AT32

Receiving Card

Specifications

Change History

Document Version	Release Date	Description
V1.3.2	2025-05-20	• Added support for multi-batch adjustment. • Added an installation diagram. • Added details about static protection. • Updated the load capacity information. • Updated the description for uploading coefficients. • Updated the dimensions diagram. • Updated the storage environment temperature range.
V1.3.1	2023-12-30	Updated product feature descriptions.
V1.3.0	2022-11-01	Updated the appearance diagram.
V1.2.1	2022-08-31	Updated the input voltage.
V1.2.0	2022-04-24	Updated the top-view diagram.

Introduction

The AT32 is a general small-size general receiving card developed by NovaStar Tech Co., Ltd. (hereinafter referred to as NovaStar). Supporting various functions such as Pixel Level Brightness and Chroma Calibration, Quick Adjustment of Dark or Bright Lines, Multi-batch Adjustment, 3D, Individual Gamma Adjustment for RGB, and 90° Image Rotation, the AT32 can significantly improve the display effect and user experience.

The AT32 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 AT32 has improved electromagnetic compatibility and is suitable for various on-site setups.

For PWM driver ICs, the maximum load capacity per card is:

- 512×384@60Hz (For 8bit video sources)

- 512×192@60Hz (For 10bit and 12bit video sources)

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

- 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.

- Multi-batch Adjustment

  Adjust the brightness of cabinets or modules to minimize display discrepancies caused by variations in production batches.

- 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°).

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 1.0

  The cabinets can display the receiving card number and Ethernet port information, allowing users to easily obtain the 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.

- LVDS Transmission (dedicated firmware required)

  Low-voltage differential signaling (LVDS) transmission is used to reduce the number of data cables from the hub board to module, increasing the transmission distance and improving the signal transmission quality.

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 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.

Appearance

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

Indicator
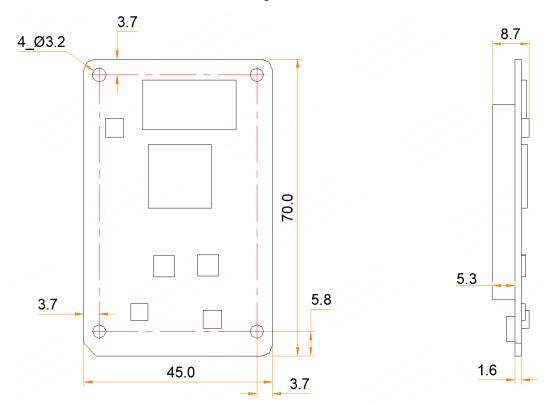
Indicators	Color	Status	Description
Running indicator	Green	Flashing once every 1s	The receiving card is functioning normally. Ethernet cable connection is normal, and video source input is available.
		Flashing once every 3s	Ethernet cable connection is abnormal.
		Flashing 3 times every 0.5s	Ethernet 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	A redundancy switchover occurred on the Ethernet

Indicators	Color	Status	Description
		every 0.5s	port and the loop backup has taken effect.
Power indicator	Red	Always on	The power input is normal.

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 9.5 mm. Ground connection (GND) is enabled for mounting holes.

Tolerance: ±0.3 Unit: mm

📄 Note
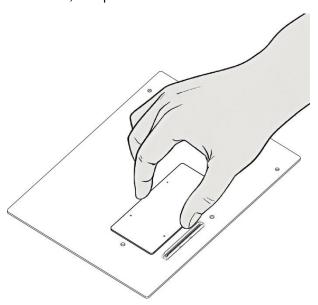
The distance between outer surfaces of the product and hub boards after their high–density connectors fit together is 8.0mm. An 8.0mm copper pillar is recommended.

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 RGB Data

JH1						JH2					
Ground	GND	1	2	GND	Ground	Ground	GND	1	2	GND	Ground
/	G15	3	4	R15	/	Gigabit Ethernet port	Port1_T0+	3	4	Port2_T0+	Gigabit Ethernet port
/	R16	5	6	B15	/		Port1_T0-	5	6	Port2_T0-	
/	B16	7	8	G16	/		Port1_T1+	7	8	Port2_T1+	
/	G17	9	10	R17	/		Port1_T1-	9	10	Port2_T1-	
/	R18	11	12	B17	/		Port1_T2+	11	12	Port2_T2+	
/	B18	13	14	G18	/		Port1_T2-	13	14	Port2_T2-	
/	G19	15	16	R19	/		Port1_T3+	15	16	Port2_T3+	
/	R20	17	18	B19	/		Port1_T3-	17	18	Port2_T3-	
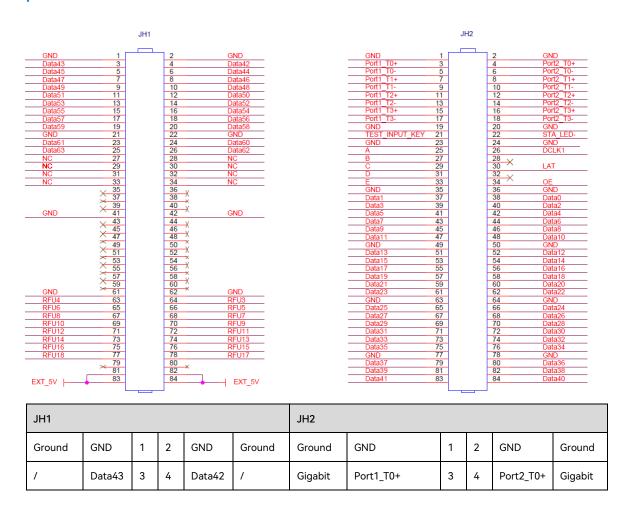
JH1						JH2					
/	B20	19	20	G20	/	Ground	GND	19	20	GND	Ground
Ground	GND	21	22	GND	Ground	Test button	TEST_INPUT_KEY	21	22	STA_LED–	Running indicator
/	G21	23	24	R21	/	Ground	GND	23	24	GND	Ground
/	R22	25	26	B21	/	Line decoding signal	A	25	26	DCLK1	Shift clock
/	B22	27	28	G22	/		B	27	28	DCLK2	Shift clock
/	G23	29	30	R23	/		C	29	30	LAT	Latch signal
/	R24	31	32	B23	/		D	31	32	CTRL	Afterglow control signal
/	B24	33	34	G24	/		E	33	34	OE	Display enable
/	G25	35	36	R25	/	Ground	GND	35	36	GND	Ground
/	R26	37	38	B25	/	/	G1	37	38	R1	/
/	B26	39	40	G26	/	/	R2	39	40	B1	/
Ground	GND	41	42	GND	Ground	/	B2	41	42	G2	/
/	G27	43	44	R27	/	/	G3	43	44	R3	/
/	R28	45	46	B27	/	/	R4	45	46	B3	/
/	B28	47	48	G28	/	/	B4	47	48	G4	/
/	G29	49	50	R29	/	Ground	GND	49	50	GND	Ground
/	R30	51	52	B29	/	/	G5	51	52	R5	/
/	B30	53	54	G30	/	/	R6	53	54	B5	/
/	G31	55	56	R31	/	/	B6	55	56	G6	/
/	R32	57	58	B31	/	/	G7	57	58	R7	/
/	B32	59	60	G32	/	/	R8	59	60	B7	/
Ground	GND	61	62	GND	Ground	/	B8	61	62	G8	/
Reserved	RFU4	63	64	RFU3	Reserved	Ground	GND	63	64	GND	Ground
	RFU6	65	66	RFU5		/	G9	65	66	R9	/
	RFU8	67	68	RFU7		/	R10	67	68	B9	/

JH1						JH2					
	RFU10	69	70	RFU9		/	B10	69	70	G10	/
	RFU12	71	72	RFU11		/	G11	71	72	R11	/
	RFU14	73	74	RFU13		/	R12	73	74	B11	/
	RFU16	75	76	RFU15		/	B12	75	76	G12	/
	RFU18	77	78	RFU17		Ground	GND	77	78	GND	Ground
/	NC	79	80	NC	/	/	G13	79	80	R13	/
5V	EXT_5V	81	82	EXT_5V	5V	/	R14	81	82	B13	/
	EXT_5V	83	84	EXT_5V		/	B14	83	84	G14	/

64 Groups of Serial Data

JH1						JH2					
Ground	GND	1	2	GND	Ground	Ground	GND	1	2	GND	Ground
/	Data43	3	4	Data42	/	Gigabit	Port1_T0+	3	4	Port2_T0+	Gigabit

JH1						JH2					
/	Data45	5	6	Data44	/	Ethernet port	Port1_T0–	5	6	Port2_T0–	Ethernet port
/	Data47	7	8	Data46	/		Port1_T1+	7	8	Port2_T1+	
/	Data49	9	10	Data48	/		Port1_T1–	9	10	Port2_T1–	
/	Data51	11	12	Data50	/		Port1_T2+	11	12	Port2_T2+	
/	Data53	13	14	Data52	/		Port1_T2–	13	14	Port2_T2–	
/	Data55	15	16	Data54	/		Port1_T3+	15	16	Port2_T3+	
/	Data57	17	18	Data56	/		Port1_T3–	17	18	Port2_T3–	
/	Data59	19	20	Data58	/	Ground	GND	19	20	GND	Ground
Ground	GND	21	22	GND	Ground	Test button	TEST_INPUT_KEY	21	22	STA_LED–	Running indicator
/	Data61	23	24	Data60	/	Ground	GND	23	24	GND	Ground
/	Data63	25	26	Data62	/	Line decoding signal	A	25	26	DCLK1	Shift clock
/	NC	27	28	NC	/		B	27	28	NC	/
/	NC	29	30	NC	/		C	29	30	LAT	Latch signal
/	NC	31	32	NC	/		D	31	32	NC	/
/	NC	33	34	NC	/		E	33	34	OE	Display enable
/	NC	35	36	NC	/	Ground	GND	35	36	GND	Ground
/	NC	37	38	NC	/	/	Data1	37	38	Data0	/
/	NC	39	40	NC	/	/	Data3	39	40	Data2	/
Ground	GND	41	42	GND	Ground	/	Data5	41	42	Data4	/
/	NC	43	44	NC	/	/	Data7	43	44	Data6	/
/	NC	45	46	NC	/	/	Data9	45	46	Data8	/
/	NC	47	48	NC	/	/	Data11	47	48	Data10	/
/	NC	49	50	NC	/	Ground	GND	49	50	GND	Ground
/	NC	51	52	NC	/	/	Data13	51	52	Data12	/
/	NC	53	54	NC	/	/	Data15	53	54	Data14	/
/	NC	55	56	NC	/	/	Data17	55	56	Data16	/
/	NC	57	58	NC	/	/	Data19	57	58	Data18	/
/	NC	59	60	NC	/	/	Data21	59	60	Data20	/
Ground	GND	61	62	GND	Ground	/	Data23	61	62	Data22	/

JH1						JH2						
Reserved	RFU4	63	64	RFU3	Reserved	Ground	GND	63	64	GND	Ground
	RFU6	65	66	RFU5		/	Data25	65	66	Data24	/
	RFU8	67	68	RFU7		/	Data27	67	68	Data26	/
	RFU10	69	70	RFU9		/	Data29	69	70	Data28	/
	RFU12	71	72	RFU11		/	Data31	71	72	Data30	/
	RFU14	73	74	RFU13		/	Data33	73	74	Data32	/
	RFU16	75	76	RFU15		/	Data35	75	76	Data34	/
	RFU18	77	78	RFU17		Ground	GND	77	78	GND	Ground
/	NC	79	80	NC	/	/	Data37	79	80	Data36	/
5V	EXT_5V	81	82	EXT_5V	5V	/	Data39	81	82	Data38	/
	EXT_5V	83	84	EXT_5V		/	Data41	83	84	Data40	/

Reference Design for Extended Functions

Pins for Extended Functions			
Pin	Recommended Module Flash Pin	Recommended Smart Module Pin	Description
RFU4	HUB_SPI_CLK	(Reserved)	Clock signal of serial pin
RFU6	HUB_SPI_CS	Reserved	CS signal of serial pin
RFU8	HUB_SPI_MOSI	/	Module flash data storage input
	/	HUB_UART_TX	Smart module TX signal
RFU10	HUB_SPI_MISO	/	Module flash data storage output
	/	HUB_UART_RX	Smart module RX signal
RFU3	HUB_CODE0		Module Flash BUS control pin
RFU5	HUB_CODE1		
RFU7	HUB_CODE2		
RFU9	HUB_CODE3		
RFU14	POWER_STA1		Dual power supply detection signal
RFU16	POWER_STA2		

Pins for Extended Functions		
RFU15	MS_DATA	Dual card backup connection signal
RFU17	MS_ID	Dual card backup identifier signal

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.

Specifications

Maximum Resolution	For PWM driver ICs, the maximum load capacity per card is: • 512×384@60Hz (For 8bit video sources) • 512×192@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 × 8.7 mm
	Net weight	16.5 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	378.0 mm × 190.0 mm × 120.0 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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