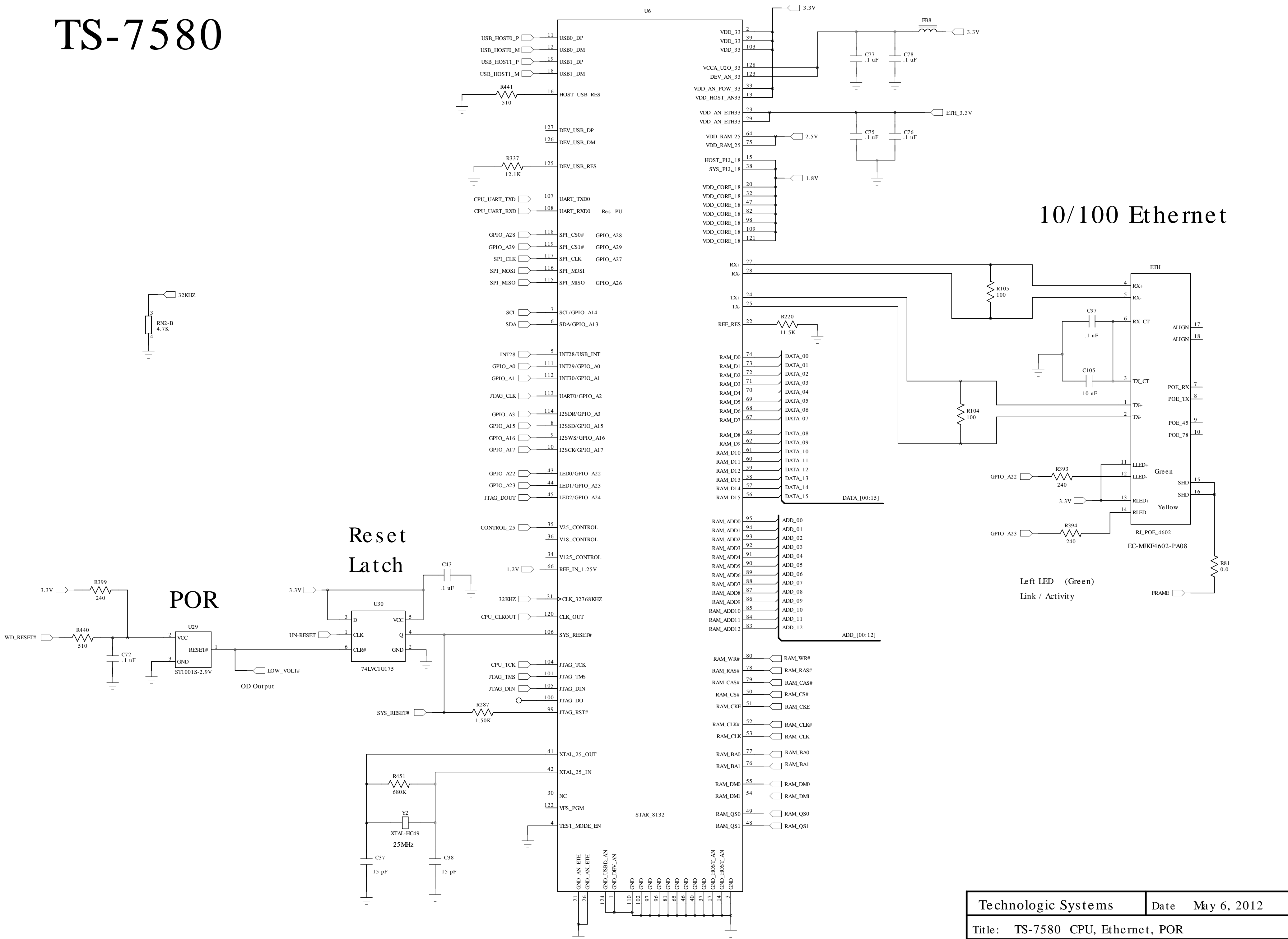


TS-7580



10/100 Ethernet

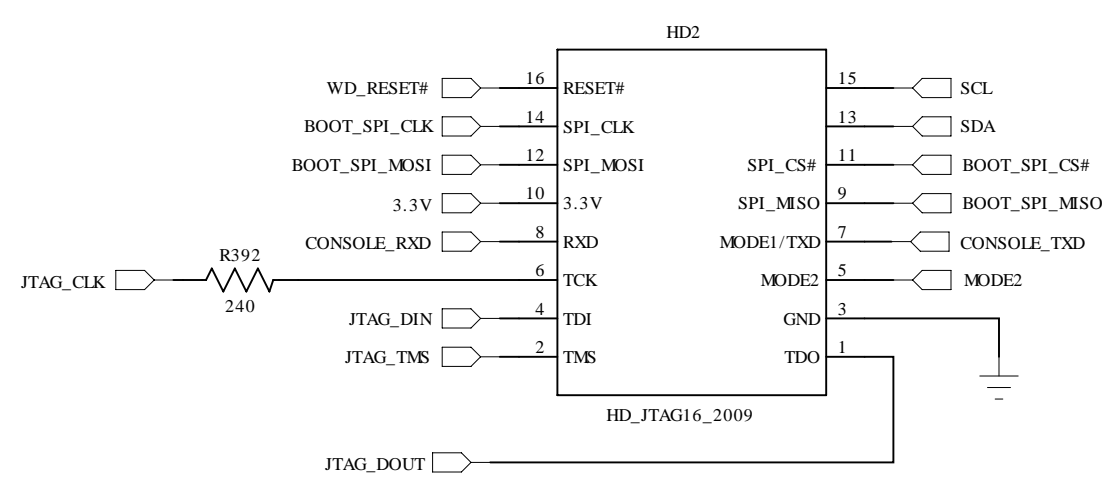
Left LED (Green)
Link / Activity

Technologic Systems		Date	May 6, 2012
Title: TS-7580 CPU, Ethernet, POR			
Rev: A	Designer	Sheet 1 of 25	

JTAG 16-pin Header

FPGA with 8000 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



Mode 1	Mode 2	Boots from
1	1	SPI Flash
1	0	SD Card
0	1	Off-board Flash
0	0	Off-board Flash

MODE1 and MODE2 states are latched when CPU_RESE# is deasserted

MODE1 = CONSOLE_TXD

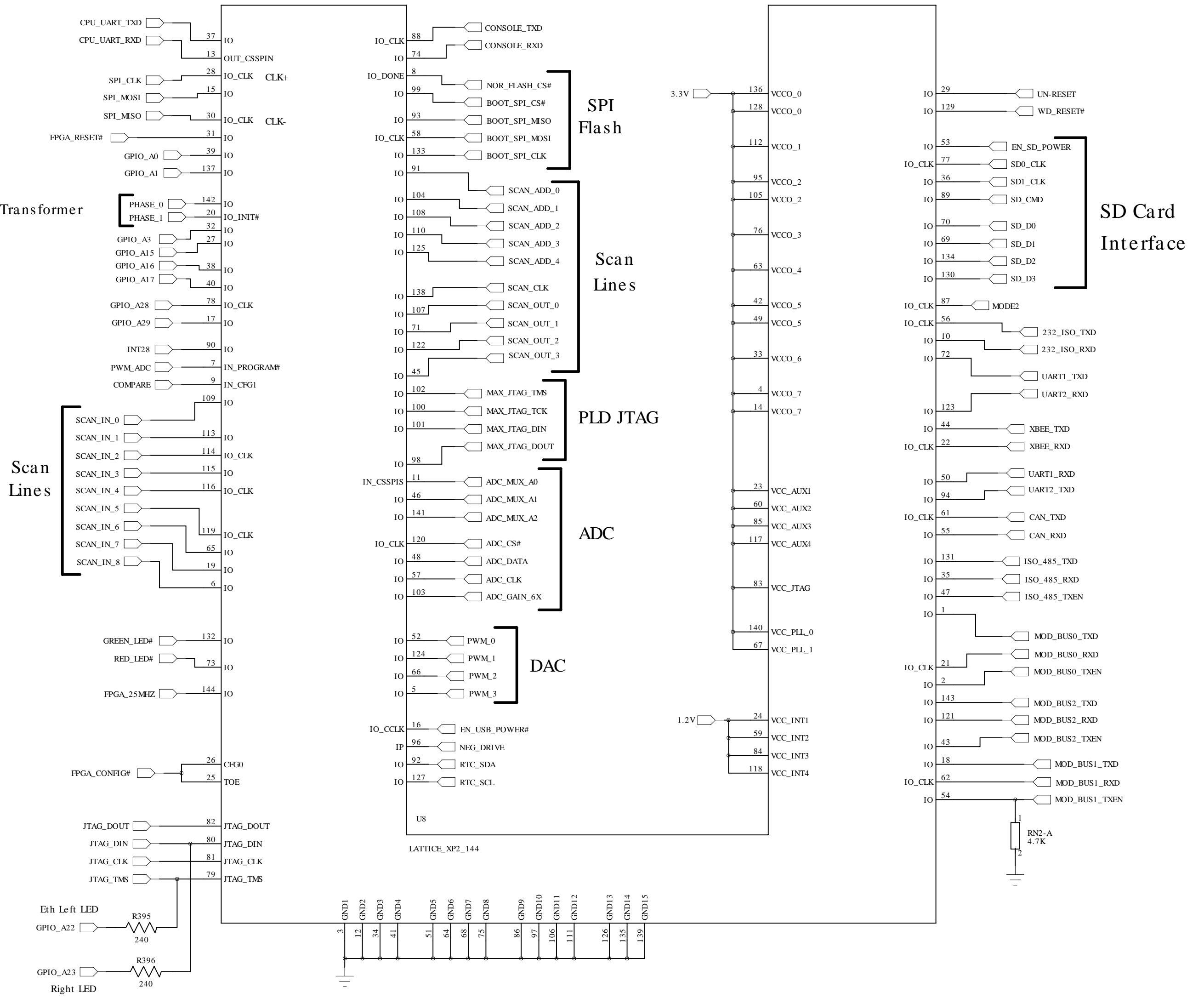
Console always is enabled

Board ID bits

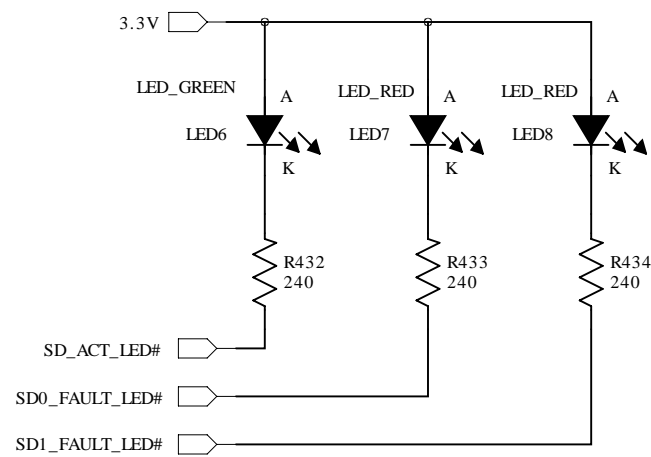
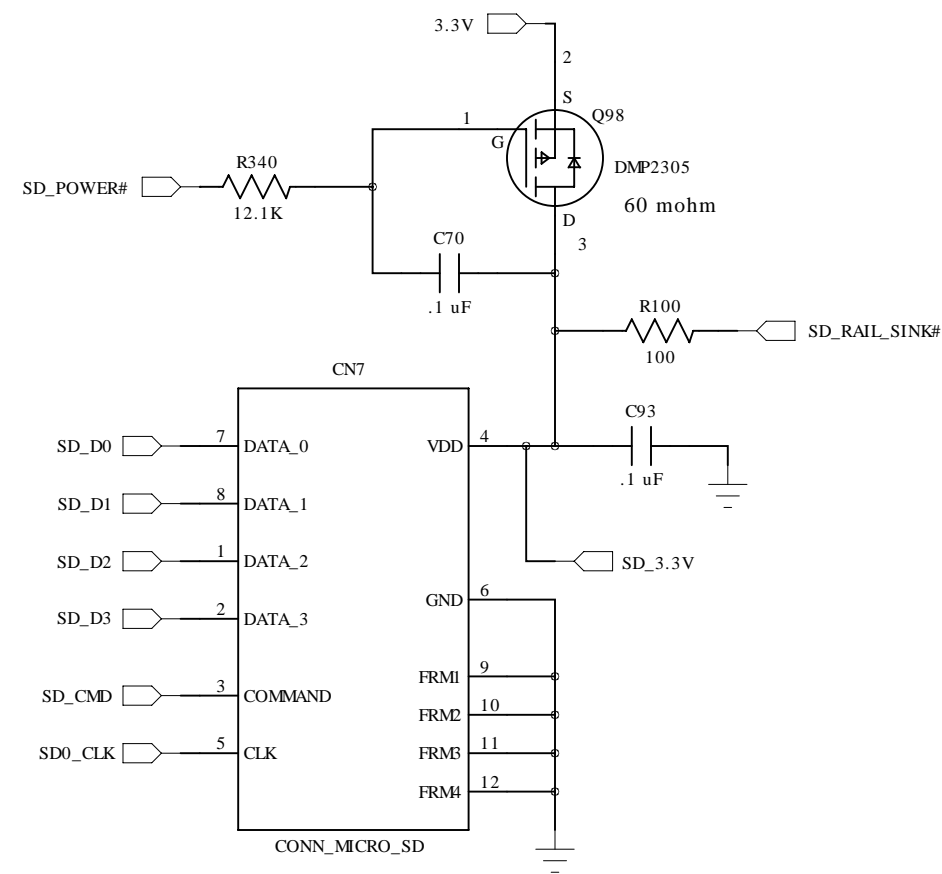
	Pin 54 (weak PU)	Pin 138 (weak PD)	Pin 71	Pin 37	Hex	Pin 72	Pin 122	Pin 107 (weak PU)
TS-7500	1	1	1	1	F	Float		
TS-7550	1	1	0	1	B	Float		
WM-7551	0	0	1	1	C	Float		
TS-7552	1	0	1	1	D	1		
TS-7553	1	0	0	1	9	1		
TS-7554	0	0	0	1	8	1		
TS-7558	0	1	0	1	A	1		
TS-7520	0	1	1	1	E	1	1	1
TS-4500	0	0	0	0	0	Float		
TS-7580	0	1	1	1	E	1	1	0

7552 and 7553 FPGA pin 93 = MISO
 TS-7554 = Softek TxPort001

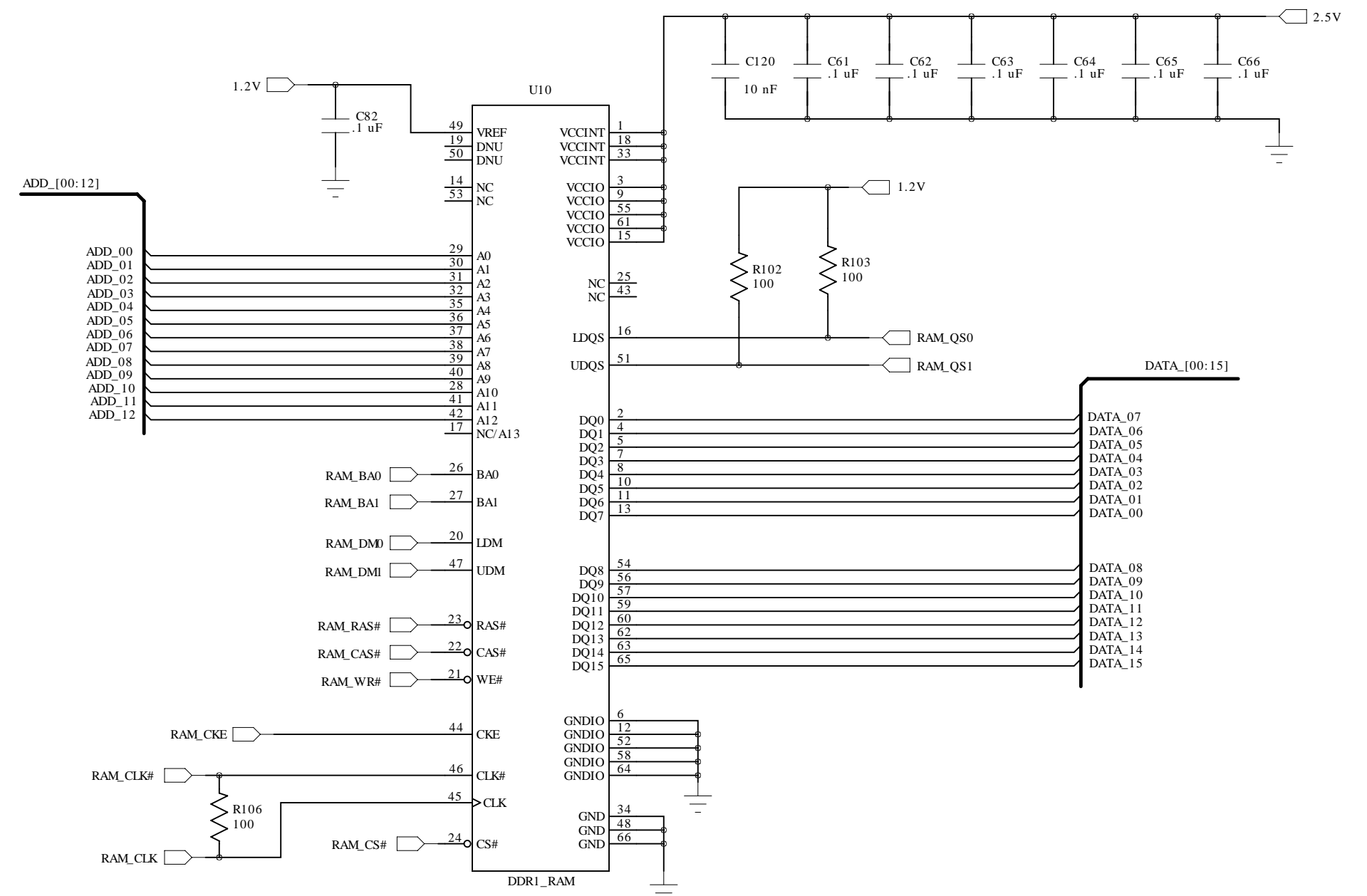
Drives Transformer
 Page 7



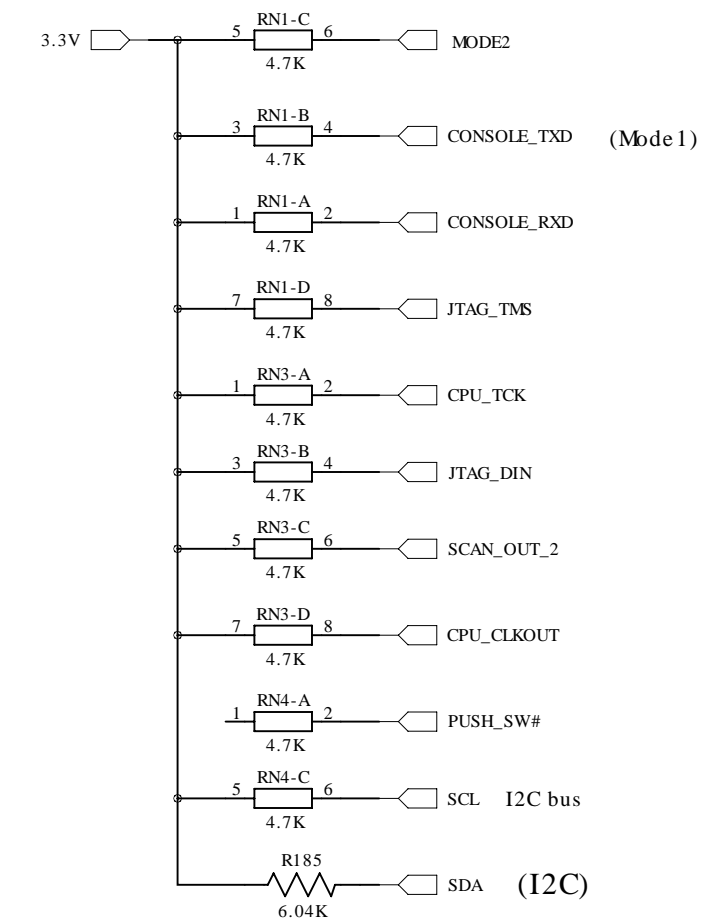
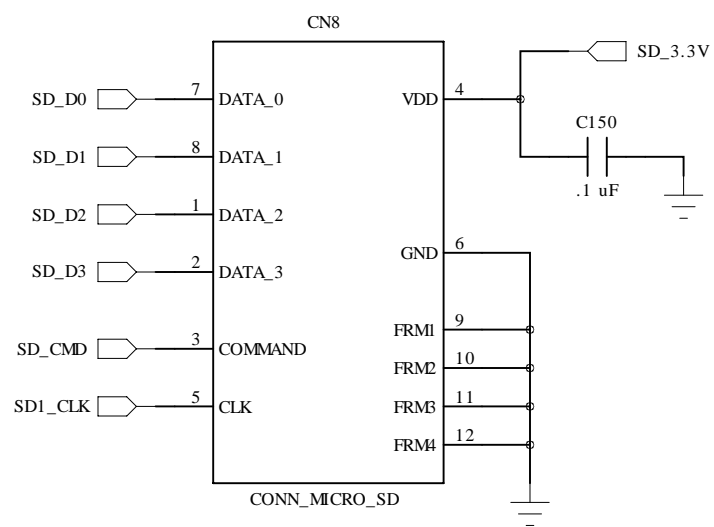
Micro SD Card Socket # 0



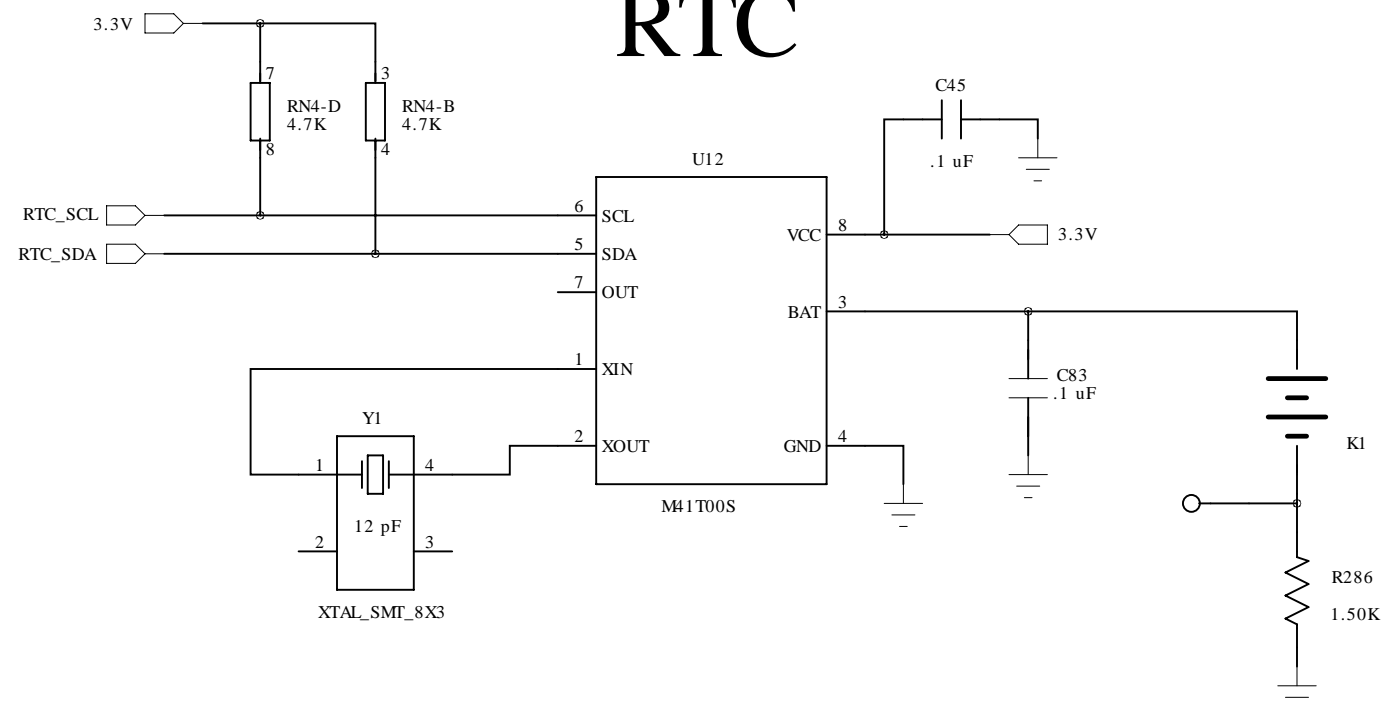
64 Mbyte DDR1 SDRAM



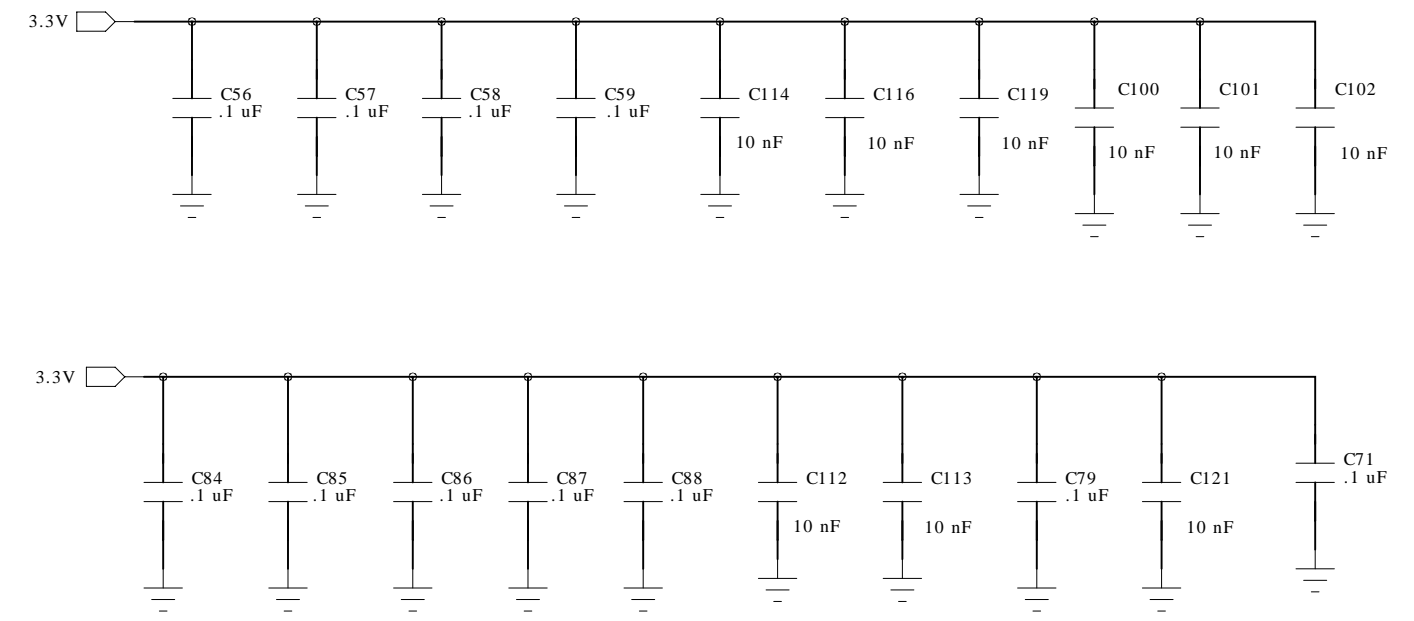
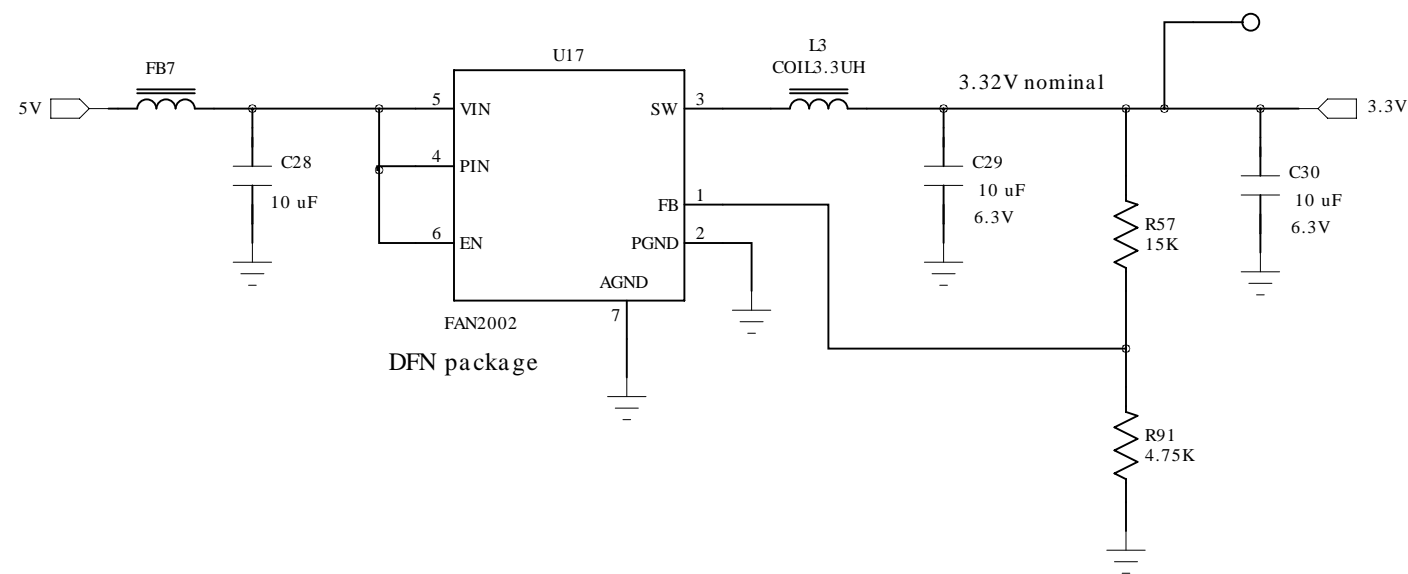
Micro SD Socket # 1



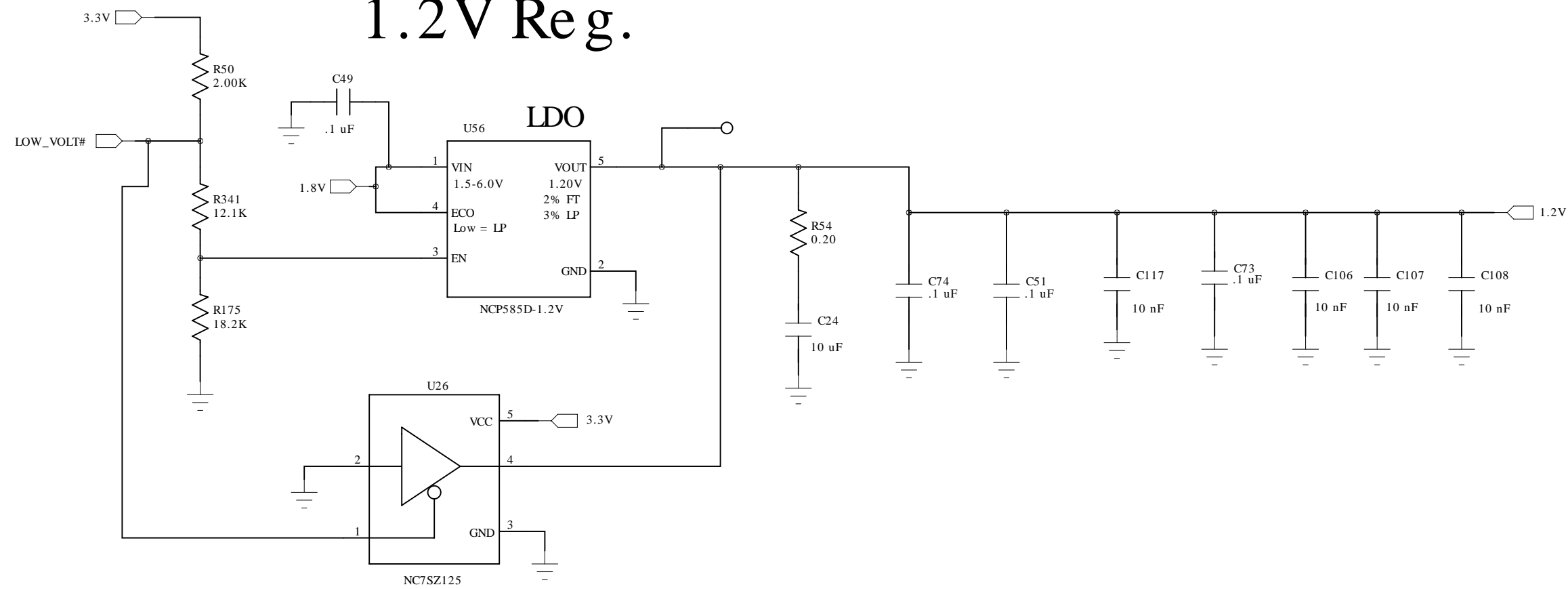
RTC



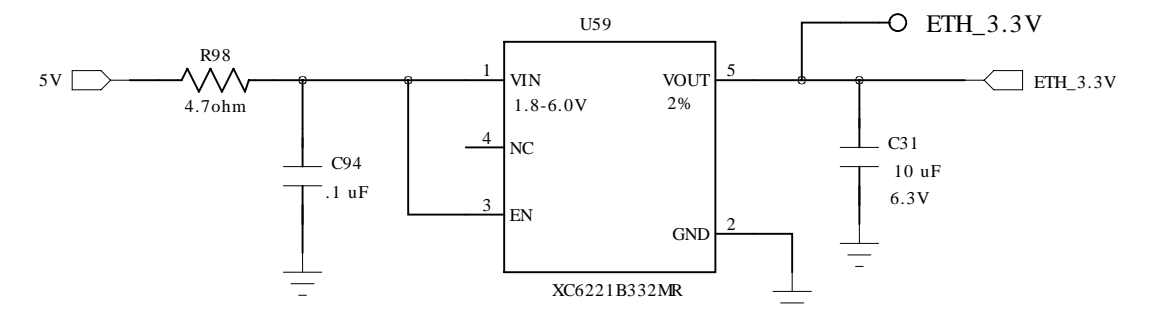
3.3V Regulator



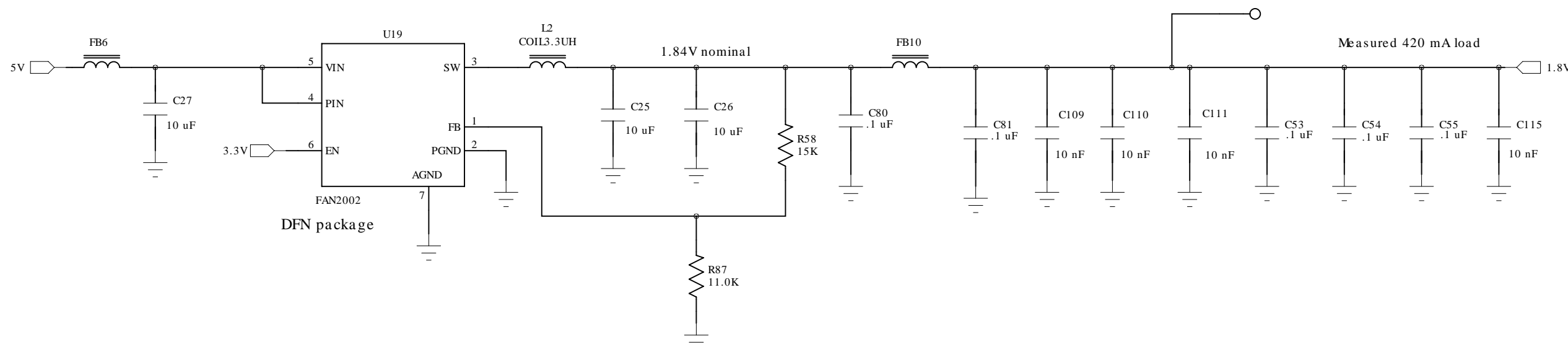
FPGA Core 1.2V Reg.



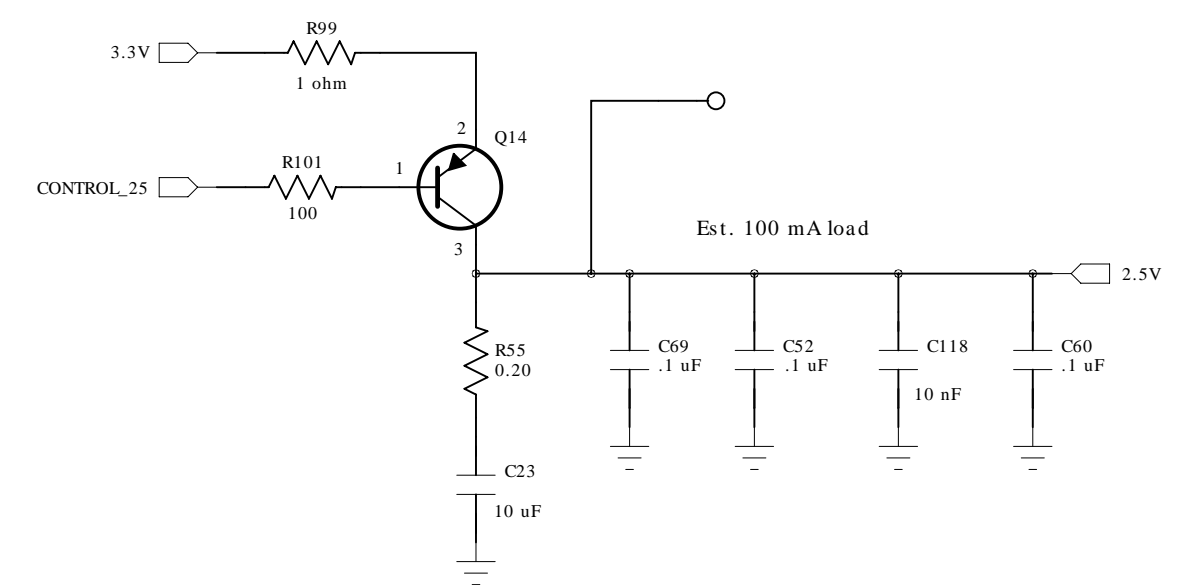
Ethernet Analog 3.3V



1.8V Regulator

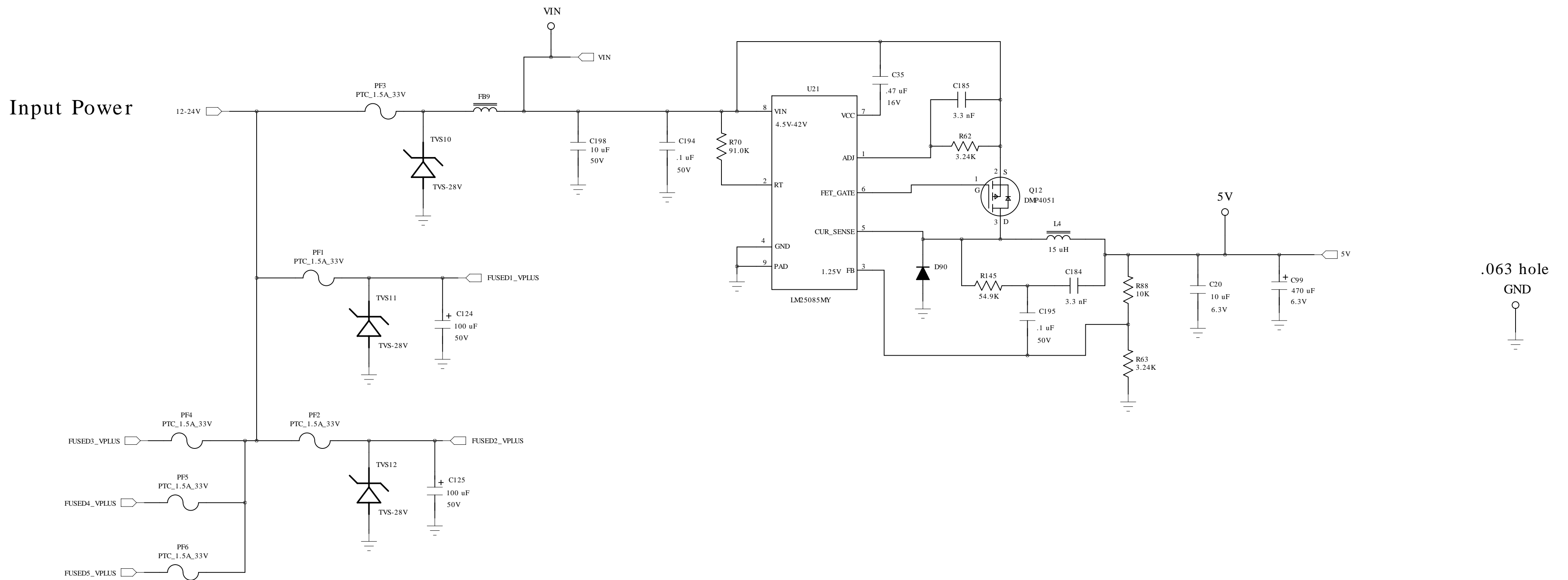


2.5V Regulator

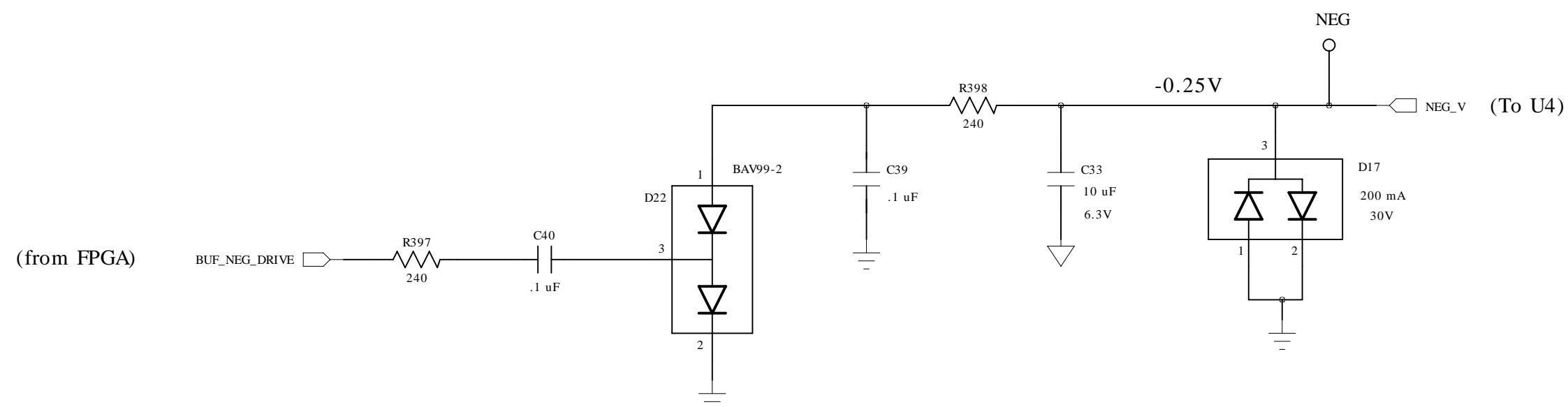


Technologic Systems	Date May 6, 2012
Title: TS-7580 Power Supplies	
Rev: A	Designer RLM Sheet 4 of 25

5V Power Supply (2.0 Amps)



Negative Rail for ADC Op Amp

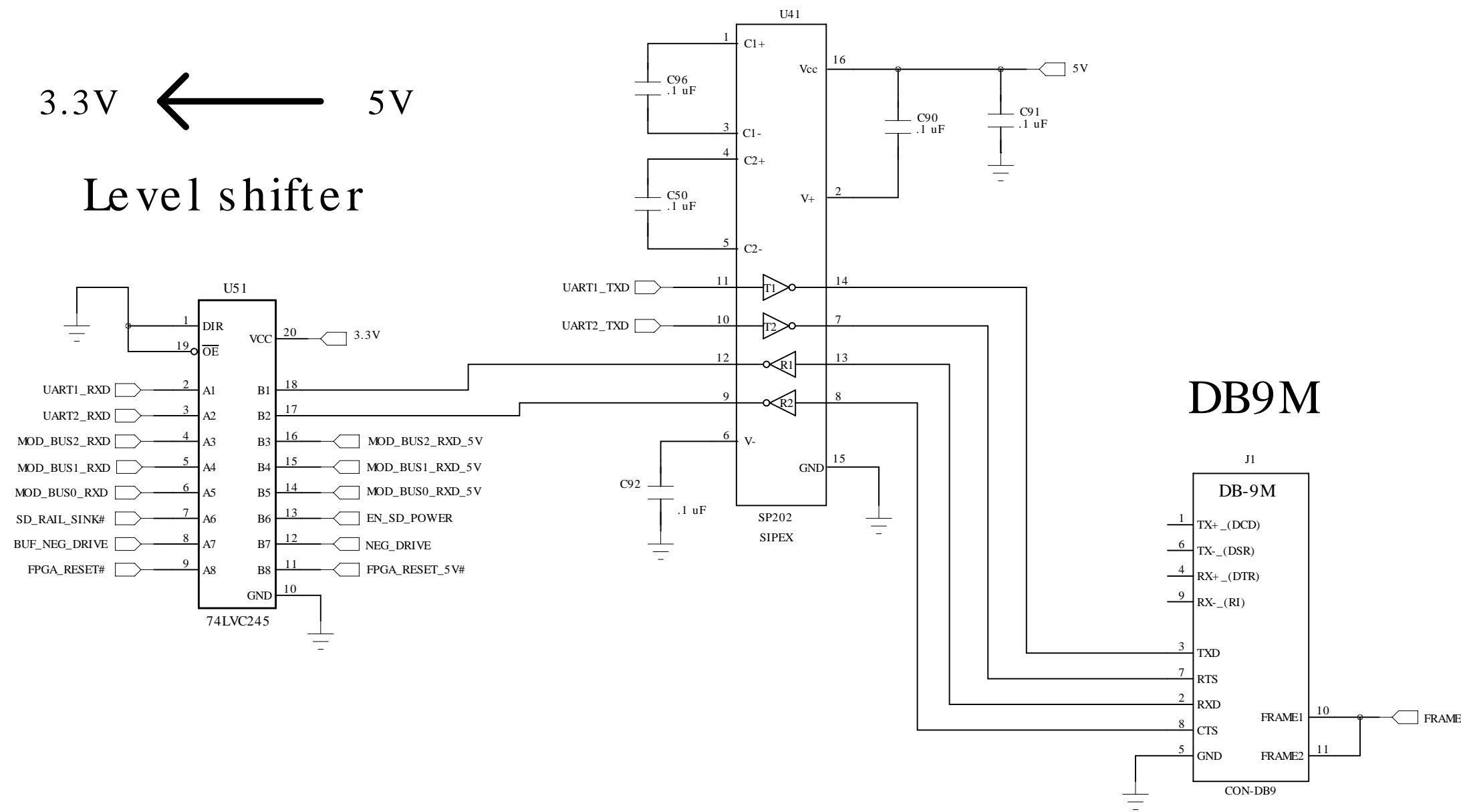


Technologic Systems	Date: May 6, 2012
Title: TS-7580 5V Power and Neg. Rail	
Rev: A	Designer
Sheet 5 of 25	

RS-232 Transceiver

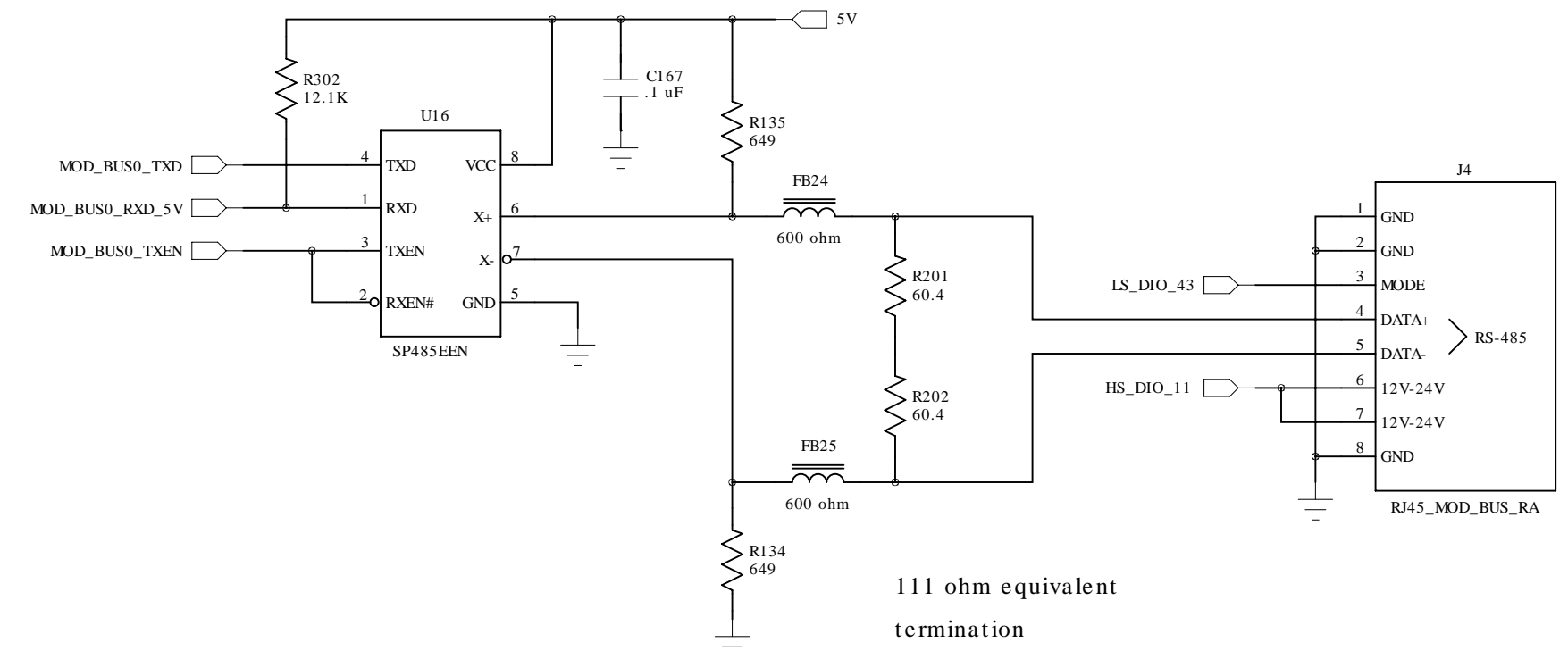
3.3V ← 5V

Level shifter



MOD Bus # 0

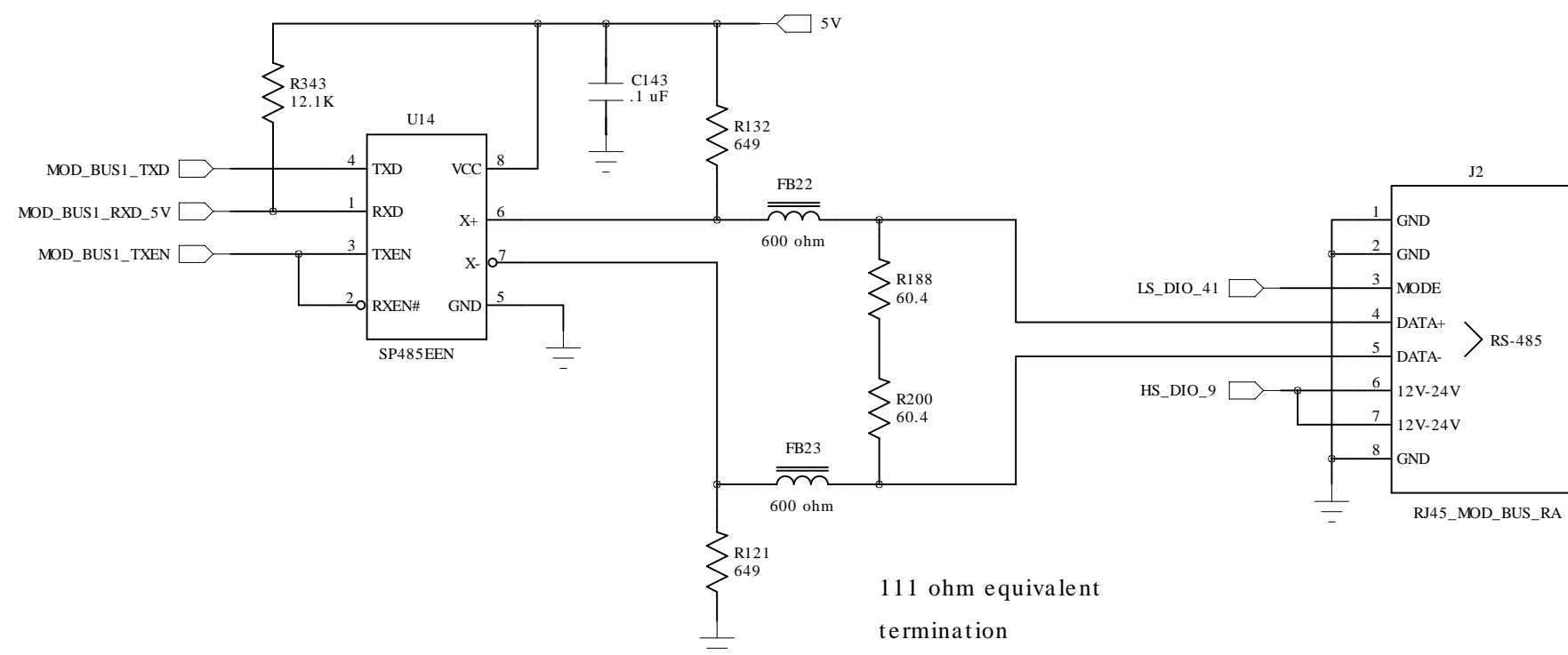
RS-485 Driver



111 ohm equivalent termination

MOD Bus # 1

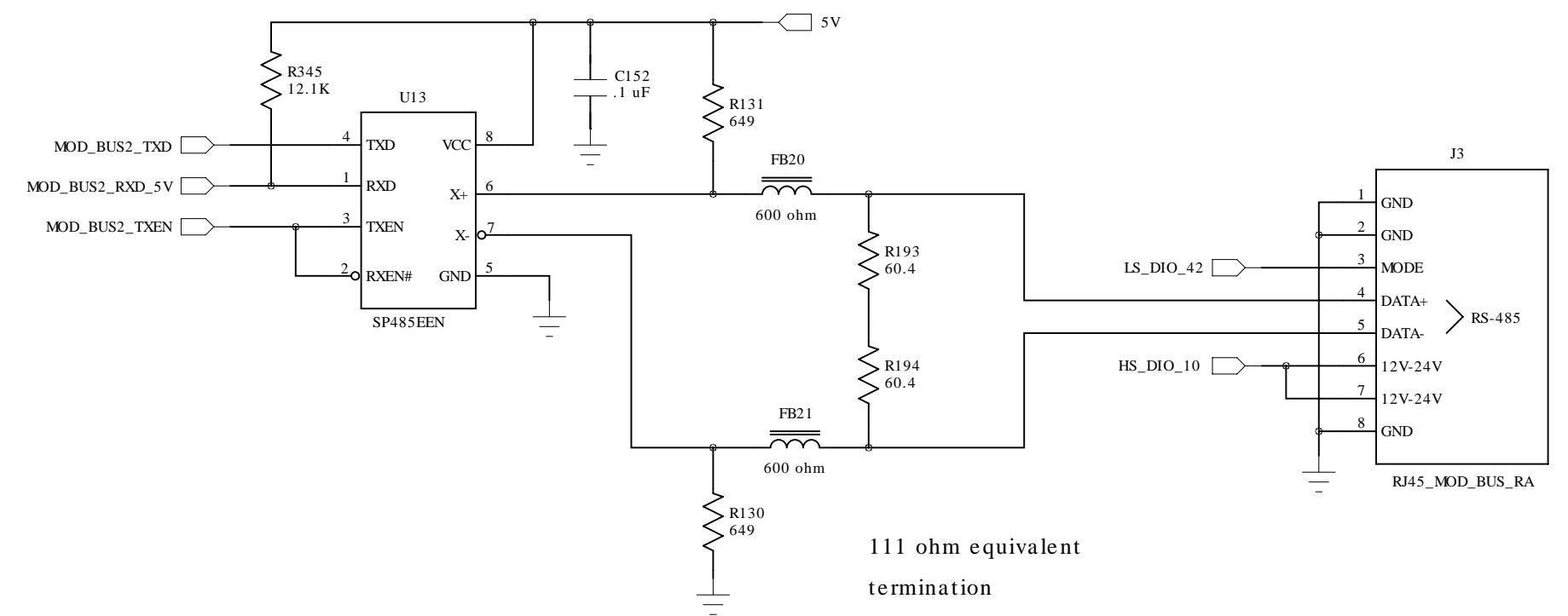
RS-485 Driver



111 ohm equivalent termination

MOD Bus # 2

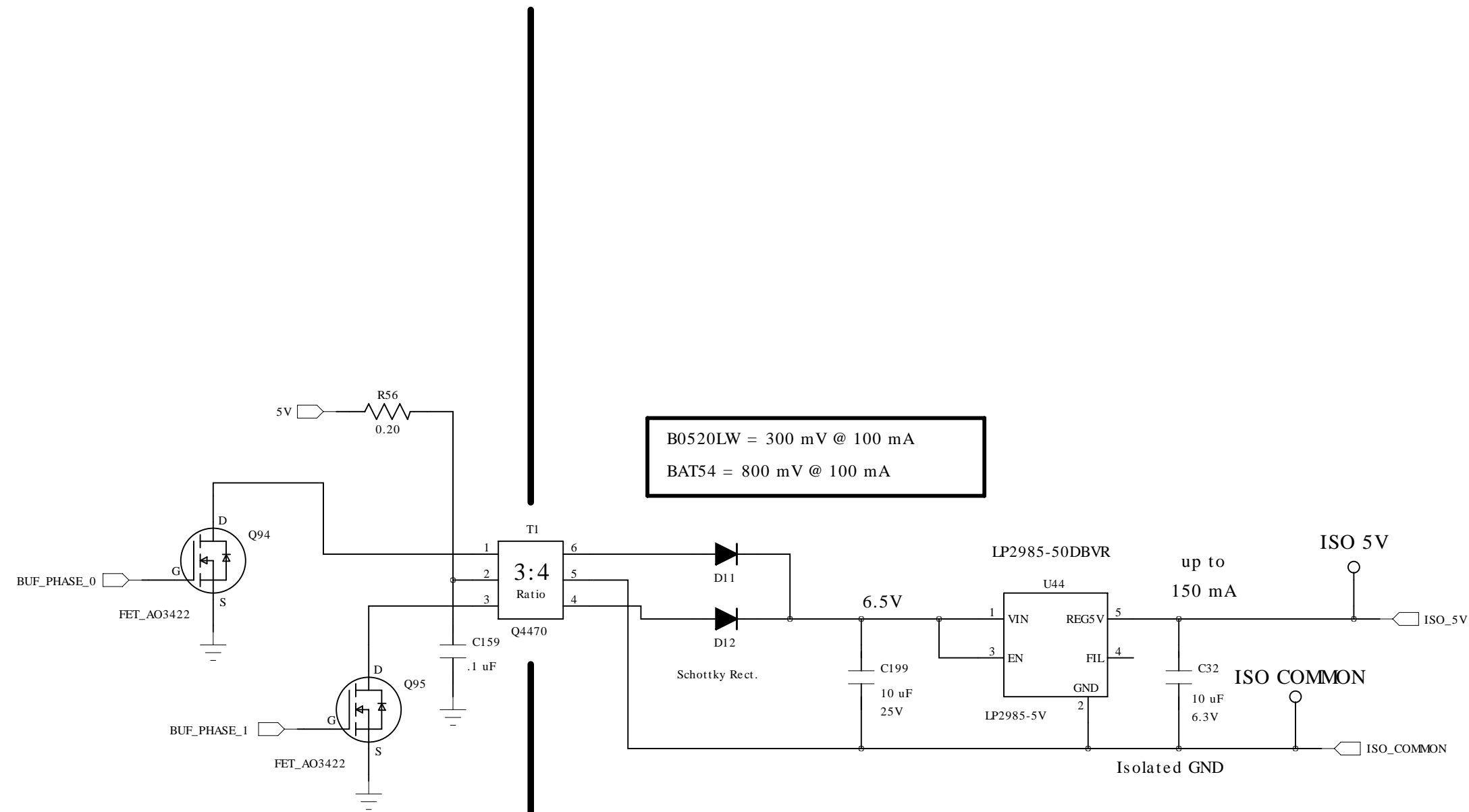
RS-485 Driver



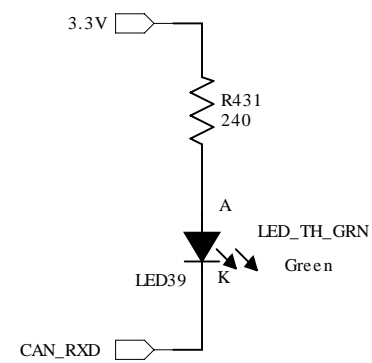
111 ohm equivalent termination

Technologic Systems	Date	May 6, 2012
Title: TS-7580 COM port, CAN, RS-485		
Rev: A	Designer	RLM
Sheet		6 of 25

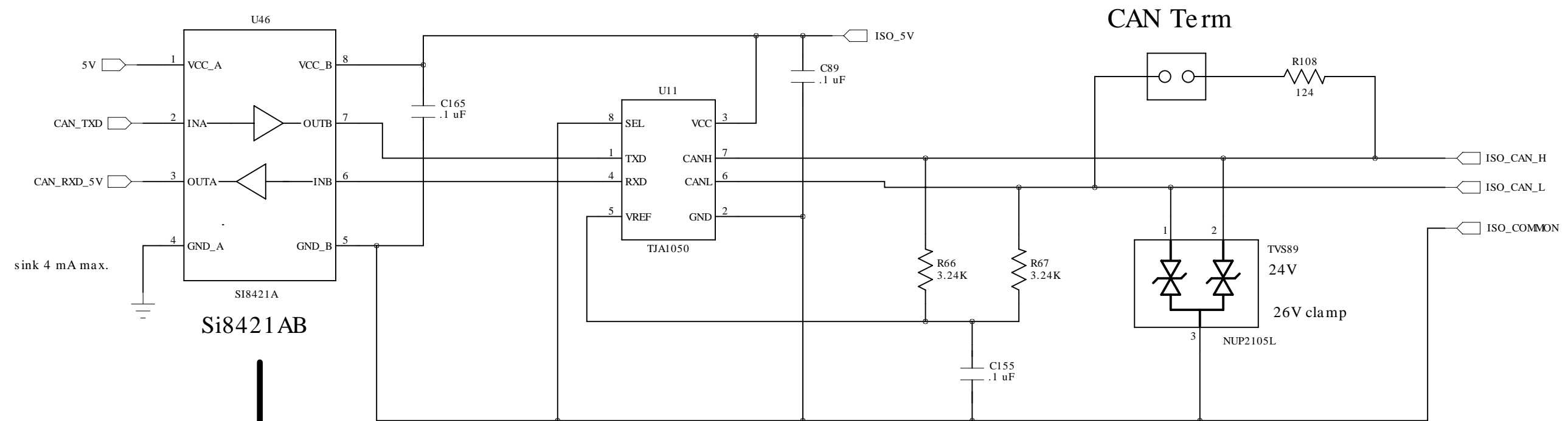
Opto-Isolated Power and Isolated CAN



CAN Activity LED

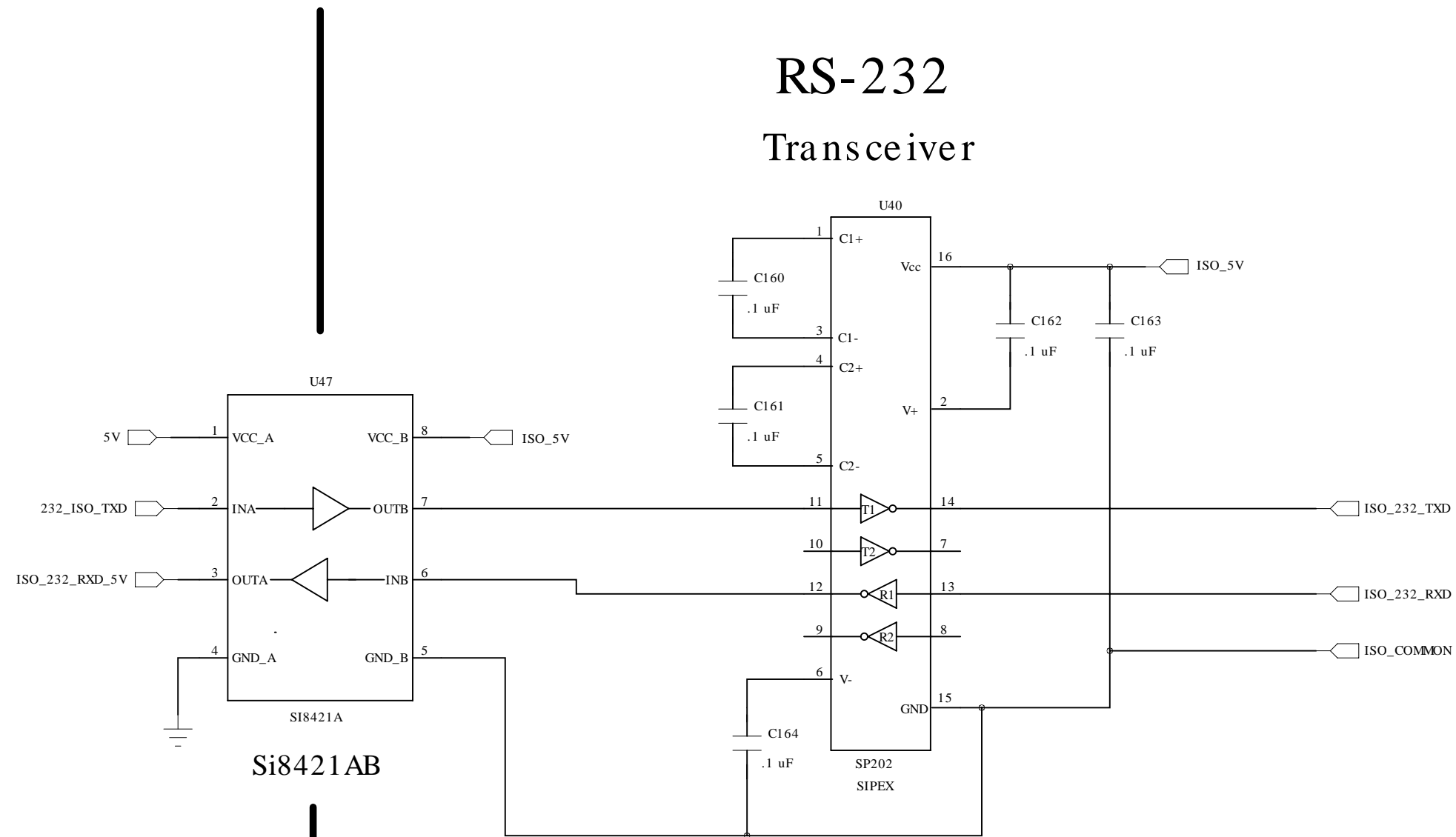


CAN Transceiver

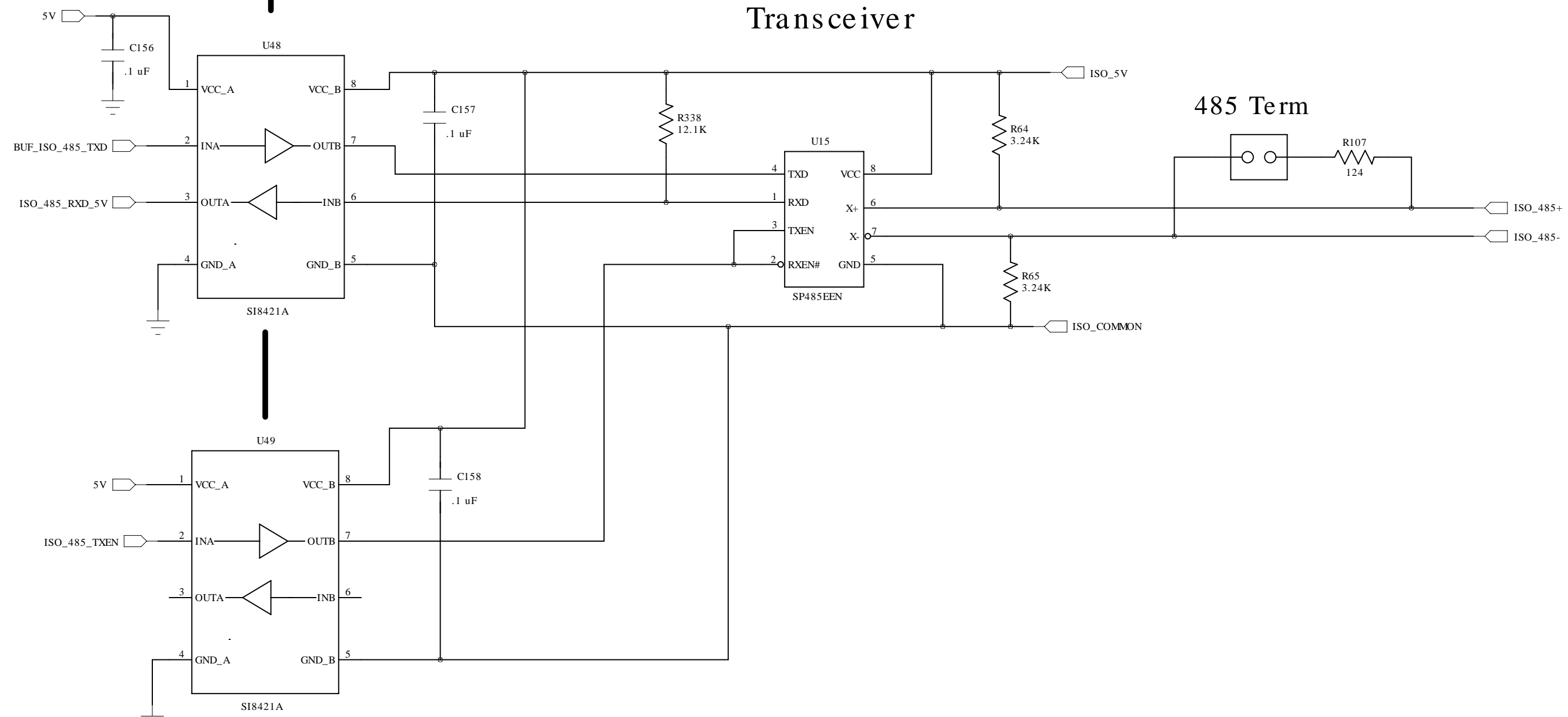


Isolated RS-232 and RS-485

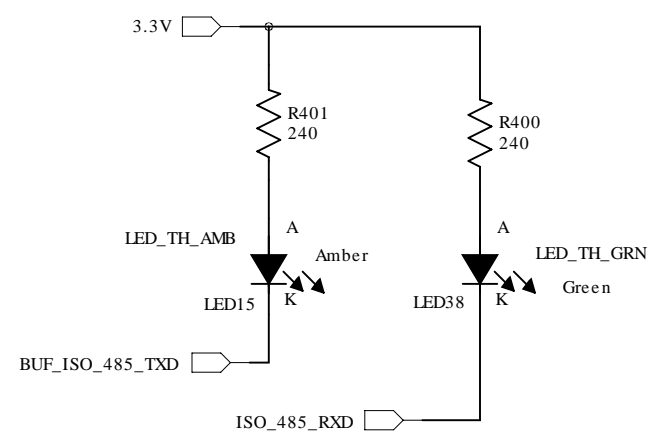
RS-232 Transceiver



RS-485 Transceiver

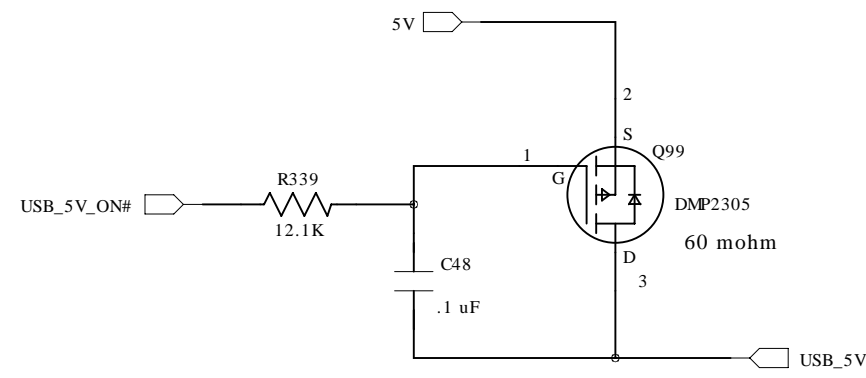


RS-485 LEDs

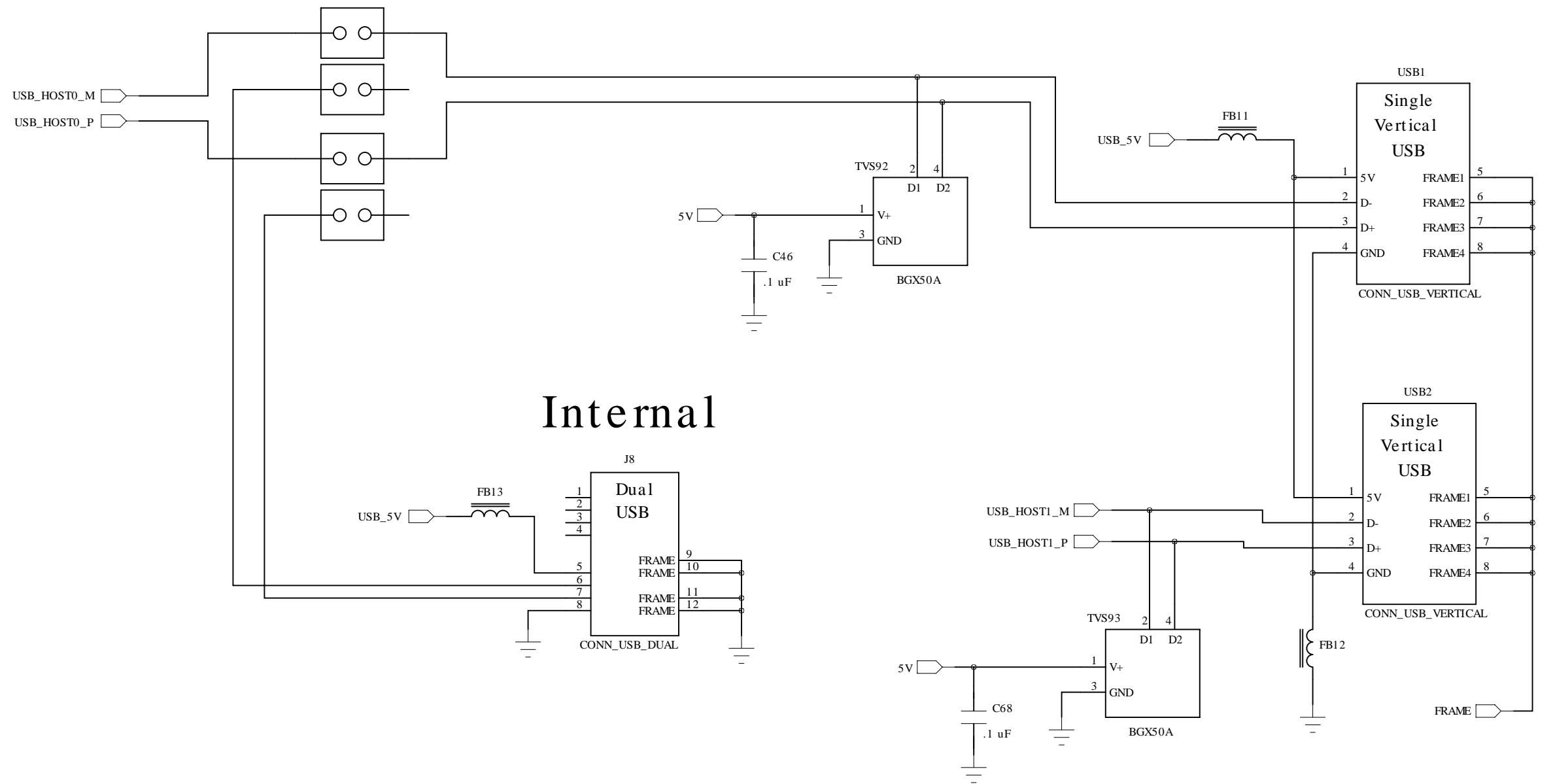


Technologic Systems	Date	May 6, 2012
Title: TS-7580 Isolated RS-232 and RS-485		
Rev: A	Designer	Sheet 8 of 25

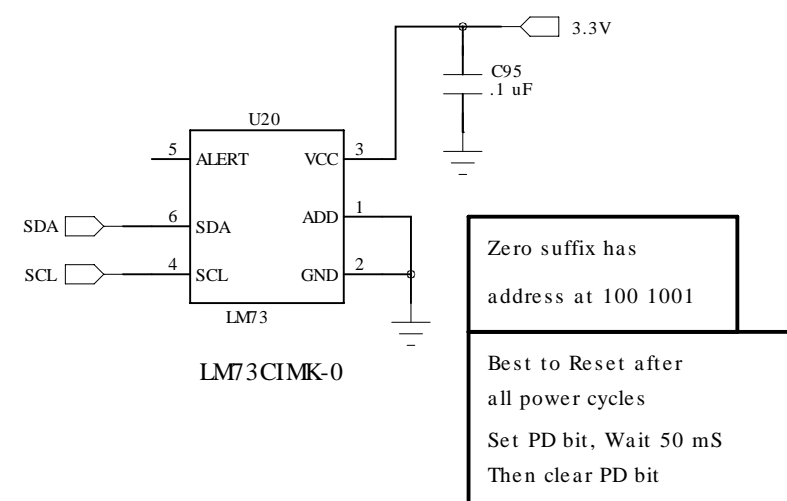
USB Power Switch



USB ports

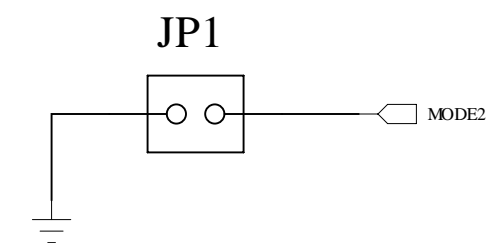
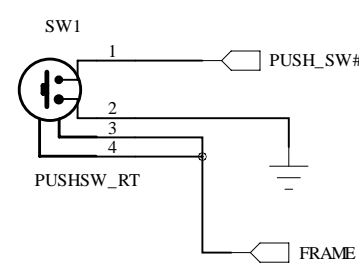


Temp Sensor



Force Boot to SD card

Push Switch



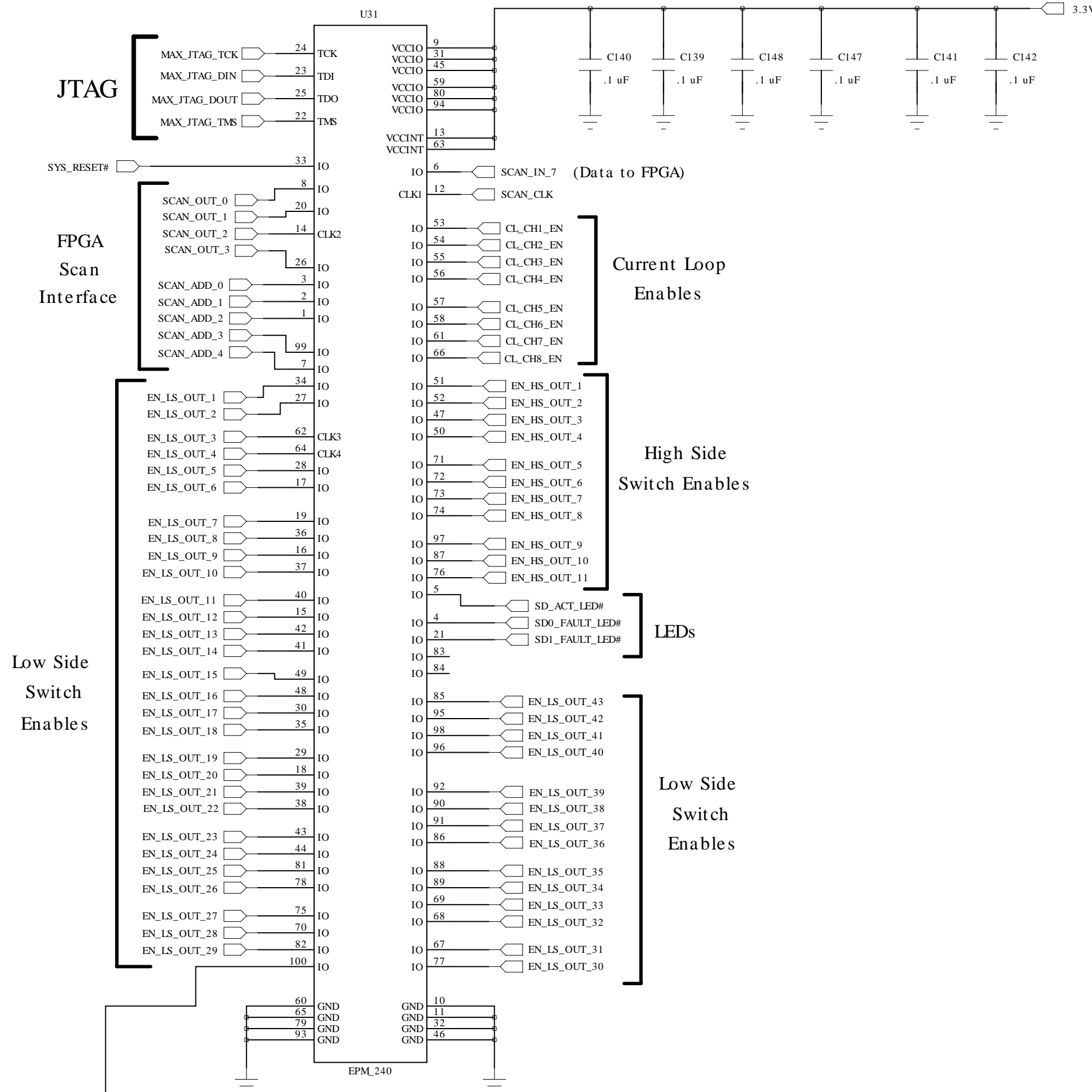
Technologic Systems	Date	May 6, 2012
Title: TS-7580 USB, Temp Sensor, Flash		
Rev: A	Designer	RLM
		Sheet 9 of 25

2 Isolated Inputs

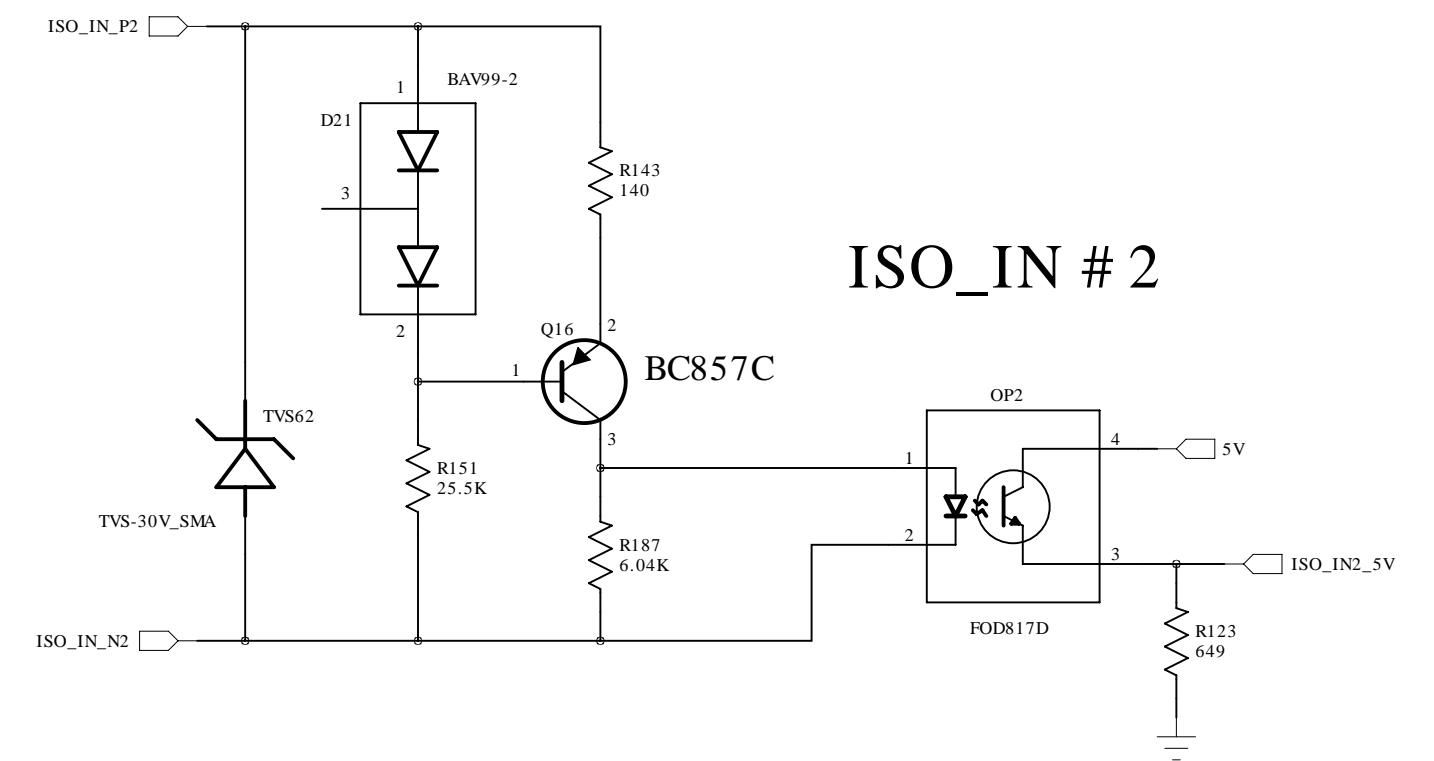
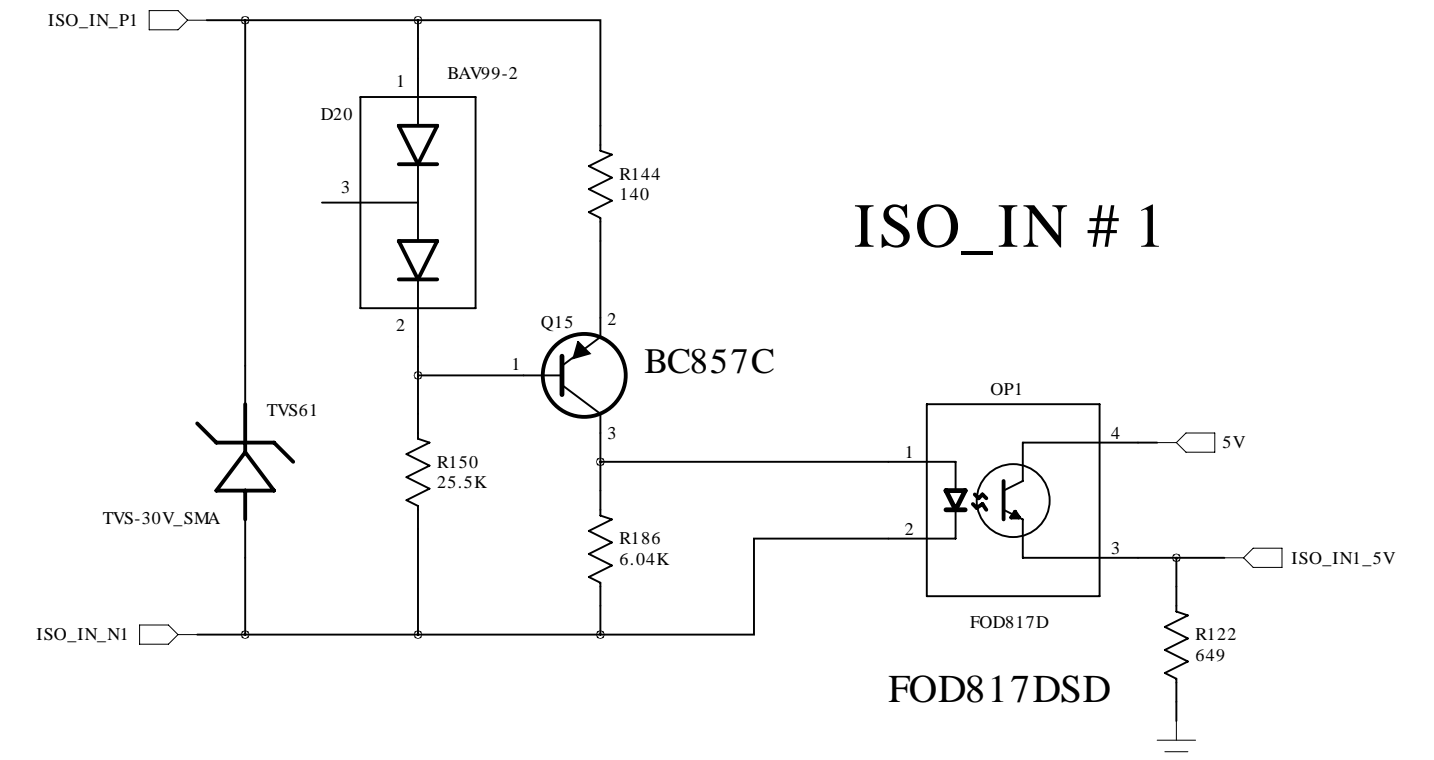
PLD

SYS_RESET# sets all Outputs deasserted except for RED_LED# Does not affect NV Flag

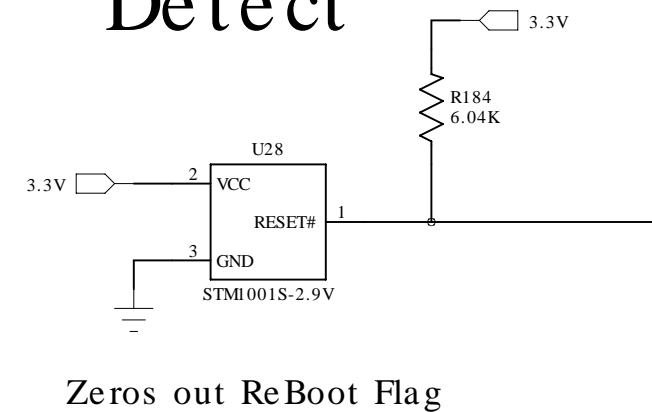
Power Cycle clears NV Flag



50 KHz Bandwidth
32V tolerant



Power Cycle Detect



66 Outputs to write
8 Inputs to read

8 bits of Input =
6 PLD Version
2 NV ReBoot Flag

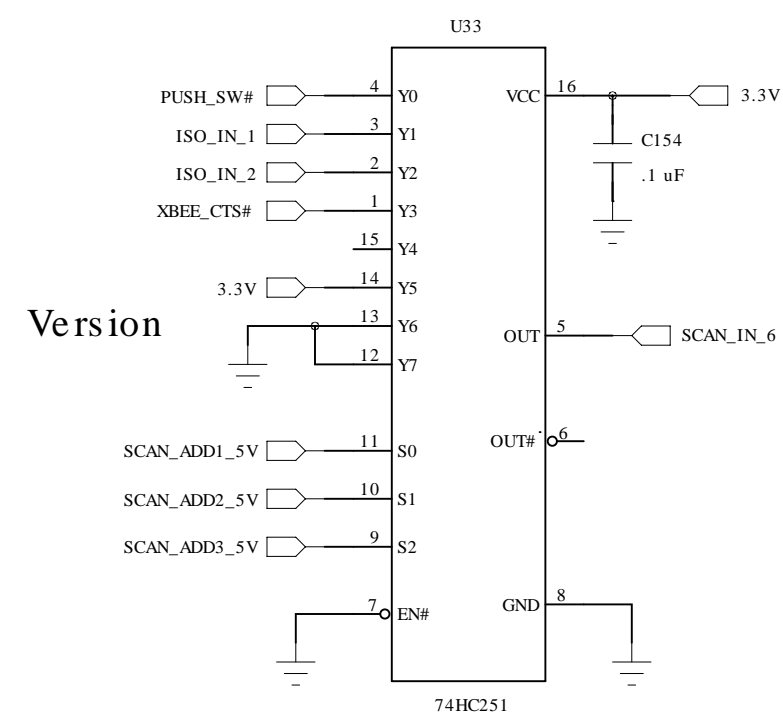
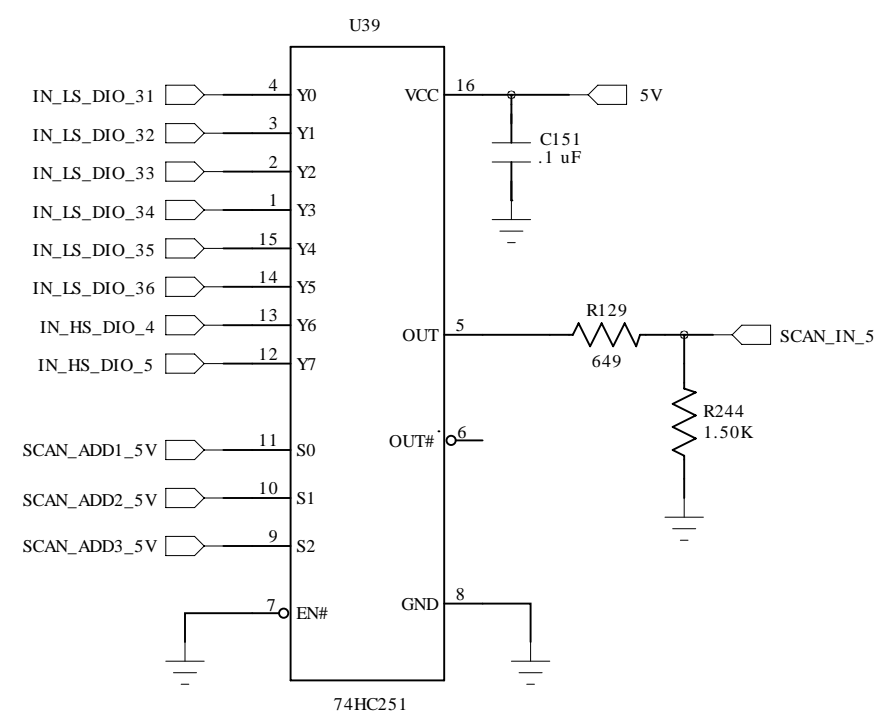
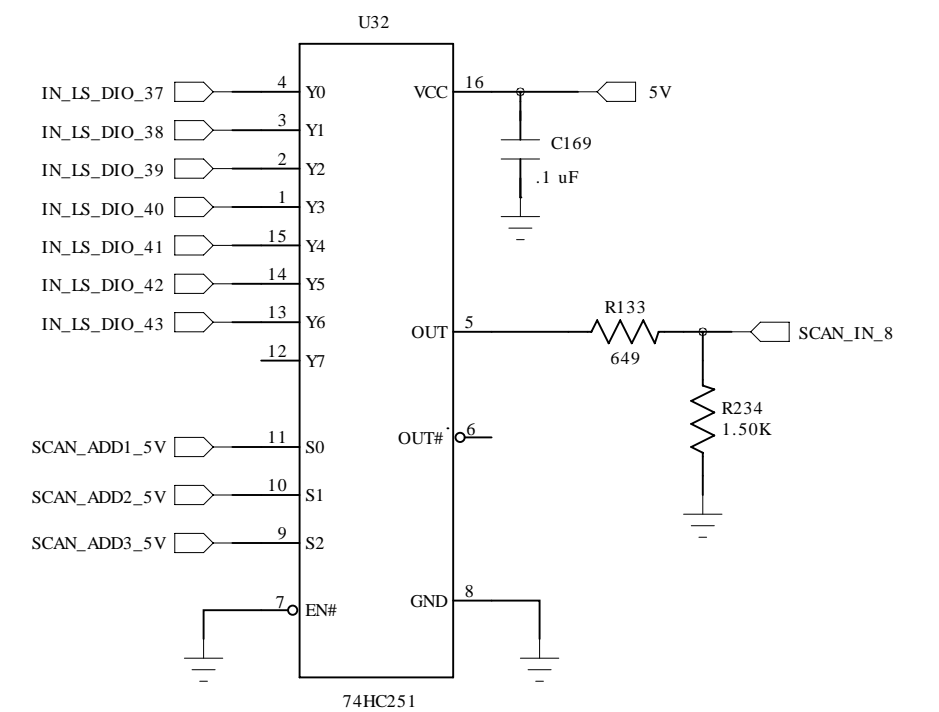
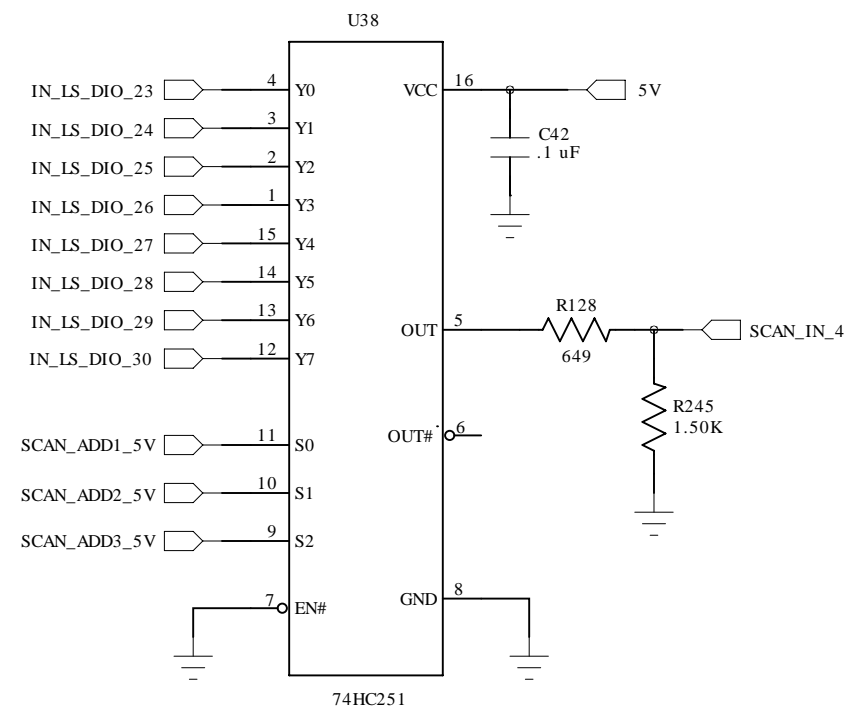
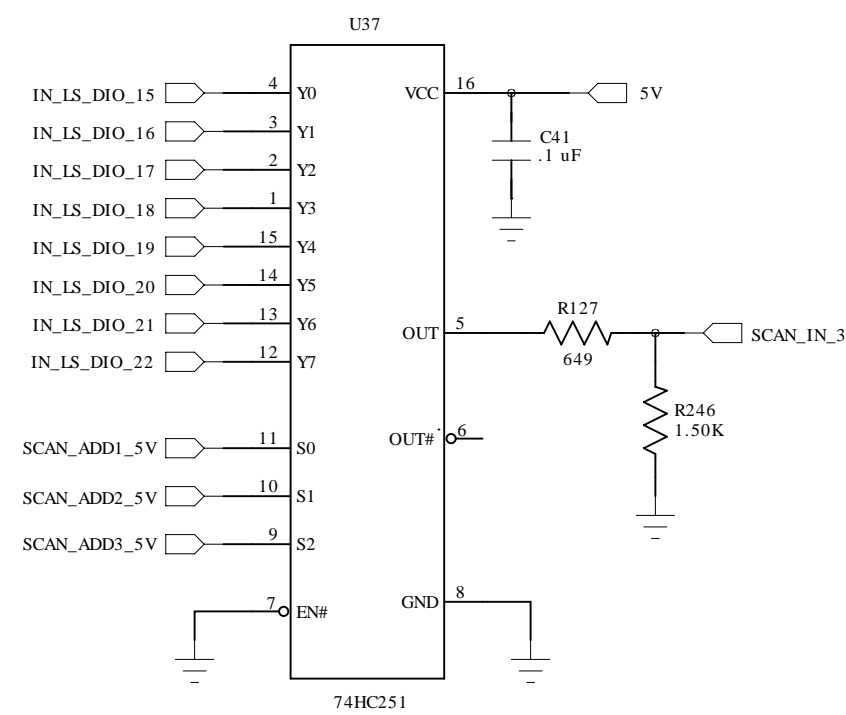
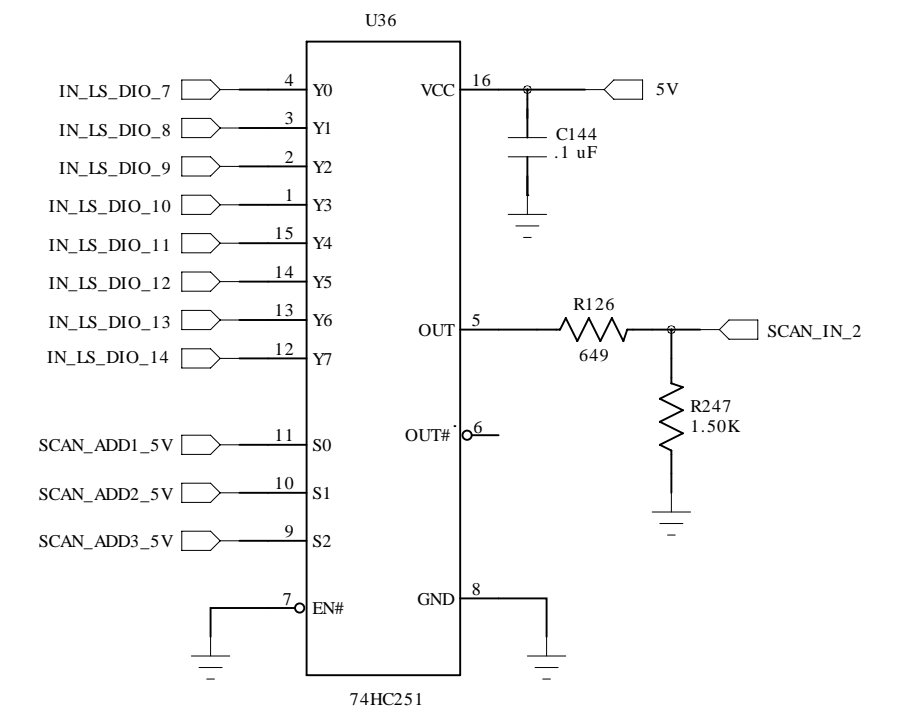
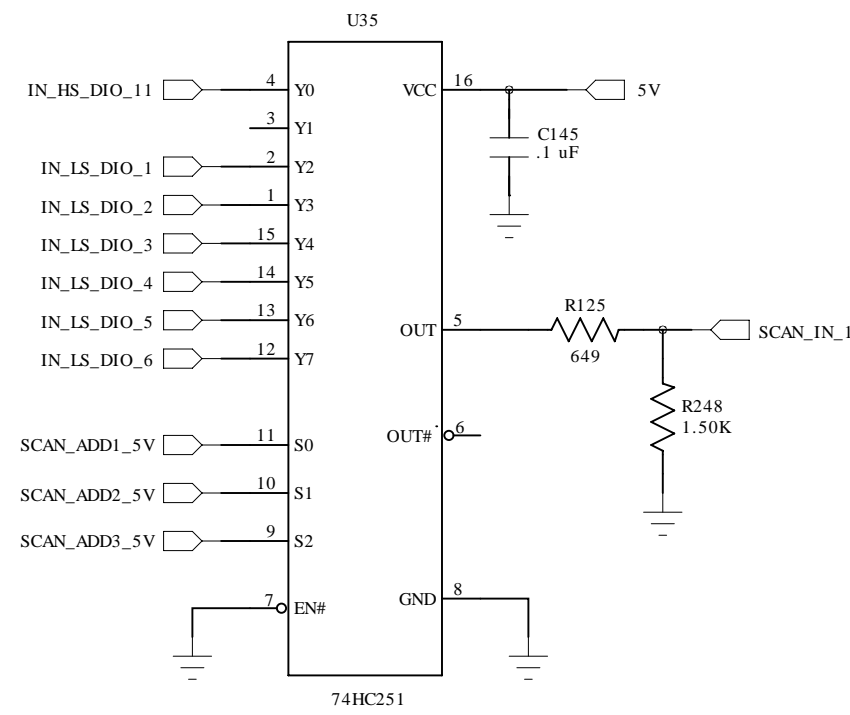
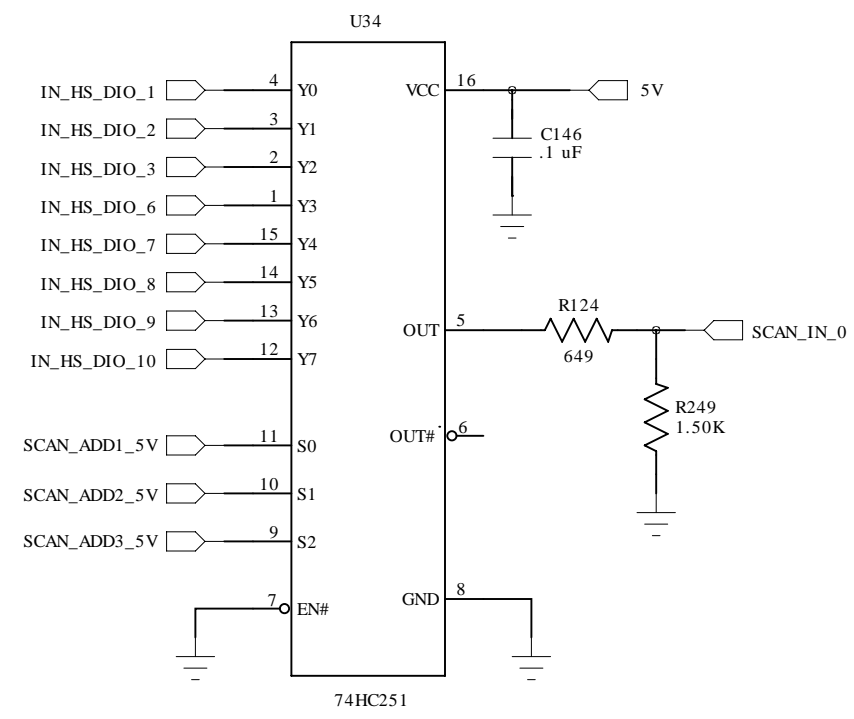
ReBoot Flag

- 0 = Power Cycle
- 1 = Soft Reset
- 2 = WatchDog
- 3 = ?

Reg. = 66 + ReBoot Flag = 68 bits total

Technologic Systems	Date: May 6, 2012
Title: TS-7580 PLD and Isolated Dig. Inputs	
Rev: A	Designer
Sheet 10 of 25	

MUXEs for Scanning Inputs



8 Channels of 12-bit A/D

ADC notes

Input Impedance = >110 Kohm

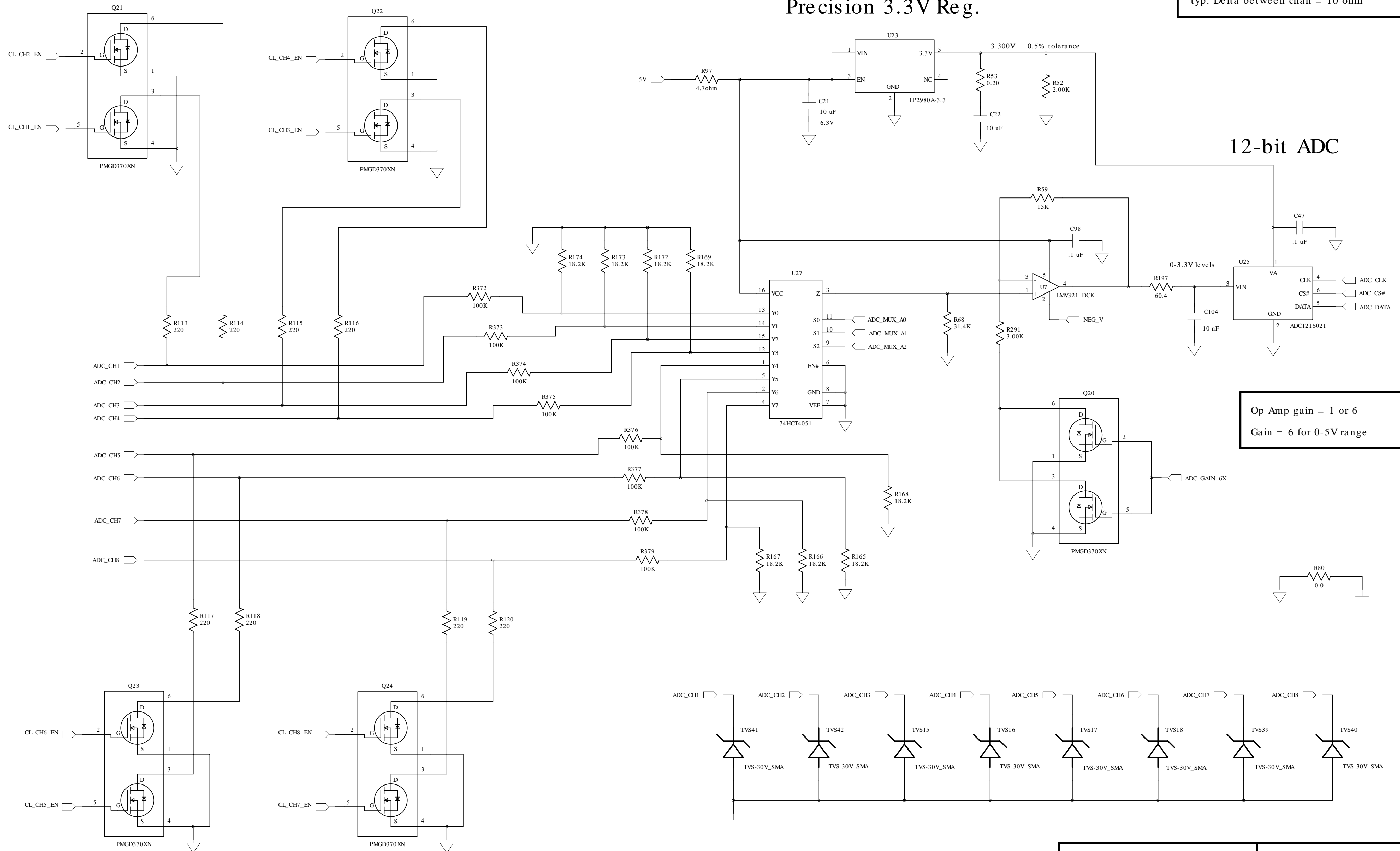
TVS adds 1000-3000 pF

typ. MUX ON resistance = 120 ohm

typ. Delta between chan = 10 ohm

Precision 3.3V Reg.

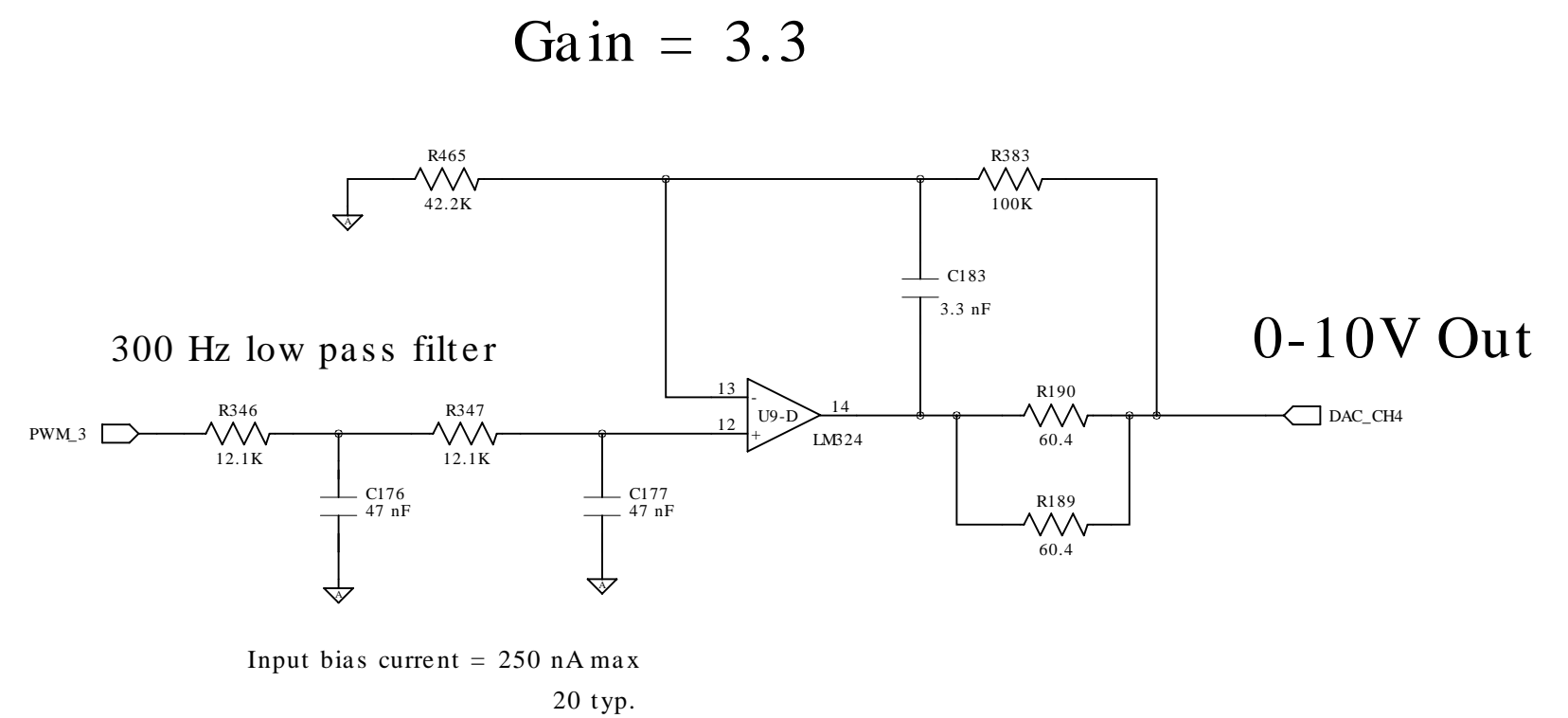
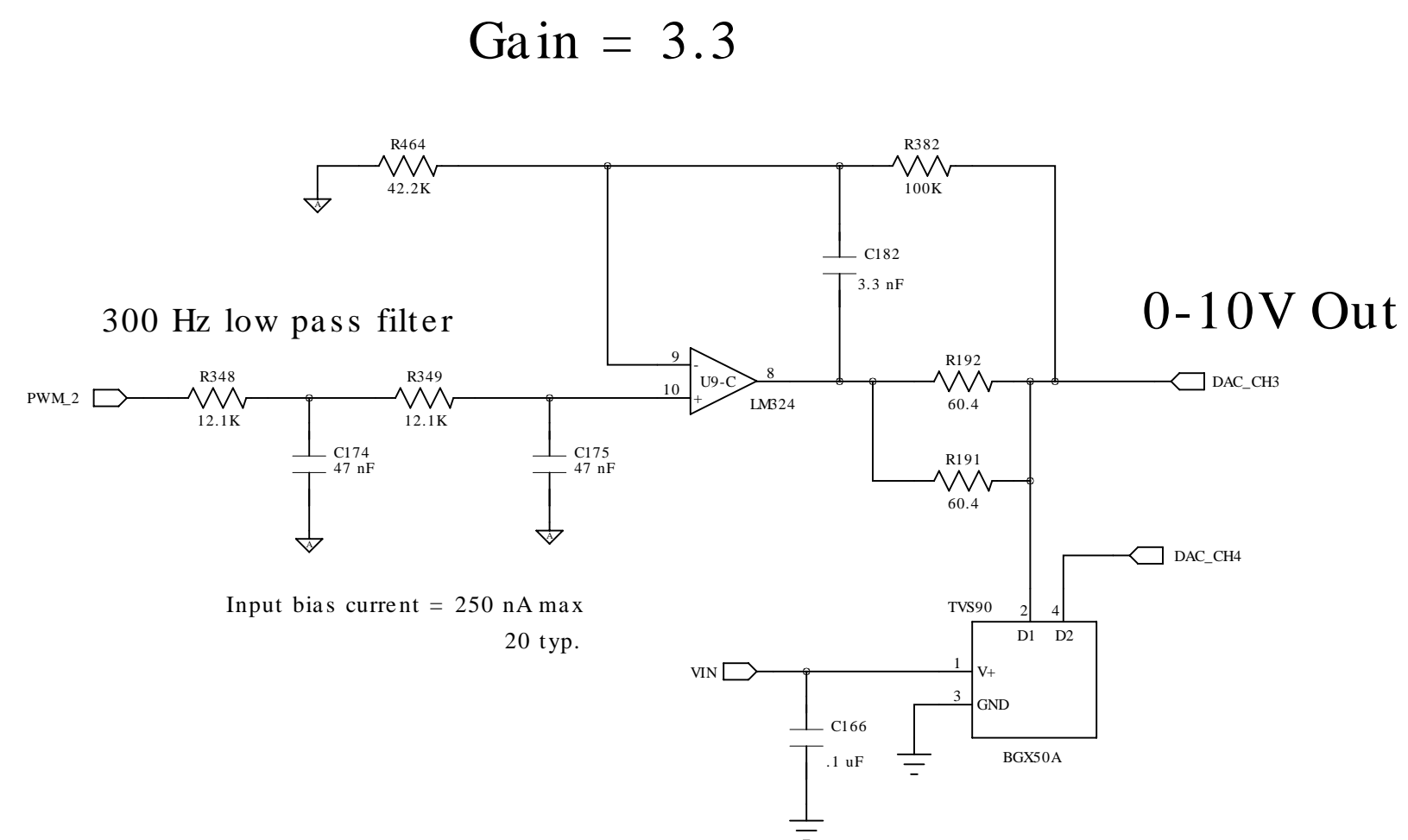
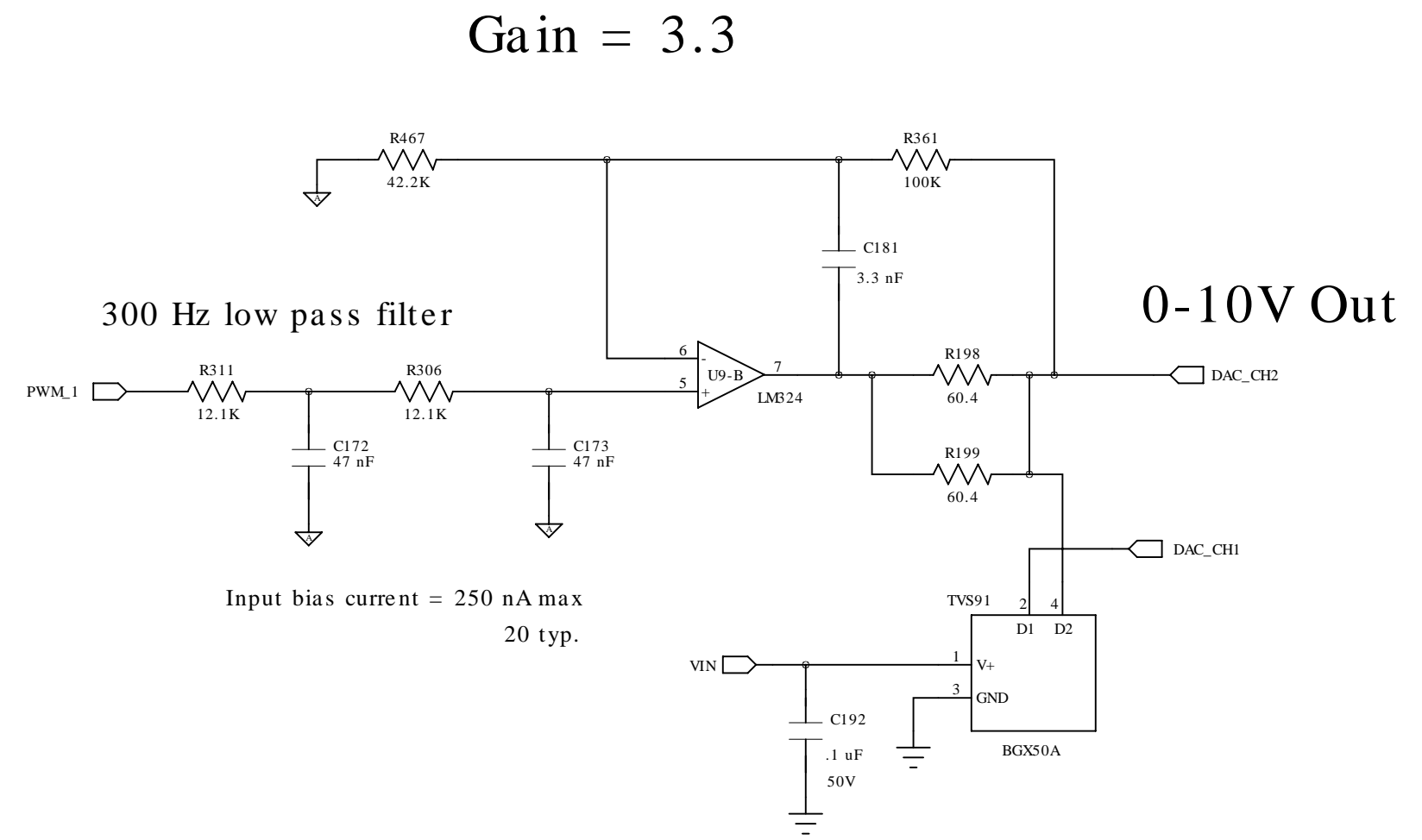
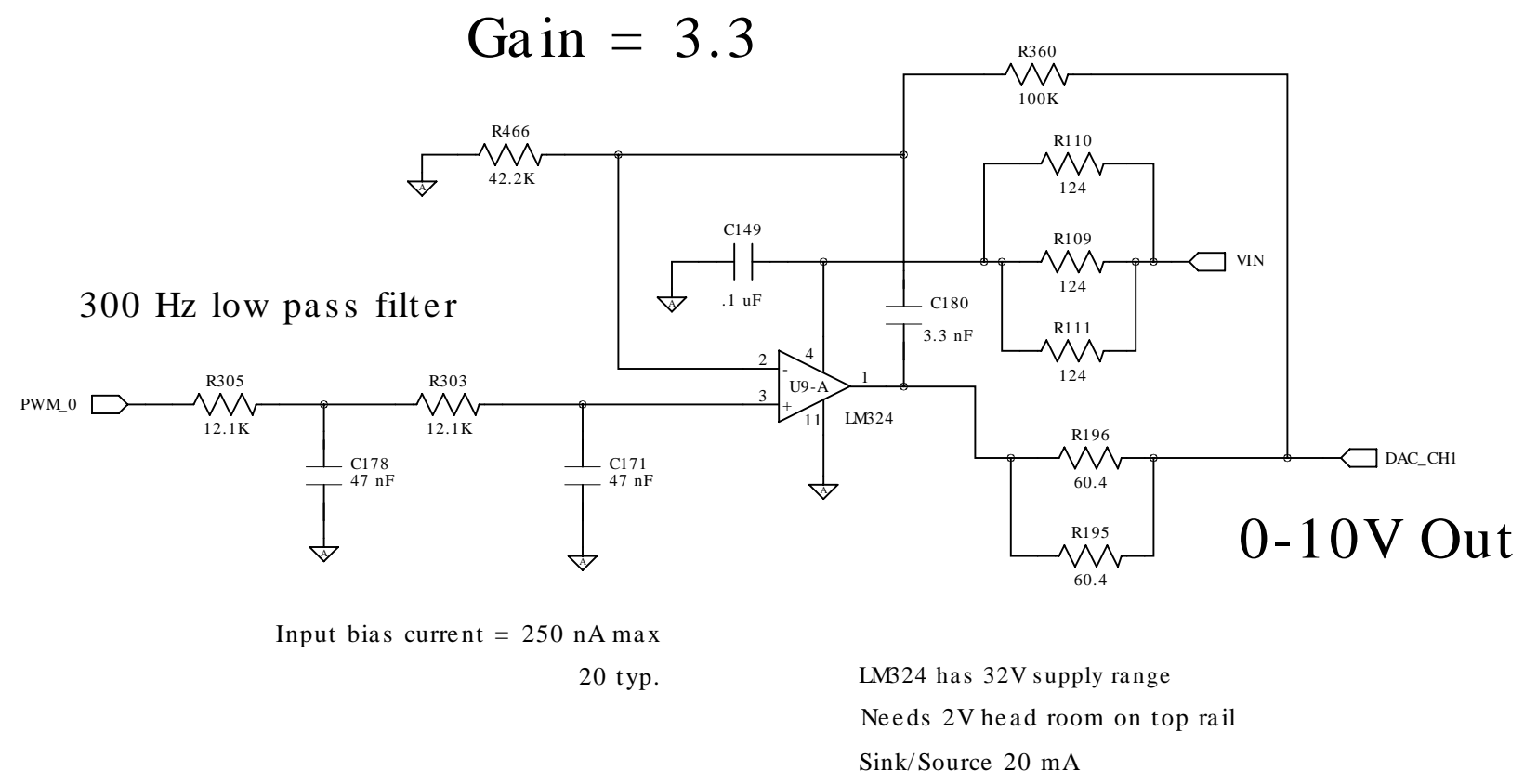
12-bit ADC



Op Amp gain = 1 or 6
Gain = 6 for 0-5V range

Technologic Systems		Date: May 6, 2012
Title: TS-7580 ADC		
Rev: A	Designer	Sheet 12 of 25

10-bit DAC Outputs

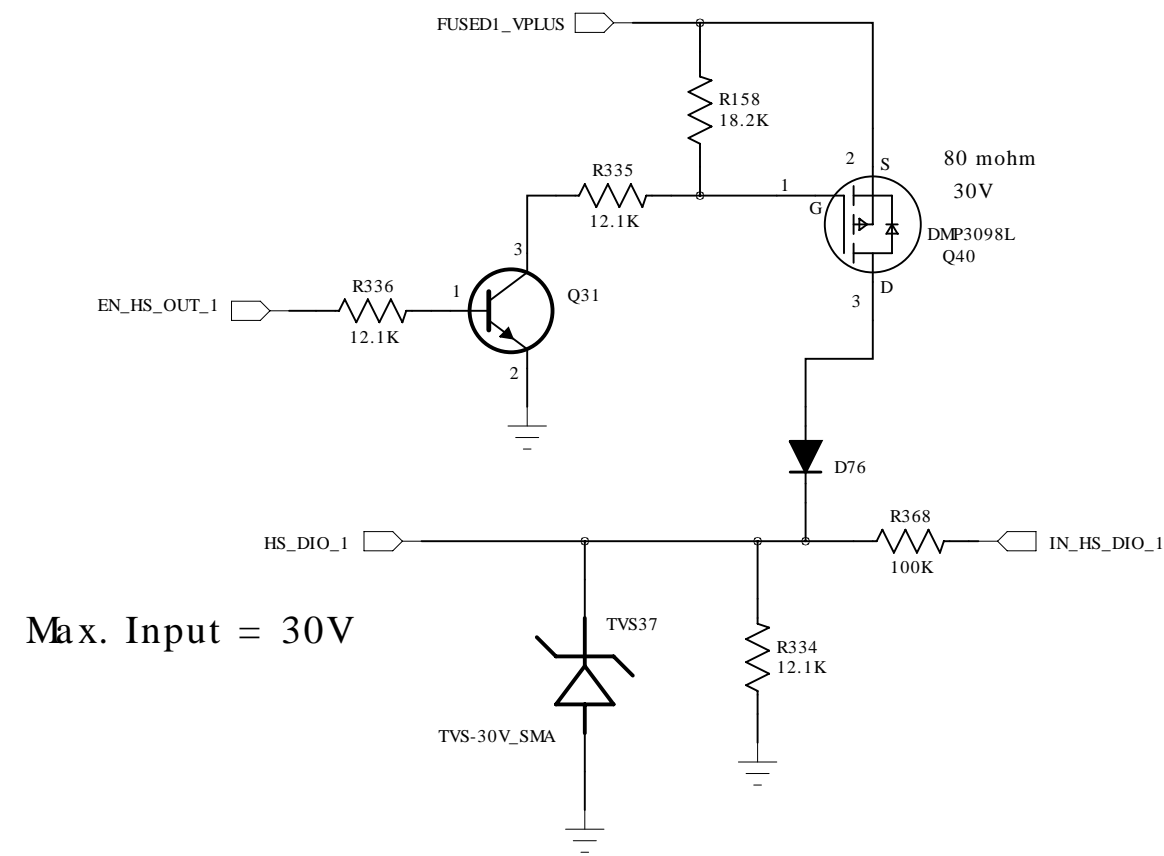


Technologic Systems	Date	May 6, 2012
Title: TS-7580 DAC		
Rev: A	Designer	Sheet 13 of 25

High Side Switches

High-Side Switch

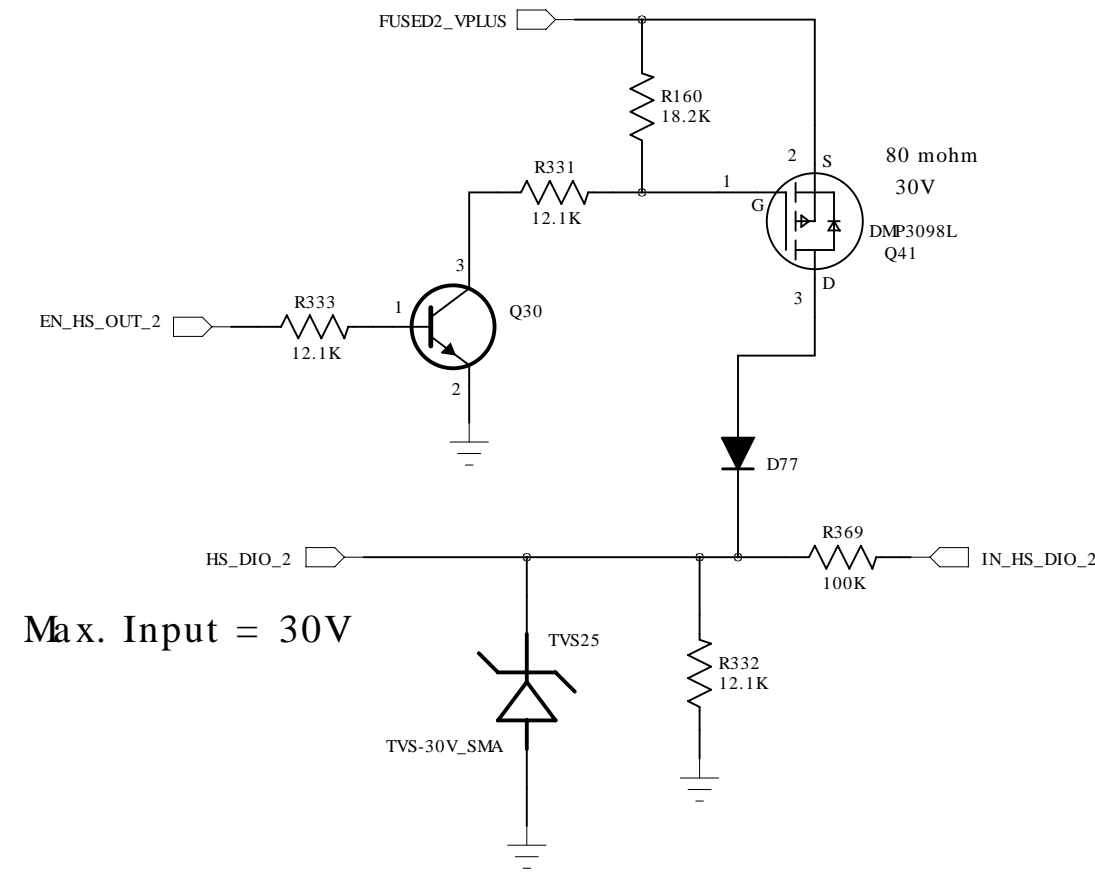
Source 500 mA



Max. Input = 30V

High-Side Switch

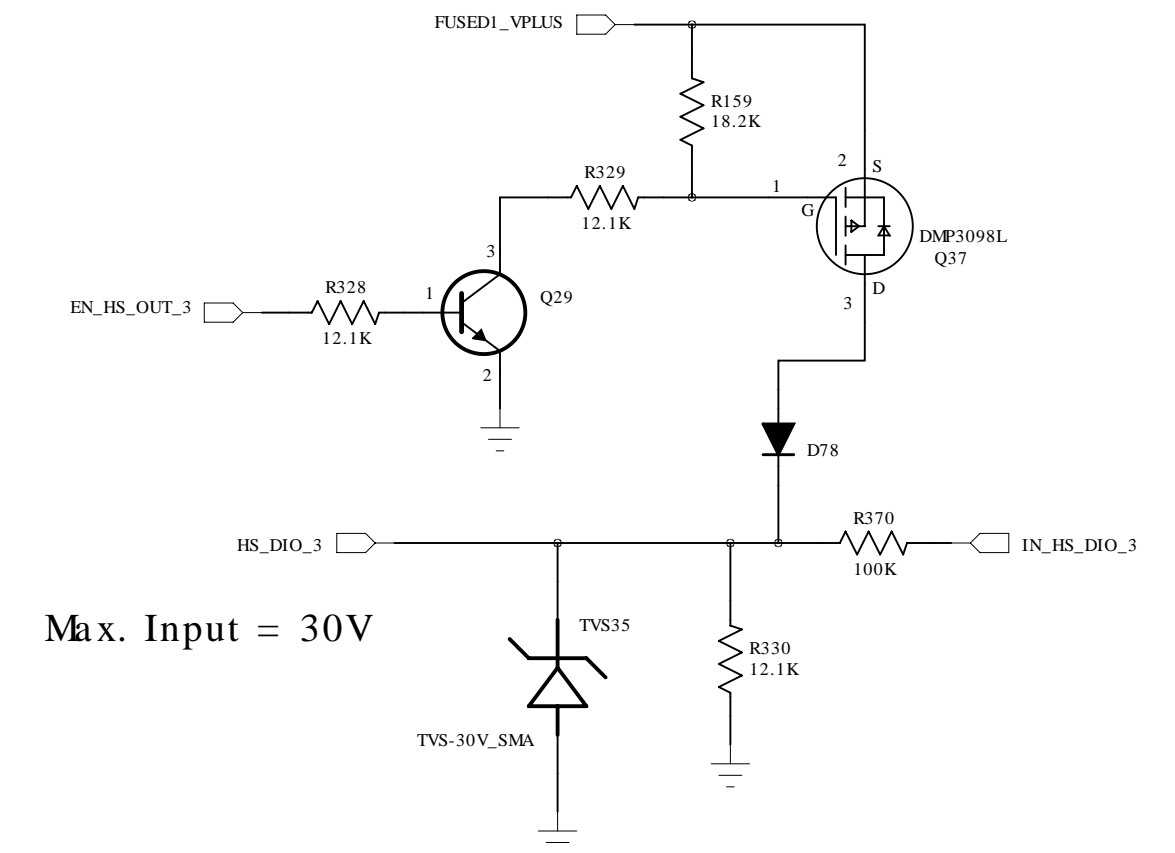
Source 500 mA



Max. Input = 30V

High-Side Switch

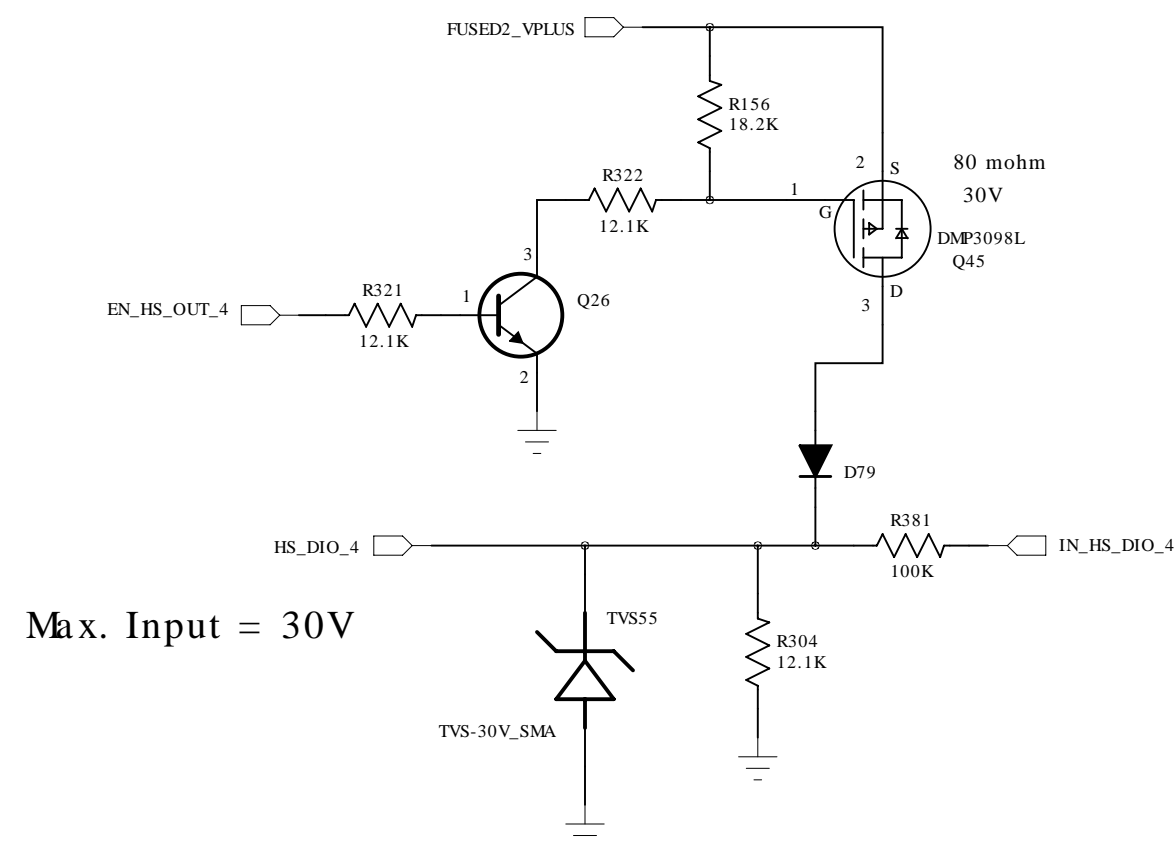
Source 500 mA



Max. Input = 30V

High-Side Switch

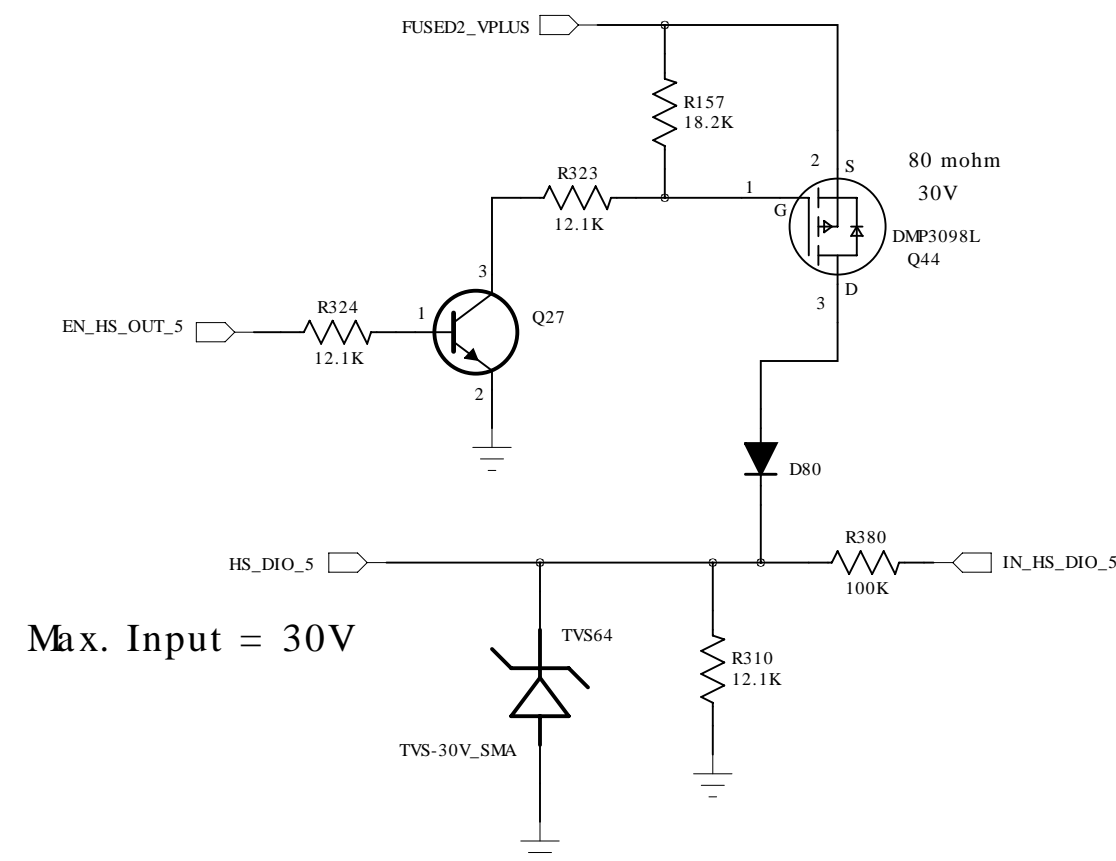
Source 500 mA



Max. Input = 30V

High-Side Switch

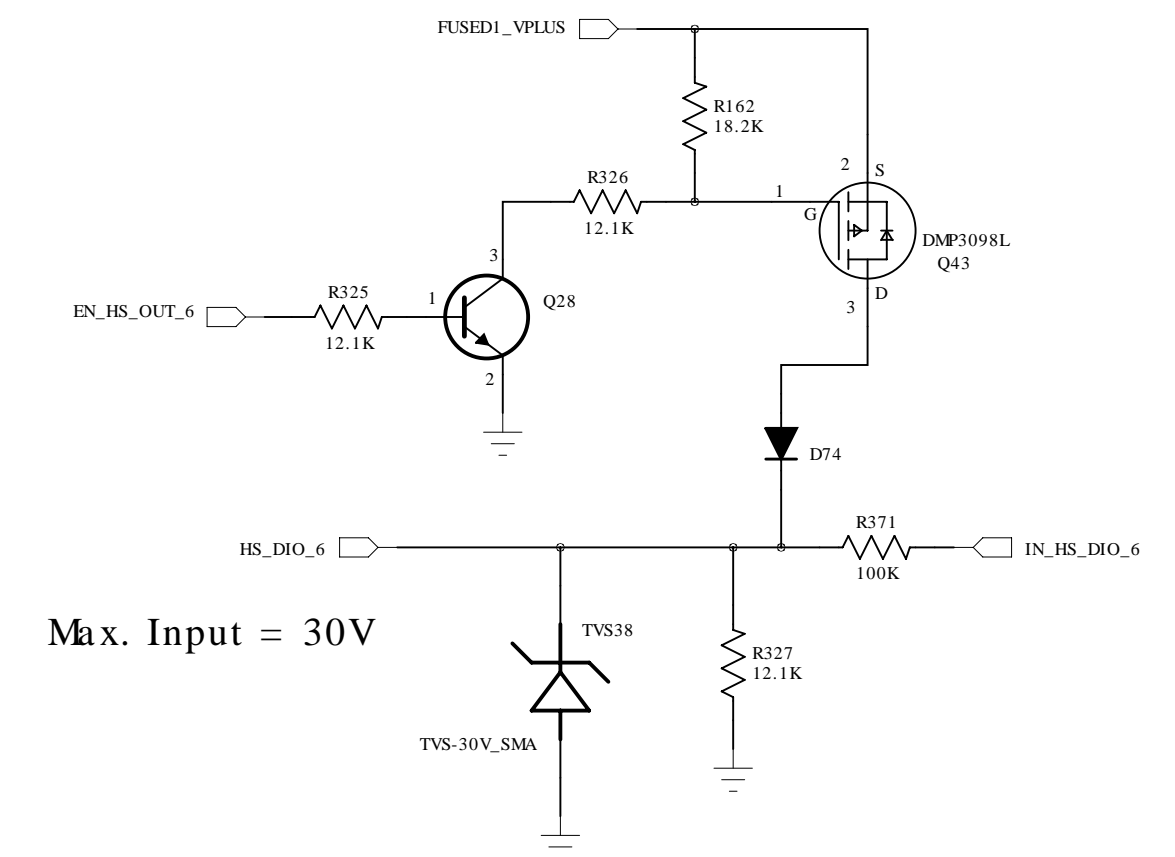
Source 500 mA



Max. Input = 30V

High-Side Switch

Source 500 mA



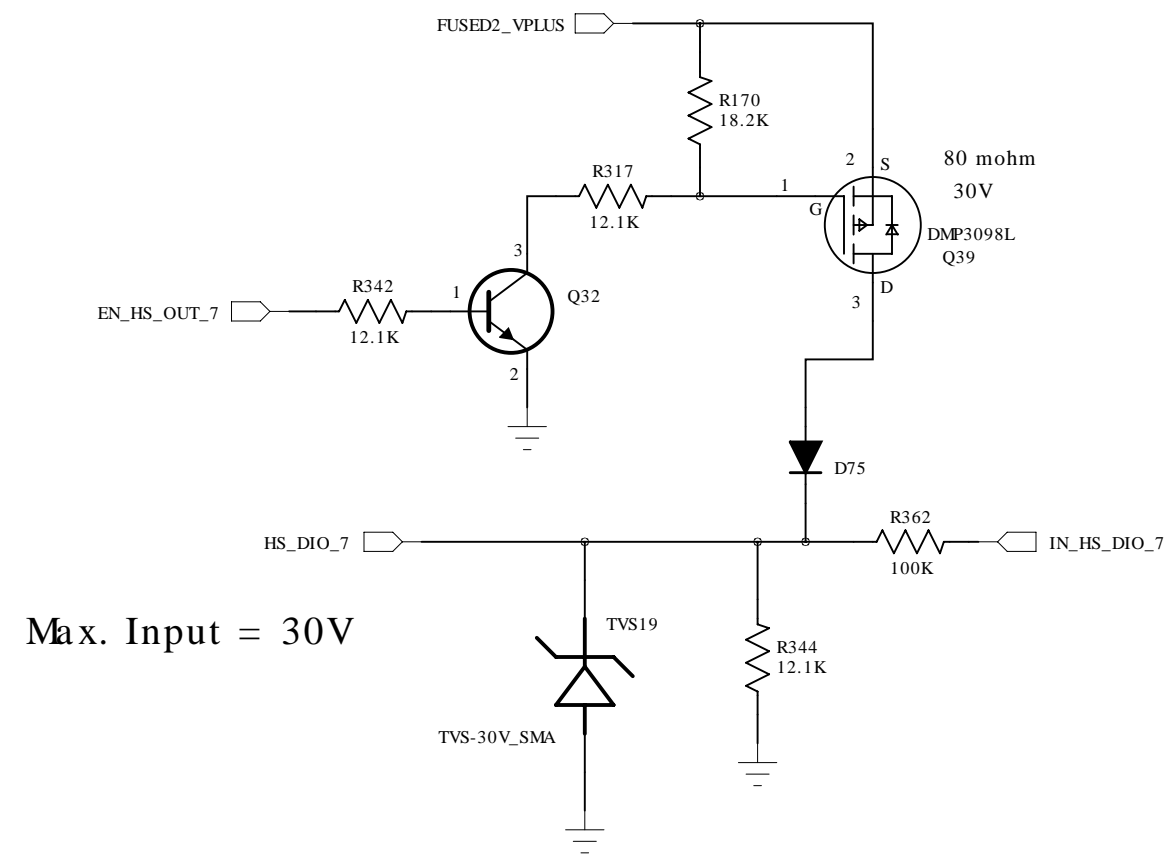
Max. Input = 30V

Technologic Systems	Date	May 6, 2012
Title: TS-7580 High Side Switches		
Rev: A	Designer	Sheet 14 of 25

High Side Switches

High-Side Switch

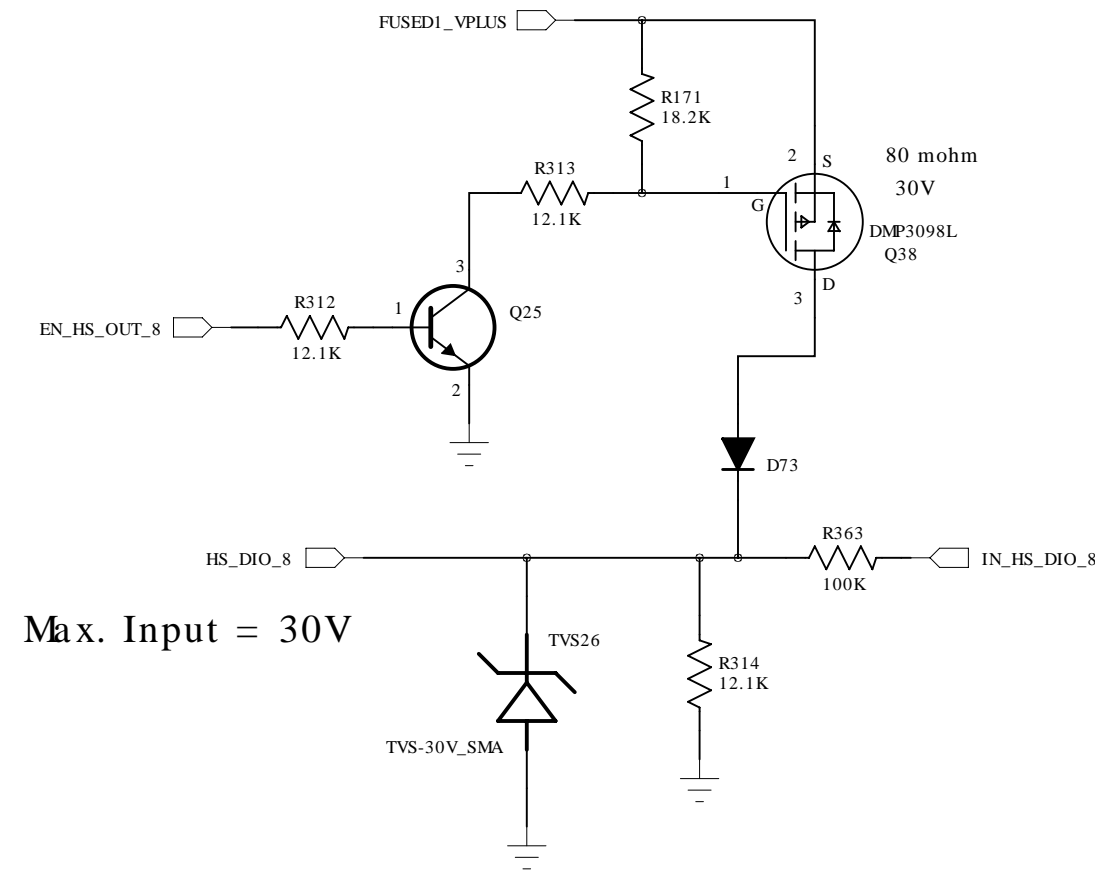
Source 500 mA



Max. Input = 30V

High-Side Switch

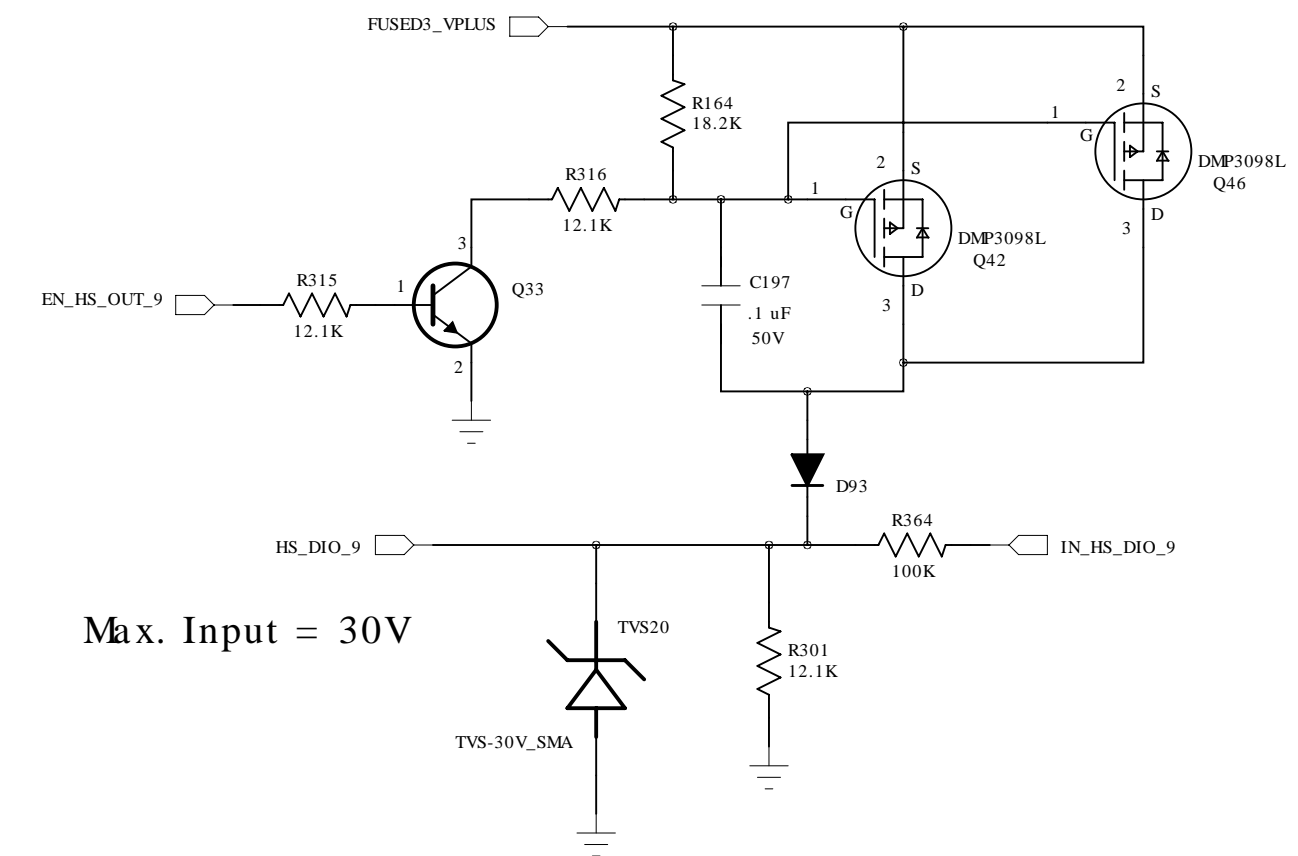
Source 500 mA



Max. Input = 30V

High-Side Switch

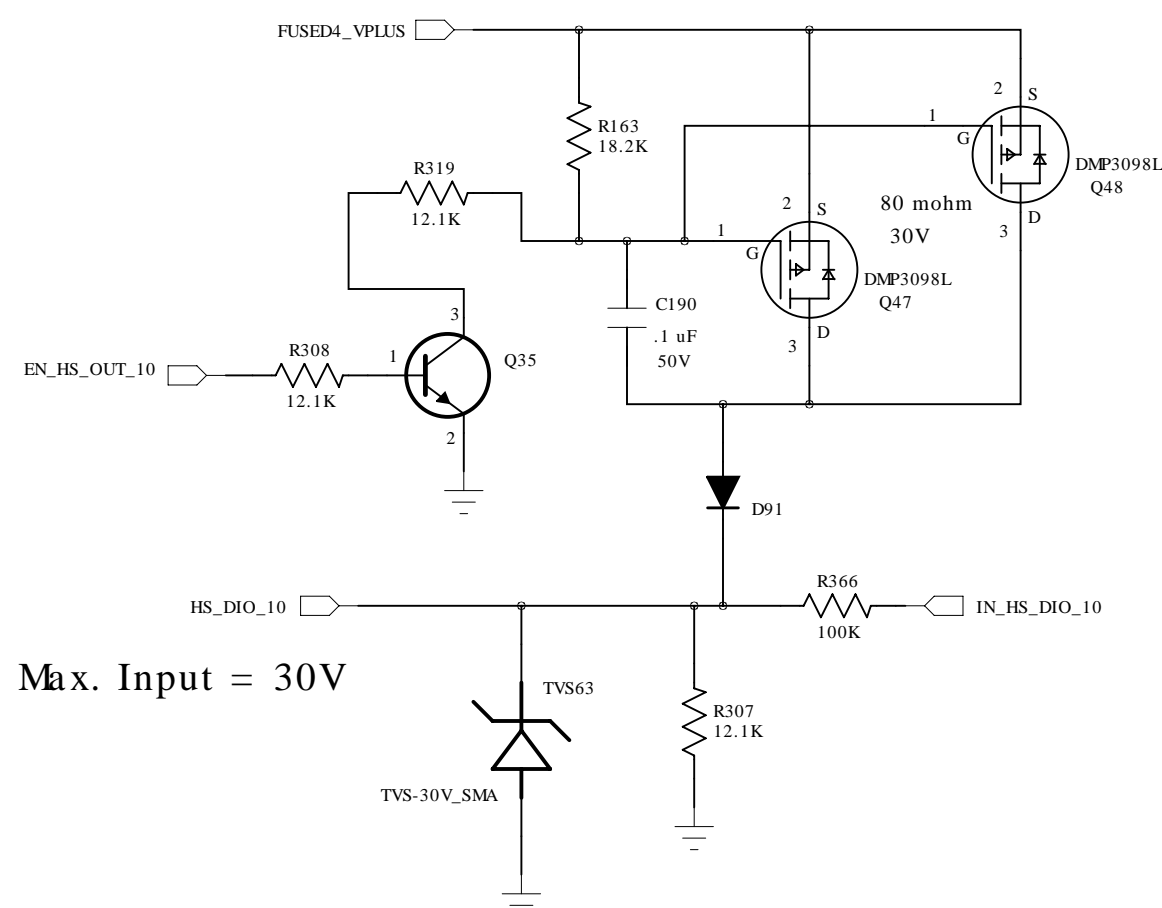
Source 1000 mA



Max. Input = 30V

High-Side Switch

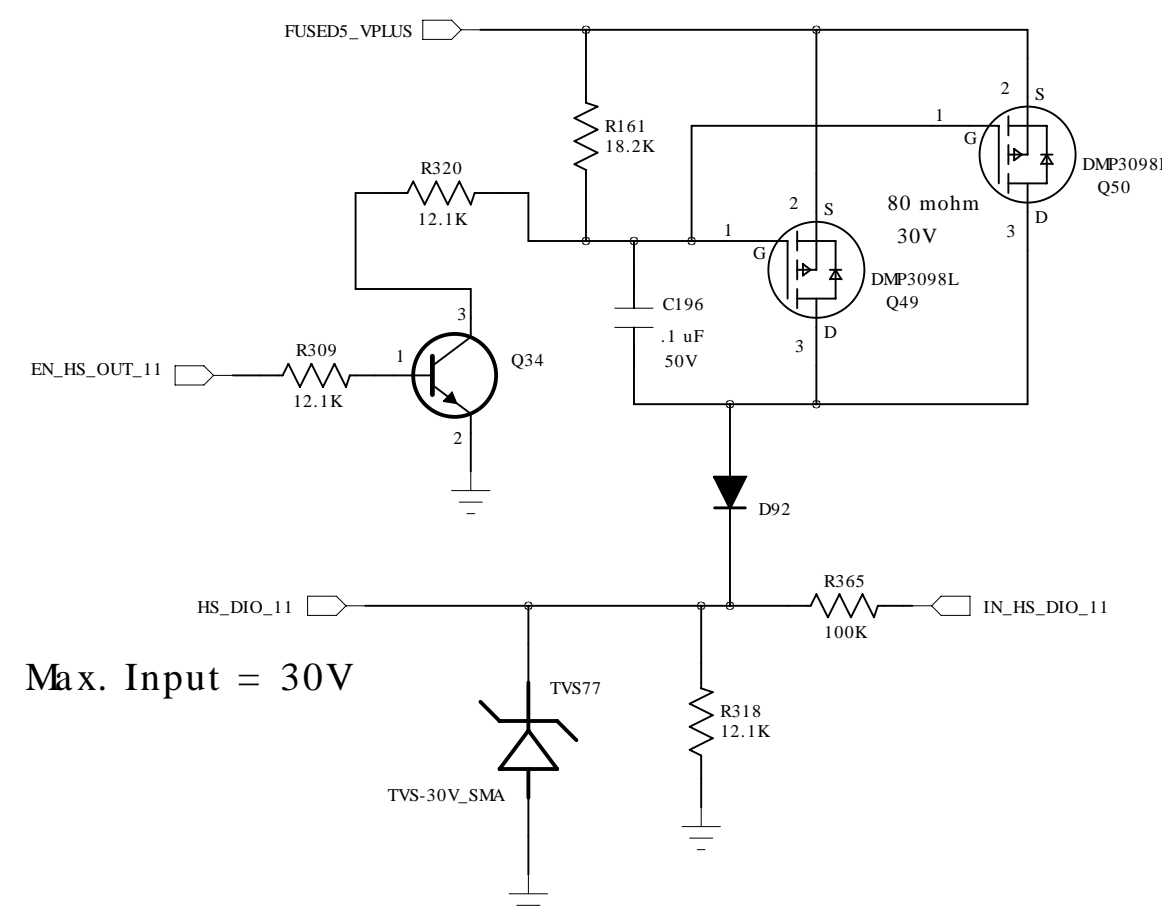
Source 1000 mA



Max. Input = 30V

High-Side Switch

Source 1000 mA



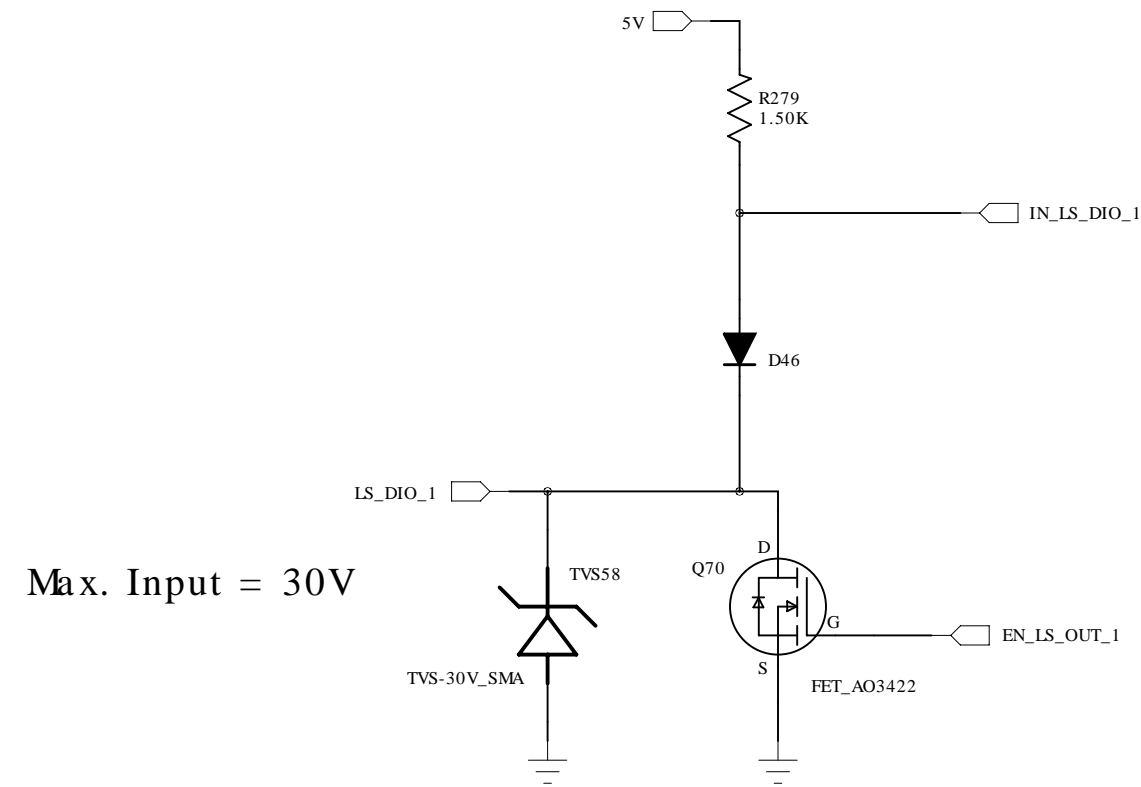
Max. Input = 30V

Technologic Systems	Date	May 6, 2012
Title: TS-7580 High Side Switches		
Rev: A	Designer	Sheet 15 of 25

Low Side Switches

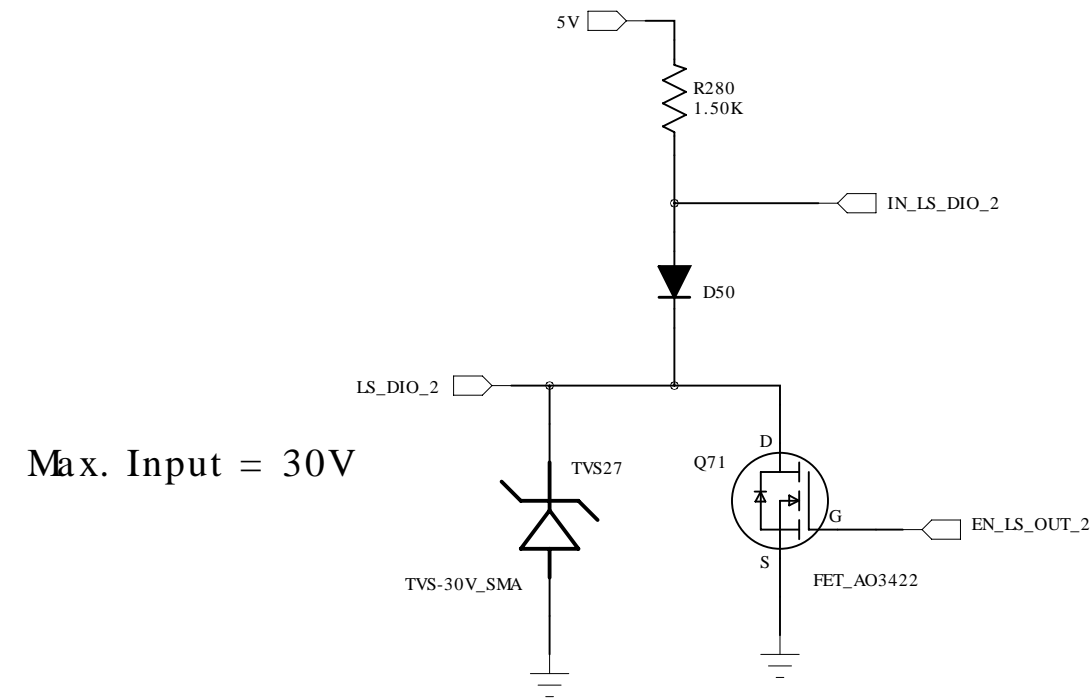
Low-Side Switch

Sinks 500 mA



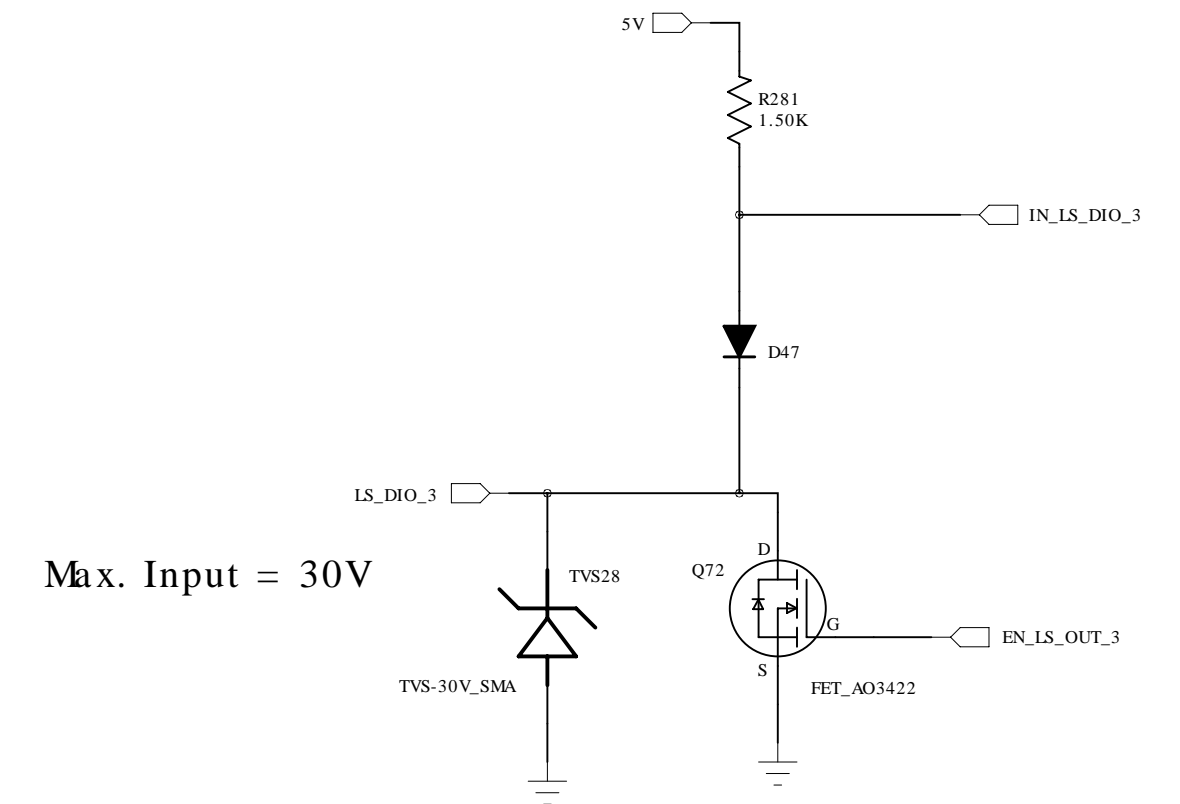
Low-Side Switch

Sinks 500 mA



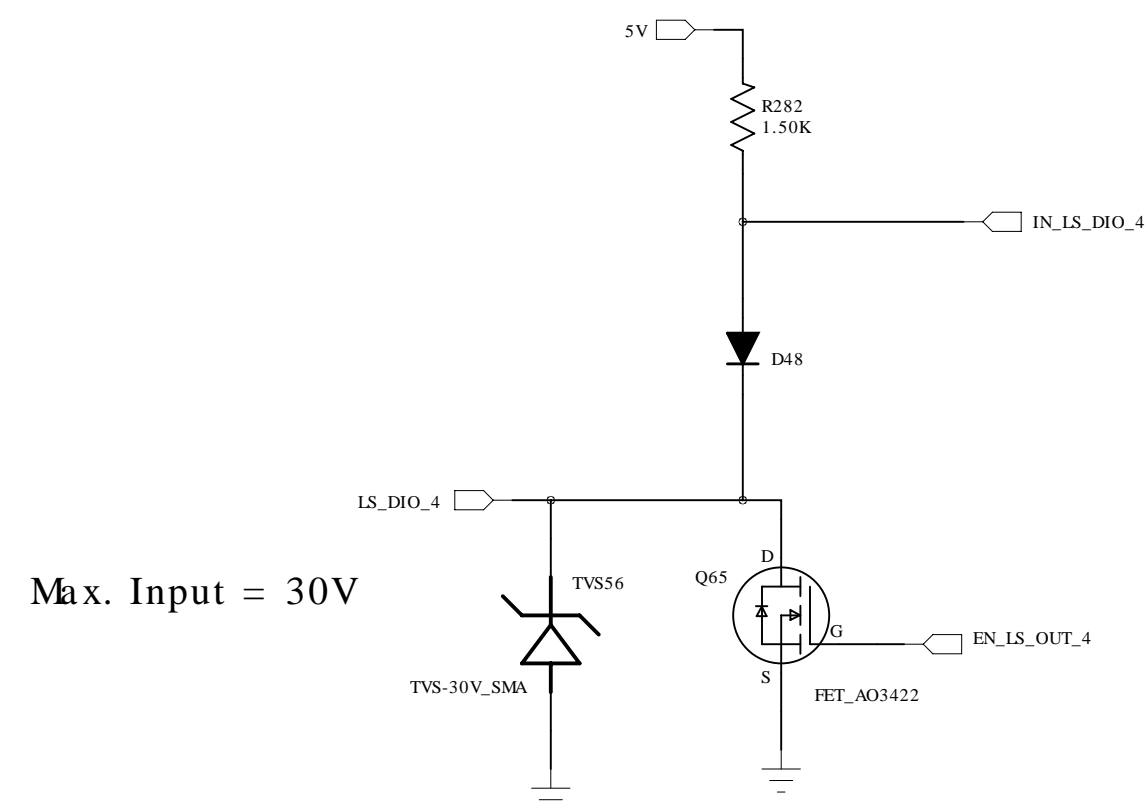
Low-Side Switch

Sinks 500 mA



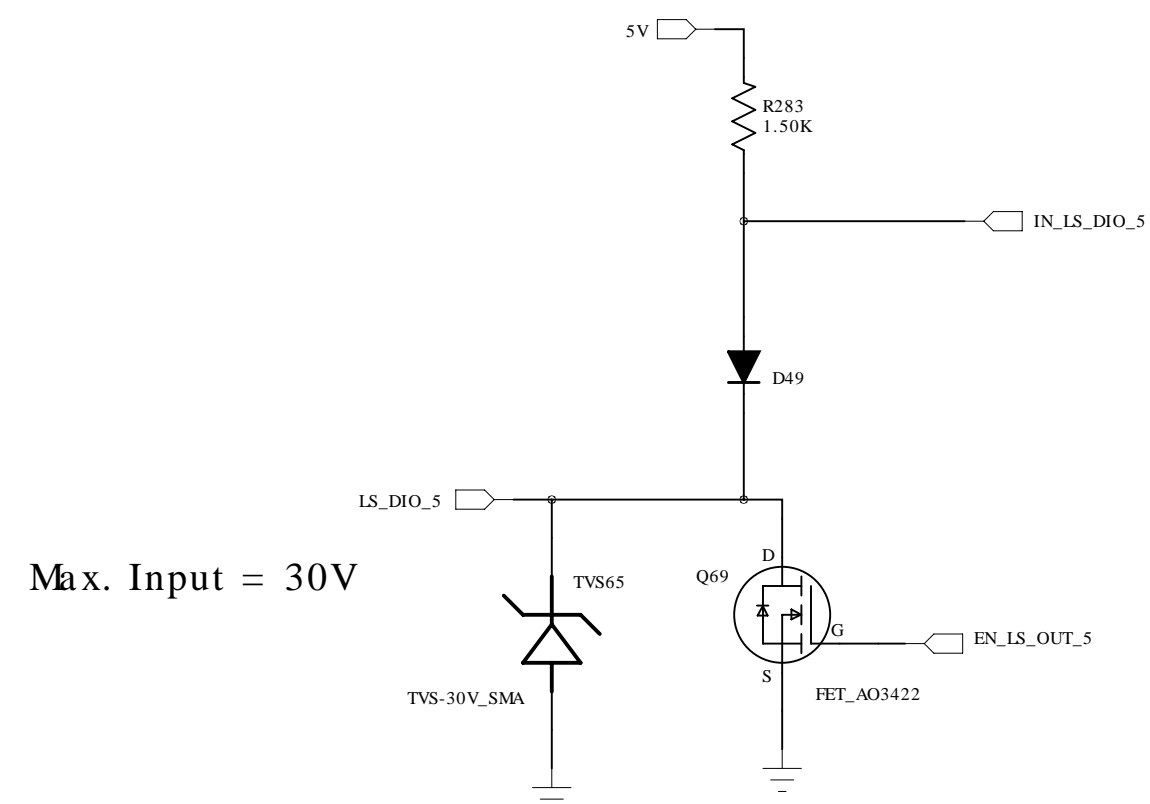
Low-Side Switch

Sinks 500 mA



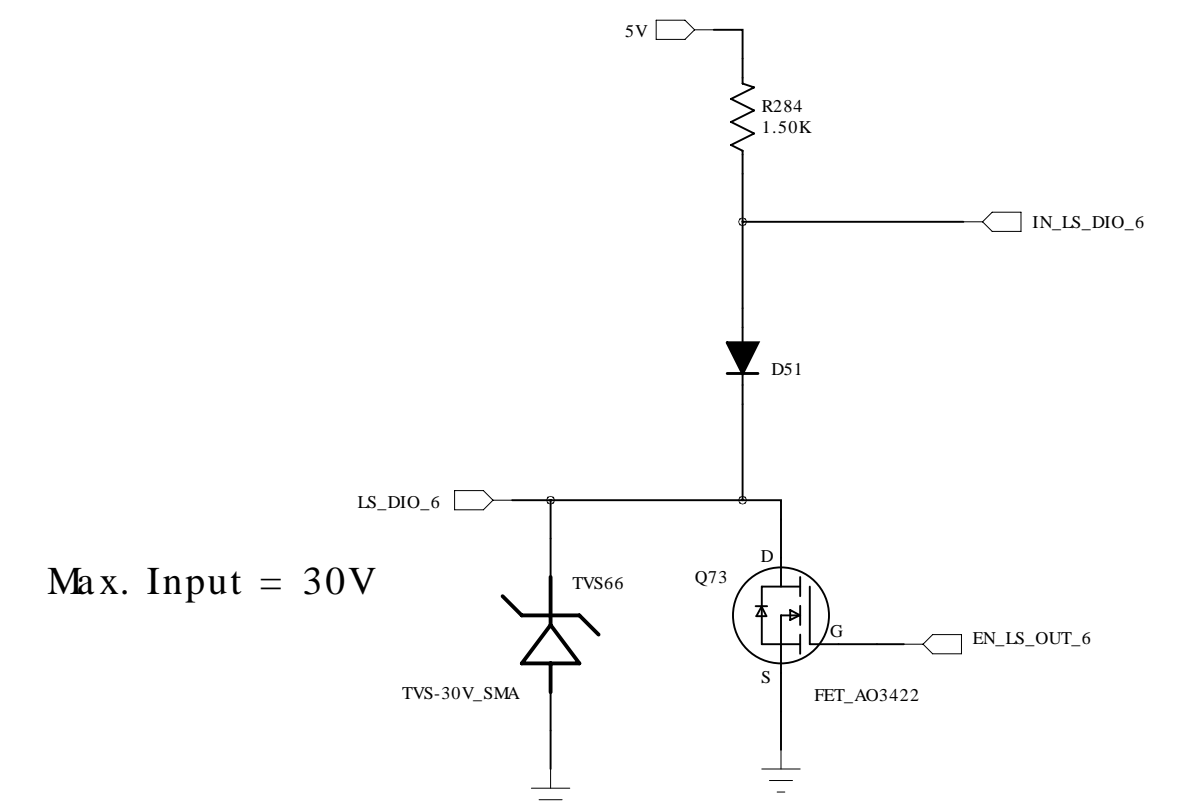
Low-Side Switch

Sinks 500 mA



Low-Side Switch

Sinks 500 mA

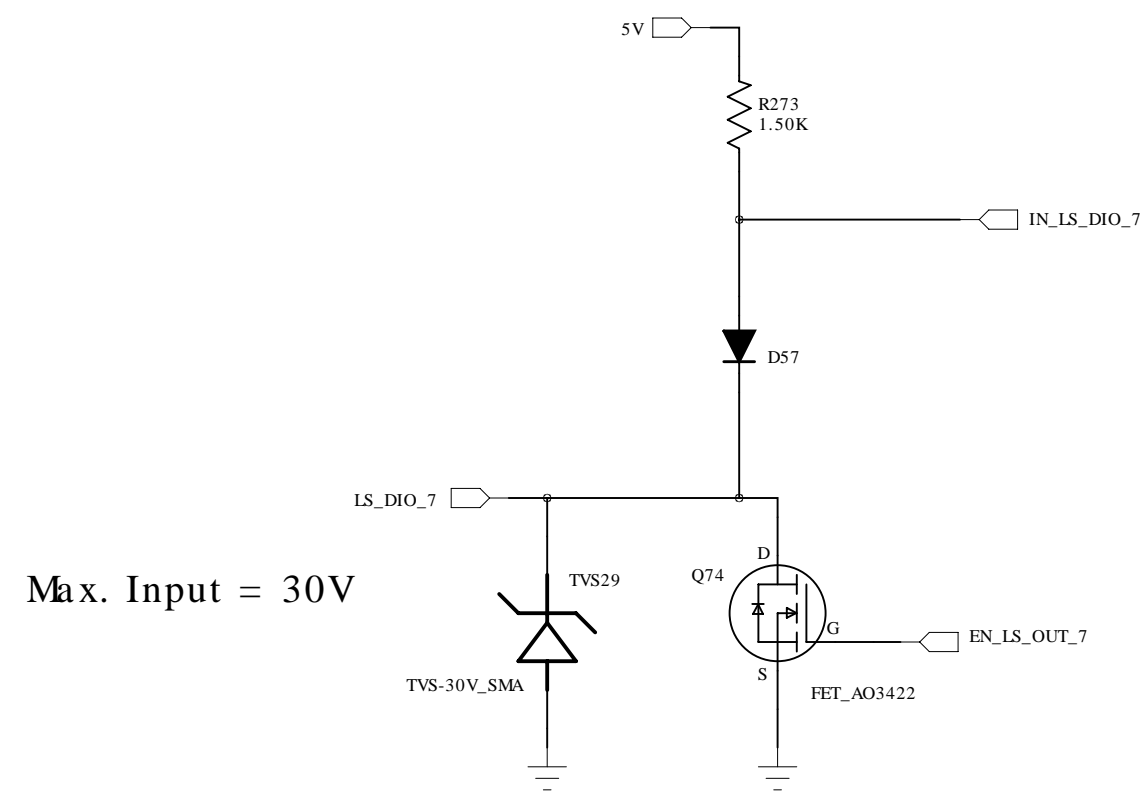


Technologic Systems	Date	May 6, 2012
Title: TS-7580 Low Side Switches		
Rev: A	Designer	Sheet 16 of 25

Low Side Switches

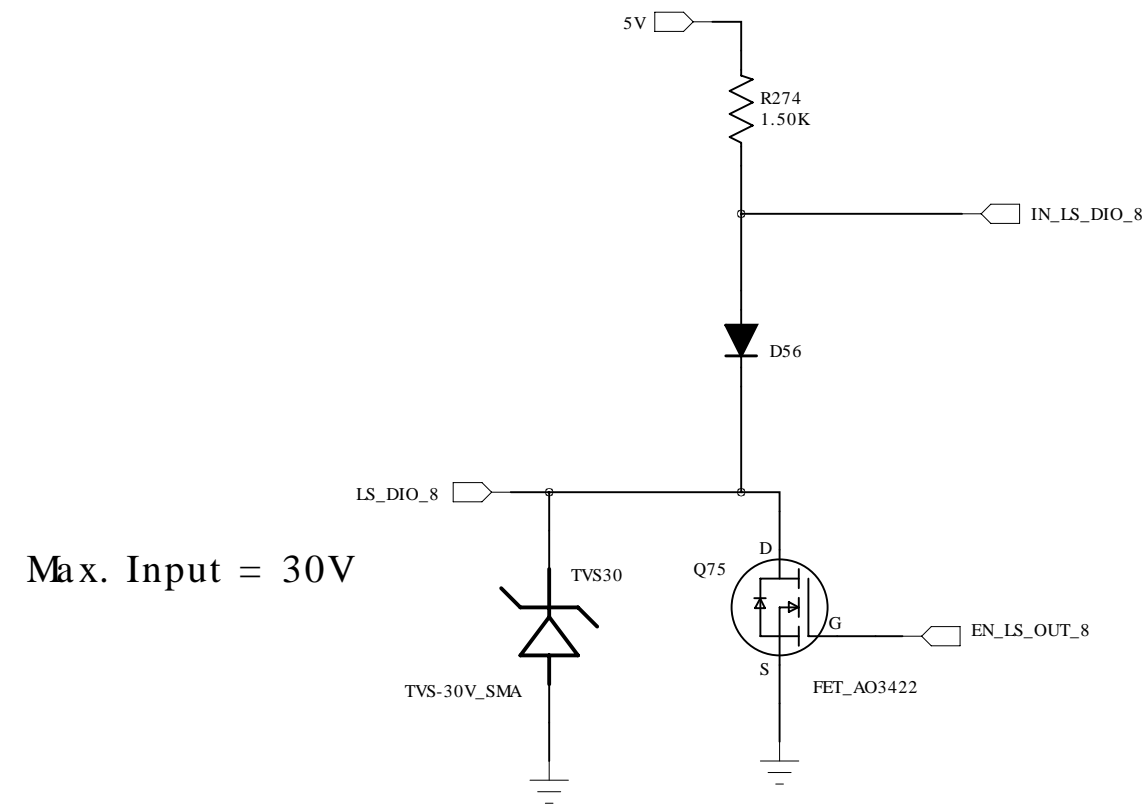
Low-Side Switch

Sinks 500 mA



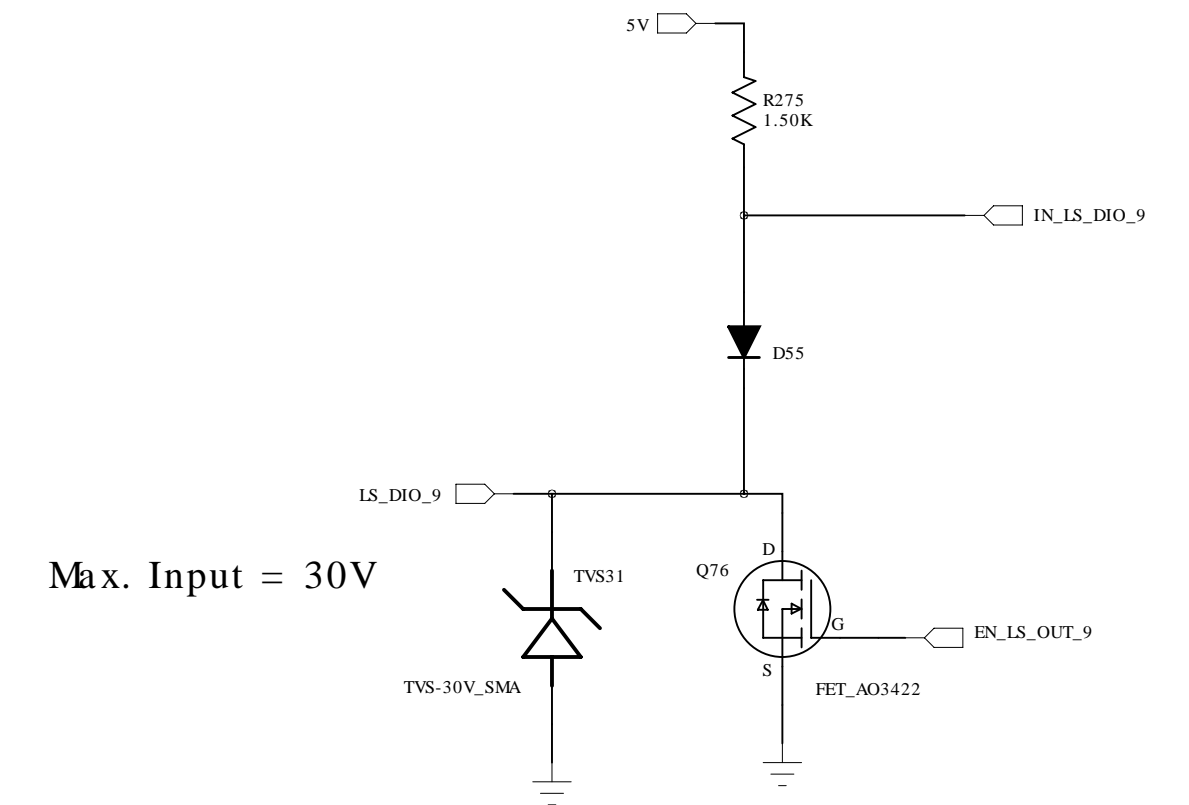
Low-Side Switch

Sinks 500 mA



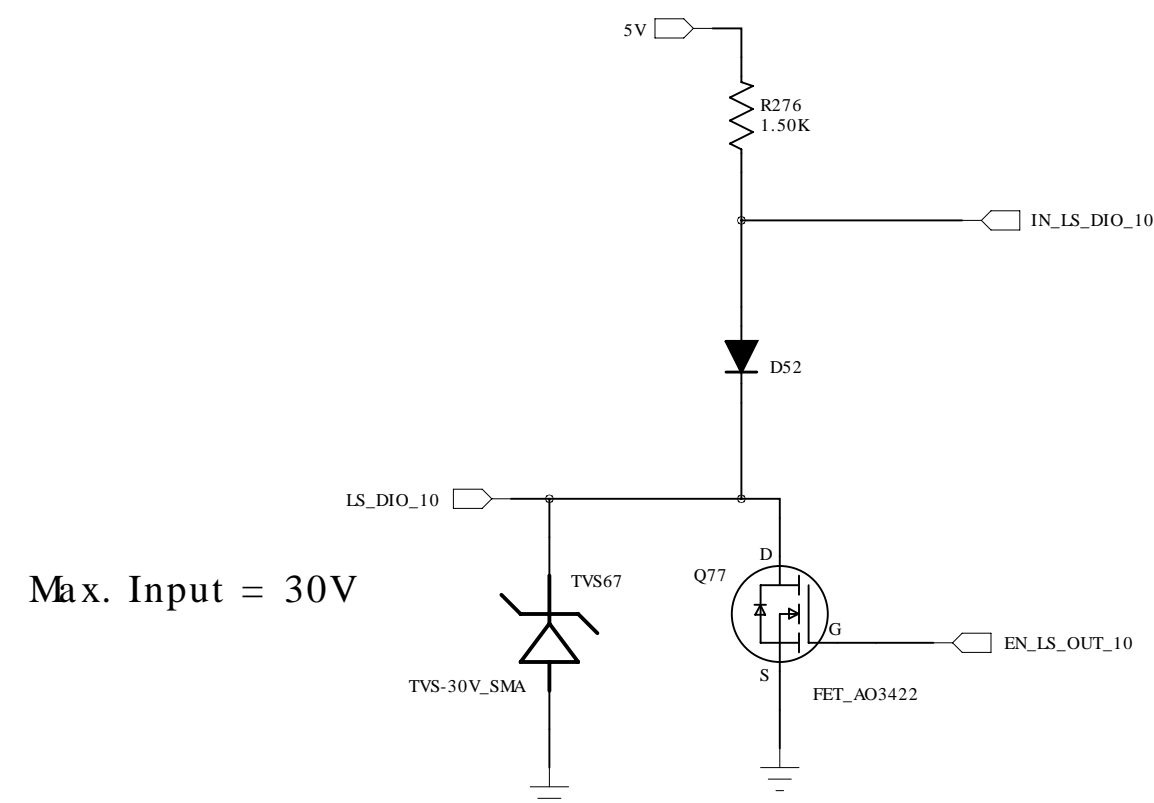
Low-Side Switch

Sinks 500 mA



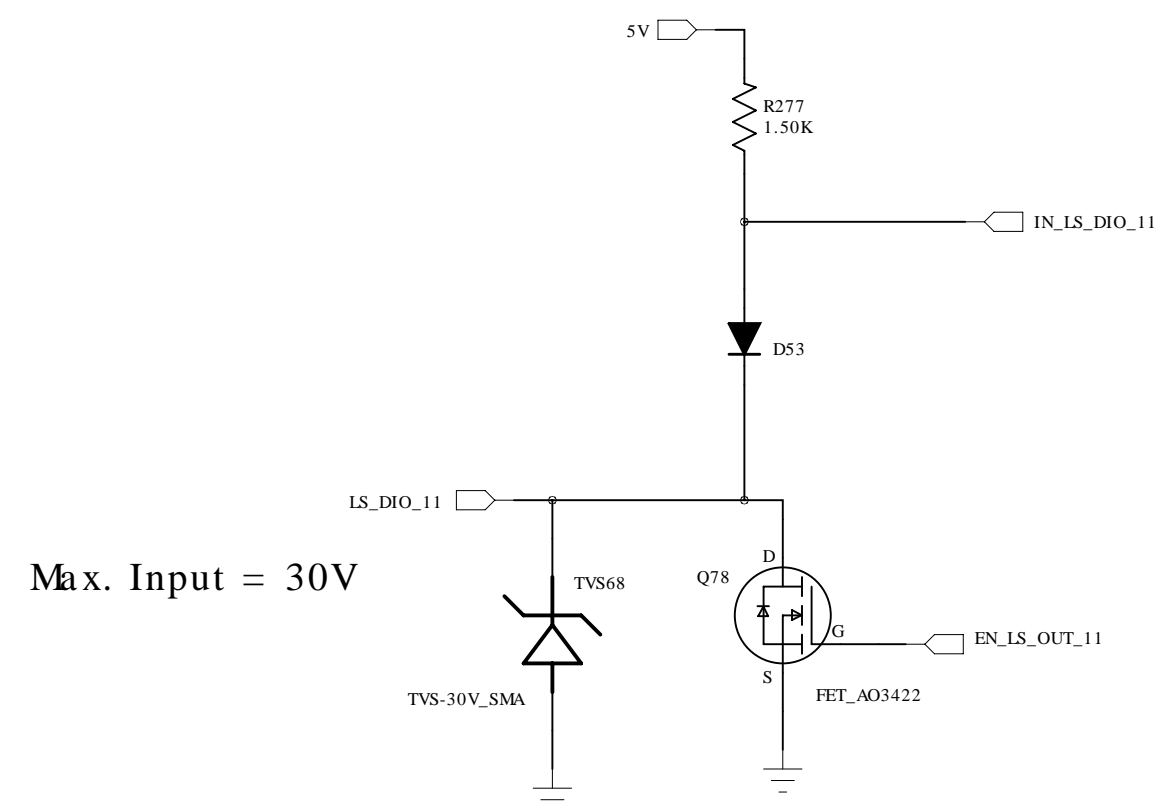
Low-Side Switch

Sinks 500 mA



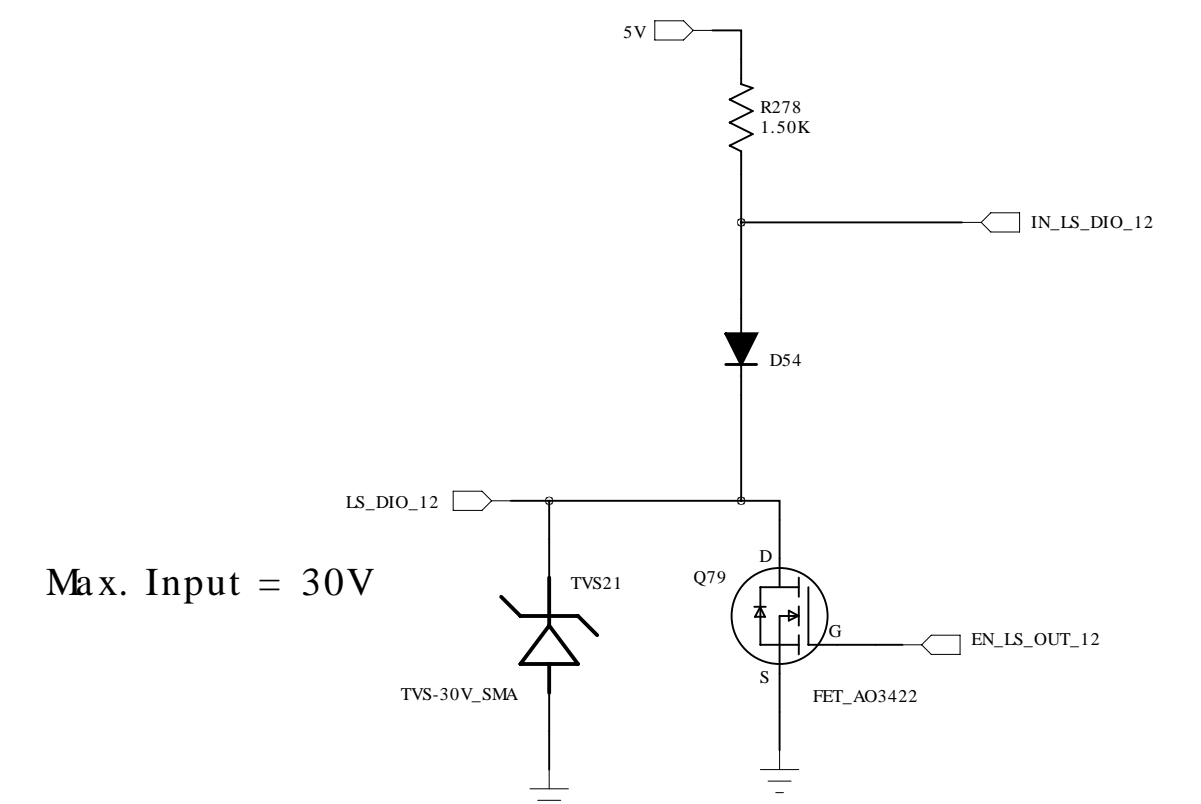
Low-Side Switch

Sinks 500 mA



Low-Side Switch

Sinks 500 mA

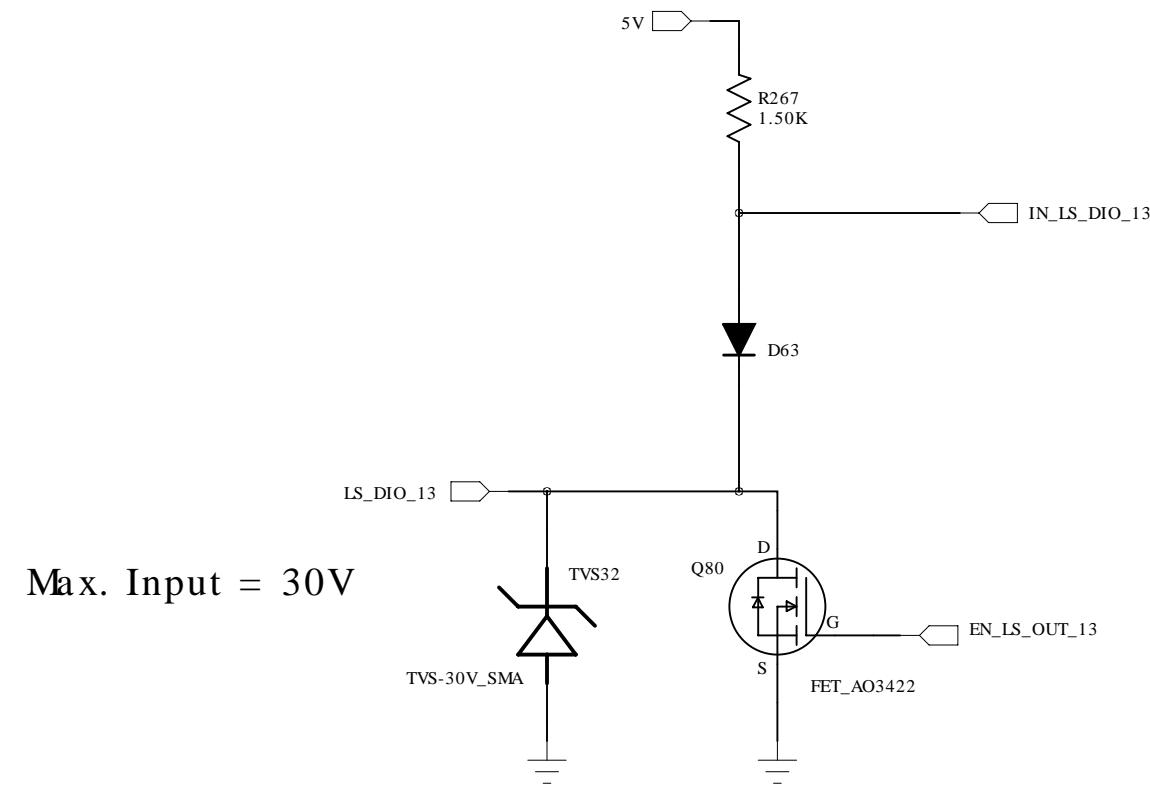


Technologic Systems	Date	May 6, 2012
Title: TS-7580 Low Side Switches		
Rev: A	Designer	Sheet 17 of 25

Low Side Switches

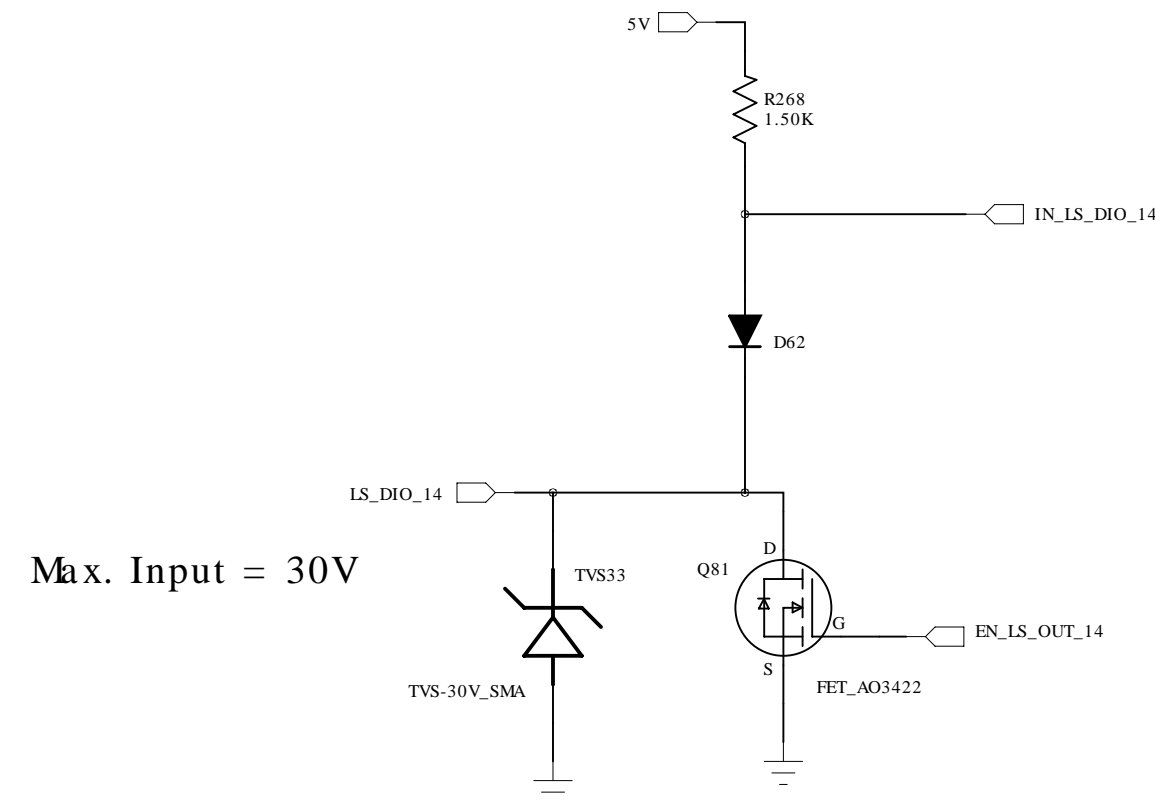
Low-Side Switch

Sinks 500 mA



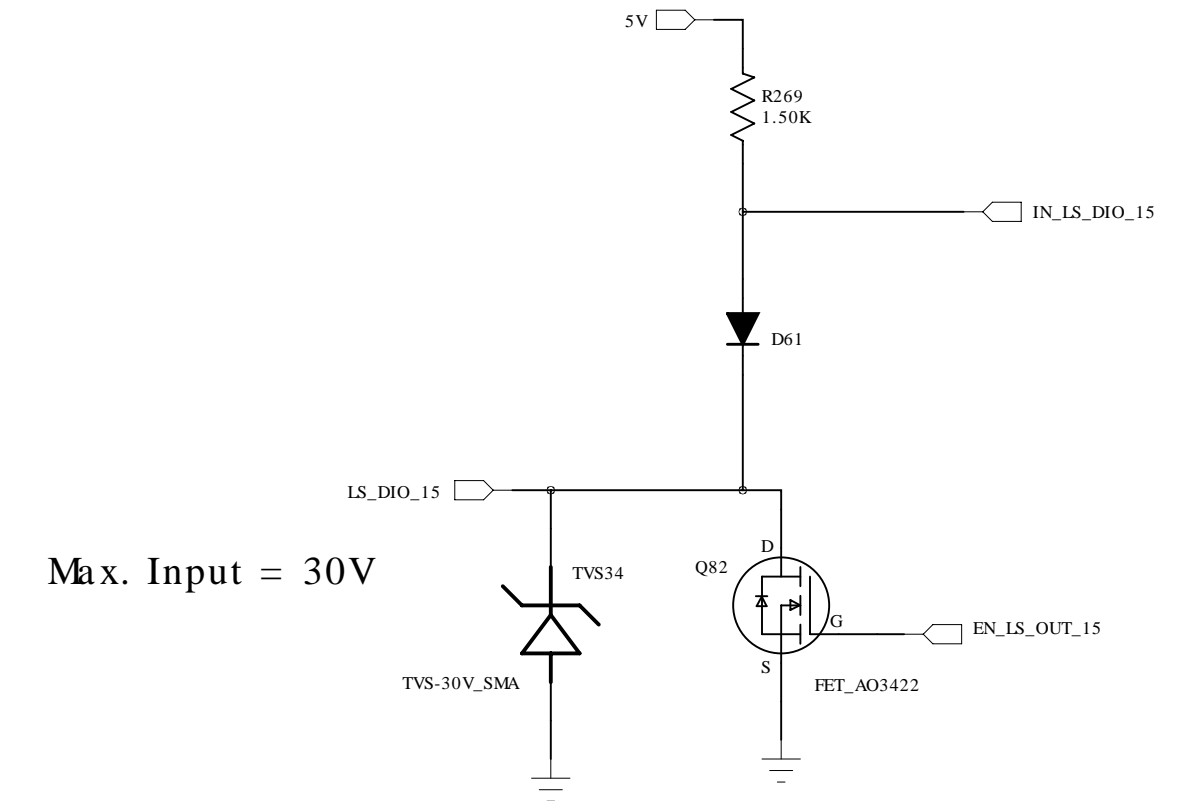
Low-Side Switch

Sinks 500 mA



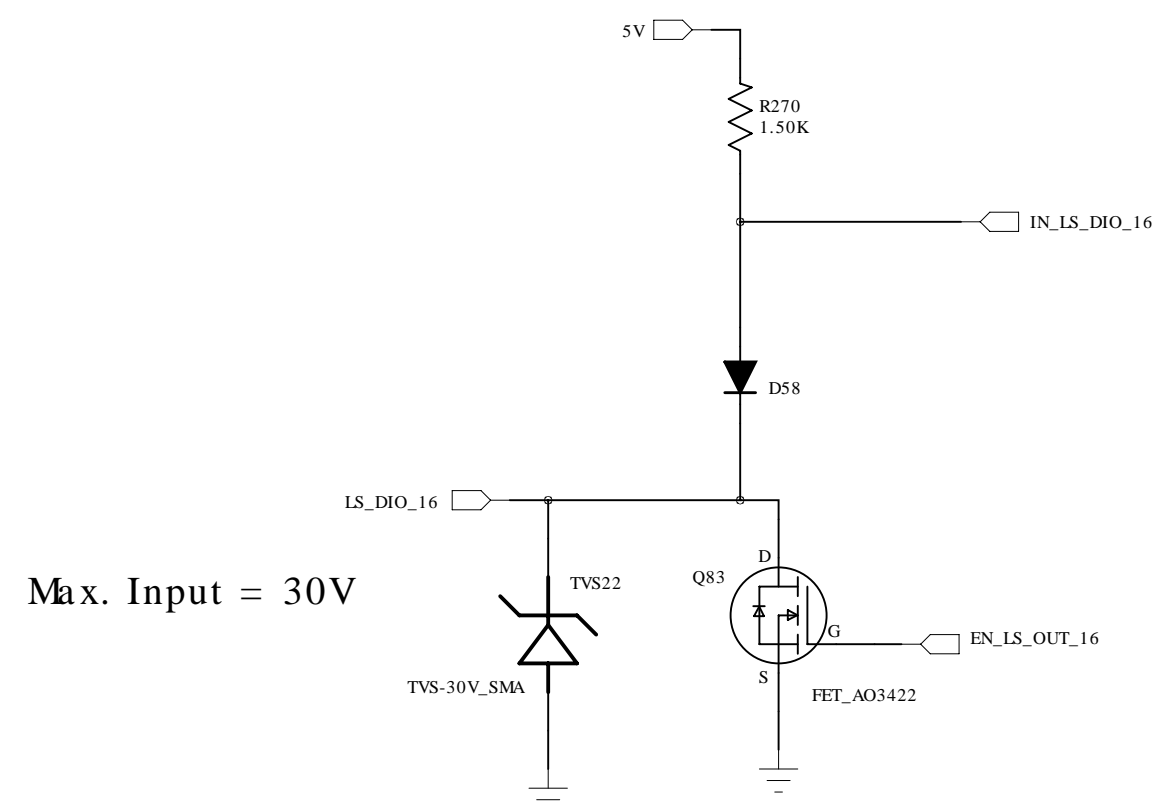
Low-Side Switch

Sinks 500 mA



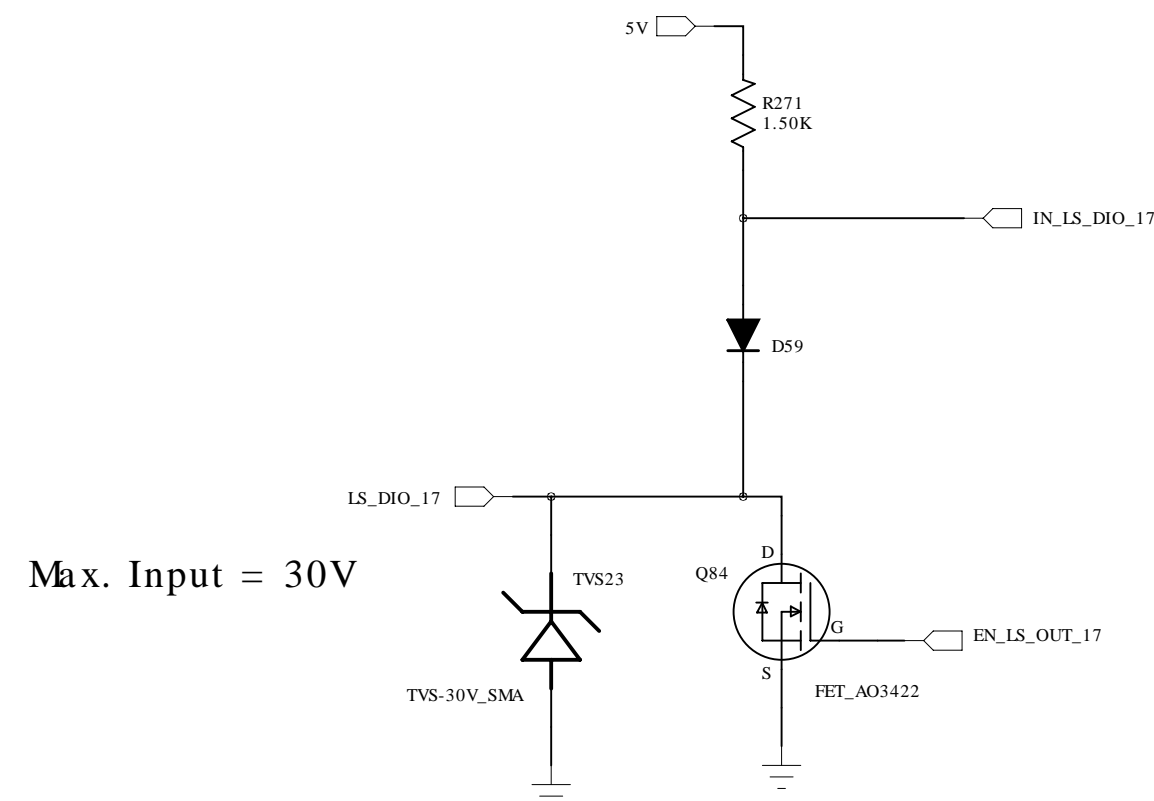
Low-Side Switch

Sinks 500 mA



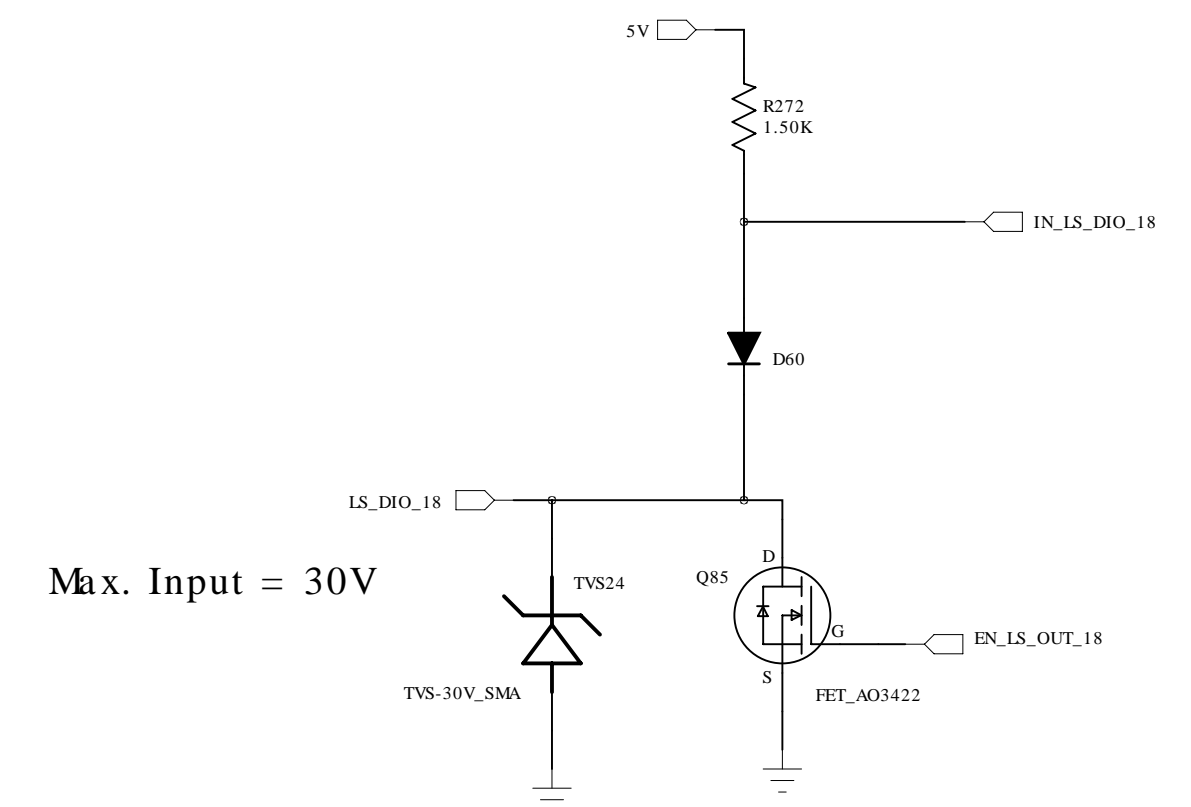
Low-Side Switch

Sinks 500 mA



Low-Side Switch

Sinks 500 mA

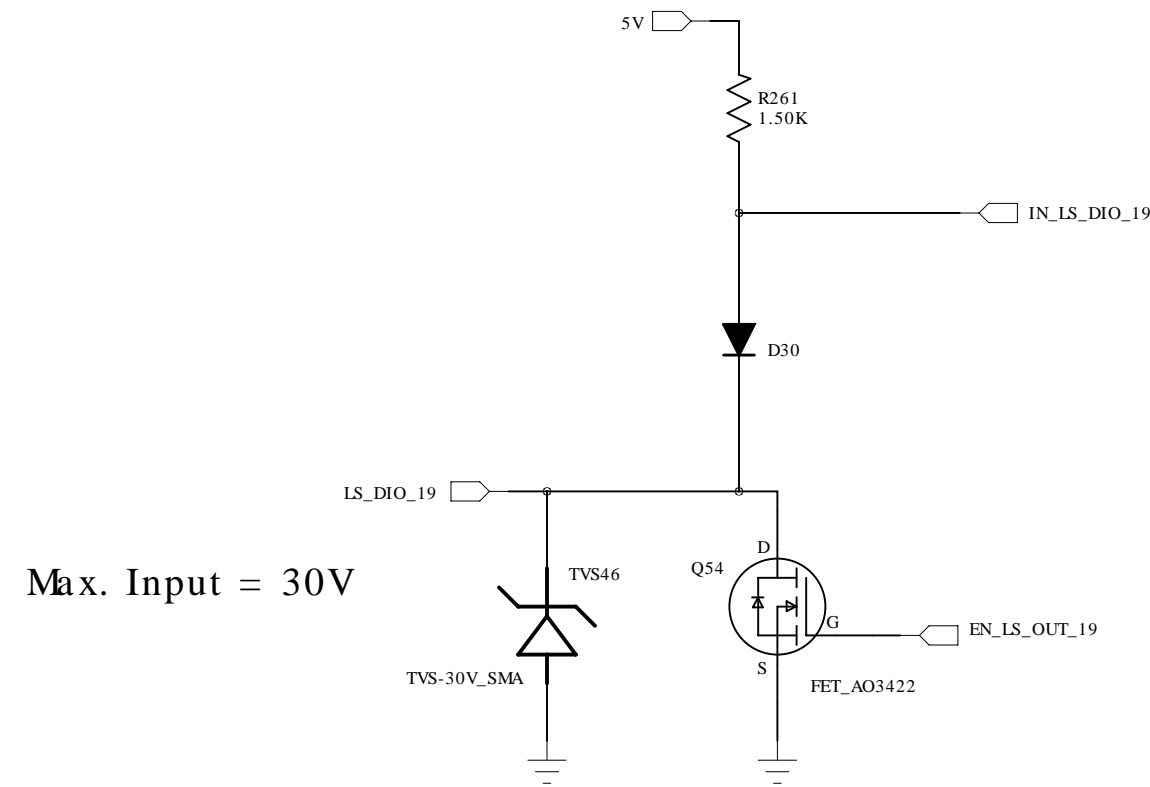


Technologic Systems	Date	May 6, 2012
Title: TS-7580 Low Side Switches		
Rev: A	Designer	Sheet 18 of 25

Low Side Switches

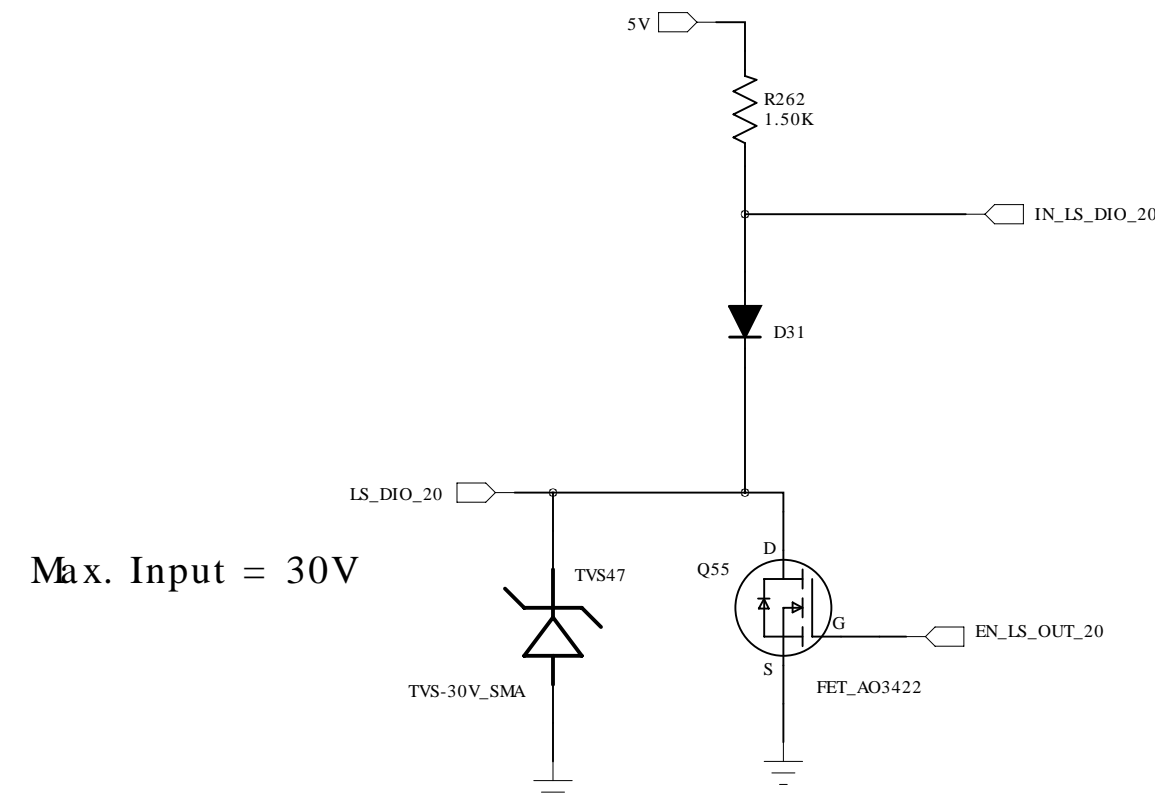
Low-Side Switch

Sinks 500 mA



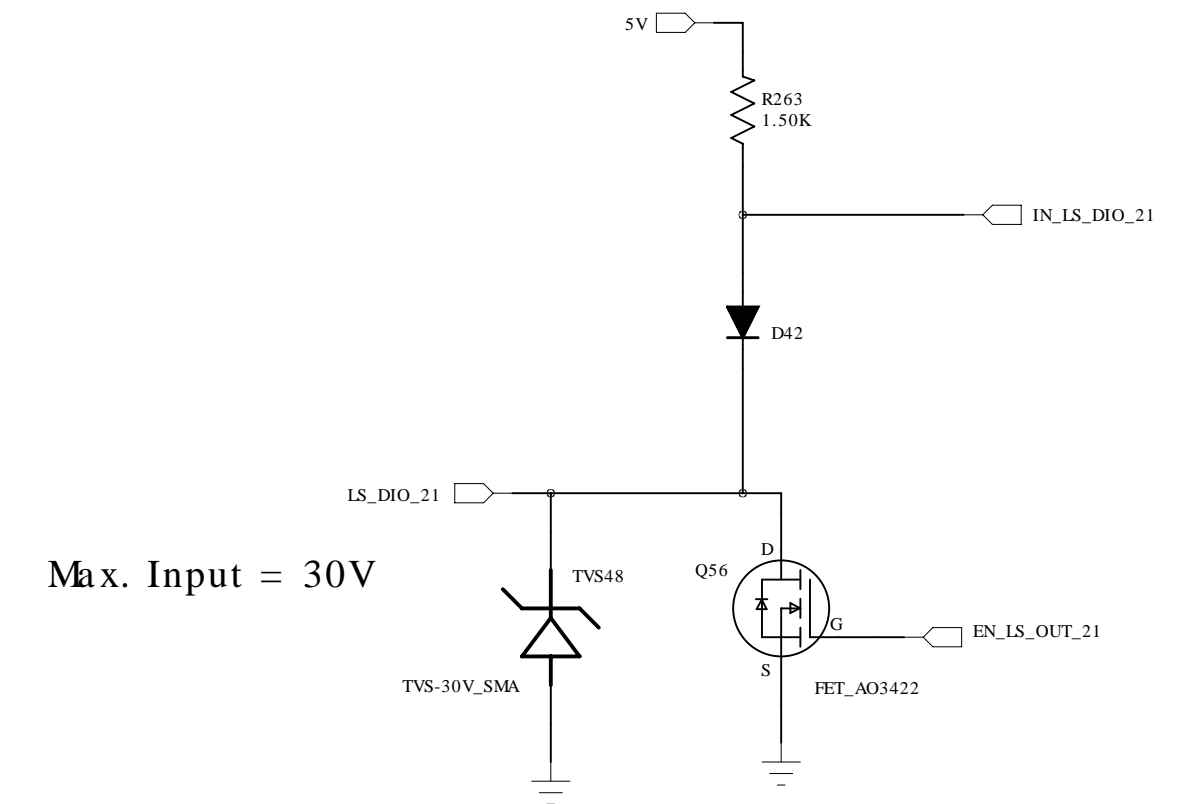
Low-Side Switch

Sinks 500 mA



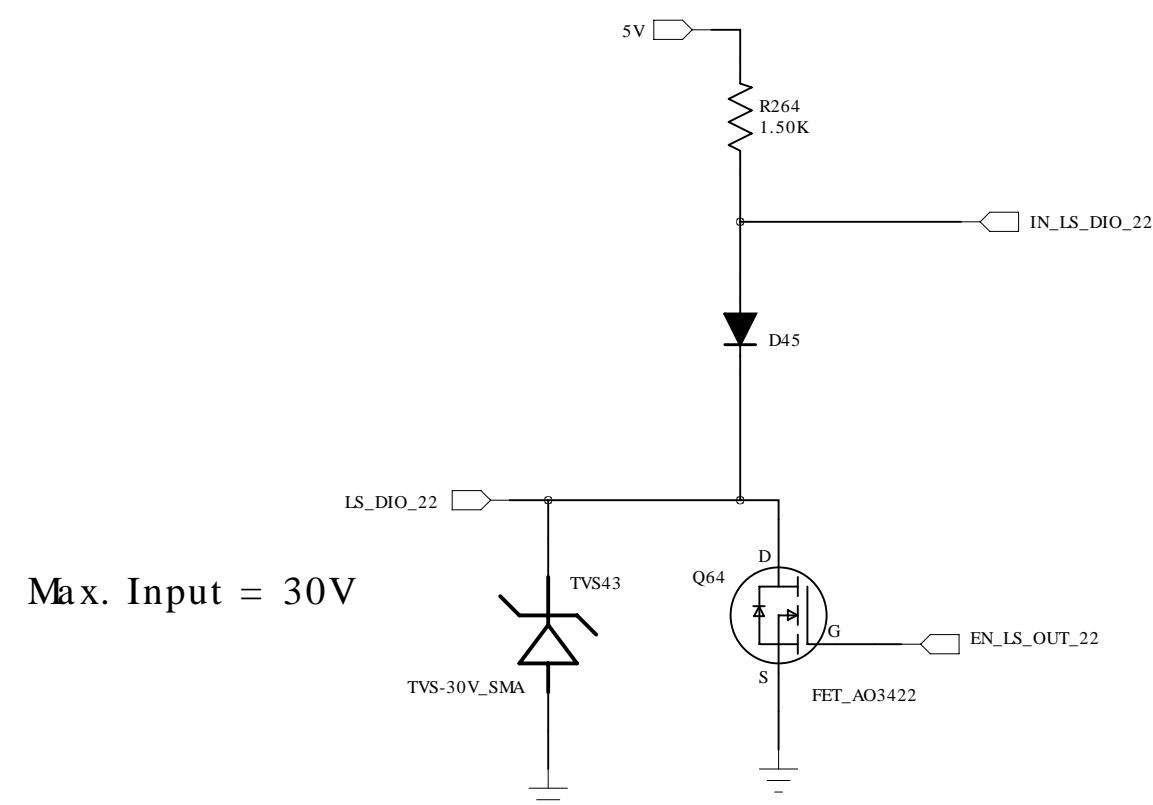
Low-Side Switch

Sinks 500 mA



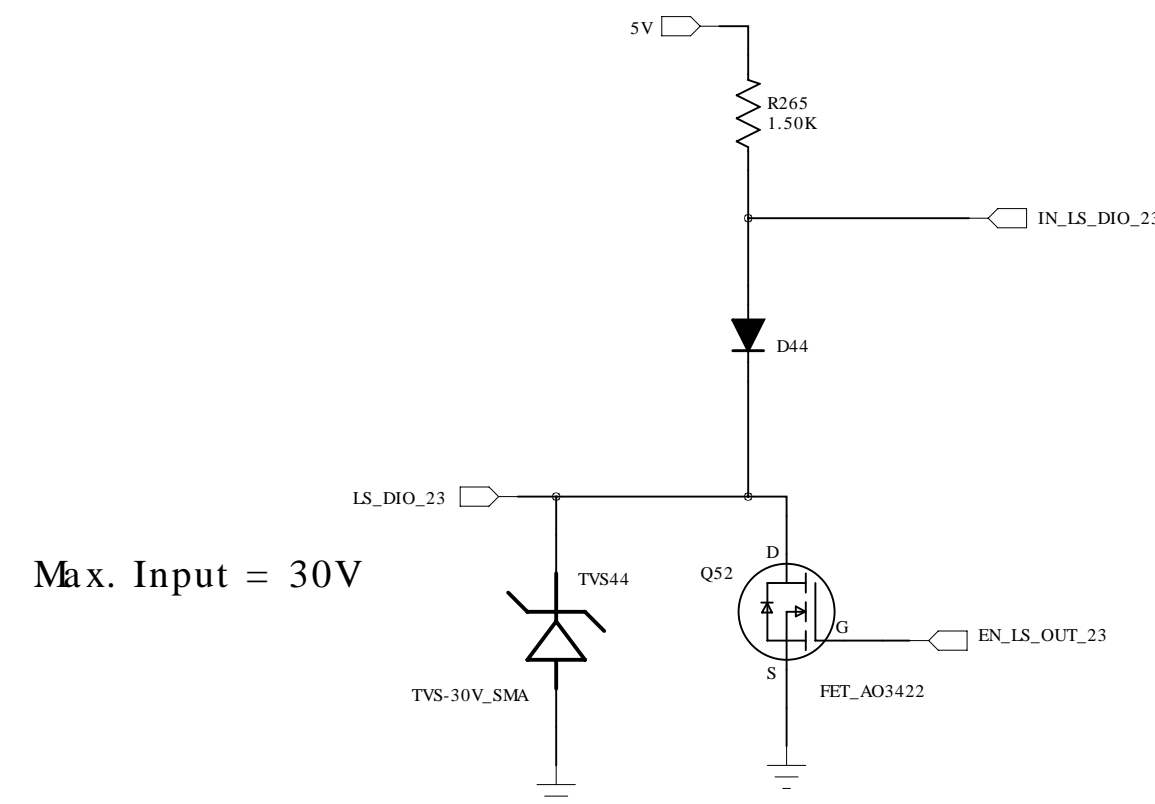
Low-Side Switch

Sinks 500 mA



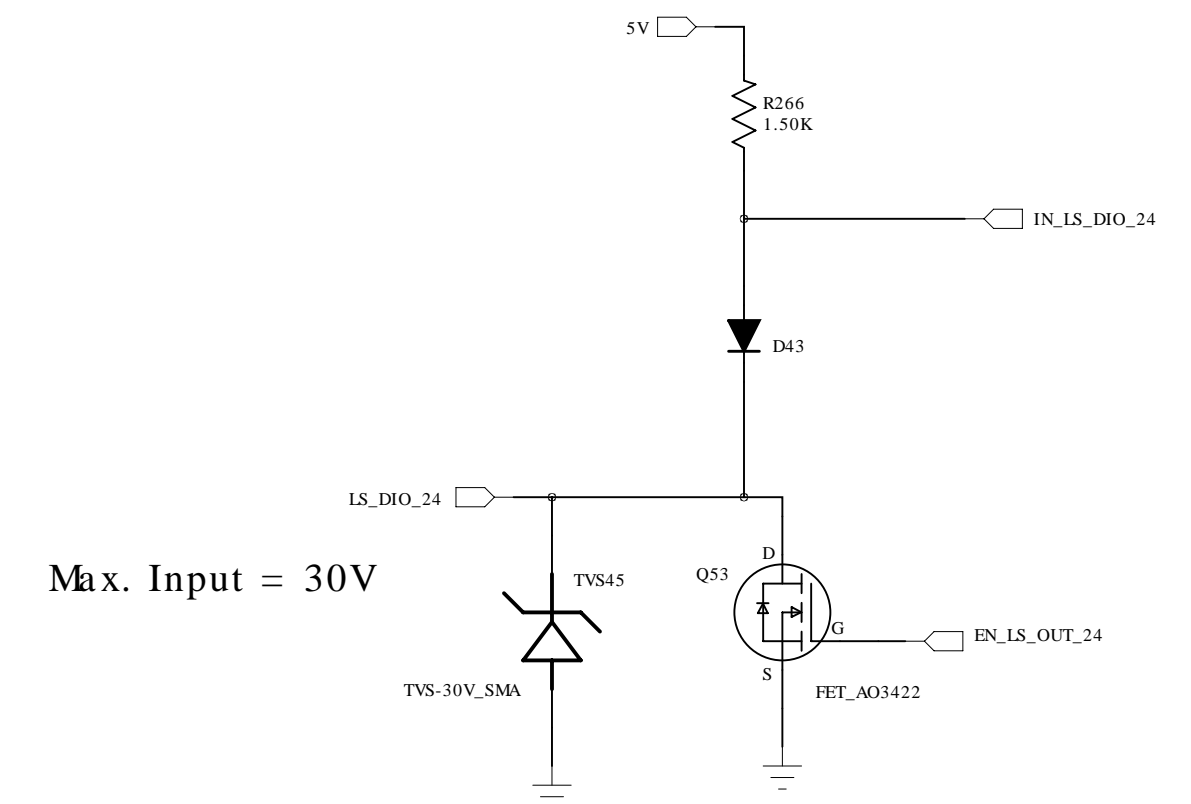
Low-Side Switch

Sinks 500 mA



Low-Side Switch

Sinks 500 mA

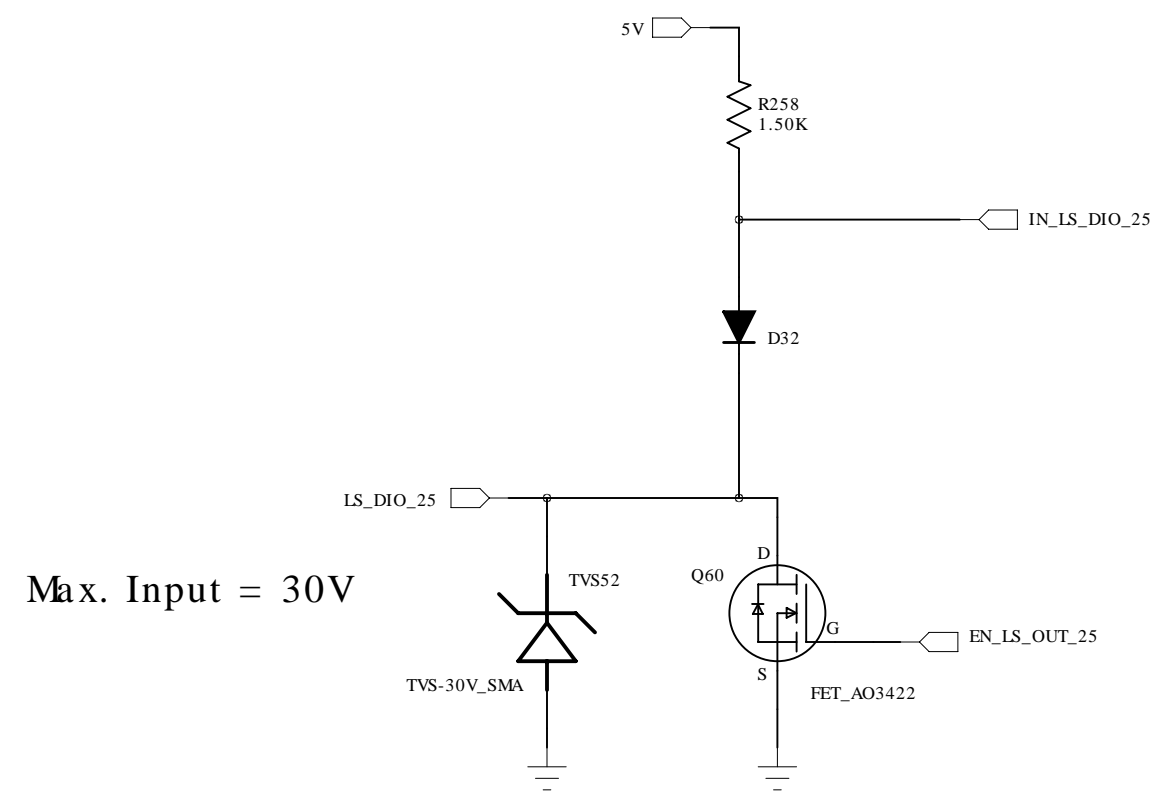


Technologic Systems	Date	May 6, 2012
Title: TS-7580 Low Side Switches		
Rev: A	Designer	Sheet 19 of 25

Low Side Switches

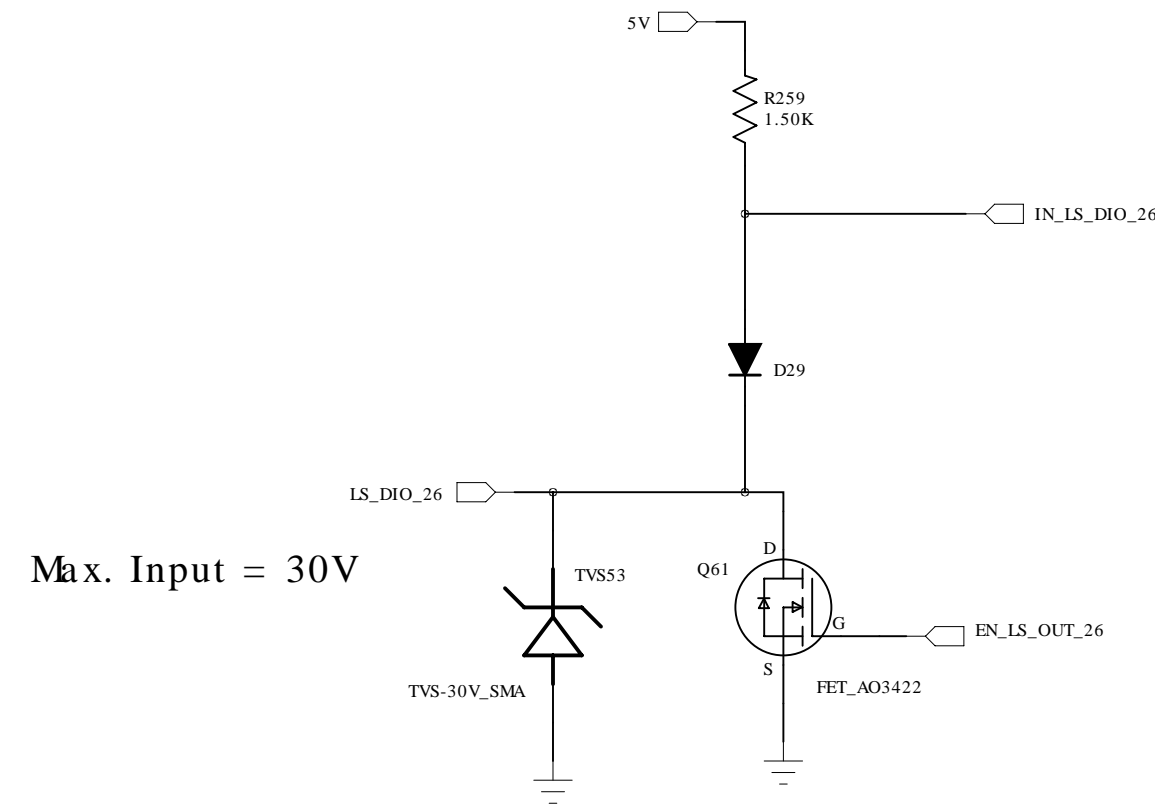
Low-Side Switch

Sinks 500 mA



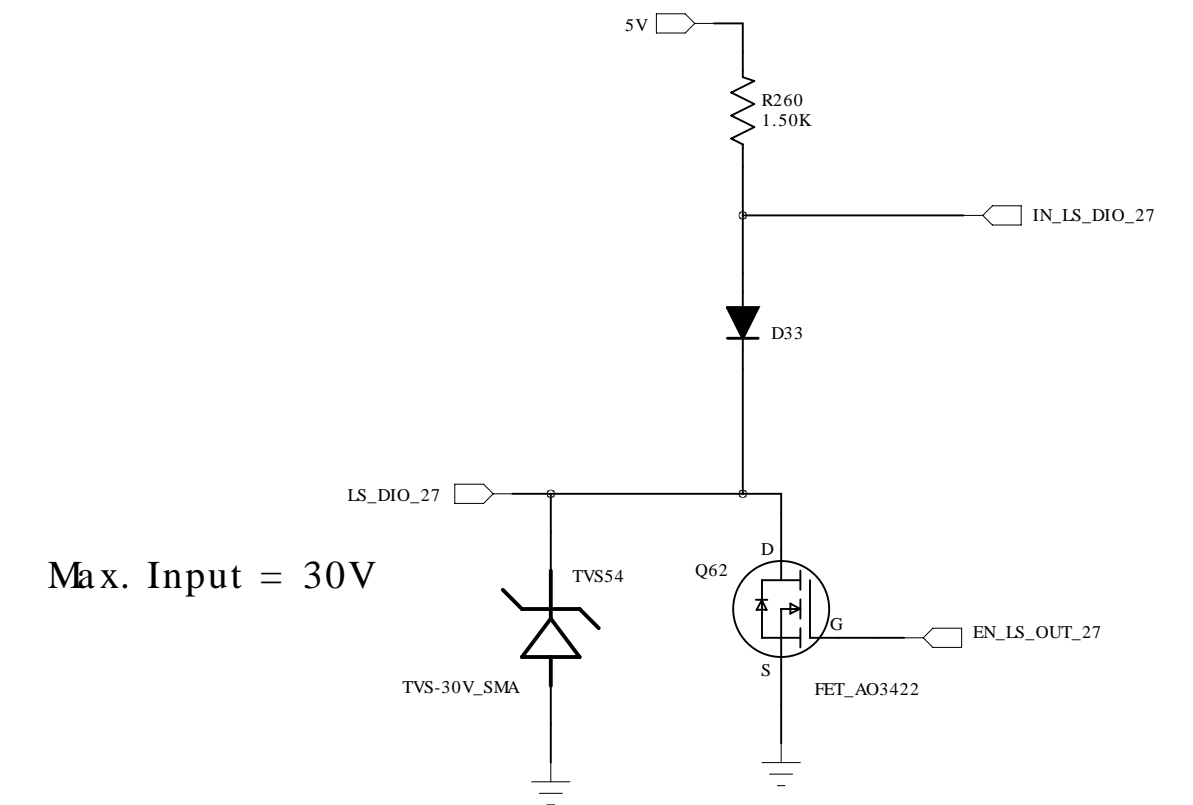
Low-Side Switch

Sinks 500 mA



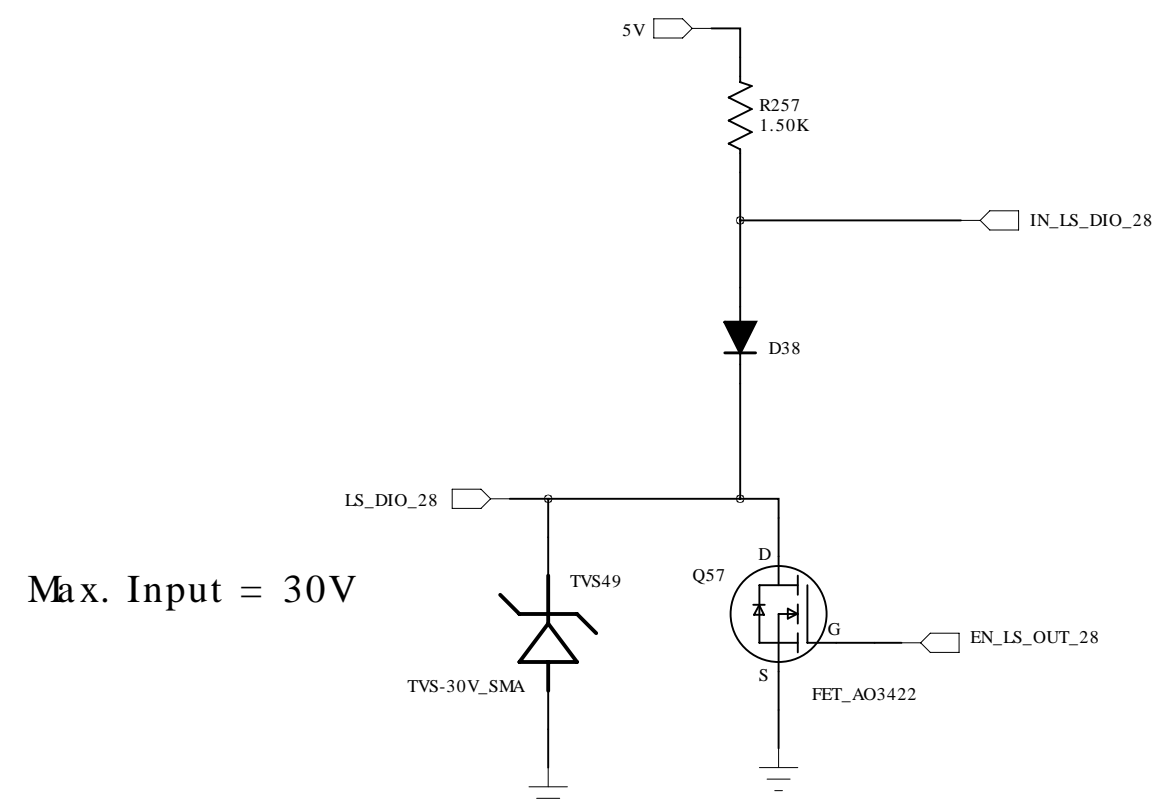
Low-Side Switch

Sinks 500 mA



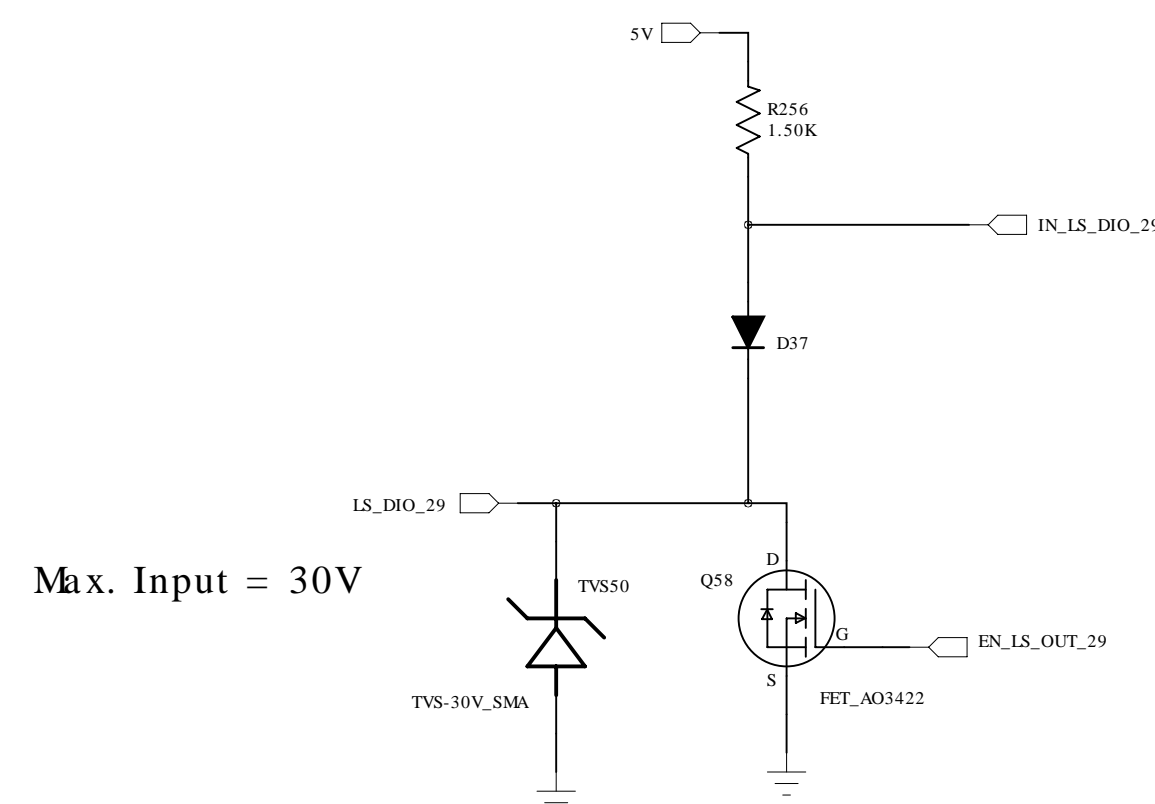
Low-Side Switch

Sinks 500 mA



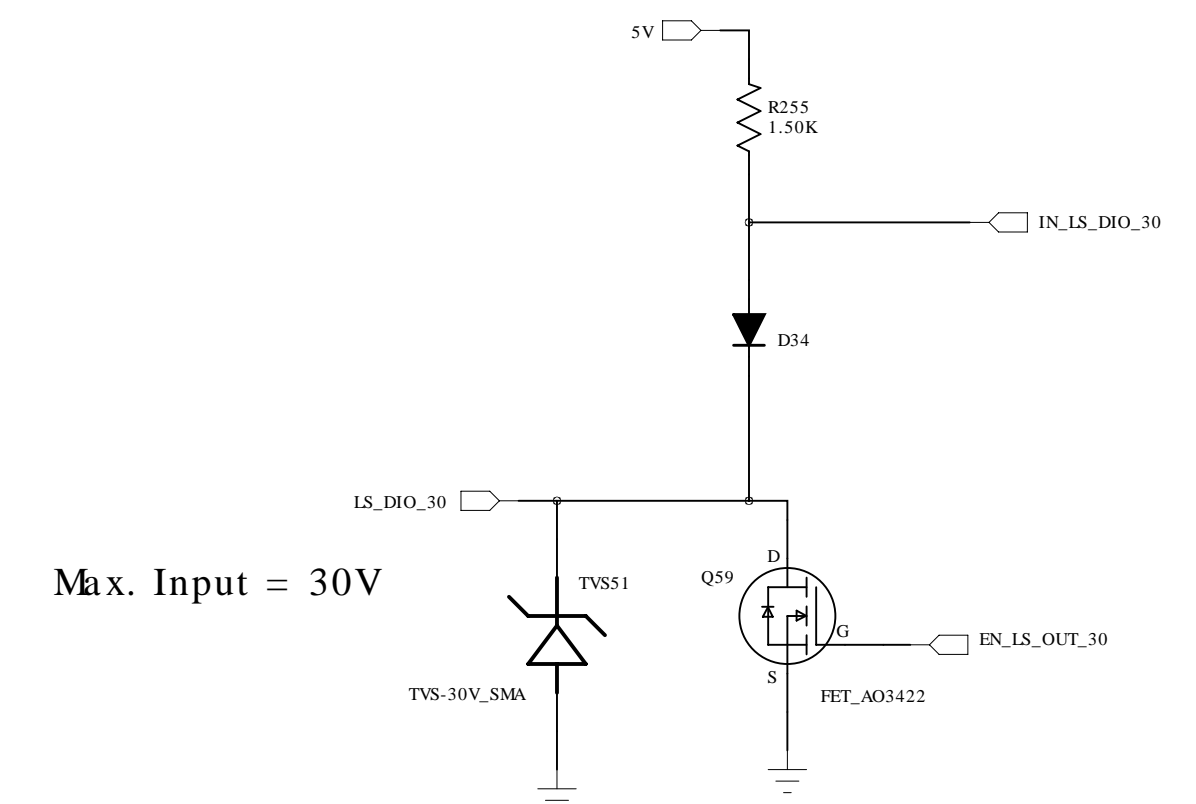
Low-Side Switch

Sinks 500 mA



Low-Side Switch

Sinks 500 mA

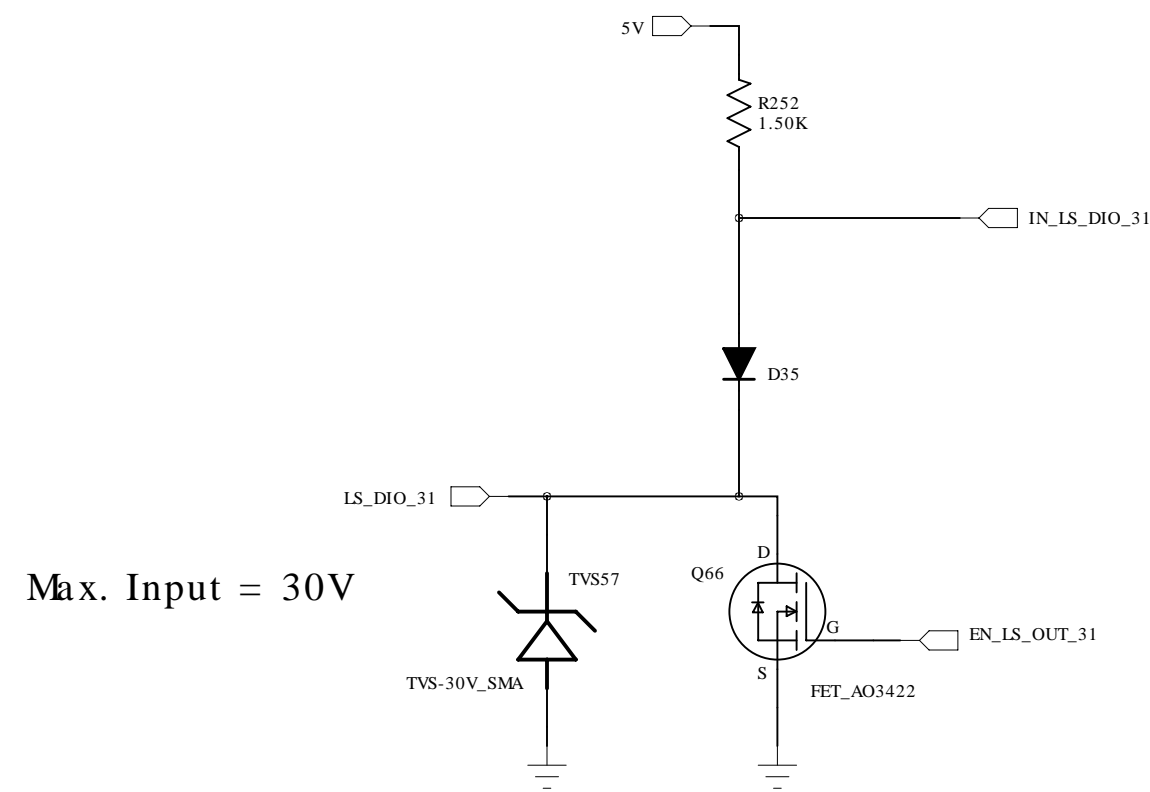


Technologic Systems	Date	May 6, 2012
Title: TS-7580 Low Side Switches		
Rev: A	Designer	Sheet 20 of 25

Low Side Switches

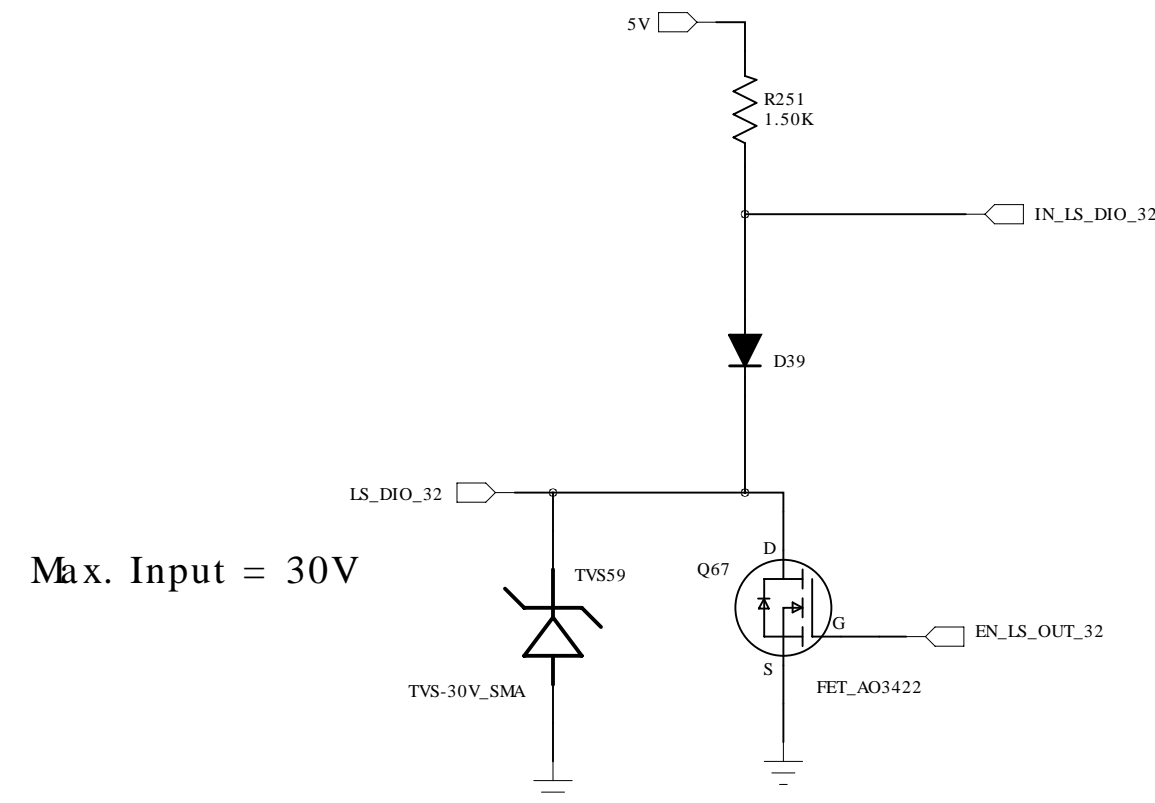
Low-Side Switch

Sinks 500 mA



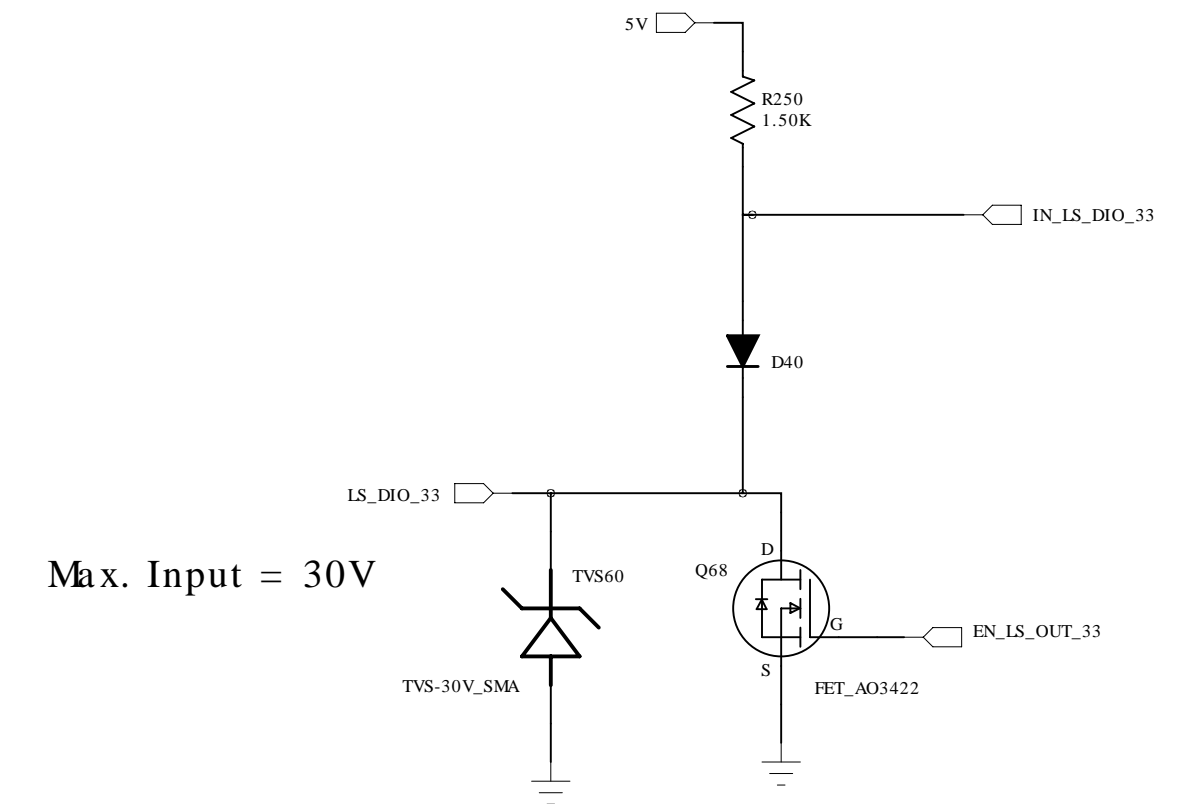
Low-Side Switch

Sinks 500 mA



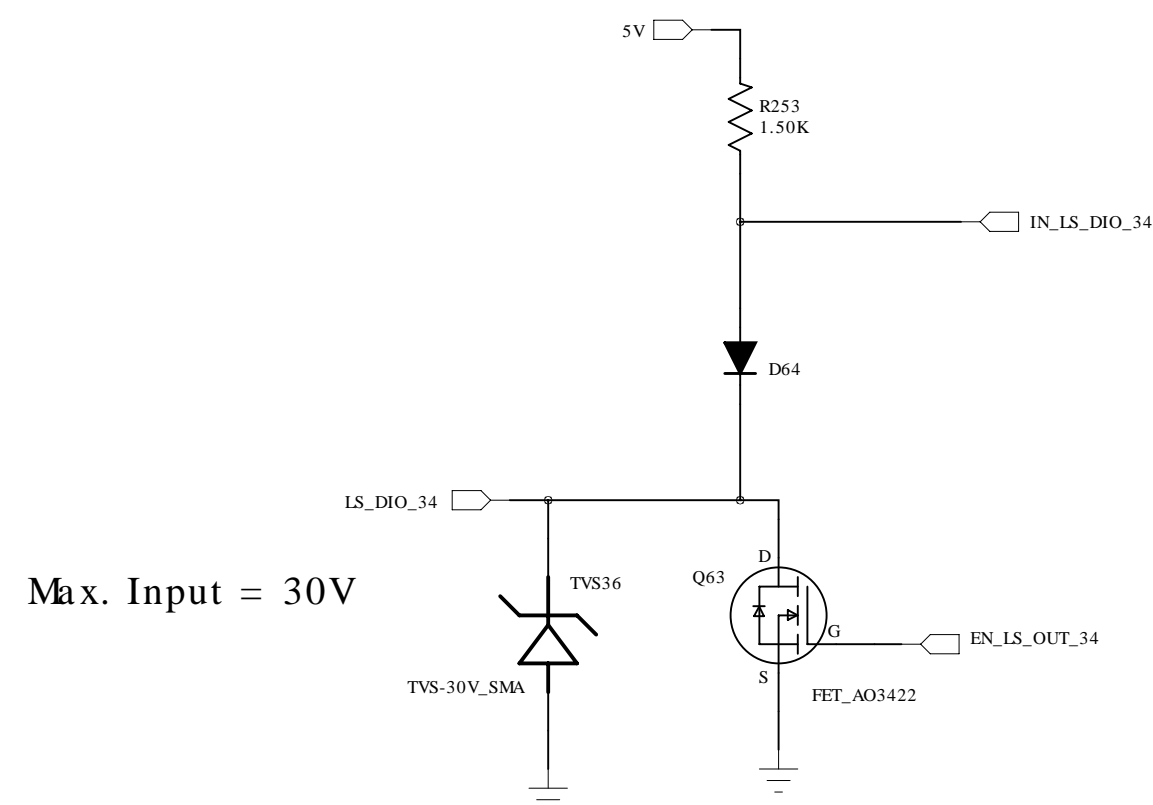
Low-Side Switch

Sinks 500 mA



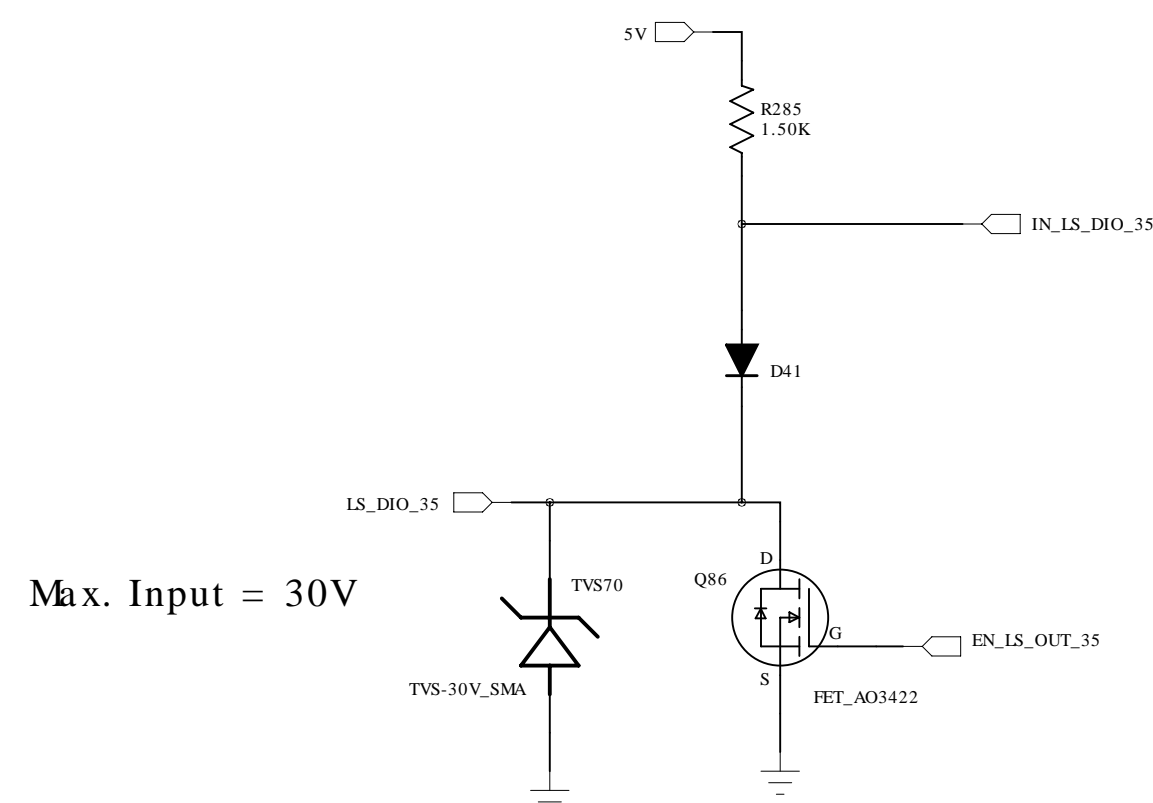
Low-Side Switch

Sinks 500 mA



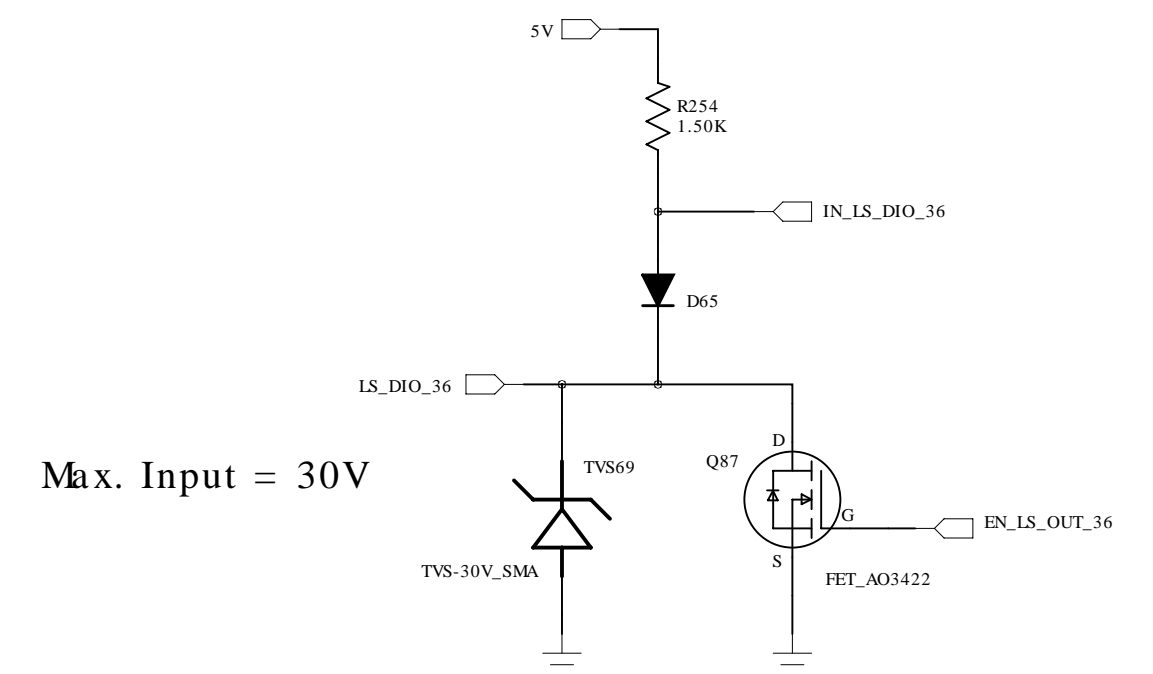
Low-Side Switch

Sinks 500 mA



Low-Side Switch

Sinks 500 mA

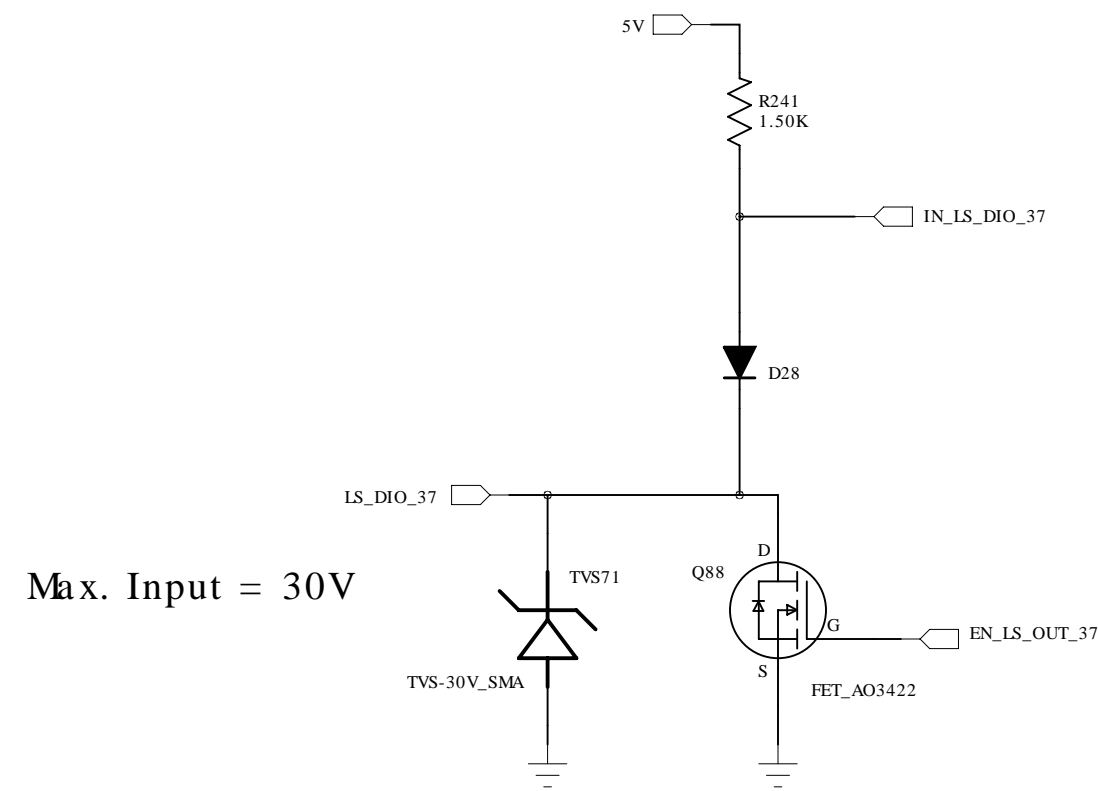


Technologic Systems	Date	May 6, 2012
Title: TS-7580 Low Side Switches		
Rev: A	Designer	Sheet 21 of 25

Low Side Switches

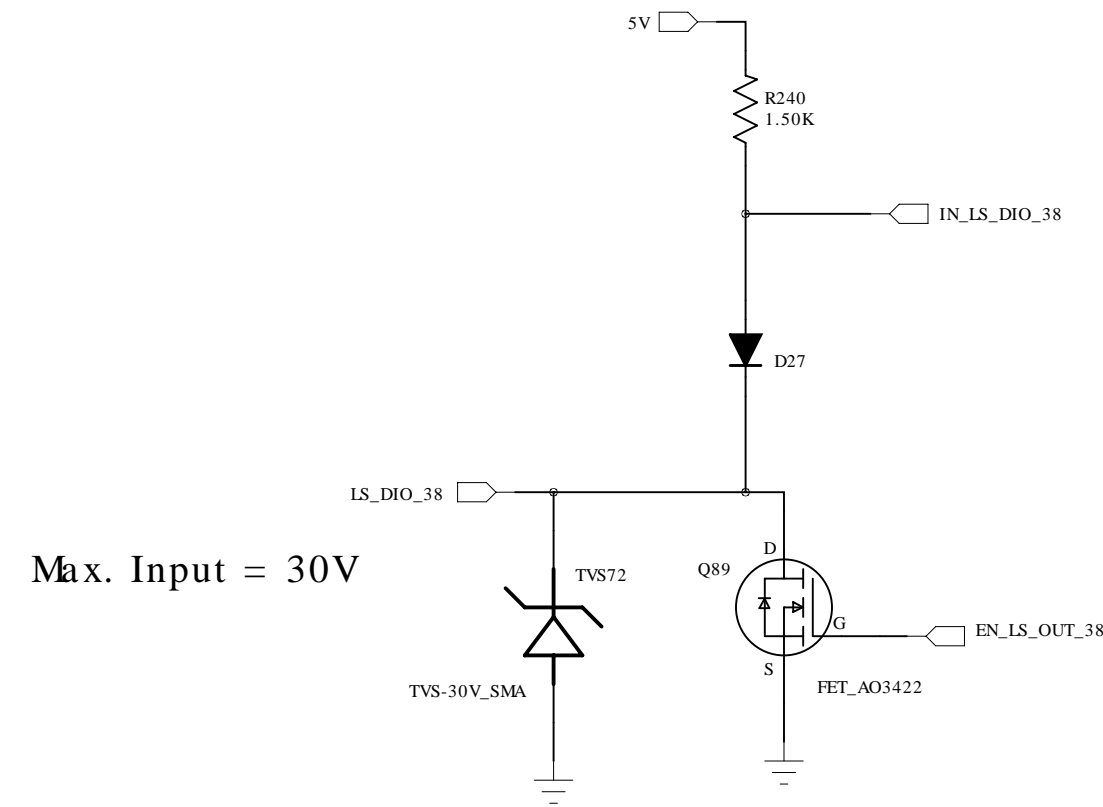
Low-Side Switch

Sinks 500 mA



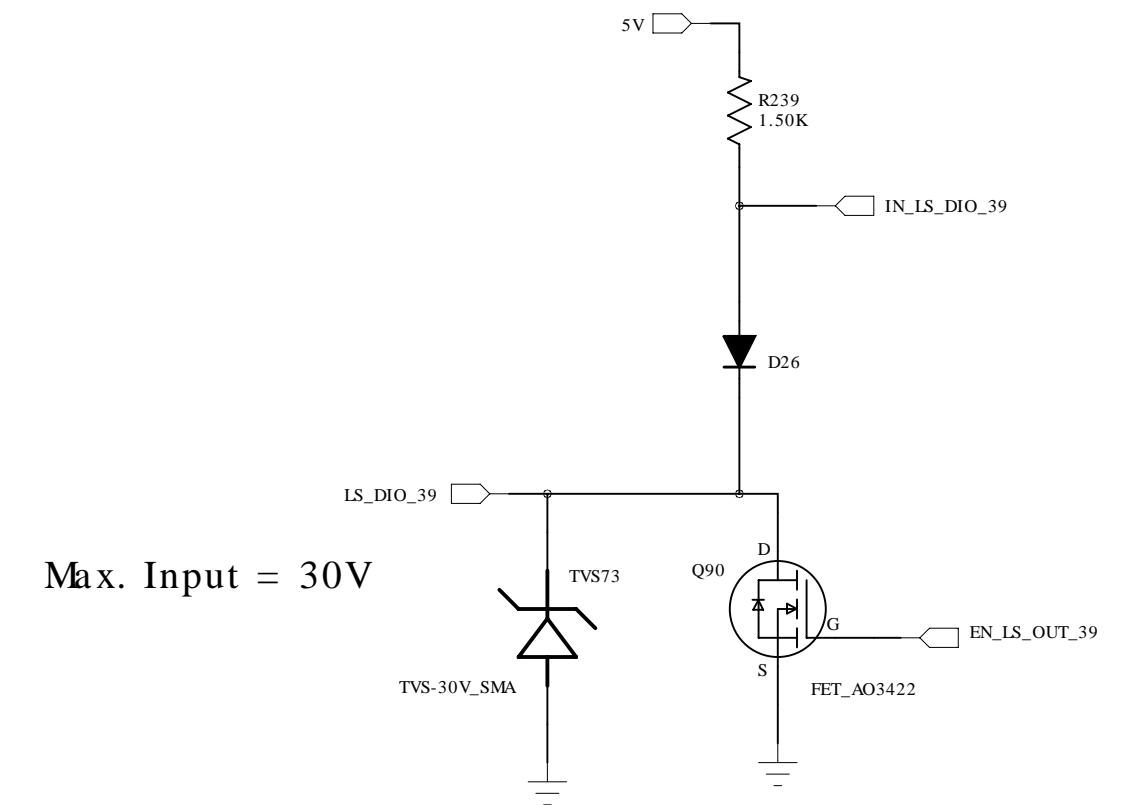
Low-Side Switch

Sinks 500 mA



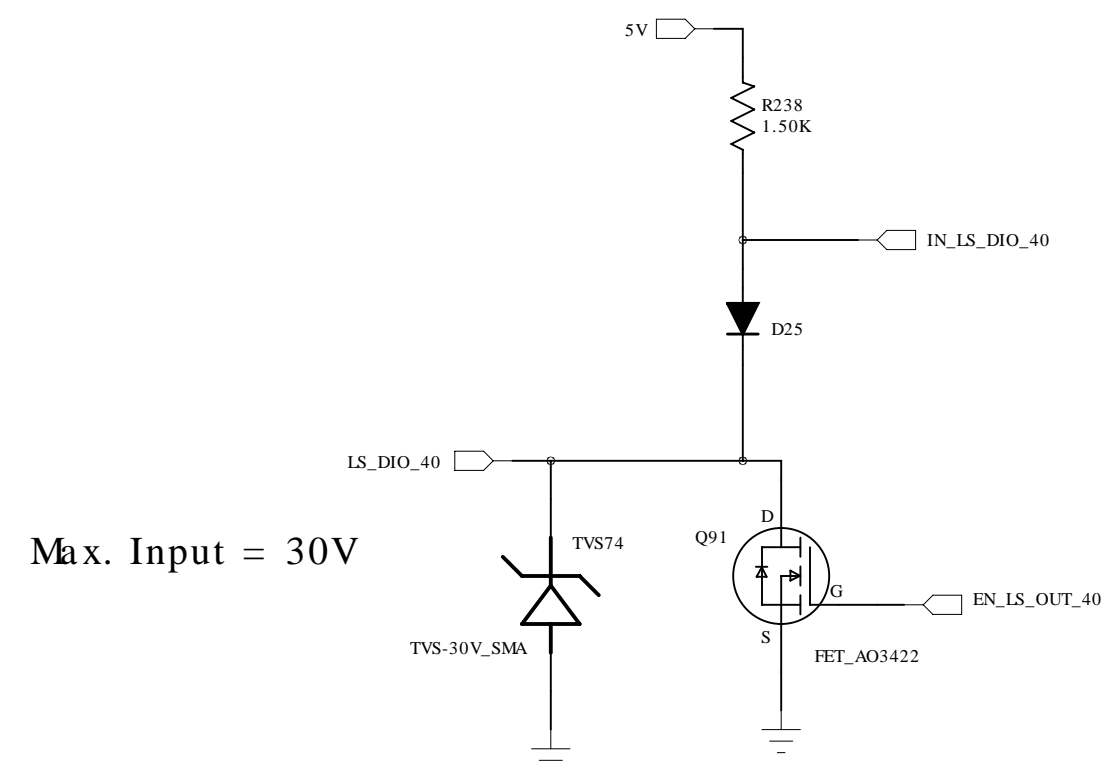
Low-Side Switch

Sinks 500 mA



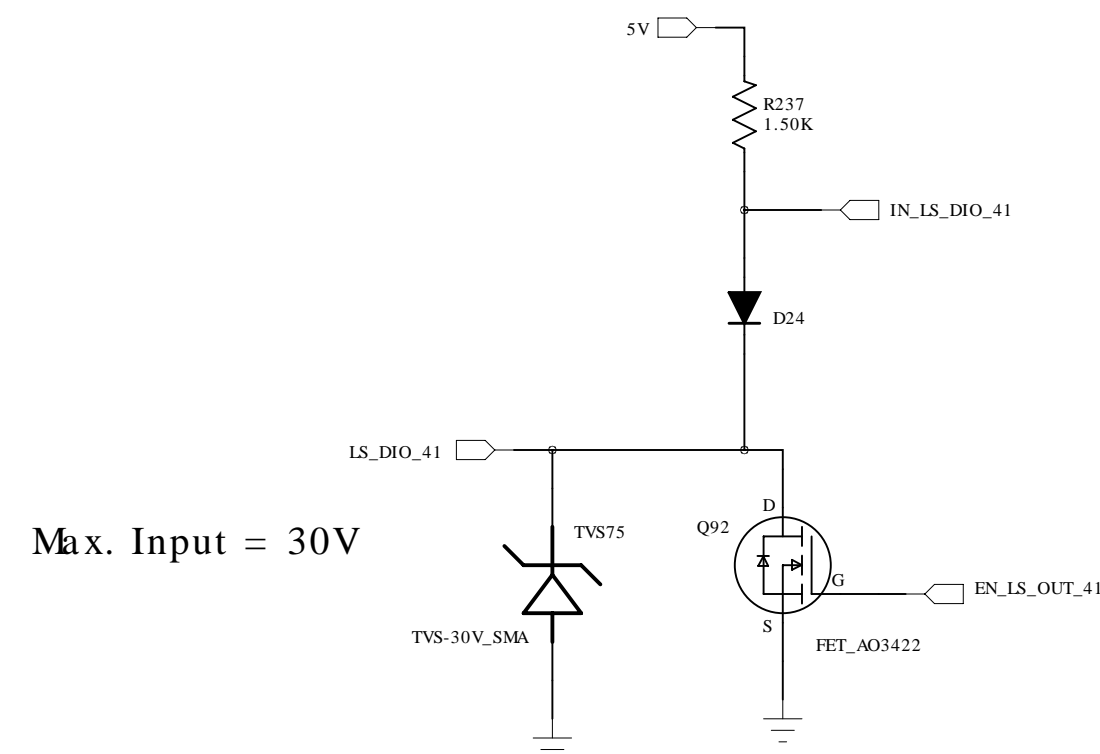
Low-Side Switch

Sinks 500 mA



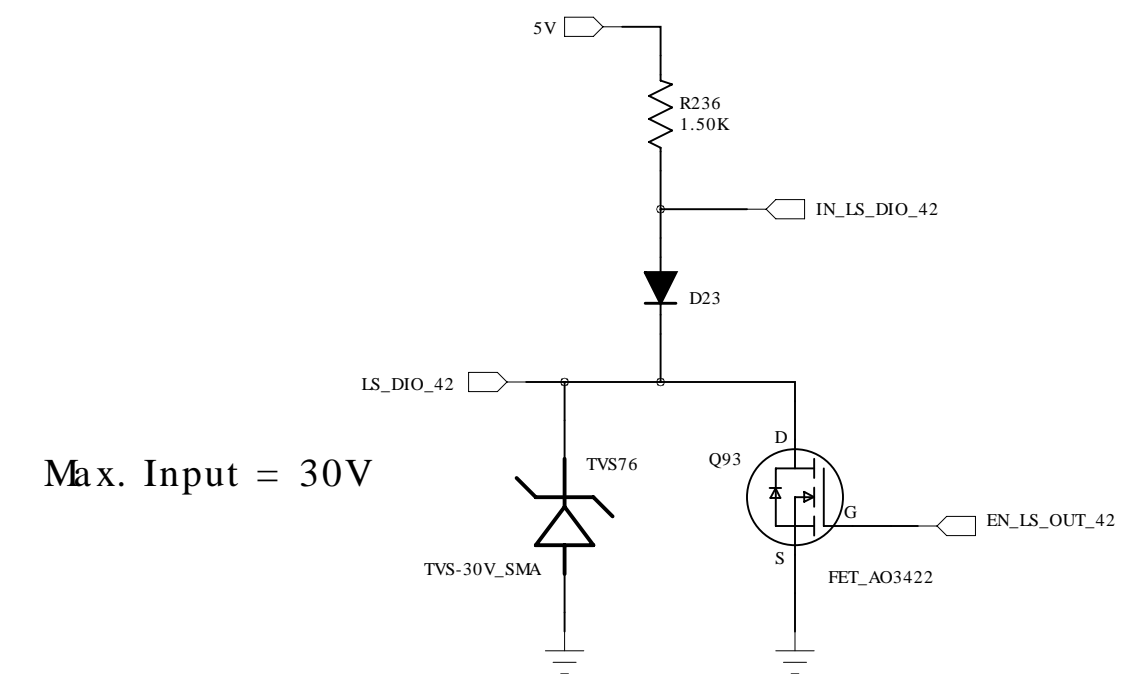
Low-Side Switch

Sinks 500 mA



Low-Side Switch

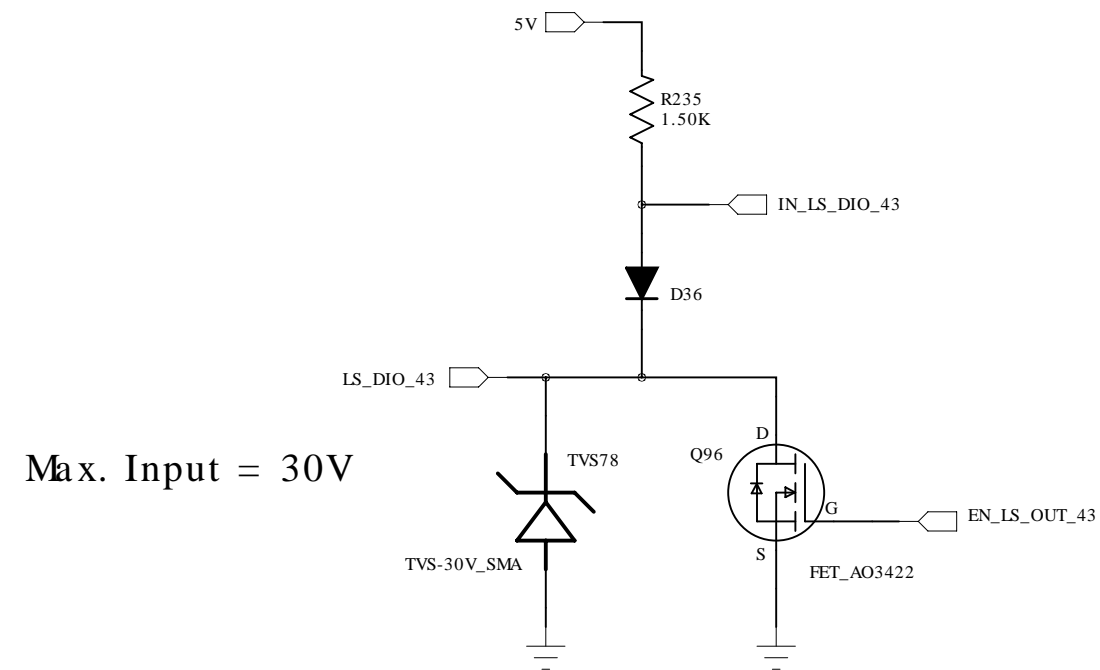
Sinks 500 mA



Technologic Systems	Date	May 6, 2012
Title: TS-7580 Low Side Switches		
Rev: A	Designer	Sheet 22 of 25

Low-Side Switch

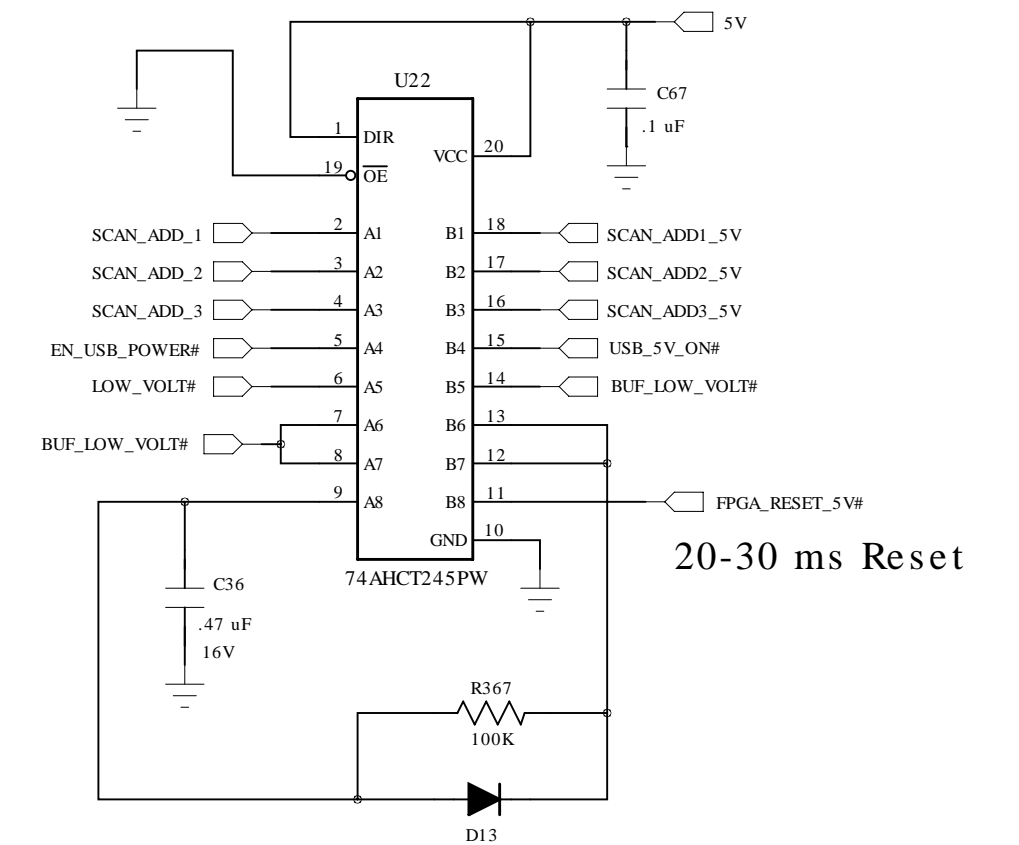
Sinks 500 mA



Max. Input = 30V

3.3V → 5V

Level shifters

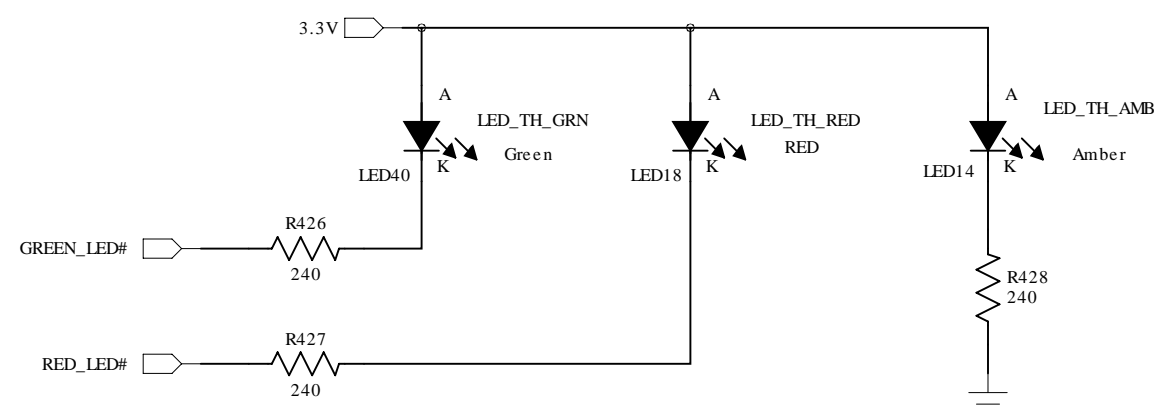


20-30 ms Reset

U22 has Schmitt-trigger Inputs

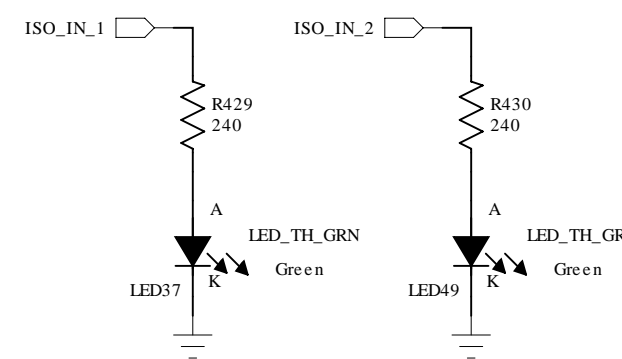
Red Green Amber

LEDs



Isolated Input

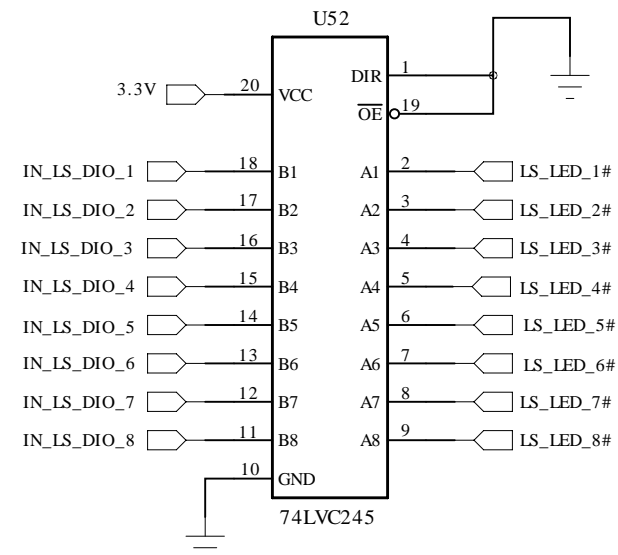
LEDs



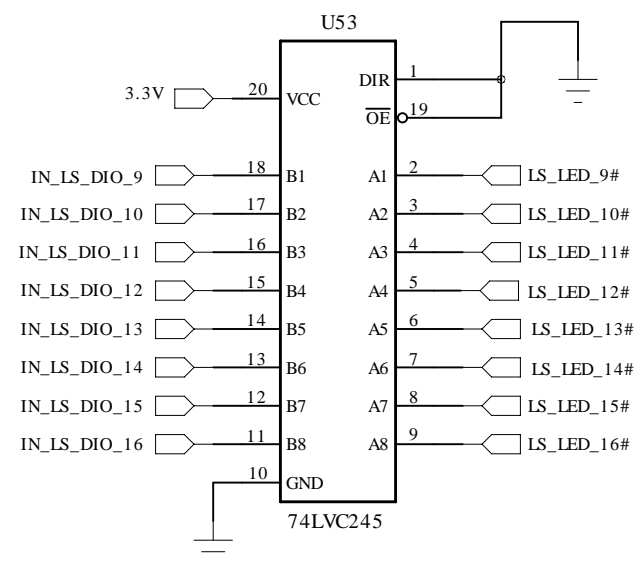
Technologic Systems	Date	May 6, 2012
Title: TS-7580 Low Side Switches		
Rev: A	Designer	Sheet 23 of 25

LED Buffers

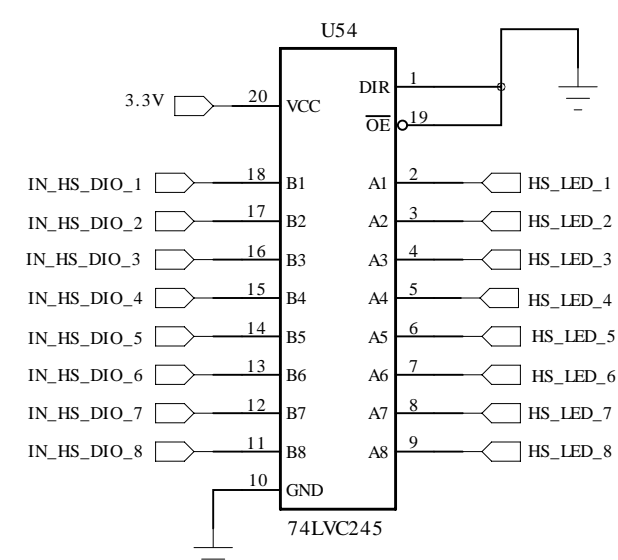
Buffer →



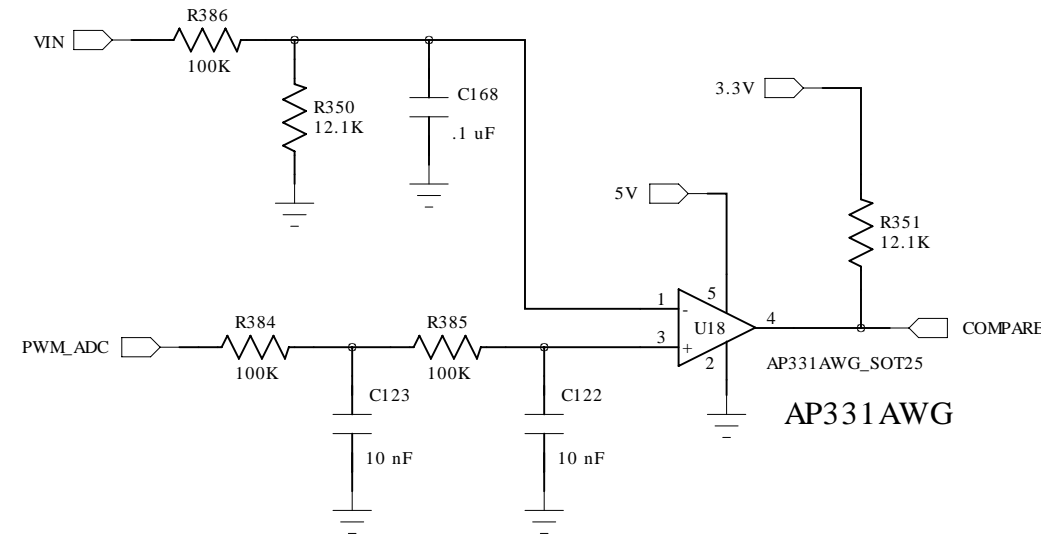
Buffer →



Buffer →

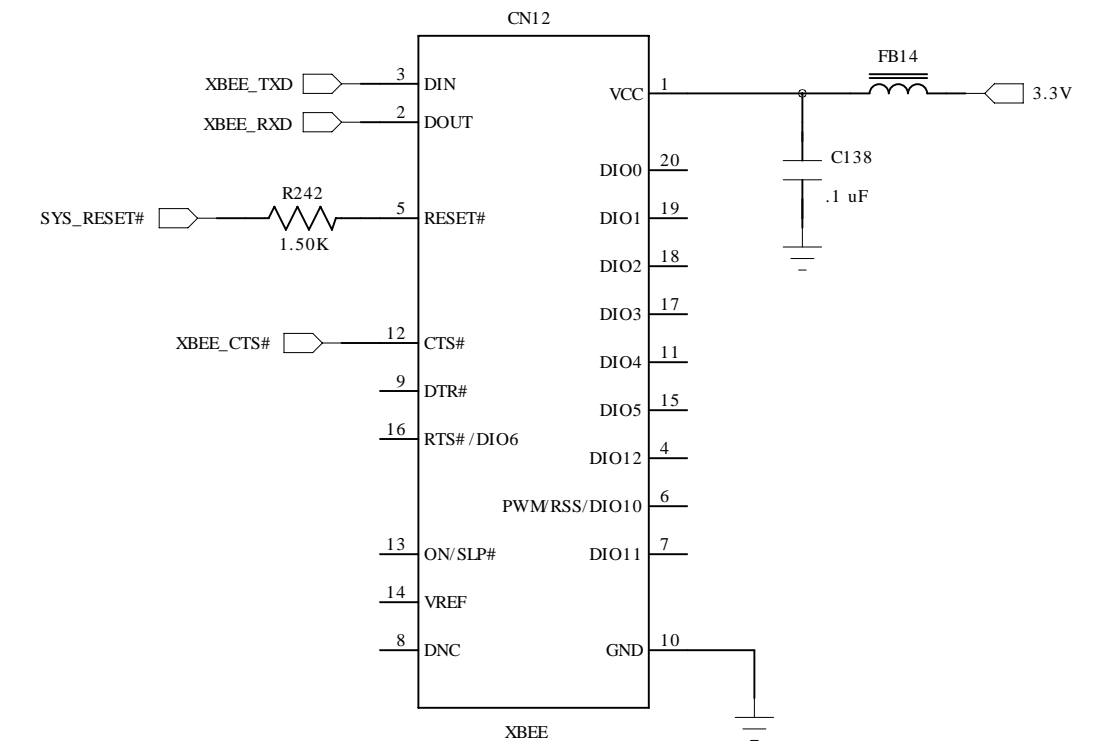


A/D Converter



Not Populated

Digi/MaxStream
XBee Radio Socket



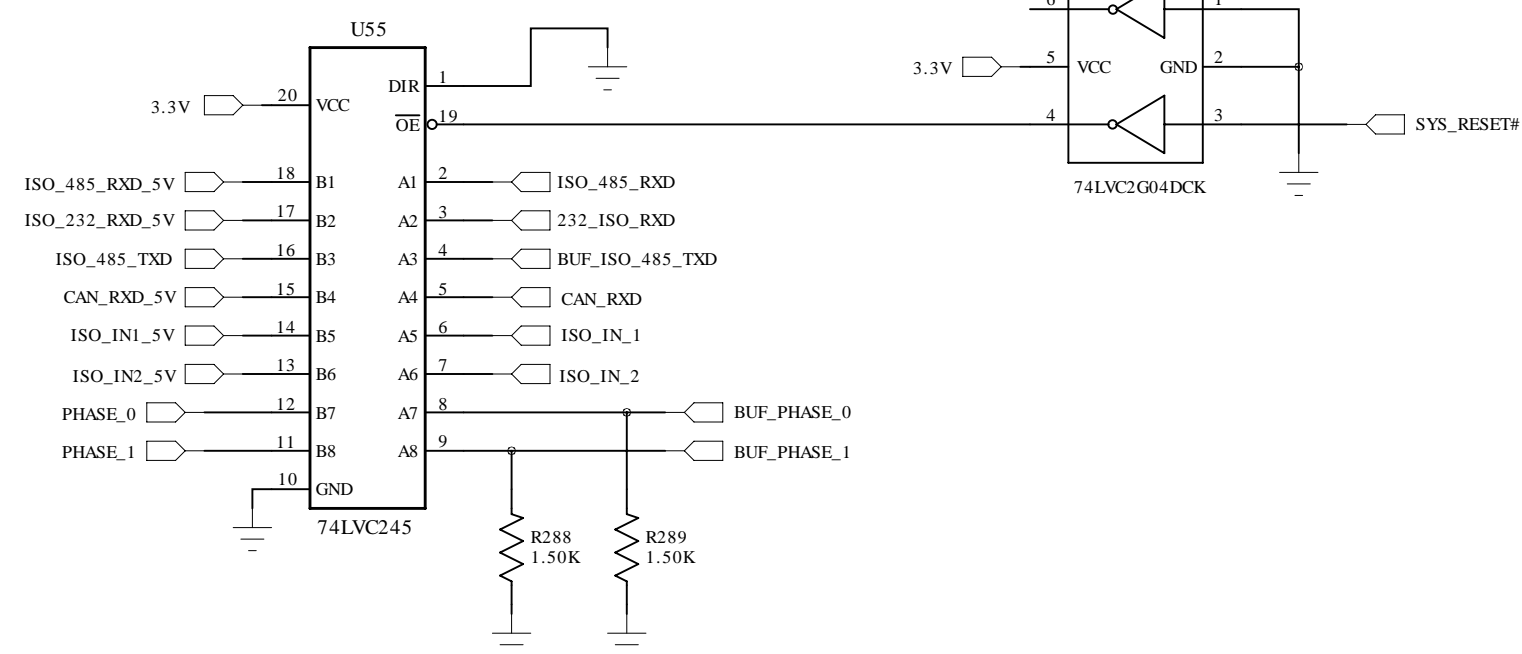
10-pin 2mm socket
S5751-10-ND
56 cents / 100

Reset# must be driven
with Open drain

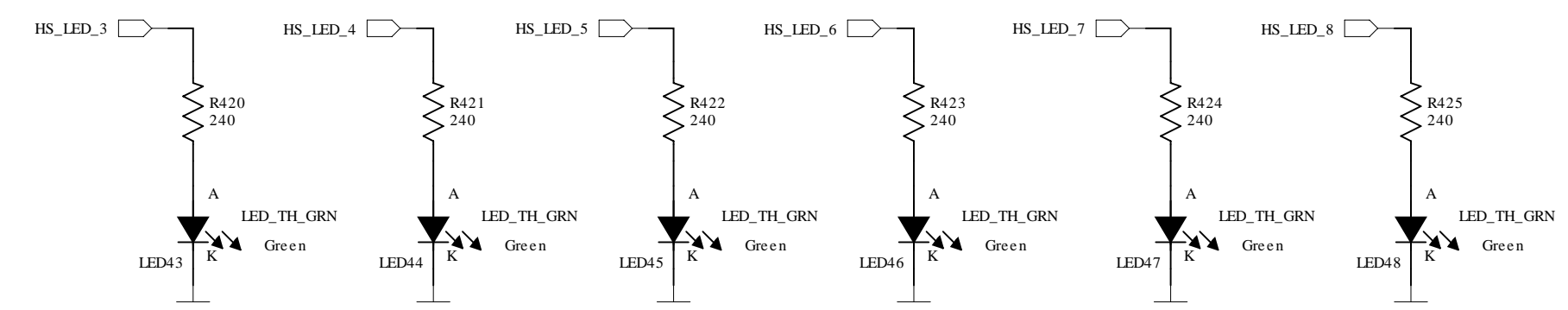
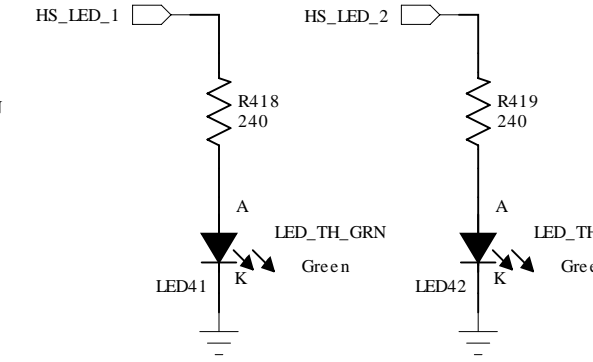
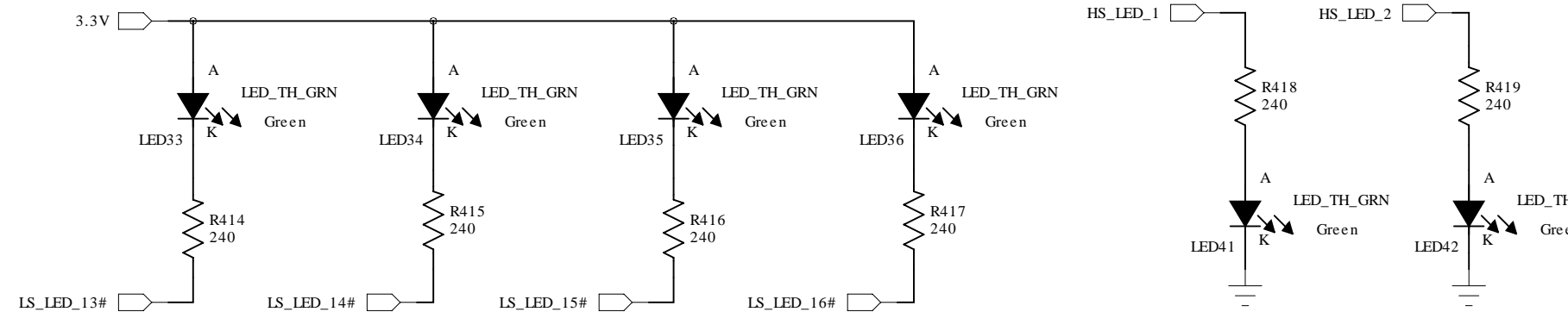
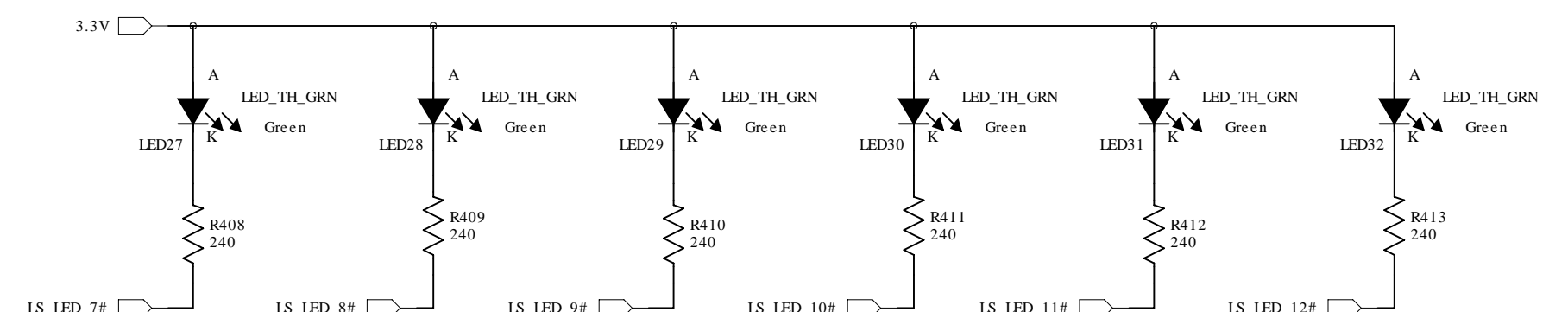
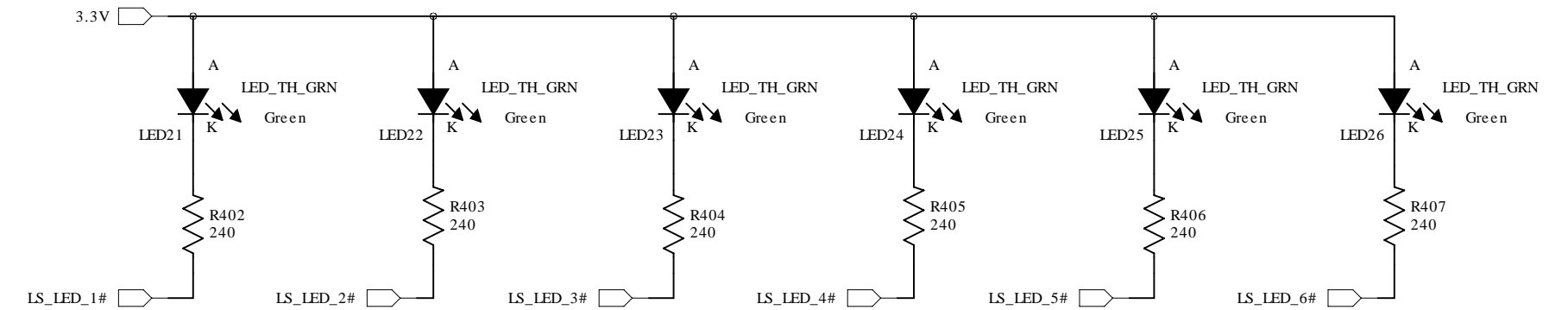
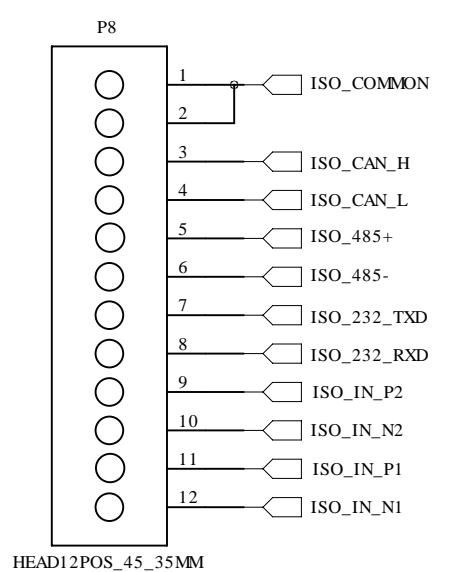
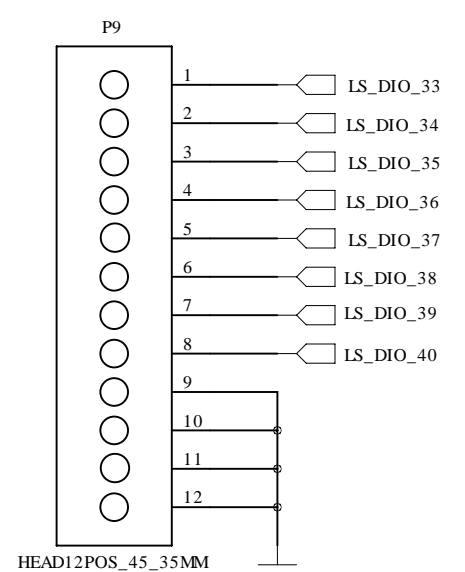
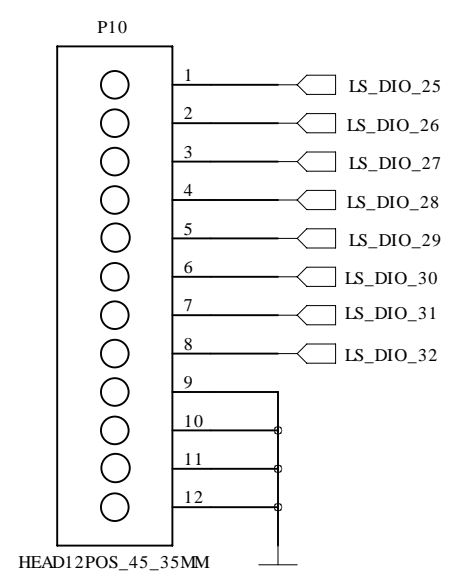
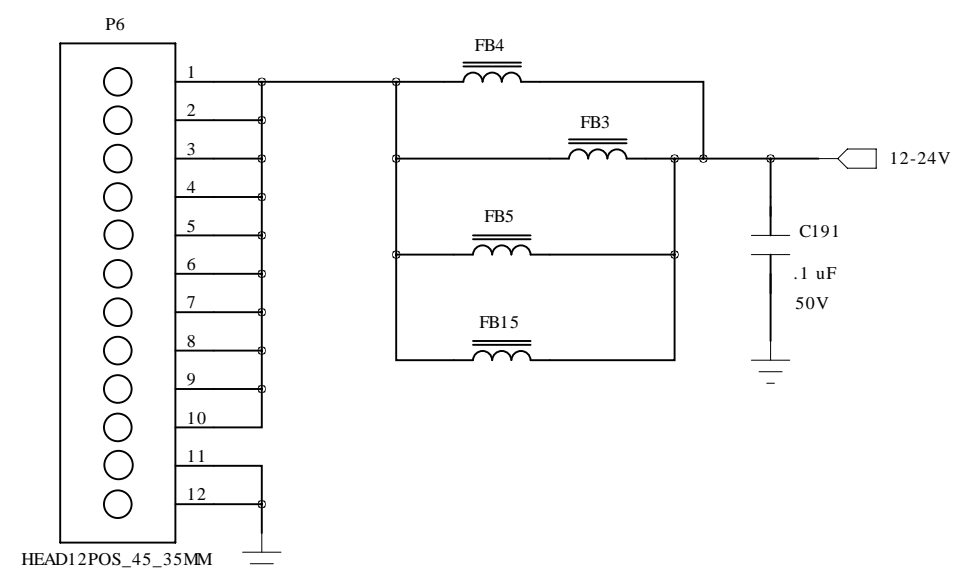
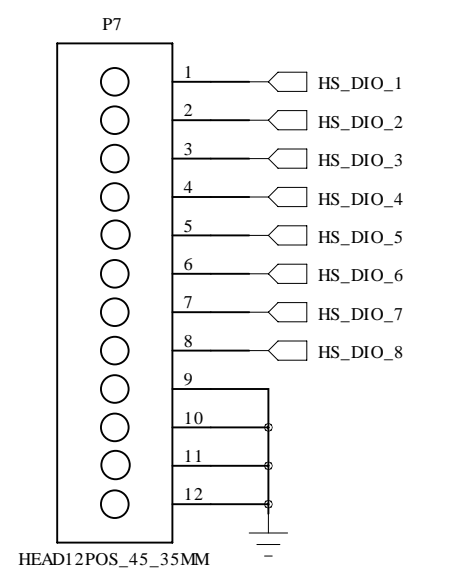
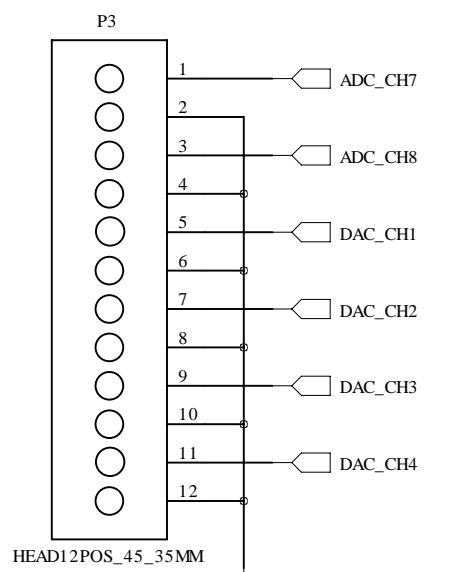
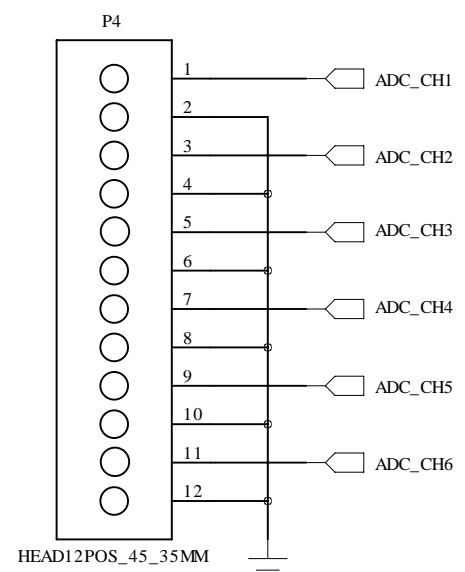
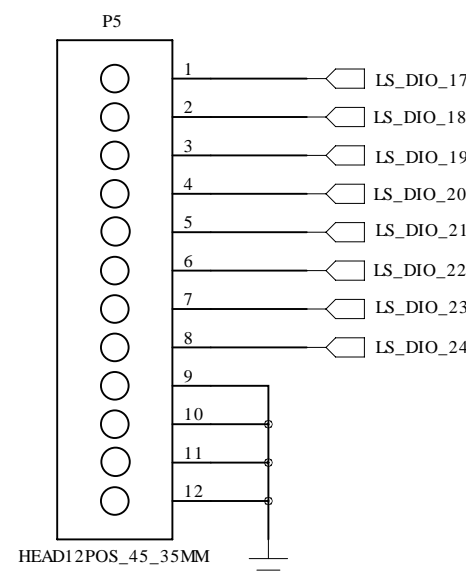
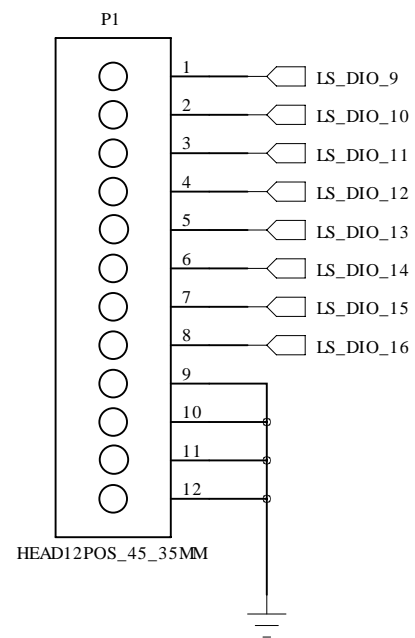
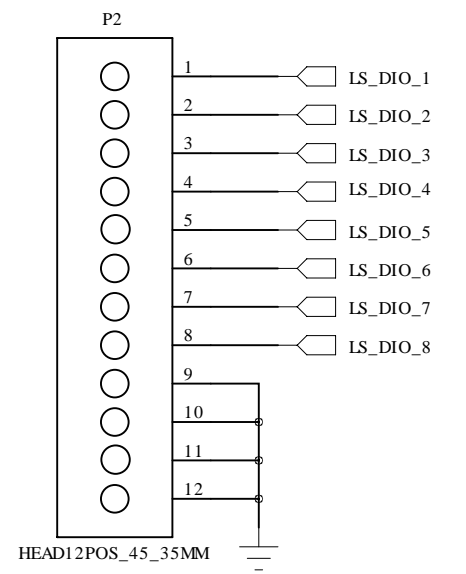
CTS# is an output
that can be used for
hardware flow control

Baud rates up to
230.4K supported

Buffer →



Screw Terminal Conn.



Technologic Systems		Date May 6, 2012
Title: TS-7580 Power, Terminals, LEDs		
Rev: A	Designer	Sheet 25 of 25