

## How to use the STEVAL-C34KPM1 evaluation kit for current sensing and power monitoring

### Introduction

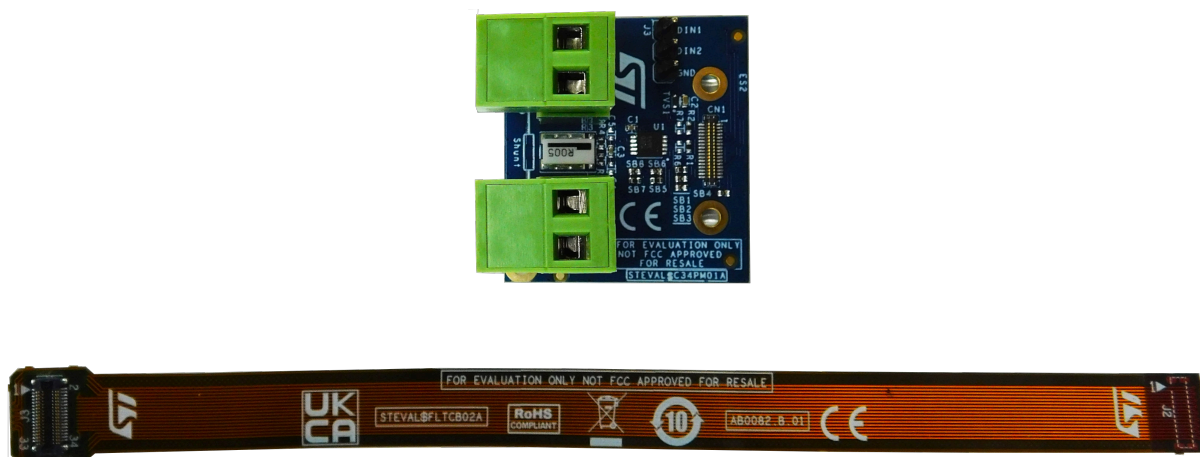
The **STEVAL-C34KPM1** evaluation kit allows the user to evaluate the performance of the **TSC1641**, 16-bit, high precision current and power monitor with an MIPI I3C/I<sup>2</sup>C interface.

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**



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## 1 Overview

### 1.1 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 I<sup>2</sup>C up to 1 MHz and compatible with MIPI I3C up to 12.5 MHz
- From 128  $\mu$ s to 32.768 ms total conversion time
- 2.7 to 3.6 V power supply
- Alert signals 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

### 1.2 Main component

#### 1.2.1 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  $\mu$ s to 32.7 ms.

The digital bus interface is flexible from an I<sup>2</sup>C/SMBus 1 MHz data rate to an MIPI I3C 12.5 MHz data rate. This allows connectivity to most of the recent STM32 products.

## 2 Get started with the board

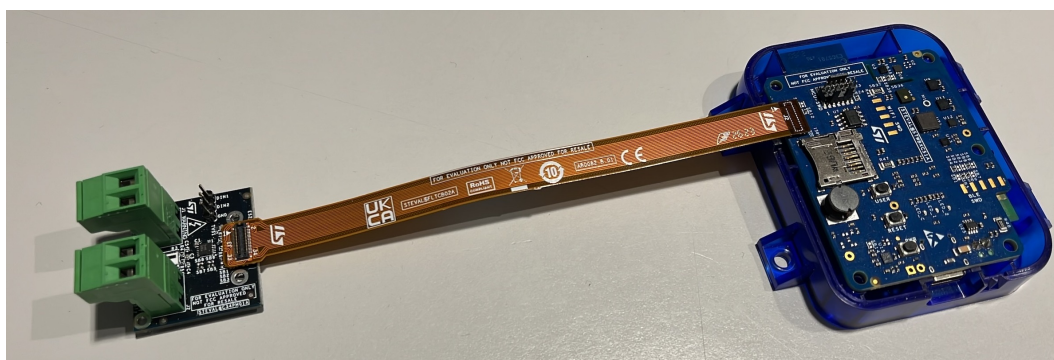
The **STEVAL-C34KPM1** expansion board can be used with the **STEVAL-STWINBX1** kit (STWIN.box). The device can be attached to the STWIN.box using the provided flex cable, through the 34-pin connectors available on both platforms.

**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-SNS-DATALOG2** 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.*

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### 3 Precautions for use

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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.

Figure 5. STEVAL-C34PM01 circuit schematic

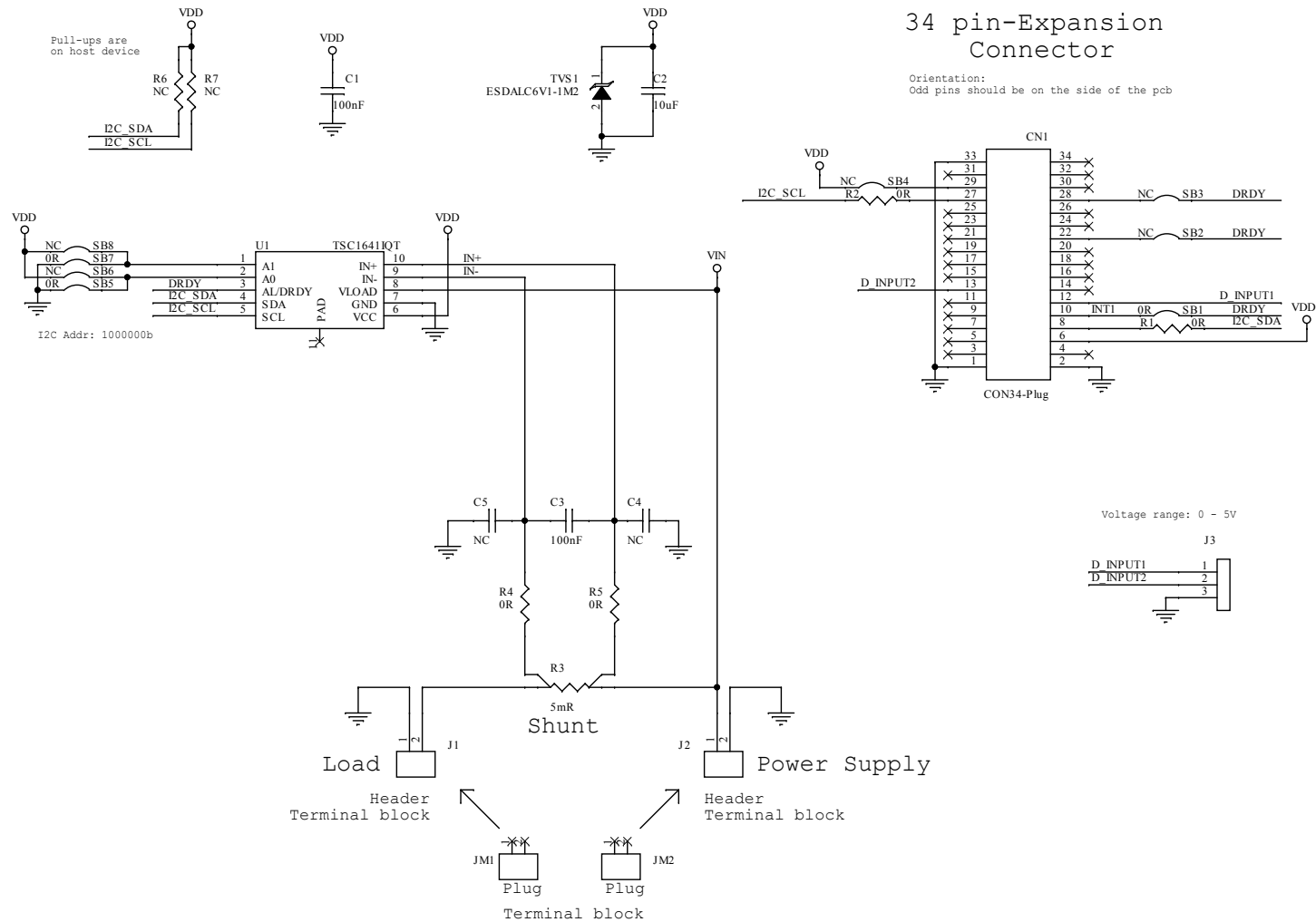
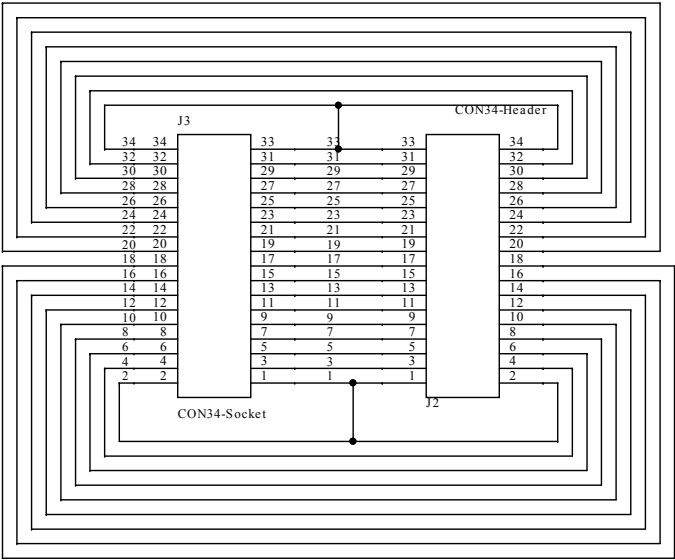
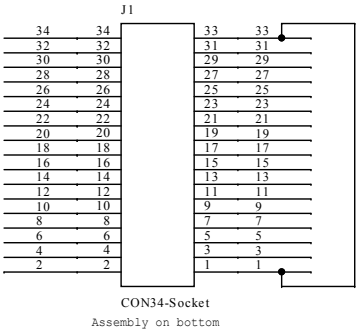


Figure 6. STEVAL-FLTCB02 circuit schematic



## 5 Bill of materials

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

Item	Q.ty	Ref.	Part/value	Description	Manufacturer	Order code
1	1	-	<a href="#">Table 2. STEVAL-C34KPM1</a>	Power Monitoring Add-on	ST	Not available for separate sale
2	1	-	<a href="#">Table 3. STEVAL-FLTCB02</a>	34pin Flex Cable - 15cm	ST	Not available for separate sale

**Table 2. STEVAL-C34KPM1 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	GRM155R71C104KA88J
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	GCM1885C2A101JA16D
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, 1 Row, Straight Pin Header	RS PRO	251-8092
9	7	SB1,R1,R2,R4,SB5,R5,SB7	0R	RES SMD 0 OHM 0402	Vishay Dale	CRCW04020000Z0ED
10	1	R3	5mR	RES SMD 5mOHM	OHMITE	FC4L64R005FER
11	2	R6,R7	NC	RES SMD 4.7K OHM 1% 1/16W 0402	TE Connectivity Passive Product	CRG0402F4K7
12	5	SB2,SB3,SB4,SB6,SB8	NC	RES SMD 0 OHM 0402	Vishay Dale	CRCW04020000Z0ED
13	1	TVS1	ESDALC6V1-1M2, SOD-882	DIODO TVS TRANSIL UNIDIR. 50W 6.1V	ST	<a href="#">ESDALC6V1-1M2</a>
14	1	U1	TSC1641IQT, VDFPN 10 3x3x1.0	Digital current, voltage, power, temperature monitor	ST	<a href="#">TSC1641IQT</a>

**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 Reference	FLEX PCB 3 LAYER	FLEX Support- DUPONT Kapton Polyimide Film	DUPONT	



## 6 Kit versions

**Table 4. STEVAL-C34KPM1 versions**

PCB version	Schematic diagrams	Bill of materials
STEVAL\$C34KPM1A <sup>(1)</sup>	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.

## 7 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.

À des fins d'évaluation uniquement. Ce kit génère, utilise et peut émettre de l'énergie radiofréquence et n'a pas été testé pour sa conformité aux limites des appareils informatiques conformément aux règles d'Industrie Canada (IC).

### 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.

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