TFT-LCD TV

Chassis SP20SO

Model LA20S51B

SERVICE Manual

TFT-LCD TV

CONTENTS

2-2 Pin Assignments

2-2-1 DVD

RCA Green	Y
	GND
RCA Blue	Pb (Cb)
	GND
RCA Red	Pr (Cr)
	GND
RCA White	Audio L
	GND
RCA Red	Audio R
	GND

2-2-2 S-Video

Pin	Separate
1	GND
2	Y
3	C
4	GND
5	GND

2-2-3 A/V

RCA Yellow	CVBS
RCA White	Audio L
	GND
RCA Red	Audio R
	GND

2-2-4 D-SUB

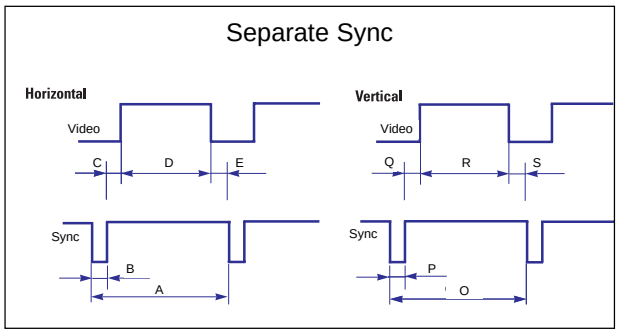
Pin	Separate
1	Red
2	Green
3	Blue
4	GND
5	GND (DDC Return)
6	GND-Red
7	GND-Green
8	GND-Blue
9	No Connection
10	GND-Sync / Self Test
11	GND
12	DDC Data
13	H - Sync
14	V - Sync
15	DDC Clock

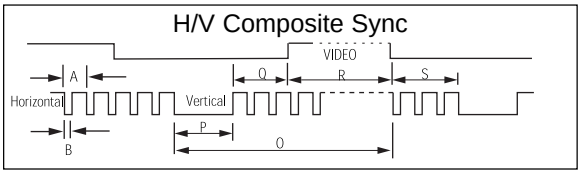
2-3 Timing Chart

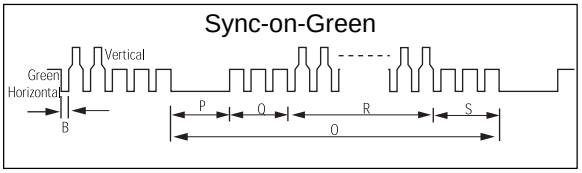
This section of the service manual describes the timing that the computer industry recognizes as standard for computer-generated video signals.

Table 2-1 Timing Chart

Mode / Timing	IBM				VESA		
	VGA2/70 Hz 720 x 400	VGA3/60 Hz 640 x 480	640/75 Hz, 60Hz, 72Hz 640 x 480	800/75 Hz, 56Hz, 60Hz, 72Hz 800 x 600	1024/60Hz 1024 x 768	1024/75Hz 1024 x 768	1280/75Hz,50Hz 1280x1024
fH (KHz)	31.469	31.469	37.500	46.875	48.363	60.023	79.976
A µsec	31.777	31.778	26.667	21.333	20.677	16.660	
B µsec	3.813	3.813	2.032	1.616	2.092	1.219	12.504
C µsec	1.589	1.589	3.810	3.232	2.462	2.235	
D µsec	26.058	26.058	20.317	16.162	15.754	13.003	1.067
E µsec	0.318	0.318	0.508	0.323	0.369	0.203	
fV (Hz)	70.087	59.940	75.000	75.000	60.004	75.029	1.837
O msec	14.268	16.683	13.333	13.333	16.666	13.328	9.481
P msec	0.064	0.064	0.080	0.064	0.124	0.050	
Q msec	0.858	0.794	0.427	0.448	0.600	0.466	0.119
R msec	13.155	15.761	12.800	12.800	15.880	12.795	
S msec	0.191	0.064	0.027	0.021	0.062	0.017	75.025
Clock Freq. (MHz)	28.322	25.175	31.500	49.500	75.000	78.750	13.329
Polarity H.Sync	Negative	Negative	Negative	Positive	Negative	Positive	0.038
V.Sync	Positive	Negative	Negative	Positive	Negative	Positive	0.475
Remark	Separate	Separate	Separate	Separate	Separate	Separate	12.804







A : Line time total	B : Horizontal sync width	O : Frame time total	P : Vertical sync width
C : Back porch	D : Active time	Q : Back porch	R : Active time
E : Front porch	S : Front porch		

3 Disassembly and Reassembly

This section of the service manual describes the disassembly and reassembly procedures for the LA20S51B TFT-LCD TV.

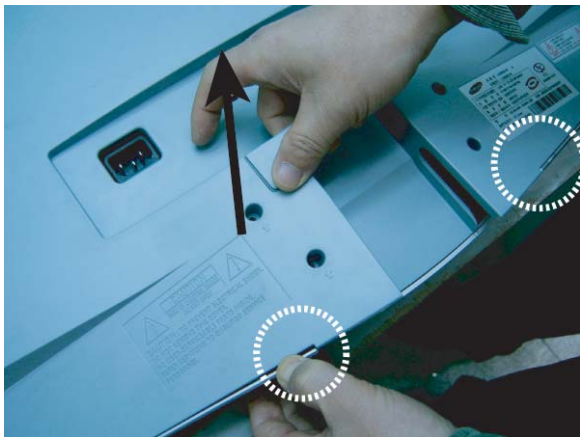
⚠ **WARNING**: This monitor contains electrostatically sensitive devices. Use caution when handling these components.

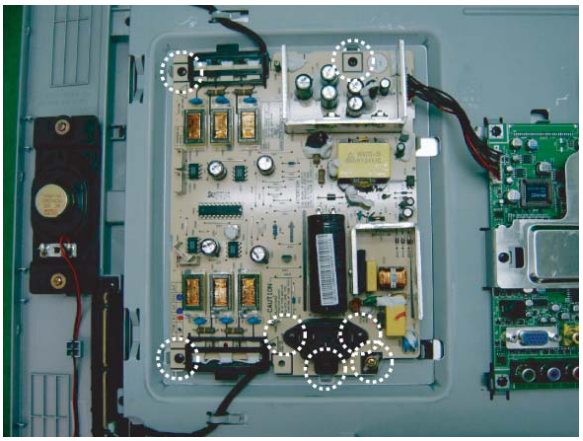
3-1 Disassembly

⚠ **Cautions**:1. Disconnect the monitor from the power source before disassembly.

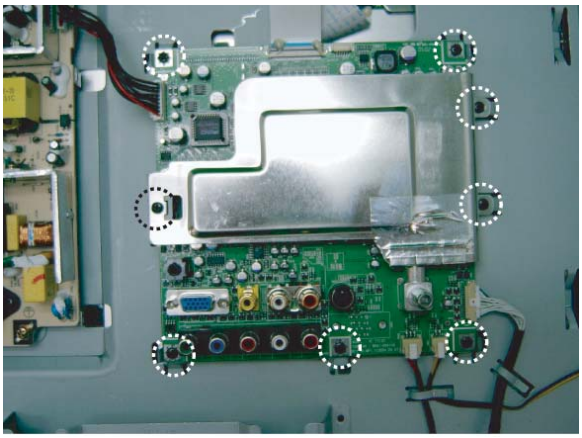
2. Follow these directions carefully; never use any metal instrument except provided jig to separate the cabinet.

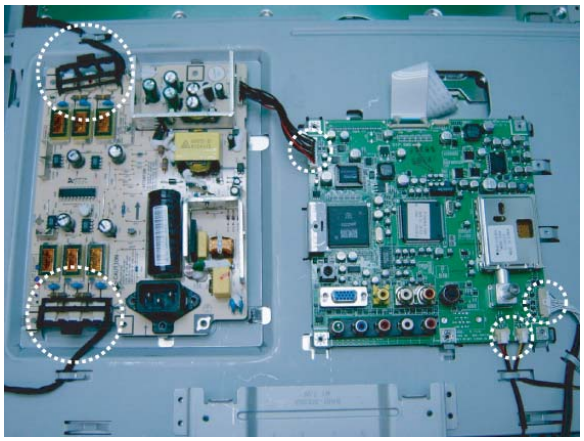
1. Place monitor face down on cushioned table and r emove 6 screws and remove stand.



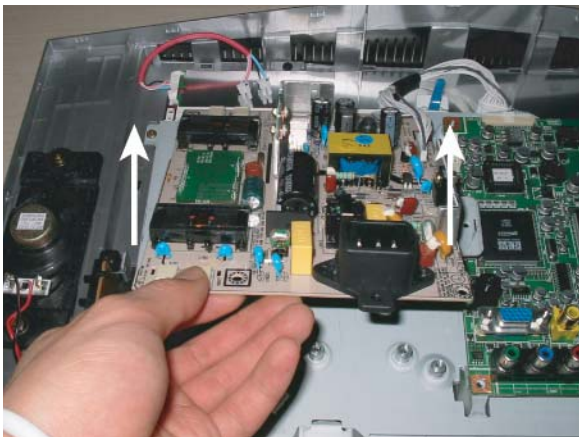


2. Lift up the rear cover and remove 7 screws from the power board.

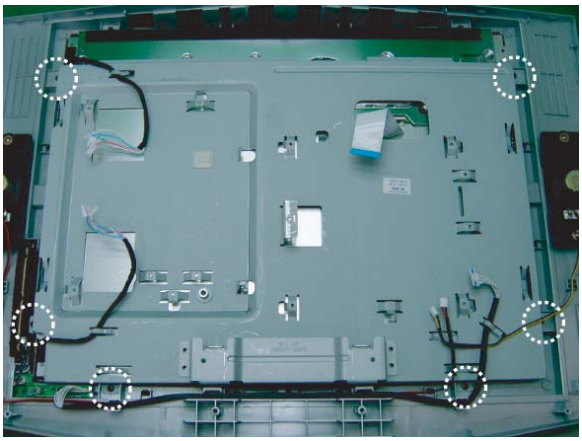


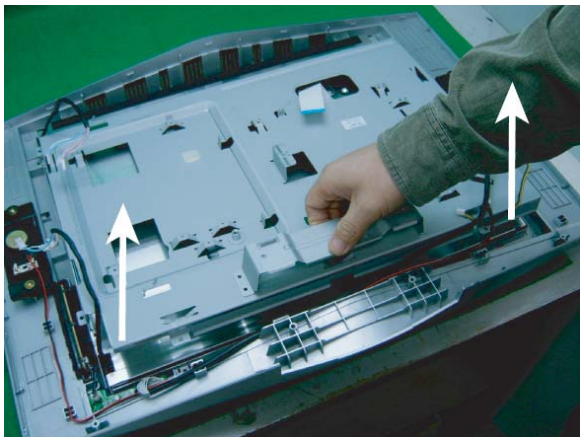


3. Remove 8 screws from the main board and disconnect cables.

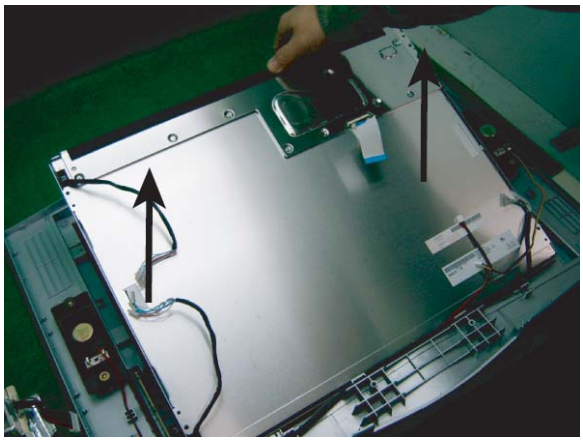


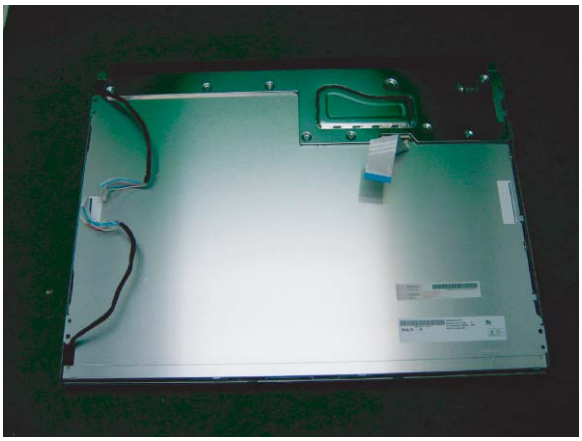
4. Lift up the power board and main board.





5. Remove 6 screws from the BRKT and lift up the BRKT.

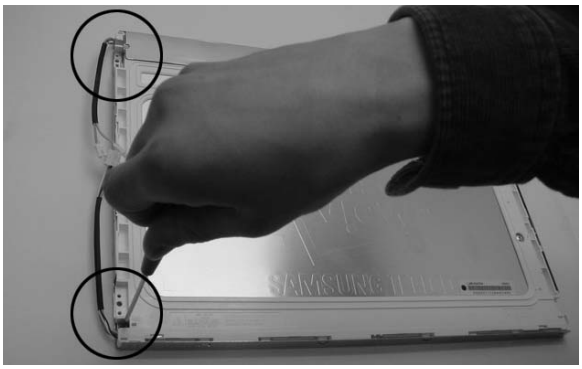




5. Lift up the panel.

3-2 Replacement Order of Lamp Assemblies

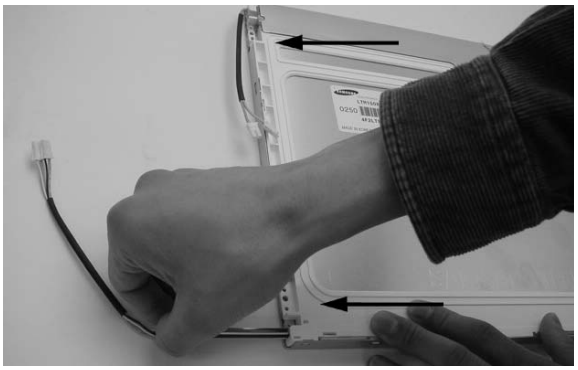
1. After confirm there is nothing on the desk, turn the LCD module over and put it on a flat desk set to the ground.



2. Remove 2 screws for the lamp unit.

3 Disassembly and Reassembly

← Slide the lamp unit out.



← Slide the lamp unit out.

3. Slide the lamp unit out. Please take out the lamp unit from the LCD module.

4. Please fix the new lamp units on the LCD module : opposite process 2 and 3.

3-3 Reassembly

Reassembly procedures are in the reverse order of disassembly procedures.

3-4

4 Alignments and Adjustments

4-1 General Alignment Instuction

1. Usually, a color LCD TV needs only slight touch-up adjustment upon installation.
   Check the basic characteristics such as height, horizontal and vertical sync.
2. Use the specified test equipment or its equivalent.
3. Correct impedance matching is essential.
4. Avoid overload. Excessive signal from a sweep generator might overload the front-end of the TV.
   When inserting signal markers, do not allow the marker generator to distort test result.
5. Connect the TV only to an DC power source with voltage and frequency as specified on
   the backcover nameplate.
6. Do not attempt to connect or disconnect any wire while the TV is turned on.
   Make sure that the power cord is disconnected before replacing any parts.
7. To protect aganist shock hazard, use an isolation transform.

4-2 Factory Mode Adjustments

4-2-1 Entering Factory Mode

1. To enter “Service Mode” Press the remote -control keys in this sequence :
   - If you do not have Factory remote - control

POWER OFF → INFO → MENU → MUTE → POWER ON

   - If you have Factory remote - control

POWER ON → INFO → FACTORY

4-2-2 Factory Mode Tree

1. Calibration	
2. Option	18 7B 0000
3. W/B	
4. ADC	
5. VCTi	1000
6. ACC/ACM	
7. Test Pattern	0
8. Bus Stop	off
9. Check Sum	0000
10. Reset	
T-VNC25PEA-0009 2004/08/31	

1. Calibration →

VCTi
Component
PC

2. Option →

1. VideoMute	8
2. AutoPower	On
3. Pannel	XGA
4. Inch	20
5. AntennaOsd	Off
6. HighDeviation	Off
7. AutoFM	On
8. Acc/Acm	1
9. GammaLUT	0
10. ESM	On
11. TTX	W.Europe
12. TTX List/Flof	Flof
13. SYSTEM	CS
14. HotelMode	Off

3. W/B(1) →

R level	128
G level	128
B level	128
R gain	128
G gain	128
B gain	128
g Sub Color	0
g Sub Tint	50
Recall	

3. W/B(2) →

Adjustment item		RF [Initial Data]	RF [Adjust Data]	Remark
Red level	ADJ[0~255]	128	128	Blue level 113 FIX
Green level	ADJ[0~255]	128	128	
Blue level	FIX[0~255]	118	113	
Red Gain	FIX[0~255]	140	140	Red Gain 140 FIX
Green Gain	ADJ[0~255]	128	135	
Blue Gain	ADJ[0~255]	128	135	
gSUB Color	FIX[0~255]	0	0	
gSUB Tint	FIX[0~255]	50	50	
Factory Recall	*A/S : Micom Initial Data Write			

ITEM		Dynamic Normal		Remark
MODE		RF[ADJ]	PC	* W/B connot be adjusted in COMPONENT &PC * Only x,y axes can be adusted in High & Low Light
Signal Source		External input ABL Pattern [MSPG925LTH]	External input ABL Pattern [MSPG925LTH]	
W/B Process Adjustment SPEC	High	x=265±2, y=265±2	Cannot be adjustment	
	Low	x=265±2, y=265±2	Cannot be adjustment	
W/B SPEC	High	x=265±15, y=265±15 , Y=25.0↑ [FL]	x=250±30, y=260±30	
	Low	x=265±20, y=265±20, Y=0.2±0.8 [FL]	x=250±30, y=255±30	

4. ADC →

VCTi		Compenent		PC	
R offset	53	R offset	113	R offset	66
G offset	43	G offset	85	G offset	63
B offset	47	B offset	83	B offset	51
R gain 0	125	R gain 0	207	R gain 0	54
R gain 1	1	R gain 1	1	R gain 1	1
G gain 0	122	G gain 0	31	G gain 0	62
G gain 1	1	G gain 1	1	G gain 1	1
B gain 0	134	B gain 0	205	B gain 0	66
B gain 1	1	B gain 1	1	B gain 1	1

5. VCTi →

R Drive	255	RF AGC	5	CR P DATA	4
G Drive	255	Vpeaking	6	CRP	2
B Drive	255	CTI GAIN	3	CR AMP TH	64
Sub Contrast	44	CTI CORING	5	V CR CNT	5
Sub Bright	0	LMIXOFS	6	SLL THD V	5
Sub Sharp	10	PKCF	3	THR SEL	0
Sud color	7	AGCADJ1	32	SLL THD ETC	0
Sub Tint	48	LTI Gain	15	RF_dB-1	
Sub Coring	5			RF_dB-2	
				RF_dB-3	

6. ACC/ ACM →

Y Max D	3	Up Start	150
Y Scl Thr	80	Low Sn Thr	0
Y Scl A	4	Up Sn Thr	0
Y Scl B	5	Y Min	16
A Ctrl	1	Y Max	240
A Snslp	8	Ym Div Slp	128
T Dixel	12	Fr Age	1
Lower End	90	Fr App	1
Mid Start	60	Esm Ctrl	127
Mid End	170		

7. Test Pattern (Test Pattern of VCTi)

1) VCTi
2) Toshiba
3) Gray Bar
4) Gray
5) Green
6) Color Bar
7) Cross

8. Bus Stop

- Bus stop is used data communication.

9. Chcek Sum

- Display the current check sum size of the MICOM.

10. Reset

- Initializes the data in the MICOM.

11. T-VNC25PEA-0004 2004/06/22

- Display the MICOM program version.

4-2-3 White Balance

High	Low
263±5, 267±5	267±5, 263±5
x, y	x, y

4-2-4 Calibration

(1) RF, VIDEO, S-VIDEO: Factory Mode → Calibration → VCTi → Enter

(2) Compoent : adjust in 16 Gray Pattern of 480p.
Based on Master device (VIDEO SIGNAL GENERATOR MSPG-925F)
after adjusting to 16 Gray Pattern (Model : 212, Pattern : 17)
Factory Mode → Calibration → Component → Enter

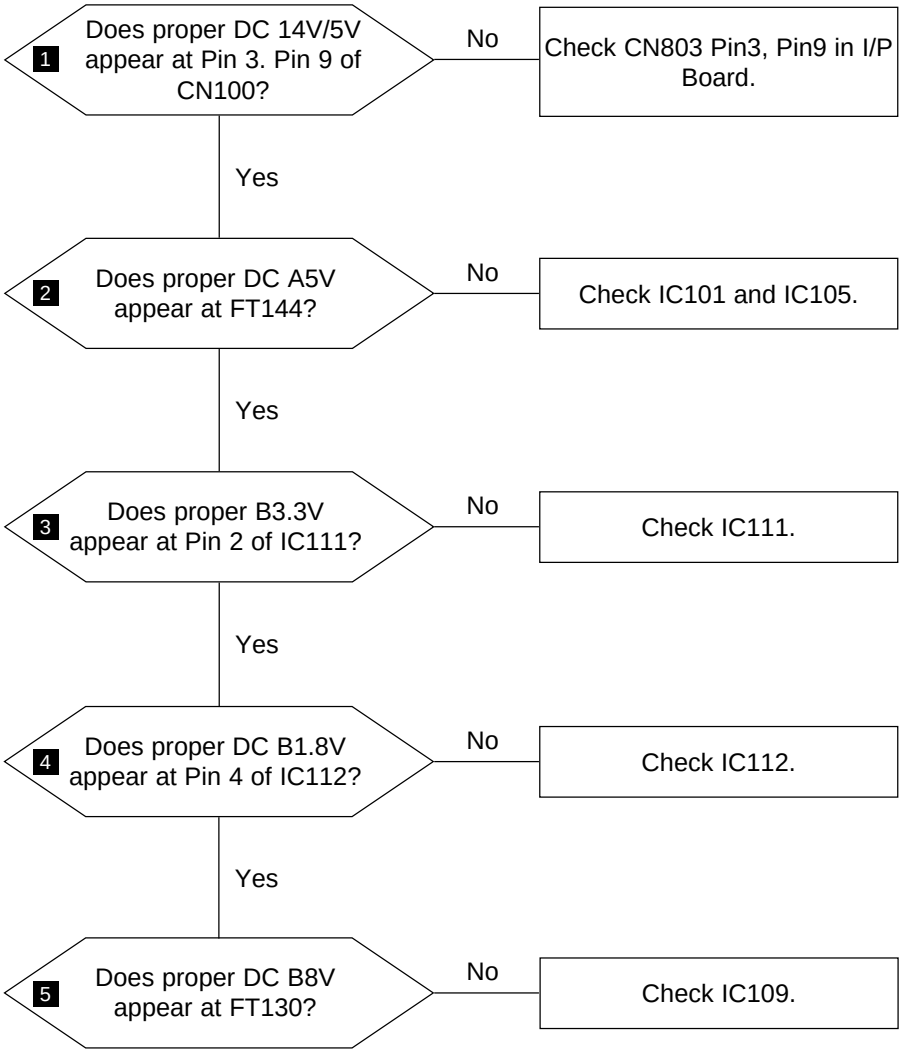
(3) PC : adjust in VGA MODE.
Based on Master device (VIDEO SIGNAL GENERATOR MSPG-925F)
execute Auto Adjustment in Cross Hatch (also called Combination) (Model : 10, Pattern : 25)
After adjusting 16 Gray Pattern (Model : 10, Pattern : 17)
Factory Mode → Calibration → PC → Enter

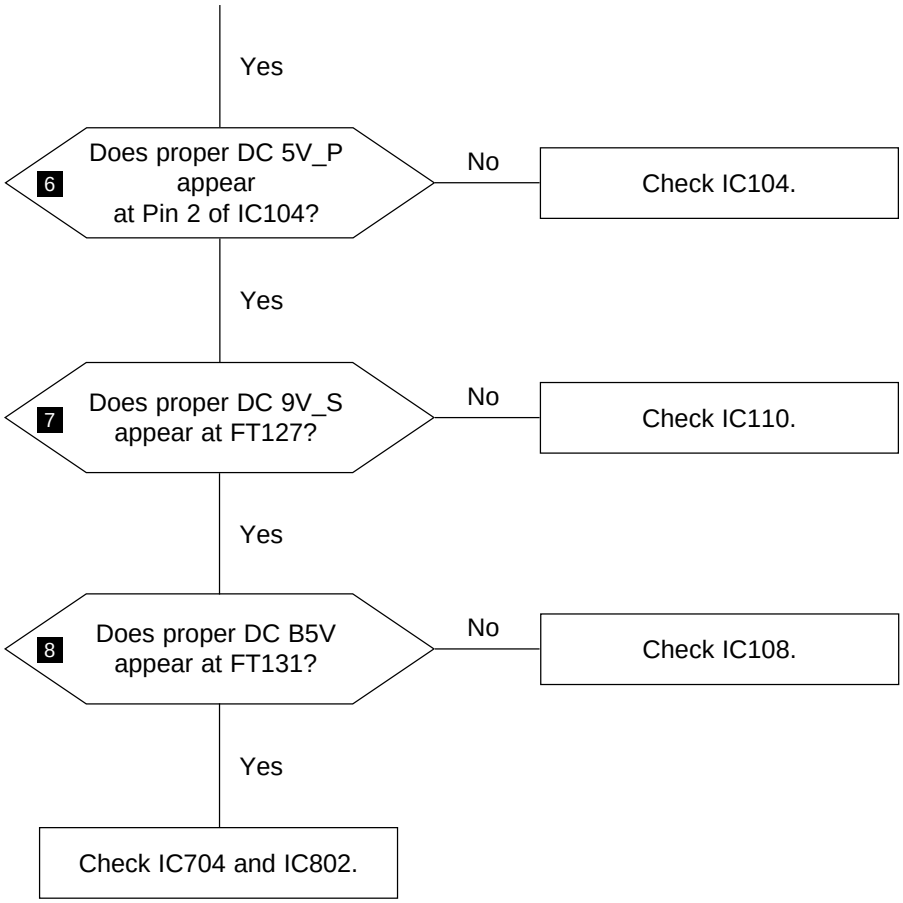
(4) check 4.ADC of Factory Mode. Adjustment can be done as below.
Value variation can be ±10~20.

VCTi			Component			PC		
Roffset	FIX[0~127]	46	Roffset	FIX[0~127]	64	Roffset	FIX[0~127]	50
Goffset	FIX[0~127]	66	Goffset	FIX[0~127]	86	Goffset	FIX[0~127]	54
Boffset	FIX[0~127]	68	Boffset	FIX[0~127]	64	Boffset	FIX[0~127]	44
Rgain0	FIX[0~255]	251	Rgain0	FIX[0~255]	215	Rgain0	FIX[0~255]	115
Rgain1	FIX[0 ~ 1]	0	Rgain1	FIX[0 ~ 1]	1	Rgain1	FIX[0 ~ 1]	1
Ggain0	FIX[0~255]	255	Ggain0	FIX[0~255]	247	Ggain0	FIX[0~255]	120
Ggain1	FIX[0 ~ 1]	0	Ggain1	FIX[0 ~ 1]	0	Ggain1	FIX[0 ~ 1]	1
Bgain0	FIX[0~255]	253	Bgain0	FIX[0~255]	215	Bgain0	FIX[0~255]	114
Bgain1	FIX[0 ~ 1]	0	Bgain1	FIX[0 ~ 1]	1	Bgain1	FIX[0 ~ 1]	1

5 Troubleshooting

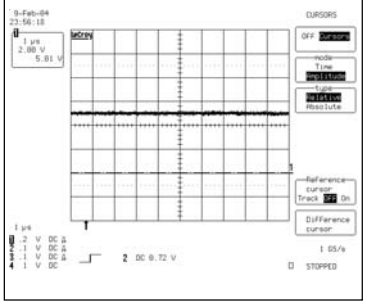
5-1 No Power




Yes
6
Does proper DC 5V_P appear at Pin 2 of IC104?
No
Check IC104.
Yes
7
Does proper DC 9V_S appear at FT127?
No
Check IC110.
Yes
8
Does proper DC B5V appear at FT131?
No
Check IC108.
Yes
Check IC704 and IC802.

WAVEFORMS

1



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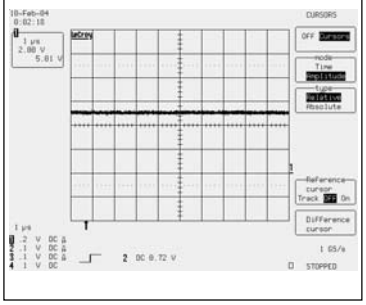

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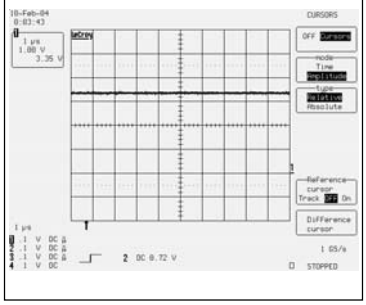

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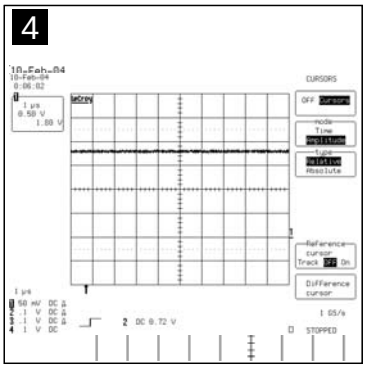

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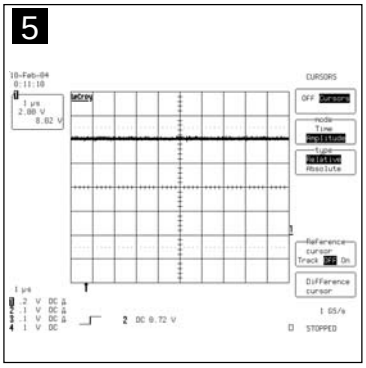

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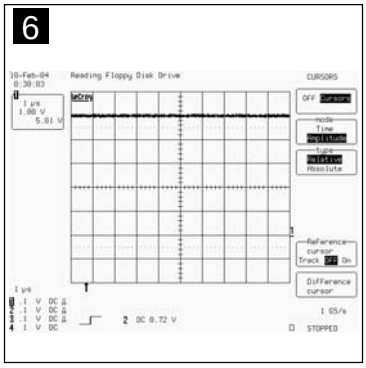

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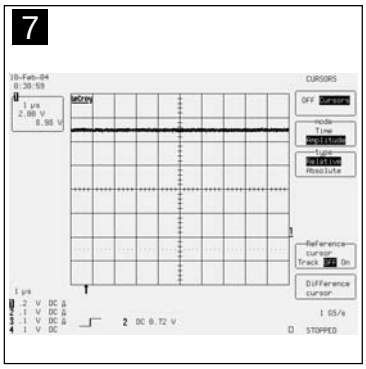
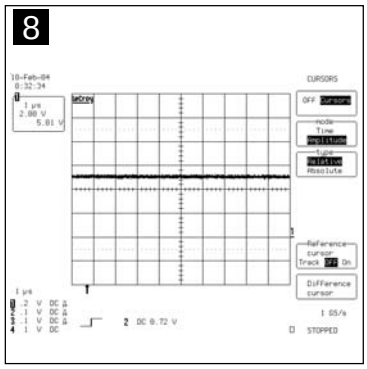
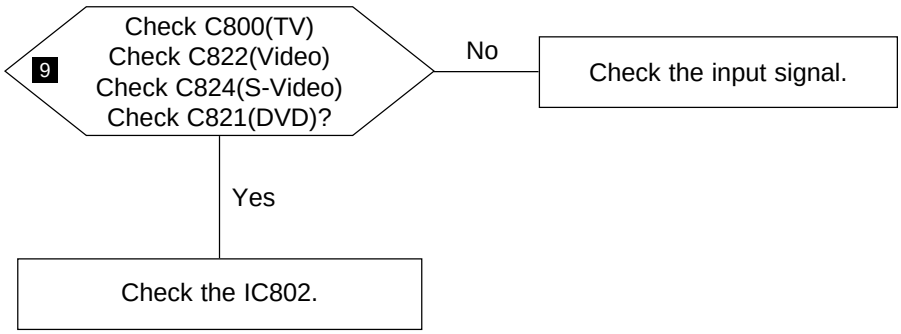


8



5-2 No Picture (TV, Video, S-Video, DVD)



WAVEFORMS

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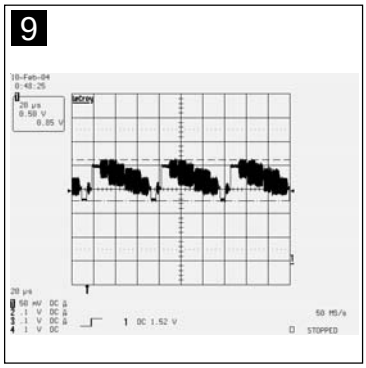
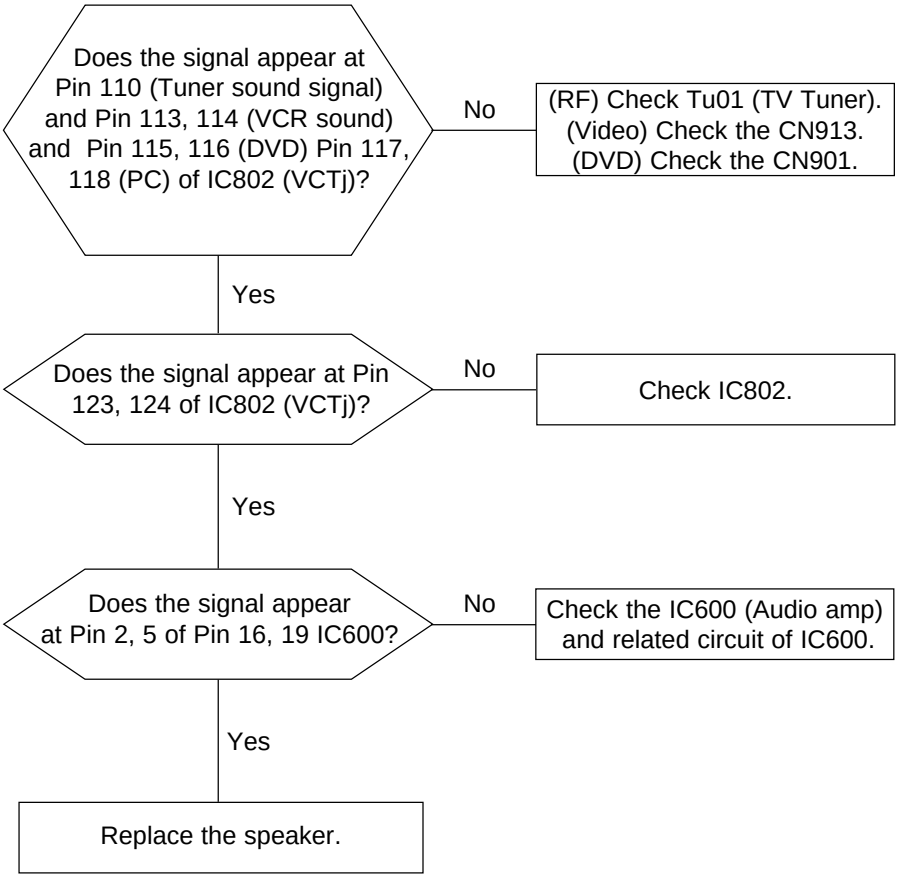


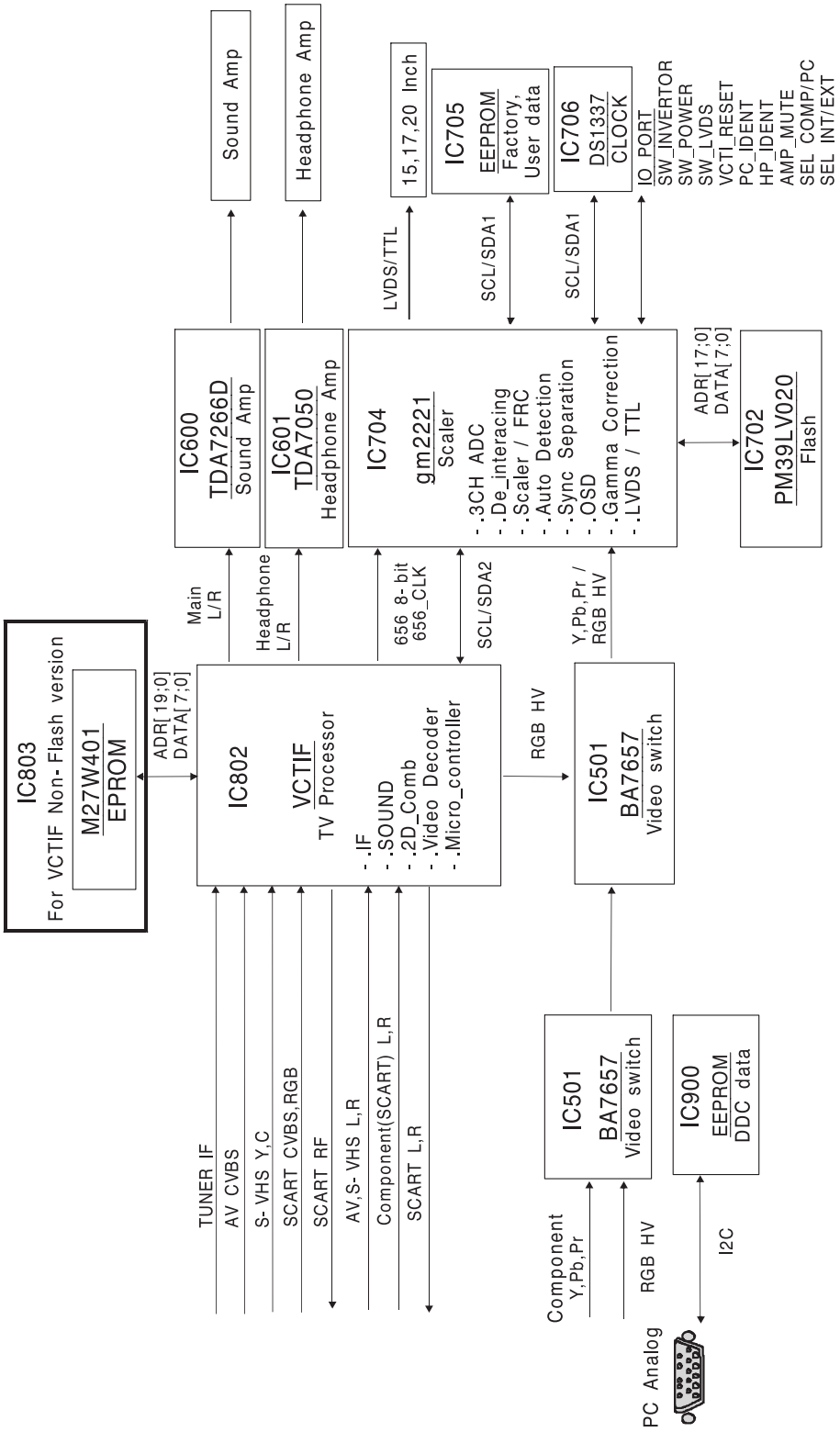
5-3 No Sound


Does the signal appear at Pin 110 (Tuner sound signal) and Pin 113, 114 (VCR sound) and Pin 115, 116 (DVD) Pin 117, 118 (PC) of IC802 (VCTj)?
No
(RF) Check Tu01 (TV Tuner).
(Video) Check the CN913.
(DVD) Check the CN901.
Yes
Does the signal appear at Pin 123, 124 of IC802 (VCTj)?
No
Check IC802.
Yes
Does the signal appear at Pin 2, 5 of Pin 16, 19 IC600?
No
Check the IC600 (Audio amp) and related circuit of IC600.
Yes
Replace the speaker.

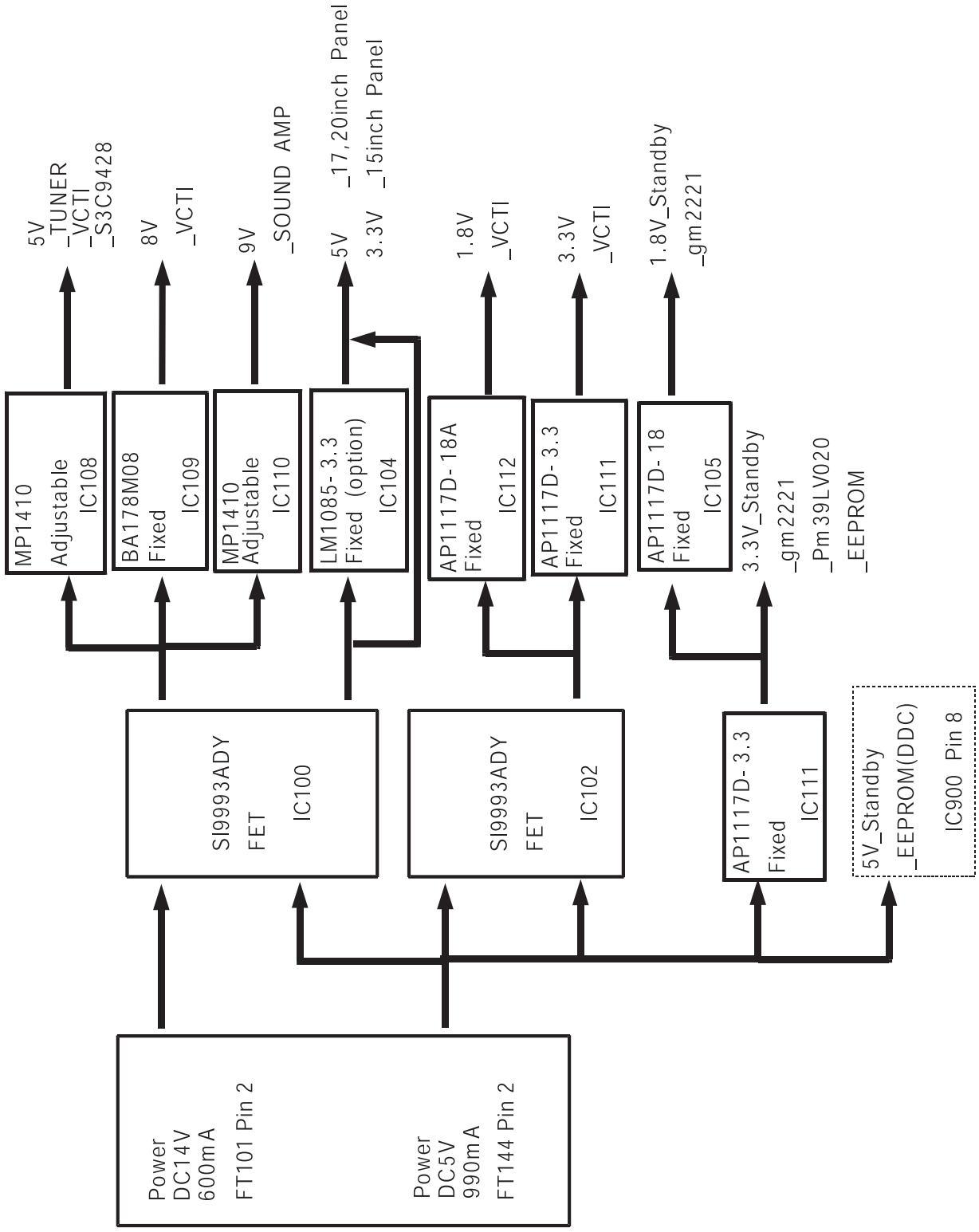
8 Block Diagram

- This Document can not be used without Samsung's authorization.

8-1 Signal Path Block Diagram

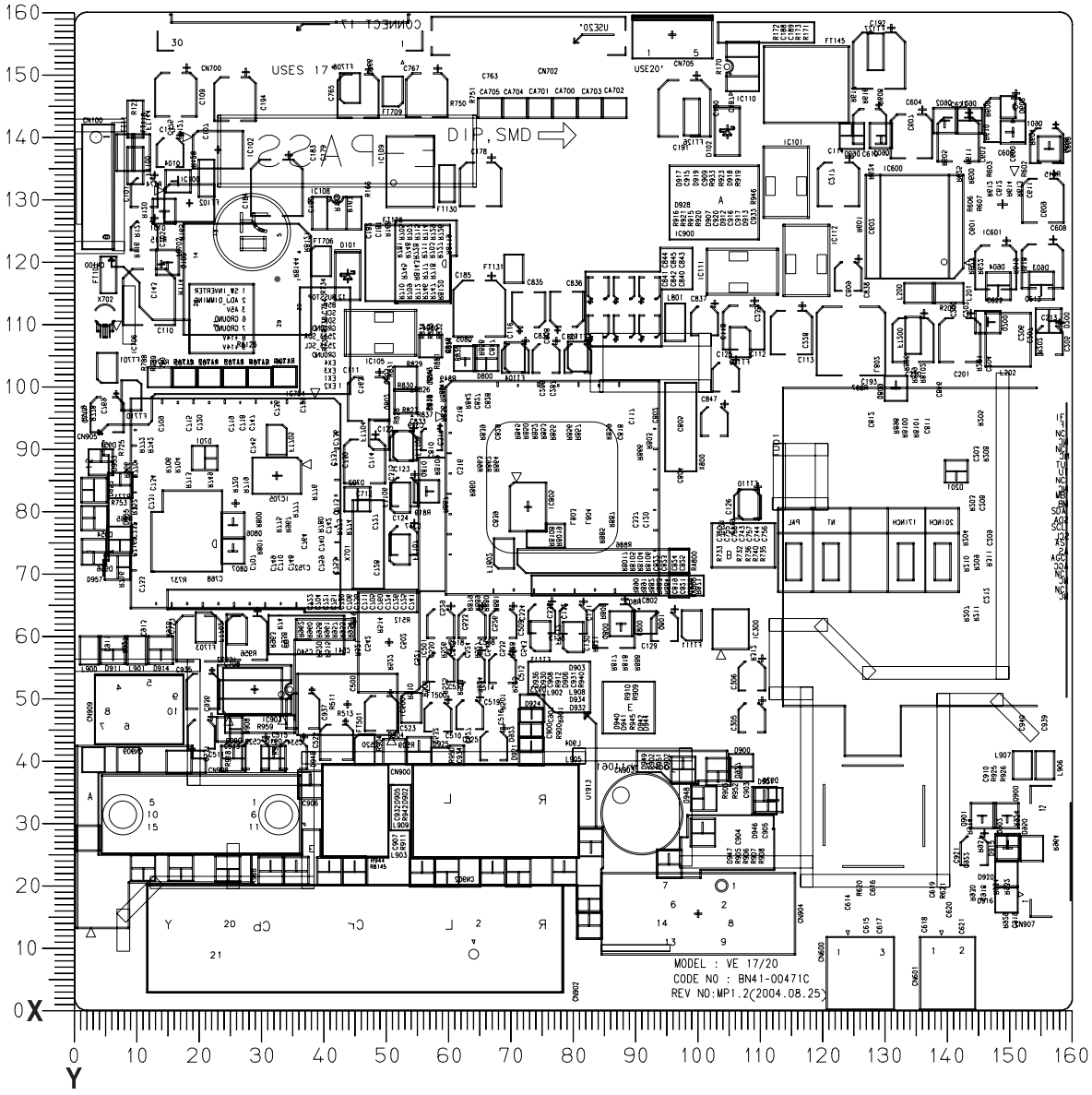


8-2 Input Power Block Diagram



10 PCB Layout

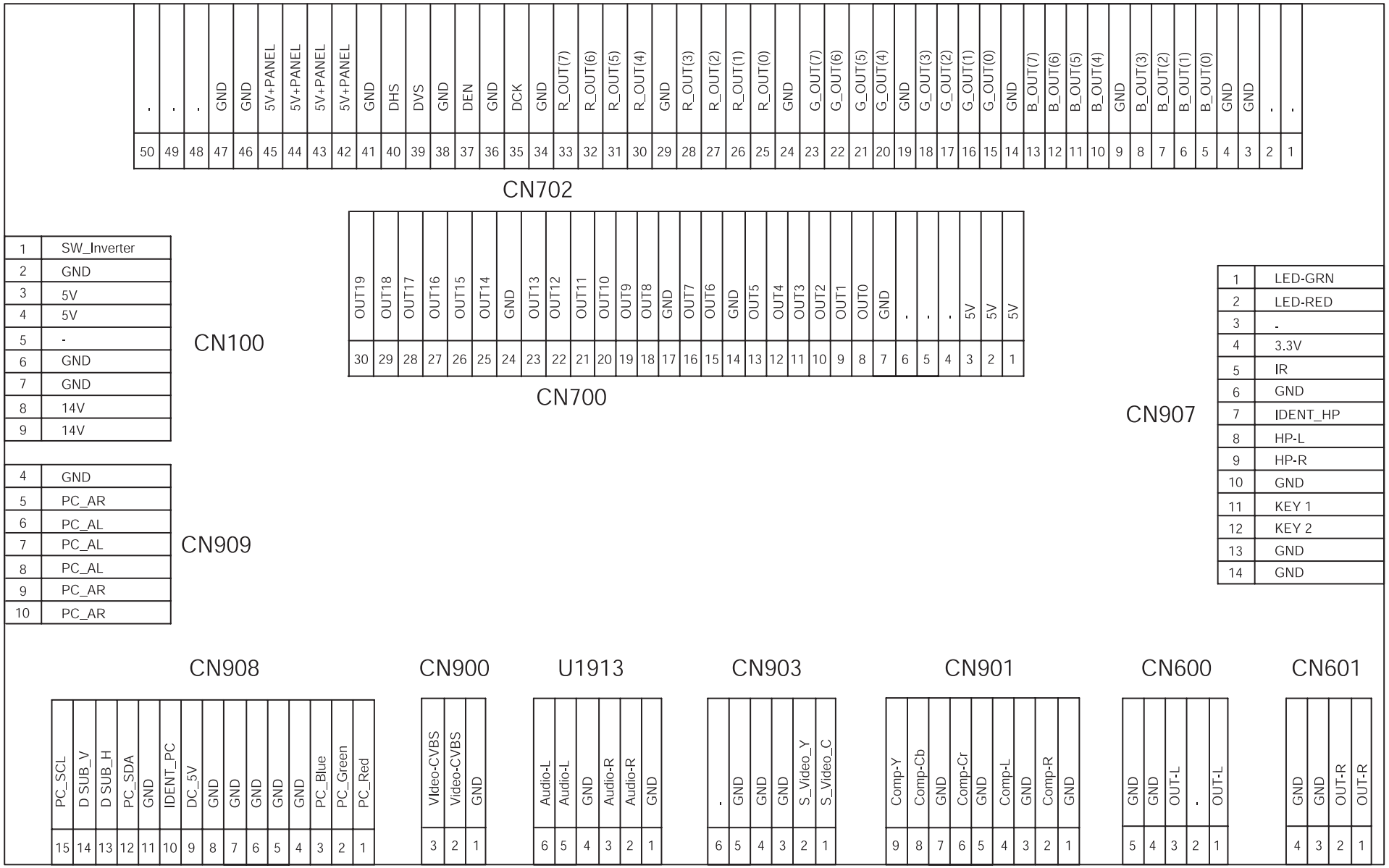
10-1 Main PCB Layout



	Loc. No.	Description		X
		DIODE		
D601		DIODE-ARRAY	143.6	142.7
D907		DIODE-ARRAY	11.0	22.8
D101		DIODE-RECTIFIER	43.8	117.7
D102		DIODE-RECTIFIER	104.7	140.8
D200		DIODE-SWITCHING	156.3	110.5
D600		DIODE-SWITCHING	124.7	140.2
D701		DIODE-SWITCHING	20.9	88.5
D702		DIODE-SWITCHING	45.4	81.9
D800		DIODE-SWITCHING	66.0	104.5
D908		DIODE-SWITCHING	24.9	45.1
D909		DIODE-SWITCHING	25.5	40.4
D910		DIODE-SWITCHING	31.9	40.4
D912		DIODE-SWITCHING	17.1	22.8
D913		DIODE-SWITCHING	24.6	22.7
D915		DIODE-SWITCHING	149.6	26.3
D948		DIODE-SWITCHING	100.8	33.9
D949		DIODE-SWITCHING	97.6	38.7
D951		DIODE-SWITCHING	4.2	87.9
D952		DIODE-SWITCHING	3.1	83.4
D953		DIODE-SWITCHING	7.3	84.2
D954		DIODE-SWITCHING	3.1	79.0
D955		DIODE-SWITCHING	7.3	75.4
D956		DIODE-SWITCHING	3.1	73.5
D957		DIODE-SWITCHING	6.9	71.1
D602		DIODE-ZENER	149.8	144.8
D904		DIODE-ZENER	51.3	41.5
D916		DIODE-ZENER	149.5	17.7
D917		DIODE-ZENER	3.0	40.2
D918		DIODE-ZENER	16.8	39.9
D919		DIODE-ZENER	8.6	40.2
D920		DIODE-ZENER	149.5	21.9
D928		DIODE-ZENER	2.2	27.6
D950		DIODE-ZENER	153.5	26.0
D201		DIODE-ZENER	141.4	86.4
D603		DIODE-ZENER	155.0	116.3
D604		DIODE-ZENER	148.1	116.2
D900		DIODE-ZENER	106.9	39.0
D901		DIODE-ZENER	110.6	33.5
D902		DIODE-ZENER	59.7	22.2
D903		DIODE-ZENER	82.8	27.0
D905		DIODE-ZENER	55.7	22.1
D906		DIODE-ZENER	78.5	22.2
D911		DIODE-ZENER	6.2	57.9
D914		DIODE-ZENER	13.9	57.9
D921		DIODE-ZENER	73.2	41.4
D922		DIODE-ZENER	73.2	43.7
D923		DIODE-ZENER	73.3	48.5
D924		DIODE-ZENER	73.2	46.2
D925		DIODE-ZENER	55.2	41.5
D926		DIODE-ZENER	111.2	33.7
D927		DIODE-ZENER	103.2	38.3
D930		DIODE-ZENER	71.2	22.2
D932		DIODE-ZENER	82.5	13.6
D934		DIODE-ZENER	82.5	17.9
D936		DIODE-ZENER	67.0	22.1
D940		DIODE-ZENER	31.4	22.3

	Loc. No.	Description		X
D941		DIODE-ZENER	35.5	22.3
D942		DIODE-ZENER	40.8	22.2
D945		DIODE-ZENER	37.7	36.1
D946		DIODE-ZENER	100.7	28.4
D947		DIODE-ZENER	95.3	23.4
D944		DIODE-ZENER	44.9	22.2
		IC		
IC600		IC-AUDIO AMP	134.7	125.6
IC601		IC-AUDIO AMP	148.8	129.2
IC902		IC-CMOS LOGIC	28.8	51.4
IC903		IC-CMOS LOGIC	28.6	51.2
IC108		IC-DC/DC CONVERTER	42.1	127.8
IC110		IC-DC/DC CONVERTER	107.2	151.3
IC900		IC-EEPROM	4.5	18.0
IC705		IC-EEPROM	32.4	85.7
IC805		IC-EEPROM	72.7	80.7
IC703		IC-FLASH MEMORY	0.0	0.0
IC704		IC-LCD CONTROLLER	25.8	81.3
IC109		IC-POSI.FIXED REG.	53.8	134.9
IC706		IC-REAL TIME CLOCK	4.8	104.4
IC500		IC-VIDEO SWITCH	43.8	49.1
IC501		IC-VIDEO SWITCH	50.4	59.0
IC300		IC-VOL. DETECTOR	105.2	60.6
IC105		IC-VOLTAGE REGULATOR	49.1	108.6
IC112		IC-VOLTAGE REGULATOR	117.4	120.2
IC101		IC-VOLTAGE REGULATOR	114.1	132.7
IC111		IC-VOLTAGE REGULATOR	107.0	118.4
		TRANSISTOR		
Q200		TR-SMALL SIGNAL	146.5	110.4
Q600		TR-SMALL SIGNAL	156.3	138.1
Q601		TR-SMALL SIGNAL	150.5	140.8
Q602		TR-SMALL SIGNAL	139.5	142.7
Q603		TR-SMALL SIGNAL	129.3	140.2
Q800		TR-SMALL SIGNAL	87.6	62.0
Q902		TR-SMALL SIGNAL	149.7	26.0
Q100		TR-SMALL SIGNAL	14.9	119.9
Q101		TR-SMALL SIGNAL	14.4	128.1
Q104		TR-SMALL SIGNAL	16.6	132.9
Q805		TR-SMALL SIGNAL	62.6	104.5
Q810		TR-SMALL SIGNAL	56.4	83.2
Q900		TR-SMALL SIGNAL	149.6	31.2
Q901		TR-SMALL SIGNAL	145.6	31.2
Q801		TR-SMALL SIGNAL	91.5	62.2
Q802		TR-SMALL SIGNAL	53.1	97.5
Q803		TR-SMALL SIGNAL	53.1	101.4
Q804		TR-SMALL SIGNAL	57.1	106.5
Q809		TR-SMALL SIGNAL	131.7	99.7

9 Wiring Diagram



11 Schematic Diagrams

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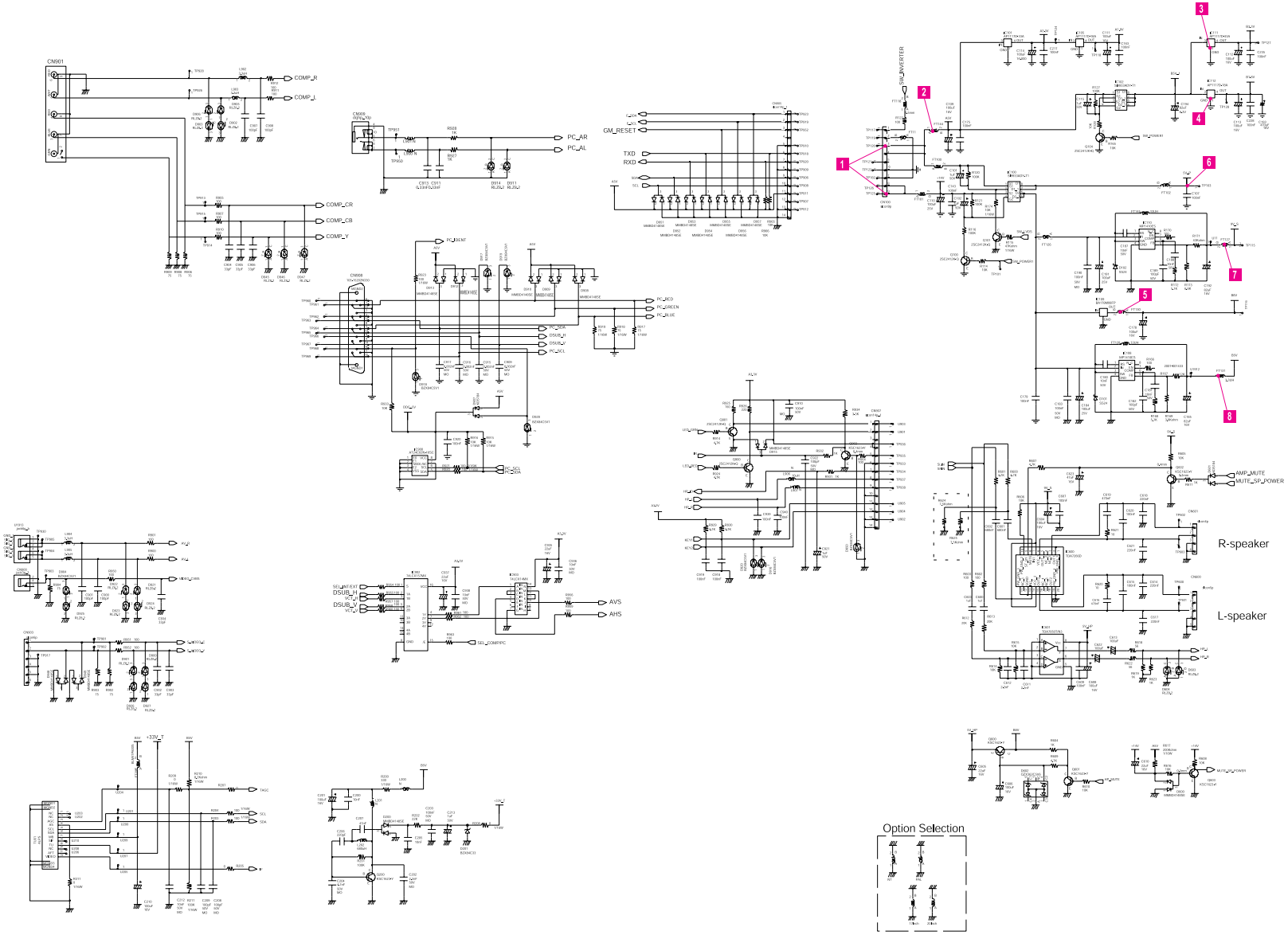
11-1 Input Power Sound Schematic Diagram



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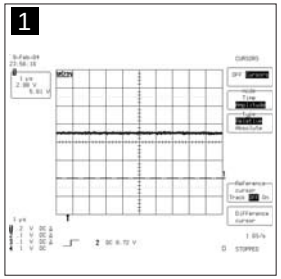

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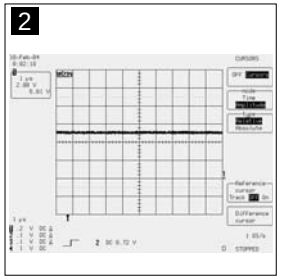

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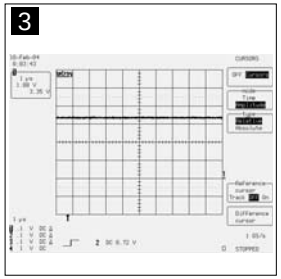

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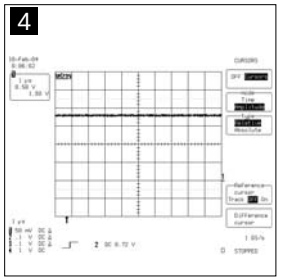

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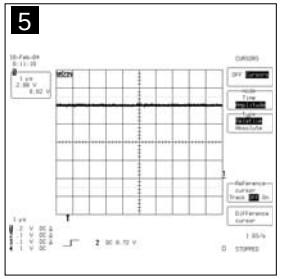

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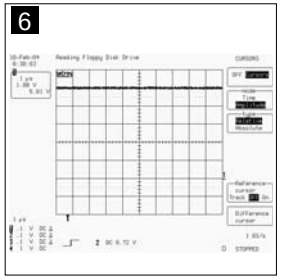

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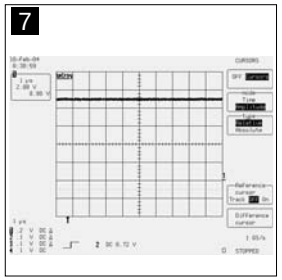

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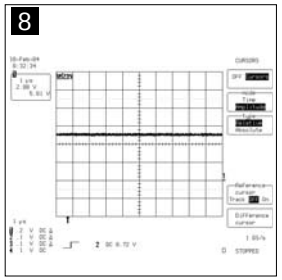
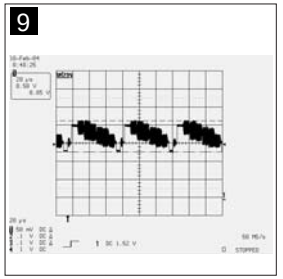


11 Schematic Diagrams

9



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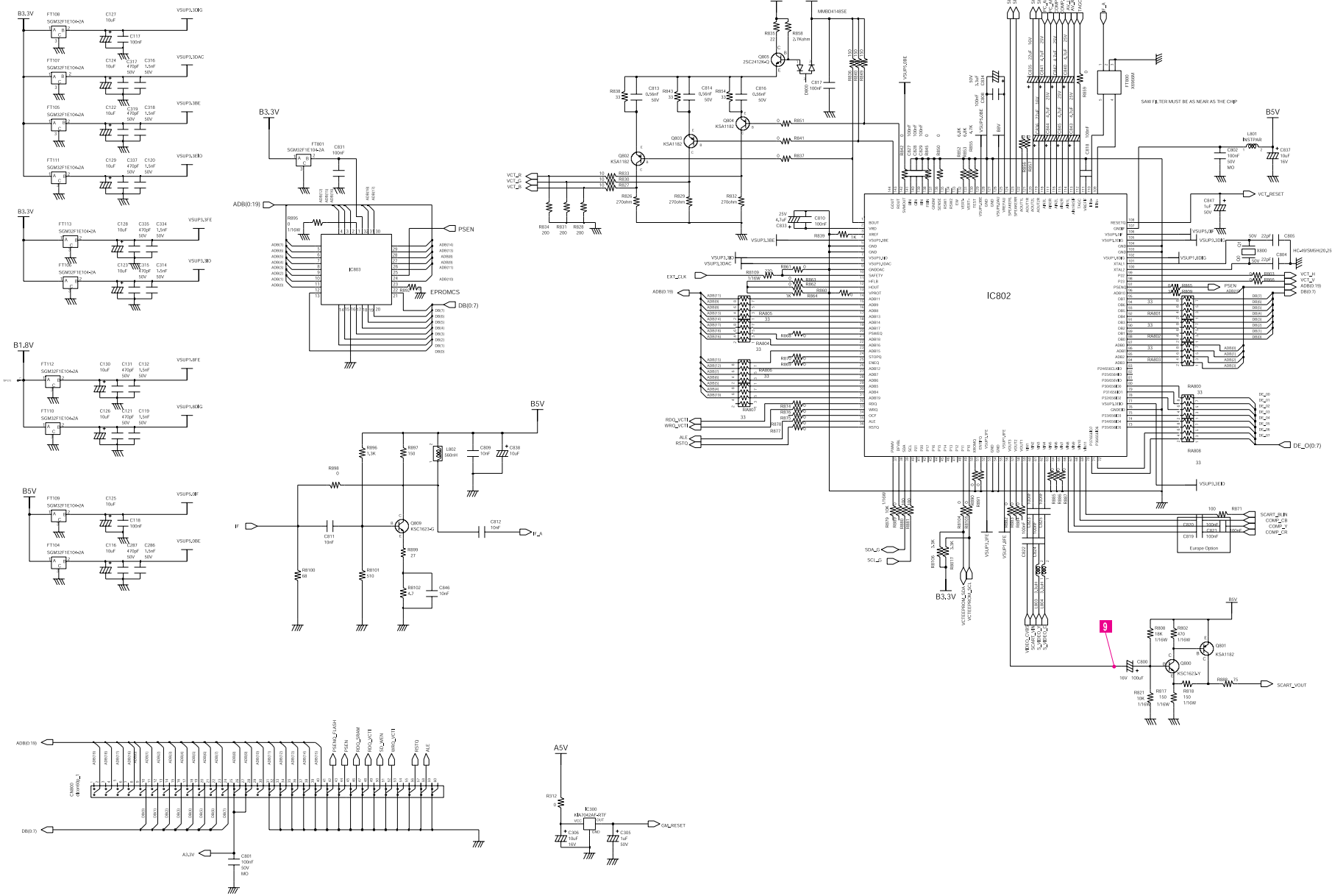
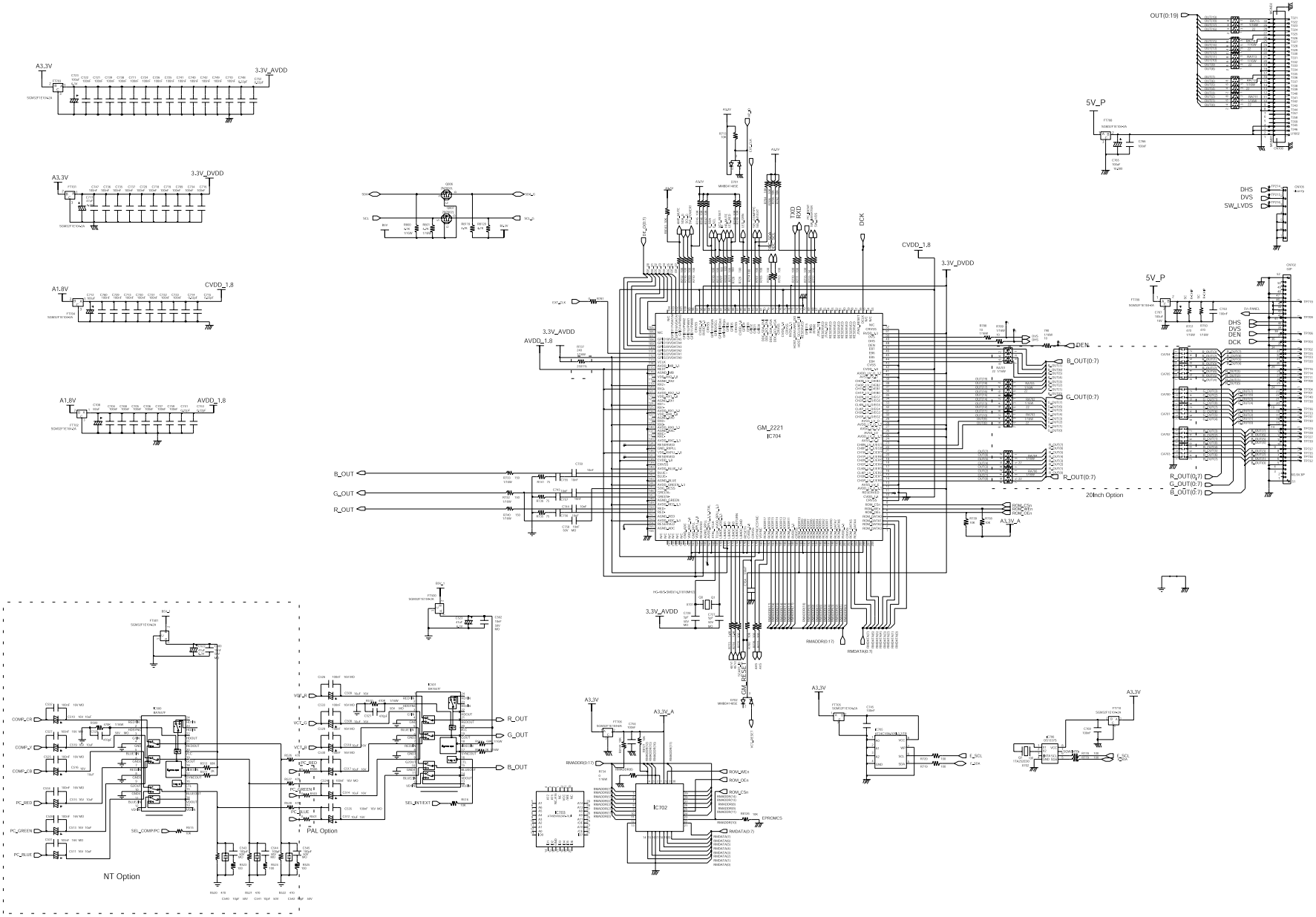
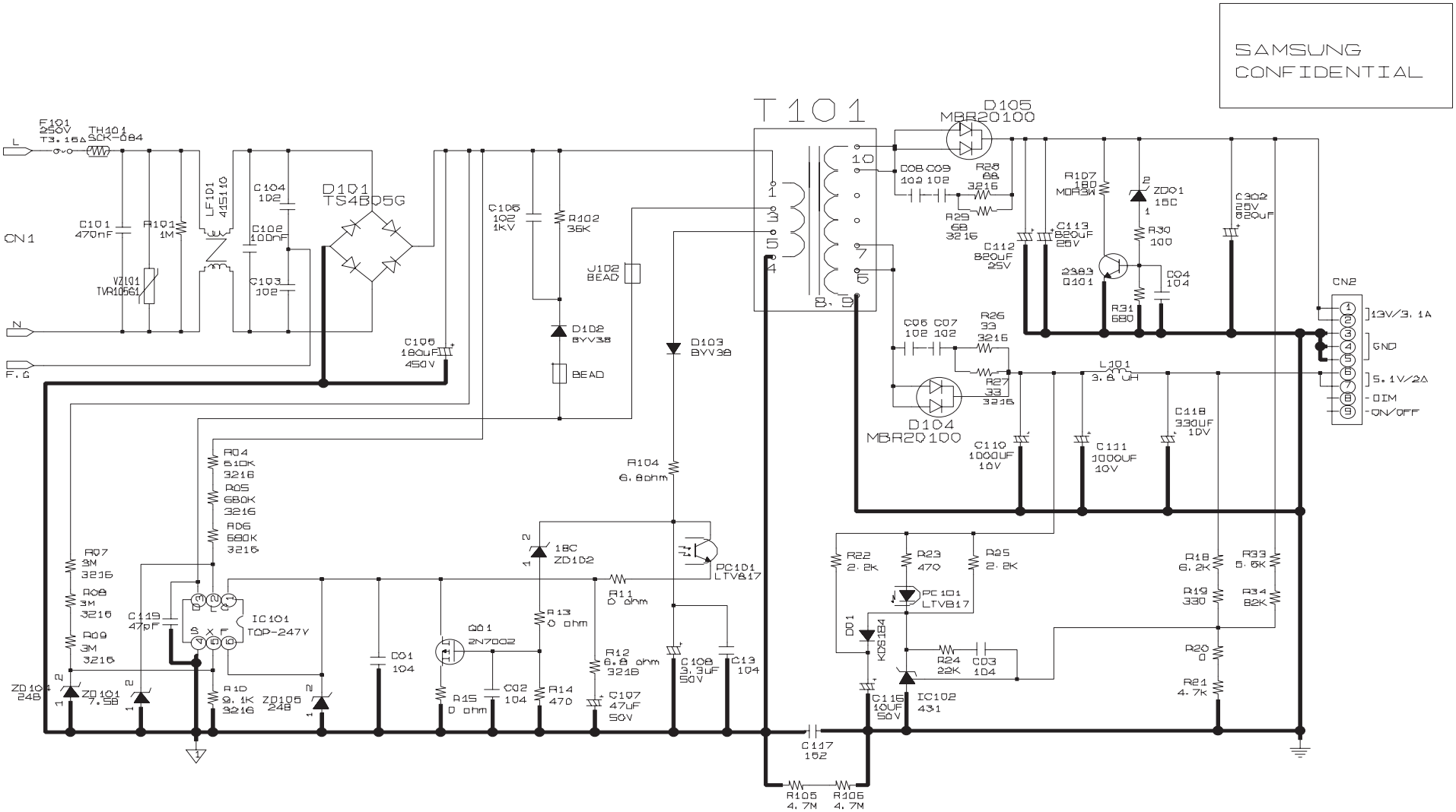
11-2 Video Decoder Schematic Diagram



11-3 Output Scaler, LVDS Schematic Diagram



11-4 IP Board_1 Schematic Diagram



11-7 IP Board_2 Schematic Diagram