

深圳市博合数码科技有限公司

Shenzhen Bohoo Digi-Tech Co.,Ltd

SPECIFICATION

MODEL: BH-4KVH-B

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Approved by		
Prepared by 编写	Checked by 审核	Approved by 批准

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REVISION HISTORY

Rev	DATE	PAGE	DESCRIPTION	AUTHOR
1.0	18.9.19	All	First issued	Danny Xu
2.0	18.11.01	7	升级2.0版本，增加SPDIF定义	
2.1	18.11.30	2,3	升级2.0版本，更新产品图片	

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1. GENERAL DESCRIPTION (概述)

BH-4KVH-B is a 4K V-by-one to HDMI and V-by-One conversion board, it support 8 lane V-by-one input and HDMI Output and 8 lane V-by-one output for 4K@60Hz panel synchronously;

BH-4KVH-B是一款4K V-by-One到HDMI的信号转换板, 支持输入8 lane V-by-One, 通过V-by-one桥接驱动8 lane V-by-one 4K 60Hz大尺寸面板, 并同步输出HDMI信号。

BH-4KVH-B HDMI output support 4K@60Hz timing if back-end display device is compatible. It also support 1080P@60Hz or lower resolution timing, except 4K@30Hz.

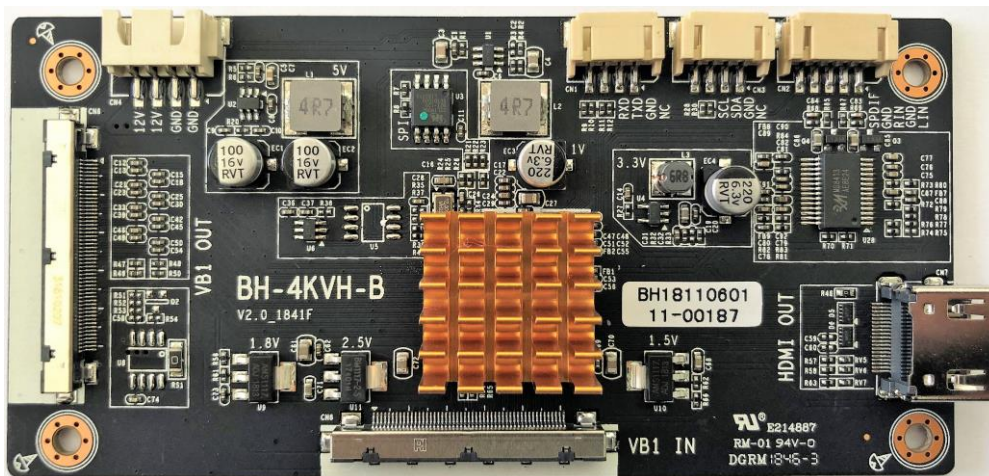
BH-4KVH-B HDMI输出支持4K@60Hz, 需要后端显示设备支持。也可以输出1080P@60Hz或其他HDMI标准分辨率格式,但不支持4K@30Hz输出。

BH-4KVH-B V-by-one input must be 3840*2160 Non-Division format, and stable timing is necessary, otherwise the HDMI output timing will be unstable.

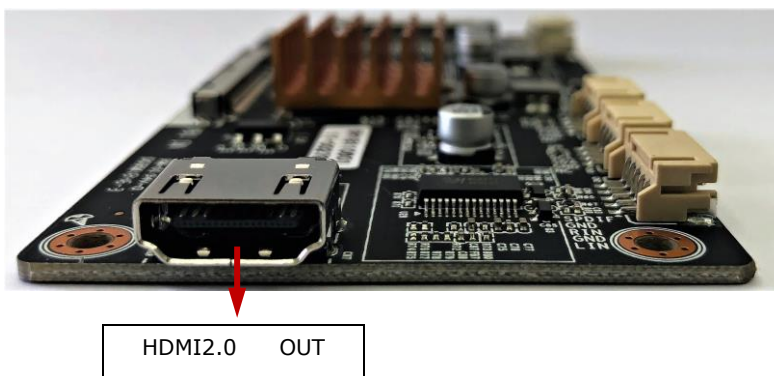
BH-4KVH-B V-by-one 输入仅支持4K单分区, V-by-One输出支持4K@60Hz 单分区或2分区; V-by-One输入信号要求timing保持稳定, 否则可能导致HDMI输出时序格式(timing)变化, 引起后端HDMI显示设备的显示异常。

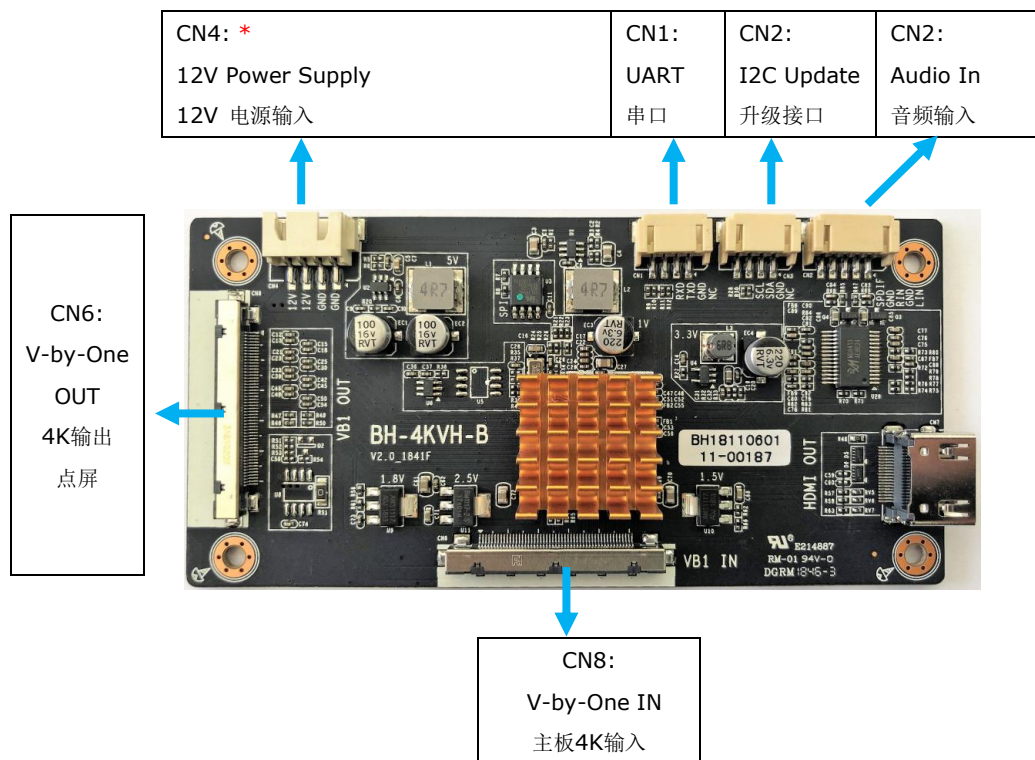
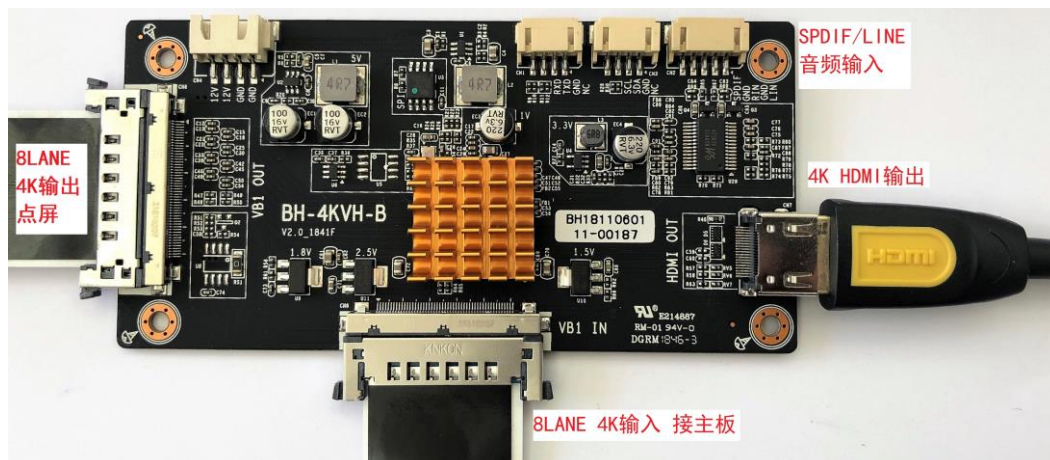
2. FUNCTION LAYOUT (产品外观)

TOP VIEW OF BH-4KVH-B (正视图)



FRONT VIEW OF BH-4KVH-B (外部接口视图)



INTERFACE VIEW OF BH-4KVH-B (内部接口示意图)**APPLICATION VIEW OF BH-4KVH-B (接线示意图)**

3. FEATURES

3.1 Main Features Overview (主要特性)

CHIPSET (主芯片)	Novatek		
MARKET (目标应用)	Education whiteboard; Meeting display; 教育、会议大屏显示		
PANEL (面板)	Panel Type(类型)	8 lane V-By-One 4K UHD@60Hz 1 or 2 division Format; 支持单分区或2分区	
	Resolution (分辨率)	Up to 3840x2160	
VIDEO INPUT (视频信号输入)	V-by-One	Suggestion Input timing, please refer to table below. 请参考下表V-by-One输入timing建议表	
AUDIO INPUT (音频信号输入)	Audio	Line Input 模拟音频输入	0.2 ~ 2.0Vrms
VIDEO OUTPUT (音频输出)	V-by-One	Repeat V-by-One input timing; 同V-by-One输入timing, 4K 输出分区可变。	
	HDMI	480p, 720p, 1080p, 4Kx2K@60Hz	
POWER REQUIREMENT	12V power supply and input from V-by-one cable is Feasible; 从V-by-one屏线供电或者12V单独供电。		
POWER CONSUMPTION	<3.5W		
POWER TO TCON (屏TCON供电)	To Panel (驱屏电压)		12V
Note: Licenses involved in specifications above are supposed to be obtained by customers themselves, especially HDMI HDCP2.2 license. 注意： 以上规格涉及License部分需要客户自己根据需要获取,特别是HDMI HDCP2.2。			

3.2 V-by-one RX recommend input timing (V-by-one 输入建议参数)

Vx1 RX phy speed and Vx1 RX link speed

a. For video pixel rate is iclk (MHz/pixel), The Vx1 RX link speed would be iclk

b. The Vx1 RX phy speed would be $iclk * (\text{byte mode} * 8 \text{ bits}) * (10/8) / \text{lanes}$

Ex: 4K2K, 30 bits depths, 4 byte mode, 8 lanes

Phy speed = $594\text{MHz} * (4 \text{ bytes} * 8 \text{ bits}) * (10/8) / 8 \text{ lanes} = 2.97\text{Gbps}$

Vx1 RX Input timing suggestion table

Resol ution	H active	V active	H total	H blank	V total	V-BI ank	H Freq	H Front	H sync	H back	V-Fr ont	V-s ync	V-b ack
4K@ 50Hz	3840	2160	5280	1440	2250	90	112.5 KHz	1056	88	296	8	10	72
4K@ 60Hz	3840	2160	4400	560	2250	90	135 KHz	176	88	296	8	10	72

Vx1 RX Pixel Freq is 594MHz fixed recommend, and Fixed Vtotal mode is strongly recommended.

4K 输入的 PixelClk 建议使用 594MHz, 因 HDMI 输出的 timing 对 Vtotal 非常敏感, 强烈建议使用 Fixed Vtotal

模式，否则输出的 HDMI 信号 timing 无法稳定。

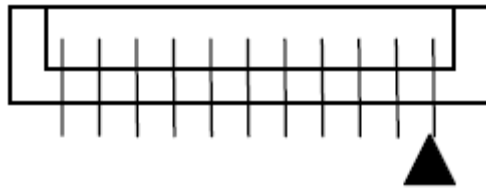
Frame rate fixed is recommended if you want back-end HDMI display is always stable when front-end input signal timing switching.

如果不希望在主板输入信号源切换时，看到 HDMI 输出屏幕上的黑屏或者信号反复检测出现的显示异常，可尝试将 V-by-one 输出的帧速率固定在 50Hz 或者 60Hz 其中一种频率。

4. INTERFACE DIFINITION(接口定义)

All connecting plug-ins recognize tacitly the square pin as No.1 pin. The pin definition also refers to PCBA bottom silkscreen. No.1 pin of 2.0/2.54mm pitch sockets show as below picture:

Pin脚顺序，PCB封装方脚均表示第1脚。2.0/2.54mm间距插座缺口朝上时，最左边为第1脚，如下图所示：



◆ CN6 (51PIN/0.5): V-By-One TO PANEL CONNECTOR

- FI-RE51S-HF (manufactured by JAE)
- Mating Connector: FI-R51HL (JAE) or compatible

NO.	SYMBOL	DESCRIPTION	NO.	SYMBOL	DESCRIPTION
51	12V	Power Supply +12.0V	25	GND	Ground
50	12V	Power Supply +12.0V	24	Rx0n	V-by-One HS DATA LANE0
49	12V	Power Supply +12.0V	23	Rx0p	
48	12V	Power Supply +12.0V	22	GND	Ground
47	12V	Power Supply +12.0V	21	Rx1n	V-by-One HS DATA LANE1
46	12V	Power Supply +12.0V	20	Rx1p	
45	12V	Power Supply +12.0V	19	GND	Ground
44	12V	Power Supply +12.0V	18	Rx2n	V-by-One HS DATA LANE2
43	NC	No Connection	17	Rx2p	
42	GND	Ground	16	GND	Ground
41	GND	Ground	15	Rx3n	V-by-One HS DATA LANE3
40	GND	Ground	14	Rx3p	
39	GND	Ground	13	GND	Ground
38	GND	Ground	12	Rx4n	V-by-One HS DATA LANE4
37	NC	No connection	11	Rx4p	
36	NC	No connection	10	GND	Ground
35	NC	No connection	9	Rx5n	V-by-One HS DATA LANE5
34	NC	No connection	8	Rx5p	

33	NC	No connection	7	GND	Ground
32	NC	No connection	6	Rx6n	V-by-One HS DATA LANE6
31	NC	No connection	5	Rx6p	
30	NC	No connection	4	GND	Ground
29	NC	No connection	3	Rx7n	V-by-One HS DATA LANE7
28	NC	No Connection	2	Rx7p	
27	HTPDN	Hot Plug Detect	1	GND	Ground
26	LOCKN	Lock Detect	-	-	-

◆ CN8 (51PIN/0.5): V-By-ONE INPUT CONNECTOR

- FI-RE51S-HF (manufactured by JAE)
- Mating Connector: FI-R51HL (JAE) or compatible

NO.	SYMBOL	DESCRIPTION	NO.	SYMBOL	DESCRIPTION
1	12V	Power Supply +12.0V	27	GND	Ground
2	12V	Power Supply +12.0V	28	Rx0n	V-by-One HS DATA LANE0
3	12V	Power Supply +12.0V	29	Rx0p	
4	12V	Power Supply +12.0V	30	GND	Ground
5	12V	Power Supply +12.0V	31	Rx1n	V-by-One HS DATA LANE1
6	12V	Power Supply +12.0V	32	Rx1p	
7	12V	Power Supply +12.0V	33	GND	Ground
8	12V	Power Supply +12.0V	34	Rx2n	V-by-One HS DATA LANE2
9	NC	No Connection	35	Rx2p	
10	GND	Ground	36	GND	Ground
11	GND	Ground	37	Rx3n	V-by-One HS DATA LANE3
12	GND	Ground	38	Rx3p	
13	GND	Ground	39	GND	Ground
14	GND	Ground	40	Rx4n	V-by-One HS DATA LANE4
15	NC	No Connection	41	Rx4p	
16	NC	No Connection	42	GND	Ground
17	NC	No Connection	43	Rx5n	V-by-One HS DATA LANE5
18	NC	No Connection	44	Rx5p	
19	NC	No Connection	45	GND	Ground
20	NC	No Connection	46	Rx6n	V-by-One HS DATA LANE6
21	NC	No Connection	47	Rx6p	
22	NC	No Connection	48	GND	Ground
23	NC	No Connection	49	Rx7n	V-by-One HS DATA LANE7
24	NC	No Connection	50	Rx7p	
25	HTPDN	Hot Plug Detect	1	GND	Ground
26	LOCKN	Lock Detect	-	-	-

◆ CN4 (4PIN/2.54): POWER SUPPLY CONNECTOR

NO.	SYMBOL	DESCRIPTION
1	GND	Ground
2	GND	Ground
3	12V	+12V Power Supply
4	12V	+12V Power Supply

◆ CN1 (4PIN/2.0): UART CONNECTOR 串口

NO.	SYMBOL	DESCRIPTION
1	NC	No Connection
2	GND	Ground
3	TX	UART Transmitter Signal
4	RX	UART Receiver Signal

◆ CN2 (5PIN/2.0): AUDIO&CONTROL CONNECTOR(音频输入和控制接口)

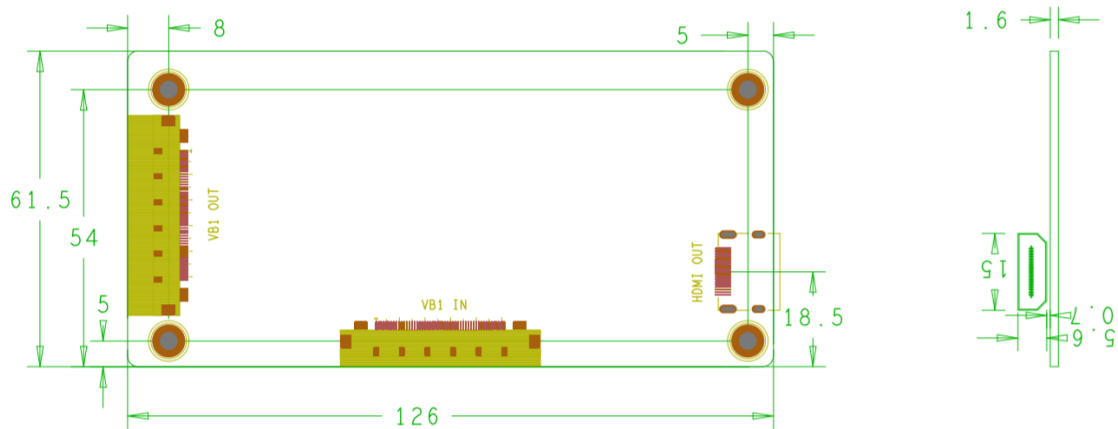
NO.	SYMBOL	DESCRIPTION
1	LIN	Audio Line Left Channel In (左声道输入)
2	GND	Ground
3	RIN	Audio Line Right Channel In (右声道输入)
4	GND	Ground
5	SPDIF	SPDIF In (SPDIF 数字音频输入)

◆ CN3 (4PIN/2.0): I2C UPDATE CONNECTOR I2C接口(仅供升级用)

NO.	SYMBOL	DESCRIPTION
1	NC	No Connection
2	GND	Ground
3	SDA	IIC Data Signal
4	SCL	IIC Clock Signal

5. PCB Dimension 尺寸图

The overall height of BH-4KVH-B is 15 mm.



6. CONFIGURATION & GENERAL PRECAUTIONS

使用环境和注意事项

- Storage temperature: -10~60°C.
- 存储温度: -10~60°C。
- Operation temperature: 0~40°C.
- 工作温度: 0~40°C。
- Operating: 10% to 90% (Non-condensing, 无冷凝)
- 工作湿度: 10% ~ 90%
- Store: 5% to 95%
- 储存湿度: 5%~95%
- Operating: 10,000ft (max)
- 工作高度: 10,000ft (最大)
- Store: 20,000ft (max)
- 储存高度: 20,000ft (最大)
- Vibration (振动) 5-55Hz, 19.6m/s²(2G), 20minutes each along X, Y and Z axis.
- Protect the board from static electricity in case of damage to the IC.
- 请使板卡远离静电。
- Keep the board away from conductor when it is working.
- 请确保板卡工作时远离导体。
- Don't push or pull the connectors when the board is working.
- 板卡工作时请勿按压和扭曲。
- Don't press, distort or disassemble the board.
- 请勿拆解板卡。
- Clean the board with soft dry cloth when it's dirty.
- 如果板卡脏了, 请用干布擦拭。
- Don't wire in the board to power supply before panel is correctly connected.

- 正确接好驱屏线前请勿接通电源。
- Inner wires of the whole set should match reasonable, we suggest the LVDS twisted pair wire between the main board and panel must be tied up well and try to use shielding wire. If it's possible, try to put on the magnetic belt ring on the wire which near the board terminal, each connected wire try to not directly cross the PCB board, especially cross over from the main chips, avoid affecting the whole set EMC performance.
- 机内需合理布线，芯片上方不建议走线，LVDS屏线必须使用双绞线并建议使用屏蔽网，同时将地环锁死在PCB孔位上。

7. PACKING, SHIPPING & STORING (包装、运输、贮存)

7.1、Packing (包装)

Product name, part number, supplier's logo, QC stamp, Pb-free display and date must be printed on the package case.

包装箱上有产品名称、型号、厂家标识、厂家质量部门的检验合格证、制造日期等。

7.2、Shipping (运输)

This product can be transported through land, sea or air. Measures should be taken for water and sun proof. Also, it should be handled with care.

适应于车、船、飞机运输，运输中应遮蓬、防晒、文明装卸。

7.3、Storing(贮存)

Please keep staying in the package case before using and keep away from hazardous gas, flammable or explosive substances and erosive chemical material. Avoid dramatic vibration or shock and strong magnetic field. The package cases should be racked 20cm above the ground and 50cm away from the wall, window, heat source or ventilation port. Generally the storage term of this product is 2 years. All the products should be double checked after that time.

产品未使用时应存放在包装箱内，仓库内不允许有有害气体，易燃，易爆的产品及有腐蚀性的化学物品，并且无强烈的机械振动，冲击和强磁场作用，包装箱应垫离地至少20cm高，距离墙壁、热源、窗口或空气入口至少50cm，在本规定条件下的贮存期一般为2年，超过2年后应重新进行检验。