

# LCD Controller Board

## Preliminary Spec

### THV65 Series Board (HDMI /VGA/DVI)

CUSTOMER: \_\_\_\_\_

PART NO.: \_\_\_\_\_

DATE: \_\_\_\_\_

<b>Revision: V 0.5</b>		
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<b>COPY :</b>	<b>1</b>	
<b>PAGE :</b>		
<b>Contact</b>		

<b>Approval by :</b>	<b>Review by :</b>	<b>Design by :</b>
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## 1. SCOPE

The THV65 is LCD Controller board with compact size and high performance which can support HDMI port and VGA as well as DVI Source input source up to 1920x1200 with Audio function( option )

### Available Model List :

**THV65 : Standard PCBA Version**

**THV65L: Low profile PCBA**

**THV65B: Standard PCBA , support 24V DC In with Backlight 12V output(8W )**

**THV65S: Standard PCBA + Audio Sound Amp.(HDMI digital Audio output)**

## 1.1 PRODUCT FEATURES


### VIDEO

- Horizontal Synchronization 30 KHz to 83 KHz.
- Vertical Synchronization 45 Hz to 75 Hz.. (custom version can support 25Hz in Vertical)
- Support HDMI Port up to 1920x1200 resolution
- Support DVI
- Support VGA Dsub
- Output data type : LVDS 18bit,24bit,36Bit,48bit.

### AUDIO (optional)

- HDMI(Digital) and External Analog Audio input source selection
- Digital Volume Control
- Support 2W+2W audio amplifier.

### POWER

- DC Power In from: 12V to 24V   
(please make sure the Backlight of LCD can support 24V when 24V DC IN ,otherwise Please Use THV65B to support 12V backlight externally.)
- Jack 5.5×2.1Φ  
(a) Wafer 4P 2.0mm
- Output for LCD panel : 3.3V / 5V / 12V.
- VESA DPMS compliant.
- Power consumption :TBD

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- Support Max. 8W for Backlight 12V output when 24V DC input

## 2. ELICTRICAL PERFORMANCE

All tests must be performed under “standard testing conditions”  
( item 2.1 ) unless otherwise specified.

### 2.1 OPERTION TEMPERATURE

- Warm up time :  $\geq 30\text{min.}$
- Operation Temperature :  $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$
- Storage Temperature :  $-30^{\circ}\text{C} \sim 80^{\circ}\text{C}$
- Operation Humidity :  $10\% \sim 80\%$
- Storage T Humidity :  $5\% \sim 90\%$

### 2.2 PRESET TIMING CHART

#### 2.2.2 FACTORY PRESETTED AND PREDEFINED TIMINGS

VESA MODES			
Mode	Resolution	Horizontal Frequency	Vertical Frequency
1	640 × 480@60Hz	31.469 KHz	59.940 Hz
2	640 × 480@72Hz	37.861 KHz	72.809 Hz
3	640 × 480@75Hz	37.500 KHz	75.00 Hz
4	800 × 600@56Hz	35.156 KHz	56.250 Hz
5	800 × 600@60Hz	37.879 KHz	60.317 Hz
6	800 × 600@72Hz	48.077 KHz	72.188 Hz
7	800 × 600@75Hz	46.875 KHz	75.000 Hz
8	1024 × 768@60Hz	48.363 KHz	60.004 Hz
9	1024 × 768@70Hz	56.476 KHz	70.609 Hz
10	1024 × 768@75Hz	60.023 KHz	75.029 Hz
11	1280 × 1024@60Hz	63.981 KHz	60.020 Hz
12	1280 × 1024@75Hz	79.976 KHz	75.025 Hz

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13	1360 × 768@60Hz	47.712 KHz	60.015 Hz
14	1440 × 900@60Hz	55.935 KHz	59.887 Hz
15	1440 × 900@75Hz	70.635 KHz	74.984 Hz
16	1680 × 1050@60Hz	65.290 KHz	59.954 Hz
17	1680 × 1050@75Hz	82.306 KHz	74.892 Hz
18	1920 × 1080@60Hz	67.158 KHz	59.963 Hz

### 3. DIMENSIONS

#### 3.1 COMPONENT SIZE

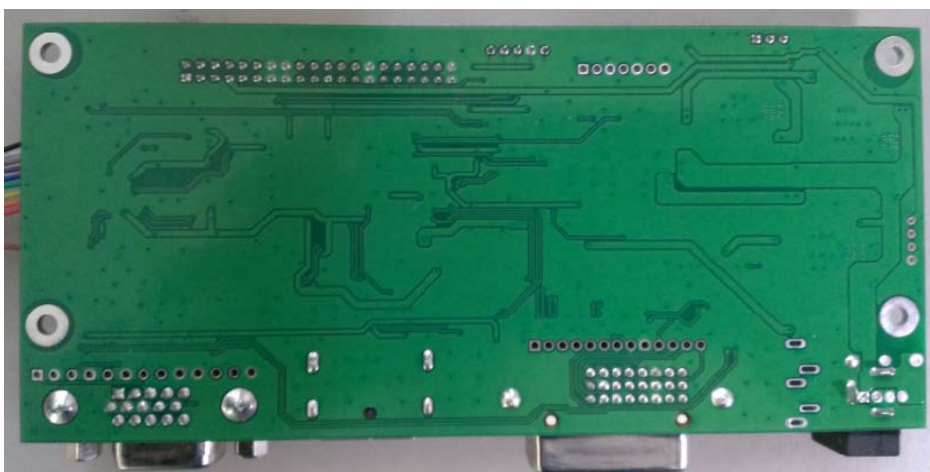


**(Standard Version)**

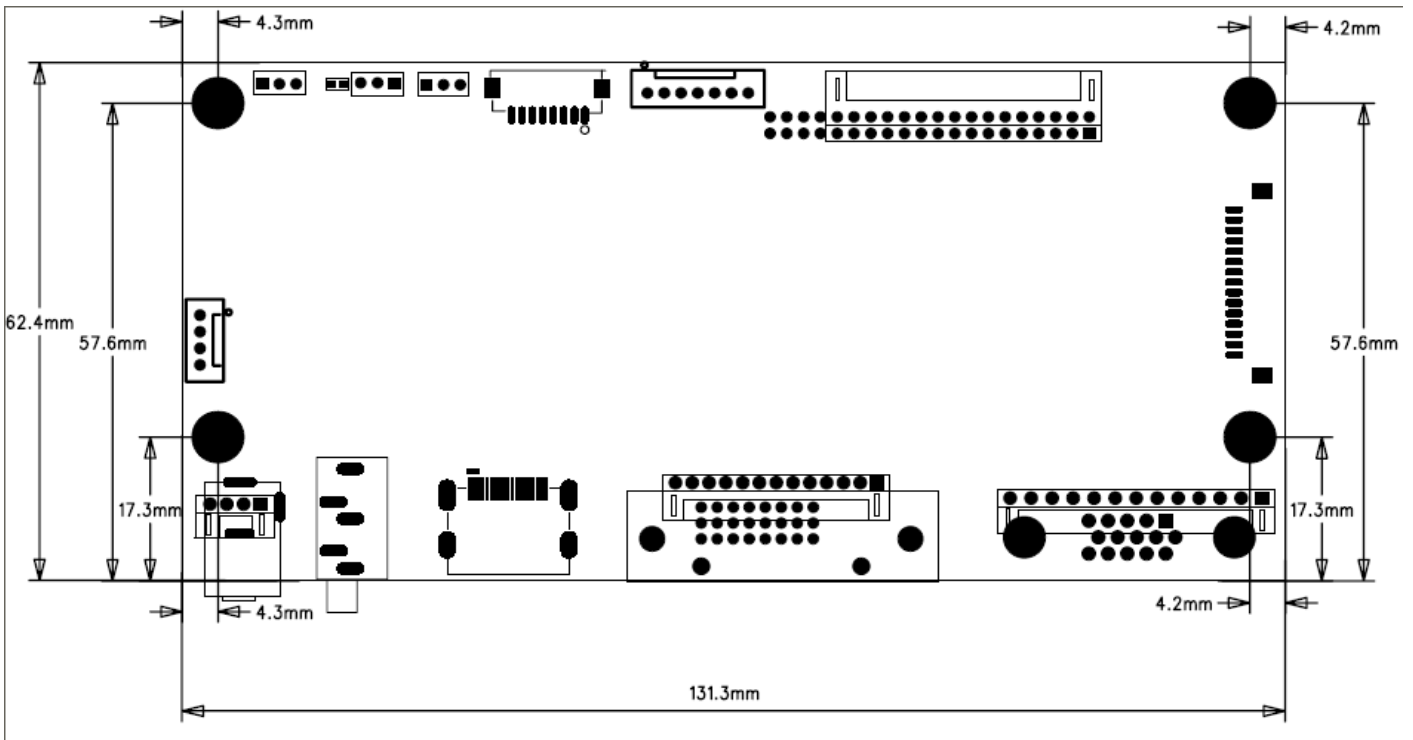
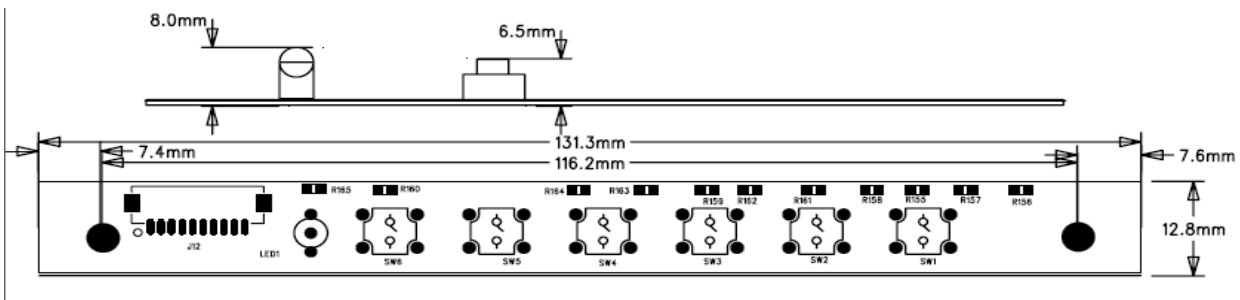


( Low Profile Version )

### 3.2 SOLDER SIDE



### 3.3 PCB DIMENSIONS



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## 4. CONNECTOR

### 4.1 POWER CONNECTOR ( P1 ) 5.5×2.1Φ

PIN	Symbol	Description
1	+12V	POWER SUPPLY +12V
3	GND	POWER SUPPLY GROUND

### 4.2 POWER CONNECTOR ( J4 ) Wafer 4P 2.0mm

PIN	Symbol	Description
1	DC_IN	POWER SUPPLY +12V
2	GND	POWER SUPPLY GND
3	GND	POWER SUPPLY GND
4	DC_IN	POWER SUPPLY +12V

### 4.3 VGA INPUT CONNECTOR ( CON1 )—D-Sub 15P

PIN	Symbol	Description	PIN	Symbol	Description
1	VGA IN R	Red analog signal	9	DDC_VDD	DDC power supply
2	VGA IN G	Green analog signal	10	GND	Digital ground
3	VGA IN B	Blue analog signal	11	N.C	N.C
4	N.C	N.C	12	DDC SDA	DDC Serial Data
5	GND	Digital ground	13	Hor. SYNC	Horizontal synchronous
6	GND-R	Analog ground of Red	14	Ver. SYNC	Vertical synchronous
7	GND-G	Analog ground of Green	15	DDC SCL	DDC Serial Clock
8	GND-B	Analog ground of Blue			

#### 4.4 VGA INPUT CONNECTOR (JP13 )—Wafer 13P 2.5mm

PIN	Symbol	Description	PIN	Symbol	Description
1	VGA IN R	Red analog signal	7	Ver. SYNC	Vertical synchronous
2	GND-R	Analog ground of Red	8	Hor. SYNC	Horizontal synchronous
3	VGA IN G	Green analog signal	9	GND	
4	GND-G	Analog ground of Green	10	GND	Digital ground
5	VGA IN B	Blue analog signal	11	DDC SDA	DDC Serial Data
6	GND-B	Analog ground of Blue	12	DDC SCL	DDC Serial Clock
			13	GND	

#### 4.5 DVI (J7) Connector (2.0 mm13 Pin 90°)

Pin	Function	Note
1	TMDS 0+	
2	TMDS 0-	
3	TMDS 1+	
4	TMDS 1-	
5	TMDS 2+	
6	TMDS 2-	
7	TMDS CK+	
8	TMDS CK-	
9	GND	
10	DVIPOWER	
11	Hot Plug	
12	DVI_SCL	
13	DVI_SDA	

#### 4.6 CONNECTOR (CN3 )— 19 PIN

##### 4.6 HDMI CONNECTOR ( JP13 )—D-19P

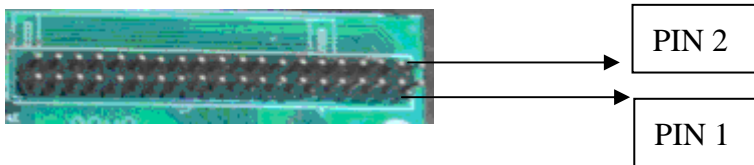
PIN	Symbol	Description	PIN	Symbol	Description
1	HDMI_0+	HDMI_0+	11	GND	Ground
2	GND	Ground	12	HDMI_CLK-	HDMI_CLK-
3	HDMI_0-	HDMI_0-	13	CEC	CEC
4	HDMI_1+	HDMI_1+	14	N.C	NO Connection
5	GND	Ground	15	HDMI_SCL	HDMI_SCL
6	HDMI_1-	HDMI_1-	16	HDMI_SDA	HDMI_SDA
7	HDMI_2+	HDMI_2+	17	GND	Ground
8	GND	Ground	18	HD_5V	+5V input
9	HDMI_2-	HDMI_2-	19	HDMI_PLGDET1	HDMI_PLGDET
10	HDMI_CLK+	HDMI_CLK+			

#### 4.7 SPEAKER OUTPUT CONNECTOR (J15 )--Wafer 7Pin 2.0mm

PIN	Symbol	Description
1	Audio_R_in	Audio_Input_R
2	Audio_L_in	Audio_Input_L
3	GND	GND
4	R-OUT	To speaker R
5	GND	GROUND
6	L-OUT	To speaker L
7	GND	GROUND

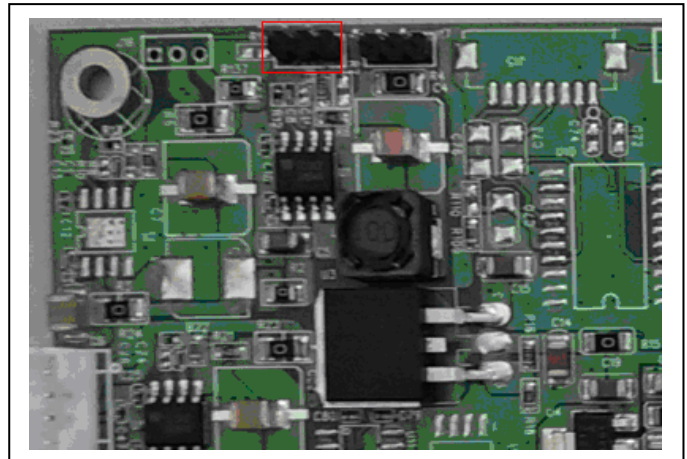
#### 4.8 LVDS OUTPUT CONNECTOR ( J8 )--Header 2x20 Pin 2.0mm

PIN	Symbol	Description	PIN	Symbol	Description
1	GPIO1	GPIO1	21	RxO2-	RxO2-
2	GPIO2	GPIO2	22	RxO2+	RxO2+
3	GPIO3	GPIO3	23	RxO1-	RxO1-
4	GPIO4	GPIO4	24	RxO1+	RxO1+
5	GPIO5	GPIO5	25	RxO0-	RxO0-
6	GPIO6	GPIO6	26	RxO0+	RxO0+
7	BK_PWR	BK_PWR *	27	GND	GND
8	GPIO8	GPIO8	28	GND	GND
9	VDD	VDD *	29	RxE3-	RxE3-
10	VDD	VDD *	30	RxE3+	RxE3+
11	BK_EN	BK_EN	31	RxEC-	RxEC-
12	LED_PWM	LED_PWM	32	RxEC+	RxEC+
13	GND	GND	33	RxE2-	RxE2-
14	GND	GND	34	RxE2+	RxE2+
15	GND	GND	35	RxE1-	RxE1-
16	GND	GND	36	RxE1+	RxE1+
17	RxO3-	RxO3-	37	RxE0-	RxE0-
18	RxO3+	RxO3+	38	RxE0+	RxE0+
19	RxOC-	RxOC-	39	GND	GND
20	RxOC+	RxOC+	40	GND	GND



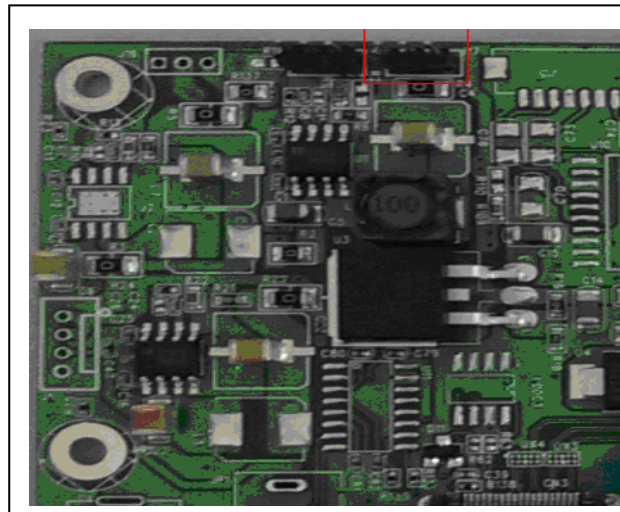
### J1 setting for LCD VDD

<table border="0"> <tr> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	1	2	3				LCD VCC= 12V
1	2	3					
<table border="0"> <tr> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	1	2	3				LCD VCC= 5V
1	2	3					
<table border="0"> <tr> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	1	2	3				LCD VCC= 3.3V
1	2	3					



### J17 —LED Backlight Voltage Setting

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1	2	3					
<table border="0"> <tr> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	1	2	3				LED VCC= DC IN 12V or 24V
1	2	3					
<table border="0"> <tr> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	1	2	3				LED VCC=external VCC2
1	2	3					



Note: VCC1 or VCC2 is defined by custom Resistor configuration

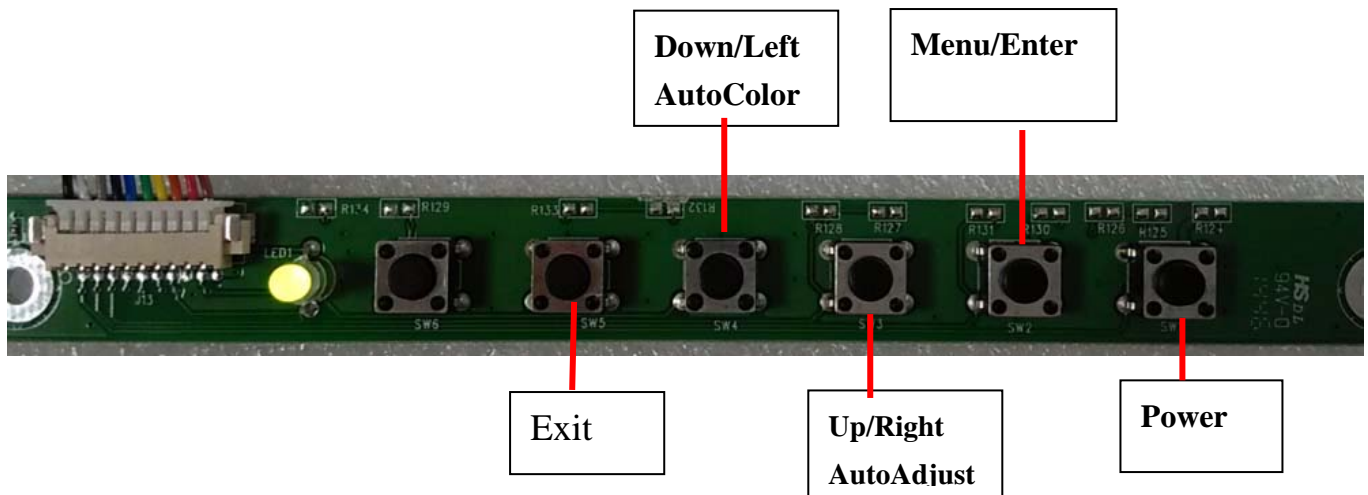
#### 4.9 INTERVER CONNECTOR (J10)--Wafer 5 Pin 2.0mm

PIN	Symbol	Description
1	+12V	Power Supply +12V
2	GND	GND
3	BK_PWM	Dimming Control by digital PWM mode
4	BK_ADJ	Dimming Control by Analog mode
5	BL_EN	Penal Backlight On/Off control

#### 4.10 Keypad SELECTION ( J9 )--Wafer 15P 1.25mm

Pin	Function	Note
1	SW1	POWER
2	SW2	MENU/ENTER
3	SW3	DOWN/ AUTO ADJUST
4	SW4	UP / AUTO COLOR
5	SW5	DOWN/AUTO ADJUST(Reserve)
6	LED-G	LED GREEN
7	LED-R	LED RED
8	GND	GND
9	SW6	UP / AUTO COLOR
10	LED_POWER	
11	Reserved	
12	Reserved	
13	Reserved	GND
14	Reserved	RX (UART—TTL/CMOS )
15	Reserved	TX(UART---TTL/CMOS )

## 5 CORRESPONDING KEYPAD



## 6 OSD WINDOW OPERATION