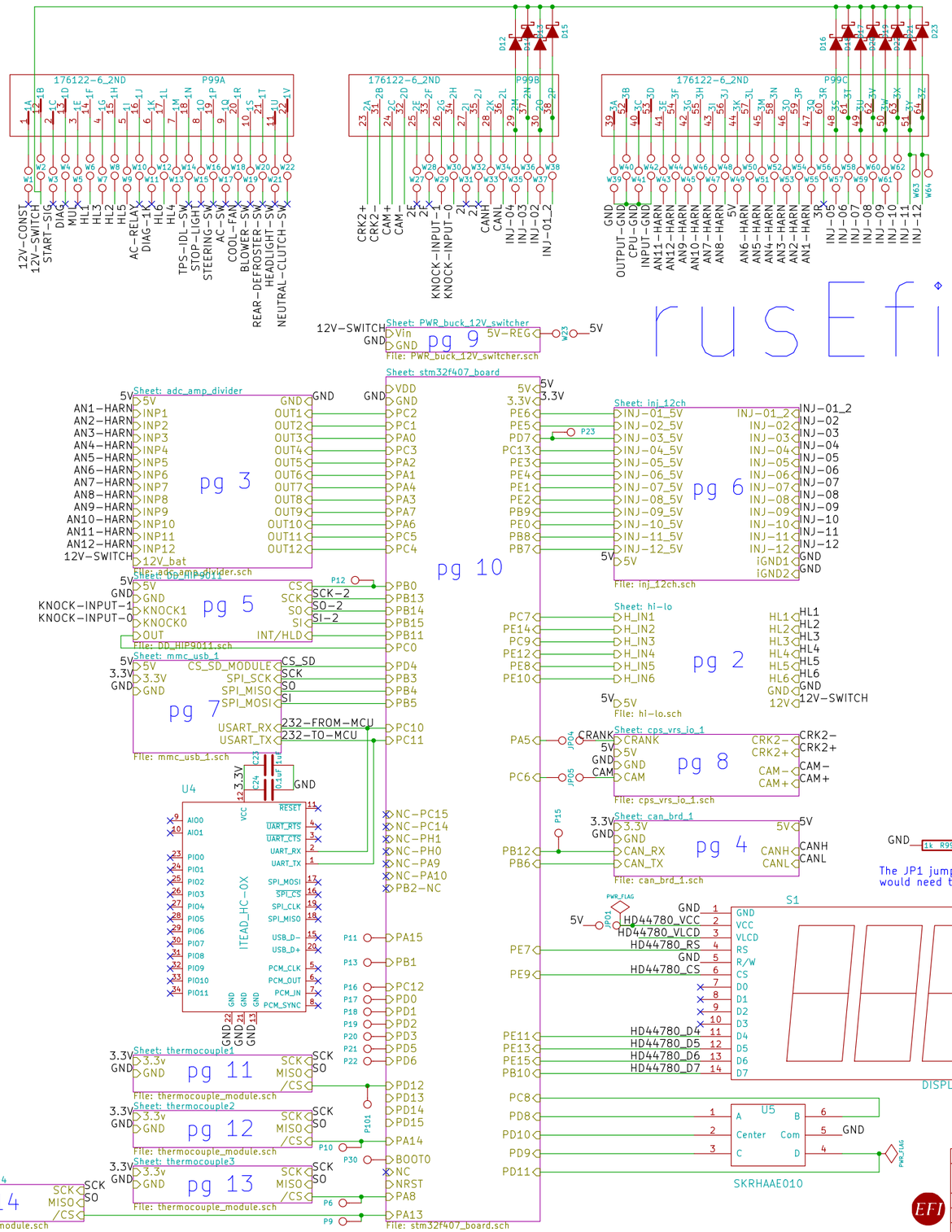
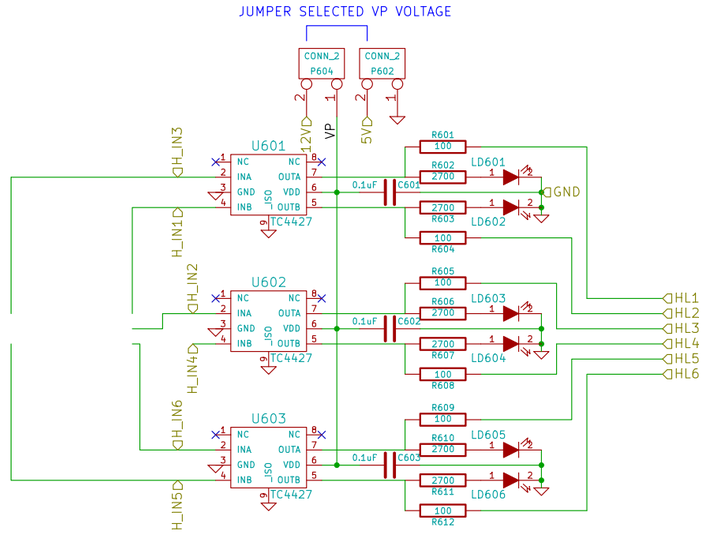
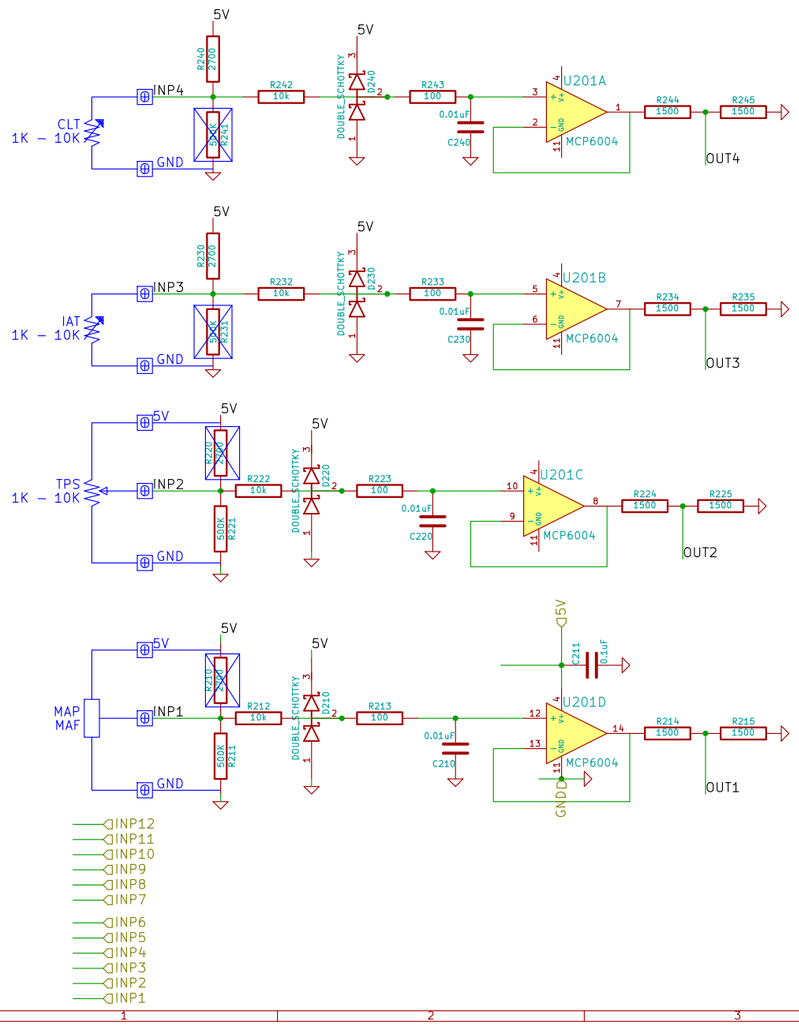

176122-6_2ND
P99A
12V-CONST
12V-SWITCH
START-SIG
DIAG
MUX
HL1
HL3
HL2
HL5
AC-RELAY
DIAG-1K
HL6
HL4
TPS-IDL-SW
STOP-LIGHT-SW
STEERING-SW
AC-SW
COOL-FAN
BLOWER-SW
REAR-DEFROSTER-SW
HEADLIGHT-SW
NEUTRAL-CLUTCH-SW
176122-6_2ND
P99B
CRK2+
CRK2-
CAM+
CAM-
5V
KNOCK-INPUT-1
KNOCK-INPUT-0
CANH
CANL
INJ-04
INJ-03
INJ-02
INJ-01_2
176122-6_2ND
P99C
GND
OUTPUT-GND
CPU-GND
INPUT-GND
AN11-HARN
AN12-HARN
AN9-HARN
AN10-HARN
AN7-HARN
AN8-HARN
5V
AN6-HARN
AN5-HARN
AN4-HARN
AN3-HARN
AN2-HARN
AN1-HARN
3R
INJ-05
INJ-06
INJ-07
INJ-08
INJ-09
INJ-10
INJ-11
INJ-12
Sheet: PWR_buck_12V_switcher
12V-SWITCH
GND
Vin
GND
5V-REG
5V
pg 9
File: PWR_buck_12V_switcher.sch
rusEfi
Sheet: adc_amp_divider
5V
AN1-HARN
AN2-HARN
AN3-HARN
AN4-HARN
AN5-HARN
AN6-HARN
AN7-HARN
AN8-HARN
AN9-HARN
AN10-HARN
AN11-HARN
AN12-HARN
12V-SWITCH
GND
INP1
INP2
INP3
INP4
INP5
INP6
INP7
INP8
INP9
INP10
INP11
INP12
12V_bat
OUT1
OUT2
OUT3
OUT4
OUT5
OUT6
OUT7
OUT8
OUT9
OUT10
OUT11
OUT12
pg 3
File: adc_amp_divider.sch
Sheet: stm32f407_board
GND
VDD
GND
PC2
PC1
PA0
PC3
PA2
PA1
PA4
PA3
PA7
PA6
PC5
PC4
pg 10
5V
3.3V
PE6
PE5
PD7
PC13
PE3
PE4
PE1
PE2
PB9
PE0
PB8
PB7
P23
Sheet: inj_12ch
INJ-01_5V
INJ-02_5V
INJ-03_5V
INJ-04_5V
INJ-05_5V
INJ-06_5V
INJ-07_5V
INJ-08_5V
INJ-09_5V
INJ-10_5V
INJ-11_5V
INJ-12_5V
5V
INJ-01_2
INJ-02
INJ-03
INJ-04
INJ-05
INJ-06
INJ-07
INJ-08
INJ-09
INJ-10
INJ-11
INJ-12
iGND1
iGND2
GND
GND
pg 6
File: inj_12ch.sch
Sheet: DD_HIP9011
5V
GND
KNOCK-INPUT-1
KNOCK-INPUT-0
5V
GND
KNOCK1
KNOCK0
OUT
CS
SCK
SO
SI
INT/HLD
P12
SCK-2
SO-2
SI-2
PB0
PB13
PB14
PB15
PB11
PC0
pg 5
File: DD_HIP9011.sch
Sheet: mmc_usb_1
5V
3.3V
GND
CS_SD_MODULE
SPI_SCK
SPI_MISO
SPI_MOSI
CS_SD
SCK
SO
SI
PD4
PB3
PB4
PB5
pg 7
USART_RX
USART_TX
232-FROM-MCU
232-TO-MCU
PC10
PC11
File: mmc_usb_1.sch
C23
C24
0.1uF
1uF
3.3V
GND
U4
ITEAD_HC-0X
VCC
RESET
AIO0
AIO1
PIO0
PIO1
PIO2
PIO3
PIO4
PIO5
PIO6
PIO7
PIO8
PIO9
PIO10
PIO11
GND
GND
GND
UART_RTS
UART_CTS
UART_RX
UART_TX
SPI_MOSI
SPI_CS
SPI_CLK
SPI_MISO
USB_D-
USB_D+
PCM_CLK
PCM_OUT
PCM_IN
PCM_SYNC
NC-PC15
NC-PC14
NC-PH1
NC-PH0
NC-PA9
NC-PA10
PB2-NC
P11
P13
P16
P17
P18
P19
P20
P21
P22
PA15
PB1
PC12
PD0
PD1
PD2
PD3
PD5
PD6
Sheet: thermocouple1
3.3V
GND
3.3v
GND
SCK
MISO
/CS
pg 11
File: thermocouple_module.sch
Sheet: thermocouple2
3.3V
GND
3.3v
GND
SCK
MISO
/CS
pg 12
File: thermocouple_module.sch
Sheet: thermocouple3
3.3V
GND
3.3v
GND
SCK
MISO
/CS
pg 13
File: thermocouple_module.sch
Sheet: thermocouple4
3.3V
GND
3.3v
GND
SCK
MISO
/CS
pg 14
File: thermocouple_module.sch
P101
P10
P6
P9
PD12
PD13
PD14
PD15
PA14
P30
BOOT0
NC
NRST
PA8
PA13
File: stm32f407_board.sch
Sheet: hi-lo
PC7
PE14
PC9
PE12
PE8
PE10
5V
H_IN1
H_IN2
H_IN3
H_IN4
H_IN5
H_IN6
5V
HL1
HL2
HL3
HL4
HL5
HL6
GND
12V
HL1
HL2
HL3
HL4
HL5
HL6
GND
12V-SWITCH
pg 2
File: hi-lo.sch
Sheet: cps_vrs_io_1
PA5
PC6
JP04
JP05
CRANK
5V
GND
CAM
CRANK
5V
GND
CAM
CRK2-
CRK2+
CAM-
CAM+
CRK2-
CRK2+
CAM-
CAM+
pg 8
File: cps_vrs_io_1.sch
Sheet: can_brd_1
P15
PB12
PB6
3.3V
GND
CAN_RX
CAN_TX
5V
CANH
CANL
CANH
CANL
pg 4
File: can_brd_1.sch
PWR_FLAG
JP01
5V
PE7
PE9
PE11
PE13
PE15
PB10
PC8
PD8
PD10
PD9
PD11
GND
HD44780_VCC
HD44780_VLCD
HD44780_RS
GND
HD44780_CS
HD44780_D4
HD44780_D5
HD44780_D6
HD44780_D7
S1
GND
VCC
VLCD
RS
R/W
CS
D0
D1
D2
D3
D4
D5
D6
D7
A
K
HD44780_VCC
GND
DISPLAY_BL
U5
A
Center
B
Com
C
D
1
2
3
5
4
GND
PWR_FLAG
SKRHAAE010
GND
1k R99
1kpot
RV101
HD44780_VLCD
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
Sheet: Misc_Vias
12V-SWITCH
5V
3.3V
GND
CRANK
CAM
12V-SWITCH
5V
3.3V
GND
CRANK
CAM
File: Misc_Vias.sch
rusEFI.com
File: frankenso.sch
Sheet: /
Title: Frankenso
Size: B
Date: 25 apr 2015
Rev: .04
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable
Id: 1/15

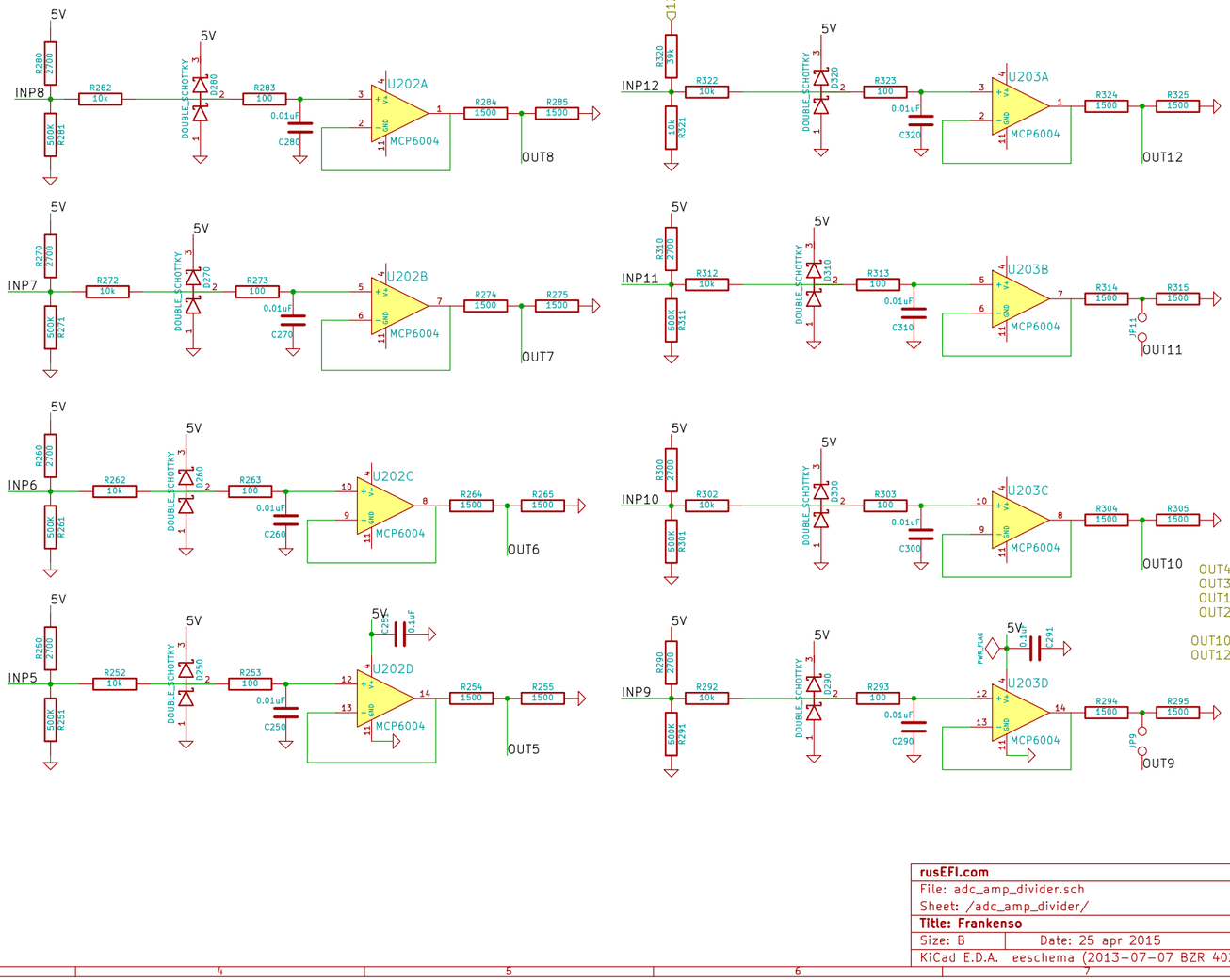
6 channel high / low side driver



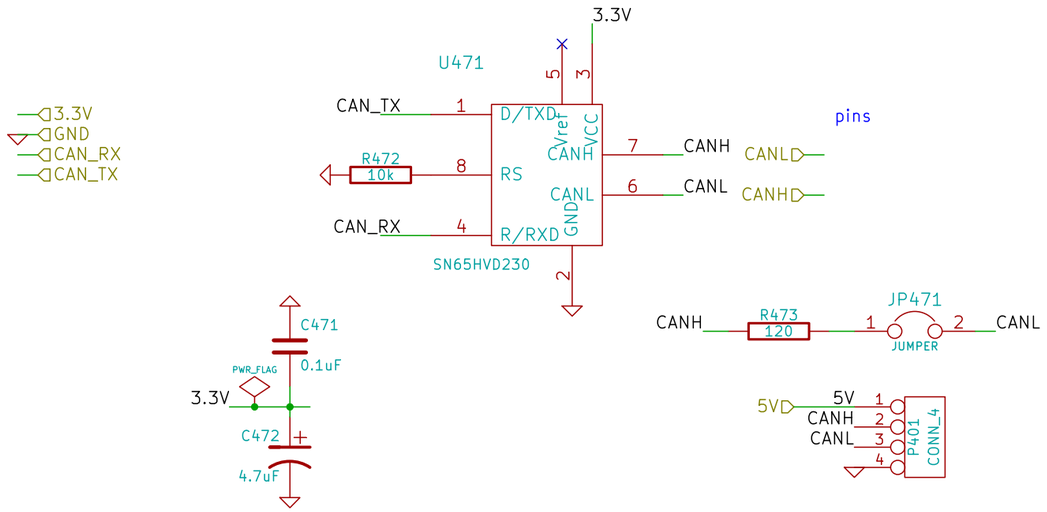
rusEFI.com		
File: hi-lo.sch		
Sheet: /hi-lo/		
Title: Frankenso		
Size: B	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 2/15

SUGGESTED ENGINE WIRING IN BLUE





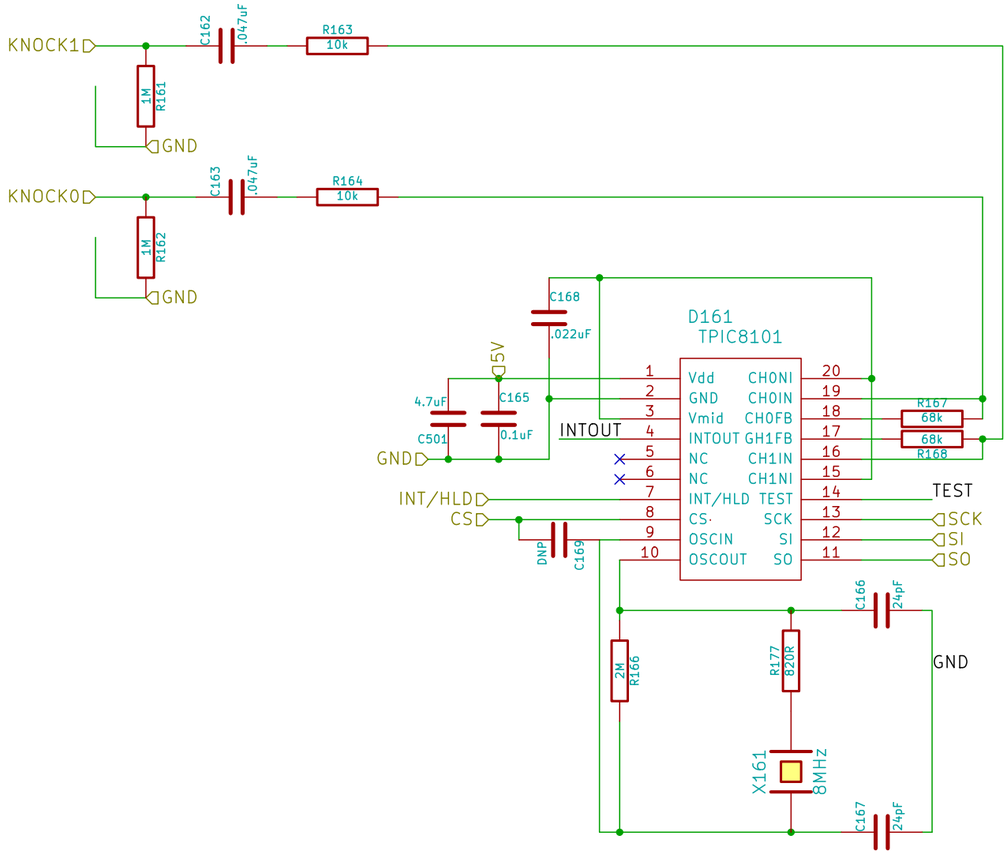
rusEFI.com		
File: adc_amp_divider.sch		
Sheet: /adc_amp_divider/		
Title: Frankenso		
Size: B	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 3/15



CAN level shifter

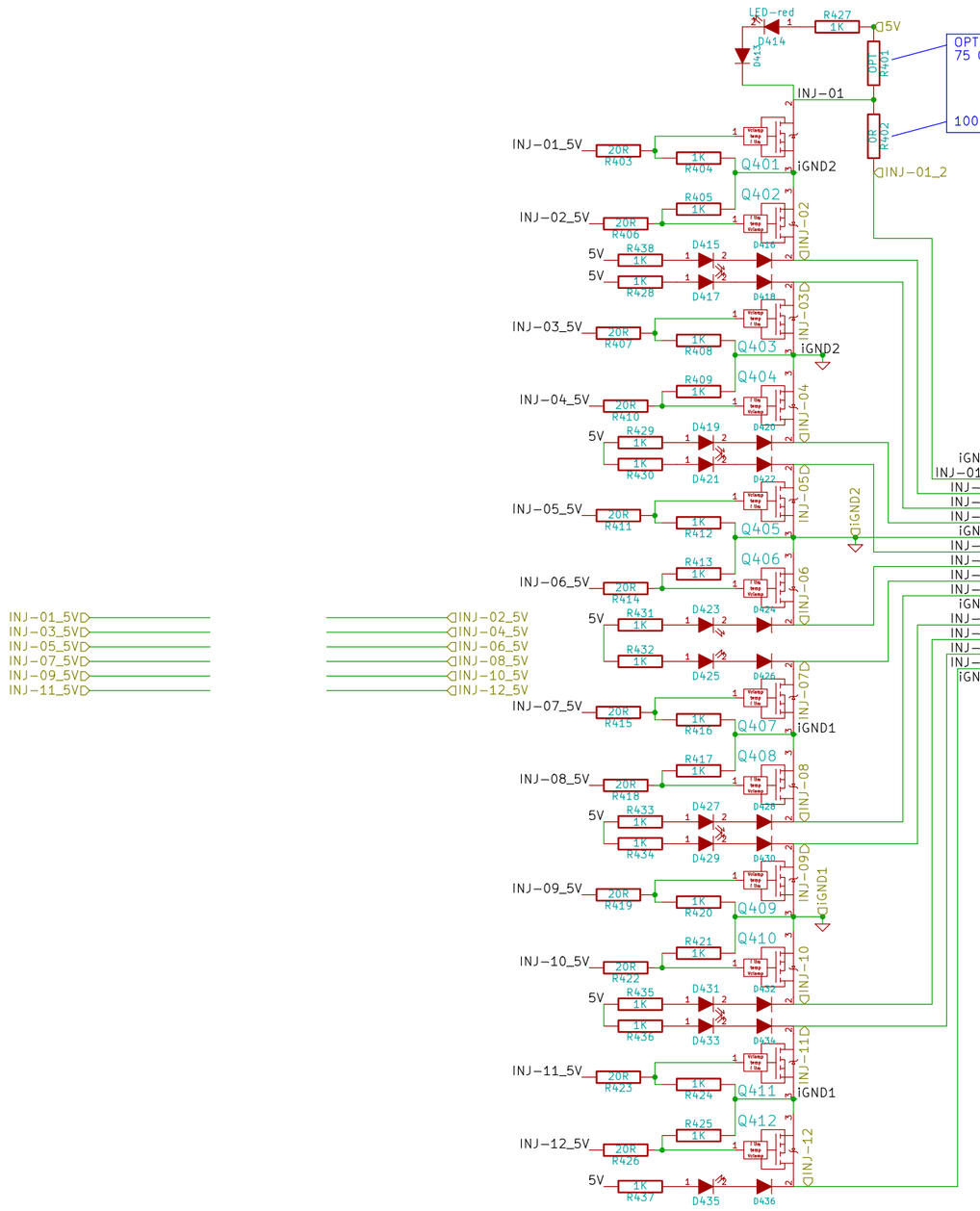
rusEFI.com		
File: can_brd_1.sch		
Sheet: /can_brd_1/		
Title: Frankenso		
Size: A4	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 4/15

DD_HIP9011 ver.2
RusEfi.com



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 = ([Cin+C1][C2+Cout])/(Cin+C1+C2_Cout)+PCBstray
Cload = ([5+24][24+5])/(5+24+24+5)+3.5= 18pF
C1=C2=C166=C167 = 24pF
Rs = 1/(2piFC2) = 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: 25 apr 2015	**Rev: .02**
KiCad E.D.A.	eeschema (2013-07-07 BZR 4022)-stable	Id: 5/15



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.

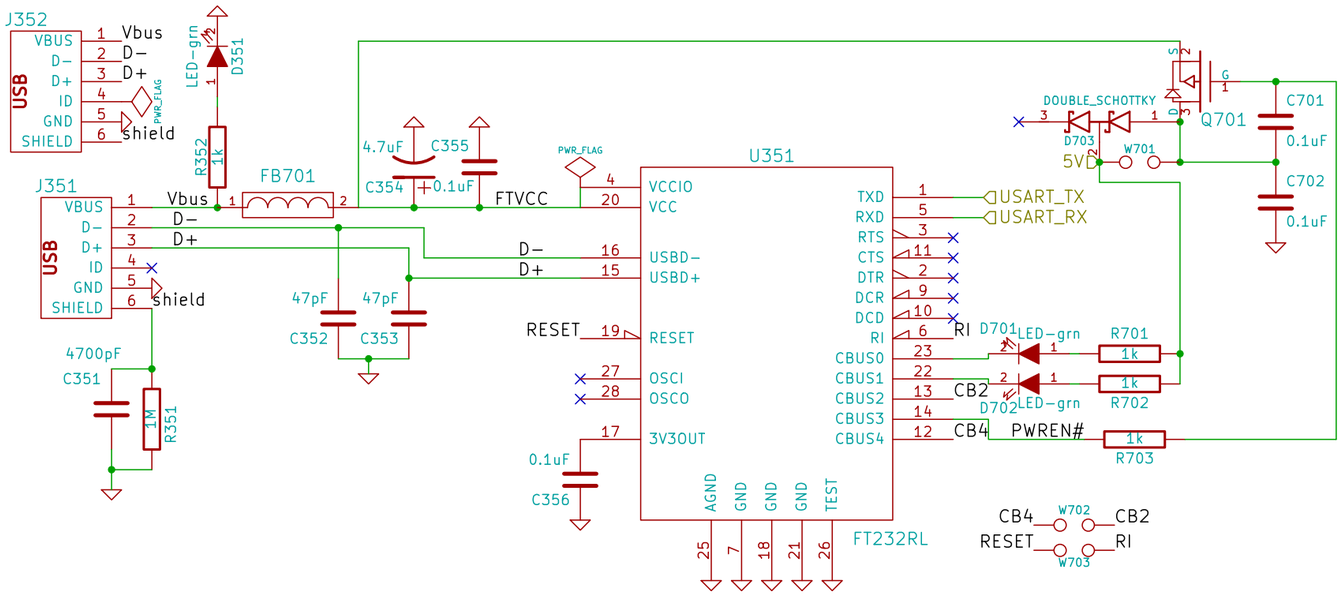
THE PCB WIRING IS SHOWN IN RED, GREEN WITH A BLUE BUS.

Screw terminals 1760500000

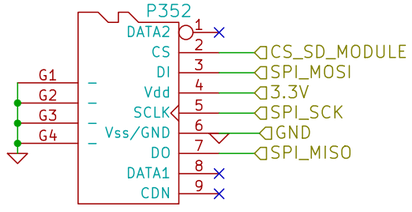
Screw connector PCB http://octopart.com/39522-1007-molex-655409
Screw connector harness http://octopart.com/partsearch#search/requestData&q=39520-0007

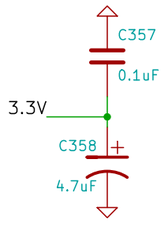
rusEFI.com		
File: inj_12ch.sch		
Sheet: /inj_12ch/		
Title: Frankenso		
Size: B	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 6/15

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



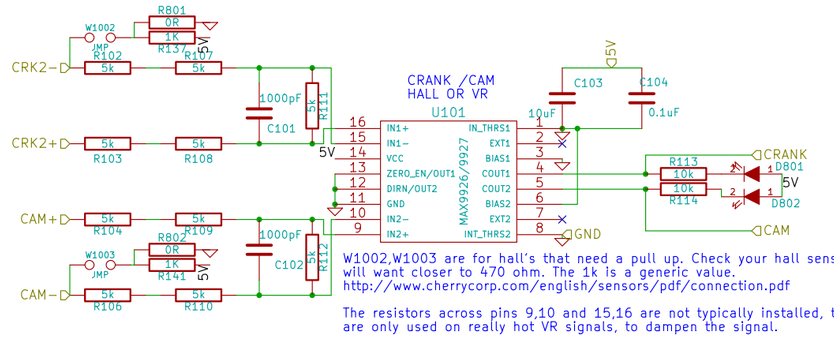
For right conn





SD card slot
USB TTL module

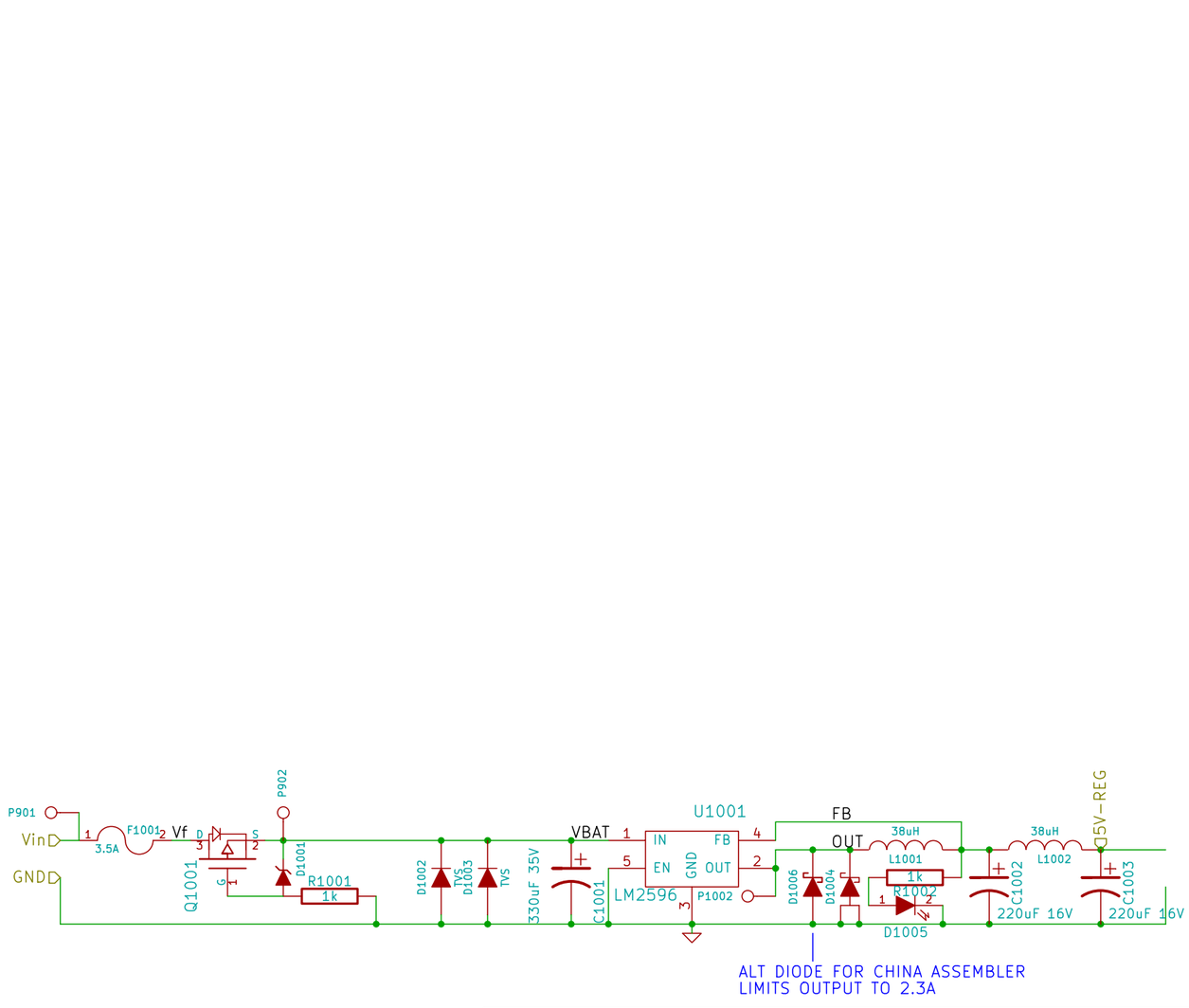
rusEFI.com		
File: mmc_usb_1.sch		
Sheet: /mmc_usb_1/		
Title: Frankenso		
Size: A4	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 7/15



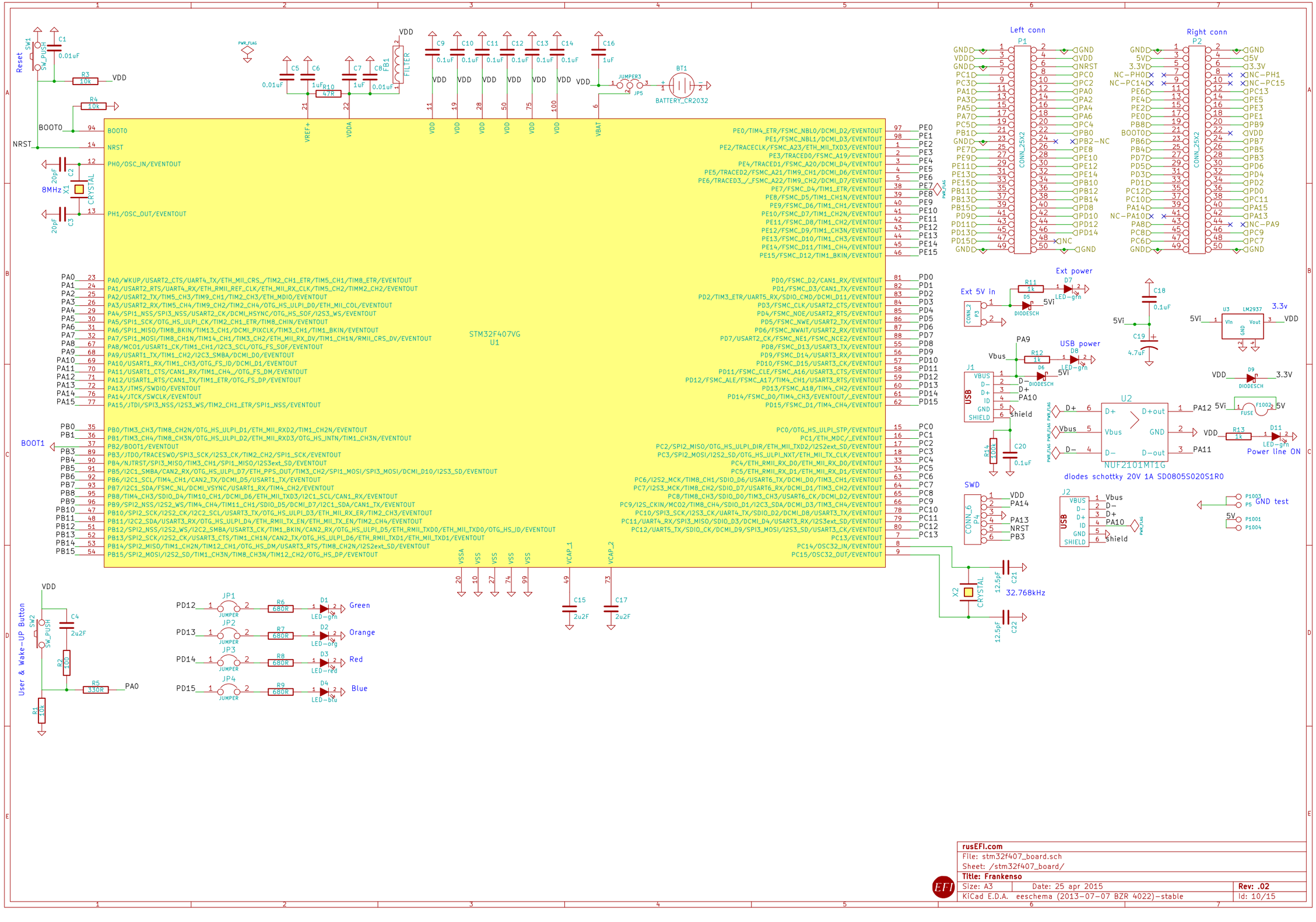
W1002,W1003 are for hall's that need a pull up. Check your hall sensors, many will want closer to 470 ohm. The 1k is a generic value.
http://www.cherrycorp.com/english/sensors/pdf/connection.pdf

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.

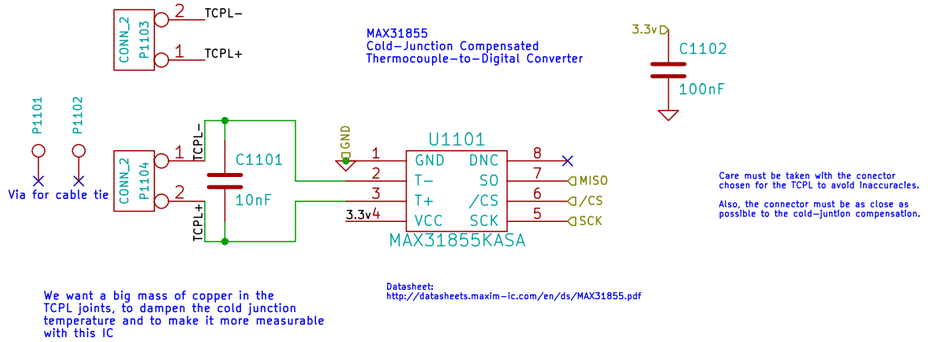
rusEFI.com		
File: cps_vrs_io_1.sch		
Sheet: /cps_vrs_io_1/		
Title: Frankenso		
Size: B	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 8/15



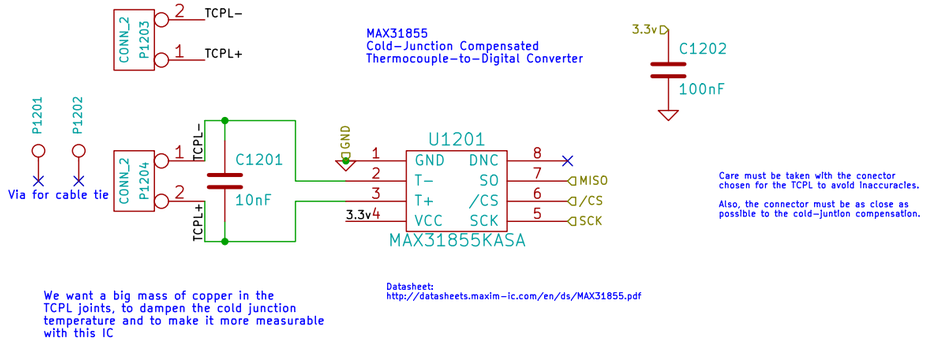
rusEFI.com		
File: PWR_buck_12V_switcher.sch		
Sheet: /PWR_buck_12V_switcher/		
Title: Frankenso		
Size: A	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 9/15



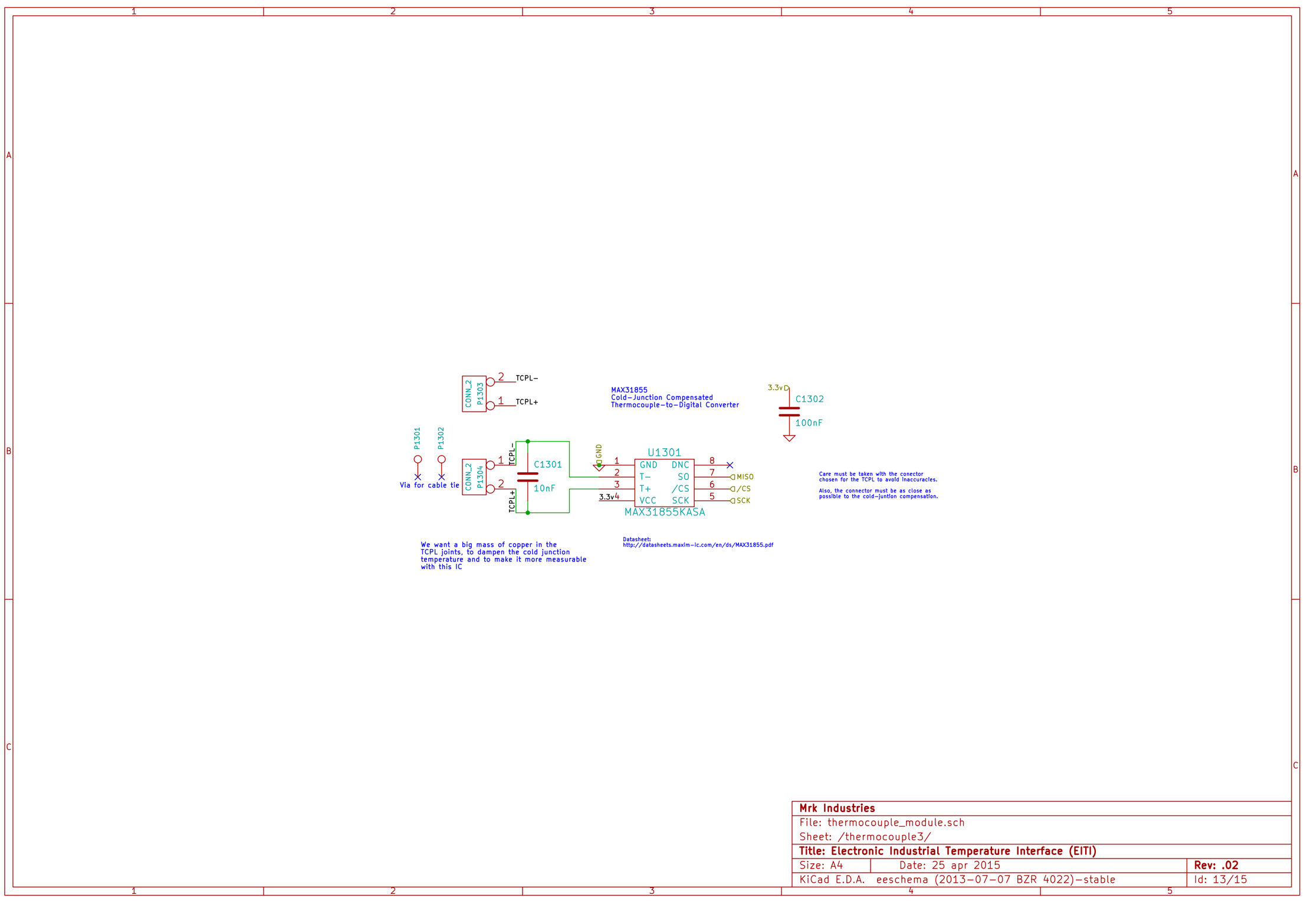
rusEFI.com	
File: stm32f407_board.sch	
Sheet: /stm32f407_board/	
Title: Frankenso	
Size: A3	Date: 25 apr 2015
KiCad E.D.A.	eeschema (2013-07-07 BZR 4022)-stable
Rev: .02	
Id: 10/15	



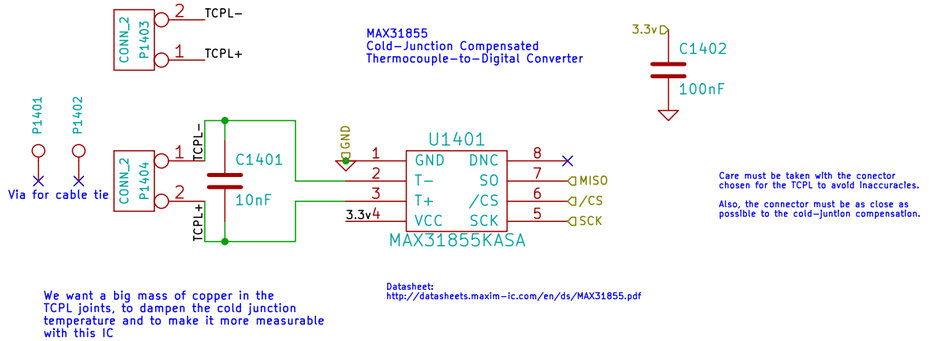
Mrk Industries		
File: thermocouple_module.sch		
Sheet: /thermocouple1/		
Title: Electronic Industrial Temperature Interface (EITI)		
Size: A4	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 11/15



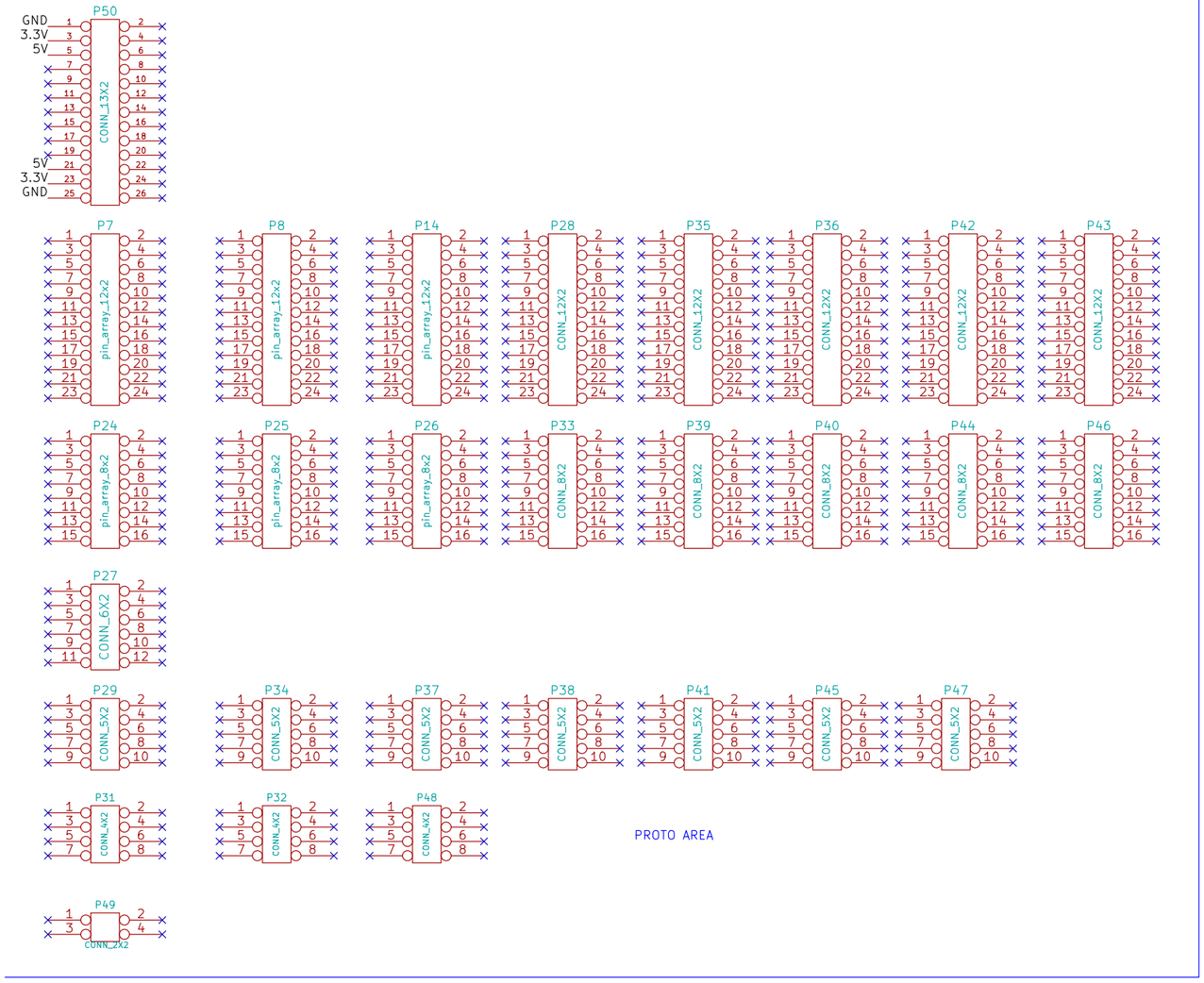
Mrk Industries		
File: thermocouple_module.sch		
Sheet: /thermocouple2/		
Title: Electronic Industrial Temperature Interface (EITI)		
Size: A4	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 12/15



Mrk Industries		
File: thermocouple_module.sch		
Sheet: /thermocouple3/		
Title: Electronic Industrial Temperature Interface (EITI)		
Size: A4	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 13/15



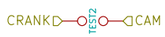
Mrk Industries		
File: thermocouple_module.sch		
Sheet: /thermocouple4/		
Title: Electronic Industrial Temperature Interface (EITI)		
Size: A4	Date: 25 apr 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 14/15



These two jumpers
are here to accomodate
stm32f4discovery

These four jumpers
are test points

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



rusEFI.com		
File: Misc_Vias.sch		
Sheet: /Misc_Vias/		
Title: Frankenso		
Size: B	Date: 25 apr 2015	**Rev: .04**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 15/15