UHF Narrow band radio unit
CCR
Command Controlled Radio Unit

Operation Guide

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GENERAL DESCRIPTION

CCR (Command Controlled Radio) is a radio unit mounted with one of Circuit Design's radio modules for incorporation in the user's system.
To allow the user easy control of the radio module, simple dedicated commands are provided. Without needing to be aware of control of the radio component, the user can concentrate on designing the transmitting and receiving protocols for the data using the commands.
By using a UART*[1] interface with an on-board CPU, or a RS232 interface for computers as the interface for transmitting and receiving data and for issuing commands, it is possible for the user to develop systems quickly.*[2]
In addition, as the CCR circuit presents the very minimum of high frequency component design issues for the user's system, it is designed so that the characteristics of the on-board radio module can be exploited to the full.

Note: *1 UART(Universal Asynchronous Receiver Transmitter)
Note: *2 A UART-RS232 conversion board (CCR-UTR-01)with a D-Sub 9 pin connector is available as an option.

FEATURES

Features

- Uses an on-board CPU with a UART interface provided as standard.
- The UART board equipped with a radio module is designed specially using a high frequency circuit design ensures stable operation of the radio module.
- The radio module and communication is controlled by a simple command system.
- All CCR units have a common interface irrespective of the radio module, so that the right CCR can be chosen for the application.
- The on-board type allows the CCR to be incorporated easily onto the user's system.
- For building 1:1 and 1:N systems, the required flexible link control IDs (system ID, RX ID, TX ID) are provided.

Applications

- Serial data transmission
  RS232 and RS485 communication
- Telemetry
  Water level monitoring for rivers, dams, etc. Monitoring systems for environmental data such as temperature, humidity, etc.
  Transmission of measurement data (pressure, voltage, current, etc) to a PC
- Telecontrol
  Industrial remote control systems Remote control systems for factory automation equipment
  Control of various driving motors

PRODUCT CONSTRUCTION

CCR is the generic term given to the UART interface radio product lineup with Circuit Design's radio modules mounted on UART interface boards. A CPU is also mounted on the UART interface board for command control of the radio module.

The circuit design of each UART interface board corresponds to the type of radio module mounted on it. The size of the board, pin assignment, and external interface signal is the same across all the boards irrespective of the radio module mounted. For this reason, while there will be functional differences in accordance with the radio module mounted, different CCR units can be mounted on the same user circuit board.

Radio module
(Image shows the STD-302 transceiver)

+

UART interface board
(Image shows the UART interface board for STD-302)

=

CCR
(Image shows CCR-STD-302)

PRODUCT LINE-UP

The table below lists the models of CCR.
The radio performance and functions of the CCR depend on the radio module mounted. Refer to the operation guide of the relevant radio module.
The part of the product name following "CCR-" is the name of the radio module mounted.

CCR product name	Radio channel	Transmitter	Receiver	Transceiver	Frequency band [MHz]			
					429	434	458	869
CCR-CDP-TX-04S *1	Single *2	O				O		O
CCR-CDP-RX-03AS *1	Single *2		O			O		O
CCR-CDP-TX-02NP *1	Multi	O				O	O	
CCR-CDP-RX-02NP *1	Multi		O			O	O	
CCR-STD-302*1	Multi			O	O	O		O

Note *1: The CCR is equipped with CE certified radio modules
CDP-TX-04S, CDP-RX-03AS, CDP-TX-02NP, CDP-RX-02NP, STD-302
For detailed regulatory compliance information, refer to the operation guide of the relevant radio module.
The CCR unit is designed to be integrated into the user's host equipment.
The user is urged to verify that their own equipment, including the CCR, meets the regulatory requirements in the relevant country before placing it on the market.
Note: CDP-TX-04S and CDP-RX-03AS are fixed channel radio modules.

ACCESSORIES

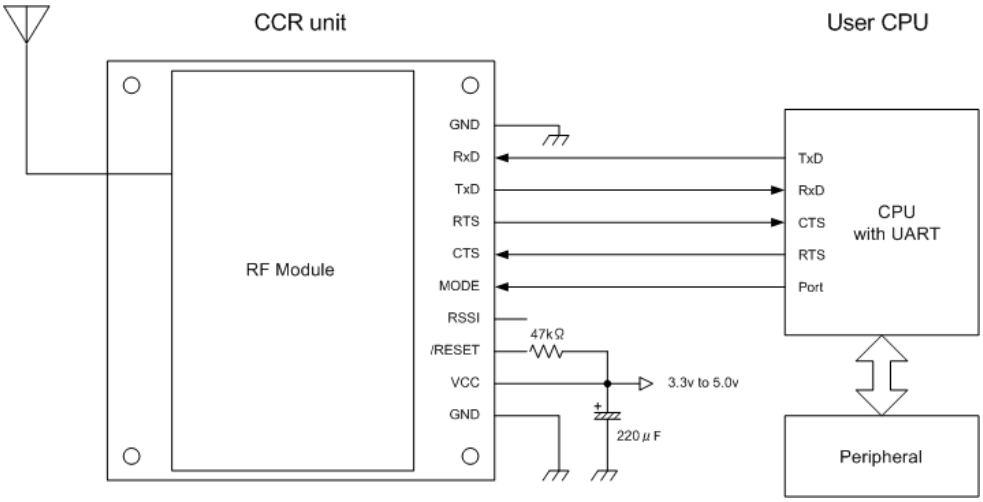
Each CCR comes with its own antenna for that model.

APPLICATION EXAMPLE

Example 1 and Example 2 are used in basically the same way except for the difference in control voltage.

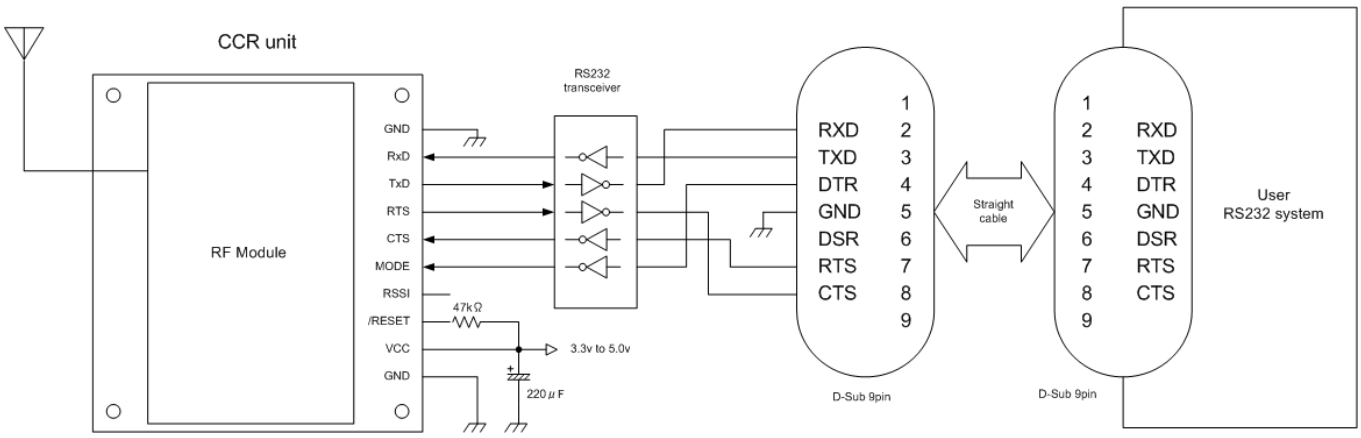
Example 1: The CCR unit is controlled by the on-board CPU.

1. With the on-board CPU with UART, it is possible to interface the CCR unit directly.
2. As the CCR unit is designed to exploit the characteristics of the radio module fully, design of the user's circuit board is made easier.



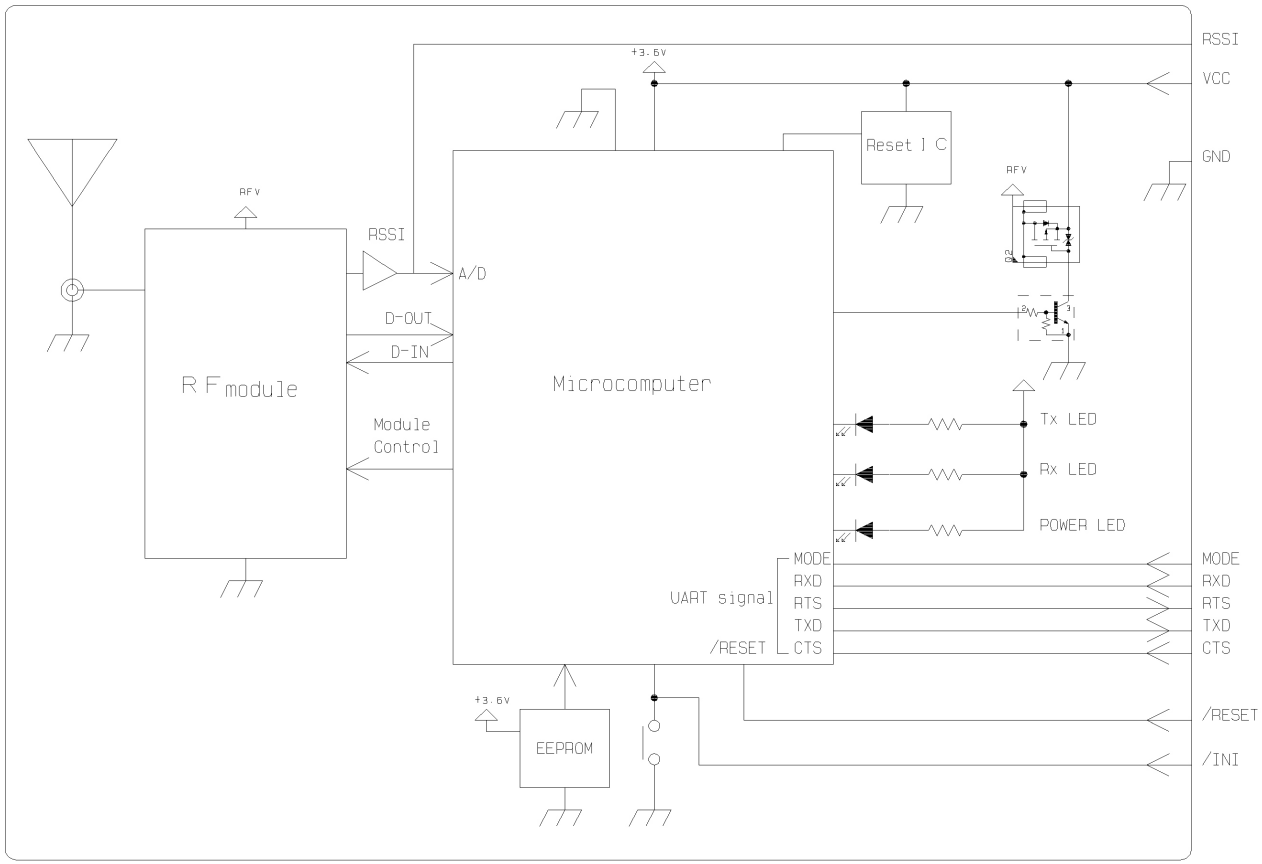
Example 2: The CCR unit is controlled through RS232.

1. Using the RS232 port of your computer, you can develop a program for OSs such as Windows and the like.
2. By supplying power to the CCR unit with a cable, you can also isolate the radio component from your circuit board and locate it in the most suitable environment.



Note: Pull up the RESET terminal with a 47 kΩ resistor.

BLOCK DIAGRAM



SPECIFICATIONS

Specifications by model

Model	Communication method	No. of CHs	Receiver sensitivity dBm	TX power mW	Radio data rate bps	Supply voltage v	Current mA at 3.6v	Operating temp. range °C	Unit weight g	External dimensions (mounted) W x D x H*3 mm
CCR-CDP-TX-04S 433.920 MHz	One-way	1	-	10	4800	3.3 – 5.0	29	-10 - +60	16	53 x 52 x 14.6
CCR-CDP-TX-04S 434.075 MHz	One-way	1	-	10	4800	3.3 – 5.0	29	-10 - +60	16	53 x 52 x 14.6
CCR-CDP-TX-04S 869.750 MHz	One-way	1	-	10	4800	3.3 – 5.0	29	-10 - +60	16	53 x 52 x 14.6
CCR-CDP-RX-03AS 433.920 MHz	One-way	1	-120*2	-	4800	3.3 – 5.0	25	-10 - +60	25	53 x 52 x 14.6
CCR-CDP-RX-03AS 434.075 MHz	One-way	1	-120*2	-	4800	3.3 – 5.0	25	-10 - +60	25	53 x 52 x 14.6
CCR-CDP-RX-03AS 869.750 MHz	One-way	1	-117*2	-	4800	3.3 – 5.0	25	-10 - +60	25	53 x 52 x 14.6
CCR-CDP-TX-02NP 433 MHz	One-way	16	-	10	4800	3.3 – 5.0	37	-10 - +60	24	53 x 52 x 16.1
CCR-CDP-TX-02NP 458 MHz	One-way	11	-	10	4800	3.3 – 5.0	37	-10 - +60	24	53 x 52 x 16.1
CCR-CDP-RX-02NP 433 MHz	One-way	16	-120*2	-	4800	3.6 – 5.0	30	-10 - +60	30	53 x 52 x 15.1
CCR-CDP-RX-02NP 458 MHz	One-way	11	-120*2	-	4800	3.6 – 5.0	30	-10 - +60	30	53 x 52 x 15.1
CCR-STD-302 429 MHz	Half-duplex	40		10	4800	3.3 – 5.0	Tx=45 Rx=30	-10 - +55	38	53 x 52 x 15.1
CCR-STD-302 434 MHz	Half-duplex	64	-119*1	10	9600	3.3 – 5.0	Tx=45 Rx=30	-10 - +55	38	53 x 52 x 15.1
CCR-STD-302 869 MHz	Half-duplex	12	-116*1	5	9600	3.3 – 5.0	Tx=43 Rx=30	-10 - +55	38	53 x 52 x 15.1

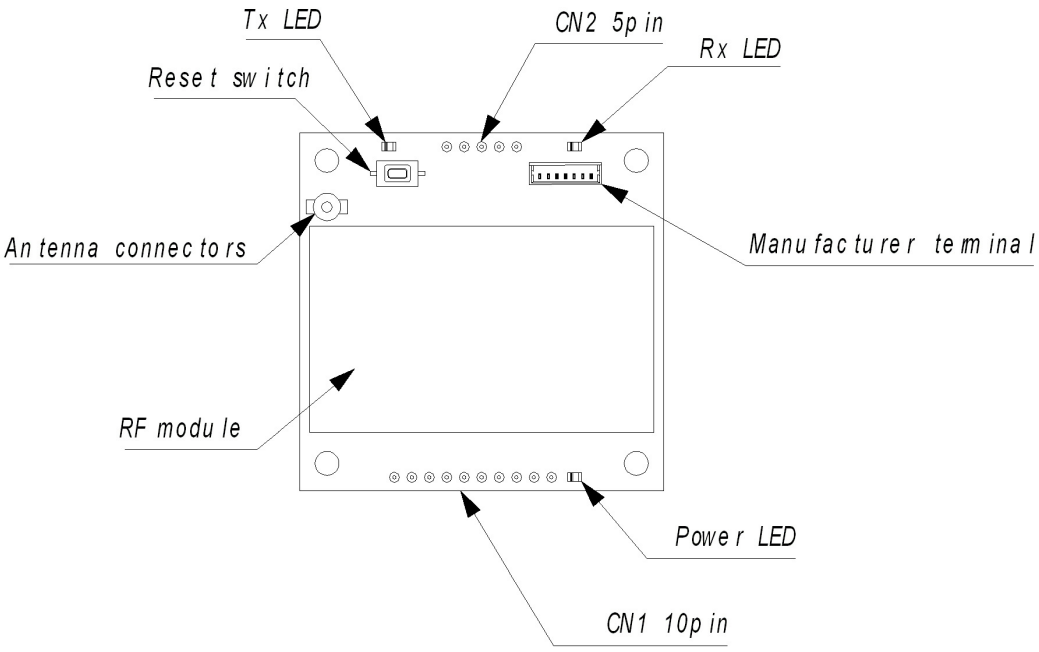
*1: 1 kHz Dev = +/-2.4 k, CCITT FILTER *2: 12 dB/SINAD, CCITT filter *3: Dimension when mounted not including the height of the connector pins

Common specifications

UART serial interface component

Synchronization	Asynchronous
Data speed	1200/2400/4800/9600/19200/38400/57600 bps
Flow control	RTS/CTS hardware control
Other parameters	Data length 8 bits, no parity, 1 stop bit
Data buffer	Transmission 255 bytes / Reception 255 bytes

PART NAMES & OPERATION



Note: The figure shows CCR-STD-302.

Power LED: On when power is supplied to the CCR unit.
Tx LED: On when data is transmitted.
Rx LED: On when data is received.
Reset switch: Turning on the power while pressing this button initializes the various parameters saved in the non-volatile memory in the CCR unit. Restarting power is necessary after this operation.
The initial values of the main parameters are as follows. For details, refer to the explanation of the commands.

Initial values for communication parameters
System ID = 0000, TX ID = 0000, RX ID = 0000
Channel CH = 00
Initial values for RS232 related parameters
Baud rate: 19,200 bps, Data bits: 8 bits, Parity: none, Stop bit: 1, Flow control: RTS, CTS hardware control

CN1, CN2: Inch pitch interface pins to your circuit board.

PIN DESCRIPTION

CN-1

Pin No.	Pin name	I/O	Description	CPU (UART)	RS232
CN1-1	GND	I	Ground terminal	GND	GND
CN1-2	RXD	I	Data input terminal	TxD	TxD
CN1-3	TXD	O	Data output terminal	RxD	RxD
CN1-4	RTS	O	RTS (Request To Send) terminal L = Data can be received H = Data cannot be received	CTS or Port	CTS
CN1-5	CTS	I	CTS (Clear To Send) terminal L = Data is output from the TXD terminal H = Data is not output	RTS or Port	RTS
CN1-6	MODE	I	Operation switching terminal for binary mode or text mode L = Binary mode (BI) or Text mode (TX) H = Command mode (CD) To switch to binary mode or text mode, set this terminal to the H level (command mode), then set the internal mode register to BI or TX with the mode command. Then set the terminal to the L level.	Port	DTR
CN1-7	RSSI	O	Received signal strength output (Transmitter modules excluded)	AD Port	-
CN1-8	/RESET	I	Reset terminal Setting this terminal to L resets the internal CPU. For normal operation, set the RESET terminal to H with pull up resistance (47 kΩ).	Port	-
CN1-9	VCC	I	Power supply terminal DC 3.3 to 5.0 V A voltage higher than the lowest operating voltage of the radio module is required. For details, refer to the data sheet of the relevant radio module. Use an electrolytic capacitor of more than 220 µF between VCC and GND.	-	-
CN1-10	GND	I	Ground terminal	GND	-

Note: Level conversion is required for connection to RS232.

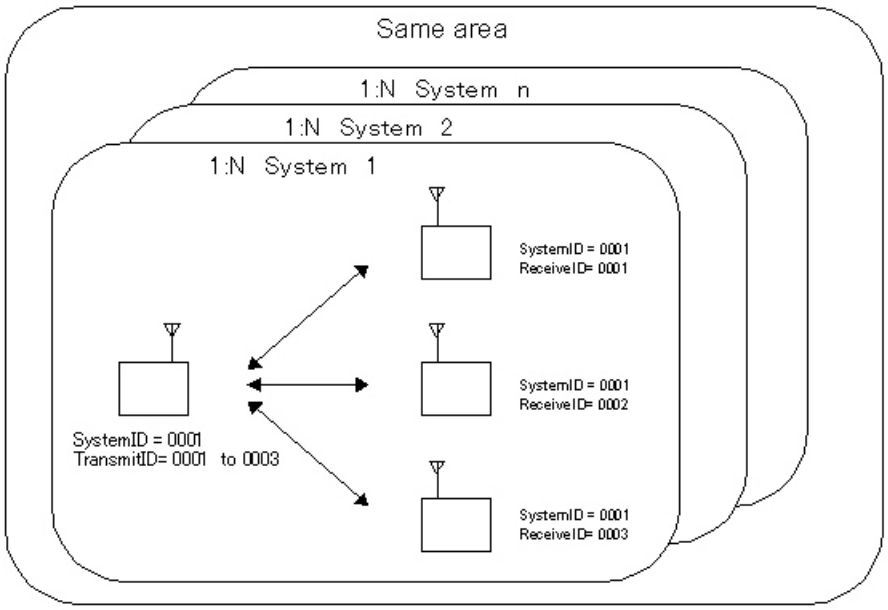
CN-2

Pin No.	Pin name	I/O	Description
CN2-1	GND	I	Ground terminal
CN2-2	GND	I	Ground terminal
CN2-3	/INI	I	Manufacturer test terminal Always set to open.
CN2-4	GND	I	Ground terminal
CN2-5	GND	I	Ground terminal

FUNCTIONS

Example system configuration

CCR units can be used for building 1:1 systems or 1:N systems. With 1:N systems, several systems can be operated within the same area.
By choosing system IDs at random as far as possible, you can avoid radio interference between CCR equipment of third parties.



Link ID & link conditions

Link ID
In order to transmit and receive data, CCR units have the following 3 types of 16-bit long link IDs.
Link IDs can be specified easily with commands, and they can be changed each time a data frame is sent.

1. System ID: 16-bit 0000-00FF — Sets a shared ID within the system
2. TX-ID: 16-bit 0000-FFFE — ID that specifies the transmitter, set to the same number as the RX ID of the destination.
3. RX-ID: 16-bit 0000-FFFF — Receiving ID of the receiver, that is compared with the TX ID included in the sent data.

Conditions for establishing a link
A data link is established between the transmitter and receiver only if the transmitter link ID and receiver link ID match.

Transmitter link ID (System ID + TX ID) = Receiver link ID (System ID + RX ID)

1:N system transmissions
1. Decide the system ID and set it for the transmitter and receiver.
2. Set the RX ID for the receiver in the system and ensure that it does not duplicate the RX ID of another receiver.
3. Decide the destination receiver for the data, and ensure that the TX ID for the transmitter and the RX ID for the destination receiver match.
4. Issue a data transmission command.
   A transmitter link ID is automatically assigned to the user data, and a radio wave is emitted.
5. Only if the receiver link ID and transmitter link ID match, the receiver within the system outputs data from the TxD terminal.

Note 1: By default, every CCR unit is set to '0000' for TX-ID, RX-ID and System-ID.
Note 2: The upper 8 bits of the 16 bits of the system ID are for factory use only and will not be disclosed to end users. The lower 8 bits can be set freely by the user. For details, refer to the command table.

MODE

CCR units have the following 3 modes.

1. Command mode (standard mode)
2. Text mode (for testing)
3. Binary mode (for testing)

Transmitting and receiving data is usually performed in the command mode. Use this mode in your application program. The text mode and binary mode are provided as testing modes, however you can also make applications within the range of these functions.

Command mode

This is the basic mode for sending and receiving using data wirelessly.
CCR unit commands consist of commands for transmitting and receiving data, and commands for control of the parameters of the CCR unit itself.
Control of the radio module is performed automatically by the CCR unit, so you do not need to pay attention to this aspect.
When data is received, only correctly received data is output to the user application as a receive response.
255 bytes of user data can be sent at one time.

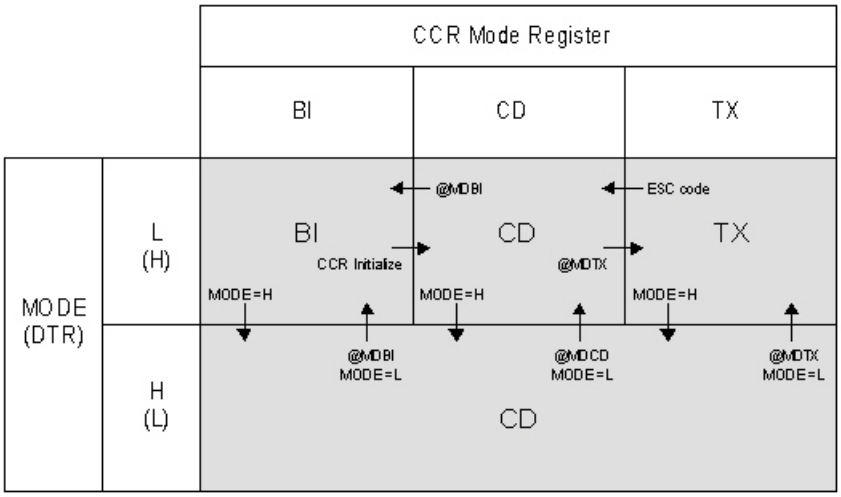
Text mode

This mode is used to check operation using RS-232C communication software (HyperTerminal and the like) on a PC. Text data can be input and output directly. This mode is convenient for transmitting and receiving characters entered using a keyboard.
The input character string (max. 255 characters) is buffered until the CRLF code is received, or the buffer is filled with 255 characters and the character string is framed and transmitted.

Binary mode

This mode is used to check operation using RS-232C communication software (HyperTerminal and the like) on a PC. All 8-bit codes (00H – FFH) can be transmitted/received as data. 225 bytes of binary data can be input or output directly at one time.
The input character string (max. 255 characters) is buffered until the buffer is filled with 255 characters, or until the value set for the period during which no data is input is reached, and the character string is framed and transmitted.

Diagram of the relationship between modes



Note: BI: Binary mode **CD:** Command mode **TX:** Text mode

Note: When using HyperTerminal, the DTR line is always at H level and the MODE terminal is at L level.

When the MODE terminal is at Low level

1. In the command mode if the @MDTX command is issued, the CCR unit mode register is set to TX, which is the text mode. Issuing the ESC code returns from the text mode to the command mode.
2. In the command mode if the @MDBI command is issued, the CCR unit mode register is set to BI, which is the binary mode. From the binary mode the CCR unit will not return to the command mode unless it is initialized. To initialize the CCR unit, turn on the power while pressing the RESET switch.
3. By setting the MODE terminal to High level, the CCR unit will be set to the command mode whatever the setting in the CCR unit mode register (irrespective of the current mode).

When the MODE terminal is at High level

1. The CCR unit is set to the command mode irrespective of the setting in the CCR unit mode register.

HOW TO DEVELOP A PROGRAM FOR A SYSTEM USING THE CCR

Control of the CCR unit is performed by issuing commands and processing the subsequent response (including the data received).
The CCR unit has 3 modes, however the only mode required for making practical applications is the command mode. The following explains the items necessary for developing a user program, focusing on the command mode.

CCR OPERATION & USAGE

Hardware

1. The radio transmission rate of the CCR unit is fixed as follows. Note that this is different from the rate of the UART (RS232) interface. In addition, besides the user data, data consists of a frame structure with a preamble, control data, error checking data and so on added in order to achieve communication.
   a. CCR-STD-302 9,600 bps
   b. Others 4,800 bps
2. RS (RTS) and CS (CTS) hardware flow control is used for the serial interface of the CCR unit.
   The RTS signal is the output signal from the CCR unit to the user system, and when RTS is Low the CCR can receive data. When RTS is High, the internal data buffer is full and it cannot receive.
   The CTS signal is the input signal from the user system, and when CTS is Low the CCR can output data. When CTS is high, data output stops.
3. The modes (command, text, binary) of the CCR unit are switched as follows.
   a. Switching between the command mode and binary mode
      To switch from the command mode to the binary mode, issue the @MDBI command, then set the MODE terminal to Low. To switch from the binary mode to the command mode, set the MODE terminal to High.
   b. b. Switching between the command mode and text mode
      To switch from the command mode to the text mode, issue the @MDTX command, then set the MODE terminal to Low.
      To switch from the text mode to the command mode, set the MODE terminal to High.
      To switch from the text mode to the command mode with the MODE terminal at Low, issue the ESC code (escape code: 1B hex).

Software

1. When transmitting and receiving user data frames, the CCR unit outputs only frames that are received normally, and discards those frames that experience errors. There is no response issued for such frames.
2. If the following link conditions are not met, the transmitter and receiver cannot communicate.
   a. Both devices have the same system ID.
   b. The RX ID of the receiver and the TX ID of the transmitter are the same.
   c. The channel used by the transmitter and the receiver are the same.
3. Transmission timing
   When transmitting data, if the channel selected is being used by other equipment, there is a possibility that the devices will not be able to communicate with each other due to interference. To avoid this, the user program should check whether the channel is being used before transmitting data, and radio waves should not be emitted if the channel is clearly being used. The RSSI level (field strength) reading command is used to check the channel.
   a. First set the transmission channel, and issue the CH command. Example: @CH00
   b. After checking the CH response, issue the RS command to read the RSSI level of the channel.
      Example: @RS
   c. Process the RS response.
      The RSSI level obtained with the RS response is an 8-bit AD converted value (hex) of the CCR control CPU.
4. CCR error response
   The CCR returns the error codes shown in the error code list.

Command transmission

Issuing commands

For example it is acceptable to feed the characters of a command such as @CH03$_{CRLF}$ to the UART sequentially.
Note @: @ (40 hex) = prefix $_{CRLF}$: CR (0D hex) = carriage return, LF (0A hex) = line feed

a. With the on-board CPU

To issue a command, first prepare the command data, then feed it to the UART 1byte at a time from the front. As the UART applies transmission interrupt with each byte transmitted, ensure that all bytes of the command are transmitted within that routine.
Example: With @CH20$_{CRLF}$
As transmission interrupt is applied automatically when the first @ is sent with discretionary timing, ensure that the next byte C is sent within the transmission interrupt routine. As transmission interrupt is stopped when all the characters within the command have been sent, obtain a suitable command size including a terminator, and keep the number of transmissions within that size.

b. With a program for OSs such as Windows

Feed already prepared command strings to an RS232 processing component or the like.

Issuing data transmission commands (DT)

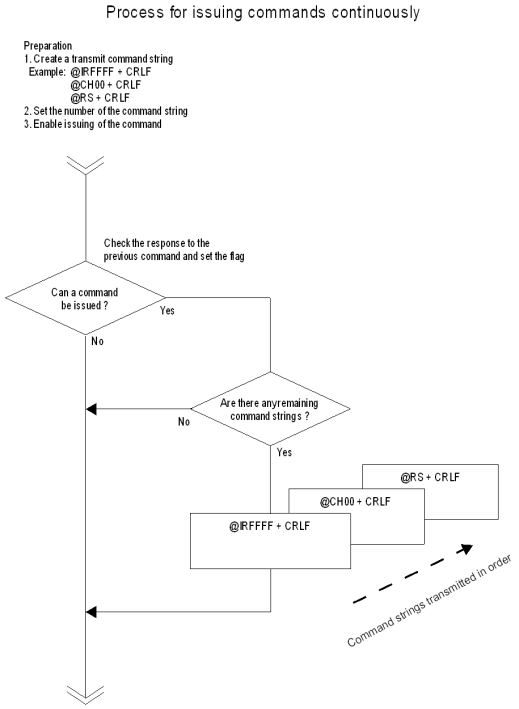
Example: With the 5-byte transmission data #%&45.

Make the command string @DT05#%&45$_{CRLF}$.
First obtain the 2 digit hex value for the number of bytes of the transmission data (#%&45), and put the DT command data size component in ASCII characters. The response is *DT=05$_{CRLF}$.
The CCR unit can send a data size of 255 bytes or less at one time.

Issuing commands continuously

You cannot issue commands successively as in @CH03$_{CRLF}$@IR003$_{CRLF}$@IT$_{CRLF}$. In other words, there is always one response corresponding to one command, and the next command should not be issued until this response has been confirmed.
The procedure is as follows.

1. Issue the command @CH03$_{CRLF}$ Confirm (process) the response *CH=03$_{CRLF}$.
2. Issue the command @IR0033$_{CRLF}$ Confirm (process) the response *IR=0033$_{CRLF}$.
3. Issue the command @IT$_{CRLF}$ Confirm (process) the response *IT=0005$_{CRLF}$.



Response reception

Responses
Responses are returned by the CCR unit in the following cases.

1. When a command is issued (control response)
2. When data is received from other radio equipment within the system (receive response = DR response)

Response structure
All responses start with the prefix '*', and the response name is the 2 ASCII characters of the corresponding command. The DR response is the response indicating the sent data, and it corresponds to the transmitting end DT command.
After the 2 character response name comes '=', followed by bytes that indicate a parameter, value or data.
At the end of the response, the 2 character terminator CRLF (0D, 0A hex) is appended.

Example: *CH=1B$_{CRLF}$ *IR=30AF$_{CRLF}$ *DR=0B66666666666$_{CRLF}$

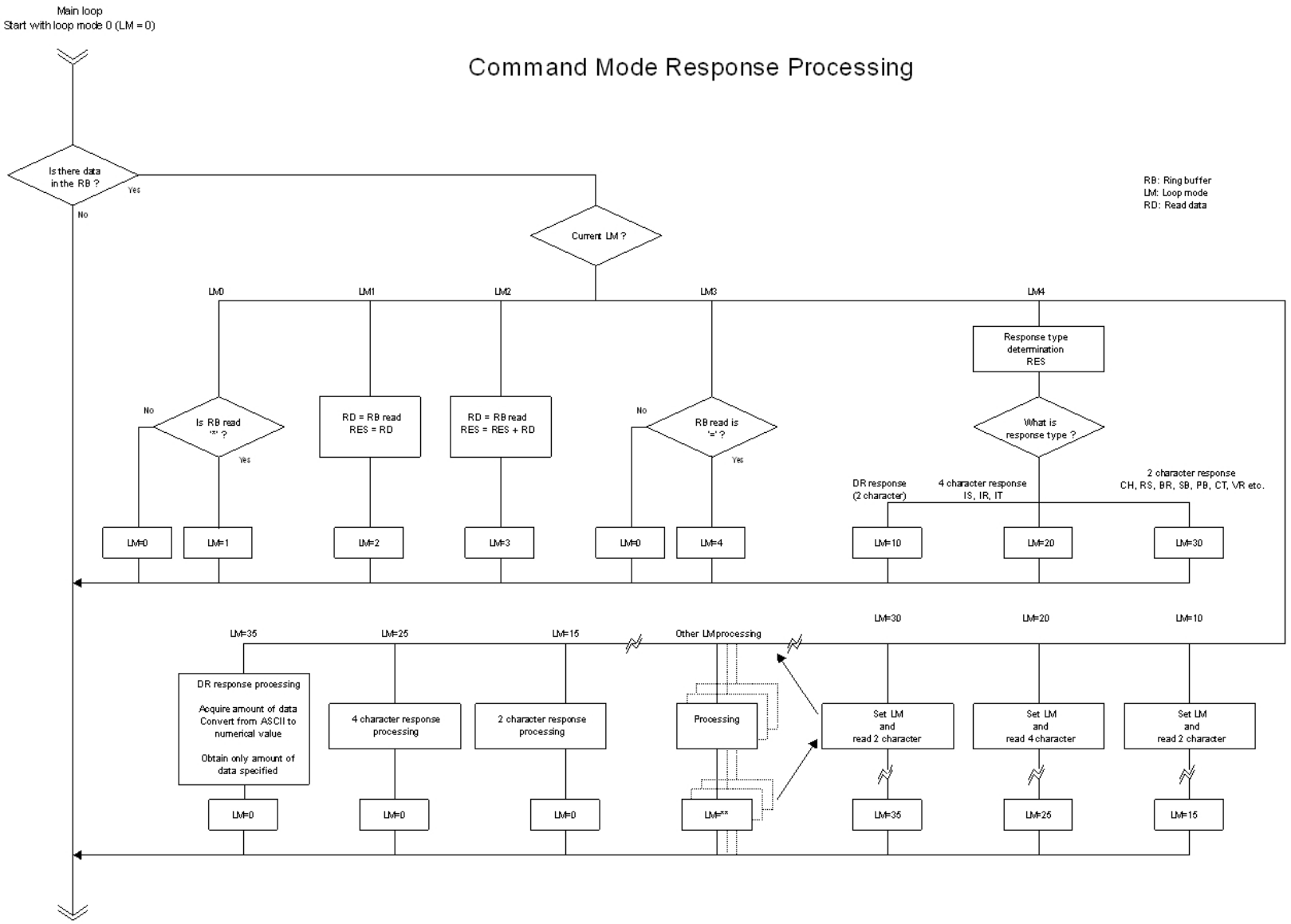
Response type
Responses consist of the following 3 types, and each type must be processed separately.

1. 2 character response: The response parameter is a 2 character response
   DT, CH, RS, BR, PB, SB, MD, TC, TB, CT, EM, ST, VR
   Example: Issue the command @CH2A Response: *CH=2A
   The value 2A consists of 2 ASCII characters that express a hexadecimal number

2. 4 character response: The response parameter is a 4 character response
   IS, IR, IT
   Example: Issue the command @IR800F Response: *IR=800F$_{CRLF}$
   The value 800F consists of 4 ASCII characters that express a hexadecimal number.

3. DR response: Response when data is received
   Example: When a reception response with 10 bytes (0A hex) is received.
   Response *DR=0A5555555555$_{CRLF}$
   The value 0A consists of 2 ASCII characters that express a hexadecimal number.
   After the data size comes the number of bytes of data indicated.

Response processing
First, the response data that enters the UART from the CCR unit is received by the ring buffer. If there is data in the ring buffer, the response identification routine takes 1 byte at a time and performs interpretation of the response. After, the processing routines diverge in accordance with each response.
To determine the response type, prepare a table of all responses, and make a comparative judgment.
It is convenient to use the table position number corresponding to the response to branch to the processing routine corresponding to the response.
Arrange the responses in the table divided into groups by response type.
Arrange the responses in the table divided into groups by type.
Example table:
Array ['DR', 'IT', 'IR', 'IS', 'DT', 'CH', 'RS', 'CA', 'MD', 'BR', 'SB', 'PB', 'TC', 'TB', 'CT', 'EM', 'VR', 'ER', 'ST']
Response values are ASCII strings that express a numerical value, so when using values, provide a routine to convert the ASCII characters into numerical values. For example, when data is received, the DR response value indicates the amount of user data received, so this is converted to a numerical value and the data is obtained with that value.


Main loop
Start with loop mode 0 (LM = 0)
Command Mode Response Processing
Is there data in the RB ?
Yes
No
RB: Ring buffer
LM: Loop mode
RD: Read data
Current LM ?
LM0
LM1
LM2
LM3
LM4
Response type determination RES
No
Is RB read '*' ?
Yes
RD = RB read
RES = RD
RD = RB read
RES = RES + RD
No
RB read is '=' ?
Yes
What is response type ?
DR response (2 character)
4 character response IS, IR, IT
2 character response CH, RS, BR, SB, PB, CT, VR etc.
LM=0
LM=1
LM=2
LM=3
LM=0
LM=4
LM=10
LM=20
LM=30
LM=30
LM=20
LM=10
LM=35
LM=25
LM=15
Other LM processing
DR response processing
Acquire amount of data
Convert from ASCII to numerical value
Obtain only amount of data specified
4 character response processing
2 character response processing
Processing
Set LM and read 2 character
Set LM and read 4 character
Set LM and read 2 character
LM=0
LM=0
LM=0
LM=**
LM=35
LM=25
LM=15

CREATING AN AIR MONITORING FUNCTION

The air monitoring function obtains the radio input level of the receiver and monitors the radio wave status of the field. The CCR unit can get the RSSI level of the designated channel by issuing the RS command.
The air monitoring function can be achieved by designating a special ID for obtaining the RSSI level as the RX ID (IR=FFFF), and outputting the RSSI level to the graph-making component and the like while obtaining the RSSI level of each channel sequentially.

Note:
When the transmitting and RX ID is FFFF, the system is reserved so the CCR unit performs special operations. When IT=FFFF, data cannot be transmitted, and when IR=FFFF, even if the link ID matches, received data is not output and only the RSSI level is output.
Setting the RX ID only once at the beginning is acceptable.

The procedure is as follows.
1. Issue the command @IRFFFF.
   This setting is made only once at the beginning.
2. Issue the command @CH##.
   Designate the channel whose RSSI level you will gather. ## is the hexadecimal value to express the channel.
3. Issue the command @RS.
   This obtains the RSSI level.
4. The RSSI level obtained is output as graph components and so on.
5. Repeat steps 2 to 4.

Note: Be sure to confirm the response to the CH command issued first before issuing the RS command.

ACHIEVING DATA TRANSMISSION

The CCR unit can send a data size of 255 bytes or less at one time. When transmitting data in excess of 255 bytes, you will need to incorporate a transmission protocol.
When transmitting and receiving user data frames, the CCR unit outputs only frames that are received correctly, and discards those frames that experience errors. There is no response issued for dropped frames.
When transmitting large volumes of data such as files, it is performed using two-way communication such as ARQ (Automatic Repeat Request), in order to provide measures against dropped frames caused by radio communication errors. Data frames include frame numbers and the like, and these are used as the criteria for ARQ.

Note:

Do NOT use commands not available to the CCR unit that you are using.

COMMAND & RESPONSE

The following types of CCR command and response are available.
1. Transmit command: Command issued to transmit user data.
2. Receive response: Response when the user data is received from the transmitter.
3. Control command: Command issued to control the CCR unit.
4. Control response: Response to the command issued.

Transmit command format

Prefix + command name + value + user data + terminator

Prefix: '@' = [40] hex, a code that indicates the front of the command string.
Command name: The 2 ASCII characters 'DT'. Specified with upper case or lower case characters.
Value: Specifies user data size with a hexadecimal number.
User data: Byte sequence of user data.
Terminator: A 2 character code that indicates the end of the command.
C$_R$ (carriage return: '**C**$_R$' = [0D] hex) + **L**$_F$ (line feed: '**L**$_F$' = [0A] hex)
In the explanation, the terminator is shown with C_RL_F ''.

Example command:

Command string	Hex code actually sent to the CCR unit
@DT06abc123**C**$_R$**L**$_F$	40,44,48,30,36,61,62,63,31,32,33,0D,0A

Receive response format

Prefix + response name + '=' + value + user data + terminator

Prefix: '*' = [2A] hex, a code that indicates the front of the response string.
Response name: The 2 ASCII characters 'DR'.
Value: 1 byte hexadecimal value to show the size of the user data. Specified by 2 ASCII characters.
User data: Byte sequence of user data.
Terminator: A 2 character code that indicates the end of the command.
C$_R$ (carriage return: '**C**$_R$' = [0D] hex) + **L**$_F$ (line feed: '**L**$_F$' = [0A] hex)

Receive response example:

Response character string	Hex code actually returned from the CCR unit
*DR=06abc123**C**$_R$**L**$_F$	2A,44,52,3D,30,36,61,62,63,31,32,33,0D,0A

Control command format

Prefix + command name + value + terminator

Prefix: '@' = [40] hex, a code that indicates the front of the command string.
Command name: 2 ASCII characters. Specified with upper case or lower case characters.
Value: Value corresponding to the relevant command.
Terminator: A 2 character code that indicates the end of the command.
C$_R$ (carriage return: '**C**$_R$' = [0D] hex) + **L**$_F$ (line feed: '**L**$_F$' = [0A] hex)

Example command:

Command string	Hex code actually sent to the CCR unit
@CH1F**C**$_R$**L**$_F$	40,43,48,31,46,0D,0A

Control response format

Prefix + command name + '=' + value + terminator

Prefix: '*' = [2A] hex, a code that indicates the front of the response string.
Command name: 2 ASCII characters for the received command.
Value: Result value corresponding to the relevant command.
Terminator: A 2 character code that indicates the end of the command.
C$_R$ (carriage return: '**C**$_R$' = [0D] hex) + **L**$_F$ (line feed: '**L**$_F$' = [0A] hex)

Command response example:

Response character string	Hex code actually returned from the CCR unit
*CH=1F**C**$_R$**L**$_F$	2A,43,48,3D,31,46,0D,0A

COMMAND OPTIONS

By specifying the option '/W' as continuation of a command, command value can be fixed in the EEPROM within the CCR unit.
The next time the power is turned on, the contents of the EEPROM are set to the initial values.

The commands that can specify the option '/W' are as follows.

CH, IT, IR, IS, BR, PB, SB, MD, TC, TB, CT, EM

Example: Fix the system ID at 0005 hex
Command to the CCR: **@IS**0005,0000/W**C**$_R$**L**$_F$
Response from the CCR: ***WR=**PS**C**$_R$**L**$_F$
***IS=**0005**C**$_R$**L**$_F$

Example: Set the channel to Ch10 and fix it in the EEPROM.
Command to the CCR: **@CH**10/W**C**$_R$**L**$_F$
Response from the CCR: ***WR=**PS**C**$_R$**L**$_F$
***CH=**10**C**$_R$**L**$_F$

COMMAND & RESPONSE TABLE

This is a list of CCR commands and responses. The commands marked with X cannot be used.

Transmit commands

Command type	Functions	Command & control response	Transceiver	Transmitter		Receiver	
			CCR-STD-302	CCR-CDP-TX-02NP	CCR-CDP-TX-04S	CCR-CDP-RX-02NP	CCR-CDP-RX-03AS
Transmit command	Transmission data input	@DT/*DT	O	O	O	X	X

Receive responses

Response type	Functions	Receive response	Transceiver	Transmitter		Receiver	
			CCR-STD-302	CCR-CDP-TX-02NP	CCR-CDP-TX-04S	CCR-CDP-RX-02NP	CCR-CDP-RX-03AS
Receive response	Receive data	*DR	O	X	X	O	O

Control commands & control responses

Command type	Functions	Control command & control response	Transceiver	Transmitter		Receiver	
			CCR-STD-302	CCR-CDP-TX-02NP	CCR-CDP-TX-04S	CCR-CDP-RX-02NP	CCR-CDP-RX-03AS
Communication parameter setting commands	Frequency channel	@CH/*CH	O	O	X	O	X
	RSSI level	@RS/*RS	O	X	X	O	O
	TX ID	@IT/*IT	O	O	O	X	X
	RX ID	@IR/*IR	O	X	X	O	O
	System ID	@IS/*IS	O	O	O	O	O
	Radio receiving level reference value	@SG/*SG	O	X	X	O	O
UART parameter setting commands	UART baud rate	@BR/*BR	O	O	O	O	O
	UART parity	@PB/*PB	O	O	O	O	O
	UART stop bit	@SB/*SB	O	O	O	O	O
CCR unit setting commands	Operation mode setting	@MD/*MD	O	O	O	O	O
	Command mode input waiting time	@TC/*TC	O	O	O	O	O
	No input in binary mode	@TB/*TB	O	O	O	X	X
	Link data continuous transmission	@CT/*CT	O	O	O	X	X
	Error display setting	@EM/*EM	O	O	O	O	O
	Radio module model name	@ST/*ST	O	O	O	O	O
	ROM version	@VR/*VR	O	O	O	O	O

COMMAND AND RESPONSE DETAILS

Transmit command

@DT Transmit data

@ + DT + data size + data + **C_RL_F**

Data size is specified by 2 hexadecimal ASCII characters.

The maximum data size that can be sent at one time is 255 bytes.

When the CCR receives the @DT command, it performs data transmission and returns a command response at the same time.

Format @DT##XXXXXX….XXXX**C_RL_F**

## :		data size shown in hexadecimal
XXX…XXX:	data	max. 255 bytes

Example: Transmit 20-byte data (14H) 012345ABCD@$%CIRCUIT

Command to the CCR: **@DT14**012345ABCD@$%CIRCUIT**$C_RL_F$**

Response from the CCR: ***DT=14C_RL_F**

Receive response

***DR** Receive data

When the CCR receives user data, the received data is output following the *DR response.

Example: Transmit 20-byte user data (14H) 012345ABCD@$%CIRCUIT

Response from the CCR: ***DR=14**012345ABCD@$%CIRCUIT**$C_RL_F$**

Control command & control response

@BR UART baud rate

Sets the UART baud rate

Default: 19

Value:	12 = 1,200 bps	24 = 2,400 bps	48 = 4,800 bps	96 = 9,600 bps
	19 = 19,200 bps	38 = 38,400 bps	57 = 57,600 bps	

Example: Change to 57,600 bps

Command to the CCR: **@BR**57**C_RL_F**

Response from the CCR: ***BR=**57**C_RL_F**

@CH Frequency channel

Default and channel settings: Refer to the item CHANNEL SETTING.

Sets the channel to be used. Specify the channel following @CH with 2 hexadecimal ASCII characters.

Example: Change the channel to 07CH

Input to the CCR: **@CH**07**C_RL_F**

Response from the CCR: ***CH=**07**C_RL_F**

@CT Link data continuous transmission

Continuously transmits link test data. When continuous transmission is enabled, the CRLF code is transmitted repeatedly from the CCR. If there is any input data during transmission, the data is transmitted.

Default: OF

Value: ON: Continuous transmission ON OF: Continuous transmission OFF

Example 1: Set to Continuous transmission ON

Input to the CCR: **@CT**ON**C_RL_F**

Response from the CCR: ***CT=**ON**C_RL_F**

Example 2: Set to Continuous transmission OFF

Input to the CCR: **@CT**OF**C_RL_F**

Response from the CCR: ***CT=**OF**C_RL_F**

@EM Error display setting (Refer to ERROR CODE LIST)
Sets the display of errors returned when a command is input either to code display or text display.
Default: CD
Value CD: Code display TX: Code and text display
Example 1: Change the error display to code display
Input to the CCR: **@EM**CD**C**$_R$**L**$_F$
Response from the CCR: ***EM=**CD**C**$_R$**L**$_F$
Example 2: Change the error display to text display
Input to the CCR: **@EM**TX**C**$_R$**L**$_F$
Response from the CCR: ***EM=**TX**C**$_R$**L**$_F$

@IR RX-ID Refer to /System-ID
Default: 0000
Value: 0000 - FFFF
(FFFF only is a special setting. When FFFF is set, the receiver outputs the RSSI level only and does not output the receive data.)
Example: Change the RX-ID to 1234
Input to the CCR: **@IR**1234**C**$_R$**L**$_F$
Response from the CCR: ***IR=**1234**C**$_R$**L**$_F$

@IS System-ID
Default: 0000
Value: 0000 - FFFF
System ID is common to transmission/reception and generates CCR link-ID code of 32 bits in a pair with the above-mentioned TX-ID or RX-ID. The system ID consists of 16 bits. However only the lower 8 bits can be changed by the user, in the range of 0000-00FF.
To change the system ID, it is necessary to input a 4-digit number in addition to the new ID setting. These 4 digits can be set freely.
Transmitting CCR unit ID: System-ID + TX-ID (total 32 bits)
Receiving CCR unit ID: System-ID + RX-ID (total 32 bits)
Example: Set the System-ID to 0012 (set the arbitrary 4-digit number to 0000)
Input to the CCR: **@IS**0012,0000**C**$_R$**L**$_F$
Response from the CCR: ***IS=**0012**C**$_R$**L**$_F$

@IT TX-ID Refer to /System-ID
Default: 0000
Value: 0000 - FFFE (Note that data is not transmitted when FFFF is set)
Example: Change the TX-ID to 00A5
Input to the CCR: **@IT**00A5**C**$_R$**L**$_F$
Response from the CCR: ***IT=**00A5**C**$_R$**L**$_F$

@MD CCR operation mode setting
Specifies the CCR operation mode.
Default: CD
Value CD: Command mode TX: Text mode BI: Binary mode

Note: No commands can be used except in the command mode (CD).

Example 1: Change to the text mode
Input to the CCR: **@MD**TX**C**$_R$**L**$_F$
Response from the CCR: ***MD=**TX**C**$_R$**L**$_F$

Example 2: Change to the binary mode
Input to the CCR: **@MD**BI**C**$_R$**L**$_F$
Response from the CCR: ***MD=**BI**C**$_R$**L**$_F$

@PB UART parity
Sets the UART parity with a parameter value following @PB.
Default: NO
Value: NO = None EV = even OD = odd
Example: Change to even parity
Input to the CCR: **@PB**EV**C**$_R$**L**$_F$
Response from the CCR: ***PB=**EV**C**$_R$**L**$_F$

@RS RSSI level
By inputting the @RS command, the received signal level of the currently set channel can be acquired.
Example: Acquire the current channel RSSI level
Input to the CCR: **@RSC**$_R$**L**$_F$
Response from the CCR: ***RS=**81**C**$_R$**L**$_F$ (RSSI level 00 – FF)

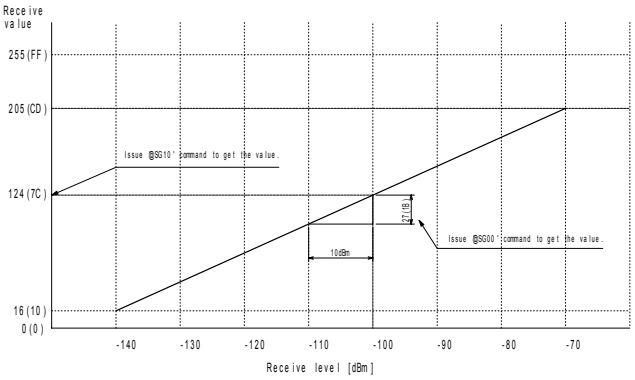
@SB UART stop bit
Sets the UART stop bit with a parameter value following @SB.
Default: 01
Value 01 = Stop bit 1 02 = Stop bit 2
Example: Change to Stop bit 1
Input to the CCR: **@SB**01**C**$_R$**L**$_F$
Response from the CCR: ***SB=**01**C**$_R$**L**$_F$

@SG Radio frequency received signal level reference value acquisition
Acquires the reference value in order to determine the radio frequency absolute received signal level.
When each CCR is shipped from the factory, the receive level at -100 dBm as measured with the SSG (standard signal generator) as the standard, and the gradient (increase in 10 dB steps) is written in the EEPROM. Using this value, the absolute level of received signal at the receiving channel can be determined.

Value:
13 = -130 dBm, 12 = -120 dBm, 11 = -110 dBm, 10 = -100 dBm, 90 = -90 dBm, 80 = -80 dBm, 70 = -70 dBm.
When 00 = -100 dBm is used as the reference, it acquires the gradient value.

Example:
Obtain the received signal level at -100 dBm.
Input to the CCR: **@SG**10**C**$_R$**L**$_F$
Response from the CCR: ***SG=**7C**C**$_R$**L**$_F$

Example:
Obtain the gradient of the CCR received signal level characteristics with the reference set at -100 dBm.
Input to the CCR: **@SG**00**C**$_R$**L**$_F$
Response from the CCR: ***SG=**1B**C**$_R$**L**$_F$



@ST Model name of the radio module mounted on the CCR unit
Obtains the model name of the radio module mounted on the CCR unit.
Value: 03: CDP-TX-02NP 433 MHz 04:CDP-RX-02NP 433 MHz
05: CDP-TX-04S 06: CDP-RX-03AS
07: STD-302 429 MHz 08: STD-302 434 MHz
09: STD-302 869 MHz
Example:
Input to the CCR: **@STC**$_R$**L**$_F$
Response from the CCR:
***ST=**03**C**$_R$**L**$_F$ (When the error display setting = CD)
***ST=**03**C**$_R$**L**$_F$: Module type CDP-TX-02NP 433 MHz**C**$_R$**L**$_F$ (When the error display setting = TX)

@TB No input in binary mode
When the length of time with no input exceeds the setting time, transmission of data in the buffer starts.
Default:10 hex (0.512 s)
Value: 01 – FF: 1 count = 32 ms
Example: Set to 20 hex (1.02 s)
Input to the CCR: **@TB**20**C**$_R$**L**$_F$
Response from the CCR: ***TB=**20**C**$_R$**L**$_F$

@TC Command mode input waiting time
If command input is not completed within the time set, the incomplete character string is canceled and the unit returns to the first input status.
Default: 00 hex(No limit for input time)
Value: 00 (No limit) 01 – FF: 1 count = 1.024 sec
Example: Set to 0A hex(10.24 s)
Input to the CCR: **@TC**0A**C**$_R$**L**$_F$
Response from the CCR: ***TC=**0A**C**$_R$**L**$_F$

@VR Program version
Obtains the program version of the CCR unit.
Example:
Input to the CCR: **@VRC**$_R$**L**$_F$
Response from the CCR: ***VR**=11 Ver1.1 2002/08/29 15:00**C**$_R$**L**$_F$

ERROR CODE LIST

Code	Description
ER=01	Command error:
ER=02	Channel data volume error
ER=03	Channel data error
ER=04	Channel data format error
ER=05	Tx data volume error
ER=06	Tx data format error
ER=07	Can not be in tx mode, rdy port high
ER=08	RSSI command format error
ER=09	Error message command format error
ER=0A	Baud rate format error
ER=0B	Write command format error
ER=0C	Mode command format error
ER=0D	Tx id data error
ER=0E	Tx id data format error
ER=0F	Rx id data error
ER=10	Rx id data format error
ER=11	TC data error
ER=12	TB data error
ER=13	Command input time over error
ER=14	Module type set command data error
ER=15	Tx continue command format error
ER=16	Pass word error
ER=17	System id data error
ER=18	System id data format error
ER=19	Car command format error
ER=1A	Parity command format error
ER=1B	Stop bit command format error

CHANNEL SETTING (: default)

The following table shows the channel number and corresponding radio frequency for each model of CCR.
Please note that the channel number of the CCR may differ from the channel number of the radio module. Please use the actual output radio frequency for identification.

CCR-CDP-TX-04S 433.920 MHz CCR-CDP-RX-03AS 433.920 MHz	
Channel	Frequency
Dec. (Hex)	
0(00)	433.920

CCR-CDP-TX-04S 434.920 MHz CCR-CDP-RX-03AS 434.920 MHz	
Channel	Frequency
Dec. (Hex)	
0(00)	434.075

CCR-CDP-TX-04S 869.750 MHz CCR-CDP-RX-03AS 869.750 MHz	
Channel	Frequency
Dec. (Hex)	
0(00)	869.750

Note:
Although CDP-TX-04S and CDP-RX-03AS are single channel radio modules, please specify 0 for the channel in the CCR unit.

CCR-CDP-TX-02NP 433 MHz CCR-CDP-RX-02NP 433 MHz		
Channel	Frequency	Frequency
Dec. (Hex)	Jumper ON	Jumper OFF
0(00)	433.875	433.900
1(01)	433.925	433.950
2(02)	433.975	434.000
3(03)	434.025	434.050
4(04)	434.075	434.100
5(05)	434.125	434.150
6(06)	434.175	434.200
7(07)	434.225	434.250
8(08)	434.275	434.300
9(09)	434.325	434.350
10(0A)	434.375	434.400
11(0B)	434.425	434.450
12(0C)	434.475	434.500
13(0D)	434.525	434.550
14(0E)	434.575	434.600
15(0F)	434.625	434.650

CCR-CDP-TX-02NP 458 MHz CCR-CDP-RX-02NP 458 MHz	
Channel	Frequency
Dec. (Hex)	Jumper ON
0(0)	458.525
1(01)	458.550
2(02)	458.575
3(03)	458.600
4(04)	458.625
5(05)	458.650
6(06)	458.675
7(07)	458.700
8(08)	458.725
9(09)	458.750
10(0A)	458.775

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Note 1: Please note that the channel number of CCR-CDP-TX-02NP and CCR-CDP-RX-02NP differ from the channel number of the radio module.
Note 2: For information about switching the jumper ON/OFF, refer to the CDP-02N manual.

CCR-STD-302 429 MHz					
Channel	Frequency	Channel	Frequency	Channel	Frequency
Dec. (Hex)	MHz	Dec. (Hex)	MHz	Dec. (Hex)	MHz
7(07)	429.2500	21(15)	429.4250	35(23)	429.6000
8(08)	429.2625	22(16)	429.4375	36(24)	429.6125
9(09)	429.2750	23(17)	429.4500	37(25)	429.6250
10(0A)	429.2875	24(18)	429.4625	38(26)	429.6375
11(0B)	429.3000	25(19)	429.4750	39(27)	429.6500
12(0C)	429.3125	26(1A)	429.4875	40(28)	429.6625
13(0D)	429.3250	27(1B)	429.5000	41(29)	429.6750
14(0E)	429.3375	28(1C)	429.5125	42(2A)	429.6875
15(0F)	429.3500	29(1D)	429.5250	43(2B)	429.7000
16(10)	429.3625	30(1E)	429.5375	44(2C)	429.7125
17(11)	429.3750	31(1F)	429.5500	45(2D)	429.7250
18(12)	429.3875	32(20)	429.5625	46(2E)	429.7375
19(13)	429.4000	33(21)	429.5750		
20(14)	429.4125	34(22)	429.5875		

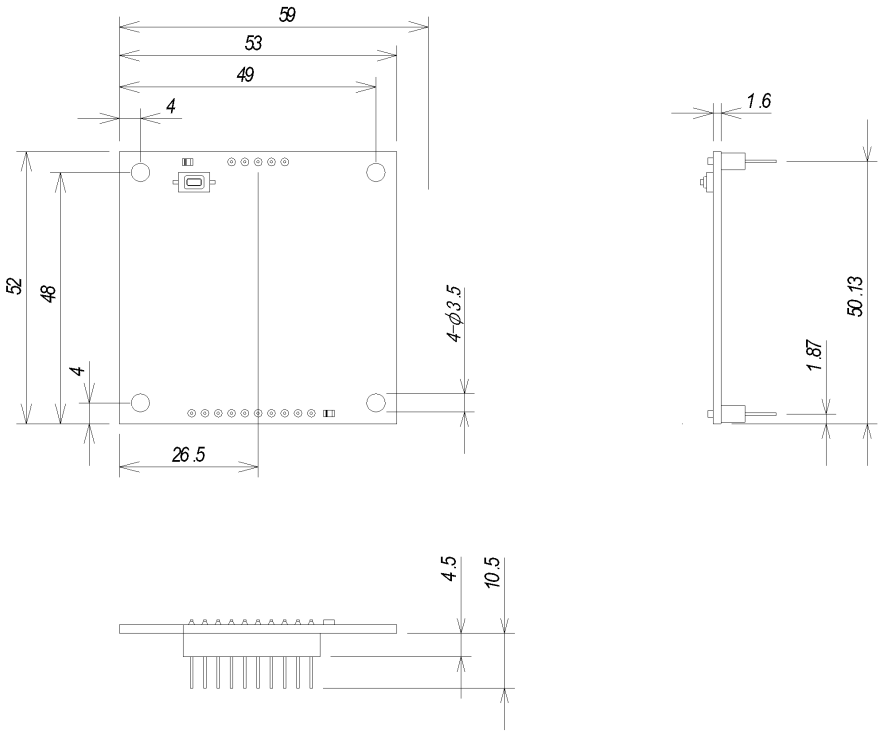
CCR-STD-302 434 MHz					
Channel	Frequency	Channel	Frequency	Channel	Frequency
Dec. (Hex)	MHz	Dec. (Hex)	MHz	Dec. (Hex)	MHz
0(00)	433.200	22(16)	433.750	44(2C)	434.300
1(01)	433.225	23(17)	433.775	45(2D)	434.325
2(02)	433.250	24(18)	433.800	46(2E)	434.350
3(03)	433.275	25(19)	433.825	47(2F)	434.375
4(04)	433.300	26(1A)	433.850	48(30)	434.400
5(05)	433.325	27(1B)	433.875	49(31)	434.425
6(06)	433.350	28(1C)	433.900	50(32)	434.450
7(07)	433.375	29(1D)	433.925	51(33)	434.475
8(08)	433.400	30(1E)	433.950	52(34)	434.500
9(09)	433.425	31(1F)	433.975	53(35)	434.525
10(0A)	433.450	32(20)	434.000	54(36)	434.550
11(0B)	433.475	33(21)	434.025	55(37)	434.575
12(0C)	433.500	34(22)	434.050	56(38)	434.600
13(0D)	433.525	35(23)	434.075	57(39)	434.625
14(0E)	433.550	36(24)	434.100	58(3A)	434.650
15(0F)	433.575	37(25)	434.125	59(3B)	434.675
16(10)	433.600	38(26)	434.150	60(3C)	434.700
17(11)	433.625	39(27)	434.175	61(3D)	434.725
18(12)	433.650	40(28)	434.200	62(3E)	434.750
19(13)	433.675	41(29)	434.225	63(3F)	434.775
20(14)	433.700	42(2A)	434.250		
21(15)	433.725	43(2B)	434.275		

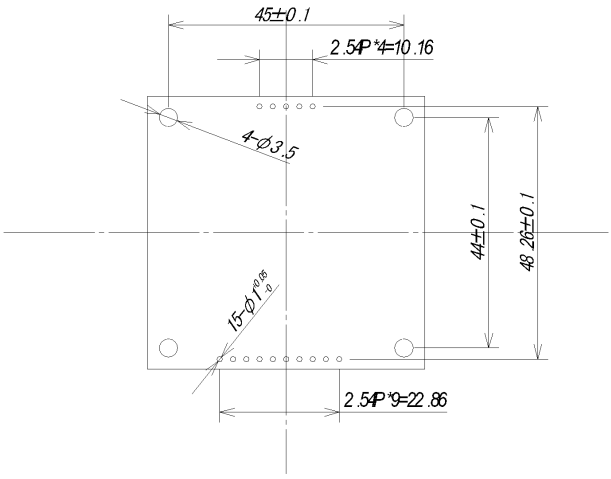
CCR-STD-302 869 MHz					
Channel	Frequency	Channel	Frequency	Channel	Frequency
Dec. (Hex)	MHz	Dec. (Hex)	MHz	Dec. (Hex)	MHz
0(00)	868.0000	28(1C)	868.7000	56(38)	869.4000
1(01)	868.0250	29(1D)	868.7250	57(39)	869.4250
2(02)	868.0500	30(1E)	868.7500	58(3A)	869.4500
3(03)	868.0750	31(1F)	868.7750	59(3B)	869.4750
4(04)	868.1000	32(20)	868.8000	60(3C)	869.5000
5(05)	868.1250	33(21)	868.8250	61(3D)	869.5250
6(06)	868.1500	34(22)	868.8500	62(3E)	869.5500
7(07)	868.1750	35(23)	868.8750	63(3F)	869.5750
8(08)	868.2000	36(24)	868.9000	64(40)	869.6000
9(09)	868.2250	37(25)	868.9250	65(41)	869.6250
10(0A)	868.2500	38(26)	868.9500	66(42)	869.6500
11(0B)	868.2750	39(27)	868.9750	67(43)	869.6750
12(0C)	868.3000	40(28)	869.0000	68(44)	869.7000
13(0D)	868.3250	41(29)	869.0250	69(45)	869.7250
14(0E)	868.3500	42(2A)	869.0500	70(46)	869.7500
15(0F)	868.3750	43(2B)	869.0750	71(47)	869.7750
16(10)	868.4000	44(2C)	869.1000	72(48)	869.8000
17(11)	868.4250	45(2D)	869.1250	73(49)	869.8250
18(12)	868.4500	46(2E)	869.1500	74(4A)	869.8500
19(13)	868.4750	47(2F)	869.1750	75(4B)	869.8750
20(14)	868.5000	48(30)	869.2000	76(4C)	869.9000
21(15)	868.5250	49(31)	869.2250	77(4D)	869.9250
22(16)	868.5500	50(32)	869.2500	78(4E)	869.9500
23(17)	868.5750	51(33)	869.2750	79(4F)	869.9750
24(18)	868.6000	52(34)	869.3000		
25(19)	868.6250	53(35)	869.3250		
26(1A)	868.6500	54(36)	869.3500		
27(1B)	868.6750	55(37)	869.3750		

OUTLINE DRAWING/MOUNTING DIMENSION DIAGRAM

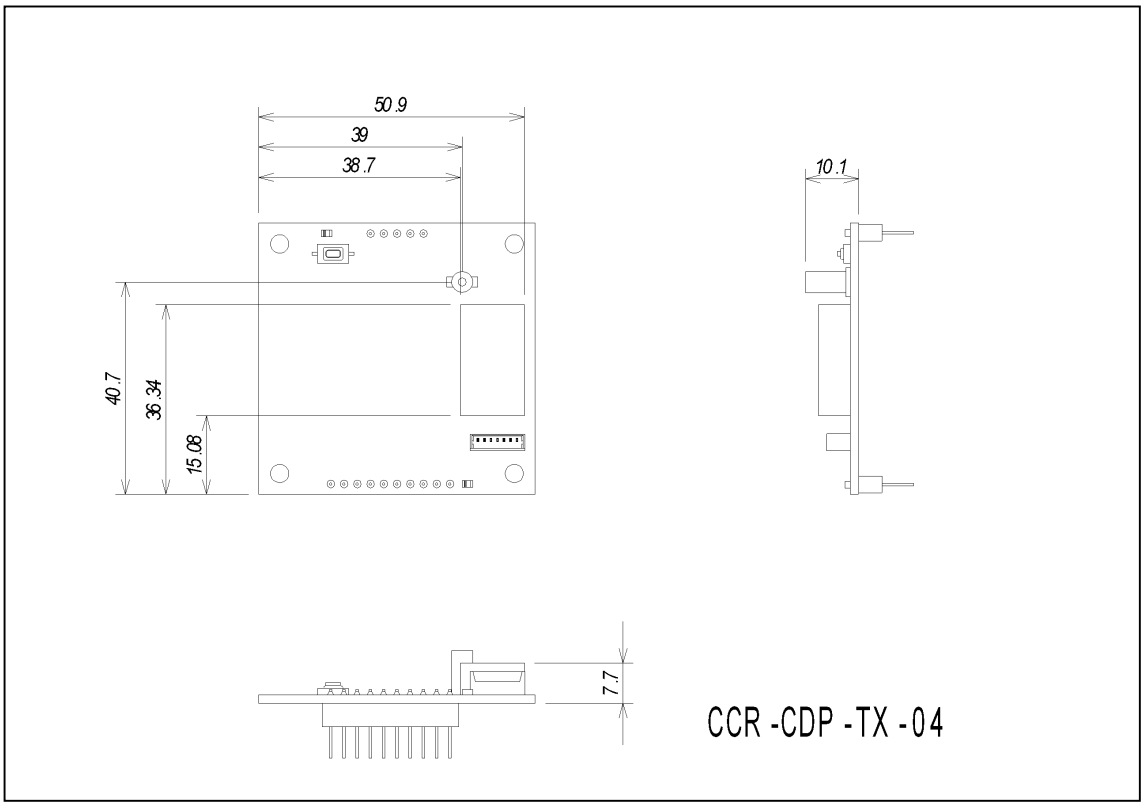
Outline drawing & mounting dimension diagram common to all CCR units

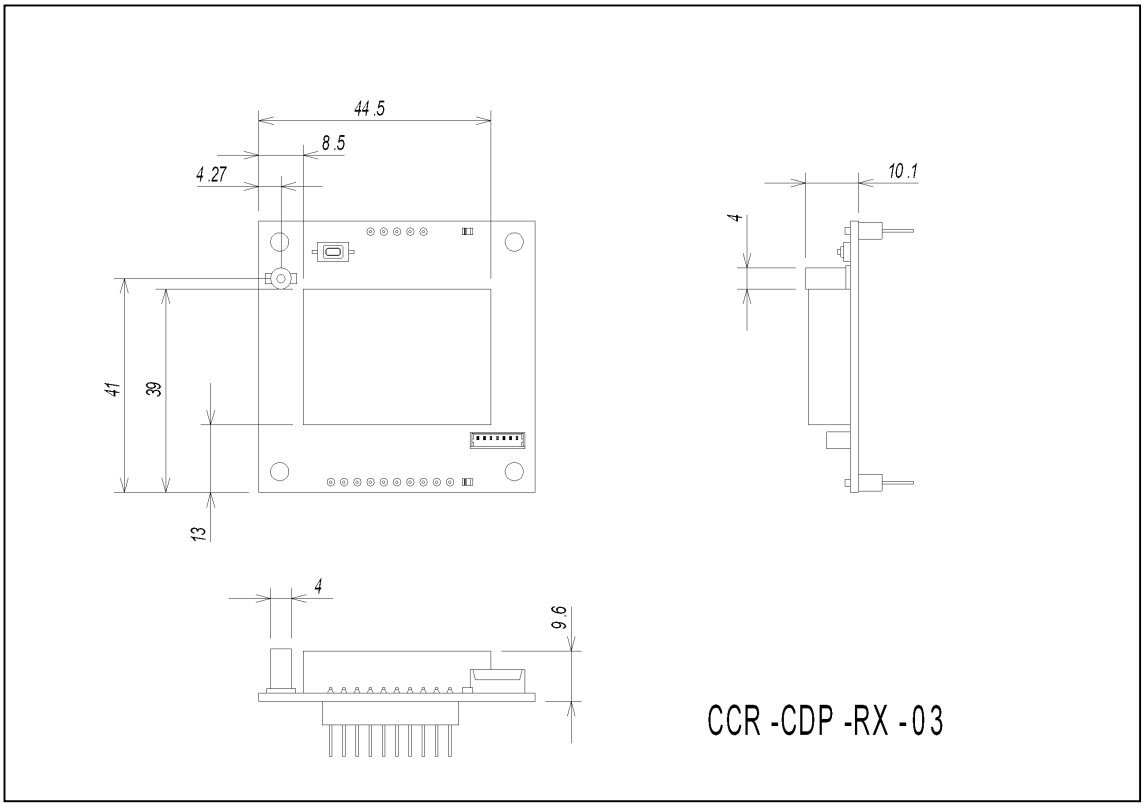
When attaching the CCR unit to a circuit board, make the area beneath the CCR ground pattern to ensure the widest possible ground area, and do not place components there in order to ensure the high frequency characteristics.

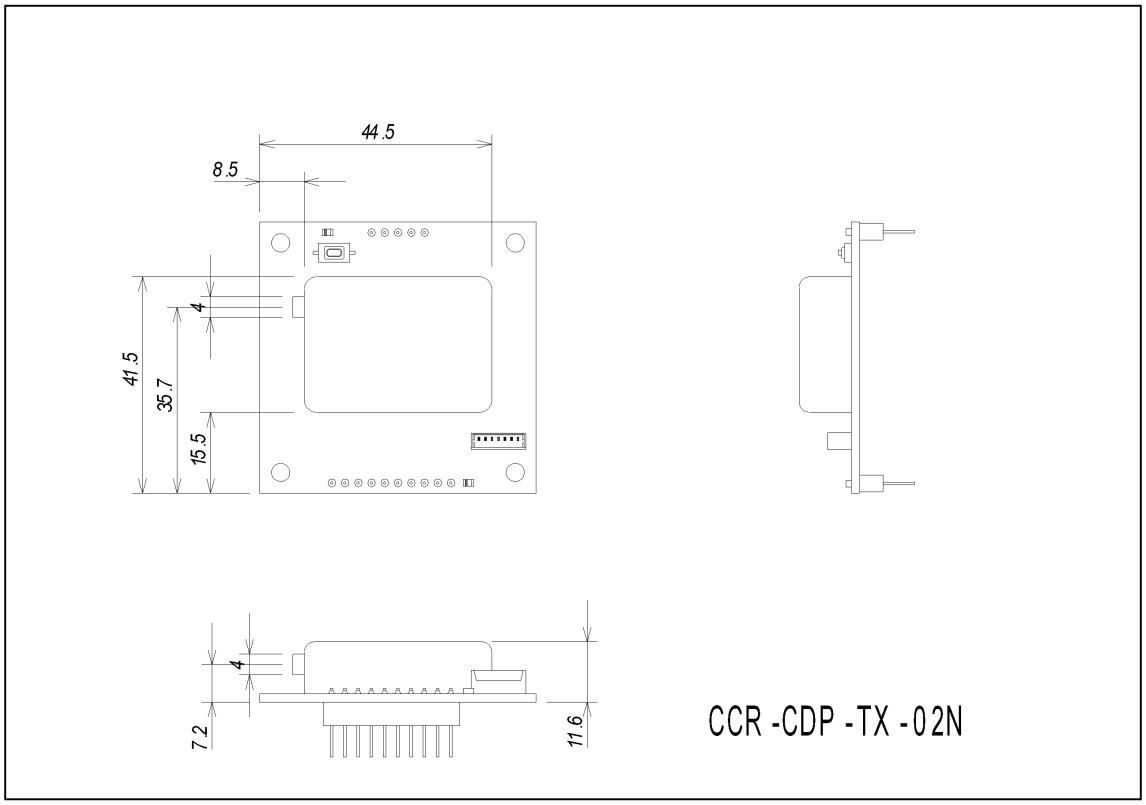


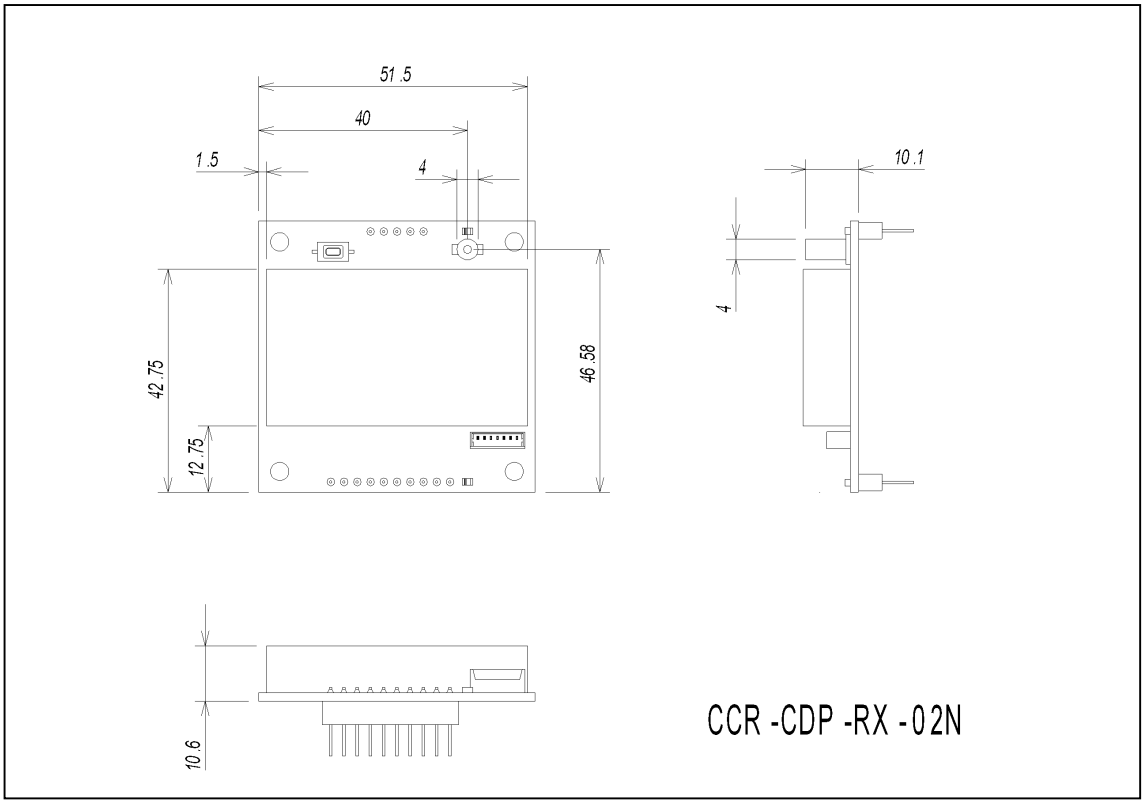


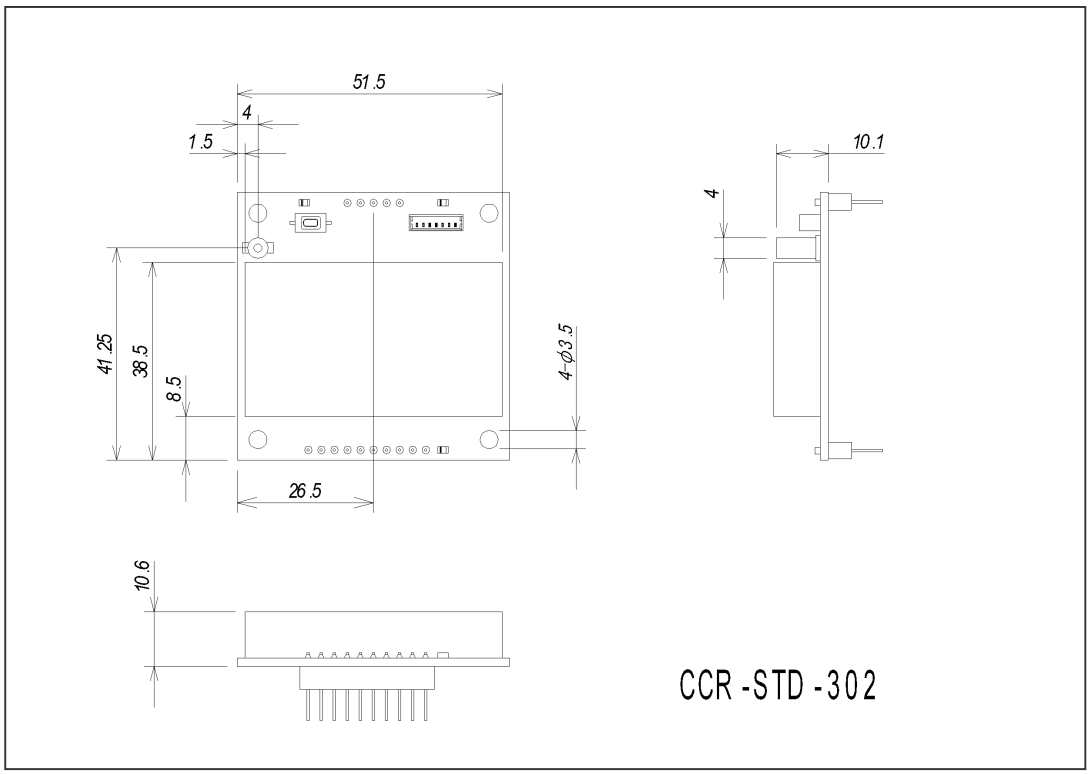
Individual outline drawings






44.5
8.5
41.5
35.7
15.5
4
4
7.2
11.6
CCR-CDP-TX-02N


51.5
40
1.5
4
10.1
4
42.75
12.75
46.58
10.6
CCR-CDP-RX-02N


51.5
4
1.5
10.1
4
41.25
38.5
8.5
4-φ3.5
26.5
10.6
CCR-STD-302

SIMPLE OPERATIONAL CHECK USING HYPERTERMINAL

Note: We recommend that you use the dedicated 'CCR evaluation program' for performing operational checks and evaluation of the CCR unit.

You can also perform a simple operational check using the Windows accessory HyperTerminal. The following is an explanation of how to use HyperTerminal, and cautions when using the program. Please read the detailed explanation of the commands before starting the evaluation.
When performing evaluation using a computer, mount the CCR unit on a UART-232C conversion board.

Preparing the CCR unit

Before starting the evaluation, turn on the power while pressing the RESET switch to initialize the CCR internal non-volatile memory. The initial values of the parameters are as follows.

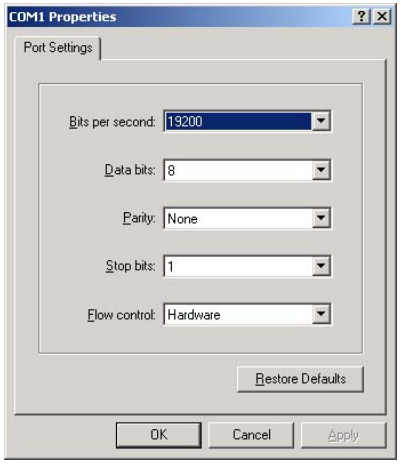
Initial values for communication parameters
System ID = 0000, TX ID = 0000, RX ID = 0000
Channel CH = 00
Initial values for RS232 related parameters
Baud rate: 19,200 bps, Data bits: 8 bits, Parity: none,
Stop bit: 1, Flow control: RTS, CTS hardware control

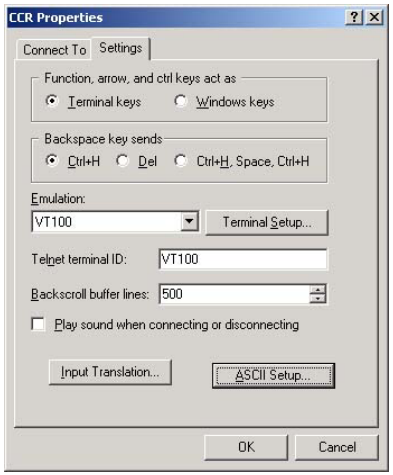
Note: Initialization using the RESET switch initializes all of the CCR unit parameters, so do not press it for any other reason than initialization.

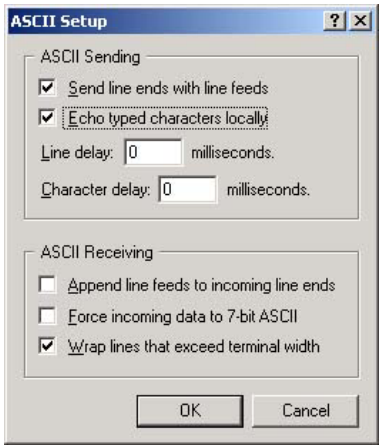
Evaluation using HyperTerminal

Start up HyperTerminal, then set the communication parameters using the example shown at right for reference.
Refer to the Cautions for important information.
Issue the various commands from the keyboard.
Refer to the section on modes for evaluating the different modes.

HyperTerminal settings







Cautions when using HyperTerminal

1. *CRLF* in the detailed explanation of commands means the "Enter" key on the computer keyboard. When testing the commands with HyperTerminal or the like, press the "Enter" key for CRLF. However, the "Enter" key on the number keypad outputs 'CR' in HyperTerminal, so it should not be used.
2. With HyperTerminal, pressing a key outputs the corresponding code, so the "Backspace" key and "Delete" key should not be pressed.
3. With HyperTerminal, the DTR line is always fixed at High Level and cannot be controlled

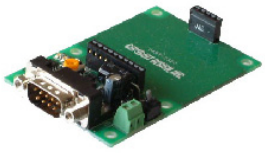
EVALUATION KIT

The evaluation kit allows you to perform various evaluations from a computer (Windows) using the RS232 interface.

EVALUATION KIT COMPONENTS

UART-RS232 conversion board (CCR-UTR-01) 2
Evaluation software (on CD) 1
CCR operation guide (on CD)
RS232 straight cable 1.8 m x 2
9 v battery holder 2
Note: Battery not included

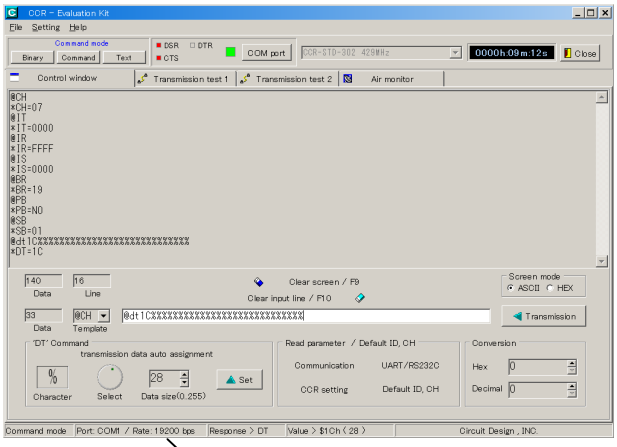

Operation guide/Software CD x 1

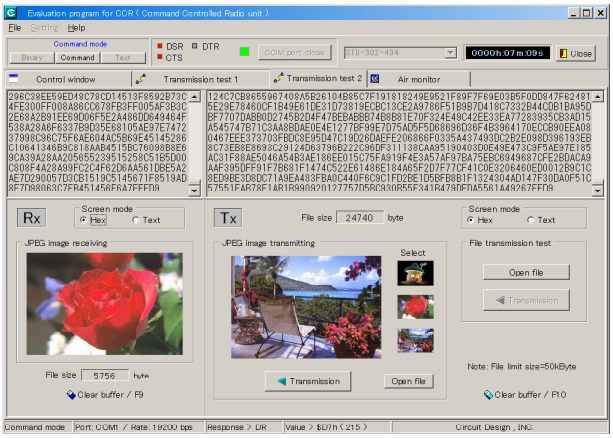

UART-RS232 conversion board x 2

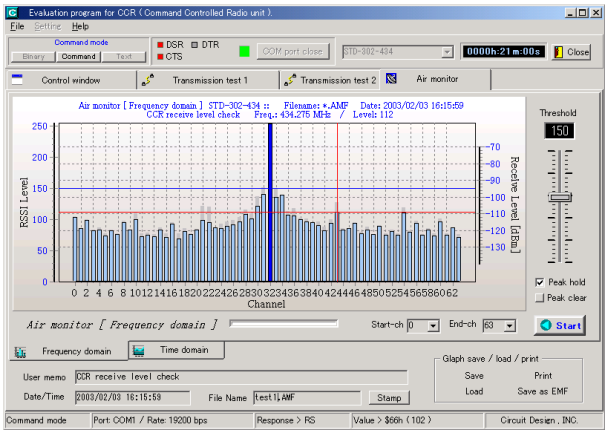

RS232 cable x 2

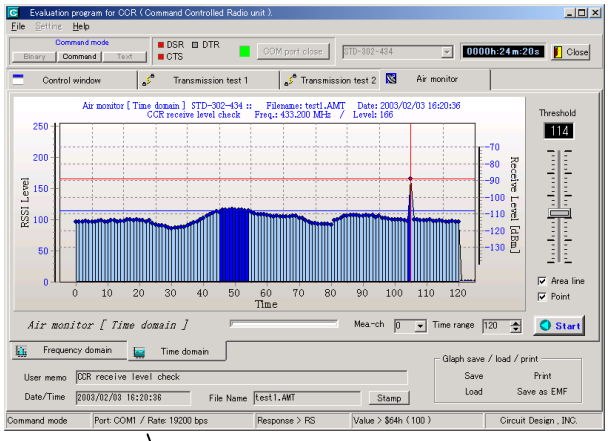

Battery holder x 2

Evaluation software screens


Control window


Transmission test


Air monitoring function
Frequency Domain


Air monitoring function
Time Domain

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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