

# LAB.GRUPPEN

***fp2200***

**SERVICE MANUAL**

**Version 2**

**Lab.gruppen AB**  
**Gullregnsvägen 16, SE-434 44 KUNGSBACKA, SWEDEN**  
**Phone: +46 300 56 28 00**  
**Fax: +46 300 56 28 99**  
**[info@labgruppen.com](mailto:info@labgruppen.com)**  
**[www.labgruppen.com](http://www.labgruppen.com)**

**fP2200**

Internal connections .....	3
Component list .....	4
Variant specific components .....	4
Description for variant dependent components .....	4
Sparepart list for fP2200 .....	5

**A04B / A08B**

Schematics for A04B, A08B .....	2
Board placement for A04B .....	3
Board placement for A08B .....	4
Component list for A04B, A08B - rev 04A .....	5
Variant specific components for A04B versions - rev 04A .....	9
Variant specific components for A08B versions - rev 04A .....	9
Description for variant dependent components .....	10

**IN2G**

Schematics for IN2G .....	2
Board placement for IN2G .....	3
Component list for IN2G - rev 04 .....	4
Variant specific components .....	5
Description for variant dependent components .....	5

**LD92**

Schematics for LD92 .....	2
Board placement for LD92 .....	3
Component list for LD92 - rev 01 .....	4
Variant specific components .....	5
Description for variant dependent components .....	6

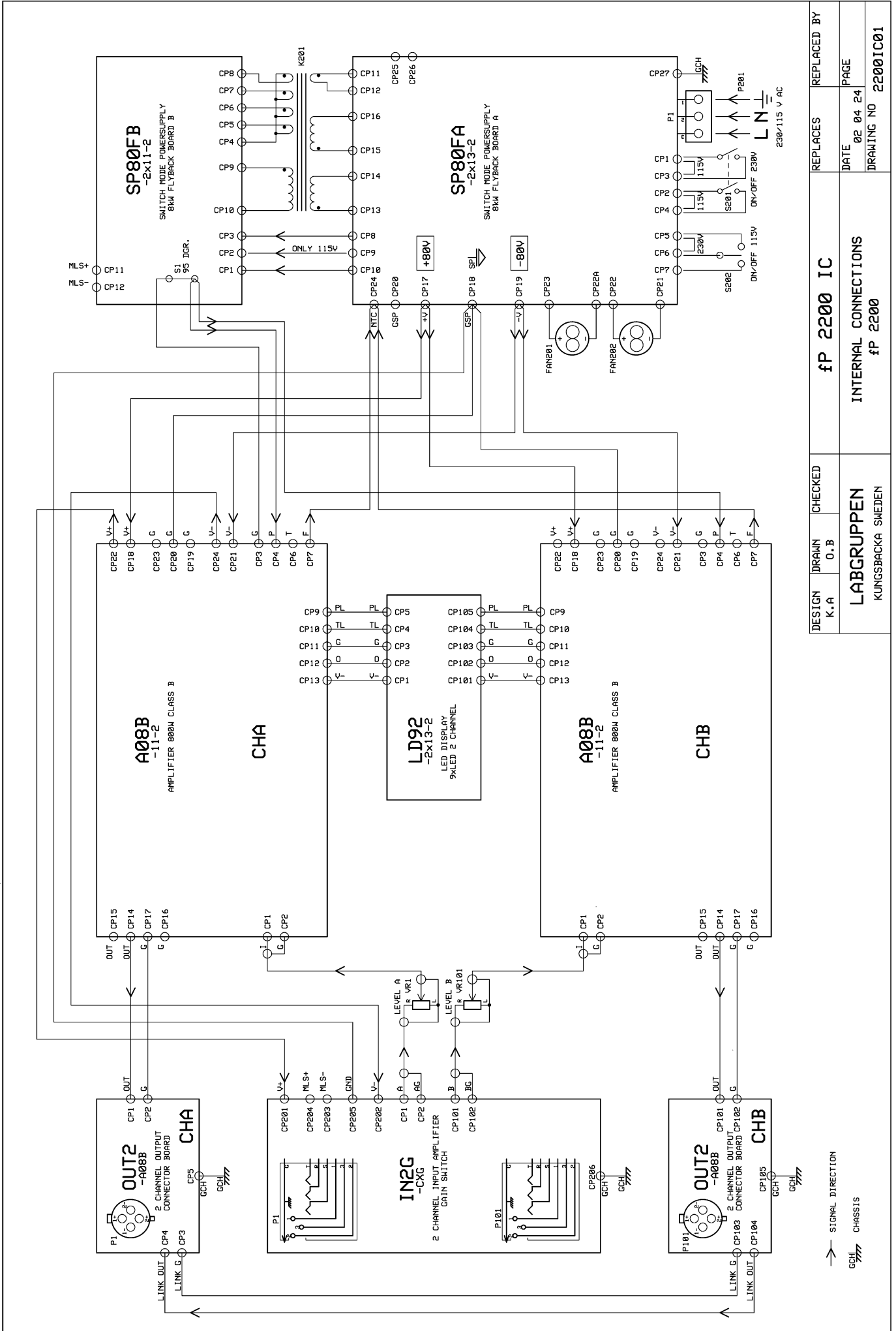
**OUT2**

Schematics for OUT2 .....	2
Board placement for OUT2 .....	3
Component list for OUT2CHA, OUT2CHB - rev 01A .....	4
Variant specific components .....	4
Description for variant dependent components .....	4

**SP80FA / SP80FB**

Functional description for switch mode powersupply SP80FA & SP80FB .....	2
Schematics for SP80FA & SP80FB .....	4
Schematics for SP80FA, SP80FB & PIND .....	5
SP80FA .....	6
Board placement for SP80FA - rev 04 .....	6
Board placement for SP80FA - rev 06 .....	7
Component list for SP80FA - rev 06 .....	8
Variant specific components for 230V versions - rev 06 .....	9
Variant specific components for 115V versions - rev 06 .....	10
Description for variant dependent components .....	11
SP80FB .....	12
Board placement for SP80FB & PIND .....	12

Component list for PIND, SP80FB - rev 01A.....	13
Variant specific components for 230V versions - rev 01A .....	15
Variant specific components for 115V versions - rev 01A .....	16
Description for variant dependent components.....	17



DESIGN K.A	DRAWN O.B	CHECKED	REPLACES <b>fP 2200 IC</b>	REPLACED BY
LABGRUPPEN KUNGSBACKA SWEDEN			INTERNAL CONNECTIONS <b>fP 2200</b>	DATE 02 04 24
				PAGE
				DRAWING NO 2200IC01

→ SIGNAL DIRECTION  
 CHASSIS

## Component list

⚠ - Safety critical component. Should only be replaced with the specified type.

	Position	Partnumber	Description	Comment
⚠	FAN201	F80x25-24HS	Fan 80x80x25mm 24VDC high speed	
⚠	FAN202	F80x25-24HS	Fan 80x80x25mm 24VDC high speed	
⚠	K201	2K4FUI9330_LAB	Trafo. 2,4KW flyback U93/76/30 I93/28/30 core LAB. Rev01	
⚠	P201		Variant dependent, see separate list	
⚠	P201A		Variant dependent, see separate list	
⚠	S201		Variant dependent, see separate list	
⚠	S202		Variant dependent, see separate list	
	VR1	VR10KLIN31_TOK	Potentiometer 10K LIN 31step TOKOS B103 TP96N08 Y4929 Rev1	
	VR101	VR10KLIN31_TOK	Potentiometer 10K LIN 31step TOKOS B103 TP96N08 Y4929 Rev1	

## Variant specific components

	Position	230V	115V
⚠	P201	MLEU3x1.52.5mBLK	SJOOW-3xAWG12
⚠	P201A	-	MP5-15P15A125V
⚠	S201	RK2-0-10A15x21	-
⚠	S202	-	RK1-1-6A15x21

## Description for variant dependent components

Partnumber	Description
MLEU3x1.52.5mBLK	Mains lead EU Plug type CEE7/VII 3x1.5mm <sup>2</sup> 2.5m Black
MP5-15P15A125V	Mains plug type 5-15P 15A 125V
RK1-1-6A15x21	Switch Rocker Single Pole Double Trough on - on 6A 15x21mm
RK2-0-10A15x21	Switch Rocker Double Pole Single Trough on - off 10A 15x21mm
SJOOW-3xAWG12	Cable SJOOW 3xAWG12 UL style 817

## Sparepart list for fP2200

### Completed modules

Partnumber	Description
A08B-11-2	Amplifier 800W class B, variant 11-2
IN2G-CXG	2 channel input amplifier and gainswitch, variant CXG
LD92-2x13-2	Led display 9 x led 2 channel, variant 2x13-2
OUT2CHA-A08B	2 channel output connector board channel A, variant A08B
OUT2CHB-A08B	2 channel output connector board channel B, variant A08B
SP80FA-2x13-2	Switch mode powersupply 8kW flyback board A, variant 2x13-2, 230V
SP80FA-2x13-2U	Switch mode powersupply 8kW flyback board A, variant 2x13-2U, 115V
SP80FB-2x11-2	Switch mode powersupply 8kW flyback board B, variant 2x11-2, 230V
SP80FB-2x11-2U	Switch mode powersupply 8kW flyback board B, variant 2x11-2U, 115V

### Mecanical parts

⚠ - Safety critical component. Should only be replaced with the specified type.

Partnumber	Description
TCA08BA-PBLK	Top / bottom cover
FP-FP2200	Front panel
SPLA08BA-A	Side panel left
SPRA08BA-A	Side panel right
RP-FP2200	Rear panel 230V
RP-FP2200U	Rear panel 115V
HDL2HEM5_MEN	Handle
DCSL1-PBLK	Dustfilter clip left
DCSR1-PBLK	Dustfilter clip right
DF139x62x5-20 ⚠	Dustfilter left
DF115x62x5-20 ⚠	Dustfilter right
KNBD18.5_TAI	Gain potentiometer knob

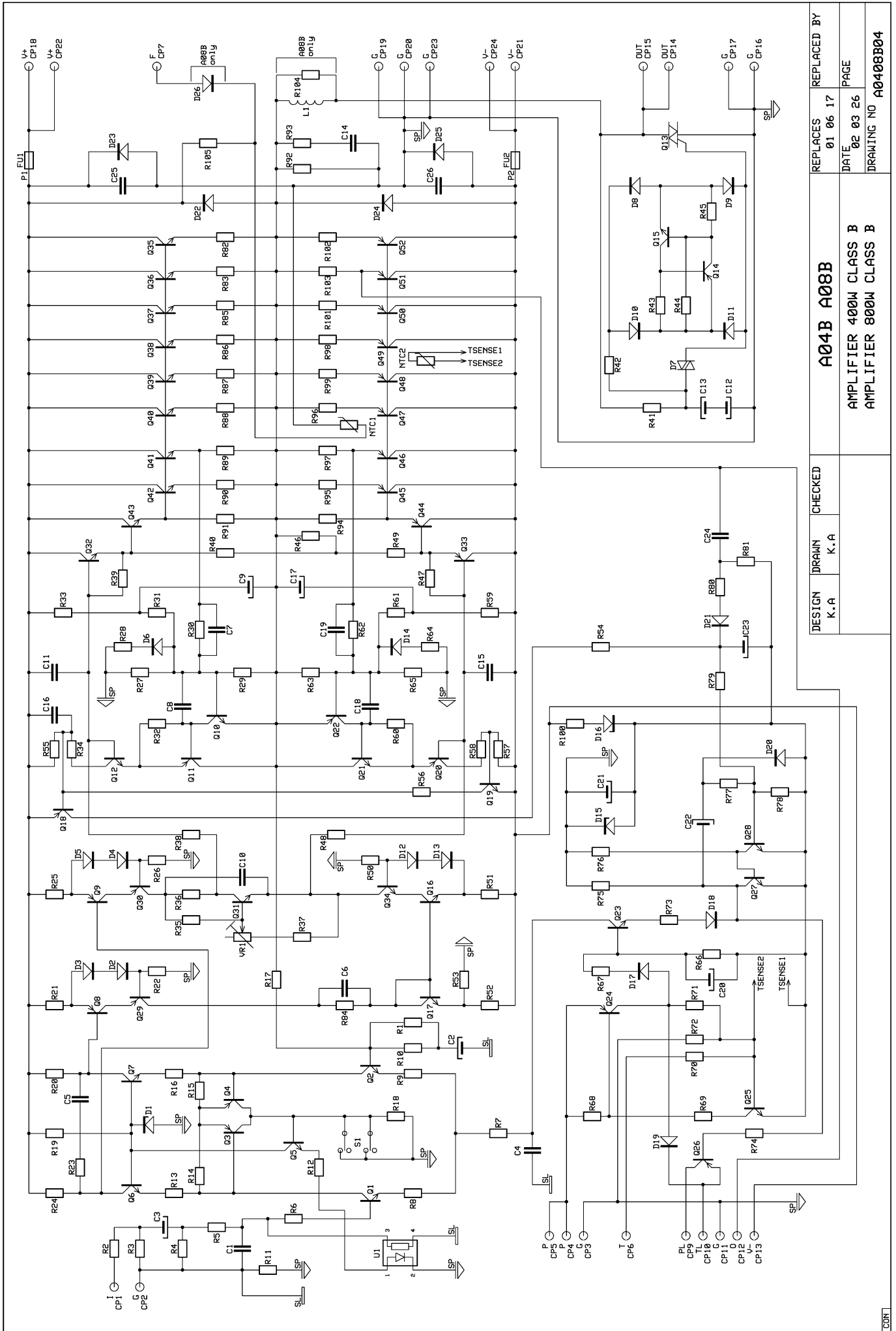
### Screws

Partnumber	Description
MRX3x10SV	Machine screw, pan head, phillips, M3x10, black
MFX3x12SV	Machine screw, countersunk head, phillips, M3x12, black
MFX3x20SV	Machine screw, countersunk head, phillips, M3x20, black
RTS-HST2.9x9.5SV	Self tapping screw, pan head, torx, 2.9x9.5mm, black
MC6S4x10FBB-SV	Hexagon socket screw, cap head, M4x10 with spring washer, black
LAB_T3x8-SV	Top / bottom cover screw, torx, M3x8, black

**A04B / A08B**

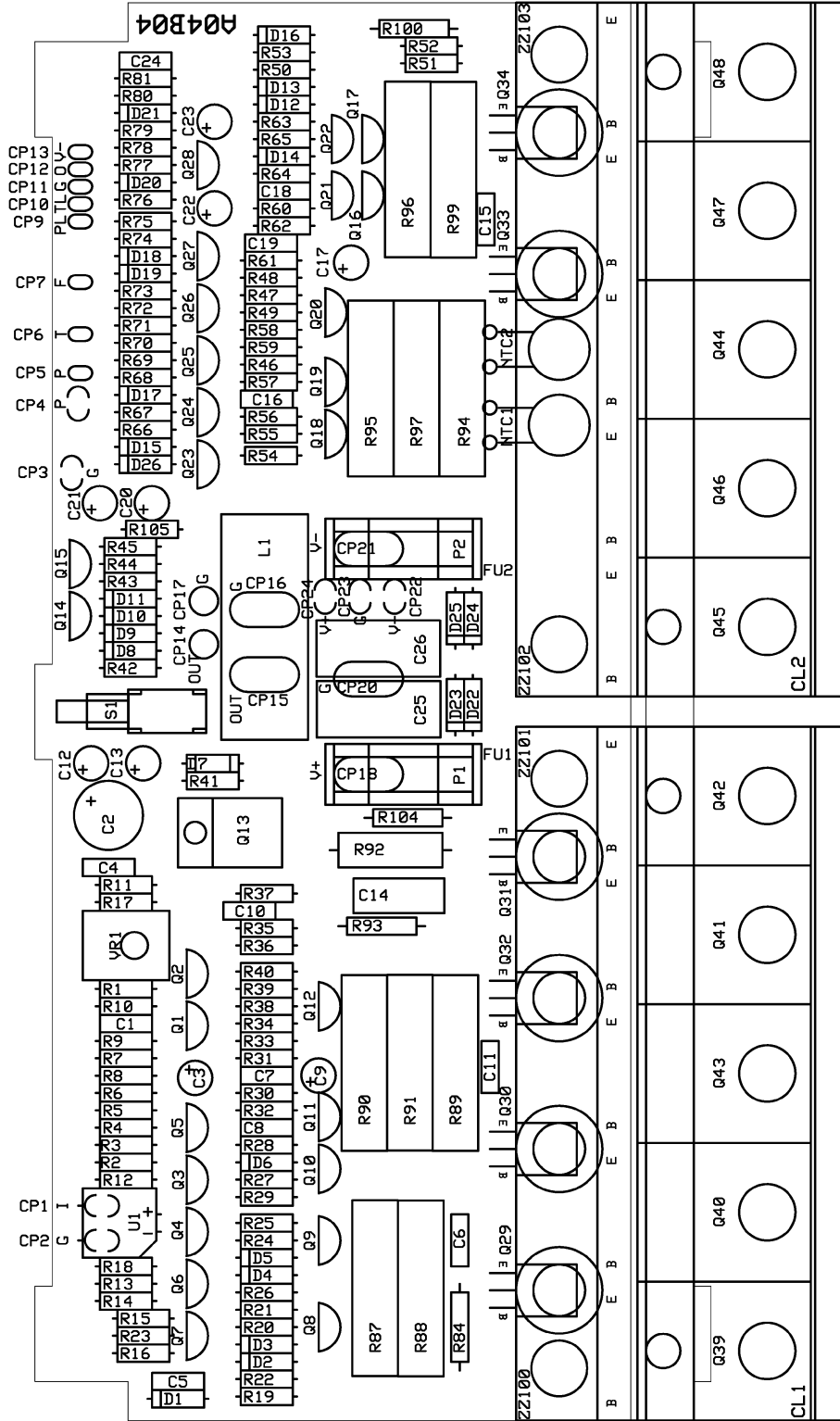
---

Schematics for A04B, A08B.....	2
Board placement for A04B .....	3
Board placement for A08B .....	4
Component list for A04B, A08B - rev 04A .....	5
Variant specific components for A04B versions - rev 04A .....	9
Variant specific components for A08B versions - rev 04A .....	9
Description for variant dependent components.....	10

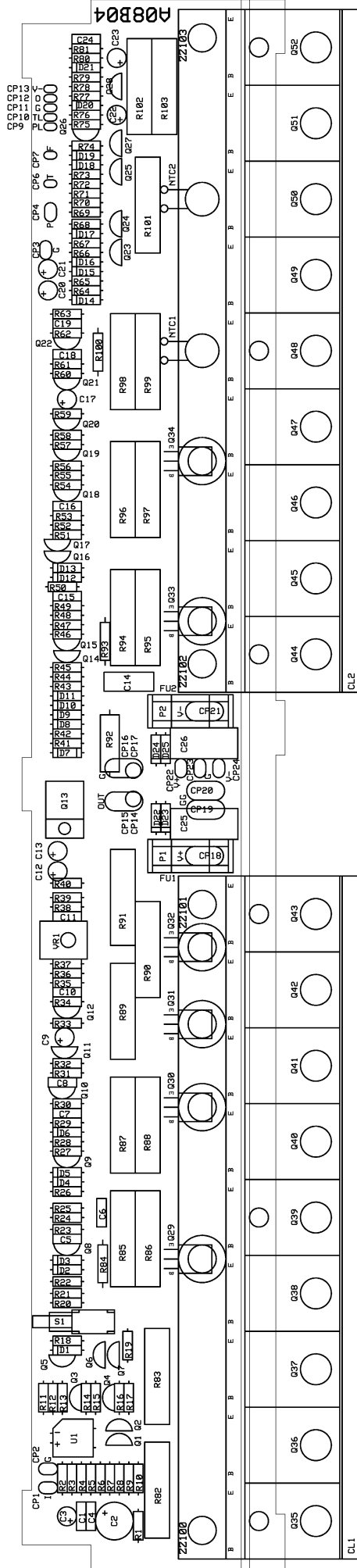


DESIGN	DRAWN	CHECKED	REPLACES	REPLACED BY
K.A	K.A		Ø1 06 17	
			DATE	PAGE
			Ø2 03 26	
			DRAWING NO A0408B04	
<b>A04B A08B</b>				
AMPLIFIER 400W CLASS B				
AMPLIFIER 800W CLASS B				





DESIGN K.A	DRAWN K.A	CHECKED	REPLACES		REPLACED BY
			A04B		01 08 20
			AMPLIFIER 400W CLASS B		DATE 02 03 26
					PAGE
			DRAWING NO		A04B04-P



DESIGN K.A	DRAWN K.A	CHECKED	A08B	REPLACES 01 08 20	REPLACED BY
			AMPLIFIER 800W CLASS B	DATE 02 03 26	PAGE
				DRAWING NO	A08B04-P

## Component list for A04B, A08B - rev 04A

⚠ - Safety critical component. Should only be replaced with the specified type.

	Position	Partnumber	Description	Comment	Side
	C1	150p100VNP05%5	Capacitor ceramic 150p 100V NP0 5% 5mm		Top
	C2	470u16V	Capacitor electrolytic 470u 16V 5mm		Top
	C3	47u25V	Capacitor electrolytic 47u 25V 5mm		Top
	C4	1n250VMMK5	Capacitor polyester 1n 250V MMK 5mm		Top
	C5	680p400VK20005%5	Capacitor ceramic 680p 400V K2000 5% 5mm		Top
	C6	10n250VMMK5	Capacitor polyester 10n 250V MMK 5mm		Top
	C7	1n250VMMK5	Capacitor polyester 1n 250V MMK 5mm		Top
	C8	470p200VNP05%5	Capacitor ceramic 470p 200V NP0 5% 5mm		Top
	C9	2u2100V	Capacitor electrolytic 2u2 100V 5mm		Top
	C10	10n250VMMK5	Capacitor polyester 10n 250V MMK 5mm		Top
	C11	100p200VNP05%5	Capacitor ceramic 100p 200V NP0 5% 5mm		Top
	C12	10u50V	Capacitor electrolytic 10u 50V 5mm		Top
	C13	10u50V	Capacitor electrolytic 10u 50V 5mm		Top
	C14	22n250VMMK10	Capacitor polyester 22n 250V MMK 10mm		Top
	C15	22p200VNP05%5	Capacitor ceramic 22p 200V NP0 5% 5mm		Top
	C16	33n100VMMK5	Capacitor polyester 33n 100V MMK 5mm		Top
	C17	2u2100V	Capacitor electrolytic 2u2 100V 5mm		Top
	C18	470p200VNP05%5	Capacitor ceramic 470p 200V NP0 5% 5mm		Top
	C19	1n250VMMK5	Capacitor polyester 1n 250V MMK 5mm		Top
	C20	10u50V	Capacitor electrolytic 10u 50V 5mm		Top
	C21	10u50V	Capacitor electrolytic 10u 50V 5mm		Top
	C22	10u50V	Capacitor electrolytic 10u 50V 5mm		Top
	C23	4u750V	Capacitor electrolytic 4u7 50V 5mm		Top
	C24	39p200VNP05%5	Capacitor ceramic 39p 200V NP0 5% 5mm		Top
⚠	C25	2u2100VMMK15	Capacitor polyester 2u2 100V MMK 15mm		Top
⚠	C26	2u2100VMMK15	Capacitor polyester 2u2 100V MMK 15mm		Top
	D1	15V.4W5%	Diode zener 15V .4W 5%		Top
	D2	1N4148	Diode signal 1N4148		Top
	D3	1N4148	Diode signal 1N4148		Top
	D4	1N4148	Diode signal 1N4148		Top
	D5	1N4148	Diode signal 1N4148		Top
	D6	BAV21	Diode signal BAV21		Top
	D7	-	Not used		Top
	D8	1N4148	Diode signal 1N4148		Top
	D9	1N4148	Diode signal 1N4148		Top
	D10	1N4148	Diode signal 1N4148		Top
	D11	1N4148	Diode signal 1N4148		Top
	D12	1N4148	Diode signal 1N4148		Top
	D13	1N4148	Diode signal 1N4148		Top
	D14	BAV21	Diode signal BAV21		Top
	D15	15V.4W5%	Diode zener 15V .4W 5%		Top
	D16	15V.4W5%	Diode zener 15V .4W 5%		Top
	D17	1N4148	Diode signal 1N4148		Top
	D18	1N4148	Diode signal 1N4148		Top
	D19	1N4148	Diode signal 1N4148		Top
	D20	1N4148	Diode signal 1N4148		Top
	D21	BAV21	Diode signal BAV21		Top
	D22	1N4004	Diode power 1N4004		Top
	D23	1N4004	Diode power 1N4004		Top
	D24	1N4004	Diode power 1N4004		Top
	D25	1N4004	Diode power 1N4004		Top
	D26		Variant dependent, see separate list		Top

	Position	Partnumber	Description	Comment	Side
⚠	FU1		Variant dependent, see separate list		Top
⚠	FU2		Variant dependent, see separate list		Top
	L1		Variant dependent, see separate list		Top
	NTC1	NTC150KM3_EPC	Resistor NTC 150K M3 EPCOS B57045-K154-K		Top
	NTC2	NTC150KM3_EPC	Resistor NTC 150K M3 EPCOS B57045-K154-K		Top
	P1	FBPC5x209M	Fuseblock PCB 5x20mm fuse 9 modules		Top
	P2	FBPC5x209M	Fuseblock PCB 5x20mm fuse 9 modules		Top
	Q1	BC549C	Transistor bipolar signal BC549C		Top
	Q2	BC549C	Transistor bipolar signal BC549C		Top
	Q3	BC557B	Transistor bipolar signal BC557B		Top
	Q4	BC557B	Transistor bipolar signal BC557B		Top
	Q5	BC547B	Transistor bipolar signal BC547B		Top
	Q6	MPSA42	Transistor bipolar signal MPSA42		Top
	Q7	MPSA42	Transistor bipolar signal MPSA42		Top
	Q8	BC557B	Transistor bipolar signal BC557B		Top
	Q9	BC557B	Transistor bipolar signal BC557B		Top
	Q10	BC547B	Transistor bipolar signal BC547B		Top
	Q11	BC557B	Transistor bipolar signal BC557B		Top
	Q12	MPSA42	Transistor bipolar signal MPSA42		Top
	Q13	Q6015L5LY	Triac Q6015L5 lying		Top
	Q14	BC557B	Transistor bipolar signal BC557B		Top
	Q15	BC547B	Transistor bipolar signal BC547B		Top
	Q16	BC547B	Transistor bipolar signal BC547B		Top
	Q17	BC547B	Transistor bipolar signal BC547B		Top
	Q18	MPSA92	Transistor bipolar signal MPSA92		Top
	Q19	MPSA42	Transistor bipolar signal MPSA42		Top
	Q20	MPSA92	Transistor bipolar signal MPSA92		Top
	Q21	BC547B	Transistor bipolar signal BC547B		Top
	Q22	BC557B	Transistor bipolar signal BC557B		Top
	Q23	BC547B	Transistor bipolar signal BC547B		Top
	Q24	BC557B	Transistor bipolar signal BC557B		Top
	Q25	BC547B	Transistor bipolar signal BC547B		Top
	Q26	BC557B	Transistor bipolar signal BC557B		Top
	Q27	BC547B	Transistor bipolar signal BC547B		Top
	Q28	BC547B	Transistor bipolar signal BC547B		Top
	Q29	MJE350LY	Transistor bipolar power MJE350 lying		Top
	Q30	MJE350LY	Transistor bipolar power MJE350 lying		Top
	Q31	BD329LY	Transistor bipolar power BD329 lying		Top
	Q32	MJE340LY	Transistor bipolar power MJE340 lying		Top
	Q33	MJE350LY	Transistor bipolar power MJE350 lying		Top
	Q34	MJE340LY	Transistor bipolar power MJE340 lying		Top
	Q35	-	Not used		Bot.
	Q36		Variant dependent, see separate list	May have different value	Bot.
	Q37		Variant dependent, see separate list	May have different value	Bot.
	Q38		Variant dependent, see separate list	May have different value	Bot.
	Q39	-	Not used		Bot.
	Q40	MJL21194_SA	Transistor bipolar power MJL21194 surface mounted	May have different value	Bot.
	Q41	MJL21194_SA	Transistor bipolar power MJL21194 surface mounted	May have different value	Bot.
	Q42		Variant dependent, see separate list	May have different value	Bot.

	Position	Partnumber	Description	Comment	Side
	Q43	MJL3281_SA	Transistor bipolar power MJL3281 surface mounted	May have different value	Bot.
	Q44	MJL1302_SA	Transistor bipolar power MJL1302 surface mounted	May have different value	Bot.
	Q45		Variant dependent, see separate list	May have different value	Bot.
	Q46	MJL21193_SA	Transistor bipolar power MJL21193 surface mounted	May have different value	Bot.
	Q47	MJL21193_SA	Transistor bipolar power MJL21193 surface mounted	May have different value	Bot.
	Q48	-	Not used		Bot.
	Q49		Variant dependent, see separate list	May have different value	Bot.
	Q50		Variant dependent, see separate list	May have different value	Bot.
	Q51		Variant dependent, see separate list	May have different value	Bot.
	Q52	-	Not used		Bot.
	R1	-	Not used		Top
	R2	2K7.7W1%	Resistor Metal Film 2K7.7W1%		Top
	R3	1K8.7W1%	Resistor Metal Film 1K8.7W1%		Top
	R4	15K.7W1%	Resistor Metal Film 15K.7W1%		Top
	R5	6K8.7W1%	Resistor Metal Film 6K8.7W1%		Top
	R6	1K.25W5%	Resistor Carbon Film 1K.25W5%		Top
	R7	2K2.7W1%	Resistor Metal Film 2K2.7W1%		Top
	R8	47R.25W5%	Resistor Carbon Film 47R.25W5%		Top
	R9	47R.25W5%	Resistor Carbon Film 47R.25W5%		Top
	R10	309R.7W1%	Resistor Metal Film 309R.7W1%		Top
	R11	10R.25W5%	Resistor Carbon Film 10R.25W5%		Top
	R12	1K8.25W5%	Resistor Carbon Film 1K8.25W5%		Top
	R13	6K8.7W1%	Resistor Metal Film 6K8.7W1%		Top
	R14	47K.25W5%	Resistor Carbon Film 47K.25W5%		Top
	R15	47K.25W5%	Resistor Carbon Film 47K.25W5%		Top
	R16	6K8.7W1%	Resistor Metal Film 6K8.7W1%		Top
	R17	22K.7W1%	Resistor Metal Film 22K.7W1%		Top
	R18	150K.7W1%	Resistor Metal Film 150K.7W1%	May have different value	Top
	R19	10K.7W1%SO5	Resistor Metal Film 10K.7W1% 5mm stand off		Top
	R20	3K3.7W1%	Resistor Metal Film 3K3.7W1%		Top
	R21	100R.7W1%	Resistor Metal Film 100R.7W1%		Top
	R22	82K.25W5%	Resistor Carbon Film 82K.25W5%		Top
	R23	1K8.25W5%	Resistor Carbon Film 1K8.25W5%		Top
	R24	3K3.7W1%	Resistor Metal Film 3K3.7W1%		Top
	R25	100R.7W1%	Resistor Metal Film 100R.7W1%		Top
	R26	82K.25W5%	Resistor Carbon Film 82K.25W5%		Top
	R27	294K.7W1%	Resistor Metal Film 294K.7W1%		Top
	R28	150K.7W1%	Resistor Metal Film 150K.7W1%		Top
	R29	499R.7W1%	Resistor Metal Film 499R.7W1%		Top
	R30	3K3.7W1%	Resistor Metal Film 3K3.7W1%		Top
	R31	68K.7W1%	Resistor Metal Film 68K.7W1%		Top
	R32	5K6.25W5%	Resistor Carbon Film 5K6.25W5%		Top
	R33	68K.7W1%	Resistor Metal Film 68K.7W1%		Top
	R34	47K.25W5%	Resistor Carbon Film 47K.25W5%		Top
	R35	3K3.7W1%	Resistor Metal Film 3K3.7W1%		Top
	R36	47R.25W5%	Resistor Carbon Film 47R.25W5%		Top
	R37	560R.25W5%	Resistor Carbon Film 560R.25W5%		Top

	Position	Partnumber	Description	Comment	Side
	R38	180R.25W5%	Resistor Carbon Film 180R.25W5%		Top
	R39	1K8.25W5%	Resistor Carbon Film 1K8.25W5%		Top
	R40	47R.25W5%	Resistor Carbon Film 47R.25W5%		Top
	R41	330K.7W1%	Resistor Metal Film 330K.7W1%		Top
	R42	47R.25W5%	Resistor Carbon Film 47R.25W5%		Top
	R43	22K.25W5%	Resistor Carbon Film 22K.25W5%		Top
	R44	390K.25W5%	Resistor Carbon Film 390K.25W5%		Top
	R45	22K.25W5%	Resistor Carbon Film 22K.25W5%		Top
	R46	220R.25W5%	Resistor Carbon Film 220R.25W5%		Top
	R47	1K8.25W5%	Resistor Carbon Film 1K8.25W5%		Top
	R48	220R.25W5%	Resistor Carbon Film 220R.25W5%		Top
	R49	47R.25W5%	Resistor Carbon Film 47R.25W5%		Top
	R50	82K.25W5%	Resistor Carbon Film 82K.25W5%		Top
	R51	100R.7W1%	Resistor Metal Film 100R.7W1%		Top
	R52	100R.7W1%	Resistor Metal Film 100R.7W1%		Top
	R53	82K.25W5%	Resistor Carbon Film 82K.25W5%		Top
	R54	33K.7W1%	Resistor Metal Film 33K.7W1%		Top
	R55	1K8.25W5%	Resistor Carbon Film 1K8.25W5%		Top
	R56	100K.7W1%	Resistor Metal Film 100K.7W1%		Top
	R57	1K8.25W5%	Resistor Carbon Film 1K8.25W5%		Top
	R58	47K.25W5%	Resistor Carbon Film 47K.25W5%		Top
	R59	68K.7W1%	Resistor Metal Film 68K.7W1%		Top
	R60	5K6.25W5%	Resistor Carbon Film 5K6.25W5%		Top
	R61	68K.7W1%	Resistor Metal Film 68K.7W1%		Top
	R62	3K3.7W1%	Resistor Metal Film 3K3.7W1%		Top
	R63	499R.7W1%	Resistor Metal Film 499R.7W1%		Top
	R64	150K.7W1%	Resistor Metal Film 150K.7W1%		Top
	R65	294K.7W1%	Resistor Metal Film 294K.7W1%		Top
	R66	56K.7W1%	Resistor Metal Film 56K.7W1%		Top
	R67	100K.7W1%	Resistor Metal Film 100K.7W1%		Top
	R68	5K6.25W5%	Resistor Carbon Film 5K6.25W5%		Top
	R69	33K.7W1%	Resistor Metal Film 33K.7W1%		Top
	R70		Variant dependent, see separate list		Top
	R71	2M2.25W5%	Resistor Carbon Film 2M2.25W5%		Top
	R72		Variant dependent, see separate list		Top
	R73	4K32.7W1%	Resistor Metal Film 4K32.7W1%		Top
	R74	33K.7W1%	Resistor Metal Film 33K.7W1%		Top
	R75	56K.7W1%	Resistor Metal Film 56K.7W1%		Top
	R76	56K.7W1%	Resistor Metal Film 56K.7W1%		Top
	R77	180K.7W1%	Resistor Metal Film 180K.7W1%		Top
	R78	100K.7W1%	Resistor Metal Film 100K.7W1%		Top
	R79	100K.7W1%	Resistor Metal Film 100K.7W1%		Top
	R80	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R81	5K6.25W5%	Resistor Carbon Film 5K6.25W5%		Top
	R82	-	Not used		Top
	R83		Variant dependent, see separate list		Top
	R84	6K82W5%SO5	Resistor metal film 6K8 2W 5% 5mm stand off		Top
	R85		Variant dependent, see separate list		Top
	R86		Variant dependent, see separate list		Top
	R87	-	Not used		Top
	R88	R335W10%	Resistor wirewound R33 5W 10%		Top
	R89	R335W10%	Resistor wirewound R33 5W 10%		Top
	R90		Variant dependent, see separate list		Top
	R91	4R75W5%	Resistor wirewound 4R7 5W 5%		Top
	R92	4K73W5%	Resistor metal film 4K7 3W 5%		Top

	Position	Partnumber	Description	Comment	Side
	R93	10R2W5%	Resistor metal film 10R 2W 5%		Top
	R94	4R75W5%	Resistor wirewound 4R7 5W 5%		Top
	R95		Variant dependent, see separate list		Top
	R96	R335W10%	Resistor wirewound R33 5W 10%		Top
	R97	R335W10%	Resistor wirewound R33 5W 10%		Top
	R98		Variant dependent, see separate list		Top
	R99	-	Not used		Top
	R100		Variant dependent, see separate list		Top
	R101		Variant dependent, see separate list		Top
	R102	-	Not used		Top
	R103		Variant dependent, see separate list		Top
	R104		Variant dependent, see separate list		Top
	R105		Variant dependent, see separate list		Top
	S1	SPPJ32F29A_ALP	Switch inter locking PCB DPDT ALPS SPPJ32F29A		Top
	U1	VTL5C4	IC photocoupler VTL5C4		Top
	VR1	VR220RLY2X3M	Trim potentiometer 220R lying 2x3modules		Top

### Variant specific components for A04B versions - rev 04A

	Position	A04B-3-2	A04B-4.5-2	A04B-6-2
	D26	1N4148	1N4148	1N4148
⚠	FU1	T6A3250-5x20	T10A250-5x20	T10A250-5x20
⚠	FU2	T6A3250-5x20	T10A250-5x20	T10A250-5x20
	L1	1u2HD1.4_LAB	1u2HD1.4_LAB	1u2HD1.4_LAB
	Q36	-	-	-
	Q37	-	-	-
	Q38	-	-	-
	Q42	-	MJL21194_SA	MJL21194_SA
	Q45	-	MJL21193_SA	MJL21193_SA
	Q49	-	-	-
	Q50	-	-	-
	Q51	-	-	-
	R70	200K.7W1%	294K.7W1%	294K.7W1%
	R72	-	-	270K.7W1%
	R83	-	-	-
	R85	-	-	-
	R86	-	-	-
	R90	-	R335W10%	R335W10%
	R95	-	R335W10%	R335W10%
	R98	-	-	-
	R100	5K62W5%	5K62W5%	5K62W5%
	R101	-	-	-
	R103	-	-	-
	R104	10R2W5%	10R2W5%	10R2W5%
	R105	390K.7W1%	390K.7W1%	390K.7W1%

### Variant specific components for A08B versions - rev 04A

	Position	A08B-6.5-2	A08B-10-2	A08B-11-2	A08B-13-2
	D26	-	-	-	-
⚠	FU1	T10A250-5x20	T15A250-5x20	T10A250-5x20	T15A250-5x20
⚠	FU2	T10A250-5x20	T15A250-5x20	T10A250-5x20	T15A250-5x20
	L1	-	-	-	-

	Position	A08B-6.5-2	A08B-10-2	A08B-11-2	A08B-13-2
	Q36	MJL21194_SA	MJL21194_SA	MJL21194_SA	MJL21194_SA
	Q37	MJL21194_SA	MJL21194_SA	MJL21194_SA	MJL21194_SA
	Q38	-	MJL21194_SA	MJL21194_SA	MJL21194_SA
	Q42	-	MJL21194_SA	-	MJL21194_SA
	Q45	-	MJL21193_SA	-	MJL21193_SA
	Q49	-	MJL21193_SA	MJL21193_SA	MJL21193_SA
	Q50	MJL21193_SA	MJL21193_SA	MJL21193_SA	MJL21193_SA
	Q51	MJL21193_SA	MJL21193_SA	MJL21193_SA	MJL21193_SA
	R70	220K.7W1%	180K.7W1%	220K.7W1%	180K.7W1%
	R72	-	-	220K.7W1%	270K.7W1%
	R83	R335W10%	R335W10%	R335W10%	R335W10%
	R85	R335W10%	R335W10%	R335W10%	R335W10%
	R86	-	R335W10%	R335W10%	R335W10%
	R90	-	R335W10%	-	R335W10%
	R95	-	R335W10%	-	R335W10%
	R98	-	R335W10%	R335W10%	R335W10%
	R100	12K2W5%	12K2W5%	12K2W5%	12K2W5%
	R101	R335W10%	R335W10%	R335W10%	R335W10%
	R103	R335W10%	R335W10%	R335W10%	R335W10%
	R104	-	-	-	-
	R105	-	-	-	-

## Description for variant dependent components

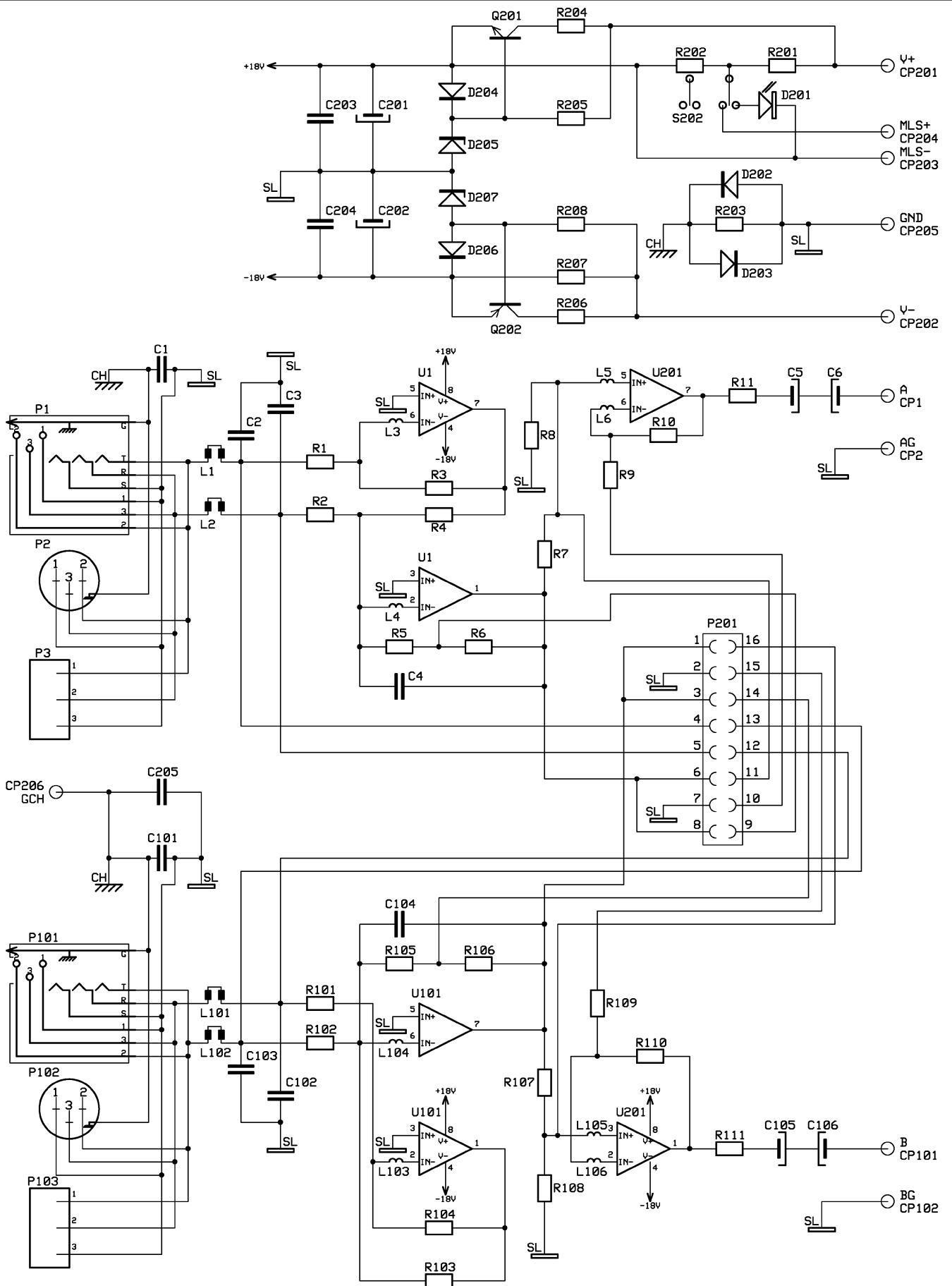
Partnumber	Description
10R2W5%	Resistor metal film 10R 2W 5%
12K2W5%	Resistor metal film 12K 2W 5%
180K.7W1%	Resistor Metal Film 180K.7W1%
1N4148	Diode signal 1N4148
1u2HD1.4_LAB	Inductor 1,2uH axial LAB. Rev 01
200K.7W1%	Resistor Metal Film 200K.7W1%
220K.7W1%	Resistor Metal Film 220K.7W1%
270K.7W1%	Resistor Metal Film 270K.7W1%
294K.7W1%	Resistor Metal Film 294K.7W1%
390K.7W1%	Resistor Metal Film 390K.7W1%
5K62W5%	Resistor metal film 5K6 2W 5%
MJL21193_SA	Transistor bipolar power MJL21193 surface mounted
MJL21194_SA	Transistor bipolar power MJL21194 surface mounted
R335W10%	Resistor wirewound R33 5W 10%
T10A250-5x20	Fuse slow blow 10A 250V 5x20mm
T15A250-5x20	Fuse slow blow 15A 250V 5x20mm
T6A3250-5x20	Fuse slow blow 6.3A 250V 5x20mm



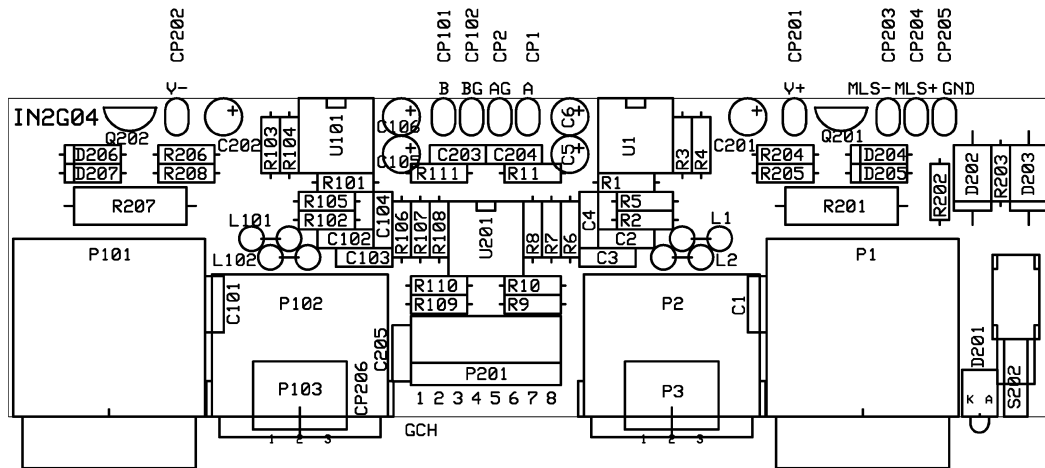
**IN2G**

---

Schematics for IN2G.....	2
Board placement for IN2G.....	3
Component list for IN2G - rev 04.....	4
Variant specific components.....	5
Description for variant dependent components.....	5



CON			<b>IN2G</b>	REPLACES	REPLACED BY
DESIGN	DRAWN	CHECKED		01 05 14	
K.A	K.A		DATE	PAGE	
			2 CHANNEL INPUT AMPLIFIER	02 03 13	
			GAIN SWITCH	DRAWING NO	IN2G04



DESIGN K.A	DRAWN K.A	CHECKED	<b>IN2G</b>  2 CHANNEL INPUT AMPLIFIER GAIN SWITCH	REPLACES 01 05 14	REPLACED BY
				DATE 02 03 13	PAGE
				DRAWING NO	IN2G04-P

## Component list for IN2G - rev 04

⚠ - Safety critical component. Should only be replaced with the specified type.

	Position	Partnumber	Description	Comment	Side
	C1	100n63VMMK5	Capacitor polyester 100n 63V MMK 5mm		Top
	C2	22p200VNP05%5	Capacitor ceramic 22p 200V NP0 5% 5mm		Top
	C3	22p200VNP05%5	Capacitor ceramic 22p 200V NP0 5% 5mm		Top
	C4	22p200VNP05%5	Capacitor ceramic 22p 200V NP0 5% 5mm		Top
	C5	22u50V	Capacitor electrolytic 22u 50V 5mm		Top
	C6	22u50V	Capacitor electrolytic 22u 50V 5mm		Top
	C101	100n63VMMK5	Capacitor polyester 100n 63V MMK 5mm		Top
	C102	22p200VNP05%5	Capacitor ceramic 22p 200V NP0 5% 5mm		Top
	C103	22p200VNP05%5	Capacitor ceramic 22p 200V NP0 5% 5mm		Top
	C104	22p200VNP05%5	Capacitor ceramic 22p 200V NP0 5% 5mm		Top
	C105	22u50V	Capacitor electrolytic 22u 50V 5mm		Top
	C106	22u50V	Capacitor electrolytic 22u 50V 5mm		Top
	C201	22u50V	Capacitor electrolytic 22u 50V 5mm		Top
	C202	22u50V	Capacitor electrolytic 22u 50V 5mm		Top
	C203	10n250VMMK5	Capacitor polyester 10n 250V MMK 5mm		Top
	C204	10n250VMMK5	Capacitor polyester 10n 250V MMK 5mm		Top
	C205	100n50VY5W5%5	Capacitor ceramic 100n 50V Y5W 5% 5mm		Top
	D201		Variant dependent, see separate list		Top
	D202	1N5404	Diode power 1N5404		Top
	D203	1N5404	Diode power 1N5404		Top
	D204	1N4148	Diode signal 1N4148		Top
	D205	18V1.3W5%	Diode zener 18V 1.3W 5%		Top
	D206	1N4148	Diode signal 1N4148		Top
	D207	18V1.3W5%	Diode zener 18V 1.3W 5%		Top
	L1	L2xBEAD2M	Inductor bead double 2 modules		Top
	L2	L2xBEAD2M	Inductor bead double 2 modules		Top
	L101	L2xBEAD2M	Inductor bead double 2 modules		Top
	L102	L2xBEAD2M	Inductor bead double 2 modules		Top
	P1	NCJ6FI-H_NEU	Connector XLR/J 3pole female+jack 90dg NEUTRIK NCJ6FI-H		Top
	P2		Variant dependent, see separate list		Top
	P3		Variant dependent, see separate list		Top
	P101	NCJ6FI-H_NEU	Connector XLR/J 3pole female+jack 90dg NEUTRIK NCJ6FI-H		Top
	P102		Variant dependent, see separate list		Top
	P103		Variant dependent, see separate list		Top
	P201	16PDILV2.5X2.5	DIL16V		Top
	Q201	MPSA42	Transistor bipolar signal MPSA42		Top
	Q202	MPSA92	Transistor bipolar signal MPSA92		Top
	R1	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R2	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R3	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R4	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R5	5K49.7W1%	Resistor Metal Film 5K49.7W1%		Top
	R6	16K5.7W1%	Resistor Metal Film 16K5.7W1%		Top
	R7	2K.7W1%	Resistor Metal Film 2K.7W1%		Top
	R8	4K7.7W1%	Resistor Metal Film 4K7.7W1%		Top
	R9	4K7.7W1%	Resistor Metal Film 4K7.7W1%		Top
	R10	4K7.7W1%	Resistor Metal Film 4K7.7W1%		Top
	R11	47R.25W5%	Resistor Carbon Film 47R.25W5%		Top
	R101	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R102	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R103	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R104	10K.7W1%	Resistor Metal Film 10K.7W1%		Top

	Position	Partnumber	Description	Comment	Side
	R105	5K49.7W1%	Resistor Metal Film 5K49.7W1%		Top
	R106	16K5.7W1%	Resistor Metal Film 16K5.7W1%		Top
	R107	2K.7W1%	Resistor Metal Film 2K.7W1%		Top
	R108	4K7.7W1%	Resistor Metal Film 4K7.7W1%		Top
	R109	4K7.7W1%	Resistor Metal Film 4K7.7W1%		Top
	R110	4K7.7W1%	Resistor Metal Film 4K7.7W1%		Top
	R111	47R.25W5%	Resistor Carbon Film 47R.25W5%		Top
	R201	4K73W5%	Resistor metal film 4K7 3W 5%		Top
	R202	470R.7W1%	Resistor Metal Film 470R.7W1%		Top
	R203	10R.25W5%	Resistor Carbon Film 10R.25W5%		Top
	R204	1K.7W1%	Resistor Metal Film 1K.7W1%		Top
	R205	18K.7W1%	Resistor Metal Film 18K.7W1%		Top
	R206	1K.7W1%	Resistor Metal Film 1K.7W1%		Top
	R207	4K73W5%	Resistor metal film 4K7 3W 5%		Top
	R208	18K.7W1%	Resistor Metal Film 18K.7W1%		Top
	S202		Variant dependent, see separate list		Top
	U1	MC33078	IC Operational amplifier MC33078		Top
	U101	MC33078	IC Operational amplifier MC33078		Top
	U201	NE5532	IC Operational amplifier NE5532		Top

## Variant specific components

	Position	IN2G-CBG	IN2G-CXG	IN2G-CXGM
	D201	-	-	LREDD3_EVE
	P2	-	NC3MA-H_NEU	NC3MA-H_NEU
	P3	TBPI3P90M_SAU	-	-
	P102	-	NC3MA-H_NEU	NC3MA-H_NEU
	P103	TBPI3P90M_SAU	-	-
	S202	-	-	SPPJ32F29A_ALP

## Description for variant dependent components

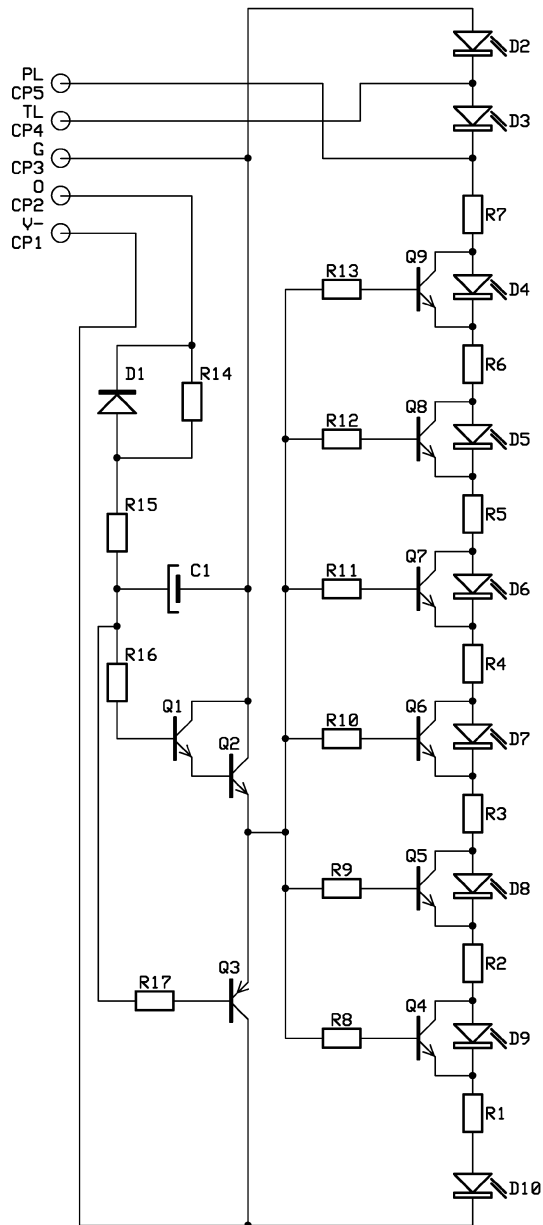
Partnumber	Description
LREDD3_EVE	Diode LED Red D3 lying EVERLIGHT A264B
NC3MA-H_NEU	Connector XLR 3pole male 90dg NEUTRIK NC3MA-H
SPPJ32F29A_ALP	Switch inter locking PCB DPDT ALPS SPPJ32F29A
TBPI3P90M_SAU	Terminal block plug in 3pole 90dg male 3.81mm Sauro CTM039PT

**LD92**

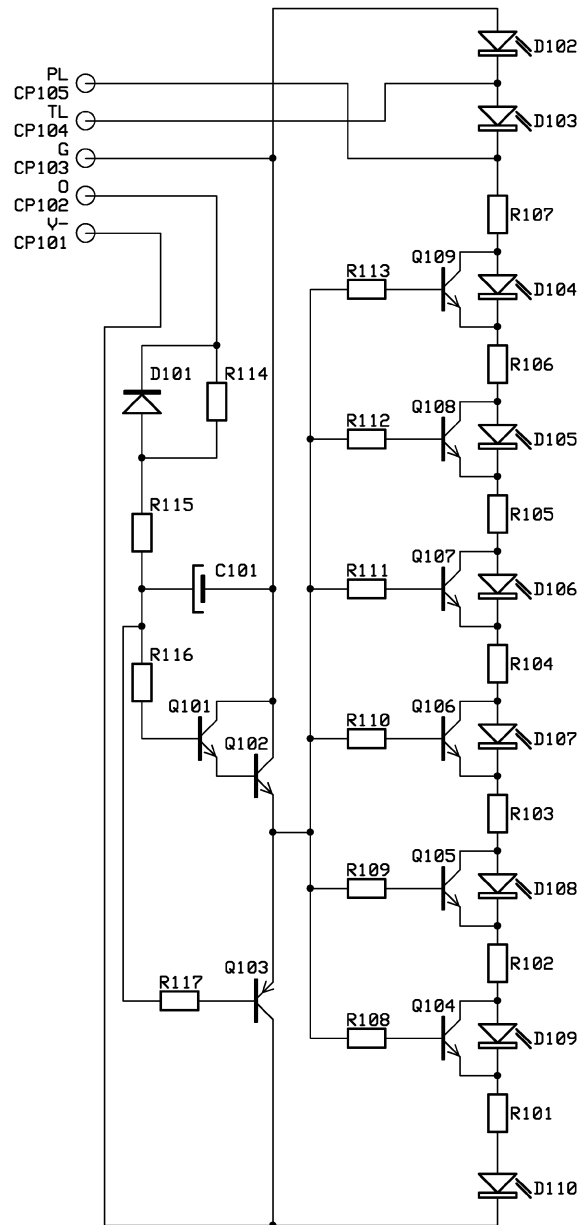
---

Schematics for LD92 .....	2
Board placement for LD92.....	3
Component list for LD92 - rev 01.....	4
Variant specific components .....	5
Description for variant dependent components.....	6

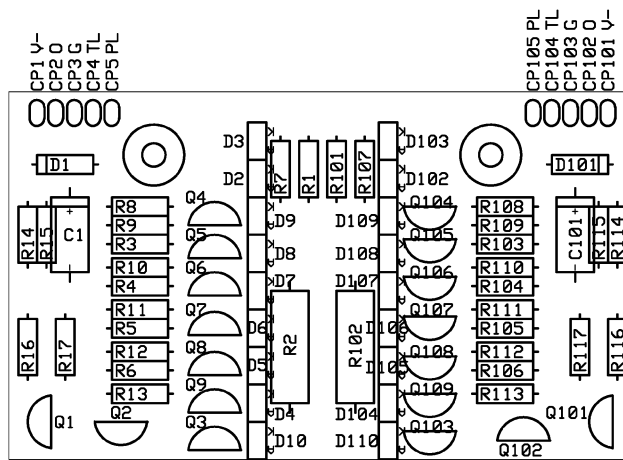
CHA



CHB



CON			<b>LD92</b>	REPLACES	REPLACED BY
DESIGN	DRAWN	CHECKED		01 03 03	
K.A	K.A		DATE	PAGE	
			02 04 15		
			DRAWING NO	LD9201	
			LED DISPLAY 9xLED 2 CHANNEL		



DESIGN K.A	DRAWN K.A	CHECKED	<b>LD92</b>	REPLACES 01 03 03	REPLACED BY
				LED DISPLAY 9xLED 2 CHANNEL	DATE 02 04 15
				DRAWING NO	LD9201-P



## Component list for LD92 - rev 01

⚠ - Safety critical component. Should only be replaced with the specified type.

	Position	Partnumber	Description	Comment	Side
	C1		Variant dependent, see separate list		Top
	C101		Variant dependent, see separate list		Top
	D1	1N4004	Diode power 1N4004		Top
	D2	LYEL2.5x5	Diode LED Yellow 2.5x5mm		Top
	D3	LYEL2.5x5	Diode LED Yellow 2.5x5mm		Top
	D4	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D5	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D6	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D7	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D8	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D9	LRED2.5x5	Diode LED Red 2.5x5mm		Top
	D10	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D101	1N4004	Diode power 1N4004		Top
	D102	LYEL2.5x5	Diode LED Yellow 2.5x5mm		Top
	D103	LYEL2.5x5	Diode LED Yellow 2.5x5mm		Top
	D104	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D105	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D106	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D107	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D108	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	D109	LRED2.5x5	Diode LED Red 2.5x5mm		Top
	D110	LGRN2.5x5	Diode LED Green 2.5x5mm		Top
	Q1	MPSA42	Transistor bipolar signal MPSA42		Top
	Q2	MPSA42	Transistor bipolar signal MPSA42		Top
	Q3	MPSA92	Transistor bipolar signal MPSA92		Top
	Q4	BC547B	Transistor bipolar signal BC547B		Top
	Q5	BC547B	Transistor bipolar signal BC547B		Top
	Q6	BC547B	Transistor bipolar signal BC547B		Top
	Q7	BC547B	Transistor bipolar signal BC547B		Top
	Q8	BC547B	Transistor bipolar signal BC547B		Top
	Q9	BC547B	Transistor bipolar signal BC547B		Top
	Q101	MPSA42	Transistor bipolar signal MPSA42		Top
	Q102	MPSA42	Transistor bipolar signal MPSA42		Top
	Q103	MPSA92	Transistor bipolar signal MPSA92		Top
	Q104	BC547B	Transistor bipolar signal BC547B		Top
	Q105	BC547B	Transistor bipolar signal BC547B		Top
	Q106	BC547B	Transistor bipolar signal BC547B		Top
	Q107	BC547B	Transistor bipolar signal BC547B		Top
	Q108	BC547B	Transistor bipolar signal BC547B		Top
	Q109	BC547B	Transistor bipolar signal BC547B		Top
	R1		Variant dependent, see separate list		Top
	R2		Variant dependent, see separate list		Top
	R3		Variant dependent, see separate list		Top
	R4		Variant dependent, see separate list		Top
	R5		Variant dependent, see separate list		Top
	R6		Variant dependent, see separate list		Top
	R7		Variant dependent, see separate list		Top
	R8		Variant dependent, see separate list		Top
	R9		Variant dependent, see separate list		Top
	R10		Variant dependent, see separate list		Top
	R11		Variant dependent, see separate list		Top
	R12		Variant dependent, see separate list		Top

	Position	Partnumber	Description	Comment	Side
	R13		Variant dependent, see separate list		Top
	R14		Variant dependent, see separate list		Top
	R15		Variant dependent, see separate list		Top
	R16	2K7.25W5%	Resistor Carbon Film 2K7.25W5%		Top
	R17	2K7.25W5%	Resistor Carbon Film 2K7.25W5%		Top
	R101		Variant dependent, see separate list		Top
	R102		Variant dependent, see separate list		Top
	R103		Variant dependent, see separate list		Top
	R104		Variant dependent, see separate list		Top
	R105		Variant dependent, see separate list		Top
	R106		Variant dependent, see separate list		Top
	R107		Variant dependent, see separate list		Top
	R108		Variant dependent, see separate list		Top
	R109		Variant dependent, see separate list		Top
	R110		Variant dependent, see separate list		Top
	R111		Variant dependent, see separate list		Top
	R112		Variant dependent, see separate list		Top
	R113		Variant dependent, see separate list		Top
	R114		Variant dependent, see separate list		Top
	R115		Variant dependent, see separate list		Top
	R116	2K7.25W5%	Resistor Carbon Film 2K7.25W5%		Top
	R117	2K7.25W5%	Resistor Carbon Film 2K7.25W5%		Top

## Variant specific components

	Position	LD92-2x13-2	LD92-2x32-2
	C1	4u7100V5x10A	2u2250V6.5x18A
	C101	4u7100V5x10A	2u2250V6.5x18A
	R1	680R.25W5%	1K2.7W1%SO5
	R2	2K73W5%	4K73W5%
	R3	1K21W5%	2K2.7W1%
	R4	680R.25W5%	1K2.7W1%
	R5	330R.25W5%	560R.25W5%
	R6	120R.25W5%	220R.25W5%
	R7	220R.25W5%	390R.25W5%
	R8	33K.25W5%	56K.25W5%
	R9	33K.25W5%	56K.25W5%
	R10	33K.25W5%	56K.25W5%
	R11	33K.25W5%	56K.25W5%
	R12	33K.25W5%	56K.25W5%
	R13	33K.25W5%	56K.25W5%
	R14	33K.25W5%	56K.25W5%
	R15	100R.7W1%	220R.25W5%
	R101	680R.25W5%	1K2.7W1%SO5
	R102	2K73W5%	4K73W5%
	R103	1K21W5%	2K2.7W1%
	R104	680R.25W5%	1K2.7W1%
	R105	330R.25W5%	560R.25W5%
	R106	120R.25W5%	220R.25W5%
	R107	220R.25W5%	390R.25W5%
	R108	33K.25W5%	56K.25W5%
	R109	33K.25W5%	56K.25W5%

	Position	LD92-2x13-2	LD92-2x32-2
	R110	33K.25W5%	56K.25W5%
	R111	33K.25W5%	56K.25W5%
	R112	33K.25W5%	56K.25W5%
	R113	33K.25W5%	56K.25W5%
	R114	33K.25W5%	56K.25W5%
	R115	100R.7W1%	220R.25W5%

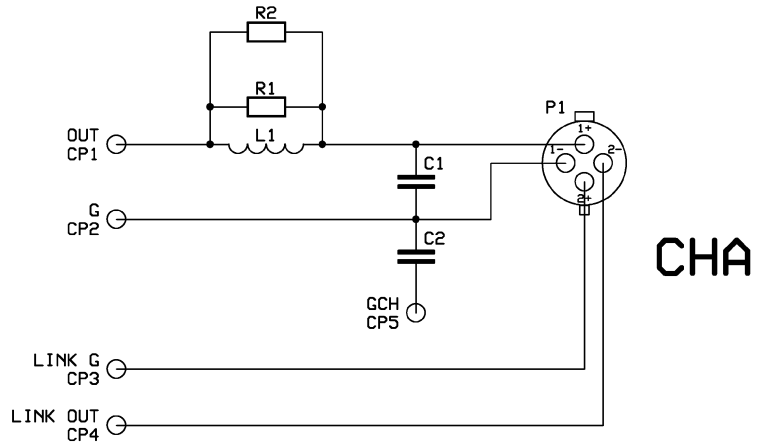
## Description for variant dependent components

Partnumber	Description
100R.7W1%	Resistor Metal Film 100R.7W1%
120R.25W5%	Resistor Carbon Film 120R.25W5%
1K2.7W1%	Resistor Metal Film 1K2.7W1%
1K2.7W1%SO5	Resistor Metal Film 1K2.7W1% 5mm stand off
1K21W5%	Resistor metal film 1K2 1W 5%
220R.25W5%	Resistor Carbon Film 220R.25W5%
2K2.7W1%	Resistor Metal Film 2K2.7W1%
2K73W5%	Resistor metal film 2K7 3W 5%
2u2250V6.5x18A	Capacitor electrolytic 2u2 250V 6.5x18mm axial
330R.25W5%	Resistor Carbon Film 330R.25W5%
33K.25W5%	Resistor Carbon Film 33K.25W5%
390R.25W5%	Resistor Carbon Film 390R.25W5%
4K73W5%	Resistor metal film 4K7 3W 5%
4u7100V5x10A	Capacitor electrolytic 4u7 100V 5x10mm axial
560R.25W5%	Resistor Carbon Film 560R.25W5%
56K.25W5%	Resistor Carbon Film 56K.25W5%
680R.25W5%	Resistor Carbon Film 680R.25W5%

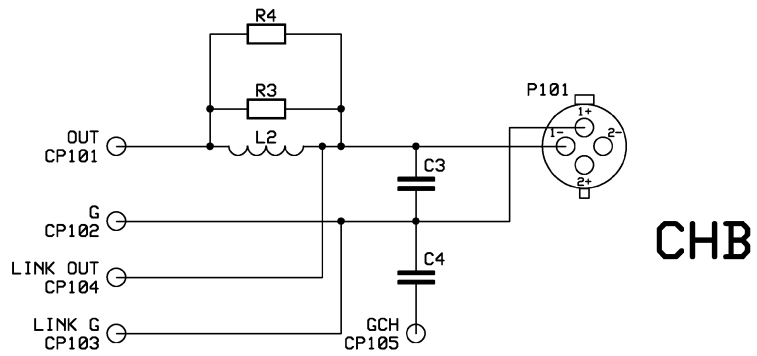
**OUT2**

---

Schematics for OUT2.....	2
Board placement for OUT2.....	3
Component list for OUT2CHA, OUT2CHB - rev 01A .....	4
Variant specific components .....	4
Description for variant dependent components.....	4

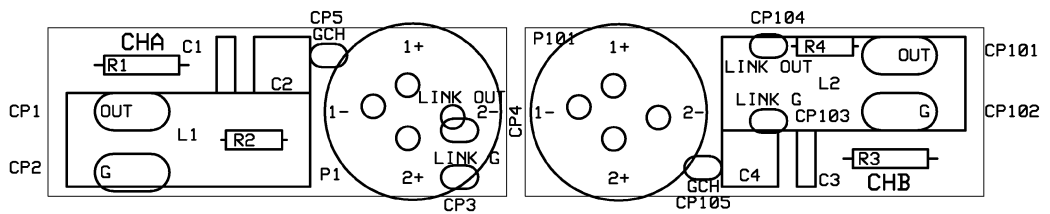


CHA



CHB

CON			<b>OUT2</b>	REPLACES	REPLACED BY
DESIGN	DRAWN	CHECKED		01 03 03	
K.A	K.A		2 CHANNEL OUTPUT CONNECTOR BOARD AB	DATE	PAGE
				02 03 14	
				DRAWING NO	OUT201



DESIGN K.A	DRAWN K.A	CHECKED	<b>OUT2</b>	REPLACES 01 03 03	REPLACED BY
				DATE 02 03 14	PAGE
			2 CHANNEL OUTPUT CONNECTOR BOARD AB	DRAWING NO	OUT201-P

## Component list for OUT2CHA, OUT2CHB - rev 01A

⚠ - Safety critical component. Should only be replaced with the specified type.

	Position	Partnumber	Description	Comment	Side
	C1	10n250VMMK5	Capacitor polyester 10n 250V MMK 5mm		Top
	C2	2u250VMMK5	Capacitor polyester 2u2 50V MMK 5mm		Top
	C3	10n250VMMK5	Capacitor polyester 10n 250V MMK 5mm		Top
	C4	2u250VMMK5	Capacitor polyester 2u2 50V MMK 5mm		Top
	L1		Variant dependent, see separate list		Top
	L2		Variant dependent, see separate list		Top
	⚠ P1	NL4MD-V_NEU	Connector speakon PCB 4pole NEUTRIK NL4MD-H		Top
	⚠ P101	NL4MD-V_NEU	Connector speakon PCB 4pole NEUTRIK NL4MD-H		Top
	⚠ R1		Variant dependent, see separate list		Top
	R2		Variant dependent, see separate list		Top
	R3		Variant dependent, see separate list		Top
	R4		Variant dependent, see separate list		Top

### Variant specific components

	Position	OUT2-A04B	OUT2-A08B
	L1	-	1u2HD1.4_LAB
	L2	-	1u2HD1.4_LAB
	R1	-	10R2W5%
	R2	R04M.6	-
	R3	-	10R2W5%
	R4	R04M.6	-

### Description for variant dependent components

Partnumber	Description
10R2W5%	Resistor metal film 10R 2W 5%
1u2HD1.4_LAB	Inductor 1,2uH axial LAB. Rev 01
R04M.6	Resistor jumper 0R 4modules D.6mm

**SP80FA / SP80FB**

---

Functional description for switch mode powersupply SP80FA & SP80FB.....	2
Schematics for SP80FA & SP80FB.....	4
Schematics for SP80FA, SP80FB & PIND.....	5
SP80FA.....	6
Board placement for SP80FA - rev 04.....	6
Board placement for SP80FA - rev 06.....	7
Component list for SP80FA - rev 06.....	8
Variant specific components for 230V versions - rev 06.....	9
Variant specific components for 115V versions - rev 06.....	10
Description for variant dependent components.....	11
SP80FB.....	12
Board placement for SP80FB & PIND.....	12
Component list for PIND, SP80FB - rev 01A.....	13
Variant specific components for 230V versions - rev 01A.....	15
Variant specific components for 115V versions - rev 01A.....	16
Description for variant dependent components.....	17



# Functional description for switch mode powersupply SP80FA & SP80FB

## Theory of function

SP80FA-board:

AC-power is coming in to terminal P1, passing interference filter L1, L2 and then reaching RE1 and R5.

In some variants the on-off switch is located directly after terminal P1, in other variants it is connected to CP5-CP7, controlling the soft start relay RE1. When the on-off switch turns in position CP5-CP6, soft start resistor R5 gives power to mains rectifier D1.

The voltage is rectified by D1 and filtered by C8, C9 and C1, C2 (SP80FB). This gives 310V DC to the transformer.

SP80FB-board:

Current generator R17, D4, Q5, R16, R10 charge C9 until D3 conduct at 15V. Q8 work as under voltage protection for the +15V voltage by turning U1:3 to 5V if U1:15 drops below 14V.

When U1:2 (under voltage protect) reach 3V soft start capacitor C10 (U1:8) is released, witch slowly increase the pulse width of U1:12.

The PWM-controller U1:12 controls the switch Q1-Q3 to give the correct output voltage at terminal CP17, CP19 (SP80FA).

When the switch Q1-Q3 is closed, current flows trough transformer, storing energy. Because of the voltage polarity, diode D3, D4 (SP80FA) are reverse-biased, thus no voltage present at the load. When the switch is open, the transformer reverses polarity because of the collapsing magnetic field, forward-biasing diode D3, D4 and inducing a current flow into the capacitors C12, C14 (SP80FA).

If U1:3 (over voltage protect) goes above 3V the pulses on pin 12 stops immediately. This occurs if the main voltage is too high, or the voltage across snubber capacitor C5 is too high.

The reversed voltage is sensed by a winding in the transformer and rectified by diode D8. The PWM-controller adjust the on-time of the switch, by comparing the voltage across C14 (U1:17) with an internal reference (U1:16), to give the right rail voltage across the capacitors C12, C14 (SP80FA). The voltage can be adjusted by potentiometer VR2.

The maximum current in the transformer is sensed over the resistor R6-R8. The voltage across R6-R8 is compared (U1:6) with a reference-voltage, set by VR3, witch make it possible to adjust the maximum output power from the power supply. Normally VR3 is in maximum position, but if something has to be repaired in the amplifier, VR3 is used for "slow starting" the amplifier.

SP80FA-board:

Immediately when Q1-Q3 (SP80FB) turn on, D2 rectify the pulse from the transformer (CP11, CP12). The DC voltage across C7 activates RE1 witch short soft start resistor R5.

To turn off the amplifier the on-off switch is set in position CP6-CP7. This disconnects R5, and open RE1, turning the amplifier off.

## Repairing instructions

REQUIRED MEASUREMENT EQUIPMENT:

- Audio generator
- Dummy load, 16 ohm
- Digital voltmeter
- Variac 0-280V, 6A
- 50Mhz oscilloscope, ex. Tek 2225 with 100x probe ex. Tek P6009
- Isolation transformer for the mains, 1:1

- 1) Turn VR3 (SP80FB) fully counter clockwise.
- 2) Change FU1 (SP80FA).
- 3) Increase the main voltage slowly by the variac.
- 4) Measure the voltage across C8 and C9 (SP80FA).
  - a) No voltage: -change R5 (SP80FA).
  - b) The current increases quickly:
    - check D1 (SP80FA).

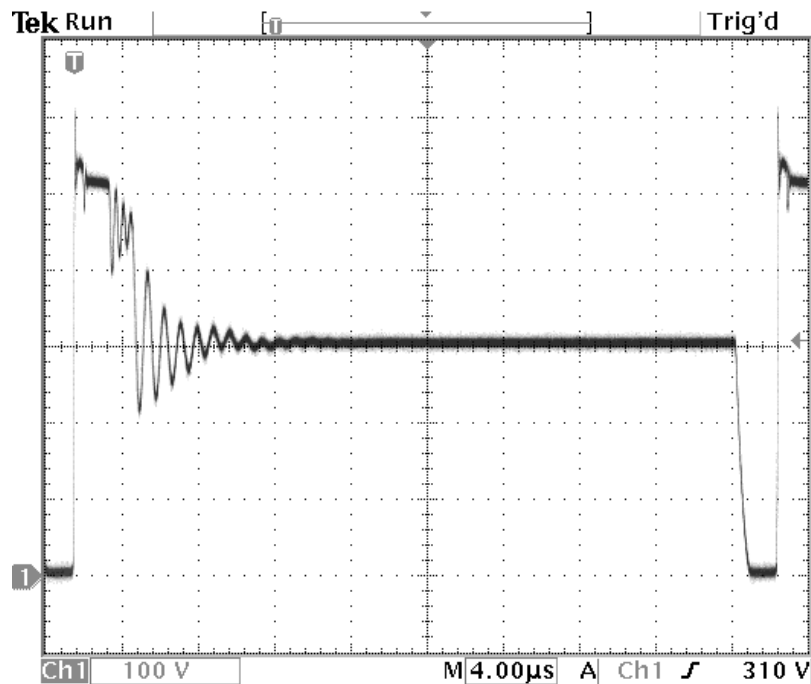
-check Q1, Q2, Q3 (SP80FB).

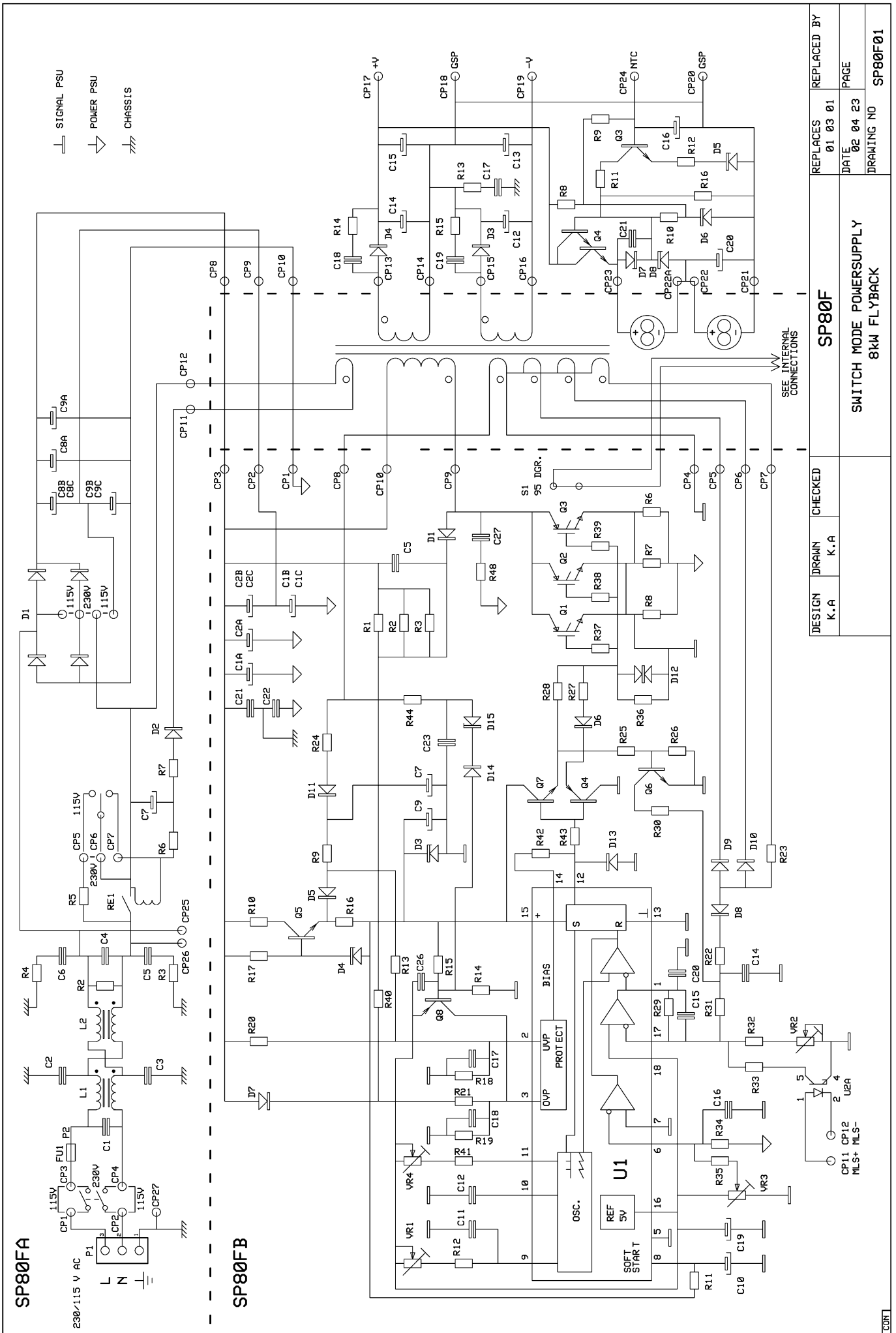
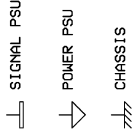
It is now possible to increase the voltage across C8 and C9 (SP80FA) to approx. 300V without current inrush.

Measure across Q1 (SP80FB) collector and emitter with an oscilloscope. This oscilloscope should be connected to mains power with an isolation transformer.

- 7) Turn VR3 slowly clockwise until a pulse is visible on the scope. The frequency is approx. 27 kHz (see figure1). If the graph is seen, go to item 9).
- 8) If only narrow spikes is seen, check the following components.
  - a) D3, D4 (SP80FA) or the output circuits.
  - b) D1, C5, R1 (SP80FA) -makes U1 go into over voltage protection.
  - c) U1 -the output will remain low all the time.
- 9) Turn VR3 fully clockwise:
  - a) Check the output voltage on C12, C14 (SP80FA). Adjust with VR2.
  - b) Check the soft start circuit by turning the main switch on and off and look at the oscilloscope.
  - c) Increase the power by applying an audio signal to the amplifier and turn up the gain controls. -The pulse width will increase.
  - d) Check the over/ under voltage protection circuits by turning the variac up to 280 VAC and down to 130 VAC. (No load)

Fig. 1

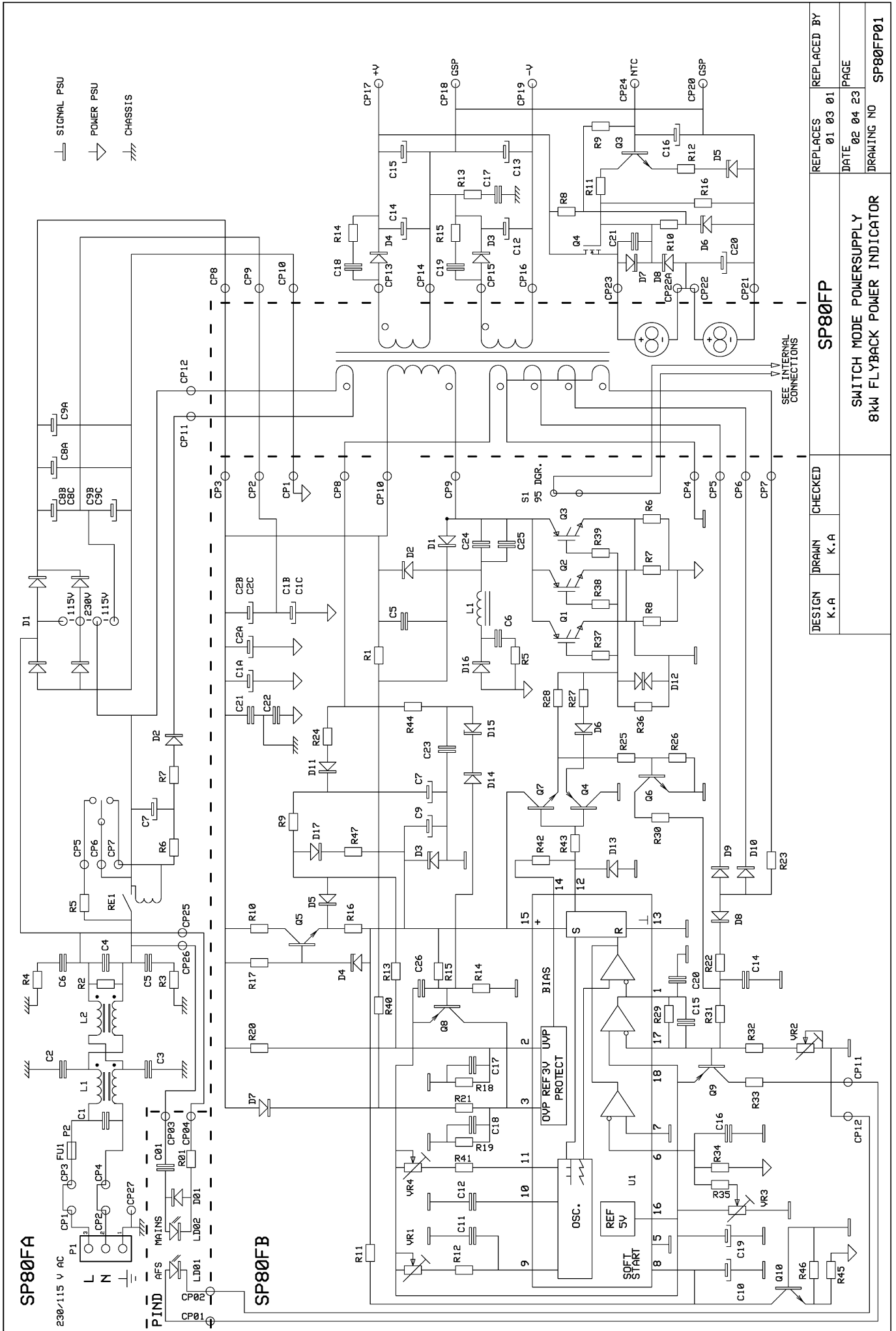




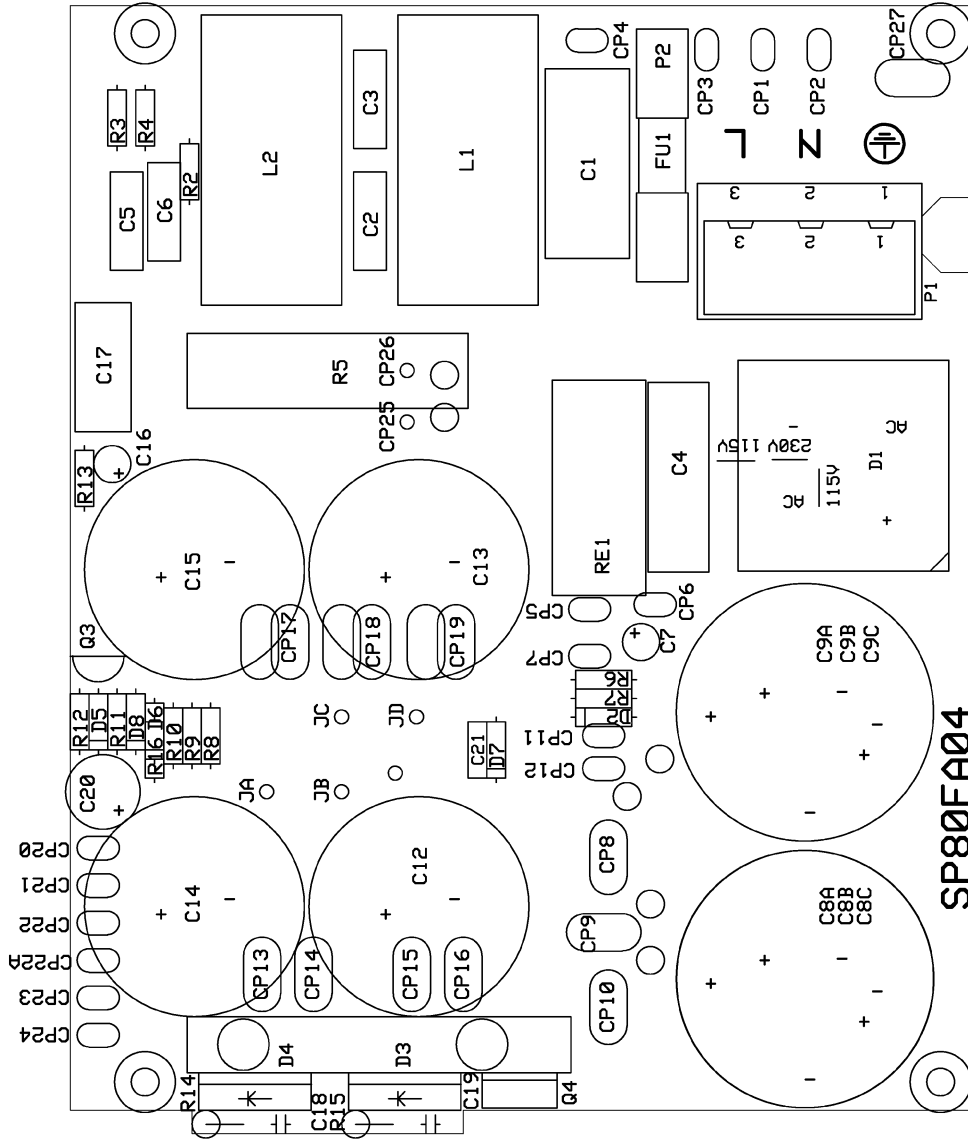
SEE INTERNAL CONNECTIONS

DESIGN	DRAWN	CHECKED	REPLACES	REPLACED BY
K. A.	K. A.		01 03 01	
			DATE	PAGE
			02 04 23	
			DRAWING NO	SP80F01

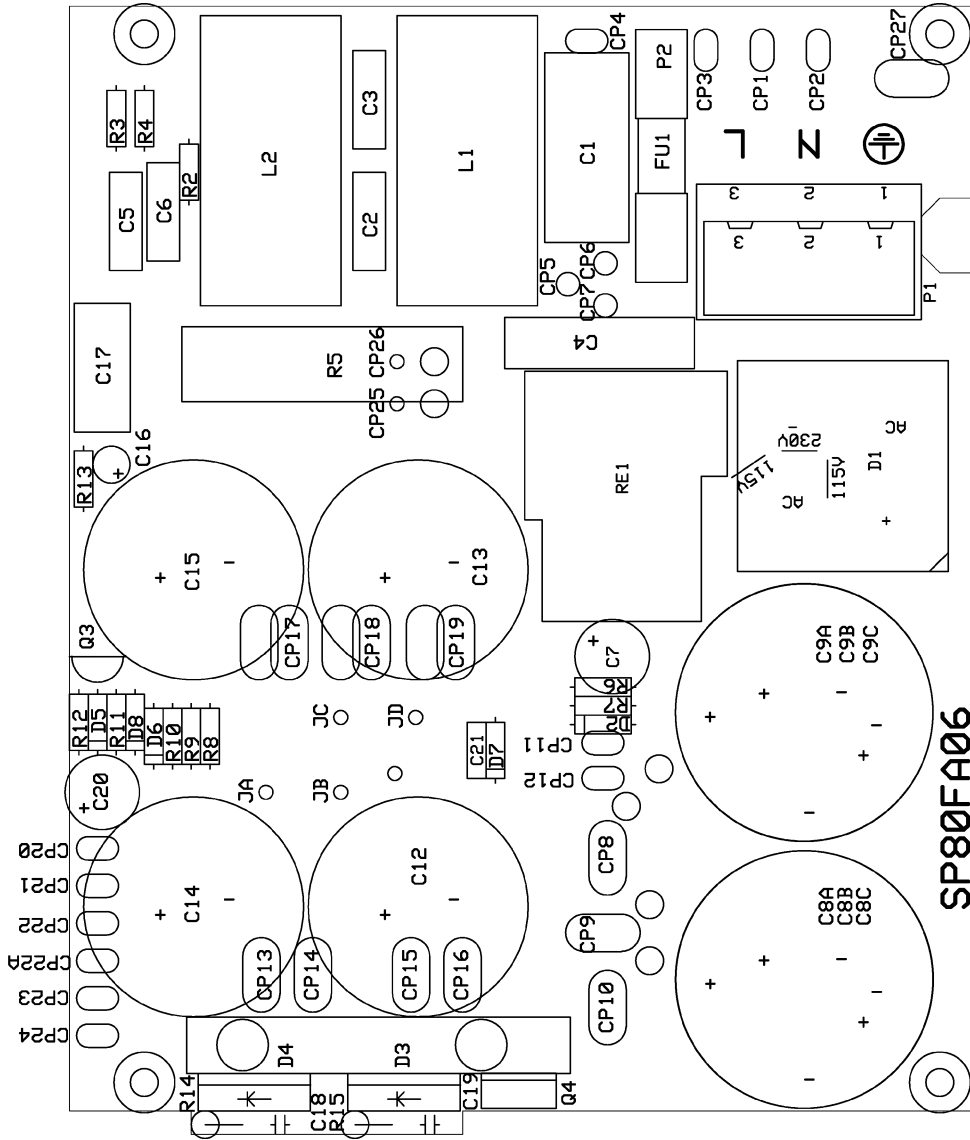
**SP80F**  
 SWITCH MODE POWERSUPPLY  
 8kW FLYBACK



DESIGN	K.A	DRAWN	K.A	CHECKED	<b>SP80FF</b>		REPLACES	01 03 01	REPLACED BY	
							DATE	02 04 23	PAGE	
							DRAWING NO			
							SP80FF01			
							SWITCH MODE POWERSUPPLY			
							8kW FLYBACK POWER INDICATOR			



DESIGN K.A	DRAWN K.A	CHECKED	SP80FA	REPLACES 01 11 23	REPLACED BY
			SWITCH MODE POWERSUPPLY 8kW FLYBACK BOARD A	DATE 02 04 30	PAGE
				DRAWING NO	SP80FA04-P



DESIGN	DRAIN	CHECKED	REPLACES	REPLACED BY
K.A	K.A		02 04 30	
LABGRUPPEN			DATE	PAGE
KUNGSBACKA SWEDEN			02 06 20	
			DRAWING NO	SP80FA06-P
			SP80FA	
			SWITCH MODE POWERSUPPLY	
			8KW FLYBACK BOARD A	

## Component list for SP80FA - rev 06

⚠ - Safety critical component. Should only be replaced with the specified type.

	Position	Partnumber	Description	Comment	Side
⚠	C1	u47X22.5	Capacitor 470n X2 metallized propylene 22.5mm		Top
⚠	C2		Variant dependent, see separate list		Top
⚠	C3		Variant dependent, see separate list		Top
⚠	C4	u22X22.5	Capacitor 220n X2 metallized propylene 22.5mm		Top
⚠	C5		Variant dependent, see separate list		Top
⚠	C6		Variant dependent, see separate list		Top
	C7	100u50V	Capacitor electrolytic 100u 50V 5mm		Top
	C8A		Variant dependent, see separate list		Top
	C8B		Variant dependent, see separate list		Top
	C8C		Variant dependent, see separate list		Top
	C9A		Variant dependent, see separate list		Top
	C9B		Variant dependent, see separate list		Top
	C9C		Variant dependent, see separate list		Top
	C12		Variant dependent, see separate list		Top
	C13		Variant dependent, see separate list		Top
	C14		Variant dependent, see separate list		Top
	C15		Variant dependent, see separate list		Top
	C16	22u50V	Capacitor electrolytic 22u 50V 5mm		Top
⚠	C17	2u2100VMMK15	Capacitor polyester 2u2 100V MMK 15mm		Top
	C18		Variant dependent, see separate list		Top
	C19		Variant dependent, see separate list		Top
	C20	100u50V	Capacitor electrolytic 100u 50V 5mm		Top
	C21		Variant dependent, see separate list		Top
⚠	D1	GBPC35-06	Diode bridge GBPC35-06		Top
	D2	BYV26C	Diode power switch BYV26C		Top
	D3	STTA3006PI	Diode power STTA3006PI standing		Top
	D4	STTA3006PI	Diode power STTA3006PI standing		Top
	D5	5V6.4W2%	Diode zener 5V6 .4W 2%		Top
	D6	62V.4W2%	Diode zener 62V .4W 2%	May have different value	Top
	D7		Variant dependent, see separate list		Top
	D8		Variant dependent, see separate list		Top
⚠	FU1		Variant dependent, see separate list		Top
	JMPR 230V		Variant dependent, see separate list		Top
	JMPR 1 115V		Variant dependent, see separate list		Top
	JMPR 2 115V		Variant dependent, see separate list		Top
	JMPR JB-JC	R04M1.2	Resistor jumper 0R 4modules D1.2mm		Top
	JMPR CP1-CP3		Variant dependent, see separate list		Top
⚠	JMPR CP2-CP4		Variant dependent, see separate list		Top
	JMPR CP5-CP6		Variant dependent, see separate list		Top
⚠	L1		Variant dependent, see separate list		Top
⚠	L2		Variant dependent, see separate list		Top
⚠	P1	TBPC3P4M8	Terminal bloc PCB 3pole 4module 8mm2		Top
	P2	FCPC5x20-6.3x32	Fuse clip combi PCB 5x20 and 6.3x32 mm fuse (2pcs)		Top
	Q3	BC546	Transistor bipolar signal BC546		Top
	Q4		Variant dependent, see separate list		Top
	R2	1M.7W1%	Resistor Metal Film 1M.7W1%		Top
	R3	33R.25W5%	Resistor Carbon Film 33R.25W5%		Top
	R4	33R.25W5%	Resistor Carbon Film 33R.25W5%		Top
⚠	R5		Variant dependent, see separate list		Top

	Position	Partnumber	Description	Comment	Side
	R6	33R.25W5%	Resistor Carbon Film 33R.25W5%		Top
	R7	2R21W5%	Resistor metal film 2R2 1W 5%		Top
	R8		Variant dependent, see separate list	May have different value	Top
	R9		Variant dependent, see separate list	May have different value	Top
	R10	39K.7W1%	Resistor Metal Film 39K.7W1%	May have different value	Top
	R11	18K.7W1%	Resistor Metal Film 18K.7W1%	May have different value	Top
	R12	4K7.7W1%	Resistor Metal Film 4K7.7W1%	May have different value	Top
	R13	4R7.25W5%	Resistor Carbon Film 4R7.25W5%		Top
	R14		Variant dependent, see separate list		Top
	R15		Variant dependent, see separate list		Top
	R16	-	Not used	May have different value	Top
⚠	RE1	PCSPNO40A18V	Relay PCB SPNO 40A 18V	May have different value	Top

**Variant specific components for 230V versions - rev 06**

	Position	SP80FA-4x6-2	SP80FA-2x13-2	SP80FA-2x17-2	SP80FA-2x32-2
⚠	C2	1n5Y10	1n5Y10	1n5Y10	1n5Y10
⚠	C3	1n5Y10	1n5Y10	1n5Y10	1n5Y10
⚠	C5	1n5Y10	1n5Y10	1n5Y10	1n5Y10
⚠	C6	1n5Y10	1n5Y10	1n5Y10	1n5Y10
	C8A	220u385V35x55PW	220u385V35x55PW	220u385V35x55PW	-
	C8B	-	-	-	1500u200V35x504TSI
	C8C	-	-	-	-
	C9A	220u385V35x55PW	220u385V35x55PW	220u385V35x55PW	-
	C9B	-	-	-	1500u200V35x504TSI
	C9C	-	-	-	-
	C12	3900u100V30x45	3900u100V30x45	1800u160V30x50	1800u160V30x50
	C13	3900u100V30x45	3900u100V30x45	1800u160V30x50	1800u160V30x50
	C14	3900u100V30x45	3900u100V30x45	1800u160V30x50	1800u160V30x50
	C15	3900u100V30x45	3900u100V30x45	1800u160V30x50	1800u160V30x50
	C18	4n7400VMFKT5	4n7400VMFKT5	-	-
	C19	4n7400VMFKT5	4n7400VMFKT5	-	-
	C21	-	-	680p400VK20005%5	680p400VK20005%5
	D7	-	-	15V.4W5%	15V.4W5%
	D8	-	-	39V.4W2%	39V.4W2%
⚠	FU1	T10AH250-5x20	T10AH250-5x20	T10AH250-5x20	T15AH250-6.3x32
	JMPR 230V	R02M.8	R02M.8	R02M.8	R02M.8
	JMPR 1 115V	-	-	-	-
	JMPR 2 115V	-	-	-	-
	JMPR CP1-CP3	-	-	-	R03M.8
⚠	JMPR CP2-CP4	-	-	-	AWG16BLU300VW1
	JMPR CP5-CP6	R02M.8	R02M.8	R02M.8	-



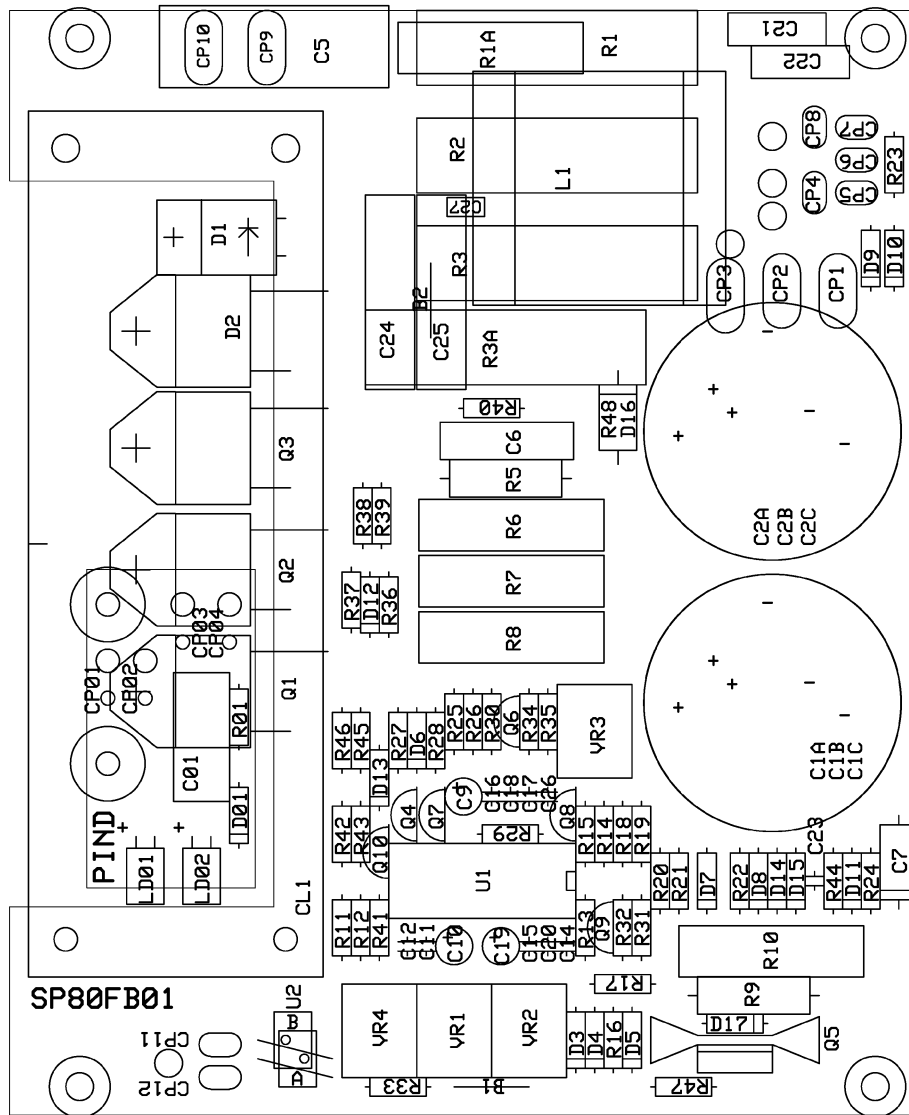
	Position	SP80FA-4x6-2	SP80FA-2x13-2	SP80FA-2x17-2	SP80FA-2x32-2
⚠	L1	2x3m7H8A-LAB	2x3m7H8A-LAB	2x3m7H8A-LAB	2x4m7H16A-LAB
⚠	L2	2x3m7H8A-LAB	2x3m7H8A-LAB	2x3m7H8A-LAB	2x4m7H16A-LAB
	Q4	TIP132	TIP132	IRF730	IRF730
⚠	R5	47R9W5%17MSO5	47R9W5%17MSO5	47R9W5%17MSO5	47R9W5%17MSO5
	R8	4K7.7W1%	8K2.7W1%	27K.7W1%SO5	27K.7W1%SO5
	R9	1M.7W1%	150K.25W5%	180K.7W1%	180K.7W1%
	R14	2R22W5%2MST	2R22W5%2MST	-	-
	R15	2R22W5%2MST	2R22W5%2MST	-	-

### Variant specific components for 115V versions - rev 06

	Position	SP80FA-4x6-2U	SP80FA-2x13-2U	SP80FA-2x17-2U	SP80FA-2x32-2U
⚠	C2	2n2Y10	2n2Y10	2n2Y10	2n2Y10
⚠	C3	2n2Y10	2n2Y10	2n2Y10	2n2Y10
⚠	C5	2n2Y10	2n2Y10	2n2Y10	2n2Y10
⚠	C6	2n2Y10	2n2Y10	2n2Y10	2n2Y10
	C8A	-	-	-	-
	C8B	1500u200V35x504TSI	1500u200V35x504TSI	1500u200V35x504TSI	-
	C8C	-	-	-	2200u200V35x55
	C9A	-	-	-	-
	C9B	1500u200V35x504TSI	1500u200V35x504TSI	1500u200V35x504TSI	-
	C9C	-	-	-	2200u200V35x55
	C12	3900u100V30x45	3900u100V30x45	1800u160V30x50	1800u160V30x50
	C13	3900u100V30x45	3900u100V30x45	1800u160V30x50	1800u160V30x50
	C14	3900u100V30x45	3900u100V30x45	1800u160V30x50	1800u160V30x50
	C15	3900u100V30x45	3900u100V30x45	1800u160V30x50	1800u160V30x50
	C18	4n7400VMFKT5	4n7400VMFKT5	-	-
	C19	4n7400VMFKT5	4n7400VMFKT5	-	-
	C21	-	-	680p400VK20005%5	680p400VK20005%5
	D7	-	-	15V.4W5%	15V.4W5%
	D8	-	-	39V.4W2%	39V.4W2%
⚠	FU1	T20AH250-6.3x32	T20AH250-6.3x32	T20AH250-6.3x32	T30AH125-6.3x32
	JMPR 230V	-	-	-	-
	JMPR 1 115V	R02M.8	R02M.8	R02M.8	R02M.8
	JMPR 2 115V	R02M.8	R02M.8	R02M.8	R02M.8
	JMPR CP1-CP3	R03M.8	R03M.8	R03M.8	R03M.8
⚠	JMPR CP2-CP4	AWG16BLU300VWW1	AWG16BLU300VWW1	AWG16BLU300VWW1	AWG16BLU300VWW1
	JMPR CP5-CP6	-	-	-	-
⚠	L1	2x4m7H16A-LAB	2x4m7H16A-LAB	2x4m7H16A-LAB	2x2mH32A-LAB
⚠	L2	2x4m7H16A-LAB	2x4m7H16A-LAB	2x4m7H16A-LAB	2x2mH32A-LAB
	Q4	TIP132	TIP132	IRF730	IRF730
⚠	R5	22R9W5%17MSO5	22R9W5%17MSO5	22R9W5%17MSO5	22R9W5%17MSO5
	R8	4K7.7W1%	8K2.7W1%	27K.7W1%SO5	27K.7W1%SO5
	R9	1M.7W1%	150K.25W5%	180K.7W1%	180K.7W1%
	R14	2R22W5%2MST	2R22W5%2MST	-	-
	R15	2R22W5%2MST	2R22W5%2MST	-	-

## Description for variant dependent components

Partnumber	Description
1500u200V35x504TSI	Cap. electrolytic 1500u 200V 35x50mm 4 terminals snap in
150K.25W5%	Resistor Carbon Film 150K.25W5%
15V.4W5%	Diode zener 15V .4W 5%
1800u160V30x50	Capacitor electrolytic 1800u 160V 30x50mm snap in
180K.7W1%	Resistor Metal Film 180K.7W1%
1M.7W1%	Resistor Metal Film 1M.7W1%
1n5Y10	Capacitor 1n5 Y2 metallized paper 10mm
2200u200V35x55	Capacitor electrolytic 2200u 200V 35x45mm snap in
220u385V35x55PW	Cap. electrolytic 220u 385V 35x55mm printed wiring terminals
22R9W5%17MSO5	Resistor wirewound 22R 9W 5% 17modules 5mm stand off
27K.7W1%SO5	Resistor Metal Film 27K.7W1% 5mm stand off
2n2Y10	Capacitor 2n2 Y2 metallized paper 10mm
2R22W5%2MST	Resistor metal film 2R2 2W 5% 2modules standing
2x2mH32A-LAB	Supression choke 2x2mH 32A 2x18 varv 1.8mm LAB. Rev01
2x3m7H8A-LAB	Supression choke 2x3m7H 8A 2x21 varv 1mm LAB. Rev01
2x4m7H16A-LAB	Supression choke 2x4m7H 16A 2x24 varv 1.25mm LAB. Rev01
3900u100V30x45	Capacitor electrolytic 3900u 100V 30x45mm snap in
39V.4W2%	Diode zener 39V .4W 2%
47R9W5%17MSO5	Resistor wirewound 47R 9W 5% 17modules 5mm stand off
4K7.7W1%	Resistor Metal Film 4K7.7W1%
4n7400VMFKT5	Capacitor polyester metal foil 4n7 400V MFKT 5mm
680p400VK20005%5	Capacitor ceramic 680p 400V K2000 5% 5mm
8K2.7W1%	Resistor Metal Film 8K2.7W1%
AWG16BLU300VWV1	Cable AWG16 Blue UL style 1569 VW1
IRF730	Transistor MOS power IRF730
R02M.8	Resistor jumper 0R 2modules D.8mm
R03M.8	Resistor jumper 0R 3modules D.8mm
T10AH250-5x20	Fuse slow blow 10A 250V 1500A IR 5x20mm
T15AH250-6.3x32	Fuse slow blow 15A 250V 1500A IR 6.3x32mm
T20AH250-6.3x32	Fuse slow blow 20A 250V 10000A IR 6.3x32mm
T30AH125-6.3x32	Fuse slow blow 30A 125V 400A IR 6.3x32mm
TIP132	Transistor bipolar power TIP132



DESIGN	DRAWN	CHECKED	REPLACES	REPLACED BY
K.A	K.A		01 11 23	
			DATE	PAGE
			02 04 23	
			DRAWING NO	SP80FB01-P
<b>SP80FB</b>				
SWITCH MODE POWERSUPPLY				
8kW FLYBACK BOARD B				

## Component list for PIND, SP80FB - rev 01A

⚠ - Safety critical component. Should only be replaced with the specified type.

	Position	Partnumber	Description	Comment	Side
	C01		Variant dependent, see separate list		Top
	C1A		Variant dependent, see separate list		Top
	C1B		Variant dependent, see separate list		Top
	C1C		Variant dependent, see separate list		Top
	C2A		Variant dependent, see separate list		Top
	C2B		Variant dependent, see separate list		Top
	C2C		Variant dependent, see separate list		Top
⚠	C5	u68X27.5	Capacitor 680n X2 metallized propylene 27.5mm		Top
	C6		Variant dependent, see separate list		Top
	C7	10u63V6x10A	Capacitor electrolytic 10u 63V 6x10mm axial		Top
	C9	10u50V	Capacitor electrolytic 10u 50V 5mm		Top
	C10	22u50V	Capacitor electrolytic 22u 50V 5mm		Top
	C11	470p200VNP05%5	Capacitor ceramic 470p 200V NP0 5% 5mm		Top
	C12	1n250VMMK5	Capacitor polyester 1n 250V MMK 5mm		Top
	C14	10n250VMMK5	Capacitor polyester 10n 250V MMK 5mm		Top
	C15	330p200VNP05%5	Capacitor ceramic 330p 200V NP0 5% 5mm		Top
	C16	330p200VNP05%5	Capacitor ceramic 330p 200V NP0 5% 5mm		Top
	C17	-	Not used		Top
	C18	1n250VMMK5	Capacitor polyester 1n 250V MMK 5mm		Top
	C19	10u50V	Capacitor electrolytic 10u 50V 5mm		Top
	C20	-	Not used		Top
⚠	C21		Variant dependent, see separate list		Top
⚠	C22		Variant dependent, see separate list		Top
	C23	1n250VMMK5	Capacitor polyester 1n 250V MMK 5mm		Top
⚠	C24		Variant dependent, see separate list		Top
⚠	C25		Variant dependent, see separate list		Top
	C26	1n250VMMK5	Capacitor polyester 1n 250V MMK 5mm		Top
	C27		Variant dependent, see separate list		Top
	D01		Variant dependent, see separate list		Top
	D1	BYT12PI1000LY	Diode power BYT12PI1000 lying		Bot.
	D2		Variant dependent, see separate list		Bot.
	D3	15V1.3W5%	Diode zener 15V 1.3W 5%		Top
	D4	5V6.4W2%	Diode zener 5V6 .4W 2%		Top
	D5	1N4148	Diode signal 1N4148		Top
	D6	BYV26C	Diode power switch BYV26C		Top
	D7	1N4004	Diode power 1N4004		Top
	D8	1N4148	Diode signal 1N4148		Top
	D9	1N4148	Diode signal 1N4148		Top
	D10	1N4148	Diode signal 1N4148		Top
	D11	BYV26C	Diode power switch BYV26C		Top
	D12	BZW06P15B	Diode transient voltage suppression BZW06P15B		Top
	D13	BAT85	Diode signal BAT85		Top
	D14	1N4148	Diode signal 1N4148		Top
	D15		Variant dependent, see separate list		Top
	D16		Variant dependent, see separate list		Top
	D17		Variant dependent, see separate list		Top
⚠	L1		Variant dependent, see separate list		Top
	LD01		Variant dependent, see separate list		Top
	LD02		Variant dependent, see separate list		Top
	Q1	-	Not used	May have different value	Bot.

	Position	Partnumber	Description	Comment	Side
	Q2	SGW25N120LY	Transistor IGBT power SGW25N120 lying	May have different value	Bot.
	Q3	SGW25N120LY	Transistor IGBT power SGW25N120 lying	May have different value	Bot.
	Q4	BC327	Transistor bipolar signal BC327		Top
	Q5	TIP50	Transistor bipolar power TIP50		Top
	Q6	BC547B	Transistor bipolar signal BC547B		Top
	Q7	R01M.6 (b-e)	Resistor jumper 0R 1module D.6mm		Top
	Q8	BC557B	Transistor bipolar signal BC557B		Top
	Q9		Variant dependent, see separate list		Top
	Q10		Variant dependent, see separate list		Top
	R01		Variant dependent, see separate list		Top
	R1		Variant dependent, see separate list		Top
	R1A	-	Not used		Top
	R2		Variant dependent, see separate list		Top
	R3		Variant dependent, see separate list		Top
	R3A	-	Not used		Top
	R5		Variant dependent, see separate list		Top
	R6	R104W10%SO5	Resistor wirewound R10 4W 10% 5mm stand off		Top
	R7	R104W10%SO5	Resistor wirewound R10 4W 10% 5mm stand off		Top
	R8	R104W10%SO5	Resistor wirewound R10 4W 10% 5mm stand off		Top
	R9		Variant dependent, see separate list		Top
	R10	4K77W5%10MSO5	Resistor wirewound 4K7 7W 5% 10modules 5mm stand off		Top
	R11	680K.25W5%	Resistor Carbon Film 680K.25W5%		Top
	R12	33K.7W1%	Resistor Metal Film 33K.7W1%		Top
	R13	270K.7W1%	Resistor Metal Film 270K.7W1%		Top
	R14	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R15	18K.7W1%	Resistor Metal Film 18K.7W1%		Top
	R16	180R.7W1%	Resistor Metal Film 180R.7W1%		Top
	R17	120K2W5%SO5	Resistor metal film 120K 2W 5% 5mm stand off		Top
	R18	10K.7W1%	Resistor Metal Film 10K.7W1%		Top
	R19		Variant dependent, see separate list		Top
	R20	432K1W1%	Resistor Metal Film 432K 1W 1%		Top
	R21	750K.7W1%	Resistor Metal Film 750K.7W1%		Top
	R22	4R7.25W5%	Resistor Carbon Film 4R7.25W5%		Top
	R23		Variant dependent, see separate list		Top
	R24	4R7.25W5%	Resistor Carbon Film 4R7.25W5%		Top
	R25	15K.7W1%	Resistor Metal Film 15K.7W1%		Top
	R26	1K.7W1%	Resistor Metal Film 1K.7W1%		Top
	R27		Variant dependent, see separate list		Top
	R28	82R.25W5%	Resistor Carbon Film 82R.25W5%		Top
	R29	4M7.25W5%	Resistor Carbon Film 4M7.25W5%		Top
	R30		Variant dependent, see separate list		Top
	R31	220K.7W1%	Resistor Metal Film 220K.7W1%		Top
	R32		Variant dependent, see separate list		Top
	R33		Variant dependent, see separate list		Top
	R34		Variant dependent, see separate list		Top
	R35		Variant dependent, see separate list		Top
	R36	15K.7W1%	Resistor Metal Film 15K.7W1%		Top
	R37		Variant dependent, see separate list		Top
	R38		Variant dependent, see separate list		Top
	R39		Variant dependent, see separate list		Top
	R40		Variant dependent, see separate list		Top
	R41	18K.7W1%	Resistor Metal Film 18K.7W1%		Top
	R42	-	Not used		Top

	Position	Partnumber	Description	Comment	Side
	R43	R04M.6	Resistor jumper 0R 4modules D.6mm		Top
	R44		Variant dependent, see separate list		Top
	R45		Variant dependent, see separate list		Top
	R46		Variant dependent, see separate list		Top
	R47		Variant dependent, see separate list		Top
	R48		Variant dependent, see separate list		Top
⚠	S1	TP1-0-5A3x8x21	Thermal protector Single Pole Single Trough on - off 5A 3x8x21mm		Bot.
	U1	UC3851	IC PWM UC3851		Top
⚠	U2A		Variant dependent, see separate list	May have different value	Top
	U2B		Variant dependent, see separate list		Top
	VR1	VR10KLY2X3M	Trimpotentiometer 10K lying 2x3modules		Top
	VR2	VR22KLY2X3M	Trimpotentiometer 22K lying 2x3modules		Top
	VR3	VR10KLY2X3M	Trimpotentiometer 10K lying 2x3modules		Top
	VR4	15K.7W1%	Resistor Metal Film 15K.7W1%		Top

**Variant specific components for 230V versions - rev 01A**

	Position	SP80FB-4x6-2	SP80FB-2x11-2	SP80FB-2x13-2	SP80FB-2x17-2	SP80FB-2x32-2
	C01	-	-	-	-	100n400VMMK15
	C1A	220u385V35x55PW	220u385V35x55PW	220u385V35x55PW	220u385V35x55PW	-
	C1B	-	-	-	-	1500u200V35x504 TSI
	C1C	-	-	-	-	-
	C2A	220u385V35x55PW	220u385V35x55PW	220u385V35x55PW	220u385V35x55PW	-
	C2B	-	-	-	-	1500u200V35x504 TSI
	C2C	-	-	-	-	-
	C6	-	-	-	-	1n1250VMKP15
⚠	C21	1n5Y10	1n5Y10	1n5Y10	1n5Y10	1n5Y10
⚠	C22	1n5Y10	1n5Y10	1n5Y10	1n5Y10	1n5Y10
⚠	C24	-	-	-	-	22n1000VMKP22.5
⚠	C25	-	-	-	-	22n1000VMKP22.5
	C27	100p1600VFKP15	100p1600VFKP15	100p1600VFKP15	100p1600VFKP15	-
	D01	-	-	-	-	1N4148
	D2	-	-	-	-	STTA1512PILY
	D15	43V.4W2%	43V.4W2%	39V.4W2%	43V.4W2%	43V.4W2%
	D16	-	-	-	-	BYM26E
	D17	-	-	-	-	1N4148
⚠	L1	-	-	-	-	400uHEFD30_LAB
	LD01	-	-	-	-	LYEL2.5x5LY
	LD02	-	-	-	-	LGRN2.5x5LY
	Q9	R01M.6 (b-c)	-	R01M.6 (b-c)	-	BC557B
	Q10	-	-	-	-	BC547B
	R01	-	-	-	-	4K7.7W1%
	R1	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	33K9W5%17MSO5
	R2	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	-
	R3	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	-
	R5	-	-	-	-	330R2W5%SO5
	R9	1K52W5%SO5	1K52W5%SO5	1K52W5%SO5	1K52W5%SO5	1K3W5%SO5
	R19	5K62.7W1%	5K62.7W1%	5K62.7W1%	5K62.7W1%	5K9.7W1%
	R23	8K2.7W1%	6K8.7W1%	6K8.7W1%	6K8.7W1%	6K8.7W1%

	Position	SP80FB-4x6-2	SP80FB-2x11-2	SP80FB-2x13-2	SP80FB-2x17-2	SP80FB-2x32-2
	R27	4R7.25W5%	4R7.25W5%	4R7.25W5%	4R7.25W5%	R04M.6
	R30	56K.7W1%	56K.7W1%	56K.7W1%	56K.7W1%	180K.7W1%
	R32	133K.7W1%	88K7.7W1%	169K.7W1%	88K7.7W1%	88K7.7W1%
	R33	270K.7W1%	-	330K.7W1%	-	1K.7W1%
	R34	2K2.7W1%	2K2.7W1%	2K2.7W1%	2K2.7W1%	2K4.7W1%
	R35	4K7.7W1%	4K7.7W1%	4K7.7W1%	4K7.7W1%	3K3.7W1%
	R37	4R7.25W5%	4R7.25W5%	4R7.25W5%	4R7.25W5%	2R2.25W5%
	R38	4R7.25W5%	4R7.25W5%	4R7.25W5%	4R7.25W5%	2R2.25W5%
	R39	4R7.25W5%	4R7.25W5%	4R7.25W5%	4R7.25W5%	2R2.25W5%
	R40	1M.7W1%	1M.7W1%	1M.7W1%	1M.7W1%	1M2.7W1%
	R44	470R.25W5%	470R.25W5%	470R.25W5%	470R.25W5%	560R.25W5%
	R45	-	-	-	-	698R.7W1%
	R46	-	-	-	-	196R.7W1%
	R47	-	-	-	-	820R.25W5%
	R48	2R22W5%SO5	2R22W5%SO5	2R22W5%SO5	2R22W5%SO5	-
⚠	U2A	TCET1102G	-	TCET1102G	-	R04M.6 (2-4)
	U2B	-	-	-	-	R04M.6 (1-5)

### Variant specific components for 115V versions - rev 01A

	Position	SP80FB-4x6-2U	SP80FB-2x11-2U	SP80FB-2x13-2U	SP80FB-2x17-2U	SP80FB-2x32-2U
	C01	-	-	-	-	220n250VMMK15
	C1A	-	-	-	-	-
	C1B	1500u200V35x504 TSI	1500u200V35x504 TSI	1500u200V35x504 TSI	1500u200V35x504 TSI	-
	C1C	-	-	-	-	2200u200V35x55
	C2A	-	-	-	-	-
	C2B	1500u200V35x504 TSI	1500u200V35x504 TSI	1500u200V35x504 TSI	1500u200V35x504 TSI	-
	C2C	-	-	-	-	2200u200V35x55
	C6	-	-	-	-	1n1250VMKP15
⚠	C21	2n2Y10	2n2Y10	2n2Y10	2n2Y10	2n2Y10
⚠	C22	2n2Y10	2n2Y10	2n2Y10	2n2Y10	2n2Y10
⚠	C24	-	-	-	-	22n1000VMKP22.5
⚠	C25	-	-	-	-	22n1000VMKP22.5
	C27	100p1600VFKP15	100p1600VFKP15	100p1600VFKP15	100p1600VFKP15	-
	D01	-	-	-	-	1N4148
	D2	-	-	-	-	STTA1512PILY
	D15	43V.4W2%	43V.4W2%	39V.4W2%	43V.4W2%	43V.4W2%
	D16	-	-	-	-	BYM26E
	D17	-	-	-	-	1N4148
⚠	L1	-	-	-	-	400uHEFD30_LAB
	LD01	-	-	-	-	LYEL2.5x5LY
	LD02	-	-	-	-	LGRN2.5x5LY
	Q9	R01M.6 (b-c)	-	R01M.6 (b-c)	-	BC557B
	Q10	-	-	-	-	BC547B
	R01	-	-	-	-	4K7.7W1%
	R1	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	33K9W5%17MSO5
	R2	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	-
	R3	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	18K9W5%17MSO5	-
	R5	-	-	-	-	330R2W5%SO5

	Position	SP80FB-4x6-2U	SP80FB-2x11-2U	SP80FB-2x13-2U	SP80FB-2x17-2U	SP80FB-2x32-2U
	R9	1K52W5%SO5	1K52W5%SO5	1K52W5%SO5	1K52W5%SO5	1K3W5%SO5
	R19	5K62.7W1%	5K62.7W1%	5K62.7W1%	5K62.7W1%	5K9.7W1%
	R23	8K2.7W1%	6K8.7W1%	6K8.7W1%	6K8.7W1%	6K8.7W1%
	R27	4R7.25W5%	4R7.25W5%	4R7.25W5%	4R7.25W5%	R04M.6
	R30	56K.7W1%	56K.7W1%	56K.7W1%	56K.7W1%	180K.7W1%
	R32	133K.7W1%	88K7.7W1%	169K.7W1%	88K7.7W1%	88K7.7W1%
	R33	270K.7W1%	-	330K.7W1%	-	1K.7W1%
	R34	2K2.7W1%	2K2.7W1%	2K2.7W1%	2K2.7W1%	2K4.7W1%
	R35	4K7.7W1%	4K7.7W1%	4K7.7W1%	4K7.7W1%	3K3.7W1%
	R37	4R7.25W5%	4R7.25W5%	4R7.25W5%	4R7.25W5%	2R2.25W5%
	R38	4R7.25W5%	4R7.25W5%	4R7.25W5%	4R7.25W5%	2R2.25W5%
	R39	4R7.25W5%	4R7.25W5%	4R7.25W5%	4R7.25W5%	2R2.25W5%
	R40	1M.7W1%	1M.7W1%	1M.7W1%	1M.7W1%	1M2.7W1%
	R44	470R.25W5%	470R.25W5%	470R.25W5%	470R.25W5%	560R.25W5%
	R45	-	-	-	-	698R.7W1%
	R46	-	-	-	-	196R.7W1%
	R47	-	-	-	-	820R.25W5%
	R48	2R22W5%SO5	2R22W5%SO5	2R22W5%SO5	2R22W5%SO5	-
⚠	U2A	TCET1102G	-	TCET1102G	-	R04M.6 (2-4)
	U2B	-	-	-	-	R04M.6 (1-5)

### Description for variant dependent components

Partnumber	Description
100n400VMMK15	Capacitor polyester 100n 400V MMK 15mm
100p1600VFKP15	Capacitor polypropylene 100p 1600V FKP 15mm
133K.7W1%	Resistor Metal Film 133K.7W1%
1500u200V35x504TSI	Cap. electrolytic 1500u 200V 35x50mm 4 terminals snap in
169K.7W1%	Resistor Metal Film 169K.7W1%
180K.7W1%	Resistor Metal Film 180K.7W1%
18K9W5%17MSO5	Resistor wirewound 18K 9W 5% 17modules 5mm stand off
196R.7W1%	Resistor Metal Film 196R.7W1%
1K.7W1%	Resistor Metal Film 1K.7W1%
1K3W5%SO5	Resistor metal film 1K 3W 5% 5mm stand off
1K52W5%SO5	Resistor metal film 1K5 2W 5% 5mm stand off
1M.7W1%	Resistor Metal Film 1M.7W1%
1M2.7W1%	Resistor Metal Film 1M2.7W1%
1n1250VMKP15	Capacitor polypropylene 1n 1250V MKP 15mm
1N4148	Diode signal 1N4148
1n5Y10	Capacitor 1n5 Y2 metallized paper 10mm
2200u200V35x55	Capacitor electrolytic 2200u 200V 35x45mm snap in
220n250VMMK15	Capacitor polyester 220n 250V MMK 15mm
220u385V35x55PW	Cap. electrolytic 220u 385V 35x55mm printed wiring terminals
22n1000VMKP22.5	Capacitor polypropylene 22n 1000V MKP 22.5mm
270K.7W1%	Resistor Metal Film 270K.7W1%
2K2.7W1%	Resistor Metal Film 2K2.7W1%
2K4.7W1%	Resistor Metal Film 2K4.7W1%
2n2Y10	Capacitor 2n2 Y2 metallized paper 10mm
2R2.25W5%	Resistor Carbon Film 2R2.25W5%
2R22W5%SO5	Resistor metal film 2R2 2W 5% 5mm stand off
330K.7W1%	Resistor Metal Film 330K.7W1%



330R2W5%SO5	Resistor metal film 330R 2W 5% 5mm stand off
33K9W5%17MSO5	Resistor wirewound 33K 9W 5% 17modules 5mm stand off
39V.4W2%	Diode zener 39V .4W 2%
3K3.7W1%	Resistor Metal Film 3K3.7W1%
400uHEFD30_LAB	Inductor 400uH EFD30 LAB.GRUPPEN Rev 01
43V.4W2%	Diode zener 43V .4W 2%
470R.25W5%	Resistor Carbon Film 470R.25W5%
4K7.7W1%	Resistor Metal Film 4K7.7W1%
4R7.25W5%	Resistor Carbon Film 4R7.25W5%
560R.25W5%	Resistor Carbon Film 560R.25W5%
56K.7W1%	Resistor Metal Film 56K.7W1%
5K62.7W1%	Resistor Metal Film 5K62.7W1%
5K9.7W1%	Resistor Metal Film 5K9.7W1%
698R.7W1%	Resistor Metal Film 698R.7W1%
6K8.7W1%	Resistor Metal Film 6K8.7W1%
820R.25W5%	Resistor Carbon Film 820R.25W5%
88K7.7W1%	Resistor Metal Film 88K7.7W1%
8K2.7W1%	Resistor Metal Film 8K2.7W1%
BC547B	Transistor bipolar signal BC547B
BC557B	Transistor bipolar signal BC557B
BYM26E	Diode power switch BYM26E
LGRN2.5x5LY	Diode LED Green 2.5x5mm lying
LYEL2.5x5LY	Diode LED Yellow 2.5x5mm lying
R01M.6 (b-c)	Resistor jumper 0R 1module D.6mm
R04M.6	Resistor jumper 0R 4modules D.6mm
R04M.6 (1-5)	Resistor jumper 0R 4modules D.6mm
R04M.6 (2-4)	Resistor jumper 0R 4modules D.6mm
STTA1512PILY	Diode power STTA1512PI lying
TCET1102G	IC photocoupler TCET1102G