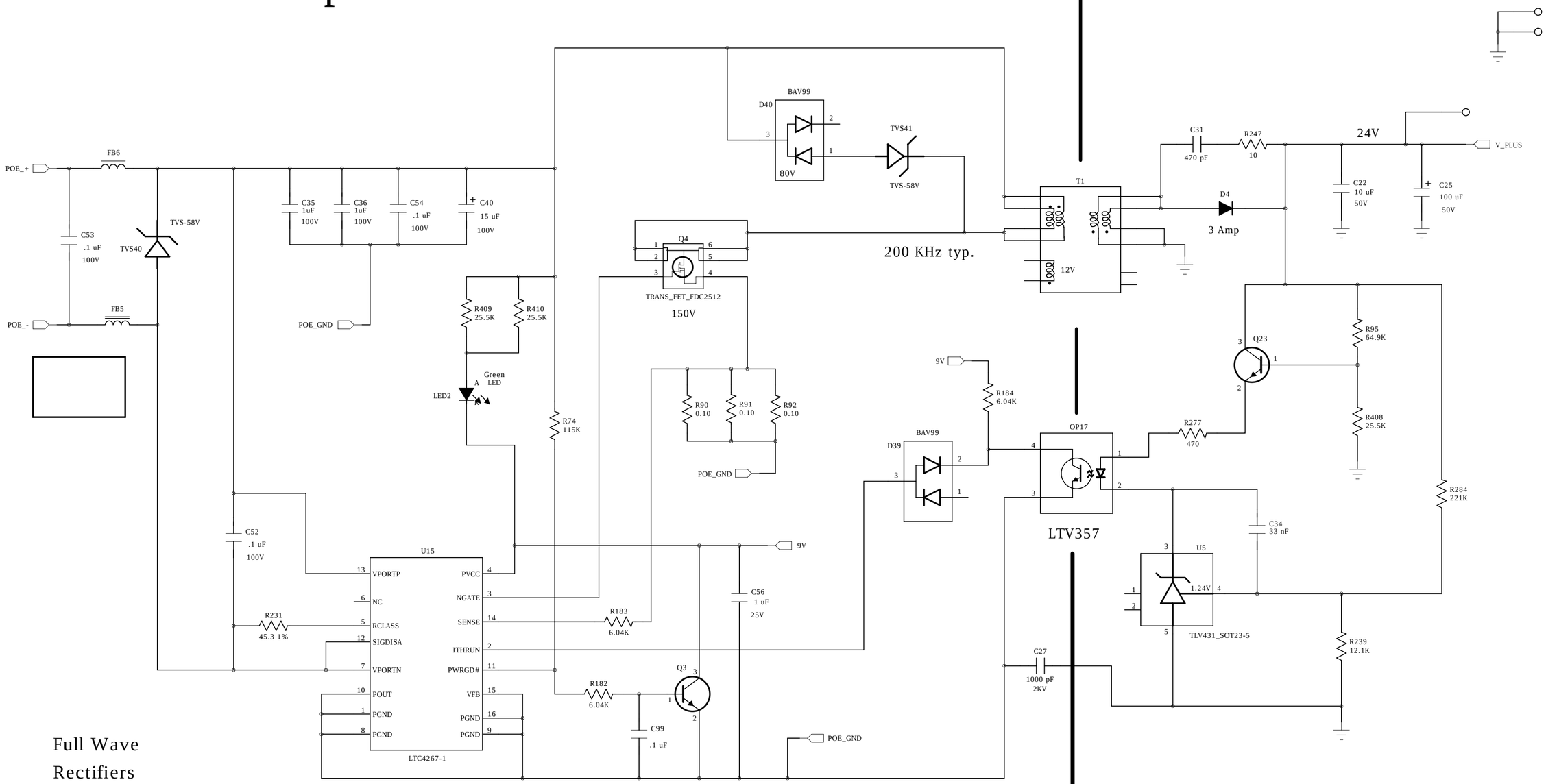
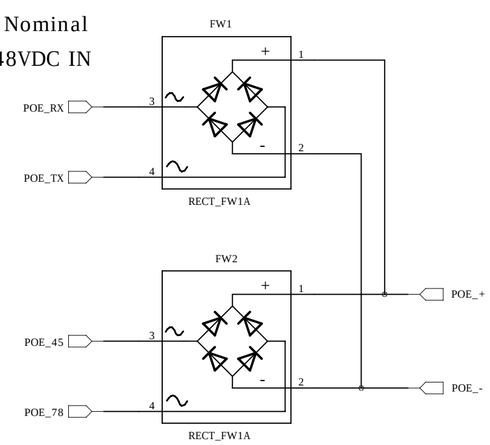
POE Side
48V DC Input

Reg. 24V Out



Full Wave Rectifiers

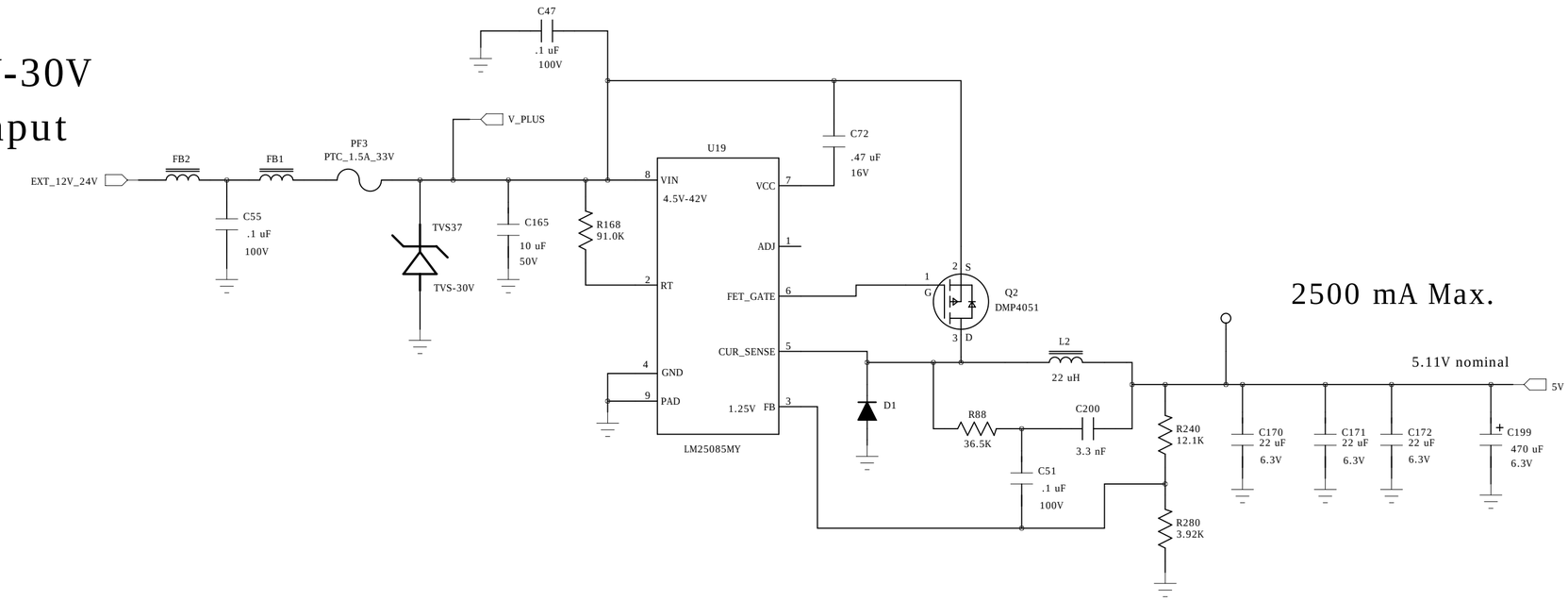
Nominal
48VDC IN



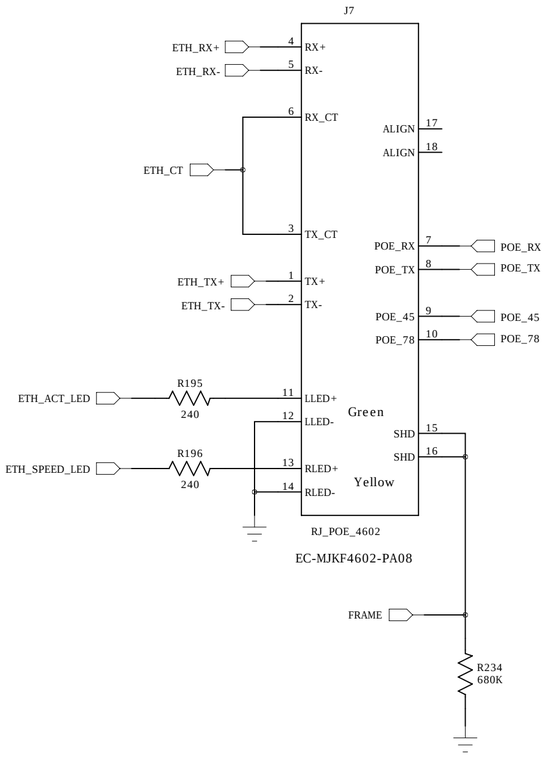
Technologic Systems		Aug. 10, 2012
Title: TS-8820 POE		
Rev: A	Designer	Sheet 1 of 18

Non-isolated 5V Power Supply

10V-30V Input



10/100 Ethernet Transformer

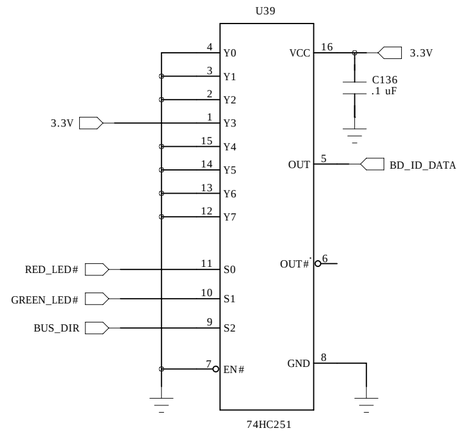


Technologic Systems		Aug. 10, 2012
Title: TS-8820 Ethernet and 5V Power		
Rev: A	Designer	Sheet 2 of 18

Battery-Backed SRAM

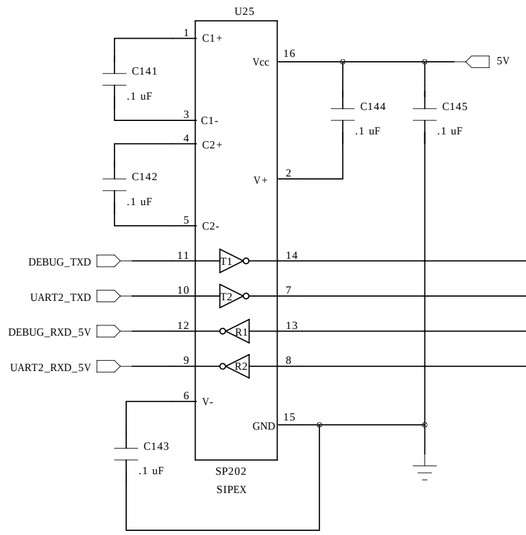
Technologic Systems		Aug. 10, 2012
Title: TS-8820 Battery and NVRAM		
Rev: A	Designer	Sheet 3 of 18

Board ID = 8

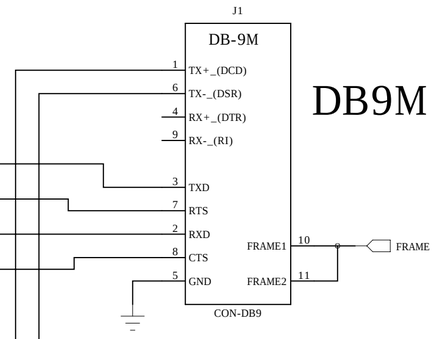


RS-232

Transceiver



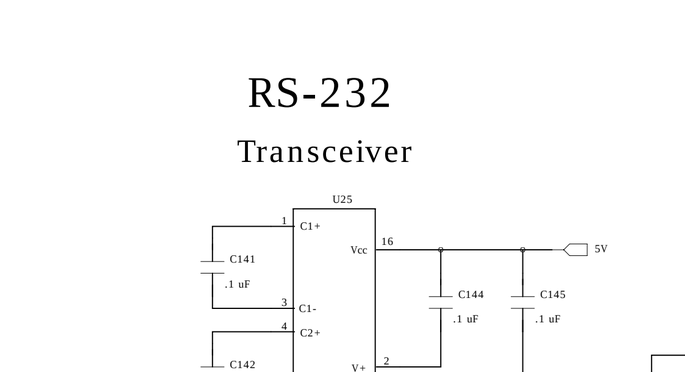
Console

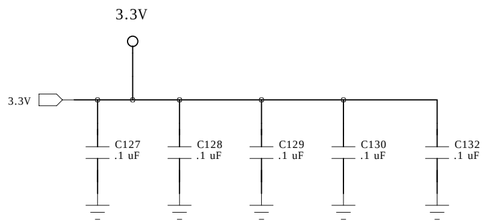


DB9M

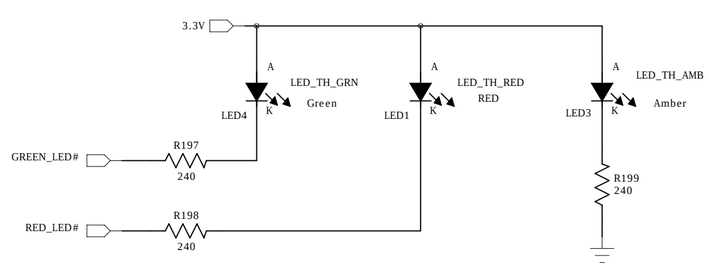
RS-485

Transceiver

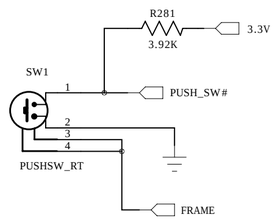




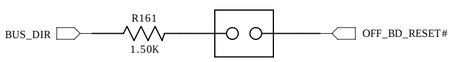
LEDs



Right Angle Push Switch



Force Boot to SD card



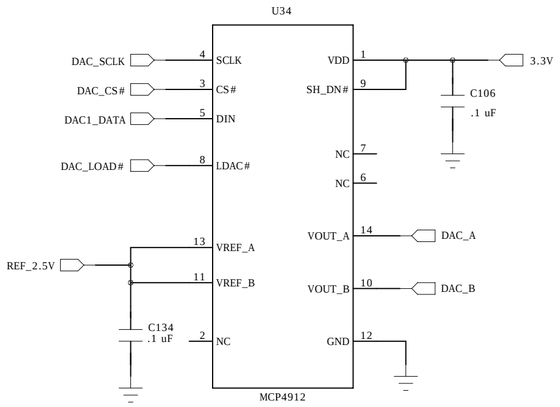
1.5K should be near CN1

Technologic Systems		Aug. 10, 2012
Title: TS-8820 Console, RS-485, Board ID		
Rev: A	Designer RLM	Sheet 4 of 18

Four 12-bit DAC channels (0-10V Range)

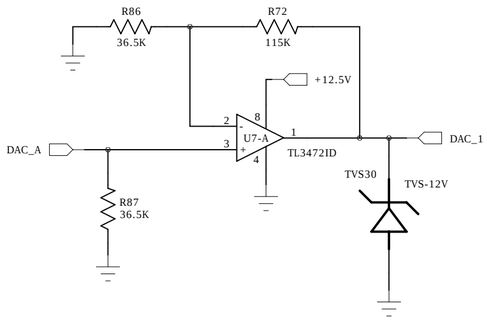
12-bit DAC

0 to 2.5V levels

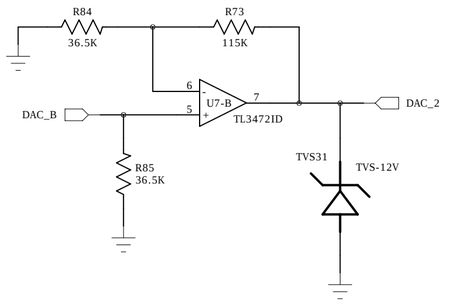


MCP4922TE

Gain = 4.15

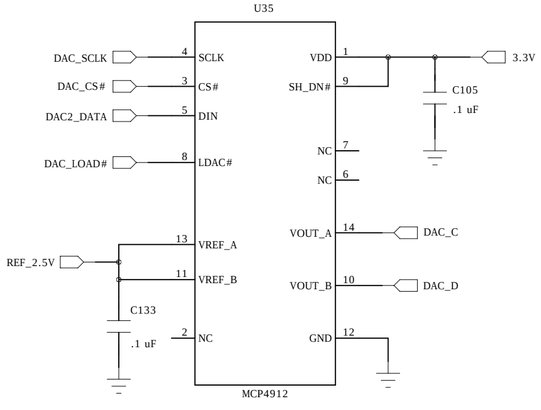


Gain = 4.15



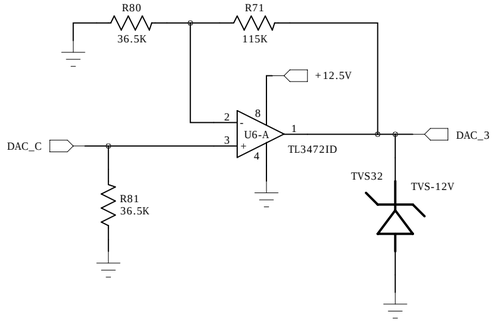
12-bit DAC

0 to 2.5V levels

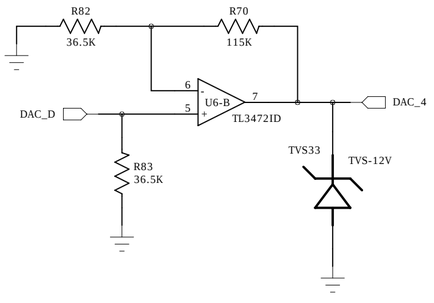


MCP4922TE

Gain = 4.15



Gain = 4.15

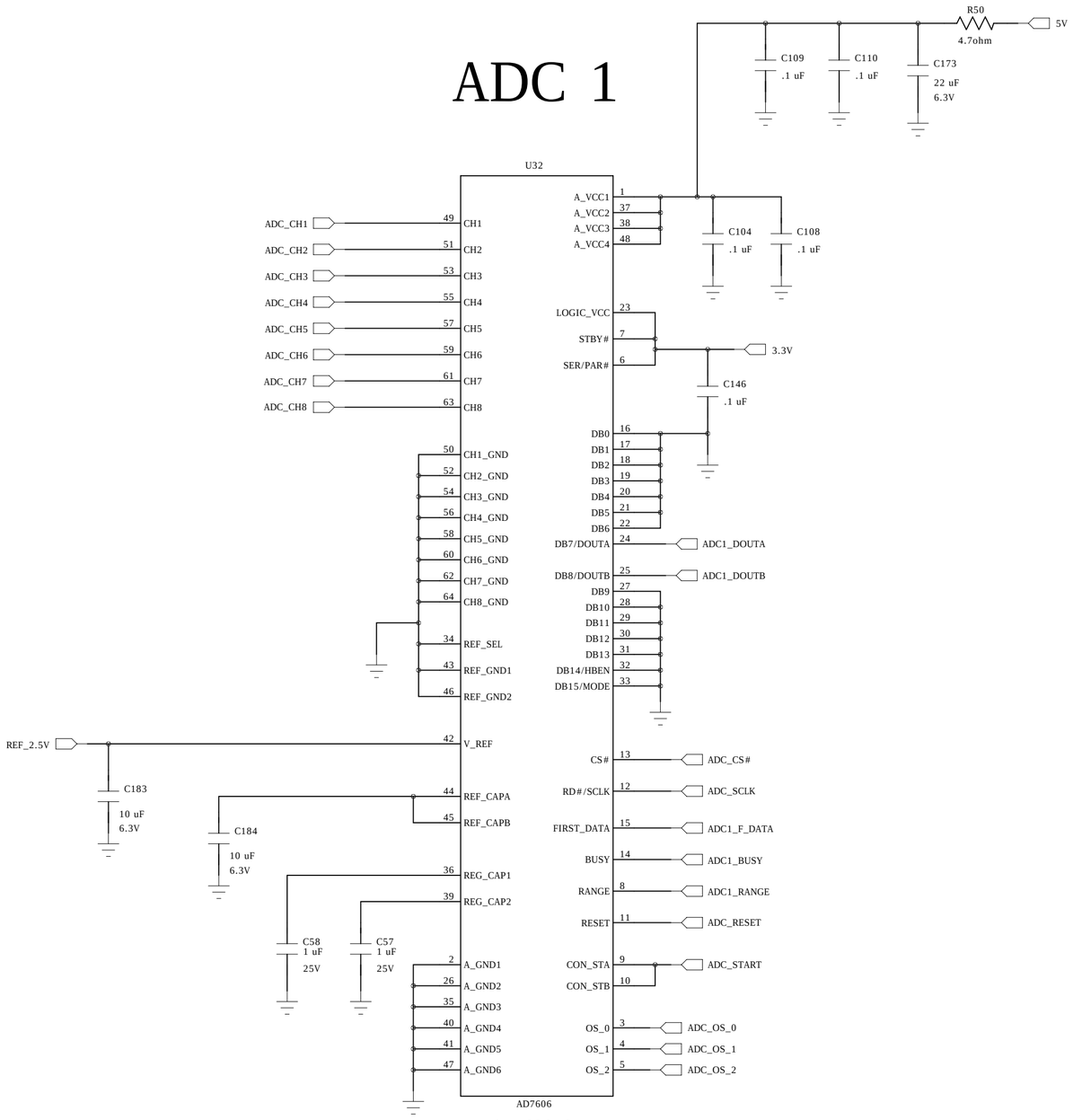


Technologic Systems		Aug. 10, 2012
Title: TS-8820 DAC and Op Amps		
Rev: A	Designer	Sheet 5 of 18

8 A/D channels

Simultaneous Sampling

ADC 1



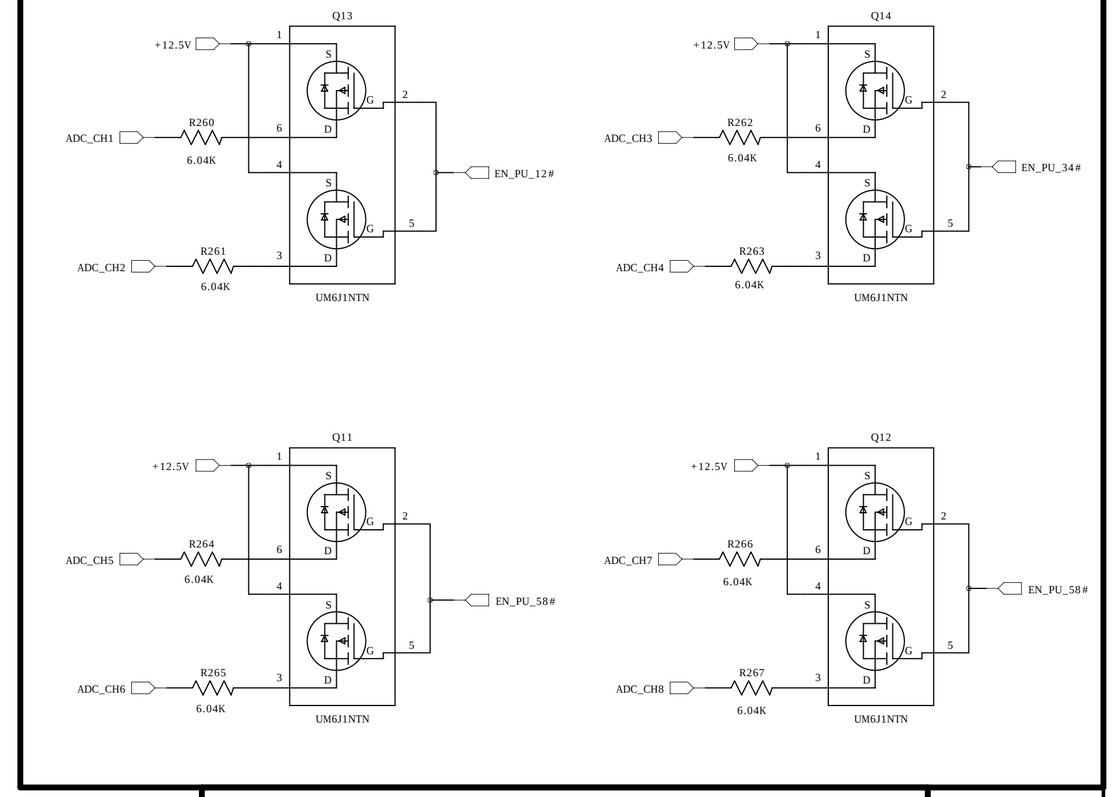
AD7606BST

Simultaneous sampling of all 8 A/D inputs

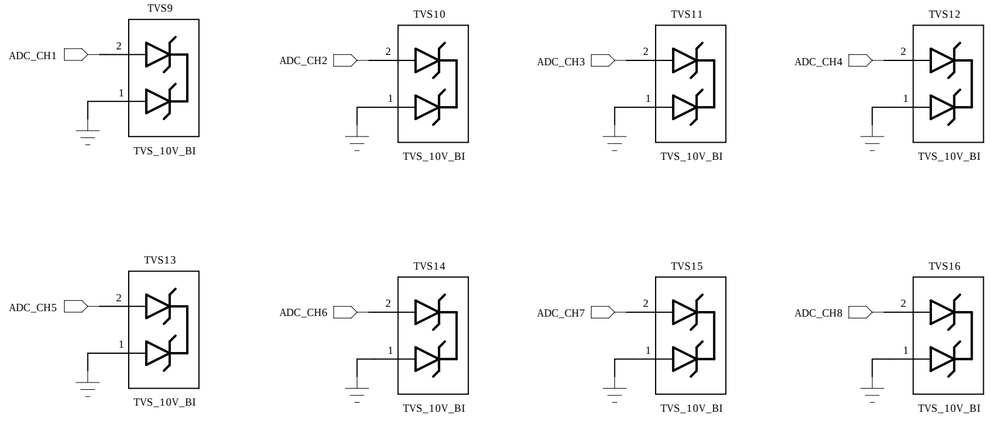
Software selectable ranges
+/-5V or +/-10V

200K samples per second

>1 Megohm input impedance



Allows up to 8 Thermistors

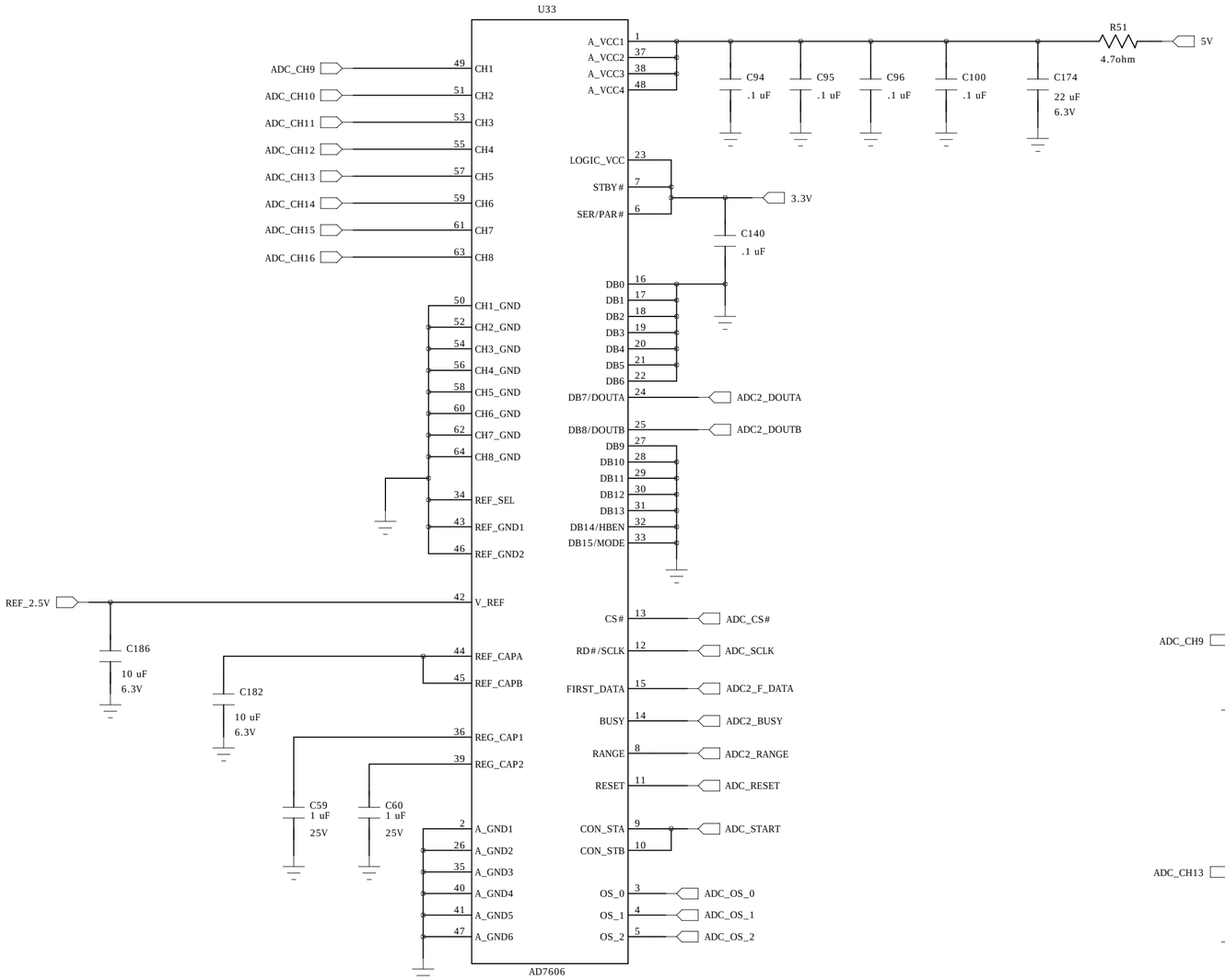


Technologic Systems		Aug. 10, 2012
Title: TS-8820 Analog-to-Digital		
Rev: A	Designer	Sheet 6 of 18

8 A/D channels

Simultaneous Sampling

ADC 2



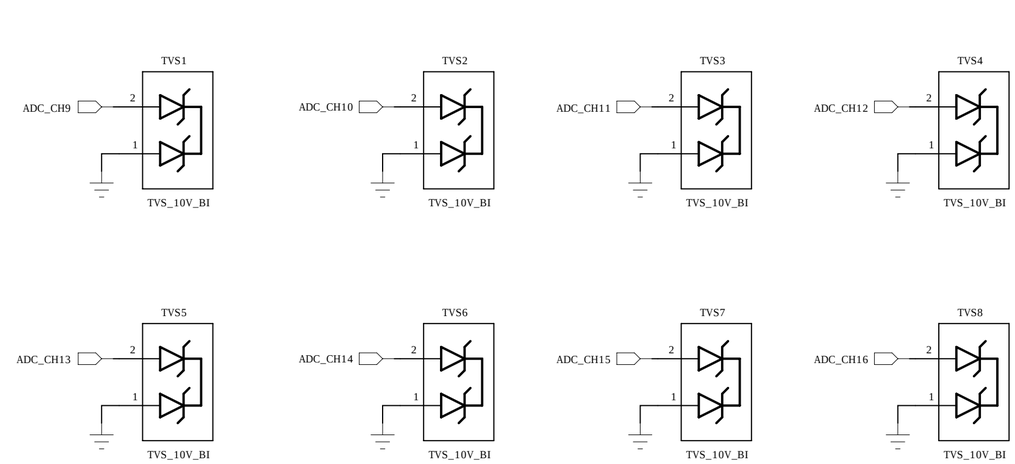
AD7606BST

Simultaneous sampling of
all 8 A/D inputs

Software selectable ranges
+/-5V or +/-10V

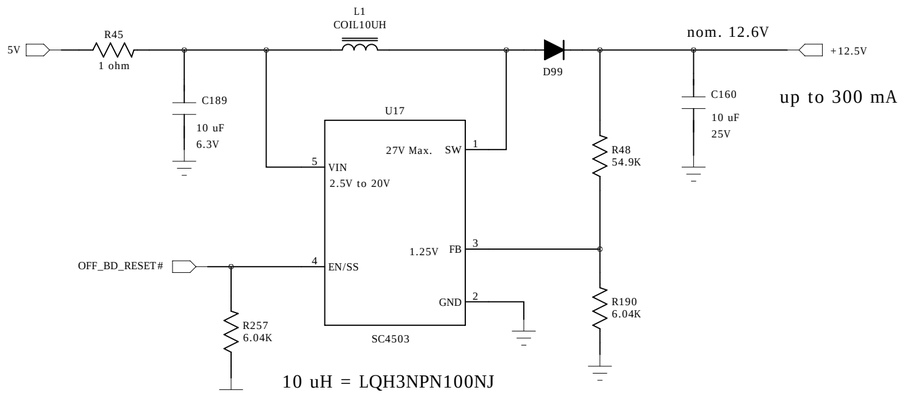
200K samples per second

>1 Megohm input impedance



Technologic Systems		Aug. 10, 2012
Title: TS-8820 Analog-to-Digital		
Rev: A	Designer	Sheet 6 of 18

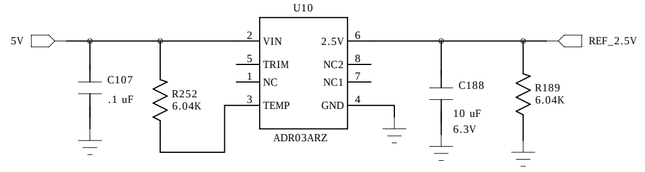
+12.5V Boost Regulator

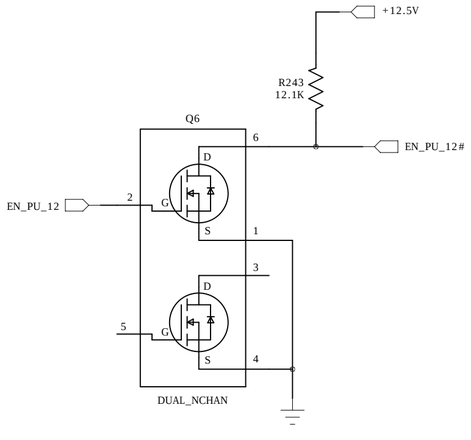


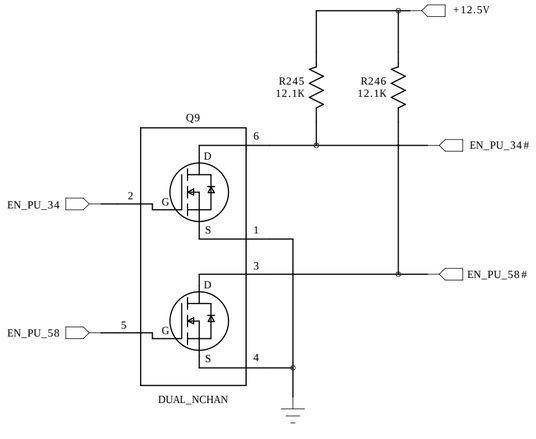
10 uH = LQH3NPN100NJ

SC4503 - 75 cents @ 100

Precision 2.5V Reference





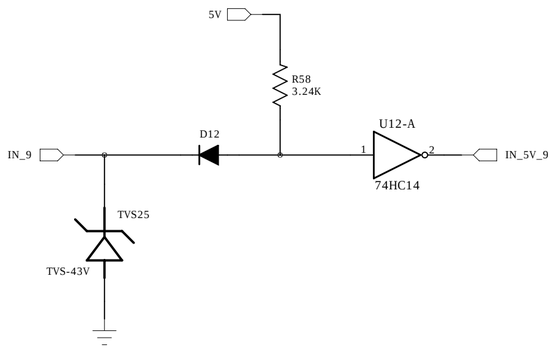


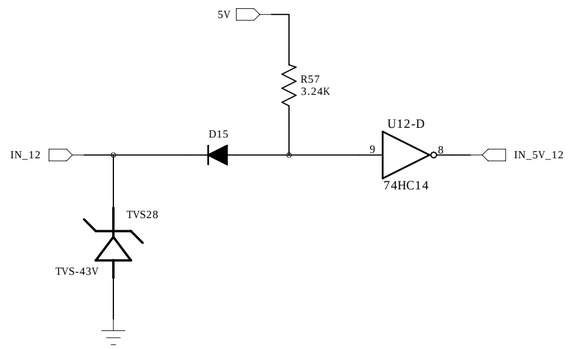
Technologic Systems		Aug. 10, 2012
Title: TS-8820 DAC, 2.5V Ref.		
Rev: A	Designer	Sheet 8 of 18

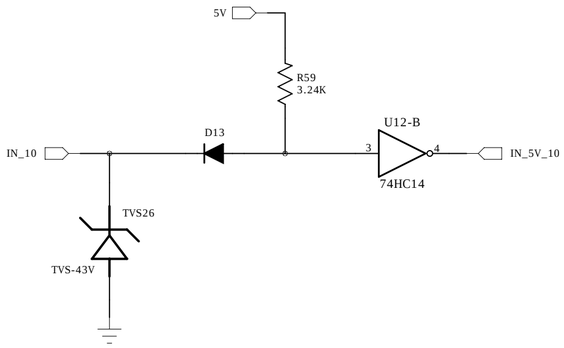
Non-Isolated Inputs

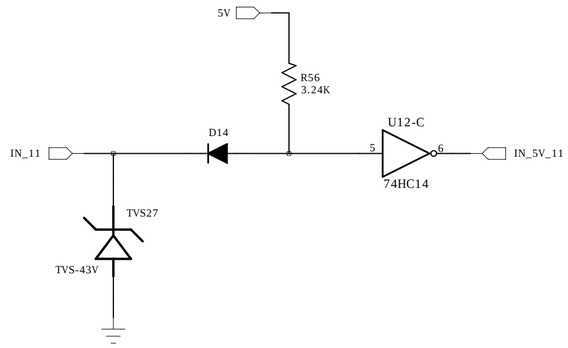
with Pull-up Resistors

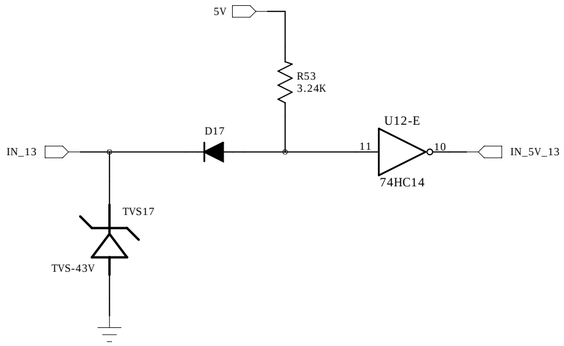
+40V tolerant

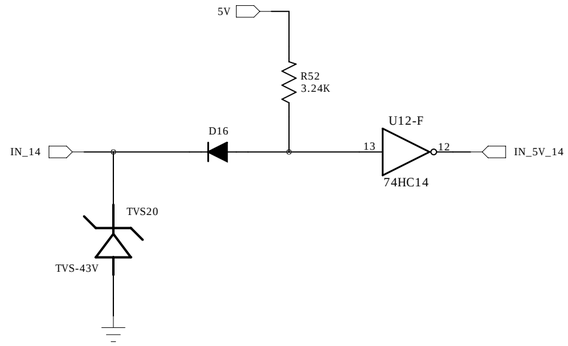




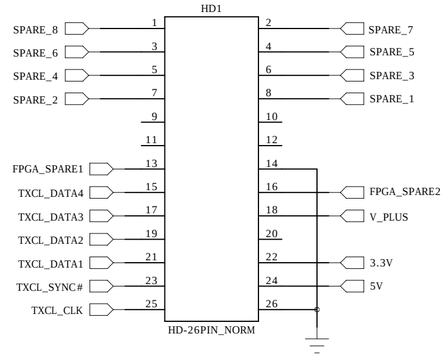






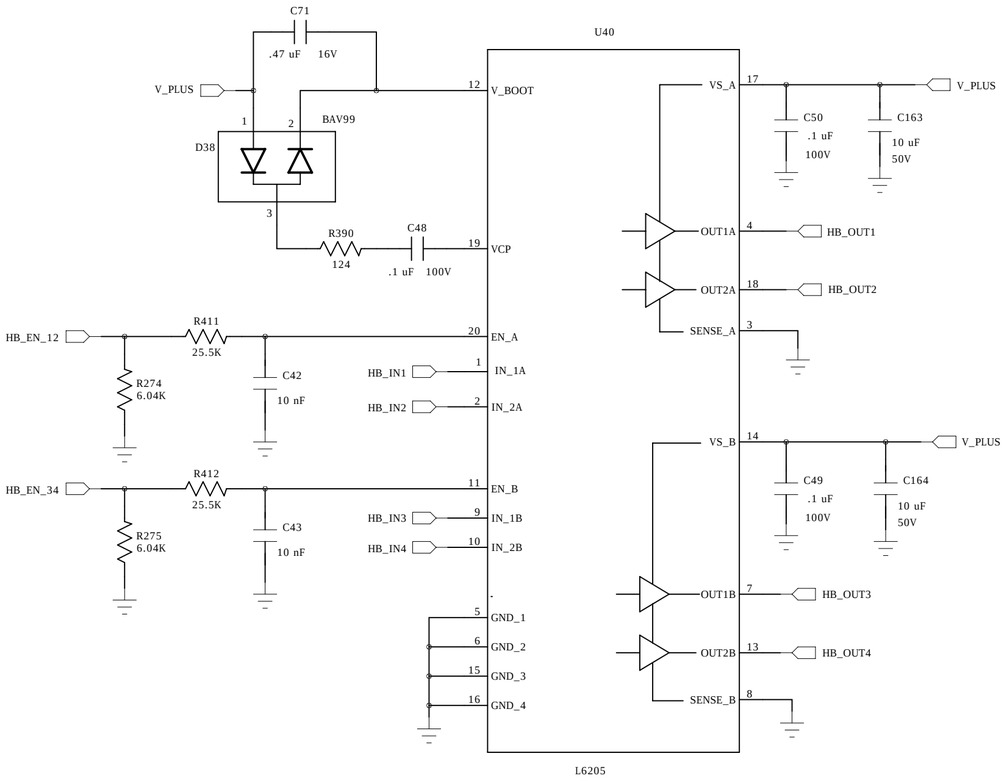


TX Current Loop Daughter Board Header



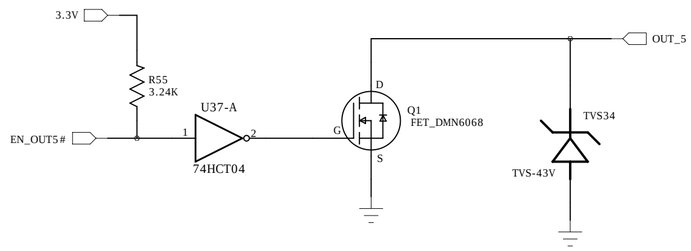
Technologic Systems		Aug. 10, 2012
Title: TS-8820 Non-isolated Inputs		
Rev: A	Designer	Sheet 9 of 18

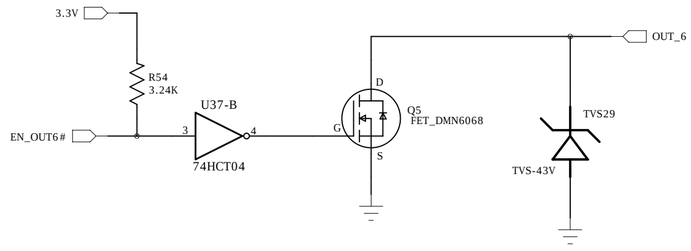
Dual H-bridge



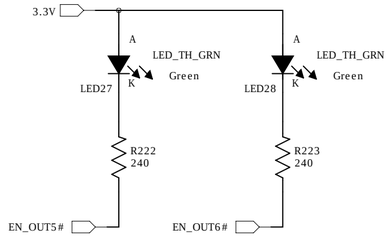
Non-Isolated Outputs

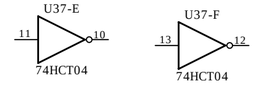
Sinks 1000 mA





74HCT04 provides level shifting to 5V levels



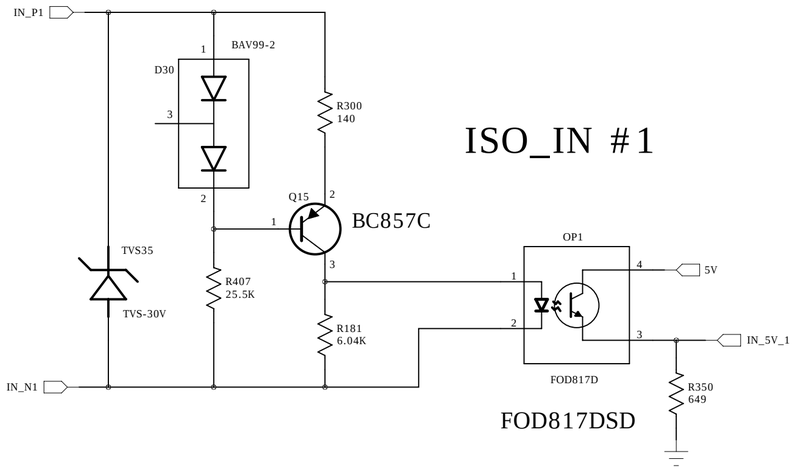


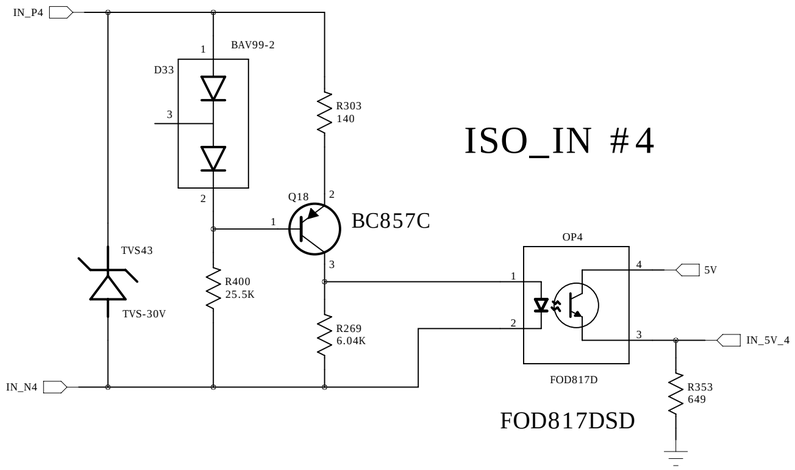
Technologic Systems		Aug. 10, 2012
Title: TS-8820 H-Bridge + Non-Iso Outputs		
Rev: A	Designer	Sheet 10 of 18

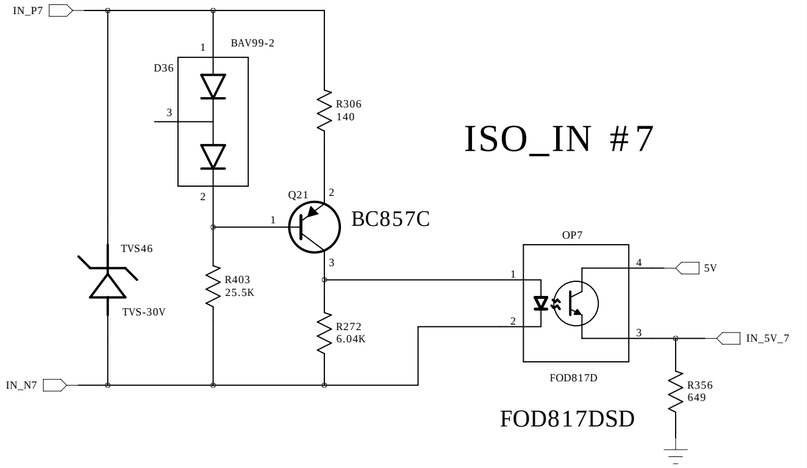
Isolated Inputs

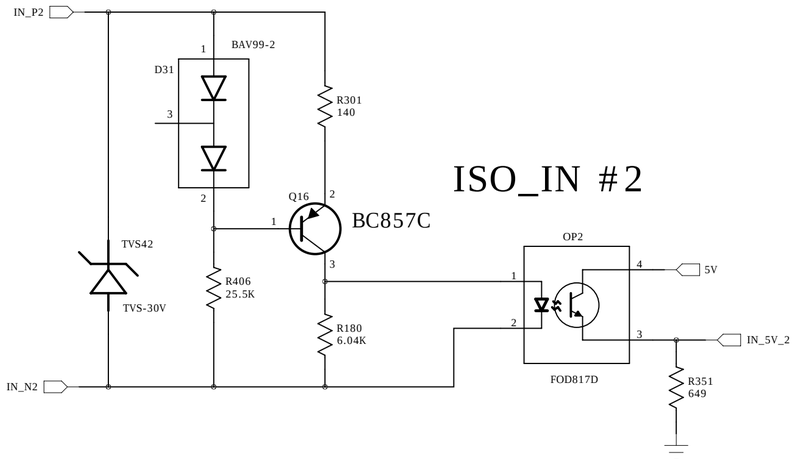
32V tolerant

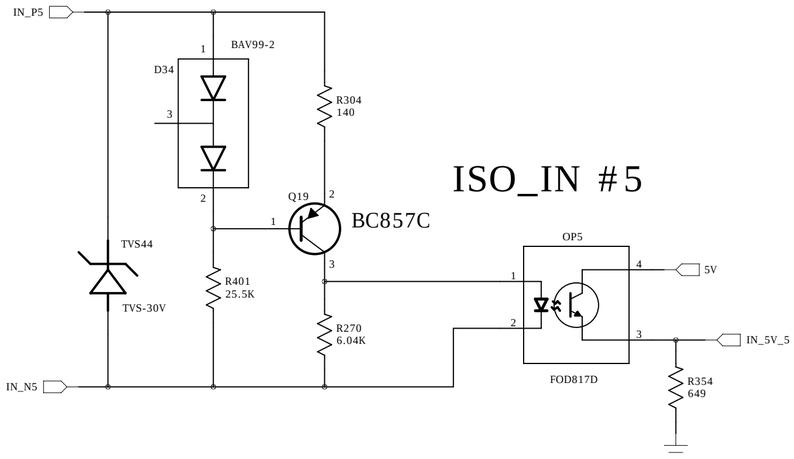
50 KHz Bandwidth

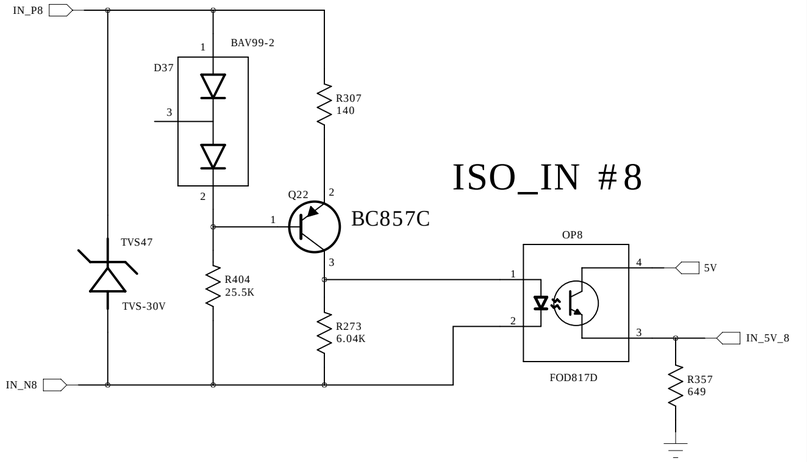


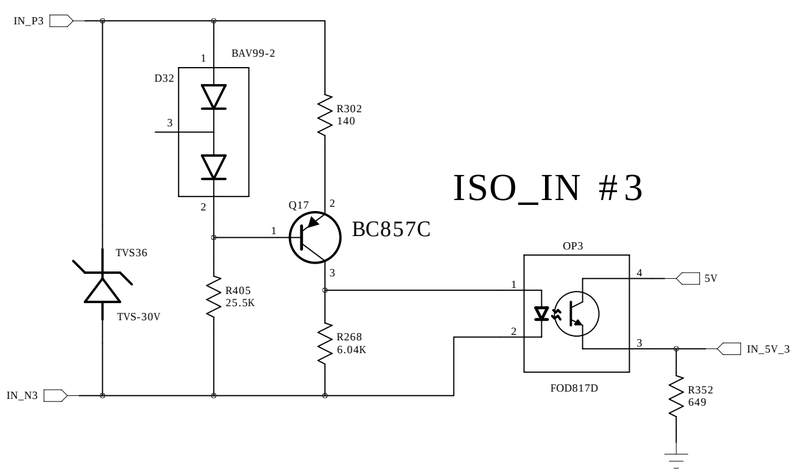


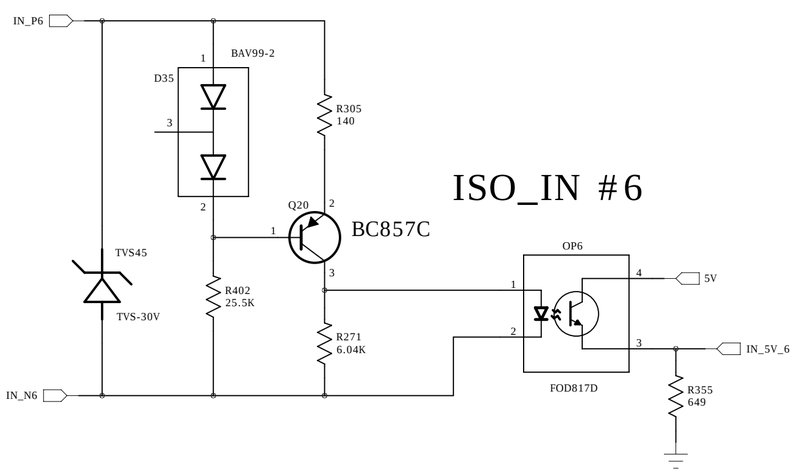






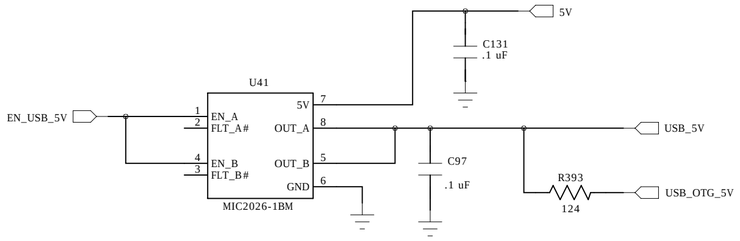






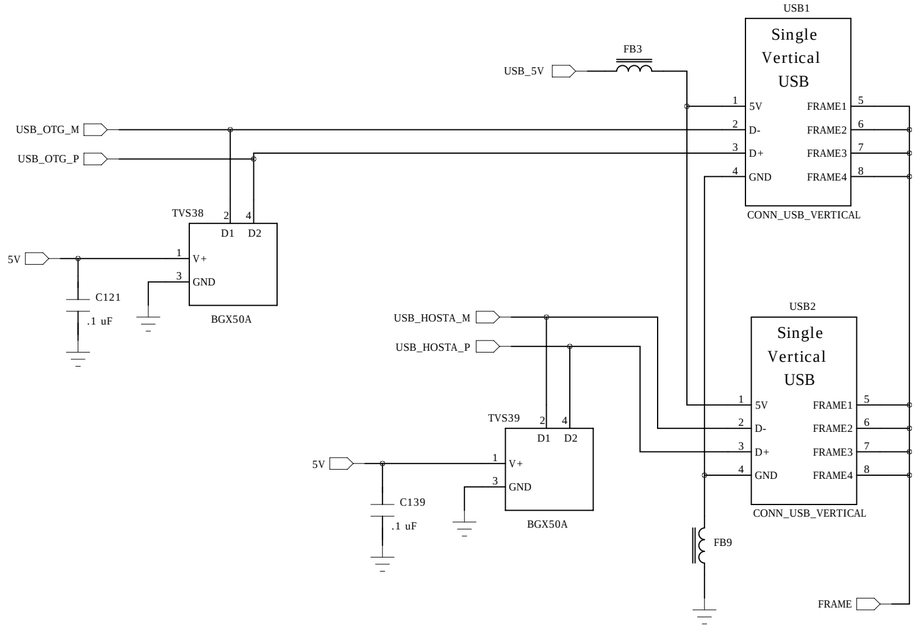
Technologic Systems		Aug. 10, 2012
Title: TS-8820 Isolated Digital Inputs		
Rev: A	Designer	Sheet 11 of 18

USB Power Switch

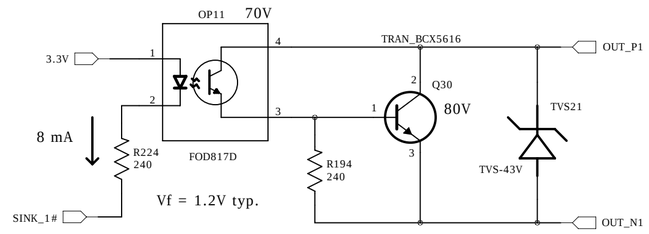


1400 mA typ. current limit

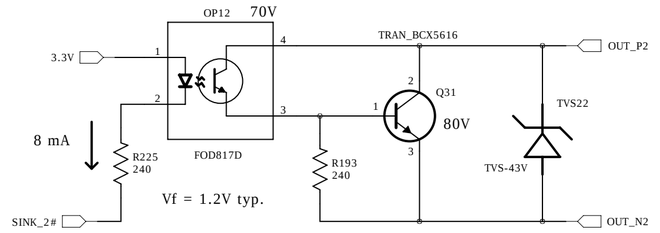
External Two USB ports



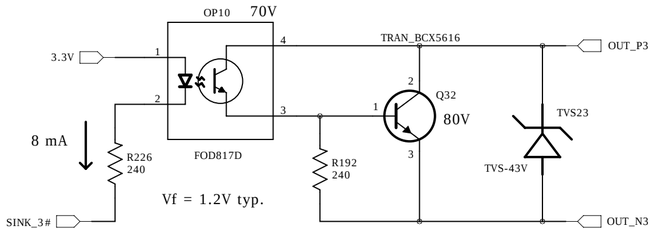
ISO_OUT #1



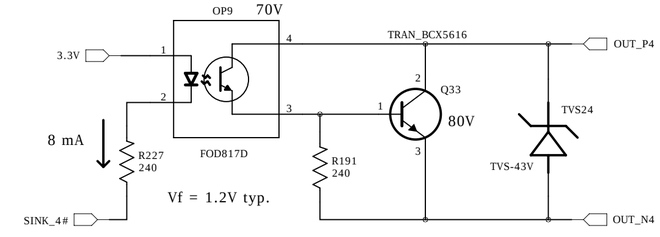
ISO_OUT #2



ISO_OUT #3

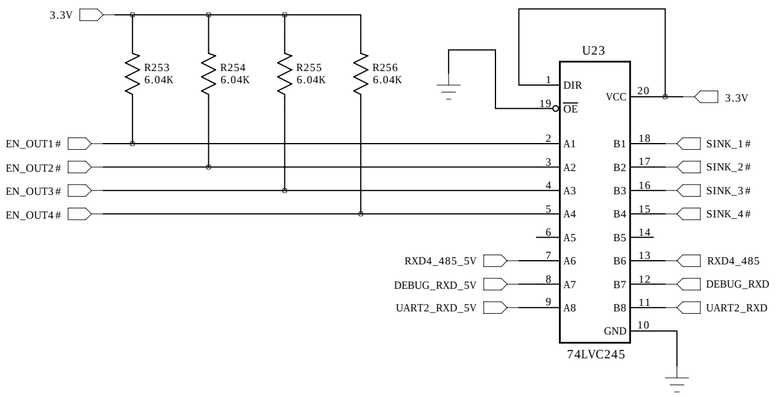


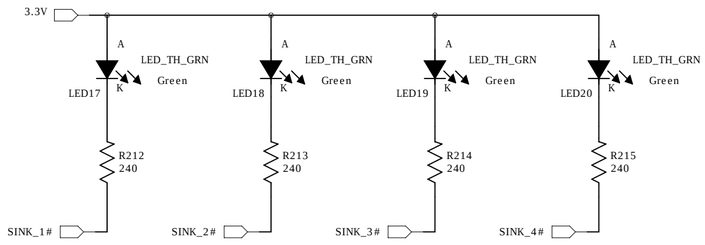
ISO_OUT #4



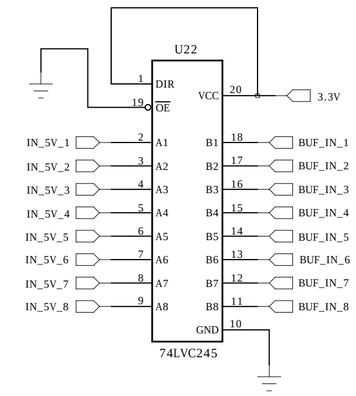
Technologic Systems		Aug. 10, 2012
Title: TS-8820 USB and Isolated Outputs		
Rev: A	Designer	Sheet 12 of 18

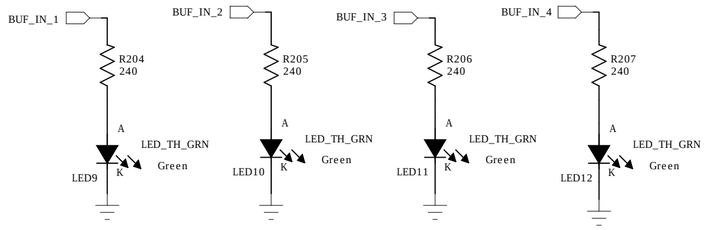
5V → 3.3V

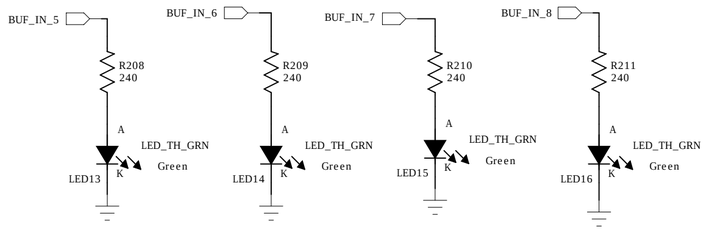




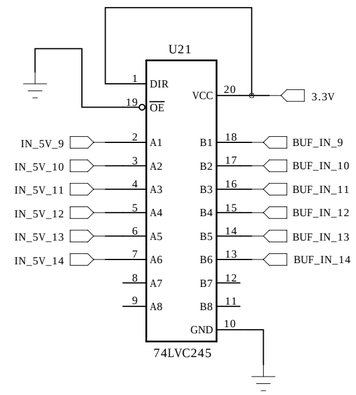
5V → 3.3V

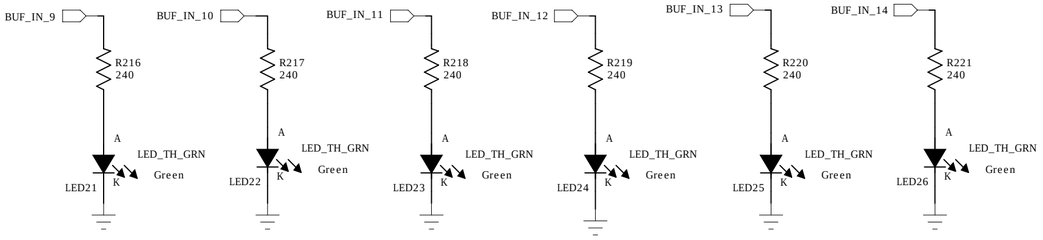




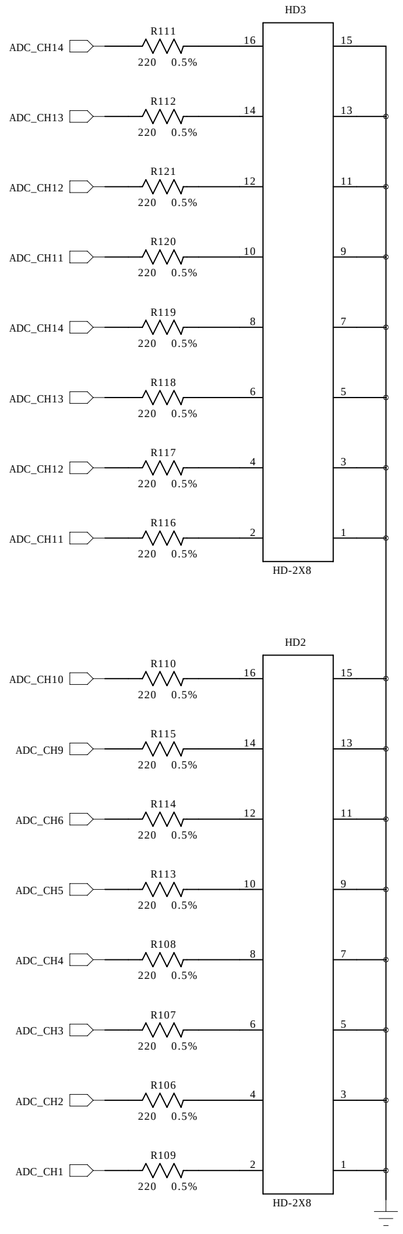


5V → 3.3V





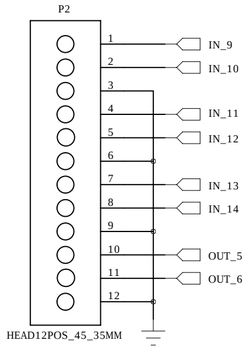
20 mA Current Loop Jumpers

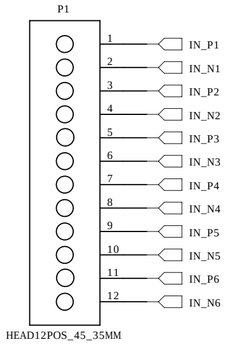


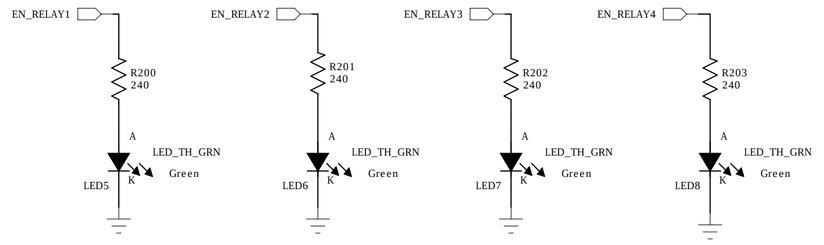
RR1220P-221-D = 220 0.5%

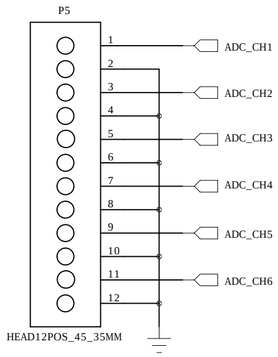
Technologic Systems		Aug. 10, 2012
Title: TS-8820 Buffers, Current Loop Res.		
Rev: A	Designer	Sheet 13 of 18

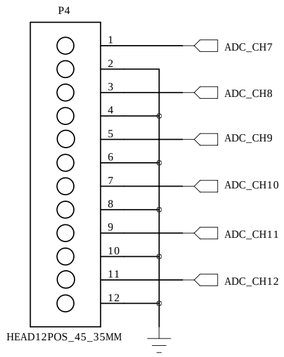
Screw Terminals + 4 Relays

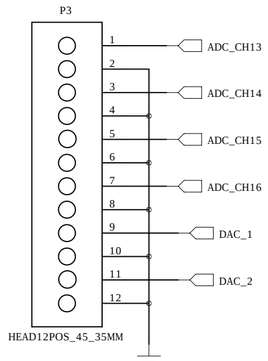


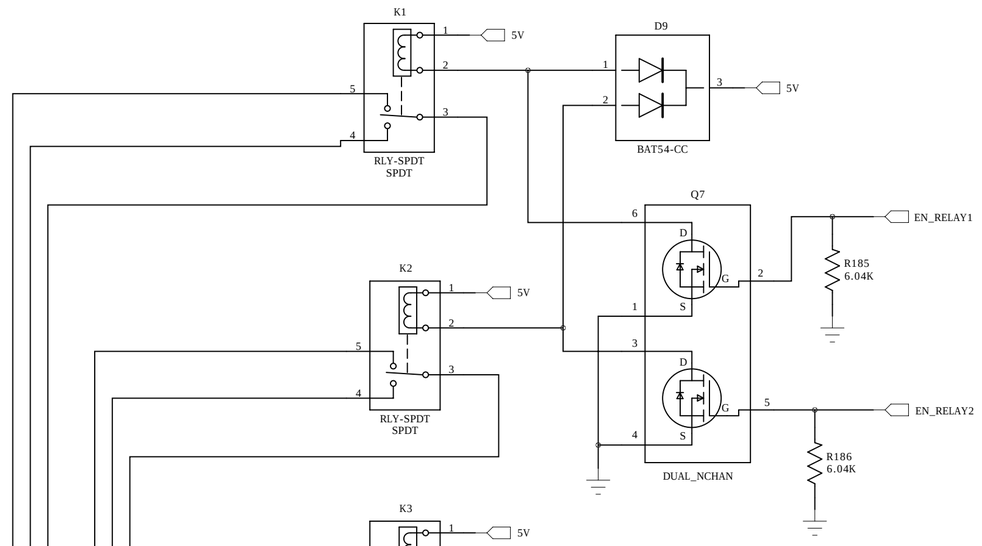


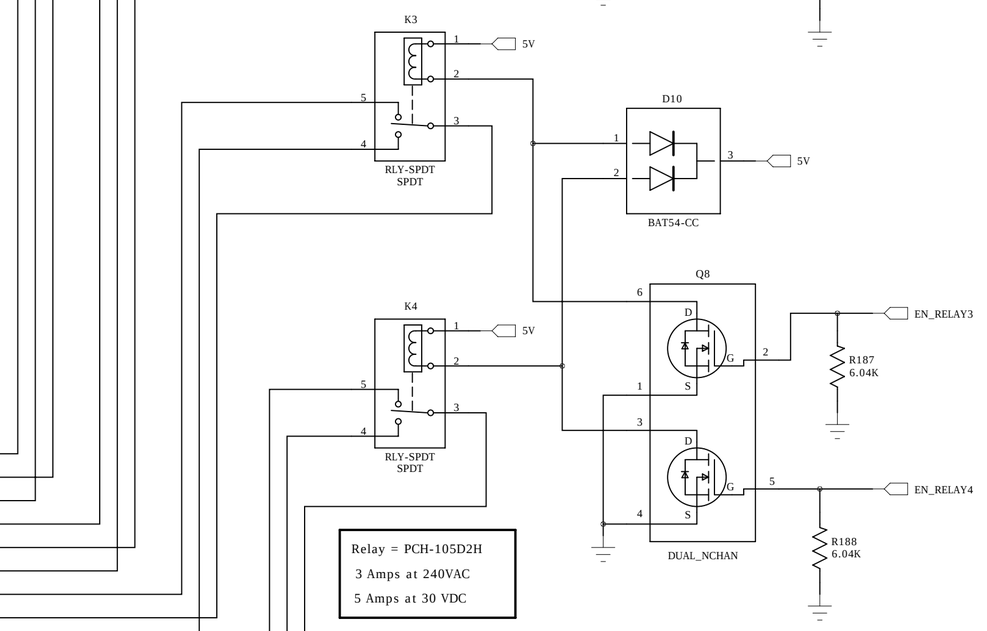






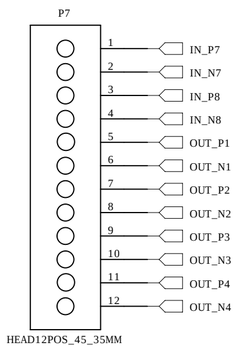


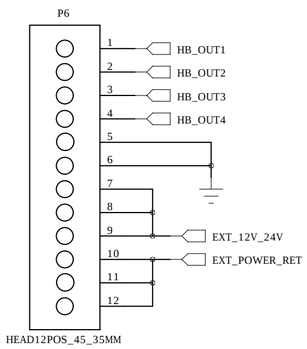


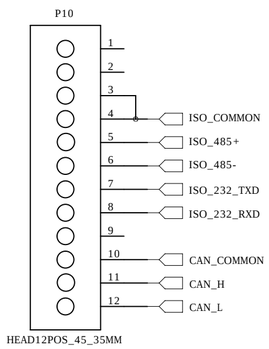


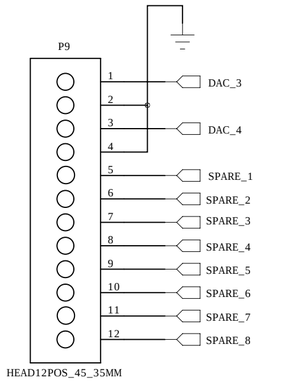
Relay = PCH-105D2H
3 Amps at 240VAC
5 Amps at 30 VDC

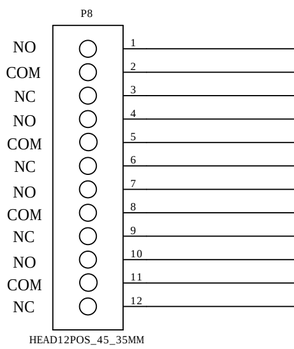
80 mA coil current





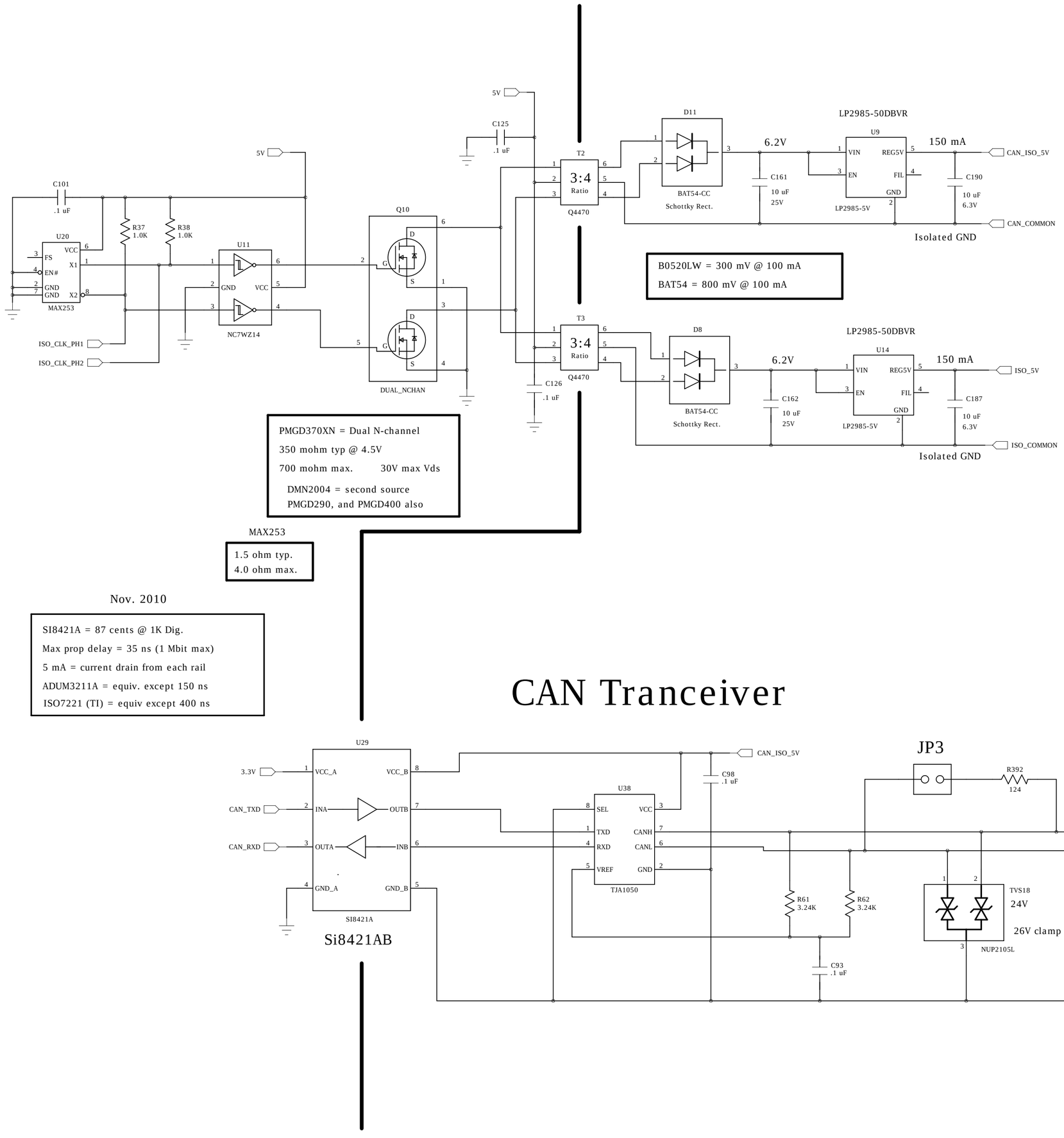






Technologic Systems		Aug. 10, 2012
Title: TS-8820 Relays and Terminal Strip		
Rev: A	Designer	Sheet 14 of 18

Opto-Isolated Power and Isolated CAN



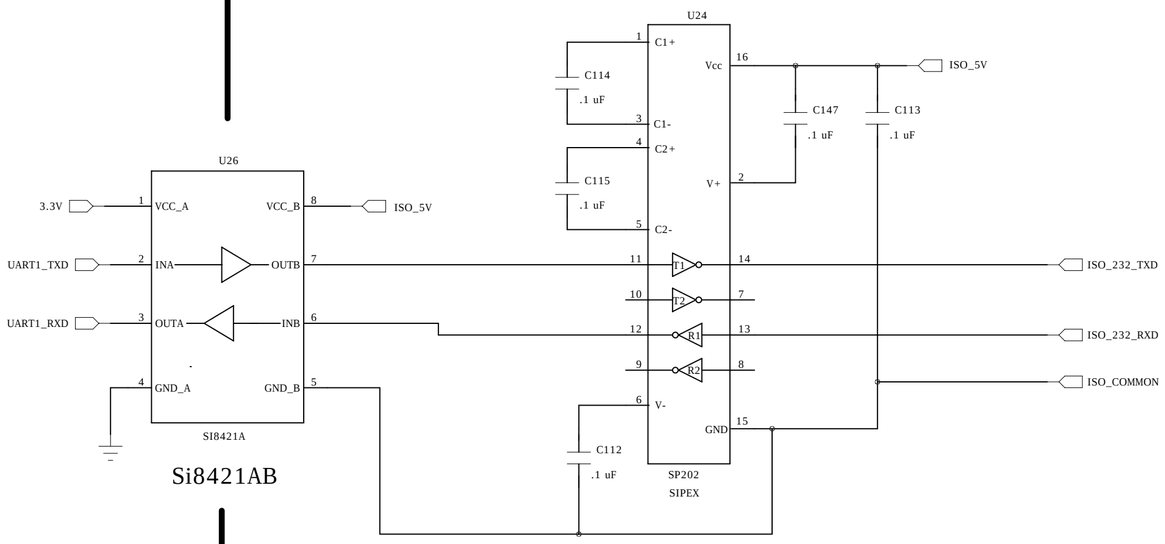
CAN Tranceiver

Technologic Systems	Date Aug. 10, 2012	
Title: TS-8820 Isolated Power and CAN		
Rev: A	Designer	Sheet 15 of 18

Isolated RS-232 and RS-485

RS-232

Transceiver



Si8421AB

RS-485

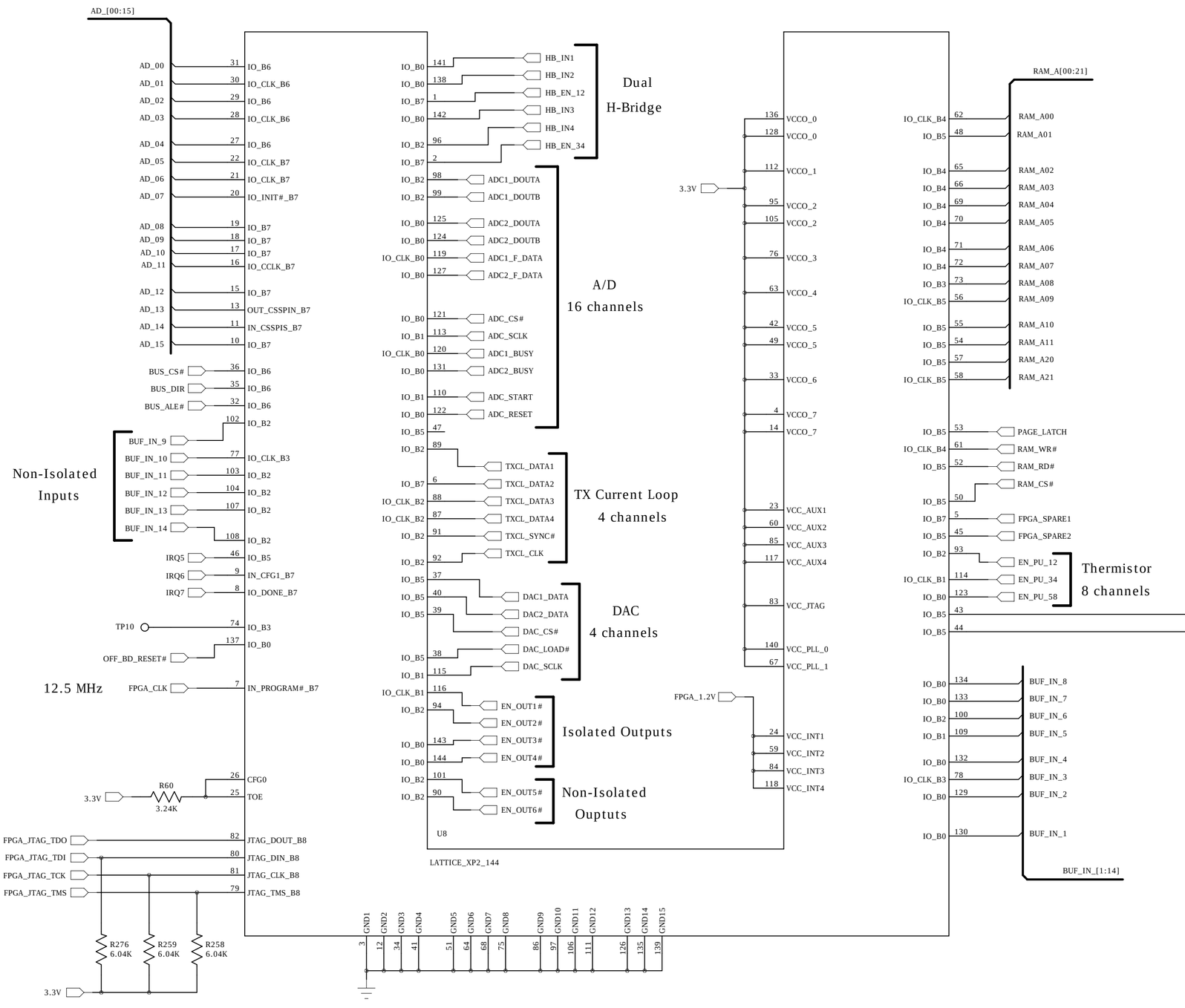
Transceiver

Technologic Systems	Date Aug. 10, 2012	
Title: TS-8820 Isolated RS-232 and RS-485		
Rev: A	Designer A	Sheet 16 of 18

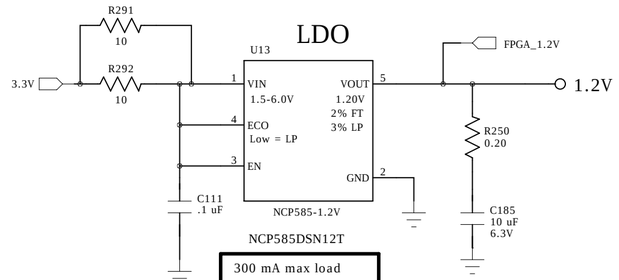
FPGA with 5000 LUTs

XP2-5 has:
5K LUTS 2 PLLs
9 blocks of 1Kx18 Block RAM
12 18x18 Multipliers
100 I/O with 144 pin package
"instant ON" = about 1.5 mS
input PLL clock = 10 MHz min

Pull-up and pull-down resistors are 6 to 30K ohms

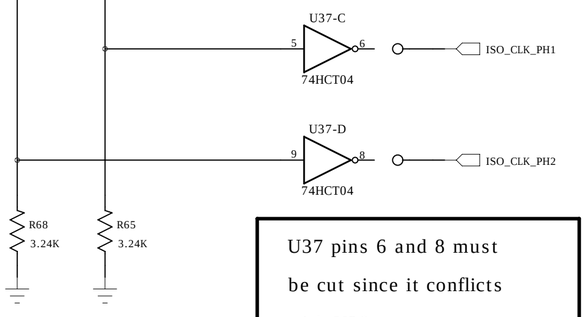


FPGA 1.2V Reg.



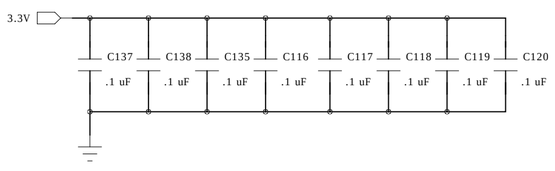
300 mA max load
500 mV drop out
25 uS Turn-on

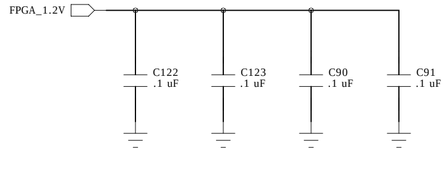
3.3V --> 5V Levels



U37 pins 6 and 8 must be cut since it conflicts with U20

FPGA does not drive Phases



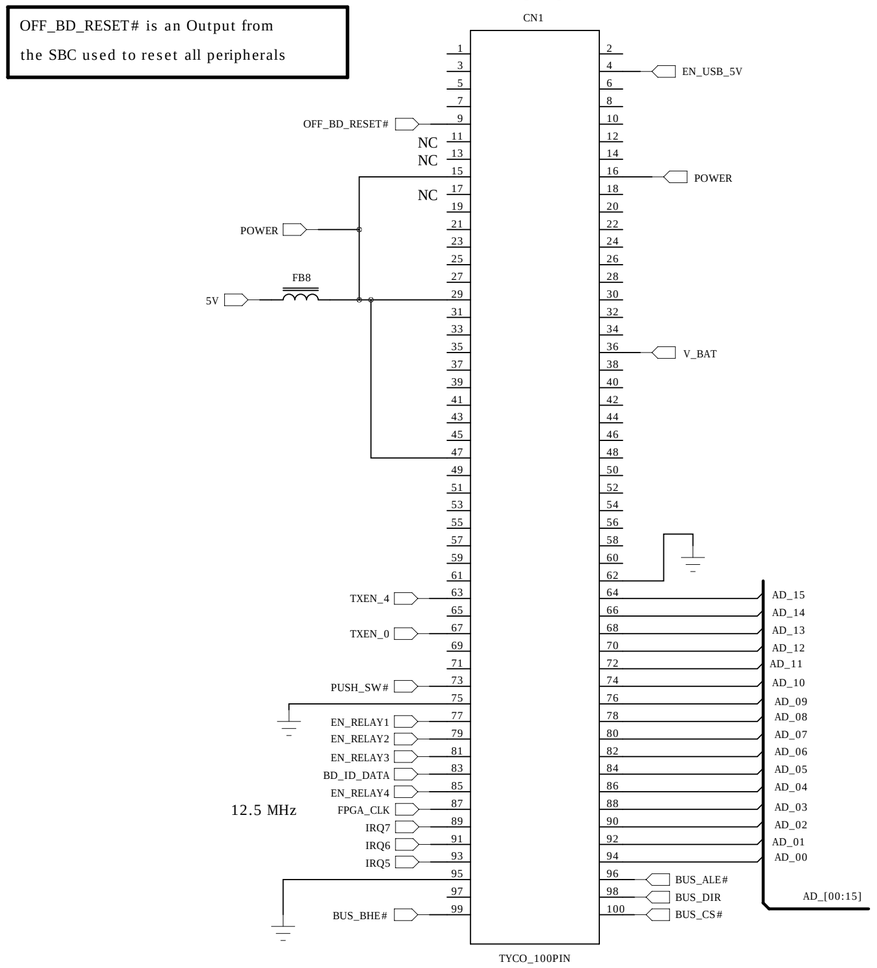


Page 37 of Data Sheet (Hot Socketing)
Power Supplies can be sequenced in any order but must be monotonic
All I/O lines are tri-stated during power cycling

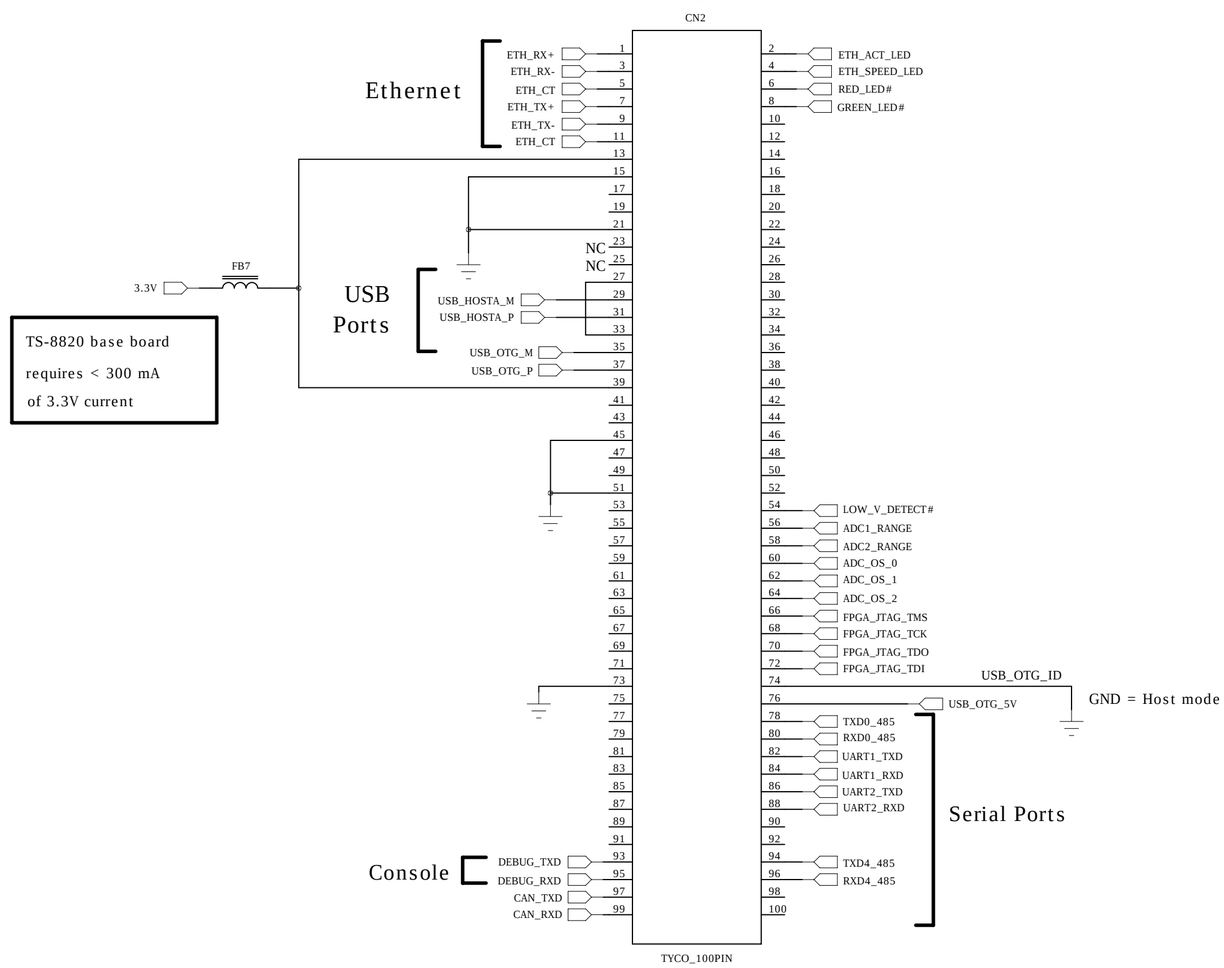
Technologic Systems	Date Aug. 10, 2012	
Title:		
Rev: A	Designer	Sheet 17 of 18

Two 100-pin Module Connectors

Left



Right



Boot Strap

BUS_DIR	SBC Boots from
1	NAND Flash
0	SD Card

BUS_DIR state is latched prior to OFF_BD_RESET# deasserted

BUS_DIR has a 12K pull-up resistor on the SBC module

Use 1.2K ohm resistor to OFF_BD_RESET# to strap logic low

Technologic Systems		Aug. 10, 2012
Title: TS-8820 TS-Socket Connectors		
Rev: A	Designer	Sheet 18 of 18