



ES Series

ES250P

Powered Subwoofer

Service Manual



JBL Consumer Products

250 Crossways Park Dr.

Woodbury, New York 11797

Rev0 3/2008

Released 2008  
Discontinued XXXX

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### ES250P SPECIFICATIONS

Amplifier Power (RMS):	400 Watts
Peak Dynamic Power *:	700 Watts
Driver:	12" (305mm) PolyPlas™
Inputs:	Line Level (switchable to LFE)
Low-Pass Frequency:	Variable from 50Hz to 150Hz (24dB/octave, continuously variable)
Frequency Response:	25Hz – Low-pass crossover setting
Dimensions (H x W x D):	19-3/4" x 15-3/4" x 16-7/8" (502mm x 400mm x 428mm)
Weight:	43 lb/19.5kg

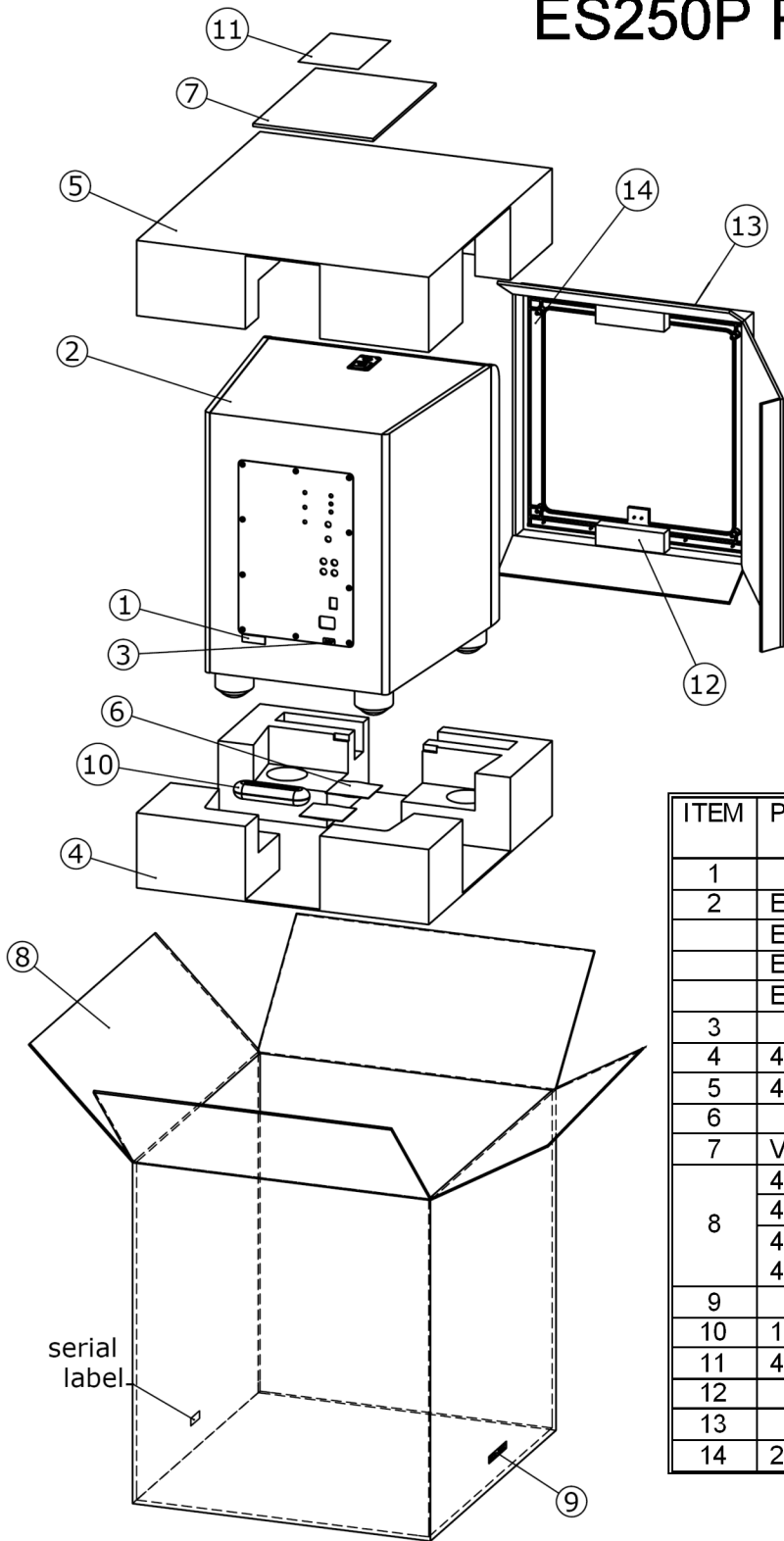
JBL continually strives to update and improve existing products, as well as create new ones. The specifications and details in this and related JBL publications are therefore subject to change without notice.

\* The Peak Dynamic Power is measured by recording the highest center-to-peak voltage measured across the output of a resistive load equal to minimum impedance of the transducer, using a 50Hz sine wave burst, 3 cycles on, 17 cycles off.

JBL ES250P 250W Powered Sub Amp					
	Yes/No	Hi/Lo Line	Nom.	Unit	Notes
US 120vac/60Hz	Yes	108-132	120	Vrms	Normal Operation
EU 230vac/50-60Hz	Yes	207-253	230	Vrms	Normal operation, MOMS required
Parameter	Specification	Unit	QA Test Limits	Conditions	Notes
<b>Amp Section</b>					
Type (Class AB, D, other)	D	n/a	n/a		
Load Impedance (speaker)	4	Ohms	n/a	Nominal	
AVG System impedance	7	Ohms	n/a	AP Computed BW from 20 to 500Hz	
Rated Output Power (120VAC)	250	Watts	250		Domestic version only 120 VAC-60 Hz
AVG RMS Dynamic Power	509	Watts	200	217mV driven into a single input	Average RMS power, 3/20 Cycles 50 Hz, Driven 6dB above its input sensitivity, average of the first 4 consecutive peaks
THD @ Rated Power	0.5	%	1	22k filter	
THD @ 1 Watt	0.2	%	0.3	22k filter	
DC Offset	10	mV-DC	30	@ Speaker Outputs	
Damping factor	>50	DF	20	Measured at amplifier board 90% of full power	Measured at the speaker cable. 225 Watts @ THD < 0.1 % @ 50 Hz
<b>Input Sensitivity</b>					
Input Frequency	50	Hz	50	Nominal Freq.	
L&R	7	mVrms	±1dB	To 1 Watt	Single input driven
LFE input	7	mVrms	±1dB	To 1 Watt	Single input driven, LFE switch ON
System Gain	49	dB	Reference		Single input driven Normal or LFE mode
<b>Signal to Noise</b>					
SNR-A-Weighted	90	dBA	85	relative to 1W	A-Weighting filter
SNR-unweighted	80	dBr	75	relative to 1W	22K filter
Residual Noise Floor	<2.0	mVrms(max)	2.5	Volume @max, w/ A/P Swept Bandpass Measurement (Line freq.+ harmonics) (BW=20 KHz)	Line level inputs must be terminated using 1KOHM
<b>Input Impedance</b>					
Line Input (L, R,LFE)	10K	ohms	n/a	Nominal	
<b>Filters</b>					
LP filter Variable	50-150	Hz	± 10		4th Order variable-24 db/Octave
Subsonic filter (HPF) 2nd Order	Fixed				
Friend circuit	Fixed				
LFE Low pass	200>LP<500	Hz		LFE input driven only	
<b>Limiter</b>					
THD at Max. Output Power	13	%	functional	Drive unit 6dB above the required level to obtain full power Approximately 208mV	Maximum THD as a result of limiting.
<b>Features</b>					
Volume pot Taper (lin/log)	LOG	--	functional		A Taper
Phase switch	0-180	deg	functional		
LP Filter defeat switch	YES		functional		Disables LP filter, intended for LFE
<b>Input Configuration</b>					
Line In (L,R) & LFE	YES	--	functional		Dual RCA jack
<b>Signal Sensing (ATO)</b>					
Auto-Turn-On (yes/no)	YES		functional		
ATO Input test frequency	50	Hz	functional		
ATO Level LFE Input	2	mV	functional		Maximum acceptable level.
ATO Turn-on time	5	ms	functional	Amp connected and AC on, then input signal applied	
Auto Mute/ Turn-OFF Time	5-15	minutes	5-15	T before muting, after signal is removed	Auto turn of time (T) must be 5 > T < 15 Minutes
<b>Power on Delay time</b>					
	3	sec.	4	AC Power Applied	
<b>Transients/Pops</b>					
ATO Transient	0.5	V-peak	0.5V	@ Speaker Output	Amplifier activated by signal presence at the Line input
Turn-on Transient	0.5	V-peak	0.8V	@ Speaker Output	AC Line cycled from OFF to ON

	Yes/No	Hi/Lo Line	Nom.	Unit	Notes
Turn-off Transient	0.5	V-peak	0.8V	@ Speaker Output	AC Line cycled from ON to OFF
<b>Efficiency</b>					
Efficiency	65	%	60	Test conducted at rated power 250W	Nominal Line voltage
Efficiency at 1/8 of rated power	48	%	45	Test conducted at 31.25 WRMS	Nominal Line voltage-Rated impedance 4 Ohms
Off state input power	10	Watts	12		Nominal Line voltage RED LED
Stand-by Input Power	18	Watts	18	@ nom. line voltage	Maximum allowable input power under nominal Input voltage and frequency, HOT or COLD operation. LED GREEN no signal applied
Power Cons. @ rated power	406	Watts	416	@ nom. line voltage	250 Watts @ 4 Ohms nominal line voltage
<b>Protections</b>					
Short Circuit Protection	YES		functional	Direct short at output	Amplifier should resume operation after short circuit condition removal
Thermal Protection	YES		functional	@1/8 max unclipped Power at 1.06 times the input voltage	Temperature rise in accessible metal parts should not exceed 35K rise for domestic version or 30K rise for European versions (refer to requirements sheet).
DC Offset Protection	YES		-	DC present at Speaker Out leads	Design must insure no Offset at the speaker output under any operating condition including abnormal operation
Line Fuse Rating					
USA-Domestic	3.15	Amps	3.15	Type-T or Slo Blo-250 V	Internal fuse with UL/SEMKO rated holder
EU	2	Amps	2	Type-T or Slo Blo-250 V, Low Breaking capacity	Internal fuse with UL/SEMKO rated holder
<b>Other Parameters/Notes:</b>					
1. Limiter circuit response must be clean sounding with no apparent pops, noises, or pumping.					
2. Volume control should be <i>at the input buffer stage</i> in order to lessen the possibility of clipping the input section with highly dynamic audio material.					
3. ALL SPECS SHOULD BE MEASURED AT NOMINAL LINE VOLTAGE.					

# ES250P PACKAGING

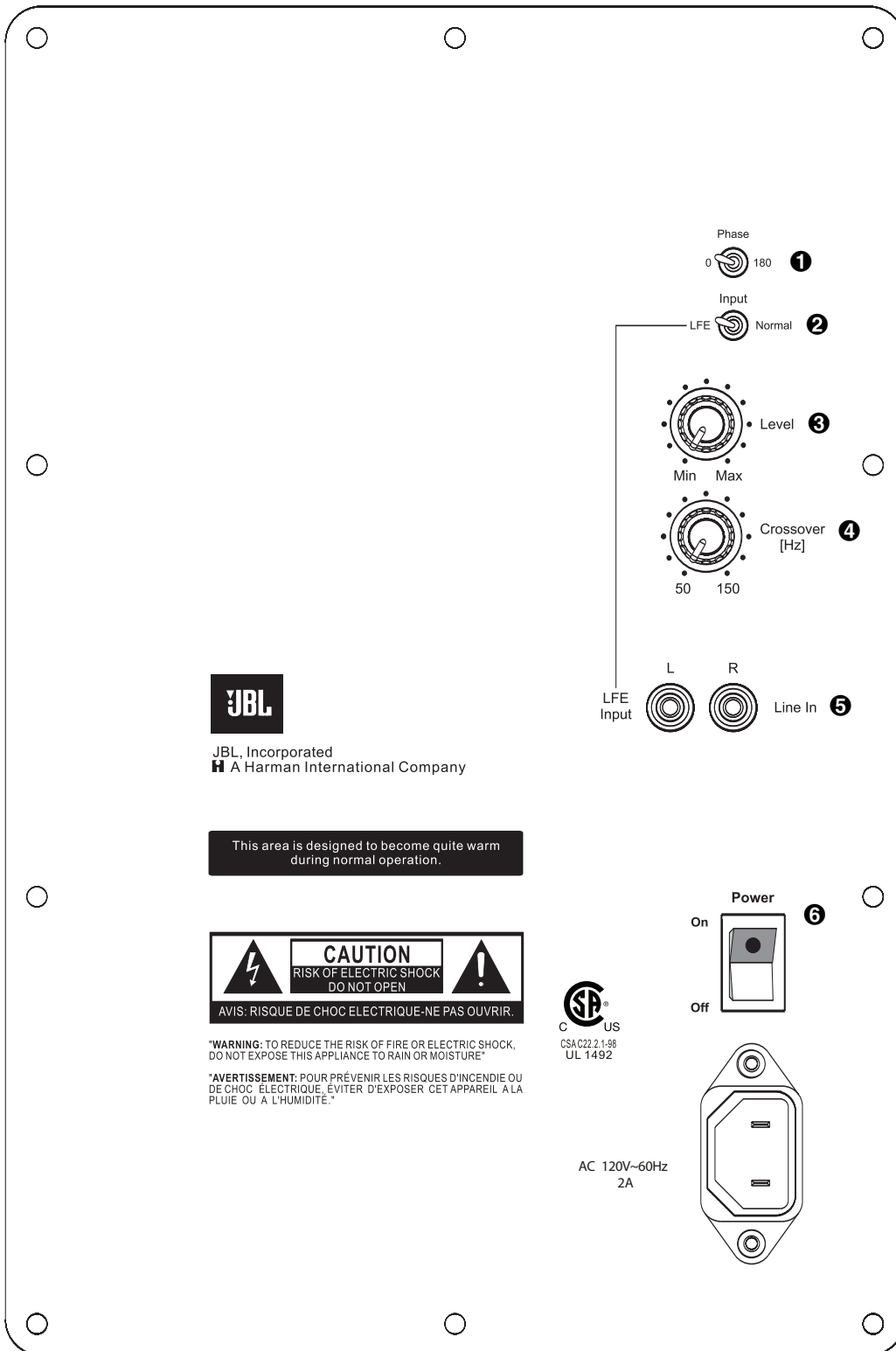


ITEM	PART NUMBER	DESCRIPTION	QTY
1		Serial Number Label	1
2	ES250PBE	ES250 P	1
	ES250PBK		
	ES250PCH		
	ES250PSIG		
3		Label	1
4	431-000-06030-E	Bottom Foam	1
5	431-000-06029-E	Top Foam	1
6		Desiccant	1
7	Visit <a href="http://www.jbl.com">www.jbl.com</a>	Owner's Manual	1
8	400-000-07571-E	Outer Carton, ES250PBE	1
	400-000-07574-E	Outer Carton, ES250PBK	1
	400-000-07570-E	Outer Carton, ES250PCH	1
	400-000-07572-E	Outer Carton, ES250PSIG	1
9		Label	1
10	165-045801100-E	15' RCA cable	1
11	405-000-05181-E	Warranty card	1
12		Packing, grille	1
13		Carton, grille	1
14	244-120-05243-0BAE	Front Grille	1

# CONTROLS AND CONNECTIONS

## Rear Panel

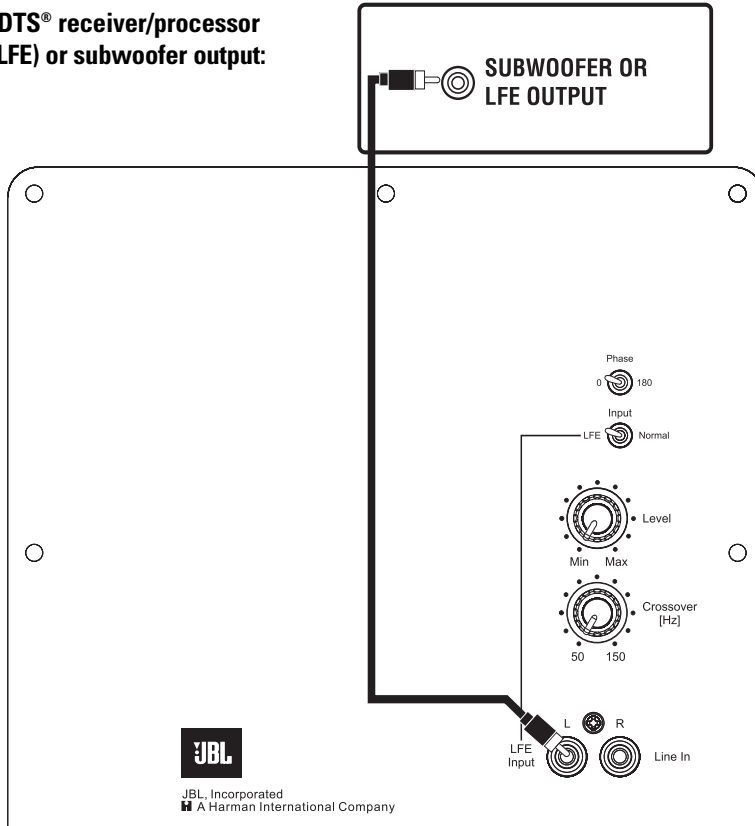
- ❶ Phase Switch
- ❷ LFE/Normal Selector
- ❸ Subwoofer-Level Control
- ❹ Crossover Adjustment
- ❺ Line-Level/LFE Input
- ❻ Power Switch



# SYSTEM CONNECTIONS

If you have a Dolby® Digital or DTS® receiver/processor with a low-frequency-effects (LFE) or subwoofer output:

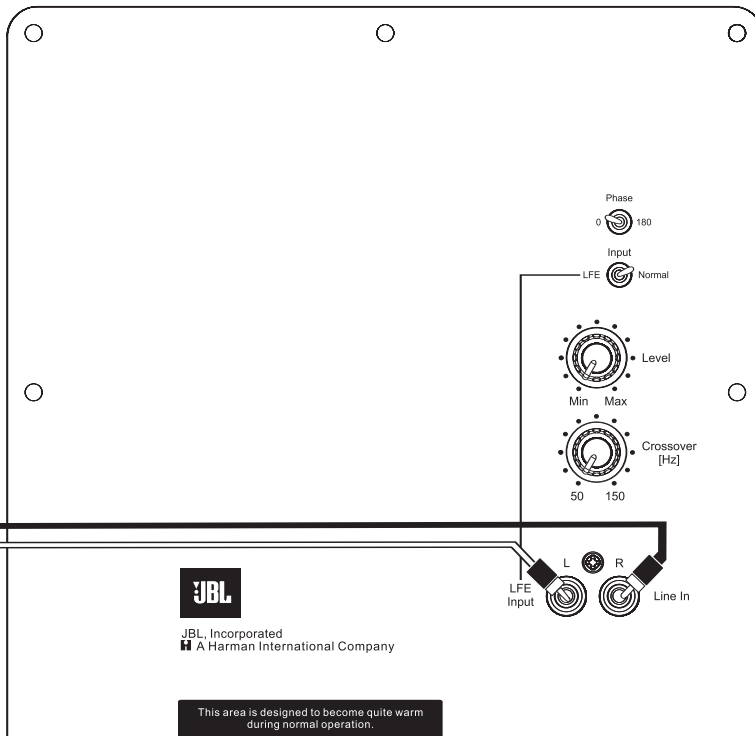
Set LFE/Normal switch to "LFE."



If your receiver/processor does not contain a Dolby Digital or DTS processor, but has subwoofer outputs:

Set line-level/LFE switch to "Normal."

NOTE: If your receiver/processor has only one sub out, you may use either the L or R input.



This area is designed to become quite warm during normal operation.

## OPERATION

### Power On

Plug your subwoofer's AC cord into a wall outlet. Do not use the outlets on the back of the receiver.

Initially set the Subwoofer-Level Control ③ to the "min" position.

Turn on your sub by pressing the Power Switch ⑥ on the rear panel.

Turn on your entire audio system and start a CD or movie soundtrack at a moderate level.

### Auto On/Standby

With the Power Switch ⑥ in the ON position, the Status LED on the top will remain lit in red or green to indicate the On/Standby mode of the subwoofer.

RED = STANDBY (No signal detected, Amp Off)

GREEN = ON (Signal detected, Amp On)

The subwoofer will automatically enter the Standby mode after approximately 10 minutes when no signal is detected from your system. The subwoofer will then power ON instantly when a signal is detected. During periods of normal use, the Power Switch ⑥ can be left on. You may turn off the Power Switch ⑥ for extended periods of nonoperation, e.g., when you are away on vacation.

### Adjust Gain

Turn your Subwoofer-Level Control ③ up to the halfway position. If no sound emanates from the subwoofer, check the AC-line cord and input cables. Are the connectors on the cables making proper contact? Is the AC plug connected to a "live" receptacle? Has the Power Switch ⑥ been pressed to the "On" position? Once you have confirmed that the subwoofer is active, proceed by playing a CD, record or cassette. Use a selection that has ample bass information.

Set the overall volume control of the preamplifier or stereo to a comfortable level. Adjust the Subwoofer-Level Control ③ until you obtain a pleasing blend of bass. Bass response should not overpower the room but rather be adjusted so there is a harmonious blend across the entire musical range. Many users have a tendency to set the subwoofer volume too loud, adhering to the belief that a subwoofer is there to produce lots of bass. This is not entirely true. A subwoofer is there to enhance bass, extending the response of the entire system so the bass can be felt as well as heard. However, overall balance must be maintained or the music will not sound natural. An experienced listener will set the volume of the subwoofer so its impact on bass response is always there but never obtrusive.

### Phase Control

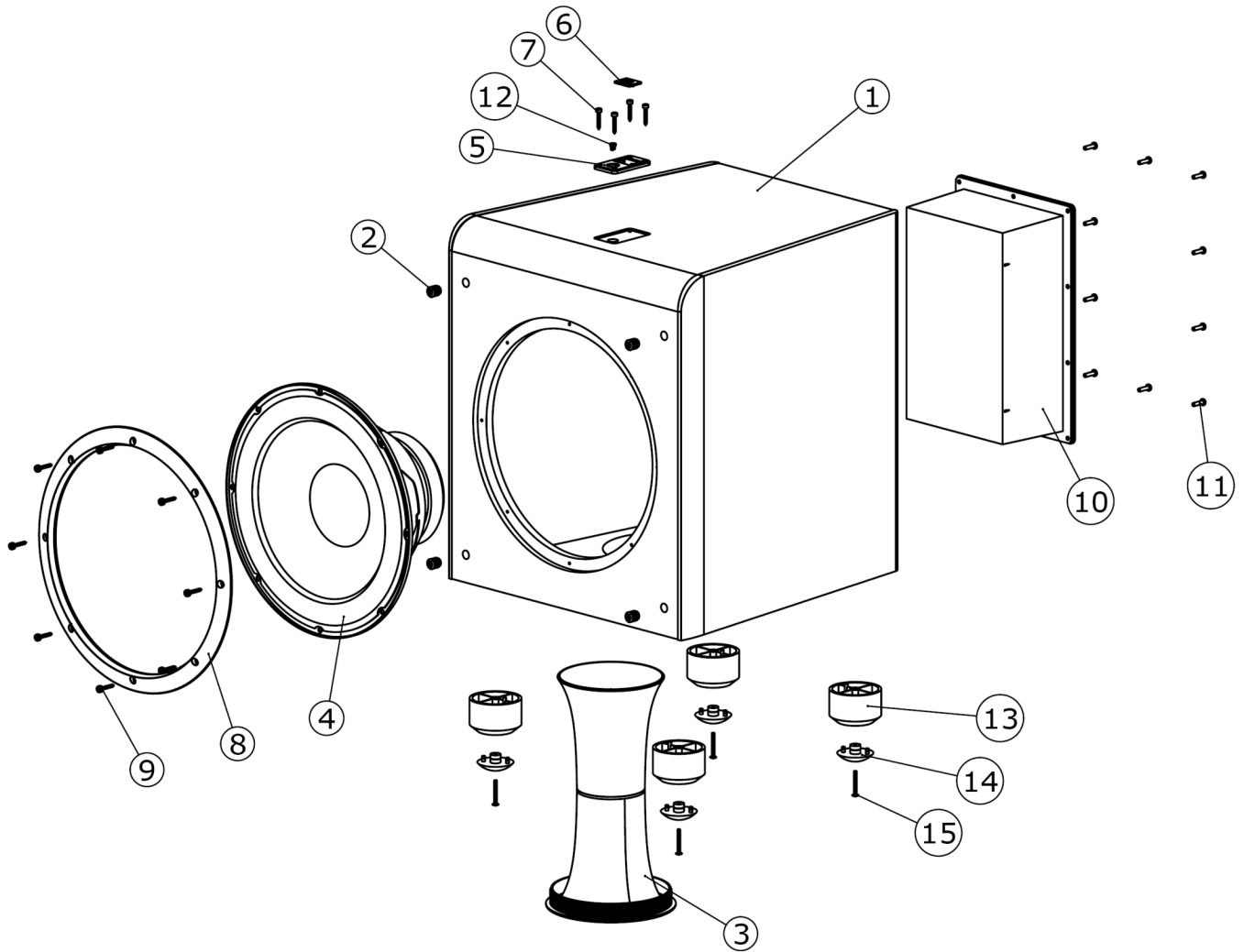
The Phase Switch ① determines whether the subwoofer speaker's pistonlike action moves in and out with the main speakers, 0°, or opposite the main speakers, 180°. Proper phase adjustment depends on several variables such as room size, subwoofer placement and listener position. Adjust the phase switch to maximize bass output at the listening position.

### Crossover Adjustment

The Crossover Adjustment Control ④ determines the highest frequency at which the subwoofer reproduces sounds. If your main speakers can comfortably reproduce some low-frequency sounds, set this control to a lower frequency setting, between 50Hz and 100Hz. This will concentrate the subwoofer's efforts on the ultradeep bass sounds required by today's films and music. If you are using smaller bookshelf speakers that do not extend to the lower bass frequencies, set the Crossover Adjustment control to a higher setting, between 120Hz and 150Hz.

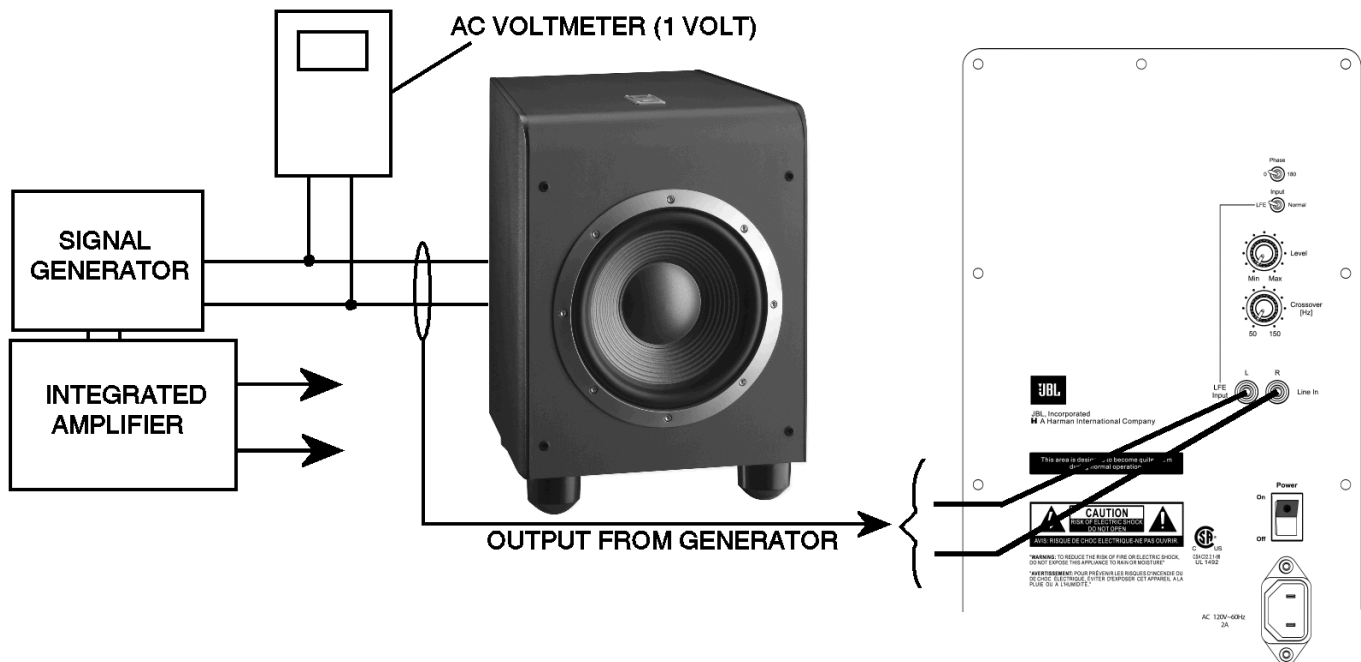
**NOTE:** This control will have no effect if the LFE/Normal Selector ② is set to LFE. If you have a Dolby Digital or DTS processor/receiver, the Low-Pass Frequency is set by the processor/receiver. Consult your owner's manual to learn how to view or change this setting.





ITEM	PART NUMBER	DESCRIPTION	QTY
1	Not for Sale	ES250PBE Cabinet	1
		ES250PBK Cabinet	1
		ES250PCH Cabinet	1
		ES250PSIG Cabinet	1
2	327-010-00622-E	Grille Cup	4
3	249-HIPS-050930BAE	Plastic port tube	1
4	363389-001	12" woofer	1
5	315-HPS-05097-0AAE	Plastic plate, logo base	1
6	316-HPS-05236-0AAE	JBL Logo	1
7	352-KM03520D1148-E	Screw, logo plate	4
8	213-120-05153-0AAE	Trim Ring 12"	1
9	352-KM04020D1149-E	Screw, trim ring	8
10	Not for Sale	ES250P Amplifier	1
11	352-AM04020D880-E	Screw, Amplifier	10
12	361-NYL-05101-0BAE	Retainer for LED	1
13	321-ABS-00008-E	Foot, main body, plastic	4
14	321-RUB-00009-E	Foot, rubber cover	4
15	352-HM04030D500-E	Screw, Feet	4

## ES250P Test Set Up and Procedure



### Equipment needed:

- Function/signal generator/sweep generator
- Integrated Amplifier
- Multimeter
- Speaker cables

### General Unit Function (UUT = Unit Under Test)

- 1) From the signal generator, connect line level (RCA) cables to the Subwoofer Line Level Input jacks L/R on the UUT. Use a Y-cable from a mono source if necessary to connect to both inputs.
- 2) Turn the CROSSOVER control to maximum (150).
- 3) Turn the LEVEL control on the UUT to completely counterclockwise (MIN).
- 4) LFE/NORMAL switch should be in NORMAL position.
- 5) PHASE switch position does not matter.
- 6) Turn on generator; adjust to **50mV, 50 Hz**.
- 7) Plug in UUT; turn the power switch ON. LED should switch from Red to Green.
- 8) Turn LEVEL control full clockwise (MAX); immediate and vigorous bass response should be heard and felt from port tube opening on the bottom.
- 9) Turn off generator, turn LEVEL control full counterclockwise (MIN), and disconnect RCA cable.

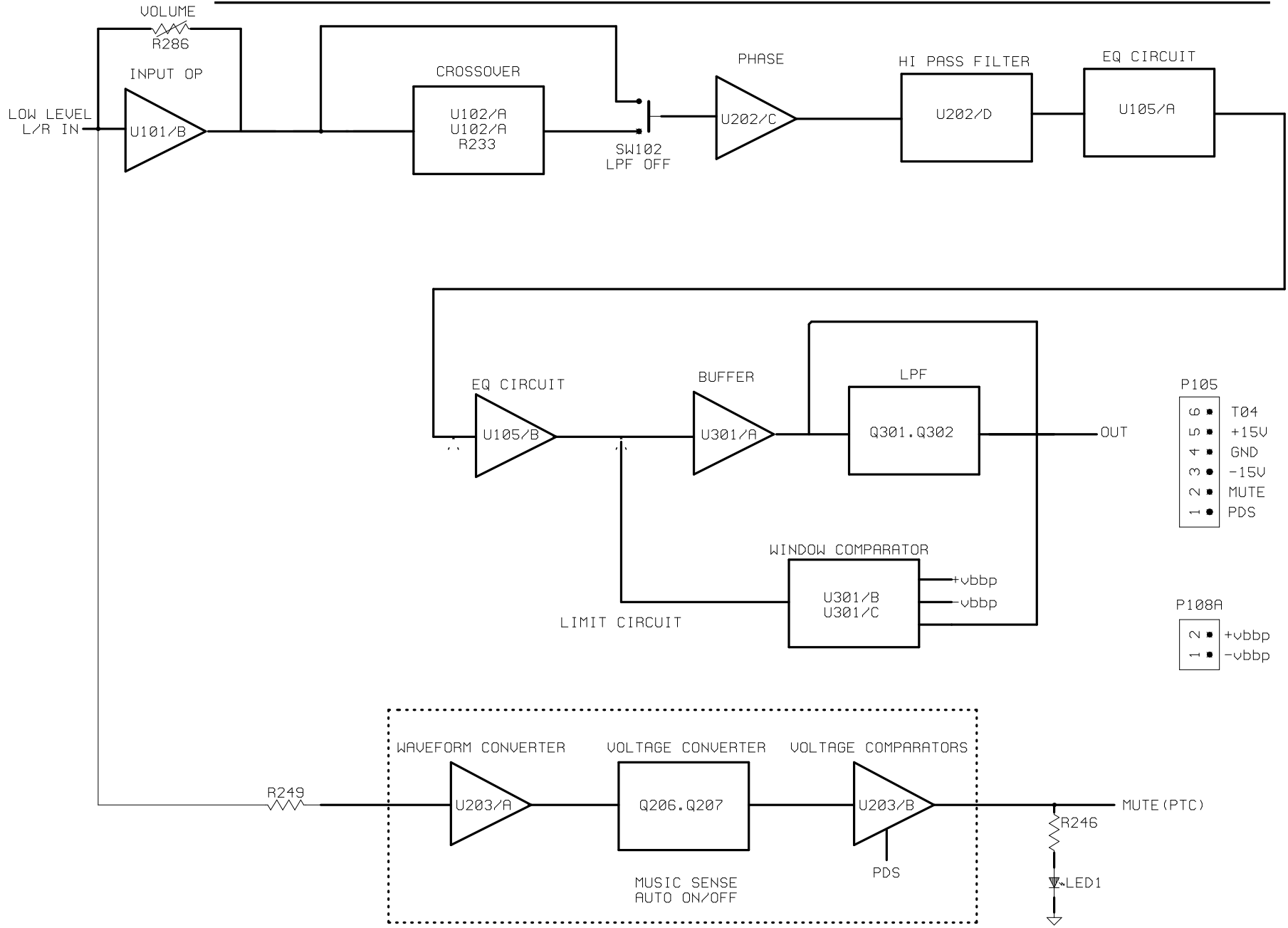
### Sweep Function

- 1) Follow steps 1-8 above, using a sweep generator as a signal source.
- 2) Sweep generator from 20Hz to 300Hz. Listen to the cabinet and drivers for any rattles, clicks, buzzes or any other noises. If any unusual noises are heard, remove woofer and test.

### Driver Function

- 1) Remove woofer from cabinet; detach + and - wire clips.
- 2) Check DC resistance of woofer; it should be **3.6 ohms ±10%**
- 3) Connect a pair of speaker cables to driver terminals. Cables should be connected to an integrated amplifier fed by a signal generator. Turn on generator and adjust so that speaker level output is **5.0V**.
- 4) Sweep generator from 20Hz to 1kHz. Listen to driver for any rubbing, buzzing, or other unusual noises.

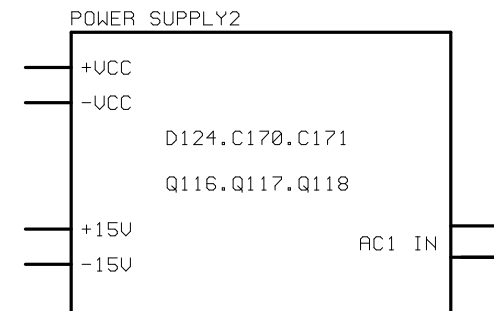
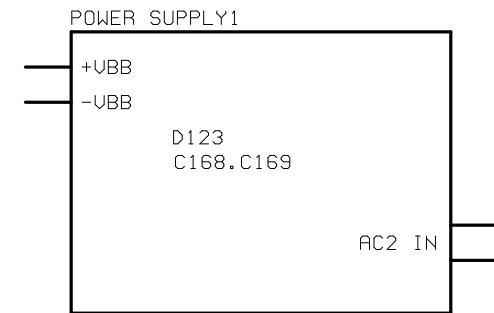
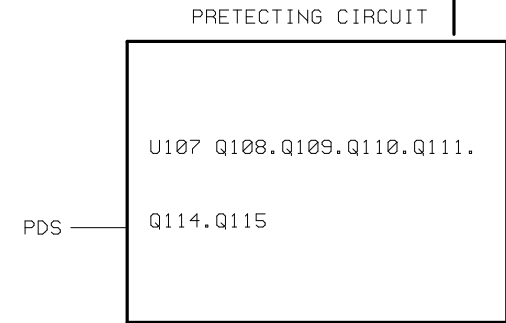
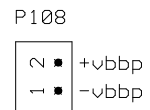
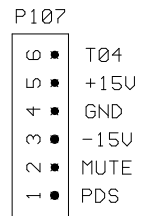
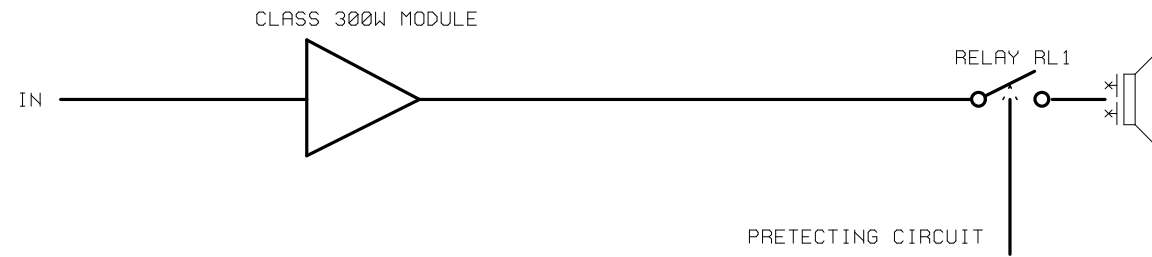
**ES250P**



- P105
- ⊖ T04
  - ⊕ +15V
  - ⊕ GND
  - ⊖ -15V
  - ⊖ MUTE
  - ⊖ PDS

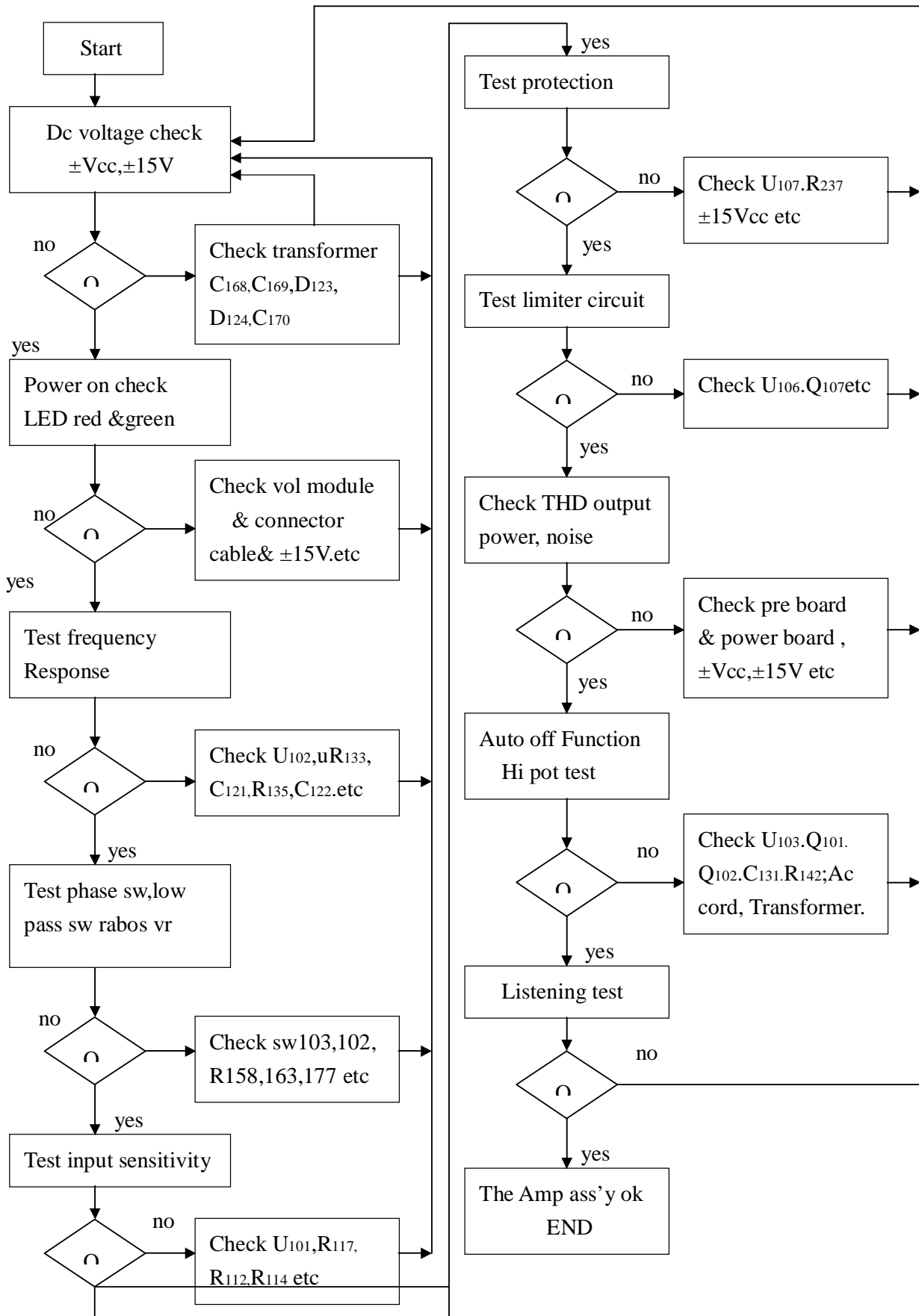
- P108A
- ⊖ +vbbp
  - ⊖ -vbbp

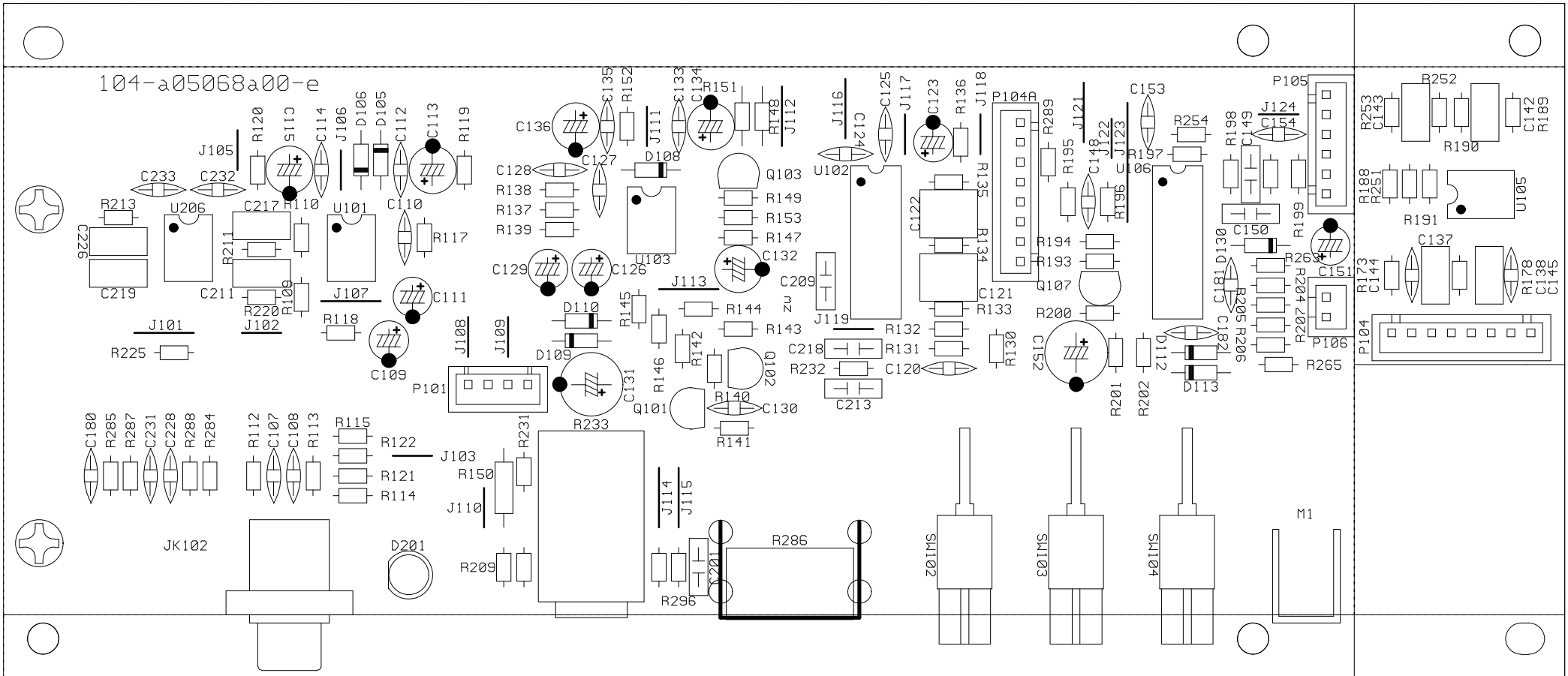
ES250P BLOCK DIAGRAM(PRE & LIMIT)

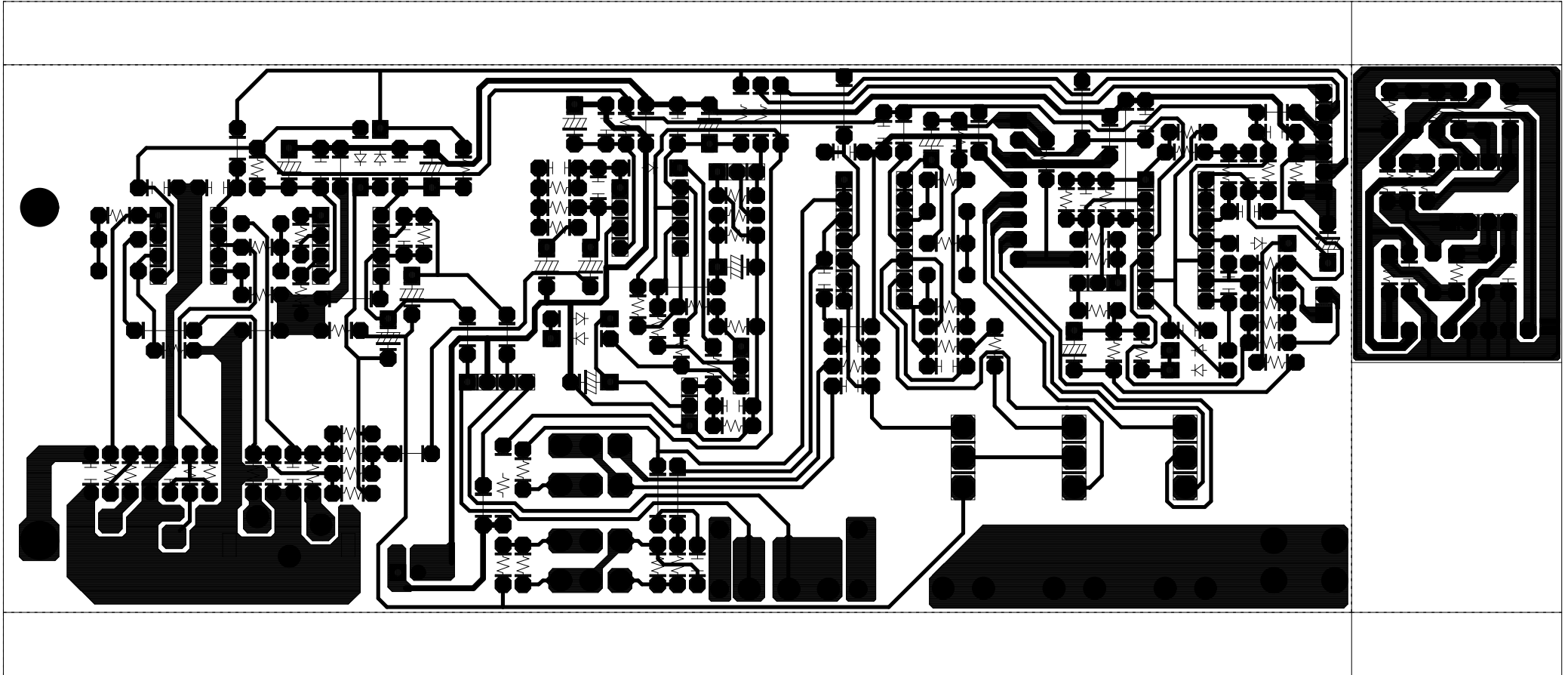


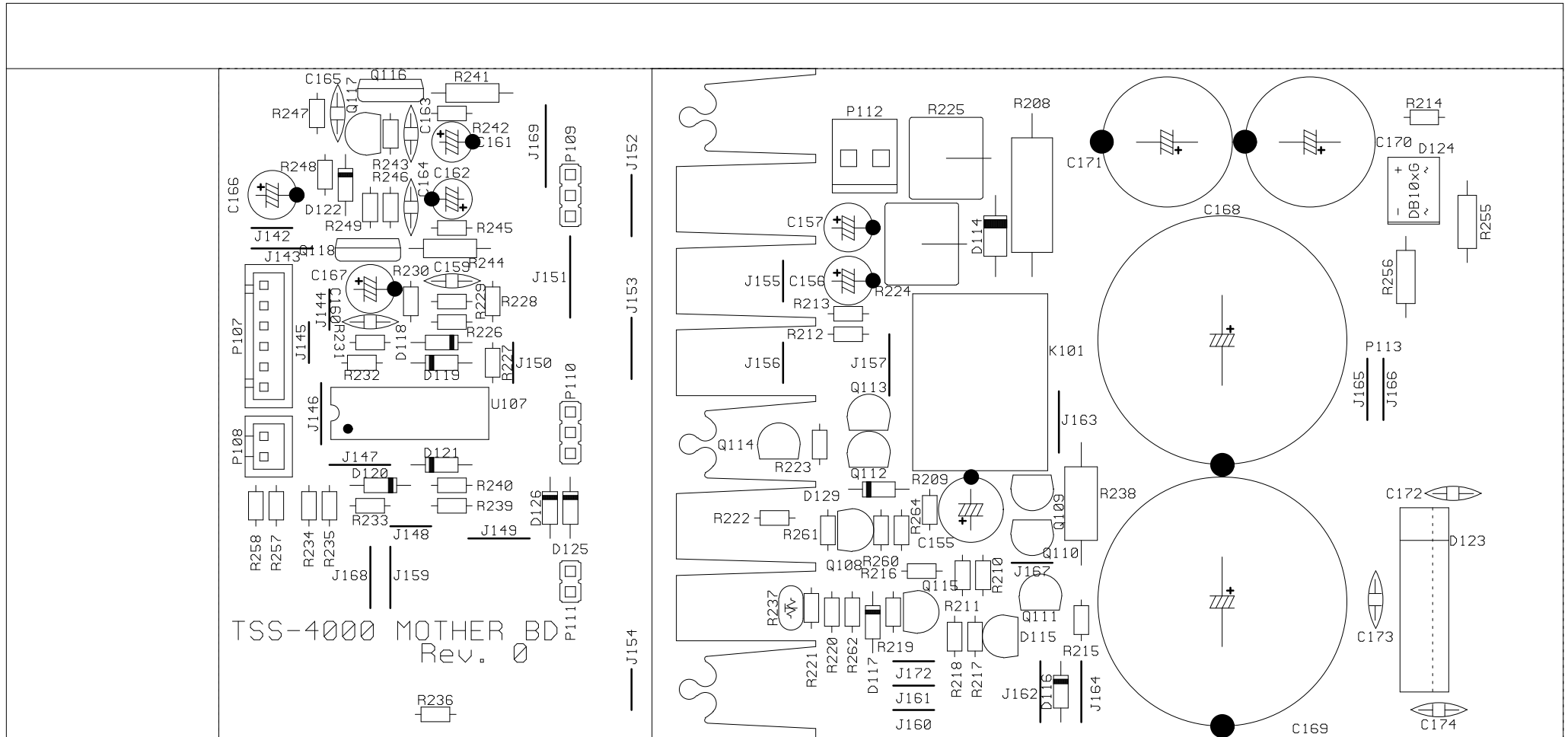
ES250P BLOCK DIAGRAM(POWER AMPLIFIER,POWER SOURCE,PRETECT)

# ES250P Troubleshooting Flow Chart

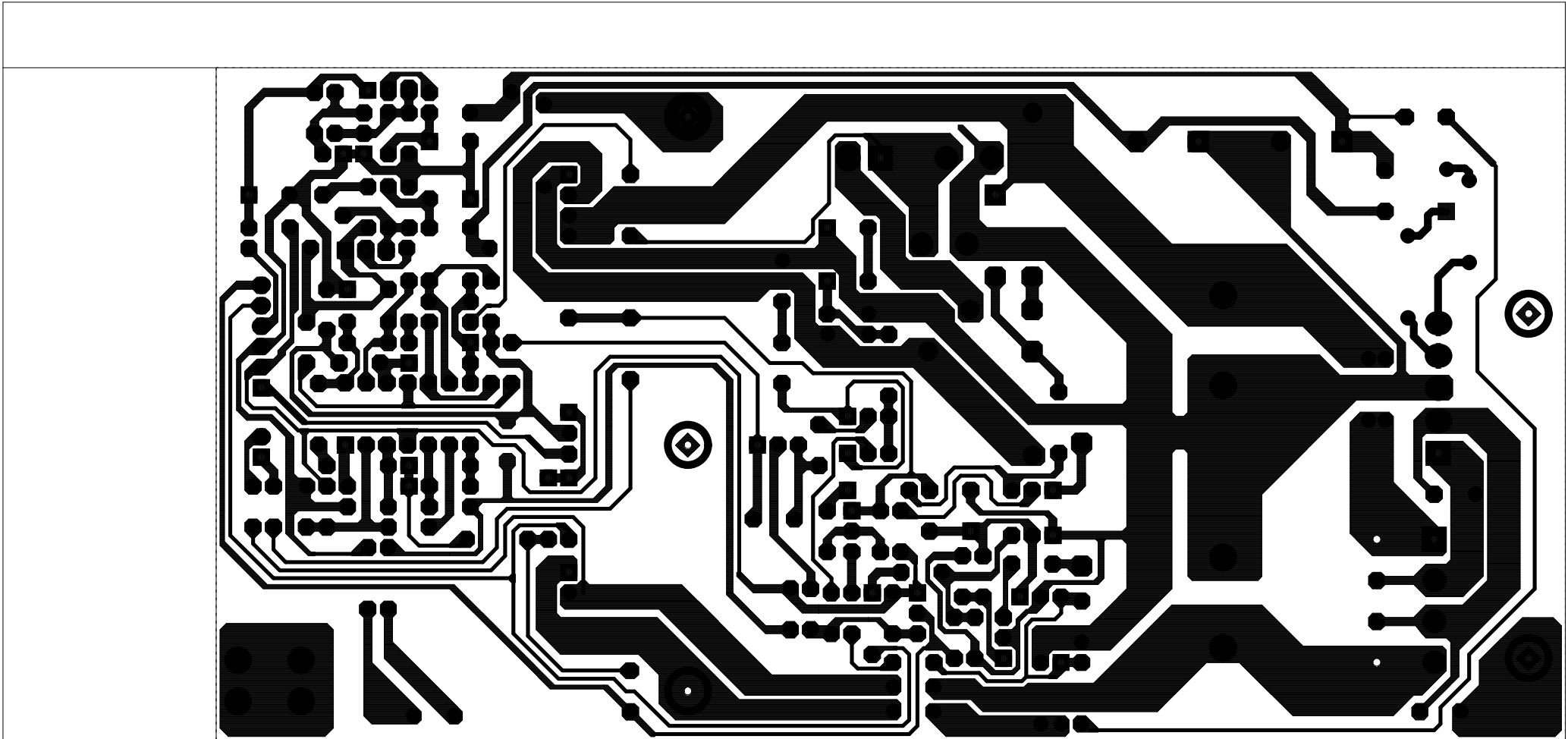


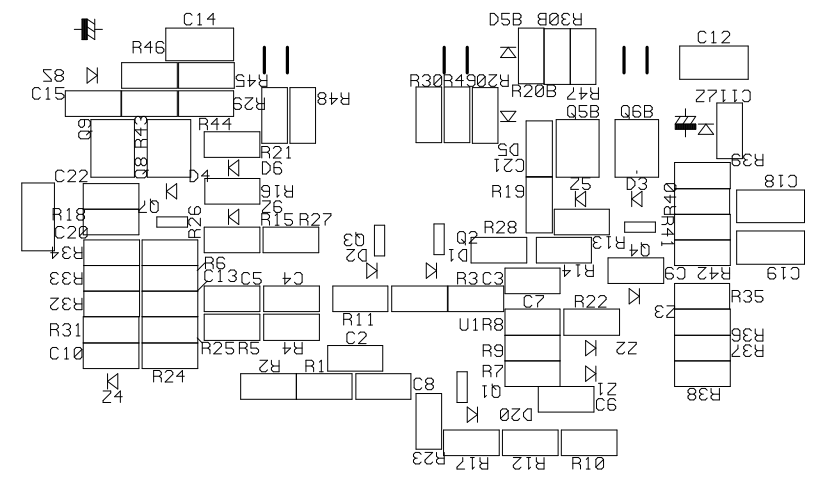
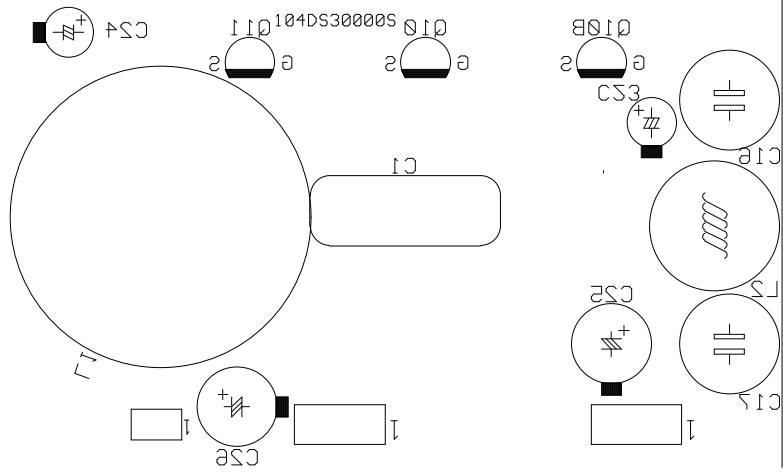
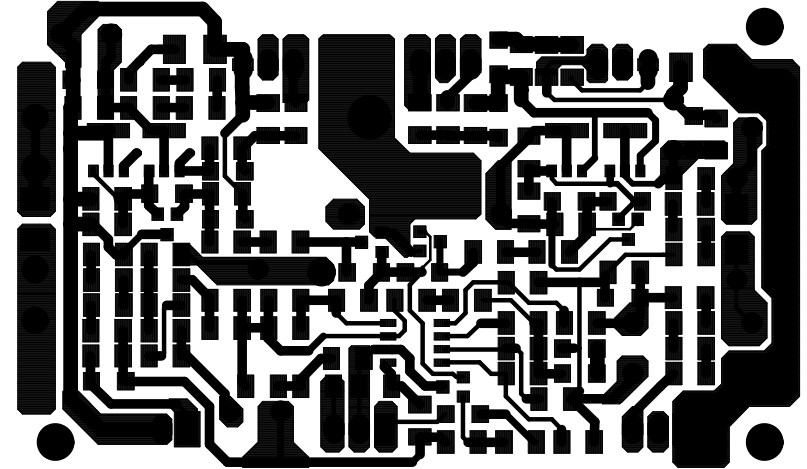
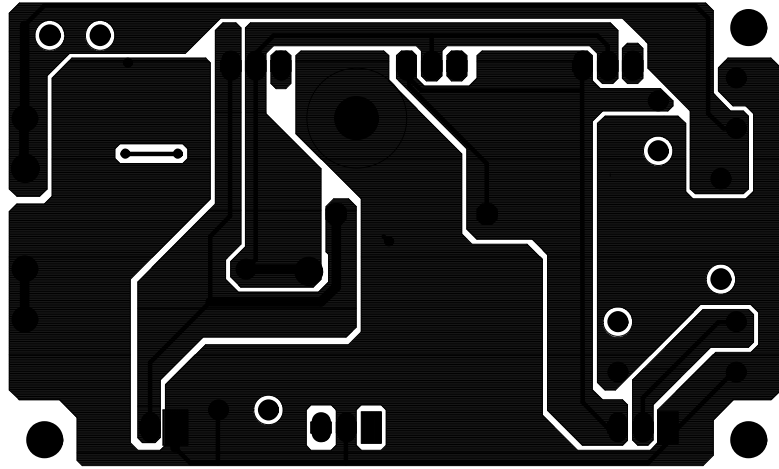












ES250P (120v) Electrical Parts List			
Part Number	Description	Qty	Reference Designator
<b>INPUT/PREAMP PCB &amp; DAUGHTER BOARD PCB</b>			
<i>Resistors</i>			
110-14392J26-E	Carbon resistor 3.9K 1/4W ±5% CF (RoHS)	1	R150,
110-16000J26-e	Carbon resistor 0Ω 1/6W ±5% CF (RoHS)	1	R191,
110-16101J26-e	Carbon resistor 100Ω 1/6W ±5% CF (RoHS)	4	R112,R113,R151,R152,
110-16102J26-e	Carbon resistor 1K 1/6W ±5% CF (RoHS)	1	R140,
110-16103J26-e	Carbon resistor 10K 1/6W ±5% CF (RoHS)	7	R263,R118,R133,R136,R146,R149,R199,
110-16105J26-e	Carbon resistor 1M 1/6W ±5% CF (RoHS)	1	R145,
110-16151J26-e	Carbon resistor 150Ω 1/6W ±5% CF (RoHS)	1	R139,
110-16183J26-e	Carbon resistor 18K 1/6W ±5% CF (RoHS)	1	R147,
110-16203J26-e	Carbon resistor 20K 1/6W ±5% CF (RoHS)	1	R200,
110-16221J26-e	Carbon resistor 220Ω 1/6W ±5% CF (RoHS)	2	R119,R120,
110-16223J26-e	Carbon resistor 22K 1/6W ±5% CF (RoHS)	2	R141,R148,
110-16274J26-e	Carbon resistor 270K 1/6W ±5% CF (RoHS)	1	R138,
110-16432J26-e	Carbon resistor 4.3K 1/6W ±5% CF (RoHS)	1	R254,
110-16472J26-e	Carbon resistor 4.7K 1/6W ±5% CF (RoHS)	1	R144,
110-16473J26-e	Carbon resistor 47K 1/6W ±5% CF (RoHS)	1	R137,
110-16474J26-e	Carbon resistor 470K 1/6W ±5% CF (RoHS)	1	R143,
110-164r7J26-e	Carbon resistor 4.7Ω 1/6W ±5% CF (RoHS)	1	R153,
116-161001f26-e	metal film resistor 1K 1/6W ±1% MF (RoHS)	1	R252,
116-161002f26-e	metal film resistor 10K 1/6W ±1% MF (RoHS)	3	R130,R131,R132,
116-161053f26-e	metal film resistor 105k 1/6w ±1% MF(RoHS)	1	R135,
116-161373f26-e	metal film resistor 137k 1/6w ±1% MF(RoHS)	1	R190,
116-161431f26-e	metal film resistor 1.43K 1/6W ±1% MF(RoHS)	1	R251,
116-161504f26-e	metal film resistor 1.5M 1/6W ±1% MF (RoHS)	1	R142,
116-161542f26-e	metal film resistor 1/6W 15.4K 1% (RoHS)	4	R197,R198,R173,R178,
116-162001f26-e	metal film resistor 2.00K 1/6W ±1% MF (RoHS)	1	R202,
116-162002f26-e	metal film resistor 20.0K 1/6W ±1% MF (RoHS)	1	R193,
116-162212f26-e	metal film resistor 22.1K 1/6W ±1% MF (RoHS)	2	R204,R206,
116-162262f26-e	metal film resistor 22.6K 1/6W ±1% MF (RoHS)	4	R209,R231,R232,R296,
116-162372f26-e	metal film resistor 23.7K 1/6W 1% MF(RoHS)	1	R188,
116-162803f26-e	metal film resistor 280K 1/6W±1% MF (RoHS)	1	R201,
116-163011f26-e	metal film resistor 3.01K 1/6W±1% MF (RoHS)	1	R194,
116-163741f26-e	metal film resistor 3.74K 1/6W ±1% MF (RoHS)	1	R253
116-164421f26-e	metal film resistor 4.42K 1/6W ±1% MF (RoHS)	2	R205,R207,
116-164751f26-e	metal film resistor 4.75K 1/6W MF (RoHS)	2	R109,R110,
116-164752f26-e	metal film resistor 47.5K 1/6W ±1% MF (RoHS)	2	R121,R122,
116-164991f26-e	metal film resistor 4.99K 1/6W ±1% MF (RoHS)	1	R265,
116-165363f26-e	metal film resistor 536K 1/6W±1% MF (RoHS)	1	R195,
116-166491f26-e	metal film resistor 6.49K 1/6W ±1% MF (RoHS)	3	R114,R115,R134,
116-168251f26-e	metal film resistor 8.25K 1/6W ±1% MF (RoHS)	1	R189,
115-h103a101-e	VARIABLE RESISTOR A10K (RoHS) LEVEL	1	R286,
115-h503b405-e	VARIABLE RESISTOR B50K (RoHS) CROSSOVER	1	R233,
<i>Capacitors</i>			
129-a104j633-e	metalize CAP. 0.1U 63V ±5% MSC (RoHS)	3	C110,C149,C137,
129-a222j633-e	metalize CAP. 0.0022u 63V ±5% MSC (RoHS)	2	C181,C182,
129-a224j633-e	metalize CAP. 0.22uF 63V ±5% MSC (RoHS)	2	C121,C122,
129-a273j633-e	metalize CAP. 0.027uF 63v ±5% MSC(RoHS)	1	C142,
129-a333j633-e	metalize CAP. 0.033U 63V MSC (RoSH)	2	C209,C218,
129-a473j633-e	metalize CAP. 0.047U 63V ±5% MSC (RoHS)	1	C138,
129-a683j633-e	metalize CAP. 0.068uF 63V ±5% MSC (RoHS)	3	C143,C201,C213,
130-2b221k503-e	Disc capacitor 220P 50V ±10% (RoHS)	2	C107,C108,
130-3f104z503-e	Disc capacitor 0.1U 50V +80/-20% (RoHS)	13	C112,C114,C124,C125,C130,C133,C135, C144,C145,C153,C154,C232,C233,
130-3f473m503-e	Disc capacitor 0.047U 50V ±20% (RoHS)	1	C180,
130-sl101k503-e	Disc capacitor 100P 50V SL ±10% (RoHS)	1	C120,
130-sl330ja03-e	Disc capacitor SL 33P 100V±5% (RoHS)	1	C148,
130-sl470k503-e	Disc capacitor 47P 50V ±10% (RoHS)	1	C128,

Part Number	Description	Qty	Reference Designator
<b>INPUT/PREAMP PCB &amp; DAUGHTER BOARD PCB</b>			
135-3105m50-e	electrolytic CAP. 1U 50V ±20% (RoHS)	1	C126,
135-3106m50-e	electrolytic CAP. 10uF 50V ±20% (RoHS)	4	C109,C111,C123,C129,
135-3107m16-e	electrolytic CAP. 100uF 16V ±20% (RoHS)	5	C113,C115,C132,C134,C136,
135-3107m25-e	electrolytic CAP. 100U 25V ±20% (RoHS)	1	C152
135-3226m50-e	electrolytic CAP. 22U 50V ±20% (RoHS)	1	C151
139-3227m16-e	LOW LEAKAGE EC 220uF 16V±20% (RoHS)	1	C131
129-a473j633-e	metalize CAP. 0.047U 63V ±5% MSC (RoHS)	1	C150,
<i>Semiconductors</i>			
192-027c1815gr-e	transistor 2SC1815GR TOSHIBA(RoHS) NPN	3	Q101,Q102,Q103,
197-631n4148-e	DIODE 500mW 75V 1N4148 Panjit (RoHS)	7	D105,D106,D108,D109,D110,D112,D113
199-55000395-e	ZENER DIODE 3.9V 1/2W 52mm (RoHS)	1	D130
192-153j111-e	FET J111 FAIRCHILD TO-92 (RoHS)	1	Q107,
190-06m4558d-e	I.C. OPA 4558D (RoHS) DUAL OP-AMP	2	U101,U103,
190-16t072n-e	I.C. TL072N @6.5 (RoHS) DUAL OP-AMP	1	U105,
190-16t074cn-e	I.C TL074CN ST (RoHS) QUAD OP-AMP	2	U102,U106,
<i>Miscellaneous</i>			
162-10169003-e	WIRE ASS'Y 160mm AWG28 WHT/BLK(RoHS)	1	P105,
162-50122004-e	WIRE ASS'Y 120mm RED/WHT 2PIN (RoHS)	1	D201,
174-0rcb202vag-e	RCA JACK RCA-209 WITH GOLD (RoHS) INPUT	1	JK102,
175-1c02v01-e	WIRE CONNECTOR&BASE 2PIN PITCH=2.5mm (RoHS)	1	P106,
175-9f40hr2-e	WIRE CONNECTOR&BASE 40PIN PITCH=2.54mm HR2*40 (R	0.5	D201,
180-T000TS81-E	TACT SWITCH T2 T8019L-SNQ-E-H+U PHASE, LFE/NORMAL	2	SW102,SW103,
362-FE-00041-0LAE	PCB SUPPORT 11.75*8.5*12.5H (RoHS)	1	
<b>MAIN PCB</b>			
<i>Resistors</i>			
110-16102J26-E	carbon resistor 1K 1/6W ±5% CF (RoHS)	3	R210,R239,R264,
110-16103J26-E	carbon resistor10K 1/6W ±5% CF (RoHS)	9	R216,R227,R229,R230,R231,R232,R233, R260,R261,
110-16153j26-e	carbon resistor15K 1/6W ±5% CF (RoHS)	2	R247,R249,
110-16182j26-e	carbon resistor 1.8K 1/6W ±5% CF (RoHS)	1	R248,
110-16222J26-E	carbon resistor2.2K 1/6W ±5% CF (RoHS)	2	R242,R245,
110-16223J26-E	carbon resistor 22K 1/6W ±5% CF (RoHS)	3	R218,R220,R223,
110-16274j26-e	carbon resistor 270K 1/6W ±5% CF (RoHS)	1	R240,
110-16333j26-e	carbon resistor 33K 1/6W ±5% CF (RoHS)	1	R211,
110-16391j26-e	carbon resistor 390Ω 1/6W CF (RoHS)	2	R243,R246,
110-16472J26-E	carbon resistor4.7K 1/6W ±5% CF (RoHS)	4	R213,R217,R219,R222,
110-16473J26-E	carbon resistor 47K 1/6W ±5% CF (RoHS)	1	R221,
110-16683j26-e	carbon resistor 68K 1/6W ±5% CF (RoHS)	1	R212,
112-14101j26-e	fuse resistor 1/4W100ohm 5% (RoHS)	2	R241,R244,
116-141r00j26x-e	metal film resistor 1.00Ω 1/4W±5% MO (fireproofing resistor )	2	R255,R256,
116-161002f26-e	metal film resistor 10K 1/6W ±1% MF (RoHS)	2	R234,R235,
116-161301f26-e	metal film resistor 1.30K 1/6W MF (RoHS)	3	R226,R228,R236,
116-161692f26-e	metal film resistor 16.9K 1/6W MF (RoHS)	1	R214,
116-162001f26-e	metal film resistor 2.00K 1/6W ±1% MF (RoHS)	1	R215,
116-162492f26-e	metal film resistor 24.9K 1/6W ±1% MF (RoHS)	2	R257,R258,
116-166813f26-e	metal film resistor 681K 1/6W ±1% MF (RoHS)	1	R262,
110-12621j15-e	Carbon resistor 620Ω 1/2W ±5% 15mm (RoHS)	1	R238,
110-20152j20-e	Carbon resistor 1.5K 2W ±5% CF 20mm KINK	1	R208,
113-50r10j10-e	CEMENT RESISTOR 0.1Ω 5W ±5% (RoHS)	2	R224,R225,
116-142003f26-e	metal film resistor 200K 1/4W ±1% MF	1	R209,
<i>Capacitors</i>			
135-4228m35-e	electrolytic CAP. 2200uF 35V ±20%	2	C170,C171,
135-4688m80-e	electrolytic CAP. 6800U 80V ±20%(RoHS)	2	C168,C169,
130-2b102k503-e	Disc Capacitor 1000P 50V ±10% (RoHS)	1	C165,

**ES250P**

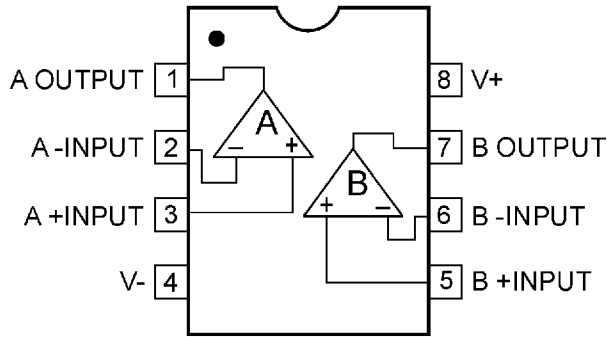
Part Number	Description	Qty	Reference Designator
<b>MAIN PCB</b>			
130-3f104z503-e	Disc Capacitor 0.1U 50V +80/-20% (RoHS)	2	C163,C164,
130-ch101j503-e	Disc Capacitor100P 50V ±5% (RoHS)	2	C159,C160,
135-3107m16-e	electrolytic cap 100uF 16V ±20% (RoHS)	2	C166,C167,
135-3226m50-e	electrolytic cap 22U 50V ±20% (RoHS)	2	C161,C162,
135-3227m10-e	elec trolytic cap 220U 10V ±20% (RoHS)	2	C156,C157,
139-3227m16-e	low leakage ec 220uF 16V±20% (RoHS)	1	C155,
140-RX473KB03-E	multy layer cap 47NF 200V X7R ±10% (RoHS)	2	C172,C173,
140-rx103ka03-e	multy layer cap 10nF 100V X7R 10%立式 (RoHS)	1	C174,
<b>Semiconductors</b>			
190-16l431clp1-e	IC TL431CLP (RoHS) PROGRAMMABLE VOLTAGE REFERENCE	1	D115
192-027c1815gr-e	transistor 2SC1815GR TOSHIBA(RoHS) NPN	4	Q110,Q112,Q114,Q117,
192-028a1015gr-e	transistor 2SA1015GR TOSHIBA(RoHS) PNP	3	Q111,Q113,Q115,
192-1572n5551-e	transistor FSC 2N5551 (RoHS) NPN	1	Q109,
192-1582n5401-e	Transistor FSC 2N5401 AI-PNP 350V500mA TO-92 (RoHS)	1	Q108,
197-631n4148-e	diode 500mW 75V 1N4148 Panjit (RoHS)	7	D117,D118,D119,D120,D121,D126,D125,
199-65000563g-e	Zener diode GDZJ5.6B 500mW 5.6V 2% (RoHS)	1	D116,
199-65001503g-e	Zener diode GDZJ15C500mW 15V 2%ROHM 52mm 1N5245B	1	D122,
199-65002003g-e	Zener diode GDZJ20D 500mW 20V 2% (RoHS)	1	D129,
190-16lm324n-e	I.C. LM324N (RoHS) QUAD OP-AMP	1	U107,
192-991d669a-e	transistor HI-SINCERITY HSD669A (RoHS) NPN	1	Q116,
192-992b649t-e	transistor HSB649T (RoHS) PNP	1	Q118,
197-00db103g-e	DIODE 1A 200V DF02M	1	D124,
197-00kbu1003-e	DIODE 10A 200V KBU1003	1	D123,
197-101n4002-e	DIODE 1N4002TB (RoHS)	1	D114,
<b>Miscellaneous</b>			
109-1tsc103j0-e	THERMISTOR TSC05103J (RoHS)	1	R237,
171-udhss124d-e	RELAY 5A 24V UDH-SS124D	1	K101,
175-1c02v01-e	WIRE CONNECTOR 2PIN PITCH=2.5mm (RoHS)	1	P108,
175-1c06v01-e	WIRE CONNECTOR 6 PIN PITCH=2.5mm	1	P107,
175-1d02v01-e	WIRE CONNECTOR 2PIN PITCH=3.96mm	1	P112,
175-1d05v01-e	WIRE CONNECTOR 5PIN 3.96mm (RoHS)	1	P113,
362-FE-00041-0LAE	PCB SUPPORT 11.75*8.5*12.5H	1	
<b>CLASS D PCB ASS'Y (RECOMMENDED REPLACE ENTIRE MODULE PART# 051-A05022C-E)</b>			
<b>Resistors</b>			
118-12061001f-e	SMD RESISTOR 1K 1206 1% (RoHS)	1	R2,
118-12061002f-e	SMD RESISTOR 10K 1206 1% (RoHS)	1	R25,
118-12061002j-e	SMD RESISTOR 10.0K 1206 5% (RoHS)	5	R29,R30,R30B,R7,R9,
118-120610r0j-e	SMD RESISTOR 10.0Ω 1206 5% (RoHS)	4	R20,R20B,R22,R23,
118-12062002f-e	SMD RESISTOR 20K 1206 1% (RoHS)	1	R26,
118-12062201j-e	SMD RESISTOR 2.20K 1206 5% (RoHS)	18	R13,R16,R31,R33,R34,R35,R36,R37,R38, R39,R40,R41,R42,R43,R44,R45,R46,R32,
118-12062204j-e	SMD RESISTOR 2.20M 1206 5% (RoHS)	1	R4,
118-12062211f-e	SMD RESISTOR 2.21K 1206 1% (RoHS)	1	R6,
118-12062550f-e	SMD RESISTOR 1206 255Ω 1% (RoHS)	1	R24,
118-12062701j-e	SMD RESISTOR 2.70K 1206 5% (RoHS)	1	R10,
118-12063301j-e	SMD RESISTOR 3.30K 1206 5% (RoHS)	4	R14,R15,R27,R28,
118-12063321f-e	SMD RESISTOR 3.32K 1206 1% (RoHS)	1	R1,
118-12063922f-e	SMD RESISTOR 1206 39.2K±1% (RoHS)	1	R3,
118-12064700j-e	SMD RESISTOR 470Ω 1206 5% (RoHS)	3	R8,R11,R21,
118-12064701j-e	SMD RESISTOR 4.70K 1206 5% (RoHS)	1	R12,
118-12064751f-e	SMD RESISTOR 4.75K 1206 1% (RoHS)	1	R5,
112-10180j00-e	FUSE RESISTOR FMF 1W 18Ω 5%(RoHS)	1	

Part Number	Description	Qty	Reference Designator
<b>CLASS D PCB ASSY (RECOMMENDED REPLACE ENTIRE MODULE PART# 051-A05022C-E)</b>			
<i>Capacitors</i>			
141-d7104ka0-e	SMD CAPACITOR 0.1uF 100V 10% 1210 X7R (RoHS)	2	C18,C19,
141-d7104kb5-e	SMD CAPACITOR 0.1uF 250V 10% 1210 X7R (RoHS)	2	C12,C14,
141-c0101k50-e	SMD CAPACITOR 100pF 50V 10%1206 NP0 (RoHS)	1	C4,
141-c0220k50-e	SMD CAPACITOR 22pF 50V 10% 1206 SMT NPO (RoHS)	1	C5,
141-c0561k50-e	SMD CAPACITOR 560pF 50V 10% 1206 NPO (RoHS)	1	C6,
141-c5104m50-e	SMD CAPACITOR 120F Y5V 0.1uF 50V ±20% (RoHS)	8	C2,C3,C7,C8,C9,C10,C11,C15,
141-c7103k50-e	SMD CAPACITOR 10nF 50V 1% 1206 X7R (RoHS)	1	C13,
128-e106ma01-e	CROSSVER CAP. 10uF 100V 20% (RoHS)	2	C16,C17,
130-sl681kb03-e	Disc capacitor SL 680PF 200V (RoHS)	1	C21
132-104kb50-e	MYLAR CAPACITOR 0.1U ±10% 250V LS-10.mm MD (RoHS)	1	C20,
132-105kb50-e	MYLAR CAPACITOR 1uF 250V ±10% (RoHS)	1	C40,
<i>Semiconductors</i>			
190-16tl072dts-e	SMD I.C. TL072CDT SGS THOMSON(RoHS) DUAL OP-AMP	1	IC1,
192-09124126qs-e	SMD TRANSISTOR 2SC2412K-T146Q/R ROHM (RoHS)	2	Q1,Q4,
192-09139066rs-e	SMD TRANSISTOR 2SC3906K-T146R ROHM (RoHS)	2	Q2,Q8,
192-091sc4672-e	TRANSISTOR 2SC4672(MPT3) ROHM (RoHS)	1	Q5B,
192-09210376qs-e	SMD TRANSISTOR 2SA1037K-T146Q/R ROHM (RoHS)	2	Q7,Q9,
192-09215146rs-e	SMDTRANSISTOR 2SA1514K-T146R ROHM (RoHS)	1	Q3,
192-1582n5401-e	TRANSISTOR FSC 2N5401 AI-PNP 350V 500mA TO-92 (RoHS)	1	Q6B,
197-03rls4148s-e	SMD DIODE RLS4148-TE11 ROHM (RoHS)	8	D1,D2,D3,D4,D5,D5B,D6,D20,
199-15000563s-e	SMD ZENER DIODE 5.6V 5% PHILIPS BZX84-C5V6 (RoHS)	2	Z1,Z2,
199-1500120s-e	SMD ZENER DIODE 12V 5% PHILIPSBZX84-C12 (RoHS)	4	Z3,Z4,Z5,Z6,
192-232irf9640-e	TRANSISTOR FET IRF9640 IR P-CH TO220 (RoHS)	2	Q10,Q10B,
192-233f640n-e	TRANSISTOR IRF640N INTERNATIONAL (RoHS)	1	Q11,
<i>Miscellaneous</i>			
122-13151k0190-e	CHOKE SA-500-280 (PT1601B*151MAA) (RoHS)	1	L1,
122-14300k4-e	Ferrite core LD1215*300KU ±10% (RoHS)	1	L2,
175-9F02H02-E	WIRE CONNECTOR&BASE 2PIN PITCH=2.54mm (RoHS)	1	HDR3,
175-9F03H020-E	WIRE CONNECTOR&BASE 3PIN PITCH=2.54mm (RoHS)	2	HDR1,HDR2,
<b>MISC./MECHANICAL &amp; AC INPUT PCB</b>			
128-C117JA01-E	electrolytic CAP 110uf 100V	1	On Woofer terminals
150-r1107011-e	RING POWER TRANSFORMER TT0930505260 (RoHS)	1	
152-u60201a02-e	LINE CORD 6FT UL 2PIN SOCKET PRONIC (RoHS)	1	
153-vpst101s2-e	AC OUTLET&SOCKET VDE 2PINS INLET	1	
154-k31505t0-e	FUSE 3.15A 250V 30mm UL/CSA/PSE (RoHS)	1	
155-630r345b-e	FUSE HOLDER UL/CSA 6*30mm R3-45B (RoHS)	1	
162-10100023-e	WIRE UL/CSA 1617 #22 100mmBLK (RoHS)	1	
162-10151001-e	WIRE UL1617 150mm 22AWG BROWN6:6 (RoHS)	1	
162-5016d001-e	WIRE 24# 160mm BLK (RoHS)	1	
162-5020d006-e	WIRE UL2468 200mm 2.5mmpitchRED/WHT (RoHS)	1	
162-a055d002-e	WIRE ASS'Y 550mm UL2468 26AWG紅白+Housing+Φ5LED	1	
166-5070a4bd-e	SPEAKER WIRE 700mm #18 #205*0.5t BLK/#250*0.8紅I (RoHS)	1	
180-prf1003b-e	SWITCH ROCK RF-1003-BB210(RoHS) POWER	1	
193-0s4211-e	INSULATOR (INSULATION SPACER)42*11 (RoHS)	1	
193-201612tr-e	INSULATOR T0-220 16mm*12mm(RoHS)	3	
236-AL-05001-OLAE	RETAINER (RoHS)	1	
302-AL-05086-0BBE	REAR BOARD 300*200*2.5T ES250/120V用(RoHS)	1	
306-ABS-05081-0BAE	REAR Housing 198*298*102mm後WITH 8 PIECE EVA (RoHS)	1	
311-ABS-00028-0BAE	KNOB 46077-W P.V.C.(RoHS) LEVEL, CROSSOVER	2	
323-AL-05000-OLAE	HEAT SINK (RoHS)	1	
325-FE-00400-OLAE	PCB FLOOR STAND 58*9*13.5T (RoHS)	1	
333-EVA-00188-0BAE	EVA GASKET 170x5x1t with glue (RoHS)	1	
333-EVA-00220-0BAE	EVA GASKET LONG 225*15*1t UL(RoHS)	1	
333-EVA-00866-0BAE	EVA 48*18*1.5T (RoHS)	1	
333-SPG-00860-0BAE	FIREPROOFING GASKET 450*50*5T (RoHS)	1	

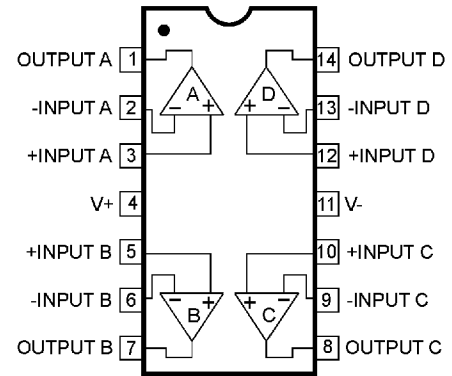
Part Number	Description	Qty	Reference Designator
<b>MISC./MECHANICAL &amp; AC INPUT PCB</b>			
335-NYL-00002-0BAE	WIRE CLKP 4K-4 NO-BB(RoHS)	1	
336-RUB-05103-0BAE	RUB GASKET 97*16*3.0T BLACK(RoHS)	2	
350-EM04012D024-E	4 $\phi$ *12 WOOD SCREW BLACK (RoHS)	4	
351-AM03008A078-E	M3*8 Machine screw with nickel(RoHS)	4	
351-AM03008A079-E	M3*8 Machine screw crloss BLK (RoHS)	7	
351-AM03018A364-E	Machine screw SCREW M3*18 BLK (RoHS)	2	
351-HM03006A308-E	Machine screw M3*6mm cross BLK (RoHS)	1	
351-HM04010A217-E	M4*10 Machine screw cross BLK (RoHS)	4	
352-AM03008D040-E	$\phi$ 3*8 B type ping screw cross BLK (RoHS)	2	
352-AM03008D041-E	$\phi$ 3*8 Btype ping screw cross with nickel (RoHS)	2	
352-AM03010D065-E	$\phi$ 3*10 Ptype ping screw cross BLK(RoHS)	1	
352-BM03010D064-E	$\phi$ 3*10 Btype ping screw cross BLK(RoHS)	2	
355-P07049-E	washer 7.2*12*0.5t COLOR(RoHS)	2	
361-FE-00002-0LAE	the holder of transformer 90*70*15mm (RoHS)	1	
361-FE-05016-0LAE	SECC HOLDER 36*12.5*8.5 (RoHS)	1	
362-FE-00013-0LAE	PCB HOLDER L TYPE t=1.6mmS.P.C.C 89*9*1.6T (RoHS)	1	

# Integrated Circuit Diagrams

4558, TL072 DUAL OP-AMP  
IC1, U101,103,105

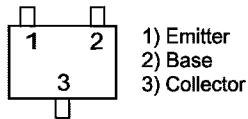


OPAMP,  
QUAD 14P DIL TL074 LM324  
U102,106,107



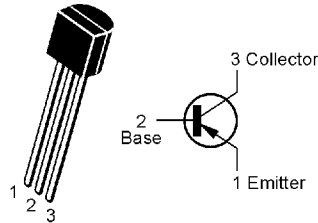
\* MMBT3906LTI SOT23  
2SC4672K(MPT3)  
2Sa1037K-T146Q/r  
2SC2412K 2SA1514K

Q1,2,3,4,5B,7,8,9

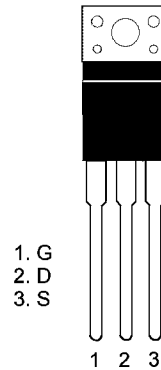


\* PREFIX MAY BE "FMMT"

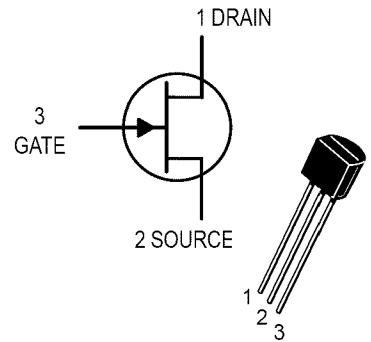
2N5401  
Q6B, 108



MOSFET IRF640, 9640  
Q10,10B,11



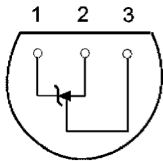
FET J111  
Q107



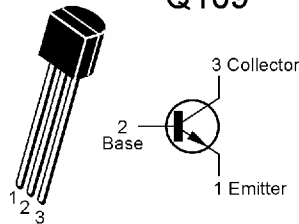
TL431 D115

T092  
(Top view)

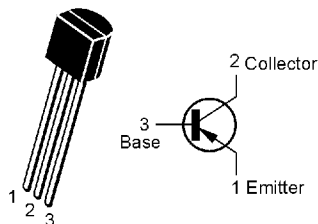
1 Cathode  
2 Anode  
3 Reference



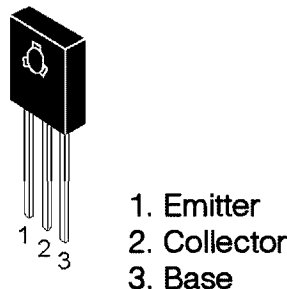
2N5551  
Q109



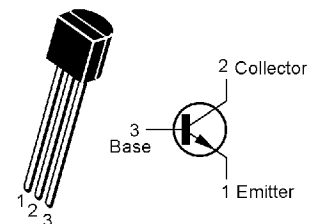
2SA1015  
Q111,113,115



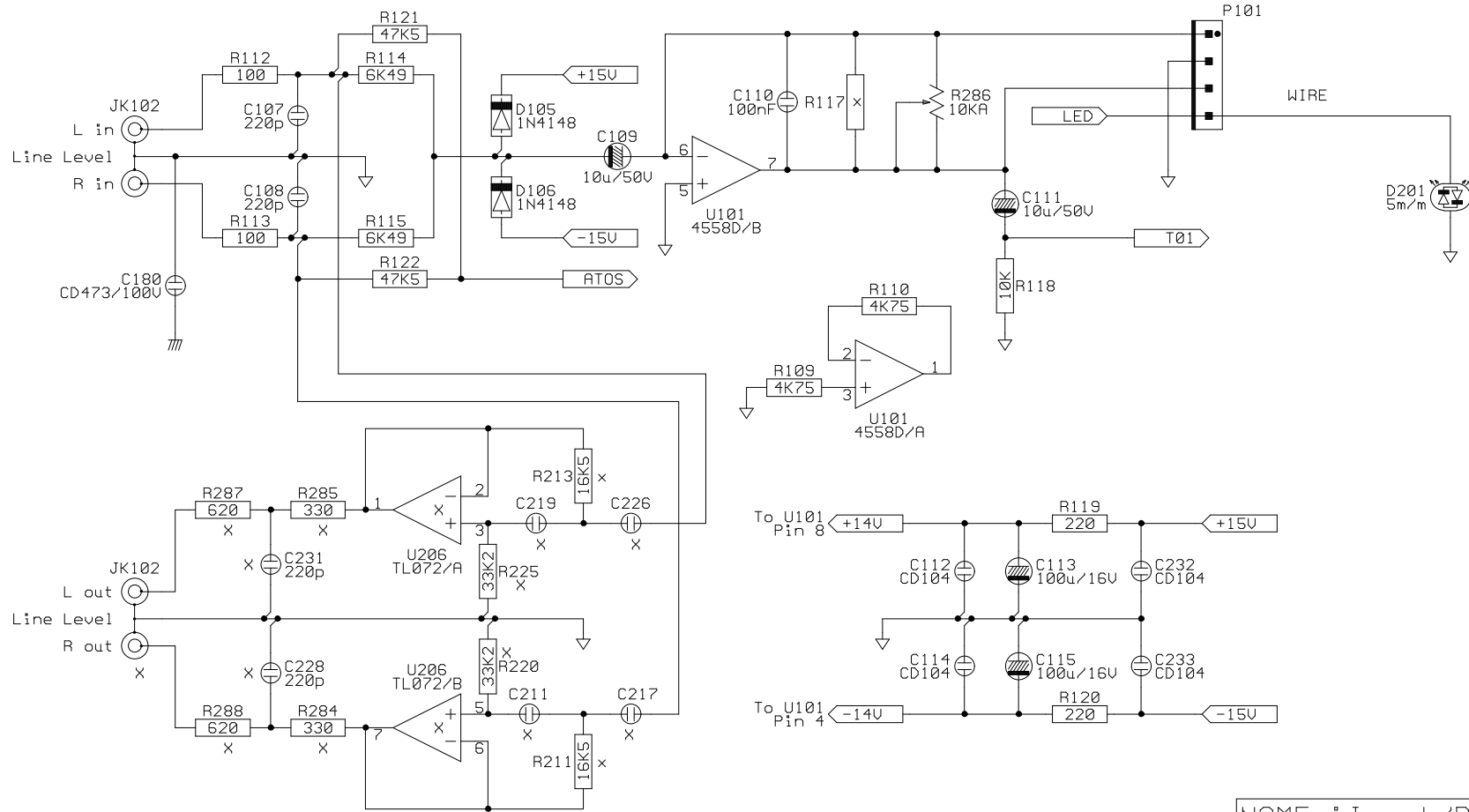
HSD669A, HSB649A  
Q116,118



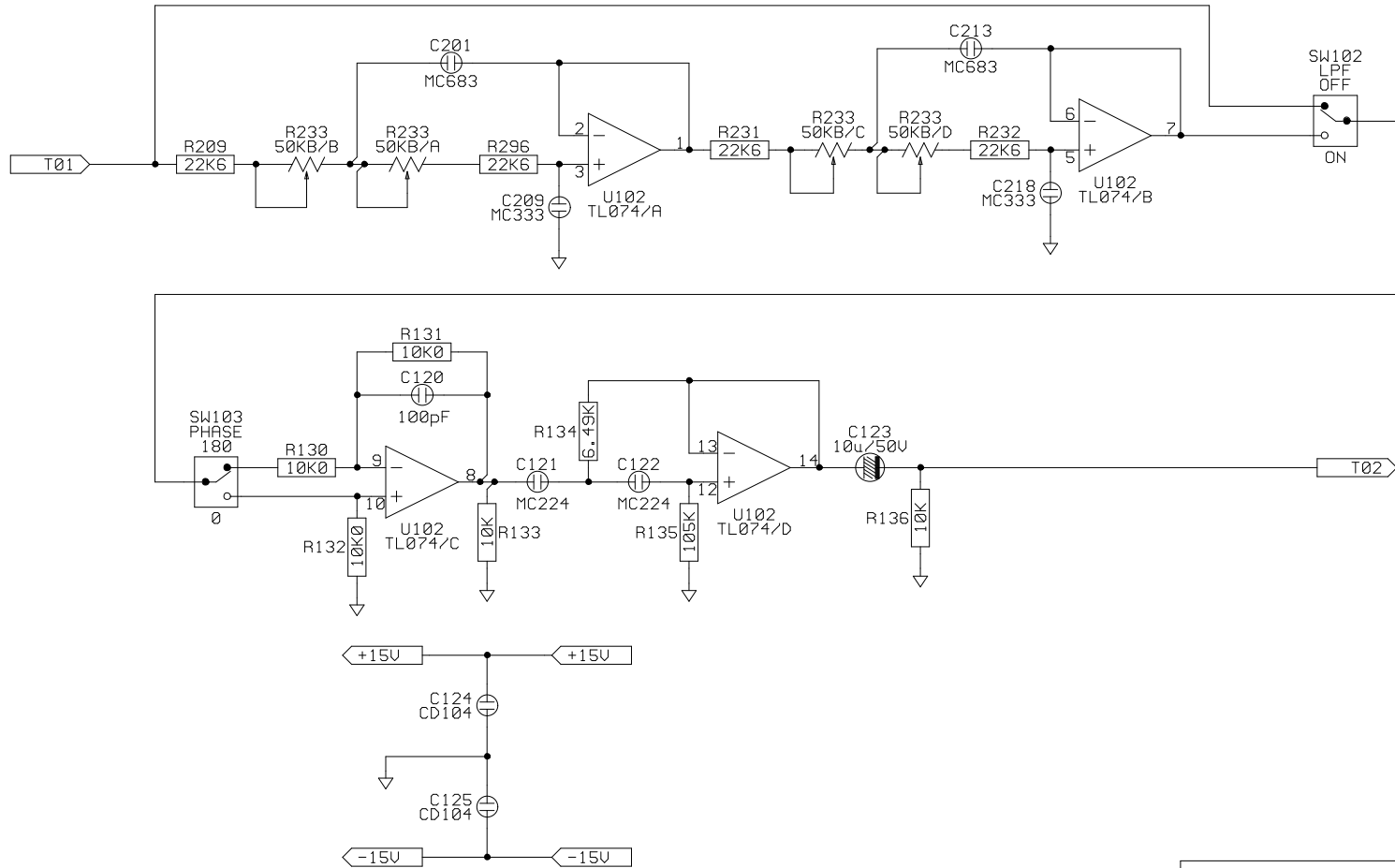
2SC1815  
Q101,102,103,110,112,114,117



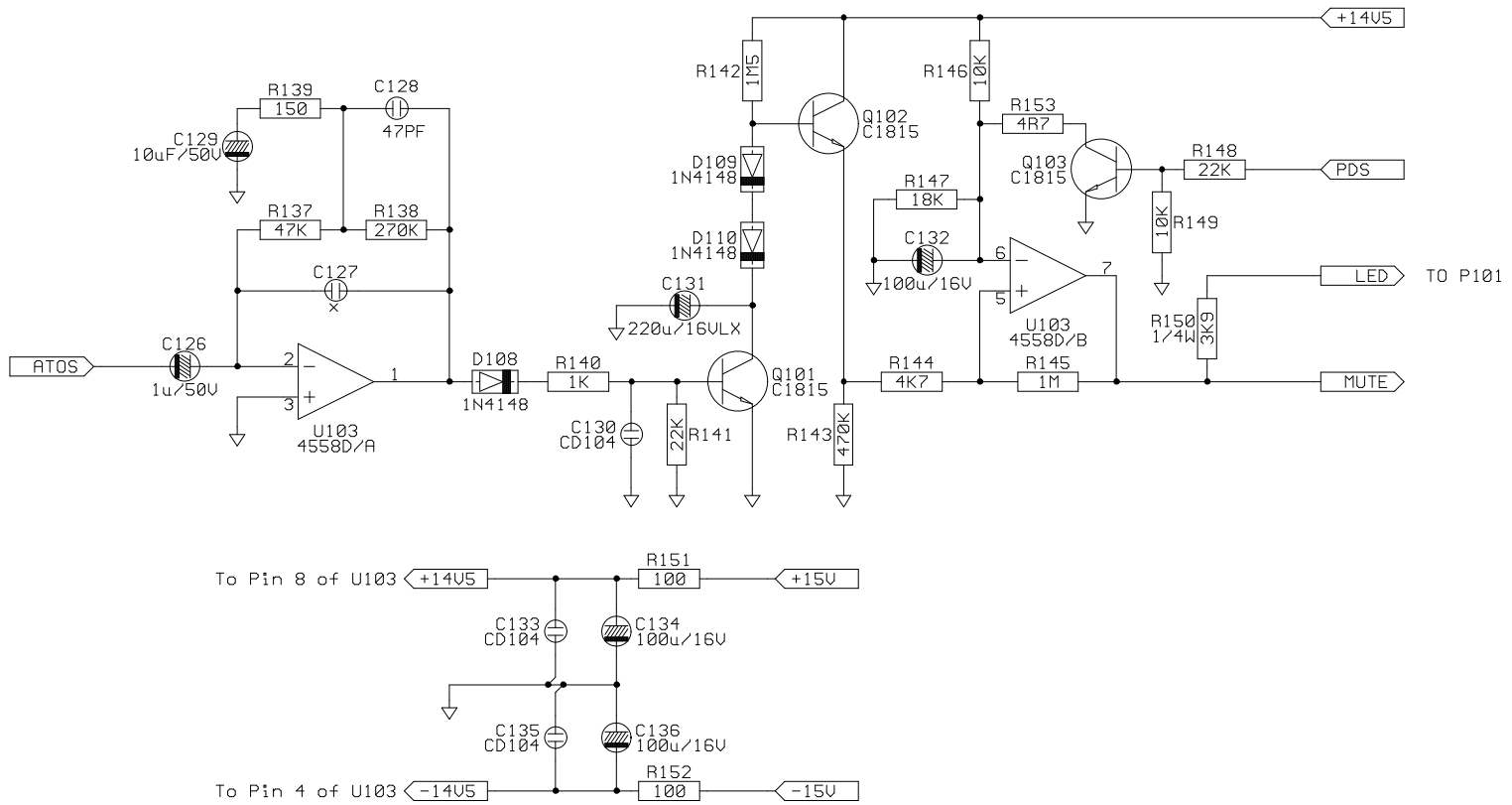




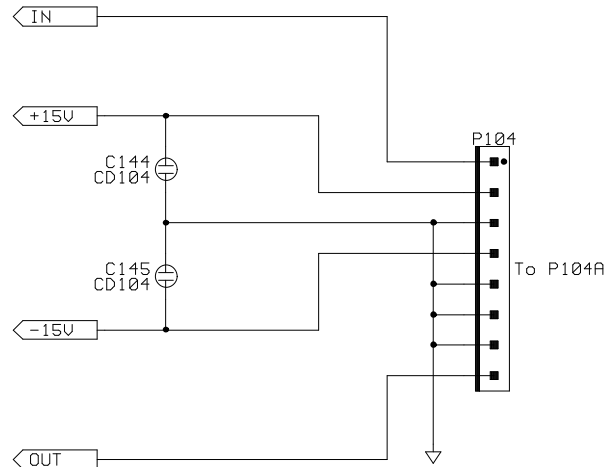
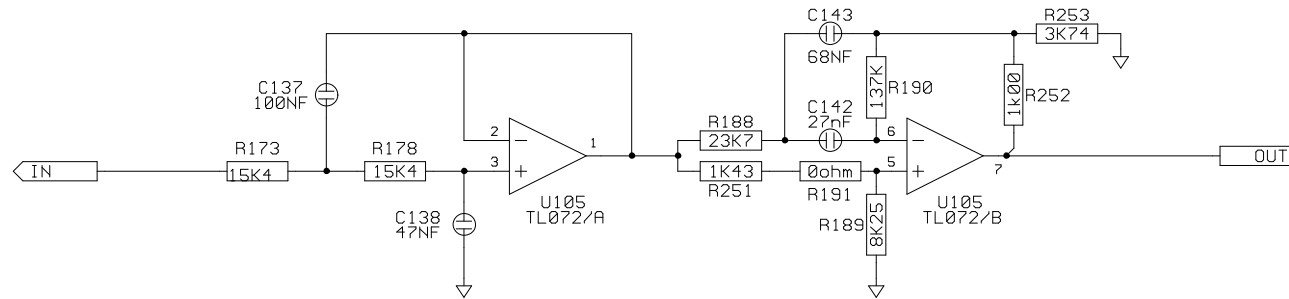
NAME : Input/PRE	1/10
MODEL : ES250P/120V	REV: 0
CUSTOMER : JBL	
DATE : 2006-11-18	
APPROVE BY	CHECK BY DRAWING BY



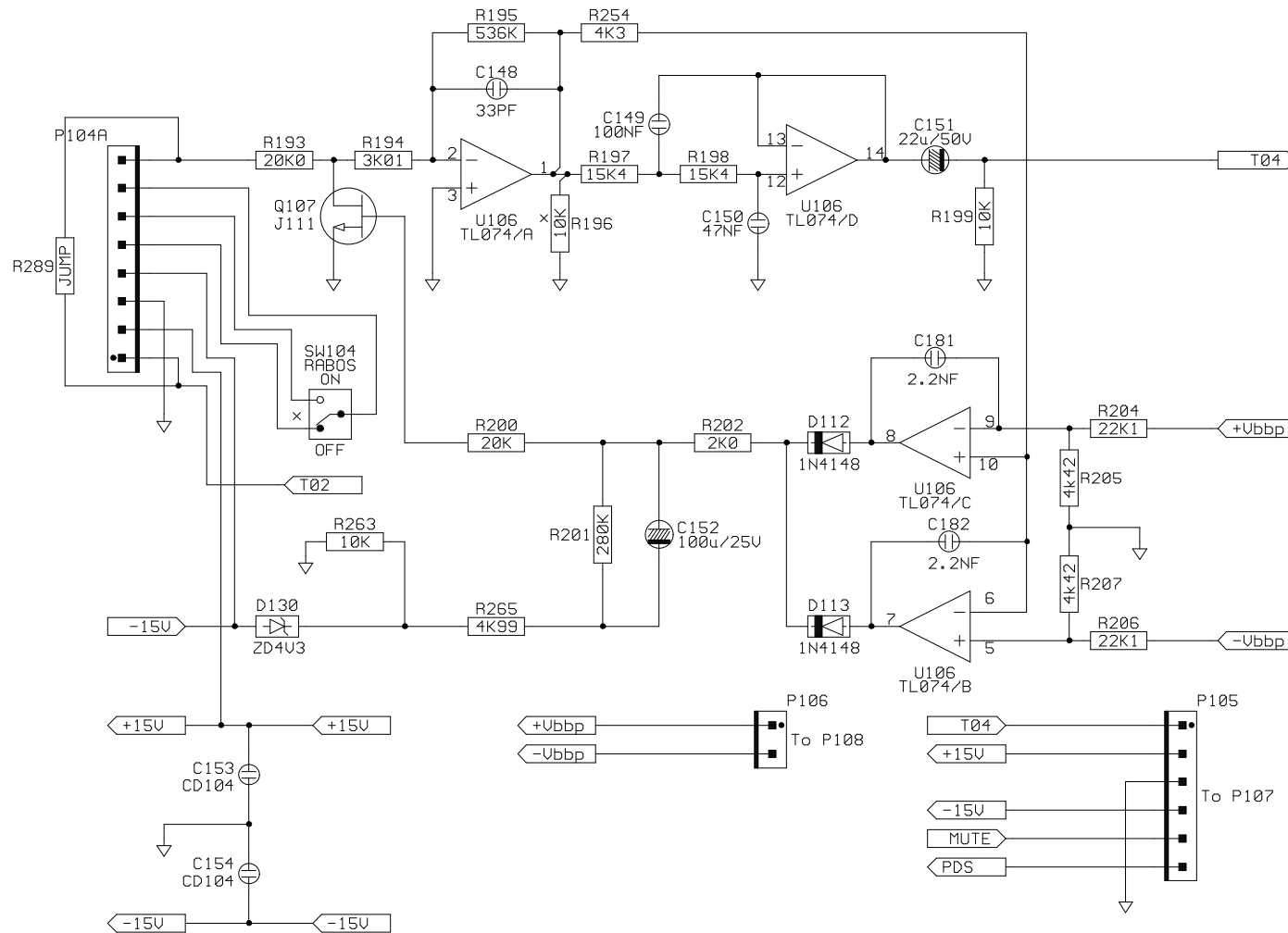
NAME : Filter/PRE	2/10
MODEL : ES250P/120V	REV: 0
CUSTOMER : JBL	
DATE : 2006-11-18	
APPROVE BY	CHECK BY DRAWING BY



NAME : Auto on/PRE	3/10
MODEL : ES250P/120V	REV: 0
CUSTOMER : JBL	
DATE : 2006-11-18	
APPROVE BY	CHECK BY
DRAWING BY	

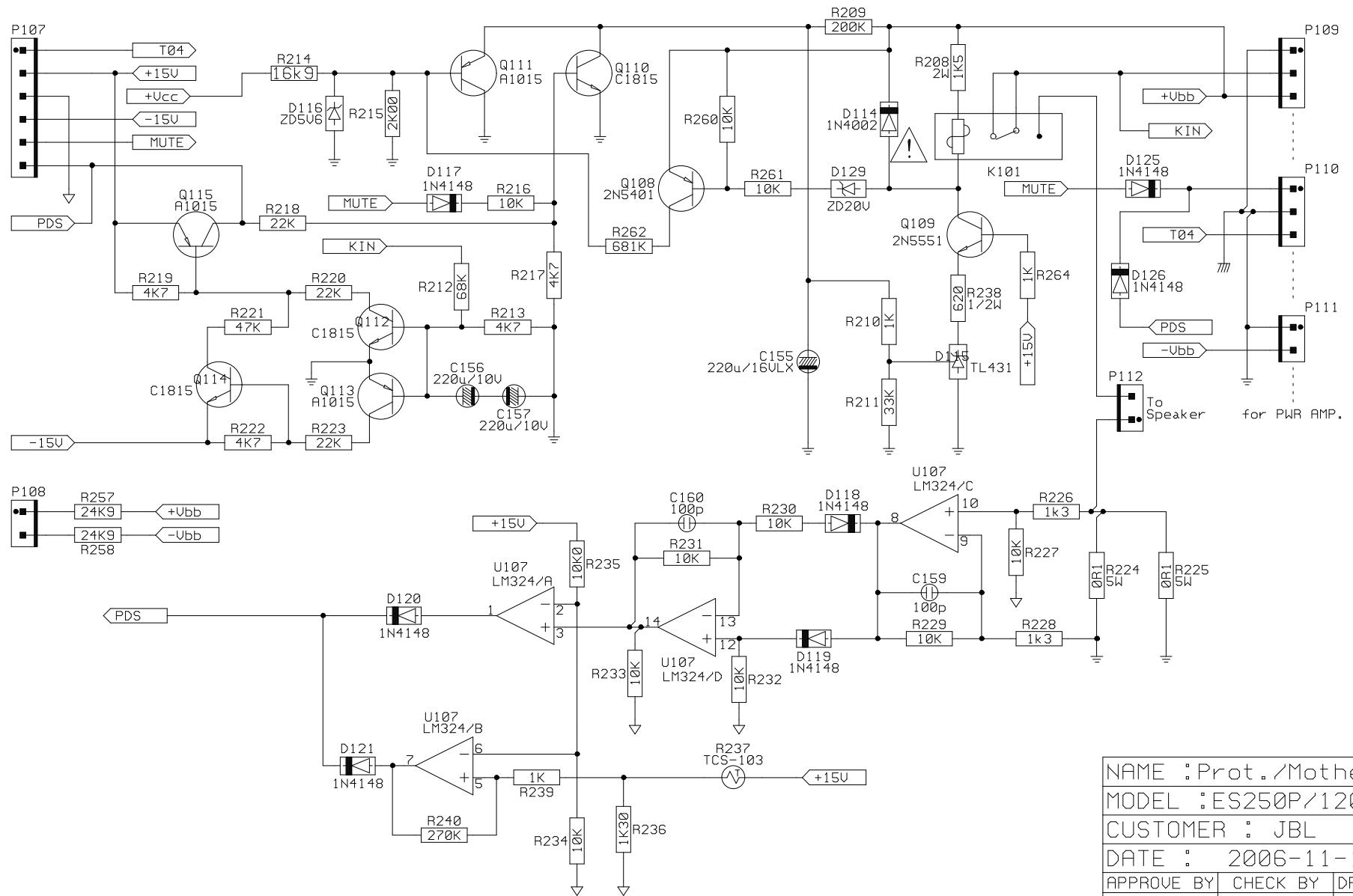


NAME : EQ CIRCUIT		4/10
MODEL : ES250P/120V		REV:0
CUSTOMER : JBL		
DATE : 2006 -11 -18		
APPROVE BY	CHECK BY	DRAWING BY

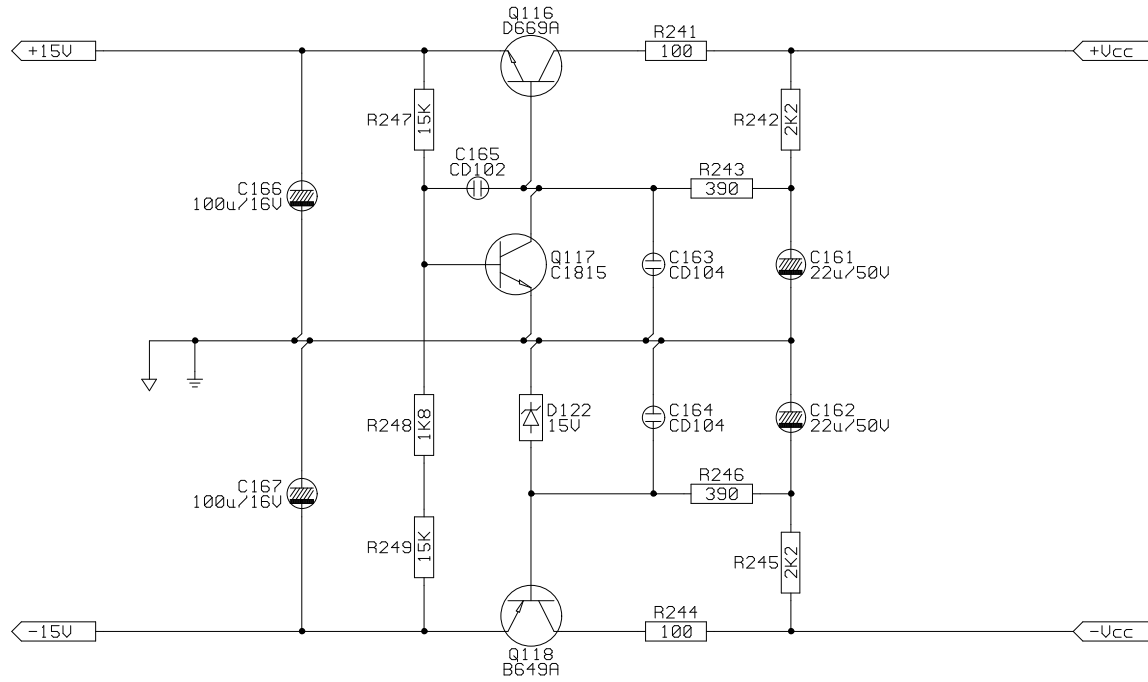


NAME : Limiter/PRE	5/10
MODEL : ES250P/120V	REV: 0
CUSTOMER : JBL	
DATE : 2006-11-18	
APPROVE BY	CHECK BY
DRAWING BY	

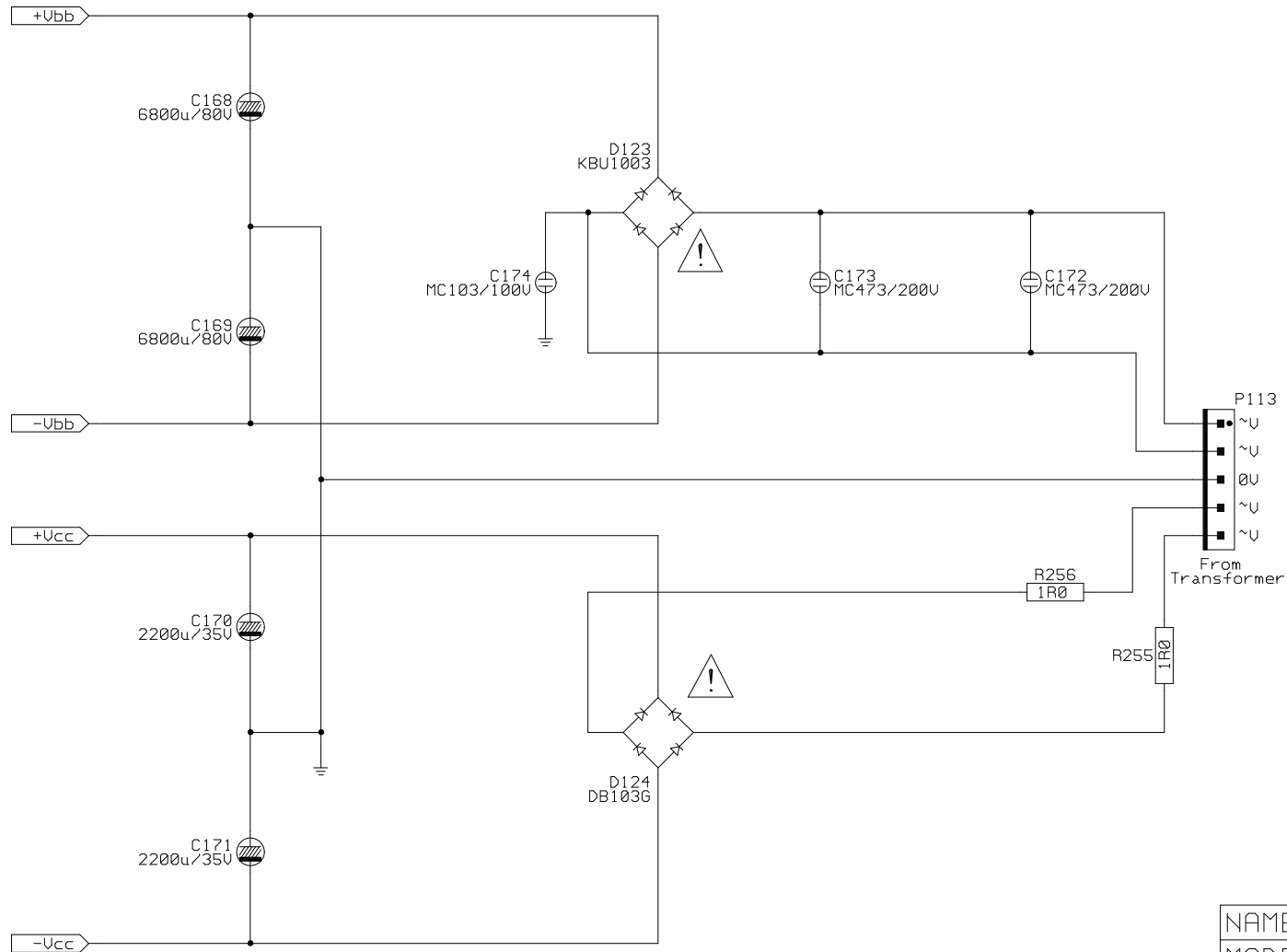
# ES250P



NAME : Prot./Mother	6/10
MODEL : ES250P/120V	REV: 0
CUSTOMER : JBL	
DATE : 2006-11-18	
APPROVE BY	CHECK BY
DRAWING BY	

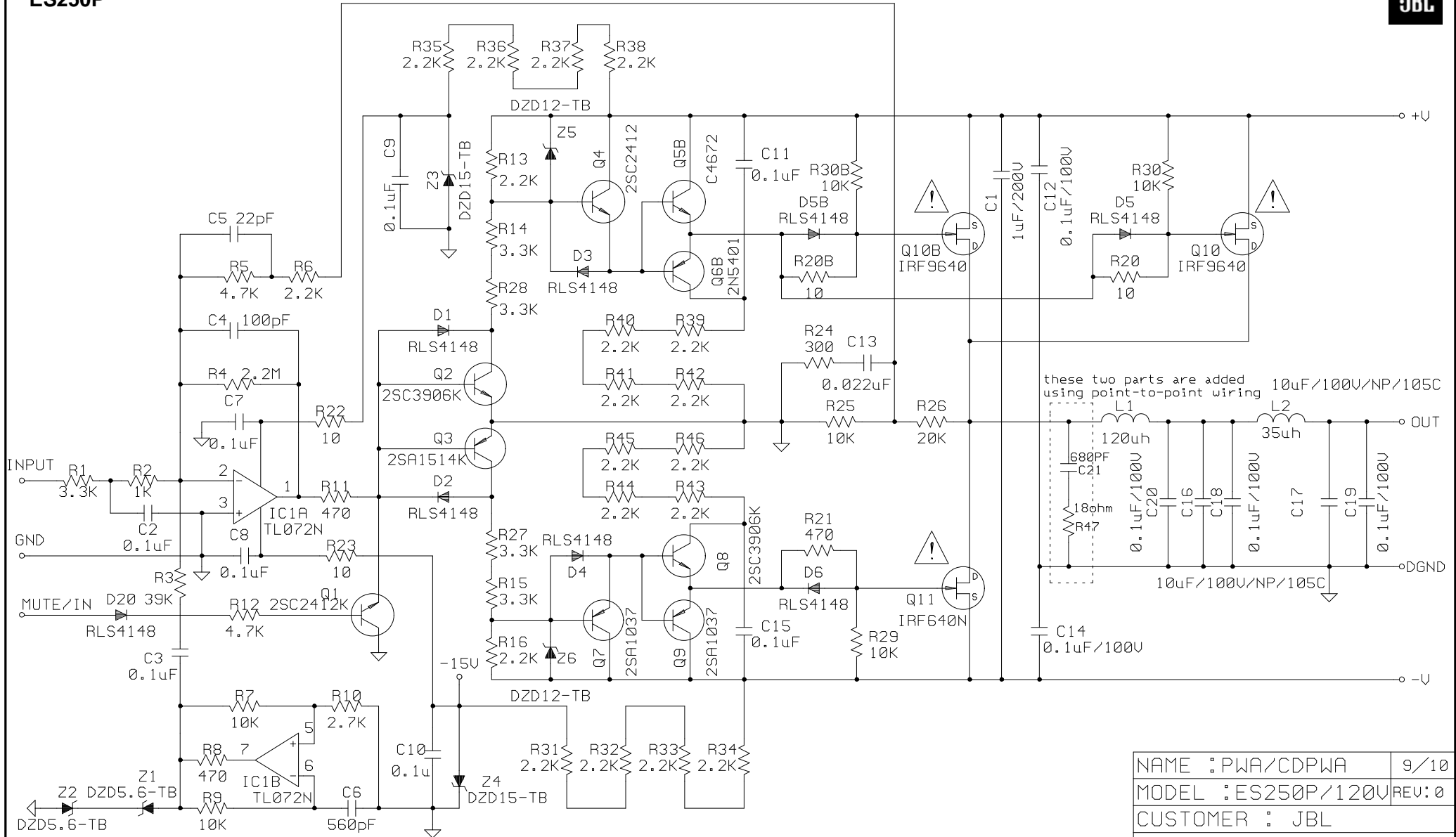


NAME : PN15U/Mother		7/10
MODEL : ES250P/120V		REV:0
CUSTOMER : JBL		
DATE : 2006-11-18		
APPROVE BY	CHECK BY	DRAWING BY

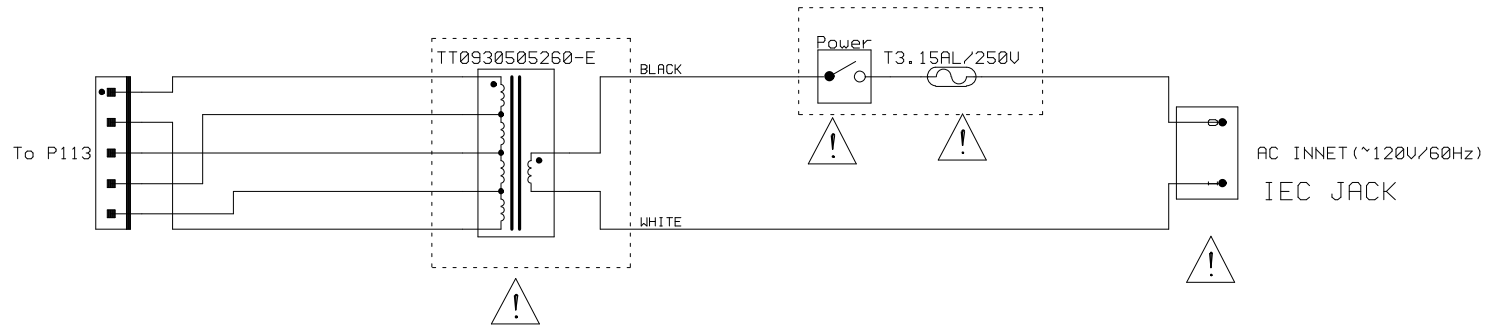


NAME : DCPWR/Mother	8/10
MODEL : ES250P/120V	REV: 0
CUSTOMER : JBL	
DATE : 2006-11-18	
APPROVE BY	CHECK BY
DRAWING BY	





NAME : PWA/CDPWA	9/10
MODEL : ES250P/120V	REV: 0
CUSTOMER : JBL	
DATE : 2006-11-18	
APPROVE BY	CHECK BY
DRAWING BY	



APPROVE BY	CHECK BY	DRAWING BY	NAME : AC INNET	10/10
			MODEL : ES250P/120V	REV:0
			CUSTOMER : JBL	
			DATE : 2006-11-18	