A8s-N

Receiving Card

Specifications

Change History

Document Version	Release Date	Description
V1.5.0	2025-06-11	• Updated the appearance diagram. • Updated the description for the mapping feature.
V1.4.2	2025-05-20	• Added an installation diagram. • Added information on expansion features. • Added details about static protection.
V1.4.1	2025-03-31	• Updated the max load capacity description. • Updated the description for upload coefficients. • Updated the storage environment temperature range.
V1.4.0	2024-08-16	• Updated the max load capacity information. • Updated the description for the Mapping feature. • Updated the dimensions diagram.
V1.3.2	2023-12-30	Updated product feature descriptions.

Introduction

The A8s-N is a high-end full-featured small receiving card developed by NovaStar Tech Co., Ltd. (hereinafter referred to as NovaStar). Supporting the exclusive Image Booster technology of NovaStar, the A8s-N can precisely calibrate the color gamut and grayscale of the screen, and improve the grayscale by 64 times. With other various functions, such as HDR, Pixel Level Brightness and Chroma Calibration, Quick Adjustment of Dark or Bright Lines, Low Latency, 3D, Individual Gamma Adjustment for RGB, 90° Image Rotation, and Free Image Rotation, this receiving card can greatly improve the brightness, grayscale and color performance from every aspect, offering users an ultimate visual experience with a uniform, smooth and lifelike image.

The A8s-N uses high-density connectors for communication to limit the effects of dust and vibration, resulting in high stability. It supports up to 32 groups of parallel RGB data or 64 groups of serial data (expandable to 128 groups of serial data). Its reserved pins allow for custom functions of users. Thanks to its EMC Class B compliant hardware design, the A8s-N has improved electromagnetic compatibility and is suitable for various on-site setups that have high requirements.

- For PWM driver ICs, the maximum load capacity per card is:
  - 512×384@60Hz (For 8bit video sources)

  - 512×256@60Hz (For 10bit and 12bit video sources)
- For common driver ICs, the maximum load capacity per card is:
  - 384×384@60Hz (For 8bit video sources)
  - 384×256@60Hz (For 10bit and 12bit video sources)

Note

When working with COEX controllers and 10bit video sources:

- For PWM driver ICs, the maximum load capacity per card is 512×384@60Hz.
- For common driver ICs, the maximum load capacity per card is 384×384@60Hz.

Certifications

RoHS, EMC Class B

If the product does not have the relevant certifications required by the countries or regions where it is to be sold, please contact NovaStar to confirm or address the problem. Otherwise, the customer shall be responsible for the legal risks caused or NovaStar has the right to claim compensation.

Features

Improvements to Display Effect

- Image Booster (Effects depend on driver IC)
  - Color Management: Support standard (Rec.709 / DCI-P3 / Rec.2020) and custom color gamuts, enabling more precise colors on the screen.
  - Precise Grayscale: Individually correct the 65,536 levels of grayscale (16bit) of the driver IC to fix the display problems at low grayscale conditions, such as brightness spikes, brightness dips, color cast and mottling. This function can also better assist other display technologies, such as 22bit+ and individual gamma adjustment for RGB, allowing for a smoother and uniform image.
  - 22bit+: Improve the LED screen grayscale by 64 times to avoid grayscale loss due to low brightness and allow for a smoother image with more details in dark areas.
- HDR
  - Support HDR10 and comply with the SMPTE ST 2084 and SMPTE ST 2086 standards.

- Support HLG.

- Pixel Level Brightness and Chroma Calibration

  Work with NovaStar's calibration system to calibrate the brightness and chroma of each pixel, effectively eliminating differences and enabling high consistency for both brightness and chroma.

- Quick Adjustment of Dark or Bright Lines

  The different brightness of seams caused by splicing of modules or cabinets can be corrected to improve the visual experience. The correction is easy and takes effect immediately.

- Low Latency

  For PWM driver ICs, the latency of video source on the receiving card end can be reduced to 1 frame. To use low latency with DCLK continuous PWM driver ICs, a customized firmware is required.

- 3D

  Work with the controller that supports 3D function to enable 3D output.

- Individual Gamma Adjustment for RGB

  Working with NovaLCT and the controller that supports this function, the receiving card supports individual adjustment to red gamma, green gamma and blue gamma, which can effectively control image non-uniformity at low grayscale conditions and white balance offset, allowing for a more realistic image.

- 90° Image Rotation

  The display image can be rotated in multiples of 90° (0°/90°/180°/270°).

- Free Image Rotation

  Support image rotation at any angle when using the dedicated MCTRL R5 controller and SmartLCT software.

Improvements to Maintainability

- Smart Module (dedicated firmware required)

  Work with the smart module to support module ID management, storage of calibration coefficients and module parameters, monitoring of module temperature, voltage and flat cable communication status, and LED error detection

- Automatic Module Calibration

After a new module with flash memory is installed to replace the old one, the calibration coefficients stored in the flash memory can be automatically uploaded to the receiving card when it is powered on, which ensures unchanged uniform display brightness and chroma.

- Uploading Calibration Coefficients

  Upload calibration coefficients to the receiving card quickly or in a stable manner, with acceleration support if needed.

- Module Flash Management

  For modules with flash memory, the information stored can be managed, allowing for the storage and readback of calibration coefficients and module IDs.

- One-click to Apply Calibration Coefficients in Module Flash

  For modules with flash memory, when the Ethernet cable is disconnected, users can hold down the self-test button on the cabinet to upload the calibration coefficients in the memory of the module to the receiving card.

- Mapping 1.1

  The cabinet displays the Ethernet port, receiving card, and controller numbers in different colors, clearly showing the physical locations and connection topology of receiving cards.

- Settings of a Stored Image in the Receiving Card

  The image displayed during startup, or displayed when the Ethernet cable is disconnected or there is no video signal can be customized.

- Temperature and Voltage Monitoring

  The receiving card temperature and voltage can be monitored without using external devices.

- Cabinet LCD

  The LCD module of the cabinet can display the temperature, voltage, single run time and total run time of the receiving card.

- Bit Error Detection

  Real-time monitoring of the communication of the Ethernet port on the receiving card which helps users troubleshoot network communication problems.

- Status Detection of Dual Power Supplies

  When two power supplies are used, their working status can be detected.

- Firmware Program Readback

  The receiving card firmware program can be read back and saved to the local computer.

- Configuration Parameter Readback

The receiving card configuration parameters can be read back and saved to the local computer.

Improvements to Reliability

- Dual Card Backup and Status Monitoring

  In an application requiring high reliability, two receiving cards can be mounted onto a single hub board for backup. When the primary card fails, the backup card can serve immediately to ensure uninterrupted operation of the display.

  The working status of the primary and backup receiving cards can be monitored inNovaLCT V5.2.0 or later.

- Loop Backup

  The receiving card and controller form a loop via the primary and backup line connections. When a fault occurs at a location of the lines, the screen can still display the image normally.

- Dual Backup of Configuration Parameters

  The receiving card configuration parameters are stored in the application area and factory area of the receiving card at the same time. Users usually use the configuration parameters in the application area. If necessary, users can restore the configuration parameters in the factory area to the application area.

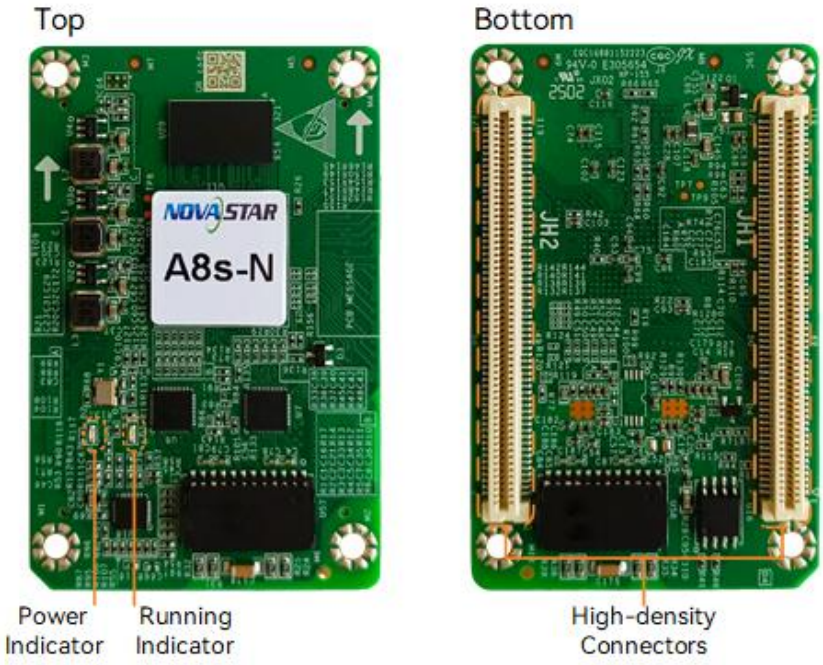
- Dual Program Backup

  Two copies of firmware program are stored in the receiving card at the factory to avoid the problem that the receiving card may get stuck abnormally during program update.

- Dual Backup of Calibration Coefficients

  Brightness and chroma calibration coefficients are stored in the application area and factory area of the receiving card at the same time. Users usually use the calibration coefficients in the application area. If necessary, users can restore the calibration coefficients in the factory area to the application area.

Appearance



All product pictures shown in this document are for illustration purpose only. Actual product may vary.

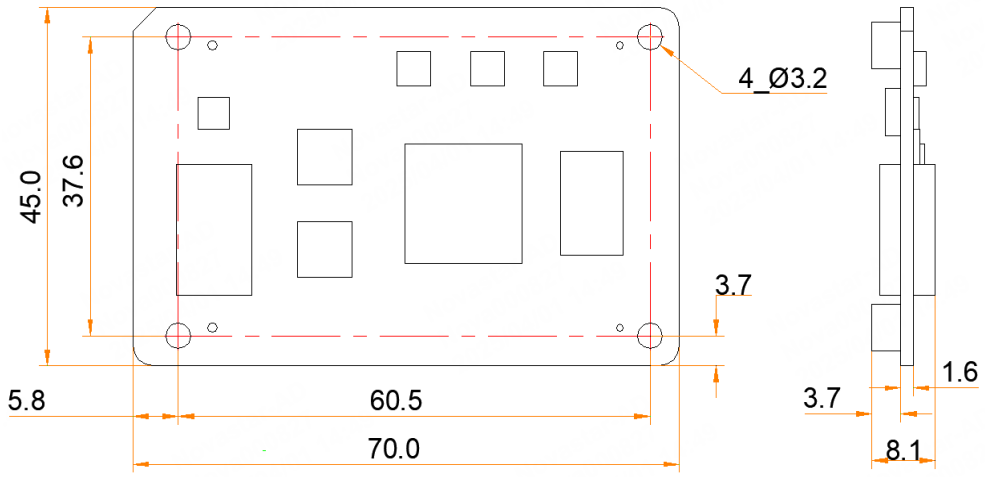
Indicator

Indicators	Color	Status	Description
Running indicator	Green	Flashing once every 1s	The receiving card is functioning normally. Ethernet cable connection is normal, and video source input is available.
		Flashing once every 3s	Ethernet cable connection is abnormal.
		Flashing 3 times every 0.5s	Ethernet cable connection is normal, but video source input is unavailable.
		Flashing once every 0.2s	The receiving card failed to load the program in the application area and is now using the backup program.
		Flashing 8 times every 0.5s	A redundancy switchover occurred on the Ethernet port and the loop backup has taken effect.
Power	Red	Always on	The power input is normal.

Indicators	Color	Status	Description
indicator			

Dimensions

The board thickness is not greater than 2.0 mm, and the total thickness (board thickness + thickness of components on the top and bottom sides) is not greater than 8.6 mm. Ground connection (GND) is enabled for mounting holes.



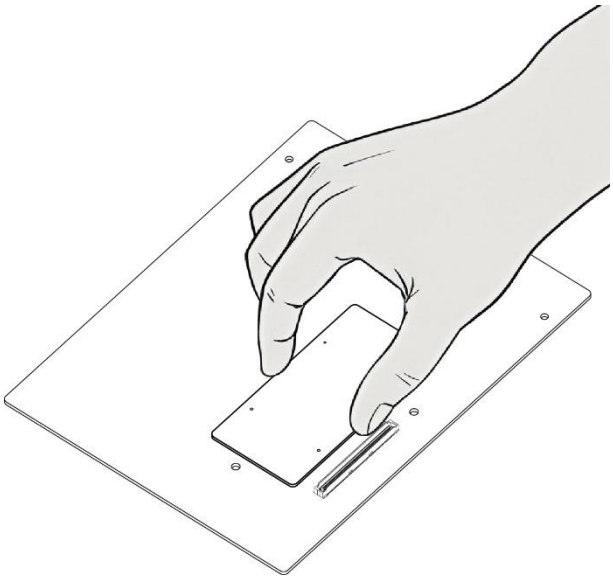
Tolerance: ±0.3 Unit: mm

Note

The distance between outer surfaces of the product and hub boards after their high-density connectors fit together is 5.0 mm. A 5.0 mm copper pillar is recommended.
To make molds or trepan mounting holes, please contact NovaStar for a higher-precision structural drawing.

Installation

Please refer to the diagram below. Hold the product securely from the sides (long edges) near the center, and press it into the HUB board to install.



Caution

The product's static resistance is 2 kV. Be mindful of static protection during handling.

Pins

32 Groups of Parallel Data

JH1					
/	GND	1	2	GND	/
LCD CS signal	EXT_CS#RW	3	4	NC	/
LCD RS signal	EXT_LCD_CD/RS	5	6	NC	/
LCD clock signal	EXT_LCD_SCL/DB0	7	8	NC	/
LCD data signal	EXT_LCD_SDA/DB1	9	10	NC	/
LCD backlight signal 1	EXT_LCD_BL0	11	12	NC	/
LCD backlight signal 2	EXT_LCD_BL1	13	14	NC	/
LCD control button	EXT_KEY	15	16	NC	/
A reserved pin for connection to MCU	EXT_MCU_ADC	17	18	NC	/
A reserved pin for	EXT_MCU_TXD	19	20	NC	/

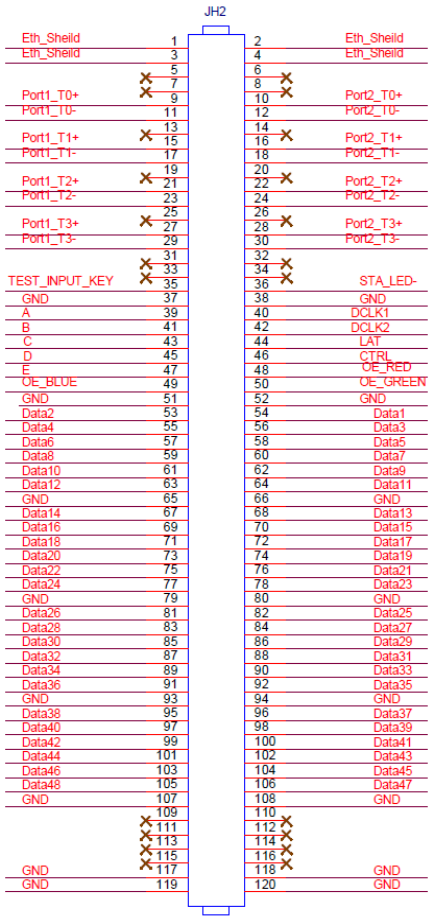
JH1					
connection to MCU					
/	GND	21	22	NC	/
/	NC	23	24	NC	/
/	GND	25	26	GND	/
/	G17	27	28	R17	/
/	R18	29	30	B17	/
/	B18	31	32	G18	/
/	G19	33	34	R19	/
/	R20	35	36	B19	/
/	B20	37	38	G20	/
/	GND	39	40	GND	/
/	G21	41	42	R21	/
/	R22	43	44	B21	/
/	B22	45	46	G22	/
/	G23	47	48	R23	/
/	R24	49	50	B23	/
/	B24	51	52	G24	/
/	GND	53	54	GND	/
/	G25	55	56	R25	/
/	R26	57	58	B25	/
/	B26	59	60	G26	/
/	G27	61	62	R27	/
/	R28	63	64	B27	/
/	B28	65	66	G28	/
/	GND	67	68	GND	/
/	G29	69	70	R29	/
/	R30	71	72	B29	/
/	B30	73	74	G30	/
/	G31	75	76	R31	/
/	R32	77	78	B31	/

JH1					
/	B32	79	80	G32	/
/	GND	81	82	GND	/
/	RFU4	83	84	RFU3	/
/	RFU6	85	86	RFU5	/
/	RFU8	87	88	RFU7	/
/	RFU10	89	90	RFU9	/
/	RFU12	91	92	RFU11	/
/	RFU14	93	94	RFU13	/
/	GND	95	96	GND	/
/	RFU16	97	98	RFU15	/
/	RFU18	99	100	RFU17	/
/	NC	101	102	NC	/
/	NC	103	104	NC	/
/	NC	105	106	NC	/
/	NC	107	108	NC	/
/	GND	109	110	GND	/
/	GND	111	112	GND	/
/	NC	113	114	NC	/
/	EXT_5V	115	116	EXT_5V	/
/	EXT_5V	117	118	EXT_5V	/
/	EXT_5V	119	120	EXT_5V	/
JH2					
Chassis ground	Eth_Sheild	1	2	Eth_Sheild	Chassis ground
Chassis ground	Eth_Sheild	3	4	Eth_Sheild	Chassis ground
/	NC	5	6	NC	/
/	NC	7	8	NC	/
Gigabit Ethernet port	Port1_T0+	9	10	Port2_T0+	Gigabit Ethernet port
	Port1_T0-	11	12	Port2_T0-	
	NC	13	14	NC	
	Port1_T1+	15	16	Port2_T1+	

JH1					
	Port1_T1-	17	18	Port2_T1-	
	NC	19	20	NC	
	Port1_T2+	21	22	Port2_T2+	
	Port1_T2-	23	24	Port2_T2-	
	NC	25	26	NC	
	Port1_T3+	27	28	Port2_T3+	
	Port1_T3-	29	30	Port2_T3-	
/	NC	31	32	NC	/
/	NC	33	34	NC	/
Test button	TEST_INPUT_KEY	35	36	STA_LED-	Running indicator (active low)
/	GND	37	38	GND	/
Line decoding signal	A	39	40	DCLK1	Shift clock output 1
Line decoding signal	B	41	42	DCLK2	Shift clock output 2
Line decoding signal	C	43	44	LAT	Latch signal output
Line decoding signal	D	45	46	CTRL	Afterglow control signal
Line decoding signal	E	47	48	OE_RED	Display enable signal
Display enable signal	OE_BLUE	49	50	OE_GREEN	Display enable signal
/	GND	51	52	GND	/
/	G1	53	54	R1	/
/	R2	55	56	B1	/
/	B2	57	58	G2	/
/	G3	59	60	R3	/
/	R4	61	62	B3	/
/	B4	63	64	G4	/
/	GND	65	66	GND	/
/	G5	67	68	R5	/
/	R6	69	70	B5	/
/	B6	71	72	G6	/
/	G7	73	74	R7	/

JH1					
/	R8	75	76	B7	/
/	B8	77	78	G8	/
/	GND	79	80	GND	/
/	G9	81	82	R9	/
/	R10	83	84	B9	/
/	B10	85	86	G10	/
/	G11	87	88	R11	/
/	R12	89	90	B11	/
/	B12	91	92	G12	/
/	GND	93	94	GND	/
/	G13	95	96	R13	/
/	R14	97	98	B13	/
/	B14	99	100	G14	/
/	G15	101	102	R15	/
/	R16	103	104	B15	/
/	B16	105	106	G16	/
/	GND	107	108	GND	/
/	NC	109	110	NC	/
/	NC	111	112	NC	/
/	NC	113	114	NC	/
/	NC	115	116	NC	/
/	GND	117	118	GND	/
/	GND	119	120	GND	/

64 Groups of Serial Data



JH1					
/	GND	1	2	GND	/
LCD CS signal	EXT_CS#RW	3	4	NC	/
LCD RS signal	EXT_LCD_CD/RS	5	6	NC	/
LCD clock signal	EXT_LCD_SCL/DB0	7	8	NC	/
LCD data signal	EXT_LCD_SDA/DB1	9	10	NC	/
LCD backlight signal 1	EXT_LCD_BL0	11	12	NC	/
LCD backlight signal 2	EXT_LCD_BL1	13	14	NC	/
LCD control button	EXT_KEY	15	16	NC	/
A reserved pin for connection to MCU	EXT_MCU_ADC	17	18	NC	/
A reserved pin for connection to MCU	EXT_MCU_TXD	19	20	NC	/
/	GND	21	22	NC	/

JH1					
/	NC	23	24	NC	/
/	GND	25	26	GND	/
/	Data50	27	28	Data49	/
/	Data52	29	30	Data51	/
/	Data54	31	32	Data53	/
/	Data56	33	34	Data55	/
/	Data58	35	36	Data57	/
/	Data60	37	38	Data59	/
/	GND	39	40	GND	/
/	Data62	41	42	Data61	/
/	Data64	43	44	Data63	/
/	NC	45	46	NC	/
/	NC	47	48	NC	/
/	NC	49	50	NC	/
/	NC	51	52	NC	/
/	GND	53	54	GND	/
/	NC	55	56	NC	/
/	NC	57	58	NC	/
/	NC	59	60	NC	/
/	NC	61	62	NC	/
/	NC	63	64	NC	/
/	NC	65	66	NC	/
/	GND	67	68	GND	/
/	NC	69	70	NC	/
/	NC	71	72	NC	/
/	NC	73	74	NC	/
/	NC	75	76	NC	/
/	NC	77	78	NC	/
/	NC	79	80	NC	/
/	GND	81	82	GND	/

JH1					
/	RFU4	83	84	RFU3	/
/	RFU6	85	86	RFU5	/
/	RFU8	87	88	RFU7	/
/	RFU10	89	90	RFU9	/
/	RFU12	91	92	RFU11	/
/	RFU14	93	94	RFU13	/
/	GND	95	96	GND	/
/	RFU16	97	98	RFU15	/
/	RFU18	99	100	RFU17	/
/	NC	101	102	NC	/
/	NC	103	104	NC	/
/	NC	105	106	NC	/
/	NC	107	108	NC	/
/	GND	109	110	GND	/
/	GND	111	112	GND	/
/	NC	113	114	NC	/
/	EXT_5V	115	116	EXT_5V	/
/	EXT_5V	117	118	EXT_5V	/
/	EXT_5V	119	120	EXT_5V	/
JH2					
Chassis ground	Eth_Sheild	1	2	Eth_Sheild	Chassis ground
Chassis ground	Eth_Sheild	3	4	Eth_Sheild	Chassis ground
/	NC	5	6	NC	/
/	NC	7	8	NC	/
Gigabit Ethernet port	Port1_T0+	9	10	Port2_T0+	Gigabit Ethernet port
	Port1_T0-	11	12	Port2_T0-	
	NC	13	14	NC	
	Port1_T1+	15	16	Port2_T1+	
	Port1_T1-	17	18	Port2_T1-	
	NC	19	20	NC	

JH1					
	Port1_T2+	21	22	Port2_T2+	
	Port1_T2-	23	24	Port2_T2-	
	NC	25	26	NC	
	Port1_T3+	27	28	Port2_T3+	
	Port1_T3-	29	30	Port2_T3-	
/	NC	31	32	NC	/
/	NC	33	34	NC	/
Test button	TEST_INPUT_KEY	35	36	STA_LED-	Running indicator (active low)
/	GND	37	38	GND	/
Line decoding signal	A	39	40	DCLK1	Shift clock output 1
Line decoding signal	B	41	42	DCLK2	Shift clock output 2
Line decoding signal	C	43	44	LAT	Latch signal output
Line decoding signal	D	45	46	CTRL	Afterglow control signal
Line decoding signal	E	47	48	OE_RED	Display enable signal
Display enable signal	OE_BLUE	49	50	OE_GREEN	Display enable signal
/	GND	51	52	GND	/
/	Data2	53	54	Data1	/
/	Data4	55	56	Data3	/
/	Data6	57	58	Data5	/
/	Data8	59	60	Data7	/
/	Data10	61	62	Data9	/
/	Data12	63	64	Data11	/
/	GND	65	66	GND	/
/	Data14	67	68	Data13	/
/	Data16	69	70	Data15	/
/	Data18	71	72	Data17	/
/	Data20	73	74	Data19	/
/	Data22	75	76	Data21	/
/	Data24	77	78	Data23	/

JH1					
/	GND	79	80	GND	/
/	Data26	81	82	Data25	/
/	Data28	83	84	Data27	/
/	Data30	85	86	Data29	/
/	Data32	87	88	Data31	/
/	Data34	89	90	Data33	/
/	Data36	91	92	Data35	/
/	GND	93	94	GND	/
/	Data38	95	96	Data37	/
/	Data40	97	98	Data39	/
/	Data42	99	100	Data41	/
/	Data44	101	102	Data43	/
/	Data46	103	104	Data45	/
/	Data48	105	106	Data47	/
/	GND	107	108	GND	/
/	NC	109	110	NC	/
/	NC	111	112	NC	/
/	NC	113	114	NC	/
/	NC	115	116	NC	/
/	GND	117	118	GND	/
/	GND	119	120	GND	/

Note

The recommended power input is 5.0 V.

OE_RED, OE_GREEN and OE_BLUE are display enable signals. When RGB are not controlled separately, use OE_RED. When the PWM chip is used, they are used as GCLK signals.

In the mode of 128 groups of serial data, Data65–Data128 are multiplexed into Data1–Data64, respectively.

Reference Design for Extended Functions

Pins for Extended Functions			
Pin	Recommended Smart Module Pin	Recommended Module Flash Pin	Description
RFU3	HUB_CODE0	HUB_CODE0	Flash control pin 1
RFU4	HUB_SPI_CLK	HUB_SPI_CLK	Clock signal of serial pin
RFU5	HUB_CODE1	HUB_CODE1	Flash control pin 2
RFU6	HUB_SPI_CS	HUB_SPI_CS	CS signal of serial pin
RFU7	HUB_CODE2	HUB_CODE2	Flash control pin 3
RFU8	/	HUB_SPI_MOSI	Module Flash data storage input
	HUB_UART_TX	/	Smart module TX signal
RFU9	HUB_CODE3	HUB_CODE3	Flash control pin 4
RFU10	/	HUB_SPI_MISO	Module Flash data storage output
	HUB_UART_RX	/	Smart module RX signal
RFU11	HUB_H164_CSD	HUB_H164_CSD	74HC164 data signal
RFU12	/	/	/
RFU13	HUB_H164_CLK	HUB_H164_CLK	74HC164 clock signal
RFU14	POWER_STA1	POWER_STA1	Dual power supply detection signal 1
RFU15	MS_DATA	MS_DATA	Dual card backup connection signal
RFU16	POWER_STA2	POWER_STA2	Dual power supply detection signal 2
RFU17	MS_ID	MS_ID	Dual card backup identifier signal
RFU18	HUB_CODE4	HUB_CODE4	Flash control pin 5

Note

The RFU8 and RFU10 are signal multiplex extension pins. Only one pin from either the Recommended Smart Module Pin or the Recommended Module Flash Pin can be selected at the same time.

For hub design, please contact NovaStar for detailed reference designs.

Specifications

Maximum Resolution	• For PWM driver ICs, the maximum load capacity per card is: – 512×384@60Hz (For 8bit video sources) – 512×256@60Hz (For 10bit and 12bit video sources) • For common driver ICs, the maximum load capacity per card is: – 384×384@60Hz (For 8bit video sources) – 384×256@60Hz (For 10bit and 12bit video sources)	
Electrical Parameters	Input voltage	DC 3.8 V to 5.5 V
	Rated current	0.6 A
	Rated power consumption	3.0 W
	Anti-static protection	2 kV
Operating Environment	Temperature	–20°C to +70°C
	Humidity	10% RH to 90% RH, non-condensing
Storage Environment	Temperature	–40°C to +85°C
	Humidity	0% RH to 95% RH, non-condensing
Physical Specifications	Dimensions	70.0 mm × 45.0 mm × 8.1 mm
	Net weight	18.7 g Note: It is the weight of a single receiving card only.
Packing Information	Packaging	Each receiving card is packaged in a blister pack. Each packing box contains 80 receiving cards.
	Packing box	392.0 mm × 200.0 mm × 123.0 mm

The amount of current and power consumption may vary depending on various factors such as product settings, usage, and environment.

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