CS Series

CS60.4

4 CHANNEL POWER AMPLIFIER

SERVICE MANUAL

JBL Consumer Products
250 Crossways Park Dr.
Woodbury, New York 11797

Rev0 11/2005

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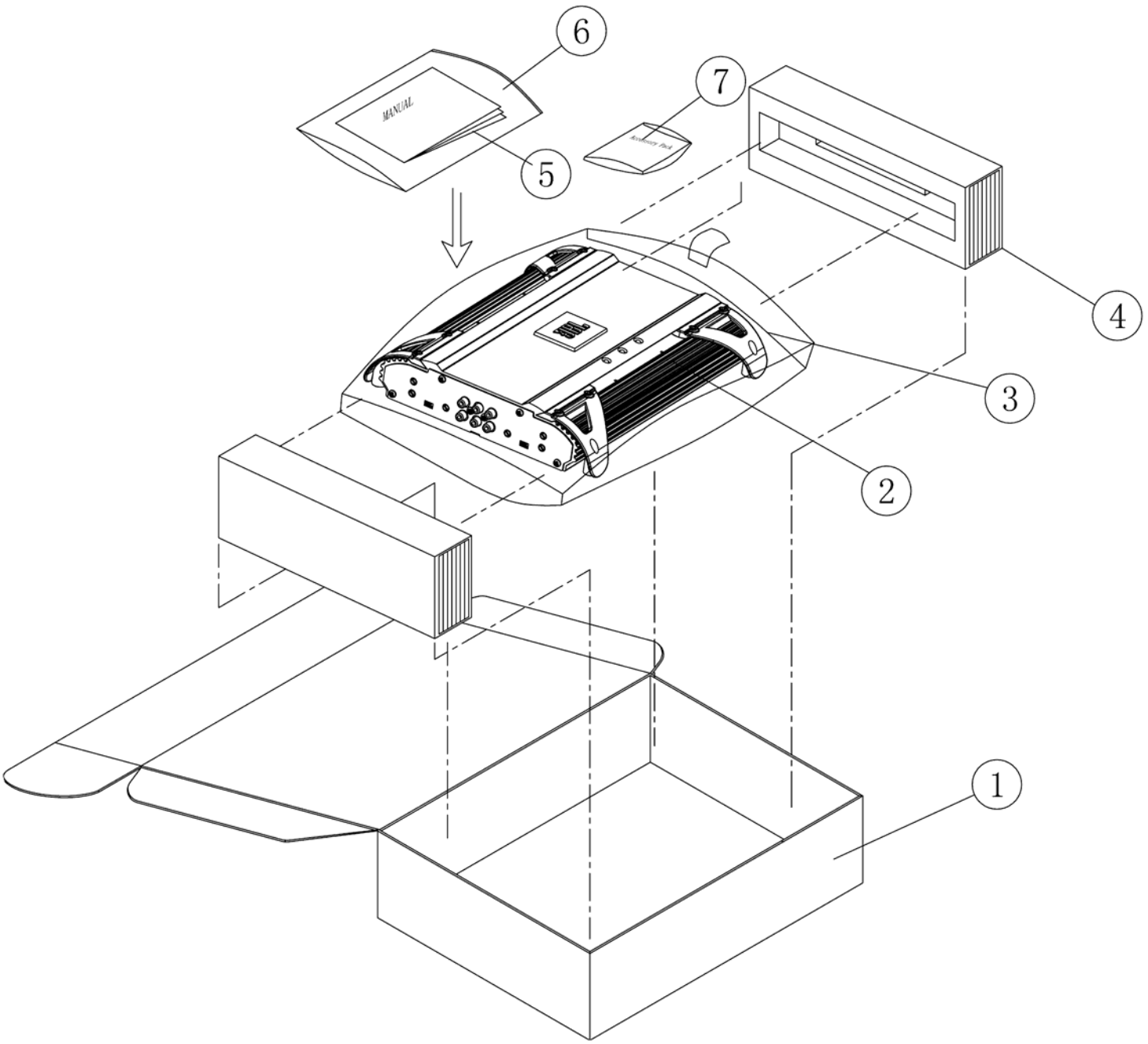
CS60.4 Specifications

Output Power:	60W RMS x 4 channels @ 4 ohms; ≤1% THD + N
(14.4V supply)	80W RMS x 4 channels @ 2 ohms; ≤1% THD + N
	160W RMS x 2 channels @ 4 ohms; ≤1% THD + N
Signal-to-noise ratio:	86dBA (reference 1W into 4 ohms)
Dynamic power:	145W @ 2 ohms
Effective damping factor:	6.395 @ 4 ohms
Frequency response:	10Hz – 27kHz (–3dB)
Maximum input signal:	6V
Maximum sensitivity:	100mV
Bass boost (45Hz)	Variable 0 – 6dB
DC Offset	<30mV
Output regulation:	.03dB @ 4 ohms
Idle Current	0.65A
Input Impedance	20kΩ
Max Current Draw	26A @ 4 ohms
	49A @ 2 ohms
Dimensions:	13 1/4 x 10 1/4 x 2 3/16” (L x W x H)
	(336mm x 260mm x 55mm)
Fuses:	25A x 2

JBL continually strives to update and improve existing products, as well as create new ones. The specifications and details in this and related JBL publications are therefore subject to change without notice.



Item	Part Number	Description	Qty
1	945TCS604	Outer Carton	1
2	CS60.4	Amplifier	1
3		Plastic Bag	1
4	930TJBL00	Cardboard End Pads	2
5	914CS604A	Owner's Manual	1
6		Plastic Bag	1
7	435T00025	Fuse 25A ATC	2
	721T50108	Screws, BLK. Philips #8*1	4
		Plastic Bag	1

APPLICATIONS – CS200.1

The CS subwoofer amplifier is a single-channel amplifier. There are two sets of terminals to make it easy to connect multiple woofers. Either set of (+/–) terminals may be used when connecting woofers.

To the right are two application diagrams to help plan your subwoofer system installation. **Figures 2 and 3** show how to configure the CS200.1 subwoofer amplifier.

NOTE: For simplicity, Figures 2 and 3 do not show power, remote and input connections.

NOTE: Minimum speaker load is 2 ohms total.

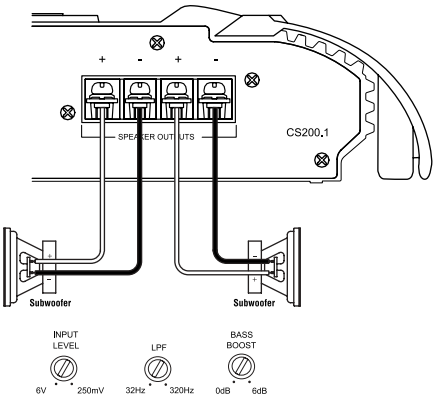


Figure 2. CS subwoofer amplifier with two woofers connected.

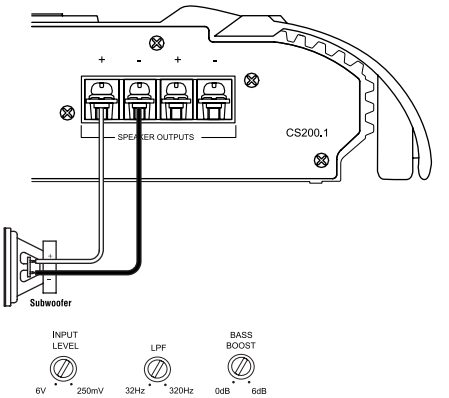


Figure 3. CS subwoofer amplifier with one woofer connected.

APPLICATIONS – CS60.4

The CS60.4 can be set up for stereo 4-channel, 3-channel or bridged 2-channel operation, as shown in **Figures 4 through 6**.

NOTE: For simplicity, Figures 4 through 6 do not show power, remote and input connections.

NOTE: Minimum speaker impedance for stereo operation is 2 ohms. Minimum speaker impedance for bridged operation is 4 ohms.

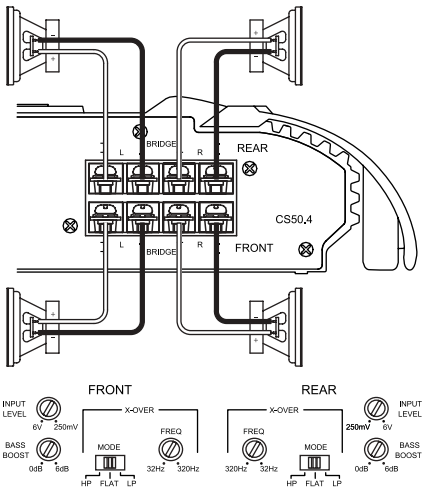


Figure 4. CS60.4 amplifier in 4-channel (stereo) operation to drive front and rear full-range speakers.

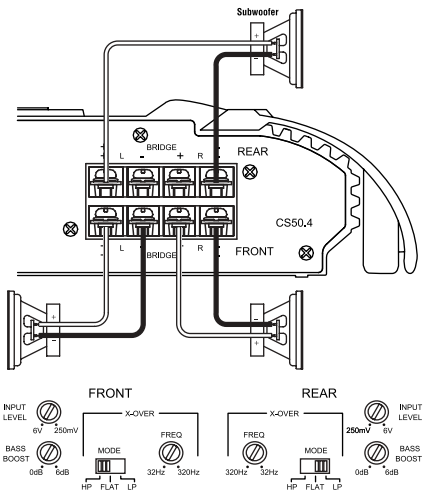


Figure 5. CS60.4 is set up for 3-channel operation to drive a set of full-range speakers and a subwoofer.

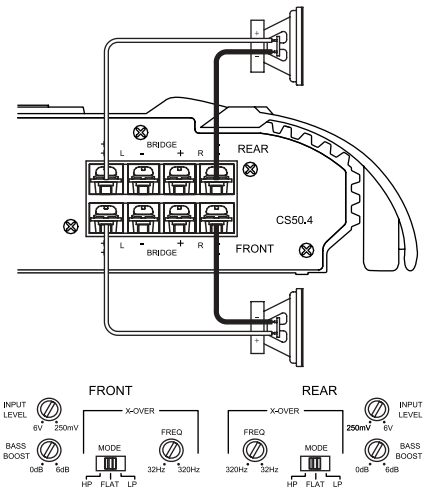


Figure 6. CS60.4 used in bridged 2-channel mode to drive a set of components or subwoofers. Set crossovers according to application.

CONTROLS AND SETUP

SETTING THE CROSSOVER(S)

Determine your system plans and set the crossover mode switch accordingly. If your system design does not include a subwoofer with the CS60.4, set the crossover mode to FLAT and skip to "Setting Input Sensitivity."

Initially set the crossover frequency control midway. While listening to music, adjust the crossover for the least perceived distortion from the speakers, allowing them to reproduce as much bass as possible.

Systems using a separate subwoofer set the crossover mode to HP (high pass) for your full-range speakers. Adjust the crossover frequency to limit bass and provide increased system volume with less distortion.

For subwoofers, choose the highest frequency that removes vocal information from the sound of the subwoofer.

If using the CS60.4 to drive a subwoofer(s), set the crossover mode to LP (low pass).

SETTING INPUT SENSITIVITY

1. Initially turn the INPUT LEVEL control(s) to minimum (counter clockwise).
2. Reconnect the (–) negative lead to the vehicle's battery. Apply power to the audio system and play a dynamic music track.
3. On the source unit, increase the volume control to 3/4 volume. Slowly increase the INPUT LEVEL control(s) toward three o'clock until you hear slight distortion in the music. Then reduce the INPUT LEVEL slightly until distortion is no longer heard.

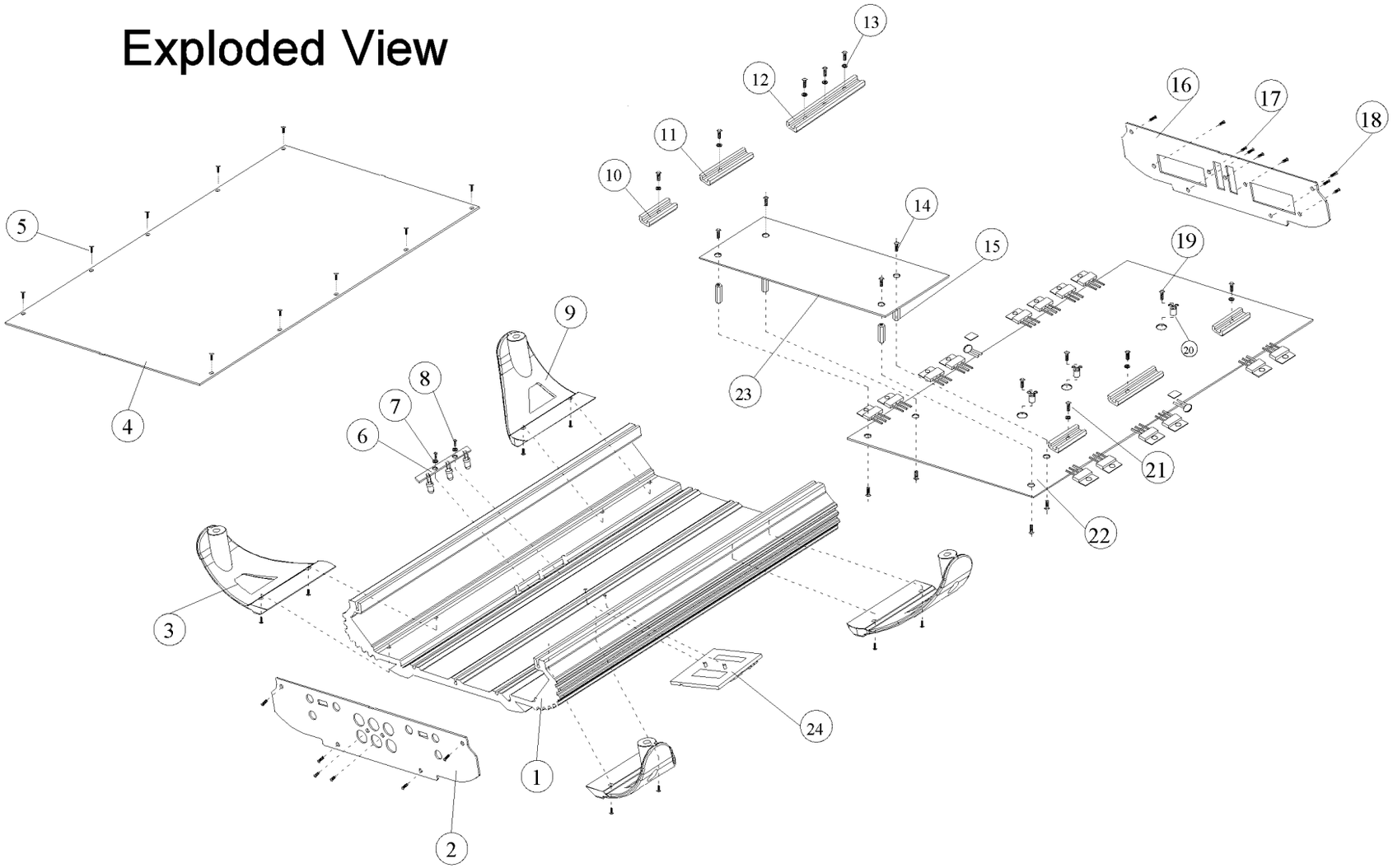
NOTE: After the source unit is on, blue LEDs (on the top panel) will light, indicating the amplifier is on. If not, check the wiring, especially the remote connection from the source unit. Also refer to "Troubleshooting" guide below.

TROUBLESHOOTING

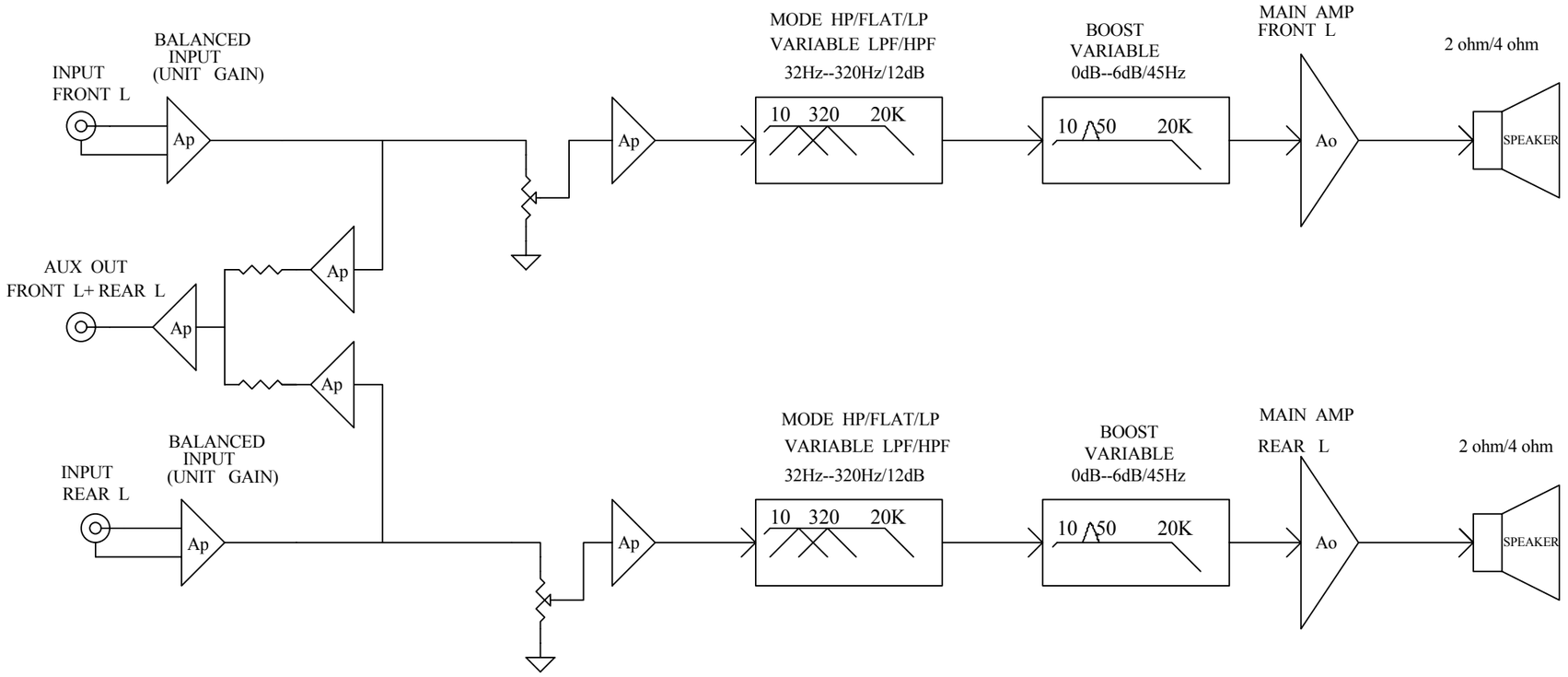
SYMPTOM	LIKELY CAUSE	SOLUTION
No audio (POWER LEDs are off)	No voltage at BATT+ or REM terminals, or bad or no ground connection	Check voltages at amplifier terminals with VOM
No audio (POWER LEDs are on)	Amplifier is overheated	Make sure amplifier cooling is not blocked at mounting location; verify speaker-system impedance is within specified limits
	Voltage more than 16V or less than 8.5V on BATT+ connection	Check vehicle charging system
No audio (POWER LEDs flash)	Voltage less than 9V on BATT+ connection	Check vehicle charging system
	DC voltage on amplifier output	Amplifier may need service; see enclosed warranty card for service information
Distorted audio	Input sensitivity is not set properly, or amplifier or source unit is defective	Check INPUT LEVEL setting; or check speaker wires for shorts or grounds
Distorted audio and POWER LEDs flash	Short circuit in speaker or wire	Remove speaker leads one at a time to locate shorted speaker or wire, then repair
Music lacks "punch"	Speakers are not connected properly	Check speaker connections for proper polarity

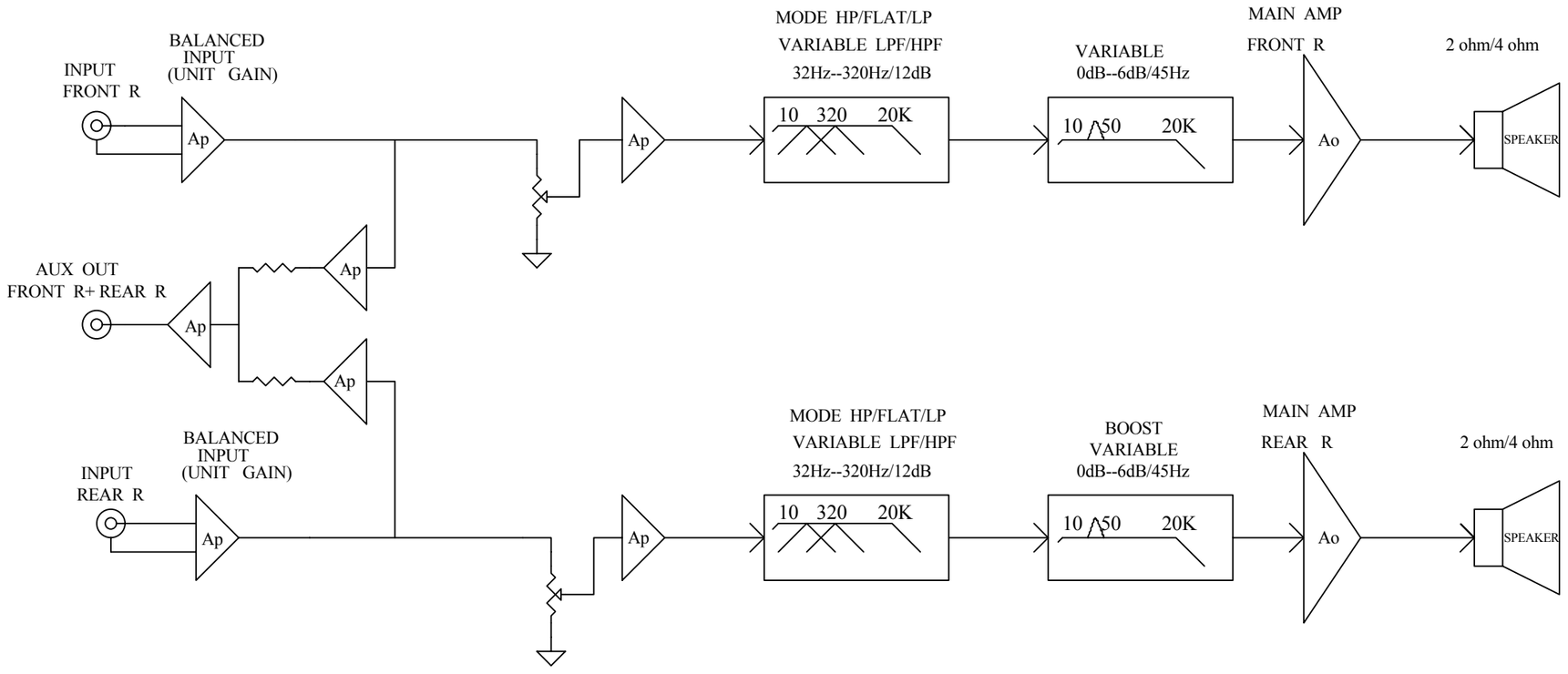
Features, specifications and appearance are subject to change without notice.

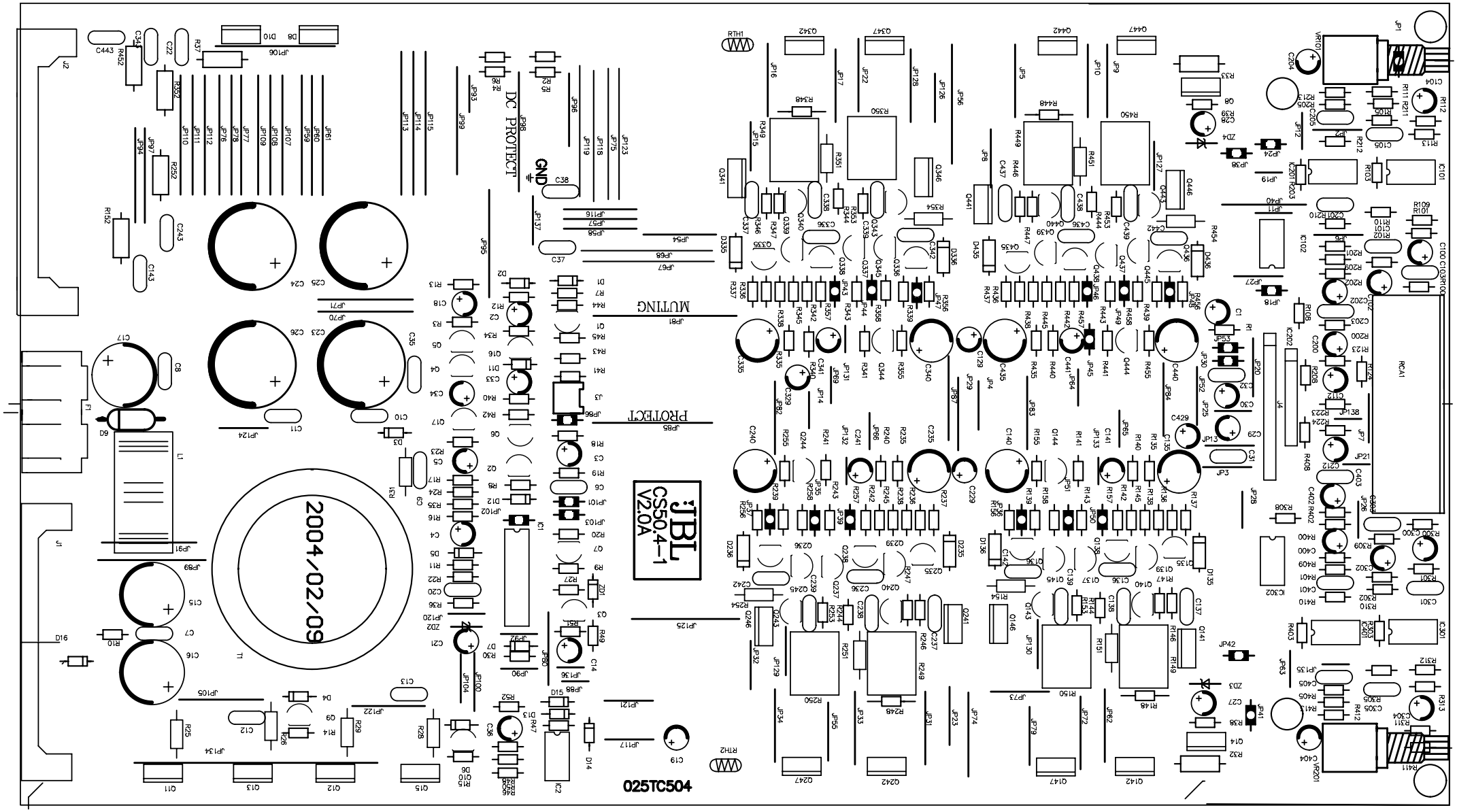
Exploded View

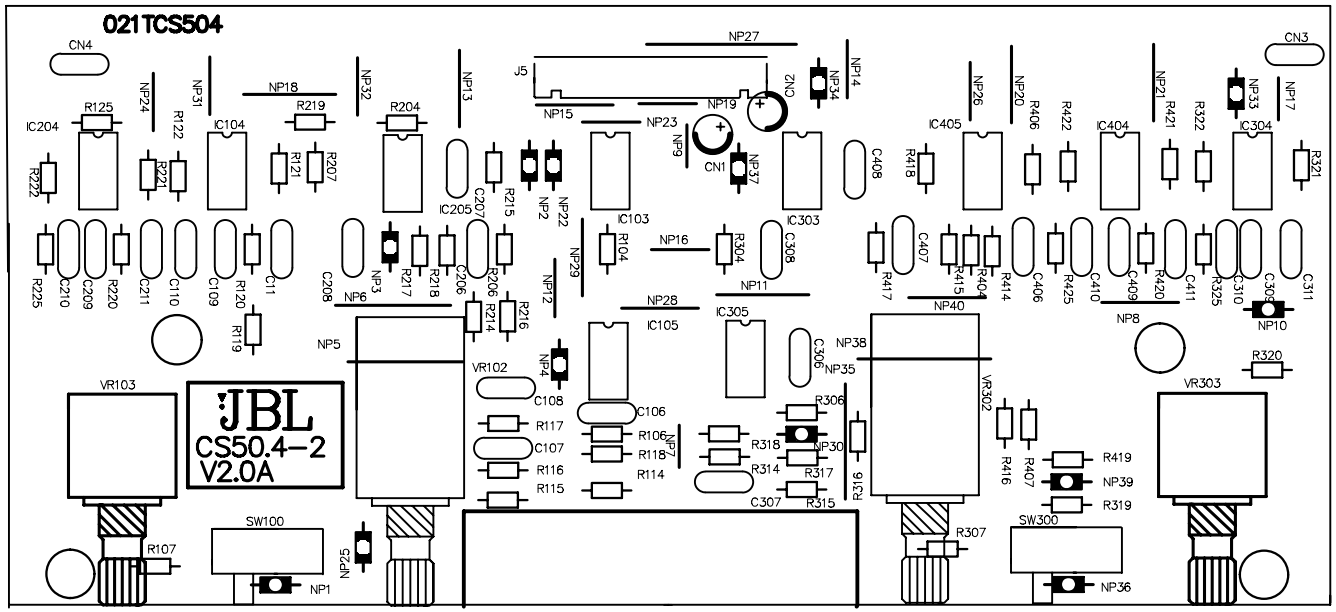


Item	Part No	Part name	Qty
24	819TJBL00	LOGO	1
23	021TCS504	MIN PCB	1
22	025TCS504	MAX PCB	1
21	711T14126	SCREW	8
20	852T00005	PLASTIC STAND	3
19	721T53125	SCREW	3
18	721T53085	SCREW	8
17	721T33085	SCREW	7
16	674TCS504	RP	1
15	771T48029	STAND	4
14	711T13065	SCREW	8
13	761T04001	WASHER	8
12	623BI5665A	PLATE	1
11	621B25050A	PLATE	2
10	621B25038A	PLATE	3
9	657TJBL0R	R-CONNER BADGE	2
8	721T26065	SCREW	2
7	830T03010	WASHER	2
6	021TCSLED	LED PCB	1
5	725T50304	SCREW	10
4	695TCS504	BP	1
3	657TJBL0L	L-CONNER BADGE	2
2	680TCS504	FP	1
1	647TCS504	HS	1


INPUT
FRONT L
BALANCED
INPUT
(UNIT GAIN)
Ap
AUX OUT
FRONT L+ REAR L
Ap
Ap
Ap
MODE HP/FLAT/LP
VARIABLE LPF/HPF
32Hz--320Hz/12dB
Ap
10 320 20K
BOOST
VARIABLE
0dB--6dB/45Hz
10 50 20K
MAIN AMP
FRONT L
Ao
2 ohm/4 ohm
SPEAKER
INPUT
REAR L
BALANCED
INPUT
(UNIT GAIN)
Ap
MODE HP/FLAT/LP
VARIABLE LPF/HPF
32Hz--320Hz/12dB
Ap
10 320 20K
BOOST
VARIABLE
0dB--6dB/45Hz
10 50 20K
MAIN AMP
REAR L
Ao
2 ohm/4 ohm
SPEAKER


INPUT
FRONT R
BALANCED
INPUT
(UNIT GAIN)
Ap
AUX OUT
FRONT R+ REAR R
Ap
Ap
Ap
MODE HP/FLAT/LP
VARIABLE LPF/HPF
32Hz--320Hz/12dB
Ap
10 320 20K
VARIABLE
0dB--6dB/45Hz
10 50 20K
MAIN AMP
FRONT R
Ao
2 ohm/4 ohm
SPEAKER
INPUT
REAR R
BALANCED
INPUT
(UNIT GAIN)
Ap
MODE HP/FLAT/LP
VARIABLE LPF/HPF
32Hz--320Hz/12dB
Ap
10 320 20K
BOOST
VARIABLE
0dB--6dB/45Hz
10 50 20K
MAIN AMP
REAR R
Ao
2 ohm/4 ohm
SPEAKER


JBL
CS50.4-1
V2.0A
025TC504
2004/02/09
DC PROTECT
MUTING
PROTECT
GND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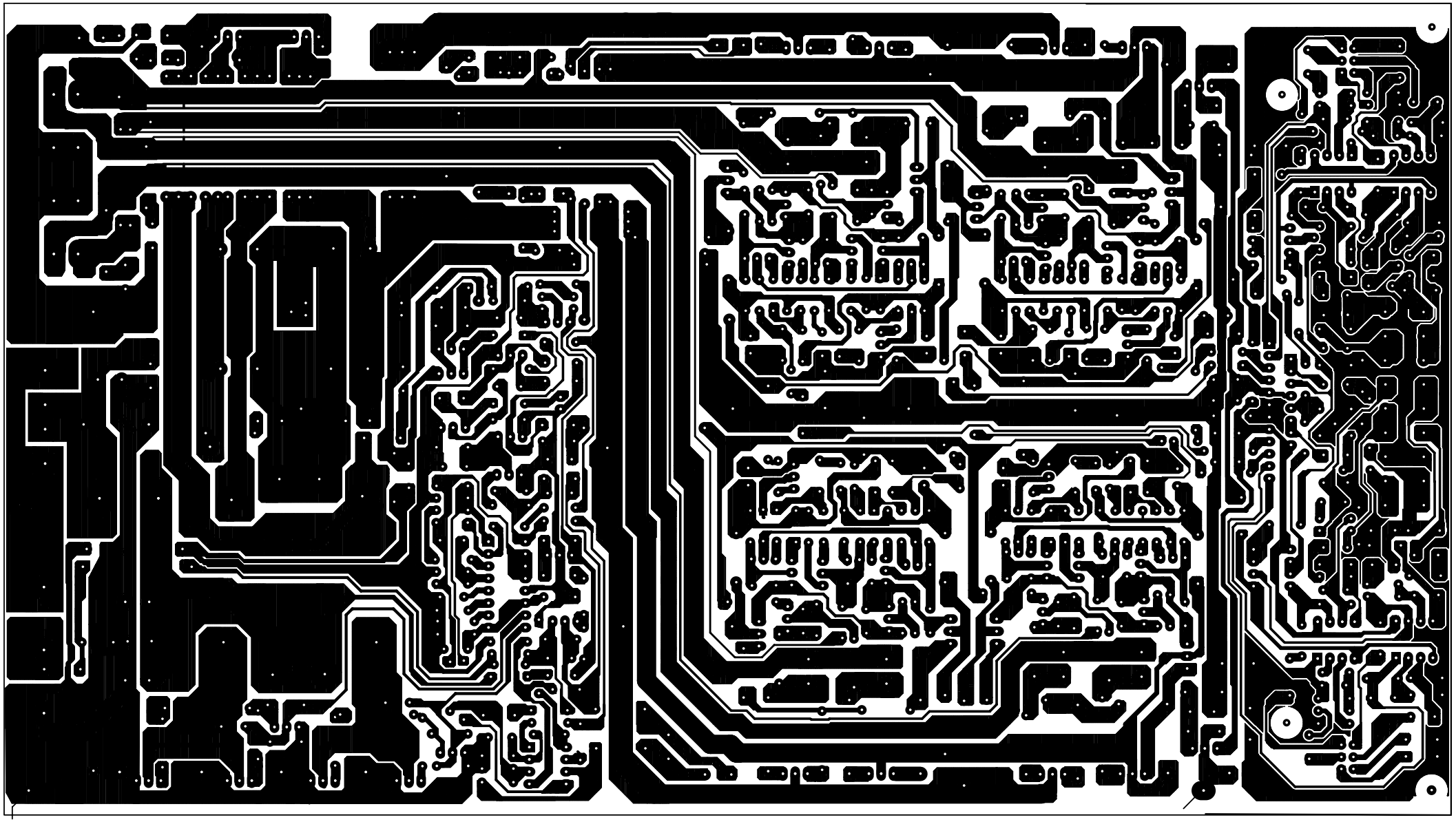
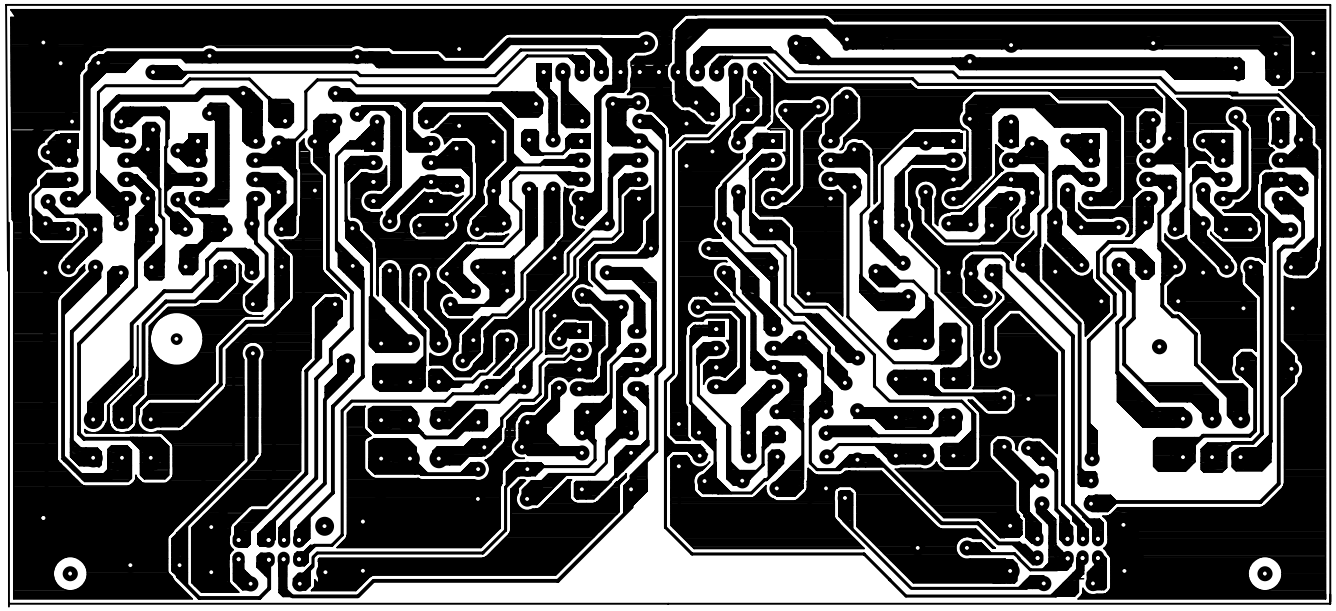
JBL
CS50.4–2
V2.0A





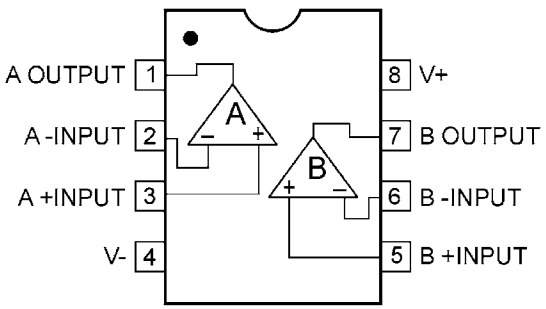
CS 60.4 Electrical Parts List				
Part Number	Description		Qty	Reference Designator
Note on Numbering Sequence, all components: "D1~7" (tilde mark) means D1,2,3,4,5,6,7.				
but "D136-D436" (hyphen) means D136,236,336,436"				
Main PCB				
Semiconductors				
124TN4401	Transistor	TR MOTOROLA 2N4401 NPN	18	Q2 Q4 Q5 Q16 Q17,Q138-Q438,Q140-Q440 Q135-Q435 Q143
124TN4403	Transistor	TR MOTOROLA 2N4403 PNP	11	Q6 Q9 Q10 Q136-Q436 Q137-Q437
124T0SA06	Transistor	TR MOTOROLA MPSA06 80V NPN	4	Q145-Q445
125T0C945	Transistor	TR NEC 2SC945P 0.1A60V NPN	4	Q144-Q444
126TSB647	Transistor	2SB647A PNP	6	Q7 Q8 Q146-Q446
126TSD667	Transistor	2SD667A NPN	5	Q14 Q141-Q441
129T0J109	Transistor	J109	1	Q1
131TN4148	DIODE	DIODE NS1N4148HSS150MA	13	D1~7 D11~16
133T0J5B6	ZINER DIODE	DIODE NECRD5.6JSB ZNR5.6V	1	ZD1
133T0011B	ZINER DIODE	DIODE NEC RD11EB3 11V	1	ZD2
133T0015B	ZINER DIODE	DIODE NEC RD15EB3 15V	2	ZD3 ZD4
155TTL431	IC DIP3	TL431 adjustable shunt regulator	1	Q3
124T0SA56	Transistor	TR MOTOROLA MPSA56 80V PNP	4	Q139-Q439
124TN4401	Transistor	TR MOTOROLA 2N4401 NPN	3	Q243 Q343 Q443
134TN4002	RECTIFIER DIODE	DIODE 1N4002 RET1.0A100V	8	D135-D435 D136-D436
134TN5402	RECTIFIER DIODE	DIODE 1N5402 ET3.0A100V	1	D9
151T04558	IC SIP8	JRC MC4558 Dual Op-Amp	1	IC202
154T04558	IC DIP8	JRC or ROHM BA4558 Dual Op-Amp	6	IC101-IC401 102-402, 203, 403
154LM358N	IC DIP8	DIP8 LM358N Dual Op-Amp	1	IC2
158TTL494	IC DIP16	NEC UPC494 or TI TL494 PWM	1	IC1
123TRFZ48	Transistor	IR IRFZ48V MOSFET	4	Q1~13,Q15
128TKD718	Transistor	KD718 NPN	4	Q142-Q442
128TKB688	Transistor	KB688 PNP	4	Q147-Q447
135T1620C	DIODE	DIODE MOTOROLA 1620CT	1	D8
135T1620R	DIODE	DIODE MOTOROLA 1620CTR	1	D10
Resistors				
22022047A	RESISTOR	RD 1/2W 4.7Ω	4	R152-R452
220440101	RESISTOR	RD 1/4W 100Ω	4	R25 R26 R28 R29
220440103	RESISTOR	RD 1/4W 10K	4	R154-R454
220440272	RESISTOR	RD 1/4W 2.7K	4	R151-R451
220880000	RESISTOR	RD 1/8W 0Ω	29	JP1 JP18 JP24 JP30 JP35~39 JP41~51 JP53 JP86 JP101~103 R103-R403
220880101	RESISTOR	RD 1/8W 100Ω	18	R11R27.R138-R438 R139-R439 R142-R442 R143-R443
220880102	RESISTOR	RD 1/8W 1K	19	R7 R14 R15 R137-R437 R156-R456 R157-R457 R136-R436
220880103	RESISTOR	RD 1/8W 10K	11	R135-R435 R10 R19 R20 R108-R408
220880104	RESISTOR	RD 1/8W 100K	8	R2~6 R12 R124 R224
220880123	RESISTOR	RD 1/8W 12K	1	R17
220880153	RESISTOR	RD 1/8W 15K	2	R49 R50
220880154	RESISTOR	RD 1/8W 150K	2	R43 R42
220880183	RESISTOR	RD 1/8W 18K	9	R35 R140-R440 R141-R441
220880202	RESISTOR	RD 1/8W 2K	2	R40 R41
230884421	RESISTOR	MF1/8W 4.42K 1%	4	R144-R444
220880204	RESISTOR	RD 1/8W 200K	1	R23
220880205	RESISTOR	RD 1/8W 2M	1	R22
220880221	RESISTOR	RD 1/8W 220Ω	4	R148-R448
220880222	RESISTOR	RD 1/8W 2.2K	1	R36
220880223	RESISTOR	RD 1/8W 22K	6	R45 R30 R100-R400
220880242	RESISTOR	RD 1/8W 2.4K	4	R147-R447

Part Number	Description		Qty	Reference Designator
Note on Numbering Sequence, all components: "D1~7" (tilde mark) means D1,2,3,4,5,6,7.				
but "D136-D436" (hyphen) means D136,236,336,436"				
Main PCB				
220880243	RESISTOR	RD 1/8W 24K	2	R123 R223
220880272	RESISTOR	RD 1/8W 2.7K	1	R24
220880302	RESISTOR	RD 1/8W 3K	4	R9 R18 R39 R38
220880363	RESISTOR	RD 1/8W 36K	1	R51
220880391	RESISTOR	RD 1/8W 390Ω	4	R111-R411
220880392	RESISTOR	RD 1/8W 3.9K	1	R13
220880470	RESISTOR	RD 1/8W 47Ω	8	R145-R445 R158-R458
220880472	RESISTOR	RD 1/8W 4.7K	4	R146-R446
220880473	RESISTOR	RD 1/8W 47K	10	R1 R34 R101-R401 R102-R402
220880474	RESISTOR	RD 1/8W 470K	1	R44
220880562	RESISTOR	RD 1/8W 5.6K	4	R155-R455
220880563	RESISTOR	RD 1/8W 56K	9	R52 R109-R409 R110-R410
220880682	RESISTOR	RD 1/8W 6.8K	2	R46 R16
220880821	RESISTOR	RD 1/8W 820Ω	4	R153-R453
230881002	RESISTOR	MF 1/8W 10K 1%	1	R48
230881003	RESISTOR	MF 1/8W 100K 1%	4	R105-R405
230881052	RESISTOR	MF 1/8W 10.5K 1%	1	R47
230882202	RESISTOR	MF 1/8W 22K 1%	1	R8
230884751	RESISTOR	MF 1/8W 4.75K 1%	6	R213 R413 R112-R412
230884991	RESISTOR	MF 1/8W 4.99K 1%	2	R113 R313
220220220	RESISTOR	RD 1/2W 22Ω	1	R37
220220470	RESISTOR	RD 1/2W 47Ω	2	R33 R32
220880472	RESISTOR	RD 1/8W 4.7K	4	C103~403
231100101	RESISTOR	1Ws 100Ω	1	R31
232XL502J	CEMENT RESISTOR	SQM 5Ws 0.2Ω	8	R149-R449 R150-R450
202G09B23	Variable Resistor	B20K 20% H=15L=9 Input Lev.	2	VR101 VR201
Capacitors				
31K510010	CERAMIC CAPACITOR	C/C NPO 10pF 100V K	4	C101-C401
31Z510305	CERAMIC CAPACITOR	C/C Y5V 10000pF 50V Z	1	C35
31Z510410	CERAMIC CAPACITOR	C/C Y5V 0.1uF 100V Z	8	C6~9 C10 C11 C31 C32
31J547010	CERAMIC CAPACITOR	C/C NPO 47pF 100V J	18	C12 C13 C136-C436 C142-C442 C137-C437 C105-C405
31J568125	CERAMIC CAPACITOR	C/C Y5E 680pF 250V K	1	C22
32J510410	M/C	M/C 0.1uF 100V J	8	C143-C443 C138-C438
32J568210	M/C	M/C 0.0068uF 100V J	1	C20
340Z10625	Electrolytic Cap	10uF 25V 5*11	6	C112 C212 C129-C429
340Z10716	Electrolytic Cap	100uF 16V 5*11	10	C4 C19 C27~30 C141-C441
340Z22550	Electrolytic Cap	2.2uF 50V 5*11	3	C3 C34 C33
340Z22616	Electrolytic Cap	22uF 16V	1	C21
340Z22625	Electrolytic Cap	22uF 25V 5*11	9	C2 C100-C300 C402 C104-C404
340Z47625	Electrolytic Cap	47uF 25V 5*11	3	C5 C36 C14
370Z10550	Electrolytic Cap	1uF 50V 5*11	3	C239 C339 C439
370Z10716	Electrolytic Cap	100uF 16V 8*12	1	C18
370Z22616	Electrolytic Cap	22uF 16V NP	1	C1
390Z22625	Electrolytic Cap	22uF 25V 4*7	4	C102 C202 C302 C400
340T10750	Electrolytic Cap	100uF 50V 8*13	8	C135-C435 C140-C440
341T22835	Electrolytic Cap	2200uF 35V 16*26 105C	4	C23~26
341T10835	Electrolytic Cap	1000uF 35V 13*26 105C	3	C15~17
370Z10550	Electrolytic Cap	1uF 50V 5*11	1	C139
370Z10625	Electrolytic Cap	10UF/25V 5*11	4	C103-C403
Miscellaneous				
261T05103	THERMISTOR	NTC THERMISTORD103J 10K	2	RTH1 RTH2
173T00102	INDUCTOR	102UH	1	JP89
401T25040	COPPER BAR	φ2.5*40m/m H=20	1	

Part Number	Description		Qty	Reference Designator
Note on Numbering Sequence, all components: "D1~7" (tilde mark) means D1,2,3,4,5,6,7.				
but "D136-D436" (hyphen) means D136,236,336,436"				
Main PCB				
401T25815	COPPER BAR	φ2.5*81.5m/m H=20	1	
410T21004	BUSS BAR	4P2.1*55.5m/m	1	JP134
571T20070	CONNECTOR W/WIRE	1015# 20AWG 70m/m	1	GND
572TB6012	CONNECTOR W/WIRE	12P 60m/m(CN*2)	1	J4
862T00010	FIBER SLEEVE	10m/m φ1.0	4	RTH1 RTH2
862T00020	FIBER SLEEVE	20m/m φ1.0	1	JP91
172T41050	INDUCTOR	T23*90-26 1.0*4*71/2TS5.	1	L1
181T37612	TRANSFORMER	ψ37 6:12 L=ψ1.2*3*6Ts	1	T1
435T00025	FUSE	25A ATC	2	F1
447T00001	FUSE HOLDER		1	for F1
526URDW14	RCA JACK	6 HOLE 14P	1	RCA1
535T25002	CONNECTOR	2P P=2.5m/m	1	J3
544T300003	TERMINAL	GA30-03-3P	1	J1
544T34324	TERMINAL	EM-2304 4P*2+C150	1	J2
Pre-Amp PCB, LED board				
Semiconductors				
154T04558	IC DIP8	ROHM BA4558	10	IC104-IC404 IC103 IC303 IC105-IC405
P137T05B02	LED	5ψLED BLUE LIGHT	3	BLED1 BLED2 BLED3
Resistors				
220880000	RESISTOR	RD 1/8W 0Ω	13	NP1~NP4 NP10 NP22 NP25 NP30 NP33 NP34 NP36 NP37 NP39
220880102	RESISTOR	RD 1/8W 1K	4	R119-R419
220880103	RESISTOR	RD 1/8W 10K	16	R104-R404 R106-R406 R107-R407 R114-R414
220880223	RESISTOR	RD 1/8W 22K	4	R115-R415
220880362	RESISTOR	RD 1/8W 3.6K	4	R120-R420
220880392	RESISTOR	RD 1/8W 3.9K	4	R122-R422
220880474	RESISTOR	RD 1/8W 470K	4	R125-R425
220880562	RESISTOR	RD 1/8W 5.6K	11	R116-R416 R117-R417 R121 R221 R421
220880682	RESISTOR	RD 1/8W 6.8K	4	R118-R418
220880562	RESISTOR	RD 1/8W 5.6K	1	R321
202G13B23	Variable Resistor	B20K 20% H=15 L=13	2	VR103 VR303
202G15C53	Variable Resistor	C50K 20% H=15 L=22	2	VR102 VR302
Capacitors				
31J510110	CERAMIC CAPACITOR	C/C NPO 100pF 100V J	4	C106-C406
31K547110	CERAMIC CAPACITOR	C/C Y5E470pF 100V K	4	C11 C211 C311 C411
32J539310	M/C	M/C 0.039uF 100V J	4	C110-C410
32J582310	M/C	M/C 0.082 uF 100V J	8	C107-C407 C108-C408
340Z10716	Electrolytic Cap	100uF 16V 5*11	2	CN1 CN2
31Z510410	CERAMIC CAPACITOR	C/C Y5V 0.1uF 100V Z	2	CN3 CN4
32J518410	Electrolytic Cap	M/C 0.18uF 100V J	4	C109-C409
Miscellaneous				
192R23D05	SWITCH	SK-23D05 G=7	2	SW100 SW300
531T25012	CONNECTOR	12P P=2.5m/m	1	J5
MISC./MECHANICAL				
571W15002	CONNECTOR W/WIRE	2P 150 T=5m/m	1	
621B25038A	TRANSISTOR BAR	1 HOLE 2.5*15*38m/m	3	
621B25050A	TRANSISTOR BAR	1HOLE 2.5*15*50m/m	2	

Part Number	Description		Qty	Reference Designator
Note on Numbering Sequence, all components: "D1~7" (tilde mark) means D1,2,3,4,5,6,7.				
but "D136-D436" (hyphen) means D136,236,336,436"				
MISC./MECHANICAL				
623BI2565A	TRANSISTOR BAR	3HLE 2.5*12*65m/m	1	
647TCS604-A	HEATSINK	CS60.4	1	
674TCS604-A	POWER PANEL	CS60.4	1	
680TCS604	RCA PANEL	CS60.4	1	
711T13065	SCREW	PMS 3*6m/m	8	
711T14145	SCREW	M4*14m/m	8	
721T33085	SCREW	PTS-1)3*8	7	
721T53125	SCREW	PTS-4 3*12	3	
721T53085	SCREW	PTS-2 3*8	8	
721T26065	SCREW	PT 2.6*6m/m	2	
761T04001	SPRING WASHER	4φ	8	
771T48029	COPPER STANDOFF	29.0*4.75m/m	4	
820TJBL00	NAME BADGE	CS60.2&CS300.1&CS60.4共用	1	
830T03010	INSULATOR	3*10*1m/m	2	
830T30010	WASHER	300*10*0.5m/m	1	
831T25046A	INSULATOR	1孔 25*46m/m	5	
833T23065A	INSULATOR	3孔 23*65m/m	1	
843101025	RUBBER WASHER	10*10m/m T=2.5	2	
843389535	RUBBER WASHER	38*9.5*3.5m/m	1	
852T00005	STANDOFF	H=5m/m PCB	3	
657TJBL0L-A	LEFT MOUNTING BRKT	CS60.4&CS300.1&CS60.2	2	
657TJBL0R-A	RIGHT MOUNTING BRKT	CS60.4&CS300.1&CS60.2	2	
695TCS504	BOTTOM PLATE	CS50.4	1	
718T63508-A	SCREW	P3.5*8	8	
721T52304	SCREW	4.7~5.2m/m	10	
830T17082	PAPER WASHER	170*82*0.5m/m 4孔	1	
843TJBL00	RUBBER WASHER		4	
863300788	INSULATOR	300*7.8*0.5m/m	2	

LM358 Dual Op-Amp
4558 Dual Op-Amp



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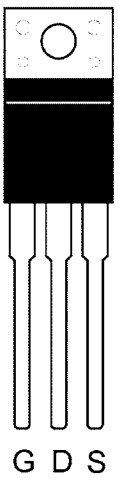

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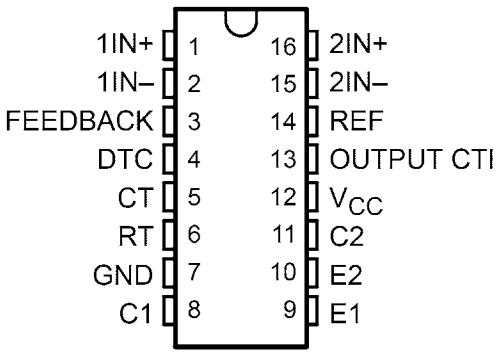

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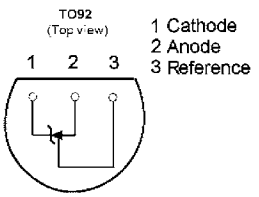

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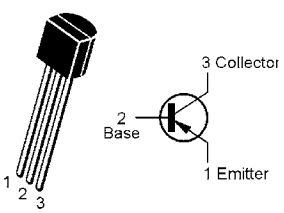

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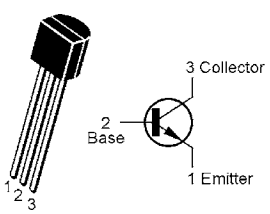

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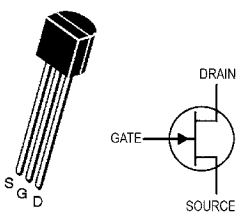

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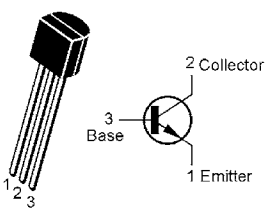

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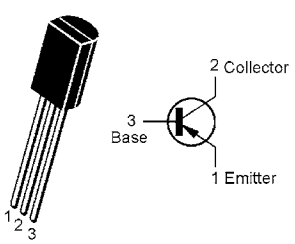

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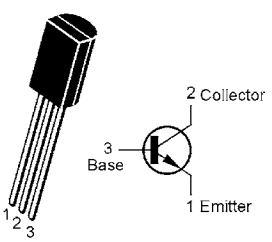

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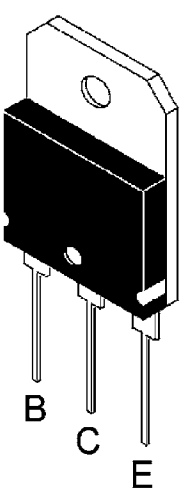

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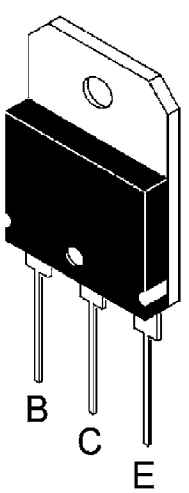

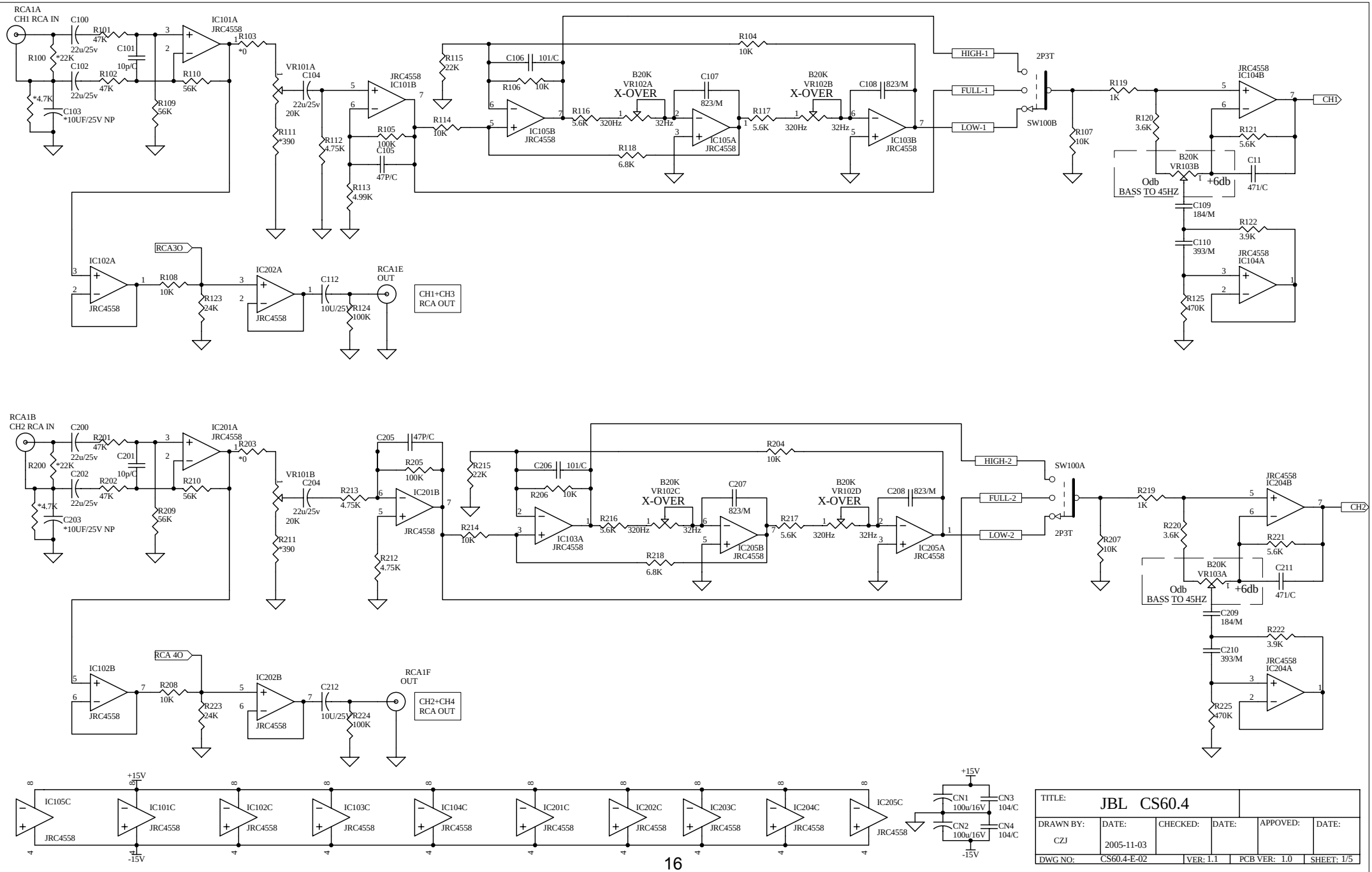

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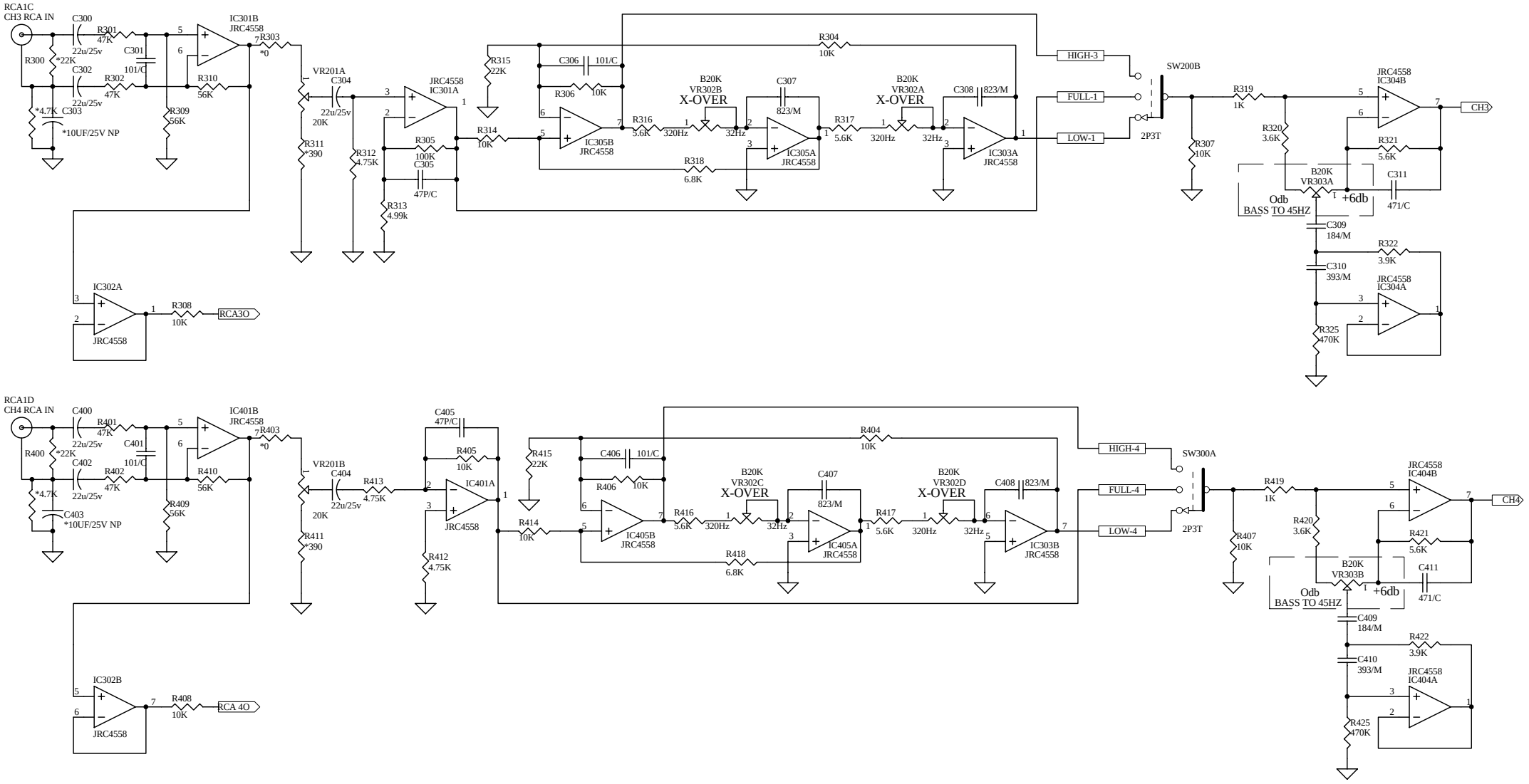

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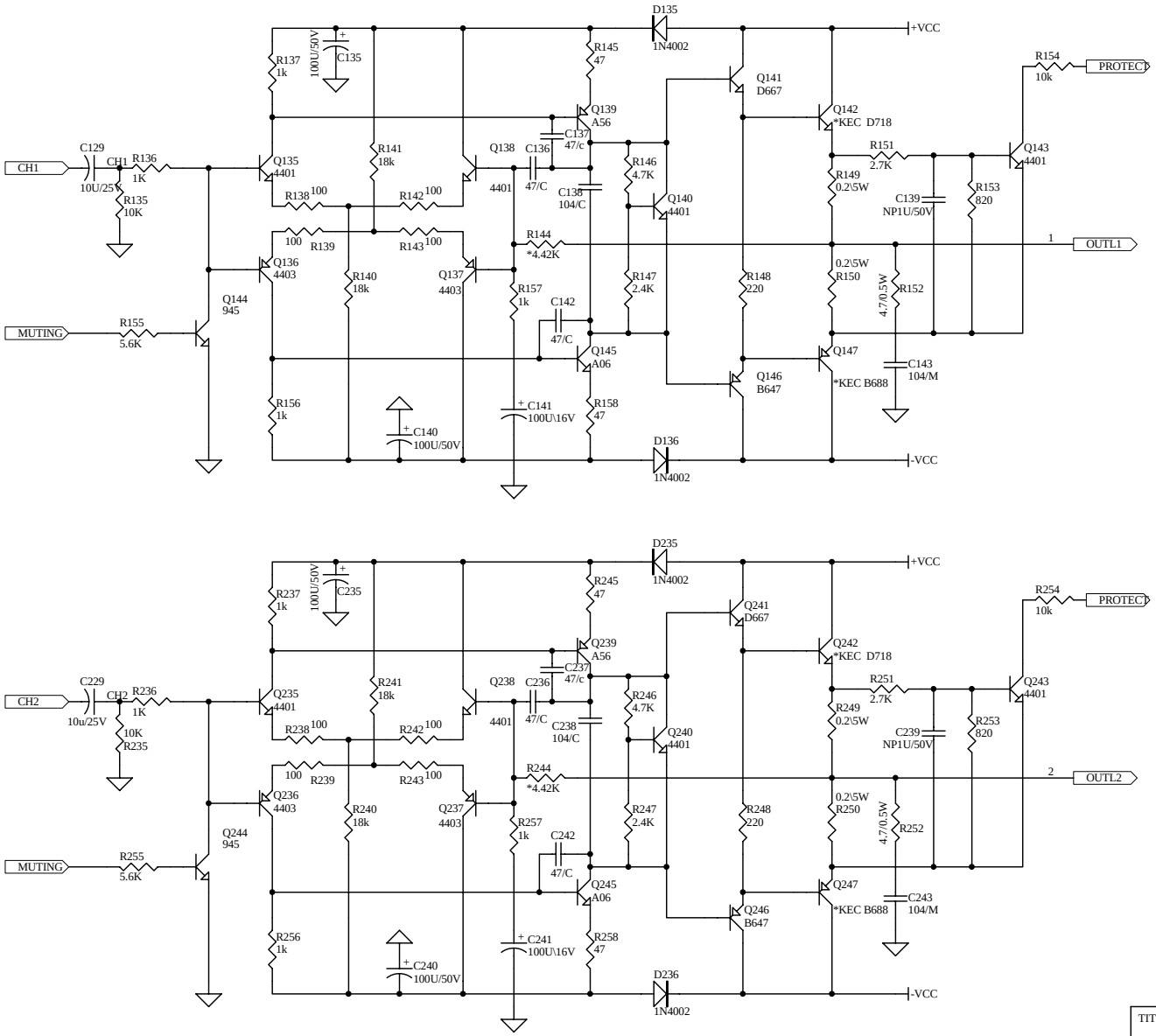

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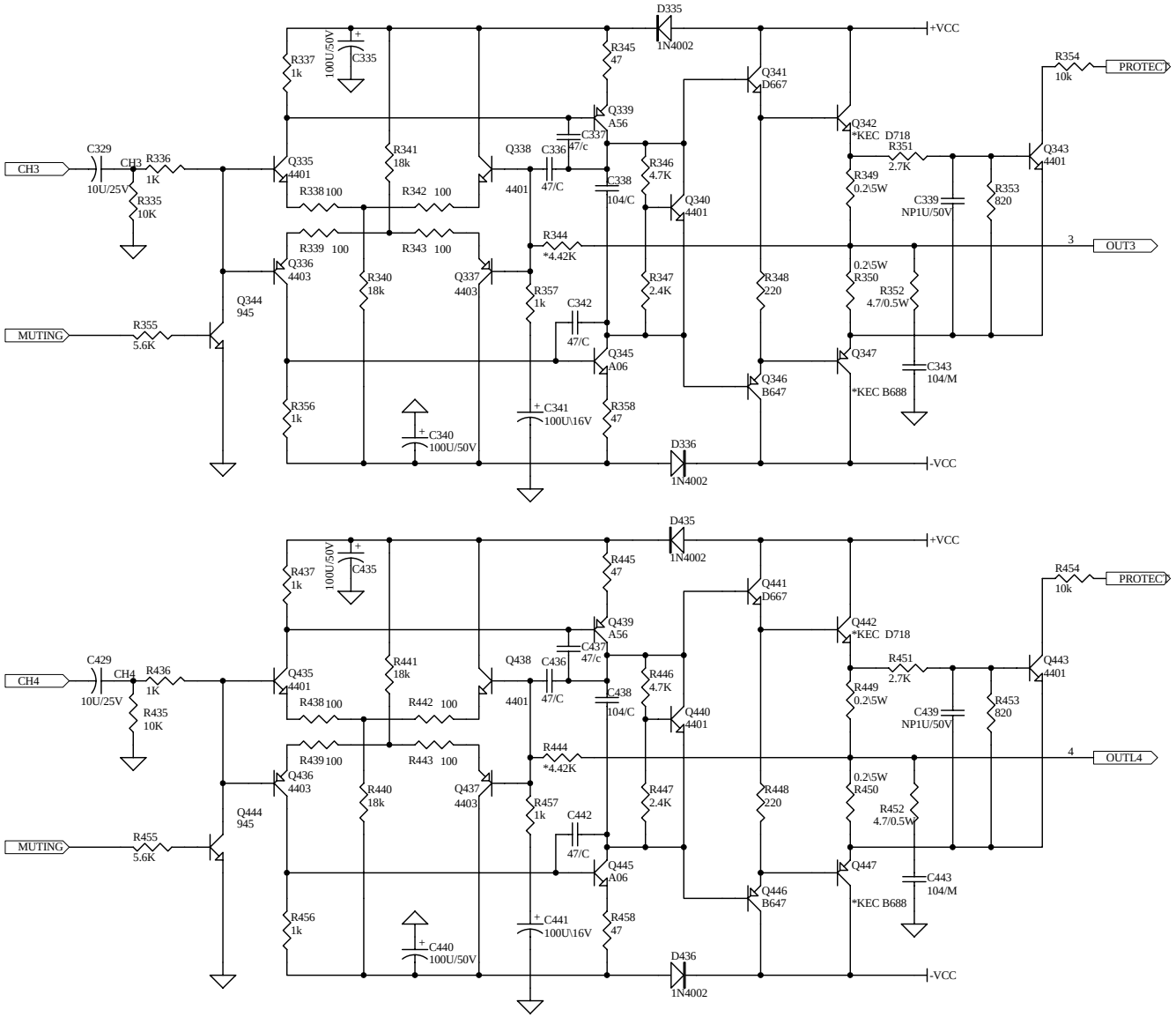

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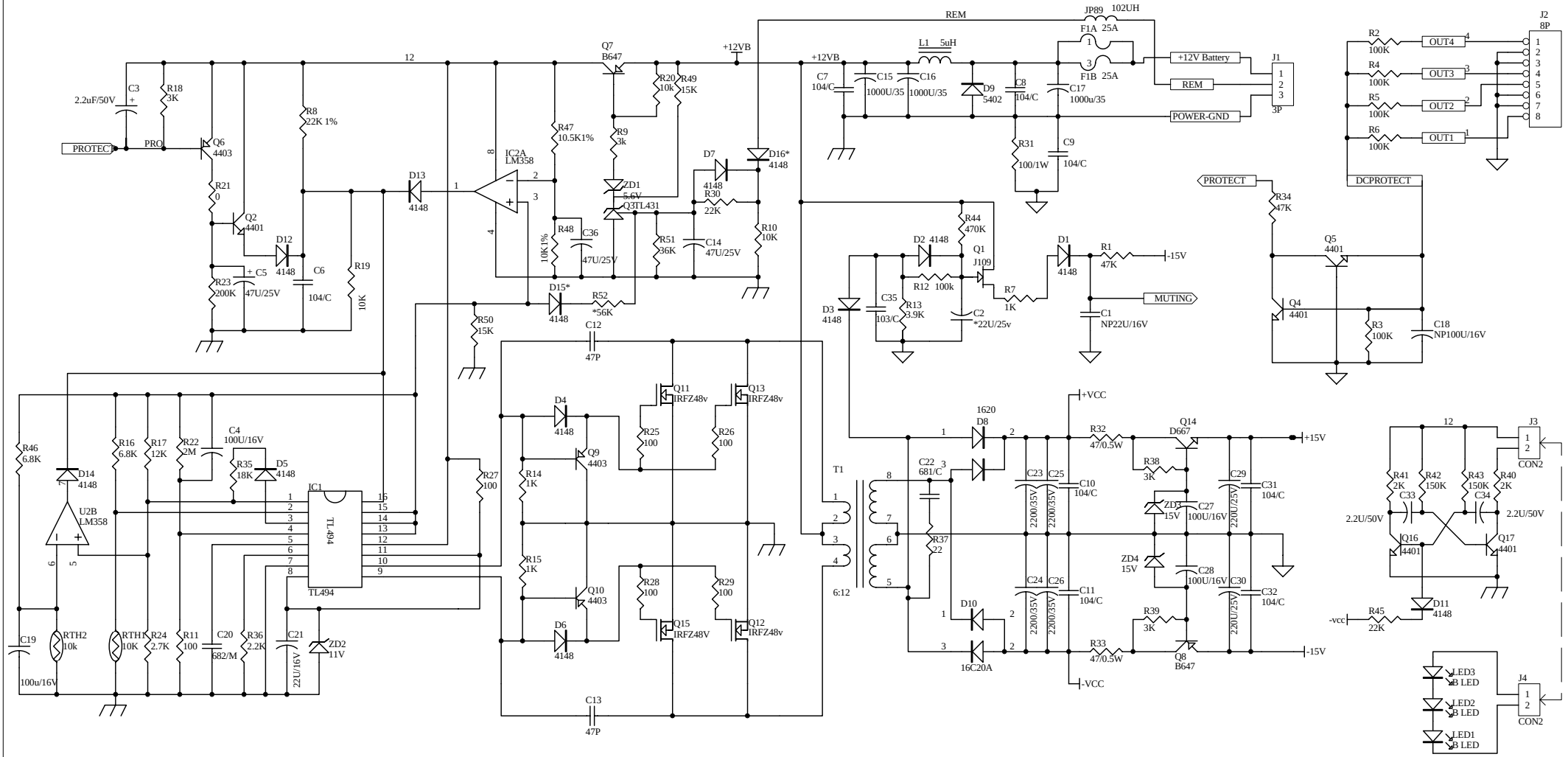

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