
D1002280-v2 (cqpd2)

aLIGO PSL Circuit Board Documentation

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Abstract

Quadrant photodiode in LIGO PSL PD package. Only DX and DY signals are generated, no sum signal.

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Safety Instructions

In order to operate the circuit properly and safely, review the following guidelines before installing and using the unit. Failure to do so may result in equipment damage or bodily injury:



This circuit was designed as a laboratory equipment to be operated only by trained and qualified technicians in research institutes or development departments. For safety reasons, usage by other persons or in other environments is *not* recommended.



- This circuit uses extra-low voltage ($< 50 V_{AC}$ and $< 75 V_{DC}$) and is therefore exempt from the regulations of the *Low Voltage Directive* (2006/95/EC).
 - The unit does not contain any mechanical drive system. Therefore, the regulations of the *Machinery Directive* (2006/42/EC) do not apply.
-

Sicherheitshinweise

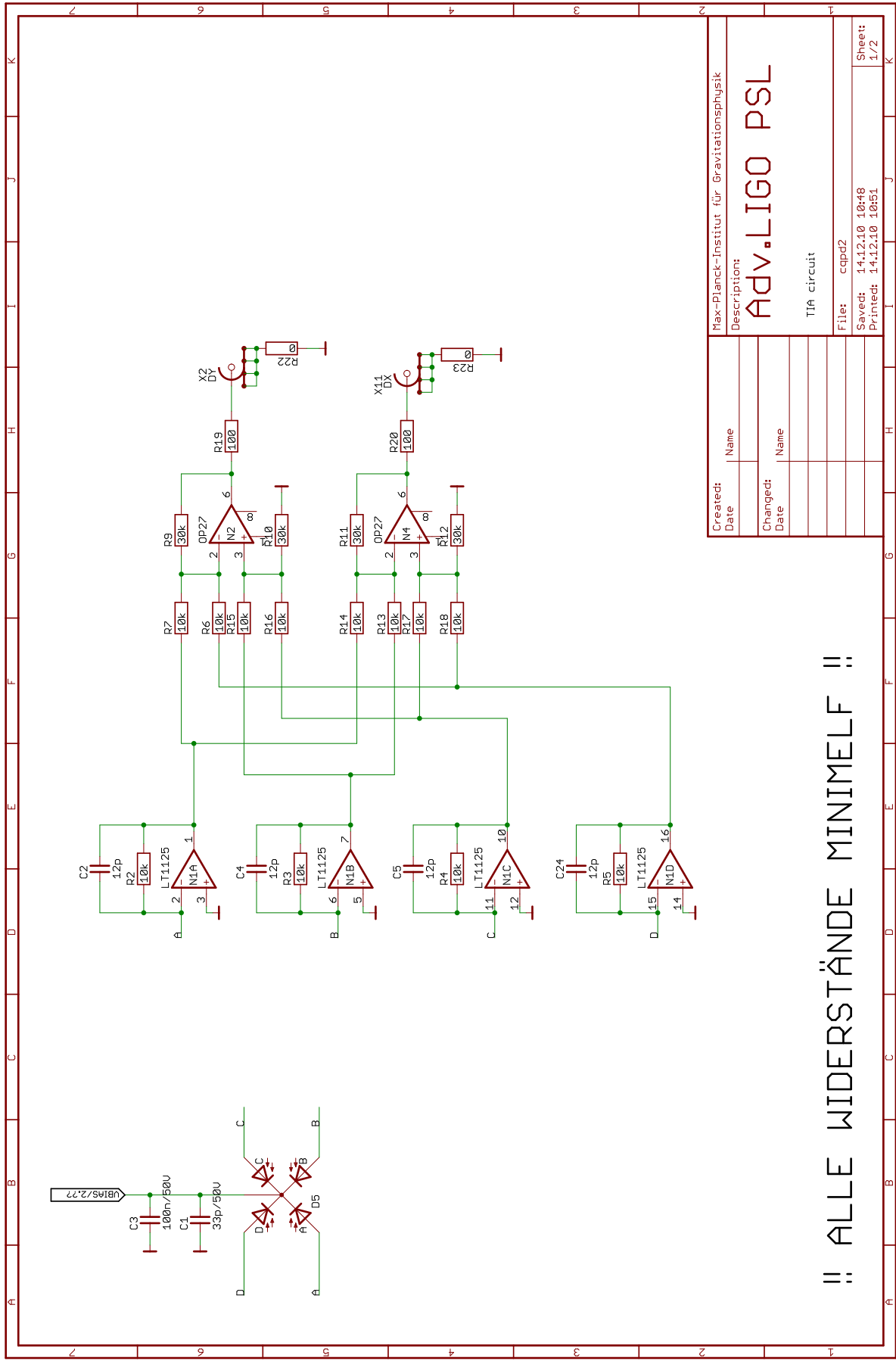
Nehmen Sie vor Aufbau und Inbetriebnahme des Geräts folgende Empfehlungen zur Kenntnis, um die Schaltung korrekt und sicher zu betreiben sowie Schäden und Verletzungen zu vermeiden:



Diese Schaltung wurde als Laborausstattung entworfen, die nur von qualifizierten und eingewiesenen Technikern in Forschungsinstituten oder Entwicklungsabteilungen benutzt wird. Aus Sicherheitsgründen wird die Verwendung durch andere Personen oder in anderer Umgebung *nicht* empfohlen.



- Diese Schaltung verwendet Kleinspannung ($< 50 V_{AC}$ und $< 75 V_{DC}$) und unterliegt daher nicht den Bestimmungen der *Niederspannungsrichtlinie* (2006/95/EC).
 - Das Gerät enthält kein mechanisches Antriebssystem – die Bestimmungen der *Maschinenrichtlinie* (2006/42/EC) sind daher nicht anwendbar.
-



!! ALLE WIDERSTÄNDE MINIMELF !!

Figure 1: Project schematics (sheet 1)

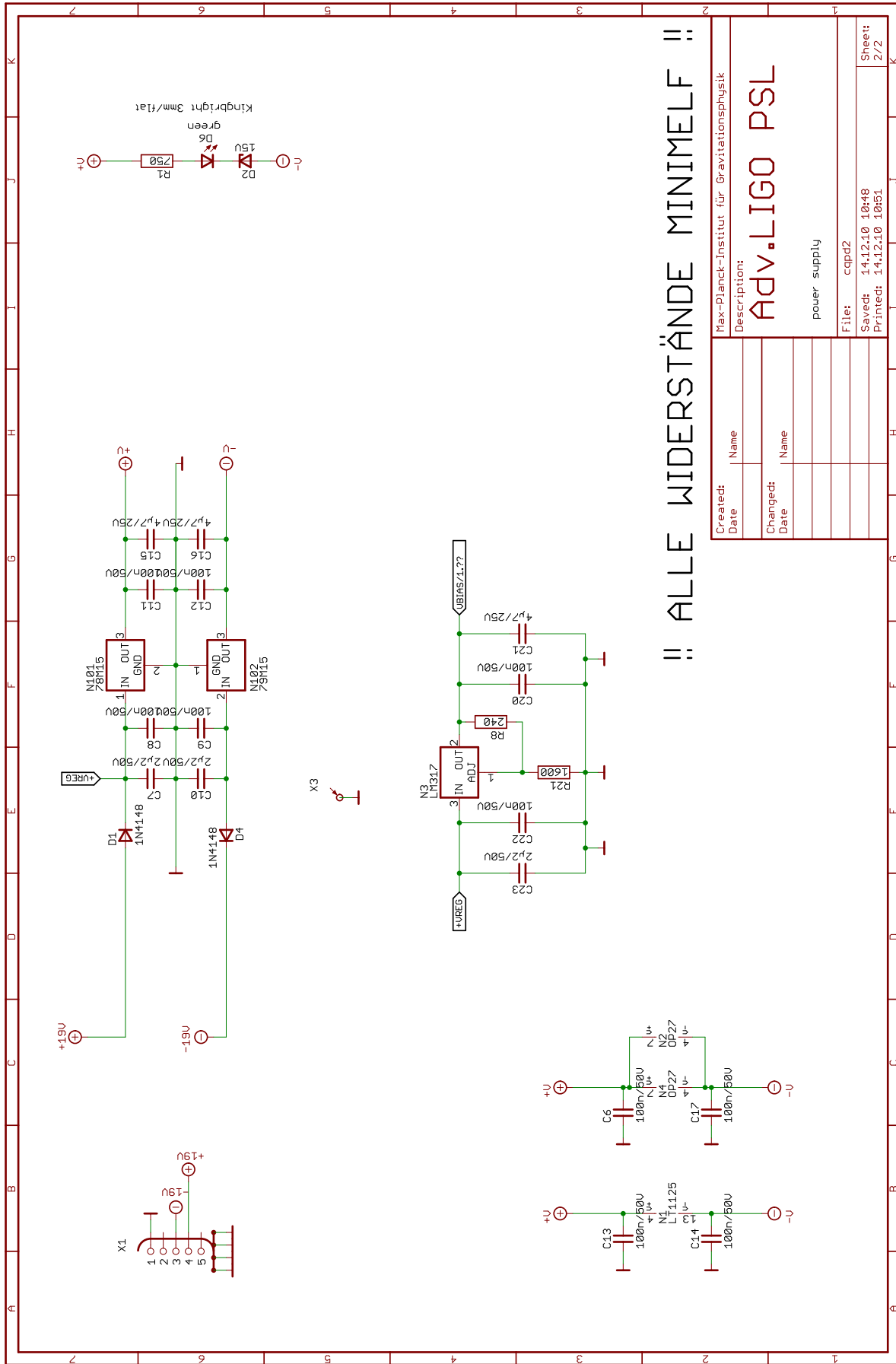


Figure 2: Project schematics (sheet 2)

Created:	Date:	Name:	Max-Planck-Institut für Gravitationsphysik
Changed:	Date:	Name:	Adv.LIGO PSL
			power supply
			File: cqpq2
			Saved: 14.12.10 10:48
			Printed: 14.12.10 10:51
			Sheet: 2/2

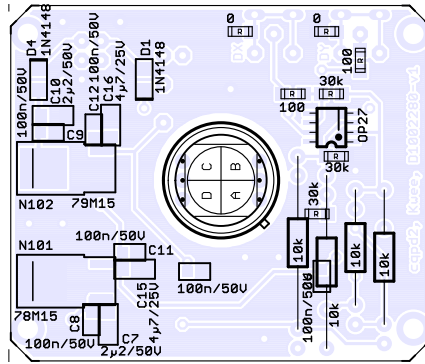


Figure 6: Board bottom view showing placeplan with component values

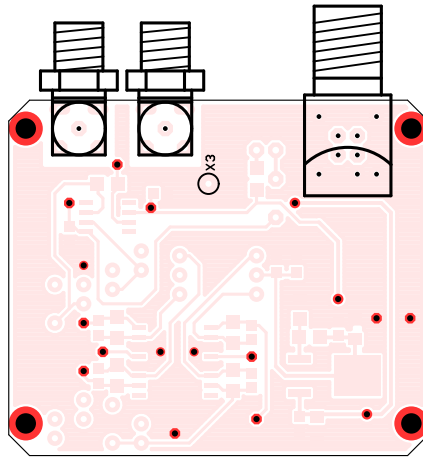


Figure 7: Board top view showing connectors, test points, vias and wired components

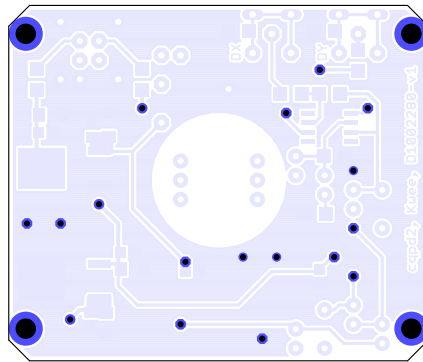


Figure 8: Board bottom view showing connectors, test points, vias and wired components

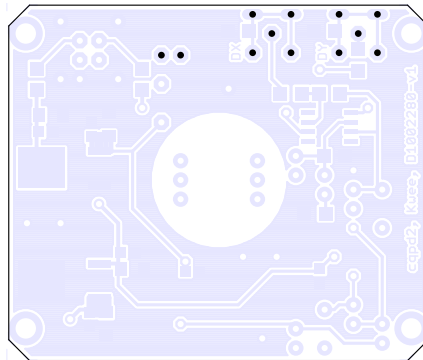


Figure 9: Board bottom view showing drills with 0.9 mm (0.035 in) diameter

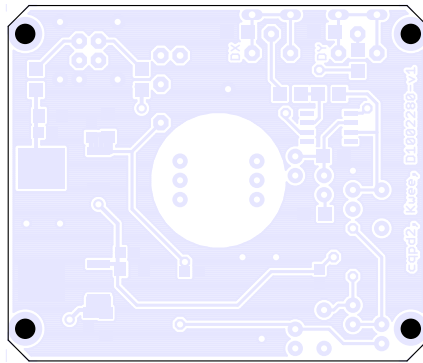


Figure 10: Board bottom view showing drills with 2.7 mm (0.106 in) diameter

Circuit Lists

Drill list: The following table shows all *final* drill diameters used in the board. When manually drilling the clearance holes, round up to the nearest available drill bit diameter, ensuring that all components fit well. When manufacturing *through-plated* boards, adjust for the additional copper coating by increasing the diameter accordingly.

\varnothing [μm]	\varnothing [mm]	\varnothing [in]	Count
812	0.8	0.032	51
889	0.9	0.035	12
2700	2.7	0.106	4
Total			67

Table 1: *Drill diameters used in the board*

Standard properties: If not explicitly stated otherwise in the schematics or value and part lists, the circuit components have the following standard properties. Parts with ‘better’ properties can be easily substituted, but care should be taken if the specifications are *not* met.

- Wired resistors: Metal film 0.6 W, 1%, 200 V, TK 100
- SMD resistors: 1%, 150 V, TK 50, MiniMELF in thin film, other packages in thick film technology

Value list: The following list shows all components available on the board (sorted by part *values*) and can be used to quickly gather components. Additional information can possibly be found directly on the board (or in the schematics).

```
1 EAGLE Version 5.10.0 Copyright (c) 1988-2010 CadSoft
2 Board value list of 'cqpd2.brd'
3 Exported at 2010-12-14 10:52
4 Created with macro 'plot.ulp' (c) Andreas Weidner
5 Shown are: Value/Type,Package,Number,Names (Library)
6
7 ---C---
8 12p          C-SMD:0805          (4*)   C2,C4,C5,C24 (miscs)
9 33p/50V     C-SMD:0805          (1*)   C1 (DIVERS)
10 100n/50V   C-SMD:0805          (11*)  C3,C6,C8,C9,C11,C12,C13,C14,C17,C20,C22
11                                     (DIVERS)
12 2u2/50V    C-SMD:1206          (3*)   C7,C10,C23 (DIVERS)
13 4u7/25V    C-SMD:1206          (3*)   C15,C16,C21 (DIVERS)
14
15 ---D---
16 1N4148     D-SMD:MiniMELF      (2*)   D1,D4 (DIVERS)
17 15V        DZ-0.2"             (1*)   D2 (DIVERS)
18 [undefined] DL2N              (1*)   D6 (opto)
19           DPQ01              (1*)   D5 (optos)
20
21 ---N---
22 78M15     TO-252              (1*)   N101 (IC)
23 79M15     TO-252              (1*)   N102 (IC)
24 LM317     TO-252              (1*)   N3 (IC)
25 LT1125    SO16W               (1*)   N1 (opamps)
26 OP27     SO-8                (2*)   N2,N4 (opamps)
27
28 ---R---
29 0         R-SMD:MiniMELF      (2*)   R22,R23 (miscs)
30 100       R-SMD:MiniMELF      (2*)   R19,R20 (miscs)
31 240       R-SMD:MiniMELF      (1*)   R8 (DIVERS)
32 750       R-SMD:MiniMELF      (1*)   R1 (DIVERS)
```


33	1600	R-SMD:MiniMELF	(1*)	R21 (miscs)
34	10k	R-0.6"	(4*)	R6,R7,R13,R15 (miscs)
35		R-0.7"	(1*)	R14 (miscs)
36		R-0.9"	(3*)	R16,R17,R18 (miscs)
37		R-SMD:MiniMELF	(4*)	R2,R3,R4,R5 (miscs)
38	30k	R-SMD:MiniMELF	(4*)	R9,R10,R11,R12 (miscs)
39				
40	---X---			
41	DX	LEMO:1-pin/horz.	(1*)	X11 (connectors)
42	DY	LEMO:1-pin/horz.	(1*)	X2 (connectors)
43	[undefined]	Testpin:0.8mm/ceramic	(1*)	X3 (connectors)
44		XLEMO05N	(1*)	X1 (connectors)

Part list: The following list shows all components available in the schematics (sorted by part *names*) and can be used to quickly locate components. The column *Layer/Cell* shows the position of the part on the board: *T* for top side and *B* for bottom side, followed by the cell of the surrounding frame (if available). The column *Sheets/Cells* shows the position of *all* the part's gates in the schematics: Sheet number followed by the cell of the surrounding frame (if available). Additional information can possibly be found directly in the schematics.

```

1 EAGLE Version 5.10.0 Copyright (c) 1988-2010 CadSoft
2 Schematics part list of 'cqp2.sch'
3 Exported at 2010-12-14 10:52
4 Created with macro 'plot.ulp' (c) Andreas Weidner
5 Shown are: Name,Value/Type,Package,Device,Layer/Cell,Sheets/Cells
6
7 ---C---
8 C1 33p/50V C-SMD:0805 C0805 T 1
9 C2 12p C-SMD:0805 CS T 1
10 C3 100n/50V C-SMD:0805 C0805 T 1
11 C4 12p C-SMD:0805 CS T 1
12 C5 12p C-SMD:0805 CS T 1
13 C6 100n/50V C-SMD:0805 C0805 B 2
14 C7 2u2/50V C-SMD:1206 C1206 B 2
15 C8 100n/50V C-SMD:0805 C0805 B 2
16 C9 100n/50V C-SMD:0805 C0805 B 2
17 C10 2u2/50V C-SMD:1206 C1206 B 2
18 C11 100n/50V C-SMD:0805 C0805 B 2
19 C12 100n/50V C-SMD:0805 C0805 B 2
20 C13 100n/50V C-SMD:0805 C0805 T 2
21 C14 100n/50V C-SMD:0805 C0805 T 2
22 C15 4u7/25V C-SMD:1206 C1206 B 2
23 C16 4u7/25V C-SMD:1206 C1206 B 2
24 C17 100n/50V C-SMD:0805 C0805 B 2
25 C20 100n/50V C-SMD:0805 C0805 T 2
26 C21 4u7/25V C-SMD:1206 C1206 T 2
27 C22 100n/50V C-SMD:0805 C0805 T 2
28 C23 2u2/50V C-SMD:1206 C1206 T 2
29 C24 12p C-SMD:0805 CS T 1
30
31 ---D---
32 D1 1N4148 D-SMD:MiniMELF DMINIMELF B 2
33 D2 15V DZ-0.2" DZ02 T 2
34 D4 1N4148 D-SMD:MiniMELF DMINIMELF B 2
35 D5 [undefined] DPQ01 DPQC1 B 1
36 D6 [undefined] DL2N DL2 T 2
37
38 ---N---
39 N1 LT1125 S016W LT1125S T 1,2

```

40	N2	OP27	SO-8	OP27S	T	1,2
41	N3	LM317	TO-252	LM317S	T	2
42	N4	OP27	SO-8	OP27S	B	1,2
43	N101	78M15	TO-252	78XXS2	B	2
44	N102	79M15	TO-252	79XXS2	B	2
45						
46	---R---					
47	R1	750	R-SMD:MiniMELF	RMINIMELF	T	2
48	R2	10k	R-SMD:MiniMELF	RMINIMELF	T	1
49	R3	10k	R-SMD:MiniMELF	RMINIMELF	T	1
50	R4	10k	R-SMD:MiniMELF	RMINIMELF	T	1
51	R5	10k	R-SMD:MiniMELF	RMINIMELF	T	1
52	R6	10k	R-0.6"	R06	T	1
53	R7	10k	R-0.6"	R06	T	1
54	R8	240	R-SMD:MiniMELF	RMINIMELF	T	2
55	R9	30k	R-SMD:MiniMELF	RMINIMELF	T	1
56	R10	30k	R-SMD:MiniMELF	RMINIMELF	B	1
57	R11	30k	R-SMD:MiniMELF	RMINIMELF	B	1
58	R12	30k	R-SMD:MiniMELF	RMINIMELF	B	1
59	R13	10k	R-0.6"	R06	B	1
60	R14	10k	R-0.7"	R07	B	1
61	R15	10k	R-0.6"	R06	T	1
62	R16	10k	R-0.9"	R09	T	1
63	R17	10k	R-0.9"	R09	B	1
64	R18	10k	R-0.9"	R09	B	1
65	R19	100	R-SMD:MiniMELF	RMINIMELF	B	1
66	R20	100	R-SMD:MiniMELF	RMINIMELF	B	1
67	R21	1600	R-SMD:MiniMELF	RMINIMELF	T	2
68	R22	0	R-SMD:MiniMELF	RMINIMELF	B	1
69	R23	0	R-SMD:MiniMELF	RMINIMELF	B	1
70						
71	---X---					
72	X1	[undefined]	XLEMO05N	XS05-4S	T	2
73	X2	DY	LEMO:1-pin/horz.	XS-4S-LEMO00HL	T	1
74	X3	[undefined]	Testpin:0.8mm/ceramic	XT	T	2
75	X11	DX	LEMO:1-pin/horz.	XS-4S-LEMO00HL	T	1