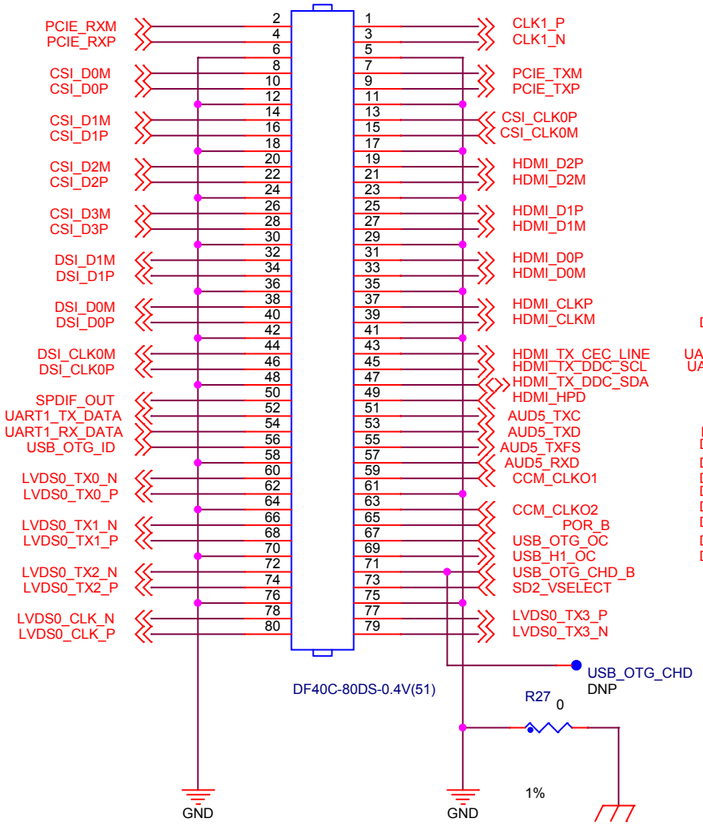
HummingBoard 2 Schematics rev 1.2

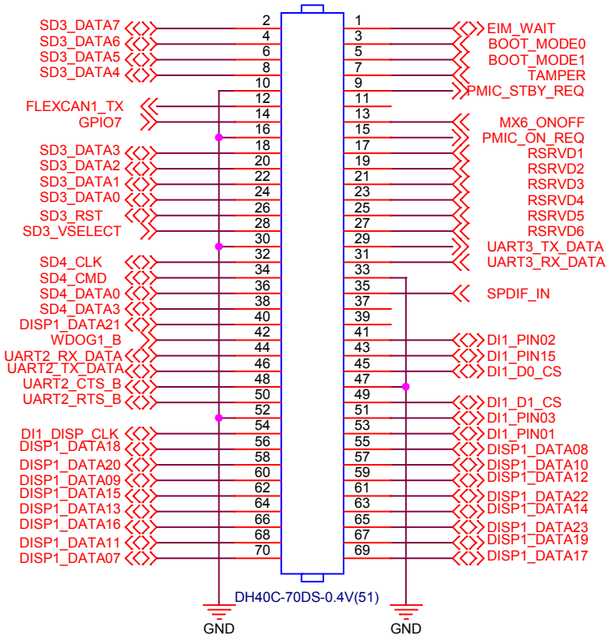
SR-uSOM-iMX6 connectivity
Three Hirose DF40 board to board are used

J7



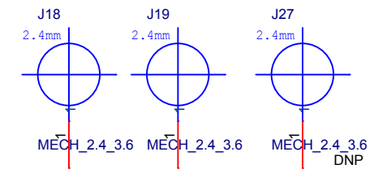
GND and GND are shorted in R27.
Notice that this should be a single point where GND
noises might pass only in this point to GNDC
(i.e. the GND noises will see a high impedence path)

J5001

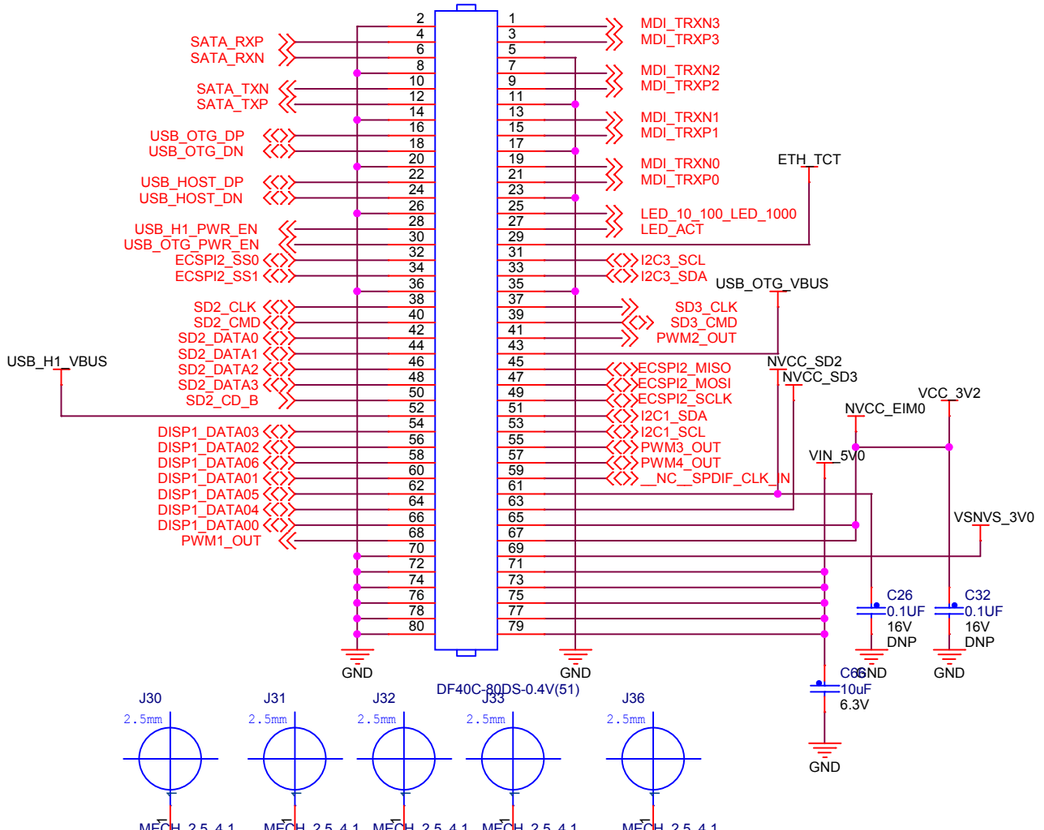


MECH_X_Y is a mechanical hole that the hole size is X mm and padstack is Y mm.
J15, J16 and J17 are M2.5
J18, J19 and J27 are M1.8
J27 is a new mechanical hole for MicroSOM rev 1.4 and newer

SR-uSOM-mx6 SR-uSOM-mx6 SR-uSOM-mx6

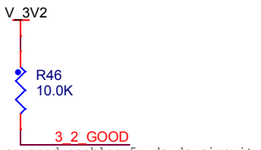


J9

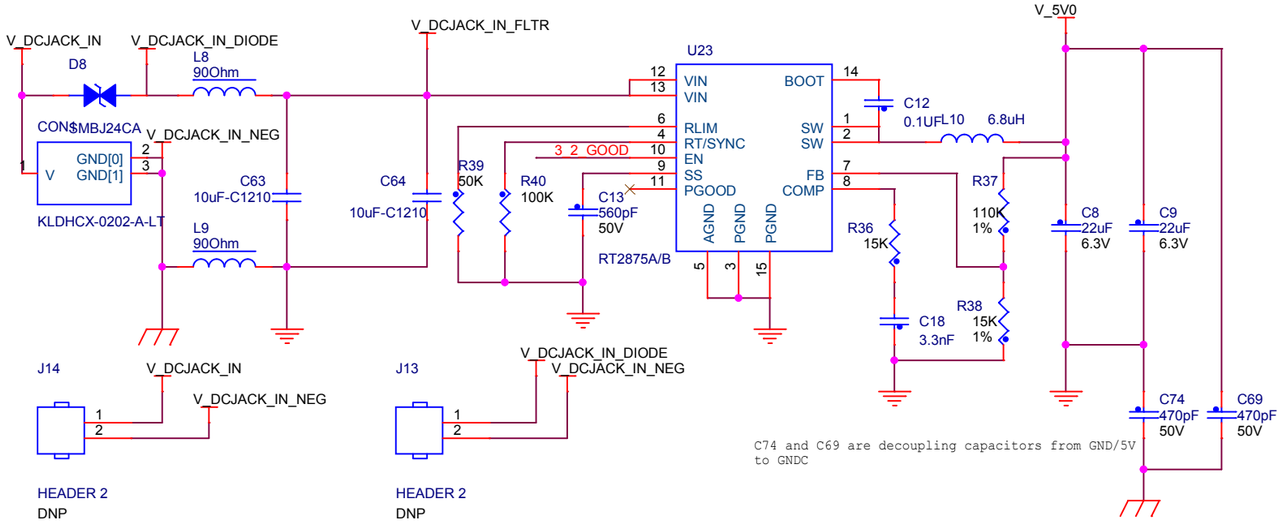


DC-IN Circuit -

- 3.2v DC-DC is first powered and enables the 5V DC-DC (look for 3_2_GOOD signal)
- D8 is a place holder for a component. SolidRun by default assembles a zero ohm resistor to short V_DCJACK_IN and V_DCJACK_IN_DIODE The user can replace this with a schotky diode that using it together with a voltage sensing (with interrupt) from the ADC device on the last page and and J13, he can implement a battery backed up device that detects brown out mode.
- J14 is a 2 pin thru hole 100mil connector to bypass DC-in.
- J13 is a 2 pin through hole 100 mil connector to get DC-in after D8 (in case aassembled schotky diode).
- Just to stress that again, D8 is assembled by default as a zero ohm resistor, the user can replace it with a diode.



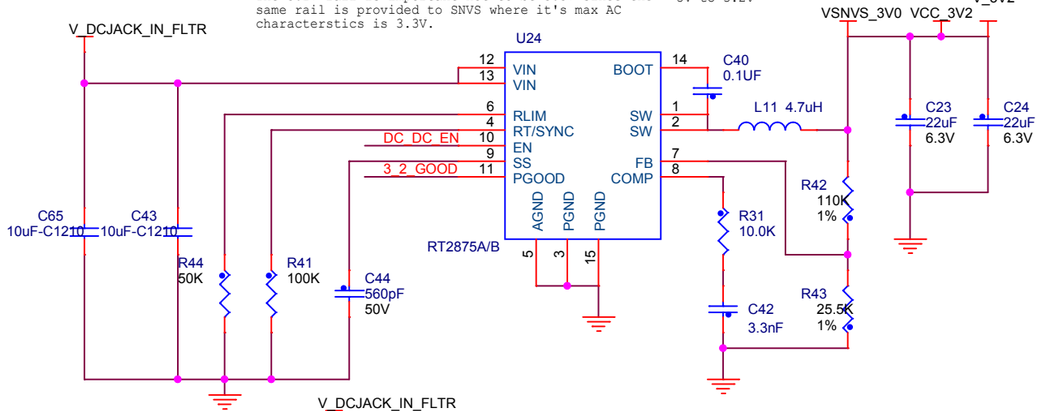
3.3v dc-dc power good enables 5v dc-dc circuit

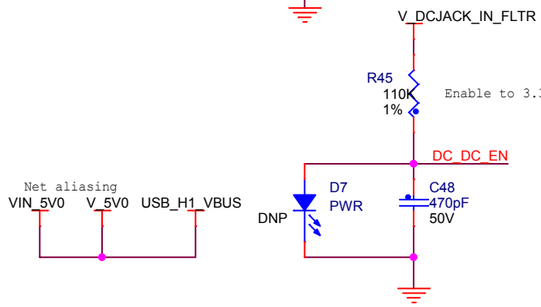


C74 and C69 are decoupling capacitors from GND/5V to GNDC

General notes -
The 3.2V rail is important not to be 3.3V since the same rail is provided to SNVS where it's max AC characterstics is 3.3V.

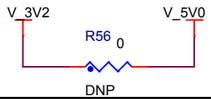
5V to 3.2v





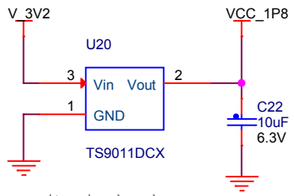
Net aliasing
VIN_5V0 V_5V0 USB_H1_VBUS

R56 is an optional bypass resistor where the user wants to completely remove the 5V circuit and feed the whole PCB from 3.3v source. Notice that in such case USB and other devices that feed from 5V will not be functional.



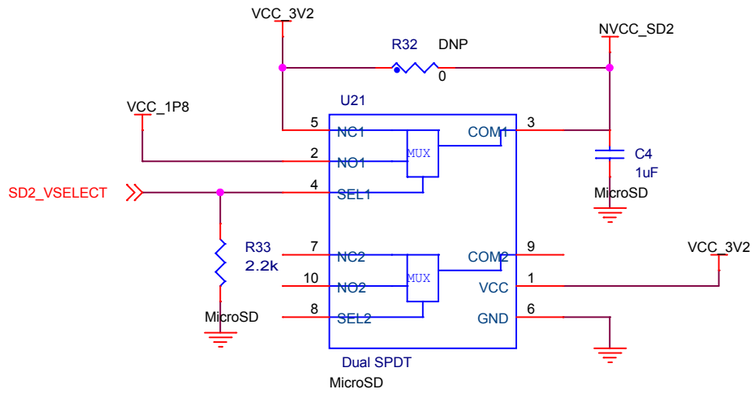
Size	Title	Rev
A3	HummingBoard2 - i.MX6 MicroSOM B2B and Power Supplies	1.2
Date: Tuesday, July 14, 2015	Sheet 1 of 6	

Analog audio and micro SD 1.8v interface support LDO

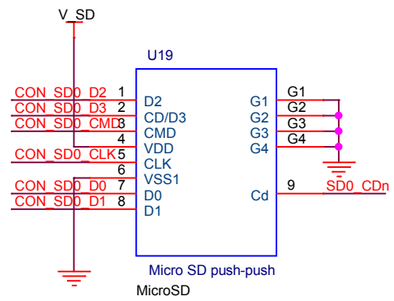


LDO input capacitor is shared
with USB hub filter

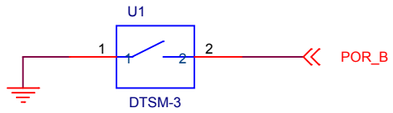
micro SD 3.2v/1.8v interface voltage switchver circuitry



micro SD interface

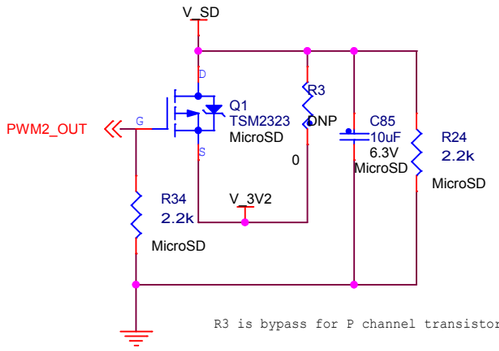


RESET button



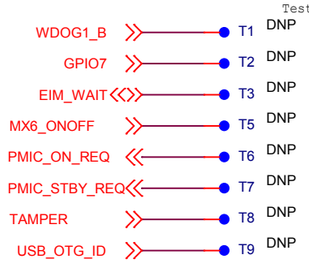
micro SD power on/off

Some micro SD cards don't report UHS-1 support after warmboot.
This power cycle circuitry is intended to power cycle those kind
of micro SD cards so that they would report UHS-1 support.

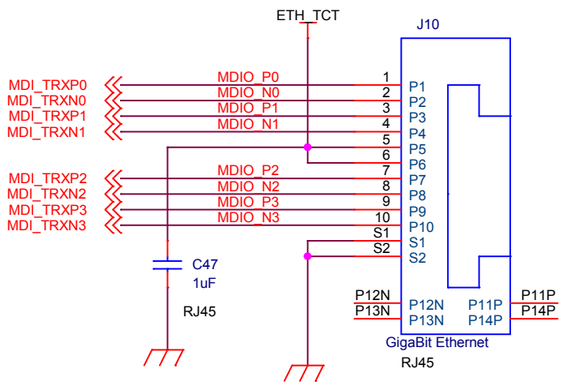


R3 is bypass for P channel transistor

Test points (refer to the layout about their places)



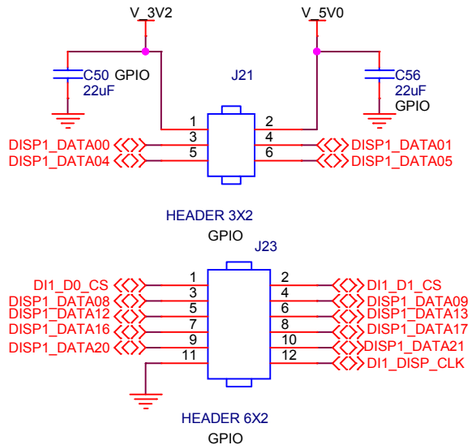
RJ45 Connector

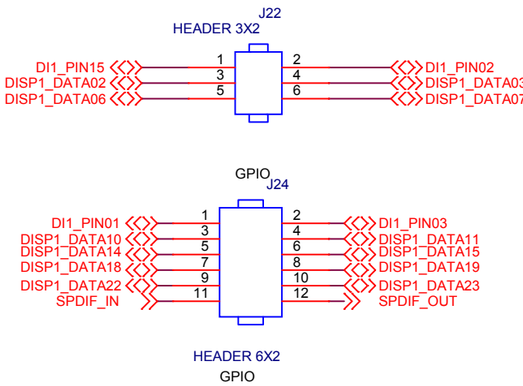


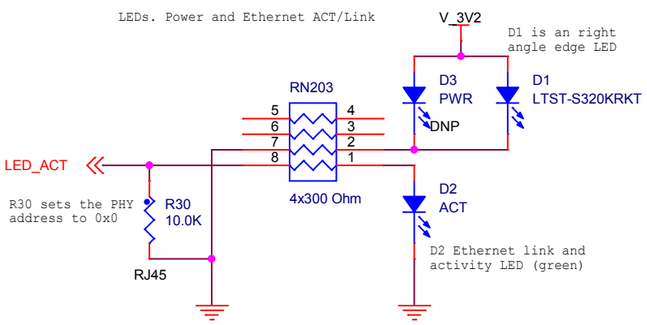
36 pin GPIO header notes -

- The header mainly exposes the parallel port display out / camera in header
  (can be muxed to other functions) with other signals that can be used as SPDIF in/out
- The pins also decides the boot device. So notice not to randomly pull up/down those
  pins without referring to the i.MX6 reference manual documentation.
- Those pins can be pulled up/down freely in case the i.MX6 device fuses are blown
  in a manner to indicate to the processor to boot from it's internal fuse settings.
  In such a case the user can pull up/down any of those pins freely.
- By default the Linux kernel device tree sets those pins as GPIOs.
- Notice how the pins order on the header, DISP1_DATA0, DATA1 ... DATA23

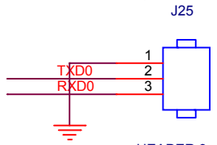
36 pin header implemented using 4 headers

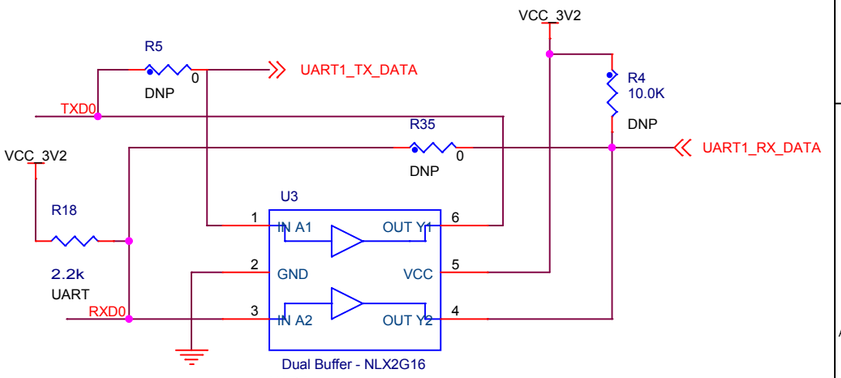






Buffered UART header (main debug console)



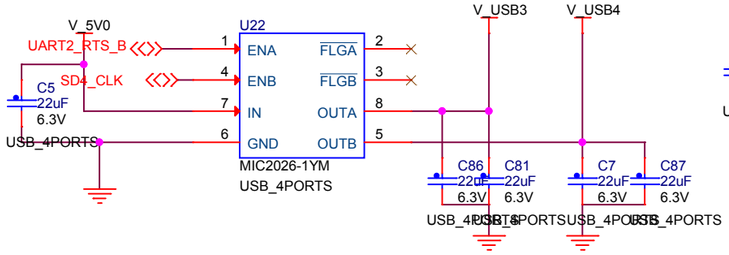


Size	Title	Rev
A3	HummingBoard2 - 36 GPIO pin header, RJ45, uSD, reset and buffered uart	1.2

Date: Tuesday, July 14, 2015 Sheet 2 of 6

Dual USB header

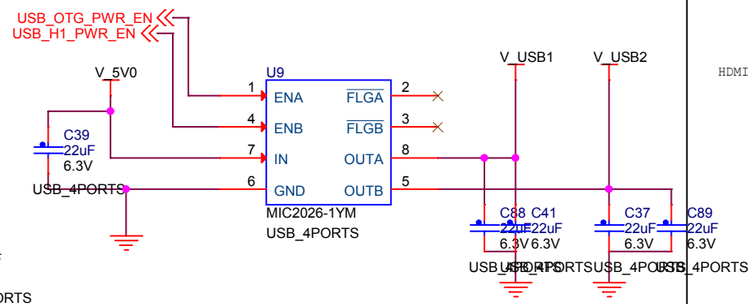
Notice dual USB header is current limited to 350mA both channels
USB current limiter



GPIO pin mapping -

Pin	GPIO
OTG(ENA)	(3, 22)
H1(ENB)	(1, 0)

USB current limiter

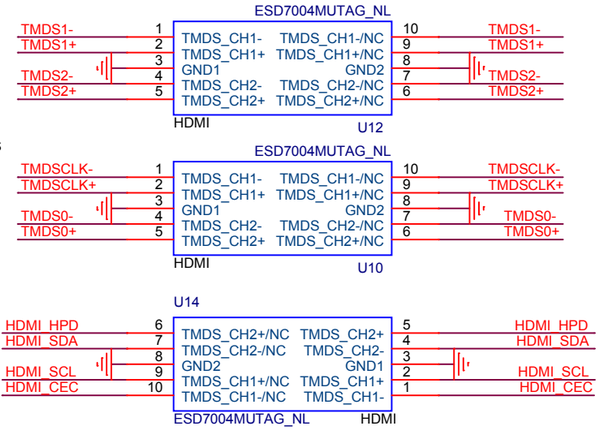


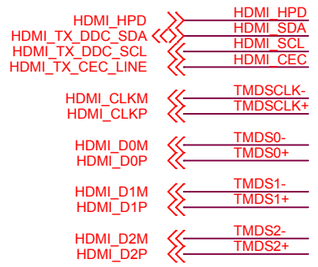
GPIO pin mapping -

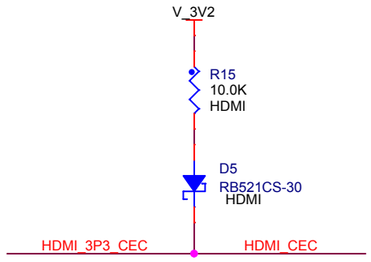
Pin	GPIO
OTG(ENA)	(3, 22)
H1(ENB)	(1, 0)

HDMI out

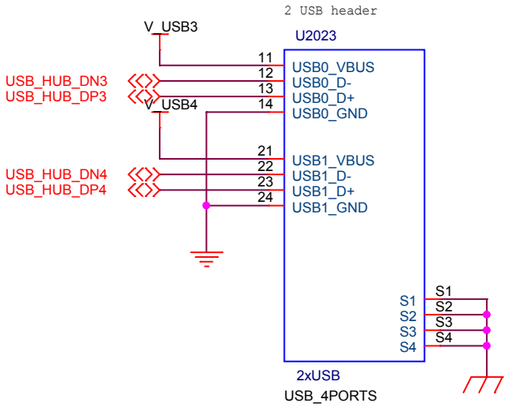
HDMI ESD protection



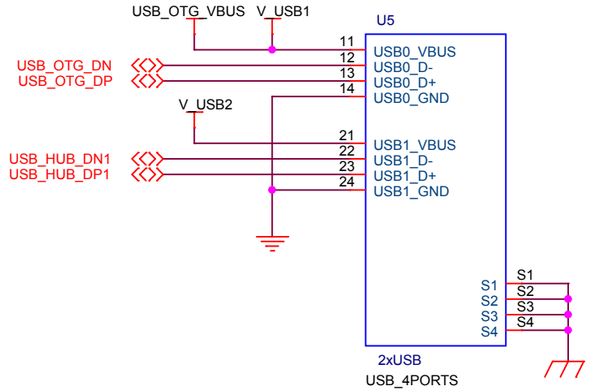


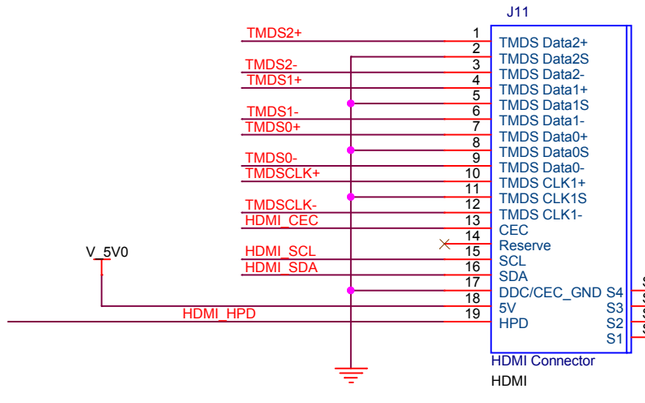


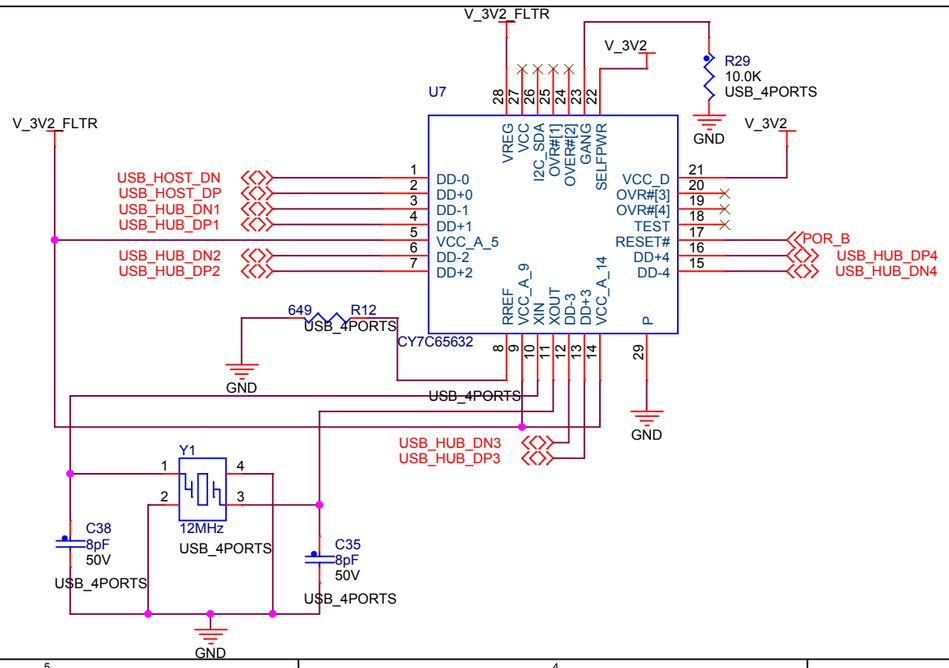
Dual USB connector front



Dual USB connector back



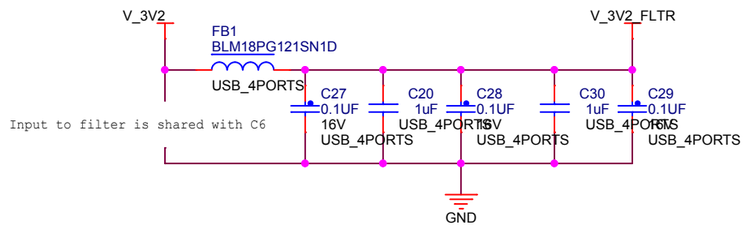




1 to 4 USB HUB.

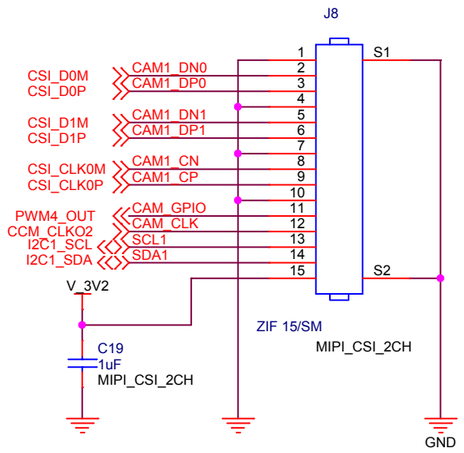
The HUB outputs goes to -
1. Dual USB on the front
2. Lower USB on the back
3. mini PCIe connector

USB hub analog phy filter

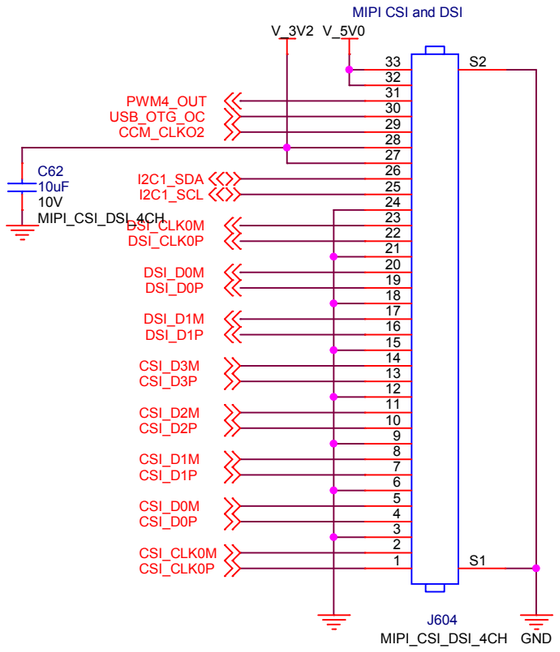


Size	Title	Rev
A3	HummingBoard2 - HDMI and 4xUSB host ports with USB HUB	1.2
Date: Tuesday, July 14, 2015	Sheet 3 of 6	

MIPI CSI-2 serial interface



Uses same pinout as Avnet ov5640 camera module

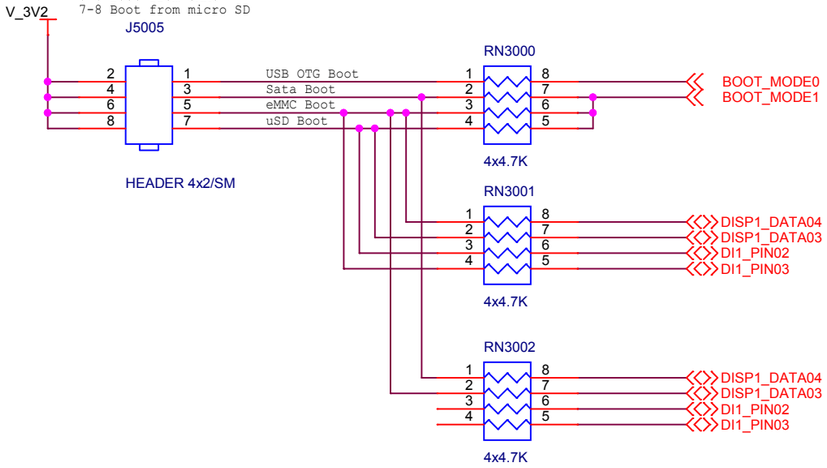


Boot select uses 3rd header pinout to select boot device.
Notice that i.MX6 without boot from fuse must be used;
otherwise the boot device is choosen with whatever
the i.MX6 fuses selects

From usage point of view, the user can use a jumper to
bridge only a single configuration from the 2x4 J5005 header -

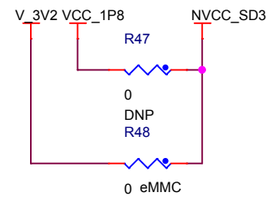
1-2 USB OTG boot (you need an external PC to boot)
3-4 Boot from SATA
5-6 Boot from eMMC
7-8 Boot from micro SD

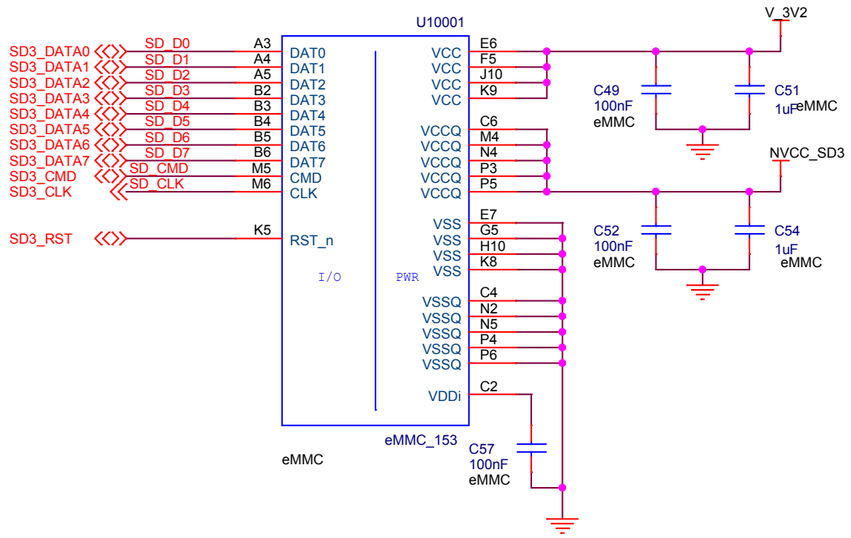
Boot Select



eMMC

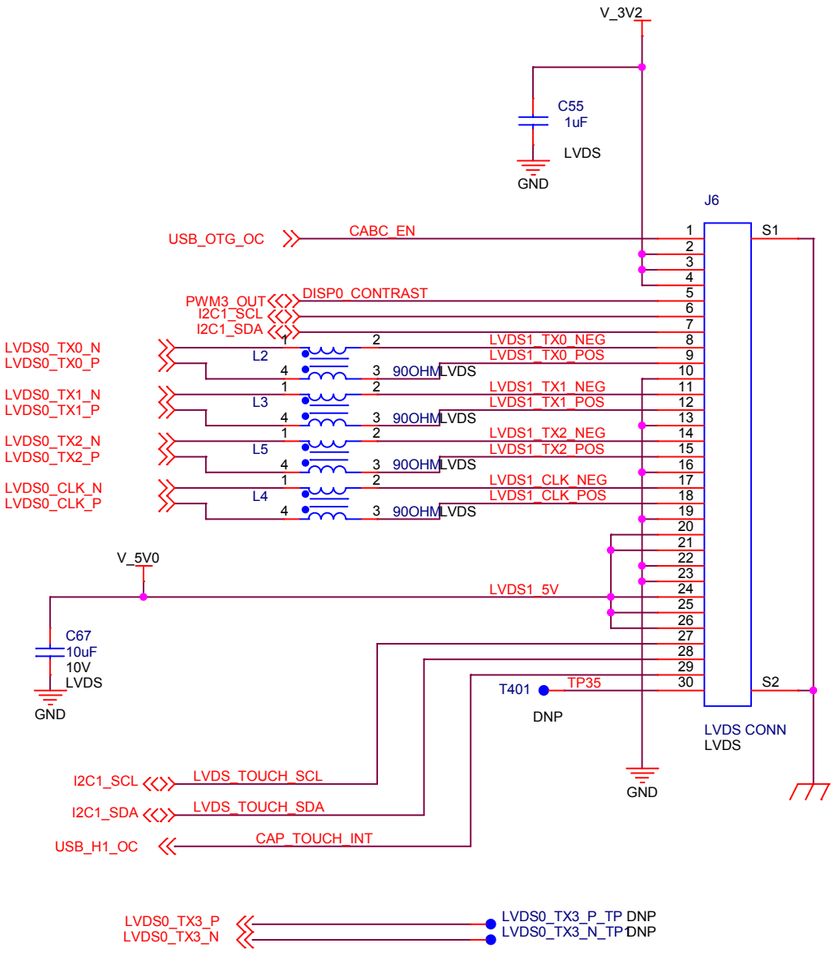
eMMC VCCQ is 3.2v





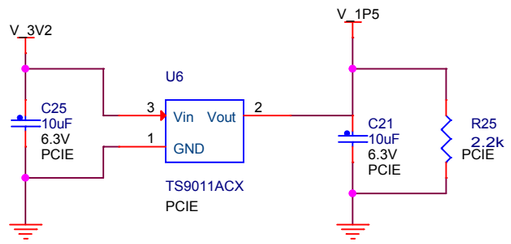
LVDS out

Since there isn't a standard LVDS out connector,
this design uses the Freescale Sabre SD LVDS display.

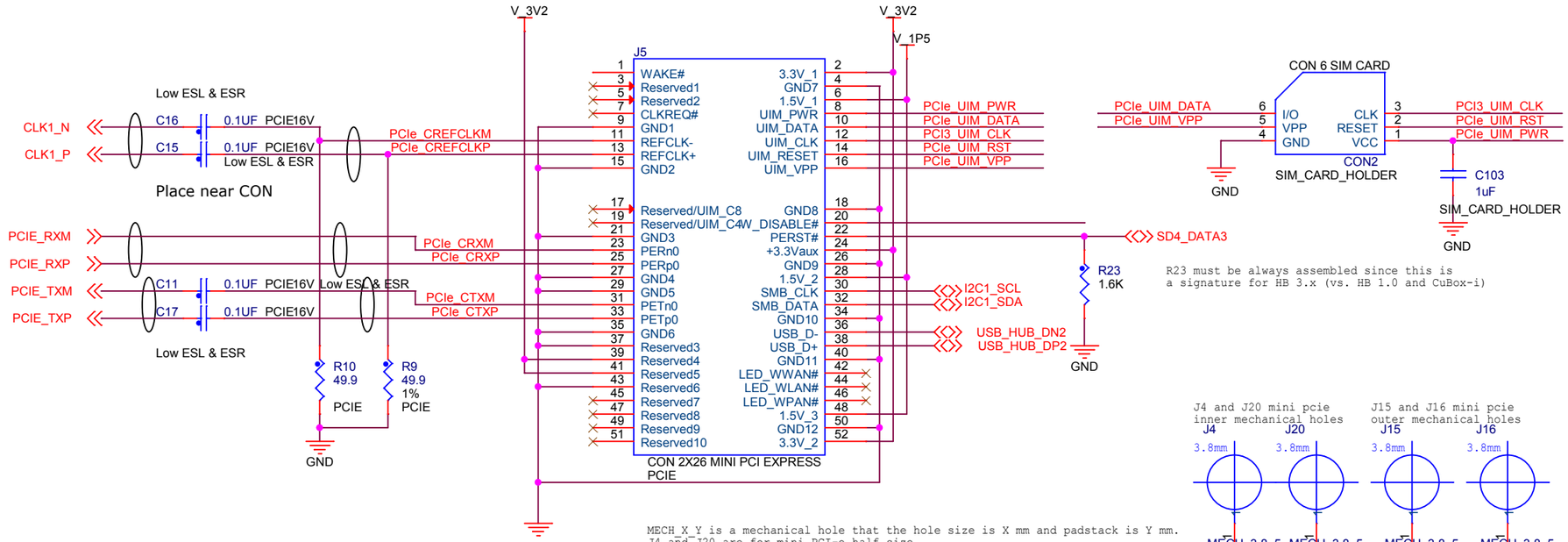


Size	Title	Rev
A3	HummingBoard2 - eMMC, LVDS disp, MIPI CSI and DSI (33pin)	1.2
Date: Tuesday, July 14, 2015	Sheet 4 of 6	

3.3v to 1.5v LDO (for mini pci express)



Mini PCI express (half and full size) with USB and sim card support



R23 must be always assembled since this is a signature for HB 3.x (vs. HB 1.0 and CuBox-i)

J4 and J20 mini pcie inner mechanical holes

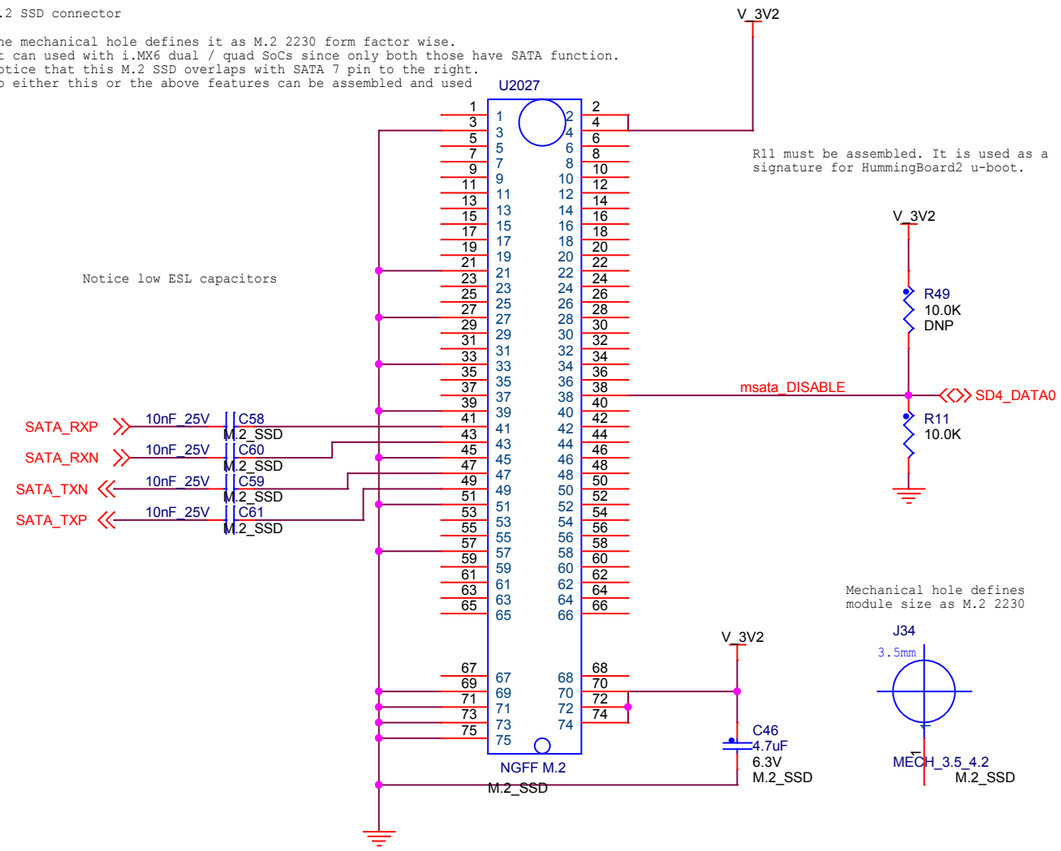
J15 and J16 mini pcie outer mechanical holes

MECH_X_Y is a mechanical hole that the hole size is X mm and padstack is Y mm.
J4 and J20 are for mini PCI-e half size
J15 and J16 are for mini PCI-e full size
4 of those mechanical holes are suitable for M2.5

M.2 SSD connector

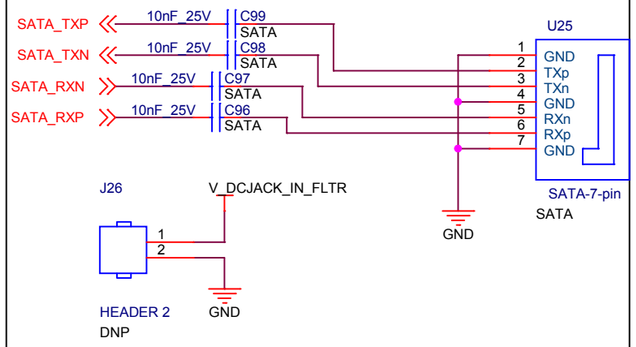
The mechanical hole defines it as M.2 2230 form factor wise.
it can used with i.MX6 dual / quad SoCs since only both those have SATA function.
Notice that this M.2 SSD overlaps with SATA 7 pin to the right.
So either this or the above features can be assembled and used

Notice low ESL capacitors



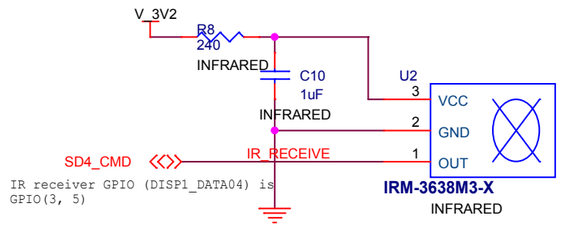
SATA connector with power

Notes -
1. This feature overlaps with M.2 SSD on the left.
   So either this or M.2 can be assembled and used.
2. Notice J26 is adjacent to U10002 pins 15 and 16.
   U10002 pins 15,16 and J26 can assemble together a 100 mil SATA HDD 12v and 5V power cable connector when V_DCJACK_IN_FLTR is set as 12V, i.e. the user uses a 12V power supply.



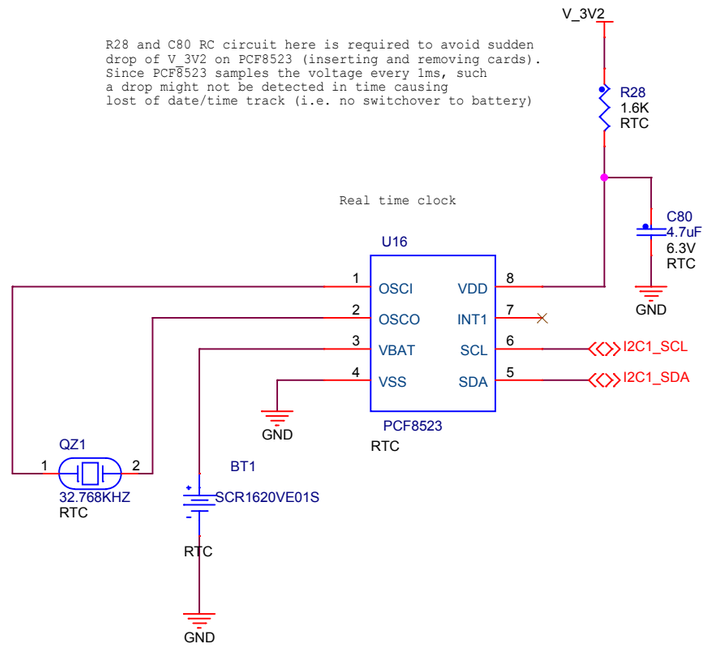
Infra red receiver

240 ohm resistor required to minimize noises on DC in



R28 and C80 RC circuit here is required to avoid sudden drop of V_3V2 on PCF8523 (inserting and removing cards). Since PCF8523 samples the voltage every 1ms, such a drop might not be detected in time causing lost of date/time track (i.e. no switchover to battery)

Real time clock



Size	Title	Rev
A3	HummingBoard2 - mini pcie, mSata, Infra red and RTC	1.2
Date: Tuesday, July 14, 2015	Sheet 5 of 6	

Audio in/out connectors

Green

J3

STERO_OUT_R

STERO_OUT_L

AGND

STX-3000
ANALOG_AUDIO

J1

MIC_IN

STX-3000
ANALOG_AUDIO

SGTL5000 audio in/out codec

Notice that VDDD is now externally supplied.
This is in order to avoid SGTL5000 ER1 errata.

VCC_1P8

C14
0.1UF
16V
ANALOG_AUDIO

U4

I2C1_SCL
I2C1_SDA
AUD5_TXD
AUD5_RXD
AUD5_TXC
AUD5_TXFS
CCM_CLKO1

CTRL_MODE
CTRL_ADR0_CS
VDDD
CTRL_CLK
NC
CTRL_DATA
I2S_DIN
I2S_DOUT

GND
HP_R
GND
HP_VGND
VDDA
HP_L
AGND
NC

I2S_SCLK
I2S_LRCLK
NC
SYS_MCLK
VDDIO
NC
CPFILT
NC
GND

V_3V2

STERO_OUT_R

STERO_OUT_L

C6
0.1UF
16V
ANALOG_AUDIO

AGND

C53
0.1UF
16V
ANALOG_AUDIO

NC
VAG
LINEOUT_R
LINEOUT_L
LINEIN_R
LINEIN_L
MIC
MIC_BIAS

SGTL5000_32QFN
ANALOG_AUDIO

Note that AGND is different than GND.

C2
0.1UF
16V
ANALOG_AUDIO

C1
0.1UF
ANALOG_AUDIO

MIC_IN

R1
2.2k ANALOG_AUDIO

C3
0.1UF
16V
ANALOG_AUDIO

LO_R
LO_L
LI_R
LI_L

MikroBUS Click Module

Notice that RX/TX are swapped in this design and Linux kernel device tree
set UART3_TX_DATA as uart rx and UART3_RX_DATA is set as uart tx
SPI, UART pins (total 8 pins) can be converted to be GPIOs

U10002

MB_AN
POR_B
ECSPI2_SS0
ECSPI2_SCLK
ECSPI2_MISO
ECSPI2_MOSI

AN
RST
CS
SCK
MISO
MOSI
+3.3V
GND

V_3V2

PWM
INT
RX
TX
SCL
SDA
+5V
GND

PWM1_OUT
ECSPI2_SS1
UART3_TX_DATA
UART3_RX_DATA
I2C3_SCL
I2C3_SDA

V_5V0

mikroBUS

DNP

4 Channel ADC Analog to digital

V_5V0
V_3V2

R50
1.6K

C93
560pF
50V
ADC

CH3 can be used as brownout
detection circuitry

C92
1uF

C91
1uF

ADC

U13

DVDD
AVDD
ADCIN
MUXOUT

POR_B
SD3_VSELECT
I2C3_SCL
I2C3_SDA

RESET_
INT_
SCLK
SDA

CH0
CH1
CH2
CH3

MB_AN

A0
DGND
PWRCON
AGND
EPAD

ads7924

Route as star to AGND

J12
HEADER 2

J29
HEADER 2

V_DCJACK_IN

R13
110K
1%

R14
15K
1%

CANBUS connector.

Notes -
1. Requires MicroSOM rev 1.4 and newer
2. Overlaps with HDMI connector CEC function. So only this or the HDMI connector can be assembled

V_5V0

U10003

FLEXCAN1_TX
HDMI_TX_CEC_LINE

R54
1K
CANBUS

R53
1K
CANBUS

TXD
GND
VCC
RXD

S
CANH
CANL
NC

x1050
CANBUS

C100
0.1UF
16V
CANBUS

R55
1K
CANBUS

L12
90Ohm
CANBUS

L13
90Ohm
CANBUS

C101
68pF
50V
CANBUS

C102
68pF
50V
CANBUS

J28

PHNX_1757255
CANBUS

RS 485 or UART 3 pin header

Notice that connector J5006 overlaps in the layout
with analog audio connectors above.

V_3V2

R2
5.6K
RS485

U8

UART2_RX_DATA
UART2_CTS_B
UART2_TX_DATA

RO
RE_
DE
DI

Vcc
B
A
GND

RS485_B
RS485_A

C90
0.1UF
RS485

RS-485-3.3v-Transceiver
RS485

J35

UART2_TX_DATA
UART2_RX_DATA

HEADER 3
DNP

V_3V2

R52
1K
RS485

Add connector, pull up and down on A/B

J5006

RS485_A
RS485_B

R51
1K
RS485

C95
68pF
50V
RS485

C94
68pF
50V
RS485

PHNX_1757255
RS485

Size	Title	Rev
A3	HummingBoard2 - Analog audio, MikroBUS click, ADC, RS-485, Canbus	1.2
Date: Tuesday, July 14, 2015	Sheet 6 of 6	