THCV231 / THCV236 Evaluation Kit

SerDes Single Link Evaluation Board

Parts Number: THEVA231, THEVA236

1. General Description

THEVA231 and THEVA236 boards are designed to evaluate THCV231 and THCV236 for transmission of Video data between the host and display.

One high-speed lane can carry up to 14bit data at a pixel clock frequency from 12MHz to 160MHz.

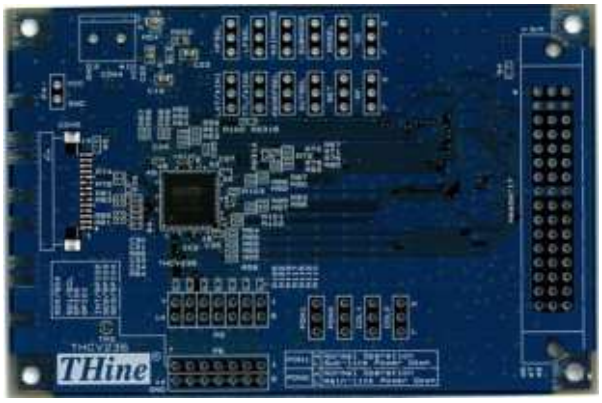
The chipset, which has one high-speed data lane, can transmit video data up to 1080p/60Hz.
The maximum serial data rate is 4.00Gbps/lane.

2. Features

- Data width selectable
- Wide frequency range
- AC coupling for high-speed lanes
- CDR requires no external frequency reference
- Wide Range Supply Voltage from 1.7V to 3.6V
- Additional SSCG on data stream
- 2-wire serial I/F bridge function(400kbps)
- Remote side GPIO control and monitoring

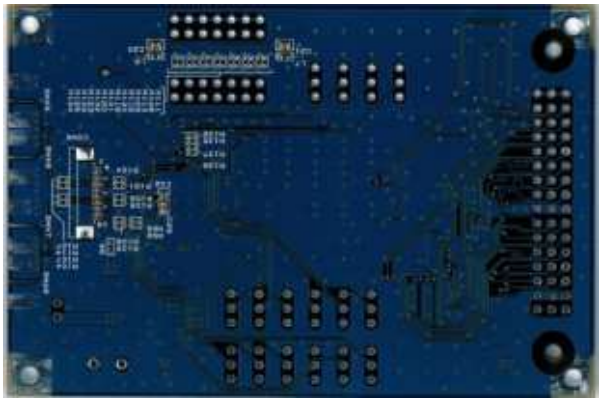
3. Overview

(a) THEVA231 (Top Side)



(b) THEVA236 (Top Side)

(c) THEVA231 (Bottom Side)



(d) THEVA236 (Bottom Side)

Figure 1 THEVA231 and THEVA236 View

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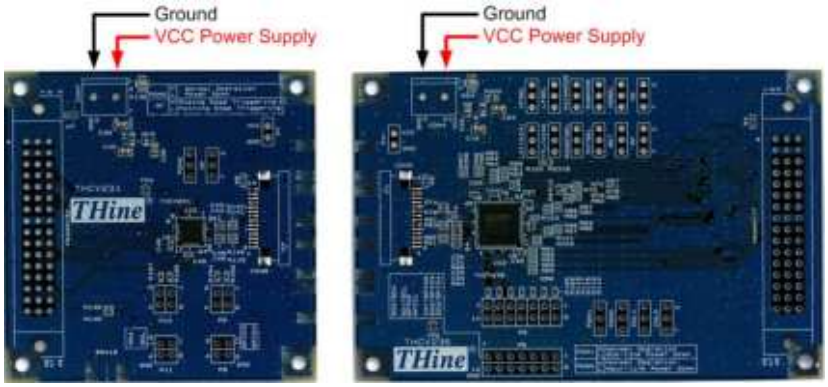
4. Power Supply Set Up

This chapter shows power supply condition.

Caution: Check if there is no power-GND short on below red trace before supplying any power.

VCC Power Supply to Each Board

Each evaluation board requires VCC power supply. Use “CON7” and “CON4” connector typically.



(a) THEVA231 (b) THEVA236

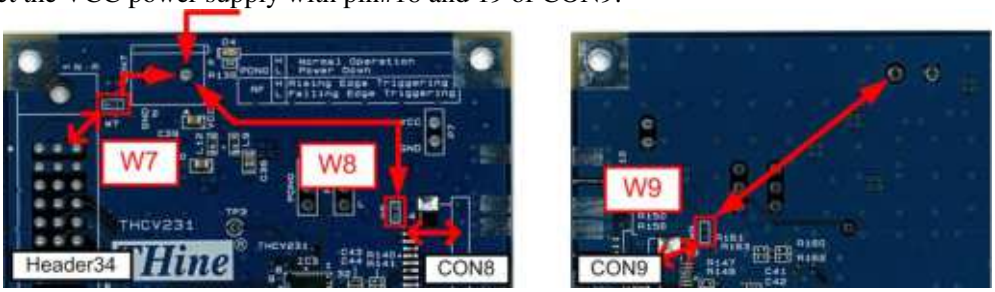
Figure 2 Power Supply for Evaluation Board

Power Supply from / to Connector

VCC power supply can be connected to each connector by using solder jumper.

THEVA231

W8: Connect the VCC power supply with pin#13 and 14 of CON8.
W7: Connect the VCC power supply with pin#1, 2 and 3 of Header34.
W9: Connect the VCC power supply with pin#18 and 19 of CON9.

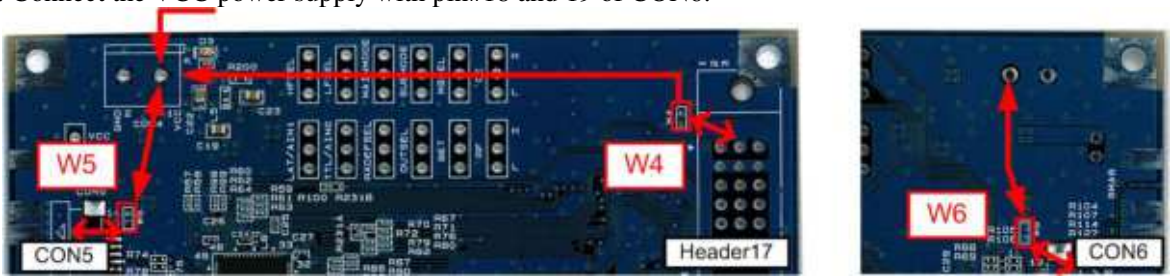


(a)THEVA231 (Top Side) (b) THEVA231 (Bottom Side)

Figure 3 THEVA231 Power Supply from / to Each Connector

THEVA236

W4: Connect the VCC power supply with pin#1, 2 and 3 of Header17.
W5: Connect the VCC power supply with pin#13 and 14 of CON5
W6: Connect the VCC power supply with pin#18 and 19 of CON6.



(a)THEVA236 (Top Side) (b) THEVA236 (Bottom Side)

Figure 4 THEVA236 Power Supply from / to Each Connector

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5. CML Line Input / Output Connector Select

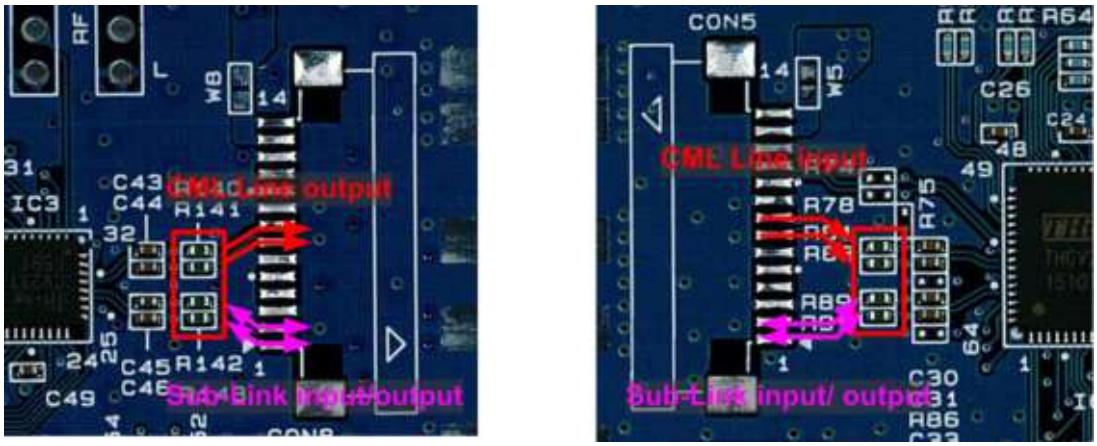
CML line input / output connector can be selected by using 0Ω resistors.

1mm Pitch Connector

Mount / unmount following 0Ω resistors to use 1mm pitch connector.

Table 1 Mount / unmount resistors for using 1mm pitch connector

	Mount	Unmount
THEVA231	R140, R141, R142, R143	R144, R145, R147, R149, R150, R155, R156, R157
THEVA236	R81, R83, R89, R91	R74, R78, R86, R94, R104, R105, R106, R107, R108, R109, R114, R121, R124, R127



(a)THEVA231 (Top Side) (b)THEVA236 (Top Side)

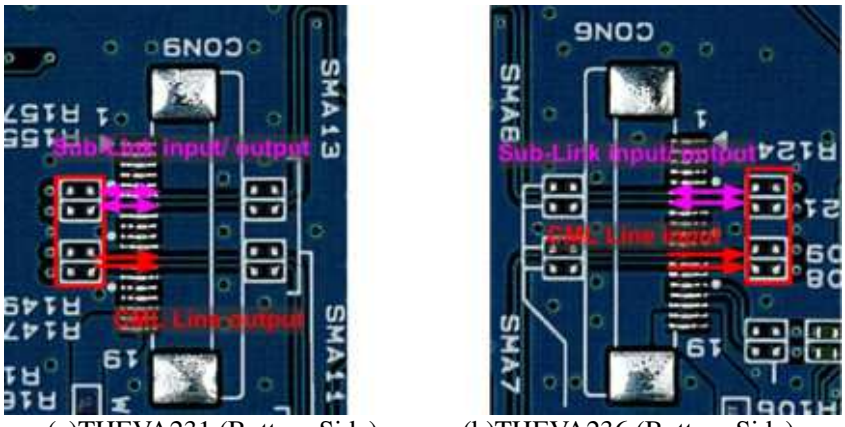
Figure 5 Resistors Mounting for 1mm Pitch Connector

0.5mm Pitch Connector

Mount / unmount following 0Ω resistors to use 0.5mm pitch connector.

Table 2 Mount / unmount resistors for using 0.5mm pitch connector

	Mount	Unmount
THEVA231	R147, R149, R155, R157	R140, R141, R142, R143, R144, R145, R150, R156
THEVA236	R108, R109, R121, R124	R74, R78, R81, R83, R86, R89, R91, R94, R104, R105, R106, R107, R114, R127



(a)THEVA231 (Bottom Side) (b)THEVA236 (Bottom Side)

Figure 6 Resistors Mounting for 0.5mm Pitch Connector

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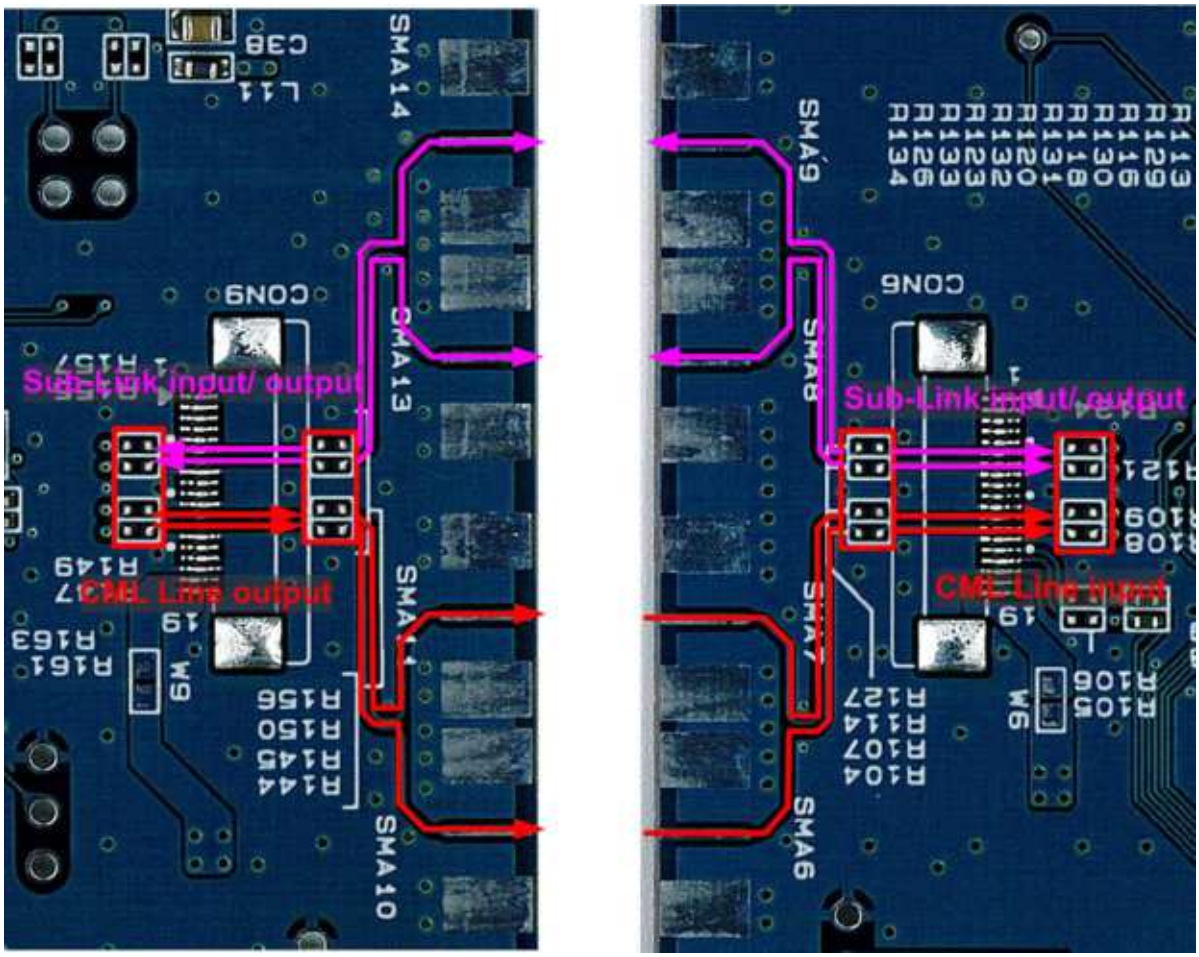
SMA connector

Mount / unmount following 0Ω resistors to use SMA connector.

Table 3 Mount / unmount resistors for using SMA connector

	Mount	Unmount
THEVA231	R144, R145, R147, R149, R150, R155, R156, R157	R140, R141, R142, R143
THEVA236	R104, R107, R108, R109, R114, R121, R124, R127	R74, R78, R81, R83, R86, R89, R91, R94, R105, R106



(a)THEVA231 (Bottom Side) (b)THEVA236 (Bottom Side)

Figure 7 Resistors Mounting for SMA Connector

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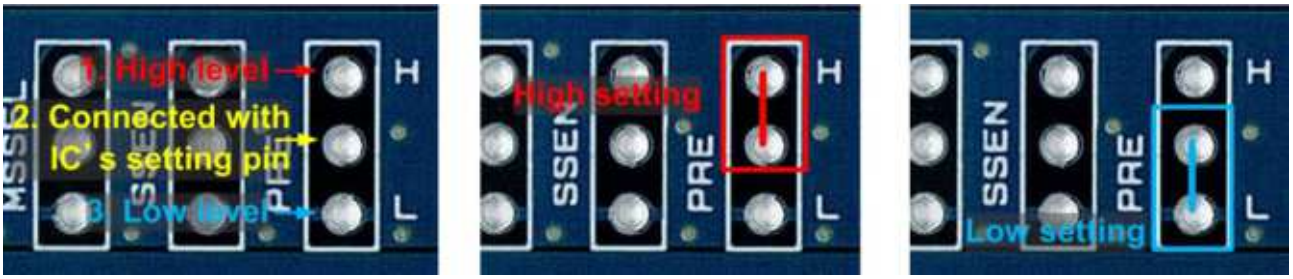
6. Function setting

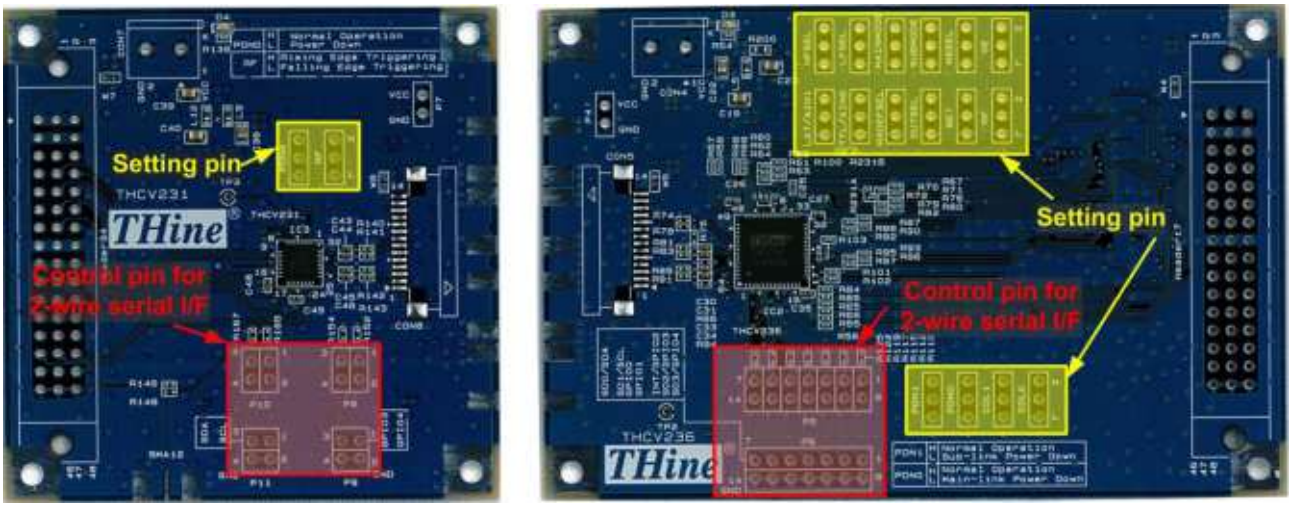
Pin#2 of each 3HEADER is connected to IC's setting pin. Each setting pin's high or low setting can set by connecting pin#2 of 3HEADER and VCC or GND level. Setting pin is yellow area in Figure 9.

P6, P9 and P11 of control pin use to control 2-wire serial I/F. P5, P8 and P10 of control pin can select Pull-up or Open. Control pin is red area in Figure 9.



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

Figure 8 High / Low Setting Description with 3HEADER



(a) THEVA231 (Top Side) (b) THEVA236 (Top Side)

Figure 9 Position of Function Setting pin and Control pin

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Header setting description

Table 4 THEVA231 Function Setting Description

Silk	Pin Name	Function
PDN0	PDN	Power down control H: Normal Operation, L: Power Down
RF	RF/BETOUT	Input clock triggering edge select(*1) H: Rising Edge, L: Falling Edge When Sub-Link Field BET Mode, this pin must be **Open**.
SDA	SDA	SDA input / output for 2-wire serial I/F
SCL	SCL	SCL input / output for 2-wire serial I/F
GPIO3	GPIO3	General Purpose Input Output
GPIO4	GPIO4	General Purpose Input Output

(*1)A pin function changes by operation mode. Carry out appropriate transact. (THCV231_THCV236_Rev.1.00_E.pdf and up)

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Table 5 THEVA236 Function Setting Description

Silk	Pin Name	Function
PDN1	PDN1	Sub-Link power down control H: Normal Operation, L: Power Down
PDN0	PDN0	Main-Link power down control H: Normal Operation, L: Power Down
COL1	COL1/SD0	Color Space Converter and Data Width Setting(*1)(*2) When PDN1=**H**, this pin must be **Open**.
COL0	COL0/INT/GPIO2	Data Width Setting(*1)(*2) When PDN1=**H**, this pin must be **Open**.
HFSEL	HFSEL/RCMN	High Frequency mode select(*1) H: Enable, L: Disable When PDN1=**H**, this pin must be **Open**.
LFSEL	LFSEL	Low Frequency mode select H: Enable, L: Disable
MAINMODE	MAINMODE/RCMP	Main-Link Mode Setting(*1) H: Sync Free Mode, L: V-by-One®HS Mode When PDN1=**H**, this pin must be **Open**.
SUBMODE	HTPDN/SUBMODE	Sub-Link Mode Setting(*1) H: Low Speed Data Bridge Mode, L: 2-wire serial I/F Mode When PDN1=**L**, this pin must be **Open.**(*3)
MSSEL	LOCKN/MSSEL	Sub-Link Master/Slave Setting(*1) H: Sub-Link Master side, L: Sub-Link Slave side When PDN1=**L**, this pin must be **Open**.
OE	OE	Output Enable Control H: LVCMOS output enable, L: LVCMOS output disable
LAT/AIN1	LATEN/SD3/AIN1/GPIO0	Field BET Latch Select and Address Setting(*1) (*4) When Sub-Link Field BET Mode and MSSEL=**H**, this pin must be **H**. When PDN1=**H** and MSSEL=**H** (Sub-Link Slave side), this pin must be **Open**.
TTL/AIN0	TTLDRV/SD2/AIN0/GPIO1	CML Output Drive Strength Select and Address Setting(*1) (*4) H: Normal, L: Weak When PDN1=**H** and MSSEL=**H** (Sub-Link Slave side), this pin must be **Open**.
RXDEFSEL	RXDEFSEL	Internal Register Default Setting Select. H: For THCV235, L: For THCV231
OUTSEL	OUTSEL/SD1	Permanent Clock Output Control(*1) H: Enable, L: Disable When PDN1=**H**, this pin must be **Open**.
BET	BET	Field BET Entry H: Field BET Entry, L: Normal Operation
RF	RF/BETOUT	Input clock triggering edge select(*1) H: Rising Edge, L: Falling Edge When Sub-Link Field BET Mode, this pin must be **Open**.

(*1)A pin function changes by operation mode. Carry out appropriate control. (THCV231_THCV236_Rev.1.00_E.pdf and up)
(*2)Data Width Setting refers to data sheet for details.
(*3)HTPDN connection is option. Refer to data sheet for details.
(*4)Address Setting for 2-wire serial I/F

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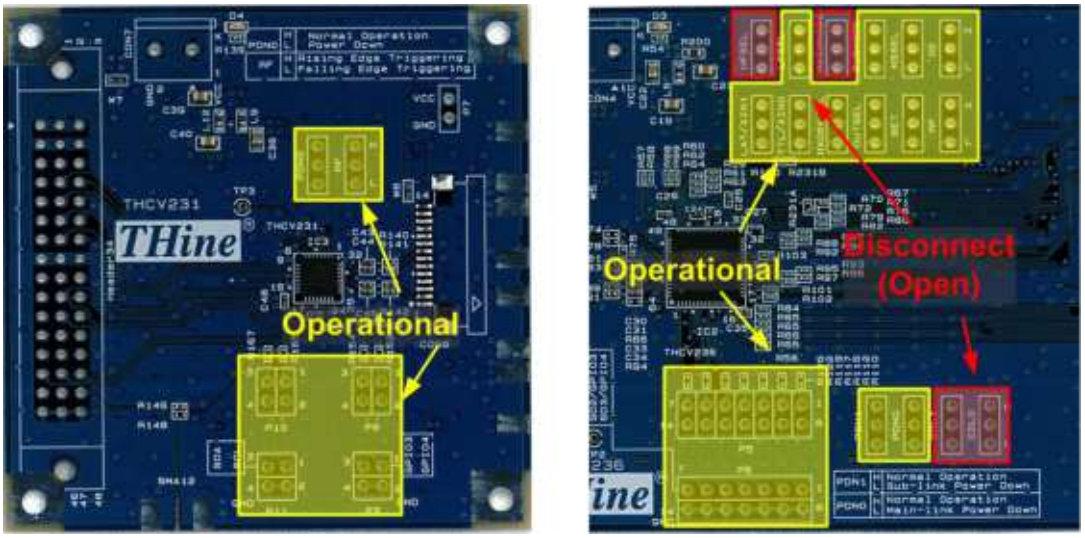
If IC's pins are used as open-drain output, connect with pull-up resistors (e.g. 10kΩ) and connect P5, P8 and P10 of header.

	Mount	Unmount
THEVA231	R151, R153, R164, R166	R158, R159, R168, R169
THEVA236	R111, R113, R116, R118, R120, R123, R126	R128, R129, R130, R131, R132, R133, R134

Furthermore, operational (yellow area) / disconnect (red area) following header.



(a) THEVA231 (Top Side) (b) THEVA236 (Top Side)

Figure 10 Operational / disconnect header

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7. Clock Input from SMA Connector

THEVA231 can also choose the clock input from SMA connector by using 0Ω resistors. If you want to use SMA connector for clock input, mount the 0Ω resistors on R148 and unmount on R146. This input function is to use Field BET operation in mainly.

THEVA231 (Top side)

Figure 11 Clock input from SMA connector

8. Status Indicate LED

The following show indicating status of each LED. (*1)

D4: VCC Power Supply Indicator for THEVA231
D3: VCC Power Supply Indicator for THEVA236

(*1) When VCC is over 2.0V, LED indicator will be valid.

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9. Schematic

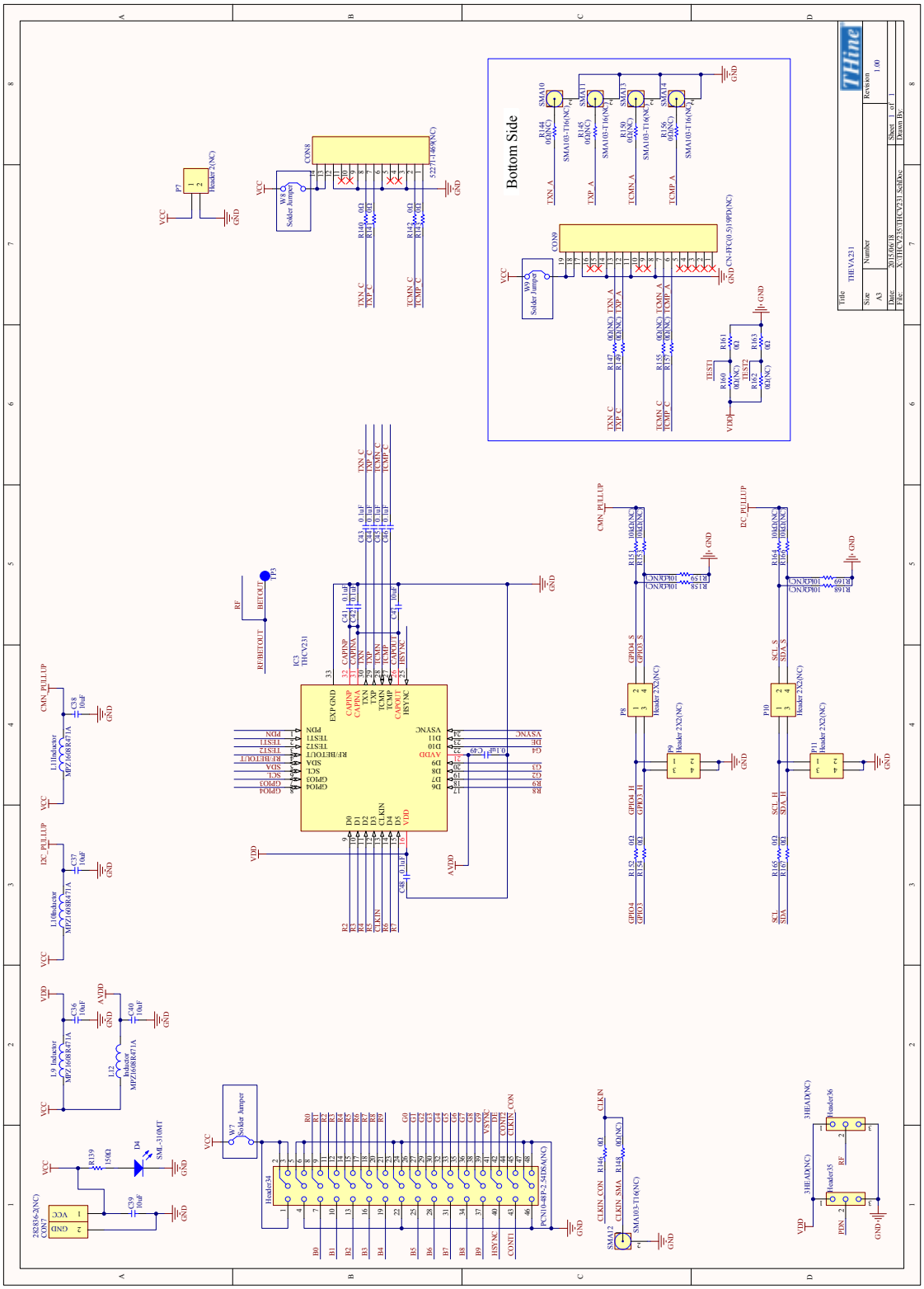

Figure 12 THEVA231 Schematic

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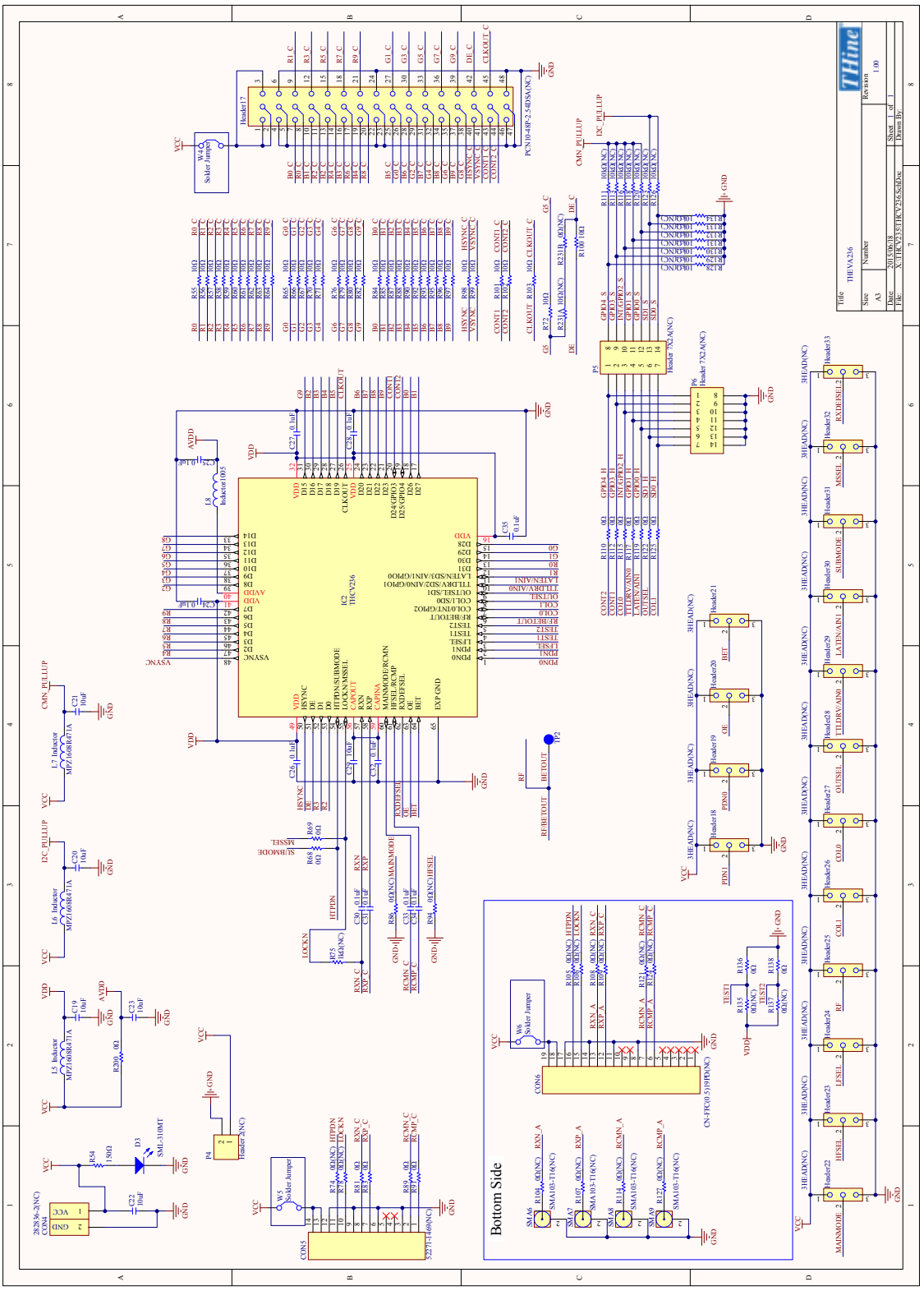

Figure 13 THEVA236 Schematic

10.Bills of Materials

Table 6 THEVA231 BOM

Type	Value / Part No.	Package	Spec	Reference No.	Quantity	Note
Capacitor	10uF	2012	16V	C36, C37, C38, C39, C40, C47	6	-
Capacitor	0.1uF	1005	16V	C41, C42, C43, C44, C45, C46, C48, C49	8	-
Connector	282836-2(NC)	5mm pitch	2pin	CON7	1	-
Connector	52271-1469(NC)	1mm pitch	14pin	CON8	1	-
Connector	CN-FFC(0.5)19PD(NC)	0.5mm pitch	12pin	CON9	1	-
Connector	PCN10-48P-2.54DSA(NC)	2.54mm pitch	48pin	Header34	1	-
Connector	SMA103-T16(NC)	1.6mm	PCB End Jack	SMA10, SMA11, SMA12, SMA13, SMA14	5	-
Header	Header, 3X1	2.54mm pitch	-	Header35, Header36	2	-
Header	Header, 2X1	2.54mm pitch	-	P7	1	-
Header	Header, 2X2	2.54mm pitch	-	P8, P9, P10, P11	4	-
IC	THCV231	QFN32	-	IC3	1	-
Inductor	MPZ1608R471A	1608	1.2A	L9, L10, L11, L12	4	-
LED	SML-310MT	1608	Green	D4	1	-
Resistor	150Ω	1005	0.1W	R139	1	-
Resistor	0Ω	1005	1A	R140, R141, R142, R143, R146, R152, R154, R161, R163, R165, R167	11	-
Resistor	0Ω(NC)	1005	1A	R144, R145, R147, R148, R149, R150, R155, R156, R157, R160, R162	11	-
Resistor	10kΩ(NC)	1005	0.1W	R151, R153, R158, R159, R164, R166, R168, R169	8	-

Table 7 THEVA236 BOM

Type	Value / Part No.	Package	Spec	Reference No.	Quantity	Note
Capacitor	10uF	2012	16V	C19, C20, C21, C22, C23, C29	6	-
Capacitor	0.1uF	1005	16V	C24, C25, C26, C27, C28, C30, C31, C32, C33, C34, C35	11	-
Connector	282836-2(NC)	5mm pitch	2pin	CON4	1	-
Connector	52271-1469(NC)	1mm pitch	14pin	CON5	1	-
Connector	CN-FFC(0.5)19PD(NC)	0.5mm pitch	12pin	CON6	1	-
Connector	PCN10-48P-2.54DSA(NC)	2.54mm pitch	48pin	Header17	1	-
Connector	SMA103-T16(NC)	1.6mm	PCB End Jack	SMA6, SMA7, SMA8, SMA9	4	-
Header	Header, 3X1	2.54mm pitch	-	Header18, Header19, Header20, Header21, Header22, Header23, Header24, Header25, Header26, Header27, Header28, Header29, Header30, Header31, Header32, Header33	16	-
Header	Header, 2X1	2.54mm pitch	-	P4	1	-
Header	Header, 7X2	2.54mm pitch	-	P5, P6	2	-
IC	THCV236	QFN64	-	IC2	1	-
Inductor	MPZ1608R471A	1608	1.2A	L5, L6, L7	3	-
Inductor	MPZ1005S331ET000	1005	700mA	L8	1	-
LED	SML-310MT	1608	Green	D3	1	-
Resistor	150Ω	1005	0.1W	R54	1	-
Resistor	10Ω	1005	0.1W	R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R70, R71, R72, R76, R79, R80, R82, R84, R85, R87, R88, R90, R92, R93, R95, R96, R97, R98, R99, R100, R101, R102, R103	36	-
Resistor	0Ω	1005	1A	R68, R69, R81, R83, R89, R91, R110, R112, R115, R117, R119, R122, R125, R136, R138	15	-
Resistor	0Ω(NC)	1005	1A	R74, R78, R86, R94, R104, R105, R106, R107, R108, R109, R114, R121, R124, R127, R135, R137, R231B	17	-
Resistor	1kΩ(NC)	1005	0.1W	R75	1	-
Resistor	10kΩ(NC)	1005	1A	R111, R113, R116, R118, R120, R123, R126, R128, R129, R130, R131, R132, R133, R134	14	-
Resistor	0Ω	1608	0.1W	R200	1	-
Resistor	10Ω(NC)	1005	0.1W	R231A	1	-

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11.Set Items

Table 8 Set Items

TYPE	Part No.
DC Connector	282836-2
FFC Connector for V-by-One®HS Link	52271-1469
FFC 14pin 1mm pitch for V-by-One®HS Link	98267-0299
Pin Header	-

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

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