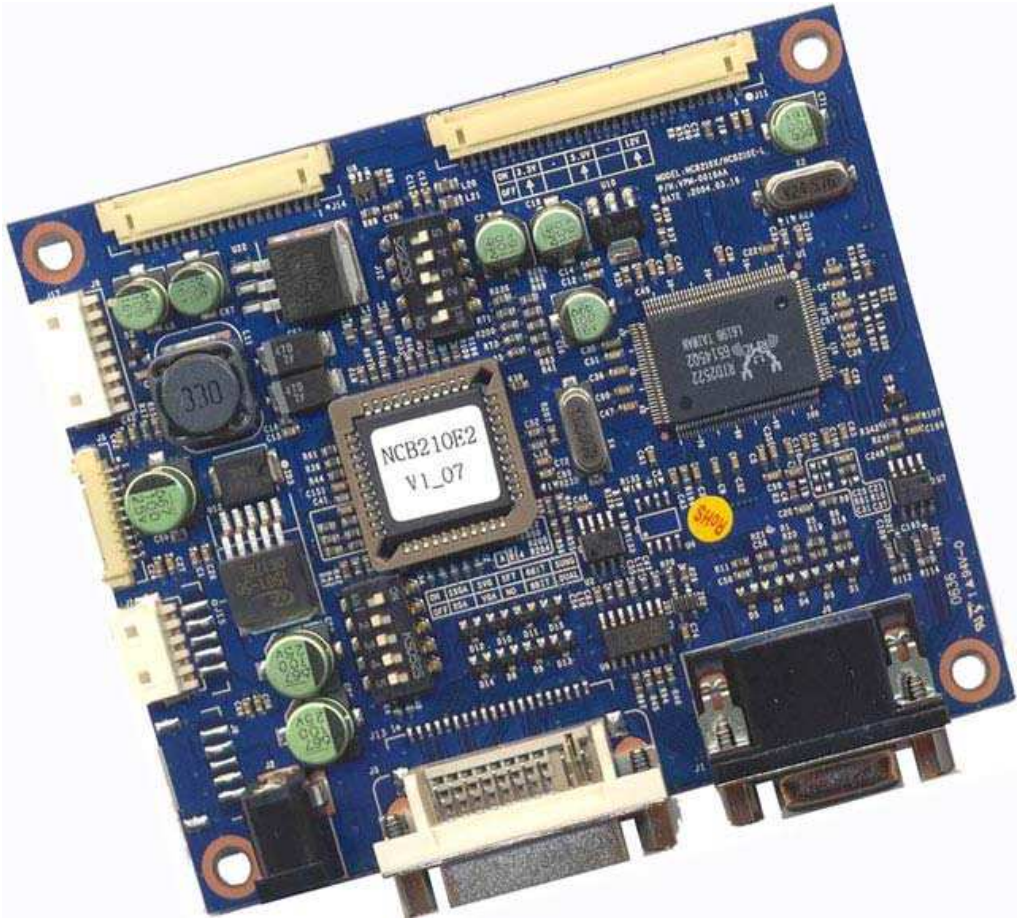
For LCD Monitor (PC + DVI) Interface Controller

For 800X600, 1024X768, 1280X1024 Resolutions TFT LCD

DATA SHEET



TFT LCD Monitor Control Board

NCB210E2-DS-AC (RoHS Compliant)

SEP. 2006

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Revision History

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INTRODUCTION

Designed for LCD monitor and other flat panel display application the NCB210E2 controller provides an auto-input synchronization and easy to sue interface controller for:

- TFT (active matrix) LCD panels of 800X600, 1024X768, and 1280x1024 resolutions
- Computer video signals of VGA, SVGA, XGA, SXGA standard.
- Input Signal Support
  - All VESA standard

HOW TO PROCEED

- Ensure that you have all parts & they are correct, refer to:
  - Connection diagram
  - Connector reference
  - Assembly notes
- Check controller switch & jumper settings (errors may damage the panel)
- Prepare the PC & Video
- Connect the parts
- Understand the operation & functions

IMPORTANT USAGE NOTE

This equipment is for use by developers and integrators. The manufacturer accepts no liability for damage or injury caused by the use of this product. It is the responsibility of the developer, integrators or other users of this product to:

- Ensure that all necessary and appropriate safety measures are taken.
- Obtain suitable regulatory approvals as may be required.
- Check power settings to all component parts before connection.

DISCLAIMER

There is no implied or expressed warranty regarding this material.

GENERAL SPECIFICATION

No.	Item	Description		
1	Model name	For SVGA Panel	NCB210S1	Note 1)
		For XGA Panel	NCB210X1	
		For SXGA Panel	NCB210E1	
2	LCD Module	SVGA, XGA, SXGA		
3	Signal Input	Analog RGB Input. Digital TMDS		
4	Resolution Support	H: 31 ~ 80kHz		
		V: 55 ~ 76Hz		
5	OSD Control	Menu, Left, Right, Up, Down, Source, Power		5 keys
	Plug & Play	VESA DDC 2B Ver1.3		
6	Power Connector	Input	Type: IEC320 MALE 3Line Connector	
7.	Power Consumption	Supply Voltage	12VDC	
		Max Power	45W (With Back Light Inverter)	
8	Signal Connector	Analog	DSUB 15P(R, G, B Separate H, V Sync)	
		Digital	DVI-D(TMDS)	TMDS

Notes 1) Depends On Panel Resolution

- S : SVGA (800X600)
- X : XGA (1024X768)
- E : SXGA (1280X1024)

ELECTRICAL SPECIFICATION

Absolute Maximum Ratings

Item	Unit	Min	Typical	Max	Remarks
Operation Temperature	℃	0	-	60	
Storage Temperature	℃	-30	-	80	
Relative Humidity	%		-	90	

Input characteristic

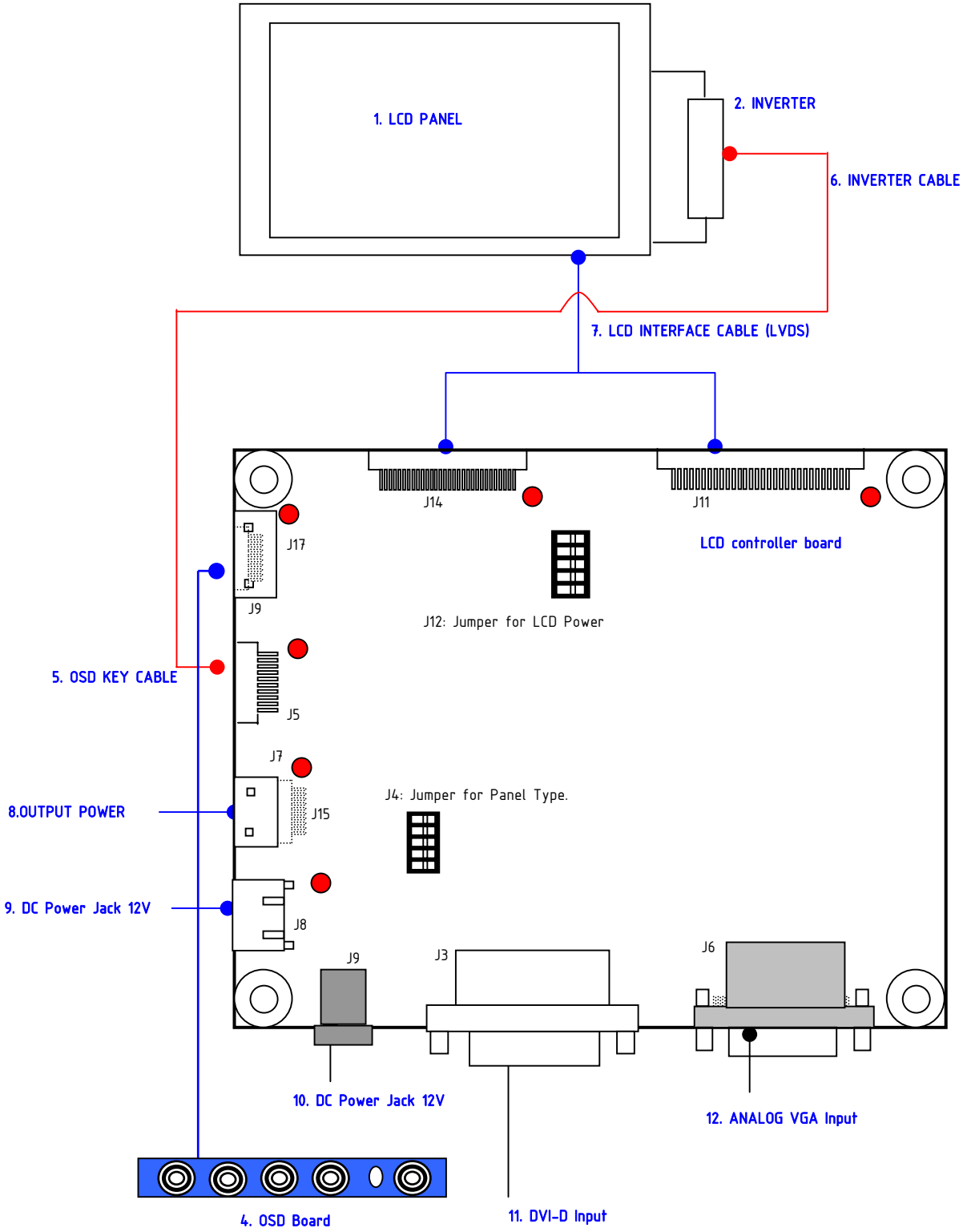
Description	Signal	Unit	Min	Typical	Max	Remarks
			Power In (12Vdc)			
	Input	12VDC	11.4	12	12.6	
	Consumption	Watt		50		
			RGB Input			
	Analog RGB	VPP	0	0.7	-	
	Sync	VDC	0	5	5.5	
	H Frequency	KHz	31		80	Depends on Mode
	V Frequency	Hz	55	75	77	Depends on Mode
			DVI-D Input			
	DATA/CLK	VPP	450	500	900	Differential +/-

Output Characteristics

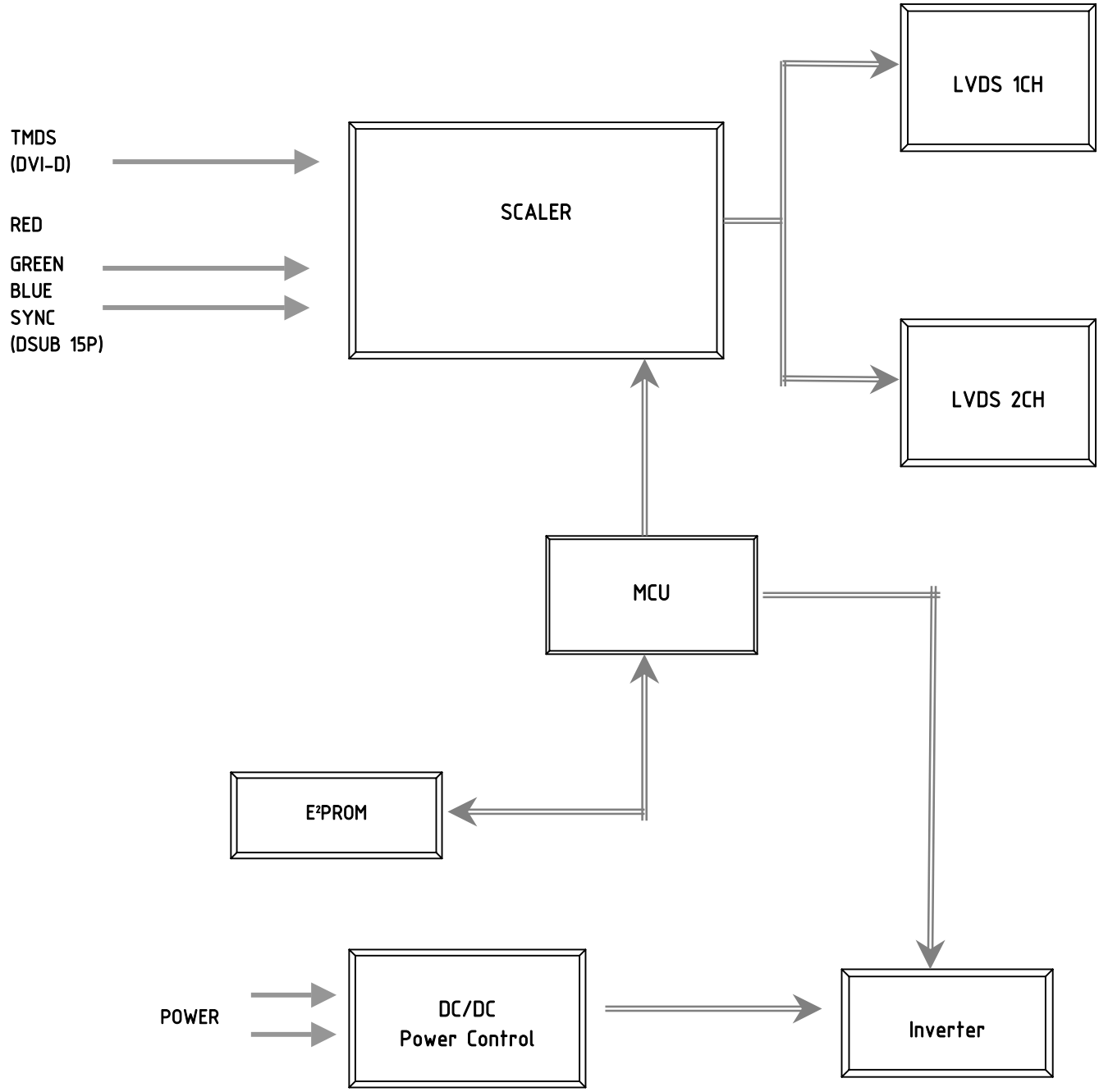
Description	Signal	Unit	Min	Typical	Max	Remarks
TTL LCD Interface						
	RGB Data	VPP		3.3		
	DE, Sync, Clock	VPP		3.3		
	Clock Freq.	MHz	25		80	Depends on Mode
	LCD Power (12V)	VDC	11.4	12	12.6	
	LCD Power(5V)	VDC	4.5	5	5.5	Jumper option
	LCD Power(3.3V)	VDC	3.16	3.3	3.5	Jumper option
LVDS Interface						
	Differential output	VPP (mV)	250	350	450	Differential +/-
Inverter Interface						
	Power	V	11.4	12	12.6	
	On/Off control	V	0		3.3	L=off, H=on
	Brightness control	V	4.0		0	
		Step	0		100	OSD Value

SYSTEM DESIGN

A typical LCD based display system utilizing this controller is likely to comprise the following.



BLOCK DIAGRAM



ASSEMBLY NOTES

This controller is designed for monitors and custom display projects using 1280x1024, resolution TFT LCD panels with a VGA, SVGA, XGA, SXGA signal input. The following provides some guidelines for installation and preparation of a finished display solution.

Preparation: Before proceeding it is important to familiarize yourself with the parts making up the system and the various connectors, mounting holes and general layout of the controller. As much as possible connectors have been labeled. Guides to connectors and mounting holes are shown in the following relevant sections.

1. LCD Panel: This controller has 5V, 3.3V or 12V LVDS interface logic on the Board for different kind of TFT LCD panel. For the other type of LCD interface like Panel Link interface and etc, this board can accommodate a daughter board instead of on-board LCD interface. Due to the different signal timing and electrical characteristics from each LCD panel manufacturer, for selecting LCD interface type and resolution, put jumper marked J4 on the right position following LCD panel specification. For selecting DC power level, put jumper marked J12 on the right position. Supplied power level depends on LCD panel specification.
2. Controller: Handle the controller with care as static charge may damage electronic components, Make sure correct jumper and switches settings to match the target LCD panel
3. LCD connector board: Different makers and models of LCD panel require different panel signal connectors and different pin assignments.
4. LCD signal cables: In order provide a clean signal it is recommended that LCD signal cables should not longer than 30cm. If loose wire cabling is utilized these can be a made into a harness with cable ties. Care should be taken when you place the cables to avoid signal interface. Additionally it may necessary in some systems to add ferrite cores to the cables to minimize signal noise.
5. Inverter: This will be required for the backlight of an LCD, some LCD panel have an inverter built in. As LCD panels may have 1 or more backlight tubes and the power requirements for different panel backlights may vary it is important to match the inverter in order to obtain optimum performance. See application notes for more information on connection.
6. Inverter cable: Different inverter models require different cables and different pin assignment. Make sure the correct cable pin out to match the inverter. Unsuitable cable pins out may damage the inverter.
7. OSD Button: See Operational Function section.
8. 3 Color LED: This LED shows the state of controller.
    - Green – Normal state
    - Off – Off mode (Can't find Sync. signals)
    - Amber – DPMS mode
9. Power switch: This switch is located on OSD button board.
10. Power input: +12VDC is required to supply power for the controller, the Inverter and the LCD panel
11. VGA Input Cable: As this may affect regulatory emission test result, a suitably shielded cable should be utilized.

EMI: Shielding will be required for passing certain regulatory emissions tests. Also the choice of video board and power supply can affect the test result.

Consideration should be given to:

- Electrical insulation.
- Grounding.
- EMI shielding.
- Heat & ventilation

Caution: Ensure that the adequate insulation is provided for all areas of the PCB with special attention to high voltage parts such as the inverter.

*** Remarks***

For a specific panel use, One LCD panel sample and full technical specifications for the LCD panel from the manufacturer are required to test for tuning up screen image. KORDIS can provide engineering service for customers specific controller development.

Please contact KORDIS. (kordis@kordis.co.kr)

12. Setup for operation

Once the circuit has been connected, a setup procedure for optimal is requires a few minutes The following instructions are likely to form the basis of the finished product operation manual.

PC Settings

The PC needs to be set to an appropriate graphics mode that has the same resolution with the LCD panel to have clear screen image. And the vertical refresh rate should be set to one of 56~75Hz, non – interlaced signal.

LCD display System Settings

The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 4 buttons OSD operation as a standard. The control functions defined on OSD operation are as below.

Pc Graphics Output: A few guidelines:

- Signal quality is very important, if there is noise or instability in the PC graphics output this may result in visible noise on the display
- Refer to the graphic modes table in specification section for supported modes.
- Non-interlaced & interlaced video input is acceptable.

Important: please read the application notes section for more information.

CONNECTION & OPERATION

CAUTION: Never connect or disconnect parts of the display system when the system is powered up as this may cause serious damage.

CONNECTION

1. LCD panel & Inverter: Connect the inverter (if it is not built- in the panel) to the CCFT lead connector of the LCD panel.
2. LVDS type panels: Plug the signal cables direct to J14 of the controller board for VGA, SVGA or XGA resolution Panel or J11 for SXGA resolution panel. Plug the other end of cables to the LCD connector board.
3. Inverter & Controller: Plug the inverter cable to J5 of the controller board and another end to the connector on the inverter.
4. Function switch & Controller: Plug the OSD switch mount cable to J9 or J17 of the controller board and another end to the OSD board.
5. Jumpers & Switch: Check all jumpers J12 (Target panel power is setting) and J4 (Target Panel Option switch) are set correctly. Details referring the jumpers and switches setting table (in the following section)
6. VGA cable & Controller: Plug the VGA cable to the connector J6 or J1 of the controller board.
7. DIV-D Cable & Controller: Plug the DVI-D Cable to the connector J3 or J13 of the controller board.
8. Power supply & Controller: Plug the DC 12V power in to the connector J2 or J8.
9. Power on: Switch on the controller board and panel by using the OSD switch mount.

General:

- If you use supplied cables & accessories, ensure that they are correct for the model of the panel and the controller.
- If you make your own cables & connectors, refer carefully to both the panel & inverter specifications and the section in this manual, "Connectors, Pin outs & Jumpers" to ensure the correct pin to pin wiring.

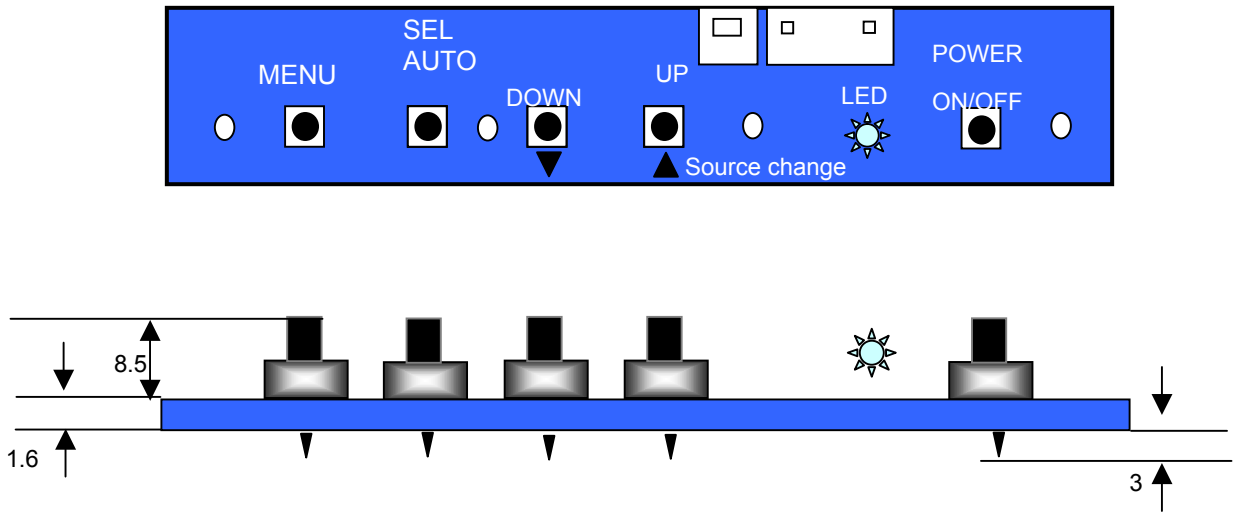
PC Setting:

The controller has been designed to take a very wide range of input signals however to optimize the PC's graphic performance we recommend choosing 60Hz vertical refresh rate – this will not cause screen flicker.

OSD Control Baord

The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 4 buttons OSD operation as a standard. The control functions defined on OSD operation are as below. (unit: mm)

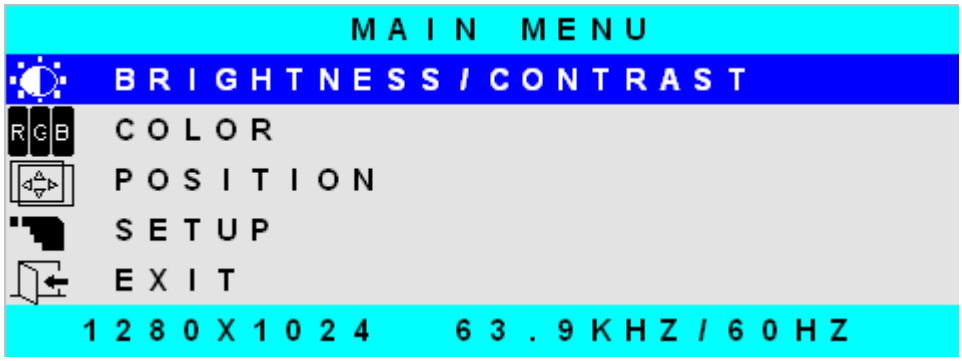
Appearance



Button	Function	Status	HOT Key
Power	Power on/off	On/Off	
Menu	Activate menu		
Select	Menu Select		Auto setting
LED	Indicates operation status	Green/ Off/ Amber	
DOWN, UP ▼ ▲	Cursor control(Value Control) Down(Decrement)/Up(Increment)		UP : Source change

The chosen OSD settings will be stored in memory. The OSD menu can be cleared from the screen from the screen by moving the selection bar to the EXIT MENU icon pressing the SEL button otherwise it will be automatically cleared after a few second of non-use

OSD MAIN MENU

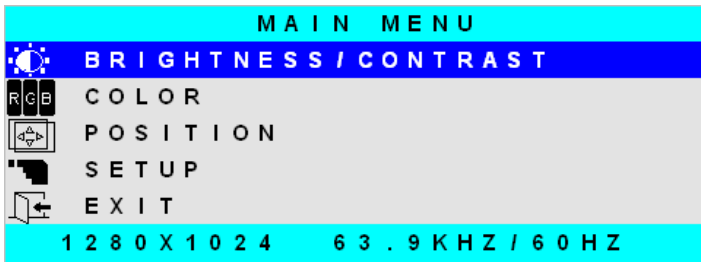


- Brightness: Increase/decrease panel brightness level, total: 100 steps
- Contrast: Increase/decrease panel Contrast level, total: 100 steps
- H, V Position: Image H, V position control, total: 100 steps
- Clock: Fine tune the number of sampled data.
- Phase: Fine tune the position of sampled data (adjust image quality), total: 31 steps
- Color: Color Temperature control, total: 100 steps
- OSD Function: OSD position, OSD Language, OSD Off Timer control
- Select, input sign: Select input signal (analog, composite, S-Video)
- Power Switch Option: Select Power Switch on/off.
- DPMS LED: IF When the DPMS select Amber LED color is Amber, otherwise LED is off.
- Information: Displays current video mode and frequency

OSD FUNCTION

BRIGHTNESS / CONTRAST Control

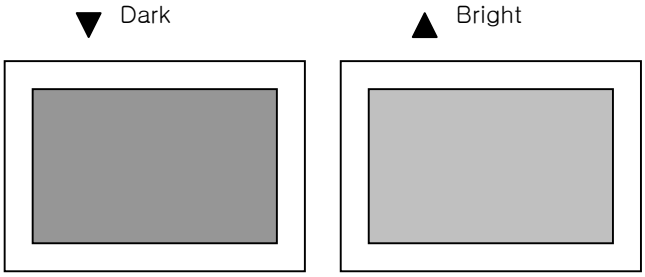
1) Menu



2) Select

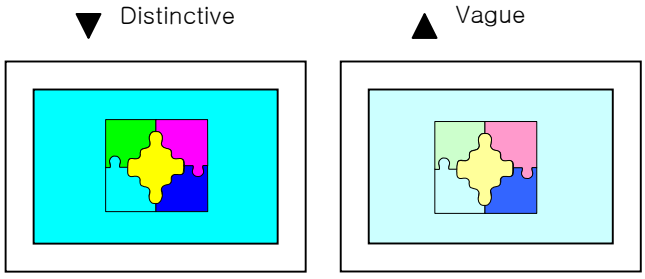
Brightness

Procedure Menu > BRIGHTNESS/CONTRAST (Blue Highlight) > Select (Brightness)



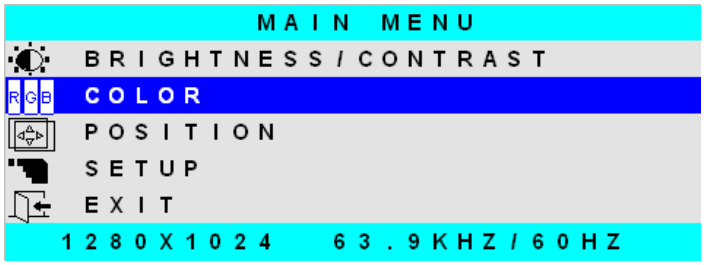
Contrast

Procedure Menu (Blue Highlight) > Select (Contrast)

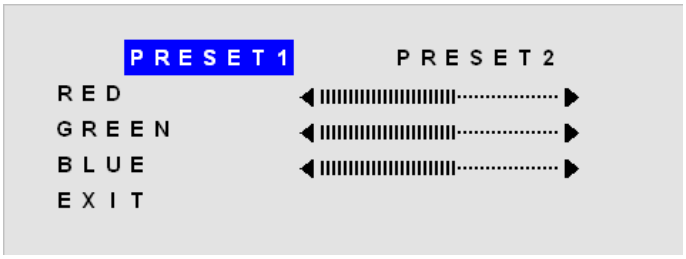


COLOR Control

1) Menu & Down

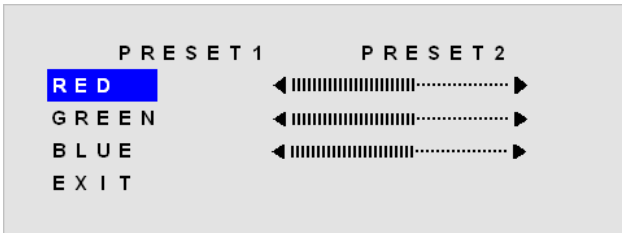


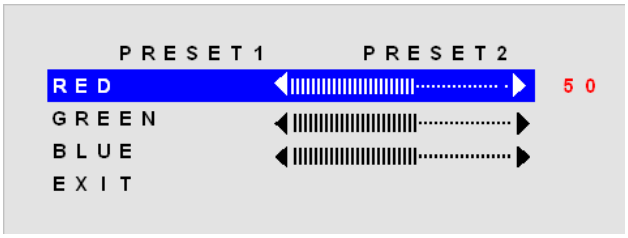
2) Select



Preset 1: Default
Preset 2: bluish white
RED/GREEN/BLUE : User Color Control

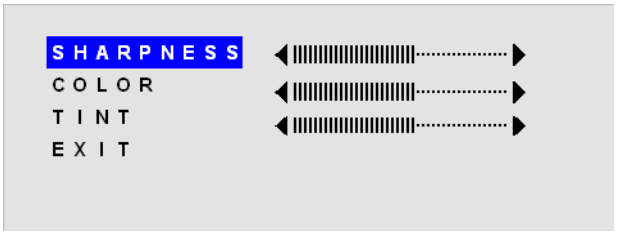
Color (PC Input Mode)
Procedure Menu > Color (Blue Highlight) > Select

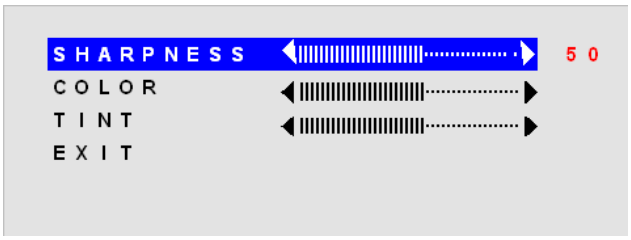




- ☐ Select (Blue Highlight) > RED Color Control (select return to Left Status)
- ☐ Select (Blue Highlight) > GREEN Color Control
- ☐ Select (Blue Highlight) > BLUE Color Control

Color (VIDEO Input Mode)
Procedure Menu > Color (Blue Highlight) > Select

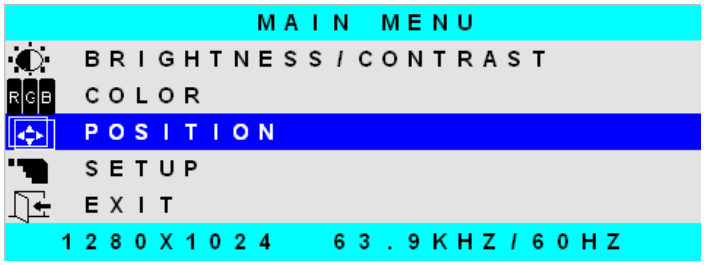




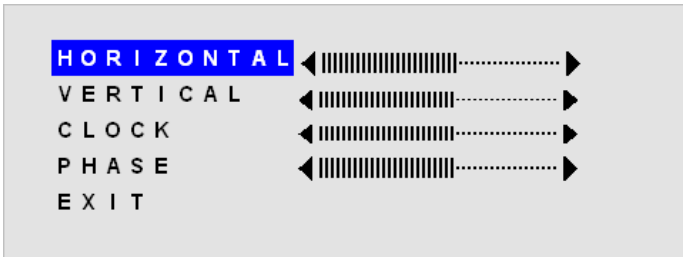
- ☐ Select (Blue Highlight) > SHARPNESS (select return to Left Status)
- ■ SHAHPNESS : Focus of Image
- ■ COLOR : Thickness of Color
- ■ TINT : Tone of Image

POSITION Control

1) Menu & Down

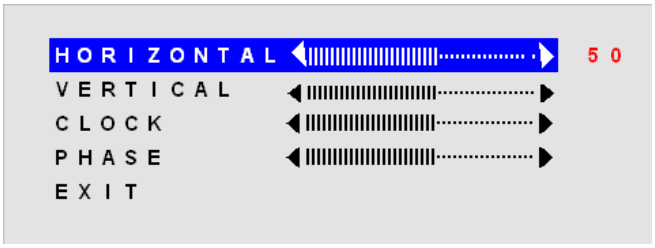


2) Select



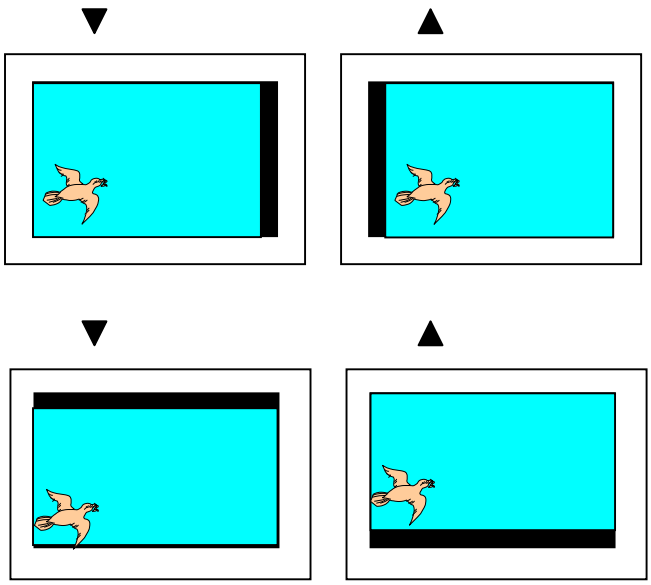
HORIZONTAL Position

Procedure Menu > POSITION > HORIZONTAL > select



When display image is out of screen, can adjust with this function for getting Optimized Image)

Adjustment



Mismatched Optimized

VERTICAL Position

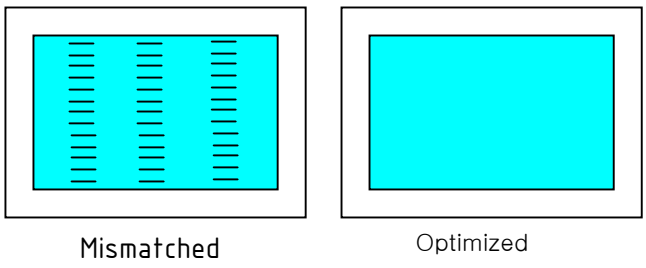
Procedure POSITION > VERTICAL > select

When display image is out of screen, can adjust with this function for getting Optimized Image)

CLOCK

Procedure POSITION > CLCOK > select

When display image is wrinkled, can adjust with this function for getting Optimized Image)

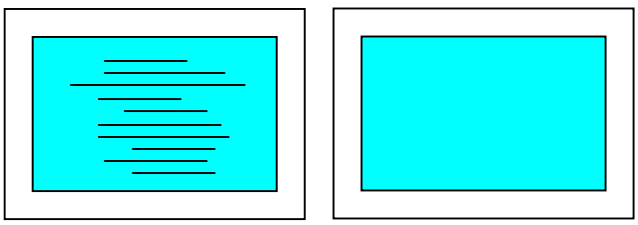


Mismatched Optimized

Phase

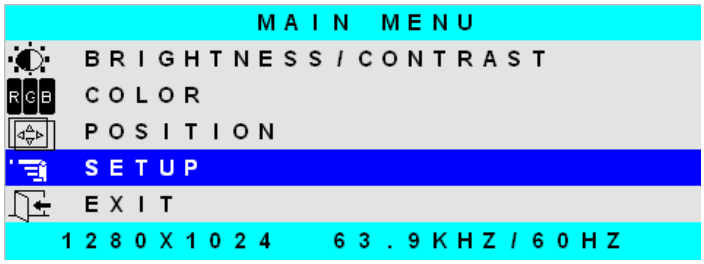
Procedure POSITION > Phase select

When display image is vague, can adjust with this function for getting Optimized Image)

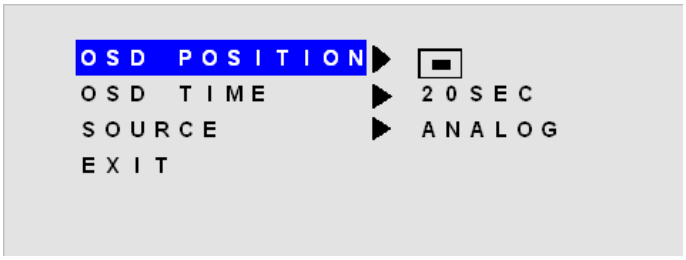


SETUP Control

1) Menu & Down

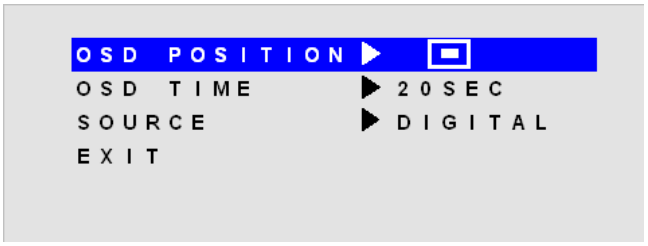


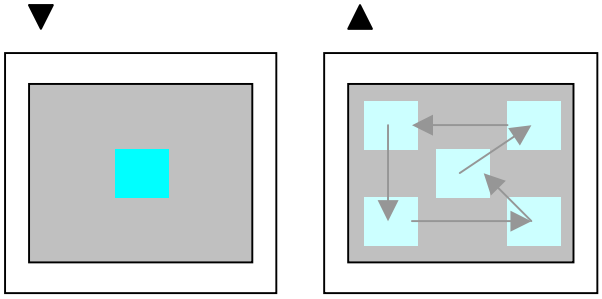
2) Select



OSD POSITION Function

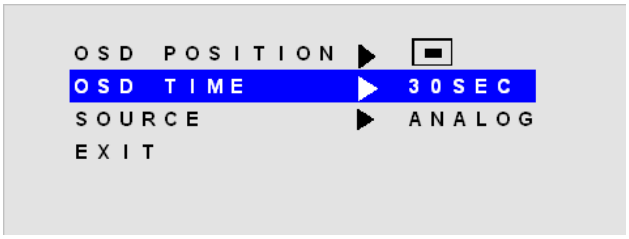
Procedure SETUP > OSD POSITION > Select





OSD POSITION Function

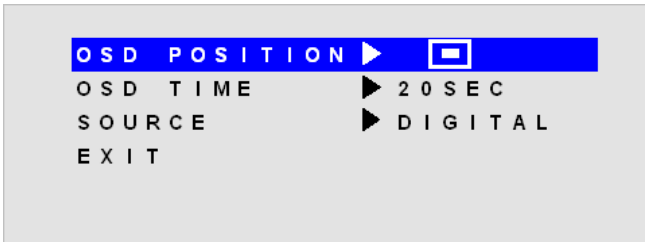
Procedure SETUP > OSD TIME > Select



10 to 60 Sec

SOURCE Select Function

Procedure SETUP > SOUREC > Select

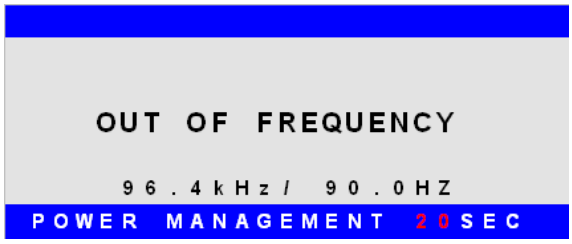


ANALOG -> DIGITAL -> ANALOG -> DIGITAL .....

Operation Message

OUT OF FREQUENCY

Input Signal is over the supporting range



POWER SAVER MODE

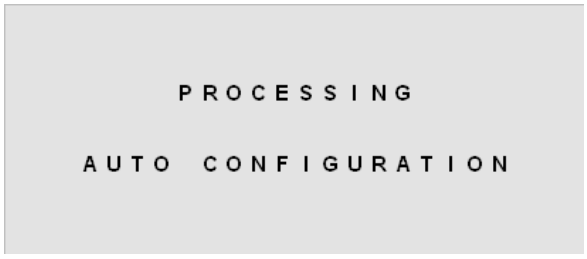
Input Signal is not present. This message is disappeared after 5 seconds.

SELF DIAGNOSTICS

Input Signal is not present after power on with power switch. This message is not disappeared before power off or activity of input signal.

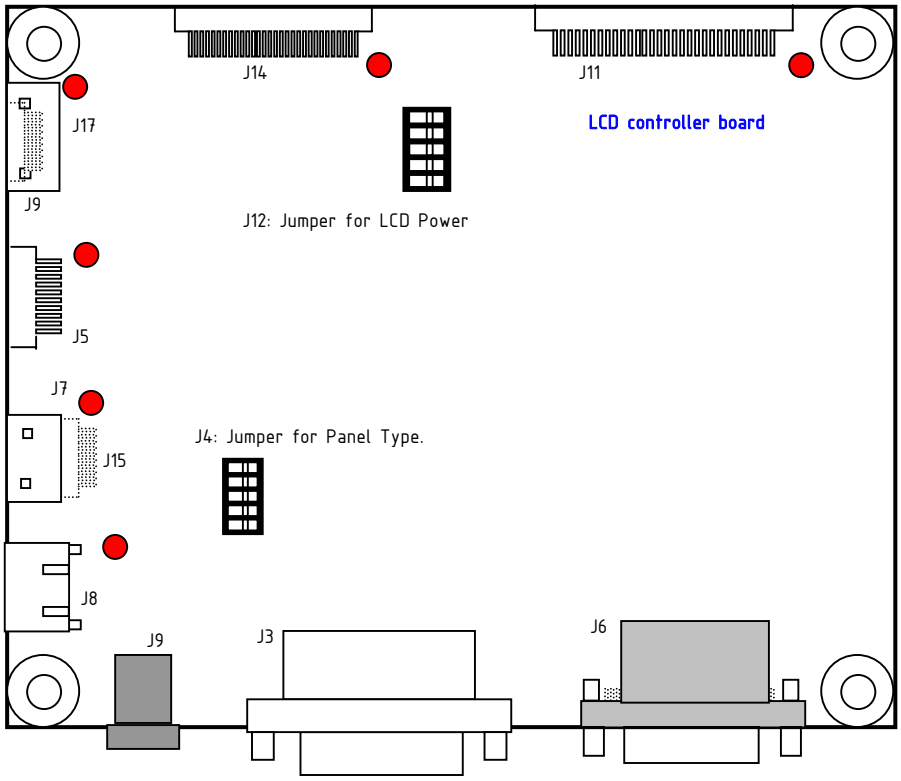
AUTO CONFIGURATION

Execute AUTO Function.



CONNECTOR, PINOUT & JUMPERS

The various connectors are:



Summary

Reference	Item	Description	P / N	Manufacture
J1	Connector	Analog RGB Input	12507WR-12	YEONHO
J2	Jack	DC power Input Jack	2.5Ø DJ05H-250Y	SANJI
J3	Connector	DVID-D Input(TMDS)	29P DVI-I CA-29DVISIR-A-2 R/A	NIKE
J4	Switch	Panel Type Select Switch	HDR5X2 KSD-52HS-HDR5*2	OTXA
J6	Connector	Analog RGB Input	15P D-SUB 2.29mm Female R/A DSH03-15-F	SHENZHEN XIANHE
J7	Connector	Output Power	53015-0310	MOLEX
J8	Connector	DC power Input	20022WR-05A00	YEONHO
J9	Connector	To OSD Board	53015-0710	MOLEX
J11	Connector	LVDS Dual (LCD interface Signal)	12507WR-30	YEONHO
J12	Switch	Panel Power Select Switch	HDR5X2 KSD-52HS-HDR5*2	OTXA
J14	Connector	LVDS Single (LCD interface Signal)	12507WR-20	YEONHO

J15	Connector	Output Power	20022WR-05A00	YEONHO
J16	Connector	Inverter Connector	53261-1090	MOLEX
J17	Connector	To OSD Board	53261-0790	MOLEX

J1: Analog RGB Input Connector

Pin No.	Symbol	Description
1	SDA	Serial Data Line for DDC
2	SCL	Serial Clock Line for DDC
3	NC	No Connection
4	VSYNC	Vertical Sync
5	HSYNC	Horizontal Sync
6	GND	Ground for HSYNC, VSNC, SCL, SDA
7	BLUE	BLUE analog input
8	BLUE GND	Ground for BLUE Input Signal
9	GREEN	GREEN analog input
10	GREEN GND	Ground for GREEN Input Signal
11	RED	RED analog input
12	RED GND	Ground for RED Input Signal

J2: 12V DC power supply

Pin No.	Symbol	Description	Pin No.	Symbol	Description
Center	Vcc	12V	Shell	GND	Ground

J4: Panel Type Select Switch

Pin No / Symbol		Description	
		OFF	ON
1	XGA/SXGA	XGA	SXGA
2	VGA/SVGA	VGA	SVGA
3	LVDS/TTL	LVDS	TTL
4	8BIT/6BIT	8BIT	6BIT
5	DUAL/SINGLE	DUAL	SINGLE

J3: DVI-D Input Connector

Pin No.	Symbol	Description
1	TMDS DATA2-	TMDS DATA2 Differential Negative Signal
2	TMDS DATA2+	TMDS DATA2 Differential Positive Signal
3	TMDS DATA2 Shield	Shield for TMDS Channel #2
4	NC	No Connection
5	NC	No Connection
6	DDC Clock	The Data Line for the DDC Interface
7	DDC Data	The Clock Line for the DDC Interface
8	NC	No Connection
9	TMDS DATA1-	TMDS DATA1 Differential Negative Signal
10	TMDS DATA1+	TMDS DATA1 Differential Positive Signal
11	TMDS DATA1 Shield	Shield for TMDS Channel #1
12	NC	No Connection
13	NC	No Connection
14	+5V Power	+5 Volt signal for EDID (Un-powered Monitor)
15	GND(for +5V)	Ground for +5 Volt Power pin, Sync return
16	HPD	Identify the presence of a monitor
17	TMDS DATA0-	TMDS DATA0 Differential Negative Signal
18	TMDS DATA0+	TMDS DATA0 Differential Positive Signal
19	TMDS DATA0 Shield	Shield for TMDS Channel #0
20	NC	No Connection
21	NC	No Connection
22	TMDS CLOCK Shield	Shield for TMDS Clock differential Pair
23	TMDS CLOCK+	TMDS DATA0 Differential Positive Signal
24	TMDS CLOCK-	TMDS DATA0 Differential Negative Signal

J6: ANALOG VGA INPUT

Pin No.	Symbol	Description
1	Red1	Red analog input
2	Green1	Green analog input
3	Blue1	Blue analog input
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	NC	Not connected
10	GND	Ground
11	GND	Ground
12	DSDA	DDC-SDA
13	HSYNC	Horizontal Sync
14	VSYNC	Vertical Sync
15	DSCL	Serial Clock Input

J7, J15 : On board +12V/+5V logic power Output

Pin No.	Symbol	Description
1,2	12V	12V
3	GND	GND
4,5	5V	5V

J8: DC power Input Connector

Pin No.	Symbol	Description
1,2	12V	12V
3	NC	Not connected
4,5	GND	Ground

J9, 17: OSD control connector

Pin No.	Symbol	Description
1	5V	+5V
2	IRQ	GREEN LED2
3	LED2	RED LED1
4	LED1	GREEN LED1
5	GND	Ground
6	KEY1	Up, Power
7	KEY0	Menu, Select, Down

J12: Panel Type Select Switch

Pin No / Symbol		Description	
		OFF	ON
1	3.3V	-	3.3V
2	NC	-	
3	5V	-	5V
4	NC	-	
5	12V	-	12V

J11: LCD Interface connector for LVDS type(Dual)

Pin No.	Symbol	Description
1	MOD_PWR	VDD For LCD Module (12V, 5V or 3.3V)
2	MOD_PWR	VDD For LCD Module (12V, 5V or 3.3V)
3	MOD_PWR	VDD For LCD Module (12V, 5V or 3.3V)
4	MOD_PWR	VDD For LCD Module (12V, 5V or 3.3V)
5	GND	Ground
6	SELLDS	LVDS DATA ORDER SELECT(Depends on Panel)/ No Connection
7	GND	Ground
8	Y3P-EVEN	Positive(+) LVDS differential first 3 data(A port)
9	Y3M-EVEN	Negative(-) LVDS differential first 3 data(A port)
10	YCP-EVEN	Positive(+) LVDS differential first Clock(A port)
11	YCM-EVEN	Negative(-) LVDS differential first Clock(A port)
12	Y2P-EVEN	Positive(+) LVDS differential first 2 data(A port)
13	Y2M-EVEN	Negative(-) LVDS differential first 2 data(A port)
14	GND	Ground
15	Y1P-EVEN	Positive(+) LVDS differential first 1 data(A port)
16	Y1M-EVEN	Negative(-) LVDS differential first 1 data(A port)
17	Y0P-EVEN	Positive(+) LVDS differential first 0 data(A port)
18	Y0M-EVEN	Negative(-) LVDS differential first 0 data(A port)
19	GND	Ground
20	Y3P-ODD	Positive(+) LVDS differential second 3 data(B port)
21	Y3M-ODD	Negative(-) LVDS differential second 3 data(B port)
22	YCP-ODD	Positive(+) LVDS differential second Clock(B port)
23	YCM-ODD	Negative(-) LVDS differential second Clock(B port)
24	Y2P-ODD	Positive(+) LVDS differential second 2 data(B port)
25	Y2M-ODD	Negative(-) LVDS differential second 2 data(B port)
26	GND	Ground
27	Y1P-ODD	Positive(+) LVDS differential second 1 data(B port)
28	Y1M-ODD	Negative(-) LVDS differential second 1 data(B port)
29	Y0P-ODD	Positive(+) LVDS differential second 0 data(B port)
30	Y0M-ODD	Negative(-) LVDS differential second 0 data(B port)

J13: DVI-D Input Connector

Pin No.	Symbol	Description
1	GND	Ground
2	HPD	Identify the presence of a monitor
3	TMDS DATA2+	TMDS DATA2 Differential Positive Signal
4	TMDS DATA2-	TMDS DATA2 Differential Negative Signal
5	TMDS DATA2 Shield	Shield for TMDS Channel #2
6	TMDS DATA1+	TMDS DATA1 Differential Positive Signal
7	TMDS DATA1-	TMDS DATA1 Differential Negative Signal
8	TMDS DATA1 Shield	Shield for TMDS Channel #1
9	GND	Ground
10	TMDS DATA0+	TMDS DATA0 Differential Positive Signal
11	TMDS DATA0-	TMDS DATA0 Differential Negative Signal
12	TMDS DATA0 Shield	Shield for TMDS Channel #0
13	TMDS CLOCK+	TMDS DATA0 Differential Positive Signal
14	TMDS CLOCK-	TMDS DATA0 Differential Negative Signal
15	TMDS CLOCK Shield	Shield for TMDS Clock differential Pair
16	+5V Power	+5 Volt signal for EDID (Un-powered Monitor)
17	NC	No Connection
18	DDC Clock	The Data Line for the DDC Interface
19	DDC Data	The Clock Line for the DDC Interface
20	GND	Ground

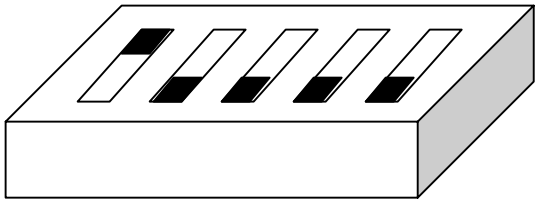
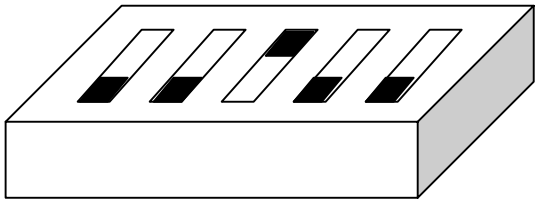
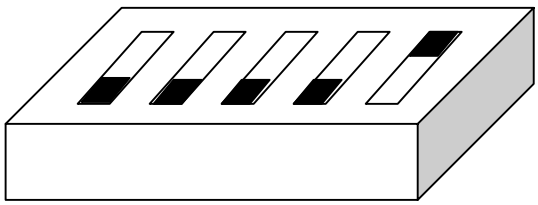
J14: LCD Interface connector for Single Channel LVDS type

Pin No.	Symbol	Description
1	GND	Ground
2	GND	Ground
3	Y3P	LVDS 3 Channel Positive Signal for LCD Module (6Bit Unused)
4	Y3M	LVDS 3 Channel Negative Signal for LCD Module (6Bit Unused)
5	GND	Ground
6	CLKOUTP	LVDS Clock Positive Signal of Channel for LCD Module
7	CLKOUTM	LVDS Clock Negative Signal of Channel for LCD Module
8	GND	Ground
9	Y2P	LVDS 2 Channel Positive Signal for LCD Module
10	Y2M	LVDS 2 Channel Negative Signal for LCD Module
11	GND	Ground
12	Y1P	LVDS 1 Channel Positive Signal for LCD Module
13	Y1M	LVDS 1 Channel Negative Signal for LCD Module
14	GND	Ground
15	Y0P	LVDS 0 Channel Positive Signal for LCD Module
16	Y0M	LVDS 0 Channel Negative Signal for LCD Module
17	GND	Ground
18	GND	Ground
19	MOD_PWR	VDD For LCD Module (12V, 5V or 3.3V)
20	MOD_PWR	VDD For LCD Module (12V, 5V or 3.3V)

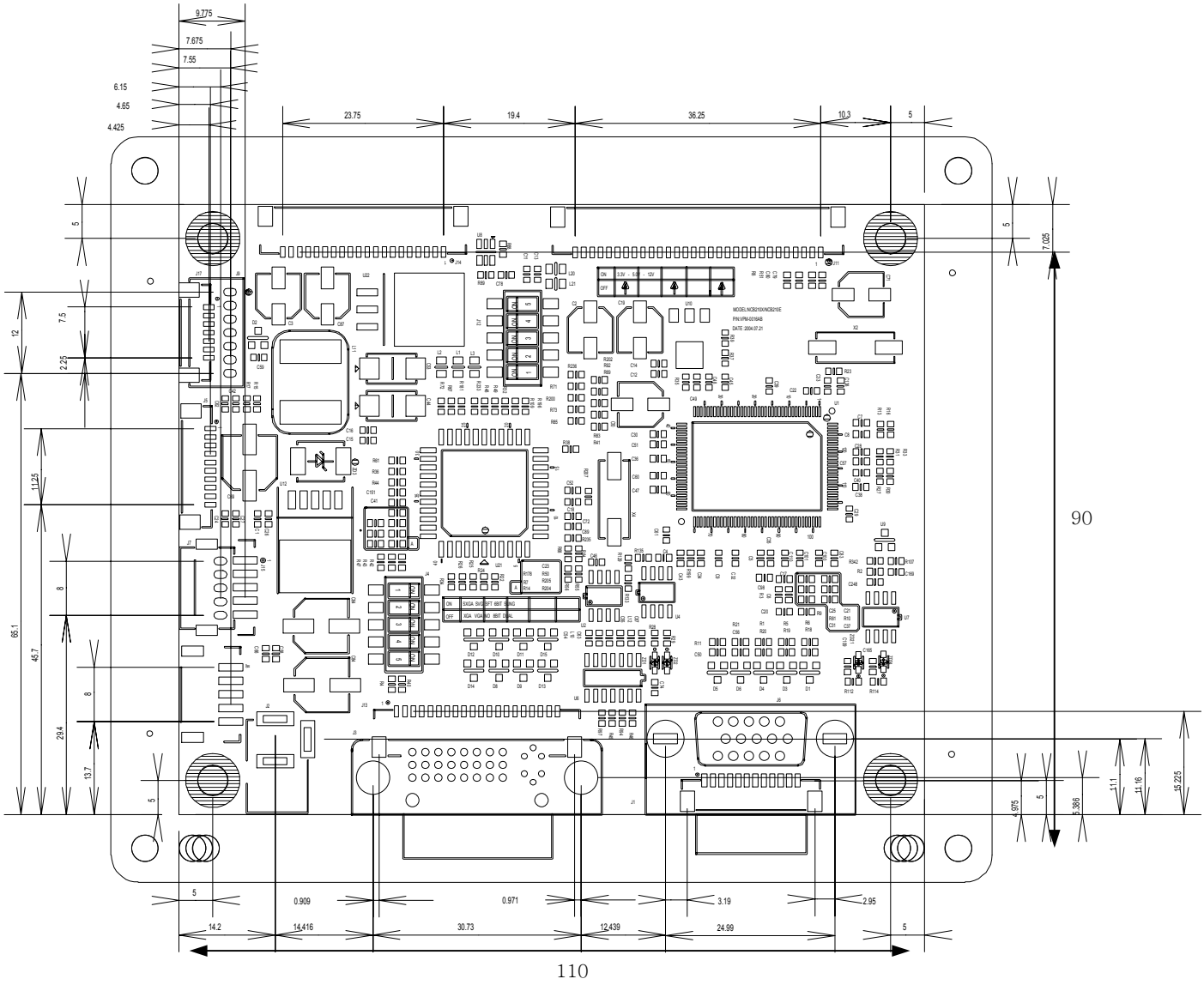
J16: Backlight Inverter connector

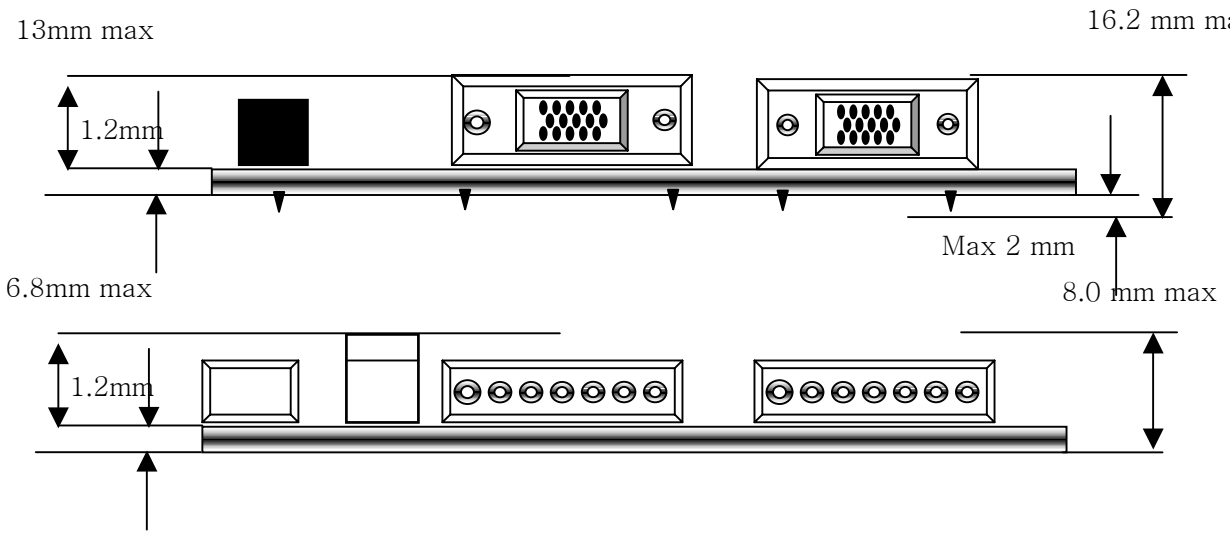
Pin No.	Symbol	Description
1	DIM-ADJ	Dimming adjustment analog dimming control signal Min 3.3V, Max 0V (cross check inverter specification)
2,6	NC	No Connection
5	ON/OFF	Inverter digital ON(3.3V)/OFF(0V) signal
3,4,7,8	GND	Ground
9,10	12V	12V

Summary: jumpers setting

Reference	Description	Connector Type
J12	3.3V panel power **CAUTION**: Incorrect setting can damage panel	
	5V panel power **CAUTION**: Incorrect setting can damage panel	
	12V panel power **CAUTION**: Incorrect setting can damage panel	

CONTROLLER DIMENSIONS





APPLICATION NOTES

USING THE CONTROLLER WITHOUT BOTTONS ATTACHED

This is very straightforward:

- Firstly setup the controller/display system with the buttons. With the attached controllers and display system active make any settings for color, contrast and image position as required then switch everything off.
- Remove the control switches, the 7-way cable.
- Refer to inverter specifications for details as to fixing brightness to a desired level, this may require a resistor, an open circuit or closed circuit depending on inverter

INVERTER CONNECTION

There are 3 potential issues to consider with inverter connection:

- Power
- ON/OFF
- Brightness (DIM-ADJ)

Inverter power: This should be matched with the inverter specification.

Inverter ON/OFF: This is a pin provided on some inverter for ON/OFF function and is used by this panel controller for VESA DPMS compliance. If the inverter does not have on/off pin or the on/off pin is not used DPMS will not operate. Pin 5 should be matched to the inverter specification for the ON/OFF pin.

Brightness Dimming control: NCB210E2 ontroller boards are analog dimming control method. And it is important to consider the specifications for the inverter to be used.

TROUBLESHOOTING

General

A general guide to troubleshooting of a flat panel display system it worth considering the system as separate elements, such as:

- Controller (jumpers, PC settings)
- Panel (controller, cabling, connection, panel, PC settings)
- Backlight (inverter, cabling, connection, panel, Pc settings)
- Cabling
- Computer system (display settings, operating system)

Through checking the system step by step cross with instruction manuals and a process of elimination to isolate the problem it is usually possible to clearly identify the problem area.

No image:

- If the panel backlight is not working it may still be possible to see just some image.
- A lack of image is most likely to be caused by incorrect connection, lack of power, failure to provide a signal or incorrect graphic card settings.

Image position:

If it is impossible to position the image correctly, the image adjustment controls will not move the image far enough, then test using another graphics card. This situation can occur when a graphic card is not close to standard timing or when something is in the graphics line that may affect the signal such as a signal splitter (please note that normally a signal splitter will not have any adverse effect).

Image appearance:

- A faulty panel can have blank lines, failed sections, flickering or flashing display.
- Incorrect graphic card refresh rate, resolution or interlaced mode will probably cause the image to be the wrong size, to scroll to, flicker badly or possibly even no image.
- Incorrect jumper settings on the controller may cause everything from incorrect image viewing to total failure.

CAUTION: Do not set the panel power input incorrectly.

- Sparkling on the display: faulty panel signal cable.

Backlight:

Items to check include: Power input, controls, inverter and Tubes generally in this order.

If half the screen is dimmer than the other half:

- Check cabling for the inverter.

Also: - If system does not power down when there is a loss of signal.

APPLICABLE GRAPHIC MODE

The microprocessor measures the, H – sync V – sync and polarity for RGB Inputs, and uses this timing information to control all of the display operation to get the proper image on a screen. This board can detect all VESA standard Graphic modes shown on the table below and Provide mare clear and stable image on a screen

Table 6.1) RGB input format

Spec / Mode	Pixel Freq.	Horizontal Timing				Vertical Timing			
		Sync Polar	Freq.	Total	Active	Sync Polar	Freq.	Total	Active
	MHz		KHz	Pixel	Pixel		Hz	Line	Lind
640*350@70Hz	25.144	P	31.430	800	640	N	70.000	449	350
640*400@70Hz	28.287	N	31.430	800	640	P	70.000	449	400
720*400@ 70Hz	28.287	N	31.430	900	720	P	70.000	449	400
640*480@60Hz	28.175	N	31.469	800	640	N	59.940	525	480
640*480@72Hz	31.500	N	37.861	832	640	N	72.809	520	480
640*480@75Hz	31.500	N	37.500	840	640	N	75.000	500	480
800*600@56 Hz	36.000	P	35.156	1024	800	P	56.250	625	600
800*600@60Hz	40.000	P	37.879	1056	800	P	60.317	628	600
800*600@72Hz	50.000	P	48.077	1040	800	P	72.188	666	600
800*600@75Hz	49.500	P	46.875	1056	800	P	75.000	625	600
1024*768@60Hz	65.000	N	48.363	1344	1024	N	60.005	806	768
1024*768@ 70Hz	75.000	N	56.476	1328	1024	P	70.070	806	768
1024*768@75Hz	78.750	P	60.023	1312	1024	P	75.030	800	768
1280*1024@60Hz	108.000	P	63.981	1688	1280	P	60.020	1066	1024
1280*1024@75Hz	135.000	P	79.976	1688	1280	P	75.035	1066	1024

ACCESSORY

This board requires several accessories to build a complete display unit. **Kordis** can provide standard accessory for this board as below.

No.	Items	Part No.	Ex) LG. Philips LP121S1
1	LCD signal cable	SC-Panel Part No.-mm	SC-LP121S1-30
2	Inverter	Part no. of Manufacturer	GH001
3	Inverter cable	IC-Panel Part No.-mm	IC-LP121S1-30
4	OSD Board	NOB005P	NOB0005P
5	OSD Cable	OC-NID01-mm	OC-NID01-20

* SC: LCD Signal Cable IC: Inverter Interface cable
OC: OSD Board cable mm: Cable length(unit: mm)

APPENDIX

A. Tested panel

This board can support various LCD panels, which have SVGA, XGA and SXGA resolution.

The table below shows the model names of LCD panel, Jumper setting for LCD power, LCD panel selection and the dedicated inverter for each LCD panel. All of the LCD Panels listed can work without changing the control program of the NCB210E board. And KORDIS will try continuously to the model names of the LCD panels that have been tested.

No.	LCD Model Name	LCD vendor	LCD VCC	Option (note1)	SW1	SW2	SW3	SW4	SW5
1	LP104S5	LG Philips LCD	+3.3V	SS6S	OFF	OFF	ON	ON	ON
2	LC121S1	LG Philips LCD	+3.3V	SS6S	OFF	OFF	ON	ON	ON
3	HT10X21	HYDIS	+3.3V	XS6S	OFF	OFF	ON	ON	ON
4	HT12X11	HYDIS	+3.3V	XS6S	OFF	OFF	ON	ON	ON
5	HT12X12	HYDIS	+3.3V	XS6S	OFF	OFF	ON	ON	ON
6	LM150X05-C3	LG Philips LCD	+3.3V	XS8N	OFF	OFF	OFF	OFF	ON
7	LM150X06-A3	LG Philips LCD	+3.3V	XS8N	OFF	OFF	OFF	OFF	ON
8	LM150X07-B4	LG Philips LCD	+3.3V	XS8N	OFF	OFF	OFF	OFF	ON
9	LM150X08-A4	LG Philips LCD	+3.3V	XS8N	OFF	OFF	OFF	OFF	ON
10	LC151X01-C3	LG Philips LCD	+5.0V	XS8N	OFF	OFF	OFF	OFF	ON
11	HT15X13	HYDIS	+3.3V	XS8N	OFF	OFF	OFF	OFF	ON
12	HT15X15	HYDIS	+3.3V	XS8N	OFF	OFF	OFF	OFF	ON
13	LTM150XH-L01	SAMSUNG	+3.3V	XS8N	OFF	OFF	OFF	OFF	ON
14	M150XN07	AU	+3.3V	XS6S	OFF	OFF	ON	ON	ON
15	LM170E01-A5	LG Philips LCD	+5.0V	ED8N	ON	OFF	OFF	OFF	OFF
16	HT17E11	HYDIS	+5.0V	ED8N	ON	OFF	OFF	OFF	OFF
17	HT17E12	HYDIS	+5.0V	ED8N	ON	OFF	OFF	OFF	OFF
18	LTM17EH-L01	SAMSUNG	+5.0V	ED8N	ON	OFF	OFF	OFF	OFF
19	LM181E06	LG Philips LCD	+12.0V	ED8N	ON	OFF	OFF	OFF	OFF
20	LM190E1-C4	LG Philips LCD	+12.0V	ED8N	ON	OFF	OFF	OFF	OFF
21	FLC48SXC8V-10	Fujitsu	+5.0V	ED8N	ON	OFF	OFF	OFF	OFF

Note1 : Abbreviated word : $E^{ⓐ}S^{ⓑ}6^{ⓒ}S^{ⓓ}$

ⓐ V/S/X : V VGA, S SVGA, X XGA, E SXGA ⓑ S/D : SINGLE PORT, D DUAL PORT

ⓒ 6/8 : 6 6BITS 8 8BITS ⓓ S/N : (SFT) SHIFT, N(NOR) NORMAL