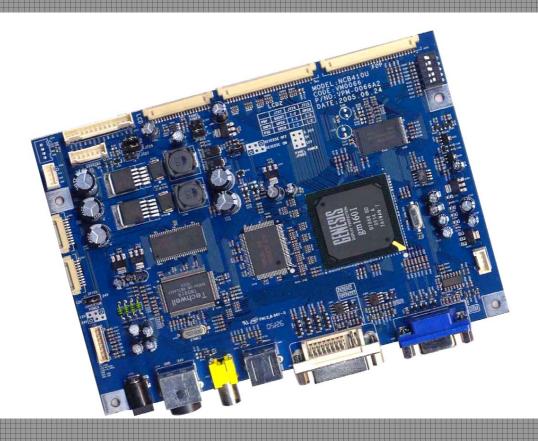


For LCD/PDP Monitor (PC, DVI, Video) Interface Controller
For 1024x768, 1280x768, 1366x768, 1280x1024, 1600x1200, 1680x1050, 1920x1080,
1920x1200 Resolutions TFT LCD/PDP

# DATA SHEET



**TFT LCD Monitor Control Board** 

NCB410U4-DS-AB(A4) (ROHS Compliant)

July 2006

1



## **CONTENT**

•	INTRODUCTION	 4
•	GENERAL SPECIFICATION	 5
•	SYSTEM DESIGN	 8
•	BLOCK DIAGRAM	 9
•	ASSEMBLY NOTES	 10
•	CONNECTION & OPERATION	 13
•	OSD	 14
•	OSD FUNCTION	 16
•	CONNECTOR, PINOUT & JUMPER	 21
•	CONTROLLER DIMENSIONS	 28
•	APPLICATION NOTES	 29
•	TROUBLESHOOTING	 30
•	APPLICABLE GRAPHIC MODE	 31
•	ACCESSORY	 32
•	APPENDIX	 33



# **Revision History**

No	Data	Revision	Page
1	Preliminary Release	A1	
2	OSD update Dimming jumper added	A2	
	Dimming jumper added		
3	Set ID & D-TV(HD) added	A3	
4	PDP Panel Setting changed LCD2	A4	
	Circuit adjusted FDC6330(2.3A) → IRF7404(3.2A)		



#### INTRODUCTION

Designed for LCD monitor and other flat panel display application the NCB410U4 controller provides an auto-input synchronization and easy to sue interface controller for:

- TFT (active matrix) LCD panels of 1024x768, 1280x768, 1366x768, 1280x1024, 1680x1050, 1600x1200, 1920x1080 and 1920x1200 resolutions.
- PDP panels of 852x480, 1024x768 and 1366x768 resolutions (Option)
- Computer video signals of VGA, SVGA, XGA, WXGA, SXGA and WSXGA+, UXGA, WUXGA standard.
- CVBS and SVHS Video signals of NTSC, PAL standard
- Components video signals of 480P: 59.94/60Hz, 756i: 50Hz, 756P: 50Hz, 720P: 59.94/60Hz, 1080i: 50/59.94/60Hz
- ▶ 3-D Comb filter and Noise Reduction adoption, 1 De-Interlacing Block
- Image Flip, All input supporting PIP/POP/PBP, Up-to 1080i HD component input supporting
- 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		
		WVGA Panel	852X480	NCB410WV4	Note 1)
		XGA Panel	1024X768	NCB410X4	
		WXGA Panel	1280X768	NCB410W4	
		WXGA Panel	1366X768	NCB410WZ4	
1	Model name	SXGA Panel	1280X1024	NCB410E4	
		WSXGA+ Panel	1680X1050	NCB410WE4	
		UXGA Panel	1600X1200	NCB410U4	
		HD Panel	1920X1080	NCB410WH4	
		WUXGA Panel	1920X1200	NCB410WU4	
2	LCD Module	SVGA, XGA, WX	GA, SXGA, WSXGA+, U	IXGA, HD, WUXGA	
3	Signal Input	Analog	RGB, TMDS(DVI). N	ITSC/PAL	
4	Resolution				
4	Support				
5	OSD Control	Menu, Sel, Le	eft, Right, Up, Down,	Source, Power	8 keys
5	Plug & Play				
6	Power Connector	Input	Type: IEC320 MALE	3Line Connector	
7.	Power Consumption	Supply Voltage	12Vdc/15Vdc/18Vdc or 24vdc		
	Consumption	Max Power	18W (Without Back Light Inverter)		
		Analog	DSUB 15P(R, G, B S	Separate H, V Sync)	
8	Signal Connector	Digital	DVI-D(T	MDS)	TMDS
5	Signal Confidence	Video	MINIDIN-4P(SVH	S), RCA(CVBS)	
		VIGCO	DSUB 15F	P(YPbPr)	

## **Notes 1) Depends On Panel Resolution**

- WV: WVGA (852X480)

- X: XGA (1024X768)

- W: WXGA (1280X768)

- WZ: WXGA (1366X768)

- E: SXGA (1280X1024)

- WS: WSXGA+ (1680x1050)

- U: UXGA (1600x1200)

WH: HD 1080i (1920x1080)WU: WUXGA (1920x1200)



## **ELECTRICAL SPECIFICATION**

Input characteristic

Input charae	Input characteristic					
Description	Signal	Unit	Min	Typical	Max	Remarks
Power In (24	IV)					
	Input	Vdc	22.8	24.0	25.2	
	Consumptio	Watt		TBD		Without INV
	n					
Power In (18	BV)					
	Input	Vdc	17.0	18.0	19.0	
	Consumptio	Watt		TBD		Without INV
	n					
Power In (15	5 <u>V)</u>				<del>,</del>	
	Input	Vdc	14.75	15.0	15.75	
	Consumptio	Watt		TBD		Without INV
	n					
Power In (12	2V)					
	Input	Vdc	11.4	12.0	12.6	
	Consumptio	Watt		TBD		Without INV
	n					
RGB Input						
	Analog RGB	Vp-p	0	0.7	-	
	Sync	Vdc	0	5	5.5	
	Н	KHz	31		80	Depends on Mode
	Frequency					
	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	
	С	Vp-p	0.6	0.8	1.0	



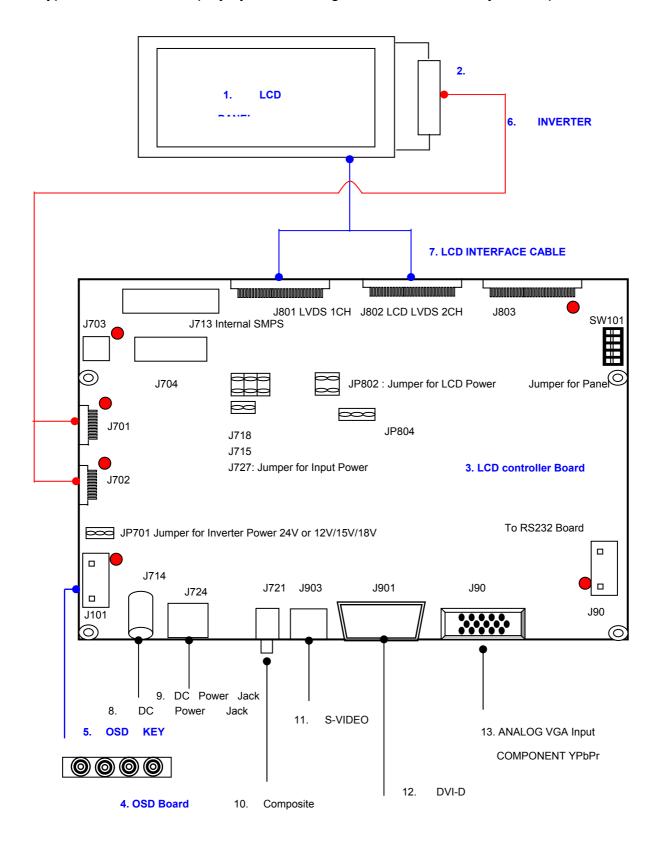
**Output Characteristics** 

Output Ch	Output Characteristics					
Descriptio	Signal	Unit	Min	Typical	Max	Remarks
n						
Panel Pow	er				T	
	LCD Power	Vdc	17.1	18	18.9	Jumper option
	(18V)					(Representative
	LCD Power	Vdc	14.25	15	15.75	12V)
	(15V)					
	LCD Power	Vdc	11.4	12	12.6	
	(12V)					
	LCD	Vdc	4.75	5	5.25	Jumper option
	Power(5V)					
	LCD	Vdc	3.13	3.3	3.46	Jumper option
	Power(3.3V)					
LVDS Inter	face					
	Differential	Vp-p	250	350	450	Different +/-
	output	(mV)				
Inverter Int	erface					
	Power out	Vdc	22.8	24	25.2	Depends on
			17.1	18	18.9	Power
			14.25	15	15.75	Input and Spec.
			11.4	12	12.6	
	On/Off control	V	0		3.3	L=off, H=on
	Brightness	V	3.3		0	Option
	control		0		3.3	Option
		Step	0		100	OSD Value



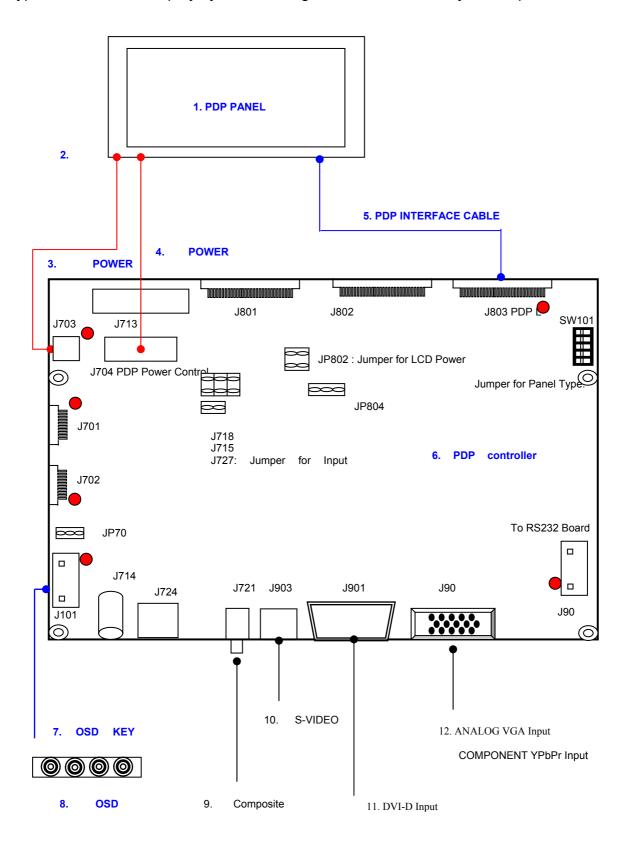
#### **SYSTEM DESIGN**

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



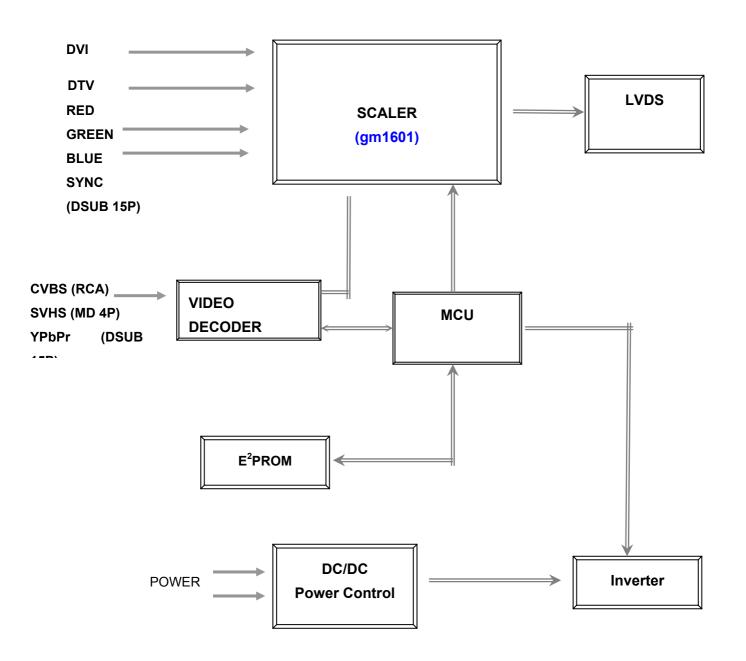


A typical PDP based display system utilizing this controller is likely to comprise the following.



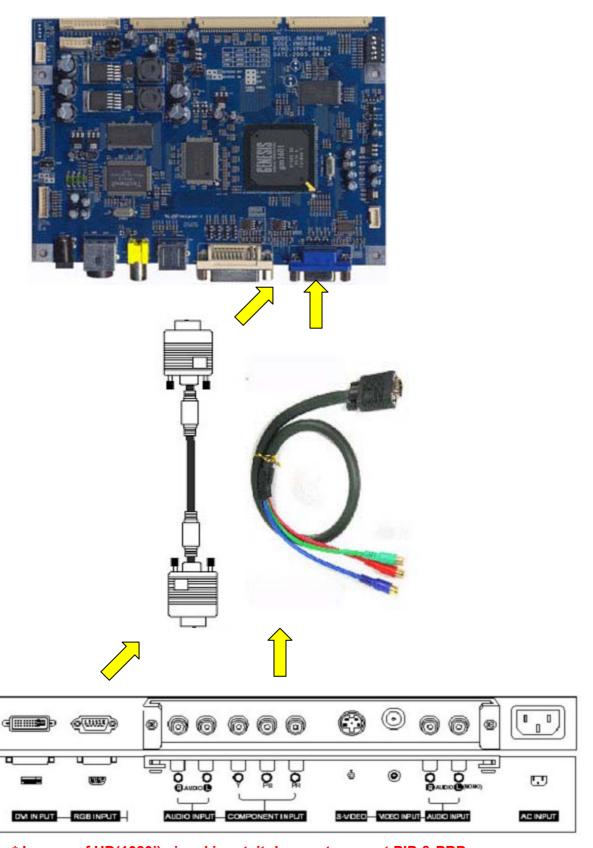


## **BLOCK DIAGRAM**





D TV Input ( Set top → RGB input : 1080i Support )
: RGB to RGB or Component to RGB



<sup>\*</sup> In case of HD(1080i) signal input, it does not support PIP & PBP...



#### **ASSEMBLY NOTES**

This controller is designed for monitors and custom display projects using TFT (active matrix) LCD panels of 1024x768, 1280x768, 1366x768, 1280x1024, 1680x1050, 1600x1200, 1920x1080 and 1920x1200 resolutions.

PDP panels of 852x480, 1024x768 and 1366x768 resolutions WVGA, SVGA, XGA, WXGA, SXGA, WSXGA+ and UXGA, WUXGA 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 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 SW101 on the right position following LCD panel specification. For selecting DC power level, put jumper marked J801, J802 on the right position. Supplied power level depends on LCD panel specification.

**PDP Panel:** This controller has LVDS interface logic on the Board for different kind of PDP panel. Due to the different signal timing and electrical characteristics from each PDP panel manufacturer, for selecting PDP interface type and resolution, put jumper marked SW101 on the right position following PDP panel specification. For selecting DC power level, put jumper marked J803 on the right position. Supplied power level depends on PDP 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 and PDP panel
- **3. LCD connector board**: Different makers and models of LCD panel require different panel signal connectors and different pin assignments.

**PDP connector board**: Different makers and models of PDP panel require different panel signal connectors and different pin assignments.

- 4. LVDS signal cables: In order to provide a clean signal it is recommended that LVDS 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:** Proper power 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 panel sample and full technical specifications for the LCD panel from the manufacturer are required to test for tuning up screen image. **INNODISPLAY** can provide engineering service for customers specific controller development.

Please contact INNODISPLAY. (sohn@innodisplay.co.kr)



#### 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.

## **Display System Settings**

The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 8 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.
- **PDP Panel & SMPS**: Connect the SMPS (Built- in the panel) to the connector of the PDP panel.
- **2. LVDS type panels**: Plug the signal cables direct to J801 of the controller board for 1 channel interface panel or J802 for 2 channel interface panel. Plug the other end of cables to the LCD connector board. J803 to the PDP.
- **3. Inverter & Controller:** Plug the inverter cable to J701, J702 of the controller board and another end to the connector on the inverter.
- **4. Function switch & Controller:** Plug the OSD switch mount cable to J101 of the controller board and another end to the OSD board.
- **5. Jumpers:** Check all jumpers JP701 (Inverter power Setting), J718/715/727 (Input power Setting) and JP802(Target Panel Power setting) are set correctly. Details referring the jumpers setting table (in the following section)
- **6. VGA cable & Controller:** Plug the VGA cable to the connector J902 of the controller board.
- **7. DIV-D Cable & Controller**: Plug the DVI-D Cable to the connector J901 of the controller board.
- **8. S/C Video Cable & Controller**: Plug S-Video Cable to the connector J903, C-Video Cable to the J721
- **9. Component Video Cable & Controller**: Plug Component Cable to the connector J902 (Convert DSUB 15P)
- **10. Power supply to Controller:** Plug the DC 12V/15V/18V power in to the connector J714 or DC 24V power in to the connector J724 of controller board.
- 11.SMPS & Controller: Plug the SMPS power in to the connector J713 of controller board
- **12. 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:



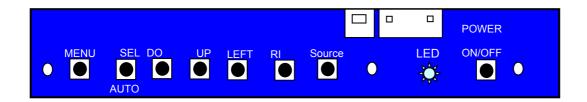
The controller has been designed to take a very wide range of input signals however to optimize the PC's graphic performance we recommend choosing 60Hz vertical refresh rate – this will not cause screen flicker.



#### **OSD Control Board**

The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 7 buttons OSD operation as a standard. The control functions defined on OSD operation are as below. (unit: mm)

#### Appearance



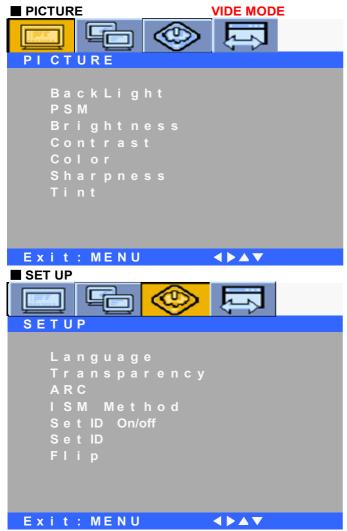


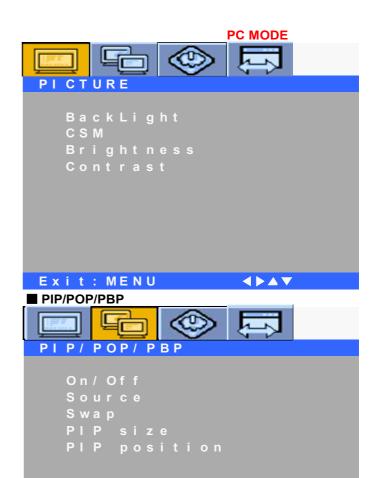
Button	Function	Status	HOT Key
LED	Indicates operation status	Green/ Red/ Amber	
POWER	Power on/off	On/Off	
MENU	Activate menu		
SELECT	Menu Select		No OSD, Auto Adjust
LEFT	Cursor control Left	First Activate Menu	
		Key	
RIGHT	Cursor control Right	First Activate Menu	
		Key	
DOWN	Cursor control Down	First Activate Menu	
		Key	
UP	Cursor control Up	First Activate Menu	
		Key	
SOURCE	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**





Exit: MENU

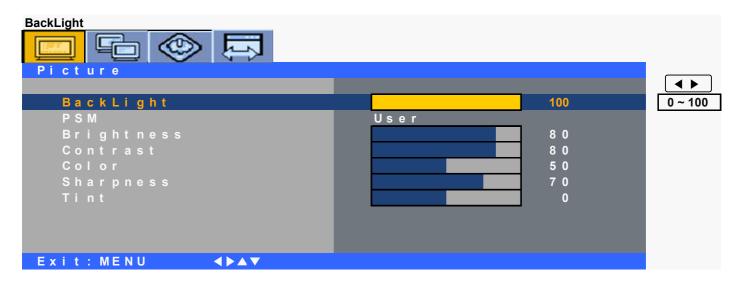
 $\blacktriangleleft \blacktriangleright \blacktriangle \blacktriangledown$ 

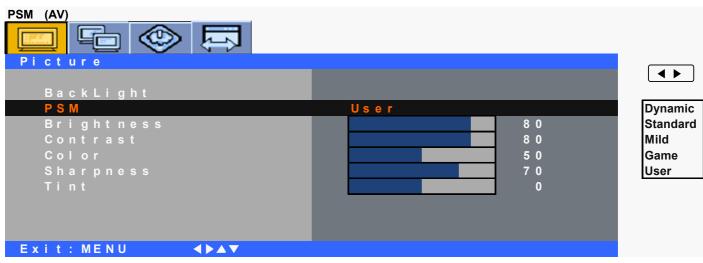


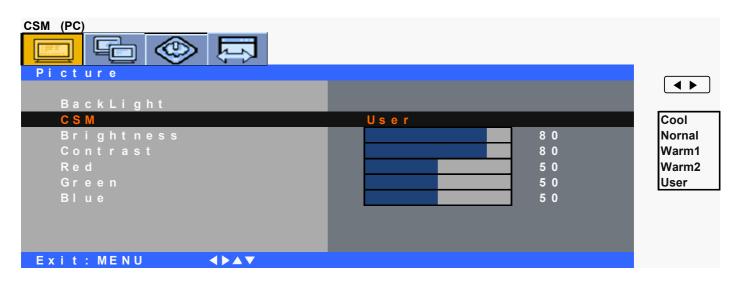
## ■ SCREEN



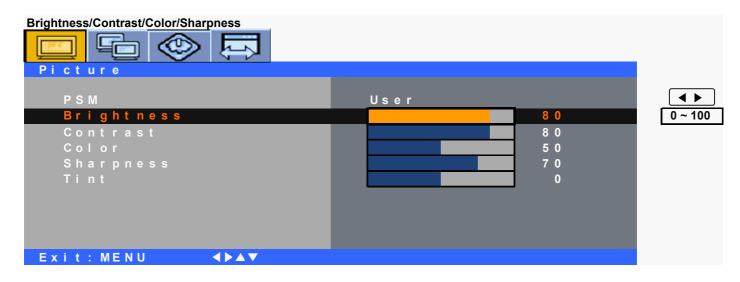


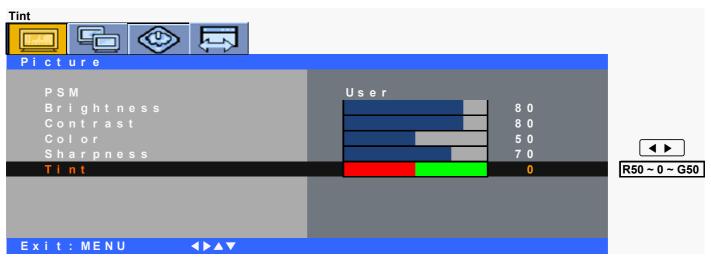










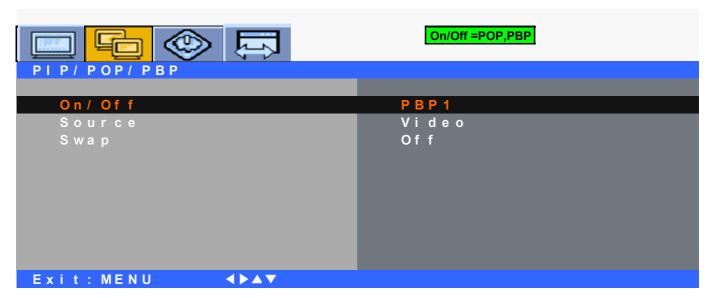


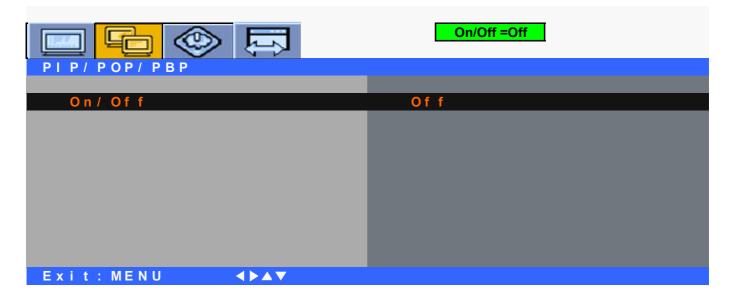
#### PIP / POP / PBP





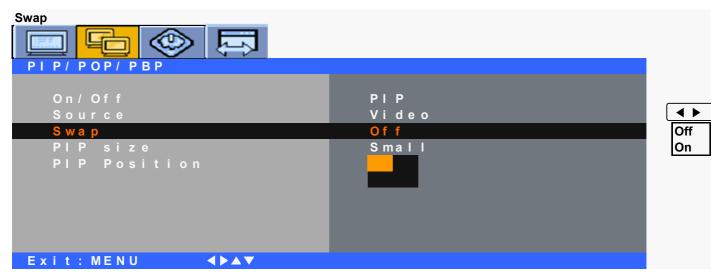


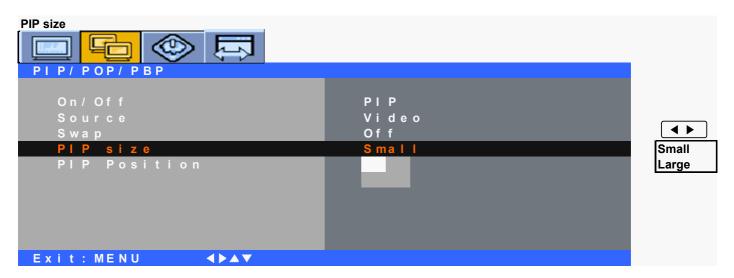




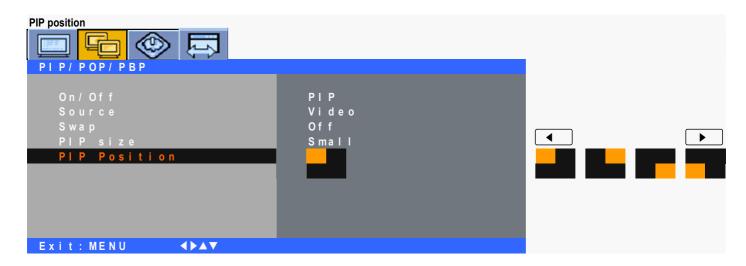




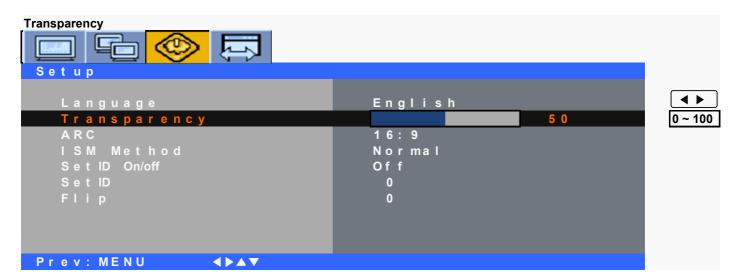


















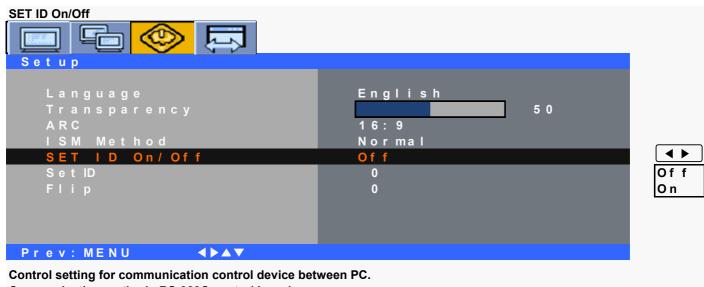


#### For PDP Application

Orbit: to move left/right/up/down every 5 seconds

White: to recover when after-image left on the display





Control setting for communication control device between PC.
Communication method: RS-323C control board
SET ID S/N support 0~99 ( Total 100)

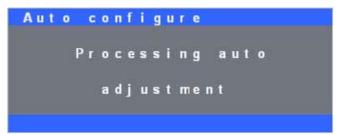




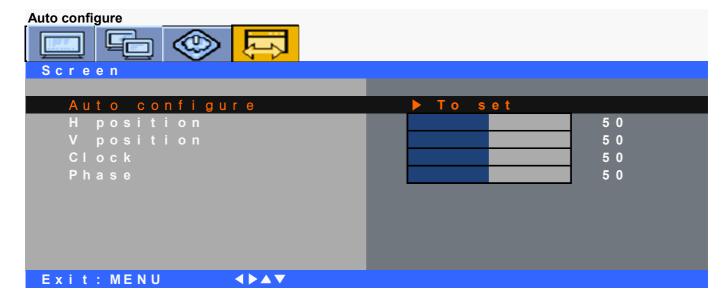


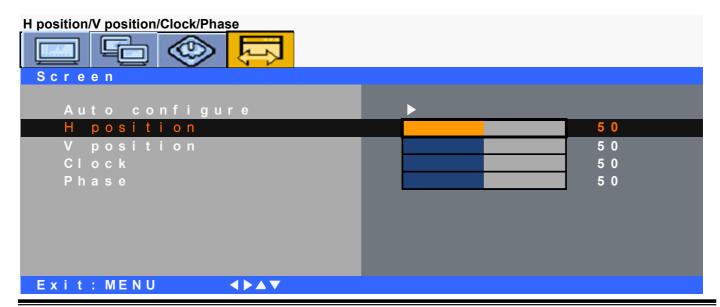
#### Screen













## **OSD GUI Control Table**

MAIN MENU	SUB MENU		CONTROL		
	PSM	Dynami	c/Standard/Mild/	VIDEO	
	1 5101	USER	Brightness, Co	ntrast, Color, Sharpness	VIDEO
PICTURE		CSM/Bi	rightness/Contrast		
	CSM	CSM	Normal/Warn	n1/ Warm2/User	PC
		User	Red/Green/Bl	ue	
PIP/POP/PBP	ON/OFF	ON	PIP	Source, Swap, PIP Size, PI	P Position
111/101/101	011/011	Oiv	POP, PBP	Source, Swap	
	Language	English,	/Deutsch/François	/Italiano/Espanol	
	Transparency	50 (1 ~100)			
		Auto/16	5:9/14:9/4:3	AV/TV : PAL	
SETUP	ARC	16:9/14:9/4:3		AV/TV:NTSC	
SEICI		4::3/16:9	4::3/16:9		PC
	ISM Method	Normal	, Orbit, White	•	
	SET ID	On/Off	(0~99)		
	Factory Reset	On/Off			
	Auto Configure	On/Off			
	H Position	50(0~1	.00)		
SCREEN	V Position	50(0~1	.00)		RGB PC
	Clock	50(0~1	.00)		
	Phase	50(0~1	.00)		



## **Operation Message**

#### **OUT OF FREQUENCY**

Input Signal is over the supporting range

OUT OF FREQUENCY

96.4kHz/ 90.0HZ

POWER MANAGEMENT 26SEC

#### **POWER SAVER MODE**

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

**POWER SAVER MODE** 

#### **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.

## SELF DIAGNOSTICS

**NO SIGNAL** 

**CHECK THE SIGNAL CABLE** 

#### **AUTO CONFIGURATION**

**Execute AUTO Function.** 

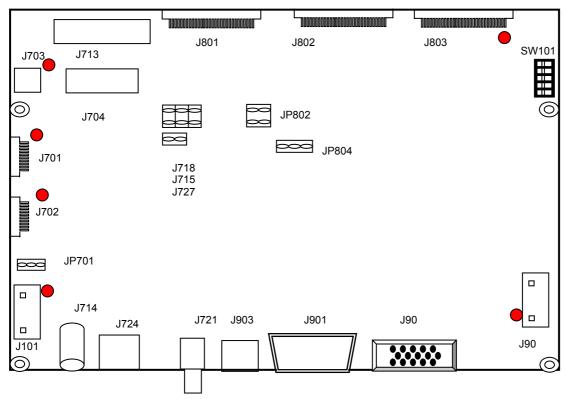
PROCESSING

AUTO CONFIGURATION



## **CONNECTOR, PINOUT & JUMPERS**

## The various connectors are:



**Summary** 

innary					
Referenc	Item	Description	Туре	Manufacture	
е					
SW101	Switch	Panel Type Select Switch	HDR5X2	-	
J101	Connector	To OSD Board	SMW200-0710	YEONHO	
JP701	Jumper	Inverter Power Jumper	HDR3X1	-	
J701,	Connector	Inverter Connector	12505WR-1090	YEONHO	
J702					
J703	Connector	24V Power Input	SMW200-0410	YEONHO	
J704	Connector	PDP Power Control	SMW200-0710	YEONHO	
J713	Connector	Internal SMPS Power Input	SMW200-1410	YEONHO	
J714	Jack	Input Dc power Jack	2.5Ø	-	
J715	Jumper	Internal SMPS Power	HDR3X1	-	
		Selection			
J718	Jumper	Internal SMPS Power	HDR3X1	-	
		Selection			
J727	Jumper	Internal SMPS Power	HDR2X1		
		Selection			



J721	Jack	C-video Input	RCA(Yellow)	-
J724	Connector	Input Dc power Jack	KPJ-4S-S	KYCON
JP802	Jumper	Panel Power Jumper	HDR2X3	-
JP804	Jumper	Output Power Jumper	HDR3X1	-

Referenc	Item	Description	Туре	Manufacture
е				
J801	Connector	LVDS Single Interface for LCD	12507WR-20	YEONHO
J802	Connector	LVDS Dual Interface for LCD	12507WR-30	YEONHO
J803	Connector	LVDS Single Interface for PDP	12507WR-30	YEONHO
J901	Connector	DVI-D Input(TMDS)	DVI-D24P	-
J902	Connector	Analog RGB Input	15P D-SUB	-
J903	Jack	S-video Input	MJ373(MINIDIN 4PIN)	-
J904	Connector	To RS232 Interface Board	SMW200-0410	YEONHO

## SW101: Panel Type Select Switch

#### J101: OSD control connector

<u> </u>					
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			

## JP701: On board +24V/+12V Inverter power select jumper

Pin No	Symbol	Description
I III INO.	Symbol	Description

<sup>\*</sup> See the appendix more information



# Data Sheet NCB410U4

1	12V	representative 12V/15V/18V, depends on power supply from J714	
2	B+	Inverter power selected by JP701' Jumper	
3	24V	24V from J724	



J701, J702: 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 12/15V/18V)	

J703: +24V DC power supply

Pin No.	Svmbol	Description
1.2	Vcc	24V
3.4	GND	Ground

J704: PDP power Control

	7.011.121   001101   00110101			
Pin No. Symbol Des		Description	I/O	Remarks
1	1 ACD-DET AC Power Detection		I	$5V\pm5\%$
2	PWR-ON	RLY On/Off Control Signal	0	$5V\pm5\%$
3	5VS	5V Standby Power	I	Max 1.2A
4	GND	Ground		
5	INV-CTRL	VS On Control Signal	0	
6	POD	5VD Power On Detection		
7	GND	Ground		



J713: Internal SMPS Power Input

Pin No.	Symbol Description		I/O	Remarks
1	NC	No Connection		
2	GND	Ground		
3,4	12V	12V Logic Power Supply	I	Max 1.0A
5,6	GND	Ground		
7,8	5VIN	5V Logic Power Supply	I	Max 1.0A
9	5VS	5V Standby Power Supply	I	
10,11	GND	Ground		
12	PWR_ON	SMPS Power On Control Signal	0	3.3V(High) :On
13	INV_DIM	Inverter Dimming Control Signal	0	
14	INV_CTRL	Inverter ON/OFF Control Signal	0	

J714: 12V DC power supply

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

## J715, J718, J727: Power Selection Jumper

J721: C-video Input Connector

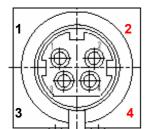
Pin No. Symbol		Description
1,3	Composite	CVBS input signal
2	GND	Ground

J724: +24V DC power supply

Pin No.	Svmbol	Description
1.3	GND	Ground
2.4	Vcc	24V

<sup>\*</sup> See the Summary: jumpers setting more information





## EX) LSE0227B24130(4PIN) Li-shin Adapter / SLS0227B24118

J801: 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)	

JP802 : LCD Panel Power Selection Jumper

\* See the Summary: jumpers setting more information

JP804 : Inverter Dimming Setting Jumper ( OFF : 0V High ON : 3.3V High )

\* See the Summary: jumpers setting more information



J802: 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)	
		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(B port)	
9	Y3M-EVEN	Negative(-) LVDS differential first 3 data(B port)	
10	YCP-EVEN	Positive(+) LVDS differential first Clock(B port)	
11	YCM-EVEN	Negative(-) LVDS differential first Clock(B port)	
12	Y2P-EVEN	Positive(+) LVDS differential first 2 data(B port)	
13	Y2M-EVEN	Negative(-) LVDS differential first 2 data(B port)	
14 GND Ground		Ground	
15	Y1P-EVEN	Positive(+) LVDS differential first 1 data(B port)	
16	Y1M-EVEN	Negative(-) LVDS differential first 1 data(B port)	
17	YOP-EVEN	Positive(+) LVDS differential first 0 data(B port)	
18	Y0M-EVEN	Negative(-) LVDS differential first 0 data(B port)	
19	GND	Ground	
20	Y3P-ODD	Positive(+) LVDS differential second 3 data(A port)	
21	Y3M-ODD	Negative(-) LVDS differential second 3 data(A port)	
22	YCP-ODD	Positive(+) LVDS differential second Clock(A port)	
23	YCM-ODD	Negative(-) LVDS differential second Clock(A port)	
24	Y2P-ODD	Positive(+) LVDS differential second 2 data(A port)	
25	Y2M-ODD	Negative(-) LVDS differential second 2 data(A port)	
26	GND	Ground	
27	Y1P-ODD	Positive(+) LVDS differential second 1 data(A port)	
28	Y1M-ODD	Negative(-) LVDS differential second 1 data(A port)	
29	YOP-ODD	Positive(+) LVDS differential second 0 data(A port)	
30	Y0M-ODD	Negative(-) LVDS differential second 0 data(A port)	

A/B port of LVDS cable must be changed above SXGA mode.



J803: PDP Interface connector for LVDS type

Pin No.	Symbol	Description		
1,2	NC	No Connection		
3,4	GND	Ground		
5	SLE	Serial Interface Enable Control Signal		
6	SCLK	Serial Interface Clock		
7	SDATA	Serial Interface Data		
8	DISPEN	Display Enable Control Signal		
9	GND	Ground		
10	RE+	LVDS E Channel Positive Signal		
11	RE-	LVDS E Channel Negative Signal		
12	GND	Ground		
13	RD+	LVDS D Channel Positive Signal		
14	RD-	LVDS D Channel Negative Signal		
15	GND	Ground		
16	RCLK+	LVDS Clock Channel Positive Signal		
17	RCLK-	LVDS Clock Channel Negative Signal		
18	GND	Ground		
19	RC+	LVDS C Channel Positive Signal		
20	RC-	LVDS C Channel Negative Signal		
21	GND	Ground		
22	RB+	LVDS B Channel Positive Signal		
23	RB-	LVDS B Channel Negative Signal		
24	GND	Ground		
25	RA+	LVDS A Channel Positive Signal		
26	RA-	LVDS A Channel Negative Signal		
27,28	GND	Ground		
29,30	NC	No Connection		



J901: DVI-D Input Connector

0301. D	ו-ט 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



# **J902: 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		

## J903: S-Video Input Jack

Pin No.	Symbol	Description		
1	GND	Ground		
2	GND	Ground		
3	C-in	CROMA signal input		
4	Y-in	LUMA signal input		
5	GND	Ground		
6	GND	Ground		
7	GND	Ground		

### J904: To RS232 Interface Board

Pin No.	Symbol	Description			
1	RXD	UART Rx			
2	TXD	UART TX			
3	GND	Ground			
4	5VS	+5V power for RS232 Device			



Summary: jumpers setting

Referenc e	Description	Connector Type
JP701	+12/15/18V inverter power enable	12V 24V
	+24V inverter power enable	12V 24V
JP804	Inverter Dimming Setting 0V (Reserve On)	3.3V 0V
	Inverter Dimming Setting 3.3V (Reserve Off)	3.3V OV

# \* Power operation scheme:

- 24V power supply from J724, 12V power generated by DC/DC converter so all 12V as marked 12V
- 12V, 15V or 18V from J714, marked 12V is representative 12V, 15V or 18V as well as power supply



Referenc	Description	Connector Type
e JP802	3.3V panel power  CAUTION: Incorrect setting can damage panel	3.3V 5V
	5V panel power  CAUTION: Incorrect setting can damage panel	3.3V 5V
	12V(15/18V) panel power  CAUTION: Incorrect setting can damage panel	3.3V 5V

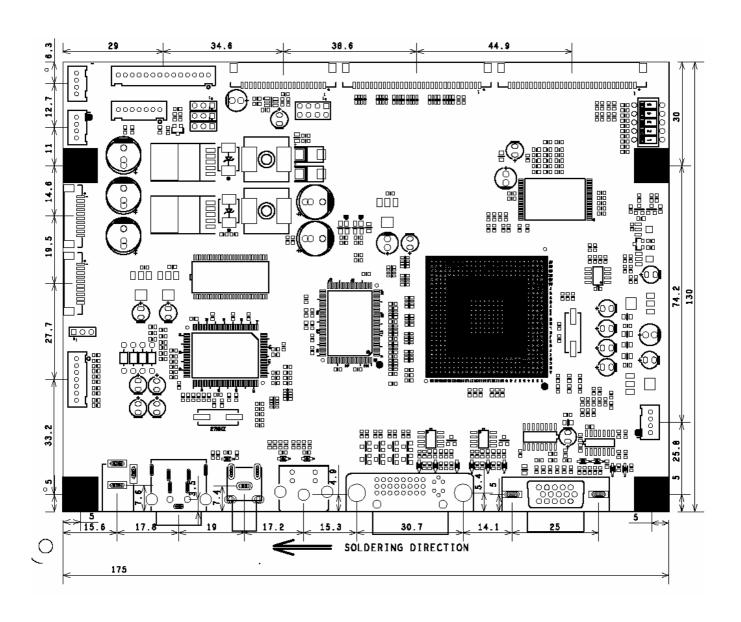


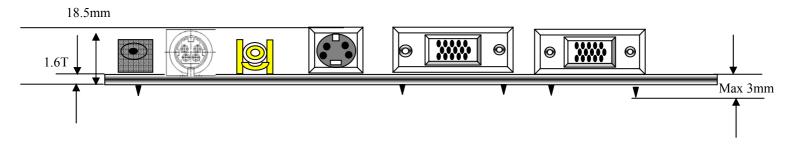
### **POWER SELECTION**

Target	J727	J718	J715	
PDP Internal SMPS	Short	1-2	Open	J718 J727
LCD Internal SMPS	Open	2-3	2-3	J718 J715
LCD External PSU	Open	1-2	1-2	J718 J715



#### **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:** NCB410 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	Pixel		Horizonta	al Timing	]		Vertica	l Timin	g
	Freq.	Syn	Freq.	Total	Activ	Syn	Freq.	Tota	Active
		С			е	С		I	
Mode		Pola				Pola			
		r				r			
	MHz		KHz	Pixel	Pixel		Hz	Line	Lind
640*350@70H	25.144	Р	31.43	800	640	N	70.00	449	350
Z			0				0		
640*400@70H	28.287	N	31.43	800	640	Р	70.00	449	400
Z			0				0		
720*400@	28.287	N	31.43	900	720	Р	70.00	449	400
70Hz			0				0		
640*480@60H	28.175	N	31.46	800	640	N	59.94	525	480
Z			9				0		
640*480@72H	31.500	N	37.86	832	640	N	72.80	520	480
Z			1				9		
640*480@75H	31.500	N	37.50	840	640	N	75.00	500	480
Z			0				0		
800*600@56	36.000	Р	35.15	1024	800	Р	56.25	625	600
Hz			6				0		
800*600@60H	40.000	Р	37.87	1056	800	Р	60.31	628	600
Z			9				7		
800*600@72H	50.000	Р	48.07	1040	800	Р	72.18	666	600
Z			7				8		
800*600@75H	49.500	Р	46.87	1056	800	Р	75.00	625	600
Z			5				0		
1024*768@60	65.000	N	48.36	1344	102	N	60.00	806	768
Hz			3		4		5		
1024*768@	75.000	N	56.47	1328	102	Р	70.07	806	768
70Hz			6		4		0		



# Data Sheet NCB410U4

1024*768@75	78.750	Р	60.02	1312	102	Р	75.03	800	768
Hz			3		4		0		
1280*720@60	74.500	Р	44.77	1664	128	Р	59.85	748	720
Hz			2		0		5		
1360*768@60	84.75	Р	47.72	1776	136	Р	59.79	798	768
Hz					0		9		
1280*1024@6	108.000	Р	63.98	1688	128	Р	60.02	106	1024
0Hz			1		0		0	6	
1280*1024@7	135.000	Р	79.97	1688	128	Р	75.03	106	1024
5Hz			6		0		5	6	
1600*1200@6	162,000	Р	75,00	2160	160	Р	60.00	125	1200
0Hz			0		0			0	

#### **#DTV Mode**

Component Video Input(Y/Pb/Pr)

- Except 480i, All Mode Support



### **ACCESSORY**

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

No.	Items	Part No.	Ex) LG Philips LC320W01
1	LCD signal cable	VSC-Panel Part Nomm	VSC-LC320W01-400mm
2	Inverter	Part no. of Manufacturer	
3	Inverter cable	VIC-Inverter Part No	VIC-LC320W01-300mm
		mm	
4	OSD Board	NOB008P	NOB008P
5	OSD Cable	VOC- OSD Part No -mm	VOC-NOB008P-300mm

<sup>\*</sup> mm : Cable length(unit: mm)



#### **APPENDIX**

## A. Target panel jumper setting (SW101)

## **☞ LCD1 (Normal Mode)**

#1~3: Output Resolution Selection

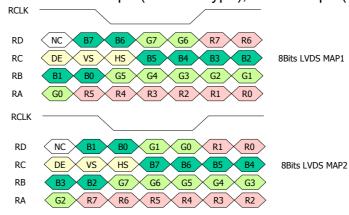
1	2	3	Remarks				
OFF	OFF	OFF	1024 X 768				
ON	OFF	OFF	1280 X 768				
OFF	ON	OFF	1366 X 768				
OFF	OFF	ON	1280 X 1024				
ON	ON	OFF	1680 X 1050				
ON	OFF	ON	1600 X 1200				
OFF	ON	ON	1920 X 1080				
ON	ON	ON	1920 X 1200				

## **☞ LCD2 (Special Mode)**

#1~3: Output Resolution Selection

- Output recolution colocion								
1	2	3	Remarks	Support Panel				
OFF	OFF	OFF	852 X 480					
ON	OFF	OFF	TBD					
OFF	ON	OFF	1366x768	LTA400W2-L1				
				80Mhz				
ON	ON	OFF	TBD					
OFF	OFF	ON	TBD					
ON	OFF	ON	TBD					
OFF	ON	ON	1600x1200	LTM213U6				
				130.25Mhz				
ON	ON	ON	1920x1200	LM230WU3 145Mhz				

# 4 : LVDS MAP Selection => ON : Map1 (Normal Type), OFF : Map2 (Shift Type)





#5: LCD/PDP Selection

\* ON: LCD1 (Normal Mode) OFF: LCD2 (Special Mode)

# **☞ PDP (Option)**

#1~3: Output Resolution Selection

1	2	3	Remarks
OFF	OFF	OFF	852 X 480
ON	OFF	OFF	1024 X 768
OFF	ON	OFF	1366 X 768

#4: LVDS MAP Selection => ON: Map1, OFF: Map2

#5: LCD/PDP Selection

\* ON:LCD OFF:PDP



### B. Tested panel

This board can support various LCD panels, which have XGA, WXGA, SXGA WSXGA+, UXGA and WUXGA 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 NCB410U board. And **INNODISPLAY** 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
1	LC151X01	LG	+5V	XN8S	OFF	OFF	OFF	ON	ON
2	LM170E01-A5	LG	+5V	SXN8D	OFF	OFF	ON	ON	ON
3	M170EN07	AU	+5V	SXN8D	OFF	OFF	ON	ON	ON
4	LM190E1-C4	LG	+12V	SXN8D	OFF	OFF	ON	ON	ON
5	LC230W01	LG	+12V	WXN8S	ON	ON	OFF	ON	ON
6	LC300W01	LG	+12V	WXS8S	ON	OFF	OFF	OFF	ON
7	LC230W02	LG	+12V	WXN8S	OFF	ON	OFF	ON	ON
8	T269XW01	AU	+12V	WXS8S	ON	OFF	OFF	OFF	ON
9	LM201U4	LG	+18V	UXN8D	ON	OFF	ON	ON	ON
10	LTM213U4	SEC	+5V	UXN8D	ON	OFF	ON	ON	ON
11	LTA260W2- L01	SEC	+5V	WXS8S	OFF	ON	OFF	OFF	ON
12	LC550W01	LG	+18V	WHXN8D	OFF	ON	ON	ON	ON
13	LM150X08	LG	+3.3V	XN8S	OFF	OFF	OFF	ON	ON
14	LC320W01	LG	+12V	WX+N8S	OFF	ON	OFF	ON	ON
15	LC370W01	LG	+12V	WX+N8S	OFF	ON	OFF	ON	ON
16	LC420W02	LG	+12V	WX+N8S	OFF	ON	OFF	ON	ON
17	M230UW01	AU	+12V	WUXN8D	ON	ON	ON	ON	ON
18	LTA400W2- LO1	SEC	+5V	WZS8S	OFF	ON	OFF	OFF	OFF
19	LTA400WT- L11	SEC	+5V						
20	LTN104S2-L01								
21	LTA320W2- L03	SEC	+5V						
22	LTA460WS- L03	SEC	+5V						



23	LQ231U1LW0 1	SHARP	+5V		ON	OFF	ON	ON	ON
24	LC470WU1- SL02	LG	+12V						
	T315XW01	AU	+5V						
	LM230WU3	LG	+12V	WUN8D	ON	ON	ON	ON	OFF
	LTM213U6	SEC	+5V	US8D	OFF	ON	ON	OFF	OFF

Note1 : Abbreviated word : U<sup>®</sup>S<sup>®</sup>6<sup>©</sup>S<sup>®</sup>

**(b)** S/N : S(SFT) SHIFT, N(NOR) NORMAL

© 6/8 : 6 6BITS 8 8BITS

(d) S/D : SINGLE PORT, D DUAL PORT