

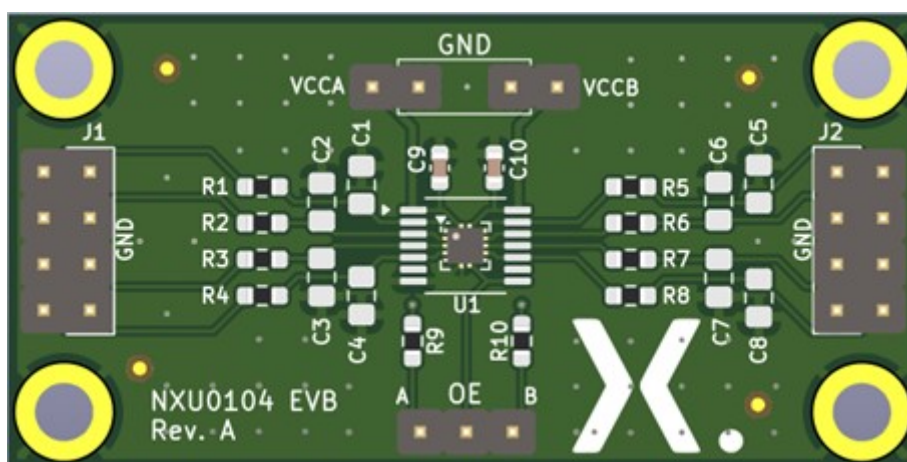


UM90041

Rev. 1 — 11 September 2024

user manual

NXU0104, NXU0204 and NXU0304 evaluation board



Abstract:

The NXU0x04 is a two-layer printed circuit board (PCB) containing the NXU0x04 dual supply level shifting device. The board simulates the device being used in a system by incorporating series resistors and parallel loads on each input/output line. Output enable (OE) is selected with a jumper to pull up to either VCCA or VCCB supply rail. Each input has a Schmitt trigger to accommodate slow or noisy input signals and a weak 6.5 M Ω pull-down accommodates floating input signals.

Keywords:

Level shifter, Dual supply, Voltage translator, Evaluation board

1. Introduction

The NXU0104, NXU0204 and NXU0304 evaluation boards (EVB) are designed for the Nexperia 4-bit dual-supply NXU-family. All three EVBs are built-up with the product in the smallest available 14 pins package, DHXQFN14 (SOT8014-1).

There is an extra footprint that can be fitted with a TSSOP14 (SOT402-1) package of the same device. Simply remove the DHXQFN14 variant and mount the TSSOP14. The Figures below (Fig. 1, Fig. 2 and Fig. 3) show each variation of the NXU0x04 family. Each NXU variation is laid out to support different applications.

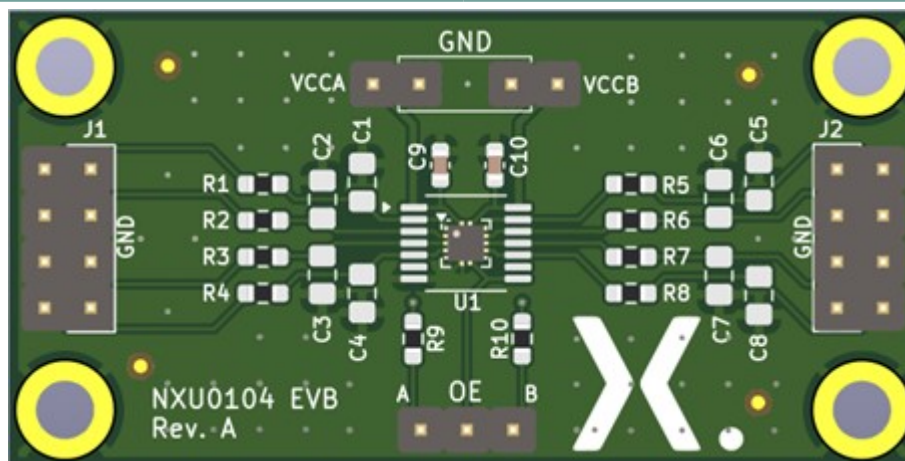


Fig. 1. NEVB-NXU0104UL: NXU0104 evaluation board

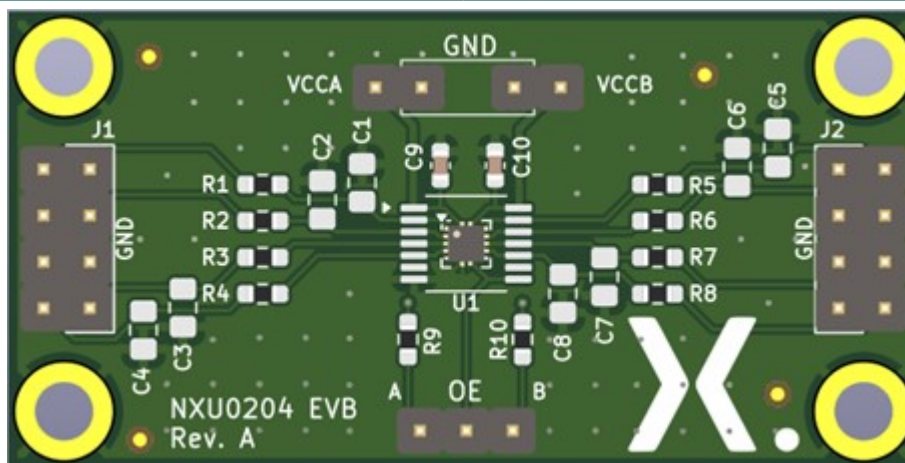


Fig. 2. NEVB-NXU0204UL: NXU0204 evaluation board

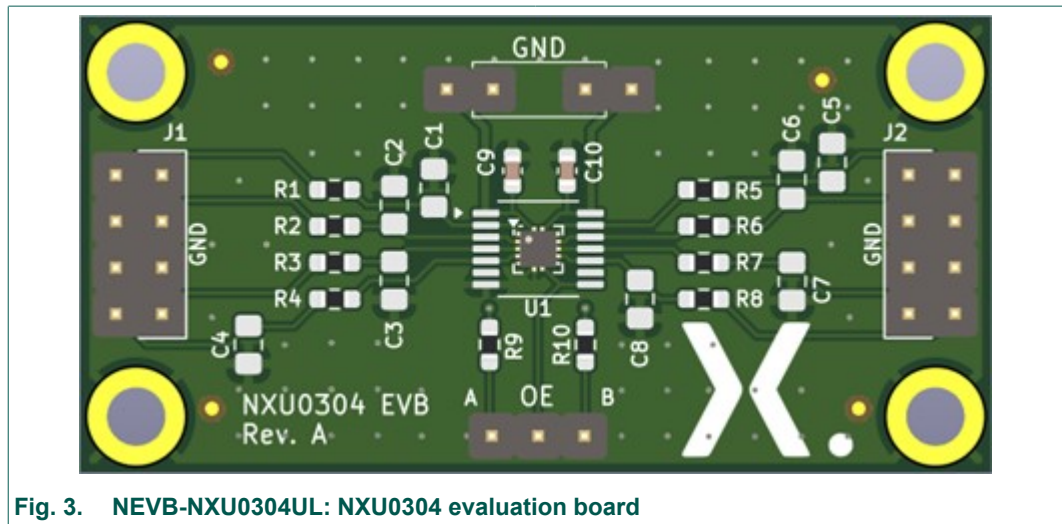


Fig. 3. NEVB-NXU0304UL: NXU0304 evaluation board

2. Device background for NXU series

- Device = NXU0x04
- Wide supply voltage range:
 - V_{CCA} : 0.9 V to 5.5 V
 - V_{CCB} : 0.9 V to 5.5 V
- Low power consumption for supply voltage range 1.1 V to 5.5 V
 - 3 μ A ($T_{amb} = 25\text{ }^{\circ}\text{C}$)
 - 5 μ A ($T_{amb} = -40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$)
- Schmitt-trigger inputs with integrated static high ohmic pull-down resistor on the input
- Maximum data rate:
 - 250 Mbps ($\geq 1.8\text{ V}$ to 5 V translation)
- Output enable (OE) allows connection to V_{CCA} or V_{CCB} domain
- Suspend mode when either one of the supply voltages is below 100 mV or disconnected (floating)
- Low noise overshoot and undershoot $<10\%$ of V_{CCO}
- I_{OFF} circuitry provides partial power-down mode operation

3. Schematic

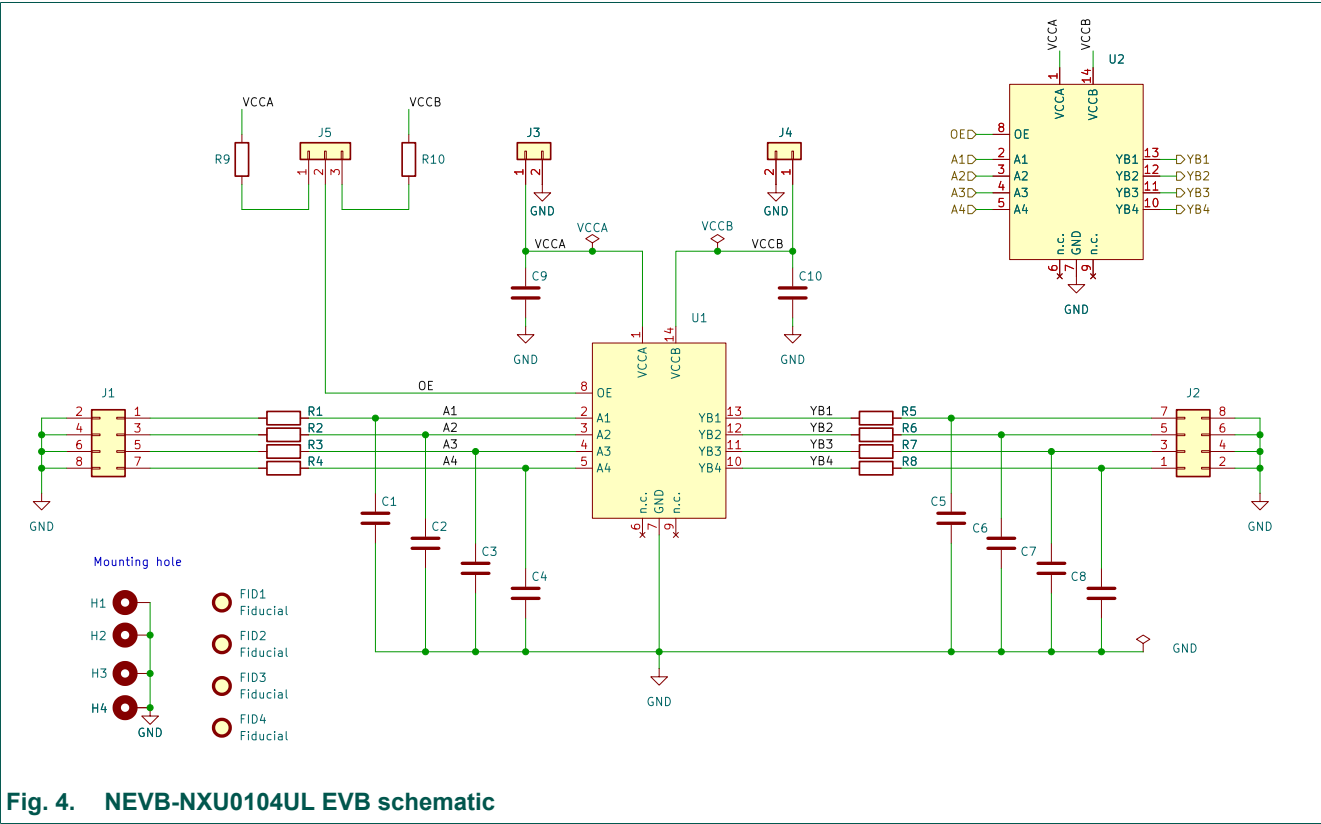


Fig. 4. NEVB-NXU0104UL EVB schematic

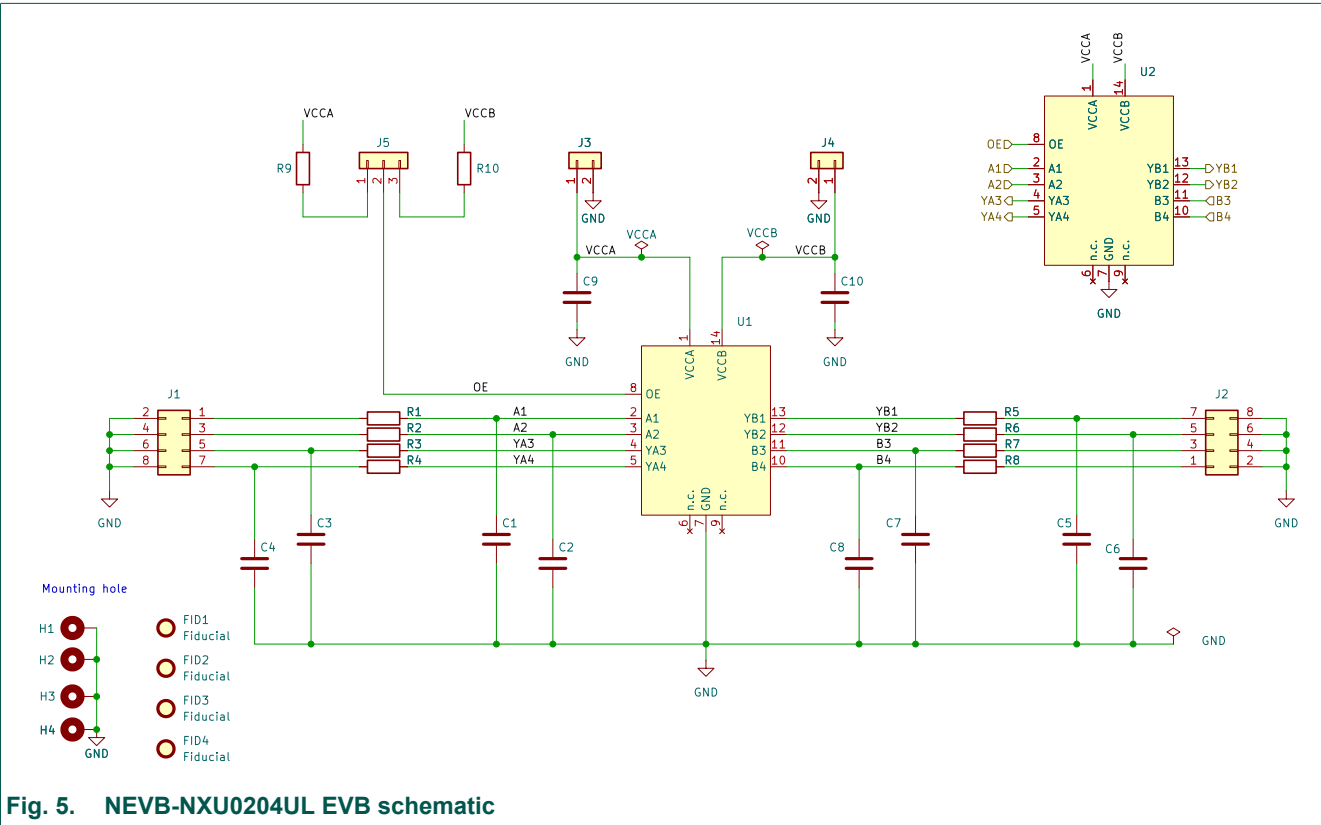


Fig. 5. NEVB-NXU0204UL EVB schematic

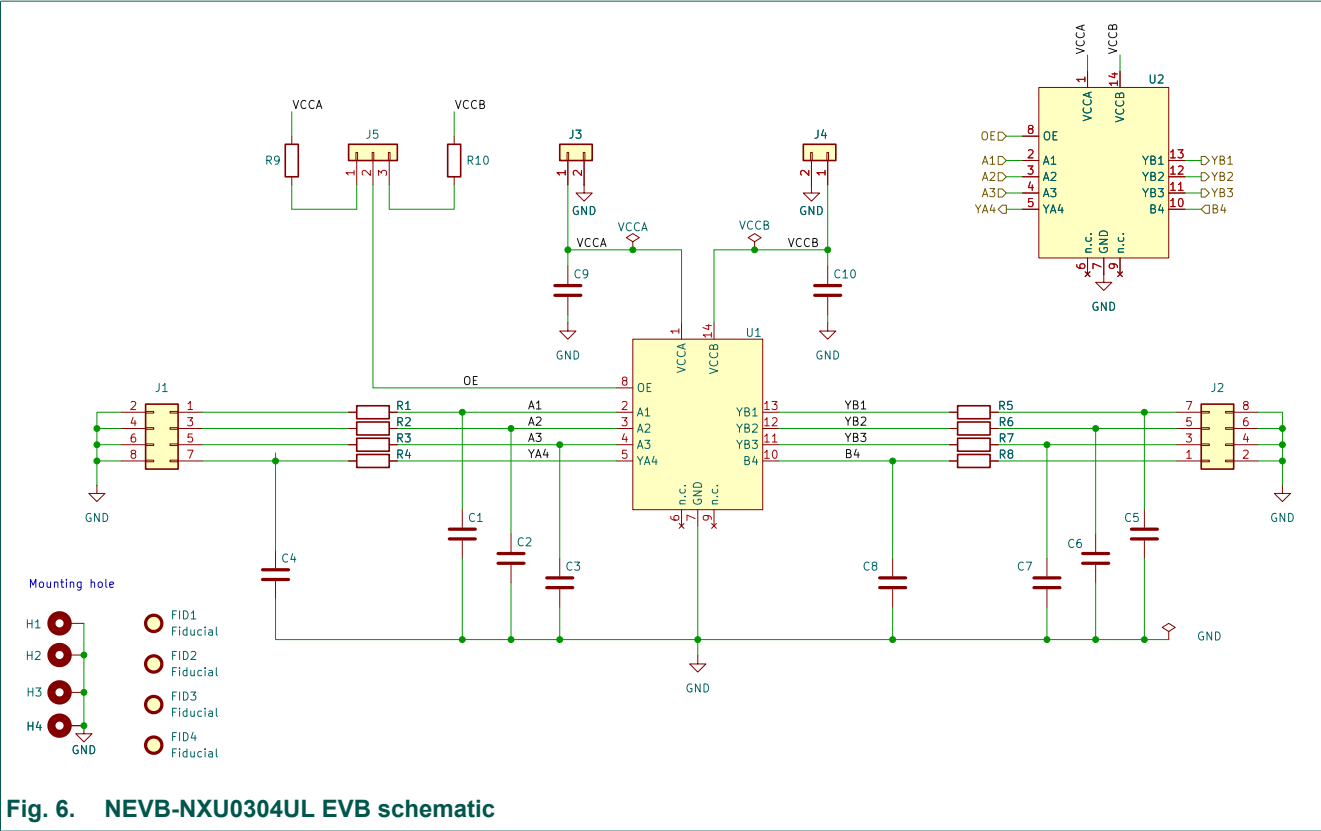


Fig. 6. NEVB-NXU0304UL EVB schematic

4. PCB layout

[Fig. 7](#) to [Fig. 10](#) include the layouts of each NXU-EVB variant. The back copper layer ([Fig. 10](#)) is the same on each board.

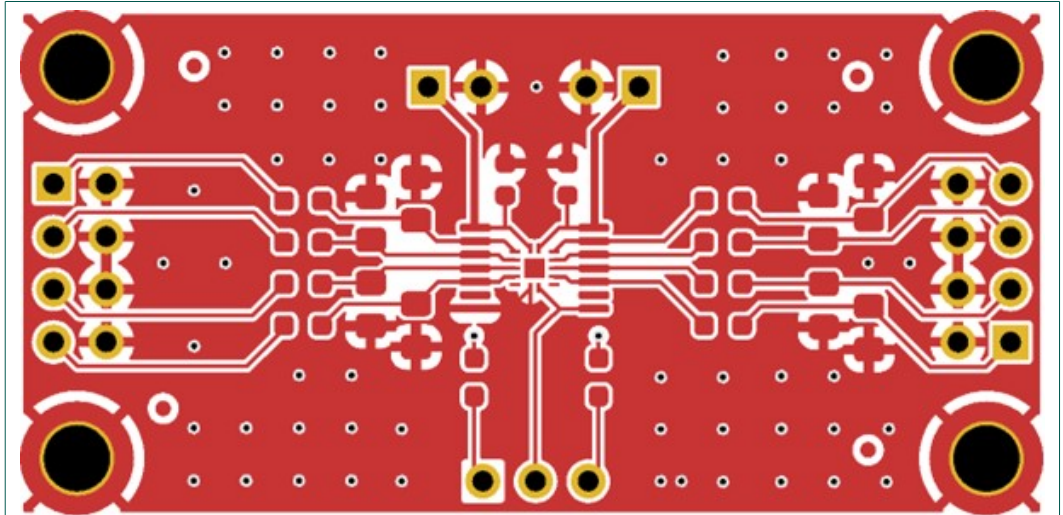


Fig. 7. NXU0104-EVB front copper layer

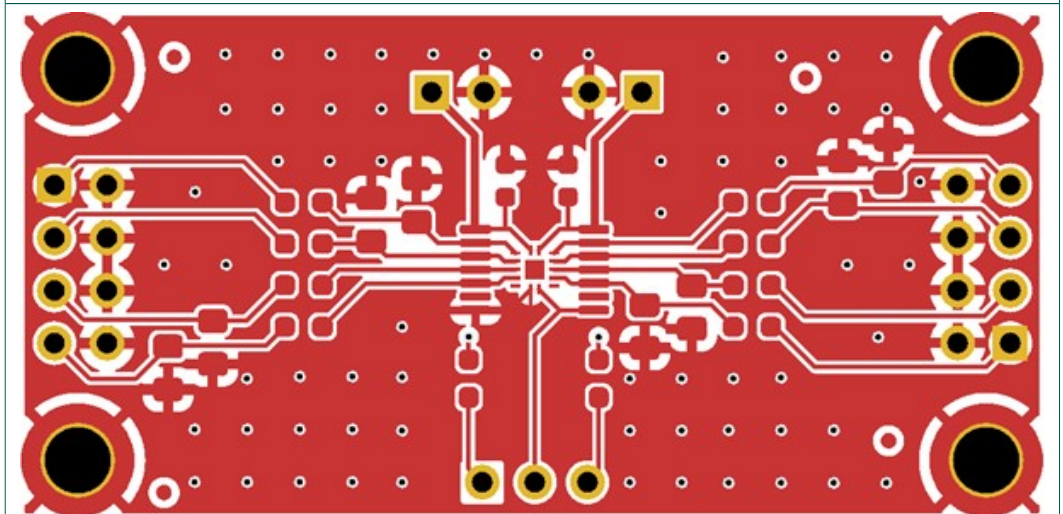


Fig. 8. NXU0204-EVB front copper layer

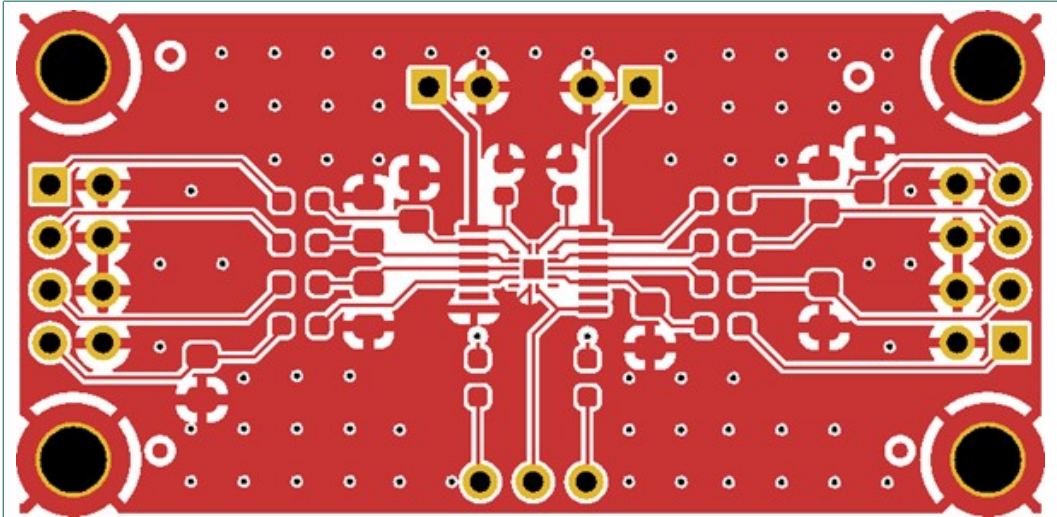


Fig. 9. NXU0304-EVB front copper layer

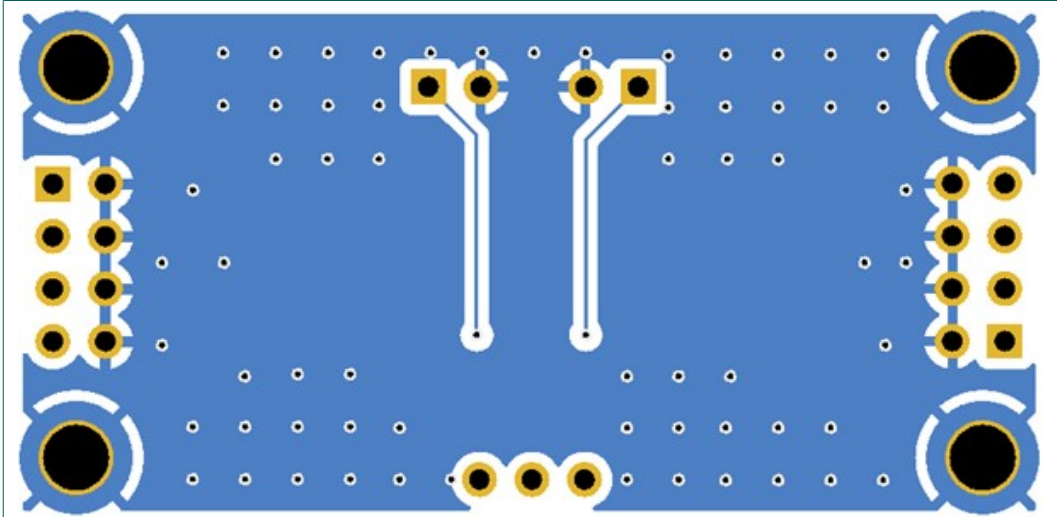


Fig. 10. NXU0104, NXU0204, NXU0305-EVB back copper

5. Bill of material

Table 1. Bill of Material (BOM)

Reference	Quantity	Value	Manufacturer	Component
-	1	Printed circuit board	Nexperia	NEVB-NXU0x04UL
R1, R2, R3, R4, R5, R6, R7, R8	8	RES 0 Ω 1/10W 0603	Yageo	RC0603JR-070RL
R9, R10	2	RES 10 K Ω 1% 1/10W 0603	Yageo	RC0603FR-0710KL
C9, C10	2	0.1 μ F $\pm$ 10% 50 V ceramic capacitor X7R 0603 (1608 Metric)	Samsung	CL10B104KB8NNNC
J1, J2	2	CONN HEADER VERT 8 POS 2.54 mm	TE Connectivity	5-146256-4
J3, J4	2	CONN HEADER VERT 2 POS 2.54 mm	TE Connectivity	5-146280-2
J5	1	CONN HEADER VERT 3 POS 2.54 mm	TE Connectivity	5-146280-3
U1	1	NXU0x04 voltage translator Package DHXQFN14 (SOT8014-1)	Nexperia	NXU0x04

6. Setup and operation

This section gives some instructions for proper use the NXU0104, NXU0204, and NXU0304 evaluation boards (EVB).

Power supply

The EVBs have a 2-position header on each V_{CC} supply rail. Power should be applied to the outside pins of J3 and J4, while the inside pins are GND connections. The V_{CC} and GND connections are labeled with silkscreen to easily identify power inputs. The NXU-EVB is accommodating of input voltages of 0.9 V to 5.5 V on either supply.

Input/output signals

The EVBs have 4x2, 8-position headers to access the A and B side data pins. The inputs and outputs are routed to the board edge to make for easy connection, and each input and output has a ground pin adjacent. The GND pins face the device and the data inputs/outputs are on the outer edge of the board. The pins with only an A or B in front of the pin number are inputs, while the pins marked YAn or YBn are outputs. Each input has a Schmitt-trigger to accommodate for slow or noisy signals. All data inputs in each NXU device have 6.5 M Ω pull-down resistors integrated which allow for these inputs to be left floating with a known state.

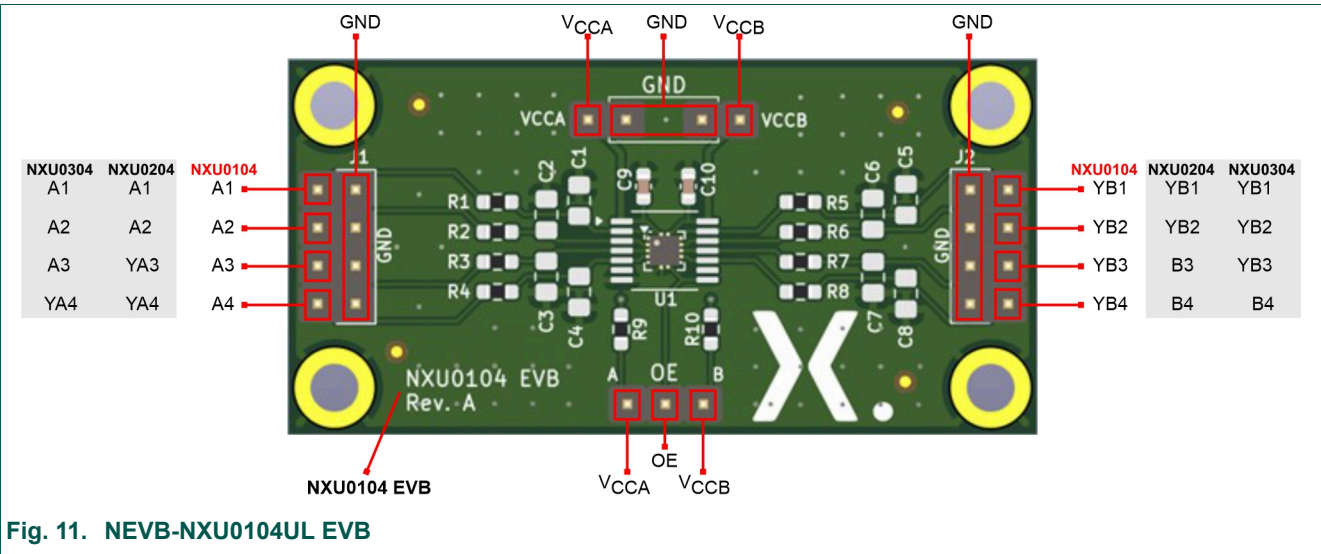


Fig. 11. NEVB-NXU0104UL EVB

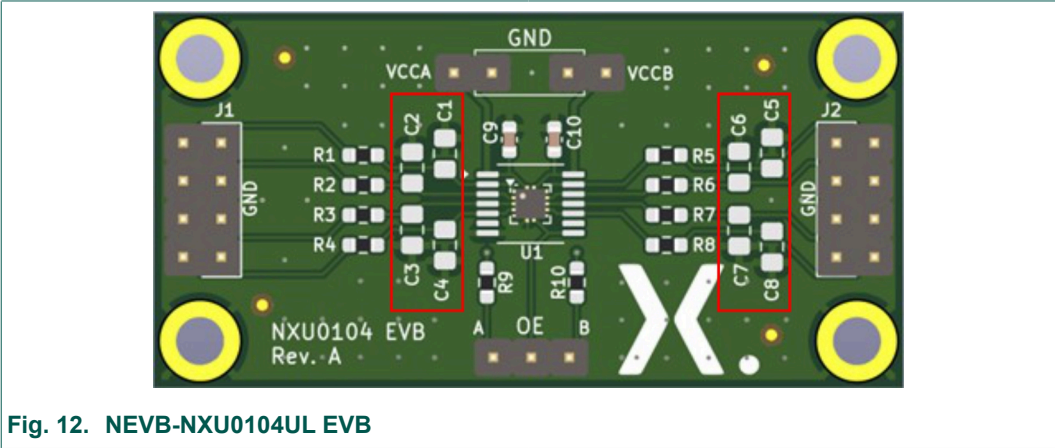
Output enable control

The output enable is available on a header located on the bottom of the board. The OE pin is the middle pin while the outside pin serve as a pullup to either V_{CC} supply rail through a 10 k Ω resistor. This allows you to drive the OE pin from either supply, while the $V_{CC(min)}$ circuit will ensure the OE pin on NXU device will follow the lowest supply voltage as reference. A pull-down resistor is also integrated on the OE pin allowing the signal to float without damaging it.

Loading

The inputs and outputs each have a series resistor and capacitor to ground to allow for different loads to be analyzed. The series resistance is populated with 0 Ω resistor by default. The loads can be configured to analyze different parameters such as rise/fall time, propagation delay, etc.

The load footprints are labeled as C1, C2, C3, C4, C5, C6, C7, C8 as shown in [Fig. 12](#).



7. Revision history

Table 2. Revision history

Revision number	Date	Description
UM90041 v.1	20240911	Initial version

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Contents

1. Introduction.....2

2. Device background for NXU series.....3

3. Schematic.....4

4. PCB layout.....6

5. Bill of material.....7

6. Setup and operation.....8

7. Revision history.....9

8. Legal information.....10

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