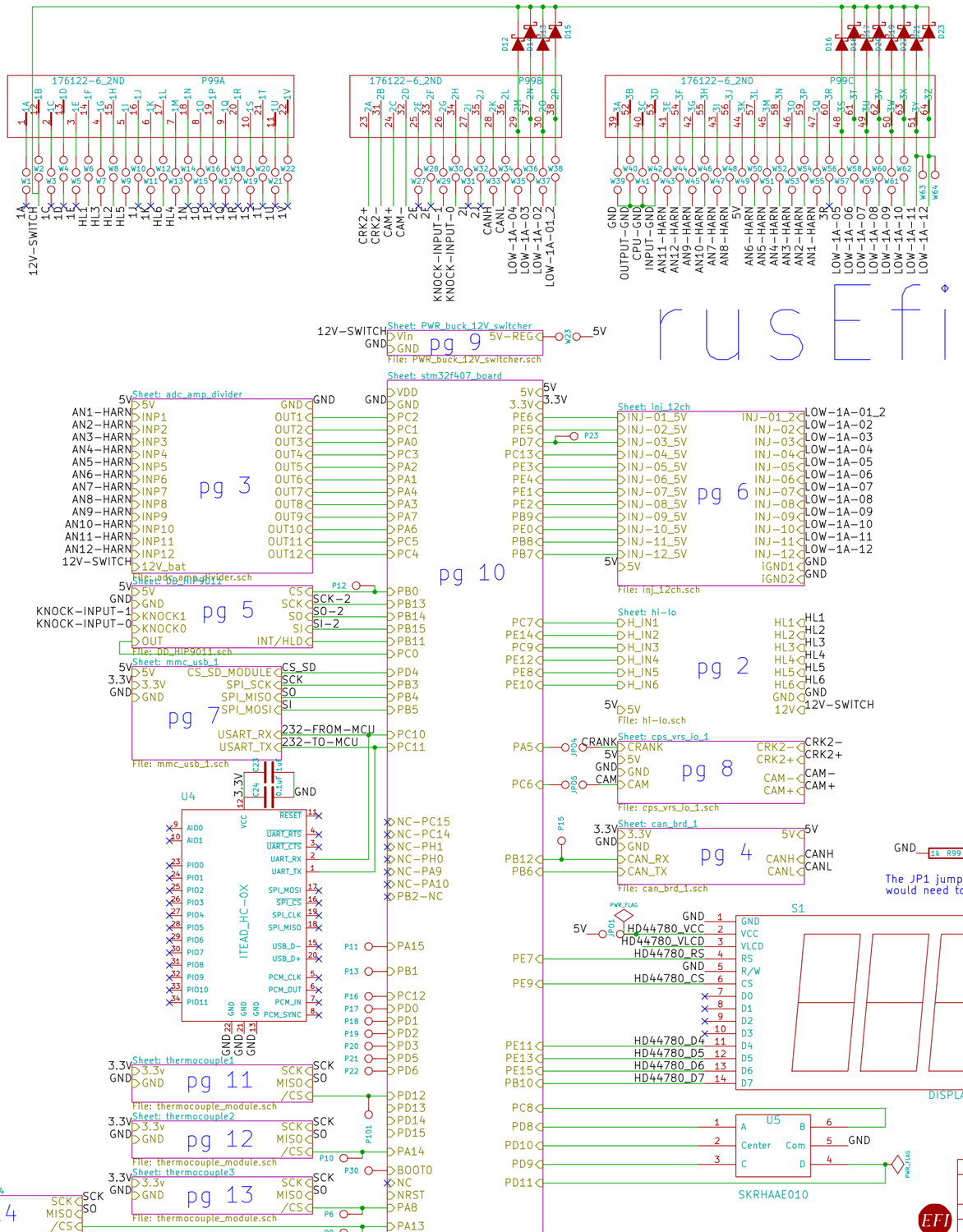
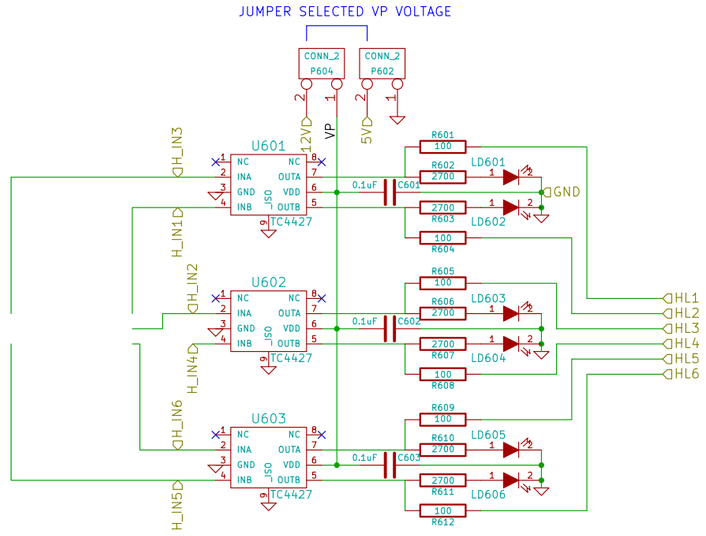

176122-6_2ND
P99A
176122-6_2ND
P99B
176122-6_2ND
P99C
1A
12V-SWITCH
HL1
HL2
HL3
HL4
HL5
HL6
CRK2+
CRK2-
CAM+
CAM-
KNOCK-INPUT-1
KNOCK-INPUT-0
CANH
CANL
LOW-1A-04
LOW-1A-03
LOW-1A-02
LOW-1A-01_2
GND
OUTPUT-GND
CPU-GND
INPUT-GND
AN11-HARN
AN12-HARN
AN9-HARN
AN10-HARN
AN7-HARN
AN8-HARN
5V
AN6-HARN
AN5-HARN
AN4-HARN
AN3-HARN
AN2-HARN
AN1-HARN
3R
LOW-1A-05
LOW-1A-06
LOW-1A-07
LOW-1A-08
LOW-1A-09
LOW-1A-10
LOW-1A-11
LOW-1A-12
rusEfi
12V-SWITCH
GND
Sheet: PWR_buck_12V_switcher
Vin
GND
5V-REG
pg 9
File: PWR_buck_12V_switcher.sch
Sheet: stm32f407_board
VDD
GND
PC2
PC1
PA0
PC3
PA2
PA1
PA4
PA3
PA7
PA6
PC5
PC4
PB0
PB13
PB14
PB15
PB11
PC0
PD4
PB3
PB4
PB5
PC10
PC11
NC-PC15
NC-PC14
NC-PH1
NC-PH0
NC-PA9
NC-PA10
PB2-NC
PA15
PB1
PC12
PD0
PD1
PD2
PD3
PD5
PD6
PD12
PD13
PD14
PD15
PA14
BOOT0
NC
NRST
PA8
PA13
pg 10
File: stm32f407_board.sch
5V
3.3V
Sheet: adc_amp_divider
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
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: 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
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
LOW-1A-01_2
LOW-1A-02
LOW-1A-03
LOW-1A-04
LOW-1A-05
LOW-1A-06
LOW-1A-07
LOW-1A-08
LOW-1A-09
LOW-1A-10
LOW-1A-11
LOW-1A-12
pg 6
File: inj_12ch.sch
P23
Sheet: dd_HIP9011
KNOCK1
KNOCK0
OUT
CS
SCK
SO
SI
INT/HLD
SCK-2
SO-2
SI-2
P12
pg 5
File: dd_HIP9011.sch
Sheet: mmc_usb_1
CS_SD_MODULE
SPI_SCK
SPI_MISO
SPI_MOSI
CS_SD
SCK
SO
SI
pg 7
File: mmc_usb_1.sch
232-FROM-MCU
232-TO-MCU
USART_RX
USART_TX
Sheet: hi-lo
H_IN1
H_IN2
H_IN3
H_IN4
H_IN5
H_IN6
PC7
PE14
PC9
PE12
PE8
PE10
HL1
HL2
HL3
HL4
HL5
HL6
GND
12V
pg 2
File: hi-lo.sch
Sheet: cps_vrs_io_1
CRANK
CAM
CRK2-
CRK2+
CAM-
CAM+
PA5
PC6
JP04
JP05
pg 8
File: cps_vrs_io_1.sch
Sheet: can_brd_1
3.3V
GND
CAN_RX
CAN_TX
5V
CANH
CANL
PB12
PB6
P15
pg 4
File: can_brd_1.sch
U4
ITEAD_HC-0X
VCC
RESET
AIO0
AIO1
UART_RTS
UART_CTS
UART_RX
UART_TX
PIO0
PIO1
PIO2
PIO3
PIO4
PIO5
PIO6
PIO7
PIO8
PIO9
PIO10
PIO11
SPI_MOSI
SPI_CS
SPI_CLK
SPI_MISO
USB_D-
USB_D+
PCM_CLK
PCM_OUT
PCM_IN
PCM_SYNC
GND
C23
C24
4.7uF
0.1uF
3.3V
Sheet: thermocouple1
Sheet: thermocouple2
Sheet: thermocouple3
Sheet: thermocouple4
SCK
MISO
/CS
SO
pg 11
pg 12
pg 13
pg 14
File: thermocouple_module.sch
P101
P10
P6
P9
P30
U5
SKRHAAE010
A
B
Center
Com
C
D
PWR_FLAG
PC8
PD8
PD10
PD9
PD11
S1
DISPLAY_BL
HD44780_VCC
HD44780_VLCD
HD44780_RS
HD44780_CS
HD44780_D4
HD44780_D5
HD44780_D6
HD44780_D7
GND
VCC
VLCD
RS
R/W
CS
D0
D1
D2
D3
D4
D5
D6
D7
A
K
JP01
PE7
PE9
PE11
PE13
PE15
PB10
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
File: Misc_Vias.sch
rusEFI.com
File: frankenso.sch
Sheet: /
Title: Frankenso
Size: B
Date: 2 may 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: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 2/15

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

OUT4
OUT3
OUT1
OUT2
OUT10
OUT12
OUT6
OUT5
OUT8
OUT7
OUT11
OUT9

SUGGESTED / DEFAULT ENGINE WIRING IN BLUE

02

INP4 R242 10k R240 39K R241 500K DOUBLE_SCHOTTKY D240 R243 100 C240 0.01uF U201A MCP6004 R244 1500 R245 1500 OUT4

INP8 R280 10k R282 10k R281 39K D280 R283 100 C280 0.01uF U202A MCP6004 R284 1500 R285 1500 OUT8

VBAT 12V_bat R320 39k INP12 R322 10k R321 10k D320 R323 100 C320 0.01uF U203A MCP6004 R324 1500 R325 1500 OUT12

MAP MAF INP3 R232 10k R230 D230 R233 100 C230 0.01uF U201B MCP6004 R234 1500 R235 1500 OUT3

INP7 R272 10k R270 D270 R273 100 C270 0.01uF U202B MCP6004 R274 1500 R275 1500 OUT7

ALT CAM INP11 R310 1k R312 10k R311 39K D310 R313 100 C310 0.01uF U203B MCP6004 R314 1500 R315 1500 JP11 OUT11

IAT 1K – 10K INP2 R220 2700 R222 10k R221 39K D220 R223 100 C220 0.01uF U201C MCP6004 R224 1500 R225 1500 OUT2

INP6 R260 10k R262 10k R261 39K D260 R263 100 C260 0.01uF U202C MCP6004 R264 1500 R265 1500 OUT6

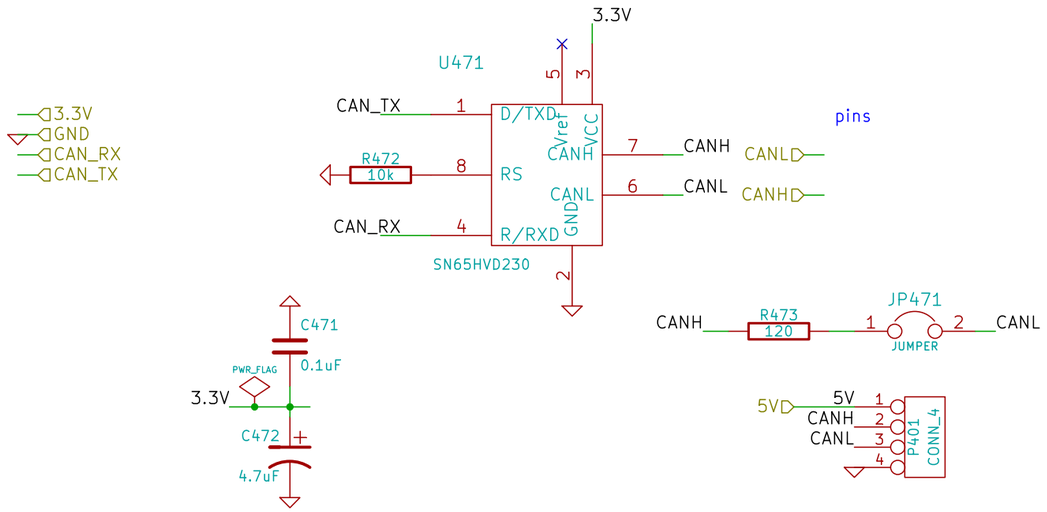
INP10 R300 10k R302 10k R301 39K D300 R303 100 C300 0.01uF U203C MCP6004 R304 1500 R305 1500 OUT10

CLT 1K – 10K INP1 R210 2700 R212 10k R211 39K D210 R213 100 C210 0.01uF C211 0.1uF U201D MCP6004 R214 1500 R215 1500 OUT1

TPS 1K – 10K INP5 R250 10k R252 10k R251 500K D250 R253 100 C250 0.01uF C254 0.1uF U202D MCP6004 R254 1500 R255 1500 OUT5

ALT CRANK INP9 R290 1k R292 10k R291 39K D290 R293 100 C290 0.01uF C291 0.1uF PWR_FLAG U203D MCP6004 R294 1500 R295 1500 JP9 OUT9

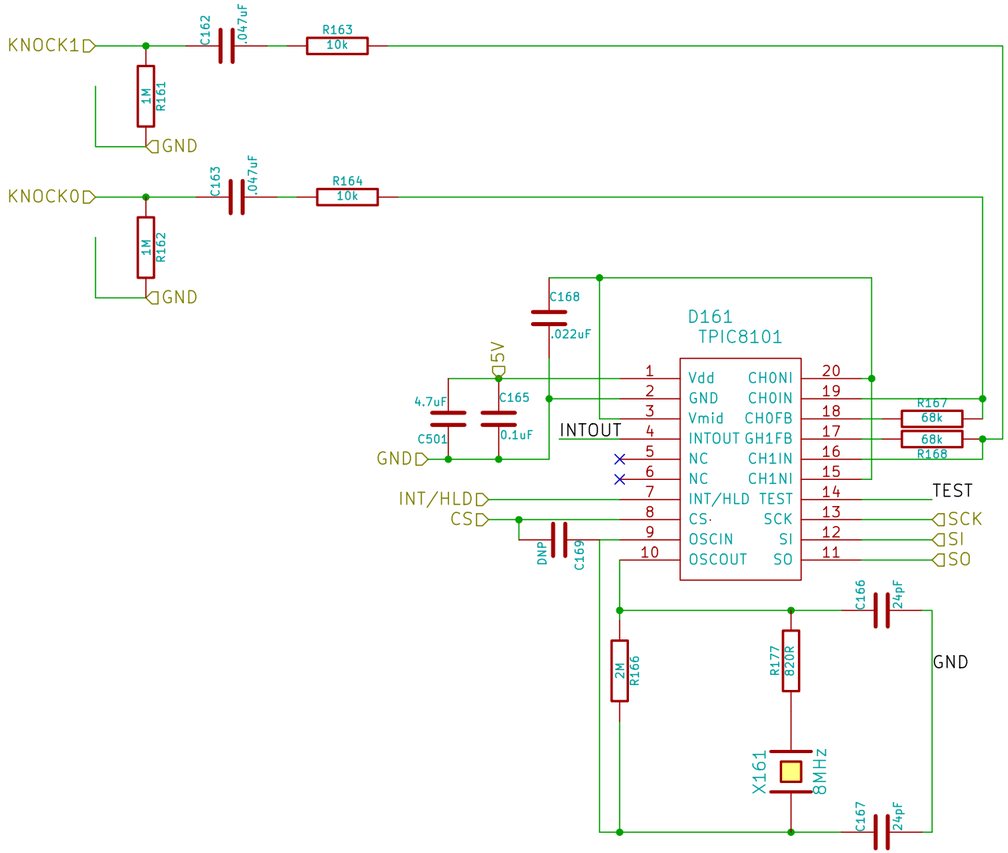
rusEFI.com		
File: adc_amp_divider.sch		
Sheet: /adc_amp_divider/		
Title: Frankenso		
Size: B	Date: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 3/15



CAN level shifter

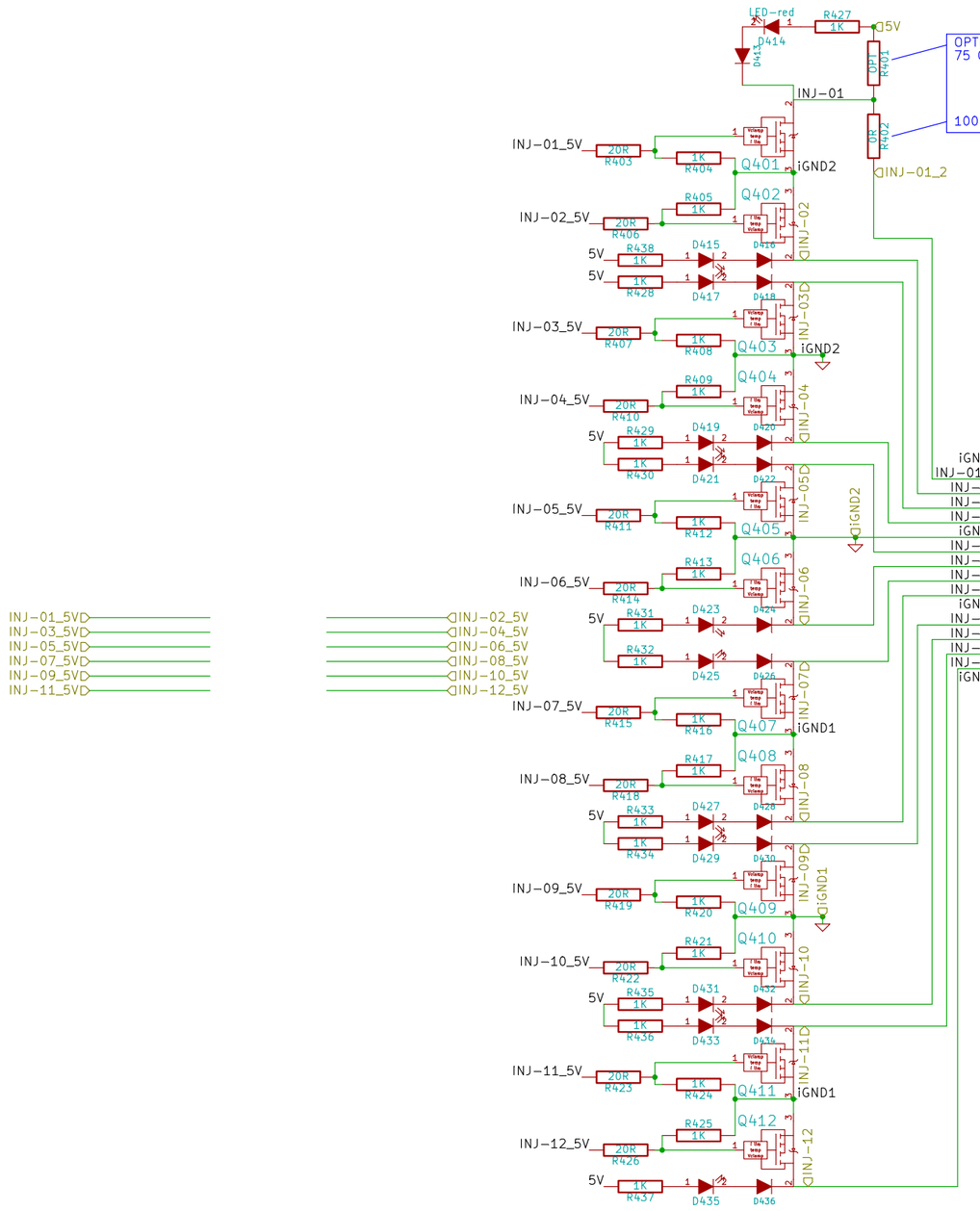
rusEFI.com		
File: can_brd_1.sch		
Sheet: /can_brd_1/		
Title: Frankenso		
Size: A4	Date: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 4/15

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: 2 may 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.

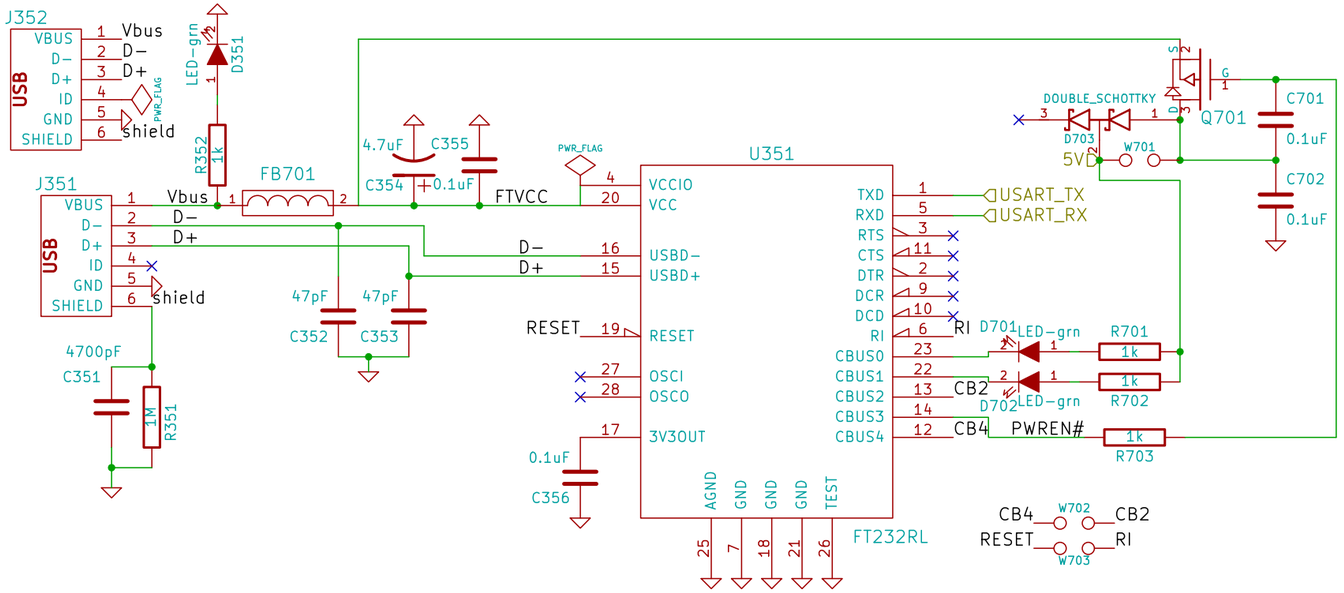
THE PCB WIRING IS SHOWN IN RED, GREEN WITH A BLUE BUS.

Screw terminals 1760500000

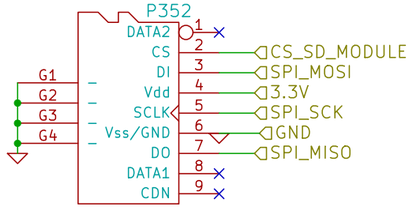
Screw connector PCB http://octopart.com/39522-1007-molex-655409
Screw connector harness http://octopart.com/partsearch#search/requestData&q=39520-0007

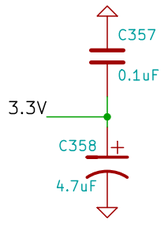
rusEFI.com		
File: inj_12ch.sch		
Sheet: /inj_12ch/		
Title: Frankenso		
Size: B	Date: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 6/15

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



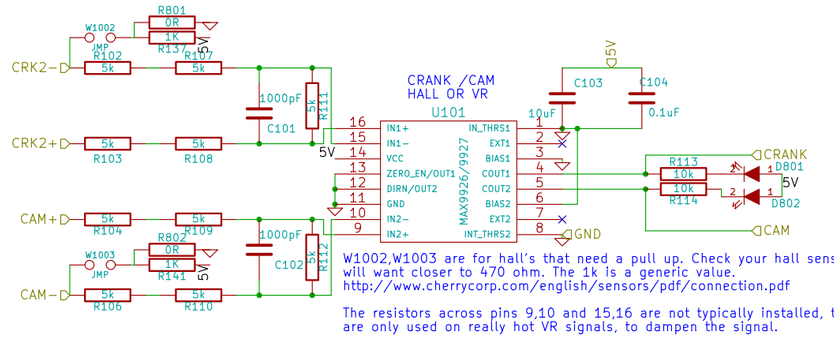
For right conn





SD card slot
USB TTL module

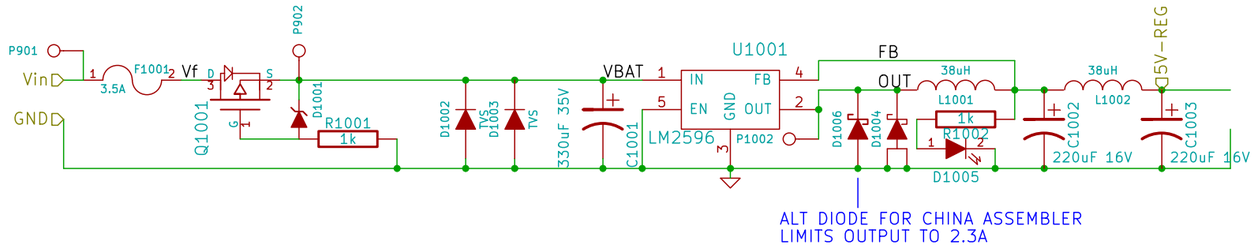
rusEFI.com		
File: mmc_usb_1.sch		
Sheet: /mmc_usb_1/		
Title: Frankenso		
Size: A4	Date: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 7/15



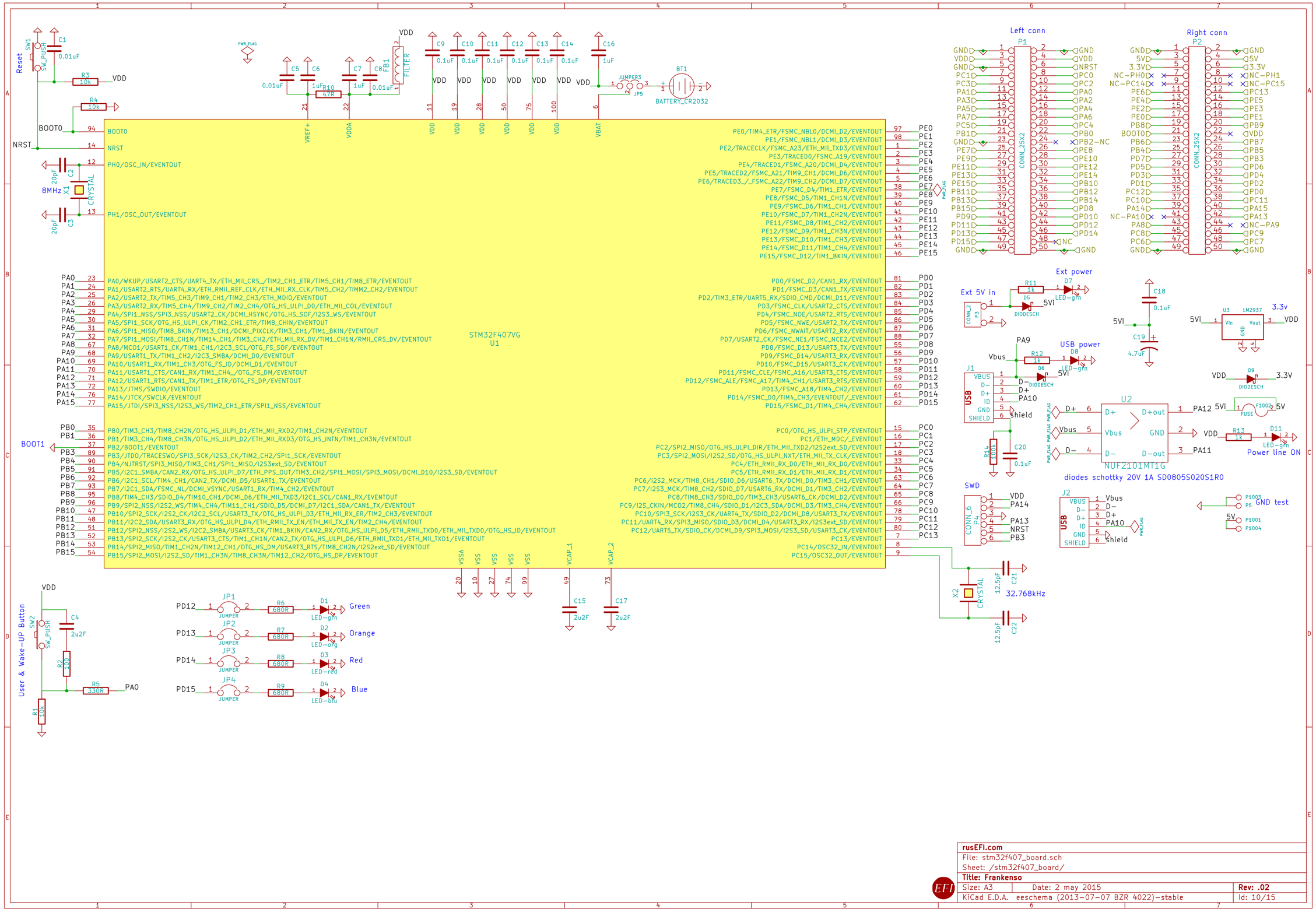
W1002,W1003 are for hall's that need a pull up. Check your hall sensors, many will want closer to 470 ohm. The 1k is a generic value.
http://www.cherrycorp.com/english/sensors/pdf/connection.pdf

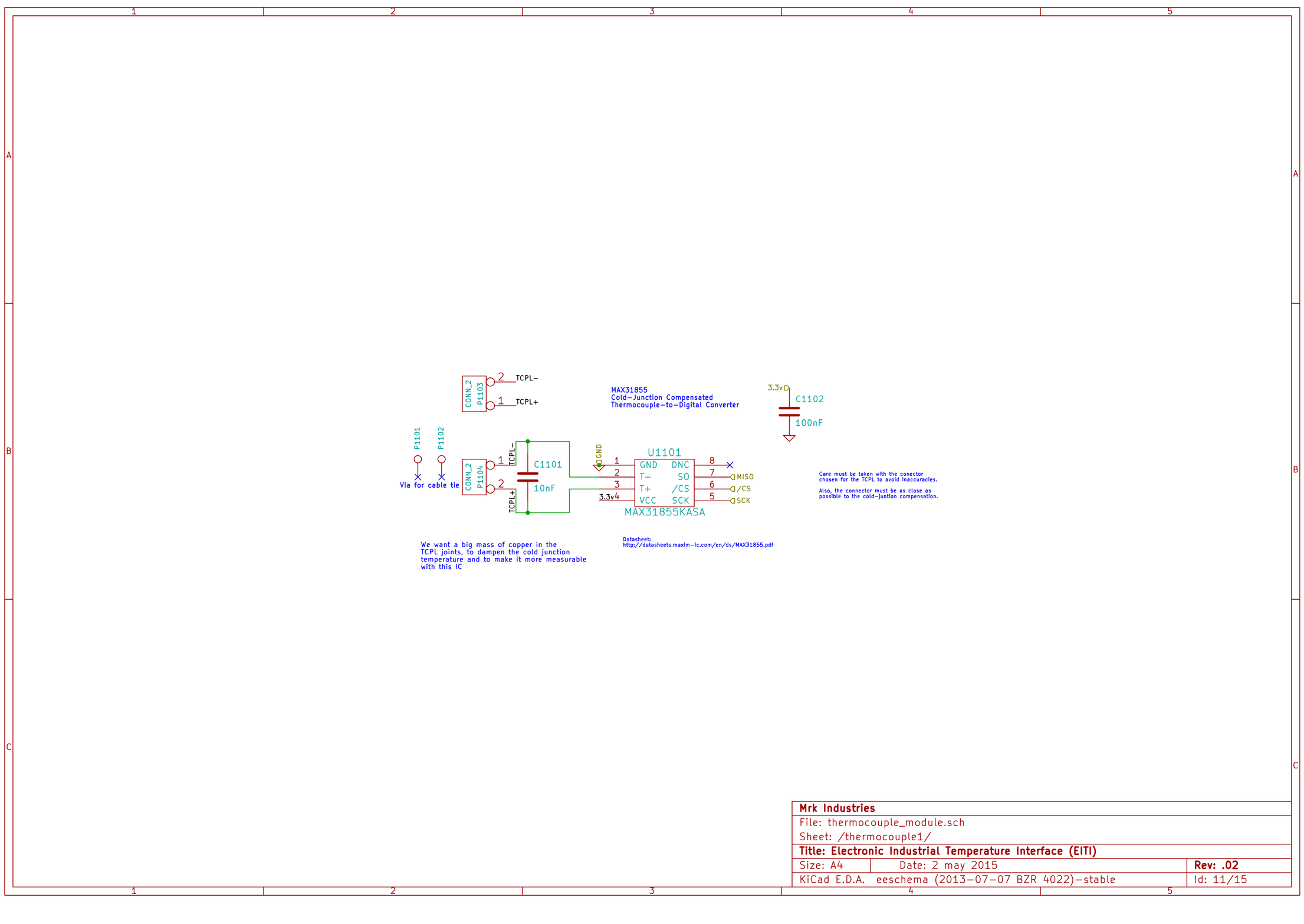
The resistors across pins 9,10 and 15,16 are not typically installed, they are only used on really hot VR signals, to dampen the signal.

rusEFI.com		
File: cps_vrs_io_1.sch		
Sheet: /cps_vrs_io_1/		
Title: Frankenso		
Size: B	Date: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 8/15

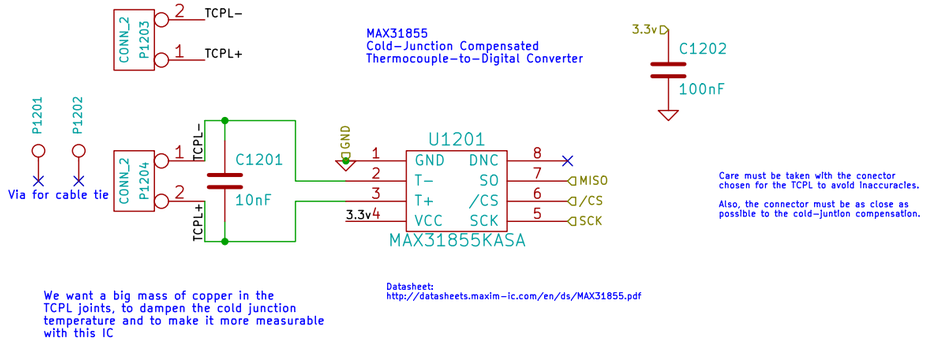


rusEFI.com		
File: PWR_buck_12V_switcher.sch		
Sheet: /PWR_buck_12V_switcher/		
Title: Frankenso		
Size: A	Date: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 9/15

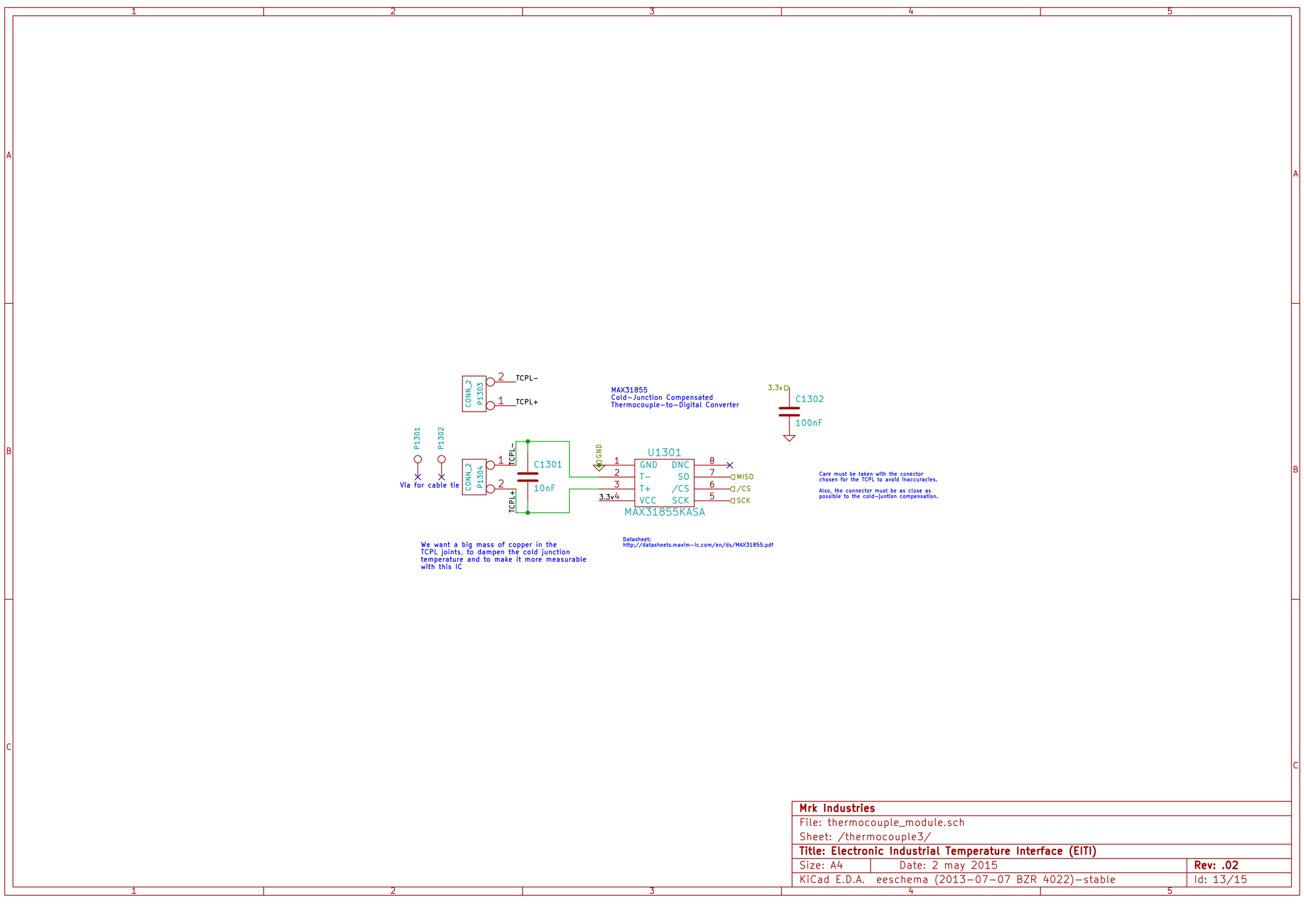

STM32F407VG
U1
Left conn
P1
Right conn
P2
Ext power
Ext 5V in
USB power
SWD
Power line ON
diodes schottky 20V 1A SD0805S020S1R0
NUF2101MT1G
32.768kHz
User & Wake-UP Button
Reset
BOOT1
8MHz
GND test
rusEFI.com
File: stm32f407_board.sch
Sheet: /stm32f407_board/
Title: Frankenso
Size: A3
Date: 2 may 2015
Rev: .02
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable
Id: 10/15



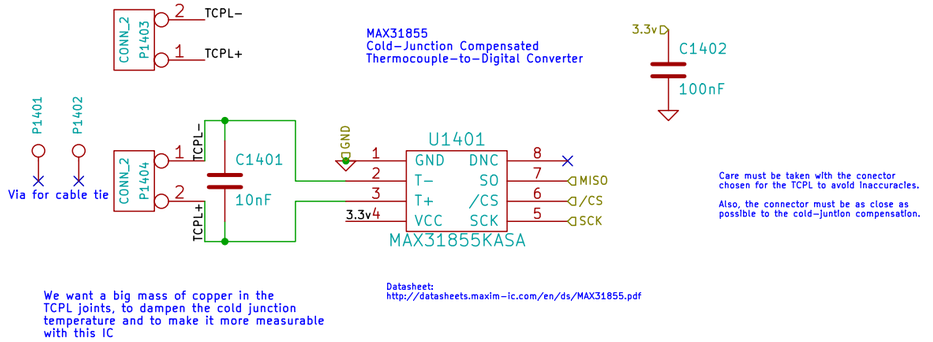
Mrk Industries		
File: thermocouple_module.sch		
Sheet: /thermocouple1/		
Title: Electronic Industrial Temperature Interface (EITI)		
Size: A4	Date: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 11/15



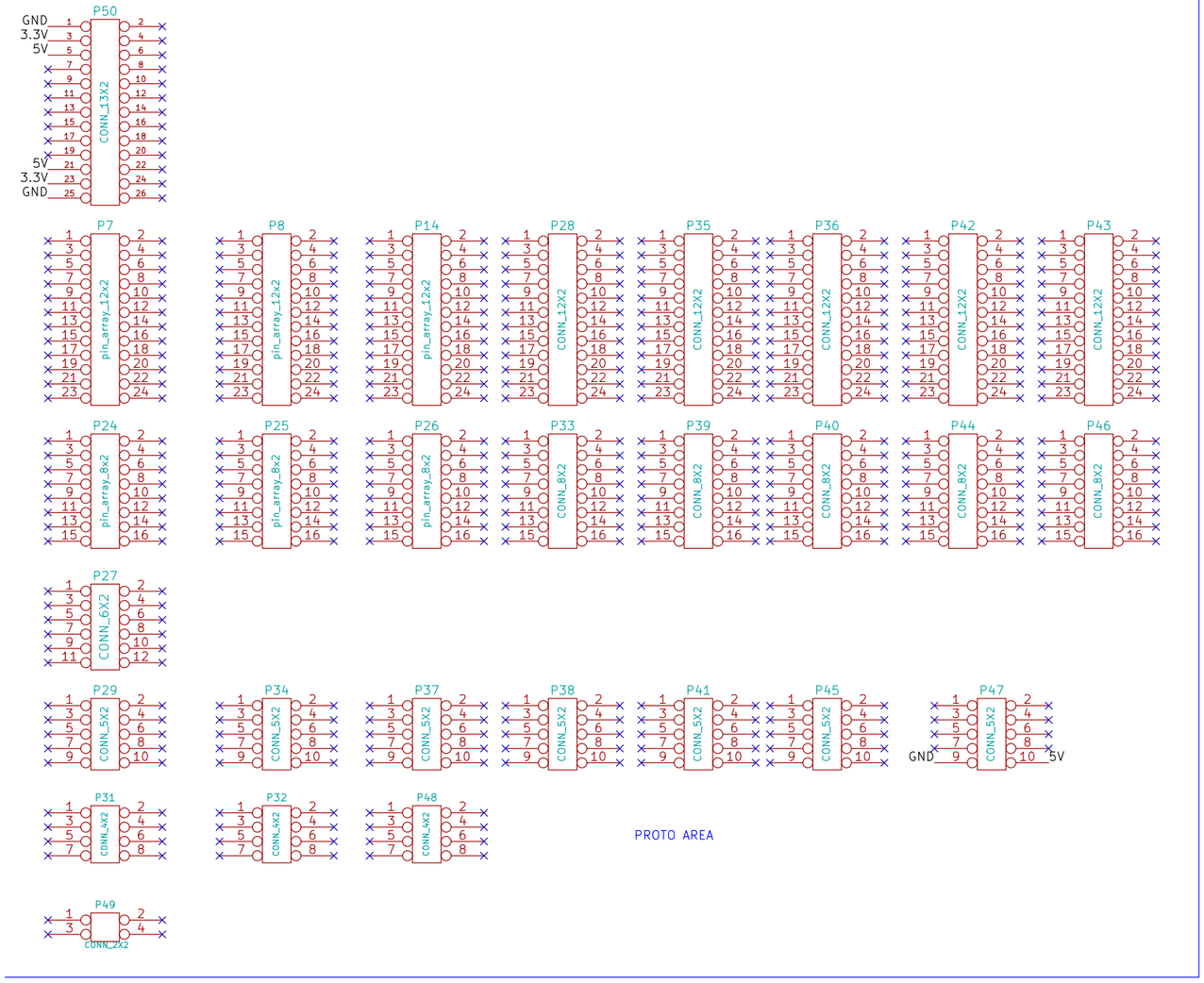
Mrk Industries		
File: thermocouple_module.sch		
Sheet: /thermocouple2/		
Title: Electronic Industrial Temperature Interface (EITI)		
Size: A4	Date: 2 may 2015	**Rev: .02**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 12/15



Mrk Industries		
File: thermocouple_module.sch		
Sheet: /thermocouple3/		
Title: Electronic Industrial Temperature Interface (EITI)		
Size: A4	Date: 2 may 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: 2 may 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

GND — JP03P02 — GND

GND — JP03P01 — GND

These four jumpers
are test points

12V-SWITCH — JP07P06 — 5VD — JP09P08 — 5V

GND — JP07P05 — GND

3.3VD — JP09P07 — 3.3V

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

CRANK — TCO2 — CAM

rusEFI.com		
File: Misc_Vias.sch		
Sheet: /Misc_Vias/		
Title: Frankenso		
Size: B	Date: 2 may 2015	**Rev: .04**
KiCad E.D.A. eeschema (2013-07-07 BZR 4022)-stable		Id: 15/15