****

**APT survey Report on**

**OPERATION OF SHORT-RANGE DEVICES (SRDs)**

**No. APT/AWG/REP-07   
(Rev. 3)**

**Edition: March 2015**

**Adopted by**

**The 18th APT Wireless Group Meeting**

**9 – 13 March 2015**

**Kyoto, Japan**

***(Source: AWG-18/OUT-17)***

**APT survey Report on**

**OPERATION OF SHORT-RANGE DEVICES (SRDs)**

Contents

[I. Introduction 3](#_Toc414869227)

[II. Scope 3](#_Toc414869228)

[III. Survey Results 4](#_Toc414869229)

[IV. Conclusions 12](#_Toc414869230)

# I. Introduction

It is necessary to share the regulatory information regarding operation of SRDs among APT member countries as early as possible, in order to facilitate the market access by equipment vendors.

To better understand the frequency bands that have been opened up for SRD operations, the survey has undertaken on the technical and procedural regulations of Short-Range Devices (SRDs) on 19 March 2008. The objective of the survey on the technical regulations is to determine, among other technical requirements, the operating specifications of SRDs across different types of applications. For procedural regulations, the key focus is on the type approval process, Mutual Recognition Agreement (MRA) arrangement, licensing requirements, operating parameters as well as future policies. Details of the survey questionnaire can be found in Annex 1.

The Administrations from Bhutan, Brunei Darussalam, China, Hong Kong China, Iran (Islamic Rep. of), Japan, Korea (Rep. of), Malaysia, New Zealand, Philippines, Singapore, Thailand and Vietnam responded to the survey. Technical regulations stipulated in respective member countries are appended in Annex 2. The survey compilation of this document may be helpful for APT member countries in preparing their national contributions and activities to the ITU-R Working Party 1B which develops and updates the Report ITU-R SM.2153-4[[1]](#footnote-1) on “Technical and operating parameters and spectrum use for short range radiocommunication devices” under the Resolution ITU-R 54-1[[2]](#footnote-2) on the ‘Studies to achieve harmonization for short-range devices (SRDs). In addition, the APT member countries wishing to formulate their national regulations for SRDs could consider this compilation as a guide.

# II. Scope

This Report provides information on the type approval process, MRA arrangement, licensing requirements, operating parameters as well as future policies in Asia Pacific region based on the survey results.

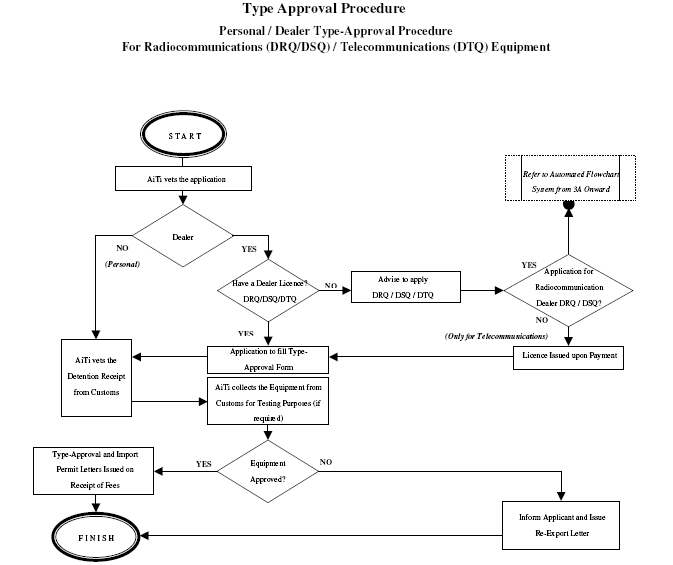
# III. Survey Results

|  |
| --- |
| **Q1. State the radio equipment type approval process and related certification and verification bodies** |

**a. Bhutan**

No approval required for use of SRDs except for those operating out of ISM band. The regulator approves the usage of such devices whereby minimal spectrum usage fee is charged.

**b. Brunei Darussalam**



**c. China**

In accordance with Radio Regulation of P. R. China, any radio transmission equipment (including SRDs) must follow Type Approval process before getting into Chinese market. The radio transimission equipment (including SRDs) should be tested by qualified test body for conformity with technical regulations or requirements. Then the manufacturer should submit the application document including test report, legal document of company and revelant technical document to Ministry of Industry and Information Technology which is the regulation authority for Type Approval. Only if the application complies with the relevant rules and requirements, Type Approcal certificate and an unique identification (CMIIT ID) will be issued to the applicant for that product. The CMIIT ID should be printed on the product label or user manual.

**d. Hong Kong**

Please refer to the following Information Notes –

(i) “How to Apply For Type Approval or Type Acceptance of Radio Equipment” available at :

<http://www.ofca.gov.hk/filemanager/ofca/common/Industry/telecom/standard/i401e.pdf>

(ii) “Technical Performance for Radiocommunications Apparatus Covered by the Telecommunications (Telecommunications Apparatus) (Exemption from Licensing) Order” available at :

<http://www.ofca.gov.hk/filemanager/ofca/common/Industry/telecom/standard/i402e.pdf>

**e. Islamic Republic of Iran**

Type Approval is obligatory for all the SRDs. Communication Regulatory Authority (CRA) is the only certification authority for Type Approval through the network of qualified national test bodies. Only the type-approved SRDs can be imported and used legally in Iran.

**f. Japan**

Please refer to <http://www.tele.soumu.go.jp/e/sys/equ/tech/index.htm>.

**g. Republic of Korea**

All the SRDs are subject of “Certification of Conformity”. They should be tested by designated test body for conformity with technical regulations or requirements. The certification body is National Radio Research Agency. Certifications for SRDs are granted in conformity with “Regulations on Conformity Assessment for Broadcasting and Communications Equipments".

**h. Malaysia**

Radio equipment must be certified by SIRIM which is at the moment the only certifying agency appointed by Malaysian Communications and Multimedia Commission (MCMC). Certification is divided into Type Approval & Special Approval. In general all equipment for sale in this country must be type approved. However if equipments are imported for exclusive use by the applicant for temporary period or for private usage, the equipment can be considered for Special Approval certification. This is normally applicable for equipment to be used for trial, exhibition, R&D and training.

**i. New Zealand**

New Zealand and Australia have established similar self-declaration processes for the certification of SRD products. The supplier of the SRD product to the market (New Zealand or Australia) is registered with the regulator and once registered able to use the Regulatory Compliance Mark (RCM).

For some SRD products operating in the 2400 MHz and 5700 MHz bands declared to meet specific ACMA standards as found in the Radiocommunications (Radio Standards) Notice (i.e. levels of conformity 1 & 2), the supplier must:

* label the product with the “RCM” compliance mark; and,
* hold the compliance documentation required in the Compliance Notice.

For all other SRD products to be used in New Zealand (i.e. levels of conformity A1 & A2), the supplier must ensure that they

* meet an appropriate standard as found in the Radiocommunications (Radio Standards) Notice;
* label with the New Zealand Radio Label (R-NZ); and,
* hold the compliance documentation required in the Compliance Notice.

**j. Philippines**

Only type-approved and/or accepted Short Range Devices (SRDs) shall be allowed for use in the country.

**k. Singapore**

Equipment registration shall be based on the submission of the Supplier’s Declaration of Conformity (SDoC) to signify that the supplier has carried out conformity assessment on the equipment to IDA’s Technical Specifications. All registration requests can be made on-line via <http://tls.ida.gov.sg> under Equipment Registration group, using one of the following two equipment registration selections:

1. Equipment Registration for Complex/Multi-Line Equipment or SRD/Low Power Devices (LPD) (for registration under the self-declaration Enhanced Simplified Equipment Registration, ESER scheme); or
2. Telecommunication Equipment Registration (for registration under the General Equipment Registration, GER (declaration certified by an IDA recognised body or evaluation by IDA) scheme.

**l. Thailand**

The radio equipment type approval process in Thailand is shown in the following diagram.

**m. Vietnam**

Only type-approved and/or accepted SRDs shall be allowed for use in the Vietnam. For more information, please refer to Circular No. 05/2014/TT-BTTTT of Ministry of Information and Communications promulgating list of products and goods potentially unsafe under the management responsibility of the Ministry of Information and Communications.[[3]](#footnote-3)



For more information, please refer to the Office of the National Broadcasting and Telecommunications Commission (NBTC) website: <http://standard.nbtc.go.th/images/file/Coneng.pdf>.

|  |
| --- |
| **Q2. State the mutual Recognition Arrangement with other countries/regions** |

**a. Bhutan**

Nil

**b. Brunei Darussalam**

Currently AITI has no mutual agreement with other country. However AITI is working with Singapore to finalise the MRA between the two countries.

**c. China**

Currently, MIIT has no mutual Recognition Agreement with other countries/regions.

**d. Hong Kong**

Hong Kong, China is a partner of the Asia Pacific Economic Cooperation Mutual Recognition Arrangement for Conformity Assessment of Telecommunications Equipment (APEC Tel MRA). The APEC Tel MRA scheme is made up of two phases. Phase I provides for recognition of test reports whereas Phase II allows for recognition of certification for product approvals.

Hong Kong, China has entered into agreement with Australia, Singapore, Chinese Taipei, Canada and United States for Phase I Program. In addition, Hong Kong, China has implemented Phase II Program with Canada and United States. Hong Kong, China considers mutual recognition arrangement an effective trade facilitation measure which speeds up product entry into markets, reduces technical barriers to trade and fosters the development and use of international standards.

**e. Islamic Republic of Iran**

Currently, CRA has no MRA arrangement with other countries/regions.

**f. Japan**

(1) EC

(2) Singapore

(3) USA

**g. Republic of Korea**

Korea has entered into MRA with Canada, United States, Vietnam, Chile and EU. The test reports from designated laboratories of those countries should be recognized.

**h. Malaysia**

On 28 January 2005, Malaysia has sealed a bilateral agreement on MRA for telecommunications equipment with Singapore. The signing means that both countries to recognise each other’s equipment conformity testing processes by removing duplicative testing procedures and reducing cost and time required to bring telecommunications equipment into both markets. This is the Phase I of the bilateral MRA where both countries will first accept equipment test reports issued by accredited test laboratories recognised by each country.

The MRA is under ATRC(ASEAN Telecommunications Regulators’ Council) JSC (Joint Sectoral Committee) MRA.

**i. New Zealand**

New Zealand has entered into mutual recognition agreements for accredited testing bodies with Australia, members of the Asia-Pacific Economic Cooperation Group, China, members of the European Union, Singapore and Taiwan

**j. Philippines**

SRDs shall be subject to one time registration prior to use and shall bear National Telecommunications Commission (NTC) registration number issued by the Commission for proper identification. The Commission shall device a standard numbering scheme for the registration of SRDs.

**k. Singapore**

Singapore has entered MRA for recognition of conformity assessment bodies with Australia, Brunei, Canada, Chinese Taipei, Hong Kong, India, Indonesia, Japan, Malaysia and United States. Under the Phase II MRA, certifications issued by recognised certification bodies are also accepted for equipment registration.

**l. Thailand**

Currently, NBTC has no Mutual Recognition Arrangement with other countries/regions.

**m. Vietnam**

Vietnam has entered into MRA with Korea, USA, Canada and Singapore. The test reports from designated laboratories of those countries should be recognized.

|  |
| --- |
| **Q3. State the licensing requirements; whether subject to general licence or individual licence.** |

**a. Bhutan**

License is not required for SRDs operating within the ISM band.

**b. Brunei Darussalam**

No license is required for the usage of the SRDs except for certain frequency band that uses high power. However, “dealer license” is required for companies who sells and distribute these devices. In addition, the short range devices need to be type approval (based on the above technical conditions) before it can be sold and used.

**c. China**

Individual license is not required for users of SRDs in China.

**d. Hong Kong**

Individual licence is not required for the use of SRDs in Hong Kong.

**e. Islamic Republic of Iran**

All SRDs having an approval certificate are exempted from obtaining of individual license in Iran.

**f. Japan**

Radio stations with antenna power of 1 watt or less which operate without causing interference with or disturbance to the operation of other radio stations under certain conditions,

and which exclusively use Radio Equipment with Conformity Mark.

**g. Republic of Korea**

All the SRDs are exempted from individual license in Korea.

**h. Malaysia**

Generally, the licensing of SRD are via Class Assignment (please refer to <http://www.skmm.gov.my/what_we_do/spectrum/assign.asp>) subject to the specified technical requirements stipulated in the [Notification Of Issuance Of Class Assignments](http://www.skmm.gov.my/registers/cma/ClassAssignment/pdf/Class%20Assign-BI-register.pdf)

**i. New Zealand**

In addition to standards conformance the product must also meet the appropriate general license requirements for SRDs (see <http://www.rsm.govt.nz/cms/licensing/types-of-licence/general-user-licences/short-range-devices/> ).

**j. Philippines**

Only duly accredited radio dealers/manufacturers shall buy, sell and carry on stocks SRDs that are legally imported, type-approved/accepted, and registered with the Commission, and the same shall be included in their sales and stocks report. However, any individual/entity intending to use, purchase, import SRDs may be allowed provided that the equipment are type-approved/accepted and shall be registered with the Commission.

**k. Singapore**

Generally, low poweredSRDs operating within IDA’s technical specifications are licence-exempted.

**l. Thailand**

Some SRDs do not require licenses (i.e. license-exempt) (see item 1) of the Annex) but they must comply with certain technical conditions such as maximum transmit power limit and compliance with technical standards. However, some radiocommunications licenses may be required on a case-by-case basis for the SRDs in items 2) and 3) of the Annex.

**m. Vietnam**

All the SRDs operating within technical specifications of Ministry of Information and Communications (MIC) are exempted from a radio license in Vietnam.

|  |
| --- |
| **Q4. State the special operating parameters or conditions for SRDs.** |

**a. Bhutan**

As per the International best practices.

**b. Brunei Darussalam**

Only subject to the technical conditions stated above.

**c. China**

Only the SRDs complying with the technical specification and certified with Type Approval certificate can be used legally in China.

**d. Hong Kong**

The requirements are specified in the relevant Regulations and class licences –

[http://www.legislation.gov.hk/blis\_ind.nsf/WebView?OpenAgent&vwpg=CurAllEngDoc\*106\*100\*106.27#106.27](http://www.legislation.gov.hk/blis_ind.nsf/WebView?OpenAgent&vwpg=CurAllEngDoc*106*100*106.27#106.27)

<http://www.coms-auth.hk/en/licensing/telecommunications/class/index.html>

**e. Islamic Republic of Iran**

Only the type-approved SRDs can be used legally in Iran. SRDs shall not cause harmful interference to, nor claim protection from other licensed operations. In some cases operation restricted to indoor, outdoor or enclosed environments.

**f. Japan**

Required parameters or conditions varies from system to system.

**g. Republic of Korea**

SRDs for relaying communications and broadcasting services should be installed by the related service provider or the identities in the contract with the related service provider.

**h. Malaysia**

Special operating parameters or conditions for SRDs

Please refer to <http://www.skmm.gov.my/registers/cma/ClassAssignment/pdf/Class%20Assign-BI-register.pdf>

**i. New Zealand**

The operating conditions for SRDs are contained within the general license mentioned above e.g. shall not cause interference, and shall not claim interference from other licensed services, indoor vs indoor/outdoor use, particular bands may be used only for particular applications.

**j. Philippines**

Duly accredited radio dealers/manufacturers shall register with the Commission all imported SRDs not later than 5 days upon release from the Bureau of Customs.

**k. Singapore**

Short range devices are intended for communications in confined areas of buildings as well as for localized on-site operations. The operation of SRD shall not cause interference with other authorized radio-communication services, and be able to tolerate any interference caused by other radio-communication services, electrical or electronic equipment. Also, the SRD shall be marked with the supplier/manufacturer’s model or type reference. The markings shall be legible, indelible and readily visible.

**l. Thailand**

The operating parameters or conditions for SRDs vary band by band. Please see the Annex.

**m. Vietnam**

Detailed requirements for SRDs differ from types of short range applications. All the SRDs operating within MIC’s technical and operational requirements shall not cause harmful interference, and shall not claim interference from other licensed devices.

For further information, please refer to http://mic.gov.vn/vbqppl/Lists/Vn%20bn%20QPPL/DispForm.aspx?ID=7817.

|  |
| --- |
| **Q5. State the future policy regarding licensing framework for SRDs (if any)** |

**a.Bhutan**

Nil.

**b. Brunei Darussalam**

Nil

**c. China**

Nil

**d. Hong Kong**

Nil

**e. Islamic Republic of Iran**

SRD regulations and requirements are subject to periodic review and new frequency bands may be opened up for specific and non-specific SRDs.

**f. Japan**

Nothing particular

**g. Republic of Korea**

The SRDs regulations is now being reviewed. New frequency bands may be open for SRDs.

**h. Malaysia**

Nil

**i. New Zealand**

The current SRD licensing and certification arrangement is regularly reviewed, with particular emphasis on harmonization with Australia and the European Union.

**j. Philippines**

Nil

**k. Singapore**

SRD licensing framework will be reviewed periodically, with the aim to streamline licensing processes and relax technical conditions where appropriate.

**l. Thailand**

Currently, NBTC Regulations define only for license-exempt **equipment**, but do not have explicit definitions of unlicensed **spectrum** or “spectrum commons.” Thailand will incorporate the concept of “spectrum commons” into modification of future NBTC Regulations in order that, in general, SRDs would be able to use unlicensed bands or spectrum commons.

**m. Vietnam**

Nothing particular

# IV. Conclusions

Overall, the survey results have provided useful information on the regulatory and technical regulations establishe

d in the APT member countries, which now serve as a good reference for other administrations intending to open up more frequency bands for SRDs. As technical regulations differ among the countries, this has created much difficulty in harmonising certain frequency bands in this region. It is also noted that even when the same band is allowed for SRD operation, the type of application designated for SRDs may not be the same; resulting in different categories of SRDs operating under various output power levels.

The compilation of survey results in Table 1[[4]](#footnote-4) shows the frequency bands already harmonized across Brunei Darussalam, Hong Kong, Japan, Korea, Malaysia, Philippines New Zealand and Singapore is summarised as follows:

|  |  |  |
| --- | --- | --- |
| **Typical Applications** | **Frequencies / Frequency band (MHz)** | **Range of the maximum power level** |
| Cordless Phones / Telemetry | 315  [This frequency is allocated for radio detection in Singapore.]  [This frequency is not used for SRDs in Korea] | 25uW to 10mW e.r.p |
| Medical Implant | 402-405 | 25uW e.r.p |
| RFID | 433.92  [This frequency is allocated for radio detection in Singapore.] | 1mW to 25m W e.r.p |
| WLAN | 2400-2483.5 | 10mW to 1000mW e.i.r.p |
| Vehicle Radar | 76000-77000 | 10mW to 100W e.i.r.p |

**Table 1**

Table 2 (see footnote 2) shows the frequency bands already harmonized across Hong Kong, Korea, Philippines, New Zealand and Singapore:

|  |  |  |
| --- | --- | --- |
| **Typical Applications** | **Frequencies / Frequency band (MHz)** | **Range of maximum power level** |
| RFID | 13.553-13.567  [This frequency is allocated for other SRDs applications, e.g. radio detection, in Singapore.] | 100 mW (e.i.r.p) / 42 dBµA/m at 10m |
|  | 26.96-27.28  [This frequency is allocated for on-site radio paging system in Singapore.] | 0.5W to 3W e.r.p / 42 dBµA/m at 10m |
| Model Control | 40.66-40.70  [This frequency is allocated for on-site radio paging system in Singapore.] | 100 mW to 1000mW e.r.p |
|  | 72-72.25  [This frequency is allocated for other SRDs applications in Singapore.] | 10 mW to 750 mW e.r.p |
| Cordless Phones | 864.8-865  [This frequency is not allocated for cordless phones applications in Singapore. 821-822 MHz/924-925 MHz is allocated for analogy cordless phones applications in Singapore.]  [This frequency band is not used for SRDs in Korea] | 10 mW to 1000 mW e.r.p |
| WLAN | 5725-5850  [5725-5825 MHz is used for this application in Korea] | 10 mW to 4W e.i.r.p |

**Table 2**

As market developments of SRDs are primarily dependent on economies of scale, there is a need to work towards harmonized spectrum bands for SRDs, to provide regulatory certainty for manufactures and end-users, as well as to catalyst the developments of new SRD applications. To achieve the above, the possible approach is to simplify the conditions on the use of SRDs, to the largest extent possible, and to adopt frequency bands that are already established in Europe or US. For example, Recommendation CEPT/ERC/REC 70-03[[5]](#footnote-5) could be a key reference for the development of regulations for SRDs, the Recommendation ITU-R SM. 1896 [[6]](#footnote-6) established by the ITU or other relevant bodies. This however should take into account potential interference from SRDs and ensuring that existing services remain protected[[7]](#footnote-7).

In considering the complexity of identifying harmonized frequencies and technical conditions, the proposed follow-up action is to seek consensus among APT members in designating harmonized bands for SRDs in the above-mentioned table and timely development of an APT Recommendation or Decision in future AWG meetings.

**ANNEX 1**

**QUESTIONNAIRE on**

**COMMON FREQUENCY BANDS FOR OPERATION OF SHORT RANGE RADIOCOMMUNICATION DEVICES**

by

SWG Sub-WG5

**A. Introduction**

Short Range Radiocommunication Devices (SRDs) is a term which applies to radio transmitters operating over short distance and at low power. Generally, these devices have little potential to cause interference to other radio equipments. They are usually exempted from licensing if operating within approved technical standards.

ITU Radio Assembly held in Geneva in October 2007 approved Resolution ITU-R54[[8]](#footnote-8) on the ‘Studies to achieve harmonization for short-range radiocommunication devices (SRDs).’

In response to this Resolution, ITU-R Study Group is expected to start its work from June 2008 when the first meeting is held in Geneva. It is necessary to share the regulatory information regarding operation of SRDs among APT member countries as early as possible. Spectrum Sub- Working Group 5 proposes to conduct a survey on the technical and procedural regulations of SRDs.

It is also helpful for APT member countries to prepare their national contributions to ITU-R study and to facilitate market access by equipment vendors in Asia Pacific.

The survey information solicited may form the basis for drafting of APT report or recommendation, to be used as a guide for APT member countries wishing to formulate their national regulations for SRDs devices.

**B. About Your Administration**

Name of Administration :

Contact Person :

Telephone :

Postal Address :

Email Address :

**C. Survey Questions**

In addition to the technical regulations or requirements (with examples given) as shown in Section D, you are kindly requested to also provide information on the administrative or procedural regulations covering the following:

1. The radio equipment type approval process and related certification and verification bodies
2. Mutual Recognition Arrangement with other countries/regions
3. Licensing requirements; whether subject to general licence or individual licence
4. Special operating parameters or conditions for SRDs
5. Future policy regarding licensing framework for SRDs (if any)

The provision of the above information is optional.

**ANNEX 2**

**Technical Regulations in Brunei Darussalam**

| **Technical Regulations for Short Range Radiocommunication Devices** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **No** | **Typical Application Types** | **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Transmitter Spurious Emissions** | **Applicable Radio Standards** | **Remarks[[9]](#footnote-9)** |
| 1 | Induction loop system / RFID | 16 – 150 kHz | ≤ 66 dBμA/m @ 3m | ≥ 32 dB below carrier at 3 m or  EN 300 224-1 | EN 300 224-1 |  |
| 150 – 5000 kHz | ≤ 13.5 dBμA/m @ 10m |
| 6765 – 6795 kHz | ≤ 42 dBμA/m @ 10m |
| 7400 – 8800 kHz | ≤ 9 dBμA/m @ 10m |
| 13.553 – 13.567 MHz | ≤ 94 dBμV/m @ 10m |
| 2 | Radio detection, alarm system | 0.016 – 0.150 MHz | ≤ 100 dBμV/m @ 3m | ≥ 32 dB below carrier at 3 m or  EN 300 330-1 | FCC Part 15 or  EN 300 330-1 |  |
| 3 | 13.553 – 13.567 MHz | ≤ 94 dBμV/m @ 10m |
| 4 | 240.15 – 240.30 MHz  300.00 – 300.30 MHz  312.00 – 316.00 MHz  444.40 – 444.80 MHz | ≤ 100 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 | FCC Part 15 or  EN 300 220-1 |
| 5 | Wireless microphone | 0.51 – 1.60 MHz | ≤ 57 dBμV/m @ 3m |
| 6 | 88.00 – 108.00 MHz | ≤ 60 dBμV/m @ 10m |
| 7 | 470.00 – 742.00 MHz | ≤ 10 mW (e.r.p.) |  |  |  |
| 8 | Remote controls of garage door, cameras, toys and miscellaneous devices | 26.96 – 27.28 MHz | ≤ 100 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 | FCC Part 15 or  EN 300 220-1 |  |
| 40.665 – 40.695 MHz | ≤ 100 mW (e.r.p.) |
| 72.13 – 72.21 MHz |
| 9 | Remote controls of aircraft and glider models, telemetry, detection and alarm systems | 26.96 – 27.28 MHz  29.70 – 30.00 MHz | ≤ 100 mW (e.r.p.) |
| 10 | Medical and Biological telemetry | 40.50 – 41.00 MHz | ≤ 0.01 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 | FCC Part 15 or  EN 300 220-1 |  |
| 216.00 – 217.00 MHz | > 25 μW to  ≤ 100 mW (e.r.p.) |
| 454.00 – 454.50 MHz | ≤ 2 mW (e.r.p.) |
| 11 | Wireless modem, data communication system | 72.080 MHz  72.200 MHz  72.400 MHz  72.600 MHz | ≤ 100 mW (e.r.p.) | ≥ 43 dB below carrier over 100 kHz to 2000 MHz;  EN 300 390-1 or  EN 300 113-1 | EN 300 390-1 or  EN 300 113-1 |  |
| 12 | Short range radar systems such as automatic cruise control and collision warning systems for vehicle | 76 – 77 GHz | ≤ 37 dBm (e.r.p.) when vehicle is in motion  ≤ 23.5 dBm (e.r.p.) when vehicle is stationary | FCC Part 15 § 15.253 (c) or  EN 301 091 | FCC Part 15 or EN 301 091 |  |
| 13 | Radio telemetry, telecommand system | 433.05 – 434.79 MHz | ≤ 10 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 | FCC Part 15 or  EN 300 220-1 |  |
| 14 | Radio Telemetry, Telecommand, RFID system | 866 – 869 MHz  923 – 925 MHz | ≤ 500 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m;  EN 300 220-1 or  EN 302 208 | FCC Part 15 ;  EN 300 220-1 or  EN 302 208 |  |
| 15 | Radio Frequency Identification (RFID) systems | 923 – 925 MHz | > 500 mW (e.r.p.)  ≤ 2000 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m;  EN 300 220-1 or  EN 302 208 | FCC Part 15 ;  EN 300 220-1 or  EN 302 208 | Only RFID systems operating in the 923 -925 MHz frequency band shall be allowed to transmit between 500 mW and 2000 mW (e.r.p.), and approved on an exceptional basis. |
| 16 | Wireless video transmitter and other SRD applications | 2.4000 – 2.4835 GHz | ≤ 100 mW (e.i.r.p.) | FCC Part 15 § 15.209; § 15.249 (d) or  EN 300 440-1 | FCC Part 15 or  EN 300 440-1 |  |
| 17 | 10.50 – 10.55 GHz | ≤ 117 dBμV/m @ 10m |
| 18 | 24.00 – 24.25 GHz | ≤ 100 mW (e.i.r.p.) | Radar gun devices are not allowed to operate under this provision. |
| 19 | Bluetooth | 2.4000 – 2.4835 GHz | ≤ 100 mW (e.i.r.p.) | FCC Part 15 § 15.209; or  EN 300 328 | FCC Part 15 § 15.247 or  EN 300 328 |  |
| 20 | Wireless LAN only | 2.4000 – 2.4835 GHz | ≤ 200 mW (e.i.r.p.) |  |  | WLAN for non-localised operations shall be approved on an exceptional basis. |
| 21 | SRD applications | 5.725 – 5.850 GHz | ≤ 100 mW (e.i.r.p.) | FCC Part 15 § 15.209 | FCC Part 15 § 15.247 or 15.407 |  |
| 22 | Wireless LAN | 5.725 – 5.850 GHz | ≤ 1000 mW (e.i.r.p.) | Non-localised operations shall be approved on an exceptional basis. |
| 23 | 5.725 – 5.850 GHz | > 1000 mW (e.i.r.p.)  ≤ 4000 mW (e.i.r.p.) | Operating under this provision shall be approved on an exceptional basis. |
| 24 | Wireless LAN | 5.150 – 5.350 GHz | > 100 mW (e.i.r.p.)  ≤ 200 mW (e.i.r.p.) | FCC Part 15 § 15.407 (b) or  EN 301 893 | FCC Part 15 § 15.407 or  EN 301 893 | WLAN operating in 5.250 – 5.350 GHz under this provision shall employ Dynamic Frequency Selection (DFS) mechanism and implement Transmit Power Control (TPC).  Non-localised operations shall be approved on an exceptional basis. |
| 25 | Wireless LAN | 5.150 – 5.350 GHz | ≤ 100 mW (e.i.r.p.) | FCC Part 15 § 15.407 (b) or  EN 301 893 | FCC Part 15 § 15.407 or  EN 301 893 | WLAN operating under this provision shall implement DFS function in the frequency range 5.250 – 5.350 GHz.  Non-localised operations shall be approved on an exceptional basis. |

**Technical Regulations in China**

**2 Technical parameters requirements**

**2.1 Analogue cordless telephone**

Transmit frequencies used for base set (MHz): 45.000, 45.025, 45.050, ..., 45.475

Transmit frequencies used for hand set (MHz): 48.000, 48.025, 48.050, ..., 48.475

Total channel number: 20

Radiated power limit: 20 mW (e.r.p.)

Maximum occupied bandwidth: 16 kHz

Frequency tolerance: 1.8 kHz

**2.2 Wireless audio transmitters and measuring devices for civilian purposes**

– Operating frequency band (MHz): 87 to 108

Radiated power limit: 3 mW (e.r.p.)

Maximum occupied bandwidth: 200 kHz

Frequency tolerance: 100 × 10-6

– Operating frequency band (MHz): 75.4 to 76.0, 84 to 87

Radiated power limit: 10 mW (e.r.p.)

Maximum occupied bandwidth: 200 kHz

Frequency tolerance: 100 × 10-6

– Operating frequency band (MHz): 189.9 to 223.0

Radiated power limit: 10 mW (e.r.p.)

Maximum occupied bandwidth: 200 kHz

Frequency tolerance: 100 ×10-6

– Operating frequency bands (MHz): 470 to 510, 630 to 787

Radiated power limit: 50 mW (e.r.p.)

Maximum occupied bandwidth: 200 kHz

Frequency tolerance: 100 × 10-6

2.3 Model and toy remote-control devices

– Operating frequencies (MHz): 26.975, 26.995, 27.025, 27.045,

27.075, 27.095, 27.125, 27.145,

27.175, 27.195, 27.225, 27.255

Radiated power limit: 750 mW (e.r.p.)

Maximum occupied bandwidth: 8 kHz

Frequency tolerance: 100 × 10-6

– Operating frequencies (MHz): 40.61, 40.63, 40.65, 40.67, 40.69,

40.71, 40.73, 40.75, 40.77, 40.79,

40.81, 40.83, 40.85

Radiated power limit: 750 mW (e.r.p.)

Maximum occupied bandwidth: 20 kHz

Frequency tolerance: 30 × 10-6

– Operating frequencies (MHz): 72.13, 72.15, 72.17, 72.19, 72.21,

72.79, 72.81, 72.83, 72.85, 72.87

Radiated power limit: 750 mW (e.r.p.)

Maximum occupied bandwidth: 20 kHz

Frequency tolerance: 30 × 10-6

2.4 Private mobile radio equipment in citizen band

– Operating frequencies (MHz): 409.7500, 409.7625, 409.7750, 409.7875,

409.8000, 409.8125, 409.8250, 409.8375,

409.8500, 409.8625, 409.8750, 409.8875,

409.9000, 409.9125, 409.9250, 409.9375,

409.9500, 409.9625, 409.9750, 409.9875

Radiated power limit: 500 mW (e.r.p.)

Modulation type: F3E

Channel spacing: 12.5 kHz

Frequency tolerance: 5 × 10-6

2.5 General radio remote-control devices

– Operating frequency bands (MHz): 470 to 566, 614 to 787

Radiated power limit: 5 mW (e.r.p.)

Maximum occupied bandwidth: 1 MHz

2.6 Biomedical telemetry transmitters

– Operating frequency bands (MHz): 174 to 216, 407 to 425, 608 to 630

Radiated power limit: 10 mW (e.r.p.)

Frequency tolerance: 100 × 10-6

– Operating frequency bands (MHz): 402 to 405

Radiated power limit: 25μW (e.r.p.)

Maximum occupied bandwidth: 300kHz

Frequency tolerance: 100 × 10-6

2.7 Equipment for lifting

– Operating frequencies (MHz): 223.100, 223.700, 223.975, 224.600,

225.025, 225.325, 230.100, 230.700,

230.975, 231.600, 232.025, 232.325

Radiated power limit: 20 mW (e.r.p.)

Maximum occupied bandwidth: 16 kHz

Frequency tolerance: 4 × 10-6

2.8 Equipment for weighing

– Operating frequencies (MHz): 223.300, 224.900, 230.050, 233.050, 234.050

Maximum occupied bandwidth: 50 kHz

Radiated power limit: 50 mW (e.r.p.)

Frequency tolerance: 4 × 10-6

– Operating frequencies (MHz): 450.0125, 450.0625, 450.1125, 450.1625, 450.2125

Maximum occupied bandwidth: 20 kHz

Radiated power limit: 50 mW (e.r.p.)

Frequency tolerance: 4 × 10-6

2.9 Radio remote-control equipment used in industry

– Operating frequencies (MHz): 418.950, 418.975, 419.000, 419.025,

419.050, 419.075, 419.100, 419.125,

419.150, 419.175, 419.200, 419.250, 419.275

Radiated power limit: 20 mW (e.r.p.)

Maximum occupied bandwidth: 16 kHz

Frequency tolerance: 4 ×10-6

2.10 Equipment for transporting data

– Operating frequencies (MHz): 223.150, 223.250, 223.275, 223.350,

224.050, 224.250, 228.050, 228.100,

228.200, 228.275, 228.425, 228.575,

228.600, 228.800, 230.150, 230.250,

230.275, 230.350, 231.050, 231.250

Radiated power limit: 10 mW (e.r.p.)

Maximum occupied bandwidth: 16 kHz

Frequency tolerance: 4 ×10-6

2.11 Radio control devices for civilian purposes

– Operating frequency bands (MHz): 314 to 316, 430 to 432, 433 to 434.79

Radiated power limit: 10 mW (e.r.p.)

Maximum occupied bandwidth: 400 kHz

– Operating frequency bands (MHz): 779 to 787

Radiated power limit: 10 mW (e.r.p.)

– Operating frequency bandwidth (MHz): 868 to 868.6

Radiated power limit: 5mW (e.r.p)

Maximum duty cycle: 1%

Frequency tolerance: 100× 10-6

2.12 Other SRDs

– Equipment A:

Operating frequency band (kHz): 9 to 190

Magnetic field strength limit: 72 dB μA/m at 10 m (in 9 to 50 kHz, quasi-peak detector)

72 dB μA/m at 10m (in 50 to 190 kHz descending 3 dB/octave, quasi-peak detector)

– Equipment B:

Operating frequency bands (MHz): 1.7 to 2.1, 2.2 to 3.0, 3.1 to 4.1, 4.2 to 5.6, 5.7 to 6.2, 7.3 to 8.3, 8.4 to 9.9

Magnetic field strength limit: 9 dB μA/m at 10 m (quasi-peak detector)

Maximum 6 dB bandwidth: 200 kHz

Frequency tolerance: 100 × 10-6

– Equipment C:

Operating frequency bands (MHz): 6.765 to 6.795, 13.553 to 13.567, 26.957 to 27.283

Magnetic field strength limit: 42 dB μ A/m at 10 m (quasi-peak detector)

Frequency tolerance: 100 × 10-6

Spurious emission limit: 9 dB μA/m at 10 m (in 13.553 to 13.567 MHz, any emission removed by less than 140 kHz from the band edges, quasi-peak detector)

– Equipment D:

Operating frequency band: 315 kHz to 30 MHz (excluding Equipment A, B, C)

Magnetic field strength limit: -5 dB μA/m at 10 m (in 315 kHz to 1 MHz, quasi-peak detector)

–15 dB μA/m at 10 m (in 1 to 30 MHz, quasi-peak detector)

– Equipment E:

Operating frequency band (MHz): 40.66 to 40.70

Radiated power limit: 10 mW (e.r.p.)

Frequency tolerance: 100 × 10-6

– Equipment F (excluding digital cordless telephone, Bluetooth devices and WLAN devices):

Operating frequency band (MHz): 2400 to 2483.5

Radiated power limit: 10 mW (e.i.r.p.)

Frequency tolerance: 75 kHz

– Equipment G:

Operating frequency band (GHz): 24.00 to 24.25

Radiated power limit: 20 mW (e.i.r.p.)

2.13 Digital cordless telephone

– Operating frequency band (MHz): 2400 to 2483.5

Radiated power limit: 25 mW (average EIRP)

Frequency tolerance: 20 × 10-6

2.14 Automotive radars (Collision avoidance radars)

– Operating frequency band (GHz): 76 to 77

Radiated power limit: 55 dBm (peak EIRP)

2.15 RFID systems in 800/900 MHz bands

– Operating frequency band (MHz): 840~845/ 920~925

Radiated power limit:

|  |  |
| --- | --- |
| Frequency band  (MHz) | Limit (e.r.p) |
| 840.5-844.5  920.5-924.5 | 2W |
| 840-845  920-925 | 100mW |

Operating Frequency: fc(MHz)=840.125+N×

fc(MHz)=920.125+M×

M, N: integer 1~19

Maximum occupied bandwidth: 16 kHz

Frequency tolerance: 20× 10-6

Adjacent channel leakage power ratio limit: 40 dB (1st adjacent channel)

60 dB (2nd adjacent channel)

Transmitter spurious emissions limit:

|  |  |  |  |
| --- | --- | --- | --- |
| Operation Mode | Frequency Range | Emission Limit(dBm) | Detector |
| Operating Mode | 30MHz-1GHz | -36 | RMS |
| 1-12.75GHz | -30 |
| 806-821MHz | -52 |
| 825-835MHz |
| 851-866MHz |
| 870-880MHz |
| 885-915MHz |
| 930-960MHz |
| 1.7-2.2GHz | -47 |
| Idle Mode | 30MHz-1GHz | -57 |
| 1-12.75GHz | -47 |

2.16 Car alarm system

– Operating frequencies (MHz): 409.7500, 409.7625, 409.7750, 409.7875,

409.8000, 409.8125, 409.8250, 409.8375,

409.8500, 409.8625

Radiated power limit: 0.5 W (e.r.p.)

Modulation type: F2D

Frequency tolerance: 5×10-6

Transmitter Spurious emissions limit: 50μW

2.17 60GHz band radio equipment

Operating frequency band (GHz): 59 to 64

Frequency tolerance: 500 × 10-6

Conducted power limit: 10 dBm

Radiated power limit (Peak): 47dBm (Peak e.i.r.p.)

Radiated power limit (AVG): 44dBm (average e.i.r.p.)

Out-of-band emission limit: 57-59GHz and 64-66GHz -5dBm/MHz (RMS)

2.18 24GHz band vehicle radars

Operating frequency band (GHz): 24.25 to 26.65

Bandwidth(-10dB bandwidth ) ≥500MHz

|  |  |
| --- | --- |
| Frequency band f(GHz) | e.i.r.p. spectral density (dBm/MHz) |
| 23.6<f<24 | -74 |
| 24.25<f<25.65 | -41.3 |
| 25.65<f<26.65 | -41.3-20×(f-25.65GHz)/1GHz |

**3 Operating parameters requirements**

3.1 The use of SRDs is forbidden when it causes harmful interference to other legal radio stations. If it causes harmful interference, the operation must be stopped. It can be put into operation again only after special measures are taken to eliminate such interference.

3.2 The use of SRDs must avoid or bear the interference from other legal radio stations or radiation interference from ISM devices. There is no legal protection for SRDs when it encounters interference. But the user can make an appeal to the local radio regulatory office.

3.3 Its use is forbidden near airports or airplanes.

3.4 The use of SRDs need not be licensed, but the necessary examination or test from the radio regulatory office is required so as to ensure that the SRDs perform within the acceptance range.

3.5 In order to develop, produce or import SRDs, they must go through the relevant formalities according to the relevant rules issued by the State Radio Office.

3.6 SRDs, without type approval certificate issued by the radio spectrum management authority, cannot be produced, sold and used in China.

3.7 For SRDs having passed the type approval, manufacturers and users cannot change the operating frequency or increase the transmitting power arbitrarily (including the addition of an extra RF amplifier). They cannot install any external antenna or replace the original one by another transmitting antenna, and cannot change the original design specification and function arbitrarily.

3.8 SRDs must be installed inside an integrated cabinet. Its external adjustment and control are only used within the range of the technical specifications of the approved type.

3.9 When using the SRDs listed below the followed stipulations must be applied:

3.9.1 Wireless audio transmitters:

They cannot be used locally when the used frequency is the same as that of the local radio or TV stations.

Their operation must be stopped if they interfere with local stations. They can be reused only after eliminating the interference and adjusting the frequency to a free one.

To avoid interference to biomedical telemetry equipment wireless audio transmitters cannot be used in the hospital. Manufacturers of wireless audio transmitters have to demonstrate this stipulation in their product manuals.

3.9.2 Biomedical telemetry transmitters:

Radio devices for transmitting measurement signals of either human or animal biomedical phenomena are allowed to be used by hospitals or medical institute and forbidden to cause interference to the radio astronomy service.

Radio devices operating in the 402-405 MHz band should use “Search before transmitting” [protocol](http://dict.youdao.com/search?q=protocol&keyfrom=E2Ctranslation).

3.9.3 Equipment for lifting, equipment for weighing:

Before installation, the EMC environment must be tested so as to avoid interference to other equipment which can cause unnecessary production accidents.

Their operation must be stopped immediately when they cause harmful interference. They can be reused only after removing the interference by adjusting the frequency to a free one.

In order to protect the radio astronomy service, devices operating at the following frequencies are forbidden to be used in Beijing and Pingtang, Guizhou Province.

223.100 MHz, 223.700 MHz, 223.975 MHz, 224.600 MHz, 225.025 MHz, 225.325 MHz, 230.100 MHz, 230.700 MHz, 230.975 MHz, 231.600 MHz, 232.025 MHz, 232.325 MHz.

3.9.4 Radio remote-control equipment used in industry:

It must be used inside the industrial workshop (or inside the building).

3.9.5 Equipment for transporting data:

It must be used inside the building.

In order to protect the radio astronomy service, devices operating at the following frequencies are forbidden to be used in Beijing and Pingtang, Guizhou Province.

223.150 MHz, 223.250 MHz, 223.275 MHz, 223.350 MHz, 224.050 MHz, 224.250 MHz, 228.050 MHz, 228.100 MHz, 228.200 MHz, 228.275 MHz, 228.425 MHz, 228.575 MHz, 228.600 MHz, 228.800 MHz, 230.150 MHz, 230.250 MHz, 230.275 MHz, 230.350 MHz, 231.050 MHz, 231.250 MHz.

3.9.6 Radio control devices for civilian purposes:

They cannot be used for radio remote-control toys and models.

3.9.7 General radio remote-control devices:

They cannot be used for radio remote control toys.

They cannot be used locally when the used frequency is the same as that of local radio or TV stations.

Their operation must be stopped if they cause harmful interference to local radio or TV stations. They can be reused only after removing the interference by adjusting the frequency to a free one.

Equipment H operating in 59-64 GHz should not interfere with legal radio equipments for space research, monitoring Earth's resources, [radio](http://dict.youdao.com/search?q=radio&keyfrom=E2Ctranslation) [astronomy](http://dict.youdao.com/search?q=astronomy&keyfrom=E2Ctranslation) and other radio services , and they would not be protected from interferences.

3.9.8 Model and toy remote-control devices:

Remote-control devices for unmanned models and toys, such as plane models in the air, ship models over the water surface and automobile models on land, cannot be used for other types of radio equipment.

They are limited to one-way control.

They cannot be used for transmitting audio signals.They are required to stop use during radio control period and within radio control area. To meet requirements of electromagnetic environment, all kinds of model and toy remote-control devices are forbidden to use within a radius of 5 000 metres. The centre of a circle for this forbidden area is the middle of the airport runway.

Radio transmitters are forbidden to set up in models.

3.9.9 Digital cordless telephone:

Digital cordless telephone operating in the 2 400-2 483.5 MHz band should use at least 75 hopping frequencies.

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 60 seconds.

3.9.10 RFID systems at 800/900 MHz bands

RFID equipments should operate in frequency hopping mode, and the maximum dell time for each channel should be 2s.

3.9.11 Car alarm

Duration of car alarm signal should be less than 15s.

**4 General technical requirements**

4.1 Frequency ranges of measurement for radiated spurious emissions

TABLE 1

|  |  |  |
| --- | --- | --- |
| Operating frequency range | Lower frequency of measurement range | Upper frequency of measurement range |
| 9 kHz - 100 MHz | 9 kHz | 1 GHz |
| 100-600 MHz | 30 MHz | 10th harmonic |
| 600 MHz - 2.5 GHz | 30 MHz | 12.75 GHz |
| 2.5-13 GHz | 30 MHz | 26 GHz |
| Above 13 GHz | 30 MHz | 2nd harmonic |

4.2 Radiated spurious emission limits

4.2.1 Radiated spurious emission limits are showed in the following table when a transmitter is in the state of maximum emission power.

TABLE 2

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Testing bandwidth | Emission limit | Detector |
| 9-150 kHz | 200 kHz (6 dB) | 27 dB μA/m at 10 m  (descending 3 dB/octave) | Quasi-peak |
| 150 kHz - 10 MHz | 9 kHz (6 dB) |
| 10-30 MHz | 9 kHz (6 dB) | –3.5 dB μA/m at 10 m | Quasi-peak |
| 30 MHz - 1 GHz | 100 kHz (3 dB) | –36 dBm | RMS |
| 1-40 GHz | 1 MHz (3 dB) | –30 dBm | RMS |
| Above 40 GHz | 1 MHz (3 dB) | –20 dBm | RMS |

(1) Magnetic field strength measurement should be made on an open field site. Radiated power measurement should be performed in a fully anechoic chamber.

(2) The state of a transmitter operating at frequencies below 30 MHz can be set up in the state single carrier transmission.

(3) If the concrete technical parameter does not comply with the general requirements, the former should be adopted.

4.2.2 Radiated spurious emission limits are showed in the following table when a transmitter is in idle or standby state.

TABLE 3

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Testing bandwidth | Emission limit | Detector |
| 9-150 kHz | 200 kHz (6 dB) | 6 dB μA/m at 10 m  (descending 3 dB/octave) | Quasi-peak |
| 150 kHz - 10 MHz | 9 kHz (6 dB) |
| 10-30 MHz | 9 kHz (6 dB) | –24.5 dB μA/m at 10 m | Quasi-peak |
| 30 MHz - 1 GHz | 100 kHz (3 dB) | –47 dBm | RMS |
| Above 1 GHz | 1 MHz (3 dB) |

4.3 Radiated spurious emission should not exceed –54 dBm in 48.5-72.5 MHz, 76-108 MHz, 167-223 MHz, 470-566 MHz, and 606-798 MHz bands.

4.4 Conducted disturbance emissions at power ports, signal ports and telecommunication ports should comply with GB9254-1998: “Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement”. This technical standard was issued by former State Administration of Quality and Technology Supervision of China in 1998.

4.5 For the bands above 30 MHz within operating frequency ranges mentioned above, radiated power can not exceed –80 dBm/Hz (e.i.r.p.) at the band edges. For the bands below 30 MHz, the edges of the occupied frequency bandwidth on any operating channel (99% of energy) can not exceed operating frequency ranges mentioned above.

Manufacturers of SRDs should announce the condition extremes of operating environment for normal use. Emission power and frequency tolerance under the condition extremes should meet requirements mentioned above.

**Technical Regulations in Hong Kong**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Technical Regulations for Short Range Radiocommunication Devices** | | | | |
| **Num** | **Typical Application Type** | **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Remarks[[10]](#footnote-10)** |
|  |  | 3–195 kHz | electric field strength not to exceed 40 dBμV/m and magnetic field strength not to exceed 48.4 dBnA/m at 100 m from the apparatus |  |
|  | Cordless phone | 1627.5-1796.5 kHz | electric field strength not to exceed 88 dBμV/m at 30 m from the apparatus |  |
|  | RFID | 13.553-13.567 MHz | (a) electric field strength not to exceed 80 dBμV/m at 30 m from the apparatus; or  (b) magnetic field strength not to exceed 42 dBμA/m at 10 m from the apparatus |  |
|  |  | 26.96-27.28 MHz | mean power not to exceed 0.5 W |  |
|  | Wireless mic | 33-33.28 MHz | e.r.p. not to exceed 10 mW |  |
|  | Model control | 35.145 – 35.225 MHz | e.r.p. not to exceed 100 mW |  |
|  | Wireless mic | 36.26-36.54 MHz | e.r.p. not to exceed 10 mW |  |
|  | Wireless mic | 36.41-36.69 MHz | e.r.p. not to exceed 10 mW |  |
|  | Wireless mic | 36.71-36.99 MHz | e.r.p. not to exceed 10 mW |  |
|  | Wireless mic | 36.96-37.24 MHz | e.r.p. not to exceed 10 mW |  |
|  | Model control | 40.66-40.70 MHz | e.r.p. not to exceed 100 mW |  |
|  |  | 42.75-43.03 MHz | e.r.p. not to exceed 10 mW |  |
|  | Cordless phone | 43.71-44.49 MHz | electric field strength not to exceed 10 mV/m at 3 m from the apparatus |  |
|  |  | 44.73-45.01 MHz | e.r.p. not to exceed 10 mW |  |
|  | Cordless phone | 46.6-46.98 MHz | electric field strength not to exceed 10 mV/m at 3 m from the apparatus |  |
|  |  | 47.13-47.41 MHz | e.r.p. not to exceed 10 mW |  |
|  | Cordless phone | 47.43-47.56 MHz | e.r.p. not to exceed 10 mW |  |
|  | Cordless phone | 48.75-50 MHz | electric field strength not to exceed 10 mV/m at 3 m from the apparatus |  |
|  | Model control | 72.00–72.02 MHz | carrier power not to exceed 750 mW |  |
|  | 72.12–72.14 MHz |  |
|  | 72.16–72.22 MHz |  |
|  | 72.26–72.28 MHz |  |
|  | Wireless mic | 173.96-174.24 MHz | e.r.p. not to exceed 20 mW |  |
|  | Wireless mic | 187.5-188.0 MHz | e.r.p. not to exceed 10 mW |  |
|  | Cordless phone | 253.85-255 MHz | e.r.p. not to exceed 12 mW |  |
|  |  | 266.75-267.25 MHz | e.r.p. not to exceed 10 mW |  |
|  |  | 313.75-314.25 MHz | e.r.p. not to exceed 10 mW |  |
|  |  | 314.75-315.25 MHz | e.r.p. not to exceed 10 mW |  |
|  | Cordless phone | 380.2-381.325 MHz | e.r.p. not to exceed 12 mW |  |
|  | Medical implant | 402 – 405 MHz | e.i.r.p. not to exceed 25 μW |  |
|  | Portable radios | 409.74-410 MHz | e.r.p. not to exceed 0.5 W |  |
|  |  | 433 – 434.79 MHz | e.r.p. not to exceed 10 mW |  |
|  |  | 819.1-823.1 MHz | (a) e.r.p. not to exceed 100 mW; and  (b) power spectral density not to exceed 10 mW per 25 kHz |  |
|  | Cordless phone | 864.1-868.1 MHz | carrier power or e.r.p. not to exceed 10 mW |  |
|  | RFID | 865–868 MHz | e.r.p. not to exceed 100 mW |  |
|  | RFID | 865.6–867.6 MHz | e.r.p. not to exceed 2 W |  |
|  | RFID | 865.6–868 MHz | e.r.p. not to exceed 500 mW |  |
|  |  | 919.5-920.0 MHz | e.r.p. not to exceed 10 mW |  |
|  | RFID | 920–925 MHz | e.i.r.p. not to exceed 4 W |  |
|  | Cordless phone | 1880-1900 MHz | (a) peak power not to exceed 250 mW for apparatus with antenna output terminal; or  (b) peak e.i.r.p. not to exceed 250 mW for apparatus with integral antenna |  |
|  | WLAN, RFID | 2400-2483.5 MHz | (a) peak e.i.r.p. not to exceed 4 W for frequency hopping spread spectrum modulation or digital modulation systems; or  (b) aggregate e.r.p. not to exceed 100 mW for any modulation |  |
|  | WLAN | 5150-5350 MHz | e.i.r.p. not to exceed 200 mW using only digital modulation |  |
|  | WLAN | 5470–5725 MHz | e.i.r.p. not to exceed 1 W |  |
|  | WLAN | 5725-5850 MHz | (a) peak e.i.r.p. not to exceed 4 W for frequency hopping spread spectrum modulation or digital modulation systems; or  (b) aggregate e.r.p. not to exceed 100 mW for any modulation |  |
|  |  | 18.82-18.87 GHz | (a) e.r.p. not to exceed 100 mW; and  (b) power spectral density not to exceed 3 mW per 100 kHz |  |
|  | Vehicle radar | 76–77 GHz | carrier power not to exceed 10 mW |  |

**Technical Regulations in Islamic Republic of Iran**

|  | | **Technical Regulations for Short Range Radiocommunication Devices** | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Typical Application Types** | **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Channel Spacing** | **Duty cycle** | **Applicable Radio Standards** | **Remarks[[11]](#footnote-11)** |
| 1 | Non-specific use | 6795 – 6765 kHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 13.553 – 13.567 MHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 26.957 – 27.283 MHz | ≤ 42 dBμA/m @ 10m or ≤ 10 mW (e.r.p.) | No requirement | No restriction | EN 300 330 | - |
| 40.660 – 40.700 MHz | ≤ 10 mW (e.r.p.) | No requirement | No restriction | EN 300 220 | - |
| 138.2 – 138.45 MHz | ≤ 10 mW (e.r.p.) | No requirement | < 1% | EN 300 220 | - |
| 433.05 – 434.79 MHz | ≤ 25 mW (e.r.p.) | No requirement | < 10% | EN 300 220 | - |
| 433.05 – 434.79 MHz | ≤ 1 mW (e.r.p.) or  -13dBm/10KHz | No requirement | Max. 100% | EN 300 220 | For bandwidth  greater than  250 kHz the  power density  is limited to  -13 dBm/10 kHz  Devices shall not support audio and/or voice applications. |
| 434.04 – 434.79 MHz | ≤ 10 mW (e.r.p.) | Max. 25 kHz | Max. 100% | EN 300 220 | Devices shall not support audio and/or voice applications. |
| 863 – 870 MHz  (see notes 3, 4 and 6) | ≤ 25 mW (e.r.p.) | ≤ 100 kHz  (see note 2) | < 1% or LBT (see notes 1 and 5) | EN 300 220 | FHSS Modulation |
| ≤ 25 mW (e.r.p.)  (see note 6)  -4/5dBm/100kHz  (see note 8) | No requirement | < 1% or LBT (see notes 1, 5 and 6) | EN 300 220 | DSSS and other wide band modulation except FHSS |
| ≤ 25 mW (e.r.p.) | ≤ 100 kHz  (see notes 2 and 7) | < 1% or LBT (see notes 1 and 5) | EN 300 220 | Narrow band and wide band modulation |
| 868 – 868.6 MHz  (see notes 4) | ≤ 25 mW (e.r.p.) | (see note 2) | < 1% or LBT (see note 1) | EN 300 220 | Narrow band and wide band modulation without channel spacing |
| 868.7 – 869.2 MHz  (see notes 4) | ≤ 25 mW (e.r.p.) | (see note 2) | < 1% or LBT (see note 1) | EN 300 220 | Narrow band and wide band modulation without channel spacing |
| 869.4 – 869.65 MHz  (see notes 4) | ≤ 500 mW (e.r.p.) | 25 kHz | < 1% or LBT (see note 1) | EN 300 220 | Narrow band and wide band modulation without channel spacing |
| 869.7 – 870 MHz | ≤ 10 mW (e.i.r.p.) | No requirement | Max. 100% | EN 300 220 | Narrow band and wide band modulation without channel spacing  Devices shall not support audio and/or voice applications. |
| 2400 – 2483.5 MHz | 10 mW (e.i.r.p.) | No requirement | No restriction | EN 300 440 | FHSS/DSSS Modulation |
| 5725 – 5875 MHz | 10 mW (e.i.r.p.) | No requirement | No restriction | EN 300 220 | - |
| 24 – 24.25 GHz | 100 mW (e.i.r.p.) | No requirement | No restriction | EN 300 220 | - |
| 61 – 61.5 GHz | 100 mW (e.i.r.p.) | No requirement | No restriction | - | - |
| 122 – 123 GHz | 100 mW (e.i.r.p.) | No requirement | No restriction | - | - |
| 244 – 246 GHz | 100 mW (e.i.r.p.) | No requirement | No restriction | - | - |
| 2 | Inductive Applications | 9 – 59.75 kHz | ≤ 72 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 59.75 – 60.25 kHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 60.25 – 70 kHz | ≤ 69 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 70 – 119 kHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 119 – 135 kHz | ≤ 66 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 135 – 140 kHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 140 – 148.5 kHz | ≤ 37.7 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 6765 – 6795 kHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 7400 – 8800 kHz | ≤ 9 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 13.553 – 13.567 MHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 13.553 – 13.567 MHz | ≤ 60 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only for RFID |
| 26.957 – 27.283 MHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 10.2 – 11 MHz | ≤ 9 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 3155 – 3400 kHz | ≤ 13.5 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 148.5 – 1600 kHz | ≤ 5 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | Only loop coil antennas is allowed as external antenna |
| 3 | Wireless LAN  (LANs, RLANs and HIPERLANs) | 2400 – 2483.5 MHz | 10 mW (e.i.r.p.) | No requirement | No restriction | EN 300 328 | For wide band modulation except FHSS Max. (e.i.r.p) density is limited to  10 mW/MHz |
| 5150 – 5250 MHz | 10 mW Max mean (e.i.r.p.) | No requirement | No restriction | EN 300 893 | Only indoor  Max mean (e.i.r.p) density is limited to  25 mW/./25kHz in 25 kHz |
| 5250 – 5350 MHz | 10 mW Max mean (e.i.r.p.) | No requirement | No restriction | EN 300 893 | Only indoor  Max mean (e.i.r.p) density is limited to  10 mW/./25MHz in 1 MHz |
| 5470 – 5725 MHz | 10 mW Max mean (e.i.r.p.) | No requirement | No restriction | EN 300 893 | Max mean (e.i.r.p) density is limited to  50 mW/MHz in 1 MHz |
| 17.1 – 17.3 MHz | 100 mW (e.i.r.p.) | No requirement | No restriction | EN 300 893 | - |
| 4 | Automatic Vehicle Identification | 2446 – 2454 MHz | 500 mW (e.i.r.p.) | No requirement | No restriction | EN 300 761 | - |
| 27.095 MHz | ≤ 42 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 4515 kHz | ≤ 10 dBμA/m @ 10m | No requirement | No restriction | EN 300 330 | - |
| 5 | Road transport and trafic telematics (RTTT) | 5795 – 5805 MHz | 2 W (e.i.r.p.) | 5 MHz and 10MHz | No restriction | EN 300 674  ES 200 674 | - |
| 5805 – 5815 MHz | 2 W (e.i.r.p.) | 5 MHz and 10MHz | No restriction | EN 300 674  ES 200 674 | - |
| 63 – 64 GHz | TBD | No requirement | No restriction | - | - |
| 76 – 77 GHz | 55 dBm peak | No requirement | No restriction | EN 301 091 | - |
| 6 | Detection, movement and alert applications. | 2400 – 2483.5 MHz | 10 mW (e.i.r.p.) | No requirement | No restriction | EN 300 440 | - |
| 9200 – 9500 MHz | 25 mW (e.i.r.p.) | No requirement | No restriction | EN 300 440 | - |
| 9500– 9975 MHz | 25 mW (e.i.r.p.) | No requirement | No restriction | EN 300 440 | - |
| 10.5 – 10.6 GHz | 500 mW (e.i.r.p.) | No requirement | No restriction | EN 300 440 | - |
| 13.4 – 14 GHz | 25 mW (e.i.r.p.) | No requirement | No restriction | EN 300 440 | - |
| 24.05 – 24.25 GHz | 100 mW (e.i.r.p.) | No requirement | No restriction | EN 300 440 | - |
| 7 | Alarms | 868.6 – 868.7 MHz | 10 mW (e.r.p.) | 25 kHz | < 0.1% | EN 300 220 | - |
| 869.25 – 869.3 MHz | 10 mW (e.r.p.) | 25 kHz | < 0.1% | EN 300 220 | - |
| 869.65 – 869.7 MHz | 25 mW (e.r.p.) | 25 kHz | < 0.1% | EN 300 220 | - |
| 869.2 – 869.25 MHz | 10 mW (e.r.p.) | 25 kHz | < 0.1% | EN 300 220 | Social Alarms |
| 869.3 – 869.4 MHz | 10 mW (e.r.p.) | 25 kHz | < 0.1% | EN 300 220 | - |
| 164.475 – 169.4875 MHz | 10 mW (e.r.p.) | 12.5 kHz | < 0.1% | EN 300 220 | Social Alarms |
| 169.5875 – 169.6 MHz | 10 mW (e.r.p.) | 12.5 kHz | < 0.1% | EN 300 220 | Social Alarms |
| 8 | Avalanche beacons | 457 kHz | ≤ 7 dBμA/m @ 10m | Continous Wave | Up to 100% | EN 300 718 | - |
| 9 | Wireless Microphones | 29.7 – 47 MHz | 10 mW (e.r.p.) | 50 kHz | Up to 100% | EN 300 422 | - |
| 173.965 – 174.015 MHz | 2 mW (e.r.p.) | 50 kHz | Up to 100% | EN 300 422 | - |
| 863 – 865 MHz | 10 mW (e.r.p.) | 200 kHz | Up to 100% | EN 300 422  EN 301 357 | - |
| 174 – 216 MHz | 10 mW (e.r.p.) and  50 mW (e.r.p.) | 200 kHz | Up to 100% | EN 300 422 | 50 mW (e.r.p.) just for professional body worn radio microphones |
| 470 – 862 MHz | 10 mW (e.r.p.) and  50 mW (e.r.p.) | 200 kHz | Up to 100% | EN 300 422 | 50 mW (e.r.p.) just for professional body worn radio microphones |
| 1785 – 1800 MHz | 10 mW (e.r.p.) and  50 mW (e.r.p.) | 200 kHz | Up to 100% | EN 840 301 | 50 mW (e.r.p.) just for professional body worn radio microphones |
| 10 | Ultra Low Power Active Medical Implants and Peripherals | 402 – 405 MHz | 25 μW (e.r.p.) | 25 kHz | No restriction | EN 301 839 | - |
| 9 – 315 kHz | ≤ 30 dBμA/m @ 10m | No requirement | < 10% | EN 300 330 | - |
| 315 – 600 kHz | ≤ -5 dBμA/m @ 10m | No requirement | < 10% | EN 300 330 | - |
| 30 – 37.5 MHz | 1 mW (e.r.p.) | No requirement | < 10% | EN 300 220 | - |
| 11 | Wireless Audio Application | 863 – 865 MHz | 10 mW (e.r.p.) | No requirement | Up to 100% | EN 301 357 | - |
| 864.8 – 865 MHz | 10 mW (e.r.p.) | 50 kHz | Up to 100% | EN 300 220 | Narrow band analog audio devices |
| 1795 – 1800 MHz | 20 mW (e.r.p.) | No requirement | Up to 100% | EN 301 357 | - |
| 87.5 – 108 MHz | 50 mW (e.r.p.) | 200 kHz | Up to 100% | EN 301 357 | - |
| 12 | Radio remote-control equipment used for lifting  (crane) | 223.100, 223.700, 223.975, 224.600,  225.025, 225.325, 230.100, 230.700,  230.975, 231.600, 232.025, 232.325 MHz | 20 mW (e.i.r.p.) | 16 kHz | No restriction | - | Frequency tolerance: 4 × 10-6 |
| 13 | RFID | 0.125 – 0.135 MHz | ≤ 72 dBμA/m @ 10m | No requirement | No restriction | ISO/IEC 18000-2  PART2  EN 300 330 | - |
| 13.553 – 13.567 MHz | ≤ 60 dBμA/m @ 10m | No requirement | No restriction | ISO/IEC 18000-3 EN 300 330 | - |
| 433.050 – 434.790 MHz | 10 mW (e.r.p.) | No requirement | < 10% | ISO/IEC 18000-7 EN 300 330 | 433.5 – 434.5 MHz is Only for active RFID |
| 2446 – 2454 MHz | 500 mW (e.i.r.p.) | No requirement | No restriction | ISO/IEC 18000-4 EN 300 440 | - |
| 865 – 865.6 MHz | 100 mW (e.r.p.) | 200 kHz | No restriction | EN 300 208 | FHSS or other spread spectrum ways is not allowed |
| 867.6 – 868 MHz | 500 mW (e.r.p.) | 200 kHz | No restriction | EN 300 220 | FHSS or other spread spectrum ways is not allowed |
| 14 | Radio remote control | 35 – 35.22 MHz | 100 mW (e.r.p.) | 10 kHz | No restriction | EN 300 220 | Only aircraft models |
| 40.665 – 40.985 MHz | 100 mW (e.r.p.) | 10 kHz | No restriction | EN 300 220 | Only non-aircraft models |
| 26,995, 27.045,  27.095, 27.145, 27.195, MHz | 100 mW (e.r.p.) | 10 kHz | No restriction | EN 300 220 | All models |

NOTE 1: When either a duty cycle, Listen Before Talk (LBT) or equivalent technique applies then it shall not be user dependent/adjustable and shall be guaranteed by appropriate technical means. For LBT devices without Adaptive Frequency Agility (AFA) or equivalent techniques, the duty cycle limit applies.

NOTE 2: The preferred channel spacing is 100 kHz allowing for subdivision into 50 kHz or 25 kHz.

NOTE 3: Not includes alarms bands.

NOTE 4: Devices shall not support audio and/or video applications.

NOTE 5: Duty cycle may be increased to 1 % if the band is limited to 865 MHz to 868 MHz.

NOTE 6: For wideband modulation other than FHSS and DSSS with a bandwidth of 200 kHz to 3 MHz, duty cycle can be increased to 1 % if the band is limited to 865 MHz to 868 MHz and power to ≤10 mW e.r.p.

NOTE 7: For other narrow band modulation with a bandwidth of 50 kHz to 200 KHz, the band is limited to 865/5 MHz to 867/5 MHz.

NOTE 8: The power density can be increased to +6,2 dBm/100 kHz and 0,8 dBm/100 kHz, if the band is limited to 865 MHz to 868 MHz and 865 MHz to 870 MHz respectively.

**Technical Regulations in Japan**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Technical Regulations for Short Range Radiocommunication Devices** | | | | | | |
| **Type of emission** | | **Frequency band (MHz)** | **Occupied bandwidth (kHz)** | **Power level or spectral density (e.i.r.p.)** | **Antenna power and Antenna gain** | **Carrier sense** |
| *Telemeter, telecontrol and data transmission* | | | | | | |
| - | | 312-315.25 | ≤ | ≤ 250W  (–6 dBm) | - | Not  required |
| 312-315.05 | ≤ 25W  (–16 dBm) |
|  | | 426.025-426.1375 (12.5 kHz spacing) | ≤ 8.5 | ≤ 1.6 mW (2.14 dBm)  | ≤ 1 mW ≤2.14 dBi | Not required |
|  | | 426.0375-426.1125 (25 kHz spacing) |  8.5 ≤ 16 | ≤ 1.6 mW (2.14 dBm) | ≤ 1 mW ≤2.14 dBi | Not required |
|  | | 429.175-429.7375 (12.5 kHz spacing) | ≤ 8.5 |  |  | 7 V |
|  | |  |  |  |
|  | | 429.8125-429.9250 (12.5 kHz spacing) |  |  |
|  | | 449.7125-449.8250 (12.5 kHz spacing) |  |  |
| F1D, F1F, F2D, F2F, F7D, F7F, G1D, G1F, G2D, G2F, G7D, G7F, D1D, D1F, D2D, D2F, D7D or D7F | | 449.8375-449.8875 (12.5 kHz spacing) |  |  |
| 469.4375-469.4875 (12.5 kHz spacing) |  |  |
| 1 216-1 216.5 (50 kHz spacing) |  16 ≤ 32 |  |  | 4.47 V |
| 1 252-1 252.5 (50 kHz spacing) | ≤ 16 mW (12.14 dBm) | ≤ 10 mW ≤2.14 dBi |
| 1 216.55-1 217 (50 kHz spacing) |
|  | | 1 252.5-1 253 (50 kHz spacing) |  |  |
|  | | 1 216.0125-1 216.5125 (25 kHz spacing) | ≤ 16 |  |  |
|  | | 1 252.0125-1 252.5125 (25 kHz spacing) |  |  |
|  | | 1 216.5375-1 216.9875 (25 kHz spacing) |  |  |
|  | | 1 252.5375-1 252.9875 (25 kHz spacing) |  |  |
| *Wireless telephone* | | | | | | |
| F1D, F1E, F2D, F2E, F3E, F7W, G1D, G1E, G2D, G2E, G7E, G7W, D1D, D1E, D2D, D2E, D3E, D7E or D7W | | 422.2-422.3 (12.5 kHz spacing) | ≤ 8.5 | ≤ 16 mW (12.14 dBm) | ≤ 10 mW ≤2.14 dBi | 7 V |
| 421.8125-421.9125 (12.5 kHz spacing) |
| 440.2625-440.3625 (12.5 kHz spacing) |
| 422.05-422.1875 (12.5 kHz spacing) |
| 421.575-421.8 (12.5 kHz spacing) |
| 440.025-440.25 (12.5 kHz spacing) |
| *Radio pager* | | | | | | |
| F1B, F2B, F3E, G1B or G2B | | 429.75 429.7625 | ≤ 8.5 | ≤ 16 mW (12.14 dBm) | ≤ 10 mW ≤2.14 dBi | 7 V |
| 429.775 429.7875 429.8 |
| *Radio microphone* | | | | | | |
| F1D,F1E,F2D,F3E,F7D,F7E,F7W,F8E,F8W,F9W,D1D,D1E,D7D,D7E,D7W,G1D,G1E,G7D,G7E,G7W or N0N | | 806.125-809.75 (125 kHz spacing) | Frequency modulation (except for Frequency shift keying)  ≤ 110  Frequency modulation (limited to Frequency shift keying), Phase modulation or Quadrature amplitude modulation  ≤ 192 | ≤ 16 mW (12.14 dBm) | ≤ 10 mW ≤2.14 dBi | Not required |
| F3E, F8W, F2D or F9W | | 322.025-322.15 (25 kHz spacing) | ≤ 30 | ≤ 1.6 mW (2.14 dBm) | ≤ 1 mW ≤2.14 dBi | Not required |
| 322.25-322.4 (25 kHz spacing) |
| *Medical telemeter* | | | | | | |
| F1D, F2D, F3D, F7D, F8D or F9D | | 420.05-421.0375, 424.4875-425.975, 429.25-429.7375, 440.5625-441.55, 444.5125-445.5 and 448.675-449.6625 (12.5 kHz spacing) | ≤ 8.5 | ≤ 1.6 mW (2.14 dBm) | ≤ 1 mW ≤2.14 dBi | Not required |
| F7D, F8D or F9D | | 420.0625-421.0125, 424.5-425.95, 429.2625-429.7125, 440.575-441.525, 444.525-445.475, 448.6875-449.6375 (25 kHz spacing) |  8.5 ≤ 16 |
| F7D, F8D, F9D or G7D | | 420.075-420.975, 424.5125-425.9125, 429.275-429.675, 440.5875-441.4875, 444.5375-445.4375, 448.7-449.6 (50 kHz spacing) |  16 ≤ 32 |
| F7D, F8D, F9D or G7D | | 420.1-420.9, 424.5375-425.8375, 429.3-429.6, 440.6125-441.4125, 444.5625-445.3625, 448.725-449.525, (100 kHz spacing) |  32 ≤ 64 |
| F7D, F8D, F9D or G7D | | 420.3, 420.8, 424.7375, 425.2375, 425.7375, 429.5, 440.8125, 441.3125, 444.7625, 445.2625, 448.925, 449.425 |  64 ≤ 320 | ≤ 16 mW (12.14 dBm) | ≤ 10 mW ≤2.14 dBi |
| *Hearing aid* | | | | | | |
| F3E or F8W | | 75.2125-75.5875 (12.5 kHz spacing) | ≤ 20 | ≤ 16 mW (12.14 dBm) | ≤ 10 mW ≤2.14 dBi | Not required |
| F3E or F8W | | 75.225-75.575 (25 kHz spacing) |  20 ≤ 30 |
| F3E or F8W | | 75.2625-75.5125 (62.5 kHz spacing) |  30 ≤ 80 |
| *PHS (land mobile station)* | | | | | | |
| G1C, G1D, G1E, G1F, G1X, G1W, G7C, G7D, G7E, G7F, G7X or G7W | | 1 884.65-1 919.45 | 1 884.65-1 893.5 MHz≤ 288  1 893.5-1 919.45 MHz:≤ 884 | ≤ 25 mW (14 dBm) | ≤ 10 mW ≤4 dBi | Not required |
| *Wireless LAN* | | | | | | |
| SS (spread spectrum) (DS (direct sequence), FH (frequency hopping), FH/DS), OFDM or others | | 2 400-2 483.5 | FH or FH/DS: ≤ 85.5 MHz Others: ≤ 26 MHz | FH or FH/DS: ≤ 4.9 mW/MHz (6.9 dBm/MHz)  DS or OFDM: ≤ 16 mW/MHz (12.14 dBm/MHz)  Others:  ≤ 16 mW (12.14 dBm/MHz) | FH or FH/DS: ≤ 3 mW/MHz  DS or OFDM: ≤ 10 mW/MHz  Others:  ≤ 10 mW  ≤4 dBi  | Not required |
| SS (DS, FH or FH/DS) | | 2 471-2 497 | ≤ 26 MHz | ≤ 16 mW (12.14 dBm/MHz) | ≤ 10 mW/MHz ≤ 2.14 dBi | Not required |
| SS (DS), OFDM or others | | 5 150-5 350 (indoor use) | DS or Others  ≤ 18 MHz  OFDM:  ≤ 19 MHz | ≤ 10 mW/MHz | DS or OFDM: ≤ 10 mW/MHz  Others:  ≤ 10 mW | 100 mV/m  DFS and TPC are required in 5 250- 5 350 MHz |
| OFDM:  ≤ 38 MHz | OFDM:  ≤ 5 mW/MHz | OFDM:  ≤ 5 mW/MHz |
| SS (DS), OFDM or others | | 5 470-5 725 | ≤ 19.7 MHz | ≤ 50 mW/MHz | DS or OFDM: ≤ 10 mW/MHz  Others:  ≤ 10 mW | 100 mV/m  DFS and TPC are required |
| OFDM:  ≤ 38 MHz | OFDM:  ≤  25 mW/MHz | OFDM:  ≤ 5 mW/MHz |
| *Millimetre-wave radar* | | | | | | |
| – | | 60.5 GHz 76.5 GHz | ≤ 500 MHz | 100 W 50 dBm | ≤ 10 mW ≤ 40 dBi | Not required |
| *Radio stations for cordless phones* | | | | | | |
| F1D, F2A, F2B, F2C, F2D, F2N, F2X or F3E | | 253.8625-254.9625 (12.5 kHz spacing) 380.2125-381.3125 (12.5 kHz spacing) | ≤ 8.5 | ≤ 10 mW (10 dBm) | – | 2 V |
| *Mobile station identification* | | | | | | |
| N0N, A1D, AXN, F1D, F2D or G1D | | 2 440 (2 427-2 453) 2 450 (2 434.25-2 465.75) 2 455 (2 439.25-2 470.75) | ≤ 5.5 | ≤ 1 W (30 dBm) | ≤ 10 mW ≤ 20 dBi | Not required |
| *Radio stations for low-power security systems* | | | | | | |
| F1D, F2D or G1D | | 426.25-426.8375 (12.5 kHz spacing) | ≤ 8.5 | ≤ 10 mW (10 dBm) | – | Not required |
| 426.2625-426.8375 (25 kHz spacing) |  8.5 ≤ 16 |
| *Radio stations for digital cordless phones* | | | | | | |
| G1C, G1D, G1E, G1F, G1X, G1W, G7C, G7D, G7E, G7F, G1X or G7W | | 1 893.65-1 905.95 (300 kHz spacing) | ≤ 288 | ≤ 25 mW/channel (14 dBm)/channel | ≤ 10 mW ≤ 4 dBi | 159 V |
| D1C, D1D, D1E, D1F, D1X, D7C, D7D, D7E, D7F, D7W, D7X, F1C, F1D, F1E, F1F, F1X, F7C, F7D, F7E, F7F, F7W, F7X, G1C, G1D, G1E, G1F, G1X, G7C, G7D, G7E, G7F, G7W, or G7X | | 1895.616-1902.528  (1,728 kHz spacing)  1,895.616 MHz, 1,897.344 MHz, 1,900.8 MHz, 1,902.528 MHz) | ≤  | ≤ 25 mW/channel (14 dBm/channel) | ≤ 10 mW ≤ 4 dBi | -62 dBm(19)  -82 dBm(20) |
| D1C, D1D, D1E, D1F, D1W, D1X, D7C, D7D, D7E, D7F, D7W, D7X, G1C, G1D, G1E, G1F, G1W, G1X, G7C, G7D, G7E, G7F, G7W, G7X, X1C, X1D, X1E, X1F, X1W, X1X, X7C, X7D, X7E, X7F, X7W or X7X | | 1,895.75MHz, 1,898.15MHz, 1,900.55MHz, 1,902.95MHz | ≤  | ≤ 25 mW/channel (14 dBm/channel) | ≤ 10 mW ≤ 4 dBi | -62 dBm(21)  -83 dBm(22) |
| *Mobile land stations for toll-road automatic toll collection systems* | | | | | | |
| A1D | | 5.835 GHz 5.845 GHz | ≤ 8 MHz | ≤ 100 mW (20 dBm) | ≤ 10 mW ≤ 10 dBi | Not required |
| *RF identification (RFID) systems* | | | | | | |
| － | | 433.67-434.17(1) | ≤500 kHz (Interrogator) ≤200 kHz (Active tag) | ≤ 0.4 mW  (–4 dBm) (12) (Interrogator) ≤ 1 mW (0 dBm)  (Active tag) | － | Not required |
| N0N, A1D, AXN, H1D, R1D, J1D, F1D, F2D or G1D | | 952-956.4(2), (8), (9) | ≤\* n kHz(13)  (n = 1-9) | ≤4W (36 dBm) | ≤ 1 W (14) ≤ 6 dBi | –74 dBm |
| ≤\* n kHz(13)  (n = 1-21) | ≤500 mW (27 dBm) | ≤ 250m W (15) ≤ 3 dBi | –74 dBm |
| N0N, A1D, AXN, H1D, R1D, J1D, F1D, F2D or G1D | | 952-957.6(3), (9) | ≤\* n kHz(13)  (n = 1-5) | ≤ mW (13 dBm) | ≤ 10 mW ≤ 3 dBi | –64 dBm |
| － | | 950.8-957.6(4), (9) | ≤\* n kHz(13)  (n = 1-5) | ≤ mW (3 dBm) | ≤ 1 mW ≤ 3 dBi | –75 dBm(16) |
| － | | 954-957.6(4), (9) | ≤ \* n kHz(13)  (n = 1-5) | ≤ mW (13dBm) | ≤ 10 mW ≤ 3 dBi | –75 dBm |
| N0N, A1D, AXN, F1D, F2D or G1D | | 2 427-2 470.75(2) | FH:  ≤ 43.75 MHz DS:  ≤ 5.5 MHz | ≤30W (44.77 dBm) | ≤ 300 mW(15) ≤ 20 dBi | Not required |
| N0N, A1D, AXN, F1D, F2D or G1D | | 2 427-2 470.75(2) | 5.5 MHz | ≤1W (30 dBm) | ≤ 10 mW ≤ 20 dBi | Not required |
| N0N, A1D, AXN, H1D, R1D, J1D, F1D, F2D or G1D | | 916.8, 918.0, 919.2, 920.4, 920.6, 920.8(2), (10) | ≤200 \* n kHz(13)  (920.4-920.8MHz :  n = 1-3) | ≤4W (36 dBm) | ≤ 1 W (14) ≤ 6 dBi | –74 dBm |
| N0N, A1D, AXN, H1D, R1D, J1D, F1D, F2D or G1D | | 916.8, 918.0, 919.2,  920.4-923.4(3), (5), (6), (10) | ≤200 \* n kHz(13)  (920.4-923.4MHz :  n = 1-5) | ≤500 mW (27 dBm) | ≤ 250 mW ≤ 3 dBi | –74 dBm |
| ≤20 mW (13 dBm) | ≤ 10 mW ≤ 3 dBi | –64 dBm |
| － | | 920.5- 923.5(4), (5), (6), (10) | ≤200 \* n kHz(13)  (n=1-5) | ≤ mW (27dBm) | ≤ 250 mW (15) ≤ 3 dBi | –80 dBm |
| － | | 920.5- 928.1(4), (5), (6), (10), (11) | ≤200 \* n kHz(13)  (n = 1-5) | ≤ mW (16dBm) | ≤ 20 mW ≤ 3 dBi | –80 dBm |
| － | | 915.9-916.9(4), (7), (10)  922.3-928.1(4), (10), (11) | ≤200 \* n kHz(13)  (n = 1-5) | ≤ mW (3 dBm) | ≤ 1 mW ≤ 3 dBi | Not required(17) |
| 928.1-929.7(4) | ≤100 \* n kHz(13)  (n = 1-5) |
| *Medical implant communication systems* | | | | | | |
| A1D, F1D or G1D | | 402-405 | ≤ 300 kHz | ≤ 25 W  (–16 dBm) |  | 10LogB –150 + GdB (with 1 mW regarded as 0 dB) (18) |
|  | | 403.5-403.8 |  | mW  (–40 dBm) |  | Not required |
| *Sensors for detecting or measuring mobile objects* | | | | | | |
| － | | 10.525 GHz | ≤ 40 MHz | ≤ 2.5 W (34 dBm) | ≤ 10 mW ≤ 24 dBi |  |
| 24.15 GHz | ≤ 76 MHz |
| *Quasi-millimeter-wave communication systems* | | | | | | |
| OFDM or  others | | 24.77-25.23 GHz  27.02-27.46 GHz | ≤ 18 MHz | ≤ 100 mW/MHz (20 dBm/MHz) | ≤ 10 mW/MHz ≤ 10 dBi | 460 mW/m |
| *Animal detection report system* | | | | | | |
| A1D, F1D, F2D or M1D | | 142.940, 142.950, 142.960, 142.970,  142.980 | ≤ 16 | ≤ 100W  (–10 dBm) | - | Not required |
| ≤ 16 mW (12.14 dBm) | ≤ 10 mW ≤2.14 dBi |
| OFDM: orthogonal frequency division multiplexing  PSK: phase shift keying  (1) International logistics only.  (2) RFID Equipment for Premises Radio Station  (3) RFID Equipment for Specified Low Power Radio Station  (4) Telemeter, Telecontrol & Data transmission Radio Equipment  (5) 920.5 – 922.3MHz : Priority band for passive tag systems  (6)  922.3 – 923.5MHz : Priority band for active tag systems  7) Band available for active tag systems for international logistics provided that backscatter channels of passive tag systems are securely protected.(8) Application for a licence or registration will be acceptable until December 31, 2012.  (9) This band will be available until March 31, 2018.  (10) This band will be available after July 25, 2012.  (11) Until July 25, 2012, 20mW or less if radio channel in use consists of only 926.2 MHz – 928.0MHz.  (12) Power level (e.i.r.p.) from interrogators is limited in less than 0.1 mW (–10 dBm) when sending a signal for the start of switching active tags on.  (13) n: n represents the number of unit radio channels which are simultaneously used.  (14) A license is required for establishment of this radio station.  (15) A registration is required for establishment of this radio station though a license is not required.  (16) Not required when transmission time is limited within 3.6 seconds per hour.  (17)  The following conditions shall be satisfied. If the center frequency is from 916.0MHz to 916.8MHz, or from 922.4MHz to 928.0MHz, and the antenna power is 1mW or less, radio equipment shall stop its emission of radio wave less than 100ms after it starts to emit radio wave. It shall wait 100ms or more for the consecutive emission. The sum of emission time per arbitrary one hour shall be 3.6s or less. Meanwhile, it may emit radio wave again without waiting 100ms, if the emission time less than 100ms after its first emission  (18) B is the maximum radiation bandwidth in the communication state (which refers to the bandwidth in which the radio equipment in a living body or the radio control equipment outside the living body radiates and is the larger of either of the upper limit and the lower limit frequency width (Hz) at which the attenuation from the maximum value of the radiation power during the maximum modulation becomes 20 dB). G is the absolute gain of the receiving antenna.  (19) When preparing to emit a radio wave, emission in the respective channel shall be enabled only if the received power of radio waves from any radio station other than the communication pair in the channel to be used for emission and the corresponding channel to be used for reception is -62 dBm or lower for at least 2 consecutive valid frames. | | | | | | |

(20) When the base unit prepares to emit a radio wave at 1,897.344 MHz, 1,899.072 MHz, or 1,900.8 MHz, emission shall only be enabled if the received power in the TDMA narrow-band digital cordless telephone control channel is -82 dBm or lower.

(21) When preparing to emit a radio wave, emission in the respective channel shall be enabled only if the received power of radio waves from any radio station other than the communication pair in the channel to be used for emission and the corresponding channel to be used for reception is -62 dBm or lower for at least 4 consecutive valid frames.

(22) When the base station prepares to emit a radio wave at 1,898.15 MHz, or 1,900.55 MHz, emission shall only be enabled if the received power in the TDMA narrow-band digital cordless telephone control channel is -83 dBm or lower. But, if a period of the time during emiting a radio wave is within 5ms per 1second, this is not applied.

**Technical Regulations in the Republic of Korea**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Technical Regulations for Short Range Radiocommunication Devices** | | | | | |
| **Num** | **Typical Application Type** | **Authorised Frequency Bands / Frequencies** | | **Maximum Field Strength / RF Output power** | **Remarks[[12]](#footnote-12)** |
|  | Citizen band transceiver | 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225, 27.235, 27.245, 27.255, 27.265, 27.275, 27.285, 27.295, 27.305, 27.315, 27.325, 27.335, 27.345, 27.355, 27.365, 27.375, 27.385, 27.395 and 27.405 MHz | | 3 W | The maximum OBW is 6 kHz for double side band and 3 kHz for single side band emission.  The antenna should be whip type, and the limit of antenna length is 1 m for portable type, 3 m for built-in vehicle type (total height should not be higher than 4.5 m) and 6 m for fixed type.  The channel 27.065 MHz is designated for emergency communication (such as fire alarm).  The channel 27.065 MHz isdesignated for meteorological, medical, traffic guide. |
|  | Citizen band transceiver | 448.7375, 448.7500,…, 448.9250 MHz and  449.1500, 449.1625,…, 449.2625 MHz | | 500 mW (e.r.p.) | Total number of channel is 26.  The channel 448.7375 MHz is designated for channel control.  The maximum OBW is 8.5 kHz. |
|  | Citizen band transceiver | 424.1375 (449.1375)424.1500 (449.1500) 424.1625 (449.1625) 424.1750 (449.1750) 424.1875 (449.1875) 424.2000 (449.2000) 424.2125 (449.2125) 424.2250 (449.2250) 424.2375 (449.2375) 424.2500 (449.2500) and 424.2625 (449.2625) MHz | | 500 mW (e.r.p.) | The channels 424.1375 (449.1375) MHz are designated for channel control.  The maximum OBW is 8.5 kHz. |
| 1. 1 | SRD with very weak electric field strength | 0 - 322 MHz  322 MHz - 10 GHz  10 GHz - 150 GHz  Above 150 GHz | | 500 uV/m @ 3m  35 uV/m @ 3m  3.5f uV/m @ 3m (1)  500 uV/m @ 3m | The measured value for the frequency of less than 15 MHz should be multiplied by the near field measurement compensation factor (6π/λ), where λ is wavelength in meter.  (1)  f : Frequency (GHz). |
|  | Inductive applications with loop antenna | 9~150 kHz | 9 - 30 kHz  30 - 90 kHz  90 - 110 kHz  110 - 135 kHz  135 - 140 kHz  140 - 148 kHz  148 - 150 kHz | 72 dBuA/m  72-10log(f/30) dBuA/m  42 dBuA/m  72-10log(f/30) dBuA/m  42 dBuA/m  37.5 dBuA/m  14.8 dBuA/m | Measurement distance is 10m. f is frequency in kHz |
| 150 kHz  ~30 MHz | 3.155 - 3.4 MHz | 13.5 dBuA/m | Measurement distance is 10m. |
| 7.4 - 8.7 MHz | 9 dBuA/m |
| 13.552 - 13.568 MHz | 93.5 dBuV/m |
| The others | 500 uV/m | Measurement distance is 3m. The measured value for the frequency of less than 15 MHz should be multiplied by the near field measurement compensation factor (6π/λ), where λ is wavelength in meter. |
|  | Radio Controller  for model automobile and model shipcraft | 26.995, 27.045,…, 27.195 MHz  (5 channels with 50 kHz space),  40.255, 40.275,…, 40.495 MHz  (13 channels with 20 kHz space), 75.630, 76.650, ..., 75.790 MHz  (9 channels with 20 kHz space) | | 10 mV/m @10m |  |
|  | Radio controller  for model aerocraft | 40.715, 40.735,..., 40.995 MHz  (15 channels with 20 kHz space), 72.630, 72.650,…, 72.990 MHz  (19 channels with 20 kHz space) | | 10 mV/m @10m |  |
|  | Radio controller  for toy, security alarm or telecommand | 13.552 - 13.568 MHz 26.958 - 27.282 MHz 40.656 - 40.704 MHz | | 10 mV/m @10m |  |
|  | Data transmission | 173.0250, 173.0375,…, 173.2750 MHz  (21 channels with 12.5kHz space) | | 5 mW (e.r.p.) | The maximum OBW is 8.5 kHz. |
|  | Data transmission | 173.6250, 173.6375,…173.7875 MHz  (14 channels with 12.5kHz space) | | 10 mW (e.r.p.) | The maximum OBW is 8.5 kHz. |
|  | Data transmission | 219.000 (224.000), 219.025 (224.025) 219.050 (224.050), 219.075 (224.075)  219.100 (224.100), 219.125 (224.125)  (6 pair channels with 25kHz space) | | 10 mW (e.r.p.) | The frequencies of 219.000 (224.000) MHz are for channel control.  The maximum OBW is 16 kHz.  Frequencies in ( ) are for duplex communication. |
|  | Data transmission | 311.0125, 311.0250,…, 311.1250 MHz  (10 channels with 12.5kHz space) | | 5 mW (e.r.p.) | The maximum OBW is 8.5 kHz. |
|  | Data transmission | 424.7000, 424.7125,…, 424.9500 MHz  (21 channels with 12.5 kHz space) | | 10 mW (e.r.p.) | The channel 424.7 MHz is for channel control.  The maximum OBW is 8.5 kHz. |
|  | Data transmission | 433.795 ∼ 434.045 MHz | | 3 mW (e.r.p.) | For tire pressure monitoring system (TPMS) and Remote Keyless Entry(RKE) in car |
|  | Data transmission | 447.6000, 447.6125,…, 447.8500 MHz  (21 channels with 12.5 kHz space) | | 5 mW (e.r.p.) | The maximum OBW is 8.5 kHz. |
|  | Data transmission | 447.8625, 447.8750,…, 447.9875 MHz  (11 channels with 12.5 kHz space) | | 10 mW (e.r.p.) | The maximum OBW is 8.5 kHz. |
|  | Application for guiding of the blind | 235.3000, 235.3125, 235.3250, 235.3375 MHz for base station and  358.5000, 358.5125, 358.5250, 358.5375 MHz for mobile station | | 10 mW (e.r.p.) | The maximum OBW is 8.5 kHz. |
|  | Security application | 447.2625, 447.2750,…, 447.5625 MHz  (25 channels with 12.5 kHz space) | | 10 mW (e.r.p.) | The maximum OBW is 8.5 kHz. |
|  | Data transmission or voice radio paging | 219.150, 219.175, 219.200 and 219.225 MHz (4 channels with 25 kHz space) | | 10 mW (e.r.p.) | The maximum OBW is 16 kHz. |
|  | Wireless microphone or audio transmission | 72.610 - 73.910 MHz 74.000 - 74.800 MHz 75.620 - 75.790 MHz | | 10 mW (e.r.p.) | The maximum OBW is 60 kHz. |
|  | Wireless microphone or audio transmission | 173.020 - 173.280 MHz 173.300 – 174.000 MHz1) 216.000 – 217.000 MHz1)217.250 - 220.110 MHz 223.000 - 225.000 MHz 740.000 - 752.000 MHz\*  925.000 - 937.500 MHz | | 10 mW (e.r.p.) | The maximum OBW is 200 kHz.  1) For hearing aids and indoor use |
|  | Wireless access system including wireless LAN | 5 150 - 5 250 MHz1) | | 2.5 mW/MHz | 1) Nominal antenna gain is 6 dBi. Conducted power density is 2.5mW/MHz in case of OBW 0.5-20MHz, or 1.25mW/MHz in case of OBW 20-40MHz, or 0.625mW/MHz in case of OBW 40-80MHz.  2) Nominal antenna gain is 7 dBi. Conducted power density is 10mW/MHz in case of OBW 0.5-20MHz, or 5mW/MHz in case of OBW 20-40MHz, or 2.5mW/MHz in case of OBW 40-80MHz. |
| 5 250 - 5 350 MHz2) | | 10 mW/MHz |
| 5 470 - 5 650 MHz2) | | 10 mW/MHz |
|  | Wireless access system including wireless LAN | 17.705 – 17. 715 GHz  17.725 – 17.735 GHz  19.265 – 19.275 GHz  19.285 – 19.295 GHz | | 10 mW | Nominal antenna gain is 2.15dBi.  The Maximum OBW is 10MHz.  This SRD is only for Wireless LAN |
| 17.700 – 17.740 GHz  19.260 – 19.300 GHz | | 1 mW/MHz | Nominal antenna gain is 23 dBi.  The OBW is 10 - 40MHz.  This SRD is only for fixed point-to-point operation. |
|  | Wireless for data communication  (Spread Spectrum, OFDM, etc) | 2 400 - 2 483.5 MHz 5 725 - 5 825 MHz | | 3 mW/MHz 1) 2) (for FHSS type)  10 mW/MHz  1) 3) (for other spread spectrum types and OFDM)  10 mW (e.r.p)4) (other types) | 1) The nominal antenna gain is 6 dBi (20 dBi for point-to-point application)  2) The peak power of a hopping channel divided by whole hopping frequency band (MHz).  3) 10mW/MHz in case of OBW 0.5-26MHz, 5 mW/MHz in case of OBW 26-40 MHz, and 2.5mW/MHz in case of OBW 40-80MHz.  Only for devices with OBW 40-60MHz in 2.4 GHz band, conducted power density is 0.1 mW/MHz .  4) The maximum OBW is 26 MHz for 2.4 GHz band and 70 MHz for 5.8 GHz band (center frequency, 5.775MHz). |
|  | Wireless data communication  (Analogue modulation techniques) | 2 410, 2 430, 2 450 and 2 470 MHz | | 10 mW | The nominal antenna gain is 6 dBi (20 dBi for point-to-point application)  The maximum OBW is 16 MHz. |
|  | Wireless data communication  (Dedicated short range communication) | 5 800 and 5 810 MHz | | 10 mW | The maximum OBW is 8 MHz.  Nominal antenna gain is 22 dBi for road side unit and 8 dBi for on-board unit. |
|  | Vehicle identification system | 2.440 (2.427-2.453) MHz  2.445 (2.434-2.465) MHz  2.455 (2.439-2.470) MHz | | 300 mW | Nominal antenna gain is 20 dBi. |
|  | RFID | 13.552 - 13.568 MHz | | 93.5 dBuV/m @ 10m |  |
|  | RFID | 433.670 - 434.170 MHz | | 3.6 mW (e.i.r.p.) |  |
|  | RFID/USN (Ubiquitous Sensor Network) | 917 – 923.5 MHz  (32 channels, 200 kHz step) | | 4W(e.i.r.p) | Passive RFID on channel No. 2, 5, 8, 11, 14 and 17. |
| 200mW(e.i.r.p) | Passive RFID on channel No. 20~32 |
| 10mW(e.i.r.p) | Any on channel No. 2, 5, 8, 11, 14, 17 and 19 ~ 32. |
| 3mW(e.i.r.p) | Any on channel No. 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16 and 18. |
|  | Car radar | 24.25 – 26.65 GHz | | -41.3 dBm/MHz(e.i.r.p) |  |
|  | Car radar | 76 - 77 GHz | | 10 mW | 50 dBm (e.i.r.p.) |
|  | Cordless phone (Digital) | 1786.750 - 1791.950 MHz | | 100 mW (e.i.r.p.) | The maximum OBW is 1.728 MHz. |
|  | Cordless phone (Digital) | 2400 – 2483.5 MHz | | 3 mW/MHz 1) 2) (for FHSS type)  10 mW/MHz 1) 3) (for other spread spectrum types and OFDM)  10 mW (e.r.p.) 4) (other type) | 1) The nominal antenna gain is 6 dBi  2) The peak power of a hopping channel divided by whole hopping frequency band (MHz).  3) 10mW/MHz in case of OBW 0.5-26MHz, 5 mW/MHz in case of OBW 26-40 MHz , 2.5mW in case of OBW 40 - 80MHz and 0.1 mW/MHz in case of OBW 40-60 MHz.  4) The maximum OBW is 26 MHz. |
|  | UWB device | 3.1 - 4.8 GHz  7.2 - 10.2 GHz | | -41.3 dBm/MHz (e.i.r.p) | The minimum 10-dB bandwidth is 450 MHz.  Interference mitigation function (DAA, LDC, etc) should be adopted in the band of 3.1 – 4.8 GHz.  However, devices are allowed to be used without any interference mitigation techniques in the 4.2 to 4.8 GHz band until the end of December 2016. |
|  | Non-specific SRD | 57 – 64 GHz | | 43dBm(e.i.r.p)  57dBm(e.i.r.p.) 1) | Nominal antenna gain is 16 dBi  1) 57dBm for fixed point-to-point application |
|  | Medical implant communication system (MICS) | 402∼405 MHz | | 25 uW (e.i.r.p.) | Maximum OBW is 300 kHz. |
|  | Object sensing device | 10.50 – 10.55 GHz | | 25mW (e.i.r.p.) | For indoor use only |
|  | Object sensing device | 24.05 – 24.25 GHz | | 100mW (e.i.r.p.) | Maximum conducted power is 10mW |
|  | Road radar | 34.275 – 34.875 GHz | | 8 dBm/MHz | 45 dBm (e.i.r.p.).  This application is only used for monitoring of road surface |

**Technical Regulations in Malaysia**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Technical Regulations for Short Range Radiocommunication Devices** | | | | |
| **Num** | **Typical Application Type** | **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power**  **(mW)** | **Remarks[[13]](#footnote-13)** |
|  | **Short range communication device** | **6.7650 to 6.7950**  **13.5530 to 13.5670**  **26.9570 to 27.2830**  **40.6600 to 40.7000**  **433.0000 to 435.0000** | **≤100 (EIRP)** |  |
| **2400.0000 to 2500.0000** | **≤500 (EIRP)** |  |
| **5150.0000 to 5250.0000**  **5250.0000 to 5350.0000**  **5725.0000 to 5875.0000**  **24.0000 GHz to 24.2500 GHz**  **61.0000 GHz to 61.5000 GHz**  **122.0000 GHz to 123.0000 GHz**  **244.0000 GHz to 246.0000 GHz** | **≤1000 (EIRP)** |  |
|  | **Personal Radio Service Device** | **477.5250 to 477.9875** | **≤500** |  |
|  | **Cordless telephone** | **46.6100 to 46.9700**  **49.6100 to 49.9700** | **≤50 (EIRP)** |  |
| **866.0000 to 871.0000**  **CT2/CT3 freq. Band\*** | **≤50 (EIRP)** |  |
| **1880.0000 to 1900.0000**  **2400.0000 to 2483.5000** | **≤100 (EIRP)** |  |
|  | **Two-way radio pager access device** | **279.0000 to 281.0000/**  **919.0000 to 923.0000** | **≤1000** |  |
|  | **Radio telemetry access device** | **162.9750 to 163.1500** | **≤1000** |  |
|  | **Infra red device** | **187.5000 THz to 420.0000 THz** | **≤125** |  |
|  | **Remote controlled consumer device**  **- boat, car model/garage door/camera/toy robot, crane, etc** | **26.9650 to 27.2750**  **40.0000**  **47.0000**  **49.0000**  **303.0000 to 320.0000**  **433.0000 to 435.0000** | **≤50 (EIRP)** |  |
|  | **Security device**  - radio detection and alarm | **3.0000 kHz to 195.0000 kHz**  **228.0063 to 228.9937**  **303.0000 to 320.0000**  **400.0000 to 402.0000**  **433.0000 to 435.0000**  **868.1000**  **76.0000 GHz to 77.000GHz** | **<50 (EIRP)** |  |
|  | **Wireless microphone system** | **26.95728 to 27.28272**  **40.4350 to 40.9250**  **87.5000 to 108.000**  **182.0250 to 182.9750**  **183.0250 to 183.4750**  **217.0250 to 217.9750**  **218.0250 to 218.4750**  **510.0000 to 798.0000** | **<50 (EIRP)** |  |
|  | **Free space optics device** | **193.5484 THz (wavelength of 1550nm)**  **352.9412 THz (wavelength of 850nm)** | **≤650** |  |
|  | **Industrial, Scientific and Medical (ISM) device** | **6765.0000 kHz to 6795.0000 kHz**  **13.5530 to 13.5670**  **26.9570 to 27.2830**  **40.6600 to 40.7000**  **2400.0000 to 2500.0000**  **5725.0000 to 5875.0000**  **24.0000 GHz to 24.2500 GHz**  **61.0000 GHz to 61.5000 GHz**  **122.0000 GHz to 123.0000 GHz**  **244.0000 GHz to 246.0000 GHz** | **<500 (EIRP)** |  |
| 1. M | **Active Medical Implant** | **402.0000 MHz to 405.0000 MHz**  **9.0000 kHz to 315.0000 kHz** | **25 microWatts**  **30 dB microA/m at 10 m** | **\* planned** |
|  | **RFID** | **13.5530 MHz to 13.5670 MHz**  **433.0000 MHz to 435.0000 MHz**  **869.0000 MHz to 870.3750 MHz**  **919.0000 MHz to 923.0000 MHz**  **2400.0000 MHz to 2500.0000 MHz** | **100 milliWatts**  **100 milliWatts**  **500 milliWatts**  **2 Watts ERP**  **500 milliWatts** | **\*planned** |

**Technical Regulations in New Zealand**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Technical Regulations for Short Range Radiocommunication Devices** | | | | |
| **Num** | **Typical Application Type** | **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Remarks[[14]](#footnote-14)** |
| 1. 1 | Determination Telemetry and Telecommand | 0.009 - 0.090 MHz | 9 dBW (8 W) eirp | In the band 0.009 to 0.090 MHz, the magnetic field strength from devices must not exceed 72 dBµA/m  at a distance of 10 metres.  In the band 0.090 to 0.190 MHz, the magnetic field strength from devices must not exceed 43 dBµA/m at a distance of 10 metres, except in the band 0.119 to 0.135 MHz, where the magnetic field strength from devices must not exceed 66 dBµA/m at a distance of 10 metres. |
|  | Determination Telemetry and Telecommand | 0.09 - 0.119 MHz | -20 dBW (10 mW) eirp |
|  | Determination, Telemetry and Telecommand | 0.119 - 0.135 MHz | 3 dBW (2 W) eirp |
|  | Determination, Telemetry and Telecommand | 0.135 - 0.190 MHz | -20 dBW (10 mW) eirp |
|  | Cordless telephones | 1.7 - 1.8 MHz | -8 dBW (160 mW) eirp | Equivalent field strength is 107 dBµV/m measured at 10 m |
|  | Auditory aids | 3.18 - 3.38 MHz | -76 dBW (25 nW) eirp | In the band 3.18 to 3.38 MHz, the maximum permitted magnetic field strength is –20 dBµA/m measured in a 10 kHz bandwidth at a distance of 10 metres. |
|  | Auditory aids | 3.64 - 4.04 MHz | -76 dBW (25 nW) eirp | In the band 3.64 to 4.04 MHz, the maximum permitted magnetic field strength is –40 dBµA/m measured in a 10 kHz bandwidth at 10 metres. |
|  | Determination Telemetry and Telecommand | 6.765 - 6.795 MHz | -20 dBW (10 mW) eirp |  |
|  | Auditory aids | 10.44 - 10.76 MHz | -76 dBW (25 nW) eirp | In the band 10.44 to 10.76 MHz, the maximum permitted magnetic field strength is –40 dBµA/m measured in a 10 kHz bandwidth at 10 metres. |
|  | Determination Telemetry and Telecommand | 13.55 - 13.57 MHz | -10 dBW (100 mW) eirp |  |
|  | Citizen band radio | 26.325 - 26.775 MHz | 10.8 dBW (12 W) eirp | 10 kHz channel plan.  Single-sideband only systems: The permitted emission is 2K80J3EJN, and the maximum permitted power is 10.8 dBW (12 W) e.i.r.p. peak envelope power (pX);  Double-sideband only systems: The permitted emission is 6K00A3EJN, and the maximum permitted power is 6.0 dBW (4 W) e.i.r.p. carrier power (pZ). |
|  | Citizen band radio | 26.960 - 27.410 MHz | 10.8 dBW (12 W) eirp |
|  | Unrestricted | 26.95 - 27.3 MHz | 0 dBW (1W) eirp |  |
|  | Unrestricted | 29.7 – 30 MHz | -10 dBW (100 mW) eirp |  |
|  | Cordless telephones | 30 - 41 MHz | 0 dBW (1 W) eirp | Channel plan of Base Tx 30.075 – 30.775 MHz and Mobile Tx of 39.775 – 40.475 MHz. Equivalent field strength is 115 dBµV/m measured at 10 metres. |
|  | Model control | 30.8 - 31.5 MHz | -10 dBW (100 mW) eirp |  |
|  | Aeronautical model control | 31.5 - 32 MHz | -10 dBW (100 mW) eirp |  |
|  | Aeronautical model control | 35 - 35.5 MHz | -10 dBW (100 mW) eirp |  |
|  | Unrestricted | 35.5 37.2 MHz | -10 dBW (100 mW) eirp |  |
|  | Aeronautical model control | 39 - 39.7 MHz | -10 dBW (100 mW) eirp |  |
|  | Aeronautical model control | 40.5 - 40.66 MHz | -10 dBW (100 mW) eirp |  |
|  | Unrestricted | 40.66 - 40.7 MHz | 0 dBW (1W) eirp |  |
|  | Aeronautical model control | 40.7 - 40.8 MHz | -10 dBW (100 mW) eirp |  |
|  | Unrestricted | 40.8 - 41.0 MHz | -10 dBW (100 mW) eirp |  |
|  | Aeronautical model control | 72 - 72.25 MHz | -10 dBW (100 mW) eirp | These frequencies are shared with auditory aid short-range devices for the hearing impaired and should be used with some caution in urban parks and reserves. |
|  | Auditory Aids | 72 - 72.25 MHz | -10 dBW (100 mW) eirp |  |
|  | Unrestricted | 72.25 - 72.50 MHz | -10 dBW (100 mW) eirp |  |
|  | Aeronautical model control | 72.5 - 72.8 MHz | -10 dBW (100 mW) eirp |  |
|  | Cordless telephones | 72.8 - 73 MHz | 0 dBW (1 W) eirp | Equivalent field strength is 115 dBµV/m measured at 10 metres. |
|  | Audio senders | 88 - 108 MHz | -50 dBW (10.µW) eirp |  |
|  | Unrestricted | 107 - 108 MHz | -16 dBW (25 mW) eirp |  |
|  | Unrestricted | 160.1 - 160.6 MHz | -3 dBW (500 mW) eirp |  |
|  | Unrestricted | 173 - 174 MHz | -10 dBW (100 mW) eirp |  |
|  | Radio microphones | 174 - 230 MHz | -20 dBW (10 mW) eirp |  |
|  | Determination Telemetry and Telecommand | 235 - 300 MHz | -30 dBW (1 mW) eirp |  |
|  | Determination Telemetry and Telecommand | 300 - 322 MHz | -20 dBW (10 mW) eirp |  |
|  | Biomedical Telemetry | 402 - 406 MHz | -46 dBW (0.025 mW) eirp | the maximum permitted duty cycle is 0.1% |
|  | Unrestricted | 433.05 - 434.79 MHz | -16 dBW (25 mW) eirp |  |
|  | Biomedical Telemetry | 444 - 444.925 MHz | -16 dBW (25 mW) eirp |  |
|  | Unrestricted | 458.54 - 458.61 MHz | -3 dBW (500 mW) eirp |  |
|  | Unrestricted | 466.80 - 466.85 MHz | -3 dBW (500 mW) eirp |  |
|  | Biomedical Telemetry | 470 - 470.5 MHz | -10 dBW (100 mW) eirp |  |
|  | Unrestricted | 471 - 471.5 MHz | -10 dBW (100 mW) eirp |  |
|  | Personal Radio Service | 476.43125 - 477.41875 MHz | 9.2 dBW (8.3 W) eirp | 12.5 and 25 kHz channel plans. Emissions desingators:16K0F3EJN, 16K0G3EJN, 8K50F3EJN, 8K50G3EJN |
|  | Radio microphones | 502 - 510 MHz | -10 dBW (100 mW) eirp |  |
|  | Radio microphones | 510 - 606 MHz | -3 dBW (500 mW) eirp |  |
|  | Radio microphones | 622 - 698 MHz | -3 dBW (500 mW) eirp |  |
|  | Audio/Video Senders | 614 - 646 MHz | -50 dBW (10 µW) eirp |  |
|  | Unrestricted | 819 - 824 MHz | -10 dBW (100 mW) eirp |  |
|  | Unrestricted | 864 - 868 MHz | 6 dBW (4 W) eirp | Transmitters using eirps greater than 0 dBW (1 W) must employ frequency hopping or digital modulation techniques |
|  | Cordless telephones | 864.1 - 868.1 MHz | 0 dBW (1 W) eirp |  |
|  | Determination, Telemetry and Telecommand | 868 - 870 MHz | -27 dBW (2 mW) eirp | Maximum permitted duty cycle is 1%. |
|  | Determination Telemetry and Telecommand | 869.2 - 869.25 MHz | -20 dBW (10 mW) eirp | Maximum permitted duty cycle is 0.1%. |
|  | Determination Telemetry and Telecommand | 915 - 921 MHz | -25 dBW (3 mW) eirp |  |
|  | Unrestricted | 921 – 921.5 MHz | 0 dBW (1 W) eirp | Transmissions from devices operating in the band 921 to 928 MHz must  not exceed the following unwanted emission limits: –79 dBW (–49 dBm) from 800 to 915 MHz, then varying  from –79 dBW (–49 dBm) at 915 MHz to –66 dBW (–36 dBm) at 921 MHz in accordance with the formula  y = mx + C, where y = dBm, x = MHz, m = dy/dx, C = the value of y when x = 0 (the y intercept). The maximum value of –63 dBW (–33 dBm) applies from 928 MHz to 1 GHz. The reference bandwidth for emissions is 100 kHz. |
|  | Unrestricted | 921.5 -928 MHz | 6 dBW (4 W) eirp |
|  | Cordless telephones | 1880 - 1900 MHz | 6 dBW (4 W) eirp | Digital Enhanced Cordless Telecommunications (DECT). Equivalent field strength of 121 dBµV/m measured at 10 metres. |
|  | Cordless telephones | 1895 - 1920 MHz | -6 dBW (250 mW) eirp | Personal Handyphone System (PHS). Equivalent field strength of 109 dBµV/m measured at 10 metres. |
|  | Unrestricted | 2.4 - 2.4835 GHz | 6 dBW (4 W) eirp | Transmitters using eirps greater than 0 dBW (1 W) must employ frequency hopping or digital modulation techniques |
|  | Radiolocation | 2.9 - 3.4 GHz | -10 dBW (100 mW) eirp |  |
|  | Wireless LAN | 5.15 - 5.25 GHz | -7 dBW (200 mW) eirp | Limited to indoor use only - the maximum permitted power density is 20 dBW/MHz (10 mW/MHz) e.i.r.p. or equivalently -36 dBW/25 kHz (0.25 mW/25 kHz) e.i.r.p. |
|  | Wireless LAN | 5.25 - 5.35 GHz | 0 dBW (1W) eirp | Indoor-Only Systems: In the band 5250 to 5350 MHz the maximum permitted mean power is -7 dBW (200 mW) e.i.r.p. and the maximum permitted mean power density is -20 dBW/MHz (10 mW/MHz) e.i.r.p., provided Dynamic Frequency Selection and Transmitter Power Control are implemented. If transmitter power control is not in use, then the e.i.r.p. values shall be reduced by 3 dB.  Indoor and Outdoor Systems: In the band 5250 to 5350 MHz, the maximum permitted mean power is 0 dBW (1W) e.i.r.p. and the maximum permitted mean power density is -13 dBW/MHz (50 mW/MHz) eirp, provided Dynamic Frequency Selection and Transmitter Power Control are implemented in conjunction with the following vertical radiation angle mask where θ is the angle above the local horizontal plane (of the Earth):  **Maximum permitted mean power density Elevation angle above horizontal**  –13 dB(W/MHz), for 0°≤θ<8°; for 0° <= θ < 8°  -13 - 0.716(θ-8) dB(W/MHz), for 8°≤θ<40°; for 8° <= θ < 40°  –35.9 – 1.22(θ-40) dB(W/MHz), for 40°≤θ<45°; for 40° <= θ <= 45°  -42 dB(W/MHz), for θ >45°. for 45° < θ |
|  | Wireless LAN | 5.47 - 5.725 GHz | 0 dBW (1W) eirp | The maximum permitted transmitter power is -6 dBW (250 mW) with a maximum permitted mean power of 0 dBW (1 W) e.i.r.p. and a maximum permitted mean power density of -13 dBW/MHz (50 mW/MHz) e.i.r.p., provided Dynamic Frequency Selection and Transmitter Power Control are implemented. If transmitter power control is not in use, then the maximum permitted mean power shall be reduced by 3 dB. |
|  | Radiolocation | 5.47 - 5.725 GHz | -10 dBW (100 mW) eirp |  |
|  | Unrestricted | 5.725 - 5.875 GHz | 6 dBW (4 W) eirp | Transmitters using eirps greater than 0 dBW (1 W) must employ frequency hopping or digital modulation techniques |
|  | Road Transport and Traffic Telematics | 5.725 - 5.875 GHz | 3 dBW (2 W) eirp |  |
|  | Radiolocation | 8.5 - 10 GHz | -10 dBW (100 mW) eirp |  |
|  | Radiolocation | 10 - 10.6 GHz | -16 dBW (25 mW) eirp |  |
|  | Radiolocation | 15.7 - 17.3 GHz | -10 dBW (100 mW) eirp |  |
|  | Unrestricted | 24 - 24.25 GHz | 0 dBW (1 W) eirp |  |
|  | Radiolocation | 33.4 - 36 GHz | -10 dBW (100 mW) eirp |  |
|  | Field Disturbance Sensors | 46.7 - 46.9 GHz | -10 dBW (100 mW) eirp |  |
|  | Wireless LAN | 57 - 66 GHz | 13 dBW (20 W) eirp | The power spectral density must not exceed 13 dBm/MHz e.i.r.p. and spurious emissions outside the band must be less than –30 dBm/MHz |
|  | Fixed point-to-point links | 57 - 64 GHz | 13 dBW (20 W) eirp | The average power density of any emission, measured during the transmit interval shall not exceed exceed -40 dBW/cm2 (9 µW/cm2) at a distance of 3 metres and the peak power density of any emission shall not exceed -37 dBW/ cm2 (18 µW/cm2) at a distance of 3 metres.  The peak total transmitter power shall not exceed -3 dBW (500 mW).  For emissions of bandwidths less than 100 MHz the transmitter peak power must be limited to -3 dBW (500 mW) x (bandwidth (MHz) / 100 (MHz)). |
|  | Radiolocation | 59 - 64 GHz | -10 dBW (100 mW) eirp |  |
|  | Field Disturbance Sensors | 76 - 77 GHz | 14 dBW (25 W) eirp |  |
|  | Unrestricted | 122 - 123 GHz | 0 dBW (1 W) eirp |  |
|  | Unrestricted | 244 - 246 GHz | 0 dBW (1 W) eirp |  |

**Technical Regulations in Philippines**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Technical Regulations for Short Range Radiocommunication Devices** | | | | |
| **Num** | **Typical Application Type** | **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Remarks** |
|  | Ultra Low Power Active MICS | 9-315 KHz | 30 dBuA/m @ 10m | \*individual transmitters may combine adjacent channels for increased bandwidth up to 300 KHz. |
| 4042-405 MHz \* | 25 uW (e.r.p.) |
|  | Biomedical Devices | 40.66-40.70 MHz | 1000 uV/m @ 3m |  |
|  | Alarms | 868.6-868.7 MHz | 10 mW (e.r.p.) |  |
| 869.2-869.25 MHz | 10 mW (e.r.p.) |
| 869.25-869.3 MHz | 10 mW (e.r.p.) |
| 869.65-869.7 MHz | 25 mW (e.r.p.) |
|  | Equipment For Detecting Movement and Alert  Alarms | 2400-2483.5 MHz | 25 mW (e.i.r.p.) |  |
| 9200-9500 MHz | 25 mW (e.i.r.p.) |
| 9500-9975 MHz | 25 mW (e.i.r.p.) |
| 13.4-14.0 GHz | 25 mW (e.i.r.p.) |
| 24.05-24.25 GHz | 100 mW (e.i.r.p.) |
|  | Equipment For Detecting Movement and Alert  Alarms | 2400-2483.5 MHz | 25 mW (e.i.r.p.) |  |
| 9200-9500 MHz | 25 mW (e.i.r.p.) |
| 9500-9975 MHz | 25 mW (e.i.r.p.) |
| 13.4-14.0 GHz | 25 mW (e.i.r.p.) |
| 24.05-24.25 GHz | 100 mW (e.i.r.p.) |
|  | Inductive Applications | 9-59.750 KHz | 72 dBuA/m @ 10m |  |
| 59.750-60.250 KHz | 42 dBuA/m @ 10m |
| 60.250-70 KHz | 69 dBuA/m @ 10m |
| 70-119 KHz | 42 dBuA/m @ 10m |
| 119-135 KHz | 66 dBuA/m @ 10m |
| 135-140 KHz | 42 dBuA/m @ 10m |
| 140-148.5 KHz | 37.7 dBuA/m @ 10m |
| 3155-3400 KHz | 13.5 dBuA/m @ 10m |
| 6765-6795 KHz | 42 dBuA/m @ 10m |
| 7400-8800 KHz | 9 dBuA/m @ 10m |
| 13.553-13.567 MHz | 42 dBuA/m @ 10m |
| 26.957-27.283 MHz | 42 dBuA/m @ 10m |
| 10.2-11 MHz | 9 dBuA/m @ 10m |
|  | Non-specific Short Range Devices, Telemetry, Telecommand, Alarms, Data in General and Other Similar Applications | 6765-6795 KHz | 42 dBuA/m @ 10m |  |
| 13.553-13.567 MHz | 42 dBuA/m @ 10m |
| 26.957-27.283 MHz | 10 mW erp / 42 dBuA/m @ 10m |
| 40.660-40.700 MHz | 10 mW (e.r.p.) |
| 138.2-138.45 MHz | 10 mW (e.r.p.) |
| 315 MHz | 10 mW (e.r.p.) |
| 433.050-434.790 MHz | 10 mW (e.r.p.) |
| 868.000-868.600 MHz | 25 mW (e.r.p.) |
| 868.700-869.200 MHz | 25 mW (e.r.p.) |
| 869.3-869.4 MHz | 25 mW (e.r.p.) |
| 869.700-870.000 MHz | 5 mW (e.r.p.) |
| 2400-2483.5 MHz | 10 mW (e.i.r.p.) |
| 5725-5875 MHz | 25 mW (e.i.r.p.) |
| 24.00-24.25 GHz | 100 mW (e.i.r.p.) |
| 61.0-61.5 GHz | 100 mW (e.i.r.p.) |
| 122-123 GHz | 100 mW (e.i.r.p.) |
| 244-246 GHz | 100 mW (e.i.r.p.) |
|  | Road Transport and Traffic Telematics | 5795-5805 MHz\* | 2W (e.i.r.p.) | \* Individual license required |
| 63-64 GHz | 8W (e.i.r.p.) |
| 76-77 GHz | 55 dBm peak |
|  | Wireless Audio Applications | 72.0-73.0 MHz \* | 80 mV/m at 3m (field strength) | \* for auditory assistance device only. In case of analogue systems, the maximum occupied bandwidth should not exceed 300 KHz |
| 75.4-76.0 MHz \* | 80 mV/m at 3m (field strength) |
| 863-865 MHz | 10 mW (e.r.p.) |
| 864.8-865.0 MHz | 10 mW (e.r.p.) |
|  | Wireless Microphones | 29.7-47.0 MHz | 2 mW (e.r.p.) | 50 mW restricted to for body worn microphones |
| 173.965-174.015 MHz | 10 mW (e.r.p.) |
| 174-216 MHz | 10 mW (e.r.p.)/50 mW (e.r.p) |
| 470-862 MHz | 10 mW (e.r.p.)/50 mW (e.r.p) |
| 863-865 MHz | 10 mW (e.r.p.) |  |
| 1785-1800 MHz | 10 mW (e.i.r.p.)/50 mW (e.i.r.p) |  |
|  | Wireless Video Transmitter | 630-710 MHz | 76 dBuV/m at 3m  5-8 MHz |  |
| 2400-2483.5 MHz (Narrowband) | 100 mW (e.i.r.p.) |

**Technical Regulations in Singapore**

|  |
| --- |
| **Technical Regulations for Short Range Radiocommunication Devices** |

| **Num** | **Typical Application Types** | **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Transmitter Spurious Emissions** | **Remarks** |
| --- | --- | --- | --- | --- | --- |
| 1 | Induction loop system / RFID | 16 – 150 kHz | ≤ 66 dBμA/m @ 10m | ≥ 32 dB below carrier at 3 m or  EN 300 224-1  EN 300 330-1 |  |
| 150 – 5000 kHz | ≤ 13.5 dBμA/m @ 10m |  |  |
| 6765 – 6795 kHz | ≤ 42 dBμA/m @ 10m |  |  |
| 7400 – 8800 kHz | ≤ 9 dBμA/m @ 10m |  |  |
| 2 | Radio detection, alarm system | 0.016 – 0.150 MHz | ≤ 100 dBμV/m @ 3m | ≥ 32 dB below carrier at 3 m or  EN 300 330-1  EN 302 291-1 |  |
| 3 | 13.553 – 13.567 MHz | ≤ 94 dBμV/m @ 10m |  |
| 4 | 146.35 – 146.50 MHz  240.15 – 240.30 MHz  300.00 – 300.30 MHz  312.00 – 316.00 MHz  444.40 – 444.80 MHz | ≤ 100 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 |  |
| 5 | Wireless microphone | 0.51 – 1.60 MHz | ≤ 57 dBμV/m @ 3m |  |
| 6 | 40.66 – 40.70 MHz | ≤ 65 dBμV/m @ 10m |  |
| 7 | 88.00 – 108.00 MHz | ≤ 60 dBμV/m @ 10m |  |
| 8 | 470.00 – 806.00 MHz | ≤ 10 mW (e.r.p.) |  |
| 9 | Wireless microphone, Hearing/Audio assistance aids | 169.40 – 175.00 MHz | ≤ 500 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 |  |
| 180.00 – 200.00 MHz  487.00 – 507.00 MHz | ≤ 112 dBμV/m @ 10m |  |
| 10 | Remote controls of garage door, cameras, toys and miscellaneous devices | 26.96 – 27.28 MHz | ≤ 100 mW (e.r.p.) [[15]](#footnote-15)Note 1 | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 |  |
| 34.995 – 35.225 MHz | ≤ 100 mW (e.r.p.) |  |  |
| 40.665 – 40.695 MHz | ≤ 500 mW (e.r.p.) |  |  |
| 40.77 – 40.83 MHz |  |  |  |
| 72.13 – 72.21 MHz |  |  |  |
| 11 | Remote controls of aircraft and glider models, telemetry, detection and alarm systems | 26.96 – 27.28 MHz  29.70 – 30.00 MHz | ≤ 500 mW (e.r.p.) |  |  |
| 12 | Remote control of cranes and loading arms | 170.275 MHz  170.375 MHz  173.575 MHz  173.675 MHz  451.750 MHz  452.000 MHz  452.050 MHz  452.325 MHz | ≤ 1000 mW (e.r.p.) Note 1 |  | Operating under these provisions shall be approved on an exceptional basis. |
| 13 | On-site radio paging system | 26.96 – 27.28 MHz  40.66 – 40.70 MHz | ≤ 3000 mW (e.r.p.) [[16]](#footnote-16)Note 1 | ≥ 32 dB below carrier at 3 m or;  EN 300 135-1  EN 300 433-1  EN 300 224-1 | Operating under these provisions shall be approved on an exceptional basis. |
| 14 | 151.125 MHz  151.150 MHz | ≤ 3000 mW (e.r.p.) | ≥ 60 dB below carrier over 100 kHz to 2000 MHz or  EN 300 224-1 |  |
| 15 | Medical and Biological telemetry | 9 – 315 kHz | ≤ 30 dBμA/m @ 10m | EN 302 195-1 |  |
| 40.50 – 41.00 MHz | ≤ 0.01 mW (e.r.p.) Note 1 | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 |  |
| 216.00 – 217.00 MHz | > 25 μW to  ≤ 100 mW (e.r.p.) |  |  |
| 454.00 – 454.50 MHz | ≤ 2 mW (e.r.p.) |  |  |
| 16 | 1427.00 – 1432.00 MHz | > 25 μW to  ≤ 100 mW (e.r.p.) | FCC Part 15 or  EN 300 440-1 |  |
| 17 | All frequencies | ≤ 25 μW (e.r.p.) | FCC Part 15;  EN 300 220-1  EN 300 330-1  EN 300 440-1  EN 301 839-1  EN 302 537-1 |  |
| 18 | Wireless modem, data communication system | 72.080 MHz  72.200 MHz  72.400 MHz  72.600 MHz  158.275/162.875 MHz  158.325/162.925 MHz  453.7250/458.7250 MHz  453.7375/458.7375 MHz  453.7500/458.7500 MHz  453.7625/458.7625 MHz | ≤ 1000 mW (e.r.p.) | ≥ 43 dB below carrier over 100 kHz to 2000 MHz or  EN 300 390-1  EN 300 113-1 |  |
| 19 | Short range radar systems such as automatic cruise control and collision warning systems for vehicle | 76 – 77 GHz | ≤ 37 dBm (e.r.p.) [[17]](#footnote-17)Note 2 when vehicle is in motion  ≤ 23.5 dBm (e.r.p.) when vehicle is stationary | FCC Part 15 § 15.253 (c) or  EN 301 091 |  |
| 20 | Radio telemetry, telecommand system | 433.05 – 434.79 MHz | ≤ 10 mW (e.r.p.) Note 1 | ≥ 32 dB below carrier at 3 m or  EN 300 220-1 |  |
| 21 | Radio Telemetry, Telecommand, RFID system | 866 – 869 MHz  920 – 925 MHz | ≤ 500 mW (e.r.p.) [[18]](#footnote-18)Note 1 | ≥ 32 dB below carrier at 3 m or  EN 300 220-1  EN 302 208 |  |
| 22 | Radio Frequency Identification (RFID) systems | 920 – 925 MHz | > 500 mW (e.r.p.)  ≤ 2000 mW (e.r.p.) | ≥ 32 dB below carrier at 3 m or  EN 300 220-1  EN 302 208 | Only RFID systems operating in the 920 -925 MHz frequency band shall be allowed to transmit between 500 mW and 2000 mW (e.r.p.), and approved on an exceptional basis. |
| 23 | Wireless video transmitter and other SRD applications | 2.4000 – 2.4835 GHz | ≤ 100 mW (e.i.r.p.) | FCC Part 15 § 15.209; § 15.249 (d) or  EN 300 440-1  EN 302 288-1 |  |
| 24 | 10.50 – 10.55 GHz | ≤ 117 dBμV/m @ 10m |  |  |
| 25 | 24.00 – 24.25 GHz | ≤ 100 mW (e.i.r.p.) |  | Radar gun devices are not allowed to operate. |

| **Num** | **Typical Application Types** | **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Transmitter Spurious Emissions** | **Remarks** |
| --- | --- | --- | --- | --- | --- |
| 26 | Bluetooth | 2.4000 – 2.4835 GHz | ≤ 100 mW (e.i.r.p.) [[19]](#footnote-19)Note 2 | FCC Part 15 § 15.209; or  EN 300 328 |  |
| 27 | Wireless LAN only | 2.4000 – 2.4835 GHz | ≤ 200 mW (e.i.r.p.) |  | WLAN for non-localised operations shall be approved on an exceptional basis. |
| 28 | SRD applications | 5.725 – 5.850 GHz | ≤ 100 mW (e.i.r.p.) | FCC Part 15 § 15.209 |  |
| 29 | Wireless LAN and Broad Band Access (WBA) only | 5.725 – 5.850 GHz | ≤ 1000 mW (e.i.r.p.) |  | Non-localised operations shall be approved on an exceptional basis. |
| 30 | 5.725 – 5.850 GHz | > 1000 mW (e.i.r.p.)  ≤ 4000 mW (e.i.r.p.) |  | Operating under this provision shall be approved on an exceptional basis. |
| 31 | Wireless LAN | 5.150 – 5.350 GHz | > 100 mW (e.i.r.p.) [[20]](#footnote-20)Note 2  ≤ 200 mW (e.i.r.p.) | FCC Part 15 § 15.407 (b)  EN 301 893 | WLAN operating in 5.250 – 5.350 GHz under this provision shall employ Dynamic Frequency Selection (DFS) mechanism and implement Transmit Power Control (TPC).  Non-localised operations shall be approved on an exceptional basis. |
| 32 | Wireless LAN | 5.150 – 5.350 GHz | ≤ 100 mW (e.i.r.p.) | FCC Part 15 § 15.407 (b)  EN 301 893 | WLAN operating under this provision shall implement DFS function in the frequency range 5.250 – 5.350 GHz.  Non-localised operations shall be approved on an exceptional basis. |
| 33 | Wireless LAN and broadband access | 5.470 – 5.725 GHz | ≤ 1000 mW (e.i.r.p.) Note 2 | FCC Part 15 § 15.407 (b)  EN 301 893 | WLAN operating under this provision shall employ Dynamic Frequency Selection (DFS) mechanism and implement Transmit Power Control (TPC).  Non-localised operations shall be approved on an exceptional basis. |
| 34 | Wireless LAN and broadband access | 57 – 66 GHz | ≤ 10 W (e.i.r.p.) | EN 302 567  EN 305 550-1 | Indoor use is restricted to maximum mean EIRP density of 13 dBm/MHz  Outdoor use is restricted to maximum EIRP of 25 dBm and maximum EIRP power spectral density of -2 dBm/MHz. |

**Technical Regulations in Thailand**

SRDs can be classified into three categories under Thai regulations:

1. **License-exempt**

|  |  |  |
| --- | --- | --- |
| **Frequency** | **Maximum Transmit Power Limit** | **Application** |
| < 135 kHz | 150 mW e.i.r.p. | Radiocommunications Equipment |
| 1.6-1.8 MHz | 10 mW | Wireless Telephone |
| 13.553 – 13.567 MHz | 10 mW e.i.r.p. | Radiocommunications Equipment |
| 26.965 – 27.405 MHz | 100 mW | Radiocommunications Equipment |
| 30-50 MHz | 10 mW | Radiocommunications Equipment |
| 54-74 MHz | 10 mW | Wireless Telephone |
| 88-108 MHz | 10 mW | Wireless Microphone |
| 165-210 MHz | 10 mW | Wireless Microphone |
| 300-500 MHz | 10 mW | Radiocommunications Equipment |
| 920-925 MHz | 4 mW e.i.r.p. | RFID Transponder or Tag |
| 2400-2500 MHz | 100 mW e.i.r.p. | Radiocommunications Equipment |
| 5.150-5.350 GHz | 0.2 W e.i.r.p. | SRD |
| 5.470-5.725 GHz | 1 W e.i.r.p. | SRD |
| 5.725-5.850 GHz | 1 W e.i.r.p. | SRD |
| 5.725-5.875 GHz | 10 mW e.i.r.p. | Radar |
| 10-10.6 GHz | 10 mW e.i.r.p. | Radar |
| 24.05-24.25 GHz | 10 mW e.i.r.p. | Radar |
| 76-81 GHz | 10 mW e.i.r.p. | Radar |

1. **License-exempt only for possessing, using, and exporting radiocommunications equipment**

|  |  |  |
| --- | --- | --- |
| **Frequency** | **Maximum Transmit Power Limit** | **Application** |
| 26.965-27.405 MHz | > 100 mW  < 500 mW | Radiocommunications Equipment |
| 72-72.745 MHz | 750 mW | Radio-controlled model |
| 78-79 MHz | 500 mW | Citizen band |
| 245-246 MHz | 500 mW | Citizen band |
| 510-790 MHz | 10 mW | Image or Video Transmitter |
| 794-806 MHz | 50 mW | Wireless Microphone |

1. **License-exempt only for possessing, using, and exporting radiocommunications equipment and constructing radiocommunications stations**

|  |  |  |
| --- | --- | --- |
| **Frequency** | **Maximum Transmit Power Limit** | **Application** |
| 920-925 MHz | 0.5 W e.i.r.p. | RFID Reader/Writer |
| 1900-1906 MHz | 10 mW | Personal Cordless telephone |
| 76-77 GHz | 10 W e.i.r.p. | Vehicle Radar |

**Technical Regulations in Vietnam**

| **TECHNICAL REQUIREMENTS FOR SHORT RANGE RADIOCOMMUNICATION DEVICES** | | | | |
| --- | --- | --- | --- | --- |
|  | **Frequency band (MHz)** | **Emission**  (Max Power) | **Spurious Emission**  (Max power or min deterioration) | **Type of devices or applications** |
|  | **A** | **B** | **C** | **D** |
|  | 16 ÷ 115 kHz | ≤ 4,5 mW ERP [[21]](#footnote-21) | Detail in relevant annex | Radio alarm and detection devices |
|  | 115 ÷ 150 kHz | ≤ 4,5 mW ERP | Detail in relevant annex | Radio alarm and detection devices |
| Radio frequency identification devices |
| Radio remote controls |
|  | 10.2 ÷ 11 MHz | ≤ 4 µW ERP | Detail in relevant annex | Wireless hearing audio aids |
|  | 13.553 ÷ 13.567 | ≤ 4,5 mW ERP | Detail in relevant annex | Radio alarm and detection systems |
| RFID |
| Non-specific SRDs |
|  | 26.957 ÷ 27.283 | ≤ 100 mW ERP | ≥ 40 dBc at output of the transmiter | Radio remote control; Radio telemetry devices |
| Non-specific SRDs |
|  | 29.70 ÷ 30.00 | ≤ 100 mW ERP | ≥ 40 dBc at output of the transmiter | Radio remote control |
| Radio alarm and detection systems |
|  | 34.995 ÷ 35.225 MHz | ≤ 100 mW ERP | ≥ 40 dBc at transmitter output | Radio remote control |
|  | 40.02 ÷ 40.98 MHz | ≤ 100 mW ERP | ≥ 40 dBc at transmitter output | Remote controls of aircraft models (a type of radio remote control) |
|  | 40.50 ÷ 41.00 MHz | ≤ 10 µW ERP | ≥ 32 dBc at transmitter output | Medical and biological applications |
|  | 40.66 ÷ 40.70 | ≤ 100 mW ERP | ≥ 40 dBc at output of the transmiter | Cordless audio devices |
| Radio remote control |
| Non-specific SRDs |
|  | 43.71 ÷ 44.00  46.60 ÷ 46.98  48.75 ÷ 49.51  49.66 ÷ 50.00 | ≤ 183 μW ERP | ≥ 32 dBc at 3m | Cordless Telephone |
|  | 50.01 ÷ 50.99 MHz | ≤ 100 mW ERP | ≥ 40 dBc at transmitter output | Remote control of aircraft models (of a type of radio remote control) |
|  | 72.00 ÷ 72.99 | ≤ 1 W ERP | ≥ 40 dBc at output of the transmiter | Radio remote control for aircraft model |
|  | 88 ÷ 108 | ≤ 3 μW ERP | ≥ 32 dBc at 3m | Radio Microphone and Headphone |
|  | 146.35 ÷ 146.50 | ≤ 100 mW ERP | ≥ 40 dBc at output of the transmiter | Radio alarm and detection systems |
|  | 182.025 ÷ 182.975 | ≤ 30 mW ERP | ≥ 40 dBc at output of the transmiter | Radio Microphone and Headphone |
|  | 216 ÷ 217 MHz | ≤ 10 µW ERP | ≥ 40 dBc at transmitter output | Medical and biological applications (of a type of radio telemetry device) |
|  | 217.025 ÷ 217.975 | ≤ 30 mW ERP | ≥ 40 dBc at output of the transmiter | Radio Microphone and Headphone |
|  | 218.025 ÷ 218.475 | ≤ 30 mW ERP | ≥ 40 dBc at output of the transmiter | Radio Microphone and Headphone |
|  | 240.15 ÷ 240.30 | ≤ 100 mW ERP | ≥ 40 dBc at output of the transmiter | Radio alarm and detection systems |
|  | 300.00 ÷ 300.33 | ≤ 100 mW ERP | ≥ 40 dBc at output of the transmiter | Radio alarm and detection systems |
|  | 312 ÷ 316 MHz | ≤ 100 mW ERP | ≥ 40 dBc at transmitter output | Radio alarm and detection devices |
| Radio remote controls |
|  | 401 ÷ 406 MHz | ≤ 25 µW ERP | Detail in relevant annex | Medical Implant Communications Systems (MICS) |
|  | 401 ÷ 402 MHz  403.5 ÷ 403.8 MHz  405 ÷ 406 MHz  403.5 ÷ 403.8 | ≤ 100 nW ERP | Detail in relevant annex | Medical Implant Telemetry Systems (MITS) |
|  | 433.05 ÷ 434.79 | ≤ 10 mW ERP | ≥ 40 dBc at output of the transmiter | RFID |
| Radio remote control  Radio telemetry devices |
|  | 444.40 ÷ 444.80 | ≤ 100 mW ERP | ≥ 40 dBc at output of the transmiter | Radio alarm and detection systems |
|  | 470 **÷** 694MHz | ≤ 30mW ERP | ≥ 40 dBc at transmitter output | Cordless audio devices |
|  | 866 ÷ 868 | ≤ 500 mW ERP | ≥ 40 dBc at output of the transmiter | RFID |
|  | 920 ÷ 925 | ≤ 500 mW ERP | ≥ 40 dBc at output of the transmiter | RFID |
|  | 821 ÷ 822  924 ÷ 925 | ≤ 183 μW ERP | ≥ 32 dBc at 3m | Cordless Telephone |
|  | 1880 ÷ 1900 MHz | ≤ 250 mW EIRP | Detail in relevant annex | Cordless telephones |
|  | 2400 ÷ 2483.5 | ≤ 100 mW EIRP and  ≤ 100 mW/100KHz  EIRP for devices using FHSS modulation or  ≤ 10 mW/1MHz EIRP for devices using other modulations. | Detail in relevant annex | WLAN  Other spread spectrum |
| 10 mW EIRP | Non-specific SRD |
|  | 2446 ÷ 2454 MHz | ≤ 500 mW EIRP | Detail in relevant annex | Radio frequency identification devices |
|  | 5150 ÷ 5250 | ≤ 200 mW EIRP and  ≤ 10 mW/MHz | Detail in relevant annex | WLAN |
|  | 5250 ÷ 5350 | ≤ 200 mW EIRP and  ≤ 10 mW/MHz | Detail in relevant annex | WLAN |
|  | 5470 ÷ 5725 MHz | ≤ 1 W EIRP và ≤ 50 mW/MHz | Detail in relevant annex | WLAN devices |
|  | 5725 ÷ 5850 MHz | ≤ 1 mW EIRP và ≤ 50 mW/MHz | Detail in relevant annex | WLAN devices |
| ≤ 100 mW EIRP | Detail in relevant annex | Wireless video transmitter |
|  | 10.5 ÷ 10.55 GHz | ≤ 100 mW EIRP | Detail in relevant annex | Wireless video transmitters |
|  | 24 ÷ 24.25 GHz | ≤ 100 mW EIRP | Detail in relevant annex | Wireless video transmitters |
| Radio telemetry devices |
| Other devices, applications |

\_\_\_\_\_\_\_\_\_\_\_\_

1. <http://www.itu.int/pub/R-RES-SM.2153> [↑](#footnote-ref-1)
2. <http://www.itu.int/pub/R-RES-R.54> [↑](#footnote-ref-2)
3. http://mic.gov.vn/vbqppl/Lists/Vn%20bn%20QPPL/DispForm.aspx?ID=7971 [↑](#footnote-ref-3)
4. Frequency and power shown in Table 1 and 2 are indicative ranges only. Actual transmit frequency or power may be subject to revision and updates in future. [↑](#footnote-ref-4)
5. http://www.erodocdb.dk/docs/doc98/official/pdf/REC7003E.PDF [↑](#footnote-ref-5)
6. http://www.itu.int/dms\_pubrec/itu-r/rec/sm/R-REC-SM.1896-0-201111-I!!MSW-E.docx [↑](#footnote-ref-6)
7. See report ITU-R SM 2057, “Studies related to the impact of devices using Ultra Wideband (UWB) technologies on radiocommunication services” [↑](#footnote-ref-7)
8. <http://www.itu.int/dms_pub/itu-r/opb/res/R-RES-R.54-2007-PDF-E.pdf> [↑](#footnote-ref-8)
9. Administrations may indicate additional information on channel spacing, necessary bandwidth and interference mitigation requirement. [↑](#footnote-ref-9)
10. Administrations may indicate additional information on channel spacing, necessary bandwidth, interference mitigation requirement, unwanted emission limit and applicable radio standards. [↑](#footnote-ref-10)
11. Administrations may indicate additional information on channel spacing, necessary bandwidth and interference mitigation requirement. [↑](#footnote-ref-11)
12. Administrations may indicate additional information on channel spacing, necessary bandwidth, interference mitigation requirement, unwanted emission limit and applicable radio standards. [↑](#footnote-ref-12)
13. Administrations may indicate additional information on channel spacing, necessary bandwidth, interference mitigation requirement, unwanted emission limit and applicable radio standards. [↑](#footnote-ref-13)
14. Administrations may indicate additional information on channel spacing, necessary bandwidth, interference mitigation requirement, unwanted emission limit and applicable radio standards. [↑](#footnote-ref-14)
15. Note 1 Effective Radiated Power (e.r.p.) refers to radiation of a half wave tuned dipole, which is used for frequencies below 1 GHz. [↑](#footnote-ref-15)
16. Note 1 Effective Radiated Power (e.r.p.) refers to radiation of a half wave tuned dipole, which is used for frequencies below 1 GHz. [↑](#footnote-ref-16)
17. Note 2 Equivalent Isotropic Radiated Power (e.i.r.p) is a product of the power supplied to the antenna and the maximum antenna gain, relative to an isotropic antenna, and is used for frequencies above 1 GHz. There is a constant difference of 2.15 dB between e.i.r.p and e.r.p [e.i.r.p. (dBm) = e.r.p (dBm) + 2.15] [↑](#footnote-ref-17)
18. Note 1 Effective Radiated Power (e.r.p.) refers to radiation of a half wave tuned dipole, which is used for frequencies below 1 GHz. [↑](#footnote-ref-18)
19. Note 2 Equivalent Isotropic Radiated Power (e.i.r.p.) is a product of the power supplied to the antenna and the maximum antenna gain, relative to an isotropic antenna, and is used for frequencies above 1 GHz. There is a constant difference of 2.15 dB between e.i.r.p. and e.r.p. [e.i.r.p. (dBm) = e.r.p. (dBm) + 2.15] [↑](#footnote-ref-19)
20. Note 2 Equivalent Isotropic Radiated Power (e.i.r.p.) is a product of the power supplied to the antenna and the maximum antenna gain, relative to an isotropic antenna, and is used for frequencies above 1 GHz. There is a constant difference of 2.15 dB between e.i.r.p. and e.r.p. [e.i.r.p. (dBm) = e.r.p. (dBm) + 2.15] [↑](#footnote-ref-20)
21. ERP (Effective Radiated Power) [↑](#footnote-ref-21)