STPM32, STPM33, STPM34
Smart Metering ICs

Taking care of every milliwatt
High accuracy down to stand-by mode

The STPM32, STPM33 and STPM34, smart metering front end provide two, three and four independent channels respectively, to accurately measure voltage, current and energy parameters in single, split and poly-phase lines.

Main benefits

• High accuracy in a wide dynamic range down to stand-by currents for accurate billing and power quality monitoring.

• Fast single point calibration and multiple flexible configurations for easy product design and low manufacturing cost.

• Embedded anti-tampering features and compliance with international metering standards for worldwide safe adoption.
Block diagram

STPM34: 4 independent channels

- Voltage sensor 1
- Current sensor 1
- Voltage sensor 2
- Current sensor 2
- Twin voltage references
- 24-bit ΣΔ ADC
- Digital Signal Processing
- SPI/UART
- MCU

Twin voltage references
ST’s complete portfolio of metering ICs

- Accurate ΣΔ analog-to-digital converter (ADCs)
- High performance digital signal processing units (DSPs)

in connection with sensors provide accurate measurements of:
  - active energy (kWh)
  - apparent energy (kVA)
  - reactive energy (kVAR) and RMS

Main applications
  - single, split and poly-phase energy meters up to class 0.2 accuracy
  - smart plugs and appliances
  - industrial instruments
  - servers, lighting
  - Power quality monitoring systems
<table>
<thead>
<tr>
<th>Independent channels</th>
<th>ADC</th>
<th>ADC+DSP</th>
<th>DSP</th>
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<tbody>
<tr>
<td>2</td>
<td>STPMS2</td>
<td>STPM32</td>
<td>STPM33</td>
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<td>3</td>
<td>STPM34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>STPMC1</td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>STPM01</td>
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</table>

- < 0.1% error over 5000:1 range, SPI, UART
- Exceeds 50-60 Hz EN 50470-x, IEC 62053-2x, ANSI12.2x
- Power quality monitoring

- < 0.5% error over 10000:1 range

- < 0.1% error over 1000:1 range, SPI
- Supports IEC 62052-11 / 62053-21 / 62053-23
- Can process data from up to 4x STPMS2

- < 0.1% error over 1000:1 range, SPI
- Support 50 - 60 Hz - IEC62052-11, IEC62053-2X
STPM32, STPM33, STPM34

- **High Accuracy**
  - Ensure accurate measurement down to few milliamps current levels for confident and consistent billing

- **Flexibility**
  - Multi sensors support (CT/Shunt/Rogo coil), flexible interfacing (UART/SPI) and multi-phase scalability for fast, easy and low cost products design

- **Integration**
  - On-chip power-quality parameters calculation and fast single point calibration reduce smart meters cost of ownership

- **Security and compliance**
  - Anti-tampering features (neutral line, case removal) and compliance with international metering standards for worldwide safe adoption
High accuracy

- Enabling up to Class 0.2 meter accuracy and beyond

- < 0.1% active power accuracy over wide 5000:1 wide dynamic range

- Can measure frequencies down to DC, with 4kHz wide bandwidth for accurate measurement of harmonic content and power-quality assessment

- Up to 4 independent 24-bits 2nd order $\Sigma\Delta$ Analog to Digital Converters

- Precision and temperature compensated built-in twin voltage references for different sensors independent compensation

- Auto-zero offset cancellation

- 16 MHz Input clock Frequency xtal or external source
• 3 p/n with scalable features to easily extend the design from single to poly phase meters

• DC component measurement

• Multi-phase, multi-branch clockout pin

• All Sensors supported (Shunt, current transformer, Rogowsky coil)

• Multiple interface 5 wires and 3 wires SPI, 2 wire UART with CRC polynomial verification
Integration

- Fully integrated 4 independent channels AFE with PGA
- Integrated DSP for “turn-key” energy parameters calculation
- Twin voltage reference
- Double LED output programmable for active and reactive pulses generation
- Digital Fast Single Point calibration with separated registers for voltage and current channels and high speed LED output
- Only few passive components to realize a complete product application
- Down to two wires interface to MCU for flexible host interfacing and optional low cost data isolation
Security and Compliance

- Case removal and neutral tamper detection
- Comprehensive set of features fits a very wide applications range
- Fully compliant to the applicable International Electrotechnical Commission (IEC), American National Standards Institute (ANSI) and exceed State Power Grid Corporation of China (SGCC) requirements.
Making your designs easier

To support STPM32, STPM33, STPM34, a comprehensive set of design tools is available, including:

- evaluation boards

<table>
<thead>
<tr>
<th>Order code</th>
<th>Description</th>
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<tbody>
<tr>
<td>EVALSTPM32</td>
<td>Single-phase energy metering evaluation board with shunt current sensor based on the STPM32</td>
</tr>
<tr>
<td>EVALSTPM33</td>
<td>Single-phase energy metering evaluation board with tamper monitoring, CT and shunt sensors based on the STPM33</td>
</tr>
<tr>
<td>EVALSTPM34</td>
<td>Dual-phase energy metering evaluation board with 2 current transformers based on the STPM34</td>
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<tr>
<td>STEVAL-IPE023V1</td>
<td>USB Programmer board for the STPM3x family</td>
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</table>

- a SW GUI for calibrating and configuring the device
GUI and USB Programmer

- to read, write and configure the device
- to perform automatic calibration
- to fasten the application design

Product evaluation Board

USB Isolated Programmer Board
STEVAL-IPE023

10 PIN flat cable

USB cable for communication and power
Available in tape and reel packing, with order codes:

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Package</th>
<th># Channels</th>
<th>Evaluation Board</th>
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For technical documentation, samples, on-line ordering visit us at: www.st.com/stpm3metering
Thank you!

ST stands for life.augmented