

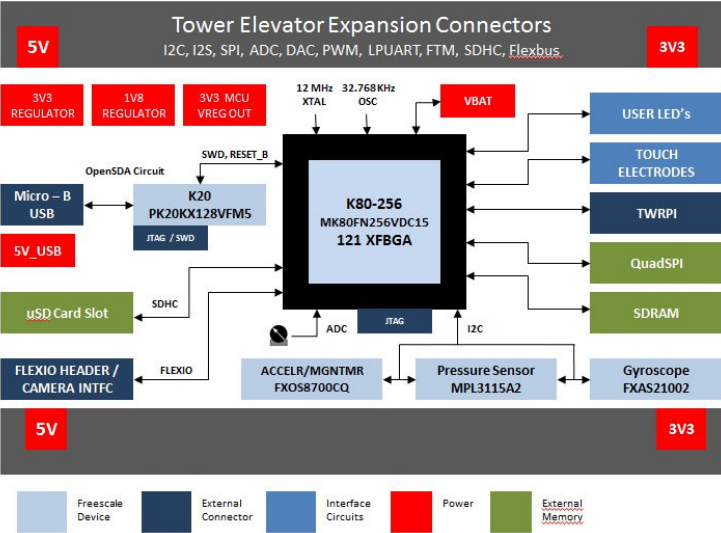
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X-TWR-K80F150M

Revisions			
Rev	Description	Date	Approved
X1	Initial Design	19-Sep-14	David Connelly
	Feedbacks implemented	25-Sep-14	David Connelly
	Feedbacks implemented	13-Oct-14	David Connelly
	-Agile Marketing Part. No. Changed. -J51 replaced by 0ohm Resistor -SW3, SW4 Changed to Sealed switches.	14-Oct-14	David Connelly
	-J8-ASSY OPT changed to DNP -R331 0ohm DNP Added for U3-Power -0ohm RES added for VDD, VDDIO of U29,U30 -TMR0,1 on Elev.connector mapped to PTB0,1 -I2S Port Mapping updated to only Port A -General TWRPI Replaced by TouchPad TWRPI -J15 replaced by Cut-trace (SH9) -LEDs remapped to PTDx to ease SW design -J35-FLEXIO Signal sequence updated. -Ports remapped for lightly used pins.	29-Oct-14	David Connelly
	-SW1 changed from RA to Vertical Mount. -J58 changed from "HDR1X12" to "HDR1X10". -PTB16, PTB17 mapping option to Primary elevator connector - UART0 by providing R340, R341 (DNP) -Agile CoreNo.changed from 28503 to 28608 -MPN changed to "X-TWR-K80F150M-S" -A070 Publish in Agile (28608,Prototype)	30-Oct-14	David Connelly
	-Port PTD11 replaced by PTA21 for SW4 -R149, R153 Value updated	4-Nov-14	David Connelly
	X3 Block Diagram updated & R54 value changed to 95.3 ohms	14-Nov-14	David Connelly
	X4 SMT Test Point Removed	17-Nov-14	David Connelly
	A Prototype Release	18-Nov-14	David Connelly
A1	Updated text in the System Power Section	19-Dec-14	David Connelly
B	Changed Socket to FBGA Added 10k Pull up resistors to SW2 and SW3 Changed Ref Des on SW1 and SW3 Reorder Ref Des on D1-D3 Changed connectivity for SDRAM DQM signals Removed -S from all Titles	20-May-15	
B1	DNP C11	01-Sep-15	

- NOTES:
- Unless Otherwise Specified:
All resistors are in ohms
All capacitors are in uF
All voltages are DC
 - Interrupted lines coded with the same letter or letter combinations are electrically connected.
 - Device type number is for reference only. The number varies with the manufacturer.
 - Special signal usage:
_B Denotes - Active-Low Signal
<-> or [] Denotes - Vectored Signals
 - Interpret diagram in accordance with American National Standards Institute specifications, current revision, with the exception of logic block symbology.

Block Diagram



Power & Ground Nets

NET	VOLTAGE	DESCRIPTION
P5V_SDA	5V	Power input from Open SDA USB connector
P5V_TRG_SDA	5V	Output of USB power switch controlled by the VTRG_EN signal from the OpenSDA and the ELE_PS_SENSE signal from the TWR elevator connectors. Goes to regulator input select header.
USB0_VBUS	5V	USB power from primary elevator Pin A57.
P3V3_VOUT	3.3V	VDD power from K80 MCU's internal regulator.
SDA_VOUT33	3.3V	Output of OpenSDA's K20 internal regulator to power OpenSDA's circuitry
P5V_ELEV	5V	Power to the elevator boards (or) from Tower System based on selection
P3V3_REG	3.3V	Output of 3.3V regulator or from the Elevator connectors.
3V3_BRD	3.3V	Output from the Elevator connector (or) from internal regulator U503 (or) from MCU's internal regulator, based on the selection header position (refer power section)
P1V8	1.8V	Output of the 1.8V regulator.
P1V8_REGIN	3.3V/3.7V/5V	Input to the 1.8V regulator.
V_BRD	1.8/3.3V	Output of 1.8V or 3.3V regulators(3V3_BRD) as selected by the board voltage select header.
5V0_K80_USB	5V	Power to K80 MCU USB for Host Mode.
5V0_VIN	5V	Power into the on board voltage regulators. Selectable from open SDA's P5V_SDA (or) P5V_TRG_SDA (or) P5V_ELEV (or) 5V0_K80_USB based on the 5V Input selection header position (refer power section)
5V0_VREGIN	5V	Power into the on board voltage regulators.
5V0_VREGIN_K80	5V	Power into the K80 MCU internal regulator. It is typically derived from the 5V0_VIN (or) the elevator USB0_VBUS pin.
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.
P3V7_BAT	3.7V	Power from Li-Ion Battery
BAT_OUT	3.7-4.2V	Lithium Ion Battery Charger Output
VCC_SIM	1.8-3.3V	Power to the EMVSIM card Slot controlled by EMVSIM1_VCCEN from MCU
VDDIO_E	1.8-3.3V	IO Power to the port E of K80 MCU, independent of VDD
MCU_PWR	1.8-3.3V	MCU digital power. Filtered from V_BRD
MCU_VDD	1.8-3.3V	MCU digital power input after current measurement jumper
VDDA	1.8-3.3V	VDDA power for MCU and analog circuits. Filtered from MCU_PWR.
VREFH	3.3V	Upper reference voltage for ADC on the MCU. Filtered from VDDA.
VREFL	0V	Lower reference voltage for ADC on the MCU. Filtered from VSSA.
VSSA	0V	VSSA power for MCU and analog circuits. Filtered from GND.
GND	0V	Digital and Analog Ground.



ICAP Classification: FCP: FIUO: X PUBI:			
Drawing Title: X-TWR-K80F150M			
Page Title: NOTES & BLOCK DIAGRAM			
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SYSTEM POWER

3V3_BRD Power Selection:

Default : Short 1-3: Use regulator U18 for 3.3V board power
Optional: Short 1-2: Use output of K80 Inbuilt Regulator for 3.3V board power (5V needed on VREGIN)

1.8V Regulator Power Input Selection:

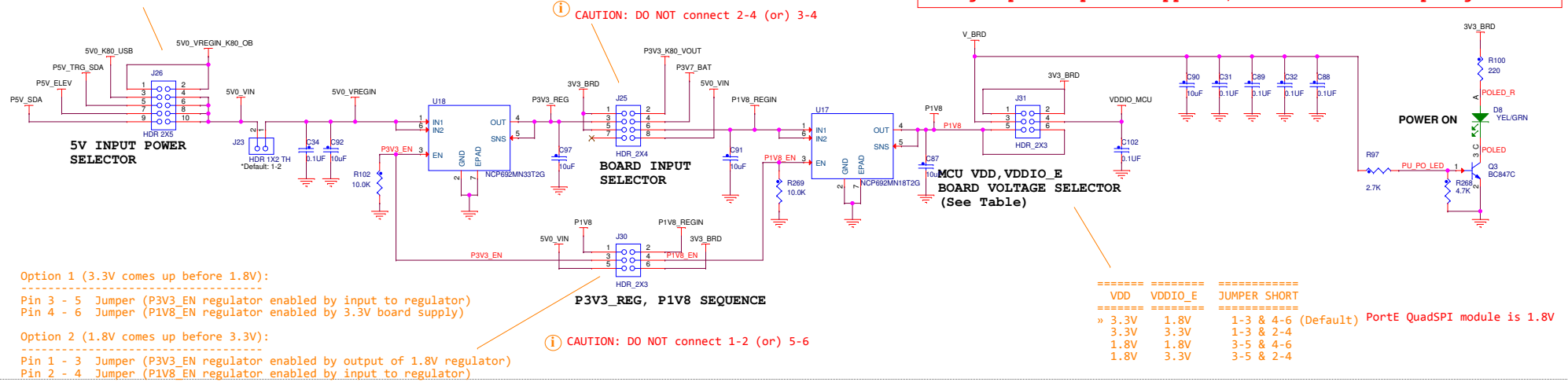
Default : Short 5-6: from 3V3 Board Power
Optional: Short 4-6: from Li-Ion Battery Domain P3V7_BAT
Optional: Short 6-8: from 5V Input 5V0_VIN directly

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.

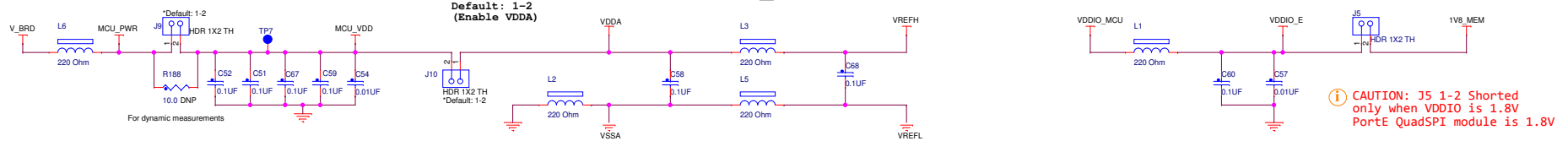
5V system Power Input Selection:

Optional: 7-8: Power from PSV_ELEV input
Optional: 9-10: Raw 5V input from USB OpenSDA
>>Default: 5-6: Regulated 5V output from OpenSDA 5V input
Optional: 3-4: Raw 5V input from K80 on board USB port

V_BRD is required to power up prior to VDDIO_MCU if using separate power supplies, otherwise can ramp together

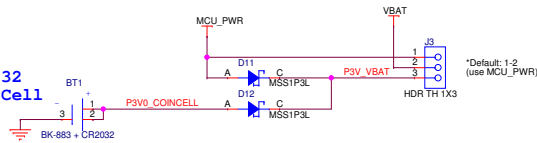


PWR_MCU

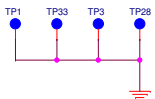


CAD NOTE:
Place this circuitry near the processor

2016/25/32
3V Coin Cell



GND LOOP TEST LOOPS

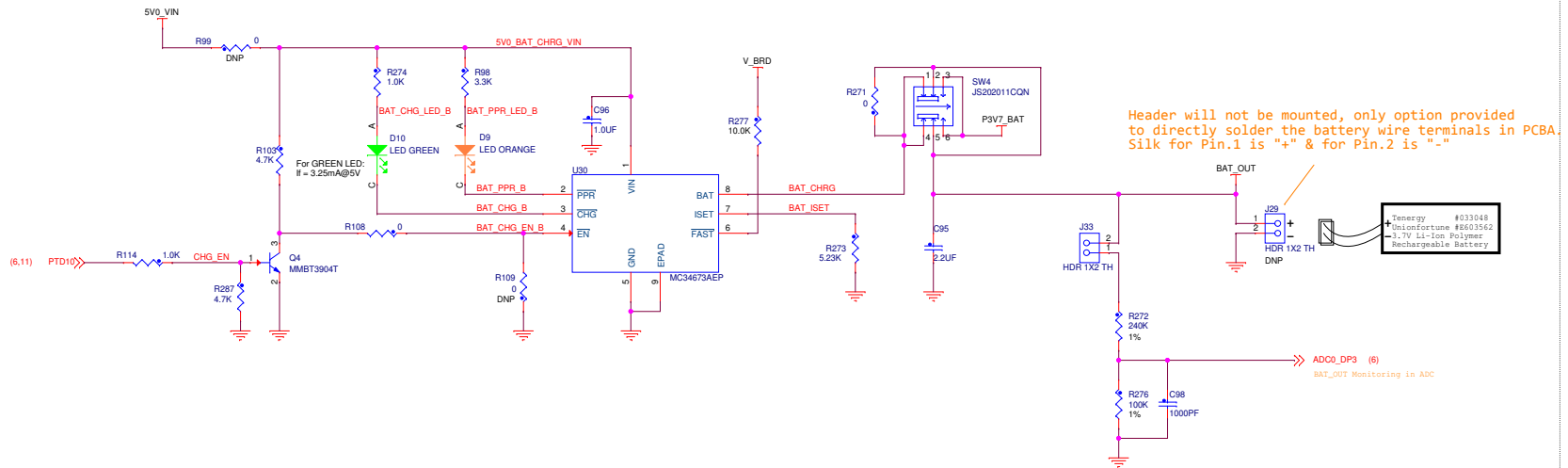


CAD NOTE:
Place ground test loops in the four corners away from sensitive signals that might short with scope probe alligator clips

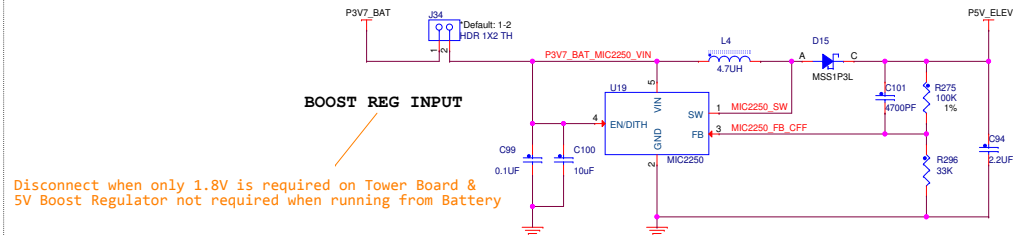


ICAP Classification: FCP:		FIUO: X	PUBI:
Drawing Title: X-TWR-K80F150M			
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Li-Ion BATTERY CHARGER

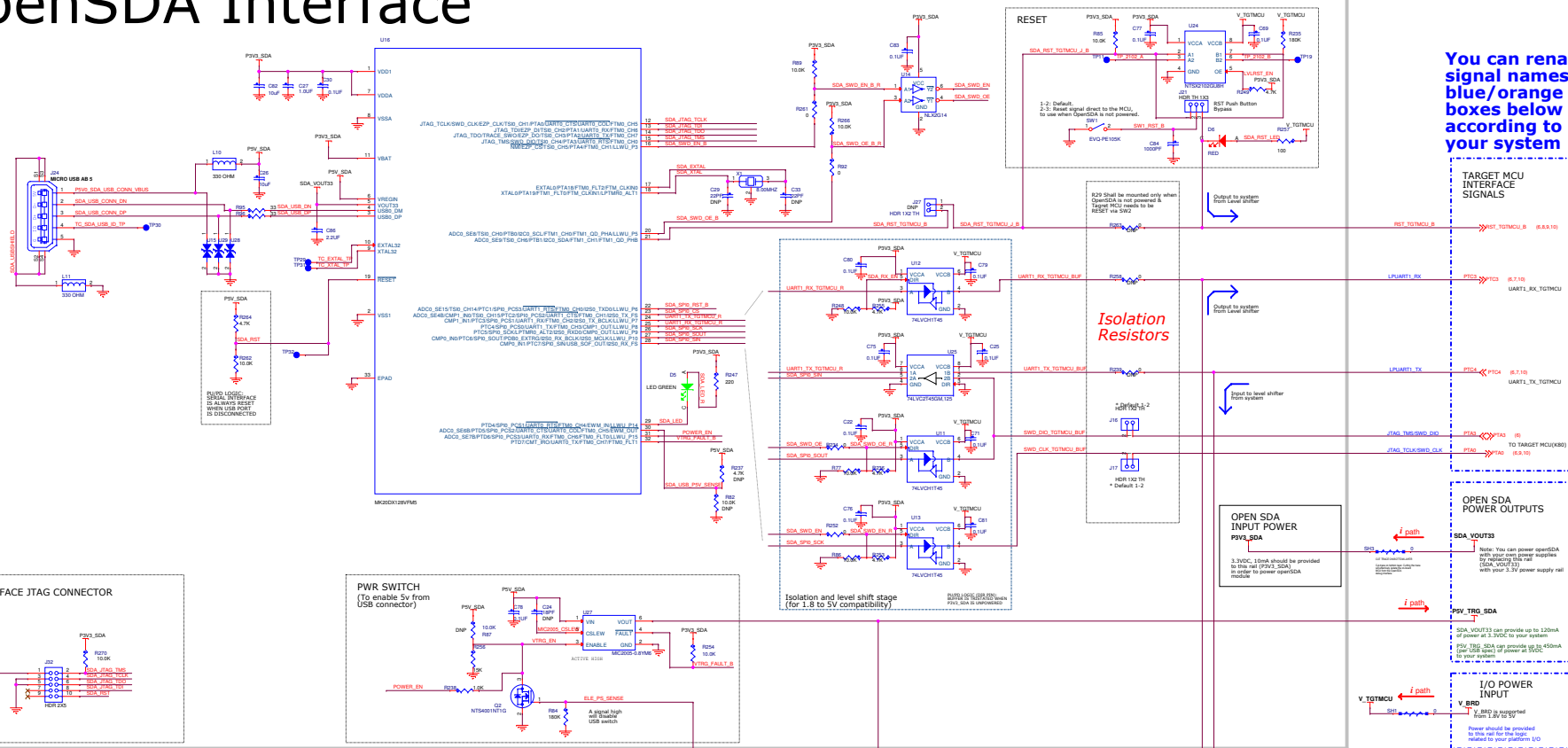


Voltage Step Up Regulator Option to Power System from Battery



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OpenSDA Interface



OpenSDA INTERFACE JTAG CONNECTOR

The diagram illustrates the JTAG connector circuit for the OpenSDA. It features a J22 connector with pins 1 through 10. Pins 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 are each connected to a 10k resistor and a 0.1uF capacitor to ground. The circuit is powered by a 3V3_SDA supply, which is connected to the JTAG pins. A 100nF capacitor is also connected to the JTAG pins.

SDA_SWD_EN

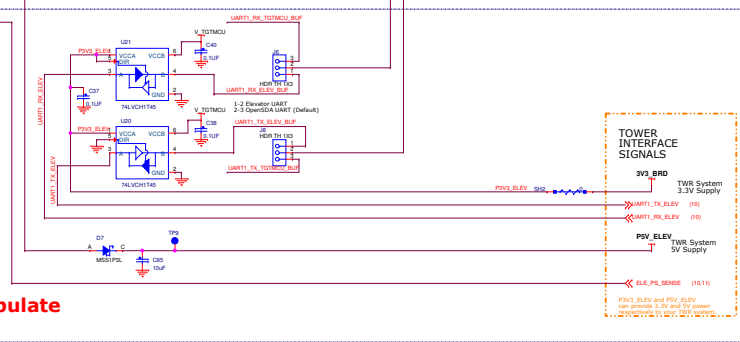
SDA_SPI_RST_B R205 0 SDA_SWD_EN
SDA_SPI_CS R260 DNP SDA_SWD_OE

{For enablement purposes only}

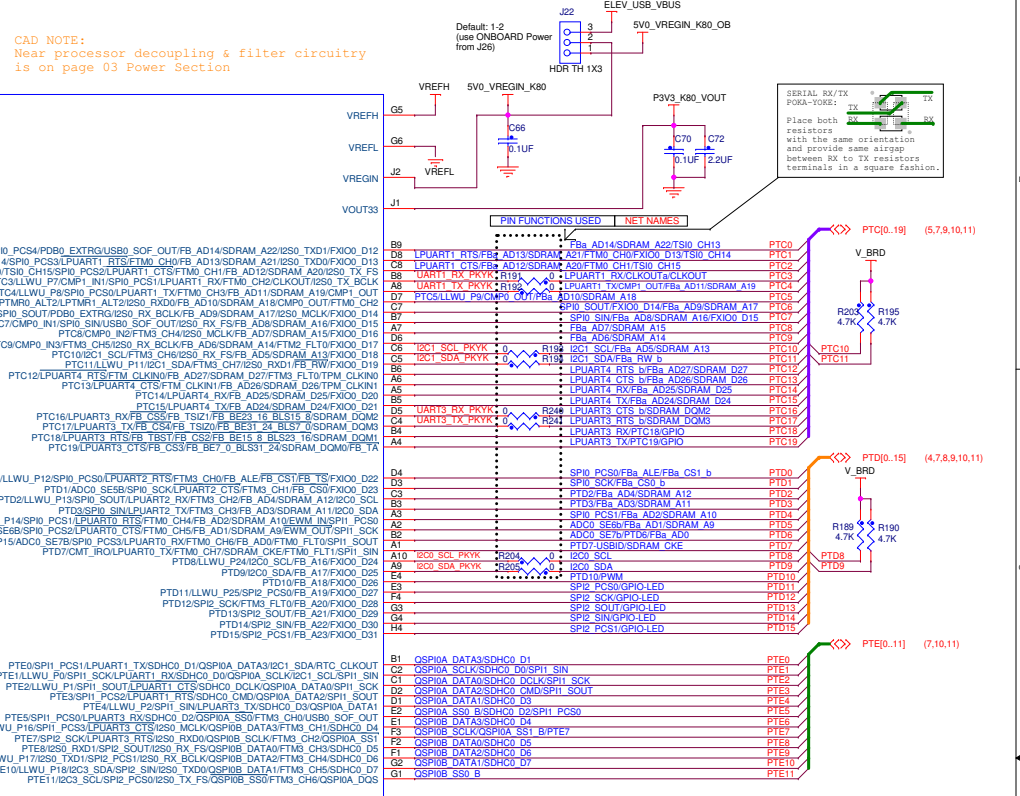
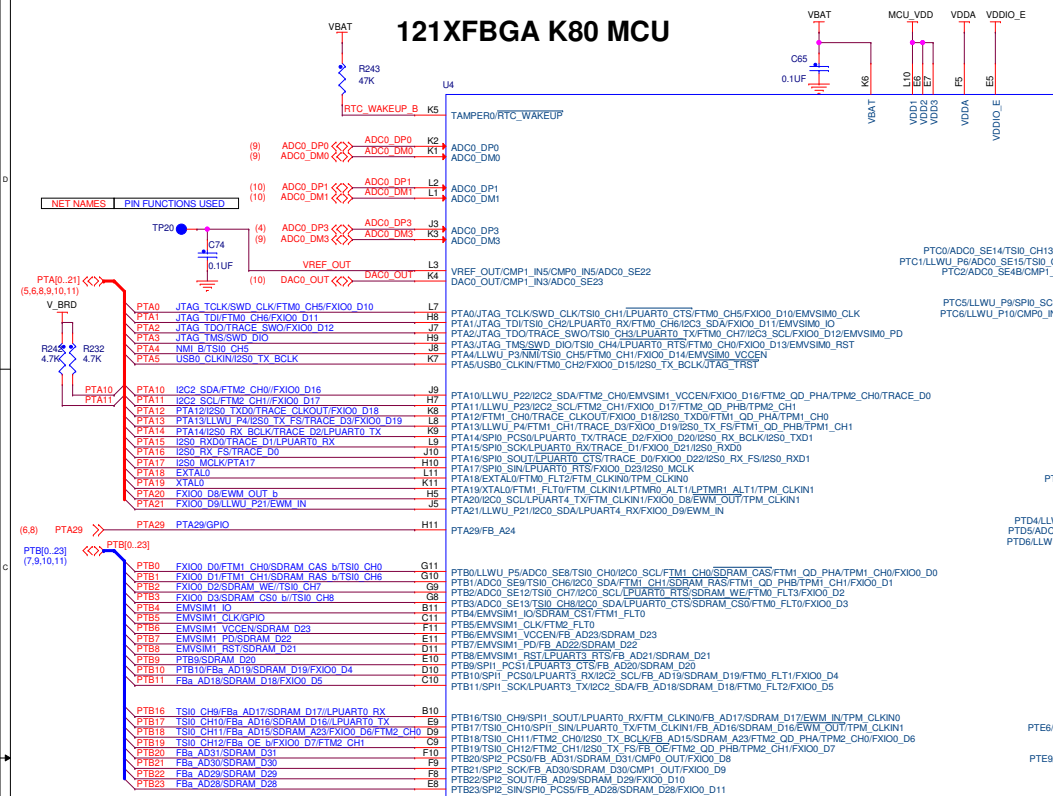
OPTIONAL TOWER SPECIFIC INTERFACING CIRCUITRY

You can entirely remove the contents in this box when interfacing openSDA in a non-Tower system.

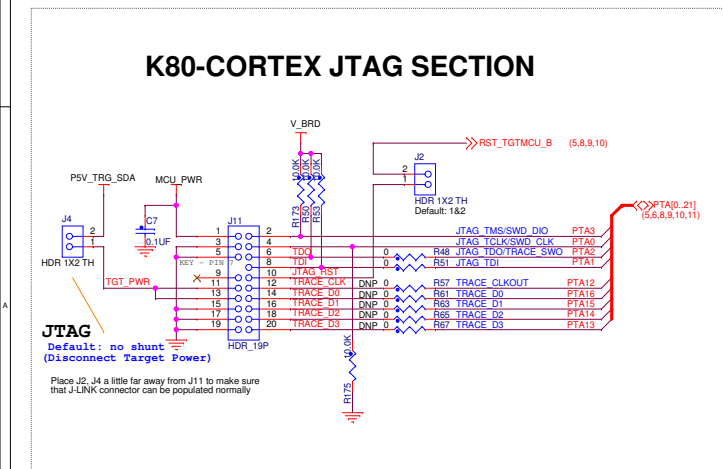
If that is the case, please populate all isolation resistors



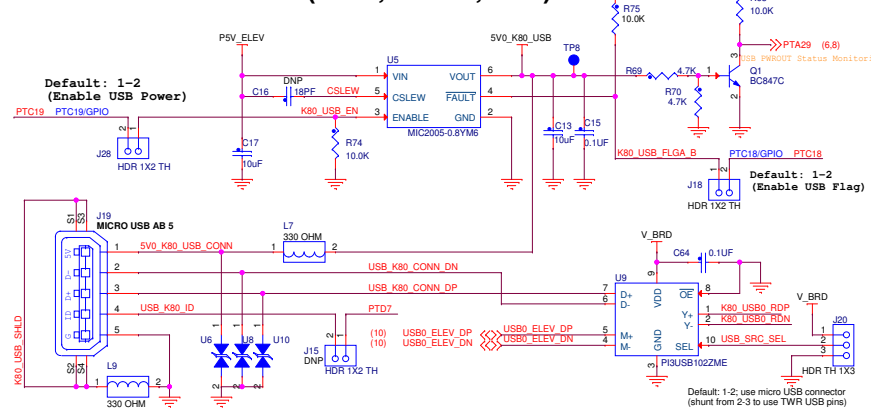
121XFBGA K80 MCU



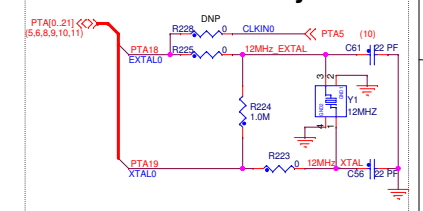
K81 TAMPER HEADER



K80 USB FS Interface (Host,Device,OTG)

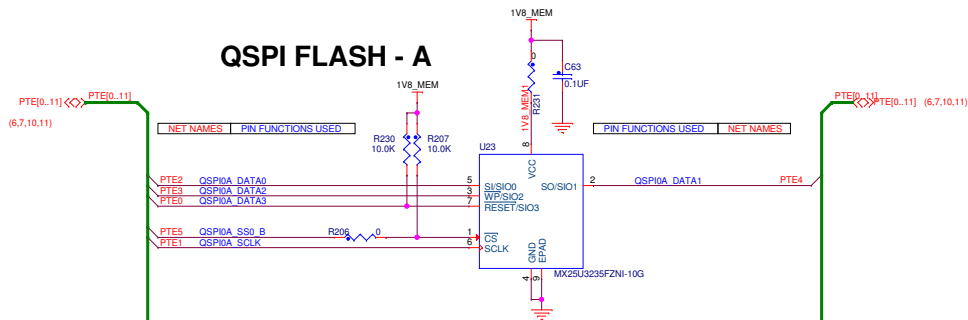


K80 12MHz Crystal

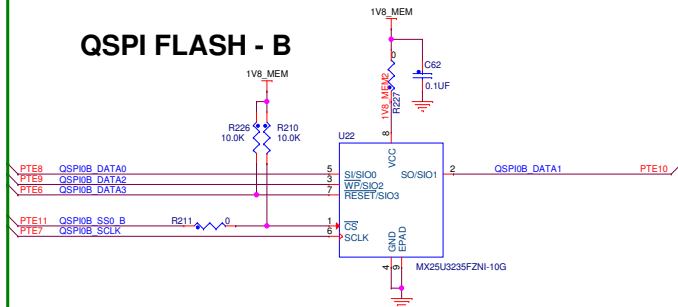


ICAP Classification:		FCP:	FUO: X	PUBL:
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MK80FN256VDC15(121XFBGA) SKT ASSY				
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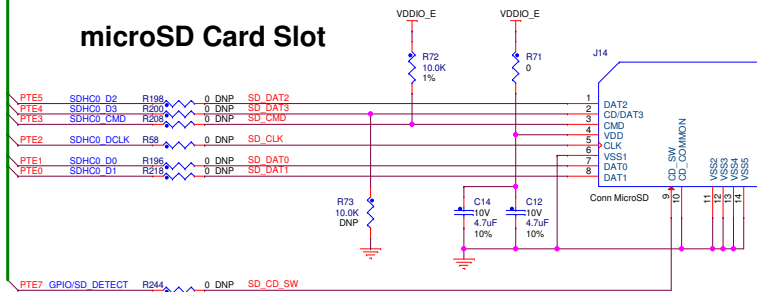
QSPI FLASH - A



QSPI FLASH - B

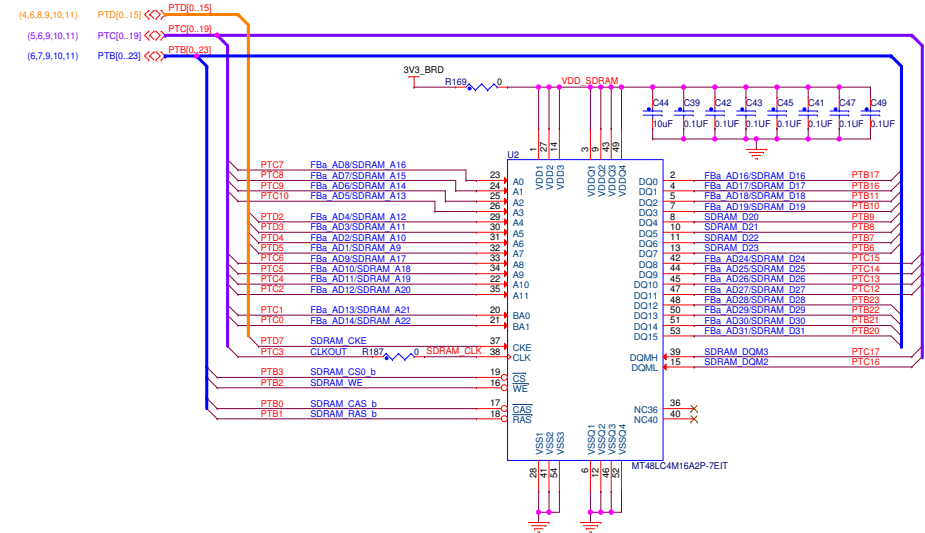


microSD Card Slot

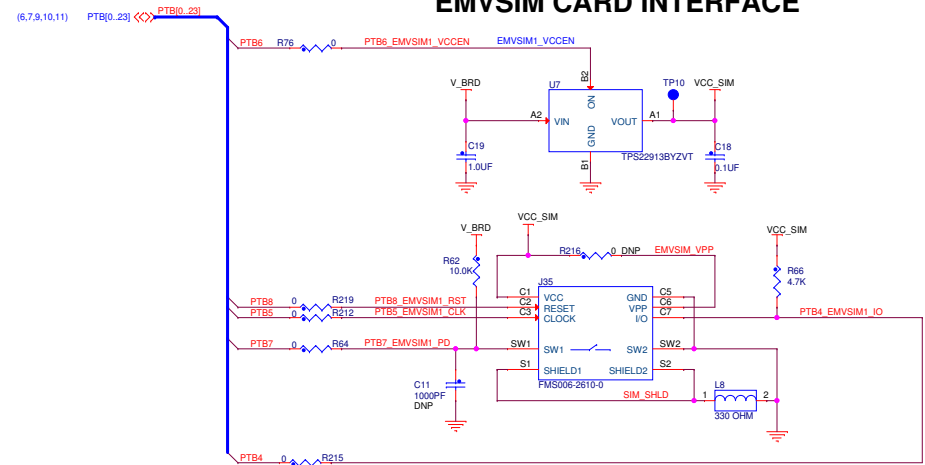


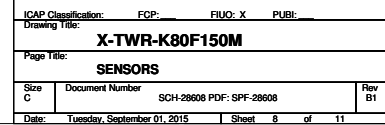
Note: This domain is powered by VDDIO_E, not V_BRD, which is 1.8V by default because of the QuadSPI voltage requirement.

16-Bit SDRAM

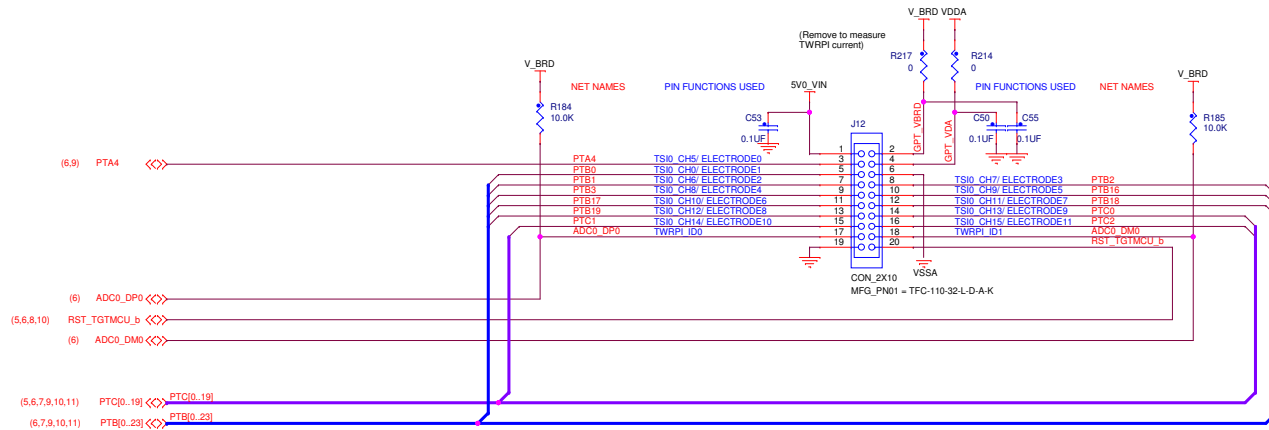


EMV SIM CARD INTERFACE





TOUCH PAD TWRPI HEADER



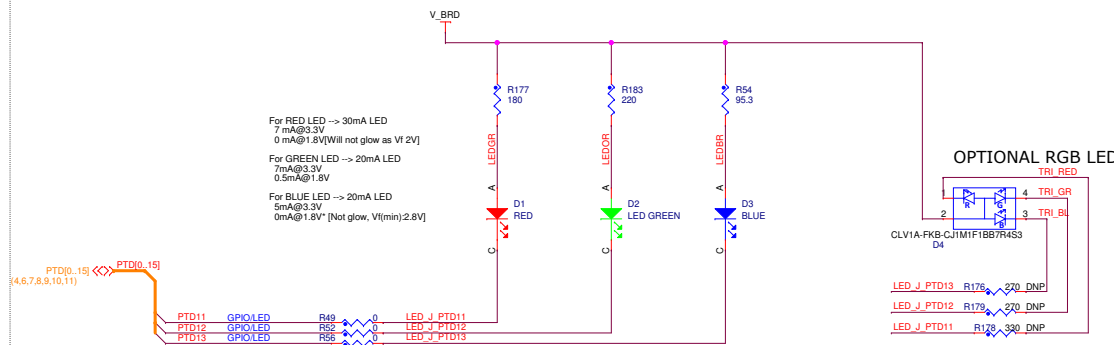
Note: The TWRPI connectors are powered by V_BRD which may be 1.8V or 3.3V.

Not all TWRPI boards will work at 1.8V.

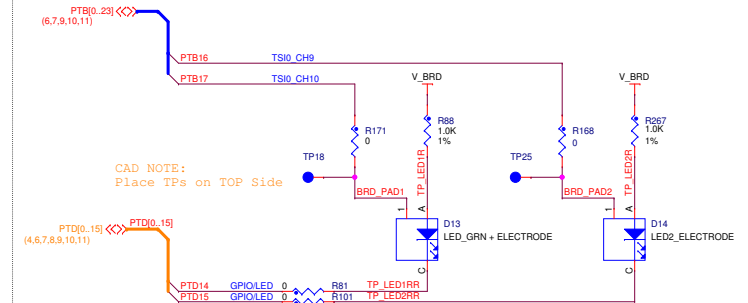
Check that TWRPI boards will work at 1.8V before using them with this board when V_BRD is jumpered for 1.8V.

CAD NOTE:
Component Height allowed under Touch Pad
TOWERPI: Plug-in board is 11mm

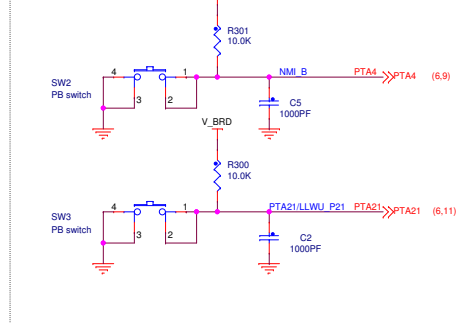
LEDS



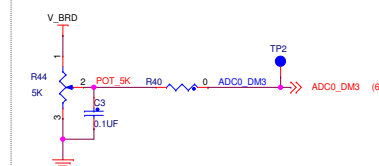
TOUCH PADS + LEDS



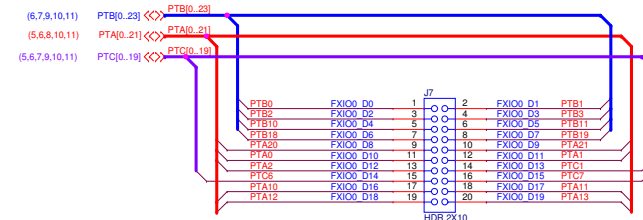
PUSH BUTTONS



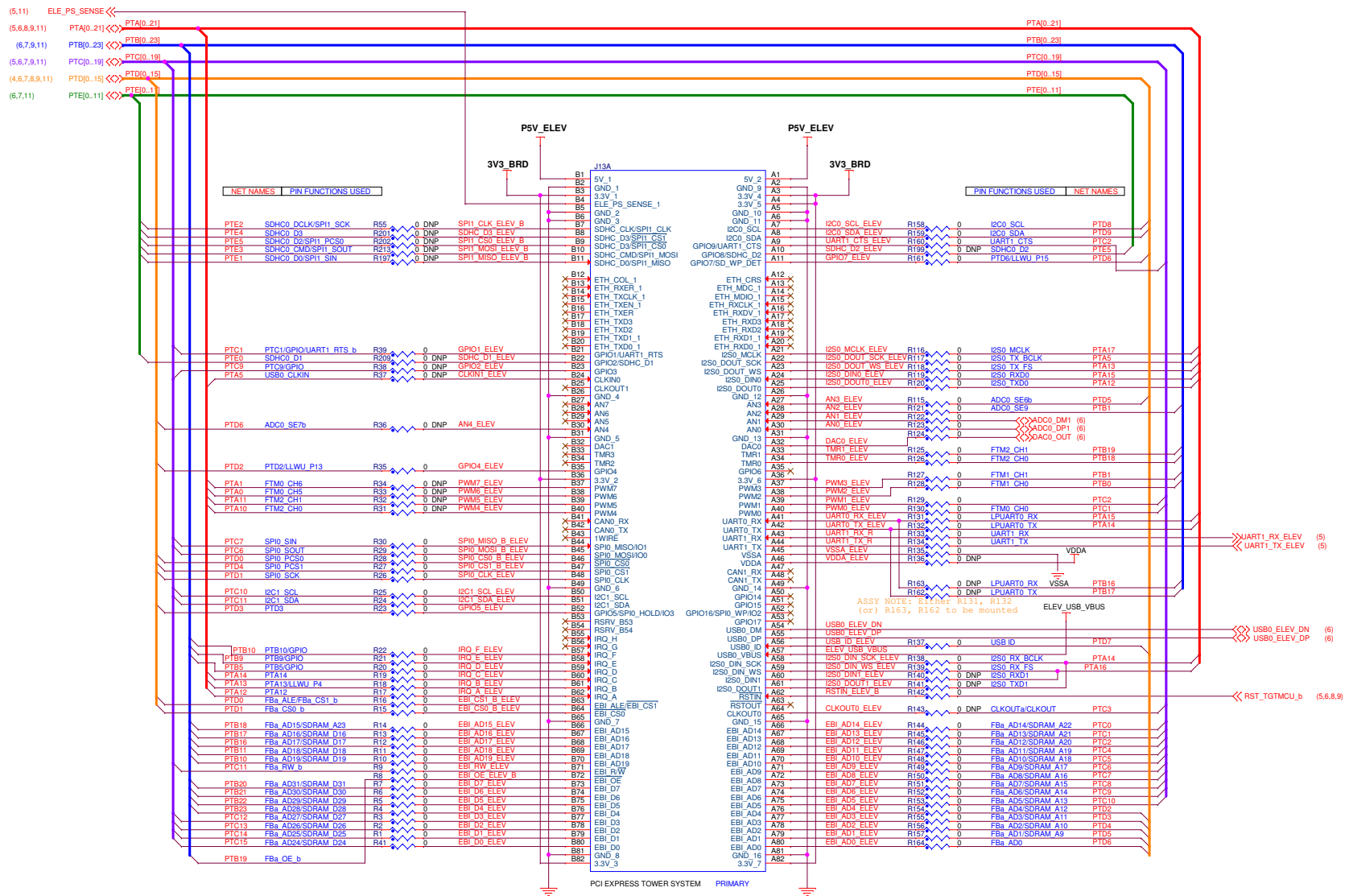
POTENTIOMETER



FLEXIO HEADER



TOWER ELEVATOR CONNECTOR - PRIMARY



Note that signals coming from the elevator are usually 3.3V. They should not be used when the board is configured for 1.8V operation.



ICAP Classification:		FCP:		FIJO: X		PUBI:	
Drawing Title:							
X-TWR-K80F150M							
Page Title:							
TWR ELEVATOR CONNECTOR PRIMARY							
Size C	Document Number						Rev B1
	SCH-28606 PDF: SPF-28606						
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Note that signals coming from the elevator are usually 3.3V. They should not be used when the board is configured for 1.8V operation.

