ENGLISH TRANSLATION

MILLIMETER-WAVE RADAR EQUIPMENT FOR SPECIFIED LOW POWER RADIO STATION

ARIB STANDARD

ARIB STD-T48 Version 2.2

Version 1.0 December 26th 1995
Version 2.0 February 2nd 1999
Version 2.1 November 30th 2005
Version 2.2 December 3rd 2015

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 "Milimeter-Wave Radar 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.

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

NOTE:

Although this ARIB Standard contains no specific reference to any Essential Industrial Property Rights relating thereto, the holders of such Essential Industrial Property Rights state to the effect that the rights listed in the Attachment 1 and 2, which are the Industrial Property Rights relating to this standard, are held by the parties also listed therein, and that to the users of this standard, in the case of Attachment 1, such holders shall not assert any rights and shall unconditionally grant a license to practice such Industrial Property Rights contained therein, and in the case of Attachment 2, the holders shall grant, under reasonable terms and conditions, a non-exclusive and non-discriminatory license to practice the Industrial Property Rights contained therein. However, this does not apply to anyone who uses this ARIB Standard and also owns and lays claim to any other Essential Industrial Property Rights of which is covered in whole or part in the contents of the provisions of this ARIB Standard.

Attachment 1 (Selection of Option 1)

(N/A)

Attachment 2 (Selection of Option 2)

(N/A)

Contents

Chapter 1 General Description

1.1 Overview

This standard defines requirements for millimeter wave radar equipment (a radar that uses radio waves in a millimeter band for radiolocation service, and hereinafter this is called as a millimeter wave radar) using 60-61GHz or 76-77GHz frequency bands which is categorized as a Specified Low Power Radio Station designated in Article 6 of the Regulations for Enforcement of the Radio Law.

1.2 Scope of this ARIB Standard

The radio equipment for the millimeter-wave radar system is shown in Figure 1.1. This standard specifies technical requirements for the radio equipment.

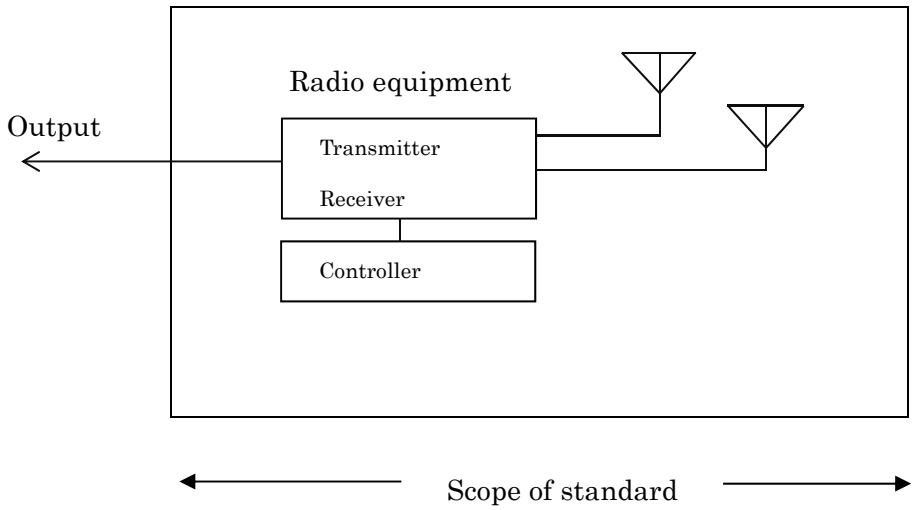

Figure 1.1 Configuration of millimeter-wave radar station

1.3 Normative references

In the standard, "RERL" refers to the Regulations for Enforcement of Radio Law, "ORE" refers to the Ordinance Regulating Radio Equipment, "OTRCC" refers to the Ordinance Concerning Technical Regulations Conformity Certification, etc. of Specified Radio Equipment and "NT" refers to the Notification of the Ministry of Posts and Telecommunications if issued in 2000 or earlier, and the Notification of the Ministry of Internal Affairs and Communications if issued in 2001 or later.

Chapter 2 Standard Systems Using the Radio Equipment

2.1 Standard system configuration

Not specified

2.2 Operation method of standard systems

Not specified

Chapter 3 Technical Requirements on Radio Equipment

3.1 General Requirements

(1) Radar Format

Not specified

(2) Type of Radio waves

Not specified

(3) Frequencies (NT: No.42 in 1989 and No.507 in 2011)

The designated frequency and designated frequency band are as indicated in Table 3-1.

Table 3-1 Designated Frequency and Designated Frequency Band

Designated Frequency	Designated frequency band
60.5 GHz	60.0 GHz – 61.0 GHz
76.5 GHz	76.0 GHz – 77.0 GHz

(4) Operational Environmental Conditions (ORE: Article 49-14)

The equipment is required to maintain the performance specified in this document under normal environmental temperature, humidity and vibration conditions.

3.2 Transmitter

(1) Antenna Power (NT: No.42 in 1989)

The antenna power shall be 10 mW or less.

(2) Antenna Power Tolerance (ORE: Article 14)

The tolerance of the antenna power, which is the maximum permissible tolerance from designated or rated antenna power, shall be 50% in the upper limit and 70% in the lower limit.

(3) Frequency Tolerance (ORE: Article 5, Attached Table 1 Note 34))

The frequency tolerance, which is the maximum permissible departure by the center frequency of the frequency band occupied by an emission from the assigned frequency, shall be within the designated frequency band indicated in Table 3-1.

(4) Permissible Value of Occupied Bandwidth

(ORE: Article 6, Attached Table 2, No.28), (NT: No.659 in 2006)

Permissible value of the occupied bandwidth, which is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers

emitted are each equal to 0.5% of the total mean power of a given emission, shall be as specified in Table 3-2..

Table 3-2 Permissible Value of Occupied Bandwidth

Radio Equipment for Specified Low Power Radio Station	Permissible Value of Occupied Bandwidth
Radio equipment using 60 – 61 GHz frequency band	500 MHz
Radio equipment using 76 – 77 GHz frequency band	1 GHz

(5) Permissible Levels of Spurious Emission or Unwanted Emission Intensity

a) Definition

(RERL: Article 2-1)

Spurious emission is defined as emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions. (RERL: Article 2-1-63)

Out-of- band emission is defined as emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process (RERL: Article 2-1-63-2)

Unwanted emissions consist of spurious emissions and out-of-band emissions. (RERL: Article 2-1-63-3)

Spurious domain is defined as the frequency range beyond the out-of-band domain in which spurious emissions generally predominate. (RERL: Article 2-1-63-4)

Out-of-band domain is defined as the frequency range, immediately outside the necessary bandwidth, in which out-of-band emissions generally predominate. (RERL: Article 2-1-63-5)

Permissible level of spurious emissions is a limit applicable to mean power of spurious emissions on each frequency supplied to an antenna transmission line by unmodulated signals. (ORE: Article 7, Attached Table 3, 1 (1))

Permissible level of unwanted emissions is a limit applicable to mean power of unwanted emission on each frequency supplied to an antenna transmission line by modulated signals. (ORE: Article 7, Attached Table 3, 1 (2))

b) Permissible Levels applied after 1 December 2005

(ORE: Article 7, Attached Table 3)

Permissible level of spurious emission in out-of-band domain	Permissible level of unwanted emission in spurious domain
equal to or less than 100μW	equal to or less than 50μW

However, there is a transitional measure. (Refer to supplementary provision of ORE: (No. 119 of the Ordinance of the Ministry of International Affairs and Communications, August 9, 2005))

c) Permissible Levels applied before 30 November 2005

(5) Permissible levels of spurious emission (ORE: Article 7)

Spurious emission is defined as emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, subharmonic emissions, parasitic emissions, intermodulation products, but exclude spurious emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process.

Permissible levels of spurious emission shall be equal to or less than 100μW in the case where the level is measured as the mean power using a normal modulation method.

In the case where the equipment is capable of transmitting an unmodulated carrier, the spurious levels can be measured by using unmodulated carriers.

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3.3 Receiver

(1) Limit of Incidentally Produced Emissions (ORE: Article 24)

The limit of incidentally produced emissions radiated from the receiving equipment which does not impair other radio equipment performance shall be, in case of measuring using a dummy antenna circuit that has the same electrical characteristic as the receiving antenna, equal to or less than 100μW.

3.4 Controller

The controller shall be comprised of the following equipment and have the following functions.

(1) Interference Prevention Function (RERL: Article 6-2), (ORE: Article 9-4)

The radio equipment shall have a function to distinguish the reflected signals of its own transmitting signals from radio waves transmitted by other radio stations by identifying the modulation methods or other characteristics of receiving radio waves.

(2) Transmission Time Control Equipment

In the transmitter, transmission time control equipment is not required.

(3) Carrier Sense Function

In the radio equipment, carrier sense function is not required.

3.5 Antenna

(1) Antenna Structure

Not specified

(2) Antenna Gain

The absolute gain of the transmitting antenna shall be 40 dB or less.

(3) Antenna Polarization

Not specified

(4) Antenna Configuration

The transmitting antenna and receiving antenna may be separate.

3.6 Others

(1) Housing

The radio equipment shall be housed in a single cabinet that cannot be opened easily. This requirement, however, does not apply to the antenna system.

(2) Stop of Transmission at Times other than Measurement (ORE: Article 49-14)

The radio equipment shall have a function of stopping transmission at times other than measurement.

(3) Marking in relation to Technical Regulations Conformity Certification

(OTRCC: Article 8)

The technical regulations conformity certification shall be marked in a specified format on a highly-visible area of the radio equipment.

(4) Safety and Reliability

In designing and operating the system, fail-safe function shall be considered against jamming and interference.

Chapter 4 Measurement Methods

As for the measurement methods, those notified in Notification of the Ministry of Internal Affairs and Communications (Note 1), which are specified in item 1(3) of Appended Table 1 of OTRCC, shall be applied.

For other test items which are not notified in the above methods, measurements methods generally used shall be applied.

Note 1: This ordinance refers to Notification of Ministry of Internal Affairs and Communications No.88 “Testing method for the characteristics examination” (January 26, 2004) as of the date of issue of this revised standard (version 2.2 issued on December 3, 2015). However, the latest version of the Notification shall be applied if the Notification or contents of the Notification is revised.

Reference
Test Items in relation to Technical Regulations Conformity Certification for Specific Radio Equipment

The test items in relation to the technical regulations conformity certification for the specific low power radio equipment (for millimeter-wave radar) are specified below. The details are described in Chapter 4.

(1) Transmitter

-Frequency tolerance,

-Occupied frequency bandwidth,

-Intensity of spurious emission or unwanted emission (Intensity of spurious emission until November 30, 2005),

-Tolerance of antenna power

Amendment History of Standard

-Standard Serial Number: ARIB STD-T48

-Name of Standard: Millimeter-wave radar equipment for specified low power radio station

-Established date: 26 December 1995

<Note> Related Ministerial Ordinances, Notifications, etc.:

Ministry of Posts and Telecommunications Ordinances No.76 in 1995
(Partial amendments of RERL)

Ministry of Posts and Telecommunications Ordinances No.77 in 1995
(Partial amendments of ORE)

Ministry of Posts and Telecommunications Notifications No.539, 540 and 541 in 1995

Revision Number	Date of Revision	Contents of Revision	Remarks
2.0	February 2, 1999		Decided at the 23rd Standard of Assembly Meeting
		-Rearrangement and clarification of conforming documents	-Rearrangement of the notation of the conformity documents and clear statement of them
		- “Call name storage device” in Contents 3.4 (1) was revised to “Interference prevention function”.	-In line with the revision of ORE (Ordinance of MPT No.87 in 1998)
		-“Notation of call name” in Contents 3.6 (3) was deleted and the subsequent sections were renumbered in order.	-In line with the revision of RERL (Ordinance of MPT No.86 in 1998)
		-Addition of “76.5 GHz, 76.0 GHz- 77.0 GHz” in Table 3.1 of “3.1 (3) Frequencies”	-In line with the revision of RERL (Ordinance of MPT No.86 and No.87 in 1997), the revision of NT of MPT (No.642 in 1997), the deletion of NT and enactment of a new NT (No.643 in 1997)

		- “Not specified” in “3.1 (4) Operational environmental conditions” was revised to “The equipment is required to maintain the performance specified in this document under normal environmental temperature, humidity and vibration conditions”	-Error correction (To meet the provision of ORE)
		-“4,000μμW” in “3.3(1) Limit of secondary emissions” was revised to “100μW”	-In line with the revision of ORE (Ordinance of MPT No.87 in 1997)
		- The requirement for “Call name storage device” in 3.4 (1) was deleted and the requirement for “Interference prevention function” is newly specified.	-In line with the revision of RERL (Ordinances of MPT No.86 and No.87 in 1998) and the abolition of NT (No.517 in 1998)
		- “Interference prevention equipment” in 3.4 (3) was deleted.	-Rearrangement of the description
		-The requirement for “Notation of call name” in 3.6 (3) was deleted and the subsequent sections were renumbered in order.	-In line with the revision of RERL (Ordinance of MPT No.86 in 1998)

		-"Radio Equipment Inspection and Certification Institute (MKK)" in Chapter 4 Measurement Methods was replaced by "Telecom Engineering Center (TELEC)".	-The name of Certification Authority was changed.
		-"Call name storage device" in Reference (3) Other equipment was changed to "Interference prevention function"	-In line with the revision of ORE (Ordinance of MPT No.87 in 1997) and the abolition of NT (No.517 in 1998)

2.1	November 30, 2005		Decided at the 60th Standard of Assembly meeting
		-In 1.3 Conforming documents, as “the Ordinance Concerning Technical Regulations Conformity Certification” “the Ordinance Concerning Technical Regulations Conformity Certification of Specified Radio Equipment” was changed to “the Ordinance Concerning Technical Regulations Conformity Certification, etc. of Specified Radio Equipment”, and as “NT”, “ the Notification of the Ministry of Posts and Telecommunications” was changed to “the Ministry of Posts and Telecommunications if issued in 2000 or earlier, and the Notification of the Ministry of Internal Affairs and Communications if issued in 2001 or later”.	-In line with the revision of the name of related Ordinances
		-In 3.2(5) “Permissible levels of spurious emission” was changed to “Permissible levels of spurious emission and unwanted emission	-In line with the partial revision of ORE (Ordinance of the Ministry of Internal Affairs and

		intensity", "(i) Definition" and "(ii) Permissible levels applicable after 1 December 2005" were added, and as a transitional measure "Permissible levels applicable before 30 November 2005 remained in (iii) "Permissible levels based on the ORE applicable until November 30, 2005".	Communications No.119 in 2005)
		-In 3.6(3) "Display of Technical regulations conformity certification", the related ordinance was changed from "No. 6 of the technical regulations conformity certification" to No. 8 of the Technical regulations conformity certification".	-In line with the revision of Ordinance concerning Technical regulations conformity certification
		-Chapter 4 "Measurement methods" was revised as "the Measurement methods notified in Notification of the Ministry of Internal Affairs and Communications, which are specified in Appended Table 1 item 1(3) of OTRCC, shall be applied.	-Refer to NT as for measurement methods.
		- Reference "Test items in relation to Technical Regulations Conformity	-In line with the test items in NT

		Certification for specific radio equipment" was revised in line with the test items in NT.	

2.2	December 3, 2015		Decided at the 98th Standard of Assembly meeting
		-Revision of Foreword	-Review of description
		-Clarification of the definition of Millimeter wave radar in Chapter 1 “General Description”	-Clarification of expression
		-Clarification of the reference of ORE to be referenced and revision of the number of NT which is revised to new number in Chapter 3 “Technical Requirements on Radio Equipment”	-Clarification of expression and in line with the revision of NT
		-Revision of permissible value of occupied bandwidth in Section 3.2 (4) based on NT	-In line with the partial revision of NT (NT of the Ministry of Internal Affairs and Communications No.217 in 2015)
		-Revision of the version no. to 2.2 in Chapter 4 “Measurement Methods”	-In line with the revision to Version 2.2 of this standard
		-Correction of editorial errors and unification of format	-Unification of description

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