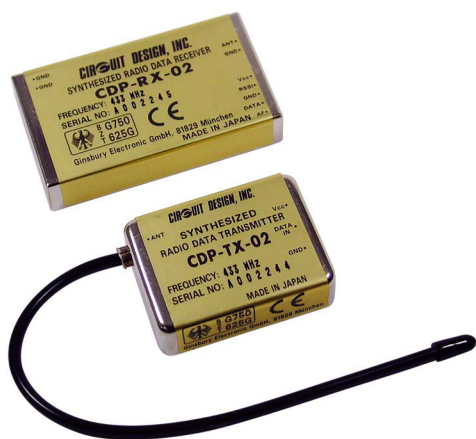# UHF Narrow band radio data module
CDP-TX/RX-02N 434 MHz/458MHz

Operation Guide

Version 1.6 (September 2003)

CONTENTS

CIRCUIT DESIGN, INC.

GENERAL DESCRIPTION & FEATURES

Features
- Compatible with European standard EN 300 220
- Very small compact integrated device with PLL synthesizer and micro controller
- Frequency selection free in 32 channels for 433 MHz, 11 channels for 458 MHz
- New integrated UHF filter technology
- 5 mW/10 mW selectable

Applications
- Radio remote control cranes and machines
- Radio remote control for garage door controls
- Security systems
- Telemetry systems

Models
The CDP-02N series includes the following models;

Model name	Frequency	Base model	Ch setting
CDP-TX-02N	434 MHz	-	Dip switches
CDP-RX-02N	434 MHz	-	Dip switches
CDP-TX-02AN	458 MHz	-	Dip switches
CDP-RX-02AN	458 MHz	-	Dip switches
CDP-TX-02NP	434 MHz	CDP-TX-02N	Pin connectors
CDP-RX-02NP	434 MHz	CDP-RX-02N	Pin connectors
CDP-TX-02ANP	458 MHz	CDP-TX-02AN	Pin connectors
CDP-RX-02ANP	458 MHz	CDP-RX-02AN	Pin connectors

For CDP-TX/RX-02(A)N, frequency setting is performed with the 4-bit switches. Instead of these 4-bit switches, CDP-TX/RX-02(A)NP have 8-pin connectors for frequency setting, making it possible to set the channels externally.
There are no other technical and mechanical differences between CDP-02(A)N and CDP-02(A)NP except the supply voltage of the TX.

Note:
Turn off the power of the module when setting the frequency channel of the transmitters (CDP-TX-02(A)N and CDP-TX-02(A)NP). The status of each channel port will be read by the CPU when power is turned on. It is not possible to change the channel setting while the power is on.
For the receiver modules (CDP-RX-02(A)N and CDP-RX-02(A)NP), frequency setting and channel change can be performed with the power turned on.

General description

*The CDP-02N models are hereinafter referred to as CDP-02N (for transmitters and receivers), CDP-TX-02N (for transmitters) and CDP-RX-02N (for receivers), unless otherwise stated.

The CDP-02N is suitable for various application fields such as wireless data communication, remote control, telemetry or wireless security systems. It is easy to use and integrate into application systems.

The CDP-02N is equipped with a frequency synthesizer system with micro controller. Available frequency ranges are from 433.875 MHz to 434.650 MHz (32 channels:16 ch x 2 groups) and from 458.525 MHz to 458.775 MHz (11 channels). The compact size, low operating voltage and frequency selectability of the CDP-02N make it ideal for various applications where its interference rejection and practical distance range is far better than similar RF modules based on wide band SAW-resonator frequency generators.

Serial digital data (TTL level), such as pulse width modulation signals and signals from standard encoder-decoder circuits of the given AF bandwidth, can be transmitted.

CDP-TX-02N transmitter module

The CDP-TX-02N is a UHF FM-narrow band transmitter with PLL synthesizer and micro controller for high frequency stability and channel selectability. Modern SMT technology gives it its small size - much smaller than a match box.

The narrow band FM modulation (direct FSK) enables efficient use of the available RF spectrum. Different modules can operate in a 25 KHz channel spacing scheme unlike SAW resonator transmitters which use a very broad band of the frequency spectrum.

The CDP-TX-02N can transmit any 5 V digital input data in the specified frequency range. Analog data is digitized by the internal comparator.

In about 80 msec (90 msec for 458 MHz) after the transmitter is connected to a power source, PLL is locked and data can be transmitted without further control or synchronization.

Transmission is physically achieved by a flexible Lambda/4 antenna connected to the module.

The amount of radiated power and the surrounding of the antenna influences directional behavior. Installation in a bigger metal housing with a ground connected to the transmitter module housing and the transmitter antenna placed in an upright position outside the metal housing will reduce the antenna impedance and increase the radiated power. For best performance in a user system general rules of radio frequency technology should be taken into consideration.

The same considerations should also be applied to the receiver.

CDP-RX-02N receiver module

The CDP-RX-02N is a UHF receiver for FM-narrow band modulated signals.

The receiver design is based on the double superheterodyne principle with PLL synthesize system and micro controller enabling high signal sensitivity, high selectivity, and high frequency stability not achieved by simple SAW resonator receivers or other low cost designs.

Extensive filtering by an integrated unique SAW filter element enables operation in hazardous areas where interference may be expected. Steadily increasing use of the available frequency spectrum demands the application of narrow band systems for maximum operation reliability and consideration for other users of the ISM band.

The CDP-RX-02N receiver module is designed to match the CDP-TX-02N transmitter module, though signals from other FM-narrow band transmitters can be received as well.

The CDP-RX-02N is designed for mounting on a PCB. A simple wire can be soldered to the antenna input or the antenna can be printed on the PC board. Better performance is attained with commercial antennas for the 433 MHz (458MHz) ISM band.

The receiver modules have two different outputs and an RSSI field power output which indicates the power of the incoming RF signal.

The AF output is the analog output from the FM detector circuit. Voltage level, DC-offset and AF noise depend directly on the receiver-input signal. This output can be connected to an MSK decoder circuit if a transmitter with an additional MSK encoder is used[1]. For simple FSK modulation of digital data, the DATA OUT terminal can be used. It contains a band-pass filter and comparator with digital output (open collector).

To achieve high signal sensitivity and a short receiver response time no internal muting is applied. Valid data signals can be detected by utilizing the RSSI output.

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[1] The data input of the CDP-TX-02N is for digital signals. If the output of the MSK encoder is input in DATA IN of the CDP-TX-02N, please make sure to input a digitalized signal in DATA IN by saturating the signal beforehand.

OPERATING INSTRUCTIONS

Please read these instructions before you start using the CDP-02N.

The CDP-02N is designed as a module which will be integrated into a user system. It is not a ready-made product for private users. It can be regarded more like a special component for part of an electronic system. The user needs basic knowledge about electronics. Special knowledge about RF technology is helpful, but the most difficult parts are integrated into the modules to enable easy operation. Some additional information is given here:

Supply voltage

The transmitter and receiver module contain a voltage regulator to guarantee stable performance in the given range of supply voltage.

The design was made for operation with a battery or regulated power source. If the battery voltage drops below the minimum voltage given in the technical specifications, the transmitter output power will drop and the RF oscillator will stop operation. No data can be transmitted in this case. The receiver will continue to work down to a certain voltage but the performance will deteriorate.

If the voltage connected to the Vcc (+) and Ground (-) terminal is above the maximum voltage given in the technical specification the internal voltage regulator will be permanently damaged. The result is an internal short-circuit or disconnection.

To enable a low minimum voltage no internal circuit is used to prevent damage by incorrect polarity. If the transmitter is connected incorrectly, it will be permanently damaged. If a higher supply voltage is available then a simple diode can be inserted in the connection line to the Vcc terminal to prevent damage by incorrect polarity. The diode must be rated for the maximum supply current detailed in the technical specifications.

Modules which have been connected to improper voltage sources should be returned to the dealer for inspection.

Data input

The data input terminal is connected to a digital transistor compatible input. Use of data sources of high impedance is acceptable.

The voltage of the data signal should be between 0V (Ground level) and Vcc. Because of the internal voltage regulator, it is recommended that the data high level be limited to 5 V.

The data can be an analog or digital signal. Analog signals will be converted to a digital 1 or 0 inside the transmitter.

It is not necessary to synchronize the data signal of the transmitter, but the data signal should be fed to the transmitter 80 ms after the transmitter is turned on.

Data format

The digital data fed to the transmitter is passed through an internal low-pass filter to limit the bandwidth of the digital data. This is needed for an efficient use of the available RF spectrum.

At the receiver, a band-pass filter is used to reject noise and out-of-band signals in the received signal. Together the transmittable signal bandwidth is approximately 150 Hz to 2400 Hz. At the receiver, the signal is converted back into a digital signal for compatibility with succeeding digital systems. The type of digital data signals transmittable is limited by the bandwidth of the system.

DC signal or long intervals of HIGH or LOW bits should be avoided. Succeeding bits can be distorted in their bit length. If the sequence of HIGH or LOW bits is too long it is possible that the logic level of the data output will be changed.

The best countermeasure is to use a digital encoding scheme, which guarantees that no low frequency components are included in the data signal. This can be achieved, for example, with "Manchester" encoding. A digital 1 is coded in a sequence of 10 and a digital 0 is encoded into a sequence of 01. In most cases it is also sufficient to transmit serial data by using start and stop bits of different logical level as can be done with the RS232 format. Each transmitted byte will be preceded by a 0 bit and succeeded by a 1 bit.

The CDP-02N was tested with a number of standard encoder-decoder IC's for simple remote control. There should be no problem with data speeds in the 300 to 4800 Baud range .

Because of the wide variety of data formats, data speeds and digital modulation techniques, it is best to set-up a 'worst case' scenario and test the data transmission before the CDP-02N is used in a practical application.

Further advice can be given if the precise format of the data and system requirement is notified to the dealer or directly to Circuit Design, Inc. Your inquiries and comments are welcome and will also help other users.

Channel and Frequency Setting

CDP-TX/RX-02(A)N (Dip switch type)
By use of a chip mounted 4-bit switch and a jumper on the PCB, 32 channels can be easily selected. In the 434 MHz version, the 32 channels are divided to 2 groups: group A and group B. Each group of channels can be selected by soldering the jumper ON or OFF. When the jumper is ON, group A is selected. When the jumper is OFF, group B is selected. There are 16 channels in each group and they can easily be selected using the 4-bit switch. Before shipment all the modules are set to group B and all the 4 bits of the switch are set to OFF. (434.65 MHz)

For 458 MHz, all the 11 channels can easily be selected using the 4-bit switch on PCB. Please refer to CHANNEL AND FREQUENCY SETTINGS for information on channel selection.

CDP-TX/RX-02(A)NP (Pin connector type)
By use of 8-pin connectors, channel setting can be performed externally.
The channel table is the same as the dip switch type. For information on channel setting, please refer to CHANNEL AND FREQUENCY SETTINGS in this document.

Notice: Turn off the power of the module when setting the frequency channel of the transmitters (CDP-TX-02(A)N and CDP-TX-02(A)NP). The status of each channel port will be read by the CPU when power is turned on. It is not possible to change the channel setting while the power is on.
For the receiver modules (CDP-RX-02(A)N and CDP-RX-02(A)NP), frequency setting and channel change can be performed with the power turned on.

Outputs

At the receiver side 3 output signals are available.

AF is the direct analog output of the FM receiver.

This signal can be used for checking the receiver and in cases where signals with additional analog modulation are to be received. For example, it can be connected to an MSK decoder.

The DATA output is a digital open collector output. An internal 10 KOhm pull-up resistor is applied to enable direct connection to CMOS compatible circuits. For other applications an additional external pull-up resistor should be used.

To avoid delays and achieve maximum sensitivity, the receiver has no internal mute circuit. The AF and DATA output will show noise in the output when no signal is received.

The third output is called RSSI. It is an indicator of the received signal strength. It can be used to drive an external mute circuit.

Test Set ECB-03 and DCB-03

The Test Set ECB-03 and DCB-03 were developed to demonstrate and test the CDP modules. In combination with the transmitter and receiver modules, it is a full four command radio remote control that can be used for various practical applications.

The Test Set will save time and effort in planning new developments that incorporate the CDP-TX/RX-02(A)N radio modules as the radio link.

*This test set cannot be used with CDP-TX/RX-02(A)NP.

Antennas

Most important for safe data transmission is a good antenna, and RF grounding, both for the transmitter and the receiver. Without an antenna it is impossible to transmit data over a long distance.

The standard antenna is a Lambda/4 wire protected by a plastic cover.

The receiver has a simple antenna input pin. Any suitable UHF antenna can be connected to it.

The easiest way to connect an antenna to the CDP-RX-02N is to solder a 17 cm wire directly to the antenna input. A 50 Ohm coaxial cable can be used to extend the distance between the antenna and the receiver. The shielding of the antenna wire should be soldered to the case near the antenna input of the CDP-RX-02N.

It is possible, but not recommended to connect the receiver module and the antenna by a connection on a PCB. This will decrease the receiver performance in most cases.

To find the best method of installation for the transmitter and receiver, many things should be considered and tested. It is recommended that the user read specialized literature on antennas and radiation characteristics to gain a better understanding of these fields. A detailed explanation cannot be given here.

Notice: For CDP-TX-02(A)N and CDP-TX-02(A)NP, use the antenna provided. Using other antennas may invalidate compliance with the regulatory standards. Refer to the REGULATORY COMPLIANCE INFORMATION in this document.

In most cases the following basic rules will help you.
- Connect an antenna with 50 Ohm impedance for 433 MHz (458 MHz).
- The easiest construction is a wire of approximately 17 cm.
- Place the antenna vertically, straight up or down from the transmitter and receiver module.
- Do not cover the antenna with metal parts.
- The connection of the metal surface of the transmitter and receiver case to a larger metal part (ground plane) will increase radiation and reception efficiency. Such metal parts should not be placed near the antenna.
- The best range is achieved if the transmitter and receiver antenna are in direct line of sight. Any object in between the transmitter and receiver antenna, and metallic objects in particular, will decrease the range.
- The transmission is influenced by reflections of the transmitter signal on metallic surfaces. By overlaying the direct and reflected signal with a 180 degree phase shift the signal can almost fade out. Such reflections and fade-outs can result in data drop-outs in mobile applications.
- The human body can have a similar effect as metal objects. Pocket transmitters should be held in your hand and held in a position away from the body and pointed in the direction of the receiver.

Start-up

After Vcc is connected to the transmitter the VCO and PLL will start-up and, after about 80 ms (434 MHz) or 90 ms (458 MHz), the output frequency and power will reach the normal value. The same start-up time is needed by the receiver after it is switched on.

Data transmission is not possible, or the data will be distorted, during this start-up period.

Therefore the input signal should be fed to the transmitter 80 ms (434 MHz) after TX is turned on.

The transmitter is active as long as the power supply is on. The power should be switched off immediately after the data transmission is finished in order to save valuable battery power and to avoid unnecessary use of the RF spectrum.

The receiver does not use the RF spectrum actively and it can remain on as long as desired.

Important Note: If the modules will be mounted on a control PCB (motherboard), this PCB must be designed as a RF PCB. The surface of the PCB must be shielded as much as possible. The modules should be kept away from the MC, EPROM and crystals. In addition, all the pins of the modules should be connected via LC filters.

SPECIFICATIONS   CDP-TX-02(A)N/CDP-RX-02(A)N

COMMON SPECIFICATIONS:

COMMUNICATION TYPE	One way
OSCILLATION SYSTEM	PLL controlled VCO
FREQUENCY 433 MHZ	433.875 MHz to 434.650 MHz
458 MHz	458.525 MHz to 458.775 MHz
NUMBER OF RF CHANNELS	32 channels (EU type), 11 channels (UK type)
CHANNEL STEP	25 kHz
FREQUENCY STABILITY	+/-2.5 kHz (-10 to 55C)
FREQUENCY RESPONSE	150 Hz to 2.4 kHz
BAUD RATE	300 to 4,800 bps
OPERATING TEMPERATURE RANGE	-10 to +60C

TRANSMITTER :

TRANSMITTER TYPE	PLL Synthesizer
RF OUTPUT POWER	10 mW/5 mW
TRANSMITTER START UP TIME	About 80 mS (EU type); 90 mS (UK type)
MODULATION	FM narrow
DATA INPUT LEVEL	2.2 to 12 V
INPUT SIGNAL	Digital
DEVIATION	2 KHz +/-300 Hz
SPURIOUS EMISSION	<-60 dBm (<862 MHz)
	<-46 dBm (862 MHz or higher)
ADJACENT CHANNEL POWER	<200 nW
SUPPLY VOLTAGE	2.4 to 12 V
SUPPLY CURRENT	30 mA
DIMENSIONS	36 x 26 x 10 mm
WEIGHT	12.5 g

RECEIVER :

RECEIVER TYPE	Double superheterodyne PLL synthesizer
SENSITIVITY	-120 dBm (12 dB/ SINAD, CCITT filter)
SELECTIVITY	+/-7.5 KHz at -6 dB point
DEMODULATION	FM narrow
DISTORTION	<3 % at 1 KHz
S/N RATIO	35 dB overall (AF OUT)
DATA OUTPUT LEVEL	Open collector (digital)
OTHER OUTPUT	RSSI and AF
SUPPLY VOLTAGE	3.6 to 12 V
SUPPLY CURRENT	26 mA
DIMENSIONS	50 x 30 x 9 mm
WEIGHT	19 g

SPECIFICATIONS   CDP-TX-02(A)NP/CDP-RX-02(A)NP

COMMON SPECIFICATIONS:

COMMUNICATION TYPE	One way
OSCILLATION SYSTEM	PLL controlled VCO
FREQUENCY 433 MHZ	433.875 MHz to 434.650 MHz
458 MHz	458.525 MHz to 458.775 MHz
NUMBER OF RF CHANNELS	32 channels (EU type), 11 channels (UK type)
CHANNEL STEP	25 kHz
FREQUENCY STABILITY	+/-2.5 kHz (-10 to 55C)
FREQUENCY RESPONSE	150 Hz to 2.4 kHz
BAUD RATE	300 to 4,800 bps
OPERATING TEMPERATURE RANGE	-10 to +60C

TRANSMITTER :

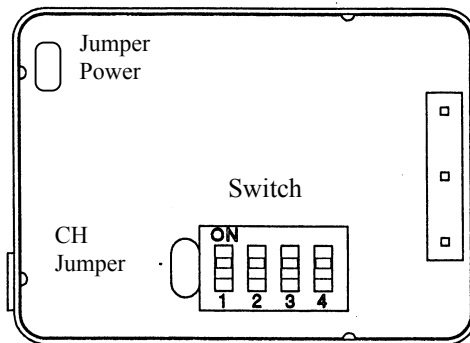|	
TRANSMITTER TYPE	PLL Synthesizer
RF OUTPUT POWER	10 mW/5 mW
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INPUT SIGNAL	Digital
DEVIATION	2 KHz +/-300 Hz
SPURIOUS EMISSION	<-60 dBm (<862 MHz)
	<-46 dBm (862 MHz or higher)
ADJACENT CHANNEL POWER	<200 nW
SUPPLY VOLTAGE	2.4 to 10 V
SUPPLY CURRENT	30 mA
DIMENSIONS	36 x 26 x 10 mm
WEIGHT	12.5 g

RECEIVER :

RECEIVER TYPE	Double superheterodyne PLL synthesizer
SENSITIVITY	-120 dBm (12 dB/ SINAD, CCITT filter)
SELECTIVITY	+/-7.5 KHz at -6 dB point
DEMODULATION	FM narrow
DISTORTION	<3 % at 1 KHz
S/N RATIO	35 dB overall (AF OUT)
DATA OUTPUT LEVEL	Open collector (digital)
OTHER OUTPUT	RSSI and AF
SUPPLY VOLTAGE	3.6 to 12 V
SUPPLY CURRENT	26 mA
DIMENSIONS	50 x 30 x 9 mm
WEIGHT	19 g

CHANNEL AND FREQUENCY SETTINGS FOR CDP-02N (434 MHz)

Group A   Group B

Channel	Frequency	4-bit Switch				Jumper	Channel	Frequency	4-bit Switch				Jumper
		1	2	3	4				1	2	3	4	
A1	433.875	ON	ON	ON	ON	ON	B1	433.900	ON	ON	ON	ON	OFF
A2	433.925	OFF	ON	ON	ON	ON	B2	433.950	OFF	ON	ON	ON	OFF
A3	433.975	ON	OFF	ON	ON	ON	B3	434.000	ON	OFF	ON	ON	OFF
A4	434.025	OFF	OFF	ON	ON	ON	B4	434.050	OFF	OFF	ON	ON	OFF
A5	434.075	ON	ON	OFF	ON	ON	B5	434.100	ON	ON	OFF	ON	OFF
A6	434.125	OFF	ON	OFF	ON	ON	B6	434.150	OFF	ON	OFF	ON	OFF
A7	434.175	ON	OFF	OFF	ON	ON	B7	434.200	ON	OFF	OFF	ON	OFF
A8	434.225	OFF	OFF	OFF	ON	ON	B8	434.250	OFF	OFF	OFF	ON	OFF
A9	434.275	ON	ON	ON	OFF	ON	B9	434.300	ON	ON	ON	OFF	OFF
A10	434.325	OFF	ON	ON	OFF	ON	B10	434.350	OFF	ON	ON	OFF	OFF
A11	434.375	ON	OFF	ON	OFF	ON	B11	434.400	ON	OFF	ON	OFF	OFF
A12	434.425	OFF	OFF	ON	OFF	ON	B12	434.450	OFF	OFF	ON	OFF	OFF
A13	434.475	ON	ON	OFF	OFF	ON	B13	434.500	ON	ON	OFF	OFF	OFF
A14	434.525	OFF	ON	OFF	OFF	ON	B14	434.550	OFF	ON	OFF	OFF	OFF
A15	434.575	ON	OFF	OFF	OFF	ON	B15	434.600	ON	OFF	OFF	OFF	OFF
A16	434.625	OFF	OFF	OFF	OFF	ON	B16	434.650	OFF	OFF	OFF	OFF	OFF
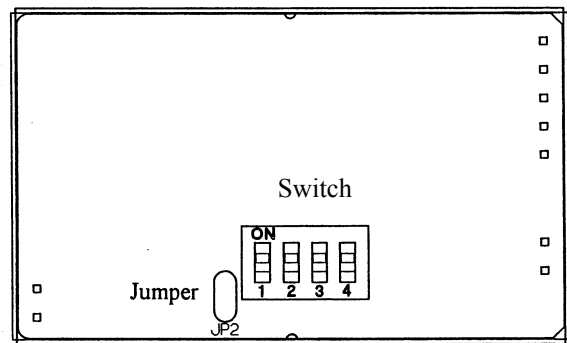
CDP-TX-02N   CDP-RX-02N

Frequency Setting Method:

Group A: Jumper ON

Group B: Jumper OFF

Switch: ON = "L"

                 OFF = "H"
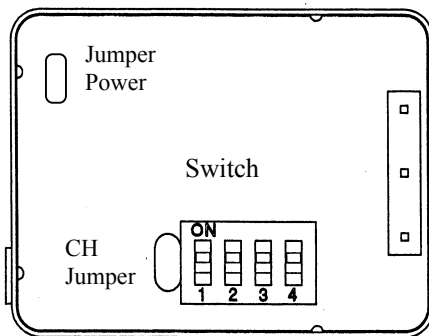
(Example)

Set to channel A5 (434.075 MHz)

Group A : Jumper ON
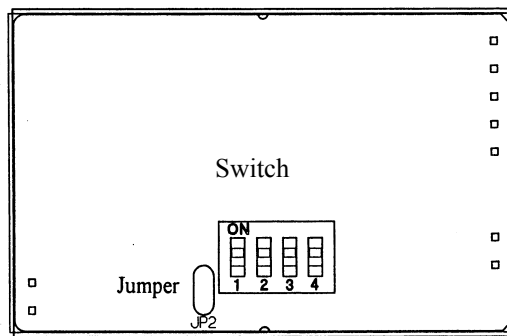
Switch: ON, ON, OFF, ON

Power Setting Method:

10 mW: Jumper ON

5 mW: Jumper OFF

CIRCUIT DESIGN, INC.

CHANNEL AND FREQUENCY SETTINGS FOR CDP-02AN (458 MHz)

CH NO.	F0	SW POSITON			
	(MHz)	1	2	3	4
CH1	458.525	ON	ON	ON	ON
CH2	458.550	OFF	ON	ON	ON
CH3	458.575	ON	OFF	ON	ON
CH4	458.600	OFF	OFF	ON	ON
CH5	458.625	ON	ON	OFF	ON
CH6	458.650	OFF	ON	OFF	ON
CH7	458.675	ON	OFF	OFF	ON
CH8	458.700	OFF	OFF	OFF	ON
CH9	458.725	ON	ON	ON	OFF
CH10	458.750	OFF	ON	ON	OFF
CH11	458.775	ON	OFF	ON	OFF

CDP-TX-02AN   **CDP-RX-02AN**

Frequency Setting Method:

Switch:　　ON = "L"

　　　　　OFF = "H"

(Example)

Set to channel 6 (458.650 MHz)

Switch: OFF, ON, OFF,ON

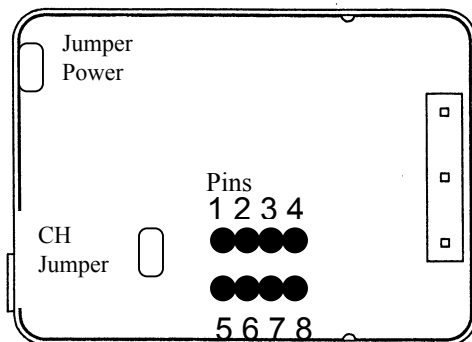**Power Setting Method:**

10 mW:　Jumper ON

5 mW:　Jumper OFF

CIRCUIT DESIGN, INC.

CHANNEL AND FREQUENCY SETTINGS FOR CDP-02NP (434 MHz)

Group A   **Group B**

Channel	Frequency	Pin position				Jumper	Channel	Frequency	Pin position				Jumper
	Pin	1	2	3	4				1	2	3	4	
A1	433.875	ON	ON	ON	ON	ON	B1	433.900	ON	ON	ON	ON	OFF
A2	433.925	OFF	ON	ON	ON	ON	B2	433.950	OFF	ON	ON	ON	OFF
A3	433.975	ON	OFF	ON	ON	ON	B3	434.000	ON	OFF	ON	ON	OFF
A4	434.025	OFF	OFF	ON	ON	ON	B4	434.050	OFF	OFF	ON	ON	OFF
A5	434.075	ON	ON	OFF	ON	ON	B5	434.100	ON	ON	OFF	ON	OFF
A6	434.125	OFF	ON	OFF	ON	ON	B6	434.150	OFF	ON	OFF	ON	OFF
A7	434.175	ON	OFF	OFF	ON	ON	B7	434.200	ON	OFF	OFF	ON	OFF
A8	434.225	OFF	OFF	OFF	ON	ON	B8	434.250	OFF	OFF	OFF	ON	OFF
A9	434.275	ON	ON	ON	OFF	ON	B9	434.300	ON	ON	ON	OFF	OFF
A10	434.325	OFF	ON	ON	OFF	ON	B10	434.350	OFF	ON	ON	OFF	OFF
A11	434.375	ON	OFF	ON	OFF	ON	B11	434.400	ON	OFF	ON	OFF	OFF
A12	434.425	OFF	OFF	ON	OFF	ON	B12	434.450	OFF	OFF	ON	OFF	OFF
A13	434.475	ON	ON	OFF	OFF	ON	B13	434.500	ON	ON	OFF	OFF	OFF
A14	434.525	OFF	ON	OFF	OFF	ON	B14	434.550	OFF	ON	OFF	OFF	OFF
A15	434.575	ON	OFF	OFF	OFF	ON	B15	434.600	ON	OFF	OFF	OFF	OFF
A16	434.625	OFF	OFF	OFF	OFF	ON	B16	434.650	OFF	OFF	OFF	OFF	OFF

ON … L (GND)   /   OFF … H (OPEN)
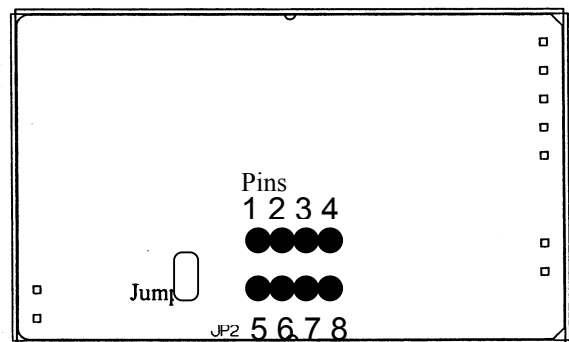
CDP-TX-02NP   **CDP-RX-02NP**

TX-02NP Pin 5, 6, 7, 8… GND   RX-02NP   Pin 5, 6, 7, 8 … GND

Frequency Setting Method:

Group A: Jumper ON

Group B: Jumper OFF

Switch: ON = "L" , OFF = "H"

(Example)

Set to channel A (434.075MHz)

Group A : Jumper ON

Switch: ON, ON, OFF, ON

Power Setting Method:

10 mW: Jumper ON

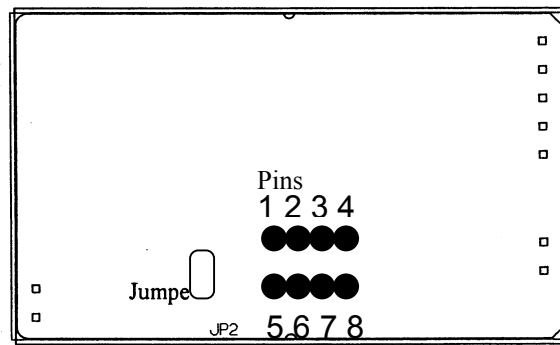5 mW: Jumper OFF

CHANNEL AND FREQUENCY SETTINGS FOR CDP-02ANP (458 MHz)

CH NO.	F0	PIN POSITON			
	(MHz)	1	2	3	4
CH1	458.525	ON	ON	ON	ON
CH2	458.550	OFF	ON	ON	ON
CH3	458.575	ON	OFF	ON	ON
CH4	458.600	OFF	OFF	ON	ON
CH5	458.625	ON	ON	OFF	ON
CH6	458.650	OFF	ON	OFF	ON
CH7	458.675	ON	OFF	OFF	ON
CH8	458.700	OFF	OFF	OFF	ON
CH9	458.725	ON	ON	ON	OFF
CH10	458.750	OFF	ON	ON	OFF
CH11	458.775	ON	OFF	ON	OFF

ON … L (GND)   /   OFF … H (OPEN)
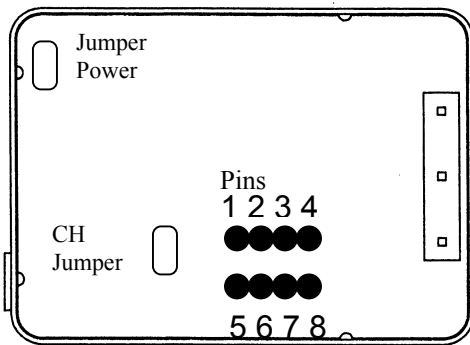
CDP-TX-02ANP

CDP-RX-02ANP

Frequency Setting Method:

Switch:　ON = "L"

OFF = "H"

(Example)

Set to channel 6 (458.650 MHz)
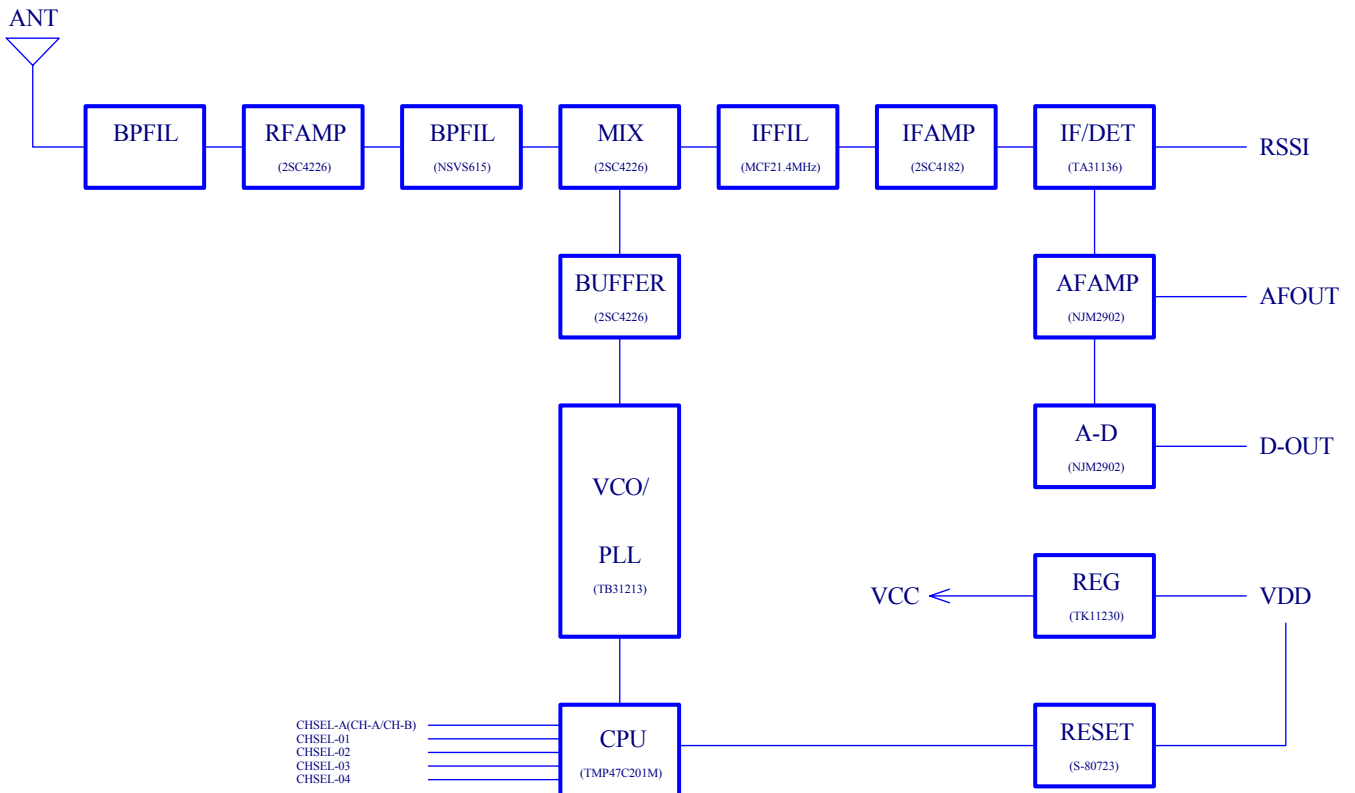
Switch: OFF, ON, OFF,ON

Power Setting Method:

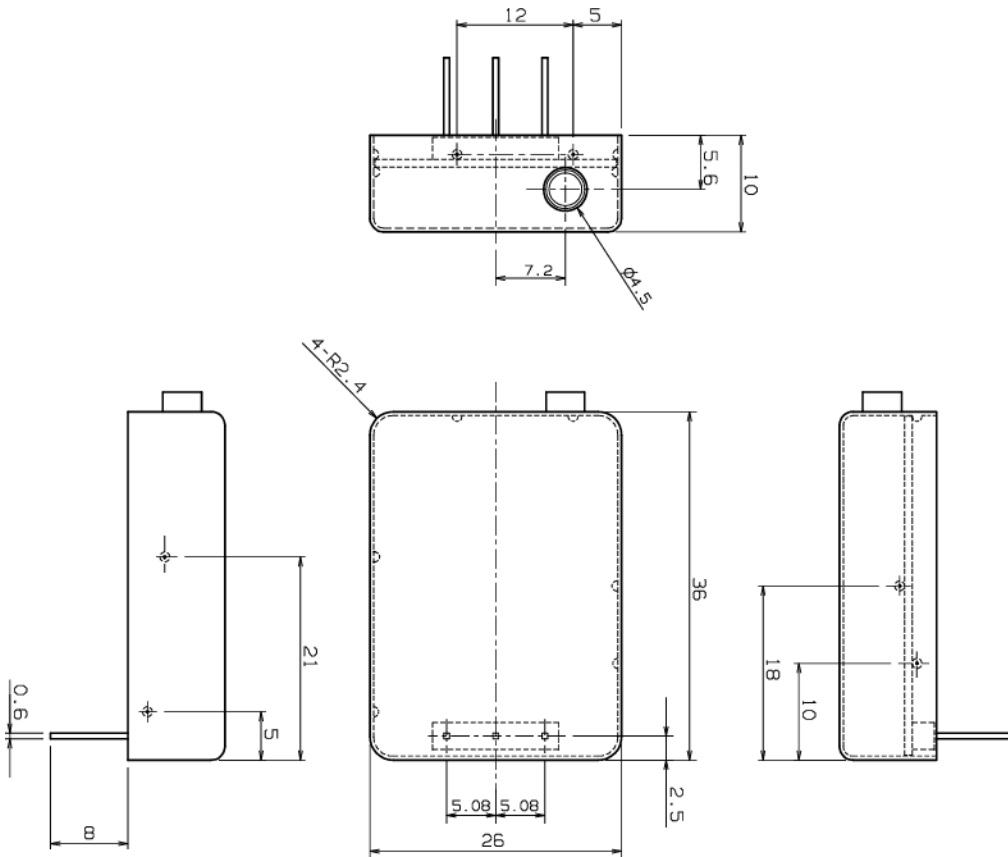10 mW:　Jumper ON

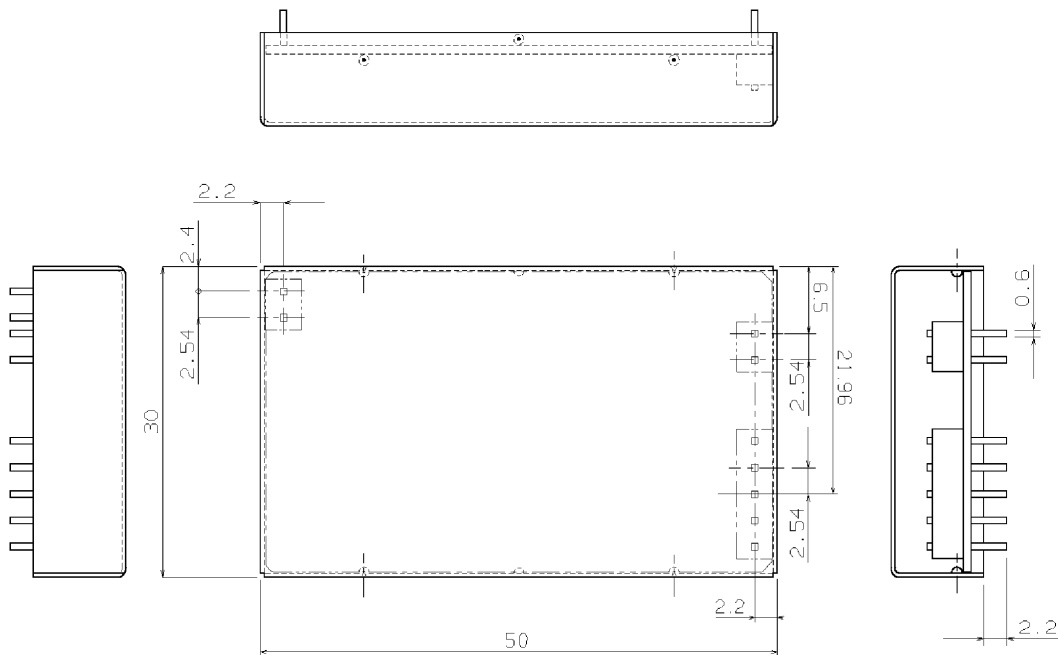5 mW:　Jumper OFF

BLOCK DIAGRAM

CDP-TX-02N

CDP-RX-02N

CIRCUIT DESIGN, INC.
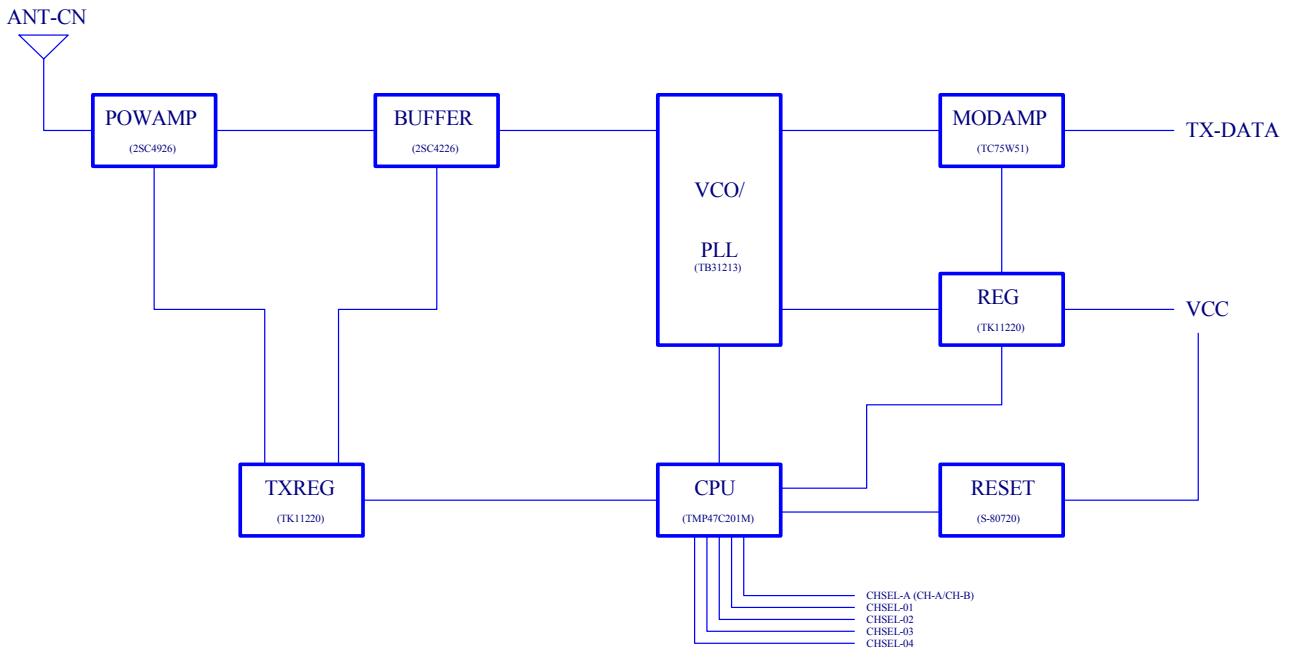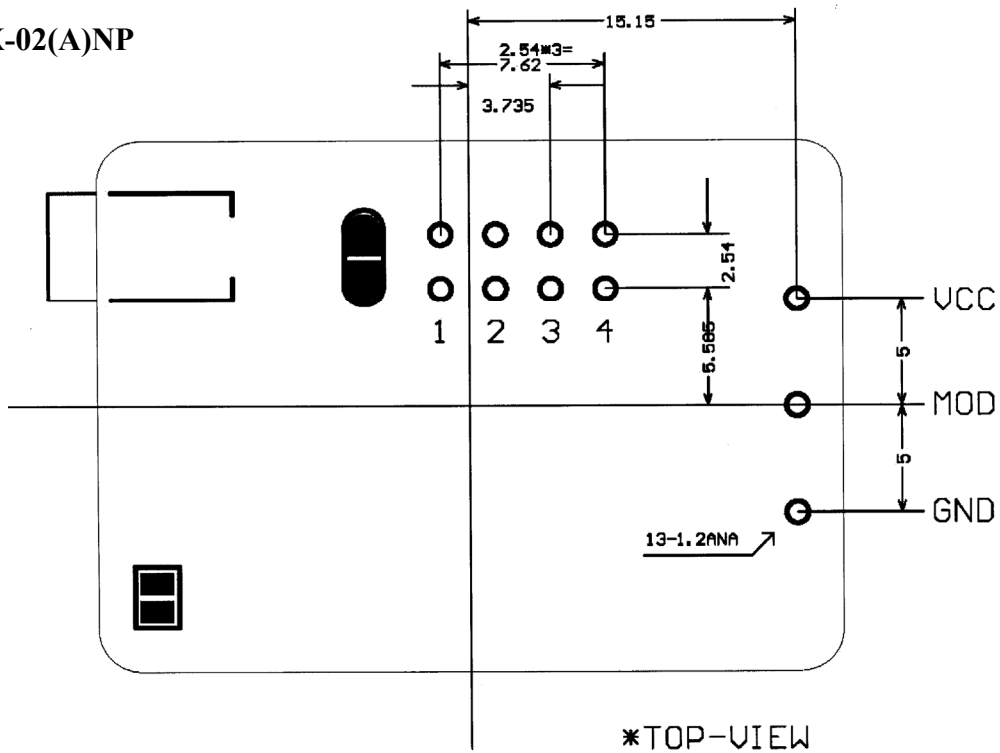
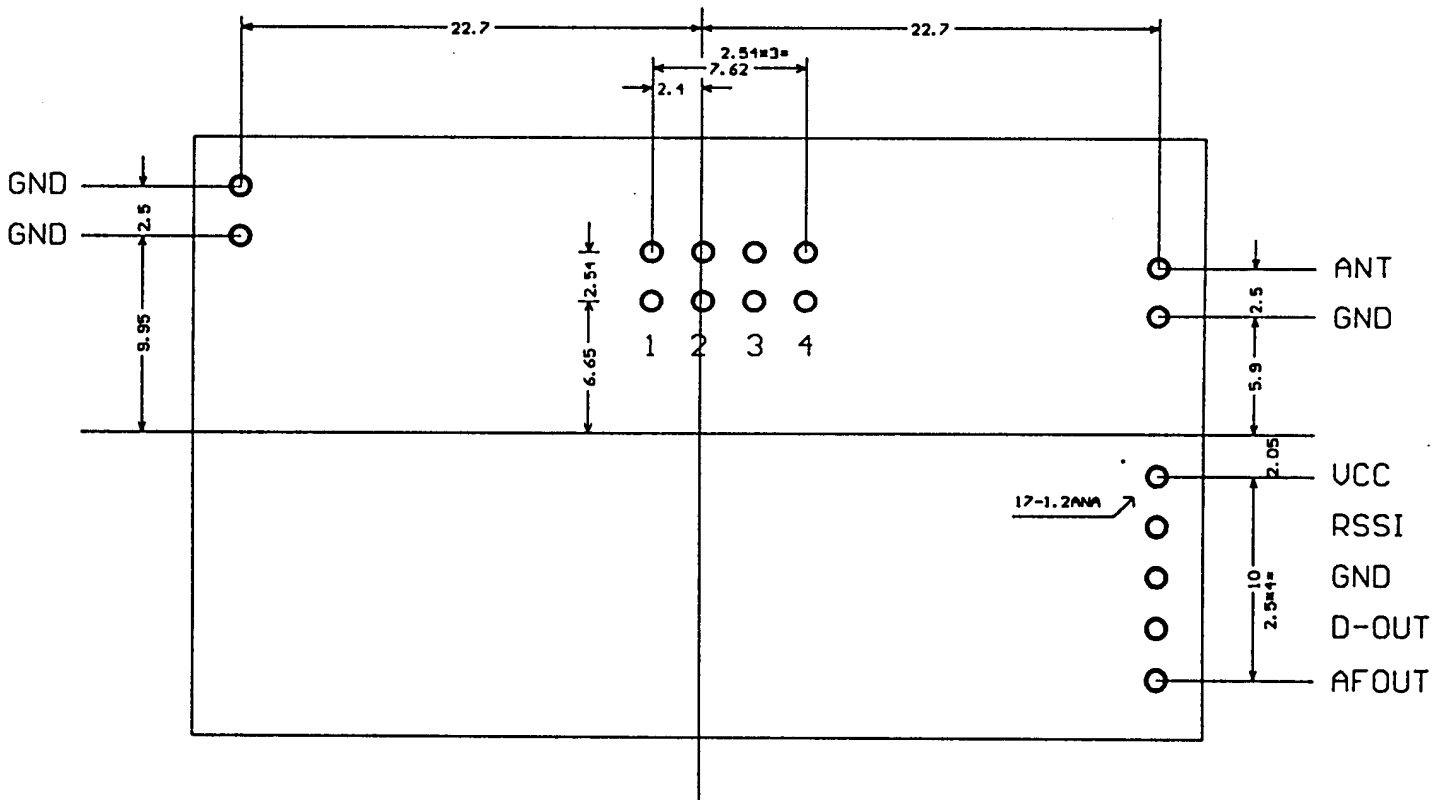## DIMENSIONS

CDP-TX-02N

CDP-RX-02N

REFERENCE HOLE POSITION FOR PIN TYPE

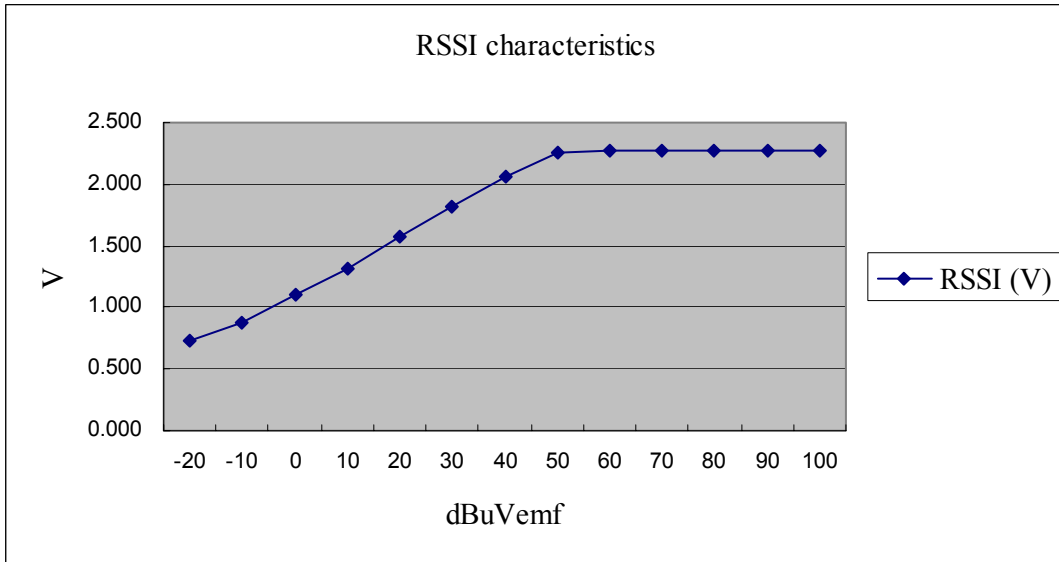**CDP-TX-02(A)NP**

CDP-RX-02(A)NP

DATA

Test condition: CCITT filter ON

Deviation: Fmod=2 kHz fm=1 kHz

RSSI characteristics

Regulatory compliance information

• The CDP-02N modules are intended to be integrated into the host equipment.

The CDP-TX-02N emits carrier signals continuously when power is supplied. The user must design the host equipment of the CDP-TX-02N to ensure that the duty cycle of the host equipment is within the requirements of the radio regulations in the country where the equipment is to be used

• Make sure that the CDP-TX-02N is used within specified supply voltage (2.4-12 V). Applying voltage over/under the rated range may cause malfunction. Use of supply voltages outside of the specification may cause malfunction.

•To fulfill the EMC requirements, make sure that the CDP-TX-02N is mounted on your PCB and enclosed in the case of the host equipment. No surface of the module should be exposed.

• Antenna of TX
The radio spectrum parameters of TX models of CDP-02N were assessed to EN300 220.
For the transmitter antenna source, both dedicated antenna and external antenna were assessed. For use of TX antenna, please follow the instruction below.
TX models of CDP-02N are supplied with a whip antenna suited to the module.
The user must use this dedicated antenna. Using other (external) antennas will require additional conformity assessment with the following exception;

> *It is acceptible to use TX models of CDP-02N with the external antenna without further conformity assessment in Germany and UK. The condition for use of such external antennas is that the antenna is a passive antenna. It is recommended to consult the national spectrum management authorities about the latest regulations on this subject before use of external antenna since radio regulations may change.*
> - This information is applicable as of November 2002.

• CDP-02N have been assessed for conformity with the following standards;
EN 300 220-3 V1.1.1
EN 301 489-3 V1.2.1
EN60950:1992+A1+A2:1993+A3:1995+A4:1997+A11:1997

• Notification for placing on the market under article 6.4 of R&TTE directive has been made in the following countries;.

CDP-TX-02N
  Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Spain, UK, Sweden, Liechtenstein, Switzerland
  *Notification is not required in Norway and Denmark
CDP-TX-02NP
  Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Spain, UK, Sweden, Liechtenstein, Switzerland, Luxemburg
  *Notification is not required in Norway and Denmark
CDP-TX-02AN, CDP-TX-02ANP
  UK

For the latest information about notification, please see Circuit Design's URL www.circuitdesign.jp
If you have any inquiries about regulatory compliance of this product, please contact Circuit Design, Inc.

We also recommend you to consult the authorities in the relevant country for detailed regulatory information.

DECLARATION OF CONFORMITY
Directive 99/5/EC

Supplier Name: **Circuit Design, Inc.**
Supplier Address: 7557-1, Hotaka, Hotaka-machi, Minamiazumi, Nagano

declares on our sole responsibility, that the following product :

Kind of equipment: Transmitter module (CDP-TX-02N)
Receiver module (CDP-RX-02N)

Type-designation: **CDP-TX-02N (433.050-434.790 MHz)**
                         CDP-RX-02N (433.050-434.790 MHz)

is/are in compliance with the following norm(s) or document(s):

EN300 220-3 V1.1.1
EN 301 489-3 V1.2.1
EN 60950:1992+A1+A2:1993+A3:1995+A4:1997+A11:1997

Hotaka, Japan July 13 2001
Place and date of issue   Manufacturer/Authorized representative
                                           name and signature

Accredited test laboratory : MIKES BABT SERVICE GmbH, Ohmstrasse 2-4 94342 Strasskirchen, Germany

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DECLARATION OF CONFORMITY
Directive 99/5/EC

Supplier Name: **Circuit Design, Inc.**
Supplier Addess: 7557-1, Hotaka, Hotaka-machi, Minamiazumi, Nagano

declares on our sole responsibility, that the following product :

Kind of equipment: Transmitter module (CDP-TX-02N)
Receiver module (CDP-RX-02N)

Type-designation: **CDP-TX-02AN (458.500-458.800 MHz)**
                         CDP-RX-02AN (458.500-458.800 MHz)

is/are in compliance with the following norm(s) or document(s):

EN300 220-3 V1.1.1
EN 301 489-3 V1.2.1
EN 60950:1992+A1+A2:1993+A3:1995+A4:1997+A11:1997

Hotaka, Japan July 13 2001
Place and date of issue   Manufacturer/Authorized representative
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Accredited test laboratory : MIKES BABT SERVICE GmbH, Ohmstrasse 2-4 94342 Strasskirchen, Germany

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DECLARATION OF CONFORMITY
Directive 99/5/EC

Supplier Name: **Circuit Design, Inc.**
Supplier Address: 7557-1, Hotaka, Hotaka-machi, Minamiazumi, Nagano

declares on our sole responsibility, that the following product :

Kind of equipment: Transmitter module (CDP-TX-02N)
Receiver module (CDP-RX-02N)

Type-designation: **CDP-TX-02NP(433.050-434.790 MHz)**
                      CDP-RX-02NP (433.050-434.790 MHz)
                      CDP-TX-02NP RF-Pin (433.050-434.790 MHz)

is/are in compliance with the following norm(s) or document(s):

EN300 220-3 V1.1.1
EN 301 489-3 V1.2.1
EN 60950:1992+A1+A2:1993+A3:1995+A4:1997+A11:1997

Hotaka, Japan Nov.29, 2002
Place and date of issue   Manufacturer/Authorized representative
                                           name and signature

Accredited test laboratory : MIKES BABT SERVICE GmbH, Ohmstrasse 2-4 94342 Strasskirchen, Germany

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DECLARATION OF CONFORMITY
Directive 99/5/EC

Supplier Name: **Circuit Design, Inc.**
Supplier Address: 7557-1, Hotaka, Hotaka-machi, Minamiazumi, Nagano

declares on our sole responsibility, that the following product :

Kind of equipment: Transmitter module (CDP-TX-02N)
Receiver module (CDP-RX-02N)

Type-designation: **CDP-TX-02ANP (458.500-458.800 MHz)**
                      CDP-RX-02ANP (458.500-458.800 MHz)

is/are in compliance with the following norm(s) or document(s):

EN300 220-3 V1.1.1
EN 301 489-3 V1.2.1
EN 60950:1992+A1+A2:1993+A3:1995+A4:1997+A11:1997

Hotaka, Japan Nov.29, 2002
Place and date of issue   Manufacturer/Authorized representative
                                           name and signature

Accredited test laboratory : MIKES BABT SERVICE GmbH, Ohmstrasse 2-4 94342 Strasskirchen, Germany

Cautions

- As the radio module communicates using electronic radio waves, there are cases where transmission may be temporarily cut off due to factors in the environment of use or the method of usage. The manufacturer is exempt from all responsibility relating to harm to personnel or other 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 environment of use, 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 allow the '+' side of the power supply terminal to make contact with the case.
- When batteries are used as the power source, avoid short circuits, recharging, dismantling, and compression. Failure to observe this 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 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 modules in equipment in which water or other foreign objects may enter 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 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 apart or modify the equipment.
- Do not remove the product label (the label attached to the upper surface of the module.) The use of modules from which the label has been removed is prohibited.