**ENGLISH TRANSLATION**

# 920MHz-BAND RFID EQUIPMENT FOR SPECIFIED LOW POWER RADIO STATION

# ARIB STANDARD

## ARIB STD-T107 Version 1. 0

Version 1.0 July 14th 2012

Association of Radio Industries and Businesses

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## Foreword

The Association of Radio Industries and Businesses (ARIB) investigates and summarizes the basic technical requirements for various radio systems in the form of "ARIB Standards". These standards are developed with the participation of and through discussions amongst radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

ARIB Standards include "government technical regulations" (mandatory standard) that are set for the purpose of encouraging effective use of frequency and preventing interference with other spectrum users, and "private technical standards" (voluntary standards) that are defined in order to ensure compatibility and adequate quality of radio equipment and broadcasting equipment as well as to offer greater convenience to radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

This ARIB Standard is developed for "920MHz-BAND RFID EQUIPMENT FOR SPECIFIED LOW POWER RADIO STATION". In order to ensure fairness and transparency in the defining stage, the standard was set by consensus at the ARIB Standard Assembly with the participation of both domestic and foreign interested parties from radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

Radio equipment defined in this standard utilizes 916.7MHz~923.4MHz. In order to avoid harmful interference to other systems, "Operational guidelines" is also documented and attached hereto as an annex material.

ARIB sincerely hopes that this ARIB Standard will be widely used by radio equipment manufacturers, telecommunication operators, broadcasting equipment manufacturers, broadcasters and users.

The radio channel assignment of radio stations (channel 1 to 5) with antenna power no greater than 1mW and the boundary frequency (922.3MHz in this ARIB Standard) between channel sharing techniques defined on radio station with antenna power no greater than 250mW, may be revised in future, reflecting changes on international regulations or prevalence of each category of radio stations.

# Contents

# Chapter 1 General Descriptions

## 1.1 Outline

Among the Specified Low Power Radio Stations defined in the Article 6 of the Regulations for Enforcement of Radio Law (Revision by Notification 162 of Ministry of Internal Affairs and Communications, 2011) and the Notification 42 of Ministry and Posts and Telecommunications, 1989 ( Revision by Notification 516, 2011), this standard specifies on the Radio Frequency Identification (RFID) equipment that uses the frequency of 916.7 MHz and more to 923.5MHz or less specified in Article 49-14, Clause 6 of the Ordinance Regulating Radio Equipment Regulations. (This RFID refers to the identification of mobile objects that radio equipment performs the identification by receiving the radio wave emitted from an apparatus for responding which is activated and operated by the received RF power from interrogator and returns all or some portion of the received power to the interrogator as the same frequency radio wave, referred to as "responder" hereinafter.)

## 1.2 Scope of the standard

The radio station of RFID consists of radio equipment and data processing equipment and power supply equipment as shown in shown in Figure 1-1.

This standard specifies the technical requirements of radio equipment a consisting of n interrogator, an antenna, and a responder, while the standard does not specify communication protocols between an interrogator and a responder (a standard for interoperability).

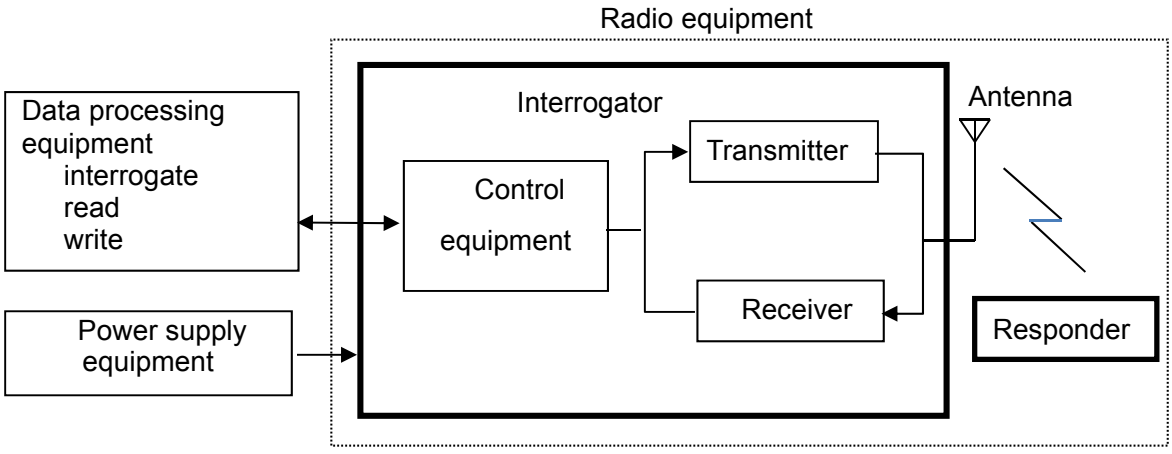


**Figure 1-1 Structure of Radio Station of RFID**

### 1.3 Reference regulations

In the standard, “RL” refers to the Radio Law, "RERL" refers to the Regulations for Enforcement of Radio Law, "ORE" refers to the Ordinance Regulating Radio Equipment, "OTRCC" refers to Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment, and "NT" refers to a Notification of the Ministry of Posts and Telecommunications before 2000, or a Notification of the Ministry of Internal Affairs and Communications after 2001.

# Chapter 2 Overview of the standard system

## 2.1 Standard system

### 2.1.1 Configuration of the standard system

The standard system consists of one interrogator and plurality of responders as shown in Figure 2-1.

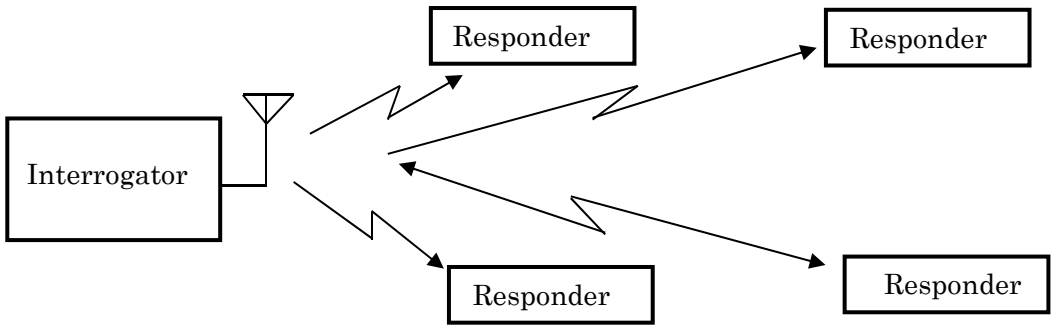


**Figure 2-1 Configuration of standard system**

This system is expected to be used in various fields such as physical distributions, apparel industries, publications, management of entry/exit and the like. In general there are two types of usage of an interrogator. One is fixed use; in this case an interrogator is installed in some equipment such as a printer and operated continuously. The other is portable use; in this case an interrogator is operated intermittently.

A responder consists of an Integrated Circuit (IC) chip and an antenna. It can be utilized as an automatic identification and recognition system by storing discrete identified information in the IC chip by read/write operation using radio waves. By radio waves, it is possible to read/write in a noncontact manner and to simultaneously read information on a plurality of responders.

### 2.1.2 Operation of the standard system

The mode of operation of the standard system is mentioned below.

- Passive tag system

  The passive tag system is a system in which a responder cannot emit radio wave autonomously but can transmit a response signal by using only the power of carrier wave received from an interrogator. Some of the passive tag systems, however, may have a battery for power supply, for example, to the internal circuit (such as a logic, a clock etc.)

and an attached sensor etc. of the responder. Thus, for transmission to the interrogator, a back-scattering scheme that uses only a passive circuit (a scheme of modulation by changing a reflection coefficient of antenna bit by bit) is adopted.

The RFID system using a passive tag as a responder is called the passive tag system.

Having no frequency filter, a passive tag can communicate at any frequency provided that antenna can receive a signal and that an air-interface and protocols are the same. For 800/900MHz passive tag system, 860MHz~960MHz-band system is standardized by International Organization for Standardization (ISO). Actual radio frequency band for passive tag system is different among Japan, U.S.A and EU. An 800/900MHz passive tag generally can be applicable to any frequency between 860 and 960 MHz, ensuring international operability of the passive tag system.

There are several passive tag systems for 800/900MHz listed below.

① Specified Low Power Radio Station(ARIB STD-T90)
② Convenience Radio Station( ARIB STD-T100)
③ Premises Radio Station ( ARIB STD-T89)
④ Premises Radio Station(ARIB STD-T106) and
⑤ Specified Low Power Radio Station (ARB STD-107: this standards)

In addition, there are a couple of active tag system in which the responder contains power source such as a battery and utilizes its energy for transmitting radio wave as follows.

① Specified Low Power Radio Station(ARIB STD-T96)
② 920MHz-Band Telemeter, Telecontrol and Data Transmission Radio Station (ARIB STD-T108).

These two systems are not included in this ARIB Standards (ARIB STD-T107).

## 2.2 Key parameters and functionality of the standard system

Key parameters and functionality of the standard system are shown in Table 2-1.

**Table2-1 Key parameters and functionality of the standard system**

| Item | | Parameters and functionality |
|---|---|---|
| Frequency band | | 916.8MHz, 918.0MHz, 919.2MHz and 920.4MHz+200kHz x n(n=1,2,3,---) when the assigned frequency is higher than 920.4MHz or lower than 923.4MHz. |
| Transmission power | | 250mW or less |
| Service range(reference only) in case of active tag system | | Up to about 2m |
| Transmission method | Contents | Data signal |
| | Emission class | N0N<br>A1D<br>AXN<br>H1D<br>R1D<br>J1D<br>F1D<br>F2D<br>G1D |
| Antenna Gain | | 3dBi or less (absolute gain).<br>However, in case EIRP (Equivalent Isotropically Radiated Power)is less than the value of 3dBi plus 250mW of antenna power, it is allowed to fill in the gap by the antenna gain. |

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# Chapter 3 Technical requirements for radio equipment

The standard includes both “national technical criteria (mandatory)” and “private optional criteria”. A regulation and an article providing a legal basis are quoted for the former.

## 3.1 General conditions

### 3.1.1 Contents of communications

Signals for data transmission

### 3.1.2 Emission class (RERL, article 6, NT: No.42, 1989)

N0N, A1D, AXN, H1D, R1D, J1D, F1D, F2D or G1D

### 3.1.3 Operating frequency band (RERL article 6, NT: No.42, 1989)

(Revised Ministerial ordinance of MIC No.162, 2011, Revised NT: No.516, 2011)

916.8MHz, 918.0MHz, 919.2MHz, and 920.4MHz + 200KHz x n (n= 1, 2, 3 ---) when the frequency is 920.4MHz or more and 923.4MHz or less.

### 3.1.4 Usage environmental conditions

Not specified.

## 3.2 Interrogator

### 3.2.1 Transmitter

(1) Antenna power (RERL article 6, NT: No.42, 1989)

(Revised Ministerial ordinance of MIC No.162, 2011, Revised NT: No.516, 2011)

It shall be 250mW or less.

(2) Tolerance of antenna power (ORE article 14)

+20%, -80%

(3) Radio channel (ORE article 49-14)

(Ministerial ordinance of MIC No.162, 2011)

A radio channel shall consist of up to five consecutive unit radio channels which are defined that their center frequencies are located 916.8MHz, 918.0MHz, 919.2MHz, or from 920.4MHz to 932.4MHz in the frequency range from 916.8MHz to 923.4 MHz with 200kHz separation.

The center frequencies of radio channels are shown through Table 3-1 to Table 3-5.

(a) The case of using one unit radio channel

**Table 3-1 Center frequency of radio channel using one unit radio channel**

| Unit radio channel number | Center frequency (MHz) | Unit radio channel number | Center frequency (MHz) |
|---|---|---|---|
| 5 | 916.8 | 29 | 921.6 |
| 11 | 918.0 | 30 | 921.8 |
| 17 | 919.2 | 31 | 922.0 |
| 23 | 920.4 | 32 | 922.2 |
| 24 | 920.6 | 33 | 922.4 |
| 25 | 920.8 | 34 | 922.6 |
| 26 | 921.0 | 35 | 922.8 |
| 27 | 921.2 | 36 | 923.0 |
| 28 | 921.4 | 37 | 923.2 |
| | | 38 | 923.4 |

(b) The case of using two unit radio channels

**Table 3-2 Center frequency of radio channel using two unit radio channels**

| Unit radio channel number | Center frequency (MHz) | Unit radio channel number | Center frequency (MHz) |
|---|---|---|---|
| 23,24 | 920.5 | 31,32 | 922.1 |
| 24,25 | 920.7 | | |
| 25,26 | 920.9 | 33,34 | 922.5 |
| 26,27 | 921.1 | 34,35 | 922.7 |
| 27,28 | 921.3 | 35,36 | 922.9 |
| 28,29 | 921.5 | 36,37 | 923.1 |
| 29,30 | 921.7 | 37,38 | 923.3 |
| 30,31 | 921.9 | | |

(c) The case of using three unit radio channels

**Table 3-3 Center frequency of radio channel using three unit radio channels**

| Unit radio channel number | Center frequency (MHz) | Unit radio channel number | Center frequency (MHz) |
|---|---|---|---|
| 23,24,25 | 920.6 | 30,31,32 | 922.0 |
| 24,25,26 | 920.8 | | |
| 25,26,27 | 921.0 | | |
| 26,27,28 | 921.2 | 33,34,35 | 922.6 |
| 27,28,29 | 921.4 | 34,35,36 | 922.8 |
| 28,29,30 | 921.6 | 35,36,37 | 923.0 |
| 29,30,31 | 921.8 | 36,37,38 | 923.2 |

(d) The case of using four unit radio channels

**Table 3-4 Center frequency of radio channel using four unit radio channels**

| Unit radio channel number | Center frequency (MHz) | Unit radio channel number | Center frequency (MHz) |
|---|---|---|---|
| 23,24,25,26 | 920.7 | | |
| 24,25,26,27 | 920.9 | | |
| 25,26,27,28 | 921,1 | | |
| 26,27,28,29 | 921.3 | 33,34,35,36 | 922.7 |
| 27,28,29,30 | 921.5 | 34,35,36,37 | 922.9 |
| 28,29,30,31 | 921.7 | 35,36,37,38 | 923.1 |
| 29,30,31,32 | 921.9 | | |

(e) The case of using five unit radio channels

**Table 3-5 Center frequency of radio channel using five unit radio channels**

| Unit radio channel number | Center frequency (MHz) | Unit radio channel number | Center frequency (MHz) |
|---|---|---|---|
| 23,24,25,26,27 | 920.8 | | |
| 24,25,26,27,28 | 921.0 | | |
| 25,26,27,28,29 | 921.2 | | |
| 26,27,28,29,30 | 921.4 | | |
| 27,28,29,30,31 | 921.6 | 33,34,35,36,37 | 922.8 |
| 28,29,30,31,32 | 921.8 | 34,35,36,37,38 | 923.0 |

(4) Frequency tolerance (ORE: article 5, attached table 1 Note 36, NT: No.50, 1989)
(Revised Ministerial ordinance of MIC No.162, 2011, NT: No.533, 2011)

It shall be within $20 \times 10^{-6}$.

(5) Transmission method and modulation method (RERL article 6, NT: No.42, 1989)

One or a combination of the following transmission modes shall be adopted:

Amplitude modulation with double sidebands (A1D, AXN) or Amplitude modulation with single sideband (H1D, R1D, J1D), Angular modulation (F1D, F2D, G1D) and carrier wave (N0N).

(6) Permissible values for occupied bandwidth

(PERL article 6, attached table No.2-28, NT: No.659, 2006)

(Revised NT: No.535, 2011)

It shall be (200 x n) KHz or less. (Note: n is a number of unit radio channels constituting one radio channel and is an integer from 1 to 5)

(7) Adjacent channel leakage power (ORE: article 49-14)

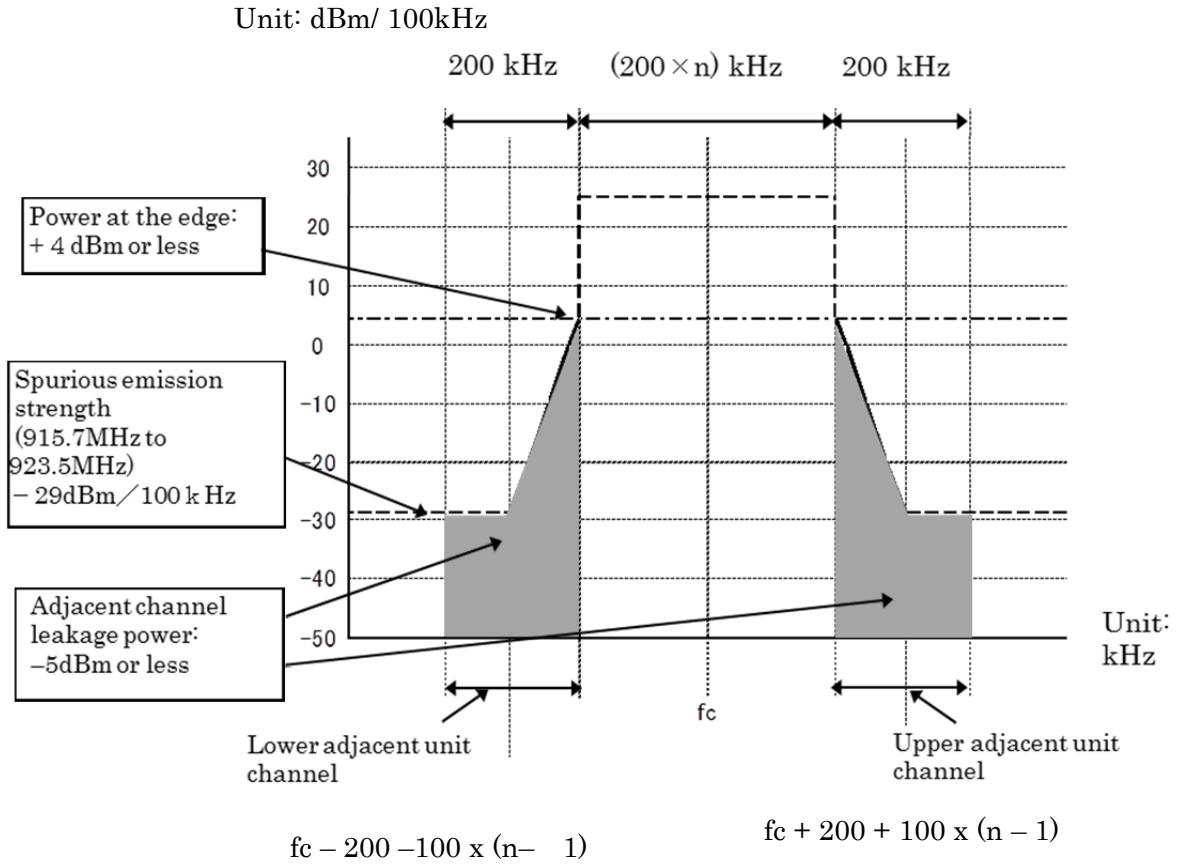
(Revised Ministerial ordinance of MIC No.162, 2011)

A. Spectral power at the both edge of a radio channel

It shall be +4dBm or less.

B. Leakage power in a unit radio channel adjacent to a radio channel (200KHz) from a transmitter

It shall be -5dBm or less, respectively.




(Note: Center frequency is one of frequencies shown in Table 3-1 to Table 3-5 of this channel, where n is the number of unit radio channels constructing one radio channel for simultaneous use. n = 1, 2, 3, 4, 5 )

**Figure 3-1 Image of channel mask of a radio channel**

(8) Permissible values for Spurious Emission/Unwanted Emission Intensity

(ORE: article 7, attached table No. 3-24)

(Revised Ministerial ordinance of MIC No.162, 2011)

Spurious Emission/Unwanted Emission Intensity at the antenna input shall be less than the value in table 3-6.

Table 3-6 Permissible Values for Unwanted Emission Intensity (Antenna input)

| Frequency band | Permissible Value for Spurious Emission / Unwanted Emission Intensity (average power) | Reference bandwidth |
|---|---|---|
| f ≤ 710 MHz | −36 dBm | 100 kHz |
| 710 MHz < f ≤ 900 MHz | −55 dBm | 1 MHz |
| 900 MHz < f ≤ 915 MHz | −55 dBm | 100 kHz |
| 915 MHz < f ≤ 915.7 MHz and 923.5 MHz < f ≤ 930 MHz | −36 dBm | 100 kHz |
| 915.7 MHz < f ≤ 923.5 MHz (except for \|f-fc\|≤ 100x(n+1)kHz) | −29dBm | 100 kHz |
| 930 MHz < f ≤ 1000 MHz | −55 dBm | 100 kHz |
| 1000 MHz < f ≤ 1215 MHz | −45 dBm | 1 MHz |
| 1215 MHz < f | −30 dBm | 1 MHz |

(Note: n is the number of the unit radio channels used simultaneously in one radio channel. )

(9) Modulation signal

No modulation or data etc.

### 3.2.2 Receiver

(1) Limit of Secondary Radiated Emission (ORE: article 24-15)

(Revised Ministerial ordinance of MIC No.162, 2011)

Limit on Secondary Radiated Emission shall be value in Table 3-7 or less.

Table 3-7 Limit on Secondary Radiated Emission, etc

| Frequency band | Limit on Secondary Radiated Emissions, etc. (Antenna input) | Reference bandwidth |
|---|---|---|
| f ≤ 710 MHz | −54 dBm | 100 kHz |
| 710 MHz < f ≤ 900 MHz | −55 dBm | 1 MHz |
| 900 MHz < f ≤ 915 MHz | −55 dBm | 100 kHz |
| 915 MHz < f ≤ 930 MHz | −54 dBm | 100 kHz |
| 930 MHz < f ≤ 1000 MHz | −55 dBm | 100 kHz |
| 1000MHz < f | −47 dBm | 1 MHz |

(2) Reception from responder (ORE: article 49-14)

Receiver shall be capable of receiving radio wave from responder.

### 3.2.3 Controller

#### 3.2.3.1 The case of using 922.3MHz or less

Controller shall have equipment and functions that comply with the conditions

specified in the section described below.

(1) Transmission time control equipment (ORE: article 49-14, NT: No.49, 1989)
(Revised NT: No.531, 2011)

Transmission time control shall comply with the conditions described below.

Carrier sense time is 5 ms or more. The controller shall cease emission of radio waves within 4 seconds after starting of emission. It shall pauses emission for 50 ms or more until the next emission.

Meanwhile, it may emit radio wave again without waiting 50 ms, if it is within 4s after its first emission and its emission frequency is the same. The emission shall finish within 4 seconds interval.

**Table 3-8 Parameters prescribed by (1) Transmission time control and (2) Carrier sense**

| Antenna power | Carrier sense time | Sending duration | Pause duration | The sum of emission time per arbitrary 1 hour |
|---|---|---|---|---|
| 250mW or less | 5ms or more | 4s or less | 50ms or more | None |

(2) Carrier sense (ORE: article 49-14, NT: No.49, 1989)
(Revised NT: No.531, 2011)

Controller shall have functions that comply with the conditions A, B and C specified below.

A. Carrier sense level

Carrier sense level that is sum of received power at all of unit radio channels included in the radio channel to emit shall be -74 dBm (-64dbm in the case of a radio equipment with less than 10mW RF power) at the antenna input. When the carrier level is more than -74 dBm (or -64dBm), radio equipment shall not transmit any radio wave.

B. Bandwidth of carrier sense

The receiving bandwidth for carrier senseshall be the same bandwidth of its transmitting radio channel. In this regulation, emission shall be prohibited when the carrier sense level on the intended radio channel is more than -74dBm(200 kHz x n) at the antenna input (more than -64dBm/(200 kHz x n) in case of radio equipment with less than 10mW RF power).

Note: n is the number of the unit radio channels used simultaneously in a radio channel. n=1, 2, 3, 4, 5.

C. Carrier sense time

Time duration shall be more than 5ms to detect whether the intended radio channel is open or not.

In this regulation, time duration is calculated as follows:

Time ≧ 5 + (R x 0.5) ms,

where R is a random integral number from 0 to 10.

#### 3.2.3.2 The case of using 922.3MHz or higher

When a radio equipment is used on 922.3MHz or higher frequency (Channel 33 to 38), following items are required. Controller shall comply with the requirements for transmission control and carrier sense specified in ARIB STD-T108 "920MHz-band Telemeter, Telecontrol and Data transmission radio equipment".

Note (1): ARIB STD-T108 part II Specified low power radio station, 3.4.1 Transmission time control . Provided, however, 3.4.1-(3) is excluded.

Note (2): ARIB STD-T108 part II Specified low power radio station, 3.4.2 Carrier sense. Provided, however, 3.4.2-(4) is excluded.

### 3.2.4 Cabinet (ORE: article 49-14)

The high frequency circuit and modulation modules except for antenna shall be structured not to be opened easily.

### 3.3 Interface between Data processing unit and Radio equipment

Not specified.

### 3.4 Antenna (ORE: article 49-14)

(Revised Ministerial ordinance of MIC No.162, 2011)

Antenna gain 3dBi or less (absolute gain)

Provided that measured EIRP (Equivalent Isotropic Radiated

Power) is less than the value of 3dBi plus 250mW of antenna power, it is allowed to fill in the gap by the antenna gain.

### 3.5 Responder (ORE article 24-14)

Responder shall be activated and operated by receiving RF power from an interrogator and return all or some portion of its received power to the interrogator as the same frequency radio wave.

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## Chapter 4 Compliance for radiation protection

(RERL, article 21-3)

Signal intensity means electric field strength, power flux density and magnetic field strength （hereinafter the same）.

It is set forth as that the place at which the signal intensity coming from radio equipment exceeds the value shown in table 4-1, protection facilities are required to guard person who are there except for operator.

(RERL, attached table 2-3-2)

**Table 4-1 Reference value of electromagnetic field strength (RERL article 21-3)**

| Frequency | Electric field strength (V/m) | Magnetic field strength (A/m) | Power flux densitv ($mW/cm^2$) | Average Time (minute) |
|---|---|---|---|---|
| More than 300MHz and less than 1.5GHz | $1.585\ f^{1/2}$ | $f^{1/2}／237.8$ | f／1500 | 6 |

Note1: unit of f is in MHz

Note2: Electric field strength and magnetic field strength should be filled in effective values.

On the other hand, power flux density S ($mW/cm^2$) at a distance of R (m) from an antenna is calculated as following formula. (NT: No. 300, 1999)

$$S=(PG)/(40\pi R^2)\cdot K$$

where, P (W): Antenna power

G : Antenna gain (absolute gain)

K : coefficient of reflection

a) No reflection K=1

b) Taking account of the reflection from the ground K=2.56

(Transmission Frequency ≥ 76MHz)

c) In case of strong reflection is considered due to obstacles such as buildings, steel towers, metallic objects, 6dB shall be added to the calculated value.

$K=2.56\times10^{6/10}=10.2$

The threshold value of compliance of radiation protection at 920.1MHz is calculated by the following formula as power flux density S.

$$S= f/1500 = 920.1/1500 =0.613\ (mW/cm^2)$$

Therefore, a limited distance R for above power flux density S is given by the following formula.

$$R = (PGK/40\pi S)^{1/2}$$

The example of calculation results of limited distance R in case of antenna power P= 250 mW and antenna gain G=3dBi (absolute gain) are shown in Table 4-2.

**Table 4-2 Example of calculation results of limited distance by radiation protection guideline**

| **Reflection circumstance** | Coefficient of reflection **K** | The limited distance of radiation protection guideline **R** |
|---|---|---|
| No-reflection | 1 | 0.081m |
| From the ground | 2.56 | 0.129m |
| From buildings towers, something of metal that has possibility to make strong reflection. | 10.2 | 0.257m |

It is noted, that in the actual case for calculating a limited distance according to the radiation protection guideline, uncertain factors which may cause especially strong reflections such as layout and structure in the vicinity of the actual point (operation site) for calculation must be considered, and necessary measures corresponding to the actual point must be taken. However, movable radio equipment, and temporary installed radio equipment for emergency such as a typhoon and an earthquake, and movable radio stations are excluded from the radiation protection guideline under RERL article 21-3.

Depending on the operation of RFID equipment for Specified low power radio station (less than 250mW), each system parameter should meet the radiation protection guideline requirements. Also, if there is any area in the vicinity of the antenna where the radiation protection guideline is not satisfied, it is required, for example, to provide a safety fence.

# Chapter 5 Measurement methods

Method of measurement of this system shall be based on OTRCC attached table 1-1-(3) (Note) or an equivalent or exceeding method of measurement. For other test item which is not specified as test item in the above document, general method of measurement shall be applied.

(Telecom Engineering Center (TELEC) Foundation has established "TELEC-T242: Method of measurement for Radio Equipment for Specified Low Power Radio Station using the frequency of 916.7MHz and more to 923.5MHz or less", based on NT No.88-2, Jan. 16, 2004 of MIC according to OTRCC attached table 1-1-(3). )

Note: NT No. 88 dated 2004/1/16 was applied in this ARIB Standard Ver.1, when it was settled in 2012/2/14 unless otherwise stated. Any revision is added, it shall be effective in accordance with its procedures.

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# Annex　Operational rule

## 1　Overview

### 1.1 Purpose

These guidelines aim to avoid undesired interference to other neighboring wireless systems, to effectively utilize frequency resource and to guarantee user's convenience when a user operates 920MHz-band low power radio station of RFID (referred to as "Specified Low power Radio Station" hereinafter).

### 1.2 Scope of application

These guidelines apply to users of Specified Low Power Radio Station and vendors who manufacture, sell, install , operate and maintain　low power radio stations.

### 1.3 Target systems

These guidelines target following systems.

920MHz-band RFID equipment for Specified Low Power Radio Station:ARIB STD-T107.

## 2　Interference avoidance method

### 2.1 Channel assignment

In addition to the radio station specified by this standard (STD-T107), in 920MHz band, radio stations targeted in this standard share same frequencies specified by STD-T106 and STD-T108. These radio stations have different output powers and carrier sense conditions, so that they have the following relationships of causing/subjecting to interference.

STD-T106 Premises Radio Station, licensed interrogator

> STD-T106 Premise Radio Station, registered interrogator

> STD-T107 and STD-T108 Convenience Radio Station which has power output less than 250mW

> STD-T108 Specified Low Power Radio Station which has power output less than 20mW

> STD-T107 and STD-T108 Specified Low Power Radio Station which has power output less than 10mW

> STD-T108 Specified Low Power Radio Station which has power output less than 1mW

> STD-T106 Premises Radio Station's responder belonged to a licensed station (sub-carrier system)

For example, STD-106 Premises Radio Station, STD-T107 and STD-T108 radio station which has power output less than 250mW have higher power output than that of Specified Low Power Radio Stations which has 1mW, 10mW and 20mW respectively. Then these Specified Low Power Radio Stations are vulnerable to interference from higher power stations. Considering above situation, take priority and appoint available channels for each radio system are recommended to avoid interference among them. Any other precaution shall be taken to protect vulnerable radio station from interference. Table S-1 shows a channel plan for STD-T106 and STD-T107.

Channel numbers 26, 27, 29, 29, 30, 31 and 32 are allocated as the priority channels for STD-T107 Specified Low Power Radio Station. These channels can be used as a unit channel or up to five consecutive unit radio channels. In the use of channel number 5, 11, and 17, some interference from a licensed Premises Radio Station is assumed. In the use of channel number 23, 24 and 25, some interference from a registered Premises Radio Station is assumed. These three channels can be used as a unit channel or up to five consecutive unit radio channels with priority channels from 26 to 29. However, some interference from registered Premises Radio Station is assumed.

In use of channel number 33, 34, 35, 36, 37 and 38, each controller of radio equipment shall meet the requirements for both transmission time limit and carrier sense, which is specified in STD-T108 part II 3.4.1((3) is excluded) and STD-T108 part II3.4.2. ((4) is excluded).

For reference, following arrangements have been made.

An operator of a licensed Premises Radio Station uses channel 5, 11, and 17 as its priority channels, and abstains from using channel 23 to avoid interference with other registered Premises Radio Station or a Specified Low Power Radio Station. An operator of a registered Premises Radio Station uses channel 23, 24 and 25 as its priority channels.

These three channels can be used as a unit radio channel or up to three consecutive unit radio channels. When a registered Premises Radio Station uses channel 5, 11, and 17, some interference from a licensed Premises Radio Station is assumed.

**Table S-1 Channel plan for "920MHz-band RFID equipment for Premises Radio Station" and "920MHz-band RFID equipment for Specified Low Power Radio Station" (Note1)**

| Center frequency (MHz) | Channel number | Premises Radio Station | | Specified low Power Radio Station (note 2) |
|---|---|---|---|---|
| | | Licensed | Registered | |
| | | 1W | 1W | 250mW |
| 916.0 | 1 | | | |
| 916.2 | 2 | | | |
| 916.4 | 3 | | | |
| 916.6 | 4 | | | |
| 916.8 | 5 | ◎ | ○ | ○ |
| 917.0 | 6 | | | |
| 917.2 | 7 | | | |
| 917.4 | 8 | | | |
| 917.6 | 9 | | | |
| 917.8 | 10 | | | |
| 918.0 | 11 | ◎ | ○ | ○ |
| 918.2 | 12 | | | |
| 918.4 | 13 | | | |
| 918.6 | 14 | | | |
| 918.8 | 15 | | | |
| 919.0 | 16 | | | |
| 919.2 | 17 | ◎ | ○ | ○ |
| 919.4 | 18 | | | |
| 919.6 | 19 | | | |
| 919.8 | 20 | | | |
| 920.0 | 21 | | | |
| 920.2 | 22 | | | |
| 920.4 | 23 | △ | ◎ | ○ |
| 920.6 | 24 | | ◎ | ○ |
| 920.8 | 25 | | ◎ | ○ |
| 921.0 | 26 | | | ◎ |
| 921.2 | 27 | | | ◎ |
| 921.4 | 28 | | | ◎ |
| 921.6 | 29 | | | ◎ |
| 921.8 | 30 | | | ◎ |
| 922.0 | 31 | | | ◎ |
| 922.2 | 32 | | | ◎ |
| 922.4 | 33 | | | △A |
| 922.6 | 34 | | | △A |
| 922.8 | 35 | | | △A |
| 923.0 | 36 | | | △A |
| 923.2 | 37 | | | △A |
| 923.4 | 38 | | | △A |

(Note1):

| | | |
|---|---|---|
| blank: | | Channel prohibited for use |
| △ | : | Abstain from using these channels for consideration of effecting to other systems |
| △A | : | Available channel according to transmit time control equipment and carrier sense in ARIB STD-T108 Part II 3.4.1 except (3) and ARIB STD-T108 Part II 3.4.2 except (4) |
| | : | Available channel for preferential use |
| ○ | : | Available channel on the precondition that there would be interference with Premises Radio Stations |

(Note2): The threshold level of carrier sense shall be -64dBm for a radio station which has antenna power output less than 10mW.

### 2.2 Interference to aeronautical radio systems

Electronic equipment that is prohibited from being activated on an aircraft to maintain the safety of the aircraft pursuant to the provisions of Civil Aeronautics Act and falls under the radio stations specified in this standard shall have either of the following structures if it is to be carried on an aircraft:

- The equipment shall be deactivated by removing the batteries or being switched off.
- The equipment shall have a structure such that it cannot be activated without being switched on.

However, it is not necessary for radio equipment which is assessed using the test procedures described

In DO-294 published be the RTCA and confirmed to be free from the risk of interference to have the above mentioned structures.

Related laws and regulations

- Civil Aeronautics Act　Article 73-4
- Ordinance for Enforcement of Civil Aeronautics Act Article 164-15 Safety impending acts
- Notification No.1346 of Ministry of Land , Infrastructure, Transport and Tourism (2003): Electronic devices prohibited for use at all times.

## 3 Influence to medical equipment

To avoid the influence to medical equipment, it is desirable to act properly according to the

guideline of action described in “Study Report on the effect of Radio Waves on Medical Devices” (note3)

(Note 3): When issuing version1.0 of this standard (February 14th, 2012), it indicates the report issued by MIC on March, 2007. However, when it is revised, it indicates the latest version.

## 4 Protection of privacy

For protection of privacy, it is desirable to be act properly according to “Guidelines for Privacy Protection with Regard to RFID tags” (note4).

(Note 4): When issuing version1.0 of this standard (February 14th, 2012), it indicates the guideline issued by MIC and METI on 8th June, 2004. However, when it is revised, it indicates the latest version.

## 5 Channel plan for 920MHz-band radio equipment

Figure S-1 shows Channel allocation for 920 MHz-band Telemeter, Telecontrol and Data Transmission Radio Equipment for convenience radio stations and Specified Low Power Radio Stations (Active tag system) and 920 MHz-band RFID equipment for Premises Radio Stations and Specified Low Power Radio Stations (Passive tag system).

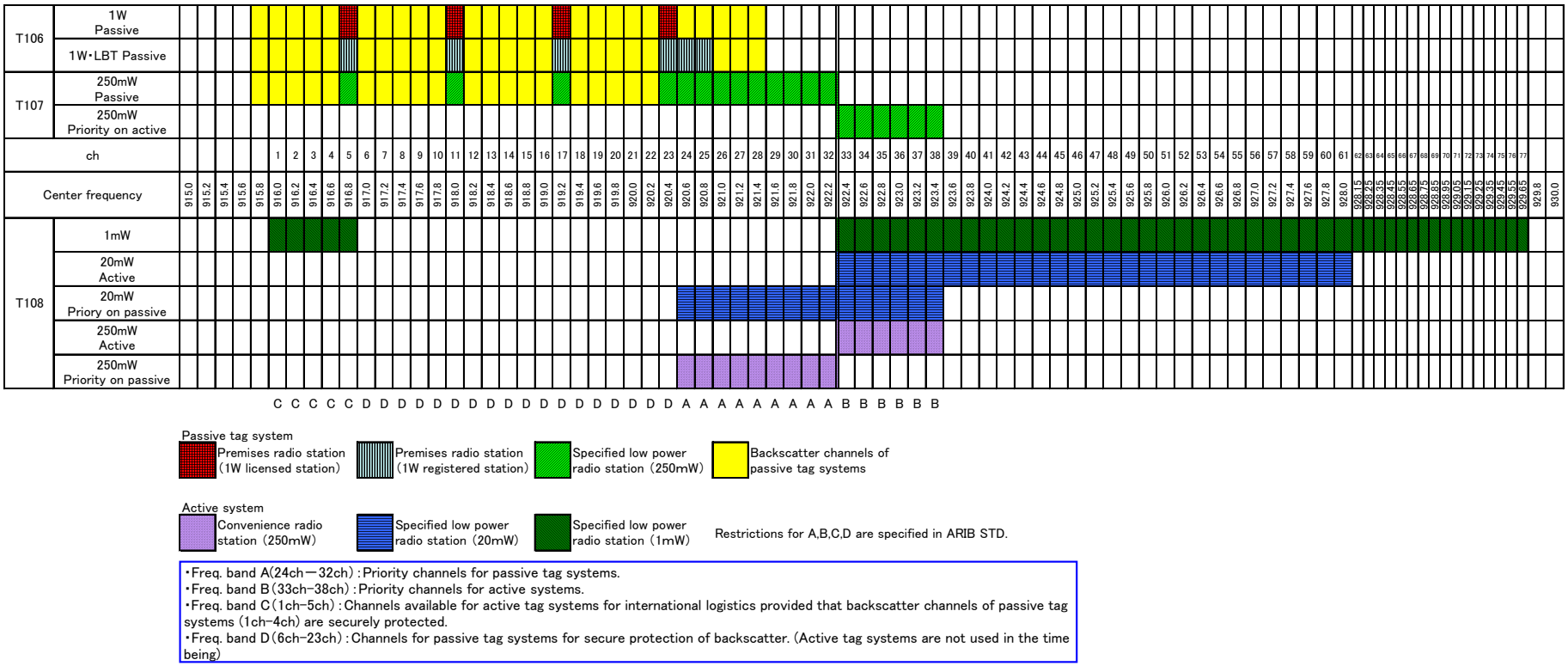


Figure S-1 Channel plan for 920MHz-band radio equipment

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# Communication Note of ARIB Standard-related Proposals, etc.

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