDA_IO 2.2k
I2C_IO
Open jumpers to disable pull-ups
U4
EN
VREF1 VREF2
SCL1 SCL2
SDA1 SDA2
R54 200k
C37 0.1uF
ESP14_SCL_IO/1
ESP15_SDA_IO/1
U17
U18
ESP32_TX/1
ESP33_RTS/1
ESP32_TX_O/1
ESP33_RTS_O/1
ESP34_RX/1
ESP35_CTS/1
ESP34_RX_I/1
ESP35_CTS_I/1
C41 0.1uF
C43 0.1uF
microSD
J3
MICRO-SD-PUSH-PUSH-EXT-PIN
VCC
DAT3/CS
DAT2
DAT1
DAT0/SDO
CLK/SCK
CMD/SDI
DET
GND
SD_DATA
SD_CLK
SD_CMD
R47 10k
R46 10k
R45 10k
C20 10uF
C18 2.2uF
C19 0.1uF
D31
D32
D33
D34
Mosaic USB-C
J6
USB-C
VBUS
D+
D-
CC1
CC2
SHLD
GND
V_USB_2
D+_MOSAIC
D-_MOSAIC
SHLD2
R33 5.1k
R34 5.1k
Open jumper to isolate shield
D8
ESD Diode
T1
D+_MOSAIC_T
D-_MOSAIC_T
Mag Jack - Mosaic
J2
MAGJACK-POE
YLW+
YLW-
GRN+
GRN-
TD+
TCT
TD-
RD+
RCT
RD-
GND
SHLD
PW+
PW-
SPEED2
LINK2
R7 1k
R6 1k
SPEED_MOSAIC
LINK_MOSAIC
VDDA
R9 49.9
R8 49.9
C29 0.1uF
TD+_MOSAIC
TD-_MOSAIC
RD+_MOSAIC
RD-_MOSAIC
C26 0.1uF
R10 49.9
R12 49.9
C30 0.1uF
D1
ESD Diode
PW+/1
PW-/1
C25 1nF
GND-ISO
Ethernet PHY - Mosaic
U9
VDDIO
VDDA
VDDP
RST
MDIO
MDC
RXD3/PHYAD0
RXD2/PHYAD1
RXD1/PHYAD2
RXD0/DUPLEX
RXDV/CONFIG2
RXC
RXER/ISO
INTRP
TXEN
TXD0
TXD1
COL/CONFIG0
CRS/CONFIG1
LED0/NWAYEN
LED1/SPEED
RX-
RX+
TX-
TX+
XO
XI/REFCLK
TXC
TXD2
TXD3
REXT
ETHER_RST
ETHER_MDIO
ETHER_MDC
ETHER_RXD1
ETHER_RXD0
ETHER_CRSDV
ETHER_RXER
ETHER_TXEN
ETHER_TXD0
ETHER_TXD1
ETHER_CLK
50MHz
LINK_MOSAIC
SPEED_MOSAIC
RD-_MOSAIC
RD+_MOSAIC
TD-_MOSAIC
TD+_MOSAIC
R56 4.7k
R55 4.7k
FB1 470Ω
C36 2.2uF
C35 0.1uF
R20 4.7k
R22 10k
R15 10k
C13 0.1uF
C24 10uF
C11 10uF
C5 0.1uF
R13 13k
R14 13k
C40 100pF
I/O Connector
J5
VIN+/1
VIN-/1
MOSAIC_RX_I
MOSAIC_TX_O
MOSAIC_RTS_O
MOSAIC_CTS_I
MOSAIC_EVENTA_I
MOSAIC_EVENTB_I
C45 10uF
C44 0.1uF
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TITLE: RTK_mosaic-X5
Design by: Paul Clark
REV: v11
Date: 02/02/2024 15:56
Sheet: 2/2