## Table of Contents



# TWR-K64F120M

## Revisions

| Rev | Description | Date | Approved |
|---|---|---|---|
| X1 | Initial Draft | 14 May 13 | Tsi Chung |
| X2 | 5K ohm potentiometer and its corresponding 0.1uF capacitor and a Header is added | 15 May 13 | Tsi Chung |
| X3 | 1. Added J27,J31,J34-J36.J29-J33.<br>2. PTC19 is connected to pin4 of J12.<br>3. PTB11,PTB9,PTB10,PTB16,PTB17, PTC12and PTC13 is connected to B7, B8,B9,B10,B11,A10 and A11 of J11A Elevator connector respectively. | 16 May 13 | Tsi Chung |
| X4 | 1. Added R23(4.7K) pull up resistor on Ethernet MDIO signal(PTB0).<br>2. Added J21 header. | 17 May 13 | Tsi Chung |
| X5 | Added Q2,R103,R110 and C507. | 17 May 13 | Tsi Chung |
| X6 | 1. Added R518,C505,C515,C514,TP8.<br>2. R520,R103,R97 resistor values changed from 1.0K to 5.6Kohm,1.0K to 2.7K, 330 ohm to 180 ohm respectively.<br>3. D8 power LED is changed to OSRAM(LS M67K-H2L1-1-0-2-R18-Z). | 20 May 13 | Tsi Chung |
| X7 | 1. R40 pullup moved to EZP_CS_B(MCU)side.<br>2. C513 pin2 connected to VSSA.<br>3. 8MHZ resonator circuit is replaced by 50MHZ OSC.<br>4. USB protection diodes is changed to COOPER BUSSMANN(0402ESDA-MLP1) and added same diodes J2 & J17 USB power pin. | 24 May 13 | Tsi Chung |
| A | A085 Release | 29 May 13 | Tsi Chung |
| AX1 | 1. Added J39 for SWD_CLK_TGTMCU signal of K64 JTAG (OpenSDA design correction)<br>2. Added J18 for Power selection of P5V_TRG_USB, USB0_VBUS and P5V_K64_USB for internal regulator<br>3. Added Power selection for U505 (J38) to select 5V from Open SDA or Elevator | 12 Sep 13 | Tsi Chung |
| AX2 | Updated U10, U9, U17 and J18 with new parts | 16 Sep 13 | Tsi Chung |
| B | A085 Release | 20 Sep 13 | Tsi Chung |


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**Microcontroller Product Group**

6501 William Cannon Drive West
Austin, TX 78735-8598




ICAP Classification: FCP: FIUO: X PUBI:

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|---|---|---|
| Designer: Velmurugan | Drawing Title: TWR-K64F120M | |
| Drawn by: Velmurugan | Page Title: Title Page | |
| Approved: Tsi Chung | Size C / Document Number SCH-27943: SPF-27943 | Rev B |
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1. Unless Otherwise Specified:
   All resistors are in ohms, 5%, 1/8 Watt
   All capacitors are in uF, 20%, 50V
   All voltages are DC
   All polarized capacitors are aluminum electrolytic

2. Interrupted lines coded with the same letter or letter combinations are electrically connected.

3. Device type number is for reference only. The number varies with the manufacturer.

4. Special signal usage:
   _B Denotes - Active-Low Signal
   <> or [] Denotes - Vectored Signals

## Power & Ground Nets

| NET | VOLTAGE | DESCRIPTION |
|---|---|---|
| P5V_USB | 5V | Primary input power. Filtered from USB connector. Input to USB power switch. |
| P5V_TRG_USB | 5V | Output of USB power switch controlled by the VTRG_EN signal from the K20 MCU. Provides input to regulator. |
| P5V_ELEV | 5V | Output of USB power switch controlled by the VTRG_EN signal from the K20 MCU. Provides power to the elevator boards. |
| USB0_VBUS | 5V | USB power from primary elevator Pin A57. |
| P5V_K64_USB | 5V | Secondary input power from the Micro USB. |
| VREGIN_K64 | 5V | Power into the K64 MCU voltage regulator. It is typically derived from the K64 micro USB connector or the elevator USB0_VBUS pin. |
| VOUT33_K20 | 3.3V | Ouput of K20 MCU internal USB Regulator |
| VOUT33_K64 | 3.3V | Ouput of K64 MCU internal USB Regulator |
| VREG_INPUT | 5V | Power into the on board voltage regulators. |
| P3V3 | 3.3V | Output of 3.3V voltage regulator or from the Elevator connector |
| P1V8 | 1.8V | Output of 1.8V voltage regulator |
| V_BRD | 3.3V or 1.8V | K64 MCU & Interface circuit input power |
| MCU_PWR | 3.3V or 1.8V | K64 MCU digital power. Filtered from V_BRD |
| VDDA | 3.3V or 1.8V | VDDA power for MCU and analog circuits. Filtered from MCU_PWR. |
| VBAT | 1.8-3.3V | Voltage to the battery input of the MCU. The value depends on whether the board is powered and at what value and the setting of the shunt that selects the source of the battery voltage. |
| VREFH | 3.3V or 1.8V | Upper reference voltage for ADC on the MCU. Filtered from VDDA. |
| GND | 0V | Digital Ground. |
| VSSA | 0V | VSSA power for MCU and analog circuits. Filtered from GND. |
| VREFL | 0V | Lower reference voltage for ADC on the MCU. Filtered from VSSA. |

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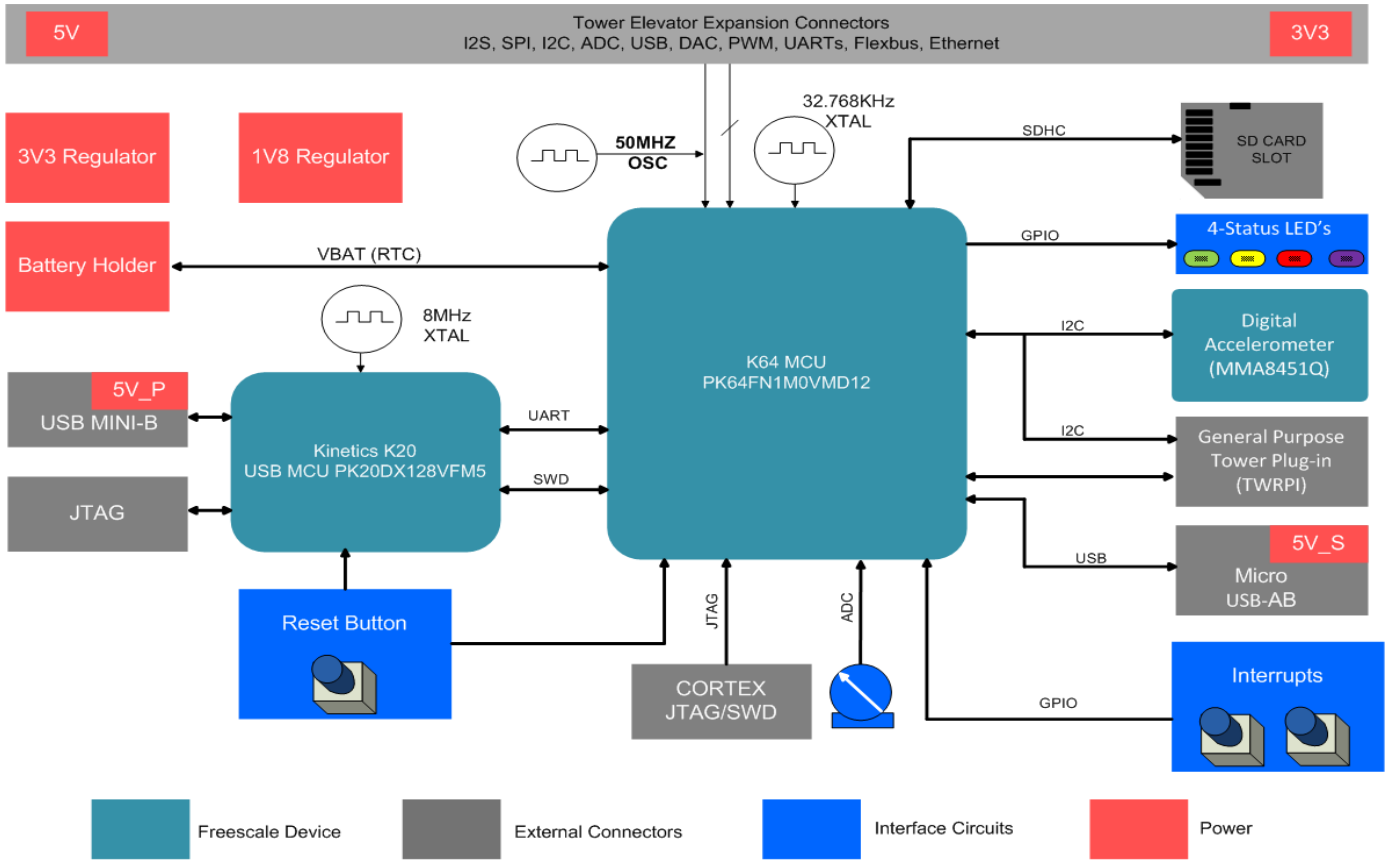
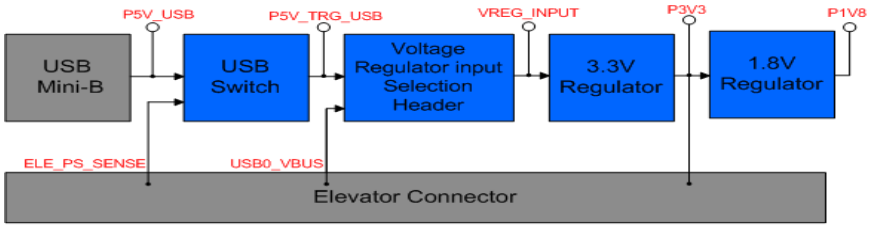
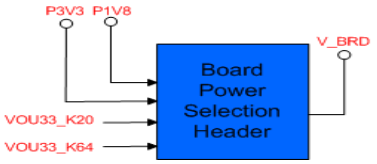
# BLOCK DIAGRAM




# POWER FLOW




If we connect the MCU board with the Elevator module, the ELE_PS_SENSE signal will be high, which disables the P5V_TRG_USB output and the elevator will supply the P3V3 supply.

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| ICAP Classification: | FCP: ___ FIUO: X PUBI: ___ |
| Drawing Title: | TWR-K64F120M |
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## 50MHz CLOCK OSC

Default: 1-2 shunt (Enable power to OSC)

Place the OSC as close as possible to the MCU.

Place the capacitor as close as possible to the OSC.

Default: no shunt (50MHz Osc Enabled)

## K64-CORTEX JTAG SECTION

JTAG/EZPORT

Default: no shunt (Disconnect Target Power)

## PORT-E HEADERS SECTION

Default:1-2 shunt

Note: When ENET_1588_CLKIN is used,replace the shunt and feed the CLK signal to pin2 with respect to pin3(GND).

## K64-MCU

Routing through PORT-E HEADERS

Note: Two 33ohm resistors needs to be soldered if using TWR-SER USB connections.By default these resistors should not be populated

Default:1-2 (Power from Micro USB)

Place the decaps near the MCU Pin
Four decaps for E5&E6,E7&E8,F5 and F8.

PK64FN1M0VMD12 +144 BGA SOCKET

Place all the components as close as possible to the MCU

## INTERRUPTS

PB switch

PB switch

## ENET0_1588_TMR_HEADER

## GND LOOP TEST PADS

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| ICAP Classification: | FCP: ___ FIUO: X PUBI: ___ |
| Drawing Title: | TWR-K64F120M |
| Page Title: | PK64FN1M0VMD12_144BGA_MCU |
| Size: C | Document Number: SCH-27943: SPF-27943 Rev: B |
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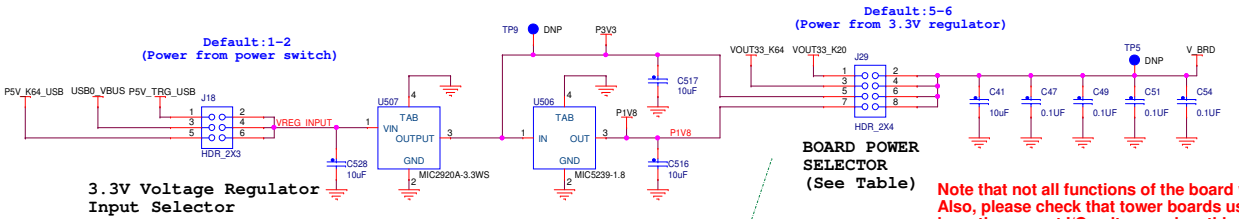
## BOARD POWER SELECTOR(3.3V or 1.8V)




3.3V Voltage Regulator Input Selector

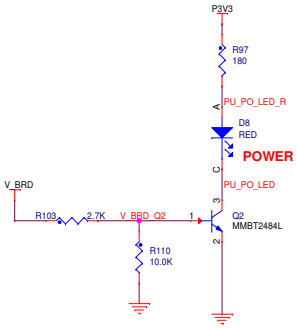
BOARD POWER SELECTOR (See Table)

Note that not all functions of the board will operate at 1.8V. Also, please check that tower boards used with this board have the correct I/O voltages when this board is set to 1.8V.

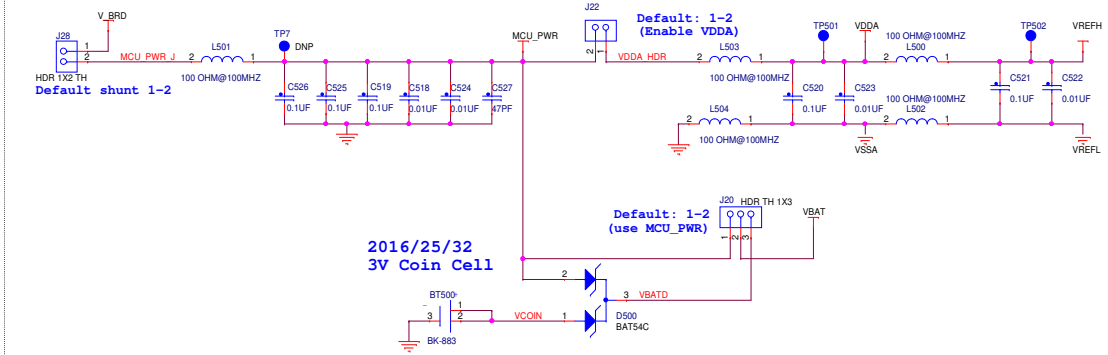
**BOARD POWER SELECTOR TABLE**

| Shunt | V_BRD Source |
|---|---|
| 1-2 | VOUT33_K20(3V3 FROM K20 MCU) - default |
| 3-4 | VOUT33_K64(3V3 FROM K64 MCU) |
| 5-6 | 3.3V from regulator |
| 7-8 | 1.8V from regulator |

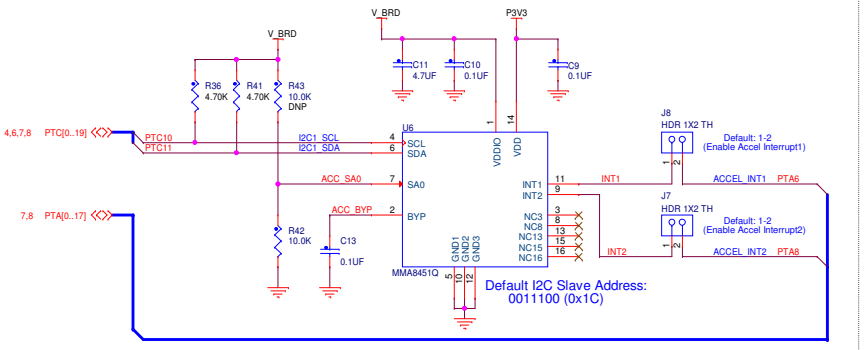
## LED-POWER INDICATOR




## MCU_PWR




## ACCELEROMETER

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| Drawing Title: TWR-K64F120M | | | |
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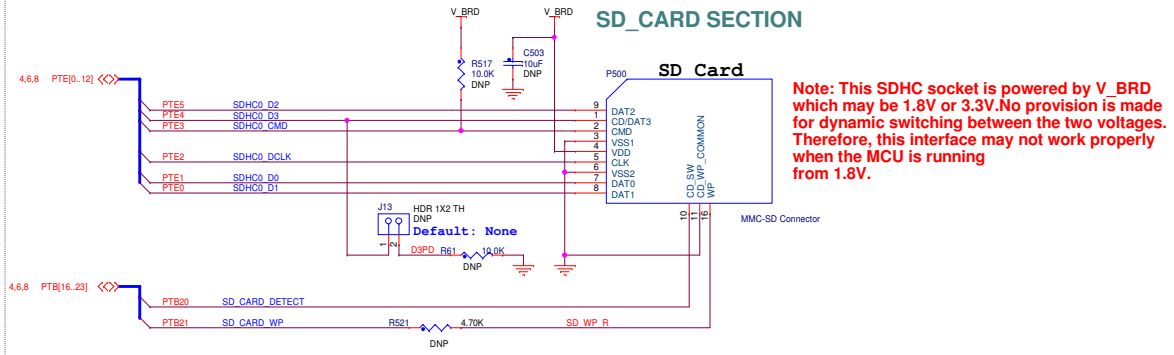
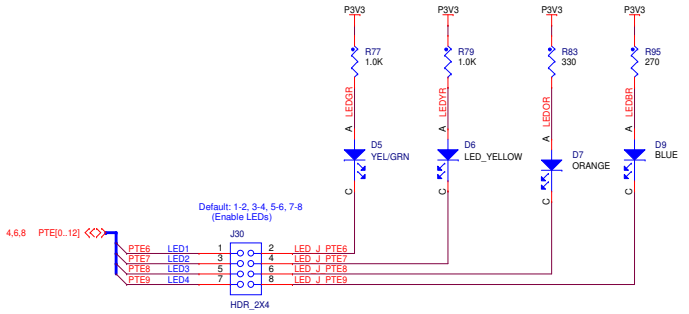
## SD_CARD SECTION

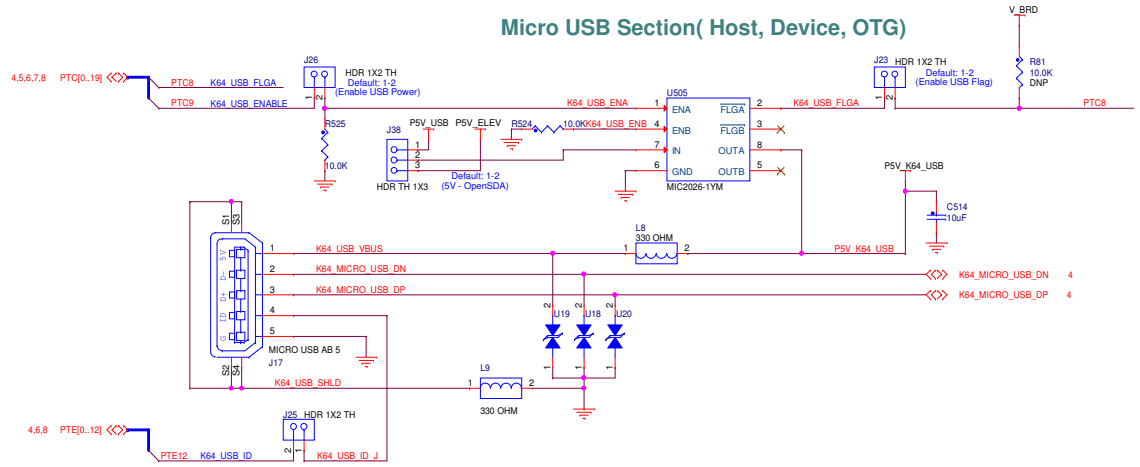



**Note: This SDHC socket is powered by V_BRD which may be 1.8V or 3.3V.No provision is made for dynamic switching between the two voltages. Therefore, this interface may not work properly when the MCU is running from 1.8V.**

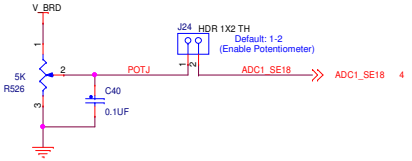
## USER INTERFACE LED'S



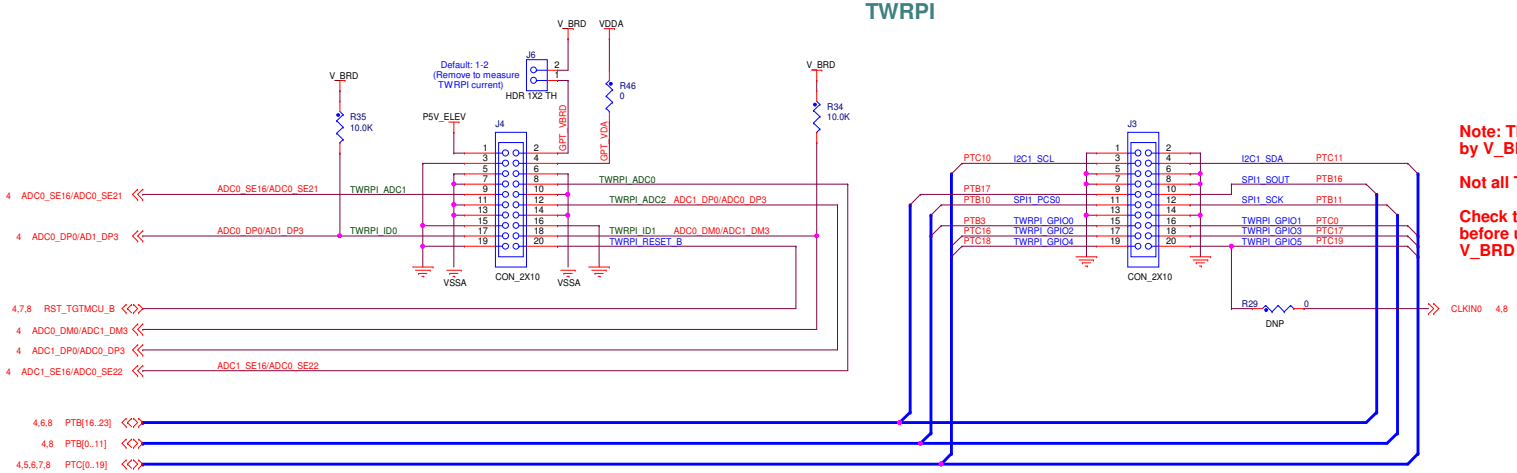

## Micro USB Section( Host, Device, OTG)




## POTENTIOMETER




## GENERAL PURPOSE TWRPI




**Note: The TWRPI connectors are powered by V_BRD which may be 1.8V or 3.3V.**

**Not all TWRPI boards will work at 1.8V.**

**Check that TWRPI boards will work at 1.8V before using them with this board when V_BRD is jumpered for 1.8V.**

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ICAP Classification: FCP: ___ FIUO: X PUBI: ___

Drawing Title: **TWR-K64F120M**

Page Title: **SDHC/K64_MICRO_USB/TWRPI**

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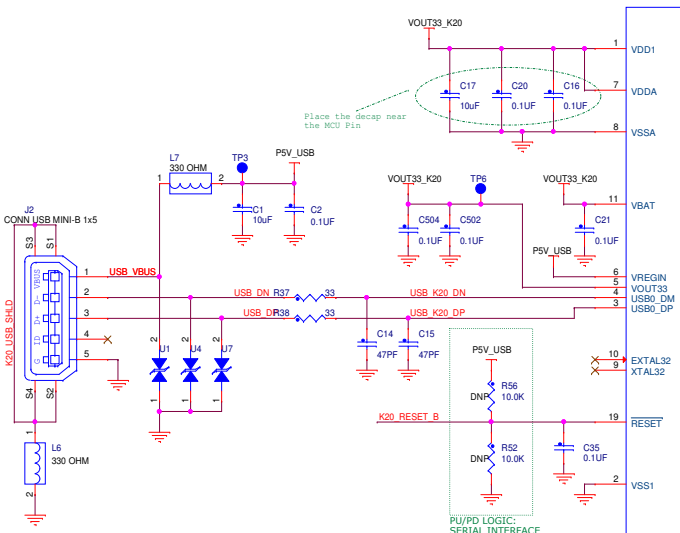
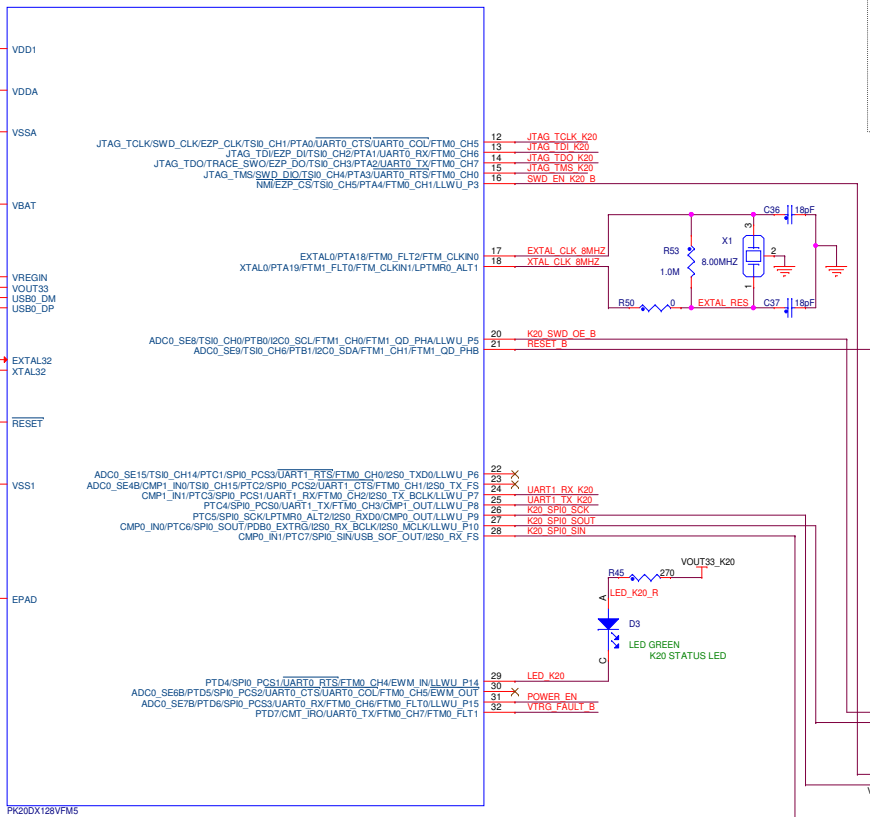
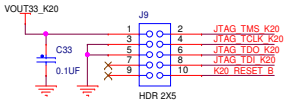
## OPEN SDA-K20 USB MCU SECTION



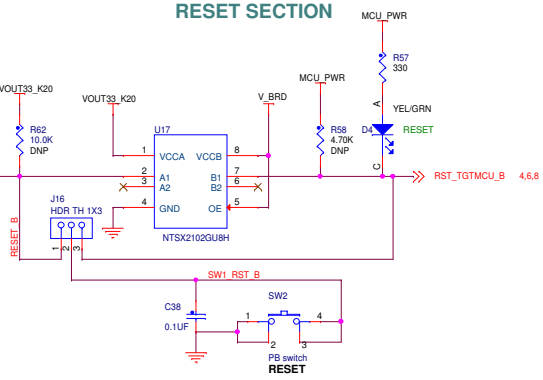

## K20 - 32QFN



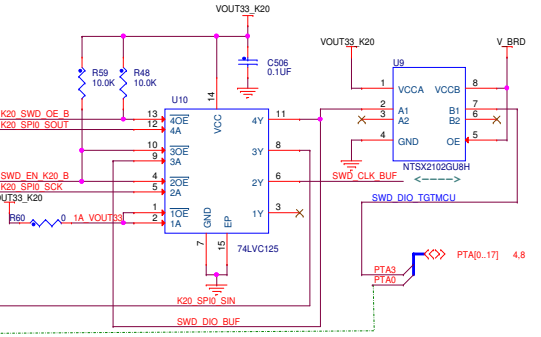

## K20 MCU JTAG CONNECTOR



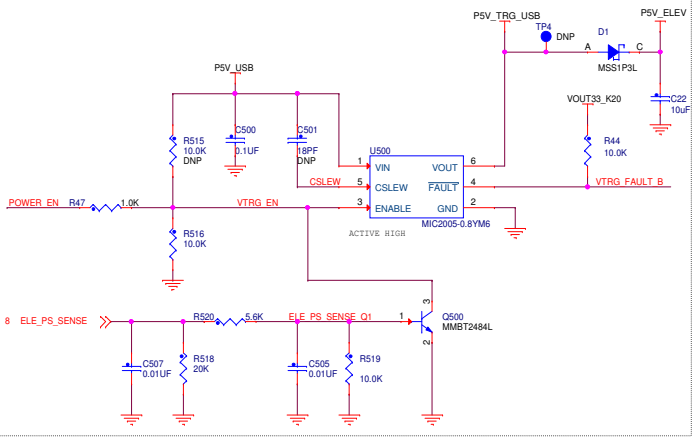

## RESET SECTION



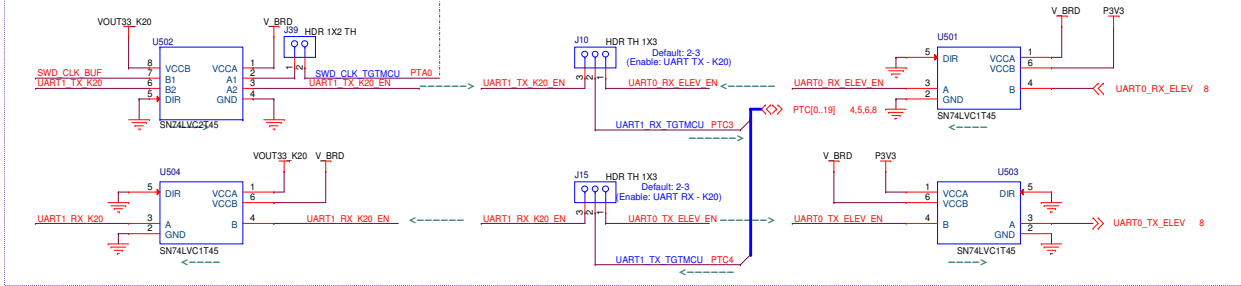

## SWD INTERFACE




## PWR switch to enable 5V from USB connector




## K20-K64 UART TRANSLATORS & HEADERS

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| Drawing Title: | TWR-K64F120M | | |
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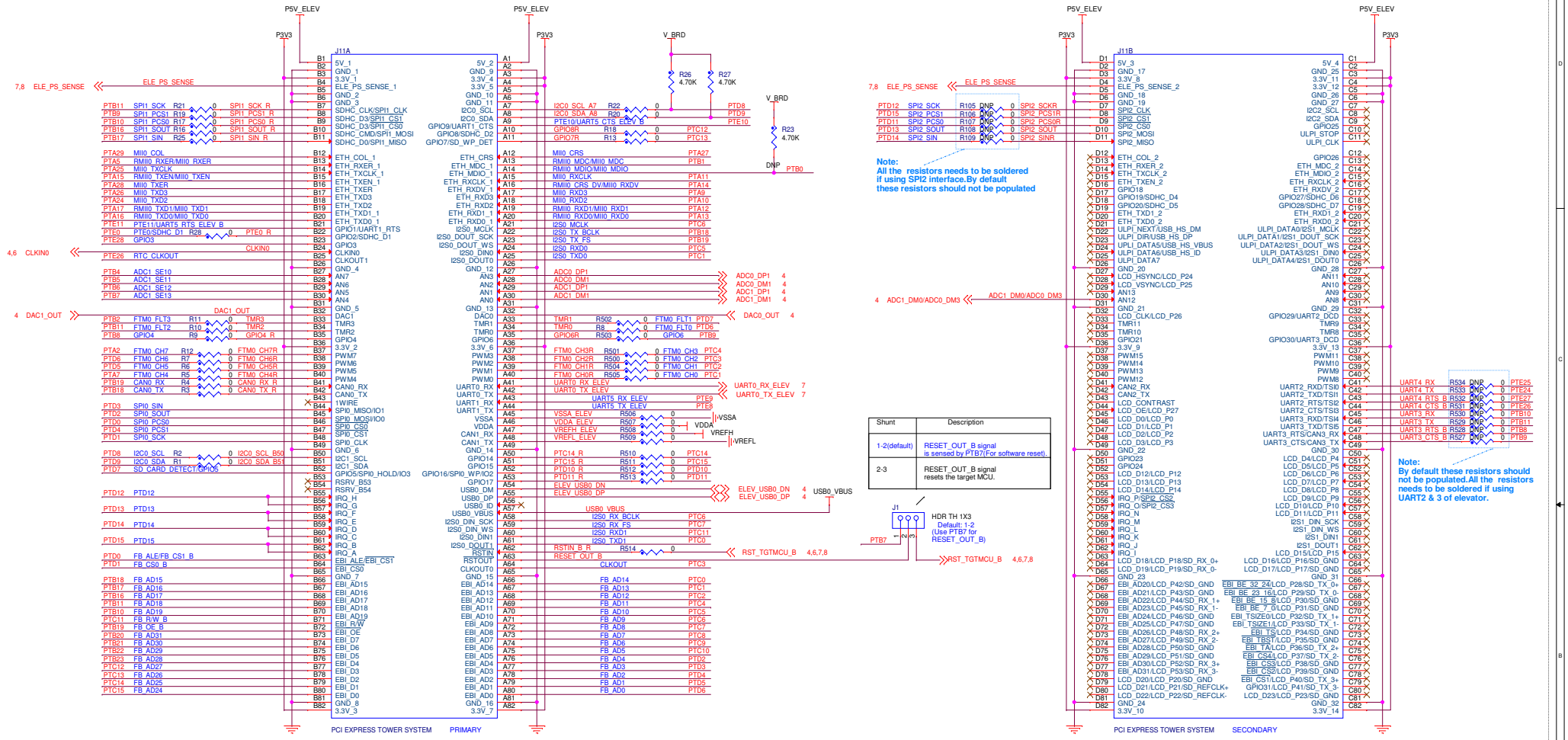
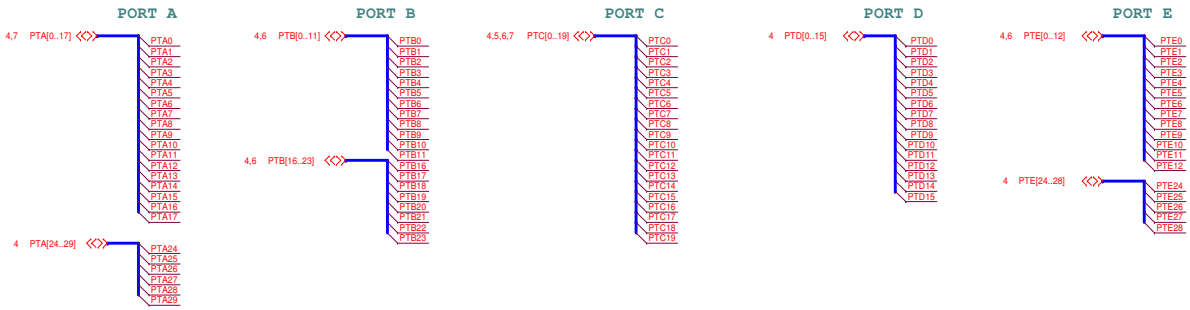
# ELEVATOR CONNECTOR




# K64-MCU PORTS

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