

WORK LOAFER EDITION / INDEPENDENT PARODY RECONSTRUCTION

CODEX KEYBORED

Parametric Fusion 360 mechanics, production STEP/DXF files, a wired six-layer PCB, BOM/CPL, USB HID firmware, and live JLC quotes—assembled into one reproducible first-article package.

108 × 108 MM

12 KEYS + ENCODER PRESS

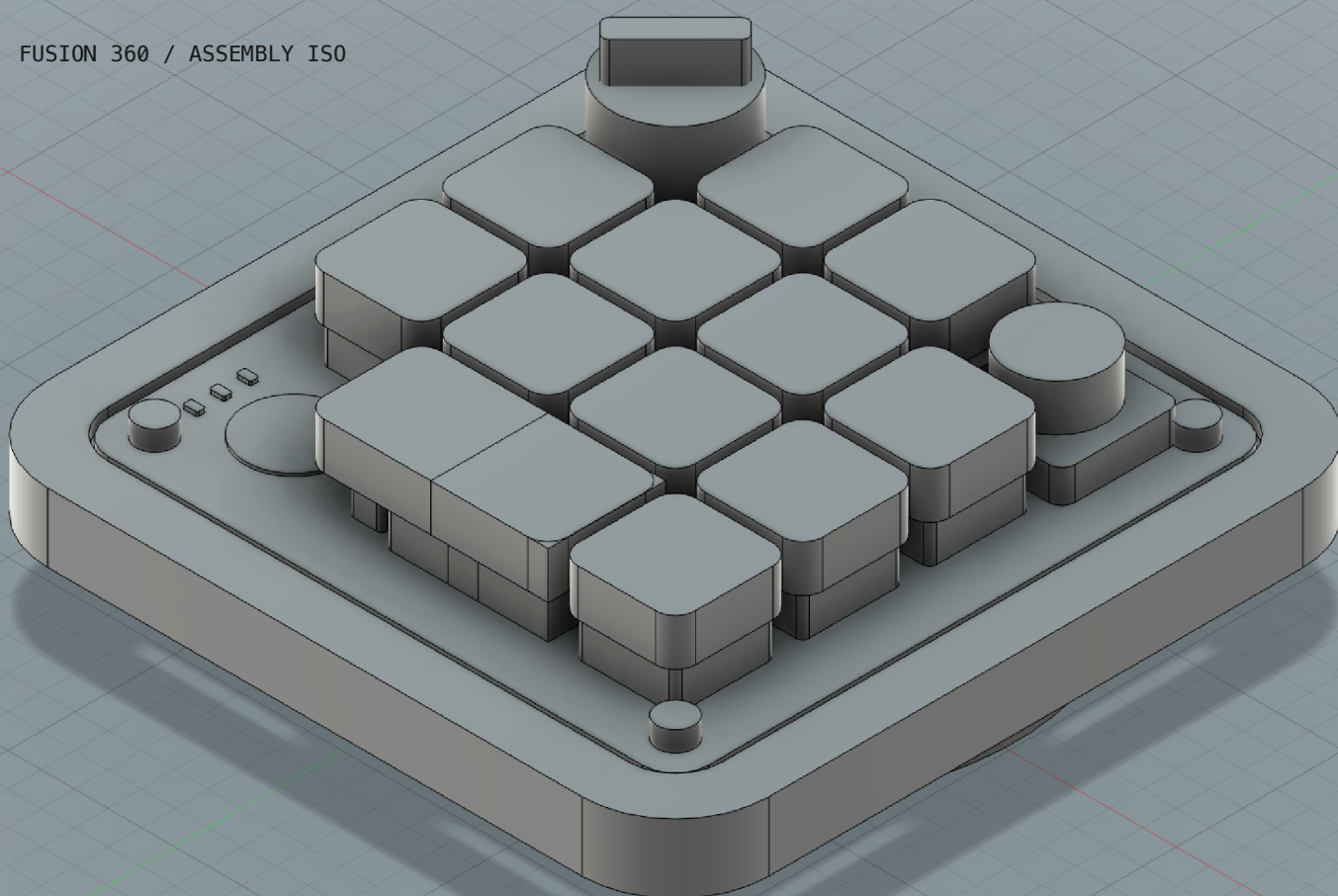
5° WEDGE

STM32F072 / USB-C

[DOWNLOAD COMPLETE HANDOFF](#)

[VIEW SCHEMATIC](#)

FUSION 360 / ASSEMBLY ISO



ABSOLUTELY 100% VIBE-CODED. END TO END.

FROM THE FIRST PROMPT TO FUSION 360, KICAD, GERBERS, FIRMWARE, AND A REAL UPLOAD INTO JLCPCB + JLCCNC.

This is not a disclaimer. It is the product story. One continuous conversational build loop crossed research, industrial design, CNC, multilayer electronics, sourcing, firmware, testing, pricing, and factory handoff—and left every intermediate artifact open for inspection.

01 / OBSERVE

IMAGES BECAME EVIDENCE

Public renders were compared, scaled from the 19.05 mm key pitch, and separated into confirmed, measured, and inferred facts.

02 / MODEL

EVIDENCE BECAME SOLIDS

Dimensions became a parametric 108 × 108 mm Fusion assembly, four machinable bodies, STEP/DXF, and controlled drawings.

03 / CONNECT

CONTROLS BECAME A PCB

The interface became a clean-room STM32F072 design, six copper layers, 74 placement centers, and a zero-error DRC gate.

04 / ANIMATE

THE PCB LEARNED USB

TinyUSB firmware, RGB safety limits, factory binaries, checksums, and a browser-based 20-input acceptance test made it behave.

05 / CONTRACT

PREFERENCES BECAME AN SOP

“No soldering at home” became both-side PCBA, consigned switches, manual operations, flashing, FCT, and photo evidence.

06 / QUOTE

FILES ENTERED THE FACTORY

Gerbers, BOM/CPL, STEP, drawings, and the turnkey ZIP entered authenticated JLC flows and returned real saved prices.

PROMPT → DATUM → FUSION → STEP → JLCCNC / ARCHITECTURE → KICAD → GERBER → JLCPCB /
FIRMWARE → TEST → TURNKEY HANDOFF

The best example is one sentence: “the aluminum thing looks slightly tilted.” That observation propagated into a corrected 5° wedge, a refreshed Fusion body, a new STEP file, a revised drawing, a successful JLCCNC import, a **\$54.56** live quote, and removal of the obsolete flat part from the cart. That traceable continuity—from vibe to physical manufacturing—is the project.



OPEN SOURCE / EVERY FILE / EVERY DECISION

THE COMPLETE BUILD LOG IS PUBLIC

OPEN THE PROJECT ON
GITHUB

github.com/slopus/codex-keyboard

CAD • PCB • GERBERS • FIRMWARE • QUOTES • FACTORY HANDOFF

BUILT & PUBLISHED BY

HAPPY ENGINEERING

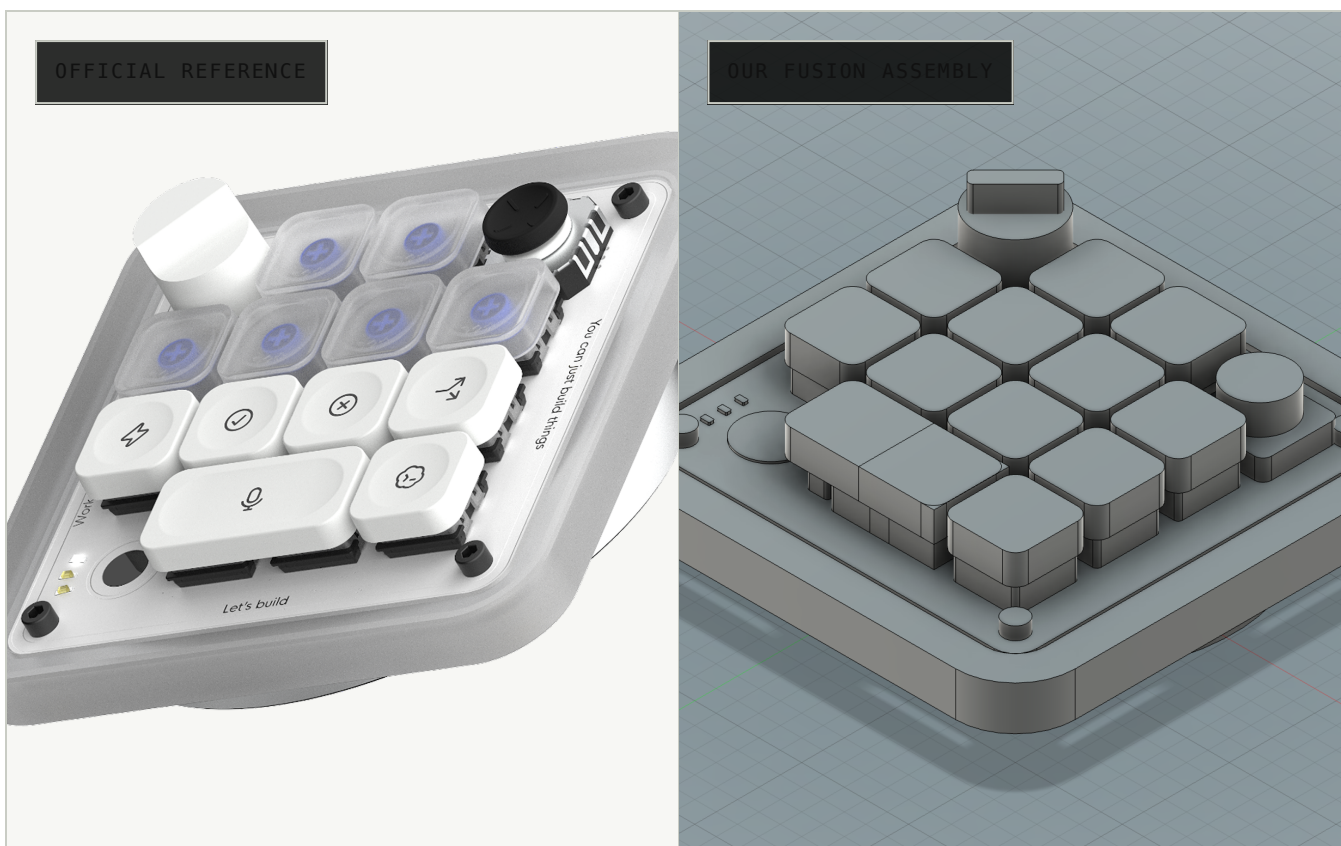
Tools, experiments, and open-source projects for
building ambitious things with coding agents.



This independent parody prototype is hosted under the Happy Engineering GitHub Pages domain.

WHAT WE ACTUALLY KNOW

External dimensions were scaled from the official near-orthographic render using the confirmed 19.05 mm key pitch. Internal steps and fasteners remain engineering assumptions until a physical unit can be inspected.



Corrected interpretation: the top panel contains twelve conventional low-profile MX keys. Work Louder's published "13 mechanical switches" count includes the encoder push; there is no mystery thirteenth key in the model or PCB.

MEASURED

108 × 108

external envelope, mm

CONFIRMED

19.05

center pitch, mm

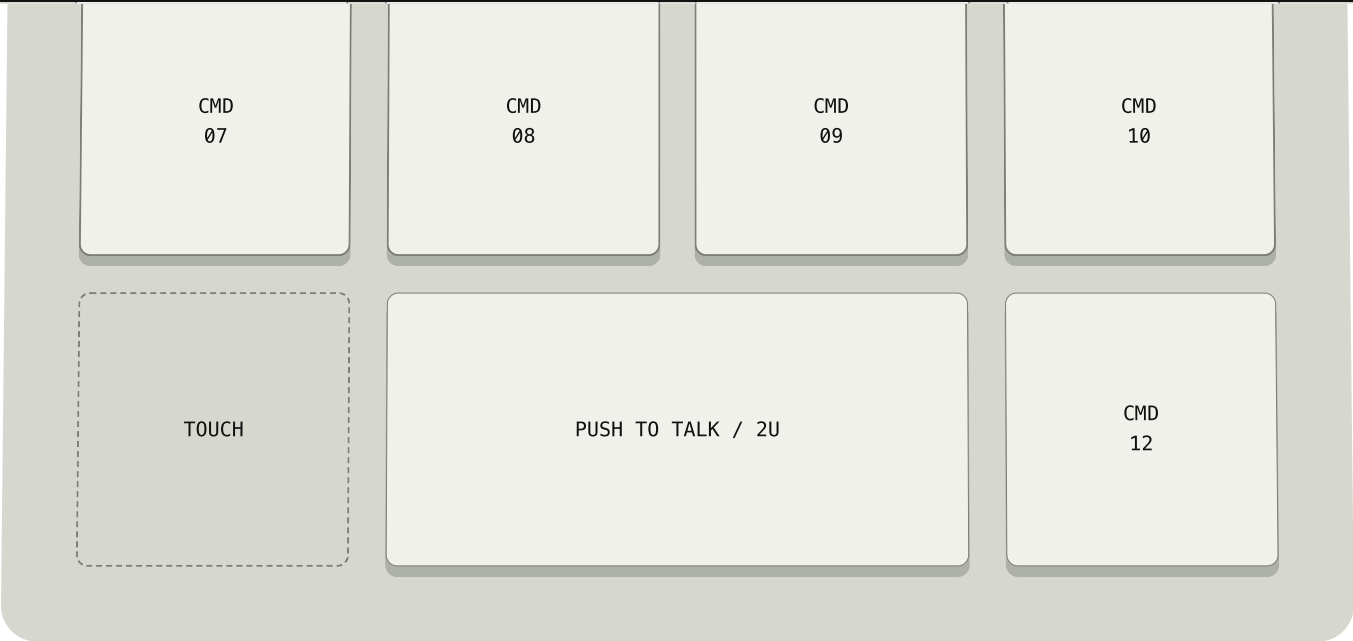
MEASURED 90 × 90 top PCB, mm	MEASURED R14 external corner radius
MEASURED Ø94 aluminum base, mm	MEASURED 5° working-plane tilt
INFERRED 3.8 → 12 wedge thickness, mm	INFERRED M3 / 78 fastener / pitch, mm

02 / INTERFACE MAP

THE EXACT LAYOUT

A 4×4 coordinate grid centered at ±28.575 and ±9.525 mm. The encoder sits on the left and the planar joystick on the right, matching the full-size official reference.





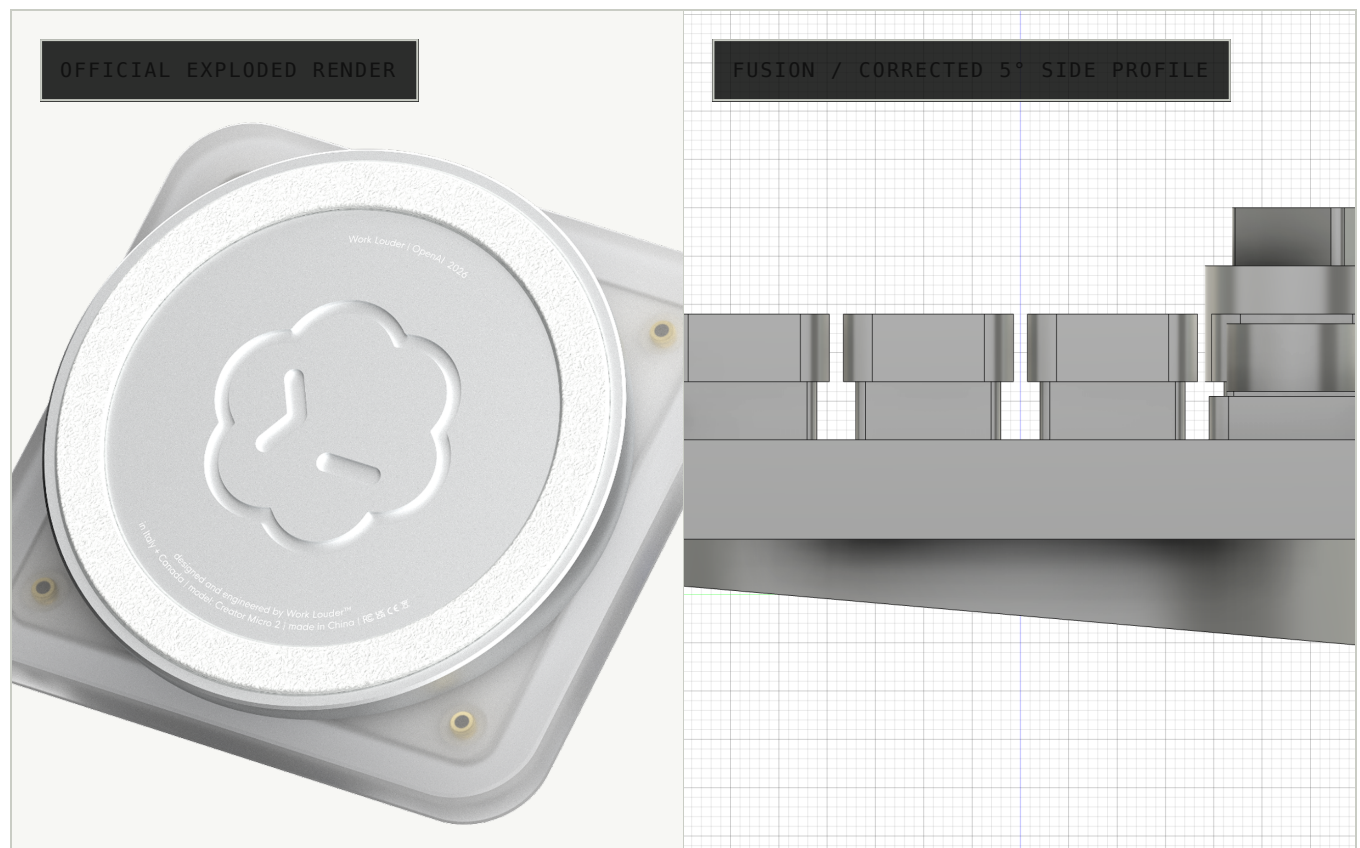
Key plane	11 × 1U + 1 × 2U, wrk. LP1 / Gateron low profile footprint Z +
Top PCB	6-layer FR-4, 90 × 90 × 1.6 mm, four provisional M3 holes 1.60 mm
Light pipe	optional frosted PMMA insert; retain for opaque/wood upper housing 1.50 mm
Upper ring	polycarbonate/PMMA, 108 × 108, inner opening 92 × 92 10.30 mm
Electronics	STM32F072, USB-C, lower keep-out and future wireless/battery volume variable
Weight wedge	6061-T6, Ø94, planar top, 5° underside 3.8–12 mm
Grip ring	silicone/EPDM with 3M 467MP adhesive

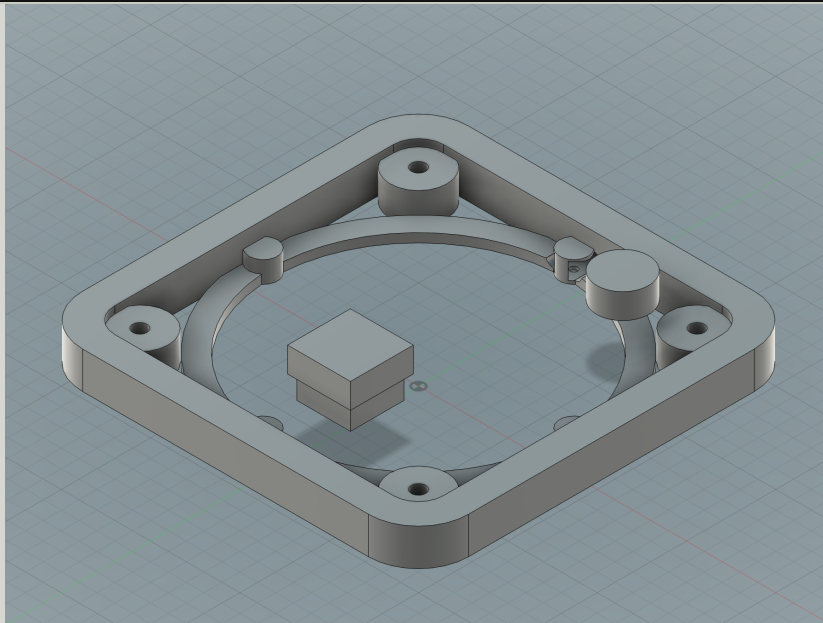
KEYS & CONTROLS

The exact Codex legend set is not sold separately. For a one-off, the most reliable path is genuine Work Louder switch/cap geometry, followed by UV printing or laser ablation after a coating test coupon.

WHAT TO BUY	DEVICE QUANTITY	CURRENT SOURCE	STATUS	USD
wrk. LP1 switches	12 + spares; pack = 106	Work Louder / Splash silent or Ember clicky	EXACT FAMILY	\$59.00
wrk. MX Pure	12×1U + 1×2U set	Frosted PC, pass-through light	EXACT GEOMETRY	\$19.00
wrk. MX Legend	optional icon donor set	58×1U + 1×2U, coated/laser etched	SIMILAR ICONS	\$54.00
wrk. Dial 2	1	Creator Micro v1/v2 compatible dial cap	EXACT ACCESSORY	\$5.98
Planar joystick	1 + spare	Alps RKJXY100000A surplus or a footprint-qualified clone	OBSOLETE CANDIDATE	\$10–30 budget
M3 hardware + standoffs	4 + spares	ISO 4762 black screws; threaded brass/aluminum spacers	FIT AFTER SAMPLE	\$10–20 budget
Grip ring	1	1 mm silicone/EPDM + 3M 467MP, laser/plotter cut	CUSTOM	\$5–15 budget

How to reproduce the Codex keycaps: use blank low-profile MX PBT with UV printing or temperature-qualified dye-sublimation for white keys. For illuminated keys, start with MX Pure, apply an opaque compatible coating, then laser-open the icon. Single-shot custom PBT is





CM2-001 / CNC

Upper housing

A diffusing outer bezel with an internal pocket for the 90 mm panel. Machine cast PC/PMMA for the transparent version; use stabilized maple, walnut, or birch laminate plus a separate light pipe for a warm wood prototype.

ENVELOPE

108 × 108 × 10.3

CORNER

R14

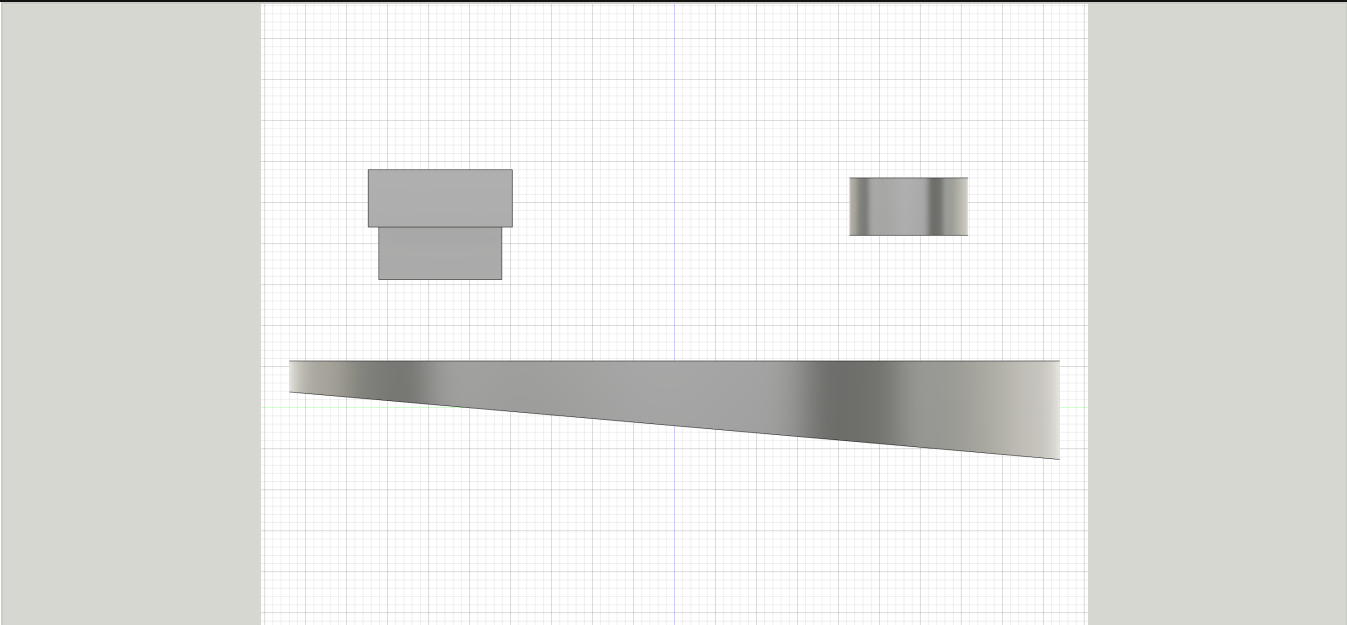
OPENING

92 × 92 / R7

VOLUME

41,391.64 mm³

\$58.96 / qty 1



CM2-002 / CNC / REVISED

Angled weight

A solid wedge with a flat upper datum and sloped underside. It corrects the critical error in the early flat base and establishes the slightly raised official profile.

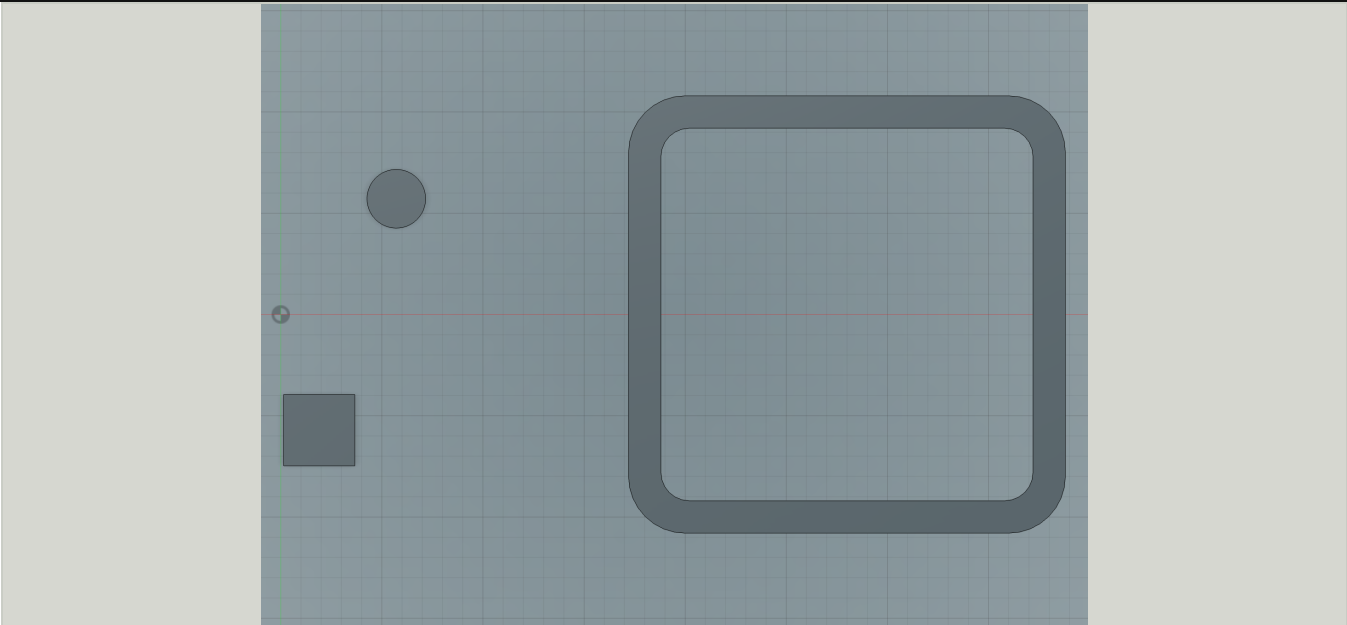
ENVELOPE
Ø94 × 12 max

TILT
5° nominal

THICKNESS
3.8 → 12.0

FINISH
bead blast + black anodize

\$54.56 / qty 1



CM2-003 / OPTIONAL

Light pipe

A thin matte PMMA insert between the PCB and an opaque housing. It is essential for the wood option; without it, the lower RGB chain cannot produce the characteristic perimeter glow.

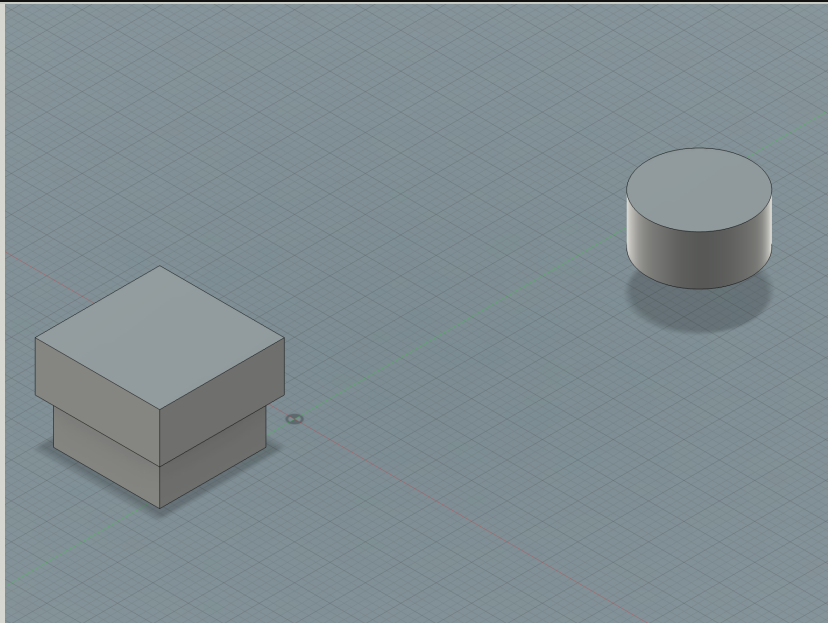
ENVELOPE
108 × 108 × 1.5

MATERIAL
frosted PMMA

FINISH
uniform matte

ROLE
underglow diffusion

\$40.62 / qty 1



CM2-004 / PROTOTYPE

Joystick cap

A rigid POM fit-check part. Cast the final tactile cap in Shore A 40–50 silicone after measuring the real RKJXY or selected substitute.

ENVELOPE
Ø14.5 × 7

QUOTE MATERIAL
POM

FINAL MATERIAL
silicone / TPU

FIT
depends on joystick shaft

\$19.42 / qty 1

05 / LIVE QUOTE

JLC CNC

Quotes were captured in an authenticated session on July 17, 2026. Prices are dynamic and exclude possible tax or duty; the corrected wedge is saved in the cart.

USD

My Account

Select Product

CNC Machining

3D Printing

Mechatronic Parts

Standard PCB/PCBA

Advanced PCB/PCBA

SMT Stencil

Online CNC Machining Quote

CNC Machining Ordering Guidelines > Upload History

Upload 3D models

File types: STEP,STP,DWG,DXF,PDF,Zip,Rar. File size: <100MB. [Upload Instructions](#)
 All uploads are secure and confidential.

Uploading weapons or parts containing export-controlled items which violates our [terms of use](#) will result in account disabled.

Charge Details

Total Price \$54.56
 Quotation will be completed in 2-4 hours during Mon-Sat: 9am-6pm, GMT+8.

Build time
☐ Expedited: 3 days
☒ Standard: 6 days
☐ Economic: 16 days
* The charges differ based on the build time.
☒ I agree to JLCCNC's [terms of use](#)

Submit Order

Save To Cart

Cart cleaned: the obsolete \$23.71 flat base was removed. Four production CNC items remain; CM2-002 is now the corrected 5° wedge at \$54.56.

PART	QUOTE ID	USD
CM2-001 / Polycarbonate	CNC...2636	\$58.96
CM2-002 / 6061 wedge	CNC...3034	\$54.56
CM2-003 / PMMA	CNC...2631	\$40.62
CM2-004 / POM	CNC...2621	\$19.42
CNC subtotal		\$173.56
PCB + PCBA		\$173.65
Combined shipping		\$29.69
JLC cart delivered estimate		\$376.90

Full IDs: wedge CNC2607175003034-3086316A; cap CNC2607175002621-3086316A; light pipe CNC2607175002631-3086316A; upper CNC2607175002636-3086316A. Cart weight: 1.06 kg; estimated ship date: July 25, 2026. Base threads remain unfrozen until first fit-check.



SHOPPING CART

All (5) JLCPCB (1) JLC3DP (0) JLCCNC (4) JLCMC (0) Flex Heater (0)

Item Qty

JLCPCB (PCB/PCBA/Stencil)



codex_micro_wired_revA_gerbbers_Y4

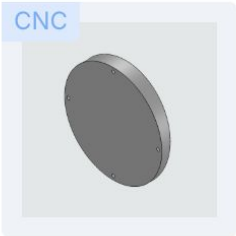
PCB prototype:Y4-3086316A

White, 1.6 Thickness, ENIG

Customer #:

Product Details | Edit Order

5



CNC

CM2-002_bottom_weight.step

CNC Machining: CNC2607175003034-3...

Aluminum 6061, Bead blasting + ...

Customer #:

Product Details | Edit Order

1



CNC

CM2-004_joystick_cap.step

CNC Machining: CNC2607175002621-3...

POM(Black), No surface finish

Customer #:

Product Details | Edit Order

1

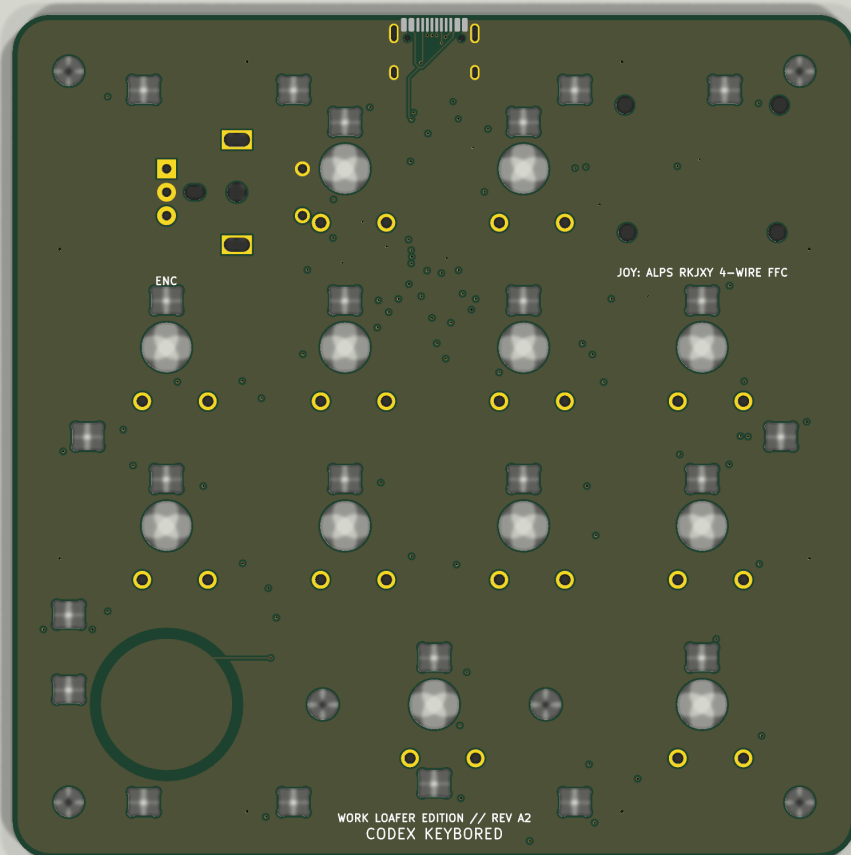
CNC

CM2-003_optional_lightpipe.s...

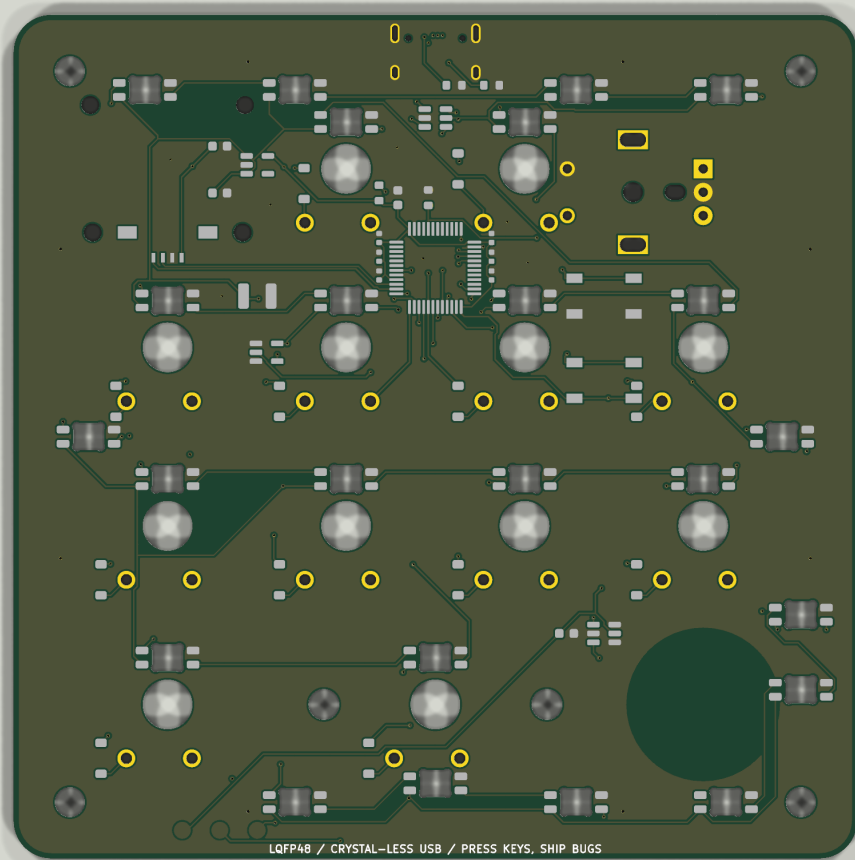
1

WIRED REV A2

The wired version preserves the 90×90 mm mechanical interface and internal volume for a future swappable wireless PCB. Six layers provide continuous GND/+5V planes, two signal layers, and a short crystal-less USB path.



TOP / CODEX KEYBORED + WORK LOAFER EDITION



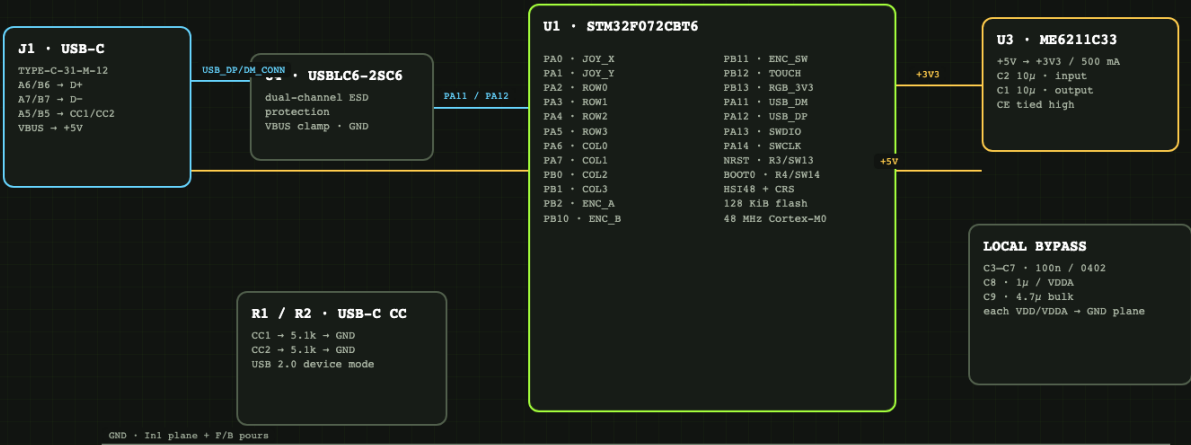
BOTTOM / STM32F072 island, power, matrix, RGB, and PRESS KEYS, SHIP BUGS

Production gate closed: KiCad DRC = 0 violations / 0 unconnected. The Gerber ZIP includes all six copper layers, mask, paste, silk, Edge.Cuts, and separate PTH/NPTH drill files. Machine-readable connectivity is exported as IPC-D-356.

CODEX KEYBORED

01 / USB, POWER, AND CONTROLLER ISLAND

REV A2 · WIRED
STM32F072CBT6 · 6 LAYERS
90 × 90 × 1.6 mm



USB Full Speed runs crystal-free: CRS continuously trims HSI48 from USB S0F. STM32F072 requires no external D+/D- series resistors; reversible pairs cross on SIGNAL_1/SIGNAL_2.

SWD + SERVICE
TP1 SWCLK · TP2 SWDIO · TP3 +3V3 · TP4 GND
SW13: NRST-GND · SW14: BOOT0→+3V3 · R3/R4: 10k bias

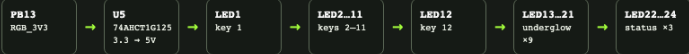
SCHEMATIC 1/3 / USB, power, STM32F072, SWD

RGB + PIN MAP + BUILD GATE

03 / ADDRESSABLE LIGHTING AND PRODUCTION TRUTH

24 × SK6812MINI-E
5V DATA LEVEL
100μF BULK

Data chain



All pixels: pin 1 +5V · pin 3 GND · reverse-bount routed window 3.38 × 2.98 mm. C19 = 100μF/6.3V at LED rail. U5 OE is tied low.

STM32F072CBT6 LQFP48 pin allocation

Pin group	Signal	Function
PA0 / PA1	JOY_X / JOY_Y	12-bit ADC
PA2-PA5	ROW0-ROW3	matrix row drive
PA6, PA7, PB0, PB1	COL0-COL3	matrix sense, pull-up
PB2 / PB10 / PB11	ENC_A/B/SW	quadrature + click
PB12 / PB13	TOUCH / RGB_3V3	touch input / LED data
PA11 / PA12	USB_DM / USB_DP	USB Full Speed
PA13 / PA14	SWDIO / SWCLK	program + debug
VBAT, VDDA, VDD×3	+3V3	local bypass C3-C9
VSSA, VSS×3	GND	dedicated In1 plane

Manufacturing gate

PCB	90 × 90 mm · 6 layer · 1.6 mm
Rules	0.15 mm route · 0.10 mm clearance
Vias	0.40/0.20 mm minimum through
Planes	In1 GND · In4 +5V · F/B GND pours
Touch	16.4 mm no-pour region under E1
DRC	0 violations · 0 unconnected
JLC assembly	37 placements · 16 BOM groups
Firmware	16,548 B flash · 2,448 B RAM
Status	build-verified; first article requires electrical bring-up

01

USB-C

HR0 TYPE-C-31-M-12, 5.1 kΩ CC, USBLC6 ESD; reversible pairs cross on SIGNAL_1/2.

02

STM32F072

LQFP48, 128 KB flash, HSI48 + CRS; no external crystal or QSPI flash.

03

Controls

12-key matrix, clickable encoder, analog X/Y joystick and capacitive touch.

04

Lighting

24 × SK6812MINI-E: 12 per-key, 9 underglow, 3 status; AHCT level shift.

05

Power

ME6211 3.3 V LD0, local bypass and 100 μF 5 V LED bulk capacitor.

REF	COMPONENT	SELECTED PART	LCSC	ASSEMBLY
U1	MCU	STM32F072CBT6 / LQFP48	C81720	JLC bottom
U3	3.3 V LD0	ME6211C33M5G-N	C82942	JLC bottom
U4	USB ESD	USBLC6-2SC6	C7519	JLC bottom
U5	LED level shift	SN74AHCT1G125DBVR	C7484	JLC bottom
U6	Touch controller	TTP223-BA6-TD	C42422127	JLC bottom
J1	USB-C	HR0 TYPE-C-31-M-12	C165948	JLC top side
D1-D12	Matrix diode	1N4148W	C81598	JLC bottom

REF	COMPONENT	SELECTED PART	LCSC	ASSEMBLY
LED1– LED24	RGB	SK6812MINI-E reverse mount	C5149201	JLC bottom
R3,R4	10 kΩ bias	Yageo RC0603FR-0710KL	C98220	JLC substitution
SW1– SW12	Low-profile switch	Work Louder wrk. LP1 / Gateron footprint	consigned	JLC manual/THT
ENC1	Encoder	Alps EC11E09444A8	C1322538	JLC manual/THT
JOY1	Joystick	Alps RKJXY1000006 with knob	consigned	JLC mechanical + FFC

● ZERO SOLDERING AT HOME

JLC CAN FINISH THE ELECTRONICS

The production route is now Standard PCBA on both sides, with specialty parts shipped directly into JLC's consigned-parts inventory. JLC manually installs the switches and encoder, fits the joystick, flashes the STM32, runs the supplied USB control test, and installs caps on the PRIMARY unit. The customer only closes the CNC enclosure with four screws after first-article fit approval.

01 / SOURCE

Consign special parts

One WRK-LP1 pack, four RKJXY joysticks, one keycap set, and one dial cap ship directly to JLC.

02 / BUILD

Both-side PCBA

JLC places SMD parts and USB-C, then manually solders 12 switches and the encoder.

03 / VERIFY

Flash + FCT

Program the release image, exercise 20 HID events, inspect all 24 RGB emitters, and save evidence.

04 / DELIVER

Primary + spare

One cosmetically completed control-pad PCBA, one programmed spare, and three bare reserve boards.

Live turnkey cart: JLC job Y5 / SMT026071763199-3086316A now holds five PCBs and two both-side Standard PCBA units. The

captured base is **\$193.01** (\$81.40 PCB + \$111.61 PCBA). Function testing, programming/manual work, the PCBA remark, and consigned-part procurement remain quote-after-review, so \$193.01 is a floor rather than the finished-device total.

24-hour PCB production. Fast Delivery to United States.



codex_micro_wired_revA_gersbers 

PCB Bill of Materials Component Placements Quote & Order

Charge Details

PCB Price	\$81.40 
Via Covering:	\$0.00
Special Offer:	\$31.00
Surface Finish:	\$17.50
Color:	\$32.90

Standard PCBA Price	\$111.61 
Setup Fee:	\$51.12
Stencil:	\$16.42
Panel:	\$0.00
Large Size:	\$0.00
Components(16 items):	\$17.81
Feeders Loading fee: 	\$24.48
SMT Assembly 	\$1.28
Packaging fee:	\$0.50

Advanced Options: (The cost of the options below is not included in the 'Total Price'. The final charge will be determined and paid after review.)

Function test: Quote after review

SMT Assembly ?	\$1.28
Packaging fee:	\$0.50

Advanced Options: (The cost of the options below is not included in the 'Total Price'. The final charge will be determined and paid after review.)

Function test:	Quote after review
Photo Confirmation:	\$8.21
Depanel boards & edge rail before delivery:	\$2.30
PCBA remark:	Quote after review

Build Time: ?

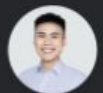
PCB: 5-6 days	\$0.00
Assembly: ☒ 3 - 4 days	\$0.00
☐ 2 - 3 days	\$49.26

Add 3 more days (extended by advanced options)

PCB Service

Support

Company



JLCPCB / LIVE TURNKEY CART

\$193.01 / captured base

THE HAND WORK IS IN THE FACTORY BRIEF

Both-side Standard PCBA, depaneling, photo confirmation, functional testing, and the complete 1.1 MB factory handoff are saved in the live JLC job. All 16 catalog groups passed the BOM matcher. Consigned switches and mechanical controls are called out in the attached SOP for manual assembly and engineering review.

Future Bluetooth compatibility: housing and fasteners do not depend on the STM32F072. The lower volume and port keep-outs remain available for

a replacement ESP32-S3/charging PCB, battery, and FFC; the current wired PCB remains a single monolithic board rather than a separate controller module.

4

Order Now

My Account

\$81.40

\$0.00

\$31.00

\$17.50

\$32.90

\$92.25

\$25.56

\$8.21

\$0.00

\$0.00

\$32.86

\$22.95

\$2.17

\$0.50

\$0.00

\$0.00

\$49.26

Total Price:

\$173.65

Weight

644.70g

Product Description

Office Appliance and Accessories / Keyboard

PCBA Remark

SAVE TO CART

By placing your order, you agree to [the Terms and Conditions of JLCPCB assembly Service.](#)

\$173.65 / partial baseline, before shipping

PCB \$81.40 + bottom-side Standard PCBA \$92.25. This saved price verifies the six-layer board and 15/15 bottom-side groups, but it does not include turnkey specialty-part assembly or testing. Whole baseline cart: \$347.21 merchandise + \$29.69 shipping = **\$376.90**. Do not treat that number as the final finished-device price.

USB HID READY

TinyUSB firmware was built with Arm GNU Toolchain 15.2 for the STM32F072CBT6. BIN/HEX/ELF files and checksums are ready; functional verification on a physical Rev A2 board is still required.

BUILD VERIFIED BIN / HEX ready for SWD	PROTOTYPE F13-F24 neutral key map
COMPILED 16,548 B flash / 12.63%	COMPILED 2,448 B RAM / 14.94%

ORDER FILES

All sources are local and reproducible. Before payment, open the STEP and Gerber files in an independent viewer and verify every critical fit against the selected physical components.

Complete order handoff / ZIP

Fusion, CNC, PCB, PCBA, firmware, test files, drawings, PDFs and SHA-256 manifest

PCBA factory handoff / ZIP

Focused turnkey electronics package for JLC engineering review

Fusion 360 / F3D

exported archive of the saved Codex assembly

CNC drawing pack / PDF

4 controlled sheets: dimensions, material, finish, acceptance

CM2-001 upper / STEP

108 × 108 × 10.3 / PC, PMMA or wood

CM2-002 wedge / STEP

Ø94 / 5° / aluminum 6061-T6

CM2-003 light pipe / STEP

optional frosted PMMA insert

CM2-004 joystick cap / STEP

POM fit prototype, then silicone

Wired Rev A2 / Gerber ZIP

6-layer 90 × 90 mm fabrication package

JLC assembly / BOM CSV

16 BOM groups / current LCSC mapping

JLC assembly / CPL CSV

57 machine placements

Turnkey assembly / BOM CSV

both-side SMD + manual controls + consigned parts

Turnkey assembly / CPL CSV

74 placements including switches and controls

Consigned parts / CSV

direct-to-JLC purchasing and install quantities

Turnkey assembly SOP

programming, secondary operations, test and acceptance

Factory control test

self-contained 20-input USB HID acceptance tool

Baseline omissions / CSV

legacy bottom-only quote gaps; assign these to the contract assembler, not the customer

IPC-D-356 / netlist

machine-readable final connectivity

Principle schematic / PDF

3 sheets: USB/MCU, inputs, RGB/build gate

Firmware / BIN

STM32F072 TinyUSB HID bring-up image

Firmware / HEX

SWD-friendly Intel HEX image

This is not leaked CAD and not an official product file. Geometry was reconstructed from public renders and published specifications; branded icons are included only as private-prototype references.

- OpenAI Supply Co × Work Louder – official product page
- Work Louder Creator Micro 2 – platform specifications
- Work Louder wrk. LP1 switches
- Work Louder wrk. MX Pure keycaps
- Alps Alpine RKJXY100000A official specification
- Analog Devices MAX77972 official page
- STMicroelectronics STM32F072CB datasheet
- LCSC C81720 / STM32F072CBT6
- FCC EAS official grantee dataset
- ISED certification search
- JLCPCB / live manufacturing quote
- JLC CNC / live manufacturing quote

Do not freeze before physical fit-check: the exact internal housing step, screw length, threads/inserts, 2U stabilizer, encoder shaft, joystick-cap fit, and exact planar-joystick marking. Any commercial or public version requires original legends and branding.

CODEx KEYBORED / WORK LOAFER EDITION / REV A2

Prepared 2026-07-17 · Fusion 360 + KiCad + TinyUSB · private parody prototype dossier · not affiliated with or endorsed by OpenAI or Work Louder.