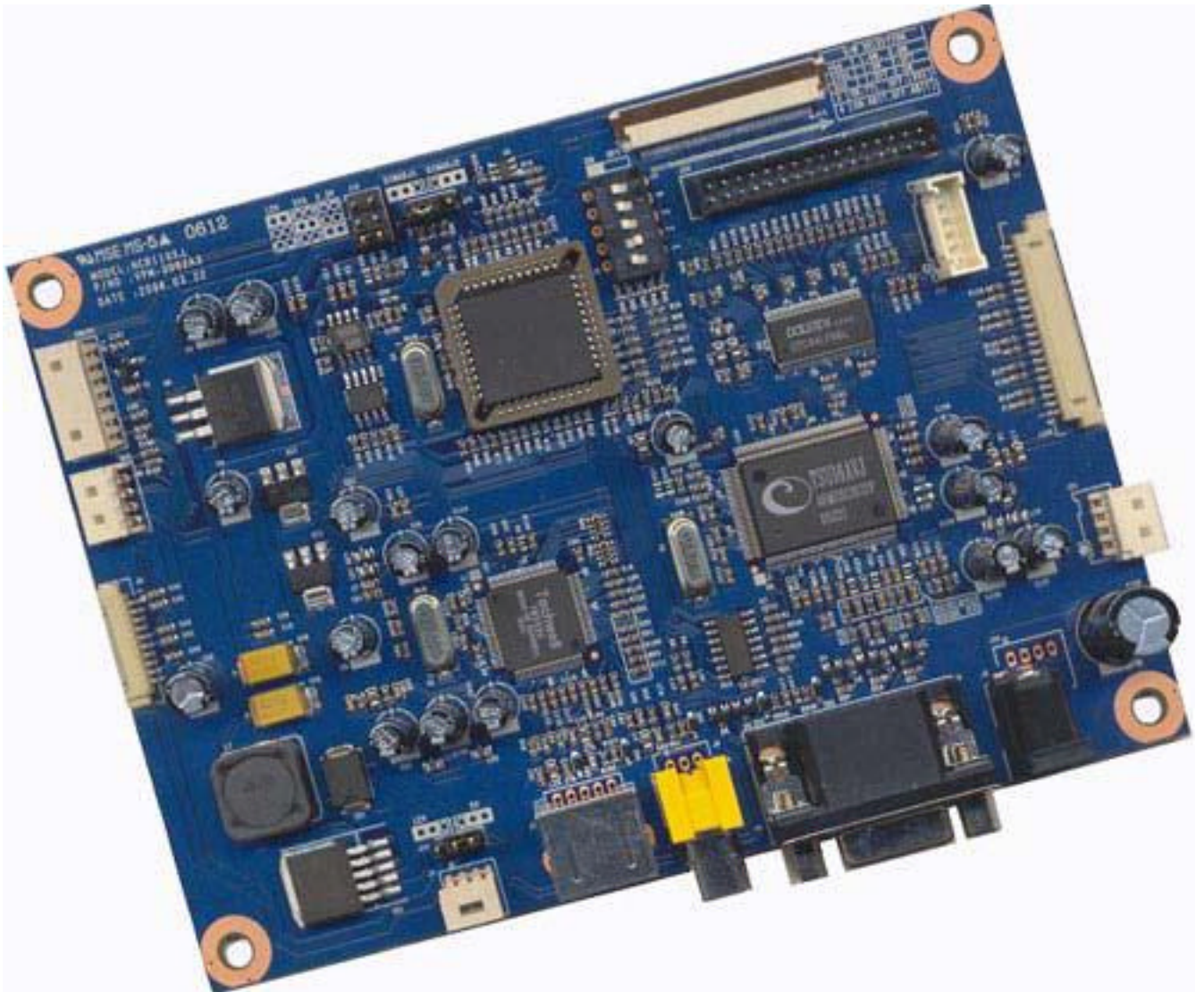


For LCD Monitor (PC + Video) Interface Controller
For 640X480, 800X600 & 1024X768 Resolutions TFT LCD

DATA SHEET



TFT LCD Monitor Control Board

DT-110X3 (RoHS Compliant)

Juni 2006

CONTENT

- INTRODUCTION ----- 4
- GENERAL SPECIFICATION ----- 5 -----
- SYSTEM DESIGN ----- 7 -----
- BLOCK DIAGRAM ----- 8 -----
- ASSEMBLY NOTES ----- 9 -----
- CONNECTION & OPERATION - 11 ----- 12 ---
- OSD ----- 13 -----
- OSD FUNCTION ----- 20 -----
- CONNECTOR, PINOUT & JUMPER ----- 29 -----
- CONTROLLER DIMENSIONS ----- 30 -----
- APPLICATION NOTES ----- 31 -----
- TROUBLESHOOTING 32 ----- 32 -----
- APPLICABLE GRAPHIC MODE ----- 33
- ACCESSORY
- APPENDIX
-
-
-
-
-
-
-

History (revision date)

| No | Description | Revision | Page |
|----|-------------------|----------|------|
| 1 | E/S | AA | |
| 2 | Connector Changed | AB | |

INTRODUCTION

Designed for LCD monitor and other flat panel display application the DT-110X3 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.
- ▶ Video signals of NTSC, PAL standard
- ▶ Input Signal Support
 - z All VESA standard
 - z In case of VGA option (VGA /NTSC/PAL Input support)
 - z In case of SVGA option (VGA/SVGA/NTSC/PAL Input support)
 - z In case of XGA option (VGA/SVGA/XGA/NTSC/PAL Input support)

HOW TO PROCEED

- ▶ Ensure that you have all parts & they are correct, refer to:
 - z Connection diagram
 - z Connector reference
 - z 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:

- z Ensure that all necessary and appropriate safety measures are taken.
- z Obtain suitable regulatory approvals as may be required.
- z 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 | Controller name | For VGA panel | NCB110V3 | | |
| | | For SVGA panel | NCB110S3 | | |
| | | For XGA Panel | DT-110X3 | | |
| 2 | LCD Module | VGA~XGA TFT LCD (TTL/LVDS Interface) | | | |
| 3 | Signal Input | Analog RGB Input. NTSC/PAL | | | |
| 4 | Resolution Support | H: 31 ~ 61kHz | | | |
| | | V: 55 ~ 76Hz | | | |
| 5 | OSD Control | Menu, Select (AUTO), Down, Up(Source change), Power | | 5 keys | |
| | Plug & Play | VESA DDC 1/2B 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 | | |
| | | Video | MINIDIN | SVHS | |
| | | | RCA | CVBS | |

ELECTRICAL SPECIFICATION

Input characteristic

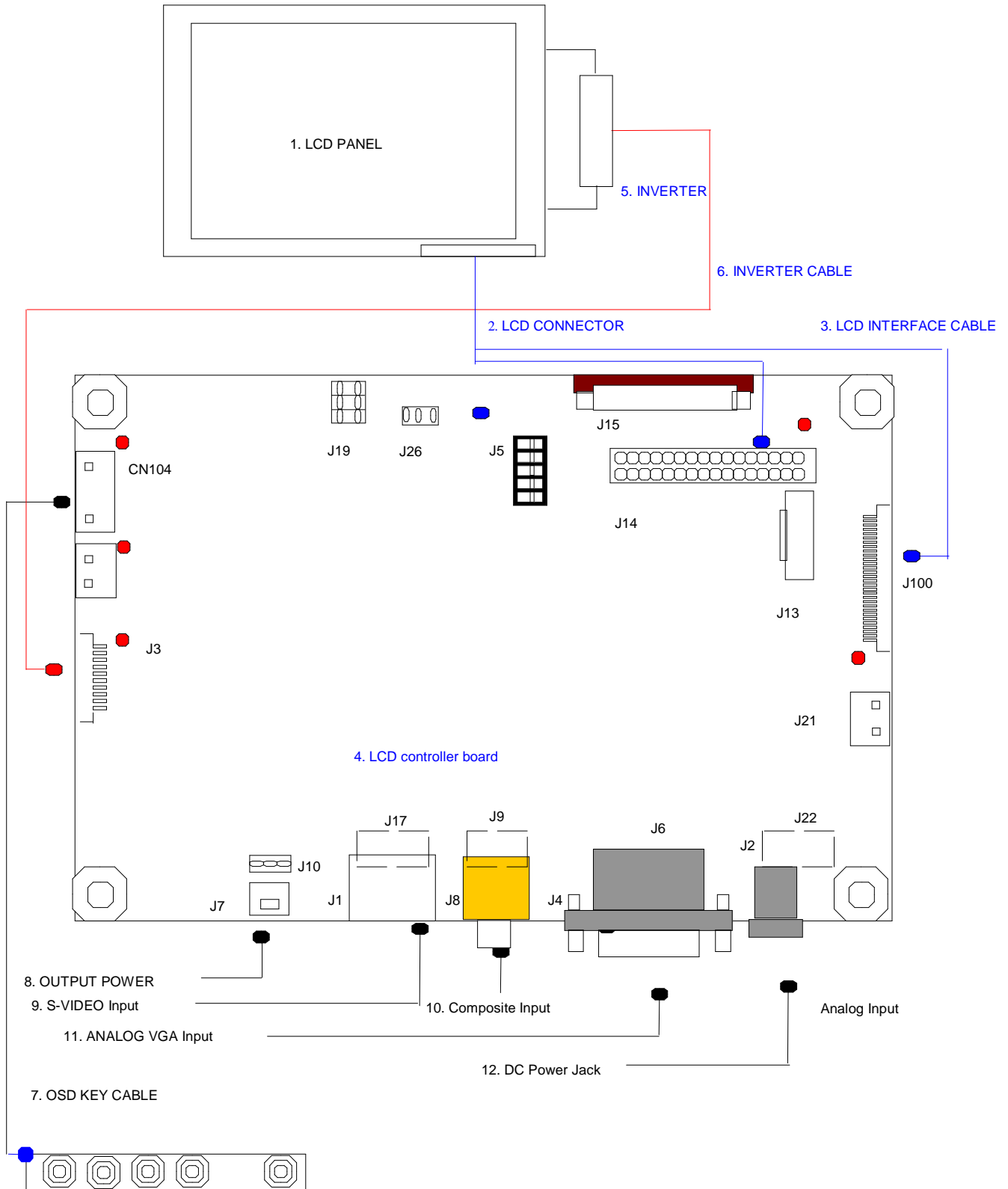
| Description | Signal | Unit | Min | Typical | Max | Remarks |
|------------------|-------------|------|------|---------|------|-----------------|
| Power In (12Vdc) | Input | Vdc | 11.4 | 12 | 12.6 | |
| | Consumption | Watt | | 5 | | Board only |
| RGB Input | Analog RGB | Vp-p | 0 | | 0.7 | |
| | Sync | Vdc | 0 | | 5.5 | |
| | H Frequency | KHZ | 31 | | 61 | Depends on Mode |
| | V Frequency | Hz | 55 | 60 | 75 | |
| NTSC/PAL | Y/CVBS | Vp-p | 0.6 | 1.0 | 1.4 | |
| | C | Vp-p | 0.6 | 0.8 | 1.2 | |

Output Characteristics

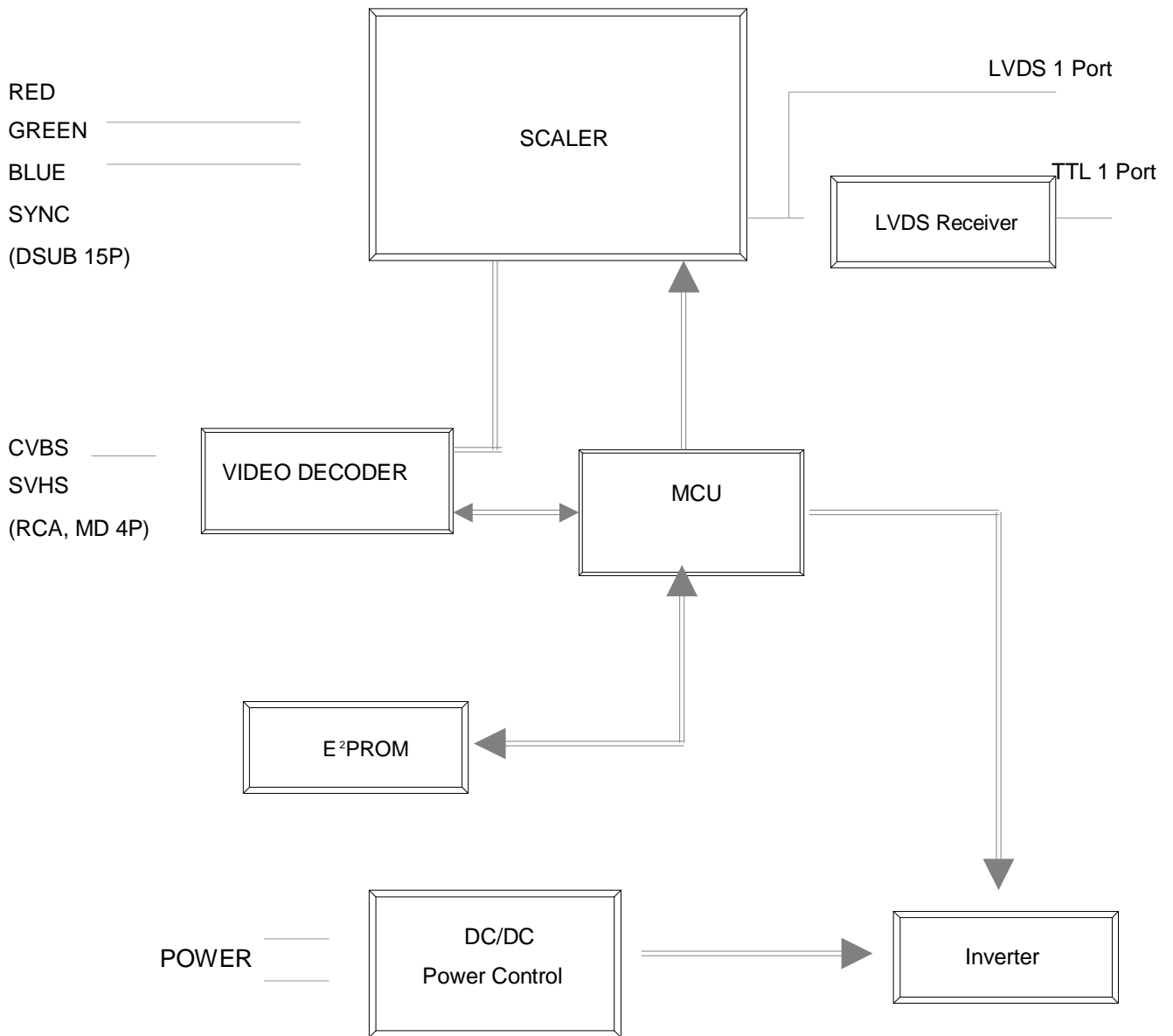
| Description | Signal | Unit | Min | Typical | Max | Remarks |
|--------------------|---------------------|-------|------|---------|------|-----------------|
| TTL LCD Interface | RGB Data | Vp-p | | 3.3 | | |
| | DE, Sync, Clock | Vp-p | | 3.3 | | |
| | Clock Freq. | MHZ | 25 | | 80 | Depends on Mode |
| | 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 | 0 | | 4.0 | |

SYSTEM DESIGN (T.B.D)

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 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 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 12V, 5V or 3.3V TTL 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 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.

z Green - Normal state

z Off - Off mode (Can't find video signals)

z 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:

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

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

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, 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:

- z 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
- z Refer to the graphic modes table in specification section for supported modes.
- z 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 cables direct to J14 (for Single 6bits, or Single (Dual first) higher 6bit, J13 (8bit dual (J13) 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 J100 of 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).
3. Inverter & Controller: Plug the inverter cable to J8 of the controller board and another end to the connector on the inverter.
4. Function switch & Controller: Plug the OSD switch mount cable to J2 of 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 setting)} and switches (J14, Target panel selection) 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 J3 of 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:

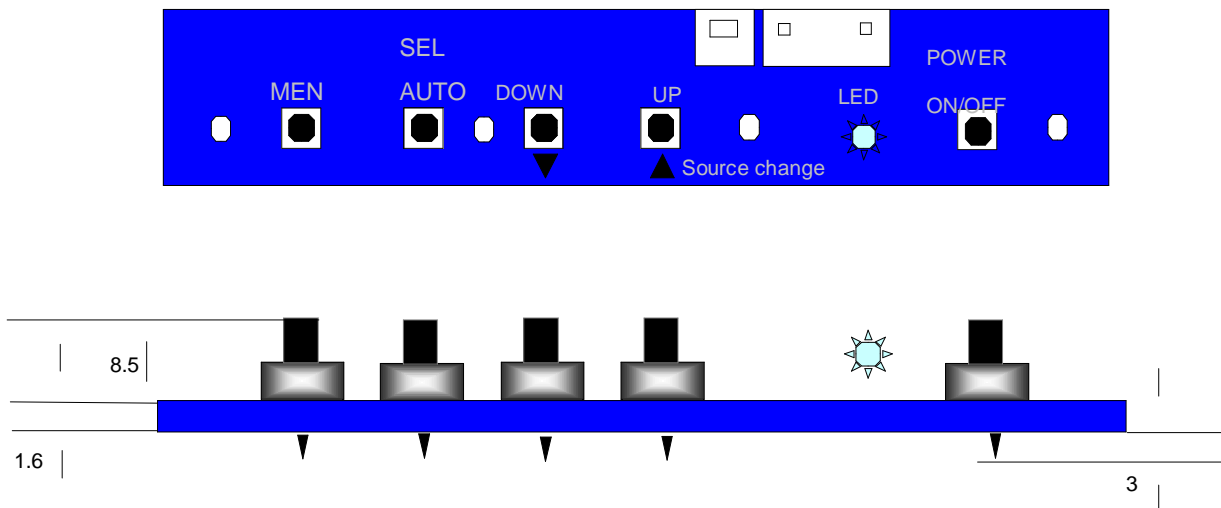
- z If you use supplied cables & accessories, ensure that they are correct for the model of the panel and the controller.
- z If you make your own cables & connectors, refer carefully to both the panel & inverter specifications and the section in this manual, "Connectors, Pin outs & Jumpers" to ensure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

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/ Amber | |
| DOWN, UP ▼ ▲ | Cursor control Increment / Decrement value | | 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 Function (MAIN MENU)

Picture



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



In case of PC mode

Setup



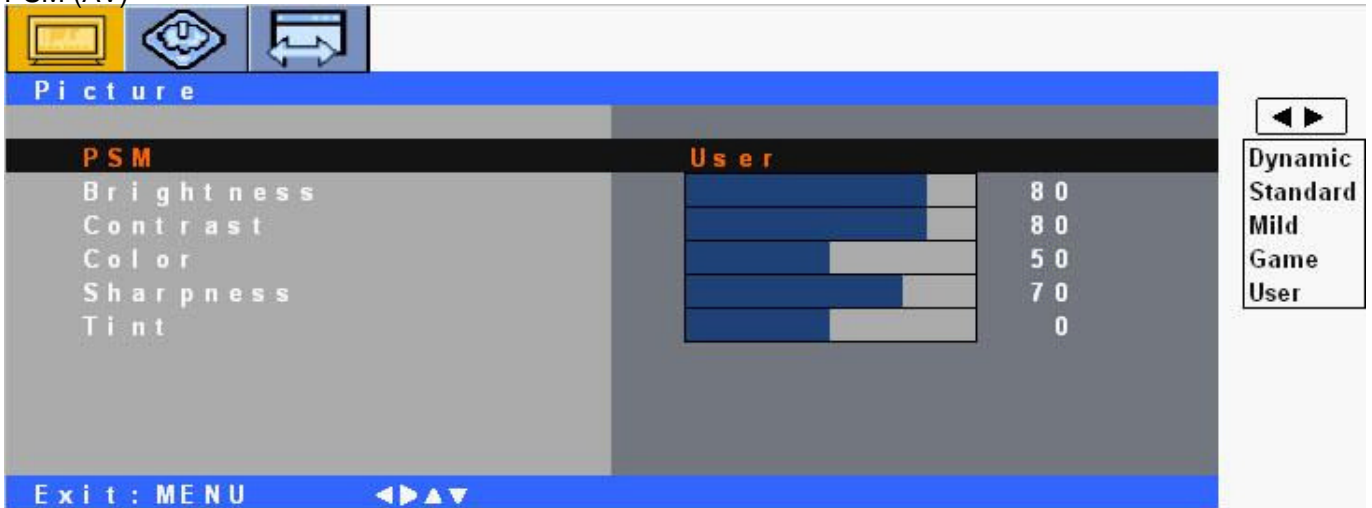
Screen



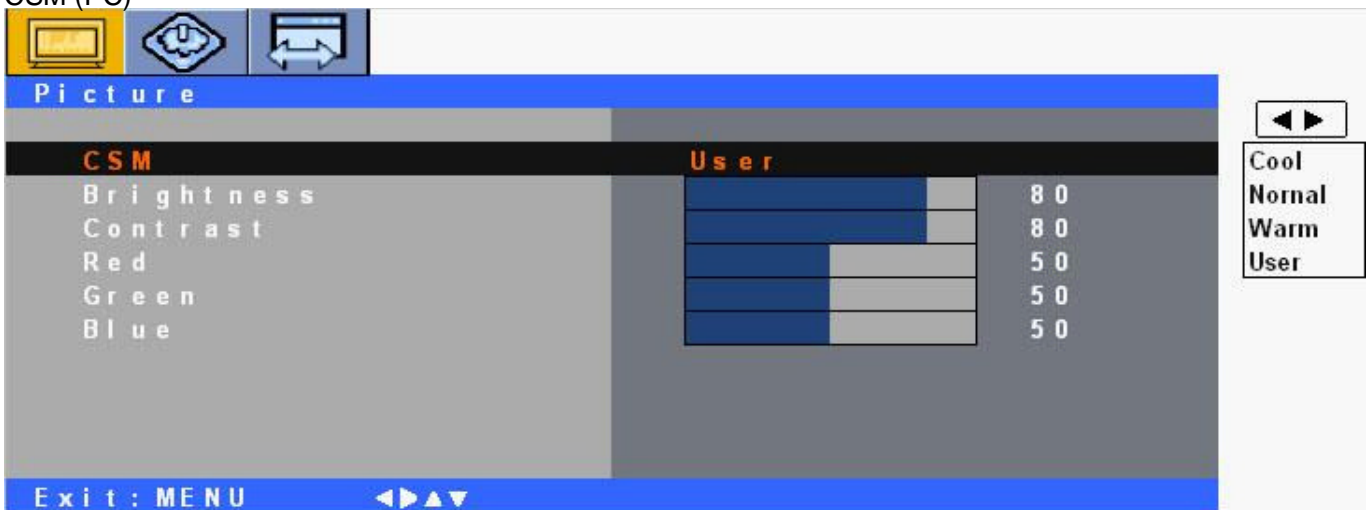
Picture Icon



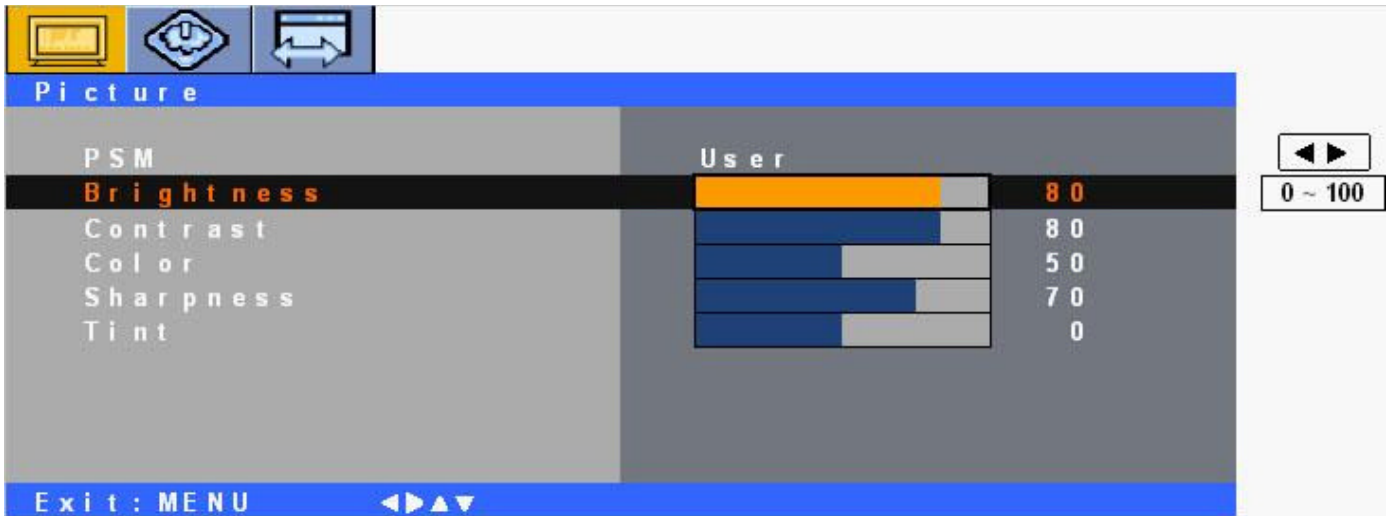
PSM (AV)



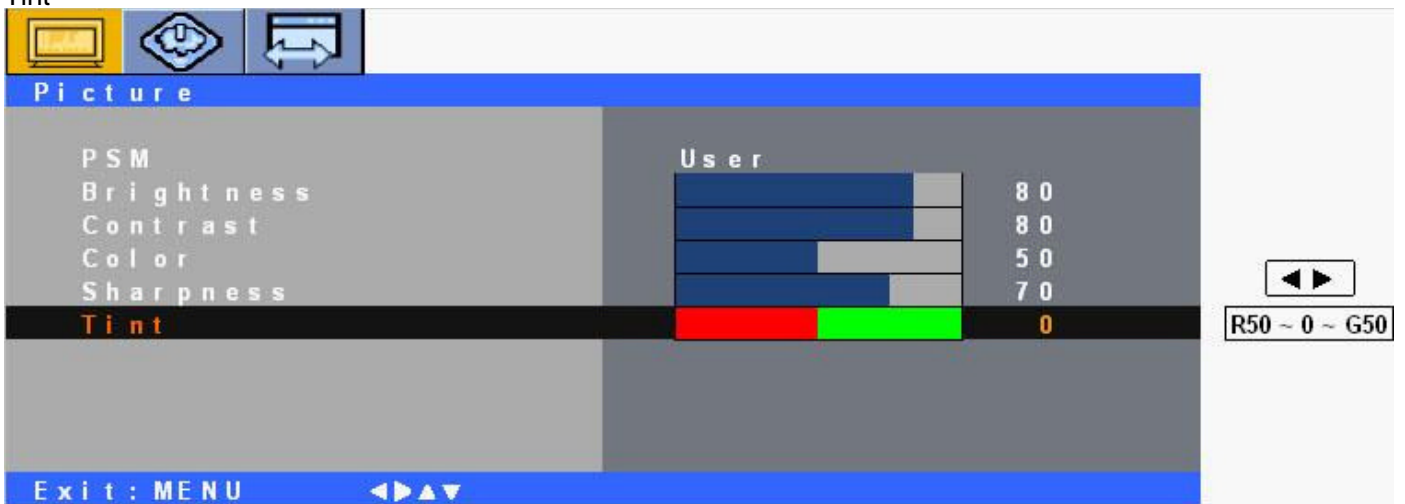
CSM (PC)



Brightness / Contrast / Color / Sharpness



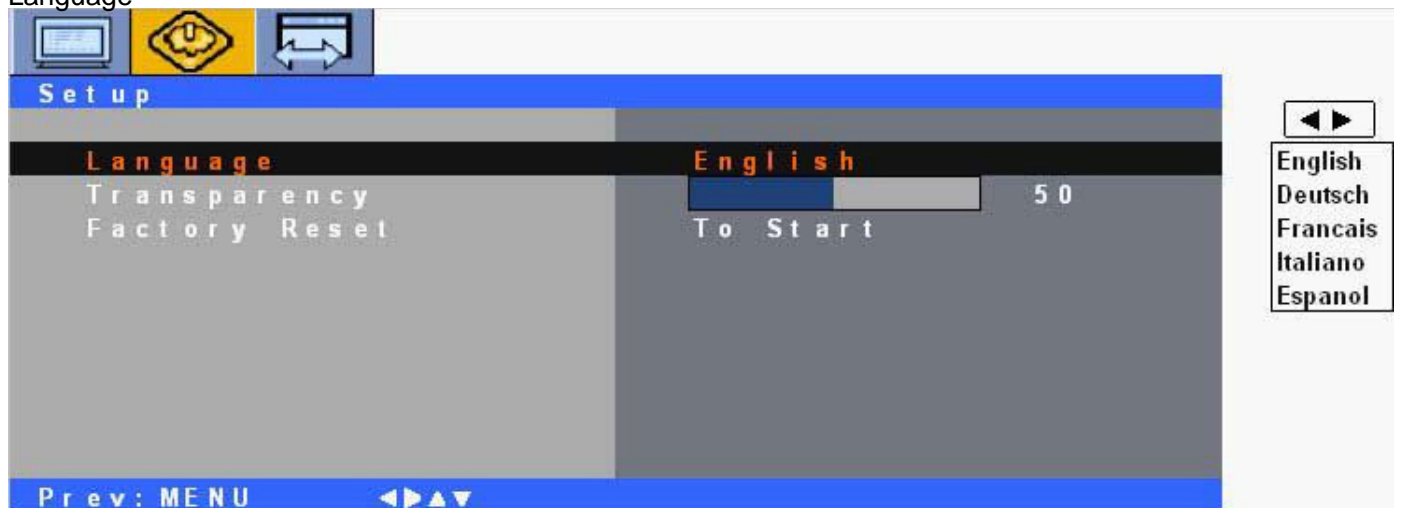
Tint



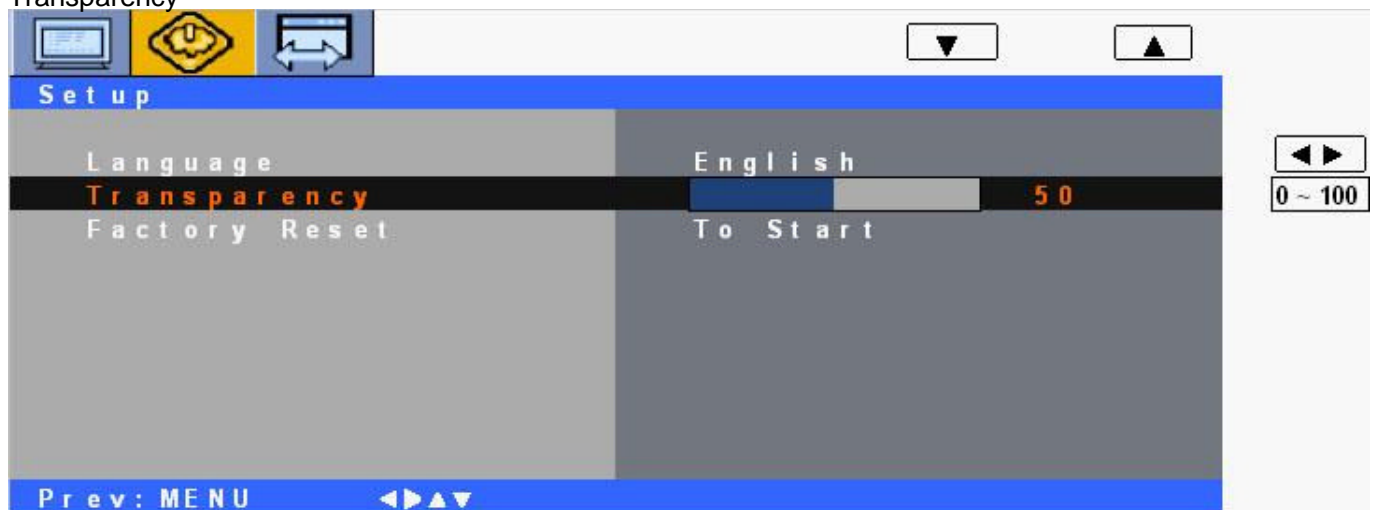
Setup



Language



Transparency



Factory Reset



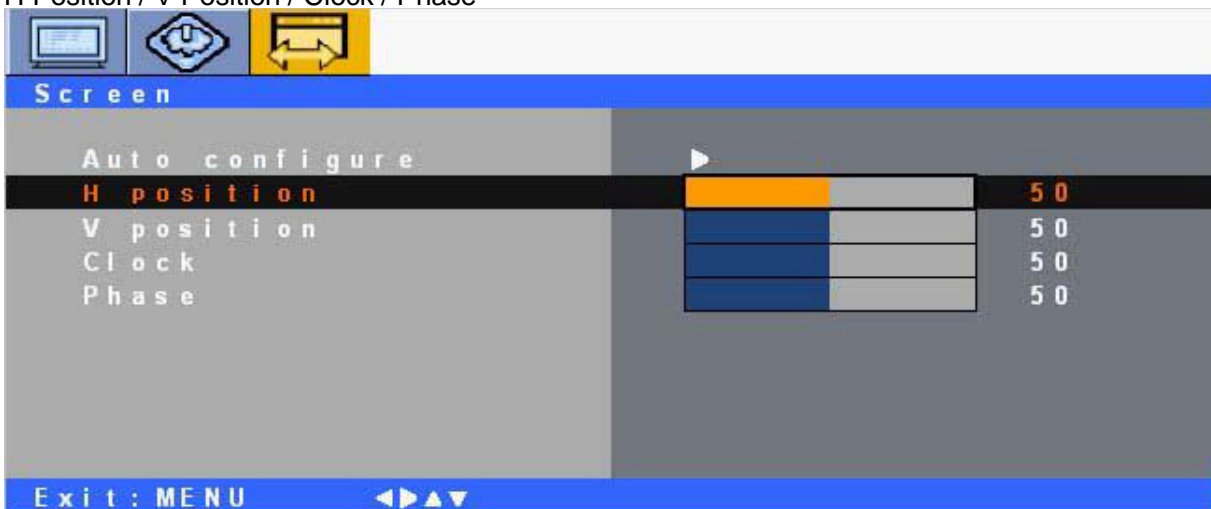
Screen



Auto Configure



H Position / V Position / Clock / Phase

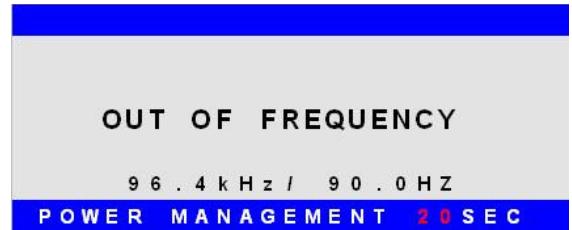


OSD GUI Control Table

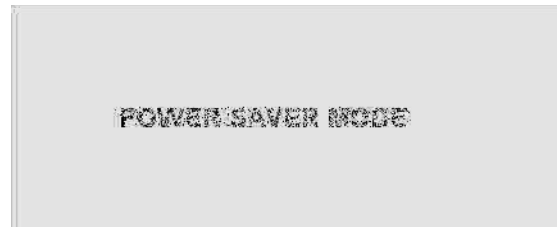
| MAIN MENU | SUB MENU | CONTROL | | |
|-----------|----------------|---|--|--------|
| PICTURE | PSM | Dynamic/Standard/Mild/Game/User | | VIDEO |
| | | USER | Brightness, Contrast, Color, Sharpness | |
| | CSM | CSM/Brightness/Contrast | | PC |
| | | CSM | Normal/Warm/User | |
| User | | Red/Green/Blue | | |
| SETUP | Language | English/Deutsch/François/Italiano/Espanol | | |
| | Transparency | 50 (1 ~100) | | |
| | 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**

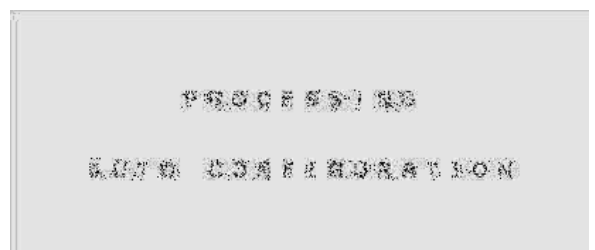
Input Signal is not present. This message is disappeared after 5 seconds.

**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.

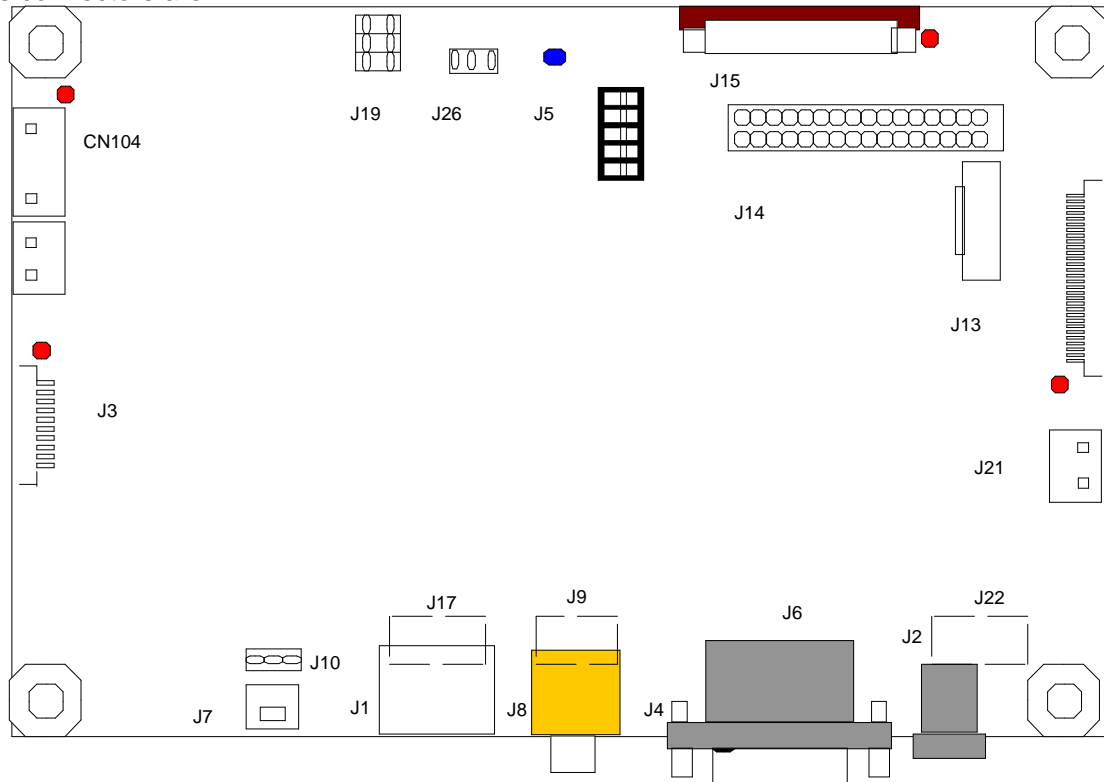
**AUTO CONFIGURATION**

Execute AUTO Function.



CONNECTOR, PINOUT & JUMPERS

The various connectors are:

**Summary**

| Reference | Description | Connector Type |
|-----------|--|------------------------------------|
| CN104 | OSD control Connector | MOLEX 53015-0710 2.0mm RIGHT ANGLE |
| J1 | S-video Jack | MJ373-4-BASE (MINIDIN 3PIN) |
| J2 | Input Dc power Jack | DC-001 2.5Ø |
| J3 | Inverter Connector | YEON-HO 12505WR-10A00 10P 1.25MM |
| J4 | D-SUB Connector | 53015-1210 MOLEX 2.0mm RIGHT ANGLE |
| J5 | Panel Type Select Switch | HDR5X2, 14pin |
| J6 | D-SUB Jack | 15P D-SUB 2.29MM RIGHT ANGLE |
| J7 | Out Power Connector | MOLEX 53015-0310 2.0mm RIGHT ANGLE |
| J8 | C-video Jack | VIDEO 3P JACK (RCA 3PIN) |
| J9 | C-video Connector | 53015-0310 MOLEX 2.0mm RIGHT ANGLE |
| J10 | Out Power Jumper | HDR3X1 CON3P-BASE |
| J13 | LCD Interface TTL - Single lower 2 bit LCD | YEON-HO SMW200-06P |
| J14 | interface board Connector for TTL 6bit | 16*2 HEADER PIN |
| J15 | LCD Interface TTL 8bit FPC Connector | YEON-HO 05002HR-50A01 |
| J17 | S-video Connector | MOLEX 53015-0510 2.0mm RIGHT ANGLE |
| J19 | Panel Power Out Jumper | 3*2 Header |
| J20 | DC power Connector | MOLEX 53015-0410 2.0mm RIGHT ANGLE |

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 |

J1: 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 |

J2: 12V DC power supply

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

J3: 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 |

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

* Refer to Appendix for setting

J6 : ANALOG VGA INPUT

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

J7: Power out connector

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

J8: C-video jack

| Pin No. | Symbol | Description |
|---------|-----------|-----------------------|
| 1,2 | Composite | Composite-video input |
| 3 | GND | Ground |

J9: C-video Connector

| Pin No. | Symbol | Description |
|---------|-----------|-----------------------|
| 1,2 | Composite | Composite-video input |
| 3 | GND | Ground |

J10: 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 |

J13 : LCD Interface connector for TTL type - Single lower 2 bit

| Pin No. | Symbol | Description | Pin No. | Symbol | Description |
|---------|--------|-------------------|---------|--------|-------------------|
| 1 | R0 | . Red output data | 4 | G1 | Green output data |
| 2 | R1 | . Red output data | 5 | B0 | Blue output data |
| 3 | G0 | Green output data | 6 | B1 | Blue output data |

J14: 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 |

J15: LCD Interface connector for 8bit TTL type

| Pin No. | Symbol | Description | Pin No. | Symbol | Description |
|---------|--------|-------------------|---------|--------|-------------------------|
| 1 | NC | . | 26 | R1 | Red output data |
| 2 | NC | . | 27 | R2 | Red output data |
| 3 | GND | Ground | 28 | R3 | Red output data |
| 4 | GND | Ground | 29 | GND | Ground |
| 5 | B0 | Blue output data | 30 | R4 | Red output data |
| 6 | B1 | Blue output data | 31 | R5 | Red output data |
| 7 | B2 | Blue output data | 32 | R6 | Red output data |
| 8 | B3 | Blue output data | 33 | R7 | Red output data |
| 9 | GND | Ground | 34 | GND | Ground |
| 10 | B4 | Blue output data | 35 | CLK | Display Clock |
| 11 | B5 | Blue output data | 36 | GND | Ground |
| 12 | B6 | Blue output data | 37 | DE | Display Enable |
| 13 | B7 | Blue output data | 38 | GND | Ground |
| 14 | GND | Ground | 39 | VSYNC | Display Vertical Sync |
| 15 | G0 | Green output data | 40 | HSYNC | Display Horizontal Sync |
| 16 | G1 | Green output data | 41 | GND | Ground |
| 17 | G2 | Green output data | 42 | VCC | VDD For LCD Module |
| 18 | G3 | Green output data | 43 | VCC | VDD For LCD Module |
| 19 | GND | Ground | 44 | VCC | VDD For LCD Module |
| 20 | G4 | Green output data | 45 | VCC | VDD For LCD Module |
| 21 | G5 | Green output data | 46 | GND | Ground |
| 22 | G6 | Green output data | 47 | GND | Ground |
| 23 | G7 | Green output data | 48 | NC | . |
| 24 | GND | Ground | 49 | NC | . |
| 25 | R0 | Red output data | 50 | NC | . |

* Optional connector for LC201V01 (LG) & A201SN01/2 (AU)

J17: S-Video Input Connector

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

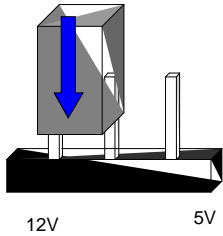
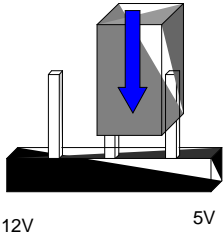
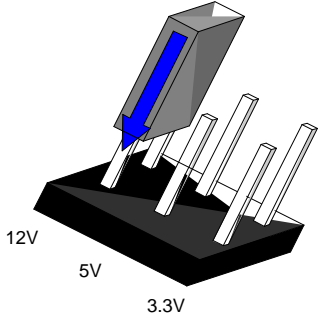
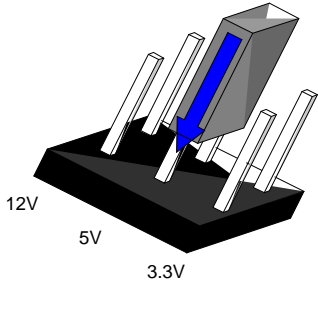
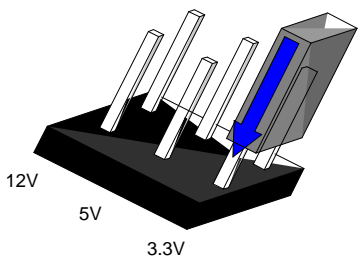
J19: LCD Panel power select jumper

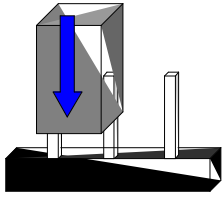
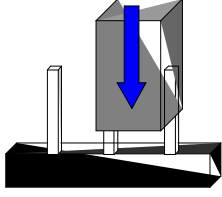
| Pin No. | Symbol | Description |
|---------|--------|-------------|
| 1 | 3.3V | 3.3V |
| 2 | 12V | 12V |
| 3 | 5V | 5V |

J100: LCD Interface connector for LVDS type

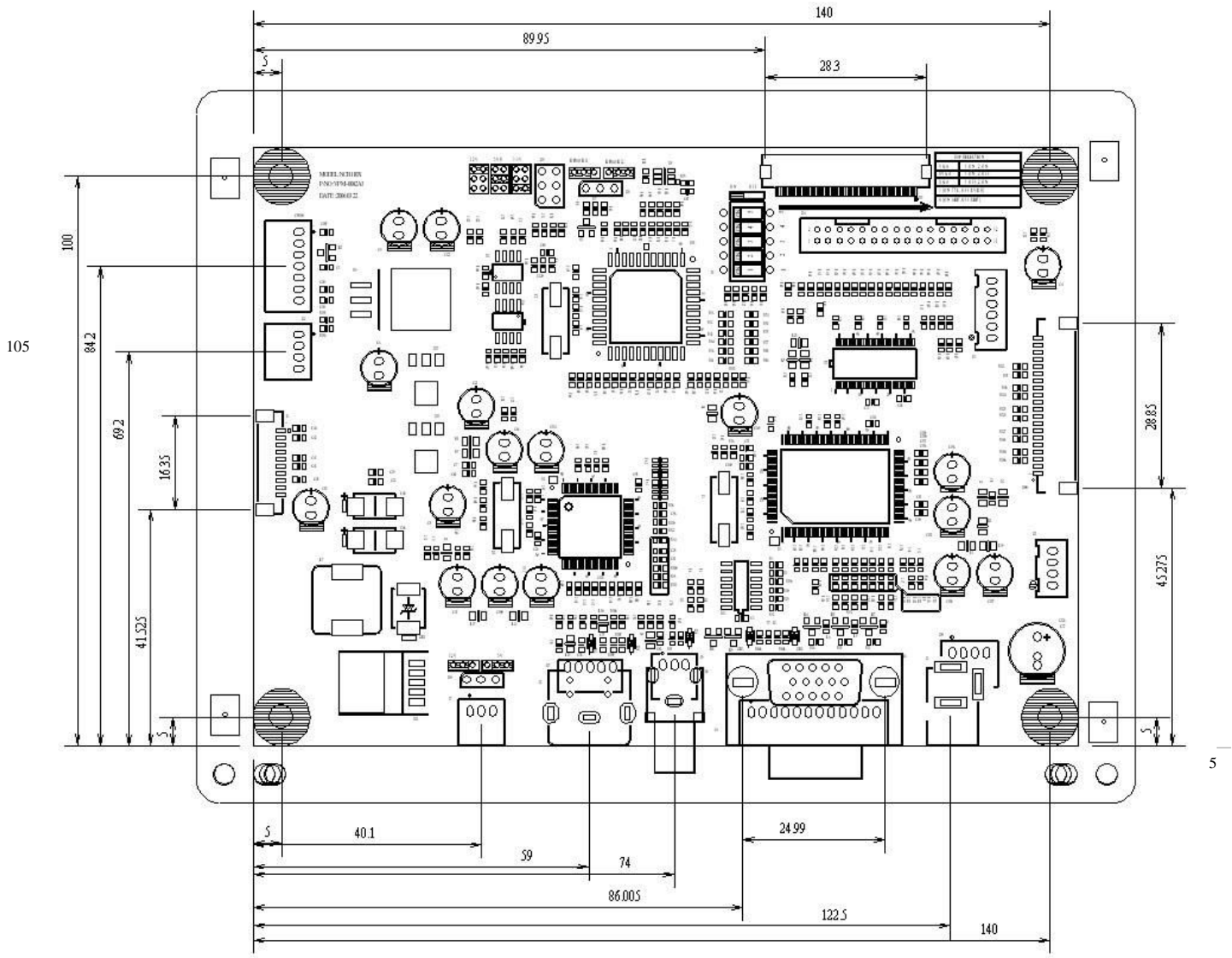
| Pin No. | Symbol | Description |
|---------|---------|--|
| 1 | GND | Ground |
| 2 | GND | Ground |
| 3 | Y3P | LVDS 3 Channel Positive Signal for LCD Module (6Bit Unused) LVDS |
| 4 | Y3M | 3 Channel Negative Signal for LCD Module (6Bit Unused) |
| 5 | GND | Ground |
| 6 | CLKOUTP | LVDS Clock Positive 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 |

Summary: jumpers setting

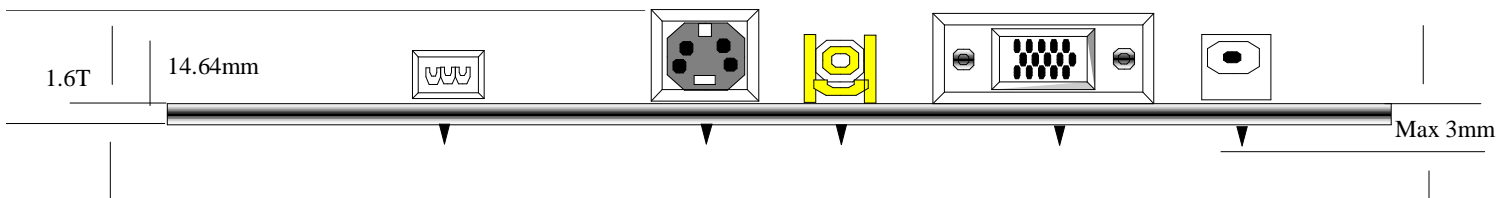
| Reference | Description | Connector Type |
|-----------|---|---|
| J10 | On board +12V logic power enable |  <p>12V 5V</p> |
| | On board +5V logic power enable |  <p>12V 5V</p> |
| J19 | 12V panel power CAUTION: Incorrect setting can damage panel |  <p>12V 5V 3.3V</p> |
| | 5V panel power CAUTION: Incorrect setting can damage panel |  <p>12V 5V 3.3V</p> |
| | 3.3V panel power CAUTION: Incorrect setting can damage panel |  <p>12V 5V 3.3V</p> |

| | | |
|------------|--|---|
| <p>J26</p> | <p>Inverter Dimming Setting 0V (For Monitor LCD)</p> |  <p>DIMADJ1 DIMADJ2</p> |
| | <p>Inverter Dimming Setting 3.3V (For LCD TV)</p> |  <p>DIMADJ1 DIMADJ2</p> |

CONTROLLER DIMENSIONS



145



APPLICATION NOTES

USING THE CONTROLLER WITHOUT BOTTONS ATTACHED

This is very straightforward:

- z 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.
- z Remove the control switches, the 7-way (J2) cable.
- z 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:

- z Power
- z ON/OFF
- z 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: NCB110 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, ie 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 more clear and stable image on a screen

Table 6.1) RGB input format

| Spec Mode | Pixel Freq. MHz | Horizontal Timing | | | | Vertical Timing | | | |
|---------------|-----------------------|-------------------|--------------|----------------|-----------------|-----------------|-------------|---------------|----------------|
| | | Sync Polar | Freq. KHz | Total Pixel | Active Pixel | Sync Polar | Freq. Hz | Total Line | Active Line |
| | 640*350@70Hz | 25.144 | P | 31.430 | 800 | 640 | N | 70.000 | 449 |
| 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 |

ACCESSORY

This board requires several accessories to build a complete display unit. We 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)

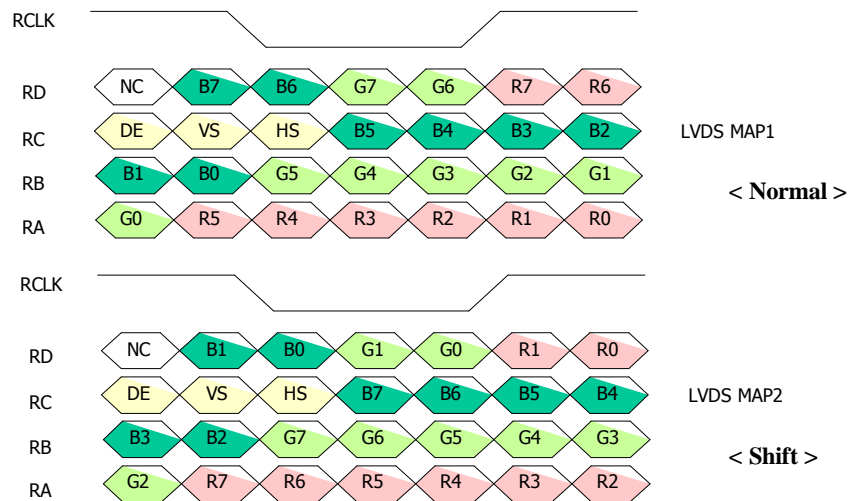
APPENDIX

* 1 ~ 2 : Output Resolution

| 1 | 2 | Resolution |
|-----|-----|------------|
| ON | ON | 640x480 |
| ON | OFF | 800x600 |
| OFF | ON | 1024x760 |
| OFF | OFF | * |

* 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 : Normal Panel

OFF: SHARP / Hydis Panel
(VGA / SVGA: Sharp)

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 NCB110 board. And we will try continuously to the model names of the LCD panels that have been tested.

| No. | LCD Model Name | LCD | LCD | Resolution | | SW1 | SW2 | SW3 | SW4 | SW5 | Dim |
|-----|-----------------------|--------|-------|------------|-------------------|-----|-----|-----|-----|-----|------|
| | | vendor | VCC | | Option (note1) | | | | | | |
| 1 | LB064V02 | LG | +3.3V | VGA | VS6S | ON | ON | ON | ON | ON | Dim1 |
| 3 | LB104V3 | LG | +3.3V | VGA | VS6S | ON | ON | ON | ON | ON | Dim1 |
| 4 | LP104S5 | LG | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 5 | LP104S6 | LG | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 6 | LB121S1 | LG | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 7 | LB121S02 | LG | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 8 | LC121S1 | LG | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 9 | LC150X01-C3 | LG | +12V | XGA | XS8N | OFF | ON | OFF | OFF | ON | Dim1 |
| 10 | LM150X08-A4 | LG | +3.3V | XGA | XS8N | OFF | ON | OFF | OFF | ON | Dim1 |
| 11 | LC151X01-C3 | LG | +5.0 | XGA | XS8N | OFF | ON | OFF | OFF | ON | Dim1 |
| 12 | LC201V01 | LG | +5V | VGA | VS8N | ON | ON | ON | ON | ON | Dim1 |
| 13 | LC201V02 | LG | +12V | VGA | VS8N | ON | ON | ON | ON | ON | Dim1 |
| 14 | HT10X21-100 | HYDIS | +3.3V | XGA | XS6S | OFF | ON | ON | ON | ON | Dim1 |
| 15 | HT12X11 | HYDIS | +3.3V | XGA | XS6S | OFF | ON | ON | ON | ON | Dim1 |
| 16 | HLT15X15 | HYDIS | +3.3V | XGA | XS8N | OFF | ON | OFF | OFF | ON | Dim1 |
| 17 | B104SN02 | AU | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 18 | G121SN01 | AU | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 19 | B150XG05 | AU | +3.3V | XGA | XS6S | OFF | ON | ON | ON | ON | Dim1 |
| 20 | M150XN07 | AU | +3.3V | XGA | XS6S | OFF | ON | ON | ON | ON | Dim1 |
| 21 | G150XG01 | AU | +3.3V | XGA | XS6S | OFF | ON | ON | ON | ON | Dim1 |
| 22 | A201SN01 | AU | +5.0V | SVGA | SS8N | ON | OFF | ON | ON | ON | Dim1 |
| 23 | T-51750GD065J-FW-AA | Optrex | +3.3V | VGA | VS6S | ON | ON | ON | ON | ON | Dim1 |
| 24 | T-51638D084J-FW-A-AC | Optrex | +3.3V | VGA | VS6S | ON | ON | ON | ON | ON | Dim1 |
| 25 | T-51639D084JU-FW-A-AB | Optrex | +3.3V | XGA | XS6S | OFF | ON | ON | ON | ON | Dim1 |
| 26 | T-51513D104JU-FW-A-AC | Optrex | +3.3V | VGA | VS6S | ON | ON | ON | ON | ON | Dim1 |
| 27 | T-51944D104J-FW-A-AA | Optrex | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 28 | T-51512D121J-FW-A-AB | Optrex | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 29 | T-51866D121J-FW-A-AA | Optrex | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | ON | Dim1 |
| 30 | T-51756D121J-FW-A-AA | Optrex | +3.3V | XGA | XS6S | OFF | ON | ON | ON | ON | Dim1 |

| | | | | | | | | | | | |
|----|----------------------|--------|-------|------|------|-----|-----|----|----|-----|------|
| 31 | T-51863D150J-FW-A-AB | Optrex | +3.3V | XGA | XS6S | OFF | ON | ON | ON | ON | Dim1 |
| 32 | LQ064V3DG01 | Sharp | +3.3V | VGA | VS6S | ON | ON | ON | ON | OFF | Dim1 |
| 33 | LQ104V1DG51 | Sharp | +3.3V | VGA | VS6S | ON | ON | ON | ON | OFF | Dim1 |
| 34 | LQ104S1DG21 | Sharp | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | OFF | Dim1 |
| 35 | LQ121S1DG41 | Sharp | +3.3V | SVGA | SS6S | ON | OFF | ON | ON | OFF | Dim1 |
| 36 | NL10276BC12-02 | NEC | +3.3V | XGA | XS6N | OFF | ON | ON | ON | ON | Dim1 |

Note1 : Abbreviated word :

① ② ③
S S 6 S

④ V/S/X

⑤ 6/8 : 6 6BITS 8 8BITS

: V VGA, S SVGA, X XGA

⑥ S/D : SINGLE PORT, D DUAL PORT

⑦ S/N : (SFT) SHIFT, N(NOR) NORMAL