


Table of Contents

2	Notes
3	Block Diagram
4	K21FN1MOVMC12 120MHz 121BGA MCU
5	USB/OSBDM/V-TRAN/PWR
6	Peripherals
7	Sensors
8	Elevator Connectors

Revisions

Rev	Description	Date	Approved
A	Proto Release	12-Jun-13	J.H.

		Microcontroller Solutions Group 6501 William Cannon Drive West Austin, TX 78735-8598	
This document contains information proprietary to Freescale Semiconductor and shall not be used for engineering design, procurement or manufacture in whole or in part without the express written permission of Freescale Semiconductor.			
Designer: Jay Hartvigsen		Drawing Title: TWR-K21F120M	
Drawn by: Jay Hartvigsen		Page Title: Table of Contents/Revisions	
Approved: Marilyn Hubbard	Size: C	Document Number: SCH-27946 PDF: SPF-27946	Rev: A
Date: Wednesday, June 12, 2013		Sheet 1 of 8	

- Unless Otherwise Specified:
 - All resistors are in ohms
 - All capacitors are in uF
 - All voltages are DC
 - All polarized capacitors are aluminum electrolytic
- 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.

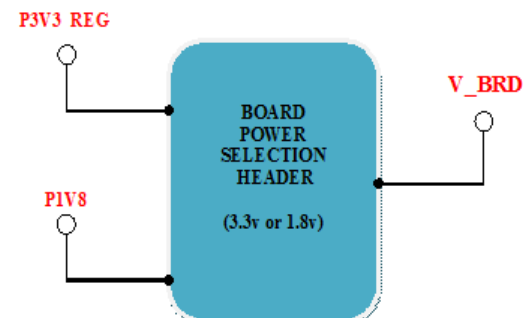
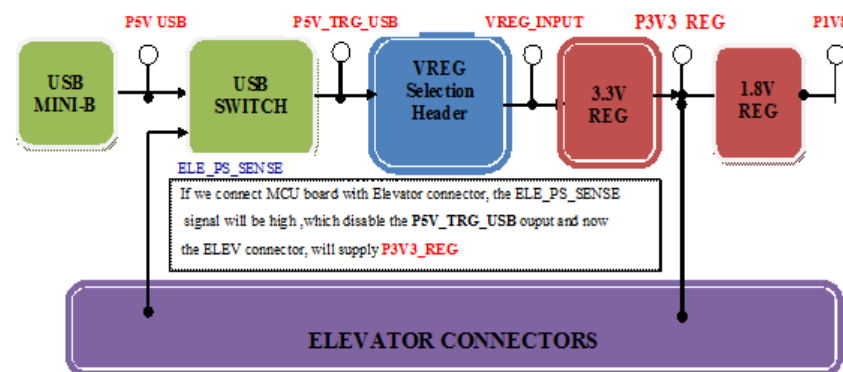
- Net function indications:

Some nets have functions indicated in addition to the net names. The net names are shown in red and the MCU functions associated with the net are shown in blue. If a net has no blue function shown the net name indicates the associated function.

Power & Ground Nets

NET	VOLTAGE	DESCRIPTION
P5V_USB	5V	Primary input power. Filtered from USB connector. Input to USB power switch.
P5V_SW	5V	Output of USB power switch controlled by the 5V_EN signal from the JM60 MCU. Used by OSBDM voltage translation circuits.
P5V_TRG_USB	5V	Output of USB power switch controlled by the VTRG_EN signal from the JM60 MCU 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.
P5V_K21_USB	5V	Secondary input power. Filtered from K21 micro AB USB connector. Goes to regulator input select header
VOUT_3V3	3.3V	VDD power from the regulator internal to the MCU.
P5V_ELEV	5V	Power to the elevator boards.
P3V3	3.3V	Output of 3.3V regulator or from the Elevator connectors. May also be supplied externally by connecting to the board voltage select header at pins 1 and 4.
P1V8	1.8V	Output of the 1.8V regulator.
V_BRD	1.8-3.3V	Output of 1.8v or 3.3V regulators as selected by the board voltage select header. May also be supplied externally by connecting to the board voltage select header at pins 3 and 4.
VREG_IN	5V	Power into the on board voltage regulators.
K21_VREGIN	5V	Power into the K21 MCU voltage regulator. It is typically derived from the K21 USB connector 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.
MCU_PWR	1.8-3.3V	MCU digital power. Filtered from V_BRD
VDDA	1.8-3.3V	VDDA power for MCU and analog circuits. Filtered from MCU_PWR.
GND	0V	Digital and Analog Ground.

Power Flow



Sheet 4

MK21FN1M0VMC12 MCU
 8 MHz XTAL
 32.768 KHz XTAL
 VDDA/VREFH filter
 VREF_OUT
 VREGIN, VOUT33
 VBAT Coin Cell Circuit
 TAMPER Header
 USB 2:1 Switch & Sel Hdr

Sheet 5

OSJTAG/USB Bridge Circuit
 USB Micro B Connector
 MC9S08JM60
 Voltage Translation
 USB Power Switch
 OSJTAG AND EZPORT Header
 Power Supply Circuits
 Regulator Input Header
 Regulator Output Header
 3.3V and 1.8V Regulators

Sheet 6

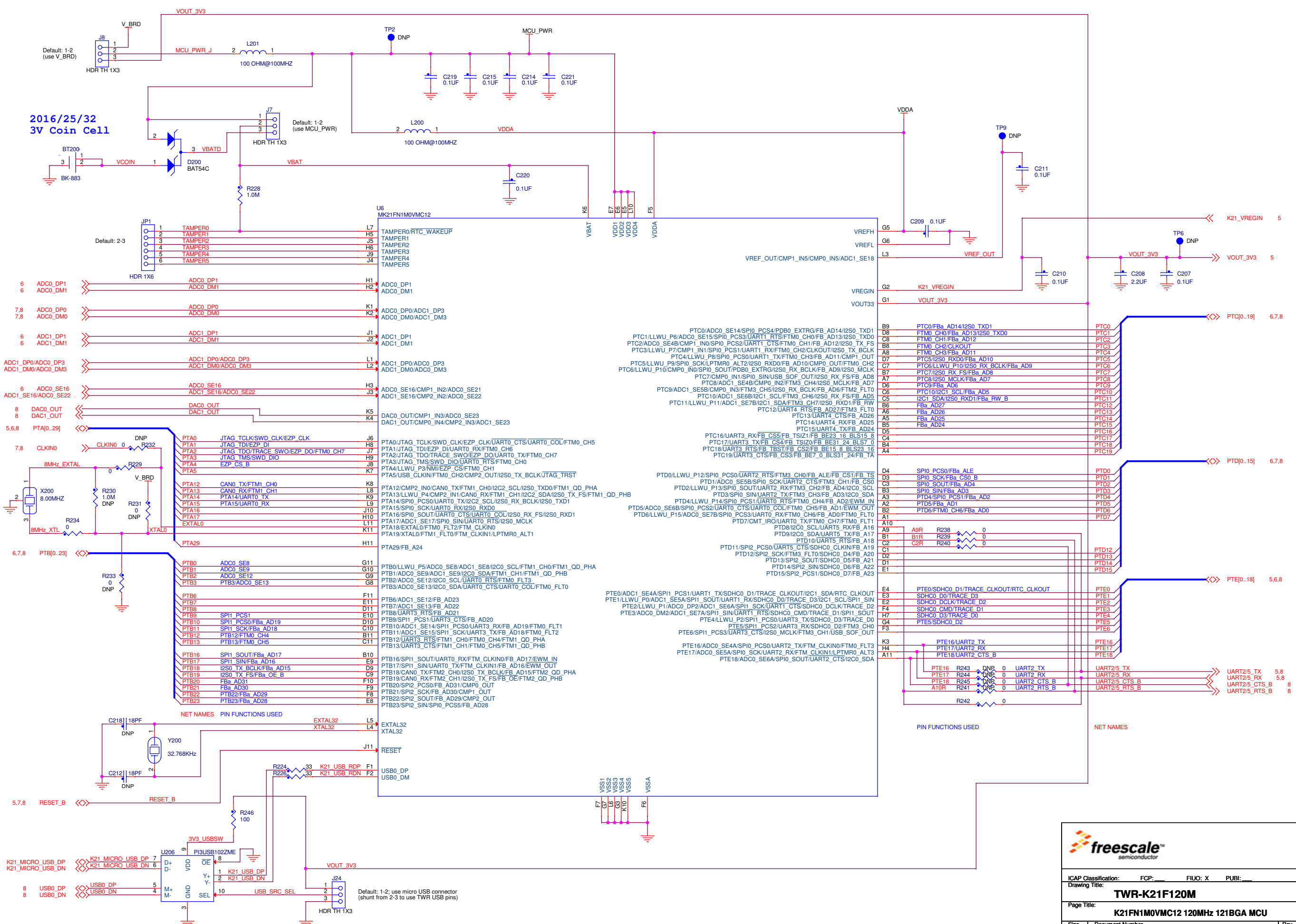
SDHC Memory Socket
 IRQ Push Buttons
 K21 USB Micro AB Connector with Power Switch
 GPIO Header

Sheet 7

TOWER PLUG-IN (TWRPI)
 GENERAL PURPOSE HEADERS
 ANALOG INPUTS
 MMA7660 ACCELEROMETER
 POTENTIOMETER
 LEDs

Sheet 8

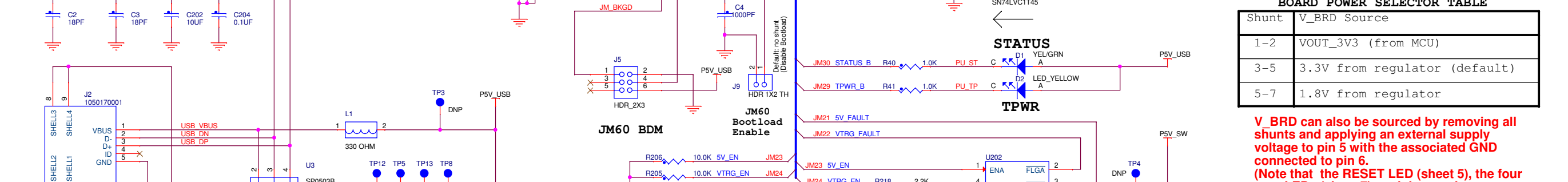
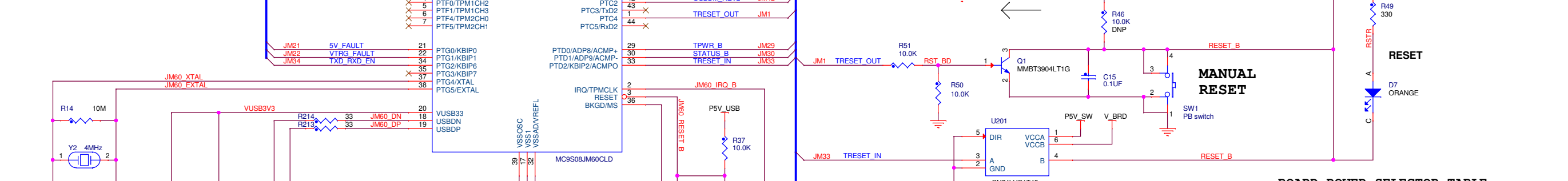
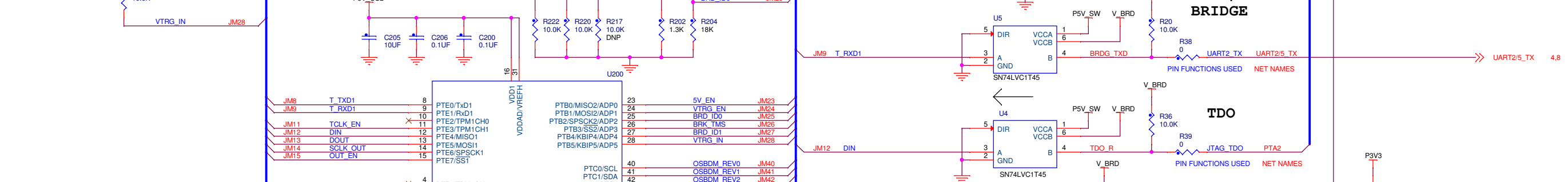
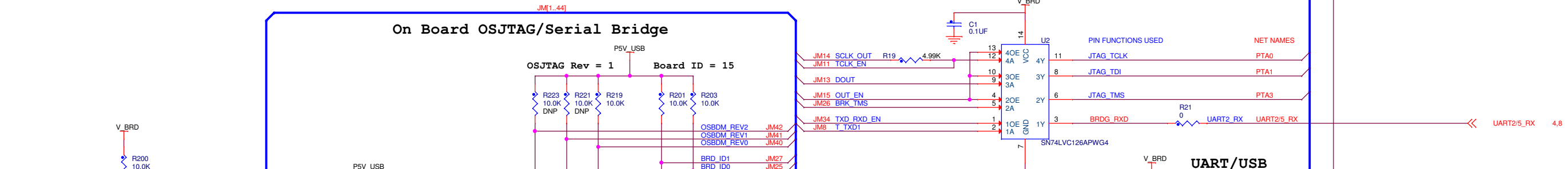
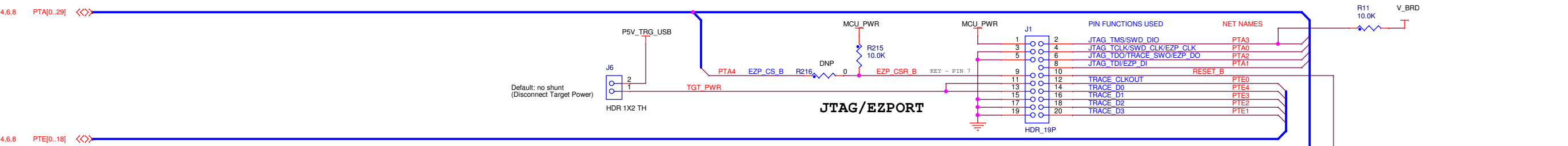
ELEVATOR CONNECTORS



freescale
semiconductor

ICAP Classification: FCP: _____ FIJU: X PUBI: _____
 Drawing Title: **TWR-K21F120M**
 Page Title: **K21FN1M0VMC12 120MHz 121BGA MCU**

Size C	Document Number SCH-27946 PDF: SPF-27946	Rev A
Date: Wednesday, June 12, 2013	Sheet 4 of 8	



BOARD POWER SELECTOR TABLE

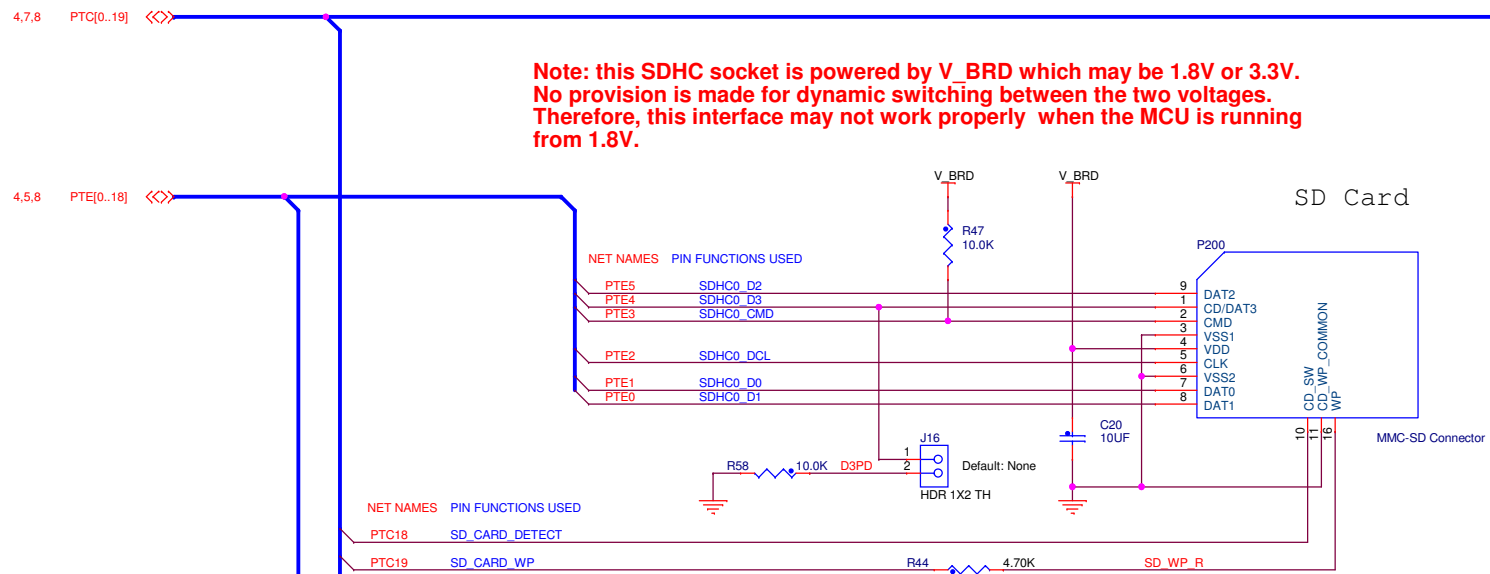
Shunt	V_BRD Source
1-2	VOUT_3V3 (from MCU)
3-5	3.3V from regulator (default)
5-7	1.8V from regulator

V_BRD can also be sourced by removing all shunts and applying an external supply voltage to pin 5 with the associated GND connected to pin 6.
 (Note that the RESET LED (sheet 5), the four user LEDs (sheet 7), and the accelerometer (sheet 7) are powered by P3V3 and will not work when using only an external source.)

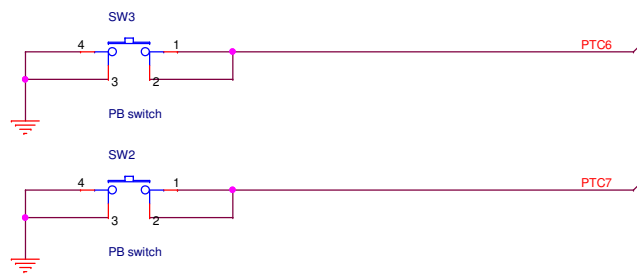
Note that not all functions of the board will operate at 1.8V. Also, please check that tower boards used with this board have the correct I/O voltages when this board is set to 1.8V.

ICAP Classification: FCP: FILUO: X PUBI:
 Drawing Title: **TWR-K21F120M**
 Page Title: **OSJTAG/PWR/V-TRANSLATORS**
 Size C Document Number SCH-27946 PDF: SPF-27946 Rev A
 Date: Wednesday, June 12, 2013 Sheet 5 of 8

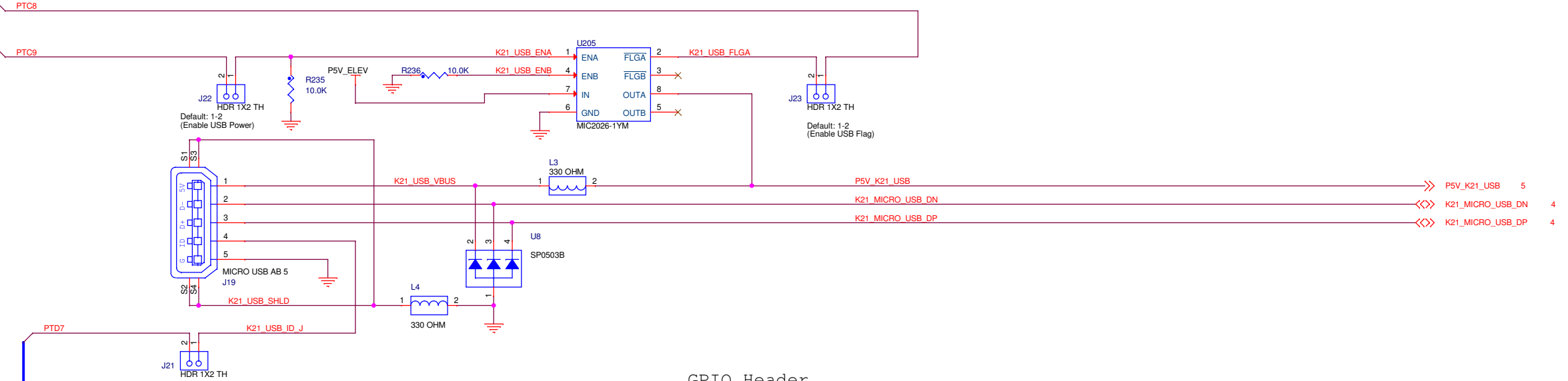
Note: this SDHC socket is powered by V_BRD which may be 1.8V or 3.3V. No provision is made for dynamic switching between the two voltages. Therefore, this interface may not work properly when the MCU is running from 1.8V.



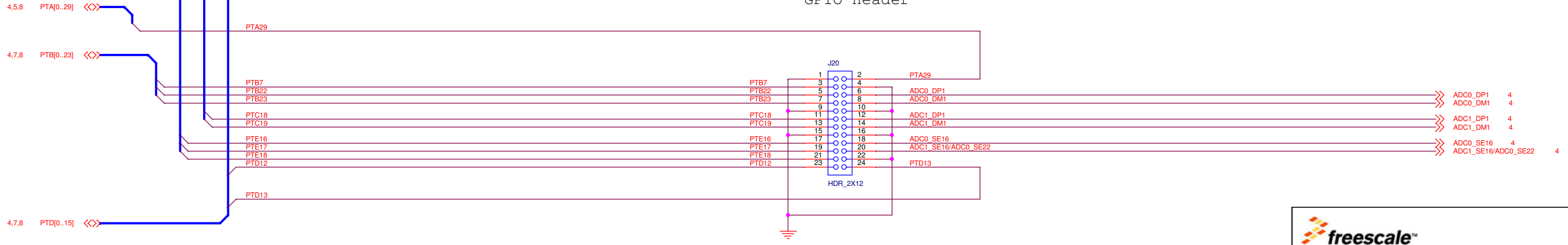
Interrupts



K21 USB Interface (Host or Device)



GPIO Header



freescale
semiconductor

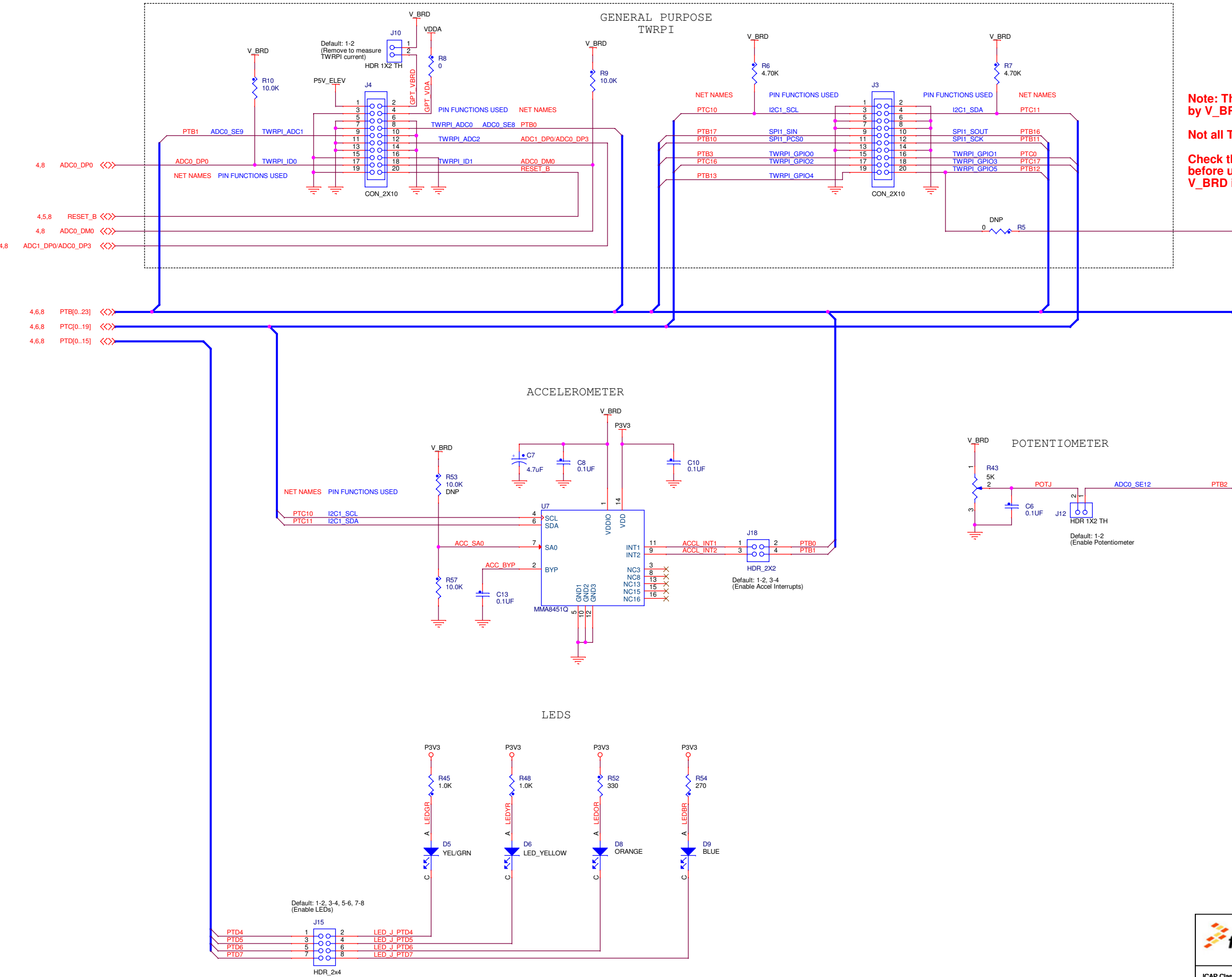
ICAP Classification: FCP: FILJO: X PUBI:

Drawing Title: **TWR-K21F120M**

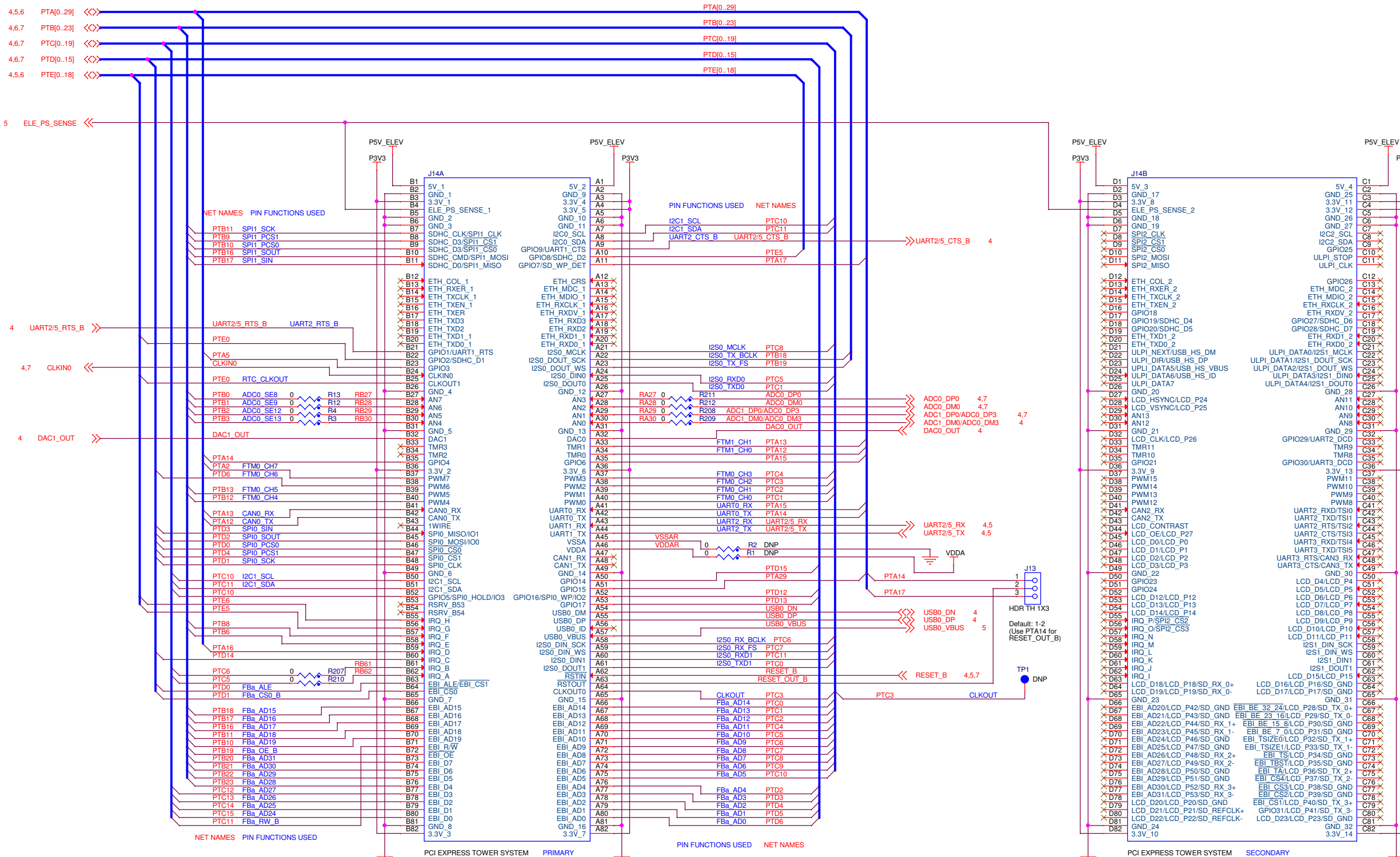
Page Title: **Peripherals**

Size C	Document Number SCH-27946 PDF: SPF-27946	Rev A
--------	--	-------

Date: Wednesday, June 12, 2013 | Sheet 6 of 8



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.



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.

freescale
semiconductor

ICAP Classification: FCP: _____ FIUO: X PUBI: _____
 Drawing Title: **TWR-K21F120M**
 Page Title: **Elevator Connectors**

Size C	Document Number SCH-27946 PDF: SPF-27946	Rev A
Date: Wednesday, June 12, 2013	Sheet 8 of 8	