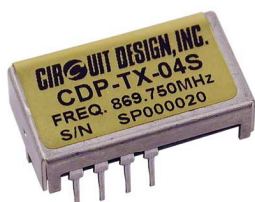


UHF narrow band radio data module **CDP-TX-04S** 434 MHz /869 MHz



Operation Guide

Version 1.4 (April 2003)

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CONTENTS

GENERAL DESCRIPTION & FEATURES	3
BLOCK DIAGRAM	4
PIN DESCRIPTION	4
OPERATING INSTRUCTIONS.....	5
VCC	5
DATAIN	5
Data format.....	5
Antennas	6
SPECIFICATIONS	7
DIMENSIONS	8
RECOMMENDED PATTERN.....	9
REGULATORY COMPLIANCE INFORMATION	10
Declaration of conformity	11
CAUTIONS & WARNINGS	13

GENERAL DESCRIPTION & FEATURES

Features

- Compliant with European EN 300 220 standard
- 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 msec
- Higher performance is achieved in combination with the CDP-RX-03AS receiver

Applications

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

General description

The CDP-TX-04S and the CDP-RX-03AS* 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 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.

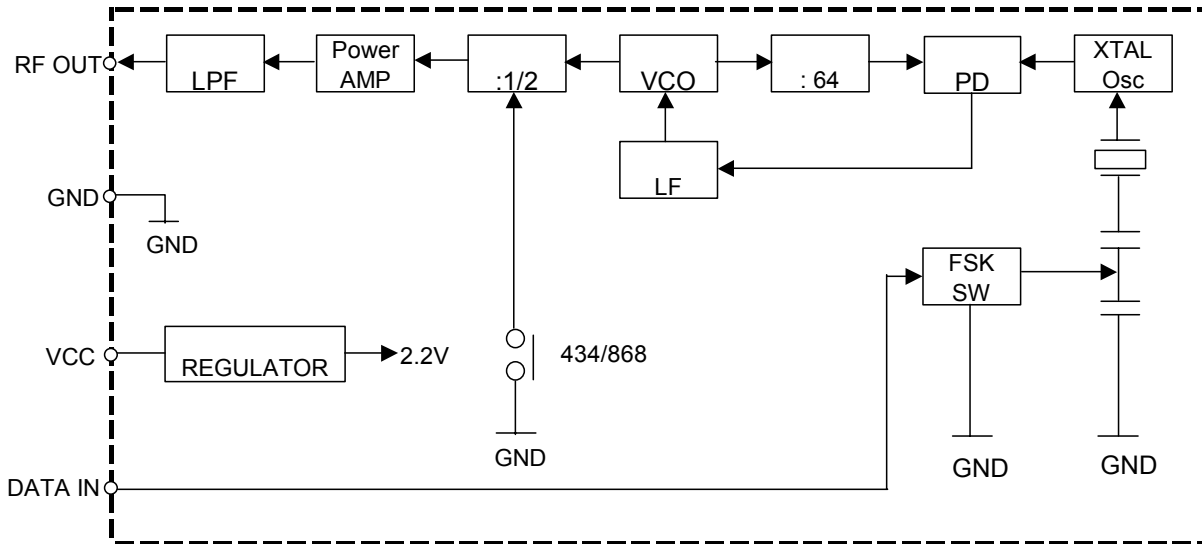
The CDP-TX-04S has all these advantages in a compact size as small as a SAW based RF module. The size of the CDP-TX-04S is reduced by 80% compared to the CDP-TX-02.

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 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 msec after VCC is fed to the terminal. The maximum time for continuous High or Low signals must be within 20 msec. 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.

The CDP-TX-04S 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 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 , 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 msec (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	9 mW +/-2 mW
SPURIOUS EMISSION	< -50 dBm (< 1 GHz)
	< -46 dBm (>=1 GHz)
MODULATION	FM narrow
MODULATION POLARITY	Positive
INPUT SIGNAL	Digital
DATA INPUT LEVEL	Hi=VCC Lo=GND
DEVIATION	+/- 2.5 KHz +/-0.5 (4800 bps PN CODE)
FM MODULATION S/N	>= 40 dB (LPF=20 kHz)
ADJACENT CHANNEL POWER	200 nW (4800 bps PN CODE/CH=25k)
START UP TIME	5 msec (Typ.)

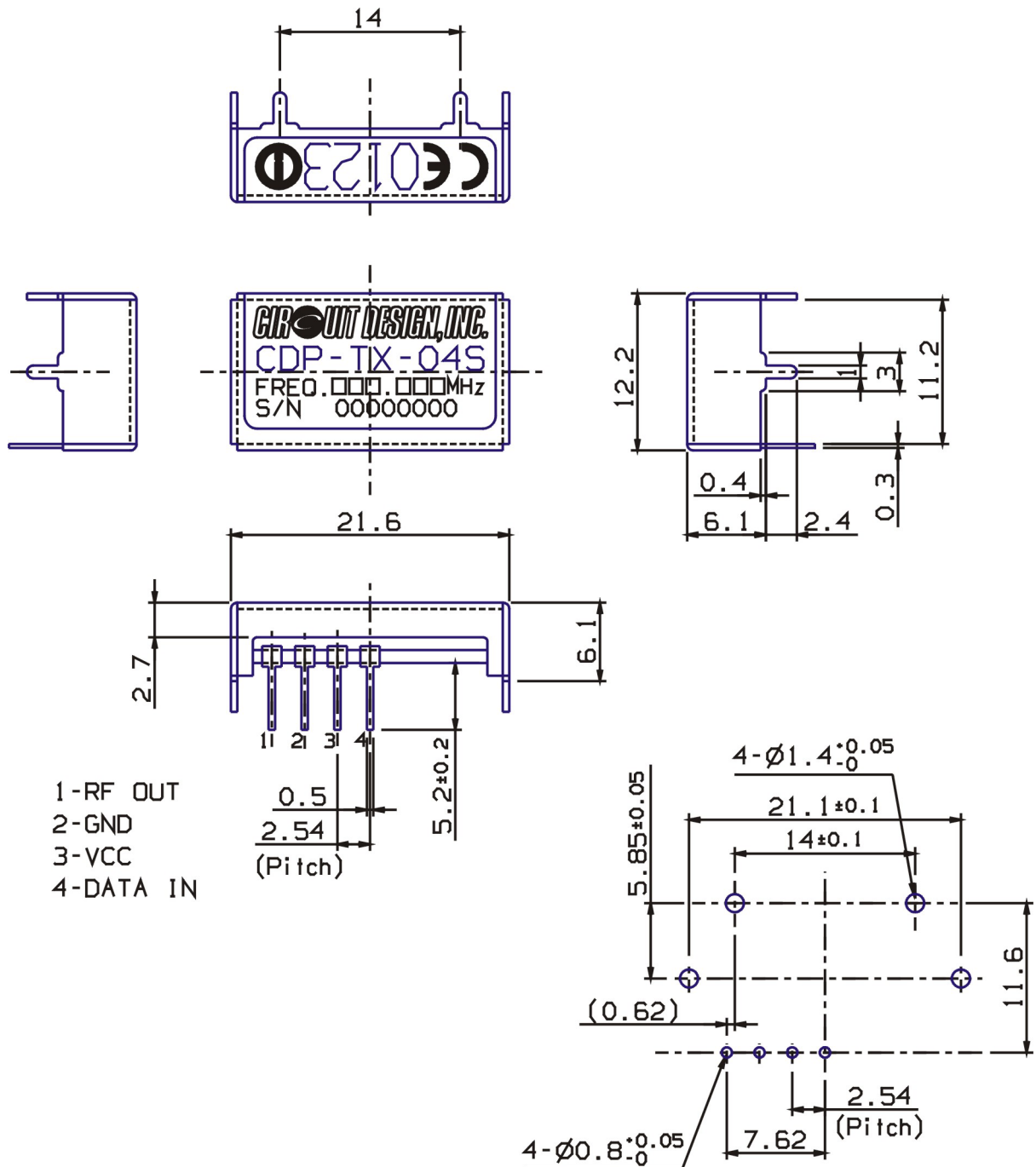
869 MHz

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 +/-1 mW
SPURIOUS EMISSION	< -50 dBm (< 1 GHz)
	< -46 dBm (>=1 GHz)
MODULATION	FM narrow
MODULATION POLARITY	Positive
INPUT SIGNAL	Digital
DATA INPUT LEVEL	Hi=VCC Lo=GND
DEVIATION	+/- 3 KHz +/-0.5 (4800 bps PN CODE)
FM MODULATION S/N	>= 35 dB (LPF=20 kHz)
ADJACENT CHANNEL POWER	200 nW (4800 bps PN CODE/CH=25k)
START UP TIME	5 msec (Typ.)

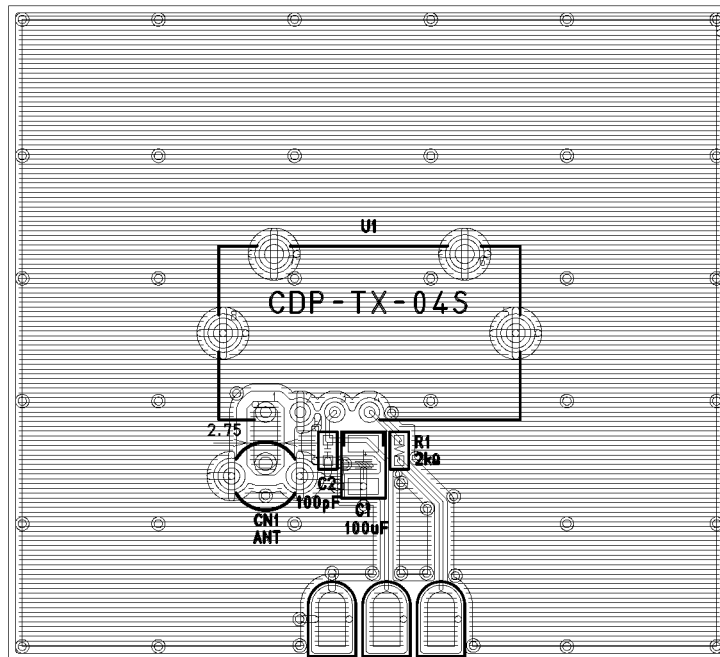
*Other frequencies: Please contact the distributor, Circuit Design, Inc.

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

DIMENSIONS

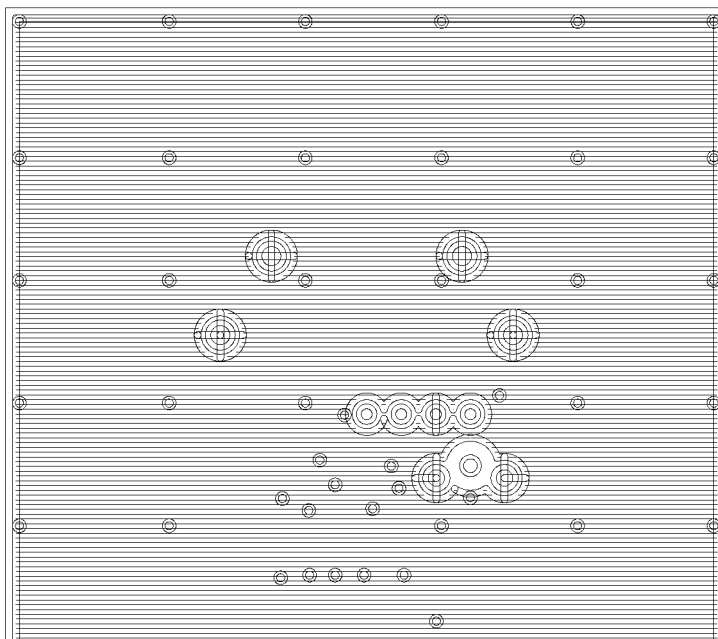


RECOMMENDED PATTERN



Component side

GND
VCC
DIN



Back side

Regulatory compliance information

- The CDP-TX-04S modules are intended to be integrated into the host equipment.

The CDP-TX-04S emits carrier signals continuously when power is supplied. The user must design the host equipment of the CDP-TX-04S 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-04S is used within the specified supply voltage (2.2-5.5V). Applying voltage over/under the rated range may cause malfunction.

- To fulfill the requirements of EMC, make sure that the CDP-TX-04S is mounted on your PCB and enclosed in the case of the host equipment. Any surface of the module should not be exposed.

- Antenna and conformity assessment of CDP-TX-04S

CDP-TX-04S is supplied without a dedicated antenna. It has a pin-type antenna connection and the user is required to prepare an antenna. However please pay attention, as far as we know, use of an external antenna is allowed only in UK and Germany (the external antenna must be a passive antenna, that means the gain of the antenna has to be zero). In other countries, use of an antenna dedicated to the unit will be required. With this point in view, the CDP-TX-04S has also been assessed using Circuit Design's standard antenna (1/4 lambda). We can recommend you to use this antenna or antennas with equivalent performance as a dedicated antenna. For information about our standard antenna, please see our URL or contact us. If you use an antenna other than we recommend, further conformity assessment may be required. Please consult the authorities in the relevant country for more details.

- CDP-TX-04S has been assessed for conformity with the following standard.

EN 300 220-3 V1.1.1

EN 301 489-3 V1.2.1

EN 60950:1992+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 notified to the following countries.

Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Spain, UK, Sweden, Liechtenstein, Switzerland and Luxembourg

*Notification is not required in Norway, and Denmark

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 each 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-04S)

Type-designation: CDP-TX-04S (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 Aug. 03 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

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-04S)

Type-designation: CDP-TX-04S (868.00-870.00)

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 Aug. 03 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

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 a part 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.

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