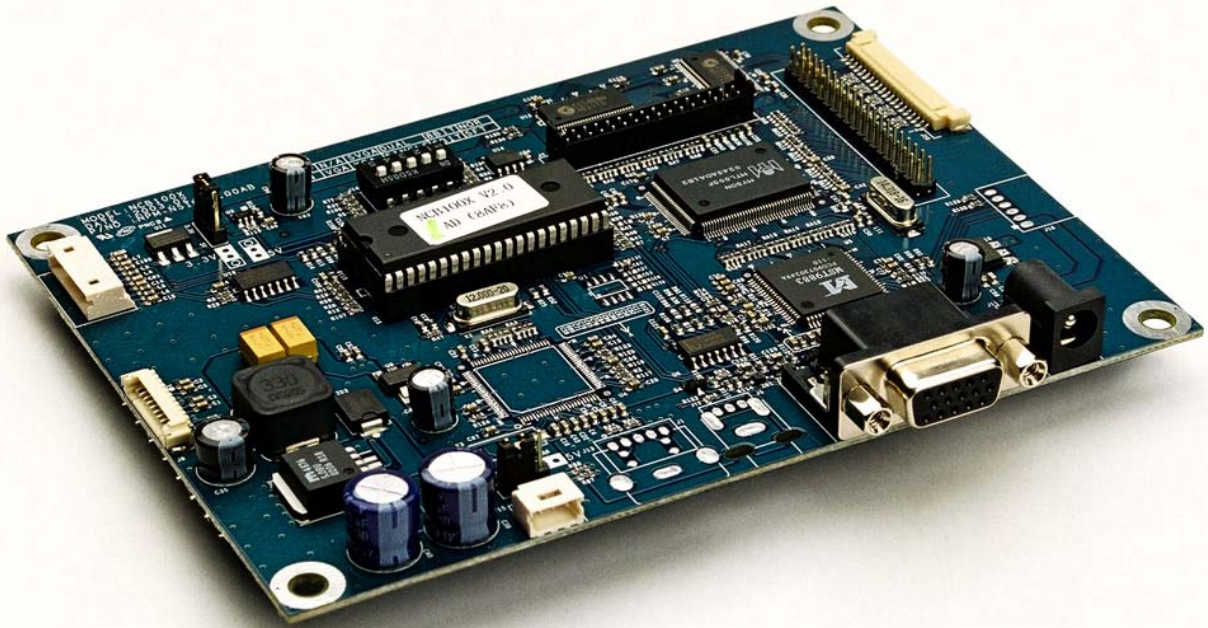


**FOR LCD MONITOR (PC Only) Interface Controller  
For 640X480, 800X600, 1024X768 Resolutions TFT LCD**



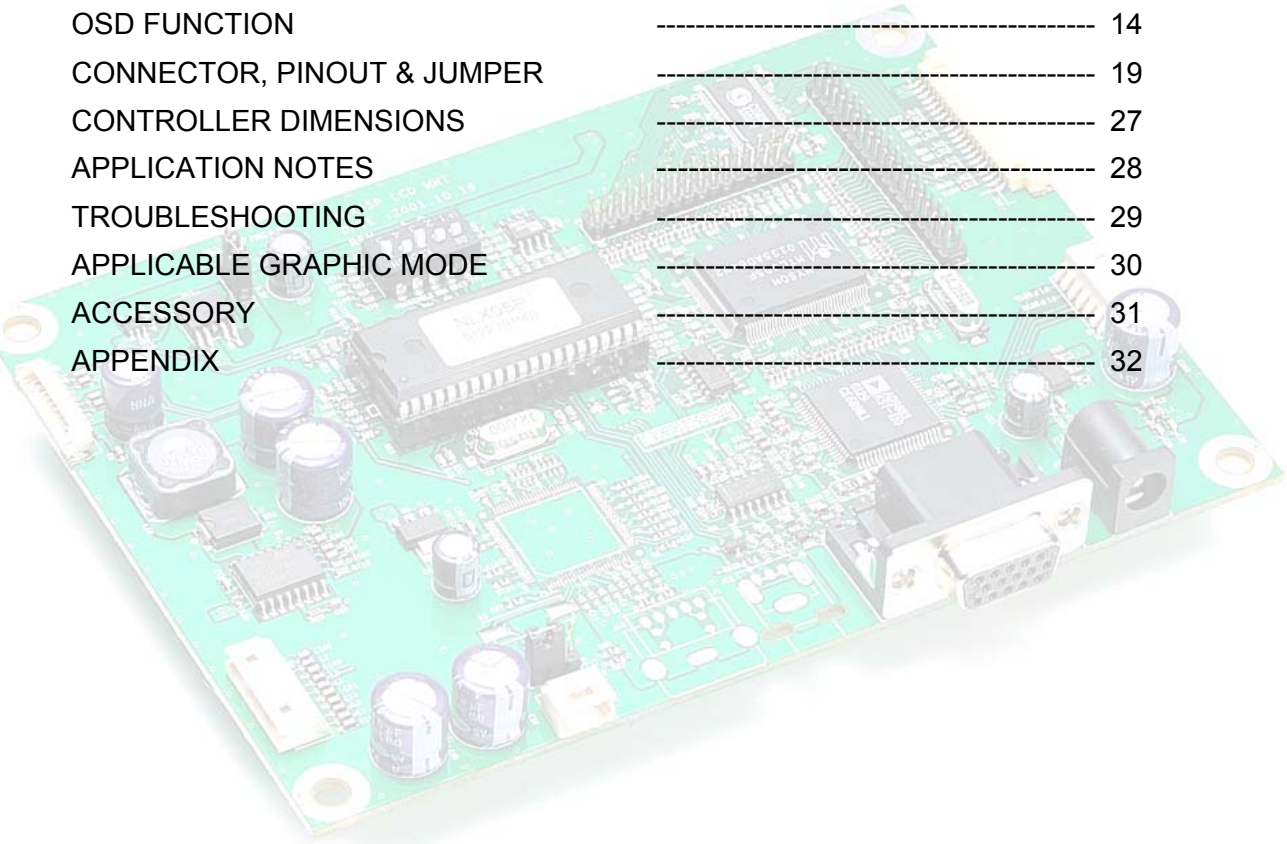
**TFT LCD Monitor Control Board**

**NCB100X1-DS-AB**

**November 2003**

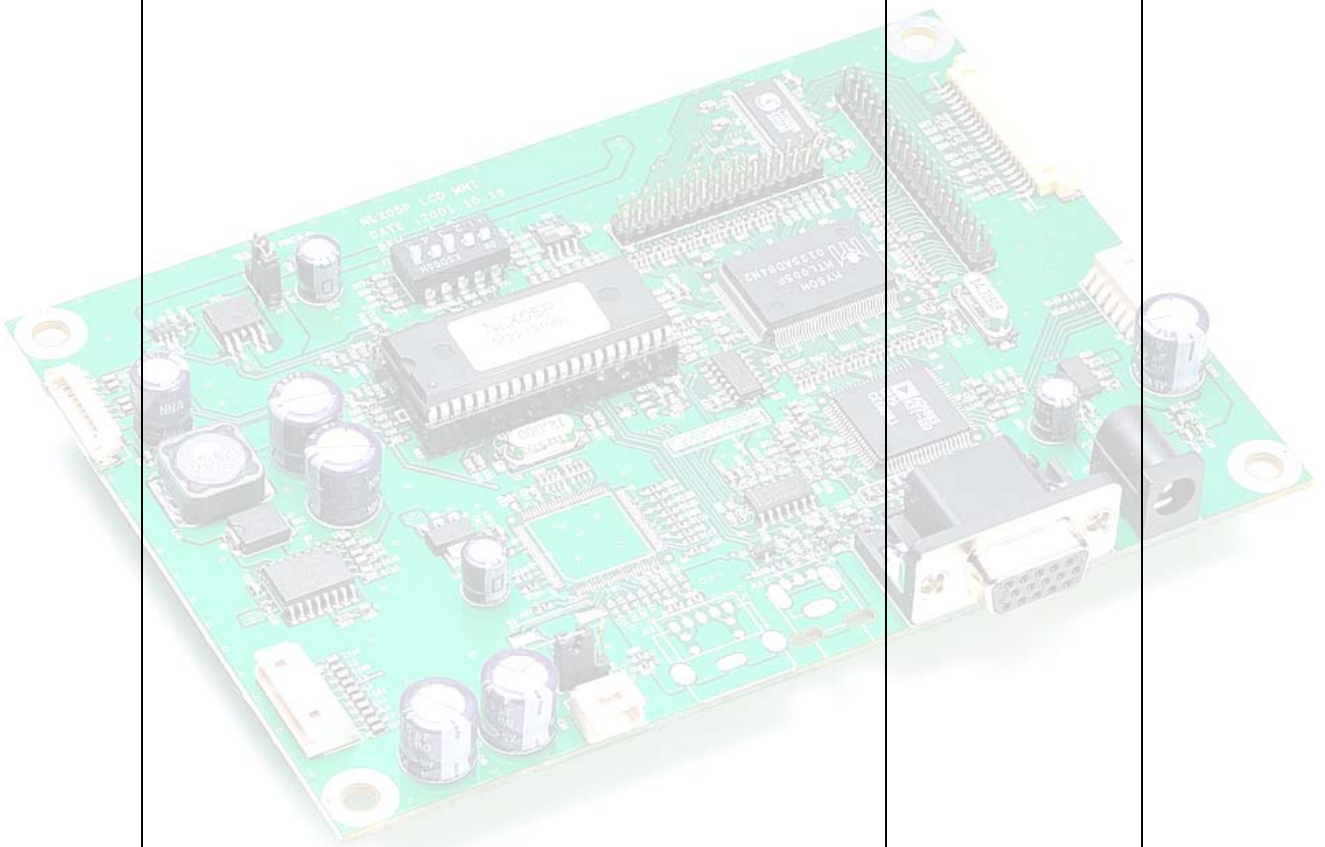
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**History (revision date)**

| No | Description                              | Revision | Page |
|----|--|----------|------|
| 1  | 2003. 04 Release Data Sheet for NCB100X1 | AA       |      |
| 2  | 2003. 05 Update Data Sheet for NCB100X1  | AB       | 6, 7 |

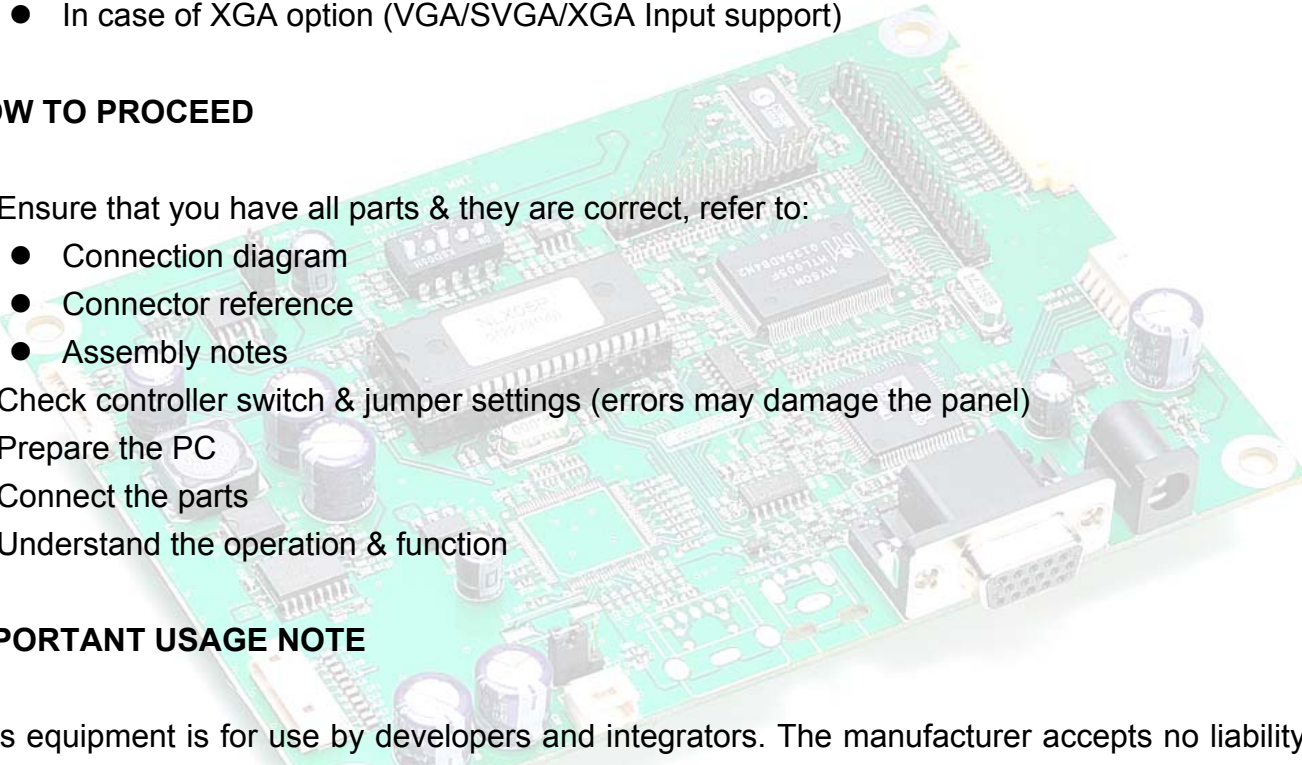


## INTRODUCTION

Designed for LCD monitor and other flat panel display application the NCB100X1-R controller provides an auto-input synchronization and easy to use interface controller for:

- ▶ TFT (active matrix) LCD panels of 1024x768, 800x600 and 640x480 resolutions
- ▶ Computer video signals of VGA, SVGA, XGA standard.
- ▶ Input Signal Support
  - All VESA standard
  - In case of VGA option (VGA Input support)
  - In case of SVGA option (VGA/SVGA Input support)
  - In case of XGA option (VGA/SVGA/XGA Input support)

## 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
  - ▶ Connect the parts
  - ▶ Understand the operation & function

## 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 VGA panel                        | NCB100V3                            |                         |
|     |                    | For SVGA panel                       | NCB100S3                            |                         |
|     |                    | For XGA Panel                        | NCB100X3                            |                         |
| 2   | LCD Module         | VGA~XGA TFT LCD (TTL/LVDS Interface) |                                     |                         |
| 3   | Signal Input       | Analog RGB Input                     |                                     |                         |
| 4   | Resolution Support | H: 31 ~ 61kHz                        |                                     |                         |
|     |                    | V: 55 ~ 76Hz                         |                                     |                         |
| 5   | OSD Control        | Menu, Select (AUTO), Up, Down, 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                               | cf) Back Light Inverter |
|     |                    | Max Power                            | 30W (including Back Light Inverter) |                         |
| 8   | Signal Connector   | Analog                               | 15Pin D-SUB Connector               |                         |

**ELECTRICAL SPECIFICATION**

**Input characteristic**

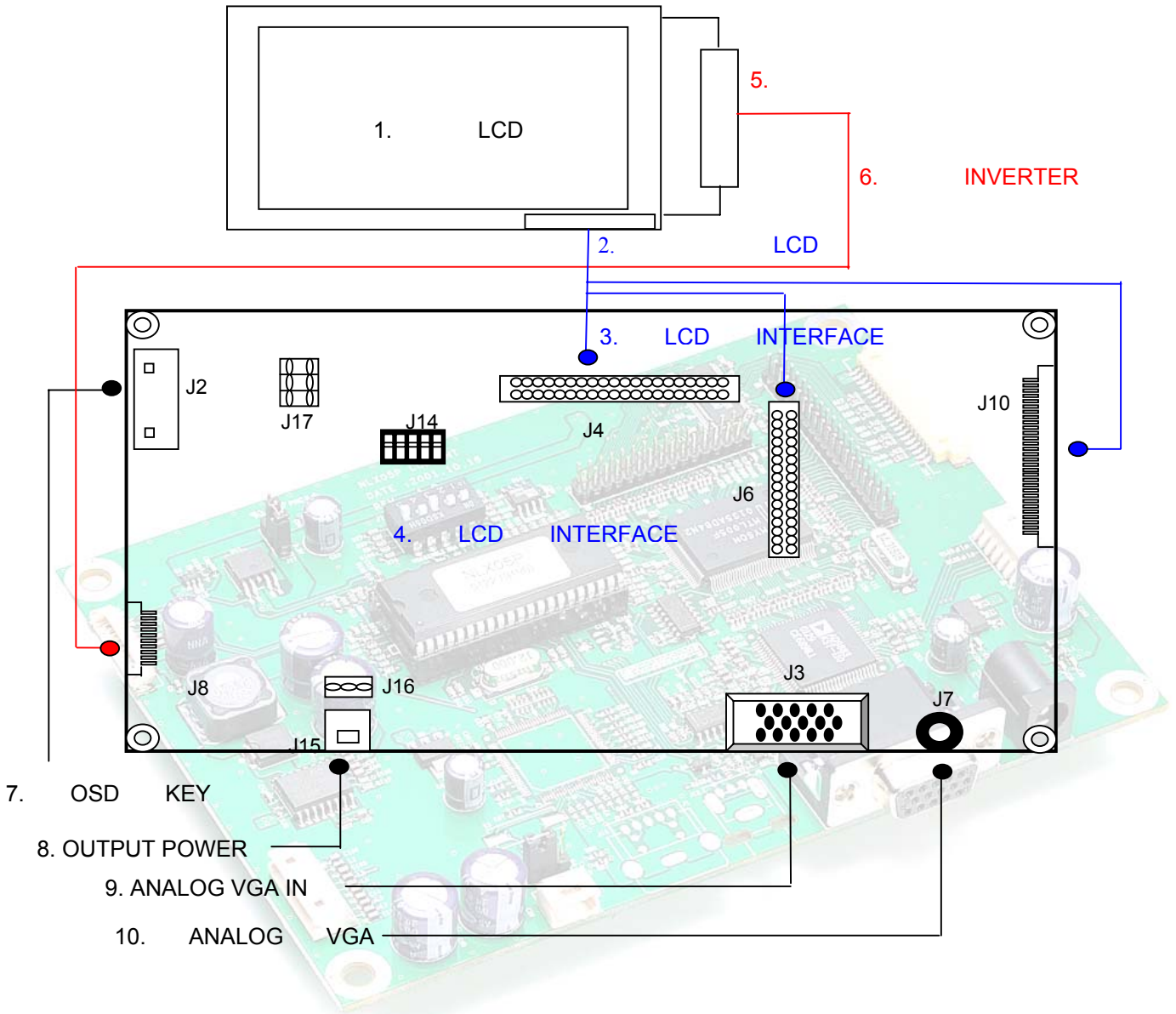
| Description      | Signal      | Unit | Min  | Typical | Max  | Remarks         |
|------------------|-------------|------|------|---------|------|-----------------|
| Power In (12Vdc) |             |      |      |         |      |                 |
|                  | Input       | Vdc  | 11.4 | 12      | 12.6 |                 |
|                  | Consumption | Watt |      | 5       |      | Board only      |
| RGB Input        |             |      |      |         |      |                 |
|                  | Analog RGB  | Vp-p | 0    |         | 0.7  |                 |
|                  | Sync        | Vdc  | 0    |         | 5.5  |                 |
|                  | H Frequency | KHz  | 31   |         | 61   | Depends on Mode |
|                  | V Frequency | Hz   | 55   | 60      | 75   |                 |

**Output Characteristics**

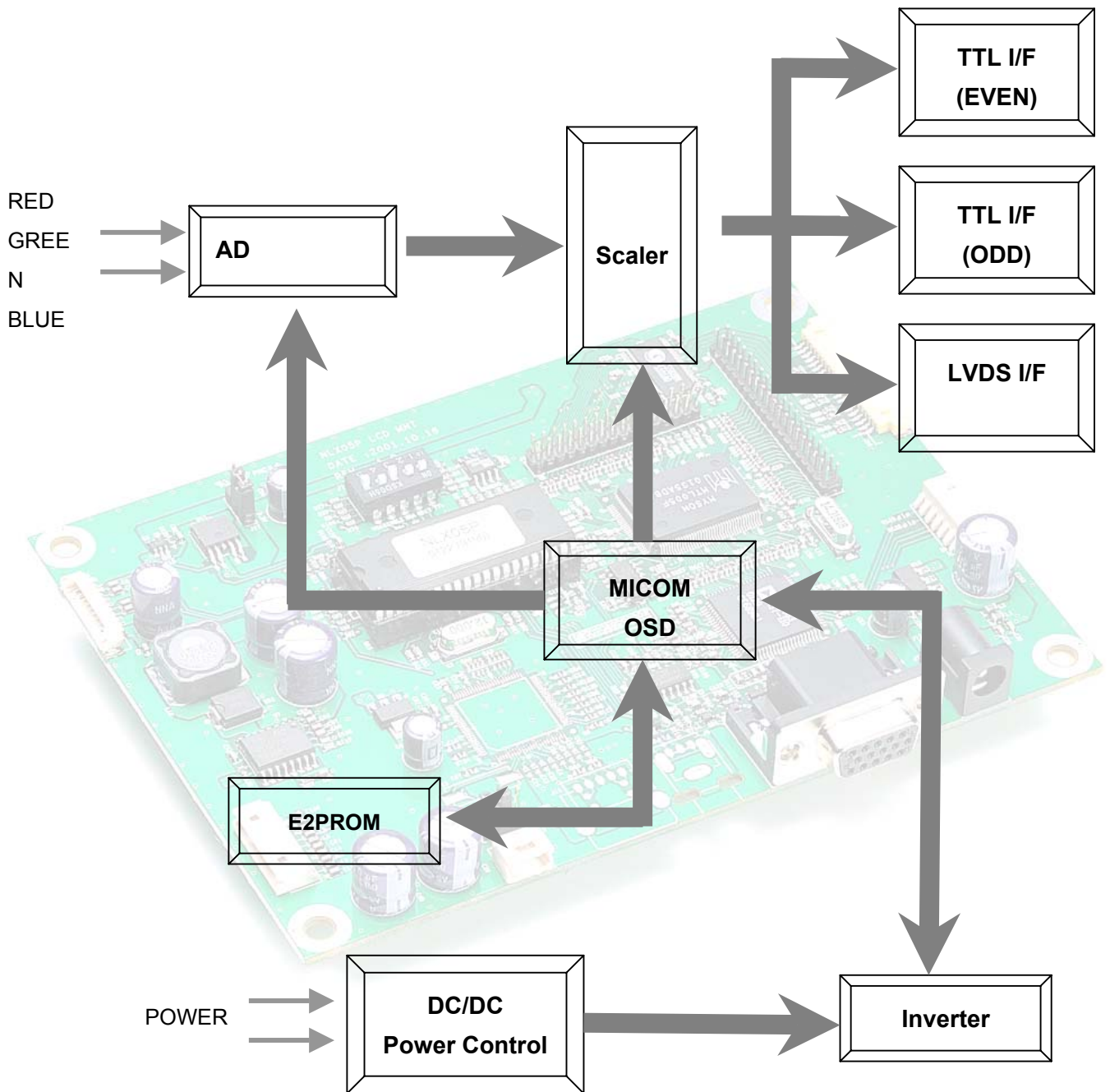
| Description        | Signal              | Unit  | Min  | Typical | Max  | Remarks         |
|--------------------|---------------------|-------|------|---------|------|-----------------|
| TTL LCD Interface  |                     |       |      |         |      |                 |
|                    | RGB Data            | Vp-p  |      | 3.3     |      |                 |
|                    | DE, Sync, Clock     | Vp-p  |      | 3.3     |      |                 |
|                    | Clock Freq.         | MHZ   | 25   |         | 80   | Depends on Mode |
|                    | 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 | MVp-p | 250  | 350     | 450  |                 |
|                    | LCD Power (5v)      | Vp-p  | 4.5  | 5       | 5.5  |                 |
|                    | LCD Power (3.3v)    | Vp-p  | 3.16 | 3.3     | 3.5  |                 |
| Inverter Interface |                     |       |      |         |      |                 |
|                    | Power out           | Vdc   | 11.5 | 12      | 12.5 |                 |
|                    | On/Off control      | Vp-p  | 0    |         | 5.25 | L=off, H=on     |
|                    | Bright control      | Vp-p  | 3.3V |         | 0    |                 |
|                    |                     |       | 0    |         | 100  | OSD Brightness  |

**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 project using 1024x768, resolution TFT LCD panels with a VGA, SVGA, XGA 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 the various connectors, mounting holes and general layout of the controller. As many 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 12V, 5V or 3.3V TTL interface and 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 J14 on the right position following LCD panel specification. For selecting DC power level, put jumper marked J17 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 to provide a clean signal it is recommended that LCD signal cables should not be longer than 30cm. If loose wire cabling is utilized these can be a made into a harness with cable ties. You should take care when placing 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 has an inverter in it. 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 video 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.

**12. Setup for operation**

Once the circuit has been connected, a setup procedure for optimal 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, but 6 - button operation can be supported with a different firmware if it is required. 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 specifications 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. **TTL type panels:** Plug the signal cable direct to J4 (for Single 6bits, or Single (Dual first) higher 6bit, J6 (8bit dual (J6) and 8bits single lower 2bit) on the controller board. Plug the other end of cables to the LCD connector board (if connector board is required, otherwise the signal can be directly plugged to the LCD panel connector).  
**LVDS type panels:** Plug the signal cables direct to J10 on the controller board. Plug the other end of cable to the LCD connector board (if connector board is required, otherwise the signal can be direct plug to the LCD panel connector).
3. **Inverter & Controller:** Plug the inverter cable to J8 on the controller board and the other end to the connector on the inverter.
4. **Function switch & Controller:** Plug the OSD switch mount cable to J2 on the controller board and another end to the OSD board.
5. **Jumpers & Switch:** Check all jumpers {J19 (External power Setting), J17 (Target panel power is set)} and switches (J14, Target panel selection) are set correctly. Details about the jumpers and switches setting table are in the following section
6. **VGA cable & Controller:** Plug the VGA cable to the connector J3 on the controller board.
7. **Power supply & Controller:** Plug the DC 12V power in to the connector J7.
8. **Power on:** Switch on the controller board and panel by using the OSD switch mount.

### General:

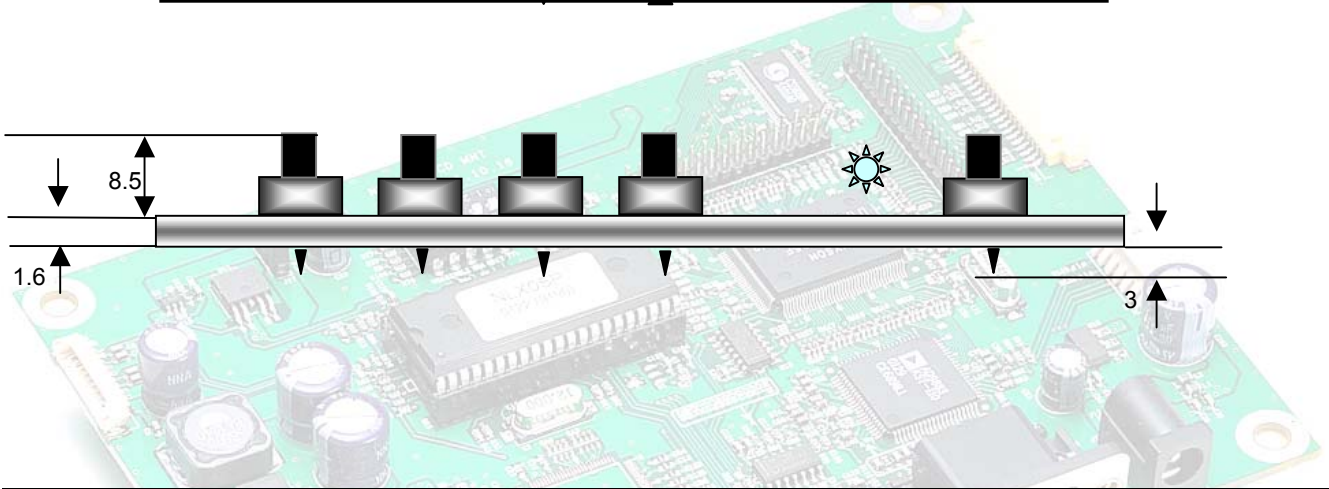
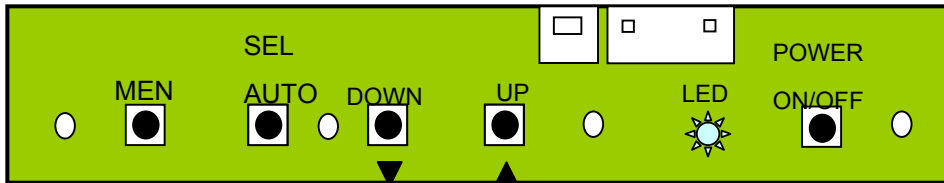
- If you use supplied cables & accessories, ensure that they are correct for the model of the panel and the controller.
- If you make your own cables & connectors refer carefully to both the panel & inverter specifications and the section in this manual, “Connectors, Pin outs & Jumpers” to ensure the 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 graphics performance. We recommend you to choose 60Hz vertical refresh rate – this will not cause screen flicker.

**OSD**

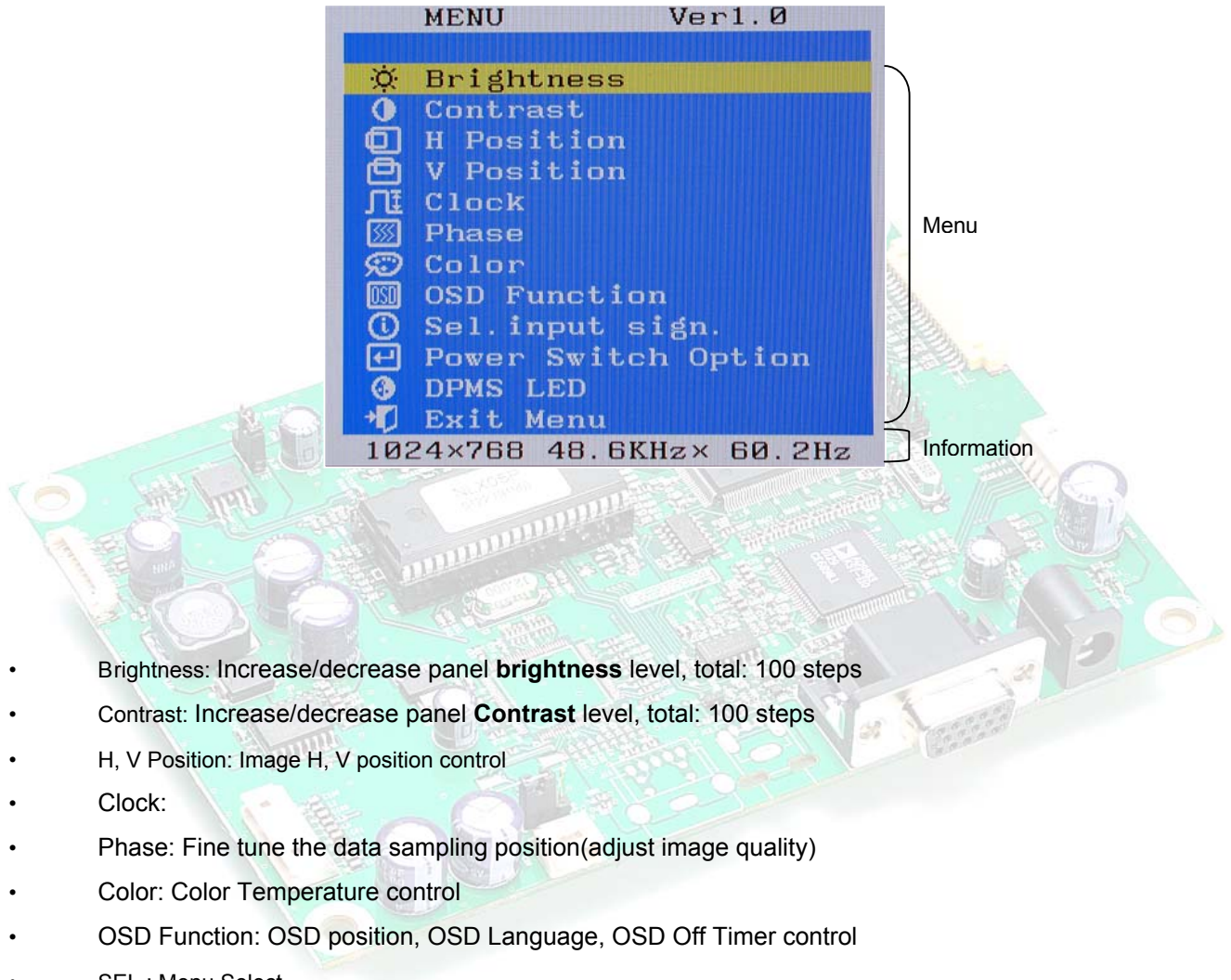
The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 4 buttons OSD operation as a standard. The control functions defined on OSD operation are as below. (unit: mm)



| 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/<br>Amber |              |
| DOWN, UP<br>▼ ▲ | Cursor control<br>Increment / Decrement value |                      |              |

The chosen OSD settings will be stored in memory. The OSD menu can be cleared from the screen by moving the selection bar to the **EXIT MENU** icon pressing the **SEL** button, otherwise it will automatically be 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
- Clock:
- Phase: Fine tune the data sampling position(adjust image quality)
- Color: Color Temperature control
- OSD Function: OSD position, OSD Language, OSD Off Timer control
- SEL : Menu Select
- Power Switch Option: Select Power Switch on/off.
- DPMS LED: When the DPMS mode select LED color how to Amber or Off
- Information: Displays current video mode and frequency

**OSD FUNCTION**

**Brightness**

Procedure Menu > (Yellow bar Display) > Select

▼ Dark                      ▲ Bright

The Brightness OSD menu features a blue header with the text 'Brightness' and a slider bar below it. The slider is currently set to 100, with '100' displayed at the right end. Below the slider are minus and plus signs, and the number '50' is centered. To the right of the slider are two preview windows. The first window, labeled 'Dark' with a downward arrow, shows a dark gray square. The second window, labeled 'Bright' with an upward arrow, shows a light gray square.

**Contrast**

Procedure Menu > (Yellow bar Display) > Select

▼ Distinct                      ▲ Vague

The Contrast OSD menu features a blue header with the text 'Contrast' and a slider bar below it. The slider is currently set to 100, with '100' displayed at the right end. Below the slider are minus and plus signs, and the number '50' is centered. To the right of the slider are two preview windows. The first window, labeled 'Distinct' with a downward arrow, shows a colorful puzzle piece on a cyan background. The second window, labeled 'Vague' with an upward arrow, shows the same puzzle piece but with a faded, less distinct appearance.

**H Position**

Procedure Menu > ▼ ▼ (Yellow bar Display) > Select (H

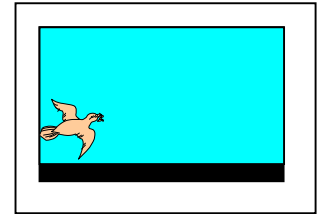
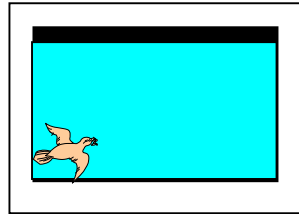
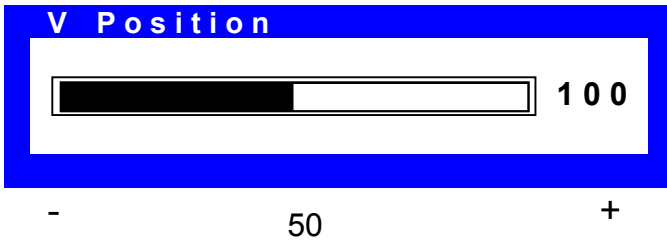
▼                                      ▲

The H Position OSD menu features a blue header with the text 'H Position' and a slider bar below it. The slider is currently set to 100, with '100' displayed at the right end. Below the slider are minus and plus signs, and the number '50' is centered. To the right of the slider are two preview windows. The first window, labeled with a downward arrow, shows a bird icon on a cyan background with a black vertical bar on the right side. The second window, labeled with an upward arrow, shows the same bird icon and cyan background with a black vertical bar on the left side.

**V Position**

**Procedure**

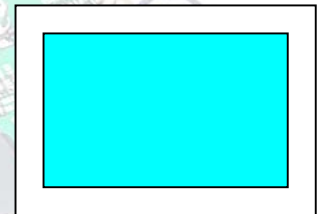
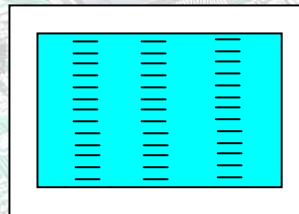
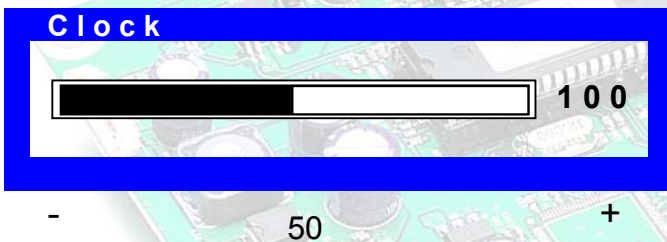
Menu > ▼ ▼ ▼ (Yellow bar Display) > Select (V



**Clock**

**Procedure**

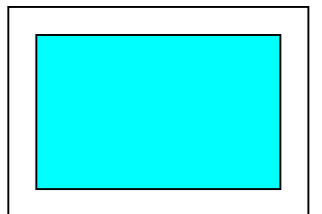
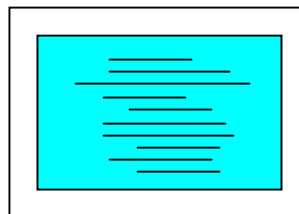
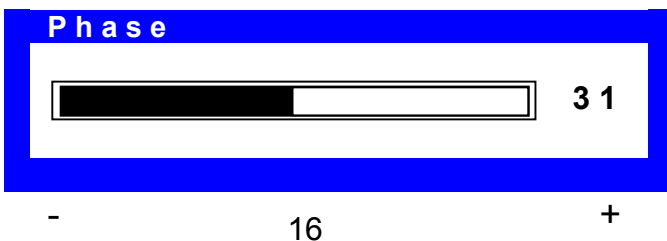
Menu > ▼ ▼ ▼ ▼ (Yellow bar Display) > Select



**Phase**

**Procedure**

Menu > ▼ ▼ ▼ ▼ ▼ (Yellow bar Display) > Select

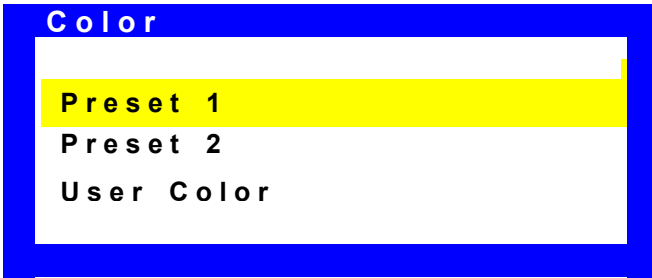


**Color**

**Procedure**

Menu > ▼ ▼ ▼ ▼ ▼ ▼

(Yellow bar Display) > Select (Sub Menu 1

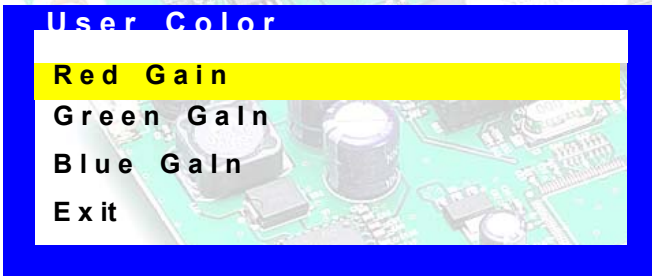


Preset 1: Default

Preset 2: bluish white

User Color: User Color Control

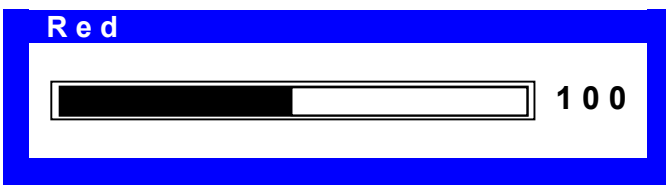
Sub Menu 1 > ▼ ▼ (Yellow bar Display) > select (Sub Menu 2 Display)



Sub Menu 2 > Select (Yellow bar Display) > Red Color Control

Sub Menu 2 > ▼ Select (Yellow bar Display) > Green Color Control

Sub Menu 2 > ▼ ▼ Select (Yellow bar Display) > Green Color Con



- 50 +

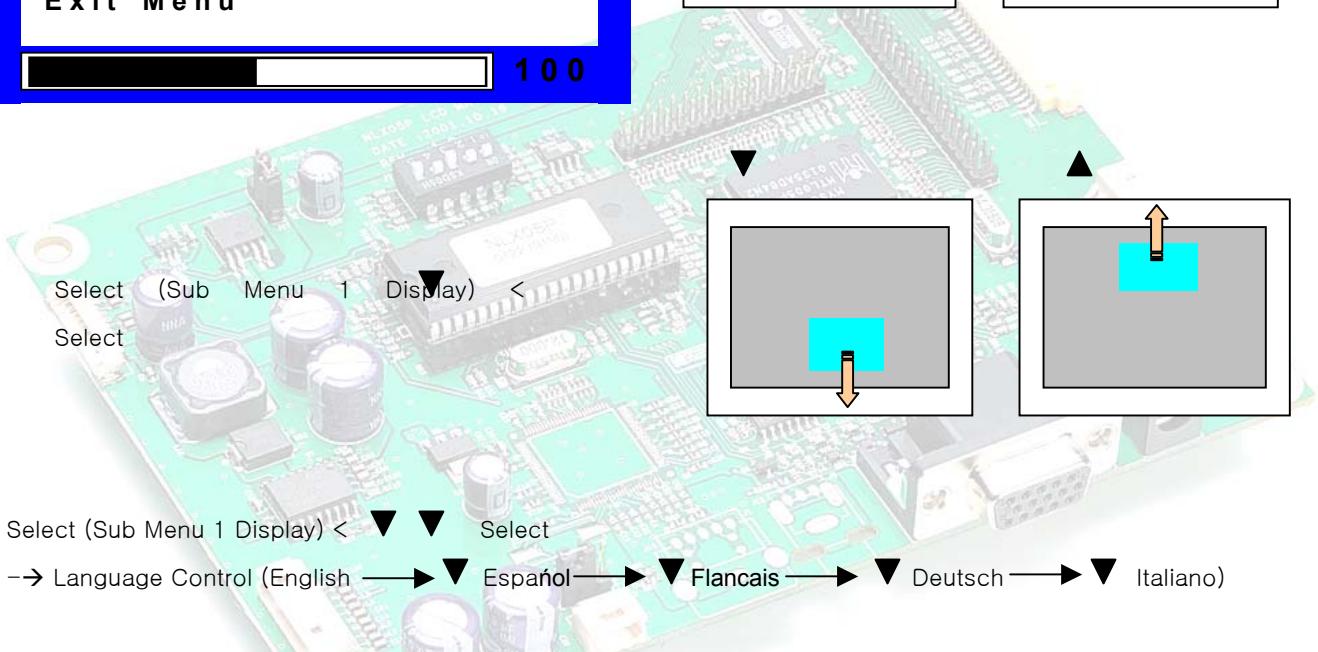
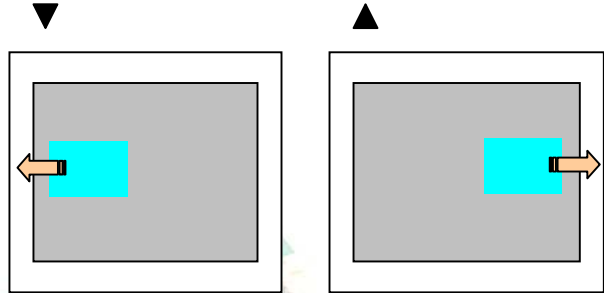
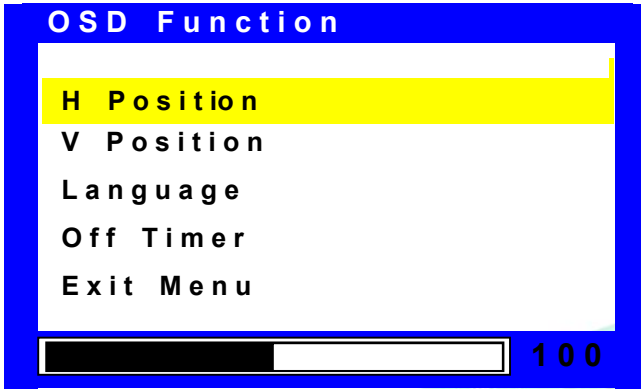


**OSD Function**

Procedure

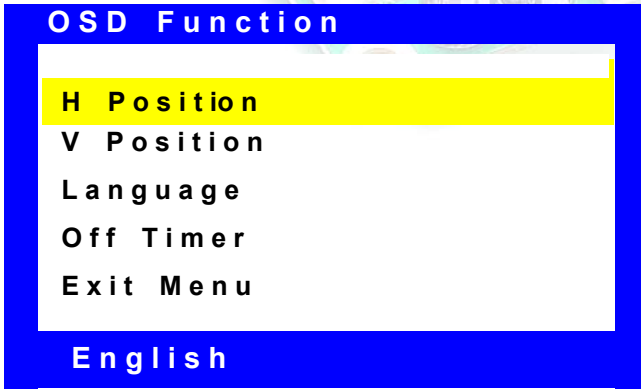
Menu ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼

(Yellow bar Display) > Select (Sub Menu 1 Display)



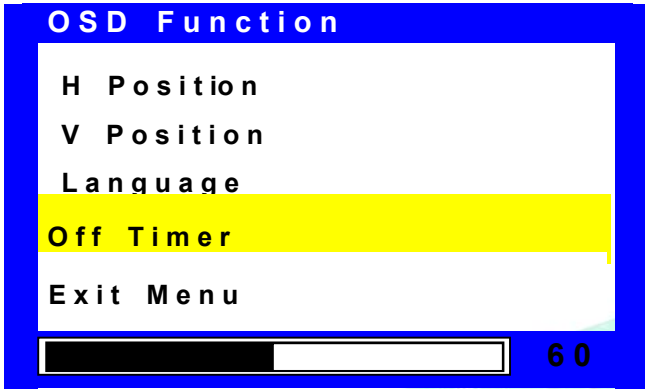
Select (Sub Menu 1 Display) <  
Select

Select (Sub Menu 1 Display) < ▼ ▼ Select  
--> Language Control (English --> ▼ Español --> ▼ Flancais --> ▼ Deutsch --> ▼ Italiano)



**OSD Function**

Select (Sub Menu 1 Display) < ▼ ▼ ▼ Select



OSD Menu Display Timer Control

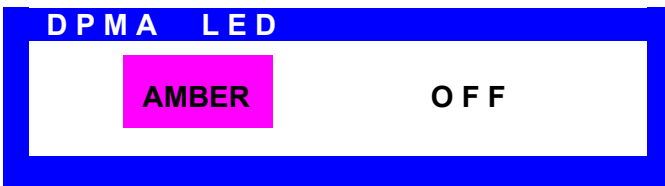
**Power Switch Option**

Procedure Menu > ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ (Magenta bar Display) >



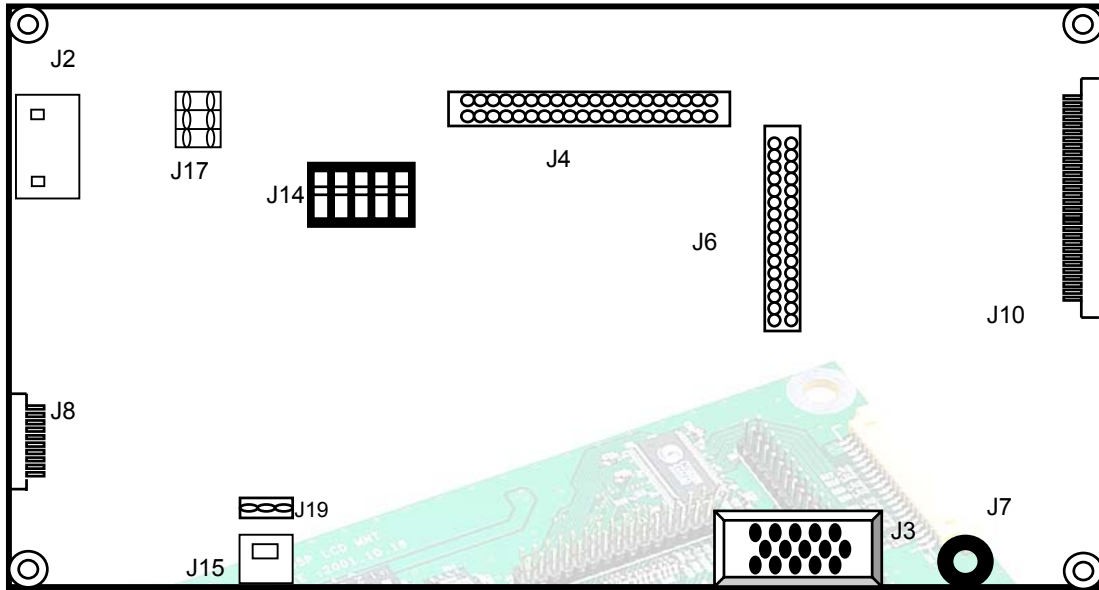
**DPMS LED**

Procedure Menu > ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ (Magenta bar Display) >



**CONNECTOR, PINOUT & JUMPERS**

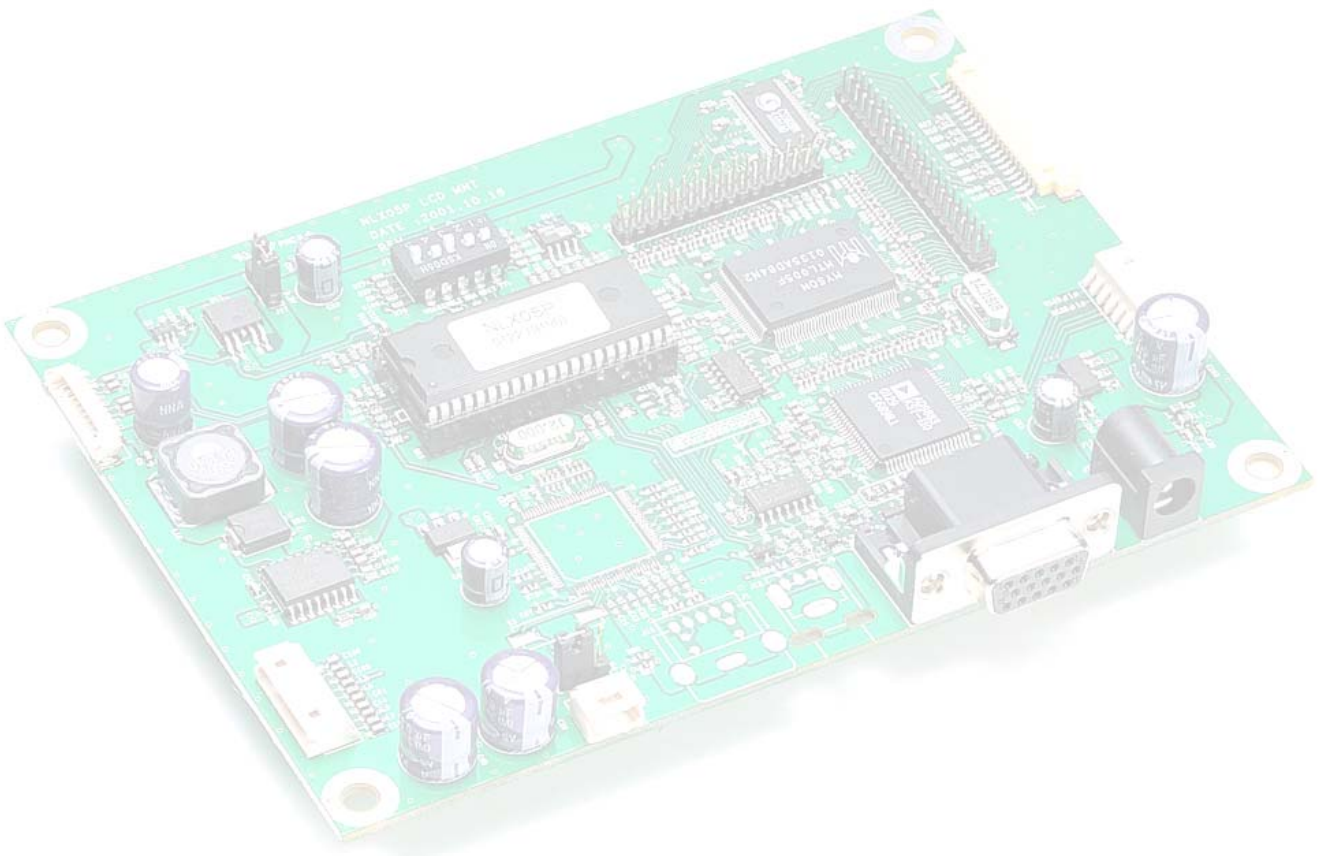
The various connectors are:



**Summary**

| Reference | Description                                       | Connector Type                     |
|-----------|---|------------------------------------|
| J2        | OSD control Connector                             | MOLEX 53015-0710 2.0mm RIGHT ANGLE |
| J3        | D-SUB Jack  | 15P D-SUB 2.29MM RIGHT ANGLE       |
| J4        | LCD interface board Connector for TTL 6bit        | 16*2 HEADER PIN                    |
| J6        | LCD interface board Connector for TTL 8bit & DUAL | 20*2 HEADER PIN                    |
| J7        | Input Dc power Jack                               | DC-001 2.5Ø                        |
| J8        | Inverter Connector                                | YEON-HO 12505WR-10A00 10P 1.25MM   |
| J9        | D-SUB Connector                                   | 53015-1210 MOLEX 2.0mm RIGHT ANGLE |
| J10       | LVDS Connector                                    | YEON-HO 12505WR-20 20P 1.25MM      |
| J11       | DC power Connector                                | MOLEX 53015-0410 2.0mm RIGHT ANGLE |

|     |                          |                                    |
|-----|--------------------------|------------------------------------|
| J14 | Panel Type Select Switch | HDR5X2, 14pin                      |
| J15 | Out Power Connector      | MOLEX 53015-0310 2.0mm RIGHT ANGLE |
| J17 | Panel Power Out Jumper   | 3*2 Header                         |
| J19 | Out Power Jumper         | HDR3X1 CON3P-BASE                  |



**J2: 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         |

**J3: 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 |

**J4: LCD Interface connector for TTL type- 6bit For  
Single 6bits, or Single (Dual first) higher 6bit**

| Pin No. | Symbol  | Description             |
|---------|---------|-------------------------|
| 1       | ROA (7) | Red output data         |
| 2       | ROA (6) | Red output data         |
| 3       | ROA (5) | Red output data         |
| 4       | ROA (4) | Red output data         |
| 5       | ROA (3) | Red output data         |
| 6       | ROA (2) | Red output data         |
| 7       | GND     | Ground                  |
| 8       | GND     | Ground                  |
| 9       | GOA (7) | Green output data       |
| 10      | GOA (6) | Green output data       |
| 11      | GOA (5) | Green output data       |
| 12      | GOA (4) | Green output data       |
| 13      | GOA (3) | Green output data       |
| 14      | GOA (2) | Green output data       |
| 15      | GND     | Ground                  |
| 16      | GND     | Ground                  |
| 17      | BOA (7) | Blue output data        |
| 18      | BOA (6) | Blue output data        |
| 19      | BOA (5) | Blue output data        |
| 20      | BOA (4) | Blue output data        |
| 21      | BOA (3) | Blue output data        |
| 22      | BOA (2) | Blue output data        |
| 23      | GND     | Ground                  |
| 24      | GND     | Ground                  |
| 25      | DVS     | Display Vertical Sync   |
| 26      | DHS     | Display Horizontal Sync |
| 27      | DCLK    | Display Clock           |
| 28      | GND     | Ground                  |
| 29      | DEN     | Display Enable          |
| 30      | MOD_PWR | VDD For LCD Module      |
| 31      | MOD_PWR | VDD For LCD Module      |
| 32      | MOD_PWR | VDD For LCD Module      |

**J6: LCD Interface connector for TTL type – 8bit dual  
and 8bits single lower 2bit**

| Pin No. | Symbol  | Description       | Pin No. | Symbol  | Description       |
|---------|---------|-------------------|---------|---------|-------------------|
| 1       | GND     | Ground            | 21      | GND     | Ground            |
| 2       | GND     | Ground            | 22      | GND     | Ground            |
| 3       | GND     | Ground            | 23      | GOB (7) | Green output data |
| 4       | GND     | Ground            | 24      | GOB (6) | Green output data |
| 5       | ROA (1) | Red output data   | 25      | GOB (5) | Green output data |
| 6       | ROA (0) | Red output data   | 26      | GOB (4) | Green output data |
| 7       | GOA (1) | Green output data | 27      | GOB (3) | Green output data |
| 8       | GOA (0) | Green output data | 28      | GOB (2) | Green output data |
| 9       | BOA (1) | Blue output data  | 29      | GOB (1) | Green output data |
| 10      | BOA (0) | Blue output data  | 30      | GOB (0) | Green output data |
| 11      | GND     | Ground            | 31      | GND     | Ground            |
| 12      | GND     | Ground            | 32      | GND     | Ground            |
| 13      | ROB (7) | Red output data   | 33      | BOB (7) | Blue output data  |
| 14      | ROB (6) | Red output data   | 34      | BOB (6) | Blue output data  |
| 15      | ROB (5) | Red output data   | 35      | BOB (5) | Blue output data  |
| 16      | ROB (4) | Red output data   | 36      | BOB (4) | Blue output data  |
| 17      | ROB (3) | Red output data   | 37      | BOB (3) | Blue output data  |
| 18      | ROB (2) | Red output data   | 38      | BOB (2) | Blue output data  |
| 19      | ROB (1) | Red output data   | 39      | BOB (1) | Blue output data  |
| 20      | ROB (0) | Red output data   | 40      | BOB (0) | Blue output data  |

**J7: 12V DC power supply**

| Pin No | Symbol | Description |
|--------|--------|-------------|
| 1      | Vcc    | 12V         |
| 2      | GND    | Ground      |
| 3      | GND    | Ground      |

**J8: Backlight Inverter connector**

| Pin No. | Symbol  | Description     | Pin No. | Symbol | Description |
|---------|---------|-----------------|---------|--------|-------------|
| 1       | DIM-adj | DIM-adjustment  | 6       | GND    | Ground      |
| 2       | GND     | Ground          | 7       | GND    | Ground      |
| 3       | GND     | Ground          | 8       | GND    | Ground      |
| 4       | GND     | Ground          | 9       | Vcc    | 12V         |
| 5       | ON/OFF  | Inverter ON/OFF | 10      | Vcc    | 12V         |

**J10: LCD Interface connector for 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  |
| 20      | MOD_PWR | VDD For LCD Module  |



**J14: Panel Type Select Switch**

| Pin No / Symbol |         | Description      |                  |
|-----------------|---------|------------------|------------------|
|                 |         | ON               | OFF              |
| 1: SFT          | 2: NOR  | 6Bits LVDS Panel | 8Bits LVDS Panel |
| 3: 6BIT         | 4: 8BIT | 6BIT             | 8BIT             |
| 5: SINGLE       | 6: DUAL | 1 Channel TTL    | 2 Channel TTL    |
| 7: XGA          | 8: SVGA | XGA              | SVGA             |
| 9: VGA          | 10: N/A | VGA              | Not Applicable   |

\* Refer to Appendix for setting

**J15: Power out connector**

| Pin No. | Symbol | Description |
|---------|--------|-------------|
| 1       | Vcc    | 12V/5V      |
| 2       | GND    | Ground      |
| 3       | GND    | Ground      |

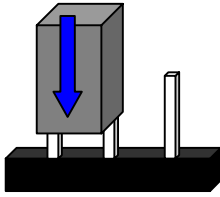
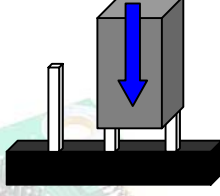
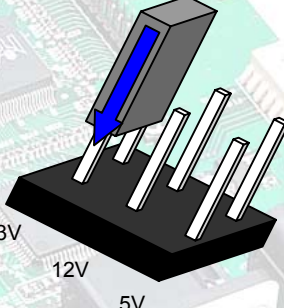
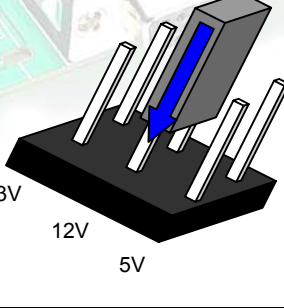
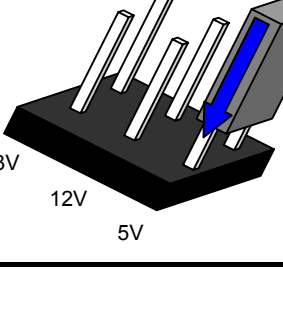
**J16: On board +12V/+5V logic power enable select jumper**

| Pin No. | Symbol | Description                  |
|---------|--------|------------------------------|
| 1       | 12V    | 12V                          |
| 2       | Vcc    | <b>On board power enable</b> |
| 3       | 5V     | 5V                           |

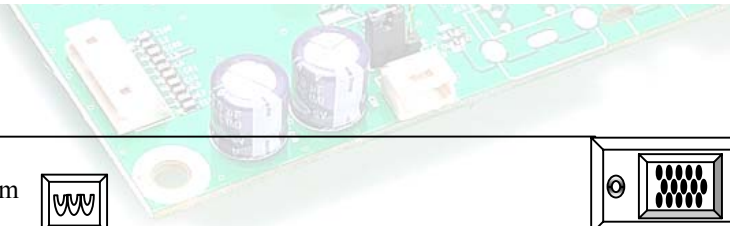
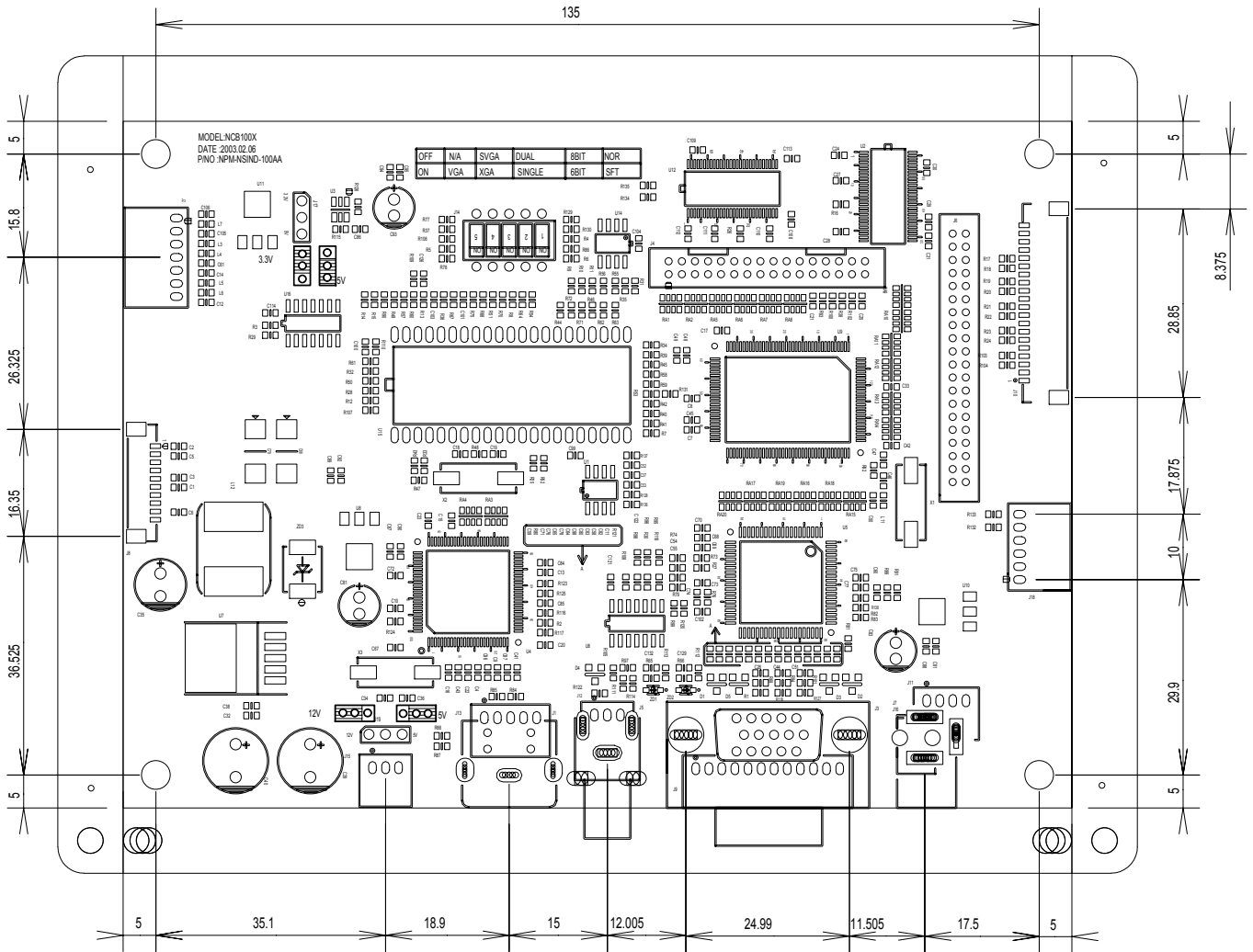
**J17: LCD Panel power select jumper**

| Pin No. | Symbol | Description |
|---------|--------|-------------|
| 1       | 3.3V   | 3.3V        |
| 2       | 12V    | 12V         |
| 3       | 5V     | 5V          |

**Summary: jumpers setting**

| Reference | Description  | Connector Type   |
|-----------|--|--|
| J16       | On board +12V logic power enable                                       |   |
|           | On board +5V logic power enable  |   |
| J17       | 3.3V panel power<br><b>CAUTION:</b> Incorrect setting can damage panel |   |
|           | 12V panel power<br><b>CAUTION:</b> Incorrect setting can damage panel  |  |
|           | 5V panel power<br><b>CAUTION:</b> Incorrect setting can damage panel   |  |

**CONTROLLER DIMENSIONS**



## **APPLICATION NOTES**

### **USING THE CONTROLLER WITHOUT THE ATTACHED BUTTONS**

**This is very straightforward:**

- First, set up the controller/display system with the buttons. With the attached controller 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 (J2) 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 potentially issues to consider with the 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:** NCB100 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 flat panel display system it is 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, to identify the problem are a clearly.

### **No image:**

- ▶ If the panel backlight is not working it may still be possible to just see some image.
- ▶ A lack of image is most likely to be caused by an 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, in 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 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 bigger or smaller, to scroll, to flicker badly or to have even no images.
- ▶ 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 :

- ▶ 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 more clearer and more stable image on a screen

**Table 6.1) RGB input format**

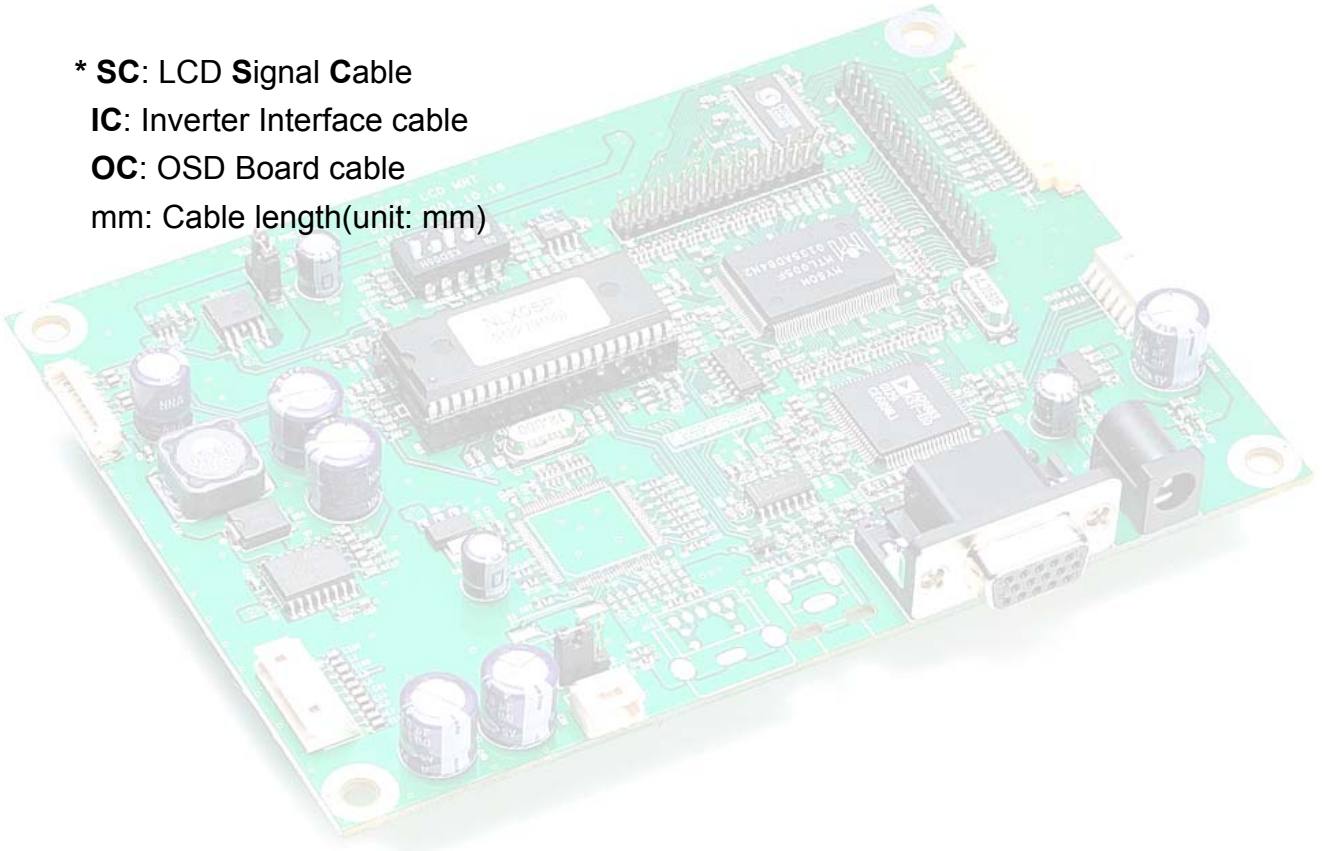
| Spec<br>Mode  | Pixel<br>Freq. | Horizontal Timing |        |       |            | Vertical Timing |        |           |        |
|---------------|----------------|-------------------|--------|-------|------------|-----------------|--------|-----------|--------|
|               |                | Syn<br>c          | Freq.  | Total | Activ<br>e | Syn<br>c        | Freq.  | Tota<br>l | Active |
|               | MHz            | Pola<br>r         | KHz    | Pixel | Pixel      | Pola<br>r       | 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@56Hz  | 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    |

**ACCESSORY**

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

| No. | Items            | Part No.                 | Ex) LG. Philips LB064V2 |
|-----|------------------|--------------------------|-------------------------|
| 1   | LCD signal cable | SC-Panel Part No.-mm     | SC-LB064V2-20           |
| 2   | Inverter         | Part no. of Manufacturer | GH006                   |
| 3   | Inverter cable   | IC-Panel Part No.-mm     | IC-GH006-20             |
| 4   | OSD Board        | NLX05-OSD                | NLX05-OSD               |
| 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 VGA, SVGA and XGA 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 NCB100 board. And SUCH will try continuously to the model names of the LCD panels that have been tested.

| No. | LCD Model Name | LCD vendor | LCD VCC | Option <sup>(note1)</sup> | SW1 | SW2 | SW3 | SW4 | SW5 |
|-----|----------------|------------|---------|---------------------------|-----|-----|-----|-----|-----|
| 1   | LB064V02       | LG Philips | +3.3V   | VS6S                      | ON  | ON  | ON  | ON  | ON  |
| 2   | LP104V2        | LG Philips | +3.3V   | VS6S                      | ON  | ON  | ON  | ON  | ON  |
| 3   | LB104V3        | LG Philips | +3.3V   | VS6S                      | ON  | ON  | ON  | ON  | ON  |
| 4   | LP104S5        | LG Philips | +3.3V   | SS6S                      | ON  | ON  | ON  | OFF | OFF |
| 5   | LP104S6        | LG Philips | +3.3V   | SS6S                      | ON  | ON  | ON  | OFF | OFF |
| 6   | LB121S1        | LG Philips | +3.3V   | SS6S                      | ON  | ON  | ON  | OFF | OFF |
| 7   | LB121S02       | LG Philips | +3.3V   | SS6S                      | ON  | ON  | ON  | OFF | OFF |
| 8   | LC121S1        | LG Philips | +3.3V   | SS6S                      | ON  | ON  | ON  | OFF | OFF |
| 9   | LP133X5        | LG Philips | +5.0V   | XS6S                      | ON  | ON  | ON  | ON  | OFF |
| 10  | LP133X7        | LG Philips | +3.3V   | XS6S                      | ON  | ON  | ON  | ON  | OFF |
| 11  | LP133X8        | LG Philips | +3.3V   | XS6S                      | ON  | ON  | ON  | ON  | OFF |
| 12  | LC150X01-C3    | LG Philips | +12V    | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 13  | LM150X05-A3    | LG Philips | +5.0V   | XD6S                      | ON  | ON  | OFF | ON  | OFF |
| 14  | LM150X05-C3    | LG Philips | +3.3V   | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 15  | LM150X06-A3    | LG Philips | +3.3V   | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 16  | LM150X07-B4    | LG Philips | +3.3V   | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 17  | LM150X08-A4    | LG Philips | +3.3V   | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 18  | LM151X05       | LG Philips | +3.3V   | XD6S                      | ON  | ON  | ON  | ON  | OFF |
| 19  | LC151X01-C3    | LG Philips | +5V     | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 20  | HT10X21-100    | HYDIS      | +3.3V   | XS6S                      | ON  | ON  | ON  | ON  | OFF |
| 21  | HT12X11        | HYDIS      | +3.3V   | XS6S                      | ON  | ON  | ON  | ON  | OFF |
| 22  | HLT15X13       | HYDIS      | +3.3V   | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 23  | HLT15X15       | HYDIS      | +3.3V   | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 24  | HT15X22        | HYDIS      | +5.0V   | XD8N                      | OFF | OFF | OFF | ON  | OFF |
| 25  | LTM150XH-T01   | SAMSUNG    | +3.3V   | XS6S                      | ON  | ON  | ON  | ON  | OFF |
| 26  | LTM150XH-L01   | SAMSUNG    | +3.3V   | XS8N                      | OFF | OFF | ON  | ON  | OFF |
| 27  | LC201V02       | LG Philips | +12V    | VS8N                      | OFF | OFF | ON  | ON  | ON  |

Note1 : Abbreviated word : S<sup>a</sup>S<sup>b</sup>6<sup>c</sup>S<sup>d</sup>

Ⓐ V/S/X : V VGA, S SVGA, X XGA

Ⓑ S/D : SINGLE PORT, D DUAL PORT

Ⓒ 6/8 : 6 6BITS 8 8BITS

Ⓓ S/N : (SFT) SHIFT, N(NOR) NORMAL