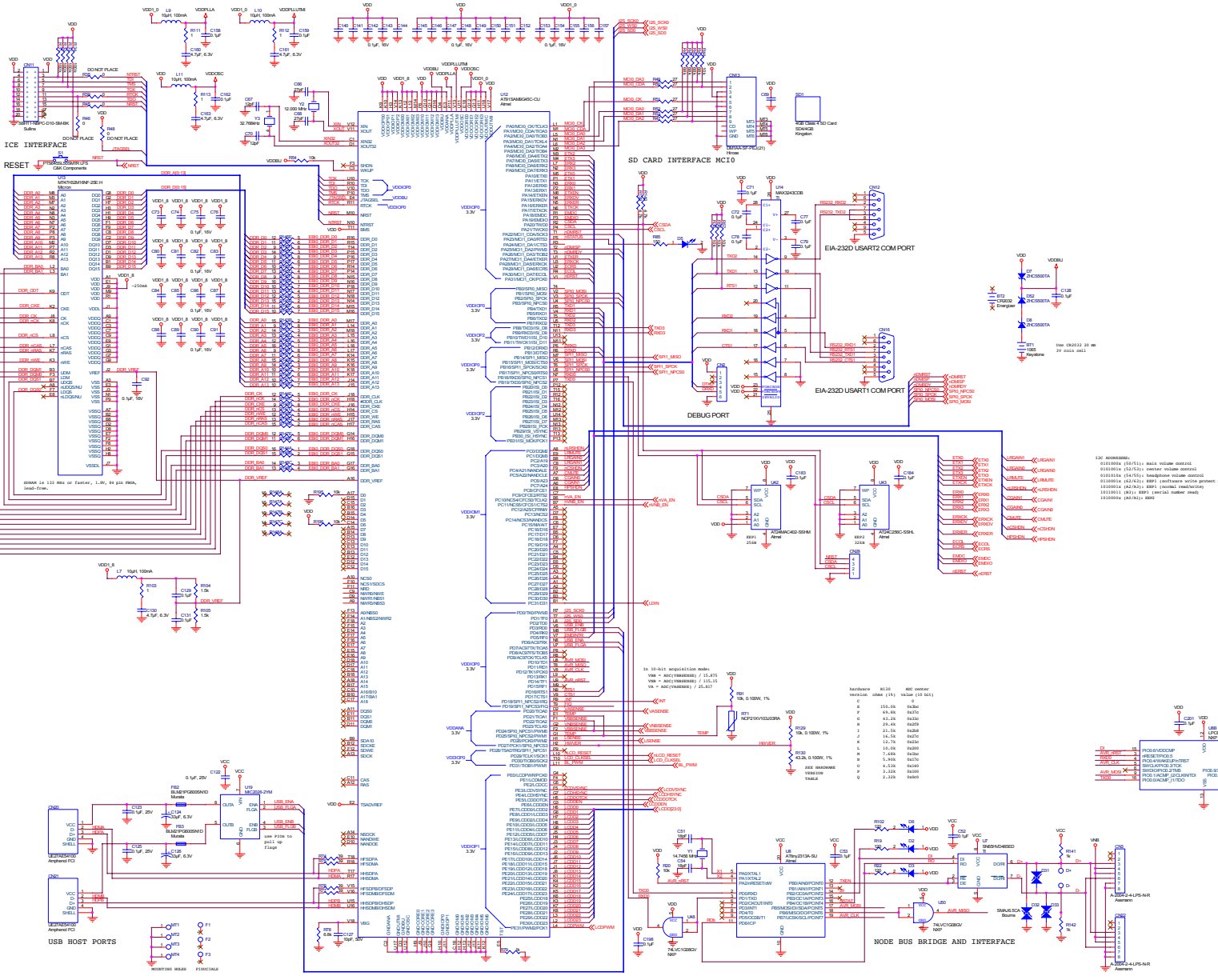


- b16: nDIP7
- b15: nDIP6
- b14: nDIP5
- b13: nDIP4
- b12: nDIP3
- b11: nDIP2
- b10: nDIP1
- b9: nDIP0
- b8: nRFLIP2
- b7: nRFLIP1
- b6: nLFLIP2
- b5: nLFLIP1
- b4: nBACK
- b3: nDOWN
- b2: nUP
- b1: nSELECT
- b0: nVBBGOOD

Title		
Stern Pinball CPU -- switch inputs		
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VDDIO0[1:0] = 500k 500k 10k, should be 1.0VDC
 VDDIO0[2:3] = 500k 10k, 500k 10k (to 3.3V)
 VDDIO0[4] = 500k 10k (to 3.3V)
 VDDIO0[5] = 50k 10k (used for SW), set to 3.3V
 VDDIO0[6] = 50k 10k (to 3.3V)
 VDDIO0[7] = 50k 10k (to 3.3V)
 VDDIO0[8] = 50k 10k (to 3.3V)
 VDDIO0[9] = 50k 10k (to 3.3V)
 VDDIO0[10] = 50k 10k (to 3.3V)
 VDDIO0[11] = 50k 10k (to 3.3V)
 VDDIO0[12] = 50k 10k (to 3.3V)
 VDDIO0[13] = 50k 10k (to 3.3V)
 VDDIO0[14] = 50k 10k (to 3.3V)
 VDDIO0[15] = 50k 10k (to 3.3V)
 VDDIO0[16] = 50k 10k (to 3.3V)
 VDDIO0[17] = 50k 10k (to 3.3V)
 VDDIO0[18] = 50k 10k (to 3.3V)
 VDDIO0[19] = 50k 10k (to 3.3V)
 VDDIO0[20] = 50k 10k (to 3.3V)
 VDDIO0[21] = 50k 10k (to 3.3V)
 VDDIO0[22] = 50k 10k (to 3.3V)
 VDDIO0[23] = 50k 10k (to 3.3V)
 VDDIO0[24] = 50k 10k (to 3.3V)
 VDDIO0[25] = 50k 10k (to 3.3V)
 VDDIO0[26] = 50k 10k (to 3.3V)
 VDDIO0[27] = 50k 10k (to 3.3V)
 VDDIO0[28] = 50k 10k (to 3.3V)
 VDDIO0[29] = 50k 10k (to 3.3V)
 VDDIO0[30] = 50k 10k (to 3.3V)
 VDDIO0[31] = 50k 10k (to 3.3V)



VBB = 48VDC (input)
 VA = 24VDC (audio amps)
 VNB = 9.0VDC (node bus)
 VCC = 5.0VDC (HDMI pin 18)
 VDD = 3.3VDC
 VDD1_8 = 1.8VDC
 VDD1_0 = 1.0VDC

ICE INTERFACE
 RESET

USB HOST PORTS

SD CARD INTERFACE IC10

DEBUG PORT

EIA-232D USART2 COM PORT

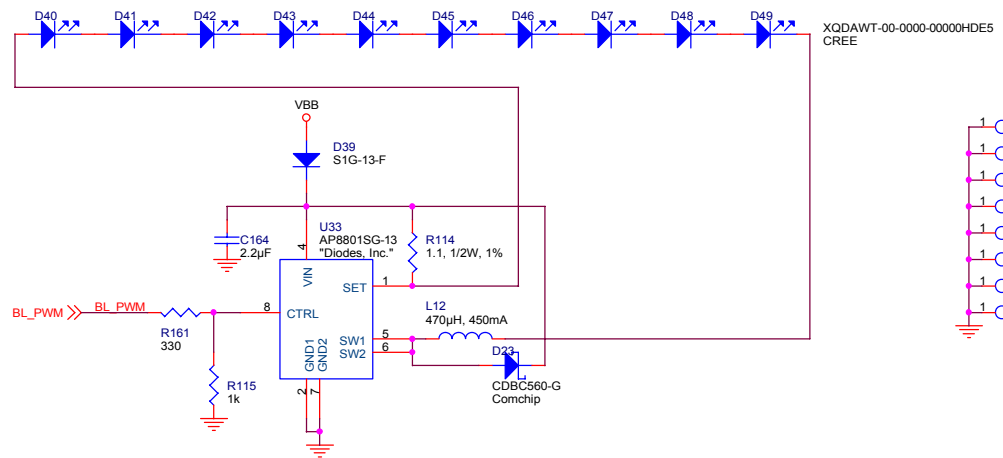
EIA-232D USART1 COM PORT

NODE BUS BRIDGE AND INTERFACE

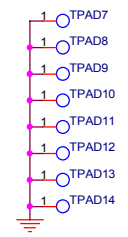
- 12: Addresses
- 00000000-0000000F: main memory control
 - 00000010-0000001F: master node control
 - 00000020-0000002F: slave node control
 - 00000030-0000003F: slave node control
 - 00000040-0000004F: SPI (internal manufacturer)
 - 00000050-0000005F: SPI (internal manufacturer)
 - 00000060-0000006F: SPI (internal manufacturer)
 - 00000070-0000007F: SPI (internal manufacturer)
 - 00000080-0000008F: SPI (internal manufacturer)
 - 00000090-0000009F: SPI (internal manufacturer)
 - 000000A0-000000AF: SPI (internal manufacturer)
 - 000000B0-000000BF: SPI (internal manufacturer)
 - 000000C0-000000CF: SPI (internal manufacturer)
 - 000000D0-000000DF: SPI (internal manufacturer)
 - 000000E0-000000EF: SPI (internal manufacturer)
 - 000000F0-000000FF: SPI (internal manufacturer)

in 16-bit acquisition mode:

VA	ANALOG	RES	RES	RES	RES
0	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000
11	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000
13	0.0000	0.0000	0.0000	0.0000	0.0000
14	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.0000	0.0000	0.0000	0.0000	0.0000
16	0.0000	0.0000	0.0000	0.0000	0.0000
17	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0000	0.0000	0.0000	0.0000	0.0000
19	0.0000	0.0000	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000	0.0000	0.0000
21	0.0000	0.0000	0.0000	0.0000	0.0000
22	0.0000	0.0000	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000	0.0000	0.0000
24	0.0000	0.0000	0.0000	0.0000	0.0000
25	0.0000	0.0000	0.0000	0.0000	0.0000
26	0.0000	0.0000	0.0000	0.0000	0.0000
27	0.0000	0.0000	0.0000	0.0000	0.0000
28	0.0000	0.0000	0.0000	0.0000	0.0000
29	0.0000	0.0000	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000	0.0000	0.0000
31	0.0000	0.0000	0.0000	0.0000	0.0000

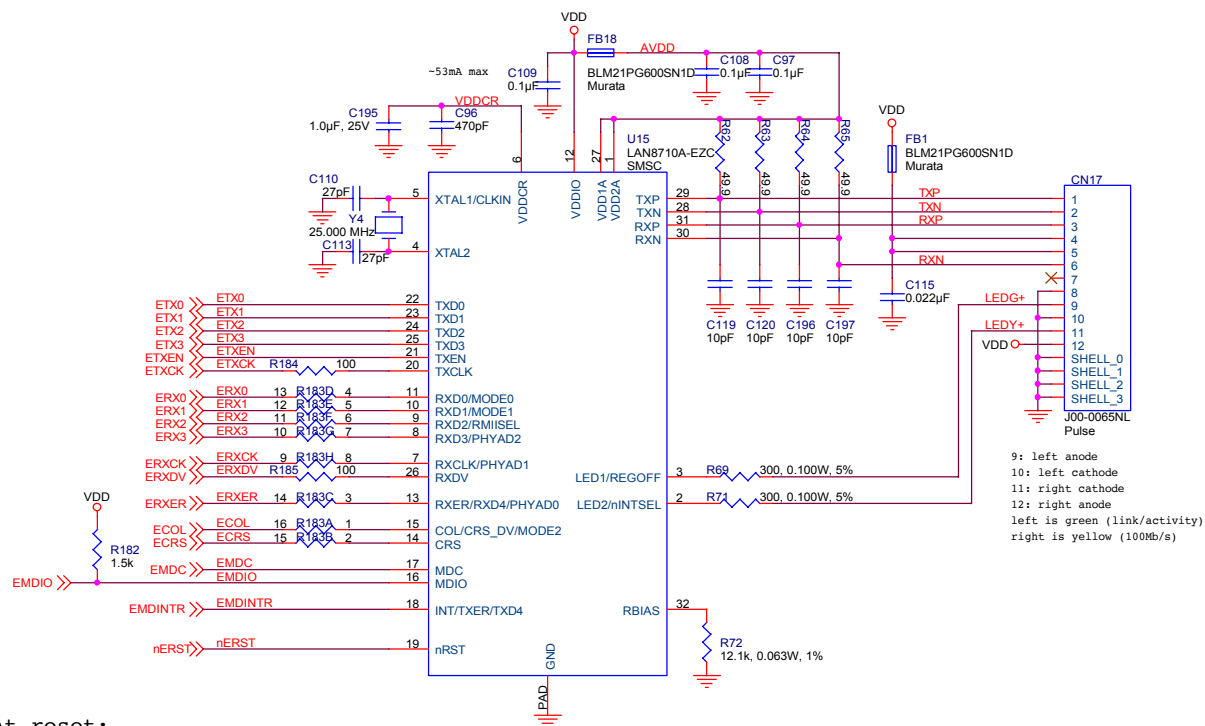


XQDAWT-00-0000-00000HDE5
CREE

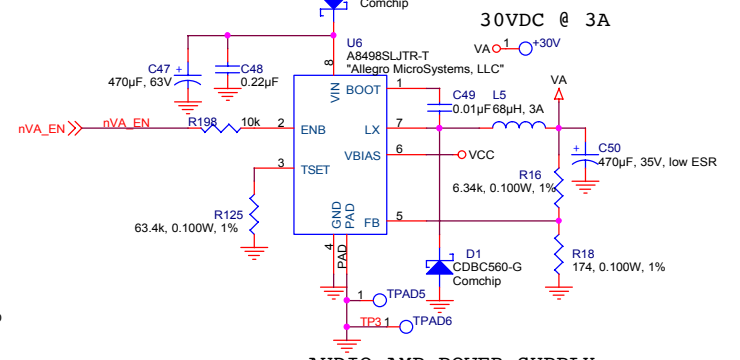
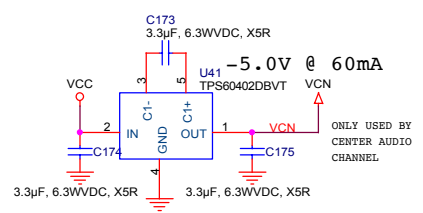
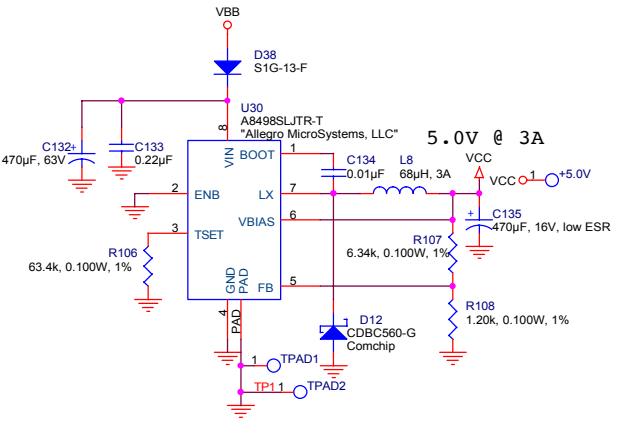
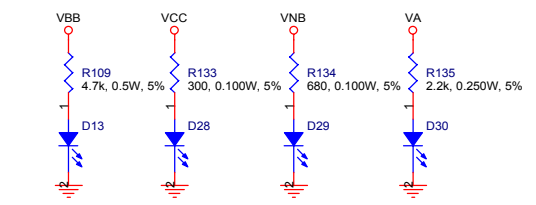
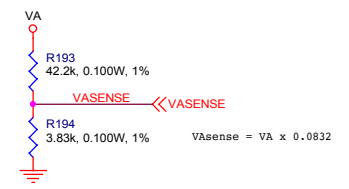
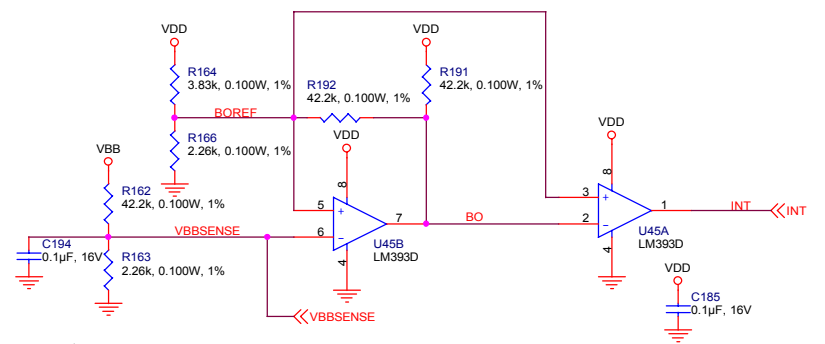
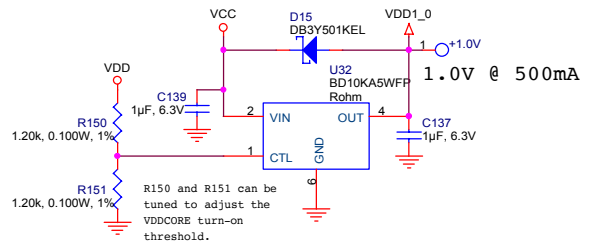
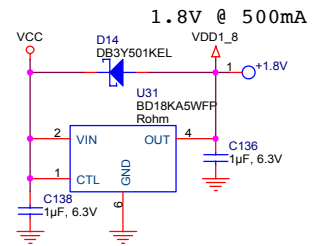
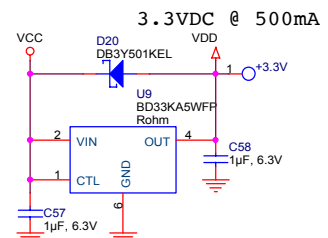
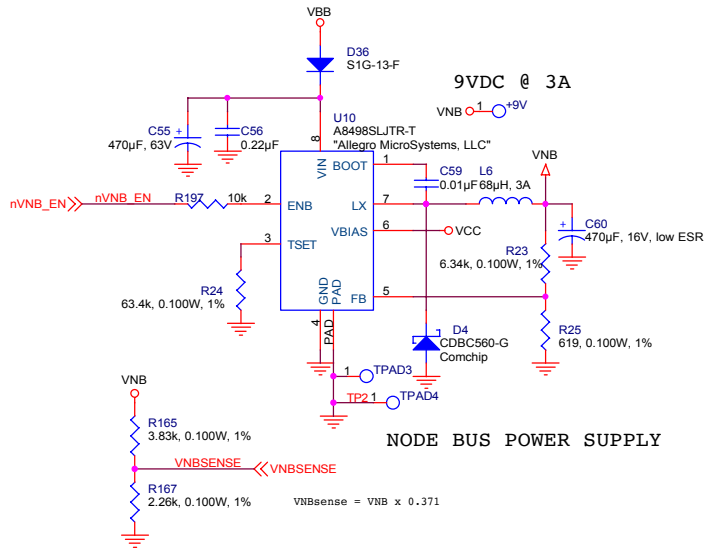


$V_{thd} = 200 \text{ mV}$
 $V_{ref} = 1.25\text{V}$
 $I_{led} = V_{ctrl} / V_{ref} \times V_{thd} / R_{set}$
 $V_{ctrl} = 3.3 \times 1\text{k} / (330 + 1\text{k}) = 2.48\text{V}$
 $I_{led} (\text{target}) = 350 \text{ mA}$
 $R_{set} = V_{ctrl} / V_{ref} \times V_{thd} / I_{led} = 2.48\text{V} / 1.25\text{V} \times 200\text{mV} / 350\text{mA} = 1.13 \text{ ohms}$
 $R_{set} = 1.1 \text{ ohms}$
 $I_{led} = 2.48 / 1.25 \times 200\text{mV} / 1.1 \text{ ohms} = 360 \text{ mA}$
 Power across Rset is $(I^2)R = (360\text{mA})^2 \times 1.1 \text{ ohms} = 143\text{mW}$

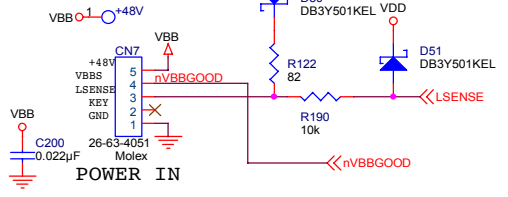
Title		
backlight		
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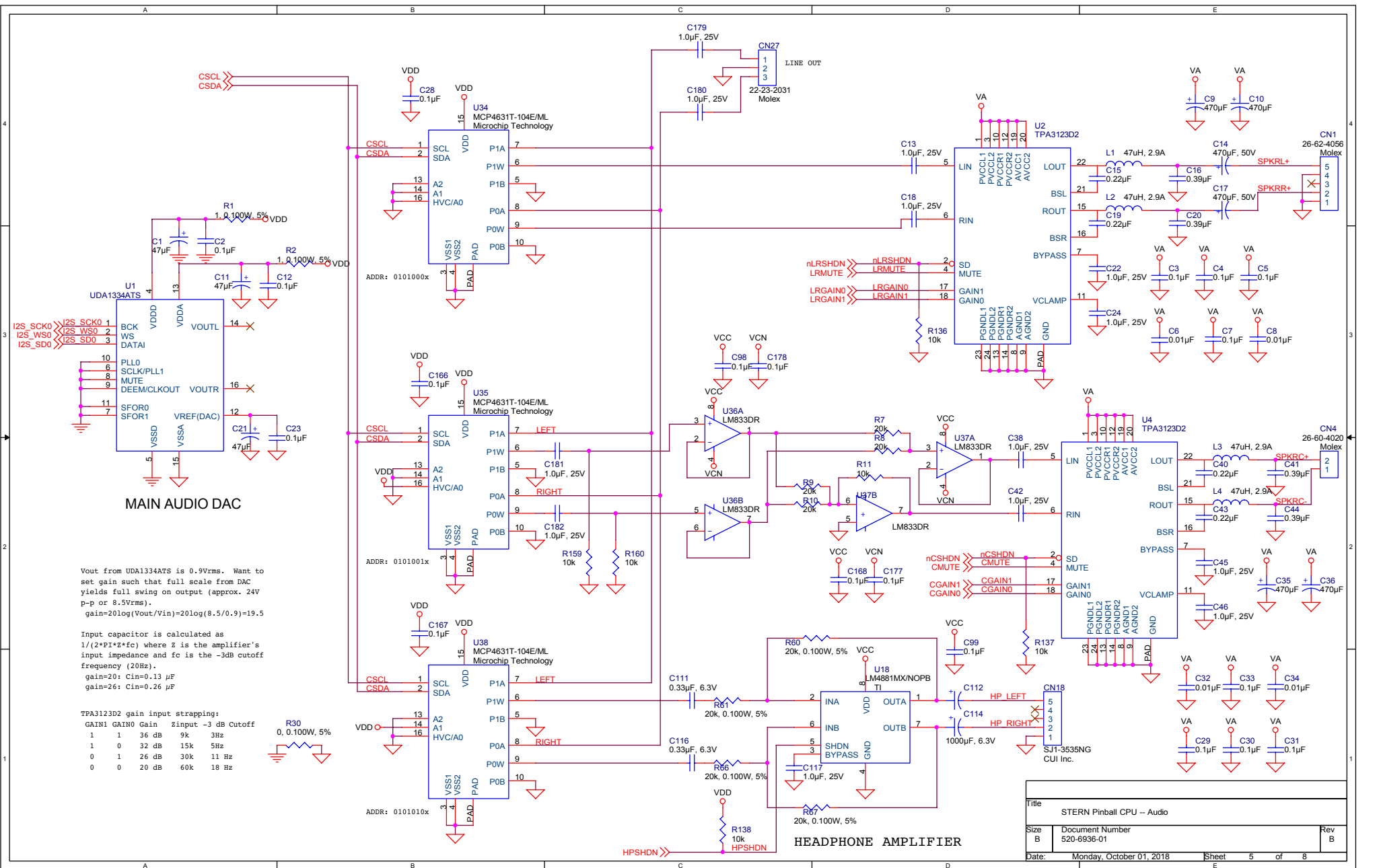
Title		
Ethernet interface		
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AUDIO AMP POWER SUPPLY



Title		
STERN Pinball CPU -- power supply		
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MAIN AUDIO DAC

Vout from UDA1334ATS is 0.9Vrms. Want to set gain such that full scale from DAC yields full swing on output (approx. 24V p-p or 8.5Vrms).
 $gain = 20 \log(V_{out}/V_{in}) = 20 \log(8.5/0.9) = 19.5$

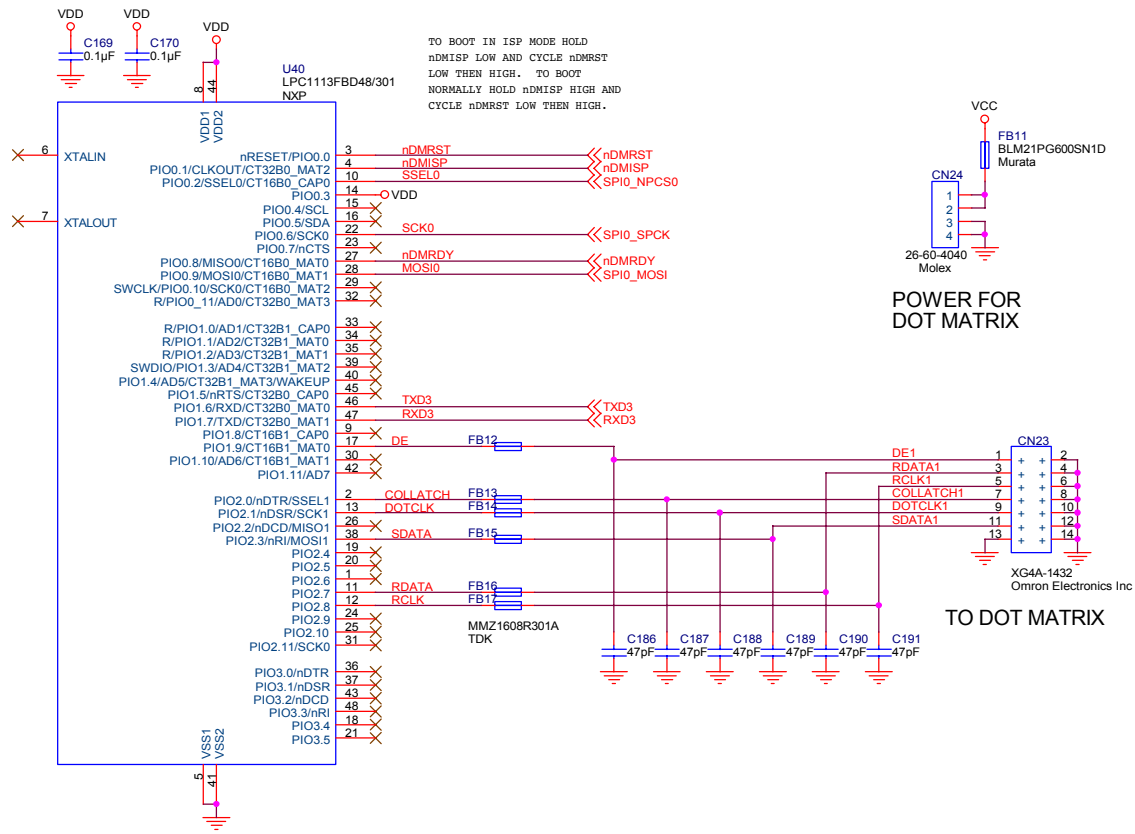
Input capacitor is calculated as $1/(2 * \pi * Z * f_c)$ where Z is the amplifier's input impedance and f_c is the -3dB cutoff frequency (20Hz).
 $gain = 20; C_{in} = 0.13 \mu F$
 $gain = 26; C_{in} = 0.26 \mu F$

TPA3123D2 gain input strapping:

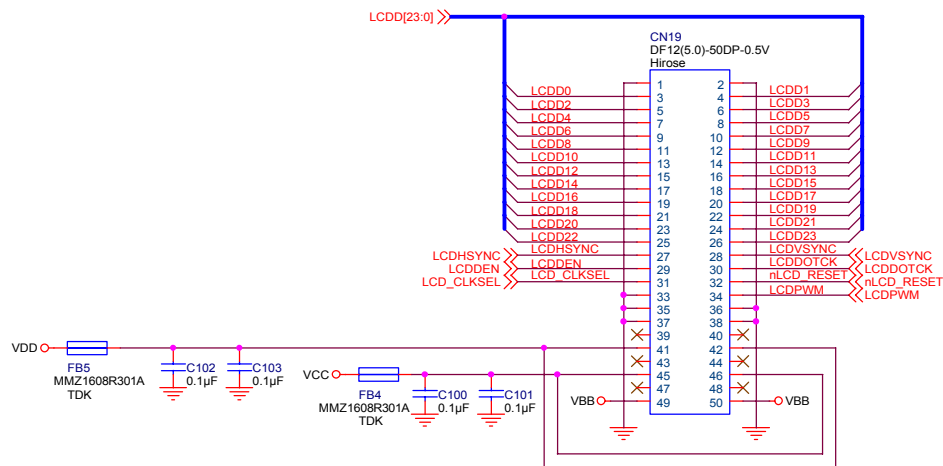
GAIN1	GAIN0	Gain	Z _{input}	-3 dB Cutoff
1	1	36 dB	9k	3Hz
1	0	32 dB	15k	5Hz
0	1	26 dB	30k	11 Hz
0	0	20 dB	60k	18 Hz

HEADPHONE AMPLIFIER

Title		
STERN Pinball CPU - Audio		
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Title		
dot matrix display interface		
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USE KEYSTONE 24390 5.0mm M3
SPACER OR EQUIVALENT



LCDD7:0 = RED
LCDD15:8 = GREEN
LCDD23:16 = BLUE

COLOR DATA IS ALWAYS TOP-JUSTIFIED
(e.g., IF ONLY FIVE BITS OF RED ARE
USED THEY ARE MAPPED TO LCDD7:3)

Title		
video interface		
Size	Document Number	Rev
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