

SPECIFICATION FOR APPROVAL
(ANALOG RGB AND VIDEO INTERFACE CONTROLLER
FOR TFT-LCD INTERFACE)

MODEL NO : AP4310

APPROVE	REFERENCE

(PLEASE RETURN ONE OF THESE TO US IMMEDIATELY WITH YOUR SIGNATURE FOR APPROVAL)

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1. Product Overview

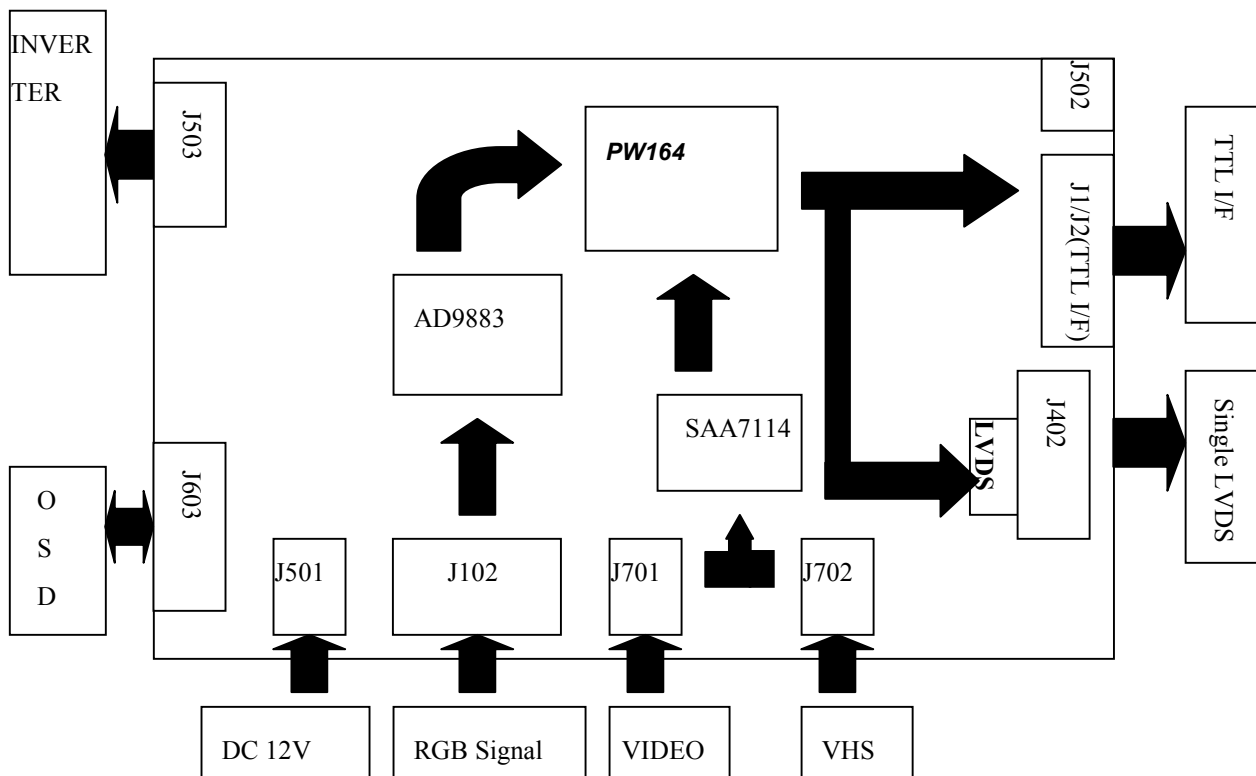
This board accepts standard analog RGB and SYNC (CRT like) signals from any XGA video controller and/or Composite, PAL or NTSC, signal. And also generates all the necessary control signals and the panel data to drive TFT-LCDs. This board supports from XGA resolutions at vertical refresh rate up to 85Hz. Lower resolution mode can be expanded to full-screen or centered through the On-Screen Menu user interface. The user interface includes Phase, Brightness, Contrast, Horizontal and Vertical Position adjustment etc. via on-screen programming.

2. Features

- λ Support up to XGA(1024x768) resolution.
- λ Automatic Mode detection from VGA to XGA.
- λ **Accept H-/V-Separate Sync, Csyn (LVDS 2 Port), Sync On Green, and Interlace mode**
- λ Provides up to 1600k Colors.
- λ Flicker-free, sharp image/text data.
- λ Refresh rates up to 85Hz without external video memory.
- λ Full screen image expansion or centered-mode display for lower resolutions.
- λ User friendly On Screen Display Menu to control image
 - λ Auto-Adjust
 - λ Brightness
 - λ Contrast
 - λ RGB Control
 - λ Clock Phase
 - λ Geometry
 - λ Screen Zooming
 - λ Input Type
 - λ OSD Control
 - λ Default-Settings
- λ Power management support (DPMS - VESA compliant)
- λ VESA-DDC1/2B display ID for Plug and Play Operation (Option)

3. System Configuration

λ Figure 1. System Block Diagram



4. Electrical Specifications

λ Video input timing;

λ Supported vertical refresh rates for each modes are as follow:

λ	640x350	70Hz
λ	640x400	70Hz
λ	720x400	70Hz
λ	640x480	56~85Hz
λ	800x600	56~85Hz
λ	1024x768	56~85Hz

λ Sync. : H/V Separate, Sync On Green, Interlace, Composite Sync

λ Video - RGB Analog(750 Ohm, 0.7Vp-p)
- Composite Video(NTSC or PAL), S-video (Option)

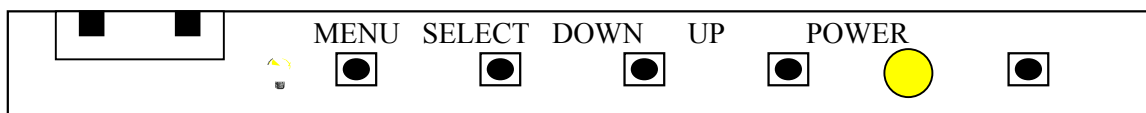
λ Electrical Characteristics;

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply Voltage		-----	11.4	12.0	12.6	Vdc
Absolute Max.Rating		-----		12.0	13.0	Vdc
Current		Board Only	0.4	0.5	0.55	A
Consumption		With LM151X2		1.8	2.4	A
Note : Test was performed with the LG's LCDs and inverters which are made by Power Net Inc..						

5. Operational Setup

Fine tune of various functional parameters can be adjusted via push buttons.

Visual feedback is provided in the form of an On-Screen-Menu.



There are 5 tack switches to control the screen on OSD PCB board and each function is as follows;

<Table 1> Function of each OSD key

No.	Button name	Switch Function
1	Menu	1. First click : Appears the OSD Main Menu 2. Second click : Change the value of OSD sub-menu to be able to control (toggle key)
2	Select	1. Move between main menu 2. Move between sub-menu inside main-menu
3	Down	1. The adjustment of sub-menu value inside main-menu (Selected value decrease)
4	Up	1. The adjustment of sub-menu value inside main-menu (Selected value increase)
5	Power	1. Put on a power, put off a power
6	Select + Down	1. Hot key for auto adjust.
7	Down + Up	1. Hot key to search another signal (RGB, Video, S-video).

1) On-Screen Display

Displaying an OSD menu, if the buttons remain untouched for a few seconds, the screen will be disappeared after save the changed parameters.

<Table 2> shows OSD menu for analog RGB and Composite Video, respectively.

MAIN MENU	SUB MENU	RANGE OF CONTROL
Picture	Brightness	0 ~ 100
	Contrast	0 ~ 100
	H position	0 ~ 100
	V position	0 ~ 100
	Phase	0 ~ 31
	Frequency	1550 ~ 1650
	Scaling	fill all, fill aspect ratio, one to one
Advanced	Sharpness	1 ~ 5
	Gamma	Linear, CRT
	Color temp	5000, 7300, 9300, user
	User red	0 ~ 100
	User green	0 ~ 100
	User blue	0 ~ 100
Options	OSD	Position of OSD on screen
	OSD h pos	0 ~ 100
	OSD v pos	0 ~ 100
	Calibration	Press <UP> to select
	Language	Korean, English, German, Japanese
	Back light	0 ~ 100
Utilities	OSD time out	1 ~ 60 second
	OSD back ground	Opaque, translucent
	Freeze frame	on , off
	Factory reset	Press <UP> to select

<Table 3> Structure of On-screen menu for Composite Video

MAIN MENU	SUB MENU	RANGE OF CONTROL
Picture	brightness	0 ~ 100
	contrast	0 ~ 100
	h position	0 ~ 100
	v position	0 ~ 100
	Color	0 ~ 31
	Tint	1550 ~ 1650
	sharpness	0 ~ 100
	Scaling	normal, wide, zoom, anamorphic, zoom2
advanced	sharpness	1 ~ 5
	gamma	linear, crt
	color temp	5000, 7300, 9300, user
	user red	0 ~ 100
	user green	0 ~ 100
	user blue	0 ~ 100
video	video format	auto, ntsc, pal, secam
	video type	dvd, vcr
options	Osd	
	osd h pos	0 ~ 100
	osd v pos	0 ~ 100
	Calibration	Press <UP> to select
	Language	Korean, English, German, Japanese
	back light	0 ~ 100
Utilities	OSD time out	1 ~ 60 second
	OSD back ground	Opaque, translucent
	Freeze frame	on , off
	Factory reset	Press <UP> to select

1) Name of OSD Menu and operational method for RGB Mode

Left column and right column of OSD menu represents “main menu” and “sub-menu” respectively.

Main Menu is left menu and Sub Menu is right menu

(1) Sub Menu of “picture”

Figure 5.1.1 shows sub menu of “picture”.

Each sub menu can be selected by "menu key"

To select next sub menu(brightness, contrast, h position, v position, phase, frequency, scaling), push the "select" key of OSD PCB. And to adjust the selected menu, push "Up" and/or "Down" key.

<Figure 5.1.1 Sub-Menu of “Picture”>



(2) Sub Menu of “advanced”

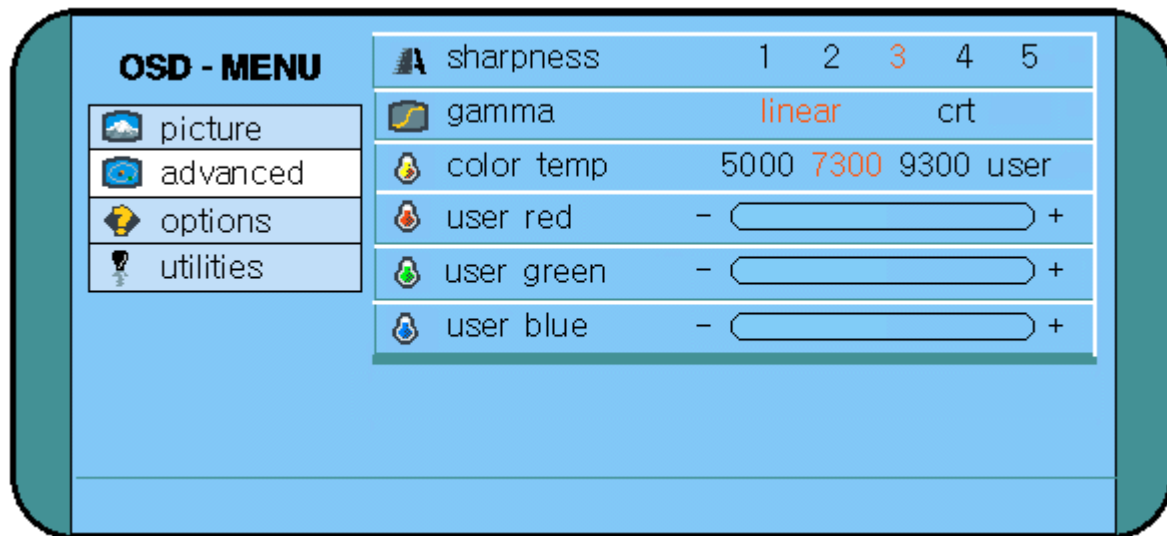
Figure 5.1.2 shows sub menu of “advanced”.

To return of main menu, just one time push the menu key button.

To select next sub menu(sharpness, gamma, color temp), push the "select" key of OSD PCB.

To control them, push the "Up" and/or "Down" key.

<Figure 5.1.2 Sub Menu of “advanced”>

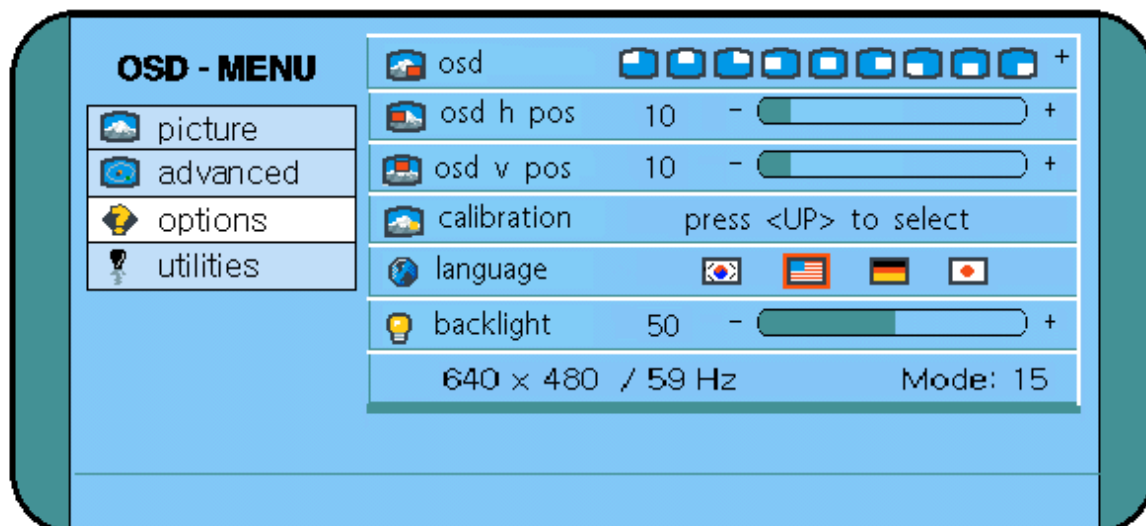


(3) Sub Menu of “options”

Figure 5.1.3 shows sub menu of options menu.

To select next sub menu(OSD position, calibration, language, backlight), push the "select" key of OSD PCB. And to control them, push the "Up" and "Down key"

<Figure 5.1.3 Sub Menu of “options”>

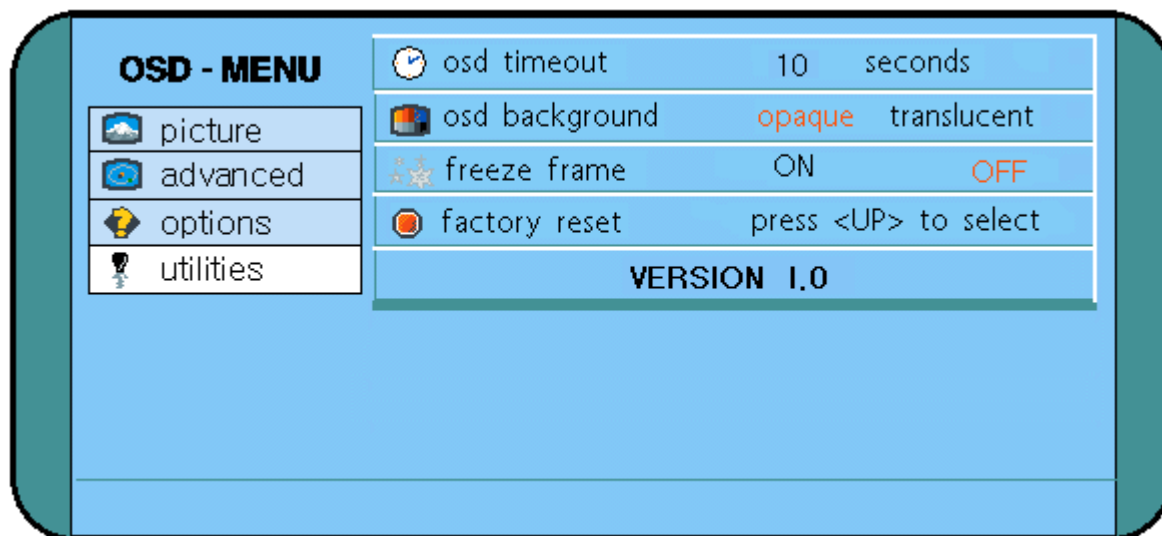


(4) Sub Menu of "Utilities"

Figure 5.1.4 shows sub menu of "Utilities".

To select next sub menu (osd timeout, osd background, freeze frame, factory reset), push the "select" of OSD PCB. And to adjust the value, push the "Up" and "Down" key.

<Figure 5.1.4 Sub Menu of "Utilities">



2) Name of OSD Menu and operational method for Video and S-video

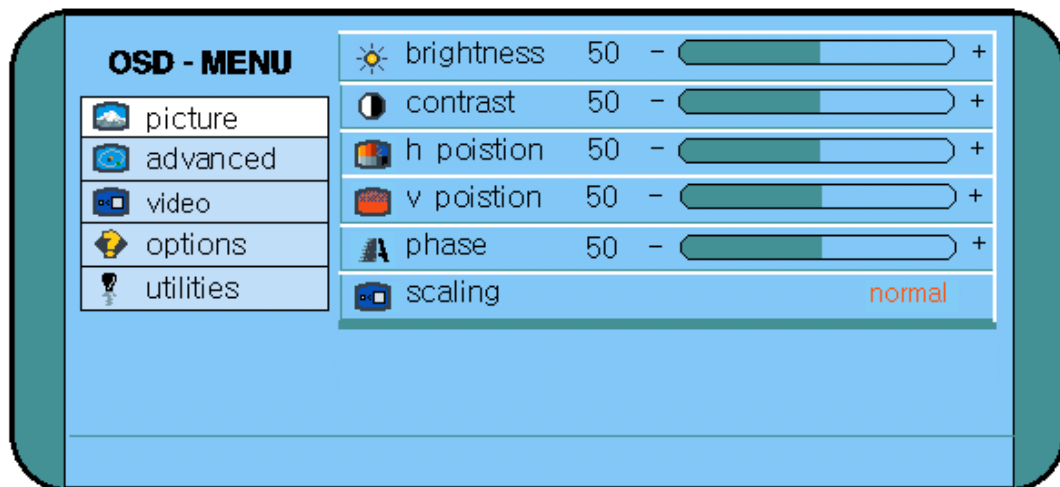
(1) Sub Menu of "picture"

Figure 5.2.1 shows sub menu of "picture".

Each sub menu can be selected by "menu key"

To select next sub menu (brightness, contrast, h position, v position, phase, frequency, scaling), push the "select" key of OSD PCB. And to adjust the selected menu, push "Up" and/or "Down" key.

<Figure 5.2.1 Sub-Menu of "Picture">



(2) Sub Menu of "advanced"

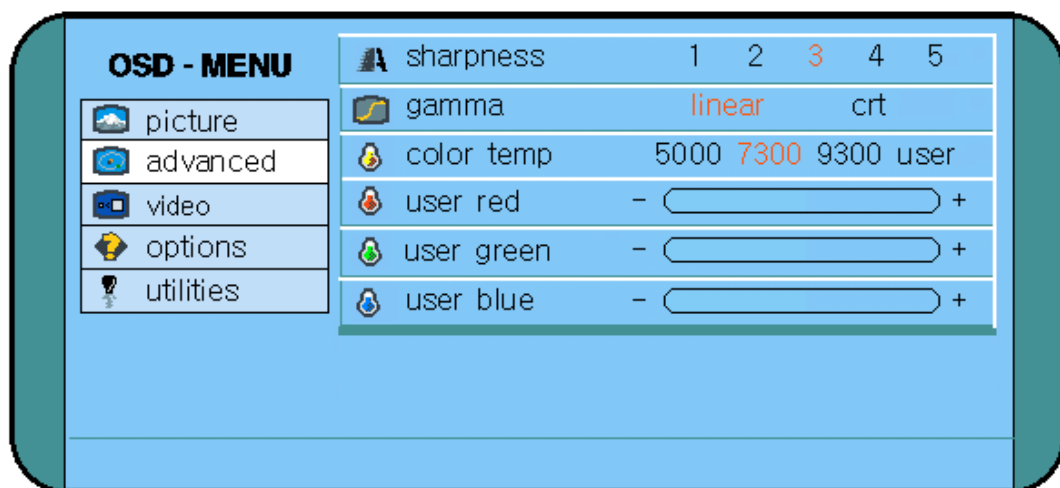
Figure 5.2.2 shows sub menu of "advanced".

To return of main menu, just one time push the menu key button.

To select next sub menu(sharpness, gamma, color temp), push the "select" key of OSD PCB.

To control them, push the "Up" and/or "Down" key.

<Figure 5.2.2 Sub Menu of "advanced">

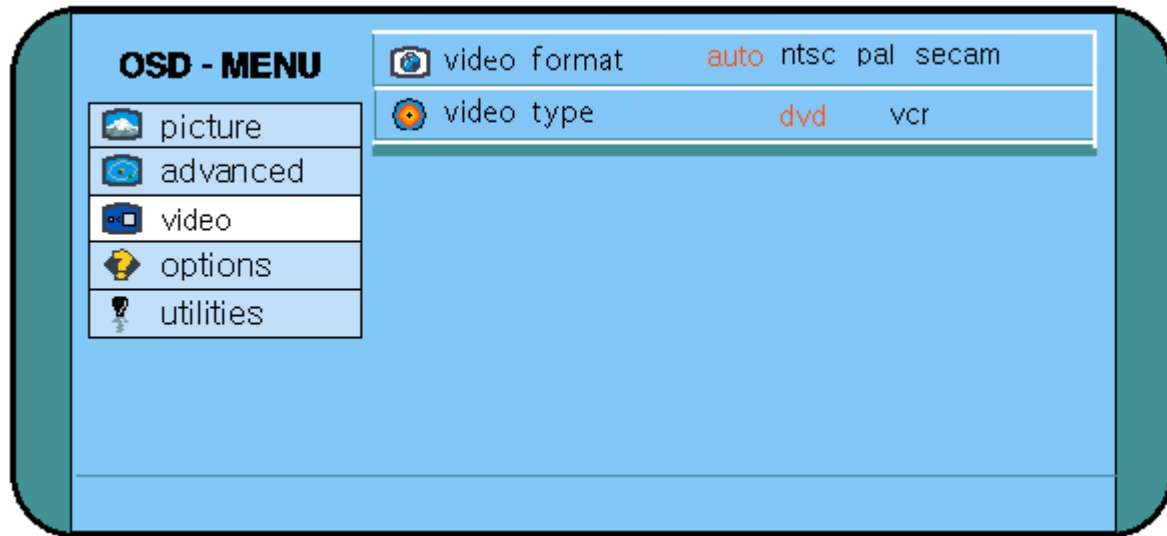


(3) Sub Menu of "video"

Figure 5.2.3 shows sub menu of video menu.

To select next sub menu(video format and video type), push the "select" key of OSD PCB. And to control them, push the "Up" and "Down key"

<Figure 5.2.3 Sub Menu of "video">



(4) Sub Menu of "options"

Figure 5.2.4 shows sub menu of options menu.

To select next sub menu(OSD position, calibration, language, backlight), push the "select" key of OSD PCB. And to control them, push the "Up" and "Down key"

<Figure 5.2.4 Sub Menu of "options">



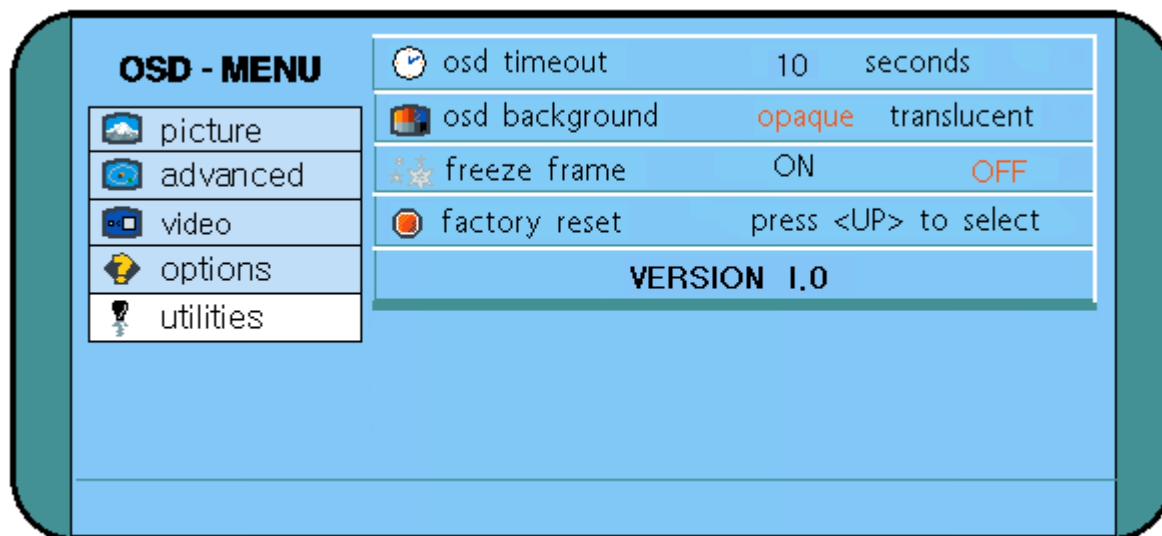
(5) Sub Menu of "Utilities"

Figure 5.2.5 shows sub menu of "Utilities".

To select next sub menu (osd timeout, osd background, freeze frame, factory reset), push the "select" of OSD PCB.

And to adjust the value, push the "Up" and "Down" key.

<Figure 5.2.5 Sub Menu of “Utilities”>



6. Input Connectors

λ Power Input connector(J501)

λ Connector : DC12 Jack(J501)

Pin No.	Symbol	Description
1	Vin	+12Vdc
2	GND	GND

λ Analog RGB Input connector(J101)

λ Connector : Mini D Sub 15pin

Pin No. No.No.	Symbol	Signal Name	Pin No.	Symbol	Signal Name
1	RED	Analog Red	9	+5V	+5Vdc
2	GREEN	Analog Green	10	SGND	Sync GND
3	BLUE	Analog Blue	11	ID0	Reserved
4	ID2	Reserved	12	SDA	DDC Serial Data
5	GND	Digital GND	13	HSYNC	Horizontal Sync
6	RGND	Red Return	14	VSNC	Vertical Sync.
7	GGND	Green Return	15	SCL	DDC Data Clock
8	BGND	Blue Return			

λ Alternate Analog RGB Input Connector(J102)

λ Connector : 53015-1410 made by Molex

Pin No.	Symbol	Signal Name	Pin No.	Symbol	Signal Name
15	RED	Analog Red	7	+5V	+5Vdc
14	GREEN	Analog Green	6	SGND	Sync GND
13	BLUE	Analog Blue	5	ID0	Reserved
12	ID2	Reserved	4	SDA	DDC Serial Data
11	GND	Digital GND	3	HSYNC	Horizontal Sync
10	RGND	Red Return	2	VAYNC	Vertical Sync.
9	GGND	Green Return	1	SCL	DDC Data Clock
8	BGND	Blue Return			

λ CVBS input connector for Composite Video (J701)

Pin No.	Symbol	Description
1	CVBS	Composite video signal
2	GND	GND

λ S-video input connector (J702)

Pin No.	Symbol	Description
1,2,5,6,7	GND	Ground
3	Y	Luminance
4	C	Chrominance

λ OSD, LED Interface Connector(J603)

λ Connector : 53015-1010 made by Molex

Pin No.	Symbol	Description
1	Menu On/Off	OSD Menu control
2	MENUSEL	OSD menu selection
3	GND	
4	MENU UP	Increase
5	Menu Down	Decrease
6	LED	Red

7	NC	No connection
8	LED	Green
9	GND	
10	Power	On/Off

7. Output Connectors for LCD Interface

7-1 TTL interface(J1, J2)

Pin No	J1 (for Single Port)	J2 (For Dual Port)	Pin No.	J1 (for Single Port)	J2 (For Dual Port)
1	GND	GND	22	B3	GND
2	CLOCK	R0	23	B4	G'2
3	GND	R1	24	B5	G'3
4	HSYNC	G0	25	B6	G'4
5	VSYNC	G1	26	B7	G'5
6	GND	B0	27	GND	G'6
7	R2	B1	28	DTMG	G'7
8	R3	GND	29	GND	GND
9	R4	R'0	30	VCC	B'2
10	R5	R'1	31	VCC	B'3
11	R6	G'0	32	VCC	B'4
12	R7	G'1	33		B'5
13	GND	B'0	34		B'6
14	G2	B'1	35		B'7
15	G3	GND	36		GND
16	G4	R'2	37		NC
17	G5	R'3	38		3.3V
18	G6	R'4	39		3.3V
19	G7	R'5	40		3.3V
20	GND	R'6			
21	B2	R'7			

7-2 LVDS Interface(J3)

Used cnt : F1-WEB21S-HF(JAE), Mating Cnt : F1-SEB20P-HF Flatlink : THC63LVDM83A			
Pin No	Description	Pin No.	Description
1	VCC(+3.3V)	11	GND
2	VCC(+3.3V)	12	A1M
3	VCC(+3.3V)	13	A1P
4	VCC(+3.3V)	14	GND
5	GND	15	A2M
6	GND	16	A2P
7	GND	17	GND
8	GND	18	CLKM
9	A0M	19	CLKP
10	A0P	20	GND

λ Backlight Power Connector(J503)

λ Connector : 53015-0710 made by Molex

Pin No.	Symbol	Description
1	GND	Ground
2	GND	
3	GND	
4	Vbr	0.0 ~ 3.5Vdc
5	On/Off	0/5Vdc(High Active)
6	Vin	+12Vdc Input
7	Vin	+12Vdc Input

8. Mechanical Dimension

