Colorlight

K5+

Receiving Card

Specification

Overview

K5+ is a high-end receiving card developed for fine-pitch LED screens featuring a large load capacity and up to 32 parallel data groups or 32 serial data groups. Due to its small form factor, K5+ is best fit into concise cabinets. With the small pixel pitch design, K5+ is suitable for small cabinet space and small pitch applications; it adopts high-density interfaces, and is dustproof and shockproof, and thus has high stability and high reliability.

K5+ not only has the functions of mainstream receiving cards, but also a series of practical and powerful features helping high-end displays to maximize video performance with stunning clarity. K5+ can be perfectly used in high-end rentals as well as fine-pitch fix-installed LED screens.

Features

Display effect

- 8bit video source input.
- Color temperature adjustment.
- 240Hz frame rate.
- Better gray at low brightness.

Correction processing

- High precise per-pixel calibration in brightness and chromaticity.

Easy maintenance

- Highlight and OSD.
- Screen rotation.
- Data group offset.
- Quick firmware upgrade and quick release of correction coefficients.
- Up to 8 intelligent modules.
- Cabinet temperature, humidity, voltage and power monitoring.

Stable and reliable

- Loop redundancy.
- Dual receiving card hot backup.
- PSU redundancy.
- Ethernet cable status monitoring.
- Firmware program redundancy and readback.
- 7×24h uninterrupted work.

Feature details

Display effect	
8bit	8bit color depth video source input and output, monochrome grayscale is 256, can be matched with 16777216 kinds of mixed colors.
Frame rate	Adaptive frame rate technology, not only supports 23.98/24/29.97/30/50/59.94/60Hz regular and non-integer frame rates, but also outputs and displays 120/240Hz high frame rate pictures, which greatly improves picture fluency and reduces drag film. (Note: it will affect the load).
Color temperature adjustment	Adjustment of color temperature, that is, saturation adjustment, to enhance the expressiveness of the picture.
Better gray at low brightness	By optimizing the gamma meter algorithm, the display screen can maintain the integrity and perfect display of gray scale when reducing the brightness, showing the display effect of low brightness and high gray scale.
8bit calibration	8bit precision brightness and chromaticity correction point by point, which can effectively eliminate the chromatic aberration of the lamp point, ensure the uniformity and consistency of the color brightness of the entire screen, and improve the overall display effect.
Shortcut operation	
Cabinet highlight	Using the control software, you can quickly mark the selected target cabinet, display a flashing box on the front of the cabinet, and change the flashing frequency of the cabinet indicator at the same time, which is convenient for front and rear maintenance.
Quick OSD	Using the control software, you can quickly mark the actual hardware connection serial number of the receiving card corresponding to the Ethernet port, which is convenient for setting the connection relationship of the screen.
Image rotation	Single cabinet image to be rotated at 90°/180°/270° angles, and with part of the main control, the single cabinet image can be rotated and displayed at any angle.
Smart module	8-way of intelligent module to save calibration coefficients and other information on module.
Hardware monitoring	
Bit error detection	It supports the detection of data transmission quality and error code between receiving cards, and can easily and quickly identify the cabinet with abnormal hardware connection, which is convenient for maintenance.
Humidity monitoring	Monitor the cabinet (need the support from the cabinet design), and send to the computer in real-time the running cabinet humidity. With the software, users can monitor current humidity and be alerted on any abnormal condition.
Temperature monitoring	Monitor the cabinet (need the support from the cabinet design), and send to the computer in real-time the running cabinet temperature. With the software, users can monitor current temperature and be alerted on any abnormal condition.

Power supply monitoring	Support 2-way power fault monitoring of the cabinet (need the support from the cabinet design), and send to the computer in real-time the running power status. From the software, users can monitor current power status and be alerted on any abnormal condition.
Voltage monitoring	Support receiving card power voltage and 2-way cabinet power voltage monitoring (need the cabinet design) in real-time. From the software, users can check corresponding voltage status.
Pixel-by-pixel monitoring	Monitoring cabinet pixel health (need the cabinet design), and send to the computer in real-time each pixel status. With the software, users can check current pixels status and be alerted on the amount of bad pixels above a predefined threshold.
Fan control	Control the fan (needs the cabinet design) manually from the software, even allow automatic fan switching on current cabinet temperature status (needs the cabinet design).
LCD monitoring	Display on the cabinet LCD screen the temperature, voltage, running time and other status, support one-click self-test.
Redundancy	
Loop redundancy	The redundant Ethernet port is used to increase the connection with the transmitting equipment and increase the reliability of cascading between equipment. When one circuit fails, it can realize seamless switching to the other circuit and ensure the normal display of the screen.
Receiving card hot backup	Two receiving cards connect to the HUB board to control a single cabinet at the same time. When the main receiving card is abnormal, the backup card will take over the display immediately.
Firmware redundancy	It supports firmware program backup and can be upgraded safely. There is no need to worry about the loss of firmware program due to cable disconnection or power interruption during the upgrade process.

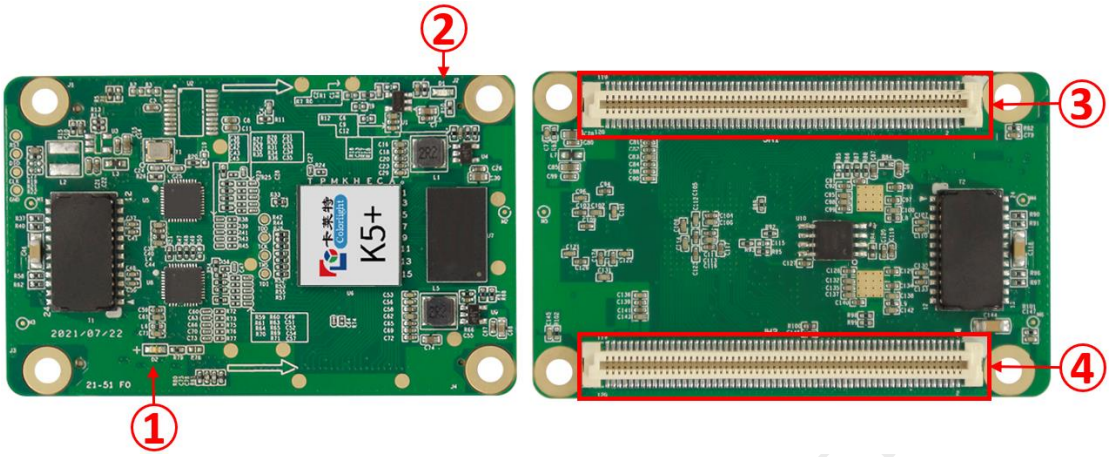
Basic parameters

Control System Parameters	
Control Area	PWM chips: 512×384 pixels. Normal chips: 512×256 pixels. Shixin chips: 512×324 pixels.
Ethernet Port Exchange	Supported, arbitrary use.
Grayscale	Up to 65536 grayscale.
Display Module Compatibility	
Chip Support	PWM chips, normal chips, Shixin chips.
Scan Type	Up to 1/128 scan
Module Dimension	Up to 8192 pixels per data group.
Cable Direction	Support route from left to right, from right to left, from top to bottom, from bottom to top.

Data Group	32 groups of parallel RGB data and 32 groups of serial RGB data, the later can be extended to 128 groups. Data groups can be exchanged freely.
Data Folded	• Normal chips: 2~8 fold horizontally, 2~4 fold vertically. • PWM and Shixin chips: horizontal or vertical 2~8 fold.
Module pumping point, row and column	Any pumping point and any pumping row and any pumping column
Monitoring Function (In conjunction with the monitoring module)	
Temperature Monitoring	Operating temperature range:-25°C~75°C.
Humidity Monitoring	Measuring range: 20%~95%RH.
Power Supply Monitoring	Operating power supply status, 2 monitoring ports available each card.
Power Voltage Monitoring	Monitoring the voltage of the power supply. 2 ports for each card. Monitoring receiving card's own voltage, no need for peripherals.
Net cable Monitoring	Operating total number of packets, error packets and network quality.
Pixel-to-Pixel Calibration	
Brightness Calibration	8bit
Chromaticity Calibration	8bit
Other features	
Redundancy	Loop redundancy, receiving card redundancy, PSU redundancy, firmware redundancy, etc.
Optional functions	18bit grayscale compensation, prestored pictures, Cabinet LCD display, module hot swap, irregular screen design etc.

Hardware

Appearance



Interface

S/N	Name	Function	
1	Signal indicator	Flashes once per second	Receiving card: normal. Ethernet cable connection: normal.
		Flashes 10 times per second	Receiving card: normal. Cabinet: Highlight.
		Flashes 4 times per second	Receiving card: working with back up channel (Loop redundancy status).
2	Power indicator	Red indicator always on: the power supply is normal.	
3	High-density connector JH1	Connect with the display's HUB or module and see pin definition for more details.	
4	High-density connector JH2	Connect with the display's HUB or module and see pin definition for more details.	

* K5+ uses DDR2 SODIMM socket, please refer to the connector specification for details. The product photos in this article are for reference only.

Equipment Specifications

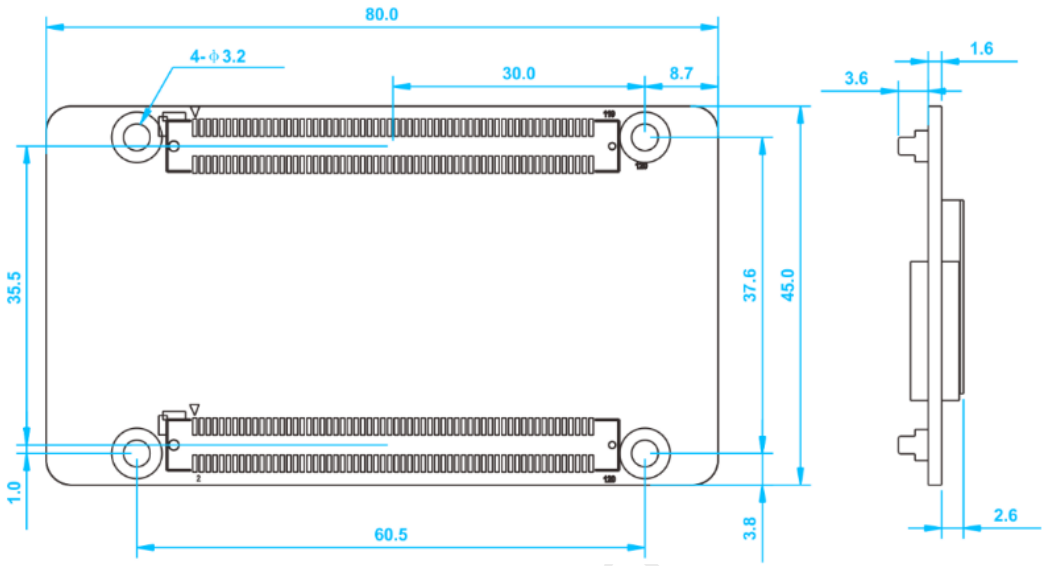
Physical Specifications	
Hardware interface	High-precision socket
Ethernet port transmission rate	1Gb/s
Communication Distance	Recommended: CAT5e cable≤100m
Compatible with Transmission Equipment	Gigabit switch, Gigabit fiber converter, Gigabit fiber switch
Size[1]	L×W×H / 70.0mm (2.76") ×45.0mm (1.77") ×7.8mm (0.31")
Weight	17g / 0.04lbs, with heat sink.
Electrical specification	
Voltage	DC 3.8~5.5V，0.5A
Rated power	2.5W
Body Static Resistance	2KV
Operating environment	
Temperature	-25°C~75°C (-13°F~167°F)
Humidity	0%RH-80%RH, no condensation
Storage and transport environment	
Temperature	-40°C~125°C (-40°F~257°F)
Humidity	0%RH-90%RH, no condensation
Packing information	
Packaging rules	Standard blister box device, 4 cards per box, 400 cards per carton
Package size	W×H×D / 550.0mm (21.65") ×180.0mm (7.09") ×398.0mm (15.67")
Certification	
* RoHS certification, EMC Class A certification, EMC needs to work with the cabinet design, please contact technical support for assistance.	

[1] Size and weight vary by manufacturing process.

Reference dimensions

Unit: mm

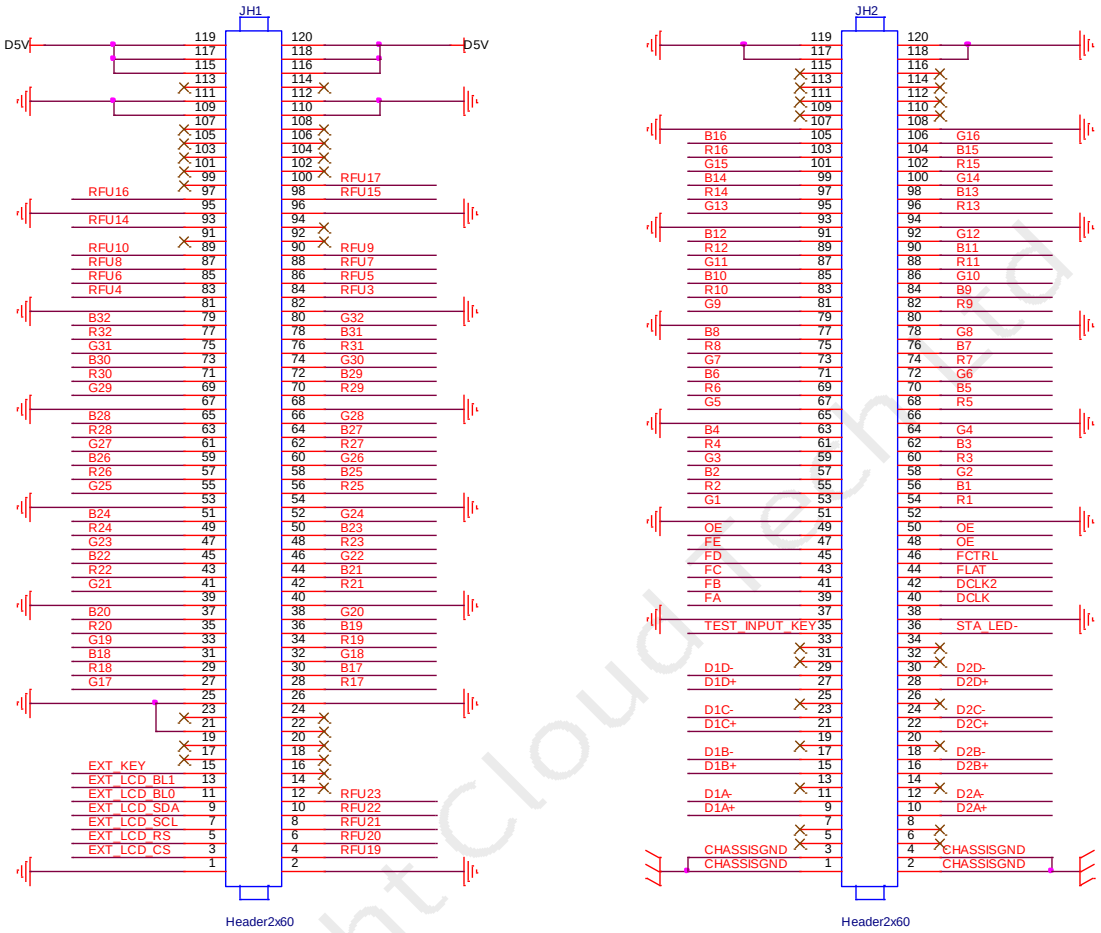
Tolerance: ±0.3mm



* The distance between outer surfaces of the K5+ and HUB boards after their high-density connectors fit together is 5.0mm. A 5-mm copper pillar is recommended.

Definition of Pins

32 groups of parallel data interfaces



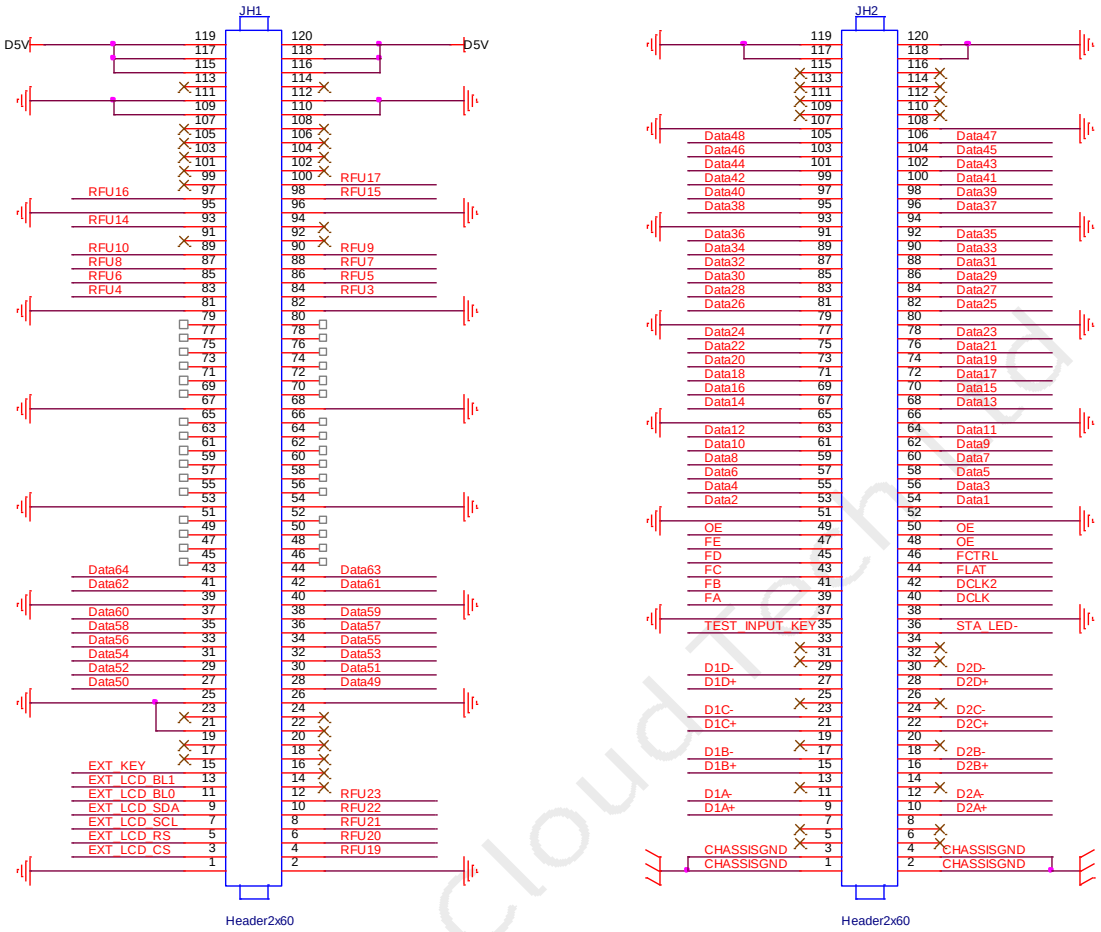
JH1					
Instructions	Definition	Pin No.		Definition	Instructions
Ground connection	GND	1	2	GND	Ground connection
LCD screen interface	EXT_LCD_CS	3	4	RFU19	Reserved
	EXT_LCD_RS	5	6	RFU20	
	EXT_LCD_SCL	7	8	RFU21	
	EXT_LCD_SDA	9	10	RFU22	
	EXT_LCD_BL0	11	12	RFU23	
	EXT_LCD_BL1	13	14	NC	Empty
	EXT_KEY	15	16	NC	
Empty	NC	17	18	NC	
	NC	19	20	NC	
Ground connection	GND	21	22	NC	
Empty	NC	23	24	NC	Empty
Ground connection	GND	25	26	GND	Ground connection

RGB output	LED_G17	27	28	LED_R17	RGB output
	LED_R18	29	30	LED_B17	
	LED_B18	31	32	LED_G18	
	LED_G19	33	34	LED_R19	
	LED_R20	35	36	LED_B19	
	LED_B20	37	38	LED_G20	
Ground connection	GND	39	40	GND	Ground connection
RGB output	LED_G21	41	42	LED_R21	RGB output
	LED_R22	43	44	LED_B21	
	LED_B22	45	46	LED_G22	
	LED_G23	47	48	LED_R23	
	LED_R24	49	50	LED_B23	
	LED_B24	51	52	LED_G24	
Ground connection	GND	53	54	GND	Ground connection
RGB output	LED_G25	55	56	LED_R25	RGB output
	LED_R26	57	58	LED_B25	
	LED_B26	59	60	LED_G26	
	LED_G27	61	62	LED_R27	
	LED_R28	63	64	LED_B27	
	LED_B28	65	66	LED_G28	
Ground connection	GND	67	68	GND	Ground connection
RGB output	LED_G29	69	70	LED_R29	RGB output
	LED_R30	71	72	LED_B29	
	LED_B30	73	74	LED_G30	
	LED_G31	75	76	LED_R31	
	LED_R32	77	78	LED_B31	
	LED_B32	79	80	LED_G32	
Ground connection	GND	81	82	GND	Ground connection
Reserved	RFU4	83	84	RFU3	Reserved
	RFU6	85	86	RFU5	
	RFU8	87	88	RFU7	
	RFU10	89	90	RFU9	
Empty	NC	91	92	NC	Empty
Reserved	RFU14	93	94	NC	
Ground connection	GND	95	96	GND	Ground connection
Reserved	RFU16	97	98	RFU15	Reserved
Empty	NC	99	100	RFU17	Reserved
Empty	NC	101	102	NC	Empty
	NC	103	104	NC	
	NC	105	106	NC	
	NC	107	108	NC	

Ground connection	GND	109	110	GND	Ground connection
	GND	111	112	GND	
Empty	NC	113	114	NC	Empty
Power supply	D5V	115	116	D5V	Power supply
	D5V	117	118	D5V	
	D5V	119	120	D5V	
JH2					
Instructions	**Definition**	**Pin No.**		**Definition**	**Instructions**
Chassis ground	CHASSISGND	1	2	CHASSISGND	Chassis ground
	CHASSISGND	3	4	CHASSISGND	
Empty	NC	5	6	NC	Empty
	NC	7	8	NC	
Ethernet port 1 signal pin	D1A+	9	10	D2A+	Ethernet port 2 signal pin
	D1A-	11	12	D2A-	
	NC	13	14	NC	
	D1B+	15	16	D2B+	
	D1B-	17	18	D2B-	
	NC	19	20	NC	
	D1C+	21	22	D2C+	
	D1C-	23	24	D2C-	
	NC	25	26	NC	
	D1D+	27	28	D2D+	
	D1D-	29	30	D2D-	
Empty	NC	31	32	NC	Empty
	NC	33	34	NC	
Test button	TEST_ INPUT_KEY	35	36	STA_LED-	Status LED
Ground connection	GND	37	38	GND	Ground connection
Row decoding signal	FA	39	40	DCLK	First data serial clock
	FB	41	42	DCLK2	Second data serial clock
	FC	43	44	FLAT	Latch
	FD	45	46	FCTRL	Blanking
	FE	47	48	OE	Display enable
Display enable	OE	49	50	OE	
Ground connection	GND	51	52	GND	Ground connection
RGB output	LED_G1	53	54	LED_R1	RGB output
	LED_R2	55	56	LED_B1	
	LED_B2	57	58	LED_G2	
	LED_G3	59	60	LED_R3	

	LED_R4	61	62	LED_B3	
	LED_B4	63	64	LED_G4	
Ground connection	GND	65	66	GND	Ground connection
RGB output	LED_G5	67	68	LED_R5	RGB output
	LED_R6	69	70	LED_B5	
	LED_B6	71	72	LED_G6	
	LED_G7	73	74	LED_R7	
	LED_R8	75	76	LED_B7	
	LED_B8	77	78	LED_G8	
Ground connection	GND	79	80	GND	Ground connection
RGB output	LED_G9	81	82	LED_R9	RGB output
	LED_R10	83	84	LED_B9	
	LED_B10	85	86	LED_G10	
	LED_G11	87	88	LED_R11	
	LED_R12	89	90	LED_B11	
	LED_B12	91	92	LED_G12	
Ground connection	GND	93	94	GND	Ground connection
RGB output	LED_G13	95	96	LED_R13	RGB output
	LED_R14	97	98	LED_B13	
	LED_B14	99	100	LED_G14	
	LED_G15	101	102	LED_R15	
	LED_R16	103	104	LED_B15	
	LED_B16	105	106	LED_G16	
Ground connection	GND	107	108	GND	Ground connection
Empty	NC	109	110	NC	Empty
	NC	111	112	NC	
	NC	113	114	NC	
	NC	115	116	NC	
Ground connection	GND	117	118	GND	Ground connection
	GND	119	120	GND	

32 groups of serial data interfaces



JH1					
Instructions	Definition	Pin No.		Definition	Instructions
Ground connection	GND	1	2	GND	Ground connection
LCD screen interface	EXT_LCD_CS	3	4	RFU19	Reserved
	EXT_LCD_RS	5	6	RFU20	
	EXT_LCD_SCL	7	8	RFU21	
	EXT_LCD_SDA	9	10	RFU22	
	EXT_LCD_BL0	11	12	RFU23	
	EXT_LCD_BL1	13	14	NC	Empty
	EXT_KEY	15	16	NC	
Empty	NC	17	18	NC	
	NC	19	20	NC	
Ground connection	GND	21	22	NC	
Empty	NC	23	24	NC	
Ground connection	GND	25	26	GND	Ground connection
RGB output	Data50	27	28	Data49	RGB output
	Data52	29	30	Data51	

	Data54	31	32	Data53	
	Data56	33	34	Data55	
	Data58	35	36	Data57	
	Data60	37	38	Data59	
Ground connection	GND	39	40	GND	Ground connection
RGB output	Data62	41	42	Data61	RGB output
	Data64	43	44	Data63	
Empty	NC	45	46	NC	Empty
	NC	47	48	NC	
	NC	49	50	NC	
	NC	51	52	NC	
Ground connection	GND	53	54	GND	Ground connection
Empty	NC	55	56	NC	Empty
	NC	57	58	NC	
	NC	59	60	NC	
	NC	61	62	NC	
	NC	63	64	NC	
	NC	65	66	NC	
Ground connection	GND	67	68	GND	Ground connection
Empty	NC	69	70	NC	Empty
	NC	71	72	NC	
	NC	73	74	NC	
	NC	75	76	NC	
	NC	77	78	NC	
	NC	79	80	NC	
Ground connection	GND	81	82	GND	Ground connection
Reserved	RFU4	83	84	RFU3	Reserved
	RFU6	85	86	RFU5	
	RFU8	87	88	RFU7	
	RFU10	89	90	RFU9	
Empty	NC	91	92	NC	Empty
Reserved	RFU14	93	94	NC	
Ground connection	GND	95	96	GND	Ground connection
Reserved	RFU16	97	98	RFU15	Reserved
Empty	NC	99	100	RFU17	Reserved
Empty	NC	101	102	NC	Empty
	NC	103	104	NC	
	NC	105	106	NC	

	NC	107	108	NC	
Ground connection	GND	109	110	GND	Ground connection
	GND	111	112	GND	
Empty	NC	113	114	NC	Empty
Power supply	D5V	115	116	D5V	Power supply
	D5V	117	118	D5V	
	D5V	119	120	D5V	
JH2					
Instructions	**Definition**	**Pin No.**		**Definition**	**Instructions**
Chassis ground	CHASSISGND	1	2	CHASSISGND	Chassis ground
	CHASSISGND	3	4	CHASSISGND	
Empty	NC	5	6	NC	Empty
	NC	7	8	NC	
Ethernet port 1 signal pin	D1A+	9	10	D2A+	Ethernet port 2 signal pin
	D1A-	11	12	D2A-	
	NC	13	14	NC	
	D1B+	15	16	D2B+	
	D1B-	17	18	D2B-	
	NC	19	20	NC	
	D1C+	21	22	D2C+	
	D1C-	23	24	D2C-	
	NC	25	26	NC	
	D1D+	27	28	D2D+	
	D1D-	29	30	D2D-	
Empty	NC	31	32	NC	Empty
	NC	33	34	NC	
Test button	TEST_ INPUT_KEY	35	36	STA_LED-	Status LED
Ground connection	GND	37	38	GND	Ground connection
Row decoding signal	FA	39	40	DCLK	First data serial clock
	FB	41	42	DCLK2	Second data serial clock
	FC	43	44	FLAT	Latch
	FD	45	46	FCTRL	Blanking
	FE	47	48	OE	Display enable
Display enable	OE	49	50	OE	
Ground connection	GND	51	52	GND	Ground connection
RGB output	Data2	53	54	Data1	RGB output
	Data4	55	56	Data3	
	Data6	57	58	Data5	

	Data8	59	60	Data7	
	Data10	61	62	Data9	
	Data12	63	64	Data11	
Ground connection	GND	65	66	GND	Ground connection
RGB output	Data14	67	68	Data13	RGB output
	Data16	69	70	Data15	
	Data18	71	72	Data17	
	Data20	73	74	Data19	
	Data22	75	76	Data21	
	Data24	77	78	Data23	
Ground connection	GND	79	80	GND	Ground connection
RGB output	Data26	81	82	Data25	RGB output
	Data28	83	84	Data27	
	Data30	85	86	Data29	
	Data32	87	88	Data31	
	Data34	89	90	Data33	
	Data36	91	92	Data35	
Ground connection	GND	93	94	GND	Ground connection
RGB output	Data38	95	96	Data37	RGB output
	Data40	97	98	Data39	
	Data42	99	100	Data41	
	Data44	101	102	Data43	
	Data46	103	104	Data45	
	Data48	105	106	Data47	
Ground connection	GND	107	108	GND	Ground connection
Empty	NC	109	110	NC	Empty
	NC	111	112	NC	
	NC	113	114	NC	
Empty	NC	115	116	NC	Empty
Ground connection	GND	117	118	GND	Ground connection
	GND	119	120	GND	

* DATA65～DATA128 correspond to the interface data of multiplexing DATA1～DATA64.

Expansion Functions

Descriptions			
Reserved pin	Smart module pin	Lamp panel Flash pin	Instruction
RFU3	HUB_CODE0	HUB_CODE0	Flash 1
RFU4	Reserved	HUB_SPI_CLK	Clock signal of serial pin
RFU5	HUB_CODE1	HUB_CODE1	Flash 2
RFU6	Reserved	HUB_SPI_CS	CS Signal of serial pin
RFU7	HUB_CODE2	HUB_CODE2	Flash 3
RFU8	/	HUB_SPI_MOSI	Flash storage data input
	HUB_UART_TX	/	TX signal of smart module
RFU9	HUB_CODE3	HUB_CODE3	Flash 4
RFU10	/	HUB_SPI_MISO	Flash storage RGB output
	HUB_UART_RX	/	RX signal of smart module
RFU14	POWER_STA1	POWER_STA1	Dual power detection signal 1
RFU15	MS_DATA	MS_DATA	Dual card backup connection signal
RFU16	POWER_STA2	POWER_STA2	Dual power detection signal 2
RFU17	MS_ID	MS_ID	Dual card backup identification signal
RFU19	HUM	HUM	Humidity monitoring
RFU20	Voltage_STA1	Voltage_STA1	Power voltage monitoring 1
RFU21	Voltage_STA2	Voltage_STA2	Power voltage monitoring 2
RFU22	TEMP	TEMP	Temperature monitoring
RFU23	Reserved	Reserved	MCU Reserved

* RFU8 and RFU10 are extension pins of multiplexed signal. Only one pin from either "Smart Module Pin" or "Lamp panel Flash Pin" can be selected at the same time.

Statement

As factors such as product batches and production processes may change, in order to provide accurate product information, specification parameters, and product characteristics in order to match the actual product, the text description and picture effects in the document will be adjusted and revised appropriately. If it is necessary to carry out the above modification and adjustment without prior notice, please refer to the actual product.

Welcome to choose to use the products of Colorlight Cloud Tech Ltd. If you have any questions or suggestions in use, please contact us through official channels, we will try our best to support and listen to your valuable suggestions. For more information and updates, please visit the official website www.colorlightinside.com or scan the QR code.

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