CEPT ECC
Electronic Communications Committee

ECC Recommendation (25)01

Emission limit requirements for Wireless Power Transmission (WPT)

approved 14 February 2025

amended 5 June 2026

Edition 5 June 2026

INTRODUCTION

This Recommendation specifies the limits of the operating and unwanted emissions of non-beam Wireless Power Transmission (WPT) applications. However, the current version only covers the use of WPT applications for medical implantable devices as well as for generic WPT applications, including portable and mobile WPT applications.

WPT applications bring together a number of different technologies to transmit energy through electromagnetic fields with or without the use of beams (beam or non-beam), inductive or capacitive coupling, magnetic resonance, etc. The concept consists of a transmitter device connected to an energy source, which is converted into an electromagnetic field directed towards a receiving device, which receives energy and converts it to be stored in its battery or to power the device directly. The WPT applications may also include data communications and/or radiodetermination simultaneously. Data can be transmitted on the same frequency or on a different frequency band or even with any other technology.

Operating emissions refer to radiated emissions resulting from the operation of the WPT transmitter at the frequencies used for the purpose of transmitting energy towards a WPT receiving device. Unwanted emissions refer to radiated emissions that are typically dominated by harmonics caused by the type of power feed of the charging coil (i.e. power transmission).

Two main types of non-beam WPT applications are considered:

- **Inductive coupling** is widely used for charging electronic devices where electrical power is transferred over a small air gap between wire coils. The primary coils and secondary coils are designed to, and need to have, strong inductive coupling. It is characterised by the fact that the efficiency of the energy transfer reduces rapidly as the air gap between the coils increases and the strength of the inductive coupling weakens;
- **Magnetic resonance coupling** technique uses a coil and a capacitor as a resonator. Electrical power is transferred over an air gap between two magnetically resonant wire coils. Electrical power can be transferred over a larger air gap, compared to inductive coupling, by matching the resonant frequency of the two coils. This technique allows flexibility in the physical arrangement of the primary coil relative to the secondary coil.

Induction cooktops, used for direct heating of cookware, are outside the scope of this Recommendation, as there is no WPT receiving loop/coil in induction cooktops.

Where a difference between the limits for a particular standard and this Recommendation might exist, in particular if the limits in the respective standard are less stringent, the iterative, consultative procedure given in the ETSI/ECC Memorandum of Understanding[1] should be followed. This procedure should consider the interaction between technical parameters, its impact on spectrum efficiency, as well as regulatory and economic aspects.

Considering that generic portable and mobile devices using WPT technologies are already available on the market and may not be able to meet the recommended values of this recommendation, it is suggested that CEPT countries may consider allowing them to remain operational even after the implementation of this recommendation.

It is considered appropriate that this Recommendation should be reviewed at least every three years, in light of changing WPT technologies and regulatory requirements. This review should involve consultation with the relevant technical bodies and working groups within CEPT/ECC, ETSI and CENELEC.

[1] https://www.cept.org/ecc/mous-and-lous-between-cept-ecc-and-other-organisations

ECC RECOMMENDATION (25)01 OF 14 FEBRUARY 2025 ON EMISSION LIMIT REQUIREMENTS FOR WIRELESS POWER TRANSMISSION (WPT), AMENDED 5 JUNE 2026

"The European Conference of Postal and Telecommunications Administrations,

considering

a) that the radio frequency spectrum is a common resource, and it is necessary to avoid harmful interference;

b) that CEPT countries need to define common limits of operating and unwanted emissions for all WPT applications that may be put into operation with a view to prevent interference to radiocommunication services;

c) that CEPT, ETSI and CENELEC have signed Memoranda of Understanding describing the relative responsibilities of the three bodies[1];

d) that emission limits are usually reflected in the ETSI Harmonised Standards;

e) that this Recommendation assumes that WPT emissions are measured with a peak detector;

f) that ETSI, CENELEC and TCAM consider that WPT applications are part of the radiocommunication framework, considering that every WPT application holds the functionality of detecting foreign objects and manages the transfer of energy simultaneously;

g) that ECC Report 333 [4] considers low power non-beam generic WPT applications operating in various frequency bands below 30 MHz;

h) that existing non-beam generic WPT applications, complying with the limits in ERC Recommendation 70-03, annex 9 [1] and ERC Recommendation 74-01 [2], showed no problem to any other existing system or existing radiocommunication service;

i) that Eurobalise tele-powering and applications based on RFID or NFC (communication and tele-powering combined) are inductive short-range devices subject to ERC Recommendation 70-03;

j) that Recommendation ITU-R SM.2129 [3] provides guidance on frequency ranges for the operation of non-beam WPT applications for mobile and portable devices;

k) that, under specific protection criteria and assumptions, some study results in ECC Report 333 [4] found limits to protect certain radio communication services that are lower than those in this Recommendation;

recommends

1. that the operating and unwanted emission limits for non-beam WPT applications apply for the range of 100 Hz to 30 MHz;

2. that the operating emission limits for non-beam generic WPT applications and for medical implantable devices defined in Annex 1 should apply;

3. that the unwanted emission limits for non-beam generic WPT applications and for medical implantable devices defined in Annex 2 should apply;

4. that the recommended emission limits should be considered for relevant standards developed or revised after the date at which this ECC Recommendation has been approved;

5. that WPT devices which have been placed on the market before the implementation of this ECC Recommendation at the national level should be allowed to continue to operate;

6. that WPT applications permitted under this ECC Recommendation operate on a non-interference, non-protected basis.

Note: Please check the ECO Documentation Database https://docdb.cept.org/ for the up to date position on the implementation of this and other ECC Recommendations.

ANNEX 1: NON-BEAM GENERIC WPT OPERATING EMISSION LIMIT REQUIREMENTS

Non-beam generic WPT applications cover typically: smartphones, small devices (tablets, cameras, loudspeakers), wearables, portables, small IoT devices and medical implantable devices.

A1.1 GENERIC REQUIREMENTS

This section covers frequency bands and regulatory limits as well as informative parameters valid for all types of non-beam WPT applications. Alternative limits for the operating emissions may be defined for specific categories of device such as medical implants (see section A1.2).

Table 1: Operating emission limits for non-beam generic WPT

Frequency Band		Power / Magnetic Field	Notes
a1	100-140 kHz	42 dBµA/m at 10 m (see also Table 2)	
a2	140-148.5 kHz	37.7 dBµA/m at 10 m	
b1	315-405 kHz	-15 dBµA/m at 10 m per 10 kHz not exceeding -5 dBµA/m at 10 m in total	
b2	1700-1800 kHz		
b3	2005-2170 kHz		
c	6765-6795 kHz	42 dBµA/m at 10 m	
d	13553-13567 kHz	42 dBµA/m at 10 m	

Table 1: Standard frequency and time signals to be protected within 9-200 kHz

Stations	Frequency	Protection bandwidth	Maximum field strength	Location
MSF	60 kHz	+/-250 Hz	42 dBµA/m at 10 m	United Kingdom
HBG	75 kHz	+/-250 Hz	42 dBµA/m at 10 m	Switzerland
DCF77	77.5 kHz	+/-250 Hz	42 dBµA/m at 10 m	Germany
DCF49	129.1 kHz	+/-500 Hz	42 dBµA/m at 10 m	Germany
ALS162	162 kHz	+/-250 Hz	-15 dBµA/m at 10 m	France

A1.2 SPECIFIC REQUIREMENTS FOR MEDICAL IMPLANTABLE WPT APPLICATIONS

This section covers frequency bands and regulatory limits as well as informative parameters valid for medical implants, where powering the implant or charging the implant battery uses WPT applications. Medical implants may use also the parameters from Table 1.

Table 2: Operating emission limits for medical implantable WPT

Frequency Band		Power / Magnetic Field	Notes
a	8.4-9.4 kHz	30 dBµA/m at 10 m	
b	36-46 kHz	30 dBµA/m at 10 m	
c	47.5-52.5 kHz	30 dBµA/m at 10 m	
d	76-87 kHz	50 dBµA/m at 10 m (see also Table 2)	
e	119-130 kHz	66 dBµA/m at 10 m descending by 10 dB/decade (see also Table 2)	
f	121-129 kHz	50 dBµA/m at 10 m (see also Table 2)	
g	200-220 kHz	40 dBµA/m at 10 m	
h	260-350 kHz	30 dBµA/m at 10 m	
i	4000-5900 kHz	9 dBµA/m at 10 m	
j	5880-7680 kHz	9 dBµA/m at 10 m	

ANNEX 2: UNWANTED EMISSION LIMIT REQUIREMENTS FOR WPT APPLICATIONS

In order to protect the existing radiocommunication services, the following emission limits should apply.

Table 3: Unwanted emission limits in the spurious domain for non-beam generic WPT

Frequency range	Power / Magnetic Field limit
100 Hz – 148.5 kHz	46.5 dBµA/m per B_R at 10 m decreasing by 10 dB/decade
148.5-5000 kHz	-15 dBµA/m per 10 kHz at 10 m
5-30 MHz	-20 dBµA/m per 10 kHz at 10 m
Note 1: These limits apply to any centre frequency offset ≥ 2.5×B_O where B_O is the occupied bandwidth of the operational emission. Note 2: B_R values are defined in Table 6.	

Table 4: Unwanted emission limits in the spurious domain for medical implantable WPT

Frequency range	Power / Magnetic Field limit
100 Hz – 10 MHz	46.5 dBµA/m per B_R at 10 m decreasing by 10 dB/decade
10-30 MHz	-3.5 dBµA/m per 10 kHz at 10 m
Note 1: These limits apply to any centre frequency offset ≥ 2.5×B_O where B_O is the occupied bandwidth of the operational emission. Note 2: B_R values are defined in Table 6.	

Table 5: Reference bandwidth B_R

Frequency range	B_R
100-500 Hz	10 Hz
500 Hz – 9 kHz	100 Hz
9-148.5 kHz	1 kHz
148.5 kHz – 30 MHz	10 kHz

The limits specified in ERC Recommendation 74-01, annex 2 row 2.1.3 [2] apply to spurious domain emissions above 30 MHz.

ANNEX 3: LIST OF ABBREVIATIONS

Table 6: List of abbreviations

Abbreviation	Explanation
CENELEC	European Committee for Electrotechnical Standardization
CEPT	European Conference of Postal and Telecommunications Administrations
ECC	Electronic Communications Committee
ERC	Former European Radiocommunications Committee (now ECC)
ETSI	European Telecommunication Standards Institute
IoT	Internet of Things
ITU	International Telecommunication Union
MoU	Memorandum of Understanding
SRD	Short Range Device
TCAM	Telecommunication Conformity Assessment and Market surveillance committee
WPT	Wireless Power Transmission

ANNEX 4: LIST OF REFERENCES

[1] ERC Recommendation 70-03: “relating to the use of Short Range Devices (SRD), approved October 1997, latest amended June 2026

[2] ERC Recommendation 74-01: “Unwanted Emissions in the Spurious Domain”, approved October 1998, latest corrected May 2022

[3] Recommendation ITU-R SM.2129: “Guidance on frequency ranges for the operation of non-beam wireless power transmission for mobile and portable devices”

[4] ECC Report 333: “Non-beam Wireless Power Transmission (WPT) applications other than WPT-EV operating in various frequency bands below 30 MHz”, approved January 2022