هيئة تنظيم الاتصالات
TELECOMMUNICATIONS REGULATORY AUTHORITY
Kingdom of Bahrain - مملكة البحرين

TECHNICAL SPECIFICATIONS

Requirements for Type Approval

Version:
Issue 01

Date:
27/02/2024

Table of Content

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General Requirements

Technical specifications and parameters outlined in this document have been prepared and approved by the Telecommunications Regulatory Authority (TRA) based on the Telecommunication Device Type Approval Regime and the use of radiocommunication Devices. Several technical specifications may apply to equipment. If an equipment offers multiple interfaces, it is imperative that each interface complies with the relevant technical specifications.

SRDs have pervaded every aspect of our modern lives. These versatile devices can be found in a multitude of applications, including Radio Frequency Identification (RFID) systems, point of sale devices and computer systems, child monitors, keyless garage doors, sensors, radars, keyless automobile entry system, and countless other common radio devices rely on this groundbreaking mode of transmission. The seamless integration of this transmission method has revolutionized our daily routines, making these devices indispensable in our interconnected world.

The term “Short Range Device” is intended to cover radio equipment that are designed to operate over a short range, at low power levels and have low capability of causing harmful interference to other radio communication services. Such devices are permitted to operate on secondary basis on non-interference and non-protected basis. If there is a discrepancy between the technical specifications mentioned in this document and the National Frequency Plan (NFP), the provisions stated in the National Frequency Spectrum Plan shall be adopted.

Scope

These technical specifications apply for the use of tables listed below, for different applications including but not necessarily limited to: Medical, Inductive, RFID, Ultra-Wideband, Wideband devices, Tank Level Probing Radars (TLPR), Private Mobile Radios, Maritime Mobile, and Aeronautical Mobile. The technical specifications are in terms of spectrum usage and mandatory requirements for SRD applications. This includes designated frequency bands, maximum radiated power/field strength levels, channel spacing or modulation/maximum occupied bandwidth and duty cycle.

Execution

These technical specifications shall be enforced starting 27/ 02/ 2024.

1. Technical Specifications

Technical specifications shown in the tables below shall apply on the use of listed applications, given guidance on available frequency ranges and major usage conditions.

1.1 Non-specific Short Range Devices (SRD)

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
13.553 – 13.567 MHz	10 mW e.r.p or 42 dBµA/m at 10m	No requirements	EN 300 330	**European regulations** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
26.957 – 27.283 MHz	10 mW e.r.p or 42 dBµA/m at 10m	No requirements	EN 300 220-2 EN 300 330	**European regulations** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
26.990-27.000 MHz 27.040-27.050 MHz 27.090-27.100 MHz 27.140-27.150 MHz 27.190-27.200 MHz	100 mW e.r.p	Duty cycle: ≤ 0.1 % Channel spacing: ≤ 10 KHz	EN 300 220-2	Other references: CEPT ERC/REC 70-03
40.660 – 40.700 MHz	10 mW e.r.p	No requirements	EN 300 220-2	**European regulations:** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
138.20 – 138.45 MHz	10 mW e.r.p	Duty cycle: ≤1.0 %	EN 300 220-2	Other references: CEPT ERC/REC 70-03
169.4000-169.4750 MHz	500 mW e.r.p	Duty cycle: ≤ 1.0 % Channel Spacing: ≤ 50 KHz	EN 300 220-2	Other references: CEPT ECC/DEC/(05)02 CEPT ERC/REC 70-03

Mandatory requirements			Information	
Spectrum bands	**Maximum permissible power/magnetic field**	**Mitigation requirement**	**Reference standards**	**Other references**
169.4000-169.4875 MHz	10 mW e.r.p	Duty cycle: ≤ 0.1 %	EN 300 220-2	Other references: CEPT ECC/DEC/(05)02 CE¬PT ERC/REC 70-03
169.4875-169.5875 MHz	10 mW e.r.p	Duty cycle: ≤ 0.001 %	EN 300 220-2	Other references: CEPT ECC/DEC/(05)02 CEPT ERC/REC 70-03
169.5875-169.8125 MHz	10 mW e.r.p	Duty cycle: ≤ 0.1 %	EN 300 220-2	Other references: CEPT ECC/DEC/(05)02 CEPT ERC/REC 70-03
315 MHz	10 mW e.r.p	The bandwidth of the emission shall be no wider than 0.25% of the center frequency.	EN 300 220-2	
433.050 – 434.790 MHz	10 mW e.r.p	Duty Cycle: ≤ 10 %	EN 300 220-2	**European regulations:** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
433.050 – 434.790 MHz	1 mW e.r.p -13 dBm/10 KHz power spectral density for Bandwidth modulation larger than 250 kHz	No requirements	EN 300 220-2	**European regulations:** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
434.040 – 434.790 MHz	10 mW e.r.p	Channel Spacing: ≤ 25 KHz	EN 300 220-2	**European regulations:** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
863 – 870 MHz	25 mW e.r.p	Duty Cycle: ≤ 0.1 % or LBT + AFA	EN 300 220-2	**European regulations:** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
868 – 868.6 MHz	25 mW e.r.p	Duty Cycle: ≤ 1 % or LBT+AFA	EN 300 220-2	**European regulations:** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
868.7 – 869.2 MHz	25 mW e.r.p	Duty Cycle: ≤ 0.1 % or LBT+AFA	EN 300 220-2	Narrow/wide-band **European regulations:** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03

Mandatory requirements			Information	
Spectrum bands	**Maximum permissible power/magnetic field**	**Mitigation requirement**	**Reference standards**	**Other references**
869.4 – 869.65 MHz	500 mW e.r.p	Duty Cycle: ≤ 10 % or LBT+AFA	EN 300 220-2	Narrow/wide-band Modulation **European regulations:** Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
869.7 – 870 MHz	5 mW e.r.p	No requirements	EN 300 220-2	Narrow/wide-band European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
869.700 – 870.000 MHz	25 mW e.r.p	Duty Cycle: ≤ 1 % or LBT+AFA	EN 300 220-2	Narrow/wide-band European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
870 - 875.8 MHz	25 mW e.r.p	Duty cycle: ≤ 1 % Occupied bandwidth: ≤ 600 KHz	EN 300 220-2	
875.8 - 876 MHz	25 mW e.r.p	Duty cycle: ≤ 0.1 % Occupied bandwidth: ≤ 200 KHz	EN 300 220-2	
2400 – 2483.5 MHz	10 mW e.i.r.p	No requirements	EN 300 440	European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
5725 – 5875 MHz	25 mW e.i.r.p	No requirements	EN 300 440	European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
24 – 24.25 GHz	100 mW e.i.r.p	No requirements	EN 300 440	European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
57 – 64 GHz	100 mW e.i.r.p	No requirements	EN 305 550	European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
122 – 123 GHz	100 mW e.i.r.p	No requirements	EN 305 550	Other references: CEPT ERC/REC 70-03
244 – 246 GHz	100 mW e.i.r.p	No requirements	EN 305 550	Other references: CEPT ERC/REC 70-03

1.2 Wideband Data Transmission Systems

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
2400 – 2483.5 MHz	100 mW e.i.r.p	Adequate spectrum sharing mechanism (e.g. LBT + DAA) shall be implemented by the Equipment	EN 300 328	European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
5150 – 5350 MHz	200 mW e.i.r.p	Indoor use only Devices must use (TPC) and (DFS) mitigation techniques	EN 301 893	European regulations: Decisions 2007/90/EC, 2005/513/EC. Other references: ECC/DEC/(04)08
5470 – 5725 MHz	500 mW e.i.r.p Maximum mean e.i.r.p density for in-band emissions: 50 mW/MHz in any 1 MHz band	Indoor & outdoor use DFS and TPC is assumed to be implemented	EN 301 893	European regulations: Decisions 2007/90/EC, 2005/513/EC Other references: CEPT ECC/DEC/(04)08
5725 – 5875 MHz	2W e.i.r.p (10 MHz channel)	Indoor & outdoor use DFS and TPC is assumed to be implemented	EN 301 489-4 EN 301 489-17 EN 302 326 EN 302 502	Individual license may be required. Other references: CEPT ECC/REC (06)04

Mandatory requirements			Information	
Spectrum bands	**Maximum permissible power/magnetic field**	**Mitigation requirement**	**Reference standards**	**Other references**
5925 - 6425 MHz	LPI 200 mW e.i.r.p	Indoor use only An adequate spectrum sharing mechanism shall be implemented	EN 303 687	Other references: CEPT ECC Decision (20)01
	VLP 25 mW e.i.r.p	Indoor and outdoor use An adequate spectrum sharing mechanism shall be implemented		
57 - 66 GHz	10 W (40 dBm) e.i.r.p	Adequate spectrum sharing mechanism (e.g. LBT & DAA) shall be implemented. Fixed outdoor installations are not allowed.	EN 302 567	

1.3 Transport and Traffic Telematics (TTT)

Mandatory requirements			Information	
Spectrum bands	**Maximum permissible power/magnetic field**	**Mitigation requirement**	**Reference standards**	**Other references**
24.050-24.075 GHz	100 mW e.i.r.p	No requirements	EN 302 858	For automotive radars
24.075-24.150 GHz	100 mW e.i.r.p	No requirements	EN 302 858	For automotive radars
24.150-24.250 GHz	100 mW e.i.r.p	No requirements	EN 302 858	For automotive radars
76 – 77 GHz	55 dBm peak e.i.r.p	No requirements	EN 301 091	Other references: CEPT ERC/REC 70-03 ECC Report 262
77-81 GHz	55 dBm peak e.i.r.p		EN 302 264	For automotive SRR. * See detailed requirements in ECC/DEC/(04)03 ECC Decision

1.4 Radiodetermination Applications

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
2400 – 2483.5 MHz	25 mW e.i.r.p	No requirements	EN 300 440	
4.5 – 7.0 GHz	-41.3 dBm/MHz e.i.r.p outside the enclosed test tank structure Or 250 mW (24 dBm) maximum peak power, measured in 50 MHz, (within main beam)	No requirements	EN 302 372	For TLPR
6 - 8.5 GHz	5 mW (7 dBm/50 MHz peak e.i.r.p.) (- 33 dBm/MHz mean e.i.r.p. within the LPR operating Bandwidths – within main beam)		EN 302 729	ECC Decision (11)02
8.5 – 10.6 GHz	-41.3 dBm/MHz e.i.r.p outside the enclosed test tank structure Or 1W (30 dBm) maximum peak power, measured in 50 MHz, (within main beam)	No requirements	EN 302 372	For TLPR
9.2 - 9.975 GHz	25 mW e.i.r.p	No requirements	EN 300 440	
10.5 – 10.6 GHz	500 mW e.i.r.p	No requirements	EN 300 440	
13.4 – 14 GHz	25 mW e.i.r.p	No requirements	EN 300 440	
17.1 – 17.3 GHz	400 mW (26 dBm e.i.r.p)	DAA	EN 300 440	(GBSAR) Specific requirements for the radar antenna pattern and for the implementation of (DAA) technique apply as described in EN 300 440
24.05 – 24.25 GHz	100 mW e.i.r.p	No requirements	EN 300 440	Other references: CEPT ERC/REC 70-03

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
24.05 - 27 GHz	-41.3 dBm/MHz e.i.r.p outside the enclosed test tank structure	No requirement	EN 302 372	For TLPR
57 – 64 GHz	-41.3 dBm/MHz e.i.r.p outside the enclosed test tank structure	No requirements	EN 302 372	For TLPR
75 – 85 GHz	-41.3 dBm/MHz e.i.r.p outside the enclosed test tank structure	No requirements	EN 302 372	For TLPR

1.5 Model control applications

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
26.990-27.000 MHz 27.040-27.050 MHz 27.090-27.100 MHz 27.140-27.150 MHz 27.190-27.200 MHz	100 mW e.r.p	Channel Spacing: 10 KHz	EN 300 220-2	European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/DEC/(01)10 CEPT ERC/REC 70-03
34.995 – 35.225 MHz				Flying Models only Other references CEPT ERC/DEC/(01)11 CEPT ERC/REC 70-03
40.660 – 40.670 MHz 40.670 – 40.680 MHz 40.680 – 40.690 MHz 40.690 - 40.700 MHz				Other references: CEPT ERC/DEC/(01)12 CEPT ERC/REC 70-03

1.6 Inductive Applications (See Note 1)

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
100 Hz – 9 KHz	82 dBµA/m at 10 m	No requirements	EN 300 330	Antenna size of < 120/ λ
90 – 119 KHz	42 dBµA/m at 10 m	No requirements	EN 300 330	In case of external antennas only loop coil antennas may be employed.
119 – 135 KHz	66 dBµA/m at 10 m	No requirements	EN 300 330	In case of external antennas only loop coil antennas may be employed.
135 – 140 KHz	42 dBµA/m at 10 m	No requirements	EN 300 330	In case of external antennas only loop coil antennas may be employed.
140 – 148.5 KHz	37.7 dBµA/m at 10 m	No requirements	EN 300 330	In case of external antennas only loop coil antennas may be employed.
3155 – 3400 KHz	13.5 dBµA/m at 10 m	No requirements	EN 300 330	In case of external antennas only loop coil antennas may be employed.
6765 – 6795 KHz	42 dBµA/m at 10 m	No requirements	EN 300 330	
7400 – 8800 KHz	9 dBµA/m at 10 m	No requirements	EN 300 330	
10.200 – 11.000 MHz	9 dBµA/m at 10 m	No requirements	EN 300 330	
26.957 – 27.283 MHz	42 dBµA/m at 10 m	No requirements	EN 300 330	European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
13.553 – 13.567 MHz	42 dBµA/m at 10 m	No requirements	EN 300 330	
148.5 KHz – 5 MHz	-15 dBµA/m at 10m	No requirements	EN 302 536	In the case of external antennas only loop coil antennas may be employed. The maximum field strength is specified in a bandwidth of 10 KHz. The maximum allowed total field strength is -5 dBA/m at 10m for systems operating at bandwidths larger than 10 KHz whilst keeping the density limit (-15 dBA/m in a bandwidth of 10 KHz) European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
5 - 30 MHz	-20 dBµA/m at 10m	No requirements	EN 300 330	In the case of external antennas only loop coil antennas may be employed. The maximum field strength is specified in a bandwidth of 10 KHz. The maximum allowed total field strength is -5 dBA/m at 10m for systems operating at bandwidths larger than 10 KHz whilst keeping the density limit (-20 dBA/m in a bandwidth of 10 KHz) European Legislation: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03

Note 1 : This category covers, for example, devices for car immobilizers, animal identification, alarm systems, cable detection, waste management, personal identification, wireless voice links, access control, proximity sensors, anti-theft systems including RF anti-theft induction systems, EAS (Electronic Article Surveillance), data transfer to handheld devices, automatic article identification, wireless control systems and automatic road tolling.

1.7 Alarm Equipment

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
868.6 – 868.7 MHz	10 mW e.r.p	Duty Cycle: ≤ 1 % Channel Spacing: 25 KHz	EN 300 220	The whole frequency band may also be used as 1 channel for high-speed data transmissions.
869.200 – 869.250 MHz	10 mW e.r.p	Duty Cycle: ≤ 0.1 % Channel Spacing: 25 KHz	EN 300 220	Social Alarms (Note 2)
869.250 – 869.300 MHz	10 mW e.r.p	Duty Cycle: ≤ 0.1 % Channel Spacing: 25 KHz	EN 300 220	
869.3 – 869.4 MHz	10 mW e.r.p	Duty Cycle: ≤ 1 % Channel Spacing: 25 KHz	EN 300 220	
869.650 – 869.700 MHz	25 mW e.r.p.	Duty Cycle: ≤ 10 % Channel Spacing: 25 KHz	EN 300 220	

Note 2: Social alarm devices are used to assist elderly people and people with disabilities living at home when they are in distress.

1.8 Radio Microphones, Hearing Aids and Wireless Audio Applications

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
100 Hz - 9 KHz	120 dBµA/m at 10m	No requirements	EN 303 348	Inductive loop systems intended to assist the hearing impaired. Antenna size of < 1/20 λ.
29.7 – 47.0 MHz	10 mW e.r.p	Channel Spacing: ≤ 50 KHz	EN 300 422-2	Radio microphones. On a tuning range basis.
87.5 - 108 MHz	50 nW e.r.p	Channel Spacing: ≤ 200 KHz	EN 301 357	European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
169.4 – 174.0 MHz	10 mW e.r.p	Channel Spacing: ≤ 50 KHz	EN 300 422-2	Assistive Listening Device (ALD). On a tuning range basis. Aids for the hearing impaired. On a tuning range basis.
169.400 - 169.475 MHz	500 mW e.r.p	Channel Spacing: ≤ 50 KHz	EN 300 422-2	Assistive Listening Device (ALD). (Public Hearing Aid System) Individual license may be required. ECC/DEC/(05)02
169.4875 - 169.5875 MHz	500 mW e.r.p	Channel Spacing: ≤ 50 KHz	EN 300 422-2	Assistive Listening Device (ALD). (Public Hearing Aid System). Individual licence may be required. ECC/DEC/(05)02
173.965 - 216 MHz	10 mW e.r.p	Channel Spacing: ≤ 50 KHz	EN 300 422	Assistive Listening Device (ALD). On a tuning range basis. Individual licence may be required.
174 - 216 MHz	50 mW e.r.p	No requirements	EN 300 422	Radio microphones. On a tuning range basis. Individual license may be required.
470 - 614 MHz	50 mW e.r.p	No requirements	EN 300 422	Radio microphones. On a tuning range basis.
863 - 865 MHz	10 mW e.r.p	No requirements	EN 300 422	Wireless Audio and Multimedia streaming devices. other references: CEPT/ERC 70-03

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
864.8 – 865 MHz	10 mW e.r.p	Channel Spacing: 50 KHz	EN 300 220	Narrow band analogue voice devices
1518 - 1525 MHz	50 mW e.i.r.p	No requirements	EN 300 422	Radio Microphones. On a tuning range basis. Individual license may be required. Restricted to indoor use only.
1656.5 - 1660.5 MHz	2 mW/600 KHz e.i.r.p	No requirements	EN 300 422	Assistive Listening Systems. Individual license may be required.
1785 - 1795 MHz	20 mW e.i.r.p/ 50 mW e.i.r.p	No requirements	EN 300 422	Radio microphones. Individual license may be required. 50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP) implemented for the 1785-1804.8 MHz band
1795 - 1800 MHz	20 mW e.i.r.p/ 50 mW e.i.r.p	No requirements	EN 301 357	Radio microphones including wireless audio and multimedia streaming devices. Individual license may be required. 50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP) implemented for the 1785-1804.8 MHz band.
1800 - 1804.8 MHz	20 mW e.i.r.p/ 50 mW e.i.r.p	No requirements	EN 300 422	Radio microphones. Individual license may be required. 50 mW restricted to body worn equipment or equipment with Spectrum Scanning Procedure (SSP) implemented for the 1785-1804.8 MHz band
1880 – 1900 MHz	250 mW peak e.r.p	No requirements	EN 301 406	Safety: EN 60950, EN 50360 & EN 50364 EMC: EN 301 489-1, EN 301 489-6 Other references CEPT ERC/DEC/(98) 221

1.9 Radio Frequency Identification (RFID) Applications

Mandatory requirements			Information	
Spectrum bands	**Maximum permissible power/magnetic field**	**Mitigation requirement**	**Reference standards**	**Other references**
13.553 – 13.567 MHz	60 dBµA/m @ 10m		EN 300 330 EN 302 291	European Legislations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
400 – 600 KHz	-5 dBµA/m at 10m	No requirements	EN 300 330	
865-868 MHz	2 W e.r.p	Channel Spacing: 200 KHz	EN 302 208	Interrogator transmissions in sub-band a) at 2 W e.r.p. are only permitted within the four channels centred at 865.7 MHz, 866.3 MHz, 866.9 MHz and 867.5 MHz; each with a maximum bandwidth of 200 kHz. RFID tags respond at a very low power level (-20 dBm e.r.p.) in a frequency range around the RFID interrogator channels.
2446 – 2454 MHz	500 mW e.i.r.p	FHSS or unmodulated carrier (Continuous Wave) only	EN 300 440	
2446 – 2454 MHz	> 500 mW to 4 W e.i.r.p	Indoor use only. ≤ 15% duty cycle FHSS techniques should be used.	EN 300 440	Any emission shall not exceed 500 mW when measured 10 meters from either the installed building or boundary of the user's premises

1.10 Active Medical Implants and Their Associated Peripherals

Mandatory requirements			Information	
Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other references
9 – 315 KHz	30 dBµA/m at 10 m	Duty Cycle: ≤ 10 %	EN 302 195	The application is for (ULP-AMI) systems using inductive loop techniques for telemetry purposes. European regulations: Decision 2006/771/EC Decision 2009/381/EC Decision 2011/829/EU Other references: CEPT ERC/REC 70-03
315 – 600 KHz	-5 dBµA/m at 10 m	Duty Cycle: ≤ 10 %	EN 302 536	For animal implants.
12.5 - 20 MHz	-7 dBµA/m at 10 m	Duty Cycle: ≤ 10 %	EN 300 330	For ULP (ULP-AID)
30 – 37.5 MHz	1 mW e.r.p	Duty Cycle: ≤ 10 %	EN 302 510	The application is for (ULP) medical membrane implants for blood pressure measurements.
401 – 402 MHz	25 µW e.r.p	LBT + AFA for spectrum access Channel Spacing: ≤ 25 KHz Individual transmitters may combine with adjacent channels for increased bandwidth up to 100 KHz	EN 302 537	For (ULP-AMI) ERC/DEC/(01)17
402 – 405 MHz	25 µW e.r.p	Channel Spacing: ≤ 300 KHz	EN 301 839	
2483.5 - 2500 MHz	10 dBm e.i.r.p		EN 301 559	

1.11 Tracking, Tracing and Data Acquisition

Mandatory requirements			Information	
Spectrum bands	**Maximum permissible power/magnetic field**	**Mitigation requirement**	**Reference standards**	**Other references**
456.9 – 457.1 KHz	7 dBµA/m at 10 m	Duty cycle: ≥ 150 Hz, No modulation allowed	EN 300 718	Emergency detection of buried victims and valuable items. European regulations: 2001/148/EC Other references: CEPT ECC/DEC/(04)01 CEPT ERC/REC 70-03
169.4 – 169.475 MHz	500 mW e.r.p	Duty cycle: ≤ 10%, channel spacing: ≤ 50 KHz	EN 300 220-2	Meter Reading European regulations: Decision 2005/928/EC Decision 2008/673/EC Other references: CEPT ECC/DEC(05)02 CEPT ERC/REC 70-03
865 - 868 MHz	500 mW e.r.p	Bandwidth ≤ 200 KHz, (APC) is required, Duty cycle: ≤ 10 % For network access points ≤ 2.5 % otherwise		
5725-5875 MHz	400 mW e.i.r.p	(APC) is required, DFS or DAA shall be implemented as adequate sharing mechanism ≥ 1 MHz and ≤ 20 MHz duty cycle	EN 303 258	

1.12 Generic UWB devices shall comply with latest version of ETSI (EN 302 065)

1.12.1 The maximum value of mean power spectral density shall not exceed the values as given in the following table:

Frequency range (GHz)	Without mitigation techniques E.I.R.P. (dBm/MHz)	With mitigation techniques E.I.R.P. (dBm/MHz)
f ≤ 1.6	-90	-90
1.6 < f ≤ 2.7	-85	-85
2.7 < f ≤ 3.1	-70	-70
3.1 < f ≤ 3.4	-70	-41.3 (notes 1+2)
3.4 < f ≤ 3.8	-80	-41.3 (notes 1+2)
3.8 < f ≤ 4.2	-70	-41.3 (notes 1+2)
4.2 < f ≤ 4.8	-70	-41.3 (notes 1+2)
4.8 < f ≤ 6.0	-70	-70
6.0 < f ≤ 8.5	-41.3	-41.3
8.5 < f ≤ 9.0	-65	-41.3 (note 2)
9.0 < f ≤ 10.6	-65	-65
f > 10.6	-85	-85

NOTE 1: Within the band 3.1 GHz to 4.8 GHz, devices implementing Low Duty Cycle (LDC) mitigation technique Annex 2 (LDC) and Annex 3 (DAA) of ECC Decision (06)04 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.

NOTE 2: Within the bands 3.1 GHz to 4.8 GHz and 8.5 GHz to 9.0 GHz, devices implementing Detect and Avoid (DAA) mitigation technique Annex 2 (LDC) and Annex 3 (DAA) of ECC Decision (06)04 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.

1.12.2 Generic UWB devices shall not exceed the maximum peak power limits as given in the table below:

Frequency Range (GHz)	Without mitigation techniques defined in 50 MHz E.I.R.P. (dBm)	With mitigation techniques defined in 50 MHz E.I.R.P. (dBm)
f ≤ 1.6	-50	-50
1.6 < f ≤ 2.7	-45	-45
2.7 < f ≤ 3.1	-36	-36
3.1 < f ≤ 3.4	-36	0 (notes 1+2)
3.4 < f ≤ 3.8	-40	0 (notes 1+2)
3.8 < f ≤ 4.2	-30	0 (notes 1+2)
4.2 < f ≤ 4.8	-30	0 (notes 1+2)
4.8 < f ≤ 6.0	-30	-30
6.0 < f ≤ 8.5	0	0
8.5 < f ≤ 9.0	-25	0 (notes 2)
9.0 < f ≤ 10.6	-25	-25
f > 10.6	-45	-45

NOTE 1: Within the band 3.1 GHz to 4.8 GHz, devices implementing Low Duty Cycle (LDC) mitigation technique Annex 2 (LDC) and Annex 3 (DAA) of ECC Decision (06)04 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.

NOTE 2: Within the bands 3.1 GHz to 4.8 GHz and 8.5 GHz to 9.0 GHz, devices implementing Detect And Avoid (DAA) mitigation technique Annex 2 (LDC) and Annex 3 (DAA) of ECC Decision (06)04 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.

1.13 Location Tracking devices using UWB technology shall comply with latest version of ETSI (EN 302 065). The maximum mean EIRP spectral density and the maximum peak EIRP shall not exceed the values as given in the following table:

Frequency range (GHz)	Maximum mean E.I.R.P. spectral density (dBm/MHz)	Maximum peak E.I.R.P. (dBm, measured in 50 MHz bandwidth)
f ≤ 1.6	-90	-50
1.6 < f ≤ 2.7	-85	-45
2.7 < f ≤ 3.4	-70	-36
3.4 < f ≤ 3.8	-80	-40
3.8 < f ≤ 4.8	-70	-30
4.8 < f ≤ 6.0	-70	-30
6.0 < f ≤ 8.5	-41.3	0
8.5 < f ≤ 9.0	-41.3 (see note 1)	0 (see note 2)
9.0 < f ≤ 10.6	-65	-25
f > 10.6	-85	-45

NOTE 1: Operation is subject to the implementation of DAA. If DAA is not implemented, the following applies: 8.5 GHz to 9.0 GHz ≤-65 dBm/MHz.

NOTE 2: Operation is subject to the implementation of DAA. If DAA is not implemented, the following applies: 8.5 GHz to 9.0 GHz ≤-25 dBm (measured in 50 MHz bandwidth).

1.14 Building Material Analysis (BMA) devices using UWB technology shall comply with latest version of ETSI (EN 302 065). The values of undesired emissions shall not exceed the values as given in the following table:

1.14.1: The limits for the indirect emission which operate without any active mitigation techniques.

Frequency range (GHz)	Maximum mean e.i.r.p. spectral density (dBm/MHz)	Maximum peak e.i.r.p. (dBm defined in 50 MHz)	Remarks
Below 1,73	-85	-45	-
1,73 to 2.2	-65	-25	-
2,2 to 2,5	-50	-10	-
2,5 to 2,69	-65	-25	Note 1
2,69 to 2,7	-55	-15	Note 1, note 2, note 3
2,7 to 2,9	-70	-30	-
2,9 to 3,4	-70	-30	-
3,4 to 3,8	- 50	-10	Note 2, note 3
3,8 to 4,8	- 50	-10	-
4,8 to 5,0	-55	-15	Note 1, note 2, note 3
5,0 to 5,25	-50	-10	-
5,25 to 5,35	-50	-10	-
5,35 to 5,6	- 50	-10	-
5,6 to 5,65	-50	-10	-
5,65 to 5,725	-50	-10	-
5,725 to 6,0	-50	-10	-
6,0 to 8,5	-41,3	0	-
8,5 to 9,0	-65	-25	-
9,0 to 10,6	-65	-25	-
Above 10,6	-85	-45	-

Note 1: An additional requirement on TRP applies, see clause 4.3.6. of EN 302 0651-4-.
Note 2: An additional requirement on DC applies, see clause 4.3.8. of EN 302 0651-4-.
Note 3: Reduced limits for mean e.i.r.p. spectral density do apply in case of trading DC and power according to clause 4.3.8.3, table 14 of EN 302 0651-4-.

1.15 Gound- and wall-probing radar imaging systems (GPR/WPR) devices using UWB technology shall comply with latest version of ETSI (EN 302 066)

1.15.1 The values of mean power density of undesired emissions shall not exceed the values as given in the following table:

Frequency range (MHz)	Maximum mean e.i.r.p. density (dBm/MHz)
<230	-65
230-1000	-60
1000-1600	-65 (note 1)
1600-3400	-51.3
3400-5000	-41.3
5000-6000	-51.3
>6000	-65

Note 1: In addition to the maximum mean e.i.r.p. density given in the table above, a maximum mean e.i.r.p. density of -75 dBm/kHz applies in the RNSS bands 1164-1215 MHz and 1559-1610 MHz in case of spectral lines in these bands.

1.15.2 The values of measure peak power density of undesired emissions shall not exceed the values as given in the following table:

Frequency range (MHz)	Maximum peak power
30 to 230	-44.5dBm/120KHz (e.r.p.)
> 230 to 1000	-37.5dBm/120KHz (e.r.p.)
> 1000 to 18000	-30dBm/MHz (e.i.r.p.)

1.16 Private Mobile Radios (PMR):

Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other notes
118 - 137 MHz	*	No requirements		License is required. Aeronautical mobile
156-162.1 MHz	5 W for Handhelds, 25 W for base stations	No requirements		License is required. Maritime mobile.
136 – 174 MHz	5 W for handhelds, 20 W Vehicle mounted devices, 25 W for base stations, 35 W for base stations, 50 W for repeaters	Channel Spacing: 6.25 KHz, 12 KHz, 25 KHz		Specific frequency assignment is subject to licensing. Radio equipment transmitting signals to initiate a specific response in the receiver
401 – 470 MHz				

1.17 UAVs and ancillary equipment (note 3):

Spectrum bands	Maximum permissible power/magnetic field	Mitigation requirement	Reference standards	Other notes
26.957 - 27.283 MHz	100 mW e.r.p	Channel spacing: ≤ 10 kHz	EN 300 220-2	European regulations: ERC/REC 70-03
34.995 - 35.225 MHz				European regulations: ERC/DEC/(01)11 ERC/REC 70-03
40.665 - 40.7 MHz				European regulations: ERC/DEC/(01)12 ERC/REC 70-03
433.05 - 434.79 MHz	10 mW e.r.p	No requirements		
863 - 867 MHz	25 mW e.r.p	No requirements		
869.4 - 869.65 MHz	500 mW e.r.p	No requirements		
2400 - 2483.5 MHz	100 mW e.i.r.p	No requirements	EN 300 328 EN 300 440	
5725 - 5875 MHz	25 mW e.i.r.p	No requirements	EN 300 440	

Note 3: UAVs have the potential to operate on IMT networks using services provided by licensed telecom operators in the Kingdom of Bahrain.

Abbreviations

AFA	Adaptive Frequency Agility
ALD	Assistive Listening Device
APC	Adaptive Power Control
BMA	Building Material Analysis
CEPT	European Conference of Postal and Telecommunications Administrations
DAA	Detect-And-Avoid
DFS	Dynamic Frequency Selection
ECC	Electronic Communications Committee
EMC	Electromagnetic Compatibility
ERIP	Equivalent Radiated Isotropic Power
ERP	Equivalent Radiated Power
ETSI	European Telecommunications Standards Institute
FHSS	Frequency Hopping Spread Spectrum
GBSAR	Ground Based Synthetic Aperture Radar
GPR	Ground Probing Radar
IMT	International Mobile Telecommunication
LBT	Listen Before Talk
LDC	Low Duty Cycle
LPI	Low Power Indoor
NFP	National Frequency Plan
OE	Other Emissions
PMR	Private Mobile Radio
RF	Radio Frequency
RFID	Radio-frequency Identification
RNSS	Regional Navigation Satellite Systems
SRD	Short Range Device
SRR	Short Range Radars
TLPR	Tank Level Probing Radar
TPC	Transmitter Power Control
TRP	Total Radiated Power
UE	Undesired (UWB) Emissions
ULP-AID	Ultra Low Power-Animal Implants Devices
ULP-AMI	Ultra Low Power-Active Medical Implant
UWB	Ultra-Wideband
UAV	Unmanned Aerial Vehicle
VLP	Very Low Power

References

National Frequency Plan

Telecommunications law

Type Approval Regulations

Iot Position Paper

Fixed link policy

Document history

Version	Version 1 (Enforce)
Date of Issuance	27th February 2024