

UHF Narrow band radio data module

CDP-RX-07M 434MHz
CDP-RX-07MP 434MHz**Operation Guide**

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GENERAL DESCRIPTION & FEATURES

General description

The CDP-RX-07M and CDP-RX-07MP are low power narrow band FSK receiver modules.

Double super heterodyne receiver with high reception sensitivity provides stable long distance communication.

Using a TCXO as the reference oscillator circuit of the radio component ensures high frequency stability and a wide operating temperature range from -20°C to $+65^{\circ}\text{C}$.

The CDP-RX-07M is compatible with the CDP-RX-05M-R in shape and function, and provides equivalent performance.

The RF channel is selectable from four preset frequency channels and set by the solder jumpers on the bottom side of the module and with the CDP-RX-07MP, it can also be set through the connector pins.

Furthermore, with the CDP-RX-07MP, the user can reprogram each channel with a frequency selected from 67 frequencies in the 434MHz band using a dedicated setting program. For details of the dedicated setting program and how to reprogram the frequency channels, refer to the application note "*How to reprogram the preset frequencies of the CDP-TX-07MP/CDP-RX-07MP*".

Features

- Low power narrow band FSK - 25 kHz channel spacing
- 4 preset RF channels
- Low voltage operation
- Wide operating temperature range (-20°C to $+65^{\circ}\text{C}$) / TCXO built in
- High receiver sensitivity for long range applications - 600 m or more at line of sight
- High reliability for industrial applications - robust metal housing, high selectivity and shock resistance
- Compact size
- RSSI (Received Signal Strength) output
- RoHS / RED compliant
- EN 300 220 Receiver category 1

Applications

- Industrial remote control
- Security / Alarms
- Telemetry / Monitoring systems
- Tracking systems

SPECIFICATIONS

All ratings at 25°C +/- 5°C unless otherwise noted

Item	Specification								
Applicable standard	EN 300 220 (Receiver category 1)								
Communication form	One way								
Oscillation system	Crystal based PLL oscillation								
Number of channels	4								
Frequencies [MHz]	<table border="0"> <tr> <td>CH 3*</td> <td>434.0750 *</td> </tr> <tr> <td>CH 2</td> <td>433.9200</td> </tr> <tr> <td>CH 1</td> <td>434.6000</td> </tr> <tr> <td>CH 0</td> <td>434.7000</td> </tr> </table>	CH 3*	434.0750 *	CH 2	433.9200	CH 1	434.6000	CH 0	434.7000
CH 3*	434.0750 *								
CH 2	433.9200								
CH 1	434.6000								
CH 0	434.7000								
* Factory default frequency channel setting. Frequency setting can be done with the jumpers and also the channel select pins are available with the CDP-RX-07MP. For details, refer to PIN DESCRIPTION.									
Frequency stability	< +/- 2.5 ppm (-20 to + 65 °C, reference frequency = 25 °C)								
Aging rate	< +/- 1 ppm / Year								
Initial frequency tolerance at delivery	< +/- 1.5 ppm (within 1 year after the final adjustment)								
Pulse width	208 us - 20 ms								
Data rate (FSK)	100 - 4,800 bps								
Operating temp. range	-20 °C to + 65 °C								
Demodulation	FM Narrow								
Sensitivity (12dB/SINAD at CCITT filter)	-120 dBm								
Sensitivity (BER <0.1 %)	-115 dBm								
Selectivity	+/-5 kHz at -6 dB point								
Adjacent CH selectivity	45 dB								
Spurious radiations	< -60 dBm								
Distortion (AF output)	< 5 % at 1 kHz								
S/N ratio (AF output)	45 dB								
AF Output level (Fm=1KHz)	-10.5 dBm (Fmod=+/- 3 KHz)								
Data output	Digital output, pulled up to Vcc (22 k ohm)								
Other outputs	RSSI, AF								
Supply Voltage	3.0 to 14 V DC								
Supply current (Typ. at 3.0V)	23 mA (Typ.)								
I/O terminals	Ant, Gnd, Vcc, Dataout, AFout, RSSIout, Power Control Channel select (CDP-RX-07MP)								
Dimensions	36 X 26 X 8 mm								
Weight	13 g								

CDP-RX-07MP reprogrammable frequency channels

Each of the 4 preset channels are reprogrammable using values chosen from a frequency table containing 67 values that consists of 433.920 MHz and values from 433.075 MHz to 434.700 MHz with 25 kHz spacing.

To reprogram the preset channels, a dedicated setting program is provided.

For details, refer to the application note "How to reprogram the preset frequencies of the CDP-TX-07MP/CDP-RX-07MP".

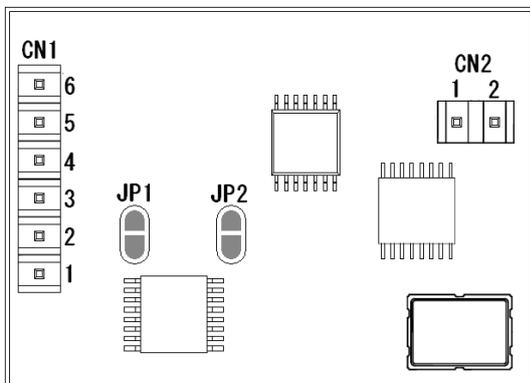
PIN DESCRIPTION

Common to CDP-RX-07M and CDP-RX-07MP

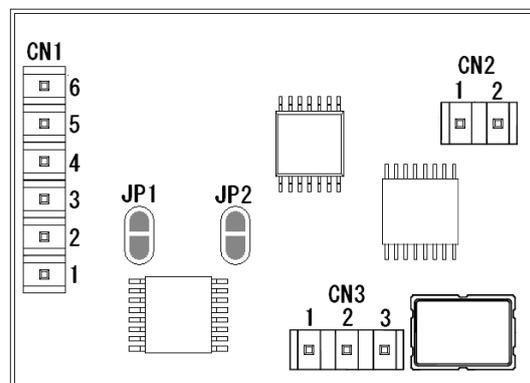
Pin-No.	Pin-Name	I/O	Description	Equivalent internal circuit
CN1-1	DATA	O	The data signal output The terminal is pulled up with a resistor. The output signal level is 0 to Vcc.	
CN1-2	AF	O	The AF signal output terminal The signal output level is -10.5dBm typ. (Fm=1 kHz /Fmod=+/-3 kHz, 100 k ohm)	
CN1-3	RSSI	O	The receiving level output The level indicates the strength of RF level. Note that the output voltage may be reduced depending on the load impedance to be connected.	
CN1-4	CTRL	I	The power on/off control terminal (Low active). A voltage of VCC-1.8 V or lower voltage makes the circuit active and VCC-0.6 V or higher disables the circuit. Please control this terminal with an open-collector or open-drain output. Note that leakage current will flow if there is a potential difference between VCC and the CTRL. Do not apply a voltage of VCC+0.3 V or higher to the CTRL pin.	
CN1-5	VCC	-	The power supply terminal. Operates on 3.0 to 14 V.	
CN1-6	GND	-	The ground. Connect to the ground of the control board.	
CN2-1	ANT		The antenna terminal Connect an antenna with 50 ohm impedance.	
CN2-2	GND	-	The ground terminal for the antenna.	
	JP1	I	Solder jumpers for frequency channel setting. This terminal is pulled-up to the internal power supply. Ch3 (JP1-Open JP2-Open) Ch2 (JP1-Short JP2-Open) Ch1 (JP1-Open JP2-Short) Ch0 (JP1-Short JP2-Short)	
	JP2			

CDP-RX-07MP

Pin-No	Pin-Name	I/O	Description	Equivalent internal circuit
CN3-1	S1	I	<p>Channel selection terminals. The S1 and S2 are internally connected to JP1 and JP2, respectively. Set the terminal to Open or Gnd-Short to select the channel.</p> <p>Ch3 (S1-Open S2-Open) Ch2 (S1-Short S2-Open) Ch1 (S1-Open S2-Short) Ch0 (S1-Short S2-Short)</p>	
CN3-2	S2	I	<p>Do not apply a voltage exceeding the internal voltage 2.7V+0.3V. Also, do not apply a voltage when the circuit power is off.</p> <p>Via S1 and S2, the user can reprogram the 4 frequency channels to preset by using a dedicated setting program. For details of how to reprogram the preset channels, refer to the application note.</p>	
CN3-3	MODE	I	<p>Normally leave this terminal open.</p> <p>Setting this terminal to Low enables the user to reprogram the 4 preset channels by using a dedicated setting program. For details of how to reprogram the preset channels, refer to the application note.</p>	



CDP-RX-07M



CDP-RX-07MP

OPERATING INSTRUCTIONS

Supply voltage

The CDP-RX-07M contains a voltage regulator to guarantee stable performance in the given range of supply voltage. It is designed to operate on batteries and operates with low voltage and low current consumption. The supply voltage must be within the specified voltage range. The module shows an unstable operation with the lower voltage specified.

If there is a lot of power supply noise, or if there is a noise source nearby, receiver performance such as sensitivity may be degraded.

Data format

The maximum data rate is 4800 bps. The maximum pulse width for continuous High and Low signal is 20 ms (96 bits) at 4800 bps. The minimum pulse width is 208 us.

Long intervals of HIGH or LOW bits should be avoided. Succeeding bits can be distorted in their pulse width. If the sequence of HIGH or LOW bits is too long then there is a possibility that the logic level of the data output will change.

It is good to have a 20bit preamble (1010...) in front of the data to ensure communication reliability.

Inputs/Outputs

The CDP-RX-07M has 3 output terminals (AF, DATA and RSSI) and one input terminal (CTRL).

The AF output is the analog output from the FM detector circuit.

The DATA output is a digital output. This is the signal after AF signals pass through a band pass filter and comparator. The output signal level is 0 to Vcc and can be easily connected to other digital circuits.

The RSSI output is an indicator of the received signal strength. The stronger the received signal is, the higher voltage is output. There is individual variability in the output level of the RSSI signal. Also it should be noted that the output voltage may be reduced depending on the load impedance to be connected.

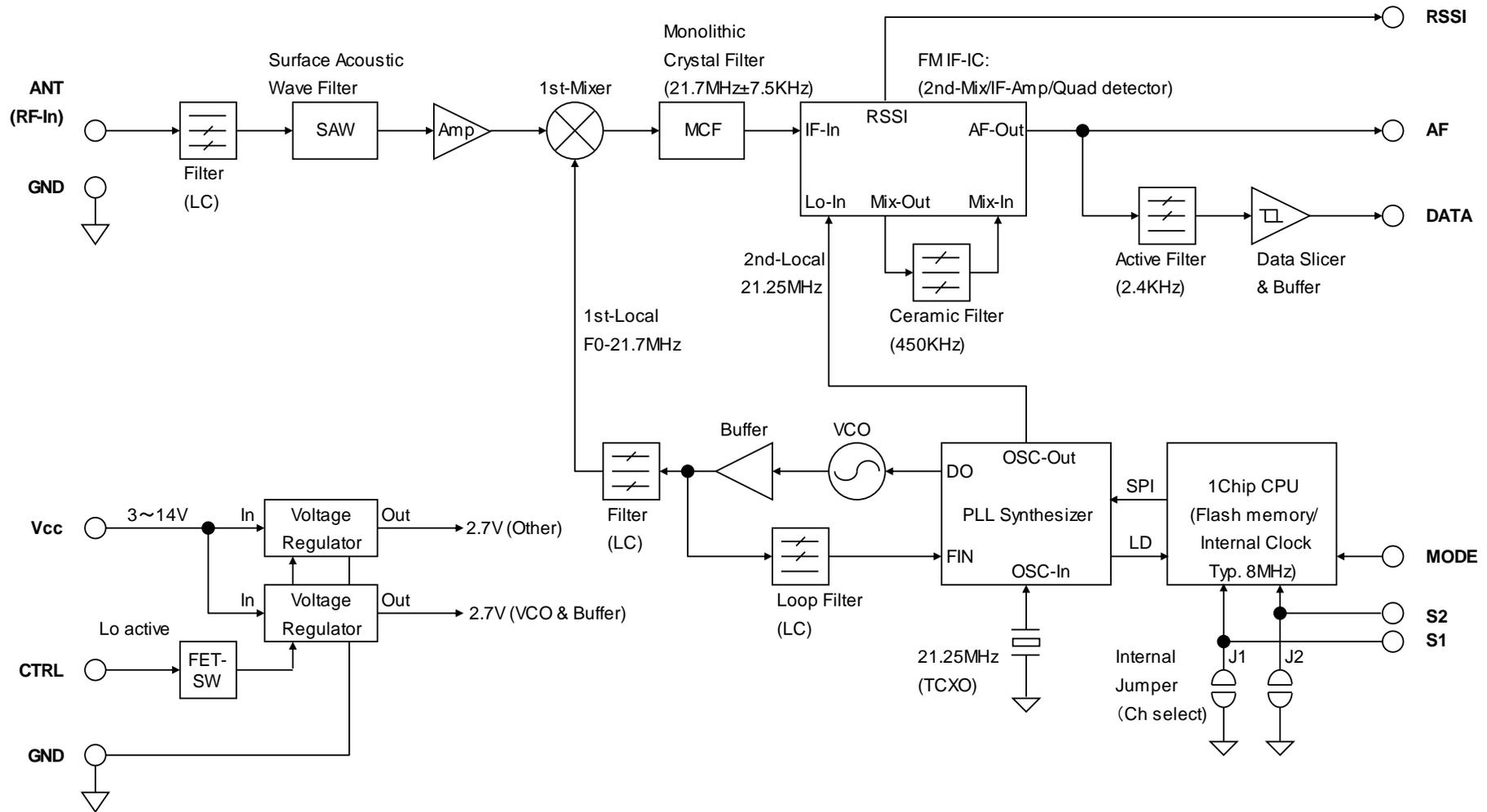
The CDP-RX-07M does not have a built-in mute circuit. The AF and DATA outputs will show noise on the outputs when no signal is received. Valid data signals can be detected by utilizing the RSSI output to configure a mute circuit.

The CTRL input can be used to control the internal voltage regulator and turn on/off the power supply to the internal circuit. Normally, use this terminal as Open or Gnd-short.

Antennas

Connect an antenna of 50 Ω impedance according to the frequency to be used. Note that the performance of the antenna changes significantly depending on the connection condition, shape, and surrounding environment, and it affects the reception sensitivity and distance.

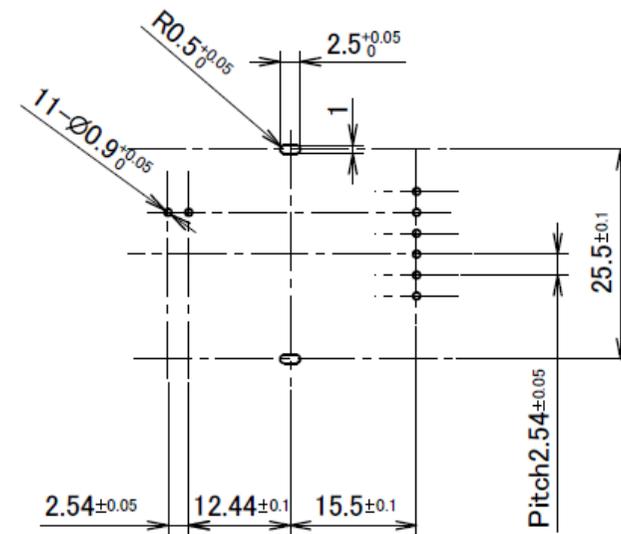
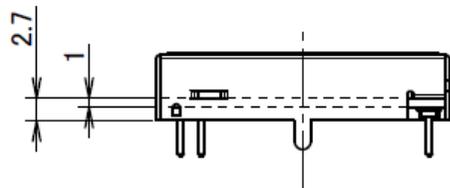
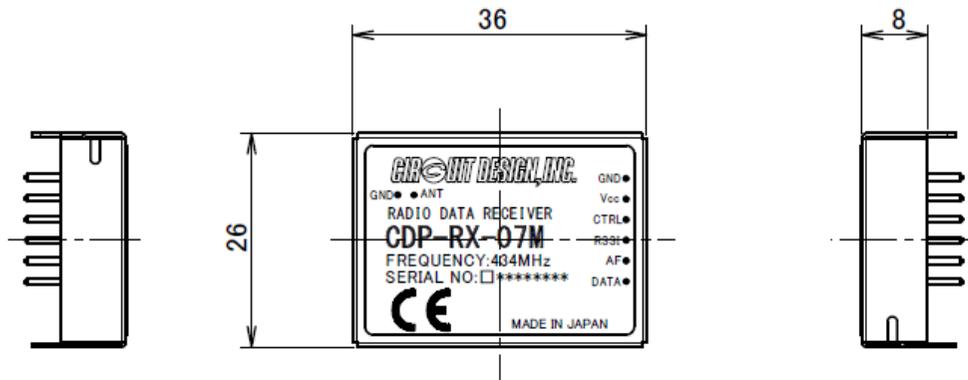
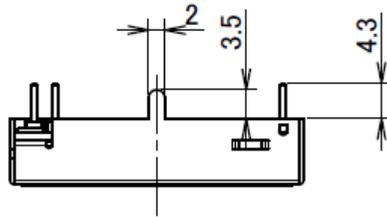
BLOCK DIAGRAM



S1/S2/MODE: CDP-RX-07MP only.

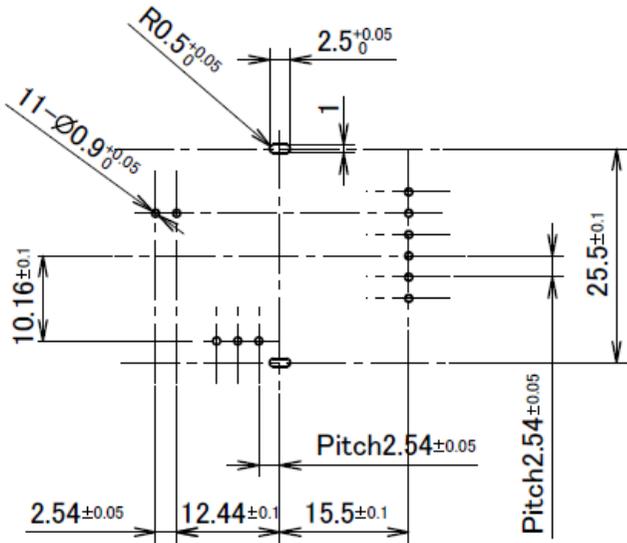
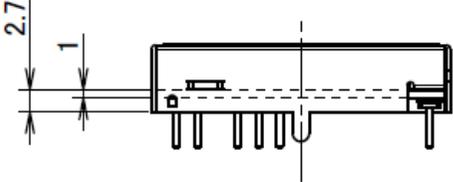
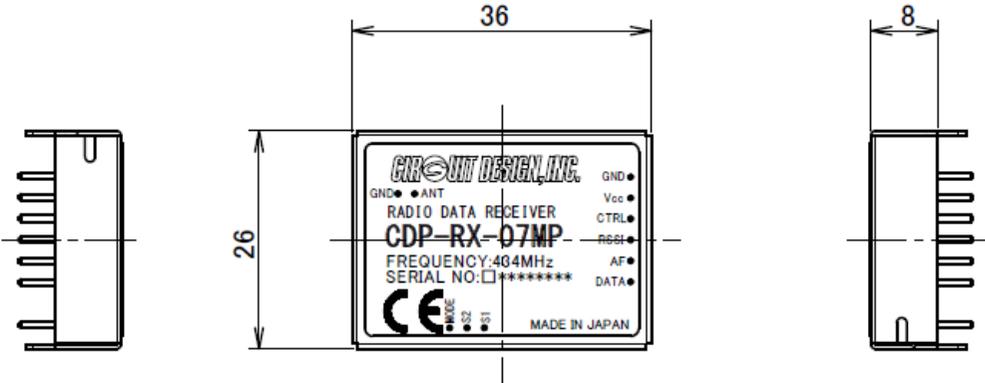
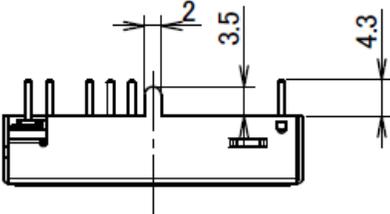
DIMENSIONS

CDP-RX-07M



Top view

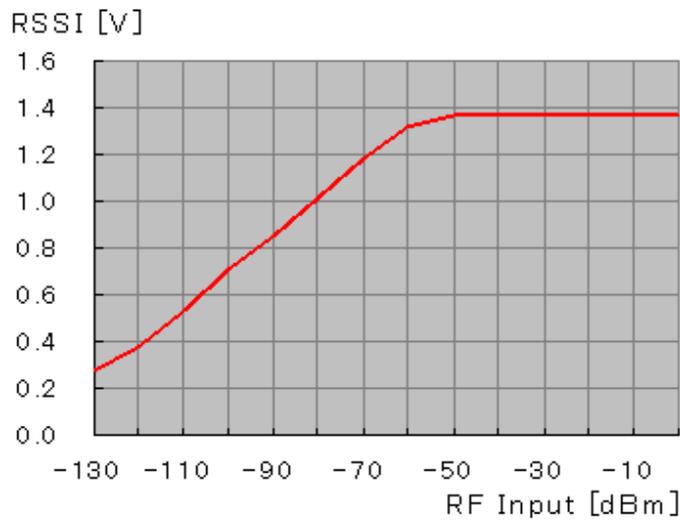
CDP-RX-07MP



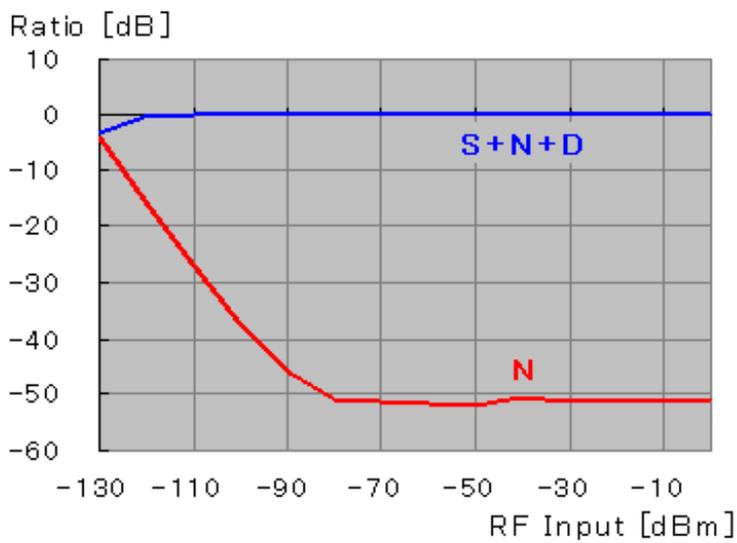
Top view

TEST DATA

RSSI rising



S/N ratio



Regulatory compliance information

Declaration of Conformity

Hereby, Circuit Design, Inc. declares that the CDP-RX-07M and CDP-RX-07MP are in compliance with RE Directive (2014/53/EU).

The full text of the EU Declaration of Conformity is available at www.circuitdesign.jp.

Cautions related to regulatory compliance when embedding the CDP-RX-07M and CDP-RX-07MP

To fulfill the requirements of EMC and safety requirements, the CDP-RX-07M and CDP-RX-07MP should be mounted on the circuit board of the final product and must be enclosed in the case of the final product. No surface of the module should be exposed.

Conformity assessment of the final product

The manufacturer of the final system needs to conduct full EMC testing in the final configuration and also ensure the final product fulfills the health and safety requirements and is also responsible for the conformity assessment procedures of the final product in accordance with the RE Directive.

Important notice

- Customers are advised to consult with Circuit Design sales representatives before ordering. Circuit Design believes the provided information is accurate and reliable. However, Circuit Design reserves the right to make changes to this product without notice.
- Circuit Design products are neither designed nor intended for use in life support applications where malfunction can reasonably be expected to result in significant personal injury to the user. Any use of Circuit Design products in such safety-critical applications is understood to be fully at the risk of the customer and the customer must fully indemnify Circuit Design, Inc for any damages resulting from any improper use.
- 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.
- 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.

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Cautions

- Do not use the equipment within the vicinity of devices that may malfunction as a result of electronic radio waves from 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 soot 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 great effect on communication performance. As far as possible, ensure that the equipment is placed well away from metallic objects.
- The GND for the radio module 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 a part 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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REVISION HISTORY

Version	Date	Description	Remark
0.9	Apr. 2019		
1.0	May 2019	Regulatory compliance information added	
1.1	Oct. 2019	Correction of misdescription	
2.0	Mar. 2020	07MP Pin Description updated	
2.1	July 2022	Temperature range for frequency stability changed to -20 to + 65 °C	