

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

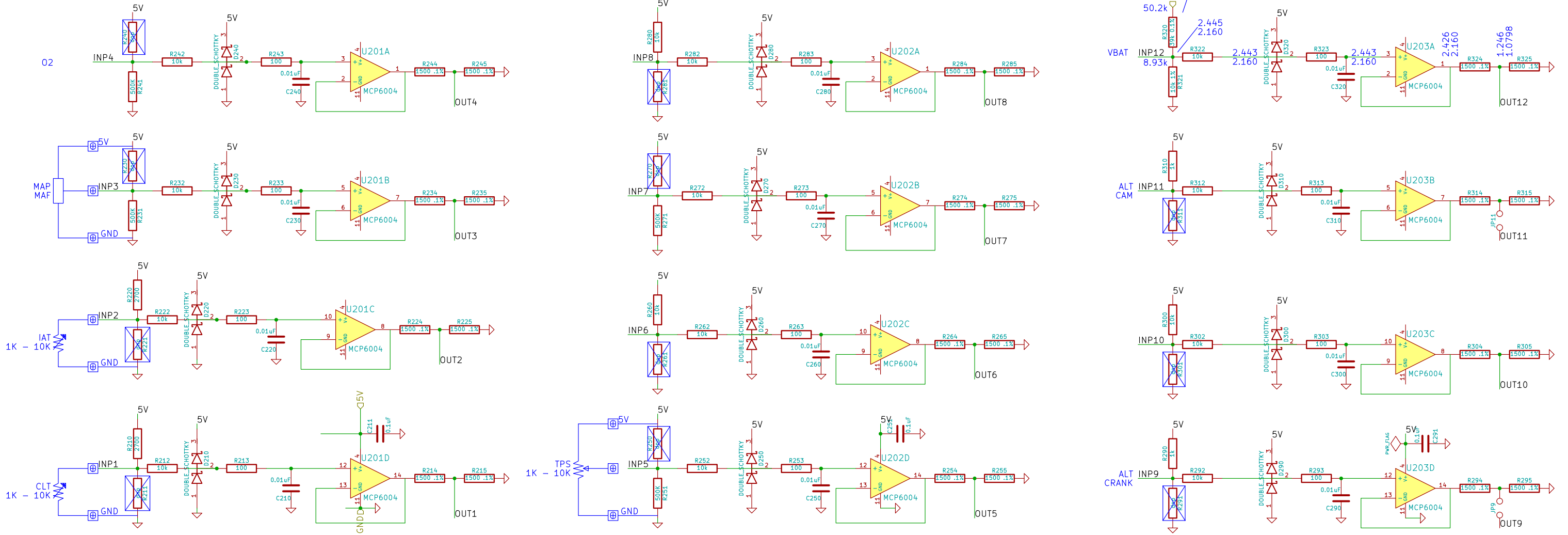
<b>rusEfi.com</b> File: frankenso.sch Sheet: /			
<b>Title: Frankenso</b>			
Size: B	Date: 13 oct 2015	Rev: .05	
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 1/15	

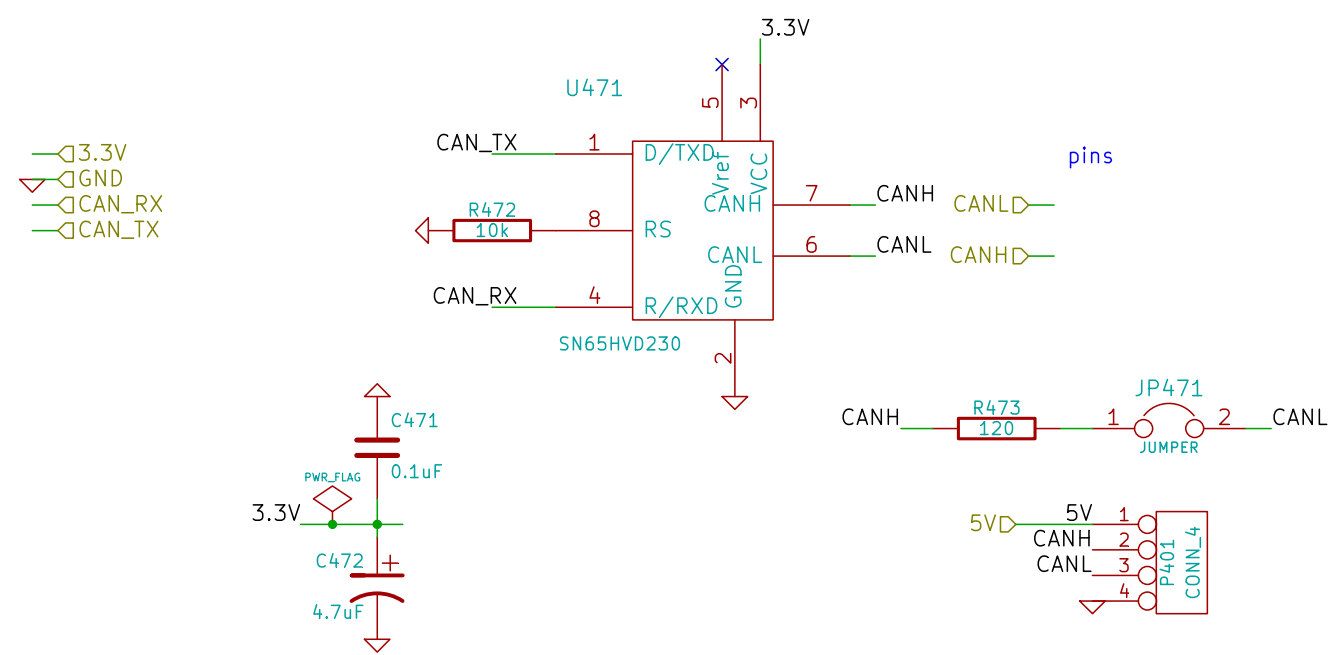


- INP12
- INP11
- INP10
- INP9
- INP8
- INP7
- INP6
- INP5
- INP4
- INP3
- INP2
- INP1

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

SUGGESTED / DEFAULT ENGINE WIRING IN BLUE

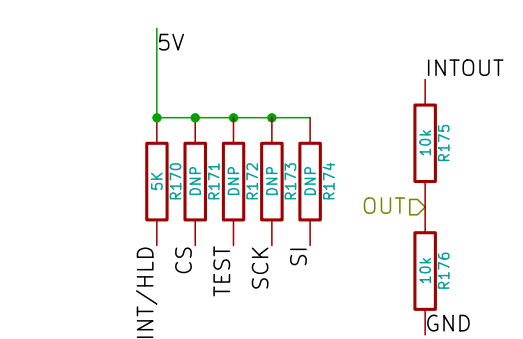
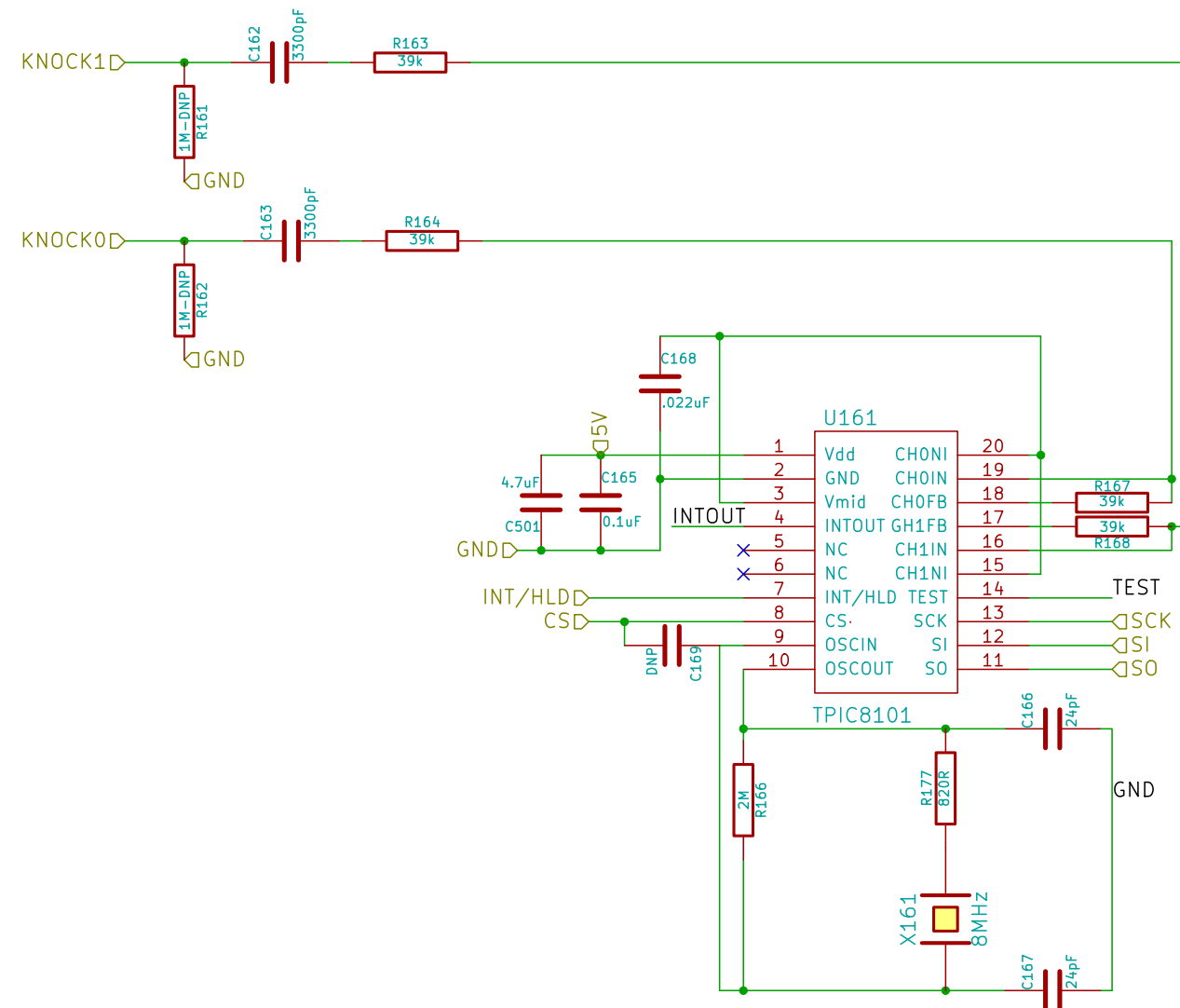




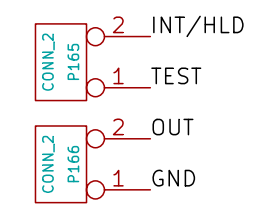
CAN level shifter

<b>rusEFI.com</b>		
File: can_brd_1.sch		
Sheet: /can_brd_1/		
<b>Title: Frankenso</b>		
Size: A4	Date: 13 oct 2015	<b>Rev: .05</b>
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.

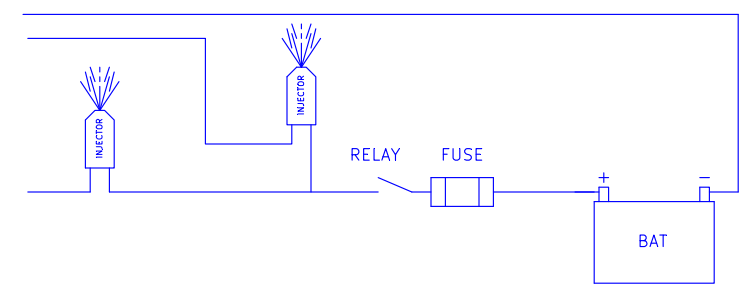
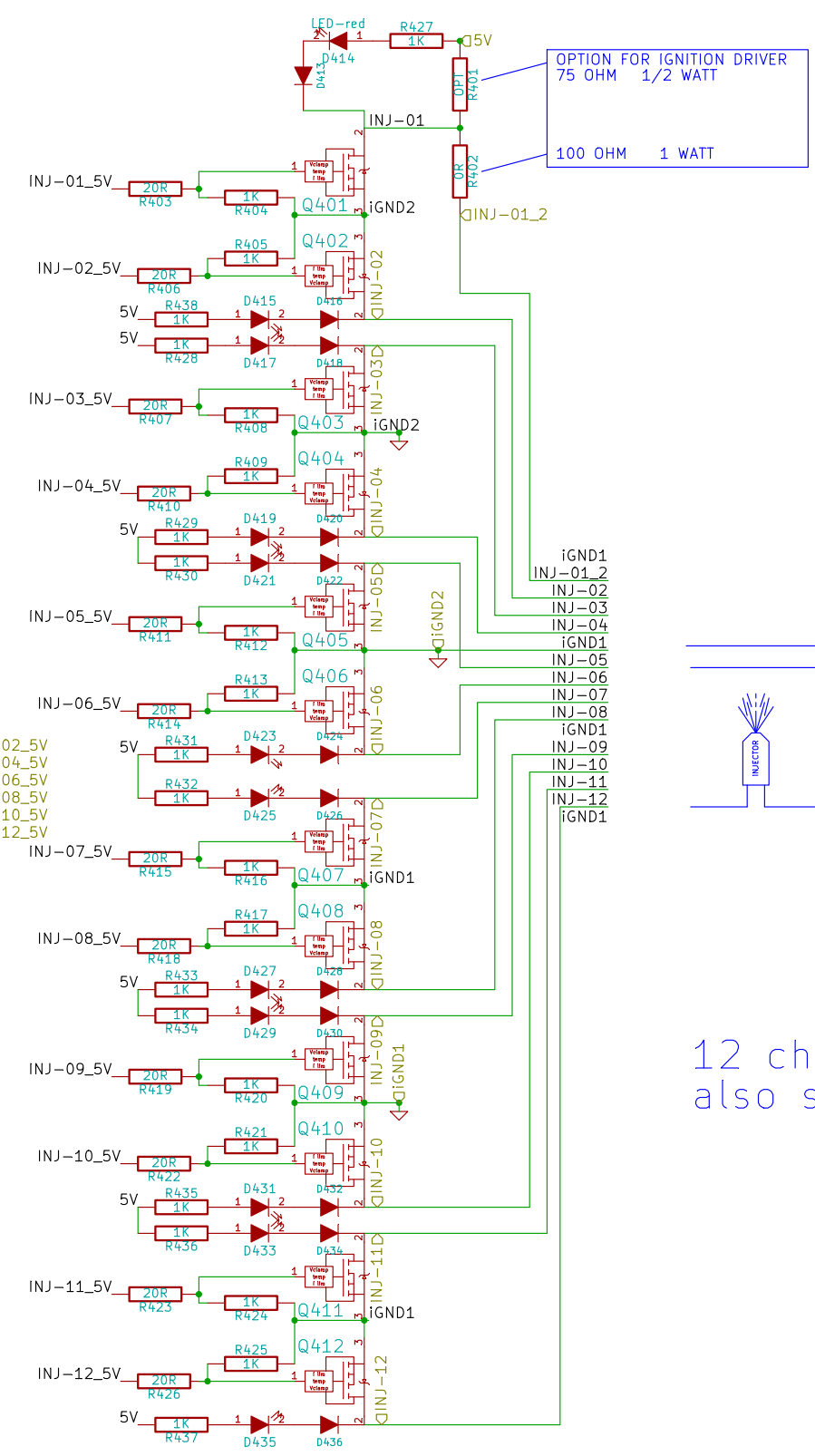


<http://www.crystek.com/documents/appnotes/Pierce-GateIntroduction.pdf>  
PCB per predictions with SaturnPCB has less then 3.5pF traces,  
TPIC pins assumed 5pF  
ESR = 80ohms max  
Rf = 2meg could be between 1meg and 10meg.  
Cload = 18pF per XTAL datasheet  
Cload =  $\frac{([Cin+C1][C2+Cout])}{(Cin+C1+C2\_Cout)+PCBstray}$   
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

<b>rusEFI.com</b>		
File: DD_HIP9011.sch		
Sheet: /DD_HIP9011/		
<b>Title: Frankenso</b>		
Size: A4	Date: 13 oct 2015	<b>Rev: .05</b>
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

INJ-02\_5V  
 INJ-04\_5V  
 INJ-06\_5V  
 INJ-08\_5V  
 INJ-10\_5V  
 INJ-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.

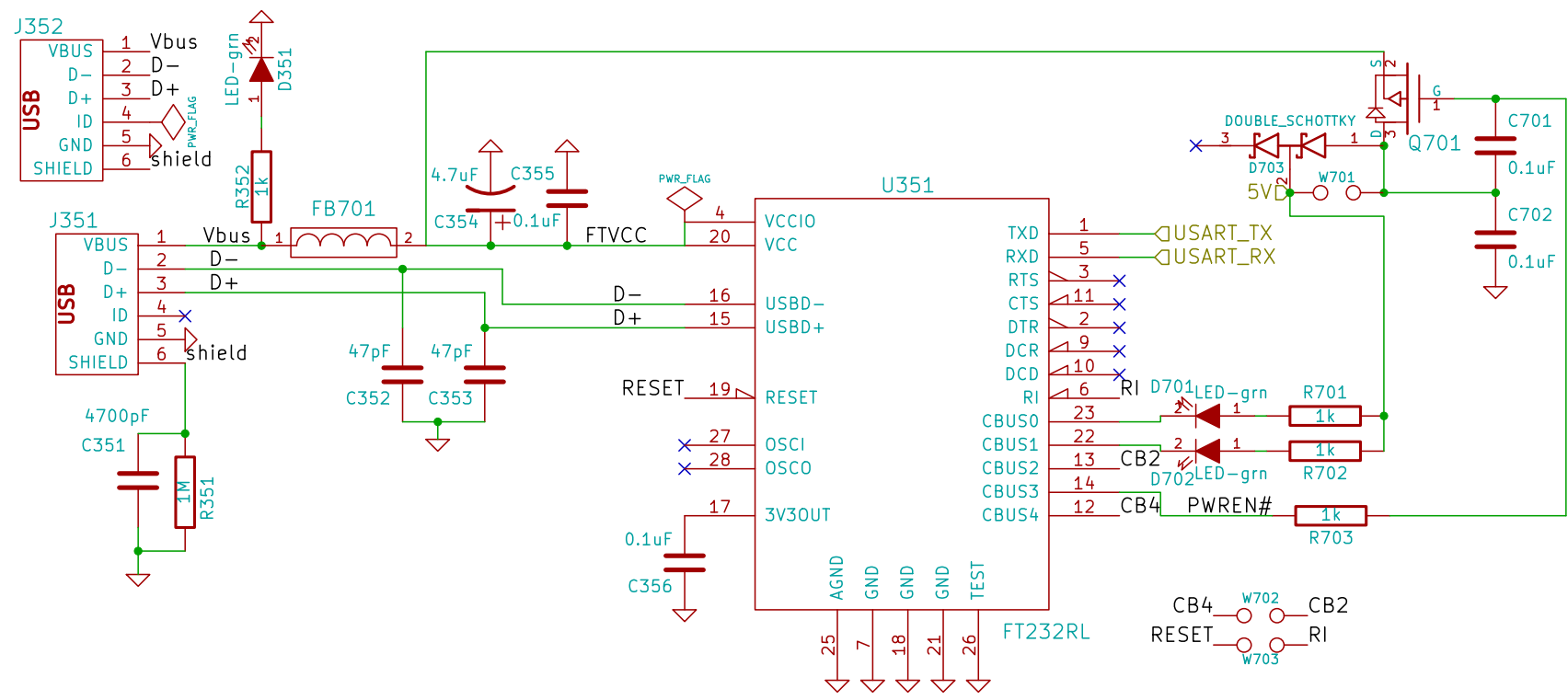
THE PCB WIRING IS SHOWN IN RED, GREEN WITH A BLUE BUS.

Screw terminals 1760500000

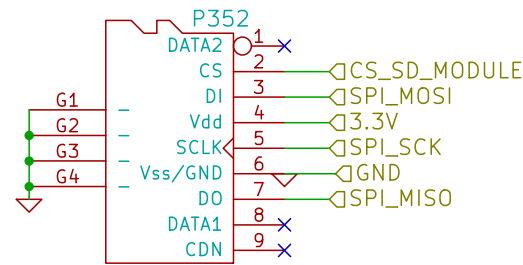
Screw connector PCB <http://octopart.com/39522-1007-molex-655409>  
 Screw connector harness <http://octopart.com/partsearch#search/requestData&q=39520-0007>

rusEFI.com		
File: inj_12ch.sch		
Sheet: /inj_12ch/		
Title: Frankenso		
Size: B	Date: 13 oct 2015	Rev: .05
KiCad E.D.A.	eeschema (2013-07-07 BZR 4022)-stable	Id: 6/15

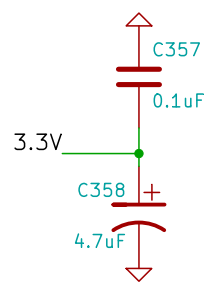
WJ01 IS A BACKUP PLAN. THE VOLTAGE DROP ACROSS D703 MAY BE NOT TOLERABLE, SO WE HAVE A BACK UP PLAN IF WE NEED TO BYPASS THE DIODE WITH A LOWER VOLTAGE DROP



For right conn



SD card slot  
USB TTL module



<b>rusEFI.com</b>		
File: mmc_usb_1.sch		
Sheet: /mmc_usb_1/		
<b>Title: Frankenso</b>		
Size: A4	Date: 13 oct 2015	<b>Rev: .05</b>
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 7/15

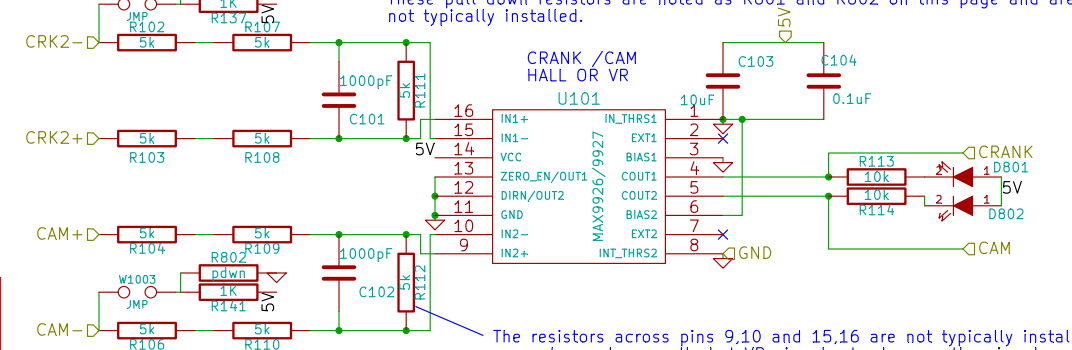
When configured for VR, do not populate W1002 or W1003. These jumpers allow isolation which prevents the VR signal from getting into the 5V or GND.



Recommended pull-up resistor values are as follows:

Volts dc	5	9	12	15	24
Ohms	1 k	1.8 k	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.

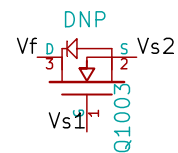
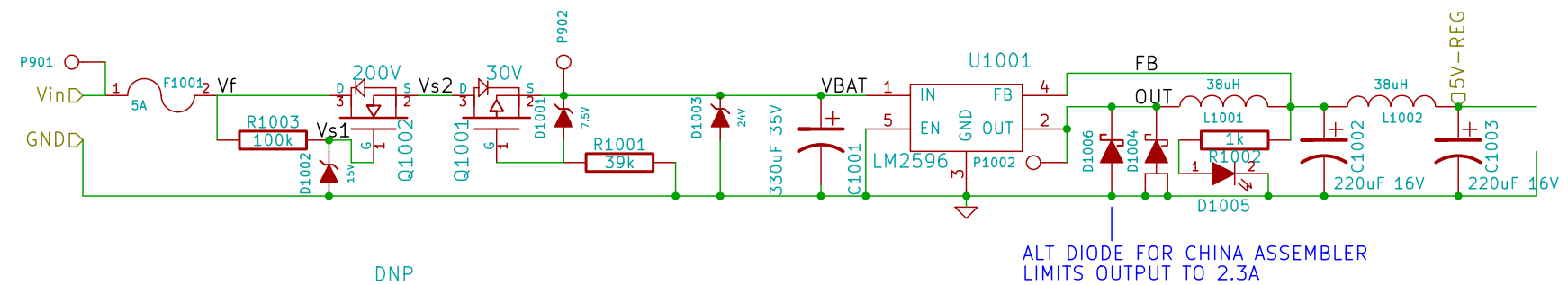


The resistors across pins 9,10 and 15,16 are not typically installed, they are only used on really hot VR signals, to dampen the signal.



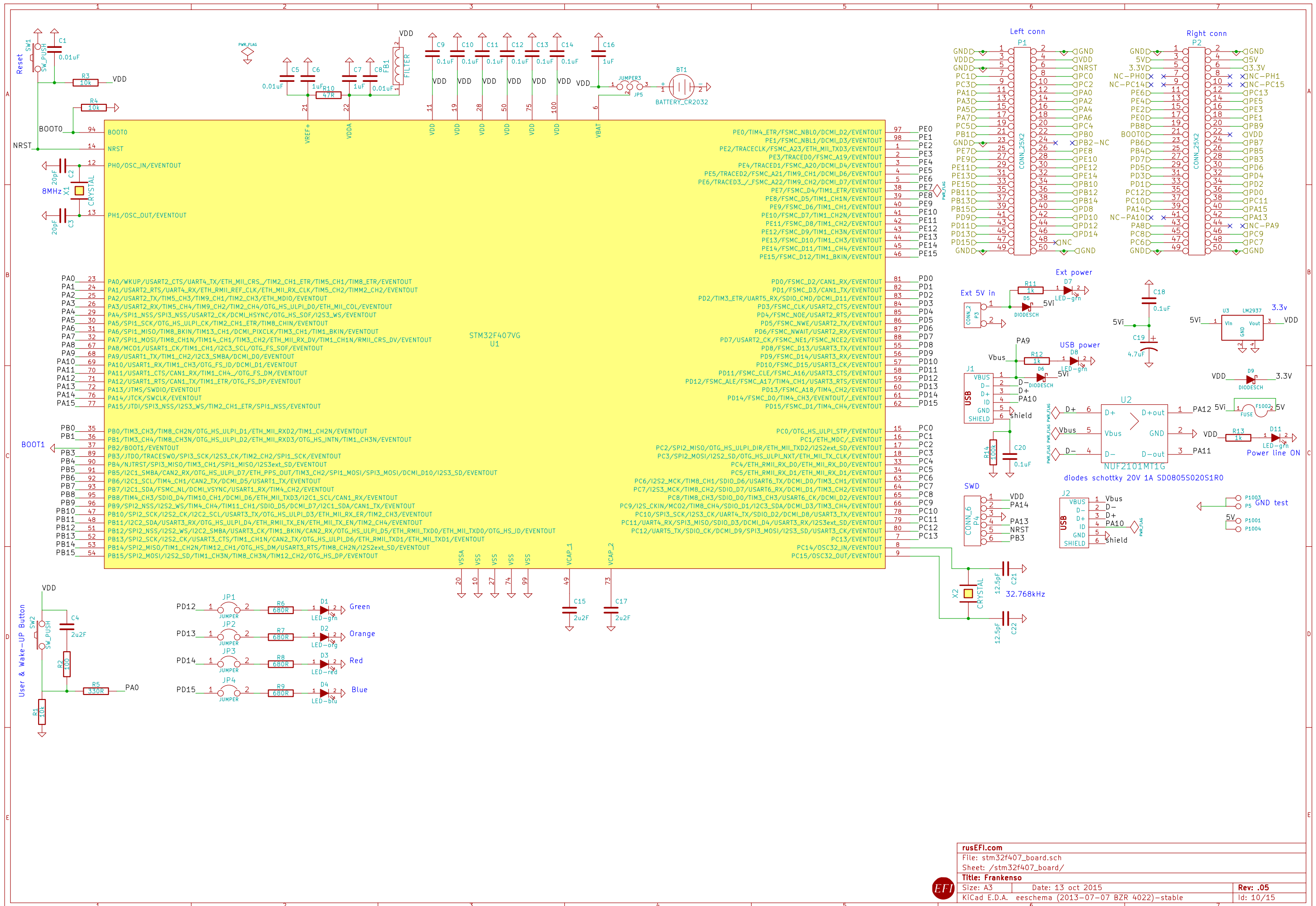
**Brief overview**

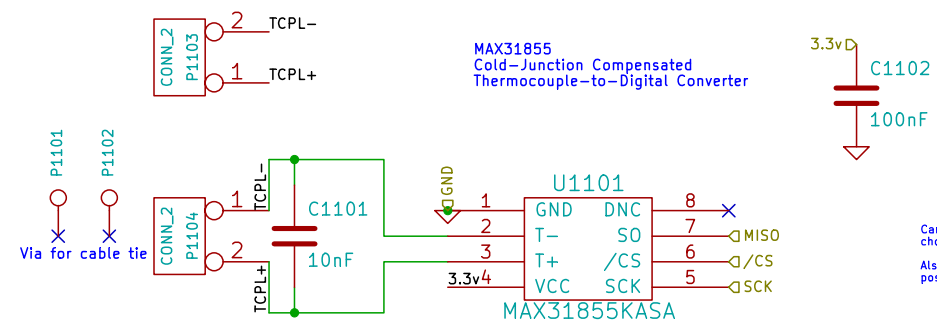
- Q1002, R1003, D1002 preform an active transient protection. It will suppress voltages up to 200V.
- Q1001, R1001, D1001 preform a reverse polarity protection. If the input signal is the wrong polarity, the gate will not conduct which will prevent current from flowing.
- D1003 is a second transient 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.



alternative footprint for Q1002

<b>rusEFI.com</b>		
File: PWR_buck_12V_switcher.sch		
Sheet: /PWR_buck_12V_switcher/		
<b>Title: Frankenso</b>		
Size: A	Date: 13 oct 2015	<b>Rev: .05</b>
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 9/15

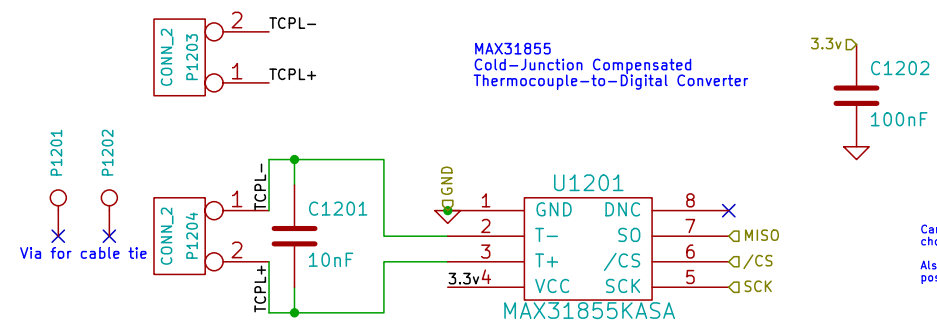




We want a big mass of copper in the TCPL joints, to dampen the cold junction temperature and to make it more measurable with this IC

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

<b>rusEFI.com</b>		
File: thermocouple_module.sch		
Sheet: /thermocouple1/		
<b>Title: Frankenso</b>		
Size: A4	Date: 13 oct 2015	<b>Rev: .05</b>
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 11/15



MAX31855  
Cold-Junction Compensated  
Thermocouple-to-Digital Converter

U1201

MAX31855KASA

3.3v4  
C1202  
100nF

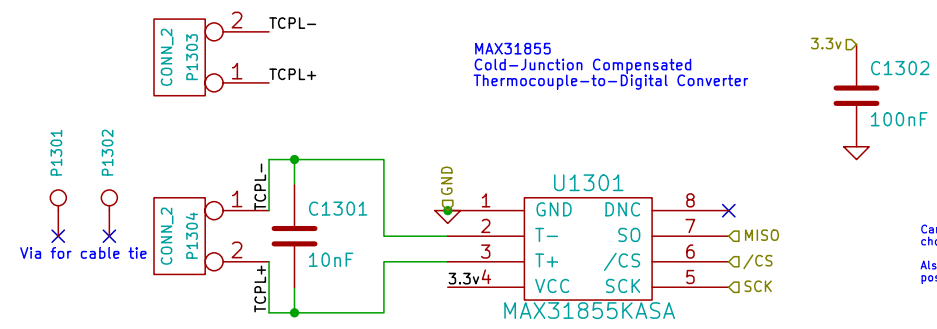
P1201  
P1202  
Via for cable tie

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

<b>rusEFI.com</b>		
File: thermocouple_module.sch		
Sheet: /thermocouple2/		
<b>Title: Frankenso</b>		
Size: A4	Date: 13 oct 2015	<b>Rev: .05</b>
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 12/15



MAX31855  
Cold-Junction Compensated  
Thermocouple-to-Digital Converter

U1301

MAX31855KASA

3.3v4  
C1302  
100nF

P1301  
P1302  
Via for cable tie

CONN\_2 P1303  
2 TCPL-  
1 TCPL+

CONN\_2 P1304  
1 TCPL-  
2 TCPL+

C1301  
10nF

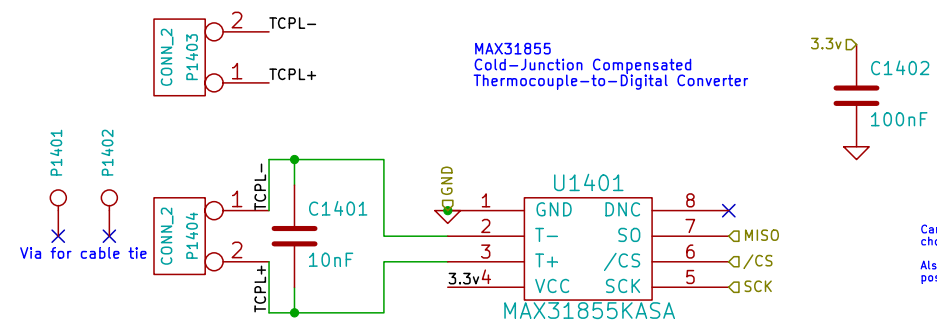
1 GND  
2 T-  
3 T+  
4 VCC  
5 SCK  
6 /CS  
7 MISO  
8 DNC

Care must be taken with the connector  
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>

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



MAX31855  
Cold-Junction Compensated  
Thermocouple-to-Digital Converter

U1401  
MAX31855KASA

3.3v4  
C1402  
100nF

Via for cable tie  
P1401  
P1402

CONN\_2 P1403  
1 TCPL+  
2 TCPL-

CONN\_2 P1404  
1 TCPL-  
2 TCPL+

C1401  
10nF

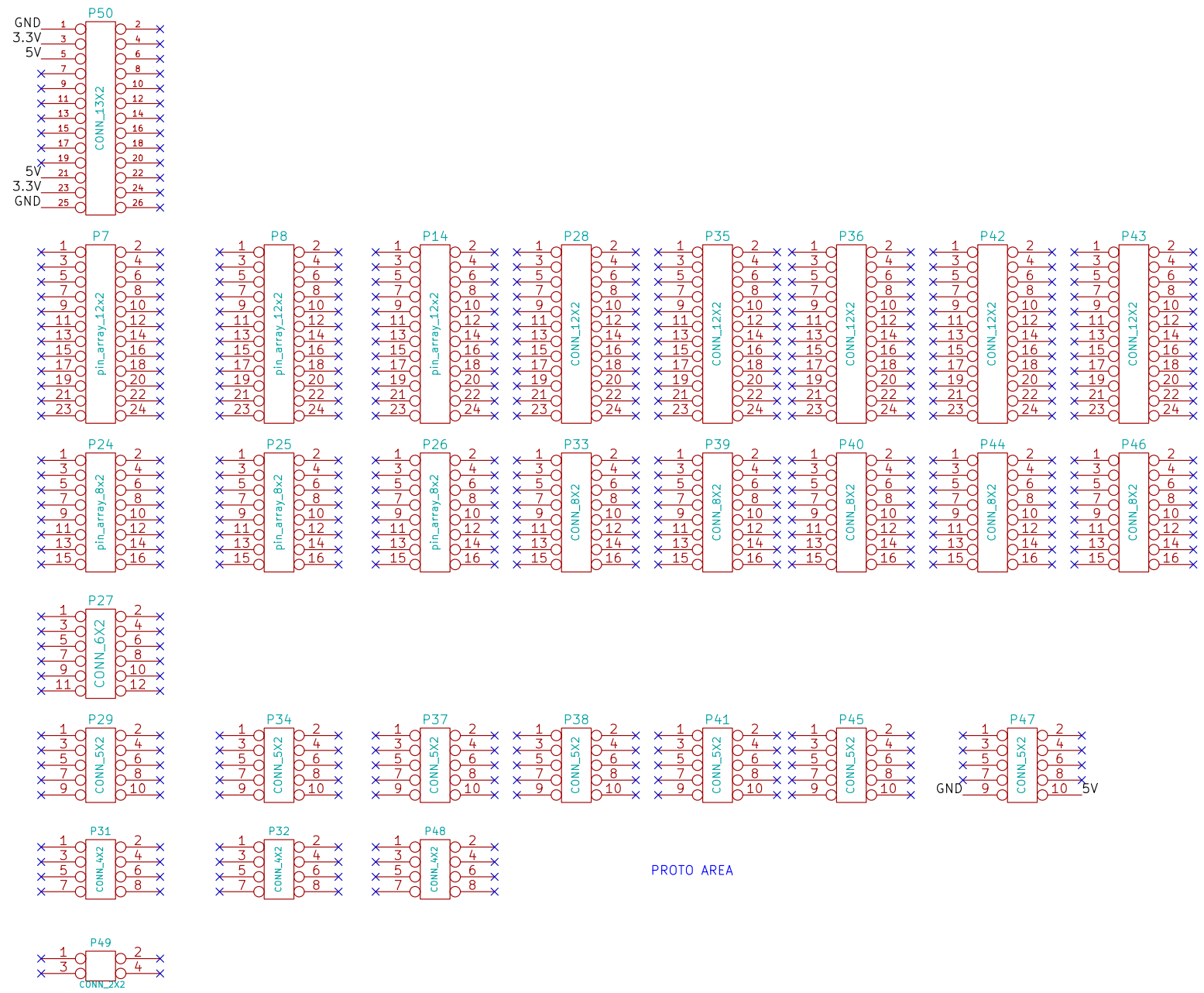
GND  
3.3v4

Care must be taken with the connector  
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>

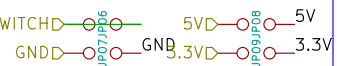
<b>rusEFI.com</b>		
File: thermocouple_module.sch		
Sheet: /thermocouple4/		
<b>Title: Frankenso</b>		
Size: A4	Date: 13 oct 2015	<b>Rev: .05</b>
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 14/15



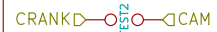
These two jumpers  
are here to accommodate  
stm32f4discovery



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: 13 oct 2015

Rev: .05

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

Id: 15/15