<table>
<thead>
<tr>
<th>Rev</th>
<th>DESCRIPTION</th>
<th>DATE</th>
<th>APPROVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Release</td>
<td>11/13/14</td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Update Infrared circuitry</td>
<td>3/3/11</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Release</td>
<td>3/19/15</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Release</td>
<td>5/11/15</td>
<td></td>
</tr>
</tbody>
</table>

1. Unless Otherwise Specified:
   - All resistors are in ohms
   - All capacitors are in uF
   - All voltages are DC

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

5. Interpret diagram in accordance with American National Standards Institute specifications, current revision, with the exception of logic block symbology.
Power & Ground Nets

Tower Elevator Expansion Connectors
- I2S, SPI, I2C, ADC, USB, DAC, PWM, TMR, CAN, IRQs, GPIOs, UARTs, Flexbus, Ethernet

5V
- JTAG 9-PIN
- USB MINI-B
- JTAG 9-PIN
- FS USB

Accelerometer
- MMA8451Q

I2C/SPI/UART/GPIO
- CLK/RST/IRQ/TMR/PWM/AN

KM34 MCU
- PKM34Z256CLQ7

K20 MCU
- MK20DX128VFm5

XTAL 8MHz
- RESET Button

INFRARED transceiver
- XBAR

INTERRUPT Buttons
- GPIO

LED
- Green
- Red/Blue

3.3V LDO

Freescale Devices

External Connectors

Interface Circuits

Power Devices

General Purpose Tower Plug-in Headers

ADC/AFE
- I2C/SPI/SCI

GPIO/TAMPER Header

ADC

PWM/ADC Header

SPI

SPI FLASH 64Mbit

LCD
- 8x20 segment

THERMISTOR
- 47K Ohm

POTENTIOMETER
- 5K Ohm

ADC

Monday, May 11, 2015
Power & Ground Nets

<table>
<thead>
<tr>
<th>NET</th>
<th>VOLTAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>P5V_USB</td>
<td>5V</td>
<td>Primary input power. Filtered from USB connector. Input to USB power switch.</td>
</tr>
<tr>
<td>P5V_TRG_USB</td>
<td>5V</td>
<td>Output of USB power switch controlled by the VTRG_EN signal from the SWD K20 MCU. Provides input to regulator.</td>
</tr>
<tr>
<td>P5V_ELEV</td>
<td>5V</td>
<td>Secondary input power from primary elevator connector. Provides input to regulator.</td>
</tr>
<tr>
<td>P3V3</td>
<td>3.3V</td>
<td>Output from LDO or from the Elevator connector.</td>
</tr>
<tr>
<td>V_BRD</td>
<td>3.3V</td>
<td>MCU &amp; Interface circuit input power.</td>
</tr>
<tr>
<td>MCU_PWR</td>
<td>3.3V</td>
<td>MCU circuit input power. Filtered from V_BRD.</td>
</tr>
<tr>
<td>VDDA</td>
<td>3.3V</td>
<td>Power for ADC Filtered from MCU_PWR.</td>
</tr>
<tr>
<td>VREFH</td>
<td>1.2V</td>
<td>Upper reference voltage for ADC. Generated internally by MCU.</td>
</tr>
<tr>
<td>VREFL</td>
<td>0.4V</td>
<td>Lower reference voltage for ADC. Generated internally by MCU.</td>
</tr>
<tr>
<td>VDDA_AFE</td>
<td>3.3V</td>
<td>Power for AFE-ADC Filtered from MCU_PWR.</td>
</tr>
<tr>
<td>VBAT</td>
<td>3.3V</td>
<td>Power from Coin battery.</td>
</tr>
<tr>
<td>VSSA</td>
<td>0V</td>
<td>Analog ground for ADC. Filtered from GND.</td>
</tr>
<tr>
<td>VSSA_AFE</td>
<td>0V</td>
<td>Analog ground for AFE-ADC. Filtered from GND.</td>
</tr>
<tr>
<td>GND</td>
<td>0V</td>
<td>Digital Ground (common)</td>
</tr>
</tbody>
</table>
**BOARD POWER SUPPLY**

- Default: 1-2 (V_BRD=3.3V)

**MCU POWER SUPPLY**

- Default: 1-2 (from V_BRD)

**8 MHz**

- Default: 1-2 (use 8MHz crystal)

**COIN BATTERY**

- Default: 1-2 (use MCU_PWR)

**32.768 kHz**

- Default: 1-2 (use 32.768kHz crystal)

**GND LOOP TEST POINTS**

- VSSA_AFE can be connected to VSS by replacing the bead with 0R0
GENERAL PURPOSE TWRPI

PWM HDR

Default: external PWM is not used.
Solder R118->R124 to use external PWM.

PWM Iout max < 7mA
Lo-pass RC filter cut-off:
506 Hz (higher harmonic gen.)
Voltage divider ~ 1:7 (82 / 470 Ohm),
Uout < 500mV pk-to-pk

GPIO HDR

SCI, I2C, SPI, TIMERS, SAR_ADC, EXT_AFE Interface

KM34 JTAG / SWD CONNECTOR

Keep room for JTAG/SWD header of emulator.