



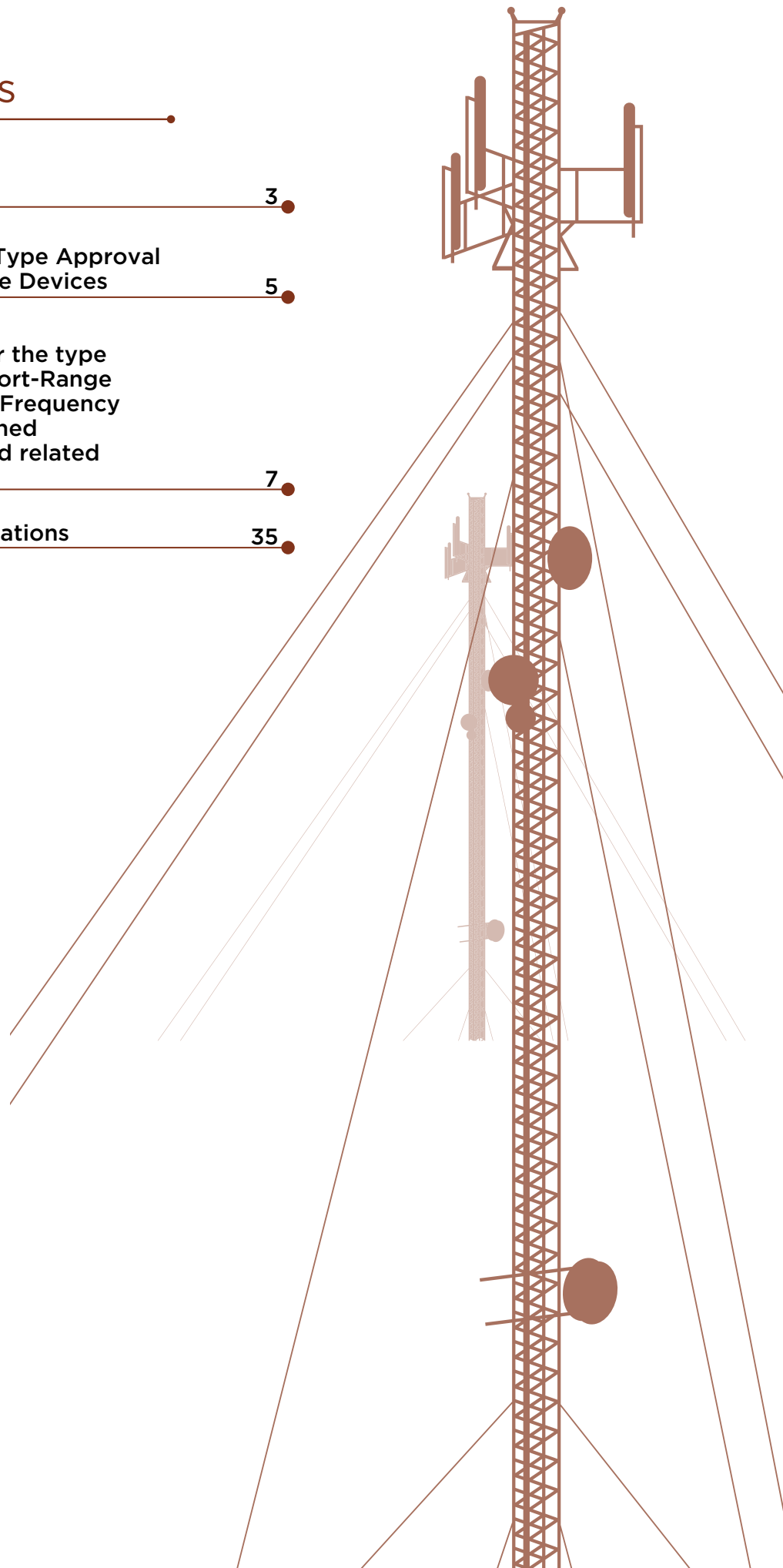
INFORMATION &  
eGOVERNMENT AUTHORITY

# The Regulations of “Type Approval for Short-Range Devices”



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# Introduction

Type approval is a set of procedures that determine the conformity of telecommunication equipment and devices to the standards applied within the Kingdom of Bahrain, whereby a Type approval certificate is issued accordingly.

The difference in regulations and laws regarding the use of short-range radiocommunication devices around the world makes some devices usable in some countries, while prohibited in others. As a result, most countries set their own regulation standards for operation of short-range radio communication devices without causing any damages for the users or networks for various radiocommunications.

Therefore, it is necessary to apply the type approval system as a prerequisite for permitting of short-range radiocommunication devices before they are allowed entry to the Kingdom of Bahrain local market. This procedure aims to regulate the import and sale of these devices in the Kingdom via manufacturers and suppliers, by issuing type approval certificates to the devices that complied to the specifications and standards adopted in the Kingdom.

Approval is granted only after ensuring that all requirements and technical conditions have been met.

Countries also identify the frequency bands that can be used by these devices, as short-range radios are approved and regulated at the national level. Some countries exempt these devices from issuing a frequency license in Industrial, Scientific, and Medical (ISM) bands and in other non-ISM bands, on the basis of obtaining a type approval certificate for the specific devices. Short-range radiocommunication devices are operated on the basis that they shall not cause harmful interference to licensed and planned services and not to claim protection from such services. If a short-range radiocommunication device caused interference with a licensed radio communication service, and even if that device complies with all technical standards and licenses required by national regulations, the user must stop using it until a solution to the interference problem is found.

Short-range radiocommunication devices are used everywhere. For example: Radio Frequency Identification (RFID) systems, Electronic article Surveillance (EAS), sales and computer systems, child monitors, garage doors, safety radio systems, remote sensing for personal use, keyless car opening systems, and hundreds of other common electronic uses are based on this mode of transmission.



# Introduction

## Definition of Short-Range Radiocommunication Devices:

Short-range radiocommunication devices are devices that can be used on a secondary basis as fixed, mobile, or portable stations, they are equipped with a radio frequency output connector and a dedicated or built-in antenna.

In most cases, short-range devices transmitters are provided with built-in or specialized antennas. In case the transmitters antenna is changed, it is likely that a significant increase or decrease in the signal's strength will occur. With the exception of some special applications, the radio frequency specifications depend not only on the output power, but also on the specifications of the antenna, as a short-range devices transmitter that conforms to the technical standards of a bound antenna might exceed the specified limits if connected to a different antenna, which could result in a serious harmful interference problem in licensed radio communication systems (emergency communications, broadcasting, air traffic control, etc.).

To avoid this type of interference, short-range devices transmitters must be designed in a way to ensure that an antenna type other than the one designed for could not be used, especially if the factory had restricted it to the appropriate transmission level. This means that short-range devices transmitters must either have connected antennas, or detachable antennas equipped with a unique connector. The unique conductor is defined by national administrations, as it is not a standard connector like the ones available in electronics stores, or the connectors commonly used for radio connection purposes.

Providers of short-range radio transmitters often prefer that customers be able to replace a broken antenna, which is why manufacturers are allowed to design their transmitters in a way that enables the user to replace a broken antenna with another similar antenna. The approval includes all types of radiocommunication equipment prior to its import to, or use in, the Kingdom of Bahrain. The personal-use devices of passengers are excluded, provided that they conform to the technical specifications adopted in the Kingdom.

This regulations aim to set standards, specifications, and technical requirements for the issuance of type approval certificates for short-range devices that are to be imported and used within the Kingdom. All procedures set forth within these regulations must be followed when applying for a type approval certificate.



# The Regulations of Type Approval for Short Range Devices

## **Resolution No. 8 of 2017 - Information & eGovernment Authority**

Issued: 5th Rajab, 1438 AH - Corresponding: 3rd April, 2017

After reviewing the Telecommunications Law issued by Decree-law No. 48 of 2002; upon Decree No.69 of 2015 to establish the Information & eGovernment Authority; regulation regarding the fees imposed by the Telecommunication Regulatory Authority on licenses and other services issued by Decree No. 3 of 2010; upon the relevant reports and recommendation issued by the International Telecommunication Union; upon Decree No. 50 of 2015 to establish and form the Spectrum Strategy and Coordination Committee; upon the approval of the Spectrum Strategy and Coordination Committee members and based on the presentation by the General Director of Information Security and Radiocommunication.

### **Article (1) Definitions**

The words and phrases included in this regulation shall have the same meanings noted to each of them, unless the context stated otherwise:

**Type Approval:** Including the procedures for verifying the conformity of the radiocommunication equipment and standards adopted in the Kingdom of Bahrain prior to their import for the purpose of issuing the approval certificate and allowing entry and use in the Kingdom.

**Short Range Radiocommunication Devices:** Radiocommunication devices used on a secondary basis as fixed, mobile or portable stations equipped with a link for radio frequency output and dedicated or built-in antennas, which provide unidirectional or bi-directional communications and the probability of causing a harmful interference to other radio equipment is very low.

**Internationally accredited laboratories for Telecommunications:** Laboratories having a certification of the radio spectrum within the geographical region of which the Kingdom of Bahrain is located, as the division adopted by the Radiocommunication Conference.

**Declaration of conformity of the manufacturer** The acknowledgment by the manufacturer of short-range radiocommunication equipment that these devices correspond to the frequency division of the geographical radio band in which the Kingdom of Bahrain is located.

**Directorate:** Wireless Licensing, Frequency & Monitoring at the Information & eGovernment Authority.

**Licensee:** A regular or legal person who is get the type approval certificate for the Directorate.

**Device Applications:** Radiocommunication devices used for the operation of devices or facilities designed for the generation and local use of radio energy for industrial, scientific, medical, domestic or similar purposes set out in the Annex to this Resolution, except for radio-related devices (applications) used in The field of communication.

**Harmful interference:** means interference which endangers the functioning of a radio-navigation service or other safety services or seriously degrades, obstructs or repeatedly interrupts a Radiocommunications Service operating in accordance with the radio regulations.

**Secondary Basis:** The service that operates on domains does not cause harmful interference to another wireless station and does not claim protection from it.

### **Article (2) General Provisions**

Short-range radiocommunication devices or application devices may not be used or imported except after obtaining a specific certification from the Department, except for devices imported for personal use if they conform to the technical specifications approved in the Kingdom unless five devices.

# The Regulations of Type Approval for Short Range Devices

## **Article (3) Scope of application**

All devices that meet the specifications and broadcast power conditions mentioned in the Annex are not considered to be effectively occupied by the spectrum and are not protected from harmful interference.

## **Article (4) Procedures for applying for a Type Approval Certificate**

The application for a type approval certification for the radiocommunication equipment subject to the provisions of this resolution shall be submitted to the form prepared by the Department for this purpose:

- Device name, manufacturer and model.
- Detailed technical description of the devices and associated units, including frequencies that can be tuned or used.
- Electromagnetic compatibility (EMC) and safety and radio safety test reports from internationally accredited telecommunications laboratories.
- Declaration of conformity from the manufacturer.
- Type Approval certificates issued by other countries, if any.

If the applicant for a type approval certification is a foreign company, the application must be submitted on its behalf by a Bahraini company. Along with attaching the validity of the office of the foreign company.

## **Article (5) Decide on the application for the type approval certificate**

The Directorate shall decide on the application for a specific approval certificate within five working days from the date of submitting the application in compliance with the required requirements, after coordination with the competent authorities, as the case may be, and in case of rejection the decision must be reasoned. In case of approval of the application, the applicant or his legal representative shall receive the specific type approval certificate after payment of the fee issued by the Telecommunication Regulatory Authority.

## **Article (6) The validity of a Type Approval Certificate**

The certificate of Type Approval shall be issued for a period of three years. The applicant for a Type Approval certificate or its legal representative shall be required to renew the Type Approval Certificate at least one month before the expiry of the period, subject to the approval of the Directorate, following the procedures stipulated in Articles 4 and 5 of this Resolution. And does not renew the Type Approval certificate in case of changing the specifications and requirements adopted in the Kingdom of Bahrain.

## **Article (7) Technical requirements**

Short-range radiocommunication devices shall comply with the maximum field strength or emission capacity described in the Annex to this Resolution for frequency bands or frequencies assigned to them, and shall meet the requirements relevant to these specifications at all permitted frequencies.

## **Article (8) Harmful Interference**

Short-range radiocommunication devices operate on a secondary service basis, which are shared used for various applications, such as industrial, scientific, medical and other applications. These devices are not allowed to cause harmful interference to other licensed radio stations and in cases where the devices may cause harmful interference, the Directorate shall suspend its operation and remove it from service. The owners or users of such devices shall not have the right to claim protection from interference caused by licensed radio stations.

## **Article (9)**

The Director-General of Information Security and Radiocommunication shall implement the provisions of this Resolution and the Annex thereto, and shall enter into force on the day following the date of their publication in the Official Gazette.

# Annex 1

## Regulations for the type approval of Short-Range Radio Devices Frequency bands or assigned frequencies and related requirements

1. Radio spectrum associated standards and technical conditions				
1.1 Non-Specific Short Range Devices				
Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
6765 - 6795 kHz	42 dB $\mu$ A/m @ 10m	No requirement	EN 300 330	European legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU
13.553 - 13.567 MHz			EN 300 330 EN 301 489	
26.957 - 27.283 MHz	42 dB $\mu$ A/m @ 10m or 10mW e.r.p.		EN 300 220, EN 300 330	Other references: CEPT/ERC/REC 70-03
26.990-27.000 MHz 27.040-27.050 MHz 27.090-27.100 MHz 27.140-27.150 MHz 27.190-27.200 MHz	100 mW e.r.p	Duty cycle $\leq$ 0.1 % (Note 1) Channel Spacing: Up to 10 kHz		Other references: CEPT ERC/REC 70-03
40.660 - 40.700 MHz	10 mW e.r.p.	No requirement	EN 300 220	European legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
138.20 - 138.45 MHz	$\leq$ 10 mW e.r.p.	Duty cycle $\leq$ 1.0% (Note 1)		Other references: CEPT ECC/DEC (05)02 CEPT ERC/REC 70-03
169.4000-169.4750 MHz	200 mW e.r.p.	Duty cycle $\leq$ 1.0 % (Note 1) Channel Spacing: $\leq$ 50 KHz		Other references: CEPT ECC/DEC/(05)02 CEPT ERC/REC 70-03  Other Notes: The permitted output power may increase after conducting the necessary study.
169.4000-169.4875 MHz	10 mW e.r.p.	Duty cycle $\leq$ 0.1 % (Note 1)	EN 300.220	Other references: CEPT ECC/DEC/(05)02 CEPT ERC/REC 70-03
169.4875-169.5875 MHz		Duty cycle $\leq$ 0.001 % (Note 1)		
169.5875-169.8125 MHz		Duty cycle $\leq$ 0.1 % (Note 1)		

# 1. Radio spectrum associated standards and technical conditions

## 1.1 Non-Specific Short Range Devices

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
315 MHz	≤ 10 mW e.r.p.	The bandwidth of the emission shall be no wider than 0.25% of the center frequency		
433.050 – 434.790 MHz	10 mW e.r.p.	Duty Cycle ≤10 % (Note 1)	EN 300 220	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
433.050 – 434.790 MHz	1 mW e.r.p. -13 dBm/10 kHz	No requirement except for (Note 9)		Power density limited to -13 dBm/10 kHz for wideband modulation with a bandwidth greater than 250 kHz  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
434.040 – 434.790 MHz	10 mW e.r.p.	No requirement except for (Note 9) Channel Spacing: ≤ 25 kHz		European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03





# 1. Radio spectrum associated standards and technical conditions

## 1.1 Non-Specific Short Range Devices

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
863 - 870 MHz (Notes 3 and 4)	25 mW e.r.p	Duty Cycle $\leq$ 0.1 % or LBT (Note 1 and 5), Channel Spacing: $\leq$ 100 kHz for 47 or more channels (Note 2)	EN 300 220	(Note 4) FHSS Modulation  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
	25 mW e.r.p Power density: -4.5 dBm/100 kHz (Note 7)	Duty Cycle $\leq$ 0.1 % or LBT+AFA (Note 1, 5 and 6)		(Note 4) DSSS and other wideband modulations other than FHSS  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
	25 mW e.r.p	Duty Cycle $\leq$ 0.1 % or LBT+AFA (Note 1 and 5), Channel Spacing: $\leq$ 100 kHz, for 1 or more channels modulation bandwidth $\leq$ 300 KHz (Note 2)		(Note 4) Narrow/wide-band Modulation  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
868.000 - 868.600 MHz (Note 4)	25 mW e.r.p	Duty Cycle $\leq$ 1 % or LBT+AFA (Note 1), Channel Spacing: No spacing for 1 or more channels (Note 2)		Narrow/wide-band Modulation No channel spacing. However the whole stated frequency band may be used (Note 3).  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03

# 1. Radio spectrum associated standards and technical conditions

## 1.1 Non-Specific Short Range Devices

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/Other Notes
868.700 – 869.200 MHz (Note 4)	25 mW e.r.p	Duty Cycle $\leq$ 0.1 % or LBT+AFA (Note 1) , Channel Spacing: No spacing for 1 or more channels (Note 2)	EN 300 220	Narrow/wide-band Modulation No channel spacing. However the whole stated frequency band may be used (Note 3).  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
869.400 – 869.650 MHz	500 mW e.r.p	Duty Cycle $\leq$ 10 % or LBT+AFA (Note 1) Channel spacing: No spacing, for 1 or more channels The whole stated band may also be used as one single channel for high speed data transmission.		Narrow/wide-band Modulation  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
869.700 – 870.000 MHz (Note 9)	5 mW ERP	No requirement		Narrow/wide-band Modulation No channel spacing, however the whole stated frequency band may be used.
	25 mW ERP	Duty Cycle: $\leq$ 1% or LBT+AFA (Note 1)	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03	

# 1. Radio spectrum associated standards and technical conditions

## 1.1 Non-Specific Short Range Devices

Mandatory Requirements			Information		
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes	
870-876 MHz	25 mW e.i.r.p.	≤0.1% duty cycle. For GSM-R protection (873-876 MHz, where applicable), the duty cycle is limited to ≤0.01% and limited to a maximum transmit ontime of 5ms/1s; Channel spacing: ≤ 200 kHz			
870-875.8 MHz		≤ 1% duty cycle. For GSM-R-protection (873.0-875.8 MHz, where applicable), the duty cycle is limited to ≤0.01% and limited to a maximum transmit on time of 5ms/1s; Channel spacing: ≤ 600 kHz			
2400 - 2483.5 MHz	10 mW e.i.r.p.	No requirement	EN 300 440	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03	
5725 - 5875 MHz	25 mW e.i.r.p.				
24.00 - 24.25 GHz	100 mW e.i.r.p.				
57 - 64 GHz	100 mW e.i.r.p., A max. transmitter output power of 10 mW, and a power density limited to 13dBm/MHz e.i.r.p. applies		EN 305 550		
61.0 - 61.5 GHz	100 mW e.i.r.p.				
122 - 122.25 GHz	10 dBm e.i.r.p./ 250 MHz & -48 dBm/MHz at 30° elevation				(Note 8)
122.25 - 123 GHz	100 mW e.i.r.p.				No requirement
244 - 246 GHz					

**Note 1:** When either duty cycle, Listen Before Talk (LBT) or equivalent efficient mitigation 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.

For any type of frequency agile device the duty cycle limit applies to the total transmission unless LBT or equivalent technique is used.

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

**Note 3:** Sub-bands for alarms are excluded (see Table 5)

**Note 4:** Audio and video applications are allowed provided that a digital modulation method is used with a max. bandwidth of 300 kHz. Analogue and digital voice applications are allowed with a max. bandwidth  $\leq$  25 kHz.

In sub-band 863-865 MHz voice and audio conditions of Table 11.

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

**Note 6:** For wide-band techniques, other than FHSS , operating with a bandwidth of 200 kHz to 3 MHz, the duty cycle can be increased to 1% if the band is limited to 865-868 MHz and power to  $\leq$ 10 mW e.r.p.

**Note 7:** The power density can be increased to +6.2 dBm/100 kHz and -0.8 dBm/100 kHz, if the band of operation is limited to 865 –868 MHz and 865-870 MHz respectively.

**Note 8:** These limits should be measured with an rms detector and an average time of 1 ms or less.

**Note 9:** Audio and video applications are excluded. Voice applications (analogue or digital) are allowed with a maximum bandwidth of  $\leq$  25 kHz, and with spectrum access technique such as LBT or equivalent and shall include a power output sensor controlling the transmitter to a maximum transmit period of 1 minute for each transmission.



# 1. Radio spectrum associated standards and technical conditions

## 1.2 Wideband Data Transmission Systems

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
2400 - 2483.5 MHz	100 mW EIRP	Adequate spectrum sharing mechanism (e.g. Listen-before-Talk, Detect-And-Avoid) shall be implemented by the equipment	EN 300 328 IEEE 802.11a,b,g,ac	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT CEPT ERC/REC 70-03
5150 - 5250 MHz	200 mW EIRP (Max mean) Power Density (Max mean EIRP): 10 mW/MHz in any 1 MHz band or equivalently 0.25 mW/25 kHz in any 25 kHz band	Indoor use only.	EN 301 893 IEEE 802.11h IEEE 802.16-2009	European Legislation: Decisions 2007/90/EC, 2005/513/EC.  Other references: CEPT ECC/DEC (04)08
5250-5350 MHz	200 mW EIRP (Max mean) Power Density (Max mean EIRP): 10 mW/MHz in any 1 MHz band.	Indoor use only  See Note 10		
5725 - 5875 MHz	2 W EIRP (Max mean) Power Density (Max mean EIRP): 100mW MHz		EN 301 489-4 EN 301 489-17 EN 302 326 EN 302 502 IEEE 802.11h IEEE 802.16-2009	Individual license may be required  Other references: CEPT ECC/REC (06)04
57 -66 GHz *	40 dBm mean e.r.i.p. This refers to the highest power level of the transmitter power control range during the transmission burst if transmitter power control is implemented	Fixed outdoor installations are not allowed. Adequate spectrum sharing mechanism (e.g. Listen-before-Talk, Detect-And-Avoid) shall be implemented by the equipment	EN 302 567	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: ERC/REC 70-03

**Note 10:** Transmitter Power Control (TPC) and Dynamic Frequency Selection (DFS) have been included in the reference standard EN 301 893.

## 1. Radio spectrum associated standards and technical conditions

### 1.3 Transport and Traffic Telematics (TTT)

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
5795 - 5805 MHz	2 W e.i.r.p.	No requirement	EN 300 674 ES 200 674	Other references: CEPT ERC/REC 70-03
5805 - 5815 MHz				Individual license may be required  Other references: CEPT ERC/REC 70-03
24.05 - 24.25 GHz	Maximum peak power of 20 dBm e.i.r.p.	Duty cycle limited to 10% for peak emissions higher than -10 dBm e.i.r.p.		For Automotive Short Range Radars (SRR) narrow-band emission mode/ component.  Other references: ECC/DEC/(04)10
24.25 -26.65 GHz	Maximum mean e.i.r.p. density of -41.3 dBm/MHz and a peak e.i.r.p. density of 0 dBm/50MHz			For Automotive Ultra Wideband Short Range Radars (SRR). SRR equipment may only be placed onto the market until 1 January 2018. This date is extended by 4 years for SRR equipment mounted on motor vehicles for which vehicle conformity compliance has been granted before 1 January 2018.  Other references: ECC/DEC/(04)10
24.050-24.075 GHz	100 mW e.i.r.p.	No requirement		For vehicle radars
24.075-24.150 GHz	0.1 mW e.i.r.p.			
24.075-24.150 GHz	100 mW e.i.r.p.	$\leq 4\mu\text{s}/40\text{ kHz}$ dwell time every 3ms		For automotive radars. The spectrum access and mitigation requirement is given for devices mounted behind a bumper. If mounted without a bumper, the requirement should be $3\mu\text{s}/40\text{kHz}$ maximum dwell time every 3ms. A requirement for minimum frequency modulation range (applicable to FMCW or step frequency signals) or minimum instantaneous bandwidth (applicable to pulsed signal) of 250 kHz applies in addition to the requirement on maximum dwell time

## 1. Radio spectrum associated standards and technical conditions

### 1.3 Transport and Traffic Telematics (TTT)

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
24.075-24.150 GHz		≤ 1ms/40 kHz dwell time every 40ms		For automotive radars. The spectrum access and mitigation requirement is given for devices mounted either behind a bumper or mounted without a bumper. A requirement for minimum frequency modulation range (applicable to FMCW or step frequency signals) or minimum instantaneous bandwidth (applicable to pulsed signal) of 250 kHz applies in addition to the requirement on maximum dwell time
24.150-24.250 GHz	100 mW e.i.r.p.	No requirement		For vehicle radars
24.250-24.495 GHz	-11 dBm e.i.r.p.	Duty cycle: ≤ 0.25%/s/25 MHz		For automotive radars The activity of the Wideband Low Activity Mode (WLAM) is limited to avoid the risk of interference and this mode is only activated in specific configurations as a complementary to designation 24.050 GHz to 24.250 GHz as described in ECC Report 164
24.495-24.500 GHz	-8 dBm e.i.r.p.	Duty cycle: ≤1.5%/s/5 MHz		
24.250-24.500 GHz	+20 dBm e.i.r.p.	Duty cycle: ≤5.6%/s/25 MHz		
	+16 dBm e.i.r.p.	Duty cycle: ≤2.3%/s/25 MHz		
76 - 77 GHz	55 dBm peak e.i.r.p.	No requirement	EN 301 091	50 dBm average power or 23.5 dBm average power for pulse radar only. For ground based vehicle and infrastructure radar systems  Other references: CEPT ERC/REC 70-03
77-81 GHz	<ul style="list-style-type: none"> <li>Maximum mean power density of -3 dBm/MHz e.i.r.p. associated with an peak limit of 55 dBm e.i.r.p.</li> <li>Maximum mean power density outside a vehicle resulting from the operation of one SRR equipment shall not exceed -9 dBm/MHz e.i.r.p.</li> </ul>			For automotive short range radar (SSR)  other references: EDC/DEC/(04)03

# 1. Radio spectrum associated standards and technical conditions

## 1.4 Radiodetermination Applications

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
30 MHz-12.4 GHz	Apply the technical requirements mentioned in the ECC/DEC/(06)08	Apply the technical requirements mentioned in the ECC/DEC (06)08		For Ground and Wall Probing Radar (GPR/WPR) imaging systems. subject to an appropriate licensing regime  Other references: ECC/DEC/(06)08
2200-8000 MHz*	See the Technical requirements for Material Sensing & Building Material Analysis (BMA) devices using UWB technology part below 1.15			For Material Sensing Devices. subject to an appropriate licensing regime  Other references: ECC/DEC/(07)01
2400 - 2483.5MHz	25 mW e.i.r.p.	No requirements	EN 300 440	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/DEC/(01)08 CEPT ERC/REC 70-03
3100-4800 MHz	See the table (1.17 A) Location Tracking Application for Emergency Services (LAES) part below.			For UWB Location tracking application for emergency and disaster situations (LAES). subject to an appropriate licensing regime  Other references: ECC/REC/(11)10
3100-4800 MHz	See the Location Tracking Systems Type 2 (LT2) part below table (1.17 B)			For UWB Location Tracking Systems Type 2 (LT2). subject to an appropriate licensing regime.  Other references: ECC/REC/(11)09
4.5 - 7.0 GHz	-41.3 dBm/MHz e.i.r.p. outside the enclosed test tank structure	No requirements		Tank Level Probing Radar (Note 11) (TLPR) only  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03



# 1. Radio spectrum associated standards and technical conditions

## 1.4 Radiodetermination Applications

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
8.5 - 10.6 GHz	-41.3 dBm/MHz e.i.r.p. outside the enclosed test tank structure	No requirement		Tank Level Probing Radar (Note 11) (TLPR) only The radiated unwanted emissions within frequency band 10.6-10.7 GHz outside the test tank enclosure shall be less than -60 dBm/MHz e.i.r.p.  European legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
24.05 - 27.0 GHz				
57 - 64 GHz				
75 - 85 GHz				
9200 - 9500 MHz	25 mW e.i.r.p.		EN 300 440	Other references: CEPT ERC/REC 70-03
9500 - 9975 MHz	25 mW e.i.r.p.			
10.5 - 10.6 GHz	500 mW EIRP			
13.4 - 14 GHz	25 mW e.i.r.p.			
17.1 - 17.3 GHz	26 dBm e.i.r.p.	DAA		Ground Based Synthetic Aperture Radar (GBSAR) Specific requirements for the radar antenna pattern and for the implementation of Detect And Avoid (DAA) technique apply as described in EN 300 440.  European legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
24.05 - 24.25GHz	100 mW e.i.r.p.	No requirement	EN 300 440	Other references: CEPT ERC/REC 70-03

**Note 11:** “Tank Level Probing Radar” (TLPR) is a specific type of radiodetermination application, which is used for tank level measurements and is installed in metallic or reinforced concrete tanks, or similar structures made of material with comparable attenuation characteristics. The purpose of the tank is to contain a substance.

## 1. Radio spectrum associated standards and technical conditions

### 1.5 Model Control

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
26.990-27.000 MHz 27.040-27.050 MHz 27.090-27.100 MHz 27.140-27.150 MHz 27.190-27.200 MHz	100 mW e.r.p.	Channel Spacing: 10 kHz	EN 300 220	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU
34.995 - 35.225 MHz				Other references: CEPT ERC/DEC/(01)10 CEPT ERC/REC 70-03
40.660, 40. 700 MHz				Flying Models only Other references (Note 12)  CEPT ERC/DEC/(01)11 CEPT ERC/REC 70-03  Other references: CEPT ERC/DEC/(01)12 CEPT ERC/REC 70-03

**Note 12:** Model airborne vehicles are NOT normally permitted in the Kingdom except under special circumstances and exceptionally an individual authorization would therefore be required. Model aircraft and other model airborne vehicles are therefore NOT covered or permitted by this Regulation.

# 1. Radio spectrum associated standards and technical conditions

## 1.6 Inductive Applications (See Note 13)

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/Other Notes
9 - 90 kHz	72 dB $\mu$ A/m @ 10m	No requirement	EN 300 330	In case of external antennas only loop coil antennas may be employed. Field strength level descending 3dB/octave at 30kHz  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
90 - 119 kHz	42 dB $\mu$ A/m @10m			In case of external antennas only loop coil antennas may be employed.  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
119 - 135 kHz	66 dB $\mu$ A/m @ 10m			In case of external antennas only loop coil antennas may be employed. Field strength level descending 3dB/octave at 119kHz  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
135 - 140 kHz	42 dB $\mu$ A/m @10 m			In case of external antennas only loop coil antennas may be employed.
140 - 148.5 kHz	37.7 dB $\mu$ A/m@10			European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03

# 1. Radio spectrum associated standards and technical conditions

## 1.6 Inductive Applications (See Note 13)

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
400 - 600 kHz	-8 dB $\mu$ A/m at 10m	No requirement	EN 300 330	For RFID only. In the case of external antennas only loop coil antennas may be employed. The maximum field strength is specified in a bandwidth of 10 kHz. The maximum allowed total field strength is -5dB $\mu$ A/m at 10 m for systems operating at bandwidths larger than 10 kHz measured at the center frequency whilst keeping the density limit (-8dB $\mu$ A/m in a bandwidth of 10 kHz.) These systems should operate with a minimum operating bandwidth of 30 kHz  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
3155 - 3400 kHz	13.5 dB $\mu$ A/m @ 10 m			In case of external antennas only loop coil antennas may be employed.  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
6765 - 6795 kHz	42 dB $\mu$ A/m @ 10 m			European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
7400 - 8800 kHz	9 dB $\mu$ A/m @ 10 m			
10.200 - 11.000 MHz				
26.957 - 27.283 MHz	42 dB $\mu$ A/m @ 10 m			

# 1. Radio spectrum associated standards and technical conditions

## 1.6 Inductive Applications (See Note 13)

Mandatory Requirements			Information		
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes	
11.810-12.660 MHz	-16 dBμA/m at 10m	No requirement	EN 300 330	For RFID only European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU	
12.660-13.110 MHz	-10 dBμA/m at 10m				
13.110-13.410 MHz	-3.5 dBμA/m at 10m				
13.410-13.553 MHz	9 dBμA/m at 10m			Other references: CEPT ERC/REC 70-03	
13.567-13.710 MHz					
13.710-14.010 MHz	-3.5 dBμA/m at 10m			For RFID only European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU	
14.010-14.460 MHz	-10 dBμA/m at 10m				
14.460-15.310 MHz	-16 dBμA/m at 10m			Other references: CEPT ERC/REC 70-03	
13.553 - 13.567 MHz	60 dBμA/m @ 10 m			For RFID and EAS only European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU	
				Other references: CEPT ERC/REC 70-03	
12.660-13.110 MHz	-5 dBμA/m at 10m			For RFID only European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU	
13.110-13.360 MHz	-3.5 dBμA/m at 10m				
13.360-13.460 MHz	Linear transition from 27 to -3.5 dBμA/m at 10m				
13.460-13.553 MHz	27 dBμA/m at 10m				Other references: CEPT ERC/REC 70-03
13.567-13.660 MHz					
13.660-13.760 MHz	Linear transition from 27 to -3.5 dBμA/m at 10m				

## 1. Radio spectrum associated standards and technical conditions

### 1.6 Inductive Applications (See Note 13)

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/Other Notes
13.760-14.010 MHz	-3.5 dB $\mu$ A/m at 10m	No requirement	EN 300 330	For RFID only European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU
14.010-14.460 MHz	-5 dB $\mu$ A/m at 10m			Other references: CEPT ERC/REC 70-03
148.5 kHz - 5 MHz	-15 dB $\mu$ A/m at 10m			In the case of external antennas only loop coil antennas may be employed. The maximum field strength is specified in a bandwidth of 10 kHz. The maximum allowed total field strength is -5 dBA/m at 10m for systems operating at bandwidths larger than 10 kHz whilst keeping the density limit (-15 dBA/m in a bandwidth of 10 KHz)
				European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
5 - 30 MHz	-20 dB $\mu$ A/m at 10m			In the case of external antennas only loop coil antennas may be employed. The maximum field strength is specified in a bandwidth of 10 kHz. The maximum allowed total field strength is -5 dBA/m at 10m for systems operating at bandwidths larger than 10 kHz whilst keeping the density limit (-20 dBA/m in a bandwidth of 10 KHz)
				European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03

**Note 13:** This category covers, for example, devices for car immobilizers, animal identification, alarm systems, cable detection, waste management, personal identification, wireless voice links, access control, proximity sensors, anti-theft systems including RF anti-theft induction systems, EAS (Electronic Article Surveillance), data transfer to handheld devices, automatic article identification, wireless control systems and automatic road tolling.

## 1. Radio spectrum, associated standards and technical conditions

### 1.7 Alarms

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
868.6 - 868.7 MHz	10 mW e.r.p.	Duty Cycle $\leq 1\%$ Channel Spacing: 25 kHz The whole frequency band may also be used as one single channel for high-speed data transmission. (Note 7)	EN 300 220	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
869.200 - 869.250 MHz		Duty Cycle $\leq 0.1\%$ Channel Spacing: 25 kHz (Note 7)		Social Alarms (Note 14)  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
869.250 - 869.300 MHz		Duty Cycle $\leq 1\%$ Channel Spacing: 25 kHz (Note 7)		European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU
869.3 - 869.4 MHz				Other references: CEPT ERC/REC 70-03
869.650 - 869.700 MHz	25 mW e.r.p.	Duty Cycle $\leq 10\%$ Channel Spacing: 25 kHz (Note 7)		Other references: CEPT ERC/REC 70-03

**Note 14:** Social alarm devices are used to assist elderly people and people with disabilities living at home when then they are in distress.

# 1. Radio spectrum associated standards and technical conditions

## 1.8 Radio Microphone Applications Including Aids for the Hearing Impaired

Mandatory Requirements			Information		
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes	
29.7 - 47.0 MHz	10 mW ERP.	Channel Spacing: ≤ 50 kHz	EN 300 422	On a tuning range basis. Other references: CEPT ERC/REC 70-03	
169.4 - 174.0 MHz				Aids for the hearing impaired. On a tuning range basis.  European Legislation: Decision 2005/928/EC Decision 2008/673/EC  Other references: CEPT ECC/DEC(05)02 CEPT ERC/REC 70-03 (Note 19)	
169.400 - 169.475 MHz				500 mW ERP	Assistive Listening Device (ALD). (Personal Hearing Aid System)
169.4875 - 169.5875 MHz				10 mW ERP	Assistive Listening Device (ALD). (Public Hearing Aid System) Individual licence may be required.
				500 mW ERP	Assistive Listening Device (ALD). (Personal Hearing Aid System)
173.965 - 216MHz				10 mW ERP	Assistive Listening Device (ALD). (Public Hearing Aid System). Individual licence may be required For Assistive Listening Device (ALD) systems. On a tuning range basis. Individual licence may be required
174-216 MHz	50 mW e.r.p.	No requirement	Not specified	On a tuning range basis. Individual license may be required	
470 - 694 MHz				On a tuning range basis. Individual license required. Restricted to indoor use	
1492-1518 MHz				Individual license may be required. 50 mW restricted to body worn equipment	
1785-1795 MHz	20 mW e.i.r.p. / 50 mW e.i.r.p.		No requirement	Not specified	Individual license may be required. 50 mW restricted to body worn equipment
1795-1800 MHz					Individual license may be required. 50 mW restricted to body worn equipment
1800-1804.8 MHz					Individual license may be required. 50 mW restricted to body worn equipment



## 1. Radio spectrum associated standards and technical conditions

### 1.9 Radio Frequency Identification Applications (RFID)

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
13.553 - 13.567 MHz	42 dB $\mu$ A/m @ 10m or 10mW Effective Radiated Power (ERP)		EN 300 330 EN 301 489	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
865 - 865.6 MHz	100 mW ERP	LBT or equally efficient mitigation technique which gives adequate protection to other users of the radio spectrum. Channel Spacing: 200 kHz	EN 302 208	Other references: CEPT ERC/REC 70-03
865.6 - 867.6 MHz	2 W ERP			
867.6 - 868 MHz	500 mW ERP			
2446 - 2454 MHz	$\leq$ 500 mW EIRP	No requirement		
2446 - 2454 MHz	> 500 mW to 4 W e.i.r.p	$\leq$ 15% duty cycle FHSS techniques should be used.	Not specified	Power levels above 500 mW are restricted to be used inside the boundaries of a building and the duty cycle of all transmissions shall in this case be $\leq$ 15 % in any 200 ms period (30 ms on /170 ms off)



# 1. Radio spectrum associated standards and technical conditions

## 1.10 Active Medical Implants and their Associated Peripherals

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
9 - 315 kHz	30 dB $\mu$ A/m @ 10 m	Duty Cycle $\leq$ 10 %	EN 300 330	The application is for Ultra Low Power Active Medical Implant systems using inductive loop techniques for telemetry purposes  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
315 - 600 kHz	-5 dB $\mu$ A/m @ 10 m			The application is for Animal implantable devices  Other references: CEPT ERC/REC 70-03
12500-20000 kHz	-7 dB $\mu$ A/m at 10m	$\leq$ 10% duty cycle	Not specified	The application is for ULP active animal implantable devices (ULP-AID), limited to indoor only applications. The maximum field strength is specified in a bandwidth of 10 kHz. The transmission mask of ULP-AID is defined as follows: 3dB bandwidth 300 kHz 10dB bandwidth 800 kHz 20dB bandwidth 2 MHz
30 - 37.5 MHz	1 mW ERP	Duty Cycle $\leq$ 10 %	EN 300 220	The application is for Ultra Low Power medical membrane implants for blood pressure measurements  Other references: CEPT ERC/REC 70-03
2483.5-2500 MHz	10 dBm e.i.r.p.	LBT+AFA and $\leq$ 10% duty cycle. The equipment shall implement a spectrum access mechanism as described in the applicable harmonized standard or an equivalent spectrum access mechanism		For Low Power Active Medical Implants and associated peripherals, covered by the applicable harmonized standard. Individual transmitters may combine adjacent channels on a dynamic basis for increased bandwidth higher than 1 MHz. Peripheral units are for indoor use only.  The frequency band is also identified in Table 1.12

## 1. Radio spectrum associated standards and technical conditions

### 1.11 Wireless Audio Applications (See Note 15)

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
87.5 - 108 MHz	50 nW ERP	Channel Spacing: 200 kHz	EN 301 357	European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
863 - 865 MHz	10 mW ERP	No requirements		Wireless Audio and Multimedia Streaming Devices.  European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU  Other references: CEPT ERC/REC 70-03
864.8 - 865 MHz			Channel Spacing: 50 kHz	EN 300 220
1795-1800 MHz	20 mW e.i.r.p.	No requirement	Not specified	

**Note 15:** Applications for wireless audio systems include cordless loudspeakers, cordless headphones for portable use e.g. portable CD, cassette or radio devices carried on a person, cordless headphones for use in a vehicle, e.g. for use with a radio or mobile telephone, in-ear monitoring, for use with concerts or other stage productions.

## 1. Radio spectrum associated standards and technical conditions

### 1.12 Tracking, Tracing and Data Acquisition

Mandatory Requirements			Information	
Frequency Band	Maximum Permitted Radiated Power/ Field Strength	Mitigation Requirements	Reference Standards	Relevant Documents/ Other Notes
456.9 - 457.1 KHz	7 dB $\mu$ A/m @ 10 m	Continuous Wave operation No modulation	EN 300 718	Emergency detection of buried victims and valuable items. Note: Centre frequency is 457 kHz  European Legislation: 2001/148/EC  Other references: CEPT ECC/DEC/(04)01 CEPT ERC/REC 70-03
169.4 - 169.475 MHz	500 mW e.i.r.p.	Duty cycle $\leq$ 10%, channel spacing: $\leq$ 50 kHz	EN 300 220	Meter Reading  European Legislation: Decision 2005/928/EC Decision 2008/673/EC  Other references: CEPT ECC/DEC(05)02 CEPT ERC/REC 70-03
2483.5-2500 MHz	1 mW e.i.r.p.	Adequate spectrum sharing mechanisms (e.g. Listen-Before-Talk and Adaptive Frequency Agility) shall be implemented by the equipment and $\leq$ 10% duty cycle		The frequency band is also identified in Table 1.10. The application is for MBANS, indoor only within healthcare facilities
2483.5-2500 MHz	10 mW e.i.r.p.			
5725-5875 MHz	$\leq$ 400 mW e.i.r.p.	APC required Adequate spectrum sharing mechanisms (e.g. DFS and DAA) shall be implemented (note 3)		Wireless Industrial Applications (WIA). Registration and/or notification may be required. The Adaptive Power Control is able to reduce the e.i.r.p. to $\leq$ 25 mW. The frequency band is also identified in Table 1.1

## 1. Radio spectrum associated standards and technical conditions

### 1.13 Technical requirements for Material Sensing devices using UWB technology

Frequency range	Fixed installations		Non fixed installations Maximum mean e.i.r.p. spectral density
	Maximum mean e.i.r.p spectral density	Maximum mean e.i.r.p spectral density in the horizontal plane (-20 to 30° elevation)	
Below 1.73 GHz	-85 dBm/MHz		-85 dBm/MHz
1.73 to 2.2 GHz	-65 dBm/MHz	-70 dBm /MHz	-70 dBm/MHz
2.2 to 2.5 GHz	-50 dBm/MHz		-50 dBm/MHz
2.5 to 2.69 GHz	-65 dBm/MHz Note 1	-70dBm/MHz	-65 dBm/MHz Note 1 & Note 2
2.69 to 2.7 GHz	-55 dBm/MHz	-75 dBm/MHz	-70 dBm/MHz Note 3
2.7 to 2.9 GHz	-50 dBm/MHz	-70 dBm/MHz	-70 dBm/MHz
2.9 to 3.4 GHz	-50 dBm/MHz	-70 dBm/MHz	-70 dBm/MHz Note 1
3.4 to 3.8 GHz	-50 dBm/MHz	-70 dBm/MHz	-50 dBm/MHz Note 2 & Note 3
3.8 to 4.8 GHz	-50 dBm/MHz		-50 dBm/MHz
4.8 to 5 GHz	-55 dBm/MHz	- 75 dBm/MHz	-55 dBm/MHz Note 2 & Note 3
5 to 5.25 GHz	-50 dBm/MHz		-50 dBm/MHz
5.25 to 5.35 GHz	-50 dBm/MHz	- 60 dBm/MHz	-60 dBm/MHz
5.35 to 5.6 GHz	-50 dBm/MHz		-50 dBm/MHz
5.6 to 5.65 GHz	-50 dBm/MHz	-65 dBm/MHz	-65 dBm/MHz
5.65 to 5.725 GHz	-50 dBm/MHz	-60 dBm/MHz	-60 dBm/MHz
5.725 to 8.0 GHz	-50 dBm/MHz		-50 dBm/MHz

Emissions radiating from Material Sensing devices shall be kept to a minimum and in any case not exceed the e.i.r.p. spectral density limits within the above table.

**Note 1:** Devices using a Listen Before Talk (LBT) mechanism, as described in the harmonised standard EN 302 498-2, which meet the technical requirements defined within the following table, are permitted to operate in frequency ranges 2.5 to 2.69 and 2.9 to 3.4 GHz with a maximum mean e.i.r.p. spectral density of -50 dBm/MHz.

**Note 2:** To protect the radio services, non fixed installations must fulfil the following requirement for Total Radiated Power:

- a) In the frequency ranges 2.5 to 2.69 GHz and 4.8 to 5 GHz, the Total Radiated Power spectral density has to be 10dB below the max e.i.r.p. spectral density.
- b) In the frequency ranges 3.4 to 3.8 GHz, the Total Radiated Power spectral density has to be 5dB below the max e.i.r.p. spectral density

**Note 3:** Limitation of the Duty Cycle to 10% per second.

## 1. Radio spectrum, associated standards and technical conditions

### 1.14 Technical requirements for the Listen Before Talking (LBT) mechanism for material sensing devices:

1. Peak power threshold value for the “Listen Before Talk” (LBT) mechanism to ensure the protection of the listed services are defined within the table below.

Frequency range	Radio service to be detected	Peak power threshold value
2.5 - 2.69 GHz	Land Mobile service	-50 dBm/MHz
2.9 - 3.4 GHz	Radiodetermination Service	-7 dBm/MHz

2. Additional requirements for Radar detection: Continuously listening and automatic switch-off within 10ms for the related frequency range if the threshold value is exceeded the table in bullet 1 above. A silent time of at least 12s while listening continuously is necessary before the transmitter can be switched on again. This silent time during which only the LBT receiver is active has to be ensured even after the device is switched off by the functions described in Technical requirements for Material Sensing devices using UWB technology, the proximity sensor and manual operation.

**Relevant documents/other notes:**

European Legislation:  
Commission Decision 2007/131/EC  
2009/343/EC

CEPT references:  
ECC/DEC(07)01

## 1. Radio spectrum associated standards and technical conditions

### 1.15 Technical requirements for Building Material Analysis (BMA) using UWB technology :

1. BMA Devices permitted under this resolution shall fulfil the following requirements:

- a) Transmitter-On only if manually operated with a non-locking switch (e.g. it may be a sensor for the presence of the operators hand) plus being in contact or close proximity to the investigated material and the emissions being directed into the direction of the object (e.g. measured by a proximity sensor or imposed by the mechanical design);
- b) The BMA transmitter has to switch-off after max 10s without movement;
- c) The Total Radiated Power spectral density (Definition at the Technical requirements for Material Sensing devices) has to be 5 dB below the maximum mean e.i.r.p. spectral density limits in Table below;

2. missions radiating from BMA devices permitted under this decision shall be kept to a minimum and in any case not exceed the e.i.r.p. spectral density limits within the following Table below. The compliance with the limits of Table below has to be ensured with the BMA device on a representative wall (see definition below).

Frequency range	Maximum mean e.i.r.p. spectral density
Below 1.73 GHz (Note 1)	-85 dBm/MHz
1.73 to 2.2 GHz	-65 dBm/MHz
2.2 to 2.5 GHz	-50 dBm/MHz
2.5 to 2.69 GHz (Note 1)	-65 dBm/MHz
2.69 to 2.7 GHz (Note 2)	-55 dBm/MHz
2.7 to 3.4 GHz (Note 1)	-70 dBm/MHz
3.4 to 4.8 GHz	-50 dBm/MHz
4.8 to 5 GHz (Note 2)	-55 dBm/MHz
5 to 8.5 GHz	-50 dBm/MHz

**Note 1:** Devices using a Listen Before Talk (LBT) mechanism, as described in the harmonised standard EN 302 435, which meets the technical requirements defined within Technical requirements of the “Listen Before Talk” mechanism for BMA devices, are permitted to operate in frequency range 1.215 to 1.73 GHz with a maximum mean e.i.r.p. spectral density of -70 dBm/MHz and in the frequency ranges 2.5 to 2.69 and 2.7 to 3.4 GHz with a maximum mean e.i.r.p. spectral density of -50 dBm/MHz

**Note 2:** To protect the RAS bands 2.69 to 2.7 GHz and 4.8 to 5 GHz, the Total Radiated Power spectral density has to be below -65 dBm/MHz.

## 1. Radio spectrum associated standards and technical conditions

### 1.16 Technical requirements for the Listen Before Talking (LBT) mechanism for Building Material Analysis (BMA) devices:

1. Peak power threshold value for the “Listen Before Talk” mechanism to ensure the protection of the listed services are defined within Table 4 below.

Frequency range	Radio service to be detected	Peak power threshold value
1.215 - 1.4 GHz	Radiodetermination Service	+8 dBm/MHz
1.61 - 1.66 GHz	Mobile Satellite service	-43 dBm/MHz
2.5-2.69 GHz	Land Mobile service	-50 dBm/MHz
2.7 - 3.4 GHz	Radiodetermination Service	-7 dBm/MHz

2. Additional requirements for Radar detection: Continuously listening and automatic switch-off within 10ms for the related frequency range if a threshold value is exceeded the table in bullet 1 above. A silent time of at least 12s while listening continuously is necessary before the transmitter can be switched on again. This silent time during which only the LBT receiver is active has to be ensured even after the device is switched off by the functions described in Technical requirements for Building Material Analysis (BMA) devices using UWB technology, the proximity sensor and manual operation.

#### Other requirements:

The pulse repetition frequency (PRF) for pulsed UWB devices shall not be less than 5MHz. This restriction does not apply to burst repetition frequency.

The peak e.i.r.p. (in dBm) measured in a bandwidth of 50MHz shall be less than a limit that is obtained by adding a conversion factor (in dB) to the ‘maximum mean e.i.r.p. spectral density’ (in dBm/MHz) limit. By default, the conversion factor for material sensing devices using UWB technology is 25 dB. In case of BMA devices, this conversion factor is 40 dB.

#### Definitions for the above table

##### Maximum mean e.i.r.p. spectral density

The highest signal strength measured in any direction at any frequency within the defined range. The mean e.i.r.p. spectral density is measured with a 1MHz resolution bandwidth, an RMS detector and an averaging time of 1ms or less.

##### Maximum peak e.i.r.p.

The highest signal strength measured in any direction at any frequency within the defined range. The peak e.i.r.p. is measured within a 50MHz bandwidth centered on the frequency at which the highest mean radiated power occurs.

#### CEPT References:

ECC/DEC/(07)01



## 1. Radio spectrum associated standards and technical conditions

### 1.17 Technical requirements for Location Tracking Application for Emergency Services (LAES) in emergencies and disasters situations:

LAES systems are limited to services or agencies, recognized and defined as such by the national law, responsible for public safety, the LAES systems aim to provide accurate indoor location and tracking information of personnel involved in search or rescue operations in buildings and should mainly be used indoor.

#### A. Technical requirements for LAES

##### Maximum e.i.r.p. for LAES systems

Frequency range	Maximum mean e.i.r.p. spectral density	Maximum peak e.i.r.p. (defined in 50 MHz)
Below 1.6 GHz	-90 dBm/MHz	-50 dBm
1.6 GHz to 2.7 GHz	-85 dBm/MHz	-45 dBm
2.7 GHz to 3.1 GHz	-70 dBm/MHz	-36 dBm
3.1 GHz to 3.4 GHz (see note 1)	-70 dBm/MHz	-36 dBm
3.4 GHz to 4.2 GHz (see note 2)	-21.3 dBm/MHz	20 dBm
4.2 GHz to 4.8 GHz (see note 2)	-41.3 dBm/MHz	0 dBm

**Note 1:** Within the band 3.1 – 3.4 GHz, systems implementing Detect And Avoid (DAA) mitigation technique (see technical parameters for DAA in band 3.1 – 3.4 GHz as defined in ECC/DEC/(06)04) may be permitted to operate with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz. A maximum duty cycle of 5% per transmitter per second also applies.

**Note 2:** A maximum duty cycle of 5% per transmitter per second applies.

#### B. Technical requirements for LAES applications for ultra-wideband emergency services, Type 2, LT2 devices

##### Maximum e.i.r.p. for fixed outdoor terminals

Frequency range	Maximum mean e.i.r.p. spectral density	Maximum peak e.i.r.p. (defined in 50 MHz)
Below 1.6 GHz	-90 dBm/MHz	-50 dBm
1.6 to 2.7 GHz	-85 dBm/MHz	-45 dBm
2.7 to 3.4 GHz	-70 dBm/MHz (Note 1)	-36 dBm
3.4 to 4.8 GHz	-41.3 dBm/MHz (Note 2 and 3)	0 dBm

## 1. Radio spectrum associated standards and technical conditions

### 1.17 Technical requirements for Location Tracking Application for Emergency Services (LAES) in emergencies and disasters:

**Note 1:** within the band 3.1-3.4 GHz, terminals implementing Detect-And-Avoid (DAA) mitigation technique (see technical parameters for DAA in the band 3.1-3.4 GHz as defined in ECC/DEC/(06)04) may be permitted to operate with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz. A maximum duty cycle of 5% per transmitter per second and a maximum Ton = 25 ms also apply.

**Note 2:** a maximum duty cycle of 5% per transmitter per second and a maximum Ton = 25 ms apply.

**Note 3:** the maximum mean e.i.r.p. spectral density in the band 4.2-4.4 GHz for emissions that appear 30° or greater above the horizontal plane should be less than -47.3 dBm/MHz

#### Maximum e.i.r.p. for mobile terminals and fixed indoor terminals

Frequency range	Maximum mean e.i.r.p. spectral density	Maximum peak e.i.r.p. (defined in 50 MHz)
Below 1.6 GHz	-90 dBm/MHz	-50 dBm
1.6 to 2.7 GHz	-85 dBm/MHz	-45 dBm
2.7 to 3.4 GHz	-70 dBm/MHz (Note 1)	-36 dBm
3.4 to 4.8 GHz	-41.3 dBm/MHz (Note 2)	0 dBm

**Note 1:** Within the band 3.1-3.4 GHz, terminals implementing Detect-And-Avoid (DAA) mitigation technique (see technical parameters for DAA in the band 3.1-3.4 GHz as defined in ECC/DEC/(06)04) may be permitted to operate with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz. A maximum duty cycle of 5% per transmitter per second and a maximum Ton = 25 ms also apply.

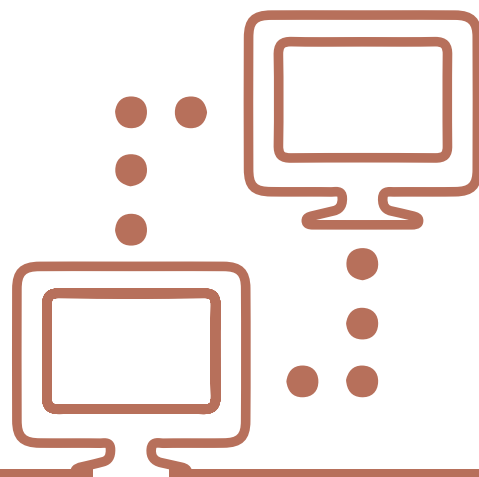
**Note 2:** A maximum duty cycle of 5% per transmitter per second and a maximum Ton = 25 ms apply. The duty cycle should also be limited to 1.5% per minute or equipment should implement an alternative mitigation technique that provides at least equivalent protection.

## List of Abbreviations

AVI	Automatic Vehicle Identification
BMA	Building Material Analysis
NFP	National Frequency Plan
LLOC	Legislation and Legal Opinion Commission
ITU	International Telecommunication Union
BW	Bandwidth (in MHz or part thereof)
RF	Radio Frequency
ERM	Electromagnetic compatibility and Radio spectrum Matters
ISM	Industrial, Scientific & Medical applications
RTTT	Road Transport and Traffic Telematics
BRAN	Broadband Radio Access Networks
EMC	ElectroMagnetic Compatibility
DSRC	Dedicated Short Range Communication
MAC	Medium Access Control
PHY	Physical Layer
LDC	Low Duty Cycle
IDEN	Integrated Digital Enhanced Network
WAS	Wireless Access Systems
RLAN	Radio Local Area Networks
DoC	Declaration of Conformity
ERP	Equivalent Radiated Power
LTE	Long Term Evolution
ERIP	Equivalent Radiated Isotropic Power
FDDA	Field Disturbance and Doppler Apparatus
LBT	Listen Before Talk
AFA	Adaptive Frequency Agility

## List of Abbreviations

RFID	Radio-frequency Identification
DFS	Dynamic Frequency Selection
SRD	Short Range Device
DAA	Detect-And-Avoid
iGA	Information & eGovernment Authority of the Kingdom of Bahrain
UHF	Ultra High Frequency
TPC	Transmitter Power Control
UWB	Ultra-Wideband
TLPR	Tank Level Probing Radar
VHF	Very High Frequency
SRR	Short Range Radars



# List of Abbreviations

## Definitions:

**Necessary Bandwidth:** For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

**Power:** Whenever the power of a radio transmitter, etc. is referred to it shall be expressed in one of the following forms, according to the class of emission, using the arbitrary symbols indicated:

- peak envelope power (PX or pX);
- mean power (PY or pY);
- carrier power (PZ or pZ).

For different classes of emission, the relationships between peak envelope power, mean power and carrier power, under the conditions of normal operation and of no modulation, are contained in ITU-R Recommendations which may be used as a guide.

For use in formulae, the symbol p denotes power expressed in watts and the symbol P denotes power expressed in decibels relative to a reference level.

**Gain of an Antenna:** The ratio, usually expressed in decibels, of the power required at the input of a loss-free reference antenna to the power supplied to the input of the given antenna to produce, in a given direction, the same field strength or the same power flux-density at the same distance. When not specified otherwise, the gain refers to the direction of maximum radiation.

The gain may be considered for a specified polarization.

Depending on the choice of the reference antenna a distinction is made between:

**a)** absolute or isotropic gain ( $G_i$ ), when the reference antenna is an isotropic antenna isolated in space;

**b)** gain relative to a half-wave dipole ( $G_d$ ), when the reference antenna is a half-wave dipole isolated in space whose equatorial plane contains the given direction;

**c)** gain relative to a short vertical antenna ( $G_v$ ), when the reference antenna is a linear conductor, much shorter than one quarter of the wavelength, normal to the surface of a perfectly conducting plane which contains the given direction.

**Equivalent Isotropically Radiated Power (e.i.r.p.):** The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain).

**Effective Radiated Power (e.r.p.) (in a given direction):** The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.

## What is the relation between $\mu\text{V/m}$ & W?

The Watt (W) is the unit used to measure the power generated by a sender. As the Microvolts/Metre ( $\mu\text{V/m}$ ), it is the unit used to measure the electric field strength caused by the operation of a transmitter. A transmitter, generating a (W) power at a constant level, can produce varying electric fields ( $\mu\text{V/m}$ ) depending on, in particular, the transmitted line and antenna pattern. Since electric field that interferes with the licensed radio communication devices, and the electric field strength does not correspond directly to the transmitter's power level.



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