

Sinowealth BMS Tool Introduction

1. Introduction

- PC upper computer software operating environment

For Windows 7 and above, you need to run the host computer software as an administrator (**Windows XP** and **Windows 2000** are not supported).

- Communication interface

Standard USB to UART interface.

Note: The corresponding host computer version of the host computer introduction document **V0.1** is **Sinowealth BMS Tool V0.1.exe**.

2. Basic Functions

2.1. Select IC model and configure serial port

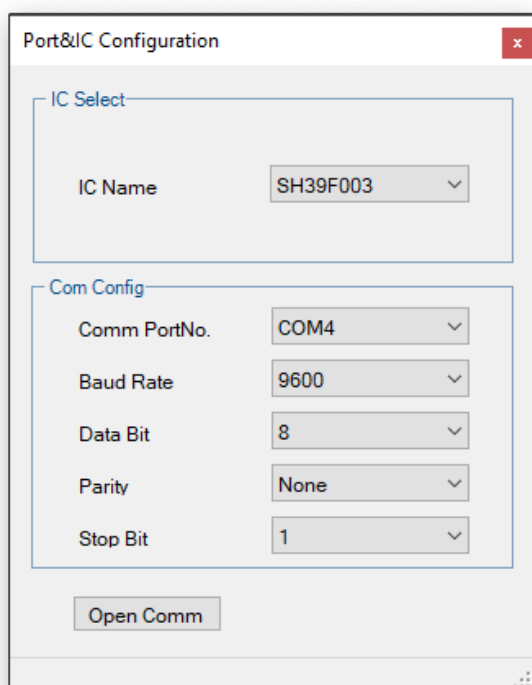
Execute the host computer software *.exe as an administrator to enter the serial port & IC configuration interface: IC model can be selected

SH367303/367305/367306/367309/39F003/39F004/39F005 (This document mainly uses SH39F003 as an example for introduction).

Select the serial port number "COM n" → set the baud rate to "9600" → set the data bit to "8" → set the check digit to "None" → set the stop bit to "1", after the configuration is completed,

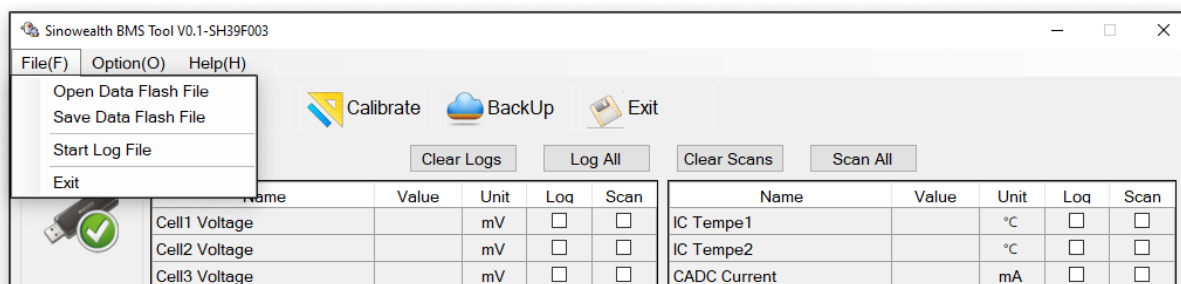
Select "open port", it will prompt "open port COM n successfully", then click "OK" to enter the main interface.

The main interface includes menu bar, scan information, MCU Parameters, calibration, backup.



2.2. Menu bar

The menu bar includes: files, options, and help.



➤ File

The "File" menu includes:

Open DataFlash file (text format): load MCU parameter area data

Save DataFlash file: save data in MCU parameter area

Start/stop recording data: you can record and save the contents checked in the "Information" interface

➤ Options

The "Options" menu includes: language setting, scanning, setting Log time interval, serial port configuration, software upgrade;

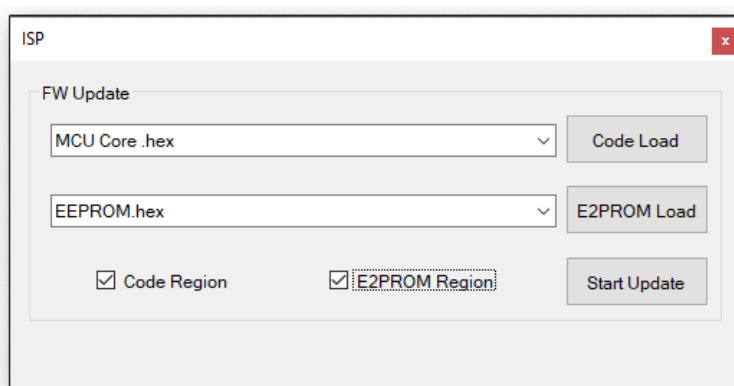
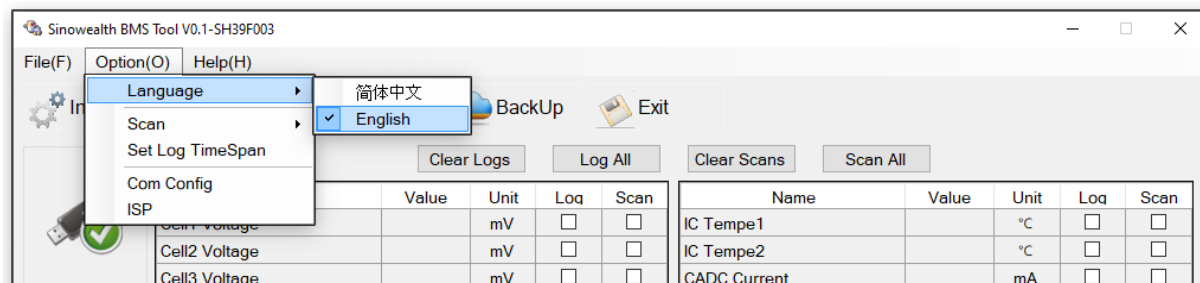
Language: Simplified Chinese, English.

Scan: On/Off (the default is on, when "Off" is selected, the scan interface will not update data).

Set Log time interval: Set the data logging interval time (unit is 1S).

Serial port configuration: Configure COM port information: serial port number, baud rate, data bit, parity bit, stop bit.

Software upgrade: The Code area and E2PROM area can be updated online individually or simultaneously.



➤ Help

The "Help" menu includes: About (introduction to the version of the tool).

2.3. Information interface

Click "Information" to enter the information scanning interface, as shown below.

The screenshot shows the Sinowealth BMS Tool V0.1-SH39F003 interface. The window title is "Sinowealth BMS Tool V0.1-SH39F003". The menu bar includes "File(F)", "Option(O)", and "Help(H)". The toolbar has "Info", "MCU", "Calibrate", "BackUp", and "Exit". Below the toolbar are buttons for "Clear Logs", "Log All", "Clear Scans", and "Scan All". The main area contains two tables of sensor data. The left table lists cell voltages (Cell1 to Cell10), total voltage, and external temperatures. The right table lists IC temperatures, CADC current, full and remaining capacity, RSOC, cycle count, pack status, battery status, pack config, and manufacture access. Below these tables are "Pack Status" and "Battery Status" sections with various status indicators. On the left side, there are status indicators for "Volt OK", "Curr OK", "Temp OK", "Power OK", and "Port OK". At the bottom, there is a status bar showing "USB Connected", "SBS Task Scanning", and the date/time "2020/10/01 17:51:17". Red callouts 1, 2, 3, and 4 point to specific areas: 1 points to the status indicators, 2 points to the "Clear Logs" button, 3 points to the "Clear Scans" button, and 4 points to the "Pack Status" table.

➤ Zone "1"

The voltage is normal: if there is no voltage protection, it will display green, otherwise it will display red, corresponding to the Status bit: **OV, UV, AFE_OV**;

The current is normal: if there is no current protection, it will display green, otherwise it will display red, corresponding to the Status bit: **OCC, OCD, AFE_SC**;

Normal temperature: if there is no temperature protection, it will display green, otherwise it will display red, corresponding to Status bits: **OTC, OTD, UTC, UTD**;

Normal startup: if there is no disconnection protection, it will be displayed in green, otherwise it will be displayed in gray, corresponding to the Status bit: **CTO**;

The port is normal: if the serial port connection is normal, it will display green, otherwise it will display red.

➤ Zone "2"

Clear Logs: Click this button to cancel all items in the Log zone "3";

Log All: Click this button to check all items in the Log zone "3";

Clear Scans: Click this button to cancel all items in the Scan zone "3";

Scan all: Click this button to check all items in the Scan zone "3";

➤ Zone "3"

All parameters of information scan are updated every 1S.

Name	Type of data	Length Byte	Function description
Cell1 Voltage	unsigned int	2	Returns the voltage value of cell 1 (mV)
Cell2 Voltage	unsigned int	2	Returns the voltage value of cell 2 (mV)
Cell3 Voltage	unsigned int	2	Returns the voltage value of cell 3 (mV)
Cell4 Voltage	unsigned int	2	Returns the voltage value of cell 4 (mV)
Cell5 Voltage	unsigned int	2	Returns the voltage value of cell 5 (mV)
Cell6 Voltage	unsigned int	2	Returns the voltage value of cell 6 (mV)
Cell7 Voltage	unsigned int	2	Returns the voltage value of cell 7 (mV)
Cell8 Voltage	unsigned int	2	Returns the voltage value of cell 8 (mV)
Cell9 Voltage	unsigned int	2	Returns the voltage value of cell 9 (mV)
Cell 0 Voltage	unsigned int	2	Returns the voltage value of cell 10 (mV)
Total Voltage	unsigned long	4	Returns the total voltage value of the battery (mV)
External Tempe1	unsigned int	2	Return battery temperature 1(°C)
External Tempe2	unsigned int	2	Return battery temperature 2(°C)
IC Tempe1	unsigned int	2	Chip internal temperature 1
IC Tempe2	unsigned int	2	Chip internal temperature 2
CADC Current	signed long	4	Return real-time current value (mA)
FullChargeCapacity	unsigned long	4	System full charge capacity (mAh)
RemainingCapacity	unsigned long	4	Return the current remaining power of the battery pack (mAh)
RSOC	unsigned int	2	Returns the percentage of remaining power of the battery pack (%)
Cycle Count	unsigned int	2	Cycle discharge times
Pack Status	unsigned int	2	Return system status
Battery Status	unsigned int	2	Return to Battery status
Pack Config	unsigned int	2	MCU system configuration parameters
ManufactureAccess	unsigned int	2	Manufacturing information

➤ Zone "4"

The status bit of Pack and Battery, if the status bit is 0, it will be displayed in green CHGING, if it is 1 it will display red DSGMOS

Bit symbol	Description
FST_DSG	1: Discharge MOS is always high
MID_DSG	1: Discharge MOS is PWM output, high level duty is high
SLOW_DSG	1: Discharge MOS is PWM output, high level duty is low
DSGING	0: non-discharged state 1: Discharge state
CHGING	0: Not charging 1: Charging status
DSGMOS	0: Discharge MOSFET is off 1: Discharge MOSFET is turned on
CHGMOS	0: Charging MOSFET is off 1: Charging MOSFET is turned on
CAL	0: not calibrated 1: Calibrated
VDQ	0: The full charge capacity update is invalid 1: Full charge capacity update is valid
FD	0: no discharge cut-off 1: Discharge cut-off
FC	0: no charge cut off 1: Charging cut off
OCD	0: Discharge overcurrent protection has not occurred 1: Discharge overcurrent protection occurs
OCC	0: Charge overcurrent protection has not occurred 1: Charge overcurrent protection occurs
UV	0: Undervoltage protection has not occurred 1: Undervoltage protection occurs
OV	0: Overvoltage protection has not occurred 1: Overvoltage protection occurs
CTO	0: No disconnection protection 1: Disconnection protection occurs
AFE_SC	0: No hardware short circuit protection has occurred 1: Hardware short circuit protection occurs
AFE_OV	0: No hardware overvoltage protection has occurred 1: Hardware overvoltage protection occurs
UTD	0: No discharge low temperature protection 1: Discharge low temperature protection
UTC	0: Charging low temperature protection has not occurred 1: Charge low temperature protection occurs
OTD	0: No discharge high temperature protection 1: Discharge high temperature protection
OTC	0: No charging high temperature protection 1: Charge high temperature protection occurs

2.4. MCU interface

The MCU interface is mainly divided into four parts: system settings, charge settings, discharging settings, and calibration settings.

➤ System settings

System Settings

System | Charge | Discharge | Calibration

Read All | Write All

Name	Value	Unit	Name	Value	Unit
AFE Protect Config	75	Hex	Cycle Count	0	-
AFE Over Voltage	4000	mV	Learn Low Temperature	0,0	°C
Pack Configuration	0B61	Hex	Near FCC	0	mAh
Voltage of Capacity 10%	2750	mV	DfitterCur	2000	mA
Voltage of Capacity 20%	2850	mV	PowerDownDelay	60	Sec
Voltage of Capacity 30%	2950	mV	ChargeBackupDelay	1	Min
Voltage of Capacity 40%	3050	mV	ChargeBackupCurrent	200	mA
Voltage of Capacity 50%	3150	mV	RTCBackupDelay	5	Sec
Voltage of Capacity 60%	3250	mV	Software Version	7,25	-
Voltage of Capacity 70%	3350	mV	Hardware Version	1,10	-
Voltage of Capacity 80%	3450	mV	Identify Device	00	Hex
Voltage of Capacity 90%	3550	mV	Manufacturer Name	DALY--DALY	String
Voltage of Capacity 100%	3650	mV	Manufacture Date	2019-06-14	Date
Design Capacity	800000	mAh	Serial Number	0000	Hex
Full Charge Capacity	720000	mAh	Device Name	SH39F003	String
Cycle Threshold	200000	-	Device Chemistry	LiFePo4	String
			Battery Chemistry ID	0000	Hex

AFEProtectConfig

- AFE Short Current Delay: 100 uS
- AFE Short Current: 200 mV
- AFE Over Voltage Delay: 6400 mS

PackConfig

- CHGEnd DSGEnd OCRC_EN SC_EN EnEEPROMBK
- BAL_EN PF_EN CTO_EN OV_EN OCPM
- Cell Num: 4 Cells | LED Num: No Leds | TempeNum: 2

SOC = 32%

Volt OK
Curr OK
Temp OK
Power OK
Port OK

SingleLine DoubleLine

USB Connected | SBS Task Scanning | 2020/10/01 18:29:01

Settings Description:

Name	type of data	Length Byte	Function description
AFEProtectConfig	unsigned char	1	Front-end protection settings
AFEOVvol	unsigned int	2	Front-end overvoltage protection voltage
PackConfigMap	unsigned int	2	For battery pack configuration parameters, refer to the PackConfigMap description in the following table
VOC[10]	unsigned int	2*10	The voltage value corresponding to the battery pack capacity
DesignCapacity	unsigned long	4	System design capacity (mAH)
FCC	unsigned long	4	System full charge capacity (mAH)
CycleThreshold	unsigned long	4	Total discharge of the system in a single cycle (mAH)
CycleCount	unsigned long	4	Cycle discharge times
LearnLowTemp	unsigned int	2	Minimum temperature allowed for full charge capacity update
NearFCC	unsigned int	2	Difference between remaining capacity and full charge capacity at the beginning of effective discharge (mAH)
DfilterCur	signed int	2	Zero current detection window, current smaller than this window is displayed as 0
PowerDownDelay	unsigned char	1	Waiting time for entering low power mode (S)
ChargeBackupDelay	unsigned char	1	Effective charging time (Min)
ChargeBackupCur	signed int	2	The minimum current for judging effective charging in the data backup function (mA)
RTCBackupDelay	unsigned char		RTC data backup delay (S)
SWVersion	unsigned int	2	Software version: V2.00
HWVersion	unsigned int	2	Hardware version: V4.00
ID	unsigned char	1	Device ID "0xAA"
MNFName[12]	unsigned char	12	Manufacturer's name [12]
MNFDate	unsigned long	4	Manufacturing date 2018-03-28
SerialNum	unsigned int	2	Serial number
DeviceName[12]	unsigned char	12	Equipment name
DeviceChem[12]	unsigned char	12	Cell material
ChemID	unsigned int	2	Cell Chemistry ID

PackConfigMap description:

Bit symbol	Description	Value
DSGEnd	Discharge cut off	0: Charging cutoff does not turn off the discharge MOSFET 1: Charge cutoff, turn off the discharge MOSFET
CHGEnd	Charge cutoff	0: Charging cutoff does not turn off the charging MOSFET 1: Charge cutoff, turn off the charging MOSFET
TempNum	Temperature monitoring point	0: Support 1 temperature point detection 1: Support 2 temperature point detection
LEDNum	Number of indicator lights	0: No LED display 1: Support 3 LED displays 2: Support 4 LED display 3: Support 5 LED displays
CellNum[3]	String configuration	Number of battery strings configuration: 000: 3 strings 001: 4 strings 010: 5 strings 011: 6 strings 100: 7 strings 101: 8 strings 110: 9 strings 111: 10 strings
EEPROMBK	Data backup	0: Disable the data backup function 1: Enable data backup function
OCPM	Electric MOS	0: Discharge overcurrent closes the discharge MOS, charge overcurrent closes the charge MOS 1: Overcurrent turns off charge and discharge MOS at the same time
CTO_EN	Disconnection enable	0: Disable the disconnection detection function 1: Enable disconnection detection function
PF_EN	Secondary protection enable	0: Disable secondary protection 1: Enable secondary protection (PF pin output low level can be used to burn FUSE)
BAL_EN	Balance enable	0: Disable the balance function 1: Enable balance function
OCRC_EN	OCC self-recovery	0: Disable over-current self-recovery enable 1: Enable over-current self-recovery enable
OV_EN	Hardware overvoltage enable	0: Disable hardware overvoltage protection 1: Enable hardware overvoltage protection
SC_EN	Hardware short-circuit enable	0: Disable hardware short circuit protection 1: Enable hardware short circuit protection

➤ Charge settings

Sinowealth BMS Tool V0.1-SH39F003

File(F) Option(O) Help(H)

Info MCU Calibrate BackUp Exit

System Charge Discharge Calibration Read All Write All

Name	Value	Unit	Name	Value	Unit
Over Voltage	3750	mV	Balance Open Current	30	mA
Over Voltage Release	3650	mV	Balance Open Delay	2	500mS
Over Voltage Delay	2	500mS	Charge Over Temperature	65,0	°C
Over Voltage Release Delay	2	500mS	Charge Over Temp Release	60,0	°C
Charge End Voltage	3800	mV	Charge Under Temperature	-1,0	°C
Charge End Current	200	mA	Charge Under Temp Release	0,5	°C
Charge End Delay	5	Sec	Temperature Protect Delay	1	Sec
Charge Over Current	375000	mA	Temperature Protect Relea...	1	Sec
Charge Over Current Delay	2	500mS			
Chg Over Curr Release Del...	1	Sec			
Balance Voltage	3200	mV			
Balance Voltage Difference	50	mV			

SOC = 32%

Volt OK

Curr OK

Temp OK

Power OK

Port OK

SingleLine

DoubleLine

USB Connected

SBS Task Scanning

2020/10/01 18:42:18

Settings Description:

Name	Type of data	Length Byte	Function description
OVvol	unsigned int	2	Overvoltage protection threshold (mV)
OVRvol	unsigned int	2	Overvoltage protection recovery threshold (mV)
DelayOV	unsigned char	1	Overvoltage protection delay (S)
DelayOVR	unsigned char	1	Overvoltage protection recovery delay (S)
ChgEndvol	unsigned int	2	Charging cut-off voltage (mV)
ChgEndCur	signed int	2	Charging cut-off current (mA)
DelayChgEnd	unsigned char	1	Charge cut-off delay (Sec)
OCCvol	signed int	2	Charging overcurrent protection current (mA)
DelayOCC	unsigned char	1	Charge overcurrent protection delay (S)
DelayOCCR	unsigned char	1	Charge overcurrent self-recovery delay (S)
BalanceVol	unsigned int	2	Balance opening voltage (mV)
BalanceVolDiff	unsigned int	2	Balance opening pressure difference (mV)
BalCurrent	signed int	2	Balance open charging current (mA)
BalanceDelay	unsigned char	1	Balance opening delay (S)
TempOTC	unsigned int	2	Charging high temperature protection threshold (°C)
TempOTCR	unsigned int	2	Charging high temperature protection recovery threshold (°C)
TempUTC	unsigned int	2	Charging low temperature protection threshold (°C)
TempUTCRC	unsigned int	2	Charging low temperature protection recovery threshold (°C)
DelayTemp	unsigned char	1	Temperature protection delay (S)
DelayTempR	unsigned char	1	Temperature protection recovery delay (S)

➤ Discharge settings

Sinowealth BMS Tool V0.1-SH39F003

File(F) Option(O) Help(H)

Info MCU Calibrate BackUp Exit

System Charge Discharge Calibration Read All Write All

Name	Value	Unit	Name	Value	Unit
Under Voltage	2200	mV	Discharge PWM Frequency	4000	Hz
Under Voltage Release	2300	mV	Slow Discharge Speed Ratio	30	%
Under Voltage Delay	2	500mS	Fast Discharge Speed Ratio	70	%
Under Voltage Release Del...	2	500mS	Discharge Over Temperature	70,0	°C
Discharge End Voltage	2200	mV	Discharge Over Temp Rele...	65,0	°C
Discharge End Delay	5	Sec	Discharge Under Temperat...	-10,0	°C
Discharge Over Current	-375000	mA	Discharge Under Temp Rel...	-5,0	°C
Discharge Over Curren Delay	10	500mS			
Discharge Over Curren2	-500000	mA			
Discharge Over Curren2 D...	8	125mS			
Detect Load Delay	4	125mS			

SOC = 32%

Volt OK

Curr OK

Temp OK

Power OK

Port OK

SingleLine

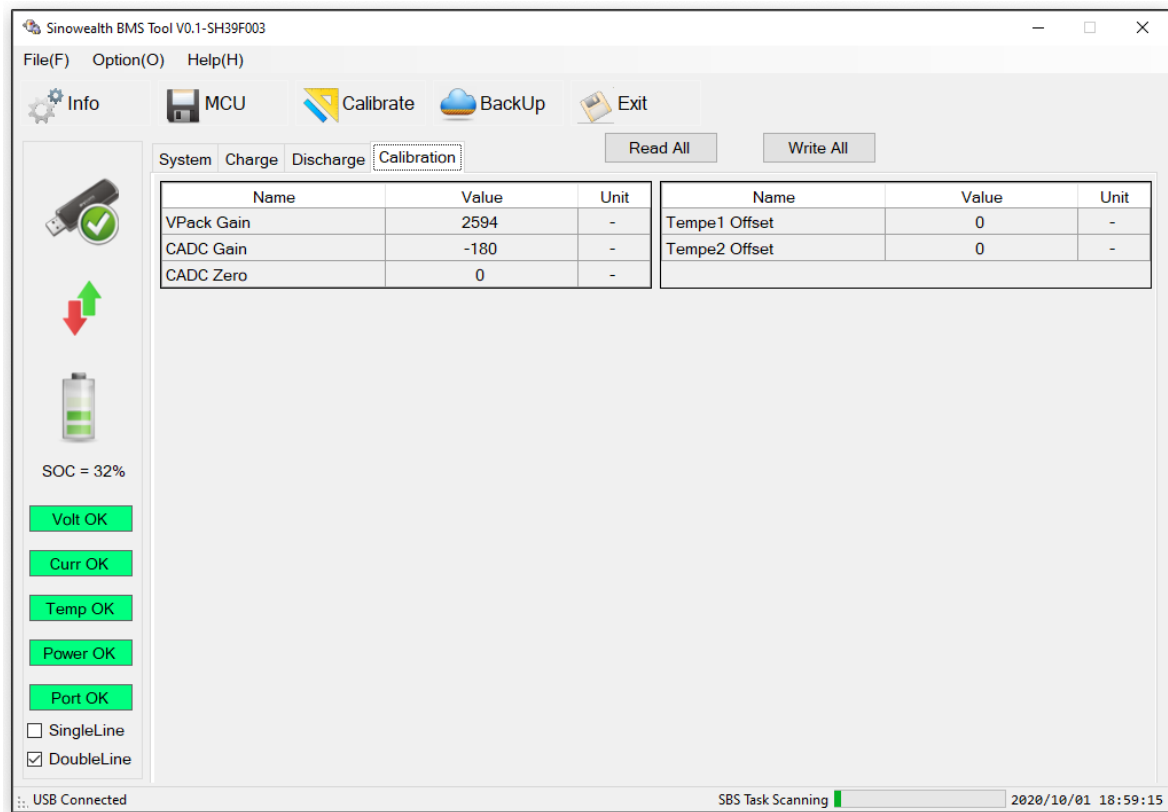
DoubleLine

USB Connected SBS Task Scanning 2020/10/01 18:50:08

Settings Description:

Name	Type of data	Length Byte	Function description
UVvol	unsigned int	2	Overcharge protection threshold (mV)
UVRvol	unsigned int	2	Overcharge protection recovery threshold (mV)
DelayUV	unsigned char	1	Overcharge protection delay (S)
DelayUVR	unsigned char	1	Overcharge protection recovery delay (S)
DsgEndvol	unsigned int	2	Discharge cut-off voltage (mV)
DelayDsgEnd	unsigned char	1	Discharge cut-off delay (Sec)
OCDvol	signed long	4	Discharge overcurrent 1 protection current (mA)
DelayOCD	unsigned char	1	Discharge overcurrent 1 protection delay (S)
OCD2vol	signed long	4	Discharge overcurrent 2 protection current (mA)
DelayOCD2	unsigned char	1	Discharge overcurrent 2 protection delay (125mS)
DelayLoadR	unsigned char	1	Load release delay (125mS)
DSG1PWMFreq	unsigned int	2	Discharge PWM frequency
DSG1PWMRatioL	unsigned char	1	Low-speed discharge duty cycle
DSG1PWMRatioH	unsigned char	1	High-speed discharge duty cycle
TempOTD	unsigned int	2	Discharge high temperature protection threshold (°C)
TempOTDR	unsigned int	2	Discharge high temperature protection recovery threshold (°C)
TempUTD	unsigned int	2	Discharge low temperature protection threshold (°C)
TempUTDR	unsigned int	2	Discharge low temperature protection recovery threshold (°C)

➤ Calibration settings

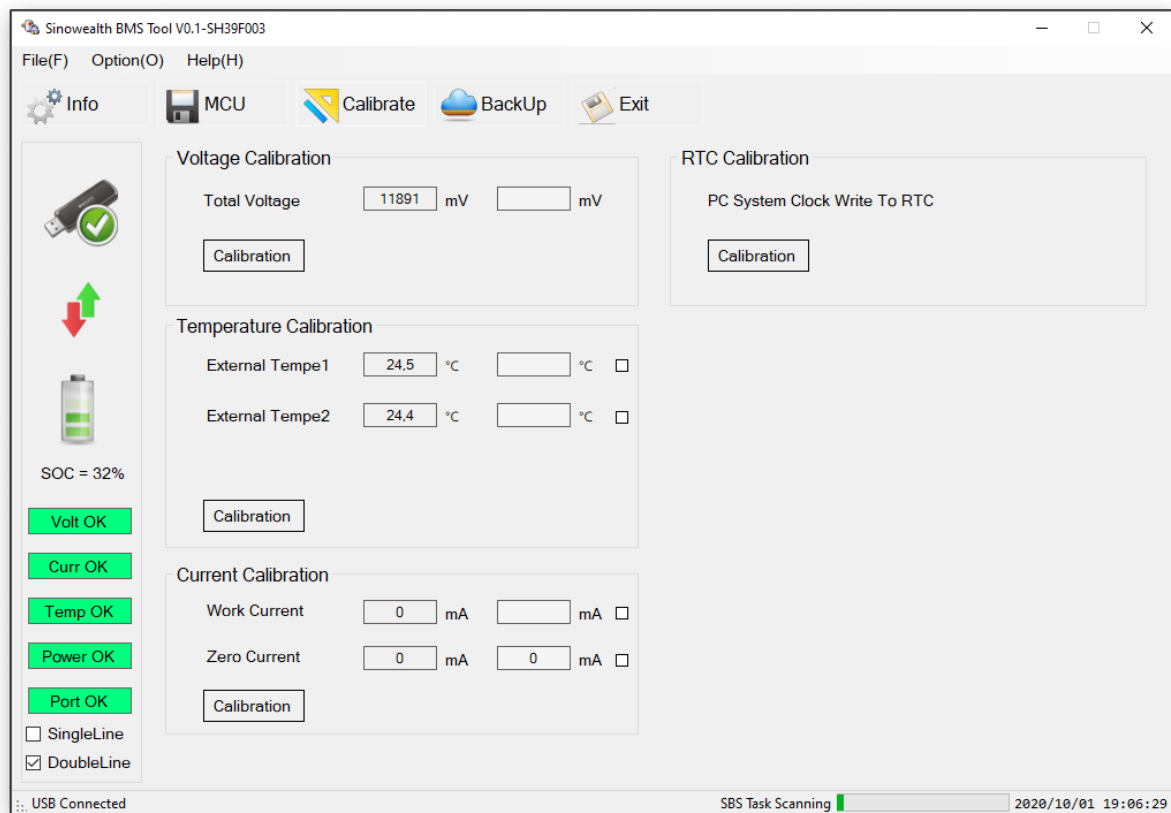


Settings Description:

Name	Type of data	Length Byte	Function description
VPackGain	unsigned int	2	Total voltage gain
CadcGain	signed int	2	Current gain
CadcOffset	signed int	2	Zero current offset
TS1Offset	signed int	2	External temperature 1 offset
TS2Offset	signed int	2	External temperature 2 offset

2.5. Calibration interface

The calibration function mainly provides board-level calibration, which can calibrate total voltage, external temperature, zero current, working current, and RTC time. After calibration, the calibration parameters will be written to MCU Flash storage area, used for subsequent calculations.



➤ Total voltage calibration

The box on the left side of the calibration interface will display the total voltage value calculated by the current MCU. The user can manually input the calibration value in the corresponding box on the right according to the actual measured value.

After finishing, click "Calibrate" to perform voltage calibration. After the calibration is completed, there will be a "calibration successful" prompt.

Note: No load can be added during total voltage calibration.

➤ Temperature calibration

It can be calibrated separately for 2 groups of external temperatures. The box on the left side of the calibration interface will display the temperature value calculated by the current MCU. The user can correspond to the right side

Manually enter the calibration value in the box. When all the entries are completed, click "Calibrate" to perform external temperature calibration, or you can calibrate each group of external temperature separately (check the right the corresponding small box), after the calibration is completed, there will be a "calibration successful" prompt.

Note: No load can be applied during temperature calibration.

➤ Current calibration

It can be calibrated for board-level zero current and discharge current (simultaneous calibration is not allowed).

You need to calibrate the zero current first and select the corresponding small box on the right (the system cannot be connected to any load equipment, even if the load equipment is not discharged), then calibrate the discharge current, and select the corresponding small box on the right (current during discharge). The display is a negative value, and the user can calibrate the discharge current according to the current during normal operation (the discharge current is at least 1A).

The box on the left side of the calibration interface will display the current calculated by the MCU. The user can manually enter the calibration value in the corresponding box on the right according to the actual measurement. When the input is completed, click "Calibrate" to perform the corresponding current calibration. After the calibration is completed, there will be a "calibration successful" prompt.

➤ RTC calibration

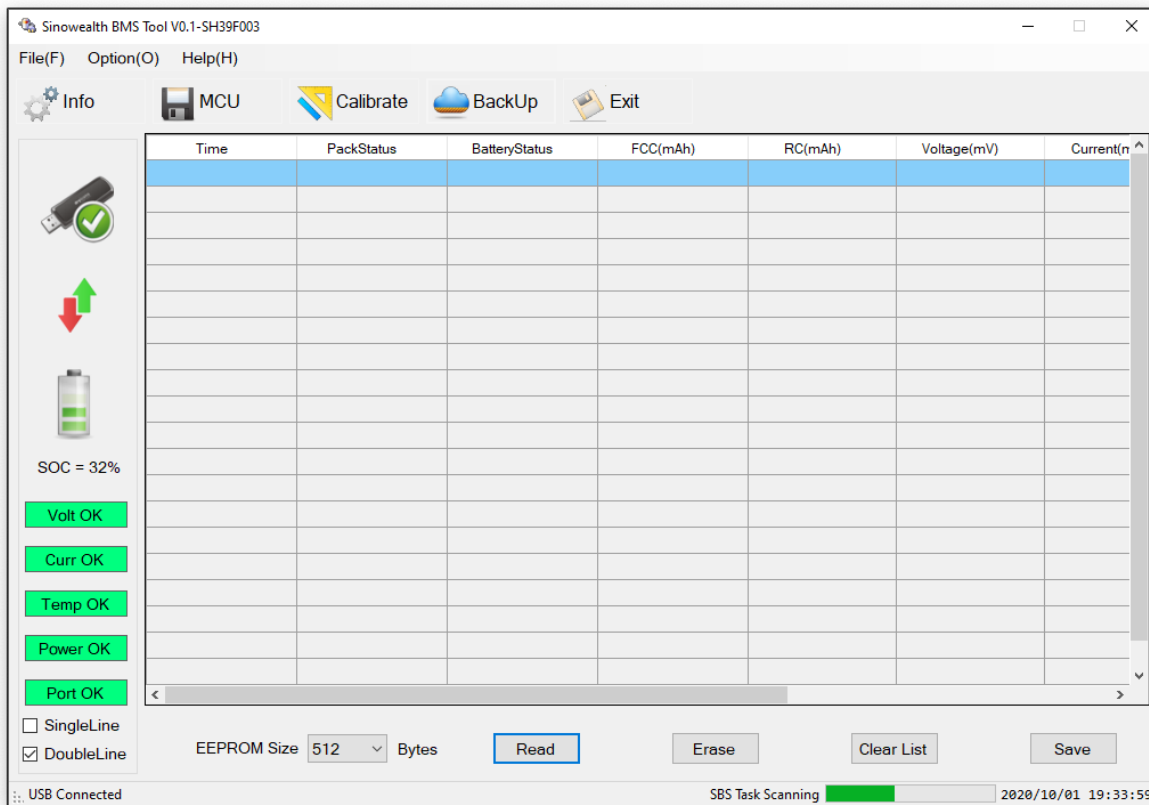
When the system has an external EEPROM&RTC module, you can calibrate the RTC time. Clicking on the calibration will update the current PC system time to the RTC module.

Block to achieve RTC calibration. After calibration is completed, there will be a "calibration successful" prompt.

2.6. Backup interface

When the system has an external EEPROM&RTC module, the data backup function can be enabled, and the system will back up the system state information that the user needs to store to the external

EEPROM, the user can read, erase, and save the system status information stored in the external EEPROM on this interface.



2.7. AFEReg interface

When the IC model is SH367309/39F005, this interface will be displayed. Through this interface, you can read and write AFE registers for system configuration, voltage protection, current

The functions and thresholds corresponding to protection and temperature protection are configured online, and after the configuration is completed, click Write Register.

