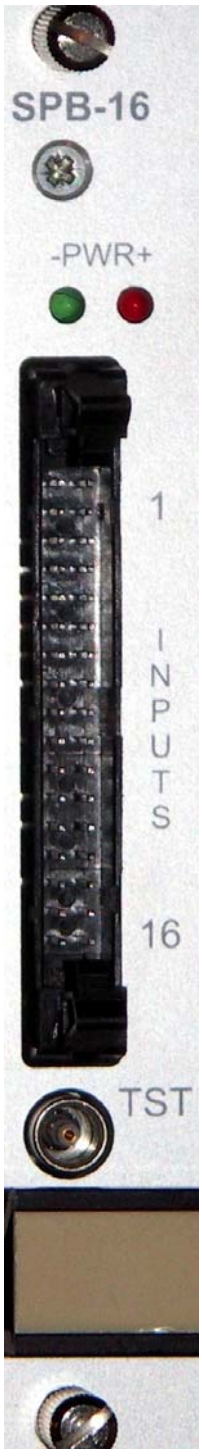
SPB-16 (Wire Discriminator Board)

SPB-16 is a 16-channel discriminator with an adjustable threshold. The outputs are

LVDS signals. The module is in fact a redesign of (link). The main features of the redesign are:

- New form factor - Eurocard 1 unit wide 3U height
- PCB size - 160 mm x 100 mm
- Remote power off possibility
- Temperature sensor added

Fig. 1 SPB-16 front panel view.



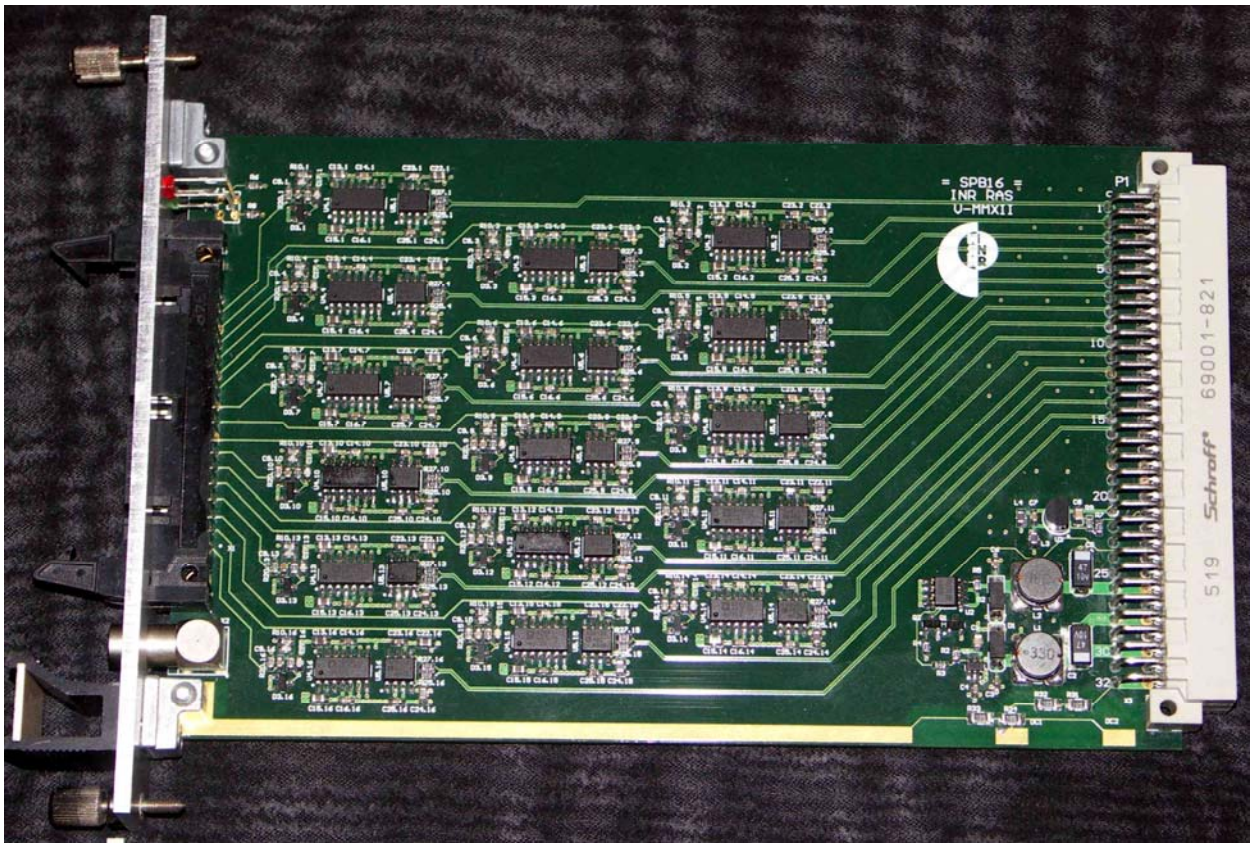
On the front panel side there are:

- The input connector (IDC 34 pins)
- LEMO connector for test signal (input)
- Power LEDS (+5V – red, -5V - green)

On the back side:

- The output connector (DIN 41612 type C connector, 64ac male 3 rows x 32 pins, the middle row is empty)

Fig. 2 Picture of the PCB



The main components of the circuit are:

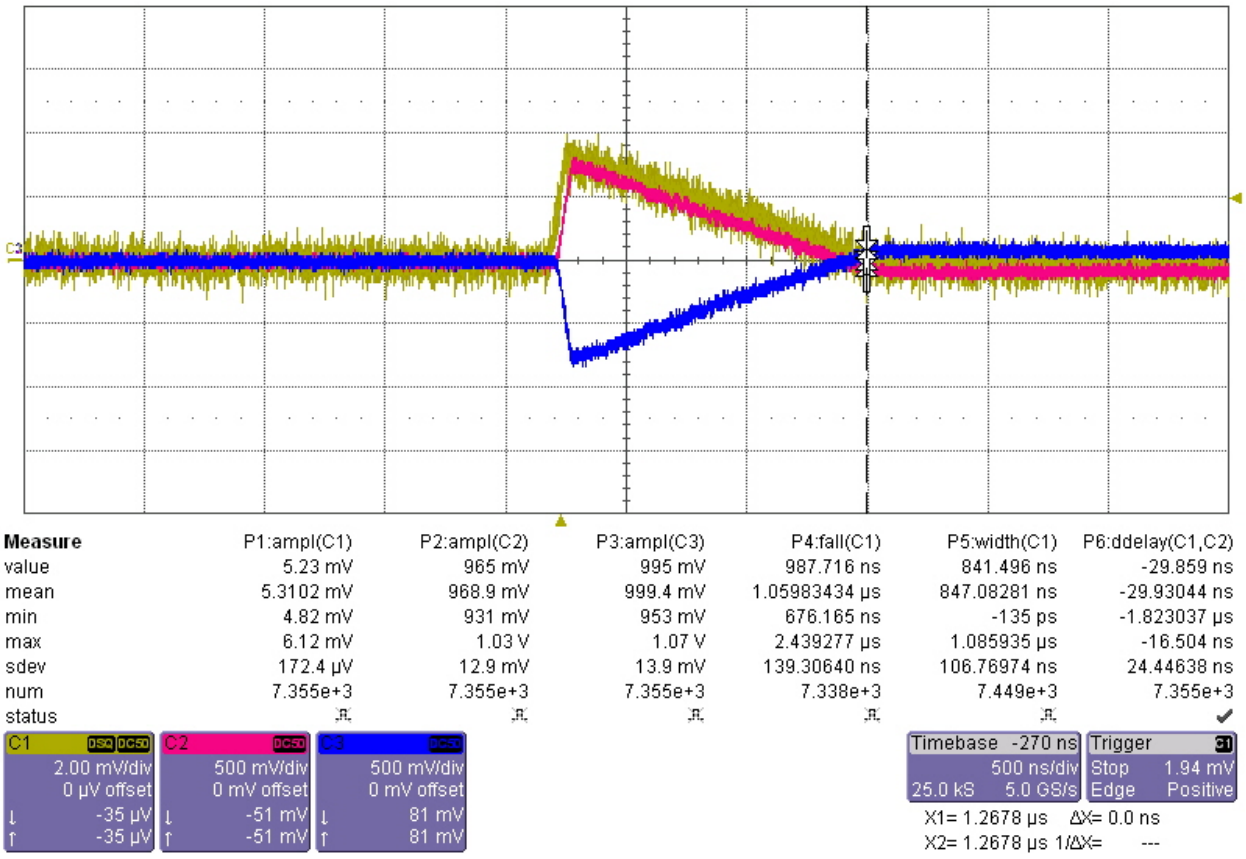
- A single channel triple amplifier (AD8013)
- A differential amplifier (AD8132)
- a temperature sensor (LM35DZ)
- power switches (MIC2005-0.5YM6 and VNS3NV04D)

The module requires 2 power supply voltages: +5V and -5V. The derived currents are typically 390 mA (+5V) and 390 mA (-5V) without load .

Test of the SPB

The fig. 3 shows the response of the module on positive pulses 5,3 mV amplitude with leading edge 50 ns and trailing edge 1000 ns.

Fig. 3 Response of the SPB-16



The table 1 shows the SPB-16 characteristics.

Table 1. SPB-16 characteristics

Number of channels	16
Limiting counting rate of each channel	$1 * 10^5$ /s
Amplification factor	850
Dynamic range	100 FC – 1000FC
Supply current, no load	Upos 5V, 390 mA; Uneg -5V, -390 mA
Output amplitude	1,5V max

Temperature output is 10 mV / C^0.

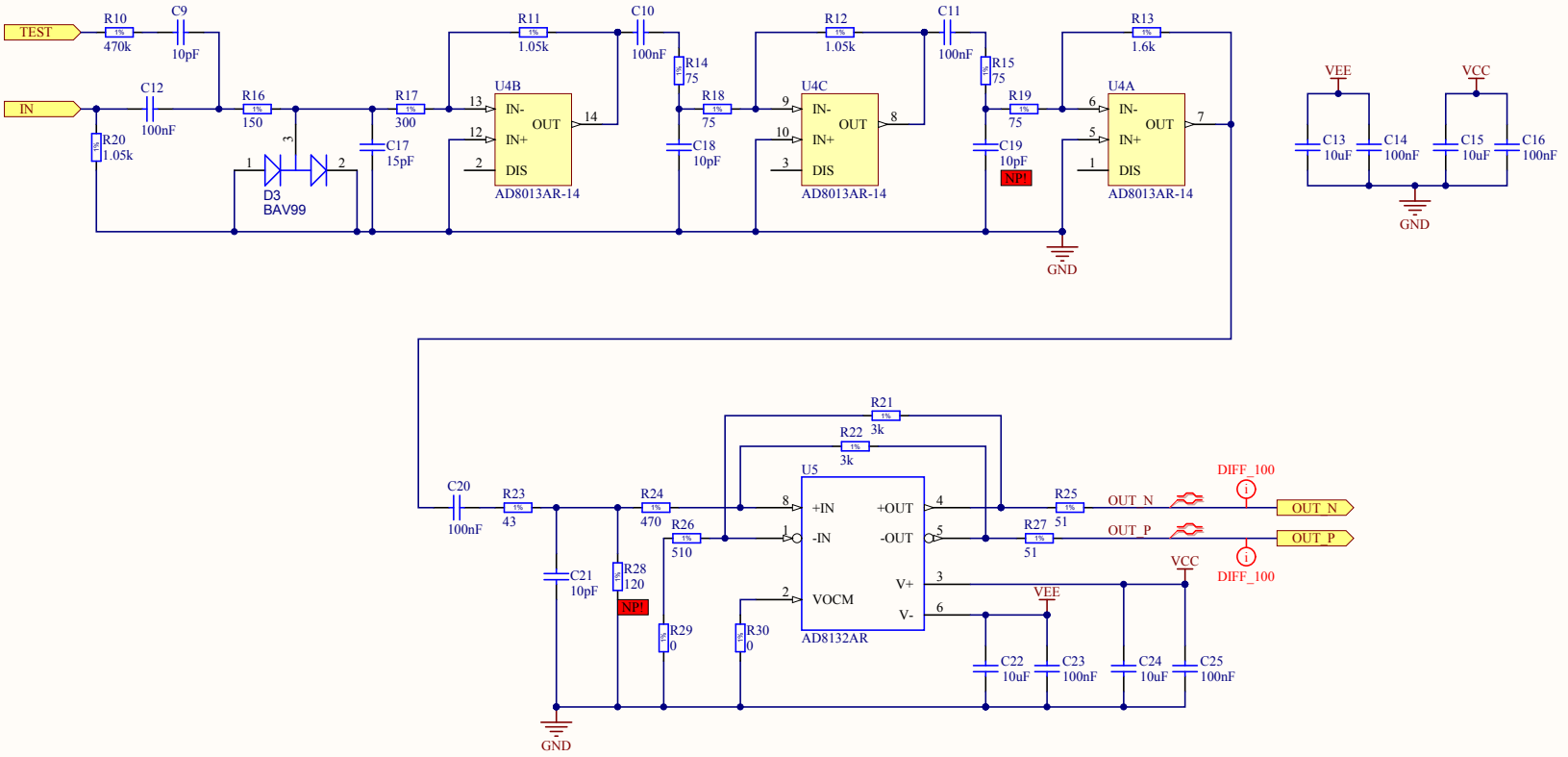
To turn the module's power off, connect the "OFF" contact to GND or supply to it 5V TTL/CMOS logic "0".

Table 2. Input connector IDC-34 pinout, front view

Pin #		Pin #	
34	FRAME	33	FRAME
32	GND	31	IN1
30	GND	29	IN2
28	GND	27	IN3
26	GND	25	IN4
24	GND	23	IN5
22	GND	21	IN6
20	GND	19	IN7
18	GND	17	IN8
16	GND	15	IN9
14	GND	13	IN10
12	GND	11	IN11
10	GND	9	IN12
8	GND	7	IN13
6	GND	5	IN14
4	GND	3	IN15
2	GND	1	IN16

Table 3. Output connector pinout, rear view

Pin #	c	b	a
1	OUT1-		OUT1+
2	OUT2-		OUT2+
3	OUT3-		OUT3+
4	OUT4-		OUT4+
5	OUT5-		OUT5+
6	OUT6-		OUT6+
7	OUT7-		OUT7+
8	OUT8-		OUT8+
9	OUT9-		OUT9+
10	OUT10-		OUT10+
11	OUT11-		OUT11+
12	OUT12-		OUT12+
13	OUT13-		OUT13+
14	OUT14-		OUT14+
15	OUT15-		OUT15+
16	OUT16-		OUT16+
17			
18	FRAME		FRAME
19	FRAME		FRAME
20			
21	T_GND		TEMP
22			
23			
24			OFF
25			
26	5V-		5V-
27			
28	GND		GND
29			
30	5V+		5V+
31			
32	GND		GND



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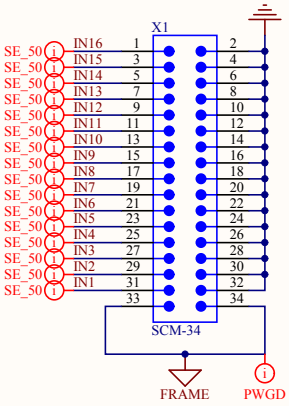
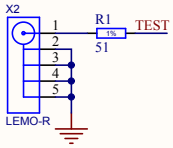
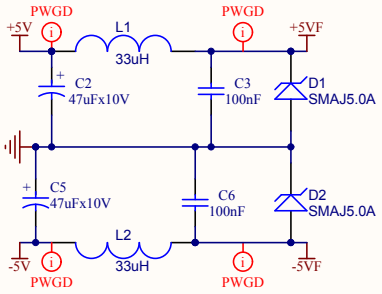
WIRE INPUT CONNECTOR



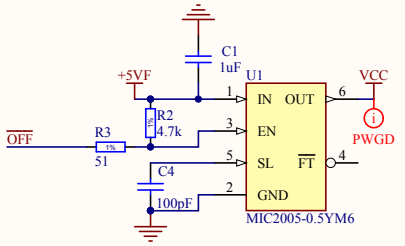
TEST INPUT CONNECTOR



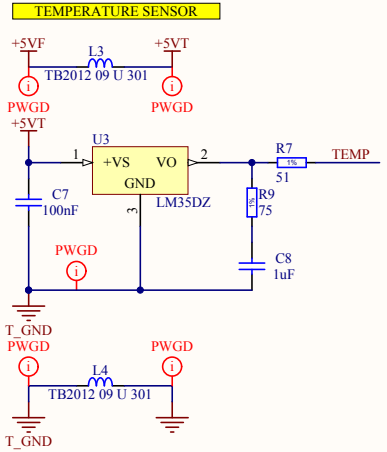
POWER FILTER



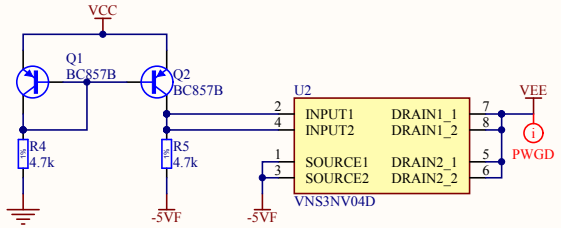
POWER DESACTIVATION SWITCHES



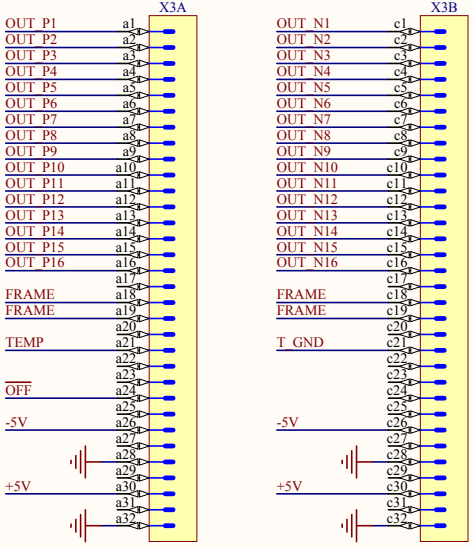
TEMPERATURE SENSOR



POWER DESACTIVATION SWITCHES

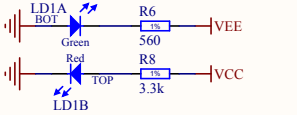


BACK PLANE CONNECTOR

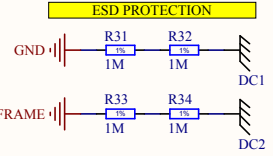


DIN41612, male 32x2 A,C right angle

POWER ACTIVE LEDS



ESD PROTECTION



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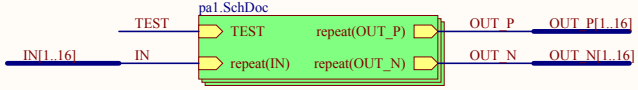

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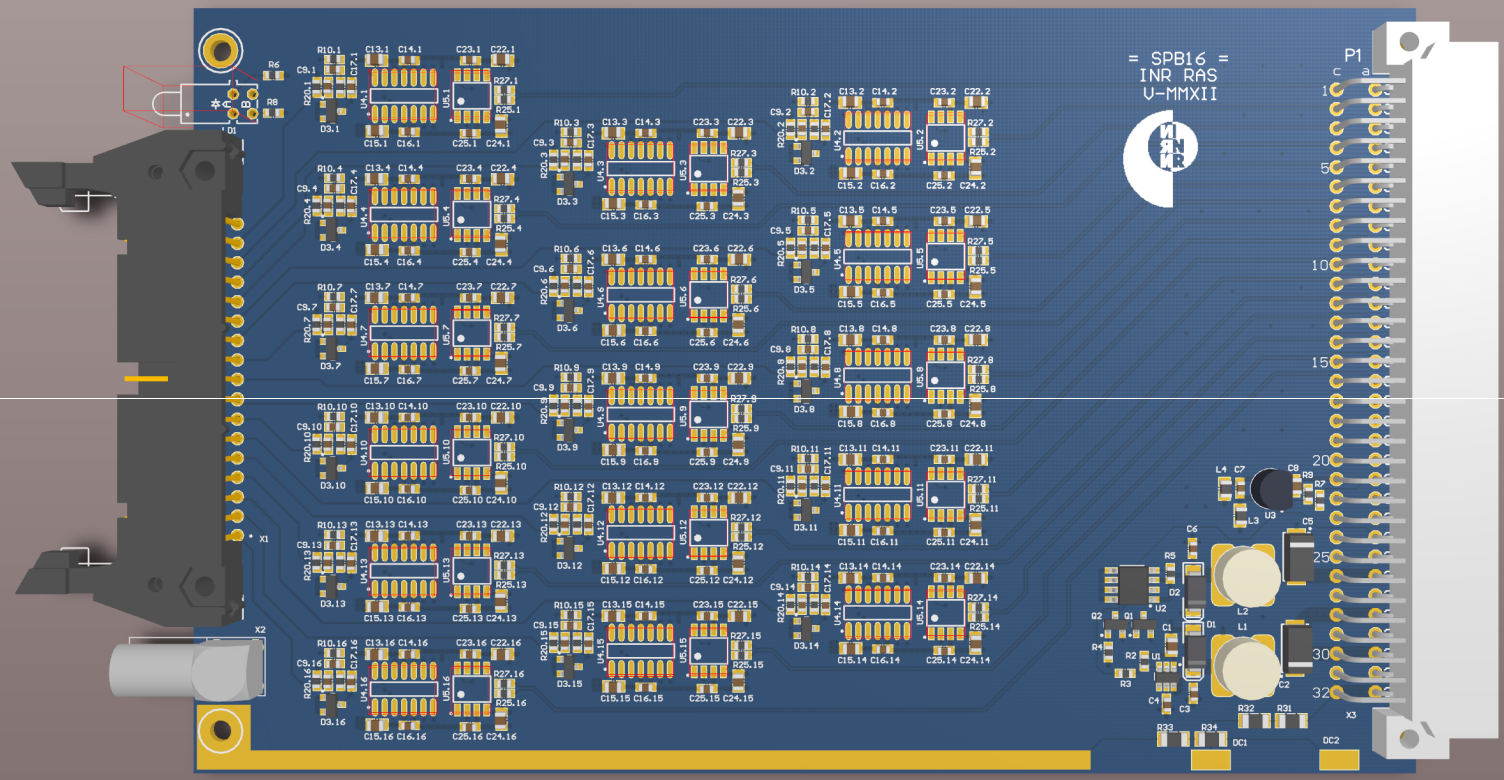
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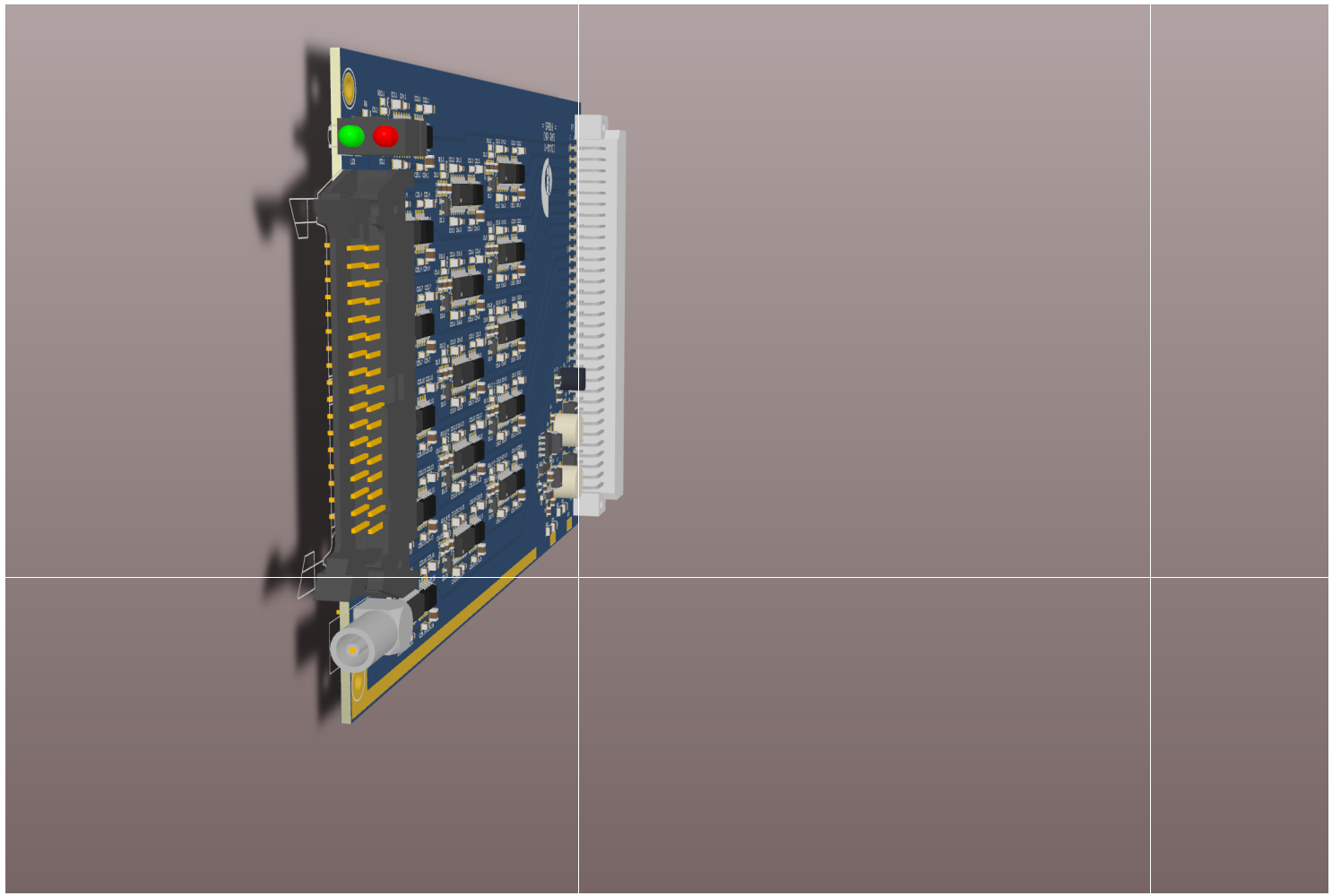
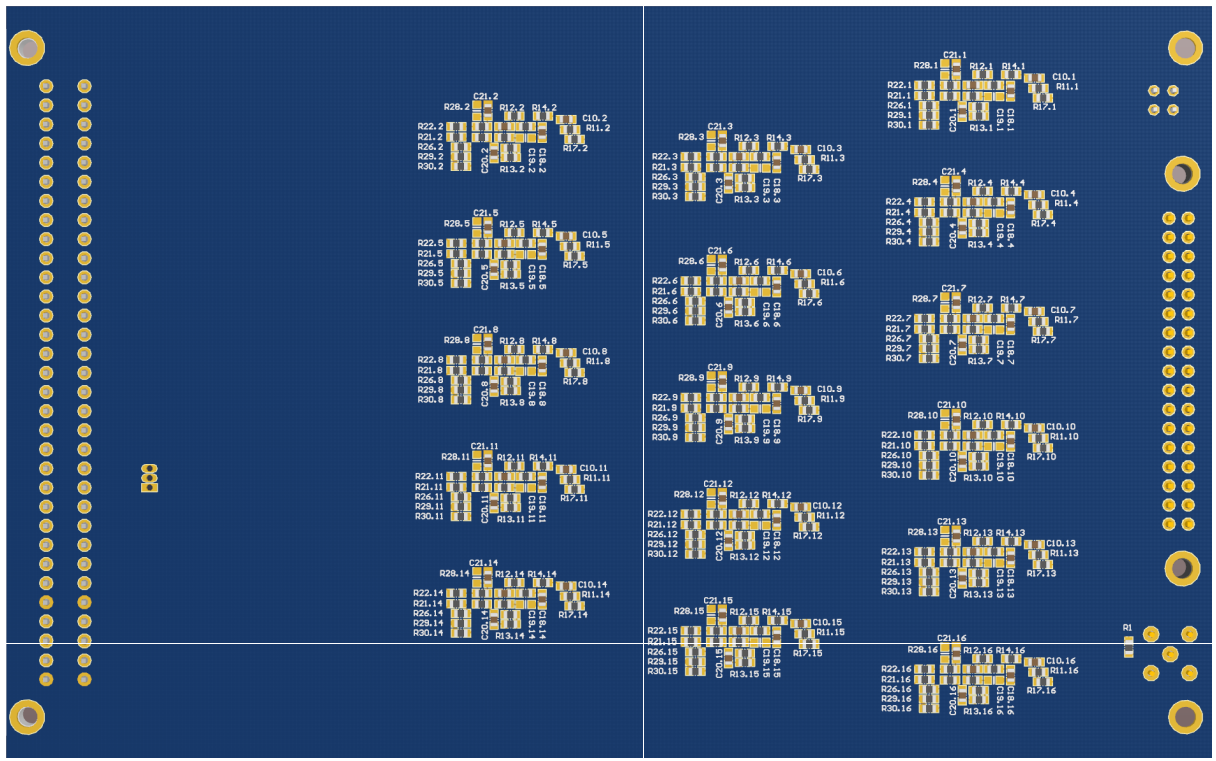
P1

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R29.2
R30.2
C20.2
R13.2
C19.2
C18.2
R17.2
C21.5
R28.5
R12.5
R14.5
C10.5
R11.5
R22.5
R21.5
R26.5
R29.5
R30.5
C20.5
R13.5
C19.5
C18.5
R17.5
C21.8
R28.8
R12.8
R14.8
C10.8
R11.8
R22.8
R21.8
R26.8
R29.8
R30.8
C20.8
R13.8
C19.8
C18.8
R17.8
C21.11
R28.11
R12.11
R14.11
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C10.14
R11.14
R22.14
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R29.13
R30.13
C20.13
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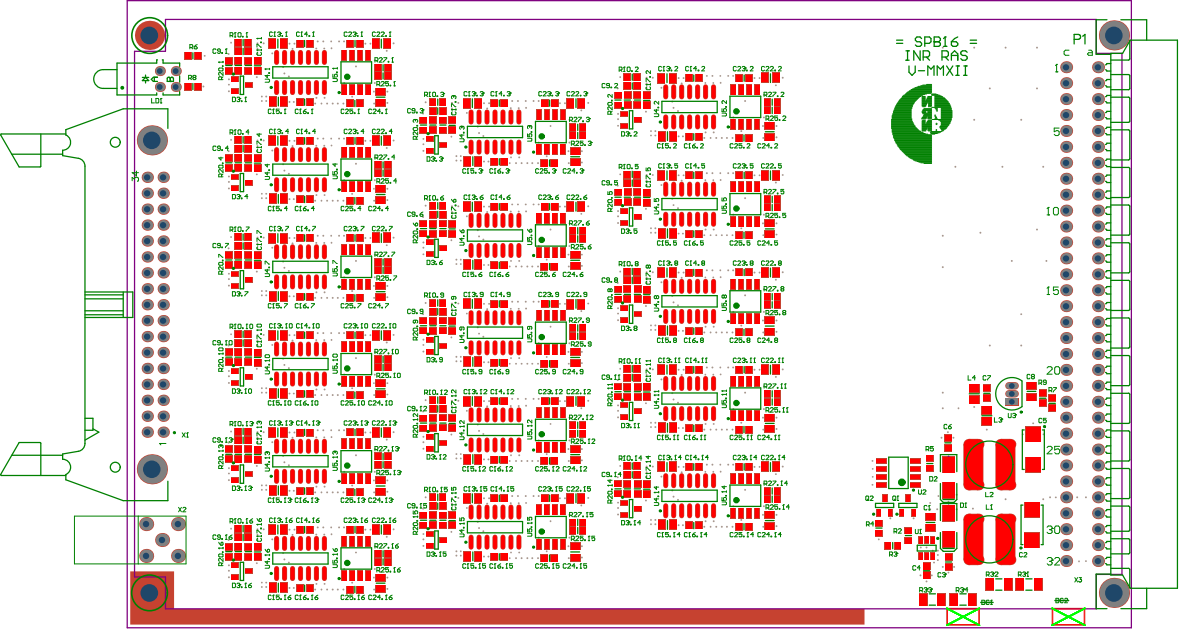
C19.16
C18.16
R17.16
R1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15
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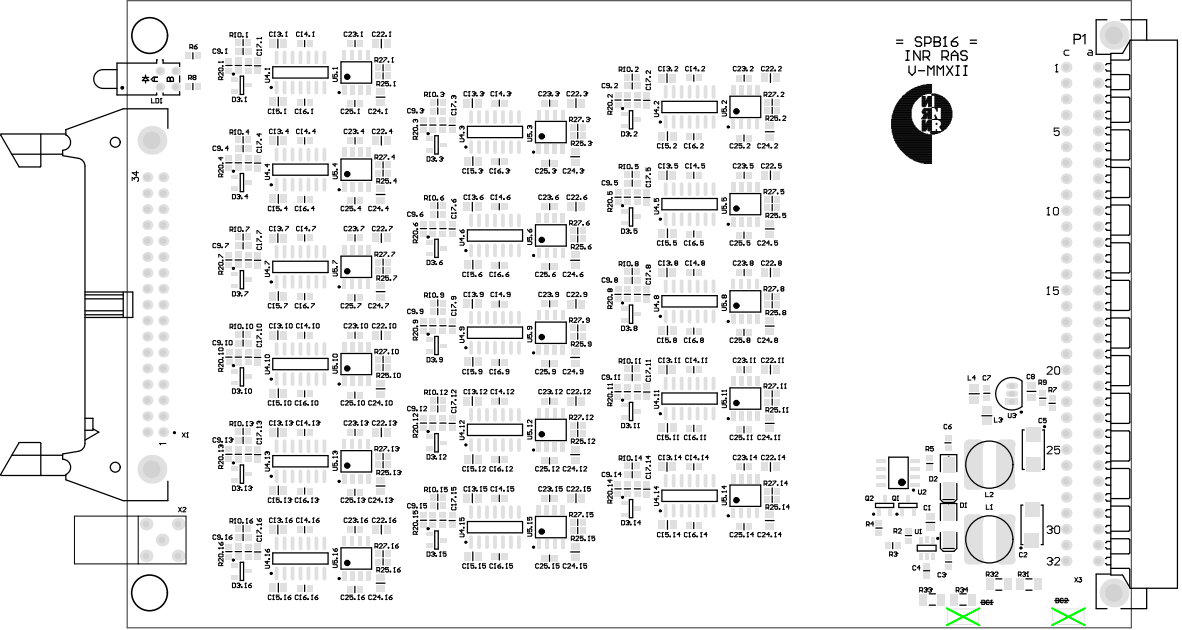
25
30
32
J4
LD1
X1
X2
X3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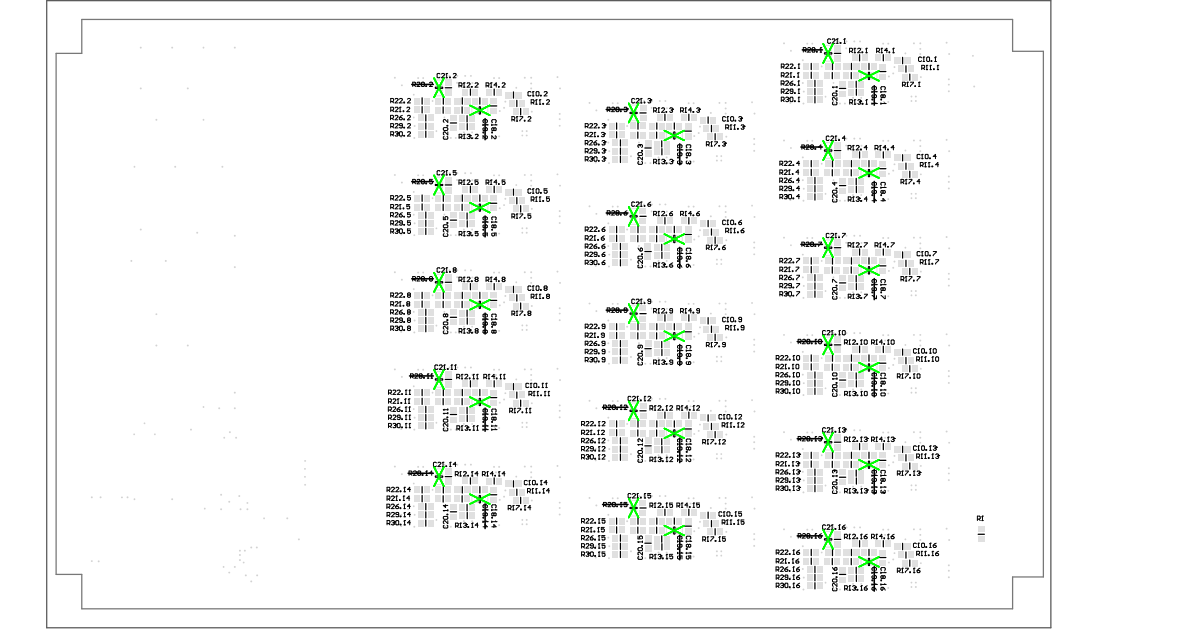
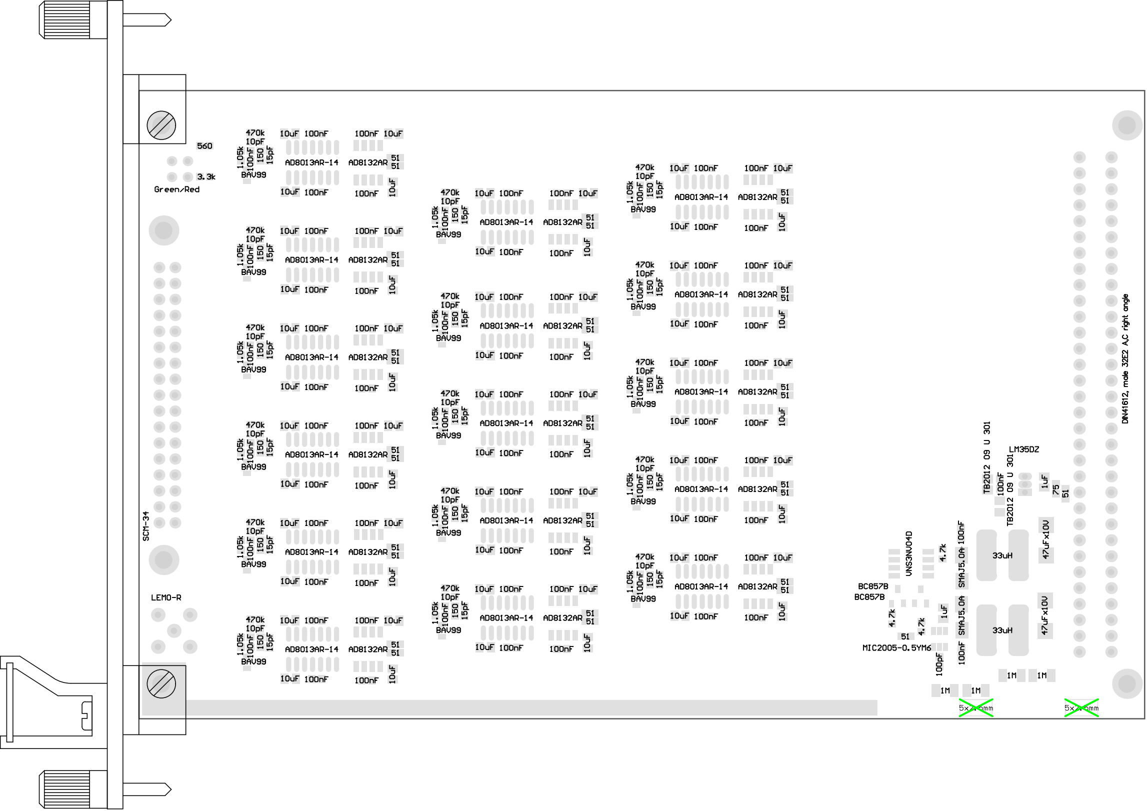
X1
X2
X3
LD1
J4





560
3.3k
Green/Red
SCM-34
LEMO-R
470k
10pF
1.05k
100nF
150
15pF
BAV99
10uF
AD8013AR-14
AD8132AR
51
TB2012 09 U 301
LM35DZ
1uF
75
47uFx10V
33uH
SMAJ5.0A
4.7k
UNS3NV04D
BC857B
MIC2005-0.5YM6
100pF
1M
5x
mm
DIN41612, male 32E2 A,C right angle

3k 470 100nF 75 1.05k 300
3k 43 75 10nF 50 1.6k
810 0 75 100nF
0 0 1.6k
0

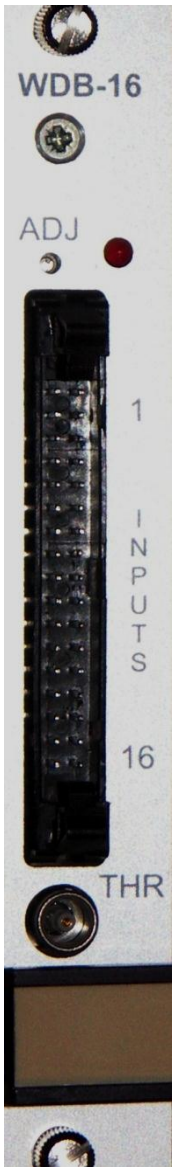
WDB-16 (Wire Discriminator Board)

WDB-16 is a 16-channel discriminator with an adjustable threshold. The outputs are

LVDS signals. The module is in fact a redesign of (link). The main features of the redesign are:

- New form factor - Eurocard 1 unit wide 3U height
- PCB size - 160 mm x 100 mm
- Remote power off possibility
- Temperature sensor added

Fig. 1 WDB-16 front panel view.



On the front panel side there are:

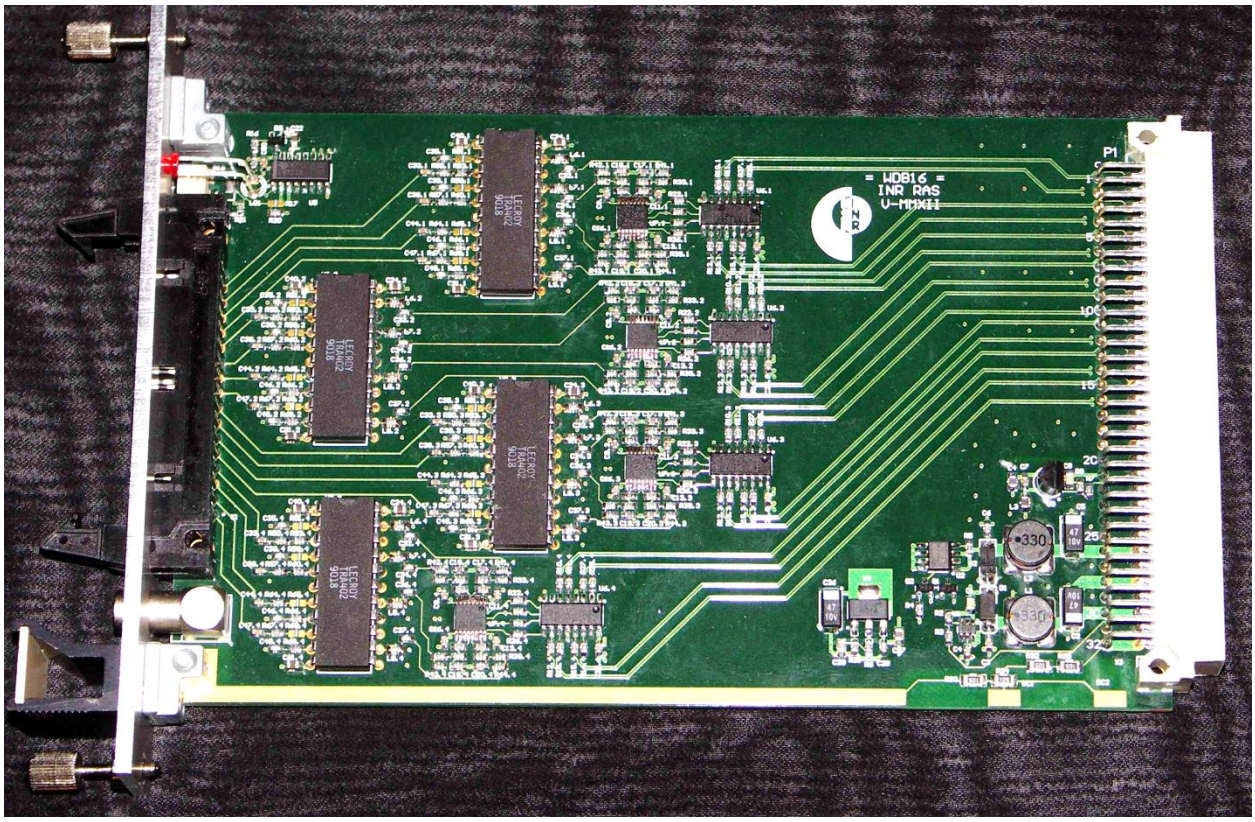
- The input connector (IDC 34 pins)
- LEMO connector for threshold measurement
- The trimmer screw for threshold regulation

• A red led (trigger counts of channel no. 2)

On the back side:

• The output connector (DIN 41612 type C connector, 64ac male 3 rows x 32 pins, the middle row is empty)

Fig. 2 Picture of the PCB



The main components of the circuit are:

• a monolithic 4 channel amplifier (Lecroy TRA402)

• a 4 channel voltage comparator (MAX 9201)

• a 4 channel LVDS driver (MAX 9124)

• a temperature sensor (LM35DZ)

• power switches (MIC2005-0.5YM6 and VNS3NV04D)

The output of channel no. 2 is connected to a front led that flashes when

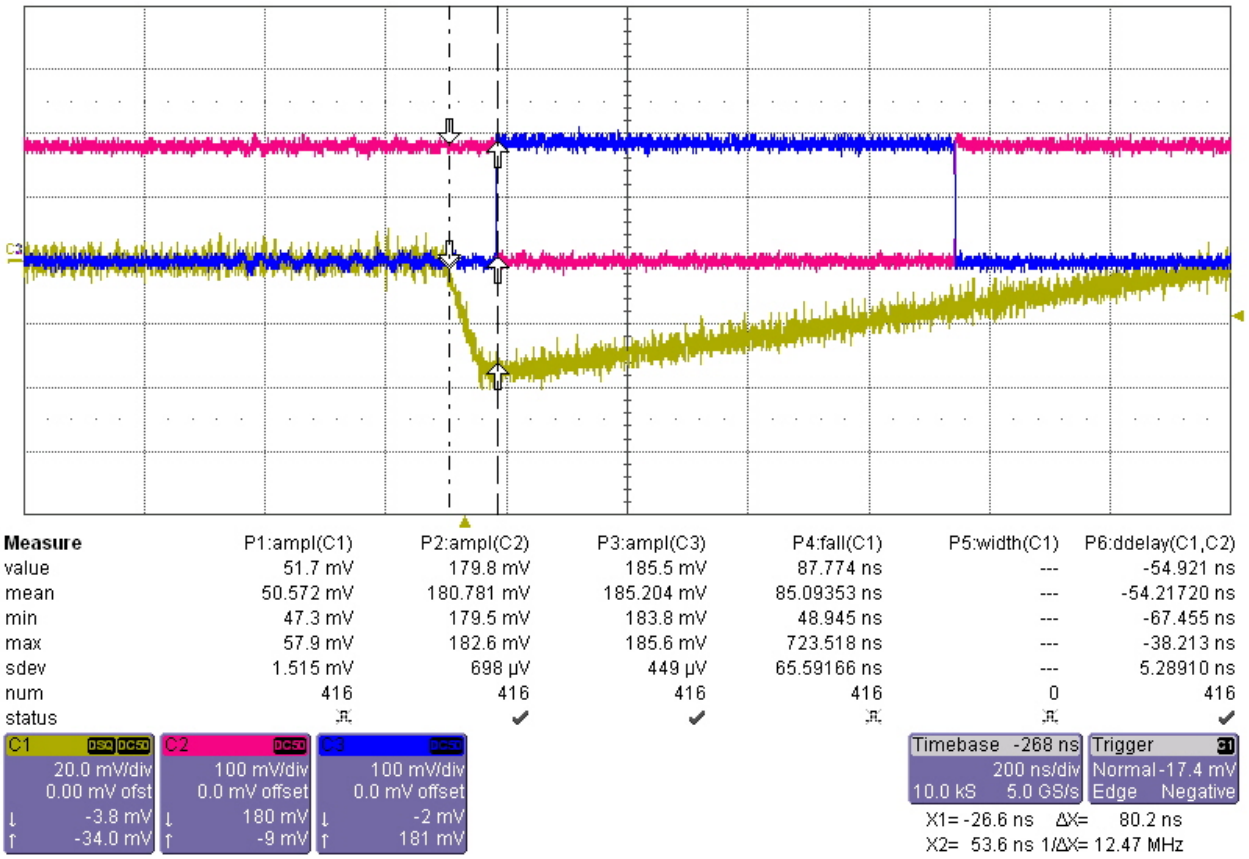
the input signal is above the threshold and it is useful for threshold regulation.

The module requires 2 power supply voltages: +5V and -5V. The derived currents are typically 310 mA (+5V) and 220 mA (-5V) without load . LVDS 100 Ohm loads add approximately 90 mA to the +5V supply current.

Test of the WDB

The fig. 3 shows the response of the module on negative pulses 35 mV amplitude with leading edge 50 ns and trailing edge 1000 ns. The module's threshold is set to -25 mV.

Fig. 3 Response of the WDB-16



The table 1 shows the WDB-16 characteristics.

Table 1. WDB-16 characteristics

Number of channels	16
Limiting counting rate of each channel	$1 * 10^5$ /s
Amplification factor	25mV/uA
Dynamic range	100 FC – 1000FC
Supply current, no load	Upos 5V, 307 mA; Uneg -5V, 216 mA
Output amplitude, 100 Ohm load	LVDS positive, 190 mV; LVDS negative, 190 mV
Delay	80 ns

Temperature output is 10 mV / C^0.

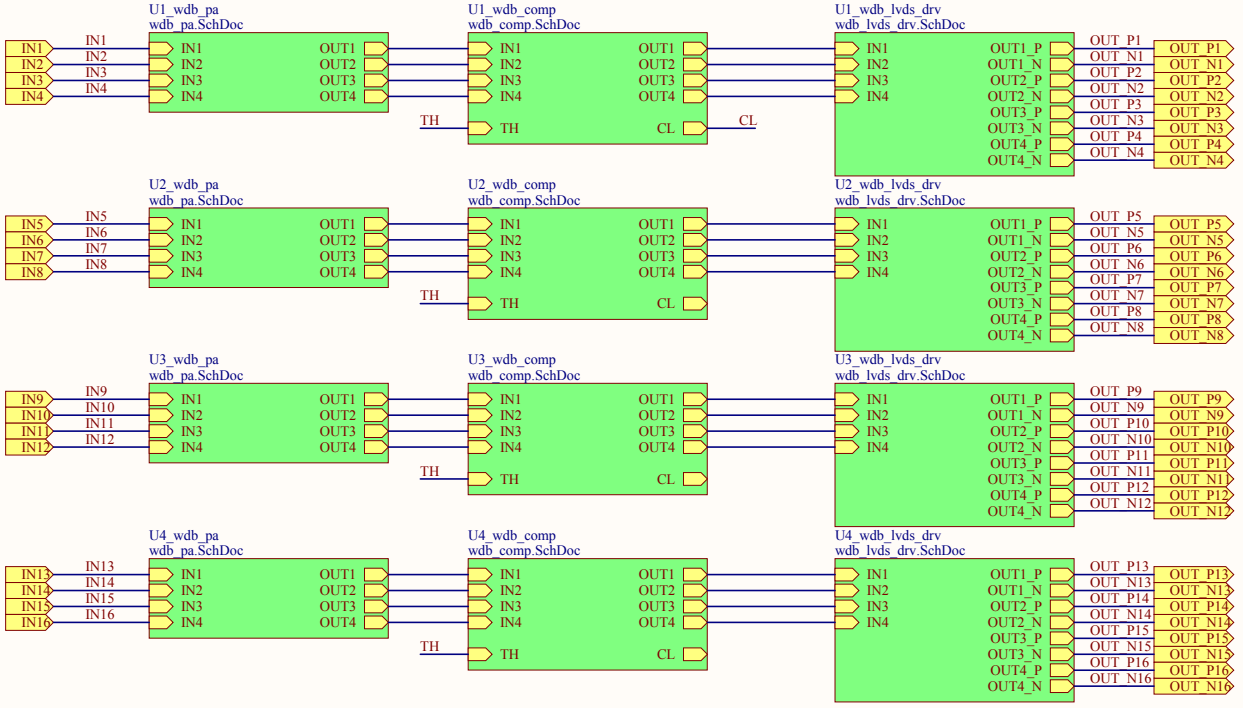
To turn the module's power off, connect the "OFF" contact to GND or supply to it 5V TTL/CMOS logic "0".

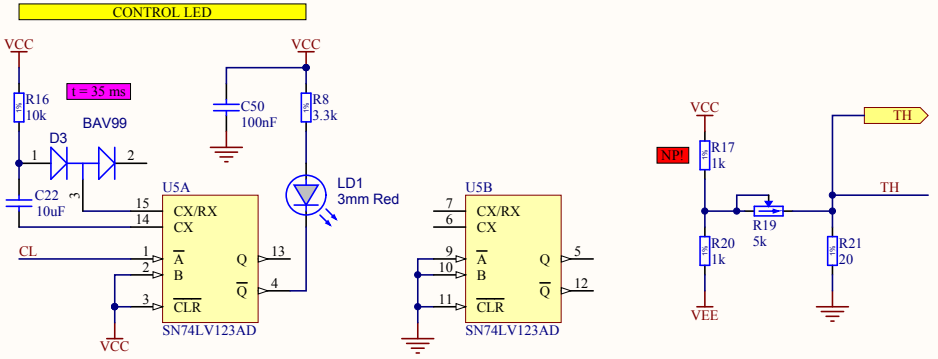
Table 2. Input connector IDC-34 pinout, front view

Pin #		Pin #	
34	FRAME	33	FRAME
32	GND	31	IN1
30	GND	29	IN2
28	GND	27	IN3
26	GND	25	IN4
24	GND	23	IN5
22	GND	21	IN6
20	GND	19	IN7
18	GND	17	IN8
16	GND	15	IN9
14	GND	13	IN10
12	GND	11	IN11
10	GND	9	IN12
8	GND	7	IN13
6	GND	5	IN14
4	GND	3	IN15
2	GND	1	IN16

Table 3. Output connector pinout, rear view

Pin #	c	b	a
1	OUT1-		OUT1+
2	OUT2-		OUT2+
3	OUT3-		OUT3+
4	OUT4-		OUT4+
5	OUT5-		OUT5+
6	OUT6-		OUT6+
7	OUT7-		OUT7+
8	OUT8-		OUT8+
9	OUT9-		OUT9+
10	OUT10-		OUT10+
11	OUT11-		OUT11+
12	OUT12-		OUT12+
13	OUT13-		OUT13+
14	OUT14-		OUT14+
15	OUT15-		OUT15+
16	OUT16-		OUT16+
17			
18	FRAME		FRAME
19	FRAME		FRAME
20			
21	T_GND		TEMP
22			
23			
24			OFF
25			
26	5V-		5V-
27			
28	GND		GND
29			
30	5V+		5V+
31			
32	GND		GND





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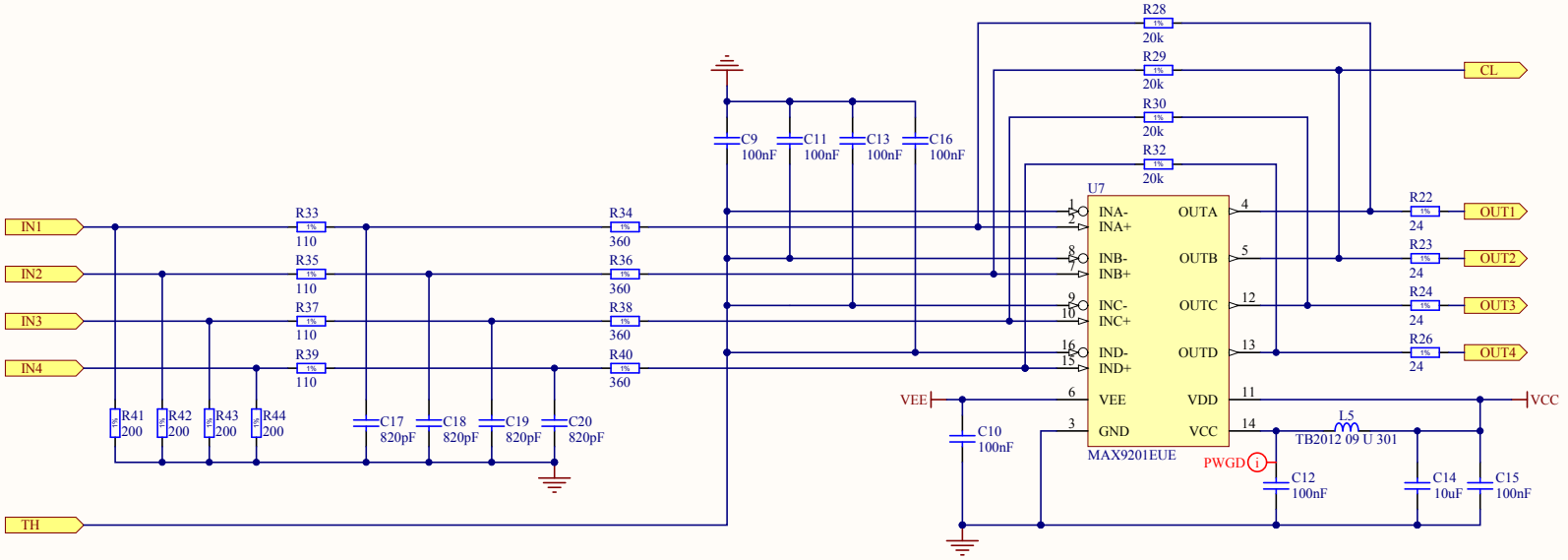

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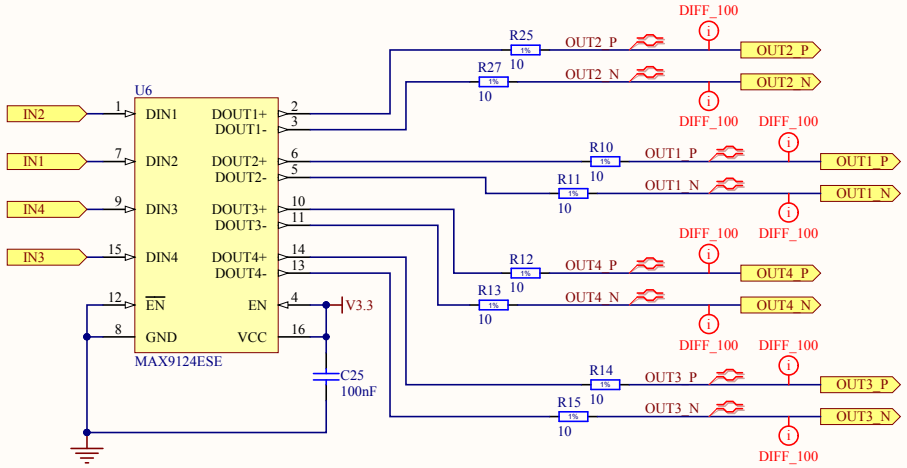

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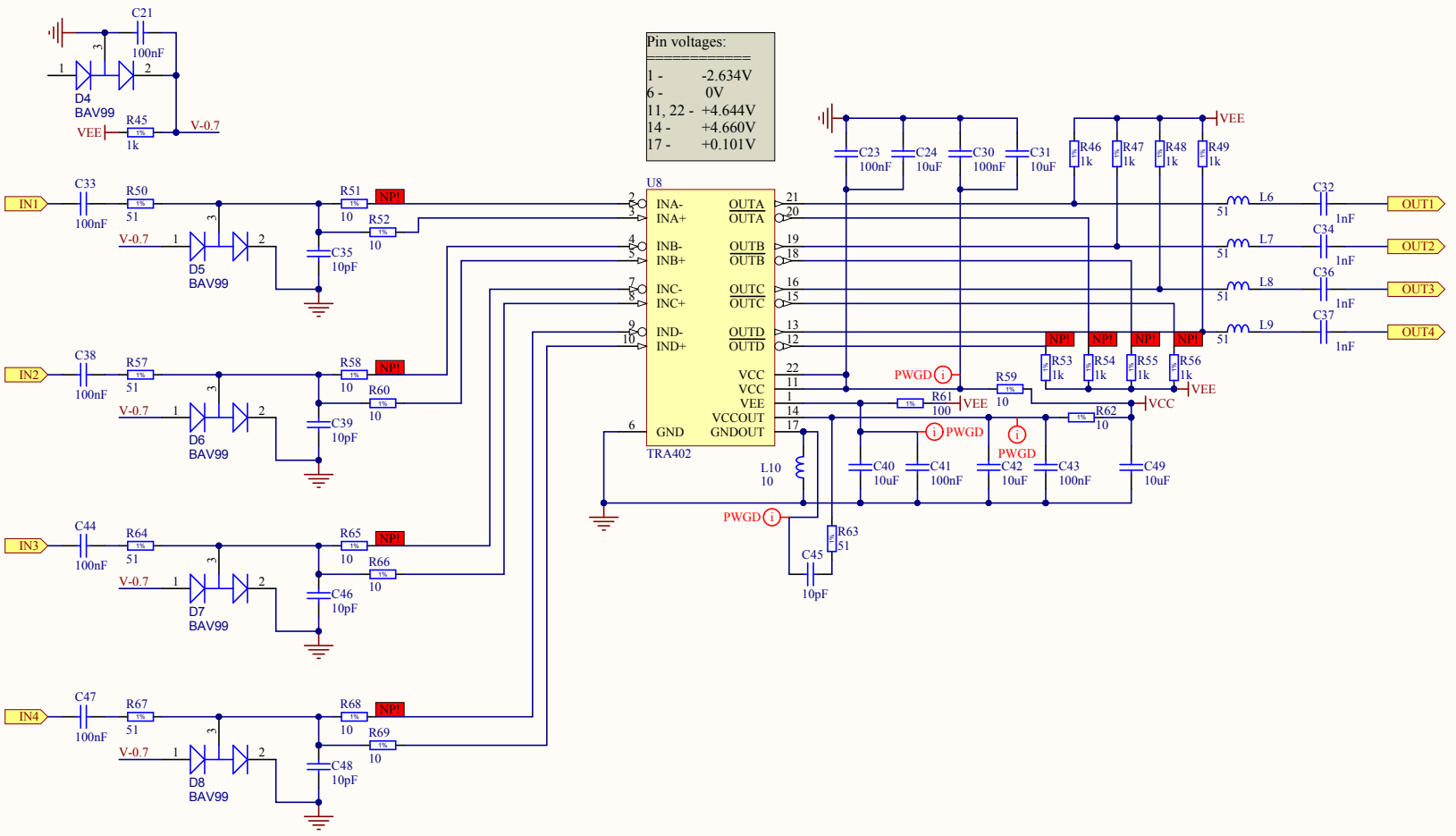
Pin voltages:
1 - -2.634V
6 - 0V
11, 22 - +4.644V
14 - +4.660V
17 - +0.101V
U8
TRA402
INA-
INA+
INB-
INB+
INC-
INC+
IND-
IND+
GND
OUTA
OUTB
OUTC
OUTD
VCC
VEE
VCCOUT
GNDOUT
IN1
IN2
IN3
IN4
OUT1
OUT2
OUT3
OUT4
D4 BAV99
D5 BAV99
D6 BAV99
D7 BAV99
D8 BAV99
V-0.7
VEE
VCC
PWGD
NP!
Title
Size A4
Number
Revision
Date: 11.07.2012
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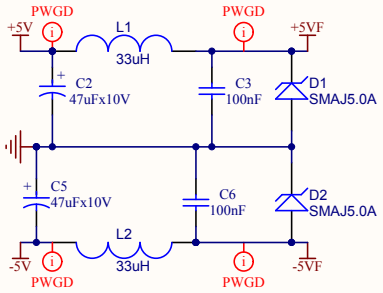
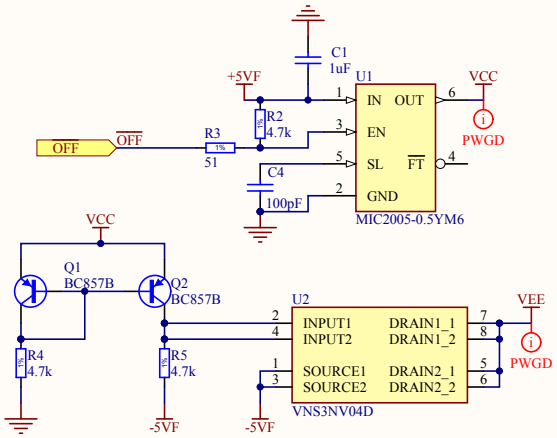
POWER FILTER



POWER DESACTIVATION SWITCHES



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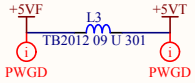
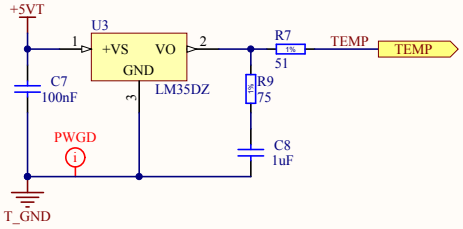
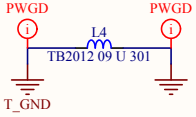
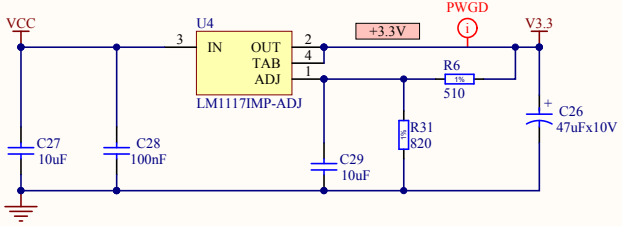


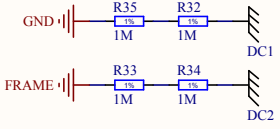




LVDS DRIVERS SUPPLY



ESD PROTECTION



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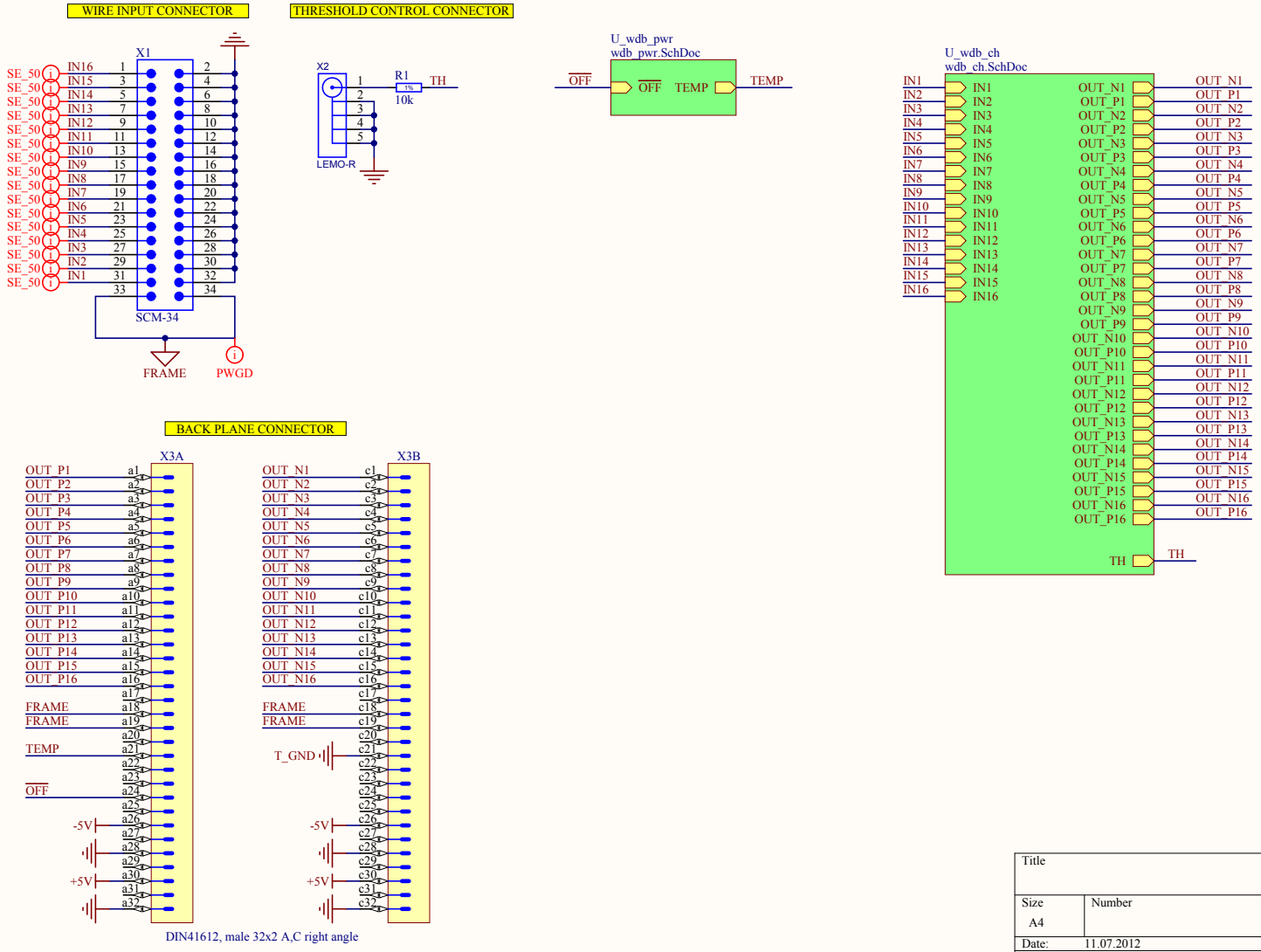
WIRE INPUT CONNECTOR
THRESHOLD CONTROL CONNECTOR
X1
SCM-34
FRAME
PWGD
X2
LEMO-R
R1
10k
TH
U_wdb_pwr
wdb_pwr.SchDoc
OFF
TEMP
U_wdb_ch
wdb_ch.SchDoc
BACK PLANE CONNECTOR
X3A
X3B
DIN41612, male 32x2 A,C right angle
Title
Size
A4
Number
Revision
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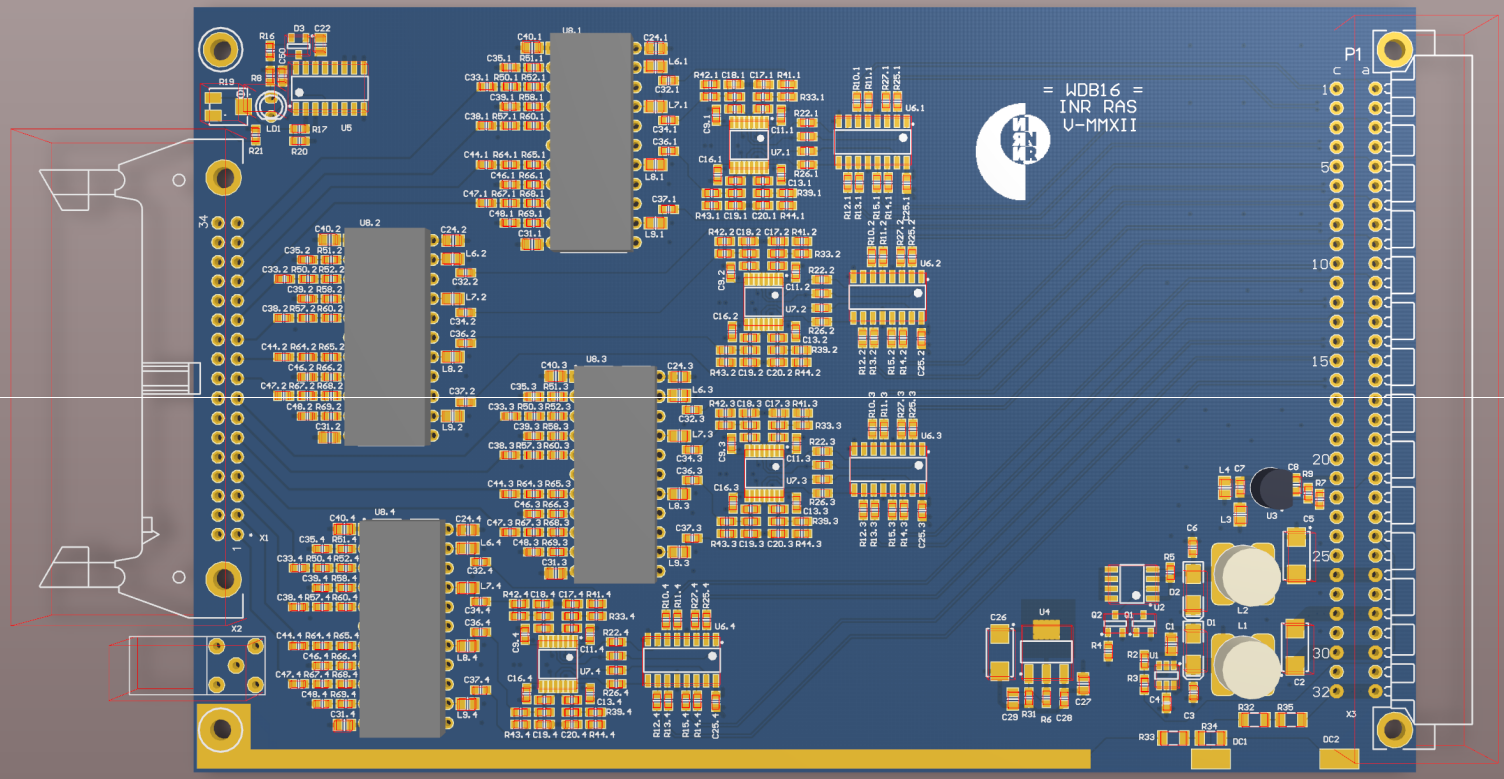
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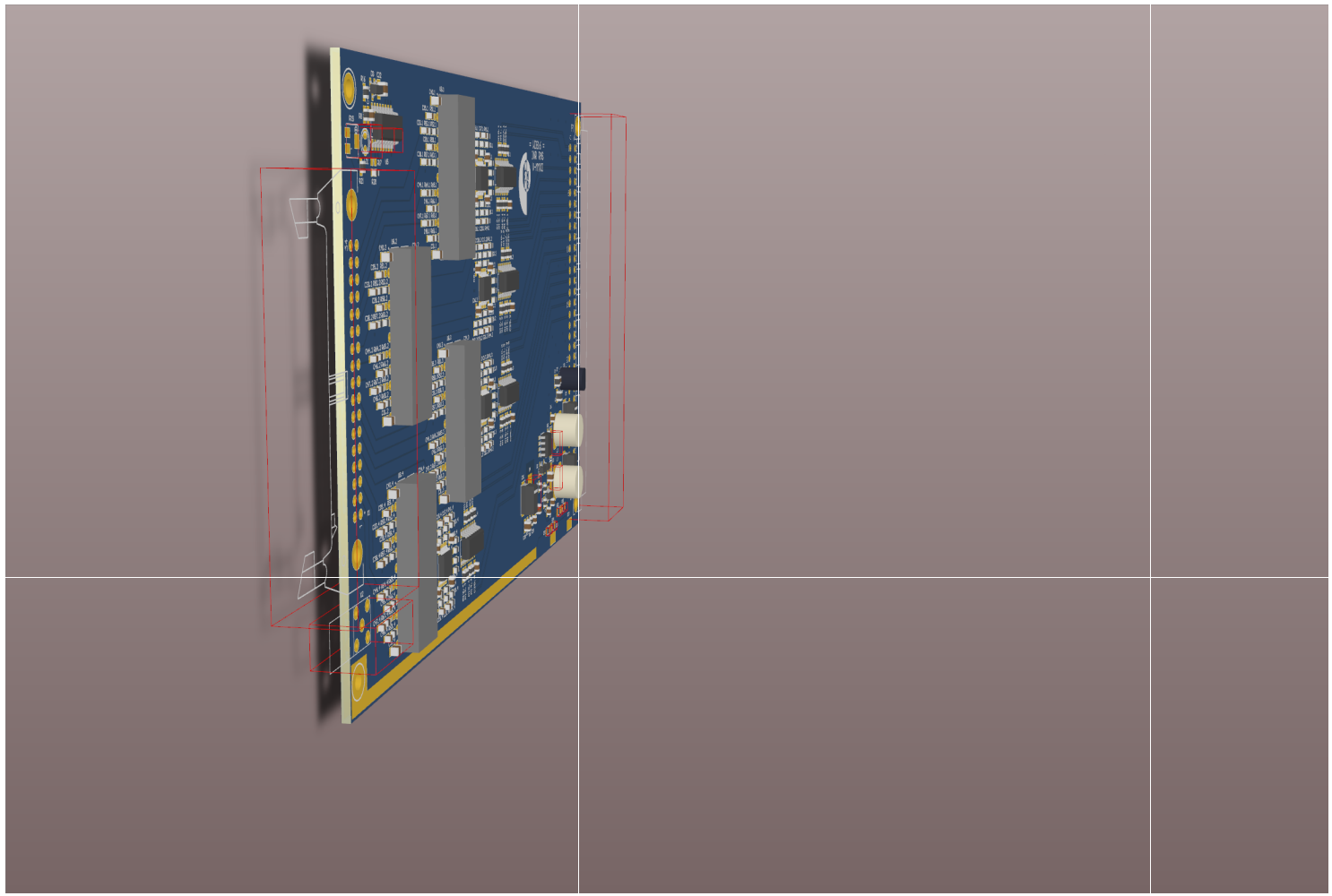
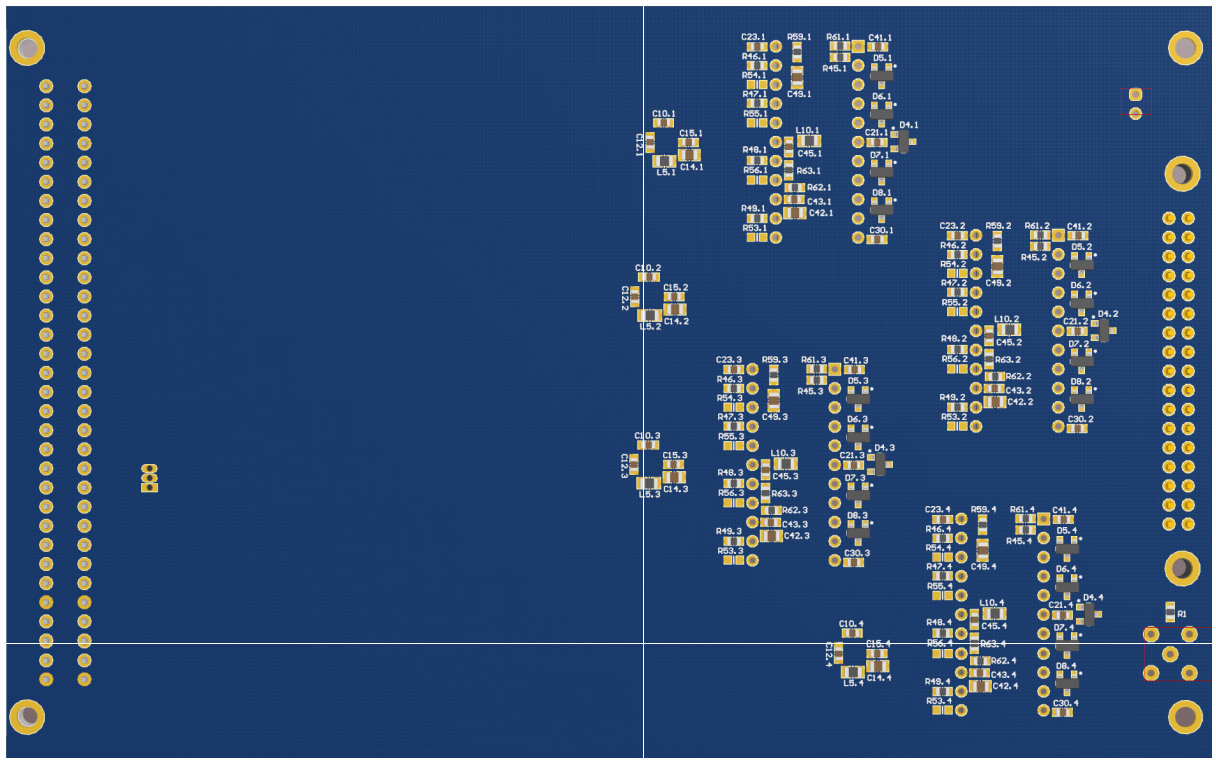
INR RAS
V-MMXII
P1




C23.1
R59.1
R61.1
C41.1
R46.1
D5.1
R45.1
R54.1
C49.1
D6.1
R47.1
C10.1
R55.1
C21.1
D4.1
C15.1
L10.1
D7.1
C12.1
R48.1
C45.1
L5.1
C14.1
R56.1
R63.1
D8.1
R62.1
C43.1
R49.1
C42.1
C30.1
R53.1
C23.2
R59.2
R61.2
C41.2
R46.2
D5.2
R45.2
R54.2
C49.2
D6.2
R47.2
C10.2
R55.2
C21.2
D4.2
C15.2
L10.2
D7.2
C12.2
R48.2
C45.2
R56.2
R63.2
D8.2
C14.2
C62.2
C43.2
L5.2
R49.2
C42.2
C30.2
R53.2
C23.3
R59.3
R61.3
C41.3
R46.3
D5.3
R45.3
R54.3
C49.3
D6.3
R47.3
C10.3
R55.3
C21.3
D4.3
C15.3
L10.3
D7.3
C12.3
R48.3
C45.3
R56.3
R63.3
D8.3
C14.3
R62.3
C43.3
L5.3
R49.3
C42.3
C30.3
R53.3
C23.4
R59.4
R61.4
C41.4
R46.4
D5.4
R45.4
R54.4
C49.4
D6.4
R47.4
C10.4
R55.4
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D4.4
C15.4
L10.4
D7.4
C12.4
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R56.4
R63.4
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C42.4
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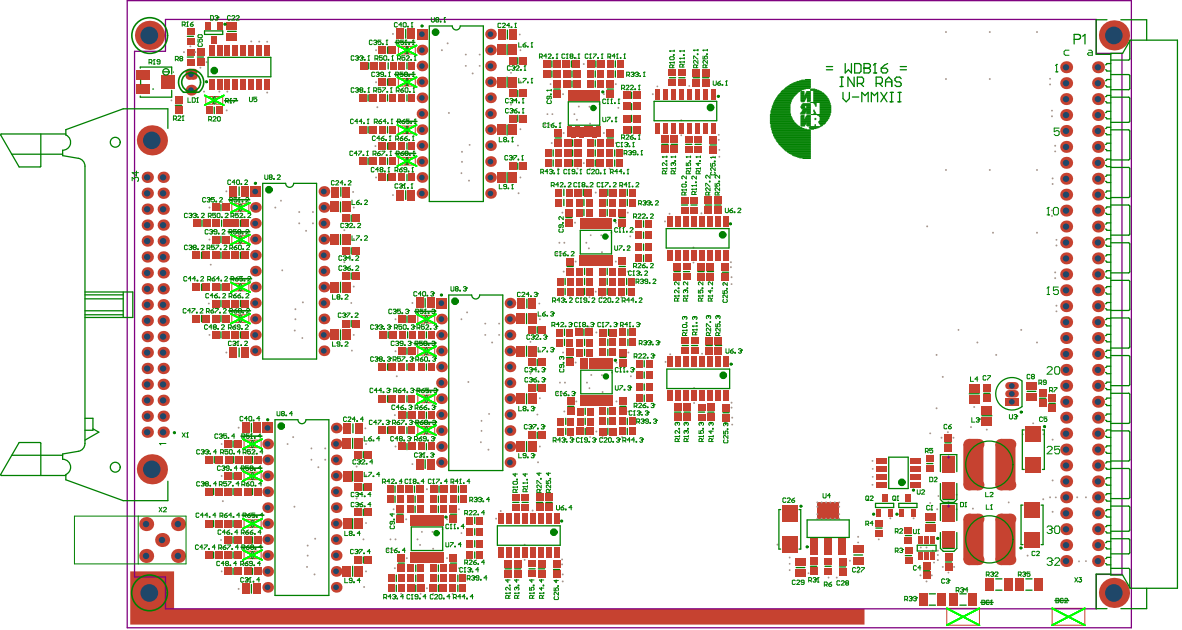
R53.4
R1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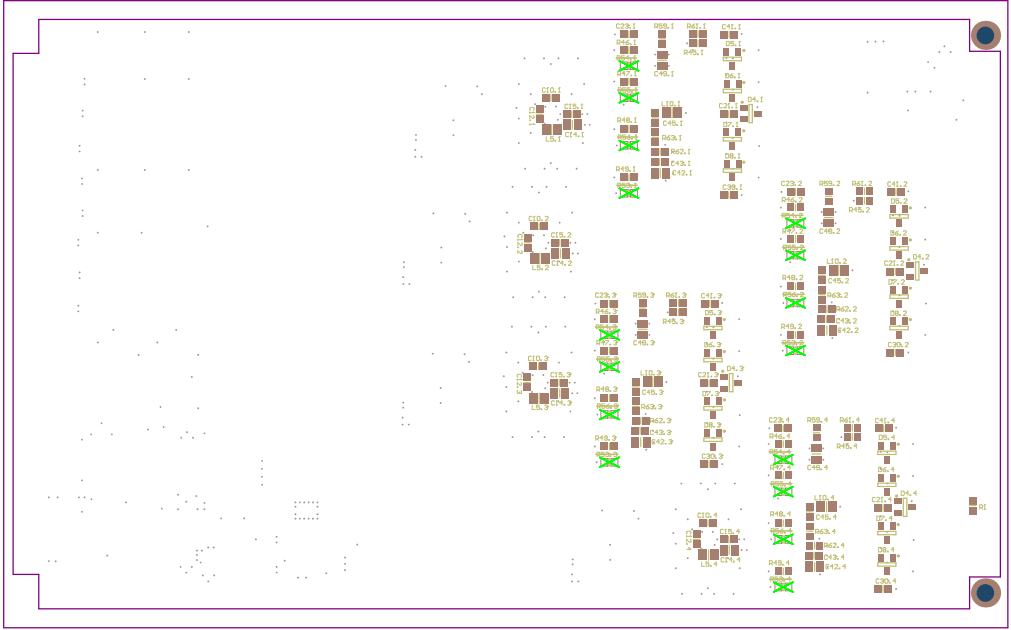
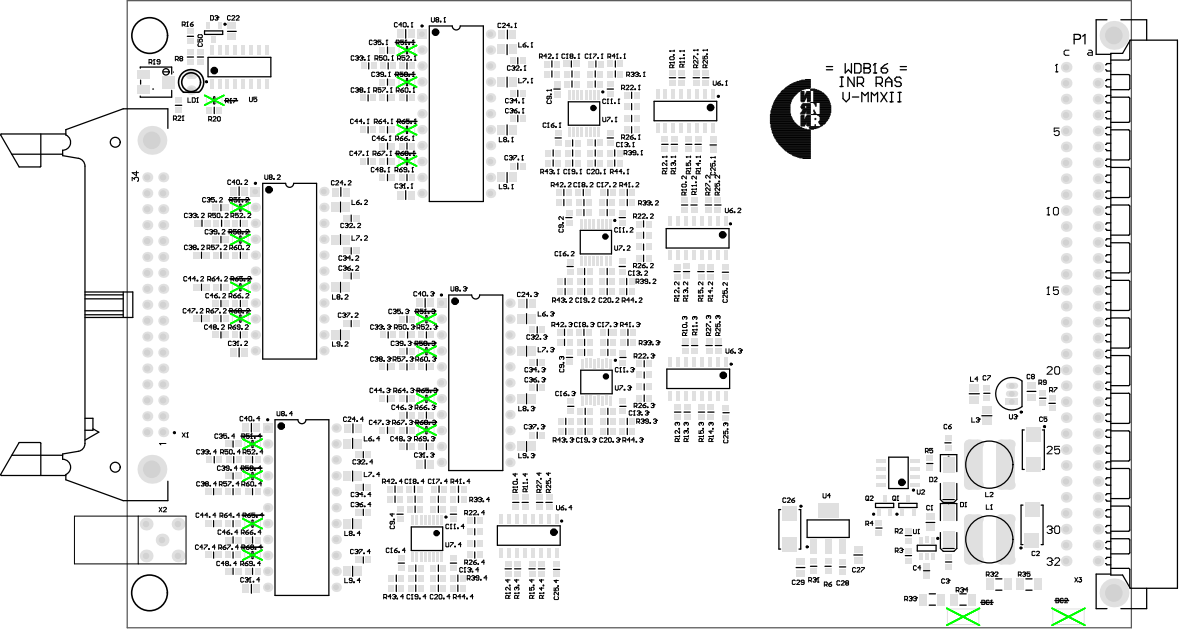
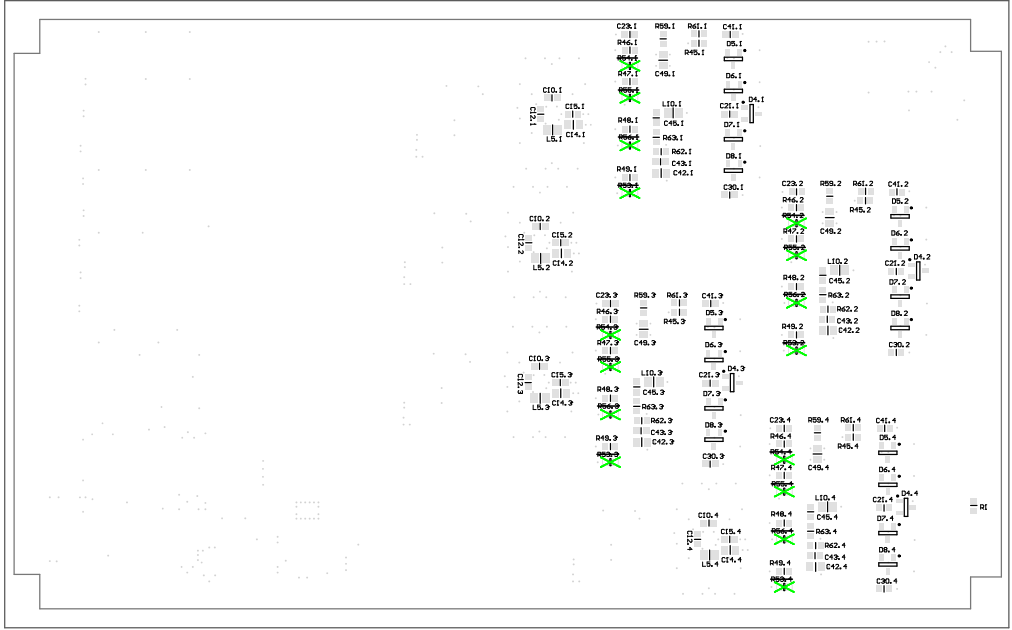
V-MMXII
P1
J4
X1
X2
X3




= WDB16 =
INR RAS
V-MMXII
P1
X2
X3



SCH-34
LEMO-R
SN74LVC123AD
BAV99
MAX9201EUE
MAX9124ESE
TRA402
LM1117IMP-ADJ
BC857B
VN5NA040
SMAJ5.0A
TB2012 09 U 30I
LM3502
DM1812, mode 3CE2 A/C right angle
5x 4.0mm

100nF
1k
10uF
BAV99
TB2012 09 U 30E