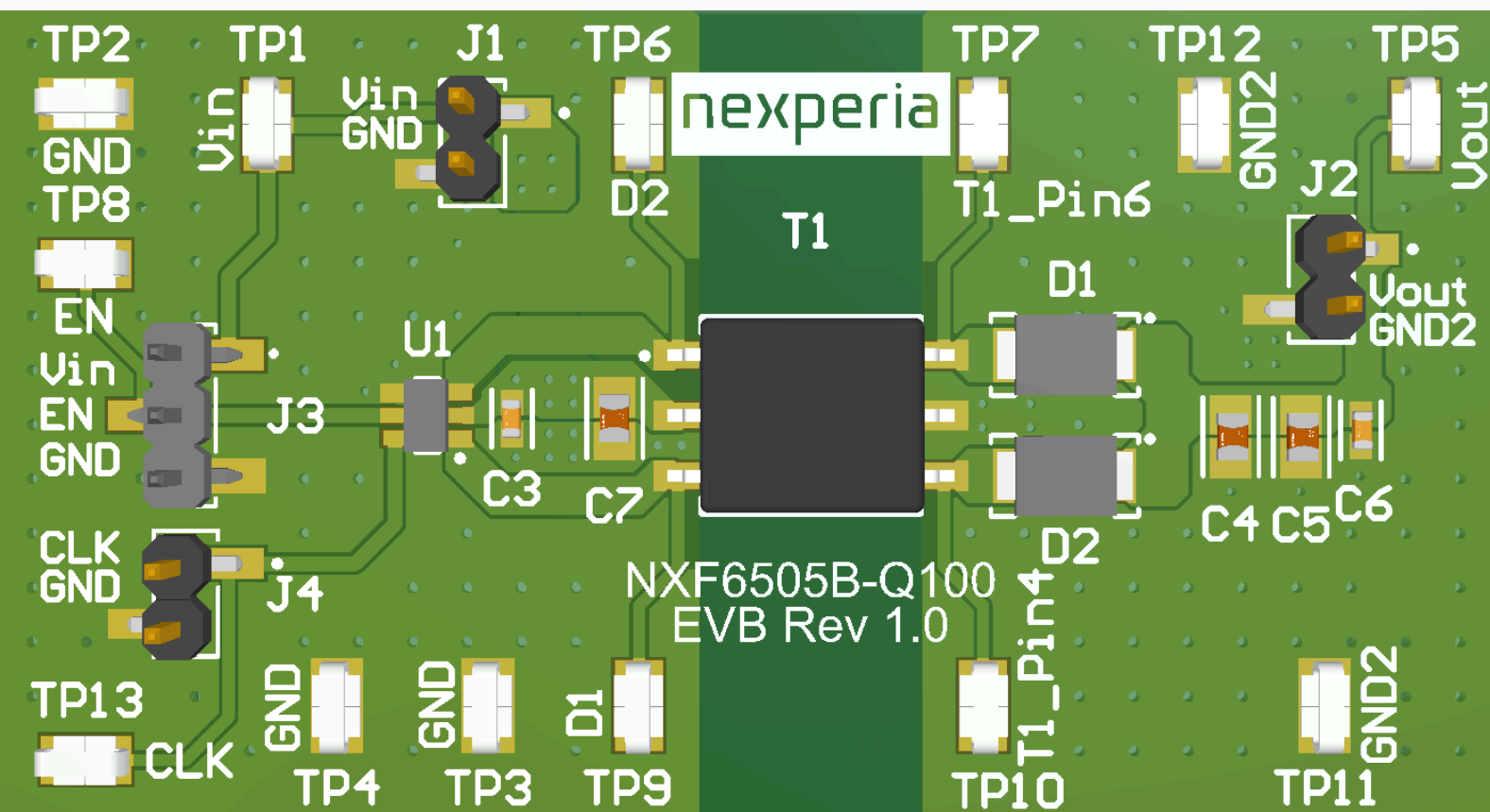




NXF6505B-Q100 Low noise, 1.2 A transformer driver for isolated power supplies evaluation board



Abstract:


This user manual describes the NXF6505B-Q100 Nexperia evaluation board (EVB). The NXF6505B-Q100 is a specialized push-pull transformer driver that is designed to deliver isolated power low noise and low EMI for isolated power supplies in small form factors. This document contains the NEVB schematics, configuration, bill of materials (BOM), NEVB top layer, and NEVB bottom layer.

Keywords:

NXF6505B-Q100 evaluation board, isolated power

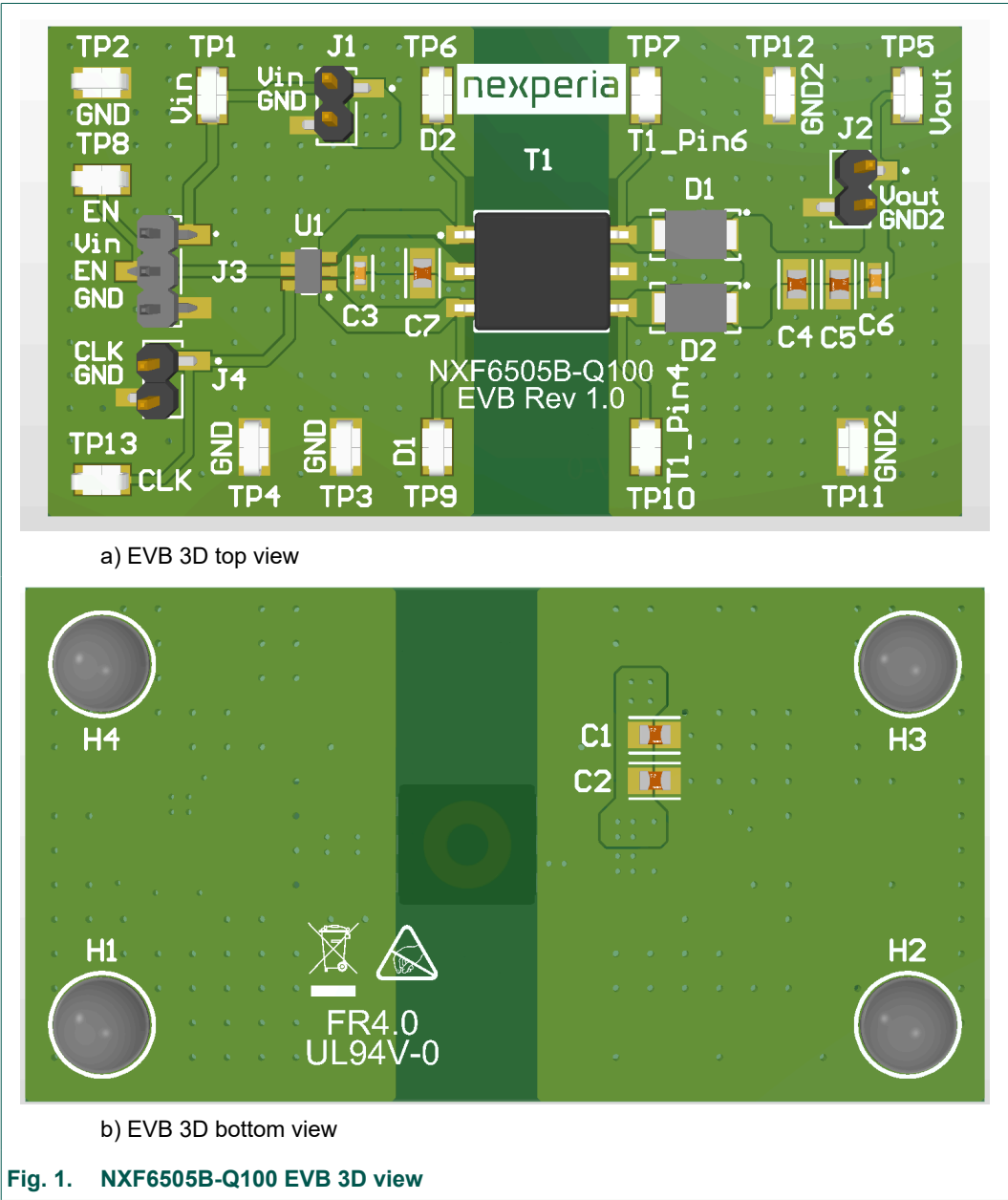
1. Introduction

This evaluation board (EVB) is designed for NXF6505B-Q100 devices. Fig. 1 shows the 3D view of the EVB. The EVB can provide the isolated power supply with one positive output voltage. For easy evaluation of this EVB, the test points are added to measure the circuitry voltages. The EVB is designed for the evaluation of device operating parameters only. The parameters include the input and output voltages, the switching rise and fall times, and break-before-make time (t_{b-m}).



NOTE

The Evaluation Board (EVB) is only intended for evaluating the device parameters. The EVB is not intended for use with high voltages. There is no active protection against high-voltage shock to users and equipment. Take appropriate precautions against electric shock.



2. Features

The following features are available on this EVB:

- Input voltage range: $V_{CC} = 2.25\text{ V}$ to 5.5 V
- Maximum output current:
 - NXF6505B-Q100: 1.2 A ¹
- Enable pin
- External clock pin
- Fail safe input

3. Applications

The EVB design can be used in many applications, including the following:

- Isolated power supply for CAN, RS-485, RS-422, RS-232, SPI, I²C, low-power LAN
- Process control
- Telecom supplies
- Radio supplies
- Distributed supplies
- Isolated power supplies for automotive
 - Traction inverter and motor control
 - DC/DC converter
 - Battery management system (BMS)
 - On-board charger (OBC)

¹ The transformer on the EVB is limited to 1.0 A maximum output current. This transformer can be removed and replaced for different output voltages and currents.

4. Schematic

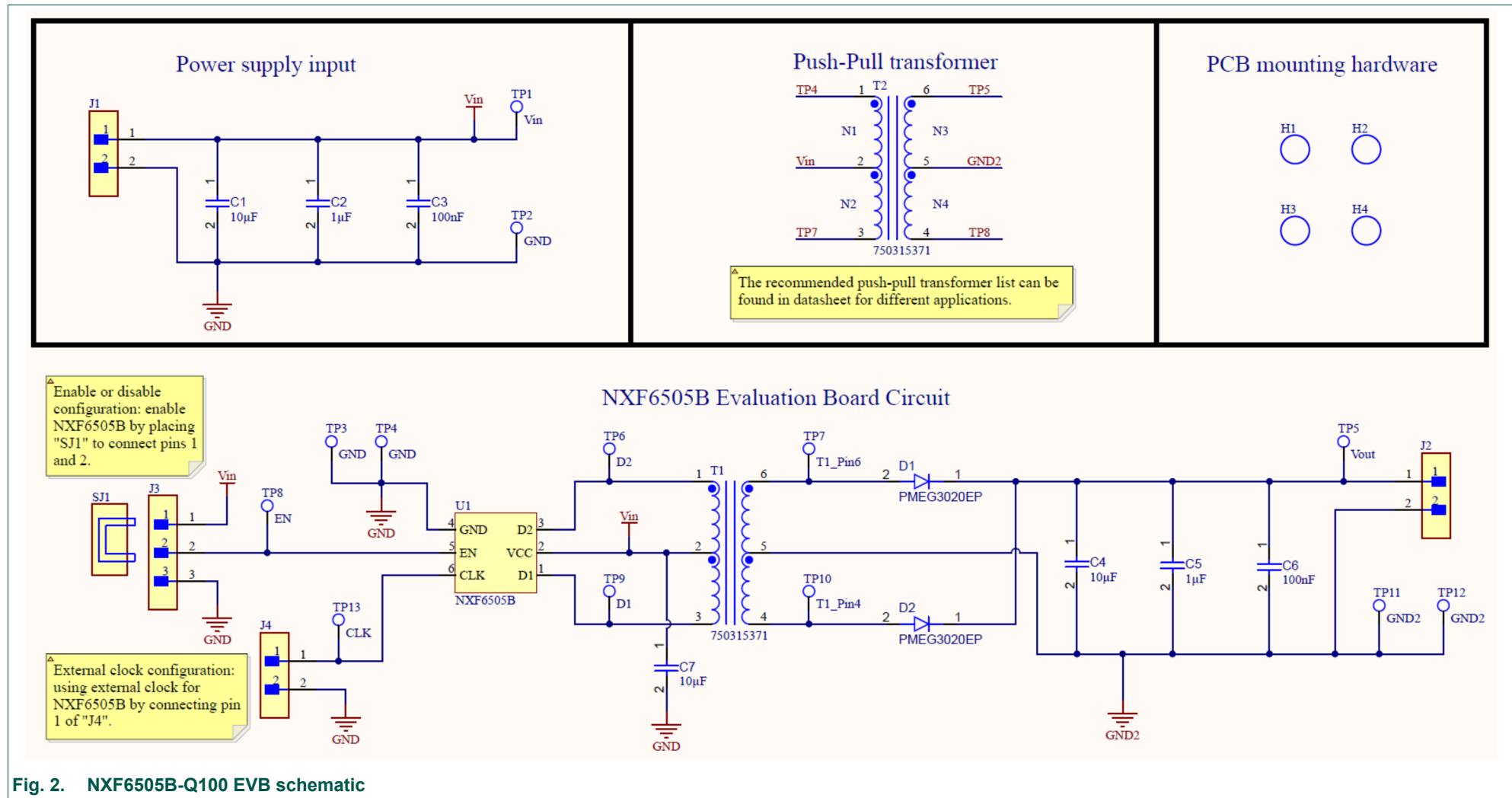


Fig. 2. NXF6505B-Q100 EVB schematic

5. General configuration and description

This section describes the connectors and test points on the EVB, and how to properly connect, setup and use the NXF6505B-Q100 EVB.

5.1. Physical access

[Table 1](#) lists the NXF6505B-Q100 EVB connectors functionality, [Table 2](#) describes the NXF6505B-Q100 EVB test point availability.

Table 1. NXF6505B-Q100 EVB connectors

Connector	Label	Description
J1 Pin1	V _{in}	Power input pin for this board
J1 Pin2	GND	Power ground pin for this board
J2 Pin1	V _{out}	Isolated power output pin
J2 Pin2	GND2	Isolated power output ground pin
J3	V _{in} /EN/GND	NXF6505B-Q100 enable or disable pin
J4	CLK/GND	NXF6505B-Q100 external clock pin

Table 2. NXF6505B-Q100 EVB test points

Test point	Label	Description
TP1	V _{in}	Power input
TP2	GND	Power input ground
TP3	GND	Power input ground
TP4	GND	Power input ground
TP5	V _{out}	Power output
TP6	D2	NXF6505B-Q100 input of pin D2
TP7	T1_Pin6	Transformer output of pin 6
TP8	EN	NXF6505B-Q100 input of pin EN
TP9	D1	NXF6505B-Q100 input of pin D1
TP10	T1_Pin4	Transformer output of pin 4
TP11	GND2	Power output ground
TP12	GND2	Power output ground
TP13	CLK	NXF6505B-Q100 external clock pin

5.2. Test setup and procedure


⚠ WARNING	
	<p>RISK OF SERIOUS INJURY OR DEATH DUE TO ELECTRIC SHOCK</p> <p>Do not connect more than 50 V to this evaluation board, and follow all safety precautions in documents provided by Nexperia.</p> <p>Failure to take appropriate precautions against could result in serious injury or death due to electric shock.</p>

Fig. 3 shows a typical setup for NXF6505B-Q100 EVB. The operational test procedures for this EVB are available below:

1. Connect the enable jumper SJ1 to J3 pin 1 and pin 2.
2. Use wires to connect the Vin and GND to a 5 V power supply through the header J1.
3. Connect a load using header J2.
4. Measure the isolated output voltage across TP5 and TP12, expecting around 5 V.

You can use a transformer with an alternative turns ratio to produce a different output voltage. Kindly refer to the NXF6505B-Q100 data sheet for a selection of recommended transformers featuring diverse turns ratios.

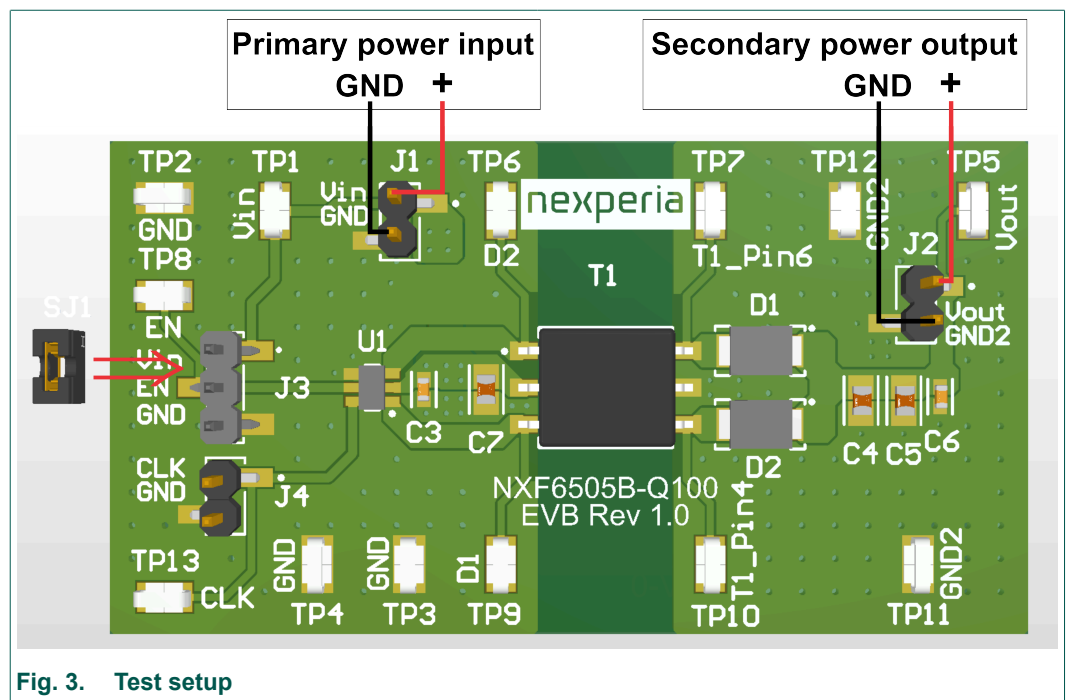


Fig. 3. Test setup

5.3. External clock function

NXF6505B-Q100 supports an external clock with a frequency range from 100 kHz to 1600 kHz. The maximum input logic high voltage (V_{IH}) is $0.7 \times V_{CC}$ and the minimum input logic low voltage (V_{IL}) is $0.3 \times V_{CC}$. The external clock frequency is halved by the internal circuitry to control the switching on pin D1 and pin D2 of the NXF6505B-Q100. Below are the procedures of using the external clock.

1. Connect the CLK and GND pins to the external clock source via header J4 or TP13 and TP4.
2. Activate the external clock source to enable the function.

For more detail about the external clock, you can refer to the data sheet of NXF6505B-Q100.

6. Board layout

[Fig. 4](#) shows the top layer of NXF6505B-Q100 EVB, and [Fig. 5](#) shows the bottom layer of NXF6505B-Q100 EVB.

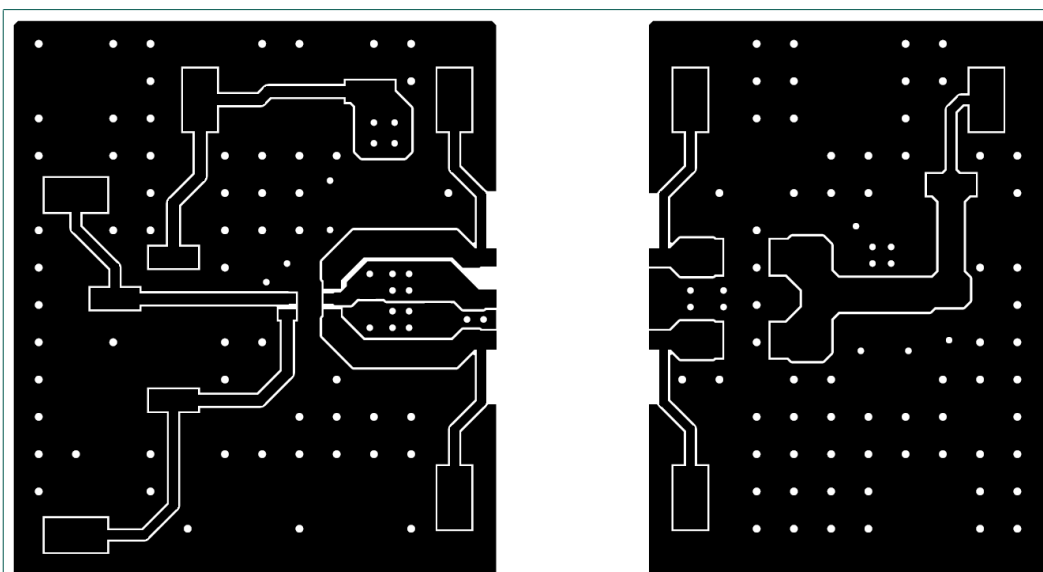


Fig. 4. NXF6505B-Q100 EVB top layer

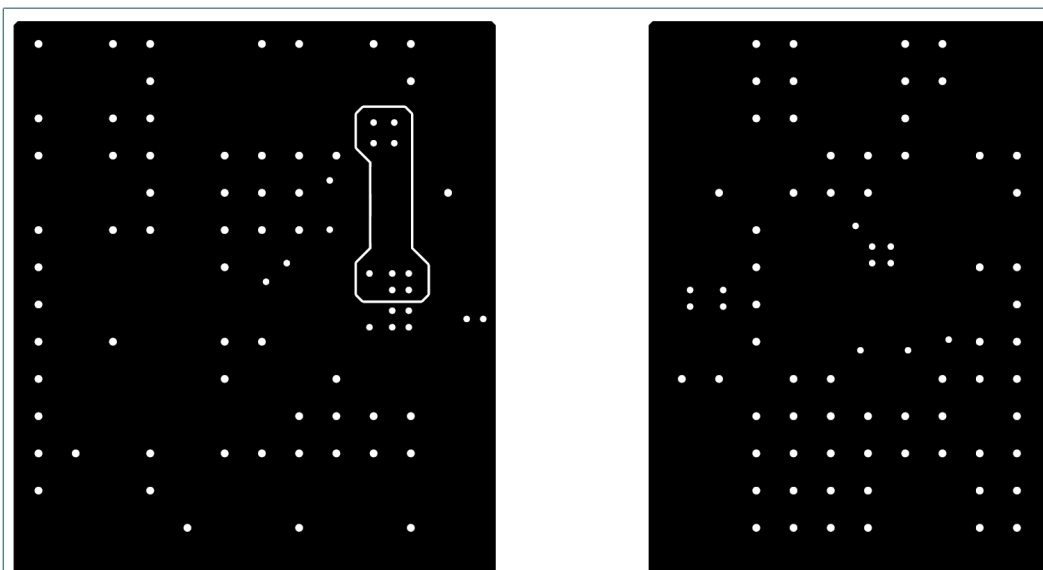


Fig. 5. NXF6505B-Q100 EVB bottom layer

7. NXF6505B-Q100 EVB Bill of Materials (BOM)

Table 3. Bill of Materials (BOM)

Designator	Description	Part number	Quantity	Manufacturer
H1, H2, H3, H4	Bumpers, Hemisphere, Transparent polyurethane, Adhesive mount, 6.4 mm x 1.9mm	SJ5382	4	3M
C1, C4, C7	Multilayer Ceramic Capacitor, 10 µF, 25 V, ±10%, X7R, 1206	GRM31CR71E106KA12L	3	Murata
C2, C5	Multilayer Ceramic Capacitor, 1 µF, 25 V, ±10%, X7R, 0805	CC0805KFX7R8BB105	2	Yageo
C3, C6	Multilayer Ceramic Capacitor, 0.1 µF, 25 V, ± 10%, X7R, 0603 (1608 Metric)	CC0603KRX7R8BB104	2	Yageo
D1, D2	Diode Schottky, 30 V, 2 A, Forward voltage 310 mV, CFP5 (SOD128)	PMEG3020EP	2	Nexperia
J1, J2, J4	Header, Pitch 2.54 mm, 2 POS, Single row, SMT	87898-0204	3	Molex
J3	Header, Pitch 2.54 mm, 3 POS, Single row, SMT	87898-0306	1	Molex
SJ1	2 Position 2.54 mm Centerline Single Circuit Open Top Jumper	QPC02SXGN-RC	1	Sullins
T1	Push-Pull Transformer, 72 µH, Turns ratio 1:1.1, 5 V, 1 A, 2500 V RMS, 400 kHz, LxWxH 8.3 mm x 9.25 mm x 4.1 mm, SMD/SMT	750315371	1	Würth Electronics
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13	Test Point, Mini, SMT, Phos Bronze/Silver, Tape & Reel, Keystone Electronics 5019	5019	13	Keystone Electronics
U1	NXF6505B-Q100, 420 kHz, 5 V, 1.2 A, External clock, Enable, Low-Noise 1.2-A Transformer Driver for Isolated Power Supplies	NXF6505BDA-Q100	1	Nexperia

8. Revision history

Table 4. Revision history

Revision number	Date	Description
UM90035 v.1	20240702	Initial version

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