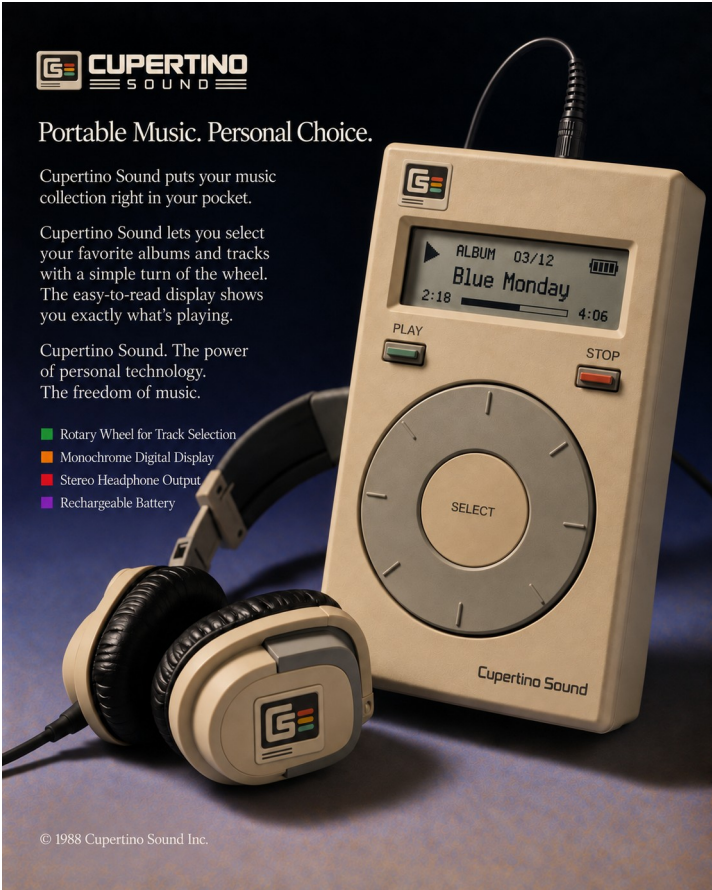


CUPERTINO SOUND

CS-84 Engineering Documentation

Revision 1.1 | 25 October 2026 | English (US)

ENGINEERING PROTOTYPE — NOT PRODUCTION APPROVED



00 READ ME FIRST

CUPERTINO SOUND CS-84 — Engineering Documentation Package

****Document set:**** CS84-DOC-001 | ****Revision:**** 1.1 | ****Issue date:**** 2026-10-25 | ****Language:**** English (US) | ****Release classification:**** Prototype / Engineering Development

Scope

This archive consolidates the current design concept, electronic architecture, mechanical files, software distribution, preliminary procurement data, test strategy, operating guidance, risk register and marketing/legal notes. The source software and mechanical models are provided as development assets, not manufacturing-approved deliverables.

Read this before building

- ****No physical hardware integration testing has been completed.**** Python unit tests and graphics previews do not prove hardware readiness.
- The 3D model is ****mechanical concept V1****, not a validated housing. The wheel has no approved bearing/coupling mechanism; display, charger, battery, DAC and connector mounts are incomplete.
- The battery and charging solution is ****not selected or validated****. Do not assemble a Li-ion-powered prototype from an unverified charger/boost combination.
- The current CS-84 OS installer ****overwrites `/etc/mpd.conf**** and is intended only for a dedicated test installation.
- The original marketing artwork depicts a fictional historical advertisement. References to “1988” do not describe a historical Cupertino Sound product or incorporated company.
- No certification, legal clearance, registered trademark search, or commercial safety conformity assessment has been completed.

Folder index

01_Project: product requirements, architecture, release control.

02_Hardware: electrical interfaces, parts selection and power strategy.

03_Mechanical: CAD/STL, print and assembly guidance.

04_Software: CS-84 OS source, install instructions and UI.

05_Validation: verification plan, test procedures and open issues.

06_Product: user guide and brand/publication guidance.

07_References: legacy artifacts, research pointers and source inventory.

08_Assets: visual references.

Revision authority

All dimensions are provisional and must be checked against purchased component datasheets and physical sample measurements. Refer to the ****verification matrix**** before claiming prototype completion.

Revision 1.1 changes

Public third-party brand references were removed from published engineering text. English/EUR BOM 1.1 and English simulator 1.1 replace the earlier legacy files. Mechanical geometry and CS-84 OS source remain concept/prototype stage.

01 Project/01 Product Requirements

CS-84 Product Requirements Specification

ID: CS84-PRS-001 | **Rev:** 1.1 | **Status:** Draft for engineering validation

Product definition

A handheld, independent retro-themed digital audio player inspired by late-1980s consumer-electronics design; it is an independent contemporary engineering concept. The current brand is **Cupertino Sound**, model **CS-84**. Primary design cues: ivory enclosure, inset monochrome display, rotary selection wheel with eight radial markers, separate PLAY and STOP/BACK buttons, recessed SELECT center.

Functional requirements

| ID | Requirement | Acceptance criterion | Implementation status |

|---|---|---|---|

| FR-01 | Play MP3 and FLAC files from microSD | Audio reaches stereo headphones through DAC and amplifier | Software planned/partly implemented; hardware untested |

| FR-02 | Browse albums and select a track/album | Wheel and SELECT allow consistent navigation | Album browsing coded; track navigation still open |

| FR-03 | Display metadata and playback progress | Monochrome 128×64 screen shows song/status legibly | Software rendering available; hardware untested |

| FR-04 | Physical rotary wheel | Independent mechanical support, reliable step recognition | Open |

| FR-05 | Local transport controls | PLAY pauses/resumes; STOP/BACK behavior documented | PLAY and BACK software implemented; STOP semantics differ from printed label |

| FR-06 | Internal rechargeable battery | Protected cell and safe charging/discharge | Open |

| FR-07 | Controlled power-off | Filesystem shutdown before DC supply cutoff | Open |

| FR-08 | Transfer media via Wi-Fi | Documented SFTP workflow | Standard Linux capability; not integrated into UI |

| FR-09 | Start playback UI without desktop | systemd starts UI and MPD | Provisioned; not hardware tested |

Constraints

Approximate body 94 × 155 × 33 mm. Processing board Raspberry Pi Zero 2 W (65 × 30 mm). Display target Waveshare 2.42-inch SSD1309 monochrome SPI OLED (module 61.5 × 39.5 mm); final fit requires physical check. Main software stack: Raspberry Pi OS Lite, ALSA, MPD, Python. All

documentation English (US), all measurements metric, budget expressed in EUR; preferred vendor discovery through Amazon.de.

Exclusions for rev 1.0

Real microcassettes, internal speaker, microphone, touchscreen, streaming subscriptions, Bluetooth audio qualification, mass production, certification.

Success criteria for physical prototype

Battery-independent bench prototype with verified OLED, encoder, audio and input controls; repeatable print-and-fit assembly; documented 4-hour playback and controlled shutdown tests. No success criteria have yet been certified as passed.

01 Project/02 System Architecture

System Architecture

ID: CS84-SYS-001 | **Rev:** 1.1

Functional block diagram

```text

microSD (OS + local music)

|

Raspberry Pi Zero 2 W (Raspberry Pi OS Lite)

|        |        |        |

|        |        |        +-- Wi-Fi: SSH / SFTP / maintenance

|        |        +-- GPIO: encoder A/B, SELECT, PLAY, BACK

|        +-- SPI: Waveshare SSD1309 OLED 128x64

+-- I2S / ALSA --> PCM5102A DAC (line level)

--> headphone amplifier (TBD)

--> 3.5 mm TRS headphone jack

Protected single-cell battery (TBD) --> charger + power path + 5V regulator (TBD)

--> Pi and peripherals

Shutdown / fuel gauge circuit (TBD) --> GPIO/I2C (pins TBD)

```

Interfaces and boundaries

- GPIO is **3.3 V logic only**. Never apply 5 V directly to GPIO.
- DAC output is line level; an appropriately specified headphone stage is required.
- The precise OLED module must be identified; datasheet connector orientation and actual active area must be verified.
- The software currently expects MPD at localhost port 6600; it does not perform battery shutdown control.
- 5 V input must be sized for startup/current transients and measured with the complete assembly.

Current integration state

Software is a prototype and CAD is concept-level. There is no integrated PCB or verified battery power solution. This drawing is a design intent, not an as-built schematic.

02 Hardware/01 Hardware Design and GPIO

Hardware Design and GPIO Assignment

ID: CS84-HW-001 | **Rev:** 1.1 | **Status:** Proposed pin plan, subject to bench testing

Main components

1. Raspberry Pi Zero 2 W, 512 MB RAM, 65 × 30 mm board.
2. Waveshare 2.42-inch monochrome OLED, SSD1309, 128 × 64 pixels, SPI, PCB approximately 61.5 × 39.5 mm.
3. GY-PCM5102 / PCM5102A stereo I2S DAC module.
4. Stereo headphone amplifier module (model not selected) and 3.5 mm TRS panel jack.
5. EC11 mechanical rotary encoder (exact detent/pulse variant pending) and three normally-open pushbuttons.
6. 64 GB microSD card; rechargeable power components unselected.

GPIO mapping

Function	BCM / interface	Raspberry Pi physical pin	Comment
---	---	---	---
OLED VCC	3.3 V	1	Verify module voltage requirement
OLED ground	GND	6	Common ground
OLED DIN/MOSI	GPIO10	19	SPI MOSI
OLED CLK	GPIO11	23	SPI SCLK
OLED CS	GPIO8	24	SPI CE0
OLED DC	GPIO25	22	D/C signal
OLED RESET	GPIO27	13	Reset
Encoder A	GPIO5	29	Pull-up input
Encoder B	GPIO6	31	Pull-up input
SELECT	GPIO16	36	Switch to GND
PLAY	GPIO20	38	Switch to GND
STOP/BACK	GPIO26	37	Switch to GND; software currently BACK
I2S BCLK	GPIO18	12	DAC clock

| I2S LRCLK | GPIO19 | 35 | DAC left/right clock |

| I2S DIN | GPIO21 | 40 | Pi audio data output |

| Shared ground | GND | 34 | Example button common ground |

Electrical design checks

- Check PCB size, mounting hole geometry, connector thickness, ground clearance and wiring radius.
- Test encoder debounce and directional resolution; the current software's GPIO map is not a mechanical verification.
- Confirm physical clearances for jack, switch and planned charging port.
- Confirm correct I2S driver overlay for the exact PCM5102 module and inspect ALSA card enumeration.
- Test DAC/headphone amplifier levels, output noise, short-circuit behavior and hearing safety.
- No final circuit schematic or PCB Gerbers have been produced.

External references

- <https://www.raspberrypi.com/products/raspberry-pi-zero-2-w/>
- https://www.waveshare.com/wiki/2.42inch_OLED_Module

02 Hardware/02 Power and Battery Strategy

Power and Battery Engineering Note

ID: CS84-PWR-001 | **Rev:** 1.1 | **Critical open design item**

Required architecture

A protected single-cell Li-ion/LiPo pack (~2500–3000 mAh as a provisional capacity) will require a compatible charger, power-path/load-sharing circuitry, a regulated Pi-compatible 5 V rail, appropriate over-current/over-discharge protection, battery-state reporting and controlled filesystem shutdown. Do not assemble a battery-operated unit until those elements have been designed and verified together.

Mandatory validation

1. Record board input current at boot, idle and peak audio/network workload; size regulator accordingly.
2. Verify USB charging with the device ON and OFF, including load sharing, thermal behavior and termination.
3. Verify 5 V undervoltage margin during CPU/Wi-Fi bursts and near depleted-cell voltage.
4. Implement and test shutdown: signal low battery; halt OS; only then remove the 5 V rail.
5. Assess mechanical restraint, insulation, pack swelling clearance and temperature rise in the 33 mm housing.
6. Select a protected pack from a reputable supplier with applicable transport and safety documentation.

Prototype bring-up restriction

Use an external 5 V regulated power supply (capable of adequate current, e.g. nominal 2.5 A) before any battery tests. A generic TP4056 charger board is **not** by itself a complete safe power-management system for a Pi-based portable computer.

Status

Battery model, charger module, fuel gauge and regulated power path: **TBD**. Battery runtime: **not measured; not quoted**.

02 Hardware/03 Procurement and BOM Notes

Procurement Notes and BOM Release Conditions

ID: CS84-BOM-NOTES-001 | **Rev:** 1.1

The workbook `07\_References/CS84\_Professional\_BOM\_v1\_1\_EN\_EUR.xlsx` contains a preliminary parts list with estimated EUR prices and procurement references, prioritizing Amazon.de searches where appropriate. These are indicative budgets, not confirmed vendor quotes or approved purchase orders.

Procurement gates

Candidate modules that can be bought for bench experimentation: Pi Zero 2 W; the specifically selected Waveshare 2.42-inch OLED; the GY-PCM5102 DAC; an EC11 sample, noting its exact variant is not specified yet.

Do not freeze for production or order in volume: charger/battery system, headphone amplifier, headphone jack and its position, USB-C connector, mechanical wheel support, SELECT plunger, attachment fasteners, and final print bill of materials.

BOM fields and revision policy

The workbook includes item code, category, part name, technical description, manufacturer, part number/model, quantity, units, unit price, total, class, status, vendor/reference and notes. A line with `TBD`, `Open` or `To select` is **not approved for purchase** without engineering review.

Cost assumptions

No labor, tools beyond listed bench PSU, shipping, inspection, design revisions, scrap prints, manufacturing overhead, compliance tests or commercial margin. One-off unit prototypes normally cost more than arithmetic parts totals.

03 Mechanical/01 CAD and 3D Printing

Mechanical Design, CAD and 3D Printing

ID: CS84-MEC-001 | **Rev:** 1.1 | **Status:** Concept-stage CAD only

Baseline geometry

Preliminary enclosure approximately 94 mm wide × 155 mm tall × 33 mm deep. Rear housing CAD: 94 × 155 × 30 mm, approximate wall thickness 2.6 mm. Visible display aperture 56 × 29 mm. Rotary wheel outer diameter around 67.5 mm with eight radial index markers, central SELECT key. Raspberry Pi 65 × 30 mm, nominal hole spacing 58 × 23 mm.

Available CAD assets

The `03\_Mechanical/CAD\_STL/` folder contains the CS84_Retro80.scad parametric source and seven conceptual STL files: `body`, `front`, `wheel`, `select`, `play`, `stop`, and `bezel`. These assets remain unvalidated.

Provisional print recipe

PETG in warm ivory/beige. Initial trial print with 0.20 mm layer height, four perimeters, 15–20% infill. Trial-fit mating surfaces; typical printer-dependent clearance goal of approximately 0.2–0.4 mm. Test the front face alone before committing to the full assembly.

Unresolved mechanical elements

- Waveshare PCB retaining bosses and serviceable display mount.
- Support/bearing for the large rotating wheel, independent of the EC11 shaft; secure coupling and detent feel.
- SELECT button plunger guidance and PLAY/STOP switch mounts.
- Audio amplifier, DAC, battery, charger and fuel gauge mounts.
- Panel cutouts for jack, USB-C and power control.
- Thermal and wiring/strain-relief clearances, assembly sequence and fastening lengths.

Gate before production print

Revise CAD after component sample measurements, generate dimensioned drawing, test wheel rotation and screen aperture, and sign off a fit/clearance checklist. V1 STL files must **not** be represented as manufacturing-ready.

03 Mechanical/02 Assembly Guide

Assembly Guide — Bench Prototype

ID: CS84-ASM-001 | **Rev:** 1.1 | **Status:** Work instruction draft, not a completed assembly record

Prerequisites

ESD-safe bench, regulated 5 V external supply, microSD prepared with Raspberry Pi OS Lite, small screwdriver, continuity meter, verified module pinouts, soldering tools and printed trial parts.

Sequence

1. Review the CAD/STL measurements against the specific OLED and Pi units; inspect mounting points.
2. Trial-fit the display aperture, bezel and front panel. Protect OLED glass from pressure or screw contact.
3. Mount Raspberry Pi on suitable spacers without shorts; perform mechanical and electrical continuity checks.
4. Wire OLED SPI pins, rotary encoder and SELECT/PLAY/BACK buttons according to the interface table. Use correct BCM numbering; never feed 5 V into GPIO.
5. Wire DAC to I2S, with common ground, and test ALSA output through a verified headphone amplifier (or safe line-level test equipment).
6. Boot from an external regulated 5 V source; confirm SPI operation and execute the smoke test.
7. Install and test the CS-84 OS software on a dedicated Pi image; check music browsing and transport behavior.
8. Prototype wheel guide/bearing and coupling. Do not force the EC11 shaft to bear full wheel loads.
9. Only after power-system approval, fit the protected cell and charger system; complete thermal and cutoff validation.
10. Photograph the final assembly, record part numbers and serials, and update as-built drawings.

Hold points

H1 before powering: voltage/polarity check; H2 before connecting audio: output-level check; H3 before battery integration: power safety sign-off; H4 before closing housing: no pinching, appropriate thermal clearance and strain relief.

04 Software/01 Operating System and Install

Cupertino Sound CS-84 OS 1.0 — Software Guide

ID: CS84-SW-001 | **Release:** CS-84_OS_1_0 | **Status:** Software prototype, physical hardware untested

Stack

Raspberry Pi OS Lite (32-bit preferred for Zero 2 W), MPD music server, ALSA audio, Python 3 UI, `luma.oled` SPI SSD1309 output, `gpiozero`/`lgpio` GPIO input, `systemd` service `cs84.service`. Source code under `04\_Software/CS-84\_OS\_1\_0/`.

Preparation

1. Flash Raspberry Pi OS Lite to a microSD card, configure Wi-Fi and SSH if needed.
2. Enable SPI using `sudo raspi-config` and reboot.
3. Connect components following `02\_Hardware/01\_Hardware\_Design\_and\_GPIO.md` **only when unpowered**.
4. Configure appropriate I2S overlay for the purchased PCM5102A board (often `dtoverlay=hifiberry-dac` in `/boot/firmware/config.txt`, verify its datasheet); reboot and check `aplay -l`.
5. Set the ALSA default output to the DAC before launching MPD, or adapt the provided MPD output configuration.
6. From the OS source distribution run `sudo bash scripts/install.sh` **on a fresh dedicated Pi installation**.
7. Copy music into `/var/lib/mpd/music`, use `sudo mpc update` to index, and check `systemctl status cs84 mpd`.

Important installer warning

The supplied installer **replaces** `/etc/mpd.conf`, installs apt/pip dependencies and creates a system service/user. It does **not** automatically configure boot overlays, ALSA routing, battery control or safe power-off. Back up existing configurations if not on a fresh dedicated image.

Simulation and tests

From package directory, with Python and Pillow available:

```
""bash

python -m unittest discover -s tests -v

python -m cs84 --simulate --output ./screen.png

...
```

Terminal controls: `w/s` navigate, `e` SELECT, `p` PLAY, `b` BACK, `q` exit. The simulation still attempts to contact MPD; absent MPD it may display `OFFLINE`. The standalone `CS-84\_Simulator.html` is a browser-based UI mock-up, not a physical hardware emulator or music decoder.

Operational mapping

Rotary wheel changes the selected menu item; while in the player view, wheel changes volume in 5-point steps. SELECT opens menus/chooses album; PLAY toggles playback/pause; BACK switches views. ****Although the enclosure labels the red button STOP, current firmware handles it as BACK; STOP semantics require a specification/software update.****

Remaining software work

Battery gauge, low-power shutdown, media transfer UX, specific track browsing, persistent settings, audio card diagnostics, hardware GPIO/SPI/I2S acceptance testing, encoder debounce tuning and correct user-facing behavior for the STOP button.

Maintenance commands

```
```bash

sudo systemctl restart cs84

sudo journalctl -u cs84 -n 100 --no-pager

sudo systemctl status mpd cs84

sudo mpc update

```
```

04 Software/02 User Interface and Controls

OLED User Interface and Control Specification

ID: CS84-UX-001 | **Rev:** 1.1

Reference screen

Monochrome 128 × 64 pixel OLED. Display content should show device title/branding where suitable, playback status, album or track name, playback progress/time and battery state **once battery telemetry exists**. The marketing concept render depicts an example named track; it is not proof of the exact 128 × 64 pixel layout implemented in code.

Views

- **Player:** now-playing information, progress/time, volume adjustment by wheel.
- **Main menu:** Now Playing, Albums, Update Library, Volume.
- **Albums:** list items returned by MPD, select to clear/replace playlist and begin playback.
- **Offline/error:** indicate MPD connection errors.

Control semantics now implemented

| Control | Current response | Desired future refinement |

| --- | --- | --- |

| Encoder CW / CCW | Navigate list or ±5 volume | Tune direction, debounce and acceleration |

| SELECT | Enter menu, confirm menu item/album | Optional long press for main menu |

| PLAY | Play/pause via MPD | Add long-press behavior only after testing |

| Red button | BACK (not STOP) | Define separate STOP/BACK semantics |

Typography and layout

Design for actual monochrome pixels, not a simulated segment LCD. Limit text overflow via truncation or scrolling. Contrast and line spacing must be verified on the purchased display. The existing package includes a reference PNG under `04\_Software/CS-84\_OS\_1\_0/`.

05 Validation/01 Verification and Test Plan

System Verification and Test Plan

****ID:**** CS84-VER-001 | ****Rev:**** 1.1 | ****Test status:**** NOT EXECUTED on physical hardware

| Test ID | Objective | Acceptance condition | Status |
|---------|-----------|----------------------|--------|
|---------|-----------|----------------------|--------|

| | | | |
|-----|-----|-----|-----|
| --- | --- | --- | --- |
|-----|-----|-----|-----|

| | | | |
|-------|-----------------------|--|------|
| T-001 | CAD dimensional check | Sample modules fit without mechanical interference | OPEN |
|-------|-----------------------|--|------|

| | | | |
|-------|--------------------|--|------|
| T-002 | Screen boot/render | 128×64 text readable and stable at required SPI rate | OPEN |
|-------|--------------------|--|------|

| | | | |
|-------|--------------------------|--|------|
| T-003 | Wheel rotation and click | 100 consecutive detents registered without false steps | OPEN |
|-------|--------------------------|--|------|

| | | | |
|-------|---------------|--|------|
| T-004 | PLAY and BACK | 50 cycles each; labels match actual behavior or revised labels | OPEN |
|-------|---------------|--|------|

| | | | |
|-------|-----------|--|------|
| T-005 | I2S audio | Stereo MP3/FLAC playback without audible artifacts | OPEN |
|-------|-----------|--|------|

| | | | |
|-------|-------------------|---|------|
| T-006 | Extended playback | ≥4 hours continuous playback on external bench supply | OPEN |
|-------|-------------------|---|------|

| | | | |
|-------|-------------|--|------|
| T-007 | MPD library | At least 3 albums load with correct metadata | OPEN |
|-------|-------------|--|------|

| | | | |
|-------|------------------|---|------|
| T-008 | Startup recovery | Five cold boots without intervention or data corruption | OPEN |
|-------|------------------|---|------|

| | | | |
|-------|--------------|--|------|
| T-009 | Power safety | 5 V stays in spec; controlled OS shutdown before cut-off | OPEN |
|-------|--------------|--|------|

| | | | |
|-------|-----------------------|--|----------------------------|
| T-010 | Battery charge safety | Thermal/current/termination and ON/OFF charge validation | BLOCKED — power design TBD |
|-------|-----------------------|--|----------------------------|

| | | | |
|-------|-------------------|---|------|
| T-011 | Enclosure thermal | Measured temperatures meet component safety margins | OPEN |
|-------|-------------------|---|------|

| | | | |
|-------|------------------|---|------|
| T-012 | Headphone output | Check output and volume safety with 16/32 Ω loads | OPEN |
|-------|------------------|---|------|

| | | | |
|-------|---------------|---|------|
| T-013 | Documentation | Full as-built schematic/BOM and English user guide complete | OPEN |
|-------|---------------|---|------|

Test record form

Record: specimen ID, PCB/module revision, OS image/hash, date/time, tester, instruments and calibration, initial conditions, steps, measured results, PASS/FAIL, linked photos/logs, corrective action, retest outcome.

Current software evidence

Python syntax/unit test checks were previously reported for the source distribution, but were not equivalent to integrated hardware tests. This documentation release does not claim any electrical, mechanical or environmental test passes.

05 Validation/02 Risk Register

Engineering and Product Risk Register

****ID:**** CS84-RSK-001 | ****Rev:**** 1.1

| ID | Risk | Severity | Mitigation / exit condition |

|---|---|---|---|

| R01 | Li-ion overheating or improper load sharing | Critical | Select integrated charger/power path, protection and test thermals before battery use |

| R02 | Filesystem corruption on switch-off | High | Add power-hold and software-driven clean shutdown |

| R03 | Unstable 5 V under peak Pi load | High | Measured load budget, scope startup/network transients |

| R04 | Headphone line output not designed for 16/32 ohm load | Medium | Select and validate stereo headphone amplifier |

| R05 | Wheel mount loads EC11 shaft | High | Mechanical bearing/tube and coupling independent of encoder |

| R06 | Actual screen PCB does not fit front panel | Medium | Verify PCB datasheet and print fit gauge |

| R07 | STOP label does not match firmware BACK | Medium | Reconcile hardware legend with final input specification |

| R08 | Potential conflicts with third-party intellectual property | High | Maintain independent visual identity; complete IP clearance before commercialization |

| R09 | Reuse of third-party AI concept artwork | High | Confirm rights or commission wholly original visual asset |

| R10 | Prototype released as finished/approved product | High | Use explicit release classifications and gate-based approvals |

| R11 | Excess heat in sealed 33 mm enclosure | Medium | Measure actual thermal profiles and adapt airflow |

Commercial release gate

Before any sale, commission qualified review for relevant EU electrical/electronic safety requirements, EMC, radio equipment applicability due to Wi-Fi/Bluetooth, RoHS/WEEE, battery, labeling and consumer information. This engineering package is not a regulatory compliance report.

06 Product/01 User Guide Draft

Cupertino Sound CS-84 — User Guide (Draft)

****Document ID:** CS84-UG-001 | ****Rev:**** 1.1 | ****For a future validated prototype only******

What is the CS-84?

A conceptual portable local-music player with an ivory housing, 128×64 monochrome screen and distinctive rotary navigation wheel. The design is inspired by late-1980s electronics, but it is a contemporary independent project, not a historical commercial product.

Controls — current software prototype

- Turn the wheel: scroll a menu or change playback volume in the player screen.
- SELECT: open and confirm menu/album choices.
- PLAY: play or pause music.
- Red key: BACK in CS-84 OS 1.0. ****Despite the STOP marking in artwork, it is not implemented as dedicated STOP.****

Media

Music is indexed from microSD storage under MPD. The engineering setup imports files to `/var/lib/mpd/music` and runs `sudo mpc update`. MP3/FLAC behavior must be proven in hardware tests.

Charging and safety

The battery configuration has not been approved, so no public charging or operating instructions are available yet. Do not assemble or charge an internal battery based only on this draft. Use a verified 5 V external test supply during engineering bring-up.

Troubleshooting prototype

- Screen blank: verify SPI, pin mapping, supply and reset line.
- No audio: check PCM5102 wiring, selected ALSA card, volume, MPD running and separate headphone amplifier.
- Menu not moving: validate BCM pins and EC11 debounce/direction.
- Display says OFFLINE: check MPD service and localhost TCP 6600.

Release status

Draft only; not a shipping user manual. No runtime, charging duration, operating temperature or warranty claims can yet be provided.

06 Product/02 Brand and Publication Guide

Brand and Publication Guide

ID: CS84-BRAND-001 | **Rev:** 1.1 | **Status:** Working creative identity, pending clearance

Identity

Brand: CUPERTINO SOUND | **Model:** CS-84 | **Operating system:** CS-84 OS | **Current build label:** CS-84_OS_1_0.

Visual principles

Ivory/cream housing, charcoal typography, restrained 1980s electronic-product styling, minimal accents and precise geometric wheel markings. Use the independently developed Cupertino Sound icon and wordmark consistently.

Messaging

Suggested current English copy: “Portable Music. Personal Choice.” Present the artifact as a 2026 concept/prototype inspired by vintage electronics, not a historical 1988 commercial release.

Artwork and labels

The recent illustrated advertisement includes a stylized © 1988 Cupertino Sound Inc. line. This is fictional branding, not a true claim of incorporation or a genuine historical copyright notice. For publication, replace or clearly contextualize it with “An imagined 1988 product concept — created in 2026” and a correct current copyright statement only where justified. Avoid promises such as included headphones, tested rechargeable runtime or product availability if not substantiated.

Trademark and rights disclaimer

“Cupertino Sound” and “CS-84” have not been confirmed cleared in EUIPO, UPRP, WIPO or domain name searches. The project's initial inspiration image was supplied by the user but authorship/license is not established. Seek professional IP review before selling products or releasing downloadable commercial artwork. A disclaimer is not a substitute for a license.

Site footer example

“Cupertino Sound CS-84 is an independent design and engineering prototype inspired by late-1980s consumer electronics. Concept images may depict non-final features.”

07 References/01 References and Legacy Files

References, Traceability and Known Legacy Materials

ID: CS84-REF-001 | **Rev:** 1.1

Authoritative development references

- Raspberry Pi Zero 2 W product: <https://www.raspberrypi.com/products/raspberry-pi-zero-2-w/>
- Waveshare 2.42-inch OLED SSD1309: https://www.waveshare.com/wiki/2.42inch_OLED_Module
- MPD manual: <https://www.musicpd.org/doc/html/>
- Raspberry Pi documentation: <https://www.raspberrypi.com/documentation/>
- EUIPO IP search: <https://www.euipo.europa.eu/en/search-ip>

Retained source and legacy files

- `03\_Mechanical/CAD\_STL/CS84\_Retro80.scad`: editable OpenSCAD enclosure concept source.
- `07\_References/CS84\_Professional\_BOM\_v1\_1\_EN\_EUR.xlsx`: active English-language procurement workbook in EUR; part selection remains provisional.
- The previous Polish README is intentionally excluded from this English-only delivery. The English `04\_Software/01\_Operating\_System\_and\_Install.md` is the active documentation.
- UI simulator is illustrative; it is not a substitute for hardware qualification.

Planned revisions

Rev 1.1 should include CAD fit-validated enclosure, updated BOM with exact purchasable manufacturer part numbers, electrical schematic/power architecture, tested STOP/BACK behavior, display/encoder/audio logs and finished publication artwork.