LITEON

Service Manual

17-inch LCD Monitor
U170ATA

Table of Contents

1. Audio circuit (Circuit diagrams Main PWB 1/1 JACK PWB 1/1)

1.1 Audio input

The audio signal input received from the audio input terminal (JK011) is applied to the pre-amplifier I006 of 2 (L-CH) and 29 (R-CH) through the low-pass filter consisting of R047, R049, R048, R050, C062 and C063. In this pre-amplifier, controls of Volume, Balance, Bass, and Treble are conducted. The audio signal controlled at the pre-amplifier is entered in and amplified at the AMP I007 of 9 (L-CH) and 1 (R-CH). Since then, the signal is to the output jack.

1.2 Audio output

The audio signal is output from the output terminal (P012) of the jack to the speaker system.

2. Power supply (Circuit daigrams MAIN PWB 8/10, 9/10, 10/10)

1. I322:DC-DC converter

   A 5V power supply for LCD module, CPU, and logic is generated from the 19V source.

2. I323:3-terminal regulator

   A 3.3V power supply for Scaler IC I315, LVDS IC I319, I320 is generated from the 5V source.

3. I330:3-terminal regulator

   A 3.3V power supply for SDRAM IC I316, I317, I318 is generated from the 5V source.

4. I324:3-terminal regulator

   A 2.5V power supply for Scaler IC I315 is generated from the 5V source.

Q307, I321 ON/OFF control for LCD Module

ON/OFF control is performed for power ON/OFF and also for the power saving sequence.

3. Video input circuit (Circuit diagram MAIN PWB 4/10)

The AC-coupled video signal is used to clamp the black level at 0V).

4. Definition converter LSI peripheral circuit (Circuit diagram MAIN PWB)

I315 gm5020 is the definition converter LSI.

The analog R, G, B signal input entered from the video input circuit is converted into the digital data of video signal through the incorporated A/D converter. Based on this conversion, this device performs interpolation during pixel extension. The source voltage for this device is 3.3V, 2.5V and the system clock frequency is 24MHz. The withstand voltage level for the input signal voltage if I315 is 3.3V and 5V.

5. System reset, LED control circuit (Circuit diagram MAIN PWB 3/10)

5.1 System reset

System reset is performed by detecting the rising and falling of the 5V source voltage at I301.

5.2 LED control circuit

Green / amber is lit with the control signal of the LED GREEN and LED AMBER signal pin 15, 12 from I306 (Circuit diagram MAIN PWB 2/8).

6. E^2PROM for PnP (Circuit diagram MAIN PWB 4/10)

7. E²PROM (Circuit diagram MAIN PWB 3/10)

Data transfer between I305 (AT24 C16) and CPU (Circuit diagram MAIN PWB 2/8 (I302) is effected through the IIC bus SCL (pin 15) and SDA (pin 16) of I302. The data to be transferred to each device are stored in I305.

- I315 control data.
- OSD related setting data.
- Other control data for service menu.

8. CPU circuit (Circuit diagram MAIN PWB 3/10)

I302 (87C51RD2) functions as the CPU.

The source voltage for the device is 5.0V and the system clock frequency is 24MHz.

8.1 Detection of POWER switch status

The CPU identifies the ON status of the two power supplies. The identification is made when the power supply is turned off. For example, if the power supply is turned off with the POWER switch, the POWER switch must be turned on when activating the power supply again. If the power supply is turned off by pulling out the power cord, then this power supply can be turned on by connecting the power cord, without pressing the POWER switch.

8.2 Display mode identification

8.2.1 Functions

(1) Display mode identification

- The display mode of input signal is identified based on Table 1.
- When the mode has been identified through the measurement of horizontal and vertical frequencies, the total number of lines is determined with a formula of " Horizontal frequency / Vertical frequency = Total number of lines. "Final identification can be made by examining the coincidence of the obtained figure with the number of lines for the mode identified from the frequency. The boundary number of lines in each mode is shown in Table 2.
- When the detected frequency if the sync signal has changed, the total number of lines should be counted even through it is rge identified frequency in the same mode.

(2) Power save mode.

This power save mode is assumed when the frequency of the horizontal / vertical signal is as specified below.

- Vertical frequency : 50 ~ 86 Hz
- Horizontal frequency : 24 ~ 92 KHz
- VTOTAL : 1200 or more.

(3) Power save mode.

The power save mode is assumed when the horizontal / vertical signals are as specified below.

- If there is no horizontal sync signal input.
- If there is no vertical sync signal input.
- If the horizontal sync signal is outside the measuring range of gm5020.
- If the vertical sync signal is outside the measuring range of gm5020.

Table 1

Mode	Resolution	H-freq (KHz)	Band Width (MHz)	Polarity	
				H	V
1.	VGA 720 x 400 70Hz	31.47	28.322	-	+
2.	VGA 640 x 480 60Hz	31.47	25.175	-	-
3.	MAC 640 x 480 66Hz	35	32.24	-	-
4.	VESA 640 X 480 72Hz	37.86	31.5	-	-
5.	VESA 640 X 480 75Hz	37.5	31.5	-	-
6.	VESA 640 X 480 85Hz	43.27	36	-	-
7.	VESA 800 x 600 56Hz	35.16	36	+	+
8.	VESA 800 x 600 60Hz	37.88	40	+	+
9.	VESA 800 x 600 75Hz	46.88	49.5	+	+
10.	VESA 800 x 600 72Hz	48.08	50	+	+
11.	VESA 800 x 600 85Hz	53.67	56.25	+	+
12.	MAC 832 x 624 75Hz	49.72	57.283	-	-
13.	VESA 1024 x 768 60Hz	48.36	65	-	-
14.	VESA 1024 x 768 70Hz	56.48	75	-	-
15.	VESA 1024 x 768 75Hz	60.02	78.75	+	+
16.	VESA 1024 x 768 85Hz	68.68	94.5	+	+
17.	VESA 1280 x 1024 60Hz	64	108	+	+
18.	VESA 1280 x 1024 75Hz	80	135	+	+
19.	VESA 1280 x 1024 85Hz	91.1	157.5	+	+
20.	VESA 1152 x 864 75Hz	67.5	108	+	+
21.	VESA 1280 x 960 60Hz	60	108	+	+
22.	VESA 1280 x 960 85Hz	85.9	148.5	+	+

Table 2 the number of the lines, Vsync distinction

Indication resolution	The number of the distinction lines	Distinction Vsync	The fixed mode
640 x 480	487 < LINE ≤ 607	fV ≤ 63 Hz	2
		63 Hz < fV ≤ 68 Hz	3
		68 Hz < fV ≤ 74 Hz	4
		74 Hz < fV ≤ 78 Hz	5
		78 Hz ≤ fV	6
800 x 600	607 < LINE ≤ 777	fV ≤ 58 Hz	7
		58 Hz < fV ≤ 63 Hz	8
		63 Hz < fV ≤ 73 Hz	10
		73 Hz < fV ≤ 78 Hz	9
		78 Hz ≤ fV	11
832 x 624	640 ≤ LINE	-	12
1024 x 768	768 < LINE ≤ 870	fV ≤ 63 Hz	13
		68 Hz < fV ≤ 73 Hz	14
		73 Hz < fV ≤ 78 Hz	15
		78 Hz ≤ fV	16
1152 x 864	870 < LINE ≤ 1031		20
1280 x 960	960 < LINE ≤ 1027		21, 22
1280 x 1024	1027 < LINE		17, 18, 19

9.3 User Control

9.3.1 Related ports of I315 and pin of I302

Port	Pin No.	I/O	Signal name	Function	Remarks
GPI04	I315, M1	1	MENU	EXIT/ENTER switch input	ENTER/Withdraw from OSD
GPI05	I315, L1	1	DOWN	▼ switch input	(▼) key
GPI06	I315, G18	1	-	◀ switch input	(◀) key
GPI07	I315, G19	1	+	▶ switch input	(▶) key
GPI0	I302, 15	1	POWER	soft power switch input	(power) key

9.3.2 Functions

Control is effected for the push-switches to be used when the user changes the parameters, in order to modify the respective setting values. Whether the switch has been pressed is identified with the switch input level that is turned “L”.

Each switch input port is pulled up at outside of ASIC

Each parameter is stored in the EEPROM, the contents of which are updated as required.

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8.4 Control of definition converter LSI I315

8.4.1 Ports related to control

Pin No.	I/O	Signal name	Function
R3	I	IRQ	gmZan1 interrupt signal
P1	O	HCLK	gmZan1 serial clock
P3, P4, R1, R2	I/O	HDATA	gmZan1 serial data
P2	O	HFS	gmZan1 serial select

8.4.2 Functions

Major function of I315 are as follows:

(1) Expansion of the display screen.

(2) Timing control for various signal types.

(3) Power-supply sequence (LCD panel).

8.5 I^2C bus control

8.5.1 Related ports of I302

Port	Pin No.	I/O	Signal name	Function
P3.5	17	I	IICCLK	IIC bus clock
P3.4	16	I/O	IICDATA	IIC bus data

8.5.2 I^2C-controlled functions

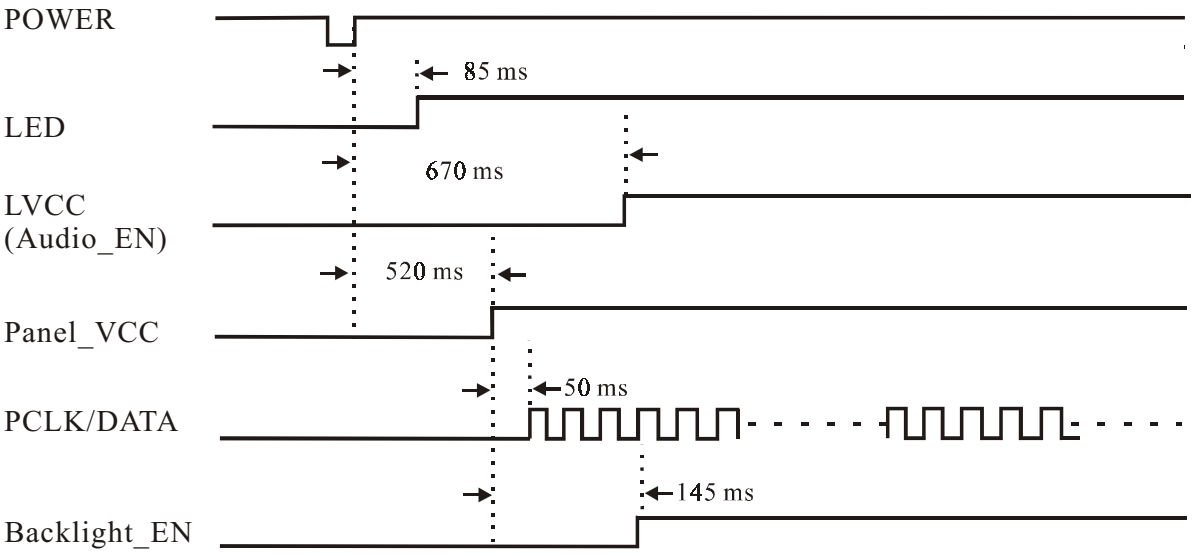
The following functional controls are effected by I^2C.

(1) Control of EEPROM I305f for parameter setting.

(2) Control of audio preamplifier.

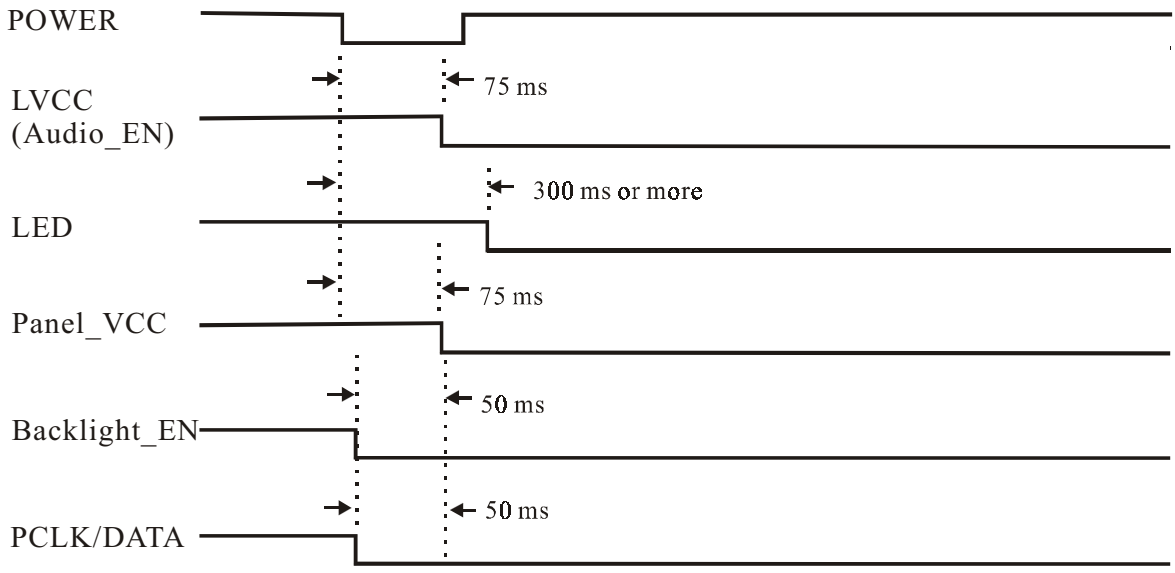
8.6 Power ON sequence

When the POWER switch is pressed, the POWER OFF signal is turned “H”. When this “H” potential is detected, the CPU begins to establish the respective power supplies according to the sequence shown below.



8.7 Power OFF sequence

When the POWER switch is pressed while the power supply is ON, the POWER ON signal is turned “H”. When this “H” potential is detected, the CPU begins to turn off the respective power supplies according to the sequence shown below.



8.8 List of CPU Pin Assignments

Port	Pin No.	Signal Name	Initial Setting	Function	Remark
~	1	NC	~	~	
P1.0	2	HDATA0	~	gm5020 4bit interface data	
P1.1	3	HDATA1	~	gm5020 4bit interface data	
P1.2	4	HDATA2	~	gm5020 4bit interface data	
P1.3	5	HDATA3	~	gm5020 4bit interface data	
P1.4	6	HCLK	~	gm5020 4bit interface Clock	
P1.5	7	HFS	~	gm5020 data enable	
P1.6	8	Bank	~	~	
P1.9	9	PWM	~	Pulse width modulation	
~	10	RST	L	Reset CPU	Active H
P3.0	11	RXD	H	Receive data	
~	12	NC	~	~	
P3.1	13	TXD	H	Transmit data	
P3.2	14	IRQ	~	gm5020 interrupt signal	
P3.3	15	PWR_SW	~	ON/OFF monitor power	
P3.4	16	SDA	H	IIC Bus Data	
P3.5	17	SCL	~	IIC Bus Data	Active L
P3.6	18	P3.6	H	External Memory Write Enable	
P3.7	19	DDC_GND	L	Detect Dsub cable plug-in	
~	20	XTAL2	~	Crystal signal out	
~	21	XTAL	~	Crystal signal in	
~	22	GND	~	~	
~	23	NC	~	~	
P2.0	24	A8	~	High-order address byte	
P2.1	25	A9	~	High-order address byte	
P2.2	26	A10	~	High-order address byte	
P2.3	27	A11	~	High-order address byte	
P2.4	28	A12	~	High-order address byte	
P2.5	29	A13	~	High-order address byte	
P2.6	30	A14	~	High-order address byte	
P2.7	31	A15	~	High-order address byte	
~	32	PSEN#	H	Program store enable	
~	33	ALE	~	Address latch enable	
~	34	NC	~	~	
~	35	EA#	H	External Access Enable	
P0.7	36	D7(USB_ON)	H	USB HUB power Enable (option)	
P0.6	37	D6(MUTE)	H	Audio MUTE Enable	
P0.5	38	D5(LVCC)	L	Audio suspend Enable	
P0.4	39	D4(LEDGRN)	H	LED Green ON	
P0.3	40	D3(LEDAMBER)	L	LED AMBER ON	
P0.2	41	D2(BKLT_EN)	~	Inverter Back light Enable	
P0.1	42	D1(LVDS_ON)	H	LVDS IC Enable	
P0.0	43	D0(PANEL_EN)	H	Panel power Enable	
~	44	VCC	~	VCC	

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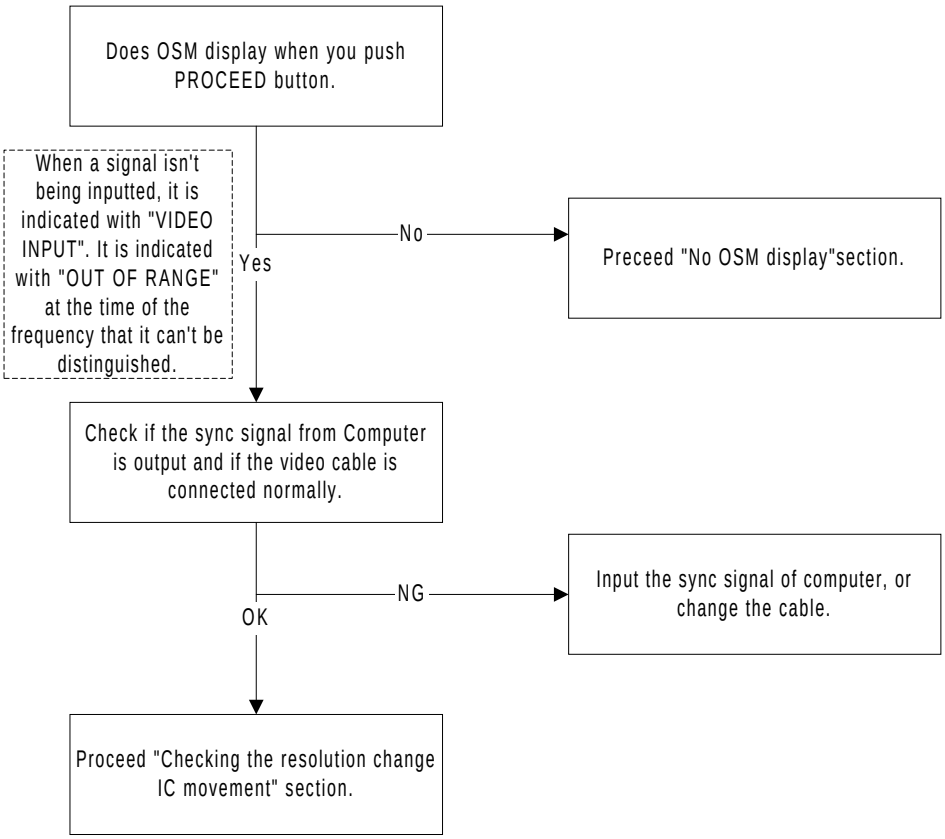
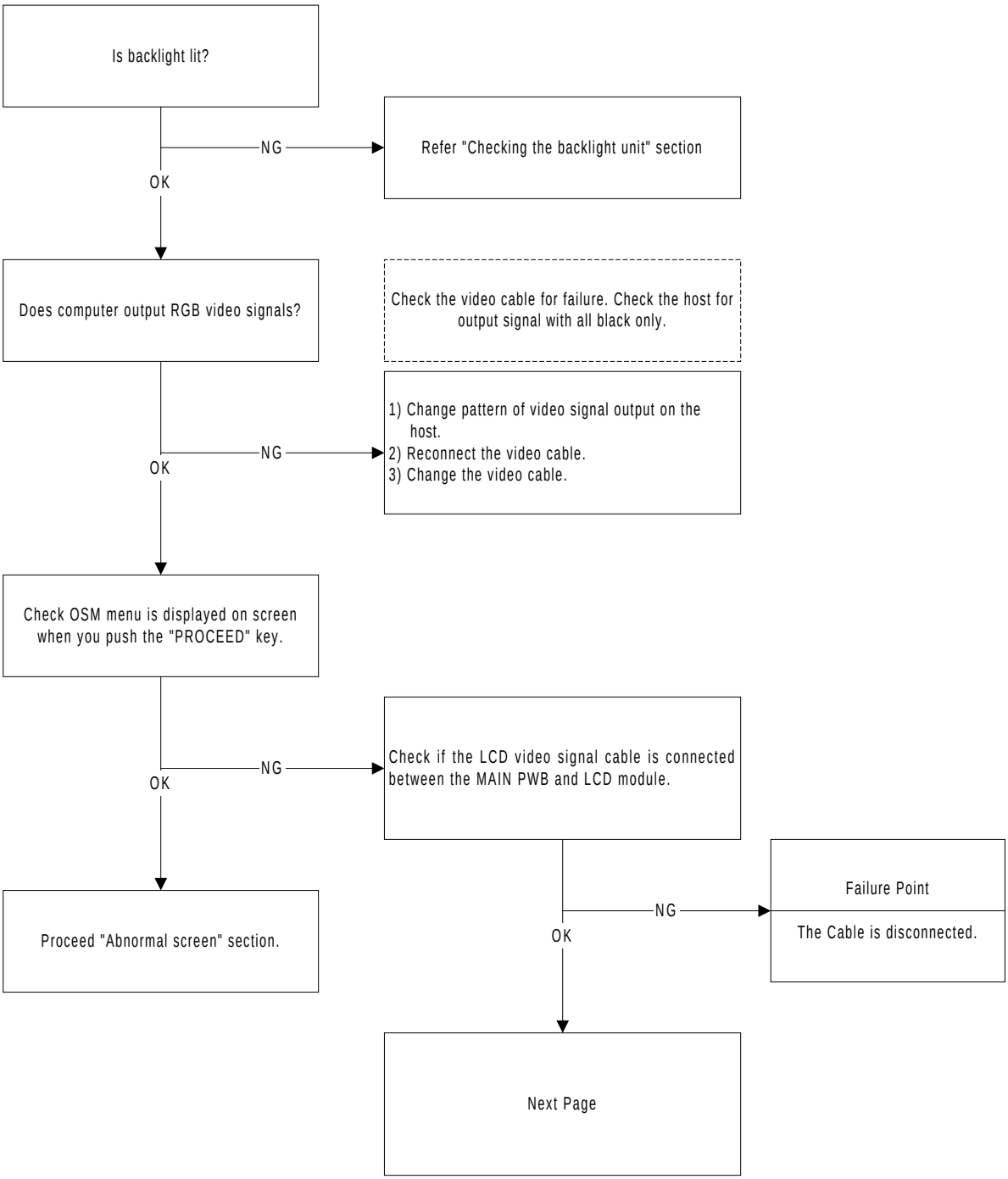
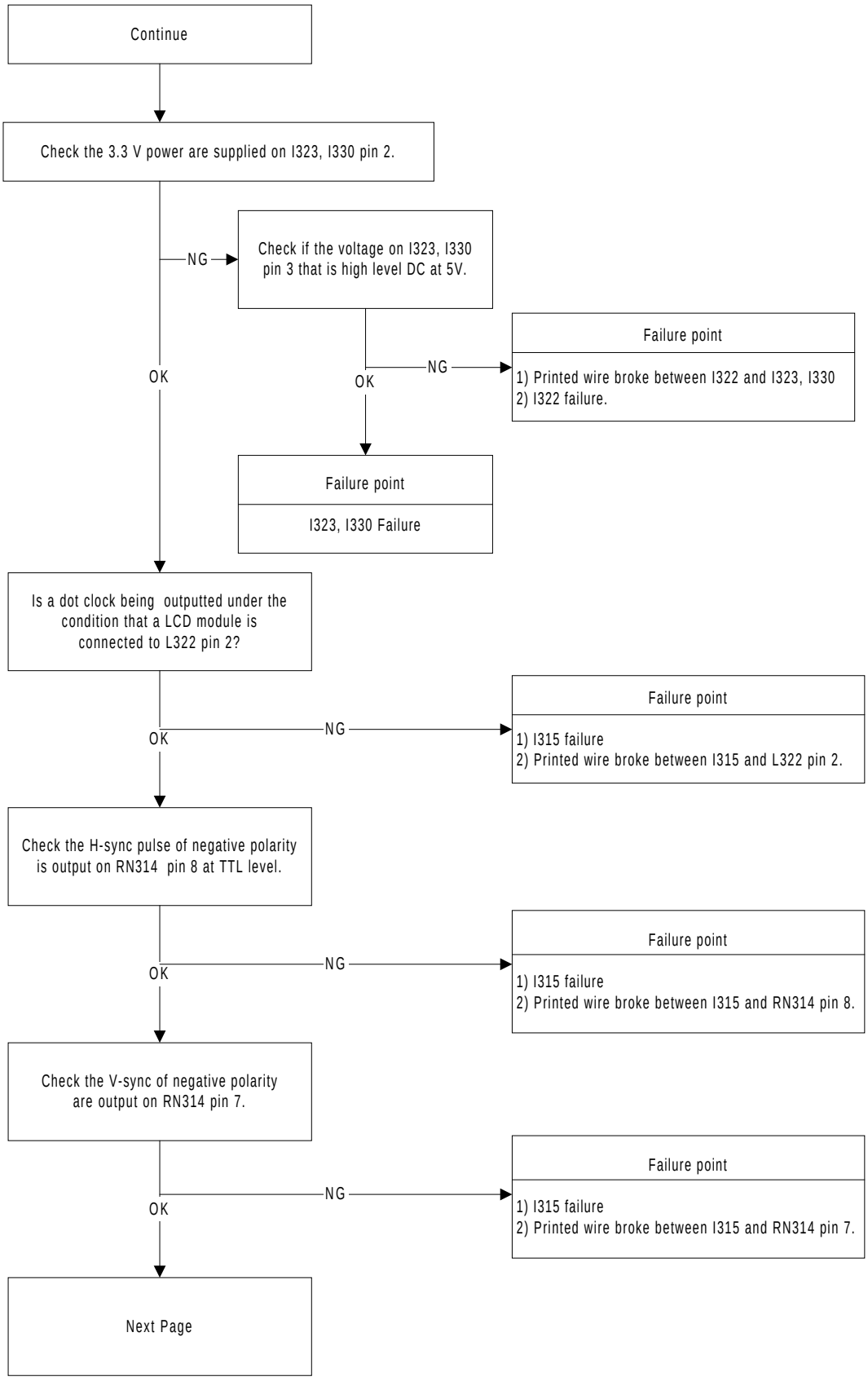
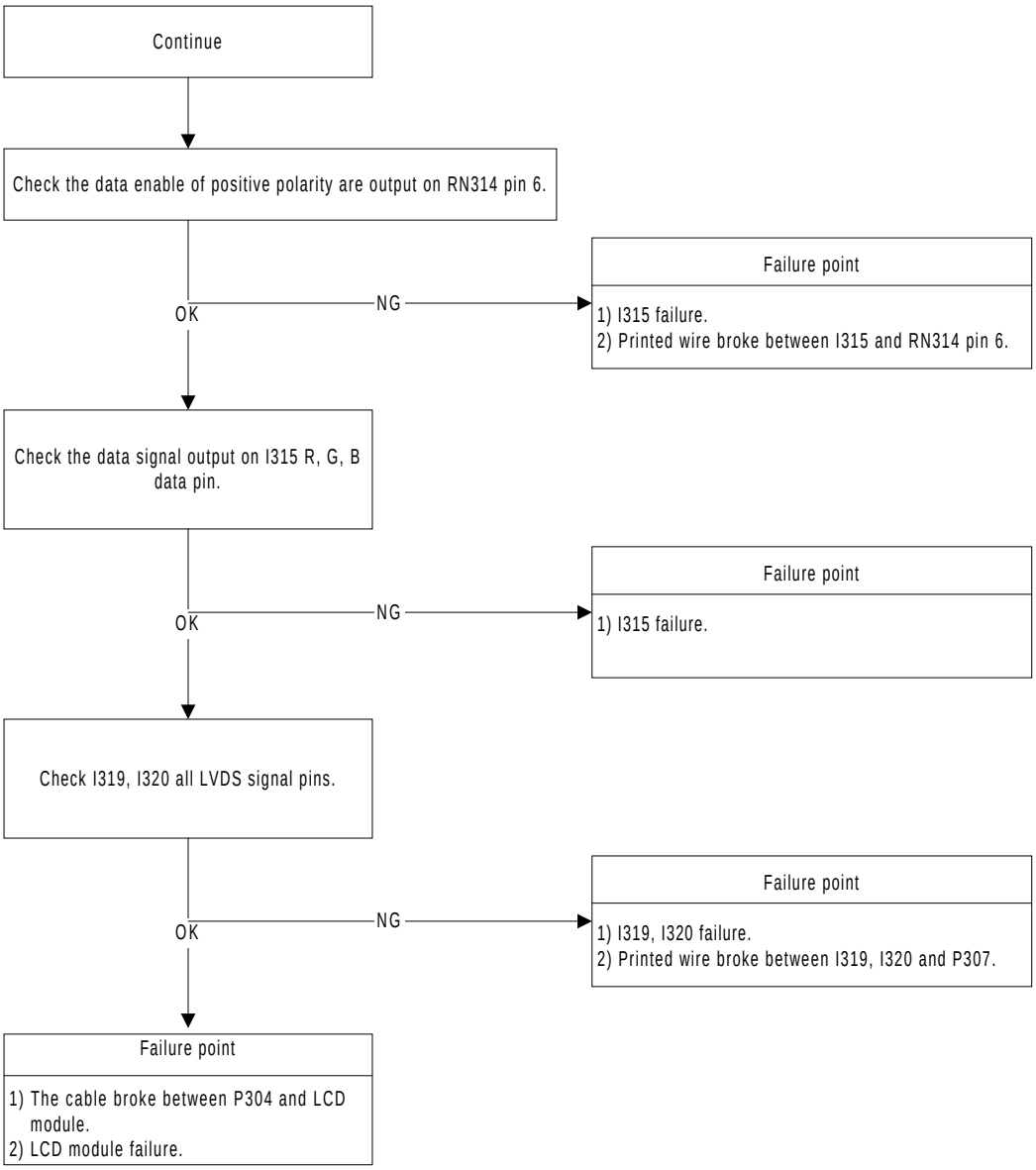
1. No display of screen (Screen is black, color of LED is amber)



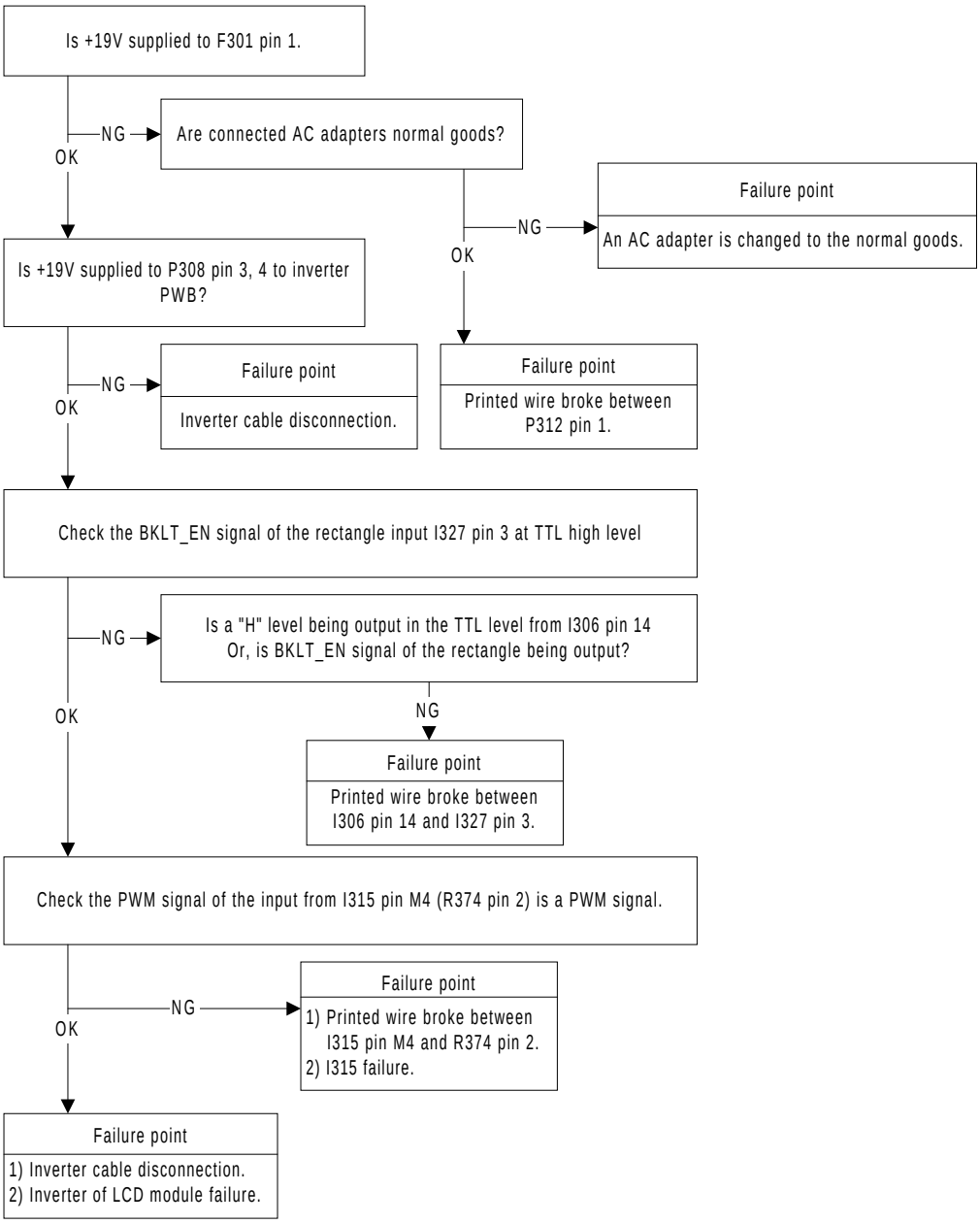
2. Nothing displays on screen (Screen is black, color of LED is green)



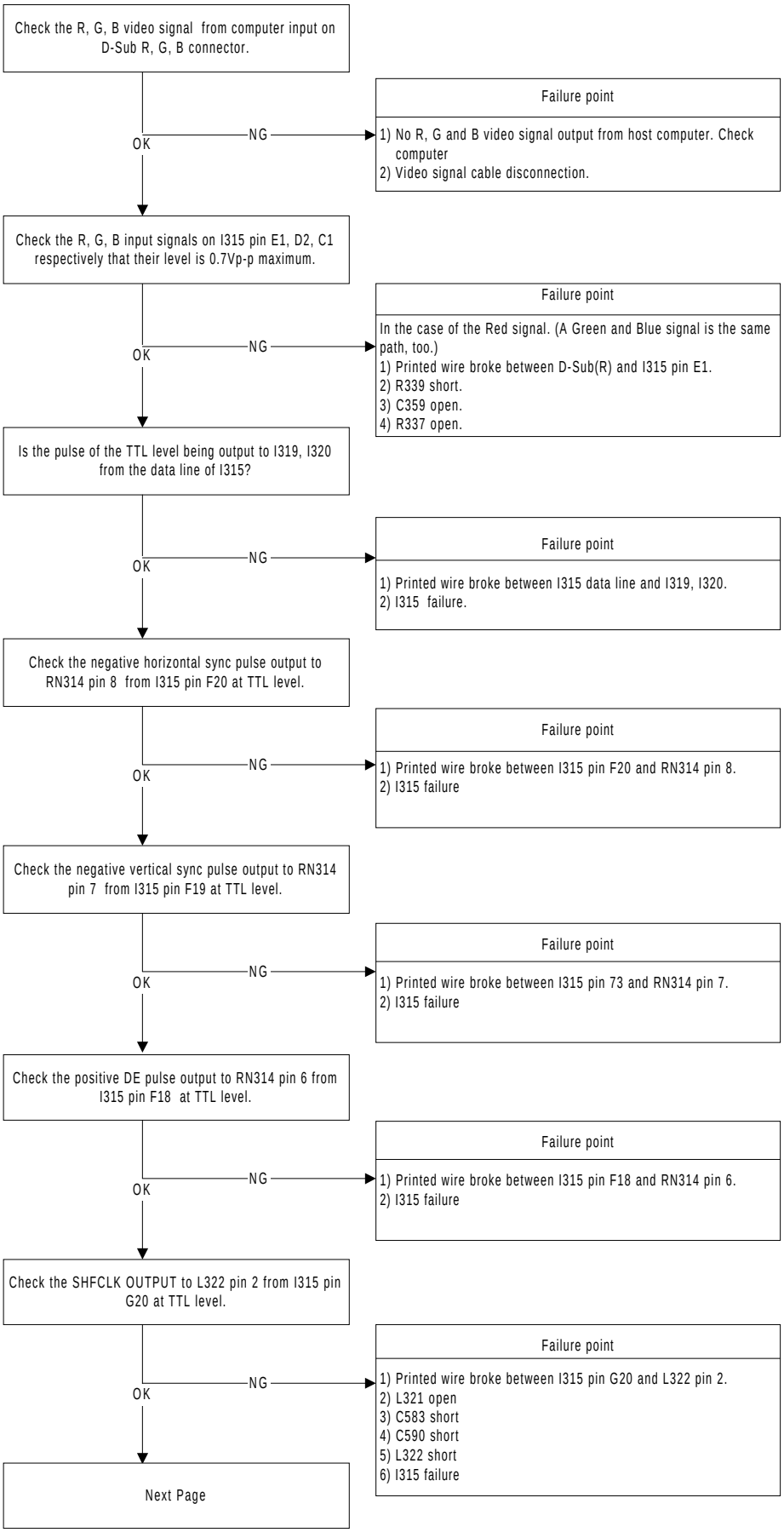

Continue
Check the 3.3 V power are supplied on I323, I330 pin 2.
NG
Check if the voltage on I323, I330 pin 3 that is high level DC at 5V.
OK
NG
Failure point
1) Printed wire broke between I322 and I323, I330
2) I322 failure.
OK
Failure point
I323, I330 Failure
Is a dot clock being outputted under the condition that a LCD module is connected to L322 pin 2?
OK
NG
Failure point
1) I315 failure
2) Printed wire broke between I315 and L322 pin 2.
Check the H-sync pulse of negative polarity is output on RN314 pin 8 at TTL level.
OK
NG
Failure point
1) I315 failure
2) Printed wire broke between I315 and RN314 pin 8.
Check the V-sync of negative polarity are output on RN314 pin 7.
OK
NG
Failure point
1) I315 failure
2) Printed wire broke between I315 and RN314 pin 7.
Next Page

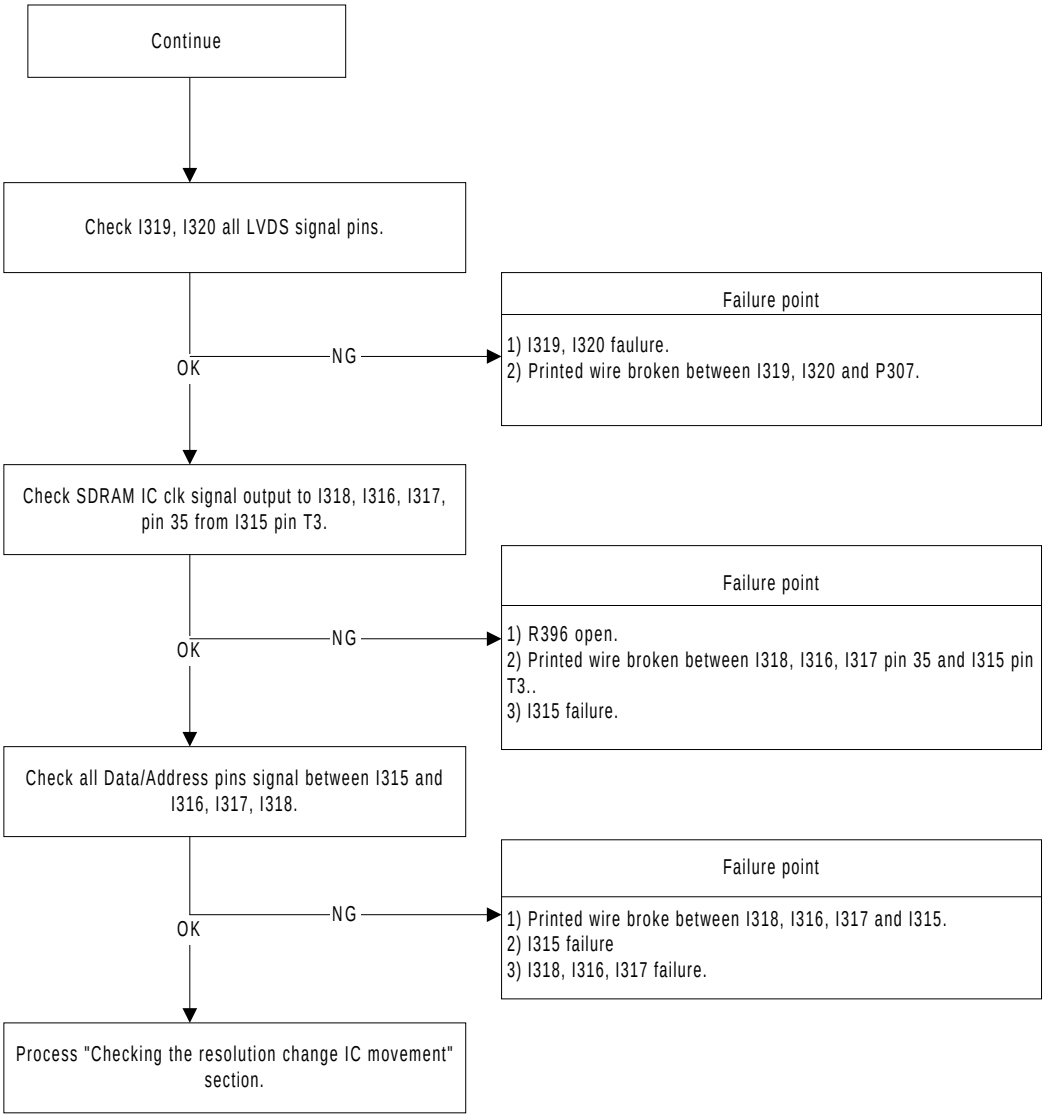

Continue
Check the data enable of positive polarity are output on RN314 pin 6.
NG
Failure point
1) I315 failure.
2) Printed wire broke between I315 and RN314 pin 6.
OK
Check the data signal output on I315 R, G, B data pin.
NG
Failure point
1) I315 failure.
OK
Check I319, I320 all LVDS signal pins.
NG
Failure point
1) I319, I320 failure.
2) Printed wire broke between I319, I320 and P307.
OK
Failure point
1) The cable broke between P304 and LCD module.
2) LCD module failure.

3. Checking the back light unit



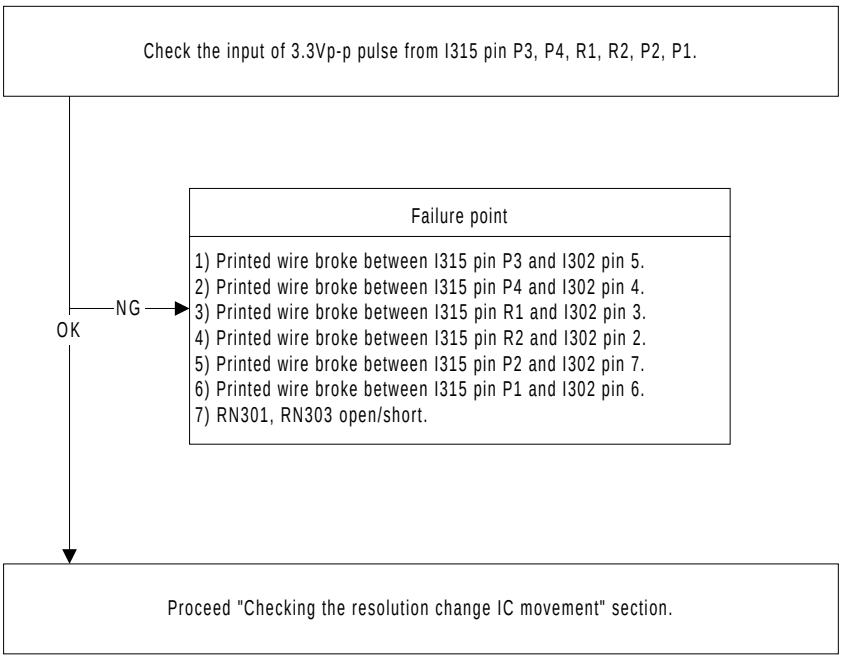
4. Abnormal screen



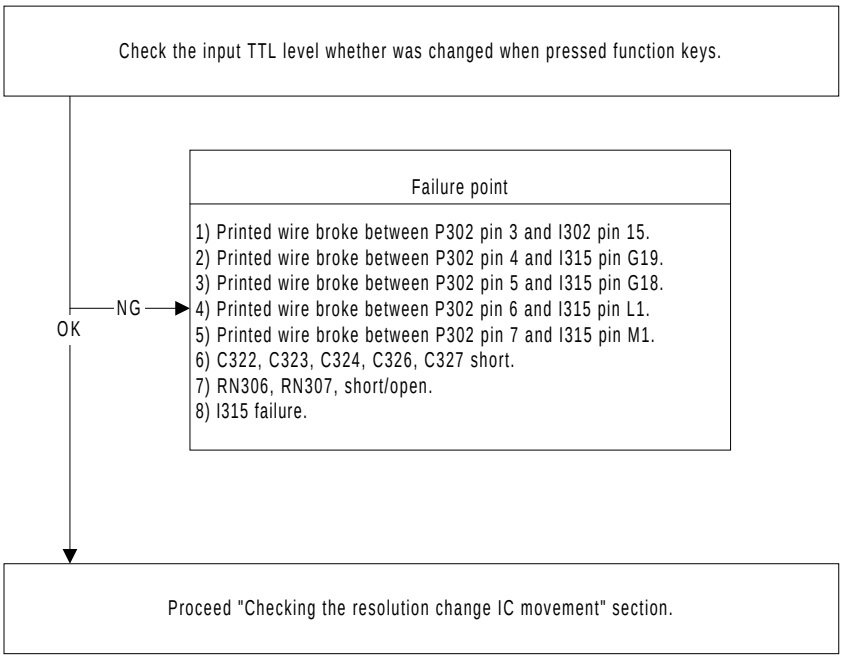

Continue
Check I319, I320 all LVDS signal pins.
NG
Failure point
1) I319, I320 faulure.
2) Printed wire broken between I319, I320 and P307.
OK
Check SDRAM IC clk signal output to I318, I316, I317, pin 35 from I315 pin T3.
NG
Failure point
1) R396 open.
2) Printed wire broken between I318, I316, I317 pin 35 and I315 pin T3..
3) I315 failure.
OK
Check all Data/Address pins signal between I315 and I316, I317, I318.
NG
Failure point
1) Printed wire broke between I318, I316, I317 and I315.
2) I315 failure
3) I318, I316, I317 failure.
OK
Process "Checking the resolution change IC movement" section.

5. Abnormal OSM display

5.1 NO OSM display

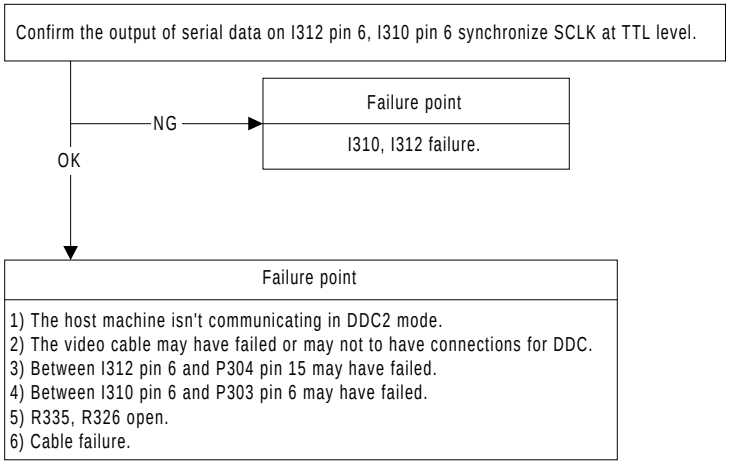


5.2 OSD Adjust problem



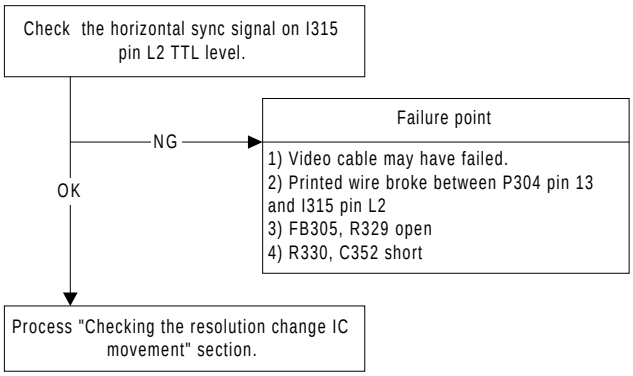
6. Abnormal plug and play operation

6.1 Abnormal DDC2

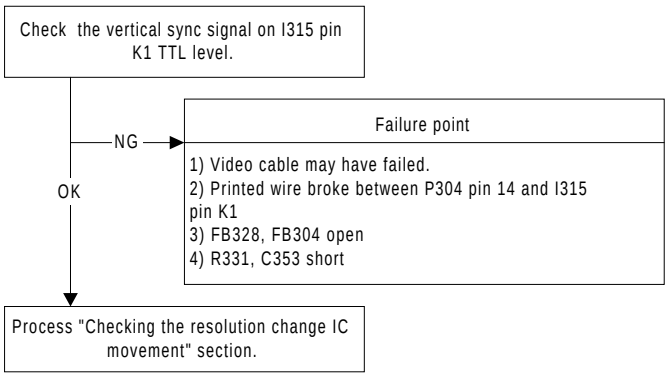


7. Checking the interface circuit of sync signal

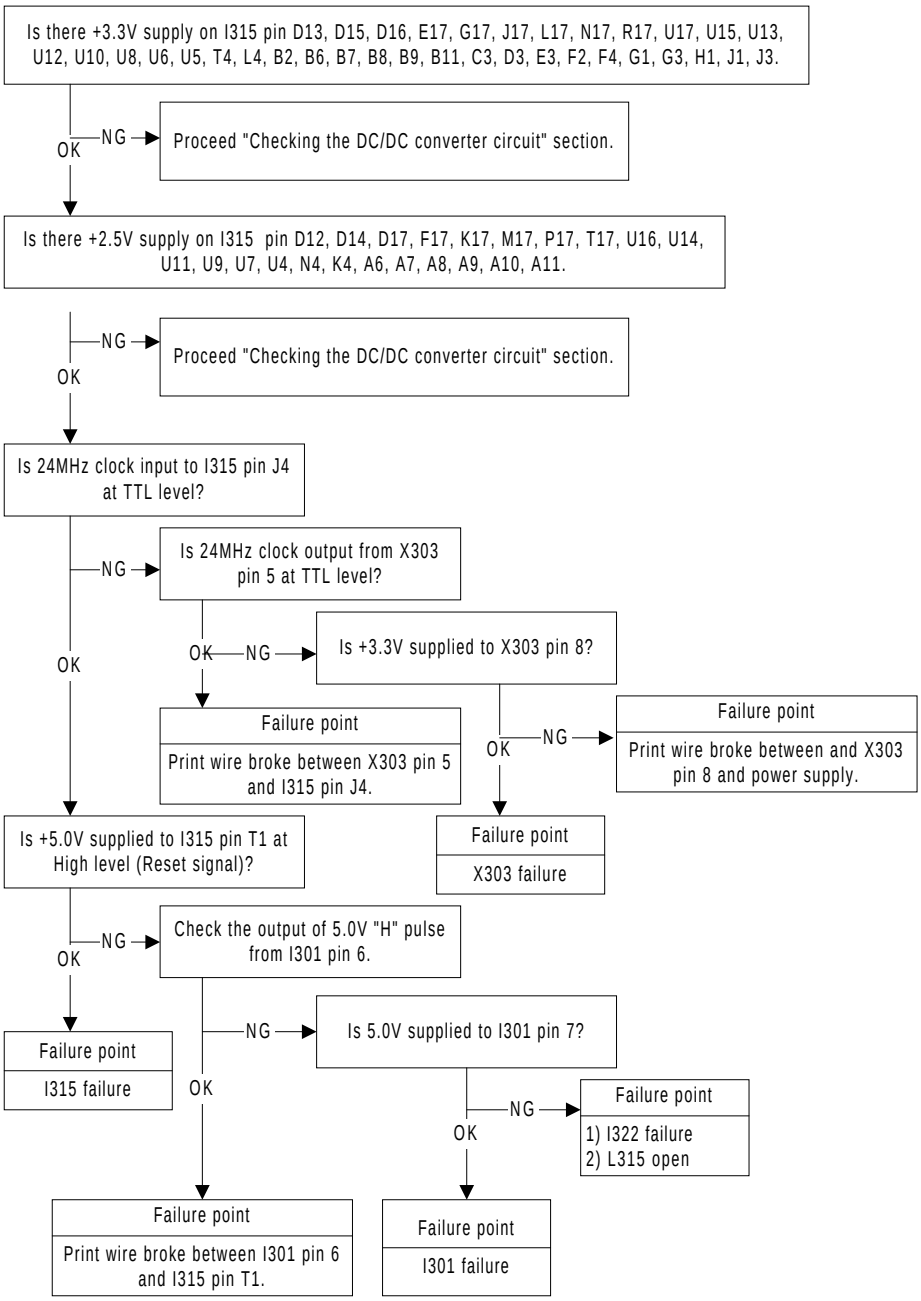
7.1 Checking the control circuit of horizontal sync pulse



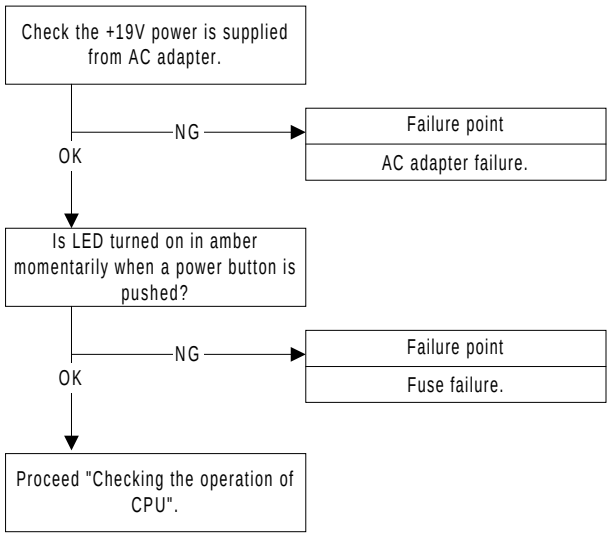
7.2 Checking the control circuit of vertical sync pulse



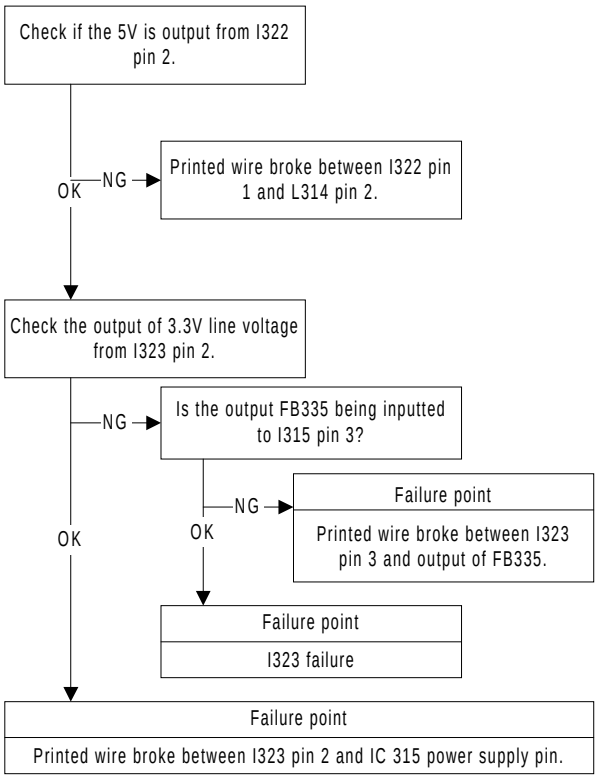
8. Checking the resolution change IC movement



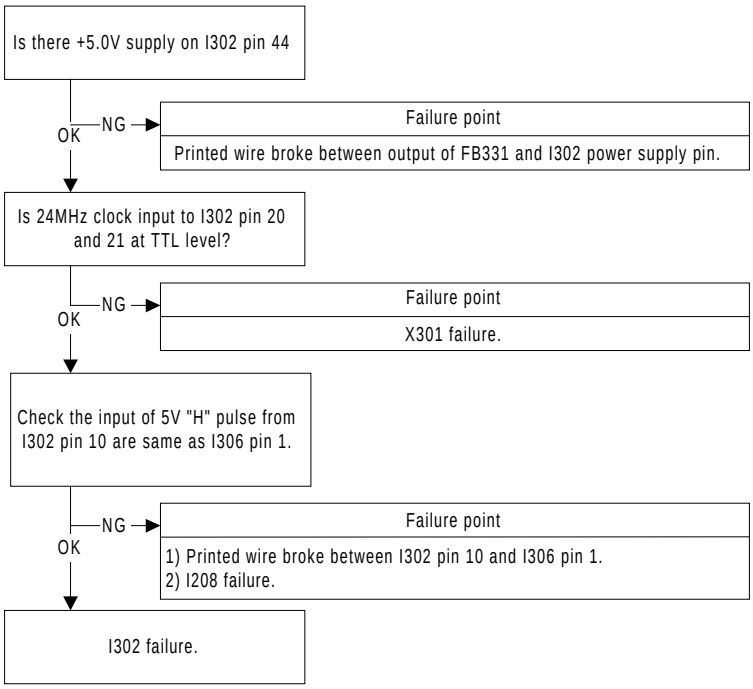
9. No power on


Check the +19V power is supplied from AC adapter.
NG
Failure point
AC adapter failure.
OK
Is LED turned on in amber momentarily when a power button is pushed?
NG
Failure point
Fuse failure.
OK
Proceed "Checking the operation of CPU".

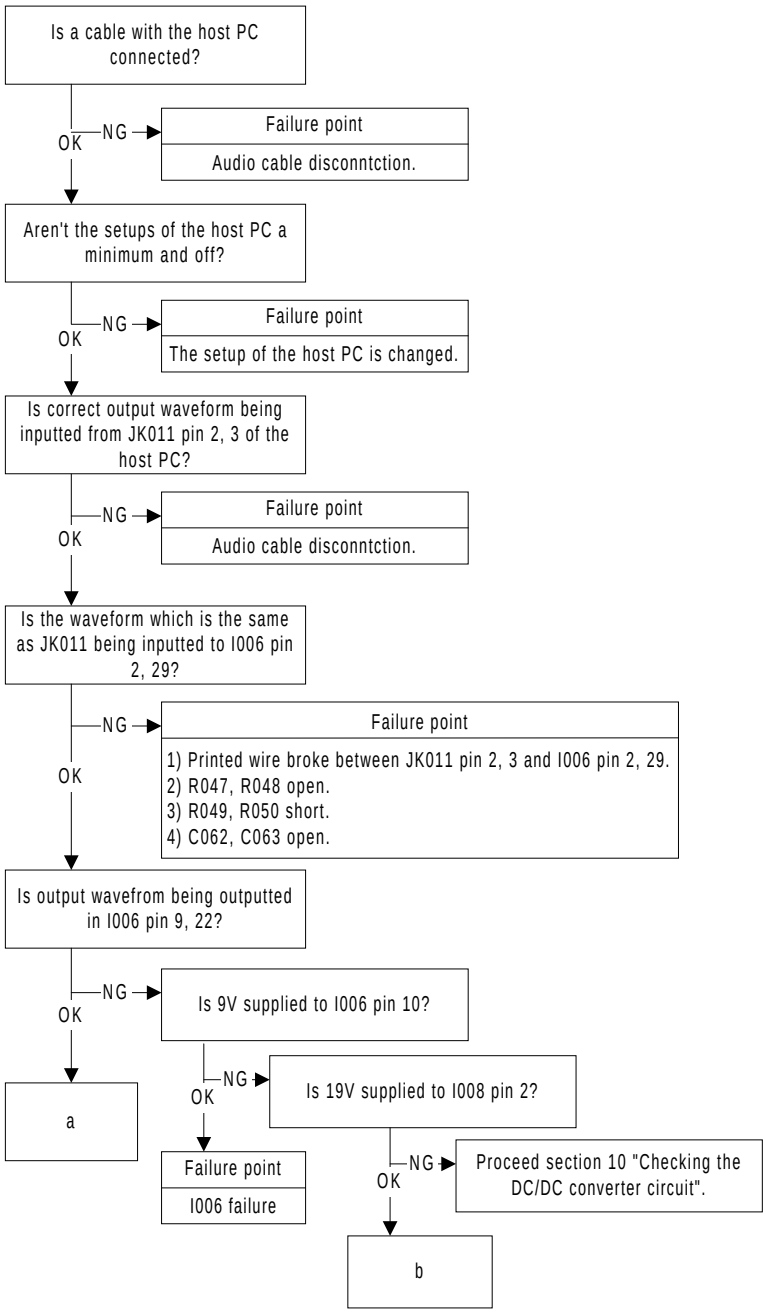
10. Checking the DC/DC converter circuit

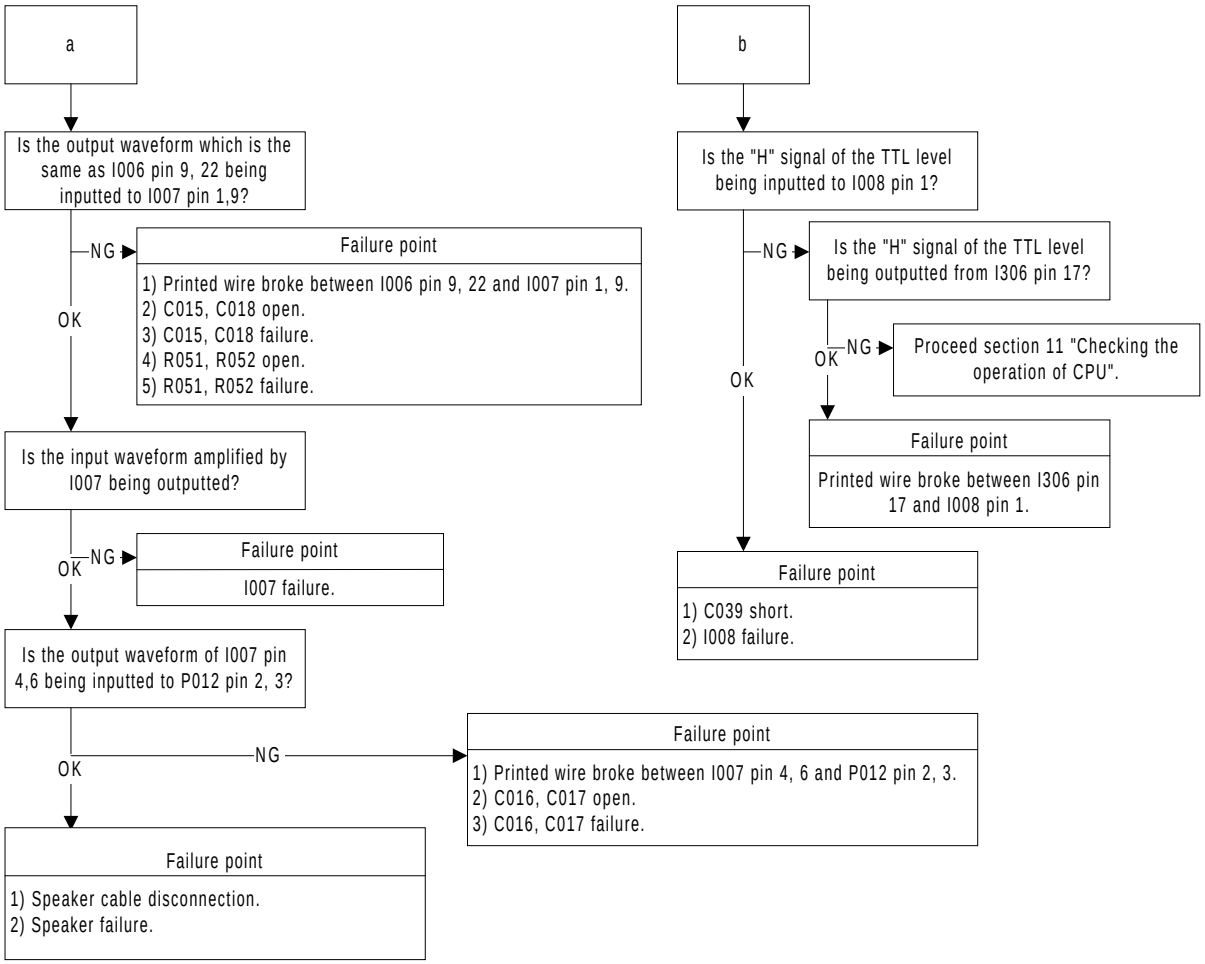


11. Checking the operation of CPU



12. Checking the audio circuit




a
Is the output waveform which is the same as I006 pin 9, 22 being inputted to I007 pin 1,9?
NG
Failure point
1) Printed wire broke between I006 pin 9, 22 and I007 pin 1, 9.
2) C015, C018 open.
3) C015, C018 failure.
4) R051, R052 open.
5) R051, R052 failure.
OK
Is the input waveform amplified by I007 being outputted?
OK
NG
Failure point
I007 failure.
Is the output waveform of I007 pin 4,6 being inputted to P012 pin 2, 3?
OK
NG
Failure point
1) Printed wire broke between I007 pin 4, 6 and P012 pin 2, 3.
2) C016, C017 open.
3) C016, C017 failure.
Failure point
1) Speaker cable disconnection.
2) Speaker failure.
b
Is the "H" signal of the TTL level being inputted to I008 pin 1?
NG
Is the "H" signal of the TTL level being outputted from I306 pin 17?
OK
NG
Proceed section 11 "Checking the operation of CPU".
Failure point
Printed wire broke between I306 pin 17 and I008 pin 1.
OK
Failure point
1) C039 short.
2) I008 failure.

1. Recommended Parts List

Note: 1. The components identified by " ⚠ " mark are critical for X-ray safety. Replace these with only the same parts specified.

2. There is only OTP IC at the model beginning (FPR stage or before). When it put in mass production and there must be Mask coming out. If you have spart parts need, please use BOM to get the last release part number and related information.

No.	Location	Part Number	Description
1 ⚠	INVA	6716009400	INVERTER DC-AC 19V-TAD585 TDK
2	V002	6711300030	HARNESS 30P 200mm 20276#28-3
3 ⚠	V170	6814002100	LCD L170E3 ACER
4	D312	6412001778	DIODE MM4148 SMD GOODARK
5	D316	6414056038	DIODE ZNR RLZ TE 11 5.6B LL 34
6	F301	6851105092	FUSE SLOW TR5 T CG90L=4.3+-0.3
7	I301	6444006108	IC MOS M51953AFP 8P SOP
8	I302	6448015548	IC CPU PROM P87C51RD+IA 44P PL
9	I304	6446006608	IC TTL 74HCT573DT 20P SMD PHIL
10	I305	6448016508	IC 24LC16B/SN 8P SOP
11	I310	6448018208	IC 24LC02B 8PIN SOP MICROCHIP
12	I315	6444007608	IC CMOS gm5020 292P BGA GENESI
13	I316	6448018108	IC NT56V1616AOT 50P TSOP NANYA
14	I319	6444007708	IC CPU SN75LVDS83 56PIN DGG TI
15	I321	6442027308	IC Linear Si4431DY 8P SOP
16	I322	6442024106	IC Linear LM2596S 5.0 5P TO 26
17	I323	6442023326	IC Linear AIC1084 33CM 3P TO26
18	I324	6442028308	IC Linear Si3025LS 8P SOP SANK
19	I325	6446002406	IC TTL 74HCT08 14P SMD
20	I326	6446002506	IC TTL 74HCT04 14P SMD
21	I327	6442001908	IC LM358DT 8P SOP ST
22	L302	6855003500	EMI FILTER EF 1T2012 050T C&C
23	X301	6449002650	CRYSYAL 24MHz AT 49 50pp
24	X303	6449200800	RESONATOR 24MHz half size

No.	Location	Part Number	Description
25	0000	5113800002	FUNCTION KEY BD U170ATUAV(99)
26	0000	5114600001	CONTROL BD U170ATUAV(99)
27	D501	6418004401	LED LTL 36EDJP 1(Y)3(G) LITEON
28	I006	6442027700	IC Linear BH3856S 30P SDIP ROH
29	I007	6442033000	IC TDA2616 9P SOT131 PHILIPS
30	I008	6442027600	IC Linear BA09ST 5P TO 220 ROH
31	L006	6111456131	COIL CHOKE uH 45 K DRWW10x10L
32 ⚠	PC02	6716009500	ADAPTOR POWER AC DC 19V/65W BL

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