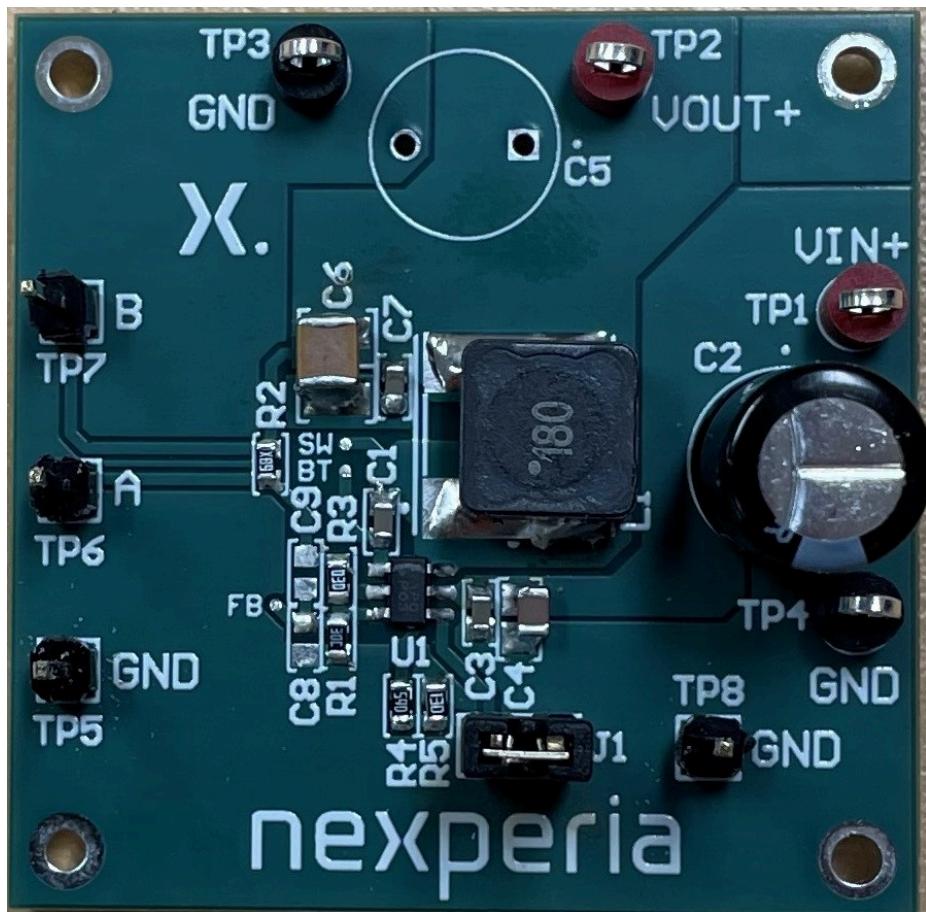


NEX40400: 4.5 V to 40 V, 600 mA, synchronous step-down converter evaluation board



Abstract: The NEX40400EVM evaluation board is a reference design of a step down DC-DC switching voltage converter, assembled on a two-layer PCB.

Keywords: Synchronous step-down converter, input voltage, output current, switching frequency, Pulse Frequency Modulation, Forced PWM, evaluation board (EVB)

1. Introduction

The NEX40400EVM evaluation board allows to test functionality and measure performance of step-down DC-DC voltage regulator designed based on NEX40400 - integrated 4.5 V to 40 V, 600 mA synchronous step-down converter.

2. Features

- 4.5V to 40V input voltage range
- 600mA continuous output current
- 5V output or 12V output
- 1.05 MHz switching frequency Forced PWM operation or
- 2.1 MHz with Pulse Frequency Modulation (PFM) at light load
- Frequency foldback for high conversion ratio and low drop-out application
- Internal compensation
- Short circuit protection with Hiccup mode
- TSOT23-6 package

Table 1. Module Information

PART NUMBER	Output Voltage	Operation Mode	Switching Frequency
NEX40400EVM-05	5 V	FPWM	1.05 MHz
NEX40400EVM-12	12 V	PFM	2.1 MHz

3. Schematic

Fig. 1 shows the schematic of the NEX40400EVM-05 evaluation board: 5 V output, 1.05 MHz, FPWM. Explanation of the test pins, jumpers and other features can be found in the next sections.

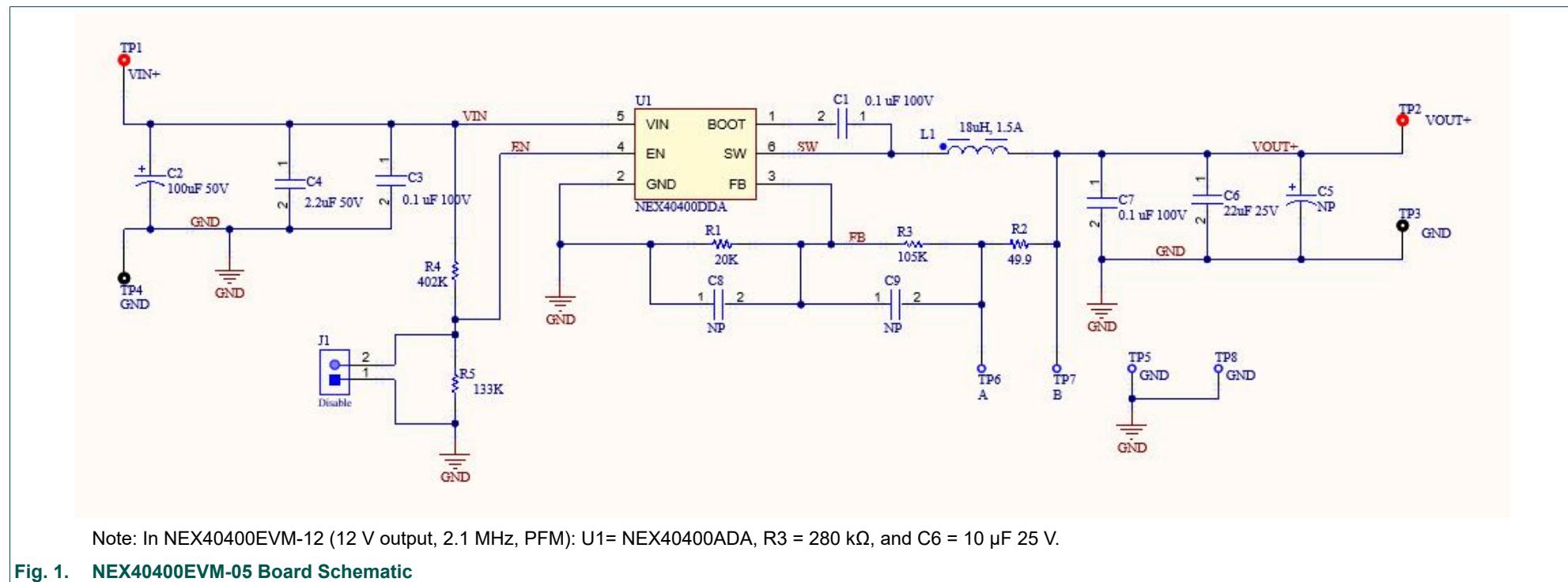


Fig. 1. NEX40400EVM-05 Board Schematic

4. PCB layout

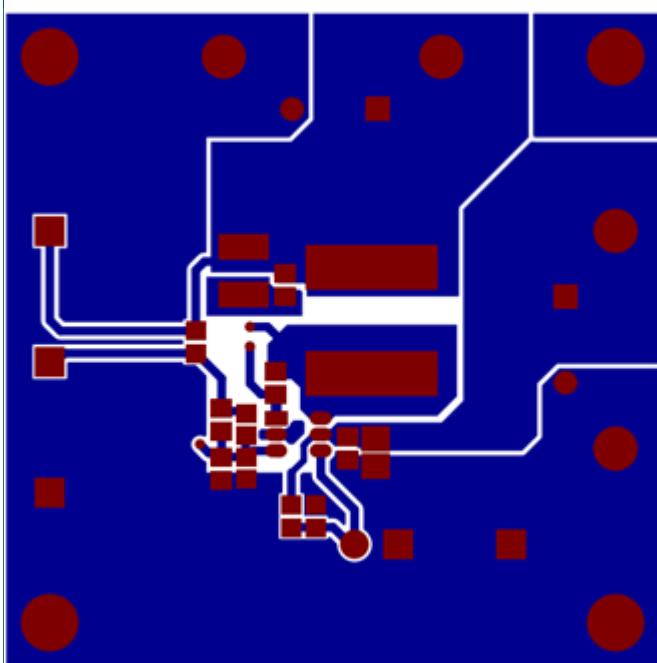


Fig. 2. Top copper layer



Fig. 3. Silkscreen top

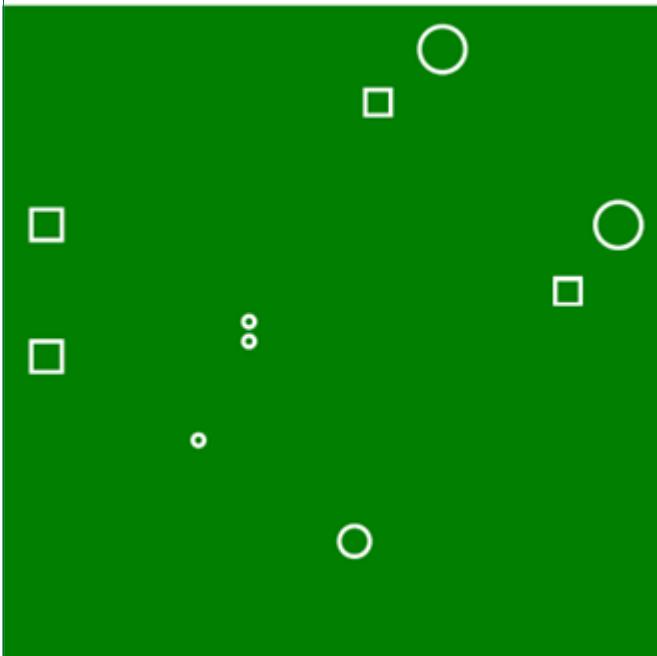


Fig. 4. Bottom copper layer



Fig. 5. Silkscreen Bottom

5. Bill of Material

Table 2. Bill of Material NEX40400EMV-05

Reference	Description	Quantity	Manufacturer name	Manufacturer part number
C1, C3, C7	CAP CER 0.1UF 100V X7R 0603	3	Murata	GRM188R72A104KA35D
C2	CAP ALUM 100UF 20% 50V RADIAL	1	Panasonic	EEUFR1H101B
C4	CAP CER 2.2UF 50V X7R 0805	1	Yageo	CC0805KKX7R9BB225
C6	CAP CER 22uF, X6S, 22%, 10%, 25V, 1210	1	Murata	GRM32EC81E226KE15L
J1	Header 2, Pitch 2.54 mm	1	Wurth Electronics	61300211121
L1	SMT Power Inductor, 18uH, 1.5A, 91mOhm	1	Wurth Electronics	744777118
R1	RES SMD 20K OHM 1% 1/10W 0603	1	Yageo	RT0603FRE0720KL
R2	RES SMD 49.9 OHM 1% 1/10W 0603	1	Yageo	RC0603FR-0749R9L
R3	RES SMD 105K OHM 1% 1/10W 0603	1	Yageo	RC0603FR-07105KL
R4	RES SMD 402K OHM 1% 1/10W 0603	1	Yageo	RC0603FR-07402KL
R5	RES SMD 133K OHM 1% 1/10W 0603	1	Yageo	RC0603FR-07133KL
TP1, TP2	PC TEST POINT COMPACT RED	2	Keystone Electronics	5005
TP3, TP4	PC TEST POINT COMPACT BLACK	2	Keystone Electronics	5006
TP5, TP6, TP7, TP8	Header, 1-Pin	4	Wurth Electronics	61300111121
U1	40V 600mA Synchronous Step-down Converter 1.05 MHz , FPWM, TSOT23-6	1	Nexperia	NEX40400EDA
	CONN JUMPER SHORTING .100" GOLD	1	Sullins Connector Solutions	QPC02SXGN-RC

Table 3. Bill of Material difference for NEX40400EVM-12

Reference	Description	Quantity	Manufacturer name	Manufacturer part number
C6	CAP CER 10μF, X7R, 15%, 10%, 25V, 1206	1	Murata	GRM31CR71E106KA12L
R3	RES SMD 280KΩ 1% 1/10W 0603	1	Yageo	RC0603FR-07280KL
U1	40 V 600 mA synchronous Step-down Converter 2.1 MHz , PFM, TSOT23-6	1	Nexperia	NEX40400ADA

6. Quick start

- 6.1. Connect TP4 GND of the NEX40400EVM to the negative terminal of a power supply and connect TP1 VIN+ to the positive terminal of the power supply.
- 6.2. Apply 24V from the power supply than remove short from J1 to enable the converter.
- 6.3. Measure output voltage at the TP2 VOUT+ or TP7 B with respect to GND at TP1 or TP5.
- 6.4. Apply a load between TP2 VOUT+ and TP3 GND.
- 6.5. The converter SW pin and BOOT pin operation can be monitored with a scope by probing the SW and BT via correspondently next to resistor R2.
- 6.6. For measurements of the converter's control loop frequency response, use TP6 A, TP7 B and TP5 GND.
- 6.7. Short J1 to disable the converter.

7. Revision history

Table 4. Revision history

Revision number	Date	Description
UM90049 Rev.1	20241210	Initial version

8. Legal information

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