OLIGHKER

ESP8266 2.42" OLED Desk Clock User Manual

ESP8266 Network Desk Clock · 2.42-inch OLED

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1. Product Overview

The ESP8266 2.42" OLED Desk Clock is a multifunctional network clock board from OLIGHKER. Based on the ESP-12F Wi-Fi module, it integrates a 2.42-inch 128×64 OLED display, temperature/humidity and barometric pressure sensors, an RGB status LED, an active buzzer and one-touch Wi-Fi provisioning — usable as a desktop clock and as an entry-level ESP8266 IoT development platform.



Figure 1-1 ESP8266 2.42" OLED desk clock (actual product)

This manual is intended for end users and developers. It describes the hardware composition, initial configuration, daily operation and troubleshooting of the product.

2. Hardware Resources

The board uses a purple PCB with all major components and connectors clearly silkscreened. The figure below shows the onboard hardware layout, and Table 2-1 describes each item in detail.

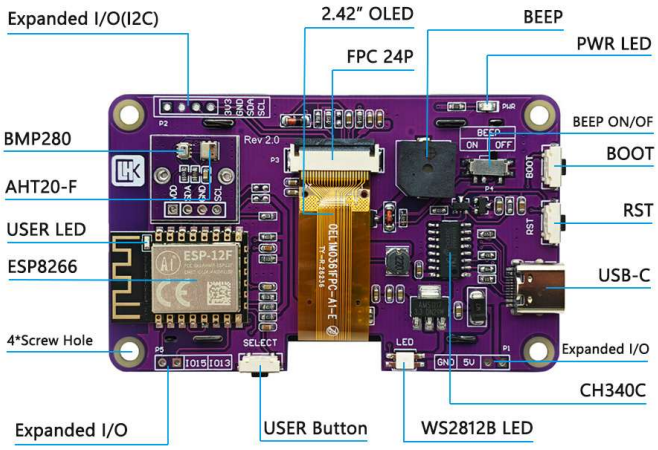


Figure 2-1 Onboard hardware layout

No.	Resource	Description	Interface / Address
1	ESP-12F module	Main controller with integrated ESP8266 Wi-Fi / MCU	—
2	2.42" OLED	128×64 dot-matrix SSD1309 display	I2C 0x3C
3	AHT20-F	Digital temperature and humidity sensor	I2C 0x38
4	BMP280	Digital barometric pressure sensor	I2C 0x76/0x77
5	WS2812B	Full-colour RGB status LED	GPIO12
6	BEEP	Active buzzer for the alarm	GPIO14
7	PWR LED	Power indicator LED	—
8	USER LED	User indicator LED	GPIO2
9	SELECT button	Short press: change page, alarm snooze/dismiss	GPIO16
10	BOOT button	Hold 3 s to show the setup hotspot info	GPIO0
11	RST button	Reset button	—
12	USB-C	Type-C power + CH340C serial port	—
13	Expanded I/O	2.54 mm header exposing GPIO pins	See code definitions
14	4× mounting holes	M3 through-holes for enclosure mounting	—

Table 2-1 Onboard hardware resources

Tip: All I2C devices share SCL (GPIO5 / D1) and SDA (GPIO4 / D2) with pull-ups already fitted, so the environment sensors work without any extra wiring.

3. Mechanical Dimensions

The board is compact, suitable for desktop use or enclosure mounting. The PCB outline measures 80 mm × 49.5 mm, the OLED viewing area is about 60.7 mm × 37.5 mm, and the four M3 mounting holes make it easy to fit into a case.

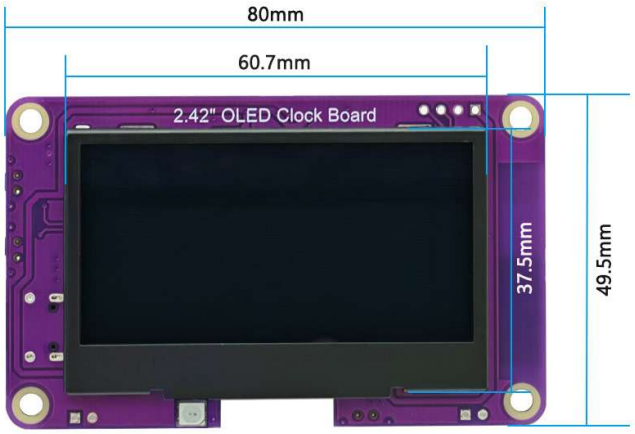


Figure 3-1 Mechanical drawing (units: mm)

Item	Dimension
PCB length	80 mm
PCB width	49.5 mm
OLED viewing area length	60.7 mm
OLED viewing area width	37.5 mm
Mounting holes	4× M3

Table 3-1 Key dimensions

4. First Use and Wi-Fi Setup

On power-up the device enters AP+STA concurrent mode: it starts the configuration hotspot DeskClock-XXXXXX and at the same time tries to connect to the last saved home Wi-Fi.

4.1 Setting up Wi-Fi with a phone

1. Open Wi-Fi settings on your phone and join the hotspot named DeskClock-XXXXXX; the password is fixed at 88888888.

2. If the phone reports that the hotspot has no internet, stay connected anyway; open http://192.168.4.1/ in a browser (some phones pop the page up automatically).

3. After the page loads, choose or scan for a 2.4 GHz Wi-Fi network, enter its password and tap “Connect & continue”.

4. Once connected, the device immediately saves the verified credentials; continue configuring the time zone, alarm and weather city.

5. Tap “Save & restart” — all settings are written to Flash with read-back verification, and the device restarts automatically in about 2 seconds.

Note: The setup hotspot is available from power-on and never closes when the home Wi-Fi connects; its password is fixed at 88888888. When uploading a sketch, set Erase Flash in the Arduino IDE to “Only Sketch”, otherwise the saved Wi-Fi passwords will be erased.

4.2 Development environment

To modify or extend the firmware, select NodeMCU 1.0 (ESP-12E Module) in the Arduino IDE, set CPU Frequency to 160 MHz, set Erase Flash to Only Sketch, and install ESP8266 Core 3.0.1 together with the U8g2 library. The NeoPixel driver and the single-file ArduinoJson library are already bundled.

```
Board: NodeMCU 1.0 (ESP-12E Module)
CPU frequency: 160 MHz
Flash erase: Only Sketch
Serial baud rate: 115200
```

5. Buttons and Page Navigation

The SELECT button (GPIO16) switches pages and the BOOT button (GPIO0) opens the setup entry. All buttons are debounced and edge-latched, so a complete short or long press is never lost even while the main loop is busy with network synchronisation. See Table 5-1 for the full operation list.

Action	Trigger	Effect
SELECT short press	GPIO16 short press	Cycles: Clock → Indoor → Current weather → 3-day forecast → Device info
SELECT short press (while ringing)	GPIO16 short press	Snooze the alarm for 5 minutes
SELECT hold 1 s	GPIO16 hold	Dismiss this alarm
BOOT hold 3 s	GPIO0 hold	Shows the setup hotspot name, password and 192.168.4.1 on screen

Table 5-1 Button operations

> **Tip:** Hold BOOT only after the device has started; holding GPIO0 while powering on or resetting enters the chip download mode and the clock will not run.

6. Web Configuration

The firmware embeds a responsive web page available in English, Русский and 中文. It provides Wi-Fi management, city and time zone, alarm, weather city and status-LED brightness settings; the main options are listed in Table 6-1.

6.1 Main configuration options

Option	Description
Wi-Fi	Choose or scan a 2.4 GHz network; saved-network passwords can be reused
City & time zone	Pick one of 461 world cities; UTC offset and DST are calculated automatically
Alarm	Enable/disable, set the time, weekdays-only option
Weather city	Independent of the time zone; set your location or any city of interest
LED brightness	Global WS2812B brightness 0–100%, default 30%
Buzzer volume	0–100%, default 50%

Table 6-1 Main web configuration options

Tip: When a saved network is selected, leave the password field empty to reuse the stored password; a newly typed password takes priority. Passwords are never returned by the web API.

7. Alarm and Status LED

The alarm is disabled by default with a default time of 07:00 and can ring daily or on weekdays only. At the set minute the buzzer beeps intermittently in the selected pattern and the WS2812B flashes in sync. The meaning of the LED colours in each state is given in Table 7-1.

State	LED colour / behaviour	Description
Home Wi-Fi not connected	Blue, slow blink	Trying to restore a saved network
New network connected	Green for 2 seconds	IP obtained, preparing NTP sync
Clear sky	Blue	The weather LED reflects current conditions
Rain / thunderstorm	Green	Based on WMO weather codes
Snow	White	Based on WMO weather codes
High-temperature alert	Red	Default threshold 35°C, adjustable 25–50°C
Alarm ringing	Flashes in the configured colour	Default red; red/green/blue/white/amber/purple options

Table 7-1 Status LED meanings

While ringing, tap SELECT to snooze for 5 minutes; hold SELECT for 1 second to dismiss this alarm — later dates still ring as scheduled. The alarm stops automatically after 2 minutes without any input.

8. Weather Feature

Weather data comes from Open-Meteo; no API key or registration is required. Current conditions and the 3-day forecast are fetched in a single HTTPS request, normally every 10 minutes, retrying 5 minutes after a failure. The weather city is independent of the clock time zone, and the 476 built-in popular cities can be picked directly during initial setup.

The OLED weather page shows at most 3 data items; this limit is enforced by both the front end and the firmware. By default it displays the weather condition, sunrise and sunset; other available items include temperature, humidity, wind speed, visibility, pressure, rain/snowfall and cloud cover — 18 items in total. Temperature is in degrees Celsius, wind speed in m/s and visibility in km.

> **Note:** When the network is down, the last weather result is kept in RAM; after 1 hour without an update it is marked OLD and the weather LED turns off. The weather cache is not written to Flash and is fetched again after a reboot.

9. Precautions and Maintenance

Power supply: use a 5 V USB-C power adapter or a computer USB port. The current draw is low and an ordinary charger is sufficient.

OLED care: an OLED panel may develop image retention if a static picture is displayed for a long time. The firmware shifts the content by 1 pixel per minute within a safe margin and applies night brightness limits to slow ageing, but this cannot prevent it entirely.

Network requirements: the device needs 2.4 GHz Wi-Fi; 5 GHz networks cannot be used. NTP time sync requires the router to allow outbound NTP requests.

Sensor protection: the AHT20-F and BMP280 are sensitive to ambient temperature, humidity and pressure. Avoid prolonged exposure to corrosive gases or liquids.

Flash lifespan: settings and network history are stored in the EEPROM area and written only when you tap save or when Wi-Fi verification succeeds, so normal use causes very little wear.

10. Troubleshooting

No display after power-on

Check that the USB-C power supply is working; view the boot log at 115200 baud and confirm that the I2C scan finds address 0x3C.

Cannot open the setup page

Make sure the phone is connected to the DeskClock-XXXXXX hotspot with password 88888888, then open http://192.168.4.1/.

Wi-Fi reports an authentication failure

reason 15/202/204 means the password or handshake failed; re-enter the password and tap “Connect & continue”.

The clock keeps waiting for time sync

The device has not connected to an internet-enabled Wi-Fi or NTP is blocked; check that the router allows access to ntp.aliyun.com and pool.ntp.org.

Weather does not update

Make sure Wi-Fi is online and time sync has completed; the first weather request starts only after 60 seconds of stable connection; TLS errors can be found in the serial log.

The alarm does not ring

Check that the alarm is enabled and the time is set correctly; in weekdays-only mode it does not trigger on Saturday or Sunday.

If the problem persists, provide the 115200 serial log covering the period from boot to failure (including the Config:, WiFi begin: and WiFi disconnected: keywords). There is no need to include your Wi-Fi password.