

# usb\_joystick\_routed

## Design Report

kicad-tools 0.13.0

Rev 1 | 2026-06-16 | jlcpcb-tier1

### Board Summary

| Property   | Value                       |
|------------|-----------------------------|
| Layers     | 2 copper (F.Cu, B.Cu)       |
| Footprints | 19 (17 SMD, 2 THT, 0 other) |
| Nets       | 16                          |
| Traces     | 582 segments                |
| Vias       | 15                          |
| Board Size | 80.0 x 60.0 mm              |

### Design Overview

#### Theory of Operation

USB Joystick Controller

USB game controller with analog joystick

Demonstrates autolayout functionality

#### Communication Interfaces

| Protocol | Signals        |
|----------|----------------|
| USB      | USB_D+, USB_D- |

#### Power Architecture

**Power Rails:** +5V, GND, PWR\_FLAG

#### Assembly Notes

1 fine-pitch component

- **Fine-pitch components:** 1 (U1)

## Hand-Solder (THT) Components

The following 1 through-hole component is **excluded from the SMT pick-and-place file** and must be hand-soldered (or wave/selective-soldered) after SMT assembly. It appears in the BOM for sourcing.

| Value    | Package         | Qty | References |
|----------|-----------------|-----|------------|
| Joystick | Joystick_Analog | 1   | J2         |

## ERC Status

| Metric   | Count |
|----------|-------|
| Errors   | 0     |
| Warnings | 0     |

**Status:** SKIPPED – ERC skipped by user request

Schematic: usb\_joystick

Figure 1: Schematic: usb\_joystick

## Schematic Overview

Schematic: usb\_joystick

PCB Front

Figure 2: PCB Front

PCB Back

Figure 3: PCB Back

**PCB Layout**

**Copper**

**Assembly**

PCB Copper

Figure 4: PCB Copper

Assembly

Figure 5: Assembly

F.Cu

Figure 6: F.Cu

**Copper Layers**

**F.Cu**

**B.Cu**

B.Cu

Figure 7: B.Cu

## Bill of Materials

| Value    | Package                      | Qty | References         |
|----------|------------------------------|-----|--------------------|
| 100nF    | C_0402_1005Metric            | 4   | C1, C2, C3, C4     |
| 16nF     | C_0402_1005Metric            | 2   | C10, C11           |
| 22pF     | C_0402_1005Metric            | 2   | C5, C6             |
| Joystick | Joystick_Analog              | 1   | J2                 |
| TYPE-C   | USB_C_Receptacle_GCT_USB4105 | 1   | J1                 |
| 10k      | R_0402_1005Metric            | 3   | R10, R11, R12      |
| Button   | SW_SPST_TL3342               | 4   | SW1, SW2, SW3, SW4 |
| MCU      | TQFP-32_7x7mm_P0.8mm         | 1   | U1                 |
| 16MHz    | Crystal_HC49-U_Vertical      | 1   | Y1                 |

## DRC Status

| Metric   | Count |
|----------|-------|
| Errors   | 0     |
| Warnings | 16    |
| Blocking | 0     |

**Status:** PASS ### Violations by Type

| Violation Type         | Count |
|------------------------|-------|
| silkscreen_text_height | 16    |

## Manufacturing Readiness

**Verdict:** WARNING

### Action Items

- **[OPTIONAL]** Verify zone fill in KiCad for 3 zone-connected nets
- **[OPTIONAL]** Review 16 DRC warnings

## Routing Status

| Metric                | Value          |
|-----------------------|----------------|
| Signal Net Completion | 100.0% (13/13) |
| Overall Completion    | 100.0%         |
| Complete Nets         | 16 / 16        |
| Zone-Connected Nets   | 3              |
| Incomplete Nets       | 0              |
| Unconnected Pads      | 0              |

## Zone-Connected Nets

- GND
- VBUS
- VCC

## Cost Estimate

| Metric                   | Per Board (estimated) |
|--------------------------|-----------------------|
| PCB Fabrication          | ~1.36 USD             |
| Components (estimated)   | ~1.33 USD             |
| Assembly (estimated)     | ~2.03 USD             |
| <b>Total (estimated)</b> | <b>~4.72 USD</b>      |
| Batch Quantity           | 5                     |
| Batch Total (estimated)  | ~23.61 USD            |