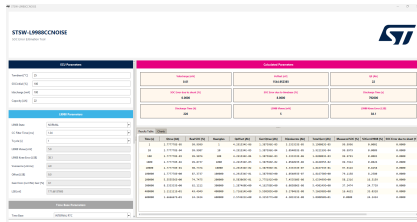


Coulomb counter SOC error evaluation tool for L9988 12 V BMS IC



Features

- Calculation utility for evaluating coulomb counter SOC error
- Evaluates the contribution of:
 - L9988 front-end error,
 - shunt-related error,
 - time-base error
- Automatically derives:
 - offset,
 - gain error,
 - noise,
 - LSB
 - knee voltage,
 - knee error
- Provides compact summary values and detailed results table
- Supports export of calculated results for documentation or design review
- Useful for design reviews, sensitivity studies, and clock accuracy assessment

Description

The **STSW-L9988CC** tool is a calculation utility developed to help users evaluate the **State of Charge (SOC) error** in battery monitoring applications based on coulomb counting.

In a real application, the SOC estimation accuracy is affected by multiple error sources that accumulate over time, including:

- shunt resistor tolerance and temperature drift,
- measurement front-end offset,
- ADC gain error,
- quantization and noise contribution,
- time base accuracy,
- L9988 operating state and CC filter time,
- “knee” behavior at low shunt voltages.

Product status link

[STSW-L9988CC](#)

1 Overview

The **STSW-L9988C** tool is a practical calculation utility developed to help users assess how measurement and timing imperfections affect the performance of a coulomb counter-based SOC estimation system.

It enables fast evaluation of whether a selected combination of shunt value, clock source, and L9988 operating configuration remains acceptable over the desired observation time. The tool helps engineers make informed design decisions early in the development flow by quantifying the impact of each error contribution.

The tool supports both design review and sensitivity analysis, with results organized by time point and error source. It is intended as a useful aid during:

- battery system analysis,
- shunt selection,
- clock source selection,
- sensing front-end tuning,
- SOC accuracy verification.

For each selected operating condition, the tool calculates:

- true charge,
- measured charge,
- real SOC,
- measured SOC,
- total SOC error,
- contribution of each error source.

The user can set:

- **ECU parameters**
 - Ambient temperature
 - initial SOC
 - discharge current
 - battery capacity
- **L9988 parameters**
 - operating state
 - CC filter time
 - sampling period
- **Time base parameters**
 - internal RTC or external clock
 - external clock tolerance
 - external clock temperature coefficient
- **Shunt parameters**
 - shunt resistance at 25 °C
 - shunt tolerance
 - shunt temperature coefficient
- **Time points**
 - one or more evaluation instants

The tool automatically computes and reports the following outputs:

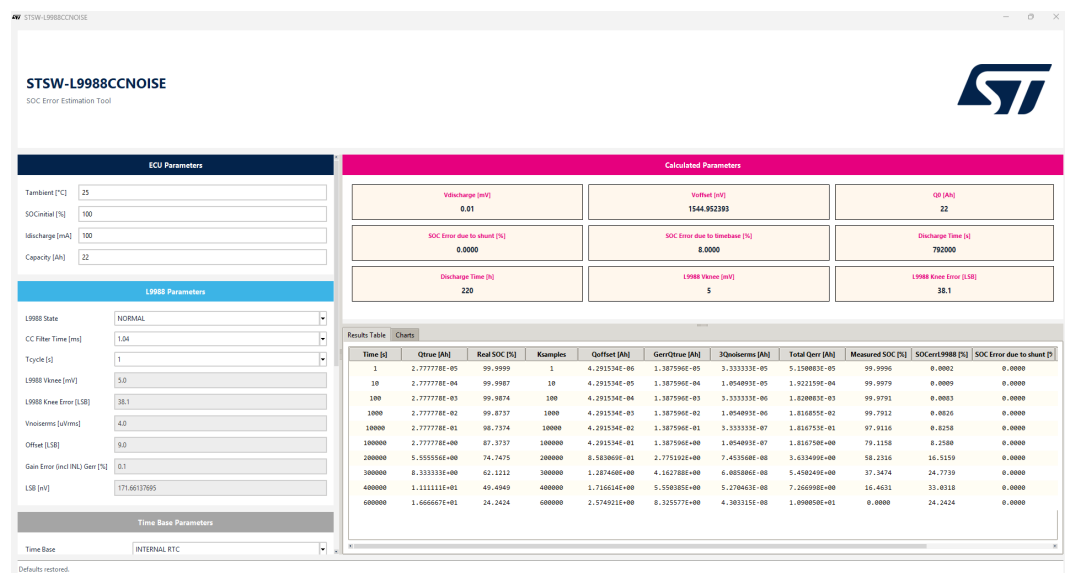
- discharge voltage across the shunt,
- initial battery charge,
- SOC error due to shunt,
- SOC error due to time base,
- L9988-related SOC error,
- total SOC error,
- error decomposition over time.

The tool calculates, for each operating point:

- **Qtrue**
- **Real SOC**
- **Qoffset**
- **GerrQtrue**
- **3Qnoiserm**
- **Total Qerr**
- **Measured SOC**
- **SOCerrL9988**
- **SOC error due to shunt**
- **SOC error due to timebase**
- **Total SOC Error**

Results are presented in a compact table and in charts to simplify interpretation.

Figure 1. STSW-L9988CC TOOL



Revision history

Table 1. Document revision history

Date	Version	Changes
05-Oct-2026	1	Initial release.



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