

Service  
Service  
Service



- 220BW9CS/00
- 220BW9CB/00
- 220BW9CB/27
- 220BW9CB/69
- 220BW9CB/75
- 220BW9CB/93



# Service Manual

Horizontal frequencies  
30 - 83 kHz

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### SAFETY NOTICE

ANY PERSON ATTEMPTING TO SERVICE THIS CHASSIS MUST FAMILIARIZE HIMSELF WITH THE CHASSIS AND BE AWARE OF THE NECESSARY SAFETY PRECAUTIONS TO BE USED WHEN SERVICING ELECTRONIC EQUIPMENT CONTAINING HIGH VOL TAGES.

CAUTION: USE A SEPARATE ISOLATION TRANSFORMER FOR THIS UNIT WHEN SERVICING.

REFER TO BACK COVER FOR IMPORTANT SAFETY GUIDELINES

## Important Safety Notice

Proper service and repair is important to the safe, reliable operation of all Philips Consumer Electronics Company equipment. The service procedures recommended by Philips and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It is also important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Philips could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Philips has not undertaken any such broad evaluation. Accordingly, who uses a service procedure or tool which is not recommended by Philips must first satisfy himself thoroughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

\*\* Hereafter throughout this manual, Philips Consumer Electronics Company will be referred to as Philips. \*\*

### WARNING

Critical components having special safety characteristics are identified with a by the Ref. No. in the parts list and enclosed within a broken line

(where several critical components are grouped in one area) along with the safety symbol on the schematics or exploded views.

Use of substitute replacement parts which do not have the same specified safety characteristics may create shock, fire, or other hazards.

Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.

### FOR PRODUCTS CONTAINING LASER :

- DANGER - Invisible laser radiation when open.  
AVOID DIRECT EXPOSURE TO BEAM.
- CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- CAUTION - The use of optical instruments with this product will increase eye hazard.

TO ENSURE THE CONTINUED RELIABILITY OF THIS PRODUCT, USE ONLY ORIGINAL MANUFACTURER'S REPLACEMENT PARTS, WHICH ARE LISTED WITH THEIR PART NUMBERS IN THE PARTS LIST SECTION OF THIS SERVICE MANUAL.

Take care during handling the LCD module with backlight unit

- Must mount the module using mounting holes arranged in four corners.
- Do not press on the panel, edge of the frame strongly or electric shock as this will result in damage to the screen.
- Do not scratch or press on the panel with any sharp objects, such as pencil or pen as this may result in damage to the panel.
- Protect the module from the ESD as it may damage the electronic circuit (C-MOS).
- Make certain that treatment body are grounded through wrist band.
- Do not leave the module in high temperature and in areas of high humidity for a long time.
- Avoid contact with water as it may as short circuit within the module.
- If the surface of panel become dirty, please wipe it off with a soft material. (Cleaning with a dirty or rough cloth may damage the panel.)

# Technical Data

## SEC Panel

Type NR.	: SEC LTM220M1-L01
Resolution	: 1680 x 1050 (WSXGA+)
Outside dimensions	: 493.7(H) x 320.1(V) Typ. x 17.0(D) Max.
Pitch (mm)	: 0.282mm x 0.282mm
Color pixel arrangement	: RGB vertical stripe
Display surface	: Haze 25% Hard coating (3H)
Color depth	: 16.7M (6 bit Hi-FRC)
Backlight	: 4 CCFL
Active area (W x H)	: 473.76(H) x 296.1(V) mm
View angle (CR=10)	: =160 for Right/Left (Typ) : =160 for Up/Down (Typ)
Contrast ratio	: 1000:1 (Typ)
White luminance	: 300(Typ.)
Color gamut	: >=72%
Gate IC	: TOSHIBA
Source IC	: NEC
Response time	: Tr + Tf <=5 ms (Typ)
Vertical frequency range	: 53~76Hz



Pin No.	Description
1	T.M.D.S. data2-
2	T.M.D.S. data2+
3	T.M.D.S. data2 shield
4	No Connect
5	No Connect
6	DDC clock
7	DDC data
8	No Connect
9	T.M.D.S. data1-
10	T.M.D.S. data1+
11	T.M.D.S. data1 shield
12	No Connect
13	No Connect
14	+5V Power
15	Ground (for +5V)
16	Hot plug detect
17	T.M.D.S. data0-
18	T.M.D.S. data0+
19	T.M.D.S. data0 shield
20	No Connect
21	No Connect
22	T.M.D.S. clock shield
23	T.M.D.S. clock+
24	T.M.D.S. clock-

## Scanning frequencies

Hor.	: 30 – 83 K Hz
Ver.	: 56 - 76 Hz
Video dot rate:	< 205 MHz (warning message must be displayed while over 165 MHz)
Power input:	90-264 V AC, 50/60 ± 2 Hz
Power consumption:	55 W(Max) (with audio)
Functions:	
(1)D-SUB analog R/G/B separate inputs, H/V sync separated, Composite (H+V) TTL level, SOG sync	
(2) DVI digital Panel Link TMDS inputs	

**Ambient temperature: 0 °C - 40 °C**

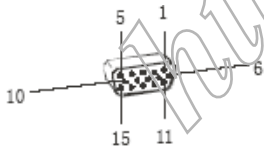
## Power input connection

Power cord length	: 1.8 M
Power cord type	: 3 leads power cord with protective earth plug.

## Power management

The monitor must comply with the Microsoft On Now specification, and meet EPA requirements.

Mode	HSYNC	VSYSNC	Video	Pwr-cons.	Indication	Spec. time
Power-On	On	On	active	< 55 W	Blue LED	--
Standby	Off	Off	blanked	< 1W	Blink Blue LED Period: 3sec on, 3sec off	< 3 s
DC Power Off			N/A	< 0.8W	LED Off	



## Susceptibility of display to external environment

Operating	
- Temperature	: 0 to 35 degree C
- Humidity	: 80% max
- Altitude	: 0-3658m
- Air pressure	: 600-1100 mBAR

Storage	
- Temperature	: -20 to 60 degree C
- Humidity	: 95% max
- Altitude	: 0-12192m
- Air pressure	: 300-1100 mBAR

Note: recommend at 5 to 35°C, Humidity less than 60 %

PIN No.	SIGNAL	PIN No.	SIGNAL
1	Red	9	DDC +3.3V or +5V
2	Green/ SOG	10	Logic GND
3	Blue	11	Sense (GND)
4	Sense (GND)	12	Bi-directional data
5	Cable Detect (GND)	13	H/H+V sync
6	Red GND	14	V-sync
7	Green GND	15	Data clock
8	Blue GND		

Input DVI-D connector pin

# Technical Data

## LPL Paneal

Type NR. : LPL LM220WE1-TLE2/4  
 Resolution : 1680 x 1050 (WSXGA+)  
 Outside dimensions : 493.7(H) x 320.1 (V) x 16.5(D) mm (Typ.)  
 Pitch (mm) : 0.282mm x 0.282mm  
 Color pixel arrangement : 1680 horizontal By 1050 vertical Pixels.  
 RGB stripe arrangement  
 Display surface : Hard coating (3H), Anti-glare treatment of the front polarizer  
 Color depth : 16.7M colors  
 Backlight : 4 CCFL  
 Active area (W x H) : 21.995 inches(558.673mm) diagonal (Aspect ratio 16:10)  
 View angle (CR>=10) : R/L 170(Typ.), U/D 160(Typ.)  
 Contrast ratio : >1000:1 (Typ)  
 White luminance : 300 cd/m2(Typ. Center 1 point)  
 Color gamut : >=72%  
 Gate IC : N/A  
 Source IC : Magna , OKI  
 Response time : <=5 ms (Typ)  
 Vertical frequency range : 50~75Hz



## Scanning frequencies

Hor. : 30 – 83 K Hz  
 Ver.: 56 - 76 Hz  
 Video dot rate: < 205 MHz (warning message must be displayed while over 165 MHz)  
 Power input: 90-264 V AC, 50/60 ± 2 Hz  
 Power consumption: 55 W(Max) (with audio)  
 Functions:  
 (1)D-SUB analog R/G/B separate inputs, H/V sync separated, Composite (H+V) TTL level, SOG sync  
 (2) DVI digital Panel Link TMDS inputs

**Ambient temperature: 0 °C - 40 °C**

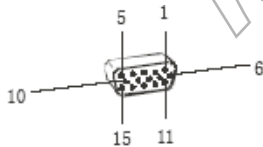
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Power cord length : 1.8 M  
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The monitor must comply with the Microsoft On Now specification, and meet EPA requirements.

Mode	HSYNC	VSYNC	Video	Pwr-cons.	Indication	Rec. time
Power-On	On	On	active	< 55 W	Blue LED	--
Standby	Off	Off	blanked	< 1W	Blink Blue LED Period: 3sec on, 3sec off	< 3 s
DC Power Off			N/A	< 0.3W	LED Off	



PIN No.	SIGNAL	PIN No.	SIGNAL
1	Red	9	DDC +3.3V or +5V
2	Green/ SOG	10	Logic GND
3	Blue	11	Sense (GND)
4	Sense (GND)	12	Bi-directional data
5	Cable Detect (GND)	13	H/H+V sync
6	Red GND	14	V-sync
7	Green GND	15	Data clock
8	Blue GND		

Input DVI-D connector pin

Pin No.	Description
1	T.M.D.S. data2-
2	T.M.D.S. data2+
3	T.M.D.S. data2 shield
4	No Connect
5	No Connect
6	DDC clock
7	DDC data
8	No Connect
9	T.M.D.S. data1-
10	T.M.D.S. data1+
11	T.M.D.S. data1 shield
12	No Connect
13	No Connect
14	+5V Power
15	Ground (for +5V)
16	Hot plug detect
17	T.M.D.S. data0-
18	T.M.D.S. data0+
19	T.M.D.S. data0 shield
20	No Connect
21	No Connect
22	T.M.D.S. clock shield
23	T.M.D.S. clock+
24	T.M.D.S. clock-

## Susceptibility of display to external environment

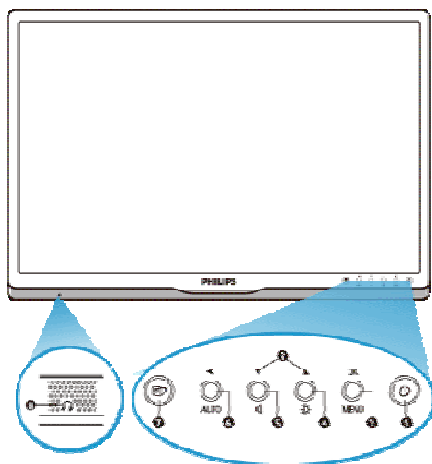
Operating  
 - Temperature : 0 to 35 degree C  
 - Humidity : 80% max  
 - Altitude : 0-3658m  
 - Air pressure : 600-1100 mBAR








Storage  
 - Temperature : -20 to 60 degree C  
 - Humidity : 95% max  
 - Altitude : 0-12192m  
 - Air pressure : 300-1100 mBAR

Note: recommend at 5 to 35°C, Humidity less than 60 %

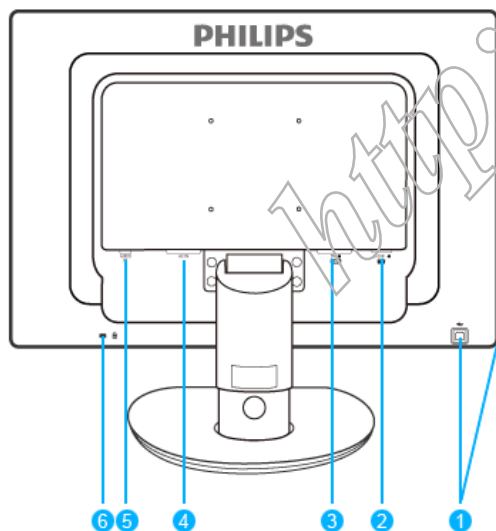
## Installation

### Front View Product Description



- 1  To switch monitor's power On and Off
- 2 MENU / OK To access OSD menu
- 3  To adjust the OSD menu
- 4  To adjust brightness of the display
- 5  To adjust volume of the display
- 6  Automatically adjust the horizontal position, vertical position, phase and clock settings / Return to previous OSD level
- 7  SmartImage. There are five modes to be selected: Office Work, Image Viewing, Entertainment, Economy, and Off
- 8  Earphone jack

### Rear View



- 1 USB upstream port and downstream port
- 2 VGA input
- 3 DVI-D input (available for selective models)
- 4 AC power input
- 5 PC Audio input
- 6 Kensington anti-theft lock

### Accessory Pack

Unpack all the parts



Power cord

DVI cable (Optional)



VGA cable

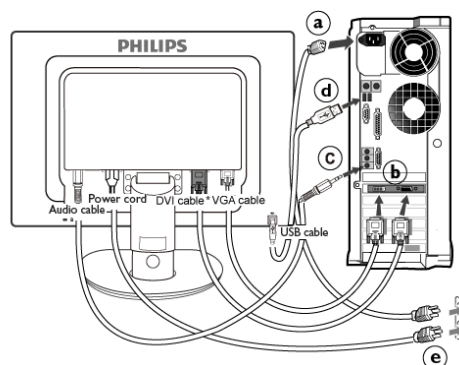
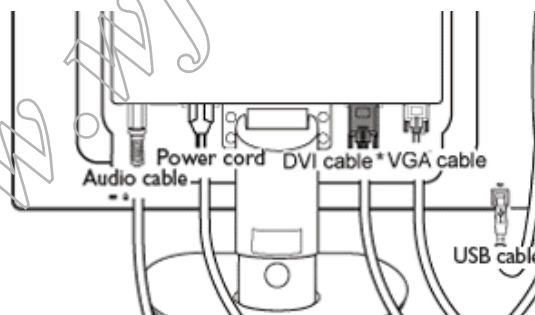
EDFU pack



Audio cable

### Connecting to Your PC

- 1) Connect the power cord to the back of the monitor firmly. (Philips has pre-connected VGA cable for the first installation.)






- 2) Connect to PC

- (a) Turn off your computer and unplug its power cable.
- (b) Connect the monitor signal cable to the video connector on the back of your computer.
- (c) Connect the PC audio cable to the audio connector on the back of your computer.
- (d) Connect the USB upstream port on the monitor and the USB port on PC with a USB cable. The USB downstream port is now ready for any USB device to plug in.
- (e) Plug the power cord of your computer and your monitor into a nearby outlet.
- (f) Turn on your computer and monitor. If the monitor displays an image, installation is complete.

## Trouble shooting

This page deals with problems that can be corrected by a user. If the problem still persists after you have tried these solutions, contact Philips customer service representative.

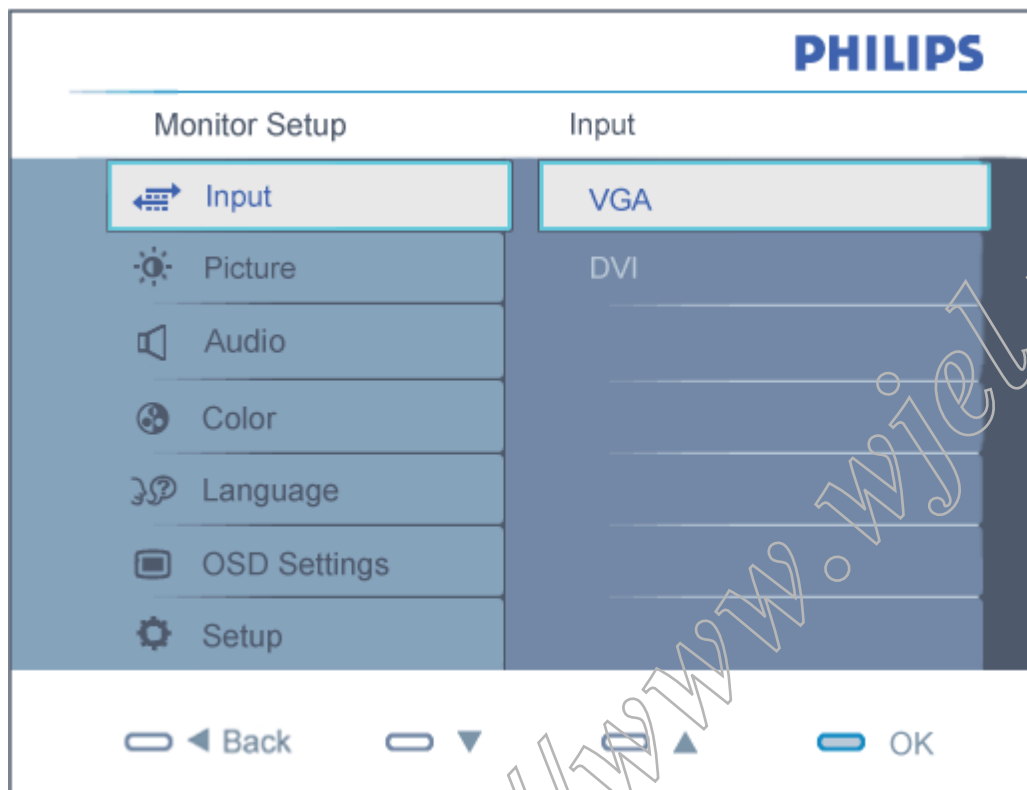
Common Problems	
Having this problem	Check these items
No Picture (Power LED not lit)	<ol style="list-style-type: none"> <li>1. Make sure the power cord is plugged into the power outlet and into the back of the monitor.</li> <li>2. First, ensure that the power button on the front of the monitor is in the OFF position, then press it to the ON position.</li> </ol>
No Picture (Power LED is amber or yellow)	<ol style="list-style-type: none"> <li>1. Make sure the computer is turned on.</li> <li>2. Make sure the signal cable is properly connected to your computer.</li> <li>3. Check to see if the monitor cable has bent pins.</li> <li>4. The Energy Saving feature may be activated</li> </ol>
Screen says 	<ol style="list-style-type: none"> <li>1. Make sure the monitor cable is properly connected to your computer. (Also refer to the Quick Set-Up Guide).</li> <li>2. Check to see if the monitor cable has bent pins.</li> <li>3. Make sure the computer is turned on.</li> </ol>
AUTO button not working properly	<ol style="list-style-type: none"> <li>1. The Auto Function is designed for use on standard Macintosh or IBM-compatible PCs running Microsoft Windows.</li> <li>2. It may not work properly if using nonstandard PC or video card.</li> </ol>
Imaging Problems	
Display position is incorrect	<ol style="list-style-type: none"> <li>1. Press the Auto button.</li> <li>2. Adjust the image position using the Horizontal Position and/or Vertical Position in OSD Main Controls.</li> </ol>
Image vibrates on the screen	Check that the signal cable is properly connected to the graphics board or PC.
Vertical flicker appears 	<ol style="list-style-type: none"> <li>1. Press the Auto button.</li> <li>2. Eliminate the vertical bars using the More Settings of Phase/Clock in OSD Main Controls.</li> </ol>
Horizontal flicker appears 	<ol style="list-style-type: none"> <li>1. Press the Auto button.</li> <li>2. Eliminate the vertical bars using the More Settings of Phase/Clock in OSD Main Controls.</li> </ol>
The screen is too bright or too dark	Adjust the contrast and brightness on OSD Main Controls. (The backlight of the LCD monitor has a fixed life span. When the screen becomes dark or begins to flicker, please contact your dealer).
An after-image appears	If an image remains on the screen for an extended period of time, it may be imprinted in the screen and leave an afterimage. This usually disappears after a few hours.
An after-image remains after the power has been turned off.	This is characteristic of liquid crystal and is not caused by a malfunction or deterioration of the liquid crystal. The after-image will disappear after a period of time.
Green, red, blue, dark, and white dots Remains	The remaining dots are normal characteristic of the liquid crystal used in today's technology.

## On Screen Display

### Description of the On Screen Display

#### *What is the On-Screen Display?*

On-Screen Display (OSD) is a feature in all Philips LCD monitors. It allows an end user to adjust screen performance or select functions of the monitors directly through an on-screen instruction window. A user friendly on screen display interface is shown as below :



#### ***Basic and simple instruction on the control keys.***

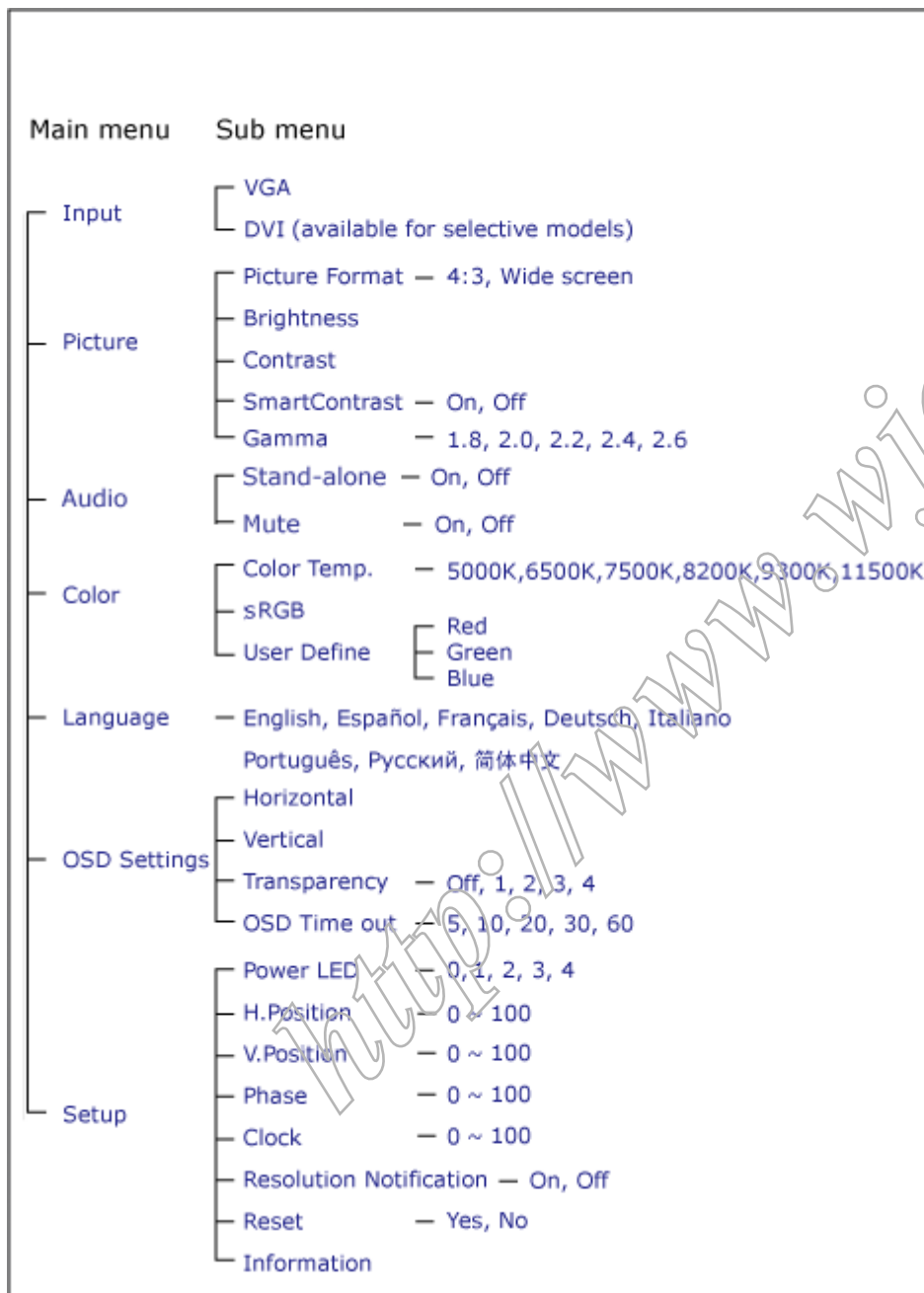
In the OSD shown above users can press ▼▲ buttons at the front bezel of the monitor to move the cursor, **OK** to confirm the choice or change.



## On Screen Display

### The OSD Tree

Below is an overall view of the structure of the On-Screen Display. You can use this as a reference when you want to work your way around the different adjustments later on.



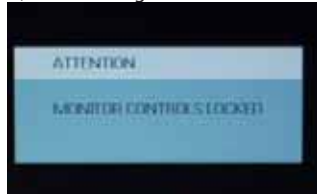
### Resolution notification

This monitor is designed for optimal performance at its native resolution, 1680X1050@60Hz. When the monitor is powered on at a different resolution, an alert is displayed on screen: Use 1680x1050@60Hz for best results.

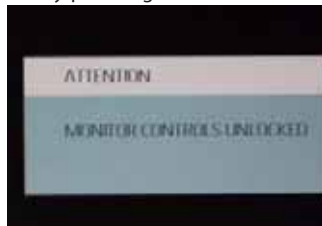
Display of the native resolution alert can be switched off from Setup in the OSD (On Screen Display) menu.



**To Lock/Unlock OSD FUNCTION(User Mode)**  
 The OSD function can be locked by pressing "OK" button for more than 10 seconds, the screen shows following windows for 4 seconds. Every time when you press "OK" button, this message appears on the screen automatically.

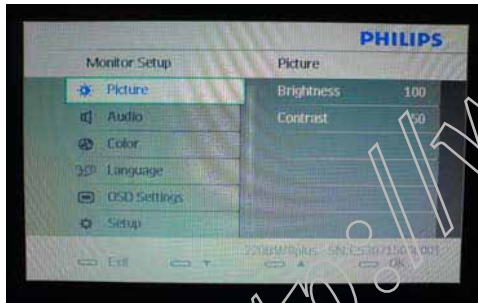


**Unlock OSD function**  
 Unlocked OSD function can be released by pressing "OK" button for more than 10 seconds again.



### Access Factory Mode

- 1). Turn off monitor.
- 2). [Push "AUTO" & "MENU" buttons at the same time and hold them] + [Press "power" button until comes out "Windows screen" ] => then release all buttons
- 3). Press "MENU" button, wait until the OSD menu with Characters "HUDSON 220SW8 V0.07 2007-12-21" (below OSD menu) come on the Screen of the monitor.



Factory Mode indicator

**Factory Menu**  
 Cursor can move on gray color area  
 Hot key function: by pressing "UP" and "DOWN" key Simultaneously at User Mode (or Factory Mode)  
 (PS: The Offset R G B function can be used on reduce or eliminate snowy noise on the background when the resolution of video signal is 1680\*1050 vertical 60Hz. Slightly increase or decrease the value until snowy noise completely disappear .

### Access Aging Mode

- Step 1 : Access Factory Mode then enter Factory Menu.
- Step 2 : By pressing "UP" and "DOWN" key to Burning Icon. Press "MENU" then press "UP" and "DOWN" key to turn on Aging Mode.



Step 3 : Disconnect interface cable between Monitor and PC.

After 3 seconds, bring up:

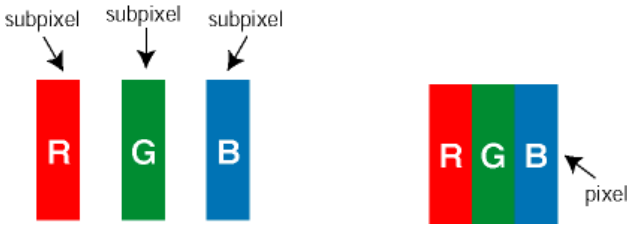


repeatly  
 Connect Signal cable again => go back to normal display

# Philips Pixel Defect Policy

## Philips' Flat Panel Monitors Pixel Defect Policy

Philips strives to deliver the highest quality products. We use some of the industry's most advanced manufacturing processes and practice stringent quality control. However, pixel or sub pixel defects on the TFT LCD panels used in flat panel monitors are sometimes unavoidable. No manufacturer can guarantee that all panels will be free from pixel defects, but Philips guarantees that any monitor with an unacceptable number of defects will be repaired or replaced under warranty. This notice explains the different types of pixel defects and defines acceptable defect levels for each type. In order to qualify for repair or replacement under warranty, the number of pixel defects on a TFT LCD panel must exceed these acceptable levels. For example, no more than 0.0004% of the sub pixels on a 19" XGA monitor may be defective. Furthermore, Philips sets even higher quality standards for certain types or combinations of pixel defects that are more noticeable than others. This policy is valid worldwide.



### Pixels and Sub pixels

A pixel, or picture element, is composed of three sub pixels in the primary colors of red, green and blue. Many pixels together form an image. When all sub pixels of a pixel are lit, the three colored sub pixels together appear as a single white pixel. When all are dark, the three colored sub pixels together appear as a single black pixel. Other combinations of lit and dark sub pixels appear as single pixels of other colors.

### Types of Pixel Defects

Pixel and sub pixel defects appear on the screen in different ways. There are two categories of pixel defects and several types of sub pixel defects within each category.

**Bright Dot Defects** Bright dot defects appear as pixels or sub pixels that are always lit or 'on'. That is, a *bright dot* is a sub-pixel that stands out on the screen when the monitor displays a dark pattern. There are the types of bright dot defects:



One lit red, green or blue sub pixel

Two adjacent lit sub pixels:  
 - Red + Blue = Purple  
 - Red + Green = Yellow  
 - Green + Blue = Cyan (Light Blue)

Three adjacent lit sub pixels (one white pixel)



A red or blue *bright dot* must be more than 50 percent brighter than neighboring dots while a green bright dot s 30 percent brighter than neighboring dots.

**Black Dot Defects** Black dot defects appear as pixels or sub pixels that are always dark or 'off'. That is, a *dark dot* is a sub-pixel that stands out on the screen when the monitor displays a light pattern. These are the types of black dot defects:



One dark sub pixel

Two or three adjacent dark sub pixels

### Proximity of Pixel Defects

Because pixel and sub pixels defects of the same type that are near to one another may be more noticeable, Philips also specifies tolerances for the proximity of pixel defects.

### Pixel Defect Tolerances

In order to qualify for repair or replacement due to pixel defects during the warranty period, a TFT LCD panel in a Philips flat panel monitor must have pixel or sub pixel defects exceeding the tolerances listed in the following tables

BRIGHT-DOT DEFECTS	ACCEPTABLE LEVEL
MODEL	220BW9
1 lit subpixel	3
2 adjacent lit subpixels	1
3 adjacent lit subpixels (one white pixel)	0
Distance between two bright dot defects*	>15mm
Total bright dot defects of all types	3

BLACK DOT DEFECTS	ACCEPTABLE LEVEL
MODEL	220BW9
1 dark subpixel	5
2 adjacent dark subpixels	2
3 adjacent dark subpixels	0
Distance between two black dot defects*	>15mm
Total black dot defects of all types	5

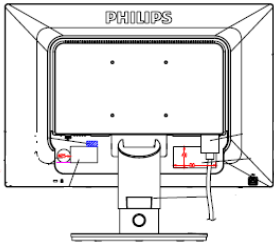
TOTAL DOT DEFECTS	ACCEPTABLE LEVEL
MODEL	220BW9
Total bright or black dot defects of all types	5

Note:

\* 1 or 2 adjacent sub pixel defects = 1 dot defect

# Mechanical Instruction

Disassemble the base, press the circular button and uplift the above monitor

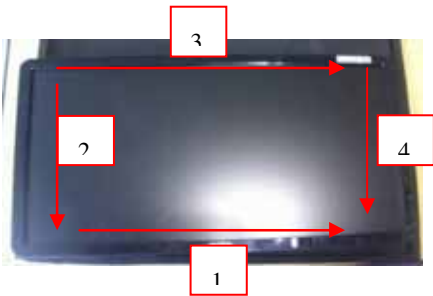


Disassemble four Mylars on the screws of column, then disassemble four screws by a screw-driver



Disassembly the bezel from the monitor, notice the disassembly order :

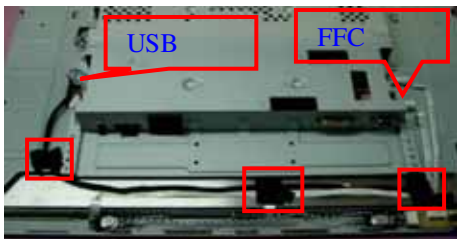
1. Bottom (1) parts of bezel
  2. Left (2) parts of bezel
  3. Top (3) parts of bezel
  4. Right (4) parts of bezel
- Don't draw the BZL



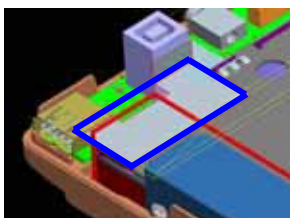
Turn over the monitor ,Uplift the Rear cover from the monitor



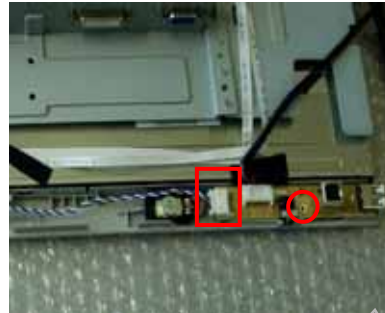
Tear off four pieces of acetic tapes; draw two pieces of FFC cables and the USB cable



Take off the Mylar on the USB and panel



Disassemble a screw on the USB board, then draw the cable which links the speaker



Tear off two pieces cables , take off the speaker , then take the entire internal mechanism from Bezel and put it on the cushion



Disassembled the Main-BKT : hexagonal screw \*4



Tear off these two AL tapes



Pull out the lamp cables



Disassemble the Main-BKT, →2 screws

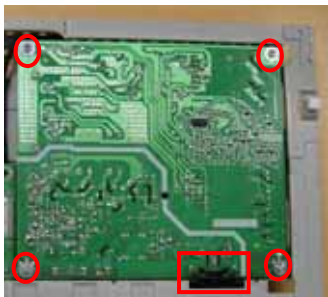


## Mechanical Instruction

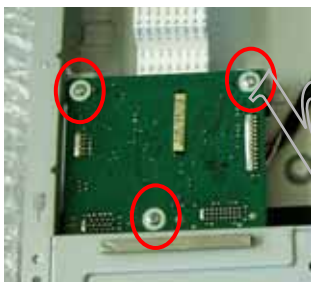
Uplift the Main-BKT and  
Unlock the LVDS by using two hands (see note).



Disassemble the Power board, → 4 screws  
Tear off the cover of AC-SOCKET



Disassemble the ITF-board → 3 screws



Take the PCBA from Main-BKT and then put it on the cushion



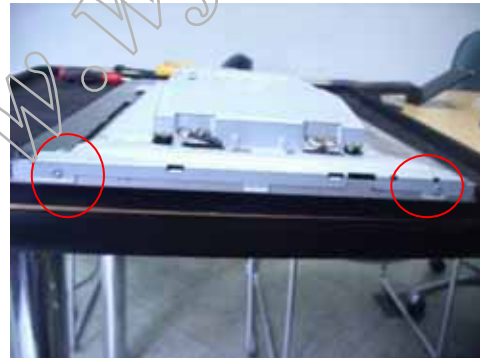
Pull out the cable of Power board



Pull out the LVDS cable



Disassemble the Main-BKT : Side screw\*4



Disassemble the C/B: screw\*3

Uplift the LED/B, and separate the boards and bezel





### Alignment procedure

1. Turn on the LCD monitor .
2. Turn on the Timing/pattern generator. See Fig.1
3. Preset LCD color Analyzer CA-1 10
- Remove the lens protective cover of probe CA-A30.
- Set measuring/viewing selector to measuring position for reset analyzer .(zero calibration) as Fig.2
- Turn on the color analyzer (CA-1 10)
- Press 0-CAL button to starting reset analyzer .

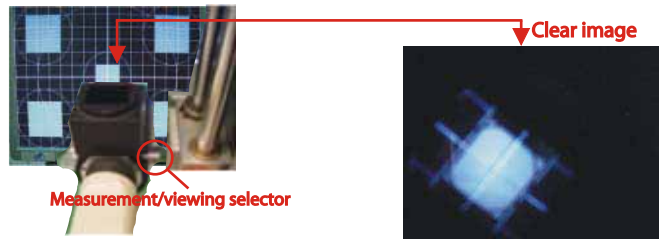


Fig.5

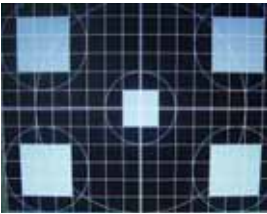


Fig. 1

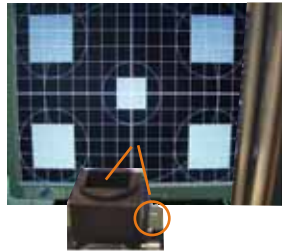


Fig. 2

### 4. Access Factory Mode

- 1). Turn off monitor.
- 2). [Push "AUT O" & "MENU" buttons at the same time and hold them] +[Press "power" button until comes out "Windows screen" ] => then release all buttons
- 3). Press "MENU" button, wait until the OSD menu with Characters" HUDSON 240BW8 V0.13 2007-08-10 "(below OSD menu) come on the Screen of the monitor. as shown in Fig3.



Factory Mode indicator

Fig. 3

- 4). Press "MENU" button, then select factory mode indicator by "LEFT" or "RIGHT" button .Press "MENU" button to bring up submenu windows as below:



Fig. 4

### 5.Display

Press "UP" or "DOWN" button to select . Change the value by "UP" or "DOWN" key until the X, Y co-ordinates as below

#### 5.1 White color adjustment

There are three factory preset white color 9300K , 6500K , s R G B.

Apply full white pattern, with brightness in 100 % position and the contrast control at 50 % position.

The 1931 CIE Chromaticity (color triangle) diagram (x , y) coordinate for the screen centers should be:

Production	Product SPEC
5000K	x = 0.345 ± 0.006 y = 0.357 ± 0.006
6500K	x = 0.313 ± 0.006 y = 0.329 ± 0.006
7500K	x = 0.298 ± 0.006 y = 0.314 ± 0.006
8200K	x = 0.291 ± 0.006 y = 0.306 ± 0.006
9300K	x = 0.283 ± 0.006 y = 0.297 ± 0.006
11500K	x = 0.270 ± 0.006 y = 0.281 ± 0.006

#### Quality inspect

5000K	x = 0.345 ± 0.015 y = 0.357 ± 0.015
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7500K	x = 0.298 ± 0.015 y = 0.314 ± 0.015
8200K	x = 0.291 ± 0.015 y = 0.306 ± 0.015
9300K	x = 0.283 ± 0.015 y = 0.297 ± 0.015
11500K	x = 0.270 ± 0.015 y = 0.281 ± 0.015

## FAQs (Frequently Asked Questions)

### General FAQs

**Q: When I install my monitor what should I do if the screen shows 'Cannot display this video mode'?**

**A:** Recommended video mode for Philips 22": 1680x1050 @60Hz.  
 1. Unplug all cables, then connect your PC to the monitor that you used previously.  
 2. In the Windows Start Menu, select Settings/Control Panel. In the Control Panel Window, select the Display icon. Inside the Display Control Panel, select the 'Settings' tab. Under the setting tab, in box labeled 'desktop area', move the slider to 1680x1050 pixels (22").  
 3. Open 'Advanced Properties' and set the Refresh Rate to 60Hz, then click OK.  
 4. Restart your computer and repeat step 2 and 3 to verify that your PC is set at 1680x1050@60Hz (22").  
 5. Shut down your computer, disconnect your old monitor and reconnect your Philips LCD monitor.  
 6. Turn on your monitor and then turn on your PC.

**Q: What does 'refresh rate' mean in connection with an LCD monitor?**

**A:** The refresh rate is of much less relevance for LCD monitors. LCD monitors display a stable, flicker-free image at 60Hz. There is no visible difference between 85Hz and 60Hz.

**Q: What are the .inf and .icm files on the CD-ROM? How do I install the drivers (.inf and .icm)?**

**A:** These are the driver files for your monitor. Follow the instructions in your user manual to install the drivers. Your computer may ask you for monitor drivers (.inf and .icm files) or a driver disk when you first install your monitor. Follow the instructions to insert the ( companion CD-ROM) included in this package. Monitor drivers (.inf and .icm files) will be installed automatically.

**Q: How do I adjust the resolution?**

**A:** Your video card/graphic driver and monitor together determine the available resolutions. You can select the desired resolution under Windows® Control Panel with the "Display properties".

**Q: What if I get lost when I am making monitor adjustments?**

**A:** Simply press the OK button, then select 'Reset' to recall all of the original factory settings.

**Q: What is the Auto function?**

**A:** The *AUTO adjustment* key restores the optimal screen position, phase and clock settings by pressing of a single button – without the need to navigate through OSD (On Screen Display) menus and control keys.

**Note: Auto function is available in selected models only.**

**Q: My Monitor has no power (Power LED does not light up). What should I do?**

**A:** Make sure the AC power cord is connected between the monitor and AC outlet, and click a key on keyboard/mouse to wake up the PC.

**Q: Will the LCD monitor accept an interlaced signal under PC models?**

**A:** No. If an Interlace signal is used, the screen displays both odd and even horizontal scanning lines at the same time, thus distorting the picture.

**Q: What does the Refresh Rate mean for LCD?**

**A:** Unlike CRT display technology, in which the speed of the electron beam is swept from the top to the bottom of the screen determines flicker, an active matrix display uses an active element (TFT) to control each individual pixel and the refresh rate is therefore not really applicable to LCD technology.

**Q: Will the LCD screen be resistant to scratches?**

**A:** A protective coating is applied to the surface of the LCD, which is durable to a certain extent (approximately up to the hardness of a 2H pencil). In general, it is recommended that the panel surface is not subject to any excessive shocks or scratches.

**Q: How should I clean the LCD surface?**

**A:** For normal cleaning, use a clean, soft cloth. For extensive cleaning, please use isopropyl alcohol. Do not use other solvents such as ethyl alcohol, ethanol, acetone, hexane, etc.

**Q: Can I change the color setting of my monitor?**

**A:** Yes, you can change your color setting through OSD control as the following procedures,  
 1. Press "OK" to show the OSD (On Screen Display) menu  
 2. Press "Down Arrow" to select the option "Color" then press "OK" to enter color setting, there are three settings as below.  
 a. Color Temperature; The six settings are 5000K, 6500K, 7500K, 8200K, 9300K and 11500K. With settings in the 5000K range the panel appears 'warm,' with a red-white color tone, while a 11500K temperature yields 'cool, blue-white toning.'  
 b. sRGB; this is a standard setting for ensuring correct exchange of colors between different device (e.g. digital cameras, monitors, printers, scanners, etc)  
 c. User Define; the user can choose his/her preference color setting by adjusting red, green blue color.  
 d. Gamma; The five settings are 1.8, 2.0, 2.2, 2.4, and 2.6.

\*A measurement of the color of light radiated by an object while it is being heated. This measurement is expressed in terms of absolute scale, (degrees Kelvin). Lower Kelvin temperatures such as 2004K are red; higher temperatures such as 9300K are blue. Neutral temperature is white, at 6504K.

**Q: Can the Philips LCD Monitor be mounted on the wall?**

**A:** Yes. Philips LCD monitors have this optional feature. For standard VESA mount holes on the rear cover allows the user to mount the Philips monitor on most of the VESA standard arms or accessories. We recommend to contact your Philips sales representative for more information.

### Screen Adjustments

**Q: When I install my monitor, how do I get the best performance from the monitor?**

**A:** For best performance, make sure your display settings are set at 1680x1050@60Hz for 22". Note: You can check the current display settings by pressing the OSD OK button once. The current display mode is shown in OSD setup information page.

**Q: How do LCDs compare to CRTs in terms of radiation?**

**A:** Because LCDs do not use an electron gun, they do not generate the same amount of radiation at the screen surface.

### Compatibility with other Peripherals

**Q: Can I connect my LCD monitor to any PC, workstation or Mac?**

**A:** Yes. All Philips LCD monitors are fully compatible with standard PCs, Macs and workstations. You may need a cable adapter to connect the monitor to your Mac system. Please contact your Philips sales representative for more information.

**Q: Are Philips LCD monitors Plug-and-Play?**

**A:** Yes, the monitors are Plug-and-Play compatible with Windows® 95, 98, 2000, XP and Vista.

**Q: What is USB (Universal Serial Bus)?**

**A:** Think of USB as a smart plug for PC peripherals. USB automatically determines resources (like driver software and bus bandwidth) required by peripherals. USB makes necessary resources available without user intervention. There are three main benefits of USB. USB eliminates "case anxiety," the fear of removing the computer case to install circuit board cards -- that often requires adjustment of complicated IRQ settings -- for add-on peripherals. USB does away with "port gridlock." Without USB, PCs are normally limited to one printer, two Com port devices (usually a mouse and modem), one Enhanced Parallel Port add-on (scanner or video camera, for example), and a joystick. More and more peripherals for multimedia computers come on the market every day. With USB, up to 127 devices can run simultaneously on one computer. USB permits "hot plug-in." No need to shut down, plug in, reboot and run set up to install peripherals. No need to go through the reverse process to unplug a device. Bottom line: USB transforms today's "Plug-and-Pray" into true Plug-and-Play!

Please refer to glossary for more information about USB.

## FAQs (Frequently Asked Questions)

### Q: What is a USB hub ?

**A:** A USB hub provides additional connections to the Universal Serial Bus. A hub's upstream port connects a hub to the host, usually a PC. Multiple downstream ports in a hub allows connection to another hub or device, such as a USB keyboard, camera or printer.

## LCD Panel Technology

### Q: What is a Liquid Crystal Display?

**A:** A Liquid Crystal Display (LCD) is an optical device that is commonly used to display ASCII characters and images on digital items such as watches, calculators, portable game consoles, etc. LCD is the technology used for displays in notebooks and other small computers. Like light-emitting diode and gas-plasma technologies, LCD allows displays to be much thinner than cathode ray tube (CRT) technology. LCD consumes much less power than LED and gas-displays because it works on the principle of blocking light rather than emitting it.

### Q: What differentiates passive matrix LCDs from active matrix LCDs?

**A:** An LCD is made with either a passive matrix or an active matrix display grid. An active matrix has a transistor located at each pixel intersection, requiring less current to control the luminance of a pixel. For this reason, the current in an active matrix display can be switched on and off more frequently, improving the screen refresh time (your mouse pointer will appear to move more smoothly across the screen, for example). The passive matrix LCD has a grid of conductors with pixels located at each intersection in the grid.

### Q: What are the advantages of TFT LCD compared with CRT?

**A:** In a CRT monitor, a gun shoots electrons and general light by colliding polarized electrons on fluorescent glass. Therefore, CRT monitors basically operate with an analog RGB signal. A TFT LCD monitor is a device that displays an input image by operating a liquid crystal panel. The TFT has a fundamentally different structure than a CRT: Each cell has an active matrix structure and independent active elements. A TFT LCD has two glass panels and the space between them is filled with liquid crystal. When each cell is connected with electrodes and impressed with voltage, the molecular structure of the liquid crystal is altered and controls the amount of inlet lighting to display images. A TFT LCD has several advantages over a CRT, since it can be very thin and no flickering occurs because it does not use the scanning method.

### Q: Why is vertical frequency of 60Hz optimal for an LCD monitor?

**A:** Unlike a CRT monitor, the TFT LCD panel has a fixed resolution. For example, an XGA monitor has 1024x3 (R, G, B) x 768 pixels and a higher resolution may not be available without additional software processing. The panel is designed to optimize the display for a 65MHz dot clock, one of the standards for XGA displays. Since the vertical/horizontal frequency for this dot clock is 60Hz/48kHz, the optimum frequency for this monitor is 60Hz.

### Q: What kind of wide-angle technology is available? How does it work?

**A:** The TFT LCD panel is an element that controls/displays the inlet of a backlight using the dual-refraction of a liquid crystal. Using the property that the projection of inlet light refracts toward the major axis of the liquid element, it controls the direction of inlet light and displays it. Since the refraction ratio of inlet light on liquid crystal varies with the inlet angle of the light, the viewing angle of a TFT is much narrower than that of a CRT. Usually, the viewing angle refers to the point where the contrast ratio is 10. Many ways to widen the viewing angle are currently being developed and the most common approach is to use a wide viewing angle film, which widens the viewing angle by varying the refraction ratio. IPS (In Plane Switching) or MVA (Multi Vertical Aligned) is also used to give a wider viewing angle.

### Q: Why is there no flicker on an LCD Monitor?

**A:** Technically speaking, LCDs do flicker, but the cause of the phenomenon is different from that of a CRT monitor -- and it has no impact of the ease of viewing. Flickering in an LCD monitor relates to usually undetectable luminance caused by the difference between positive and negative voltage. On the other hand, CRT flickering that can irritate the human eye occurs when the on/off action of the fluorescent object becomes visible. Since the reaction speed of liquid crystal in an LCD panel is much slower, this troublesome form of flickering is not present in an LCD display.

### Q: Why is an LCD monitor virtually low of Electro Magnetic Interference?

**A:** Unlike a CRT, an LCD monitor does not have key parts that generate Electro Magnetic Interference, especially magnetic fields. Also, since an LCD display utilizes relatively low power, its power supply is extremely quiet.

## Ergonomics, Ecology and Safety Standards

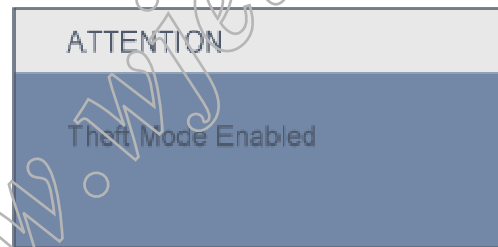
### Q: What is the CE mark?

**A:** The CE (Conformité Européenne) mark is required to be displayed on all regulated products offered for sale on the European market. This 'CE' mark means that a product complies with the relevant European Directive. A European Directive is a European 'Law' that relates to health, safety, environment and consumer protection, much the same as the U.S. National Electrical Code and UL Standards.

### Q: Does the LCD monitor conform to general safety standards?

**A:** Yes. Philips LCD monitors conform to the guidelines of MPR-II and TCO 99/03 standards for the control of radiation, electromagnetic waves, energy reduction, electrical safety in the work environment and recyclability. The specification page provides detailed data on safety standards.

### Q: After I change new PC, I found this information on screen, how can I do?



**A:** Because you activate Theft Deterrence function in SmartControl II. Please contact IT manager or Philips Service Center.



# Electrical Instructions

## Electrical characteristics

### 1.1 Interface signals

#### 1). D-Sub Analog

Input signal: Video, Hsync., Vsync

Video: 0.7 Vp-p, input impedance, 75 ohm @DC

Sync.: Separate sync TTL level, input impedance 2.2k ohm terminate

Hsync Positive/Negative

Vsync Positive/Negative

Composite sync TTL level, input impedance 2.2k ohm terminate (Positive/Negative)

Sync on green video 0.3 Vp-p Negative (Video 0.7 Vp-p Positive)

#### 2). DVI-D Digital

Input signal: Single TMDS link (Three channels: RX0-/+, RX1-/+, RX2-/+) )

#### 3). Audio (waiting for supplier input)

Input signal: 1000 mVrms

Loudspeaker (Impedance: 16 Ohm +/-15%): 1.5W+1.5W stereo for RMS Power

Frequency range: 450Hz - 20KHz

Headphone connection will mute speakers

#### 4). USB PLUG

USB port (1 upstream, 1 downstream)

### 1.2 Interface

#### 1.2.1 D-Sub Cable

Length : 1.8 M +/- 50 mm

Fix with monitor when packing, with transplant pin protective cover.

Connector type : D-Sub male with DDC2B pin assignments  
Blue connector thumb-operated jack screws

#### 1.2.2 DVI Cable

The input signals are applied to the display through DVI-D cable.

Length : 1.8 M +/- 50 mm

Connector type : DVI-D male with DDC-2B pin assignments  
White connector thumb-operated jackscrews  
With transplant pin protective cover.

### 1.3 Timing requirement

#### 1.3.1 Factory preset modes : D-sub :18 , DVI : 17

Preset modes : 49

User modes : 10

#### 1.3.2 Factory preset modes (18 modes)

Item	HFreq.	Mode	Resolution	V/Hz (Hz)	SW (MHz)
1	31.469	SMVGA_10H	640x350	60	55.75
2	31.469	SMVGA_3H	720x400	60	55.75
3	31.469	SMVGA_120	640x480	75	55.75
4	35	MA/CNTOSH	640x480	75	55.75
5	37.551	VEGA	640x480	72.506	55.75
6	37.5	VEGA	640x480	75	55.75
7	43.259	VEGA	640x480	85.073	55.75
8	35.154	VEGA	800x600	75	55.75
9	37.679	VEGA	800x600	80.917	55.75
10	48.077	VEGA	800x600	72.188	55.75
11	48.876	VEGA	800x600	75	55.75
12	53.874	VEGA	800x600	85.081	55.75
13	49.7	MA/CNTOSH	832x624	75	55.75
14	55.4	-	960x720	75	55.75
15	44.75	-	960x720	60	55.75
16	44.75	VEGA	1024x768	60.054	55.75
17	54.476	VEGA	1024x768	70.099	55.75
18	59.959	VEGA	1024x768	75.291	55.75
19	61.08	ISM.XGA-2	1024x768	75.291	55.75
20	68.677	VEGA	1024x768	84.997	55.75
21	60.389	CVT 2.3MA	1280x720	60	55.75
22	60.389	CVT 2.3MA	1280x720	75	55.75
23	54.1	-	1152x864	60	55.75
24	63.851	VEGA	1152x864	70.012	55.75
25	67.5	VEGA	1152x864	75	55.75
26	68.7	MA/CNTOSH	1152x864	75	55.75
27	61.845	SUNWS	1152x900	60.004	55.75
28	71.81	SUNWS	1152x900	75.15	55.75
29	49.7	CVT	1280x900	59.81	55.75
30	62.8	CVT	1280x900	74.93	55.75
31	60	VEGA	1280x960	60	55.75
32	75	VEGA	1280x960	75	55.75
33	63.981	VEGA	1280x1024	60.02	55.75
34	71.891	SUNWS	1280x1024	67.189	55.75
35	75	SUNWS	1280x1024	75.2	55.75
36	79.976	VEGA	1280x1024	75.036	55.75
37	81.13	SUNWS	1280x1024	78.11	55.75
38	91.1	VEGA	1280x1024	85	55.75
39	44.772	-	1280x720	60	55.75
40	62.5	-	1280x720	70	55.75
41	50	CVT	1400x1050	60	121.75
42	50	CVT	1400x1050	75	156.001
43	60.5	CVT	1400x1050	85	220.5
44	60.5	VEGA (clock 180, out of range, suggest to remove)	1400x1050	85	220.5
45	60.5	VEGA (clock 180, out of range, suggest to remove)	1400x1050	85	220.5
46	75	VEGA	1400x1050	75	156.001
47	75	VEGA	1400x1050	85	181
48	60.5	CVT 1.2MA	1600x1200	60	113.5
49	60.5	CVT 1.2MA	1600x1200	60	148
50	60.5	CVT 1.2MA	1600x1200	80	119

Factory preset mode: 18 Sets
Preset mode: 50 Sets
User mode: 10 Sets

2006/09/10, EICD to have 1280x960@60Hz into EICD to solve DELL N18 1800x1200 can not display problem

please check 180, out of range, suggest to remove

2006/09/10, EICD to have 1600x1200@60Hz into EICD to solve DELL N18 1800x1200 can not display problem

## 2. White color adjustment

There are three factory preset white color 9300K, 6500K, sRGB. Apply full white pattern, with brightness in 100 % position and the contrast control at 50 % position. The 1931 CIE Chromaticity (color triangle) diagram (x,y) coordinate for the screen center should be:

Production		Product SPEC	
5000K	x = 0.345 ± 0.006 y = 0.357 ± 0.006	5000K	x = 0.345 ± 0.02 y = 0.357 ± 0.02
6500K	x = 0.313 ± 0.006 y = 0.329 ± 0.006	6500K	x = 0.313 ± 0.02 y = 0.329 ± 0.02
7500K	x = 0.298 ± 0.006 y = 0.314 ± 0.006	7500K	x = 0.298 ± 0.02 y = 0.314 ± 0.02
8200K	x = 0.291 ± 0.006 y = 0.306 ± 0.006	8200K	x = 0.291 ± 0.02 y = 0.306 ± 0.02
9300K	x = 0.283 ± 0.006 y = 0.297 ± 0.006	9300K	x = 0.283 ± 0.02 y = 0.297 ± 0.02
11500K	x = 0.270 ± 0.006 y = 0.281 ± 0.006	11500K	x = 0.270 ± 0.02 y = 0.281 ± 0.02

### Quality inspect

5000K	x = 0.345 ± 0.015 y = 0.357 ± 0.015
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8200K	x = 0.291 ± 0.015 y = 0.306 ± 0.015
9300K	x = 0.283 ± 0.015 y = 0.297 ± 0.015
11500K	x = 0.270 ± 0.015 y = 0.281 ± 0.015

### DDC Data Re-programming

In case the DDC data memory IC or main EEPROM which storage all factory settings were replaced due to a defect, the serial numbers have to be re-programmed "Analog DDC IC, Digital DDC IC & EEPROM".

It is advised to re-soldered DDC IC and main EEPROM from the old board onto the new board if circuit board have been replaced, in this case the DDC data does not need to be re-programmed.

### Additional information

Additional information about DDC (Display Data Channel) may be obtained from Video Electronics Standards Association (VESA).

Extended Display Identification Data(EDID) information may be also obtained from VESA.

### Configuration and procedure

"PI-EDID" The software is provided by IMS to upgrade the firmware of CPU.

PI-EDID Tools is for the interface between "Parallel Port of PC" and "15 pin-D-SUB connector of Monitor".

It is a windows-based program, which cannot be run in MS-DOS.

System and equipment requirements

1. An Pentium (or above) personal computer or compatible.
2. Microsoft operation system Windows 95/98/2000/XP and Port95NT.exe.
3. EDID Software "PI-EDID.exe"
4. ISP boardas shown in Fig. 1

**And I2C Board Jump wire should follow J10 (short), J9 (open), J5/J6/ (1and 2 pin short) J7/J8 (1 and 2 pin short)**

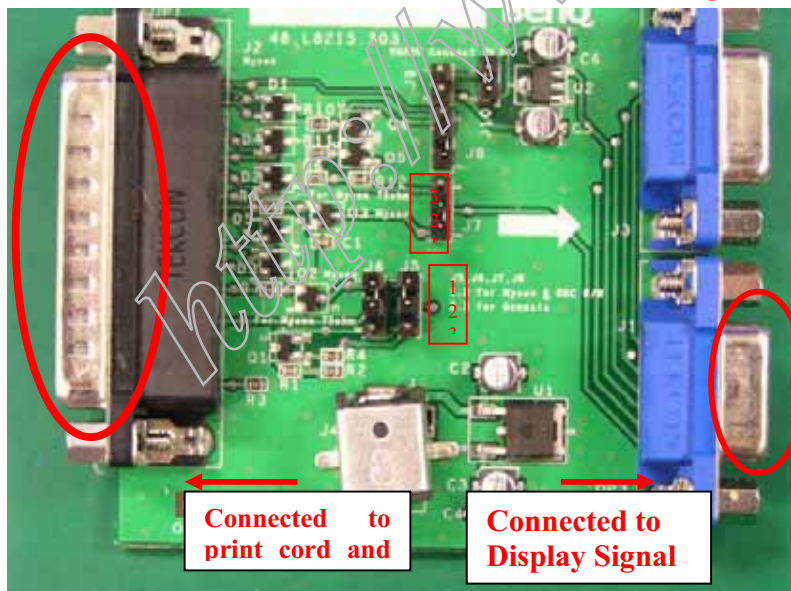


Fig.1

5. Connect and Mains cord to Monitor as shown in Fig.2.

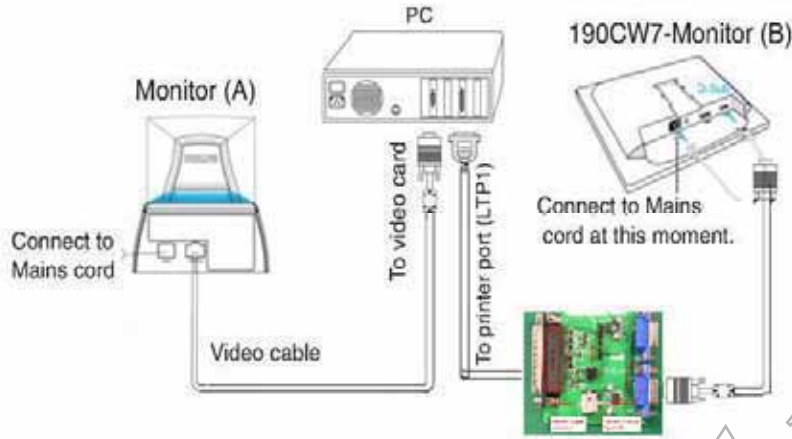
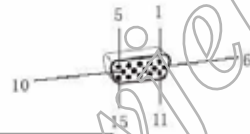


Fig. 2

Pin assignment

A. 15-pin D-Sub Connector



PIN No.	SIGNAL
1	Red video input
2	Green video input / sync on green
3	Blue video input
4	GND
5	GND - Cable detect
6	Red video GND
7	Green video GND
8	Blue video - ND
9	DDC +3.3V or +5V
10	Logic GND
11	GND
12	Serial data line (SDA)
13	Hot-plug / HiV
14	+5V DDC
15	Data clock line (SCL)

B. Input DVI-D Connector pin



Pin No.	Description
1	T.M.D.S. data2-
2	T.M.D.S. data2+
3	T.M.D.S. data2 shield
4	No Connect
5	No Connect
6	DDC clock
7	DDC data
8	No Connect
9	T.M.D.S. data1-
10	T.M.D.S. data1+
11	T.M.D.S. data1 shield
12	No Connect
13	No Connect
14	+5V Power
15	Ground (for +5V) - Cable detect
16	Hot plug detect
17	T.M.D.S. data0-
18	T.M.D.S. data0+
19	T.M.D.S. data0 shield
20	No Connect
21	No Connect
22	T.M.D.S. clock shield
23	T.M.D.S. clock+
24	T.M.D.S. clock-

Fig. 2a

## 6. Setup the Philips-IMS EDID Tools program

Step 1: Make a folder in your PC as shown in Fig. 3.

For example: C:\EDID

Step 2: Copy PI-EDID Software into your folder as shown in Fig.3.



Fig.3

Step 3: Copy the

LCD\_Analog.ddc and LCD\_DVI.ddc  
to C:\EDID as shown in Fig. 4 .



Fig.4

Update the DDC

1. Connect DSUB Cable to I2C Board.

Double click the PI-EDID.exe icon in desktop then appears window as shown in Fig.5.

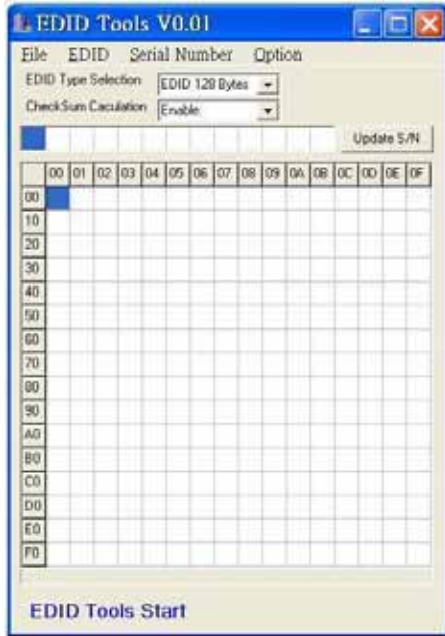


Fig.5

2. Press File->OPEN EDID to Load DDC file as shown in Fig.6.

Load Analog EDID file LCD\_Analog.ddc to PI-EDID.exe

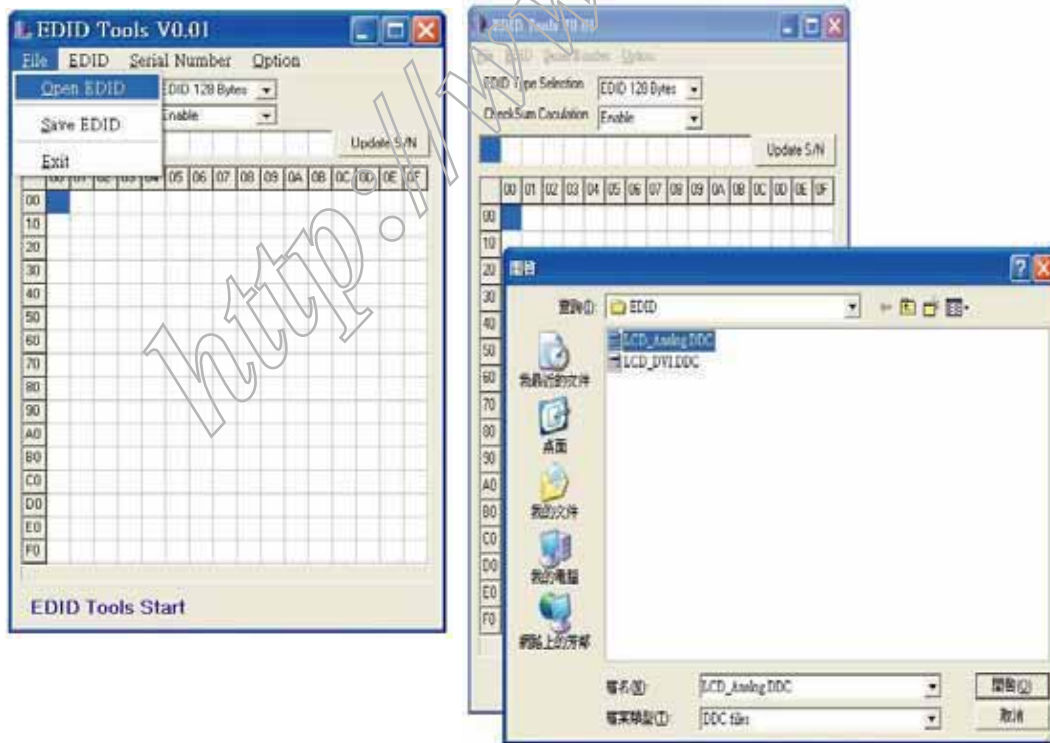


Fig.6



3. Load EDID file OK as shown in Fig.7.

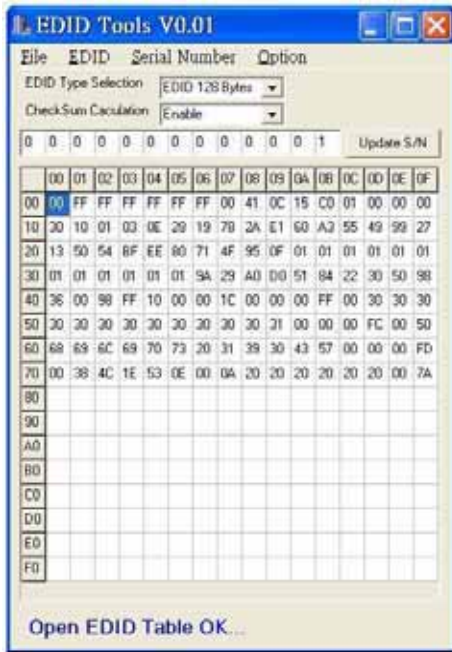


Fig.7

4. Modify Serial Number then Press •Update S/N button as shown in Fig.8.

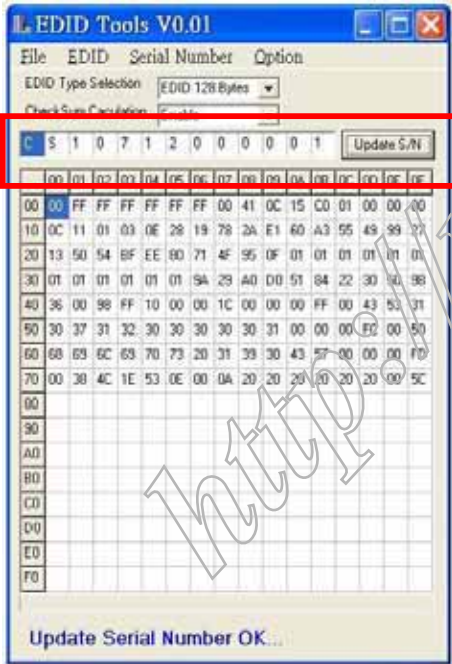


Fig.8



5. Press EDID->Write to write EDID data to EEPROM as shown in Fig. 9.

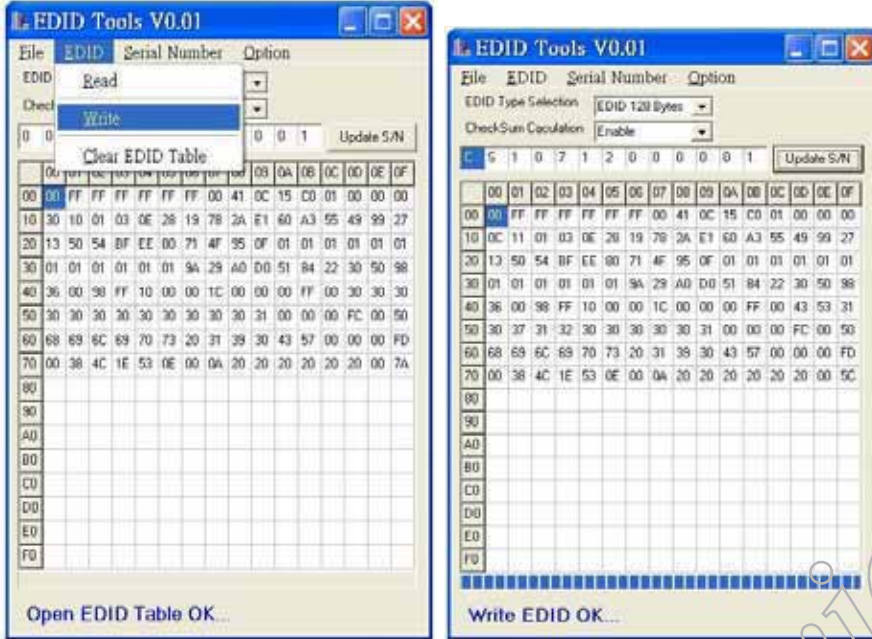


Fig.9

6. Connect DVI Cable to I2C Board.  
Repeat Step 1~5 to write DVI EDID file.

7. Enter Factory Mode then Press the Serial Number->Write EDIDS/N to EEPROM as shown in Fig.10

Note: If not enter Factory Mode, this Write EDID S/N will not work.

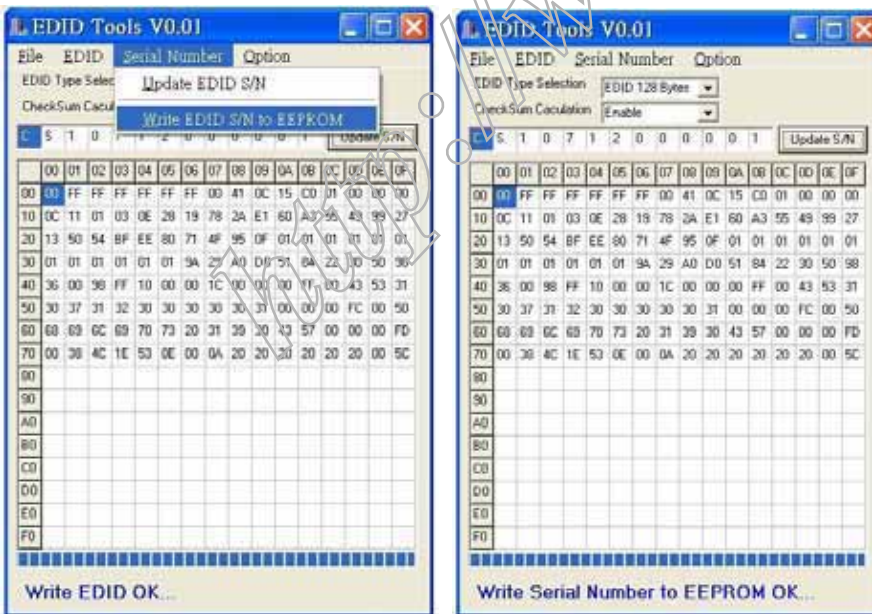


Fig.10



## DDC DATA

/////////Displaying Monitor EDID/////////

128 bytes EDID Data (Hex):

```

0 1 2 3 4 5 6 7 8 9
0: 00 FF FF FF FF FF FF 00 41 0C
10: 70 08 01 00 00 00 12 12 01 03
20: 0E 2F 1D 78 EE B5 05 A5 56 4A
30: 9A 25 12 50 54 BF EF 80 B3 00
40: 81 80 81 8F 95 00 95 0F B3 0F
50: A9 40 A9 4F 21 39 90 30 62 1A
60: 27 40 68 B0 36 00 DA 28 11 00
70: 00 1E 00 00 00 FF 00 43 53 33
80: 30 37 31 35 30 30 30 30 30 31
90: 00 00 00 FC 00 50 68 69 6C 69
100: 70 73 20 32 32 30 42 57 00 00
110: 00 FD 00 38 4C 1E 53 11 00 0A
120: 20 20 20 20 20 00 F5

```

Decoded EDID data

<---Header--->

Header: 00 FF FF FF FF FF FF 00

<-x-Header-x->

<---Vendor/Product Identification--->

ID Manufacturer Name: PHL  
ID Product Code: 0870  
ID Serial Number: 00000001  
Week of Manufacture: 18  
Year of Manufacture: 2008

<-x-Vendor/Product Identification-x->

<---EDID Structure Version/Revision--->

EDID Version#: 1  
EDID Revision#: 3

<-x-EDID Structure Version/Revision-x->

<---Basic Display Parameters/Features--->

Video i/p definition: Analog  
Setup: Blank-to-Black not expected  
Separate Syncs. support: Yes  
Composite Sync. support: Yes  
Vsync. Pulse: serration required  
Max Horz Image Size: 47 cm.  
Max Vert Image Size: 29 cm.  
Display Gamma: 2.2  
Display Type: RGB color display  
Standard Default Color Space: Yes  
Features, Preferred Timing Mode: In first detailed block  
Features, GTF support: No  
DPMS Features, Stand-by: Yes  
DPMS Features, Suspend: Yes  
DPMS Features, Active Off: Yes

<-x-Basic Display Parameters/Features-x->

<---Color Characteristics--->

Red x: 0.646484  
Red y: 0.338867  
Green x: 0.290039  
Green y: 0.602539  
Blue x: 0.144531  
Blue y: 7.03125e-002  
White x: 0.313477  
White y: 0.329102

<-x-Color Characteristics-x->

<---Established Timings--->

Established Timings 1: BF

- 720x400 @70Hz  
- 640x480 @60Hz  
- 640x480 @67Hz  
- 640x480 @72Hz  
- 640x480 @75Hz  
- 800x600 @56Hz  
- 800x600 @60Hz

Established Timings 2: EF

- 800x600 @72Hz  
- 800x600 @75Hz  
- 832x624 @75Hz  
- 1024x768 @60Hz  
- 1024x768 @70Hz  
- 1024x768 @75Hz  
- 1280x1024 @75Hz  
- 1152x870x75Hz

Established Timings 3: 80

<-x-Established Timings-x->

<---Standard Timing Identification--->

Standard Timing: 1680x1050 @60Hz  
Standard Timing: 1280x1024 @60Hz  
Standard Timing: 1280x1024 @75Hz  
Standard Timing: 1440x 900 @60Hz  
Standard Timing: 1440x 900 @75Hz  
Standard Timing: 1680x1050 @75Hz  
Standard Timing: 1600x1200 @60Hz  
Standard Timing: 1600x1200 @75Hz

<-x-Standard Timing Identification-x->

<---Detailed Timing Descriptions--->

Detailed Timing: 1680x1050 @59Hz  
Detailed Timing: FF (Monitor SN) 'CS30715000001'  
Detailed Timing: FC (Monitor name) 'Philips 220BW'  
Detailed Timing: FD (Monitor limits)  
Vert: 56 - 76 Hz  
Horz: 30 - 83 KHz  
Clk: 170 MHz

<-x-Detailed Timing Descriptions-x->

Extension Flag: 00  
Checksum: F5

## DDC DATA

/////////Displaying Monitor EDID/////////

128 bytes EDID Data (Hex):

	0	1	2	3	4	5	6	7	8	9
0:	00	FF	FF	FF	FF	FF	FF	00	41	0C
10:	70	08	01	00	00	00	12	12	01	03
20:	80	2F	1D	78	EE	B5	05	A5	56	4A
30:	9A	25	12	50	54	BF	EF	80	B3	00
40:	81	80	81	8F	95	00	95	0F	A9	40
50:	01	01	01	01	7C	2E	90	A0	60	1A
60:	1E	40	30	20	36	00	DA	28	11	00
70:	00	1A	00	00	00	FF	00	43	53	33
80:	30	37	31	35	30	30	30	30	30	31
90:	00	00	00	FC	00	50	68	69	6C	69
100:	70	73	20	32	32	30	42	57	00	00
110:	00	FD	00	38	4C	1E	53	11	00	0A
120:	20	20	20	20	20	20	00	50		

Decoded EDID data

```

<---Header--->
Header:                00 FF FF FF FF FF FF 00
<-x-Header-x->

<---Vendor/Product Identification--->
ID Manufacturer Name:  PHL
ID Product Code:       0870
ID Serial Number:      00000001
Week of Manufacture:   18
Year of Manufacture:   2008
<-x-Vendor/Product Identification-x->

<---EDID Structure Version/Revision--->
EDID Version#:         1
EDID Revision#:        3
<-x-EDID Structure Version/Revision-x->

<---Basic Display Parameters/Features--->
Video i/p definition:  Digital
Setup:                 Blank-to-Black not expected
Seperate Syncs. support: No
Composite Sync. support: No
Vsync. Pulse:         serration not required
Max Horz Image Size:  47 cm
Max Vert Image Size:  29 cm
Display Gamma:         2.2
Display Type:          RGB color display
Standard Default Color Space: Yes
Features, Preferred Timing Mode: In first detailed block
Features, GTF support: No
DPMS Features, Stand-by: Yes
DPMS Features, Suspend: Yes
DPMS Features, Active Off: Yes
<-x-Basic Display Parameters/Features-x->

<---Color Characteristics--->
Red x:                 0.646484
Red y:                 0.338867
Green x:               0.290039
Green y:               0.602539
Blue x:                0.144531
Blue y:                7.03125e-002
White x:               0.313477
White y:               0.329102
<-x-Color Characteristics-x->

```

<---Established Timings--->

```

Established Timings 1: BF
- 720x400 @70Hz
- 640x480 @60Hz
- 640x480 @67Hz
- 640x480 @72Hz
- 640x480 @75Hz
- 800x600 @56Hz
- 800x600 @60Hz

```

```

Established Timings 2: EF
- 800x600 @72Hz
- 800x600 @75Hz
- 832x624 @75Hz
- 1024x768 @60Hz
- 1024x768 @70Hz
- 1024x768 @75Hz
- 1280x1024 @75Hz
- 1152x870x75Hz

```

```

Established Timings 3:      80

```

<-x-Established Timings-x->

<---Standard Timing Identification--->

```

Standard Timing:       1680x1050 @60Hz
Standard Timing:       1280x1024 @60Hz
Standard Timing:       1280x1024 @75Hz
Standard Timing:       1440x 900 @60Hz
Standard Timing:       1440x 900 @75Hz
Standard Timing:       1600x1200 @60Hz
<-x-Standard Timing Identification-x->

```

<---Detailed Timing Descriptions--->

```

Detailed Timing:       1680x1050 @59Hz
Detailed Timing:       FF (Monitor SN) 'CS30715000001'
Detailed Timing:       FC (Monitor name) 'Philips 220BW'
Detailed Timing:       FD (Monitor limits)

```

```

Vert: 56 - 76 Hz
Horz: 30 - 83 KHz
Clk: 170 MHz

```

<-x-Detailed Timing Descriptions-x->

```

Extension Flag:        00
Checksum:              50

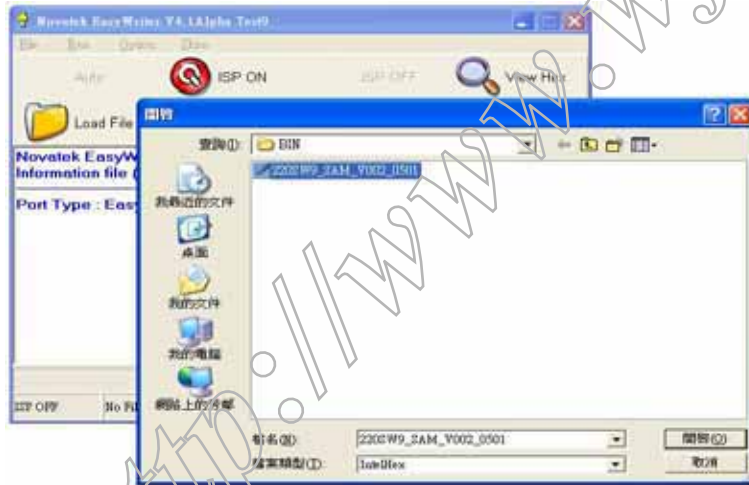
```

## Firmware Upgrade for CPU

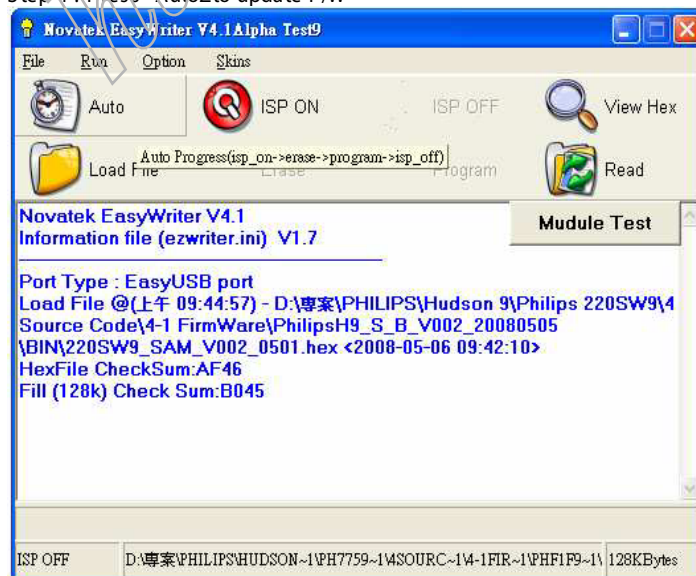
- Step 1 : Install •Port95nt.exeŽ  
Restart computer.
- Step 2 : Dobule click •EasyUSB Writer\Writer\_t9.exeŽ  
Press •Load FileŽ



- Step 3 : Choose \*.hex

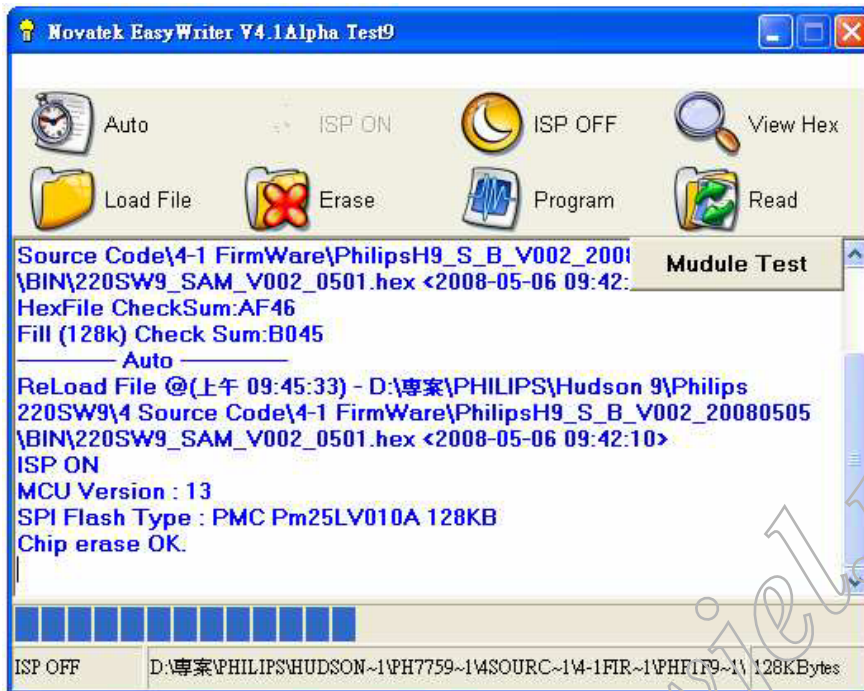


- Step 4 : Press •AutoŽto update F/W

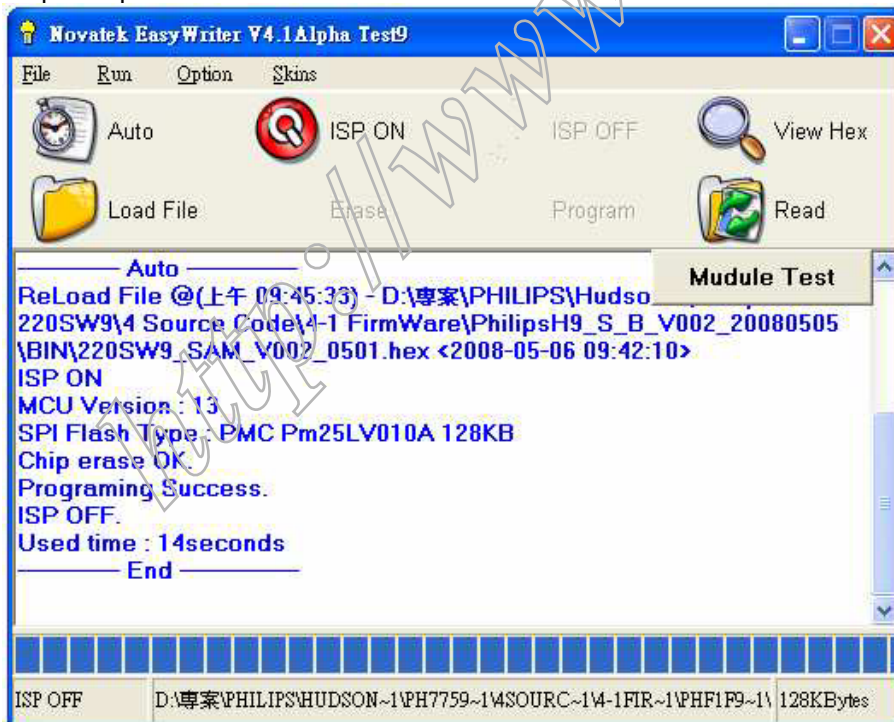




## Firmware Upgrade for CPU



Step 5 : Update OK !!



## Failure Mode Of Panel

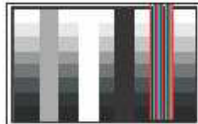
Quick reference for failure mode of LCD panel

this page presents problems that could be made by LCD panel. It is not necessary to repair circuit board. Simply follow the mechanical instruction on this manual to eliminate failure by replace LCD panel.

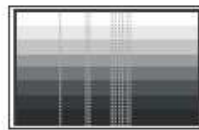
Failure description

Phenomenon

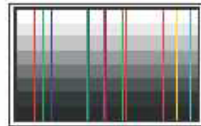
Vertical block defect



Vertical dim lines



Vertical lines defect  
(Always bright or dark)



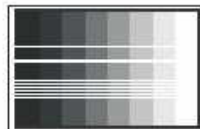
Horizontal block defect



Horizontal dim lines



Horizontal lines defect  
(Always bright or dark)



Has bright or dark pixel



Polarizer has bubbles



Polarizer has bubbles



Foreign material inside polarizer. It shows liner or dot shape.



Concentric circle formed



Bottom back light of LCD is brighter than normal



Back light un-uniformity

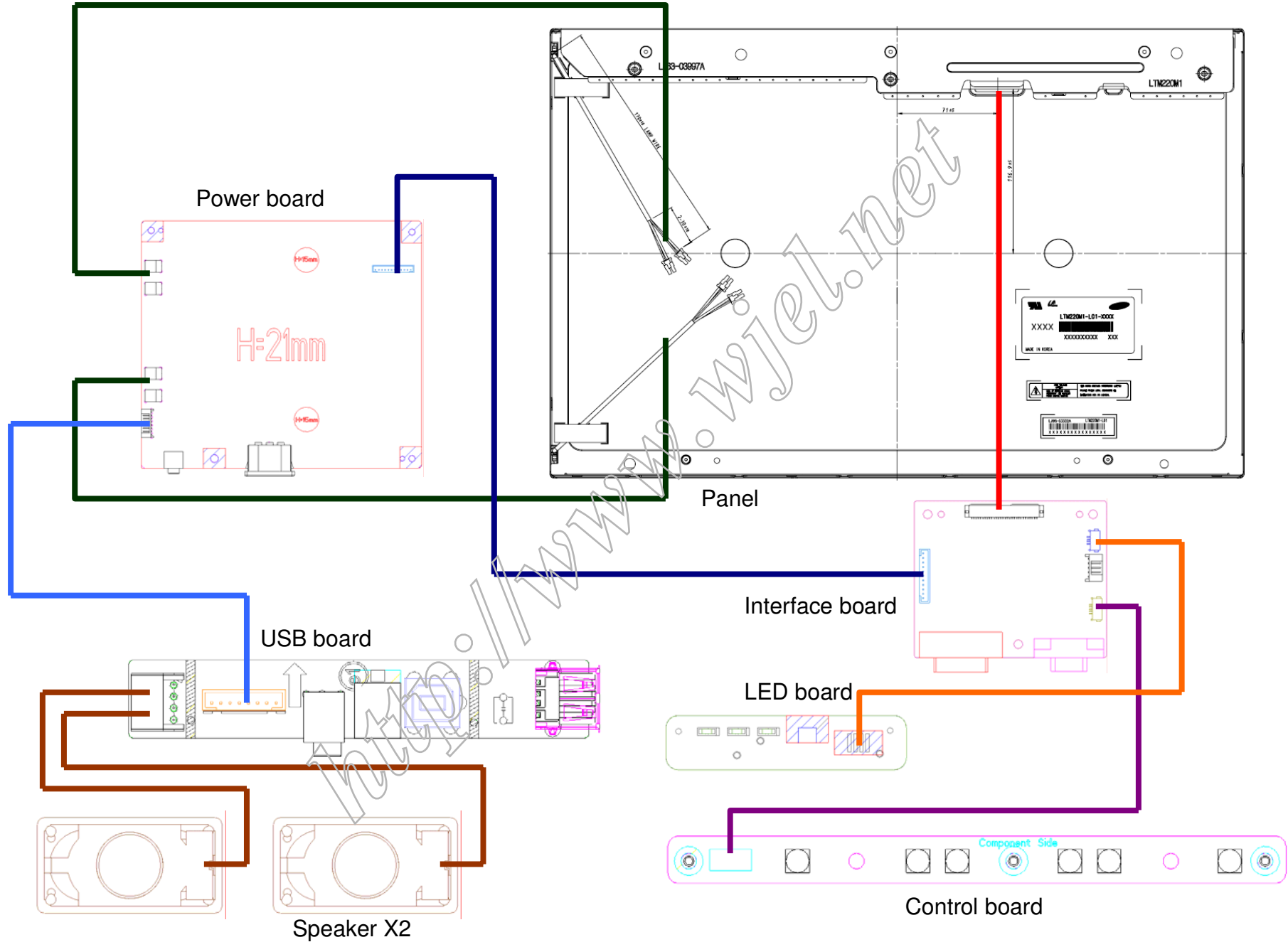


Backlight has foreign material. Black or white color, liner or circular type



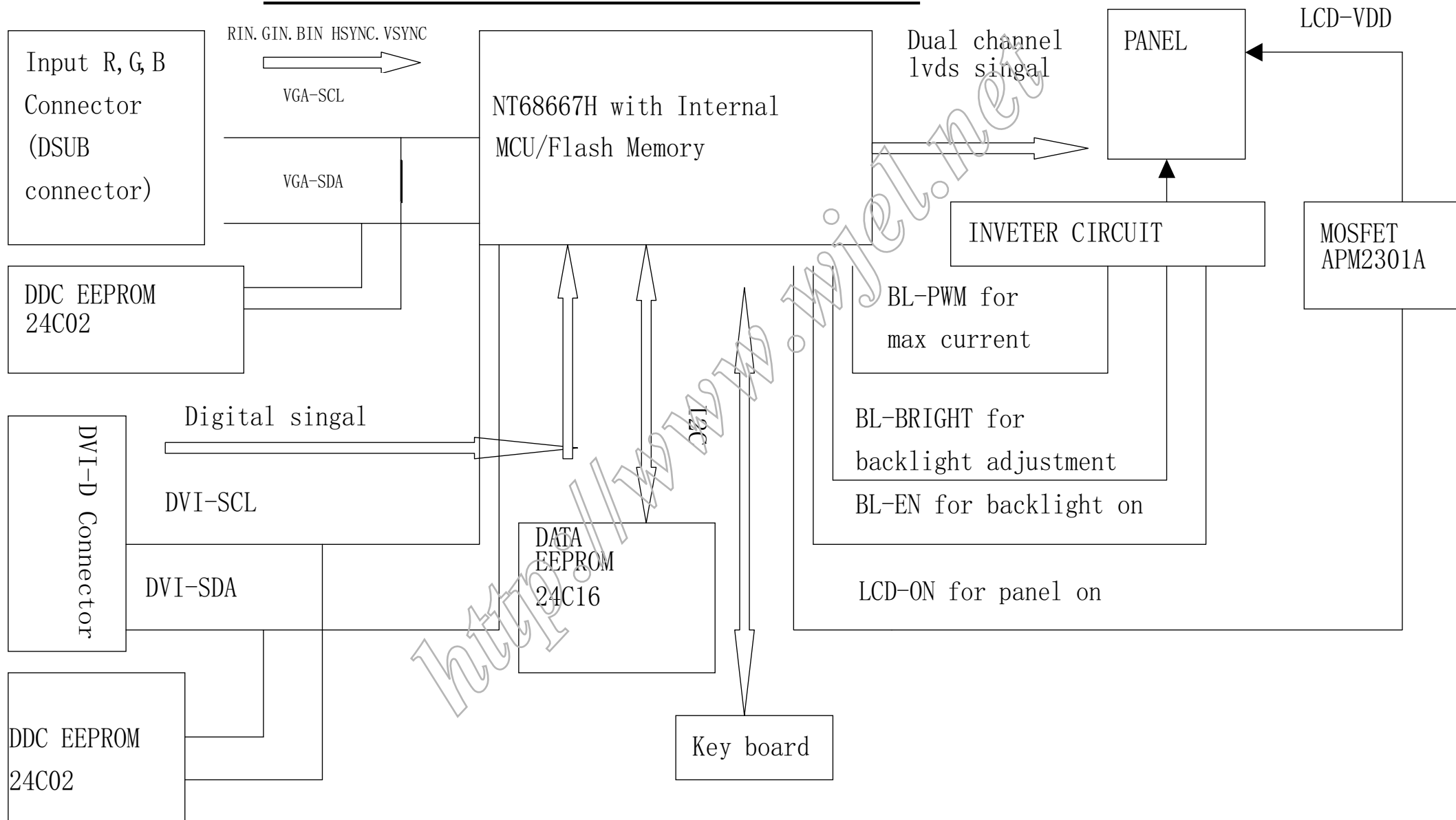


# Wiring Diagram

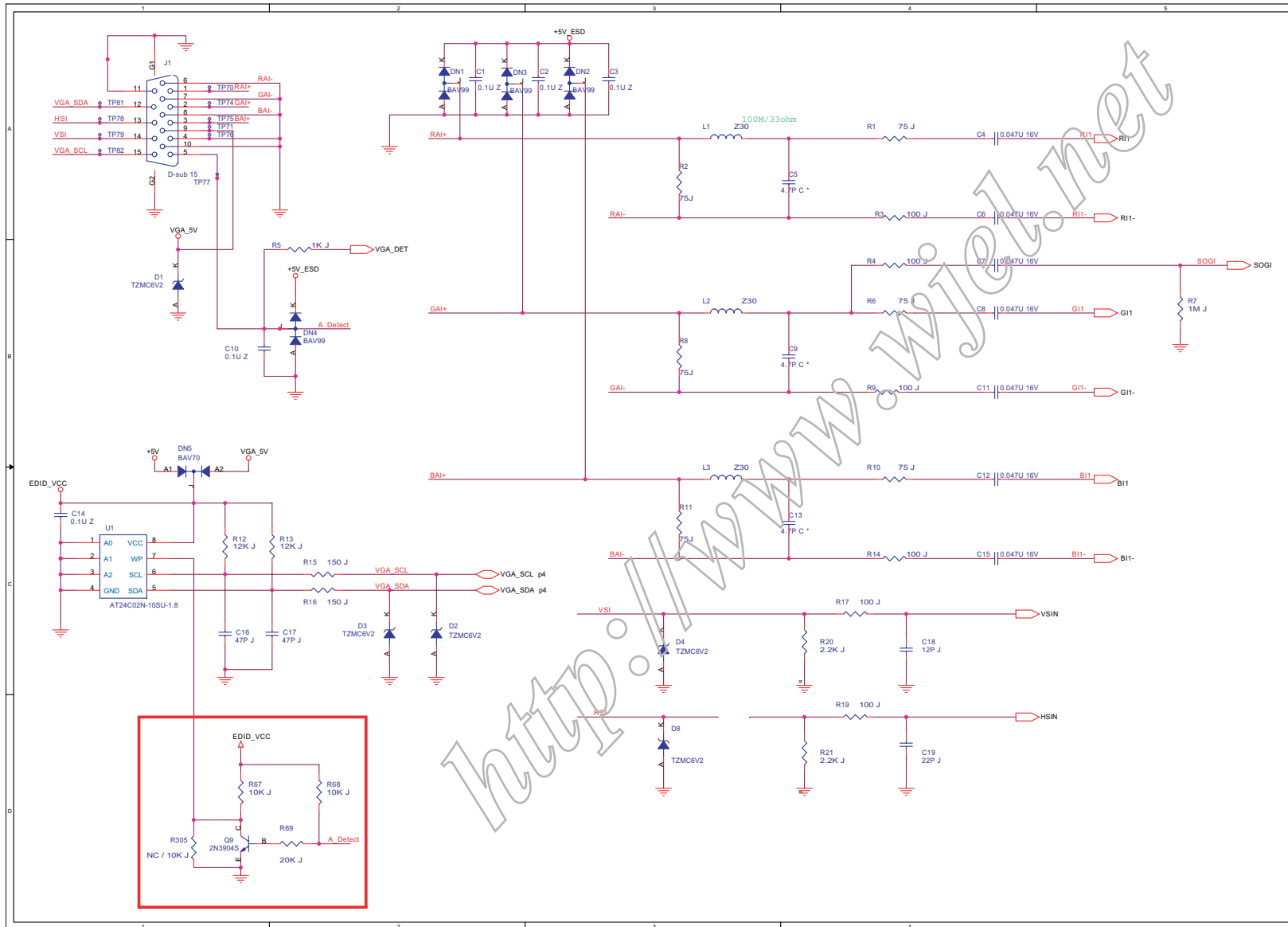


Block Diagram

PHILIPS 220BW9 MAIN BOARD BLOCK DIAGRAM

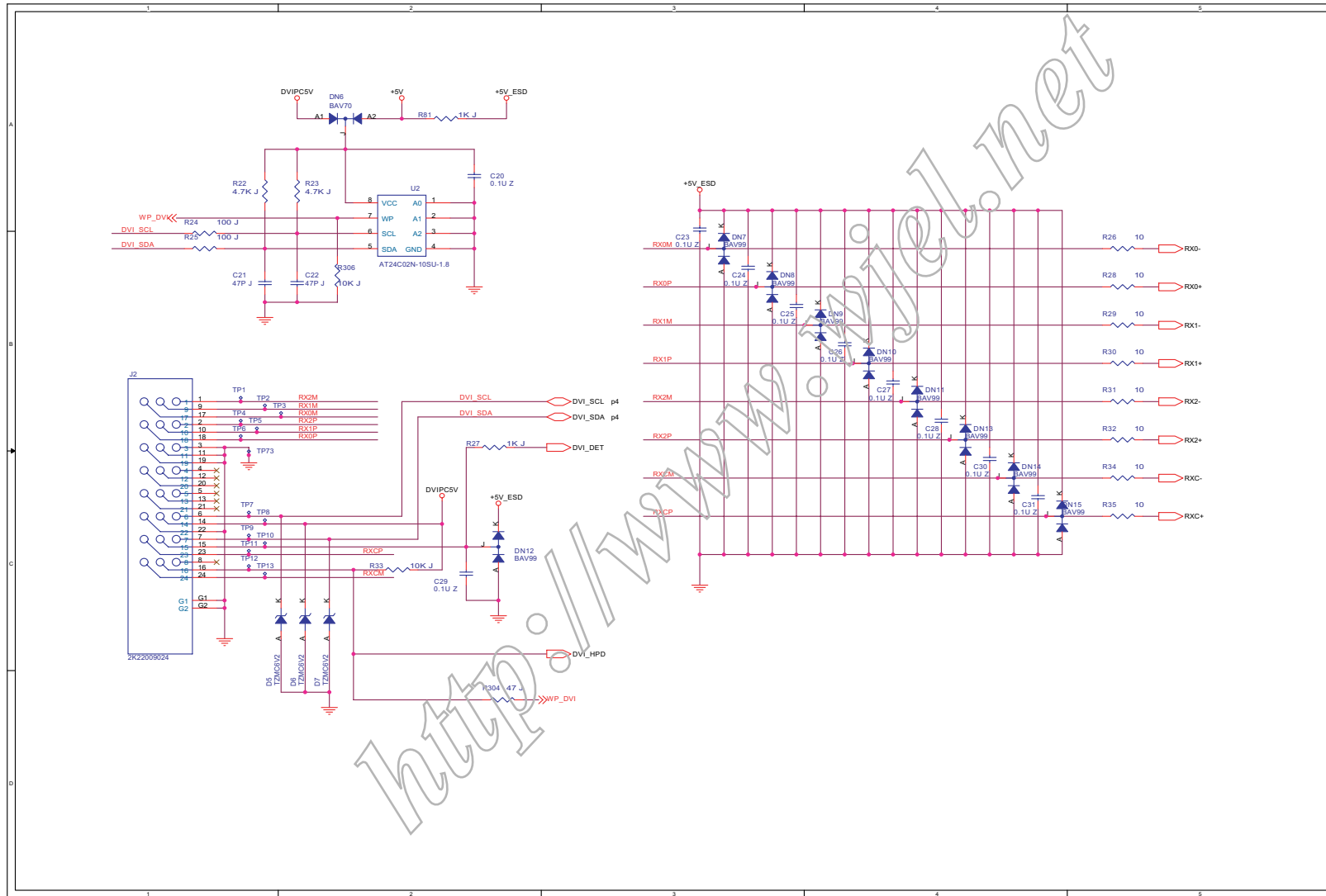


# Scaler Diagram & C.B.A



C1	A2
C10	B1
C11	B4
C12	C4
C13	C3
C14	C1
C15	C4
C16	C1
C17	C1
C18	C4
C19	D4
C2	A3
C3	A3
C4	A4
C5	A3
C6	A4
C7	B4
C8	B4
C9	B3
D1	B1
D2	C2
D3	C2
D4	C3
D8	D3
DN1	A2
DN2	A3
DN3	A2
DN4	B2
DN5	B1
J1	A1
L1	A3
L2	B3
L3	C3
Q9	D1
R1	A4
R10	C4
R11	C3
R12	C1
R13	C1
R14	C4
R15	C2
R16	C2
R17	C4
R18	D3
R19	D4
R2	A3
R20	C4
R21	D4
R3	A4
R4	B4
R5	A2
R6	B4
R67	D1
R68	D2
R69	D2
R7	B5
R8	B3
R9	B4
U1	C1

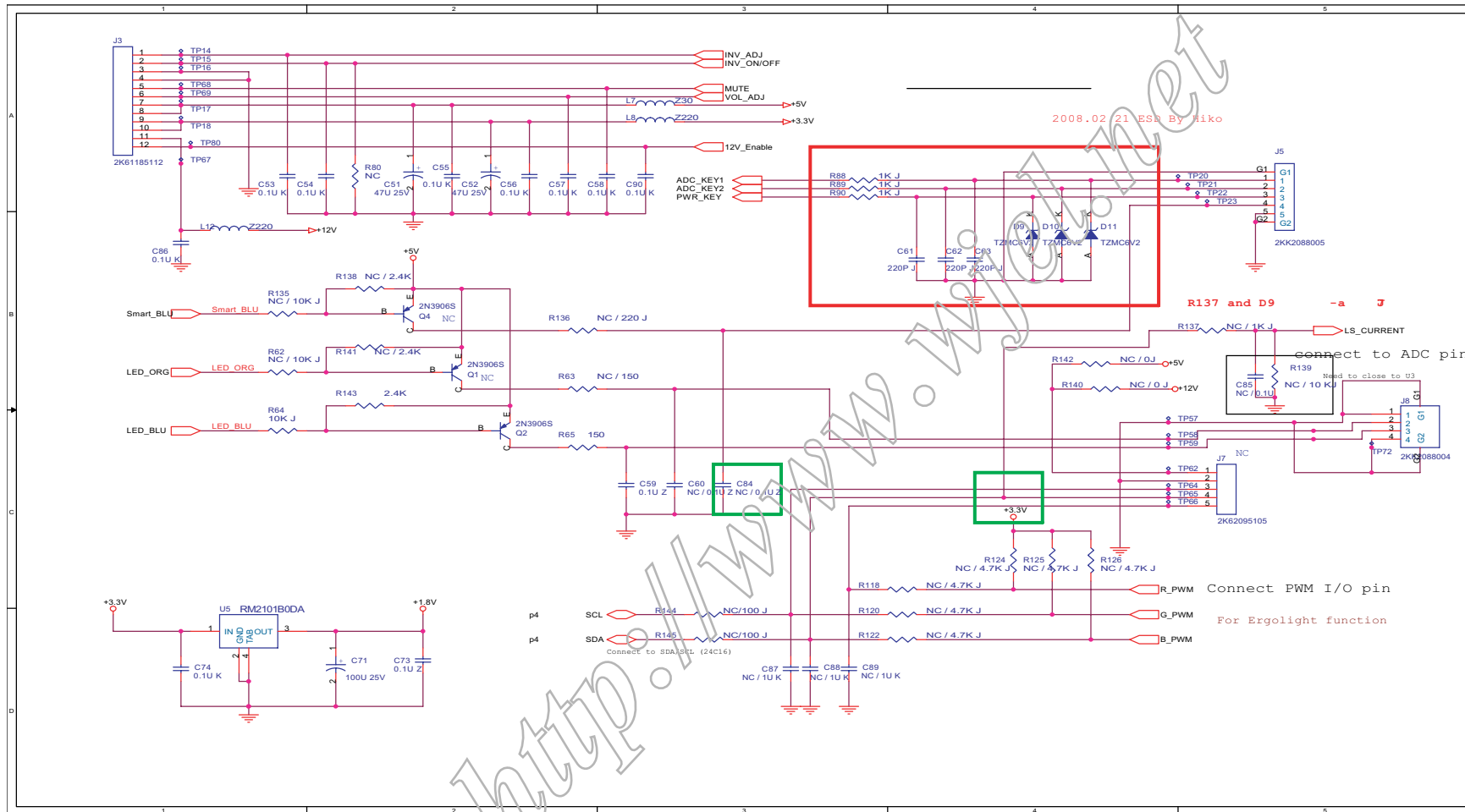
# Scaler Diagram & C.B.A



C 20	A2
C 21	B1
C 22	B2
C 23	A3
C 24	B3
C 25	B3
C 26	B4
C 27	B4
C 28	B4
C 29	C2
C 30	C4
C 31	C4
D5	C1
D6	C2
D7	C2
DN10	B4
DN11	B4
DN12	C2
DN13	B4
DN14	C4
DN15	C4
DN6	A2
DN7	A3
DN8	B3
DN9	B4
J2	B1
R22	A1
R23	A2
R24	A1
R25	B1
R26	B5
R27	B2
R28	B5
R29	B5
R30	B5
R304	D2
R306	B2
R31	B5
R32	B5
R33	C2
R34	C5
R35	C5
R81	A2
U2	A2

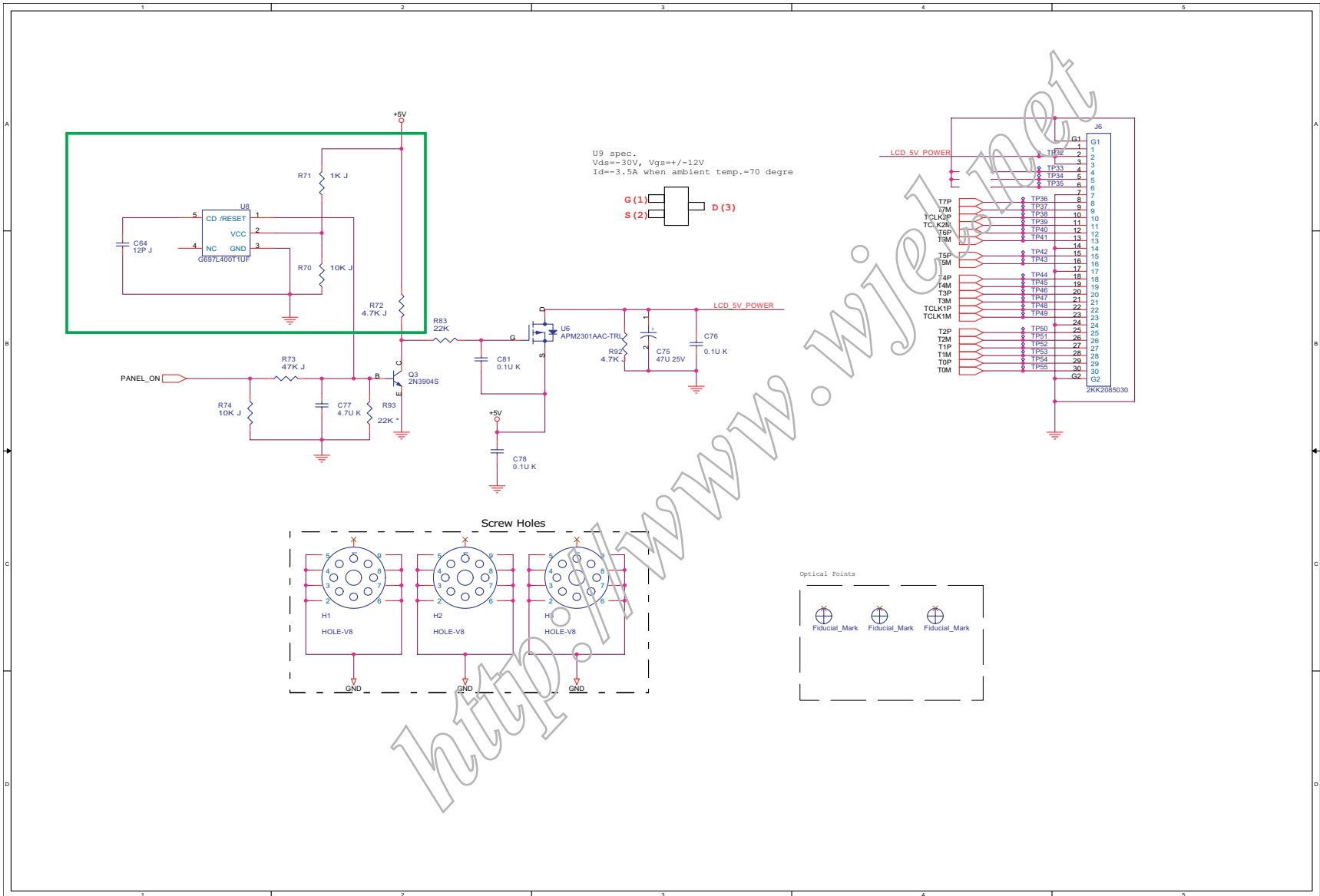


# Scaler Diagram & C.B.A



- C51 A2
- C52 A2
- C53 A1
- C54 A1
- C55 A2
- C56 A2
- C57 A2
- C58 A2
- C59 B2
- C61 A3
- C62 A3
- C63 A3
- C71 C1
- C73 C2
- C74 C1
- C86 A1
- C90 A2
- D10 A4
- D11 A4
- D9 A4
- J3 A1
- J5 A4
- J8 B5
- L12 A1
- L7 A2
- L8 A2
- Q2 B2
- R143 B2
- R64 B1
- R65 B2
- R88 A3
- R89 A3
- R90 A3
- U5 C1

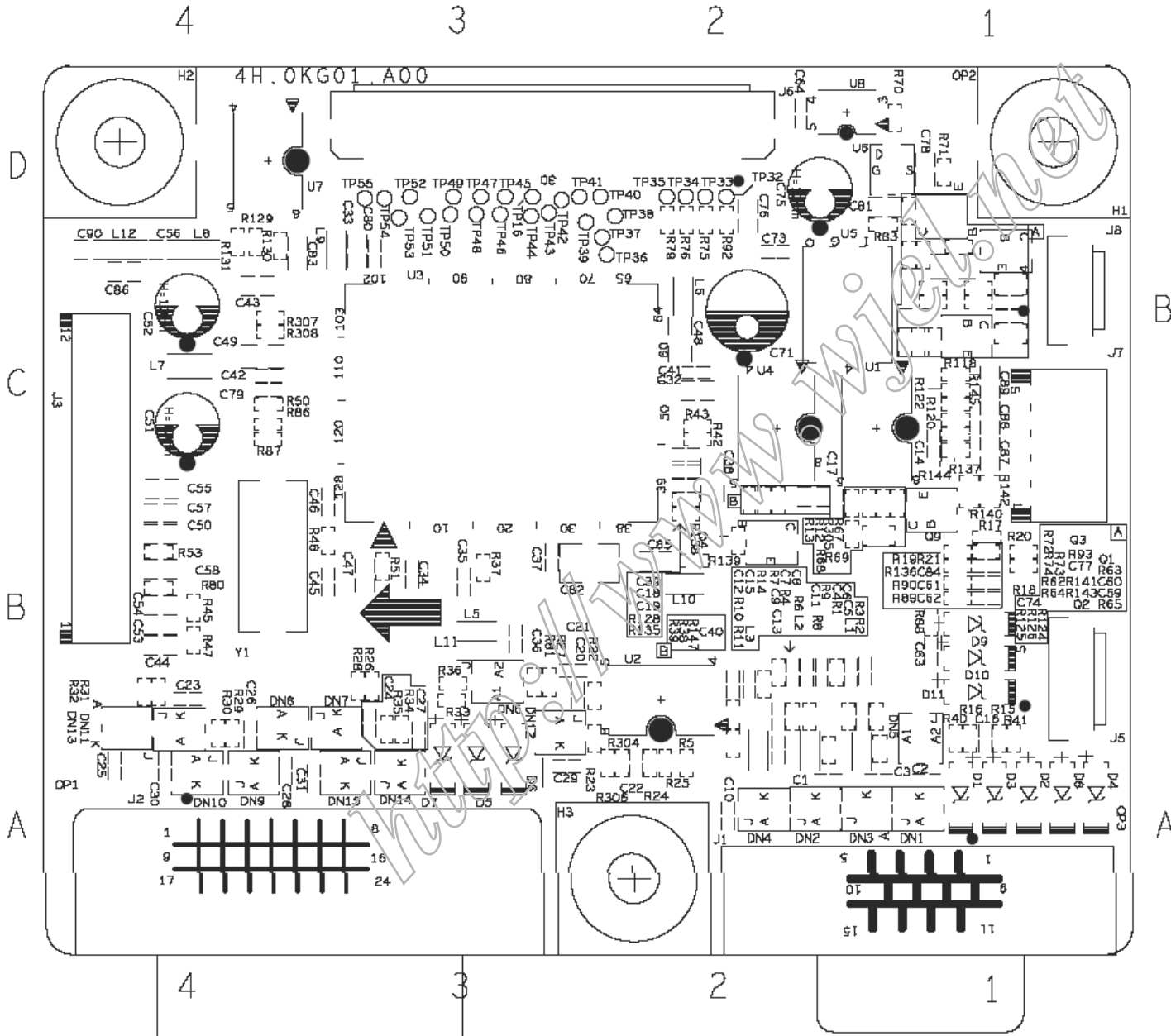
### Scaler Diagram & C.B.A



- C64 B1
- C75 B3
- C76 B3
- C77 B2
- C78 B2
- C81 B2
- J6 A5
- Q3 B2
- R70 B2
- R71 A2
- R72 B2
- R73 B2
- R74 B1
- R83 B2
- R92 B3
- R93 B2
- U6 B2
- U8 A1

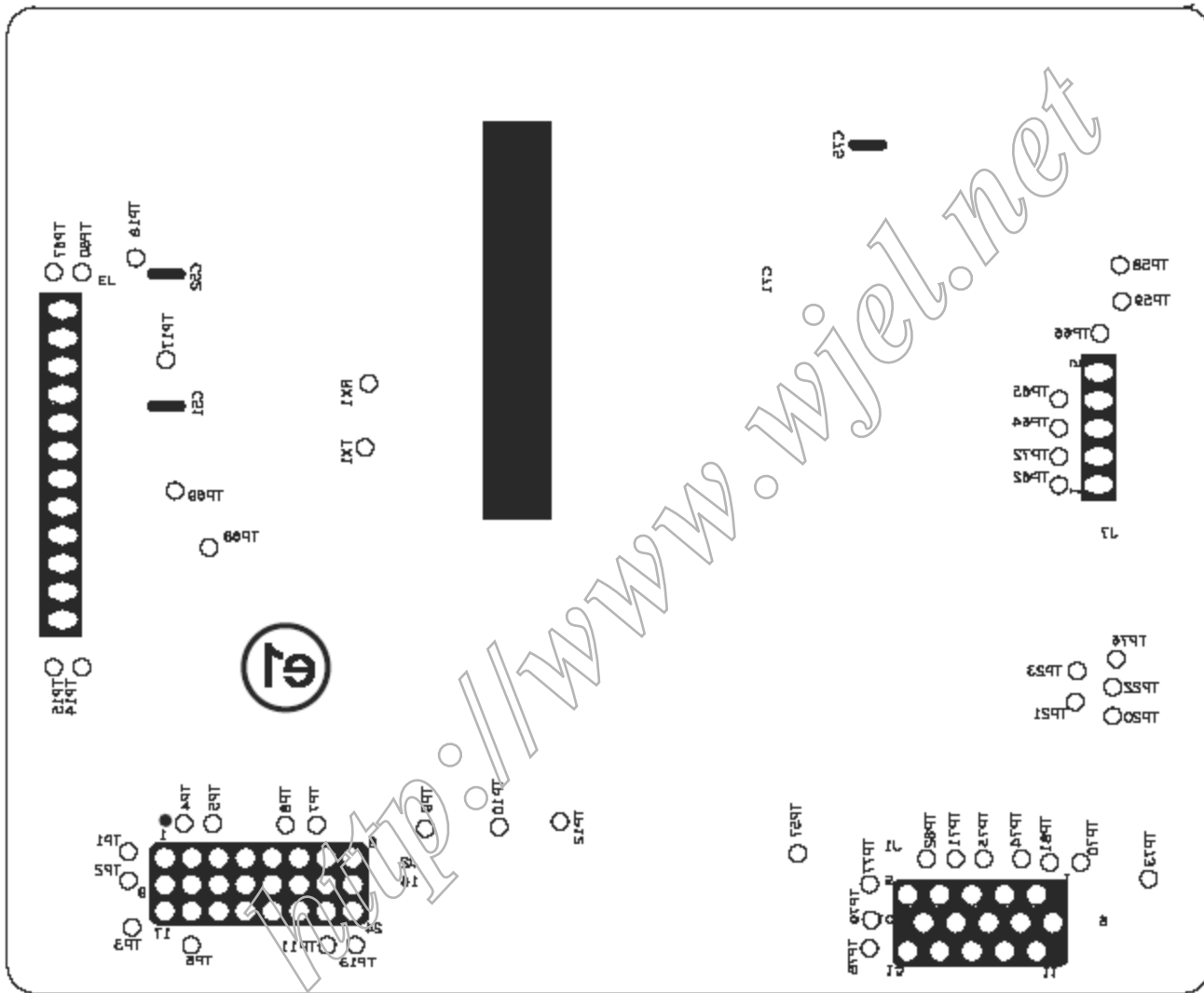


### Scaler Diagram & C.B.A

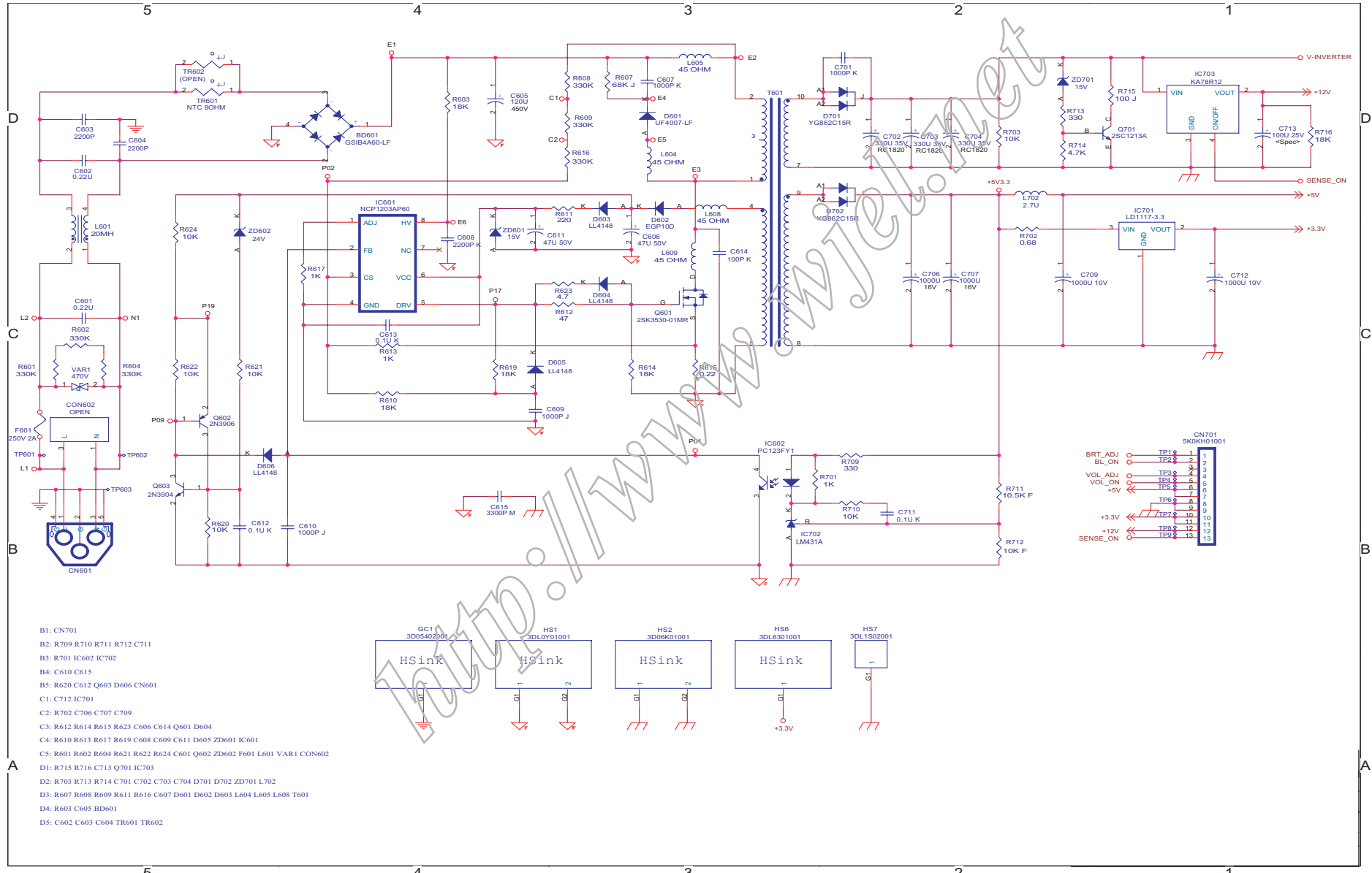


- A 1 : J 5
- A 1 : R 3
- A 1 : R 2 1
- A 1 : R 1 7
- A 2 : U 2
- A 3 : R 3 5
- A 3 : D 6
- A 4 : R 4 7
- A 4 : R 4 5
- A 4 : R 3 1
- A 4 : C 4 4
- B 1 : U 6
- B 1 : U 1
- B 2 : U 4
- B 2 : R 7 6
- B 2 : R 4 2
- B 2 : R 3 9
- B 2 : R 3 8
- B 2 : R 1 3
- B 2 : C 3 9
- B 2 : C 1 9
- B 2 : C 1 8
- B 2 : C 1 7
- B 3 : U 3
- B 3 : L 9
- B 3 : C 3 3

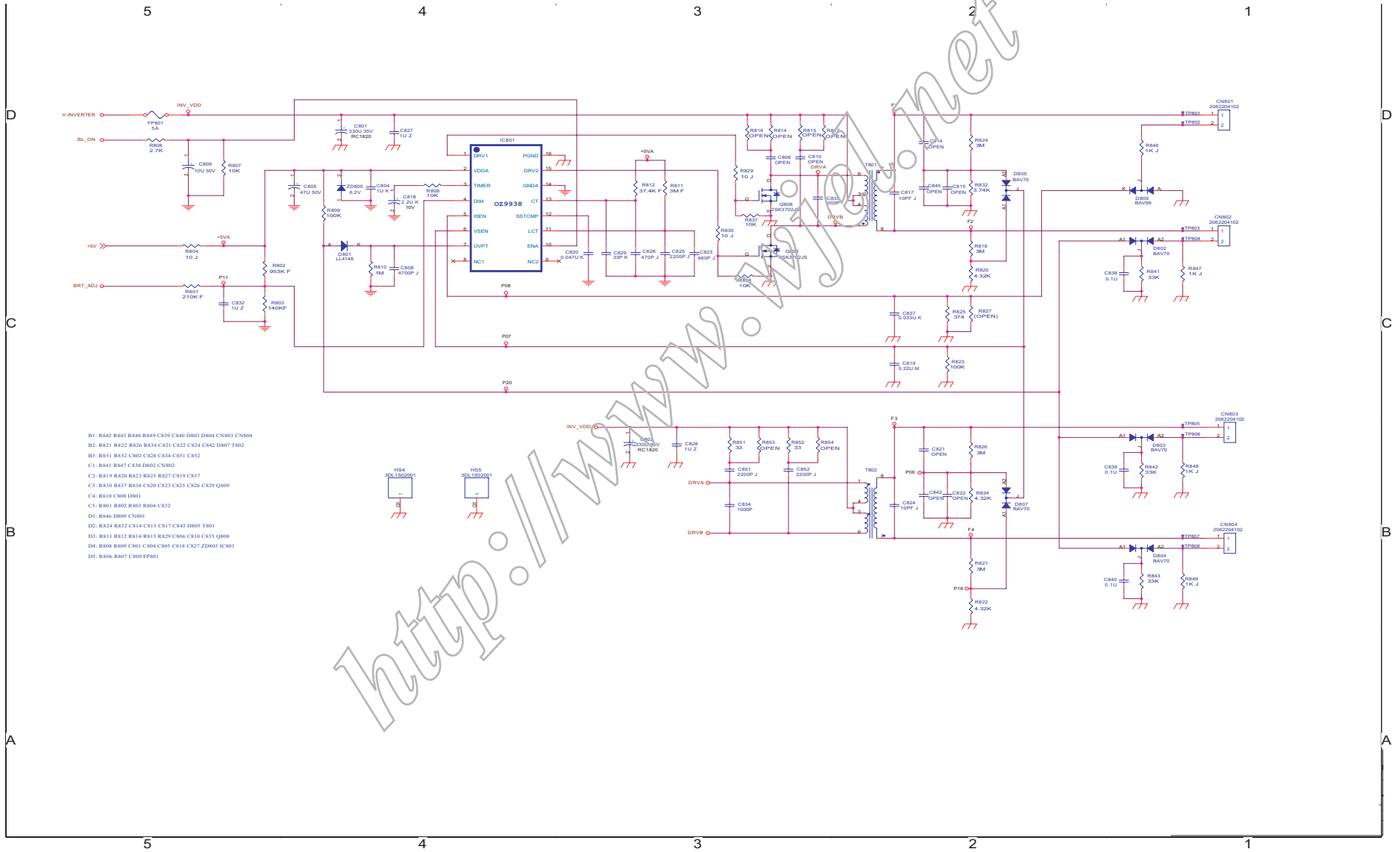
### Scaler Diagram & C.B.A



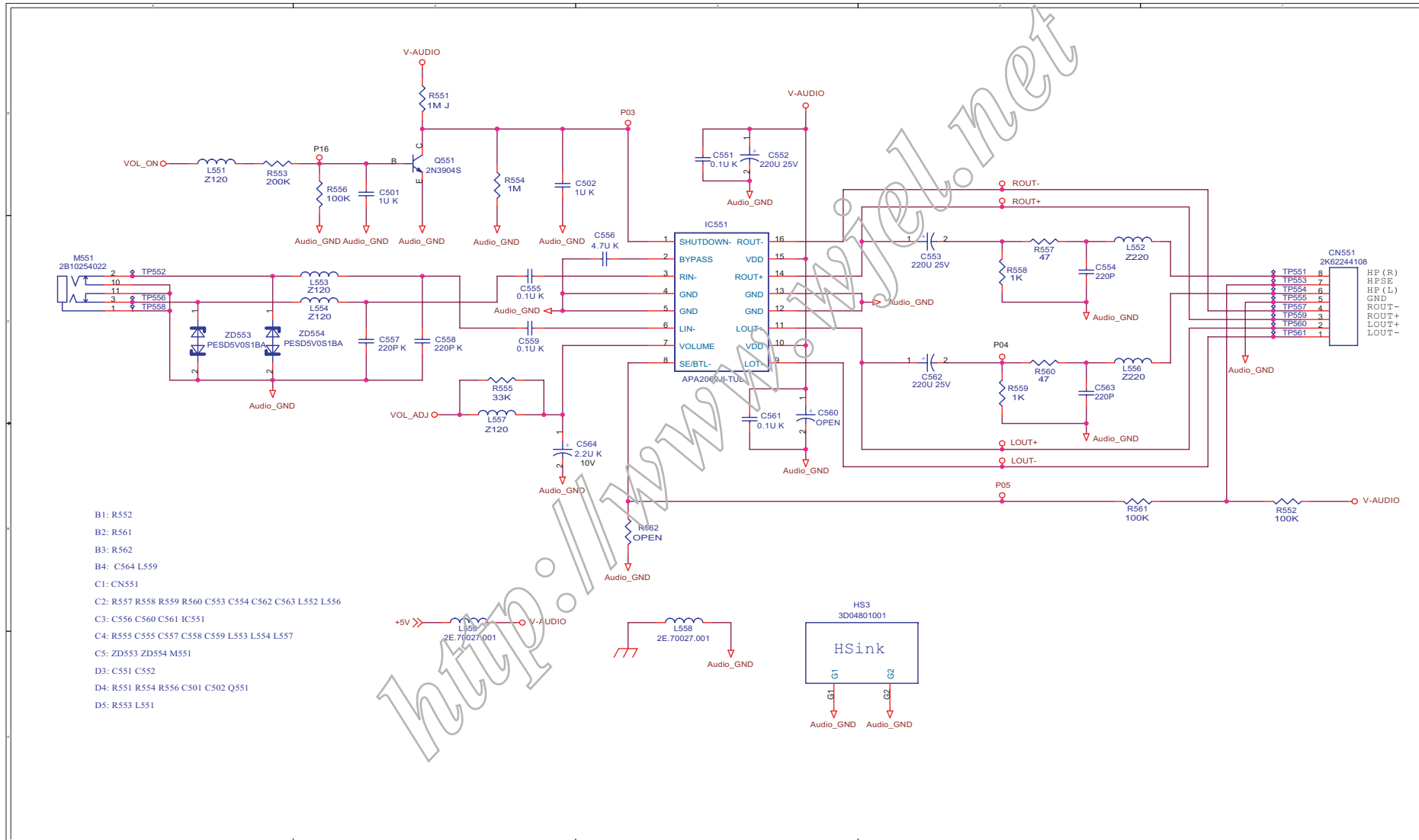
# Power Diagram & C.B.A



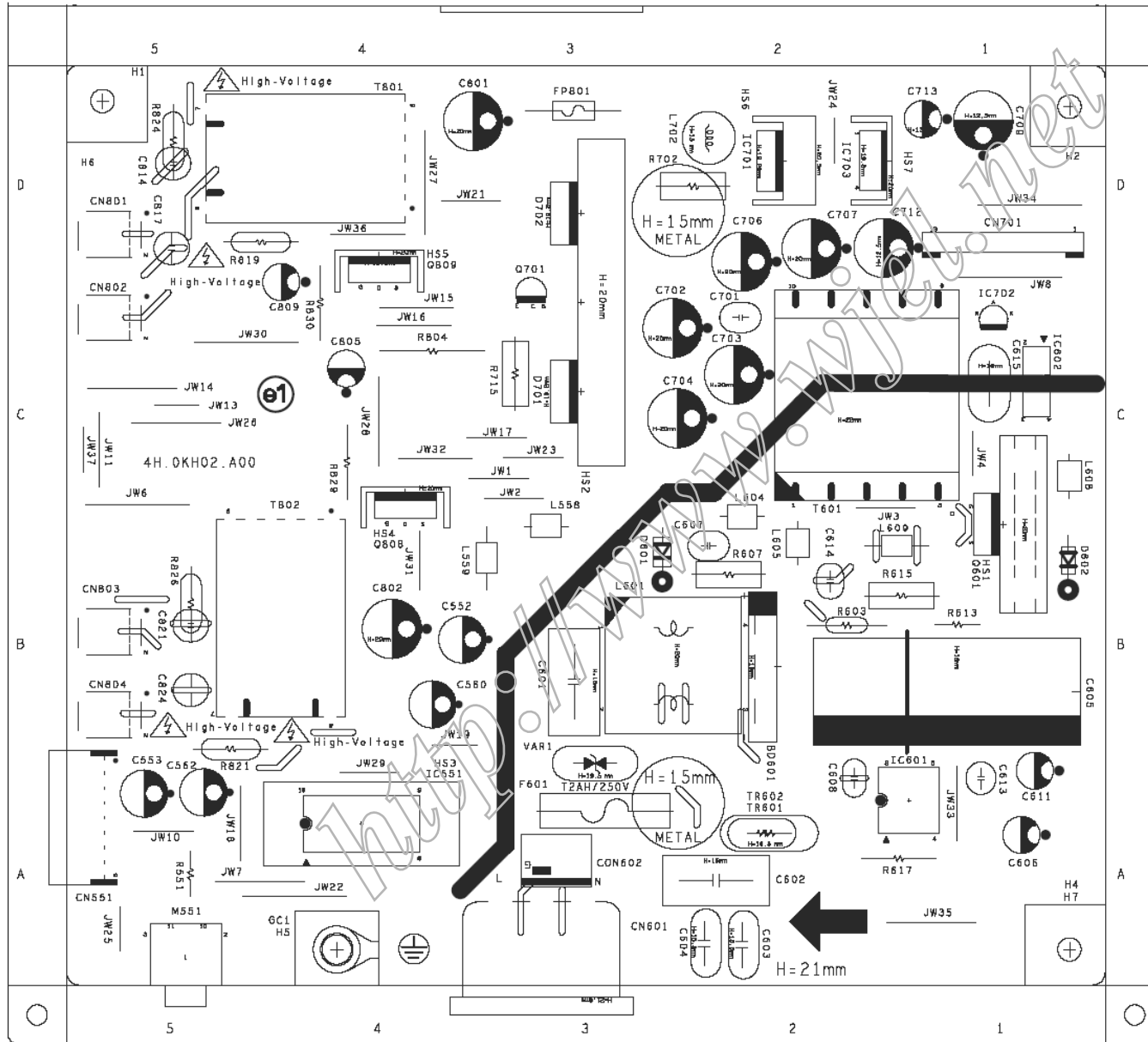
# Power Diagram & C.B.A



# Power Diagram & C.B.A

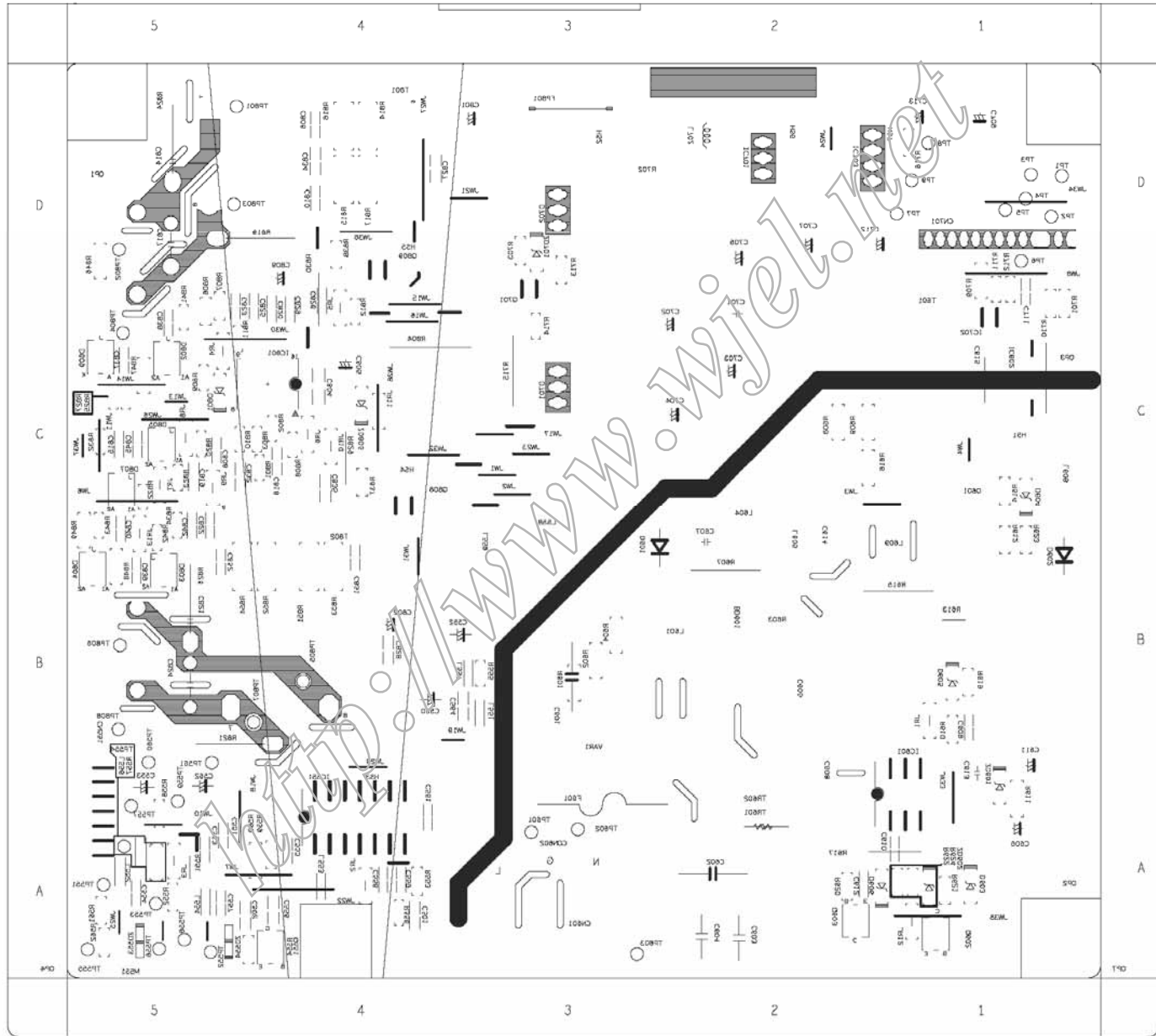


# Power Diagram & C.B.A.

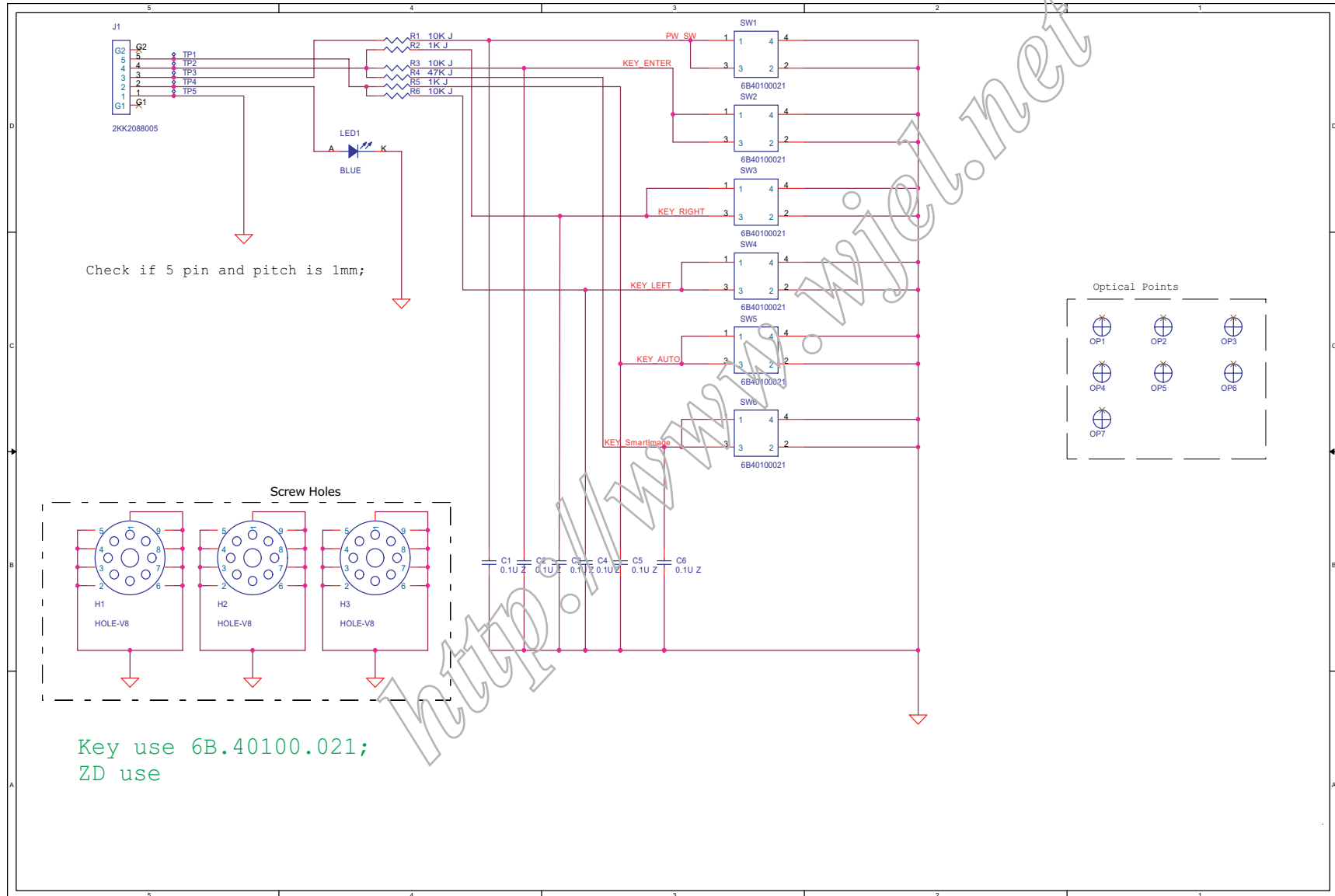


- |     |       |     |        |
|-----|-------|-----|--------|
| C1: | IC602 | A1: | JW33   |
| C2: | IC702 | A1: | C613   |
| C2: | T601  | A1: | C611   |
| C2: | L604  | A1: | C606   |
| C2: | JW3   | A1: | R617   |
| C2: | C701  | A2: | C608   |
| C2: | C703  | A2: | TR602  |
| C3: | D701  | A2: | JW35   |
| C3: | JW23  | A2: | C602   |
| C3: | JW2   | A2: | TR601  |
| C3: | C704  | A2: | C702   |
| C3: | C702  | A2: | C604   |
| C3: | R804  | A2: | C603   |
| C3: | R715  | A3: | CN601  |
| C4: | Q808  | A3: | F601   |
| C4: | JW32  | A3: | VAR1   |
| C4: | JW28  | A3: | CON602 |
| C4: | JW17  | A4: | CS51   |
| C4: | JW16  | A4: | JW29   |
| C4: | JW15  | A4: | GC1    |
| C4: | JW1   | A5: | CN551  |
| C4: | C805  | A5: | JW7    |
| C4: | R830  | A5: | JW25   |
| C4: | R829  | A5: | JW22   |
| C5: | JW6   | A5: | JW18   |
| C5: | JW37  | A5: | JW10   |
| C5: | JW30  | A5: | C62    |
| C5: | JW26  | A5: | C62    |
| C5: | JW14  | A5: | C553   |
| C5: | JW13  | A5: | M51    |
| C5: | JW11  | A5: | M51    |
| C5: | CN602 | B1: | D802   |
| C5: | CN701 | B1: | R613   |
| D1: | CN701 | B1: | R615   |
| D1: | C713  | B2: | C605   |
| D1: | JW8   | B2: | C614   |
| D1: | JW34  | B2: | R603   |
| D1: | C709  | B2: | L609   |
| D2: | IC703 | B2: | L605   |
| D2: | IC701 | B2: | L607   |
| D2: | L702  | B3: | L601   |
| D2: | C707  | B3: | L558   |
| D2: | C706  | B3: | D702   |
| D3: | F601  | B3: | F601   |
| D3: | R702  | B4: | JW31   |
| D3: | Q701  | B4: | JW19   |
| D4: | Q809  | B4: | C560   |
| D4: | JW36  | B4: | C552   |
| D4: | JW27  | B4: | T802   |
| D4: | JW21  | B4: | C802   |
| D4: | R801  | B5: | CN804  |
| D4: | C801  | B5: | CN803  |
| D5: | CN801 | B5: | C824   |
| D5: | C817  | B5: | C821   |
| D5: | C814  | B5: | C814   |
| D5: | C809  | B5: | R826   |
| D5: | R824  | B5: | R821   |
| D5: | R819  | C1: | Q801   |

# Power Diagram & C.B.A.



### Control Diagram & C.B.A.



R 1	D 4
R 3	D 4
R 6	D 4
R 2	D 4
R 5	D 4
R 4	D 4
SW 1	D 3
SW 2	D 3
SW 3	D 3
SW 4	C 3
SW 5	C 3
SW 6	C 3

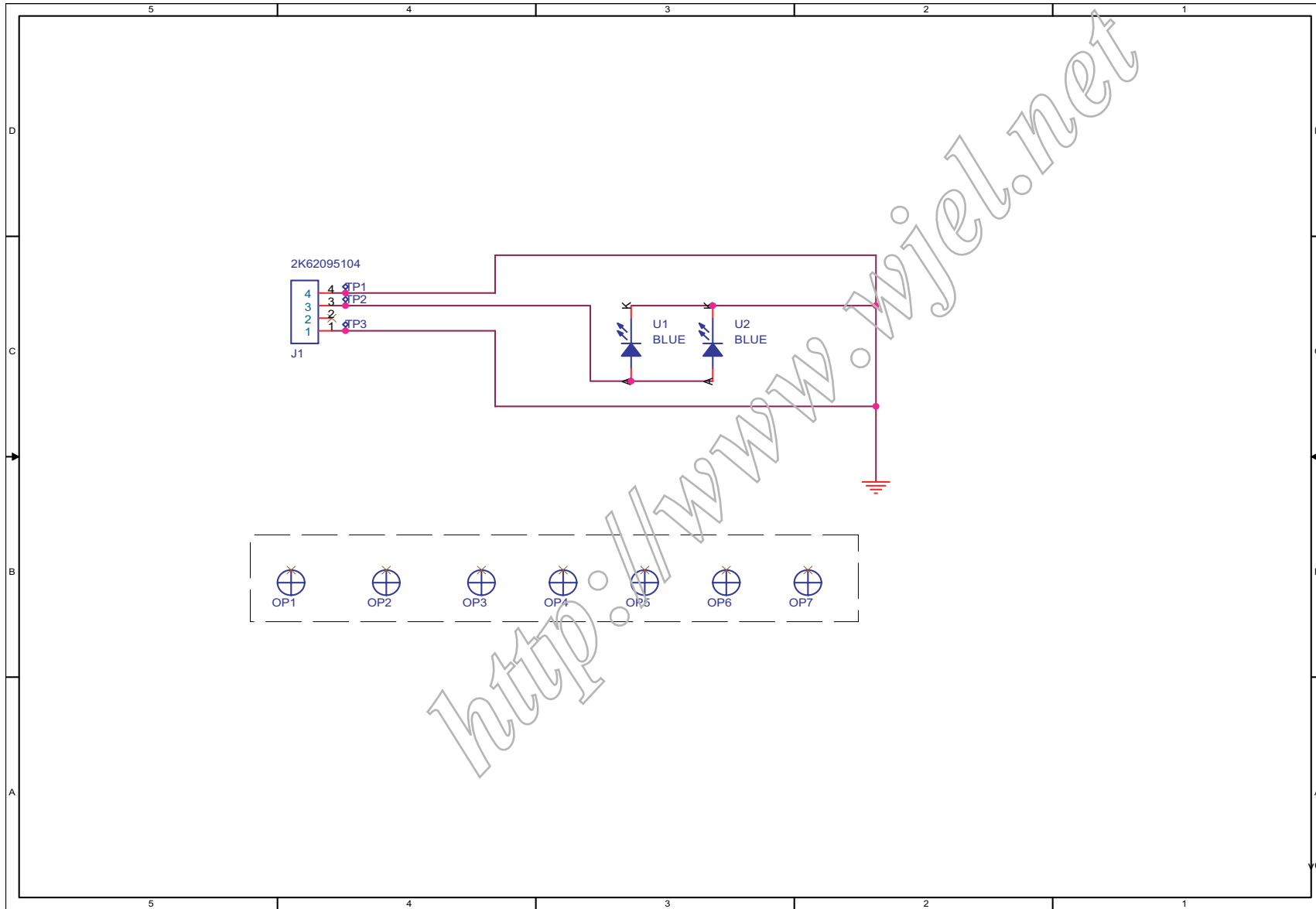


### Control Diagram & C.B.A



<http://www.wjernet.com>

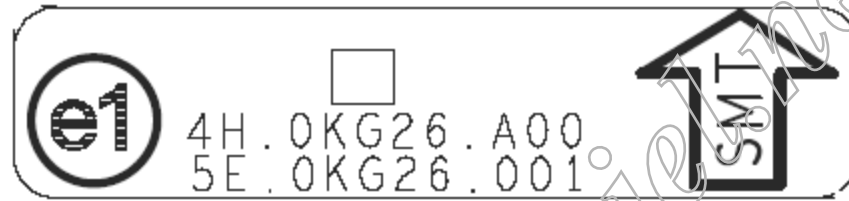
### LED Diagram & C.B.A



U1

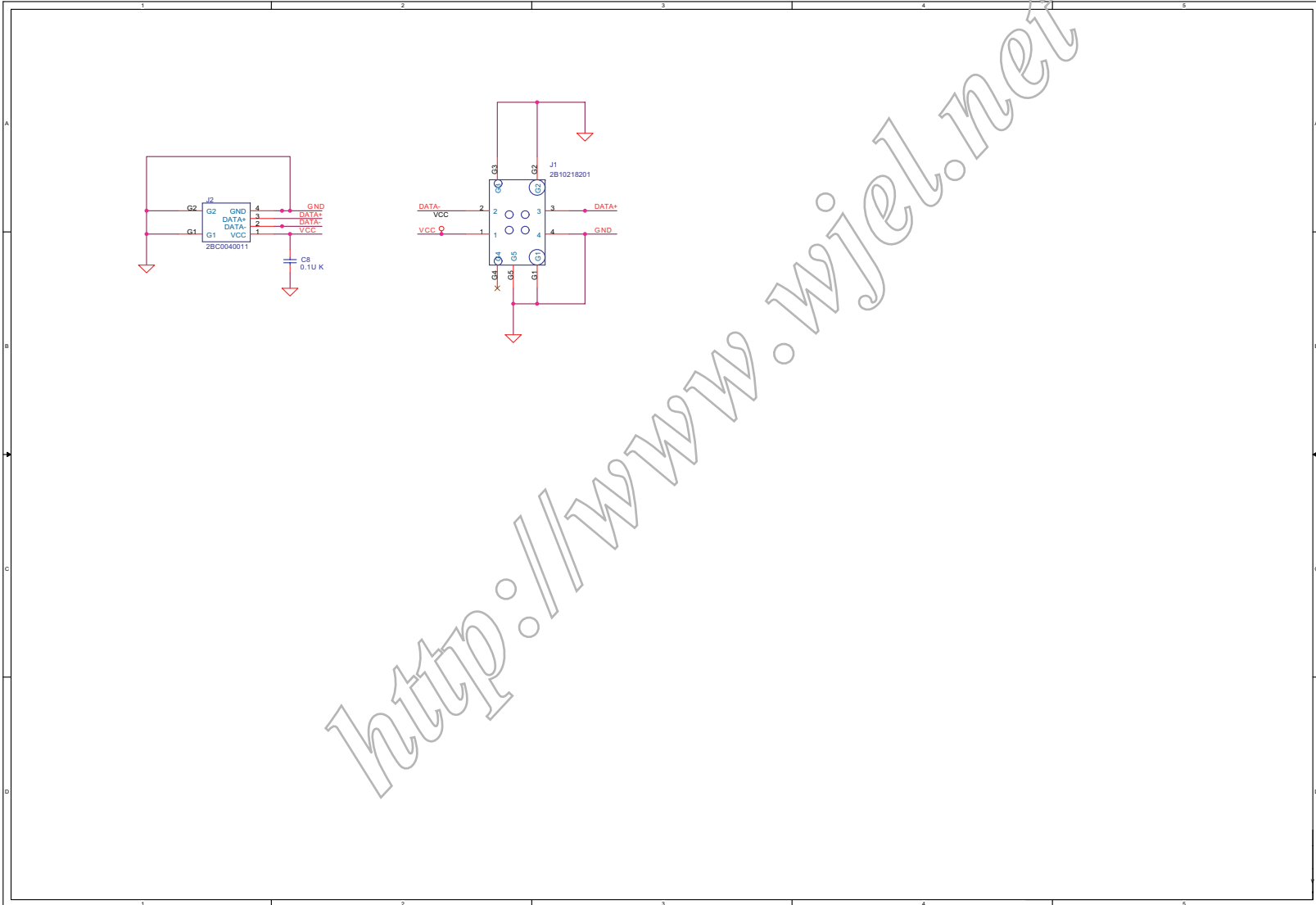
C3

### LED Diagram & C.B.A



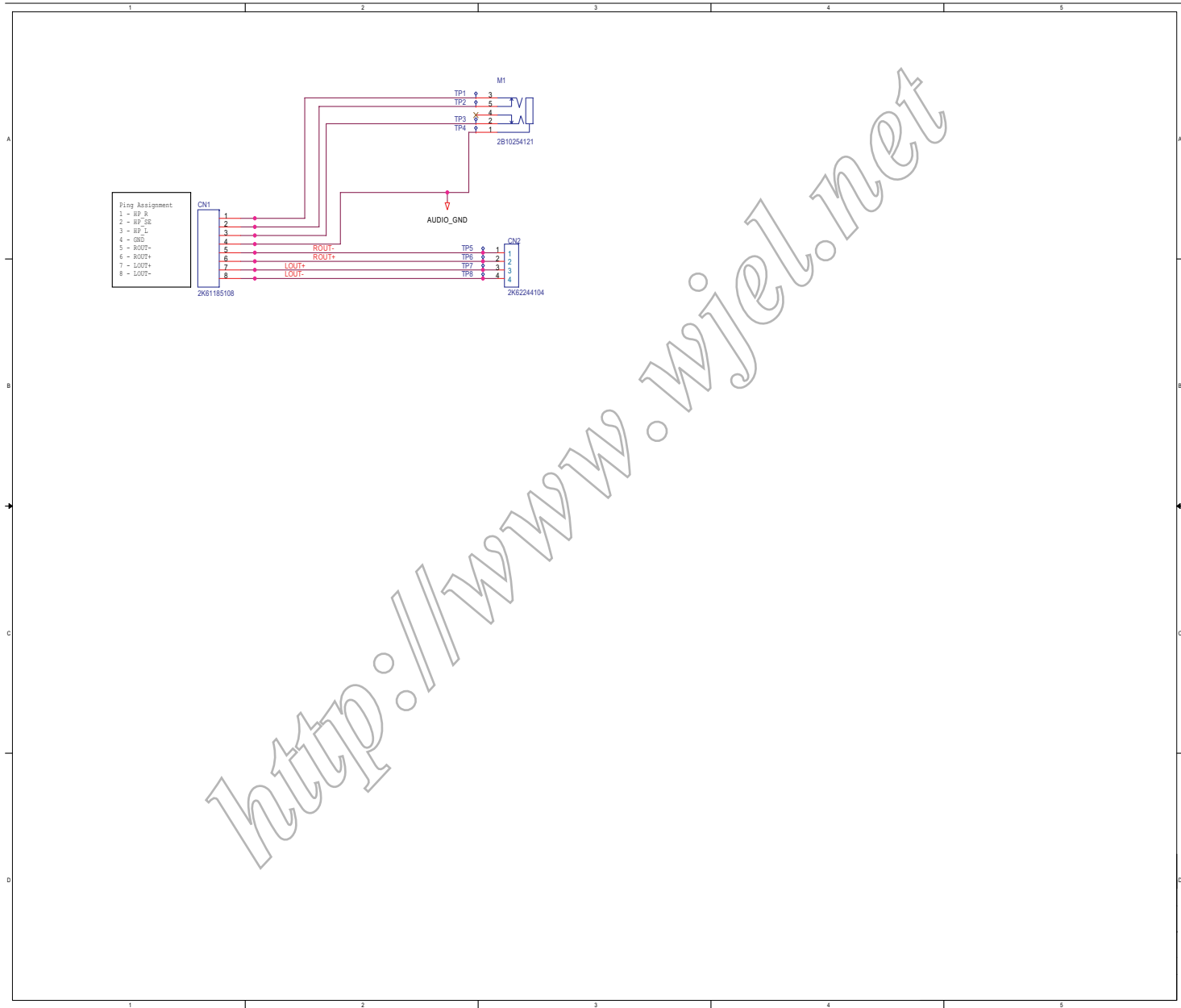
<http://www.wjcm.net>

### USB Diagram & C.B.A



J2:A1  
J1:A2

# USB Diagram & C.B.A



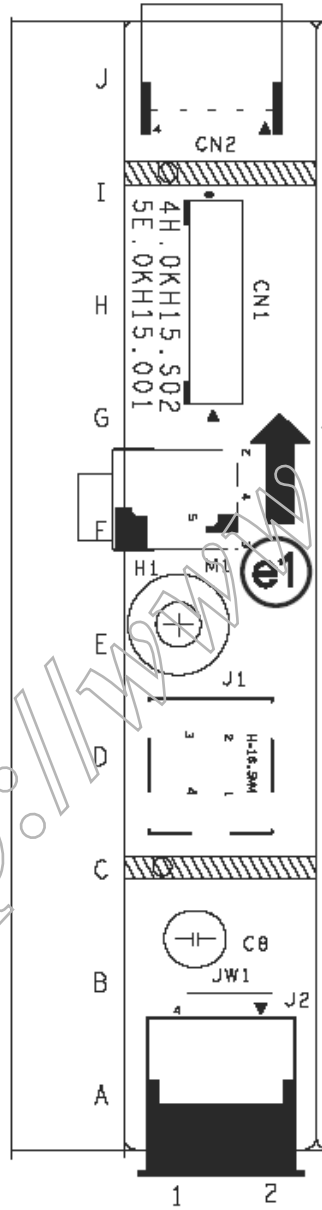
CN1:A1

M1:A3

CN2:B3

<http://www.wjel.net>

### USB Diagram & C.B.A



<http://www.wjw.net>



# General Product Specification

<b>HUDSON 9-220BW9 GENERAL PRODUCT SPECIFICATION</b>
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Issued by: Mark Chan/ Argent Chan

## Revision History

Ver.	Date (yy.mm.dd)	Author	Brief Description
0.1	2008.03.31	UC	Initiate version
0.2	2008.04.30	Mark	1) Modify panel source sec.2.2
0.3	2008 Apr 25	Argent	Updated ME request

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## General Product Specification

- . ANALOG AND DIGITAL (optional) DUAL INPUT
  
- . AUTO PICTURE ADJUSTMENT
  
- . 18 FACTORY PRESET MODES AND 48 PRESET MODES WHICH CAN BE RECOVERED TO PRESET MODES, 10 USER MODES
  
- . USER FRIENDLY OSD DISPLAY FOR MODE IDENTIFICATION /ADJUSTMENT
  
- . MAX. RESOLUTION 1680 x 1050 NON-INTERLACED AT 76 HZ
  
- . 22"W WSXGA+ 1680x1050 COLOR TFT LCD FLAT PANEL
  
- . FULL RANGE POWER SUPPLY 90 – 264 VAC
  
- . CE ENVIRONMENTAL POLICY
  
- . ANTI-GLARE TO REDUCE LIGHT REFLECTION
  
- . POWER MANAGEMENT CAPABILITY
  
- . SOG SUPPORT
  
- .Windows Vista Premium Logo Certification
  
- .HDCP support
  
- .AUDIO support
  
- .USB PLUG
  
- .SMART CONTROL & SMART MANAGEMENT REQUIREMENT
  
- .SMART Contrast 10000:1 (Typical) Waiting for supplier input
  
- .SMART Image
  
- . PrefectTune II (formerly FGA, FACTORY GAMMA Alignment)
  
- . PHILIPS LOGO displayed while power on
  
- .WEEE REQUIREMENT
  
- .RoHS REQUIREMENT
  
- .TCO06 REQUIREMENT

# General Product Specification

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## General Product Specification

### 1 FOREWORD

This specification describes a 22" WSXGA multi-scan color TFT LCD monitor with maximum resolution up to **1 80 x 1050 / 0H** non-interlaced.

All optical characteristics (including WHITE-D, Brightness, and so on) are determined according to panel specification after warming up approximate 30 minutes that brightness stability is optimal, and follow strictly after panel specification.

### 2 PRODUCT PROFILE

This display monitor unit is a color display monitor enclosed in PHILIPS styling cabinet which has an integrated tilt base.

#### 2.1 EDID header

##### Data for EDID & .inf file

1	User visible strings on .inf file	Philips 220BW (22inch Wide LCD MONITOR 220BW9)
2	Manufacturer ID ( EDID data)	PHL
3	Product ID, "xxxx" 4 codes	MSB(byte 12): 08
		LSB (byte 11): 70
4	maximum resolution	1680x1050
5	Horizontal Frequency Range	30~83 KHz
6	Vertical Frequency Range	56~76Hz
7	Monitor Name (13 characteries max.)	Philips 220BW

#### 2.2 LCD

Suppliers to offer the panel specification.

Panel incoming specification: Follow Philips' specification.

##### SEC

Type NR.	: SEC LTM220M1-L01
Resolution	: 1680 x 1050 (WSXGA+)
Outside dimensions	: 493.7(H) x 320.1(V) Typ. x 17.0(D) Max.
Pitch (mm)	: 0.282mm x 0.282mm
Color pixel arrangement	: RGB vertical stripe
Display surface	: Haze 25% Hard coating (3H)
Color depth	: 16.7M (6 bit Hi-FRC)
Backlight	: 4 CCFL
Active area (W x H)	: 473.76(H) x 296.1(V) mm
View angle (CR=10)	: =160 for Right/Left (Typ)
	: =160 for Up/Down (Typ)
Contrast ratio	: 1000:1 (Typ)
White luminance	: 300(Typ.)
Color gamut	: >=72%
Gate IC	: TOSHIBA
Source IC	: NEC
Response time	: Tr + Tf <=5 ms (Typ)
Vertical frequency range	: 53~76Hz





## General Product Specification

Vsync Positive/Negative

Composite sync TTL level, input impedance 2.2k ohm terminate  
(Positive/Negative)

Sync on green video 0.3 Vp-p Negative (Video 0.7 Vp-p Positive)

### 2). DVI-D Digital

Input signal: Single TMDS link (Three channels: RX0-/+, RX1-/+, RX2-/+)

### 3). Audio (waiting for supplier input)

Input signal: 1000 mVrms

Loudspeaker (Impedance: 16 Ohm +/-15%): 1.5W+1.5W stereo for RMS Power

Frequency range: 450Hz - 20KHz

Headphone connection will mute speakers

### 4). USB PLUG

USB port (1 upstream, 1 downstream)

## 3.2 Interface

### 3.2.1 D-Sub Cable

Length : 1.8 M +/- 50 mm

Fix with monitor when packing, with transplant pin protective cover.

Connector type : D-Sub male with DDC2B pin assignments.

Blue connector thumb-operated jack screws

# General Product Specification

Pin assignments :

PIN No.	IGNAL
1	Red
2	Green/ OG
3	Blue
4	ense (GND)
5	Cable Detect (GND)
	Red GND
7	Green GND
8	Blue GND
9	DDC +3.3V or +5V
10	Logic GND
11	ense (GND)
12	Bi-directional data
13	H/H+V sync
14	V-sync
15	Data clock

### 3.2.2 DVI Cable

The input signals are applied to the display through DVI-D cable.

Length : 1.8 M +/- 50 mm

Connector type : DVI-D male with DDC-2B pin assignments

White connector thumb-operated jackscrews

With transplant pin protective cover.

Pin Assignment:

Pin No.	Description
1	T.M.D.S. data2-
2	T.M.D.S. data2+
3	T.M.D.S. data2 shield
4	No Connect
5	No Connect
6	DDC clock
7	DDC data
8	No Connect
9	T.M.D.S. data1-
10	T.M.D.S. data1+
11	T.M.D.S. data1 shield
12	No Connect
13	No Connect
14	+5V Power
15	Ground (for +5V)
16	Hot plug detect

## General Product Specification

17	T.M.D.S. data0-
18	T.M.D.S. data0+
19	T.M.D.S. data0 shield
20	No Connect
21	No Connect
22	T.M.D.S clock shield
23	T.M.D.S. clock+
24	T.M.D.S. clock-

### 3.2.3 Audio Cable (waiting for supplier input)

Length : 1.5 M +/- 50 mm  
 Connector type : 3.5-mini jack with color on the both end heads.  
 Sliver & Black model: Black heads and cable.  
 T color model: Green heads and white cable.

### 3.3 Timing requirement

#### Factory Preset mode definition:

1. Perfect FOS while presenting those timings.
2. Will specify those timing in User s Manual

#### Preset mode definition:

1. Need to support those timings.
2. Perfect FOS after auto adjustment.

#### User mode

1. Can save those timing that not in Preset mode and can be showed (not over scalar or Panel spec.)
2. It needs to reserve the 10 timings space in memory size.

#### 3.3.1 Mode storing capacity

Factory preset modes : D-sub :18 , DVI : 17  
 Preset modes : 49  
 User modes : 10

#### 3.3.2 Factory preset modes (18 modes)

- Factory modes and preset modes are defined in the enclosed timing table file



H9 Timing  
 table\_20080401.xls





Please refer to 20W\_22W sheet in enclosed H9 timing table file

- Video timing mode (internal firmware support) ,  
 60Hz: 480p/720p/1080i/1080p  
 50Hz: 576p/720p/1080i/1080p

#### 3.3.3 Software control functions via OSD / control ad ustable functions:

## General Product Specification

Please refer to following Hudson9 OSD definitions, if any deviation, then refer to PVT Exit sample.

ITEM			
1	OSD DEFINITIONS	 Hudson 8 OSD Definition - v14.doc	Reset - No: Exit Yes: Auto adjustment for displaying timing mode and recall factory preset
2	OSD LANGUAGES	 H9 OSD translation - 20080516 - Final.xls	8 LANGUAGES
3	OSD TREE	 Button definition _ 20080409.xls	
4	POWER ON LOGO	 22W_1680x1050.zip	Power On Logo: Power On → Show up Philips logo 3 seconds → Change to input signal.  This picture is reference only. The official drawing will send out by PM.
5	Audio Selection	Stand-alone – On: Isolate video and audio control input Stand-alone – Off: Integrate video and audio control input Mute – On: Turn off audio Mute – Off: Turn on audio	

### 3.4 Horizontal scanning

Sync polarity : Positive or Negative  
Scanning frequency : 30 – 83 K Hz

### 3.5 Vertical scanning

Sync polarity : Positive or Negative  
Scanning frequency : 56 - 76 Hz

## General Product Specification

### 3. Power input connection

Power cord length : 1.8 M  
Power cord type : 3 leads power cord with protective earth plug.

### 3.7 Power management

The monitor must comply with the Microsoft On Now specification, and meet EPA requirements.

Mode	HSYNC	VSYNC	Video	Pwr-cons.	Indication	Rec. time
Power-On	On	On	active	< 55 W	Blue LED	--
Standby	Off	Off	blanked	< 1W	Blink Blue LED Period: 3sec on, 3sec off	< 3 s
DC Power Off			N/A	< 0.8W	LED Off	

### 3.8 VGA Display identification

In accordance with VESA Display Channel Standard Ver.1.0 and DDC 2B capability

### 3.9 DVI Display identification

In accordance with DVI requirement (DDWG digital Visual Interface revision 1.0) use DDC-2B, DDC/CI, and EDID V1.3

### 3.10 USB support

Connect the upstream port of the monitor to host PC's USB port via USB cable, Then attach external device to the downstream port of the monitor. Check if the device can work properly.

### 3.11 DDC /CI Support and Smart Manage/Control

In accordance with VESA DDC/CI and MCCS ver.2.0, the monitor should be workable with Philips SmartManage, SmartControl V6.1, and Protrait Display Tune at least.

### 3.12 Hot-key definition



Hot key operation for  
Hudson Monitors.xls



# General Product Specification

## 3.13 Smart contrast (Dynamic contrast ratio)

Smart Contrast is a kind of dynamic backlight control.

This function changes

the panel backlight dynamically according to the frame brightness histogram.

At least the minimum contrast ratio has to be **10000:1**.

## 3.14 Smart image

### 3.14.2 Smart Image OSD outlook



#### 3.14.2.1 Position

The position of the button is at the bottom center of the screen.

#### 3.14.2.2 Smart Image Logo & Banner

As design to keep the LightFrame logo at header but change the name to "SmartImage" with bitmap format.

#### 3.14.2.3 Icon of each profile

Each profile will use text instead of icon & text before.

#### 3.14.2.4 User Operation Procedure

- A. 5 different modes are switched to next in the sequence from 1 to 5 then back to 1 while pressing this button: 1) Office Work 2) Image Viewing 3) Entertainment 4) Economy 5) Off. The default setting is 'Off'.
- B. The FOS optimization will be changed in real time by which profile to be scrolled,

## General Product Specification

users don't need to confirm to enable.

- C. The Smart Image OSD will remain on screen for 5 seconds after user last action. Or user can also press [MENU] to close the Smart Image OSD immediately.
- D. Except using [MENU] button to scroll down profile. If Smart Image OSD already launched onscreen. User is allowed to use up/down key to choose profile and press [MENU] to confirm selection and close the Smart Image OSD.
- E. If the model has multiple inputs including VGA and DVI, each input has their own set of profiles. When user switch input, the profile to be applied will also change.
- F. Each input can memorize their individual "Smart Image" profile status.

For example, Smart Image is on with "Office" profile at VGA input, when switch to DVI input, the Smart Image will revert to previous profile of DVI.

In the input switching process the "Smart Image" OSD will also show up to present which profile is selected if "Smart Image" is enabled at that input.

The Smart Image status will also be stored after the monitor is resumed from AC on/off or power switch on/off.

### 3.14.2.5 Linkage between Smart Image OSD and main OSD

- A. Settings within main OSD have linkage with Smart Image OSD.
  - i. Brightness
  - ii. Contrast
  - iii. Color Temperature
- B. Because each preset profiles will define default setting of these 3 parameters. Users can understand what is the value of that in preset profile by open the main OSD.
- C. When any SmartImage Lite profile had been enabled. The parameters in main OSD are still available for user to adjust. But these adjustments are temporary only. If users switch to another profile and then go back. The setting in main OSD will show preset values of that SmartImage profile enabled.

### 3.14.2. Profile Definitions (system integrators to input at design stages)

#### A. Office Work

- i. Purpose: Design for general office application, like word processing, Spreadsheet and email. The screen is dominated by text.

## General Product Specification

- ii. Enhancement point:
  1. A little sharpness for increasing the details of e.g. an excel grid.  
No other type of enhancement as it won't bring value.
  2. Color temperature remains in 6500 °K.
  3. Brightness level should be 70%.
  4. Smart Response set to "Off".
  5. Smart Contrast set to "Off".

### B. Entertainment

- i. Purpose: Design for video application, Like Microsoft Media Player or Real Player. The screen is dominated by video.
- ii. Enhancement Point:
  1. Dynamic contrast enhancement by histogram analysis (DLC) should be implemented.
  2. Sharpness enhanced 90%.
  3. Color enhancement set as the same with Video.
  4. Color temperature set to 7500° (**Based on final P settings**)  
(if higher)
  5. Brightness level sets to maximum.
  6. SmartResponse set to "High".(N/A for this model)
  7. Gamma Table turn off to achieve
  8. Fastest response time. (N/A for this model)
  9. Smart Contrast set to "On"
  10. Gamma Value set to 2.4

### C. Image Viewing

- i. Purpose: Design for image viewing application, especially in slide show. The screen is dominated by picture. Powerpoint presentation could use this profile also.
- ii. Enhancement Point:
  1. Dynamic contrast enhancement by histogram analysis (DLC) should be off.

## General Product Specification

2. Sharpness and color to be enhanced 75%.
3. Color temperature 6500 °K
4. Brightness level sets to maximum.
5. Smart Response set to “Off”. (N/A for this model)
6. Smart Contrast set to “Off”.

### D. Economy

- i. Purpose: Adjust brightness level for reducing power consumptions
- ii. No optimization by Smart Image.
- iii. Design:
  1. Brightness level set to 70%, a little higher brightness level than laptop PC, fine tune brightness level before DVT exit.
  2. Color temperature set to 6500K.
  3. Gamma Table is turn on.

### E. Off

- i. Purpose: No optimization by SmartImage.
- ii. Design:
  1. This will follow user OSD setting. If any change by user, it will be saved. When switch back from other SmartImage profiles, it will go back to last saved setting.
  2. Gamma Table is turn on to reduce bad color tracking.
  - 3.

#### 3.14.2.7 Demo mode

A. Purpose: Built-in demo mode for sales in-store demo.

B. Design:

- i. Dynamically split screen to 2 vertical frames with one vertical white line. The line width is 2 pixels. The left frame will be enhanced by SmartImage Lite and right frame remains original performance.
- ii. There is OSD showing “SmartImage Lite & SmartResponse Demonstration” in left frame and “Original Image” in right frame.
- iii. The OSD word color is white with transparent background.
- iv. The demo profile will be “Video Playback” profile with “High” ODC

# General Product Specification

setting.

- v. The current SmartContrast value also be shown on the bottom of the screen.

## C. Hot keys to trigger:

Press [Smart Image] 3 seconds or more to trigger the demo mode.

When demo mode is On, press 3 seconds or more to turn off the demo mode.

When the demo mode is enabled, the blue LED will flash until demo mode disabled.

## 4 Visual characteristics

### 4.1 Test conditions

Unless otherwise specified, this specification is defined under the following conditions.

- signal
- (1) Input signal : As defined in 3.3, 1680 x 1050 non-interlaced mode (1680X1050@60Hz 146.25MHz), sources must have 75 ohm output impedance.
  - (2) Luminance setting : controls to be set to 300 nits with full screen 100 % duty cycle white signal
  - (3) Warm up: more than 30 minutes after power on with signal supplied.
  - (4) Ambient light: 400 -- 600 lux.
  - (5) Ambient temperature:  $20 \pm 5$  °C

### 4.2 Brightness

Follow Panel specification.

### 4.3 Image size

Actual display size 473.76 mm x 296.1 mm

### 4.4 Brightness uniformity

Set contrast at 100% and turn the brightness to get average above 300 nits at centre of the screen.

Apply the Fig 1, it should comply with the following formula:

## General Product Specification

$$\frac{B_{\min}}{B_{\max}} \times 100\% > 75\%$$

Where B\_max =Maximum brightness  
B\_min = Minimum brightness

### 4.5 Check Cross talk (S)

Apply Pattern 2. Set contrast and brightness at 100 %.  
Measure YA. Then output Pattern 3 and measure YB.  
the cross talk value :

$$\frac{\text{ABS} ( YA - YB )}{YA} \times 100\% < 1.5 \%$$

### 4. White color adjustment

There are three factory preset white color 9300K, 6500K, sRGB.

Apply full gray64 pattern, with brightness in 100 % position and the contrast control at 50 % position.

The 1931 CIE Chromaticity (color triangle) diagram (x ,y) coordinate for the screen center should be:

#### Product specification

CIE coordinates	(x,y)	
11500K	x = 0.270 ± 0.02 y = 0.281 ± 0.02	FGA
9300K	x = 0.283 ± 0.02 y = 0.297 ± 0.02	
8200K	x = 0.291 ± 0.02 y = 0.306 ± 0.02	FGA
7500K	x = 0.298 ± 0.02 y = 0.314 ± 0.02	FGA
6500K/sRGB	x = 0.313 ± 0.02 y = 0.329 ± 0.02	
sRGB	x = 0.313 ± 0.02 y = 0.329 ± 0.02	
5000K	x = 0.345 ± 0.02 y = 0.357 ± 0.02	FGA

#### Production alignment spec.

CIE coordinates	(x,y)	
11500K	x = 0.270 ± 0.006	FGA

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	$y = 0.281 \pm 0.006$	
9300K	$x = 0.283 \pm 0.006$ $y = 0.297 \pm 0.006$	
8200K	$x = 0.291 \pm 0.006$ $y = 0.306 \pm 0.006$	FGA
7500K	$x = 0.298 \pm 0.006$ $y = 0.314 \pm 0.006$	FGA
6500K/sRGB	$x = 0.313 \pm 0.006$ $y = 0.329 \pm 0.006$	
sRGB	$x = 0.313 \pm 0.006$ $y = 0.329 \pm 0.006$	
5000K	$x = 0.345 \pm 0.006$ $y = 0.357 \pm 0.006$	FGA

### Quality Inspection specification:

CIE coordinates	(x,y)	
9300K	$x = 0.283 \pm 0.015$ $y = 0.297 \pm 0.015$	
6500K/sRGB	$x = 0.313 \pm 0.015$ $y = 0.329 \pm 0.015$	
sRGB	$x = 0.313 \pm 0.015$ $y = 0.329 \pm 0.015$	

## 5 Mechanical characteristics

- 5.1 **Cosmetic -**  
Philips ID
- 5.2 **Mechanical data files -**  
ProE files required
- 5.3 **Location of Philips logo -**  
Per Philips make-up sheet
- 5.4 **Gap between panel and front bezel**  
< 1.2mm
- 5.5 **Location of Control icons -**  
Per Philips Graphic sheet



## General Product Specification

### 5. Color for resin/paint –

Per Philips make-up sheet

### 5.7 Fire enclosure request-

Shielding Cover should fulfill international standard

### 5.8 Resins

- RoHS required
- WEEE required.
- Resin type/selection refer to Project Book Section 7.2 Plastic material.

### 5.9 If paint is used

- RoHS required
- WEEE require
- If new painting type need to implement, refer to UN-D 1235.

### 5.10 Plastic mold tooling

- Tooling to be designed to minimize cosmetic defects induced by molding process (sink, blush, weld lines, gate marks, ejector marks, etc.). Refer to “TYV61-90007”.
- Painting to cover up cosmetic defects due to molding is strongly discouraged.
- China RoHS mark requested.

### 5.11 Plastics flammability

- All Plastics to be Flame Retardant UL 94-HB or Better.
- Base / Pedestal to be Flame Retardant UL 94-HB.
- All major plastic parts (bezel, back cover) need to be molded from same resin.
- Plastic resin type selection should be referred to “plastic-Philips Pool monitor”.

### 5.12 Texture/Glossing of housing

- The texture area and texture no should follow Philips make-up sheet.
- The exterior surfaces shall have a uniform texture.
- Philips must approve the mold texturing.

## General Product Specification

- Detail document for texture refer to “UN-D249”, “UN-D 600”.
- $< = 20$  gloss units

### 5.13 Tilt and swivel base

- Tilt angle :  $-5^{\circ} +2/- 0^{\circ}$  (forward)  
 $+20^{\circ} + 0/- 3^{\circ}$  (backward)
- Swivel angle :  $\pm 45^{\circ} \pm ?$
- High Adjustment :  $70\text{mm} \pm ?$
- Portrait Display : \_\_\_\_\_ nil

### 5.14 Kensington Lock

- Must meet Kensington\_slot.spec “TYE-M0004”
- MMD request metal plate in Kensington hole.

### 5.15 Label

- Regulatory label / Carton label should follow Philips requirement.
- China RoHS label
- Detail document refer to Philips Engineering Reference Book.

### 5.1 Product dimension / Weight ( Refer to Philips approved SHT 191/SHT5 0 )

- Unit dimension :
- Packed unit dimension:
- Net weight :
- Gross weight

### 5.17 Transportation

Transportation standards refer to UAN-D1534/00/01/02.

#### 5.17.1 Transportation packages

- Net weight Packaging and wrapping shall be sufficient to protect the product against damage

## General Product Specification

or loss during shipment from the supplier to the destination specified in the purchase order.

All packaging materials are subject to test and evaluation per UAN-D1534/00/01/02.

- The cushion material shall be constructed using EPS material.
- The doggy hole is requested.

### 5.17.2 Transportation Test

Overall tests refer to UAN-D1534/00/01/02.

Vibration, drop test should be performed at ambient temperature (20°C to 23°C) and relative humidity (40% to 65%).

#### A. Transportation test specification for all regions

- Package test
  1. Random Vibration test
  2. Drop test
  3. Cold Drop test (for design reference)
- Un-package test
  1. Half sine shock test (non operation)

### 5.18 Pallet / Container loading (Refer to Philips approved SHT 5 0)

Transportation standards refer to TYE-M0002 ,UAN-D1534 and UAW-0309.

- Air shipment -
- Sea container 20 (pallet/slip sheet)
- Sea container 40 (pallet/slip sheet)
- Sea container 40 High Cube (pallet/slip sheet)
- Land 45' Truck and Trailer (800X1200mm pallet)
- Land 45' Truck and Trailer (1000X1200mm pallet) for UK
- Truck shipment-

Transportation request for all regions except China/India

A. Air shipment

B. 20'/40'/40'H Container loading for WW

# General Product Specification

Transportation request for China and India

- A. Container loading for China and India
- B. Truck loading

Transportation request for EU

- a. Land 45' Truck and Trailer (800X1200mm pallet)
- C. Land 45' Truck and Trailer (1000X1200mm pallet) for UK

## Environmental characteristics

The following sections define the interference and susceptibility condition limits that might occur between external environment and the display device.

### .1 Susceptibility of display to external environment

Operating

- Temperature : 0 to 35 degree C
- Humidity : 80% max
- Altitude : 0-3658m
- Air pressure : 600-1100 mBAR

Storage

- Temperature : -20 to 60 degree C
- Humidity : 95% max
- Altitude : 0-12192m
- Air pressure : 300-1100 mBAR

Note: recommend at 5 to 35°C, Humidity less than 60 %

### .2 Transportation tests

Refer to 5.15.2

### .3 Display disturbances from external environment

According to IEC 801-2 for ESD disturbances

### .4 Display disturbances to external environment

## 7 Reliability

## General Product Specification

### 7.1 Mean Time Between Failures

System MTBF (Including the LCD panel and CCFL) : 50,000 hrs

## 8 Quality assurance requirements

### 8.1 Acceptance test

According to MIL-STD-1916D Control III level

A L: NA

(Please also refer to annual quality agreement)

Customer acceptance criteria: UAW0377/00

<http://www.wjel.net>

# General Product Specification

## 9 Philips' Flat Panel Monitors Pixel Defect Policy

### Philips' Flat Panel Monitors Pixel Defect Policy

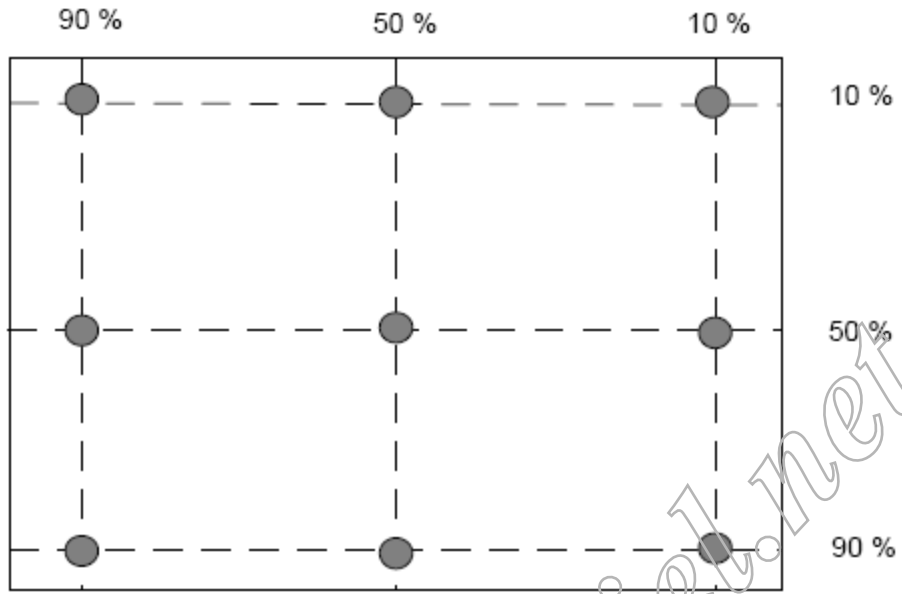
<b>BRIGHT DOT DEFECTS</b>	<b>ACCEPTABLE LEVEL</b>		
<i>MODEL</i>	<b>220BW9</b>		
1 lit sub-pixel	3		
2 adjacent lit sub-pixels	1		
3 adjacent lit sub-pixels (one white pixel)	0		
Distance between two bright dots	15mm		
Bright dot defects within 20 mm circle	0		
Total bright dot defects of all type	3		

<b>BLACK DOT DEFECTS</b>	<b>ACCEPTABLE LEVEL</b>		
<i>MODEL</i>	<b>220BW9</b>		
1 dark sub-pixel	5		
2 adjacent dark sub-pixels	2		
3 adjacent dark sub-pixels (one white pixel)	1		
Distance between two black dots	15mm		
Black dot defects within 20 mm circle*	1		
Total black dot defects of all type	5		

<b>TOTAL DOT DEFECTS</b>	<b>ACCEPTABLE LEVEL</b>		
<i>MODEL</i>	<b>220BW9</b>		
Total bright or black dot defects of all type	5		

### General Product Specification

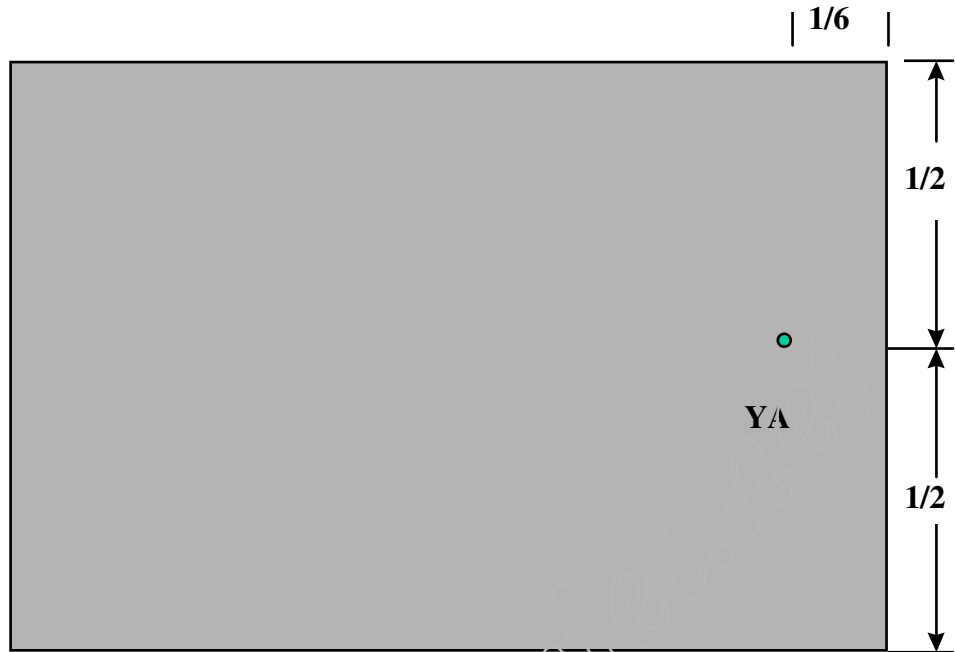
Fig 1: Measurement locations of Brightness Uniformity



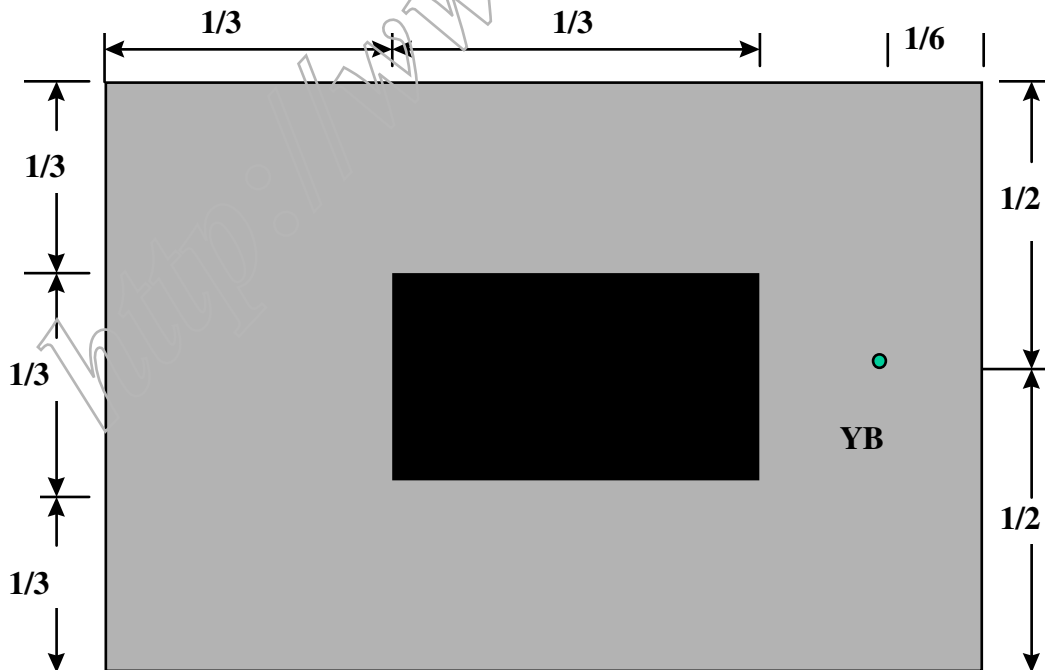
<http://www.wjeb.net>

# General Product Specification

**Fig 2: Cross talk pattern**  
**Gray level 4 ( 4 Gray level)**



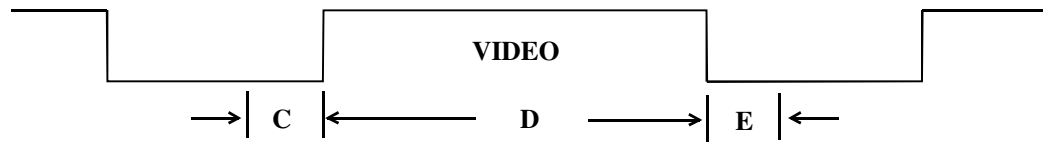
**Fig 3: Cross talk Pattern**  
**Center at Gray level 0 (Black)**



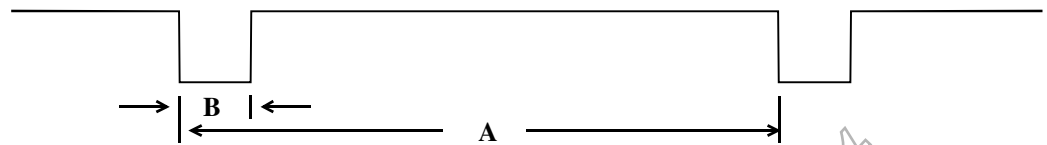


### General Product Specification

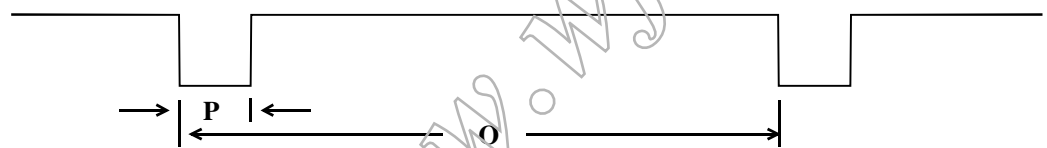
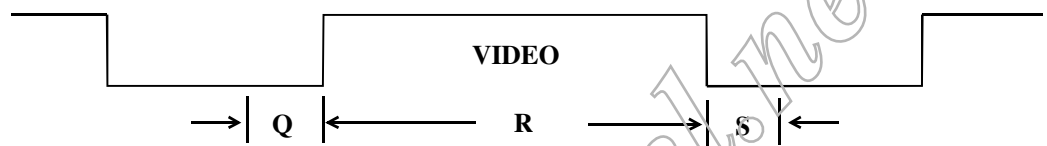
SEPARATE SYNC.



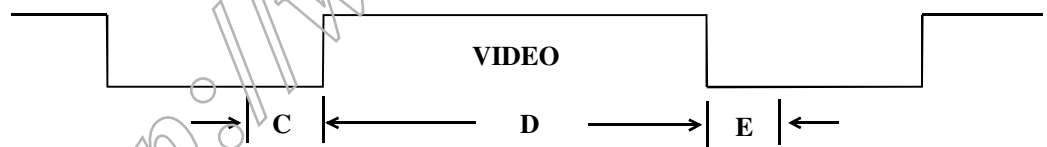
HORIZONTAL



VERTICAL



COMPOSITE SYNC.



HORIZONTAL

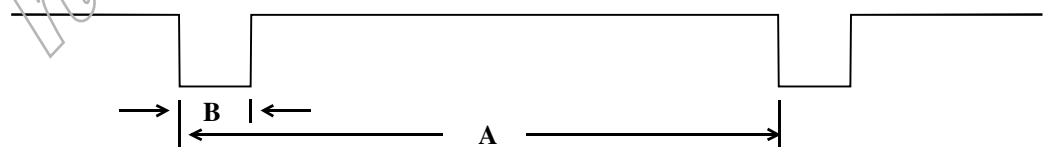


FIG-4 TIMING CHART -1

# General Product Specification

## 10 REGULATORY COMPLIANCE

### 10.1 Worldwide Regulatory



WW\_Regulatory.xls

### 10.2 EMC Requirements

Supplier DVT EMI test result must be submitted prior to DVT samples delivery, and PVT EMI test result must be submitted again prior to PVT samples delivery. Which also has to meet Philips immunity testing specification.

### 10.3 RoHS

Restriction on the use of certain hazardous substances.

Lead, Cadmium, Mercury, Hexavalent Chromium, Polybrominated Biphenyl (PBB) and Polybrominated Biphenyl Ether (PBDE)(flame retardant).

### 10.4 WEEE

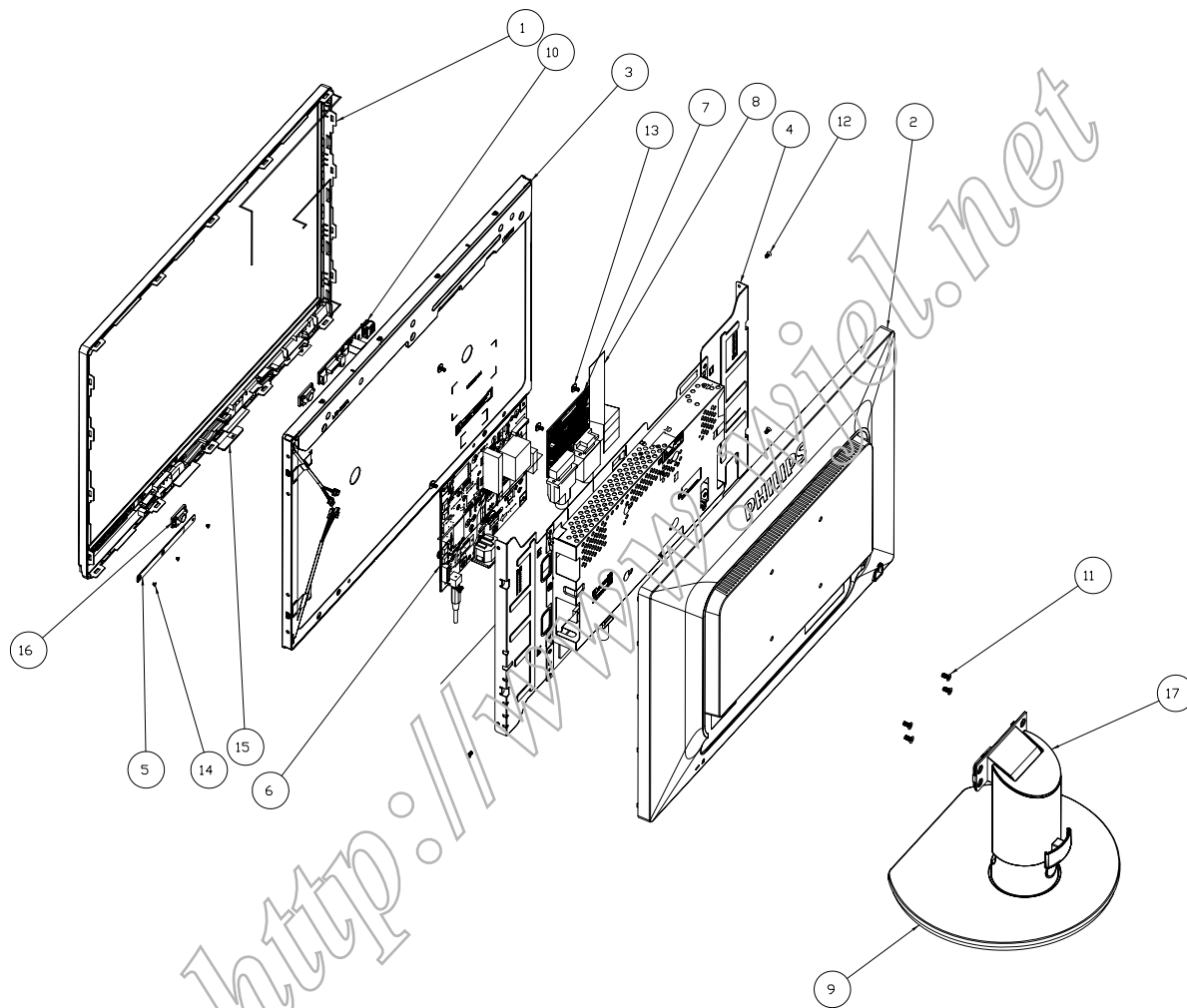
Producer (Philips) responsible for retailer take back schemes and recycling.

--System implemented.

--Collection and recycle targets.

### 10.5 Ongoing Regulatory

There s a possibility that other regulatory certificates will be required during the life of the product. It is the responsibility of the supplier to provide related documentation.





## Panel &amp; PCBA photos

ITEM	PCM	Philips 12NC	Description	Photo
1	5F.LLBP9.001	996510017933	LCDM LM220WE 1-TLE2/TLE4 (LPL)	
2	5F.LSBVP.011	996510019015	LCDM LTM220M1-L01 SD(SEC)	
3	5E.0KH01.011	996510018828	MAIN (I/F) BOARD ASS'Y	
4	5E.0KH01.001	996510019324	MAIN (I/F) BOARD ASS'Y	
5	5E.0KH02.001	996510018829	POWER BOARD ASS'Y	
6	6K.0KG19.001	996510017942	ASSY CTRL BD WITH CABLE	
7	6K.0KG18.001	996510017941	ASSY LED BD WITH CABLE	
8	5E.0KH15.001	996510018831	USD	

## 0. Warning

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the unit via a wrist wrap with resistance. Keep components and tools also at the same potential!

### 1. Servicing of SMDs (Surface Mounted Devices)

#### 1.1 General cautions on handling and storage

- Oxidation on the terminals of SMDs results in poor soldering.

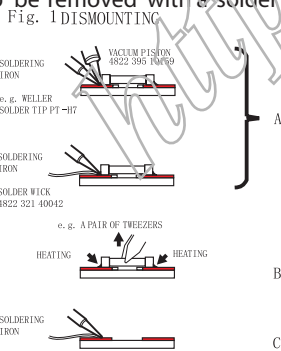
Do not handle SMDs with bare hands.

- Avoid using storage places that are sensitive to oxidation such as places with sulphur or chlorine gas, direct sunlight, high temperatures or a high degree of humidity. The capacitance or resistance value of the SMDs may be affected by this.

- Rough handling of circuit boards containing SMDs may cause damage to the components as well as the circuit boards. Circuit boards containing SMDs should never be bent or flexed. Different circuit board materials expand and contract at different rates when heated or cooled and the components and/or solder connections may be damaged due to the stress. Never rub or scrape chip components as this may cause the value of the component to change. Similarly, do not slide the circuit board across any surface.

#### 1.2 Removal of SMDs

- Heat the solder (for 2-3 seconds) at each terminal of the chip. By means of litz wire and a slight horizontal force, small components can be removed with the soldering iron. They can also be removed with a solder sucker (see Fig. 1A)



While holding the SMD with a pair of tweezers, take it off gently using the soldering iron's heat applied to each terminal (see Fig. 1 B).

- Remove the excess solder on the solder lands by means of litz wire or a solder sucker (see Fig. 1C).

#### 1.3 Caution on removal

- When handling the soldering iron, use suitable pressure and be careful.
- When removing the chip, do not use undue force with the pair of tweezers.
- The soldering iron to be used (approx. 30 W) should

preferably be equipped with a thermal control (soldering temperature: 225 to 250 C).

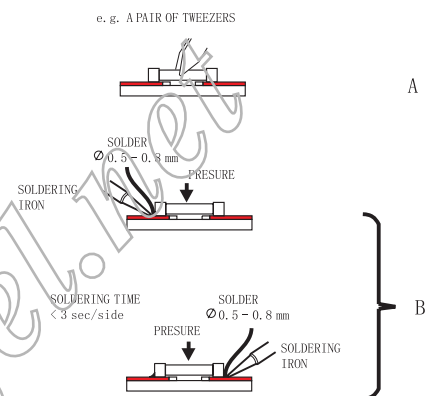
- The chip, once removed, must never be reused.

### 1.4 Attachment of SMDs

- Locate the SMD on the solder lands by means of tweezers and solder the component on one side. Ensure that the component is positioned correctly on the solder lands (see Fig.2A).

- Next complete the soldering of the terminals of the component (see Fig. 2B).

Fig. 2 MOUNTING



### 2. Caution when attaching SMDs

- When soldering the SMD terminals, do not touch them directly with the soldering iron. The soldering should be done as quickly as possible, care must be taken to avoid damage to the terminals of the SMDs themselves.

- Keep the SMD's body in contact with the printed board when soldering.

- The soldering iron to be used (approx. 30 W) should preferably be equipped with a thermal control (soldering temperature: 225 to 250 C).

- Soldering should not be done outside the solder land.

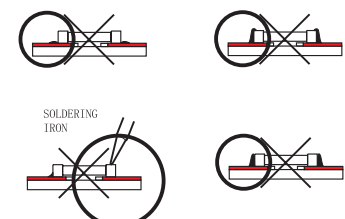
- Soldering flux (of rosin) may be used, but should not be acidic.

- After soldering, let the SMD cool down gradually at room temperature.

- The quantity of solder must be proportional to the size of the solder land. If the quantity is too great, the SMD might crack or the solder lands might be torn loose from the printed board (see Fig. 3).



Fig.3 Examples



### 3. Lead-free product identification

You can identify lead-free product by Philips-lead-free logo on PCB.



### 4. Lead-free product repair instruction

4.1 Use only lead-free Solder Alloy 0622 149 00106(1.2mm SAC305) or 0622 14900108(1.0mm SAC305).

Remark: For lead free soldering material, please visit [www.alphametals.com](http://www.alphametals.com) website for details. This is recommended by Philips.

4.2 Use only adequate solder tools applicable for lead-free soldering-tin. The solder tool must be able to reach at least a solder-temperature of 400 , to stabilize the adjusted temperature at the solder-tip and to exchange solder-tips for different applications. Small Passives/Actives to be removed with thermal tweezers

Automated system for IC and BGA repair (Microscope, Camera, Beam split optics, Computer, Programmer, Heat controllers, Vacuum system, Laser pointer) Solder Hand-Tool (Adjustable in temperature height, Temperature shall be held constant, Flexible tips)

4.3 Adjust your solder tool so that a temperature around 360 -380 is reached and stabilized at the solder joint. Heating-time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400 otherwise wear-out of tips will rise drastically and flux-fluid will be destroyed. Corrosion of Tool-Spikes can be avoided when using SAC305 and a temperature of less than 400 .

4.4 Mix of lead-free solder-tin/parts with leaded soldering-tin/parts is possible but not recommended. If not to avoid clean carefully the solder-joint from old tin and re-solder with new tin.

4.5 Use only original spare-parts listed in the Service-Manuals. Standard-material(consumables) can also be purchased at external companies.

4.6 Special information for lead-free BGA-ICs: this ICs will be delivered in so-called dry-packaging to protect the IC against moisture and with lead-free logo on it. This packaging may only be opened shortly before it is used (soldered). Otherwise the body of the IC gets wet inside and during the heating time the structure of the IC will be destroyed due to high (steam-)pressure. If the packaging was opened before usage the IC has to be heated up for some hours (around 90 ) for drying (Take attention for ESD-protection!)

### 5. Rework on BGA (Ball Grid Array) ICs

#### General

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

#### Device Removal

As is the case with any component that, it is essential when removing an (LF)BGA, the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the chance of warping the PWB.

To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

#### Area Preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA.

Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent. After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA

Note: Do not apply solder paste, as this has shown to result in problems during re-soldering.

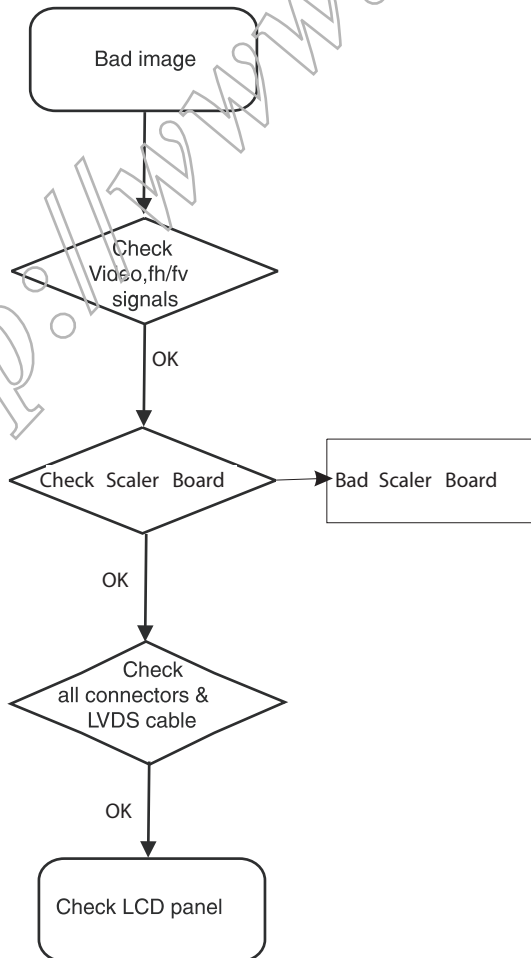
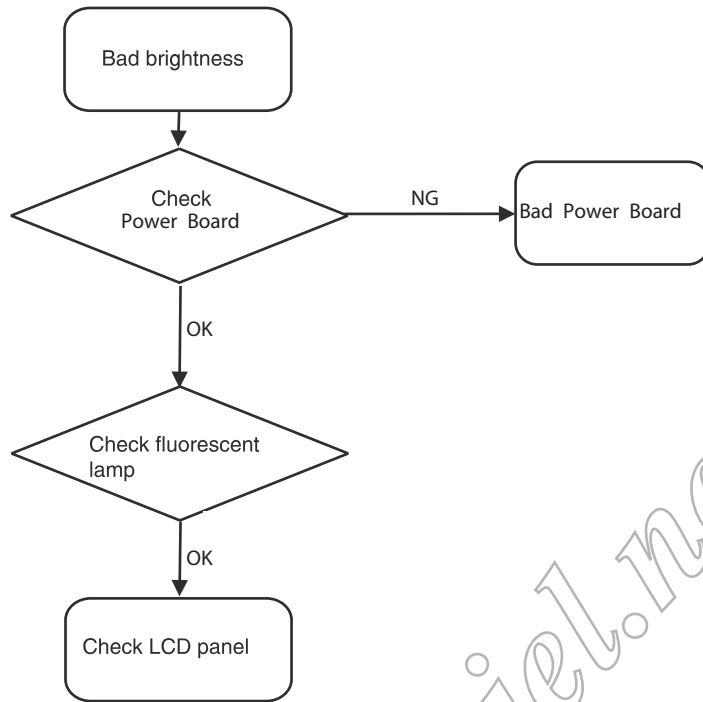
#### Device Replacement

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers.

To reflow the solder, apply a temperature profile according to the IC data sheet. So as not to damage neighbouring components, it may be necessary to reduce some temperatures and times.

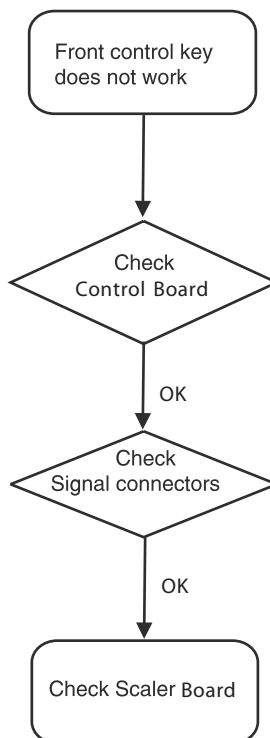
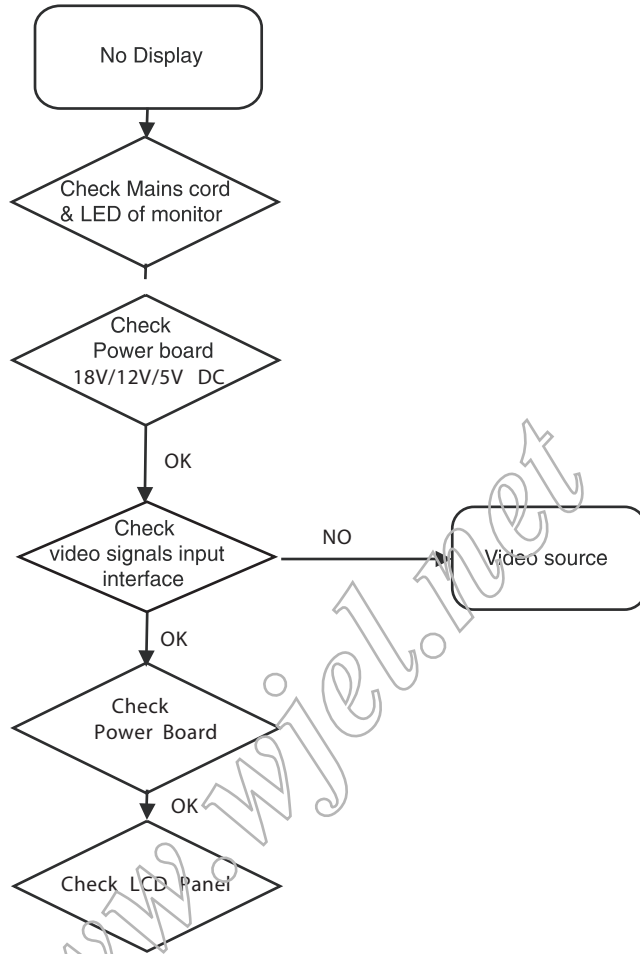
#### More Information

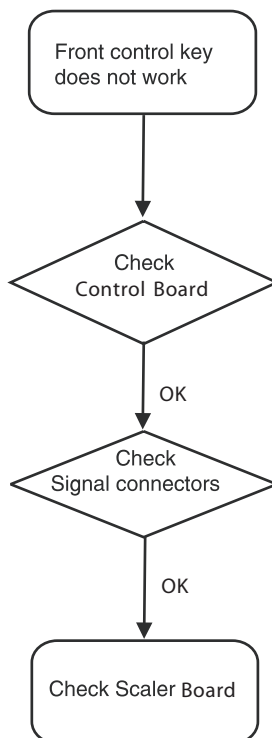
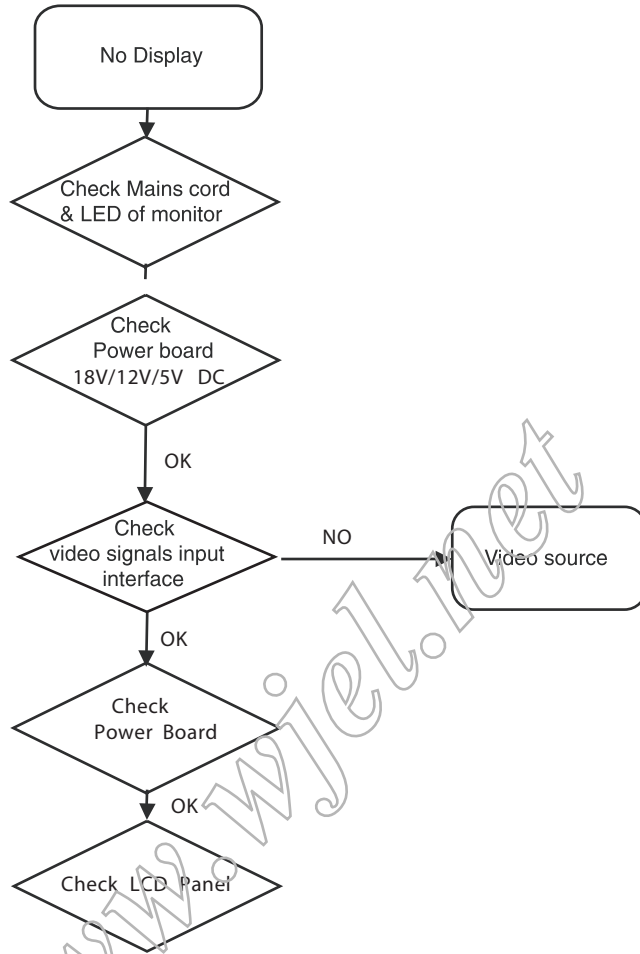
For more information on how to handle BGA devices, visit this URL: <http://www.your.service.ce.philips.com> (needs subscription). After login, select Magazine, then go to Workshop Information. Here you will find information on how to deal with BGA-ICs.





# Repair Flow Chart





## Safety Test Requirements

All units that are returned for service or repair must pass the original manufactures safety tests. Safety testing requires both Hipot and Ground Continuity testing.

### HI-POT TEST INSTRUCTION

#### 1. Application requirements

- 1.1 All mains operated products must pass the Hi-Pot test as described in this instruction.
- 1.2 This test must be performed again after the covers have been refitted following the repair , inspection or modification of the product.

#### 2. Test method

##### 2.1 Connecting conditions

- 2.1.1 The test specified must be applied between the parallel-blade plug of the mains cord and all accessible metal parts of the product.
- 2.1.2 Before carrying out the test, reliable conductive connections must be ensured and thereafter be maintained throughout the test period.
- 2.1.3 The mains switch(es) must be in the "ON" position.

##### 2.2 Test Requirements

All products should be HiPot and Ground Continuity tested as follows:

Condition	Hi-Pot Test for products where the mains input is 220V AC	Hi-Pot Test for products where the mains input is 110V AC	Ground Continuity Test requirement
Test voltage	2820VDC (2000VAC)	1700VDC (1200VAC)	Test current: 25A, AC
Test time	3 seconds	1 seconds	Test time: 3 seconds
Trip current (Tester)	Set at 100uA for Max limit; Set at 0.1uA for Min limit.	5mA	Resistance required: $\leq 0.09 + R_{ohm}$ R is the resistance of the mains cord.
Ramp time (Tester)	Set at 2 seconds		

- 2.2.1 The minimum test duration for Quality Control Inspector must be 1 minute.
- 2.2.2 The test voltage must be maintained within the specified voltage + 5%.
- 2.2.3 There must be no breakdown during the test.
- 2.2.4 The grounding blade or pin of mains plug must be conducted with accessible metal parts.

### 3. Equipments and Connection

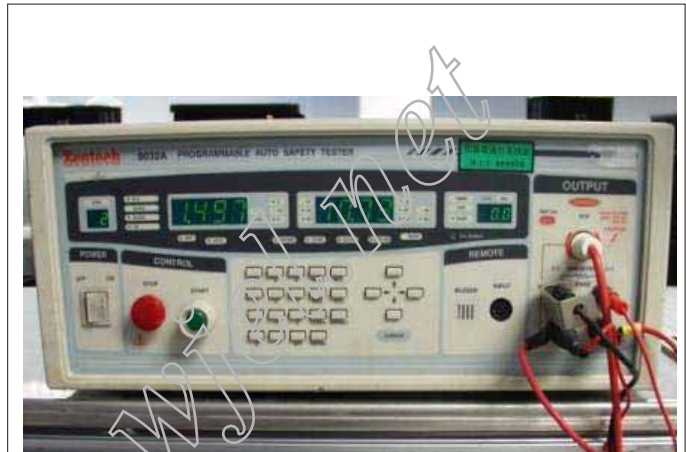
#### 3.1. Equipments

For example :

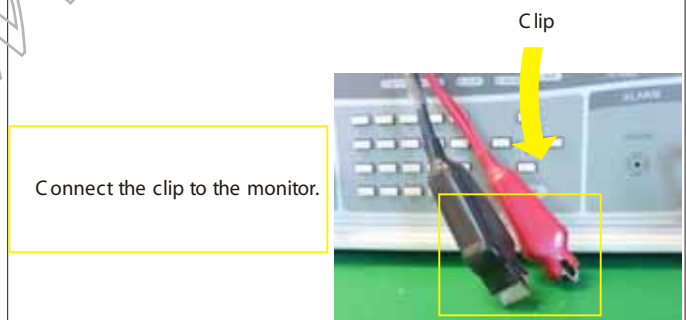
- Zentech 9032 PROGRAMMABLE AUT O SAFETY TESTER

#### 3.2. Connection

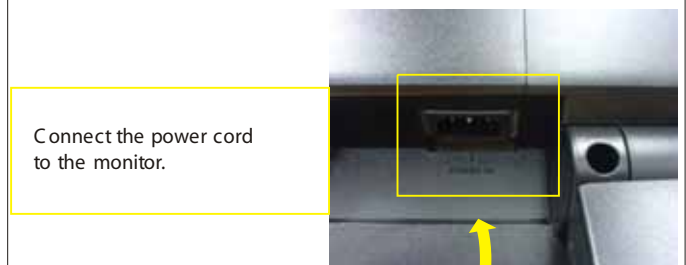
- \* Turn on the power switch of monitor before Hipot and G round C ontinuity testing.



(Zentech 9032 tester)



Connect the clip to the monitor.



Connect the power cord to the monitor.

Power outlet

### 4. Recording

(Rear view of monitor)

Hipot and Ground Continuity testing records have to be kept for a period of 10 years.