

# **Low power long range radio modem SLR-434M Evaluation Program Manual**

Version 1.1 (Jun 2022)

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**CIRCUIT DESIGN, INC.,**

7557-1 Hotaka, Azumino-city  
Nagano 399-8303 JAPAN  
Tel: + +81-(0)263-82-1024  
Fax: + +81-(0)263-82-1016

e-mail: [info@circuitdesign.jp](mailto:info@circuitdesign.jp)  
<https://www.circuitdesign.jp>

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## 1. INTRODUCING THE EVALUATION PROGRAM

### 1.1 Summary

The SLR-434M evaluation program allows you to test and evaluate the functions of the SLR-434M module. The control and test window allow you to issue commands and use air monitor as well as individually test each function.

It is possible to confirm the LED response according to the ON/OFF signal applied to the input and output ports on the SLR-434M.

It is possible to use air monitor feature when incorporating wireless into your system during product development so you can optimize radio performance, as well as prepare graphical reports during field tests. For various tests, you can confirm RF parameters such as RSSI level of installed equipment as well as packet reception rate using your own PC.

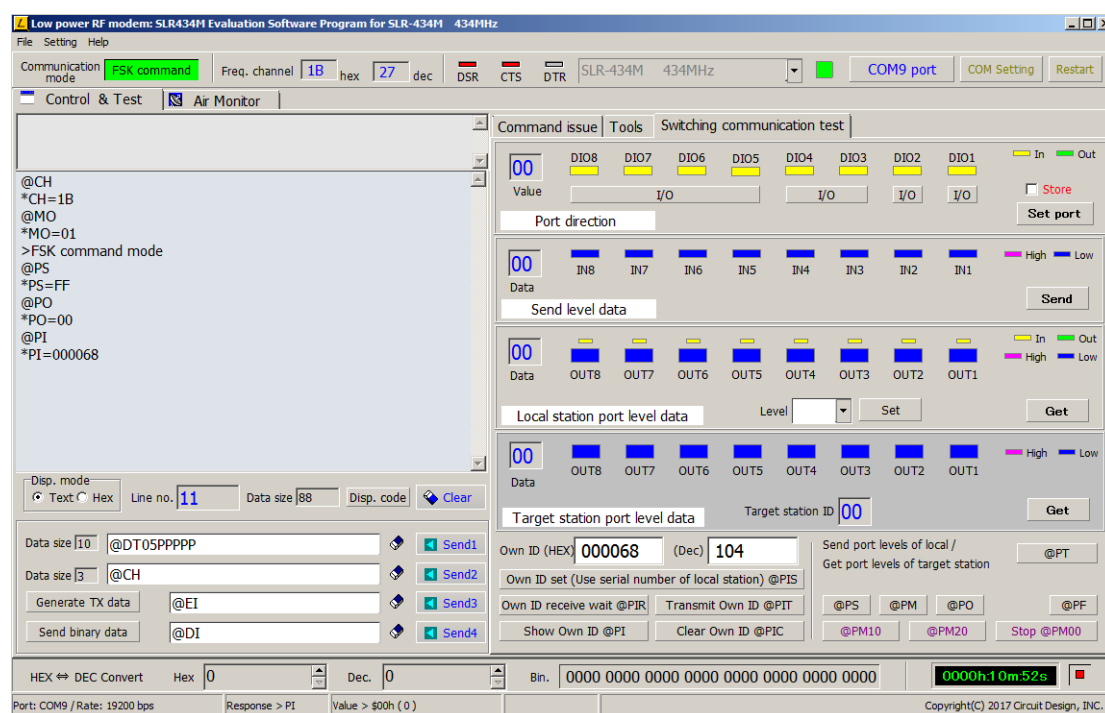
*Warning: This program cannot be evaluated with equipment other than products in the SLR series.*

### 1.2 Name, Product no

Name: Low Power RF modem SLR-434M Software Evaluation Program  
Product no. SLR-434M-ESP

### 1.3 Operating Window / requirements

Operating system: Windows XP, Windows 7-10  
Recommended CPU speed: 400 MHz or more  
Recommended display: XGA (1024 x 768) or more  
Hard disk space: 5 MB  
Navigation: Mouse  
Interface: COM port, 19200 bps



## 1.4 Function summary

This program contains the following interface.



Ensure you understand the SLR-434M functions by reading the manual before using this program.

- Control and test window

In the control and test window, you can view the response when you issue commands corresponding to the SLR-434M.

By using the command mode and binary mode for SLR-434M, you can confirm operation and testing. Also you can save values for basic operating parameters of the SLR-434M to the EEPROM.

In the various test windows, you can confirm the equipment field parameters and packet reception rate as well as the internal setting values and information about switching communication tests.

- Command issue window
- Tools window
- Switching communication test window

- Air monitor window

Using the RSSI level information obtained from the SLR-434M, you can monitor RF parameters by using graphs.

In air monitor, you can constantly view RF changes by viewing in frequency domain or time domain.

- Always view received level
- Write measured data to file and be able to read them from file
- Be able to print measured result
- Can save measurement result as image data such as JPEG, enhanced meta file etc. to help prepare field test reports.
- Analyse by scrolling and zooming on measurement data.
- Customise graph colour and display in 3D.

### 1. Monitor using frequency domain

- View and measure RSSI level for each channel, monitor RF parameters in the field.
- For each channel, peak level hold available while measuring.

### 2. Monitor using time domain

The electric field strength (signal level and noise floor) of the current channel can be monitored in realtime. Use of this function can determine the radio installation and antenna positions.

- Perform continuous measurement or one-shot measurement.
- Measuring while moving transmitter can determine optimum receiving level and distance.

- Image viewer

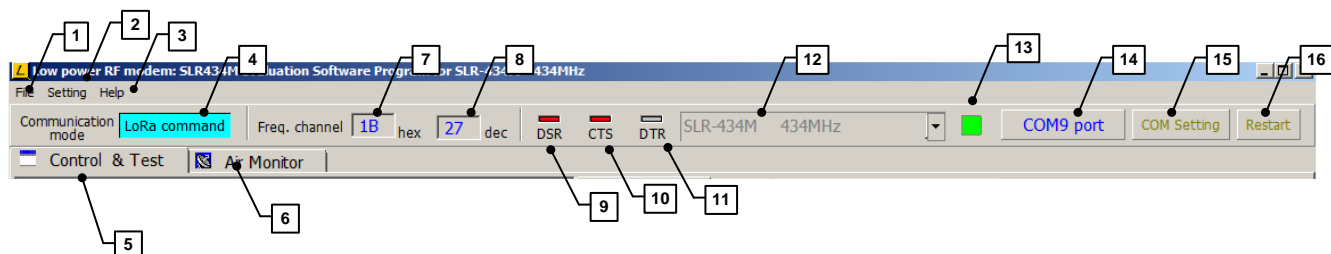
Files created by air monitor can be read and displayed. The image can be copied onto clipboard and copied to other applications.



## 2. METHOD OF OPERATION

### 2.1 Basic operation and display information

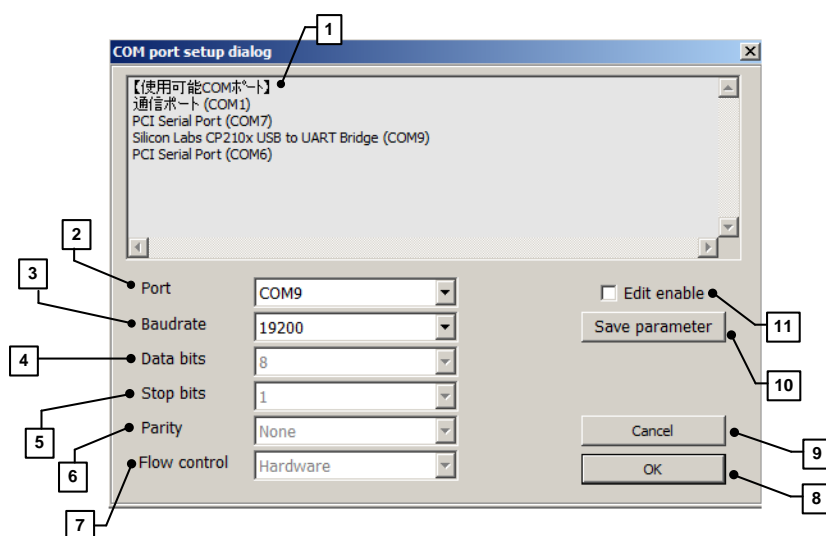
#### 2.1.1 COM Port operation and status



- ① File menu
  - Image viewer start
  - Close program
- ② Setting menu
  - COM port setting
  - Option panel menu
- ③ Help menu
  - Version info
- ④ Communication mode
  - There are 4 modes for communication – here displays current mode.
- ⑤ Control & Test window tab
- ⑥ Air monitor window tab
- ⑦ Frequency channel: Hex
- ⑧ Frequency channel: Dec
- ⑨ DSR            COM port DSR signal status            Red = High level
- ⑩ CTS            COM port CTS signal status            Red = High level
- ⑪ DTR            COM port DTR signal status            Red = High level
- ⑫ Model selection menu
  - Connects to selected model
- ⑬ COM port status monitor
  - When connected, indicator is green
- ⑭ COM port connect button
  - Will connect using the currently displayed port no.
- ⑮ COM setting button
  - COM port selection and parameter setting
- ⑯ Restart button
  - Re-attempt to connect when COM port communication fails

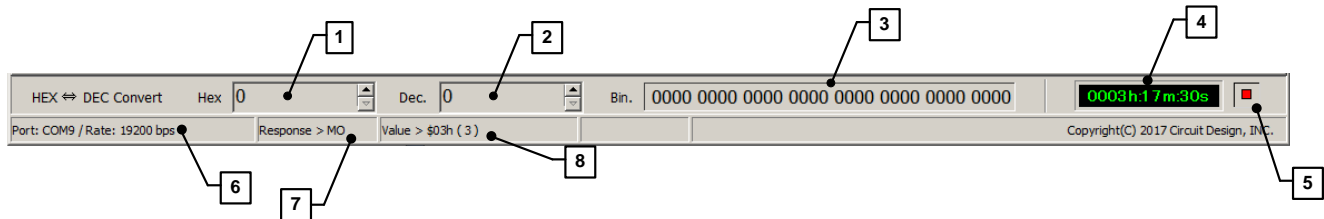
## 2.1.2 COM Port setup

When you push the COM Setting button, the below screen appears:



- ① Available COM port list
  - The COM ports available for you to use on current PC. Decide the port and select using ②
- ② Port
  - Select the COM port you are going to use.
- ③ Baudrate
  - Select the appropriate baud rate. The baud rate for SLR-434M is fixed at 19200bps.
- ④ Data bits
  - Select the appropriate data bit length. Initial value is 8 bits.
- ⑤ Stop bits
  - Select the appropriate stop bit length. Initial value is 1 bit.
- ⑥ Parity
  - Select the appropriate parity. Initial value is no parity.
- ⑦ Flow control
  - Set the flow control. Initialised to "Hardware" flow
- ⑧ OK button
  - Executes settings
- ⑨ Cancel button
  - Cancel the settings
- ⑩ Save parameter
  - Saves the setting parameters. Will load these parameters when COM Setting dialog box is opened again.
- ⑪ Edit enable checkbox
  - To enable settings to be changed, please check this box.

### 2.1.3 Hexadecimal and decimal conversion area, parameter status, counter



#### ① – ③ Hexadecimal and Decimal convert

It is possible to convert Hex (16) and Dec(10). The maximum range is 0h – FFFFFFFh for Hex and 0 – 268435455 for Decimal. To set value, double click in the value area and input the value. For binary, it is not possible to input value.

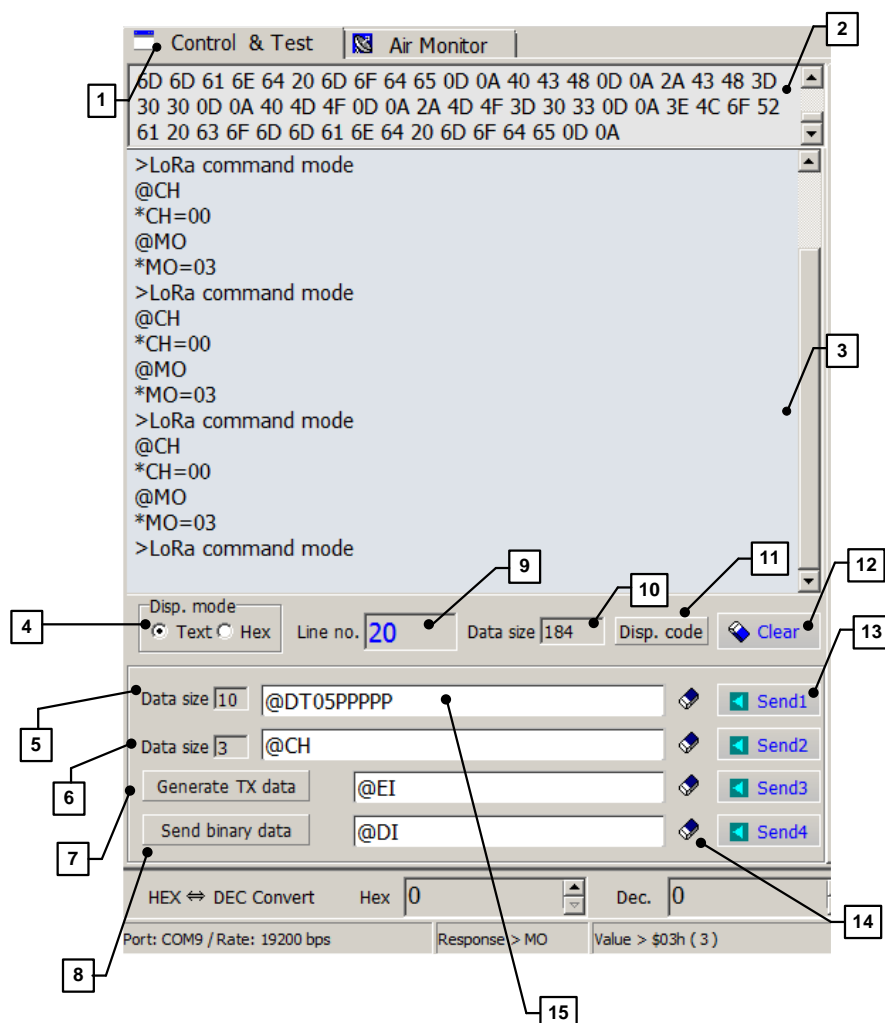
- ① Hex input
  - Input Hex value and converted value displays.
- ② Decimal input
  - Input Dec value and converted value displays.
- ③ Binary display
  - The binary equivalent of the input value displays.
- ④ Elapsed time counter
  - Start/stop by right clicking
- ⑤ Start/stop button

## 2.2 Control and test window

You can perform the following actions in the control and test window.

1. View command issued and confirm the corresponding response.
2. Write parameter to EEPROM.
3. Packet reception rate test

### 2.2.1 Control and test window



- ① Control and test window
- ② Code Hex window
  - Displays in Hex the content that is on the screen. By pushing “Disp. code” button ⑪, this Hex content is displayed above the screen. (no. of displayable characters is limited)
- ③ Screen
  - Displays commands and responses. Also displays received data.  
By right clicking on the screen area displays option menu.  
It is possible to select text and copy it to the clipboard however it is not possible to edit the command or response string, nor can you print or save.
- ④ Display mode
  - Change the screen display mode.

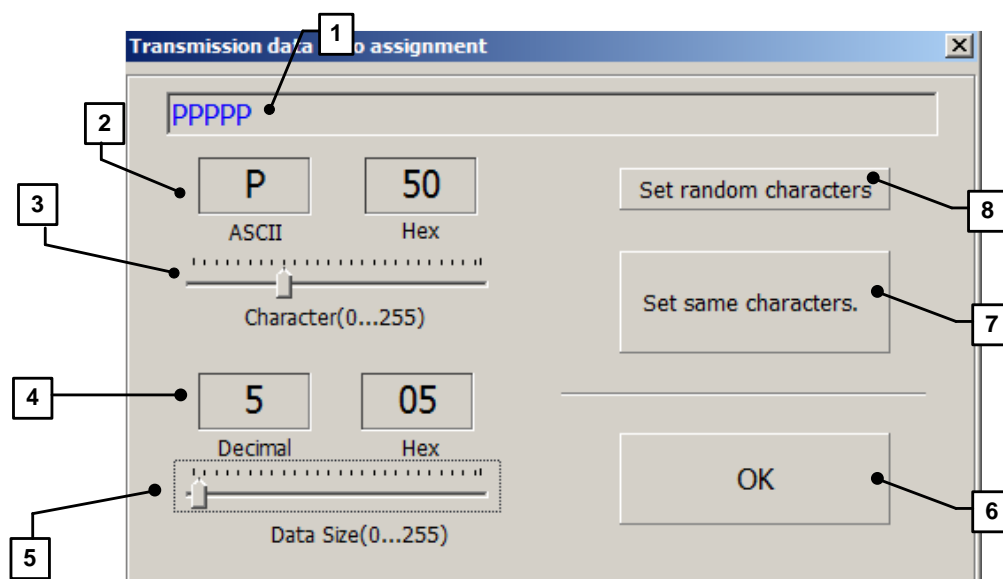
- ⑤ Data size
  - Data size on input line 1.
- ⑥ Data size
  - Data size on input line 2.
- ⑦ Form to generate TX data automatically
  - Generate TX data automatically and display it in line 1.
- ⑧ Form to send binary data
  - You can include the code for ESC key that cannot normally be sent in the usual programs in the binary data and send it.
- ⑨ Line no.
  - Line number on the screen.  
For data forwarding test, clear the entire screen and prepare to receive data packet. When data packet is received from the transmitter side, this line number will change. You can count the number of lines and compare number of times of transmitted packet to received packets, therefore you can calculate data reception rate.
- ⑩ Data size
  - The amount of data displayed on the screen.
- ⑪ Display code
  - Allows the data in the screen to be displayed as Hex code in ②. There is a limit on the code displayed.
- ⑫ Clear button
  - Clears the screen. Pressing F7 will also clear the screen.
- ⑬ TX button 1 -4
  - Command etc. in data input line 1-4 will be transmitted.
- ⑭ Erase button 1-4
  - Clears data input line 1-4 of any data.
- ⑮ Data input line 1-4
  - During command mode  
After inputting command, pressing Send will send the data. Pressing the ENTER key will also send the data. You can clear the line by double clicking with the mouse.
  - When using the form ⑦ to generate TX data automatically, the result will be added to data input line 1.
  - The buttons in the command issue window that generate the command string will be inserted into line input 2.
  - During binary mode  
For the data in each of the data input lines, press send button or ENTER key. The data should be 255 bytes or less.

\* When converting from binary mode to command mode, apply low level signal to the IN1 terminal of the SLR-434M for 3 seconds or more. If LoRa, it will go to LoRa command mode and if FSK, it will go to FSK command mode.

· When issuing commands

When using command for forwarding data, it is necessary to include "@DT" and the data size. When using the automatic TX generator, the "@DT" command structure is automatically created for you.

## 2.2.2 TX data generator window



## ① TX data display

- Character string to be sent using transmit command.

## ② Character

- Displays character / Hex code to be sent using transmit command.

## ③ Select character

- Select character for transmission between values of 0-255. Control codes cannot be displayed. To send control codes, set screen mode to Hex in the program being used at the target station and confirm reception.

## ④ Display data size

- Displays data size in Decimal and Hex.

## ⑤ Data size

- Determines the data size. Range is 0 – 255 bytes.

## ⑥ OK button

- Fixes the character string to be sent and inserts it into input line 1.

## ⑦ Set character (repeatedly)

- Inserts the highlighted character chosen in ③ repeatedly for a number of times according to ⑤.

## ⑧ Set random characters

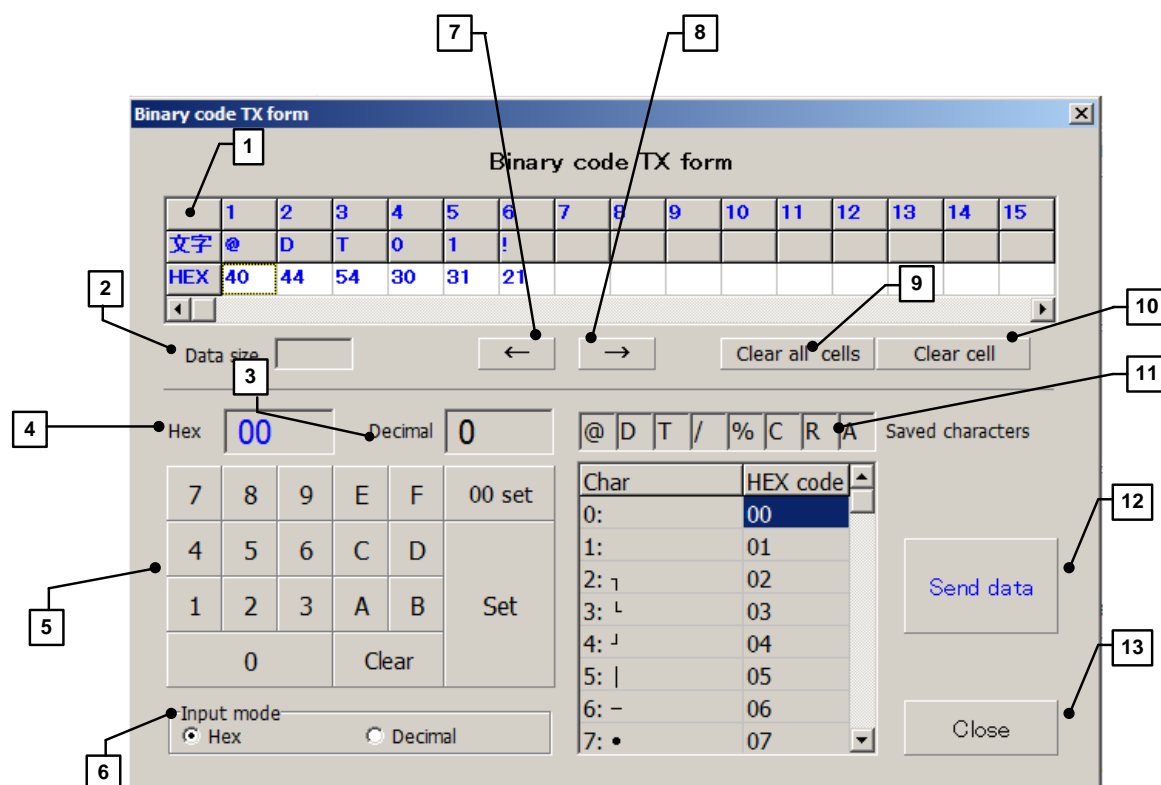
- Inserts random characters repeatedly for a number of times according to ⑤.

## 2.2.3 Send binary data window

Normally it is not possible to directly send binary code (00h – FFh Hex) in standard programs. By using this form it is possible to include binary data for control codes within the transmit command for the SLR-434M and transmit them.

You can also use commands other than transmit so you can refer to these when you are making the control program for the SLR-434M.

To see the transmissions, please use the control and test window.



## ① TX data cell

- TX data is generated in each cell. During command mode, any data string that does not form any of the commands used exclusively by the SLR-434M will result in error. When you press “send data button”, it will transmit the data generated in the cells.

## ② Data size

- The data size produced in ① is displayed.

## ③ Decimal:

- The generated data byte value displayed in Decimal.

## ④ Hex:

- The generated data byte value displayed in Hex.

## ⑤ Hex entry panel

- To input data byte value into ①.

⑥ Input mode

- Changes the input mode for when entering data byte value into ①.

⑦ ← button

⑧ → button

- Move left and right between cells in ①

⑨ Clear all cells

- Clear all cell entries in ①

⑩ Clear cell

- Clear highlighted cell in ①

⑪ Character memory

- Frequent characters can be temporarily saved here. During selection you can insert those characters into ① by left clicking with the mouse. To reserve a character in ⑪ right click with the mouse, press ESC when the pop up menu appears then type desired character with the keyboard.

⑫ Data transmit button

- Transmit these generated characters using command.

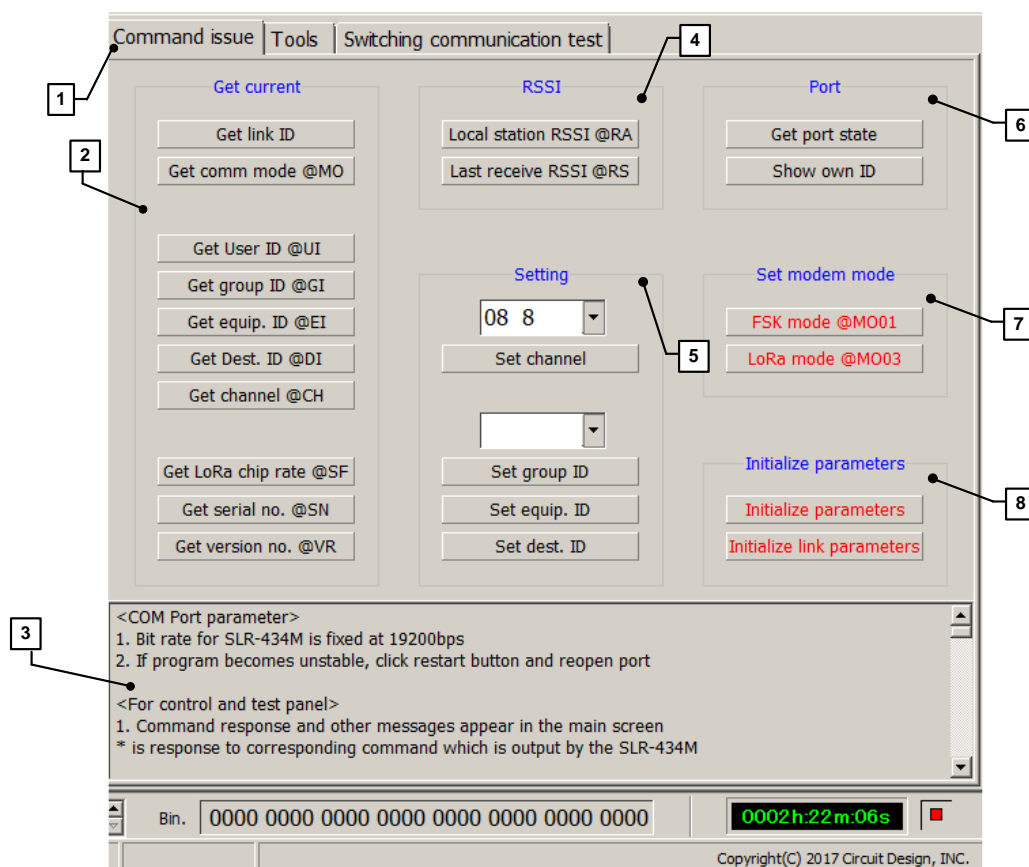
⑬ Close button

- Closes the window



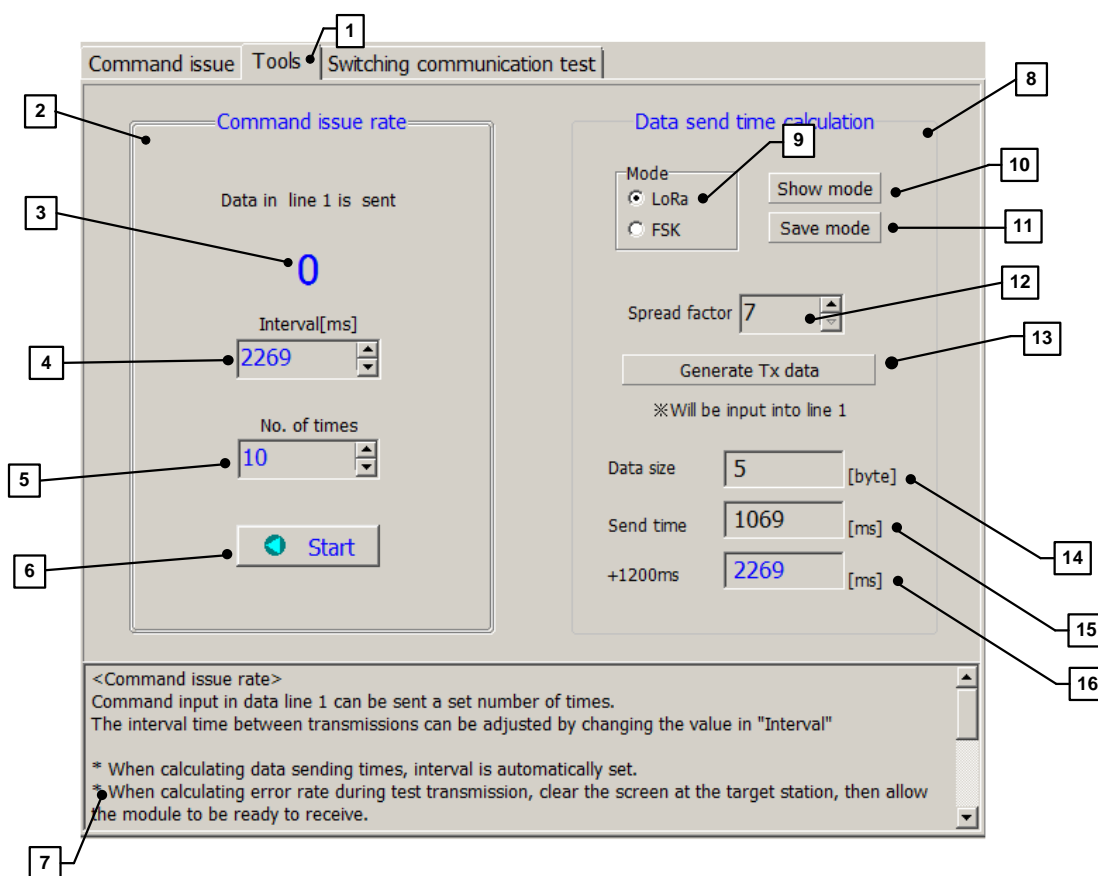
### 2.2.4 Command issue window

This panel allows you to easily confirm the internal parameter values and also set them. When setting parameters here, the command displays in input line 2. Then you can press the send button.



- ① Command issue tab
- ② Get current values
- ③ Function help notes
- ④ Get the RSSI values
- ⑤ Setting
  - Channel values are ch0 to ch116 (for channel setting ch117 to ch136, use the channel command). Group ID, Destination ID can be assigned up to 255.
- ⑥ Get setting to do with port
- ⑦ Set modem mode
  - Change the mode between LoRa and FSK.
  - \* When changing mode, it is written to the EEPROM every time.
- ⑧ Parameter initialise
  - Initialise user ID to 0000. Link parameters are initialised to GI=00, EI=01, DI=01, CH=1B
  - \* When initializing parameters, it is written to EEPROM every time.

## 2.2.5 Tools



- ① Tools
- ② Command issue rate setting
  - Determine how many times and at what interval the command in line input 1 should be sent.
- ③ Display how many times the transmission has occurred.
- ④ Transmission occurs at these intervals.
- ⑤ Set the number of times transmission should occur.
- ⑥ Button to start and stop transmission.
- ⑦ Operation notes
- ⑧ Data send time calculation
  - Calculates the transmission time corresponding to the communication mode and the interval in ④.
- ⑨ Communication mode setting
  - To determine transmission time, select the communication mode (LoRa or FSK).
- ⑩ Confirm the current mode for communication.
- ⑪ Save button. Changes the communication mode and saves the setting.

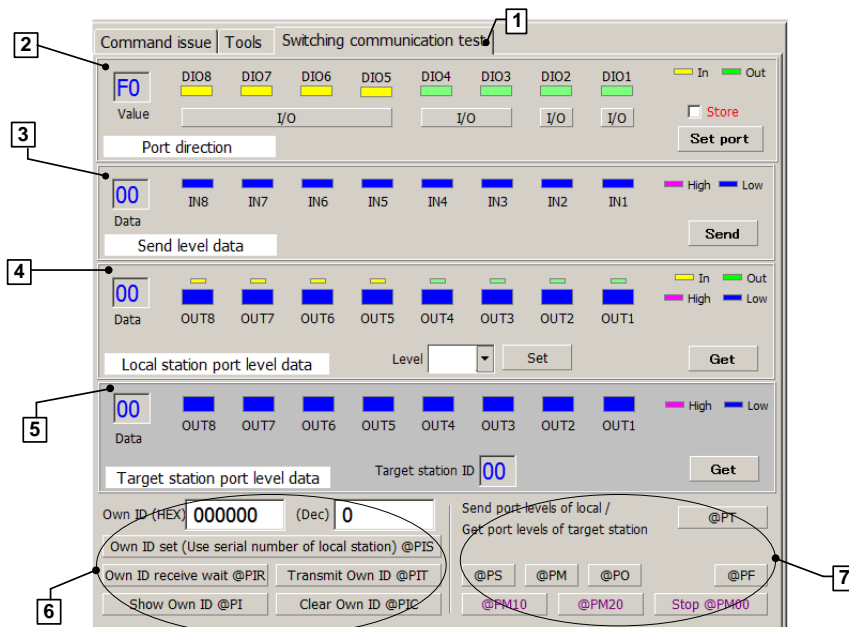
- ⑫ Spread factor. During LoRa mode, set the chip rate.
- ⑬ Generate TX data button. Opens the TX form to prepare data.
- ⑭ Size of data. Transmit data size value.
- ⑮ Send time. Data send transmission time according to data size.
- ⑯ +1200ms (LoRa), +200ms (FSK). The time interval added to the above sending time, depending on the communication mode setting.

### 2.2.6 Switching communication test

As well as data, it is also possible to communicate switching signals with the SLR-434M. Two way transmission is possible and a maximum of 8 input/output ports can be set by using the command. Also, by applying a common ID (Own ID) to the radio modules during configuration of the system, it is possible to avoid interference from other user's system and so provide secure communication.

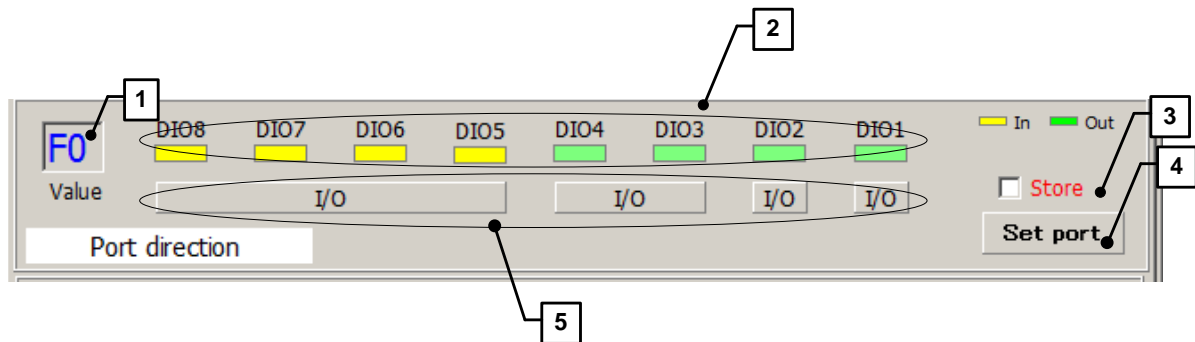
By using the corresponding panel, you can evaluate the switching transmission function as shown below.

1. Set the input/output status of the port on local station.
2. Set and get port level of local station.
3. Set port level of target station.
4. Get port level of target station.
5. Set Own ID of local and target station (All modules in the system must have the same Own ID)
6. One way continuous communication.
7. Two way continuous communication.



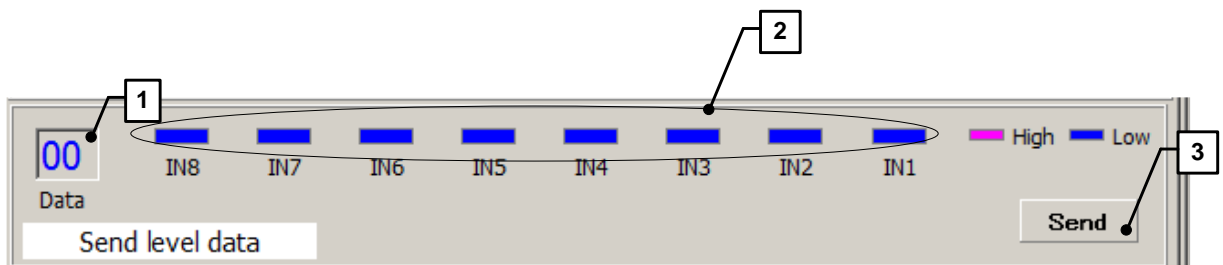
- ① Switching communication test tab.
- ② Port direction setting panel
  - Setting to use port on local station as input or as output. Use the I/O button to set. The corresponding command is “@PSxx”.
- ③ Send level data
  - Set the corresponding data to be sent to the output port on target station. Click on IN1 – IN8. The corresponding command is “@PTxx”.
- ④ Local station port level data
  - Display port level on local station. Use level pull down list to select value using “@POxx” command.
- ⑤ Target station port level data
  - Display port level on target station. The corresponding command is “@PT”.
- ⑥ Own ID function panel
- ⑦ Port function panel

### ■ Port direction setting panel



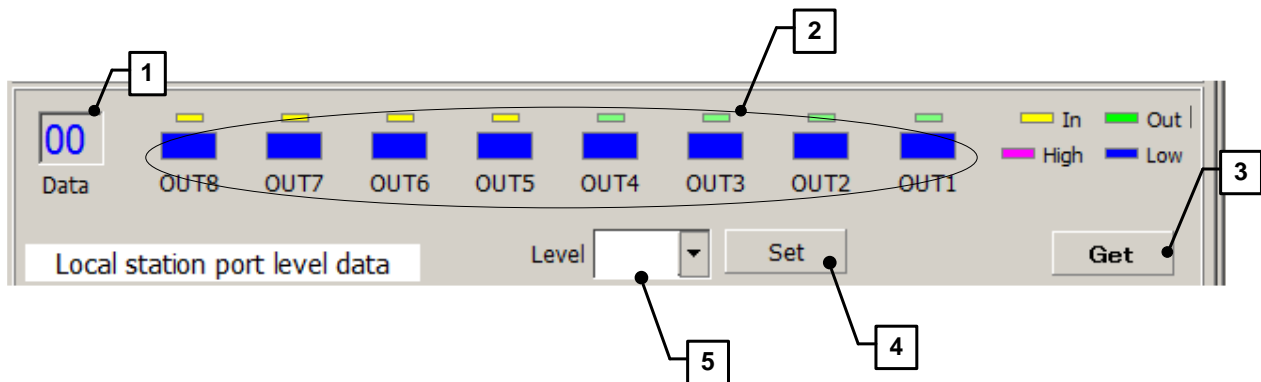
- ① Port value. Displays the port value in Hex.
- ② Port input/output status. Yellow = input, Green = output
- ③ Store. Checking this box will save the value.
- ④ Set port button. Set the direction of the port.
- ⑤ I/O button. Set the input port / output port.
  - Set the port direction as input or output. When button is clicked the command is issued but will not be saved.

### ■ Send level data panel



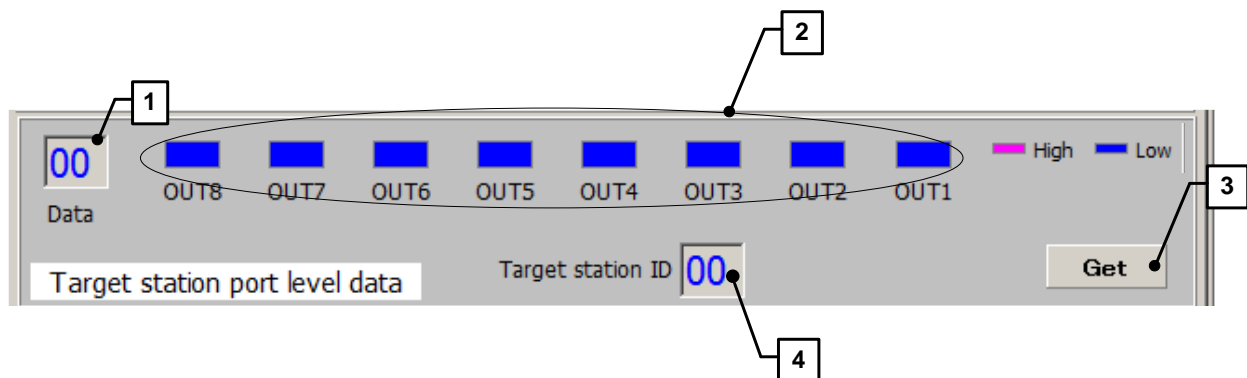
- ① Port level data. Data to be sent in Hex.
- ② Levels to be sent. Purple = High level, Blue = Low level
- ③ Send button. Send port level to target station.

### ■ Port level on local station



- ① Port level data. Port level of local station in Hex.
- ② Port level state. Shows port level. Purple = High, Blue = Low
- ③ Get button. Get the port level for local station.
- ④ Set button. From the pull down list, selected value will apply to local station port.
- ⑤ Level pull down list. Select level for the port.

### ■ Port level on target station



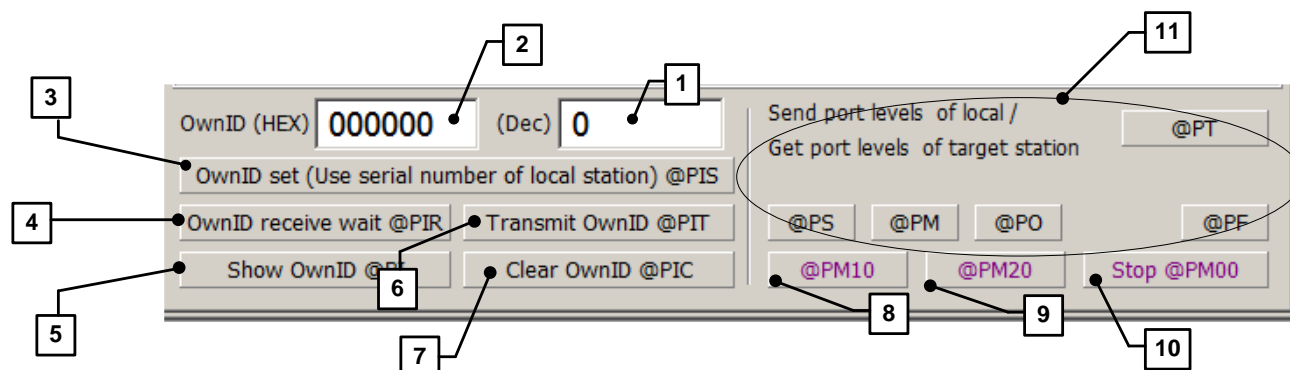
- ① Port level data. Displays port level of target station in Hex.
- ② Port level state. The state of the port on target station. Purple = High, Blue = Low
- ③ Get button. Gets the port level of the target station.
- ④ Target station ID. Shows the ID of the target.

- Own ID function panel,
- Port function panel

All modules in a system must use the same Own ID value.

The serial number of either module in the system can be commonly applied to all the modules as the Own ID.

- Procedure to set Own ID (Using the module serial number of the local station).
  1. Set the Own ID for the local station. (@PIS)
  2. Prepare the target station to receive the Own ID. (@PIR)
  3. From the local station, transmit the Own ID. (@PIT)



- ① Own ID (Dec). Display Own ID in Decimal.
- ② Own ID (Hex). Display Own ID in Hex.
- ③ Own ID setting button. Sets the Own ID of the local station.
- ④ Own ID receive wait. Prepare local station to receive Own ID.
- ⑤ Show Own ID. Shows the currently set Own ID.
- ⑥ Transmit Own ID. Transmit the Own ID to the target station prepared to receive the Own ID.
- ⑦ Clear Own ID. Clears the Own ID.
- ⑧ @PM10 button. Set to one way continuous mode. (only during FSK mode)
- ⑨ @PM20 button. Set to two way continuous mode. (only during FSK mode)
- ⑩ Stop button. Cancel continuous communication mode.
- ⑪ Commands for port functions.

## 2.3 Air monitor

The air monitor feature can display visually the absolute RSSI level of each frequency channel for the specified channel range between ch0 and ch116 only. It can also display the RSSI level for a frequency channel and how it varies with time.

The air monitor uses the command “@RA” to obtain the absolute RSSI level from the SLR-434M.

The measurement results can be analysed, printed out, saved or read from a file. The graph showing RSSI and channel can be scrolled or zoomed for analysis.

\* The absolute RSSI level is referenced to a signal from a standardised signal generator and there will be errors of a few percent which should be considered.

### Peak hold

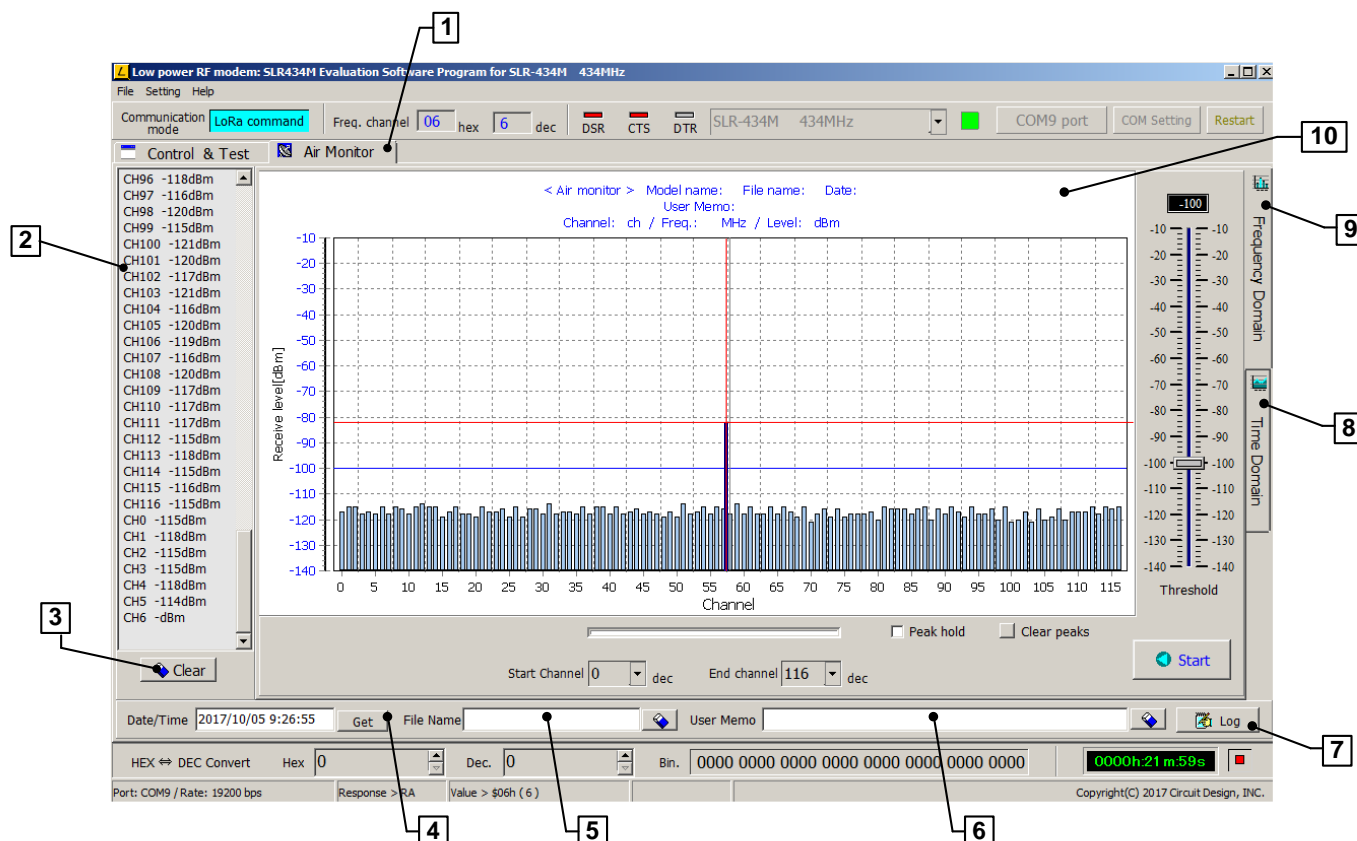
During measurements, the RSSI level for each channel can be memorized. By monitoring the channel for a long period of time, you can find out how often it is used in the field.

### Processing the graph as data

By saving to or reading from a file, measurement results can be re-loaded. When customising the graph colour, the loaded data will be displayed in that colour.

### Processing the graph as an image

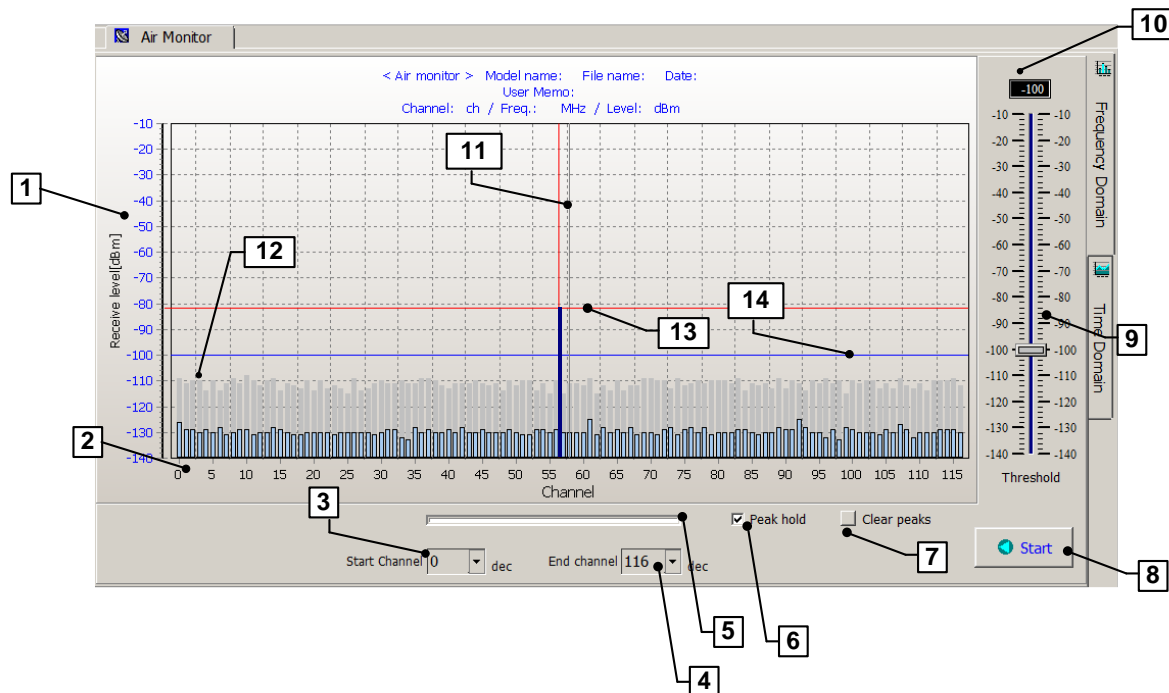
This program allows you to save the graph as an enhanced meta file (EMF) or WMF, BMP, JPEG which can be used later in a Word document. If a custom graph colour has been applied, this will also be saved. Also, EMF WMF, BMP formats can be copied to the clipboard.





- ① Air monitor tab. Clicking on this tab brings up air monitor function.
- ② RSSI level display. Displays measured levels during RSSI acquisition.
- ③ Clear button. Clears RSSI levels.
- ④ Get date / time button. Gets the current date and time.
  - Clicking ⑦ Log button inserts the date and time on to the graph. Double clicking on the Date / Time text box will clear it.
- ⑤ File name text box.
  - When saving graph data to a file, enter the file name. Do not attach the file extension as it will be attached automatically.  
For frequency domain, extension is .AMF and for time domain extension is .AMT.  
To clear this text box, double click here.
- ⑥ User Memo input line. Enter the memo text to be displayed on the graph.
- ⑦ Log button. Information from ④⑤⑥ will be displayed on the graph.
- ⑧ Time domain tab. Displays graph of RSSI of the current channel vs. time.
- ⑨ Frequency domain tab. Displays the RSSI for each frequency channel in the specified channel range.
- ⑩ User memo area. Displays the information from ④-⑥ here.

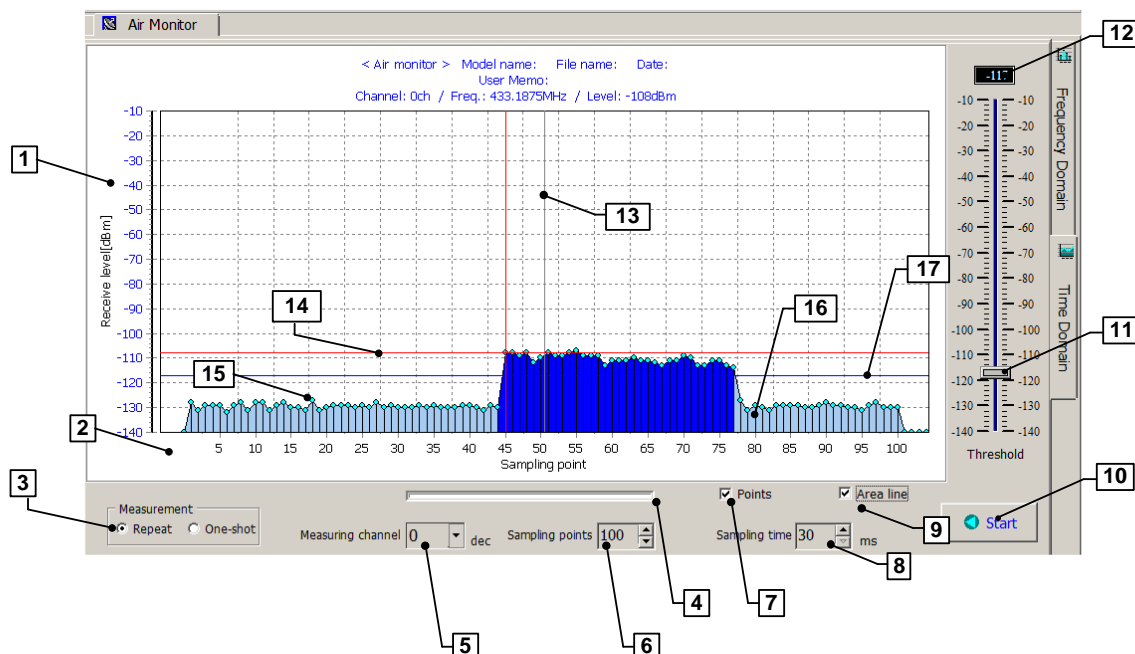
### 2.3.1 Air monitor (Frequency domain)



- ① RSSI absolute level (vertical axis)
  - The absolute RSSI level induced in the antenna of the current SLR-434M.
- ② Channel under measurement (horizontal axis)
- ③ Starting channel for the sweep.
- ④ End channel for the sweep.
  - By specifying the start and end channel, RSSI data for all the channels within will be measured. Note that the maximum channel range that can be measured is ch0 to ch116.
- ⑤ Progress bar
  - Acquisition of RSSI data for the channels progress meter.
- ⑥ Peak hold
  - Holds and displays the peak value.
- ⑦ Clear peaks
  - Clear all peak hold values.
- ⑧ Start / Stop button
  - Start and stop RSSI acquisition. During acquisition, do not touch any other function.
- ⑨ Threshold adjust
- ⑩ Sets the threshold value. Levels that exceed this threshold will change colour. When active, you can drag the controller using the mouse wheel or keyboard up/down keys to adjust the threshold position.

- ⑪ Center line
  - Graph center line. Pressing F7 will toggle this line on-off.
- ⑫ Peak display
  - Peak value for each channel is displayed during acquisition of data.
- ⑬ Analysis line
  - By clicking on the graph, the channel and its absolute RSSI level can be read. By hovering over this point with the mouse, values will display.
- ⑭ Threshold line.

## 2.3.2 Air monitor (Time domain)



### ① RSSI absolute level (vertical axis)

- The absolute RSSI level induced in the antenna of the current SLR-434M.

### ② Sampling point (horizontal axis)

### ③ Measurement mode

- Repeat: Repeat mode. When first acquisition up to the sample count is obtained, further acquisitions are obtained continuously. The sampling time sets the overall time for one acquisition.
- One shot: When first acquisition up to the sample count is obtained, the measurement process will stop. The sampling time sets the overall time for one acquisition.

### ④ Progress bar

- Progress of each acquisition of the data.

### ⑤ Measuring channel

- Select the channel to be measured. Note that the maximum channel that can be selected is ch116.

### ⑥ Sampling points

- Number of sampling points can be set up from 10 to 5000 in steps of 10. Values can be input directly from the keyboard by double clicking with the left mouse button on the text box. When directly entering value, the text box colour will change. Press enter after entering the value.

### ⑦ Display points

- Hide or display individual data points.

**⑧ Sampling time setting**

- Set up the time for one measurement acquisition by changing this value in ms. The minimum setting is 30ms. The button steps the value up or down by 10ms. It is possible to enter value directly using the keyboard. In this case, first double click on the text box using the left mouse button and enter the value. While doing this the text box will become green. After entering the value, press enter key.

When acquiring the measurement at the target station and the measurement at the local station when it is receiving, this sampling time must be set to an appropriate value. In particular, when using a relay station, it is necessary to avoid radio wave collision. When setting the route information using the route setting panel in this program, a 1:1 communication requires a minimum setting of 260ms. Every time one relay station is added, this is automatically increased by 260ms.

**⑨ Area under graph line display**

- Hide or display lines under the graph.

**⑩ Stop / Start button**

- Start and stop the data acquisition. For each mode, you can stop even during the data acquisition.

**⑪ Threshold adjust****⑫ Threshold value.** Levels that exceed this threshold will change colour. When active, you can drag the controller using the mouse wheel or keyboard up/down keys to adjust the threshold position.**⑬ Center line**

- Graph center line. Pressing F7 will toggle this line on-off.

**⑭ Analysis line**

- By clicking on the graph, the channel and its absolute RSSI level can be read. By hovering over this point with the mouse, values will display.

**⑮ Graph points****⑯ Graph area lines****⑰ Threshold line**

### 2.3.3 Air monitor mouse functions

#### 1. Analyse

While measurement is stopped, the absolute RSSI level and frequency for each channel can be displayed by left clicking on the mouse.

#### 2. Graph scroll

While measurement is stopped, you can hold the left mouse button on the graph to scroll left or right.

#### 3. Graph zoom

While measurement is stopped, you can hold shift key and click left mouse button to zoom.

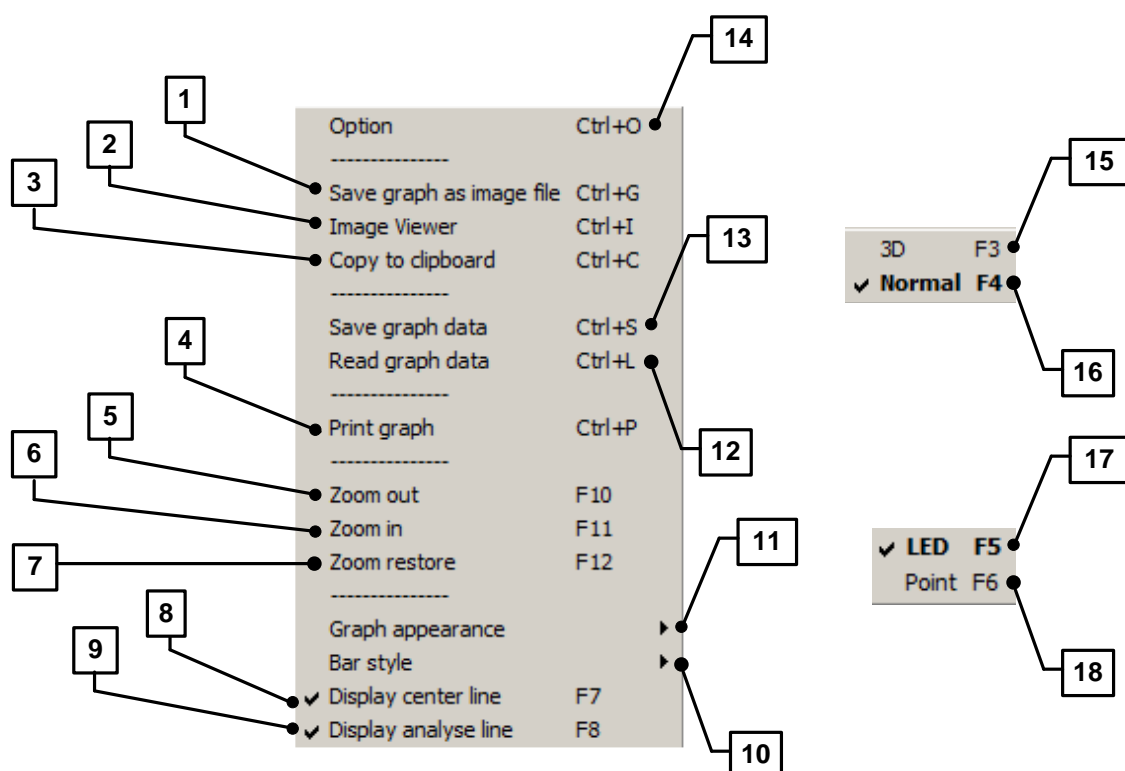
Select an area by dragging from top left to bottom right to zoom.

Select an area by dragging from top right to bottom left to undo zoom. (can also be done in popup menu)

\* When the scroll or zoom function is used, move the cursor outside of the measurement data area.

#### 4. Popup menu

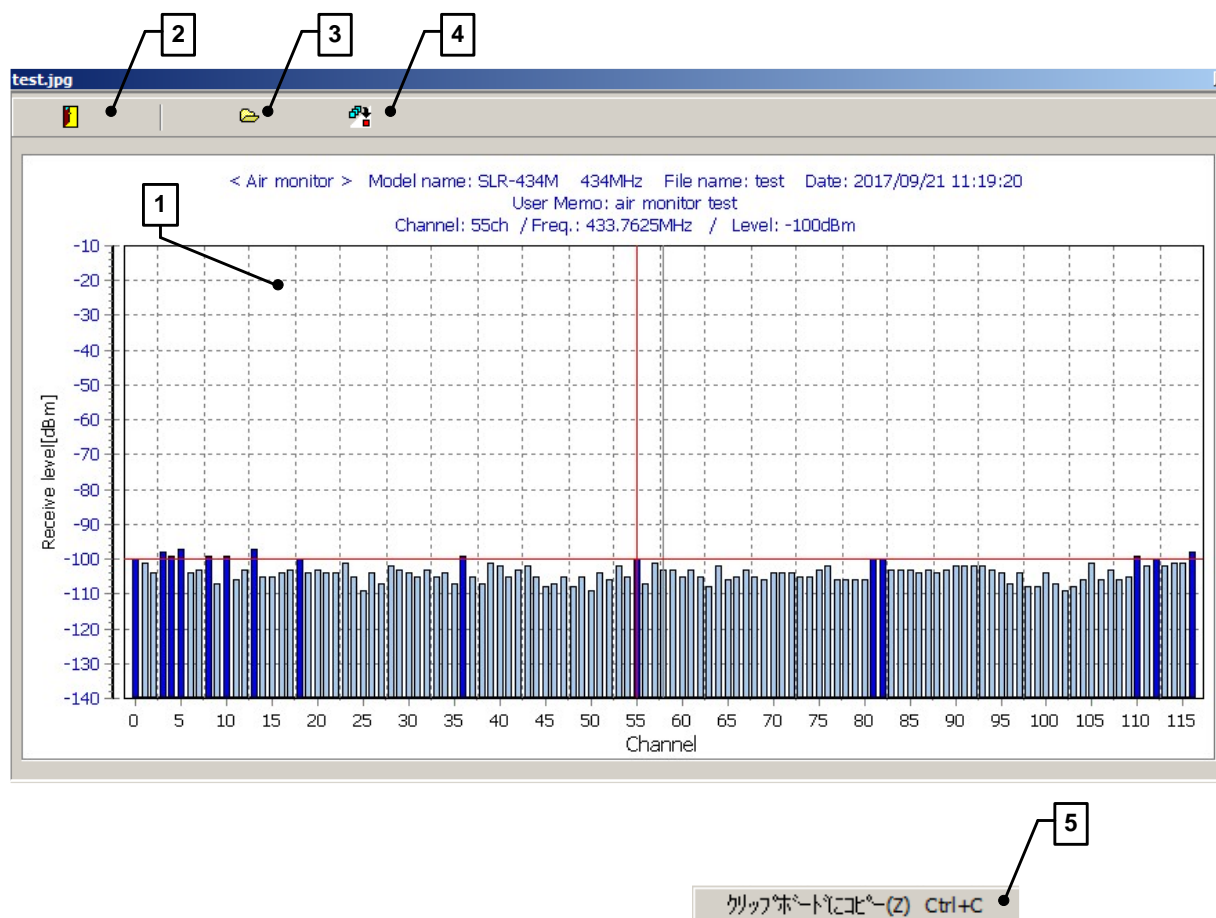
Right click to bring up the popup menu.



\* Each menu item contains its shortcut key on the right hand side.

- ① Save graph as image file.(Ctrl+G)
  - Graph that contains measurement results can be saved to Windows extended meta file (EMF), meta file (WMF), bitmap (BMP), JPEG(JPG). If using the save dialog box to specify the file name always append the file name with the extension.
- ② Image Viewer (Ctrl+I) Opens image viewer
- ③ Copy to clipboard (Ctrl+C)
  - You can copy the graph image data to the clipboard. The format can be selected in advance in the option menu. EMF,WMF,BMP can be copied.
- ④ Print graph (Ctrl+P)
  - You can print out the measurement data. Printed area is limited to the graph.
- ⑤ Zoom out (F10)
- ⑥ Zoom in (F11)
- ⑦ Zoom restore (F12)
- ⑧ Display center line (F7)
  - Can permanently display the center line.
- ⑨ Display analyse line (F8)
  - Can permanently display the analyse line.
- ⑩⑰⑱ Bar style
  - Progress bar display style can be changed.
    - LED progress bar. Display as LED.
    - Point progress bar. Display as point.
- ⑪⑮⑯ Graph appearance can be changed.
  - 3D graph. Convert to 3D. (F3)
  - Normal. Convert to 2D. (F4)
- ⑫ Read graph data (Ctrl+L)
  - You can read graph data from file. Do not read from files with extensions other than "AMF" or "AMT".
- ⑬ Save graph data (Ctrl+S)
  - Save graph data to file. Do not change the file extension. The extensions are "AMF" for frequency domain and "AMT" for time domain.
- ⑭ Option (Ctrl+O) - Display option panel.

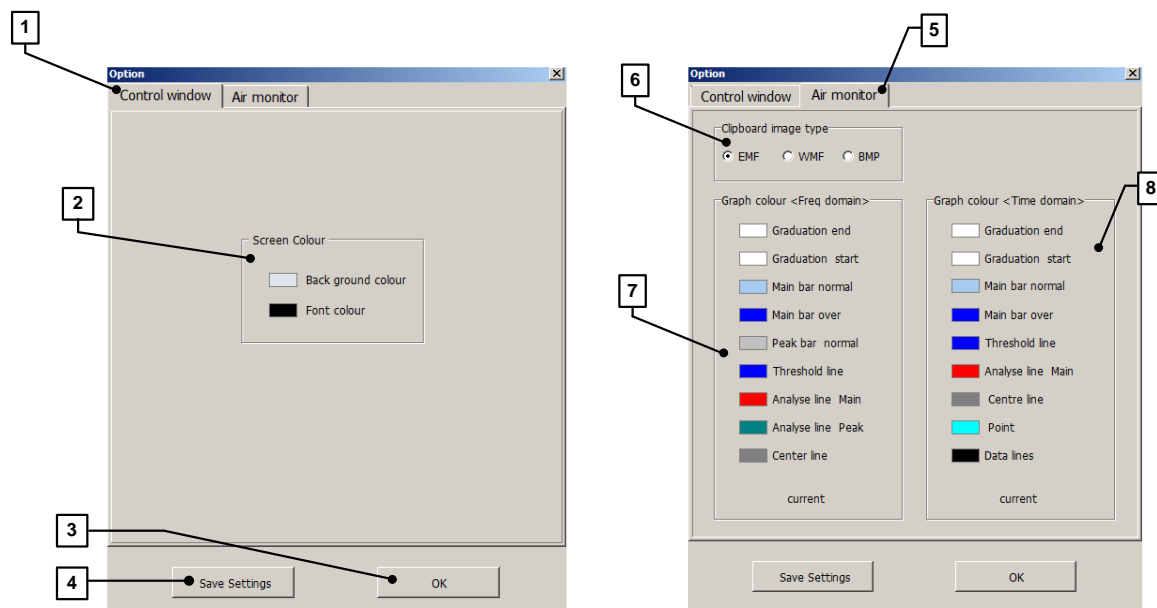
## 2.4 Image viewer



- ① Image display screen
  - ・ Image data read from file is displayed. You can move the window with the left mouse button. Right click will bring up the popup menu.
- ② Close button
  - ・ Close the image viewer
- ③ Open file button
  - ・ Opens the file dialog box.
- ④ Copy to clipboard
  - ・ Copy the obtained image to the clipboard. To fix the image type, go to the option panel. Initial selection is "EMF" format.
- ⑤ Popup menu
  - ・ Copy to clipboard: Copy image to clipboard.



### Option panel



① Control and air monitor window

② Screen colour

- \* Background colour select
- \* Font colour select

③ OK button

- The selections in the option panel are applied to the current program. The initialization file is not changed.

④ Save settings

- The selections in the option panel are applied to the current program and saved to the initialization file. On next program startup these settings will be applied.

⑤ Air monitor window setting

⑥ Clipboard image type

- Fix the image format to use when copying to the clipboard.

⑦ Graph colour setting (Frequency domain)

- |                     |   |
|---------------------|---|
| * Graduation end    | : Graduation end colour select.             |
| * Graduation start  | : Graduation start colour select.           |
| * Main bar normal   | : Main bar normal colour select.            |
| * Main bar over     | : When bar exceeds threshold colour select. |
| * Peak bar normal   | : Peak bar colour select                    |
| * Threshold line    | : Threshold line colour select.             |
| * Analyse line main | : Main bar analyse line colour select.      |
| * Analyse line peak | : Peak bar analyse line colour select.      |
| * Center line       | : Center line colour select.                |
| * Current           | : Restore default settings.                 |

- ⑧ Graph colour settings (Time domain)
- |                     |   |
|---------------------|---|
| * Graduation end    | : Graduation end colour select.             |
| * Graduation start  | : Graduation start colour select.           |
| * Main bar normal   | : Main bar normal colour select.            |
| * Main bar over     | : When bar exceeds threshold colour select. |
| * Threshold line    | : Threshold line colour select.             |
| * Analyse line main | : Main bar analyse line colour select.      |
| * Center line       | : Center line colour select.                |
| * Point             | : Graph point colour select.                |
| * Data lines        | : Graph data line colour select.            |

#### 2.4.1 File creation

When starting SLR-434M Evaluation Program from the folder, user data files will be placed in the same folder. If uninstalling, please move important files to another location.

- |        |                                       |
|--------|---------------------------------------|
| * .AMF | : Air monitor data (frequency domain) |
| * .AMT | : Air monitor data (time domain)      |

### 3. OTHER

#### Cautions

- As the product communicates using electronic radio waves, there are cases where transmission will be temporarily cut off due to the surrounding environment and method of usage. The manufacturer is exempt from all responsibility relating to resulting harm to personnel or equipment and other secondary damage.
- Do not use the equipment within the vicinity of devices that may malfunction as a result of electronic radio waves from the product.
- The manufacturer is exempt from all responsibility relating to secondary damage resulting from the operation, performance and reliability of equipment connected to the product.
- Communication performance will be affected by the surrounding environment, so communication tests should be carried out before actual use.
- Ensure that the power supply for the product is within the specified rating. Short circuits and reverse connections may result in overheating and damage and must be avoided at all costs.
- Ensure that the power supply has been switched off before attempting any wiring work.
- The case is connected to the GND terminal of the internal circuit, so do not make contact between the '+' side of the power supply terminal and the case.
- When batteries are used as the power source, avoid short circuits, recharging, dismantling, and pressure. Failure to observe this caution may result in the outbreak of fire, overheating and damage to the equipment. Remove the batteries when the equipment is not to be used for a long period of time. Failure to observe this caution may result in battery leaks and damage to the equipment.
- Do not use this product in vehicles with the windows closed, in locations where it is subject to direct sunlight, or in locations with extremely high humidity.
- The product is neither waterproof nor splash proof. Ensure that it is not splashed with soot or water. Do not use the equipment if water or other foreign matter has entered the case.
- Do not drop the product or otherwise subject it to strong shocks.
- Do not subject the equipment to condensation (including moving it from cold locations to locations with a significant increase in temperature.)
- Do not use the equipment in locations where it is likely to be affected by acid, alkalis, organic agents or corrosive gas.
- The GND for the product will also affect communication performance. If possible, ensure that the case GND and the circuit GND are connected to a large GND pattern.

#### Warnings

- Do not take apart or modify the equipment.
- Do not remove the product label (the label attached to the upper surface of the product.) Using a product from which the label has been removed is prohibited.

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**Customers are advised to consult with Circuit Design sales representatives before ordering.**

**Circuit Design, Inc. believes the furnished information is accurate and reliable. However, Circuit Design, Inc. reserves the right to make changes to this product without notice.**

**REVISION HISTORY**

<b>Version</b>	<b>Date</b>	<b>Description</b>	<b>Remark</b>
<b>1.0</b>	<b>Dec. 2017</b>	<b>The first issue</b>	
<b>1.1</b>	<b>Jun. 2022</b>	<b>Notes added that the available channels are ch0 to 116 URL corrected</b>	