



Notice of Ofcom's proposal to  
make the Wireless Telegraphy  
(Ultra-Wideband Equipment)  
(Exemption) Regulations 2015

Consultation

Publication date: 17 December 2015

Closing Date for Responses: 20 January 2015



## About this document

This document sets out Ofcom's consultation on a proposal to make regulations that would amend the existing Wireless Telegraphy licence exemption criteria for Ultra Wideband (UWB) devices.

UWB devices use very large bandwidth and are able to transmit high data rates over short distances, but transmit at very low power levels so do not interfere with other devices.

UWB uses include wireless multi-media applications, such as streaming videos and connecting cameras to TVs, as well as radar and detection devices which can be used to sense objects behind walls.

These regulations will implement a European Commission decision on UWB devices which harmonises the technical parameters for equipment across all European member states.



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## Section 1

# Executive summary

- 1.1 This document consults on draft regulations to make the Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption) Regulations 2015 (the “Proposed Regulations”). The Proposed Regulations will implement the requirements of the European Commission Implementation Decision of 7 October 2014 (2014/702/EU) (the “UWB Amendment Decision”).<sup>1</sup> The Proposed Regulations will also revoke the Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption) Regulations 2009 (the “Principal Regulations”).<sup>2</sup>
- 1.2 Ultra-wideband (UWB) is a generic term for technologies typically characterised by the emission of very low power radiation spread over a very large radio bandwidth. This is unlike other wireless systems, which use spectrum in discrete narrow frequency bands. UWB can transfer large amounts of data wirelessly over short distances, typically less than ten metres. Using mitigation techniques multiple pieces of UWB equipment are able to operate in the same area.
- 1.3 The UWB Amendment Decision amends Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community (the “UWB Decision”).<sup>3</sup> All European Member States are required to implement the UWB Amendment Decision - a copy of which can be found in Annex 7.
- 1.4 The Proposed Regulations revoke the Principal Regulations, and The Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption) (Amendment) Regulations 2010<sup>4</sup> (the “Amending Regulations”), and make a new set of regulations as we believe that this will reduce the regulatory burden on stakeholders and simplify the legislation. If we had proposed to amend the Principal Regulations, manufactures would need to refer to three sets of regulations in order to understand the technical parameters required for licence exemption in the UK. By revoking the Principal Regulations and the Amending Regulations, and making a new Statutory Instrument, stakeholders will only need to consult one set of regulations.
- 1.5 Although the European Commission has used tables in the UWB Amendment Decision annex, we have decided to follow a similar format to the Principal Regulations in the Proposed Regulations. We recognise that this has led to lengthy Proposed Regulations but our view is that this format will make the requirements clearer for stakeholders and is consistent with what we have done previously in this area.
- 1.6 The Proposed Regulations will replace the existing technical parameters for the establishment, installation or use of UWB equipment and will enable new equipment to use UWB technology. For the purpose of this notice the word “use” in the context of UWB equipment also includes establishing or installing such equipment. The Proposed Regulations will:

<sup>1</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0702&from=EN>

<sup>2</sup> [http://www.legislation.gov.uk/ukxi/2009/2517/pdfs/ukxi\\_20092517\\_en.pdf](http://www.legislation.gov.uk/ukxi/2009/2517/pdfs/ukxi_20092517_en.pdf)

<sup>3</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:055:0033:0036:EN:PDF>

<sup>4</sup> <http://www.legislation.gov.uk/ukxi/2010/2761/made/data.pdf>

- permit the use of UWB equipment on Aircraft;
- permit the use of UWB equipment in Location Tracking System Type 1 (LT1);
- in some frequency bands, allow enhanced permitted transmit power, provided the Low Duty Cycle (LDC) mitigation technique or the Detect and Avoid (DAA) mechanism are employed. These mitigation techniques are described in Section 3 of CEPT Report 45<sup>5</sup>; and
- relax the limits for the use of material sensing devices (used to detect and take images of objects in walls such as pipes and wires).
- contains replacement definitions of some terms defined previously in the Principal Regulations and includes some new definitions.

1.7 In accordance with the requirements of section 122(4) and (5) of the Wireless Telegraphy Act 2006 (the “WT Act”), this document gives notice of our intention to make the Proposed Regulations. We do not consider it appropriate to first conduct a policy consultation as implementing the UWB Amendment Decision is mandatory. Therefore, we are only seeking comments on whether the Proposed Regulations correctly implement it.

1.8 Comments on the Proposed Regulations and in particular the detailed technical aspects are invited by 5pm on 20 January 2014. Subject to consideration of responses we intend to bring the new Regulation into force in February 2015. An impact assessment for the Proposed Regulation is available at Annex 5 to this document. The Proposed Regulation is included in this document at Annex 6. Further copies may be obtained from [www.ofcom.org.uk](http://www.ofcom.org.uk) or from Ofcom at Riverside House, 2a Southwark Bridge Road, London SE1 9HA.

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<sup>5</sup> <http://www.erodocdb.dk/Docs/doc98/official/pdf/CEPTREP045.PDF>

## Section 2

# Background

## Regulatory Framework

- 2.1 We are responsible for authorising civil use of the radio spectrum and achieve this by granting wireless telegraphy licences under the WT Act and by making regulations exempting users of particular equipment from the requirement to hold such a licence.
- 2.2 Under section 8(1) of the WT Act, it is an offence to install or use equipment to transmit without holding a licence granted by us unless the use of such equipment is exempted. We can exempt the installation or use of wireless telegraphy equipment by making Regulations under section 8(3) of the WT Act.
- 2.3 Under section 8(4) of the WT Act, we have to make regulations to exempt equipment if its installation or use is not likely to:
  - involve undue interference with wireless telegraphy;
  - have an adverse effect on technical quality of service;
  - lead to inefficient use of the part of the electromagnetic spectrum available for wireless telegraphy;
  - endanger safety of life;
  - prejudice the promotion of social, regional or territorial cohesion; or
  - prejudice the promotion of cultural and linguistic diversity and media pluralism.
- 2.4 In accordance with the requirements of section 8(3B) of the WT Act, the terms, provisions and limitations specified in the regulations must be:
  - objectively justifiable in relation to the wireless telegraphy stations or wireless telegraphy apparatus to which they relate;
  - not such as to discriminate unduly against particular persons or against a particular description of persons;
  - proportionate to what they are intended to achieve; and
  - transparent in relation to what they are intended to achieve.
- 2.5 Before making any regulations we are required by section 122(4) of the WT Act to give notice of our proposal to do so. Under section 122(5), the notice must state that we propose to make the regulations in question, set out their general effects, specify an address from which a copy of the proposed regulations or order may be obtained, and specify a time of at least one month before which any representations with respect to the proposal must be made to us.

## Policy Background

- 2.6 In February 2007 the European Commission harmonised, across the European Union (EU), the technical conditions for UWB equipment (“the UWB Decision”).<sup>6</sup> This was in order to eliminate barriers to the uptake of UWB equipment and created a single market that would allow manufacturers to benefit from economies of scale and allow consumers and citizens to benefit from new technologies and cheaper prices.
- 2.7 To implement this into UK law we made the Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption) Regulations 2007.<sup>7</sup> These Regulations were amended on 17 August 2007 to correct an error.<sup>8</sup>
- 2.8 Due to changes in technologies since the UWB Decision was adopted, the European Commission issued mandates to the European Conference of Postal and Telecommunications Administrations (CEPT), to undertake further compatibility studies of UWB technologies. This resulted in the European Commission amending the UWB Decision in 2009.<sup>9</sup>
- 2.9 This was implemented in the UK via the Principal Regulations and the Amending Regulations in 2010.

## European Commission Decision on UWB

- 2.10 As part of the ongoing work on UWB the European Commission issued a Fifth Mandate, to CEPT on UWB technology, to clarify technical parameters in the light of a potential update to Decision 2007/131/EC.
- 2.11 In response to this, CEPT Report 45 was produced and approved on 21 June 2013. CEPT advised the European Commission to take a more streamlined approach on subsequent amendments of the UWB Decision, taking into account the description of mitigation techniques with all the relevant detailed parameters within the harmonised European standards developed by the European Telecommunications Standards Institute (ETSI).
- 2.12 CEPT Report 45 also clarified the technical conditions under which specific mitigation techniques enable UWB equipment to be operated with higher transmission powers, while offering equivalent protection for existing UWB limits on generic use, automotive and railway vehicles use and location-tracking equipment.
- 2.13 Based on CEPT Report 45, the European Commission decided to change the UWB Decision by making the “UWB Amendment Decision”).<sup>10</sup> All European Member States are required to implement the UWB Amendment Decision - a copy of which can be found in Annex 7 of this document.

## Document structure

- 2.14 The document is structured as follows:
- Section 3 sets out the general effects of the Proposed Regulations;

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<sup>6</sup> <http://www.erodocdb.dk/docs/doc98/official/pdf/2007131EC.pdf>

<sup>7</sup> <http://www.legislation.gov.uk/uksi/2007/2084/made/data.pdf>

<sup>8</sup> <http://www.legislation.gov.uk/uksi/2007/2440/made/data.pdf>

<sup>9</sup> <http://www.erodocdb.dk/Docs/doc98/official/pdf/2009343EC.PDF>

<sup>10</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0702&from=EN>

- A Regulatory Impact Assessment (RIA) for the Proposed Regulations is available in Annex 5. The RIA sets out the risks, costs and benefits of the proposals and the effects that the Proposed Regulations would have;
- Annex 6 contains a draft of the Proposed Regulations; and
- Annex 7 contains a copy of the UWB Amending Decision.

## Next steps

- 2.15 We did not consider it appropriate to first conduct a policy consultation prior to drafting the Proposed Regulations, as implementing the Amending Decision is a mandatory requirement for all Member States. Following the publication of this consultation document, stakeholders are welcome to provide their feedback. The deadline to submit responses to us is **5pm on 20 January 2015**. We expect to release a statement on this consultation in February 2015, having taken into account the stakeholder responses to our proposals and subsequently to make, and bring into force the new regulations.

## Section 3

# General effects of the draft Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption) Regulations 2015)

## The Legislative Framework

- 3.1 As previously stated, under section 8(1) of the WT Act it is an offence to install or use equipment to transmit without holding a licence granted by Ofcom, unless the installation or use of such equipment is exempted. Ofcom can exempt the establishment, installation and use of wireless telegraphy equipment by making regulations under section 8(3) of the WT Act.

## Extent of application

- 3.2 The Proposed Regulations will apply in the United Kingdom, the Channel Islands and Isle of Man subject to formal agreement of the Island Authorities.

## The Proposed Regulations

- 3.3 A draft of the Proposed Regulations is set out in Annex 6
- 3.4 Regulation 2 revokes the Principal Regulations and the Amending Regulations.
- 3.5 Regulation 3 sets out the meaning of defined terms used in the Proposed Regulations. Regulation 3 includes replacement definitions of some terms defined previously in the Principal Regulations (including “e.i.r.p” and “peak power”) and some new definitions (including “maximum mean power spectral density”, “onboard aircraft” and “total radiated power spectral density”).
- 3.6 Part 2 sets out the technical provisions for the use of generic UWB equipment:
- 3.6.1 Regulation 5 sets out the restrictions in use including use outdoors providing it is not at a fixed location.
  - 3.6.2 Regulation 6 sets out the transmission limits.
  - 3.6.3 Regulation 7 provides information on appropriate mitigation techniques.
- 3.7 Part 3 sets out the technical provisions for the use of location tracking system UWB devices.
- 3.7.1 Regulation 9 states the terms and limitations of the exemption.
  - 3.7.2 Regulation 10 sets out the transmission limits.
  - 3.7.3 Regulation 11 provides information on appropriate mitigation techniques.
- 3.8 Part 4 sets out the technical provisions for the use of UWB used in automotive and railway vehicles.

- 3.8.1 Regulation 13 states the terms and limitations of the exemption.
- 3.8.2 Regulation 14 sets out the transmission limits.
- 3.8.3 Regulation 15 provides information on appropriate mitigation techniques.
- 3.9 Part 5 sets out the technical provisions for the use of UWB used onboard aircraft.
  - 3.9.1 Regulation 17 states the terms and limitations of the exemption.
  - 3.9.2 Regulation 18 sets out the transmission limits.
  - 3.9.3 Regulation 19 provides information on appropriate mitigation techniques.
- 3.10 Part 6 sets out the technical provisions for the use of UWB material sensing devices.
  - 3.10.1 Regulations 21 and 22 state the terms and limitations of the exemption.
  - 3.10.2 Regulation 23 sets out the transmission limits for fixed installations.
  - 3.10.3 Regulation 24 sets out the transmission limits for non-fixed installations.
- 3.11 Part 7 sets out the technical provisions for the use of UWB building material analysis devices.
  - 3.11.1 Regulation 26 states the terms and limitations of the exemption including provisions that the equipment is operated manually with a non-locking switch and only in close proximity to the material being analysed. Please note that Regulation 26(4) refers to EN 302-498-1 rather than EN302-498-2 which is specified in the relevant section of the UWB Amendment Decision. We consider that the reference to EN302-498-2 in the UWB Amendment Decision is likely to be a typographical error as it contains no mention of “representative walls” and we have therefore referred to EN302-498-1 instead which contains the relevant detail.
  - 3.11.2 Regulation 27 sets out the transmission limits.

*Question 1) Do you have any comments on the drafting of the Proposed Regulations?*

*Question 2) Do you have any comments on the technical aspects of the Proposed Regulations*

*Question 3) Do you have any comments on the defined terms in Regulation 3 of the Proposed Regulations?*

## Annex 1

# Responding to this consultation

## How to respond

- A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 20 January 2015**.
- A1.2 Ofcom strongly prefers to receive responses using the online web form at <http://stakeholders.ofcom.org.uk/consultations/uwb-regulations/howtorespond/form>, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.
- A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email [paul.chapman@ofcom.org.uk](mailto:paul.chapman@ofcom.org.uk) attaching your response in Microsoft Word format, together with a consultation response coversheet.
- A1.4 Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.
- Paul Chapman  
Spectrum Policy Group  
Riverside House  
2A Southwark Bridge Road  
London SE1 9HA
- A1.5 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

## Further information

- A1.7 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact Paul Chapman on 020 7981 3069.

## Confidentiality

- A1.8 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk), ideally on receipt. If you think your response should be kept confidential, can you please specify what part or whether all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

- A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at <http://www.ofcom.org.uk/about/accoun/disclaimer/>

## Next steps

- A1.11 Following the end of the consultation period, Ofcom intends to publish a statement in February 2015.
- A1.12 Please note that you can register to receive free mail Updates alerting you to the publications of relevant Ofcom documents. For more details please see: [http://www.ofcom.org.uk/static/subscribe/select\\_list.htm](http://www.ofcom.org.uk/static/subscribe/select_list.htm)

## Ofcom's consultation processes

- A1.13 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.
- A1.14 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at [consult@ofcom.org.uk](mailto:consult@ofcom.org.uk) . We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.15 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Graham Howell, Secretary to the Corporation, who is Ofcom's consultation champion:

Graham Howell  
Ofcom  
Riverside House  
2a Southwark Bridge Road  
London SE1 9HA

Tel: 020 7981 3601

Email [Graham.Howell@ofcom.org.uk](mailto:Graham.Howell@ofcom.org.uk)

## Annex 2

# Ofcom's consultation principles

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

### Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

### During the consultation

A2.3 We will be clear about who we are consulting, why, on what questions and for how long.

A2.4 We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.

A2.6 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why.

### After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We would usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

## Annex 3

# Consultation response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk).
- A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at [www.ofcom.org.uk/consult/](http://www.ofcom.org.uk/consult/).
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

## Cover sheet for response to an Ofcom consultation

### BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

### CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing	<input type="checkbox"/>	Name/contact details/job title	<input type="checkbox"/>
Whole response	<input type="checkbox"/>	Organisation	<input type="checkbox"/>
Part of the response	<input type="checkbox"/>	If there is no separate annex, which parts?	

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

### DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name

Signed (if hard copy)

## Annex 4

# Consultation question

- A4.1 As required by section 122 of the WT Act, we must give notice of proposals that we intend to make and consider any representations that we receive. This document gives notice of our proposal to make the Proposed Regulations.

*Question 1) Do you have any comments on the drafting of the Proposed Regulations?*

*Question 2) Do you have any comments on the technical aspects of the Proposed Regulations?*

*Question 3) Do you have any comments on the defined terms in Regulation 3 of the Proposed Regulations?*

*Question 4) Do you have any comments on the Regulatory Impact Assessment?*

## Annex 5

# Impact Assessment

## Introduction

- A5.1 In accordance with Government practice, where a statutory regulation is proposed, a Regulatory Impact Assessment (“RIA”) must be undertaken.
- A5.2 The analysis presented here, represents an RIA as defined by section 7 of the Communications Act 2003 (the “Comms Act”) for the Proposed Regulations.
- A5.3 RIAs provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making and are commonly used by other regulators. This is reflected in section 7 of the Comms Act, which means that we will generally carry out impact assessments where proposals would be likely to have a significant effect on businesses or the general public, or when there is a major change in our activities.
- A5.4 However, as a matter of policy we are committed to carrying out and publishing impact assessments in relation to the great majority of our policy decisions. In accordance with section 7 of the Comms Act, in producing this RIA, we have had regard to such general guidance as we consider appropriate including related Cabinet Office guidance. For further information about our approach to impact assessments, see the guidelines, Better policy-making: Ofcom’s approach to impact assessment, which are on our website:  
[http://www.ofcom.org.uk/consult/policy\\_making/guidelines.pdf](http://www.ofcom.org.uk/consult/policy_making/guidelines.pdf).

## Background

- A5.5 In the UK, Ofcom is responsible for authorising civil use of the radio spectrum and achieve this by granting wireless telegraphy licences under the WT Act and by making regulations exempting users of particular equipment from the requirement to hold such a licence. Under section 8(1) of the WT Act, it is an offence to install or use equipment to transmit without holding a licence granted by us, unless the use of such equipment is exempted. However, under section 8(4) of the WT Act, we have to make regulations to exempt equipment if its installation or use is not likely to:
- involve undue interference with wireless telegraphy;
  - have an adverse effect on technical quality of service;
  - lead to inefficient use of the part of the electromagnetic spectrum available for wireless telegraphy;
  - endanger safety of life;
  - prejudice the promotion of social, regional or territorial cohesion; or
  - prejudice the promotion of cultural and linguistic diversity and media pluralism.
- A5.6 In accordance with the requirements of section 8(3B) of the WT Act, the terms, provisions and limitations specified in the regulations must be:

- objectively justifiable in relation to the wireless telegraphy stations or wireless telegraphy apparatus to which they relate;
- not such as to discriminate unduly against particular persons or against a particular description of persons;
- proportionate to what they are intended to achieve; and
- transparent in relation to what they are intended to achieve.

## Proposal

A5.7 This impact assessment relates to the proposal to make the Proposed Regulations by revoking the Principal Regulations” and the Amending Regulations. The Proposed Regulations will implement the UWB Amendment Decision.

## The citizen and/or consumer interest

A5.8 Our principal duty under section 3 of the Comms Act is to further the interests of citizens in relation to communications matters; and of consumers in relevant markets, where appropriate by promoting competition. We take account of the impact of our decisions upon both citizen and consumer interests in the markets we regulate. We must, in particular, secure the optimal use for wireless telegraphy of spectrum and have regard to the principle under which all regulatory activities should be targeted only at cases in which action is needed. In proposing changes to the existing regulations we have considered the wider impact beyond immediate stakeholders in the radiocommunications community. We believe that the proposals will be of benefit to consumers for the following reasons:

- i) the measures proposed all concern the use of radio equipment on a licence-exempt basis, which reduces the regulatory and administrative burden on our stakeholders and helps to secure the optimal use of spectrum;
- ii) the proposed new licence exemptions and amendments to existing licence exemptions support the introduction of new and innovative technologies that will be of benefit to consumers and citizens in general; and
- iii) licence exemption is proposed only in areas where use of equipment is unlikely to have an impact on technical quality of service and cause undue interference to other spectrum users.

## Equality Impact Assessment

A5.9 We are required by statute to assess the potential impact of all our functions, policies, projects and practices on the following equality groups: age, disability, gender, gender reassignment, pregnancy and maternity, race, religion or belief and sexual orientation– an Equality Impact Assessment (EIA) is our way of fulfilling these obligations.

A5.10 Following an initial assessment of our policy proposals we considered that it was reasonable to assume that any impacts on consumers and citizens arising from the Proposed Regulations in most cases would not differ significantly between groups or classes of UK consumers and citizens, all of whom would have access to these services, potentially at end-user prices reflective of all general input costs, including

opportunity costs of spectrum used. We have not identified any particular impact in relation to the identified equality groups and we do not envisage that the Proposed Regulations are likely to be to the detriment of any group in society. Nor have we seen the need to carry out separate EIAs in relation to the additional equality groups in Northern Ireland: religious belief, political opinion and dependants. This is because we anticipate that our proposals will not have a differential impact in Northern Ireland compared to consumers in general.

## **Our policy objective**

- A5.11 We seek wherever possible, to reduce the regulatory burden upon our stakeholders, in this instance users of the radio spectrum. One way in which we can do this is to remove the need for spectrum users to apply for individual licences to authorise the use of radio equipment. Exemption is realised by describing the details of equipment and the parameters under which it may be used in a Statutory Instrument (secondary legislation called Regulations) that exempts users of such equipment from the need to hold a licence provided they comply with the terms of the regulations.
- A5.12 In accordance with the WT Act, we must exempt from licensing the use of specified equipment that meet the requirements of sections 8(4) and 8(5) of the WT Act. We are also required by law to implement EU legislation relating to radio spectrum and from time to time this requires licence exemption arrangements to be changed.
- A5.13 As a Member State, the UK is bound by the terms of the UWB Amendment Decision and the requirement to implement it.

## **Options considered**

- A5.14 The options open to us in relation to compliance with the UWB Amendment Decision are as follows:
- to make the Proposed Regulations that are in line with the UWB Amendment Decision; or
  - to do nothing.

## **Analysis of options**

### **Make new regulations**

- A5.15 EU harmonisation decisions are binding on all Member States and we are therefore legally required to implement them.
- A5.16 When considering the authorisation of devices Ofcom can either licence them or make regulations to exempt them from licensing. Section 8(4) of the WT Act requires that if Ofcom is satisfied that the criteria set out in section 8(5) of the WT Act are met, Ofcom must make regulations to licence-exempt the equipment. If the equipment does not meet all of the requirements of section 8(5) this does not prevent us still going ahead with exemption but any decision would need to consider the impacts verses the benefits of any such decision.
- A5.17 Generally, licence exemption presents the lowest barrier to entry compared with other forms of authorisation, such as individual licences. Our analysis takes this

proposition as a starting point and then assesses concerns over harmful interference or congestion to existing users (if any) or potential new users of the band. Harmful interference or congestion could negate the benefits of any reductions in the regulatory burden gained from exemption.

- A5.18 Overall we believe that costs to business are likely to be lower under a licence-exempt approach than the requirement for users to obtain individual licences. Licence exemption represents the least cost regulatory approach to authorisations on the use of spectrum. For example if use of spectrum is authorised through a licence, businesses face administrative costs associated with applying for the licence and the cost of the licence itself.
- A5.19 The measures set out in the Proposed Regulations would enable the development of a harmonised market across Europe for UWB devices. This brings with it many benefits from the free circulation and use of devices. Manufacturers benefit from economies of scale which drive down prices for consumers. Citizens are able to benefit from continued access to devices when travelling to other European countries.
- A5.20 We consider that implementing the Proposed Regulations is likely to generate a net benefit for UK businesses, citizens and consumers and at worst would have a neutral outcome (to the extent that benefits may depend on the uptake of the new opportunities afforded by each proposal). We consider that each measure is unlikely to impose costs on other users. Therefore the effect of implementing the proposed measures would be likely to be positive overall.
- A5.21 There are one-off administrative costs associated with making Statutory Instruments. We consider the implementation costs to be low, both in absolute terms and in comparison to licensing alternatives that might require an auction or the maintenance of a licence scheme. Moreover, the costs such as they are will also be offset by the benefits to businesses and consumers outlined above. There may also be a slight reduction in spectrum management costs in certain areas through licence exemption.

### **Do nothing**

- A5.22 The alternative to making the Proposed Regulations would be to do nothing. By doing nothing, we mean not making the Proposed Regulations and therefore not enabling the use of this equipment on a licence-exempt basis.
- A5.23 Citizens and consumers would not be able to benefit from the opportunities that these devices could provide. The only way for citizens and consumers to use such devices would be under a licensing regime. This would impose additional administrative and financial costs to consumers.
- A5.24 More importantly, if we did not implement an EU decision, the European Commission and others could begin legal proceedings against the UK, the costs of which we deem to be potentially very high both quantitatively and qualitatively, outweighing any costs we consider to be associated with correct implementation.

### **The preferred option**

- A5.25 Our preferred option is to go ahead and make the Proposed Regulations. This would be consistent with European law.

*Question 4) Do you have any comments on the Regulatory Impact Assessment?*

**Annex 6****Proposed Regulations**


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 S T A T U T O R Y   I N S T R U M E N T S
 

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**2015 No. \*\*\*\*****ELECTRONIC COMMUNICATIONS**
**The Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption)  
Regulations 2015**

*Made* - - - - - \*\*\*\*

*Coming into force* - - - - - \*\*\*\*

The Office of Communications (“OFCOM”) make the following Regulations in exercise of the powers conferred by section 8(3) of the Wireless Telegraphy Act 2006 (the “Act”)<sup>(11)</sup>.

Before making these Regulations OFCOM have given notice of their proposal to do so in accordance with section 122(4)(a) of the Act, published notice of their proposal in accordance with 122(4)(b) of the Act and have considered the representations made to them before the time specified in that notice in accordance with section 122(4)(c) of the Act.

**PART 1****INTRODUCTORY****Citation and commencement**

**1.** These Regulations may be cited as the Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption) Regulations 2014 and shall come into force on \*\*\*\* 2015.

**Revocation**

**2.** The Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption) Regulations 2009<sup>(12)</sup> and The Wireless Telegraphy (Ultra-Wideband Equipment) (Exemption) (Amendment) Regulations 2010<sup>(13)</sup> are hereby revoked.

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<sup>(11)</sup> 2006 c. 36. Section 8(3) was extended to the Bailiwick of Guernsey by article 2 of the Wireless Telegraphy (Guernsey) Order 2006 (S.I. 2006/3325); and to the Bailiwick of Jersey by article 2 of the Wireless Telegraphy (Jersey) Order 2006 (S.I. 2006/3324); and to the Isle of Man by article 2 of the Wireless Telegraphy (Isle of Man) Order 2007 (S.I. 2007/278).

<sup>(12)</sup> S.I. 2009/2517

<sup>(13)</sup> S.I. 2010/2761

## Interpretation

### 3. In these regulations—

“automotive vehicle” has the meaning given for “vehicle” by Article 3 of Council Directive 2007/46/EC of 5 September 2007 establishing a framework for the approval of motor

vehicles and their trailers, and of systems, components and separate technical units for such vehicles<sup>(14)</sup>;

“building material analysis device” means a type of material sensing device that is designed to detect the location of objects within a building structure or to determine the physical properties of building material;

“dB” means decibel;

“dBm” means decibels of power referenced to one milliWatt;

“dBm/MHz” means decibels of power referenced to one milliWatt per megahertz;

“detect and avoid mitigation technique” means a technique which is used to detect other transmissions and avoid interference with those transmissions;

“e.i.r.p.” means equivalent isotropic radiated power, which is the product of the power supplied to an antenna and the absolute or isotropic antenna gain in a given direction relative to an isotropic antenna;

“equivalent transmission level” means the peak level of transmission contained within a bandwidth which is other than 50 MHz, centred on the frequency at which the highest mean radiated power occurs, and which is the relevant maximum peak e.i.r.p. scaled down by a factor of  $20\log(50/x)$ dB, where “x” is the bandwidth expressed in MHz;

“exterior limit” is the maximum mean power spectral density for emissions measured outside a vehicle at elevation angles higher than 0 degree as described in EN302 065-3<sup>(15)</sup>;

“GHz” means gigahertz;

“harmonised standards” has the meaning given in regulation 7;

“indoors” means inside buildings or places in which the shielding will typically provide the necessary attenuation to protect wireless telegraphy against harmful interference;

“listen before talk” is a mechanism to protect other operating systems from interference in the same frequency band;

“location tracking systems type 1” are systems intended for location tracking of people and objects;

“low duty cycle mitigation technique” means a technique which is used to limit the length of time of transmissions made from ultra-wideband equipment;

“material sensing device” means a radiodetermination device designed to detect the location of objects within a structure or to determine the physical properties of a material;

“maximum mean power spectral density” means the maximum mean e.i.r.p. of a radio device under test at a particular frequency and the average power per unit bandwidth centred on that frequency, radiated in the direction of the maximum level under the specified conditions of measurement;

“MHz” means megahertz;

“onboard aircraft” means the use of radio links for intra-aircraft communications purposes inside an aircraft;

“peak power” means the peak e.i.r.p. contained within a 50 MHz bandwidth at the frequency at which the highest mean radiated power occurs, radiated in the direction of the maximum level under the specified conditions of measurement;

“railway vehicle” has the meaning given by Article 3 of Regulation (EC) No 91/2003 of the European Parliament and of the Council of 16 December 2002 on rail transport statistics<sup>(16)</sup>;

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<sup>(14)</sup> OJ No L 263, 9.10.2007, p 5. There are amendments to Council Directive 2007/46/EC not relevant to these regulations.

<sup>(15)</sup> EN 302 065-3 (Version 1.1.1) published in April 2014.

“shielded portholes” means the use of shielding on the windows of an aircraft in order to give the windows similar radio frequency attenuation characteristics as other parts of the aircraft fuselage;

“the Act” means the Wireless Telegraphy Act 2006;

“total power control” means a mechanism to reduce the amount of power to that necessary for successful communication;

“total radiated power spectral density” means the average of the mean power spectral density values measured over a sphere around the measurement scenario contained within ETSI EN302 435-1<sup>(17)</sup> with a resolution of at least 15 degrees between each measurement point;

“transmit power control mitigation technique” means a technique that mitigates interference arising from the aggregate power from a number of items of ultra-wideband equipment by reducing the amount of power necessary for those apparatus to operate; and

“ultra-wideband equipment” means a wireless telegraphy station or wireless telegraphy apparatus incorporating, as an integral part or as an accessory, technology for short-range radiocommunication involving the intentional generation and transmission of radio-frequency energy that spreads over a frequency range wider than 50 MHz, which may overlap several frequency bands allocated to wireless telegraphy.

## PART 2

### GENERAL USE OF ULTRA-WIDEBAND EQUIPMENT

#### Exemption

4. The establishment, installation or use of ultra-wideband equipment complying with the terms, provisions and limitations in regulation 5 is hereby exempt from the provisions of section 8(1) of the Act.

#### Terms, provisions and limitations

5.—(1) The exemption provided for in regulation 4 shall apply to ultra-wideband equipment which complies with the requirements of paragraphs (2) to (4) of this regulation.

(2) The ultra-wideband equipment must be used—

- (a) indoors; or
- (b) other than indoors provided it is not—
  - (i) attached to a fixed installation;
  - (ii) attached to fixed infrastructure; or
  - (iii) attached to a fixed outdoor antenna.

(3) The ultra-wideband equipment must not cause or contribute to undue interference to other users of the electromagnetic spectrum.

(4) The ultra-wideband equipment must emit transmissions which are in accordance with the condition in regulation 6.

#### Transmission limits

6. The condition referred to in regulation 5(4) is that the ultra-wideband equipment only emits transmissions which—

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<sup>(16)</sup> OJ No L 14, 21.1.03, p1. Article 3 was amended by Commission Regulation (EC) No 1192/2003 amending Regulation (EC) No 91/2003 of the European Parliament and of the Council on rail transport statistics, OJ No L 167, 4.7.2003, p13. Regulation (EC) No 91/2003 has also been amended by Commission Regulation (EC) No 1304/2007, OJ No L 290, 8.11.07, p14 and by Regulation (EC) No 219/2009 of the European Parliament and of the Council, OJ L 87, 31.3.09, p109.

<sup>(17)</sup> EN 302 435-1 (Version 1.3.1) published in December 2009.

- (a) in frequencies up to 1.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -90.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -50.0 dBm or the equivalent transmission level;
- (b) in the frequency band 1.6 GHz to 2.7 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level;
- (c) in the frequency band 2.7 GHz to 3.1 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -36.0 dBm or the equivalent transmission level;
- (d) in the frequency band 3.1 GHz to 3.4 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density—
    - (aa) no greater than -70.0 dBm; or
    - (bb) no greater than -41.3 dBm/MHz provided that either of the techniques set out in regulation 7 below are used to mitigate interference to other users of the electromagnetic spectrum; and
  - (ii) have a maximum peak power—
    - (aa) no greater than -36.0 dBm or the equivalent transmission level; or
    - (bb) no greater than 0 dBm or the equivalent transmission level provided that either of the techniques set out in regulation 7 below are used to mitigate interference to other users of the electromagnetic spectrum;
- (e) in the frequency band 3.4 GHz to 3.8 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density—
    - (aa) no greater than -80.0 dBm/MHz; or
    - (bb) no greater than -41.3 dBm provided that either of the techniques set out in regulation 7 below are used to mitigate interference to other users of the electromagnetic spectrum; and
  - (ii) have a maximum peak power—
    - (aa) no greater than -40.0 dBm or the equivalent transmission level; or
    - (bb) no greater than 0.0 dBm or the equivalent transmission level provided that either of the techniques set out in regulation 7 below are used to mitigate interference to other users of the electromagnetic spectrum;
- (f) in the frequency band 3.8 GHz to 4.8 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density—
    - (aa) no greater than -70.0 dBm/MHz; or
    - (bb) no greater than -41.3 dBm/MHz provided that either of the techniques set out in regulation 7 below are used to mitigate interference to other users of the electromagnetic spectrum; and
  - (ii) have a maximum peak power—
    - (aa) no greater than -30.0 dBm or the equivalent transmission level; or
    - (bb) no greater than 0.0 dBm or the equivalent transmission level provided that either of the techniques set out in regulation 7 below are used to mitigate interference to other users of the electromagnetic spectrum;
- (g) in the frequency band 4.8 GHz to 6.0 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -30.0 dBm or the equivalent transmission level;
- (h) in the frequency band 6.0 GHz to 8.5 GHz when measured in any direction have—

- (i) a maximum mean power spectral density no greater than -41.3 dBm/MHz; and
- (ii) a maximum peak power no greater than 0.0 dBm or the equivalent transmission level;
- (i) in the frequency band 8.5 GHz to 9 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density—
    - (aa) no greater than -65.0 dBm/MHz; or
    - (bb) no greater than -41.3 dBm/MHz provided that the technique set out in regulation 7(b) below is used to mitigate interference to other users of the electromagnetic spectrum; and
  - (ii) have a maximum peak power—
    - (aa) no greater than -25.0 dBm; or
    - (bb) no greater than 0.0 dBm provided that the technique set out in regulation 7(b) below is used to mitigate interference to other users of the electromagnetic spectrum;
- (j) in the frequency band 9 GHz to 10.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -65.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm or the equivalent transmission level; and
- (k) in frequency bands above 10.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level.

### Mitigation techniques

7. The mitigation techniques referred to in regulation 6 are techniques for mitigating interference described in harmonised standards for ultra-wideband equipment whose reference numbers have been published in the Official Journal of the European Union under Article 5 of Council Directive 1999/5/EC on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity<sup>(18)</sup> (“harmonised standards”) and includes each of the following—

- (a) The low duty cycle mitigation technique and its limits which is described in EN 302 065-1<sup>(19)</sup>; and
- (b) The detect and avoid mitigation technique and its limits which is described in EN 302 065-1.

## PART 3

### USE OF ULTRA WIDEBAND EQUIPMENT IN LOCATION TRACKING SYSTEMS TYPE 1

#### Exemption

8. The establishment, installation or use of ultra-wideband equipment complying with the terms, provisions and limitations in regulation 9 is hereby exempt from the provisions of section 8(1) of the Act.

#### Terms, provisions and limitations

9.—(1) The exemption provided for in regulation 8 shall apply to ultra-wideband equipment which complies with the requirements of paragraphs (2) to (4) of this regulation.

- (2) The ultra-wideband equipment must be used in a location tracking systems type 1.

<sup>(18)</sup> OJ No L 911, 7.4.1999, p10. Article 5 was amended by Regulation (EC) No 596/2009 of the European Parliament and of the Council, OJ L 188, 18.07.2009, p10. There are other amendments to Council Directive 1999/5/EC not relevant to these regulations.

<sup>(19)</sup> EN 302 065-1 (Version 1.3.1) published in April 2014.

(3) The ultra-wideband equipment must not cause or contribute to undue interference to other users of the electromagnetic spectrum.

(4) The ultra-wideband equipment must emit transmissions which are in accordance with the condition in regulation 10.

### **Transmission limitations**

**10.** The condition referred to in regulation 9(4) is that the ultra-wideband equipment only emits transmissions which—

- (a) In frequencies up to 1.6GHz when measured in any direction have—
  - (i) A maximum mean power spectral density no greater than -90.0 dBm/MHz; and
  - (ii) A maximum peak power no greater than -50.0 dBm or the equivalent transmission level;
- (b) in the frequency band 1.6 GHz to 2.7 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level;
- (c) in the frequency band 2.7 GHz to 3.4 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -36.0 dBm or the equivalent transmission level;
- (d) in the frequency band 3.4 GHz to 3.8 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -80.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -40.0 dBm or the equivalent transmission level;
- (e) in the frequency band 3.8GHz to 6.0 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -30.0 dBm or the equivalent transmission level;
- (f) in the frequency band 6 GHz to 8.5 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -41.3 dBm/MHz; and
  - (ii) a maximum peak power no greater than 0.0 dBm or the equivalent transmission level;
- (g) in the frequency band 8.5 GHz to 9 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density—
    - (aa) no greater than -65.0 dBm/MHz; or
    - (bb) no greater than -41.3 dBm/MHz provided that the technique set out in regulation 11 below is used to mitigate interference to other users of the electromagnetic spectrum; and
  - (ii) have a maximum peak power—
    - (aa) no greater than -25.0 dBm or the equivalent transmission level; or
    - (bb) no greater than 0.0 dBm or the equivalent transmission level provided that the technique set out in regulation 11 below is used to mitigate interference to other users of the electromagnetic spectrum; and
- (h) in the frequency band 9 GHz to 10.6 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density no greater than -65.0 dBm/MHz; and
  - (ii) have a maximum peak power no greater than -25.0 dBm or the equivalent transmission level; and
- (i) in the frequency bands above 10.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level.

**Mitigation technique**

11. The mitigation technique referred to in regulation 10(g) is a technique for mitigating interference described in harmonised standards called the detect and avoid mitigation technique and the technique and its limits are described in EN 302 065-2<sup>(20)</sup>.

**PART 4****USE OF ULTRA-WIDEBAND EQUIPMENT IN AUTOMOTIVE VEHICLES AND RAILWAY VEHICLES****Exemption**

12. The establishment, installation or use of ultra-wideband equipment complying with the terms, provisions and limitations in regulation 13 is hereby exempt from the provisions of section 8(1) of the Act.

**Terms, provisions and limitations**

13.—(1) The exemption provided for in regulation 12 shall apply to ultra-wideband equipment which complies with the requirements of paragraphs (2) to (4) of this regulation.

(2) The ultra-wideband equipment must be used in an automotive vehicle or in a railway vehicle.

(3) The ultra-wideband equipment must not cause or contribute to undue interference to other users of the electromagnetic spectrum.

(4) The ultra-wideband equipment must emit transmissions which are in accordance with the condition in regulation 14.

**Transmission limits**

14. The condition referred to in regulation 13(4) is that the ultra-wideband equipment only emits transmissions which—

(a) in frequencies up to 1.6 GHz when measured in any direction have—

(i) a maximum mean power spectral density no greater than -90.0 dBm/MHz; and

(ii) a maximum peak power no greater than -50.0 dBm or the equivalent transmission level;

(b) in the frequency band 1.6 GHz to 2.7 GHz when measured in any direction have—

(i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and

(ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level;

(c) in the frequency band 2.7 GHz to 3.1 GHz when measured in any direction have—

(i) a maximum mean power spectral density no greater than -70.0 dBm/MHz; and

(ii) a maximum peak power no greater than -36.0 dBm or the equivalent transmission level;

(d) in the frequency band 3.1 GHz to 3.4 GHz when measured in any direction—

(i) have a maximum mean power spectral density—

(aa) no greater than -70.0 dBm; or

(bb) no greater than -41.3 dBm/MHz provided that the technique set out in regulation 15(a) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; or

(cc) no greater than -41.3 dBm/MHz provided that both of the techniques set out in regulation 15(b) and (c) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; and

(ii) have a maximum peak power—

<sup>(20)</sup> EN 302 065-2 (Version 1.1.1) published in April 2014.

- (aa) no greater than -36 dBm or the equivalent transmission level; or
  - (bb) no greater than 0.0 dBm or the equivalent transmission level provided that the technique set out in regulation 15(a) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; or
  - (cc) no greater than 0.0 dBm or the equivalent transmission level provided that both of the techniques set out in regulation 15(b) and (c) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied;
- (e) in the frequency band 3.4 GHz to 3.8 GHz when measured in any direction—
- (i) have a maximum mean power spectral density—
    - (aa) no greater than -80.0 dBm/MHz; or
    - (bb) no greater than -41.3 dBm provided that the technique set out in regulation 15(a) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; or
    - (cc) no greater than -41.3 dBm provided that both of the techniques set out in regulation 15(b) and (c) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; and
  - (ii) have a maximum peak power—
    - (aa) no greater than -40.0 dBm or the equivalent transmission level; or
    - (bb) no greater than 0.0 dBm or the equivalent transmission level provided that both of the techniques set out in regulation 15(a) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; or
    - (cc) no greater than 0.0 dBm or the equivalent transmission level provided that both of the techniques set out in regulation 15(b) and (c) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied;
- (f) in the frequency band 3.8 GHz to 4.8 GHz when measured in any direction—
- (i) have a maximum mean power spectral density—
    - (aa) no greater than -70.0 dBm/MHz; or
    - (bb) no greater than -41.3 dBm provided that the technique set out in regulation 15(a) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; or
    - (cc) no greater than -41.3 dBm provided that both of the techniques set out in regulation 15(b) and (c) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; and
  - (ii) have a maximum peak power—
    - (aa) no greater than -30.0 dBm or the equivalent transmission level; or
    - (bb) no greater than 0.0 dBm or the equivalent transmission level provided that the technique set out in regulation 15(a) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; or
    - (cc) no greater than 0.0 dBm or the equivalent transmission level provided that both of the techniques set out in regulation 15(b) and (c) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied;
- (g) in the frequency band 4.8 GHz to 6.0 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -70.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -30.0 dBm or the equivalent transmission level;
- (h) in the frequency band 6.0 GHz to 8.5 GHz when measured in any direction—
- (i) have a maximum mean power spectral density—

- (aa) no greater than -53.3 dBm/MHz; or
  - (bb) no greater than -41.3 dBm provided that the technique set out in regulation 15(a) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; or
  - (cc) no greater than -41.3 dBm provided that the technique set out in regulation 15(c) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; and
- (ii) have a maximum peak power—
- (aa) no greater than -13.3 dBm or the equivalent transmission level; or
  - (bb) no greater than 0.0 dBm or the equivalent transmission level provided that the technique set out in regulation 15(a) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; or
  - (cc) no greater than 0.0 dBm or the equivalent transmission level that the technique set out in regulation 15(c) below is used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied;
- (i) in the frequency band 8.5 GHz to 9 GHz when measured in any direction have—
- (i) a maximum mean power spectral density—
    - (aa) no greater than -65.0 dBm/MHz; or
    - (bb) no greater than -41.3 dBm/MHz provided that both of the techniques set out in regulation 15(b) and (c) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied; and
  - (ii) have a maximum peak power—
    - (aa) no greater than -25 dBm; or
    - (bb) no greater than 0 dBm or the equivalent transmission level provided that both of the techniques set out in regulation 15(b) and (c) below are used to mitigate interference to other users of the electromagnetic spectrum and an exterior limit of -53.3 MHz is applied;
- (j) in the frequency band 9 GHz to 10.6 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -65.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm or the equivalent transmission level; and
- (k) in frequency bands above 10.6 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level.

### Mitigation techniques

**15.** The mitigation techniques referred to in regulation 14 are techniques for mitigating interference described in harmonised standards and includes each of the following—

- (a) the low duty cycle mitigation technique and its limits which is described in EN 302 065-3<sup>(21)</sup>; and
- (b) the detect and avoid mitigation technique and its limits which is described in EN 302 065-3; and
- (c) the transmit power control mitigation technique and its limits which is described in EN 302 065-3.

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<sup>(21)</sup> EN 302 065-3 (Version 1.1.1) published in April 2014.

## PART 5

### USE OF ULTRA-WIDEBAND EQUIPMENT ONBOARD AIRCRAFT

#### Exemption

**16.** The establishment, installation or use of ultra-wideband equipment complying with the terms, provisions and limitations in regulation 17 is hereby exempt from the provisions of section 8(1) of the Act.

#### Terms, provisions and limitations

**17.**—(1) The exemption provided for in regulation 16 shall apply to ultra-wideband equipment which complies with the requirements of paragraph (2) to (4) of this regulation.

- (2) The ultra-wideband equipment must be used onboard aircraft where the aircraft is—
- (a) an aircraft registered in the British Islands; and
  - (b) flying over the British Islands and the territorial waters adjacent thereto, or for the time being beyond the British Islands and the territorial waters adjacent hereto.
- (3) The ultra-wideband equipment must not cause or contribute to undue interference to other users of the electromagnetic spectrum.
- (4) The ultra-wideband equipment must—
- (a) emit transmissions which are in accordance with the condition in regulation 18; or
  - (b) operate using mitigation techniques described in regulation 19 to reduce interference to other users of the electromagnetic spectrum.

#### Transmission limits

**18.** The condition referred to in regulation 17(4)(a) is that the ultra-wideband equipment only emits transmissions—

- (a) in frequencies up to 1.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -90.0 dBm/MHz; and
  - (ii) a maximum peak power density no greater than -50.0 dBm or the equivalent transmission level;
- (b) in the frequency band 1.6 GHz to 2.7 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and
  - (ii) a maximum peak e.i.r.p. density no greater than -45.0 dBm or the equivalent transmission level;
- (c) in the frequency band 2.7 GHz to 3.4 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dBm/MHz; and
  - (ii) a maximum peak power density no greater than -36.0 dBm or the equivalent transmission level;
- (d) in the frequency band 3.4 GHz to 3.8 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density no greater than -80.0 dBm; and
  - (ii) a maximum peak power density no greater than -40.0 dBm or the equivalent transmission level;
- (e) in the frequency band 3.8 GHz to 6.0 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -30.0 dBm or the equivalent transmission level;
- (f) in the frequency band 6.0 GHz to 6.650 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -41.3 dBm/MHz; and

- (ii) a maximum peak power no greater than 0.0 dBm or the equivalent transmission level;
- (g) in the frequency band 6.650 GHz to 6.6752 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -62.3 dBm/MHz; and
  - (ii) a maximum peak power no greater than -21.0 dBm or the equivalent power level;
- (h) in the frequency bands 6,6752 GHz to 7.25 GHz and 7.9 GHz to 8.5 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -41.3 dBm/MHz; and
  - (ii) a maximum peak power no greater than 0.0 dBm or the equivalent transmission level;
- (i) in the frequency band 7.25 GHz to 7.75 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density—
    - (aa) no greater than -41.3 dBm/MHz; or
    - (bb) no greater than  $-51.3 \text{ dBm/MHz} - 20 \cdot \log_{10}(10[\text{km}]/x[\text{km}])(\text{dBm/MHz})$  (where x is the aircraft height above ground) provided that the aircraft that the ultra-wideband equipment is onboard is above 1000 meters above ground level; or
    - (cc) no greater than -71.3 dBm/MHz provided that the aircraft that the ultra-wideband equipment is onboard is 1000 meters above ground level or below; and
  - (ii) have a maximum peak power no greater than 0.0 dBm or the equivalent transmission level;
- (j) In the frequency band 7.75 GHz to 7.9 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density—
    - (aa) no greater than -41.3 dBm/MHz; or
    - (bb) no greater than  $-44.3 \text{ dBm/MHz} - 20 \cdot \log_{10}(10[\text{km}]/x[\text{km}])(\text{dBm/MHz})$  provided that the aircraft that the ultra-wideband equipment is onboard is above 1000 meters above ground level; or
    - (cc) no greater than -64.3 dBm/MHz provided that the aircraft that the ultra-wideband equipment is onboard is 1000 meters above ground level or below; and
  - (ii) have a maximum peak power no greater than 0.0 dBm or the equivalent transmission level;
- (k) in the frequency band 8.5 to 10.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -65.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm or the equivalent transmission level; and
- (l) in frequency bands above 10.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level.

### Mitigation techniques

**19.**—(1) The mitigation techniques referred to in regulation 17(4)(b) are techniques for mitigating interference which achieve at least an equivalent level of protection from interference to other users of the electromagnetic spectrum as that provided by the condition in regulation 18(f) to (j).

(2) The techniques that may be used under regulation 19(1) for equipment operating in the frequency bands 6.650 GHz to 6.6752 GHz and 7.25 GHz to 7.9 GHz include the use of shielded portholes.

## PART 6

### USE OF ULTRA-WIDEBAND EQUIPMENT FOR MATERIAL SENSING DEVICES

#### Exemption

**20.** The establishment, installation or use of ultra-wideband equipment complying with the terms, provisions and limitations in either regulation 21 or 22 are hereby exempt from the provisions of section 8(1) of the Act.

#### Terms, provisions and limitations for fixed installations

**21.**—(1) The exemption provided for in regulation 20 shall apply to ultra-wideband equipment which is also a material sensing device and which complies with the requirements of paragraphs (2) to (4) of this regulation.

(2) The ultra-wideband equipment must—

- (a) have a sensor that detects when it is not running and turns the transmitter off;
- (b) implement a total power control with a dynamic range of 10.0 dB as described in EN 302 498-2<sup>(22)</sup>; and
- (c) be attached to a fixed installation.

(3) the ultra-wideband equipment must not cause or contribute to undue interference to other users of the electromagnetic spectrum.

(4) The ultra-wideband equipment must emit transmissions which are kept to a minimum and in accordance with the condition in regulation 23.

#### Terms, provisions and limitations for non-fixed installations

**22.**—(1) The exemption provided for in regulation 20 shall also apply to ultra-wideband equipment which is also a material sensing device and which complies with the requirements of paragraphs (2) to (4) of this regulation.

(2) The ultra-wideband equipment must—

- (a) only have the transmitter turned on if manually operated with a non-locking switch;
- (b) be in contact with or in close proximity to the investigated material; and
- (c) direct the emissions into the direction of the object of the analysis.

(3) the ultra-wideband equipment must not cause or contribute to undue interference to other users of the electromagnetic spectrum.

(4) The ultra-wideband equipment must only emit signals that are radiated into the air which are kept to a minimum and (if the equipment were placed on a representative wall as defined within Annex D of EN 302-435-1<sup>(23)</sup> and EN302 498-1<sup>(24)</sup>) are in accordance with the condition in regulation 24.

#### Transmission limits for fixed installations

**23.** The condition referred to in regulation 21(4) is that the ultra-wideband equipment only emits transmissions which—

- (a) In frequencies up to 1.73 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dB/MHz; and
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -85dB/MHz; and

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<sup>(22)</sup> EN 302 498-2 (Version 1.1.1) published in June 2010

<sup>(23)</sup> EN 302 435-1 (Version 1.3.1 published in December 2009.

<sup>(24)</sup> EN 302 498-1 (Version 1.1.1) published in June 2010.

- (iii) a maximum peak power no greater than -60.0 dBm;
- (b) In frequency band 1.73 GHz to 2.2GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -65.0 dB/MHz; and
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -70.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -40.0 dBm;
- (c) In frequency band 2.2 GHz to 2.5GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz; and
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -50.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25 dBm;
- (d) In frequency band 2.5 GHz to 2.69GHz when measured in any direction have—
  - (i) a maximum mean power spectral density—
    - (aa) no greater than -65.0 dB/MHz; or
    - (bb) no greater than -50.0 dB/MHz provided that a listen before talk mechanism described in ETSI EN 302 435-1 is used to mitigate interference to other users of the electromagnetic spectrum;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -70.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -40dBm;
- (e) In frequency band 2.69 GHz to 2.7GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -55.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -75.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -30.0 dBm;
- (f) In frequency band 2.7 GHz to 2.9GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -70.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (g) In frequency band 2.9 GHz to 3.4 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -70.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (h) In frequency band 3.4 GHz to 3.8 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -70.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (i) In frequency band 3.8 GHz to 4.8 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -50.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (j) In frequency band 4.8 GHz to 5.0 GHz when measured in any direction have—

- (i) a maximum mean power spectral density no greater than -55.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -75.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -30.0 dBm;
- (k) In frequency band 5 GHz to 5.25 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -50.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (l) In frequency band 5.25 GHz to 5.35 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -60.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (m) In frequency band 5.35 GHz to 5.6 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -50.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (n) In frequency band 5.6 GHz to 5.65 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -65.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (o) In frequency band 5.65 GHz to 5.725 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -60.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (p) In frequency band 5.725 GHz to 8.5 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -50.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -50.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -25.0 dBm;
- (q) In frequency band 8.5 GHz to 10.6 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -65.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -65.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -40.0 dBm; and
- (r) In frequency bands above 10.6 GHz when measured in any direction have—
- (i) a maximum mean power spectral density no greater than -85.0 dB/MHz;
  - (ii) a maximum mean power spectral density in the horizontal plane (-20 degrees to 30 degrees elevation) of -85.0 dB/MHz; and
  - (iii) a maximum peak power no greater than -60.0 dBm;

**Transmission limits for non-fixed installations**

24. The condition referred to in regulation 22(4) is that the ultra-wideband equipment only emits transmissions which—

- (a) In frequencies up to 1.73 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -60.0 dBm;
- (b) In frequency band 1.73 GHz to 2.2 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm;
- (c) In frequency band 2.2 GHz to 2.5 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm;
- (d) In frequency band 2.5 GHz to 2.69 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density—
    - (aa) no greater than -65.0 dB/MHz; or
    - (bb) no greater than -50.0 dB/MHz provided that a listen before talk mechanism described in EN 302 435-1<sup>(25)</sup> is used to mitigate interference to other users of the electromagnetic spectrum;
  - (ii) a maximum peak power no greater than -40.0 dBm; and
  - (iii) a total radiated power spectral density no greater than -75.0 dB/MHz;
- (e) In frequency band 2.69 GHz to 2.7 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dB/MHz provided that all transmissions are limited to a maximum of 100 milliseconds in any one second; and
  - (ii) a maximum peak power no greater than -45.0 dBm;
- (f) In frequency band 2.7 GHz to 2.9 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -70.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm;
- (g) In frequency band 2.9 GHz to 3.4 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density
    - (aa) no greater than -70.0 dB/MHz; or
    - (bb) no greater than -50.0 dB/MHz provided that a listen before talk mechanism described in EN 302 435-1 is used to mitigate interference to other users of the electromagnetic spectrum;
  - (ii) a maximum peak power no greater than -45.0 dBm;
- (h) In frequency band 3.4 GHz to 3.8 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz provided that all transmissions are limited to a maximum of 100 milliseconds in any one second;
  - (ii) a maximum peak power no greater than -25.0 dBm; and
  - (iii) a total radiated power spectral density no greater than -55.0 dB/MHz;
- (i) In frequency band 3.8 GHz to 4.8 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm;
- (j) In frequency band 4.8 GHz to 5.0 GHz when measured in any direction have—

<sup>(25)</sup> EN 302 435 -1 (Version 1.3.1) published in December 2009.

- (i) a maximum mean power spectral density no greater than -55.0 dB/MHz provided that all transmissions are limited to a maximum of 100 milliseconds in any one second;
- (ii) a maximum peak power no greater than -30.0 dBm; and
- (iii) a total radiated power spectral density no greater than -65.0 dB/MHz;
- (k) In frequency band 5 GHz to 5.25 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm;
- (l) In frequency band 5.25 GHz to 5.35GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm;
- (m) In frequency band 5.35 GHz to 5.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm;
- (n) In frequency band 5.6 GHz to 5.65 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -65.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -40.0 dBm;
- (o) In frequency band 5.65 GHz to 5.725 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -60.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -35.0 dBm;
- (p) In frequency band 5.725 GHz to 8.5 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -25.0 dBm;
- (q) In frequency band 8.5 GHz to 10.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -65.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -40.0 dBm; and
- (r) In frequency bands above 10.6 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dB/MHz; and
  - (ii) a maximum peak power no greater than -60.0 dBm;

## **PART 7**

### **USE OF ULTRA-WIDEBAND EQUIPMENT FOR BUILDING MATERIAL ANALYSIS**

#### **Exemption**

**25.** The establishment, installation or use of ultra-wideband equipment complying with the terms, provisions and limitations in regulation 26 is hereby exempt from the provisions of section 8(1) of the Act.

#### **Terms, provisions and limitations**

**26.—(1)** The exemption provided for in regulation 25 shall apply to ultra-wideband equipment which is also a building material analysis device and which complies with the requirements of paragraphs (2) to (6) of this regulation.

(2) The ultra-wideband equipment must—

- (a) only have the transmitter turned on if manually operated with a non-locking switch;
- (b) be used in close proximity to the material being analysed with the emissions being directed into the direction of the object of the analysis; and

(c) switch off automatically after 10 seconds without any movement.

(3) The ultra-wideband equipment must not cause or contribute to undue interference to other users of the electromagnetic spectrum.

(4) The ultra-wideband equipment must only emit signals that are radiated into the air which are kept to a minimum and (if the equipment were placed on a representative wall as defined within Annex D of EN 302-435-1<sup>(26)</sup> and EN 302-498-1<sup>(27)</sup>) are in accordance with the condition in regulation 21.

### Transmission limits

27. The condition referred to in regulation 26(4) is that the ultra-wideband equipment only emits transmissions which—

- (a) in the frequencies up to 1.215 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz; and
  - (ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level;
  - (iii) a total radiated power spectral density of -90.0 dBm/MHz;
- (b) in the frequency band 1.215 GHz to 1.73 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density —
    - (aa) no greater than -85.0 dBm/MHz; or
    - (bb) no greater than -70.0 dBm/MHz provided that a listen before talk mechanism described in EN302 435-1 is used to mitigate interference to other users of the electromagnetic spectrum.
  - (ii) have a maximum peak power no greater than -45.0 dBm or the equivalent transmission level; and
  - (iii) have a total radiated power spectral density of -90.0 dBm/MHz;
- (c) in the frequency band 1.73 GHz to 2.2 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -65.0 dBm/MHz;
  - (ii) a maximum peak power no greater than -25.0 dBm or the equivalent transmission level; and
  - (iii) a total radiated power spectral density of -70 dBm/MHz;
- (d) in the frequency band 2.2 GHz to 2.5 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dBm/MHz;
  - (ii) a maximum peak power no greater than -10.0 dBm or the equivalent transmission level; and
  - (iii) a total radiated power spectral density of -55 dBm/MHz;
- (e) in the frequency band 2.5 GHz to 2.69 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density —
    - (aa) no greater than -65.0 dBm/MHz; or
    - (bb) no greater than -50.0 dBm/MHz provided that a listen before talk mechanism described in harmonised standard EN302 435-1 is used to mitigate interference to other users of the electromagnetic spectrum;
  - (ii) have a maximum peak power spectral density no greater than -25.0 dBm or the equivalent transmission level; and
  - (iii) have a total radiated power spectral density of -70.0 dBm/MHz;
- (f) in the frequency band 2.69 GHz to 2.7 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -55.0 dBm/MHz;
  - (ii) a maximum peak power no greater than -15.0 dBm or the equivalent transmission level; and

<sup>(26)</sup> EN 302 435-1 (Version 1.3.1) published in December 2009.

<sup>(27)</sup> EN 302 498-1 (Version 1.1.1) published in June 2010.

- (iii) a total radiated power spectral density below -65.0 dBm/MHz;
- (g) in the frequency band 2.7 GHz to 3.4 GHz when measured in any direction—
  - (i) have a maximum mean power spectral density —
    - (aa) no greater than -70.0 dBm/MHz; or
    - (bb) no greater than -50.0 dBm/MHz provided that a listen before talk mechanism described in EN302 435-1 is used to mitigate interference to other users of the electromagnetic spectrum;
  - (ii) have a maximum peak power no greater than -30.0 dBm or the equivalent transmission level; and
  - (iii) have a total radiated power spectral density of -75.0 dBm/MHz;
- (h) in the frequency band 3.4 GHz to 4.8 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dBm/MHz;
  - (ii) a maximum peak power no greater than -10.0 dBm or the equivalent transmission level; and
  - (iii) a total radiated power spectral density of -55.0 dBm/MHz;
- (i) in the frequency band 4.8 GHz to 5.0 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -55.0 dBm/MHz;
  - (ii) a maximum peak power no greater than -15.0 dBm or the equivalent transmission level; and
  - (iii) a total radiated power spectral density below -65.0 dBm/MHz;
- (j) in the frequency band 5.0 GHz to 8.5 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -50.0 dBm/MHz;
  - (ii) a maximum peak power no greater than -10.0 dBm or the equivalent transmission level; and
  - (iii) a total radiated power spectral density of -55.0 dBm/MHz;
- (k) in the frequency bands above 8.5 GHz when measured in any direction have—
  - (i) a maximum mean power spectral density no greater than -85.0 dBm/MHz;
  - (ii) a maximum peak power no greater than -45.0 dBm or the equivalent transmission level; and
  - (iii) a total radiated power spectral density of -90.0 dBm/MHz.

**Annex 7**

# UWB Amendment Decision

## COMMISSION IMPLEMENTING DECISION

of 7 October 2014

**amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community**

*(notified under document C(2014) 7083)*

*(2014/702/EU)*

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Decision No 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community (Radio Spectrum Decision)<sup>(1)</sup>, and in particular Article 4(3) thereof,

Whereas:

- (1) Commission Decision 2007/131/EC<sup>(2)</sup> as amended by Decision 2009/343/EC<sup>(3)</sup>, harmonises the technical conditions for radio equipment using ultra-wideband (hereinafter 'UWB') technology in the Union. It ensures that the radio spectrum is available across the Union under harmonised conditions, eliminates barriers to the uptake of UWB technology and creates an effective single market for UWB systems with significant economies of scale and benefits to the consumer.
- (2) Rapid changes in technology and in the use of the radio spectrum need to be adequately reflected in the regulation of UWB technology, to allow European society to benefit from the introduction of innovative applications based on this technology, while ensuring that other spectrum users are not adversely affected. The latest version of Decision 2007/131/EC therefore needs to be amended.
- (3) For this reason, on 28 May 2012 the Commission issued a Fifth Mandate, pursuant to Decision No 676/2002/EC, to the European Conference of Postal and Telecommunications Administrations (CEPT) on UWB technology, to clarify technical parameters in the light of a potential update to Decision 2007/131/EC.
- (4) In CEPT Report 45, approved on 21 June 2013 by the Electronic Communications Committee (ECC) and submitted in response to the fifth mandate, CEPT advised the Commission to take a more streamlined approach on subsequent amendments of Decision 2007/131/EC, taking into account the description of mitigation techniques with all the relevant detailed parameters within the harmonised European standards developed by the European Telecommunications Standards Institute (ETSI).
- (5) CEPT Report 45 clarified the technical conditions under which specific mitigation techniques enable UWB equipment to be operated with higher transmission powers, while offering equivalent protection for existing UWB limits on generic use, Automotive and railway vehicles use and location-tracking equipment. In addition to the recommendations from this report, which should be applied across the EU, the definitions and the technical

parameters of these mitigation techniques should also be made binding, as set out in the relevant standards, as these techniques only provide a mitigation effect when used with appropriate operational parameters.

- (6) UWB equipment onboard aircraft should be permitted only on the condition that they fulfil air safety standards, with appropriate airworthiness certification and other relevant aeronautical provisions, and electronic communication standards. Airworthiness certificates valid throughout the Community are issued by the European Aviation Safety Agency, pursuant to Commission Regulation (EU) No 748/2012 <sup>(4)</sup>.
- (7) Material sensing devices have a number of uses in detecting and characterising objects and materials or taking pictures of pipes, wires and other intra-wall structures in residential or commercial buildings. CEPT has advised the Commission that more relaxed limits on the use of material sensing devices are possible, as the way they are used, combined with their very low deployment densities and activity factors, further mitigate the possibility of harmful interference to radio-communication services. The revised limits are set out in ECC Decision ECC/DEC/(07)01 of 30 March 2007, as amended on 26 June 2009.
- (8) Pursuant to Directive 1999/5/EC of the European Parliament and of the Council <sup>(5)</sup>, the Commission has given mandate M/407 to the European standardisation organisations to draw up a set of harmonised standards. These will cover UWB equipment to be recognised under this Directive, and there will be a presumption of conformity with its requirements. In response to mandate M/407 from the Commission, ETSI has developed the harmonised standards: EN 302 065-1 on common technical requirements for short-range devices using UWB, EN 302 065-2, on requirements for UWB location tracking and EN 302 065-3 on requirements for UWB devices for road and rail vehicles.
- (9) The Memorandum of Understanding between the ECC and ETSI, signed on 20 October 2004, ensures coordination of the development of harmonised standards and the regulatory conditions for the use of the spectrum relevant to such standards. Technical details of mitigation techniques are set through ETSI-harmonised European standards and ECC Decision (06)04, and these will remain aligned in any subsequent modifications, as set out in the ECC-ETSI Memorandum of Understanding. As a result, the Commission Decision should only list appropriate mitigation techniques.
- (10) Decision 2007/131/EC should therefore be amended accordingly.
- (11) The measures provided for in this Decision are in accordance with the opinion of the Radio Spectrum Committee,

HAS ADOPTED THIS DECISION:

#### *Article 1*

Decision 2007/131/EC is amended as follows:

- (1) in Article 2, points 6, 7 and 8 are replaced by:

6. “e.i.r.p” means equivalent isotropically radiated power, which is 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);

7. “maximum mean power spectral density”, specified as e.i.r.p. of the radio device under test at a particular frequency, is the average power per unit bandwidth (centred on that frequency) radiated in the direction of the maximum level under the specified conditions of measurement;

8. “peak power”, specified as e.i.r.p., contained within a 50 MHz bandwidth at the frequency at which the highest mean radiated power occurs, radiated in the direction of the maximum level under the specified conditions of measurement;’

;

(2) in Article 2, point 9 is deleted;

(3) in Article 2, point 11 is replaced by:

‘11. “total radiated power spectral density” means the average of the mean power spectral density values measured over a sphere around the measurement scenario with a resolution of at least 15 degree. The detailed measuring setup is contained within ETSI EN 302 435;’

;

(4) in Article 2, the following points 12 and 13 are added:

‘12. “onboard aircraft” means the use of radio links for intra-aircraft communications purposes inside an aircraft;

13. “LT1” are systems intended for general location tracking of people and objects that can be put into service on an unlicensed basis.’

;

(5) Article 3, is replaced by the following:

#### *Article 3*

The Member States shall allow the use of the radio spectrum on a non-interference and non-protected basis by equipment using ultra-wideband technology provided that such equipment meets the conditions set out in the Annex and it is used indoors or, if it is used outdoors, it is not attached to a fixed installation, a fixed infrastructure or a fixed outdoor antenna. Equipment using ultra-wideband technology which meets the conditions set in the Annex shall also be allowed in automotive and railway vehicles’

;

(6) the Annex is replaced by the text in the Annex to this Decision.

#### *Article 2*

This Decision shall take effect from 1 February 2015.

#### *Article 3*

This Decision is addressed to the Member States.

Done at Brussels, 7 October 2014.

*For the Commission*

Neelie KROES

*Vice-President*

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(<sup>1</sup>) [OJ L 108 24.4.2002, p. 1.](#)

<sup>(2)</sup> Commission Decision 2007/131/EC of 21 February 2007 on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community ([OJ L 55, 23.2.2007, p. 33](#)).

<sup>(3)</sup> Commission Decision 2009/343/EC of 21 April 2009 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community ([OJ L 105, 25.4.2009, p. 9](#)).

<sup>(4)</sup> Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations ([OJ L 224, 21.8.2012, p. 1](#)).

<sup>(5)</sup> Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ([OJ L 91, 7.4.1999, p. 10](#)).

## ANNEX

### 1. GENERIC UWB USAGE

Technical requirements		
Frequency range	Maximum mean power spectral density (e.i.r.p)	Maximum peak power (e.i.r.p) (defined in 50 MHz)
$f \leq 1,6$ GHz	– 90 dBm/MHz	– 50 dBm
$1,6 < f \leq 2,7$ GHz	– 85 dBm/MHz	– 45 dBm
$2,7 < f \leq 3,1$ GHz	– 70 dBm/MHz	– 36 dBm
$3,1 < f \leq 3,4$ GHz	– 70 dBm/MHz or – 41,3 dBm/MHz using LDC <sup>(1)</sup> or DAA <sup>(2)</sup>	– 36 dBm or 0 dBm
$3,4 < f \leq 3,8$ GHz	– 80 dBm/MHz or – 41,3 dBm/MHz using LDC <sup>(1)</sup> or DAA <sup>(2)</sup>	– 40 dBm or 0 dBm
$3,8 < f \leq 4,8$ GHz	– 70 dBm/MHz or – 41,3 dBm/MHz using LDC <sup>(1)</sup> or DAA <sup>(2)</sup>	– 30 dBm or 0 dBm
$4,8 < f \leq 6$ GHz	– 70 dBm/MHz	– 30 dBm
$6 < f \leq 8,5$ GHz	– 41,3 dBm/MHz	0 dBm
$8,5 < f \leq 9$ GHz	– 65 dBm/MHz or – 41,3 dBm/MHz using DAA <sup>(2)</sup>	– 25 dBm or 0 dBm
$9 < f \leq 10,6$ GHz	– 65 dBm/MHz	– 25 dBm
$f > 10,6$ GHz	– 85 dBm/MHz	– 45 dBm

### 2. LOCATION TRACKING SYSTEMS TYPE 1 (LT1)

Technical requirements
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Frequency range	Maximum mean power spectral density (e.i.r.p)	Maximum peak power (e.i.r.p) (defined in 50 MHz)
$f \leq 1,6$ GHz	- 90 dBm/MHz	- 50 dBm
$1,6 < f \leq 2,7$ GHz	- 85 dBm/MHz	- 45 dBm
$2,7 < f \leq 3,4$ GHz	- 70 dBm/MHz	- 36 dBm
$3,4 < f \leq 3,8$ GHz	- 80 dBm/MHz	- 40 dBm
$3,8 < f \leq 6,0$ GHz	- 70 dBm/MHz	- 30 dBm
$6 < f \leq 8,5$ GHz	- 41,3 dBm/MHz	0 dBm
$8,5 < f \leq 9$ GHz	- 65 dBm/MHz or - 41,3 dBm/MHz using DAA <u>(3)</u>	- 25 dBm or 0 dBm
$9 < f \leq 10,6$ GHz	- 65 dBm/MHz	- 25 dBm
$f > 10,6$ GHz	- 85 dBm/MHz	- 45 dBm

### 3. UWB DEVICES INSTALLED IN ROAD AND RAIL VEHICLES

Technical requirements		
Frequency range	Maximum mean power spectral density (e.i.r.p)	Maximum peak power (e.i.r.p) (defined in 50 MHz)
$f \leq 1,6$ GHz	- 90 dBm/MHz	- 50 dBm
$1,6 < f \leq 2,7$ GHz	- 85 dBm/MHz	- 45 dBm
$2,7 < f \leq 3,1$ GHz	- 70 dBm/MHz	- 36 dBm
$3,1 < f \leq 3,4$ GHz	- 70 dBm/MHz or - 41,3 dBm/MHz using LDC <u>(4)</u> + e,1, <u>(7)</u> or - 41,3 dBm/MHz using TPC <u>(6)</u> + DAA <u>(5)</u> + e,1, <u>(7)</u>	- 36 dBm or $\leq 0$ dBm or $\leq 0$ dBm
$3,4 < f \leq 3,8$ GHz	- 80 dBm/MHz or - 41,3 dBm/MHz using LDC <u>(4)</u> + e,1, <u>(7)</u> or - 41,3 dBm/MHz using TPC <u>(6)</u> + DAA <u>(5)</u> + e,1, <u>(7)</u>	- 40 dBm or $\leq 0$ dBm or $\leq 0$ dBm
$3,8 < f \leq 4,8$ GHz	- 70 dBm/MHz or - 41,3 dBm/MHz using LDC <u>(4)</u> + e,1, <u>(7)</u> or - 41,3 dBm/MHz using TPC <u>(6)</u> + DAA <u>(5)</u> + e,1,	- 30 dBm or $\leq 0$ dBm or

	(7)	≤ 0 dBm
4,8 < f ≤ 6 GHz	– 70 dBm/MHz	– 30 dBm
6 < f ≤ 8,5 GHz	– 53,3 dBm/MHz or – 41,3 dBm/MHz using LDC (4) + e, l, (7) or – 41,3 dBm/MHz using TPC (6) + e, l, (7)	– 13,3 dBm or ≤ 0 dBm or ≤ 0 dBm
8,5 < f ≤ 9 GHz	– 65 dBm/MHz or – 41,3 dBm/MHz using TPC (6) + DAA (5) + e, l, (7)	– 25 dBm or ≤ 0 dBm
9 < f ≤ 10,6 GHz	– 65 dBm/MHz	– 25 dBm
f > 10,6 GHz	– 85 dBm/MHz	– 45 dBm

#### 4. UWB ONBOARD AIRCRAFT

The values for maximum mean power spectral density (e.i.r.p) and maximum peak power (e.i.r.p) for Short Range Devices (SRD) using Ultra Wide Band technology (UWB), with or without use of mitigation techniques are listed in the table below.

Technical requirements			
Frequency range	Maximum mean power spectral density (e.i.r.p)	Maximum peak power (e.i.r.p) (defined in 50 MHz)	Requirements for mitigation techniques
f ≤ 1,6 GHz	– 90 dBm/MHz	– 50 dBm	
1,6 < f ≤ 2,7 GHz	– 85 dBm/MHz	– 45 dBm	
2,7 < f ≤ 3,4 GHz	– 70 dBm/MHz	– 36 dBm	
3,4 < f ≤ 3,8 GHz	– 80 dBm/MHz	– 40 dBm	
3,8 < f ≤ 6,0 GHz	– 70 dBm/MHz	– 30 dBm	
6,0 < f ≤ 6,650 GHz	– 41,3 dBm/MHz	0 dBm	
6,650 < f ≤ 6,6752 GHz	– 62,3 dBm/MHz	– 21 dBm	notch of 21 dB should be implemented to meet a level – 62,3 dBm/MHz (8)
6,6752 < f ≤ 8,5 GHz	– 41,3 dBm/MHz	0 dBm	7,25 to 7,75 GHz (FSS and MetSat (7,45 to 7,55 GHz) protection) (8) (9) 7,75 to 7,9 GHz (MetSat protection) (8) (10)
8,5 < f ≤ 10,6 GHz	– 65 dBm/MHz	– 25 dBm	

GHz			
f > 10,6 GHz	– 85 dBm/MHz	– 45 dBm	

## 5. MATERIAL SENSING DEVICES USING UWB TECHNOLOGY

### 5.1. Material sensing devices

Material sensing devices permitted under this Decision shall fulfil the following requirements:

—*Fixed installation (application A)*

- The transmitter has to switch off if the machine is not running, ‘running sensor’;
- The transmitter shall implement a TPC with a dynamic range of 10 dB, as described in the harmonised standard EN 302 498-2 for ODC (*Object Discrimination and Characterisation*) applications;
- The transmitter shall be attached to a fixed installation.

—*Non-fixed installation (application B)*

- 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);
- The transmitter has to switch off if the machine is not running, ‘running sensor’

Emissions radiating from material sensing devices permitted under this decision shall be kept to a minimum and in any case not exceed the e.i.r.p. density limits within the following Table. The compliance with the limits of the following Table for non-fixed installations (application B) has to be ensured with the device on a representative structure of the investigated material (e.g. representative wall as defined in ETSI EN 302 435-1 or ETSI EN 302 498-1).

Frequency range	Fixed installations (Application A)		Non-fixed installations (Application B) Maximum mean power spectral density (e.i.r.p)
	Maximum mean power spectral density (e.i.r.p)	Maximum mean power spectral density (e.i.r.p) 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 <sup>(11)</sup>	– 70dBm/MHz	– 65 dBm/MHz <sup>(11)</sup> <sup>(12)</sup>
2,69 to 2,7 GHz	– 55 dBm/MHz	– 75 dBm/MHz	– 70 dBm/MHz <sup>(13)</sup>
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 <sup>(11)</sup>
3,4 to 3,8 GHz	– 50 dBm/MHz	– 70 dBm/MHz	– 50 dBm/MHz <sup>(12)</sup> <sup>(13)</sup>
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 <sup>(12)</sup> <sup>(13)</sup>
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 8,5 GHz	– 50 dBm/MHz		– 50 dBm/MHz
8,5 to 10,6 GHz	– 65 dBm/MHz		– 65 dBm/MHz
Above 10,6 GHz	– 85 dBm/MHz		– 85 dBm/MHz
The peak power (in dBm) measured in a bandwidth of 50 MHz shall be less than a limit that is obtained by adding a conversion factor (25 dB) to the ‘maximum mean power spectral density’ (in dBm/MHz) limit.			

## 5.2. Building material analysis devices (BMA)

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

- (a) Transmitter-On only if manually operated with a non-locking switch plus being in contact or close proximity to the investigated material and the emissions being directed into the direction of the object;
- (b) The BMA transmitter has to switch-off after max 10s without movement;
- (c) The total radiated power spectral density has to be 5 dB below the maximum mean power spectral density limits in the table below;

2. Emissions radiating from BMA devices shall be kept to a minimum and in any case not exceed the maximum power limits within the table below with the BMA device on a representative wall as defined within ETSI Standards EN 302 435-1 and EN 302 498-2.

Technical requirements		
Frequency range	Maximum mean power spectral density (e.i.r.p)	Maximum peak power (e.i.r.p) (defined in 50 MHz)
Below 1,73 GHz	– 85 dBm/MHz <sup>(14)</sup>	– 45 dBm
1,73 to 2,2 GHz	– 65 dBm/MHz	– 25 dBm
2,2 to 2,5 GHz	– 50 dBm/MHz	– 10 dBm
2,5 to 2,69 GHz	– 65 dBm/MHz <sup>(14)</sup>	– 25 dBm
2,69 to 2,7 GHz	– 55 dBm/MHz <sup>(15)</sup>	– 15 dBm
2,7 to 3,4 GHz	– 70 dBm/MHz <sup>(14)</sup>	– 30 dBm
3,4 to 4,8 GHz	– 50 dBm/MHz	– 10 dBm

4,8 to 5 GHz	– 55 dBm/MHz <sup>(15)</sup>	– 15 dBm
5 to 8,5 GHz	– 50 dBm/MHz	– 10 dBm
Above 8,5 GHz	– 85 dBm/MHz	– 45 dBm

<sup>(1)</sup> Within the band 3,1 GHz to 4,8 GHz, The Low Duty Cycle mitigation technique and its limits are defined in ETSI Standard EN 302 065-1.

<sup>(2)</sup> Within the band 3,1 GHz to 4,8 GHz and 8,5 GHz to 9 GHz. The Detect and Avoid mitigation technique and its limits are defined in ETSI Standard EN 302 065-1.

<sup>(3)</sup> The Detect and Avoid mitigation technique and its limits are defined in ETSI Standard EN 302 065-2

<sup>(4)</sup> The Low Duty Cycle (LDC) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3

<sup>(5)</sup> The Detect and Avoid (DAA) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3

<sup>(6)</sup> The Transmit Power Control (TPC) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3

<sup>(7)</sup> The exterior limit (e,l)  $\leq -53,3$  dBm/MHz is required. The exterior limit is defined in ETSI Standard EN 302 065-3

<sup>(8)</sup> Alternative mitigation techniques offering equivalent protection such as the use of shielded portholes could be a solution,

<sup>(9)</sup> 7,25 to 7,75 GHz (Fixed Satellite Service) and 7,45 to 7,55 GHz (Meteorological Satellite) protection:  $-51,3 - 20 \cdot \log_{10}(10[\text{km}]/x[\text{km}])(\text{dBm}/\text{MHz})$  for heights above ground above 1 000 m, where x is the aircraft height above ground in kilometres,  $-71,3$  dBm/MHz for heights above ground of 1 000 m and below,

<sup>(10)</sup> 7,75 to 7,9 GHz (Meteorological satellite) protection:  $-44,3 - 20 \cdot \log_{10}(10[\text{km}]/x[\text{km}])(\text{dBm}/\text{MHz})$  for heights above ground above 1 000 m, where x is the aircraft height above ground in kilometres, and  $-64,3$  dBm/MHz for heights above ground of 1 000 m and below.

<sup>(11)</sup> devices using a Listen Before Talk (LBT) mechanism, as described in the harmonised standard EN 302 498-2, are permitted to operate in frequency ranges 2,5 to 2,69 and 2,9 to 3,4 GHz with a maximum mean power spectral density of  $-50$  dBm/MHz,

<sup>(12)</sup> to protect the radio services, non-fixed installations (application B) must fulfil the following requirement for total radiated power spectral density:

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 10 dB below the maximum mean power 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 maximum mean power spectral density.

<sup>(13)</sup> Limitation of the Duty Cycle to 10 % per second.

<sup>(14)</sup> Devices using a Listen Before Talk (LBT) mechanism described in the harmonised standard EN 302 435-1 are permitted to operate in frequency range 1,215 to 1,73 GHz with a maximum mean power 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 power spectral density of  $-50$  dBm/MHz.

<sup>(15)</sup> To protect the Radio Astronomy Service (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.