

## BT5525 Sample Application Manual

### Overview

BT5525 Sample Application (this application) can perform the following operations on the BT5525:

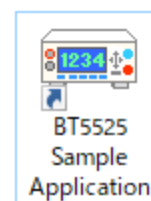
- Setting for BT5525
- Display of measured values (measurement or update of measured values at specified time intervals)
- Backup and Restoration of the instrument's settings
- Sending and receiving communication commands
- Displaying and saving monitor data
- Displaying and saving BDD data

### System requirements

- CPU: 1 GHz or greater
- Memory: 512 MB or more
- OS: Windows10, Windows11
- Microsoft .NET Framework 6.0
- Interface: USB 2.0 (virtual COM port), LAN
- Monitor resolution: 1024 x 768 dots or greater
- Hard disk: 5 MB free space or more (However, if .NET Framework 6.0 is not installed, approximately 2.5 GB is required separately)

### Installing the application

1. Double-click “ setup\_BT5525 Sample Application.exe”.
2. The installer screen will appear.
3. Click **Next** every time when it appears.
4. Installation will begin. When the installation is complete, a shortcut icon will be created on the desktop.



### Uninstalling the application

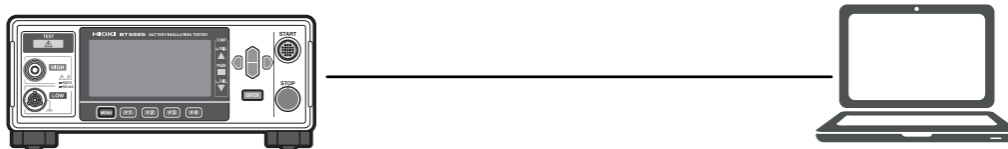
- Windows10, 11

The application can be uninstalled by opening the Windows Setting, choosing Apps.

### Connecting the instrument to your computer

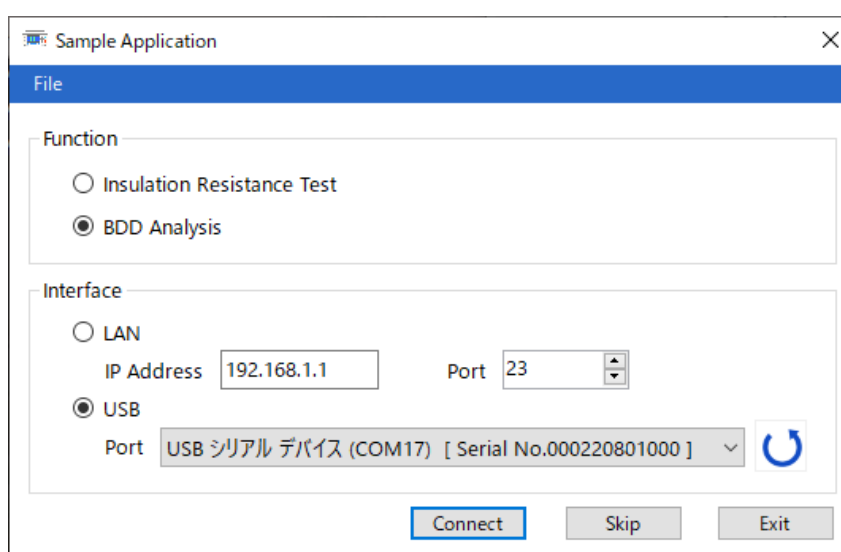
- Connecting the instrument via USB  
Works with standard Windows drivers.

- Connecting the instrument via LAN  
You'll need a LAN cross cable.

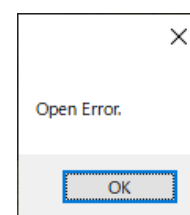


### Launching and connecting to the application

1. Double-click the application's shortcut on the desktop. The measurement screen will be displayed.
2. Select the Function and Interface then click [Connect].



3. If you get an error message like the one on the right, please make sure that you are using the correct IP address and port. Also, the port may be used by other applications.



### Application interface

This application will force the following settings upon connection. When the application is closed, the following settings will be restored to the original settings at the time of connection.

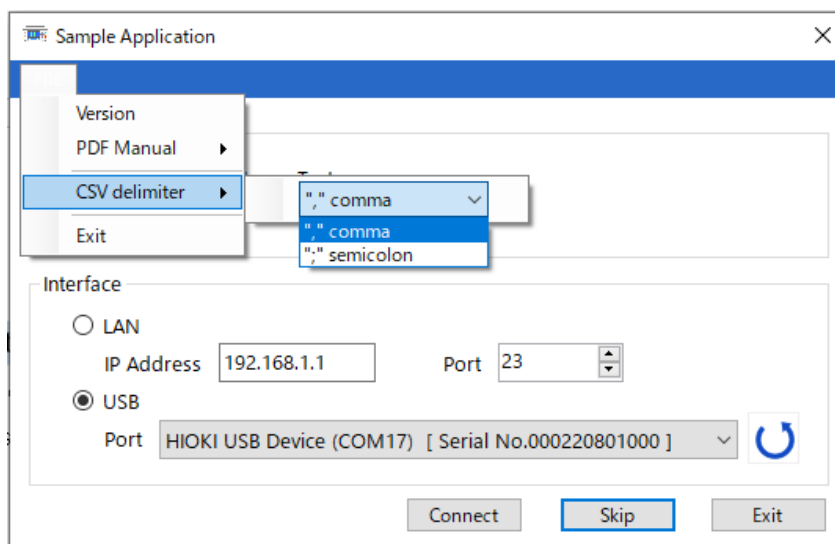
※If it does not exit successfully or cannot communicate on exit, the settings remain as follows.

- Response of measured value and status. :MEASure:VALid 255
- Command monitor OFF.
- Automatic data output setting OFF.

## Selecting the delimiter character for text (CSV) files

- This application has the ability to save data to a text (CSV) file
- You can set the separator used for data delimitation from the menu.  
Please set the separator according to your environment.

- Comma (“,”) separator
- Semicolon (“;”) separator



## Insulation Resistance Test

Operate this instrument from the application to perform an insulation resistance test.

### ● Overview of Main Screen

- When this application is launched, it synchronizes with the settings of the instrument.
- When you change the settings on the screen, the settings on the instrument will automatically change as well. Please note that if you change the settings from the instrument, the settings on the screen will not be reflected.

The screenshot shows the 'Sample Application [Standard]' interface. It is divided into two main sections: 'SET' and 'TEST'. The 'SET' section on the left contains various configuration options such as VOLTAGE (25 V), RANGE (AUTO), SPEED (1), MEAS DELAY (1), TIMER (ON), COMP DELAY (0.001), COMP MODE (CONTINUE), and COMP BEEP (FAIL). The 'TEST' section on the right displays the current range (2000M), voltage (0 v), and a large 'MΩ' reading. Below the 'TEST' section is a table for recording results with columns for No., Date, TIME, STA..., R(ohm), and COMP. On the far right, there are control buttons: a green 'START [F5]' button, a red 'STOP [F4]' button, and an 'Interval' section with an 'Enable Time' checkbox and a time value of 200 s. A 'COMP SET' button is also visible between the 'SET' and 'TEST' sections.

**You can set up and check the instrument.**

**Displays the measured value.**

**Displays measurement results.**

**Interval Measurement Records test results at each set time interval.**

**Press the button to perform the TEST, which can also be operated with the F5/F4 keys.**

● MEAS1、MEAS2

➤ All test settings that can be configured on the instrument can be changed.

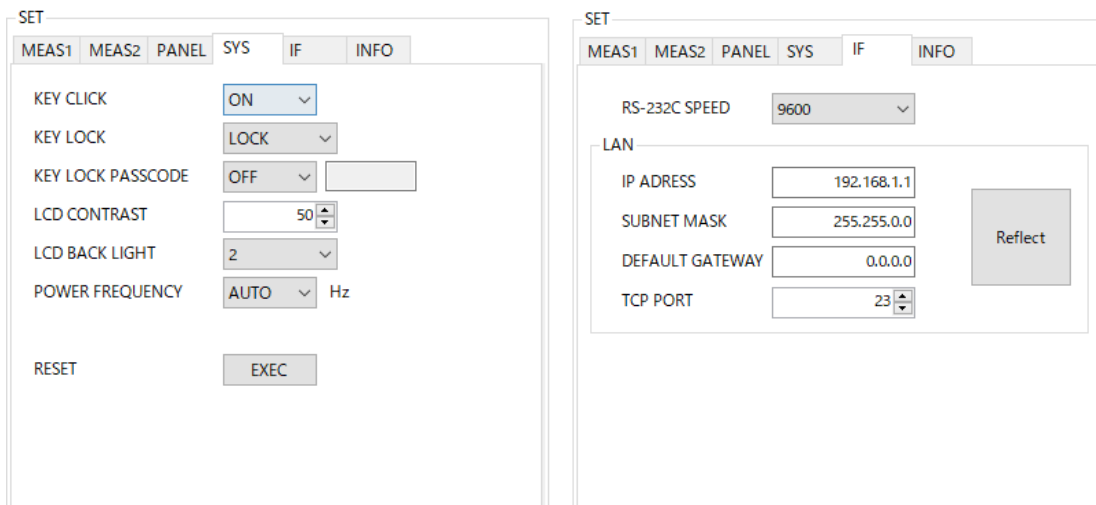
● COMPARATOR SETTING

Reflects the setting in this instrument.

● PANEL

- Saves the settings to the specified panel number. If panel data already exists, it is overwritten.
- Loads the settings for the specified panel number.
- Renames the specified panel number. (Max. 10 single-byte alphanumeric characters)
- Deletes the setting of the specified panel number.

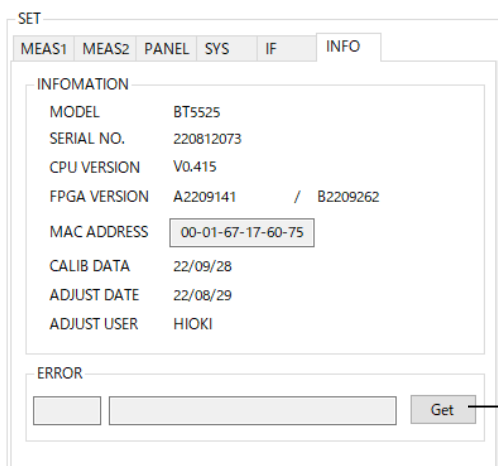
● SYS, IF



- [RESET] : The settings of the instrument other than the communication settings and panel are initialized.
- LAN: To change the LAN settings, press [Reflect]. The instrument's LAN settings will not be changed until [Reflect] is pressed; if a LAN connection has been made, it will be reconnected.
- Some functions cannot be set from the application.

● INFO

Information on this instrument can be checked.



- Obtains error information from the instrument.

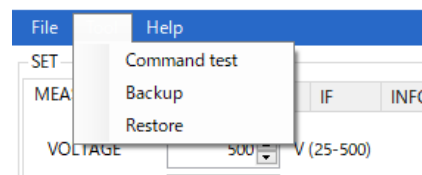
For details on various errors, refer to the “:SYSTEM:ERROR?” command page in the instrument’s instruction manual.

- Various Tools

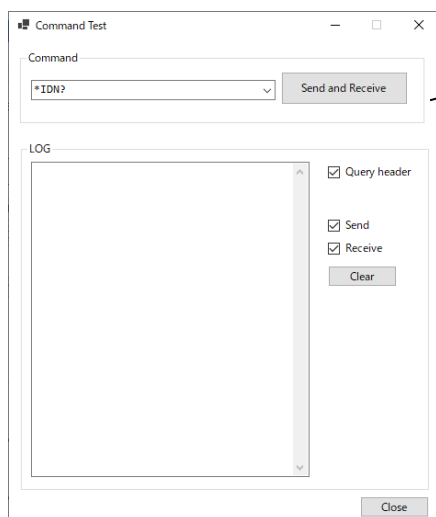
The following windows open from [Tool] on the top toolbar.

When the window is closed, it returns to the original screen.

The instrument will be synchronized with the instrument at that time.

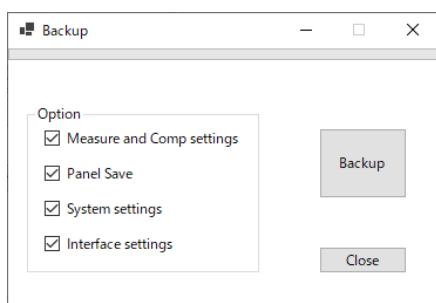


- **Command test**



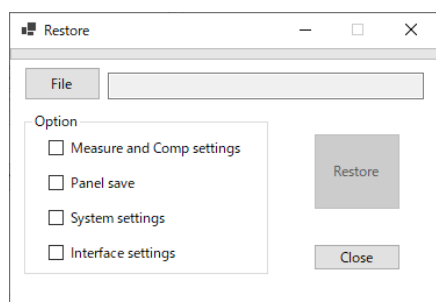
Send and receive arbitrary commands.

- **Backup**



- Backs up the instrument's settings and saves a dedicated settings file.
- Check the items to be backed up and click [Backup] to open the folder selection screen. When "Complete Backup" is displayed, the backup is complete. If multiple PANELs are set up, it may take some time.

- **Restore**



- Restore the instrument's settings from the dedicated settings file created by the above backup.
- Press [File] and select the backup file from the folder.
- Press [Restore] to execute the restoration, which is complete when "Complete Restore" is displayed. If multiple PANELs are set up, it may take some time.

## BDD Analysis

Insulation resistance test is performed, and when the test stops, monitor voltage and current values (reference values) from the start of the test are acquired, displayed on the data grid, and waveforms are displayed on the graph.

Waveform data can be saved as CSV. (Note that this is different from the actual detection waveform of the BDD function.)

- Overview of Main Screen

- When this application is launched, it synchronizes with the settings of this instrument.
- When the screen settings are changed, the settings of this unit are automatically changed as well.

The screenshot shows the 'Sample Application [BDD Analysis]' interface. It is divided into several sections:

- SETTING (Left Panel):** Contains 'INFORMATION' (MODEL: BT5525 / 220812081 / V1.01a, FPGA VERSION: A2209302 / B2210031), 'Graph setting' (Number of samplings: 5000, Decimation rate: 15, Recording time: 4830.043 ms), and 'BDD' settings (CCV, CVV, CVI, BDD STOP, VOLTAGE, RANGE, SPEED, TIMER, CONTACT CHECK, CURRENT LIMIT).
- TEST (Top Right):** Shows 'IDLE' status, 'RANGE' (200M), 'BDD COUNT' (0), and 'START [F5]' and 'STOP [F4]' buttons.
- Graph (Center):** Displays two graphs: 'V monitor [V]' and 'I monitor [A]', both plotted against 'Time [ms]'. The V monitor graph shows a step change in voltage, and the I monitor graph shows a corresponding step change in current.
- TEST data (Right Panel):** A table for displaying test results, with checkboxes for 'V-monitor', 'V-BDD', 'V-monitor fixed', 'V-BDD fixed', 'I-monitor', 'I-VDD', 'I-monitor fixed', and 'I-BDD fixed'.

Callouts provide additional information:

- 'Press the button to perform the test.' points to the START and STOP buttons.
- 'You can set up and check the instrument. Displays monitor data and BDD data acquired after the test.' points to the SETTING panel.
- 'Display a graph of monitored data and a list of test results.' points to the Graph and TEST data panels.



● SETTING

➤ Graph setting

Graph setting

|   |           |          |
|---|-----------|----------|
| Number of samplings   | 500       | (1-5000) |
| Decimation rate   | 1         | (0-15)   |
| Recording time  | 60.376 ms |          |
| <input checked="" type="checkbox"/> Separate voltage and current graphs |           |          |

- Sets the number of waveforms sampled.
- Sets the degree to which sampled waveforms are thinned out. Larger values result in lower resolution, but allow acquisition of waveforms of longer duration.
- The recording time with the above settings is shown.
- If checked, the voltage and current graphs are displayed separately.

➤ BDD setting

BDD

|          |     |     |               |
|----------|-----|-----|---------------|
| CCV      | OFF | 1.0 | V (0.1-500.0) |
| CVV      | OFF | 1.0 | V (0.1-500.0) |
| CVI      | OFF | 1.0 | % (0.6-999.9) |
| BDD STOP | OFF |     |               |

Enable BDD setting, set threshold

- CCV: Detects V in CC (charging) state
- CVV: Detects V in CV (steady) state
- CVI: Detects I in CV (steady) state
- When turned ON, the test is stopped when the BDD count reaches 1 or more.

● TEST

Displays the test status of the instrument.  
 IDLE: Waiting  
 TEST: Testing  
 DISCHARGE: Discharging  
 INTERLOCK: Waiting at interlock

Displays measurement results.

TEST

Monitor TEST status

|       |           |     |     |     |
|-------|-----------|-----|-----|-----|
| RANGE | BDD COUNT | CCV | CVV | CVI |
| 2M    | 0         | 0   | 0   | 0   |

START [F5] STOP [F4]

Displays the number of BDD counts and their breakdown.

When checked, the test status of this instrument is monitored; check this box if you want to control the test with EXT I/O. The operation of this instrument will not be possible because it will always be in the remote state (RMT). Uncheck the check box if you want to operate the instrument.

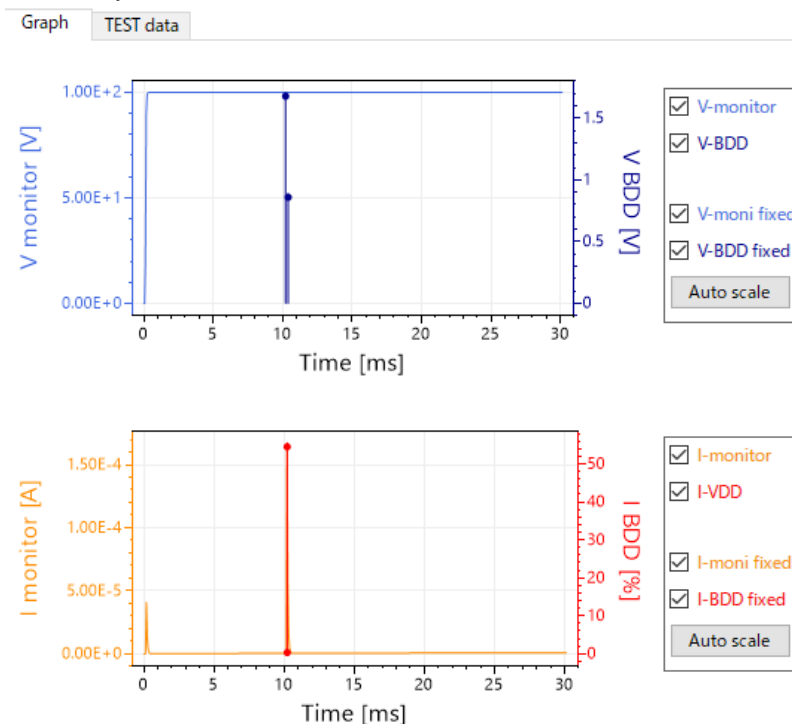
● BDD data / MONITOR data

| Time[ms] | Vmoni[V] | Imoni[A] |
|----------|----------|----------|
| 0.12     | 6.464    | 0.003461 |
| 0.241    | 14       | 0.003461 |
| 0.362    | 21.24    | 0.003461 |
| 0.483    | 28.48    | 0.003461 |
| 0.603    | 35.71    | 0.003461 |
| 0.724    | 42.95    | 0.003461 |
| 0.845    | 50.21    | 0.003461 |
| 0.966    | 57.45    | 0.003461 |
| 1.086    | 64.7     | 0.003461 |

- After the test STOP, it is read from the instrument and the display is updated.
- It can be saved as CSV by [SAVE].
- Vmoni and Imoni are reference values.
- BDD data displays the result when BDD COUNT is 1 or more, and the unit of BDD value is [V] when Type is CCV or CVV, and [%] when CVI.

Note that the % of CVI is a percentage of the BT5525's own reference value and cannot be converted to a current value.

● Graph / TEST data



Graph

- Displays monitor value waveforms of voltage and current.
- Displays the detection time and magnitude of BDD as dots with bars.
- Move, zoom in/out, and copy images on the graph by mouse operation.
- Check boxes allow you to switch between showing/hiding the waveforms and fixing the axes.

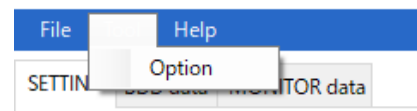
| No. | Date     | TIME     | STATUS | R[Ω]      | COMP   | BDD | CCheck ... |
|-----|----------|----------|--------|-----------|--------|-----|------------|
| 1   | 22/10/24 | 14:32:47 | 0      | 9.959E+06 | NOCOMP | 0   | 45.9E-09   |

TEST data

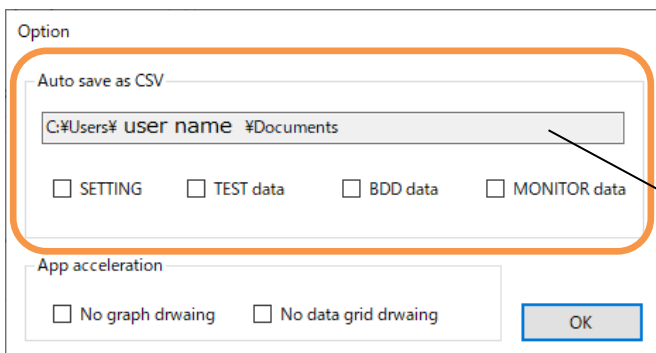
- Lists the test results.
- For details, refer to the “:MEASure?” and “:CONTactcheck:CAPacitance?” command pages of the instrument’s user manual.

- **Option**

The [Tool] on the top toolbar opens the [Option] window.



- **Auto save function**



- At the end of the test, the checked items are automatically saved in CSV format. If none of the items are checked, the file will not be automatically saved.
- Enter the location to save the CSV file.
- Click [OK] to save the settings and apply them from the next test.

The file name to be saved automatically changes depending on the data checked.

File name : yyyy-MM-dd\_HH-mm-ss\_auto\_xxxx.csv (xxxx is the type of storage and number of data)

|    |                 |            |          |           |          |        |     |                 |
|----|-----------------|------------|----------|-----------|----------|--------|-----|-----------------|
| 1  | #INFORMAITON    |            |          |           |          |        |     |                 |
| 2  | DATE            | 2022/10/24 | 15:31.12 |           |          |        |     |                 |
| 3  | MODEL           | HIOKI      | BT5525   | 2.21 E+08 |          |        |     |                 |
| 4  | VERSION         | V1.01      |          |           |          |        |     |                 |
| 5  | FPGA            | A2209302   | B2210031 |           |          |        |     |                 |
| 6  |                 |            |          |           |          |        |     |                 |
| 7  | #SETTING        |            |          |           |          |        |     |                 |
| 8  | VOLTAGE         |            | 500      |           |          |        |     |                 |
| 9  | RANGE           | HOLD       | 2M       |           |          |        |     |                 |
| 10 | SPEED           |            | 1        |           |          |        |     |                 |
| 11 | TIMER           |            | 0.1      |           |          |        |     |                 |
| 12 | CONTACT CHECK   | ON         | 20       |           |          |        |     |                 |
| 13 | BDD CCV         | ON         | 0.1      |           |          |        |     |                 |
| 14 | BDD CVV         | ON         | 0.1      |           |          |        |     |                 |
| 15 | BDD CVI         | ON         | 0.6      |           |          |        |     |                 |
| 16 | BDD STOP        | OFF        |          |           |          |        |     |                 |
| 17 | CURRENT LIMIT   | MANUAL     | 25       |           |          |        |     |                 |
| 18 | CHARGE TIME     | 0.01       |          |           |          |        |     |                 |
| 19 | DUT CAPACITY    | MANUAL     | 0.1      |           |          |        |     |                 |
| 20 | Graph setting   | 500        | 1        |           |          |        |     |                 |
| 21 |                 |            |          |           |          |        |     |                 |
| 22 | #TEST DATA      |            |          |           |          |        |     |                 |
| 23 | No.             | Date       | TIME     | STATUS    | R[Ω]     | COMP   | BDD | CCheck value[F] |
| 24 | 1               | 2022/10/24 | 15:31.11 | 0         | 9.96E+06 | NOCOMP | 6   | 4.60E-08        |
| 25 |                 |            |          |           |          |        |     |                 |
| 26 | #Number of data |            | 506      |           |          |        |     |                 |
| 27 | Time            | Vmoni      | Imoni    | Type      | Value    | Bdd_Id |     |                 |
| 28 | 0.12            |            | 17.2     | 0.00316   |          |        |     |                 |
| 29 | 0.158           |            |          | CCV       | 0.23     | 1      |     |                 |
| 30 | 0.241           |            | 77.18    | 0.003461  |          |        |     |                 |
| 31 | 0.339           |            |          | CCV       | 0.23     | 2      |     |                 |
| 32 | 0.362           |            | 141      | 0.003461  |          |        |     |                 |
| 33 | 0.483           |            | 205.8    | 0.003461  |          |        |     |                 |
| 34 | 0.603           |            | 270.7    | 0.003461  |          |        |     |                 |
| 35 | 0.724           |            | 335.7    | 0.003461  |          |        |     |                 |
| 36 | 0.725           |            |          | CCV       | 0.16     | 3      |     |                 |
| 37 | 0.729           |            |          | CCV       | 0.25     | 4      |     |                 |
| 38 | 0.733           |            |          | CCV       | 0.17     | 5      |     |                 |
| 39 | 0.845           |            | 400.8    | 0.003461  |          |        |     |                 |
| 40 | 0.966           |            | 465.5    | 0.003461  |          |        |     |                 |
| 41 | 1.063           |            |          | CCV       | 0.21     | 6      |     |                 |
| 42 | 1.086           |            | 499      | 0.003461  |          |        |     |                 |
| 43 | 1.207           |            | 500      | 0.001953  |          |        |     |                 |
| 44 | 1.328           |            | 500      | 0.000801  |          |        |     |                 |

Date and time the file was saved, information.

● **Measurement Setting**  
Saves when SETTING is checked.

● **TEST result**  
Saves when TEST data is checked.

● **BDD data, MONITOR data**  
If either BDD data or MONITOR data is checked, it will be saved.  
If both BDD data and MONITOR data are checked, both data are combined and sorted by Time and saved.

## ➤ Application acceleration

Option

Auto save as CSV

C:\Users\% user name %\Documents

SETTING    TEST data    BDD data    MONITOR data

App acceleration

No graph drwaing    No data grid drwaing

OK

- Checking the option speeds up the operation of this application. If you have a lot of data you want to auto-save and the test interval is short, etc., and data cannot be read out in time, please try speeding up the process.
- Press [OK] to save and apply the settings.

### Disclaimer

This application is free software. HIOKI ELECTRIC CO., LTD. assumes no responsibility for any damage caused by the use of this application. Also, HIOKI Electric Corporation assumes no responsibility for any bugs or other inconveniences that may occur with the software. Please note that HIOKI is unable to respond to questions about this software. Thank you for your understanding.