



QUANTUM CONTROL BOARD

Rev -005

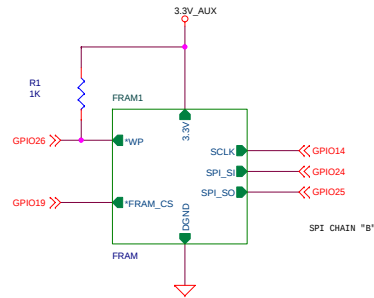
Ready to release, only changes from -004: Removing test points, tie off unused gates, and improving clearances around heatsink mounting holes, Change DB9 to 4 pin header. Relay became 24v, zeners became 6v. Removing test points.

© 2009 Tennant Company. All rights reserved. Under copyright law, neither this documentation nor the related software may be copied, photocopied, reproduced, translated, distributed, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of Tennant Company. This document is confidential and proprietary, and can only be used with explicit permission from Tennant Company.

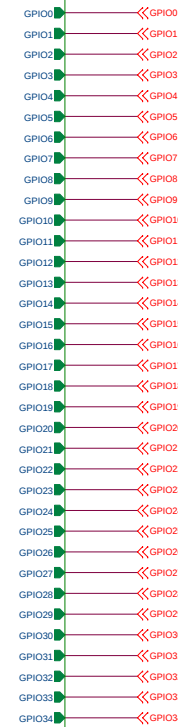
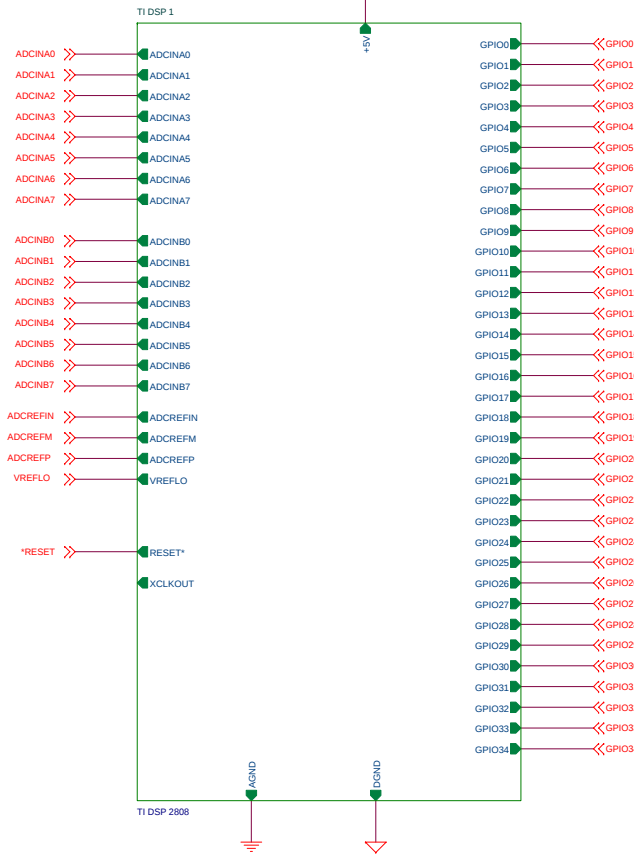
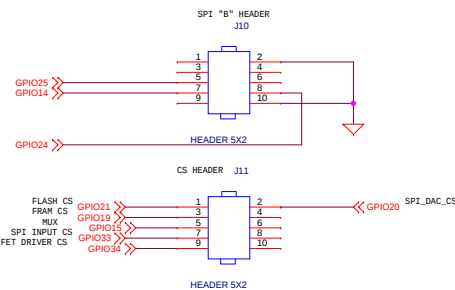
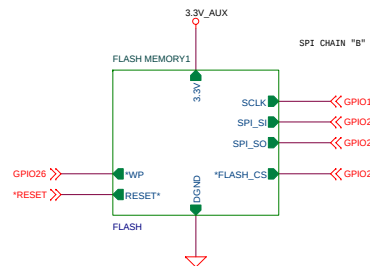
Tennant Company
701 North Lilac Drive
Minneapolis, Minnesota 55440
United States of America

DSP

FRAM



FLASH

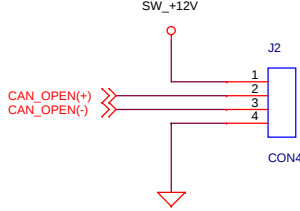
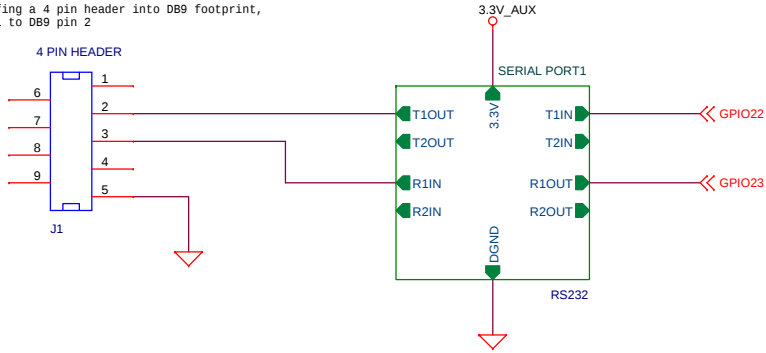


Title		<Title>
Size	Document Number	Rev
C	<Doc>	A
Date:	Wednesday, August 18, 2010	Sheet 2 of 26

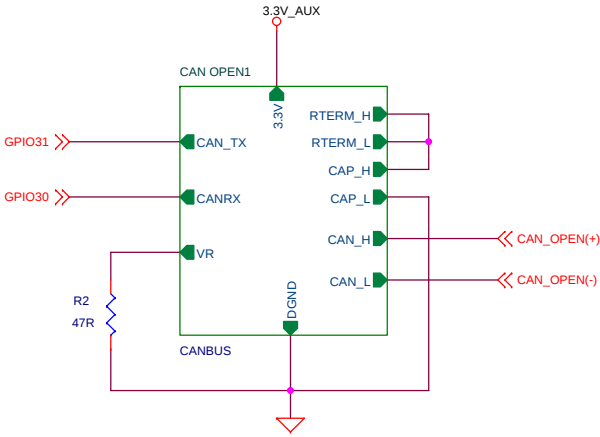
COMM PORTS

RS-232 DIAGNOSTICS

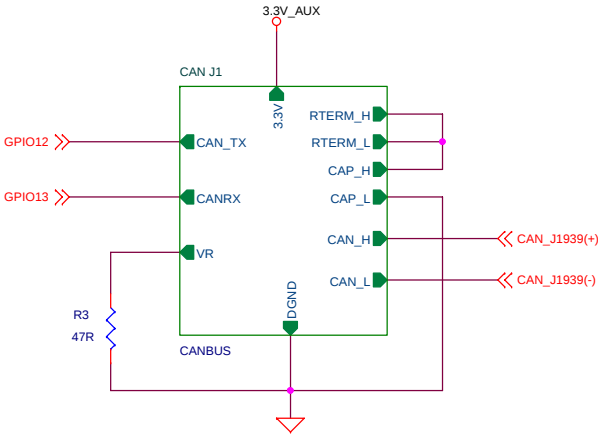
Stuffing a 4 pin header into DB9 footprint,
pin 1 to DB9 pin 2



CAN Open

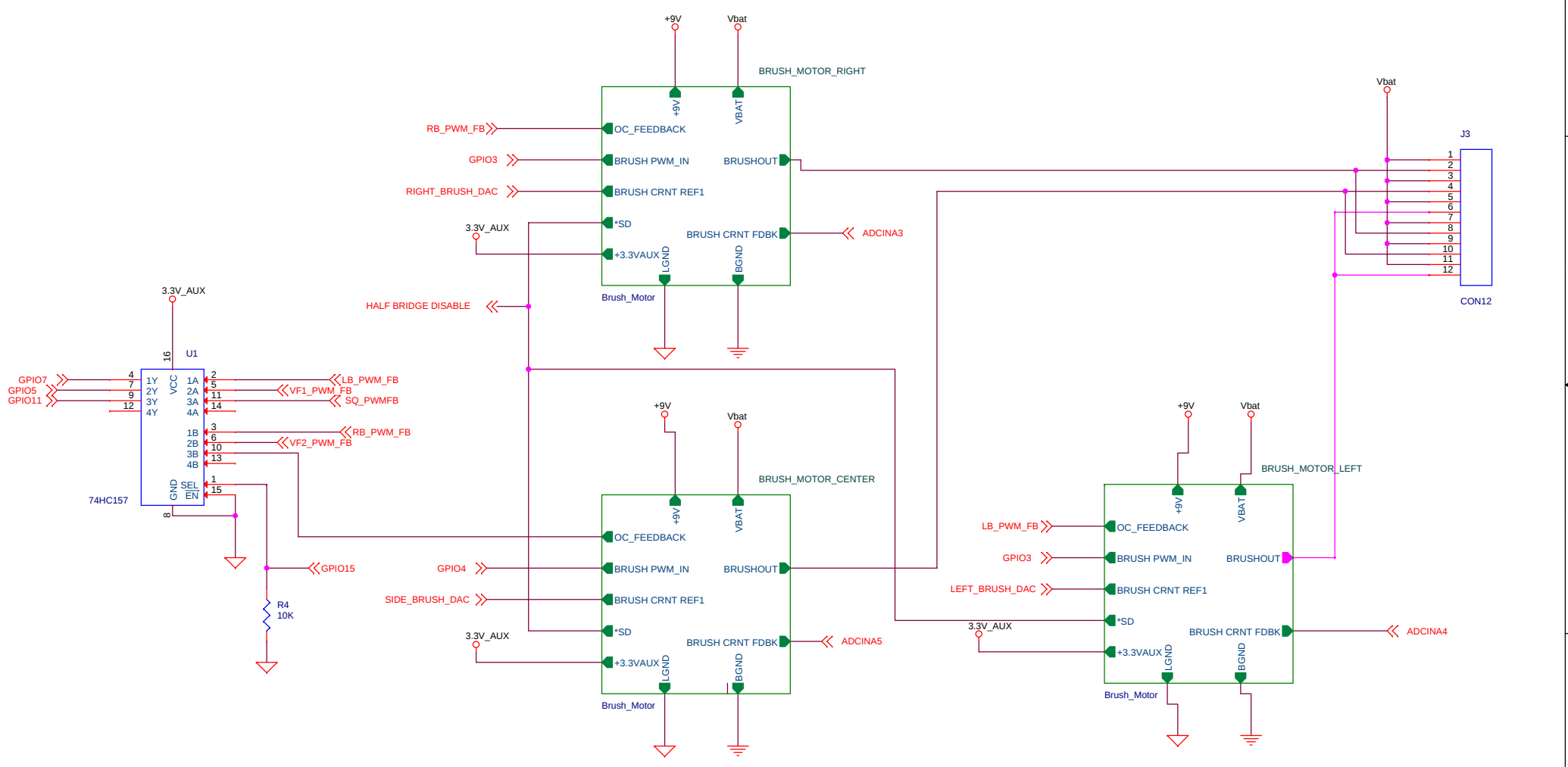


J1939



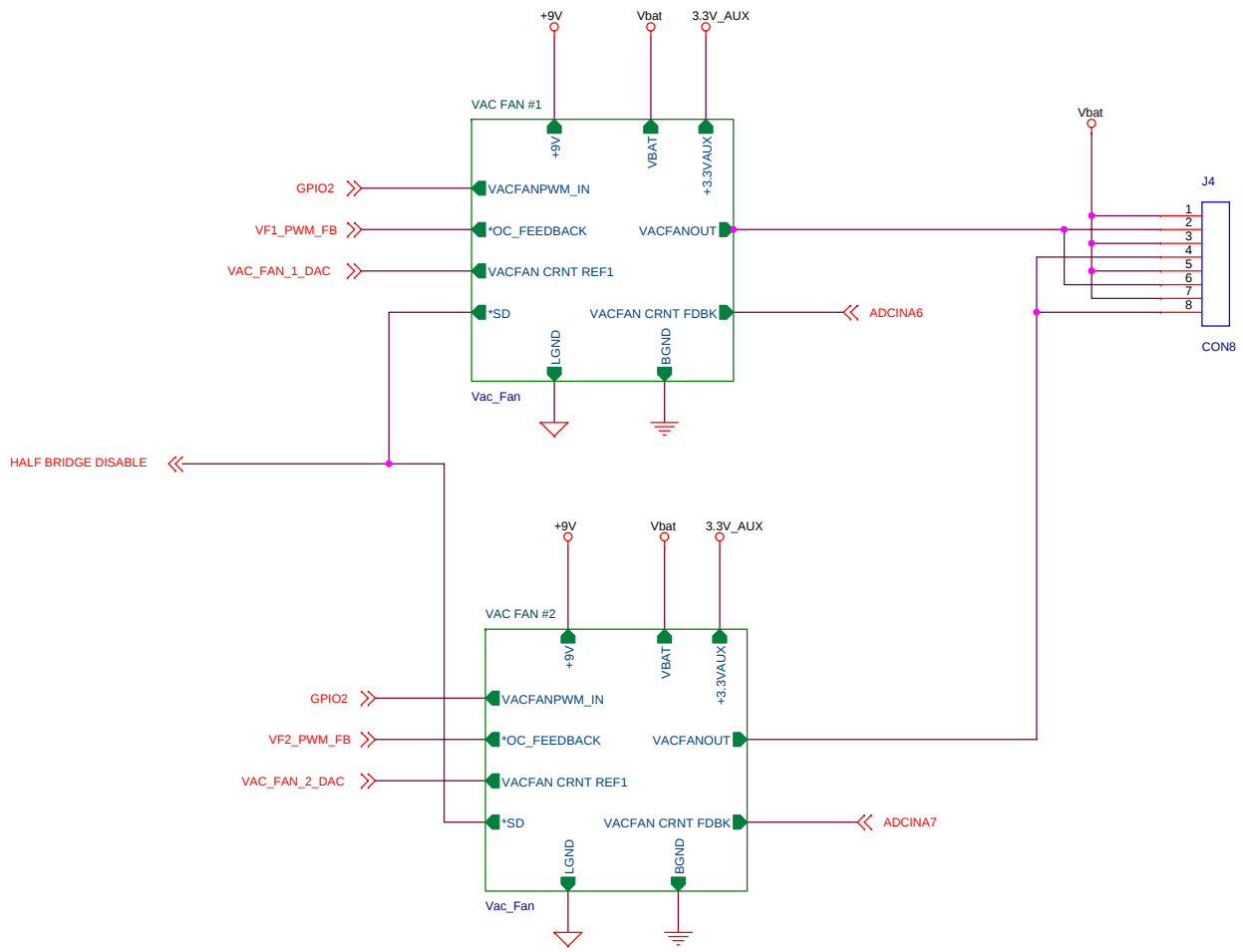
Title			
<Title>			
Size	Document Number		Rev
B	<Doc>		A
Date:	Wednesday, August 18, 2010	Sheet	3 of 26

BRUSH MOTORS



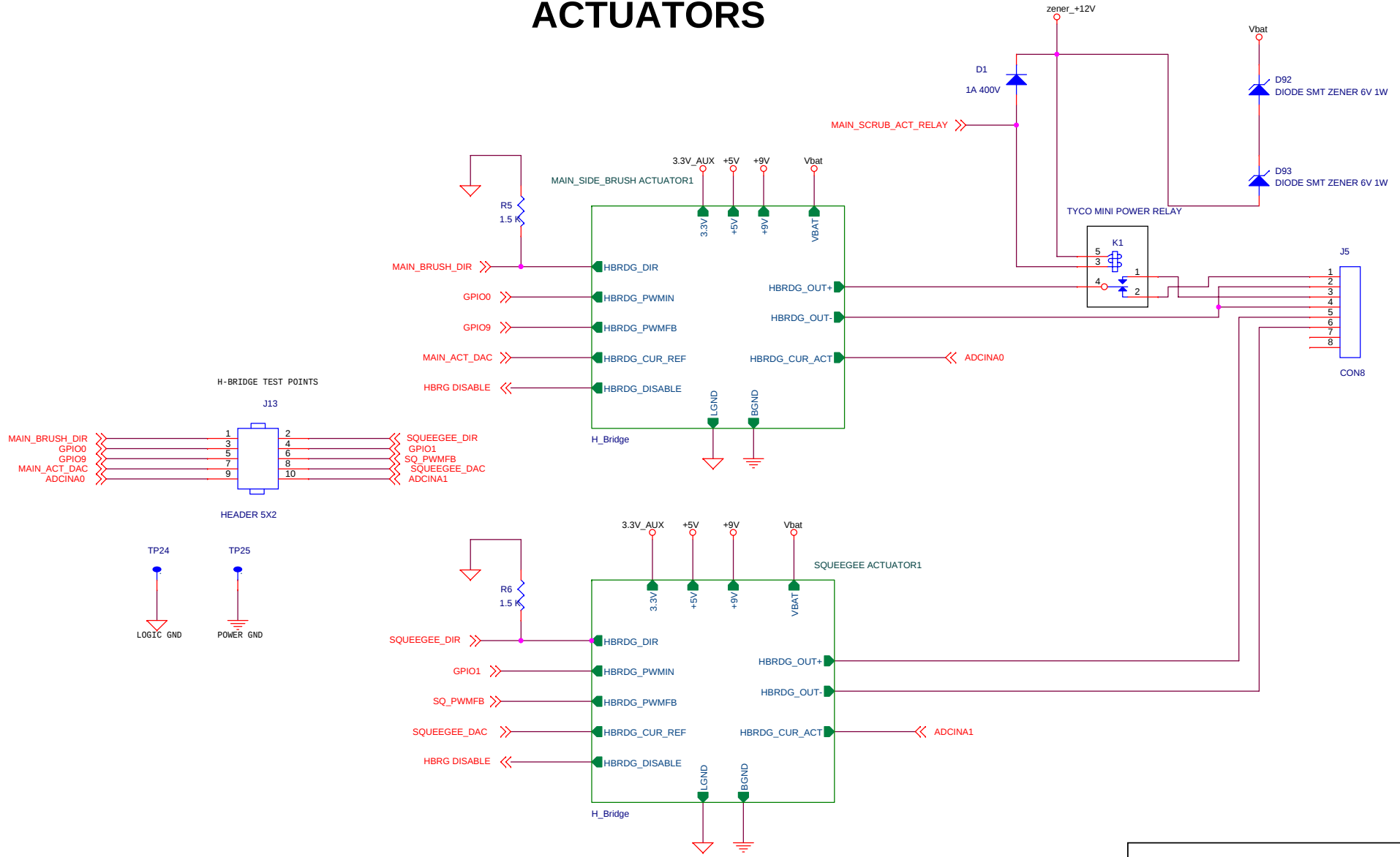
Title			
<Title>			
Size B	Document Number		Rev A
	<Doc>		
Date:	Wednesday, August 18, 2010	Sheet 4 of 26	

VACUUM FANS



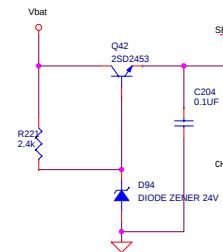
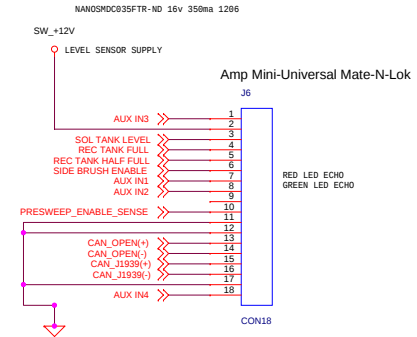
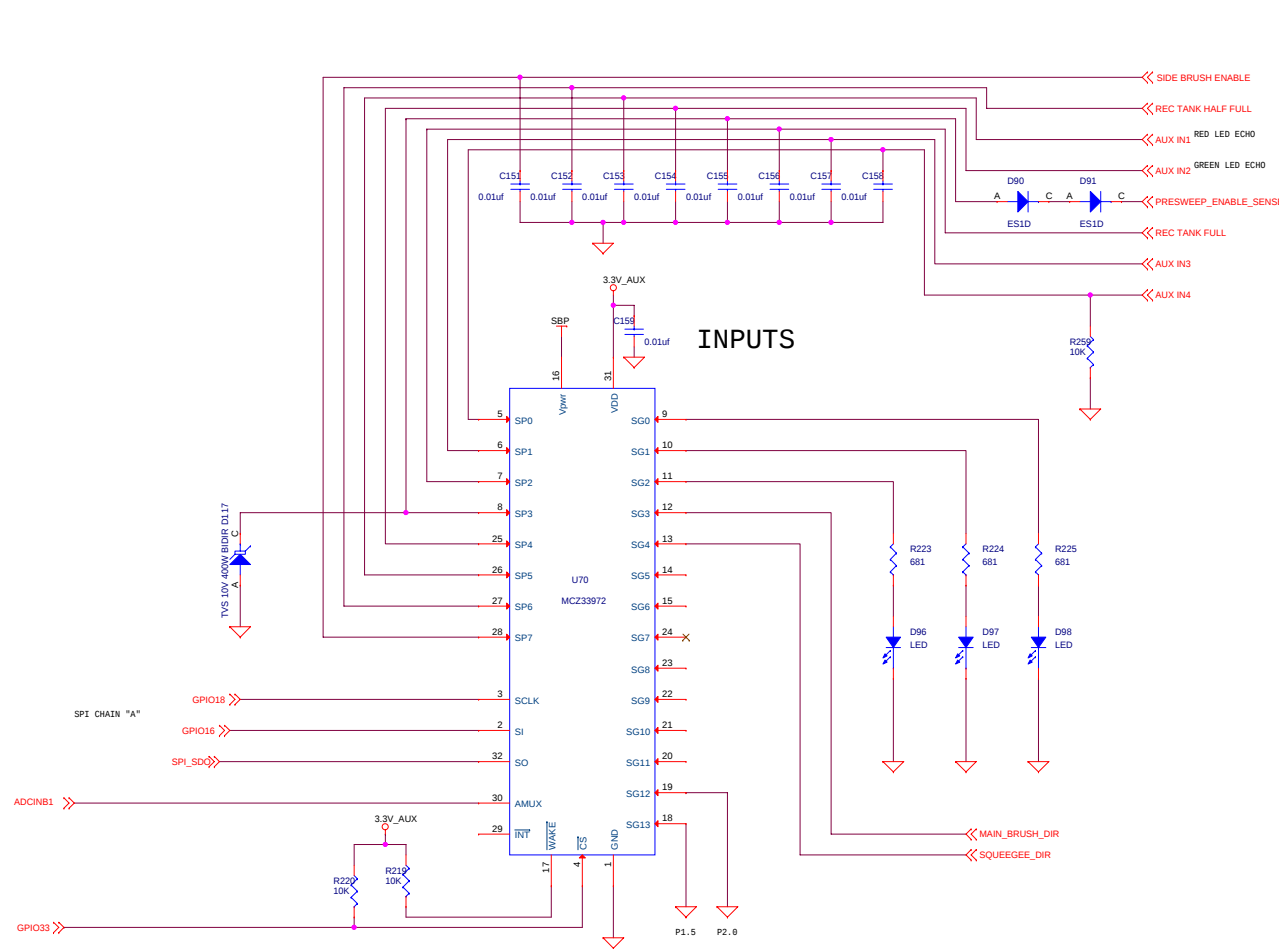
Title			<Title>		
Size	Document Number	Rev			A
B	<Doc>				
Date:	Wednesday, August 18, 2010	Sheet	5	of	26

ACTUATORS



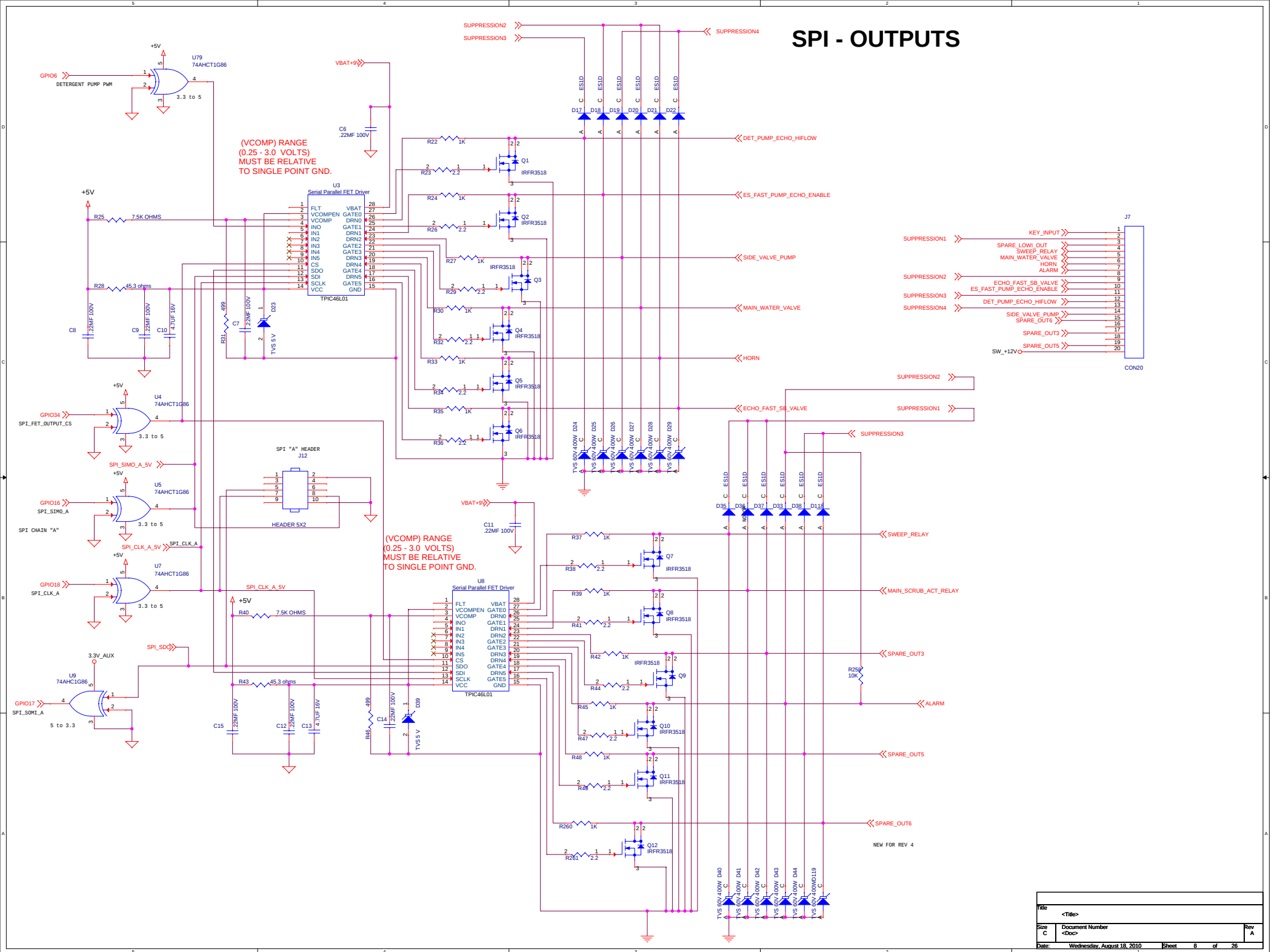
Title			<Title>
Size	Document Number		Rev
B	<Doc>		A
Date:	Wednesday, August 18, 2010	Sheet	6 of 26

SPI INPUTS



Title		<Title>
Size	Document Number	Rev
C	<Doc>	A
Date:	Wednesday, August 18, 2010	Sheet 7 of 26

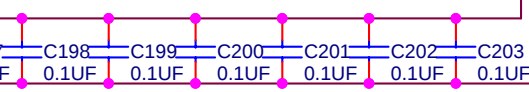
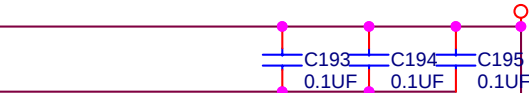
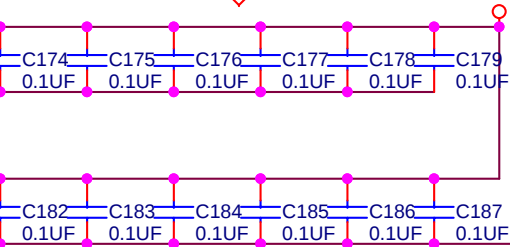
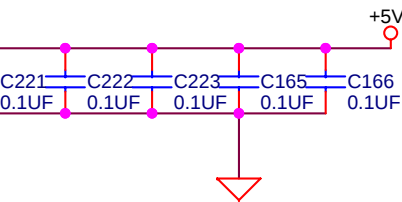
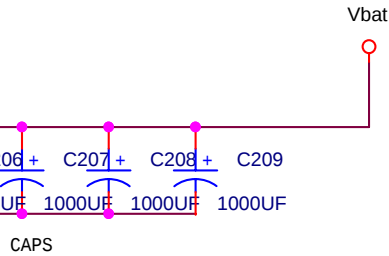
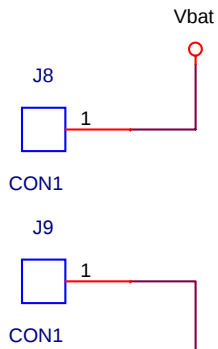
SPI - OUTPUTS



Title	<Title>	Rev	A
Size	Document Number		
C	<Doc>		
Date:	Wednesday, August 18, 2010	Sheet	8 of 26

Power Supply

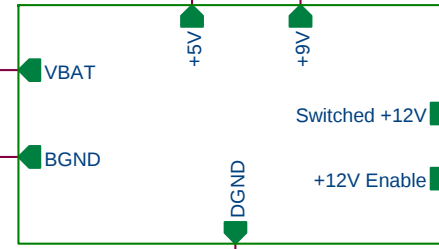
Battery Input



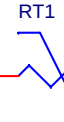
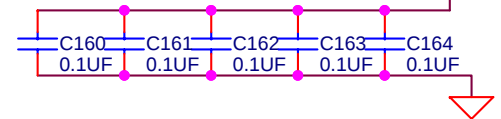
KEY_INPUT



POWERSUPPLY



MODULAR - POWERSUPPLY

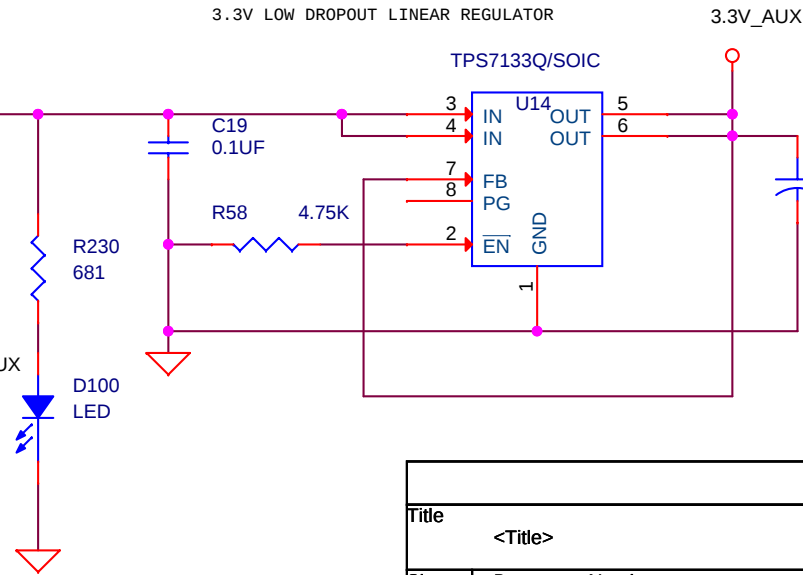


PolySwitch

GPIO29

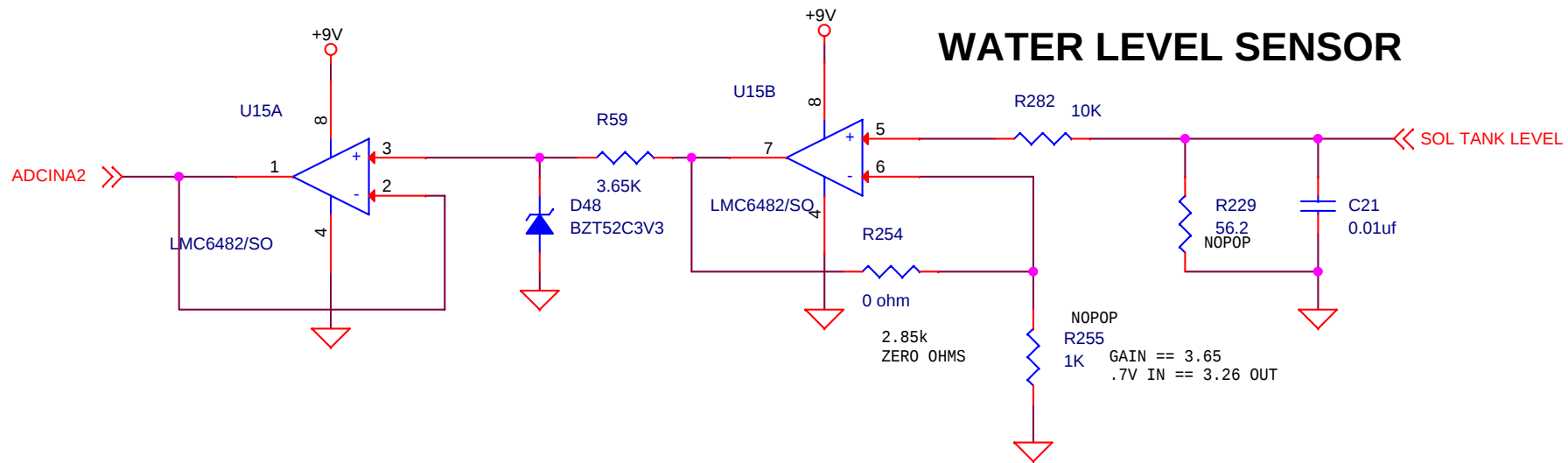
POWER SUPPLY +3.3V

3.3V LOW DROPOUT LINEAR REGULATOR

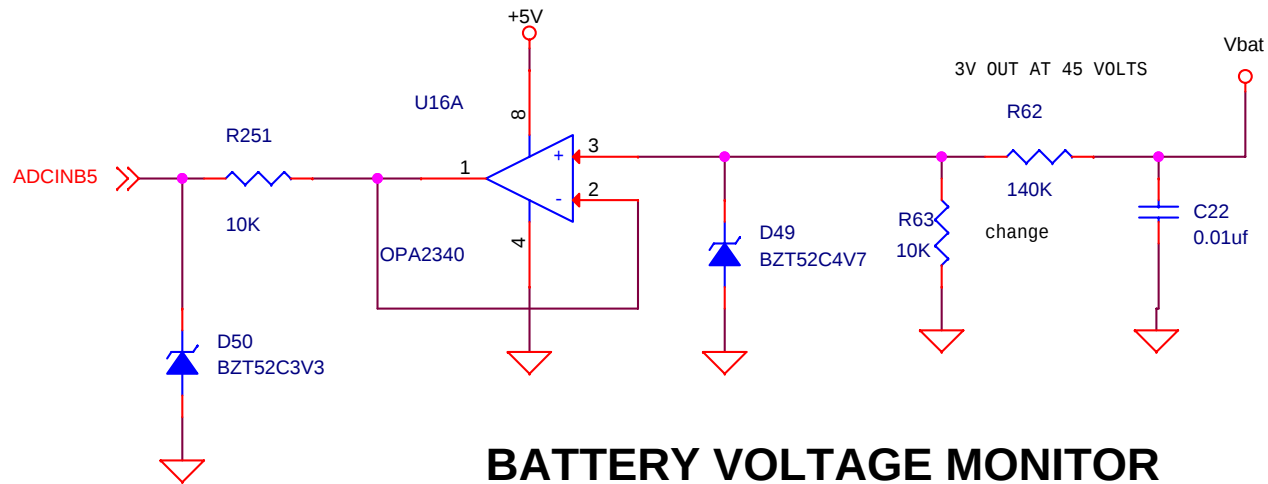


Title		
<Title>		
Size	Document Number	Rev
A	<Doc>	A
Date:	Wednesday, August 18, 2010	Sheet 10 of 26

WATER LEVEL SENSOR



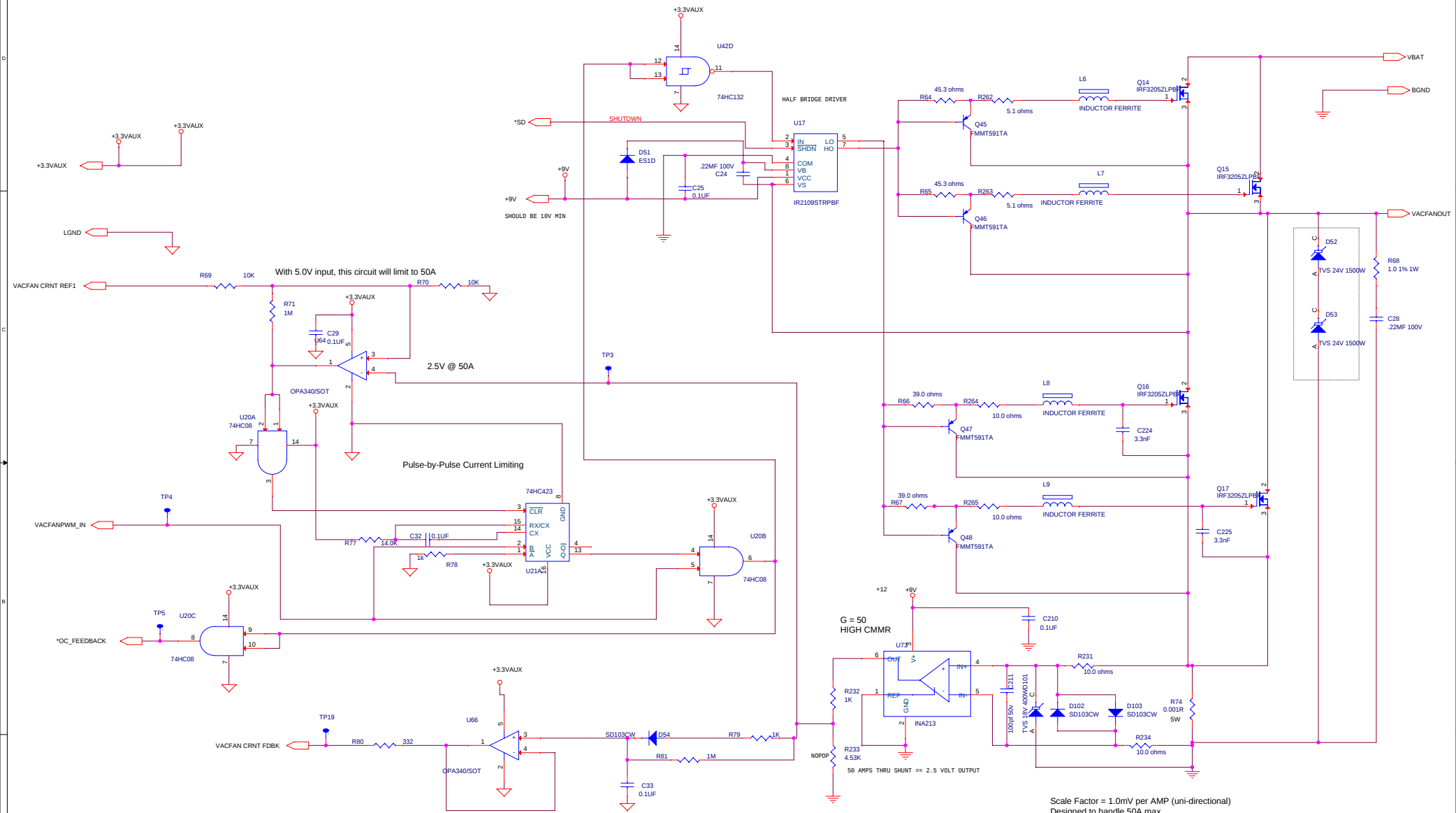
changed this to a unity gain amp for pressure tube sensor



BATTERY VOLTAGE MONITOR

Title		
<Title>		
Size	Document Number	Rev
A	<Doc>	A
Date:	Wednesday, August 18, 2010	Sheet 11 of 26

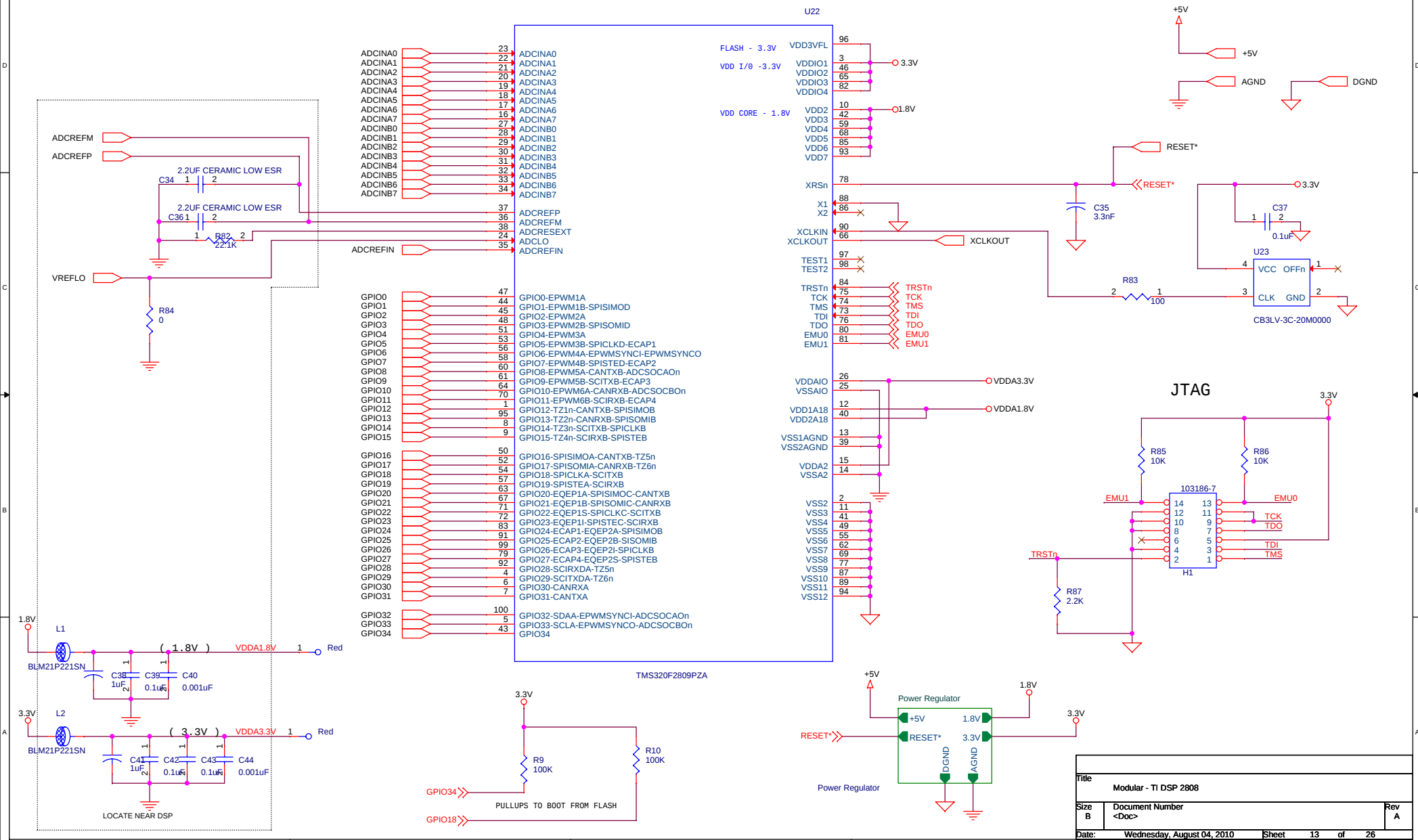
Vacuum Fan Control



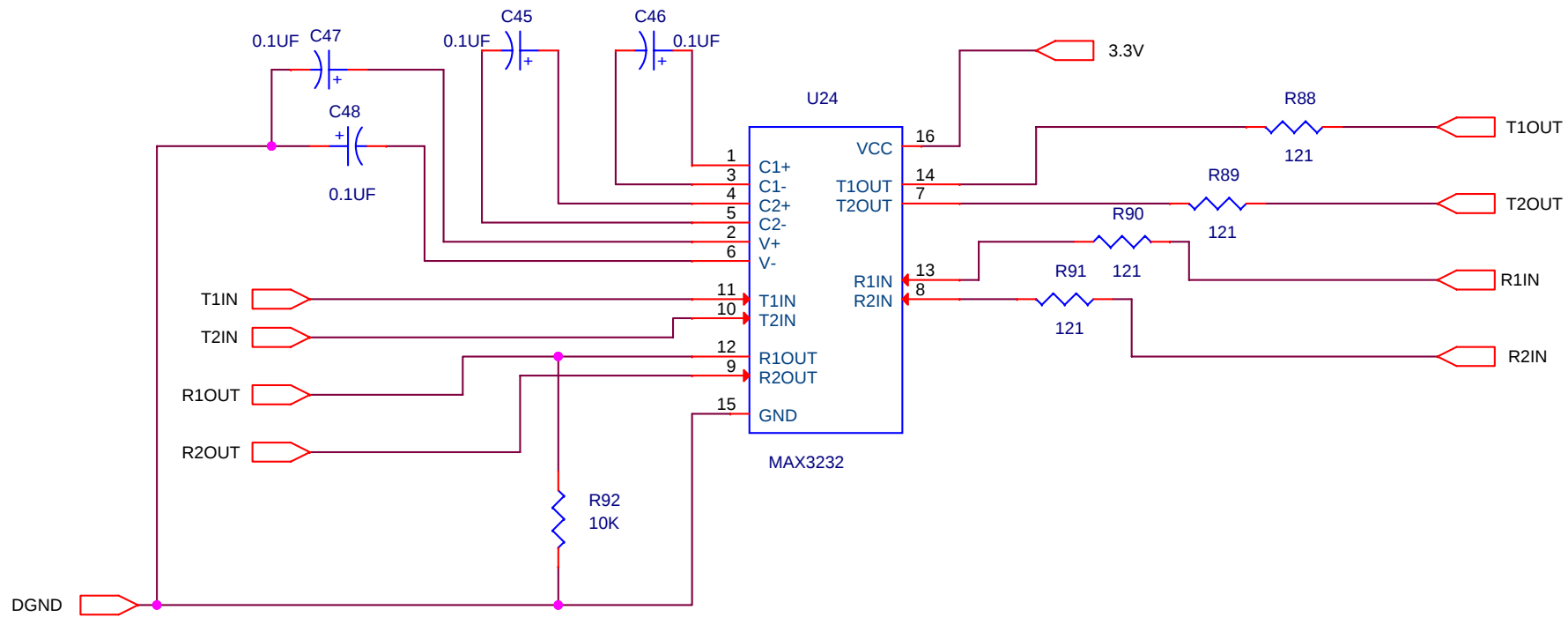
Scale Factor = 1.0mV per AMP (uni-directional)
Designed to handle 50A max.

Title Modular - Vacuum Fan			
Size C	Document Number <Doc>		Rev A
Date:	Friday, August 20, 2010	Sheet	12 of 26

DSP

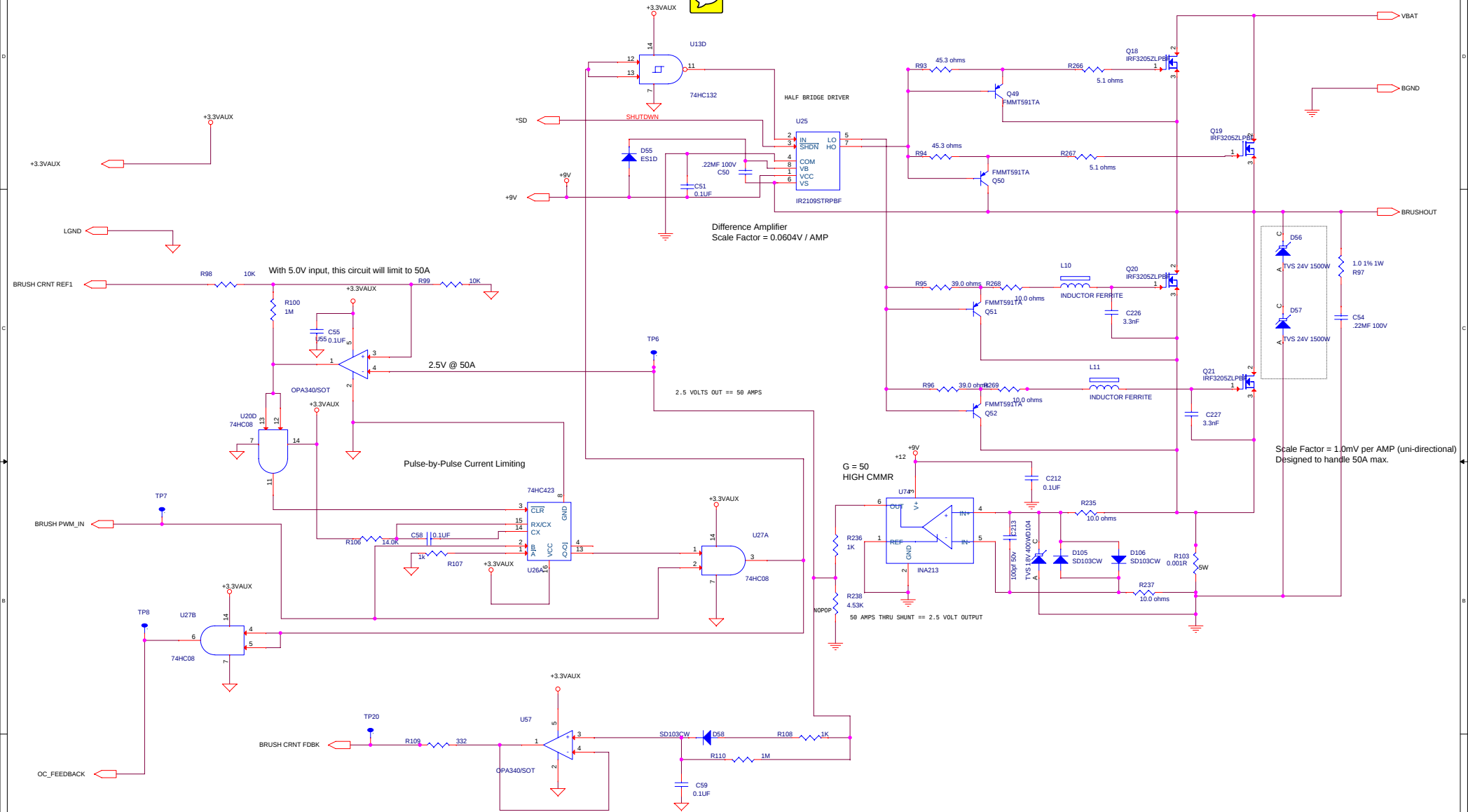


RS-232 SERIAL PORT



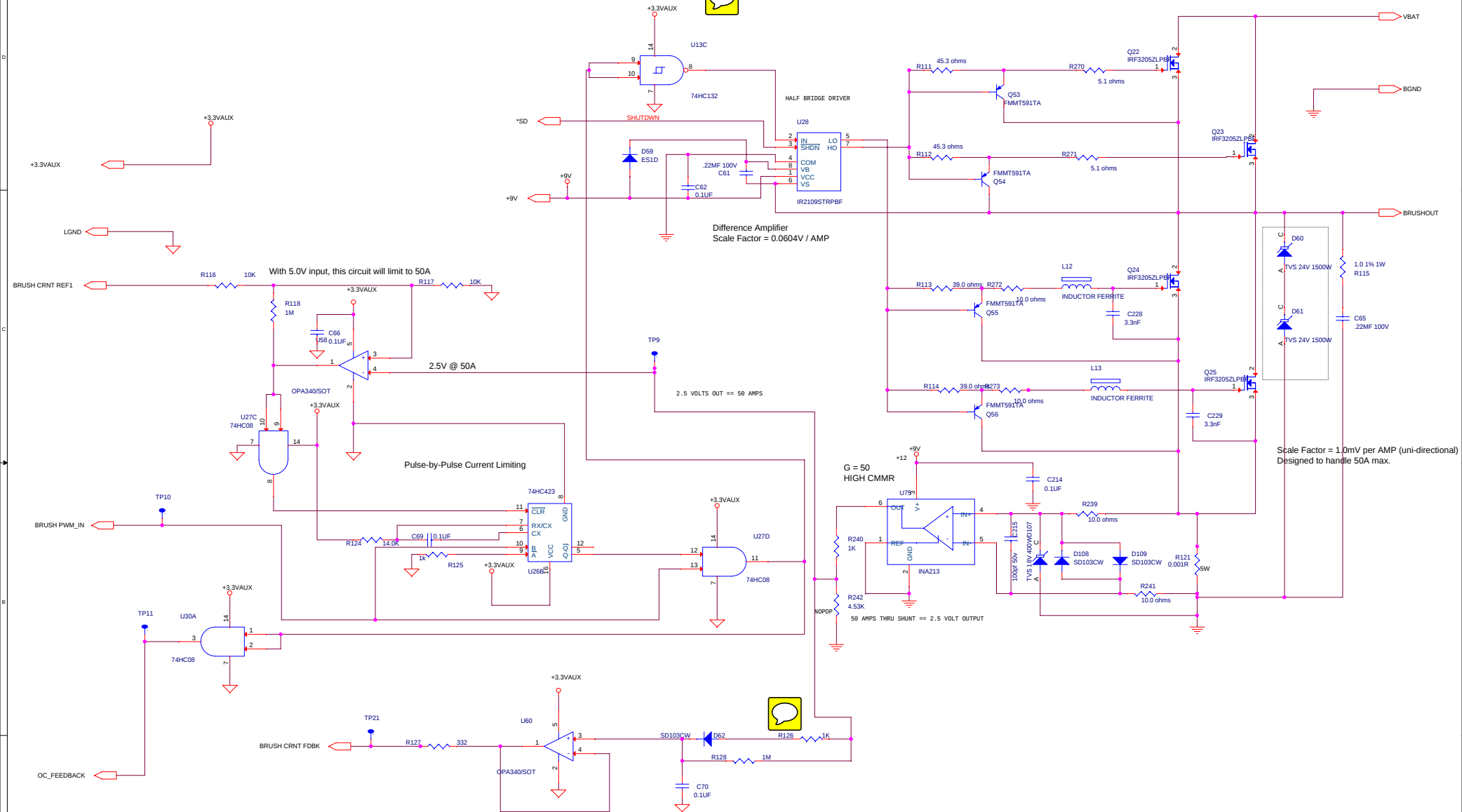
Title		
Modular - RS232		
Size	Document Number	Rev
A	<Doc>	A
Date:	Tuesday, July 20, 2010	Sheet 14 of 26

Brush Motor Control



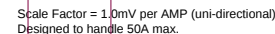
Title			Modular - Brush Motor
Size	Document Number	Rev	
C	<Doc>	A	
Date:	Friday, August 20, 2010	Sheet	15 of 26

Brush Motor Control



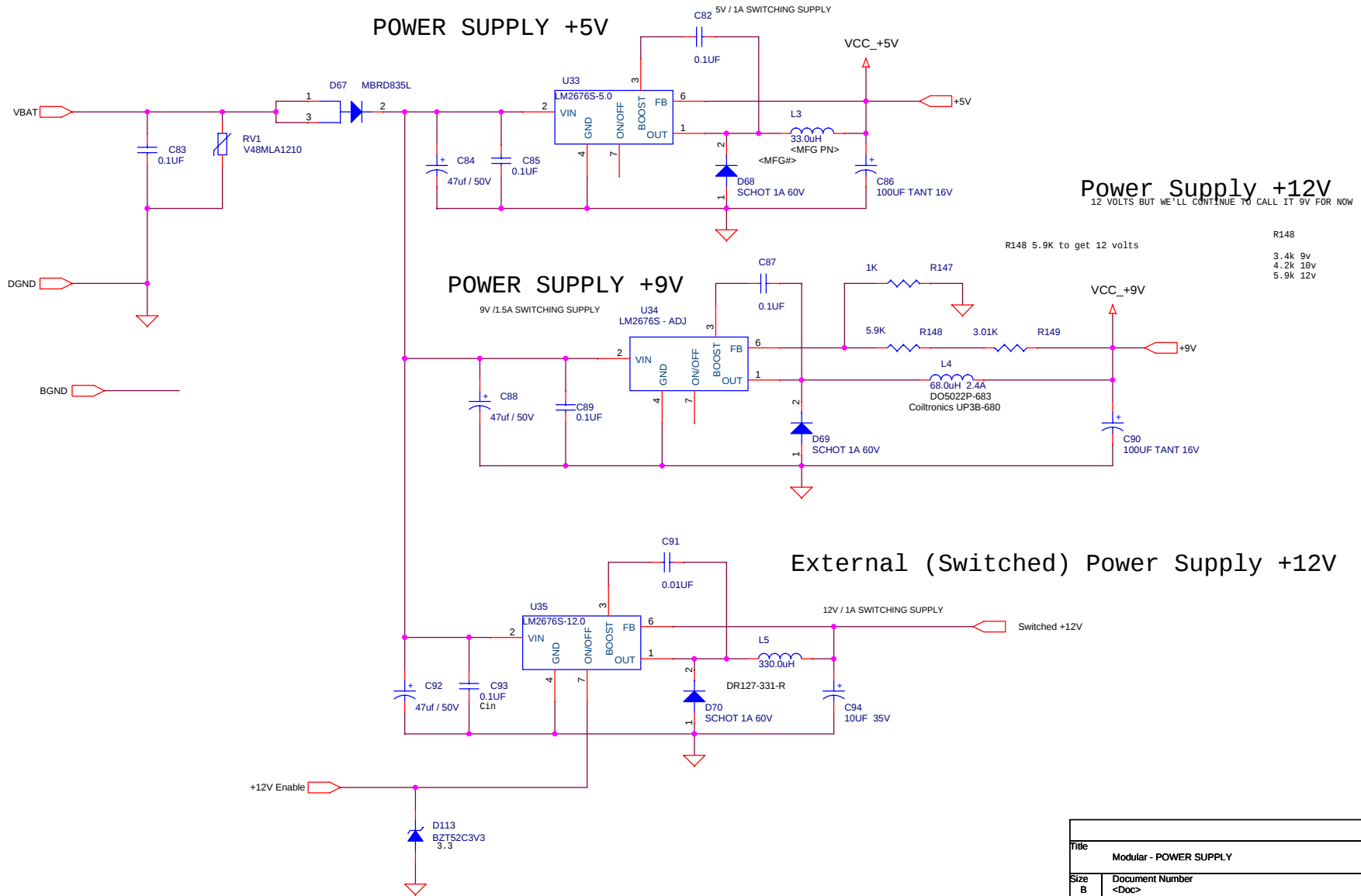
Title			Modular - Brush Motor
Size	Document Number	Rev	
C	<Doc>	A	
Date:	Friday, August 20, 2010	Sheet	16 of 26

+3.3VAUX



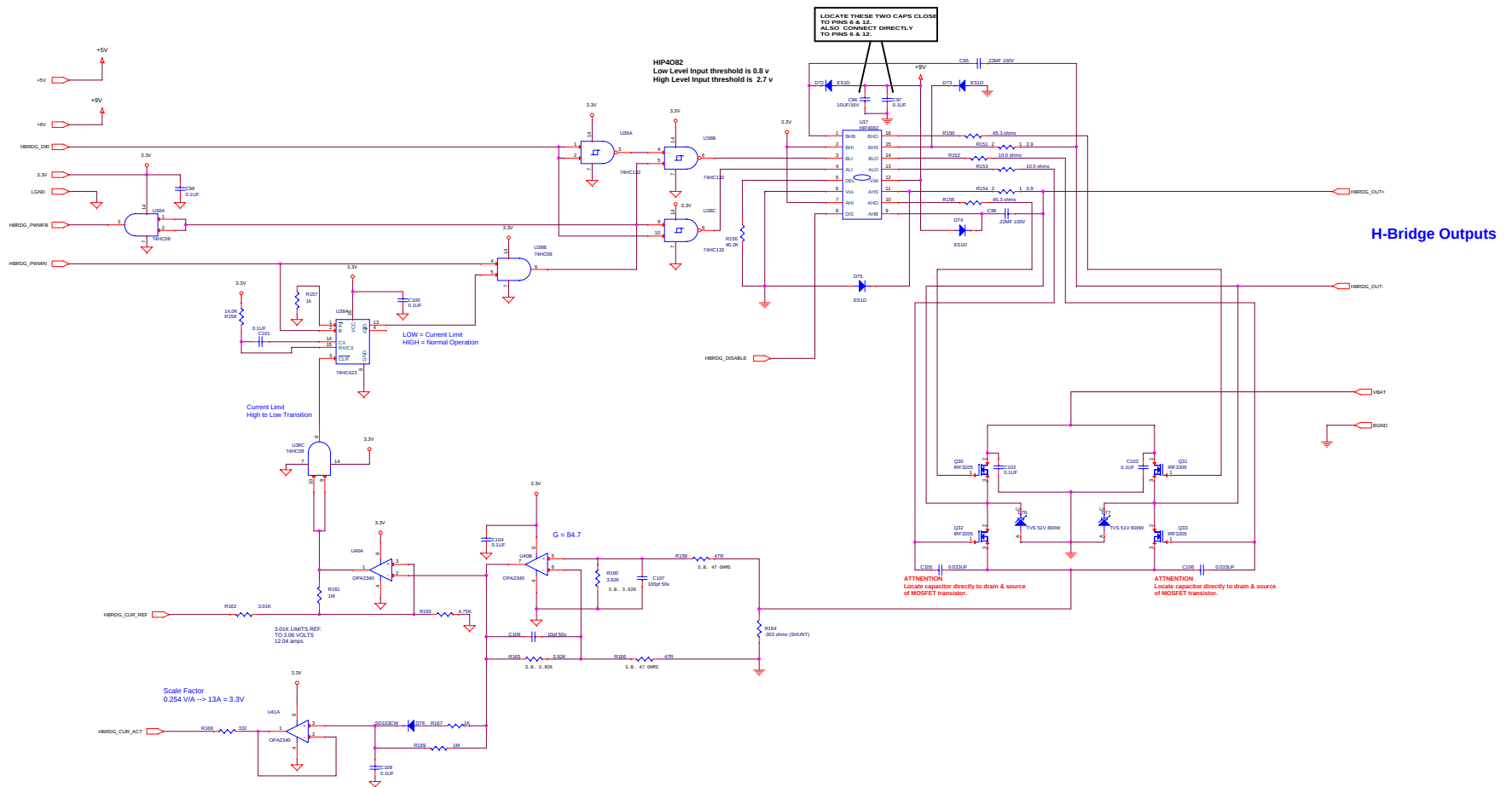
Title Modular - Brush Motor			
Size C	Document Number <Doc>	Rev A	
Date:	Friday, August 20, 2010	Sheet	17 of 26

Power Supply

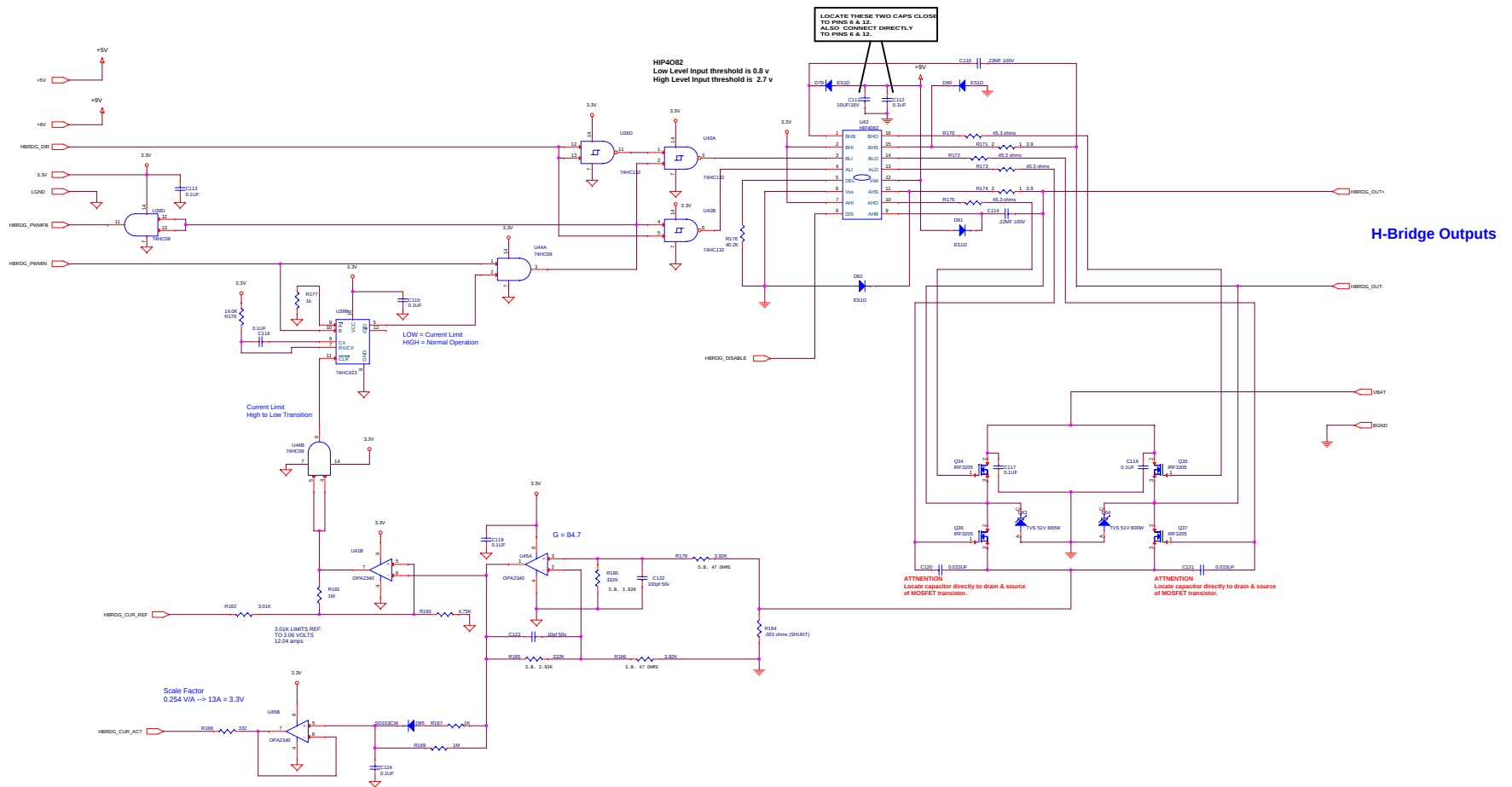


Title		
Modular - POWER SUPPLY		
Size	Document Number	Rev
B	<Doc>	A
Date:	Wednesday, August 04, 2010	Sheet 18 of 26

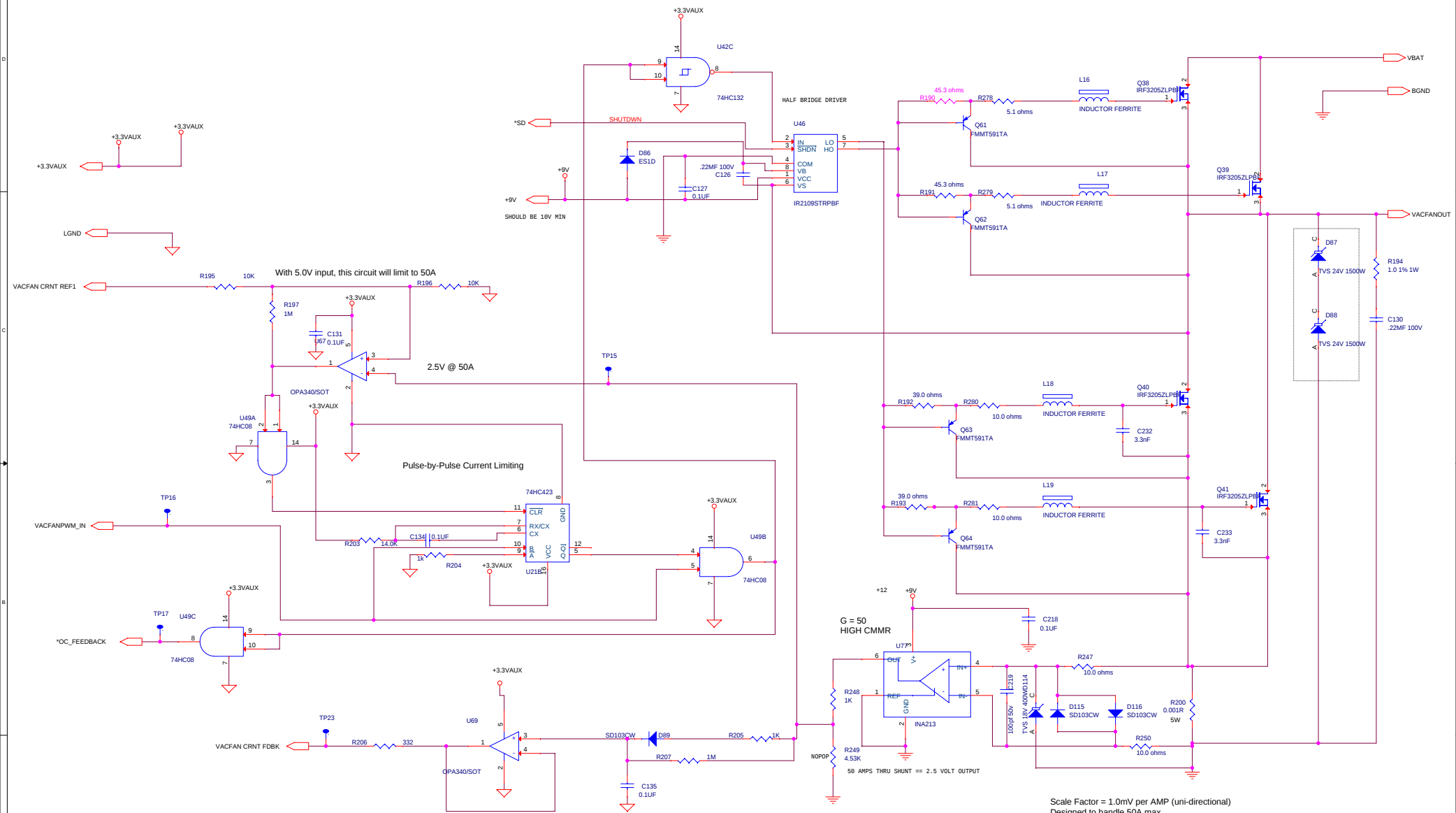
H-Bridge Control



H-Bridge Control



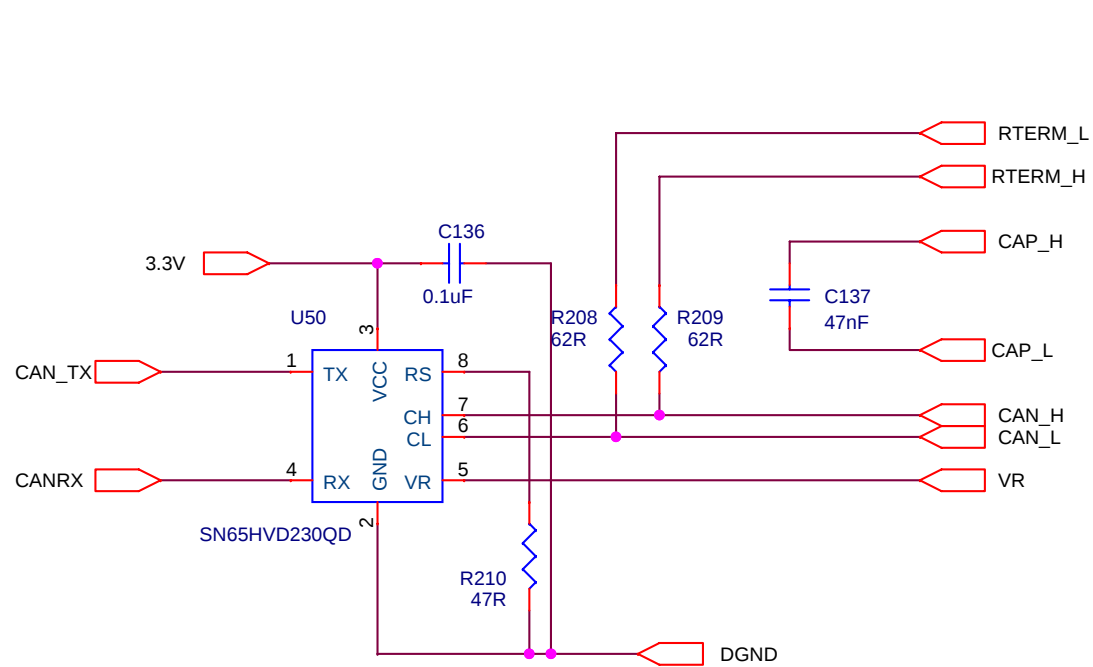
Vacuum Fan Control



Scale Factor = 1.0mV per AMP (uni-directional)
Designed to handle 50A max.

Title Modular - Vacuum Fan			
Size C	Document Number <Doc>		Rev A
Date:	Friday, August 20, 2010	Sheet	21 of 26

CANBUS

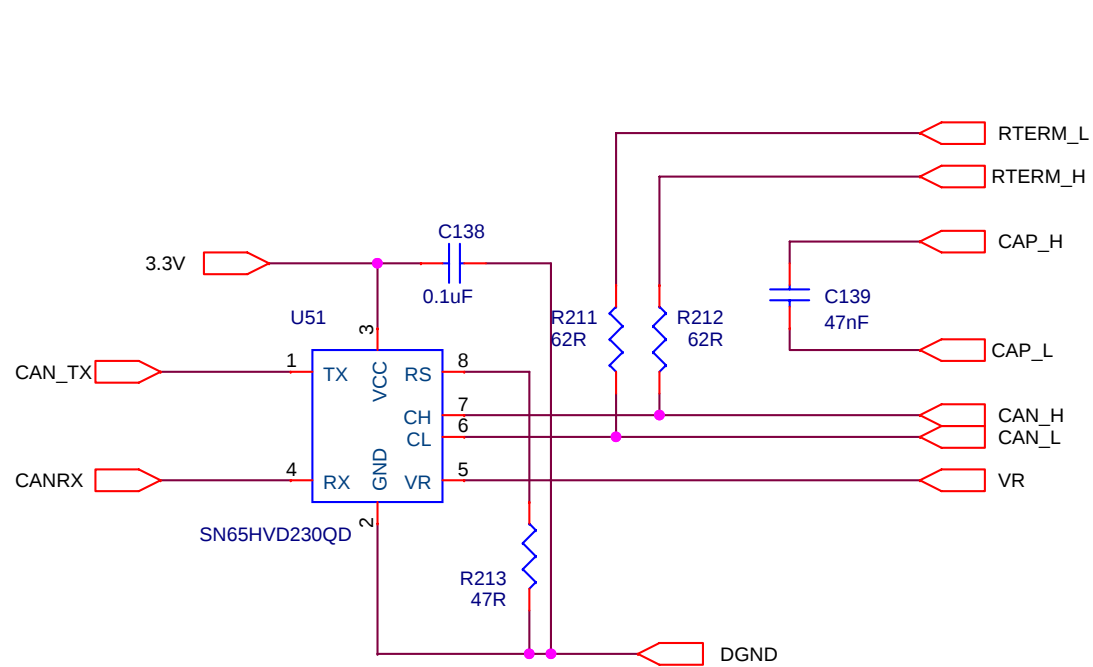


Note:
Connect RTERM_H and RTERM_L
together when transceiver is at an
end-point.

Note:
Connect CAP_H to both RTERM_H and
RTERM_L. Connect CAP_L to DGND when
transceiver is at an end-point.

Title		
Modular - CANBUS		
Size	Document Number	Rev
A	<Doc>	A
Date:	Tuesday, July 20, 2010	Sheet 22 of 26

CANBUS

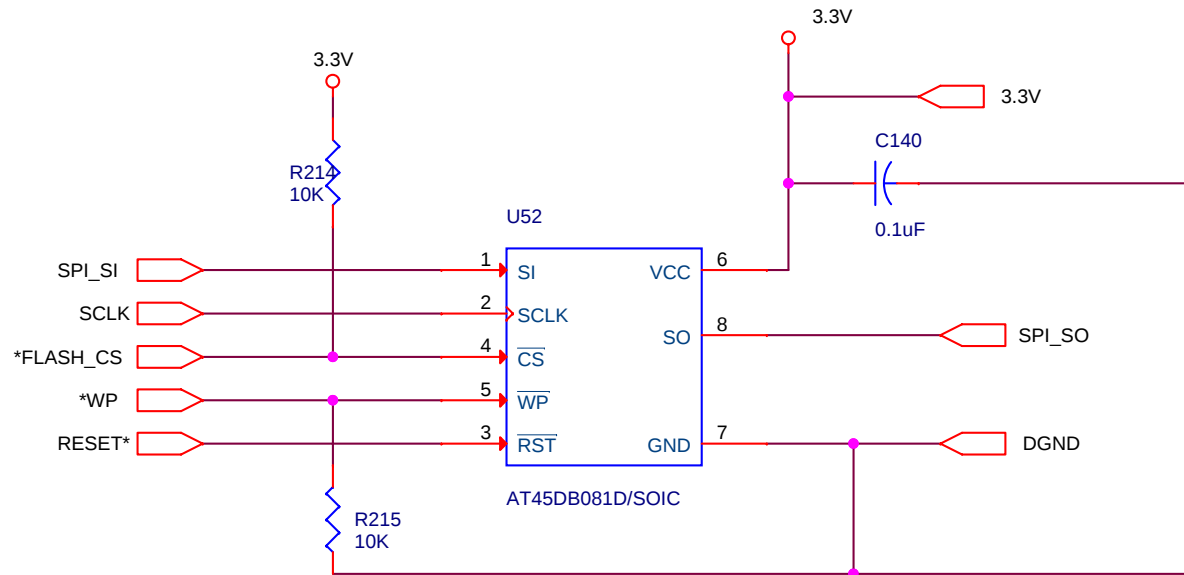


Note:
Connect RTERM_H and RTERM_L
together when transceiver is at an
end-point.

Note:
Connect CAP_H to both RTERM_H and
RTERM_L. Connect CAP_L to DGND when
transceiver is at an end-point.

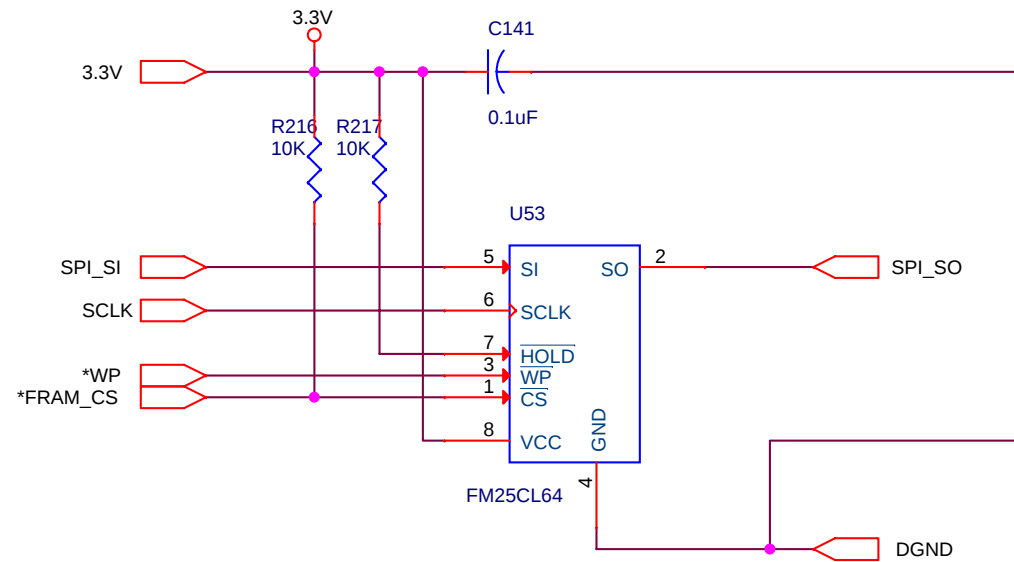
Title		
Modular - CANBUS		
Size	Document Number	Rev
A	<Doc>	A
Date:	Tuesday, July 20, 2010	Sheet 23 of 26

FLASH MEMORY



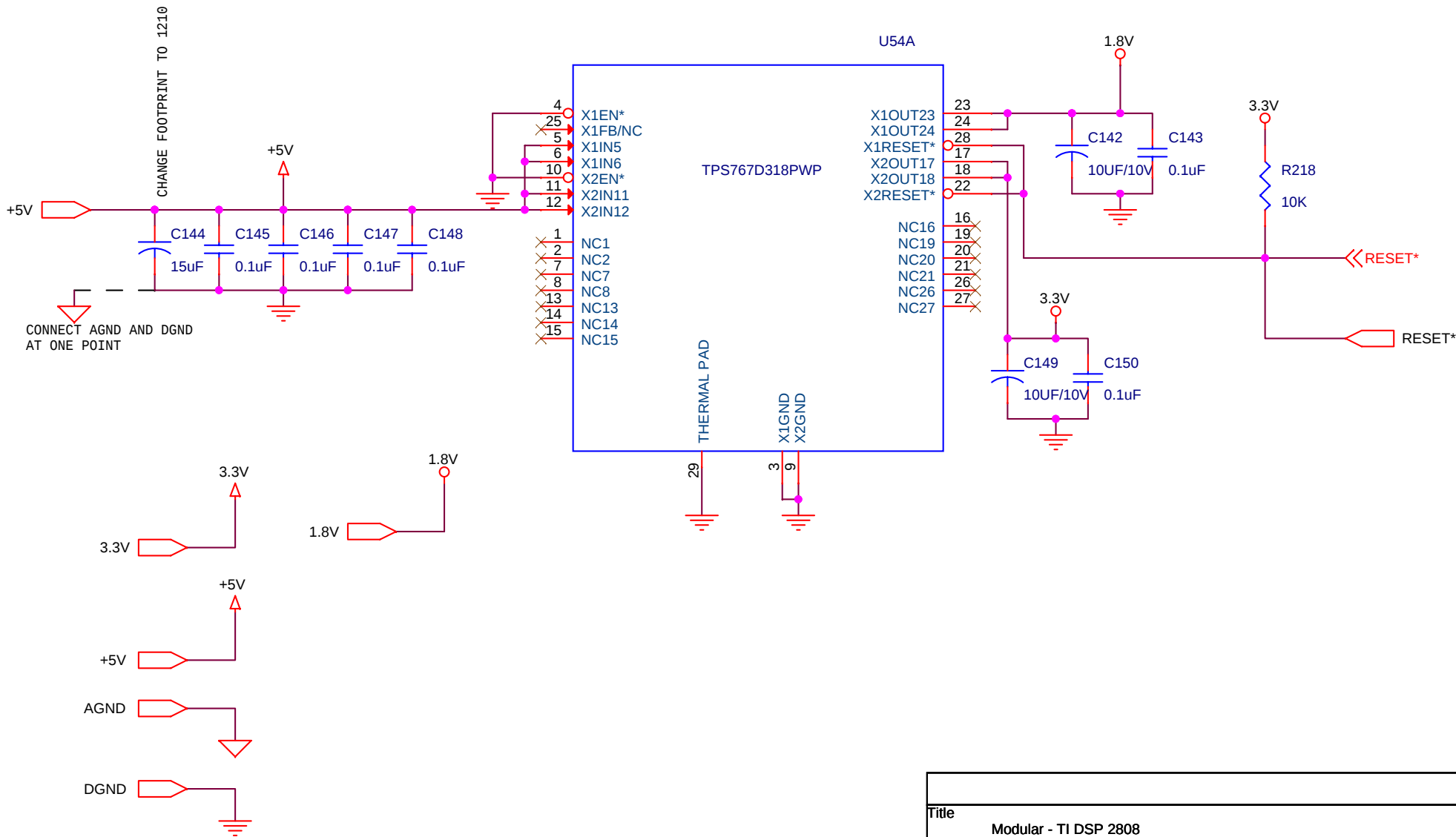
Title		
Modular - FLASH		
Size	Document Number	Rev
A	<Doc>	A
Date:	Wednesday, August 04, 2010	Sheet 24 of 26

FRAM



Title		
Modular - FRAM		
Size A	Document Number <Doc>	Rev A
Date:	Wednesday, August 04, 2010	Sheet 25 of 26

POWER REGULATOR



Title		
Modular - TI DSP 2808		
Size	Document Number	Rev
A	<Doc>	A
Date:	Wednesday, August 04, 2010	Sheet 26 of 26