►**B**

COMMISSION DECISION

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

(notified under document number C(2007) 522)

(Text with EEA relevance)

(2007/131/EC)

(OJ L 55, 23.2.2007, p. 33)

Amended by:

		Official Journal		
		No	page	date
►**M1**	Commission Decision 2009/343/EC of 21 April 2009	L 105	9	25.4.2009
►**M2**	Commission Implementing Decision2014/702/EU of 7 October 2014	L 293	48	9.10.2014
►**M3**	Commission Implementing Decision (EU) 2017/1438 of 4 August 2017	L 205	89	8.8.2017

▼B

COMMISSION DECISION

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

(notified under document number C(2007) 522)

(Text with EEA relevance)

(2007/131/EC)

Article 1

The purpose of this Decision is to allow the use of the radio spectrum by equipment using ultra-wideband technology and to harmonise the conditions of such use in the Community.

This Decision shall apply without prejudice to Directive 1999/5/EC (the R&TTE Directive) and to any Community provisions allowing use of the radio spectrum by specific types of equipment using ultra-wideband technology.

Article 2

For the purposes of this Decision:

1. ‘equipment using ultra-wideband technology’ means equipment 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 radiocommunication services;

2. ‘non-interference and non-protected basis’ means that no harmful interference may be caused to any radiocommunication service and that no claim may be made for protection of these devices against harmful interference originating from radiocommunication services;

3. ‘indoors’ means inside buildings or places in which the shielding will typically provide the necessary attenuation to protect radiocommunication services against harmful interference;

4. ‘automotive vehicle’ means any vehicle as defined by Council Directive 70/156/EEC ([1]);

5. ‘railway vehicle’ means any vehicle as defined by Regulation (EC) No 91/2003 of the European Parliament and of the Council ([2]);

▼M2

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);

([1]) OJ L 42, 23.2.1970, p. 1.
([2]) OJ L 14, 21.1.2003, p. 1.

▼M2

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;

_____

▼M1

10. ‘building material analysis’ (BMA) means a field disturbance sensor that is designed to detect the location of objects within a building structure or to determine the physical properties of a building material;

▼M3

11. ‘total 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 302 065-4;

▼M2

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.

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

▼B

Article 4

Member States shall keep the use of the bands identified in the Annex by equipment using ultra-wideband technology under scrutiny, in particular with regard to the continued relevance of all the conditions specified in Article 3, and report their findings to the Commission to allow a timely review of this Decision.

Article 5

This Decision is addressed to the Member States.

▼**M2**

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 ≤ 1,6 GHz	– 90 dBm/MHz	– 50 dBm
1,6 < f ≤ 2,7 GHz	– 85 dBm/MHz	– 45 dBm
2,7 < f ≤ 3,1 GHz	– 70 dBm/MHz	– 36 dBm
3,1 < f ≤ 3,4 GHz	– 70 dBm/MHz or – 41,3 dBm/MHz using LDC ([1]) or DAA ([2])	– 36 dBm or 0 dBm
3,4 < f ≤ 3,8 GHz	– 80 dBm/MHz or – 41,3 dBm/MHz using LDC ([1]) or DAA ([2])	– 40 dBm or 0 dBm
3,8 < f ≤ 4,8 GHz	– 70 dBm/MHz or – 41,3 dBm/MHz using LDC ([1]) or DAA ([2])	– 30 dBm or 0 dBm
4,8 < f ≤ 6 GHz	– 70 dBm/MHz	– 30 dBm
6 < f ≤ 8,5 GHz	– 41,3 dBm/MHz	0 dBm
8,5 < f ≤ 9 GHz	– 65 dBm/MHz or – 41,3 dBm/MHz using DAA ([2])	– 25 dBm or 0 dBm
9 < f ≤ 10,6 GHz	– 65 dBm/MHz	– 25 dBm
f > 10,6 GHz	– 85 dBm/MHz	– 45 dBm

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

2. LOCATION TRACKING SYSTEMS TYPE 1 (LT1)

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 ≤ 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

▼**M2**

Technical requirements		
Frequency range	Maximum mean power spectral density (e.i.r.p)	Maximum peak power (e.i.r.p) (defined in 50 MHz)
3,8 < f ≤ 6,0 GHz	– 70 dBm/MHz	– 30 dBm
6 < f ≤ 8,5 GHz	– 41,3 dBm/MHz	0 dBm
8,5 < f ≤ 9 GHz	– 65 dBm/MHz or – 41,3 dBm/MHz using DAA (1)	– 25 dBm or 0 dBm
9 < f ≤ 10,6 GHz	– 65 dBm/MHz	– 25 dBm
f > 10,6 GHz	– 85 dBm/MHz	– 45 dBm

(1) The Detect and Avoid mitigation technique and its limits are defined in ETSI Standard EN 302 065-2

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 ≤ 1,6 GHz	– 90 dBm/MHz	– 50 dBm
1,6 < f ≤ 2,7 GHz	– 85 dBm/MHz	– 45 dBm
2,7 < f ≤ 3,1 GHz	– 70 dBm/MHz	– 36 dBm
3,1 < f ≤ 3,4 GHz	– 70 dBm/MHz or – 41,3 dBm/MHz using LDC (1) + e,l, (4) or – 41,3 dBm/MHz using TPC (3) + DAA (2) + e,l, (4)	– 36 dBm or ≤ 0 dBm or ≤ 0 dBm
3,4 < f ≤ 3,8 GHz	– 80 dBm/MHz or – 41,3 dBm/MHz using LDC (1) + e,l, (4) or – 41,3 dBm/MHz using TPC (3) + DAA (2) + e,l, (4)	– 40 dBm or ≤ 0 dBm or ≤ 0 dBm
3,8 < f ≤ 4,8 GHz	– 70 dBm/MHz or – 41,3 dBm/MHz using LDC (1) + e,l, (4) or – 41,3 dBm/MHz using TPC (3) + DAA (2) + e,l, (4)	– 30 dBm or ≤ 0 dBm or ≤ 0 dBm
4,8 < f ≤ 6 GHz	– 70 dBm/MHz	– 30 dBm

▼**M2**

Technical requirements		
Frequency range	Maximum mean power spectral density (e.i.r.p)	Maximum peak power (e.i.r.p) (defined in 50 MHz)
6 < f ≤ 8,5 GHz	– 53,3 dBm/MHz or – 41,3 dBm/MHz using LDC (1) + e,l, (4) or – 41,3 dBm/MHz using TPC (3) + e,l, (4)	– 13,3 dBm or ≤ 0 dBm or ≤ 0 dBm
8,5 < f ≤ 9 GHz	– 65 dBm/MHz or – 41,3 dBm/MHz using TPC (3) + DAA (2) + e,l, (4)	– 25 dBm or ≤ 0 dBm
9 < f ≤ 10,6 GHz	– 65 dBm/MHz	– 25 dBm
f > 10,6 GHz	– 85 dBm/MHz	– 45 dBm

(1) The Low Duty Cycle (LDC) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3
(2) The Detect and Avoid (DAA) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3
(3) The Transmit Power Control (TPC) mitigation technique and its limits are defined in ETSI Standard EN 302 065-3
(4) The exterior limit (e,l,) ≤ – 53,3 dBm/MHz is required. The exterior limit is defined in ETSI Standard EN 302 065-3

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 (1)

▼M2

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
6,6752 < f ≤ 8,5 GHz	– 41,3 dBm/MHz	0 dBm	7,25 to7,75 GHz (FSS and MetSat (7,45 to 7,55 GHz) protection) (1) (2) 7,75 to 7,9 GHz (MetSat protection) (1) (2)
8,5 < f ≤ 10,6 GHz	– 65 dBm/MHz	– 25 dBm	
f > 10,6 GHz	– 85 dBm/MHz	– 45 dBm	

(1) Alternative mitigation techniques offering equivalent protection such as the use of shielded portholes could be a solution,

(2) 7,25 to 7,75 GHz (Fixed Satellite Service) and 7,45 to 7,55 GHz (Meteorological Satellite) protection: – 51,3 – 20*$\log_{10}$ (10[km]/x[km])(dBm/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,

(3) 7,75 to 7,9 GHz (Meteorological satellite) protection: – 44,3 – 20*$\log_{10}$ (10[km]/x[km]) (dBm/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.

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';

▼M3

— The transmitter shall implement a TPC with a dynamic range of 10 dB, as described in the harmonised standard ETSI EN 302 065-4 for material sensing devices;

▼M2

— 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'

▼M3

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 302 065-4).

▼**M2**

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 (1)	– 70dBm/MHz	– 65 dBm/MHz (1) (2)
2,69 to 2,7 GHz	– 55 dBm/MHz	– 75 dBm/MHz	– 70 dBm/MHz (3)
2,7 to 2,9 GHz	– 50 dBm/MHz	– 70 dBm/MHz	– 70 dBm/MHz
2,9 to 3,4 GHz	– 50 dBm/MHz	– 70 dBm/MHz	– 70 dBm/MHz (1)
3,4 to 3,8 GHz	– 50 dBm/MHz	– 70 dBm/MHz	– 50 dBm/MHz (2) (3)
3,8 to 4,8 GHz	– 50 dBm/MHz		– 50 dBm/MHz
4,8 to 5 GHz	– 55 dBm/MHz	– 75 dBm/MHz	– 55 dBm/MHz (2) (3)
5 to 5,25 GHz	– 50 dBm/MHz		– 50 dBm/MHz
5,25 to 5,35 GHz	– 50 dBm/MHz	– 60 dBm/MHz	– 60 dBm/MHz
5,35 to 5,6 GHz	– 50 dBm/MHz		– 50 dBm/MHz
5,6 to 5,65 GHz	– 50 dBm/MHz	– 65 dBm/MHz	– 65 dBm/MHz
5,65 to 5,725 GHz	– 50 dBm/MHz	– 60 dBm/MHz	– 60 dBm/MHz
5,725 to 8,5 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.

(1) ►**M3** devices using a Listen Before Talk (LBT) mechanism, as described in the harmonised standard ETSI EN 302 065-4, 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, ◄

(2) 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.

(3) Limitation of the Duty Cycle to 10 % per second.

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;

▼**M2**

(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;

▼**M3**

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 EN 302 065-4.

▼**M2**

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 ([1])	– 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 ([1])	– 25 dBm
2,69 to 2,7 GHz	– 55 dBm/MHz ([2])	– 15 dBm
2,7 to 3,4 GHz	– 70 dBm/MHz ([1])	– 30 dBm
3,4 to 4,8 GHz	– 50 dBm/MHz	– 10 dBm
4,8 to 5 GHz	– 55 dBm/MHz ([2])	– 15 dBm
5 to 8,5 GHz	– 50 dBm/MHz	– 10 dBm
Above 8,5 GHz	– 85 dBm/MHz	– 45 dBm

([1]) ►**M3** Devices using a Listen Before Talk (LBT) mechanism described in the harmonised standard ETSI EN 302 065-4 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. ◄

([2]) 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.