STMicroelectronics UM3441 36 V – 1 A Synchronous Buck Converter User Manual

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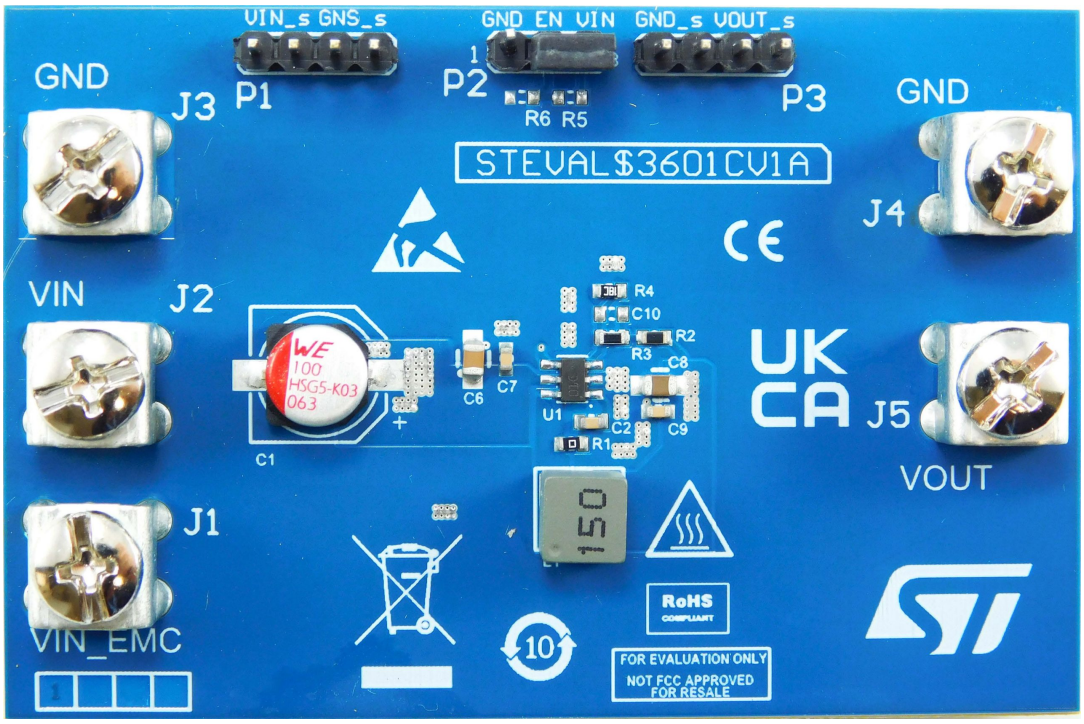
STMicroelectronics UM3441 36 V – 1 A Synchronous Buck Converter



Specifications

- **Product Name:** STEVAL-3601CV1
- **Converter:** DCP3601 36 V – 1 A synchronous buck converter
- **Package:** SOT23-6L
- **Input Voltage Range:** 12V to 36V
- **Output Voltage:** 5V
- **Output Current:** Up to 1A

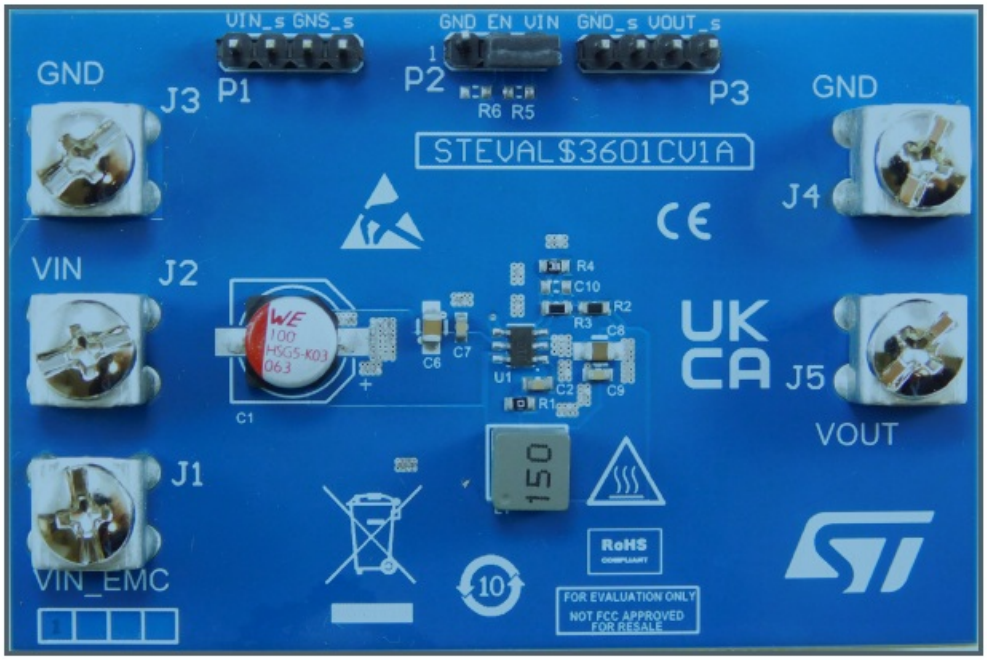
FAQS

- **Q: What is the recommended input voltage range for the STEVAL-3601CV1?**
  - **A:** The input voltage range is from 12V to 36V.
- **Q: How can I adjust the output voltage of the converter?**
  - **A:** You can adjust the output voltage by changing the power resistor or active load connected between VOUT and GND connectors.

Introduction

- The STEVAL-3601CV1 evaluation board demonstrates a smart converter design able to deliver up to 1 A output current from a 3.3 V to 36 V input, with a 5.0 V output voltage.
- The board features the DCP3601 miniaturized synchronous step-down converter, which implements enhanced peak current control and advanced design circuitry to minimize quiescent current, including also soft-start circuit, overcurrent protection circuit, overtemperature protection and output overvoltage protection.
- The board highlights key application benefits made possible by the DCP3601, including high efficiency and small PCB size, and is ideal for power conversion solutions in major appliances, smart metering, industrial 12/24 V bus conversion, and general-purpose wide Vin power supplies.
- The device used on this board is supplied in the SOT23-6L package.

Figure 1. STEVAL-3601CV1 top view



- **Notice:** For dedicated assistance, submit a request through our online support portal at www.st.com/support.

Electrical performance specification

Table 1 provides a summary of the electrical performance of the STEVAL-3601CV1.

Table 1. Electrical performance specification (Ta = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit
VIN	Input supply voltage	–	12 or 24	36	V
VOUT	Output voltage	–	5	–	V
IOUT	Output current	–	–	1	A

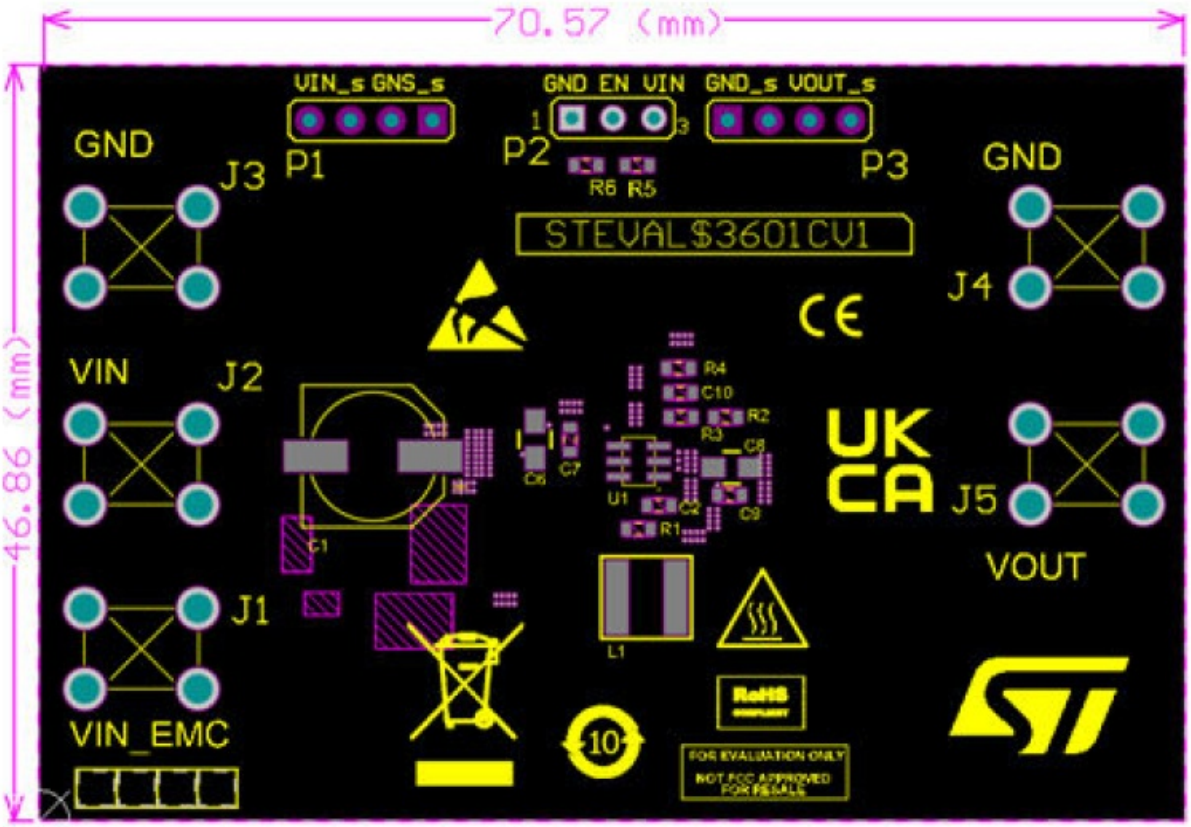
Input Output connector descriptions

This section provides the descriptions of the input/output connectors present on the STEVAL-3601CV1.

- **J1:** Input power supply (Vin_EMC). Input voltage is filtered to decrease the EMI. Supply voltage should be set with a current limitation compatible with the power board request.
- **J2:** Main input power supply (Vin). Input voltage is not filtered to decrease the EMI. Supply voltage should be set with a current limitation compatible with the power board request.
- **J3:** Ground (Gnd)
- **J4:** Ground (Gnd)
- **J5:** Output voltage Connector (VOUT)
- **P1:** Input voltage sense Connector
  - **VIN_S:** Input voltage sense
  - **VIN_S:** Input voltage sense
  - **GND_S:** Ground sense

    - **GND_S:** Ground sense
- **P3:** Output voltage sense Connector
    - **VOUT_S:** Output voltage sense
    - **VOUT_S:** Output voltage sense
    - **GND_S:** Ground sense
    - **GND_S:** Ground sense
- **P3:** ENABLE pin.
    - Place the jumper across EN and VIN to enable the buck converter
    - Place the jumper across EN and GND to disable the buck converter

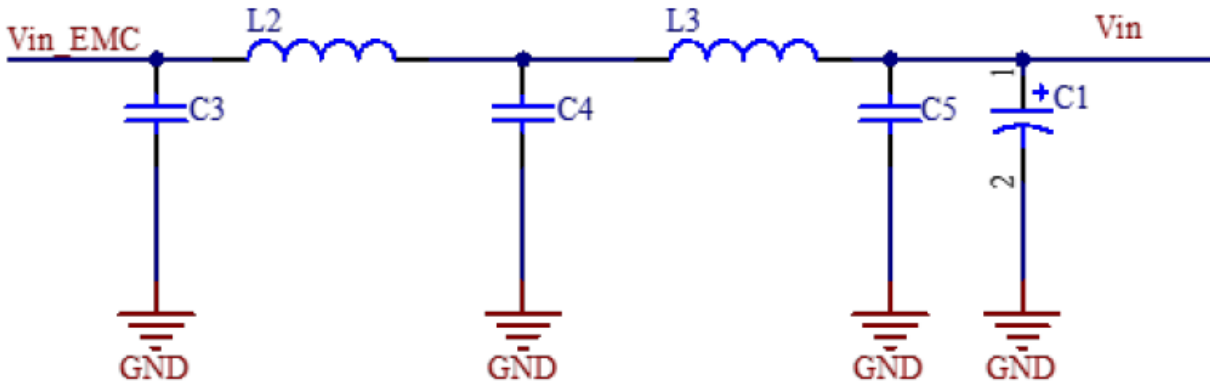
Figure 2. Connector descriptions



Input EMI filter

- The STEVAL-3601CV1 is compliant with CISPR16-4-2.
- An input filter helps to reduce EMI. The filter consists of a ferrite bead (L2), an inductor (L3), and three ceramic capacitors (C3, C4 and C5). An electrolytic capacitor is used for bulk energy storage and input damping.

Figure 3. **Input EMI filter**



How to use the board

The STEVAL-3601CV1 is set to deliver a 5 V output voltage. This board is best suited for applications where high efficiency at low current is preferred to output ripple.

- **Step 1.** Connect the voltage supply between VIN and GND connectors or VIN_EMC and GND connectors.
- **Step 2.** Connect the load (power resistor or active load) between the VOUT and GND connectors.
  - **Note:** For Step 1 and Step 2 short wires are recommended.
- **Step 3.** Set the supply voltage VIN to 12 or 24 V.
- **Step 4.** By default, VOUT is set to 5 V. Increase or decrease the output power resistor or active load to reach the suitable output current (max. 1 A).
  - **Note:** Using DCP3601CMR, at light load the board works in PSK mode to guarantee high efficiency performance.

Board Layout

This section shows the STEVAL-3601CV1 layout. All the dimensions are in millimeters (mm).

Figure 4. **STEVAL-3601CV1 top layer**

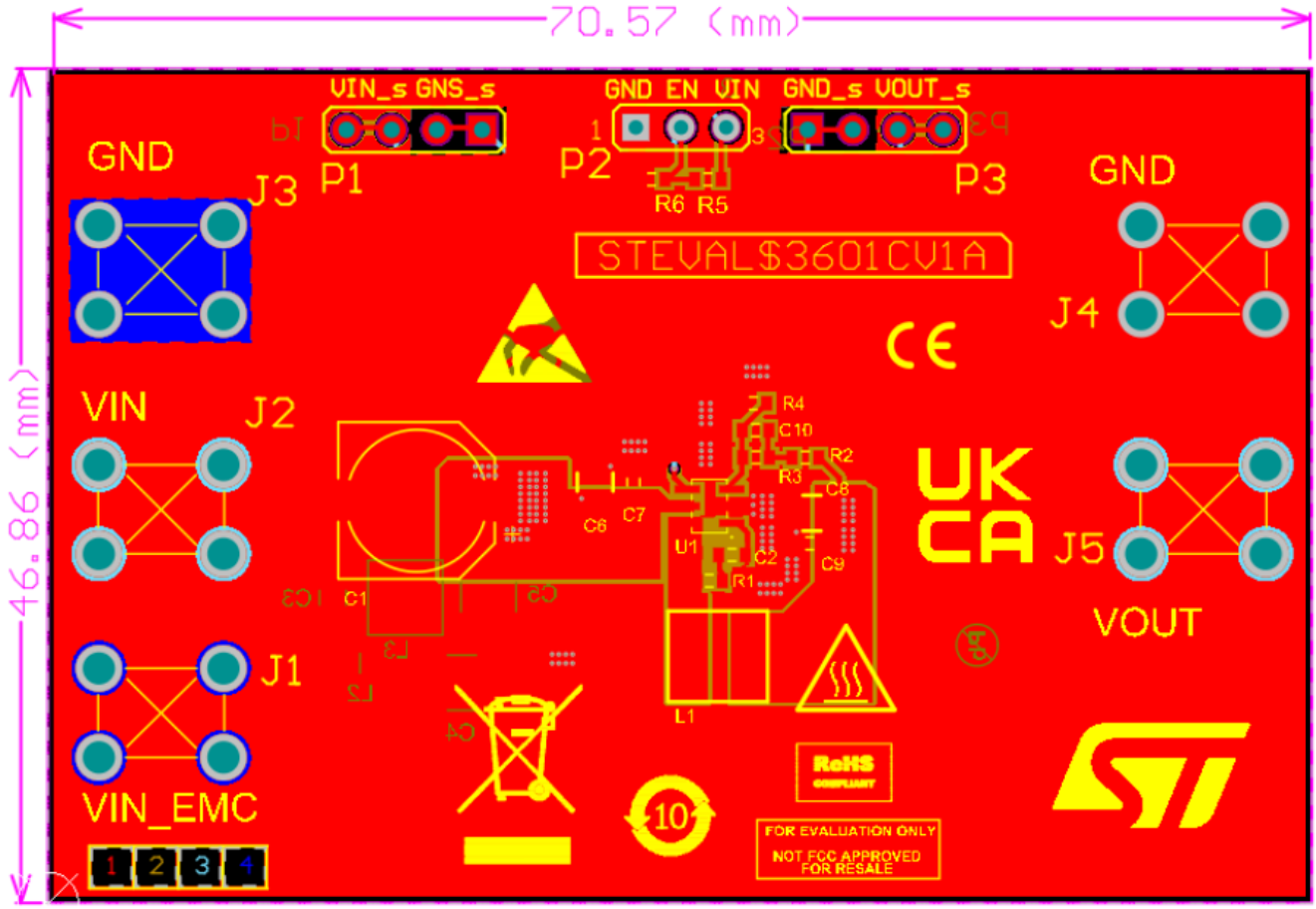


Figure 5. **STEVAL-3601CV1 L1 layer**

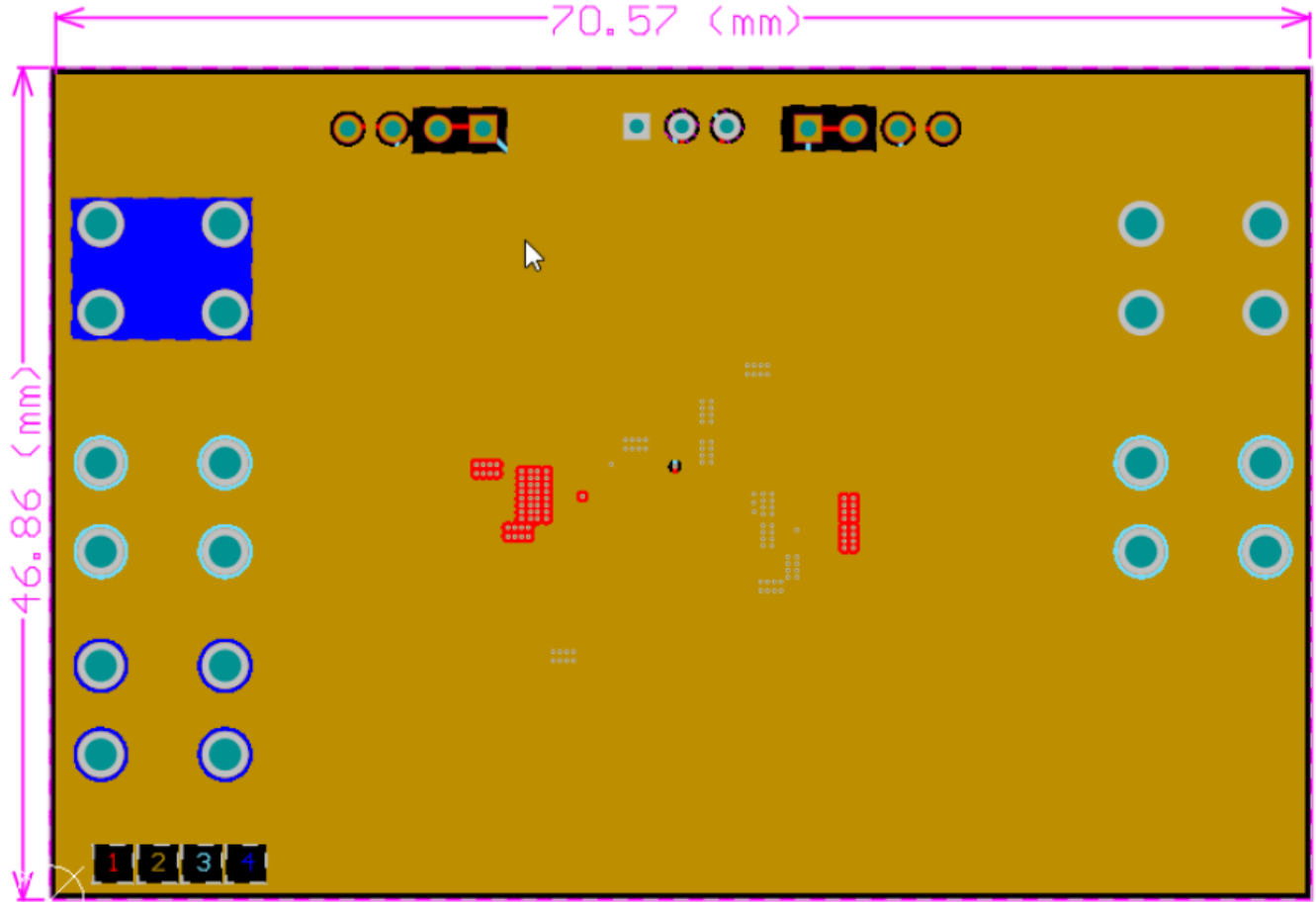


Figure 6. **STEVAL-3601CV1 L2 layer**

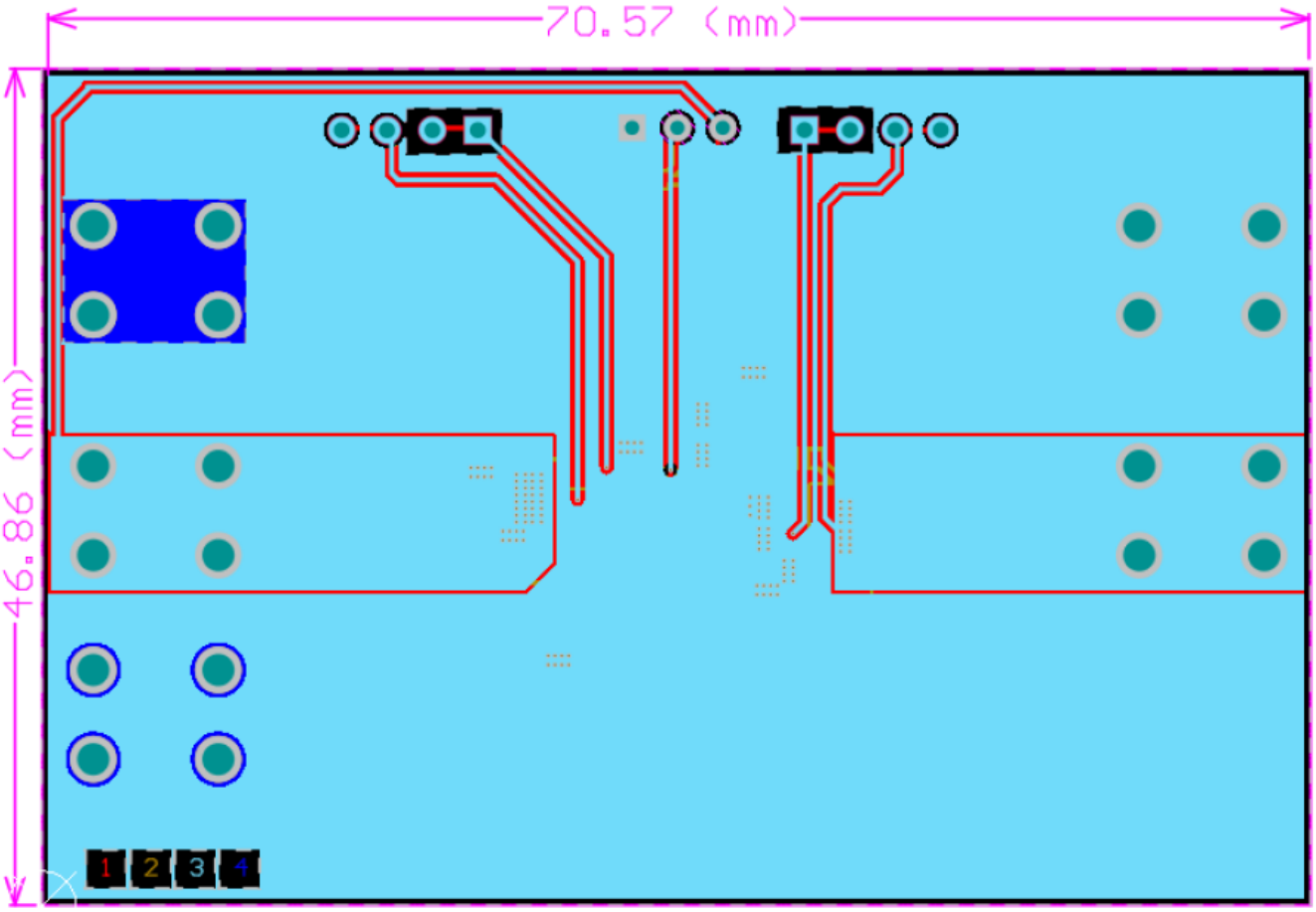
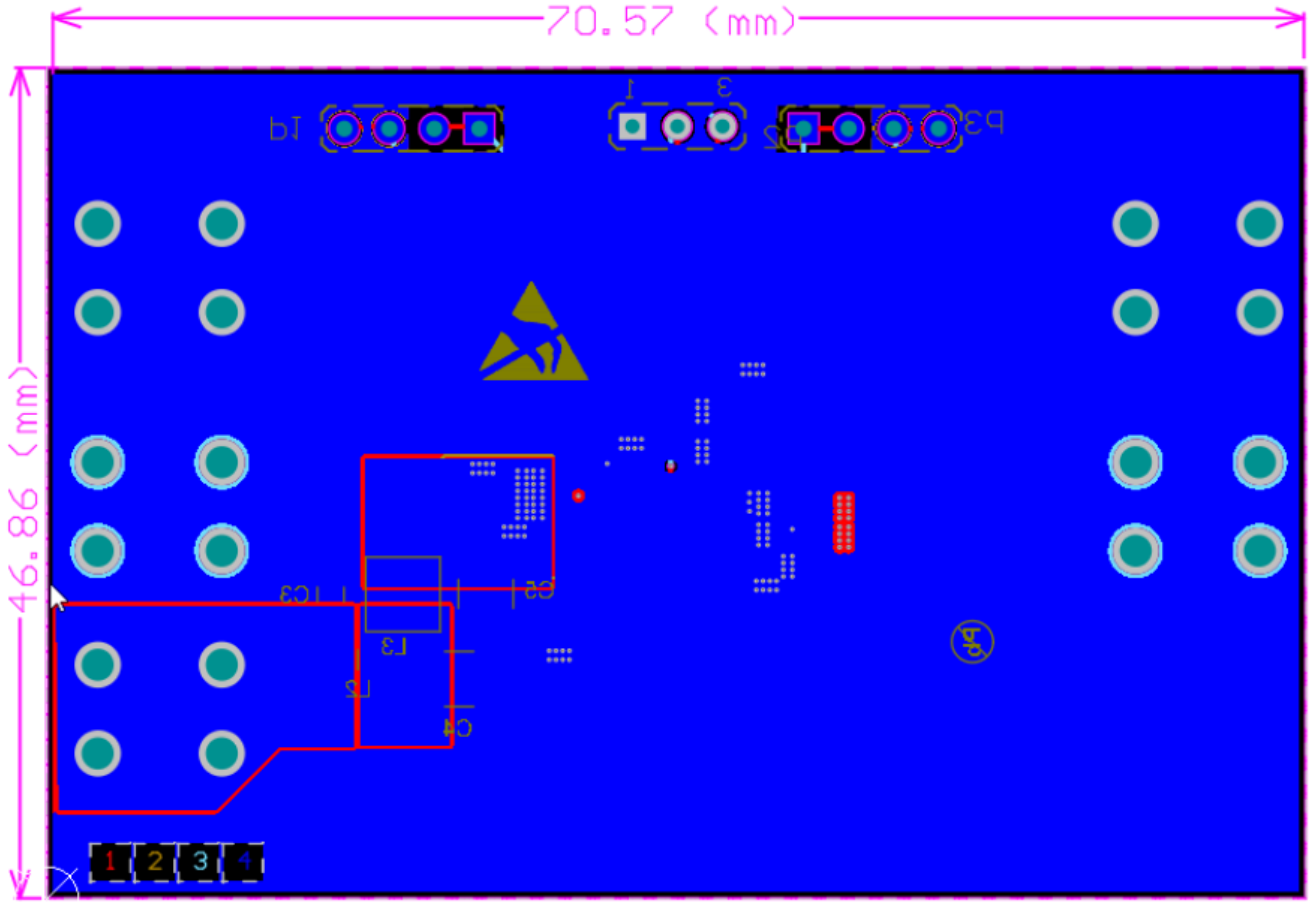
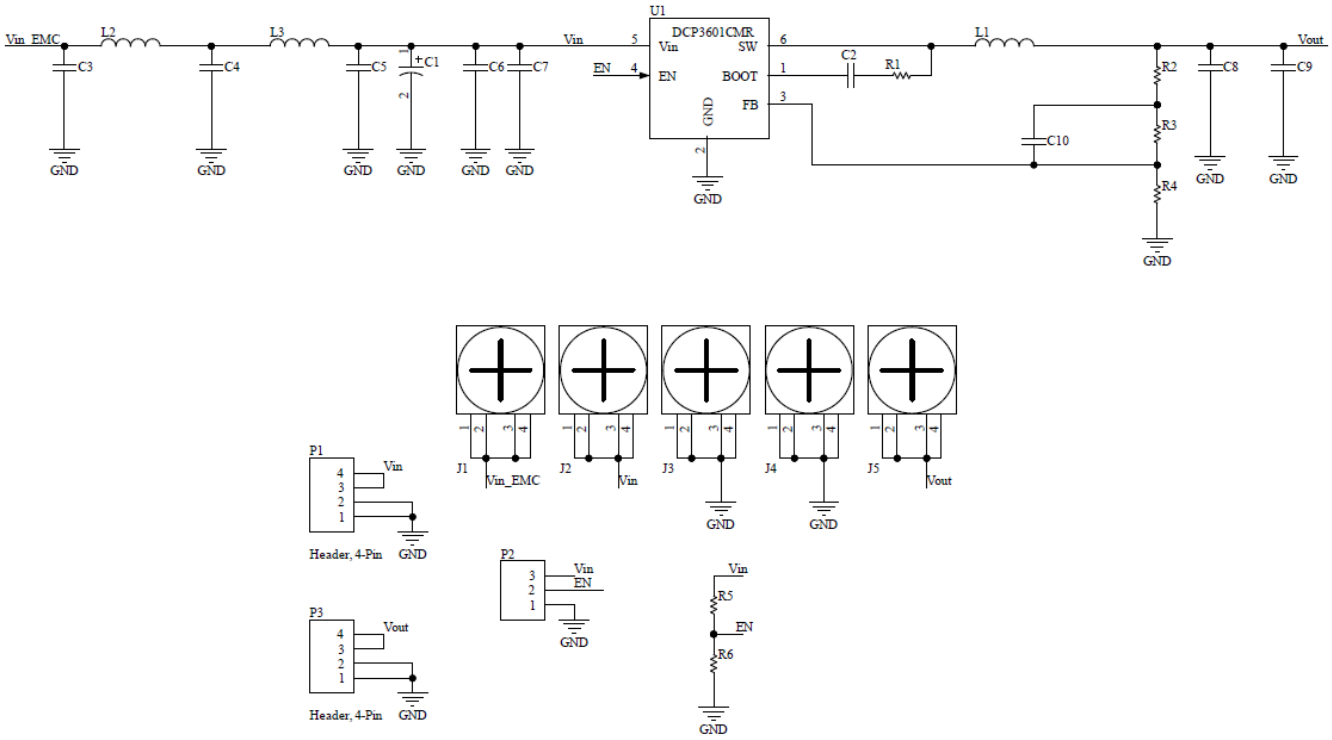


Figure 7. **STEVAL-3601CV1 bottom layer**



Schematic diagrams

Figure 8. **STEVAL-360CV1 circuit schematic**



Bill of materials

Table 2. STEVAL-3601CV1 bill of materials

Item	Q.ty	Ref.	Part/value	Description	Manufacturer	Order code
1	1	R1	0	Thick film resistor	RS	732-5646
2	1	R2	20 Ω	Thick film resistor	RS	678-9973
3	1	R3	73.2 kΩ	Thick film resistor	RS	708-8981
4	1	R4	15 kΩ	Thick film resistor	RS	228-4708
5	2	R5, R6	NOT ASSEMBLY	Thick film resistor		
6	1	C1	10 uF	10uF/63V/20 % Hybrid Polymer	WURTH Electronics Inc	875 575 844 001

7	3	C2, C7, C9	0.1 uF	0.1uF / 50V / 0603 / X7R / 10%	TDK	C1608X7R1H104K080AA
8	1	C3	100 nF	100nF / 50V / 10%	WURTH Electronics Inc	885 012 208 087
9	2	C4, C5	2.2 uF	2.2uF / 50V / 1812/ 10%	WURTH Electronics Inc	885 012 210 032
10	1	C6	2.2 uF	2.2uF / 50V / 0805 / X7R / 10%	TDK	C2012X7R1H225K125AC
11	1	C8	22 uF	22uF / 25V / 0805 / X5R / 20%	TDK	C2012X5R1E226M125A
12	1	C10	NOT ASSEMBLY			
13	1	L1	15 uH		WURTH Electronics Inc	744 393 305 150
14	1	L2			WURTH Electronics Inc	742 792 651
15	1	L3	1uH		WURTH Electronics Inc	744 383 130 10
16	1	U1	DCP3601CMR	Synchronous step-down converter	ST	**DCP3601CMR**
17	5	J1, J2, J3, J4, J5	–	PC SCREW TERMINAL, 22-14AWG	KEYSTONE	KEYSTONE 7693

18	2	P1, P3	–	Male SIL Vertical Throughboard Conn pitch 2.54mm	Wurth Electronics Inc	61300411121
19	1	P2	–	Male SIL Vertical Throughboard Conn pitch 2.54mm	Wurth Electronics Inc	61300311121

Item	Q.ty	Ref.	Part/value	Description	Manufacturer	Order code
20	1	JP1	–	Female Straight Black Closed Top 2 Way 1 Row 2.54 mm Pitch	RS	251-8503

Board versions

Table 3. STEVAL-3601CV1 versions

Finished good	Schematic diagrams	Bill of materials
STEVAL$3601CV1A(1)	STEVAL$3601CV1A schematic diagrams	STEVAL$3601CV1A bill of materials

1. This code identifies the STEVAL-3601CV1 evaluation board first version.

FCC

Regulatory compliance information

Notice for US Federal Communication Commission (FCC)
For evaluation only; not FCC approved for resale

FCC NOTICE – This kit is designed to allow:

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- This device is in conformity with the essential requirements of the Directive 2014/30/EU (EMC) and of the
- Directive 2015/863/EU (RoHS).

Notice for the United Kingdom

- This device is in compliance with the UK Electromagnetic Compatibility Regulations 2016 (UK S.I. 2016 No. 1091) and with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (UK S.I. 2012 No. 3032).

Revision history

Table 4. Document revision history

Date	Revision	Changes
06-Nov-2024	1	Initial release.
19-Dec-2024	2	Updated title in cover page and **Section Introduction**.

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Documents / Resources

	**STMicroelectronics UM3441 36 V - 1 A Synchronous Buck Converter** [pdf] User Manual UM3441, UM3441 36 V - 1 A Synchronous Buck Converter, 36 V - 1 A Synchronous Buck Converter, Synchronous Buck Converter, Buck Converter, Converter

References

- **User Manual**