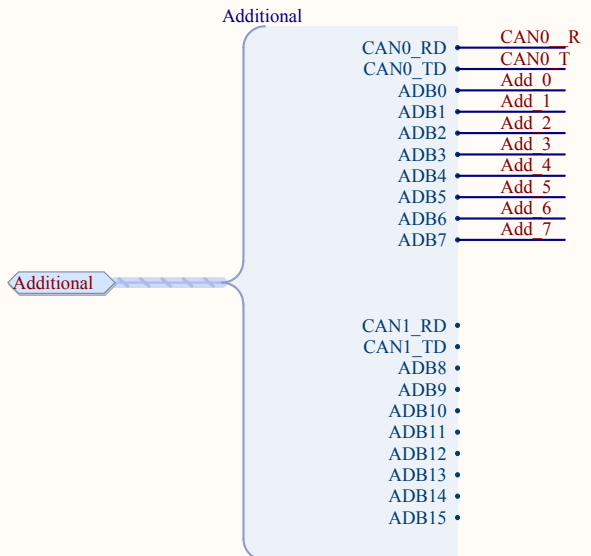
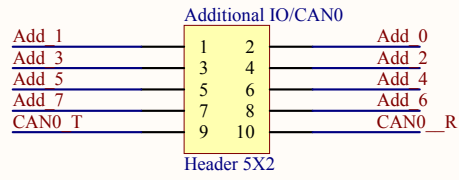


Additional GPIO Breakout & CAN Bus Controllers



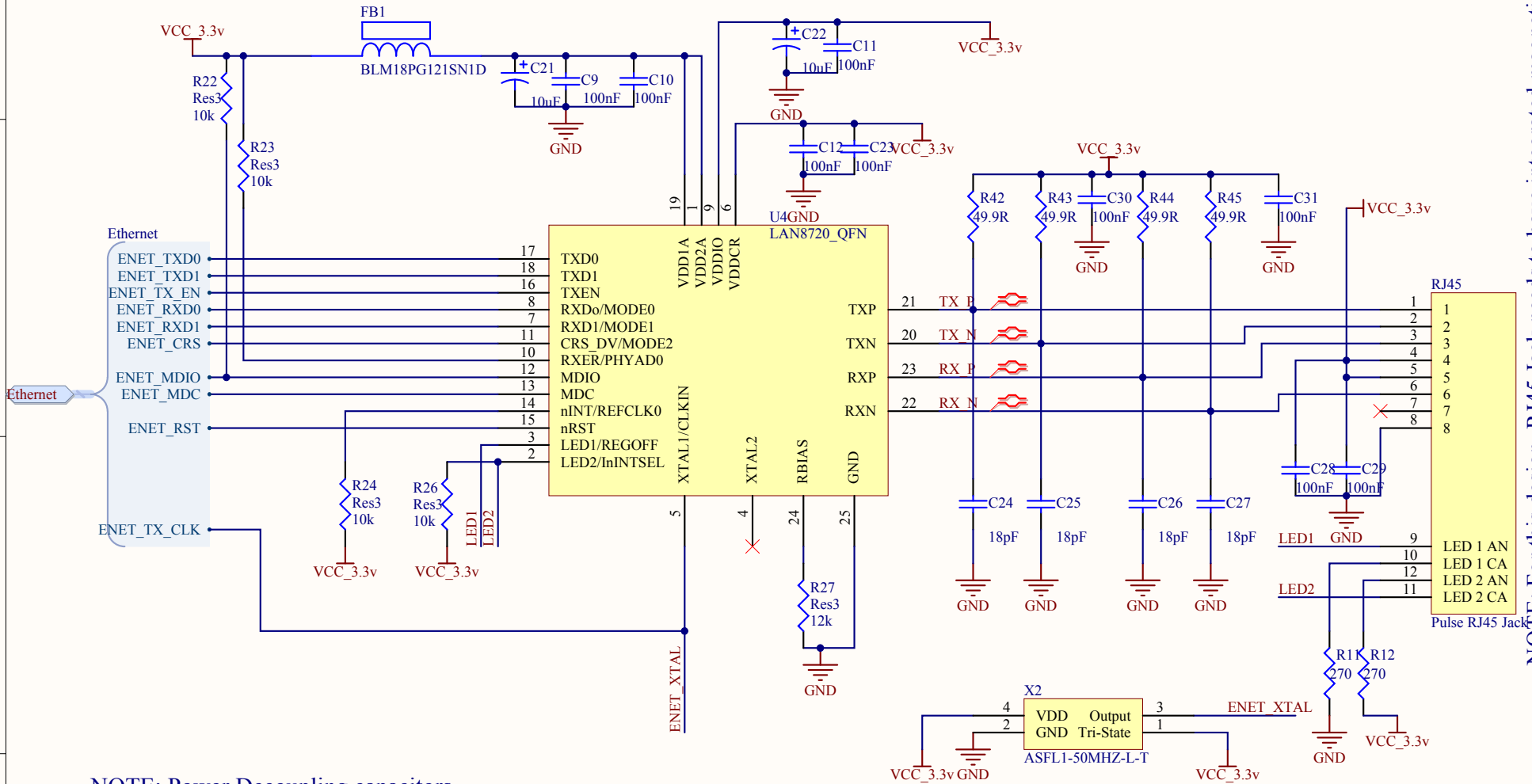
10 Pin Additional Breakout with CAN Bus



NOTE: Second 10 Pin Header not on R1.0 of AHD Board

Title		
Size A	Number 1.2	Revision Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\...\Additional Breakout.SchDoc	Drawn By: Adam Vadala-Roth

Ethernet Physical Layer (SMSC LAN8720)



NOTE: Power Decoupling capacitors need to be 7mm from power supply

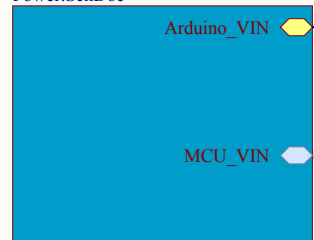
NOTE: Crystal oscillator needs to be 12mm from PHY

NOTE: For this design, RJ45 Jack needs to have integrated magnetics

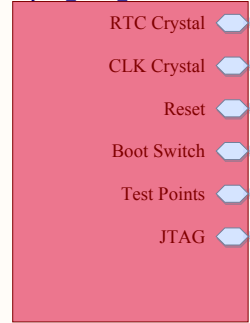
Title		
Abstract Hardware Device Ethernet		
Size	Number	Revision
A		Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\... \AHD Ethernet.SchDoc	Drawn By
		Vadala-Roth

RoboSub Module Abstract Hardware Device

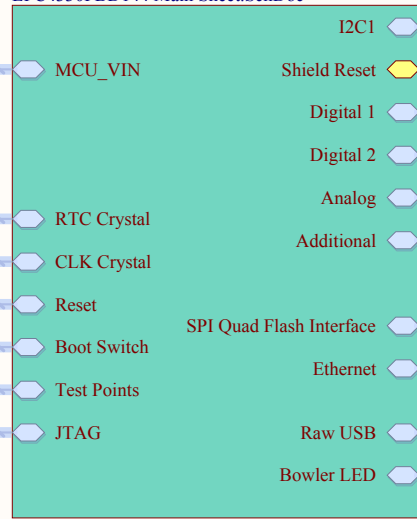
Power Electronics
Power.SchDoc



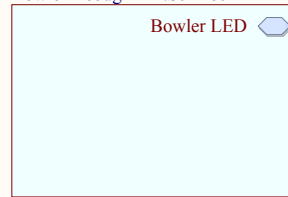
Crystal / Reset / Boot
Crystal_Reset_Boot.SchDoc



Main Controller LPC4330FBD144
LPC4330FBD144 Main Sheet.SchDoc



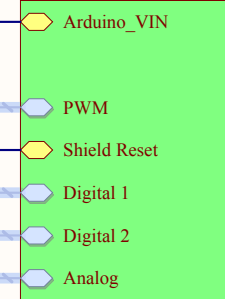
Bowler Debug LED
Bowler Debug LED.SchDoc



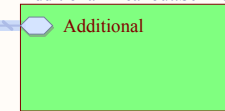
PWM CoProcessor
AHD PWM CoProcessor.SchDoc



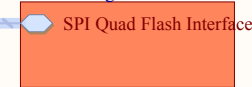
Arduino Header Breakout
Arduino Breakout.SchDoc



Additional Breakout Headers
Additional Breakout.SchDoc



Flash Module
Flash Storage.SchDoc



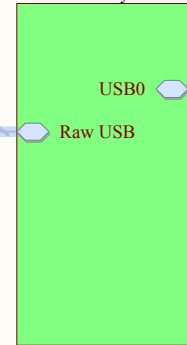
Ethernet
AHD Ethernet.SchDoc



USB Device (USB0)
USB Device.SchDoc



USB PHY Layer
USB PHY Layer.SchDoc

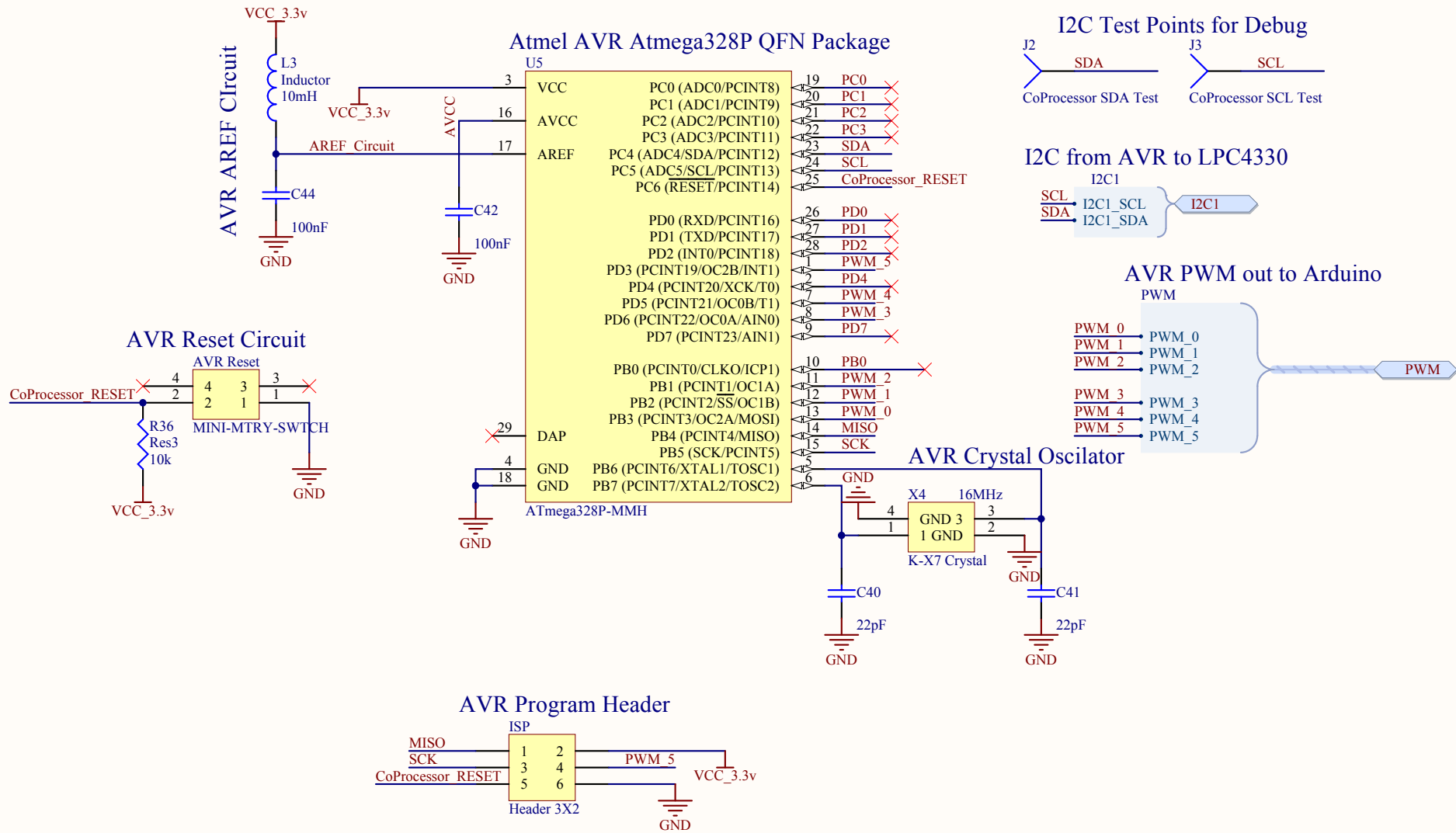


Title **RoboSub Abstract Hardware Device Master Sheet**

Size A Number **1.2** Revision Revision 1

Date: 1/9/2013 Sheet of File: C:\Users\...\AHD Master Schematic.SchDoc Drawn By: Adam Vadala-Roth

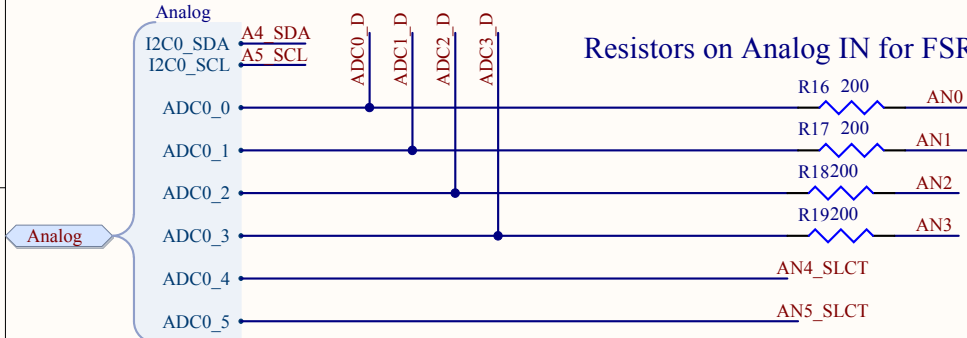
PWM Generation CoProcessor



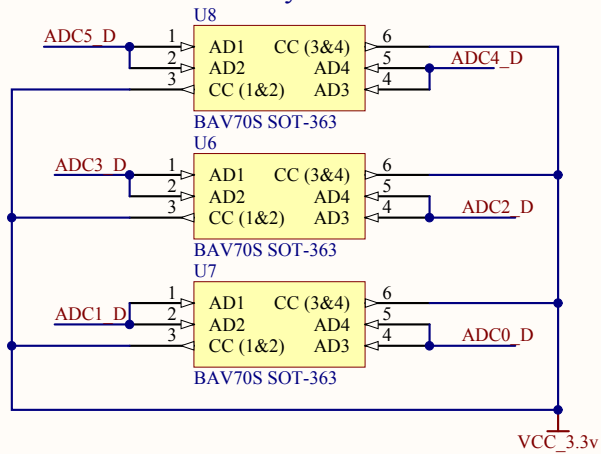
Title		
Abstract Hardware Device PWM CoProcessor		
Size	Number	Revision
A		Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\...\AHD PWM CoProcessor.SchDoc	Drawn By: Adam Vadala-Roth

Arduino Header Break Out

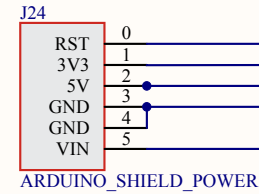
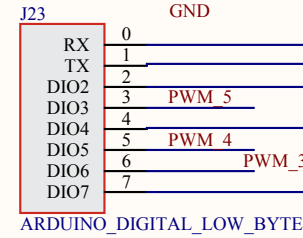
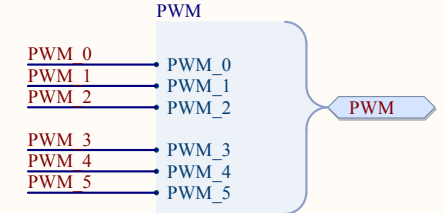
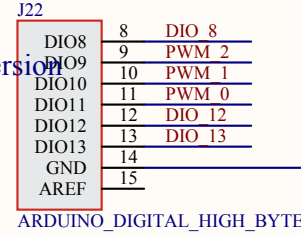
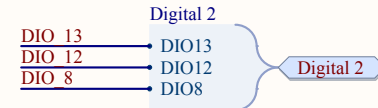
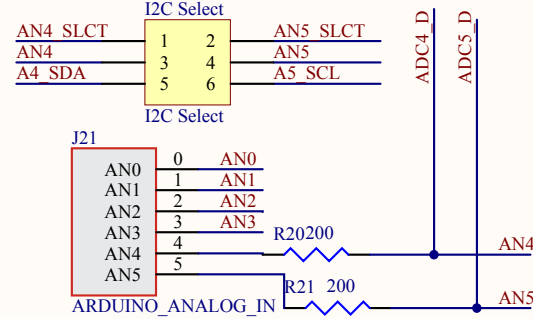
Resistors on Analog IN for FSR Conversion



Analog Sensor Full Scale Range conversion circuitry for 5 volt sensors

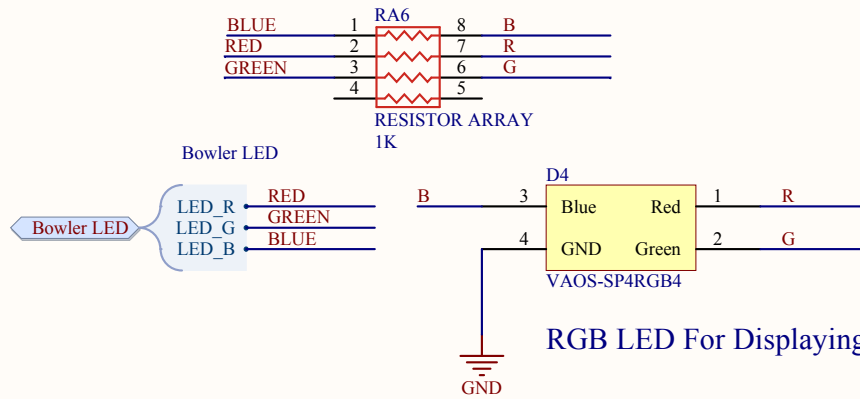


A4 & A5 I2C Pin Configuration Jumper



Title		
Size	Number	Revision
A	1.2	Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\...\Arduino Breakout.SchDoc	Drawn By: Adam Vadala-Roth

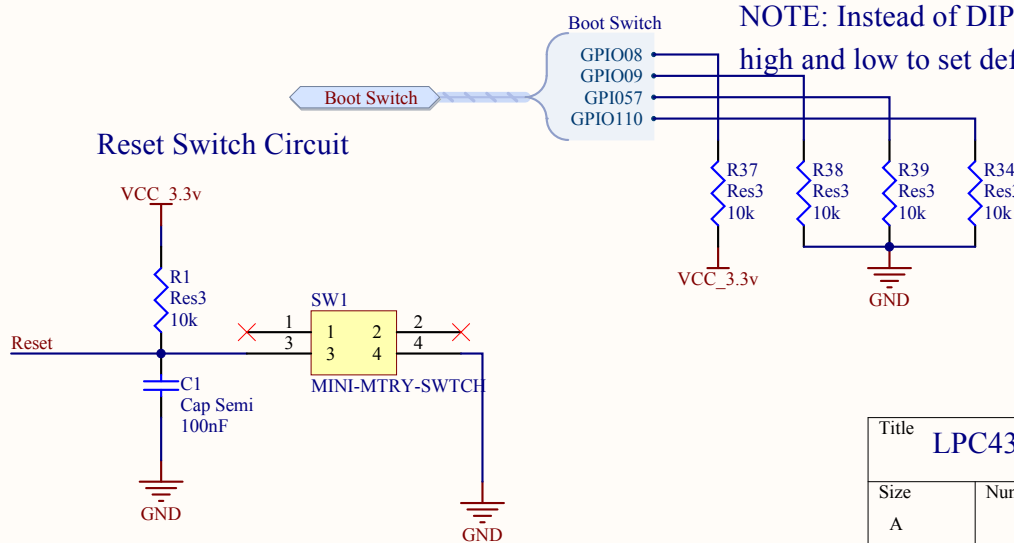
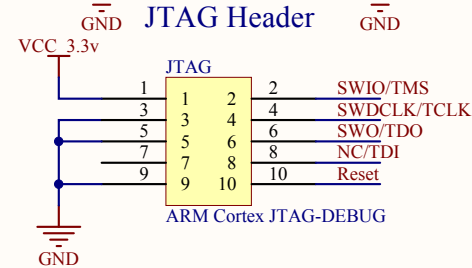
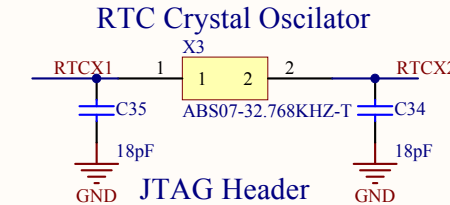
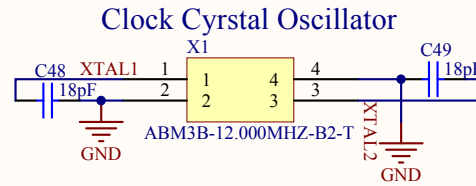
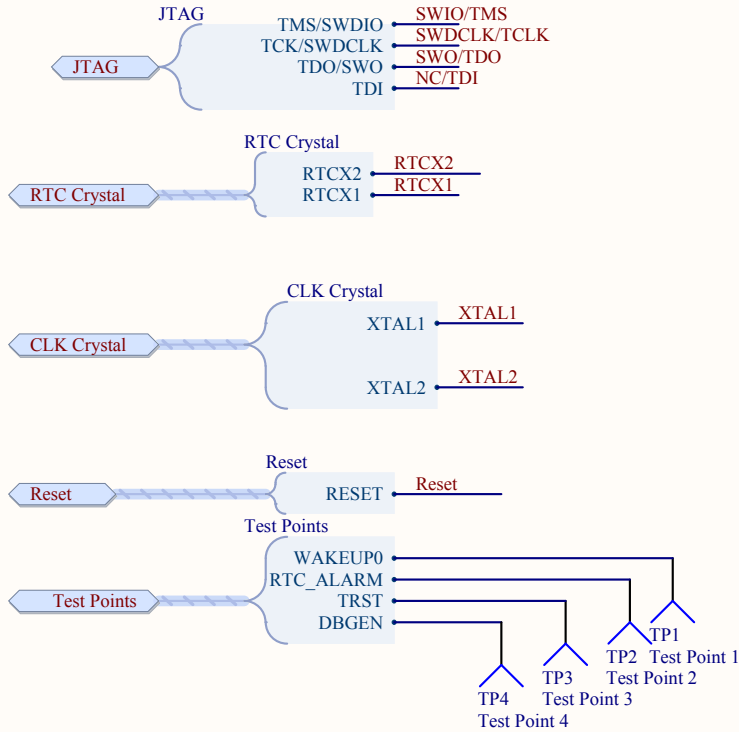
Status LED (RGB LED for Bowler Status Changes)



RGB LED For Displaying various Bowler Device States

Title		
Size	Number	Revision
A	1.2	Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\...\Bowler Debug LED.SchDoc	Drawn By: Adam Vadala-Roth

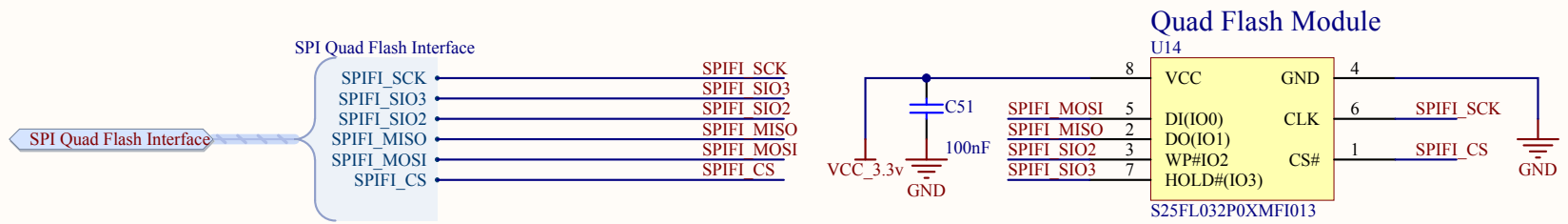
Crystals / Reset / Boot / JTAG



NOTE: Instead of DIP Switch pins are pulled high and low to set default boot to Quad Flash

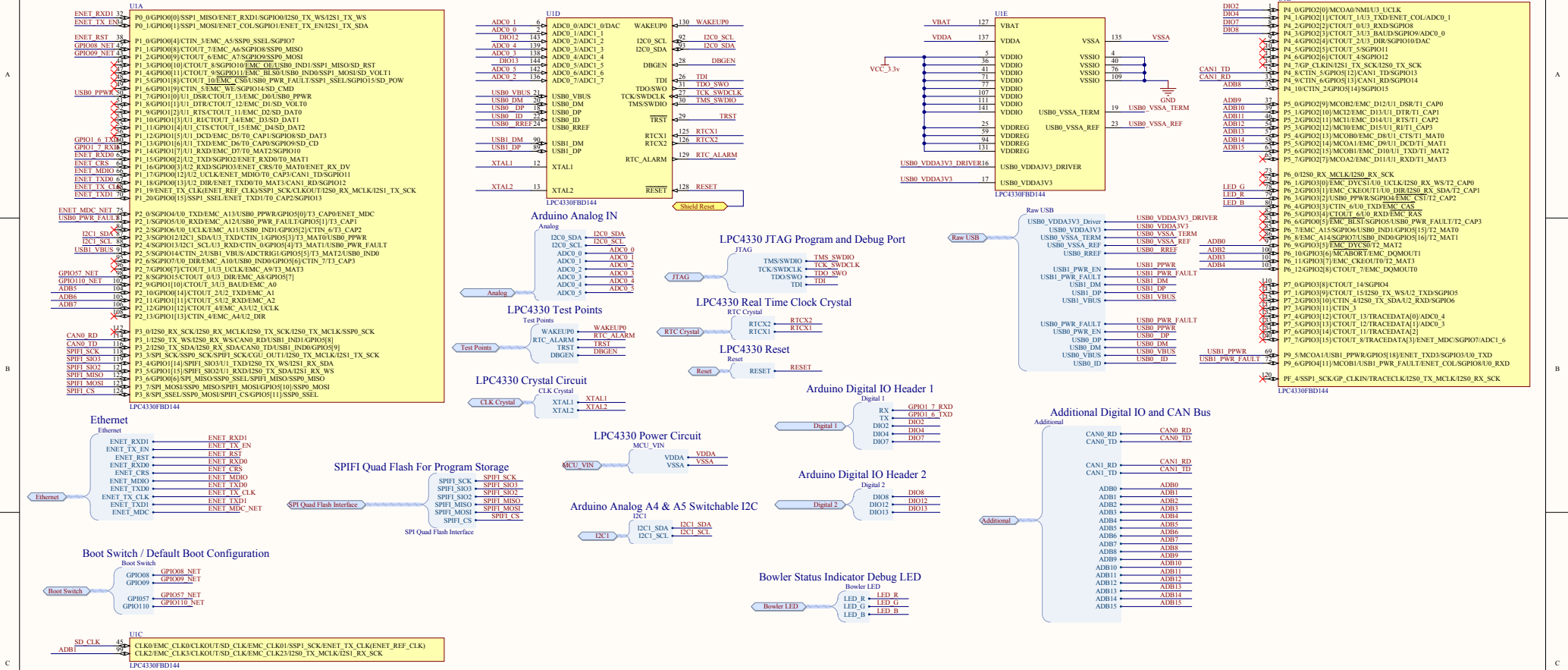
Title		
LPC4330 Reset / Crystal / JTAG/ BOOT / RTC		
Size	Number	Revision
A	1.2	Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\...\Crystal_Reset_Boot.SchDoc	Drawn By: Adam Vadala-Roth

Program Flash Module (SPI Quad Flash Interface)



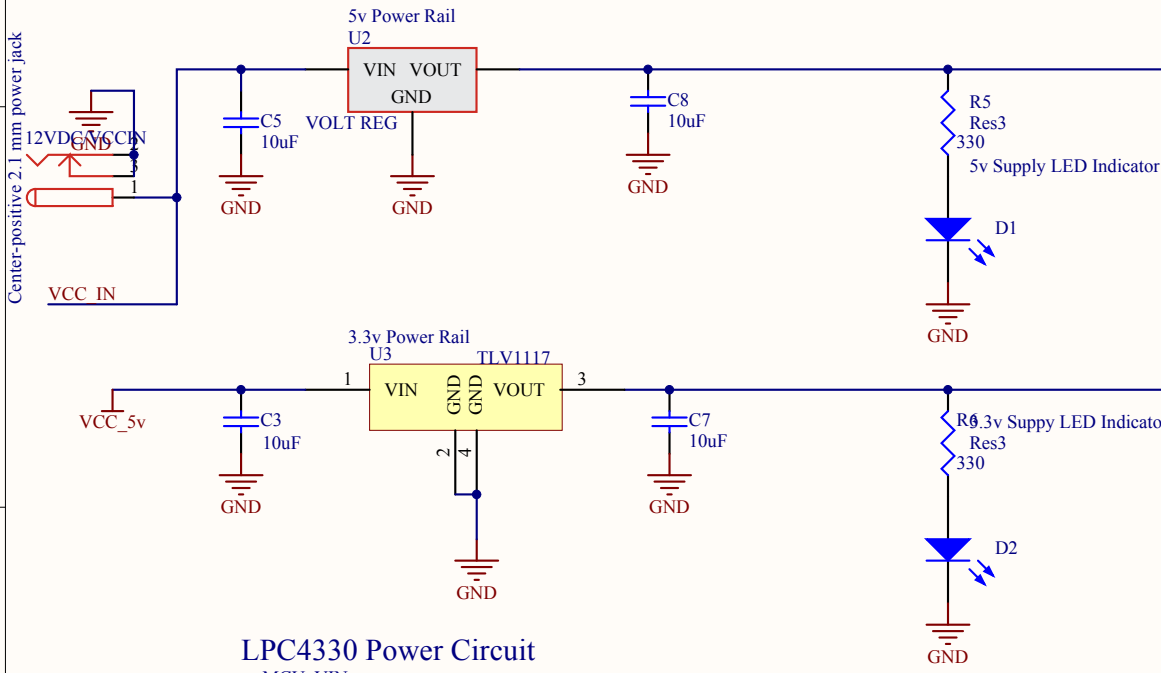
Title		
Size	Number	Revision
A	1.2	Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\...\Flash Storage.SchDoc	Drawn By: Adam Vadala-Roth

NXP LPC4330FBD144 ARM Cortex M4/0 Asymmetrical Core Processor

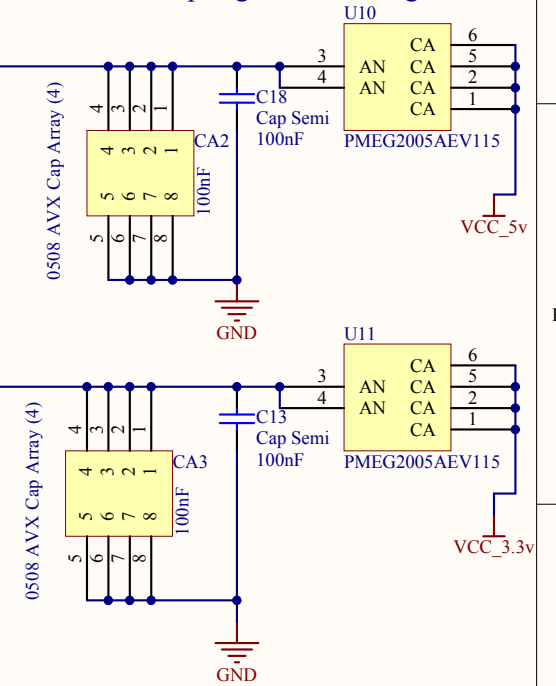


Board Level Power Electronics / Power Conditioning / Power Decoupling

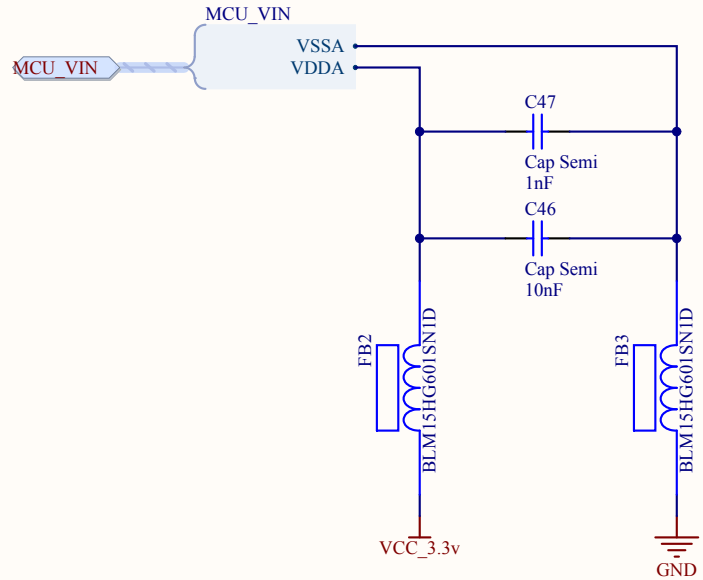
Power Conversion



Power Decoupling/Conditioning

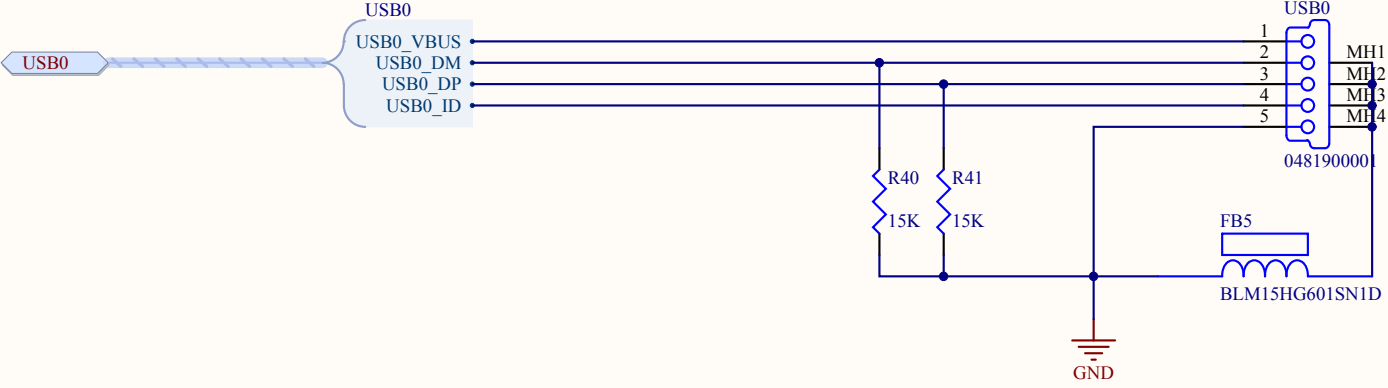


LPC4330 Power Circuit



Title			On Board Power Circuitry		
Size	Number	Revision		Revision 1	
A	1.2				
Date:	1/9/2013	Sheet	of		
File:	C:\Users\...\Power.SchDoc	Drawn By:	Adam Vadala-Roth		

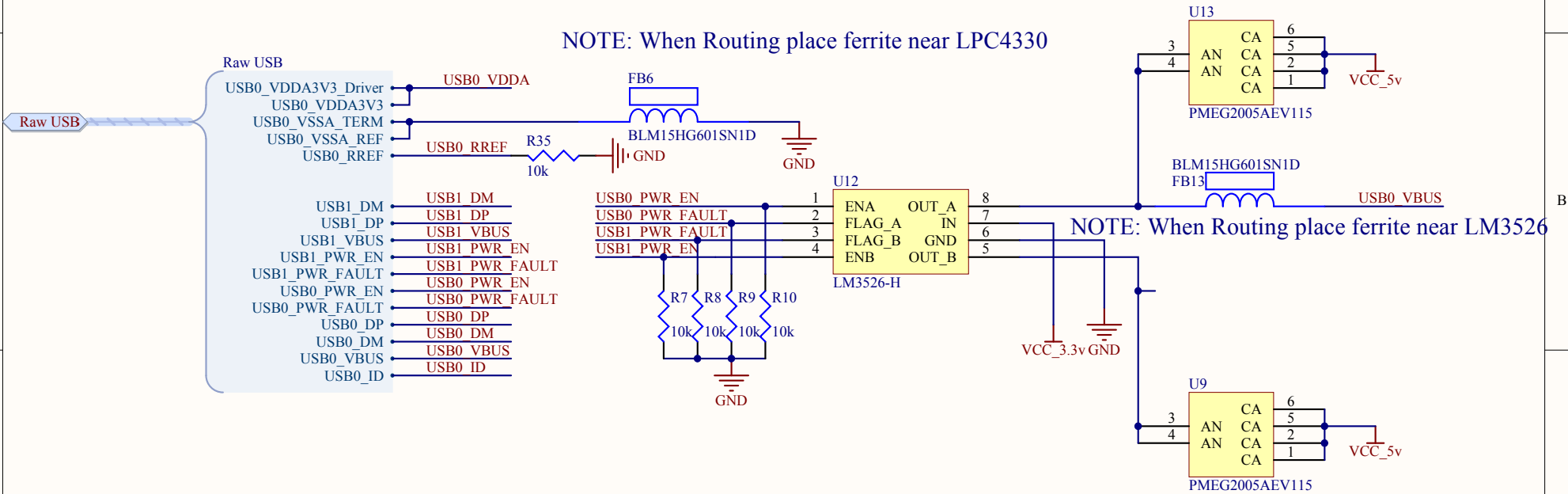
USB Device



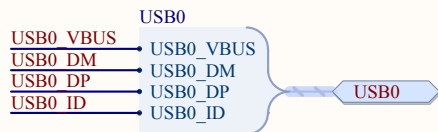
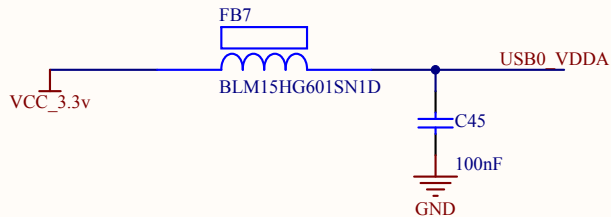
Title		
Size	Number	Revision
A	1.2	Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\...\USB Device.SchDoc	Drawn By: Adam Vadala-Roth

USB Physical Layer

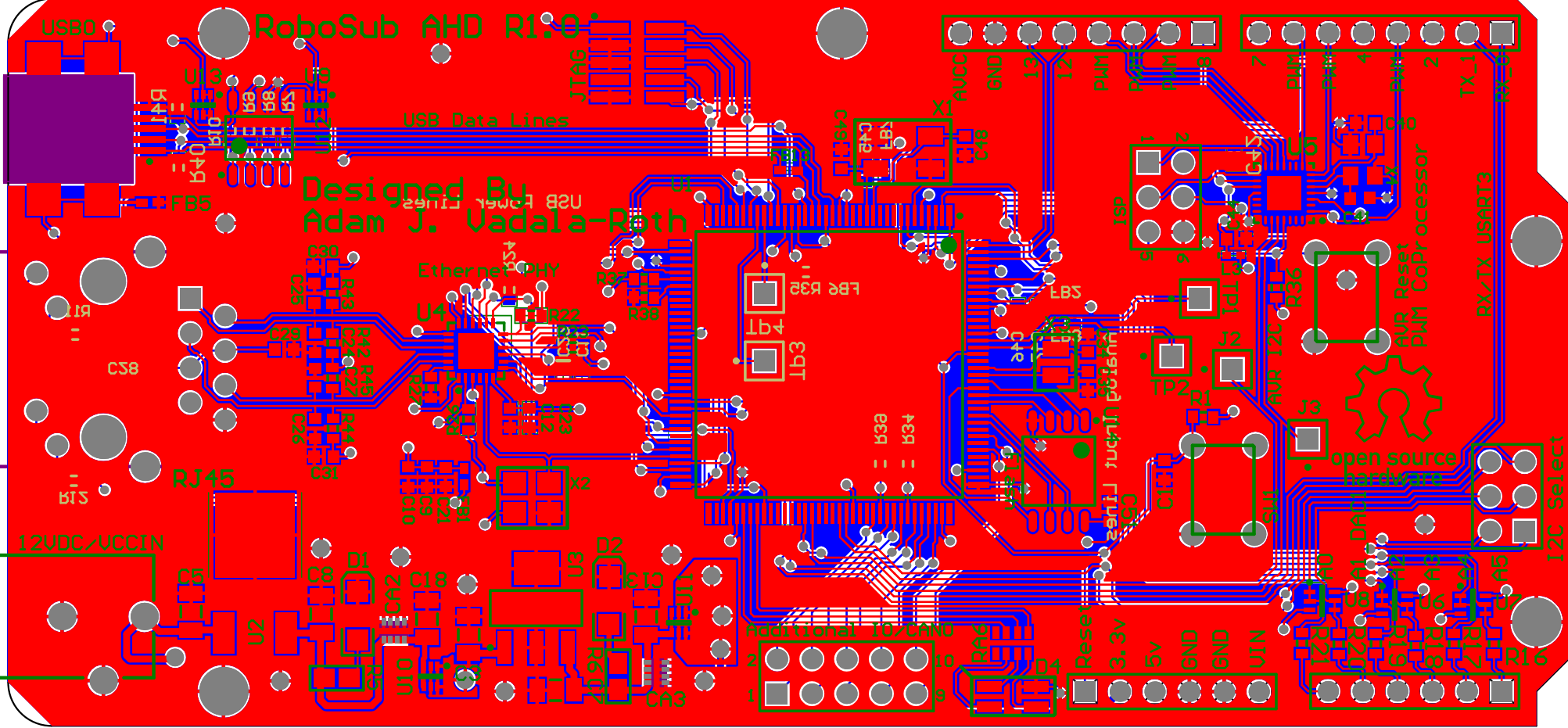
NOTE: When Routing place ferrite near LPC4330



NOTE: When Routing place this circuit near LPC4330 and power supply



Title		
Size	Number	Revision
A	1.2	Revision 1
Date:	1/9/2013	Sheet of
File:	C:\Users\...\USB PHY Layer.SchDoc	Drawn By: Adam Vadala-Roth



RoboSub AHD R1.0

Designed By
Adam J. Vadala-Roth

RJ45

open source
hardware

USB0

12VDC/UCCIN

Additional I/O/CAN0

I2C Select

RX/TX USART3

AVR Reset
PMIC Coprocessor

USB Data Lines

Ethernet PHY

AVCC GND

Reset
3.3v
5v
GND
GND
VDD

I2C
CAN0
CAN1
CAN2
CAN3
CAN4
CAN5
CAN6
CAN7
CAN8
CAN9
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