

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

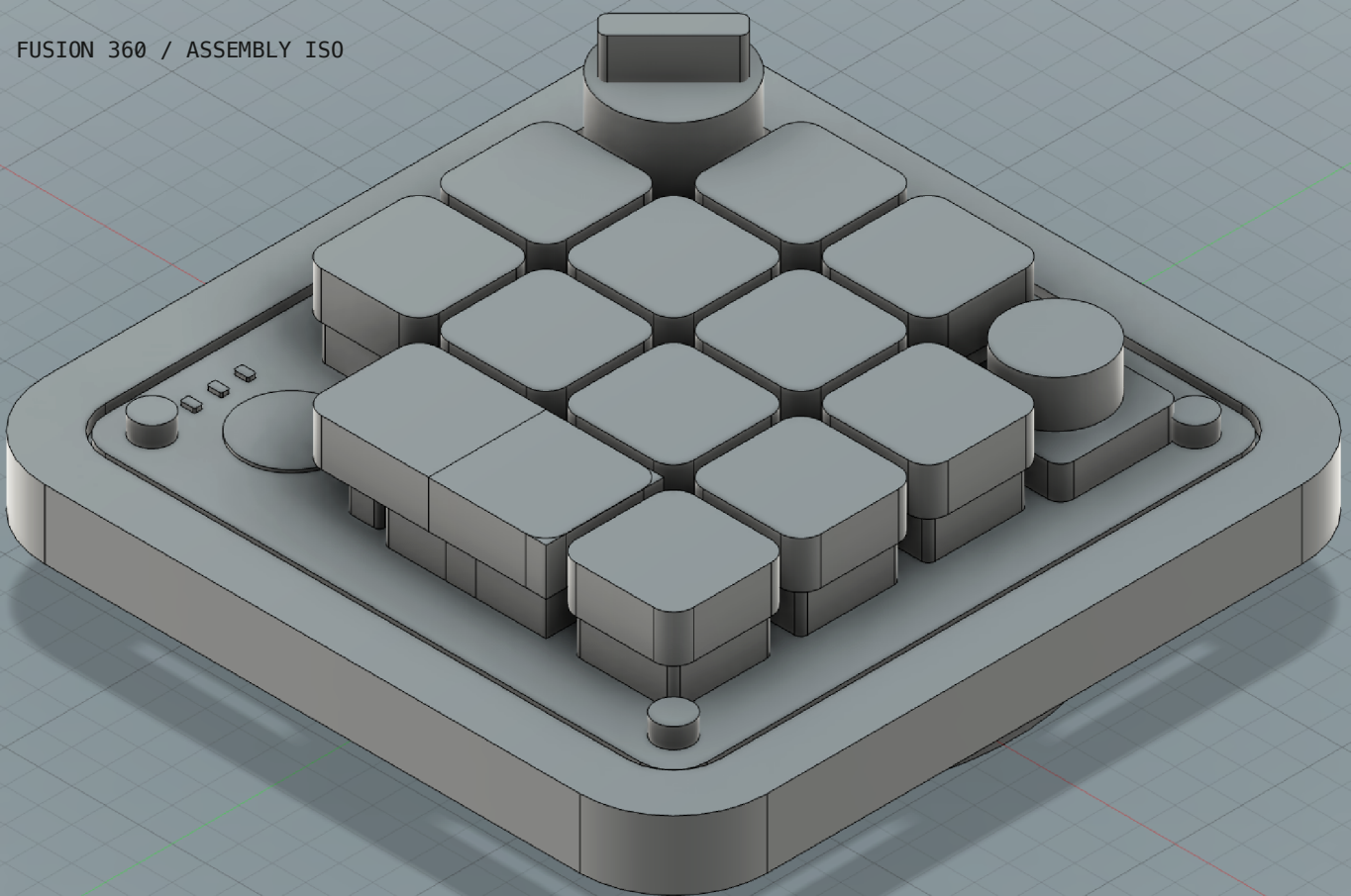
5° WEDGE

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 examples are two tiny corrections: "the aluminum thing looks slightly tilted" became a **verified 5° wedge**; "not a foot, a ring" became a purchased G-65 O-ring, a concentric groove in the Fusion body, new STEP/DXF/PDF files, a successful JLCCNC import, and a **\$68.31** live base quote. That traceable continuity—from sentence to factory cart—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

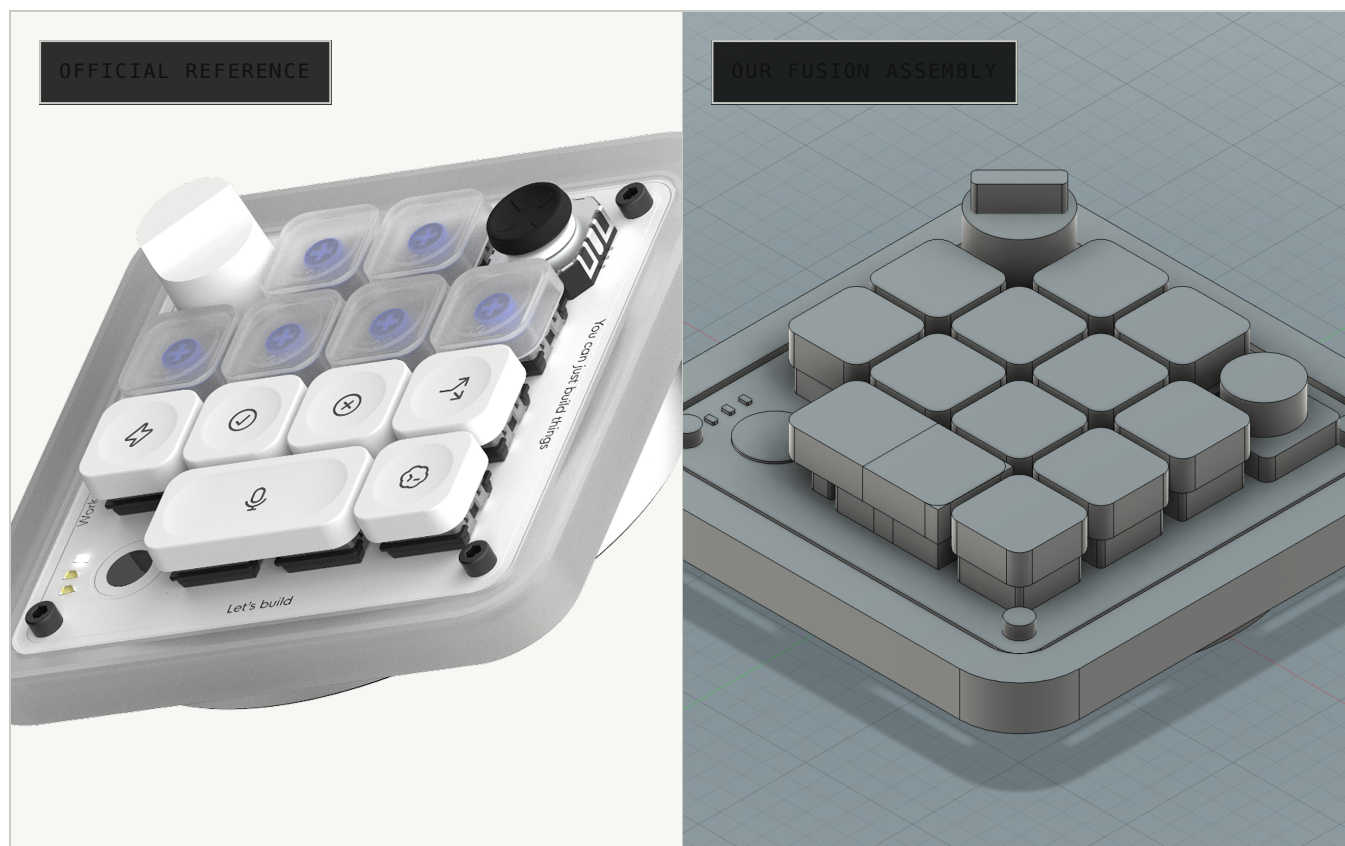
Tools, experiments, and open-source projects for
building ambitious things with coding agents.



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

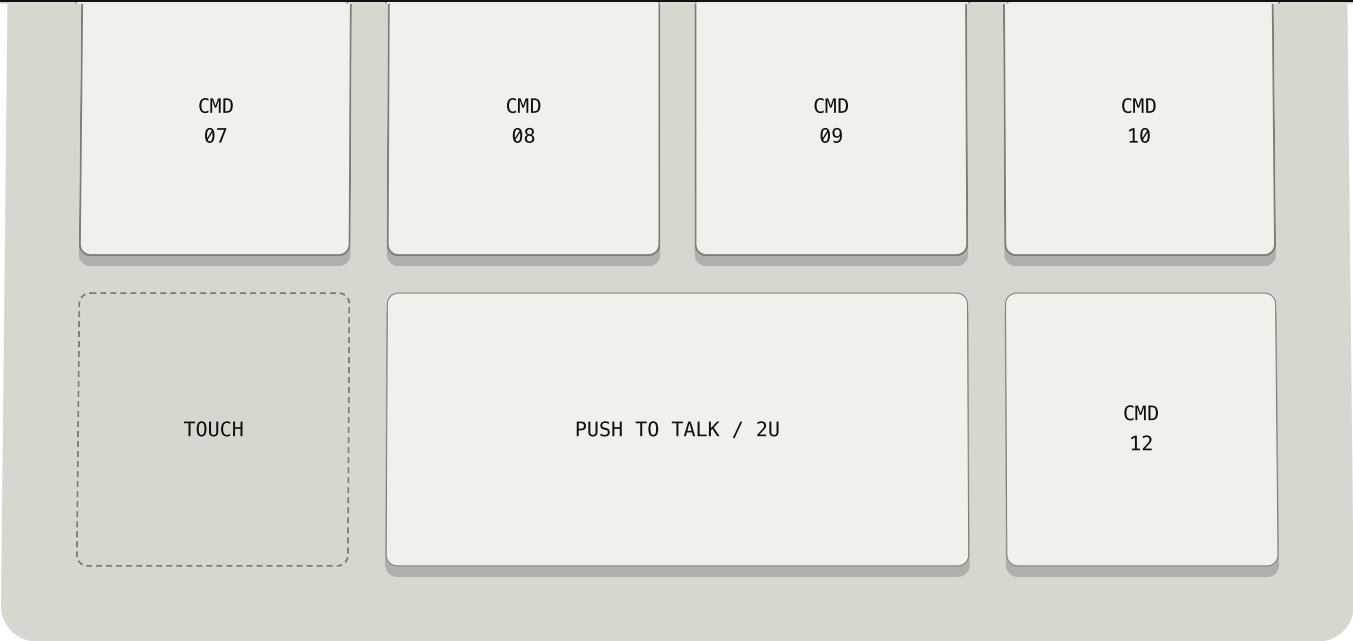
MEASURED 90 × 90 top PCB, mm	MEASURED R14 external corner radius
MEASURED Ø94 aluminum base, mm	MEASURED 5° working-plane tilt
INFERRED 3.8 → 12 wedge thickness, mm	INFERRED M3 / 78 fastener / pitch, mm

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 M3 mounting holes on 78 mm pitch 1.60 mm
Light pipe	captured clear cast PMMA insert, frosted optical face 1.50 mm
Upper ring	polished black POM, 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	JLCCM JIS G-65 black NBR O-ring, captured without adhesive

03 / BUY FIRST

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
Continuous grip ring	1	JLCCM AMFG-P5-A65-65 / JIS B 2401 G-65 / black NBR 65A	IN CART	\$0.1522

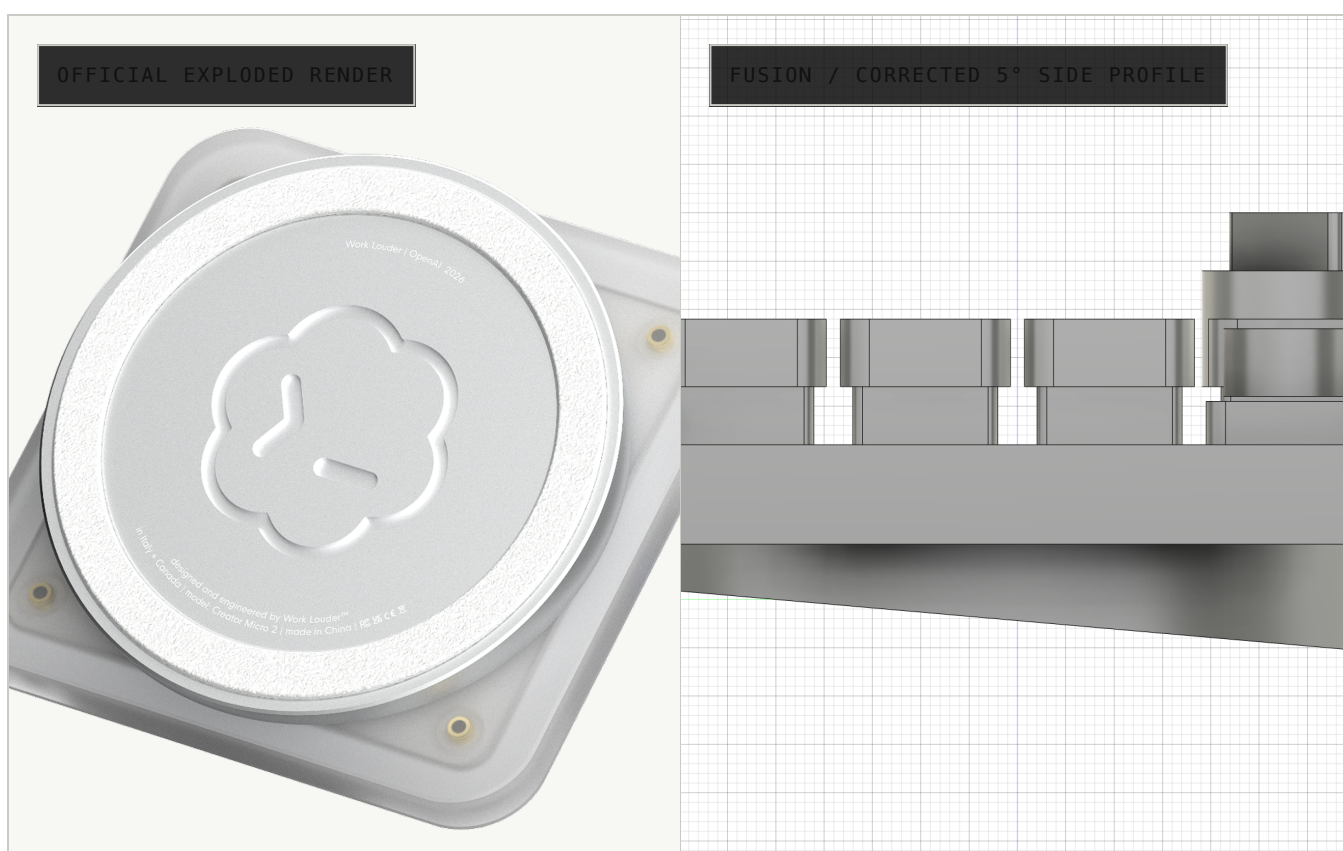
How to reproduce the Codex keycaps: use blank low-profile MX PBT with UV printing or temperature-qualified dye-sublimation for white keys. For illuminated keys, start with MX Pure, apply an opaque compatible coating, then laser-open the icon. Single-shot custom PBT is

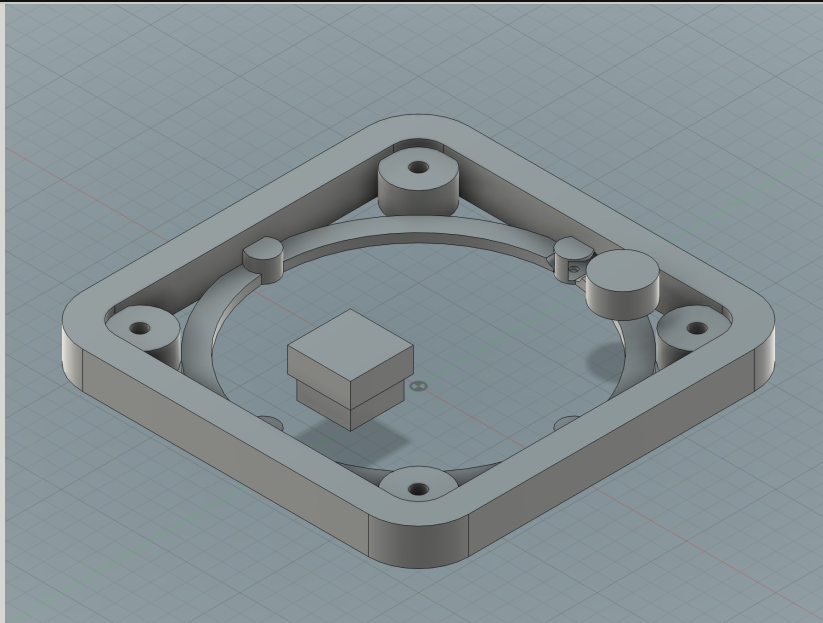
economically irrational for one unit; validate a fully custom shape in tough/clear SLA, beginning with an isolated MX-cross calibration coupon.

04 / CNC PACK

FOUR MACHINED PARTS

All Rev B STEP files passed automated JLC CNC import. The aluminum base is a 5° wedge with a machined G-65 retention groove; the light pipe is a mandatory captured part under the black POM housing.





CM2-001 / CNC / REV B

Upper housing

The production bezel is machined from black POM with polished cosmetic A-surfaces. It captures the PMMA light pipe, carries M3 PCB bosses, M2.5 base threads, the USB notch, and a service opening for future boards.

ENVELOPE

108 × 108 × 10.3

CORNER

R14

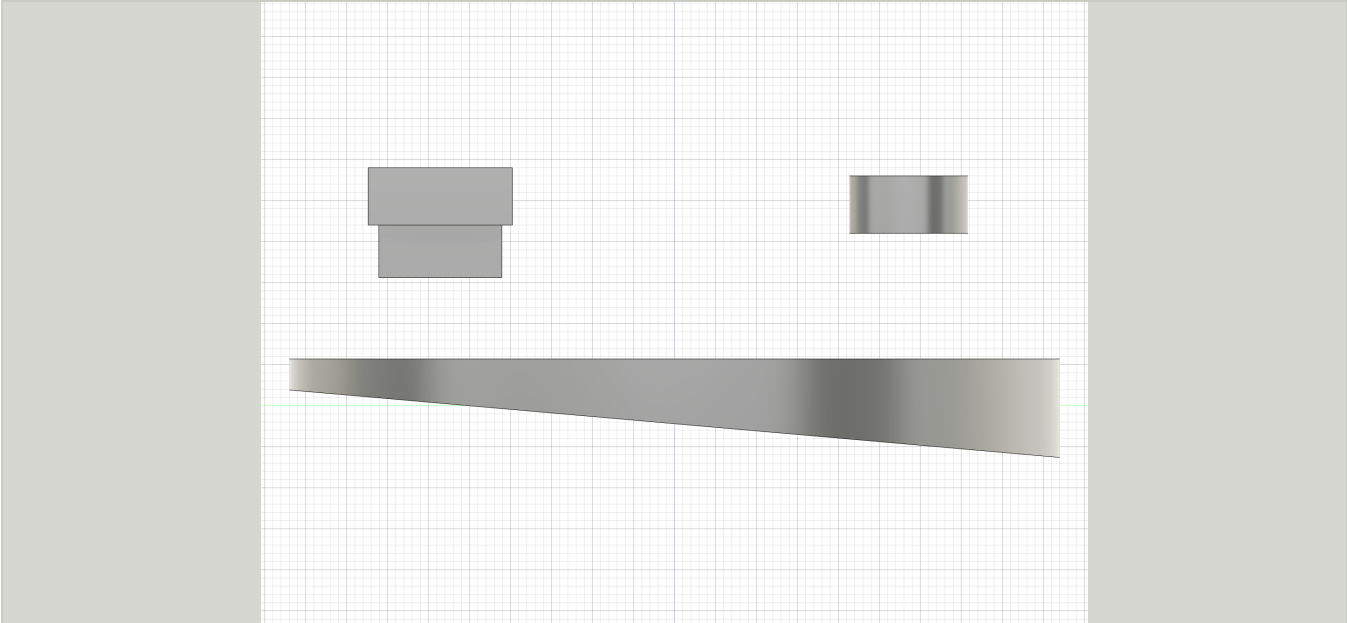
OPENING

92 × 92 / R7

MATERIAL

black POM

\$88.97 / qty 1



CM2-002 / CNC / REV B

Angled weight

A 6061-T6 wedge with a flat top datum, 5° underside, four M2.5 clearance counterbores, post-anodize engraving, and a concentric groove that mechanically captures the purchased G-65 ring.

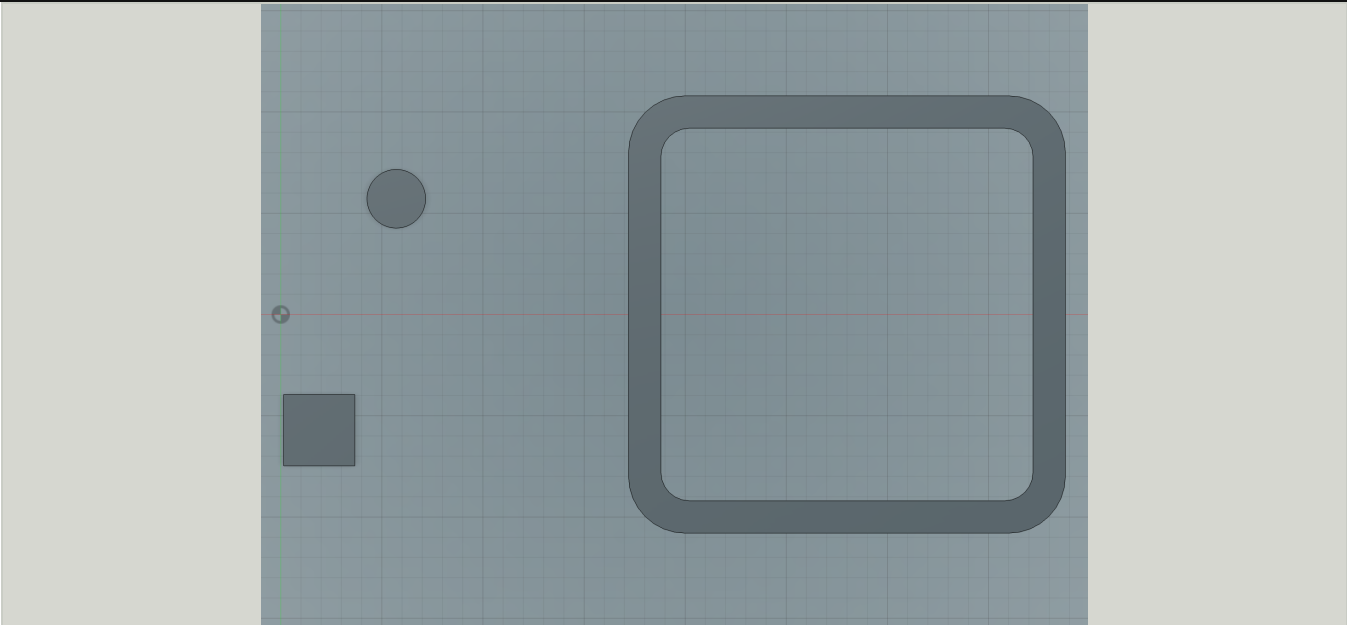
ENVELOPE
Ø94 × 12 max

TILT
5° nominal

G-65 GROOVE
Ø67.5 CL × 3.6 × 2.2

FINISH
bead blast + matte black anodize

\$68.31 / qty 1



CM2-003 / REQUIRED

Light pipe

A captured clear cast PMMA insert between the PCB and black housing. Transparent-polished edges distribute the nine underglow emitters while a uniformly frosted top face softens the perimeter light.

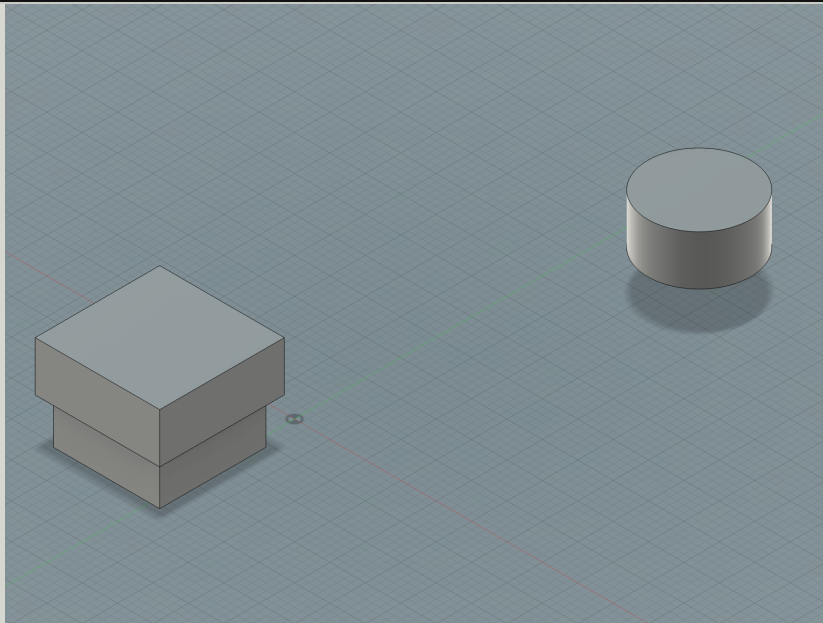
ENVELOPE
106.1 × 106.1 × 1.5

MATERIAL
clear cast PMMA

FINISH
polished edges + fine frost

REAR GAP
12.0 mm USB

\$45.70 / 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

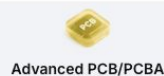
\$19.42 / qty 1

05 / LIVE QUOTE

JLC CNC + JLCMC

Authenticated live prices captured July 17, 2026. The cart now contains exactly four current Rev B CNC parts and one purchased grip ring; every superseded CNC revision and the individual rubber feet were removed.

Select Product



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.

Select All (1)

Batch Edit Delete

94 × 94 × 12 mm, Volume: 52830.58 mm³

CM2-002_bottom_weight.step

Aluminum 6061 Bead blas...

ISO 2768 medium Strict

[Edit Specifications](#)

1

\$68.31

[Detail >](#)

Charge Details

Total Price \$68.31

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

Shipping Estimate \$27.87

DHL Express (DDP) 2-4 business days

Weight 0.31 kg

Coupons

[Save \\$50.00](#) [Save \\$40.00](#)

Online Chat >

Chat with our live agent for fast reply.

Mon-Fri: 24 hours, Sat: 9am-6pm, GMT+8

Email Us >

Contact us at support@jlcpcb.com

Typically reply within hours.

Help Center >

Get instant answers.

24/7 Available.

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Get \$524 Exclusive Coupons

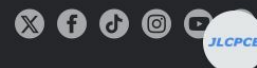
Windows

MAC

Android

IOS

CONNECT WITH US



Factory accepted the groove geometry: 94 × 94 × 12 mm, 52,830.58 mm³, 6061-T6, bead blast + matte black anodize, strict cosmetic inspection, with CM2-002 Rev B drawing attached.

PART	QUOTE ID	USD
CM2-001 / black POM	CNC...1726	\$88.97
CM2-002 / 6061 + G-65 groove	CNC...1881	\$68.31
CM2-003 / clear PMMA	CNC...1718	\$45.70
CM2-004 / black POM	CNC...1716	\$19.42
CNC subtotal		\$222.40
JLCCM G-65 ring		\$0.16
Mechanical merchandise		\$222.56

Full IDs: base CNC2607185001881-3086316A; cap CNC2607185001716-3086316A; light pipe CNC2607185001718-3086316A; upper CNC2607185001726-3086316A. Prices exclude shipping, tax, duty, and engineering review. First article remains mandatory before ordering multiples.



CM2-005 / PURCHASED / NO ADHESIVE

ONE RING. NOT FOUR FEET.

JLCCM part AMFG-P5-A65-65 is a standard JIS B 2401 G-65 black nitrile O-ring. The aluminum groove captures it mechanically and leaves 0.9 mm nominal protrusion, so the device grips the desk continuously without adhesive pads, printed rubber, or user cutting.

INSIDE DIAMETER	CROSS-SECTION	NOMINAL OD
64.4 ±0.57	3.1 ±0.10	70.6 mm
GROOVE CENTERLINE	GROOVE W × D	LIVE UNIT PRICE
Ø67.5 mm	3.6 × 2.2	\$0.1522

[OPEN THE EXACT JLCCM PART ↗](#)



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Materials ▾

Support ▾

About Us

SHOPPING CART

All (7) JLCNC (4) JLCPCB (2) JLC3DP (0) **JLCMC (1)** Flex Heater (0)

☐ Item Qty

☐ JLCMC (Mechatronic Parts)

☐		O-ring G series AMFG-P5-A65-65 Customer #:	1
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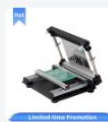
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SMT Stencil Printing - Suitable for 200×200mm Stencils

From **\$63.87**

[Order Now](#)



SMT Stencil Printing - Suitable for 150×150mm Stencils

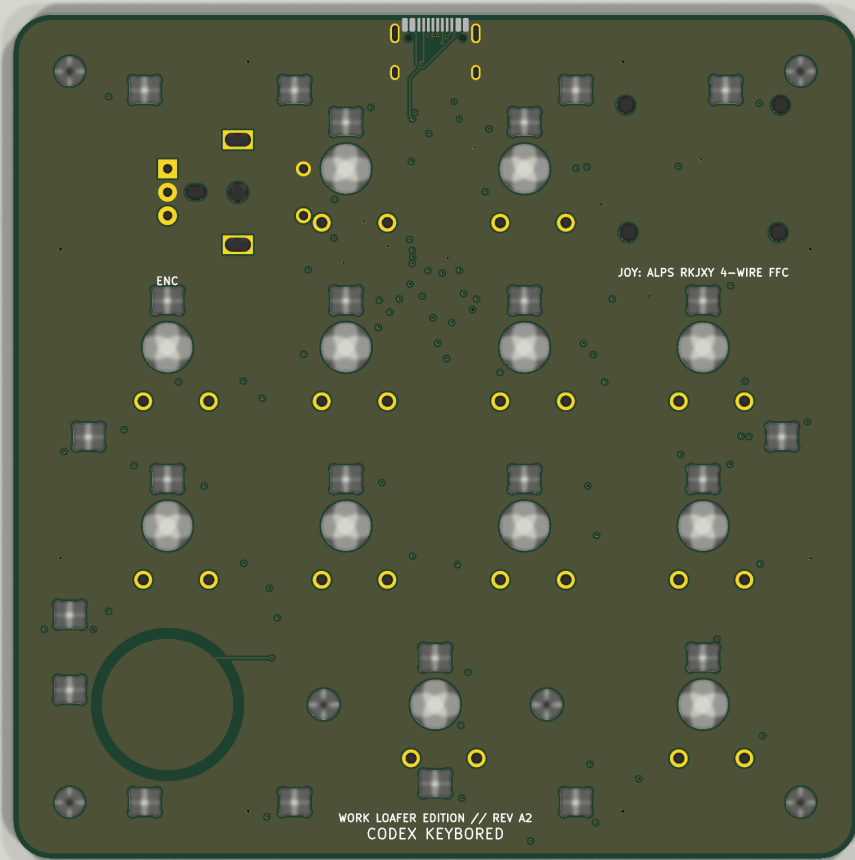
From **\$51.1**

[Order Now](#)

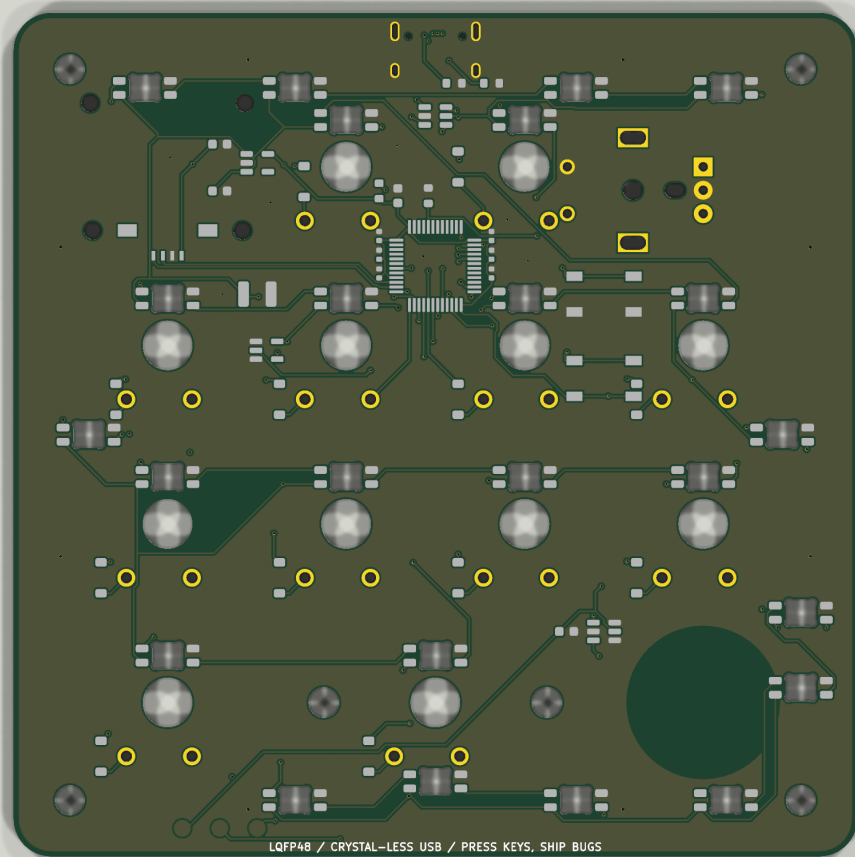
06 / ELECTRONICS

WIRED REV A2

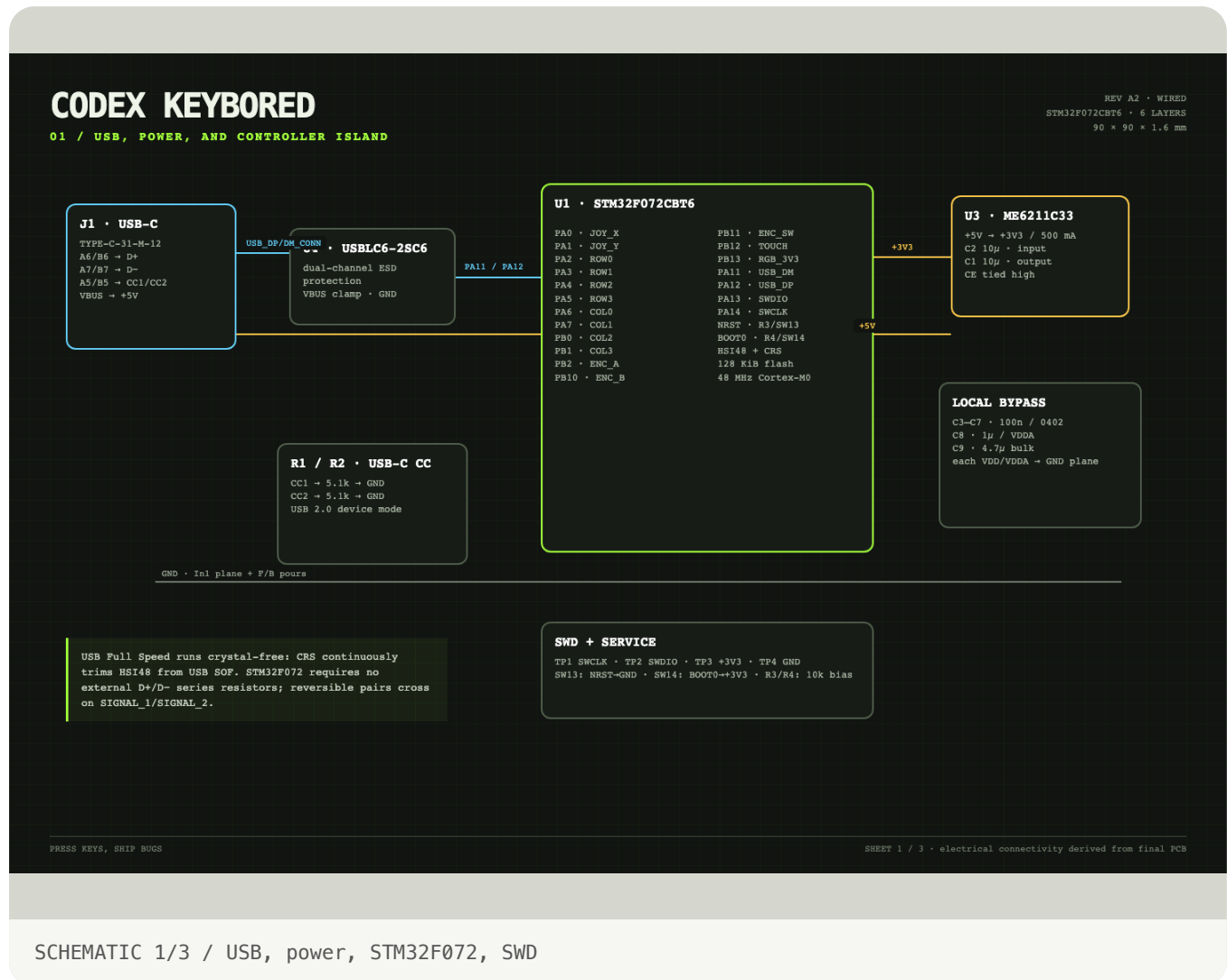
The wired version preserves the 90×90 mm mechanical interface and internal volume for a future swappable wireless PCB. Six layers provide continuous GND/+5V planes, two signal layers, and a short crystal-less USB path.



TOP / CODEX KEYBORED + WORK LOAFER EDITION



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.

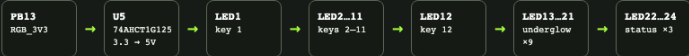


RGB + PIN MAP + BUILD GATE

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-mount 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	57 placements · 16 BOM groups
Firmware	16,548 B flash · 2,448 B RAM
Status	build-verified; first article requires electrical bring-up

CODEX KEYBORED · CRYSTAL-LESS USB · PRESS KEYS, SHIP BUGS

SHEET 3 / 3

SCHEMATIC 3/3 / RGB, pin map, production gate

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 LDO, local bypass and 100 μ F 5 V LED bulk capacitor.

REF	COMPONENT	SELECTED PART	LCSC	ASSEMBLY
U1	MCU	STM32F072CBT6 / LQFP48	C81720	JLC bottom
U3	3.3 V LDO	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
LED1-LED24	RGB	SK6812MINI-E reverse mount	C5149201	JLC bottom
R3,R4	10 k Ω 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.



codex_micro_wired_revA_gerbbers

- 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 aft 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:

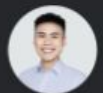
PCB: 5-6 days	\$0.00
Assembly: ☒ 3 - 4 days	\$0.00
☐ 2 - 3 days	\$49.26

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 Rev B order handoff / ZIP

Fusion scripts, current CNC geometry, ring vendor reference, PCB/PCBA, firmware, tests, drawings and manifest

Mechanical factory handoff / ZIP

Four CNC STEP files, Rev B drawings, DXF profiles, fit report, spec and purchased G-65 reference

Manufacturing dossier / PDF

Printable Rev B landing page with geometry, prices, factory screenshots and source links

PCBA factory handoff / ZIP

Focused turnkey electronics package for JLC engineering review

Fusion 360 / F3D

exported archive of the saved Codex assembly

Rev B CNC drawing pack / PDF

5 controlled sheets: four CNC parts plus the purchased G-65 ring interface

CM2-001 upper / STEP

108 × 108 × 10.3 / polished black POM

CM2-002 wedge / STEP

Ø94 / 5° / 6061-T6 / G-65 retention groove

CM2-003 light pipe / STEP

captured clear PMMA with frosted optical face

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

SOURCES & LIMITS

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
- JLCMC O-ring G series / AMFG-P5-A65-65

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.

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