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THCV233 / THCV234 Evaluation Kit



V-by-One® HS Single Link Evaluation Board

Parts Number: THEVA233-V2, THEVA234-V2

1. General Description

THEVA233-V2 and THEVA234-V2 boards are designed to evaluate THCV233 and THCV234 for transmission of Video data. The supply voltage range are "3.0V to 3.6V" or "5V". THCV233 and THCV234 are V-by-One® HS High-speed video data transmitter/receiver with bi-directional transceiver. They convey not only video data (Main-Link), but also bi-directional system control data (Sub-Link) that is driven by 2-wire serial interface. HOST CPU-side of Sub-Link is selectable on each device and the other side of Sub-Link integrates I/O expander. THCV233-234 system is able to watch and control peripheral devices via 2-wire serial interface or GPIOs. They also can report interrupt events caused by change of GPIO inputs and internal state.

Table 1 Main-Link Operation Mode and Spec

	Width	Link	LVDS Clock Freq. *1
THCV233	24bit	Si/So, Si/DDo	20MHz to 100MHz
		Si/Do	40MHz to 100MHz
THCV234	24bit	Si/So, Si/DDo	20MHz to 85MHz
		Si/Do	40MHz to 85MHz
	32bit	Si/So, Di/SSo	20MHz to 100MHz
		Di/So	40MHz to 100MHz
32bit	Si/So, Di/SSo	20MHz to 85MHz	
	Di/So	40MHz to 85MHz	

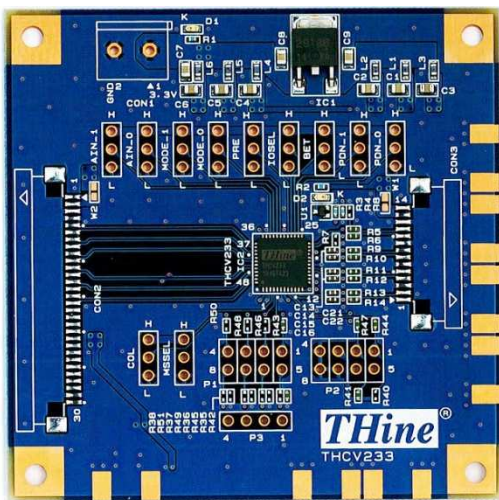
*1 This is typical value, please refer the datasheet for detail.

Si/So:Single-in/Single-out, Si/Do:Single-in/Dual-out
 Si/DDo:Single-in/Distributed Dual-out
 Di/So: Dual-in/Single-out, Di/SSo: Dual-in/Selected Single-out

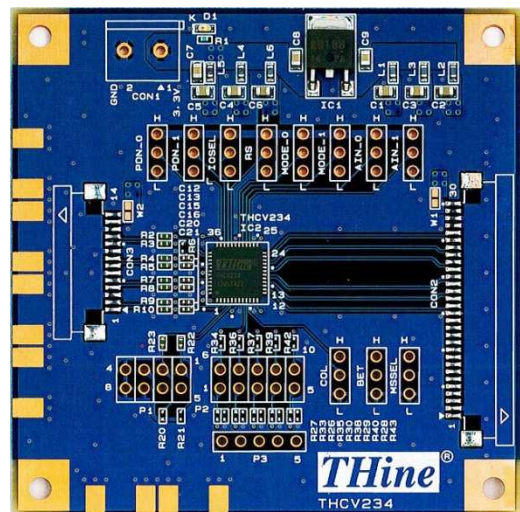
2. Features

- LVDS Input Internal Termination
- CORE 1.8v, LVDS 3.3v
- Package: 48 pin QFN
- EU RoHS Compliant
- Main-Link
 - Data Width Selectable: 24/32 bit
 - Single/Dual Link Selectable
 - AC Coupling
 - Wide Frequency Range
 - CDR Requires no External Freq. Reference
 - Supports Spread Spectrum Clocking: Up to 30kHz/±0.5%(center spread)
- Sub-Link
 - Driven by 2-wire Serial I/F (Max. 400kbps)
 - GPIO Expander 233: 4pins / 234: 5pins

3. Overview

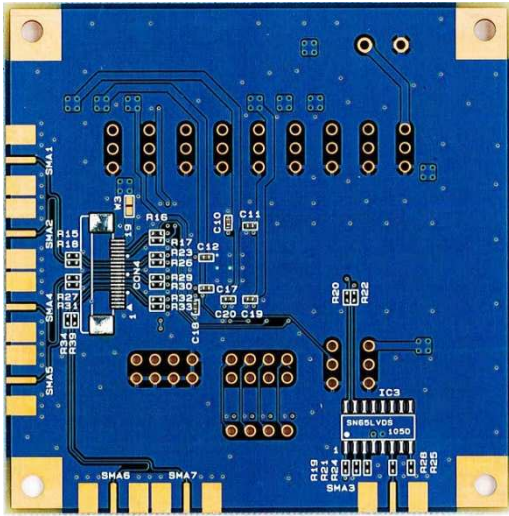


(a) THEVA233-V2 (Top Side)

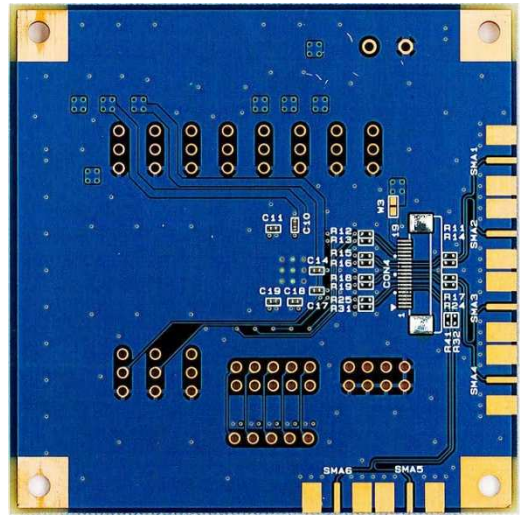


(b) THEVA234-V2 (Top Side)

Figure 1 THEVA233-V2 and THEVA234-V2 Top Side View



(a) THEVA233-V2 (Bottom Side)



(b) THEVA234-V2 (Bottom Side)

Figure 2 THEVA233-V2 and THEVA234-V2 Bottom Side View

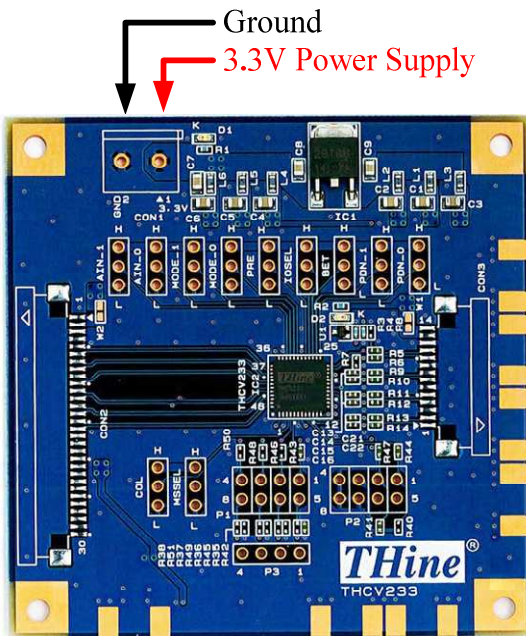
4. Power Supply Set Up

This chapter shows power supply condition.

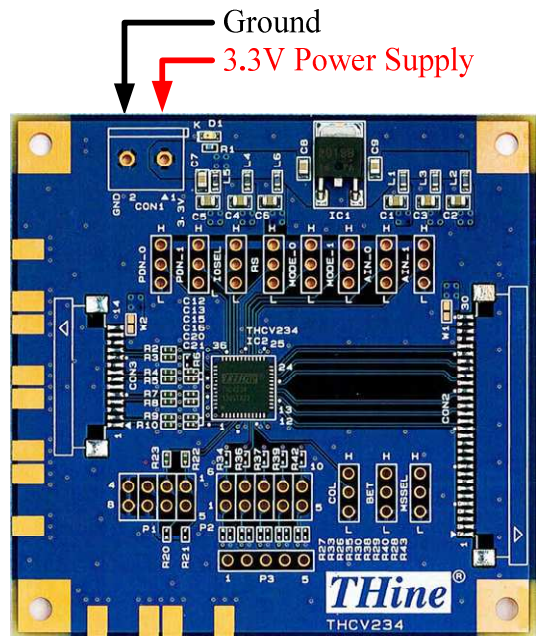
Caution: Please check if there is no power-GND short on below red trace before supplying any power.

3.3V Power Supply to Each Board

Each evaluation board requires 3.3V power supply. Please use “CON1” connector typically.



(a)THEVA233-V2



(b)THEVA234-V2

Figure 3 Power Supply for Evaluation Board

Power Supply from / to Connector

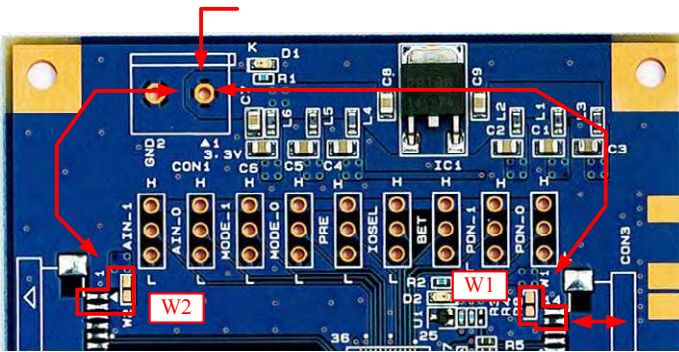
3.3V power supply can be connected to CON2, CON3 and CON4 by using W1, W2 and W3 solder jumper.

THEVA233-V2

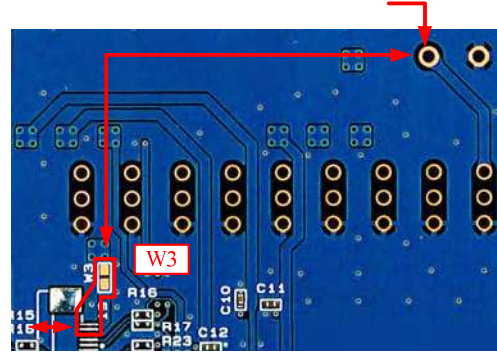
W1: Connect the 3.3V power supply with pin#13 and 14 of CON3.

W2: Connect the 3.3V power supply with pin#1 and 2 of CON2.

W3: Connect the 3.3V power supply with pin#18 and 19 of CON4.



(a)THEVA233-V2 (Top Side)



(b) THEVA233-V2 (Bottom Side)

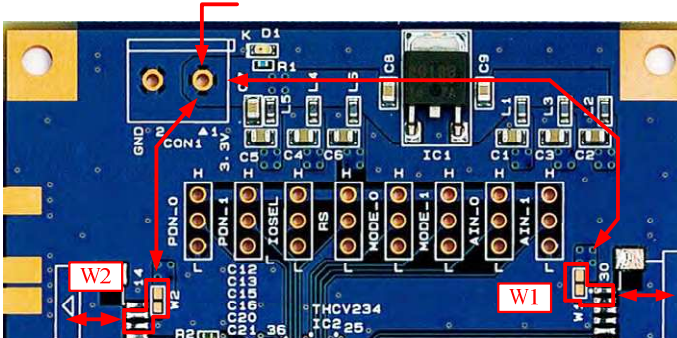
Figure 4 THEVA233-V2 Power Supply from / to Each Connector

THEVA234-V2

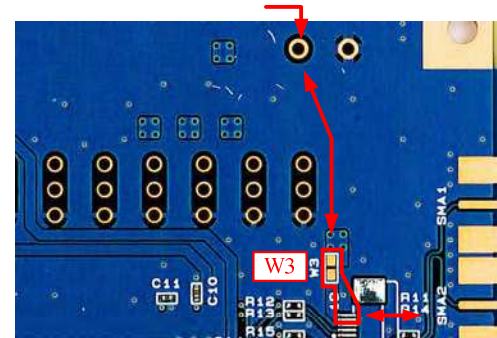
W1: Connect the 3.3V power supply with pin#13 and 14 of CON3.

W2: Connect the 3.3V power supply with pin#1 and 2 of CON2

W3: Connect the 3.3V power supply with pin#18 and 19 of CON4.



(a)THEVA234-V2 (Top Side)



(b) THEVA234-V2 (Bottom Side)

Figure 5 THEVA234-V2 Power Supply from / to Each Connector

5. V-by-One® HS Input / Output Connector Select

V-by-One® HS input / output connector can be selected by using 0ohm resistors.

(1) 1mm Pitch Connector (Default Setting)

Please mount / unmount following 0ohm resistors to use 1mm pitch connector.

	Mount	Unmount
THEVA233-V2	R5,R6,R9,R10,R11,R12,R13,R14	R16,R17,R23,R26,R29,R30,R32,R33
THEVA234-V2	R2,R3,R4,R5,R7,R8,R9,R10	R12,R13,R15,R16,R18,R19,R25,R31

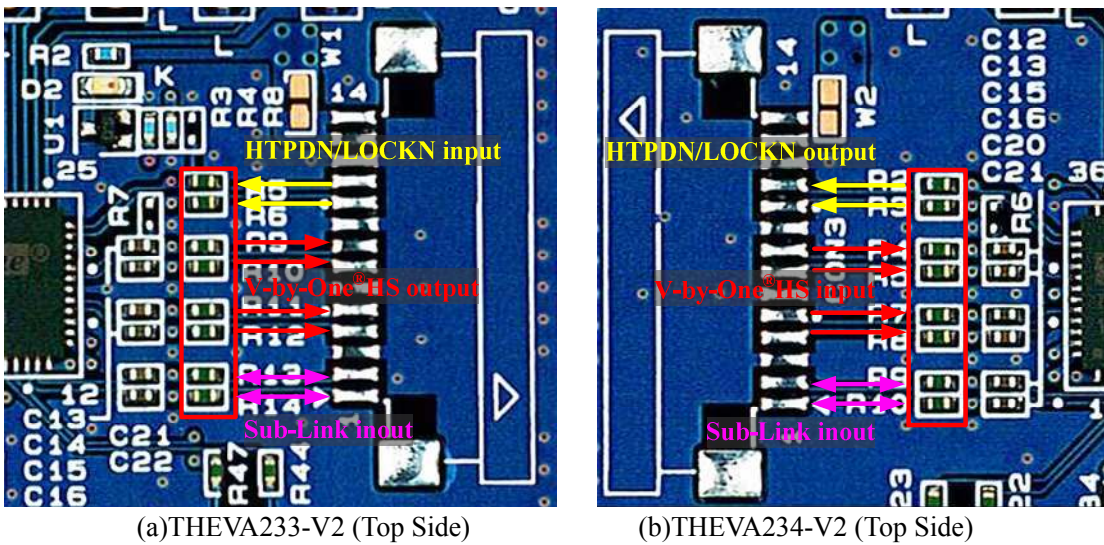


Figure 6 Resistors Mounting for 1mm Pitch Connector

(2) 0.5mm Pitch Connector

Please mount / unmount following 0ohm resistors to use 0.5mm pitch connector.

	Mount	Unmount
THEVA233-V2	R16,R17,R23,R26,R29,R30,R32,R33	R5,R6,R9,R10,R11,R12,R13,R14 R15,R18,R27,R31,R34,R39
THEVA234-V2	R12,R13,R15,R16,R18,R19,R25,R31	R2,R3,R4,R5,R7,R8,R9,R10 R11,R14,R17,R24,R32,R41

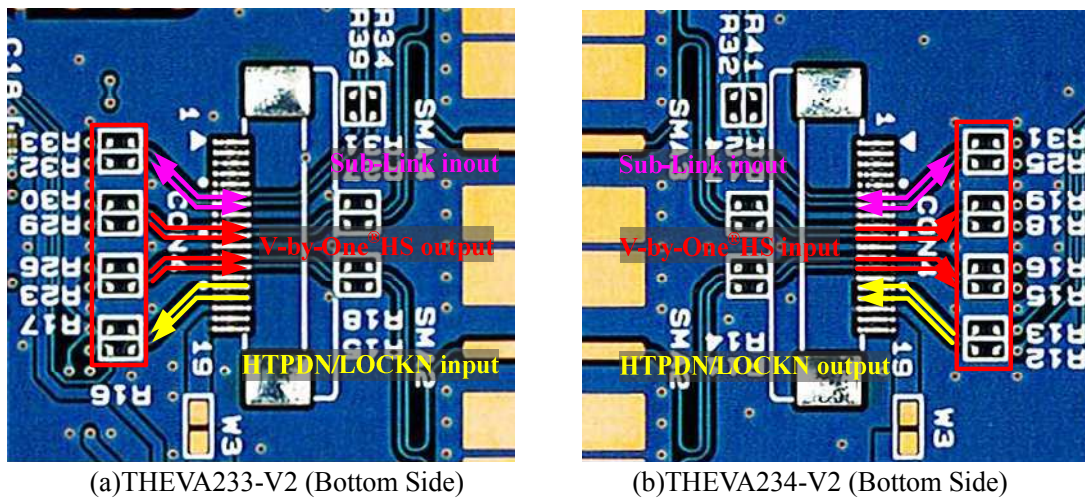


Figure 7 Resistors Mounting for 0.5mm Pitch Connector

(3) SMA connector

Please mount / unmount following 0ohm resistors to use SMA connector.

*HTPDN and LOCKN signals don't have SMA connector input / output connection.

	Mount	Unmount
THEVA233-V2	R23,R26,R29,R30,R32,R33 R15,R18,R27,R31,R34,R39	R9,R10,R11,R12,R13,R14
THEVA234-V2	R44, R46, R47, R48	R12, R15, R20, R23

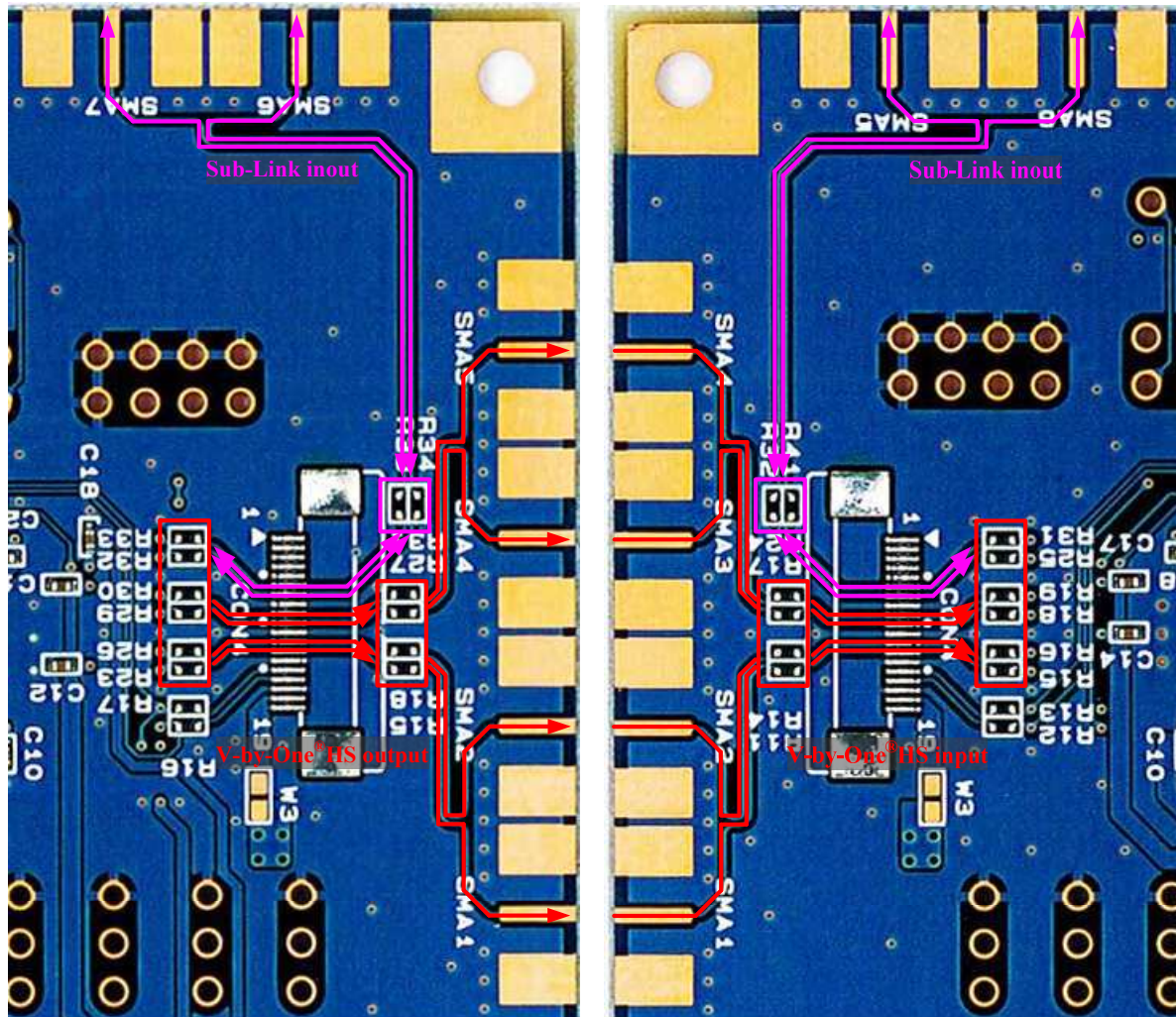


Figure 8 Resistors Mounting for SMA Connector

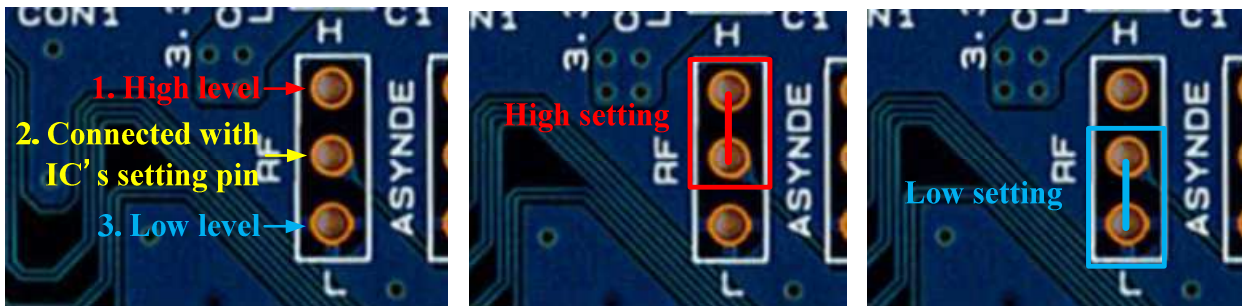
6. Function setting

Setting pin except ALNIN/GPIO[3] of each board is shown in yellow area of Figure 9. 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.



Figure 9 Position of Function Setting Pin



(a)3HEADER Description

(b)High Level Setting

(c)Low Level Setting

Figure 10 High / Low Setting Description

ALNIN Setting

Setting of ALNIN/GPIO[3] pin is shown in yellow area of Figure 11. Please connect HEADER when ALNIN/GPIO[3] is set low. Please mount R35 and unmount R42 to set ALNIN/GPIO[3] high.

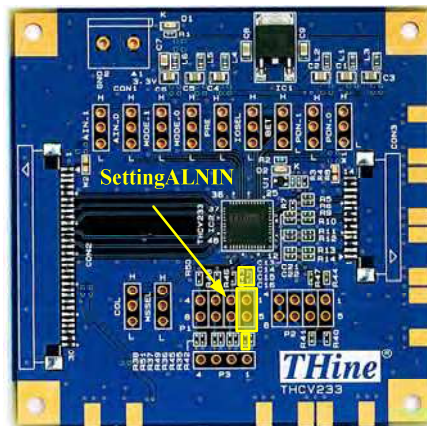


Figure 11 Setting ALIN

7. Clock Input from SMA Connector

THEVA233-V2 can also choose the LVDS clock input from SMA connector by using 0ohm resistors and LVDS buffer. If you want to use SMA connector for clock input, please mount the 0ohm resistors, LVDS buffer and so on.

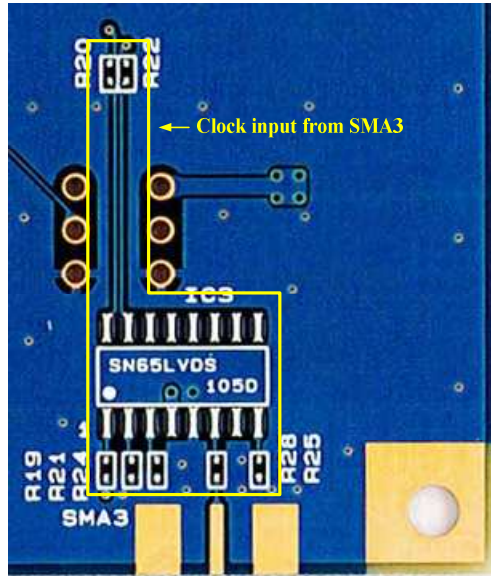


Figure 12 LVDS Clock Input Connector Select

8. Status Indicate LED

The following table shows indicating status of each LED.

Table 2 LED Description

	THEVA233-V2	THEVA234-V2
D1	3.3V Power Supply Indicator	
D2	LOCKN Status Indicator	

9. LOCKN Sharing and HTPDN Omission

LOCKN Sharing

LOCKN connection can be shared with V-by-One[®] HS trace. When you share the LOCKN signal, Please mount 1k ohm resistors to share the LOCKN signal, and unmount the 0ohm resistors shown in Figure 13.

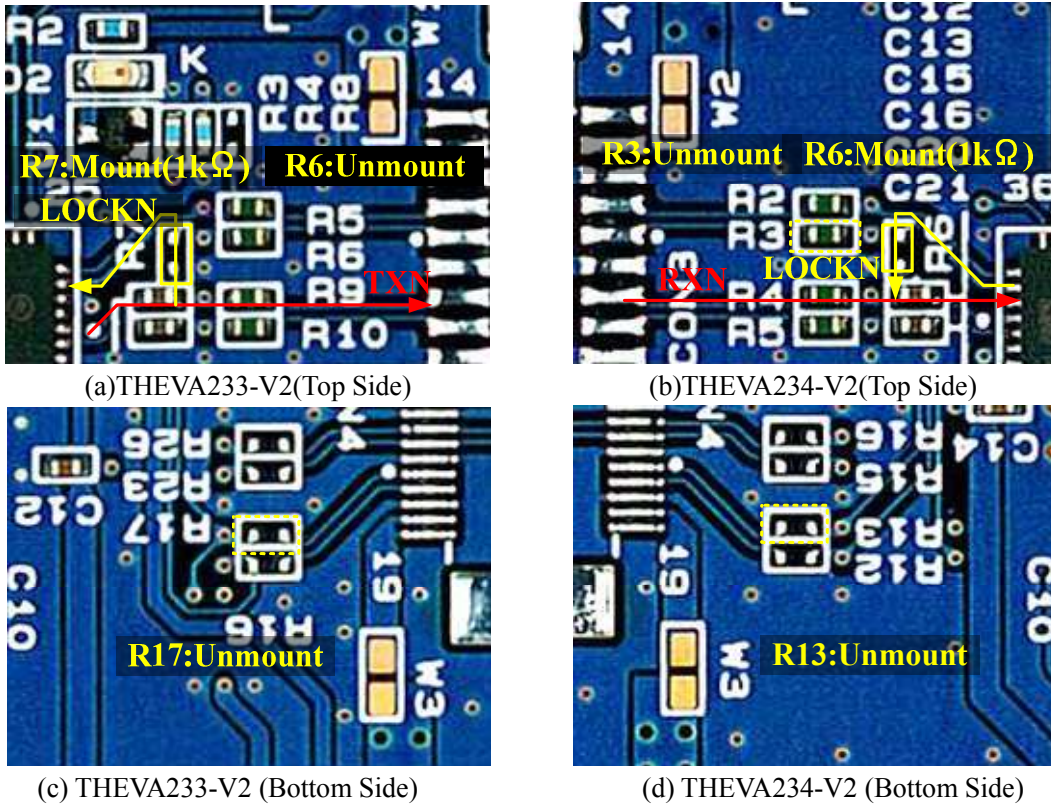
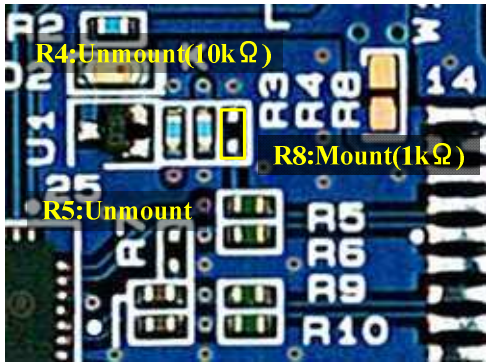


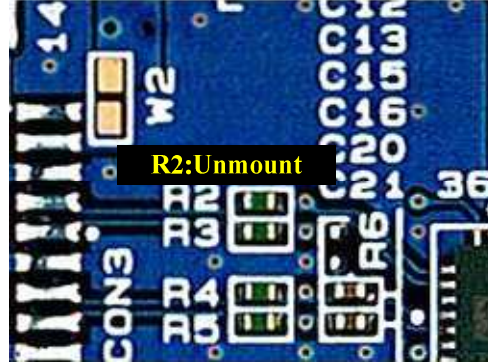
Figure 13 LOCKN Sharing

HTPDN Signal Omission

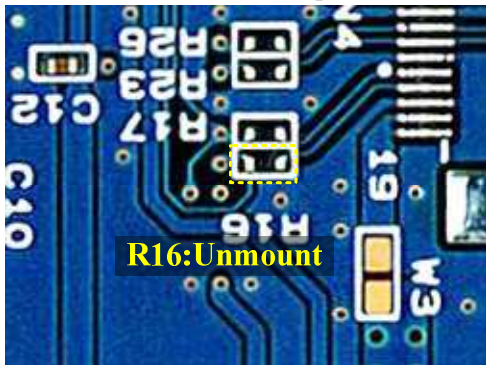
HTPDN signal can be omitted by using 1k ohm resistor. When you omit the HTPDN signal, please mount 1k ohm resistor to pull down the HTPDN signal at transmitter side, and unmount the 0ohm resistors shown in Figure 14. When the HTPDN omission using, HTPDN output from receiver side is open connection.



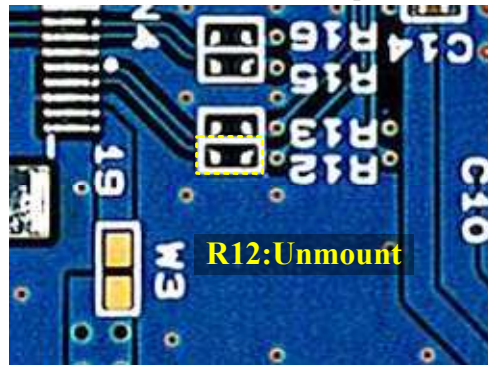
(a)THEVA233-V2 (Top Side)



(b)THEVA234-V2 (Top Side)



(c)THEVA233-V2 (Bottom Side)



(d)THEVA234-V2 (Bottom Side)

Figure 14 HTPDN Omission

10. Function

This chapter shows function setting of THEVA233-V2 and THEVA234-V2.

Table 3 THEVA233-V2 Function Setting Description

Silk	Pin Name	Function
PDN_1	PDN[1]	For Sub-Link power down control (2-wire serial interface + Sub-Link) H: Normal Operation, L: Power Down
PDN_0	PDN[0]	For Main-Link power down control (LVDS-Rx + Main-Link) H: Normal Operation, L: Power Down
BET	BET	Field-BET entry. H : Field BET Operation, L : Normal Operation
IOSEL	IOSEL	HTPDN, LOCKN pin enable input for Main-Link. H : HTPDN, LOCKN Pin Disable (GPIO[1:0] Enable) L : HTPDN, LOCKN Pin Enable (GPIO[1:0] Disable) When IOSEL inputs H, HTPDN and LOCKN state in THCV234 are brought by Sub-Link.
PRE	PRE	Pre-Emphasis level select input for Main-Link. H : 100%, L : 0%
MODE_1	MODE[1]	Operation mode select input for Main-Link. MODE[1:0] =LL : Single-in/Distribution Dual-out =LH : Single-in/Single-out =HL : Single-in/Dual-out =HH : Reserved (Forbidden)
MODE_0	MODE[0]	
COL	COL	Data width setting for Main-Link. H : 24bit, L : 32bit
MSSEL	MSSEL	Master-side/Slave-side selector for Sub-Link and 2-wire serial interface. H : Sub-Link Slave Side (inside 2-wire serial I/F is master) L : Sub-Link Master Side (inside 2-wire serial I/F is slave) Sub-Link Master is connected to HOST MPU. Forbid the same setting between THCV233 and THCV234.
AIN_0	AIN[0]	Address setting for 2-wire serial interface. When using 2-wire serial interface, it must be set the same value as THCV234's one. AIN[1:0] =LL : 7'b0001011 =LH : 7'b0110100 =HL : 7'b1110111 =HH : Reserved (Forbidden)
AIN_1	AIN[1]	

Table 4 THEVA234-V2 Function Setting Description

Silk	Pin Name	Function
PDN_1	PDN[1]	For Sub-Link power down control (2-wire serial interface + Sub-Link) H: Normal Operation, L: Power Down
PDN_0	PDN[0]	For Main-Link power down control (LVDS-Rx + Main-Link) H: Normal Operation, L: Power Down
BET	BET	Field-BET entry. H : Field BET Operation, L : Normal Operation
IOSEL	IOSEL	HTPDN, LOCKN pin enable input for Main-Link. H : HTPDN, LOCKN Pin Disable (GPIO[1:0] Enable) L : HTPDN, LOCKN Pin Enable (GPIO[1:0] Disable) When IOSEL inputs H, HTPDN and LOCKN state in THCV234 are brought by Sub-Link.
RS	RS	LVDS output swing range select input. H : Normal Swing (350mv@typ.) L : Reduced Swing (200mv@typ.) Latch select input under Field-BET operation H : Latched Result, L : NOT Latched Result
MODE_1	MODE[1]	Operation mode select input for Main-Link. MODE[1:0] =LL : Dual-in/Selected single-out(Lane0) =LH : Dual-in/Single-out =HL : Dual-in/Selected single-out(Lane1) =HH : Single-in/Single-out
MODE_0	MODE[0]	
COL	COL	Data width setting for Main-Link. H : 24bit, L : 32bit
MSSEL	MSSEL	Master-side/Slave-side selector for Sub-Link and 2-wire serial interface. H : Sub-Link Slave Side (inside 2-wire serial I/F is master) L : Sub-Link Master Side (inside 2-wire serial I/F is slave) Sub-Link Master is connected to HOST MPU. Forbid the same setting between THCV233 and THCV234.
AIN_0	AIN[0]	Address setting for 2-wire serial interface. When used 2-wire serial interface, it must be set the same value as THCV233's one. AIN[1:0] =LL : 7'b0001011 =LH : 7'b0110100 =HL : 7'b1110111 =HH : Reserved (Forbidden)
AIN_1	AIN[1]	

11. Schematic

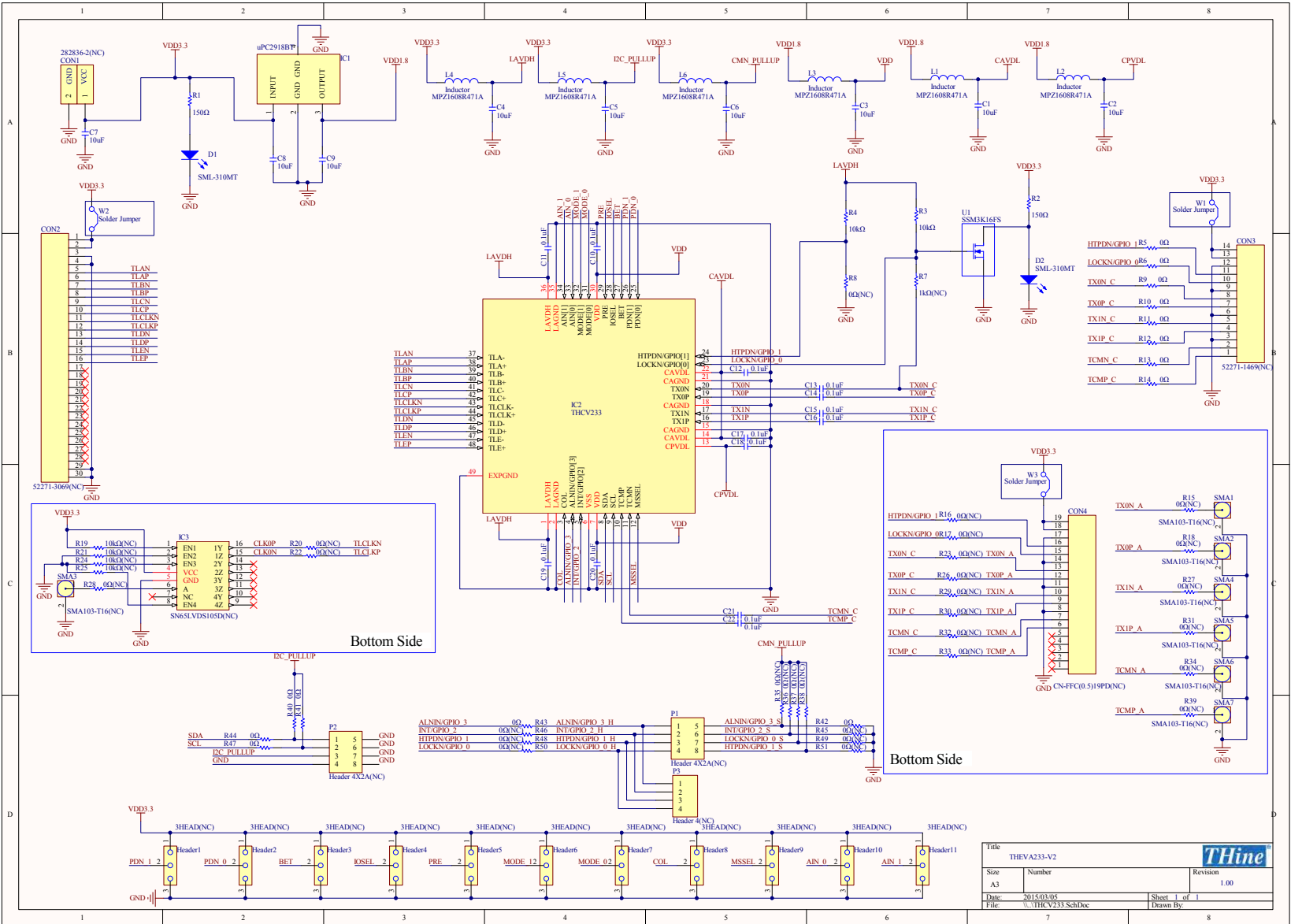


Figure 15 THEVA233-V2 Schematic

Title		THEVA233-V2		THine	
Size	A3	Number		Revision	1.00
Date	2015/08/05	Sheet 1 of 1		Drawn By:	
File	\THX\VA233 SchDwg				

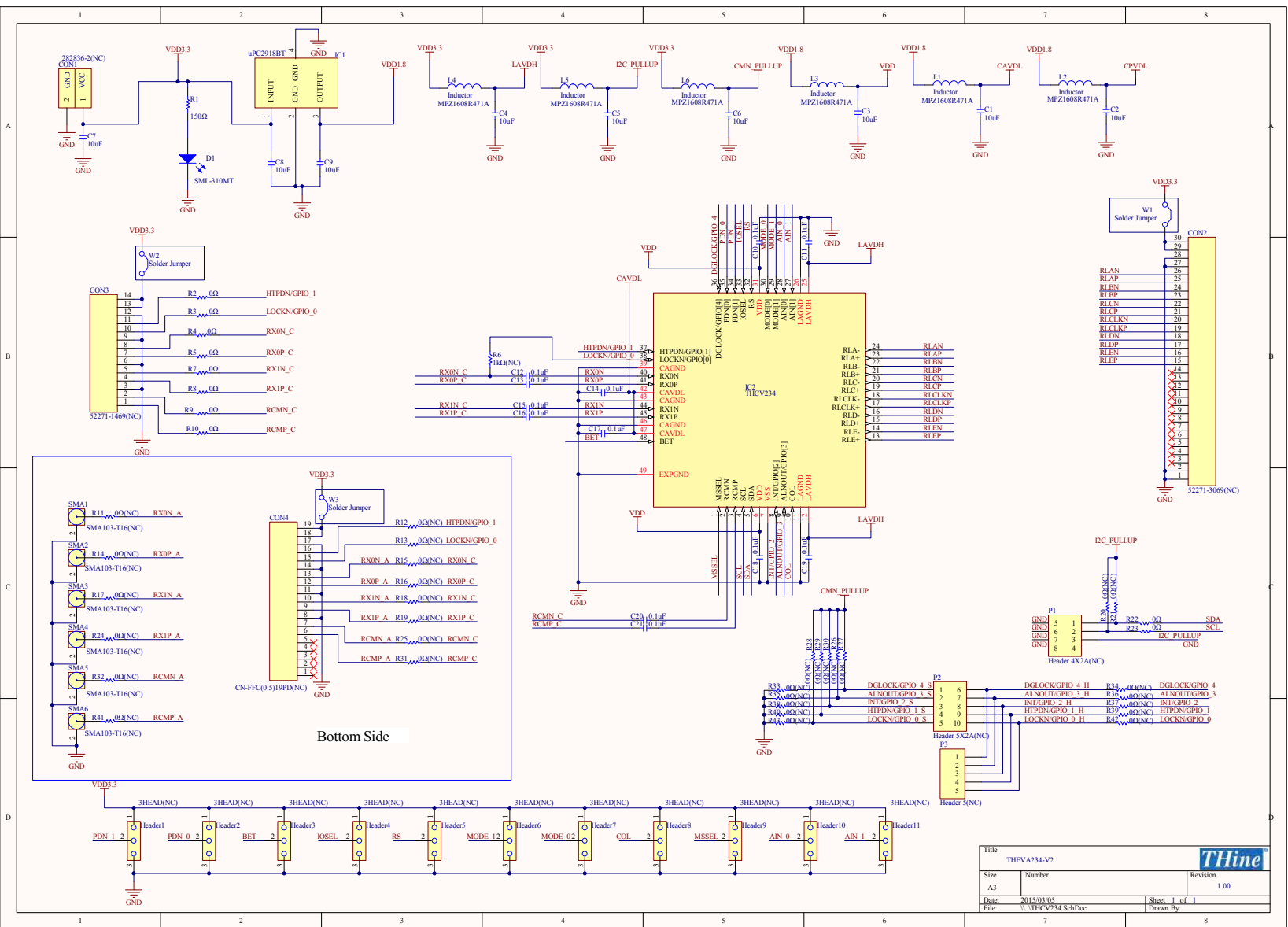


Figure 16 THEVA234-V2 Schematic

Title		THEVA234-V2		THine	
Size	A3	Number		Revision	1.00
Date:	2015.03.05	File:	\\V:\THCV234_SchDwg	Sheet	1 of 1
				Drawn By:	

12. Bills of Materials

Table 5 THEVA233-V2 BOM

TYPE	Value / Part No.	Package	SPEC	Reference No.	Q'ty	Note
Capacitor	10uF	2012	16V	C1, C2, C3, C4, C5, C6, C7, C8, C9	9	
Capacitor	0.1uF	1005	16V	C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22	13	
Connector	SMA103-T16(NC)	1.6mm	PCB End Jack	SMA1, SMA2, SMA3, SMA4, SMA5, SMA6, SMA7	7	
Connector	52271-3069(NC)	1mm_pitch	30pin	CON2	1	
Connector	CN-FFC(0.5)19PD(NC)	0.5mm_pitch	19pin	CON4	1	
Connector	52271-1469(NC)	1mm_pitch	14pin	CON3	1	
Connector	282836-2(NC)	5mm_pitch	2pin	CON1	1	
Header	3HEAD(NC)	2.54mm_pitch	---	Header1, Header2, Header3, Header4, Header5, Header6, Header7, Header8, Header9, Header10, Header11	11	
Header	Header 4(NC)	2.54mm_pitch	---	P3	1	
Header	Header 4X2A(NC)	2.54mm_pitch	---	P1, P2	2	
IC	SN65LVDS105D(NC)	TSSOP	4V	IC3	1	
IC	THCV233	QFN48	---	IC2	1	
IC	uPC2918BT	SC-63	1A	IC1	1	
IC	SSM3K16FS	SSM	RON15Ω	U1	1	
Inductor	MPZ1608R471A	1608	1.2A	L1, L2, L3, L4, L5, L6	6	
LED0	SML-310MT	1608	GREEN	D1, D2	2	
Resistor	150Ω	1005	0.1W	R1	1	
Resistor	150Ω	1005	0.1W	R2	1	
Resistor	10kΩ(NC)	1005	0.1W	R19, R21, R24, R25	4	
Resistor	10kΩ	1005	0.1W	R3, R4	2	
Resistor	1kΩ(NC)	1005	0.1W	R7	1	
Resistor	0Ω(NC)	1005	0.1W	R8, R15, R16, R17, R18, R20, R22, R23, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R45, R46, R48, R49, R50, R51	29	
Resistor	0Ω	1005	0.1W	R5, R6, R9, R10, R11, R12, R13, R14, R40, R41, R42, R43, R44, R47	14	

Table 6 THEVA234-V2 BOM

TYPE	Value / Part No.	Package	SPEC	Reference No.	Q'ty	Note
Capacitor	10uF	2012	16V	C1, C2, C3, C4, C5, C6, C7, C8, C9	9	
Capacitor	0.1uF	1005	16V	C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21	12	
Connector	282836-2(NC)	5mm_pitch	2pin	CON1	1	
Connector	52271-3069(NC)	1mm_pitch	30pin	CON2	1	
Connector	52271-1469(NC)	1mm_pitch	14pin	CON3	1	
Connector	CN-FFC(0.5)19PD(NC)	0.5mm_pitch	19pin	CON4	1	
Connector	SMA103-T16(NC)	1.6mm	PCB End Jack	SMA1, SMA2, SMA3, SMA4, SMA5, SMA6	6	
Header	3HEAD(NC)	2.54mm_pitch	---	Header1, Header2, Header3, Header4, Header5, Header6, Header7, Header8, Header9, Header10, Header11	11	
Header	Header 4X2A(NC)	2.54mm_pitch	---	P1	1	
Header	Header 5X2A(NC)	2.54mm_pitch	---	P2	1	
Header	Header 5(NC)	2.54mm_pitch	---	P3	1	
IC	uPC2918BT	SC-63	1A	IC1	1	
IC	THCV234	QFN48	---	IC2	1	
Inductor	MPZ1608R471A	1608	1.2A	L1, L2, L3, L4, L5, L6	6	
LED0	SML-310MT	1608	GREEN	D1	1	
Resistor	150Ω	1005	0.1W	R1	1	
Resistor	0Ω	1005	1A	R2, R3, R4, R5, R7, R8, R9, R10, R22, R23	10	
Resistor	1kΩ(NC)	1005	0.1W	R6	1	
Resistor	0Ω(NC)	1005	1A	R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43	31	

13. Set Items

Table 7 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.

14. Notices and Requests

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

For the Material:

1. The product specifications described in this material are subject to change without prior notice.
2. The circuit diagrams described in this material are examples of the application which may not always apply to design of respective customers. THine Electronics, Inc. (“THine”) is not responsible for possible errors and omissions in this material. Please note if the errors or omissions should be found in this material, THine may not be able to correct them immediately.
3. This material contains THine’s copyright, know-how or other proprietary. Copying or disclosing of the contents of this material to any third party without THine’s prior permission is strictly prohibited.

For the Product:

1. This product is solely designed for evaluation purpose, and other purposes including mass production and distribution are not intended.
2. This product has been solely manufactured for electric design engineers but not for end-users.
3. This product is not radiation-tolerant product.
4. This product is presumed to be used for general electric device, not for applications which require extremely high-reliability/safety (including medical device concerned with critical care, aerospace device, or nuclear power control device). Also, when using this product for any device concerned with control and/or safety of transportation mean, traffic signal device, or other various types of safety device, such use must be after applying appropriate measures to the product.
5. This product has been designed with the utmost care to accomplish the purpose of evaluation of IC products manufactured by THine Electronics, Inc., however, THine MAKES NO WARRANTIES OR REPRESENTATIONS WITH REGARD TO ANY PERFORMANCE OR FUNCTION OF THIS PRODUCT IN ANY CIRCUMSTANCE.
6. This product has been manufactured with the utmost care in quality control and product reliability, however, there may be faults or defects with a low but fixed probability, as inevitable phenomenon concerned with semiconductor manufacturing processes. Therefore, Customers are encouraged to have sufficiently redundant or error-preventive design applied to the use of the product so as not to have THine’s product cause any social or public damage. Replacement of the product is only available in case of obvious defects of mount devices at the point of unpacking the product. Neither replacement nor failure analysis of the product is available in any other case of defects with the product and/or the product’s components.
7. Customers are asked, if required, to judge by themselves on whether this product falls under the category of strategic goods under the Foreign Exchange and Foreign Trade Control Law.
8. Please Note that if infringement of any third party’s industrial ownership should occur by using this product, THine will be exempted from any responsibility unless it directly relates to the production process or functions of the product.
9. Developing, designing and manufacturing of Customers’ own products, equipments or system by using of this product is strictly prohibited in any way.

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