



**GUIDELINES ON THE USE OF SHORT-RANGE  
RADIOCOMMUNICATION DEVICES (SRDs) AND ULTRA  
WIDEBAND (UWB) DEVICES**

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## **1. INTRODUCTION**

Short-range Radio Devices (SRDs) have become an integral part of the radiocommunication devices ecosystem. These come in varieties which include the traditional narrowband and Ultra-Wide Band (UWB devices).

SRDs and UWBs are used in a wide range of day-to-day radiocommunication applications including but not limited to Radio Local Area Network (RLAN), railway and road transport traffic telematics, video and audio production, cinematography, baby monitors. Examples of SRDs and applications thus include; access control (including door and gate openers), alarms and movement detectors, cordless audio devices, including wireless microphones, industrial control, and Local Area Networks. Others include medical implants, metering devices. remote control, radio frequency identification (RFID), road transport telematics (RTT), telemetry, wireless chargers, etc.

The authority to develop this guide is derived from among others, Sections 5(1)(c) and 25(1)(b) of the Uganda Communications Act, 2013 (the “Act”), the Uganda Communications (Licensing) Regulations for radio communication services and installation and operation of radio communications services’ equipment.

## **2. OBJECTIVE**

The objective of this guide is to present technical requirements associated with the operation and use of SRDs and UWB devices in Uganda.

## **3. AMENDMENT**

These guidelines shall be subjected to periodic reviews to enable inclusion of any changes as a result of evolution in the radiocommunications industry, changes in policy or regulatory direction as well as emerging regional and international best practices.

## **4. INTERPRETATION**

The terms in this document shall carry the interpretation used in the International Telecommunications Union (ITU) Radio Regulations 2020 (RR), Uganda Communications Act 2013, and regulations issued thereunder unless otherwise defined below;

**“Alarm devices or systems”** refers to devices or systems that give an audible, visual, or another form of alarm signal reporting a problem or condition.

**“Level Probing Radar (LPR)”** refers to short-range radar transceivers widely used in industrial process instrumentation for contactless level measurement of various substances, mostly liquids or granulates in tanks.

**“Medical implants”** refers to devices that either support, enhance or even replace a fraction or whole of biological structure and or function, monitor through radio signal transmissions.

**“Model controls”** refers to a specific kind of telecommand and telemetry radio equipment that is used to remotely control the movement of models (principally miniature representations of vehicles) in the air, on land, or over or under the water surface.”

**“Narrowband”** refers to equipment to be used in non-channelized continuous frequency bands with an occupied bandwidth of equal to or less than 25 kHz, or equipment to be used in a channelized frequency bands with a channel spacing of equal or less than 25 kHz.

**“Non-specific SRDs”** refers to devices used for service categories such as telemetry, telecommand, alarms, data, and other similar applications.

**“Radio Microphone application”** refers to applications that rely on small battery-powered radio transmitters embedded in microphone bodies, to transmit audio signals from the microphone by radio waves to a nearby receiver unit.

**“Short Range Devices”** refers to radio devices that operate at low transmit power and hence range, thus offering a low risk of interference to other radio services.

**“The Act”** means the Uganda Communications Act of 2013 the law that governs the communications sector in Uganda.

**“The Commission”** means the Uganda Communications Commission established under section 4 of the Act.

**“Transport and traffic telematics”** refer to systems that allow for influencing the behavior of drivers, the operation of vehicle elements, or the route through information transfer and analysis.

**“Ultra-Wide Band (UWB)”** refers to a short-range technology for the transmission of data using techniques that cause a spreading of the radio energy over a very wide frequency band (thus operating at very high frequencies), with a very low power spectral density.

**“Wideband data transmission systems”** refers to systems that transmit data utilizing a wide frequency range, these include Bluetooth wireless technologies, Zigbee, and systems conforming to the IEEE 802.11 RLANs standard.

## **5. APPLICABLE LEGISLATION AND REGULATIONS**

This guide shall be applied together with the following statutes and frameworks.

- i)* The provisions of the Act 2013 including, sections 5 (1)(c), and 25;
- ii)* The Uganda Communications (Licensing) Regulations 2019;
- iii)* The Uganda Communications Commission Radio Spectrum Management Guidelines in force;
- iv)* The Uganda Communications Commission Spectrum Assignment Framework 2019;
- v)* Any decisions or directives issued by the Commission however so described;
- vi)* The terms and conditions outlined in the radio frequency spectrum authorizations.

## **6. SCOPE**

This guide outlines regulatory and technical requirements to support and facilitate effective operations of SRDs and UWB devices in various spectrum bands.

## **7. APPLICABILITY**

This guide shall apply to all categories of SRD and UWB operations in Uganda.

## **8. AUTHORISATION AND TECHNICAL REQUIREMENTS**

### **8.1. Regulatory Requirements**

The use of SRDs shall not require the issuance of service or operational license in Uganda; however, SRDs users/operators shall be required to ensure that,

- i)* the associated equipment type-approved before deployment or bringing into use;
- ii)* the respective operation does not cause interference to or claim protection from the duly licensed radio communication services and/or systems.

### **8.2. Technical Requirements**

Annex 1 and 2 provide detailed technical specifications and/or requirements to guide the operations of SRDs and UWB devices in Uganda. The following must however be noted;

- a) UWB device requirements in table 1, Annex 2 shall apply to all types of devices, both transceivers, and receive only devices, except for devices installed in flying crafts and fixed outdoor devices;
- b) Tables-2 & 3 of Annexure-2 highlight technical specifications for UWB devices operated onboard aircraft and industrial probing radars;
- c) Table-4 highlights the specifications for automotive short-range radar equipment (proximity sensors);
- d) In addition, device antennas shall either be;
  - (i) integrated to the devices (no external antenna socket) or,
  - (ii) dedicated external (type-approved with the equipment).

### **8.3. Interference Mitigation**

- a) SRD devices including UWB devices shall operate on a non-interference, non-protected basis.
- b) In the event of any such devices and/or associated base station is suspected to cause interference, all transmissions shall immediately be shut down until the interference is resolved.
- c) Licensed operators are to report to the Commission incidences of suspected radio interferences from short-range and ultra-wide bandwidth devices.

## **9. STAKEHOLDER RESPONSIBILITY**

### **9.1. The regulator (the Commission)**

- a) Shall regularly review and update the provisions of these guidelines in consultation with the stakeholders to ensure continued relevance and effectiveness.
- b) Where necessary inspect systems and devices to ensure conformity with the guidelines

### **9.2. Stakeholders (Importers, vendors, and operators)**

All stakeholders are required to;

- a) adhere and operate under the provision of these guidelines.
- b) acquaint themselves with the relevant provisions in the legislation and regulatory tools under Section-5 of this guide associated with their respective operations under this guide.

### Annex 1: Technical specifications for the operation of SRDs in Uganda

CATEGORY	Frequency Band	Power / Magnetic Field	Spectrum access and mitigation requirements	Channel Spacing	Harmonized Standard	Notes
NON-SPECIFIC SRDS	6765 - 6795 kHz	42 dBµA/m @ 10m	No requirement		EN 300 330	No special notes
	13553 - 13567 kHz	10 mW e.r.p.	No requirement		EN 300 220 EN 300 330	
	26957 - 27283 kHz					
	26990 - 27000 kHz	100 mW e.r.p.	≤ 0.1 % duty cycle	Not specified		
	27040 - 27050 kHz					
	27090 - 27100 kHz					
	27140 - 27150 kHz					
	27190 - 27200 kHz					
	40.66 - 40.7 MHz	10 mW e.r.p.	No requirement			
	138.2 - 138.45 MHz	500 mW e.r.p.	≤ 1% duty cycle		≤ 50 kHz	
	169.4 - 169.475 MHz					
	169.4 - 169.4875 MHz	10 mW e.r.p.	≤ 0.1% duty cycle	Not specified	EN 300 220	
	169.4875 - 169.5875 MHz		≤ 0.001% duty cycle except for 00:00 h to 06:00 h local time where the duty cycle limit is ≤ 0.1%			
	169.5875 - 169.8125 MHz		≤ 0.1% duty cycle			
	433.05 - 434.79 MHz	1 mW e.r.p.	No requirement			
	433.05 - 434.79 MHz	10 mW e.r.p.	≤ 10% duty cycle		≤ 25 kHz	
	434.04 - 434.79 MHz		No requirement			
	862 - 863 MHz	25 mW e.r.p.	≤ 0.1% duty cycle		≤ 350 kHz	
	863 - 865 MHz	25 mW e.r.p. - 4.5 dBm/100 kHz	≤ 0.1% duty cycle or LBT+AFA	Not specified		
	863 - 870 MHz					
863 - 870 MHz	25 mW e.r.p.	≤ 0.1% duty cycle		≤ 100 kHz for 47 or more hop channels		

	865 - 868 MHz		≤ 1% duty cycle or LBT+AFA	Not specified		
	865 - 868 MHz		≤ 1% duty cycle	≤ 50 kHz for 58 or more hop channels		
	868 - 868.6 MHz		≤ 1% duty cycle or LBT+AFA	Not specified		
	868.7 - 869.2 MHz		≤ 0.1% duty cycle or LBT+AFA			
	869.4 - 869.65 MHz	500 mW e.r.p.	≤ 10% duty cycle or LBT+AFA			
	869.7 - 870 MHz	25 mW e.r.p.	≤ 1% duty cycle or LBT+AFA			
	869.7 - 870 MHz	5 mW e.r.p.	No requirement			

CATEGORY	Frequency Band	Power / Magnetic Field	Spectrum access and mitigation requirements	Channel Spacing	Harmonized Standard	Notes
NON-SPECIFIC SRDS	870 - 874.4 MHz	25 mW e.r.p.	≤ 1% duty cycle. For ER-GSM protection (873-876 MHz)	Not specified	EN 300 440	
	915 - 919.4 MHz	25 mW e.r.p. except within the RFID channels identified in note 5 where 100 mW e.r.p. applies	≤ 1% duty cycle. For ER-GSM protection (918-921 MHz)			
	2400 - 2483.5 MHz	10 mW (e.i.r.p).	No requirement			
	3100 - 4800 MHz	Refer to Annex 2; Table 1 on Generic UWB technology applications.			EN 302 065	Generic UWB technology applications
	5725 - 5875 MHz	25 mW (e.i.r.p).	No requirement		EN 300 440	
	6000 - 8500 MHz	Refer to Annex 2, Table 2 on UWB technology applications on-board aircrafts			EN 302 065	Generic UWB technology applications
	6000 - 9000 MHz	Refer to Annex 2; Table 1 on Generic UWB technology applications.				
	24 - 24.25 GHz	100 mW (e.i.r.p).	No requirement		EN 300 440	No special notes
	57 - 64 GHz	100 mW (e.i.r.p). 10 mW output power				
	61 - 61.5 GHz	100 mW (e.i.r.p).				
	122 - 122.25 GHz	10 dBm/250 MHz (e.i.r.p). -48 dBm/MHz at >30° elevation)				
	122.25 - 123 GHz	100 mW (e.i.r.p).				
	244 - 246 GHz					
TRACKING, TRACING AND DATA ACQUISITION	442.2 - 450 kHz	7 dBμA/m at 10m	No requirement	Continuous wave (CW) - no modulation	EN 300 718	Person detection and collision avoidance
	456.9 - 457.1 kHz			Continuous wave (CW) at 457 kHz - no modulation		Emergency detection of buried victims and valuable items
	169.4 - 169.475 MHz	500 mW (e.r.p).	≤ 10% duty cycle	≤ 50 kHz	EN 300 220	Meter Reading.
	865 - 868 MHz		Adaptive Power Control (APC) required for spectrum sharing (note 1)	≤ 200 kHz	EN 303 659	Data networks
	870 - 874.4 MHz				EN 303 204	



			and the following duty cycle restrictions also apply: $\leq 10\%$ duty cycle for network access points; $\leq 2.5\%$ duty cycle otherwise			
	915 - 919.4 MHz	25 mW (e.r.p).	$\leq 1\%$ duty cycle	$\leq 600$ kHz	EN 303 659	
	917.3 - 918.9 MHz	500 mW (e.r.p).	Adaptive Power Control (APC) required for spectrum sharing (note 1) and the following duty cycle restrictions also apply: $\leq 10\%$ duty cycle for network access points; $\leq 2.5\%$ duty cycle otherwise	$\leq 200$ kHz	EN 303 659	
	2483.5-2500 MHz	1 mW (e.i.r.p).	Adequate spectrum sharing mechanisms (e.g. Listen-Before-Talk and Adaptive Frequency Agility) shall be implemented by the equipment and $\leq 10\%$ duty cycle	Not specified		The application is for MBANS, indoor only within healthcare facilities
	2483.5-2500 MHz	10 mW (e.i.r.p).	Adaptive spectrum sharing mechanism (e.g. listen before talk and adaptive			The application is for MBANS, indoor only within the patient's home

			Frequency Agility shall be implemented by the equipment and $\leq 2\%$ duty cycle				
	5725 - 5875 MHz	400 mW (e.i.r.p). Adaptive Power Control (APC) required	Adequate spectrum sharing mechanisms (e.g. DFS and DAA) shall be implemented	$\geq 1$ MHz and $\leq 20$ MHz	EN 303 258	Wireless Industrial Applications (WIA).	
<b>WIDEBAND AND DATA TRANSMISSION SYSTEMS</b>	863 - 868 MHz	25 mW (e.r.p).	$\leq 10\%$ duty cycle for network access points and polite spectrum access. $\leq 2.8\%$ duty cycle otherwise and polite spectrum access	$> 600$ kHz $\leq 1$ MHz	EN 304 220	Wideband data transmission in data networks. All nomadic and mobile devices within the data network shall be controlled by a master network access point (NAP)	
	915.8 - 919.4 MHz						
	2400 - 2483.5 MHz	100 mW (e.i.r.p).	Adequate spectrum sharing mechanism (e.g. LBT and DAA) shall be implemented	Not specified	EN 300 328	For wideband modulations other than FHSS, the maximum (e.i.r.p.) density is limited to 10 mW/MHz	
	5.150 - 5.350 GHz						
	17.1 - 17.3 GHz						
		57 - 66 GHz	10W	Restricted to indoor use. Max mean eirp density is limited to 13dBm/MHz			
			55 dBm (e.i.r.p).				Applies only to fixed outdoor installations
	57 - 71 GHz	40 dBm (e.i.r.p).	23 dBm/MHz (e.i.r.p.) density. Adequate spectrum sharing mechanism shall be		EN 302 567	Fixed outdoor installations are not allowed.	

			implemen ted 23dBm /MHz (e.i.r.p) density and max transmit power of 27dBm at antenna port or ports. Adequate spectrum sharing mechanis m shall be implemen ted			
<b>RAILW AY APPLIC ATIONS</b>	984 - 7484 kHz	9 dBμA/m at 10m	≤ 1% duty cycle	Not specified	EN 302 608	Balise up-link (ground to train) systems
	7300 - 23000 kHz	-7 dBμA/m at 10m	No requireme nt		EN 302 609	Loop up-link (ground to train) systems
	2.446 - 2.454 MHz	-15 dBμA/m at 10m				
	27090 - 27100 kHz	42 dBμA/m at 10 m			EN 302 608	Balise tele- powering and down-link (train to ground) systems
	76 - 77 GHz	55 dBm peak (e.i.r.p).			EN 301 091	Obstruction/ Veh icle detection via radar sensor at railway level crossings
<b>TRANS PORT AND TRAFFI C TELEM ATICS (TTT)</b>	5795 - 5805 MHz	2 W (e.i.r.p).		No requireme nt	EN 300 674	
	5805 - 5815 MHz	2 W (e.i.r.p).	EN 300 674			
	21.65 - 26.65 GHz	UWB radar equipment Please check Annex2; Table 4		EN 302 288	For automotive Short Range Radars (SRR).	
	24.05 - 24.075 GHz	100 mW (e.i.r.p).	No requireme nt	EN 302 858	For automotive radars	
	24.075 - 24.15 GHz	100 mW (e.i.r.p).	≤ 1ms/40 kHz dwell time every 40ms	EN 302 858		
	24.075 - 24.15 GHz	100 mW (e.i.r.p).	≤ 4μs/40 kHz dwell time every 3ms	EN 302 858	For automotive radars (road vehicles only). The spectrum access and mitigation requirement is given for devices mounted behind a bumper. If mounted without a bumper, the	
	24.075 - 24.15 GHz	0.1 mW (e.i.r.p).	No requireme nt			

					EN 302 858	<p>requirement should be 3µs/40kHz maximum dwell time every 3ms. A requirement for minimum frequency modulation range (applicable to FMCW or step frequency signals) or minimum instantaneous bandwidth (applicable to pulsed signal) of 250 kHz applies in addition to the requirement on maximum dwell time</p> <p>For automotive radars (road vehicles only)</p>
	24.15 - 24.25 GHz	100 mW (e.i.r.p).				
	24.25 - 26.65 GHz	UWB radar equipment Please check Annex2; Table 4			EN 302 288	For automotive Short Range Radars (SRR).
	63 – 64 GHz	10W (e.i.r.p)				
	76 - 77 GHz	55 dBm peak (e.i.r.p).			EN 301 091 EN 303 360	50 dBm average power or 23.5 dBm average power for pulse radar only. For ground based vehicle and infrastructure systems only.
	100 Hz- 148 kHz	46 dBµA/m at 10 m distance at 100 Hz outside the NMR device	No requirement			Nuclear Magnetic Resonance (NMR) applications.
	148 - 5000 kHz	-15 dBµA/m at 10 m distance outside the NMR device				
	5000 - 30 MHz	-5 dBµA/m at 10m distance outside the NMR device				
	30 - 130 MHz	-36 dBm (e.r.p). outside the NMR device				
	30 MHz - 12.4 GHz	Refer to Standard EN 302 066 for requirements per sub-band			EN 302 066	For Ground- and Wall- Probing Radar (GPR/ WPR) imaging systems
	2200 - 8000 MHz	Refer to Annex 2, Table 1 for UWB generic requirements		Not specified	EN 302 065	For Material Sensing Devices.
	2400 - 2483.5 MHz	25 mW (e.i.r.p).	No requirement		EN 300 440	
	3100 - 4800 MHz	Refer to Annex 2, Table 1 for UWB generic requirements			EN 302 065	For UWB Location Tracking Systems
	3100 - 4800 MHz	Refer to Annex 2, Table 1 for UWB generic requirements			EN 302 065	For UWB Location

<b>RADIO DETERMINATION ON APPLICATIONS</b>						tracking application for emergency and disaster situations (LAES),
	4500 - 7000 MHz	-41.3 dBm/MHz (e.i.r.p). outside the enclosed test tank structure	No requirement	Not specified	EN 302 372	Tank Level Probing Radar (TLPR)
	6000 - 8500 MHz	Refer to Annex2; Table 3 for general technical requirements for industrial level probing radars using UWB technology			EN 302 729	Industrial Level Probing Radar (LPR).
	8500 - 10.6 GHz	-41.3 dBm/MHz (e.i.r.p). outside the enclosed test tank structure	No requirement		EN 302 372	Tank Level Probing Radar (TLPR).
	9200 - 9500 MHz	25 mW (e.i.r.p).			EN 300 440	
	9500 - 9975 MHz	25 mW (e.i.r.p).			EN 300 440	
	10.5 - 10.6 GHz	500 mW (e.i.r.p).			EN 300 440	
	13.4 - 14 GHz	25 mW (e.i.r.p).			EN 300 440	
	17.1 - 17.3 GHz	26 dBm (e.i.r.p).	DAA		EN 300 440	Ground Based Synthetic Aperture Radar (GBSAR)
	24.05 - 24.25 GHz	100 mW (e.i.r.p).	No requirement		EN 300 440	
	24.05 - 26.5 GHz	Refer to Annex2; Table 3 for general technical requirements for industrial level probing radars using UWB technology			EN 302 729	Industrial Level Probing Radar (LPR)
	24.05 - 27 GHz	-41.3 dBm/MHz (e.i.r.p). outside the enclosed test tank structure	No requirement		EN 302 372	Tank Level Probing Radar (TLPR)
	57 - 64 GHz	Check Annex2; Table 3 for general technical requirements for industrial level probing radars using UWB technology			EN 302 729	Industrial Level Probing Radar (LPR)
	57 - 64 GHz	-41.3 dBm/MHz (e.i.r.p). outside the enclosed test tank structure	No requirement		EN 302 372	
	75 - 85 GHz	Check Annex2; Table 3 for general technical requirements for industrial level probing radars using UWB technology			EN 302 729	
75 - 85 GHz	-41.3 dBm/MHz (e.i.r.p). outside the enclosed test tank structure	No requirement	EN 302 372			
<b>ALARMS</b>	169.4 – 169.6	10mW (e.r.p)		Not specified	The whole frequency band may also be used as 1 channel for high speed data transmissions	
	868.6 - 868.7 MHz	10 mW (e.r.p).	≤ 1.0 % duty cycle	25 kHz		

	869.2 - 869.25 MHz		≤ 0.1 % duty cycle		EN 300 220	Social Alarms
	869.25 - 869.3 MHz					
	869.3 - 869.4 MHz		≤ 1.0 % duty cycle			
	869.65 - 869.7 MHz	25 mW (e.r.p).	≤ 10 % duty cycle			
<b>MODEL CONTROL</b>	26990 - 27000 kHz	100 mW (e.r.p).	No requirement	10 kHz		Only for flying models
	27040 - 27050 kHz					
	27090 - 27100 kHz					
	27140 - 27150 kHz					
	27190 - 27200 kHz					
	26.96 - 27.28 MHz					
	29.70 - 30.00 MHz					
	34.995 - 35.225 MHz					
	40.66 - 40.67 MHz					
	40.67 - 40.68 MHz					
	40.68 - 40.69 MHz					
40.69 - 40.7 MHz						
<b>INDUCTIVE APPLICATIONS (Including WPT)</b>	100 Hz- 9 kHz	82 dBμA/m at 10m			EN 303 660 EN 303 447 EN 303 454	Antenna size of < 1/20 λ
	9 - 90 kHz	72 dBμA/m at 10m			EN 303 447 EN 303 454 EN 300 330	In case of external antennas only loop coil antennas may be employed. Magnetic field strength level descending 3 dB/octave above 30 kHz
	90 - 119 kHz	42 dBμA/m at 10m				In case of external antennas only loop coil antennas may be employed
	119 - 135 kHz	66 dBμA/m at 10m		Not specified		In case of external antennas only loop coil antennas may be employed. Magnetic field strength level

			No requirement		descending 3 dB/octave above 119 kHz
	135 - 140 kHz	42 dB $\mu$ A/m at 10m			In case of external antennas only loop coil antennas may be employed
	140 - 148.5 kHz	37.7 dB $\mu$ A/m at 10m			In case of external antennas only loop coil antennas may be employed
	148.5 - 5000 kHz	-15 dB $\mu$ A/m at 10 m			EN 300 330 EN 302 536 In case of external antennas only loop coil antennas may be employed. The maximum magnetic field strength is specified in a bandwidth of 10 kHz. The maximum allowed total magnetic field strength is -5 dB $\mu$ A/m at 10 m for systems operating at bandwidths larger than 10 kHz whilst keeping the density limit (-15 dB $\mu$ A/m in a bandwidth of 10 kHz)
	400 - 600 kHz	-8 dB $\mu$ A/m at 10 m			EN 300 330 For RFID only. In case of external antennas only loop coil antennas may be employed. The maximum field strength is specified in a bandwidth of 10 kHz. The maximum allowed total magnetic field strength is - 5dB $\mu$ A/m at 10 m for systems operating at bandwidths larger than 10 kHz measured at the centre frequency whilst keeping the density limit (-

						8dB $\mu$ A/m in a bandwidth of 10 kHz.) These systems should operate with a minimum operating bandwidth of 30 kHz
	3155 - 3400 kHz	13.5 dB $\mu$ A/m at 10m			EN 300 330	In case of external antennas only loop coil antennas may be employed
	5000kHz - 30 MHz	-20 dB $\mu$ A/m at 10 m			EN 300 330	In case of external antennas only loop coil antennas may be employed. The maximum magnetic field strength is specified in a bandwidth of 10 kHz. The maximum allowed total magnetic field strength is -5 dB $\mu$ A/m at 10 m for systems operating at bandwidths larger than 10 kHz whilst keeping the density limit (-20 dB $\mu$ A/m in a bandwidth of 10 kHz)
	6765 - 6795 kHz	42 dB $\mu$ A/m at 10m			EN 300 330	N/A
	7400 - 8800 kHz	9 dB $\mu$ A/m at 10m				
	10200 - 11000 kHz					
	13553 - 13567 kHz	60 dB $\mu$ A/m at 10m			EN 300 330	For RFID only
	13553 - 13567 kHz	42 dB $\mu$ A/m at 10m				RFID indoor use only
	2446 – 2454 MHz	4WW (e.i.r.p)				RFID outdoor use
	2446 – 2454 MHz	500mW (e.i.r.p)				
	865 – 867.6MHz	2W (e.r.p)				
	100 Hz- 9 kHz	120 dB $\mu$ A/m at 10m			EN 303 348	Inductive loop systems intended to assist the hearing impaired. Antenna size of < 1/20 $\lambda$
	510 -1600 kHz	-5 dB $\mu$ A/m at 10m		Not specified		



<b>RADIO MICROPHONE APPLICATIONS INCLUDING ASSISTIVE LISTENING DEVICES (ALD), WIRELESS AUDIO AND MULTIMEDIA STREAMING SYSTEMS</b>	29.7 - 47 MHz	10 mW (e.r.p).	No requirement	≤ 50 kHz	EN 300 422	Radio microphones. On a tuning range basis.	
	87.5 - 108 MHz	50 nW (e.r.p).		200 kHz	EN 301 357	Band II low power FM transmitters	
	169.4 - 169.475 MHz	500 mW (e.r.p).		≤ 50 kHz	EN 300 422	Assistive Listening Device (ALD)	
	169.4 - 174 MHz	10 mW (e.r.p).	Assistive Listening Device (ALD). On a tuning range basis				
	169.4875 - 169.5875 MHz	500 mW (e.r.p).	Assistive Listening Device (ALD)				
	173.965 - 216 MHz	10 mW (e.r.p).	Assistive Listening Device (ALD). On a tuning range basis.				
	174 - 216 MHz	50 mW (e.r.p).	No requirement			Not specified	Radio microphones. On a tuning range basis.
	470 - 786 MHz						Radio microphones.10 0 mW restricted to body worn equipment. See technical conditions for PMSE (including radio microphones)
	786 - 789 MHz	12 mW (e.r.p).		EN 301 357	Radio microphones, wireless audio and multimedia streaming devices.		
	823 - 826 MHz	20 mW (e.i.r.p). / 100 mW (e.i.r.p).			Radio microphones.50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP)		
	826 - 832 MHz	100 mW (e.i.r.p).			Radio microphones. On a tuning range basis. Restricted to indoor use		
	863 - 865 MHz	10 mW (e.r.p).		No requirement/ SSP (see notes column)	EN 300 422		Radio microphones. On a tuning range basis. Restricted to indoor use
	1350 - 1400 MHz	20 mW (e.i.r.p). / 50 mW (e.i.r.p).	Radio microphones. On a tuning range basis. Restricted to indoor use				
	1492 - 1518 MHz	50 mW (e.i.r.p)	Assistive Listening Systems.				
	1518 - 1525 MHz						
	1656.5 - 1660.5 MHz	2 mW/ 600 kHz (e.i.r.p)					

	1785 - 1795 MHz					Radio microphones. 50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP)
	1795 - 1800 MHz	20 mW (e.i.r.p.) / 50 mW (e.i.r.p).			EN 301 357	Radio microphones including wireless audio and multimedia streaming devices. 50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP)
	1800 - 1804.8 MHz				EN 300 422	Radio microphones. 50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP)
<b>RADIO FREQUENCY IDENTIFICATION APPLICATIONS</b>	865 - 865.6 MHz	100 mW (e.r.p).	No requirement	≤ 200 kHz	EN 302 208	Operated only when necessary to perform the intended operation, i.e. when RFID tags are expected to be present.
	865 - 868 MHz	2 W (e.r.p).				
	865.6 - 867.6 MHz	2 W (e.r.p).				
	867.6 - 868 MHz	500 mW (e.r.p).				
	915 - 921 MHz	4 W (e.r.p).				
	2446 - 2454 MHz	> 500 mW to 4 W (e.i.r.p)	≤ 15% duty cycle FHSS techniques should be used	Not specified	EN 300 440	Power levels above 500 mW are restricted to be used inside the boundaries of a building and the duty cycle of all transmissions shall in this case be ≤ 15 % in any 200 ms period (30 ms on / 170 ms off)
	2446 - 2454 MHz	≤ 500 mW (e.i.r.p).	No requirement			
<b>ACTIVE MEDICAL IMPLANTS AND THEIR ASSOCIATED PERIPHERALS</b>	9 - 315 kHz	30 dBμA/m at 10m	≤ 10% duty cycle	Not specified	EN 302 195	Ultra Low Power Active Medical Implant systems using inductive loop techniques for telemetry purposes
	315 - 600 kHz	-5 dBμA/m at 10m				
	12.5 - 20 MHz	-8 dBμA/m at 10m				
	30 - 37.5 MHz	1 mW (e.r.p).				
	401 - 405 MHz	25 μW (e.r.p)				

						blood pressure measurements.
	2483.5 - 2500 MHz	10 dBm (e.i.r.p).	LBT+AFA and ≤ 10% duty cycle. The equipment shall implement a spectrum access mechanism as described in the applicable harmonized standard or an equivalent spectrum access mechanism.	1 MHz	EN 301 559	Low Power Active Medical Implants and associated peripherals. Individual transmitters may combine adjacent channels on a dynamic basis for increased bandwidth higher than 1 MHz. Peripheral units are for indoor use only.
<b>MEDICAL DATA ACQUISITION</b>	430 - 440 MHz	-50 dBm/100kHz max (e.r.p). density but not exceeding a total power of -40 dBm/10MHz (both limits are intended for measurement outside of the patient's body)	No requirement	≤ 10 MHz	EN 303 520	Ultra-Low Power Wireless Medical Capsule Endoscopy (ULP-WMCE) application
	2483.5 - 2500 MHz	10 mW (e.i.r.p).	Adequate spectrum sharing mechanisms (e.g. Listen-Before-Talk and Adaptive Frequency Agility) shall be implemented by the equipment and ≤ 2% duty cycle	≤ 3 MHz	EN 303 203	MBANS, indoor only within the patient's home.
	2483.5 - 2500 MHz	1 mW (e.i.r.p).	Adequate spectrum sharing mechanisms (e.g. Listen-Before-Talk and Adaptive Frequency Agility) shall be implemented by the equipment	≤ 3 MHz		MBANS, indoor only within healthcare facilities.

			<i>t and ≤ 10% duty cycle</i>			
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## Annex 2: Technical Requirements for UWB Technology Applications

**Table 2: Technical requirements for operation of generic UWB devices**

Frequency ranges (GHz)	Maximum Mean (e.i.r.p) power spectral density (dBm/MHz)		Maximum peak power (dBm) defined in 50MHz		Harmonized Standard Reference
	Without mitigation	With mitigation	Without mitigation	With mitigation	
Below 1.6	-90	-90	-50	-50	EN 302 500 EN 302 065 EN 303 883 ETSI TR 101 994 ETSI TR 102 495 ETSI TS 102 754 ETSI TS 102 321
1.6 - 2.7	-85	-85	-45	-45	
2.7 - 3.1	-70	-70	-36	-36	
3.1 - 3.4	-70	-41.3 (LDC,DAA)	-36	0 (LDC,DAA)	
3.4 - 3.8	-80	-41.3 (LDC,DAA)	-40	0 (LDC,DAA)	
3.8 - 4.8	-70	-41.3 (LDC,DAA)	-30	0 (LDC,DAA)	
4.8 - 6	-70	-70	-30	-30	
6 - 8.5	-41.3	-41.3	0	0	
8.5 - 9	-65	-41.3 (DAA)	-25	0 (DAA)	
9 -10.6	-65	-65	-25	-25	

Above 10.6	-85	-85	-45	-45	
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**Note:**

- i. Within the 3.1 - 4.8 GHz band, devices implementing Low Duty Cycle (LDC) 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 measured in 50 MHz.
- ii. Within the 3.1 - 4.8 GHz and 8.5 to 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.

**Table 3: Technical requirements for operation UWB applications onboard aircrafts**

Frequency ranges (GHz)	Maximum (e.i.r.p) spectral (dBm/MHz)	Mean power density	Maximum peak (e.i.r.p) (dBm) defined in 50MHz	Requirements for Mitigation Techniques	Harmonized Standard Reference
Below 1.6	-90		-50	Mitigation requirements don't apply	EN 302 065
1.6 - 2.7	-85		-45		
2.7 - 3.4	-70		-36		
3.4 - 3.8	-80		-40		
3.8 - 4.2	-70		-30		
4.2 - 4.8	-70		-30		
4.8 - 6	-70		-30		
6.0-6.650	-41.3		0		
6.65-6.6752	-62.3		-21	notch of 21 dB should be implemented to meet a level -62.3 dBm/MHz (Note i below)	
6.6752-8.5	-41.3		0	7.25-7.75 GHz (FSS and MetSat (7.45-7.55 GHz) protection) (Note i and ii below) 7.75-7.9 GHz (MetSat protection) (Note i and Note iii below)	
8.5 -10.6	-65		-25	Mitigation requirements don't apply	
Above 10.6	-85		-45		

**Notes:**

- i. Where requirements for interference mitigation techniques are not highlighted, alternative mitigation techniques offering equivalent protection such as the use of shielded portholes shall apply.
- ii. For 7.25-7.75 GHz (Fixed Satellite Service) and 7.45-7.55 GHz (Meteorological Satellite) bands, a protection criteria of  $-51.3 - 20 * \log_{10}(10 [km] / x [km])$  (dBm/MHz) for heights above 1000m above ground above where x is the aircraft height above ground in kilometers, and -71.3 dBm/MHz for heights above ground of 1 000 m and below shall apply.
- iii. For 7.75-7.9 GHz (Meteorological Satellite) band a protection criteria:  $-44.3 - 20 * \log_{10}(10 [km] / x [km])$  (dBm/MHz) for heights above ground above 1000

$m$ , where  $x$  is the aircraft height above ground in kilometers, and  $-64.3$  dBm/MHz for heights above ground of 1000 m and below shall apply.

**Table 3a: Technical requirements for Industrial Level Probing Radars using UWB technology.**

Freq band (GHz)	Antenna Orientation and tilt angle	Maximum Mean (e.i.r.p) power spectral density (dBm/MHz)	Maximum peak (e.i.r.p) (dBm) defined in 50MHz	Maximum Antenna beam width (degree)	Maximum mean (e.i.r.p). spectral density on half-sphere (dBm/MHz) (Notes 4 and 5)	Mitigation Techniques	Harmonized Standard Reference
6.0-8.5	Strict down Ward	-33	7	12	-55	Adaptive Power Control(APC)	EN 302 729
24.05-26.5	Strict down Ward	-14	26	12	-41.3		
57-64	Strict down Ward	-2	35	8	-41.3		
75-85	Strict down Ward	-3	34	8	-41.3		
75-85	Down Ward $\pm 15^\circ$	-3	34	See note ii below	-41.3		
75-85	Down Ward $\pm 30^\circ$	-10	34	See note ii below	-41.3		
75-85	Down Ward $\pm 45^\circ$	-20	20	See note ii below	-41.3		

**Notes :**

- i.** For LPR devices operating in the 6.0-8.5GHz band, the applicable limits of unwanted emissions are highlighted in Table 3b. LPR operating in other bands, the emission limits of unwanted emissions shall be at least 20 dB less than the in-band limits specified in Table 3a above. LPRs operating in the 24GHz band, the unwanted emissions in the 23.6-24.0 GHz “passive band” shall be at least 30 dB less than the in-band limits specified in Table 3a.
- ii.** For LPR applications with non-restrictive downward orientation; as a safeguard to avoid interference to radio systems shall apply the following maximum mean (e.i.r.p) spectral density limits:
  - $-41,3$  dBm/MHz (e.i.r.p). above  $60^\circ$ , related to the vertical axis of the tilted LPR device;
  - $-35$  dBm/MHz (e.i.r.p). between  $24^\circ$  and  $60^\circ$ , related to the vertical axis of the tilted LPR device. For positive elevation angles, the maximum mean (e.i.r.p). spectral density on half-sphere (dBm/MHz) of  $-41.3$  dBm/MHz must be fulfilled

**Table 3b: Limits of unwanted emissions for LPR operated in 6.0-8.5 GHz band**

<b>Frequency Range (GHz)</b>	<b>Max. mean (e.i.r.p). spectral density limit (dBm/MHz)</b>	<b>Max. mean (e.i.r.p). spectral density limit on half sphere (dBm/MHz)</b>
<i>Below 1.73</i>	-63	-85
<i>1.73-2.7</i>	-58	-80
<i>2.7-5</i>	-48	-70
<i>5-6</i>	-43	-65
<i>8.5-10.6</i>	-43	-65
<i>Above 10.6</i>	-63	-65

- iii.** *Adaptive Power Control (APC) implemented with a dynamic range of at least about 20 dB or an equivalent mitigation technique shall be used to limit radiation in all directions, regardless of installation heights and reflecting material below the LPR.*
- iv.** *Radio Astronomy Services (RAS) stations shall be protected as follows:*
- *installation of LPR devices operating in 6.6 GHz, 24 GHz and 75 GHz bands shall be prohibited from 0km to 4km radius around any RAS station.*
  - *the antenna height of any LPR installation operating in 6.6 GHz, 24 GHz and 75 GHz bands shall not exceed 15 m within a radius of 4 to 40km around the RAS station.*

**Table 4: Technical Requirements for Automotive Short-Range Radars (SRR) using UWB technology**

<b>Frequency Range (GHz)</b>	<b>Max. mean (e.i.r.p). spectral density limit (dBm/MHz)</b>	<b>Maximum peak (e.i.r.p) (dBm) defined in 50MHz</b>
<i>21.65-26.65</i>	-41.3	0
<i>24.25-26.65</i>	-41.3	0

**Notes :**

- i.** *The maximum emitted power for out-of-band emission in the band 23.6-24 GHz shall not exceed -74dBm/MHz (e.i.r.p). Any emissions that appear 30° or greater above the horizontal plane shall be kept to a minimum.*
  
- ii.** *In case of transmissions greater than -74dBm/MHz in the 23.6-24GHz band or SRRs transmitting in the 22.01-22.5 GHz, 22.81-22.86 GHz and 23.07-23.12 GHz bands with a mean (e.i.r.p) density higher than -57 dBm/MHz; such devices shall be fitted with an automatic deactivation mechanism to ensure protection of radio astronomy sites.*