

ETSI EN 300 718-1 V2.2.1 (2021-06)



**Avalanche Beacons operating at 457 kHz;
Transmitter-receiver systems;
Part 1: Harmonised (Standard for access) to radio spectrum**

[ETSI EN 300 718-1 V2.2.1 \(2021-06\)
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Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).
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The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

The present document is part 1 of a multi-part deliverable covering avalanche beacons operating at 457 kHz transmitter-receiver systems, as identified below:

- Part 1:** "Harmonised Standard for access to radio spectrum";
- Part 2: "Harmonised Standard for features for emergency services";
- Part 3: "Harmonized EN covering essential requirements of article 3.3e of the R&TTE Directive".

NOTE: This part 3 is obsolete and has been replaced with ETSI EN 300 718-2 [2].

National transposition dates	
Date of adoption of this EN:	24 May 2021
Date of latest announcement of this EN (doa):	31 August 2021
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	28 February 2022
Date of withdrawal of any conflicting National Standard (dow):	28 February 2023

Modal verbs terminology

In the present document "shall", "shall not", "should", "should not", "may", "need not", "will", "will not", "can" and "cannot" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document specifies technical characteristics and methods of measurements for avalanche beacon transmitter-receiver systems operating from 456,9 kHz to 457,1 kHz. The frequency range 456,9 kHz to 457,1 kHz is EU wide harmonised for emergency detections of buried victims and valuable items devices according to Commission Implementing decision (EU) 2019/1345 [i.9].

An avalanche beacon comprises in one unit at least a transmitter/receiver including antenna and battery.

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in annex A.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [1] CISPR 16-1-4 (2019): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Antennas and test sites for radiated disturbance measurements".
- [2] ETSI EN 300 718-2 (V2.1.1) (01-2018): "Avalanche Beacons operating at 457 kHz; Transmitter-receiver systems; Part 2: Harmonised Standard for features for emergency services".

2.2 Informative references

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.2] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.3] ANSI C63.5: "American National Standard for Electromagnetic Compatibility-Radiated Emission Measurements in Electromagnetic Interference (EMI) Control-Calibration of Antennas (9 kHz to 40 GHz)".

- [i.4] ETSI TR 100 028 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.5] ETSI TR 102 273-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 2: Anechoic chamber".
- [i.6] ETSI TR 102 273-3: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 3: Anechoic chamber with a ground plane".
- [i.7] ETSI TR 102 273-4: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 4: Open area test site".
- [i.8] ECC Report 284 (September 2018): "Feasibility studies of Person detection and collision avoidance applications in the 442.2-457.1 kHz range".
- [i.9] Commission Implementing decision (EU) 2019/1345 of 2 August 2019 amending Decision 2006/771/EC updating harmonised technical conditions in the area of radio spectrum use for short-range devices.
- [i.10] ERC Recommendation 70-03 (June 2019): "Relating to the use of Short Range Devices (SRD)".
- [i.11] ETSI EG 203 336 (V1.2.1): "Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".
- [i.12] ETSI TS 103 361 (V1.1.1): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Receiver technical requirements, parameters and measurement procedures to fulfil the requirements of the Directive 2014/53/EU".
- [i.13] ETSI TS 103 567 (V1.1.1): "Requirements on signal interferer handling".
- [i.14] Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services.
- [i.15] Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

avalanche beacons: portable radio systems used for locating avalanche victims, for the purpose of direct rescue (i.e. for rescue by comrades not buried by the avalanche)

NOTE: An avalanche beacon has two operating modes: transmit and receive.

E-field: electric component of the field measured as voltage per unit length

environmental profile: range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

H-field: magnetic component of the field measured as current per unit length

H-field test antenna: electrically screened loop or equivalent antenna, with which the magnetic component of the field can be measured

integral antenna: antenna designed as an indispensable part of the equipment, with or without the use of an antenna connector

measuring receiver: selective voltmeter or a spectrum analyser

NOTE: See clause 5.4.

radiated measurements: measurements which involve the absolute measurement of a radiated field

receive mode: operating mode of the avalanche beacon where it receives, or is ready to receive, the signal(s) of other avalanche beacon(s) (also called: SEARCH mode)

transmit mode: operating mode of the avalanche beacon where it radiates a magnetic field with carrier frequency and on/off keying as defined in the present document (also called: SEND mode)

3.2 Symbols

For the purposes of the present document, the following symbols apply:

E	Electrical field strength
E ₀	Reference electrical field strength
f	Frequency
H	Magnetic field strength
H ₀	Reference magnetic field strength
N	Newton
P	Power
R	Distance
R ₀	Reference distance
t	Time
Z	Wave impedance
l	Wavelength

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3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CEPT	Conférence des administrations Européennes des Postes et Telecommunications
CISPR	Comité International Spécial des Perturbations Radioélectriques
DSP	Digital Signal Processor
EC	European Commission
ECC	Electronic Communications Committee
EFTA	European Free Trade Association
ERC	European Radio communications Committee
EU	European Union
EUT	Equipment Under Test
OATS	Open Area Test Site
RF	Radio Frequency
UWB	Ultra Wideband
VSWR	Voltage Standing Wave Ratio

4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be in accordance with its intended use, but as a minimum, shall be that specified in the test conditions contained in the present document (see clause 5.1). The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the operational environmental profile defined by its intended use.

4.2 Conformance requirements for transmitters

4.2.1 Modulation and carrier keying

4.2.1.1 Applicability

This requirement applies to all avalanche beacons.

4.2.1.2 Description

The modulation used for avalanche beacons is carrier keying. The carrier keying defines the on and off times for a non-continuous carrier.

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4.2.1.3 Limits

The carrier keying shall be as shown in figure 1:

- on time: 70 ms minimum;
- off time: 400 ms minimum;
- period: 1 000 ms \pm 300 ms (on time plus off time).

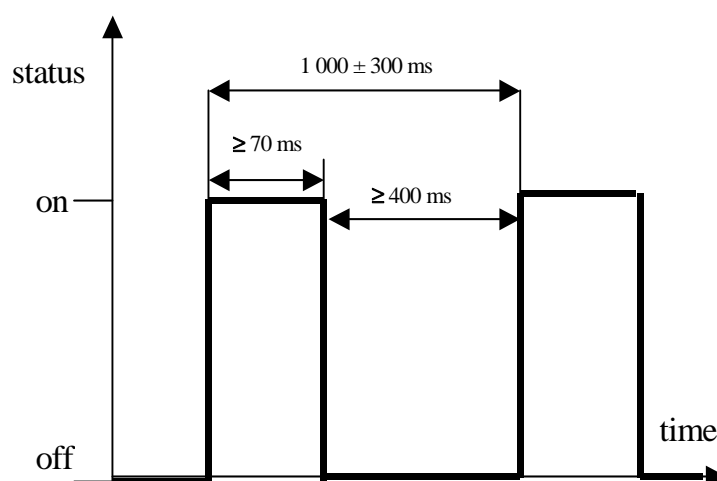


Figure 1

4.2.1.4 Conformance

The conformance tests for transmitter modulation and carrier keying shall be as defined in clause 5.3.1 of the present document.

Conformance shall be established under normal as well as under extreme test conditions according to clause 5.1.

The interpretation of the results for the measurements uncertainty shall be as given in clause 5.2.

4.2.2 Frequency error

4.2.2.1 Applicability

This requirement applies to all avalanche beacons.

4.2.2.2 Description

The frequency error of the transmitter system is the difference between the measured carrier frequency and the nominal carrier frequency.

4.2.2.3 Limits

The frequency error shall not exceed ± 80 Hz at 457 kHz.

4.2.2.4 Conformance

The conformance tests for transmitter frequency error shall be as defined in clause 5.3.2 of the present document.

Conformance shall be established under normal as well as under extreme test conditions according to clause 5.1.

The interpretation of the results for the measurements uncertainty shall be as given in clause 5.2.

4.2.3 Output field strength (H-field)

4.2.3.1 Applicability

This requirement applies to all avalanche beacons.

4.2.3.2 Description

The H-field is measured in the direction of maximum field strength under specified conditions of measurement.

4.2.3.3 Limits

The minimum transmitted field strength at 457 kHz shall not be lower than -6 dB μ A/m ($0,5$ μ A/m) at a distance of 10 m.

The maximum transmitted field strength at 457 kHz shall not exceed 7 dB μ A/m ($2,23$ μ A/m) at a distance of 10 m.

4.2.3.4 Conformance

The conformance tests for Transmitter output field strength (H-field) shall be as defined in clause 5.3.3 of the present document.

Conformance shall be established under normal as well as under extreme test conditions according to clause 5.1.

The interpretation of the results for the measurements uncertainty shall be as given in clause 5.2.

4.2.4 Transmitter spurious emissions

4.2.4.1 Applicability

This requirement applies to all avalanche beacons.

4.2.4.2 Description

Spurious emissions are emissions at frequencies other than those of the carrier and sidebands associated with its modulation. The level of spurious emissions shall be measured at normal conditions as their effective radiated power or field strength radiated by the cabinet and the integral antenna.

4.2.4.3 Limits

Radiated emissions below 30 MHz shall not exceed the generated H-field at 10 m given in table 1.

Table 1

State	Frequency $9 \text{ kHz} \leq f < 10 \text{ MHz}$ Except $457 \text{ kHz} \pm 0,1 \text{ kHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
Transmit	27 dB μ A/m descending 3 dB/oct	-3,5 dB μ A/m

A graphical representation is shown in annex C, figure C.1.

The power of any radiated emission shall not exceed the values given in table 2.

Table 2

State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies between 30 MHz to 1 000 MHz
Operating	4 nW	250 nW

4.2.4.4 Conformance

The conformance tests for Transmitter spurious emissions shall be as defined in clause 5.3.4 of the present document.

Conformance shall be established under normal test conditions according to clause 5.1.

The interpretation of the results for the measurements uncertainty shall be as given in clause 5.2.

4.3 Conformance requirements for receiver parameters

4.3.1 Receiver sensitivity

4.3.1.1 Applicability

This requirement applies to all avalanche beacons.

4.3.1.2 Description

The maximum usable sensitivity of the receiver is the minimum level of the wanted signal (H-field strength which, when applied to the receiver input, produces an optical and/or acoustic indication of a received beacon).