


Table of Contents

2	Notes
3	Block Diagram
4	MK21DN512 121BGA MCU & SKT
5	USB/OSBDM/V-TRAN/PWR
6	Peripherals
7	Sensors
8	Elevator Connectors

Revisions

Rev	Description	Date	Approved
B	Production Release	14-JUN-12	J.H.

		Microcontroller Solutions Group 6501 William Cannon Drive West Austin, TX 78735-8598	
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Designer: Jay Hartvigsen		Drawing Title: TWR-K21D50M	
Drawn by: Jay Hartvigsen		Page Title: Table of Contents/Revisions	
Approved: Marilyn Hubbard	Size: C	Document Number: SCH-27405 PDF: SPF-27405	Rev: B
Date: Thursday, June 14, 2012		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.

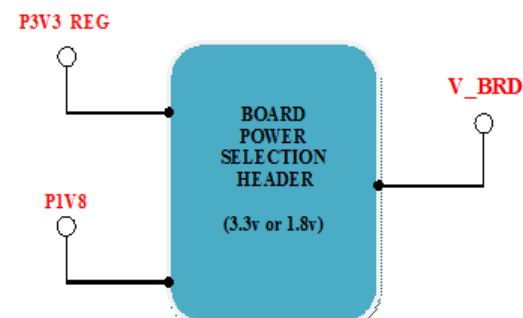
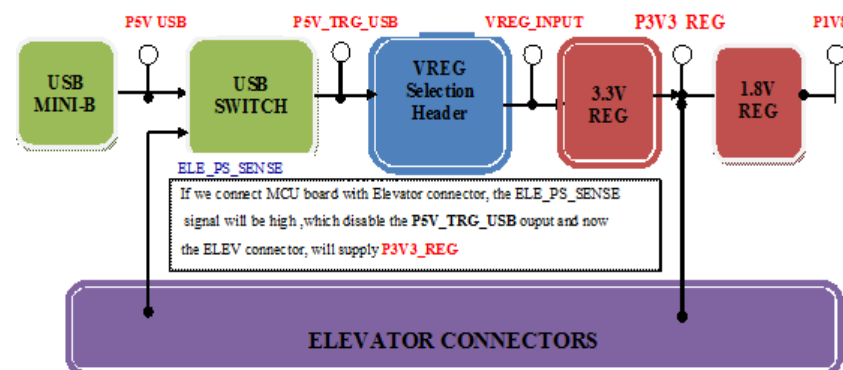
- Net function indications:

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

MCF51JF128 MCU
 8 MHz XTAL
 32.768 KHz XTAL
 VDDA/VREFH filter
 VREF_OUT
 VREGIN, VOUT33
 VBAT Coin Cell Circuit
 TAMPER Header

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

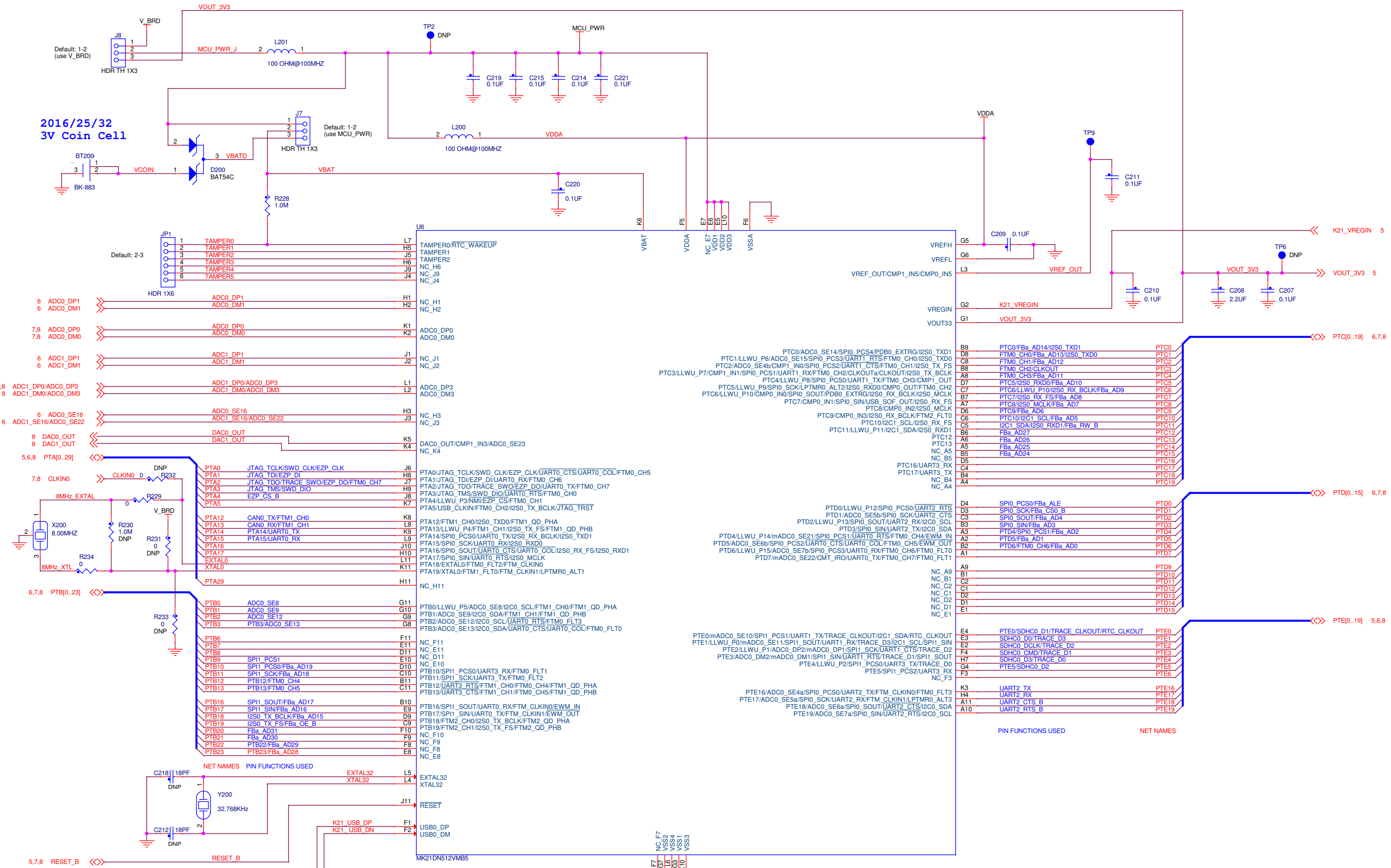
TOWER PLUG-IN (TWRPI)
 GENERAL PURPOSE HEADERS
 ANALOG INPUTS
 MMA7660 ACCELEROMETER
 POTENTIOMETER
 LEDs

Sheet 8

ELEVATOR CONNECTORS



ICAP Classification: FCP: FILIO: X PUBI:		
Drawing Title: TWR-K21D50M		
Page Title: Block Diagram		
Size C	Document Number SCH-27405 PDF: SPF-27405	Rev B
Date: Thursday, June 14, 2012	Sheet 3 of 8	



If using the K21 micro USB connector leave the 33 ohm resistors on nets K21_MICRO_USB_DP and K21_MICRO_USB_DN and do not populate the resistors on USB0_DP and USB0_DN.

If using the Tower USB install the 33 ohm resistors on nets USB0_DP and USB0_DN and remove the resistors on nets K21_MICRO_USB_DP and K21_MICRO_USB_DN.

PIN FUNCTIONS USED NET NAMES

B9	PTC0/FBa AD14/I2S0_TXD1	PTC0
D8	FTM0_CH0/FBa AD13/I2S0_TXD0	PTC1
C8	FTM0_CH1/FBa AD12	PTC2
B8	FTM0_CH2/CLKOUT	PTC3
A8	FTM0_CH3/FBa AD11	PTC4
D7	PTC5/I2S0_RXD0/FBa AD10	PTC5
C7	PTC6/LLWU_P10/I2S0_RX_BCLK/FBa AD9	PTC6
A7	PTC7/I2S0_RX_FS/FBa AD8	PTC7
D6	PTC8/I2S0_MCLK/FBa AD7	PTC8
C6	PTC9/FBa AD6	PTC9
B6	PTC10/I2C1_SCL/FBa AD5	PTC10
C5	I2C1_SDA/I2S0_RXD1/FBa RW_B	PTC11
B6	FBa AD27	PTC12
A6	FBa AD26	PTC13
A5	FBa AD25	PTC14
B5	FBa AD24	PTC15
D5	NC_B5	PTC16
C4	PTC16/UART3_RX	PTC17
B4	PTC17/UART3_TX	PTC18
A4	NC_A4	PTC19
D4	SPI0_PCS0/FBa ALE	PTD0
D3	SPI0_SCK/FBa CS0_B	PTD1
C3	SPI0_SOUT/FBa AD4	PTD2
B3	SPI0_SIN/FBa AD3	PTD3
A3	PTD4/SPI0_PCS1/FBa AD2	PTD4
A2	PTD5/FBa AD1	PTD5
B2	PTD6/FTM0_CH6/FBa AD0	PTD6
A1	PTD7	PTD7
A9	NC_A9	PTD8
B1	NC_B1	PTD10
C2	NC_C2	PTD11
C1	NC_C1	PTD12
D2	NC_D2	PTD13
D1	NC_D1	PTD14
E1	NC_E1	PTD15
E4	PTE0/SDHC0_D1/TRACE_CLKOUT/RTC_CLKOUT	PTE0
E3	SDHC0_D0/TRACE_D3	PTE1
E2	SDHC0_DCLK/TRACE_D2	PTE2
F4	SDHC0_CMD/TRACE_D1	PTE3
F7	SDHC0_D3/TRACE_D0	PTE4
G4	PTE5/SDHC0_D2	PTE5
F3	NC_F3	PTE6
K3	UART2_TX	PTE16
H4	UART2_RX	PTE17
A11	UART2_CTS_B	PTE18
A10	UART2_RTS_B	PTE19

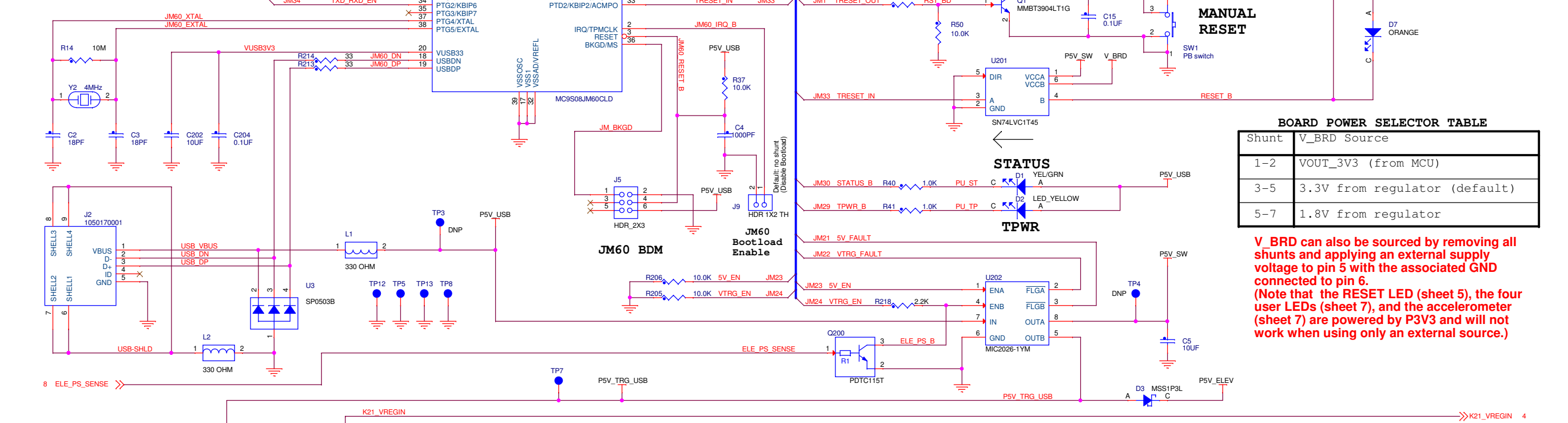
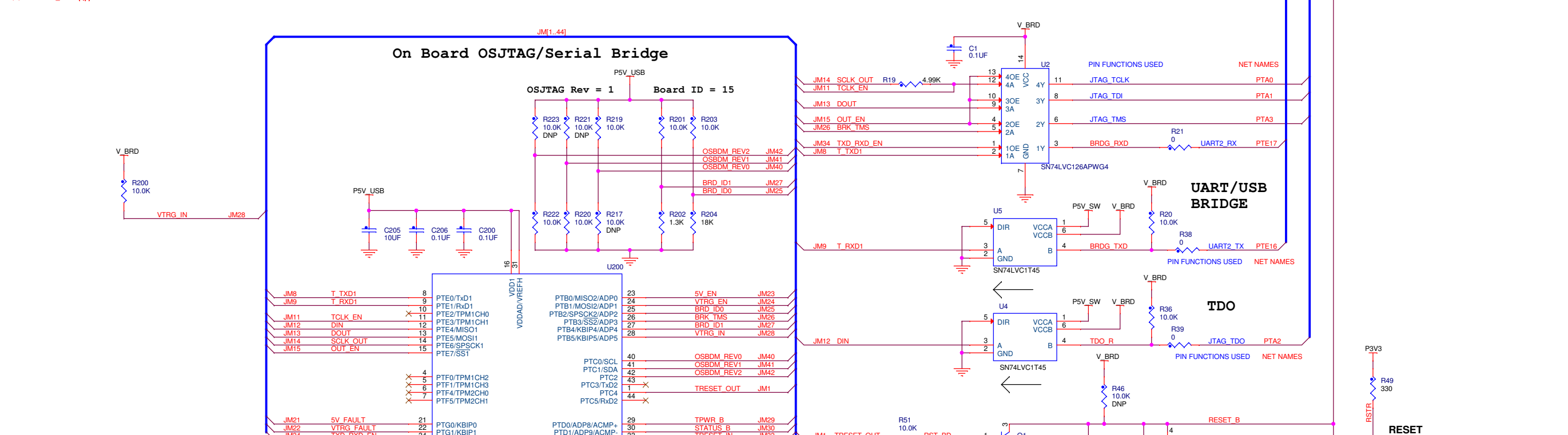
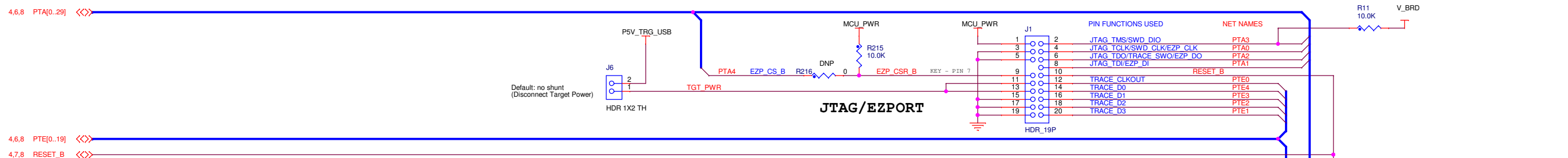
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Page Title: **K21D50M 121BGA MCU**

Size C	Document Number SCH-27405 PDF: SPF-27405	Rev B
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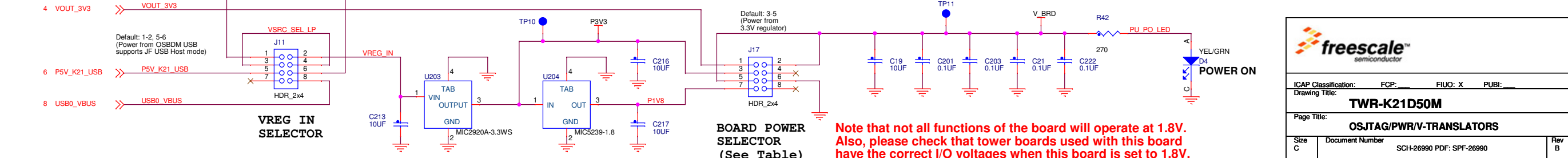
Date: Thursday, June 14, 2012 | Sheet 4 of 8



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.

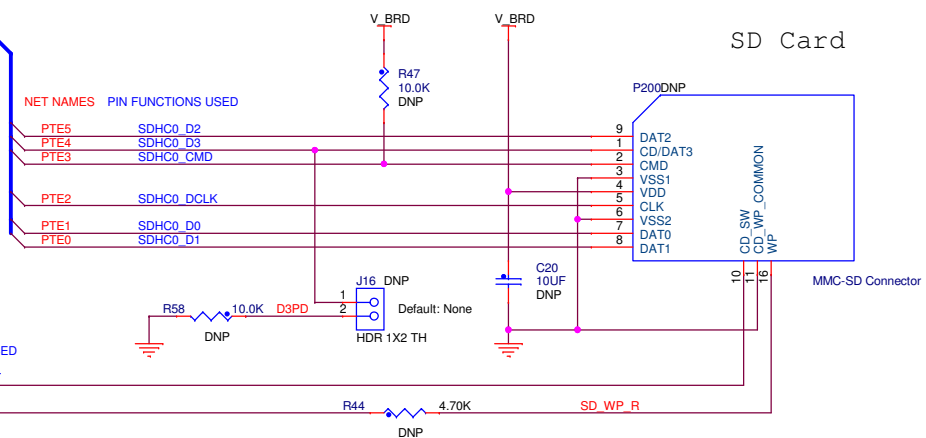
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 Page Title: **OSJTAG/PWR/V-TRANSLATORS**

Size C	Document Number SCH-26990 PDF: SPF-26990	Rev B
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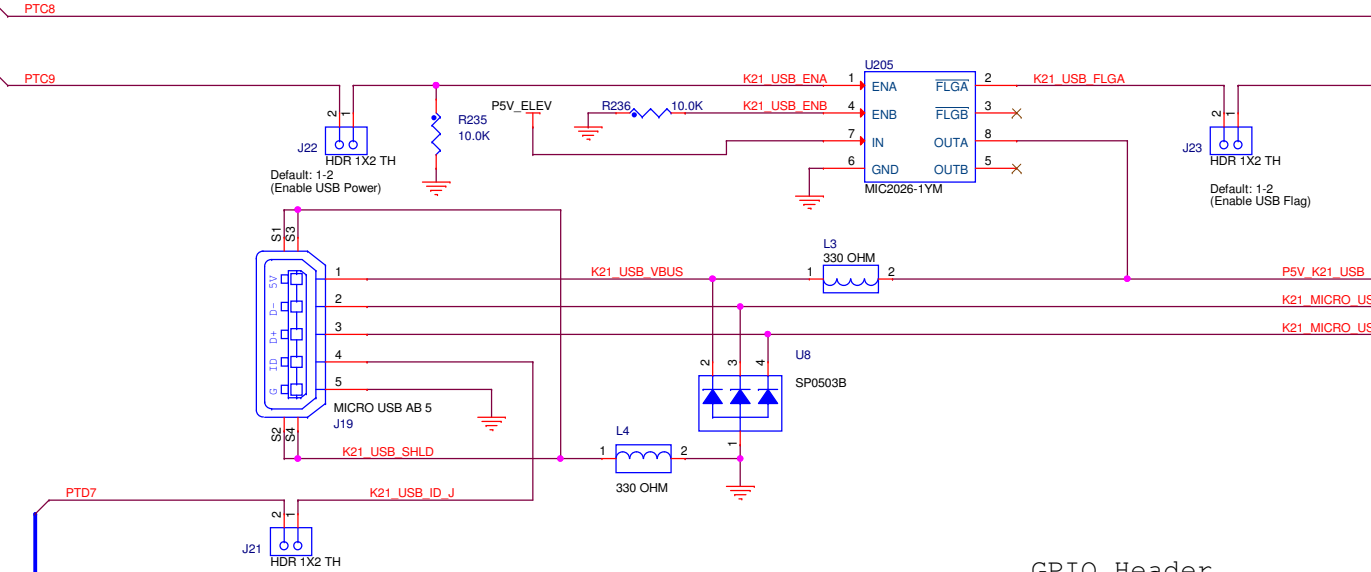
Date: Thursday, June 14, 2012 | Sheet 5 of 9

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.

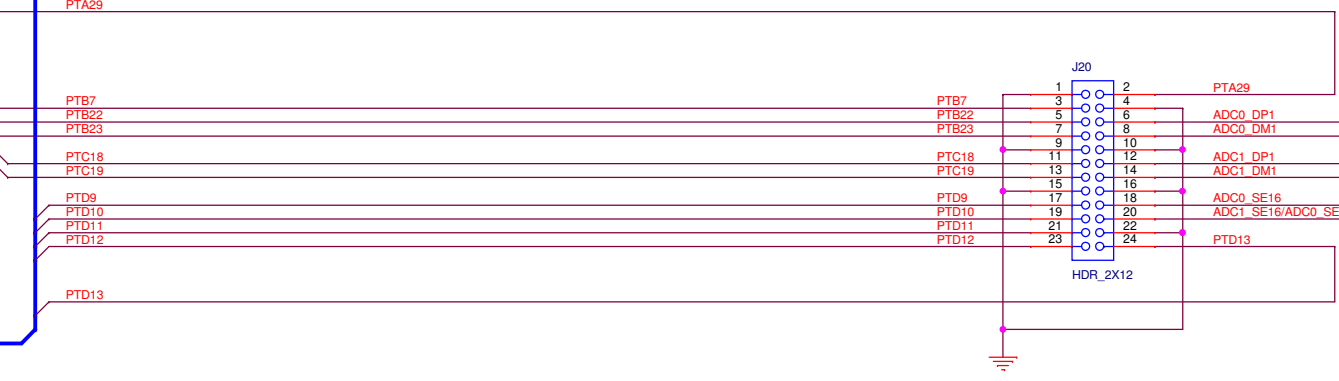


NET NAMES	PIN FUNCTIONS USED
PTC18	SD_CARD_DETECT
PTC19	SD_CARD_WP

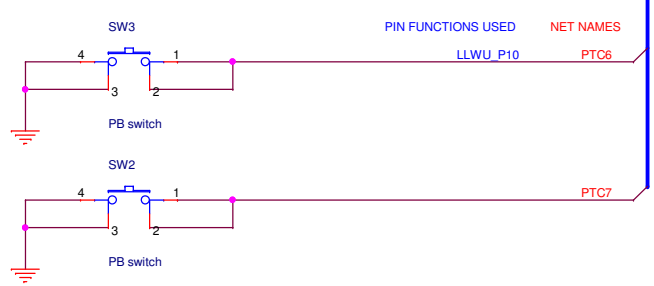
K21 USB Interface (Host or Device)



GPIO Header



Interrupts



PIN FUNCTIONS USED	NET NAMES
LLWU_P10	PTC6
PTC7	PTC7

4,7,8 PTC[0..19] <<>

4,5,8 PTE[0..19] <<>

4,5,8 PTA[0..29] <<>

4,7,8 PTB[0..23] <<>

4,7,8 PTD[0..15] <<>

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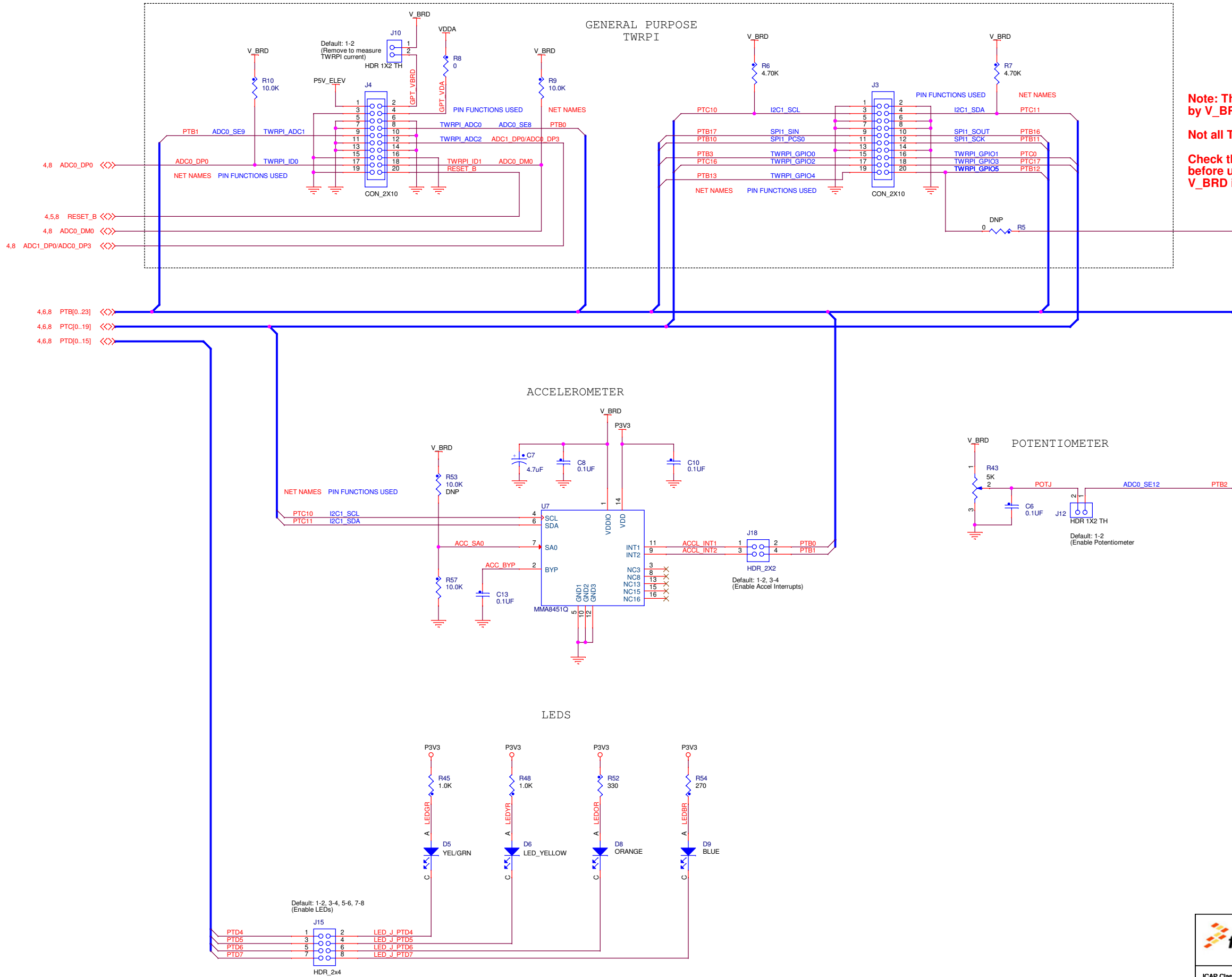
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Page Title: **Peripherals**

Size C	Document Number SCH-27405 PDF: SPF-27405	Rev B
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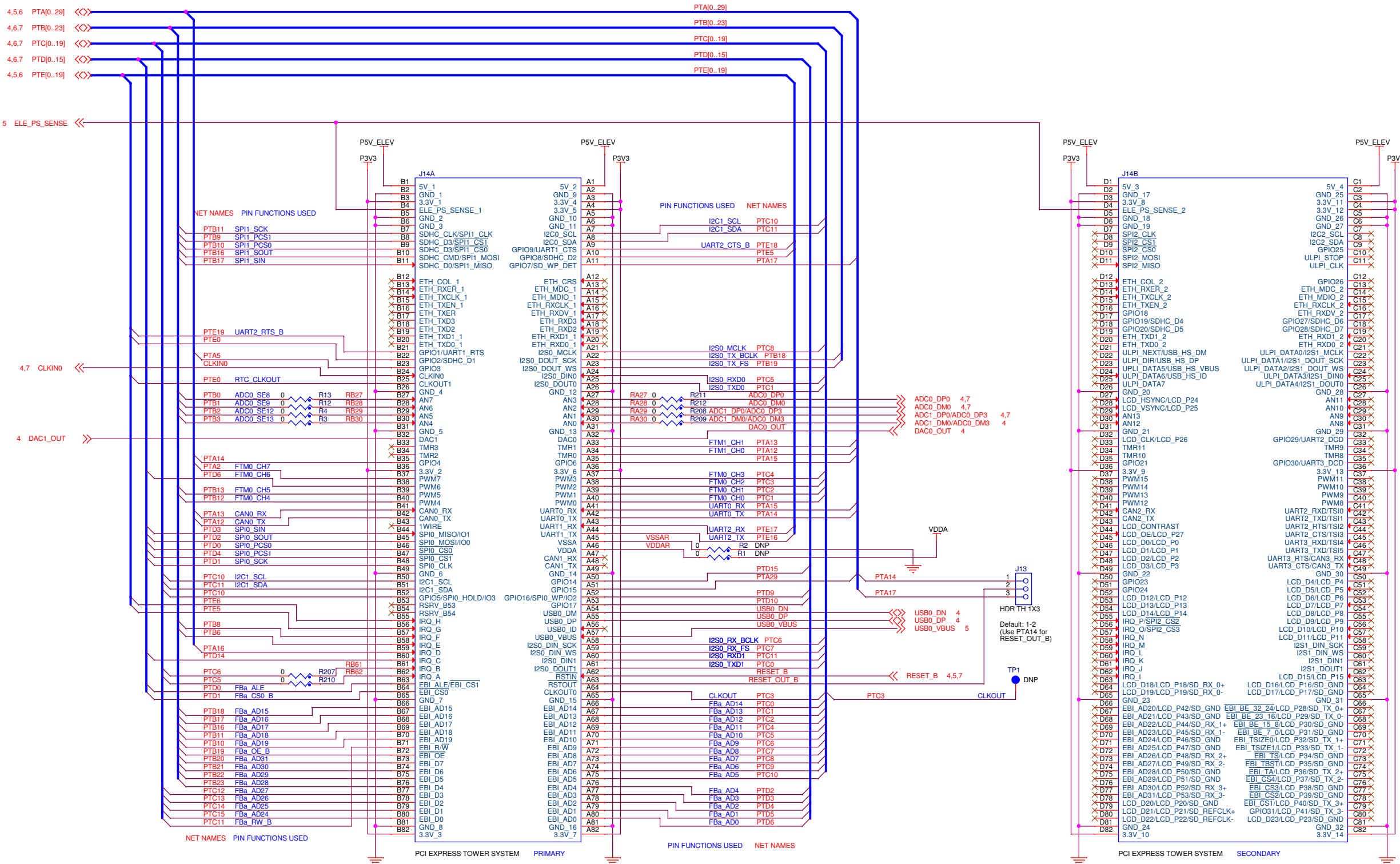
Date: Thursday, June 14, 2012 | Sheet 6 of 8



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.

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Page Title: **Elevator Connectors**

Size C	Document Number SCH-27405 PDF: SPF-27405	Rev B
Date: Thursday, June 14, 2012	Sheet 8 of 8	