UM0746
User manual

Energy meter demonstration kit based on the STPMC1 and STPMS1

Introduction

The STEVAL-IPE010V1 demonstration board is designed to provide the user with a ready-to-use energy meter application for the STPMC1 device, while the STEVAL-IPE011V1 is a demonstration board for its companion chip STPMS1.

The package contains a STEVAL-IPE010V1 motherboard and three STEVAL-IPE011V1 daughterboards. Additional daughterboards can be ordered if required.

The demonstration board can be used in two ways:

- For demonstration purposes, by connecting the demonstration platform to an AC power source, and setting the parameters through the GUI (graphical user interface) and the parallel hardware programmer/reader.
- For user application evaluation and development.

Note: The boards do not come programmed or calibrated.

Figure 1. STEVAL-IPE010V1 motherboard

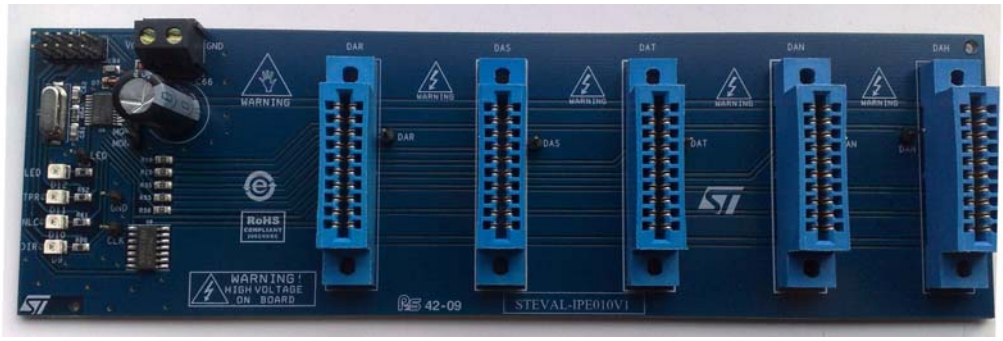
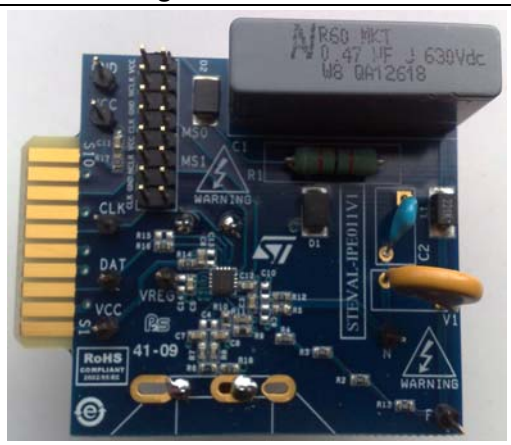


Figure 2. STEVAL-IPE011V1 daughterboard



Contents

1 Safety rules

This board can be connected to mains voltage (220 V/110 V). In the case of improper use, faulty installation or malfunction, there is a danger of serious personal injury and damage to property. All operations such as transport, installation and commissioning, as well as maintenance, should only be carried out by skilled technical personnel (applicable accident prevention rules must be observed).

Due to the risk of death when using this prototype on mains voltage (220 V/110 V), only skilled technical personnel who are familiar with the installation, mounting, commissioning and operating of power electronic systems, and have the relevant qualifications required to perform these functions, may use this prototype.

1.1 Operating conditions

Table 1. Operating conditions

Condition	Value	Unit
V_{NOM}	230	V_{RMS}
I_{NOM}	CT: I_{NOM} = 1	A_{RMS}
I_{MAX}	CT: I_{MAX} = 30	A_{RMS}
f_{LIN}	50 / 60 ± 10%	Hz
T_{OP}	- 40 / + 85	°C

1.2 Features

- Modularity
- Programmability
- Supports:
  - 3-phase, 4-wire RSTN, 4-system RSTN (tamper); extra module is needed
  - 3-phase, 4-wire RSTN, 3-system RST
  - 3-phase, 3-wire RST_, 3-system RST_ (tamper)
  - 3-phase, 3-wire RST_, 2-system R_T_ (Aron)
  - 2-phase, 3-wire _STN, 2-system _ST_ (America)
  - 1-phase, 2-wire __TN, 2-system _ST_ (tamper)
  - 1-phase, 2-wire __TN, 1-system __T_.
- 4 LEDs showing:
  - Power
  - No load condition
  - Tamper detection
  - Reverse current direction
  - Embedded capacitive power supply
  - Isolation of current channel

1.3 References

This document describes how to use and set up a basic test session with a GUI. Additional information can be found in the following documents:

- STPMC1 datasheet
- STPMS1 datasheet
- STMicroelectronics application notes
- Schematic diagrams

1.4 Getting technical support

Technical assistance is available without charge to all customers. For technical assistance, documentation and information on product upgrades and services, please refer to your local ST distributor/office.

STmicroelectronics offers its customers a free technical support service with online support at www.st.com. Before contacting us, we advise you to confirm that you are using the latest version of the software/firmware. Upgrades are available without charge at http://www.st.com/metering.

2 STEVAL-IPE010V1 components

2.1 Package contents

The package contains:

a) 1 STEVAL-IPE010V1 motherboard
b) 3 STEVAL-IPE011V1 daughterboard
c) 1 parallel programmer/reader
d) Promotional CD

2.2 STEVAL-IPE010V1

This is the motherboard which can accept up to 5 daughterboards. An STPMC1 is mounted on the module and 4 LEDs indicate the status of the system.

The motherboard can be connected to a PC using the parallel programmer/reader through the P1 connector.

The board can be supplied from an external DC source (3.3 to 5 V) through the W34 connector.

Test points available are:

- LED
- MOP, MON (stepper counter display connector)
- GND
- CLK
- DAR, DAS, DAT, DAN, DAH

For 3-phase 4-wire/3-wire systems only three daughterboards are needed for a complete measurement system.

Table 2. P1 connector pin description

Pin	Pin name	Functional description
1	VOTP	Power supply input of +15.0 V during permanent write to OTP cells.
2	---	Not connected.
3	GND	Signal reference level 0 V and power supply return.
4	SDA-TD	SPI interface data.
5	SCS	SPI interface enable.
6	SCL-NLC	SPI interface clock.
7	---	Not connected.
8	SYN-NP	SPI interface signal.
9	---	Not connected.
10	VCC	Power out of +3.3 or 5 V.

2.3 STEVAL-IPE011V1

This is the daughterboard. Each module serves one single phase, converting the voltage and current information, multiplexing them and sending the stream to the STPMC1.

Each of the boards must be connected to the voltage source of the relative phase and to the load.

Test points available are:

- GND
- VCC (stepper counter display connector)
- CLK
- DAT
- VREG
- F, N

The STEVAL-IPE011V1 should be plugged into the motherboard using the connector on the edge of the board.

Voltage inputs are pin F (hot wire) and N (neutral wire).

Current input (load wire) should be passed through the current transformer placed on the non-component side of the module.

2.3.1 Jumpers settings

The on-board jumpers JP1 and JP2 allow the setting of the STPMS1 device according to *Table 3* and *Table 4* below.

Table 3. Modes of operation

JP1	MS0	Description
1	VCC	ampl = 32
2	NCLK	Reserved
3	GND	ampl = 8
4	CLK	Reserved

Table 4. Changing of band-gap voltage reference

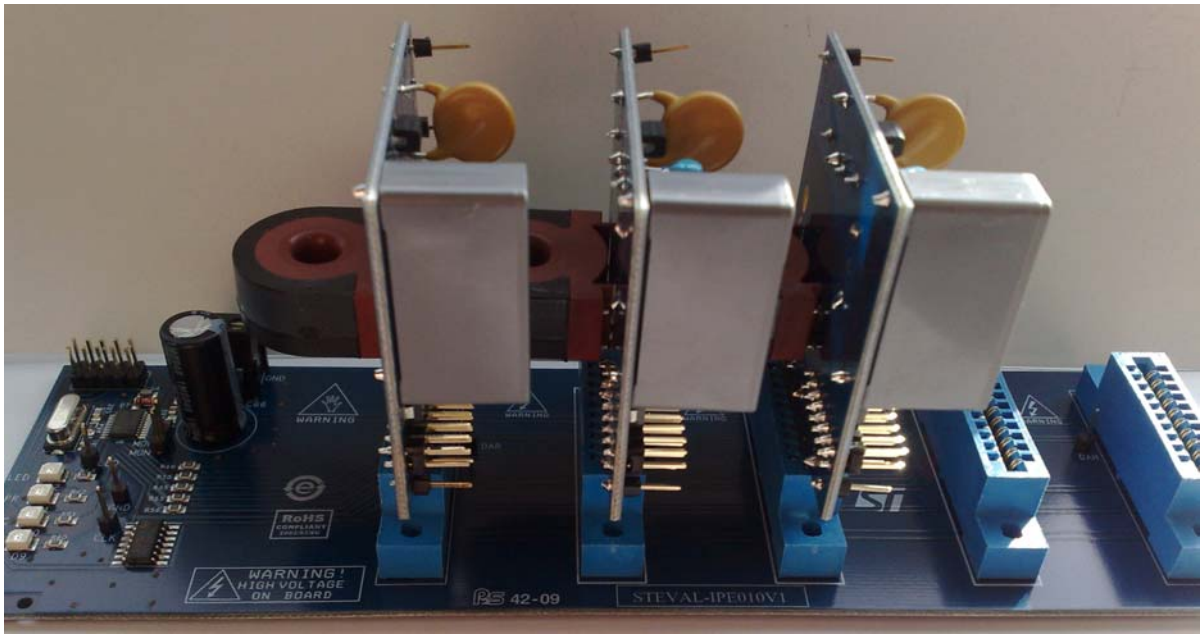
JP2	MS1	Description
1	VCC	TC = 190 ppm/°C
2	NCLK	TC = 125 ppm/°C
3	GND	TC = 100 ppm/°C
4	CLK	TC = 170 ppm/°C

3 Getting started

3.1 Board assembly

Assemble the board as illustrated in the figure below.

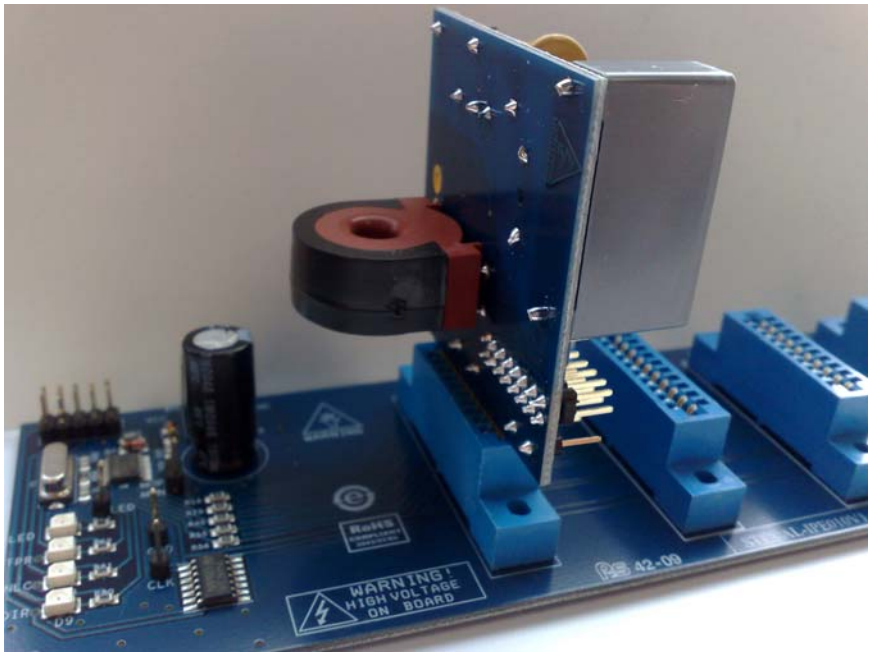
Figure 3. STEVAL-IPE010V1 assembly



3.2 Board connection

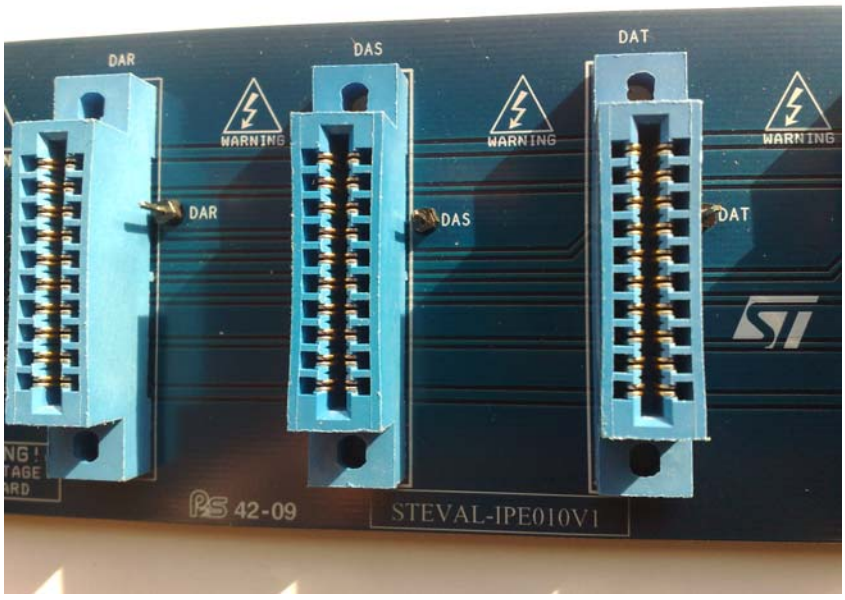
Plug in the daughterboard as shown in the figure below.

Figure 4. STEVAL-IPE010V1 assembly



Use the connectors DAR, DAS, DAT, DAN (optional for 4-wire with tamper systems) as shown in the figure below.

Figure 5. STEVAL-IPE010V1 assembly



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
06-Mar-2010	1	Initial release.

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