

Draft **ETSI EN 303 722** V1.1.0 (2021-07)



**Wideband Data Transmission Systems (WDTs)
for Fixed Network Radio Equipment operating
in the (57 GHz to 71 GHz) band;
Harmonised Standard for access to radio spectrum**

ETSI EN 303 722 V1.1.0 (2021-07)
<https://standards.iteh.ai/catalog/standards/sist/b7e05e4a-8910-4928-9627-39a3e69ab31e/etsi-en-303-722-v1-1-0-2021-07>

Reference

DEN/BRAN-230025

Keywords60 GHz, access, broadband, fixed networks, radio,
SRD**ETSI**650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2021.
All rights reserved.

Contents

Intellectual Property Rights	6
Foreword.....	6
Modal verbs terminology.....	6
1 Scope	8
2 References	8
2.1 Normative references	8
2.2 Informative references.....	8
3 Definition of terms, symbols and abbreviations.....	9
3.1 Terms.....	9
3.2 Symbols.....	10
3.3 Abbreviations	10
4 Technical requirements specifications	10
4.1 Environmental profile.....	10
4.2 Conformance requirements	10
4.2.1 Spectral power density.....	10
4.2.1.0 Applicability.....	10
4.2.1.1 Definition	11
4.2.1.2 Limit.....	11
4.2.1.3 Conformance.....	11
4.2.2 RF output power.....	11
4.2.2.0 Applicability.....	11
4.2.2.1 Definition	11
4.2.2.2 Limit.....	11
4.2.2.3 Conformance.....	11
4.2.3 Transmitter unwanted emissions in the spurious domain.....	12
4.2.3.0 Applicability.....	12
4.2.3.1 Definition	12
4.2.3.2 Limit.....	12
4.2.3.3 Conformance.....	12
4.2.4 Transmitter out-of-band emissions	12
4.2.4.0 Applicability.....	12
4.2.4.1 Definition	12
4.2.4.2 Limit.....	13
4.2.4.3 Conformance.....	13
4.2.5 Adaptivity (medium access protocol)	13
4.2.5.1 Applicability.....	13
4.2.5.2 Definition	13
4.2.5.3 Limit.....	14
4.2.5.3.0 General	14
4.2.5.3.1 Automatic Transmit Power Control.....	14
4.2.5.3.2 Automatic Link Adaptation	14
4.2.5.4 Conformance.....	14
4.2.6 Occupied Channel Bandwidth	14
4.2.6.1 Applicability.....	14
4.2.6.2 Definition	14
4.2.6.3 Limit.....	14
4.2.6.4 Conformance.....	14
4.2.7 Receiver unwanted emissions in the spurious domain.....	14
4.2.7.0 Applicability.....	14
4.2.7.1 Definition	15
4.2.7.2 Limit.....	15
4.2.7.3 Conformance.....	15
4.2.8 Receiver Blocking	15
4.2.8.1 Applicability.....	15

4.2.8.2	Definition	15
4.2.8.3	Performance Criteria	15
4.2.8.4	Limit	15
4.2.8.5	Conformance	16
4.2.9	Receiver Sensitivity level	16
4.2.9.1	Applicability	16
4.2.9.2	Definition	16
4.2.9.3	Limit	16
4.2.9.4	Conformance	16
5	Testing for compliance with technical requirements	16
5.1	Environmental conditions for testing	16
5.1.1	General	16
5.1.2	Normal test conditions	17
5.1.2.1	Normal temperature and humidity	17
5.1.2.2	Normal power source	17
5.1.3	Extreme test conditions	17
5.2	Test procedure for the essential radio test suites	17
5.2.0	General	17
5.2.1	Product Information	17
5.2.2	Test modulation, frequency and configuration	17
5.2.3	Spectral power density	18
5.2.3.1	Test conditions	18
5.2.3.2	Test method	18
5.2.4	RF output power	19
5.2.4.1	Test conditions	19
5.2.4.2	Test method	19
5.2.5	Transmitter unwanted emissions in the spurious domain	20
5.2.5.0	Test conditions	20
5.2.5.1	Pre-scan	20
5.2.5.2	Identified emissions	21
5.2.6	Transmitter out-of-band emissions	22
5.2.6.1	Test conditions	22
5.2.6.2	Test method	22
5.2.7	Adaptivity (medium access protocol)	23
5.2.7.1	Test conditions	23
5.2.7.2	Test method (ATPC)	23
5.2.7.3	Test method (ALA)	24
5.2.8	Occupied Channel Bandwidth	25
5.2.8.1	Test conditions	25
5.2.8.2	Test method	25
5.2.9	Receiver unwanted emissions in the spurious domain	25
5.2.9.0	Test conditions	25
5.2.9.1	Pre-scan	26
5.2.9.2	Identified emissions	26
5.2.10	Receiver Blocking	27
5.2.10.1	Test conditions	27
5.2.10.2	Test Method	27
5.2.11	Receiver sensitivity level	28
5.2.11.1	Test conditions	28
5.2.11.2	Test method	28
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	29
Annex B (informative):	Maximum Measurement Uncertainty	31
Annex C (normative):	Test sites and arrangements for radiated measurements	32
C.1	Test sites	32
C.1.1	Open air test sites	32
C.1.2	Anechoic chamber	33
C.1.2.1	General	33

C.1.2.2	Description.....	33
C.1.2.3	Influence of parasitic reflections.....	33
C.1.2.4	Calibration and mode of use	33
C.2	Test antenna.....	35
C.3	Substitution antenna	35
Annex D (normative):	General description of measurement	36
D.1	Radiated measurements.....	36
D.2	Substitution measurement	37
Annex E (informative):	Bibliography.....	38
Annex F (informative):	Change History	39
History		40

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ETSI EN 303 722 V1.1.0 \(2021-07\)](https://standards.iteh.ai/catalog/standards/sist/b7e05e4a-8910-4928-9627-39a3e69ab31e/etsi-en-303-722-v1-1-0-2021-07)

<https://standards.iteh.ai/catalog/standards/sist/b7e05e4a-8910-4928-9627-39a3e69ab31e/etsi-en-303-722-v1-1-0-2021-07>

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

ITh STANDARD PREVIEW
(standards.iteh.ai)

Foreword

ETSI EN 303 722 V1.1.0 (2021-07)

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Broadband Radio Access Networks (BRAN), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

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.5].

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.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ETSI EN 303 722 V1.1.0 \(2021-07\)](#)

<https://standards.iteh.ai/catalog/standards/sist/b7e05e4a-8910-4928-9627-39a3e69ab31e/etsi-en-303-722-v1-1-0-2021-07>

1 Scope

The present document specifies technical characteristics and methods of measurements for Wideband Data Transmission Systems (WDTS) fixed network radio equipment operating in the 57 GHz to 71 GHz band taking into consideration ERC/REC 70-03 [i.3] annex 3 (frequency bands c2 and c3) and Commission Decision 2006/771/EC [i.4] bands 75a and 75b.

This radio equipment is capable of operating in all or any part of the frequency bands given in table 1.

Table 1: Radiocommunications service frequency band

Transmit/Receive	Radiocommunications service frequency band
Transmit	57 GHz to 71 GHz
Receive	57 GHz to 71 GHz

NOTE 1: The technical characteristics of applications using these radio equipment are further described in ETSI TR 103 583 [i.1].

NOTE 2: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.5] 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 reference, only the cited version applies. For non-specific reference, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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

Not applicable.

2.2 Informative 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.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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] ETSI TR 103 583 (V1.1.1): "System Reference document (SRdoc); Technical characteristics of Multiple Gigabit Wireless Systems (MGWS) in radio spectrum between 57 GHz and 71 GHz".
- [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] ERC Recommendation 70-03 (Tromsø 1997 and subsequent amendments): "Related to the Use of Short Range Devices (SRD)".
- [i.4] Commission Decision of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices (notified under document number C(2006) 5304) (Text with EEA relevance) (2006/771/EC).
- NOTE: Available at [http://data.europa.eu/eli/dec/2006/771\(2\)/2019-08-13](http://data.europa.eu/eli/dec/2006/771(2)/2019-08-13).
- [i.5] 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.6] 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 (notified under document C(2019) 5660) Text with EEA relevance.
- [i.7] ERC Recommendation 74-01 (Approved 1998 and subsequent amendments): "Unwanted emissions in the spurious domain".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in Directive 2014/53/EU [i.5] and the following apply:

60 GHz range or 60 GHz band: one of the variously permitted frequencies of operation, between 57 GHz to 71 GHz

activity factor: percentage over any one-minute time period when equipment is operating under a given set of conditions

adjacent channel: channels on either side of the nominal channel separated by the nominal channel bandwidth

automatic transmit power control: mechanism that automatically reduces the transmit power based on the power at the receiver

channel separation: minimum separation (in MHz) between the centre frequencies of two adjacent channels in the channel plan of the radio equipment

integral antenna: antenna which is declared to be part of the radio equipment by the manufacturer

NOTE 1: In some cases, it may not be possible to remove an integral antenna or expose an antenna connector without changing the output characteristics of the radio equipment.

NOTE 2: Even with an integral antenna, it might still be possible to separate the antenna from the equipment using a special tool.

mean power: average power (transmitted or received) during the On Time of the signal

nominal channel bandwidth: bandwidth assigned to a single channel

NOTE: The nominal channel bandwidth is part of the product information as outlined in clause 5.2.1.

occupied bandwidth: bandwidth of the signal containing 99 % of the transmitted mean power

NOTE: Both below the lower and above the upper frequency limits, the mean power emitted is equal to 0,5 % of the total mean power of the emission.

smart antenna system: equipment that combines multiple transmit and/or receive antenna elements with a signal processing function to increase its radiation and/or reception capabilities

NOTE: This includes techniques such as spatial multiplexing, beam forming, cyclic delay diversity, etc.

3.2 Symbols

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

dBc	decibel relative to the maximum spectral power density of the transmitted signal
dB _i	decibel relative to the gain of an isotropic antenna
dBm	decibel relative to one milliwatt
dBr	decibel relative to a given maximum power level
GHz	thousand millions of cycles per second
kHz	thousands of cycles per second
μs	millionths of seconds

3.3 Abbreviations

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

ACM	Adaptive Code and Modulation
ALA	Adaptive Level Adjust
ATPC	Automatic Transmit Power Control
BW	BandWidth
CW	Continuous Wave
DC	Duty Cycle
EFTA	European Free Trade Association
EIRP	Equivalent Isotropically Radiated Power
EIRP ₀	Equivalent Isotropically Radiated Power spectral density
ERP	Effective Radiated Power
FER	Frame Error Rate
MCS	Modulation and Coding Scheme
PD	Power Density
PDL	spectral Power Density Limit
PSD	Power Spectral Density
RBW	Resolution BandWidth
RF	Radio Frequency
RMS	Root Mean Square
UUT	Unit Under Test

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. 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

4.2.1 Spectral power density

4.2.1.0 Applicability

The present requirement applies to all equipment within the scope of the present document.

4.2.1.1 Definition

The spectral power density is the mean Equivalent Isotropically Radiated Power (EIRP) density ($EIRP_0$) during a transmission burst.

4.2.1.2 Limit

The maximum spectral power density is applicable to the system as a whole when operated at the highest power spectral density level ($EIRP_0$). The maximum spectral power density shall be as indicated in table 2.

Table 2: Power Spectral Density (PSD) limit

Condition	Maximum $EIRP_0$
Fixed outdoor installations with ≥ 30 dBi transmit antenna gain	38 dBm/MHz
Otherwise	23 dBm/MHz

NOTE: Information on PSD limit is aligned with the Commission Implementing Decision (EU) 2019/1345 [i.6] (see Annex, Table 2, Bands 75a and 75b).

4.2.1.3 Conformance

Conformance tests as defined in clause 5.2.3 shall be carried out and result compared to the limit.

4.2.2 RF output power

4.2.2.0 Applicability

The present requirement applies to all equipment within the scope of the present document.

[ETSI EN 303 722 V1.1.0 \(2021-07\)](https://standards.iteh.ai/catalog/standards/sist/b7e05e4a-8910-4928-9627-39a3e69ab31e/etsi-en-303-722-v1-1-0-2021-07)

4.2.2.1 Definition

<https://standards.iteh.ai/catalog/standards/sist/b7e05e4a-8910-4928-9627-39a3e69ab31e/etsi-en-303-722-v1-1-0-2021-07>

The RF output power is the mean Equivalent Isotropically Radiated Power (EIRP) for the equipment during a transmission burst.

4.2.2.2 Limit

The maximum RF output power is applicable to the system as a whole when operated at the highest stated power level. For a smart antenna system, the limit applies to the configuration that results in the highest EIRP. In case of multiple (adjacent or non-adjacent) channels the total RF output power of all channels shall be less than or equal to the limits in table 3.

The maximum RF output power shall be as indicated in table 3.

Table 3: RF output power limit

Antenna Gain (G_A)	Additional Conditions	Maximum power level (EIRP)
$G_A < 13$ dBi		27 dBm + G_A
13 dBi $\leq G_A < 30$ dBi		40 dBm
30 dBi $\leq G_A$		40 dBm
	Fixed outdoor installations	55 dBm

NOTE: Information on RF output power limit is aligned with the Commission Implementing Decision (EU) 2019/1345 [i.6] (see Annex, Table 2, Bands 75a and 75b).

4.2.2.3 Conformance

Conformance tests as defined in clause 5.2.4 shall be carried out and result compared to the limit.

4.2.3 Transmitter unwanted emissions in the spurious domain

4.2.3.0 Applicability

The present requirement applies to all equipment within the scope of the present document.

4.2.3.1 Definition

Transmitter unwanted emissions are unwanted emissions in the spurious domain while the equipment is transmitting.

4.2.3.2 Limit

The level of unwanted emissions in the spurious domain shall be less than or equal to the limits given in table 4, where the lower boundary between the spurious domain and the out-of-band domain shall be at a frequency F_L :

- $F_L = \min(57 \text{ GHz}; f_C - \min(2,5 \times \text{nominal channel BW}, 1,5 \times \text{nominal channel BW} + 500 \text{ MHz}))$

where f_C is the nominal centre frequency of the transmission.

The upper boundary between the spurious domain and the out-of-band domain shall be at a frequency F_H :

- $F_H = \max(71 \text{ GHz}; f_C + \min(2,5 \times \text{nominal channel BW}, 1,5 \times \text{nominal channel BW} + 500 \text{ MHz}))$

Table 4: Transmitter unwanted emissions in the spurious domain

Frequency range	Emission Limit ERP (≤ 1 GHz) EIRP (> 1 GHz)	Measurement Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to F_L GHz	-30 dBm	1 MHz
F_H GHz to 142 GHz	-30 dBm	1 MHz

NOTE: Information on limits for transmitter unwanted emissions in the spurious domain is based on ERC Recommendation 74-01 [i.7].

4.2.3.3 Conformance

Conformance tests as defined in clause 5.2.5 shall be carried out and result compared to the limit.

4.2.4 Transmitter out-of-band emissions

4.2.4.0 Applicability

The present requirement applies to all equipment within the scope of the present document.

4.2.4.1 Definition

Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in transmit mode, on frequencies immediately outside the necessary bandwidth which results from the modulation process but excluding spurious emissions.

4.2.4.2 Limit

The transmitter unwanted emissions in the out-of-band domain shall be less than or equal to the relative limits provided in figure 1, where the x-axis is the ratio of frequency (F) to declared nominal channel BandWidth (BW), or an absolute level of -30 dBm within a 1 MHz bandwidth, whichever is greater. Non-adjacent channels shall be tested separately. Within the 57 to 71 GHz band and outside -2,5 to +2,5 ratio of frequency to declared nominal bandwidth range the -30 dBm or -30 dBm in 1 MHz whichever is the greater shall apply.

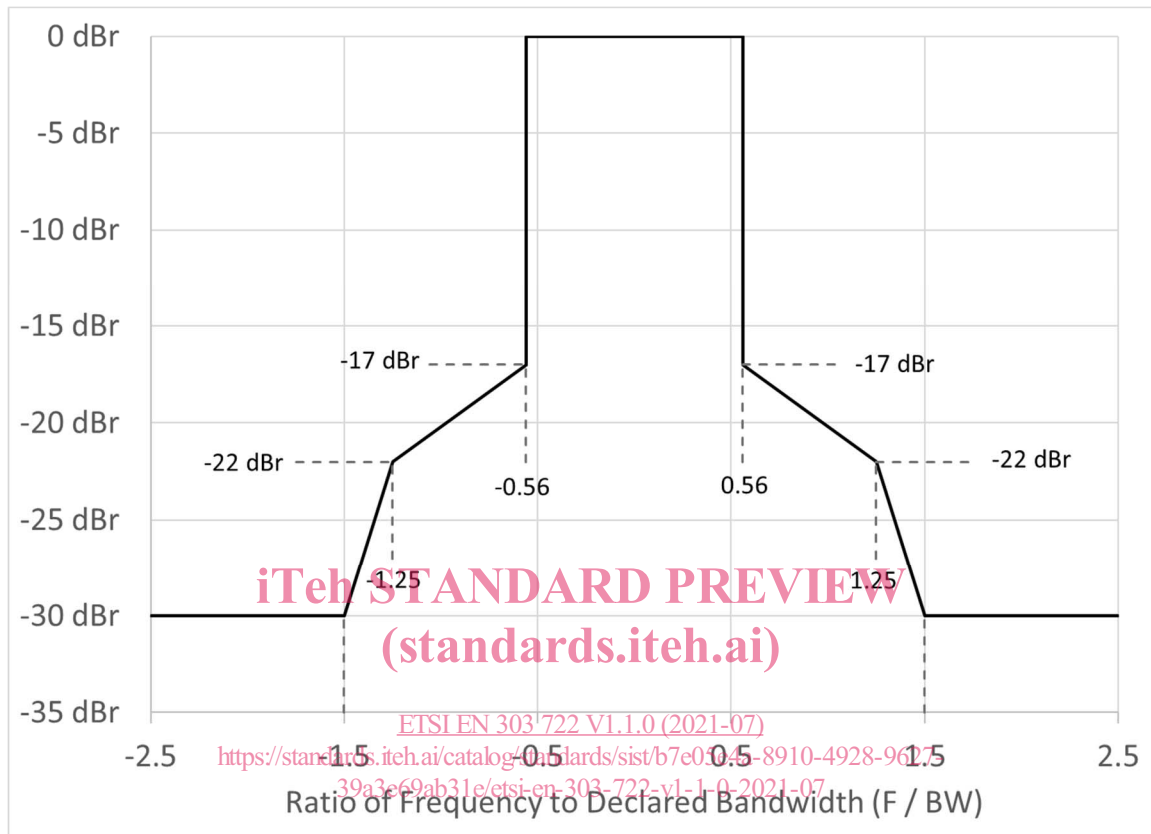


Figure 1: Transmit Mask

4.2.4.3 Conformance

Conformance tests as defined in clause 5.2.6 shall be carried out and result compared to the limit.

4.2.5 Adaptivity (medium access protocol)

4.2.5.1 Applicability

The present requirement applies to all equipment within the scope of the present document.

4.2.5.2 Definition

Automatic Transmit Power Control (ATPC) and Automatic Link Adaptation (ALA), also known as Automatic Adaptive Coding and Modulation (ACM), are adaptivity (medium access protocol) mechanisms designed to facilitate spectrum sharing with other devices. ATPC automatically reduces transmit power when there is excess link margin such that link performance (throughput and FER) are not impacted. ALA automatically adapts the coding and modulation to maximize spectral efficiency, thus reducing the transmission time of a given amount of payload. Both ATPC and ALA reduce the interference caused to other links in the band and facilitates spectrum sharing. Equipment may support either, or both, types of adaptivity mechanisms.