Microcontroller

# Power Debugger PCtool
# User Manual





For additional information or question, please contact Nuvoton Technology Corporation Japan.
www.nuvoton.co.jp

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# About This Manual

Objective

The primary objective of this user manual is to describe the pctool software of Power Debugger by Nuvoton Technology Corporation Japan (hereinafter, “NTCJ”).

Please go through license agreement terms, before using this pctool software (hereinafter, “this software”). Usage will be authorized only when following terms are approved.

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# Contents

# 1. OVERVIEW

## 1.1 Overview

Power Debugger is a RAM monitor tool compatible with the microcontroller manufactured by Nuvoton Technology Corporation Japan.

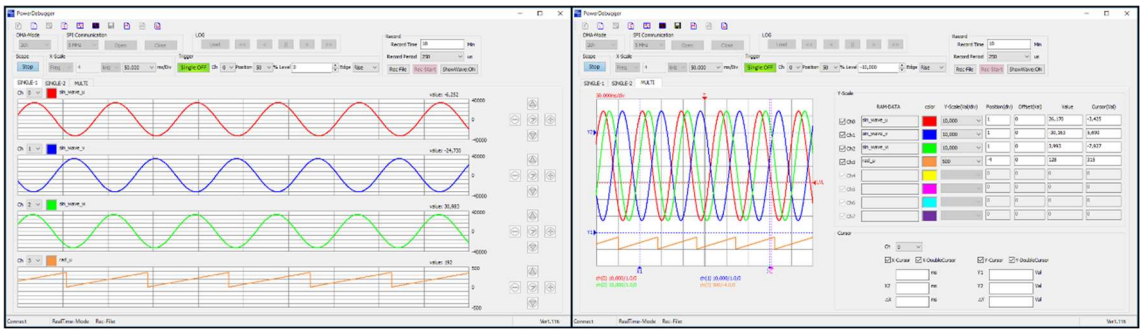


Figure 1.1 Power Debugger GUI

## 1.2 Features

Power Debugger has 3 main functions

(1) Real Time Monitoring Function

Read any RAM (variable) data and display as waveform in real time.

Display maximum of 8 RAM data, (max. 8 ch) (*).

* The maximum display channel number depends on sampling rate limit etc.

(2) Record Save/Replay Function

The displayed RAM variable data can be saved to csv file.

Power Debugger Tool can read the csv file and display the waveform.

(3) RAM Monitor Function

RAM variable can be read / write.

The maximum RAM variable is 24 channels.

## 1.3 Package Contents

This product (Power Debugger) includes the following items.

Table 1.1 Power Debugger package contents

| No | Content | No. |
|---|---|---|
| 1 | Power Debugger Communication Module | 1 |
| 2 | USB cable (1 meter) | 1 |
| 3 | Cable (20cm) for target board connection | 1 |
| 4 | Power Debugger installation software for PC | 1 |
| 5 | Power Debugger PCtool user manual （this file） | 1 |

*Power Debugger sample software will be provided separately according to the NTCJ microcomputer part number to be used.

## 1.4 Operating Environment

The recommended specifications for using Power Debugger are shown below.
High speed CPU of 4 or more cores is recommended as it is necessary to process communication / waveform display processing / record storage etc. at the same time.

Table 1.2 Operating Environment

| No | term | Content |
|---|---|---|
| 1 | Computer | Available hard disk space: >540 Kbyte+ record data space<br>RAM：> 1 GByte<br>USB port：1 ort (USB2.0) |
| 2 | OS | Windows10 32bit / 64bit |

## 1.5 Power Debugger Specifications

The following shows a summary of the specifications of the Power Debugger.

Table 1.3 Power Debugger Specifications

| No | term | Content |
|---|---|---|
| 1 | Sampling cycle | Max. 50 µsec *1 |
| 2 | Display channel | Max. 8channel *1 |
| 3 | Trigger mode | Single |
| 4 | Trigger source | 8 channel |
| 5 | Record function | Record file save to csv format, replay function |
| 6 | Microcontroller ports | SBT、SBO、SBI、VDD5、VSS |
| 7 | Microcontroller peripherals | Serial port: 1 ch *3<br>Timer for baudrate 1 ch<br>DMA: 2 ch *2<br>Internal RAM: About 2 KB |

*1 The relationship between the sampling cycle and the number of display channels is determined by the microcontroller used and also CPU processing performance.

*2 If DMA channel is used other than Power Debugger, Power Debugger might not work properly.

*3 Some channels cannot be used due to the synchronous serial specifications.
For details,refer to the PowerDebugger sample software manual of the microcomputer you are using.

# 2. SETUP

## 2.1 Installation

Power Debugger installation procedures

■ Power Debugger folder

pctool_verXXXX ----- setup.exe

|---- PowerDebuggerSetup.msi

|---- vcredist_x86 --- vcredist_x86.exe

(1) Installation of Power Debugger

①Start installation program

Click setup.exe in the Power Debugger folder.

The Power Debugger installer starts up.

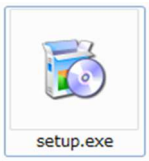



Figure 2.1 Setup execution file

②Installation of Visual C++ Runtime Libraries(x86)

If the computer has not installed Visual C++ Runtime Libraries, click the button【Install】to install. It is not displayed if it is already installed.

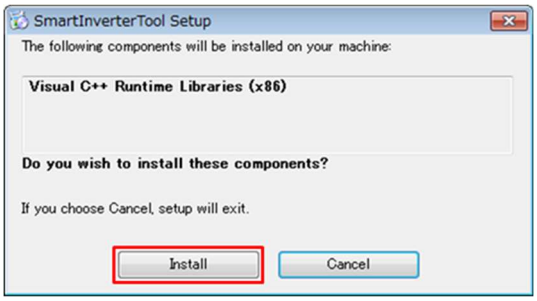



Figure 2.2 Installation of Visual C++ Runtime Libraries(x86)

③Starts Installation

Please click the【Next】button


Figure 2.3 Power Debugger installation start screen

④Select installation folder

Set the folder to install Power Debugger. If necessary, you can change the installation folder.

After confirming the installation folder, click the【Next】button.

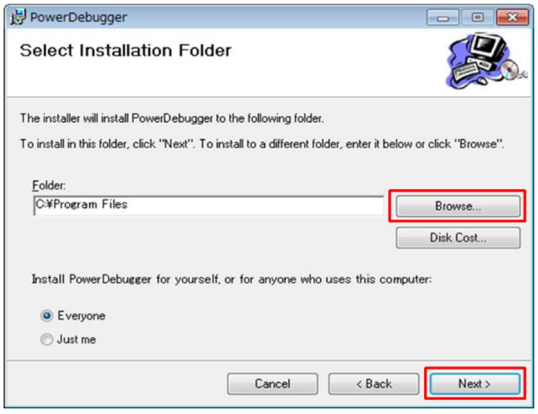



Figure 2.4 Select installation folder

⑤Confirm Installation

Please click the【Next】button to start installation.

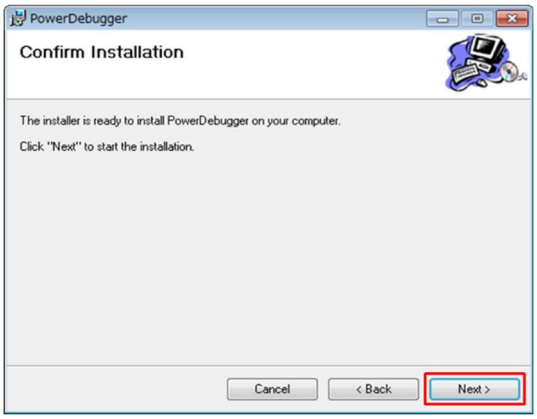



Figure2.5 Confirm installation

⑥Installation complete

When installation is completed, please click the【Close】button.

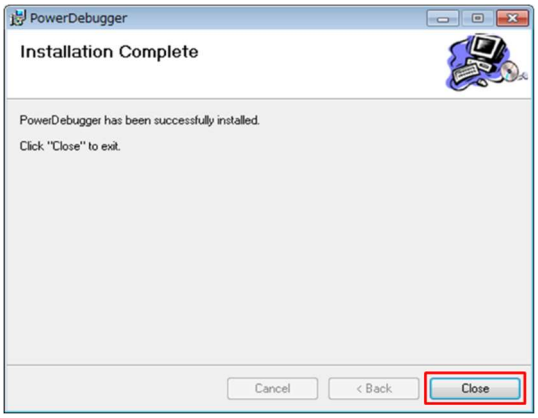



Figure2.6 Installation complete

After the installation is completed, a shortcut is created on the desktop.


Figure2.7 Power Debugger shortcut icon

(2) Installing Power Debugger communication module driver

The Power Debugger communication module is using a product from Future Technology Devices International Ltd. (hereinafter referred to as FTDI)

Since it uses a serial-to-USB conversion IC, it is necessary not to connect another serial-to-USB conversion module etc. of FTDI Inc.

The Driver software can be download from http://www.ftdichip.com/.

## 2.2 Link Library

In order to use the Power Debugger, it is necessary to include the library in the microcontroller program.Please refer to《Power Debugger sample software user manual》for how to install the library.

## 2.3 Connection with target board

As the Power Debugger communication module is isolated, it is necessary to connect microcontroller power supply & GND other than the serial ports. As shown below, connect the target board and the Power Debugger communication module to each other using the supplied cable (20cm) in the package. Connect the USB cable (1 meter) supplied in the package to the computer.

Please extend the USB cable when the distance between the target board and the personal computer is too far. Do not change the target board connection cable.

The pin assignment of the connector that connects the communication module to the target is shown in Figure 2.9.

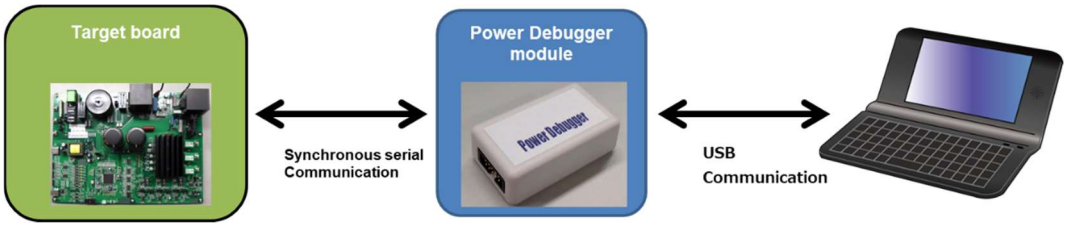



Figure2.8 Connection

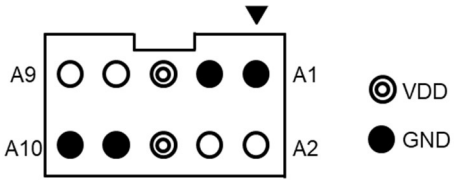



Figure2.9 Socket Pin Assignment

Table 2.1 Connector Wiring List

| Pin No. | Name | Pin No. | Name |
|---|---|---|---|
| A1 | GND | A2 | CK(clock output) |
| A3 | GND | A4 | DO(data output) |
| A5 | VDD | A6 | VDD |
| A7 | (CS) | A8 | GND |
| A9 | DI(data input) | A10 | GND |

# 3. OPERATION

## 3.1 Start / Stop

To start the tool, double-click 【Power Debugger icon 】or Click "All Programs - PowerDebugger - PowerDebugger.exe". The screen display immediately after startup is as shown on Figure 3.1

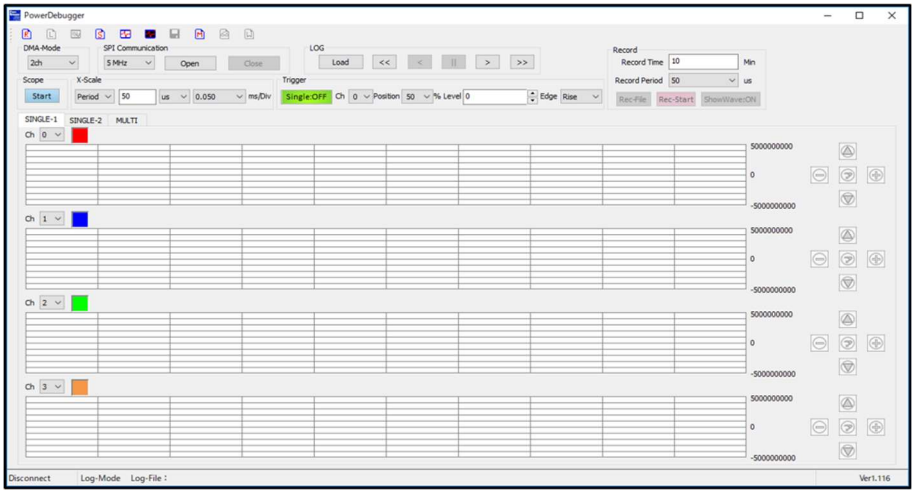



Figure 3.1 Screen display immediately after startup

To terminate the tool, click the button【×】on the top right corner. Figure 3.2 will pop up. Click the【OK】button to end it. If do not want to quit, click the【Cancel】button.

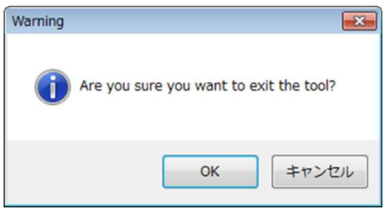



Figure 3.2 Stop the tool dialog display

The tool cannot be stopped while displaying the waveform. If you click the【×】button during waveform display,The following warning dialog is displayed. Please click the【OK】button and close the dialog.

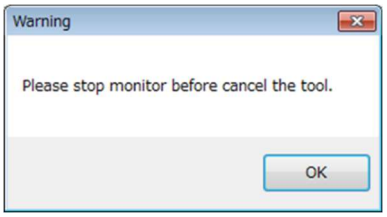



Figure 3.3 Warning dialog display

■About setting auto save auto read

This tool saves the communication settings and Scale settings at the end of the tool automatically. When the tool is started next time, the file (initFile.ini) that was automatically saved at the end of the last tool will be read. Click the [Open] button. After the communication is connected, simply click the [Set] button on the channel setting screen to send the setting information to the MCU, and you can use the tool in the same state as the previous one.

When the tool is started, the setting of the specified setting file (****.ini) is valid when the individual save setting file (****.ini) is specified by the [Load] button in the channel setting screen.

In addition, when the RAM-DATA monitored in the channel setting screen is changed, the setting of the corresponding Ch Scale is initialized.

(setting information that is automatically saved)

- DMA-Mode
- SPI-Communication communication cycle number
- X-Scale sampling period
- Channel setting（RAM-DATA、Signed、Byte）
- Trigger setting（TriggerCh、Position、Level、Edge）
- SINGLE-1 Y - axis Scale、Position
- SINGLE-2 Y - axis Scale、Position
- MULTI Y - axis Scale、Position、Offset

*Please note that automatic saving is only performed in RealTime mode, and LOG mode is not automatically saved.

## 3.2 Communication Setup

After the tool started, setup communication connection between the tool and the microcontroller.

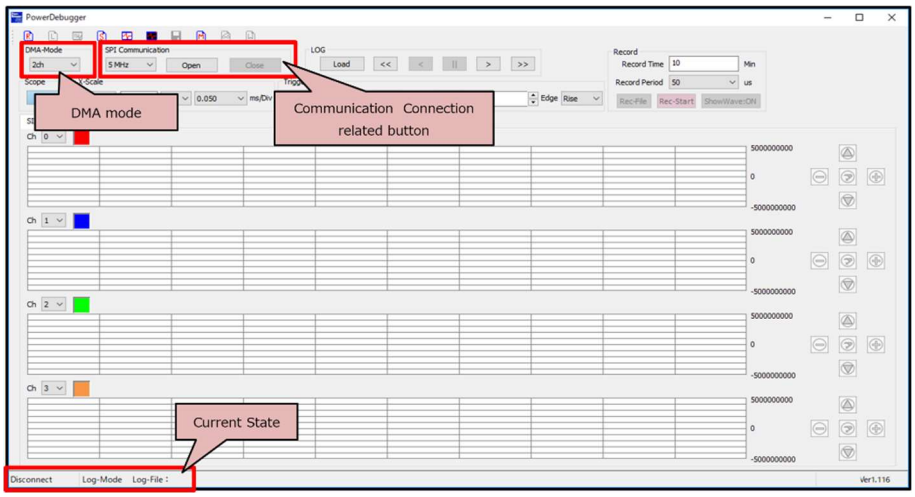



Figure 3.4 Communication connection related button

① Select the DMA mode according to the DMA setting of the Power Debugger library of the microcontroller to be used.If the library and DMA mode settings do not match, it will not operate. The sample software is using 2ch DMA.

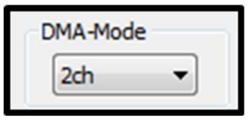



Figure 3.5 DMA mode select

② Set the Synchronous serial communication clock frequency, click the【Open】button. Default startup communication frequency is 5MHz, Status is Disconnect mode and Record Mode.

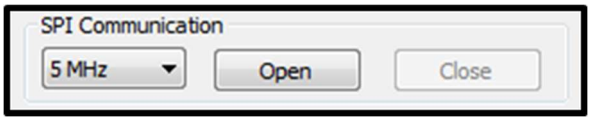



Figure 3.6 Communication connection button (before connection)

③ During normal communication, 【Open】is unavailable. 【Close】is available. Status show Connect、Real Time Mode.

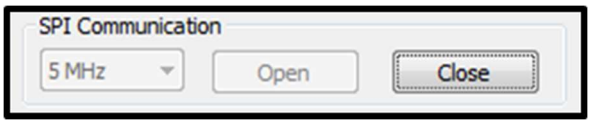



Figure 3.7 Communication connection button (normal communication)

If communication connection cannot be established normally, a warning dialog like the one shown below will be displayed.

■ Communication connection warning dialog (1)

Power Debugger module cannot be detected by computer (Fig 3.8).

Please reconfirm driver installation in Computer and USB cable connection.

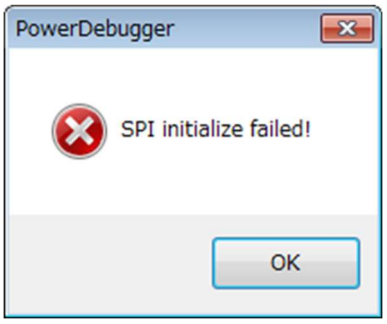



Figure 3.8 Communication connection warning dialog (1)

■ Communication connection warning dialog (2)

Communication connection failed between Power Debugger tool and target board.

Please check wiring signals between target board and Power Debugger communication module and the setting of the microcontroller software serial port setting.

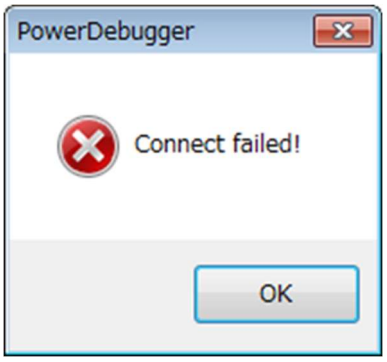



Figure 3.9 Communication connection warning dialog (2)

## 3.3 Channel Setting

Next, set the variable represented by each channel.

① Create a map file (Power debug map file) that include RAM variable name, address and byte number by text editor.

An example of the Map file format is shown below. From the left, the records are divided by TAB in the order of [RAM variable name], [address], and [Byte number].

The extension of the Map file is [****.map].

Extension name of the file must be map.

RAM variable name may be not same as MICOM software and can be Japanese.

For the float type, please record the byte number as [F]. (KM1Mxx series only)

Since the Map file for the Power Debugger is used as an auxiliary function, a Map file for the Power Debugger can be created from the Map file output according to the Debug Factory Builder 5/IAR EWARM.For details, please refer to 3.8 Others Function.

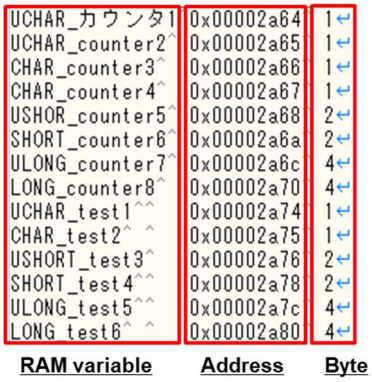



Figure 3.10 Power debug map file

② Click【Channel Setting】to open Channel Setting window(Figure 3.12).

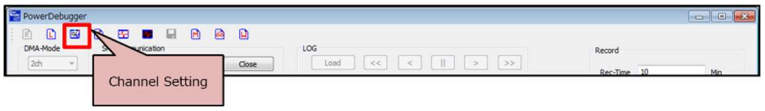



Figure 3.11 Channel Setting

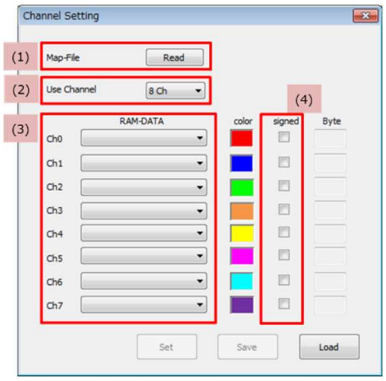



Figure 3.12 Channel Setting(Before setting)

③ Set the RAM variable that you want to display on each channel by the following procedure.

(1) Click Map-File【Read】to choose power debug map file (****.map) that created in ①.
When it is read normally, Map file name is displayed.
If you select a file with a different format or extension, a warning dialog will pop up.

(2) Set display channel number. 1Ch、2Ch、4Ch、8Ch can be choose.

(3) Use dropdown button to choose RAM variable of each channel.
The options in dropdown list are RAM variables listed in map file.
Byte column shows byte number that recorded in map file.

(4) Depending on the type of RAM variable, if there is a sign, please select the check box.

④ After setting the RAM variable, click the【Set】button to send the setting to the microcontroller.
Setting information of each channel can be saved in a file:
To save, click the【Save】button. Please click and attach file name (****. Ini) and save.
Load the setting: Click【Load】, choose (****.ini) that you saved.
In the setting file (****. ini), in addition to the RAM variable setting information of each channel, the scale setting information (Eg X - Scale, Y - Scale, Position, Offset etc) are also recorded together.

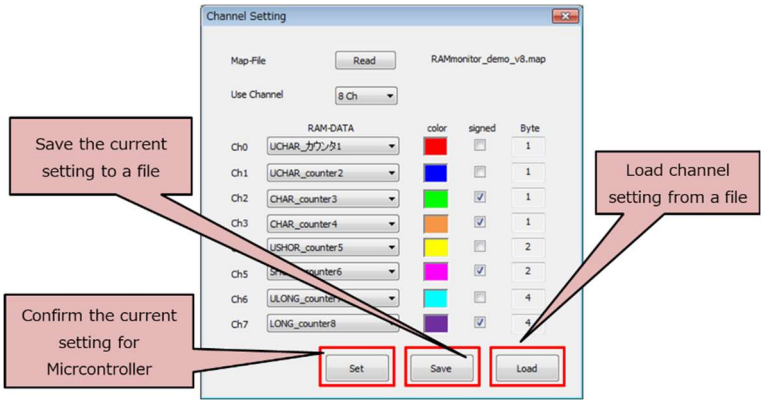



Figure 3.13 Channel Setting(After setting)

## 3.4 Real Time Monitoring Function

Read any RAM data (variable), display real time waveform.

There are two display modes:【SINGLE】waveform display mode and【MULTI】waveform display mode.

### 3.4.1 SINGLE waveform display mode

【SINGLE】: "SINGLE Waveform Display Mode" is a mode in which one channel waveform is displayed on one Waveform display, display for 4 channels is possible on one screen

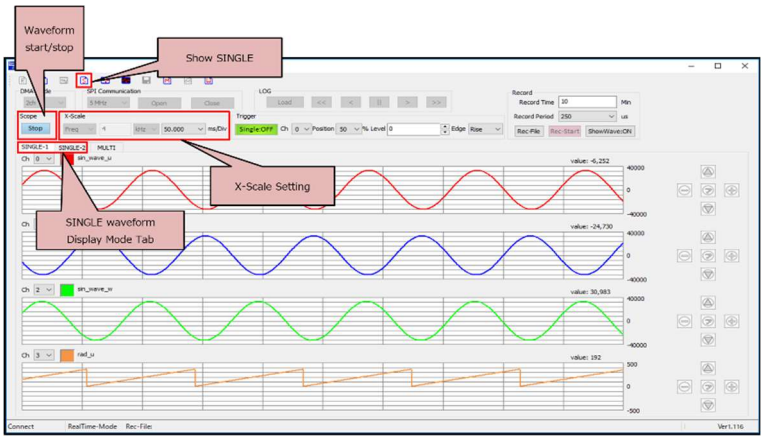



Figure 3.14 SINGLE waveform display mode

Next, the waveform display method will be explained by taking as an example the case where the number of display channels is 8 channels.

① Selection of waveform display mode

Step 1: SINGLE Waveform Display Mode Tab - Click either【SINGLE - 1】or【SINGLE - 2】.

Step 2: Clicking on【SINGLE Waveform Display Mode Different Window Icon】will display another window. 【SINGLE waveform display mode】starts up.

When the number of display channels is 8 channels, channel assignment after startup is as follows.

- 【SINGLE-1】 : Channel 0 – 3
- 【SINGLE-2】 : Channel 4 – 7
- 【Show SINGLE】 : There are no default channel setting

② X-Scale setting

In the X-Scale column, enter the sampling frequency or cycle to be stored in the RAM buffer in the microcontroller. For example, storing the RAM data in the RAM buffer within interrupt processing occurring every 20 kHz in the microcontroller. Thus select input format【Freq】for input 20, select unit as【kHz】. The choice of X-Scale setting (ms / Div) per 1 div is changed according to the input sampling frequency. Select the X - Scale setting you want to display from the pull-down button.


(a) Priod (b) Frequency

Figure 3.15 X-scale

③ Start /Stop waveform display

When you click the Scope【Start】button, the waveform display starts and the button display changes to【Stop】.To stop waveform display, click the【Stop】button. The button display changes to【Start】.

④ Change channel display, color display and waveform display

It is possible to change the channel, display color, and waveform display. Refer to Table 3.1.

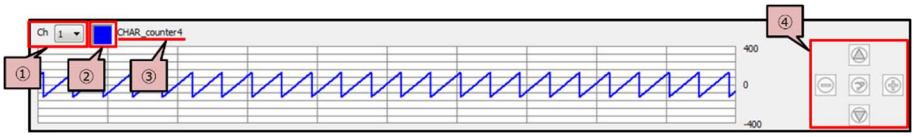



Figure 3.16 SINGLE waveform display

Table 3.1 Adjust waveform display

| No | Contents | Description |
|---|---|---|
| ① | Display channel<br>Pull down button | From the number of channels set by Channel Setting, select the channel number you want to display. |
| ② | Display color | To change the display color, click the display color ②<br>Once the color palette screen opens, change the color required. The changed display color is MULTI waveform display. |
| ③ | RAM variable | RAM variable name that set in Channel Setting |
| ④ | Waveform display adjustment button | The waveform display can be increased, decreased and moved position<br>  Move waveform position up / down<br>  Change Y-Scale<br>  Default setting |
| ⑤ | Display RAM value | Display the value of the RAM data in the waveform display<br>Update the value every 500msec |

### 3.4.2 MULTI display mode

【MULTI display mode】displays waveforms of multiple channels on one screen like an oscilloscope. Simultaneous display of up to 8 channels is possible.

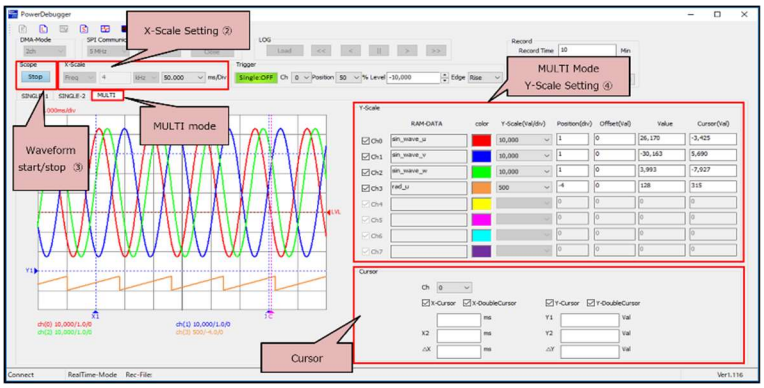



Figure 3.17 MULTI mode

① Selection of waveform display mode

MULTI Waveform display mode tab. Click【MULTI】

② Set X-Scale

The X - Scale setting is the same as in the SINGLE waveform display mode.

③ Start /Stop waveform display

The Start /Stop setting is the same as in the SINGLE waveform display mode.

④ Set Y-Scale

The Y-Scale setting is the same as in the SINGLE waveform display mode.

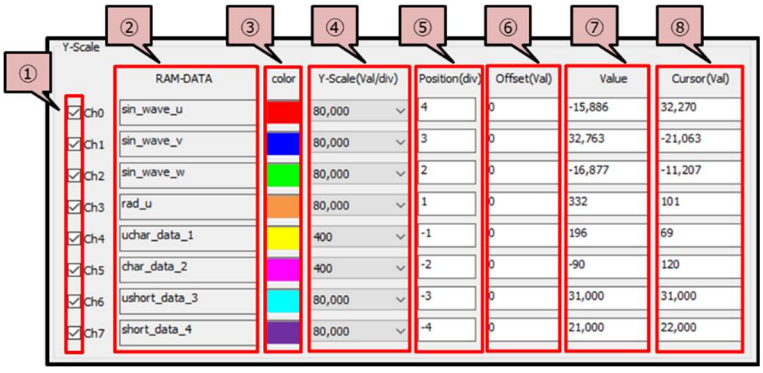
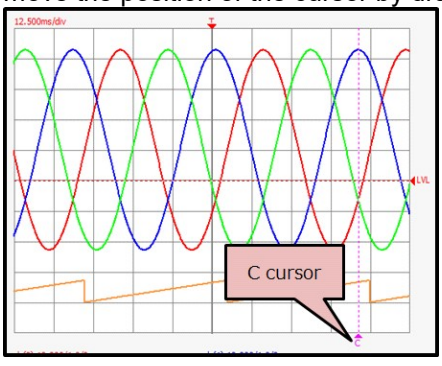



Figure 3.18 Y-Scale setting

Table 3.2 Y-Scale setting

| No | Contents | Description |
|---|---|---|
| ① | Waveform display Checkbox | Check the checkbox, display the waveform<br>Uncheck the chectbox, waveform will not be displayed |
| ② | RAM variable | RAM variable name that set in Channel Setting |
| ③ | Display color | To change the display color, click the display color ③<br>Once the color palette screen opens, change the color required. |
| ④ | Y-Scale setting | Set Y-Scale setting (Val / div) per division per channel.<br>Select from pulldown button<br>The range of Val/div is based on variable byte number.<br>・1Byte：1～400<br>・2Byte：1～80,000<br>・4Byte：1～5,000,000,000<br>Y-Scale default setting is max value |
| ⑤ | Waveform 0 positing setting | Sets the 0 level position of the waveform for each channel.<br>The initial setting is all 0 (center of graph).<br>The input range is -5 to +5, A warning dialog is displayed if value outside the range is entered. |
| ⑥ | Offset setting | RAM variable data offset setting.<br>Default value is 0.<br>The value can be ＋ or －. |
| ⑦ | Display RAM value | Display the value of the RAM data in the waveform display<br>Update the value every 500msec |
| ⑧ | Display cursor value | The value of the RAM data corresponding to the cursor position is displayed when the waveform is stopped. You can move the position of the cursor by dragging the C cursor.<br>  <br>※Cursor operation is not possible when the waveform is displayed in real time. |

⑤ Cursor for measurement

To display the cursor individually for each of the X and Y axis for measurement and display the value. The cursor position can be moved by dragging.

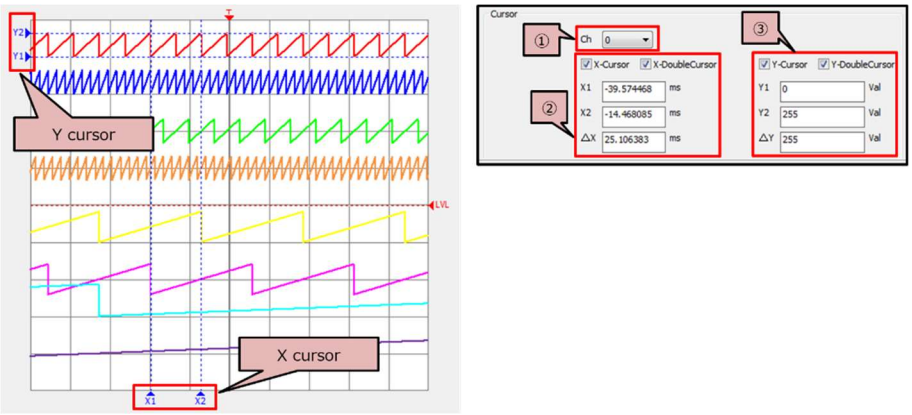



Figure 3.19 Cursor measurement

Table 3.3 Description of cursor measurement

| No | Contents | Description |
|---|---|---|
| ① | Measurement channel setting | Select the channel number to measure from the pull down button. |
| ② | X-cursor setting | ■ X-Cursor selection<br>Check the checkbox, X1、X2 cursor will be display.<br>■ X-Double Cursor selection<br>Check the checkbox, by dragging one of cursors, X1 and X2 cursor will move at the same time. It is available during X-cursor selected only.<br>■ Cursor measurement value<br>X1: X1 cursor position value<br>X2: X2 cursor position value<br>⊿X: The value of X1－X2 |
| ③ | Y-cursor setting | ■ Y-Cursor selection<br>Check the checkbox, Y1、Y2 cursor will be display.<br>■ Y-Double Cursor selection<br>Check the checkbox, by dragging one of cursors, Y1 and Y2 cursor will move at the same time. It is available during Y-cursor selected only.<br>■ Cursor measurement value<br>Y1: Y1 cursor position value<br>Y2: Y2 cursor position value<br>⊿Y: The value of Y1－Y2 |

## 3.5 Trigger function

Power Debugger has a single trigger function.

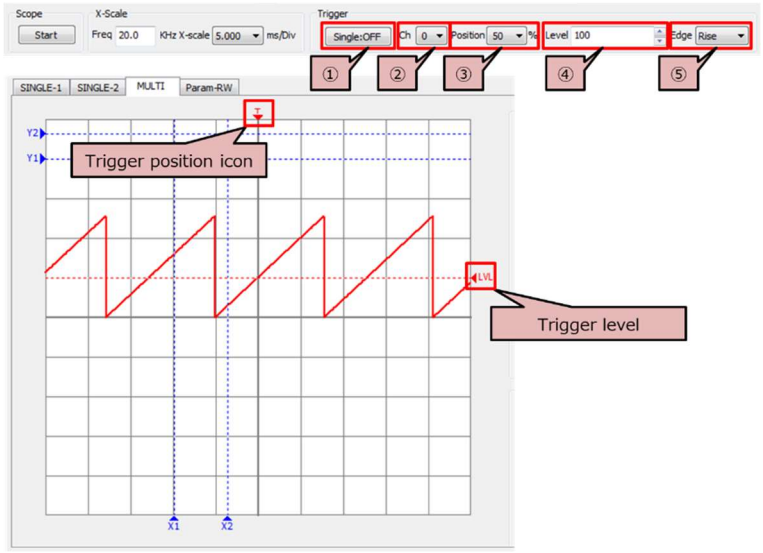



Figure 3.20 Trigger function (Single)

Table 3.4 Trigger function Setting

| No | Contents | Description |
|---|---|---|
| ① | Single trigger button | Trigger function Enable / Disable<br>・【Single: OFF】： Trigger disable<br>・【Single: ON】： Trigger enable |
| ② | Trigger source<br>Channel settings | Select the channel to trigger. |
| ③ | Trigger position setting | Select the position where the trigger is applied.<br>Default setting: 50%<br>Setting range: 0%～100%, 10% per step.<br>Also, the trigger position display mark is displayed on the graph. |
| ④ | Trigger level setting | Select the level where the trigger is applied.<br>Default setting: 0<br>Input the trigger level directly or move the trigger level icon by dragging it |
| ⑤ | Trigger edge setting | Select the edge to be triggered.<br>・Rising Edge<br>・Falling Edge<br>・Both |

Procedure for triggering:

① Set trigger conditions (trigger channel, trigger start position, trigger level, and trigger edge).

② Click Single trigger button until the display shows [Single: ON].

③ If the waveform is not displayed, click the Scope [Start] button to display the waveform.

④ If the trigger condition is met, waveform display will stop.

After trigger and waveform stop, the scope will show [Stop] and Trigger will show 【Single: OFF】.

Click Single Trigger button to show【Single: ON】to enable trigger.

Click again to show【Single: OFF】to disable trigger.

## 3.6 Record/Replay function

Displayed RAM variable data can be saved to a file in csv format.

Power Debugger can also read the csv format file and display it.

### 3.6.1 Creating Record File

This section explains related settings of recording function.

Recording is effective only when the status display【RealTime-Mode】only. It is disable in【Log-Mode】.

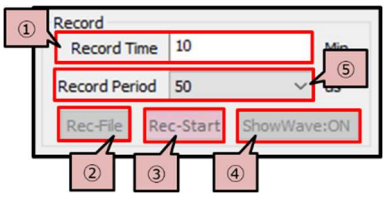



Figure 3.21 Recording related button

Table 3.5 Descriptions of recording related buttons

| No | Items | Description |
|---|---|---|
| ① | Recording time setting | Input recordinging time.<br>Default setting: 10 min<br>The input data range: 1 min – no limit; Step:1;<br>Data range of 0 and number with decimal point are not acceptable and a warning dialog will be displayed. |
| ② | Recording file name setting | Set recording file name and folder that will save in.<br>After setting, the file name and save folder is shown in state part that at the window's bottom. |
| ③ | Record start | Click【Rec-Start】button to start the recording.<br>The button is disable if record file name is not set or waveform display is not started（Scope-【Start】） |
| ④ | Show waveform On/Off | Show / Hide the waveform display during the recording progress. |
| ⑤ | Set the recording period | Set the logging period of the log file.<br>The initial value is the period value set by the Period of the X-Scale.<br>The waveform is updated by the period value set by the X-Scale's Period and stored in the log file by the selected period. |

Procedure to save (record):

① In Record-【Rec Time】window, set recording time.

② Click【Rec-File】button to set the save destination and record file name.

③ Click【Rec-Start】button to start record. The button display changes to【Rec-Stop】.

④ When the set recording time elapses, the recording will stop and the display button change to【Rec-Start】.

⑤ Record file was saved in set destination folder.
Record file is fix to certain size. If recorded data file size is over, a new file is created with numbers added to the end of the file name.
(Example：Log_file.csv、Log_file(1).csv、Log_file(2).csv・・・・)

⑥ If【Rec-Stop】button is click during recording, the recording stops and save， the display button will show【Rec-Start】.

If the CPU performance of the PC being used is low, RAM data might be loss if display waveform and recording is performed at the same time. Set【ShowWave: OFF】to turn off waveform display to prevent losing of the RAM data.

(Note)
Recording will stop If trigger function is use.
Do not use trigger function during recording.

The size of the record file to be saved depends on the setting of the sampling frequency and the storage time in the microcontroller. When recording data for a long time, please be careful of the storage capacity of the personal computer.
As a reference, the following table shows examples of record file size with channel number, sampling rate and record time.

Example of record file size with channel number, sampling rate and record time for reference as following.

■ Store data：LONG type (4Byte) data、8 channel

| Sampling Frequency(kHz) | Log File Record Time | Log file storage cycle | File Size |
|---|---|---|---|
| 4 kHz (250 us) | 1 min | 250 us | About 22.1 MB (3 files) |
| | 1 min | 1000 us | About 5.52 MB (1 file) |

### 3.6.2 Log File Playback

Log file play in【Log-Mode】 only.

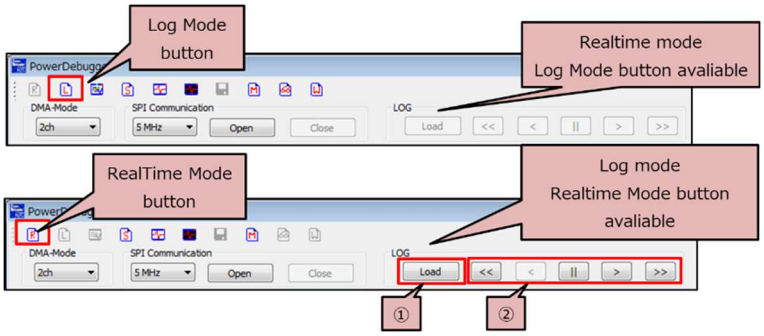



Figure 3.22 Buttons for Log File play

Table 3.6 Buttons for Log file play

| No | Contents | Description |
|---|---|---|
| ① | Log file Load | Click【Load】, choose log file that will be played.<br>If choose wrong file format, show warning.<br>Loaded log file name and from the folder name are shown at bottom of the Power Debugger window. |
| ② | Log file play | << Slow play<br>< Play back (Cannot used now)<br>\|\| Pause<br>> Play<br>>> Fast play |

Log file play steps:

① 【Log-Mode】setting: Click 【Log-Mode】, change to log mode.
(If change back RealTime mode. click【RealTime-Mode】.)

② Click【Load】 in log mode to choose log file that will play.
(The sub log file can be chosen too)

③ Click Scope - 【Start】.

④ Click【>】 to play waveform.

⑤ During play, click【>>】, 【<<】 to change play speed.
*When the log file's recording period is set to a value other than the X-Scale sampling period, the log file will not be generated correctly.

## 3.7 RAM Watch

Any RAM variable can be read or write. The max number of RAM variable channel is 24.

The read cycle can be set.

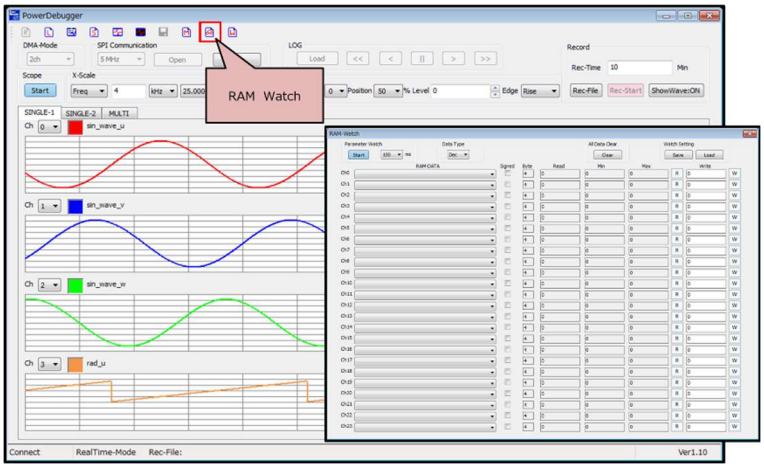



Figure 3.23 RAM Watch window

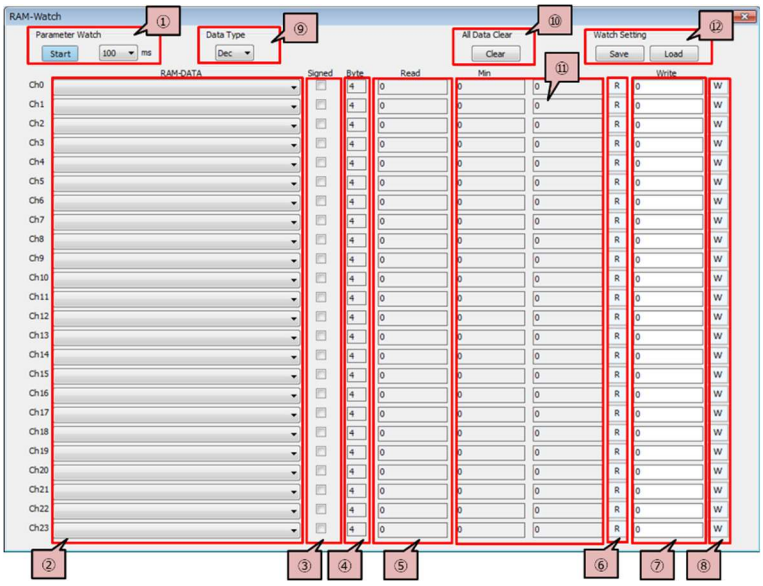



Figure 3.24 RAM Watch setting

Table 3.7 RAM Watch function setting

| No | Contents | Description |
|---|---|---|
| ① | RAM-Watch button | Read RAM variable data in regular cycle.<br>【Start】：Start reading<br>【Stop】：Stop reading<br>【regular cycle】：100ms,200ms,500ms,1000ms can be choose |
| ② | Choose RAM variable button | Scroll down to select RAM variable in each channel.<br>The variables are listed in power debug map file. |
| ③ | Byte | Show byte number of display RAM variable. |
| ④ | Signed | For signed variable, signed box **must** be tick. |
| ⑤ | Read | The data read out with DEC or HEC. |
| ⑥ | Read data button | Start to read the RAM variable data once. |
| ⑦ | Write | The data was wrote with DEC or HEC |
| ⑧ | Write data button | Write data in ⑦. |
| ⑨ | Data Type button | Choose read/write data type<br>【Dec】 : Show data in Decimal<br>【Hex】 : Show data in Hexadecimal |
| ⑩ | All Data Clear button | Set data to 0 for all R/W data and Min/Max data in all channels. |
| ⑪ | Max, Min | Max/ Min read data show by DEC or HEX. |
| ⑫ | Watch Setting<br>Save/ Load buttons | Save / Load all channels RAM variable setting.<br>【Save】：Save the setting file (***.wat).<br>【Load】：Load the setting file (***.wat). |

RAM Watch steps:

① Read power debug Map file

Click【Channel Setting】to open Channel Setting window.

Click Map-File -【Read】 to choose map file.

After the map file show at the bottom of PowerDenugger window, click【X】on Channel Setting window to close it.

② Click【RAM-Watch】to open RAM-Watch window.

③ Set RAM variable

Scroll down button in each channel to choose RAM variable.

Check the variable byte number.

Set the variable sign.

④ Start /Stop RAM Watch

Choose read data cycle by【regular cycle】.

Click【Start】 button to start data read and the button becomes【Stop】.

Read column show read data. Max / Min data the read was shown in Max /Min column.

Click【Stop】button to stop the reading and bottom becomes【Start】.

⑤ Write RAM variable

In regular cycle, new data can be written to RAM variable.

The data should be written to write column by DEC or HEX.

Click【W】to confirm.

⑥ Read / Write data of each channel.

During RAM Watch stop, RAM Watch can be read/ wrote by click【R】/【W】.

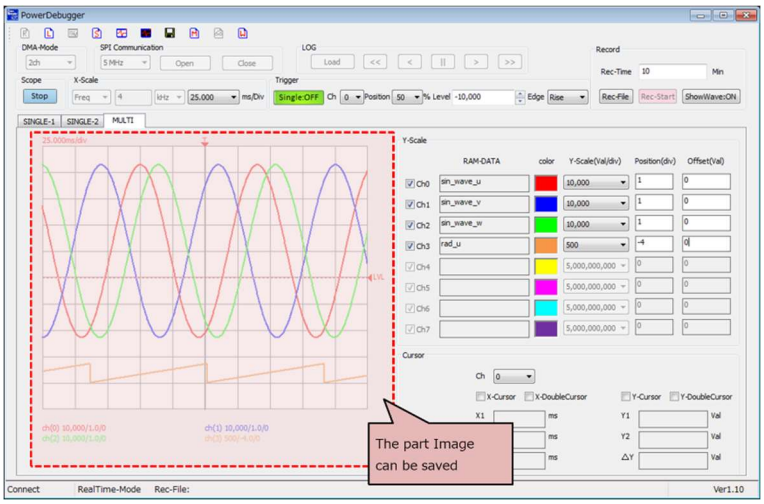
*During display SINGLE mode and MULTI mode,【RAM-Watch】 is disable.

During RAM- Watch on, SINGLE mode and MULTI mode are disable.

## 3.8 Other Function


Figure 3.25 Other Function

Table 3.8 Other Function

| No | Contents | Description |
|---|---|---|
| ① | White background | Set white color background for waveform display. |
| ② | Black background | Set black color background for waveform display. |
| ③ | Save | During MULTI mode, click【Save】waveform can be save to a picture (*.bmp).<br>【Save】 is enable in MULTI mode only, it is disable in SINGLE mode.<br>Save area is as following.<br>  |

■Create power debug map file

Based on DebugFactory5 map file, Power Debugger can create a Power Debugger/IAR EWARM map file. The creation steps are:

① Click 【Map file】to open Create Map File window


Figure 3.26 power debug Map file create

② Click【Sel... 】to select map file.

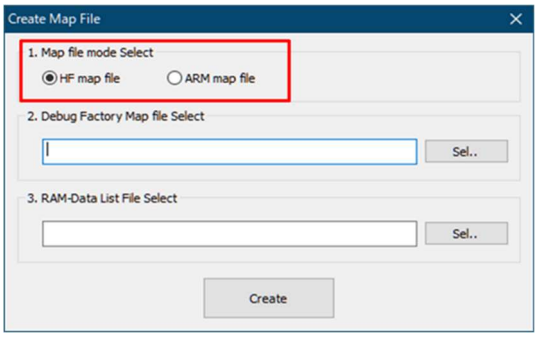



Figure 3.27 Select Map file

③ RAM variables list file

The list file format as the following.

From left side, the sequence is 【RAM variable】、【Number of Byte】、【Number of Array Element】 and split with【TAB】. The list file name is【****.list】.

If use Power Debugger create map file, RAM variable name must be same as MICOM program.

After the map file created, the variable's name can be change.

For the float type, write [F] in the byte column. (KM1Mxx series only)


Figure 3.28 RAM variable list file

④ Click【Sel... 】to Select the RAM variable list file generated during compilation.

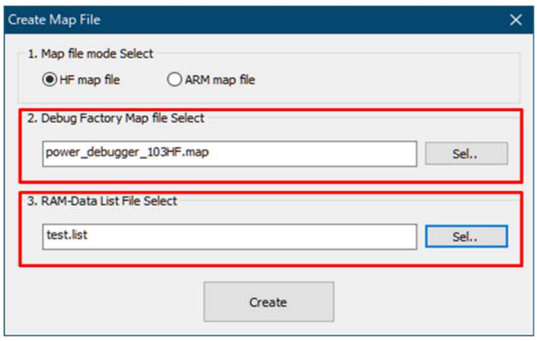



Figure 3.29 Select Map file and RAM variable list file

⑤ Click【Create】to create Power Debugger Map file.

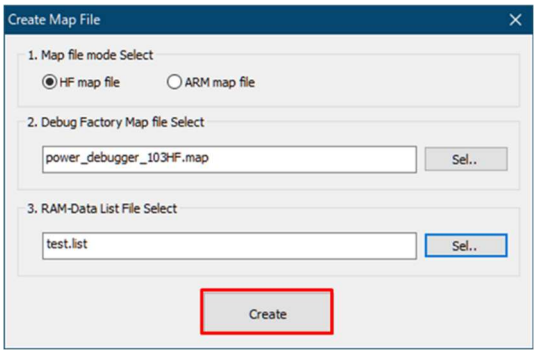



Figure 3.30 Creat Power Debugger Map file

*If Debug Factory Map file Select or RAM-Data List File select not correct, after click【Create】, show warning.

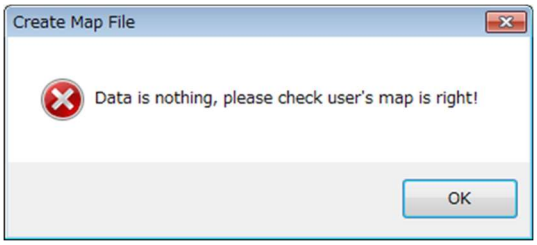



Figure 3.31 Warning

*For static variable, set link option in Debug Factory Builder, a simple MAP file can be got.

■Input Disturbances

Input disturbance function can change any RAM variable during real time display.

Input Disturbances steps are:

① Click 【Input Disturbances】 to open Input Disturb window.


Figure 3.32 Input Disturbances

② RAM variable setting

Scroll down to choose RAM variable that will be changed.

Check the number of byte and tick signed if the variable is signed.

*Before open Input Disturb window, please make sure power debug map file was read by Channel Setting.

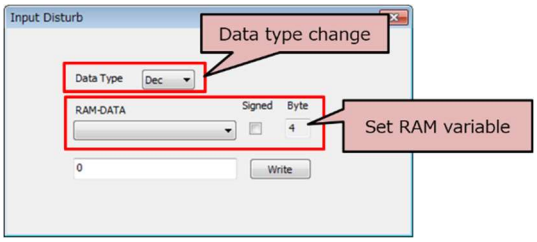



Figure 3.33 Set RAM Variable

③ Write RAM variable

Input data which will be changed (DEC or HEX depend on data type setting). Click【Write】to change data of RAM variable that set in ②.

One variable can be changed in one time.

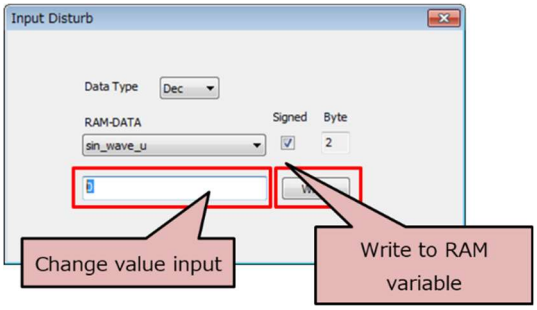



Figure 3.34 Write RAM variable

※ The disturbance cannot be effective, if the waveform which is not displayed by realtime monitor function. Please enable the waveform display, before using disturbance function.

■Log file format

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ①Map file path, file name→ | MapFile | C:¥Users¥Desktop¥powerdebugger¥Map_File¥sample_103HF_v1.08.map | | | | | | | |
| ②Ch count→ | UseChannel | 8 | | | | | | | |
| | RamData | Color | Signed | Byte | | | | | |
| ③Ch setting information→ | sin_wave_u | 255 | 1 | 2 | | | | | |
| ・RAM variable name | sin_wave_v | 16711680 | 1 | 2 | | | | | |
| ・color information | sin_wave_w | 65280 | 1 | 2 | | | | | |
| ・signed or unsigned | rad_u | 4626167 | 1 | 2 | | | | | |
| ・Byte count | uchar_data_1 | 65535 | 0 | 1 | | | | | |
| | char_data_2 | 16711935 | 1 | 1 | | | | | |
| | ushort_data_3 | 16776960 | 0 | 2 | | | | | |
| | short_data_4 | 10498160 | 1 | 2 | | | | | |
| ④Sample Period→ | Period | 125 | usec | | | | | | |
| ⑤Record start time→ | RecTime | ######### | | | | | | | |
| | X-Scale Setting: | | | | | | | | |
| ⑥X-Scale Setting→ | 0 | 8 | 0 | 7 | | | | | |
| | Single Setting | | | | | | | | |
| ⑦Single Setting Y-Scale Setting→ | 0 | 100000 | 0 | -100000 | 0 | 0 | | | |
| | 1 | 100000 | 0 | -100000 | 0 | 0 | | | |
| | 2 | 100000 | 0 | -100000 | 0 | 0 | | | |
| | 3 | 100000 | 0 | -100000 | 0 | 0 | | | |
| | 4 | 400 | 0 | -400 | 0 | 0 | | | |
| | 5 | 400 | 0 | -400 | 0 | 0 | | | |
| | 6 | 100000 | 0 | -100000 | 0 | 0 | | | |
| | 7 | 100000 | 0 | -100000 | 0 | 0 | | | |
| | Multi Setting | | | | | | | | |
| ⑧MULTI display Y-Scale Setting→ | 1 | 1 | 24 | 0 | 0 | | | | |
| | 1 | 1 | 24 | 0 | 0 | | | | |
| | 1 | 1 | 24 | 0 | 0 | | | | |
| | 1 | 1 | 24 | 0 | 0 | | | | |
| | 1 | 1 | 12 | 0 | 0 | | | | |
| | 1 | 1 | 12 | 0 | 0 | | | | |
| | 1 | 1 | 24 | 0 | 0 | | | | |
| | 1 | 1 | 24 | 0 | 0 | | | | |
| | Time | Ch0 | Ch1 | Ch2 | Ch3 | Ch4 | Ch5 | Ch6 | Ch7 |
| | 0 | 10126 | -32052 | 21926 | 163 | 131 | 0 | 59000 | 25000 |
| | 125 | 9580 | -31928 | 22348 | 164 | 132 | -10 | 59500 | 24000 |
| | 250 | 9032 | -31795 | 22763 | 165 | 133 | -20 | 60000 | 23000 |
| | 375 | 8481 | -31651 | 23170 | 166 | 134 | -30 | 60500 | 22000 |
| | 500 | 7927 | -31499 | 23571 | 167 | 135 | -40 | 61000 | 21000 |
| | 625 | 7371 | -31336 | 23965 | 168 | 136 | -50 | 61500 | 20000 |
| | 750 | 6813 | -31164 | 24351 | 169 | 137 | -60 | 62000 | 19000 |
| | 875 | 6252 | -30983 | 24730 | 170 | 138 | -70 | 62500 | 18000 |
| | 1000 | 5690 | -30792 | 25102 | 171 | 139 | -80 | 63000 | 17000 |
| | 1125 | 5126 | -30592 | 25466 | 172 | 140 | -90 | 63500 | 16000 |
| | 1250 | 4560 | -30382 | 25822 | 173 | 141 | -100 | 64000 | 15000 |
| | 1375 | 3993 | -30163 | 26170 | 174 | 142 | -110 | 0 | 14000 |
| | 1500 | 3425 | -29935 | 26510 | 175 | 143 | -120 | 500 | 13000 |

# Revision History

| Date | Revision | Description |
|---|---|---|
| 2022.06.17 | 1.8 | Document format change |
| | | |
| | | |

## Inquiries

If you have questions regarding technical information on this manual, please visit the following URL.

Nuvoton Technology Corporation Japan

URL: https://www.nuvoton.co.jp/en/contact/

- Microcontroller Home Page
  https://www.nuvoton.com/



# Power Debugger PCtool User Manual

Rev1.8 / June 17th, 2022

Issued by

Nuvoton Technology Corporation Japan

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