

DATA SHEET



Model : C-Series

Ver. 1.2

Nov 10, 2011

www.crystal-display.com

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The information presented in this document may form a part of quotation or contract under the agreement of both parties. Otherwise, this datasheet is subject to change without prior notice.

Revision No.	Date	Page	Description
Ver. 1.0	Mar . '10	1~39	First Draft, Preliminary Specification
Ver. 1.1	Aug. '11	11	Corrected typo error of pin assignment.
Ver. 1.2	Nov. '11	12	Updated J403 pin assignment.

C-Series

2. General Descriptions

C-Series is an advanced TFT-LCD Monitor Control Board. This design enables a full conventional CRT monitor and/or video replacement with a large size Active Matrix LCD module. It is suitable for video resolution up to WUXGA @ 60Hz(1080 vertical by 1920 horizontal pixel array) in all video modes, the full display area of the module is used. The design is implemented as a single printed circuit board.

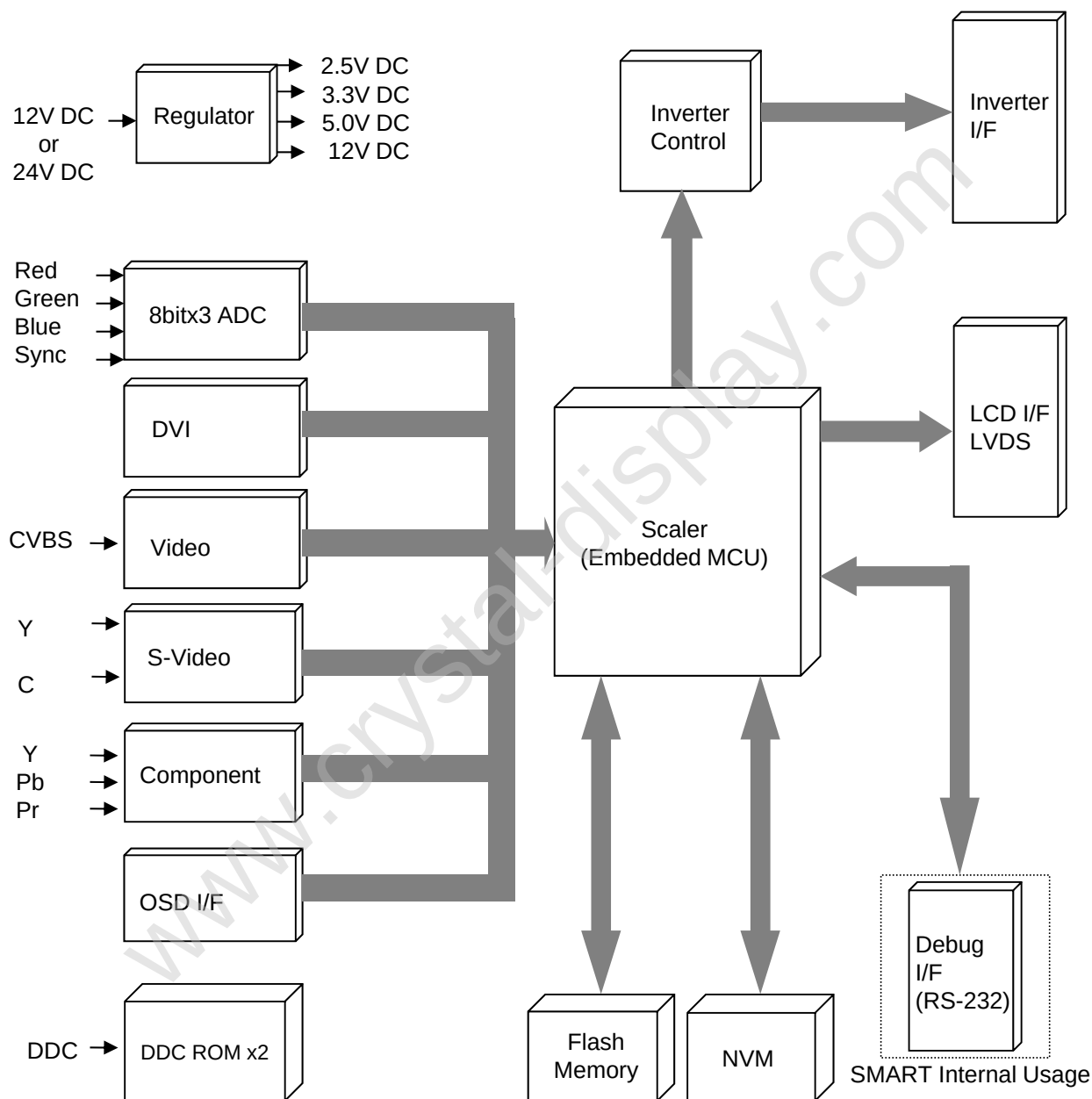
C-Series is designed to support various TFT-LCDs up to WUXGA resolution by BIOS option.

3. Features

- Designed to give state-of-the-art picture quality
- Analog RGB / DVI (Digital Video Interface) / CVBS / S-Video / YPbPr Component (Optional) / with Audio In & Out (Optional).
- Various input combination, e.g., PC monitor only
- Full CRT multi-sync monitor compatibility
- Multi-sync capability up to WUXGA resolution @ 60Hz, compatible standard SVGA, XGA and SXGA VESA timing.
- Expand DOS,VGA,SVGA,XGA, SXGA,UXGA and full HD to full screen display
- True color (16.7M) data processing and display driving
- **3-D motion adaptive video de-Interlace.**
- **Flip (Rotate) function [top to bottom] by OSD selection.**
- Single control operated & transparent On-Screen-Display (hereafter 'OSD') user interface
- Full control of all relevant display and interface parameters via OSD
- PIP & PBP function available.
- VESA DDC 1/2B compliant
- Compatible with VESA DPMS power saving modes
- Form factor: 110mm (L) x 150mm (W) x 19mm(H)
- +12V or +24V DC single power
- Operating temperature: -5°C to 60°C
- OSD & Power Switch Board : FOSD-xxx

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4. Block Diagram

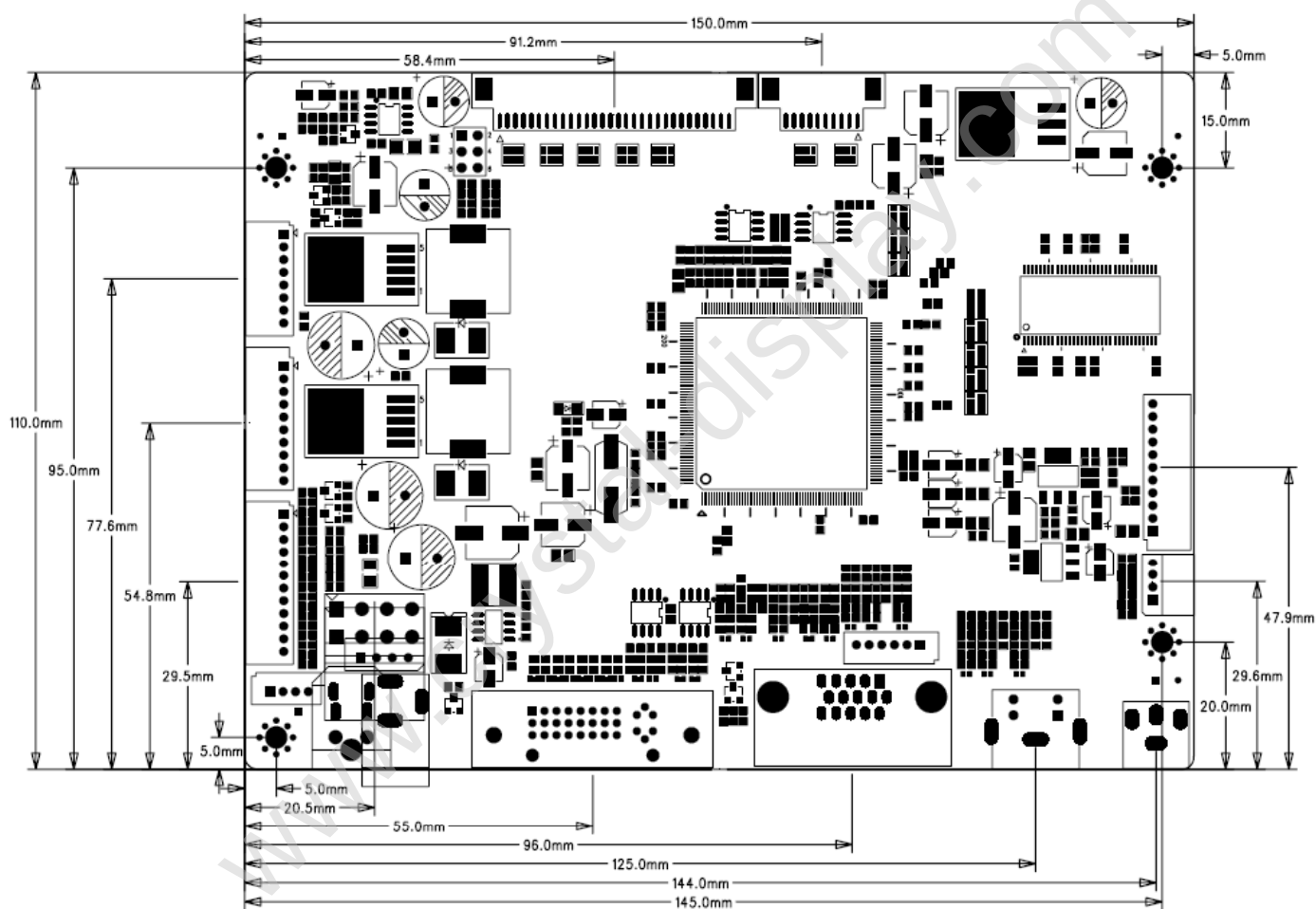


C-Series

5. Outline Dimensions

5.1 Standard Connectors with Special Power connector 4P angle (3.96mm pitch)

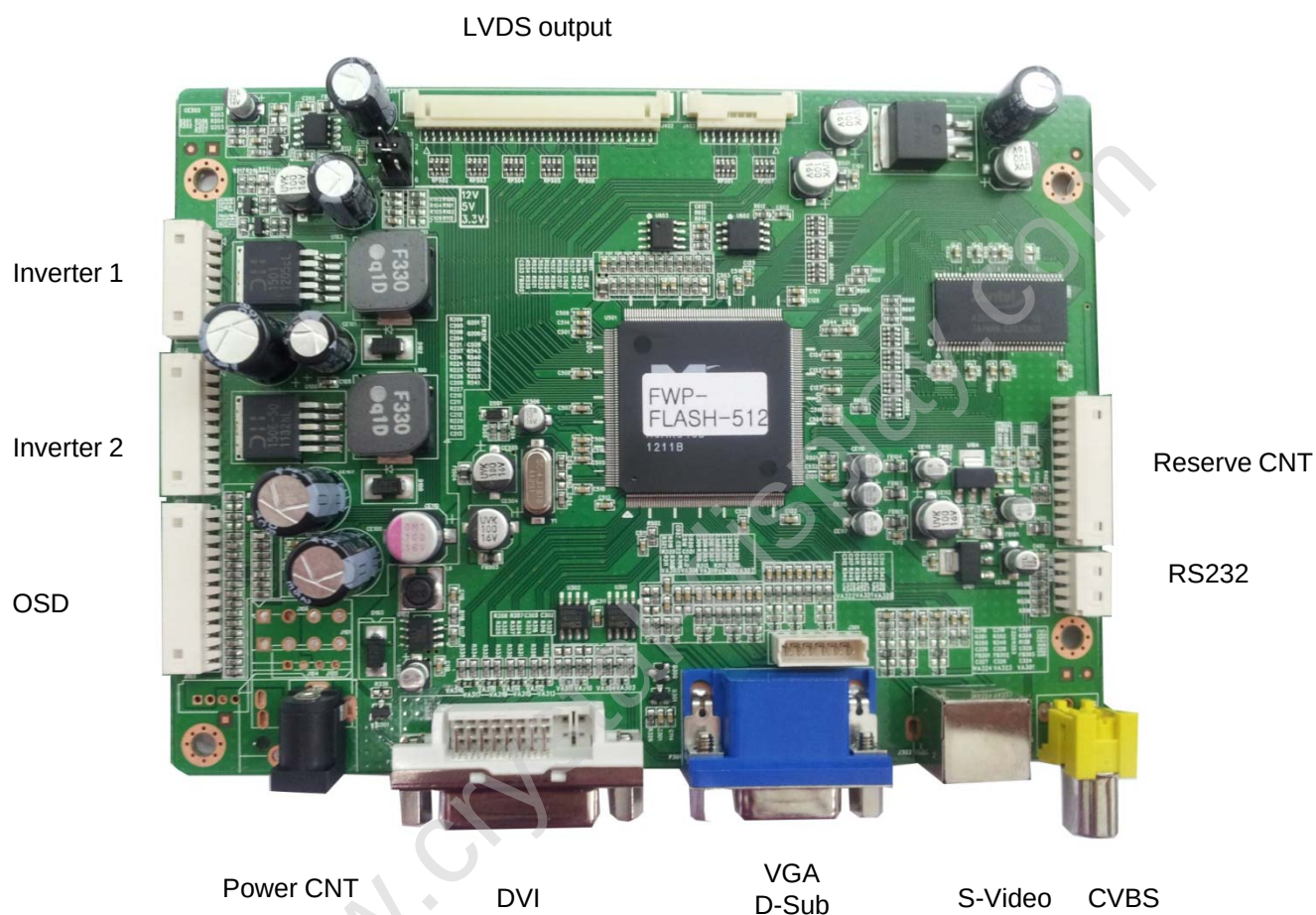
- Dimension : 110mm (L) x 150mm (W) x 19mm(H)



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5.2 Actual connectors location

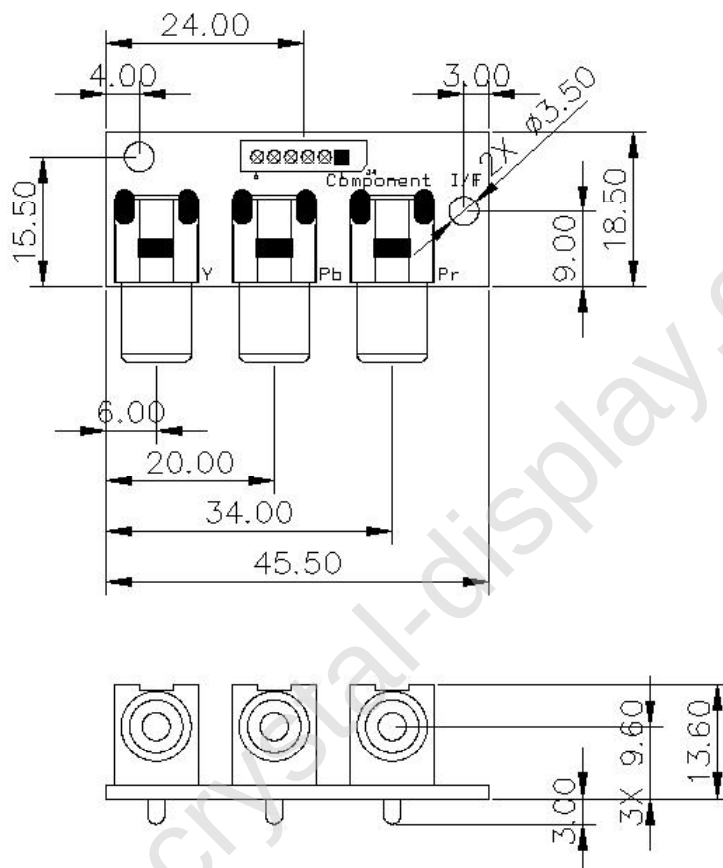
- Analog, DVI, Video and interface connector



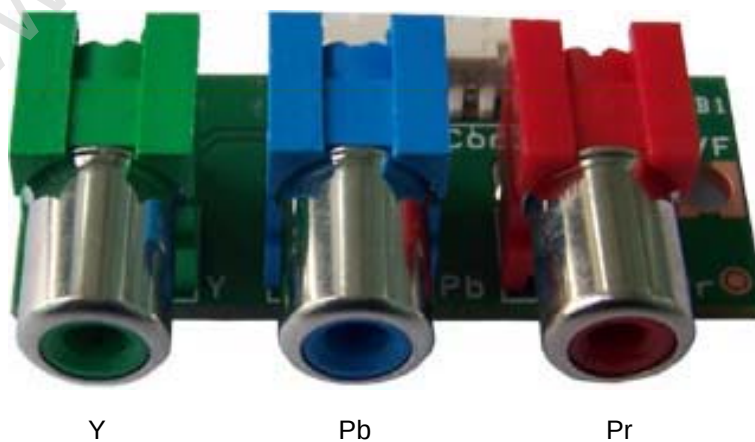
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5.3 Component daughter board

- Dimension : 18.5mm (L) x 45.5mm (W) x 13.6mm(H)



- Component input (Y/Pb/Pr)



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6. Connectors Information

6.1 Input Connectors

- Power Input Connector
Connector : DC12V Jack (J100)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1, 2	GND	GND	3	Vin	+12V DC

- Power Input Connector **(Alternative)**
Connector : Molex 09-75-2044 (J102)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VCC	POWER	3	GND	GND
2	VCC	POWER	4	GND	GND

- Analog RGB Input Connector
Connector : Mini D_Sub 15pin(P301)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	RED	Analog Red	9	NC	+5V DC
2	GREEN	Analog Green	10	SGND	Sync GND
3	BLUE	Analog Blue	11	NC	No Connection
4	GND	No Connection	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			

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- DVI-D Input Connector
Connector : DVI-D (P300)

Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
1	T.M.D.S. Data 2-	9	T.M.D.S. Data 1-	17	T.M.D.S. Data 0-
2	T.M.D.S. Data 2+	10	T.M.D.S. Data 1+	18	T.M.D.S. Data 0+
3	T.M.D.S. Data2/4 Shield	11	T.M.D.S. Data1/3 Shield	19	T.M.D.S. Data 0/5 Shield
4	T.M.D.S. Data 4-	12	T.M.D.S. Data 3-	20	T.M.D.S. Data 5-
5	T.M.D.S. Data 4+	13	T.M.D.S. Data 3+	21	T.M.D.S. Data 5+
6	DDC Clock	14	+5V Power	22	T.M.D.S. Clock Shield
7	DDC Data	15	Ground (Return for +5V, H-Sync, and V-Sync)	23	T.M.D.S. Clock+
8	N/C	16	Hot Plug Detect	24	T.M.D.S. Clock-

- Component Input Connector (C-Series side)
Input Connector : Molex 53014-0610 (J301)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	Pr	Pr	4	GND	Y return
2	GND	Pr return	5	Pb	Pb
3	Y	Y	6	GND	Pb return

- Component Input Connector (Component daughter board side)
Input Connector : Molex 53014-0710 (J4)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	GND	Pb return	5	Pr	Pr
2	Pb	Pb	6	GND	Pr return
3	GND	Y return	7	N.C	N.C
4	Y	Y			

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● S-Video input Connector

Connector :MiniDin-4p (J302)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	GND1	GND1	4	S-VIDEO	CHROMA
2	GND2	GND2	5	GND3	GND3
3	S-VIDEO	LUMINANCE			

● CVBS Connector : RCA yellow (J303)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	CVBS	Video signal	2,3	GND	Video return

● OSD, LED Interface Connector :

Connector : 53015-1210 made by Molex (J203)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	LED 1	LED 1	7	KEY2	Increase
2	LED 0	LED 0	8	KEY3	Decrease
3	Vcc	Vcc 5V	9	KEY4	Down
4	IR	Remote control	10	KEY5	Menu
5	GND	GND	11	KEY6	Source Select
6	KEY1	Power	12	KEY7	Up

● RS-232C Connector :

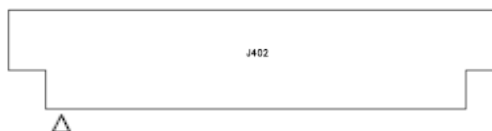
Connector : 53015-0410 made by Molex (J404)

Pin No.	Symbol	Description
1	GND	GND
2	TX	TXD
3	RX	RXD
4	VCC	VCC

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6.2 Output Connectors

- LVDS Output Connector (J402)



Pin No.	Symbol	Descripton	Pin No.	Symbol	Description
1	Tx0-E	Even data	16	Tx1+O	Odd data
2	Tx0+E	Even data	17	GND	Return
3	Tx1-E	Even data	18	Tx2-O	Odd data
4	Tx1+E	Even data	19	Tx2+O	Odd data
5	GND	Return	20	TxCLK-O	Odd data
6	Tx2-E	Even data	21	TxCLK+O	Odd data
7	Tx2+E	Even data	22	Tx3-O	Odd data
8	TxCLK-E	Even data	23	Tx3+O	Odd data
9	TxCLK+E	Even data	24	GND	Return
10	Tx3-E	Even data	25	3.3V	LVDS option
11	Tx3+E	Even data	26	GND	Return
12	GND	Return	27	VCC	Module Power
13	Tx0-O	Odd data	28	VCC	Module Power
14	Tx0+O	Odd data	29	VCC	Module Power
15	Tx1-O	Odd data	30	VCC	Module Power

- LVDS Output Connector (J403) For 10bit supporting



Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	TxE4-	Even data	6	LVS SYNC	Reserved
2	TxE4+	Even data	7	LHS SYNC	Reserved
3	TxO4-	Odd data	8	LDE	Reserved
4	TxO4+	Odd data	9	LCK	Reserved
5	GND	Return	10	GND	Return

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- Backlight Connector
Connector : 53015-0810 made by Molex (J201)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	BRIGHT	Brightness Adjustment	5	GND	Ground
2	ON/OFF	Backlight On/Off	6	GND	Ground
3	GND	Ground	7	12V	12V
4	5V	5V (Not Use)	8	12V	12V

- Backlight Power Connector (For Large size panel)
Connector : 53015-1010 made by Molex(J202)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VDD	INV PWR	6	GND	Ground
2	VDD	INV PWR	7	GND	Ground
3	VDD	INV PWR	8	GND	Ground
4	VDD	INV PWR	9	GND	Ground
5	VDD	INV PWR	10	GND	Ground

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7. Reference Data

Video Input Timing;

Supported vertical refresh rates for each modes are as follows:

640 x 350	70Hz
640 x 400	70Hz
700 x 560	55~75Hz
720 x 350	70Hz
720 x 400	70Hz
640 x 480	60~75Hz
800 x 600	60~75Hz
1024 x 768	60~75Hz
1152 x 864	60~75Hz
1280 x 1024	60~75Hz
1280 x 768	60~75Hz
1366 x 768	60~75Hz
1440 x 900	60~75Hz
1600 x 1200	60~75Hz
1680 x 1050	60~75Hz
1920 x 1080	60Hz

Sync. : H/V Separated TTL, Composite Sync

● **Electrical Parameters**

Symbol	Description	Min	Type	Max	Unit
V_{DD}	+12V (+24V) DC Power Supply	10.8	12.0	24.5	V
$V_{i(RGB)}$	Video Input Signal (w.r.t. GND)	0.5	0.7	1.0	V_{PP}
f_S	Video Sample Rate			80	MHz
f_{HS}	Horizontal Sync. Frequency	30		60	KHz
f_{VS}	Vertical Sync Frequency	56		75	Hz
F_{SIH}	Sync Input High Level	2.5			V
V_{SIL}	Sync Input Low Level			0.8	VDC
I_{DD2}	Supply Current +12V (with LCD & Inverter)		2.5	3	A

Note 1. Power consumption measuring condition is 2 pixel check board pattern @ SXGA 75Hz and maximum brightness with Samsung LTM170E6 & inverter at t_A 25°C.

C-Series

8. Supported Input Formats

8.1 Video Mode Support

The C-Series series can support any video mode within the following input constraints:

- Signal sample frequency with the input $\leq 80\text{MHz}$
- Horizontal sync frequency between 30KHz and 80KHz

The modes are detected with the presentation of the input and previous alignments for setup are Automatically recalled. The emulation of a true multi-sync monitor is implemented.

The factory preset supported modes are as follows:

Mode	Resolution	Refresh rate	H-freq.	Pixel freq.	Remarks
VGA	640 x 350	70Hz	31.47KHz	25.175MHz	VESA Standard
VGA	720 x 400	59.940HZ	31.469KHZ	25.175MHZ	IBM VGA 3H
VGA	640 x 480	60Hz	31.5KHz	25.175MHz	Industry Standard
VGA	640 x 480	72Hz	37.9KHz	31.500MHz	VESA Standard
VGA	640 x 480	75HZ	37.5KHZ	31.500MHZ	VESA Standard
SVGA	800 x 600	60Hz	37.9KHz	40.000MHz	VESA Guidelines
SVGA	800 x 600	72Hz	48.1KHz	50.000MHz	VESA Standard
SVGA	800 x 600	75HZ	46.9KHZ	49.500MHZ	VESA Standard
XGA	1024 x 768	60Hz	48.4KHz	65.000MHz	VESA Guidelines
XGA	1024 x 768	70Hz	56.5KHz	75.000MHz	VESA Standard
XGA	1024 x 768	75HZ	60KHZ	78.750MHZ	VESA Standard
SXGA	1280 x 1024	60Hz	64KHZ	108.000 MHZ	VESA Standard
SXGA	1280 x 1024	75HZ	80KHZ	135.000 MHZ	VESA Standard
WXGA	1280 x 768	60~75Hz	47.7~65KHZ	80.140 MHZ	Not Standard
WXGA	1366 x 768	60~75Hz	47.7~65KHZ	80.000 MHZ	Not Standard
WSXGA	1440 x 900	60~75Hz	65KHZ	150.000 MHZ	Not Standard
WSXGA	1680 x1050	60Hz	70KHZ	150.000 MHZ	Not Standard
WUXGA	1920 x1080	60Hz	95KHZ	190.000 MHZ	Not Standard

Notes:

1. All mentioned modes are non-interlaced. The maximum and minimum frame rates are determined by the TFT-LCD.
2. Factory preset modes are overwritten by additional user alignments for automatic recall. The factory preset modes can be recalled at any time.

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8.2 LCD Panel & I/O Support

C-Series is an advanced and general application for a TFT-LCD Monitor Control board. Therefore, the application of this board is not limited to panel manufacturers or models. Furthermore, this board operates with any LVDS interface panel ranging from VGA to Full HD that can be driven with three or less timing signals. The usual timing signals to a panel are H-sync, V-sync and Data Enable.

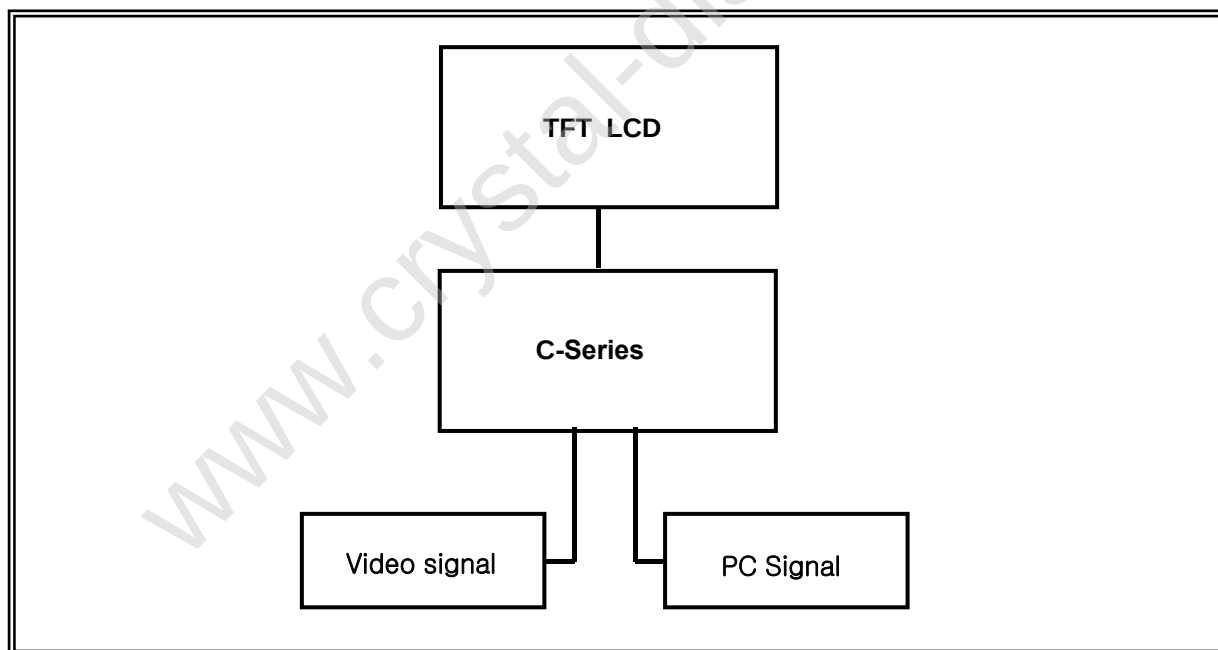
For backlight intensity control mechanism, a built-in DC dimming drive signal is installed into the CCFL inverter control port. The CCFL inverter DC power, generally 12V DC, is attached to the same port. Users can design their own key pad board by using OSD & power tact switch as well as a two-color LED. On/off power switch and OSD input signal are detected and executed by the micro controller.

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8.3 DVI (Digital Video Interface)

C-Series has one DVI input port, which complies with VESA DVI standard. Therefore, users can make direct interface to the DVI output of Digital VGA cards. The signal source can be switched through OSD.

[High-end Multi-media Display System]

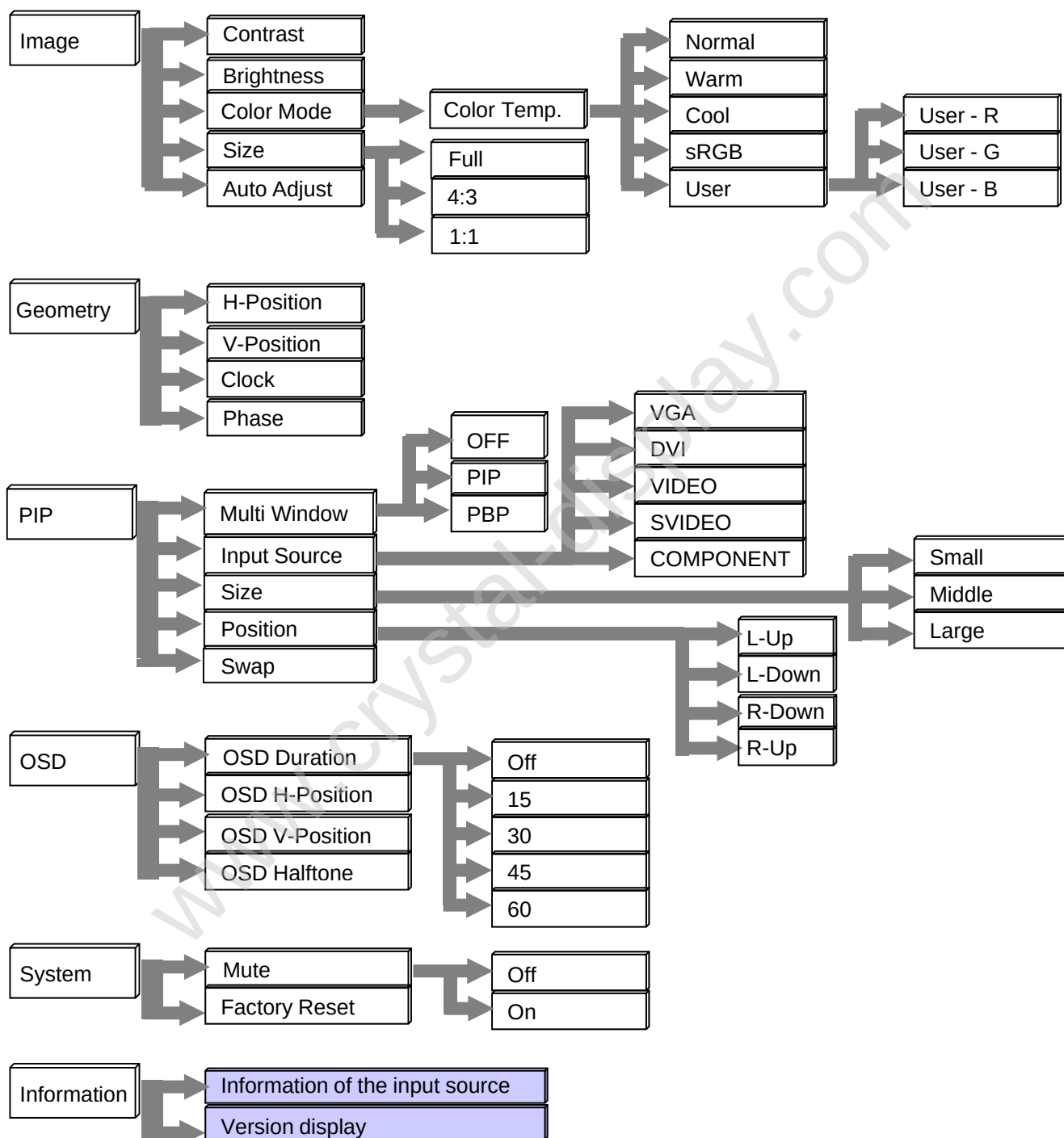
9.1 OSD Board Dimension



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9.2 Summary of OSD Menu

VGA

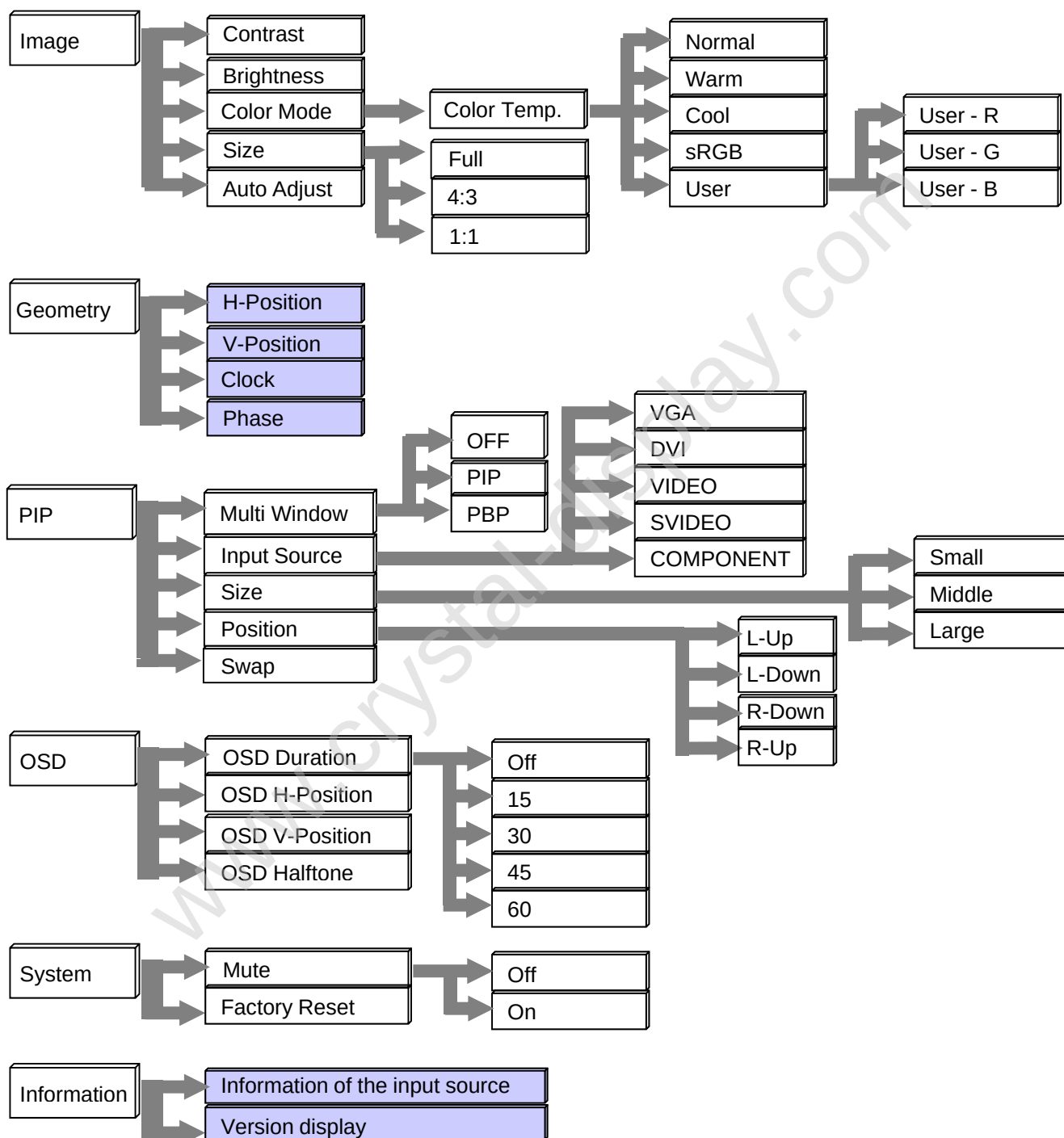


[Note]

: Adjustment does not available.

C-Series

DVI

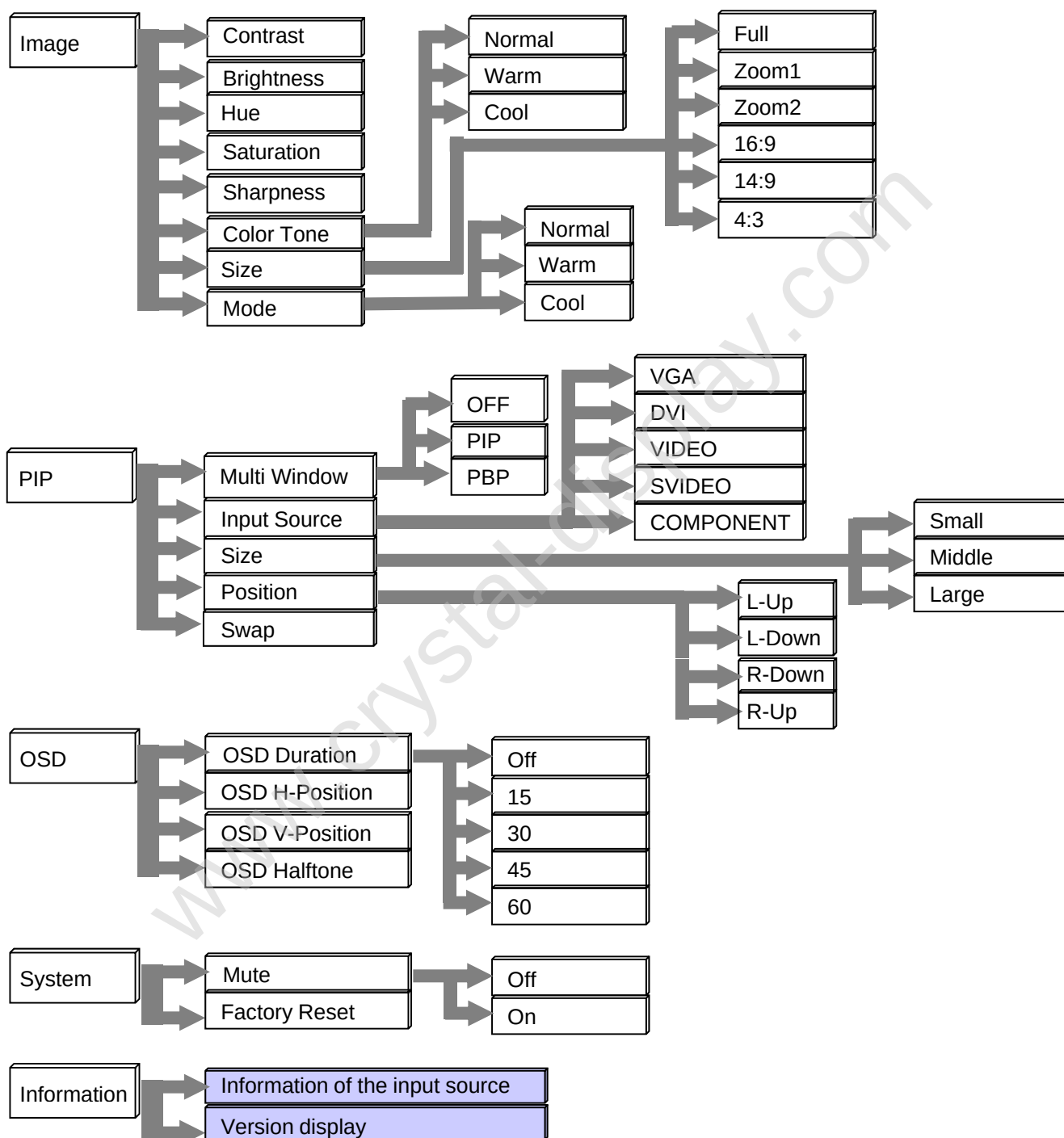


[Note]

: Adjustment does not available.

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Video, S-Video and Component



[Note]

Information of the input source : Adjustment does not available.

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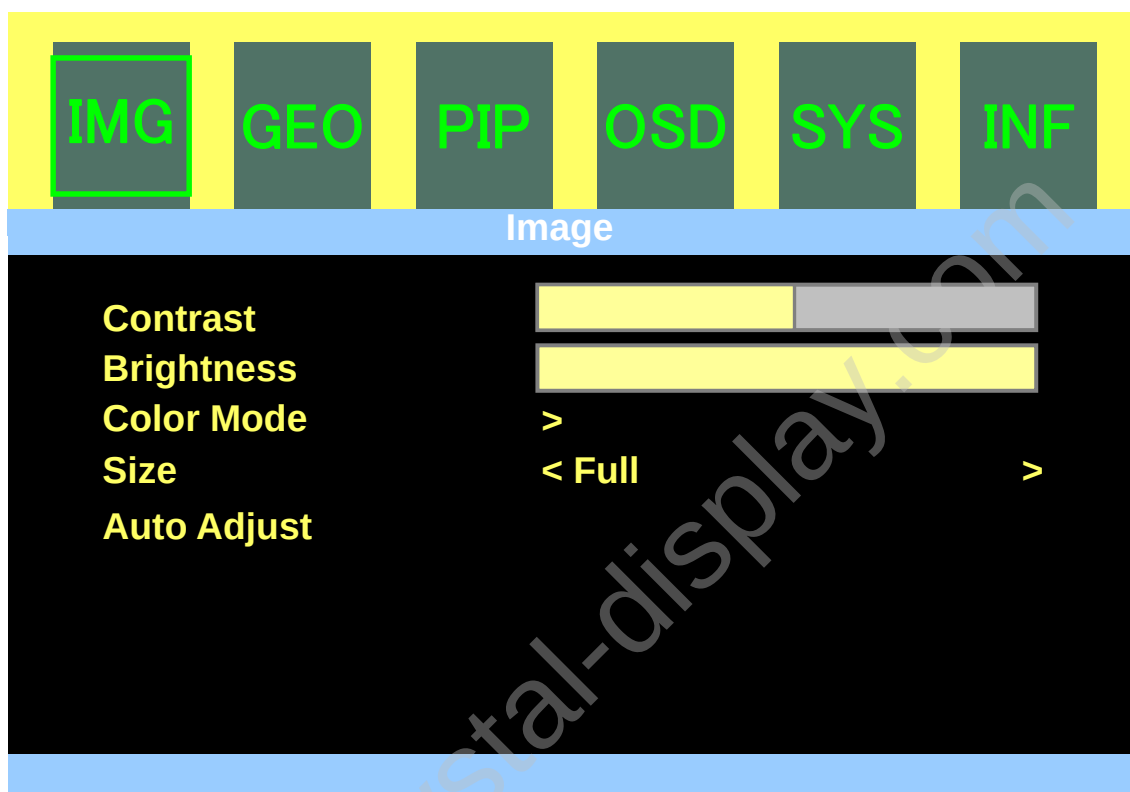
OSD Key Description

- **MENU** : Menu Key
- **DOWN** : Down Key
- **UP** : Up Key
- **DECREASE** : Decrease Key or Left Key
- **INCREASE** : Increase Key or Right Key
- **SOURCE** : Source Select OSD On key

Hot Key Description

- **DOWN** : Auto adjustment, VGA only
- **UP** : Brightness adjustment, PC only
- **DECREASE** : Contrast adjustment, PC only
- **INCREASE** : Volume adjustment

9.3 OSD Menu enables user to manipulate the image and settings

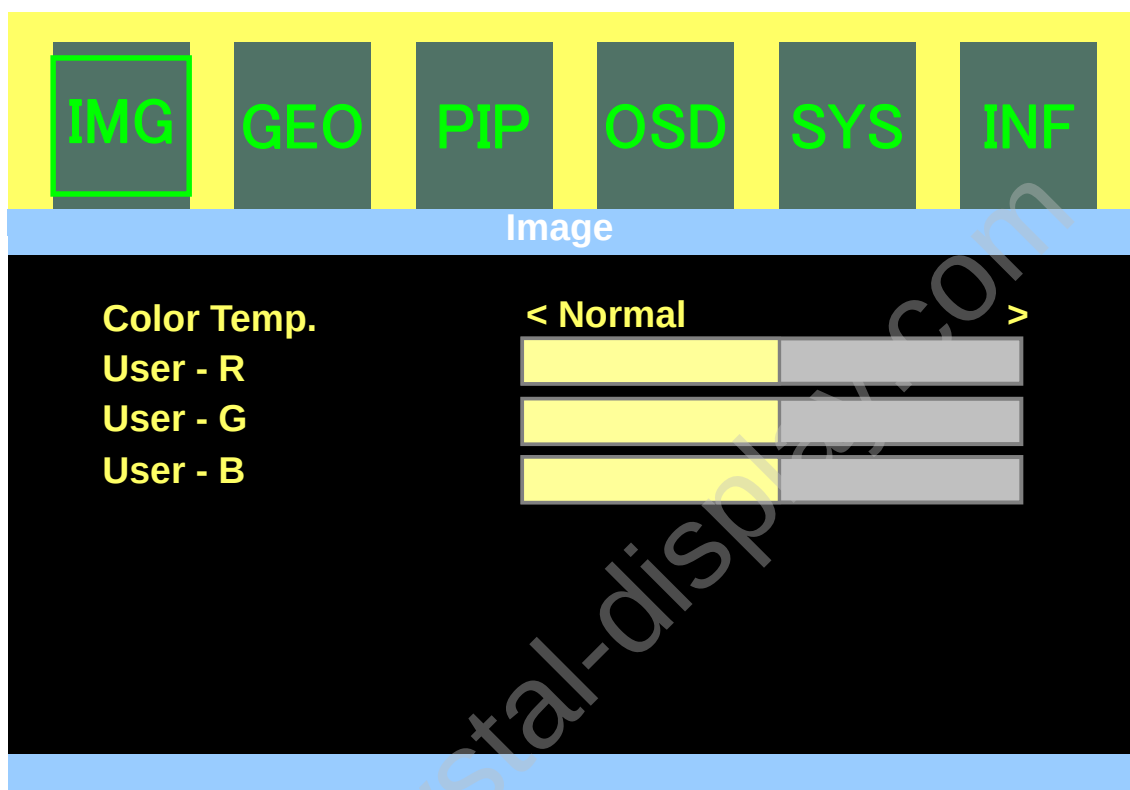


- **Contrast** : Adjust distinction
- **Brightness** : Adjust brightness of the screen (used to pwm control)
- **Color Mode** : Adjust color temperature and User RGB
- **Size** : Select display output aspect ratio
- **Auto Adjust** : Execute auto adjust for phase, clock, position and R,G,B color balance

[Note]

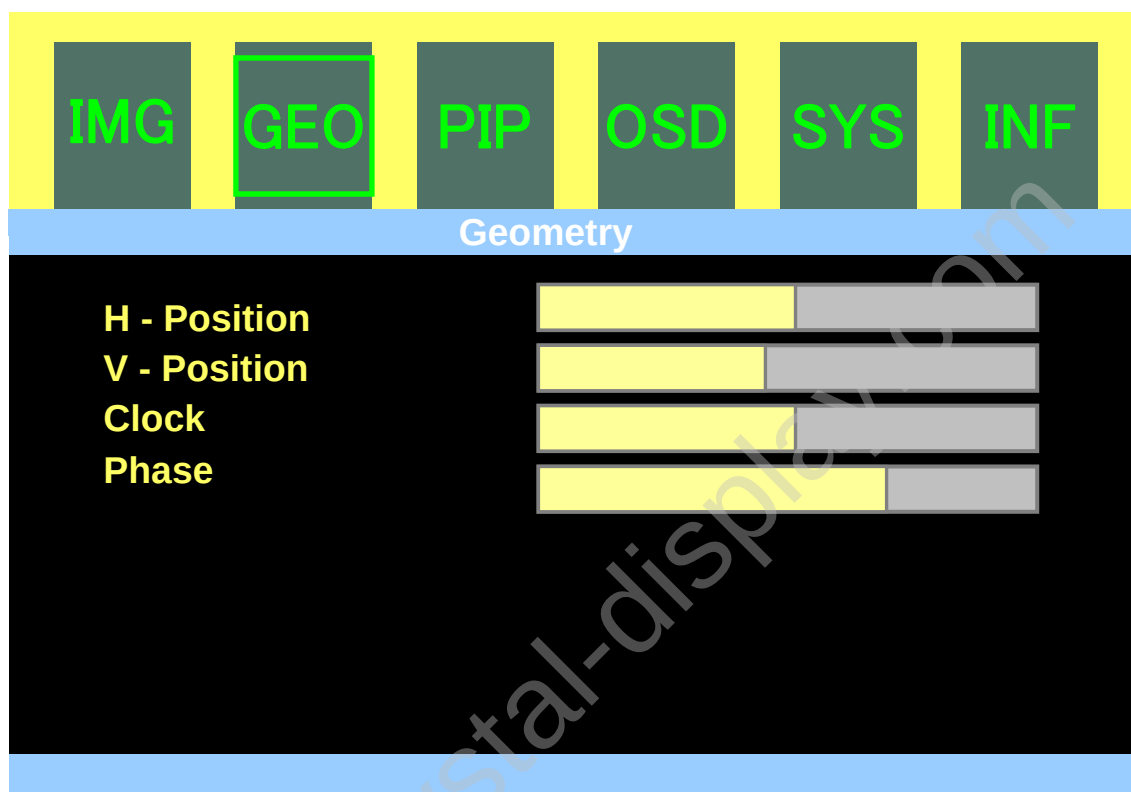
- 1) Auto Adjust menu is available only to VGA input source.

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- **Color Temp.** : Select various color temperature
- **User - R** : Adjust R value of the User color temperature
- **User - G** : Adjust G value of the User color temperature
- **User - B** : Adjust B value of the User color temperature

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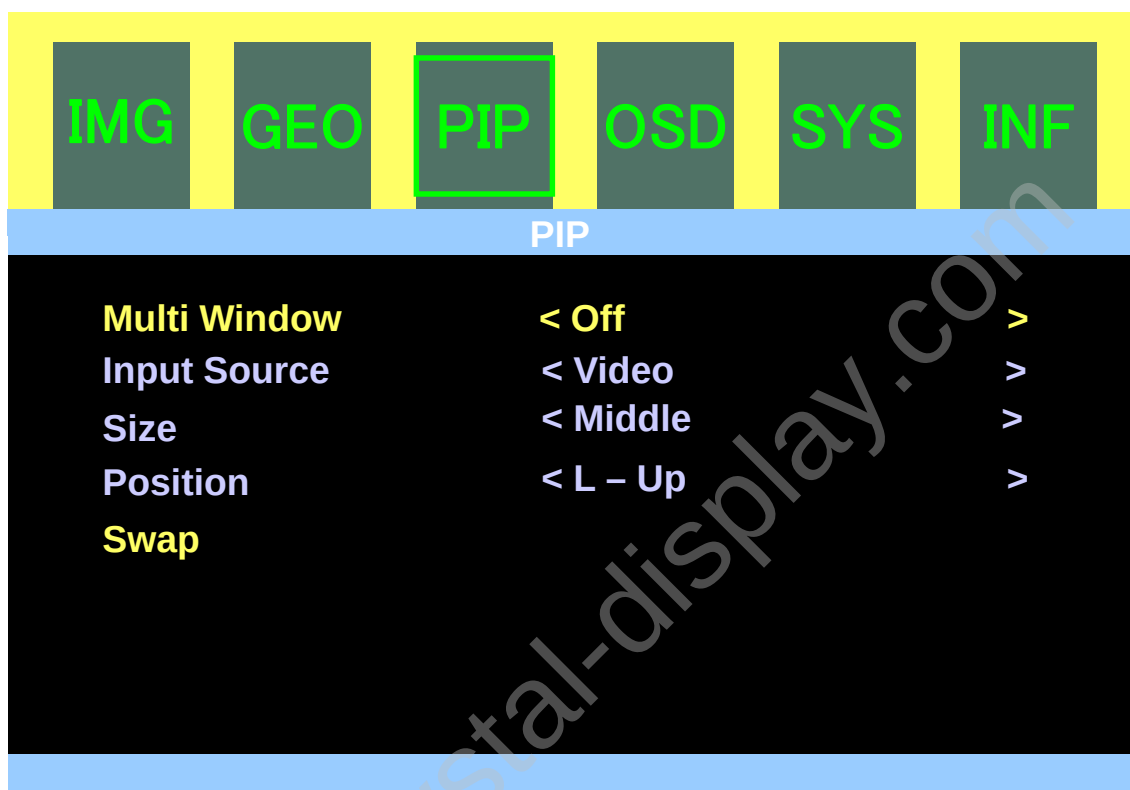


- **H - Position** : Adjust horizontal position of the screen
- **V - Position** : Adjust vertical position of the screen
- **Clock** : Adjust the clock of the screen
- **Phase** : Adjust the phase of the screen

[Note]

- 1) This menu is available only to VGA input source.

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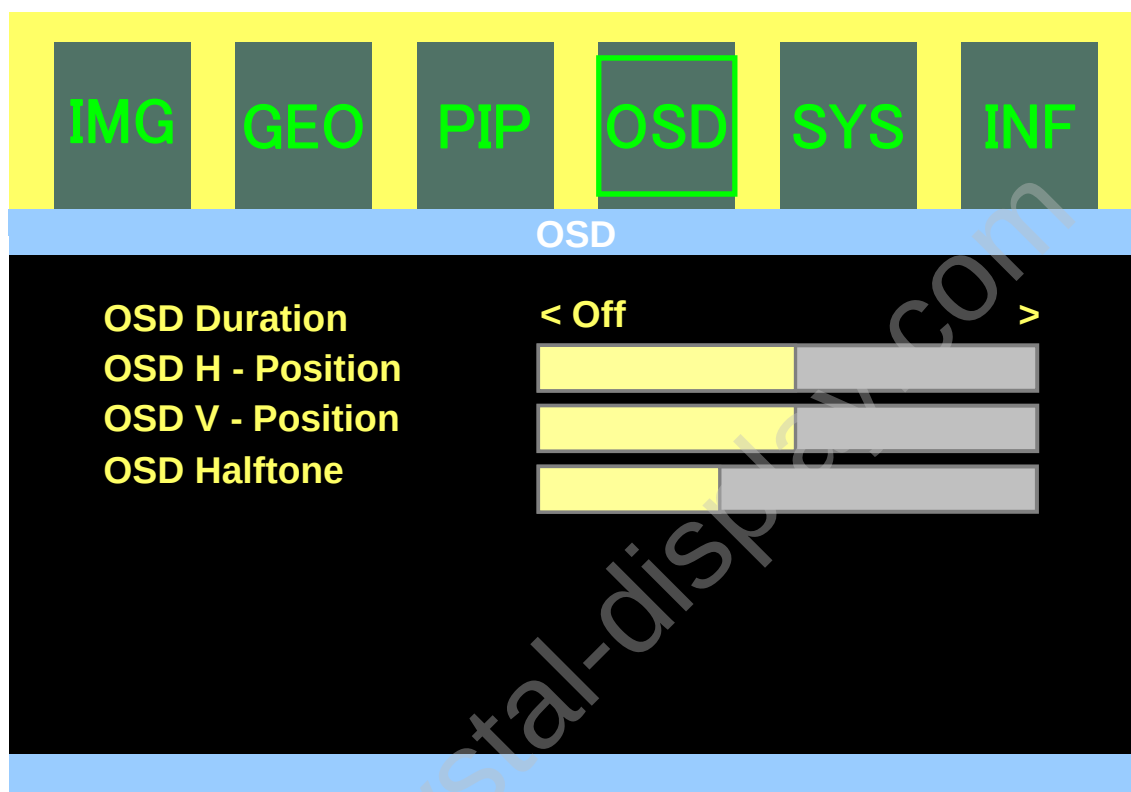


- **Multi Window** : Select PIP or PBP
- **Input Source** : Select multi window input source
- **Size** : Select various screen size of PIP
- **Position** : Select various screen position of PIP
- **Swap** : Swap main window and sub window

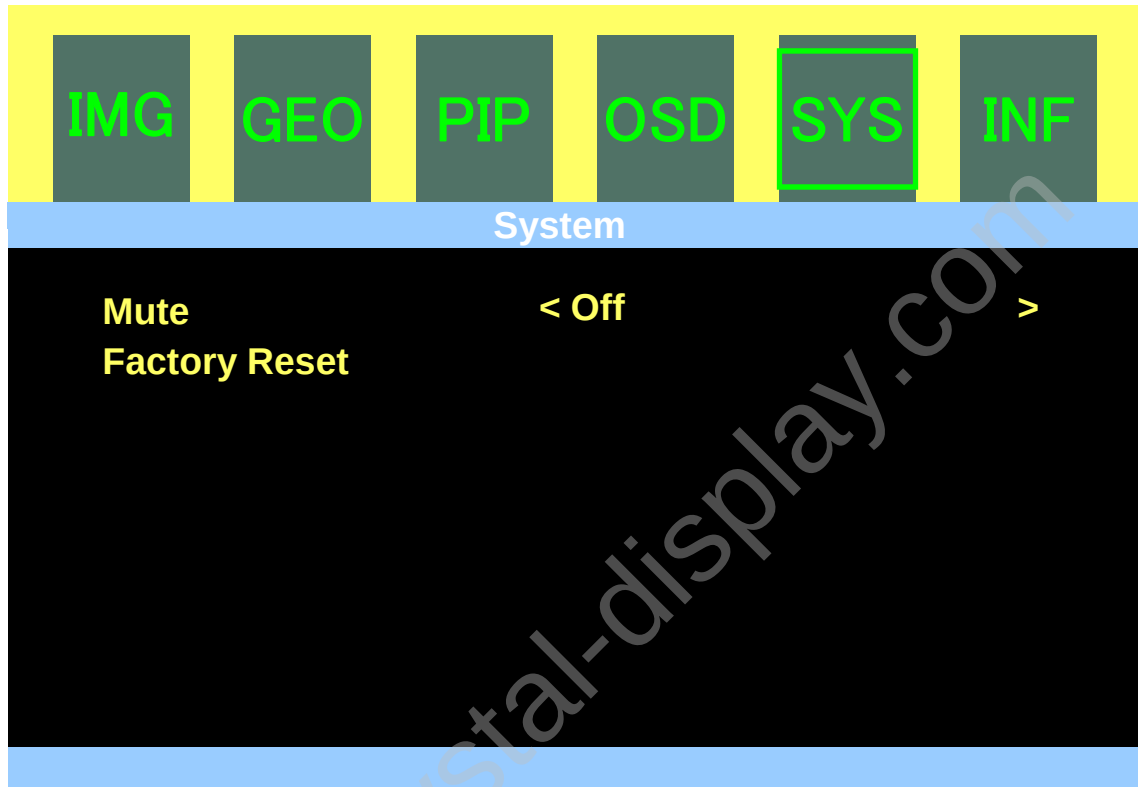
[Note]

- 1) This PIP function is optional.
- 2) Size and Position menu is available only to PIP function.

C-Series

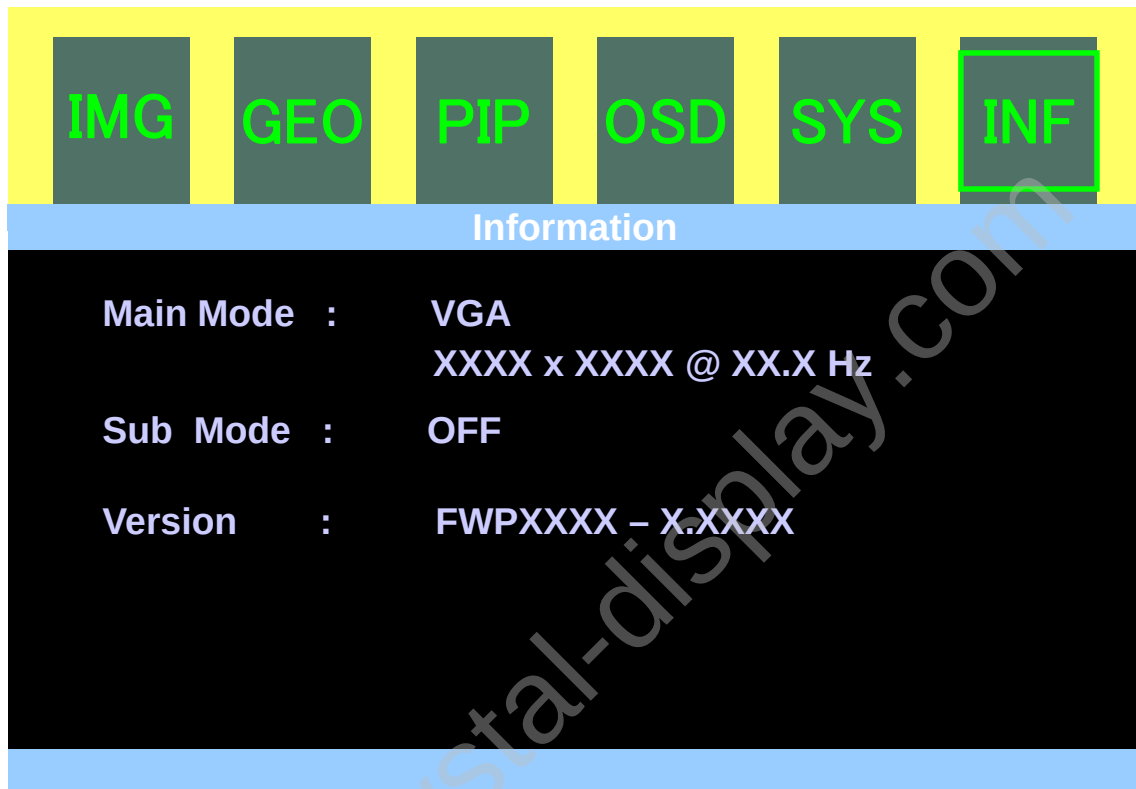


- **OSD Duration** : Select OSD turn-off time
- **OSD H - Position** : Adjust horizontal position of the OSD
- **OSD V - Position** : Adjust vertical position of the OSD
- **OSD Halftone** : Adjust OSD transparent level



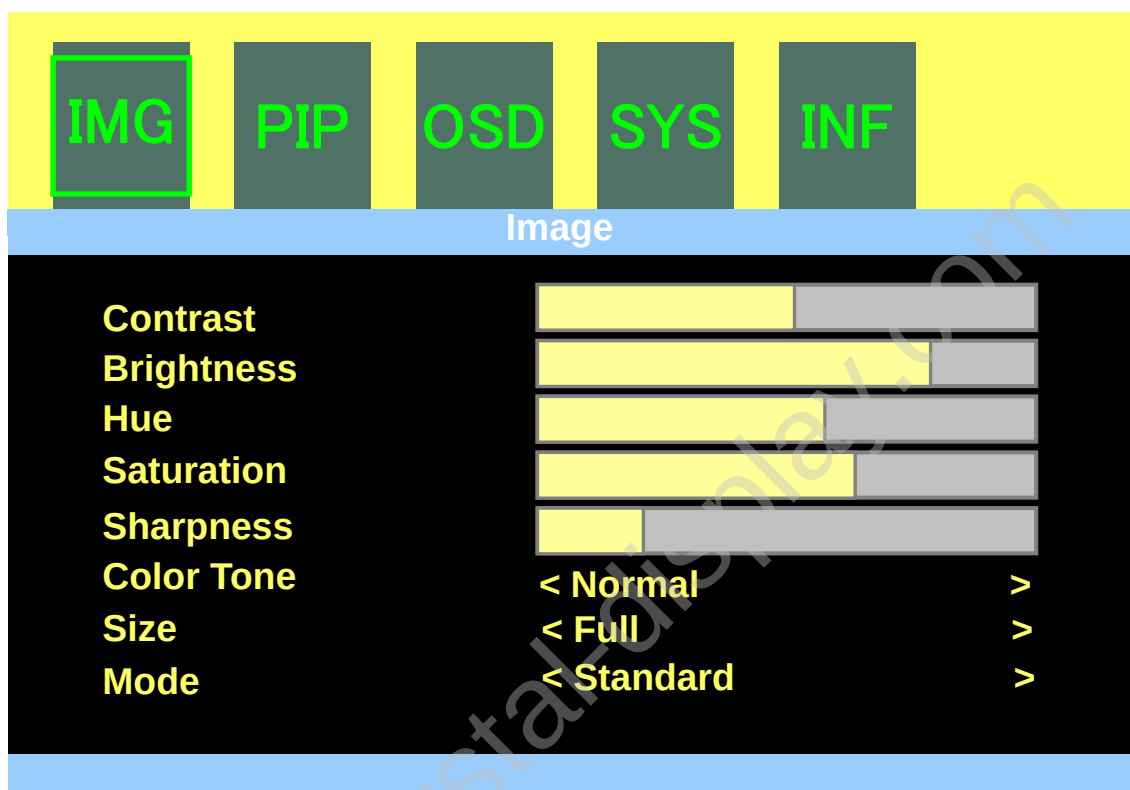
- **Mute** : Adjust audio volume mute on/off
- **Factory Reset** : Reset factory mode

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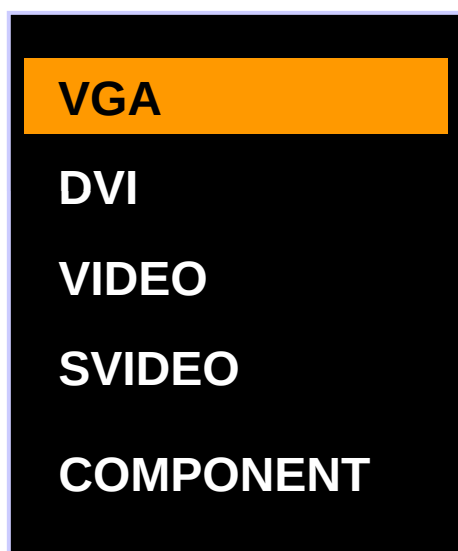
- **Main Mode** : Information of the input source is displays
- **Version** : Firmware version is displays

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- **Contrast** : Adjust distinction
- **Brightness** : Adjust brightness of the screen
- **Hue** : Adjust tint
- **Saturation** : Adjust color
- **Sharpness** : Adjust sharpness
- **Color Tone** : Select various color tone
- **Size** : Select display output aspect ratio
- **Mode** : Select various screen mode

9.4 Input source selection OSD menu



DATA SHEET

Model : Audio for C-Series

Ver. 1.0

Mar 3, 2010

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Revision No.	Date	Page	Description
Ver. 1.0	Mar. '10	32~39	First Draft, Preliminary Specification

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2. Audio Board Dimension.

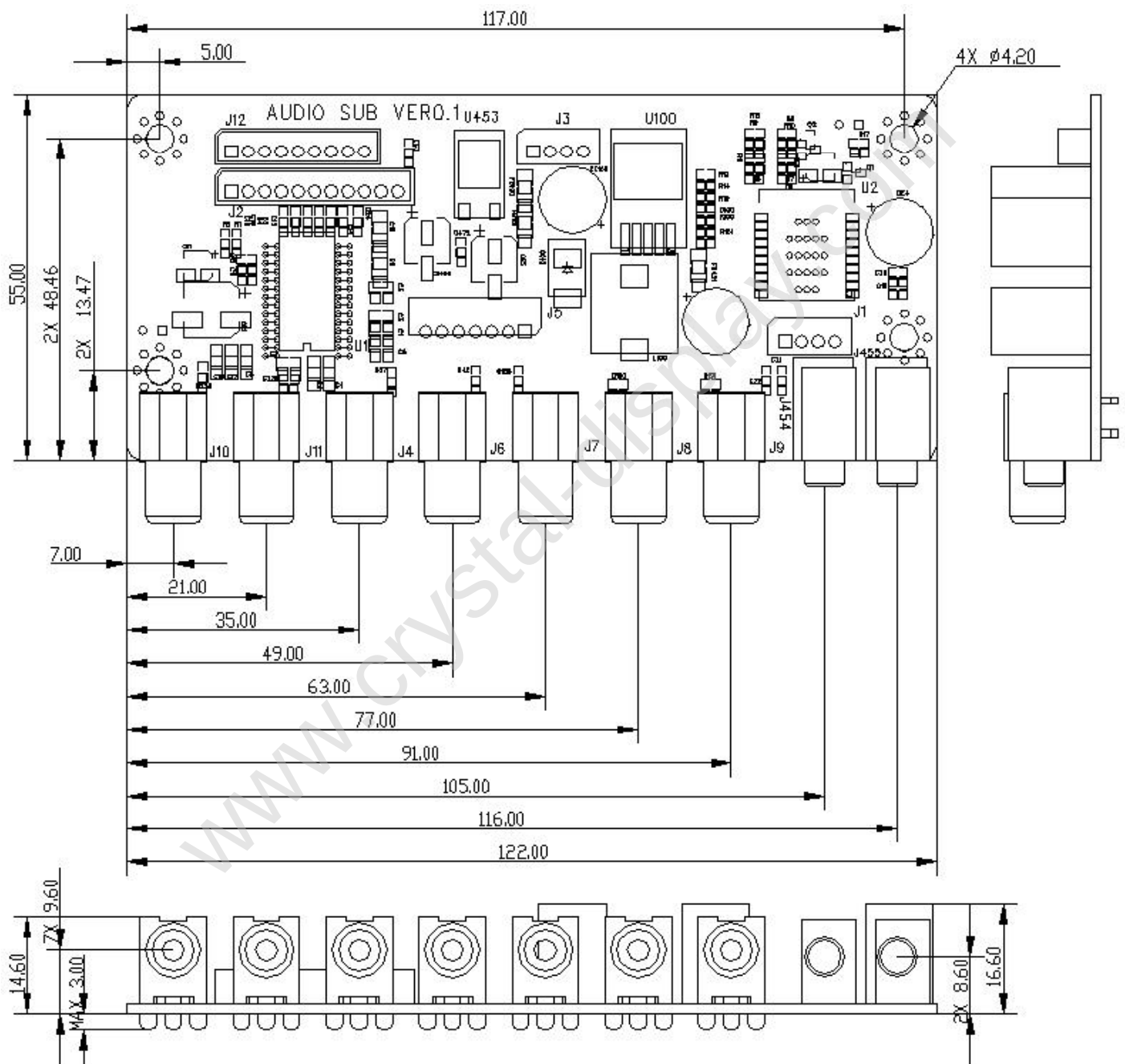


Diagram illustrating the AUDIO VER0.2 circuit board and its connections:

- Sound input from Video Source
- Y / Pb / Pr Component Video
- Sound input from component Video source
- Sound input and output from PC

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4. Pin Configuration.

- Component Input Connector
Connector : Molex 53014-0710 (J5)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	Pr	Pr	5	Pb	Pb
2	GND	Pr return	6	GND	Pb return
3	Y	Y	7	NC	NC
4	GND	Y return			

- Tuner B'D Connector
Connector : Molex 53014-0810 (J12)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VCC	5V	5	GND	Ground
2	GND	Ground	6	MONO	TV Sound
3	SDA	SDA	7	GND	Ground
4	SCL	SCL	8	TV	TV Signal

- Power Connector
Connector : Molex 53014-0410 (J3)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VCC	AMP POWER	3	GND	Ground
2	VCC	AMP POWER	4	GND	Ground

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- Main B'D Control & Signal Connector
Connector : 53014-1110 made by Molex (J2)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VCC	5V	7	GND	Ground
2	GND	Ground	8	VOL_H	Volume control H
3	SDA	SDA	9	VOL_L	Volume Control L
4	SCL	SCL	10	MUTEN	AMP Mute
5	GND	Ground	11	STBYN	AMP STBYN
6	TV	TV Signal			

- Sound Out Connector
Connector : 53014-1210 made by Molex(J16)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VIDEO L	Video Left Sound	7	COM R	Component Right Sound
2	GND	Ground	8	GND	Ground
3	VIDEO R	Video Right Sound	9	PC L	PC Left Sound
4	GND	Ground	10	GND	Ground
5	COM L	Component Left Sound	11	PC R	PC Right Sound
6	GND	Ground	12	GND	Ground

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- Headphone Out Connector
Connector : 53014-0810 made by Molex(J15)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	HP_OUT R	Headphone R Out	5	HP_RET R	Headphone return R
2	GND	Ground	6	GND	Ground
3	HP_OUT L	Headphone L Out	7	HP_RET L	Headphone return L
4	GND	Ground	8	GND	Ground

- Speaker Out Connector
Connector : 53014-0410 made by Molex(J1)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	SP_R-	Speaker R -	3	SP_L+	Speaker L +
2	SP_R+	Speaker R +	4	SP_L-	Speaker L -