

# UHF narrow band radio data module **CDP-TX-04S-R** 434 MHz /869 MHz



## Operation Guide

Version 1.0 (Apr. 2006)

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## **GENERAL DESCRIPTION & FEATURES**

### **Features**

- RoHS compliant
- R&TTE compliant (EN 300 220)
- Remarkable miniaturization for a FM narrow band module, 22 x 12 x 16 mm
- FM narrow band modulation and high frequency stability
- Low current & voltage consumption, 22 mA & 2.2-5V, ideal for mobile applications
- Five standard frequencies
  - 433.920 & 434.075 in 434 MHz band, 869.75 MHz in 869 MHz band
- Pin compatibility between 434 MHz and 869 MHz provides efficient lineup
- Data rate 4800 bps
- Fast start up time 5 ms.
- High performance is achieved in combination with the CDP-RX-03AS/BS-R receiver

### **Applications**

- Remote control systems
- Telemetry systems
- Social alarm systems
- Security alarm systems
- Paging systems
- Data communications

### **General description**

The CDP-TX-04S-R and the CDP-RX-03AS/BS-R\* are developed to cover the band plan of the ERC Recommendation on Short Range Devices (SRD) in the range of 434 MHz and 869 MHz.

The CDP-TX-04S-R is a UHF FM-narrow band transmitter with PLL controlled oscillator for high frequency stability. This module utilizes advanced RF design technique and 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 such systems.

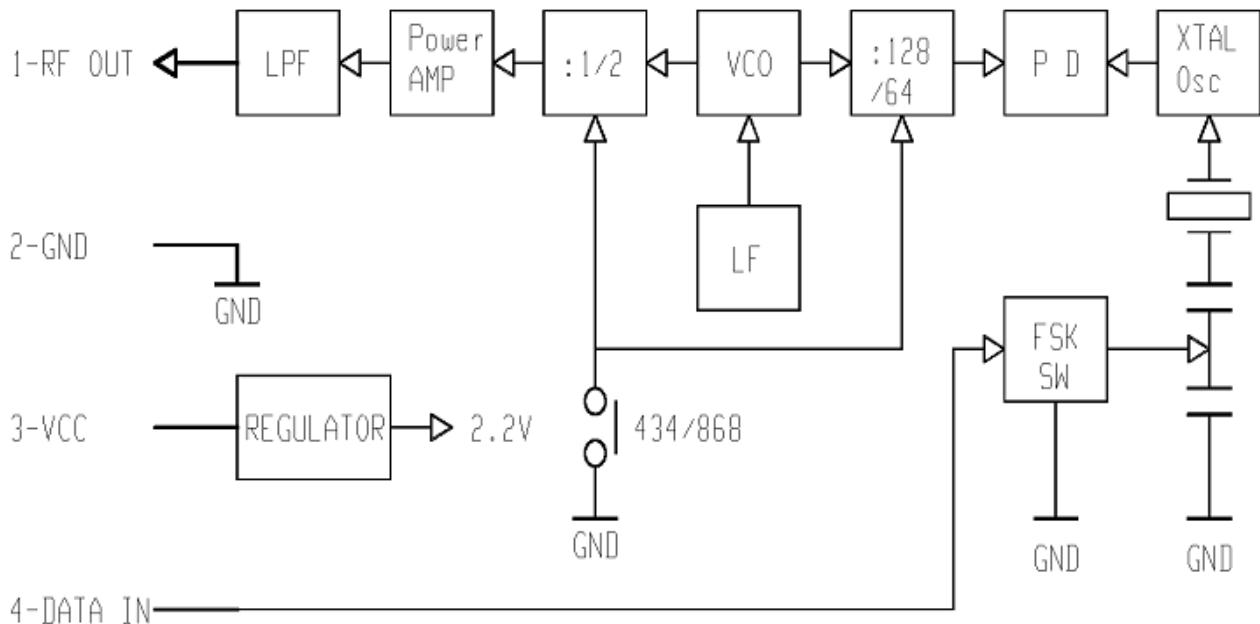
Narrow band FM technique gives you the advantage of receiver sensitivity and reliable communication and allows efficient use (25 KHz step) of the available RF spectrum.

The CDP-TX-04S-R has all these advantages in a compact size as small as a SAW based RF module. The size of the CDP-TX-04S-R is reduced by 80% compared to the CDP-TX-02. 5 ms after the transmitter is connected to a power source, 2.2-5.5 Volt digital input data can be transmitted in the specified frequency range without further control or synchronization.

For best performance in a user system, general rules of radio frequency technology should be taken into consideration.

*\* Refer to 'CDP-RX-03AS/BS-R operation manual' for further information*

## BLOCK DIAGRAM



## PIN DESCRIPTION

Pin-No.	Pin-Name	I/O	Description
1	RFOUT	O	Z=50 ohm The RF output power is 10 mW for 434 MHz and 5 mW for 869 MHz. 1/4 lambda whip antenna is recommended. The antenna length is 17.3 cm for 434 MHz and 8.6 cm for 869 MHz.
2	GND	-	The ground. Please connect to the widest GND on the PCB.
3	VCC	-	The power supply terminal. Operates on DC 2.2 V to 5.5 V. If the voltage becomes lower than 2.2 V, RF characteristics such as frequency stability will be affected.
4	DATA IN	I	The data input terminal. Digital input. Hi level = VCC Lo level = 0V Stable transmission will be obtained 5 ms after VCC is fed to the terminal. The maximum time for continuous High or Low signals must be within 20 ms. When this pin is open, the frequency has an offset drift. Once a standard code such as 511PNCODE has been input, the frequency will be within specifications.

## OPERATING INSTRUCTIONS

### **Please read these instructions before you start using the CDP-TX-04S-R.**

The CDP-TX-04S-R is designed as a module for integration into a user system. This module is not a ready-made product for private users and can be regarded more like a special component 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:

#### **VCC:**

The CDP-TX-04S-R contains a voltage regulator to guarantee stable performance in the given range of supply voltage. The design was made for operation with a battery. This module must be used with the voltage specified. The module shows unstable function with a voltage lower than specified

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 due to incorrect polarity. The diode must be rated for the maximum supply current detailed in the technical specifications.

#### **DATA IN:**

The voltage of the data signal should be between 0 V and Vcc. The data can be a digital signal.

When High (Vcc level) is input in DATAIN, High will be output from DO of the CDP-RX-03AS/BS-R, and when Low (GND level) is input, Low will be output.

***It is not necessary to synchronize the data signal of the transmitter, but the data signal should be fed to the transmitter 5 ms after the transmitter power is turned on.***

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

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

Further advice can be given if the precise format of the data and system requirements are notified to the dealer or directly to Circuit Design, Inc. Your inquiries and comments are welcome.

**Antennas:**

Most important for effective data transmission is selection of 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.

In most cases the following basic rules will help you.

- Connect an antenna with 50-Ohm impedance.
- Lambda/4 whip antenna length is approximately 17.3 cm for 434 MHz and 8.6 cm for 869 MHz.
- 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 case to a larger metal part (ground plane) will increase radiation efficiency. Such metal parts should not be placed near the antenna.
- The human body can have a similar effect to metal objects. Pocket transmitters should be held in the hand and held in a position away from the body and pointed in the direction of the receiver.
- 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 and buildings. There is possibility that data errors will occur due to overlapping of the direct and reflected signals.

**Note:**

*If a module is 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.*

## SPECIFICATIONS

## 434 MHz

General characteristics	
COMMUNICATION FORM	One way
TRANSMITTER TYPE	FSK Modulation, PLL Controlled Fixed Channel.
FREQUENCIES	Fixed channel 433.920 MHz/434.075 MHz *
FREQUENCY STABILITY	< +/- 2.5 KHz (-10 to 60 C)
PULSE WIDTH	Min. 208 us Max. 20 ms
DATA RATE	100 - 4800 bps FSK
OPERATING TEMPERATURE	-10 C to + 60 C
SUPPLY VOLTAGE	2.2 to 5.5 V
SUPPLY CURRENT	22 mA (at 10 mW/2.2 V)
I/O TERMINALS	Vcc, Data In, Gnd, RF
SIZE & WEIGHT	22 x 12 x 6 mm, 3.4 g
Electrical characteristics	
RF OUTPUT POWER	10 mW
SPURIOUS EMISSION	< -54 dBm (47M-74M, 87.5M-118M, 174M-230M, 470M-862MHz)
	< -36 dBm (Other frequencies below 1000MHz)
	< -30 dBm (Frequencies above 1000MHz)
MODULATION	FM narrow
MODULATION POLARITY	Positive
INPUT SIGNAL	Digital
DATA INPUT LEVEL	Hi=VCC Lo=GND
DEVIATION	+/- 3.0 KHz +/- 0.5 (4800 bps PN CODE)
ADJACENT CHANNEL POWER	-37dBm (200 nW) (4800 bps PN CODE/CH=25k)
START UP TIME	5 ms (Typ.)

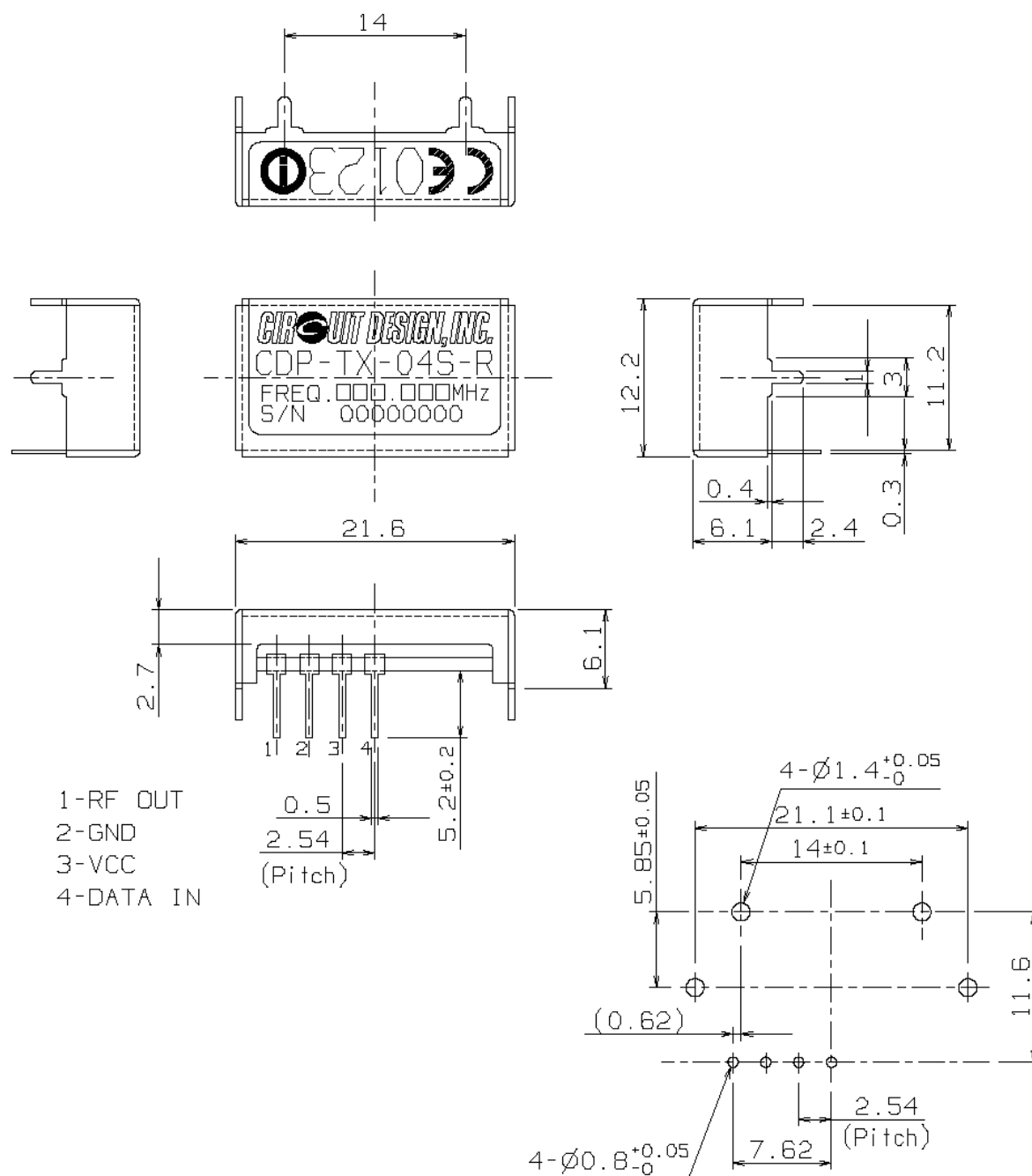
## 869 MHz

General characteristics	
COMMUNICATION FORM	One way
TRANSMITTER TYPE	FSK Modulation, PLL Controlled Fixed Channel.
FREQUENCIES	Fixed channel 869.750 MHz *
FREQUENCY STABILITY	< +/- 3.0 KHz (-10 C to 60 C)
PULSE WIDTH	Min. 208 us Max. 20 ms
DATA RATE	100 - 4800 bps FSK
OPERATING TEMPERATURE	-10 C to + 60 C
SUPPLY VOLTAGE	2.2 to 5.5 V
SUPPLY CURRENT	22 mA (at 4.5 mW/2.2 V)
I/O TERMINALS	Vcc, Data In, Gnd, RF
SIZE & WEIGHT	22 x 12 x 6 mm, 3.4 g
Electrical characteristics	
RF OUTPUT POWER	5 mW
SPURIOUS EMISSION	< -54 dBm (47M-74M, 87.5M-118M, 174M-230M, 470M-862MHz)
	< -36 dBm (Other frequencies below 1000MHz)
	< -30 dBm (Frequencies above 1000MHz)
MODULATION	FM narrow
MODULATION POLARITY	Positive
INPUT SIGNAL	Digital
DATA INPUT LEVEL	Hi=VCC Lo=GND
DEVIATION	+/- 3.25 KHz +/- 0.75 (4800 bps PN CODE)
ADJACENT CHANNEL POWER	-37dBm (200 nW) (4800 bps PN CODE/CH=25k)
START UP TIME	5 ms (Typ.)

\*Other frequencies: Please contact the distributor, Circuit Design, Inc.

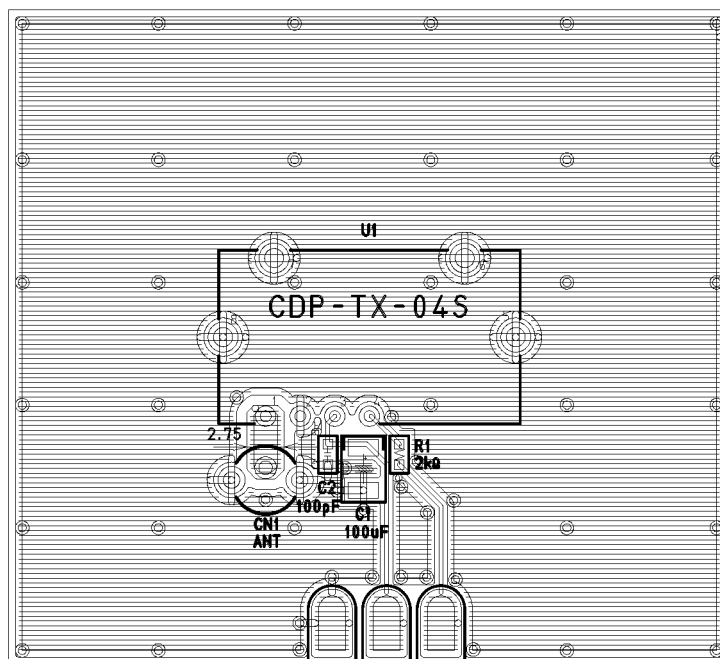
**Note:** Specifications are subject to change for improvement without prior notice

## DIMENSIONS





## RECOMMENDED PATTERN

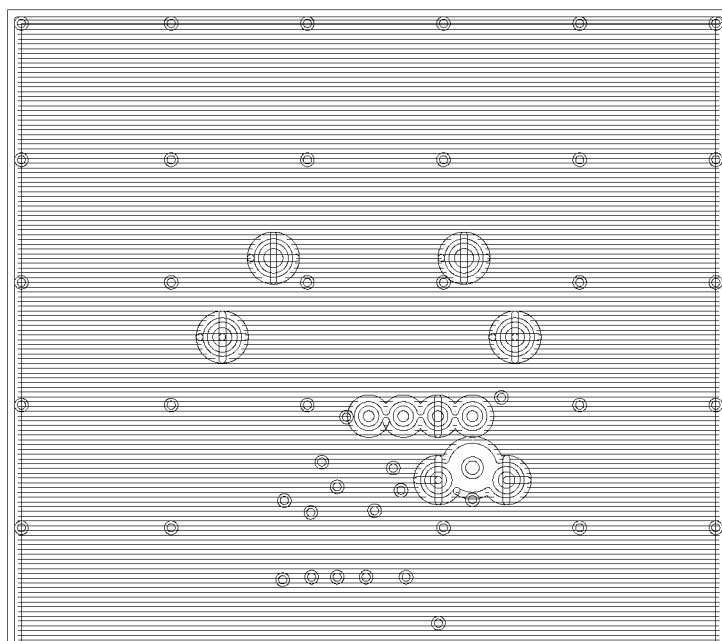


Component side

G  
N  
D

V  
C  
C

D  
I  
N



Back side

## **Regulatory compliance information**

### **Regulatory compliance of the CDP-TX-04S-R**

The CDP-TX-04S-R is designed for embedding in other equipment.

(Products incorporating the CDP-TX-04S-R are henceforward referred to as final products.)

The European regulation applicable to the CDP-TX-04S-R is the R&TTE Directive 1999/5/EC.

The conformity assessment for the CDP-TX-04S-R was completed in accordance with the R&TTE Directive Annex III procedures, and the Declaration of Conformity is attached to this manual.

### **Cautions related to regulatory compliance when embedding the CDP-TX-04S-R**

#### **1. Duty cycle**

The CDP-TX-04S-R is designed to be used for the Non-Specific Short Range Devices defined in the ERC/REC 70-03 Annex 1.

The CDP-TX-04S-R continuously emits carrier signals when power is supplied. The user must design the final product to meet the requirements of the duty cycle as provided in the *Regulatory parameters related to Annex 1* of the ERC/REC 70-03.

#### **2. Antenna**

The CDP-TX-04S-R is supplied without a dedicated antenna and the user is required to provide an antenna. The conformity assessment of the CDP-TX-04S-R was performed using Circuit Design's standard antenna ANT-LEA-01 (1/4 lambda lead antenna), so we recommend using the ANT-LEA-01 antenna or an antenna with equivalent characteristics and performance. For details about our standard antenna, refer to [www.cdt21.com](http://www.cdt21.com) or contact us. If you use an antenna other than the recommended antenna, further radio conformity assessment may be required.

#### **3. Supply voltage**

The CDP-TX-04S-R should be used within the specified voltage range (2.2 V to 5.5 V).

#### **4. Enclosure**

To fulfill the requirements of EMC and safety requirements, the CDP-TX-04S-R 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 CDP-TX-04S-R should be exposed.

### **Conformity assessment of the final product**

The manufacturer of the final product is responsible for the conformity assessment procedures of the final product in accordance with the R&TTE Directive.

As to the conformity assessment of the R&TTE Directive Article 3.2 (Efficient use of the radio spectrum), the manufacturer of the final product incorporating the R&TTE assessed CDP-TX-04S-R will be exempted from its conformity assessment procedures. For details of how to use the conformity assessment of the CDP-TX-04S-R, please consult the relevant authorities or accredited certification bodies.

### **Notification of the final product**

The notification required by R&TTE Directive Article 6 (4) is not necessary if the final product is used in the harmonized frequency band and is classified as Class-1 equipment. If the final product is not used in the harmonized frequency band and is classified as Class-2 equipment, the manufacturer of the final product has a duty to notify the relevant radio regulatory authorities in the countries where the final product is sold.

\*NOTE: In case the CDP-TX-04S-R 434.075 MHz is used with more than a 10% duty cycle, notification of the final product will be required. A list of Class-1 equipment is available at <http://www.ero.dk/>.

### **Exemption clause**

Circuit Design, Inc does not guarantee the accuracy of the above mentioned information about the conformity assessment and notification of the final product. Directives, technical standards, principles of operation and the like may be interpreted differently by the authorities in each country. Also the national laws and restrictions vary with the country. In case of doubt or uncertainty, we recommend that you check with the authorities or official certification organizations of the relevant countries.

## DECLARATION OF CONFORMITY

Directive 99/5/EC

Supplier Name: Circuit Design, Inc

Supplier Address: 7557-1, Hotak, Azumino-city, Nagano 399-8303

declare on our sole responsibility, that the following product:

**Kind of equipment:** Transmitter module (CDP-TX-04S-R 434/869MHz)

**Type-designation:** CDP-TX-04S-R (433.05-434.790MHz)  
CDP-TX-04S-R (868.00-870.00MHz)

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

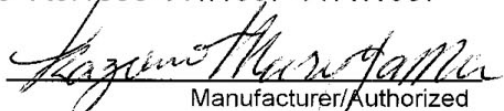
EN 300 220-3 v.1.1.1

ETS 301 489-3 v.1.2.1

EN 60950:1992+A1+A2:1993+A3:1995+A4:1997+A11:1997

Hotaka Japan /April6, 2006

place and date of issue

  
Manufacturer/Authorized  
representative name and signature

**Accredited testlaboratory:**

MKES BABT SERVICE GmbH,  
Ohmstrasse 2-4 94342 Strasskirchen, Germany

## **Cautions**

- As the radio module communicates using electronic radio waves, there may be cases where transmission is 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 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 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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Customers are advised to consult with Circuit Design sales representatives before ordering.

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

## Revision history

Version	Date	Description	Remark
1.0	April. 2006	CDP-TX-04S-R (RoHS compliant version) The first issue	