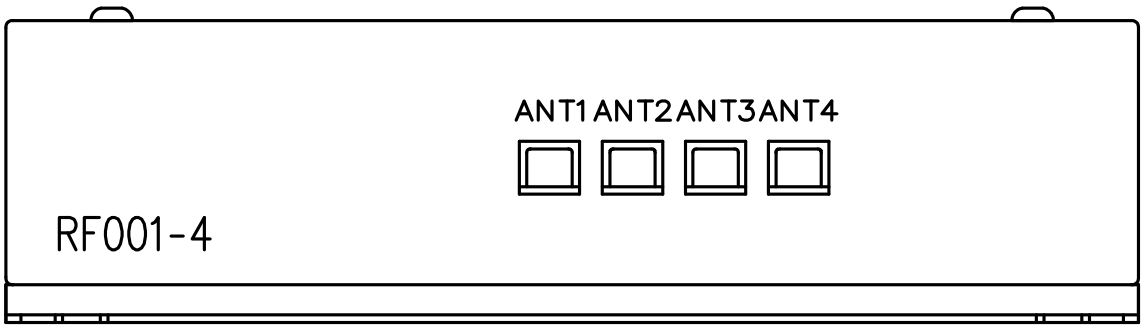
YAMAHA

RFID - Unit (4ch type)

RF001 - 4

Instruction Manual



YAMAHA FINE TECHNOLOGIES CO., LTD.

Contents

Chapter 1 Overview

1-1. Product Overview

RFID unit "RF001-4" is RF tag Reader/Writerer unit designed for mounting FA equipment.

The contents of the data read and written using this product are restrictions within the limits by the specification of the RFID tag and it can define them freely. For example, a RFID tag is attached to the jig used with FA equipment and a jig name, shape data, a usage count, and so on can be recorded.

”my-d” from Infineon Technologies, ”Tag-it HF-I” form Texas Instruments,and ”I・CODE1”, “I・CODE SLI” from Philips Semiconductors are supported.
RF tag can be read and write by command control from the external equipment which used the RS-232C interface.
The antenna of a maximum of 4 ch is connected, and it can be used with a change at any time by I/O.
The change to three steps of a transmitting output is possible, and the maximum output is 100mW.

1-2. FCC Standard

This product is confirm to the FCC standards.
This product complies with Part 15 Subpart B Class A and Subpart C of the FCC Rules.
FCC Rules (Federal Communications Commision)

FCC ID : PU8RF001-4

FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

FCC NOTICE

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference.
(2) This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a comme`rcial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

1-3. Compatible Standard

This product receives and sends radio wave in between the equipments. In the countries in below mentioned, user does not have to apply the procedure the usage of it in the Radio Law. Because in these countries the procedure is complete or it is not necessary.

In the countries other than these, user must obey the Radio Law. Please inquire to us the details.

CAUTION **If user has used this product with any modifications or without permission on the Radio Law, the punishment is received on the Law.**

1-3-1. Korea

Excerpts from
"Certification of Information and Communication Equipment"
(정보통신기기 인증서)

Certification Type	Type Registration
Equipment Name	Radio Equipment for RFID/USN (13.56 MHz bandwidth)
Model Number of Equipment	RF001-4
Certification No	YFT-RF001-4
Manufacturer and Country of Origin	YAMAHA FINE TECHNOLOGIES CO., LTD./Japan
Type Identification	RFID3-IO2Y13.56TRA1D
Date of Certification	2006-01-09

EMI 승인 안내문
A 급 기기 (업무용 정보통신기기)
이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못 판매 또는구입하였을 때에는 가정용으로 교환하시기 바랍니다.

1-3-2. Taiwan

Excerpts from
"Low-power Radio-frequency Devices Type Approval Certification"
(低功率射頻電機型式認證證明)

Manufacturer	YAMAHA FINE TECHNOLOGIES CO.,LTD
Equipment Name	RFID-Unit (4ch type)
Model Number of Equipment	YAMAHA/RF001-4
Working band	13.56 MHz
Date of Approval	2006-05-16
Certification No	CCAB06LP1800T1

低功率電波輻射性電機管理辦法 (930322)
根據交通部 低功率管理辦法 規定：
第十二條
經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

1-3-3. Japan

本装置は

誘導式読み書き通信設備（13.56MHz を使用）

であり，かつ

電界強度：500μV/m@3m 以下

です．よって「電波法施行規則　第二章第一節第六条（一）」で定められる「免許を要しない無線局」に該当し，「電波法　第四条（一）」に従い，使用に際して免許は不要です．

1-3-4. China

Excerpts from

"Radio Transmission Equipment Type Approval Certificate"

(无线电发射设备型号核准证)

Manufacturer	日本 YAMAHA FINE TECHNOLOGIES CO.,LTD.
CMII ID	2008DJ4654
Date of Approval	2008 年 12 月 22 日
Validity	五年
Equipment Name	通用微功率(短距离)无线电发射设备
Equipment Type	RF001-4-A
Main Functions	数据传输
Modulation Mode	ASK

微功率(短距离)无线电设备管理暂行规定

第十三条

1 本产品的使用方法等请参见产品说明书。本产品的技术参数如下：
   - 频率范围：13.56MHz
   - 频率容限：≤ 100ppm
   - 占用带宽：≤ 200kHz
   - 发射功率：≤ 42dBμA/m (10 米处场强准峰值)
   - 杂散发射限值：≤ 27dBμA/m (10 米处准峰值)
2 使用者不得擅自更改发射频率、加大发射功率(包括额外加装射频功率放大器)，不得擅自外接天线或改用其它发射天线；
3 使用时应注意不得对各种合法的无线电通信业务产生有害干扰；一旦发现有干扰现象时，应立即停止使用，并采取措施消除干扰后方可继续使用；
4 本产品为微功率无线电设备，能够承受各种无线电业务的干扰或工业、科学及医疗应用设备的辐射干扰；
5 本产品不得在飞机和机场附近使用。

1-3-5. Thailand

Excerpts from
"Supplier's Declaration of Conformity"

brand name	YAMAHA FINE TECHNOLOGIES
model	RF001-4

This telecommunication equipment conforms to NTC technical requirement.

Chapter 2 Specifications

2-1. Specifications

2-1-1. Appearance

Item	Specification
Dimensions	150.0(W) x 130.0(D) x 40.0(H) [mm]
Weight	about 700 [g]

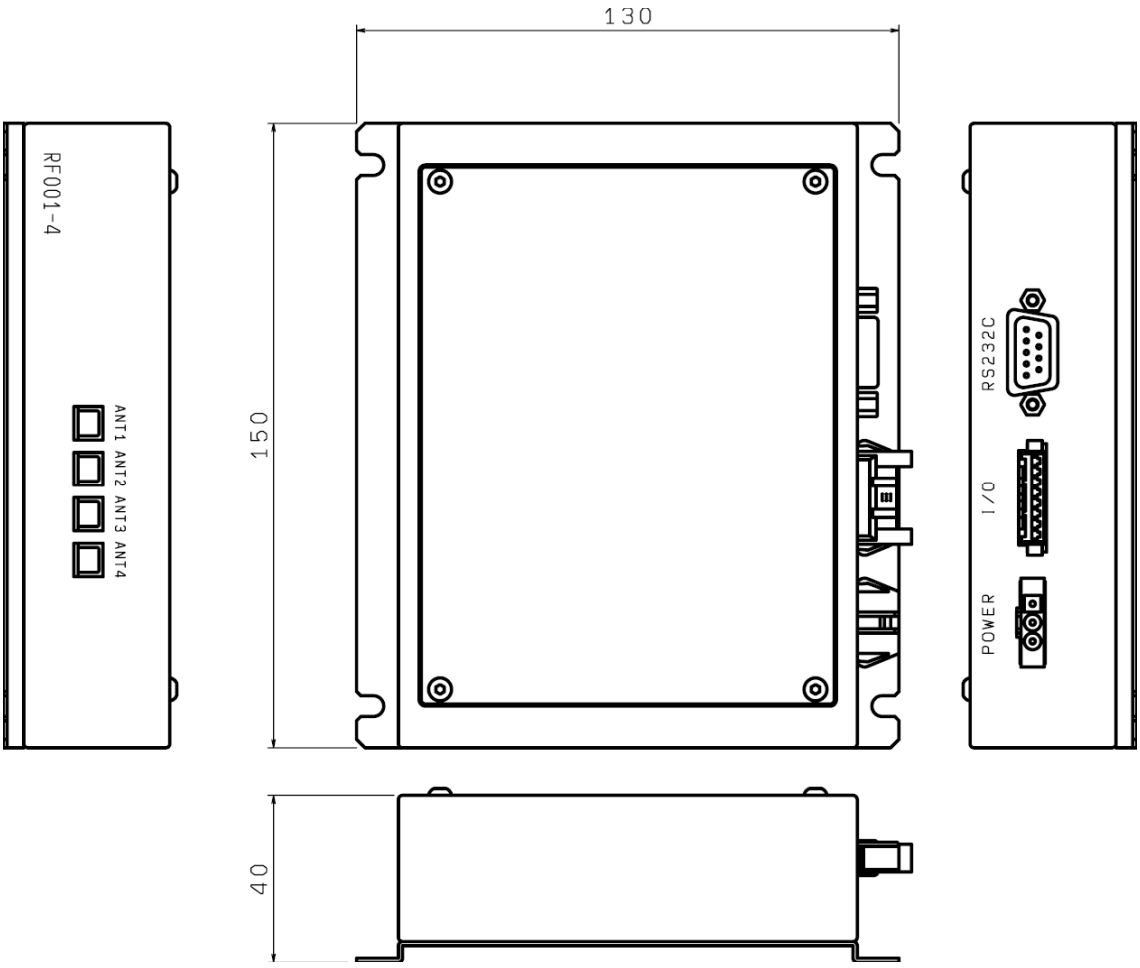


Figure 1 RF001-4 Appearance

2-1-2. Power

Item		Specification
Voltage		DC 5.0 [V] +/-5 [%]
Consumption	during RF tag access (in max RF power)	220 [mA] TYP
	during sleep mode	170 [mA] TYP
	during RF module power off ※1	110 [mA] TYP

※1 RF module power off: the I/O power control signal (PWRON) is negated.

2-1-3. RF Part

Item	Specification
Correspondence tag	my-d, Tag-it HF-I, I・CODE SLI, I・CODE1
Frequency	13.56 MHz
Transmission power	100 [mW] MAX
Antenna	Only Exclusive antenna can be used. (CB-094)

Chapter 3 Instructions for Use

3-1. Composition

- This system is designed to be used with host controller, such as PC or sequencer, and I/O Unit which is controlled by the host controler.
- Maxmam antenna number is 4. Don't use disconnected channel.

3-1-1. Circuit Diagram

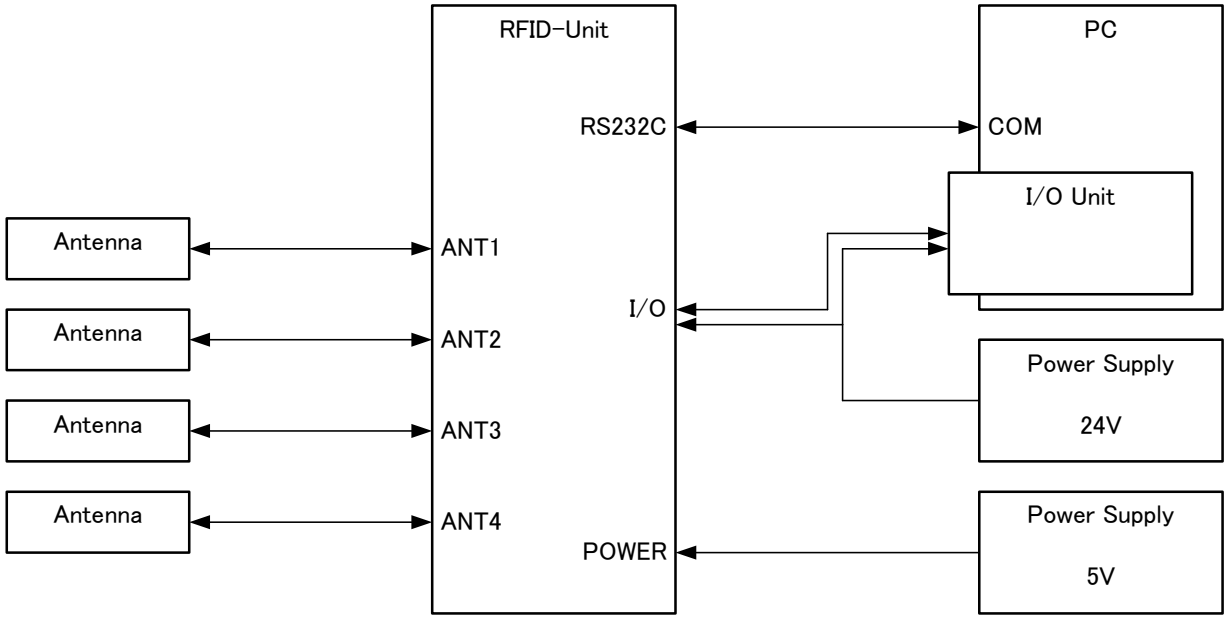


Figure 2 Circuit Diagram

3-2. Connector

3-2-1. ANT1～ANT4 Connector

To connect the antena.
Use exclusive antenna "CB-094" and exclusive antenna-cable " RFCBL-2.5"(2.5m).

3-2-2. Power Connector

For power supply.

Spcification

Item		Specification
Maker		J.S.T. Mfg Co.,Ltd
Case-side connector	Housing	ELR-03V
	Contact (pin)	SLM-41T-P1.3E
Cable-side connector	Housing	ELP-03V
	Contact (socket)	SLF-01T-P1.3E SLF-41T-P1.3E

Terminal function

Terminal no.	Signal name	Function
1	+5V	Power supply
2	5VCOM	Common of power
3	FG	Grounding

3-2-3. I/O Connector

For I/O control, such as power control, anntenna selection and monitoring.

Spcification

Item		Specification
Maker		J.S.T. Mfg Co.,Ltd
Case-side connector	Housing	XARR-08V
	Contact (pin)	SXAM- 01T-P0.6
Cable-side connector	Housing	XAP-08V
	Contact (socket)	SXA-001T-P0.6 SXA- 01T-P0.6

Terminal function

Terminal no.	Signal name	Direction	Voltage	Logic	Function
1	+24V	-	-	-	Control power supply
2	PWRON	I	24V	negative	Power control（pulled up internally） Hi: Power OFF Lo: Power ON (*)For detail, refer to “3-4-1 Power Control” (page. 13) (*)This terminal is used only for the power control. It is not related to an RF output power.
3	READY	O	24V	negative	Operate condition（open collector） Hi: Not operating Lo: Operating
4	RFON	O	24V	negative	Electric wave monitor（open collector） Hi: Not transmitting Lo:Transmitting
5	24VCOM	-	-	-	Common of control power
6	CHSEL0	I	24V	negative	Antenna select bit0 (1)（pulled up internally）
7	CHSEL1	I	24V	negative	Antenna select bit1 (2)（pulled up internally）
8	CHSEL2	I	24V	negative	Antenna select bit2 (4)（pulled up internally） Always set Hi level.

3-2-4. RS232C Connector

To control this system by PC using serial communication.

Spcification

Item	Specification	Remark
Maker	Japan Aviation Electronics Industry, Ltd.	
Case-side connector	DE-9PF-N	Dsub-9pin, male
Cable-side connector	DE-9SF-N	Dsub-9pin, female

Terminal function

Terminal no.	Signal name	Function
1	-	(Not connect)
2	RxD	Receiving data
3	TxD	Transmitting data
4	-	(Not connect)
5	SG	Grounding
6	-	(Not connect)
7	RTS	Request to send
8	CTS	Clear to send
9	-	(Not connect)

3-3. Reference Circuit

3-3-1. I/O Input Circuit Example (PWRON, CHSEL0, CHSEL1)

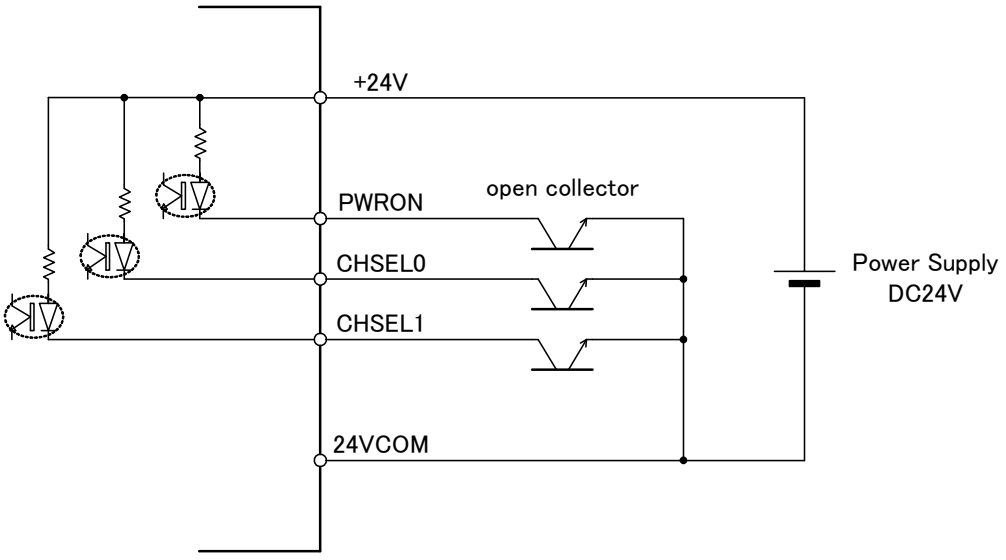


Figure 3　I/O Input Circuit Example

3-3-2. I/O Output Circuit Example (READY, RFON)

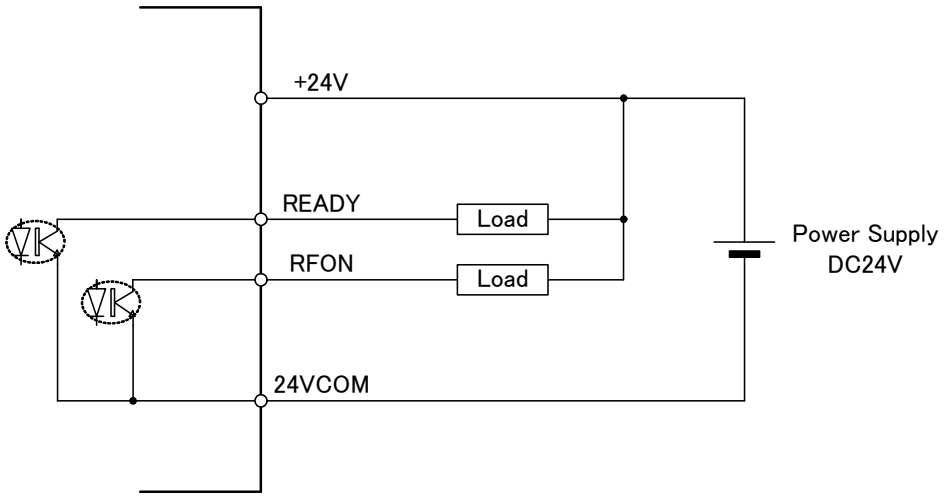


Figure 4　I/O Output Circuit Example

3-3-3. Serial Communication Circuit Example

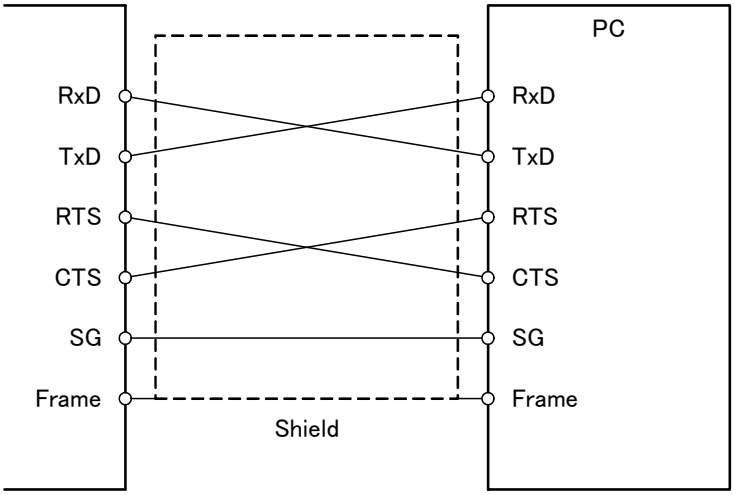


Figure 5　Serial communication circuit example

3-4. I/O Control

3-4-1. Power Control

In this system, power doesn't supplied to the internal control circuit unless the PWRON terminal of I/O connector is asserted. After asserting the PWRON terminal, wait for the ready state of the internal control circuit(READY is asserted.) before starting the serial communication.
Refer to the following figure about the time between the PWRON terminal is asserted and the READY is asserted.

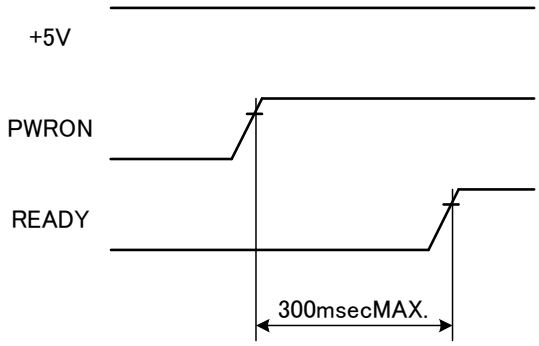


Figure 6 PWRON-READY Characteristic

3-4-2. Antenna Selection

To select the antenna to be used, control the CHSEL0, SHSEL1 terminal of I/O connector.
The relations of the antenna and the CHSEL0, SHSEL1 terminal are described below.

	CHSEL0	CHSEL1
ANT1	NEGATE	NEGATE
ANT2	ASSERT	NEGATE
ANT3	NEGATE	ASSERT
ANT4	ASSERT	ASSERT

Caution: Don't change antenna channel during RF wave transmission. If changed, internal circuit may be damaged.
Before switching antenna channel, stop RF wave transmission by serial command, or turn off RF module power by the PWRON terminal of I/O.

3-5. RS232C Control

3-5-1. Serial Communicate Conditions

Item	Conditions
Bit rate	57600 bps
Data bit length	8 bit
Stop bit length	1 bit
Parity	None
Flow control	RTS/CTS

3-5-2. Serial Command

Serial command is closed. Use the exclusive softwear library “RFLIB-01 (ActiveX DLL for Microsoft VisualBasic6.0)”.
In RFLIB-01, API below is prepared.

API	Function
GetVersion	Get the firmware version
InitConfig	Initialaze the parameter
SetConfig	Set the parameter
GetConfig	Get the present parameter
Sleep	Chenge the RF-circuit to low power consumption mode
SetRFPower	Set the RF output power (This power can be set up is three steps, Low, Middle and High. User can change any one many times.)
GetRFPower	Get the present RF output power
StopRFPower	Stop the RF power
SenseTag	Get the tagwithin sensible area
Inventory	Get DSFID and UID of ISO tag
SelectTag	Select the I・CODE1 tag
Read	Read the data from tag
Write	Write the data to tag
LockBlock	Lock the specified block of tag
GetLockStatus	Get the lock status of tag

Details are given on the another document “RFID unit control software library RFLIB-01”.

● If you have any questions, contact:

YAMAHA FINE TECHNOLOGIES CO., LTD.
FA Engineering Division

Ver.1.0 Eng.