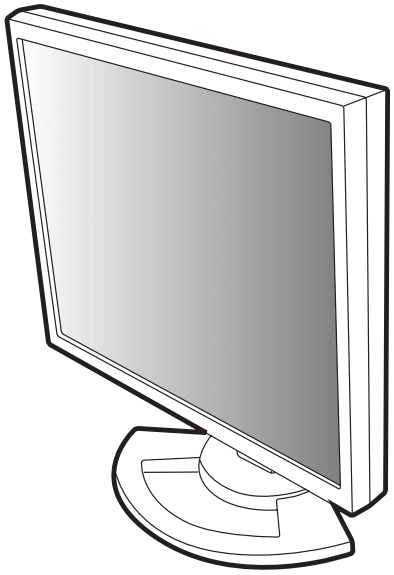
SHARP SERVICE MANUAL

CODE : 00ZLLT2020SME



LCD MONITOR

MODEL LL-T2020

CONTENTS

CHAPTER 1. OUTLINE OF THE PRODUCT, NOMENCLATURE AND FUNCTION . . . . . 1 - 1

CHAPTER 2. CONNECTION, ADJUSTMENT, OPERATION, AND FUNCTIONS. . . . . 2 - 1

CHAPTER 3. DISASSEMBLY AND ASSEMBLY . . . . . 3 - 1

CHAPTER 4. TROUBLESHOOTING . . . . . 4 - 1

CHAPTER 5. WAVE FORM . . . . . 5 - 1

CHAPTER 6. BLOCK DIAGRAM . . . . . 6 - 1

CHAPTER 7. CIRCUIT DIAGRAM . . . . . 7 - 1

CHAPTER 8. PARTS LAYOUT . . . . . 8 - 1

Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

CHAPTER 1. OUTLINE OF THE PRODUCT, NOMENCLATURE AND FUNCTION

1. SPECIFICATIONS

■ Product specifications

- LCD display

  51 cm measured diagonally
  Advanced Super-V and Anti Glare Low Reflection
  TFT LCD module

- Resolution (max.)

  UXGA 1600 x 1200 pixels

- Displayable colors (max.)

  Approx. 16.77 million colors (8 bit)

- Brightness (max.)

  220cd/m^2

- Dot pitch

  0.255 (H) x 0.255 (V) mm

- Contrast ratio

  350 : 1

- Angle of visibility

  Left-right 170° ; Up-down 170° (contrast ratio ≧ 10)

- Screen display size

  Horizontal 408 mm x Vertical 306 mm

- Video signal

  Analog: Analog RGB (0.7Vp-p) [75Ω]
  Digital: DVI standard based on 1.0

- Sync signal

  Separate Sync (TTL level: +/-), Sync on Green, Composite Sync (TTL level: +/-)

- Expansion compensation

  Digital scaling
  (Enlargement VGA/SVGA/XGA/SXGA etc. to full screen size.)

- Plug & Play

  VESA DDC2B compatible

- Power management

  VESA: based on DPMS
  DVI: based on DMPM

- Input signal terminal

  29 pin DVI-I x 2

- USB hub function

  1 upstream port, 2 downstream ports
  (selfpowered hub based on USB standard Rev 1.1)

- Height adjustment

  Adjustment range: Approx. 60 mm

- Screen rotation

  Clockwise 0 - 90°

- Screen tilt

  Upward approx. 0 - 30° ; downward approx. 0 - 5°

- Screen swivel

  Approx. 90° from left through right

- Power supply

  AC100 - 240V, 50/60Hz

- Temperature of operating environment

  5 - 35°C

- Power consumption

  53W (Not using USB hub)
  (60W maximum, 3W when in power-saving mode)

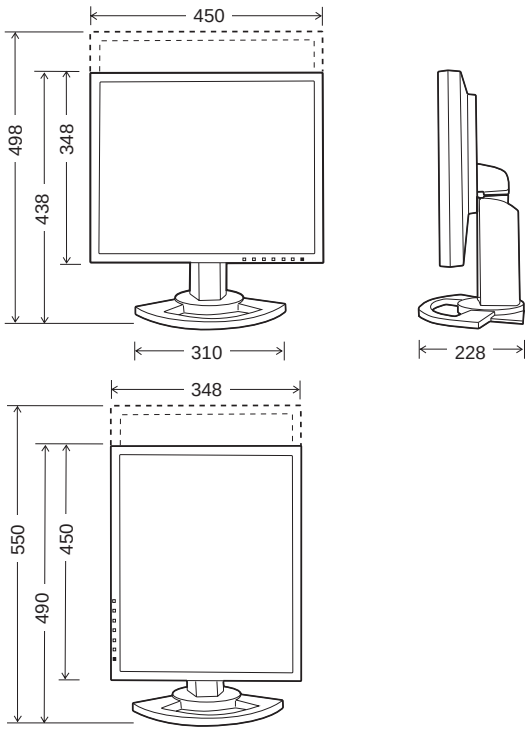
- Dimensions (W x D x H) (Units: mm)

  With long width screen: 450 x 228 x 438 - 498
  With long height screen: 348 x 228 x 490 - 550

- Weight

  Approx. 10 kg
  Display area only, approx. 6.5kg

■ Dimensions (Units: mm)



- Analog signal cable: Approx. 2.0m
- Digital signal cable: Approx. 2.0m
- USB cable: Approx. 2.0m
- Digital signal cable, NL-C04J (purchased separately): Approx. 2.0m
- Analog signal cable, NL-C02E (purchased separately): Approx. 2.0m
- 2-input cable, NL-C03J (purchased separately): Approx. 0.25m

■ Relevant signal timings (analog)

Display mode		Hsync	Vsync	Dot frequency
VESA	640 x 480	31.5kHz	60Hz	25.175MHz
		37.9kHz	72Hz	31.5MHz
		37.5kHz	75Hz	31.5MHz
	800 x 600	35.1kHz	56Hz	36.0MHz
		37.9kHz	60Hz	40.0MHz
		48.1kHz	72Hz	50.0MHz
		46.9kHz	75Hz	49.5MHz
	1024 x 768	48.4kHz	60Hz	65.0MHz
		56.5kHz	70Hz	75.0MHz
		60.0kHz	75Hz	78.75MHz
	1152 x 864	67.5kHz	75Hz	108.0MHz
	1280 x 960	60.0kHz	60Hz	108.0MHz
	1280 x 1024	64.0kHz	60Hz	108.0MHz
		80.0kHz	75Hz	135.0MHz
	1600 x 1200	75.0kHz	60Hz	162.0MHz
US text	720 x 400	31.5kHz	70Hz	28.3MHz
Power Macintosh series	640 x 480	35.0kHz	66.7Hz	30.2MHz
	832 x 624	49.7kHz	74.6Hz	57.3MHz
	1024 x 768	60.2kHz	75Hz	80.0MHz
	1152 x 870	68.7kHz	75Hz	100.0MHz
	1280 x 1024	64.0kHz	60Hz	108.0MHz
		80.0kHz	75Hz	135.0MHz
	1600 x 1200	75.0kHz	60Hz	162.0MHz
Sun Ultra series	1024 x 768	48.3kHz	60Hz	64.13MHz
		53.6kHz	66Hz	70.4MHz
		56.6kHz	70Hz	74.25MHz
	1152 x 900	61.8kHz	66Hz	94.88MHz
		71.8kHz	76.2Hz	108.23MHz
	1280 x 1024	71.7kHz	67.2Hz	117.01MHz
		81.1kHz	76Hz	134.99MHz

- Recommended resolution is 1600 x 1200.
- All are compliant only with non-interlaced.
- Frequencies for Power Macintosh and the Sun Ultra series are reference values. To connect, another adapter (commercially available) may be required.
- If the monitor is receiving timing signals that are not compatible, [OUT OF TIMING] will appear.
  Follow your computer's instruction manual to set the timing so that it is compatible with the monitor.
- If the monitor is not receiving any signal (synch signal), [NO SIGNAL] will appear.

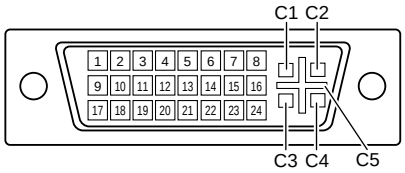
■ Relevant signal timings (digital)

Display mode		Hsync	Vsync	Dot frequency
VESA	640 x 480	31.5kHz	60Hz	25.175MHz
		37.9kHz	72Hz	31.5MHz
		37.5kHz	75Hz	31.5MHz
	800 x 600	37.9kHz	60Hz	40.0MHz
		48.1kHz	72Hz	50.0MHz
		46.9kHz	75Hz	49.5MHz
	1024 x 768	48.4kHz	60Hz	65.0MHz
		56.5kHz	70Hz	75.0MHz
		60.0kHz	75Hz	78.75MHz
	1152 x 864	67.5kHz	75Hz	108.0MHz
	1280 x 960	60.0kHz	60Hz	108.0MHz
	1280 x 1024	64.0kHz	60Hz	108.0MHz
	1600 x 1200	75.0kHz	60Hz	162.0MHz
US text	720 x 400	31.5kHz	70Hz	28.3MHz

- Recommended resolution is 1600 x 1200.
- All are compliant only with non-interlaced.
- A computer with an output terminal conforming to DVI (DVI-D24 pin or DVI-I29 pin) and with UXGA output capability can be connected here.
  (Depending on the type of computer to be connected, the display may not work correctly.)
- If the monitor is receiving timing signals that are not compatible, [OUT OF TIMING] will appear.
  Follow your computer's instruction manual to set the timing so that it is compatible with the monitor.
- If the monitor is not receiving any signal (synch signal), [NO SIGNAL] will appear.

■ The DVI-I input connector pin

(DVI-I connector with 29 pins)



No.	Function	No.	Function
1	TMDS data 2-	16	Hot plug detection
2	TMDS data 2+	17	TMDS data 0-
3	TMDS data 2/4 shield	18	TMDS data 0+
4	N.C.	19	TMDS data 0/5 shield
5	N.C.	20	N.C.
6	DDC clock	21	N.C.
7	DDC data	22	TMDS clock shield
8	Analog vertically synchronised signal	23	TMDS clock +
9	TMDS data 1-	24	TMDS clock -
10	TMDS data 1+	C1	Analogue red image signal
11	TMDS data 1/3 shield	C2	Analogue green image signal
12	N.C.	C3	Analogue blue image signal
13	N.C.	C4	Analogue horizontally synchronised signal
14	+5V	C5	Analogue GND
15	GND		

■ Power management

The monitor is based on the VESA DPMS and the DVI DMPM standards.
To activate the monitor's Power Management function, both the video card and the computer must conform to the VESA DPMS standard and the DVI DMPM standard.

DPMS: Display Power Management Signalling

DPMS mode	Screen	Power consumption	H-sync	V-sync
ON	Display on	53W*	Yes	Yes
STANDBY	Display off	3W	No	Yes
SUSPEND			Yes	No
OFF			No	No

*Not using USB hub

DMPM: Digital Monitor Power Management

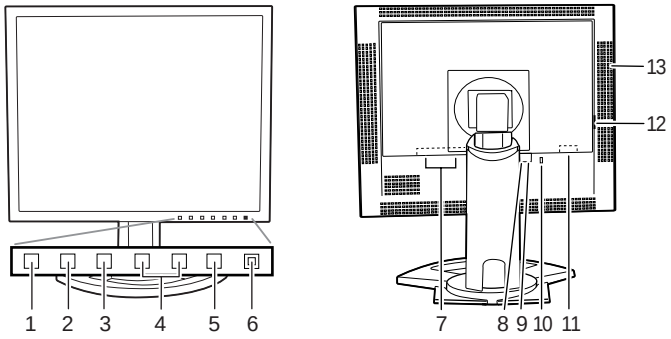
DMPM mode	Screen	Power consumption
ON	Display on	53W*
OFF	Display off	3W

*Not using USB hub

■ DDC (Plug & Play)

This monitor supports the VESA DDC (Display Data Channel) standard. DDC is a signal standard for carrying out Plug & Play functions on the monitor or PC. It transfers information such as degree of resolution between the monitor and PC. You can use this function if your PC is DDC compliant and if it is set so that it can detect the Plug & Play monitor.
There are many varieties of DDC due to the differences between systems. This monitor works with DDC2B.

2. PRODUCT DESCRIPTION



1. INPUT button	To switch between the signal's input terminals.
2. MENU button	This button is used to pop-up, select and close the OSD (On Scree Display) Menu.
3. ▼ button	This button is used to select menu options when the OSD Menu is displayed.
4. ◄► buttons	When the OSD Menu is displayed: These buttons are used to increase or decrease the value of a selected option. When the OSD Menu is not displayed: These buttons are used to adjust backlight brightness.
5. Power button	
6. Power LED	This LED is lit green when in use and orange when in power-saving mode.
7. DVI-I input terminal	The computer's digital RGB output terminal or analogue RGB output terminal can be connected here. For a digital signal input: It can be connected to a computer with a DVI-compatible output terminal (DVI-D24 pin or DVI-I29 pin) and which has UXGA output ability. Depending on the computer to be connected, correct display may or may not be possible.
8. USB port (upstream: 1 port)	
9. USB port (downstream: 2 ports)	
10. Security lock anchor	By connecting a security lock (commercially available) to the security lock anchor, the monitor is fixed so that it cannot be transported. The security slot works in conjunction with Kensington Micro Saver Security Systems.
11. Power terminal	
12. Main power switch	
13. Ventilation openings	Note: Never block the ventilation openings as this may lead to overheating inside the monitor and result in malfunction.

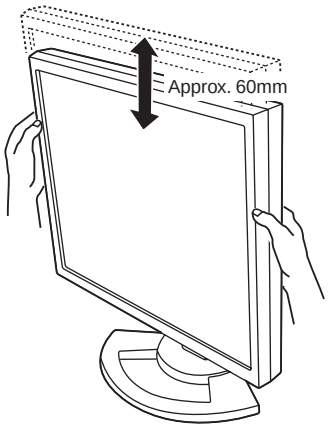
■ Height adjustment, angle adjustment, rotation (long height/width)

Caution:

- Pressure from hands on the LCD panel could cause damage.
- Be careful not to allow your fingers to be pinched.

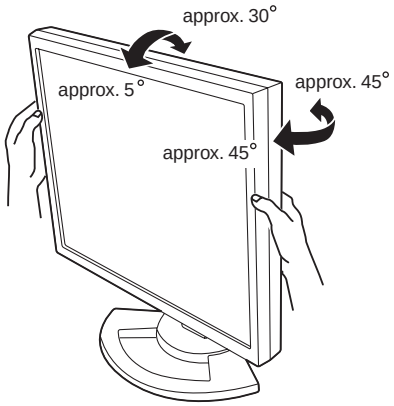
1) Height adjustment

Adjust to an easy to view height.



2) Angle adjustment

Adjust to an easy to view angle.



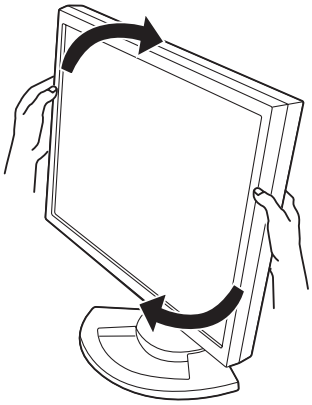
3) Rotation (long height/width)

The display can be rotated for a long height or width to suit the displayed content.

- Before rotating, move the display to its uppermost position. If the display is rotated while it is set low, it will contact the stand and could lead to damage.
- The display can only be rotated through a range of 90°. Applying excessive force may cause malfunction.
- Do not apply excessive force when the cable is connected.

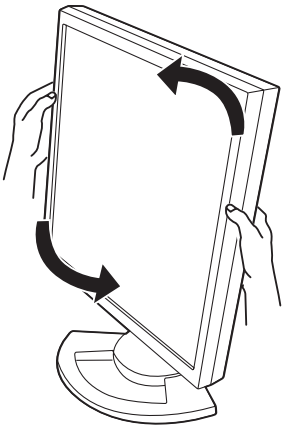
To set to long height

Gently turn in the clockwise direction (to 90°).



To set to long width

Gently turn in the counterclockwise direction (to 90°).



Note: The orientation of the display can be changed using Pivot Software.

CHAPTER 2. CONNECTION, ADJUSTMENT, OPERATION, AND FUNCTIONS

1. CONNECTING THE MONITOR AND TURNING THE MONITOR ON AND OFF

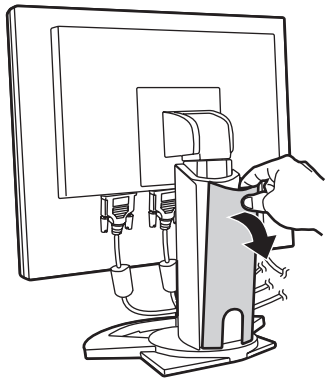
Caution:

- When connecting, ensure that both the monitor and computer are switched off.
- Be careful not to overly bend the cable or add extension cords as this could lead to a malfunction.

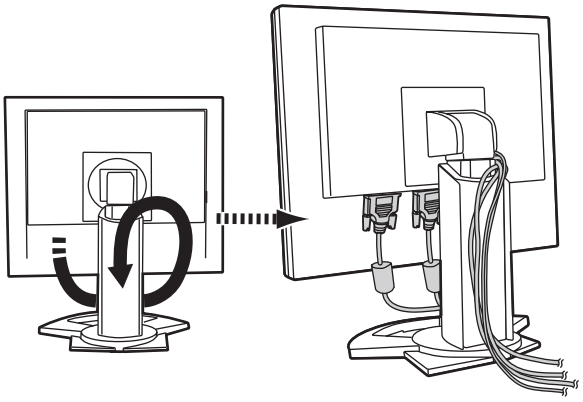
Cable storage

If necessary, excess cable can be housed in the stand.

1. Remove the cover.
   Gently pull the top of the cover towards yourself.

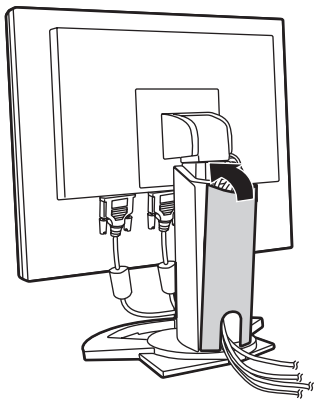


2. Run cable along the back of the stand.
   Pass cable in front of the stand, and then bring it through the back.



- If the display is to be rotated, first house the cables with the display in the long height position, so there is sufficient length when the display is turned.

3. Refit the cover.
   Be careful not to pinch the cable.



- If the cover is hard to refit, do not force it.
  Check whether cables are trapped.

Caution: If the display is to be rotated, first house the cable, and then check while gently turning the display. If it cannot be turned, rehouse the cable with sufficient slack. (If there is insufficient cable length, rotation will be impossible. Forcing rotation may cause cable disconnection.)

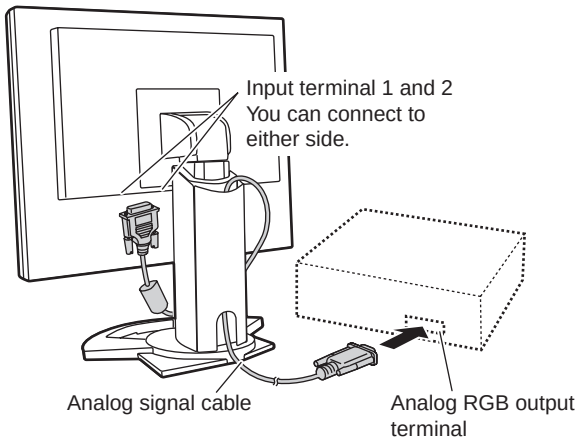
1-1. Connecting the monitor to a computer

The accessory signal cable enables connection of two computers.
(One analog and one digital connection.)

- To achieve an analog and digital connection for two computers, a separately sold signal cable is required.
- The separately sold 2-input cable enables connection of two computers to the DVI-I input terminal.
- When using the 2-input cable, set the connecting input terminal [INPUT-1] or [INPUT-2] to [2LINES] under the MODE SELECT-1 Menu.

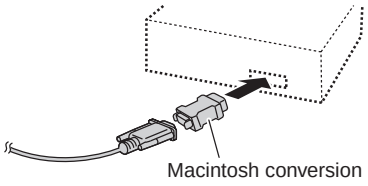
■ Analog connection

Connect the analog signal cable to the analog RGB output terminal of the computer.



- Paying attention to connector direction, firmly insert the signal cable to terminal, and then tighten the screws at both sides.

If connecting to a D-sub 15 pin 2 row Apple Power Macintosh, attach a Macintosh conversion adapter (commercially available) to the analog signal cable.

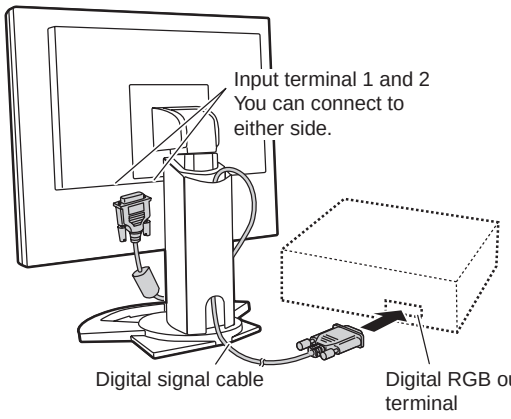


Note: If connecting to the Sun Ultra series, a conversion adapter (commercially available) may be required.

■ Digital connection

Connect the digital signal cable to the digital RGB output terminal of the computer.

- For digital RGB connection, the monitor has an input for connecting to a computer with a DVI-compatible output connector (DVI-D 24 pin or DVI-I 29 pin) and UXGA output capability.
  (Depending on the type of computer to be connected, the display may not work correctly.)
- Use the accessory digital signal cable or an NL-C04J cable (sold separately).
  If using other commercially available digital signal cables, correctly display may not be achieved. UXGA resolution may not be available when using the NL-C01E digital signal cable.

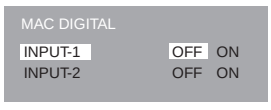


- Paying attention to connector direction, firmly insert the signal cable to terminal, and then tighten the screws at both sides.

Set the monitor as follows when establishing a digital connection with a Power Mac using an ADC-DVI adapter made by Belkin. (Operation has been checked with the Power Mac G4 M7627J/A)

- Perform settings with the Power Mac power supply off.

1. After connecting the power cord, turn on the monitor's main power.
2. Press the ◄ button and ► button simultaneously, and while doing this press the POWER button (i.e. turn the power on).

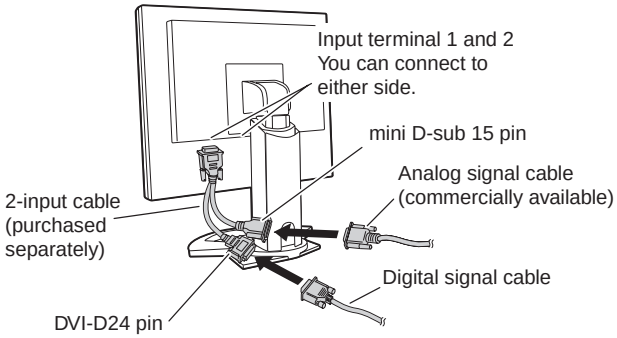


3. Set the input terminal to which the Belkin ADC-DVI adapter is connected to ON.
   Use the ▼ button to select [INPUT1] or [INPUT2], and use the ◄ ► buttons to select [ON] and [OFF].
   - Do not set to [ON] if you are not using a Belkin ADC-DVI adapter, as this may result in incorrect display.
4. Press the power button, and turn off the monitor power.
   This completes setting.

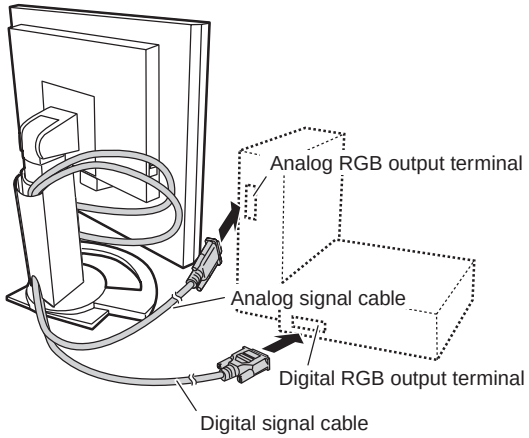
■ When connecting using a separately sold 2-input cable

The separately sold 2-input cable (NL-C03J) enables connection between the DVI-I input terminal on the monitor and the two PCs.
(One analog and one digital connection.)

1. Connect the 2-input cable to the DVI-I input terminal of the monitor, and then connect the analog signal cable (commercially available) and the digital signal cable to the 2-input cable.



   - For analog connection, use the commercially available analog signal cable (both ends should be mini D-sub 15 pin).
2. Connect each signal cable to the computers.

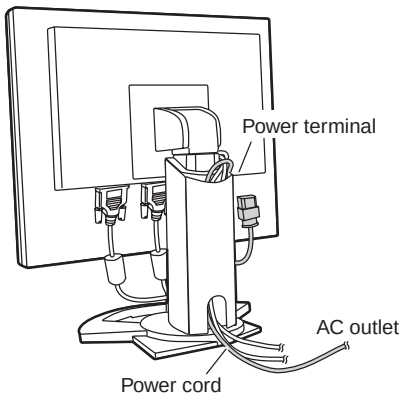


   - Paying attention to connector orientation, firmly insert the signal cable into the PC, and then tighten the screws at both sides.

Note:

- When using the 2-input cable, set the connecting input terminal [INPUT-1] or [INPUT-2] to [2LINES] under the MODE SELECT-1 Menu.
- The monitor connected to the 2-input cable by analog connection may not be automatically recognized and setup under Plug & Play. Perform storage of setup information manually.

1-2. Connecting the monitor to a power source



1-3. Connecting a USB device

This monitor is equipped with a USB standard (Rev. 1.1) self-powered hub.

Downstream (2 ports)

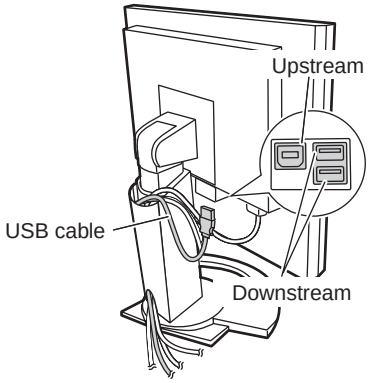
Each of these ports enables connection of a USB device with working current up to 500 mA.

Upstream (1 port)

This enables connection of a USB compatible computer or USB hub.

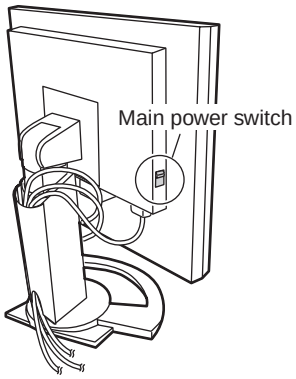
Note:

- If a USB cable is required, please use the one included.
- Before connecting, ensure that the shape of the USB cable connector is correct.
- For information regarding the USB function (such as set-up) please refer to the operation manual of the computer to be connected.
- Some computers, OS and other devices may not be able to be activated. To ascertain a certain device's USB compatibility, please contact the manufacturer of the device.



1-4. Turning the power on

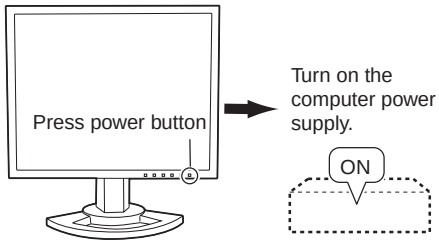
1. Turn on the main power of the monitor.



- When switching the main power switch on and off, always wait for an interval of at least 5 seconds. Rapid switching may result in malfunction.

2. Press the monitor's POWER button.
   The power LED will light up orange.

3. Turn on the computer.



When a signal is input from the computer, the power LED lights up green, and the screen is displayed (After power is turned on, it may take a little time until the screen is displayed.)

- If the input terminal to which the computer is connected has not been selected, the screen will not be displayed. If necessary, perform input terminal switching. (right column)

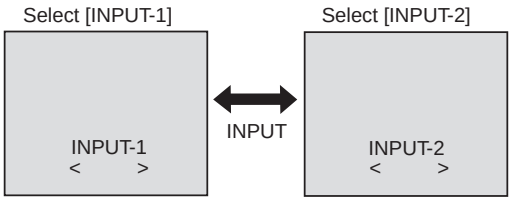
Notes: (when using an analog signal)

- If using the monitor for the first time or after having changed the system settings during use, perform an automatic screen adjustment.
- When connecting to a notebook, if the notebook computer's screen is set so that it is displaying at the same time, the MS-DOS screen may not be able to display properly. In this case, change the settings so that only the monitor is displaying.

1-5. Changing between input terminals

Use the INPUT button to switch between signal input terminals.

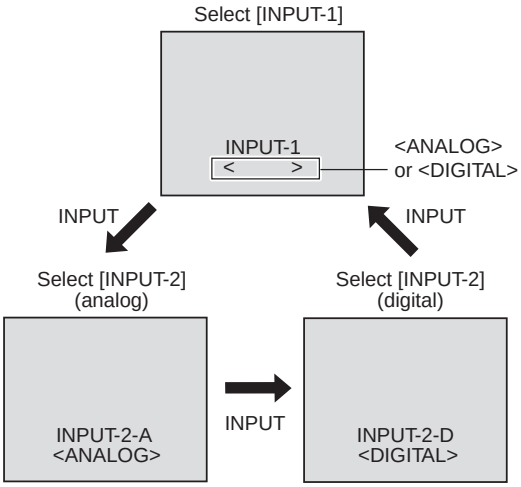
When not using a 2-input cable



The input signal type (ANALOG/DIGITAL) is displayed within angle brackets < >.

When using a 2-input cable

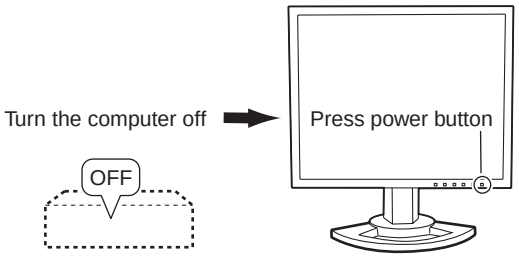
When selecting the input terminal connected to the 2-input cable, the input terminal [INPUT-1] or [INPUT-2] is displayed, followed by the symbol for analog [-A] or digital [-D].
(Example when connecting the 2-input cable to input terminal 2 [INPUT-2])



Note: When there is no input signal, [NO SIGNAL] is displayed.

1-6. Turning the power off

1. Turn the computer off.
2. Press the monitor's POWER button.
   The Power LED will disappear.



If the monitor will not be used for a long time, turn off the main power switch of the monitor, and remove the power plug from the outlet.

1-7. Instructions for attaching a VESA compliant arm

An arm or stand based on the VESA standard (commercially available) can be attached to the monitor.
Procurement of the arm or stand is at the customer's discretion.

■ Arms or stands able to be used

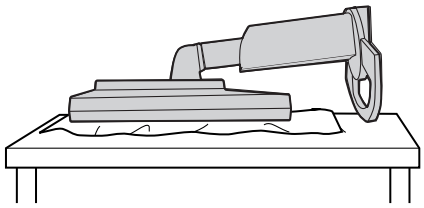
Attachments must satisfy the following.

- Compatible with the VESA standard.
- Have a gap of 100 mm x 100 mm between the screw holes on the section to be attached.
- Not be likely to fall off or break off after being attached to the monitor.

■ How to attach the arm or stand

- Be careful not to overly bend the cable or add extension cords as this could lead to malfunction.
- While following these instructions, please also refer to the installation instructions in the operation manual included with the arm or stand.

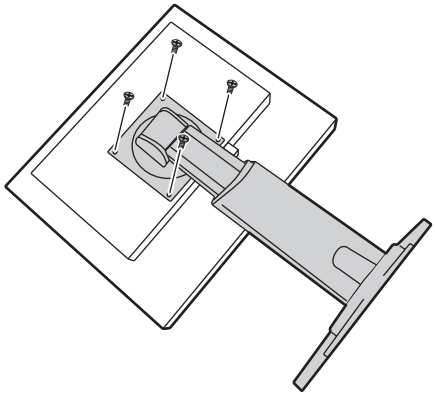
1. Remove the cable.
2. Spread out a soft cloth on a suitable horizontal surface.
3. Being careful not to damage the monitor, gently lay the monitor on it display-side down.



Caution:

Securely grasp both the display and stand, and gently tip over. When the monitor is inclined, the stand may suddenly pop out and cause injury.

4. Remove the four screws and then remove the stand from the monitor.



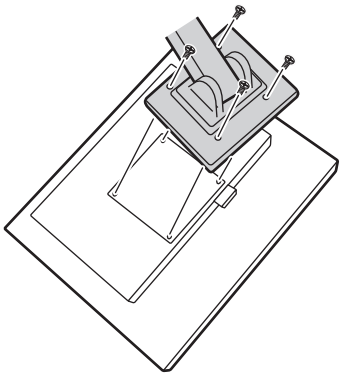
Note:

- The stand is specially made for use with this monitor. Once having removed the stand, never attempt to attach it to another device.
- Once having removed the screws, store them together with the stand and if the stand is ever re-attached be sure to use the original screws.
  Using different screws could lead to a malfunction.

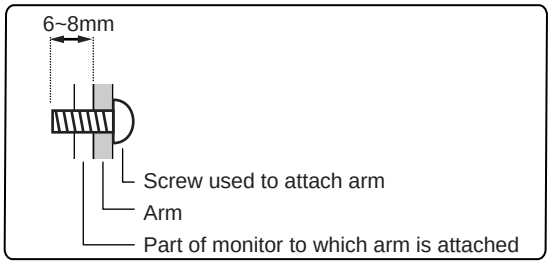
Caution:

Do not disassemble the stand. Parts may spring out and cause injury.

5. Attach the arm to the monitor with the four screws.



Note: The screws used to attach the arm should be M4 screws with a length of 6 mm ~ 8 mm protruding from the surface to be attached. Using different screws could lead to malfunction or may lead to the monitor falling off, internal damaged, personal injury.



1-8. Information about the Pivot Software (Long height/width display)

When rotating the display, change the display orientation using Pivot Software.

Compatible operating systems (OS) for the Pivot Software that comes with the monitor:

Windows 98/2000/Me/XP
Macintosh OS 8.x - 9.1

- Depending on the graphics accelerator, it may be impossible to use Pivot Software, even with a compatible OS.

For production information and inquiries regarding Pivot Software:

Portrait Displays, Inc.
(http://www.portrait.com)

■ Installation of Pivot Software

For Windows

1. Quit all applications being used.
2. Load the accessory CD-ROM into the CD-ROM drive of the computer.
3. Open the [My computer] CD-ROM.
4. Double click on the [Pivot] folder.
5. Double click on [SETUP.exe].
6. Click [Next].
7. Choose [I accept the tems in the License Agreement].
8. Click [Next].
9. Input your Customer information [User Name] and [Organization].
10. Click [Next].
11. Click on [Install].
    Installation will begin.
12. When the message indicating installation is finished is displayed, click [Next].
13. Click on [Finish].
14. Click on [Yes] and restart the computer.

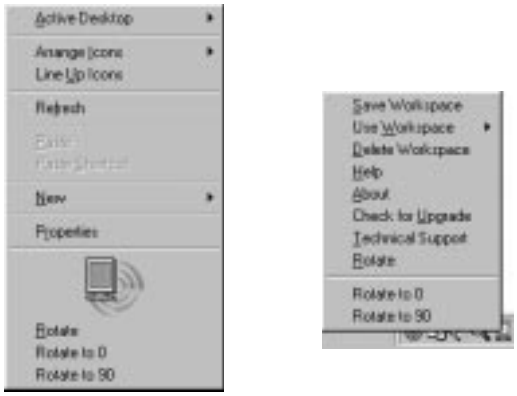
For Macintosh

1. Quit all applications being used.
2. Load the accessory CD-ROM into the CD-ROM drive of the computer.
3. Open the CD-ROM.
4. Double click on the [Pivot] folder.
5. Select the desired language.
6. Double click on [Install MacPortrait].
7. Drag the [MacPortrait Install] icon onto the desired disk.
   Installation will begin.
8. When the message indicating installation is finished is displayed, click on [Restart].

■ Switching display direction

For Windows

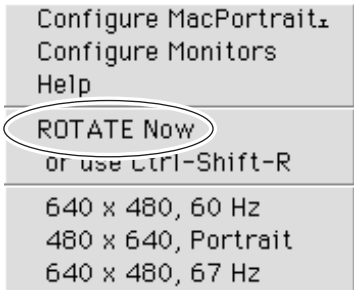
1. Click the right mouse button or click the left mouse button on  at the lower right of the screen.
2. Select [Rotate], [Rotate to 0] or [Rotate to 90].



Rotate:	The display direction switches.
Rotate to 0:	The display direction is switched to long width.
Rotate to 90:	The display direction is switched to long height.

For Macintosh

Choose [ROTATE Now] from  at the lower right of the screen.



Each time [ROTATE Now] is selected, the display direction switches.

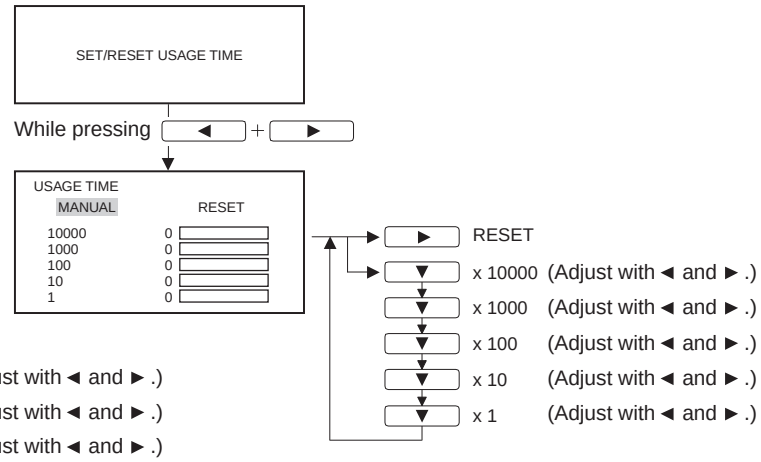
Note:

- Rotation of the display to match the display direction is done manually.
- The display direction on the OSD menu is switched using [OSD PIVOT] on the [MODE SELECT-2] menu.

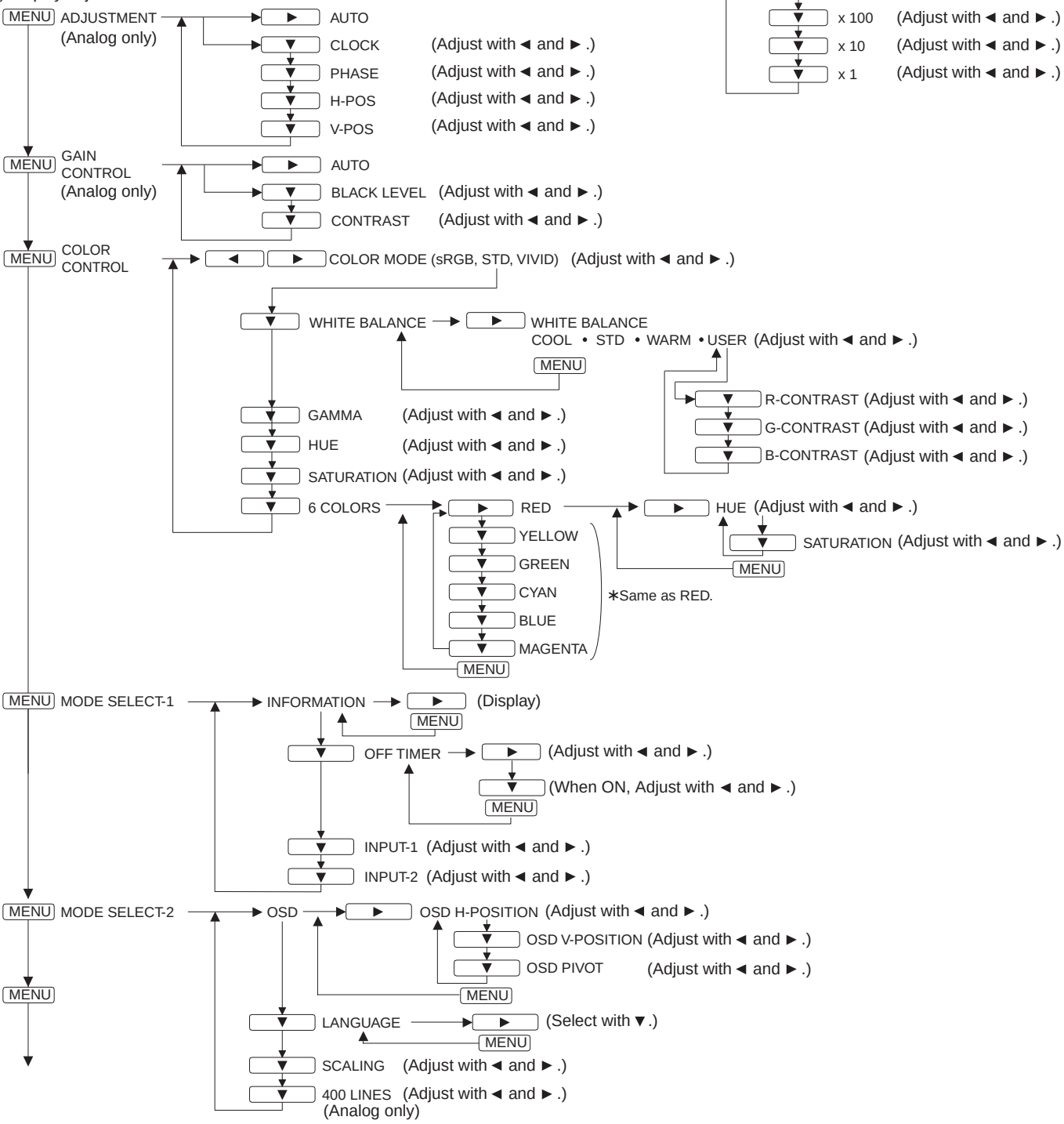
2. ADJUSTMENT

2-1. ADJUSTMENT METHOD

1) Resetting all adjustment values.
   While pressing [MENU] + [▼], turn on the power.
2) ADJUSTMENT menu reset (Analog only)
   Press [MENU] + [◄] simultaneously.
3) Adjustment lock and lock release
   While pressing [MENU], turn on the power.
4) Adjusting the backlight
   Adjust with [◄] and [►]
5) Checking product information
   While pressing [▼], turn on the power.
6) Aging
   While pressing [▼] + [◄], turn on the power.
7) SET/RESET of Usage Time
   While pressing [INPUT] + [▼] + [◄], turn on the power.



8) Display adjustment



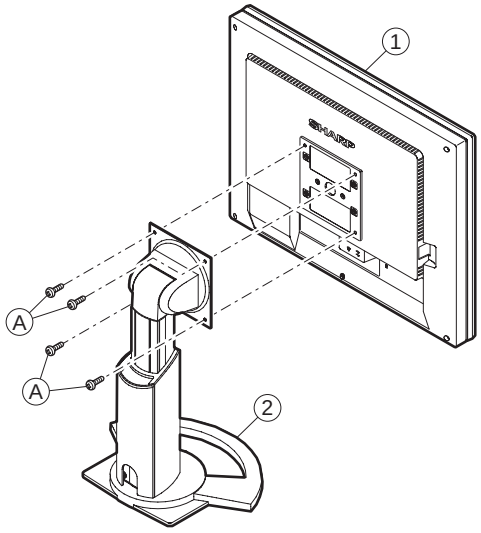
2-2. ADJUSTMENT ITEM LIST

BUTTON	ITEM			ADJUSTMENT	DESCRIPTION
MENU	MENU 1: ADJUSTMENT	MANUAL	CLOCK	0~255	CLOCK: The figure below demonstrates how to adjust so that vertical flicker noise is not emitted. (◄► buttons)
			PHASE	0~31	PHASE: The figure below demonstrates how to adjust so that horizontal flicker noise is not emitted. (◄► buttons)
			H-POS	0~	H-POS (horizontal positioning) and V-POS (vertical positioning) To center the screen image within the boundaries of the screen, adjust the left-right (H-POS) values and the up-down (V-POS) values. (◄► buttons)
			V-POS	0~	
		AUTO			Automatic screen adjustment Options in the ADJUSTMENT Menu can be adjusted automatically (CLOCK, PHASE, H-POS V-POS).
	MENU 2: GAIN CONTROL	MANUAL	BLACK LEVEL	0~100	BLACK LEVEL: Total screen brightness can be adjusted while watching the color pattern. (◄► buttons)
			CON-TRAST	0~100	CONTRAST: While watching the color pattern, adjustments can be made so that all graduations appear. (◄► buttons)
		AUTO			GAIN CONTROL Menu AUTO: Every menu option is automatically adjusted using the Auto Gain Control function.
	MENU 3: COLOR CONTROL	COLOR MODE		sRGB, STD, VIVID	STD: Displays image with the color tone results from original scheme of liquid crystal panel. sRGB: sRGB is international standard of color representation specified by IEC (International Electrotechnical Commission). Color conversion is made in taking account of liquid crystals characteristics and represents color tone close to it original image. VIVID: Displays an image with dynamic and VIVID primary colors.
MENU 1 ↓ MENU 2 ↓ MENU 3 ↓ MENU 4 ↓ MENU 5 ↓ MENU END		WHITE BALANCE		COOL • STD • WARM (5 levels), USER R • G • B: 0~255	WHITE BALANCE Menu COOL : Color tone bluer than standard • : Color tone slightly bluer than standard STD : Color tone standard setting • : Color tone slightly redder than standard WARM : Color tone redder than standard USER R-CONTRAST : ◄ button for blue-green ► button for red G-CONTRAST : ◄ button for purple ► button for green B-CONTRAST : ◄ button for yellow ► button for blue
		GAMMA		-10~10	Adjust so that dark and bright images are easy to see. If the screen is dark and hard to see, increase the numerical value. If it is bright and hard to see, lower the numerical value. (◄► buttons)
		HUE		-20~20	Hue can be adjusted. (◄► buttons)
		SATURATION		-50~50	Color saturation can be adjusted. (◄► buttons) At the minimum value, the screen is black and white.
		6 COLORS		RED, YELLOW, GREEN, CYAN, BLUE, MAGENTA	Hue (HUE) and saturation (SATURATION) may be adjusted by color.
	MENU 4: MODE SELECT-1	IINFORMATION			A model name (MODEL), a serial no. (S/N), and usage time (USAGE TIME) of the display can be checked.
		OFF TIMER		ON (1 - 23 hours) • OFF	Power is automatically shut off when the set time elapses.
		INPUT-1		1LINE • 2LINES	Set [1 LINE] when connecting digital or analog signal cables to a DVI-I input terminal (INPUT-2) on the display. Set [2LINES] when connecting a 2-input cable.
		INPUT-2		1LINE • 2LINES	
	MENU 5: MODE SELECT-2	OSD H-POSITION			OSD H-POSITION (OSD horizontal position) The position of the OSD display can be moved to the left and right. (◄► buttons)
		OSD V-POSITION			OSD V-POSITION (OSD vertical position) The position of the OSD display can be moved up and down. (◄► buttons)
		OSD PIVOT		OFF (landscape) • ON (portrait)	The orientation of the OSD display can be changed.
		LANGUAGE		7 countrys DEUTSCH, ENGLISH, ESPANOL, FRANCAIS, ITALIANO, NETHERLAND, SVENSKA	LANGUAGE Messages displayed on the screen and OSD Menu contents can be changed to the following languages. Dutch, English, French, German, Spanish, Italian, Swedish.
		SCALING		0~4	SCALING (Level of scaling) The sharpness of the image can be adjusted. (◄►buttons)
		400 LINES		640 • 720	400 LINES (degree of resolution) You can specify the horizontal resolution of a 400-line screen when using US text, etc.(◄► buttons) 640: 640 × 400 dot mode 720: 720 × 400 dot mode (US text etc.)
▼					Select the item
◄►				0~31	Adjusting the backlight
POWER				ON, OFF	

CHAPTER 3. DISASSEMBLY AND ASSEMBLY

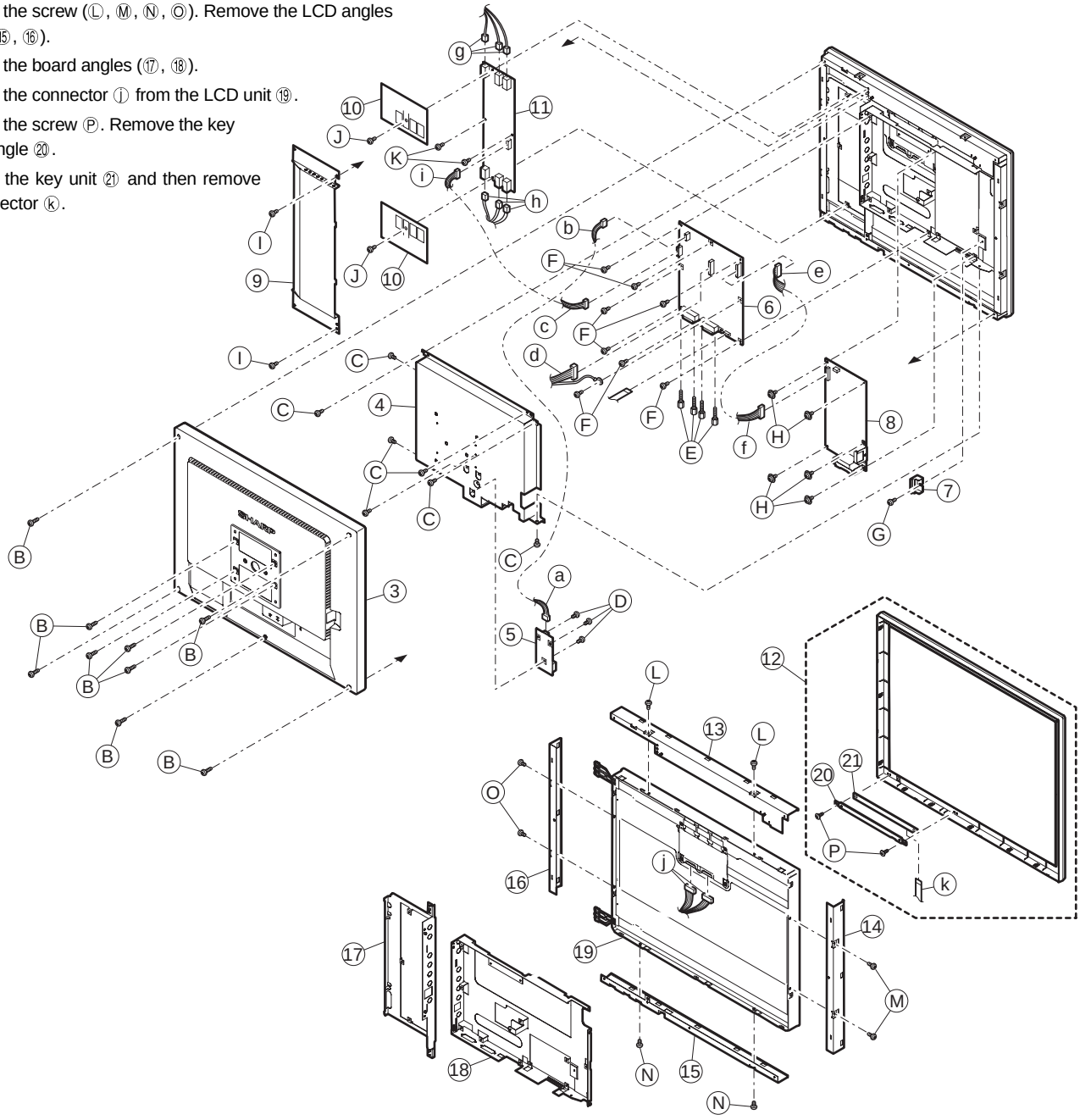
1. SEPARATING DISPLAY UNIT FROM STAND UNIT

1) Remove the screw Ⓐ. Separate the display unit ① from the stand unit ②.



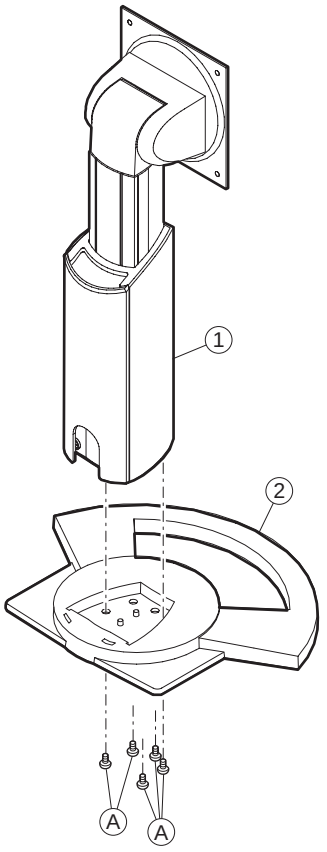
2. DISASSEMBLING DISPLAY UNIT

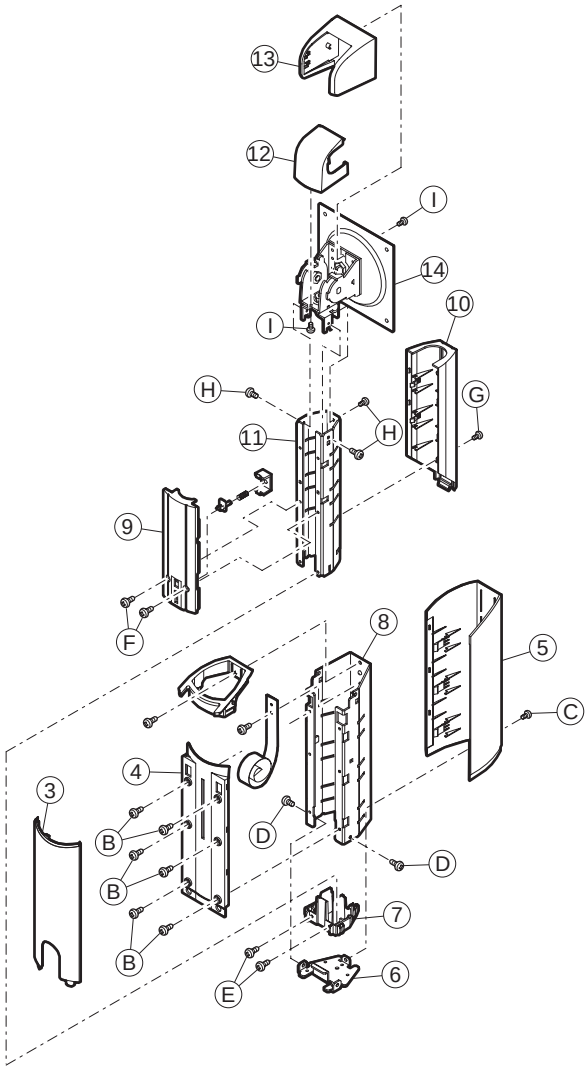
1) Remove the screw Ⓑ and then remove the display cover ③.
2) Remove the screw Ⓒ and then remove the shield plate ④.
3) Remove the connector pin ⓐ and screw Ⓓ. Remove the USB board ⑤.
4) Remove the connectors (ⓑ, ⓒ, ⓓ, ⓔ) and screws (Ⓔ, Ⓕ). Remove the main board ⑥.
5) Remove the screw Ⓖ and then remove the PS switch cover ⑦.
6) Remove the connector ⓕ and screw Ⓗ. Remove the power supply board ⑧.
7) Remove the screw Ⓘ and then remove the shield plate ⑨.
8) Remove the screw Ⓙ and then remove the connector locking seat ⑩.
9) Remove the connectors (ⓖ, ⓗ, ⓘ) and screw Ⓚ. Remove the inverter board ⑪.
10) Remove the display mask unit ⑫.
11) Remove the screw (Ⓛ, Ⓜ, Ⓝ, Ⓞ). Remove the LCD angles (⑬, ⑭, ⑮, ⑯).
12) Remove the board angles (⑰, ⑱).
13) Remove the connector ⓙ from the LCD unit ⑲.
14) Remove the screw Ⓟ. Remove the key switch angle ⑳.
15) Remove the key unit ㉑ and then remove the connector ⓚ.

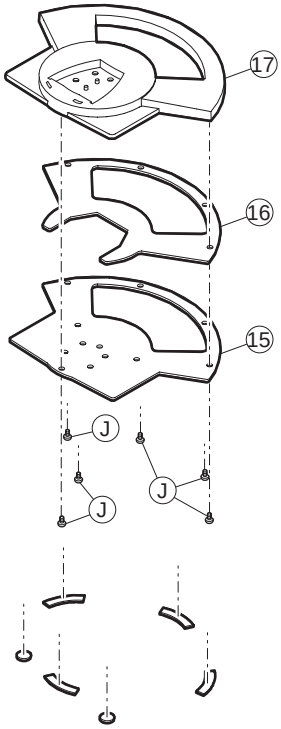


3. DISASSEMBLING STAND UNIT

1) Remove the screw Ⓐ. Separate the arm unit ① from the base unit ②.
2) Remove the cable cover ③.
3) Remove the screw Ⓑ and then remove the base arm cover ④.
4) Remove the screw Ⓒ and then remove the base arm cover ⑤.
5) Remove the screw Ⓓ and then remove the base arm install angle ⑥.
6) Remove the screw Ⓔ and then remove the slide guide ⑦.
7) Remove the base arm angle ⑧.
8) Remove the screw Ⓕ and then remove the slide arm cover ⑨.
9) Remove the screw Ⓖ and then remove the slide arm cover ⑩.
10) Remove the screw Ⓗ and then remove the slide arm angle ⑪.
11) Remove the screw Ⓘ and then remove the hinge covers (⑫, ⑬) from the hinge unit ⑭.
12) Remove the screw Ⓙ and then remove the stand base plates (⑮, ⑯) from the stand cover ⑰.





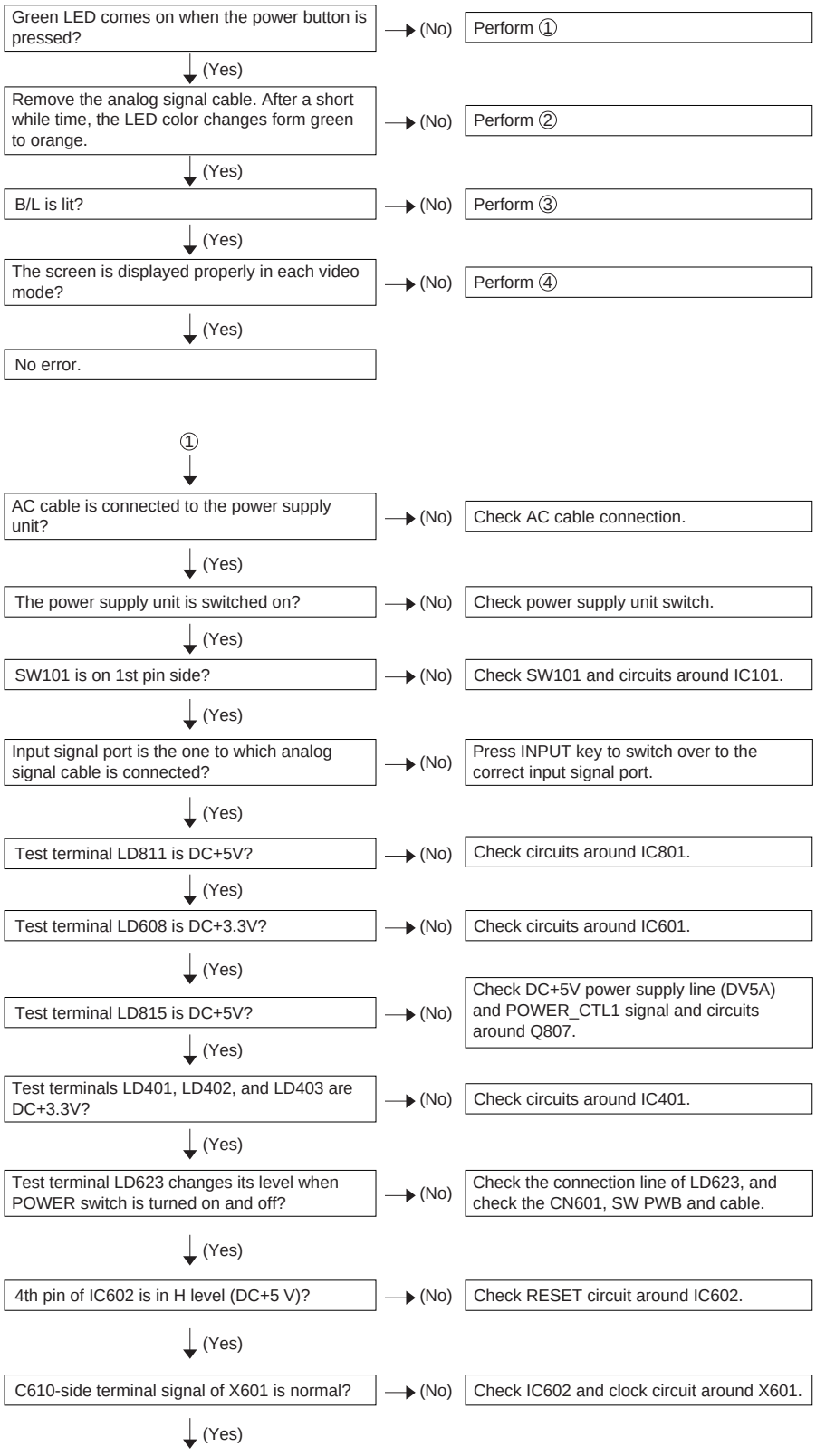


CHAPTER 4. TROUBLESHOOTING

Check whether the following cables are connected correctly.
In addition, check whether the PCs video mode is properly set to the signal timing which meets this machine.

☆ Attached cables
- Dedicated AC adapter
- Dedicated analog signal cable (DVI-A cable)
- Dedicated digital signal cable (DVI-D cable)

• The display does not work. (with analog connection, DVI-A cable use)



continued from ①

(Yes)

Signal waveforms of test terminals LD304, LD305 (LD317, LD318) are normal? → (No) Check analog signal cable and CN101 (CN201).

(Yes)

Signal waveforms of test terminals LD312, LD323 (LD313, LD324) are normal? → (No) Check circuits around IC301 and IC302.

(Yes)

Signal waveforms of 31st and 32nd pins of IC402 are normal? → (No) Check SDA and SCL signals and circuits around IC402 and IC602.

(Yes)

48th pin of IC602 is in H level (DC+3.3V)? → (No) Check circuits around IC602.

(Yes)

LD613 is H in level (about DC+1.9V)? → (No) Check Q601 and its surrounding circuit.

(Yes)

Check SW PWB and SW cable and their connections.

②

The port from which the analog signal cable was removed is the input signal port selected? → (No) Press INPUT key to switch over to the correct input signal port.

(Yes)

48th pin and 49th pins of IC602 are in H level (DC+3.3V)? → (No) Check circuits around IC602.

(Yes)

LD613 and LD616 are in H level (about DC+1.9V)? → (No) Check Q601 and its surrounding circuits.

(Yes)

Check SW PWB and SW cable and their connections.

③

Test terminal LD801 is DC+12V? → (No) When CN802 cable is removed, check the LD801 is DC+12V. → (No) Check the power unit and cable and their connections, and DC+12V power supply line.

(Yes) ↓

Check inverter unit, inverter cable and their connections.

(Yes)

LD807 is in H level (DC+5V)? → (No) Check BL_EN signal and circuits around CN802.

(Yes)

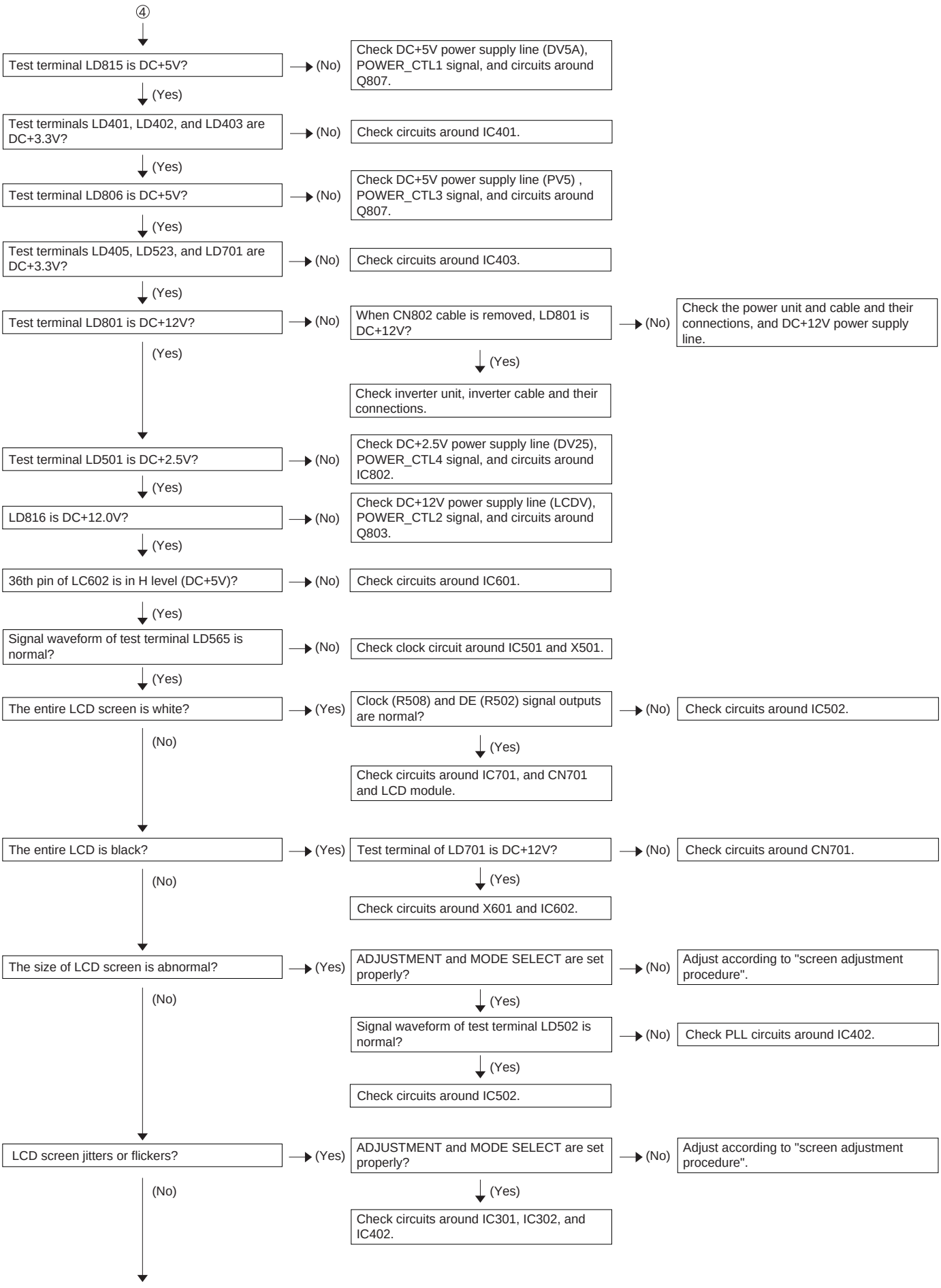
LD808 is less than DC+1.0V at maximum brightness? → (No) Check BRT_VR signal and circuits around IC604.

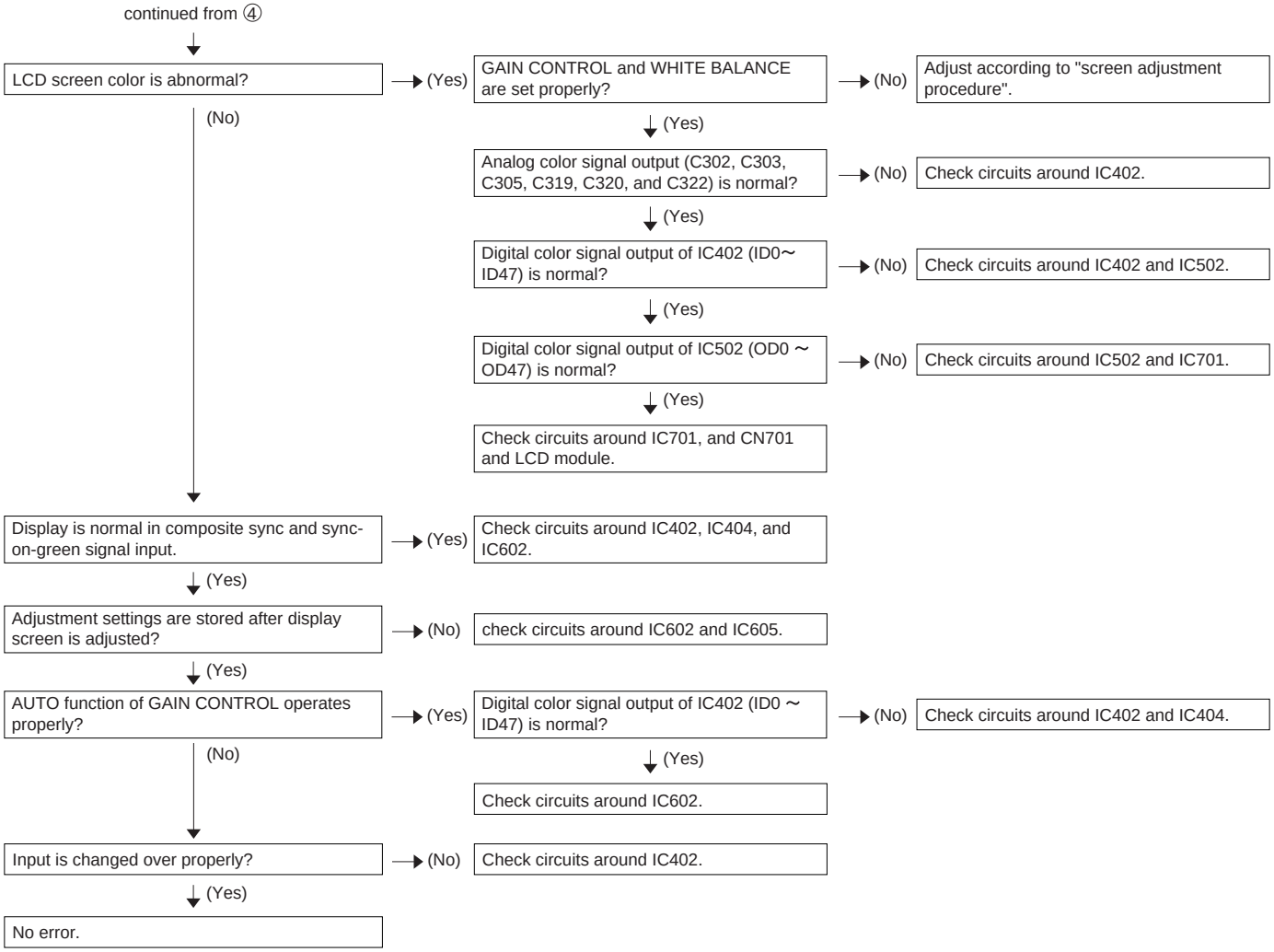
(Yes)

1st pin of CN2, CN3, CN4, CN5, CN6, and CN7 on inverter PWB unit is about 790 Vrms? (Use caution not to get electric shock accident. Use a high-voltage probe (more than 100:1) for measuring voltage.) → (No) Replace inverter PWB unit with a new one.

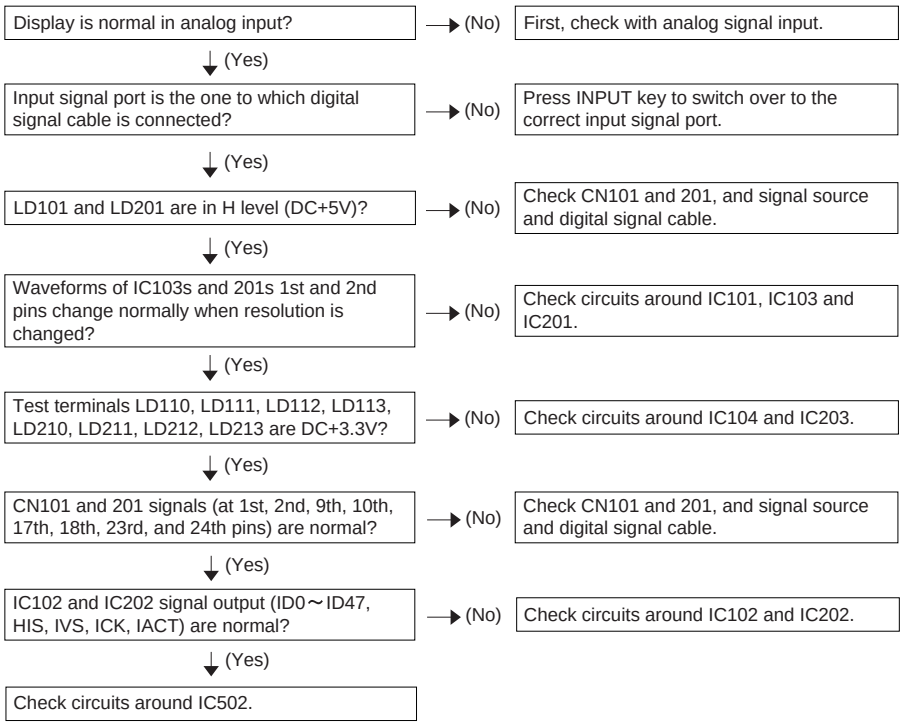
(Yes)

Check lamp inside LCD module.


④
Test terminal LD815 is DC+5V?
(No)
Check DC+5V power supply line (DV5A), POWER_CTL1 signal, and circuits around Q807.
(Yes)
Test terminals LD401, LD402, and LD403 are DC+3.3V?
(No)
Check circuits around IC401.
(Yes)
Test terminal LD806 is DC+5V?
(No)
Check DC+5V power supply line (PV5) , POWER_CTL3 signal, and circuits around Q807.
(Yes)
Test terminals LD405, LD523, and LD701 are DC+3.3V?
(No)
Check circuits around IC403.
(Yes)
Test terminal LD801 is DC+12V?
(No)
When CN802 cable is removed, LD801 is DC+12V?
(No)
Check the power unit and cable and their connections, and DC+12V power supply line.
(Yes)
(Yes)
Check inverter unit, inverter cable and their connections.
Test terminal LD501 is DC+2.5V?
(No)
Check DC+2.5V power supply line (DV25), POWER_CTL4 signal, and circuits around IC802.
(Yes)
LD816 is DC+12.0V?
(No)
Check DC+12V power supply line (LCDV), POWER_CTL2 signal, and circuits around Q803.
(Yes)
36th pin of LC602 is in H level (DC+5V)?
(No)
Check circuits around IC601.
(Yes)
Signal waveform of test terminal LD565 is normal?
(No)
Check clock circuit around IC501 and X501.
(Yes)
The entire LCD screen is white?
(Yes)
Clock (R508) and DE (R502) signal outputs are normal?
(No)
Check circuits around IC502.
(No)
(Yes)
Check circuits around IC701, and CN701 and LCD module.
The entire LCD is black?
(Yes)
Test terminal of LD701 is DC+12V?
(No)
Check circuits around CN701.
(No)
(Yes)
Check circuits around X601 and IC602.
The size of LCD screen is abnormal?
(Yes)
ADJUSTMENT and MODE SELECT are set properly?
(No)
Adjust according to "screen adjustment procedure".
(No)
(Yes)
Signal waveform of test terminal LD502 is normal?
(No)
Check PLL circuits around IC402.
(Yes)
Check circuits around IC502.
LCD screen jitters or flickers?
(Yes)
ADJUSTMENT and MODE SELECT are set properly?
(No)
Adjust according to "screen adjustment procedure".
(No)
(Yes)
Check circuits around IC301, IC302, and IC402.



- **The display does not work. (with digital connection, DVI-D cable use)**



CHAPTER 5. WAVE FORM

Waveform measurement condition: Input each of the display patterns and measure the waveform (tinming chart).

Wave-form No.	Measurement point	Name of waveform	Display pattern
1	LD565	REFCK	Arbitrary
2	IC601 of 2PIN	XTAL	Arbitrary
3	LD305, LD318	VSYNC	Arbitrary
4	LD304, LD317	HSYNC	Arbitrary
5	LD502	ICK	Arbitrary
6	LD504	VS	Arbitrary
7	LF505	IHS	Arbitrary
8	IC701 of 10PIN	DCLK	Arbitrary
9	IC701 of 9PIN	DEN	Arbitrary
10	LD300, LD301, LD302	RGB OUT	16 monochromatic gradation patterns

CAUTION

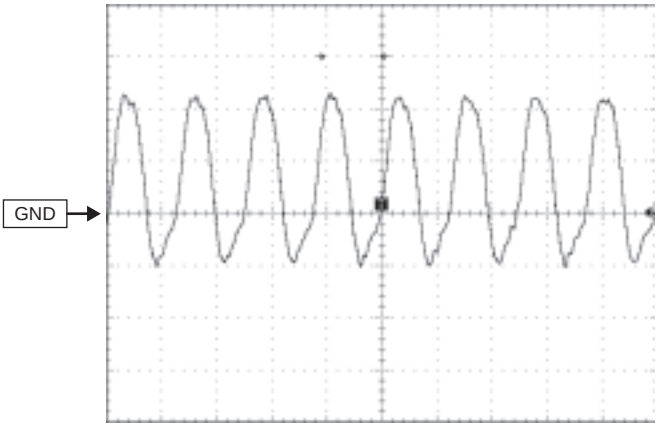
Oscilloscope: Tektronix644B
Input signal: VESA1600 x 1200
H: 75kHz V: 60Hz
DOTCLK: 162MHz

WAVE FORM 1: REFCK (LD565)

Frequency: 81MHz

Display screen: Arbitrary

2V/DIV, 10ns/DIV

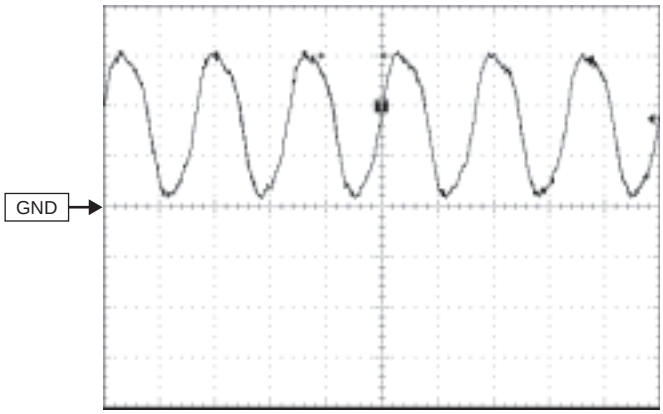


WAVE FORM 2: XTAL (IC601 of 2PIN)

Frequency: 24MHz

Display screen: Arbitrary

1V/DIV, 25ns/DIV

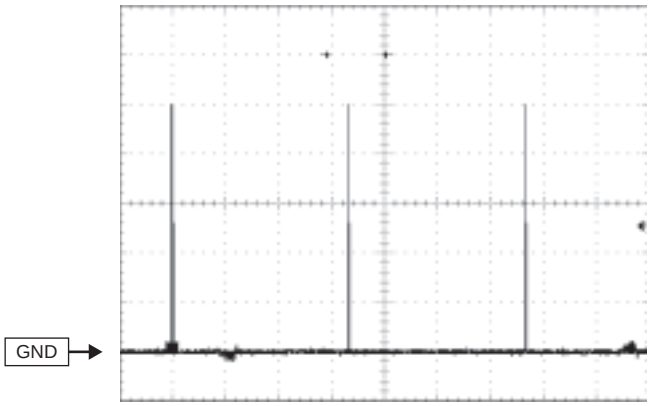


WAVE FORM 3: VSYNC (LD305, LD318)

Frequency: 60Hz

Display screen: Arbitrary

1V/DIV, 5ms/DIV

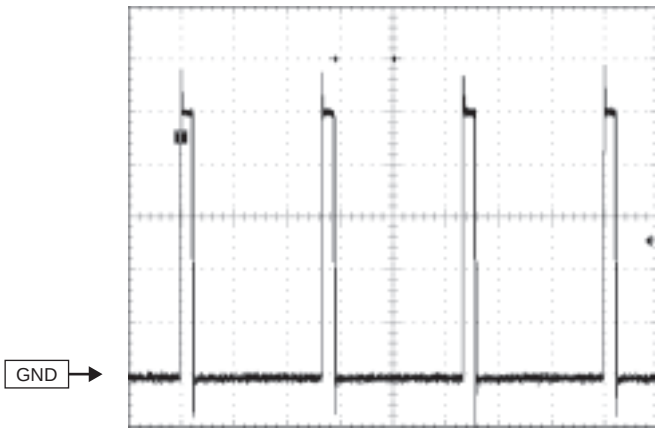


WAVE FORM 4: HSYNC (LD304, LD317)

Frequency: 75kHz

Display screen: Arbitrary

1V/DIV, 5µs/DIV

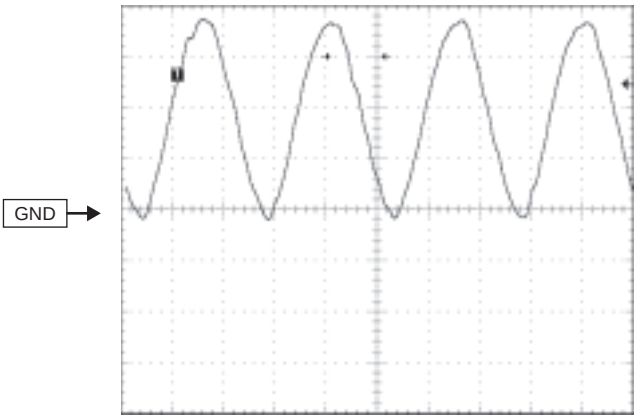


WAVE FORM 5: ICK (LD502)

Frequency: 81MHz

Display screen: Arbitrary

1V/DIV, 5ns/DIV

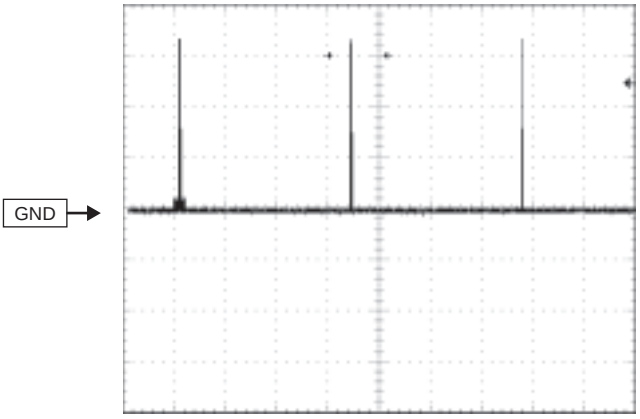


WAVE FORM 6: VS (LD504)

Frequency: 60Hz

Display screen: Arbitrary

1V/DIV, 5ms/DIV

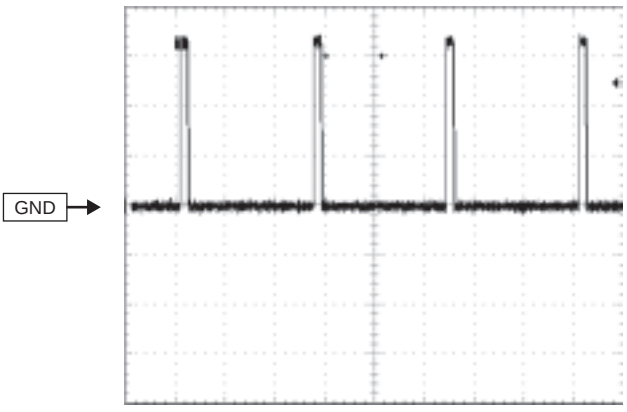


WAVE FORM 7: IHS (LD505)

Frequency: 75kHz

Display screen: Arbitrary

1V/DIV, 5µs/DIV

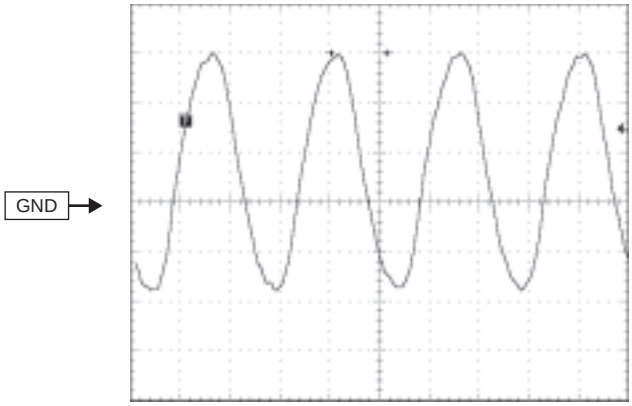


WAVE FORM 8: DCLK (IC701 of 10PIN)

Frequency: 81MHz

Display screen: Arbitrary

1V/DIV, 5ns/DIV

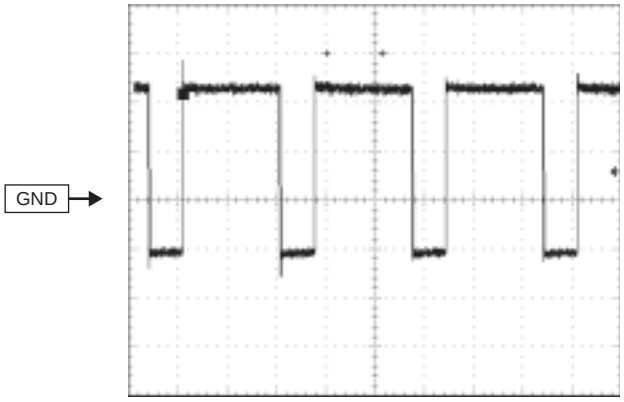


WAVE FORM 9: DEN (IC701 of 9PIN)

Frequency: 75kHz

Display screen: Arbitrary

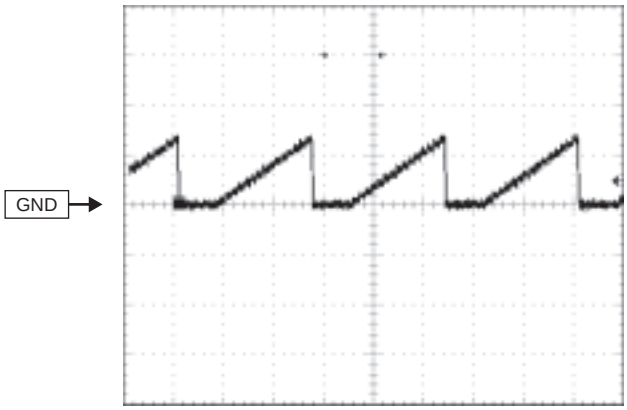
1V/DIV, 5µs/DIV



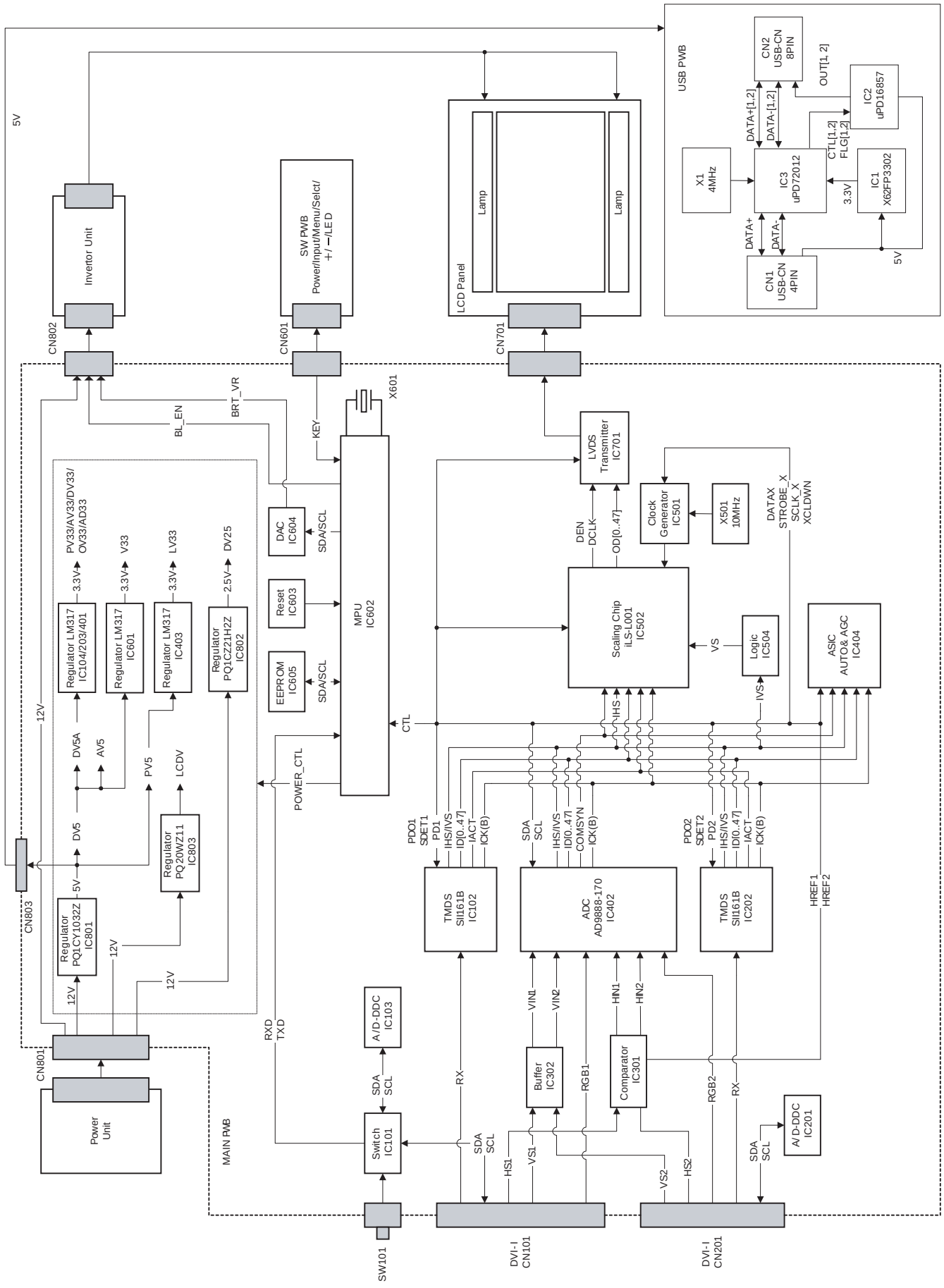
WAVE FORM 10: RGB OUT (LD300, LD301, LD302)

Display screen: 16 monochromatic gradation patterns

0.5V/DIV, 5µs/DIV



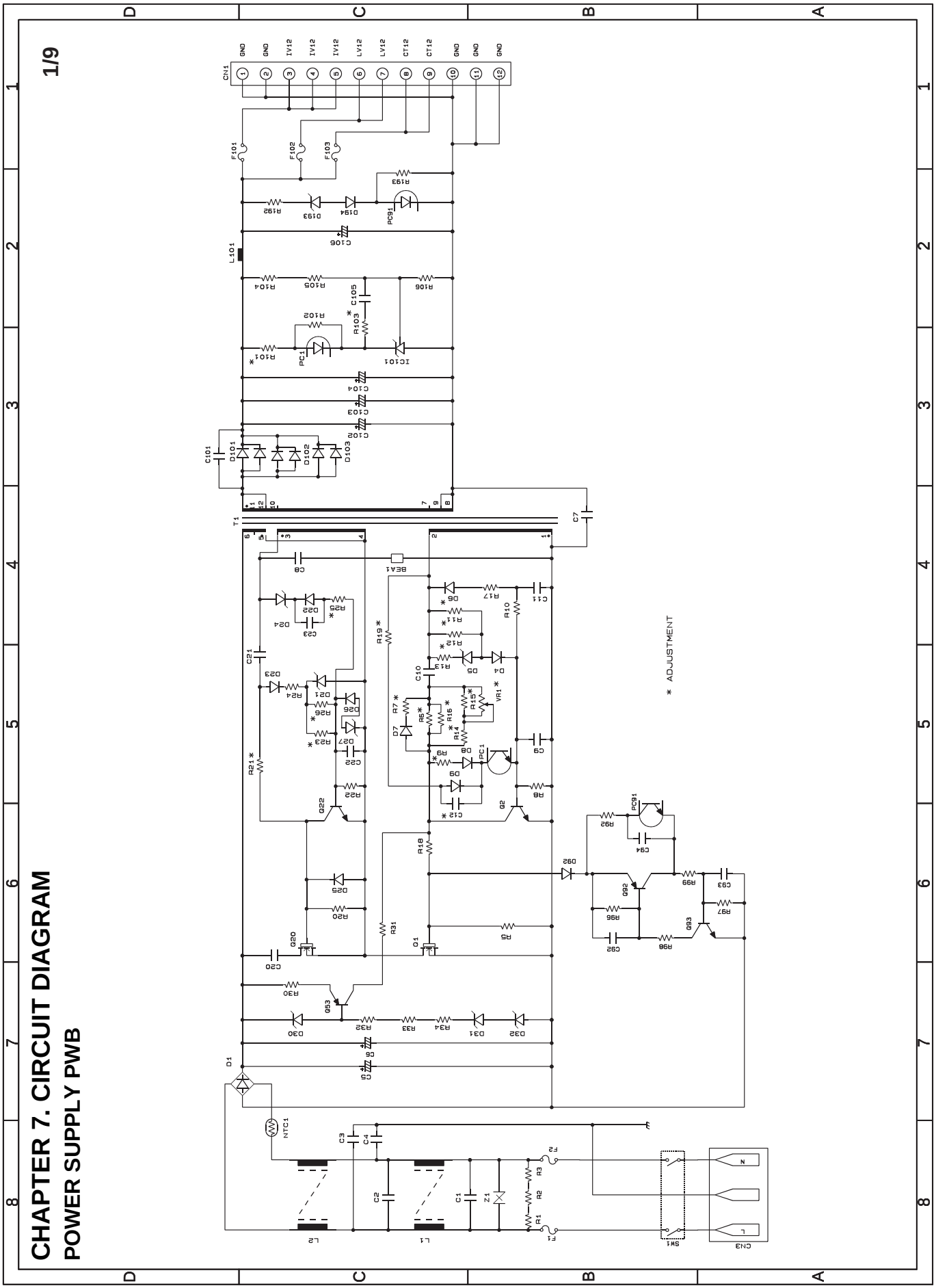
CHAPTER 6. BLOCK DIAGRAM

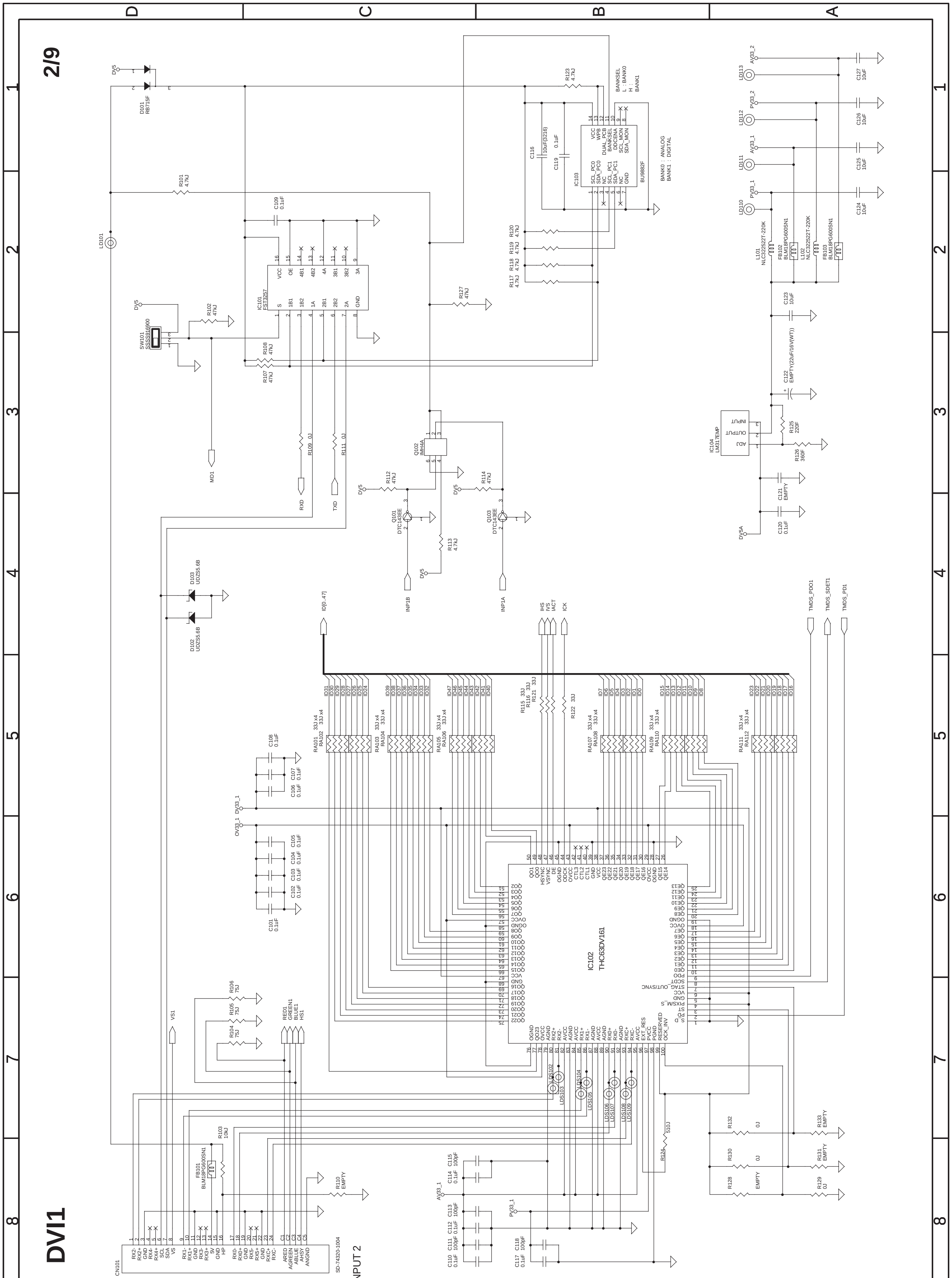


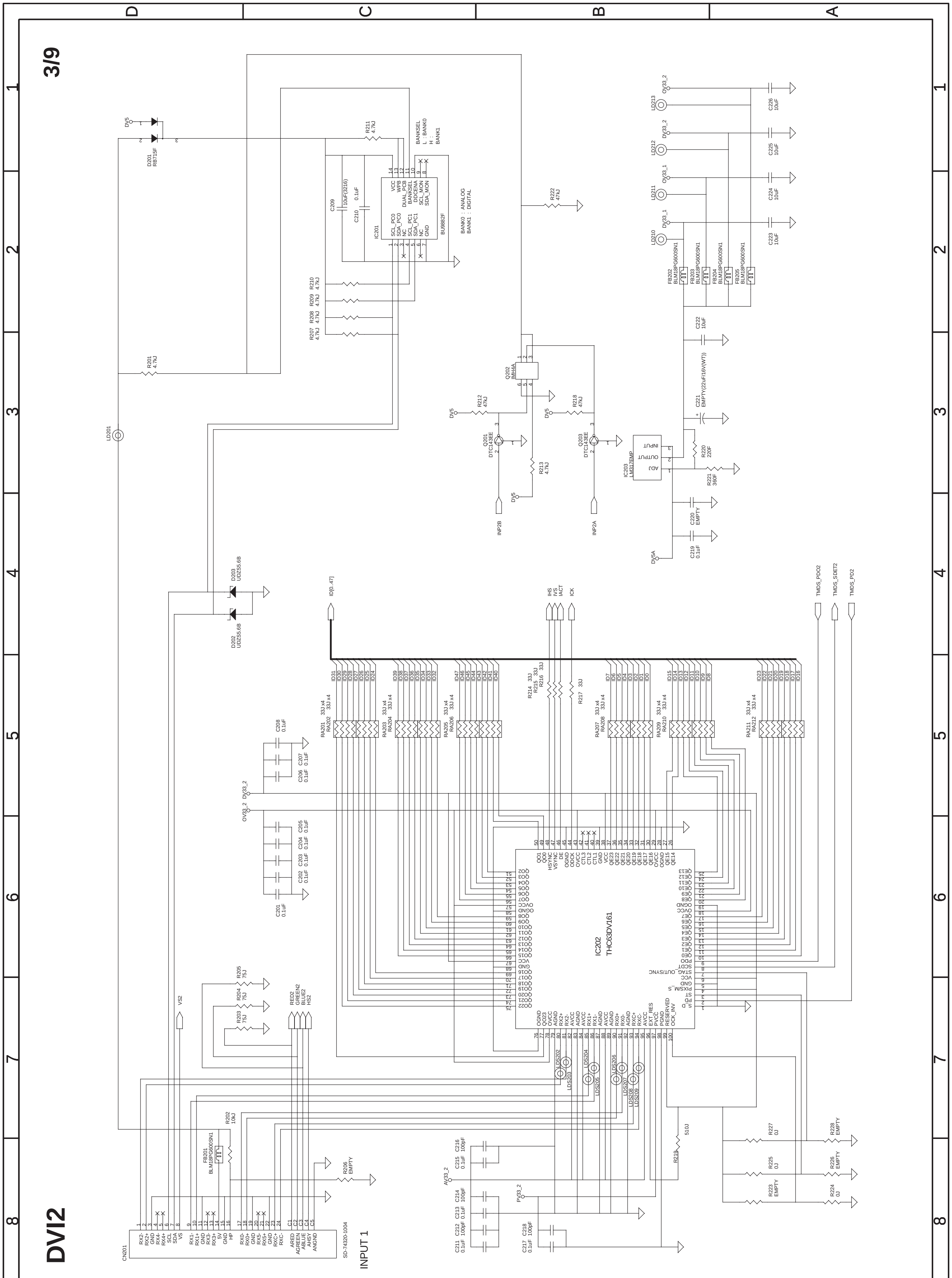
CHAPTER 7. CIRCUIT DIAGRAM

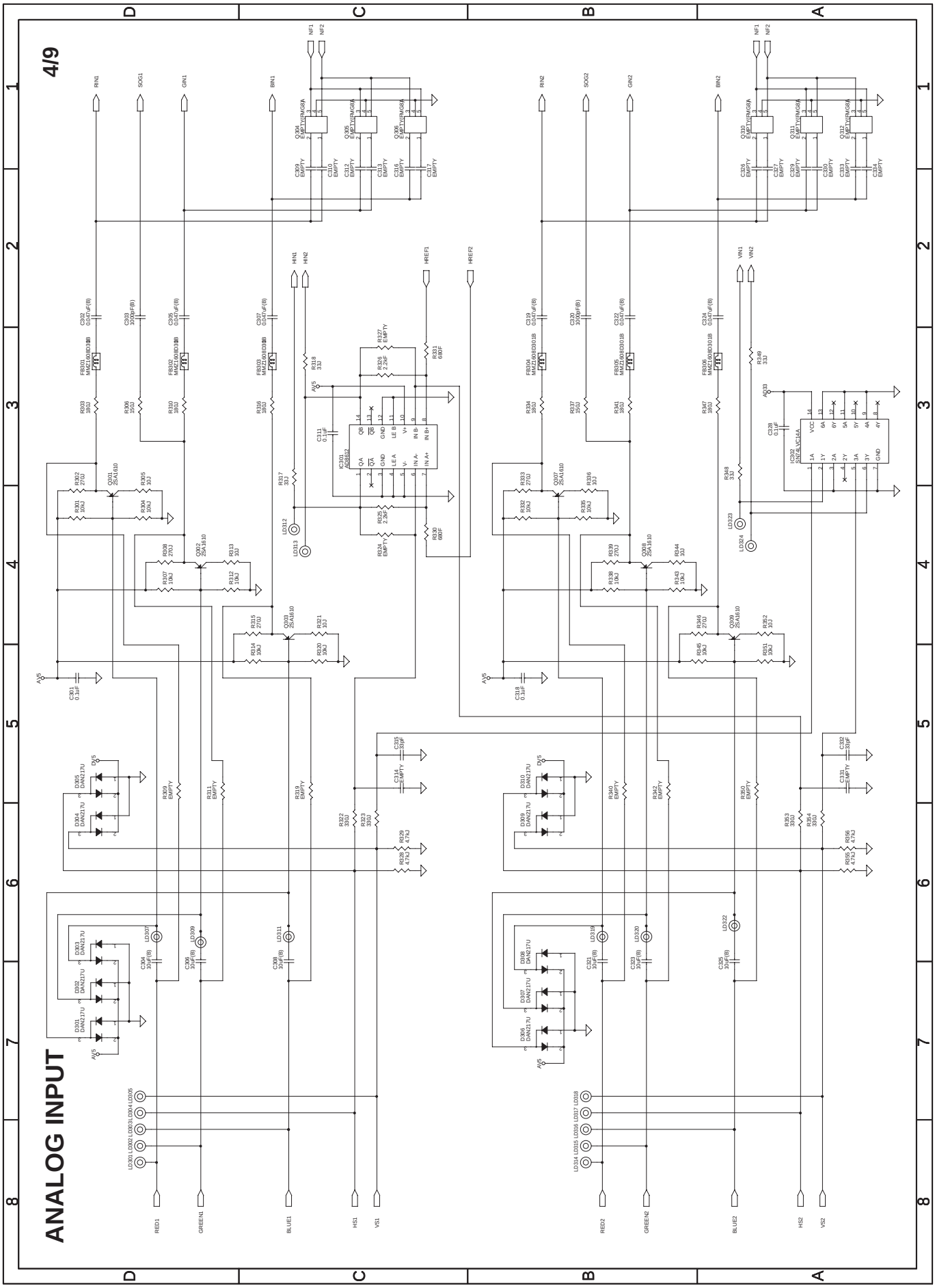
POWER SUPPLY PWB

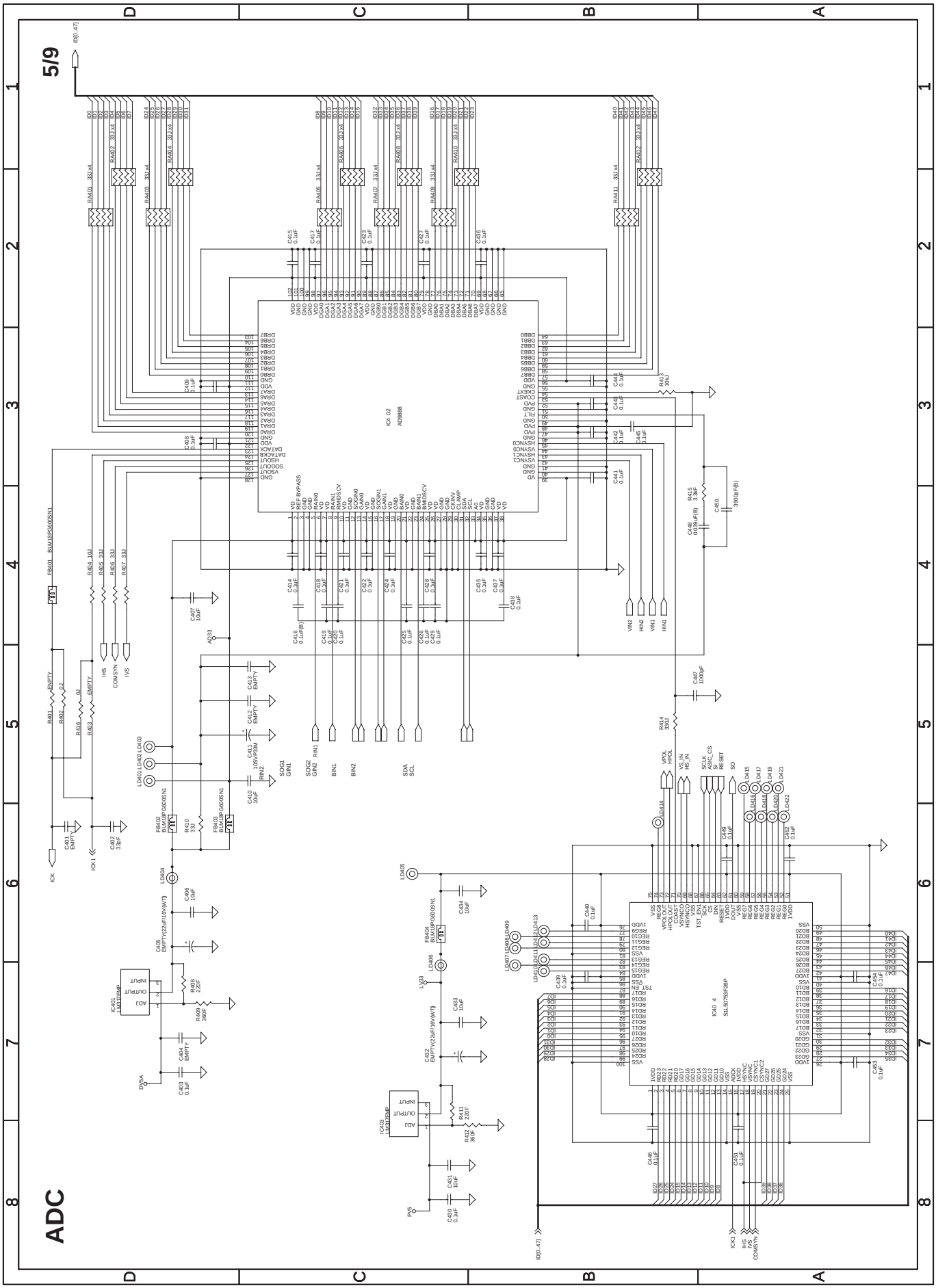
1/9

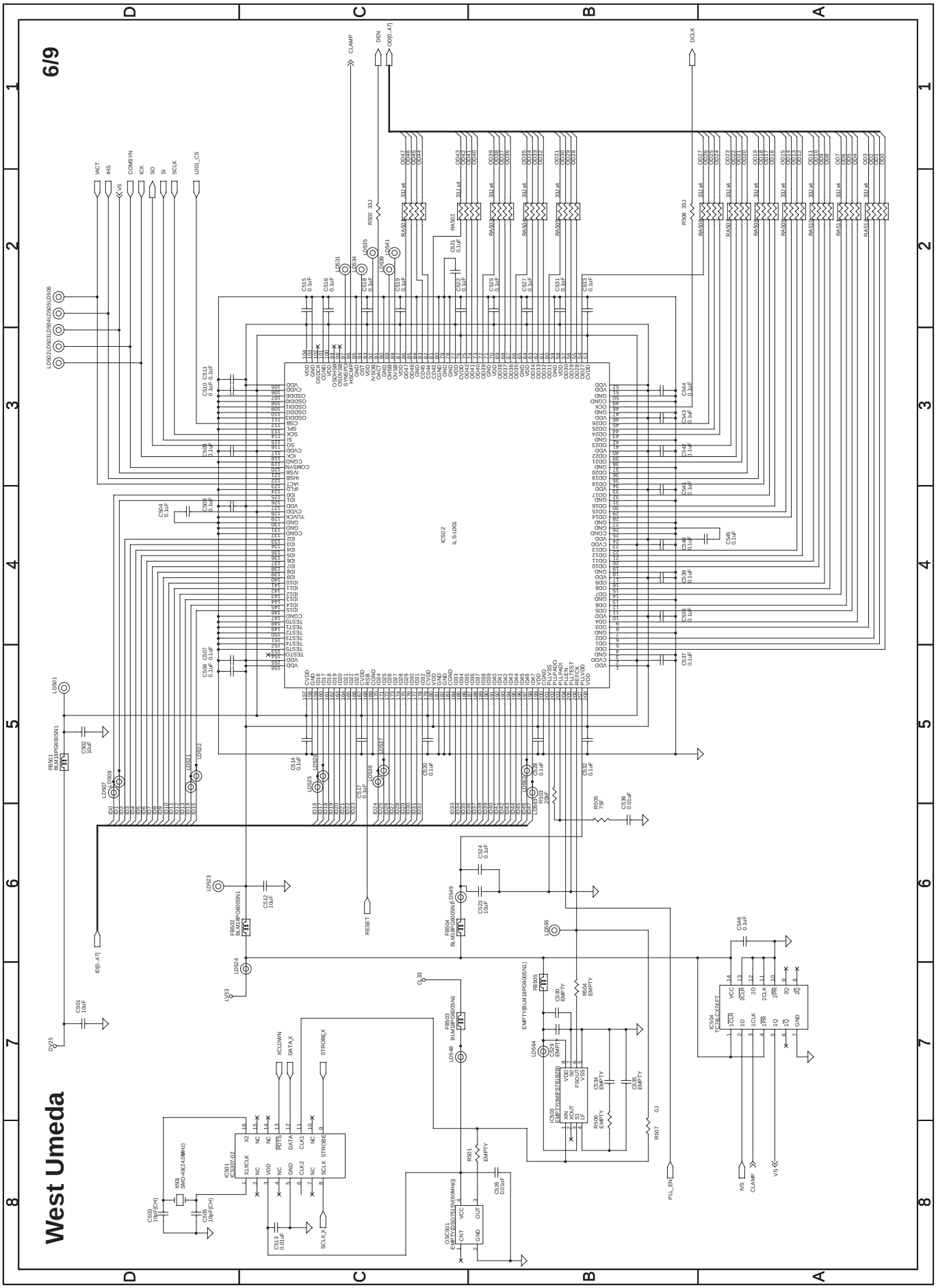


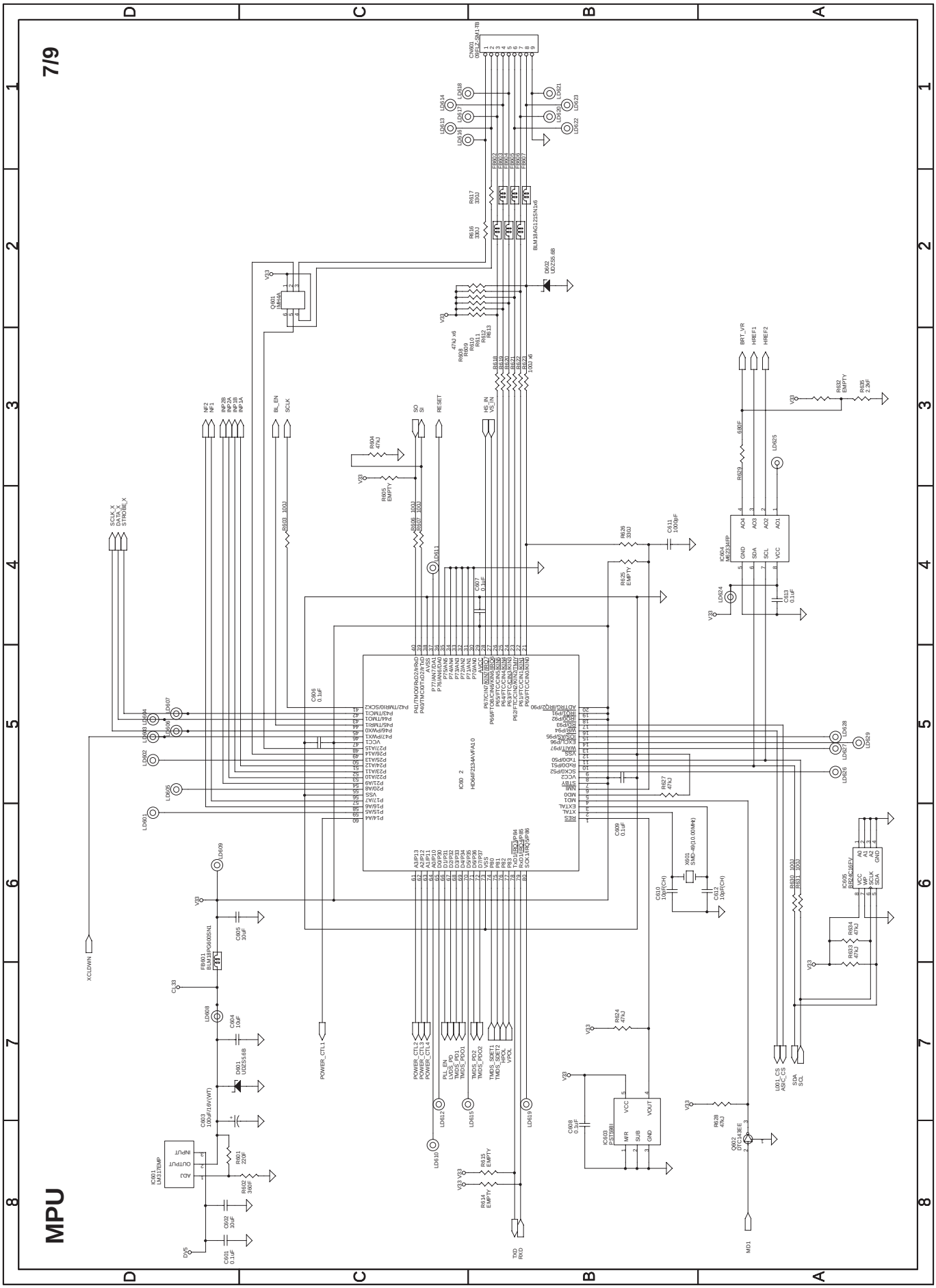

DVI1
2/9
IC101
FST3257
IC102
THC63DV161
IC103
BU9882F
IC104
LM317EMP
CN101
SD-74320-1004
INPUT 2
BANKSEL
L : BANK0
H : BANK1
BANK0 : ANALOG
BANK1 : DIGITAL
SW101
SSSS916900
D101
RB715F
Q101
DTC143EE
Q102
IMH4A
Q103
DTC143EE
D102
UDZS5.6B
D103
UDZS5.6B
FB101
BLM18PG600SN1
L101
NLC322522T-220K
L102
NLC322522T-220K
FB102
BLM18PG600SN1
FB103
BLM18PG600SN1
C122
EMPTY(22uF/16V(WT))
RXD
TXD
MD1
INP1A
INP1B
ID[0..47]
IHS
IVS
IACT
ICK
TMDS_PDO1
TMDS_SDET1
TMDS_PD1
RED1
GREEN1
BLUE1
HS1
VS1

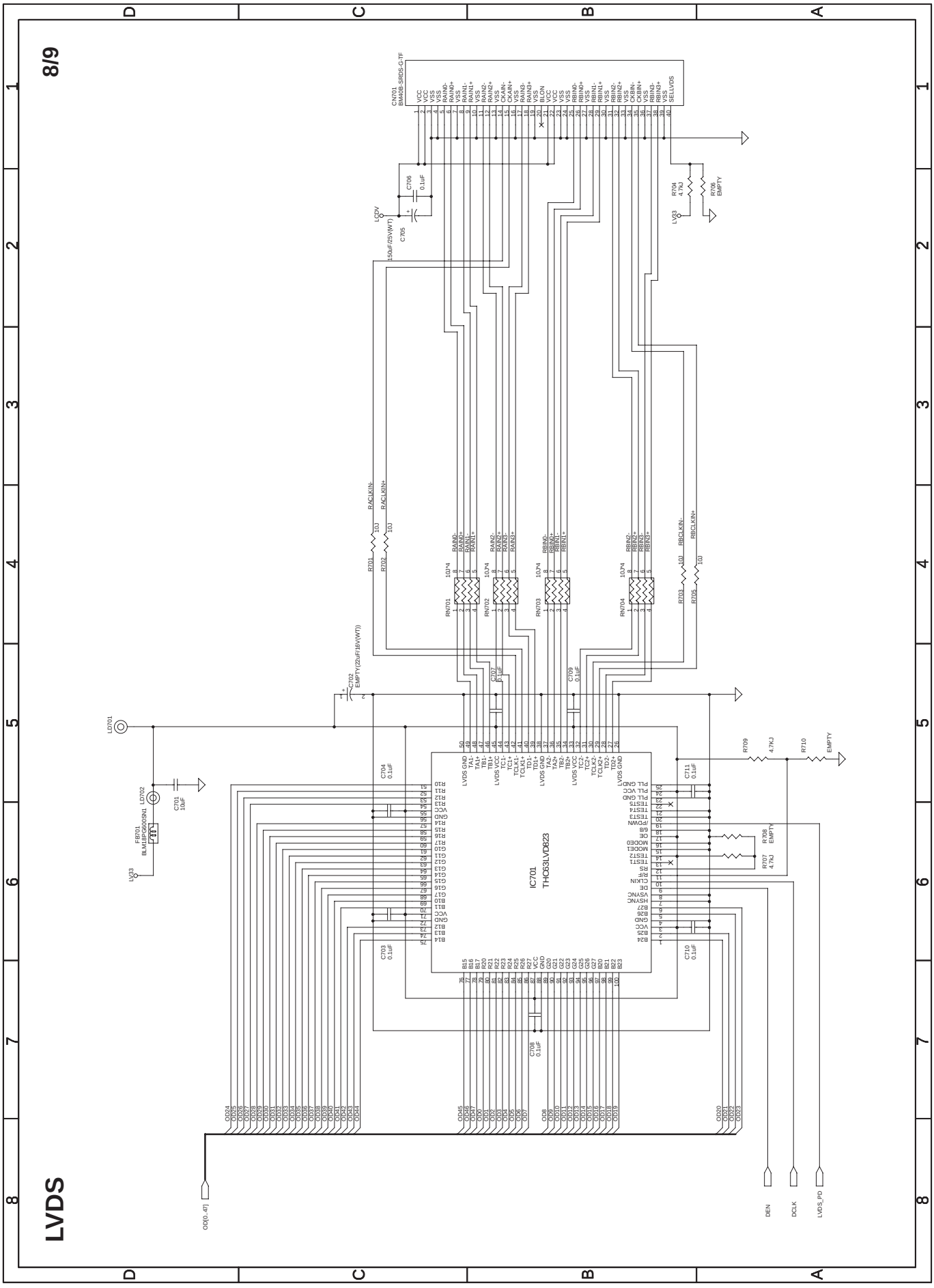

DVI2
3/9
INPUT 1
IC202
THC63DV161
IC201
BU9882F
IC203
CN201

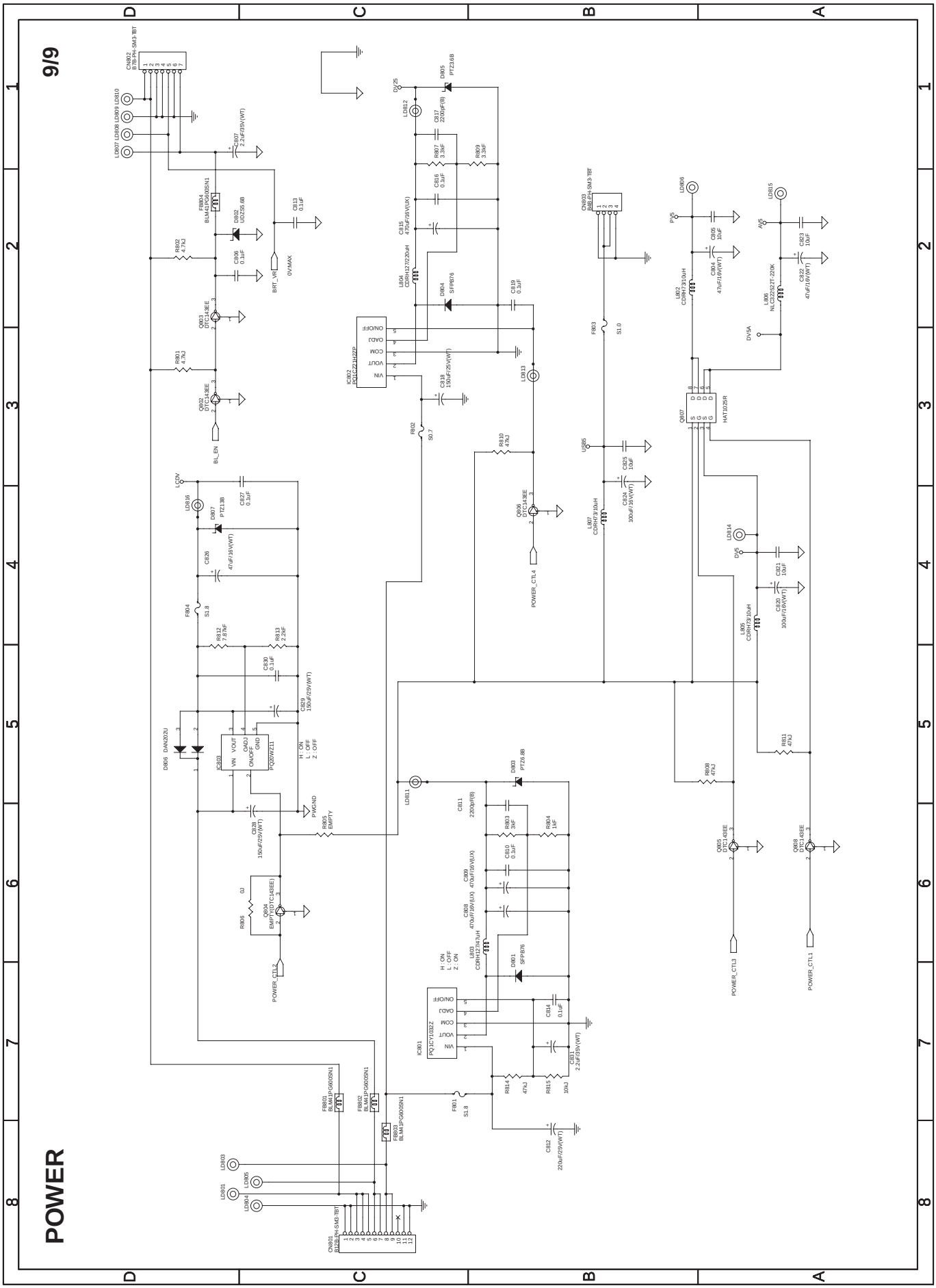

4/9
ANALOG INPUT
RIN1
SOG1
GIN1
BIN1
RIN2
SOG2
GIN2
BIN2
HIN1
HIN2
VIN1
VIN2
HREF1
HREF2
RED1
GREEN1
BLUE1
HS1
VS1
RED2
GREEN2
BLUE2
HS2
VS2


ADC
5/9


6/9
West Umeda

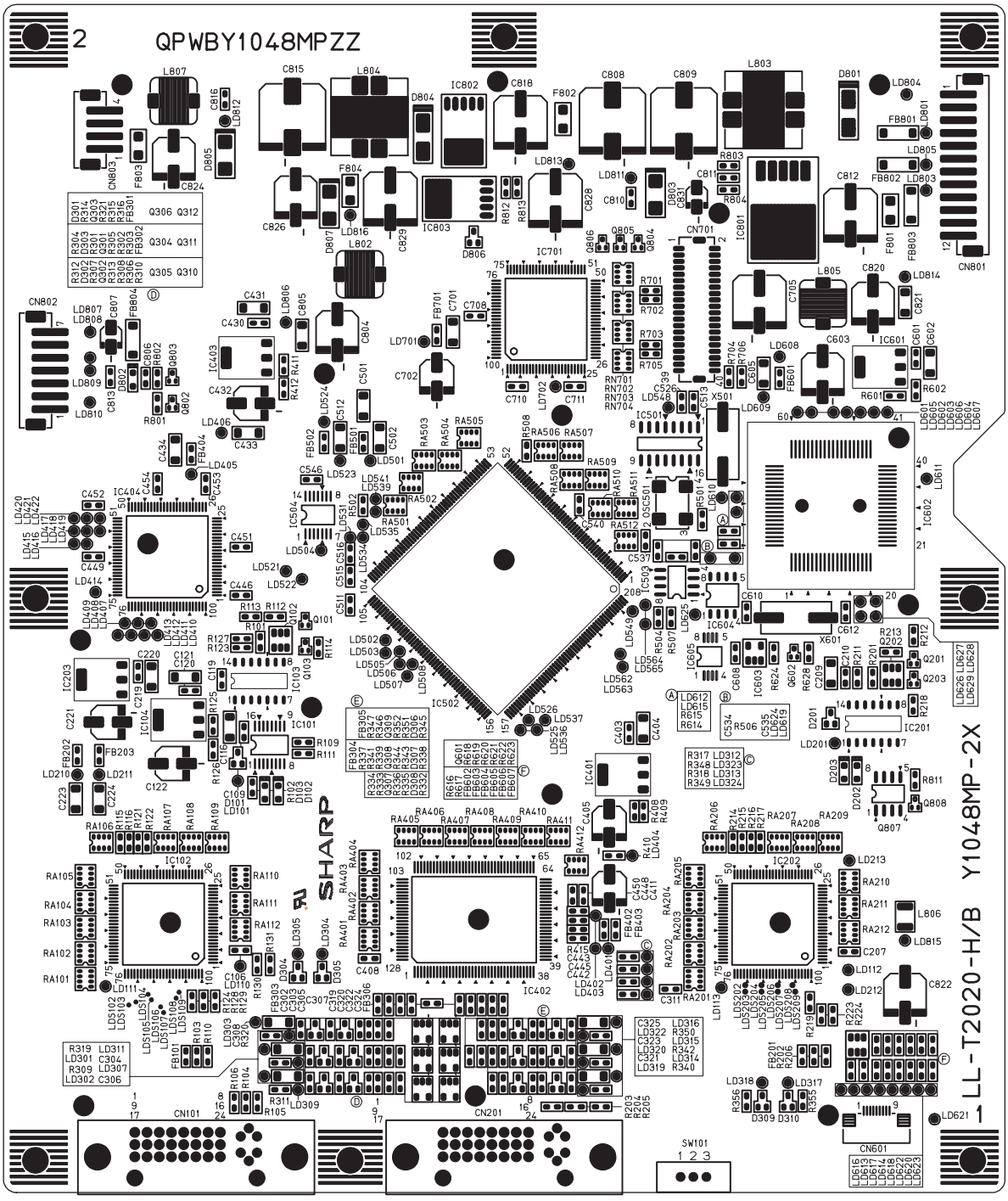

MPU
7/9

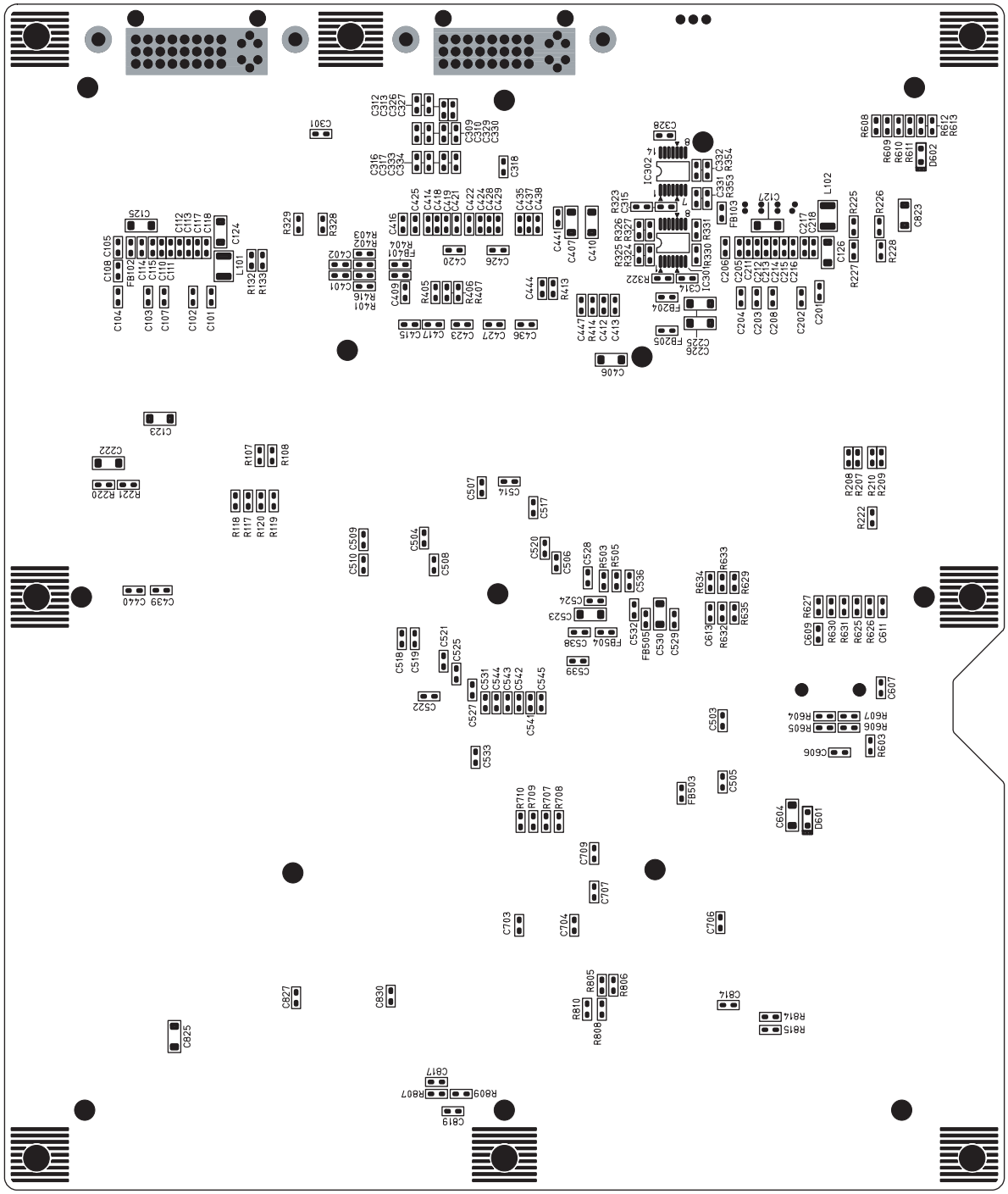

8/9
LVDS
IC701
THC63LVD823
CN701
BM40B-SRDS-G-TF
OD[0..47]
DEN
DCLK
LVDS_PD


POWER
9/9

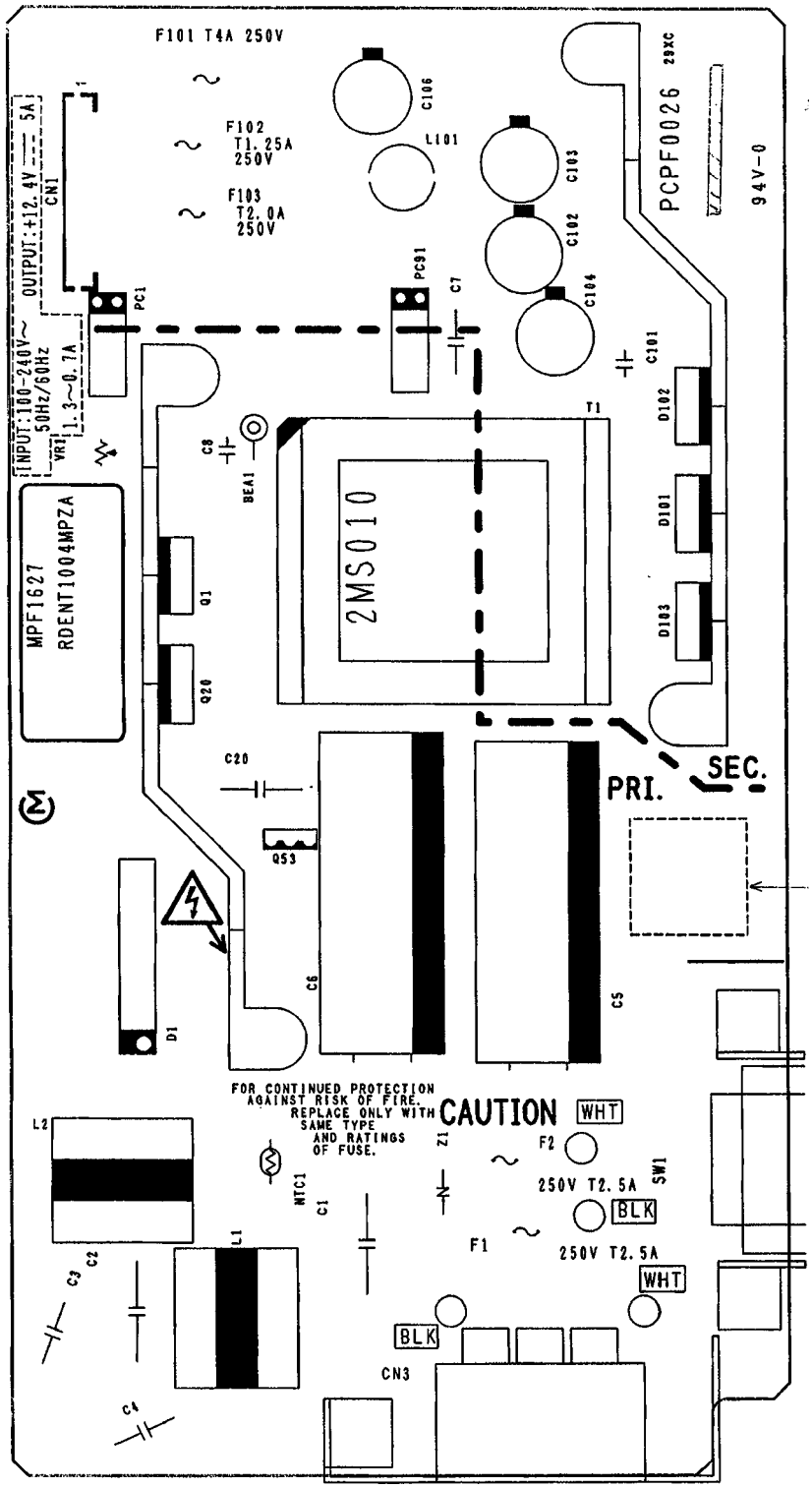
CHAPTER 8. PARTS LAYOUT

MAIN PWB





POWER SUPPLY PWB



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