

RO-IR UWB-02

TECHNICAL REGULATION

for the radio interface

concerning radio equipment based on ultra-wide band (UWB) technology

(contact based material sensing devices)

1. Basic considerations

Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC was implemented in national legislation by Government Decision No 740/2016 on making available on the market of radio equipment with subsequent amendments and completions.

This technical regulation contains the requirements for the use of license exempt of the radio spectrum by radio equipment based on ultra-wide band technology (UWB) (contact based material sensing devices) in the specified frequency bands and considers, especially, compliance with the provisions of Article 3 Paragraph 2 and Articles 6-8 of Directive 2014/53/EU.

Nothing in this technical regulation shall preclude the obligation for radio equipment placed on the market or made available on the market in Romania to comply with Directive 2014/53/EU.

The obligations arising from Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 on the procedure for the provision of information in the field of technical regulations and of rules on Information Society services are met in this regulation (OJ L 241, 17.9.2015, p. 1-15).

All Romanian technical regulations for the radio interfaces notified under Directive 2015/1535 (EU) shall be published and made available on National Authority for Management and Regulation in Communications of Romania (ANCOM) web-site at: http://www.ancom.ro/reglementari-interfete_2723.

2. Radio Interface Specifications

UWB (contact based material sensing devices)

Frequency band
$f \leq 1.73$ GHz
$1.73 < f \leq 2.2$ GHz
$2.2 < f \leq 2.5$ GHz
$2.5 < f \leq 2.69$ GHz
$2.69 < f \leq 2.7$ GHz
$2.7 < f \leq 2.9$ GHz
$2.9 < f \leq 3.4$ GHz
$3.4 < f \leq 3.8$ GHz
$3.8 < f \leq 4.8$ GHz
$4.8 < f \leq 5.0$ GHz
$5.0 < f \leq 5.25$ GHz
$5.25 < f \leq 5.35$ GHz
$5.35 < f \leq 5.6$ GHz
$5.6 < f \leq 5.65$ GHz
$5.65 < f \leq 5.725$ GHz
$5.725 < f \leq 6.0$ GHz
$6.0 < f \leq 8.5$ GHz
$8.5 < f \leq 9.0$ GHz
$9.0 < f \leq 10.6$ GHz
$f > 10.6$ GHz

For the purposes of this technical regulation, *radio equipment using ultra-wide band (UWB)* technology means equipment incorporating, as an integral part or as an accessory, technology for short-range radio communication, 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 radio communication services.

For the purposes of this technical regulation, *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).

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

Peak power means the power 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 and which is specified as e.i.r.p.

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 degrees.

Contact based UWB material sensing devices, permitted on the ground of this technical regulation, are those material sensing devices for which the UWB transmitter is only switched on when in direct contact with the material under investigation.

Contact based material sensing devices based on UWB technology shall comply either with the generic UWB regulation (RO-IR UWB-01 – *Technical Regulation for the radio interface concerning radio equipment based on ultra-wide band (UWB) technology (generic UWB usage)*) or with the specific limits for material sensing devices as defined in this technical regulation.

The generic UWB regulation excludes fixed outdoor installations. Emissions radiated by a contact based material sensing device must not exceed the limits of the regulation for generic UWB usage (see RO-IR UWB-01). Contact based material sensing devices must fulfil the requirements of mitigation techniques specified for the generic use of UWB in RO-IR UWB-01, as well.

The specific limits for contact based material sensing devices including the mitigation techniques are listed in the following table. Emissions radiating from contact based material sensing devices permitted under this technical regulation must be kept to a minimum and in any case not exceed the emission limits within the following table. Compliance with the specific limits must be ensured by the device placed on a representative structure of the investigated material. The specific limits listed in the following table are applicable in all environments for contact based material sensing devices, except those to which note 5 of this table, which excludes fixed outdoor installation in certain applicable frequency ranges, applies.

For the purposes of this technical regulation, *non-interference and non-protected basis* means that no harmful interference may be caused to any radio communication service and that no claim may be made for protection of these devices against interference originating from radio communication services.

The usage of radio spectrum by the radio equipment based on ultra-wide band (UWB) is permitted without interference and protection only provided that such equipment meets the conditions set out in the Annex below and is used indoors. *Indoors* means inside buildings or places in which the shielding will typically provide the necessary attenuation to protect radio communication services against harmful interference. If this radio equipment is used outdoors, it is not attached to a fixed installation, a fixed infrastructure or a fixed outdoor antenna.

3. Document history:

Edition	Changes
Edition 1/2015	Notification number according to Directive 98/34/EC: 2015/139/RO.
Edition 2/2018 (10.08.2018)	Update according to Commission Implementing Decision (EU) 2017/1438 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonized manner in the Community; Update of the legal framework according to Point 1 – „Basic considerations” and reference documents (row 13); Formal changes according to TCAM-RSC pattern of November 2017.
Edition 3/2021 (04.10.2021)	Changes according to Commission Implementing Decision (EU) 2019/785 of 14 May 2019 on the harmonization of radio spectrum for equipment using ultra-wideband technology in the Union and repealing Decision 2007/131/EC; Changes of titles according to Decision No 248/2021 amending and completing National Authority for Management and Regulation in Communications of Romania (ANCOM) President’s Decision No 311/2016 on radio frequencies or frequency bands exempted from the licensing regime; Update of the legal framework according to Point 1 – „Basic considerations” and reference documents (row13).

ROMANIA	Radio Interface Specification	UWB Applications	RO-IR UWB-02	Edition 3/2021
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Normative part	1	Radio communication Service	Mobile			
	2	Application	Radio equipment based on UWB technology			Contact based material sensing devices
	3	Frequency band	See the frequency bands shown in row (7)			Harmonized radio spectrum for equipment using ultra-wide band technology (Commission Implementing Decision (EU) 2019/785 of 14 May 2019 on the harmonization of radio spectrum for equipment using ultra-wide band technology in the Union and repealing Decision 2007/131/EC)
	4	Channeling (channel distribution)	-			
	5	Modulation/Occupied bandwidth	-			
	6	Direction/Separation	-			
	7	Transmit power / Power density	Frequency band	Maximum mean power spectral density (e.i.r.p.)	Maximum peak power (e.i.r.p.) (within a 50 MHz bandwidth)	<p>⁽¹⁾ Devices using the Listen Before Talk (LBT) mechanism are permitted to operate in the 1.215 to 1.73 GHz frequency range with a maximum mean e.i.r.p. spectral density of -70 dBm/MHz and in the 2.5 to 2.69 GHz and 2.7 to 3.4 GHz frequency ranges with a maximum mean e.i.r.p. spectral density of -50 dBm/MHz and a maximum peak e.i.r.p. of -10 dBm/50 MHz. The LBT mechanism is defined in clauses 4.5.2.1, 4.5.2.2 and 4.5.2.3 of ETSI Standard EN 302 065-4 V1.1.1. Alternative mitigation techniques may be used if they ensure at least an equivalent performance and level of spectrum protection in order to comply with the corresponding essential requirements of Directive 2014/53/EU and respect the technical requirements of Commission Implementing Decision (EU) 2019/785.</p> <p>⁽²⁾ To protect the radio services, non-fixed installations must fulfil the following requirement for total radiated power:</p> <p>(a) In the 2.5 to 2.69 GHz and 4.8 to 5 GHz frequency ranges, the total power spectral density must be 10 dB below the maximum e.i.r.p. spectral density;</p> <p>(b) In the 3.4 to 3.8 GHz frequency range, the total power spectral density must be 5 dB below the maximum e.i.r.p. spectral density.</p> <p>⁽³⁾ To protect the Radio Astronomy Service (RAS) in the 2.69 GHz to 2.7 GHz and 4.8 GHz to 5 GHz</p>
			f ≤ 1.73 GHz	- 85 dBm/MHz ⁽¹⁾	- 45 dBm	
			1.73 < f ≤ 2.2 GHz	- 65 dBm/MHz	- 25 dBm	
			2.2 < f ≤ 2.5 GHz	- 50 dBm/MHz	- 10 dBm	
			2.5 < f ≤ 2.69 GHz	- 65 dBm/MHz ⁽¹⁾ ⁽²⁾	- 25 dBm	
			2.69 < f ≤ 2.7 GHz ⁽⁴⁾	- 55 dBm/MHz ⁽³⁾	- 15 dBm	
			2.7 < f ≤ 2.9 GHz	- 70 dBm/MHz ⁽¹⁾	- 30 dBm	
			2.9 < f ≤ 3.4 GHz	- 70 dBm/MHz ⁽¹⁾ ⁽⁶⁾ ⁽⁷⁾	- 30 dBm	
		3.4 < f ≤ 3.8 GHz ⁽⁴⁾	- 50 dBm/MHz ⁽²⁾ ⁽⁶⁾ ⁽⁷⁾	- 10 dBm		
		3.8 < f ≤ 4.8 GHz	- 50 dBm/MHz ⁽⁶⁾ ⁽⁷⁾	- 10 dBm		
		4.8 < f ≤ 5.0 GHz ⁽⁴⁾	- 55 dBm/MHz ⁽²⁾ ⁽³⁾	- 15 dBm		
		5.0 < f ≤ 5.25 GHz	- 50 dBm/MHz	- 10 dBm		
		5.25 < f ≤ 5.35 GHz	- 50 dBm/MHz	- 10 dBm		
		5.35 < f ≤ 5.6 GHz	- 50 dBm/MHz	- 10 dBm		
		5.6 < f ≤ 5.65 GHz	- 50 dBm/MHz	- 10 dBm		
		5.65 < f ≤ 5.725 GHz	- 50 dBm/MHz	- 10 dBm		
		5.725 < f ≤ 6 GHz	- 50 dBm/MHz	- 10 dBm		
		6.0 < f ≤ 8.5 GHz	- 41.3 dBm/MHz ⁽⁵⁾	0 dBm		
		8.5 < f ≤ 9.0 GHz	- 65 dBm/MHz ⁽²⁾	- 25 dBm		
		9.0 < f ≤ 10.6 GHz	- 65 dBm/MHz	- 25 dBm		
		f > 10.6 GHz	- 85 dBm/MHz	- 45 dBm		
		Note: The specific limits for maximum mean power for the LBT mechanism to ensure the protection of radio services listed below are defined in the following table:				

		<table border="1"> <thead> <tr> <th colspan="3">Technical requirements of the LBT mechanism for contact based material sensing devices*</th> </tr> <tr> <th>Frequency range</th> <th>Radio service to be detected</th> <th>Peak power threshold value</th> </tr> </thead> <tbody> <tr> <td>1.215 < f ≤ 1.4 GHz</td> <td>Radiodetermination service</td> <td>+ 8 dBm/MHz</td> </tr> <tr> <td>1.61 < f ≤ 1.66 GHz</td> <td>Mobile-Satellite Service</td> <td>- 43 dBm/MHz</td> </tr> <tr> <td>2.5 < f ≤ 2.69 GHz</td> <td>Land mobile service</td> <td>- 50 dBm/MHz</td> </tr> <tr> <td>2.9 < f ≤ 3.4 GHz</td> <td>Radiodetermination service</td> <td>7 dBm/MHz</td> </tr> </tbody> </table> <p>*Additional requirements for radar detection: continuously listening and automatic switch-off within 10 ms for the related frequency range if the threshold value is exceeded (table with LBT mechanism). A silent time of at least 12 s while listening continuously is necessary before the transmitter can be switched on again. This silent time during which only the LBT receiver is active must be ensured even after the device is switched off.</p>	Technical requirements of the LBT mechanism for contact based material sensing devices*			Frequency range	Radio service to be detected	Peak power threshold value	1.215 < f ≤ 1.4 GHz	Radiodetermination service	+ 8 dBm/MHz	1.61 < f ≤ 1.66 GHz	Mobile-Satellite Service	- 43 dBm/MHz	2.5 < f ≤ 2.69 GHz	Land mobile service	- 50 dBm/MHz	2.9 < f ≤ 3.4 GHz	Radiodetermination service	7 dBm/MHz	<p><i>bands, the total power spectral density must be below -65 dBm/MHz.</i></p> <p><i>(⁴) Limitation of the Duty Cycle to 10 % per second.</i></p> <p><i>(⁵) No fixed outdoor installation is permitted.</i></p> <p><i>(⁶) Within the 3.1–4.8 GHz band, devices implementing LDC (Low Duty Cycle) mitigation technique are permitted to operate with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz. The LDC mitigation technique and its limits are defined in clauses 4.5.3.1, 4.5.3.2 and 4.5.3.3. of ETSI Standard EN 302 065-1 V2.1.1. Alternative mitigation techniques may be used if they ensure at least an equivalent performance and level of spectrum protection in order to comply with the corresponding essential requirements of Directive 2014/53/EU and respect the technical requirements of Commission Implementing Decision (EU) 2019/785. When LDC is implemented, note 5 applies.</i></p> <p><i>(⁷) Within the 3.1–4.8 GHz and 8.5–9 GHz bands, devices implementing Detect and Avoid (DAA) mitigation technique are permitted to operate with a maximum mean e.i.r.p. spectral density of -41.3 dBm/MHz and a maximum peak e.i.r.p. of 0 dBm defined in 50 MHz. The DAA mitigation technique and its limits are defined in clauses 4.5.1.1, 4.5.1.2 and 4.5.1.3 of ETSI Standard EN 302 065-1 V2.1.1. Alternative mitigation techniques may be used if they ensure at least an equivalent performance and level of spectrum protection in order to comply with the corresponding essential requirements of Directive 2014/53/EU and respect the technical requirements of Commission Implementing Decision (EU) 2019/785. When DAA is implemented, note 5 applies.</i></p>
Technical requirements of the LBT mechanism for contact based material sensing devices*																					
Frequency range	Radio service to be detected	Peak power threshold value																			
1.215 < f ≤ 1.4 GHz	Radiodetermination service	+ 8 dBm/MHz																			
1.61 < f ≤ 1.66 GHz	Mobile-Satellite Service	- 43 dBm/MHz																			
2.5 < f ≤ 2.69 GHz	Land mobile service	- 50 dBm/MHz																			
2.9 < f ≤ 3.4 GHz	Radiodetermination service	7 dBm/MHz																			
8	Channel occupation and access rules	-																			
9	Authorization regime	License exemption																			
10	Additional essential requirements (According to Article 3 Paragraph 3 of 2014/53/EU Directive)	-																			
11	Assumptions on spectrum planning	-																			

Informative Part	12	Planned changes	-	
	13	Reference	Commission Implementing Decision (EU) 2019/785 repealing Decision 2007/131/EC; ECC/DEC/(07)01; EN 302 065-4 V1.1.1; EN 302 065-1 V2.1.1	
	14	Notification number	-	
	15	Remarks	-	

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