For LCD Monitor (PC + DVI + Video) Interface Controller

For 1024X768, 1280X768, 1280X1024, 1366X768 Resolutions TFT LCD

DATA SHEET

TFT LCD Monitor Control Board

NCB310E2-DS-A5 (RoHS Compliant)

May 2006

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INTRODUCTION

Designed for LCD monitor and other flat panel display application the NCB310E2 controller provides an auto-input synchronization and easy to sue interface controller for:

- TFT (active matrix) LCD panels of 1024X768, 1280X768, 1280x1024 and 1366X768 Resolutions
- Computer video signals of VGA, SVGA, XGA, SXGA standard.
- Video signals of NTSC, PAL 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	XGA Panel	1024X768	NCB310X2	Note 1)
		WXGA Panel	1280X768	NCB310W2	
		WXGA Panel	1366X768	NCB310WZ2	
		SXGA Panel	1280X1024	NCB310E2	
2	LCD Module	XGA, WXGA, SXGA			
3	Signal Input	Analog RGB Input. DVI, NTSC/PAL			
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	50W (With Back Light Inverter)		
8	Signal Connector	Analog	DSUB 15P(R, G, B Separate H, V Sync)		
		Digital	DVI-D(TMDS)		TMDS
		Video	MINI DIN-4P (SVHS), RCA (CVBS)		

Notes 1) Depends On Panel Resolution

- **X : XGA (1024X768)**
- **W : WXGA (1280X768)**
- **WZ : WXGA (1366X768)**
- **E : SXGA (1280X1024)**

ELECTRICAL SPECIFICATION

Input characteristic

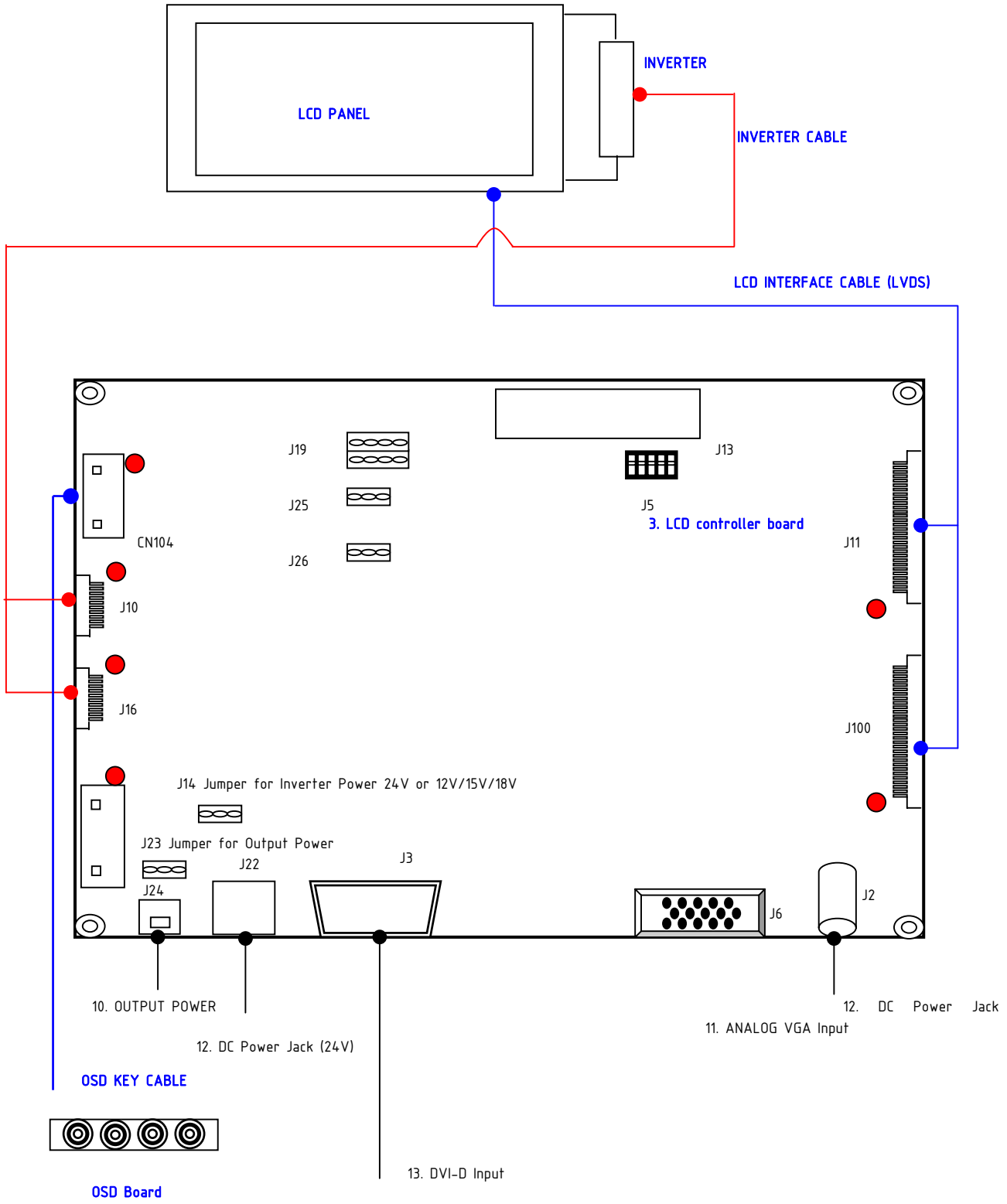
Description	Signal	Unit	Min	Typical	Max	Remarks
Power In (24V)						
	Input	Vdc	22.8	24.0	25.2	
	Consumption	Watt		TBD		Without INV
Power In (18V)						
	Input	Vdc	17.0	18.0	19.0	
	Consumption	Watt		TBD		Without INV
Power In (15V)						
	Input	Vdc	14.75	15.0	15.75	
	Consumption	Watt		TBD		Without INV
Power In (12V)						
	Input	Vdc	11.4	12.0	12.6	
	Consumption	Watt		TBD		Without INV
RGB Input						
	Analog RGB	Vp-p	0	0.7	-	
	Sync	Vdc	0	5	5.5	
	H Frequency	KHz	31		80	Depends on Mode
	V Frequency	Hz	55	60	75	
DVI Input						
	TMDS	mVp-p	450	500	900	
NTSC/PAL						
	Y/CVBS	Vp-p	0.7	1.0	1.4	
	C	Vp-p	0.6	0.8	1.0	

Output Characteristics

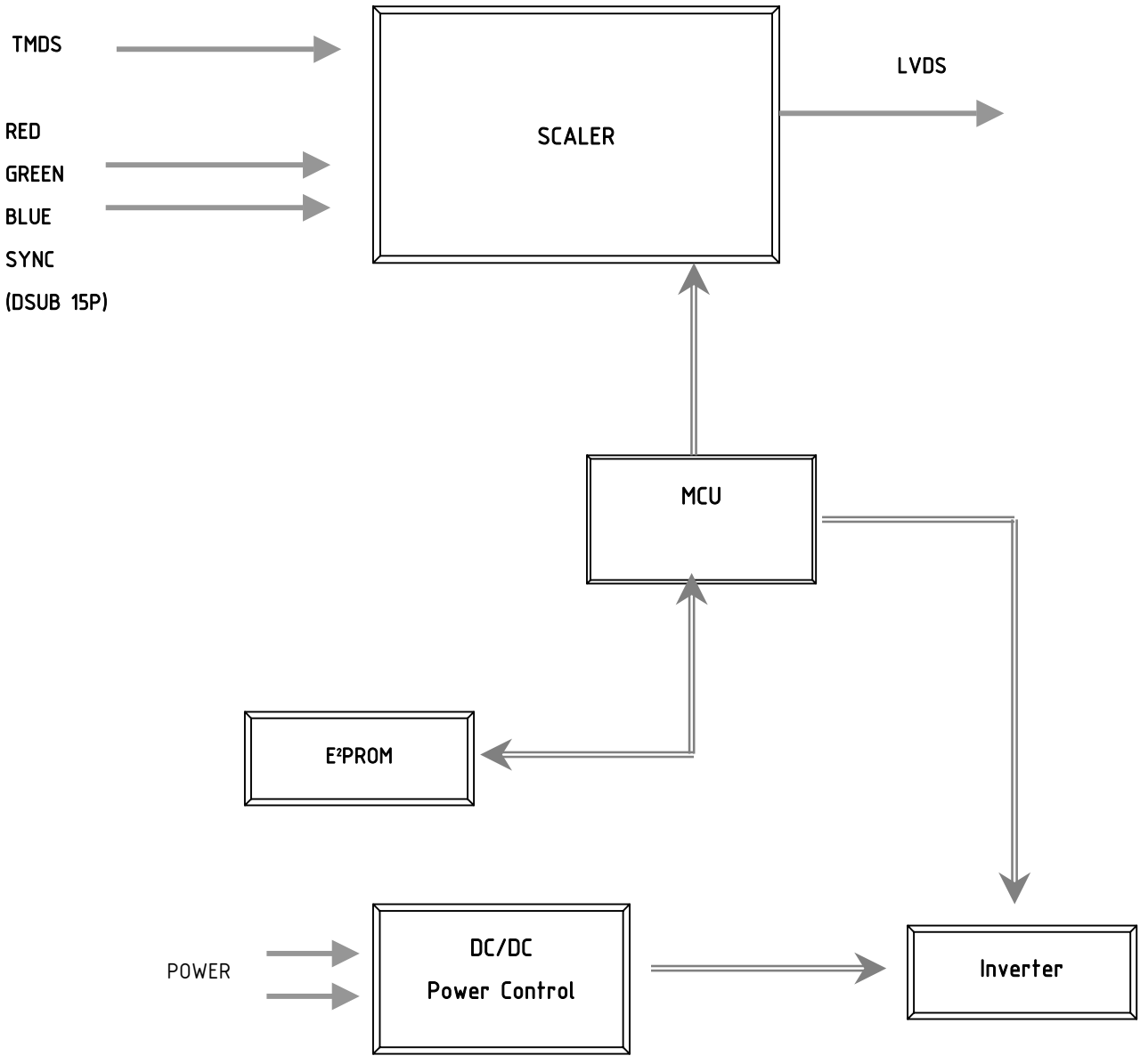
Description	Signal	Unit	Min	Typical	Max	Remarks
Panel Power						
	LCD Power (18V)	Vdc	17.1	18	18.9	Jumper option (Representative 12V)
	LCD Power (15V)	Vdc	14.25	15	15.75	
	LCD Power (12V)	Vdc	11.4	12	12.6	
	LCD Power(5V)	Vdc	4.75	5	5.25	Jumper option
	LCD Power(3.3V)	Vdc	3.13	3.3	3.46	Jumper option
LVDS Interface						
	Differential output	Vp-p (mV)	250	350	450	Different +/-
Inverter Interface						
	Power out	Vdc	22.8	24	25.2	Depends on Power Input and Spec.
			17.1	18	18.9	
			14.25	15	15.75	
			11.4	12	12.6	
	On/Off control	V	0		3.3	L=off, H=on
	Brightness control	V	3.3		0	Option
			0		5V	Option
		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 XGA, and SXGA signal input. The following provides some guidelines for installation and preparation of a finished display solution.

Preparation: Before preceding 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 LVDS interface logic on the Board for different kind of TFT LCD panel. Due to the different signal timing and electrical characteristics from each LCD panel manufacturer, for selecting LCD interface type and resolution, put jumper marked J5 on the right position following LCD panel specification. For selecting DC power level, put jumper marked J19 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. **AV cable:** Standard composite or S-video cables can be used. Reasonable quality cables should be used to avoid image quality degradation.

8. **OSD Button:** See Operational Function section.

9. 3 Color LED: This LED shows the state of controller.

- Green – Normal state
- Off – Off mode (Can't find video signals)
- Amber – DPMS mode

10. Power switch: This switch is located on OSD button board.

11. Power input: +12Vdc is required to supply power for the controller, the Inverter and the LCD panel

12. 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 customer's specific controller development.

13. 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 J100 of the controller board for Single Channel interface resolution Panel or J11 for dual channel interface panel. Plug the other end of cables to the LCD connector board.
3. **Inverter & Controller:** Plug the inverter cable to J10 & J16 of the controller board and another end to the connector on the inverter. Make sure J14 jumper position for Inverter Power
4. **Function switch & Controller:** Plug the OSD switch mount cable to J5 of the controller board and another end to the OSD board.
5. **Jumpers & Switch:** Check all jumpers J23 (External power Setting), J19 (Target panel power is setting), J5 (Target Panel Option switch) and J14 (Inverter Power) 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 of the controller board.
7. **DIV-D Cable & Controller**: Plug the DVI-D Cable to the connector J3 of the controller board.
8. **S/C Video Cable & Controller**: Plug S-Video Cable to the connector J1, C-Video Cable to the J8
9. **Power supply & Controller:** Plug the DC 12V/15V/18V power in to the connector J2 and 24V to J22.
10. **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.

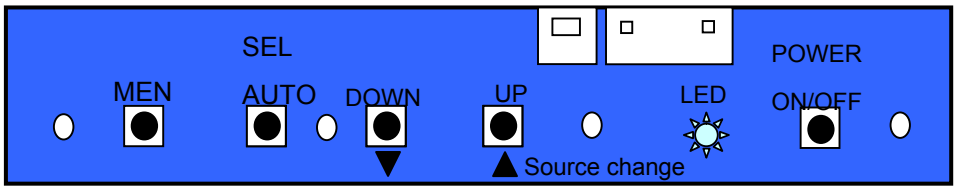
PC Setting:

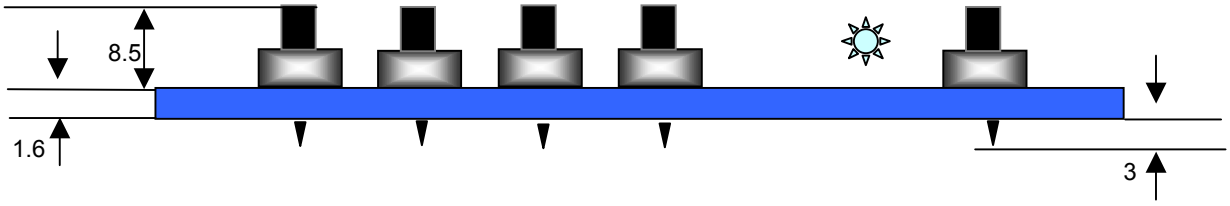
The controller has been designed to take a very wide range of input signals however to optimize the PC's graphic performance we recommend choosing 60Hz vertical refresh rate – this will not cause screen flicker.

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

Picture

In case of AV(Video & S-Video) mode

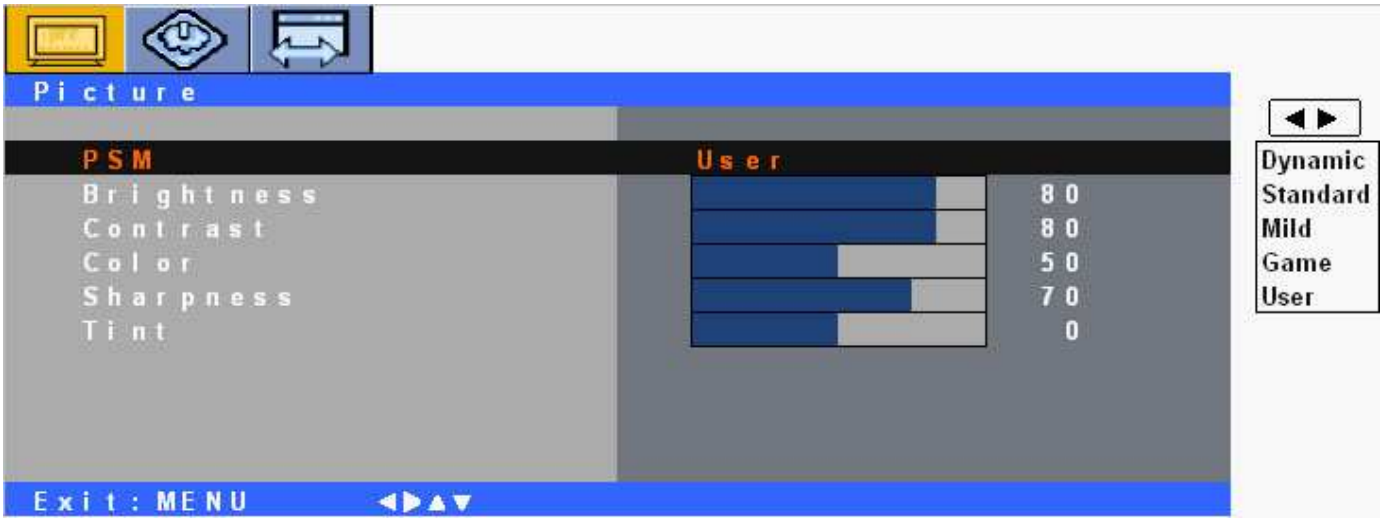
In case of PC mode

Setup

Screen

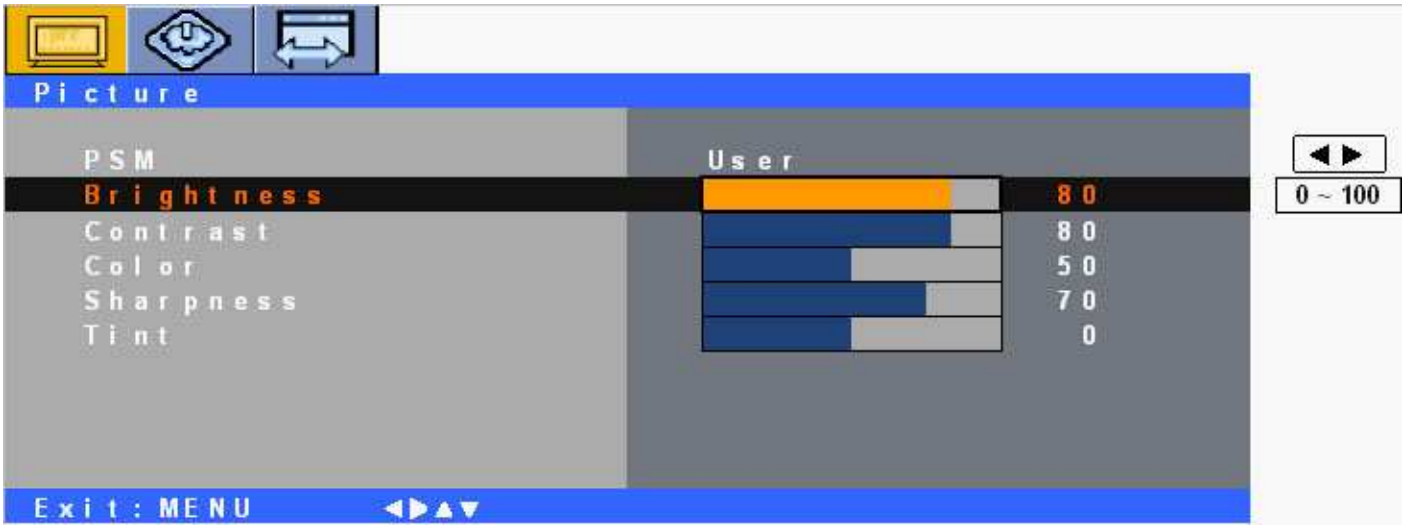
Picture Icon

PSM (AV)

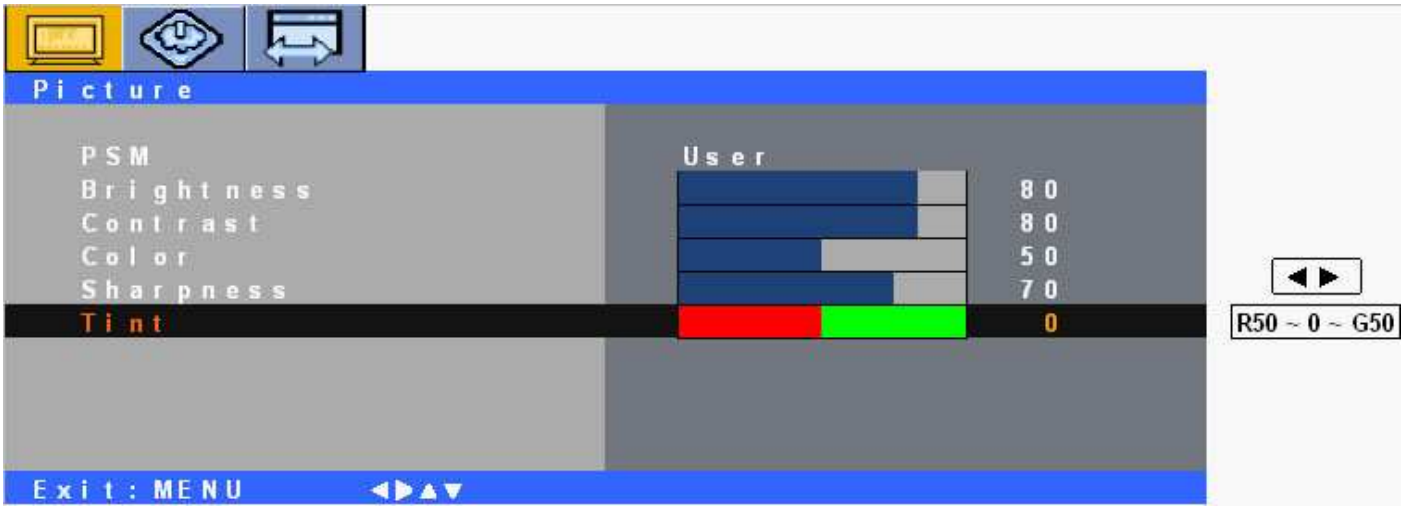


CSM (PC)

Brightness / Contrast / Color / Sharpness



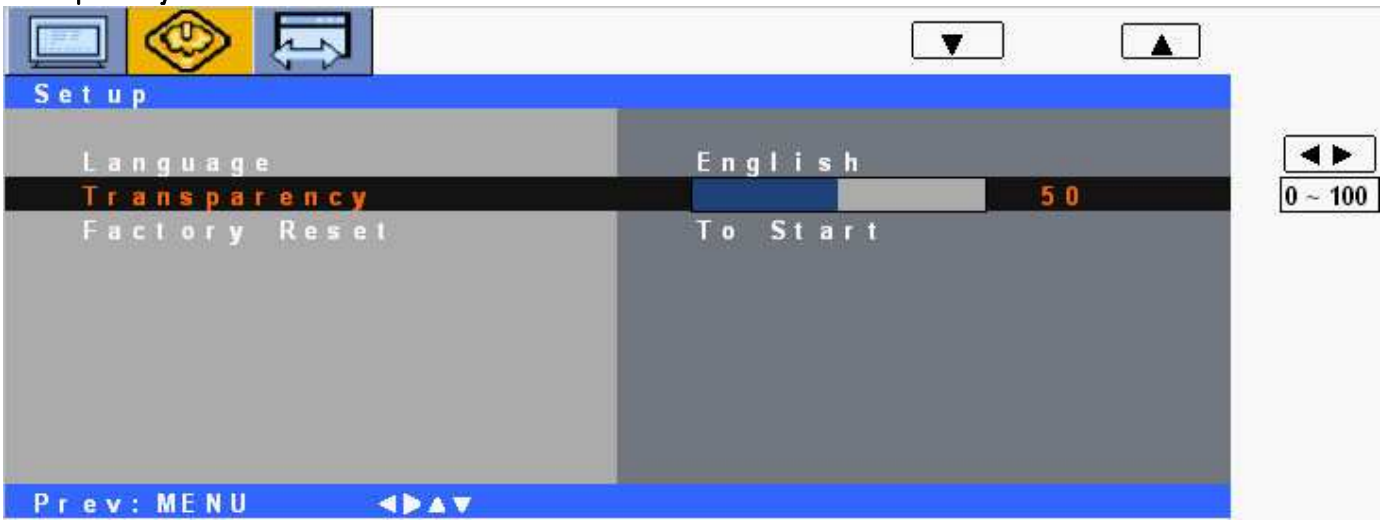
Tint



Setup

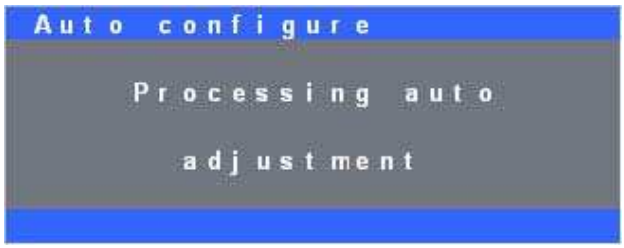
Language

Transparency

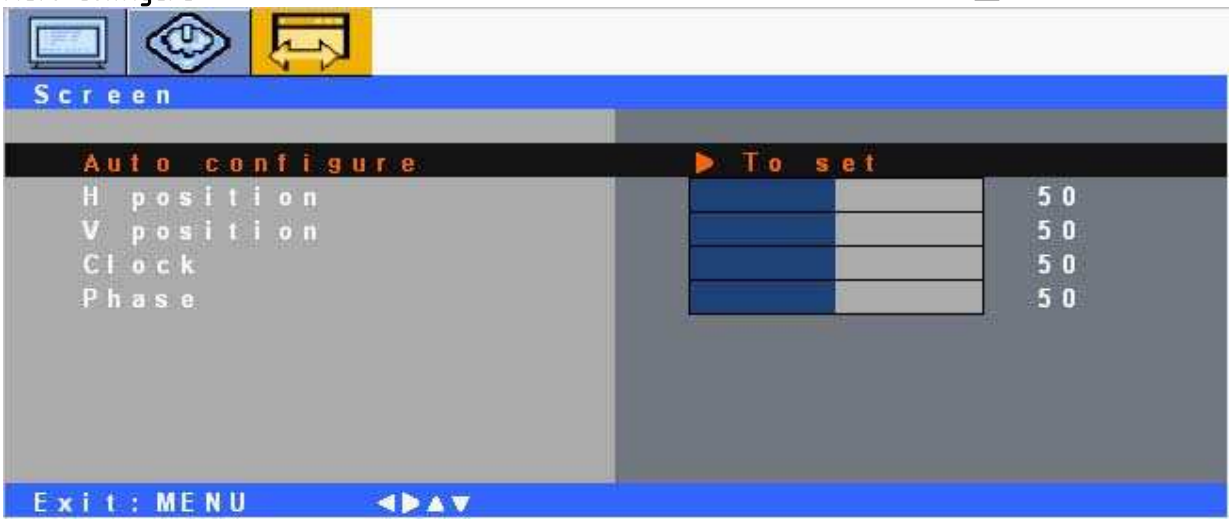


Factory Reset

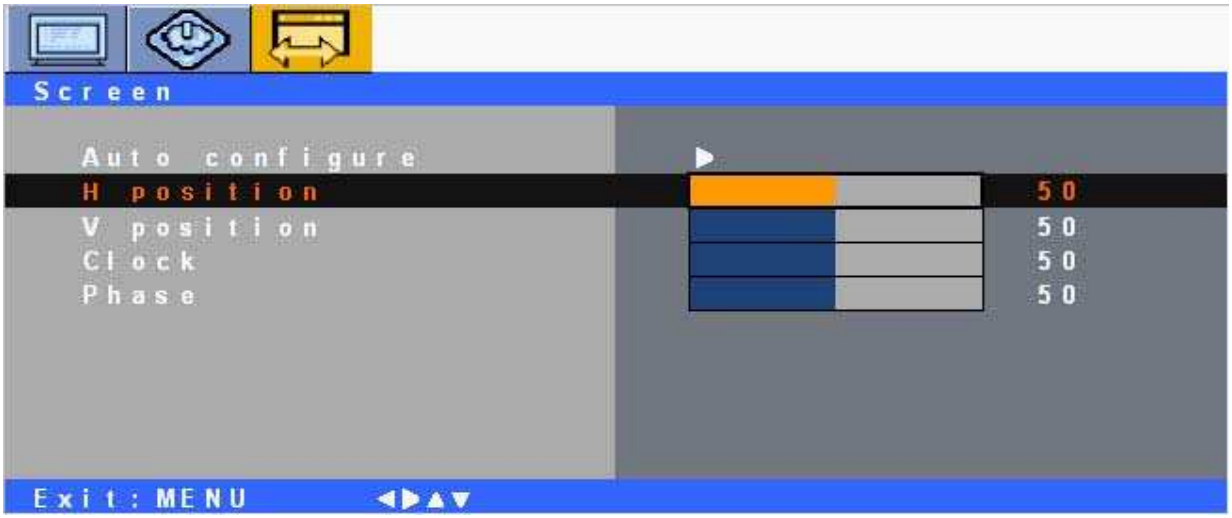
Screen



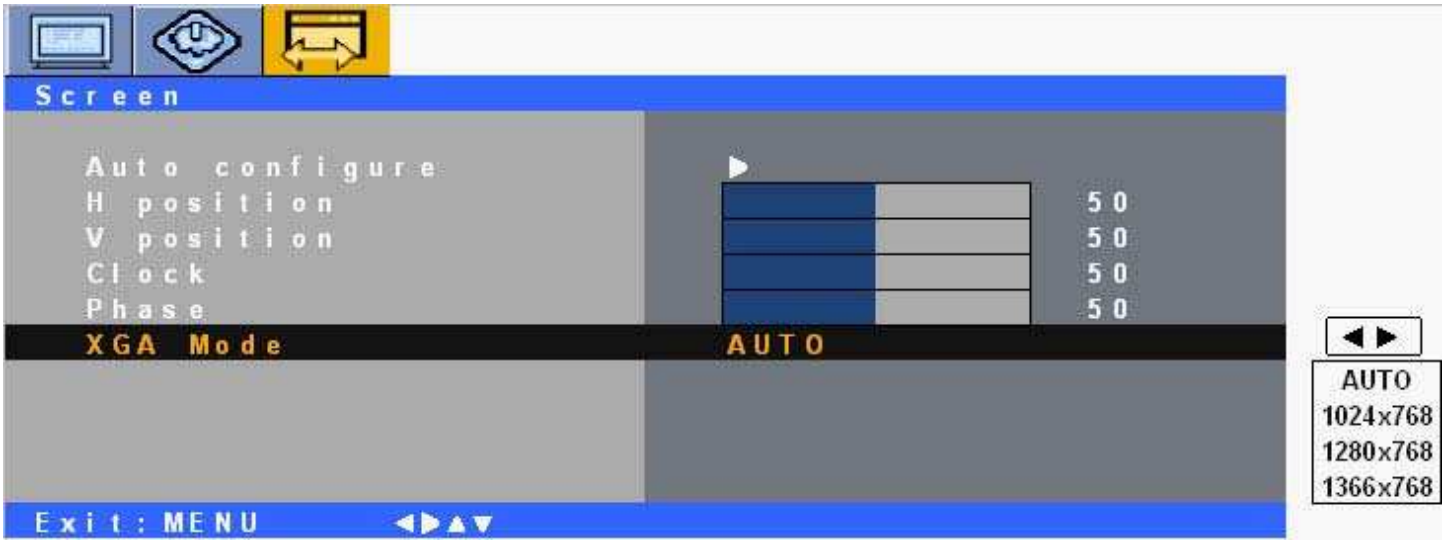
Auto Configure



H Position / V Position / Clock / Phase



XGA Mode



* XGA Mode : Setting of Auto configuration for XGA up to WXGA+ at Analog input

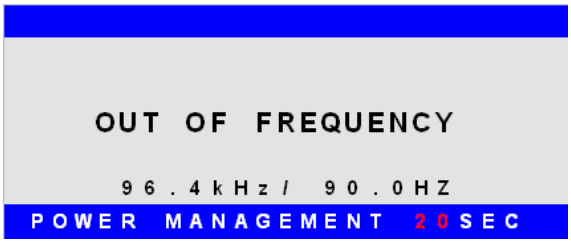
OSD GUI Control Table

MAIN MENU	SUB MENU	CONTROL		
PICTURE	PSM	Dynamic/Standard/Mild/Game/User		VIDEO
		USER	Brightness, Contrast, Color, Sharpness	
	CSM	CSM/Brightness/Contrast		PC
		CSM	Normal/Warm/User	
		User	Red/Green/Blue	
SETUP	Language	English/Deutsch/François/Italiano/Espanol		
	Transparency	50 (1 ~100)		
	ISM Method	Normal, Orbit, White		
	Factory Reset	On/Off		
SCREEN	Auto Configure	On/Off		RGB PC
	H Position	50(0 ~ 100)		
	V Position	50(0 ~ 100)		
	Clock	50(0 ~ 100)		
	Phase	50(0 ~ 100)		

Operation Message

OUT OF FREQUENCY

Input Signal is over the supporting range



POWER SAVER MODE

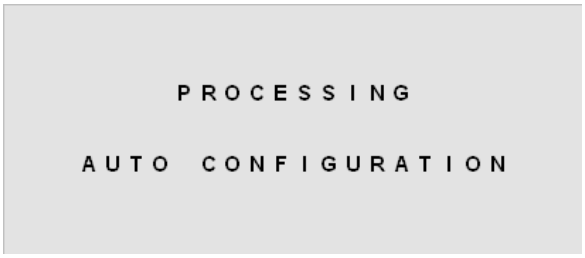
Input Signal is not present. This message is disappeared after 5 seconds.

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.

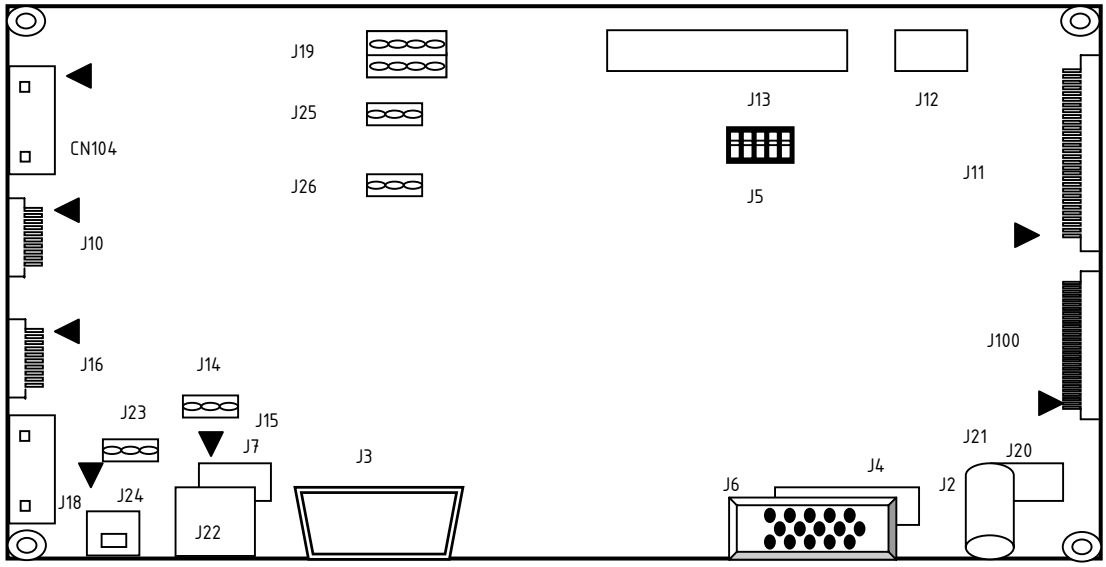
AUTO CONFIGURATION

Execute AUTO Function.



CONNECTOR, PINOUT & JUMPERS

The various connectors are:



Summary

Reference	Item	Description	Type	Manufacture
J2	Jack	Input Dc power Jack	2.5Ø	-
J3	Connector	DVID-D Input(TMDS)	DVI-D24P	
J4	Connector	Analog RGB Input Connector	20017WR-1210	YEONHO
J5	Switch	Panel Type Select Switch	HDR5X2	-
J6	Connector	Analog RGB Input	15P D-SUB	-
J7	Connector	24V Power Input	20017WR-0410	
J10, J16	Connector	Inverter Connector	12505WR-1090	YEONHO
J11	Connector	LVDS Dual Interface	12507WR-30	
J13	Connector	Internal SMPS Power Input	SMW200-1410	YEONHO
J14	Jumper	Inverter Power Jumper	HDR3X1	
J15	Block	24V Input Terminal Block		
J19	Jumper	Panel Power Jumper	HDR4X2	
J20	Connector	12V Power Input	20017WR-0410	
J21	Block	12V Input Terminal Block		
J22	Connector	Input Dc power Jack	KPJ-4S-S	KYCON
J23	Connector	Output Power Jumper	HDR3X1	
J24	Connector	Output Power	20017WR-0310	
J25	Jumper	Internal SMPS Power Selection	HDR3X1	
J26	Jumper	Dimming ADJ Selection	HDR3X1	
J100	Connector	LVDS Single Interface	12507WR-20	YEONHO

CN104	Connector	To OSD Board	20017WR-0710	YEONHO

J2: 12V DC power supply

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

J4: Analog RGB Input Connector

Pin No.	Symbol	Description
1	SCL	Serial Clock Line for DDC
2	SDA	Serial Data 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

J5: Panel Type Select Switch

*1~2 : Output Resolution

1.	2	Resolution
OFF	ON	1024x768 (XGA)
ON	ON	1280x768 (WXGA)
OFF	OFF	1366x768 (WXGA+)
ON	OFF	1280x1024 (SXGA)

3. LVDS MAP

ON : LVDS MAP2 (Shift) OFF : LVDS MAP1 (Normal)

4. Panel 6Bit or 8Bit

ON : 6Bit OFF : 8Bit

5. LVDS Channel Selection

ON : Single OFF : Dual

J7: DC power Input Connector

Pin No.	Symbol	Description
1,2	Vcc	24V
3,4	GND	Ground

J10, 16: Backlight Inverter connector

Pin No.	Symbol	Description
1	DIM-ADJ	DIM-adjustment analog dimming control signal * Make sure inverter specification
2	ON/OFF	Inverter digital ON(3.3V)/OFF(0V) signal
3,4,5,6	GND	Ground
7,8,9,10	B+	B+(24V or 12/18V)

J13: Internal SMPS Input Power Supply

Pin No.	Symbol	Description
1	NC	No Connection
2	GND	Ground
3,4	12V	12V Logic Power Supply
5,6	GND	Ground
7,8	5VP	5V Logic Power Supply
9	5VSB	5V Standby Power Supply
10,11	GND	Ground
12	PWR_ON	SMPS Power On Control Signal (3.3V(High) :On, 0.7V: Off)
13	INV_DIM	Inverter Dimming Control Signal
14	INV_CTRL	Inverter ON/OFF Control Signal

J14: On board +24V/+12V Inverter power select jumper

Pin No.	Symbol	Description
1	12V	Representative 12V/18V, depends on power supply from J2
2	B+	Inverter power selected by J14' Jumper
3	24V	24V from J22

J15: +24V Power Input Block Terminal

Pin No.	Symbol	Description
1	24V	24V
2	GND	Ground

J20: DC power Input Connector

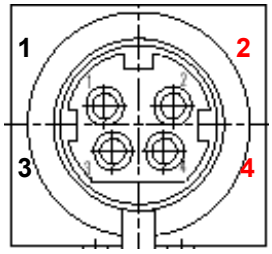
Pin No.	Symbol	Description
1,2	Vcc	12V
3,4	GND	Ground

J21: +12V Power Input Block Terminal

Pin No.	Symbol	Description
1	12V	12V
2	GND	Ground

J22: +24V DC power supply

Pin No.	*Symbol*	*Description*
1 3	*GND*	*Ground*
2 4	*Vcc*	*24V*



Ex: LSE0227B24130(4PIN) Li-shin Adapter / SLS0227B24118

J23: On board +12V/+5V logic power enable select jumper

Pin No.	Symbol	Description
1	12V	12V
2	Vcc	On board power enable
3	5V	5V

J24: Power out connector

Pin No.	Symbol	Description
1	Vcc	12V/5V from selected J23
2	GND	Ground
3	GND	Ground

CN104: OSD control connector

Pin No.	Symbol	Description
1	Vcc	+5V power for IR sensor
2	IRQ	Infrared rays signal line.
3	LED2	RED LED
4	LED1	GREEN LED
5	GND	Ground
6	KEY1	Up, Power
7	KEY0	Menu, Select, Down

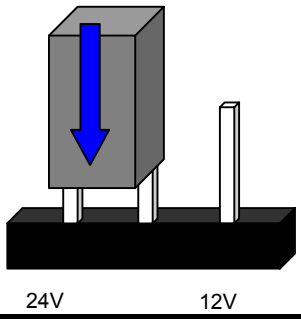
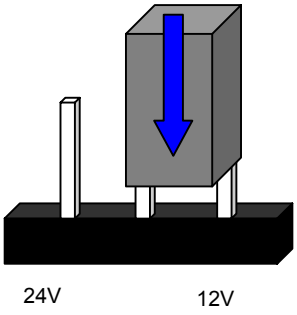
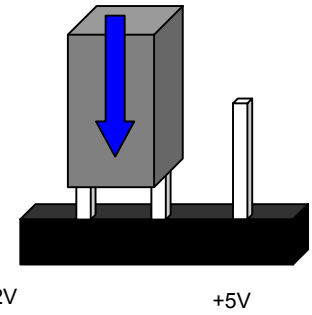
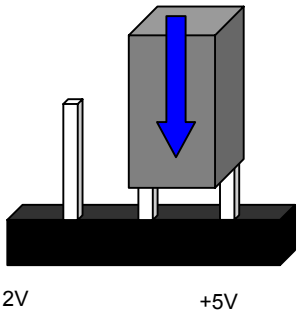
J11: LCD Interface connector for 2 Ch LVDS type

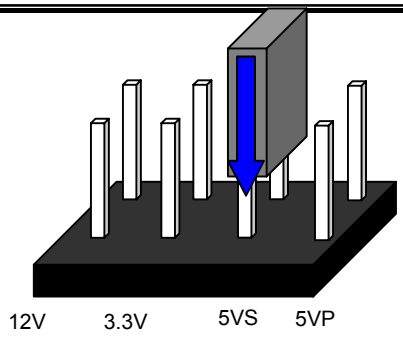
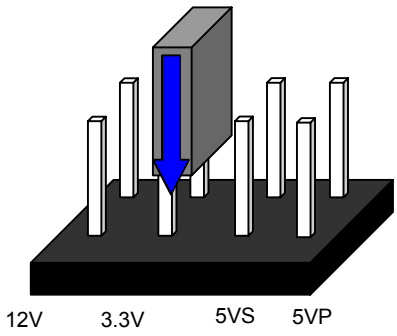
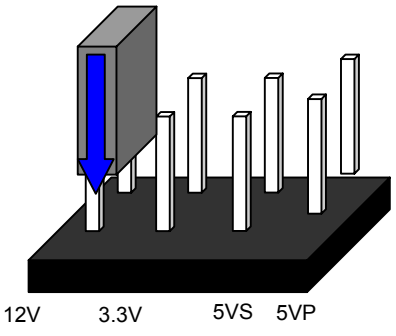
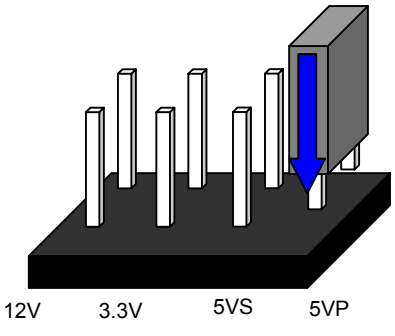
Pin No.	Symbol	Description
1	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
2	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
3	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
4	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
5	GND	Ground
6	SELLDS	LVDS DATA ORDER SELECT(Depends on Panel)/ No Connection
7	GND	Ground
8	Y3P-EVEN	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)

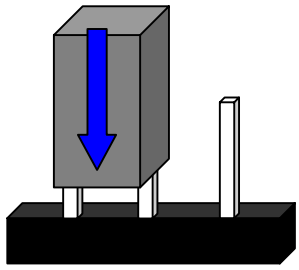
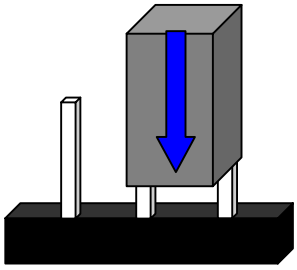
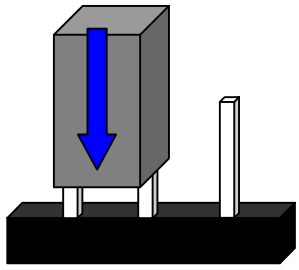
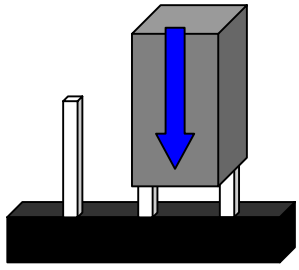
J100: LCD Interface connector for 1 Ch LVDS type

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/18V, 5V or 3.3V)
20	MOD_PWR	VDD For LCD Module (12V/18V, 5V or 3.3V)

Summary: jumpers setting

Reference	Description	Connector Type
J14	+24V inverter power enable	
	+12/18V inverter power enable	
J23	+12V Output Setting	
	+5V Output Setting	

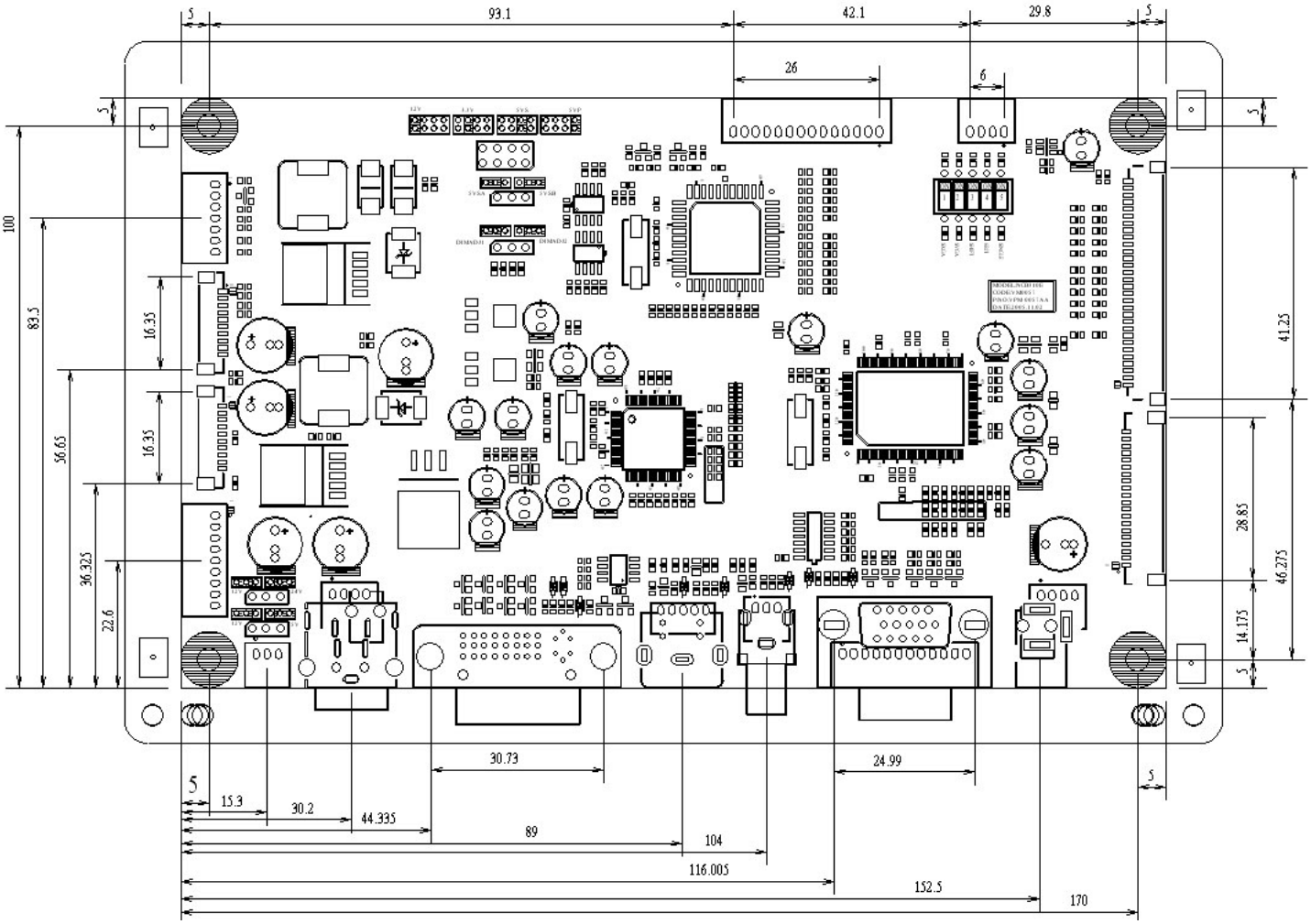
J19	5.0V panel power Only PSU Input **CAUTION**: Incorrect setting can damage panel	
	3.3V panel power Only PSU Input **CAUTION**: Incorrect setting can damage panel	
	12V panel power - PSU & Internal SMPS **CAUTION**: Incorrect setting can damage panel	
	5.0V panel power Only Internal SMPS **CAUTION**: Incorrect setting can damage panel	

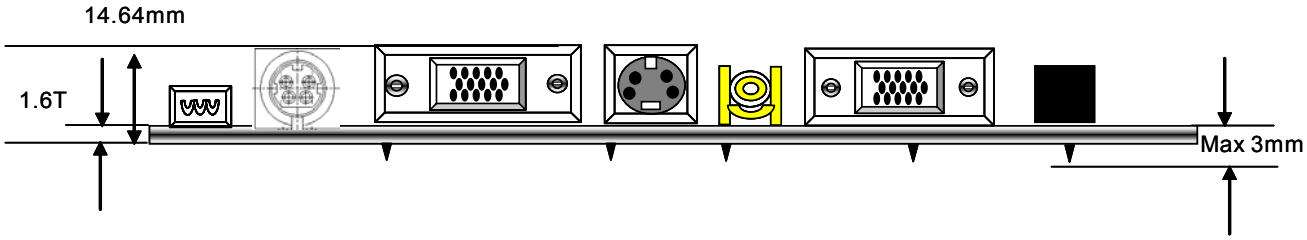
J25	LCD External PSU Input	 5VSA 5VSB
	LCD Internal SMPS Input	 5VSA 5VSB
J26	Inverter Dimming Setting 0V (For Monitor LCD)	 DIMADJ1 DIMADJ2
	Inverter Dimming Setting 3.3V (For LCD TV)	 DIMADJ1 DIMADJ2

* Power operation scheme:

- 24V power supply from J22, 12V power generated by DC/DC converter so all 12V as marked 12V
- 12V, 15V or 18V from J2, marked 12V is representative 12V, 15V or 18V as well as power supply

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: NCB310 controller 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 LM170E01-A5
1	LCD signal cable	SC-Panel Part No.-mm	SC-HT17E11-30
2	Inverter	Part no. of Manufacturer	AT0170SS
3	Inverter cable	IC-Panel Part No.-mm	IC-UGH053A-30
4	OSD Board	NOB005P	NOB005P
5	OSD Cable	OC-NID01-mm	OC-NID01-20

* **SC**: LCD **S**ignal **C**able
  IC: Inverter Interface cable
  OC: OSD Board cable
  mm : Cable length(unit: mm)

APPENDIX

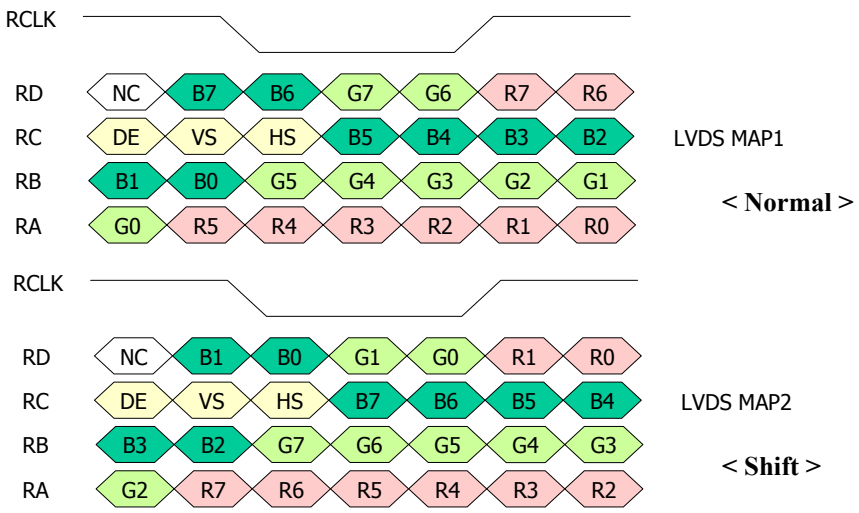
A. Target panel jumper setting

1~2 : Output Resolution Selection

1	2	Remarks
OFF	ON	1024 X 768
ON	ON	1280 X 768
OFF	OFF	1366 X 768
ON	OFF	1280 X 1024

#3. LVDS MAP

ON : LVDS MAP2 (Shift) OFF : LVDS MAP1 (Normal)



4 : Panel 6Bit or 8Bit

ON : 6Bit OFF : 8Bit

5 : LVDS Channel Selection

* ON : Single, OFF : Dual

A. Tested panel

This board can support various LCD panels, which have XGA, WXGA, WXGA+ 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 NCB310 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	SW1	SW2	SW3	SW4	SW5	J25	J26
1	LM170E01-A5	LG	+5VS	ED8N	ON	OFF	OFF	OFF	OFF	5VSA	DIM1
2	LM190E01-C4	LG	+12V	ED8N	ON	OFF	OFF	OFF	OFF	5VSA	DIM1
3	M170EN05	AU	+5VS	ED8N	ON	OFF	OFF	OFF	OFF	5VSA	DIM1
4	M170EN07	AU	+5VS	ED8N	ON	OFF	OFF	OFF	OFF	5VSA	DIM1
5	CLAA170EA07	CPT	+5VS	ED8N	ON	OFF	OFF	OFF	OFF	5VSA	DIM1
6	CLAA190EA03	CPT	+5VS	ED8N	ON	OFF	OFF	OFF	OFF	5VSA	DIM1
7	CLAA150XP01	CPT	+3.3V	XS8N	OFF	ON	OFF	OFF	ON	5VSA	DIM1
8	LM150X08	LG	+3.3V	XS8N	OFF	ON	OFF	OFF	ON	5VSA	DIM1
9	LC171W03	LG	+12V	WXS8N	ON	ON	OFF	OFF	ON	5VSA	DIM1
9	LC230W01	LG	+12V	WXS8N	ON	ON	OFF	OFF	ON	5VSA	DIM2
10	LC230W02	LG	+12V	WX+S8N	OFF	OFF	OFF	OFF	ON	5VSA	DIM2
11	LC320W01	LG	+12V	WX+S8N	OFF	OFF	OFF	OFF	ON	5VSA	DIM2
12	LC420W02	LG	+12V	WX+S8N	OFF	OFF	OFF	OFF	ON	5VSB	DIM2
13	M150XN07	AU	+3.3V	XS6S	OFF	ON	ON	ON	ON	5VSA	DIM1
14	G150XG01	AU	+3.3V	XS6S	OFF	ON	ON	ON	ON	5VSA	DIM1

* P/N : VPM-0057AA (F/W Ver 1.02)