

# **Technical Reference Specification**

**MULTI INTERFACE CONTROLLER  
FOR TFT LCD**



## 1. General Description

This controller board is designed for a LCD monitor and other flat panel display application.

This controller board provides an auto-input synchronization and easy to use interface controller for:

- TFT (active matrix) LCD panels of 800x480, 1024x768, 1024x768, 1280x768, 1366x768, 1280x1024, 1440x900 and 1600x1200, 1680x1050, 1920x1080 resolutions.
- Computer video signals of VGA, SVGA, XGA, SXGA and WUXGA standard Input Signal Support
- ✓ All VESA standard



<b>No.</b>	<b>Item</b>	<b>Description</b>	
1	<b>LCD Module</b>	LVDS, ~ 1920 x 1080	
2	<b>Input</b>	Analog RGB	
3	<b>Resolution Support</b>	H : 31 ~ 80KHz V : 55 ~ 76Hz	
4	<b>OSD Control</b>	Input, Menu, Left, Right, Down, Up, Power	<b>7 Keys</b>
5	<b>Plug &amp; Play</b>	VESA DDC 2B Ver. 1.3	
6	<b>Power</b>	Supply Voltage : 12 [V]	
7	<b>Power Consumption</b>	Power : TBD	
		Analog : D-SUB 15P	
8	<b>Signal Connector</b>	Digital : DVI, HDMI, DP	
		Video : Component Video	
9	<b>Board Size</b>	Audio : 15W+15W	
		W * H * D (mm) : 240 x 125 x 35	

## 2. Electrical Specification

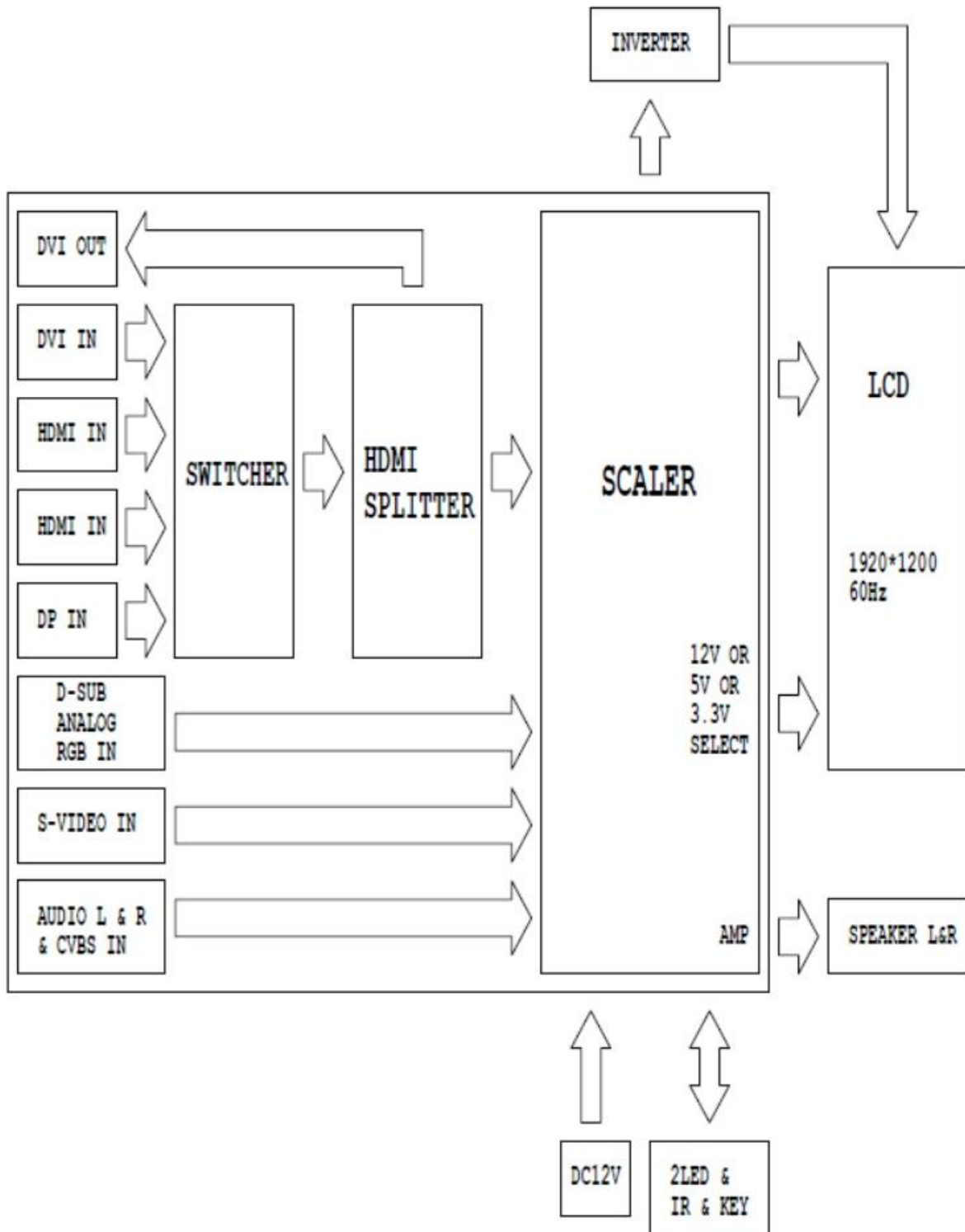
### A. Input Characteristic

Description	Signal	Unit	Min	Typical	Max	Remarks
Power In (12Vdc)						
	Input	12VDC	11.4	12	12.6	
	Consumption	Watt		TBD		
RGB Input						
	Analog RGB	VPP	0	0.7	-	
	Sync	VDC	0	5	5.5	
	H Frequency	KHz	31		80	Depends on Mode
	V Frequency	Hz	55	75	77	Depends on Mode
DVI Input						
	TMDS	mVp-p	450	500	900	
NTSC/PAL						
	Y/CVBS	Vp-p	0.7	1.0	1.4	
	C	Vp-p	0.6	0.8	1.0	
COMPONENT						
	Y	Vp-p		1.0		
	PB/PR	Vp-p		0.7		
	INPUT FORMAT		480 i		1080p	

### B. Output Characteristic

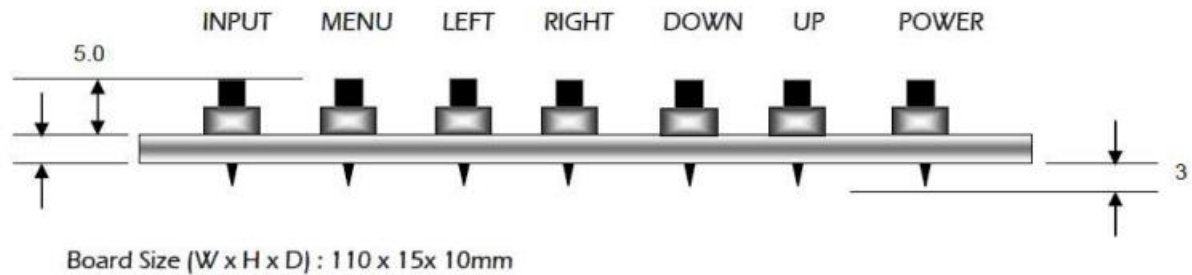
Description	Signal	Unit	Min	Typical	Max	Remarks
Panel Power						
	LCD Power (12V)	VDC	11.4	12	12.6	Jumper option
	LCD Power (5V)	VDC	4.5	5	5.5	Jumper option
	LCD Power (3.3V)	VDC	3.16	3.3	3.5	Jumper option
LVDS Interface						
	Differential output	Vp-p (mV)	250	350	450	Differential +/-
AUDIO Interface						
	Output	Watt		5	6	
	Frequency	Hz	700Hz		20KHz	
	THD		5% MAX AT 1500Hz 1.0W			
Inverter Interface						
	Power	V	11.4	12	12.6	Depends on Power
	On/Off control	V	0		3.3	L=off, H=on
	Brightness control	V	3.3		0	Option
			0		4.0	Option

### 3. Function Block Diagram

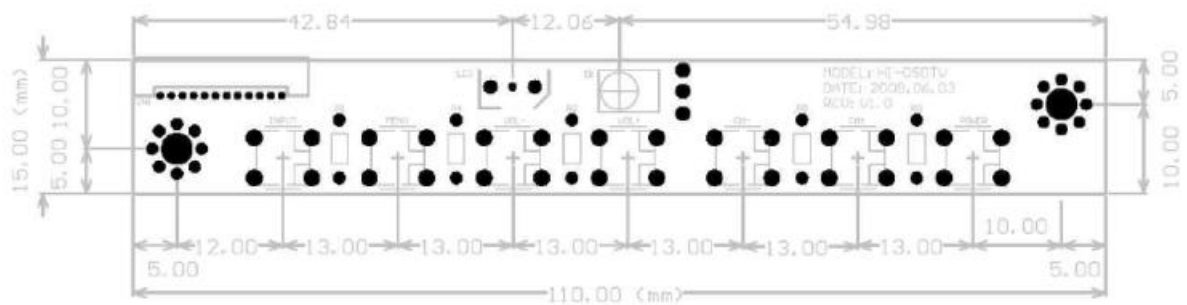


## 4. OSD Menu

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




Button	Function	Status	HOT Key
LED	Indicates operation status	Green	On: Green Off: LED Off
POWER	Power on/off	On/Off	
MENU	Activate menu / Exit Menu		
INPUT	Input Select / Source		
LEFT	Cursor control Left		
RIGHT	Cursor control Right		
DOWN	Cursor control Down		
UP	Cursor control Up / Auto Adjust		



## 5. OSD Function


### A. Picture (VGA)

	Brightness
	Contrast
	Color Mode
	Scale
	Auto


### B. Picture (Video)

	Brightness
	Contrast
	Hue / Saturation
	Sharpness
	Scale
	Color System

### C. Geometry

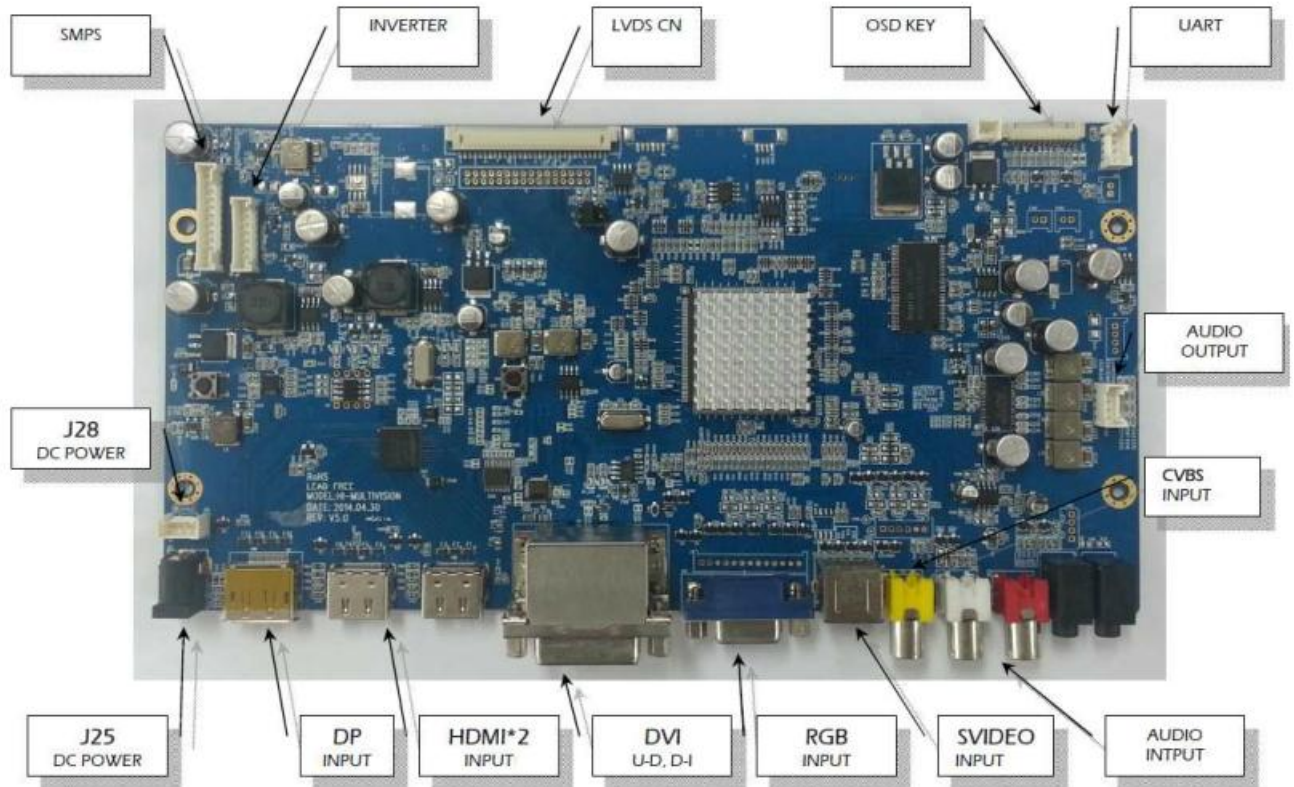
	H Position
	V Position
	Clock / Phase

### D. System

	Language
	OSD Timer
	Sleep
	Set ID
	H/V Count
	H/V Position
	Recall



## 6. Connector, Pinout & Jumpers



### Summary:

Item	Description	Type	Manufacture
Connector	Audio Connector	CKX3-3.5-11	-
Connector	Audio Output Connector	SMW200-04P-2.0mm	YEONHO
Connector	LVDS Dual Interface Connector	12507WR-30P	YEONHO
Connector	OSD Connector	12505WR-12P	YEONHO
Connector	Inverter Connector	SMW200-08P-2.0mm	YEONHO
Connector	SMPS Connector	SMW200-12P-2.0mm	YEONHO
Connector	12V Dc power Input	SMW200-04P-2.0mm	YEONHO
Jack	Dc power Jack	2.5ø DC Jack	-
Jack	Panel Power	H-3x2-6p	

### J3 : LVDS Dual interface Connector

Pin No.	Symbol	Description
1	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
2	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
3	MOD_PWR	Panel Power (12V/18V, 5V or 3.3V)
4	N.C	No Connection
5	N.C	No Connection
6	N.C	No Connection
7	GND	Ground
8	Y3P-EVEN	Positive(+) LVDS differential first 3 data(B port)
9	Y3M-EVEN	Negative(-) LVDS differential first 3 data(B port)
10	YCP-EVEN	Positive(+) LVDS differential first Clock(B port)
11	YCM-EVEN	Negative(-) LVDS differential first Clock(B port)
12	Y2P-EVEN	Positive(+) LVDS differential first 2 data(B port)
13	Y2M-EVEN	Negative(-) LVDS differential first 2 data(B port)
14	GND	Ground
15	Y1P-EVEN	Positive(+) LVDS differential first 1 data(B port)
16	Y1M-EVEN	Negative(-) LVDS differential first 1 data(B port)
17	GND	Ground
18	Y0P-EVEN	Positive(+) LVDS differential first 0 data(B port)
19	Y0M-EVEN	Negative(-) LVDS differential first 0 data(B port)
20	Y3P-ODD	Positive(+) LVDS differential second 3 data(A port)
21	Y3M-ODD	Negative(-) LVDS differential second 3 data(A port)
22	YCP-ODD	Positive(+) LVDS differential second Clock(A port)
23	YCM-ODD	Negative(-) LVDS differential second Clock(A port)
24	GND	Ground
25	Y2P-ODD	Positive(+) LVDS differential second 2 data(A port)
26	Y2M-ODD	Negative(-) LVDS differential second 2 data(A port)
27	Y1P-ODD	Positive(+) LVDS differential second 1 data(A port)
28	Y1M-ODD	Negative(-) LVDS differential second 1 data(A port)
29	Y0P-ODD	Positive(+) LVDS differential second 0 data(A port)
30	Y0M-ODD	Negative(-) LVDS differential second 0 data(A port)

### CN11 : OSD Connector

Pin No.	Symbol	Description
1	LED-Green	GREEN Color
2	LED-Red	RED Color
3	GND	Ground
4	AUTO	For Auto Switch
5	MENU	For Menu Switch
6	SEL	For Select Switch
7	DOWN	For Down Switch
8	UP	For Up Switch
9	POWER	For Power Switch
10	CDS	For Auto Brightness (Option)
11	IRD	IR DATA
12	5V	IR POWER 5V

### J26 : Backlight Inverter Connector

Pin No.	Symbol	Description
1, 2	12V	12V
3	5V	5V
4	ADJ(PWM)	DIM-adjustment analog dimming control signal * make sure inverter specification
5,6	GND	Ground
7	EN	Inverter digital ON(3.3V)/OFF(0V) signal
8	ADJ	DIM-adjustment analog dimming control signal * make sure inverter specification

### J28 : DC Power input Connector

Pin No.	Symbol	Description
1,2	VCC	12V
3,4	GND	Ground

CN1 : Analog RGB input Connector (D-SUB 15P)

Pin No.	Symbol	Description
1	Red I	Red analog input
2	Green I	Green analog input
3	Blue I	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

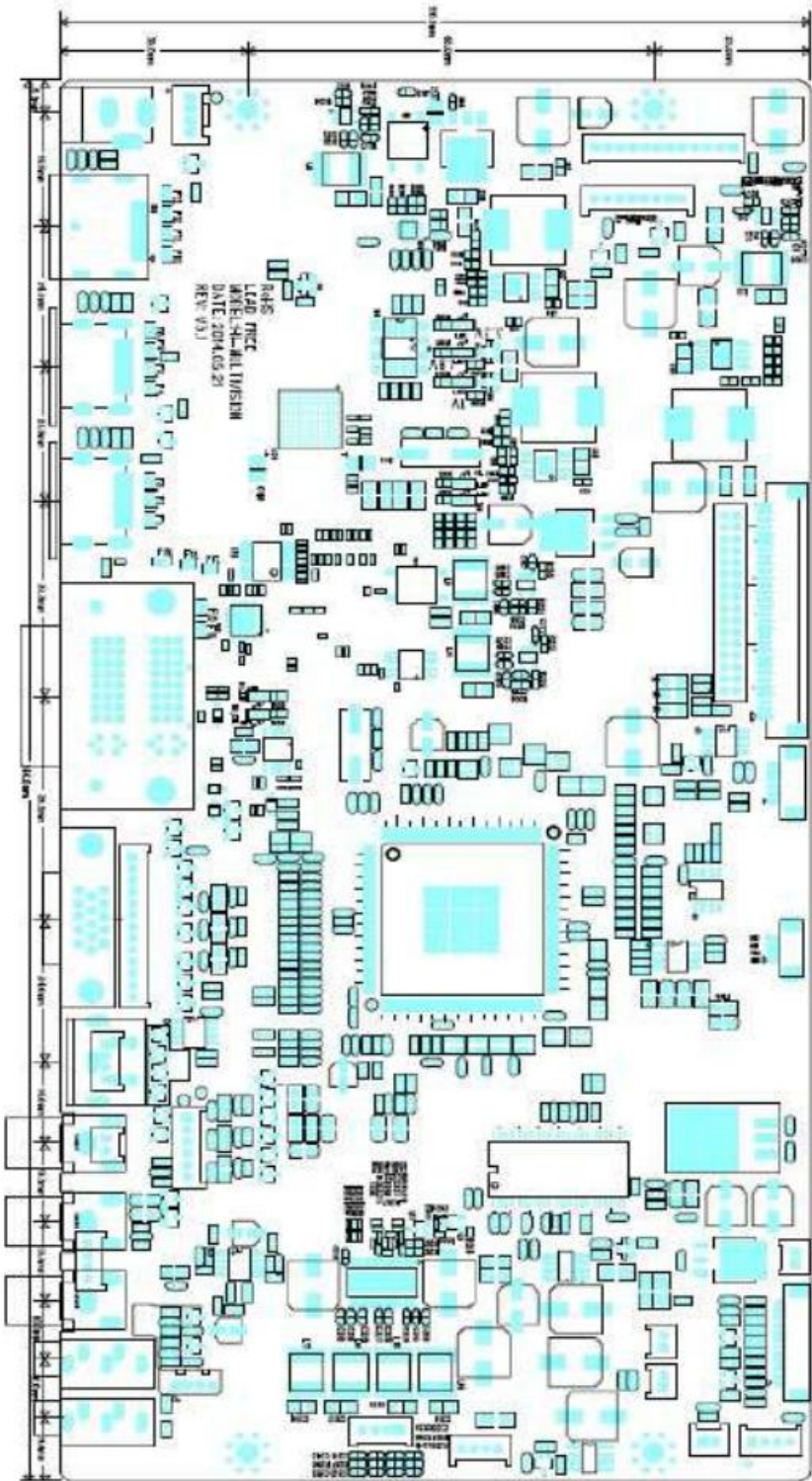
J27 : SMPS Connector

Pin No.	Symbol	Description
1	PW_ON/OFF	POWER ON/OFF Signal
2	S5V	START 5V
3,4	5V	5V
5,6	GND	Ground
7,8	12V	12V
9	EN	Inverter digital ON(3.3V)/OFF(0V) signal
10	ADJ	DIM-adjustment analog dimming control signal * make sure inverter specification
11	PWM	Pulse Width Modulation
12	GND	Ground

J17 : UART Connector

Pin No.	Symbol	Description
1	TX	Transmitt Signal
2	RX	Receive Signal
3	GND	Ground
4	S5V	START 5V

7. Dimension



## 8. Application Notes

### A. USING THE CONTROLLER WITHOUT BOTTONS ATTACHED:

This is very straightforward:

- Firstly setup the controller/display system with the buttons. With the attached controllers and display system active make any settings for color, contrast and image position as required then switch everything off.
- Remove the control switches, the 7-way cable.
- Refer to inverter specifications for details as to fixing brightness to a desired level, this may require a resistor, an open circuit or closed circuit depending on inverter

### B. INVERTER CONNECTION:

There are 3 potential issues to consider with inverter connection:

- Power
- ON/OFF
- Brightness (DIM-ADJ)

**Inverter power:** This should be matched with the inverter specification.

**Inverter ON/OFF:** This is a pin provided on some inverter for ON/OFF function and is used by this panel controller for VESA DPMS compliance. If the inverter does not have on/off pin or the on/off pin is not used DPMS will not operate. Pin5 should be matched to the inverter specification for the ON/OFF pin.

**Brightness Dimming control:** This controller boards are analog dimming control method. And it is important to consider the specifications for the inverter to be used.

## 9. Application Graphic Mode

The microprocessor measures the “H Sync, V Sync polarity for RGB Input, 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.

### A. RGB Input Format

Spec Mode	Pixel Freq.	Horizontal Timing			Vertical Timing		
		Sync Polar	Freq.	Active	Sync Polar	Freq.	Active
	MHz		KHz	Pixel		Hz	Line
640*350@70Hz	25.144	P	31.430	640	N	70.000	350
640*400@70Hz	28.287	N	31.430	640	P	70.000	400
720*400@ 70Hz	28.287	N	31.430	720	P	70.000	400
640*480@60Hz	28.175	N	31.469	640	N	59.940	480
640*480@72Hz	31.500	N	37.861	640	N	72.809	480
640*480@75Hz	31.500	N	37.500	640	N	75.000	480
800*600@56 Hz	36.000	P	35.156	800	P	56.250	600
800*600@60Hz	40.000	P	37.879	800	P	60.317	600
800*600@72Hz	50.000	P	48.077	800	P	72.188	600
800*600@75Hz	49.500	P	46.875	800	P	75.000	600
1024*768@60Hz	65.000	N	48.363	1024	N	60.005	768
1024*768@ 70Hz	75.000	N	56.476	1024	P	70.070	768
1024*768@75Hz	78.750	P	60.023	1024	P	75.030	768
1280*720@60Hz	74.500	P	44.772	1280	P	59.855	720
1366*768@60Hz	84.75	P	47.72	1366	P	59.799	768
1440*900@60Hz	106.500	N	55.935	1440	P	59.887	900
1280*1024@60Hz	108.000	P	63.981	1280	P	60.020	1024
1280*1024@75Hz	135.000	P	79.976	1280	P	75.035	1024
1600*1200@60Hz	162.000	P	75.000	1600	p	60.000	1200
1680*1050@60Hz	119.000	P	64.674	1680	N	59.883	1050
1920*1080@60Hz	138.500	P	66.587	1920	N	59.934	1080