

CODEX KEYBORED

01 / USB, ПИТАНИЕ И CONTROLLER ISLAND

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

J1 • USB-C

TYPE-C-31-M-12
A6/B6 → D+
A7/B7 → D-
A5/B5 → CC1/CC2
VBUS → +5V

USB_DP/DM_CONN

U2 • USBLC6-2SC6

двухканальная ESD-защита
VBUS clamp • GND

PA11 / PA12

U1 • STM32F072CBT6

PA0 • JOY_X	PB11 • ENC_SW
PA1 • JOY_Y	PB12 • TOUCH
PA2 • ROW0	PB13 • RGB_3V3
PA3 • ROW1	PA11 • USB_DM
PA4 • ROW2	PA12 • USB_DP
PA5 • ROW3	PA13 • SWDIO
PA6 • COL0	PA14 • SWCLK
PA7 • COL1	NRST • R3/SW13
PB0 • COL2	BOOT0 • R4/SW14
PB1 • COL3	HSI48 + CRS
PB2 • ENC_A	128 KiB flash
PB10 • ENC_B	48 MHz Cortex-M0

+3V3

U3 • ME6211C33

+5V → +3V3 / 500 mA
C2 10μ • input
C1 10μ • output
CE tied high

+5V

R1 / R2 • USB-C CC

CC1 → 5.1k → GND
CC2 → 5.1k → GND
режим USB 2.0 device

LOCAL BYPASS

C3–C7 • 100n / 0402
C8 • 1μ / VDDA
C9 • 4.7μ bulk
каждый VDD/VDDA → GND plane

GND • In1 plane + F/B pours

USB Full Speed работает без кварца: HSI48 непрерывно подстраивается CRS по USB SOF. Внешние последовательные резисторы D+/D- для STM32F072 не требуются; реверсивные пары пересекаются на SIGNAL_1/SIGNAL_2.

SWD + SERVICE

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

KEY MATRIX + HUMAN INPUT

02 / 12 SWITCHES, ENCODER, JOYSTICK, TOUCH

SCAN: ROW LOW
COL INPUT_PULLUP
1N4148W PER KEY

4 × 4 logical matrix · populated cells

ROC0 not populated	SW1 · F13 ROW0 → switch → D1 → COL1	SW2 · F14 ROW0 → switch → D2 → COL2	ROC3 joystick occupies cell
SW3 · F15 ROW1 → switch → D3 → COL0	SW4 · F16 ROW1 → switch → D4 → COL1	SW5 · F17 ROW1 → switch → D5 → COL2	SW6 · F18 ROW1 → switch → D6 → COL3
SW7 · F19 ROW2 → switch → D7 → COL0	SW8 · F20 ROW2 → switch → D8 → COL1	SW9 · F21 ROW2 → switch → D9 → COL2	SW10 · F22 ROW2 → switch → D10 → COL3
R3C0 touch electrode	SW11 · F23 ROW3 → 2U switch → D11 → COL1	R3C2 2U stabilizer field	SW12 · F24 ROW3 → switch → D12 → COL3

ENC1 · CLICKABLE

A → PB2 · ENC_A
B → PB10 · ENC_B
C/S2 → GND
S1 → PB11 · ENC_SW

JOY1 + J2 · RKJXY

pin 1 +3V3 · pin 2 GND
pin 3 Xout → PA0 / ADC0
pin 4 Yout → PA1 / ADC1
planar joystick with 4-wire FFC

U6 · TTP223-BA6

E1 14mm copper → pin 3 sensor
Q pin 1 → PB12 · TOUCH
pin 5 +3V3 · pin 2 GND
AHLB + TOG grounded: direct active-high
C10 100n local bypass

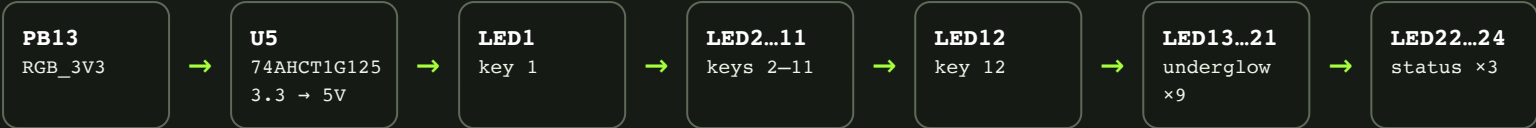
13 mechanical inputs in the public product wording = 12 keyboard switches + encoder push. The touch electrode and two joystick axes are additional inputs. Firmware debounce integrator: 5 ms; encoder uses a quadrature transition table.

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