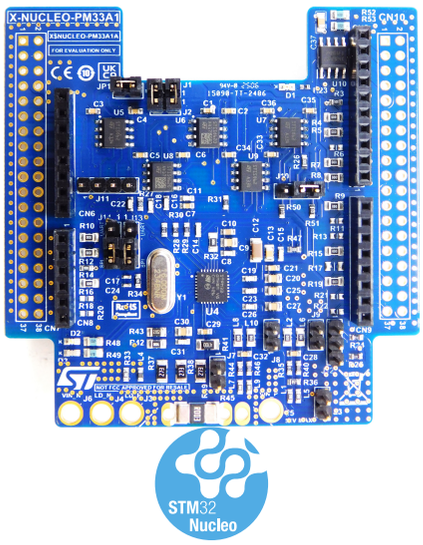
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X-NUCLEO-PM33A1

Data brief

Electricity metering IC expansion board based on STPM33 for STM32 NUCLEO



Features

- STPM33 based metering expansion board
- Dedicated IC for electricity metering with 0.1% accuracy
- Capable of measuring both AC and DC sources
- Compatible with STM32 Nucleo boards
- Equipped with Arduino® UNO R3 connector
- Externally powered or powered through the Arduino® UNO R3 connectors
- Free comprehensive development firmware library and example for STPM33, compatible with STM32Cube firmware
- RoHS compliant
- Onboard EEPROM for saving the metering data
- On-board digital isolators on UART and SPI connections to enable users to evaluate STPM33 device by isolating from MCU
- LEDs connected to STPM33 for checking pulses directly from the device
- Connectors for external CT connections

Product summary	
Electricity metering IC expansion board based on STPM33 for STM32 NUCLEO	X-NUCLEO-PM33A1
Electricity metering IC software expansion for STM32Cube	X-CUBE-PM33A1
ASSP for metering applications	STPM33TR
Dual channel digital isolator	STISO620/ STISO621
STM32 Nucleo-64 development board with STM32L476RG MCU	NUCLEO-L476RG
STM32 Nucleo-64 development board with STM32G0B1RE MCU	NUCLEO-G0B1RE
Applications	Metrological computation

Description

The X-NUCLEO-PM33A1 electricity metering IC expansion board is based on the STPM33 electricity metering IC with a capability of measuring both AC and DC sources with accuracy of 0.1%.

It can be powered through the STM32 Nucleo development board or through an external power supply (3.3 V).

The current measurement is done using the shunt mounted on the board.

The connector is available for measuring the current using CT.

The X-NUCLEO-PM33A1 expansion board is compatible with the Arduino® UNO R3 connector pin assignment and can easily be plugged onto any STM32 Nucleo development board.

You can stack other expansion boards to evaluate different devices that work together with the electricity metering.

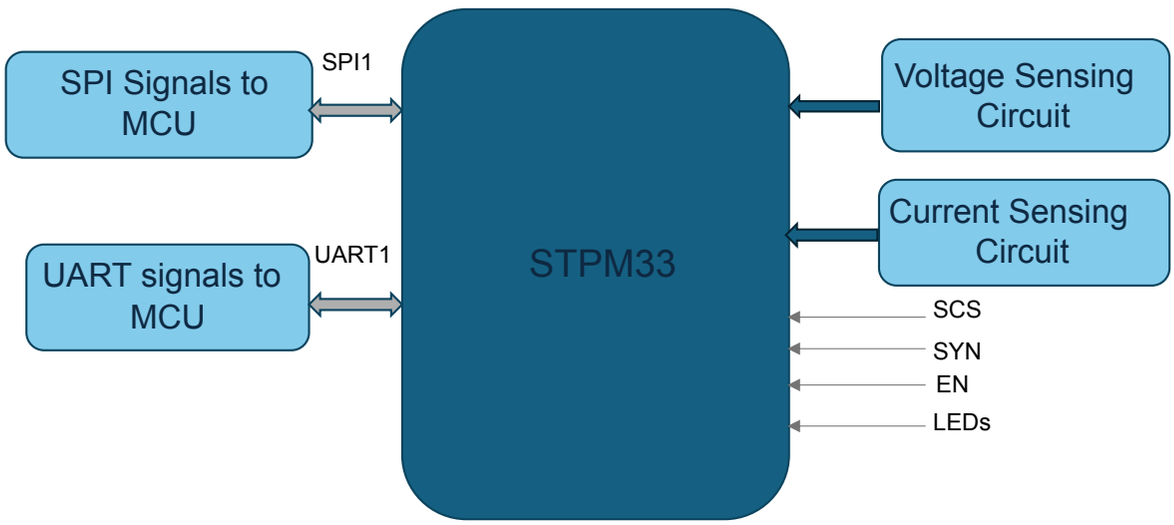
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1 Detailed description

The X-NUCLEO-PM33A1 is based on the STPM33 which measures the rms voltage, rms current, active power, active energy in defined time intervals but also communicates the information to the PC terminal utility.

Other metering parameters(frequency, period, instantaneous voltage, current etc.) can also be directed to the PC terminal.

Figure 1. Functional block diagram



STPM33 is ASSP family of mixed signals designed for high accuracy measurement of power and energy in power line systems using the rogowski coil, current transformer or shunt current sensors.

STPM33 devices provide instantaneous voltage and current waveforms and calculate voltage and current RMS values, active, reactive, and apparent powers and energies for each channel with accuracy standards for AC watt meters, such as:

- EN 504070-x
- IEC 62053-2x
- ANSI12.2x

STPM33 is a mixed signal IC family consisting of an analog and a digital section.

The analog section consists of up to two programmable gain low-noise low-offset amplifiers and up to four 2nd order 24-bit sigma-delta ADCs. Two bandgap voltage references with independent temperature compensation, a low drop voltage regulator and DC buffers.

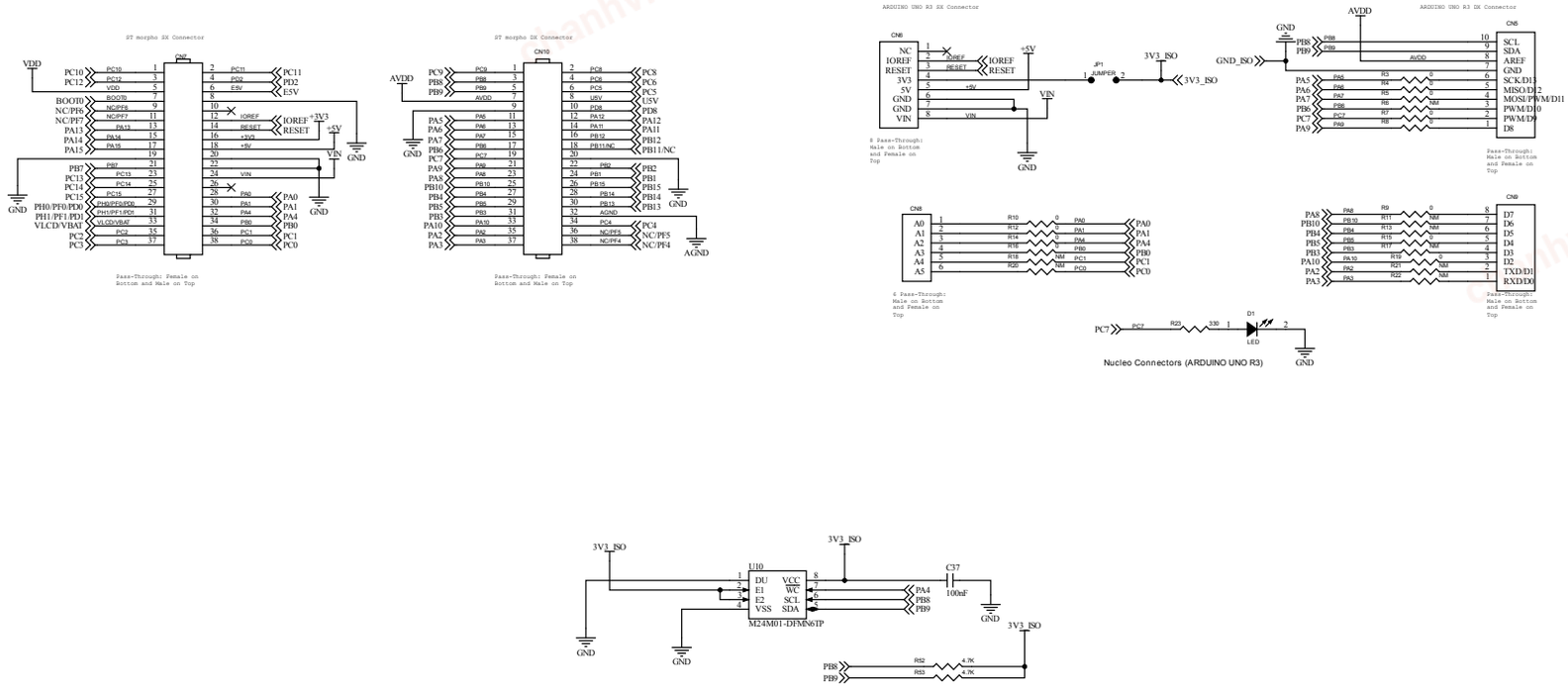
The digital section consists of a digital filtering stage, a hardwired DSP, DFE to the input and a serial communication interface (UART or SPI).

The STPM33 is fully configurable and allows a fast-digital system calibration in a single point over the entire current dynamic range.

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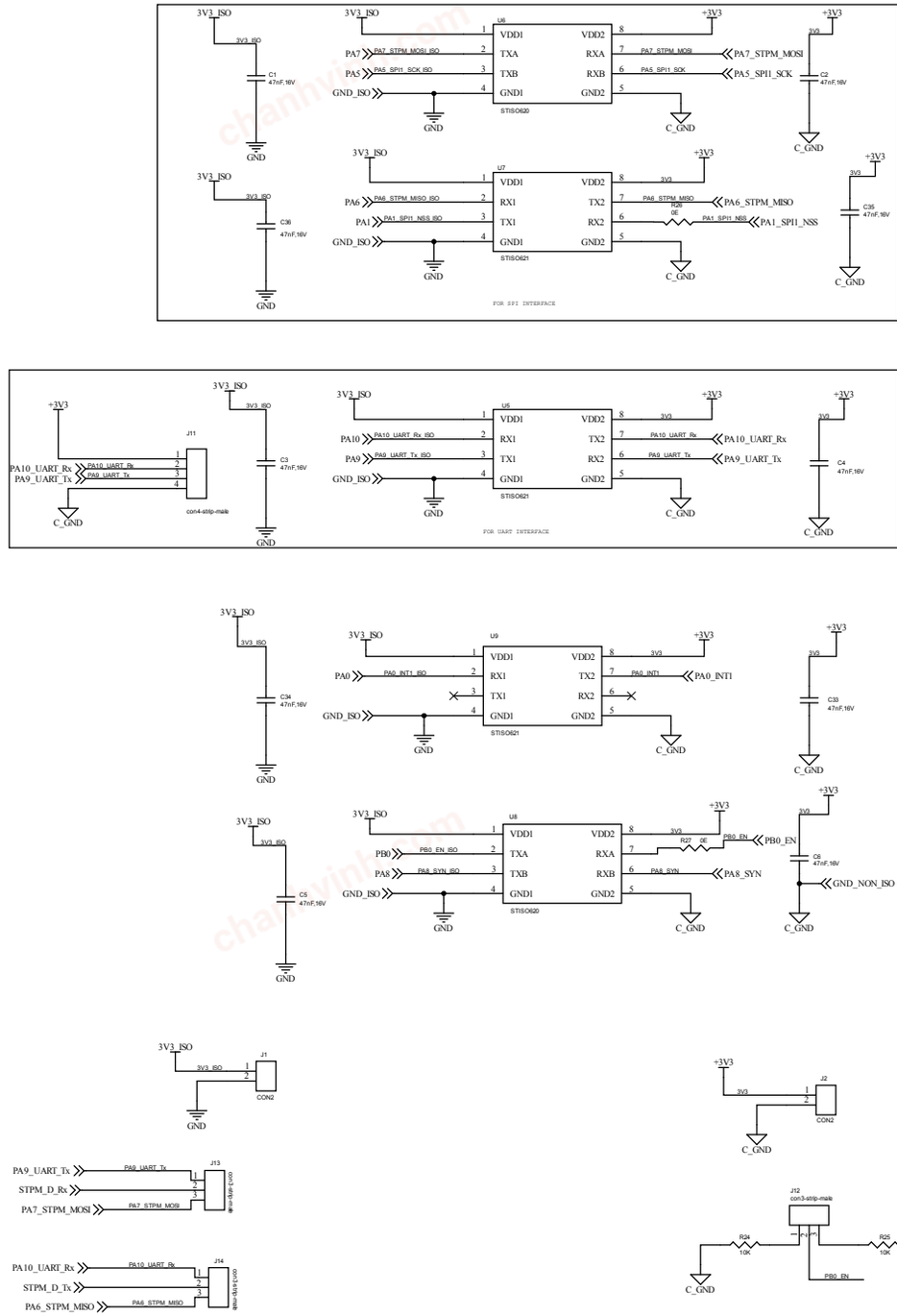
2 Schematic diagrams

Figure 2. **X-NUCLEO-PM33A1 circuit schematic (1 of 3)**



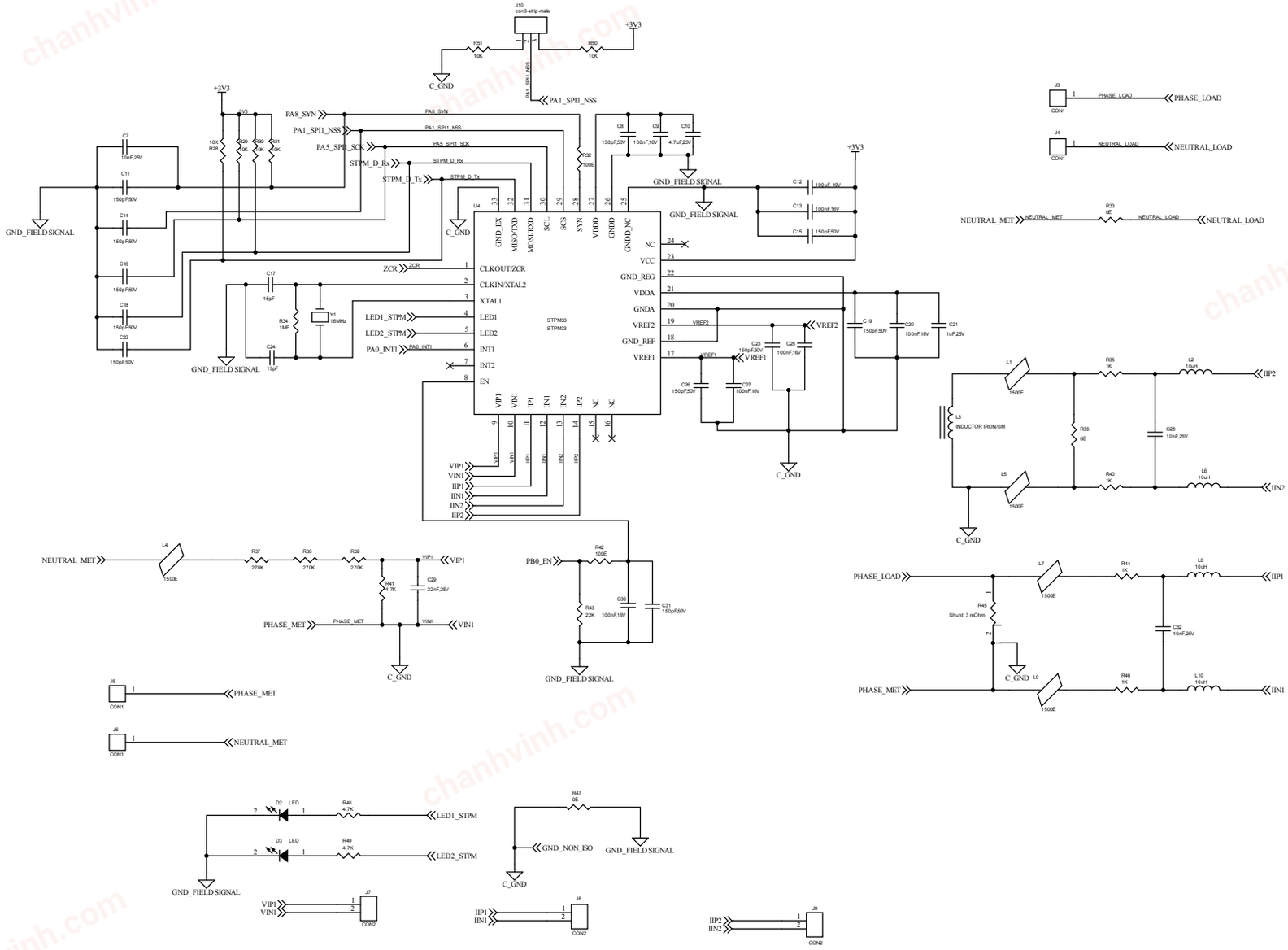
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Figure 3. X-NUCLEO-PM33A1 circuit schematic (2 of 3)



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Figure 4. X-NUCLEO-PM33A1 circuit schematic (3 of 3)



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3 Board versions

Table 1. X-NUCLEO-PM33A1 versions

Finished good	Schematic diagrams	Bill of materials
X$NUCLEO-PM33A1A(1)	X$NUCLEO-PM33A1A schematic diagrams	X$NUCLEO-PM33A1A bill of materials

1. *This code identifies the X-NUCLEO-PM33A1 evaluation board first version.*

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Revision history

Table 2. **Document revision history**

Date	Revision	Changes
11-Apr-2025	1	Initial release.

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