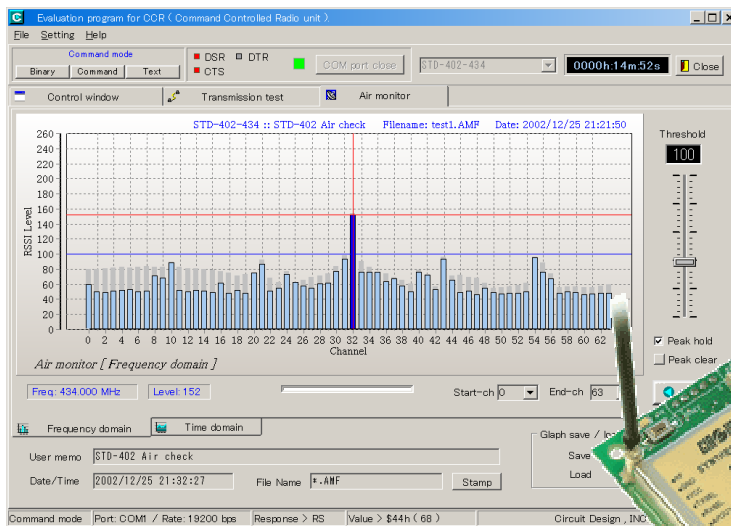
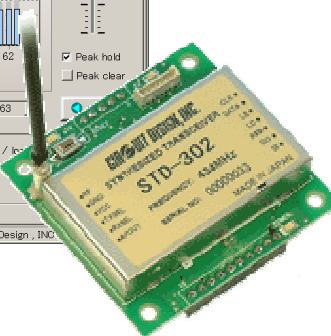


# CCR Evaluation Kit & Evaluation Software *Command Controlled Radio Unit*



## Operation Guide

Version 1.1 (July 2003)



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### ABOUT THE EVALUATION KIT

The evaluation kit is supplied to users who intend to evaluate the CCR units for their application. The kit provides an environment in which the user is able to evaluate CCR units immediately after purchasing them. The kit can be used with all types of CCR unit. Please give the name of the specific CCR model when you purchase the kit with the CCR unit.

The evaluation can be performed on the Windows operating system (Windows 95, 98, Me, 2000, XP) and is performed between PCs equipped with COM ports or one PC equipped with 2 COM ports.

Note: Refer to the CCR operation guide for CCR models.

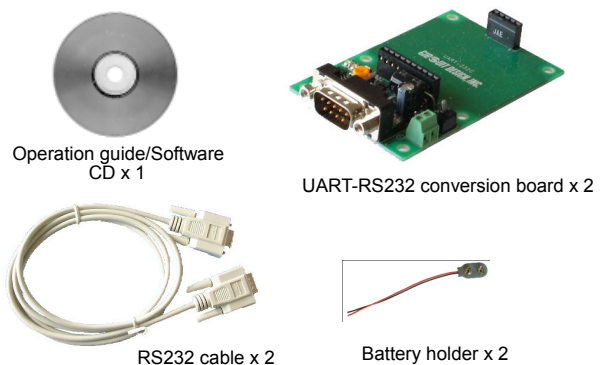
### CONTENTS OF THE EVALUATION KIT

- UART-RS232 conversion board (CCR-UTR-01) x 2
- RS232 straight cable 1.8 m x 2
- Battery holder for 9 V battery x 2
- CD (Operation guide & software program) x 1

Note: Battery is not included

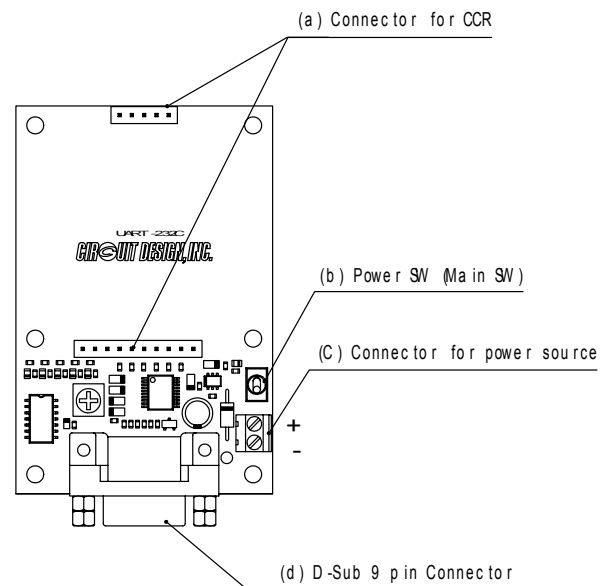
#### Contents of CD

1. Evaluation kit operation guide
2. Sample Windows program
3. CCR operation guide



### PART NAMES

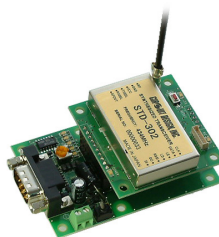
- (a) **Connector for CCR**  
Connector for mounting the CCR unit.
- (b) **Power switch (Main SW)**  
Power supply ON/OFF switch
- (c) **Connector for power source**  
Connect the battery holder included and use a 9 V battery  
Note: If power source other than a 9 V battery is used, the supply voltage must be DC +4 V to 10 V. Check the polarity when the power source is connected.
- (d) **D-Sub 9pin Connector**  
9 pin connector for RS232. Please connect to RS232. Straight cables are included.



UART-RS232 Conversion Board (CCR-UTR-01)

## SET-UP

Mount the CCR unit on the UART-RS232 board  
(Refer to right)



Connect the battery holder to the UART-RS232 conversion board and insert the 9 V battery in the holder.

Evaluation on CCR using 2 PCs.

First, install the evaluation software in accordance with the procedure mentioned later in this document. Connect the UART-RS232 conversion board and COM port of the PC using the RS232 straight cable provided. Turn the power of UART-RS232 conversion board on, then run the evaluation software. Please follow the instructions in the program.

Evaluation on CCR using 1 PC with 2 COM ports.

The basic procedure is the same as above. First, install the evaluation software. Connect the UART-RS232 conversion board to the respective COM ports. Run the evaluation software for each COM port (runs two (2) evaluation programs) and set the COM port to be used in the COM setting menu of the SET menu. The size of the evaluation software program window is fixed. Please move the windows to a suitable place on the monitor and toggle between them as necessary.

**USAGE NOTE:**

This software program is exclusively developed for CCR units and should not be used for any other equipment. The manufacturer is exempt from all responsibility relating to damage caused by misuse of the program. No part of this document or the program may be copied or distributed in part or in whole without the prior written consent of Circuit Design, Inc.

**ABOUT THE EVALUATION SOFTWARE PROGRAM:**

Please read the CCR operation guide before running the software program.

The software program has the following windows and functions.

**Control window**

The control window is used to check the operation of the CCR unit by sending commands and receiving the responses from the CCR.

The three modes (Command, Text, Binary) provided with the CCR can be tested and the principal CCR operation parameters can be written and fixed in EEPROM from this window.

**Transmission test window 1**

This window provides a test function for PC-to-PC data transmission with the CCR.

The character strings that are entered in the Data input line are transmitted and displayed on the monitor of a PC at the receiving end.

**Transmission test window 2**

This window provides a test function of PC-to-PC data transmission with CCRs.

Binary data i.e. image data can be transmitted and displayed on the monitor of a PC at the receiving end.

**Air monitor window**

This window provides a function to monitor the condition of radio use in the field by using the RSSI level information from the CCR, and showing it in a graph. The graph can be set in either the Frequency domain or the Time domain.

**1. Monitoring in Frequency domain**

The RSSI level in each channel can be measured to provide information about the condition of radio use in the field. (The number of channels to be measured depends on the model of CCR).

The peak level can be held in each channel.

**2. Monitoring in Time domain**

The RSSI level of a pre-set channel can be measured in real time, which helps the user to check the antenna position or consider the position of the CCR.

- The measured data can be saved and read.
- The measurement result can be printed.
- The measurement result can be saved as a Widows Extended Meta File (EMF).
- Scrolling and Zooming function help with analysis.
- Customisations of graph color and 3D display are possible.
- Absolute received field strength can be indicated. (Note: Not all CCR models).

**Software program operating environment**

Operating System: Windows 95, 98, Me, 2000 and XP

Recommended CPU speed: 400 MHz or more

Recommended display size: 1,280 x 1,024 pixels or more

Hard disk space: 5 MB

**Program development language**

Delphi Ver. 7

Component used: Made by Naichal PREPRE Electronic signboard component

**How to use the kit**

1. Connect the UART-RS232 board with the CCR mounted on it to the COM port of a PC. Please use the RS232 straight cable provided.
2. Turn on the main switch of the UART-RS232 board while pushing the RESET switch of the CCR unit. (This procedure sets the UART parameters to the default setting. Default setting: 19,200 bps, 8 bits, 1stop bit, no parity)
3. Click "CCR\_EP.exe" in the CCR\_EKit folder to start the evaluation software program. The dialog explaining how to start the program is displayed when the program starts. Description: " Please select CCR unit first, then open COM port ". Press "OK" to start the main program.
4. Select the CCR model to be used from the CCR unit selection box located to the right of the COM port button.
5. Open the COM port by clicking the COM port button. The operation screen is then displayed.
6. Follow the instructions in this operation guide for further evaluation.

Note:

@BR command:

The UART baud rate of the CCR can be changed with the @BR command.

The default baud rate of the CCR is 19,200 bps. When you change the baud rate with the @BR command from the program, please set a baud rate for the COM port at "COM port" in the setting menu to the same baud rate as that newly set for the CCR by the @BR command.

## CONTROL WINDOW

### General

The CCR unit can be set to one of the three modes (Command, Text, Binary) in the Control window. The “Transmission test” window and “Air monitor” window are available only in the Command mode. These windows disappear when the CCR operates in a mode other than the Command mode.

Just after the COM port opens and when the Control window is selected again after the Air-monitor window, the software automatically reads the RF channel & RX-ID and re-sets the parameters. The screen in the control window shows these parameters.

Note: Changing the unit and turning the power off should be done after the COM port is closed. Otherwise a COM port error occurs, which triggers closing of the program and may affect the operation of the operating system.

### Data input-line

When the CCR is in the Command mode, the commands can be issued to the CCR using the Data input-line.

When the CCR is in the Text mode, text characters entered in the Data input-line are transmitted when the “Transmission” button or “Enter” button is pressed. When the CCR is in the Binary mode, characters are transmitted each time they are entered in the Data input-line

### Screen

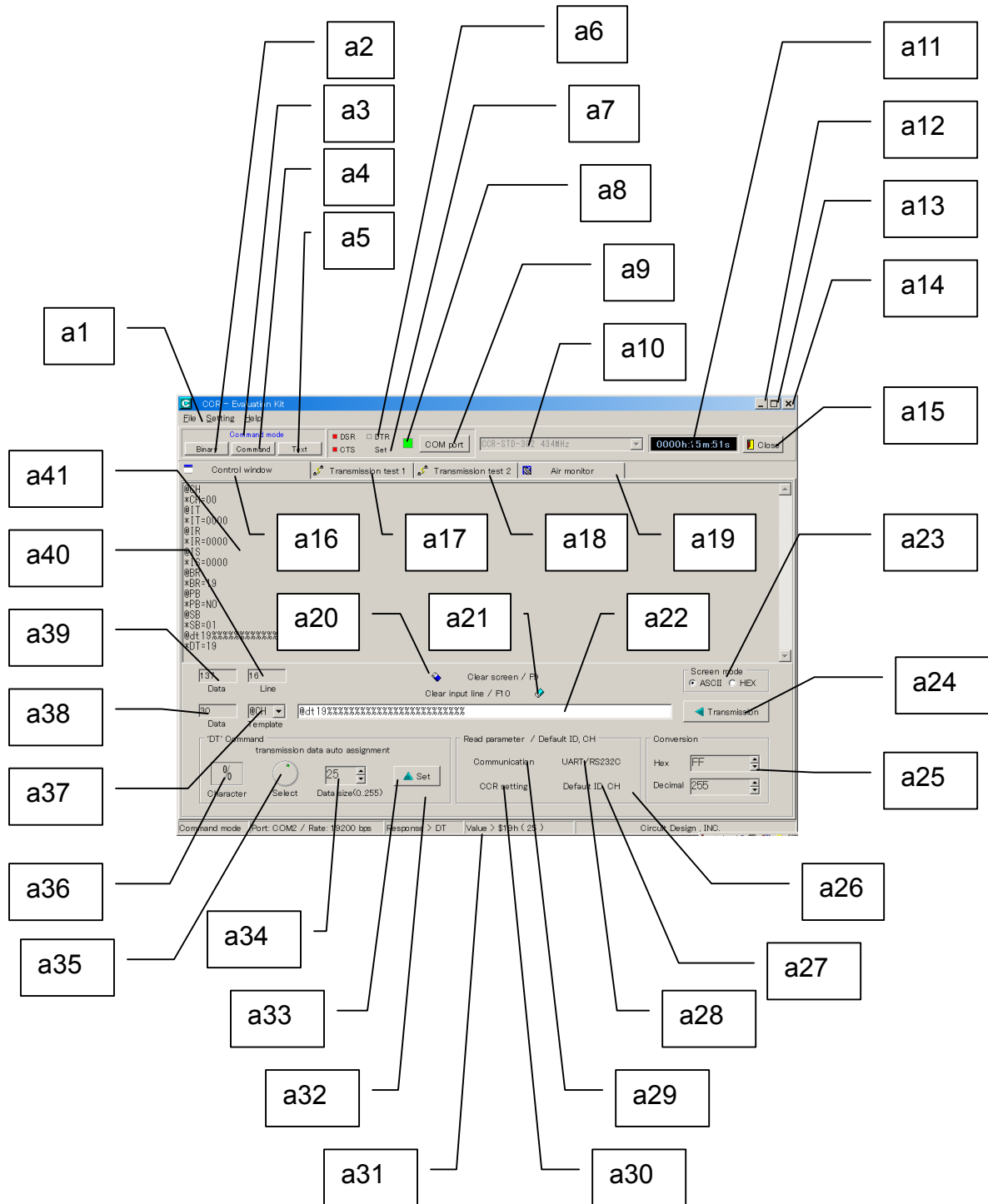
The screen displays the command and the character strings sent from the Data input-line and the response from the CCR.

It is not possible to issue commands on the screen, or to edit, print or save the screen. The amount of data can be checked using the screen data counter. When the total data amount exceeds 30,000 bytes, the content of the screen is cleared.

### Issuing commands

The data transmission command DT should be followed by the data size and the data to be transmitted. DT command auto assignment panel makes it easy to transmit data with the DT command.

Control window





**[a1] Menu bar**

File menu	Close:	Closes the program
Setting menu	COM port:	Sets the COM port
Help menu	Version:	Shows the version

**[a2] Binary mode button**

Sets the CCR to Binary mode.

**[a3] Mode indicator**

Shows the currently set mode of the CCR.

**[a4] Command mode button**

Sets the CCR to the Command mode.

**[a5] Text mode button**

Sets the CCR to the Text mode.

**[a6] COM port status indicator**

Lights up when the port status is high

The DTR lights up when the CCR is set to the Binary or Text mode.

**[a7] COM port setting button**

Displays the setting dialogue of the COM port. The same setting as the communication parameter of the CCR should be set.

**[a8] COM port indicator**

Lights up when the port is open.

**[a9] COM port button**

Opens or closes the COM port.

**[a10] CCR select box**

Selects the CCR to be used.

**[a11] Time counter**

Timer. Reset using the left mouse button.

**[a12] Minimize button****[a13] Maximize button** (Please do not use)**[a14][a15] Program close button****[a16] CCR control window** (Shown here)**[a17] Transmission test 1 window****[a18] Transmission test 2 window****[a19] Air monitor window****[a20] Screen clear button****[a21] Data input-line clear button****[a22] Data input-line**

Command and/or Data input

Input-line for the commands when CCR is in Command mode

Input-line for transmission data when the CCR is in the Text or Binary mode

**[a23] Screen mode button**

Switches between screen display modes. When ASCII is checked, ASCII characters are shown in the window. Control code is garbled on the window. When HEX is checked, the window shows 00 to FF hexadecimal digits.

**[a24] Transmission button**

Transmits the data in the Data input-line to the CCR.

**[a25] Hexadecimal to Decimal conversion**

Converts hexadecimal number to decimal and vice versa  
First, double click the number in the window then enter a new number.

**[a26] Parameter read panel**

Reads all the CCR parameters related to each category as a group.

**[a27] Default set for ID and Channel**

Resets all of system-ID, TX-ID, RX-ID and channel to the default setting (0).

**[a28] UART/RS232 parameter button**

Reads the parameters related to serial communication.

**[a29] CCR communication parameter read button**

Reads the main parameters (CH, IR, IT and IS) for communication.

**[a30] CCR unit setting read button**

Reads the main parameters (MD, CT, EM, ST, VR) for unit setting.

**[a31] Status bar**

Shows operation status.

**[a32] DT command auto assignment panel**

For testing the "DT" command, Characters can be assigned automatically. Click the SET button to enter the characters to the Data input-line, then click the Transmission button for the test.

**[a33] DT command set button**

Sets the selected character into the Data input-line with the assigned data size.

**[a34] Data size select button**

The @DT command can send 0 to 255-byte data at once.

**[a35] Character select dial**

Selects the characters for transmission. When the dial is selected with a click (focused), the characters can be changed with the mouse wheel or the arrow keys of the keyboard.

**[a36] Transmission character display**

Shows the characters to be sent.

**[a37] Command template**

The command to be entered in the Data input-line can be selected.

**[a38] Input line data counter**

Shows the data size entered in the Data Input-line

**[a39] Screen data counter**

Shows the total data amount displayed on the screen. When the total amount of data on screen exceeds 30,000 bytes, the content of the screen is cleared.

**[a40] Screen line counter**

Shows the number of the lines on the screen

**[a41] Screen**

Shows the commands issued to the CCR and responses from the CCR.

Note: Edit, Save, Print and Copy of data on the screen are not possible.

## TRANSMISSION TEST 1 WINDOW

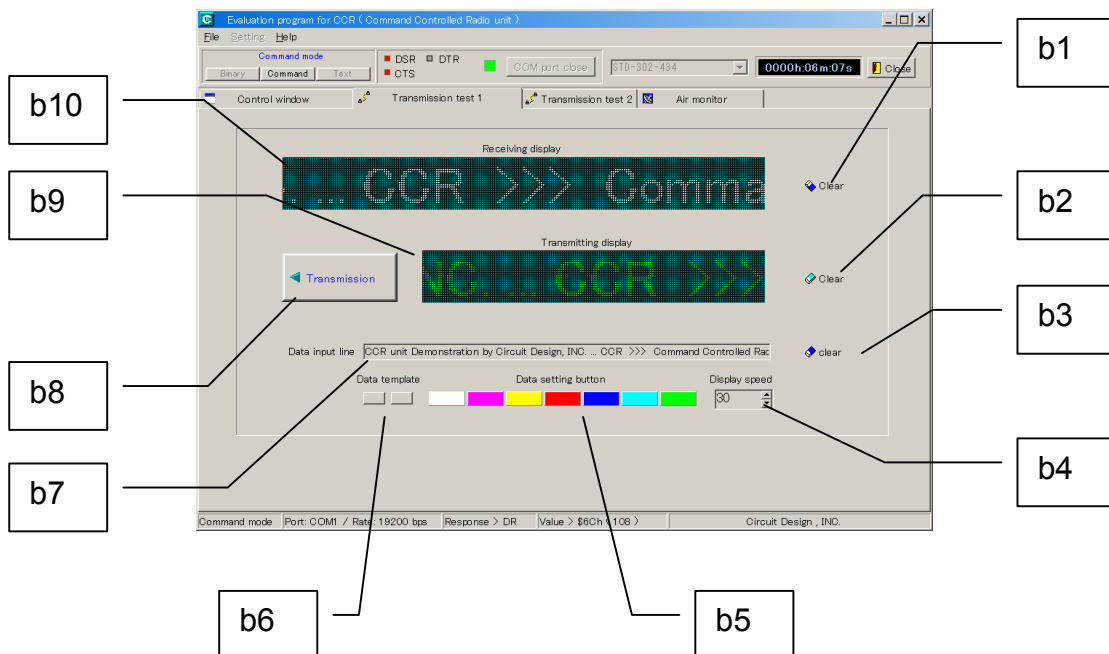
### How to use Transmission test 1

1. Select the Transmission test window 1 on both the transmission end (PC-a) and receiving end (PC-b).
2. Enter data in the Data input-line (PC-a).
3. Select the color of the characters.  
The characters are displayed on the Transmitting display.
4. Click the Transmission button.  
The characters appear on the Receiving display at the PC of the receiving side (PC-b).

**Note:**

Check the TX-ID, RX-ID, System-ID and RF channel in the control window and verify that the IDs of the transmitting CCR match up with those of the receiving CCR. Be careful especially after performing the Air monitor function because the RX-ID may be set to ffff (Hex) or the RF channel may be changed.

### Transmission test 1



**[b1] Receiving display clear button**

**[b2] Transmitting display clear button**

**[b3] Data input-line clear button**

**[b4] Character flow speed control**

Controls the flow speed of the character appearing on the transmitting display. The larger the number, the slower the speed. The newly set speed will be reflected in the flow speed on the receiving display at the destination PC.

**[b5] Data setting button**

The character strings on the Data input-line appear on the Transmitting display in the selected color.

**[b6] Transmission character strings template**

**[b7] Data input-line**

Window for data input. The data will be displayed on the transmission display when the enter key is pressed.

**[b8] Transmission button**

Transmits the character strings on the Transmitting display from CCR.

The transmission button cannot be used on a CCR that is equipped with a radio receiver module.

**[b9] Transmitting display**

Displays transmission data

**[b10] Receiving display**

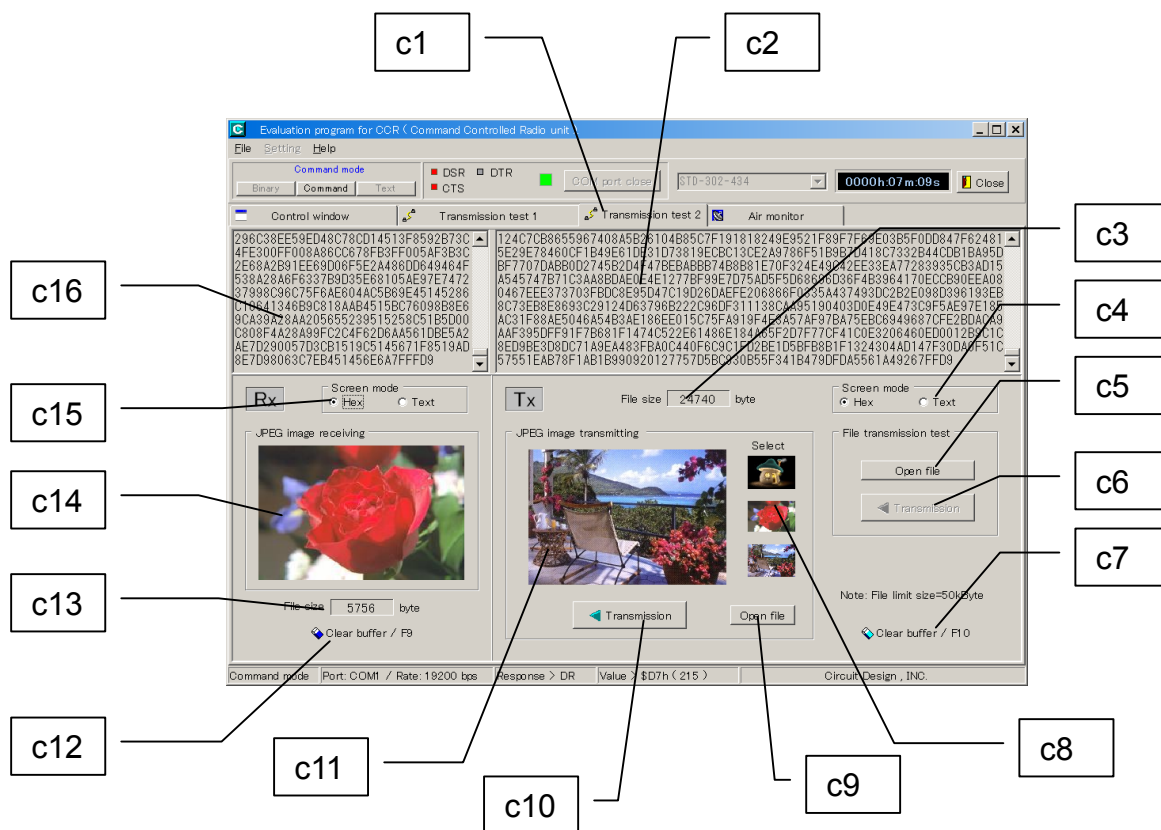
Displays received data

## TRANSMISSION TEST 2 WINDOW

The CCR unit transmits user data of up to 255 bytes at one transmission. For transmission of larger sized data, the user is required to make their own file transfer protocol at program in the user system. The sample program used in Transmission test 2 window does not carry out ARQ (Automatic repeat request) with error detection, therefore the file may not be transmitted correctly due to errors in radio transmission.

### How to use Transmission test 2

1. Open the Transmission test window 2 on both the transmission end (PC-a) and receiving end (PC-b)
2. Select the file to be transmitted by using the File open button  
The content of the file is displayed on the Transmission screen. If the file is a JPEG file, the image is also displayed.
3. Click the Transmission button.



**[c1] Data transmission test 2 tab****[c2] Transmission screen**

Shows the data content of the transmission file (include JPEG file)

**[c3] Transmission file (JPEG image) data size**

Shows the transmission file data size in bytes.

**[c4] Transmission screen display mode change**

Sets the Transmission screen display mode to Hexadecimal or text. Text files can be shown correctly in Text mode but not Binary files. Set the display mode to Hexadecimal for Binary files.

**[c5] File open button**

The button opens a file open dialogue. File data sizes of 50 kbytes or more cannot be transmitted. Files that contains large data sizes may require time for processing.

**[c6] Transmission button**

Transmits the data shown in the transmission screen.

**[c7] Transmission buffer clear button**

Clears the transmission buffer in the program.

**[c8] JPEG image sample**

Sample JPEG file for image file transmission. Clicking the image selects an image for transmission. The file sizes are 3 kB, 6 kB, and 25 kB, from the top.

**[c9] JPEG file open button**

The button opens a file open dialogue for a JPEG image. File data size of more than 50 kbytes cannot be transmitted. Files that contain large data sizes may require time for processing.

**[c10] JPEG file transmission button**

Transmits the image file displayed on the JPEG image transmitting screen.

**[c11] JPEG image transmitting**

**Displays the JPEG image selected for transmission.**

**[c12] Receive buffer clear button**

Clears the receive buffer in the program.

**[c13] Received file (image) data size**

Shows the data size of the received file in bytes.

**[c14] Received image**

Shows the JPEG image received.

**[c15] Receive screen display mode change**

Sets the Receive screen display mode to Hexadecimal or text. Text files can be shown correctly in the Text mode but not Binary files . Set the display mode to Hexadecimal for Binary files.

**[c16] Receive screen**

Shows the data contents of the received file (including JPEG files).

## AIR MONITOR WINDOW

### General

The Air-monitor window shows the level of RSSI in a graph using the RSSI reading function of the CCR. Any channel within a channel table of a connected CCR unit can be measured.

The result of measurement can be analyzed, printed, saved and loaded. RSSI level and channel frequency can be analyzed using the scroll and zoom functions in the graph.

The RSSI level is the output value from the internal 8 bit-A/D converter of the CPU on the CCR.

The scale at right shows the absolute received signal absolute value (dBm). The accuracy is within a few percentage points, however this is not a guaranteed received value.

Note:

A CCR equipped with a transmitter module does not have a function to output RSSI level, therefore the Air-monitor window button does not appear.

### Air monitor function check

The CT command makes it possible for the CCR to emit radio waves in the assigned frequency continuously. It can be used to check the Air monitor function.

Set the CCR to a desired frequency then send the command "@CT ON". The CCR starts emitting radio waves in the set frequency. To stop emitting, send the command "@CT OF".

The CCR stores the setting with the "/W" option command. The CCR emits radio waves whenever the power is on after the "@CT ON/W" command is issued.

### Peak-hold

The peak of the RSSI level in each channel during measurement can be held. Continuous monitoring with this function gives information about which channel is used frequently in the field.

### Use measurement results as data

The save and load file functions make it possible to re-use the measurement result. When the color setting of the graph is customized, the loaded graph data is shown in the customized color.

### Use measurement results as image data

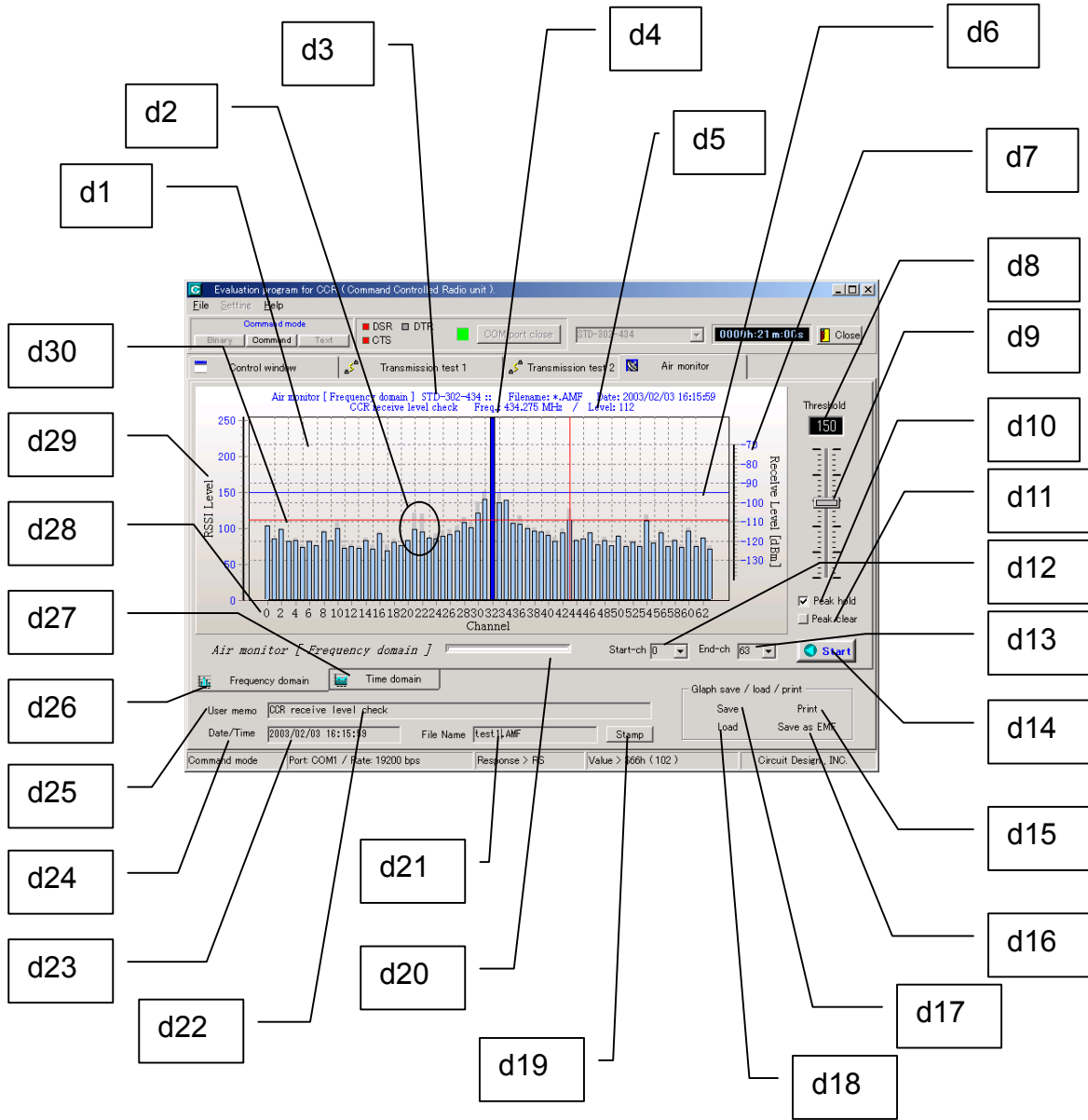
The measurement results as a graph can be saved as a Windows Extended Meta File (.EMF), which allows you to use the graph file in other application software i.e. Microsoft word, etc.

To convert the files into BMP or JPEG, please use image editing software. If the color of the graph has been customized, the graph is saved in the customized color.

Note:

Air-monitor measurement takes time to scan many RF channels. A setting of 38,400 bps or higher baud rate in the COM port gives a better response.

**Air-monitor (Frequency domain)**





**[d1] Measurement display in Frequency domain****[d2] Peak indication**

Shows the peak value during measurement in each channel.

**[d3] User memo**

Memorandum for user use. The memo can be printed out and saved along with the graph. When the Stamp button is pressed, the memo is displayed in the graph area.

**[d4] Analyzed frequency display**

Shows the radio channel frequency whose RSSI level is analyzed.

**[d5] Analyzed level display**

Shows the RSSI level of the analyzed radio channel.

**[d6] Threshold level line****[d7] RF received signal absolute level scale**

Indicates the absolute level of radio received signal strength. Accuracy is within a few percentage points. The value is only for reference.

**[d8] Threshold level value****[d9] Threshold control**

Sets a threshold for RSSI level. The level bars that exceed the threshold level, are displayed in a different color. When a level bar is selected with a click (focused), the level can be changed with the mouse wheel or the arrow keys of the keyboard.

**[d10] Peak-hold**

Check this box to hold the peak value of the RSSI level in each channel. Uncheck this box to enable the peak hold function.

**[d11] Peak clear**

Clears the Peak-hold values.

**[d12],[d13] Scan start channel , Scan end channel**

Sets a start channel and end channel for scanning. The scan (Air monitoring) is performed between these two channels.

Note: The number of the end channel must be higher than that of the start channel.

**[d14] Start/Stop measurement button**

Starts or stops the scan. Please do not change the window during measurement.

**[d15] Print out button**

Prints the measurement results.

**[d16] EMF file save button**

Saves the measurement result as a Windows Extended Meta File (.EMF).

**[d17] File save button**

Saves the graph data on the local disk. The file extension is “.AMF”. Please do not change the extension.

**[d18] File load button**

Loads the saved graph data. Please do not load graph data with extensions other than “.AMF” .

**[d19] Stamp button**

Displays the contents of the User memo, Date/Time and File name line on the user memorandum area on the top of the graph.

Note: All contents in the graph can be printed out or saved as an EMF file.

**[d20] Progress bar**

Shows the progress of data measurement in each channel.

**[d21] File name line**

A file name to be used when the “Save” button is clicked. Please enter an appropriate name in “\*” part.

Note: Please do not change the file extension “.AMF”.

**[d22] User memo input-line**

Input-line for the memo to be displayed on the graph.

**[d23] Date/Time line**

A date and time to be stamped on the graph can be set.

Double-clicking the left mouse button here updates the Date/Time.

**[d24] Date/Time button**

Clicking this button updates the date and time in the Date/Time line to the current time.

**[d25] User memo line clear button**

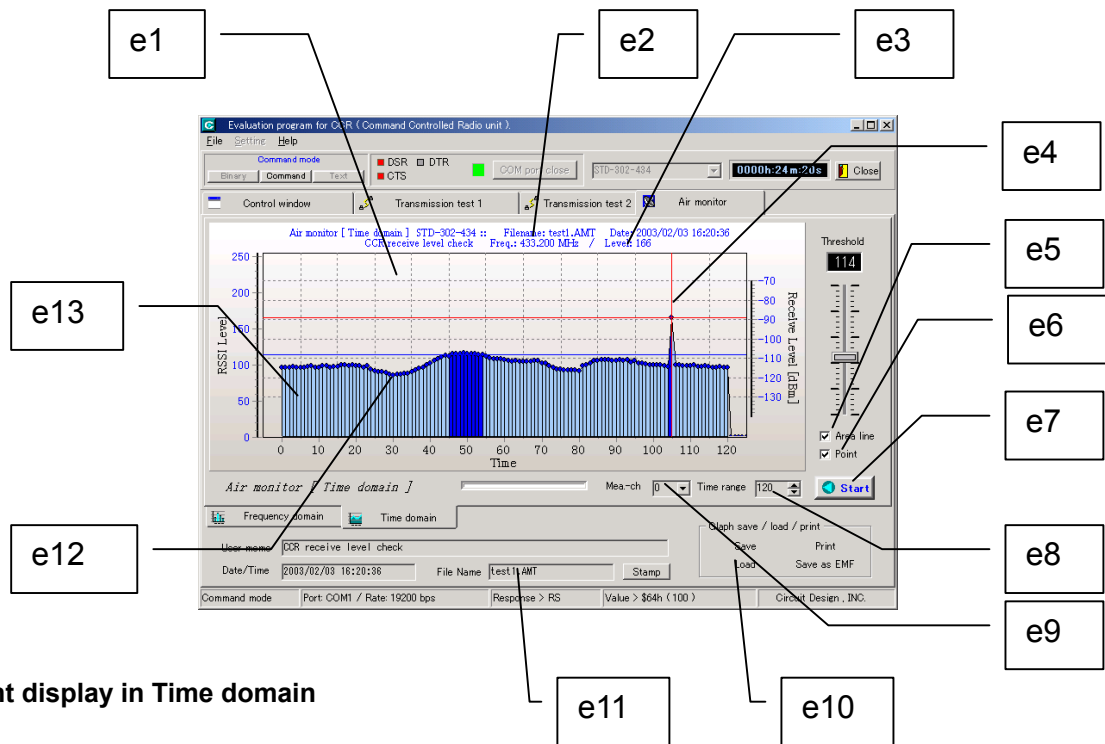
Clears all characters in the line.

**[d26] Frequency domain measurement select button****[d27] Time domain measurement select button****[d28] Measurement channel axis (horizontal axis)****[d29] RSSI level axis (vertical axis)**

The output value from the internal 8 bit-A/D converter of the CPU on the CCR.

**[d30] Analyze line**

**Air-monitor (Time domain)**



**[e1] Measurement display in Time domain**

**[e2] Measurement frequency channel display**  
Shows the frequency of the radio channel being measured.

**[e3] Level analyze result**  
Shows the RSSI level at the analyzed point.

**[e4] Data analyze line**

**[e5] Area line display function select**  
Check this box to show an Area line on the graph.

**[e6] Point display function select**  
Check this box to show a Point on the graph.

**[e7] Start and stop button for measurement**

**[e8] Time range (10 – 5000 sampling)**  
Sets the number for sampling in 10–step increments. The number can be entered directly from the keyboard. When the number is entered directly from the keyboard, the number is set by pressing the enter key and by pressing the enter key again, the graph reflects the new number.

**[e9] Measurement channel**  
Selects the RF channel to be measured.

**[e10] Save/Load button**  
Saves or loads the graph data.  
Please do not change the file extension “.AMT”.  
Also, please do not load files with extensions other than .AMT.

**[e11] File name line**  
The entered file name is used when “Save” button is clicked. Please enter an appropriate name in “\*” part.  
Note: Please do not change the file extension “.AMF”.

**[e12] Point**

**[e13] Area line**

### Mouse function in Air monitor

1. **Analyze function**  
Clicking the left mouse button on the graph shows the level and frequency of the channel. (The measurement should be stopped when this analysis is performed).
2. **Graph scroll function**  
Clicking and holding the left mouse button scrolls the recorded graph to the left or right.
3. **Graph zoom function**  
Clicking the left mouse button + SHIFT key enlarges the graph (Zooming).  
Zoom in by selecting the graph area from the left top to the right bottom.  
Zoom out by selecting the graph area from the right top to the left bottom. (Same with the pop-up menu)  
Note: When scrolling and zooming in/out, mouse pointing should start outside of the measurement data.
4. **Pop-up menu function**  
Call up the pop-up menu by clicking the right mouse button

**[f1] Undo Zoom**

Resets the zoom setting to the original size

**[f2] Graph view [3D, Normal]**

3D: Shows the graph in 3D  
Normal: Shows the normal graph

**[f3] Bar style [LED, Point]**

LED: Progress bar in LED style  
Point: Progress bar in point style

**[f4] Clear memo**

Clears the memo displayed on the graph

**[f5] Gradient [Start color, End color]**

Start color: Sets the starting color for graph gradation  
End color: Sets the ending color for graph gradation

**[f6] Graph color [Freq. domain (Main, Over, Peak)] Time domain (Main, Over)]**

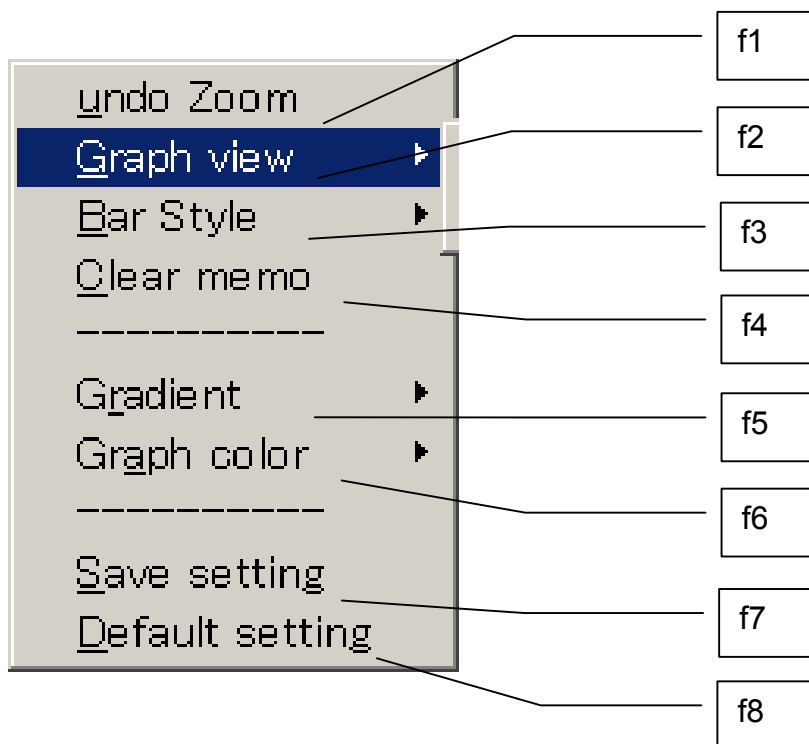
Freq. Domain – Main: Selects the color of the RSSI level bar  
– Over: Selects the color of bars that exceed the threshold level.  
– Peak: Selects the color of the peak-hold bar.  
Time domain – Main: Selects the color of the RSSI level bar.  
– Over: Selects the color of bars that exceed the threshold level.

**[f7] Save setting**

Saves the current color setting of the graph.

**[f8] Default setting**

Resets the color setting of the graph to default.



**INSTRUCTIONS FOR USE**

The Air-monitor program operates the CCR with the RX-ID “ffff (Hex)”. Please check the RX-ID (@IR) when testing in Control window or Data transmission window is performed after using Air-monitor.

The TX-ID and RX-ID must match to establish radio communication. Also the radio channel should be checked.

In Binary mode in the Control window, characters are transmitted each time they are entered in the Data input-line

To return to the Command mode from the Text mode, 1byte of ESC code (1B Hex) is sent to the CCR.

The DTR line in RS232 is used to switch the mode between Binary mode/Text mode and Command mode.

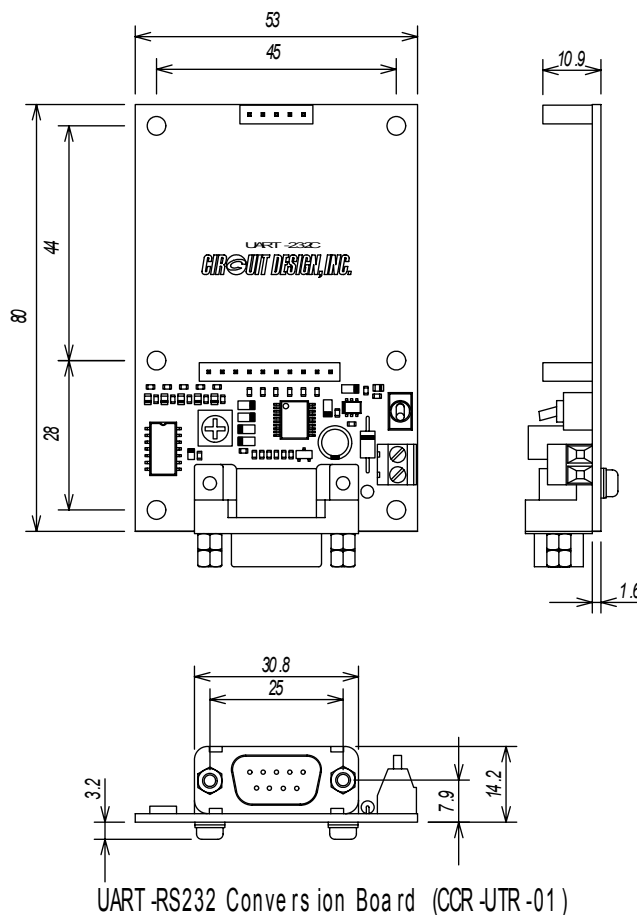
The RSSI level is an output value from the internal 8-bit A/D converter of the CPU on the CCR.

Do not change the Air-monitor window to other windows during the measurement, as this may change the RX-ID and/or Channel number. If this happens, please reset those parameters.

The CCR does not check the coverage of radio frequency channels. Do not set frequency channels that the radio module mounted on the CCR does not cover. Refer to the operation guide of the CCR for the radio frequency channel table.

Connecting the CCR and turning the power on/off must be performed after closing the COM using the COM port button. When an error occurs at the COM port, the evaluation software is closed and may affect the operating system of the PC.

**EXTERNAL DIMENSIONS**



## Cautions

- As the radio module 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 radio module.
- The manufacturer is exempt from all responsibility relating to secondary damage resulting from the operation, performance and reliability of equipment connected to the radio module.
- 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 radio module 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 equipment in vehicles with the windows closed, in locations where it is subject to direct sunlight, or in locations with extremely high humidity.
- The radio module is neither waterproof nor splash proof. Ensure that it is not splashed with dirt or water. Do not use the equipment if water or other foreign matter has entered the case.
- Do not drop the radio module 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.
- Do not bend or break the antenna. Metallic objects placed in the vicinity of the antenna will have a significant effect on communication performance. As far as possible, ensure that the equipment is placed well away from metallic objects.
- The ground for the radio module will also affect communication performance. If possible, ensure that the case ground and the circuit ground are connected to a large ground 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 module.) Using a module from which the label has been removed is prohibited.

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