AT30

Receiving Card

V1.0.2 NS110100981

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Specifications

Change History

Document Version	Firmware Version	Release Date	Description
V1.0.2	V4.6.0.0	2020-01-03	• Optimized the document content. • Changed the pin diagram.
V1.0.1	V4.6.0.0	2019-10-29	Increased the version number only.
V1.0.0	V4.6.0.0	2019-09-27	First release

Introduction

The AT30 is a general small receiving card developed by NovaStar. A single AT30 loads up to 512×256 pixels. With various functions such as pixel level brightness and chroma calibration, individual Gamma adjustment for RGB and 3D function, the AT30 can greatly improve the display effect and user experience.

The AT30 uses high-density connectors for communication to limit effects of dust and vibration, resulting in high stability and reliability. It supports up to 32 groups of parallel RGB data or 64 groups of serial data (extendable 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 AT30 has improved electromagnetic compatibility and is suitable to many applications.

Features

Improvements to Display Effect

- Pixel level brightness and chroma calibration
  Working with NovaLCT and NovaCLB, the receiving card supports brightness and chroma calibration on each LED, which can effectively remove color discrepancies and greatly improve LED display brightness and chroma consistency, allowing for better image quality.
- Quick seam correction
  Working with NovaLCT, the receiving card supports quick adjustment of bright or dark lines caused by splicing of cabinets and modules. This function is easy to use and the adjustment takes effect immediately.
- 3D function
  Working with the independent controller which supports 3D function, users can enable the 3D function in NovaLCT or on operation panel of the controller, and set 3D parameters to allow for 3D display effects.
- Individual Gamma adjustment for RGB
  Working with NovaLCT (V5.2.0 or later) and the independent controller which supports this function, the receiving card supports individual adjustment of red Gamma, green Gamma and blue Gamma, which can effectively control image non-uniformity under low grayscale and white balance offset, allowing for a more realistic image.
- Image rotation in 90° increments
  In NovaLCT, the display image can be set to rotate in multiples of 90° (0°, 90°, 180° and 270°).

Improvements to Maintainability

- Smart module (supported by dedicated firmware)
  The smart module is composed of Flash and MCU.

  Flash can store calibration coefficients and module parameters. MCU can communicate with the receiving card to monitor temperature, voltage and ribbon cable communication status at the module level. Working with the driver chip, MCU also supports LED error detection.

  The smart module allows for a smaller monitoring unit, requiring no independent monitoring card and saving cabinet space.
- Automatic module calibration
  After the module (with module Flash) has been replaced and power is supplied, the receiving card can automatically read the new module ID and calibration coefficients, and save them to the receiving card.
- Module Flash management
  Module Flash information can be managed in NovaLCT. The module ID can be managed, and calibration coefficients and module parameters can be stored in the module Flash.
- One-click application of calibration coefficients saved in module Flash
  In the event of network outage, users can hold down the self-test button to read the calibration

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coefficients in module Flash back to the receiving card.

- Mapping function
  After the Mapping function is enabled in NovaLCT, target cabinet will display the receiving card number and Ethernet port information, allowing users to easily obtain the location and wiring route of receiving cards.
- Setting of pre-stored image on receiving card
  In NovaLCT, a specified image can be set as the LED screen startup image or as the image to be displayed on LED screen when the Ethernet cable is disconnected or no video signal is available.
- Voltage and temperature monitoring
  The voltage and temperature of the receiving card can be monitored without using peripherals. The monitoring data can be checked in NovaLCT.
- Cabinet LCD
  The receiving card supports LCD of cabinet. The LCD can display temperature, voltage, single operating time and total operating time of the receiving card.
- Bit error rate monitoring
  The receiving card can work with NovaLCT (V5.2.0 or later) to monitor the network communication quality between sending device and receiving card, or between receiving cards, and record the number of errors to help troubleshoot network communication problems.
- Readback of firmware program
  In NovaLCT (V5.2.0 or later), the receiving card firmware program can be read back and saved to local computer.
- Readback of configuration parameters
  In NovaLCT, the receiving card configuration parameters can be read back and saved to local computer.

Improvements to Reliability

- Dual-card backup and status monitoring
  In an environment with requirements for high reliability, two receiving cards can be mounted onto a single HUB board. In the case that main receiving card fails, the backup card will serve to ensure uninterrupted operation of the display.

  The working status of main and backup receiving cards can be monitored in NovaLCT (V5.2.0 or later).
- Status monitoring of dual power supplies
  The receiving card supports dual power supplies and can detect whether their working statuses are normal.
- Loop backup
  The receiving card can improve the reliability for cascading of receiving cards through main and backup redundant mechanism. If either main or backup cascading lines fail, the other will begin to work to ensure uninterrupted operation of the display.
- Dual backup of configuration parameters
  Two copies of receiving card configuration parameters can be saved in receiving card via NovaLCT and one copy serves as backup.
- Dual backup of program
  Two copies of application programs are saved in the receiving card at the factory to avoid the problem that the receiving card may get stuck due to program update exception.

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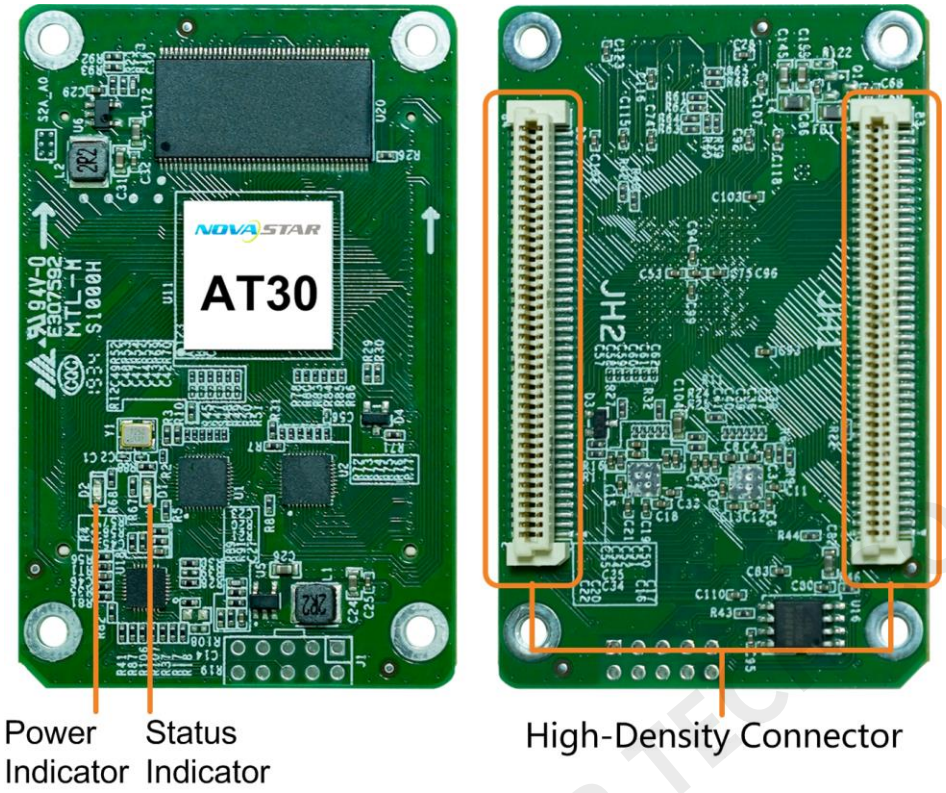
Appearance



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

Indicator Status

Indicator	Status	Description
Status indicator (Green)	Flashing every other 1s	Receiving card is functioning normally. Ethernet cable connection is normal, and video source input is available.
	Flashing every other 3s	Receiving card is functioning normally, but Ethernet cable connection is abnormal.
	Flashing 3 times every other 1s	Receiving card is functioning normally. Ethernet cable connection is normal, but no video source input is available.
	Flashing every other 0.2s	Program loading fails in normal operating state, currently loading backup operating program.
	Flashing 8 times every other 1s	Sending card's backup Ethernet port is now active. Receiving card is functioning normally.
Power indicator (Red)	Always on	It is always on after the power is supplied.

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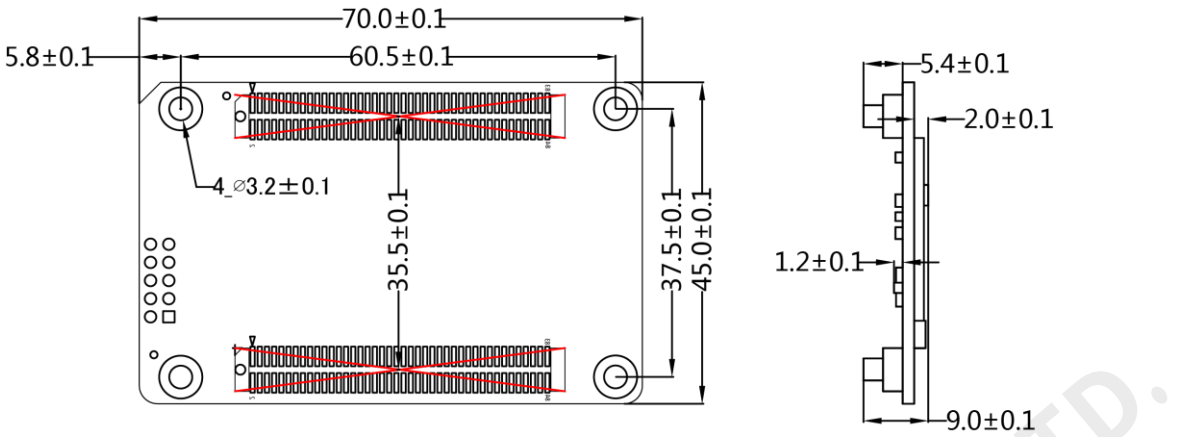
Dimensions



Unit: mm

Note:

The distance between outer surfaces of AT30 and HUB boards after their high-density connectors fit together is 8.0 mm. An 8-mm copper pillar is recommended.

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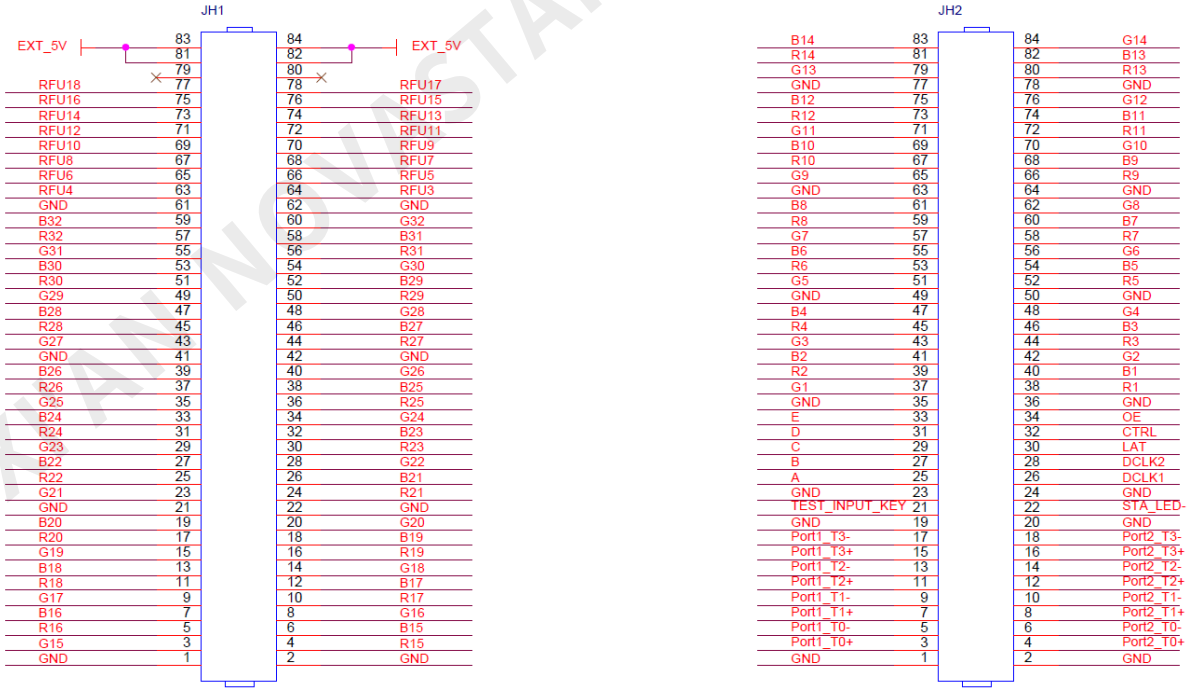
Pins

32 Groups of Parallel RGB Data



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

	RFU10	69	70	RFU9		/	B10	69	70	G10	/
	RFU8	67	68	RFU7		/	R10	67	68	B9	/
	RFU6	65	66	RFU5		/	G9	65	66	R9	/
	RFU4	63	64	RFU3		Ground	GND	63	64	GND	Ground
Ground	GND	61	62	GND	Ground	/	B8	61	62	G8	/
/	B32	59	60	G32	/	/	R8	59	60	B7	/
/	R32	57	58	B31	/	/	G7	57	58	R7	/
/	G31	55	56	R31	/	/	B6	55	56	G6	/
/	B30	53	54	G30	/	/	R6	53	54	B5	/
/	R30	51	52	B29	/	/	G5	51	52	R5	/
/	G29	49	50	R29	/	Ground	GND	49	50	GND	Ground
/	B28	47	48	G28	/	/	B4	47	48	G4	/
/	R28	45	46	B27	/	/	R4	45	46	B3	/
/	G27	43	44	R27	/	/	G3	43	44	R3	/
Ground	GND	41	42	GND	Ground	/	B2	41	42	G2	/
/	B26	39	40	G26	/	/	R2	39	40	B1	/
/	R26	37	38	B25	/	/	G1	37	38	R1	/
/	G25	35	36	R25	/	Ground	GND	35	36	GND	Ground
/	B24	33	34	G24	/	Line decoding signal	E/DCLK2	33	34	OE	Display enable
/	R24	31	32	B23	/		D	31	32	NC	/
/	G23	29	30	R23	/		C	29	30	LAT	Latch signal output
/	B22	27	28	G22	/		B	27	28	NC	/
/	R22	25	26	B21	/		A	25	26	DCLK1	Shift clock output
/	G21	23	24	R21	/	Ground	GND	23	24	GND	Ground
Ground	GND	21	22	GND	Ground	Test button	TEST_INPUT_KEY	21	22	STA_LED-	Status indicator
/	B20	19	20	G20	/	Ground	GND	19	20	GND	Ground
/	R20	17	18	B19	/	Gigabit Ethernet port	Port1_T3-	17	18	Port2_T3-	Gigabit Ethernet port
/	G19	15	16	R19	/		Port1_T3	15	16	Port2_T3+	
/	B18	13	14	G18	/		Port1_T2-	13	14	Port2_T2-	
/	R18	11	12	B17	/		Port1_T2	11	12	Port2_T2+	
/	G17	9	10	R17	/		Port1_T1-	9	10	Port2_T1-	
/	B16	7	8	G16	/		Port1_T1	7	8	Port2_T1+	
/	R16	5	6	B15	/		Port1_T0-	5	6	Port2_T0-	
/	G15	3	4	R15	/		Port1_T0	3	4	Port2_T0+	
Ground	GND	1	2	GND	Ground	Ground	GND	1	2	GND	Ground

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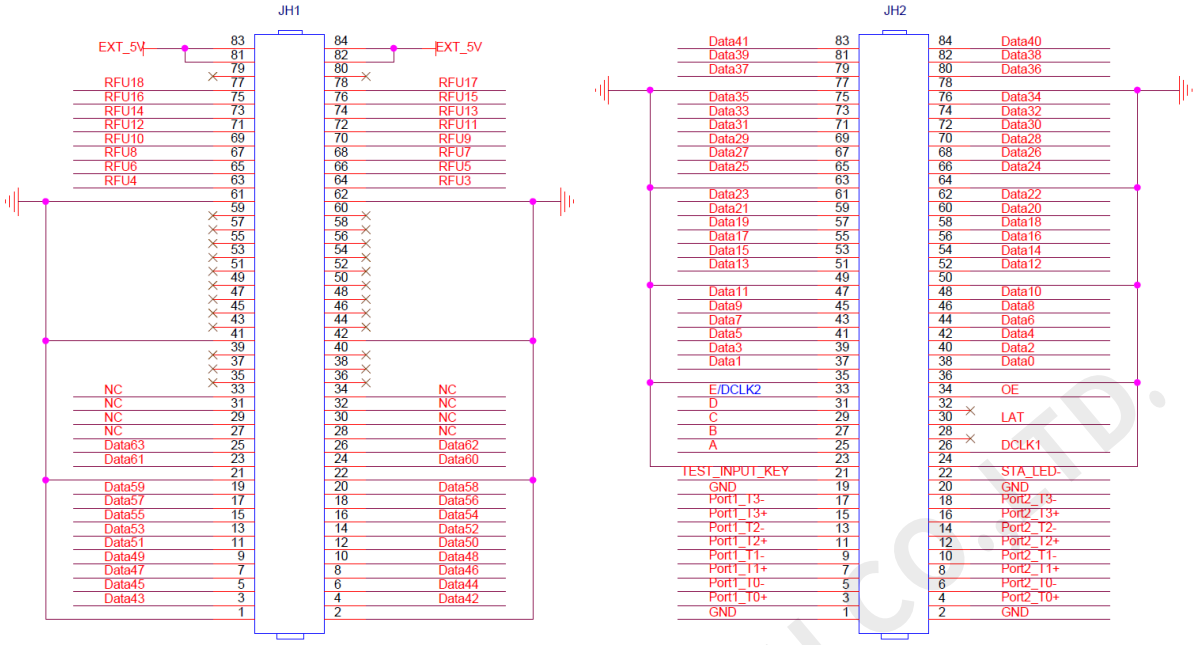
64 Groups of Serial Data



JH1						JH2					
5V	EXT_5V	83	84	EXT_5V	5V	/	Data41	83	84	Data	/
	EXT_5V	81	82	EXT_5V		/	Data39	81	82	Data	/
/	NC	79	80	NC	/	/	Data37	79	80	Data	/
Reserved pin	RFU18	77	78	RFU17	Reserved pin	Ground	GND	77	78	GND	Ground
	RFU16	75	76	RFU15		/	Data35	75	76	Data34	/
	RFU14	73	74	RFU13		/	Data33	73	74	Data32	/
	RFU12	71	72	RFU11		/	Data31	71	72	Data30	/
	RFU10	69	70	RFU9		/	Data29	69	70	Data28	/
	RFU8	67	68	RFU7		/	Data27	67	68	Data26	/
	RFU6	65	66	RFU5		/	Data25	65	66	Data24	/
	RFU4	63	64	RFU3		Ground	GND	63	64	GND	Ground
Ground	GND	61	62	GND	Ground	/	Data23	61	62	Data22	/
/	NC	59	60	NC	/	/	Data21	59	60	Data20	/
/	NC	57	58	NC	/	/	Data19	57	58	Data18	/
/	NC	55	56	NC	/	/	Data17	55	56	Data16	/
/	NC	53	54	NC	/	/	Data15	53	54	Data14	/
/	NC	51	52	NC	/	/	Data13	51	52	Data12	/
/	NC	49	50	NC	/	Ground	GND	49	50	GND	Ground
/	NC	47	48	NC	/	/	Data11	47	48	Data10	/
/	NC	45	46	NC	/	/	Data9	45	46	Data8	/
/	NC	43	44	NC	/	/	Data7	43	44	Data6	/
Ground	GND	41	42	GND	Ground	/	Data5	41	42	Data4	/
/	NC	39	40	NC	/	/	Data3	39	40	Data2	/
/	NC	37	38	NC	/	/	Data1	37	38	Data0	/
/	NC	35	36	NC	/	Ground	GND	35	36	GND	Ground
/	NC	33	34	NC	/	Line decoding signal	E/DCLK2	33	34	OE	Display enable
/	NC	31	32	NC	/		D	31	32	NC	/
/	NC	29	30	NC	/		C	29	30	LAT	Latch signal output

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/	NC	27	28	NC	/		B	27	28	NC	/
/	Data63	25	26	Data62	/		A	25	26	DCLK1	Shift clock
/	Data61	23	24	Data60	/	Ground	GND	23	24	GND	Ground
Ground	GND	21	22	GND	Ground	Test button	TEST_INPUT_KEY	21	22	STA_LED-	Status indicator
/	Data59	19	20	Data58	/	Ground	GND	19	20	GND	Ground
/	Data57	17	18	Data56	/	Gigabit Ethernet port	Port1_T3-	17	18	Port2_T3-	Gigabit Ethernet port
/	Data55	15	16	Data54	/		Port1_T3	15	16	Port2_T3+	
/	Data53	13	14	Data52	/		Port1_T2-	13	14	Port2_T2-	
/	Data51	11	12	Data50	/		Port1_T2	11	12	Port2_T2+	
/	Data49	9	10	Data48	/		Port1_T1-	9	10	Port2_T1-	
/	Data47	7	8	Data46	/		Port1_T1	7	8	Port2_T1+	
/	Data45	5	6	Data44	/		Port1_T0-	5	6	Port2_T0-	
/	Data43	3	4	Data42	/		Port1_T0	3	4	Port2_T0+	
Ground	GND	1	2	GND	Ground	Ground	GND	1	2	GND	Ground

Reference Design for Extended Functions

Description of 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 storage data input
	/	HUB_UART_TX	Smart module TX signal
RFU10	HUB_SPI_MISO	/	Module Flash storage data 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		
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.

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Specifications

Maximum Loading Capacity	512×256 pixels	
Electrical Specifications	Input voltage	DC 3.3 V–5.5 V
	Rated current	0.5 A
	Rated power consumption	2.5 W
Operating Environment	Temperature	-20°C to +70°C
	Humidity	10% RH to 90% RH, non-condensing
Storage Environment	Temperature	-25°C to +125°C
	Humidity	0% RH to 95% RH, non-condensing
Physical Specifications	Dimensions	70.0 mm × 45.0 mm × 9.0 mm
	Net weight	17.2 g
Packing Information	Packing specifications	An antistatic bag and anti-collision foam are provided for each receiving card. Each packing box contains 40 receiving cards.
	Packing box dimensions	378.0 mm × 190.0 mm × 120.0 mm
Certifications	RoHS, EMC Class B	

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