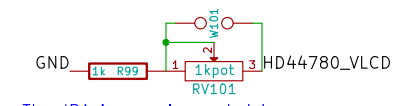
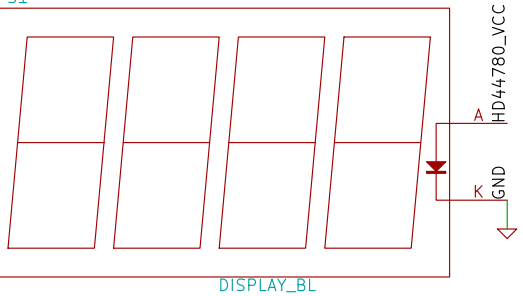


rusefi

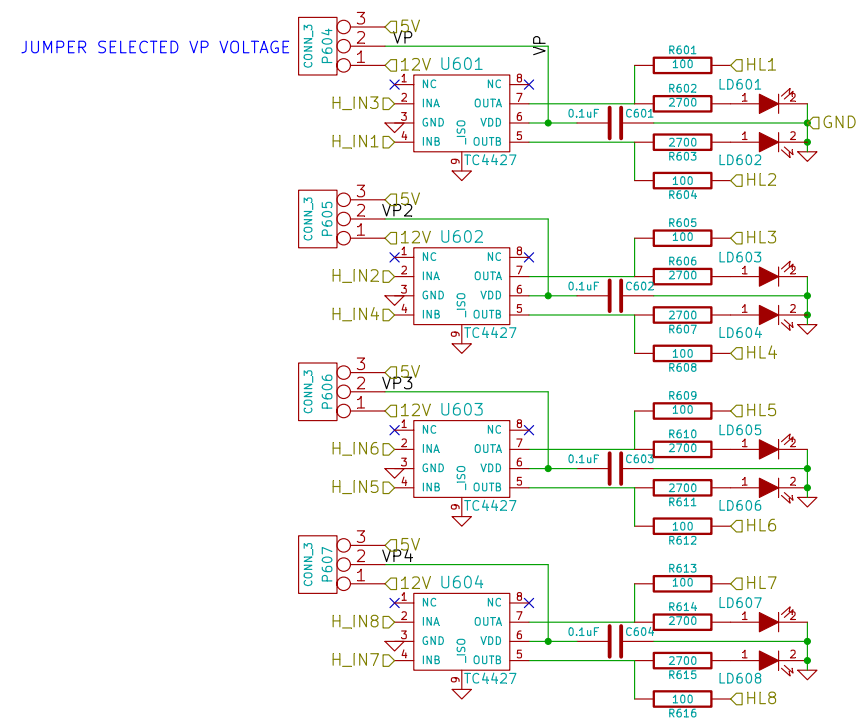


The JP1 jumper is needed because we cannot feed the screen via USB - we would need to disconnect it while the board is on a bench



rusefi.com		File: frankenso.sch	
Sheet: /		Title: Frankenso	
Size: B	Date: 18 oct 2015	Rev: .05	
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 1/15	

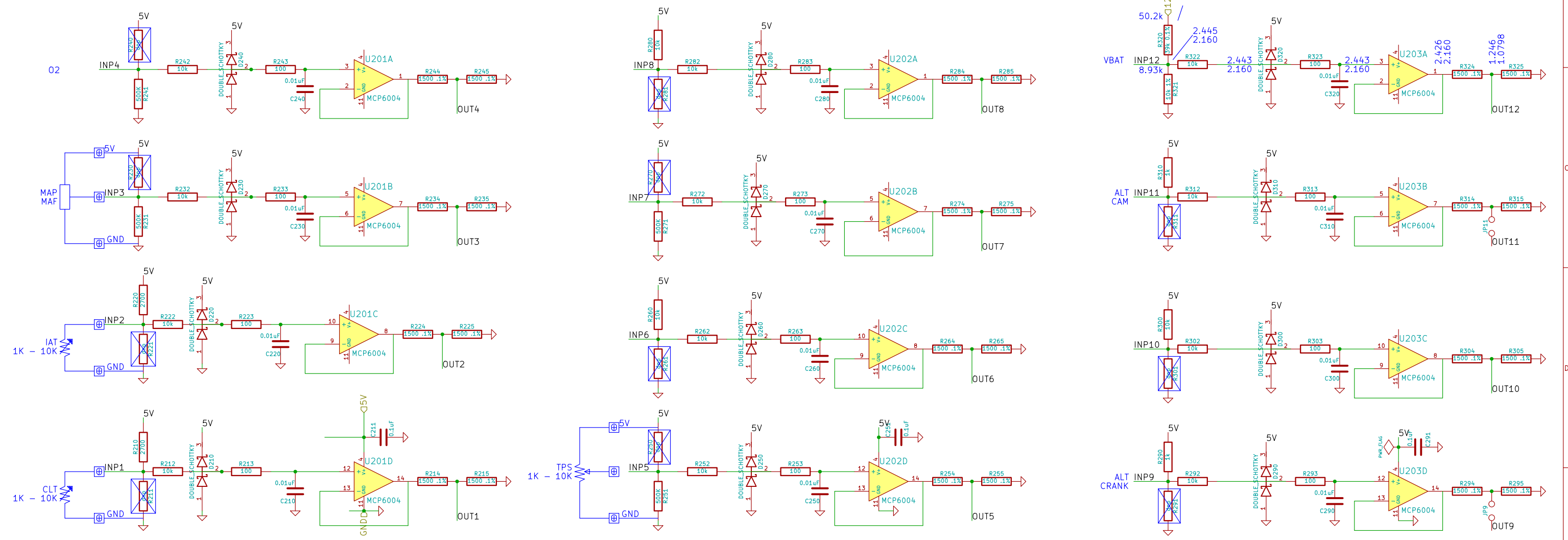
8 channel high / low side driver

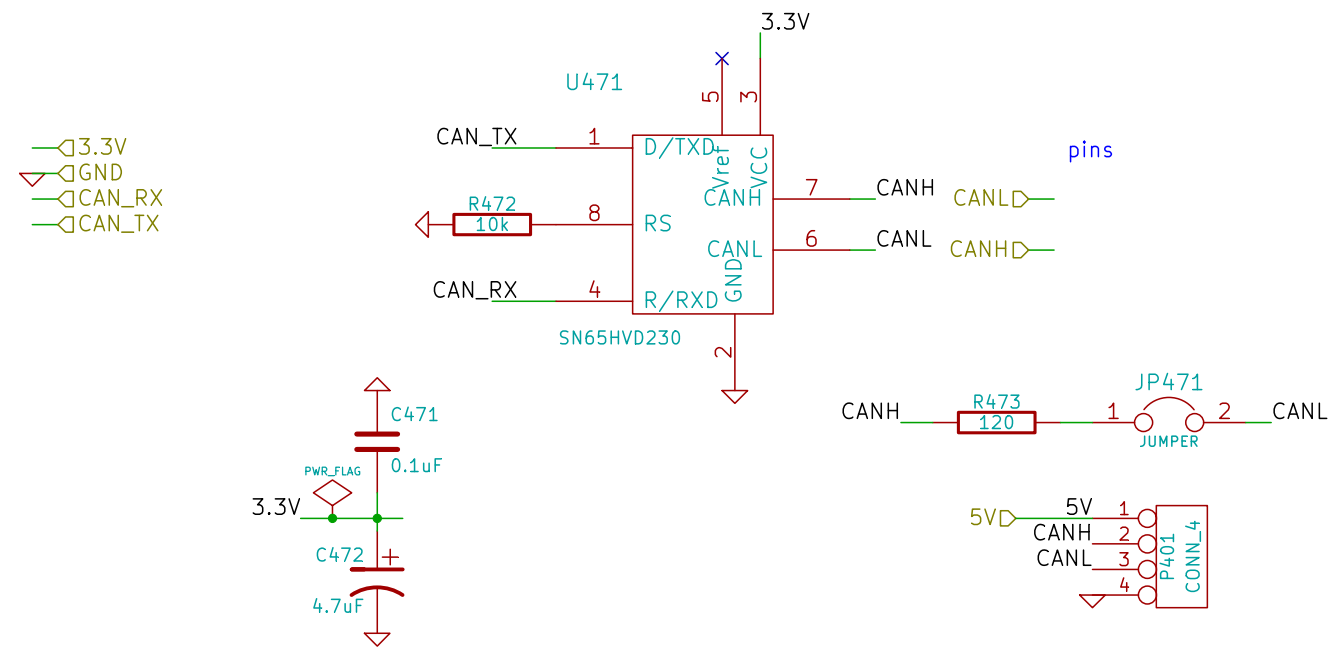


- INP12
- INP11
- INP10
- INP9
- INP8
- INP7
- INP6
- INP5
- INP4
- INP3
- INP2
- INP1

- OUT4
- OUT3
- OUT1
- OUT2
- OUT10
- OUT6
- OUT5
- OUT8
- OUT7
- OUT9
- OUT11

SUGGESTED / DEFAULT ENGINE WIRING IN BLUE

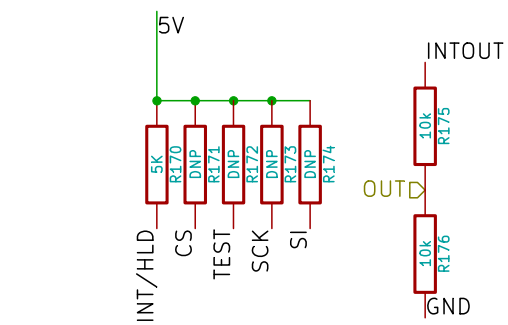
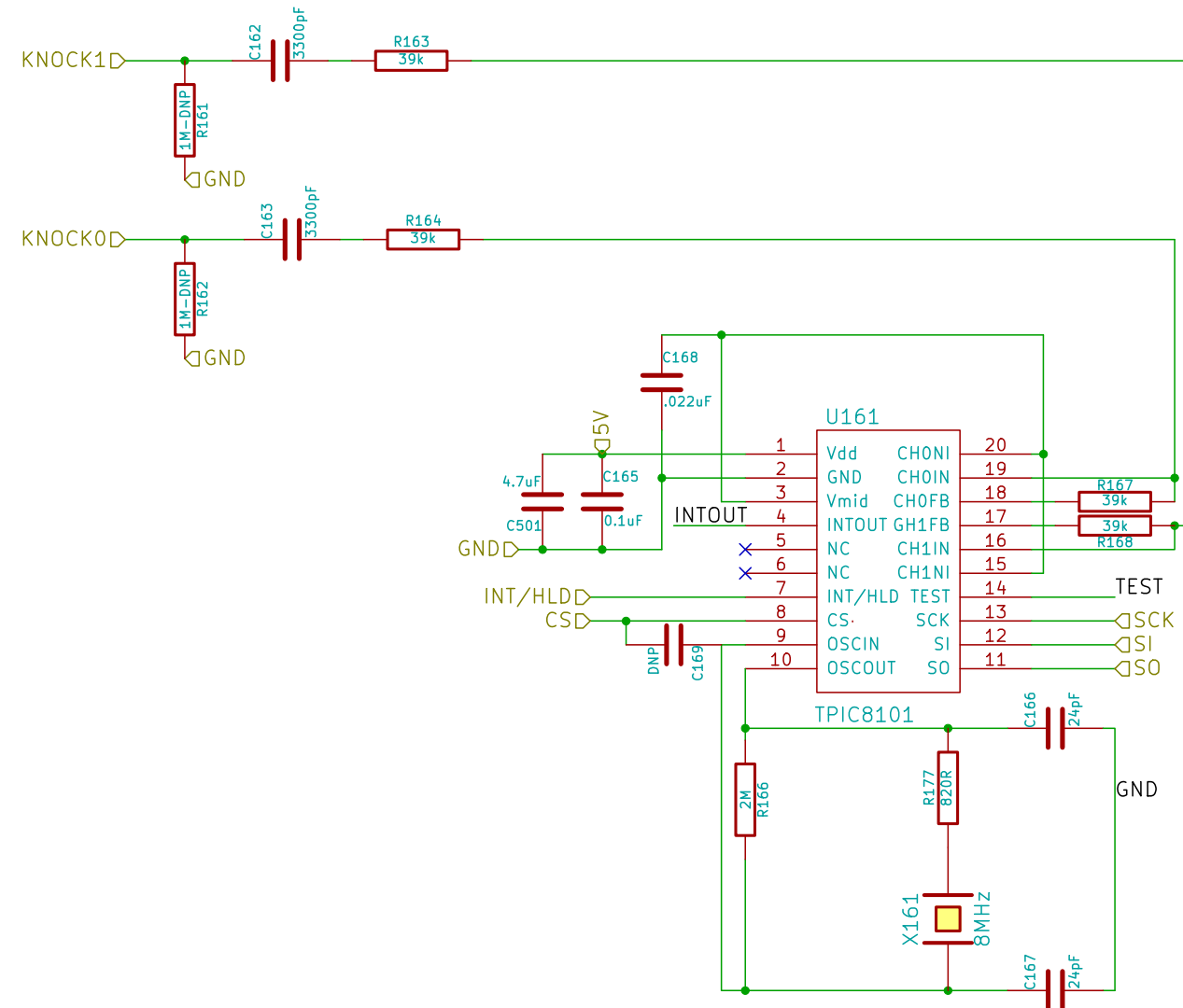




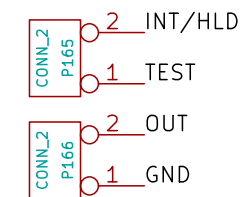
CAN level shifter

rusEFI.com		
File: can_brd_1.sch		
Sheet: /can_brd_1/		
Title: Frankenso		
Size: A4	Date: 18 oct 2015	Rev: .05
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 4/15

DD_HIP9011 ver.2
RusEfi.com



NOTE:
SPI uses internal 5V pull ups, with MCU SPI being float to pull down.
This allows 3.3V / 5V tolerant MCU's to use these SPI coms.

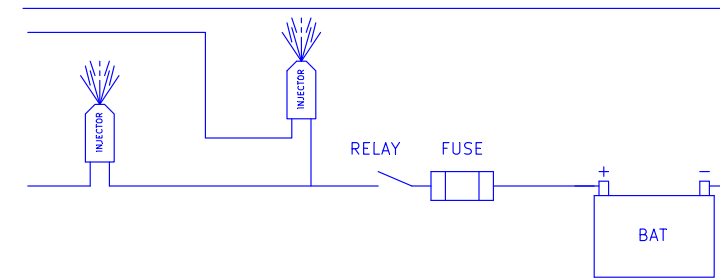
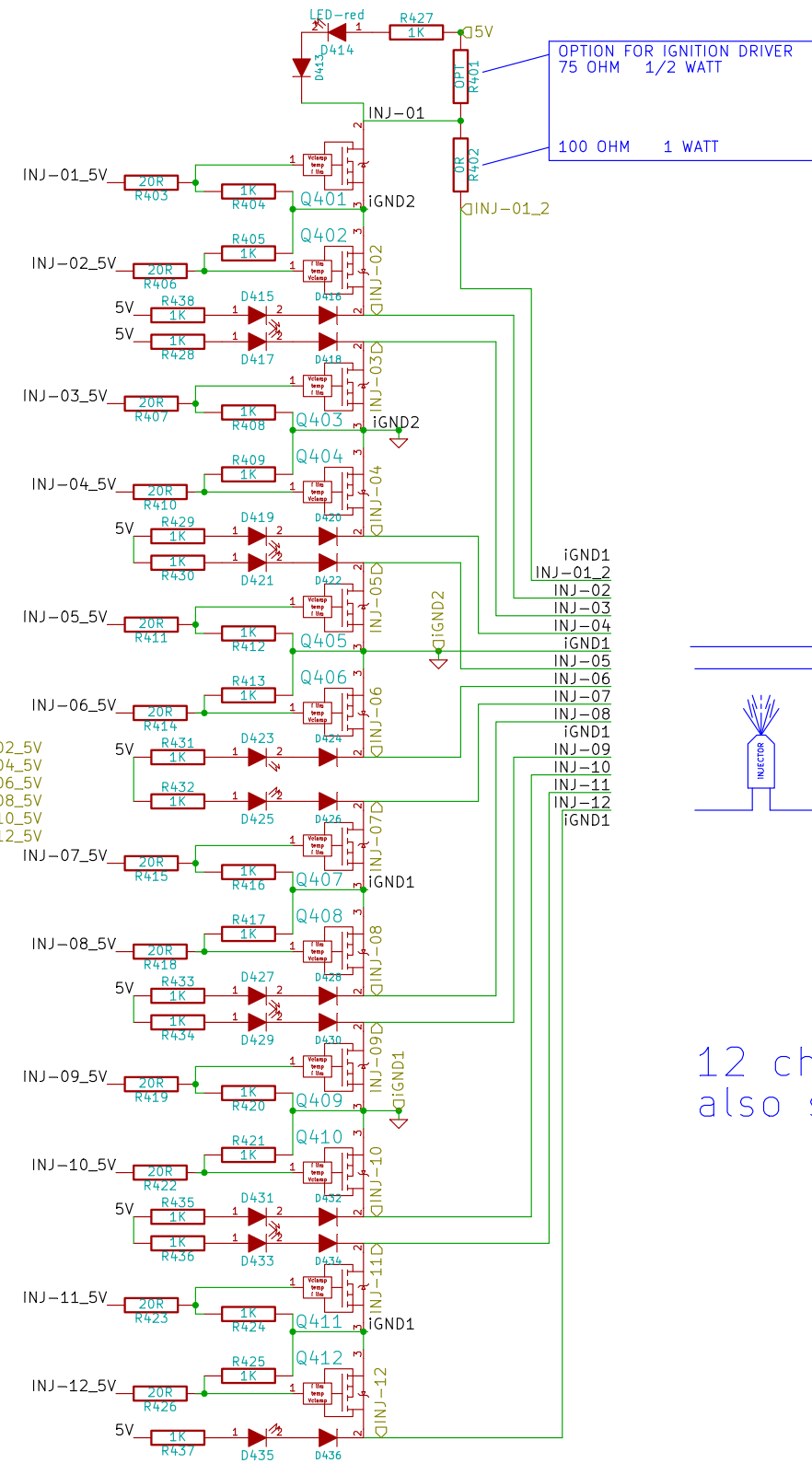


<http://www.crystek.com/documents/appnotes/Pierce-GateIntroduction.pdf>
PCB per predictions with SaturnPCB has less then 3.5pF traces,
TPIC pins assumed 5pF
ESR = 80ohms max
Rf = 2meg could be between 1meg and 10meg.
Cload = 18pF per XTAL datasheet
Cload = $\frac{([Cin+C1][C2+Cout])}{(Cin+C1+C2_Cout)+PCBstray}$
Cload = $\frac{([5+24][24+5])}{(5+24+24+5)+3.5} = 18pF$
C1=C2=C166=C167 = 24pF
Rs = $1/(2\pi f C2) = 1/(2\pi * 8MHz * 24pF) = 829ohms$, 820ohms is close enough = R177

rusEFI.com		
File: DD_HIP9011.sch		
Sheet: /DD_HIP9011/		
Title: Frankenso		
Size: A4	Date: 18 oct 2015	Rev: .05
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 5/15

INJ-01_5VD
 INJ-03_5VD
 INJ-05_5VD
 INJ-07_5VD
 INJ-09_5VD
 INJ-11_5VD

QINJ-02_5V
 QINJ-04_5V
 QINJ-06_5V
 QINJ-08_5V
 QINJ-10_5V
 QINJ-12_5V



12 channel injector driver
 also suitable for fuel pump relay, IAC solenoid etc

MISC NOTES

THE GENERAL SYSTEM LAYOUT IS SHOWN IN BLUE. THIS IS NOT THE SUGGESTED SYSTEM WIRING, IT DOES SHOW THE GENERAL OVERALL CIRCUIT LAYOUT TOPOLOGY.

THE PCB WIRING IS SHOWN IN RED, GREEN WITH A BLUE BUS.

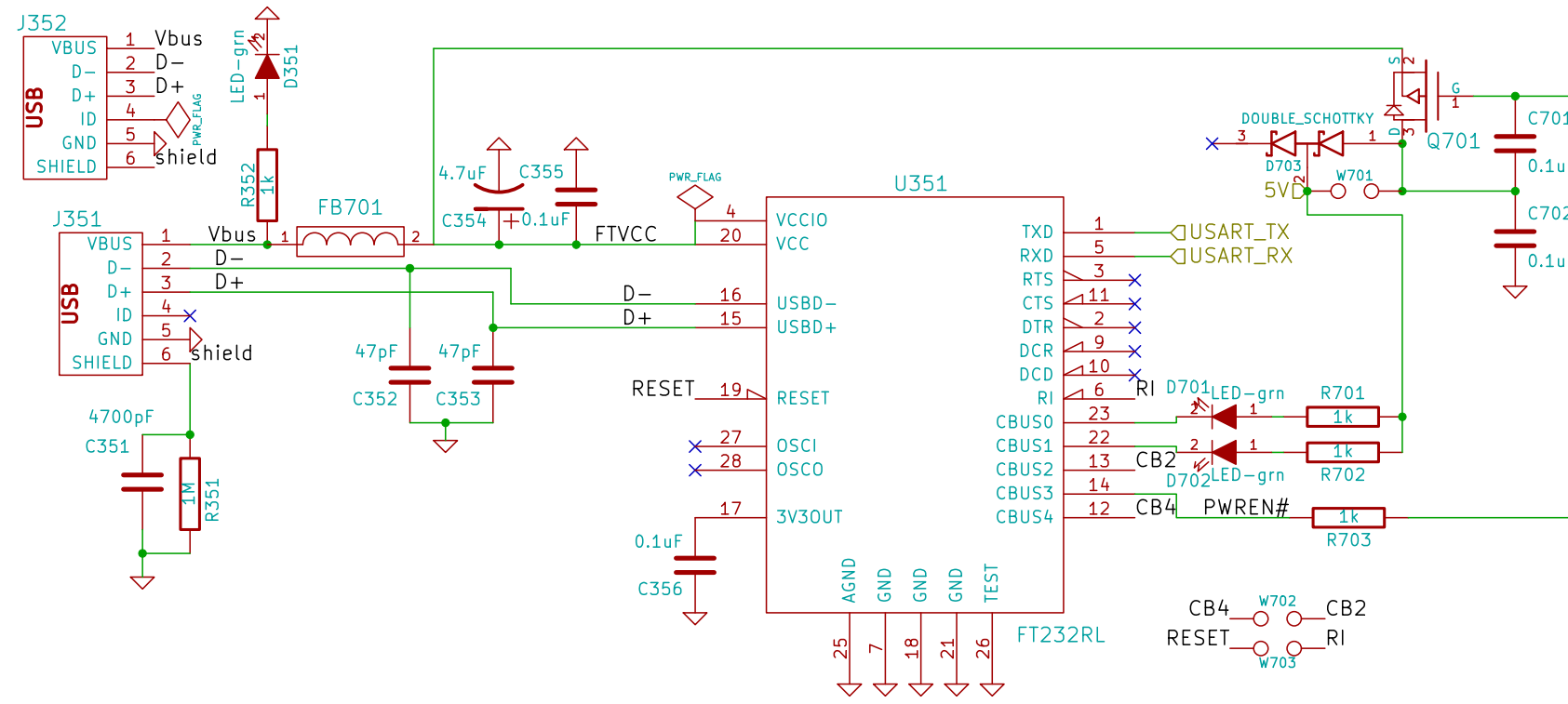
Screw terminals 1760500000

Screw connector PCB <http://octopart.com/39522-1007-molex-655409>

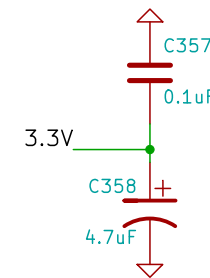
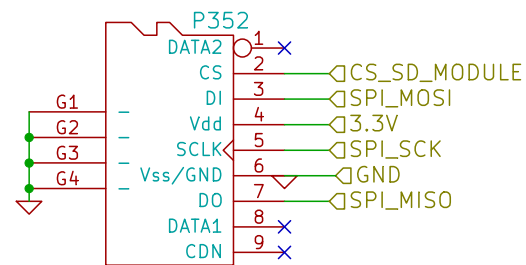
Screw connector harness <http://octopart.com/partsearch#search/requestData&q=39520-0007>

rusEFI.com		
File: inj_12ch.sch		
Sheet: /inj_12ch/		
Title: Frankenso		
Size: B	Date: 18 oct 2015	Rev: .05
KiCad E.D.A.	eeschema (2013-07-07 BZR 4022)-stable	Id: 6/15

WJ01 IS A BACKUP PLAN. THE VOLTAGE DROP ACROSS D703 MAY BE NOT TOLERABLE, SO WE HAVE A BACK UP PLAN IF WE NEED TO BYPASS THE DIODE WITH A LOWER VOLTAGE DROP



For right conn



SD card slot
USB TTL module

rusEFI.com		
File: mmc_usb_1.sch		
Sheet: /mmc_usb_1/		
Title: Frankenso		
Size: A4	Date: 18 oct 2015	Rev: .05
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 7/15

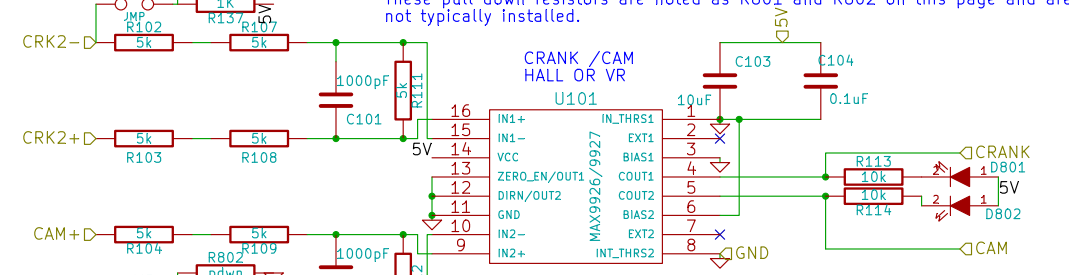
When configured for VR, do not populate W1002 or W1003. These jumpers allow isolation which prevents the VR signal from getting into the 5V or GND.



Recommended pull-up resistor values are as follows:

Volts dc	5	9	12	15	24
Ohms	1 k	1.8k	2.4 k	3 k	3 k

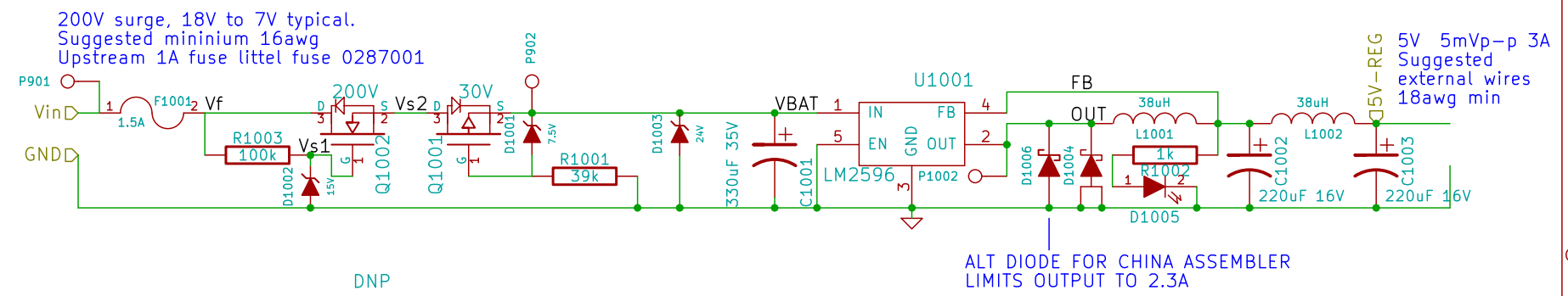
Many Hall sensors are set as a open collector sinking topology. Those setups require a pull up resistor, and 1k ohm is a common size. These pull up resistors are noted as R137 and R141 on this page. You need to match these pull up resistors with your hall sensors requirements. Often you need about 5mA of drive. See snippet from Cherry hall sensors to the right. Some sensors are the inverse, and need a pull down resistor. These are less common. These pull down resistors are noted as R801 and R802 on this page and are not typically installed.



The resistors across pins 9,10 and 15,16 are not typically installed, they are only used on really hot VR signals, to dampen the signal.

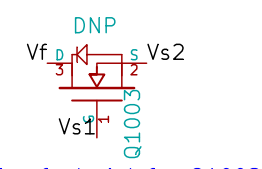
Brief overview

- Q1002, R1003, D1002 preform an active transient protection. It will suppress voltages up to 200V.
- Q1001, R1001, D1001 preform a reverse polarity protection. If the input signal is the wrong polarity, the gate will not conduct which will prevent current from flowing.
- D1003 is a second transient suppressor, it would catch faster transients allowing a brief amount of time for Q1002 to preform it's duty.
- C1001 is a bulk cap, it simply stores energy locally such that the regulator can draw large currents in short periods of time.
- U1001 and the components to the right, are a buck style switching regulator, that will pull the 5V line up to 5V. It will now pull it down from 5V if there is an external voltage.



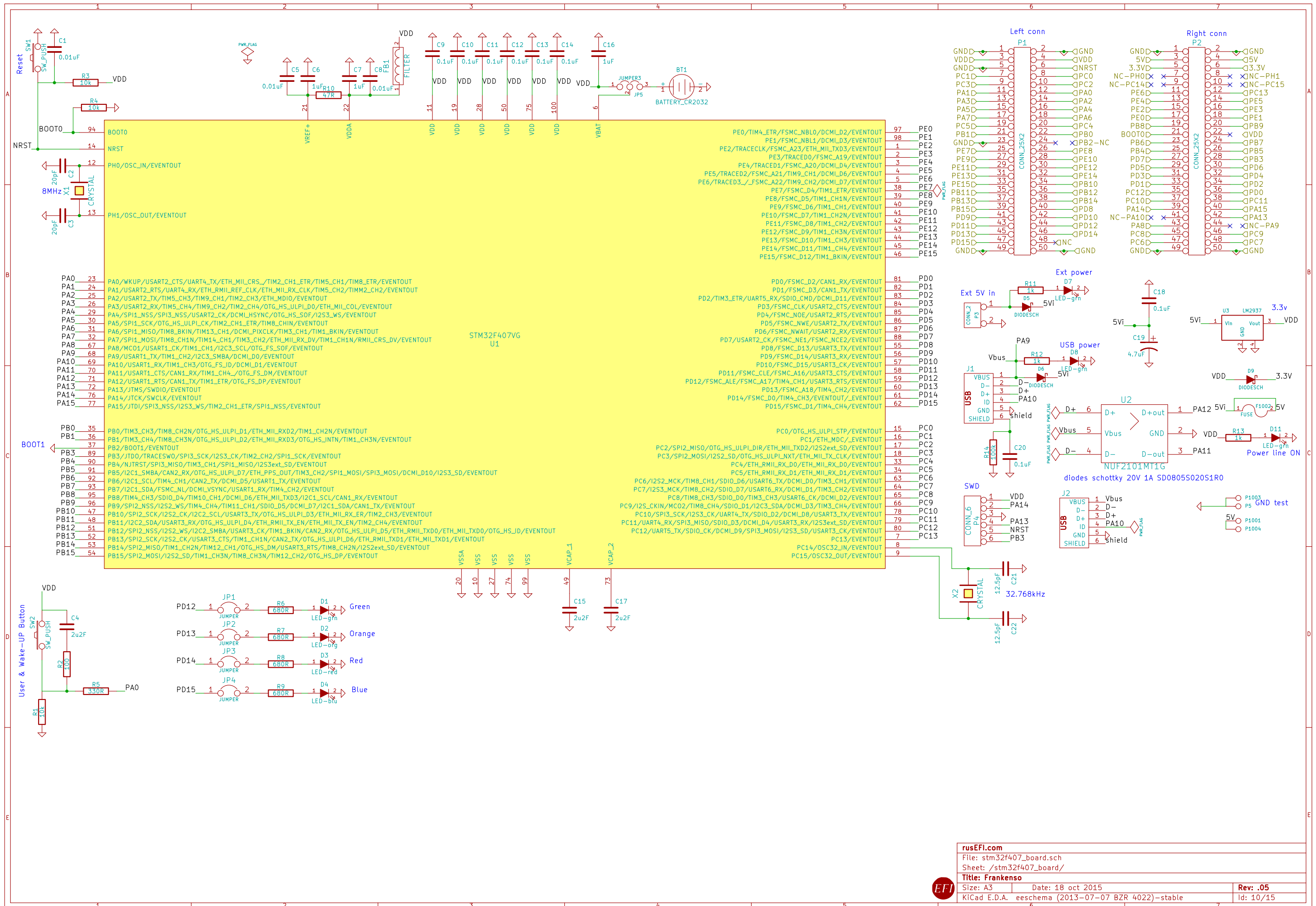
200V surge, 18V to 7V typical.
Suggested mininum 16awg
Upstream 1A fuse littel fuse 0287001

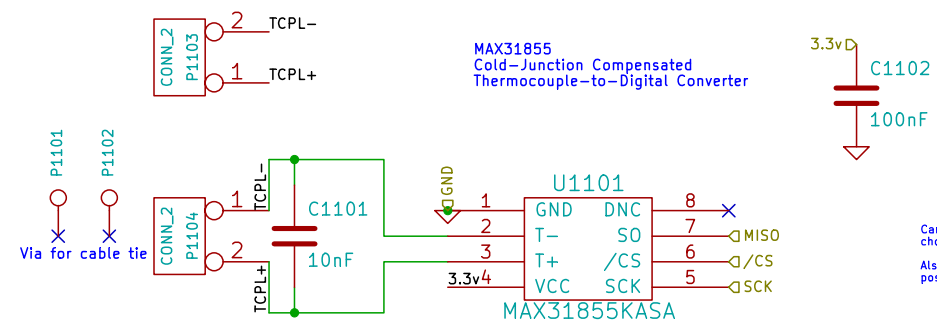
5V 5mVp-p 3A
Suggested
external wires
18awg min



alternative footprint for Q1002

rusEFI.com		
File: PWR_buck_12V_switcher.sch		
Sheet: /PWR_buck_12V_switcher/		
Title: Frankenso		
Size: A	Date: 18 oct 2015	Rev: .05
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 9/15





MAX31855
Cold-Junction Compensated
Thermocouple-to-Digital Converter

U1101

MAX31855KASA

P1101
P1102
Via for cable tie

CONN_2
P1103
1 TCPL+
2 TCPL-

CONN_2
P1104
1 TCPL-
2 TCPL+

C1101
10nF

1 GND
2 T-
3 T+
4 VCC
5 SCK
6 /CS
7 MISO
8 DNC

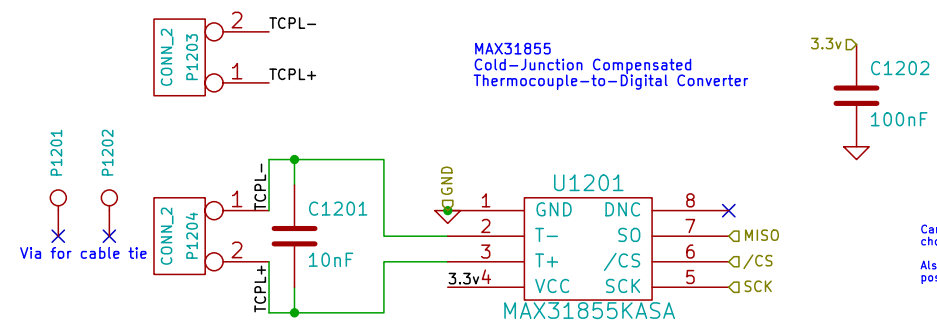
3.3vD
C1102
100nF

Care must be taken with the conector
chosen for the TCPL to avoid inaccuracies.
Also, the connector must be as close as
possible to the cold-junction compensation.

We want a big mass of copper in the
TCPL joints, to dampen the cold junction
temperature and to make it more measurable
with this IC

Datasheet:
<http://datasheets.maxim-ic.com/en/ds/MAX31855.pdf>

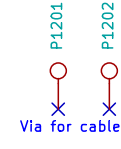
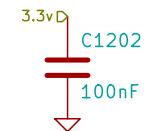
rusEFI.com		
File: thermocouple_module.sch		
Sheet: /thermocouple1/		
Title: Frankenso		
Size: A4	Date: 18 oct 2015	Rev: .05
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 11/15



MAX31855
Cold-Junction Compensated
Thermocouple-to-Digital Converter

U1201

MAX31855KASA

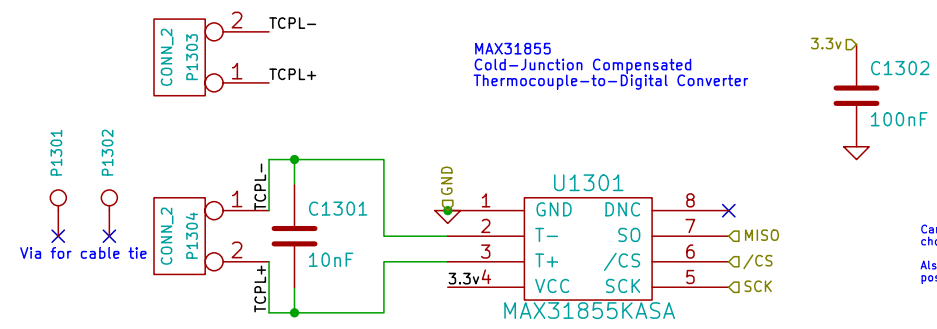


We want a big mass of copper in the TCPL joints, to dampen the cold junction temperature and to make it more measurable with this IC

Datasheet:
<http://datasheets.maxim-ic.com/en/ds/MAX31855.pdf>

Care must be taken with the conector chosen for the TCPL to avoid inaccuracies. Also, the connector must be as close as possible to the cold-junction compensation.

rusEFI.com		
File: thermocouple_module.sch		
Sheet: /thermocouple2/		
Title: Frankenso		
Size: A4	Date: 18 oct 2015	Rev: .05
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 12/15



MAX31855
Cold-Junction Compensated
Thermocouple-to-Digital Converter

U1301

MAX31855KASA

3.3vD
C1302
100nF

P1301
P1302
Via for cable tie

CONN2
P1303
1 TCPL+
2 TCPL-

CONN2
P1304
1 TCPL-
2 TCPL+

C1301
10nF

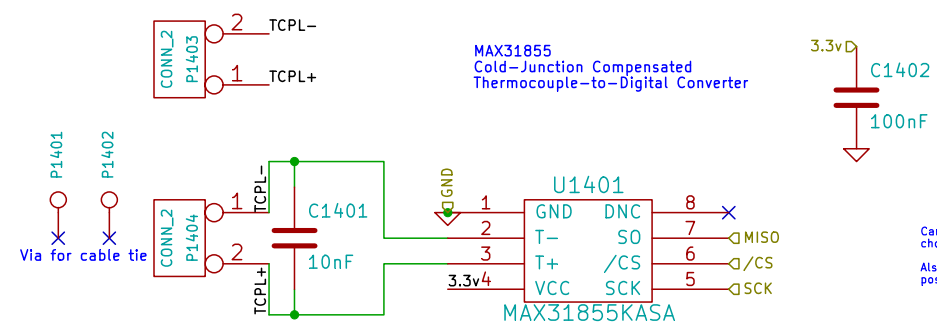
1 GND
2 T-
3 T+
3.3v4 VCC
4 /CS
5 SCK
6 CS
7 MISO
8 DNC

Care must be taken with the conector
chosen for the TCPL to avoid inaccuracies.
Also, the connector must be as close as
possible to the cold-junction compensation.

We want a big mass of copper in the
TCPL joints, to dampen the cold junction
temperature and to make it more measurable
with this IC

Datasheet:
<http://datasheets.maxim-ic.com/en/ds/MAX31855.pdf>

rusEFI.com		
File: thermocouple_module.sch		
Sheet: /thermocouple3/		
Title: Frankenso		
Size: A4	Date: 18 oct 2015	Rev: .05
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 13/15



MAX31855
Cold-Junction Compensated
Thermocouple-to-Digital Converter

U1401

MAX31855KASA

3.3vD
C1402
100nF

Via for cable tie
P1401
P1402

CONN_2 P1403
1 TCPL+
2 TCPL-

CONN_2 P1404
1 TCPL-
2 TCPL+

C1401
10nF

GND

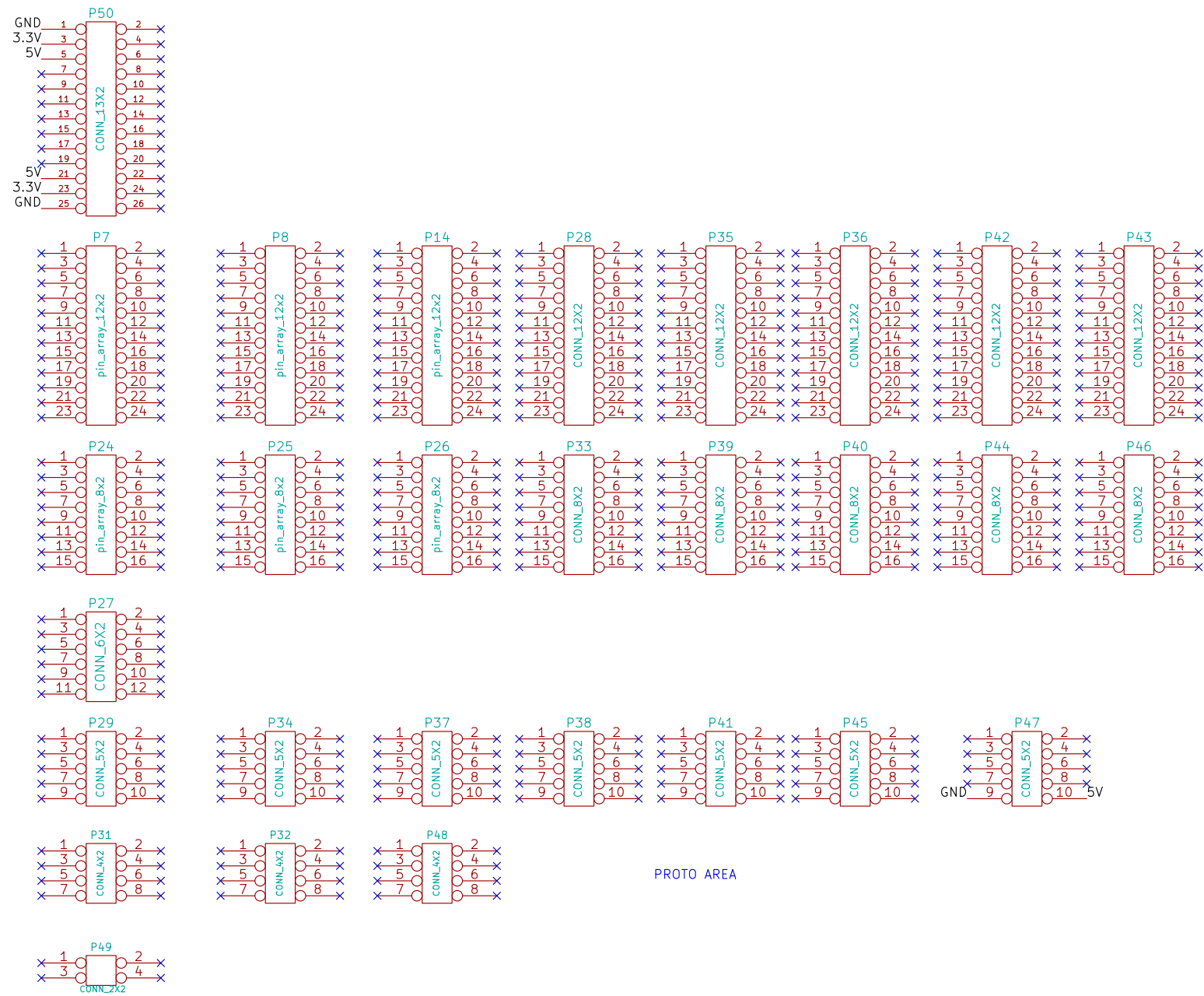
3.3v4

Care must be taken with the conector
chosen for the TCPL to avoid inaccuracies.
Also, the connector must be as close as
possible to the cold-junction compensation.

We want a big mass of copper in the
TCPL joints, to dampen the cold junction
temperature and to make it more measurable
with this IC

Datasheet:
<http://datasheets.maxim-ic.com/ds/MAX31855.pdf>

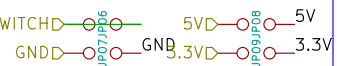
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KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 14/15



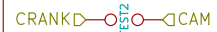
These two jumpers
are here to accommodate
stm32f4discovery



These four jumpers
are test points



That's alternative signal
OUTPUT - these traces
should be routable to PC6
and PA5 via jumpers.
Alternative to W212 and
W212 routing of op-amps
ch 11 and ch 12



rusEFI.com

File: Misc_Vias.sch

Sheet: /Misc_Vias/

Title: Frankenso

Size: B Date: 18 oct 2015

Rev: .05

KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable

Id: 15/15