
# STMicroelectronics STEVAL-C34KPM1 Evaluation Kit for Current Sensing and Power Monitoring User Manual



Contents



## STMicroelectronics STEVAL-C34KPM1 Evaluation Kit for Current Sensing and Power Monitoring

## Product Information

### Specifications

- Plug-in for STEVAL-STWINBX1 evaluation board
- TSC1641 high-precision current, voltage, power, and temperature monitoring AFE
- 16 bit dual channel for current, voltage, and power monitoring
- Temperature monitoring
- Power supply: 2.7 to 3.6 V
- Alert signals for over/under voltage, current, power, or temperature
- Load voltage sensing: 0 to 60 V
- Power supply input: 3.3 V

## Product Usage Instructions

### Overview

The STEVAL-C34KPM1 evaluation kit is designed for current sensing and power monitoring. It includes the TSC1641 AFE for precise measurements.

### Get started with the board

To begin using the board, follow these steps:

1. Attach the expansion board to the STEVAL-STWINBX1 kit using the provided flex cable and connectors.
2. Flash the STWIN.box with the FP-SNSDATALOG2 function pack for data acquisition.
3. For removal of the flex cable, use tweezers to avoid damage.

### Precautions for use

Ensure to consider the following precautions:

- Avoid exposure to intense radiant sources as per EN IEC 61000-4-3 standard.
- During radiated immunity testing, expect performance degradation of over 2% in voltage and current measurement.

## FAQ

- **Q: How can I obtain dedicated assistance for the STEVAL-C34KPM1 evaluation kit?**
  - A: For dedicated assistance, submit a request through our online support portal at www.st.com/support.
- **Q: What is the main component of the kit?**
  - A: The main component is the TSC1641 AFE which provides high-precision current, voltage, power, and temperature monitoring.
- **Q: How should I handle the flex cable when attaching it to the STWIN.box?**
  - A: Carefully remove the plastic case cover, plug in the flex cable, and then remount the cover ensuring enough space for the cable. Use tweezers to safely remove the cable.

## Introduction

The STEVAL-C34KPM1 evaluation kit allows the user to evaluate the performance of the TSC1641, 16-bit, high precision current and power monitor with an MIPI I3C/I2C interface. The board can measure: voltage up to 60 V, a load current up to 10 A delivered power, and temperature based on the dual channel power monitor. The current measurement can be high-side, low-side and bidirectional. Analog filters can be implemented on the board. This expansion kit is compatible with the STWIN.box (STEVAL-STWINBX1), and it is supported by the high speed datalogger function pack (FP-SNS-DATALOG2)

Figure 1. **STEVAL-C34KPM1 evaluation kit**


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

## Overview

### Features

- The kit includes:
  - STEVAL-C34PM01 expansion board with TSC1641 and 34 pins board-to-fpc connector
  - A 34-pin flex cable
- Ideal plug-in for the **STEVAL-STWINBX1** evaluation board
- TSC1641 high-precision current, voltage, power, and temperature monitoring analog front-end (AFE)
- 16 bit dual channel for current, voltage, and power monitoring
- Temperature monitoring

- Simple digital connection with I²C up to 1 MHz and compatible with MIPI I3C up to 12.5 MHz
- From 128 µs to 32.768 ms total conversion time
- 2.7 to 3.6 V power supply
- Alert signals are generated in case of over/under voltage, over/under current, overpower or over temperature
- Load voltage sensing from 0 to 60 V
- 3.3 V power supply input

**Main component**

**TSC1641**

The **TSC1641** is a high precision current, voltage, power, and temperature monitoring analog front-end (AFE). It monitors current into a shunt resistor and load voltage up to 60 V in a synchronized way. The current measurement can be high-side, low-side and bidirectional. The device integrates high precision 16-bit dual channel ADC with a programmable conversion time from 128 µs to 32.7 ms. The digital bus interface is flexible from an I²C/SMbus 1 MHz data rate to an MIPI I3C 12.5 MHz data rate. This allows connectivity to most of the recent STM32 products.

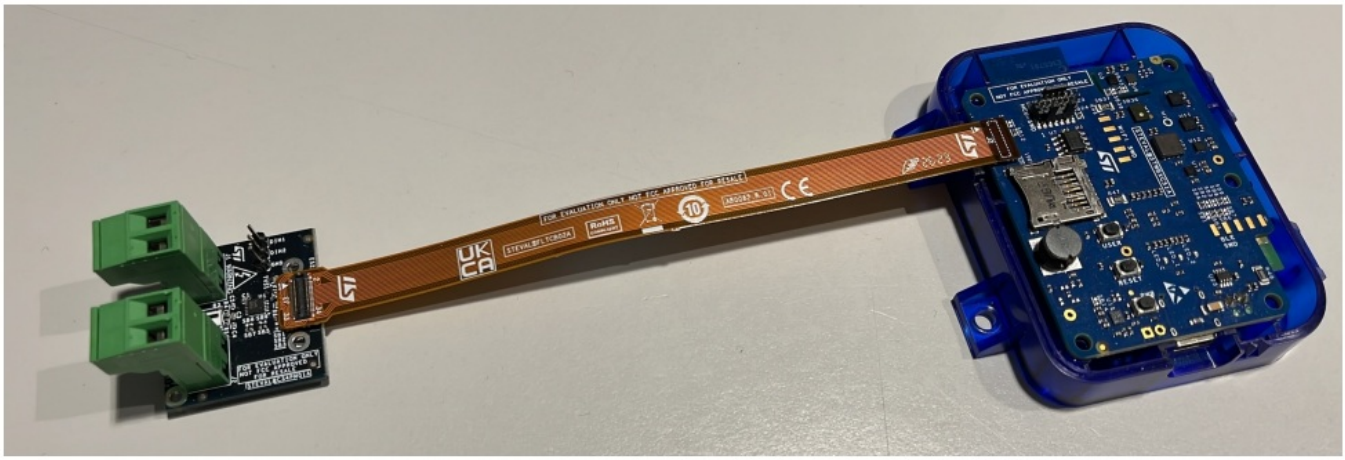
## Get started with the board

The **STEVAL-C34KPM1** expansion board can be used with the **STEVAL-STWINBX1** kit (STWIN.box). The device can be attached to the STWIN.box using the provided flex cable, through the 34-pin connectors available on both platforms.

**Figure 2. Expansion board and flex cable**

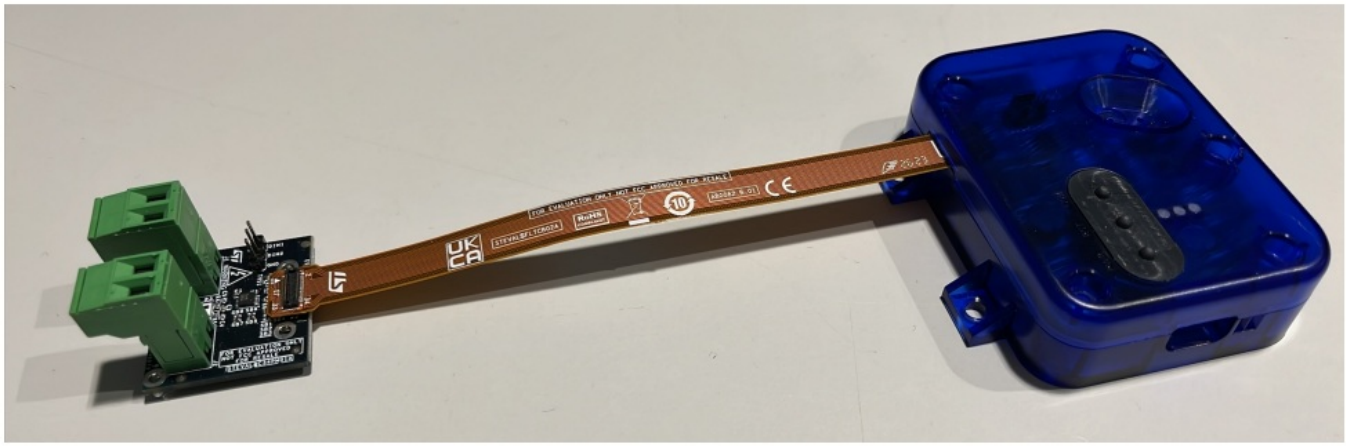
To plug the flex cable onto the STWIN.box, remove the plastic case cover.

**Figure 3. Plugging the flex cable onto the STWIN.box**



You can then remount the cover, as it leaves enough space for the flex cable.

**Figure 4. Final setup cover**



The easiest way to read data from the **STEVAL-C34KPM1** is to flash the STWIN.box with the FP-SNSDATALOG2 function pack. The firmware package provides a ready-to-use, precompiled binary to perform sensor data acquisition.

Note: Be careful when you remove the flex cable as you may damage it. The safest way to remove it is by pulling it next to the connectors using tweezers.

### Precautions for use

The board is not immune to the disturbance generated from intense radiant sources, according to EN IEC 61000-4-3. During the radiated immunity testing, the board obtained level B, meaning that the board was not damaged during the test, but showed a performance degradation of over 2% in voltage and current measurement

## Schematic diagrams

Figure 5. **STEVAL-C34PM01 circuit schematic**

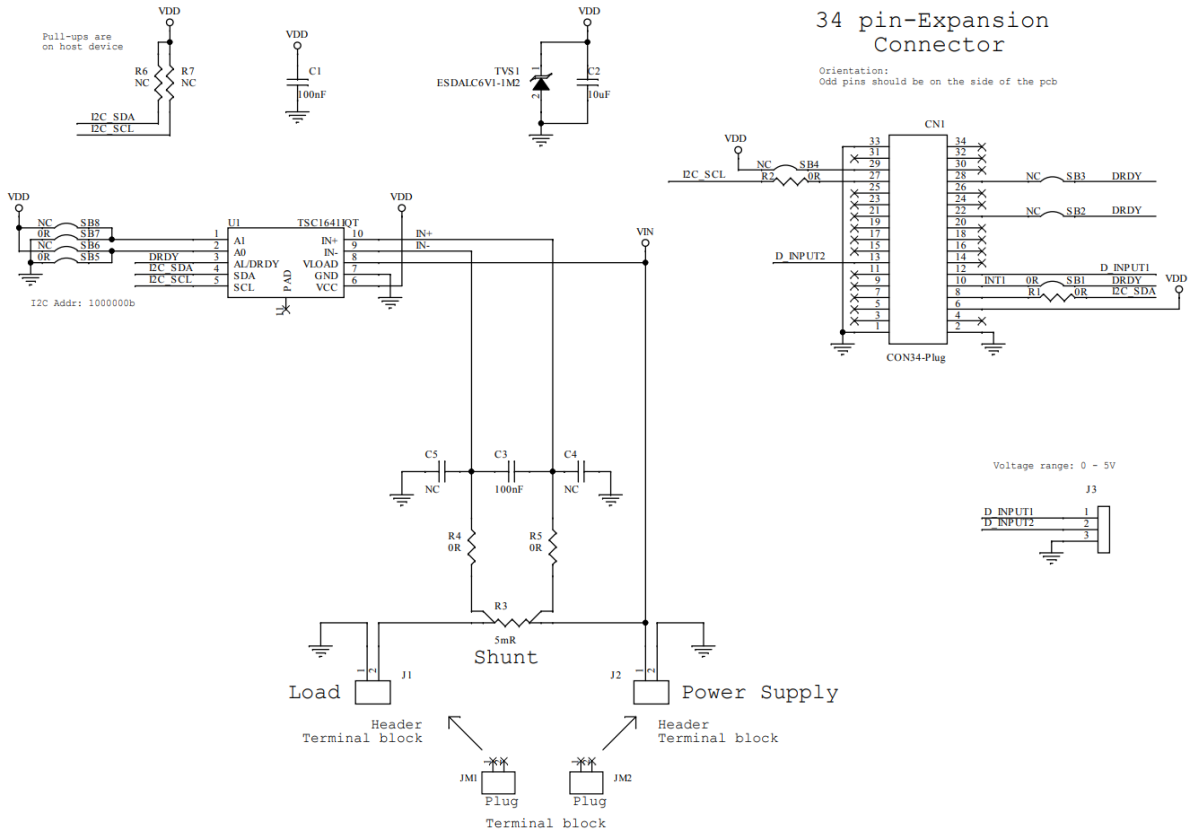
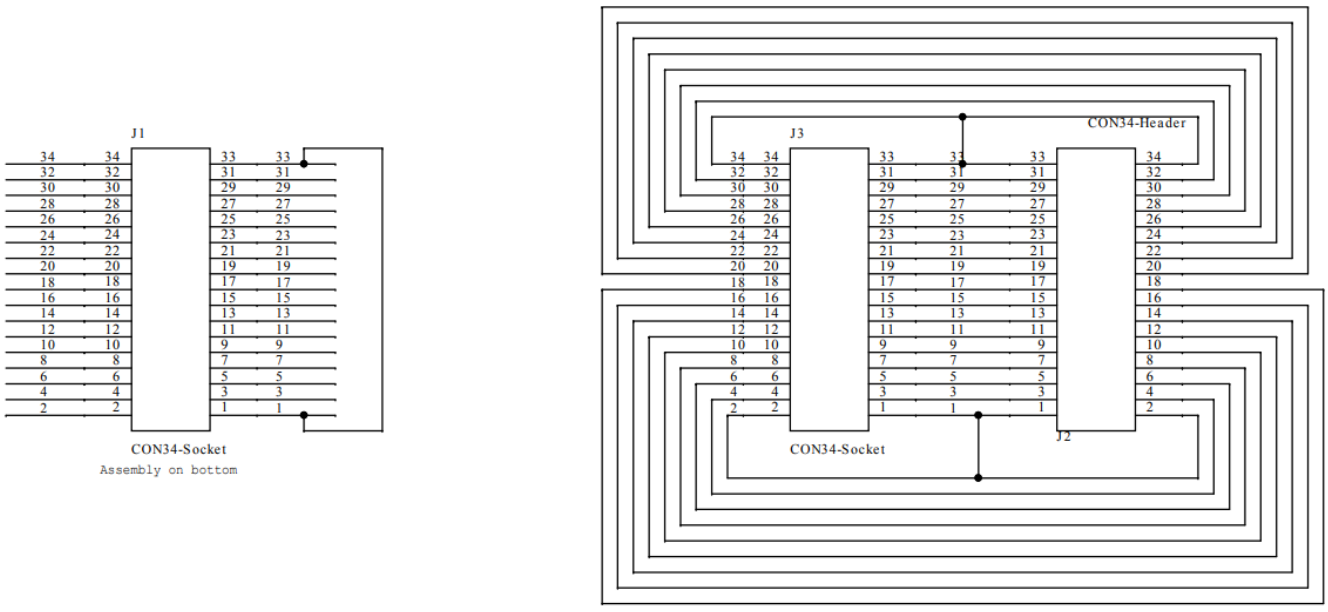



Figure 6. **STEVAL-FLTCB02 circuit schematic**




## Bill of materials

### Table 1. STEVAL-C34KPM1 bill of materials

| Item | Q.ty | Ref. | Part/value | Description | Manufacturer | Order code |
|---|---|---|---|---|---|---|
| 1 | 1 | – | Table 2. STEVAL -C34PM01 | Power Monitoring Add- on | ST | Not available for separate sale |
| 2 | 1 | – | Table 3. STEVAL -FLTCB02 | 34pin Flex Cable – 15cm | ST | Not available for separate sale |

**Table 2. STEVAL-C34PM01 bill of materials**

| Item | Q.ty | Ref. | Value | Description | Manufacturer | Order code |
|---|---|---|---|---|---|---|
| 1 | 4 | B1,B2,B3,B4 | CON1 | Adhesive Bumper Dome 8mm 2.5mm – Rubber | Serpac | 52 |
| 2 | 1 | CN1 | CON34-Plug | CONN SOCKET 34POS SMD GOLD | Panasonic Electric Works | AXF6G3412A |
| 3 | 2 | C1,C3 | 100nF | CAP CER 0.1UF 16V X7R 0402 | Murata Electronics North America | GRM155R71C104KA8 8J |
| 4 | 1 | C2 | 10uF | CAP CER 10UF 10V X5R 0402 | Samsung Electro- Mechanics America, Inc. | CL05A106MP8NUB8 |
| 5 | 2 | C4,C5 | NC | CAP CER 100PF 100V C0G/NP0 0402 | Murata Electronics North America | GCM1885C2A101JA16 D |
| 6 | 2 | JM1,JM2 | IN | Terminal Block, Header, 5.08 mm, 2 Ways | TE CONNECTIVITY | 796634-2 |
| 7 | 2 | J1,J2 | IN | Terminal Block, Header, 5.08 mm, 2 Ways | TE CONNECTIVITY | 282825-2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 1 | J3 | CON3 | 2.54mm, 3 Way,<br>1 Row, Straight Pin Header | RS PRO | 251-8092 |
| 9 | 7 | SB1,R1,R2,R4,S B5,R5,SB7 | 0R | RES SMD 0<br>OHM 0402 | Vishay Dale | CRCW04020000Z0ED |
| 10 | 1 | R3 | 5mR | RES SMD 5m OHM | OHMITE | FC4L64R005FER |
| 11 | 2 | R6,R7 | NC | RES SMD 4.7K OHM 1% 1/16W<br>0402 | TE Connectivity Passive Product | CRG0402F4K7 |
| 12 | 5 | SB2,SB3,SB4,S B6,SB8 | NC | RES SMD 0<br>OHM 0402 | Vishay Dale | CRCW04020000Z0ED |
| 13 | 1 | TVS1 | ESDALC6V1-1M 2, SOD-882 | DIODO TVS TRANSIL UNIDIR. 50W 6.1V | ST | ESDALC6V1-1M2 |
| 14 | 1 | U1 | TSC1641IQT, VDFPN 10 3x3x1.0 | Digital current, voltage, power, temperature monitor | ST | TSC1641IQT |

**Table 3. STEVAL-FLTCB02 bill of materials**

| Item | Q.ty | Ref. | Part/value | Description | Manufacturer | Order code |
|---|---|---|---|---|---|---|
| 1 | 1 | J1 | CON34-Socket | CONN SOCKET 34POS SMD GOLD | Panasonic Electric Works | AXF5G3412A |
| 2 | 1 | J3 | CON34-Socket | CONN SOCKET 34POS SMD GOLD | Panasonic Electric Works | AXF5G3412A |
| 3 | 1 | J2 | CON34-Header | CONN HDR 34POS SMD GOLD | Panasonic Electric Works | AXF6G3412A |
| 4 | 1 | FLEX PCB Not<br>Reference | FLEX PCB 3 LAYER | FLEX Support-DUPONT Kapton Polyimide Film | DUPONT | |

**Table 4. STEVAL-C34KPM1 versions**

| PCB version | Schematic diagrams | Bill of materials |
|---|---|---|
| STEVAL$C34KPM1A (1) | STEVAL$C34KPM1A schematic diagrams | STEVAL$C34KPM1A bill of materials |

1. This code identifies the STEVAL-C34KPM1 evaluation kit first version. The kit consists of the STEVAL-C34PM01 expansion board whose version is identified by the code STEVAL$C34PM01A and the STEVAL-FLTCB02 flex cable whose version is identified by the code STEVAL$FLTCB02A. The STEVAL$C34PM01A code is printed on the expansion board PCB. The STEVAL$FLTCB02A code is printed on the flex cable.

## FCC Statement

### 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:

(1) Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and (2) Software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter 3.1.2.

Notice for Innovation, Science and Economic Development Canada (ISED) For evaluation purposes only. This kit generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to Industry Canada (IC) rules.

### Notice for the European Union

This device is in conformity with the essential requirements of the Directive 2014/30/EU (EMC) and of the Directive 2015/863/EU (RoHS). Compliance to EMC standards in Class A (industrial intended use). 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). Compliance to EMC standards in Class A (industrial intended use).

### Revision history

**Table 5. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 31-Jul-2024 | 1 | Initial release. |

For further information contact your local STMicroelectronics sales office.

- www.st.com

## Documents / Resources

| | |
|---|---|
|  | STMicroelectronics STEVAL-C34KPM1 Evaluation Kit for Current Sensing and Power Monitoring [pdf] User Manual<br>TSC1641, STEVAL-C34KPM1 Evaluation Kit for Current Sensing and Power Monitoring, STEV AL-C34KPM1, Evaluation Kit for Current Sensing and Power Monitoring, Kit for Current Sensing and Power Monitoring, Current Sensing and Power Monitoring, Sensing and Power Monitoring, and Power Monitoring, Power Monitoring, Monitoring |

## References

- User Manual