# THC63LVD1023B / THC63LVD1024 Evaluation Kit

LVDS Dual Link Evaluation Board

Parts Number: THEVA1023B, THEVA1024

## 1. General Description

THEVA1023B and THEVA1024 are designed to evaluate THC63LVD1023B/THC63LVD1024 for transmission video data.

THC63LVD1023B and THC63LVD1024 chipset can transmit 67bit data via dual channel LVDS.

The maximum input clock frequency of THC63LVD1023B is 160MHz, and the maximum output clock frequency of THC63LVD1024 is 135MHz at Dual in / Single out mode.

## 2. Features

### Common Features

・Low power single 3.3V CMOS design
・Power down mode
・Wide dot clock range suited for TV signal(480i to 1080p), PC signal(VGA to QXGA)
・PLL requires no external components
・Clock edge selectable

### THC63LVD1023B

・Single/Dual TTL in, Single/Dual LVDS out
・Double Edge Input(Single in/Dual out Mode)
・Input Port Switch for Single TTL in/Dual out
・Asynchronous Dual TTL in / Dual LVDS out
・3 LVDS Data Mapping Modes
・Pseudo Random Pattern Generation Circuit
・Support Reduced Swing LVDS for Lower EMI
・LQFP 144 Pin

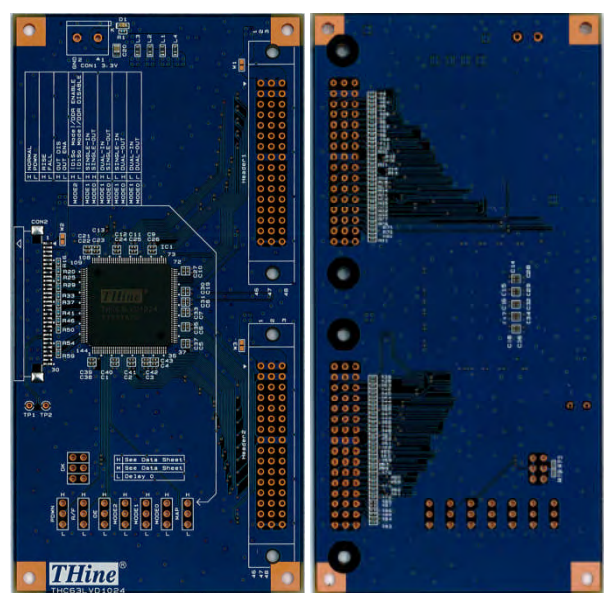### THC63LVD1024

・Single/Dual LVDS in, Single/Dual TTL out
・Double Edge Output
・50% Output Clock Duty Cycle
・TTL Clock Output Timing Programmable
・2 Output Data Mapping Modes
・LQFP 144 pin + Exposed Pad

## 3. Overview
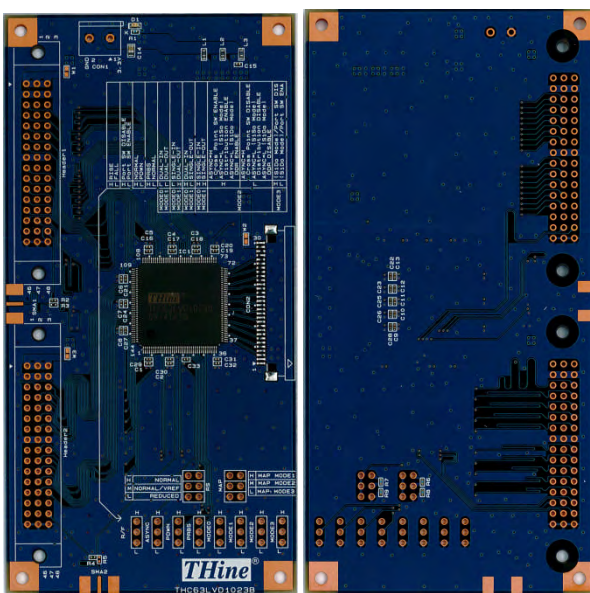


(a)THEVA1023B          (b)THEVA1024

Figure 1 THEVA1023B and THEVA1024

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# 2. Power Supply Setup
This chapter shows power supply condition.
**Caution: Please check if there is no power-GND short on below red trace before supplying any power.**

**3.3V Power Supply to Each Board**
Each evaluation board requires 3.3V power supply. Please use "CON1" connector typically.
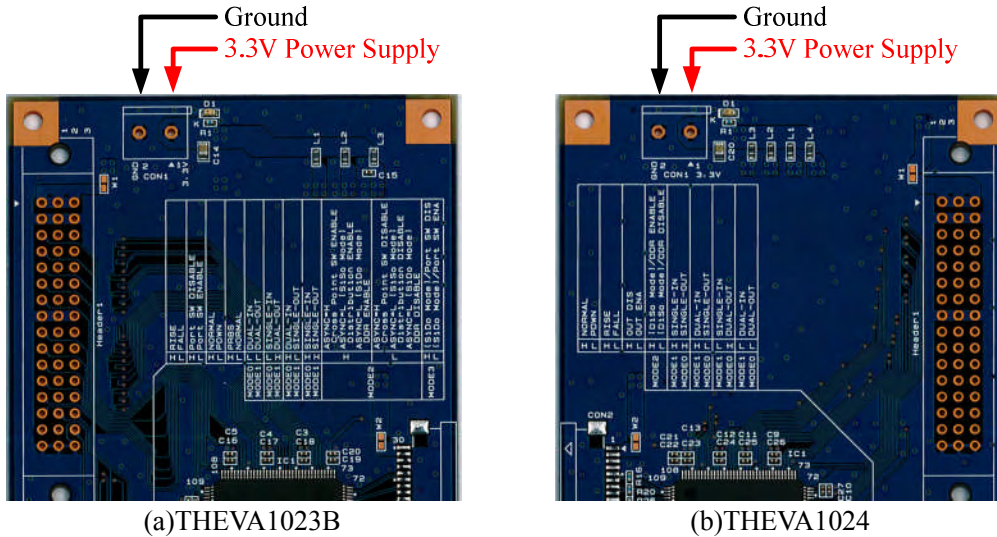


(a)THEVA1023B          (b)THEVA1024
Figure 2 Power Supply for Evaluation Board

**Power Supply from / to Connector**
3.3V power supply can be connected to Header1 and CON2 by using W1, W2 and W3solder jumper.

**THEVA1023B**
W1: Connect the 3.3V power supply with pin#1, 2 and 3 of Header1.
W2: Connect the 3.3V power supply with pin#13 and 14 of CON2.
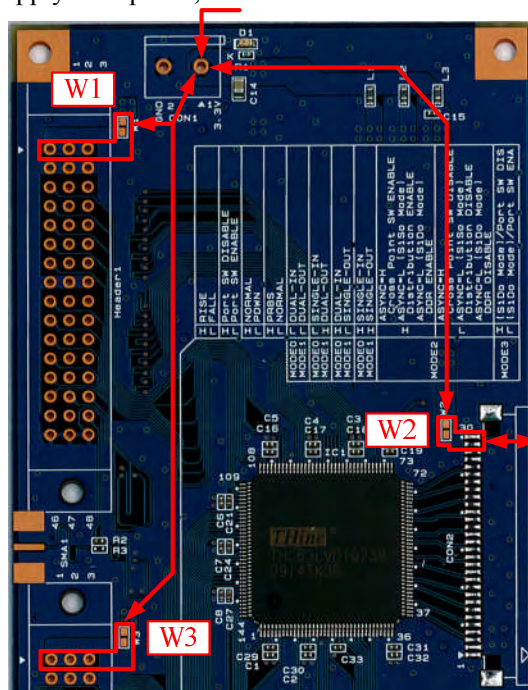W3: Connect the 3.3V power supply with pin#1, 2 and 3 of Header2.



Figure 3 THEVA1023B Power Supply from / to Each Connector

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**THEVA1024**
  W1: Connect the 3.3V power supply with pin#1, 2 and 3 of Header1.
  W2: Connect the 3.3V power supply with pin#1 and 2 of CON2.
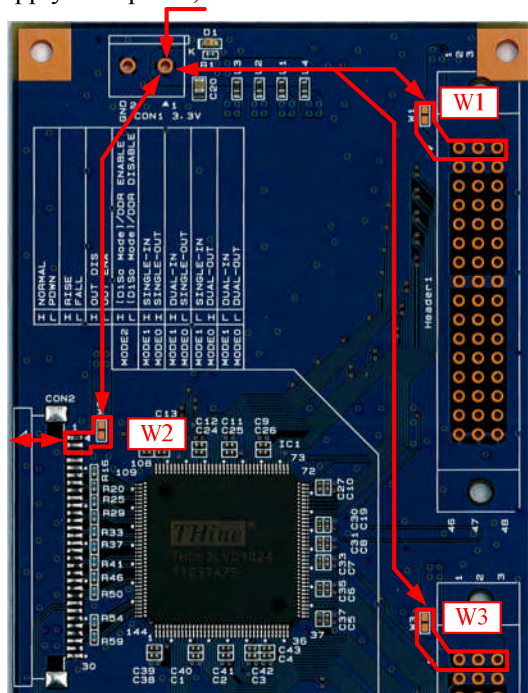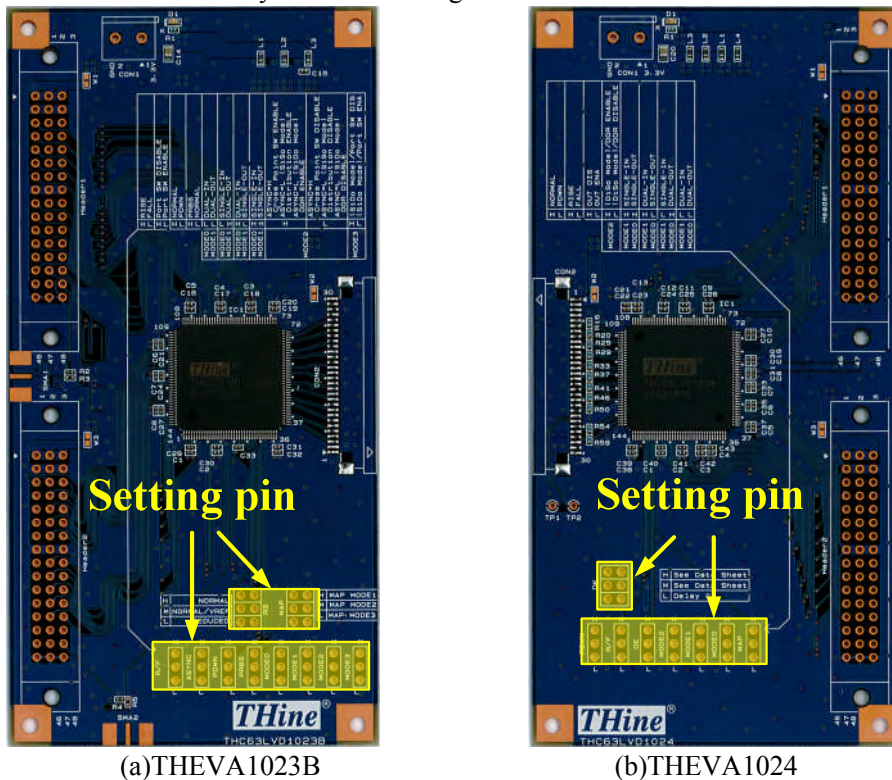  W3: Connect the 3.3V power supply with pin#1, 2 and 3 of Header2.



Figure 4 THEVA1024 Power Supply from / to Each Connector

# 3. Function Setting

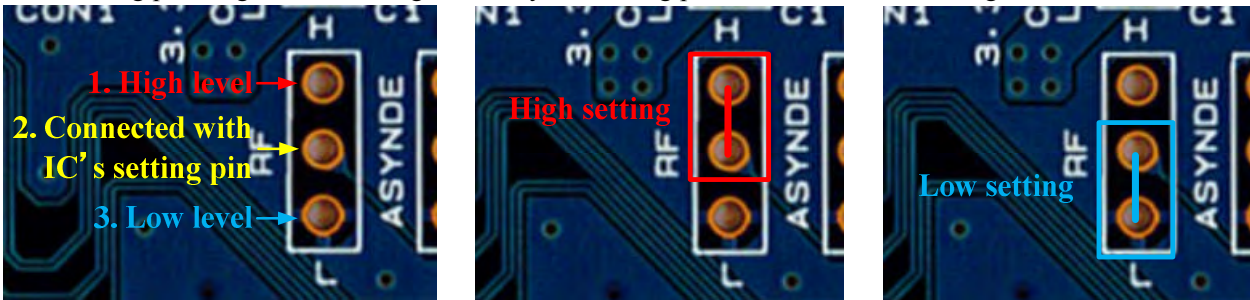Setting pin of each board is shown in yellow area of Figure 5.



(a)THEVA1023B              (b)THEVA1024

Figure 5 Position of Function Setting Pin

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Pin#2 of each 3HEADER is connected to IC's setting pin.
Each setting pin's high or low setting can set by connecting pin#2 of 3HEADER and high level or low level.



| (a)3HEADER Description | (b)High Level Setting | (c)Low Level Setting |

Figure 6 High / Low Setting Description

THEVA1023B and THEVA1024 have 3 level setting pin.
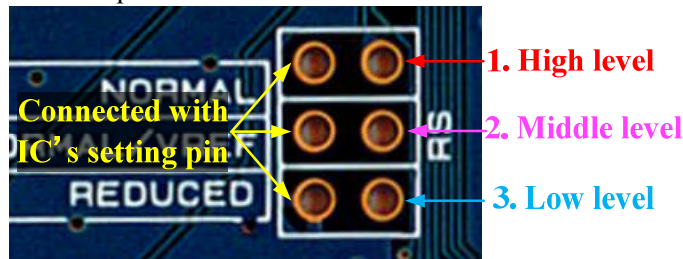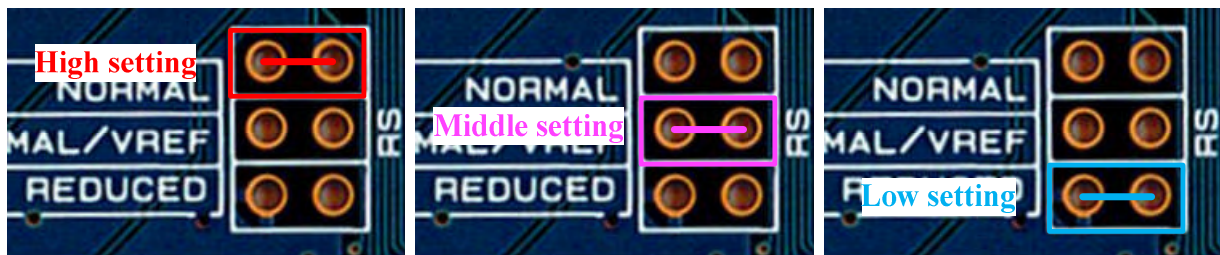Please refer to Figure 7 to set the pin into each level.



Figure 7 Description of 3Level Setting Pin



| (a) High Level Setting | (b) Middle Level Setting | (c) Low Level Setting |

Figure 8 High / Middle / Low Setting Description

## 4. Clock Input from SMA Connector

THEVA1023B can also choose the TTL clock input from SMA connector by using 0ohm resistor. If you want to use SMA connector for clock input, please change the 0ohm resistor mount from R2 to R3, and R4 to R5.
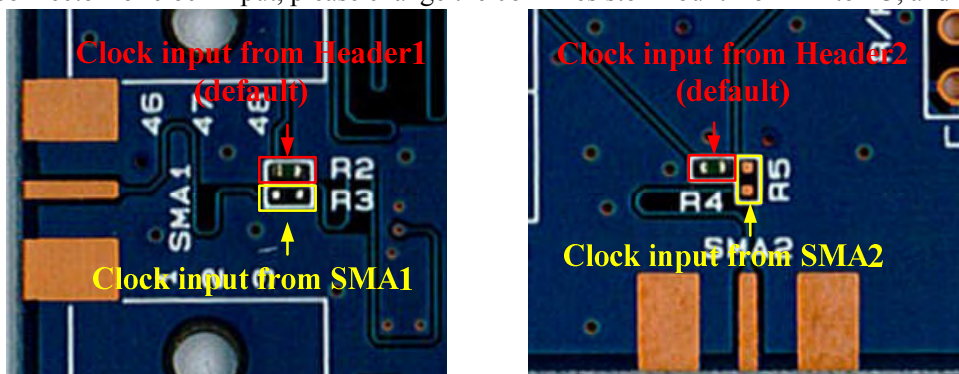


| (a)External Clock Input for Channel1 | (b)External Clock Input for Channel2 |

Figure 9 TTL Clock Input Connector Select

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# 5. Status Indicate LED

LED "D1" indicates 3.3V power supply status.

# 6. Function

This chapter shows function setting of THEVA1023B and THEVA1024.

Table 1 THEVA1023B Function Setting Description

| Silk | Symbol | Function |
|---|---|---|
| RS | RS | LVDS swing mode, VREF select.<br><br>| RS | LVDS Swing | Small Swing Input Support |<br>|---|---|---|<br>| $V_{IHM}$ | 350mV | N / A |<br>| $V_{IMM}$ | 350mV | RS = $V_{REF}$ |<br>| $V_{ILM}$ | 200mV | N / A | |
| MAP | MAP | LVDS mapping table select<br><br>| MAP | Mapping Mode |<br>|---|---|<br>| $V_{IHM}$ | Mapping MODE1 |<br>| $V_{IMM}$ | Mapping MODE2 |<br>| $V_{ILM}$ | Mapping MODE3 | |
| MODE3 | MODE3 | Input port switching function enable when MODE[1:0] = H, L(Single-in / Dual-out).<br>   H or Open: Port Switch Disable    L: Port Switch Enable |
| MODE2 | MODE2 | The use of these multi-function depends on the setting of MODE[1:0] or ASYNC.<br><br>| ASYNC | MODE1 | MODE0 | Function | MODE2 | Enable / Disable |<br>|---|---|---|---|---|---|<br>| H | x | x | Cross Point Switching | H | Enable |<br>| | | | | L | Disable |<br>| L | H | H | Distribution Function | H | Enable |<br>| | | | | L | Disable |<br>| | H | L | DDR(Double Edge Input) Function | H | Enable |<br>| | | | | L | Disable | |
| MODE1 | MODE1 | Pixel data mode select<br><br>| MODE1 | MODE0 | Function |<br>|---|---|---|<br>| L | L | Dual Link (Dual-in / Dual -out) |<br>| L | H | Dual Link (Single-in / Dual -out) |<br>| H | L | Single Link (Dual-in / Single-out) |<br>| H | H | Single Link (Single-in / Single-out) | |
| MODE0 | MODE0 | |
| ASYNC | ASYNC | Asynchronous function.<br>   H : Asynchronous Function Enable (MODE[1:0] function is enabled in this setting)<br>   L : Asynchronous Function Disable (MODE[1:0] function is disabled in this setting) |
| R/F | R/F | Input clock triggering edge select.<br>   H : Rising Edge    L : Falling Edge |
| PRBS | PRBS | PRBS (Pseudo Random Binary Sequence) generator is active in order to evaluate eye diagram when MODE[1:0] = L, L (Dual-in / Dual-out) or ASYNC = H.<br>   H : PRBS Generator Enable    L : Normal Operation |
| PDWN | PDWN | Power down function setting<br>   H : Normal Operation    L : Power Down Mode (All outputs are Hi-Z) |

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Table 2 THEVA1024 Function Setting Description

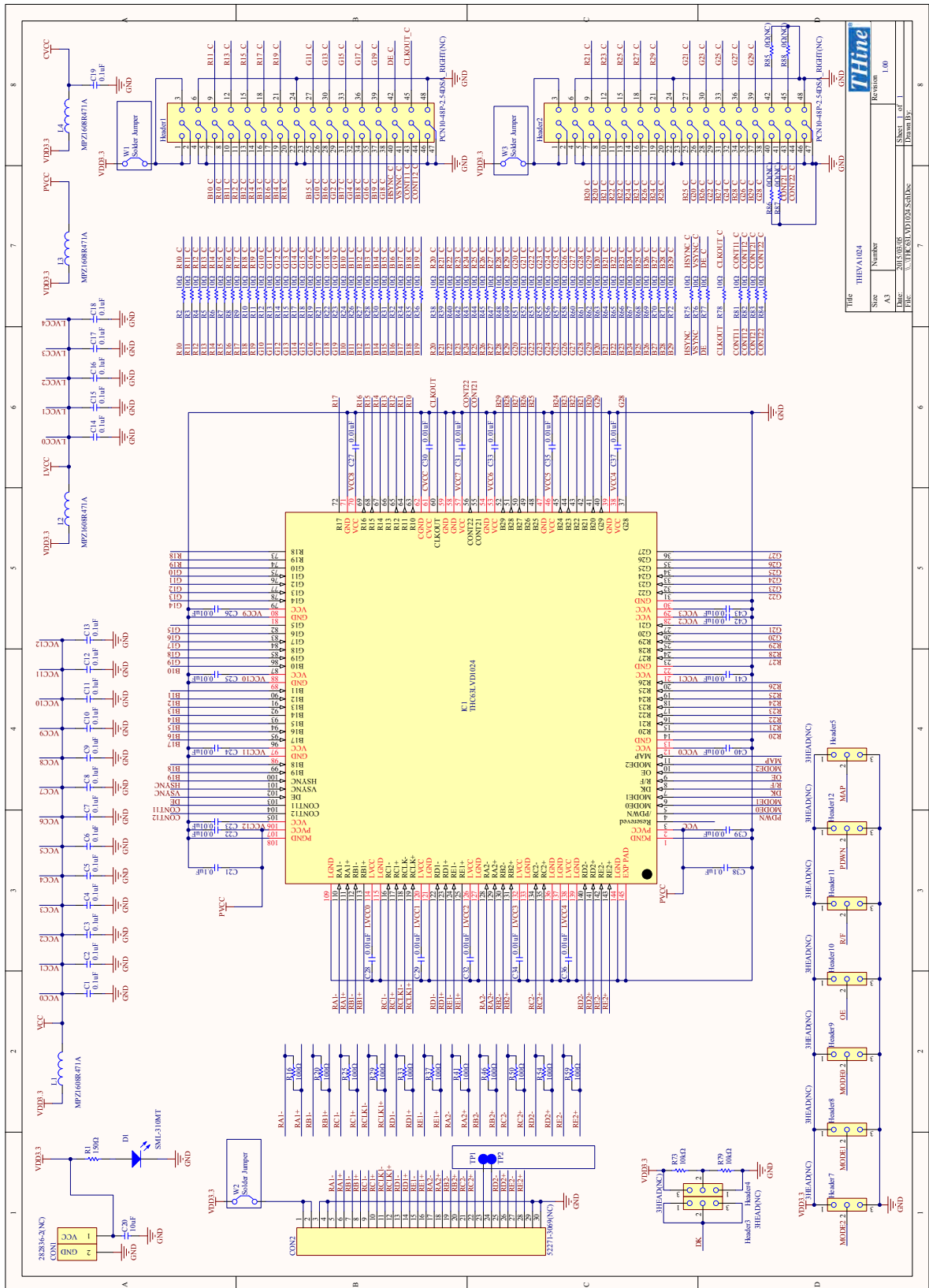| Silk | Symbol | Function |
|---|---|---|
| DK | DK | LVDS swing mode, $V_{REF}$ select.<br><br>| MODE1 | MODE0 | DK | Function |<br>|---|---|---|---|<br>| L L<br>H L<br>H H | | L | 0 |<br>| | | M | -6(tDOUT)/28 |<br>| | | H | 6(tDOUT)/28 |<br>| L H | | L | 0 |<br>| | | M | -7(tDOUT)/28 |<br>| | | H | 7(tDOUT)/28 | |
| MODE2 | MODE2 | DDR function enable. The use of this function depends on the setting MODE[1:0].<br><br>| MODE1 | MODE0 | MODE2 | Function |<br>|---|---|---|---|<br>| L | L | L | Must be tied to GND |<br>| L | H | H | DDR Function Enable |<br>| | | L | DDR Function Disable |<br>| H | L | L | Must be Tied to GND |<br>| H | H | L | Must be Tied to GND | |
| MODE1 | MODE1 | Pixel data mode select<br><br>| MODE1 | MODE0 | Function |<br>|---|---|---|<br>| L | L | Dual Link (Dual-in / Dual -out) |<br>| L | H | Dual Link (Single-in / Dual -out) |<br>| H | L | Single Link (Dual-in / Single-out) |<br>| H | H | Single Link (Single-in / Single-out) | |
| MODE0 | MODE0 | |
| OE | OE | Output enable<br>    H : Output Enable    L : Output Disable |
| R/F | R/F | Output clock triggering edge select.<br>    H : Rising Edge<br>    L : Falling Edge |
| PDWN | PDWN | Power down function setting<br>    H : Normal Operation<br>    L : Power Down Mode (All outputs are Hi-Z) |
| MAP | MAP | LVDS mapping table select.<br>    H : Mapping MODE1    L : Mapping MODE2 |

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# 7. Schematic



Figure 10 THEVA1023B Schematic

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Figure 11 THEVA1024 Schematic

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# 8. Bills of Materials

## Table 3 THEVA1023B BOM

| TYPE | Value / Part No. | Package | SPEC | Reference No. | Q'ty | Note |
|------|------------------|---------|------|---------------|------|------|
| Capacitor | 0.1uF | 1005 | 16V | C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C15, C20, C32 | 17 | |
| Capacitor | 10uF | 2012 | 16V | C14 | 1 | |
| Capacitor | 0.01uF | 1005 | 16V | C16, C17, C18, C19, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C33 | 16 | |
| Connector | 282836-2(NC) | 5mm_pitch | 2pin | CON1 | 1 | |
| Connector | 52271-3069(NC) | 1mm_pitch | 30pin | CON2 | 1 | |
| Connector | PCN10-48P-2.54DSA_LEFT(NC) | 2.54mm_pitch | 48pin | Header1, Header2 | 2 | |
| Connector | SMA103-T16(NC) | 1.6mm | PCB End Jack | SMA1, SMA2 | 2 | |
| Header | 3HEAD(NC) | 2.54mm_pitch | --- | Header3, Header4, Header5, Header6, Header7, Header8, Header9, Header10, Header11, Header12, Header13, Header14 | 12 | |
| IC | THC63LVD1023B | LQFP144 | --- | IC1 | 1 | |
| Inductor | MPZ1608R471A | 1608 | 1.2A | L1, L2, L3 | 3 | |
| LED0 | SML-310MT | 1608 | GREEN | D1 | 1 | |
| Resistor | 150Ω | 1005 | 0.1W | R1 | 1 | |
| Resistor | 0Ω | 1005 | 0.1W | R2, R4 | 2 | |
| Resistor | 0Ω(NC) | 1005 | 0.1W | R3, R5 | 2 | |
| Resistor | 10kΩ | 1005 | 0.1W | R6, R7, R8, R9 | 4 | |

## Table 4 THEVA1024 BOM

| TYPE | Value / Part No. | Package | SPEC | Reference No. | Q'ty | Note |
|------|------------------|---------|------|---------------|------|------|
| Capacitor | 0.1uF | 1005 | 16V | C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, | 21 | |
| Capacitor | 10uF | 2012 | 16V | C20 | 1 | |
| Capacitor | 0.01uF | 1005 | 16V | C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C39, C40, C41, C42, C43 | 21 | |
| Connector | 282836-2(NC) | 5mm_pitch | 2pin | CON1 | 1 | |
| Connector | 52271-3069(NC) | 1mm_pitch | 30pin | CON2 | 1 | |
| Connector | PCN10-48P-2.54DSA_RIGHT(NC) | 2.54mm_pitch | 48pin | Header1, Header2 | 2 | |
| Header | 3HEAD(NC) | 2.54mm_pitch | --- | Header3, Header4, Header5, Header6, Header7, Header8, | 10 | |
| IC | THC63LVD1024 | LQFP144 | --- | IC1 | 1 | |
| Inductor | MPZ1608R471A | 1608 | 1.2A | L1, L2, L3, L4 | 4 | |
| LED0 | SML-310MT | 1608 | GREEN | D1 | 1 | |
| Resistor | 150Ω | 1005 | 0.1W | R1 | 1 | |
| Resistor | 10Ω | 1005 | 0.1W | R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R17, R18, R19, R21, R22, R23, R24, R26, R27, R28, R30, R31, R32, R34, R35, R36, R38, R39, R40, R42, R43, R44, R45, R47, R48, R49, R51, R52, R53, R55, R56, R57, R58, R60, R61, R62, | 68 | |
| Resistor | 100Ω | 1005 | 0.1W | R16, R20, R25, R29, R33, R37, R41, R46, R50, R54, R59 | 11 | |
| Resistor | 10kΩ | 1005 | 0.1W | R73, R74, R79, R80 | 4 | |
| Resistor | 0Ω(NC) | 1005 | 1A | R85, R86, R87, R88 | 4 | |

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# 9. Set Items

Table 5 Set Items

| TYPE | Part No. |
|---|---|
| DC Connector | 282836-2 |
| FFC Connector for LVDS Link | 52271-3069 |
| FFC 30pin 1mm Pitch for LVDS Link | 98267-0475 |
| Pin Header | --- |

It's possible to mount these parts on this board and use.

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Please kindly read, understand and accept this "Notices and Requests" before using this product.

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