SPEC SHEET · PRELIMINARY

Crescent City — V2.0

An ESP32-S3 Wi-Fi and Bluetooth LE development board with a built-in 0.96" OLED, USB-C, and protected single-cell battery charging. Breadboard-friendly, fully documented, and running out of the box.

`Board V2.0 · EE202603B` `Status Preliminary` `Updated October 28, 2026`

What you get

MODULE
ESP32-S3
240 MHz dual-core, 8 MB flash
WROOM-1-N8 · Wi-Fi 4 + Bluetooth 5 LE · no PSRAM

CHARGING
303 mA
over USB-C, to 4.2 V
≈5.4 h per 1000 mAh on the test bench

BATTERY LIFE
≈24 h
per 1000 mAh
Weather Clock 2.1 at ≈41 mA, Wi-Fi off between updates

DEEP SLEEP
0.78 mA
after a low-battery shutdown
Above the 0.2–0.4 mA target; ≈1.2 µA once the battery protection cuts off

LOW-BATTERY SHUTDOWN
3.30 V
warning at 3.45 V
Weather Clock 2.1; sleeps until USB is plugged in

SIZE
70.1 × 25.4
mm · 13 mm high · 14 g
Fits a standard breadboard

Charging, battery-life, sleep and shutdown figures are bench measurements on V2.0 boards (V2.0 test report, in progress).

- 0.96" 128×64 OLED built in — no wiring, working out of the box
- Qwiic / STEMMA QT connector plus 12 GPIO on breadboard-friendly headers
- Published schematic, 3D model and test reports (V1.0: 120 of 122 tests passed; V2.0 in progress)
- Complete battery power: USB-C charging, cell protection, automatic USB/battery switching and battery monitoring
- Ships with an open-source Weather Clock; Arduino and ESPHome / Home Assistant ready

Specifications

`measured V2.0` `measured V1.0` bench measurement on the V2.0 or V1.0 boards (see the V2.0 test report and the V1.0 test report). `V2.0 target` design value, still to be confirmed in V2.0 testing (October–December 2026). All other values are from the design.

PROCESSOR & WIRELESS

Module	ESP32-S3-WROOM-1-N8 with on-module PCB antenna
Processor	Dual-core Xtensa LX7, up to 240 MHz
Memory	512 KB SRAM · 8 MB flash · no PSRAM
Wi-Fi	802.11 b/g/n (Wi-Fi 4), 2.4 GHz
Bluetooth	Bluetooth 5 (LE)

DISPLAY

Type	0.96" white monochrome OLED, 128 × 64 pixels
Controller	SSD1306, 4-wire SPI on dedicated pins (not shared with the headers)
Display pins	CS GPIO10 · DC GPIO9 · SCLK GPIO12 · MOSI GPIO11 · RESET GPIO14

USB & PROGRAMMING

Connector	USB-C, USB 2.0 full speed (native ESP32-S3 USB)
Used for	Power, charging, programming, serial console and debugging. No driver needed on Windows 10/11, macOS or Linux.
Compatibility	Works with USB-C chargers and C-to-C cables; ESD protection on the data lines
Buttons	BOOT (GPIO0, also usable as a user button) and EN (reset)

POWER & BATTERY

Power input	5 V from USB-C, or the 5V_IN header pin (input only, with a 0.5 A resettable fuse and a blocking diode). A standard 500 mA USB port is enough. `measured V2.0`
Battery	Single-cell 3.7 V Li-ion / LiPo, JST-PH 2.0 mm connector, polarity marked. 600 mAh or larger recommended.
Charging	303 mA constant current `measured V2.0` to 4.2 V (measured 4.17 V at the cell), then tapers and stops at ≈8% of the charge current (23–25 mA) `measured V2.0`
Charge time	About 5.4 h per 1000 mAh from empty on the test bench `measured V2.0`
Battery protection	Over-charge, over-discharge (cuts off at ≈2.4 V; 2.43 V `measured V2.0`), over-current / short circuit, reverse battery polarity
Power switching	Automatic: runs from USB when plugged in (battery isolated), switches to the battery when USB is removed `measured V2.0`
3.3 V regulator	Low-dropout regulator, 600 mA
Monitoring	Battery voltage on GPIO4 and USB voltage on GPIO2, each through a ½ divider (ADC1)
Low-battery shutdown	The Weather Clock warns at 3.45 V and shuts down at 3.30 V, then sleeps until USB is plugged in `measured V2.0` ESPHome configuration: same thresholds `measured V2.0`

Notes and V1.0 comparison

USB input: charging with Wi-Fi on, the board draws 363 mA from USB. `measured V2.0`

Charger temperature: the charger chip runs at ≈55 °C while charging at 303 mA (limit 85 °C). `measured V2.0`

Charge time: 1,888 mAh in 10.3 h. The bench wiring adds resistance, so a cell plugged straight into the board charges a little faster.

Low-battery shutdown: the 3.30 V shutdown comes before the 3.3 V rail sags, so the board stops cleanly, with no reboots.

V1.0: charged at 201 mA and stopped at 7.6%; about 6.7 h per 1000 mAh on the bench. `measured V1.0`

Full results: V2.0 charging · V2.0 battery life and low-battery shutdown

POWER CONSUMPTION (TYPICAL, ON BATTERY)

Weather Clock 2.1	≈41 mA — about 24 hours per 1000 mAh `measured V2.0`
Wi-Fi transmit peaks	Up to ≈400 mA for microseconds `measured V1.0`
Deep sleep	0.78 mA after a low-battery shutdown, above the 0.2–0.4 mA target `measured V2.0` Most of it is likely the RGB LED's standby current; we are confirming that.
After protection cutoff	≈1.2 µA `measured V2.0`

Notes and V1.0 comparison

Weather Clock 2.1: on battery the Wi-Fi radio is off between weather updates, so the board is not reachable on your network in between. The ≈41 mA is the average over a full discharge down to the 3.30 V shutdown.

Wi-Fi always on (firmware 1.0): ≈70 mA, about 14–14.5 hours per 1000 mAh. `measured V1.0` `measured V2.0`

ESPHome 1.1.1 (Wi-Fi always connected for Home Assistant): about 14 hours per 1000 mAh (26.5 h on a 1.9 Ah cell). `measured V2.0`

Flat battery left connected: it reaches the protection cutoff in about 3–6 days, then the board draws ≈1.2 µA.

V1.0 deep sleep: 0.88 mA. `measured V1.0`

I/O & EXPANSION

Header pins	2 × 12, 0.1" (2.54 mm) pitch, rows 0.9" (22.86 mm) apart — fits a standard breadboard
GPIO on headers	12: GPIO 1, 5, 6, 7, 13, 15, 16, 21, 35, 36, 37, 39
Analog inputs	GPIO 1, 5, 6, 7 (ADC1, usable with Wi-Fi on); GPIO 13, 15, 16 (ADC2)
Serial	UART0 on the header (pins marked TX and RX), 3.3 V logic
Qwiic / STEMMA QT	JST-SH 4-pin, I²C on GPIO8 (SDA) and GPIO18 (SCL), 3.3 V, 4.7 kΩ pull-ups
Power pins	3V3 ×3 · GND ×6 · 5V_IN ×1 (input only)
Logic level	3.3 V. GPIO are not 5 V tolerant.

LEDS

RGB status LED	Addressable SK6812 on GPIO48
CHG	Yellow, on while charging
SYS ON	Green, on when the 3.3 V rail is up

MECHANICAL

Board size	70.1 × 25.4 mm (2.76" × 1.00"); ≈76.4 mm including the antenna overhang
Height	13 mm overall, with the display fitted
Weight	14 g
Mounting holes	None — mount by the header pins or in a breadboard
PCB	4-layer
3D model	STEP file for enclosure design

SOFTWARE

Ships with	Weather Clock 2.1.6: local time and weather over Wi-Fi, with Wi-Fi setup from your phone. Open source (MIT license).
Arduino	"esp32 by Espressif Systems" board package 3.3.6 (not 3.3.7–3.3.10, which have a Bluetooth bug), board "ESP32S3 Dev Module"
ESPHome / Home Assistant	Ready-made configuration 1.1.1, installed from your browser: clock and status pages, battery level, RGB LED, updates over Wi-Fi. Temperature and humidity with a Qwiic SHT4x sensor (not included).
Other	ESP-IDF, MicroPython and CircuitPython should work with their generic ESP32-S3 builds (not yet tested by us)

ENVIRONMENT & COMPLIANCE

Operating temperature	−40 to +85 °C (ESP32-S3 module rating). With a battery fitted, stay within the battery's own limits.
Charging temperature	0 to 45 °C (battery limit; the charger has no temperature sensor)
Certification	Not yet tested. FCC / ISED testing is planned before shipping.

Header pins

PIN	J4 (LEFT, ANTENNA UP)	J5 (RIGHT)
1	GND	GND
2	3V3	3V3
3	GPIO5	GPIO1
4	GPIO6	GPIO13
5	GPIO7	GPIO39
6	GPIO15	GND
7	GPIO16	GPIO37
8	GND	GPIO36
9	TX (UART0)	GPIO35
10	RX (UART0)	GPIO21
11	GND	GND
12	3V3	5V_IN (input only)

Qwiic connector: GND, 3V3, SDA (GPIO8), SCL (GPIO18). Pin names are printed on both sides of the board. The full diagram with every alternate function is in the pinout PDF.