

JBL

CS Series

50.4

4 CHANNEL POWER AMPLIFIER

SERVICE MANUAL



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

Rev0 3/2004

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CS50.4 Specifications

Output Power:	67W RMS x 4 channels @ 4 ohms; ≤1% THD + N
(14.4V supply)	82W RMS x 4 channels @ 2 ohms; ≤1% THD + N
	162W 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:	240mV
Bass boost (45Hz)	Variable 0 – 6dB
DC Offset	<30mV
Output regulation:	.032dB @ 4 ohms
Idle Current	0.65A
Input Impedance	20kΩ
Max Current Draw	26A @ 4 ohms
	49A @ 2 ohms
Dimensions:	12 x 10 x 2 1/4" (L x W x H)
	(305mm x 254mm x 57mm)
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.

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.

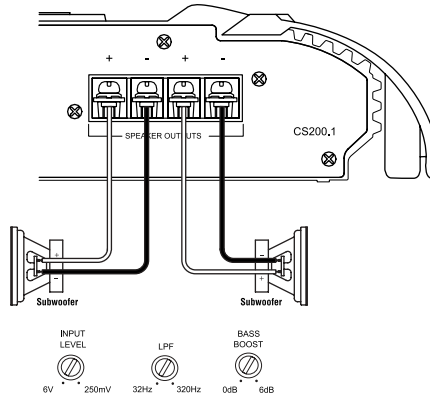


Figure 2. CS subwoofer amplifier with two woofers connected.

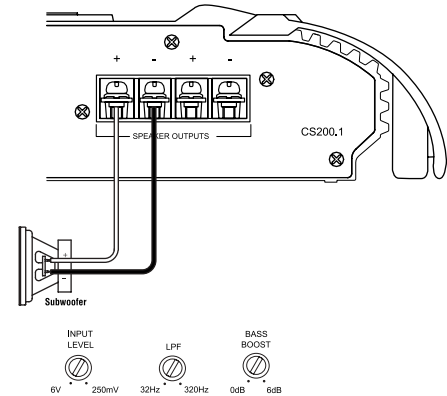


Figure 3. CS subwoofer amplifier with one woofer connected.

APPLICATIONS - CS50.4

The CS50.4 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.

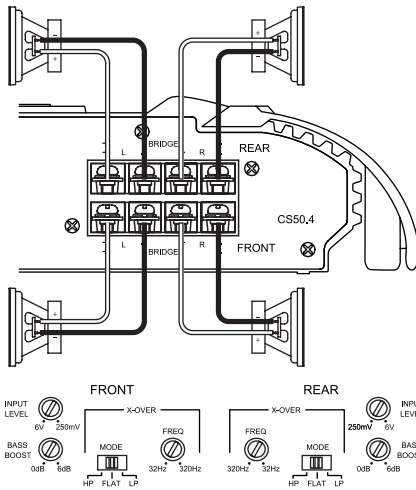


Figure 4. CS50.4 amplifier in 4-channel (stereo) operation to drive front and rear full-range speakers.

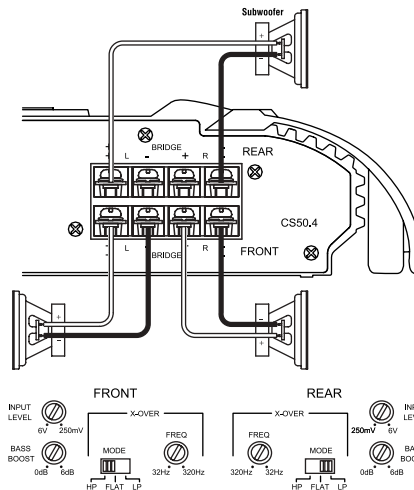


Figure 5. CS50.4 is set up for 3-channel operation to drive a set of full-range speakers and a subwoofer.

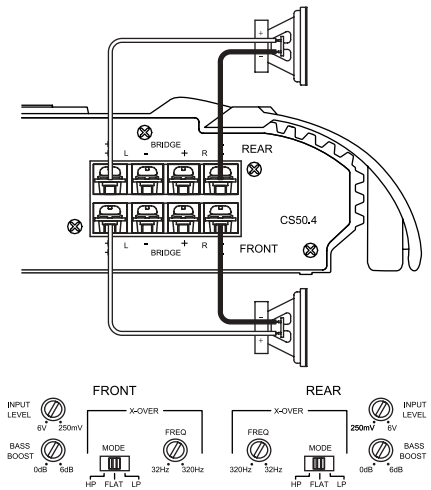


Figure 6. CS50.4 used in bridged 2-channel mode to drive a set of components or subwoofers. Set crossovers according to application.

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 CS50.4, 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 CS50.4 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.

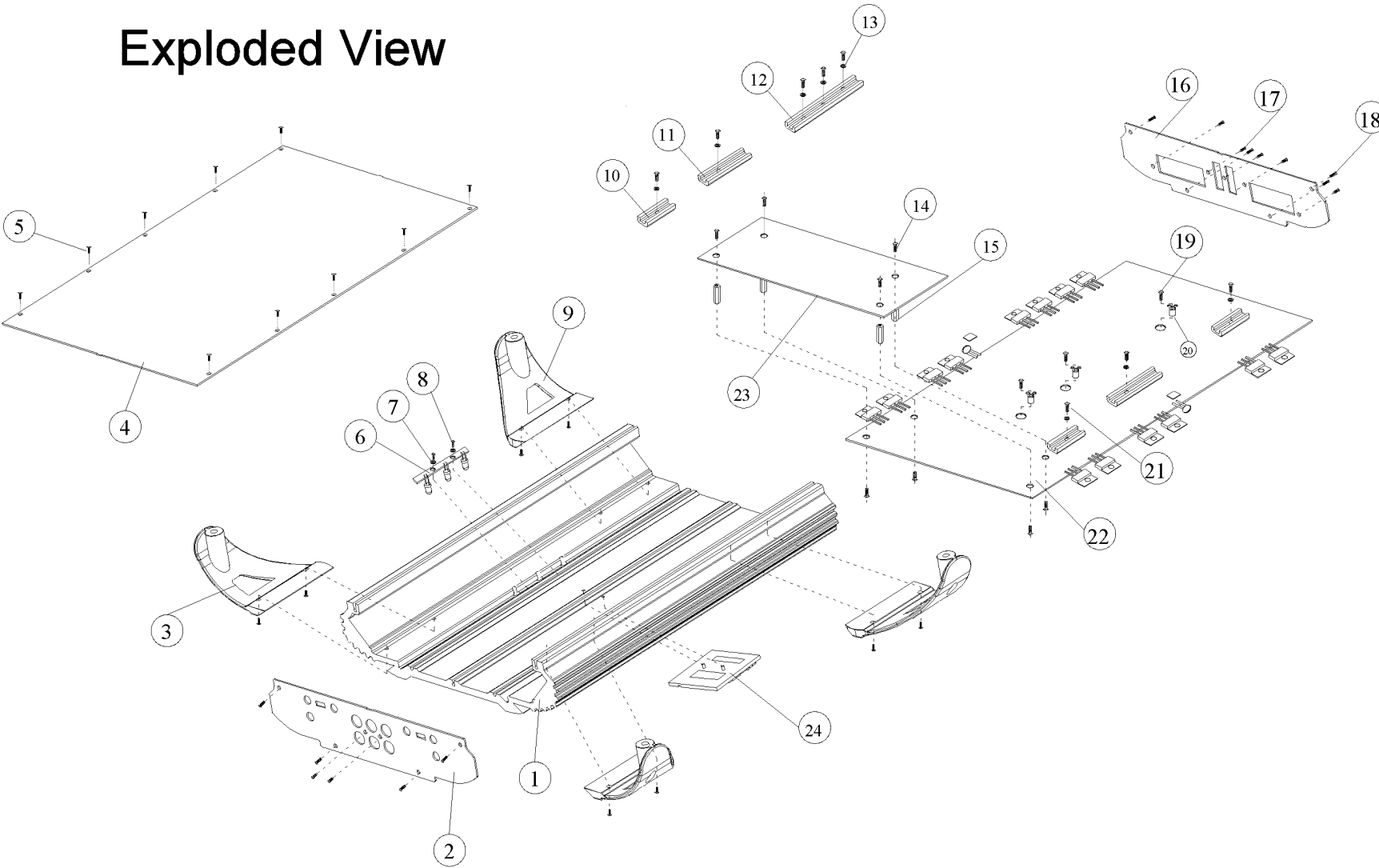
NOTE: After the source unit is on, blue LEDs (on the top panel) will light, indicating the amplifier is on. If not, check the wiring, especially the remote connection from the source unit. Also refer to “Troubleshooting” guide below.

TROUBLESHOOTING

SYMPTOM	LIKELY CAUSE	SOLUTION	SYMPTOM	LIKELY CAUSE	SOLUTION
No audio (POWER LEDs are off)	No voltage at BATT+ or REM terminals, or BATT+ no ground	Check voltages at amplifier terminals with VOM	No audio (POWER LEDs flash)	Voltage less than 9V on BATT+ connection	Check vehicle charging system
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	Distorted audio	DC voltage on amplifier output	Amplifier may need service; see enclosed warranty card for service information
	Voltage more than 16V or less than 8.5V on BATT+ connection	Check vehicle charging system	Distorted audio and POWER LEDs flash	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
			Music lacks “punch”	Short circuit in speaker or wire	Remove speaker leads one at a time to locate shorted speaker or wire, then repair
				Speakers are not connected properly	Check speaker connections for proper polarity

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

Exploded View

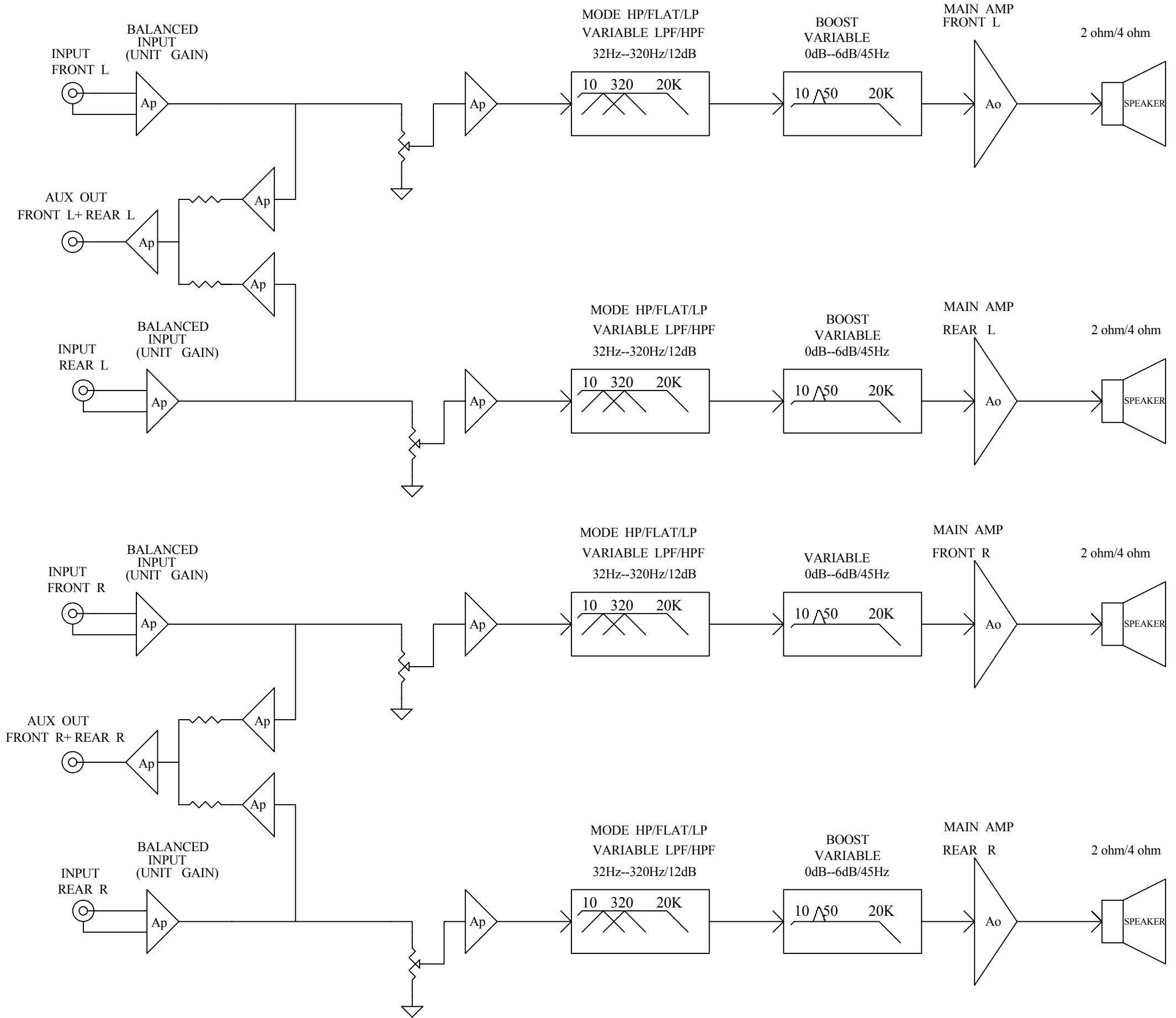


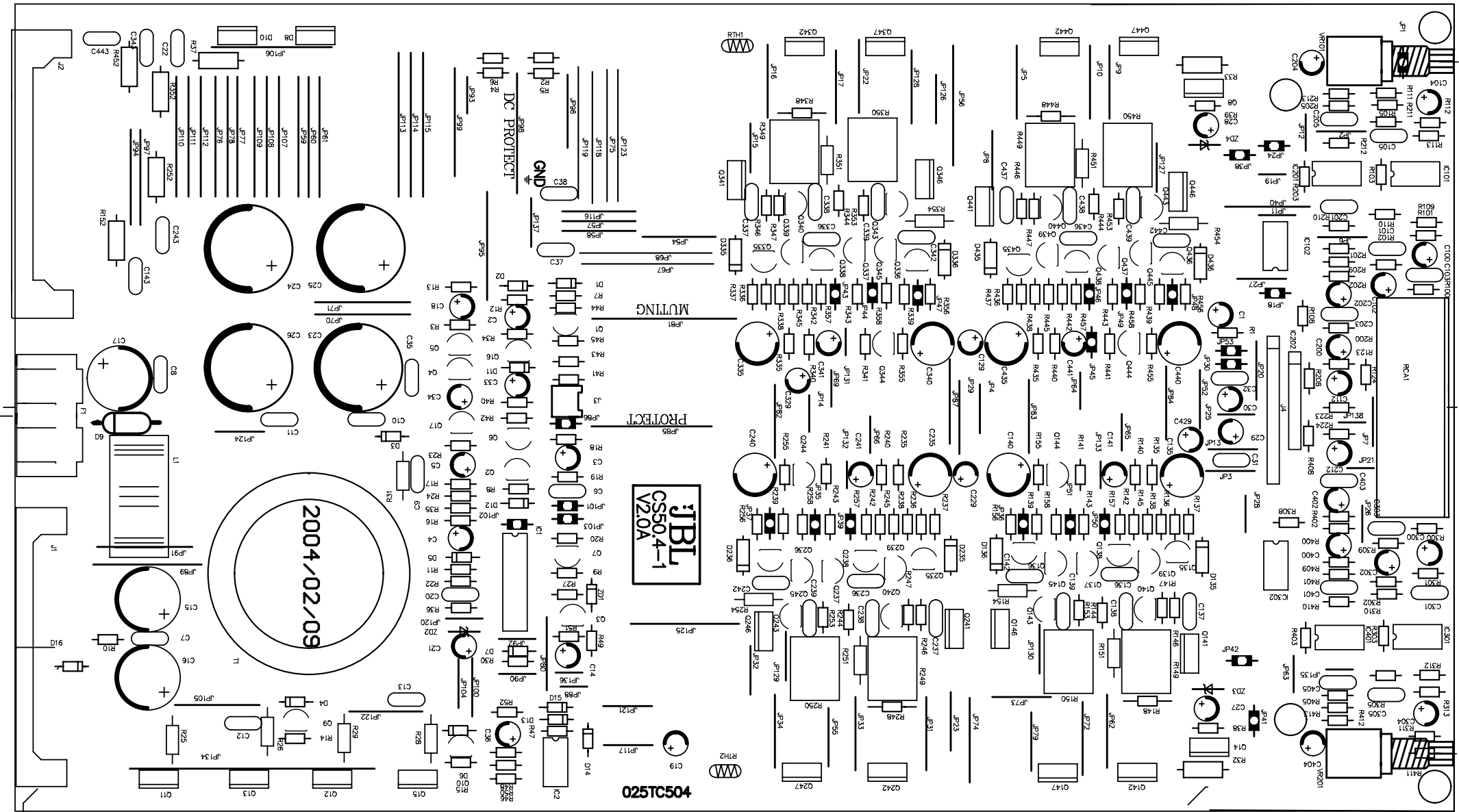
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24	819TJBL00	LOGO	1
23	021TCS504	MIN PCB	1
22	025TCS504	MAX PCB	1
21	711T14126	SCREW	8
20	852T00005	PLASTIC STAND	3
19	721T53125	SCREW	3
18	721T53085	SCREW	8
17	721T33085	SCREW	7
16	674TCS504	RP	1
15	771T48029	STAND	4
14	711T13065	SCREW	8
13	761T04001	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

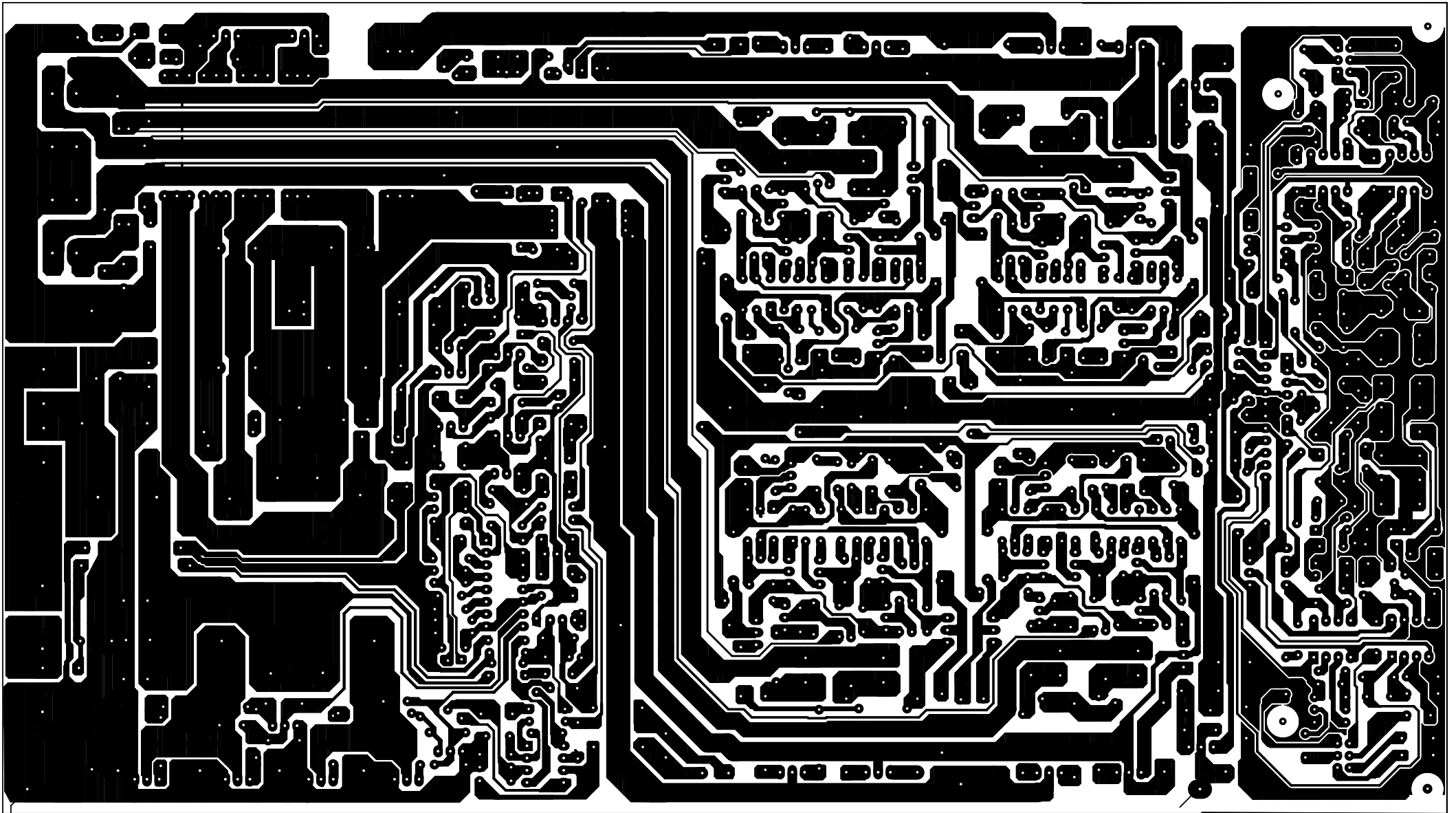
Block Diagram

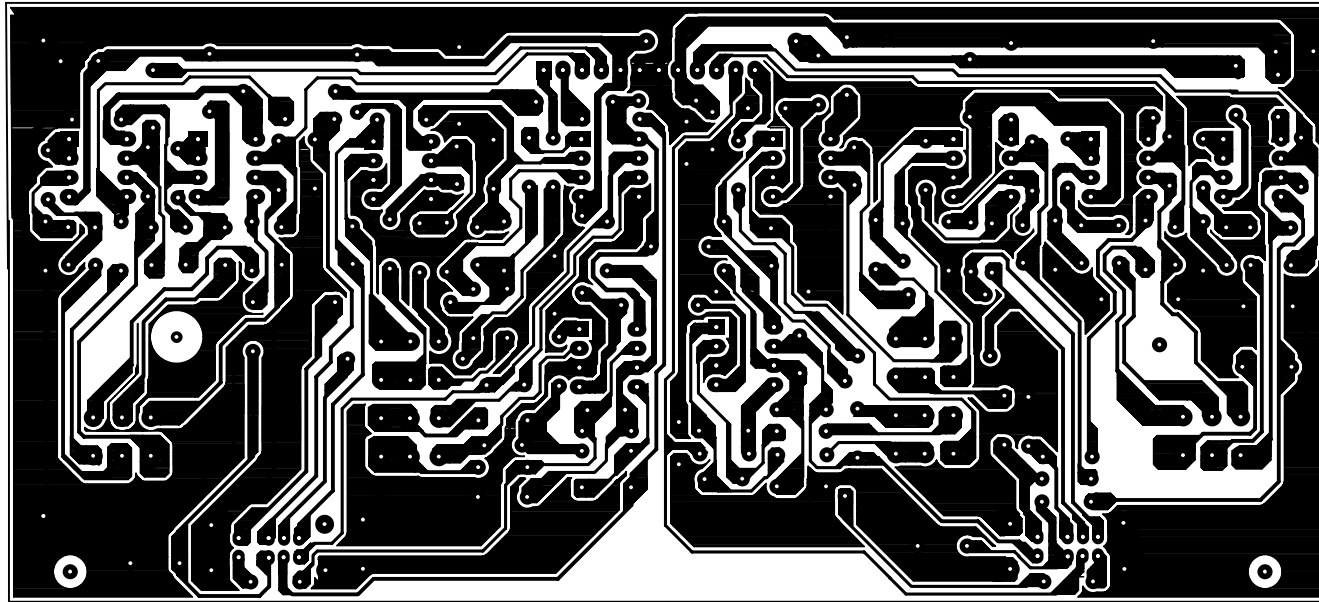
CS50.4

CS Series 50.4









CS 50.4 Electrical Parts List

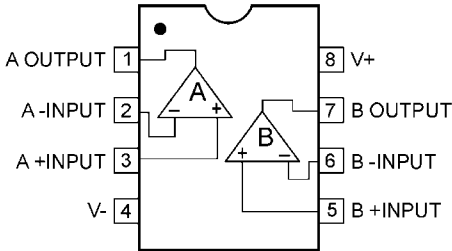
Part Number	Description		Qty	Reference Designator
Main PCB				
<i>Semiconductors</i>				
124TN4401	Transistor	MOTOROLA 2N4401	21	Q2,4,5,16,17,Q138,238,338,438,Q140,240,340,440,Q135,235,335,435,R143,243,343,443
124TN4403	Transistor	MOTOROLA 2N4403	11	Q6,9,10,Q136,2326,336,436,Q137,237,337,437
124T0SA06	Transistor	MOTOROLAMP06 80V	4	Q145,245,345,445
124T0SA56	Transistor	MOTOROLAMP06 80V	4	Q139,239,339,439
125T0C945	Transistor	NEC 2SC945P 0.1A60V	4	Q144,244,344,444
127TB1238	Transistor	B1238	6	Q7,Q8,Q146,246,346,446
127TD1859	Transistor	D1859	5	Q14,Q141,241,341,441
129T0J109	Transistor	J109	1	Q1
131TN4148	Diode	DIODE NS1N4148HSS150MA	13	D1~7,D11~16
133T0J5B6	Diode	DIODENECD5.6JSB ZNR5.6V	1	ZD1
133T0011B	Diode	DIODE NEC RD11EB3 11V	1	ZD2
133T0015B	Diode	DIODE NEC RD15EB3 15V	2	ZD4 ZD3
134TN4002	Diode	DIODE 1N4002 RET1.0A100V	8	D135,235,335,435,D136,236,336,436
154TTL431	IC DIP3	TL431	1	Q3
151T04558	IC SIP8	JRC MC4558	1	IC202
154T04558	IC DIP8	ROHM BA4558	6	IC101,201,301,401 IC102 IC302
154LM358N	IC DIP8	CHINALM358N	1	IC2
158TTL494	IC DIP16	NEC UPC494 OR TI TL494	1	IC1
134TN5402	Diode	DIODE 1N5402 ET3.0A100V	1	D9
123TRFZ4N	Transistor	IR IRFZ46N	4	Q11~13,Q15
124TN6488	Transistor	TR MOTOROLA 2N6488 80V	4	Q142,242,342,442
124TN6491	Transistor	TR MOTOROLA 2N6491 80V	4	Q147,247,347,447
135T1620C	Diode	DIODE MOTOROLA 1620CT	1	D8
135T1620R	Diode	DIODE MOTOROLA 1620CTR	1	D10
<i>Resistors</i>				
220220220	Resistor	RD 1/2W 22Ω	1	R37
22022047A	Resistor	RD 1/2W 4.7Ω	4	R152,252,352,452
220220470	Resistor	RD 1/2W 47Ω	2	R33 R32
220440100	Resistor	RD 1/4W 10Ω	1	R31
220440101	Resistor	RD 1/4W 100Ω	4	R25 R26 R28 R29
220440103	Resistor	RD 1/4W 10K	4	R154,254,354,454
220440272	Resistor	RD 1/4W 2.7K	4	R151,251,351,451
220880000	Resistor	RD 1/8W 0Ω	25	JP1 JP18 JP24 JP30 JP41~51 JP53 JP35~39 JP86 JP101~103
220880101	Resistor	RD 1/8W 100Ω	18	R27,R138,238,338,438 R139,239,339,439 R142,242,342,442 R143,243,343,443 R11
220880102	Resistor	RD 1/8W 1K	19	R7 R14-15 R137,237,337,437 R156,256,356,456 R157,257,357,457 R136,236,336,436
220880103	Resistor	RD 1/8W 10K	11	R135,235,335,435 R10 R20 R19 R108,208,308,408
220880104	Resistor	RD 1/8W 100K	8	R2~R6 R124 R224 R12
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	R140,240,340,440 R141,241,341,441 R35
220880202	Resistor	RD 1/8W 2K	6	R40 R41 R144,244,344,444
220880204	Resistor	RD 1/8W 200K	1	R23
220880205	Resistor	RD 1/8W 2M	1	R22
220880221L	Resistor	RD 1/8W 220Ω 52mm	4	R148,248,348,448
220880222	Resistor	RD 1/8W 2.2K	1	R36
220880223	Resistor	RD 1/8W 22K	2	R45 R30
220880242	Resistor	RD 1/8W 2.4K	4	R147,247,347,447
220880243	Resistor	RD 1/8W 24K	2	R123 R223
220880272	Resistor	RD 1/8W 2.7K	1	R24

Part Number	Description		Qty	Reference Designator
220880302	Resistor	RD 1/8W 3K	4	R39 R38 R18 R9
220880363	Resistor	RD 1/8W 36K	1	R51
220880392	Resistor	RD 1/8W 3.9K	1	R13
220880470	Resistor	RD 1/8W 47Ω	8	R145,245,345,445 R158,258,358,458
220880472	Resistor	RD 1/8W 4.7K	4	R146,246,346,446
220880473	Resistor	RD 1/8W 47K	10	R34 R101,201,301,401 R102,202,302,402 R1
220880474	Resistor	RD 1/8W 470K	1	R44
220880562	Resistor	RD 1/8W 5.6K	4	R155,255,355,455
220880563	Resistor	RD 1/8W 56K	9	R109,209,309,409 R110,210,310,410 R52
220880682	Resistor	RD 1/8W 6.8K	2	R46 R16
220880751	Resistor	RD 1/8W 750Ω	4	R111,211,311,411
220880821	Resistor	RD 1/8W 820Ω	4	R153,253,353,453
220880913	Resistor	RD 1/8W 91K	4	R100,200,300,400
230881001	Resistor	MF 1/8W 1K 1%	4	R103,203,303,403
230881002	Resistor	MF 1/8W 10K 1%	1	R48
230881003	Resistor	MF 1/8W 100K 1%	4	R105,205,305,405
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 R112,212,312,412
230884991	Resistor	MF 1/8W 4.99K 1%	2	R113 R313
207T15B24	VR	WH9011A-2-18T B20K	2	VR101 VR201
232XL502J	Resistor	SQM 5Ws 0.2Ω	8	R149,249,349,449 R150,250,350,450
261T05103	Thermistor	NTC THERMISTORD103J 10K	2	RTH1 RTH2
<i>Capacitors</i>				
31J510110	Capacitor	C/C NPO 100PF/100V J	4	C101,201,301,401
31K510210	Capacitor	C/C 1000PF/100V K	4	C103,203,303,403
31Z510305	Capacitor	C/C Y5V 10000P/50V Z	1	C35
31Z510410	Capacitor	C/C Y5V 0.1UF/100V Z	8	C32 C31 C6 C7 C8 C9 C10 C11
31J522110	Capacitor	C/C NPO 220PF/100V	2	C13 C12
31J547010	Capacitor	C/C NPO 47PF/100V J	16	C136,236,336,436 C142,242,342,442 C137,237,337,437 C105,205,305,405
31K547310	Capacitor	C/C 0.047UF/100V K	2	C37 C38
31J568125	Capacitor	C/C Y5E 680P/250V K	1	C22
32J510410	Capacitor	M/C 0.1UF/100V J	8	C143,243,343,443 C138,238,338,438
32J568210	Capacitor	M/C 0.0068uf/100V J	1	C20
340Z10625	Capacitor	10UF/25V 5*11	6	C112 C212 C129,229,329,429
340Z10716	Capacitor	100U/16V 5*11	10	C19 C28 C27 C141,241,341,441 C4 C29 C30
340Z10750	Capacitor	100UF/50V 8*13	8	C135,235,335,435 C140,240,340,440
340Z22550	Capacitor	2.2UF/50V 5*11	2	C34 C33
340Z22616	Capacitor	22UF/16V	1	C21
340Z22625	Capacitor	22UF/25V 5*11	10	C2 C3 C100,200,300, C402 C104,204,304,404
340Z47625	Capacitor	47UF/25V 5*11	3	C5 C36 C14
370Z10550	Capacitor	1UF/50V 5*11	4	C139,239,339,439
370Z10716	Capacitor	100UF/16V 8*12	1	C18
370Z22616	Capacitor	22UF/16V NP	1	C1
390Z22625	Capacitor	22UF/25V 4*7	4	C102,202,302,302 C400
341T22835	Capacitor	2200UF/35V 16*26 105C	4	C23 C24 C25 C26
341T10835	Capacitor	1000UF/35V 13*26 105C	3	C15 C16 C17
<i>Miscellaneous</i>				
571T20070	Wire	1015# 20AWG 70MM	1	GND
572TB6012	Wire	12Pin 60MM(CN*2)	1	J4
172T41026	Coil	T23*90-26 1.2*5 2.6uH	1	L1
182T37510	Transformer	φ37 5:10 F=1.0*5 S=1.2*3	1	T1
435T00025	Fuse	25A ATC	2	F1
447T00001	Fuse Holder	PCB Fuse Holder	1	F1
526URDW14	RCA Jack	RCA Jack	1	RCA1
535T25002	Connector	2Pin P=2.5MM 90	1	J3
544T300003	Terminal	GA30-03-3P	1	J1
544T34324	Terminal	EM-2304 4P*213.3	1	J2

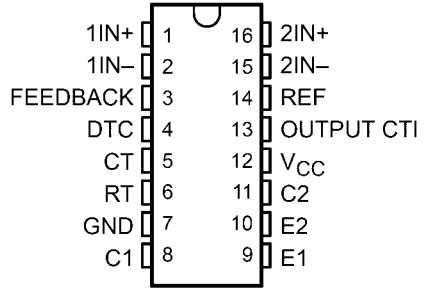
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Crossover PCB				
220880000	Resistor	RD 1/8W 0Ω	13	NP1~4 NP10 NP22 NP25 NP30 NP33-34 NP36-37 NP39
220880102	Resistor	RD 1/8W 1K	4	R119,219,319,419
220880103	Resistor	RD 1/8W 10K	16	R104,204,304,404 R106,206,306,406 R107,207,307,407 R114,214,314,414
220880223	Resistor	RD 1/8W 22K	4	R115,215,315,415
220880362	Resistor	RD 1/8W 3.6K	4	R120,220,320,420
220880392	Resistor	RD 1/8W 3.9K	4	R122,222,322,422
220880474	Resistor	RD 1/8W 470K	4	R125,225,325,425
220880562	Resistor	RD 1/8W 5.6K	12	R116,216,316,416 R117,217,317,417 R121,221,321,421
220880682	Resistor	RD 1/8W 6.8K	4	R118,218,318,418
31J510110	Capacitor	C/C NPO 100PF/100V J	4	C106,206,306,406
31Z510410	Capacitor	C/C Y5V 0.1UF/100V Z	2	CN3 CN4
31K547110	Capacitor	C/C Y5E470PF/100V K	4	C11 C211,311,411
32J518410	Capacitor	M/C 0.18uf/100V J	4	C109,209,309,409
32J539310	Capacitor	M/C 0.039UF/100V J	4	C110,210,310,410
32J582310	Capacitor	M/C 0.082 UF/100V J	8	C107,207,307,407 C108,208,308,408
340Z10716	Capacitor	100U/16V 5*11	2	CN1 CN2
154T04558	IC DIP8	ROHM BA4558	10	IC104,204,304,404 IC103 IC303 IC105,205,305,405
192R23D05	Switch	SK-23D05 G=7 L1R3	2	SW100 SW300
202G15B23	VR	B20K	2	VR103 VR303
202T15C53	VR	C50K	2	VR102 VR302
531T25012	Connector	12Pin P=2.5MM	1	J5
137T05B02	LED	5μLED White	3	BLED1~3
647TCS504	Heat Sink	CS50.4 L=300	1	

Semiconductor Pinouts

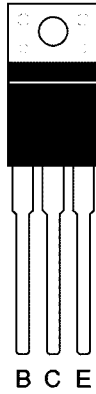
LM358 Dual Op-Amp
4558 Dual Op-Amp



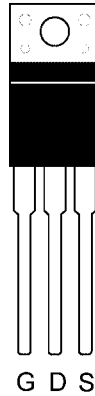
TL494 PWM



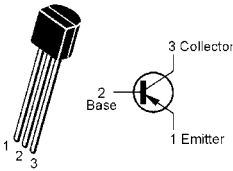
2N6488, 2N6491



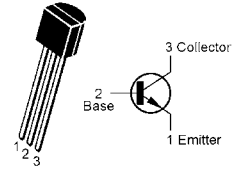
IRFZ46N
MOSFET



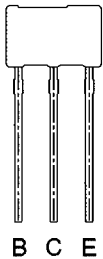
2N4403
MPSA56



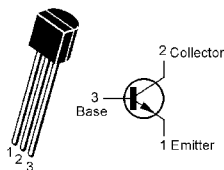
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MPSA06
MPSA42



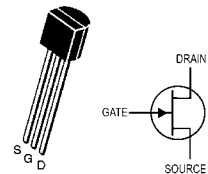
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2SD1859

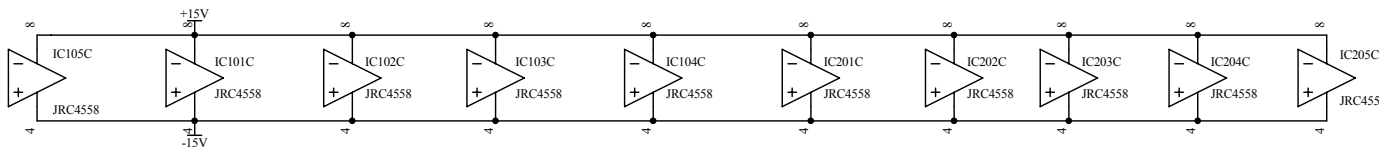
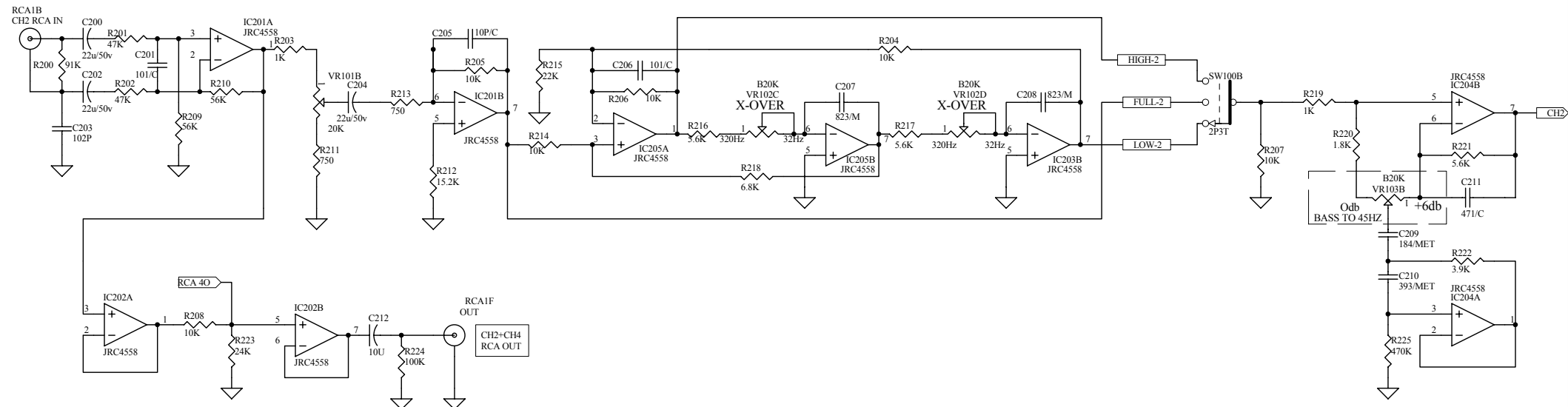
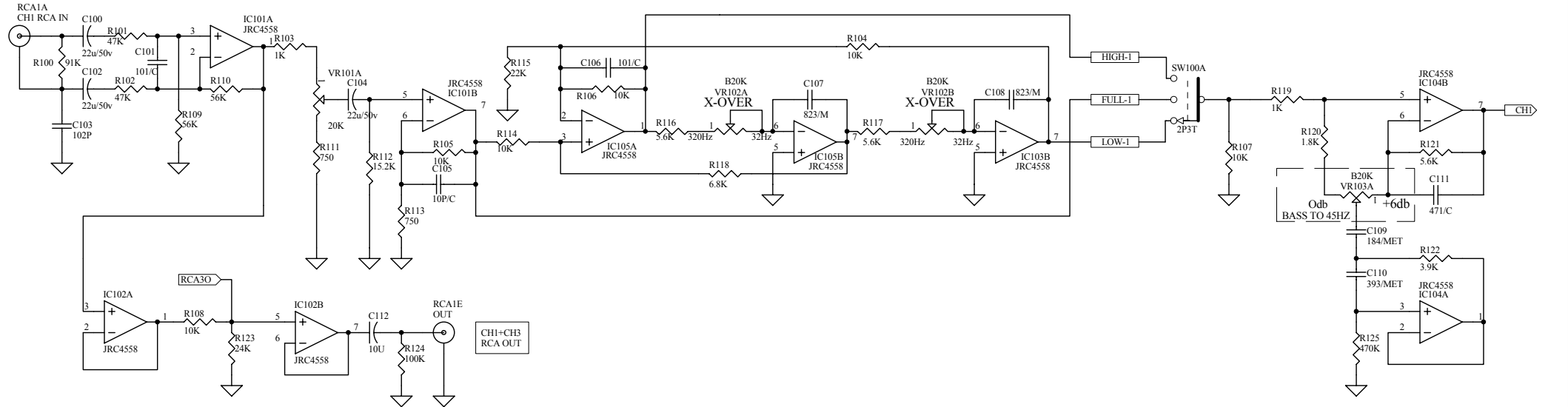


2SC945P

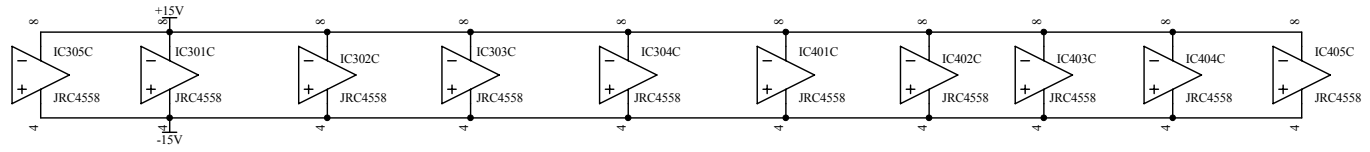
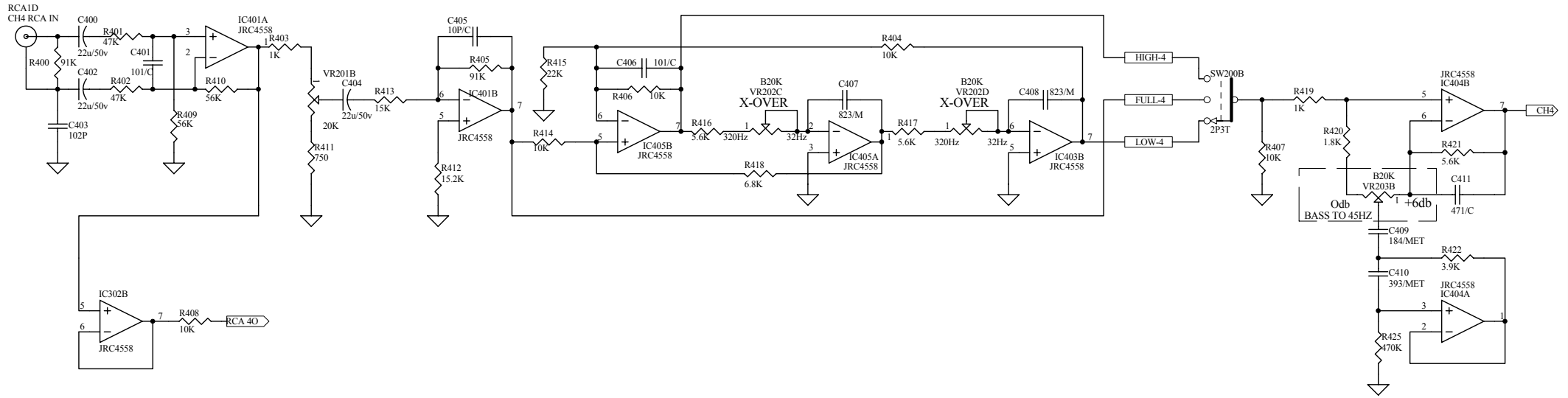
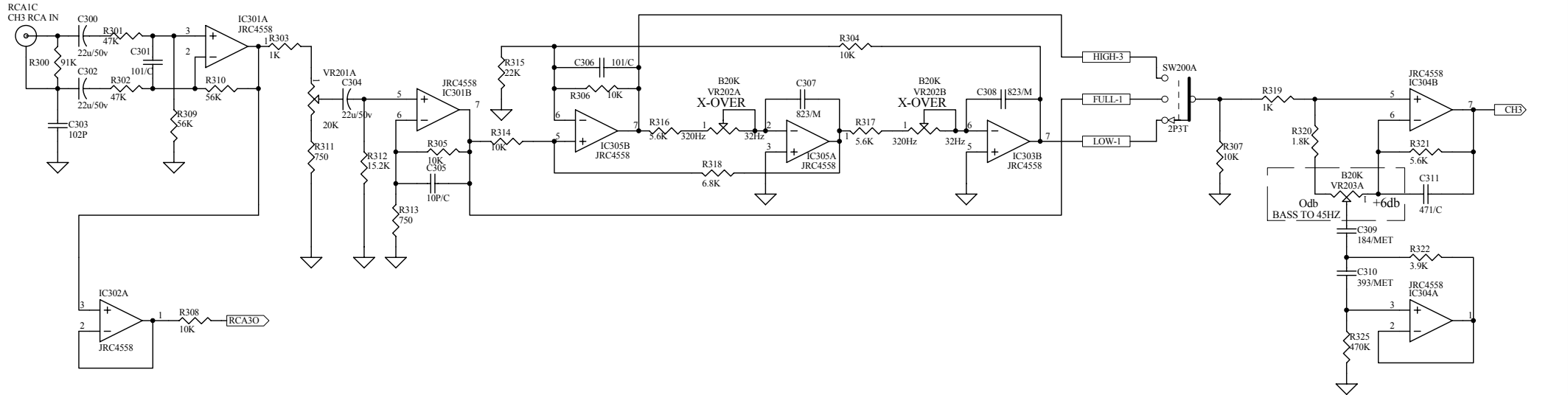


FET
2SK30ATM

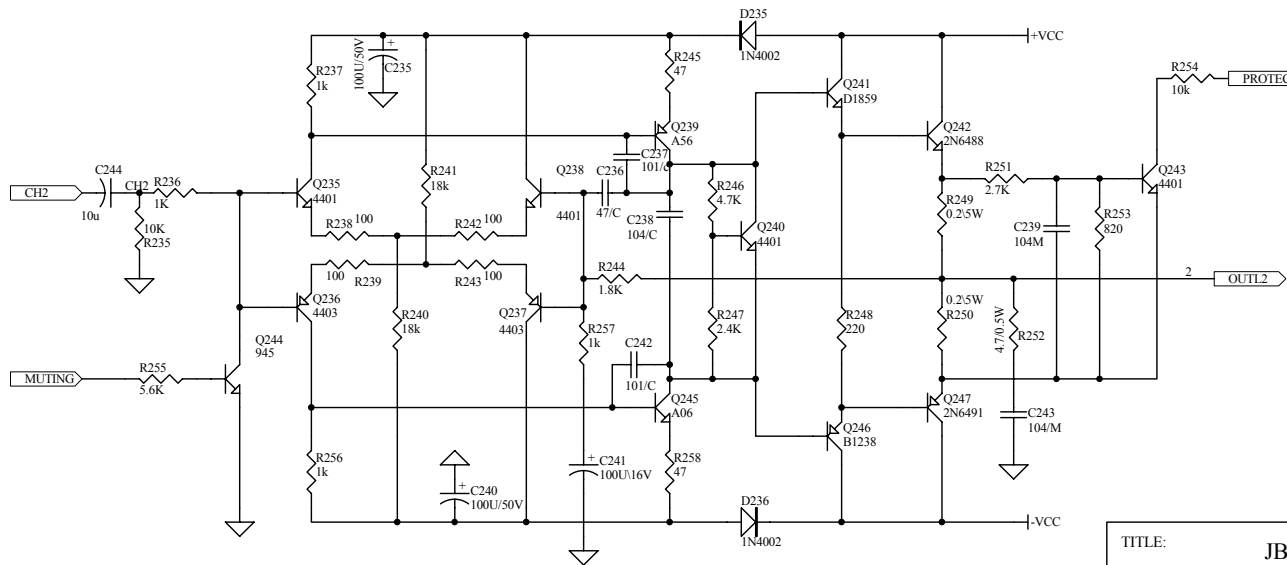
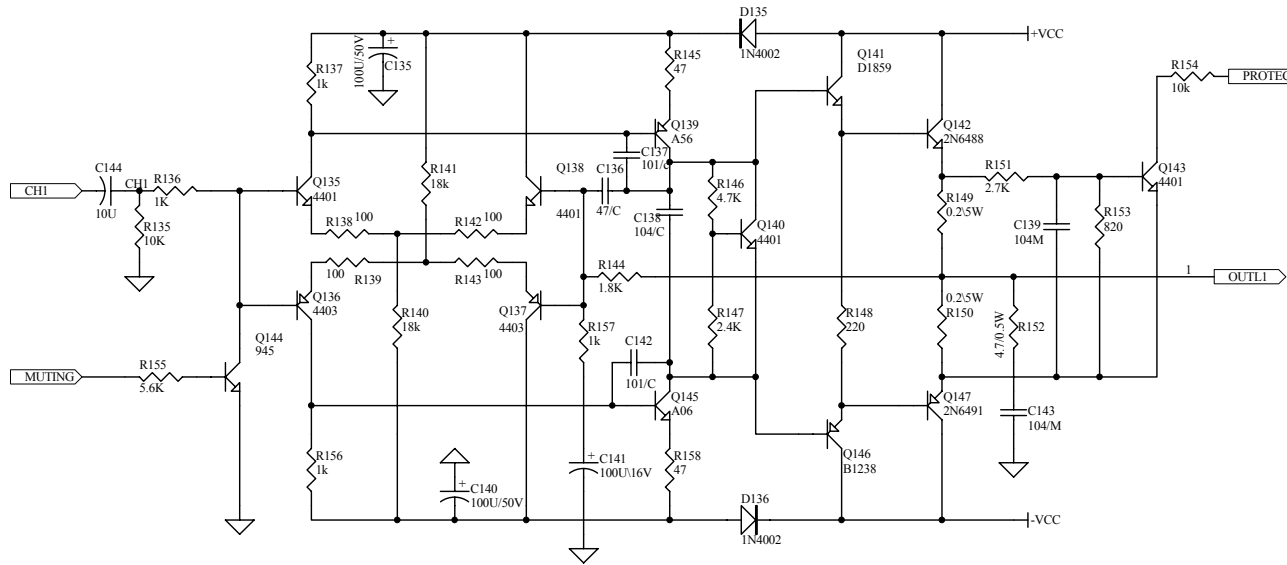




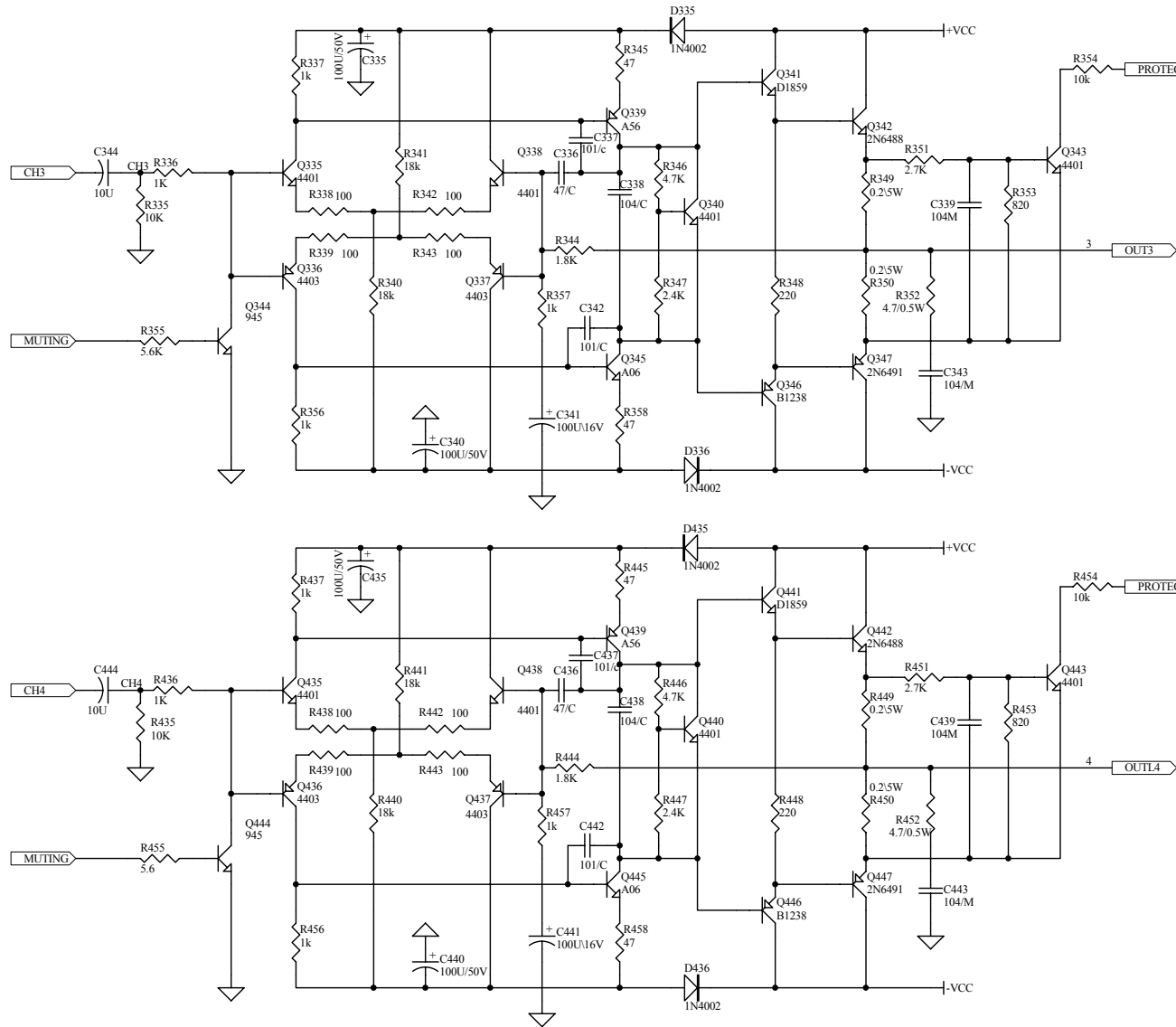
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CZJ	2004-02-19				
DWG NO:	PT-I-B045-01-A1	REV: 2.0A	SHEET:		



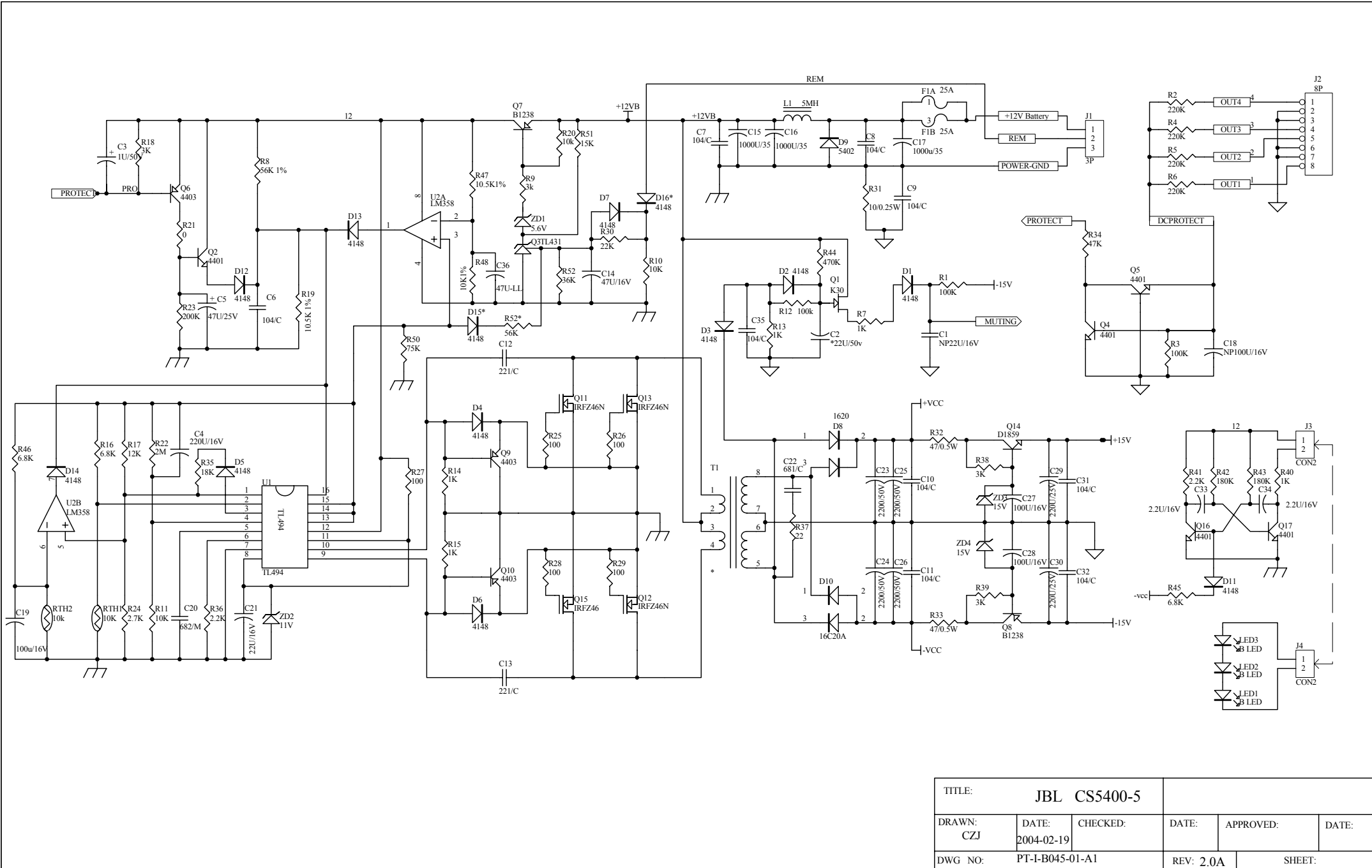
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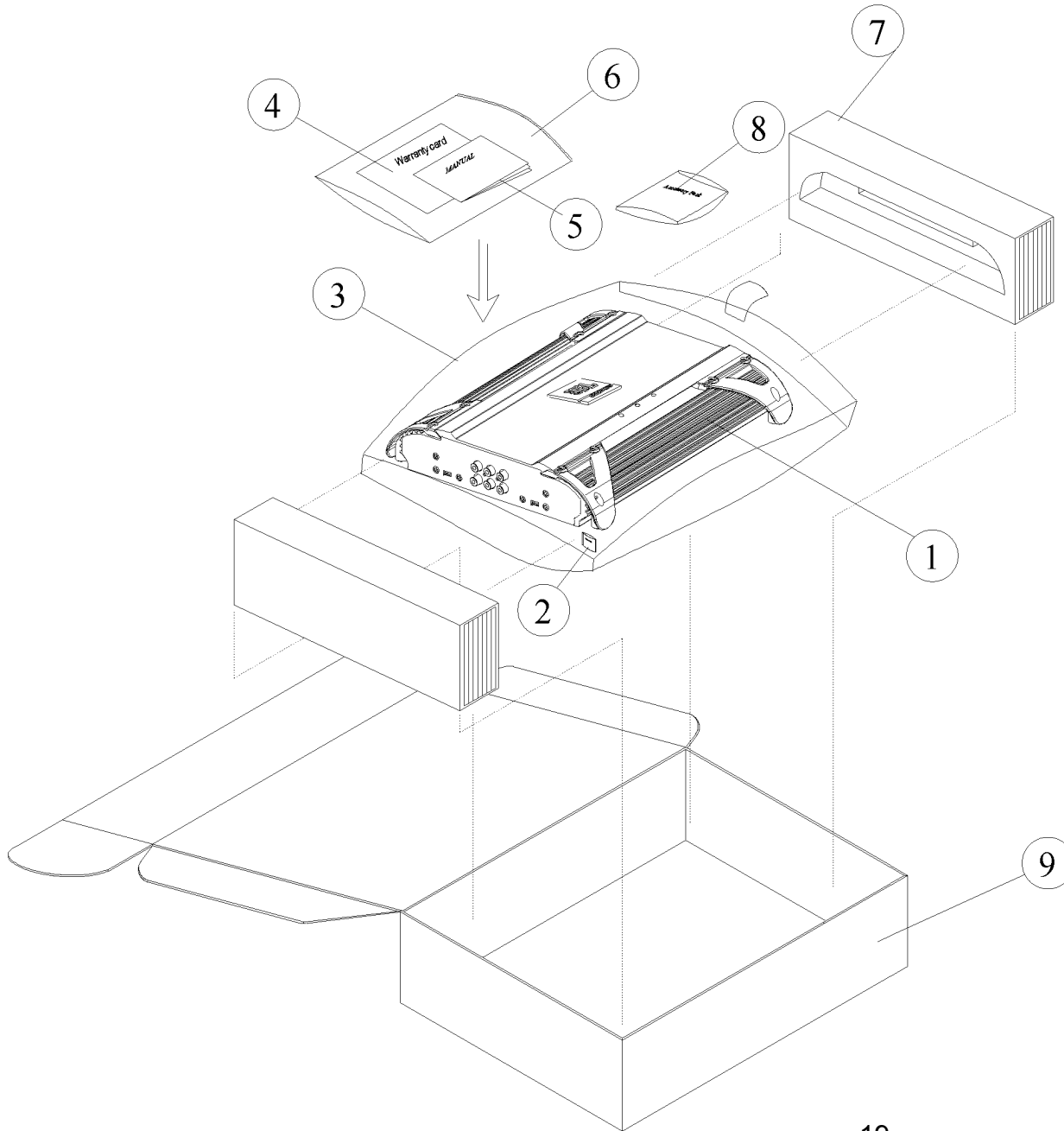
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TITLE:		JBL CS5400-4			
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CZJ	2004-02-19				
DWG NO:	PT-1-B045-01-A1	REV: 2.0A	SHEET:		



TITLE:		JBL CS5400-5			
DRAWN:	DATE:	CHECKED:	DATE:	APPROVED:	DATE:
CZJ	2004-02-19				
DWG NO:	PT-I-B045-01-A1		REV: 2.0A	SHEET:	



Item	Description	Part name	Qty
⑨	947TCS504	Outer Carton	1
⑧	CS50.4-08	Accessory Pack	1
⑦	CS50.4-07	End Pads	2
⑥	CS50.4-06	BAG	1
⑤	CS50.4-05	MANUAL	1
④	CS50.4-04	Warranty card	1
③	872Y81319	BAG	1
②		desiccant	1
①		AMP <i>JBL-CS50.4</i>	1