# BR462 Pro

LED Display Control Board



## Specifications

# Change History

| Document Version | Release Date | Description |
|---|---|---|
| V1.1.0 | 2026-09-29 | • Updated the load capacity description.<br>• Updated the feature description. |
| V1.0.1 | 2026-09-04 | Added certification. |
| V1.0.0 | 2026-07-03 | First release |

# Introduction

The BR462 Pro is an LED display control board developed by NovaStar Tech Co., Ltd. (hereinafter referred to as NovaStar). Built in with a power module, it can convert 90 Vac to 264 Vac input into DC power to directly drive the modules. Furthermore, the product offers functions such as undervoltage, overvoltage, overcurrent, overpower, and short-circuit protection, ensuring safety, high efficiency, and good reliability.

Supporting various functions such as Full-Grayscale Calibration, LED Image Booster, Thermal Compensation 2.0, HDR, Pixel Level Brightness and Chroma Calibration, Quick Adjustment of Dark or Bright Lines, Low Latency, 3D, Individual Gamma Adjustment for RGB and 90° Image Rotation, the product can significantly improve the display effect and user experience.

The product uses 4 floating connectors for communication, ensuring high stability. It supports up to 24 groups of parallel RGB data and is suitable for various on-site setups.

- For PWM driver ICs, the maximum load capacity per card when used with M3 controllers is:
  - 512×512@60Hz (For 8-bit video sources)
  - 512×384@60Hz (For 10-bit and 12-bit video sources)
- For common driver ICs, the maximum load capacity per board when used with M3 controllers is:
  - 512×384@60Hz (For 8-bit video sources)
  - 512×192@60Hz (For 10-bit and 12-bit video sources)

**Note**

- For PWM driver ICs, the maximum load capacity per card when used with COEX controllers is:
  - 512×512@60Hz (For 8-bit and 10-bit video sources)
  - 512×384@60Hz (For 12-bit video sources)

- For common driver ICs, the maximum load capacity per board when used with COEX controllers is:
  - 512×384@60Hz (For 8-bit and 10-bit video sources)
  - 512×192@60Hz (For 12-bit video sources)

# Certifications

RoHS

**If the product lacks the certifications required for sale in the destination country or region, please contact NovaStar promptly for confirmation or assistance. Otherwise, the customer shall bear any resulting legal risks and liabilities, and NovaStar reserves the right to seek compensation.**

# Features

- Smart Power Supply
  - Basic Power Supply Information Readback: Support reading back and displaying basic power supply information via NovaLCT.
  - Smart Voltage Adjustment: Support adjusting the main output voltage via NovaLCT, flexibly accommodating the power requirements of various LED modules and driver ICs to enhance compatibility.
  - Smart Sleep Settings: Support smart sleep for the display via NovaLCT, and automatic sleep mode upon video signal or network loss for the display, effectively reducing system power consumption.
- Power Module and Receiving Card in One Package

  The product supports input voltage of 90 Vac to 264 Vac and converts it to direct current to directly power the modules. Furthermore, it offers functions such as undervoltage, overvoltage, overcurrent, overpower, and short-circuit protection.
- Full-Grayscale Calibration

  Work with NovaStar's high-precision calibration system and scientific-grade camera to generate unique calibration coefficients for each grayscale, ensuring uniformity of each grayscale and significantly improving the image quality.
- LED 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 low-grayscale 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 more 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.

- Thermal Compensation 2.0

  Work with NovaStar's high-precision calibration system to precisely collect the thermal distribution data of LED cabinets and generate unique thermal compensation data for each pixel, effectively eliminating cabinet- or module-level cyan or red cross-hatch patterns caused by uneven thermal distribution.

- 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.

- Multi-batch Adjustment

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

- Low Latency

  The latency of the video source at the receiving card end can be reduced to 1 frame (only when using modules with driver ICs with built-in RAM).

- 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.

- 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 ribbon cable communication status, and LED error detection.

- Calibration Coefficient Management

  The calibration coefficients can be uploaded, read back, saved to hardware, and erased.

- 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 module Flash to the receiving card.

- Data Group Mapping

  Display the test pattern by data group to clearly show the position of each data group within the cabinet.

- 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.

- Temperature and Voltage Monitoring

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

- 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.

- Bit Error Detection

  Monitor the number of erroneous packets in the Ethernet data transmission of the receiving card to help troubleshoot network communication problems.

- Detection of Ethernet Cable Disconnections

  Monitor the number of times the Ethernet cable to the receiving card is disconnected, assisting in identifying potential communication link issues.

- 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.

- Dual NCP Backup

  The NCP file is stored in the application area and factory area of the receiving card at the same time. Typically, the NCP file in the application area is used. However, during a factory reset, the NCP file can be retrieved from the factory area.

- 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.

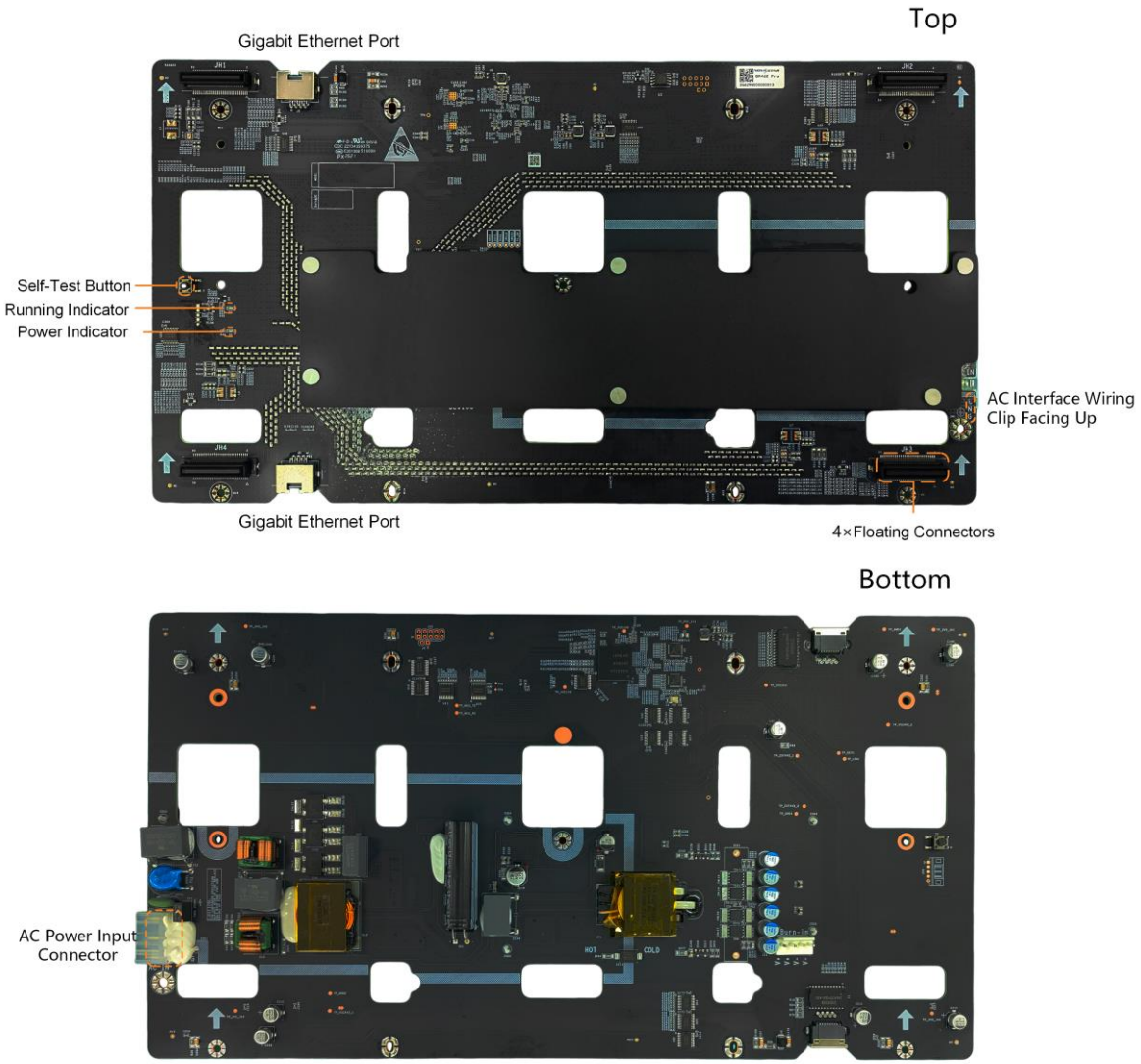
- Dual Backup of Configuration Parameters

  The receiving card configuration parameters are stored in both 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 the 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




Product images are for reference only. The actual product may vary.

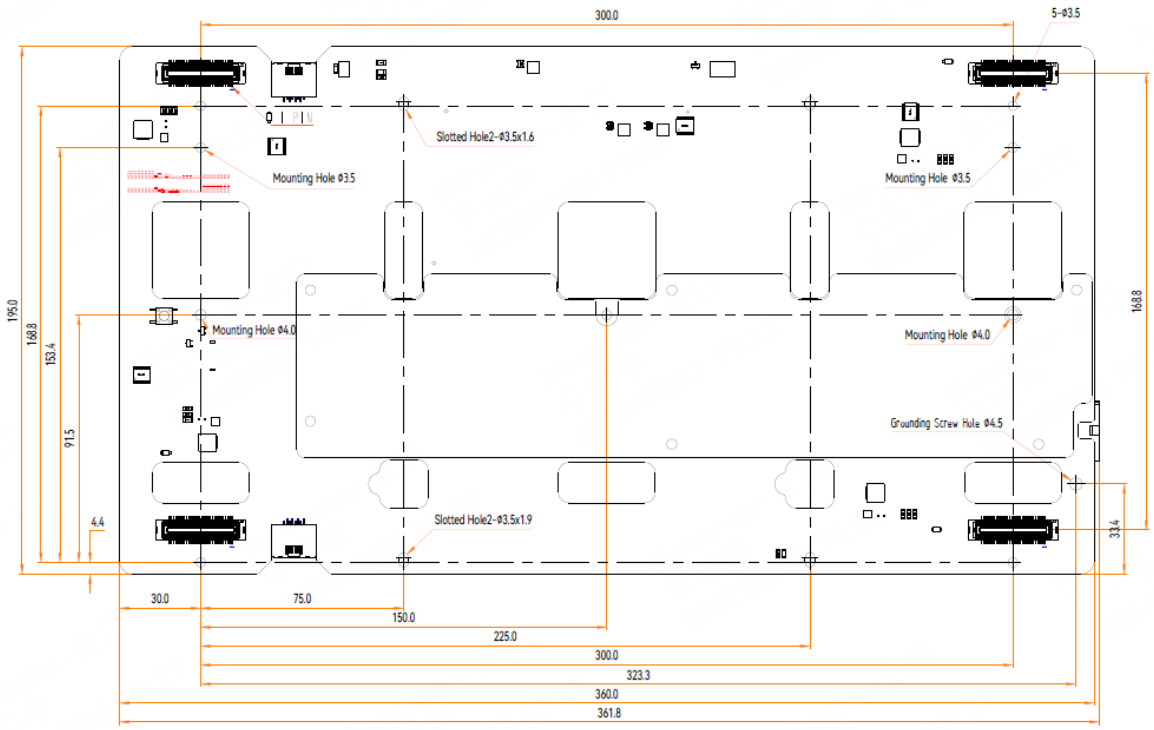
# Indicators

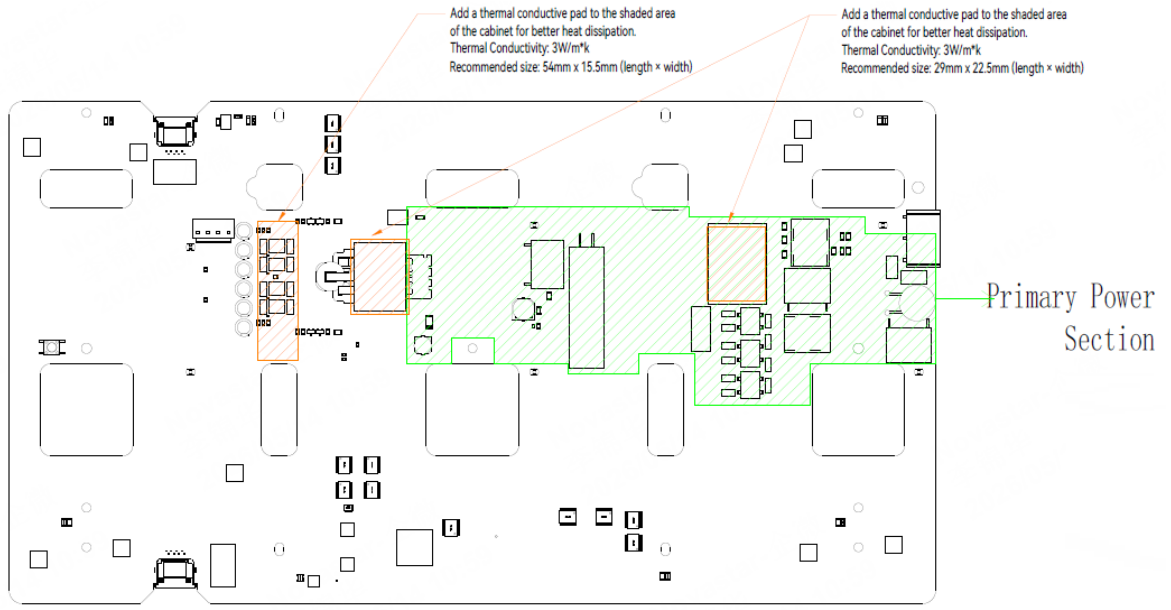
| Indicators | Color | Status | Description |
|---|---|---|---|
| Running indicator | Green | Flashing once every 1s | The receiving card is functioning normally. Ethernet cable connection is normal, and video source input is available. |
| | | Flashing once every 3s | Ethernet cable connection is abnormal. |
| | | Flashing 3 times | Ethernet cable connection is normal, but video source |

| Indicators | Color | Status | Description |
|---|---|---|---|
| | | every 0.5s | 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 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 25.0 mm.



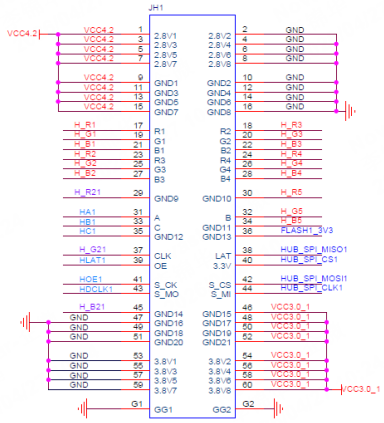


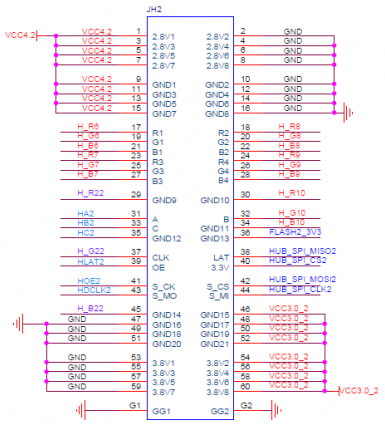

Tolerance: ±0.3 Unit: mm

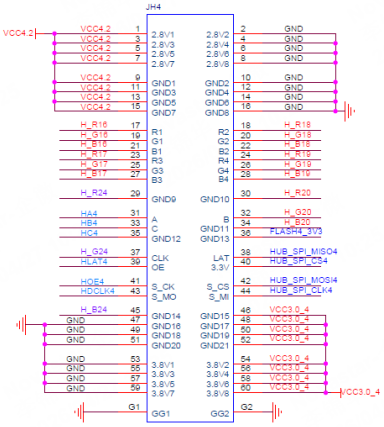
**Note**

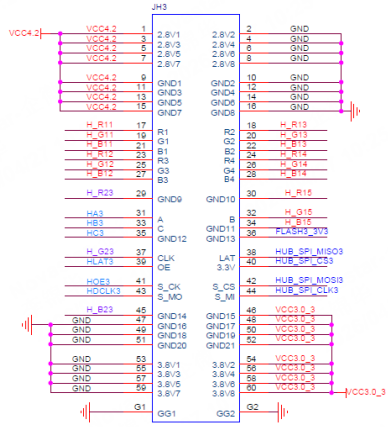
- For molding or installation cutouts, please contact NovaStar for a higher-precision structural drawing.
- The thermal conductive pad and silicone insulation pad are not included with the product. You will need to adhere them yourself according to the specified positions and sizes in the diagram. Attach the thermal conductive pad to the card, ensuring the thickness is appropriate for the available space in the cabinet and that it is compressed when in place. The silicone insulation pad should be adhered to the cabinet.
- The green shaded area in the diagram is the primary power section. Ensure a safety distance of at least 5 mm between this area and the metal conductor of the cabinet. If this distance is not met, add a silicone insulation pad for additional insulation. Design the silicone pad to extend more than 5 mm beyond the primary power section.
- For other areas, maintain a safety distance of at least 2 mm from the cabinet.
- The silicone pad should be 0.23 mm thick, with a voltage resistance of ≥ 4 kV AC and a thermal conductivity of ≥ 1.6 W/(m·K).

# Pins









| Pin Definitions (Taking JH1 as an example) | | | | | |
|---|---|---|---|---|---|
| / | VCC4.2 | 1 | 2 | GND | Ground |
| / | VCC4.2 | 3 | 4 | GND | |
| / | VCC4.2 | 5 | 6 | GND | |
| / | VCC4.2 | 7 | 8 | GND | |
| / | VCC4.2 | 9 | 10 | GND | |
| / | VCC4.2 | 11 | 12 | GND | |
| / | VCC4.2 | 13 | 14 | GND | |
| / | VCC4.2 | 15 | 16 | GND | |
| / | H_R1 | 17 | 18 | H_R3 | / |
| / | H_G1 | 19 | 20 | H_G3 | / |
| / | H_B1 | 21 | 22 | H_B3 | / |
| / | H_R2 | 23 | 24 | H_R4 | / |

| Pin Definitions (Taking JH1 as an example) | | | | | |
|---|---|---|---|---|---|
| / | H_G2 | 25 | 26 | H_G4 | / |
| / | H_B2 | 27 | 28 | H_B4 | / |
| / | H_R21 | 29 | 30 | H_R5 | / |
| Row decoding signal | HA1 | 31 | 32 | H_G5 | / |
| Row decoding signal | HB1 | 33 | 34 | H_B5 | / |
| Row decoding signal | HC1 | 35 | 36 | FLASH1_3V3 | / |
| / | H_G21 | 37 | 38 | HUB_SPI_MISO1 | Module flash data storage output |
| Latch signal. | HLAT1 | 39 | 40 | HUB_SPI_CS1 | CS signal of serial pin |
| Display enable signal | HOE1 | 41 | 42 | HUB_SPI_MOSI1 | Module flash data storage input |
| Shift clock signal | HDCLK1 | 43 | 44 | HUB_SPI_CLK1 | Clock signal of serial pin |
| / | H_B21 | 45 | 46 | VCC3.0_1 | / |
| Ground | GND | 47 | 48 | VCC3.0_1 | / |
| | GND | 49 | 50 | VCC3.0_1 | / |
| | GND | 51 | 52 | VCC3.0_1 | / |
| | GND | 53 | 54 | VCC3.0_1 | / |
| | GND | 55 | 56 | VCC3.0_1 | / |
| | GND | 57 | 58 | VCC3.0_1 | / |
| | GND | 59 | 60 | VCC3.0_1 | / |

# Electrical Specifications

## Input Specifications

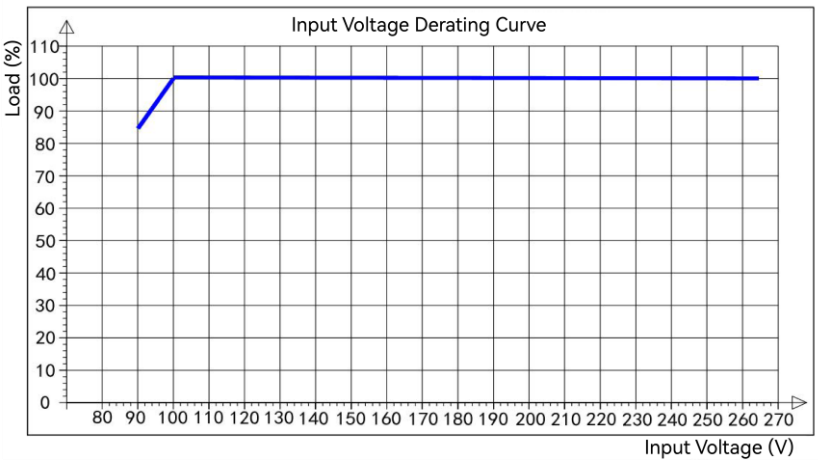
| | |
|---|---|
| Input Voltage | 90 Vac to 264 Vac |

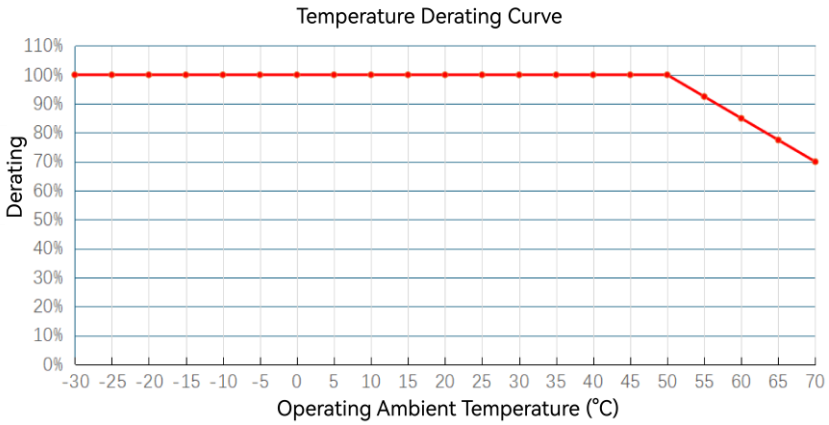
| | |
|---|---|
| Nominal Input | 100 Vac to 240 Vac |
| Frequency Range | 47 Hz to 63 Hz |
| Starting Voltage | > 70 Vac |
| Maximum Input Current | 1.8 A |
| Inrush Current | Cold start: 100 A at 240 Vac, 50 A at 100 Vac |
| Power Factor | @240 Vac, ≥0.90; @100 Vac, ≥0.97 (tested under 32 A conditions) |
| Current Harmonics | GB 17625.1; EN61000-3-2, -3 |
| Standby Power Consumption | ≤ 4 W |
| Input Fuse | T5AL/250 Vac |

## Output Specifications

| | |
|---|---|
| Output Current | 32 A (Rated)<br>Note: The peak current is tested with a pulse width of less than 100 ms and at an ambient temperature of 30°C. |
| Output Voltage | Default: 4.0 V<br>Voltage adjustment is available via the NovaLCT software. |
| Output Voltage Accuracy | ± 2.0 % |
| Line Regulation | ± 2.0 % |
| Load Regulation | ± 2.0 % |
| Output Ripple Noise | ≤ 200 mV<br>Note: In an environment of 25°C, the bandwidth is set to 20 MHz. A 0.1 μF ceramic capacitor and a 10 μF electrolytic capacitor are connected in parallel at the output for testing. |
| Temperature Coefficient | Pending |
| Dynamic Load Performance | 0% to 50% load and 50% to 100% load, < 10% |
| Efficiency | @ 240 Vac, 88%, CH1 32 A<br>@ 100 Vac, 84%, CH1 32 A |

| | |
|---|---|
| Output Rise Time | 30.0ms max<br>Note: Rise time is defined as the time it takes for the output voltage to increase from 10% to 90%. This is tested with a 0.1 μF ceramic capacitor and a 10 μF electrolytic capacitor connected in parallel at the output. |
| Start-up Delay Time | Max 1s at 220 Vac |
| Output Hold Time | @ 240 Vac, 15ms<br>@ 100 Vac, 10ms |
| Output Voltage Overshoot | 10% max<br>Note: All DC output currents should range from minimum to maximum values. |
| Capacitive Load | 32000μF |
| Ratio Radiation Emission | Pending |
| Switching Frequency | Pending |
| Power Temperature Derating | -20℃ to +70℃ (Above 50℃, reduce load by 1.5% for every additional 1℃) |
| Power Input Voltage Derating | Between 90 Vac and 100 Vac, for every 1 V decrease, reduce load by 1.5% |
| MTBF | At least 100,000 hours at full load under 25℃ ambient temperature with normal input |






## Protection

| | |
|---|---|
| Input Undervoltage Protection | Engages above 70 Vac, disengages below 65 Vac |
| Output Overvoltage Protection | < 6.5 V, self-recovery |
| Output Overcurrent Protection | Triggered at 1.3 to 1.6 times of rated current |
| Output Overpower Protection | Triggered at 1.3 to 1.6 times of rated power |
| Output Short-circuit Protection | Self-recovery |

## Safty

| | |
|---|---|
| Insulation Resistance | Input to output 500 Vdc, 100 MΩ min (at room temperature)<br>Input to FG 500Vdc, 100 MΩ min (at room temperature)<br>Output to FG 500Vdc, 100 MΩ min (at room temperature) |
| Insulation Withstand Voltage | Input to output (I/P-O/P): 3.0 kVac / 10 mA<br>Input to case (I/P-CASE): 1.8 kVac / 10 mA<br>Output to case (O/P-CASE): 500 Vdc / 10 mA<br>Note: This specifies the AC withstand voltage. The DC withstand voltage is 1.414 times the AC value, with the same leakage current limit. |
| Ground Resistance | < 0.1 Ω |
| Leakage Current | IEC 62368-1 |

**Note**

If there are lightning protection components in the circuit, the following steps should be taken during the voltage withstand test after disconnecting the air gap tube:

- The input lines (L&N) need to be short-circuited together, and all the output lines need to be short-circuited together.
- Input to output: Input short-circuit line to output short-circuit line test.
- Input to FG: Input short-circuit line to FG.

## EMC

| | |
|---|---|
| Conducted Emission | GB/T9254.1-2021/EN55032/FCC, Class A |
| Radiated Emission | GB/T9254.1-2021/EN55032/FCC, Class A |
| Power Fluctuation and Flicker | Pending |
| Radiated Susceptibility | EN55024; EN61000-4-2, 3, 4, 5, 6, 8, 11 |
| Conducted Susceptibility | EN55024; EN61000-4-2, 3, 4, 5, 6, 8, 11 |
| Surge Susceptibility | GB17626.5/IEC61000-4-5<br>Performance Criteria: B<br>DM: ±2 kV, CM: ±4 kV |
| EFT Immunity | GB17626.4/IEC61000-4-4<br>Performance Criteria: B<br>± 3 kV |
| ESD Immunity | GB17626.2/IEC61000-4-2<br>Performance Criteria: B<br>Contact ±4 kV, Air ±8 kV |
| Voltage Fluctuation and Flicker | Pending |
| Voltage Drop | GB17626.11/IEC61000-4-11<br>Performance Criteria: B/C |

Voltage Drop Requirements:

| Voltage Drop | Duration | Performance Criteria |
|---|---|---|
| 0% Ut | 10 ms | B |
| 70% Ut | 500 ms | C |
| 40% Ut | 200 ms | C |
| 0% Ut | 5000 ms | C |

**Caution**

It is required to comply with the above-mentioned standards as a whole system.

# Specifications

| | | |
|---|---|---|
| Maximum Resolution | • For PWM driver ICs, the maximum load capacity per card when used with M3 controllers is:<br>– 512×512@60Hz (For 8-bit video sources)<br>– 512×384@60Hz (For 10-bit and 12-bit video sources)<br>• For common driver ICs, the maximum load capacity per board when used with M3 controllers is:<br>– 512×384@60Hz (For 8-bit video sources)<br>– 512×192@60Hz (For 10-bit and 12-bit video sources) | |
| Operating Environment | Temperature | –20°C to +70°C |
| | Humidity | 0% RH–85% RH, non-condensing |
| | Altitude | –60 m to +5000 m<br>Note: For every 100 meters above 2000 meters in altitude, the maximum operating temperature decreases by 0.5°C. |
| Storage Environment | Temperature | –40°C to +85°C |
| | Humidity | 0% RH–85% RH, non-condensing |
| | Altitude | < 5000 m |
| Physical Specifications | Dimensions | 361.8 mm × 195.0 mm × 22.6 mm |
| | Net weight | 351.5 g<br>Note: It is the weight of a single receiving card only. |
| Packing Information | Packing specifications | An antistatic bag and anti-collision foam are provided for each receiving card. Each packing box contains 14 receiving cards. |

| | | |
|---|---|---|
| | Packing box dimensions | 635.0 mm × 595.0 mm × 283.0 mm |

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