OLIGHKER

0.96" OLED Wi-Fi Desktop Clock

User Manual

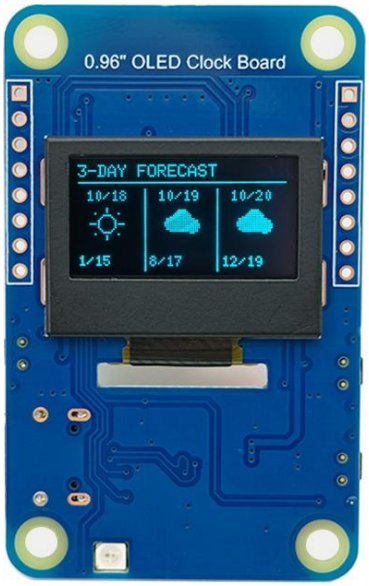


Figure 0: Product front (3-day weather forecast page)

Model: A8266-096-Clock

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1 Product Overview

The A8266-096-Clock is a 0.96-inch OLED network desktop clock built around the ESP8266. It retrieves the time automatically from an NTP server over Wi-Fi, supports world time zones and daylight saving time, and can show the current weather, a 3-day forecast, device information and alarm reminders on the OLED. The unit is powered through USB-C and provides a built-in web configuration page, so no extra app is required - a phone or a computer is enough to complete network provisioning and parameter setup.



Figure 1-1: Front of the 0.96" OLED Wi-Fi desktop clock

1.1 Key Features

- ESP8266 Wi-Fi controller, 2.4 GHz wireless network
- 0.96-inch blue SSD1306 OLED, 128x64 resolution, I2C interface
- Automatic NTP time synchronisation, 461 city time zones and DST support
- Open-Meteo weather service, no API key required, 1-3 current weather items selectable
- 3-day weather trend forecast with icons drawn from WMO weather codes
- Configurable alarm with daily / Monday-to-Friday mode, short press snoozes, long press stops
- Single WS2812B RGB LED: network status, weather light and alarm blinking
- Built-in web configuration hotspot (DeskClock-XXXXXX), fixed password 88888888

- Settings stored in flash and kept through normal reboots and power cycles

1.2 Package Contents

- 0.96" OLED Wi-Fi desktop clock board x 1
- Brass standoffs x 4
- User manual card x 1

2 Hardware Overview

This section shows the component layout of the front and back of the board, the key interfaces and the pin assignment. The ESP8266, OLED, LED, buttons and the USB-C to serial converter are all integrated on one board, so a single USB-C cable is enough for power, firmware upload and serial debugging.

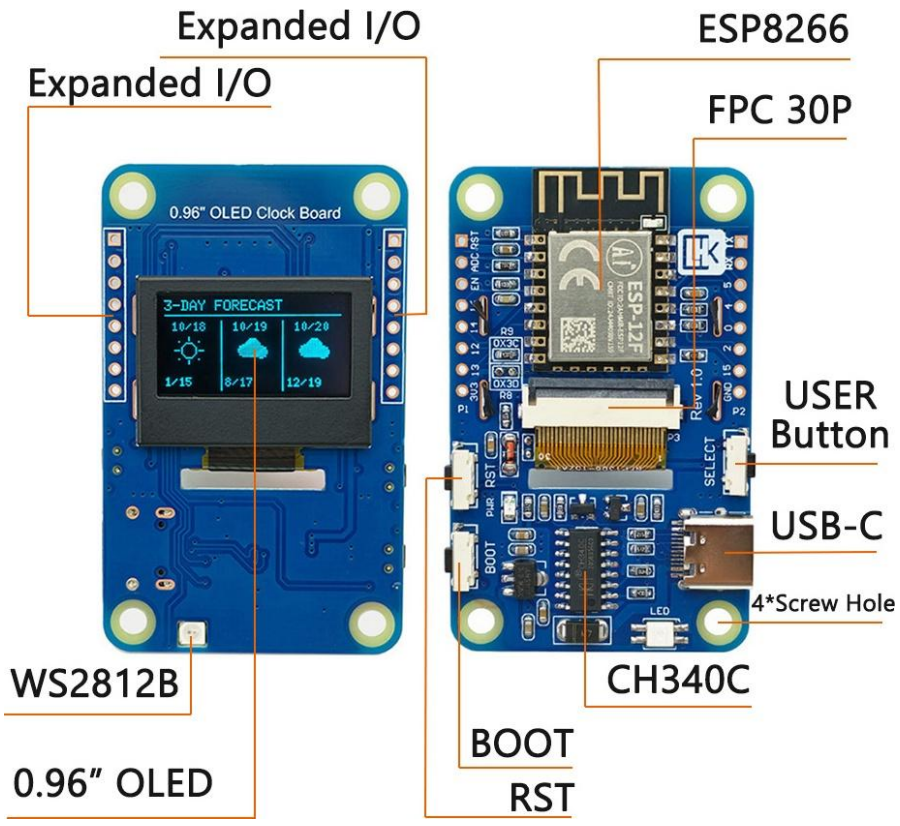


Figure 2-1: Hardware layout (front / back)

2.1 Key Components

Component	Description
ESP8266 (ESP-12F)	Wi-Fi microcontroller running the main program; handles network, NTP and the web server
0.96" OLED	Blue SSD1306, 128x64 resolution, I2C address 0x3C
CH340C	USB-C to serial chip for power supply, firmware upload and 115200 serial output
WS2812B	On-board RGB LED for status, weather and alarm indication
SELECT button	Connected to GPIO16; a short press switches OLED pages; while ringing, a short press snoozes and a long press turns the alarm off
BOOT button	Connected to GPIO0; a 3-second long press shows the configuration hotspot information on screen
RST button	Resets the ESP8266
Expansion I/O headers	Headers on both sides expose the common ESP8266 GPIOs for further development

2.2 Pin Assignment

Function	GPIO	NodeMCU label	Remarks
OLED SCL	GPIO5	D1	I2C clock, 100 kHz
OLED SDA	GPIO4	D2	I2C data
SELECT button	GPIO16	D0	External 10 K pull-up, pulled to ground when pressed
BOOT button	GPIO0	D3	Internal pull-up, active low
WS2812B LED	GPIO12	D6	GRB order, 800 kHz

Note: If GPIO0 is held low at power-on or reset, the ESP8266 enters download mode. In normal use, press BOOT only after the device has started; when uploading firmware the Arduino IDE resets the board automatically, so you do not need to hold BOOT.

3 Mechanical Dimensions

The board is compact and provides mounting holes at the four corners, so it can be dropped straight into an acrylic or 3D-printed enclosure.



Figure 3-1: Board dimensions (unit: mm)

Parameter	Value
Outline dimensions	36 mm x 58 mm
Mounting holes	4 x dia. 3.2 mm (through holes at the four corners)
PCB layers	2 layers
Power interface	USB-C (5 V)

4 First Use and Wi-Fi Setup

After power-on the device immediately starts its configuration hotspot (AP+STA mode). Even if a home Wi-Fi network was saved before, the hotspot always stays available so that the settings can be opened at any time.

4.1 Power On and Connect to the Hotspot

1. Power the device with a USB-C cable and wait until the OLED shows the start-up screen or the clock page.
2. Open the Wi-Fi settings on your phone or computer and connect to the hotspot named DeskClock-XXXXXX (XXXXXX are the last six characters of the device MAC address).
3. The hotspot password is fixed: 88888888. If a "No Internet" warning appears, stay connected.
4. Open a browser and go to http://192.168.4.1/. Some phones open the login page automatically.

4.2 Connect to Home Wi-Fi

1. In the Wi-Fi section of the page click "Scan"; the device scans nearby 2.4 GHz networks asynchronously. The results are cached and are not lost when the page is refreshed.
2. Select your router from the drop-down list, or choose "Other / hidden network" and type the SSID manually.
3. Enter the Wi-Fi password (for a saved network the field may be left empty to reuse the stored password) and click "Connect and continue".
4. The device first tries the channel/BSSID obtained from the scan for a fast association; if it does not succeed within about 7 seconds it falls back to a normal search.
5. After a successful connection the network is saved to the history (up to 3 entries) and becomes the first choice at the next start-up.

4.3 Finish and Save the Configuration

Once Wi-Fi is connected, the page enables the full city search and the weather settings. Set the time-zone city, weather city, alarm and LED parameters one after another, then click

"Save and reboot". The firmware writes the configuration, reads it back for verification and reboots automatically about 2 seconds later.

> **Tip:** The configuration hotspot is never switched off and stays available; after saving, the device reboots and tries to connect to the home network.

5 OLED Display and Button Operation

The OLED has 4 pages, cycled through by short presses of the SELECT button (GPIO16). The button is debounced by a 5 ms timer and the event is latched in an interrupt, so a short press is never missed even when the CPU is busy with network operations.

5.1 Pages

Page	Displayed content
Clock	Date, weekday, large hour:minute, seconds, current UTC offset, next alarm time, Wi-Fi icon
Current weather	Weather icon, 1-3 user-selected current weather values, city name
3-day forecast	Dates of the next 3 days, weather icons, minimum/maximum temperature
Device info	AP name, login address (LAN IP / .local) or hotspot password

5.2 Button Operations

Button	Action	Function
SELECT	Short press	Switches OLED pages; page switching also works while the alarm is snoozing
SELECT	Short press while ringing	Snooze for 5 minutes
SELECT	Long press 1 s while ringing/snoozing	Cancels the current alarm; the alarm still rings on the following days as configured
BOOT	Long press 3 s	Shows the configuration hotspot name, password and access address on the OLED
BOOT	Hold at power-on	Enters the chip download mode used to upload firmware from the Arduino IDE

5.3 Status Indicator

The on-board WS2812B LED indicates the device status by colour and blinking. Brightness can be adjusted on the web page (0-100%).

Status	LED behaviour	Meaning
Home Wi-Fi not connected	Slow blue blinking	Connecting to the network or waiting for provisioning
Just connected to Wi-Fi	Brief green	Network connected, time is being synchronised
Clear sky	Steady blue	Weather light: the current weather is clear
Rain / thunderstorm	Steady green	Weather light: it is raining
Snow	Steady white	Weather light: it is snowing
High temperature (default ≥35 °C)	Steady red	Temperature reached the configured high-temperature threshold
Alarm ringing	Blinking in the selected colour	Blinks red/green/blue/white/amber/ purple as configured

Status	LED behaviour	Meaning

Note: In other weather conditions, such as overcast or fog, the weather light stays off; the provisioning state and the alarm state take priority over the weather light.

6 Web Configuration Details

The web page is in English by default and can be switched to Chinese or Russian in the top-right corner. The browser remembers the language selected last. The time and the Wi-Fi status on the page are refreshed in real time.

6.1 Wi-Fi Settings

The Wi-Fi selector groups the entries into "Saved networks" and "Nearby networks". Click "Scan" to search for surrounding 2.4 GHz networks asynchronously. When a saved network is selected the password field shows the placeholder "********"; leave it empty to reuse the password stored on the device.

6.2 City and Time Zone

Typing a city name or its first letters automatically expands the candidate list. Coordinates of 476 common cities are built in and take effect immediately; other cities are looked up online through Open-Meteo Geocoding once the device is online and the time has been synchronised. The time-zone rules are stored as a built-in POSIX snapshot, so daylight saving time is applied automatically according to the rules of the selected city.

6.3 Weather Settings

After enabling the weather function, select the weather city and tick 1-3 current weather items to display. Available items include temperature, apparent temperature, humidity, pressure, weather condition, wind speed, wind direction, gusts, cloud cover, rainfall, snowfall,

visibility, sunrise, sunset, time zone, coordinates and more. The high-temperature threshold can be set between 25 °C and 50 °C; when it is reached the LED turns red.

6.4 Alarm and LED

The alarm can be set to a specific time and limited to "Monday to Friday only". When the alarm rings the OLED shows a reminder and the WS2812B blinks in the selected colour. The global LED brightness slider applies to the weather light, the network/provisioning state and the alarm blinking alike; set it to 0% to switch the LED off.

7 Alarm and Indicator

By default the alarm is disabled and set to 07:00. The alarm time, the on/off state and the weekday mode are all stored in flash.

- When the set minute is reached, the OLED shows WAKE UP and the WS2812B blinks.
- Short press SELECT while ringing: snooze for 5 minutes.
- Long press SELECT for 1 s while ringing/snoozing: cancel the current alarm.
- Within the same run cycle a daily alarm triggers only once per day; a reboot clears the trigger record of the current day.
- An alarm that is not acknowledged stops automatically after 2 minutes.

8 Setting Up the Arduino IDE

This section describes in detail how to install the Arduino IDE on Windows, add the ESP8266 board support package, install the required libraries and configure the upload parameters. Follow the steps below to complete the development environment setup.

8.1 Installing the Arduino IDE

1. Go to https://www.arduino.cc/en/software and download Arduino IDE 1.8.x or 2.x.
2. Run the installer and follow the prompts (keeping the default path is recommended).
3. On first start, if the firewall asks for permission, allow the Arduino IDE to access the network.

8.2 Adding ESP8266 Board Support

Open the Arduino IDE and select File -> Preferences. In "Additional Boards Manager URLs" add the following address:

```
https://arduino.esp8266.com/stable/package_esp8266com_index.json
```

Click "OK" to close the Preferences window, then select Tools -> Board -> Boards Manager. Type esp8266 in the search box, find "esp8266 by ESP8266 Community", select version 3.0.1 and click Install. The installation downloads the toolchain, so keep the network connected.

8.3 Installing the U8g2 Library

The OLED driver of this project depends on the U8g2 library. Select Sketch -> Include Library -> Manage Libraries, search for U8g2 and install the version maintained by olikraus.

> **Tip:** The src folder of the project source already contains the single-file version of ArduinoJson and the Adafruit_NeoPixel driver, so these two libraries do not need to be installed separately.

8.4 Board and Upload Settings

Connect the board to the computer with a USB-C cable and configure the Arduino IDE according to the table below:

Menu item	Recommended setting	Description
Board	NodeMCU 1.0 (ESP-12E Module)	Compatible with the on-board ESP-12F
Upload Speed	921600	Highest upload baud rate, faster uploading
CPU Frequency	160 MHz	Improves the stability of the BearSSL TLS handshake
Flash Size	4MB (FS:2MB OTA:~1019KB)	Keep the default 4 MB
Erase Flash	Only Sketch	Erases the sketch area only and keeps the settings
Port	COMx (Silicon Labs / CH340)	Select according to Device Manager

Important: You must select "Erase Flash: Only Sketch". Selecting "All Flash Contents" erases the saved Wi-Fi password and settings, so the network would have to be configured again after every upload.

8.5 Driver Installation and COM Port

If Device Manager shows an unknown device or no COM port, the CH340C driver must be installed. The CH340/CH341 driver can be found on the WCH website or in the documentation package of the board. After installation, unplug and replug the USB-C cable, then select the matching COM port under "Tools -> Port" in the Arduino IDE.

9 Compiling and Uploading the Firmware

1. Open (or extract) the project folder A8266_Clock_0_96_oled and double-click A8266_Clock_0_96_oled.ino; the Arduino IDE loads all .h/.cpp files in the same folder automatically.
2. After confirming that the board and the port are correct, click the "Verify" button (tick icon) and wait for the compilation to finish.

3. The first compilation generates a large number of object files and takes about 30-90 seconds, so please be patient.
4. Once the sketch compiles without errors, click the "Upload" button (arrow icon). The Arduino IDE resets the ESP8266 and enters download mode automatically.
5. After a successful upload, open "Tools -> Serial Monitor" and set the baud rate to 115200; you will see the boot log, the I2C scan results and the network status.

Upload troubleshooting: If "Failed to connect to ESP8266" appears, check whether the USB cable supports data transfer, whether the correct port is selected and whether the CH340 driver is installed. On some computers you must hold BOOT and then press RST immediately after clicking Upload in order to enter download mode manually.

10 Troubleshooting

Symptom	Possible cause	Solution
OLED stays dark	No power supply or I2C bus error	Check the USB-C power supply; check in the serial log whether the I2C scan found 0x3C
Cannot connect to Wi-Fi	Wrong SSID/password, weak signal, 5 GHz band	Confirm that the network is 2.4 GHz and the password is correct; retry closer to the router
Serial message reason 201	Target network not found	Check the SSID spelling or enter it manually
Serial message reason 15/202/204	Authentication or handshake failure	Re-enter the password; check the encryption mode of the router
Time shows waiting for synchronisation	Not connected to the network, or NTP is blocked	Make sure the network allows ntp.aliyun.com / pool.ntp.org
Weather shows WEATHER DATA ERR	Open-Meteo returned incomplete data	Check the network; the device retries automatically later
Weather shows API LIMIT 429	Too many requests	Wait 5 minutes for the automatic retry
LED does not light up	Brightness set to 0% or the LED is damaged	On the web page, raise the WS2812B brightness above 30% and observe
Settings lost after uploading	Erase Flash is set to All Flash Contents	Configure the network again and switch to Only Sketch

11 Specifications

Item	Specification
Controller	ESP8266 ESP-12F, 160 MHz
Wireless	802.11 b/g/n, 2.4 GHz
Display	0.96" SSD1306 OLED, 128x64, I2C 0x3C
LED	WS2812B x 1
Buttons	SELECT (GPIO16) + BOOT (GPIO0) + RST
Power supply	USB-C 5 V
Dimensions	36 mm x 58 mm
Operating temperature	0 °C to +60 °C (indoor use recommended)
Network protocols	NTP / HTTP / HTTPS (TLS 1.2)
Weather data source	Open-Meteo (no API key required)

Thank you for choosing the OLIGHKER 0.96" OLED Wi-Fi desktop clock. If you have any questions, please refer to the README.md in the project source or contact technical support.