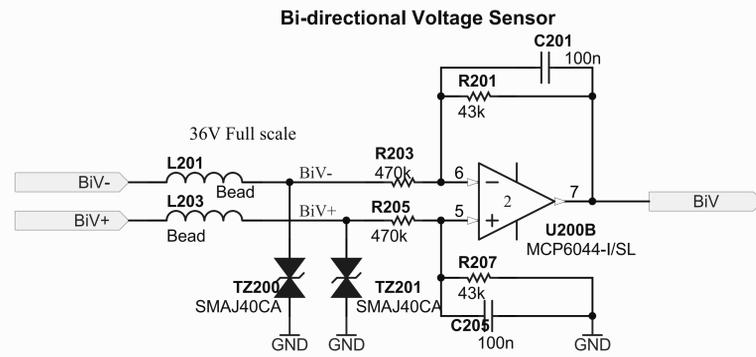
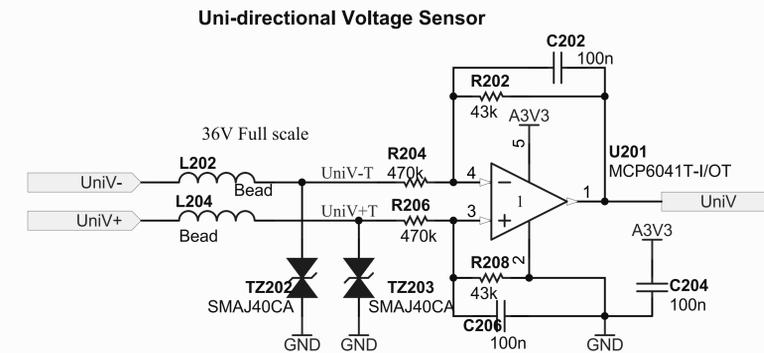
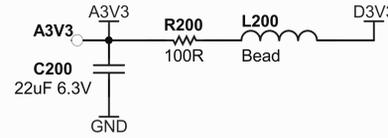


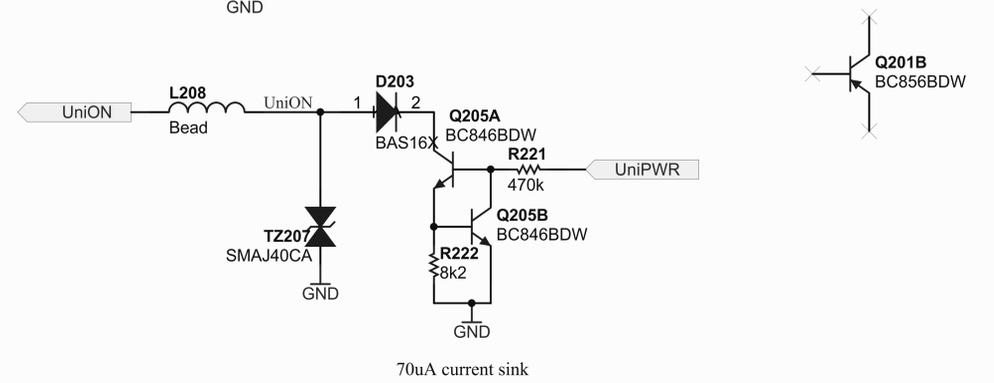
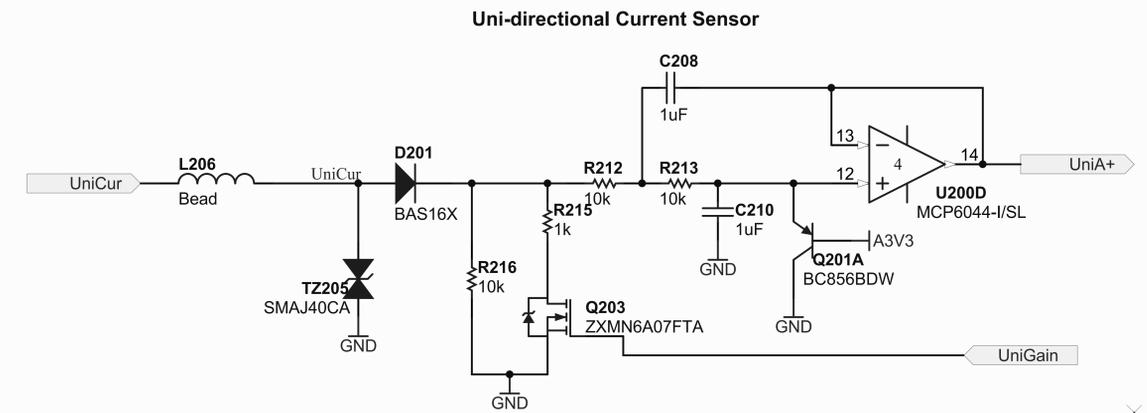
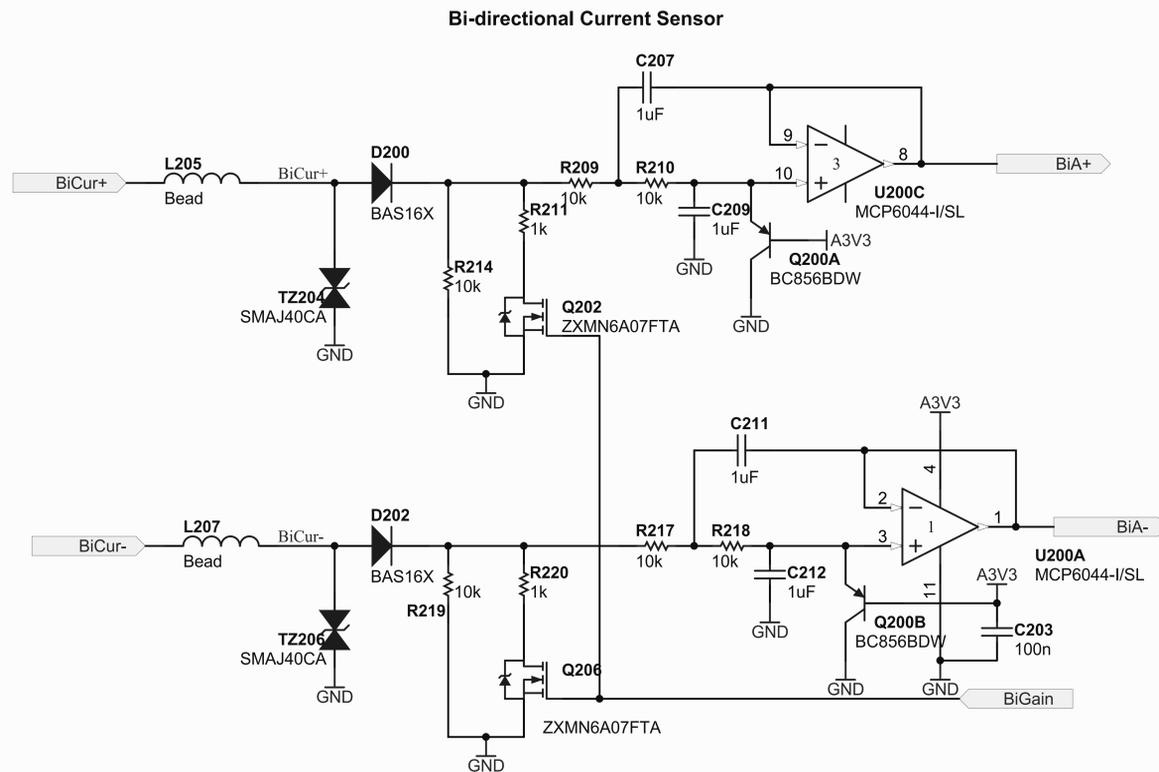
AIS Daughter Board - Top Level				
DRAWN BY:	SHEET:	OF:	REV:	DATE:
IH	1	9	B	28/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-201		



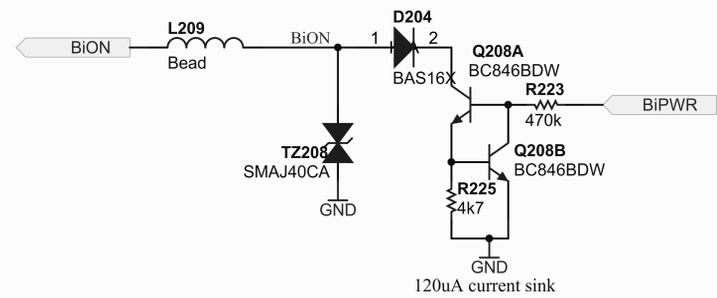
Iq <1uA but draws 24uA from 12V beacon and 48uA from 24V beacon when connected



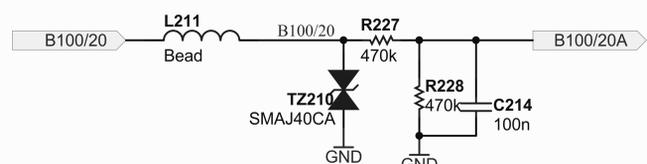
Iq <1uA but draws 24uA from 12V beacon and 48uA from 24V beacon when connected



70uA current sink



120uA current sink

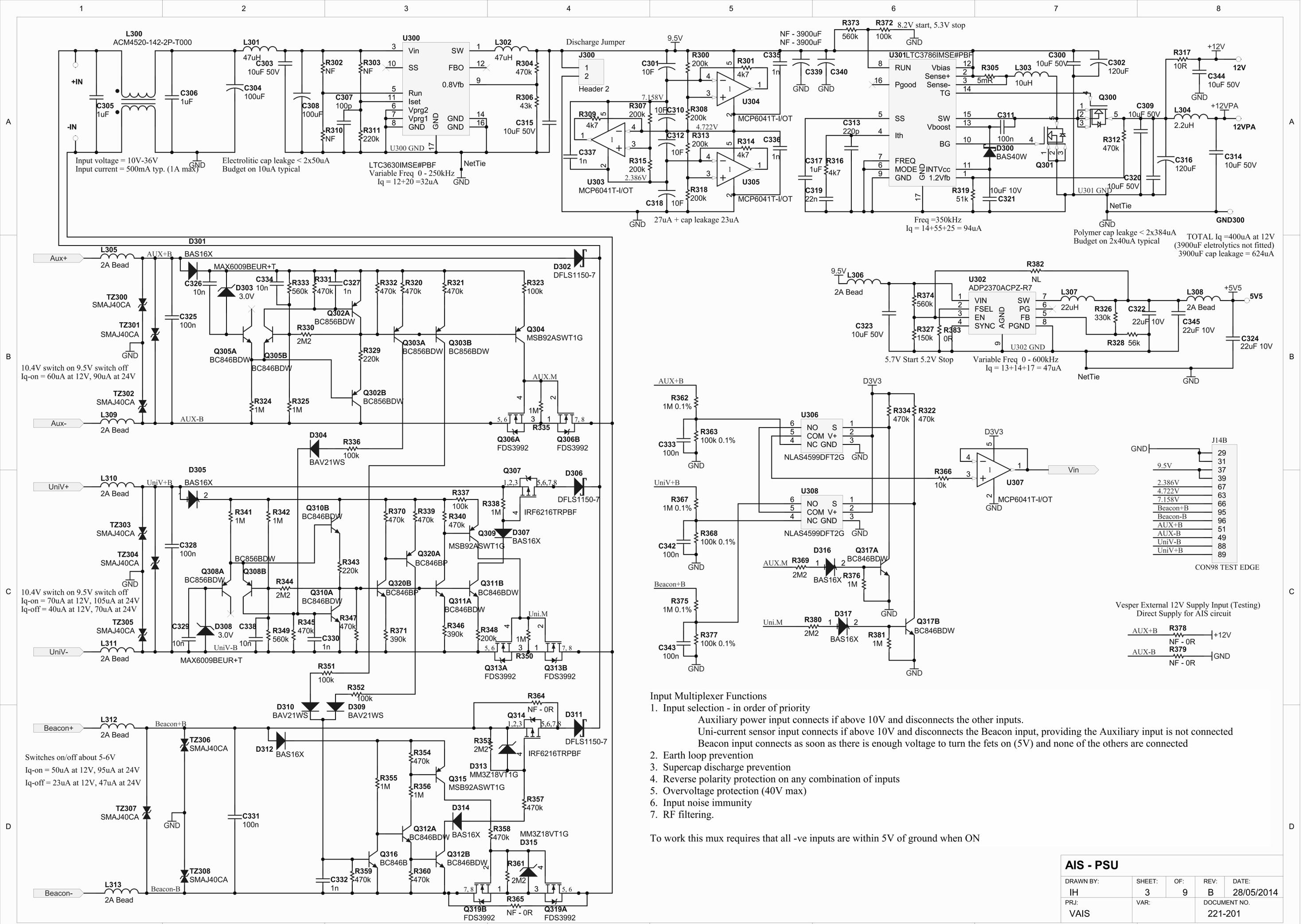


Pin	Signal
86	BiV-
83	BiV+
82	BiCur+
91	BiCur-
92	BiON
90	B100/20
93	UniCur
81	UniON
62	U100/20

CON98 TEST EDGE

AIS - Sensors

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IH	2	9	B	28/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-200		



Input voltage = 10V-36V
Input current = 500mA typ. (1A max)

Electrolytic cap leakage < 2x50uA
Budget on 10uA typical

LTC3630IMSE#PBF
Variable Freq 0 - 250kHz
Iq = 12+20 = 32uA

27uA + cap leakage 23uA

Freq = 350kHz
Iq = 14+55+25 = 94uA

Polymer cap leakage < 2x384uA
Budget on 2x40uA typical
TOTAL Iq = 400uA at 12V
(3900uF electrolytics not fitted)
3900uF cap leakage = 624uA

10.4V switch on 9.5V switch off
Iq-on = 60uA at 12V, 90uA at 24V

10.4V switch on 9.5V switch off
Iq-on = 70uA at 12V, 105uA at 24V
Iq-off = 40uA at 12V, 70uA at 24V

Switches on/off about 5-6V
Iq-on = 50uA at 12V, 95uA at 24V
Iq-off = 23uA at 12V, 47uA at 24V

Input Multiplexer Functions

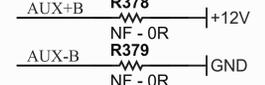
- Input selection - in order of priority
Auxiliary power input connects if above 10V and disconnects the other inputs.
Uni-current sensor input connects if above 10V and disconnects the Beacon input, providing the Auxiliary input is not connected
Beacon input connects as soon as there is enough voltage to turn the fets on (5V) and none of the others are connected
- Earth loop prevention
- Supercap discharge prevention
- Reverse polarity protection on any combination of inputs
- Overtoltage protection (40V max)
- Input noise immunity
- RF filtering.

To work this mux requires that all -ve inputs are within 5V of ground when ON

J14B CON98 TEST EDGE

29	GND
31	9.5V
37	2.386V
39	4.722V
67	7.158V
63	Beacon+B
95	Beacon-B
96	AUX+B
51	AUX-B
49	UniV-B
88	UniV+B

Vesper External 12V Supply Input (Testing)
Direct Supply for AIS circuit

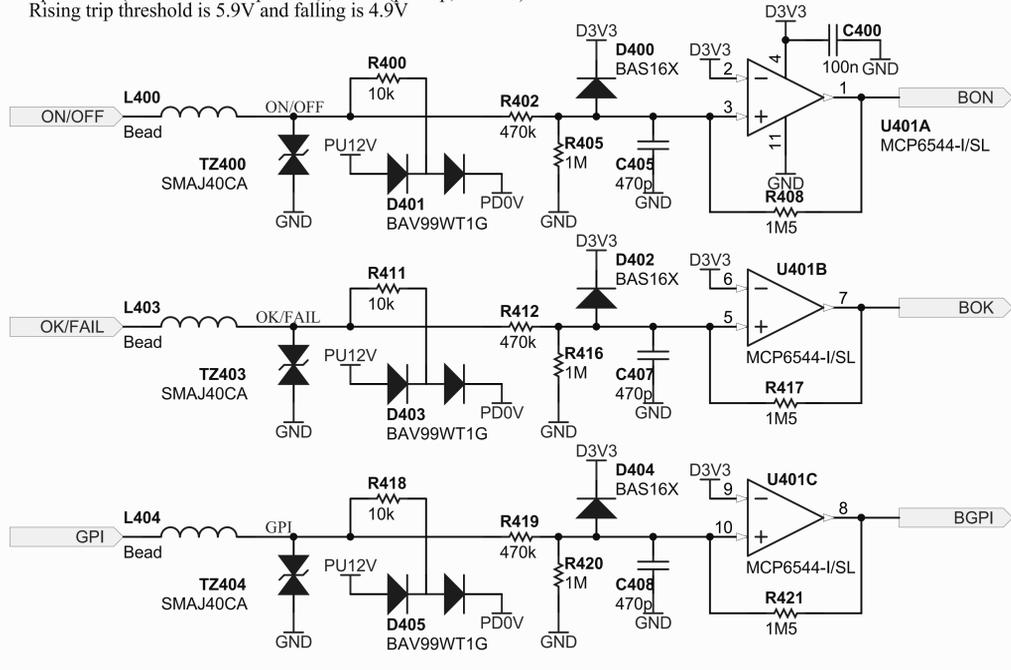


AIS - PSU

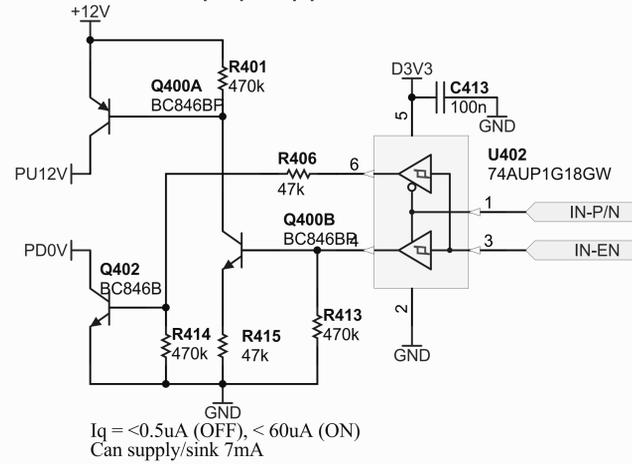
DRAWN BY:	SHEET:	OF:	REV:	DATE:
IH	3	9	B	28/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-201		

Inputs from Beacon

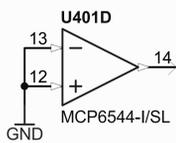
A sampling approach saves power but limits noise filtering => robust software debounce
 Powering up for 3ms every second reduces the 1mA pull up/down current to <4uA average per input
 Allow 2ms settling time before sampling. (Good for up to 100nF loading)
 Iq = 0.6uA (default state - input low), 20uA (pull up, no load)
 Rising trip threshold is 5.9V and falling is 4.9V



Input pull up/pull down

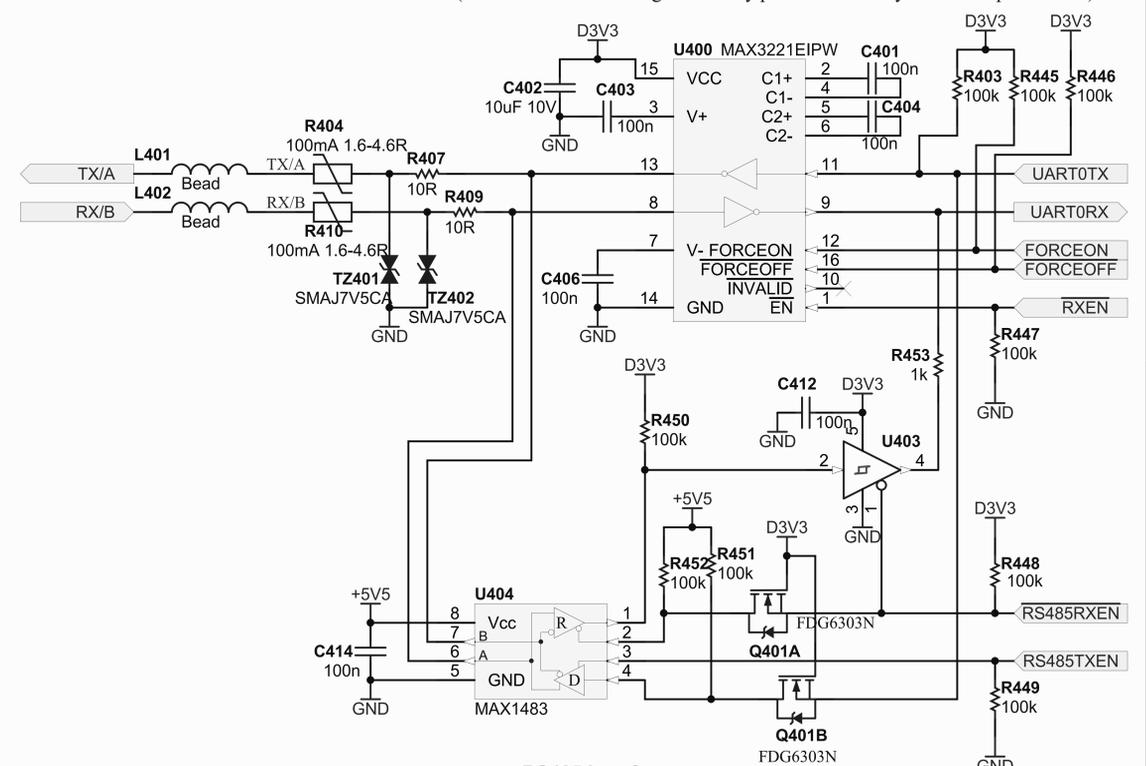


Iq = <0.5uA (OFF), < 60uA (ON)
 Can supply/sink 7mA



RS232 Interface

Enable RS232 or RS485 but not both at the same time.
 Iq = 1uA (waiting for receive activity)
 FORCEON to transmit and briefly FORCEOFF to enter low power state
 (Potential differences in grounds may prevent auto entry into lower power state)



RS485 Interface

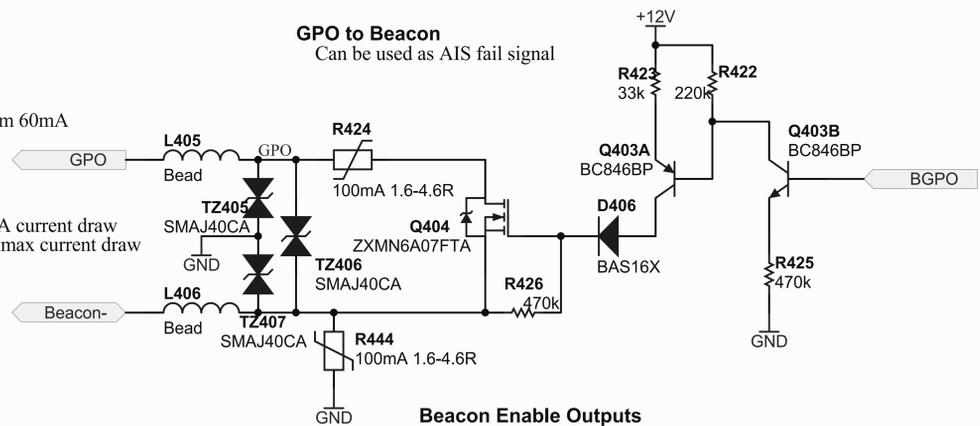
Enable RS232 or RS485 but not both at the same time.
 Iq = 1uA in shut down
 Iq = 108uA receive on, transmitter off

GPO to Beacon

Can be used as AIS fail signal

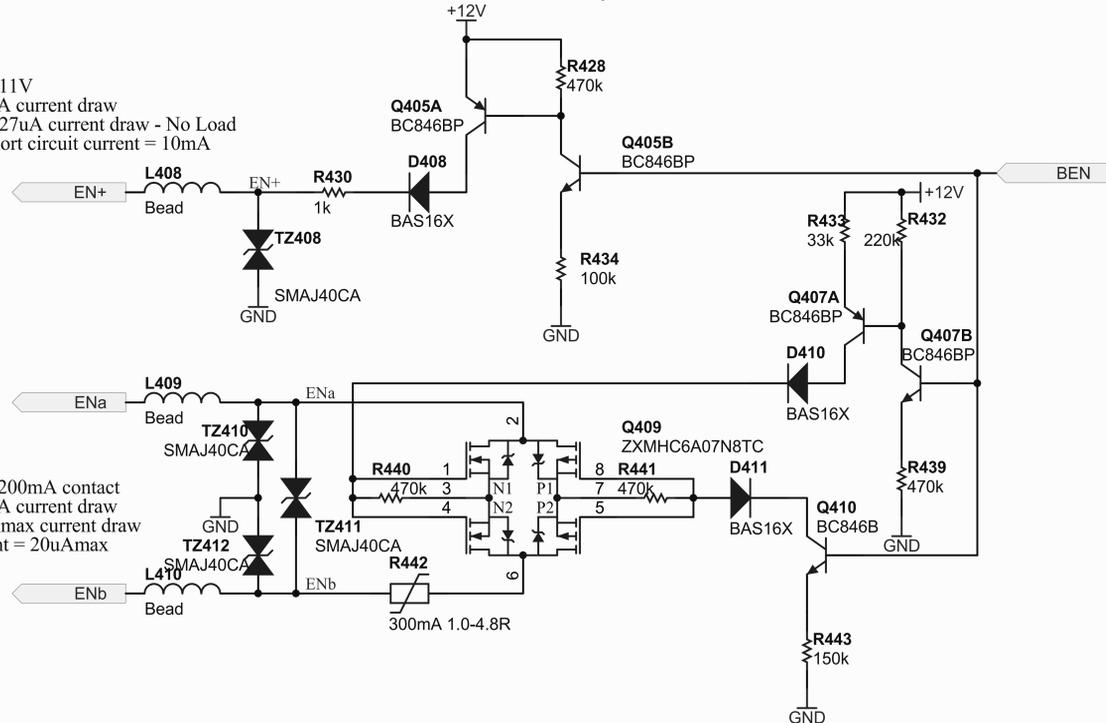
Pull down - 10 Ohm 60mA

Open = Zero uA current draw
 Closed = 30uAmax current draw



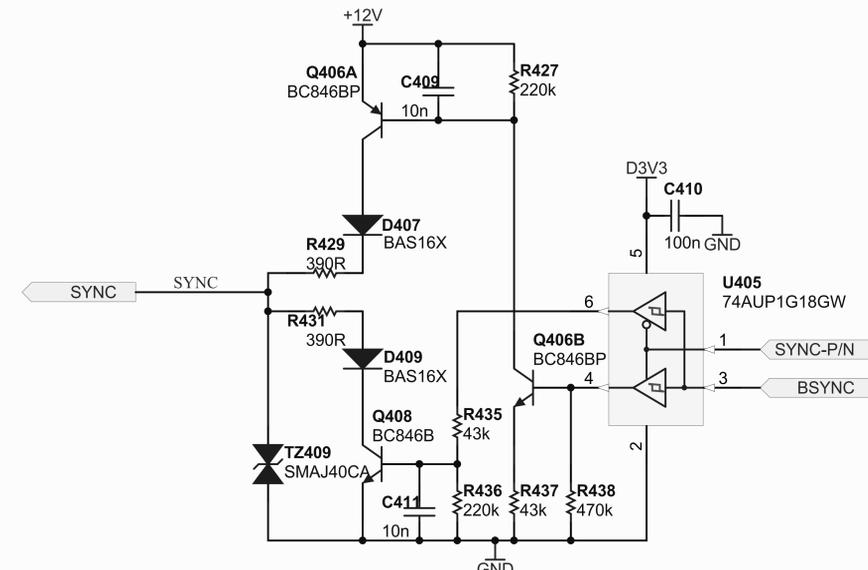
Beacon Enable Outputs

Pull up - 1k to 11V
 Open = Zero uA current draw
 Active High = 27uA current draw - No Load
 Active High short circuit current = 10mA



Sync Interface

Can supply/sink 10mA pulses
 Iq < 0.5uA
 Typically duty cycle ranges from 1:200 to 1:1000

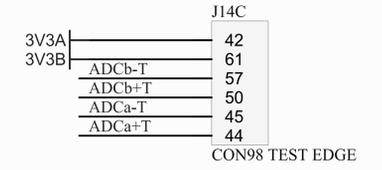
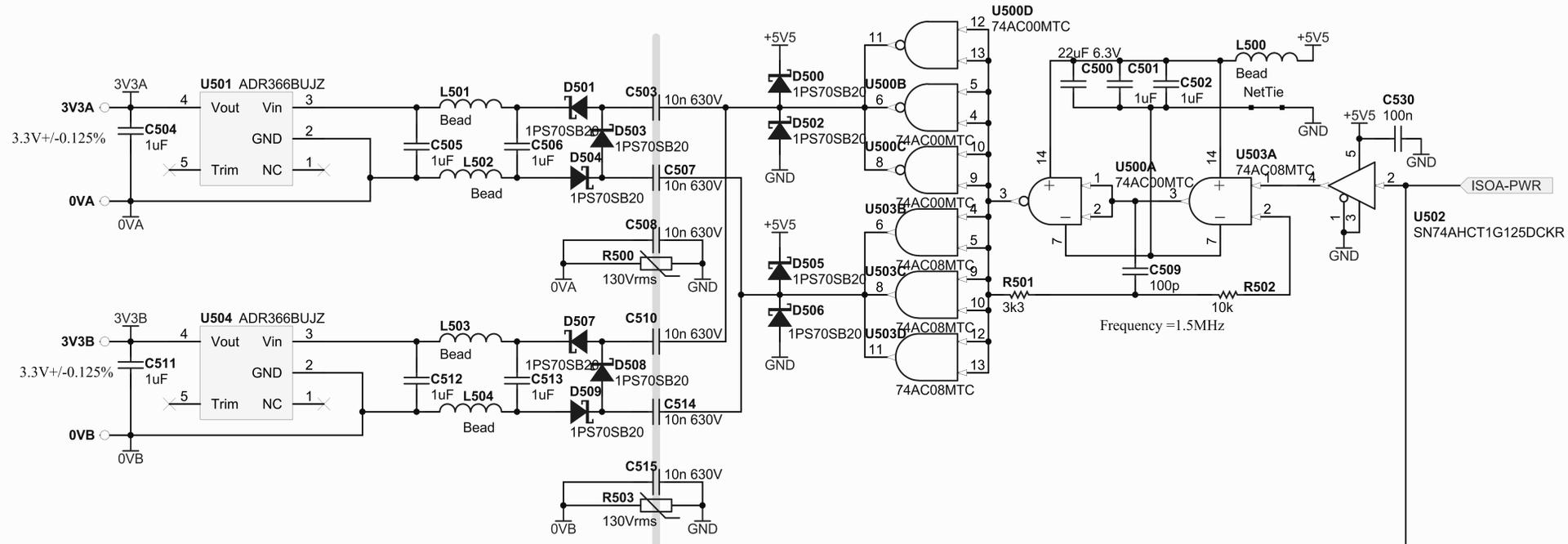


J14E	Pin
GPO	87
RX/B	84
TX/A	85
SYNC	77
EN+	72
ON/OFF	68
OK/FAIL	65
GPI	64
ENb	60
ENa	59

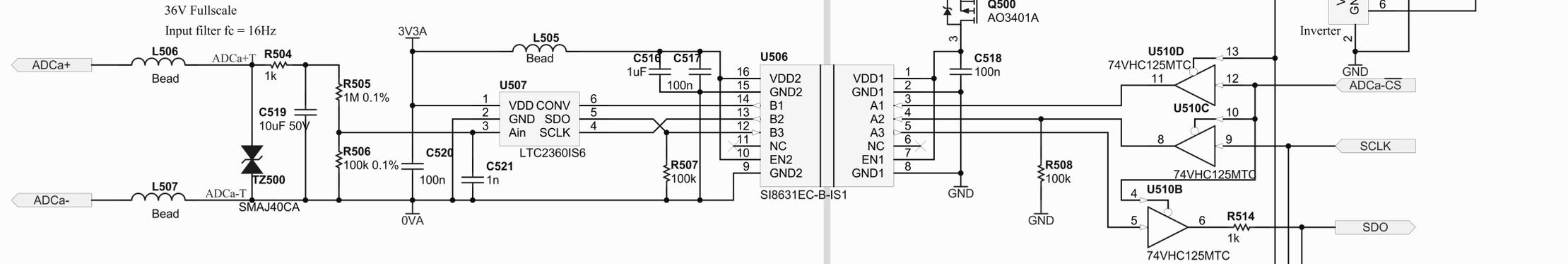
AIS - Beacon

DRAWN BY:	SHEET:	OF:	REV:	DATE:
IH	4	9	B	23/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-201		

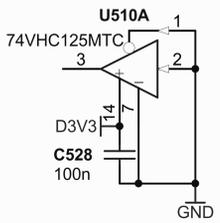
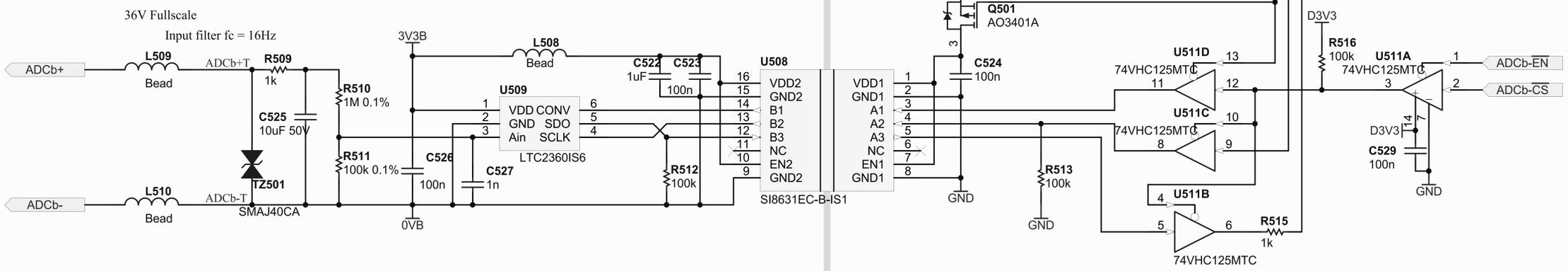
250Vrms Isolated 3V3+/-0.125% 5mA Supplies
 For connection between SELV systems, NOT SAFETY RATED FOR MAINS
 1kV peak spikes are possible so provide 1mm Isolation clearance



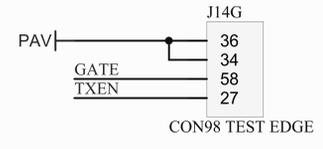
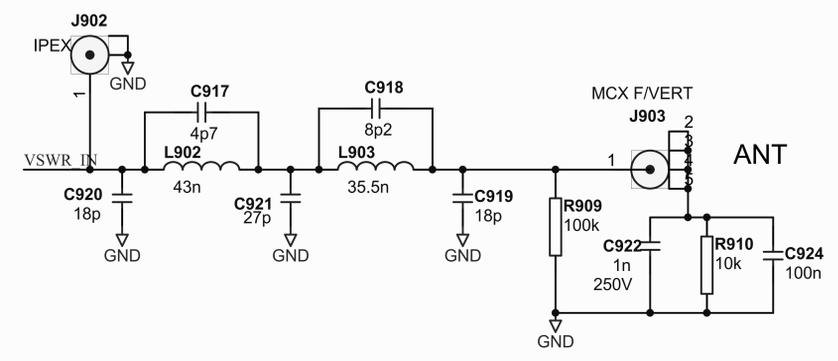
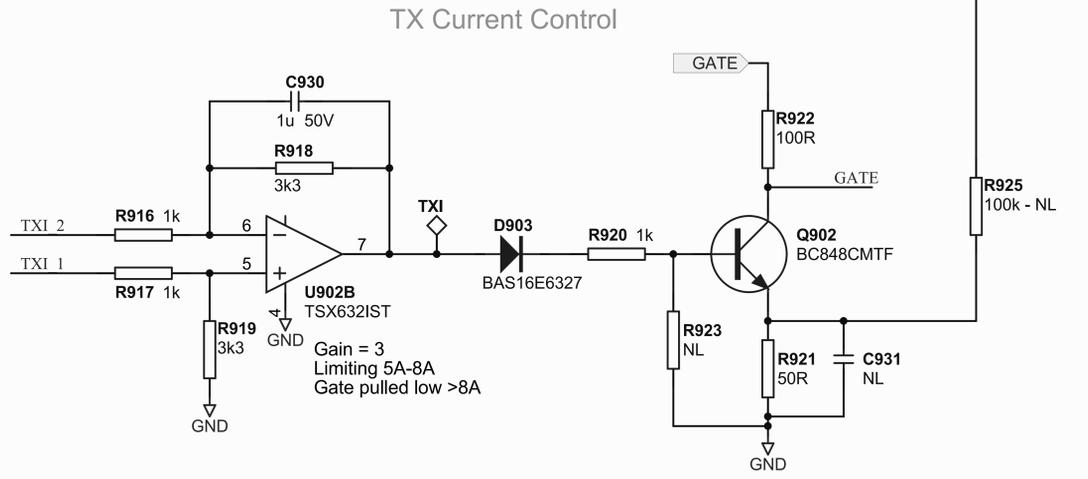
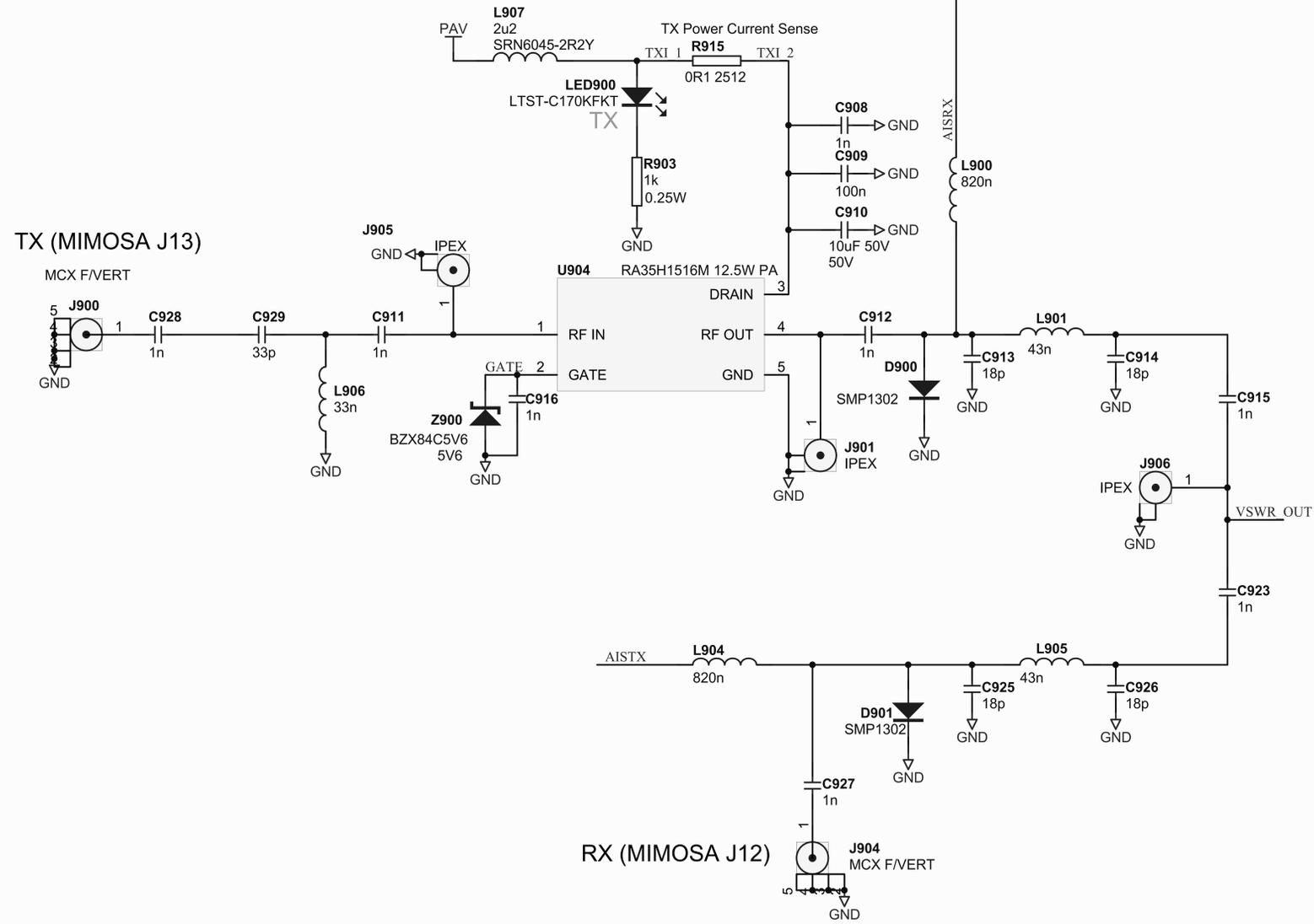
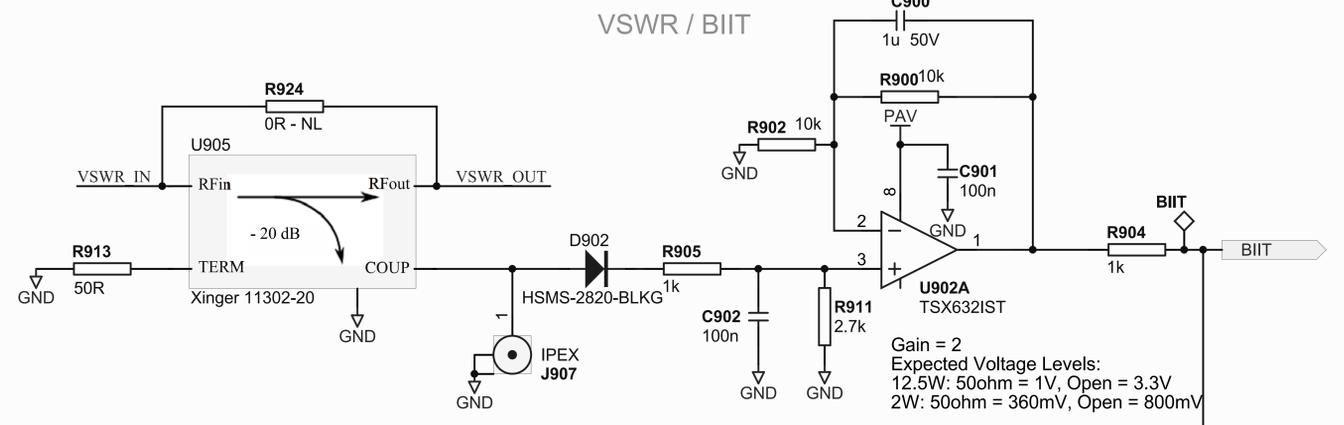
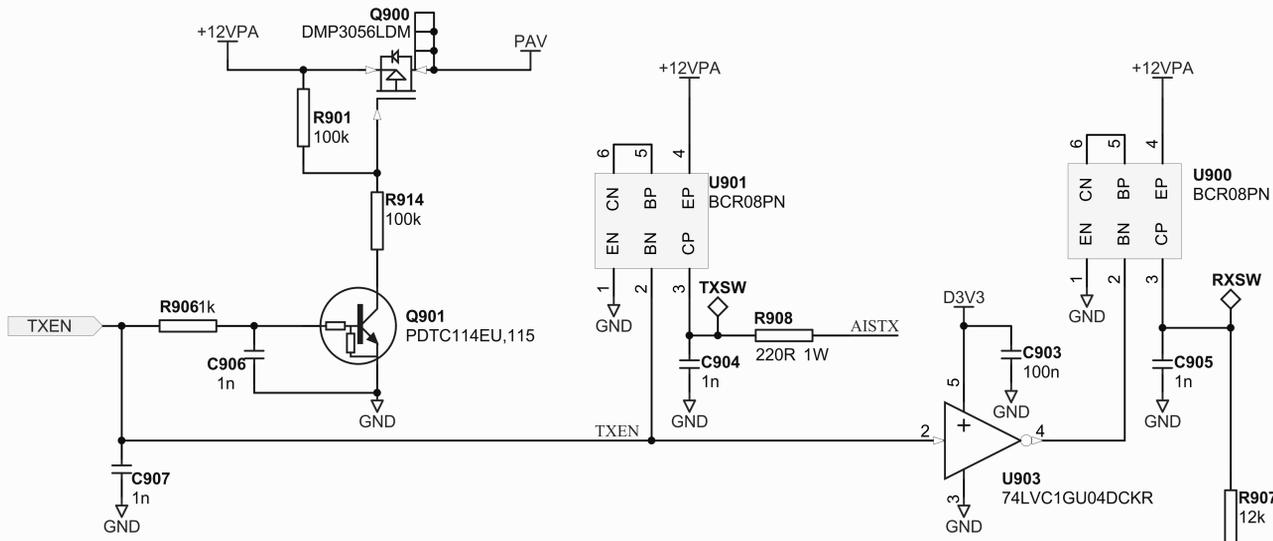
Isolated ADCs



Allow 1ms power up time and 1ms input settling time after power up.
 Also allow 20us for first acquire settling time, 2us for following acquires



AIS - Isolated ADCs				
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IH	5	9	B	27/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-201		



ALL DISCRETES 0603 UNLESS STATED OTHERWISE

RF 12.5W Power Amp & VSWR				
DRAWN BY:	SHEET:	OF:	REV:	DATE:
CO, DK	6	9	B	27/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-201		

Isolated Inputs

For connection between SELV systems, NOT SAFETY RATED FOR MAINS

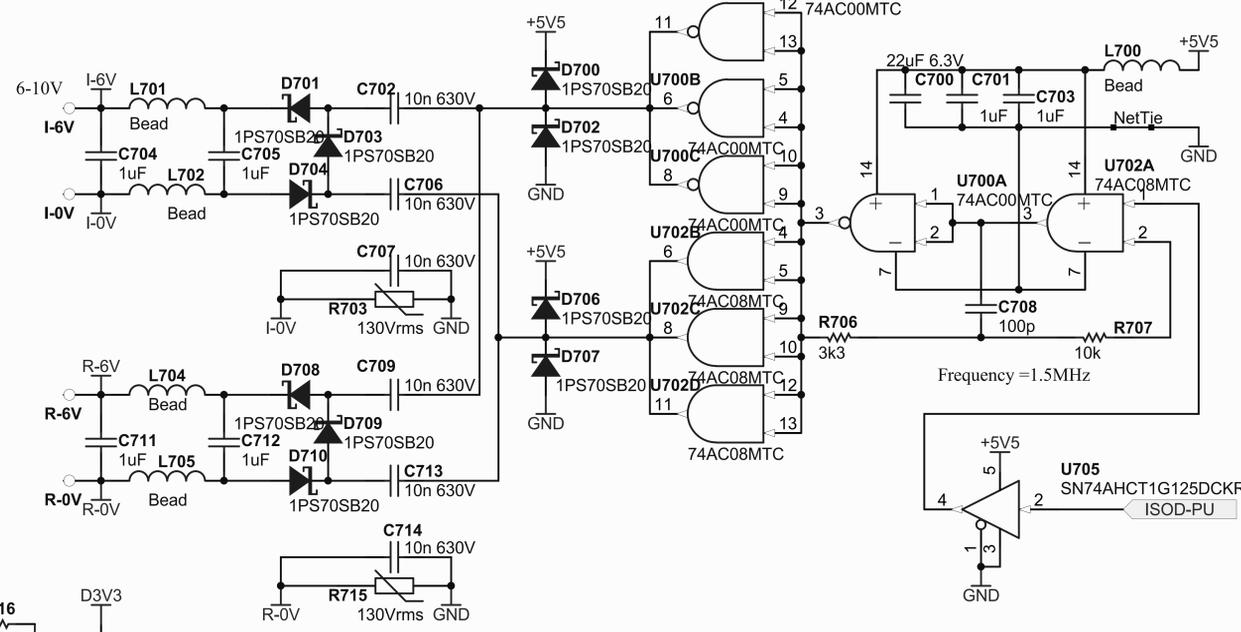
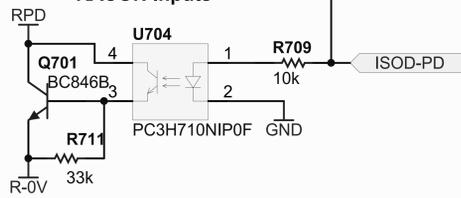
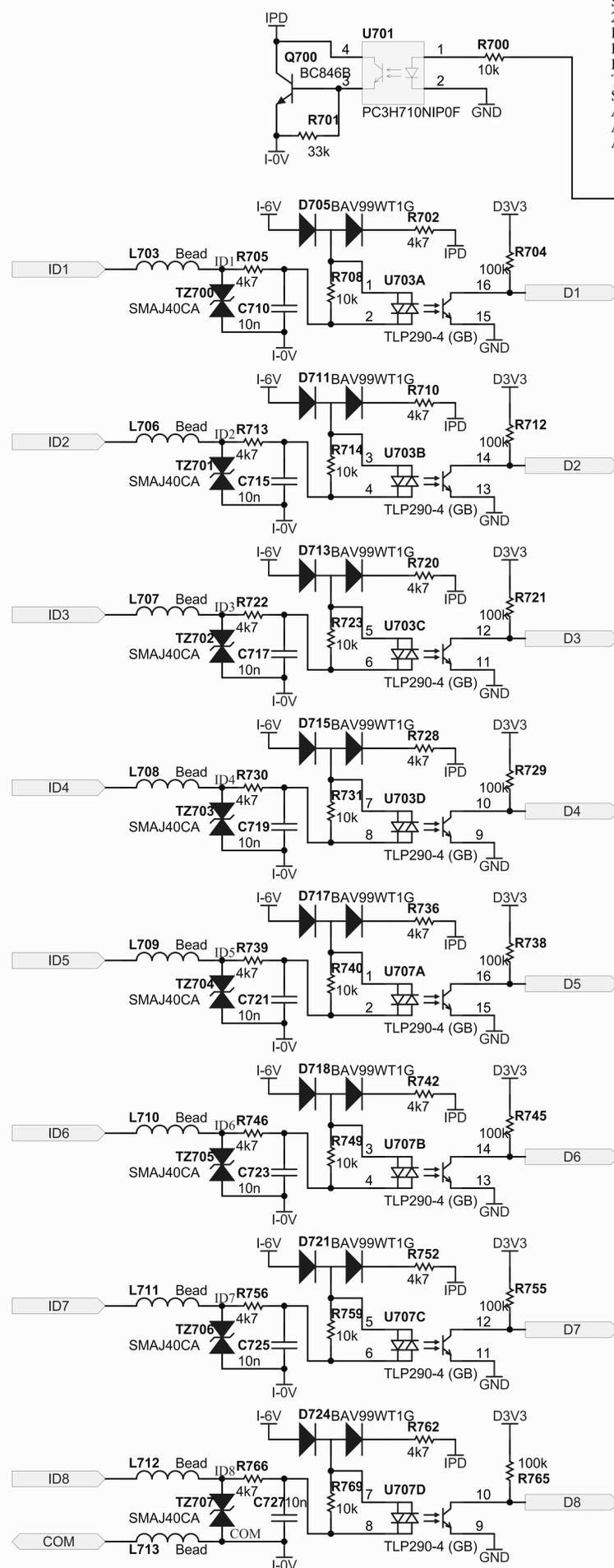
Supports active low or active high (12V, 24V battery) outputs.
 250Vrms Isolation, +/-40V maximum input
 Input will not activate with leakage <100uA (Min activation current = 0.6mA)
 Inputs maximum closed contact voltage drop = 1V at 2mA
 Inputs maximum output capacitance = 100nF
 The AIS applies a maximum of 10V to read an active low output
 Software should allow about a 3ms settling time prior to sampling.
 A closed active high output is loaded with 0.6-1.2mA, 12V and 1.7-2.7mA 24V when sampled
 AIS supplies closed active low outputs with 0.6 - 1.2mA when sampled
 Average currents should be at least 1/100 of these with 1 second sampling

Only apply pull downs when isolated supply is off

RACON Inputs

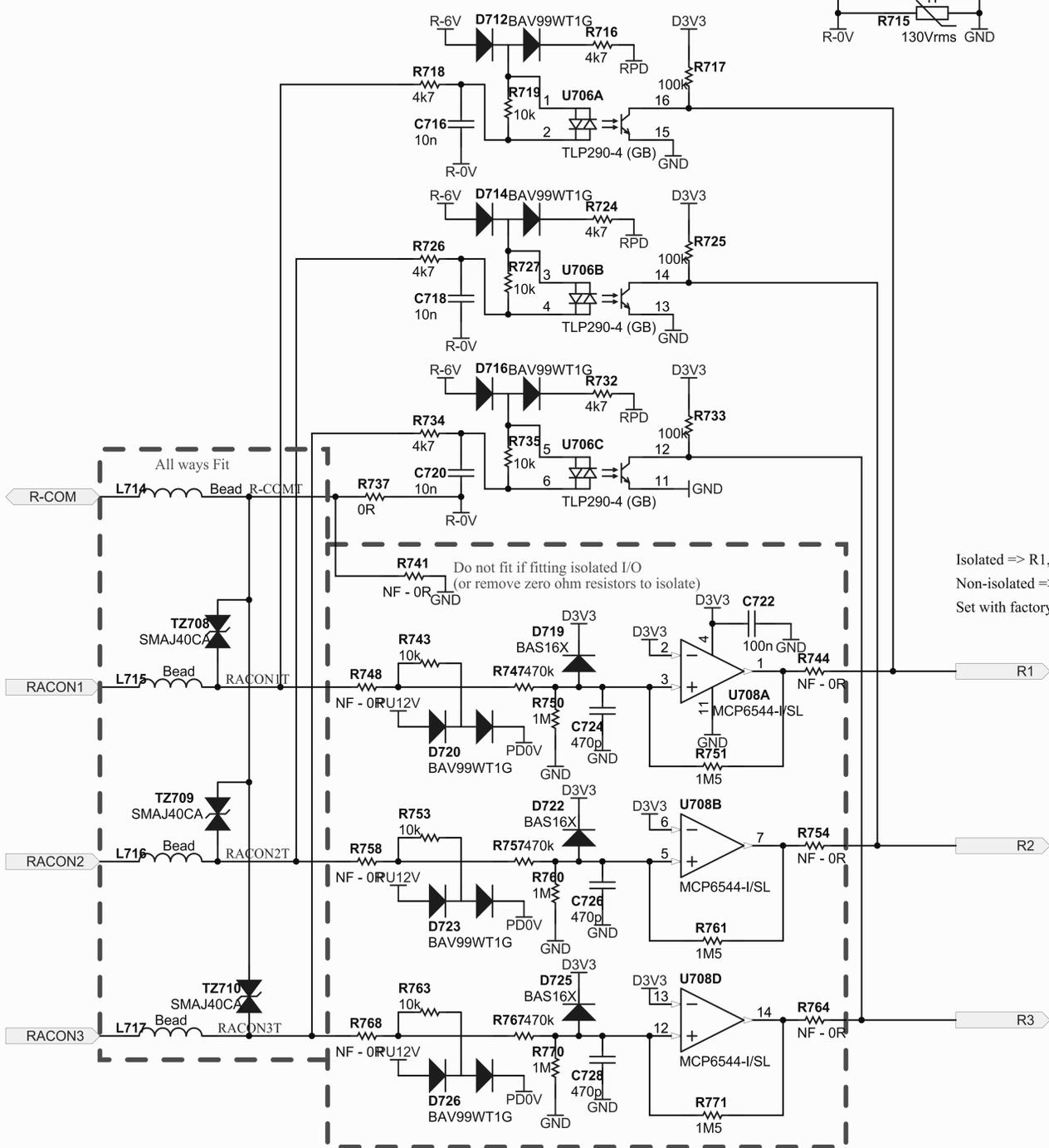
250Vrms Isolated 6V 10mA Supplies

1kV peak spikes are possible so provide 1mm Isolation clearance for all isolated I/O

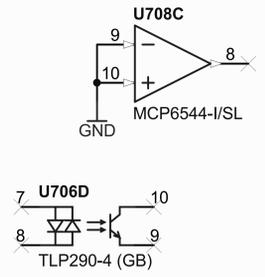


J14H	Pin
RACON3T	56
RACON2T	54
RACON1T	55
R-COMT	52
ID1	78
ID2	79
ID3	80
ID4	71
COM	70
ID5	73
ID6	74
ID7	75
ID8	76

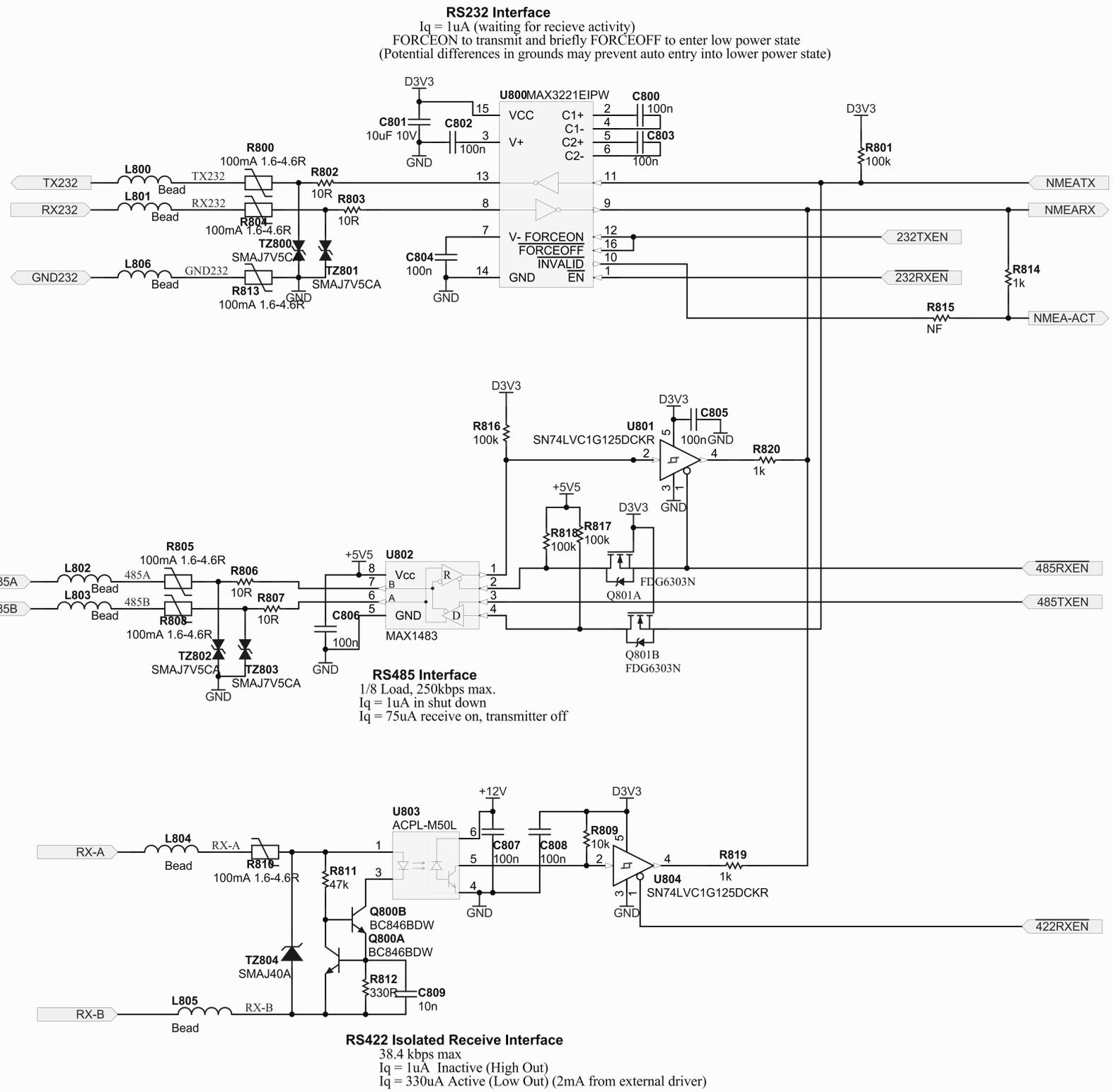
CON98 TEST EDGE



Isolated => R1, R2 and R3 go high for active low or high inputs
 Non-isolated => R1, R2 and R3 follow inputs
 Set with factory software configuration



AIS - Isolate				
DRAWN BY:	SHEET:	OF:	REV:	DATE:
IH	7	9	B	27/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-201		



RS232 Interface
 Iq = 1uA (waiting for receive activity)
 FORCEON to transmit and briefly FORCEOFF to enter low power state
 (Potential differences in grounds may prevent auto entry into lower power state)

RS485 Interface
 1/8 Load, 250kbps max.
 Iq = 1uA in shut down
 Iq = 75uA receive on, transmitter off

RS422 Isolated Receive Interface
 38.4 kbps max
 Iq = 1uA Inactive (High Out)
 Iq = 330uA Active (Low Out) (2mA from external driver)

Enable RS232, RS485 or RS422 but not more than one at the same time.
 When changing interface type cycle through an ALL OFF state

J14F	
RX232	43
TX232	38
GND232	33
485B	23
485A	21
RX-A	18
RX-B	16

CON98 TEST EDGE

RS422-232				
DRAWN BY:	SHEET:	OF:	REV:	DATE:
IH	8	9	B	23/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-201		

ASSEMBLY PARTS

- P1 ○ RF RX Loom - 4"
- P2 ○ RF TX Loom - 4"
- P3 ○ FFC - 20POS 3"
- P4 ○ FFC - 10POS 2"
- P5 ○ JST 10POS Loom - 100mm
- P6 ○ JST 5POS Loom - 100mm

- P7 ○ Nylon Standoff - 15mm M3
- P8 ○ Nylon Standoff - 15mm M3
- P9 ○ Nylon Standoff - 15mm M3
- P10 ○ Nylon Standoff - 15mm M3
- P11 ○ Nylon Screw - M3
- P12 ○ Nylon Screw - M3
- P13 ○ Nylon Screw - M3
- P14 ○ Nylon Screw - M3
- P15 ○ Nylon Screw - M3
- P16 ○ Nylon Screw - M3
- P17 ○ Nylon Screw - M3
- P18 ○ Nylon Screw - M3

- P19 ○ TX PA Hexagonal M4 Nut
- P20 ○ TX PA Hexagonal M4 Nut
- P21 ○ TX PA M4 Screw
- P22 ○ TX PA M4 Screw
- P23 ○ TX PA M4 Washers
- P24 ○ TX PA M4 Washers
- P25 ○ Thermal Paste

VAIS Assembly				
DRAWN BY:	SHEET:	OF:	REV:	DATE:
DK	9	9	B	22/05/2014
PRJ:	VAR:	DOCUMENT NO.		
VAIS		221-201		