



# SLOVENSKI STANDARD

## SIST EN 302 571 V2.1.1:2017

01-april-2017

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**Inteligentni transportni sistemi (ITS) - Radiokomunikacijska oprema, ki deluje v frekvenčnem pasu od 5855 MHz do 5925 MHz - Harmonizirani standard, ki zajema bistvene zahteve člena 3.2 direktive 2014/53/EU**

Intelligent Transport Systems (ITS) - Radiocommunications equipment operating in the 5 855 MHz to 5 925 MHz frequency band - Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

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# ETSI EN 302 571 V2.1.1 (2017-02)



**Intelligent Transport Systems (ITS);  
Radiocommunications equipment operating  
in the 5 855 MHz to 5 925 MHz frequency band;  
Harmonised Standard covering the essential requirements  
of article 3.2 of Directive 2014/53/EU**

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# Contents

Intellectual Property Rights .....	7
Foreword.....	7
Modal verbs terminology.....	7
1 Scope .....	8
2 References .....	8
2.1 Normative references .....	8
2.2 Informative references.....	9
3 Definitions, symbols and abbreviations .....	10
3.1 Definitions .....	10
3.2 Symbols.....	10
3.3 Abbreviations .....	11
4 Technical requirements specifications .....	11
4.1 Environmental profile.....	11
4.2 Conformance requirements .....	12
4.2.1 Transmitter frequency stability .....	12
4.2.1.1 Definition .....	12
4.2.1.2 Limits .....	12
4.2.1.3 Conformance.....	12
4.2.2 RF output power .....	13
4.2.2.1 Definition .....	13
4.2.2.2 Limits .....	13
4.2.2.3 Conformance.....	13
4.2.3 Power spectral density .....	13
4.2.3.1 Definition .....	13
4.2.3.2 Limits .....	13
4.2.3.3 Conformance.....	13
4.2.4 Transmit power control.....	13
4.2.4.1 Definition .....	13
4.2.4.2 Limits .....	13
4.2.4.3 Conformance.....	13
4.2.5 Transmitter unwanted emissions.....	13
4.2.5.1 Transmitter unwanted emissions outside the 5 GHz ITS frequency band.....	13
4.2.5.1.1 Definition.....	13
4.2.5.1.2 Limits .....	14
4.2.5.1.3 Conformance .....	14
4.2.5.2 Transmitter spectrum mask within the 5 GHz ITS frequency band for 10 MHz channels .....	15
4.2.5.2.1 Definition.....	15
4.2.5.2.2 Limits .....	15
4.2.5.2.3 Conformance .....	15
4.2.6 Receiver spurious emissions .....	15
4.2.6.1 Definition .....	15
4.2.6.2 Limits .....	15
4.2.6.3 Conformance.....	15
4.2.7 Receiver selectivity.....	16
4.2.7.1 Definition .....	16
4.2.7.2 Limits .....	16
4.2.7.3 Conformance.....	16
4.2.8 Receiver sensitivity.....	16
4.2.8.1 Definition .....	16
4.2.8.2 Limits .....	17
4.2.8.3 Conformance.....	17
4.2.9 Interference mitigation for CEN DSRC and HDR DSRC in the frequency band 5 795 MHz to 5 815 MHz.....	17
4.2.9.1 Definition .....	17

4.2.9.2	Limits .....	17
4.2.9.3	Conformance .....	17
4.2.10	Decentralized congestion control .....	18
4.2.10.1	Definition .....	18
4.2.10.2	Limits .....	18
4.2.10.3	Conformance .....	18
5	Testing for compliance with technical requirements .....	19
5.1	Environmental conditions for testing .....	19
5.2	Interpretation of measurement results .....	19
5.3	Radio test suites .....	19
5.3.1	Product information .....	19
5.3.2	Transmitter frequency stability .....	20
5.3.2.1	Test purpose .....	20
5.3.2.2	Test applicability .....	20
5.3.2.3	Test description .....	20
5.3.2.3.1	Initial conditions .....	20
5.3.2.3.2	Conducted measurement .....	20
5.3.2.3.3	Radiated measurement .....	21
5.3.2.4	Test requirements .....	21
5.3.3	RF output power, power spectral density and transmit power control .....	21
5.3.3.1	Test purpose .....	21
5.3.3.2	Test applicability .....	21
5.3.3.3	Test description .....	21
5.3.3.3.1	Initial conditions .....	21
5.3.3.3.2	Conducted measurement .....	21
5.3.3.3.3	Radiated measurement .....	23
5.3.3.4	Test requirements .....	23
5.3.4	Transmitter unwanted emissions outside the 5 GHz ITS frequency band .....	24
5.3.4.1	Test purpose .....	24
5.3.4.2	Test applicability .....	24
5.3.4.3	Test description .....	24
5.3.4.3.1	Initial conditions .....	24
5.3.4.3.2	Conducted measurement .....	24
5.3.4.3.3	Radiated measurement .....	25
5.3.4.4	Test requirements .....	25
5.3.5	Transmitter spectrum mask within the 5 GHz ITS frequency band for 10 MHz channel spacing .....	25
5.3.5.1	Test Purpose .....	25
5.3.5.2	Test applicability .....	25
5.3.5.3	Test description .....	26
5.3.5.3.1	Initial conditions .....	26
5.3.5.3.2	Conducted measurement .....	26
5.3.5.3.3	Radiated measurement .....	26
5.3.5.4	Test requirements .....	26
5.3.6	Receiver spurious emissions .....	27
5.3.6.1	Test Purpose .....	27
5.3.6.2	Test applicability .....	27
5.3.6.3	Test description .....	27
5.3.6.3.1	Initial conditions .....	27
5.3.6.3.2	Conducted measurement .....	27
5.3.6.3.3	Radiated measurement .....	28
5.3.6.4	Test requirement .....	28
5.3.7	Receiver selectivity .....	28
5.3.7.1	Test purpose .....	28
5.3.7.2	Test applicability .....	28
5.3.7.3	Test description .....	28
5.3.7.3.1	Initial conditions .....	28
5.3.7.3.2	Conducted measurement .....	29
5.3.7.3.3	Radiated measurement .....	29
5.3.7.4	Test requirement .....	30
5.3.8	Receiver sensitivity .....	30
5.3.8.1	Test purpose .....	30

5.3.8.2	Test applicability .....	30
5.3.8.3	Test description .....	30
5.3.8.3.1	Initial conditions .....	30
5.3.8.3.2	Conducted measurement .....	30
5.3.8.3.3	Radiated measurement .....	31
5.3.8.4	Test requirement .....	31
5.3.9	CEN DSRC and HDR DSRC protection .....	31
5.3.9.1	Test Purpose .....	31
5.3.9.2	Test applicability .....	31
5.3.9.3	Test description .....	31
5.3.9.3.1	Initial conditions .....	31
5.3.9.3.2	Measurement of RF output power, unwanted emissions, and transmit duty cycle in coexistence mode .....	31
5.3.9.4	Test requirements .....	32
5.3.10	CEN DSRC and HDR DSRC detection .....	32
5.3.10.1	Test Purpose .....	32
5.3.10.2	Initial conditions .....	32
5.3.10.3	Test of detecting CEN DSRC and HDR DSRC transmissions .....	32
5.3.10.3.1	Test purpose .....	32
5.3.10.3.2	Test applicability .....	32
5.3.10.3.3	Test description .....	32
5.3.10.3.4	Test requirements .....	34
5.3.11	Decentralized congestion control .....	34
5.3.11.1	Test purpose .....	34
5.3.11.2	Test applicability .....	34
5.3.11.3	Test description .....	34
5.3.11.3.1	Initial conditions .....	34
5.3.11.3.2	Conducted measurement .....	34
5.3.11.3.3	Radiated measurement .....	35
5.3.11.4	Test requirement .....	35
<b>Annex A (informative):</b>	<b>Relationship between the present document and the essential requirements of Directive 2014/53/EU</b> .....	<b>36</b>
<b>Annex B (normative):</b>	<b>Test sites and arrangements for radiated measurements</b> .....	<b>37</b>
B.1	Test sites .....	37
B.1.1	Open air test sites .....	37
B.1.2	Anechoic chamber .....	38
B.1.2.1	General .....	38
B.1.2.2	Description .....	38
B.1.2.3	Influence of parasitic reflections .....	38
B.1.2.4	Calibration and mode of use .....	38
B.2	Test antenna .....	39
B.3	Substitution antenna .....	40
<b>Annex C (normative):</b>	<b>General description of measurement</b> .....	<b>41</b>
C.1	Introduction .....	41
C.2	Conducted measurements .....	41
C.3	Radiated measurements .....	41
C.4	Substitution measurement .....	42
<b>Annex D (informative):</b>	<b>Guidance on declaring the environmental profile</b> .....	<b>44</b>
D.1	Recommended environmental profile .....	44
D.2	Temperatures .....	44
D.2.1	Introduction .....	44
D.2.2	Normal environmental conditions .....	44

D.2.3	Extreme environmental conditions .....	44
D.3	Test power source .....	45
D.3.1	Introduction .....	45
D.3.2	Normal test power source .....	45
D.3.2.1	AC mains voltage .....	45
D.3.2.2	Regulated lead-acid battery power sources used on vehicles .....	45
D.3.2.3	Other power sources .....	45
D.3.3	Extreme test source voltages .....	45
D.3.3.1	AC mains voltage .....	45
D.3.3.2	Regulated lead-acid battery power sources used on vehicles .....	45
D.3.3.3	Power sources using other types of batteries .....	45
D.3.3.4	Other power sources .....	46
D.3.4	Procedure for equipment designed for continuous transmission .....	46
D.3.5	Procedure for equipment designed for intermittent transmission .....	46
<b>Annex E (informative):</b>	<b>Bibliography .....</b>	<b>47</b>
<b>Annex F (informative):</b>	<b>Change History .....</b>	<b>48</b>
History .....		49

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[SIST EN 302 571 V2.1.1:2017](https://standards.iteh.ai/catalog/standards/sist/6ed1e8c2-9772-441e-bcf2-bd62fd050362/sist-en-302-571-v2-1-1-2017)

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## Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.5] 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.4].

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.

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National transposition dates	
Date of adoption of this EN:	6 February 2017
Date of latest announcement of this EN (doa):	31 May 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2017
Date of withdrawal of any conflicting National Standard (dow):	30 November 2018

## 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 measurement for radio transmitters and receivers operating in the frequency range 5 855 MHz to 5 925 MHz. The spectrum usage conditions are set out in ECC Decision (08)01 [i.1] for the frequency range 5 875 MHz to 5 925 MHz (with 5 905 MHz to 5 925 MHz considered as a future ITS extension) and in ECC Recommendation (08)01 [i.2] for the frequency range 5 855 MHz to 5 875 MHz. The Commission Decision 2008/671/EC [i.3] mandates a harmonised use of the frequency band 5 875 MHz to 5 905 MHz dedicated to safety-related applications of ITS throughout the member states of the European Union. Table 1 outlines the 5 GHz ITS frequency band segmentation.

**Table 1: 5 GHz ITS frequency band segmentation**

Frequency range	Usage	Regulation
5 855 MHz to 5 875 MHz	ITS non-safety applications	ECC Recommendation (08)01 [i.2]
5 875 MHz to 5 905 MHz	ITS road safety	Commission Decision 2008/671/EC [i.3], ECC Decision (08)01 [i.1]
5 905 MHz to 5 925 MHz	Future ITS applications	ECC Decision (08)01 [i.1]

The present document covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.4] under the conditions identified in annex A.

Interference mitigation techniques in the present document are provided to protect road tolling applications using CEN DSRC or HDR DSRC.

## 2 References

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### 2.1 Normative references

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

- [1] ETSI TS 102 792 (V1.2.1) (06-2015): "Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European CEN Dedicated Short Range Communication (CEN DSRC) equipment and Intelligent Transport Systems (ITS) operating in the 5 GHz frequency range".
- [2] ETSI EN 302 637-2 (V1.3.2) (11-2014): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Awareness Basic Service".
- [3] Void.
- [4] CISPR 16 (parts 1-1 (2015), 1-4 (2010) and 1-5 (2014)): "Specifications for radio disturbance and immunity measuring apparatus and methods; Part 1: Radio disturbance and immunity measuring apparatus".
- [5] CEN EN 12253:2004: "Road transport and traffic telematics - Dedicated short-range communication - Physical layer using microwave at 5,8 GHz".

- [6] ETSI ES 200 674-1 (V2.4.1) (05-2013): "Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communications (DSRC); Part 1: Technical characteristics and test methods for High Data Rate (HDR) data transmission equipment operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band".

## 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] ECC Decision (08)01: "ECC Decision of 14 March 2008 on the harmonised use of the 5875-5925 frequency band for Intelligent Transport Systems (ITS)", approved 14 March 2008 and amended 3 July 2015.
- [i.2] ECC Recommendation (08)01: "Use of band 5855-5875 MHz for Intelligent Transport Systems (ITS)", approved 21 February 2008 and amended 3 July 2015.
- [i.3] Commission Decision 2008/671/EC of 5 August on the harmonised use of radio spectrum in the 5875-5905 MHz frequency band for safety related application of Intelligent Transport Systems (ITS).
- [i.4] 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.5] 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.6] ETSI TR 100 028 (all parts) (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.7] ETSI TR 100 028-2 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".
- [i.8] ETSI TS 103 175 (V1.1.1) (06-2015): "Intelligent Transport Systems (ITS); Cross Layer DCC Management Entity for operation in the ITS G5A and ITS G5B medium".
- [i.9] IEEE 802.11™-2012: "IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in Directive 2014/53/EU [i.4] and the following apply:

**5 GHz ITS frequency band:** frequency bands 5 855 MHz to 5 875 MHz (ITS-G5B), 5 875 MHz to 5 905 MHz (ITS-G5A) and 5 905 MHz to 5 925 MHz (ITS-G5D)

**channel busy ratio (CBR):** time-dependent value between zero and one representing the fraction of time that a single radio channel is busy with transmissions

**dedicated antenna:** removable antenna supplied and tested with the radio equipment, designed as an indispensable part of the equipment

NOTE: The dedicated antenna has been designed or developed for one or more specific types of equipment. It is the combination of dedicated antenna and radio equipment that is expected to be compliant with the regulations.

**duty cycle:** defined as the ratio, expressed as a percentage of the transmitter total "on" time on one carrier frequency, relative to 1 second period

**integral antenna:** antenna designed as a fixed part of the equipment, without the use of an external connector and as such which cannot be disconnected from the equipment by the user

NOTE: An integral antenna may be fitted internally or externally.

**protected zone:** area defined where mitigation mechanisms are applied to protect CEN DSRC and HDR DSRC road tolls

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

**vehicle:** all kinds of land mobile vehicle

EXAMPLE: Road vehicle and rail vehicle.

### 3.2 Symbols

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

$dB$	decibel
$dBi$	antenna gain relative to isotropic radiator in decibel
$dBc$	decibel relative to carrier power
$E$	electrical field strength
$f$	frequency
$f_c$	nominal centre frequency
$G$	antenna gain
$P_H$	highest power level
$P_L$	lowest power level
$P_M$	lowest TPC power level
$P_T$	transmit power level
$R$	distance
$T_{busy}$	period of time the channel is busy
$T_{CBR}$	period of time
$T_{max}$	maximum temperature
$T_{min}$	minimum temperature
$T_{off}$	time between two transmissions

$T_{on}$	duration of a transmission
$V_{max}$	maximum voltage
$V_{min}$	minimum voltage
$V_{nominal}$	nominal voltage
$\Omega$	ohm
$\mu s$	microsecond

### 3.3 Abbreviations

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

AC	Alternative Current
BPSK	Binary Phase Shift Keying
CAM	Cooperative Awareness Message
CBR	Channel Busy Ratio
CEN	Comité Européen de Normalisation (European Committee for Standardization)
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference)
DC	Direct Current
DCC	Decentralized Congestion Control
DSRC	Dedicated Short Range Communication (CEN DRSC = tolling at 5,8 GHz)
DUT	Device Under Test
e.i.r.p.	equivalent isotropically radiated power
e.r.p.	effective radiated power
EC	European Commission
ECC	Electronic Communication Committee
EFTA	European Free Trade Association
EMC	ElectroMagnetic Compatibility
EN	European Norm
EU	European Union
HDR	High Data Rate
ITS	Intelligent Transport Systems
LP	Linear Polarized
OOB	Out-Of-Band
PD	mean Power Density
PER	Packet Error Rate
ppm	parts per million = $10^{-6}$
PSD	Power Spectral Density
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
RMS	Root Mean Square
TPC	Transmit Power Control
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 declared by the manufacturer. The equipment shall comply with all the technical requirements of the present document which are identified as applicable in annex A at all times when operating within the boundary limits of the declared operational environmental profile.

Recommended environmental profile parameters are summarized in annex D.

## 4.2 Conformance requirements

### 4.2.1 Transmitter frequency stability

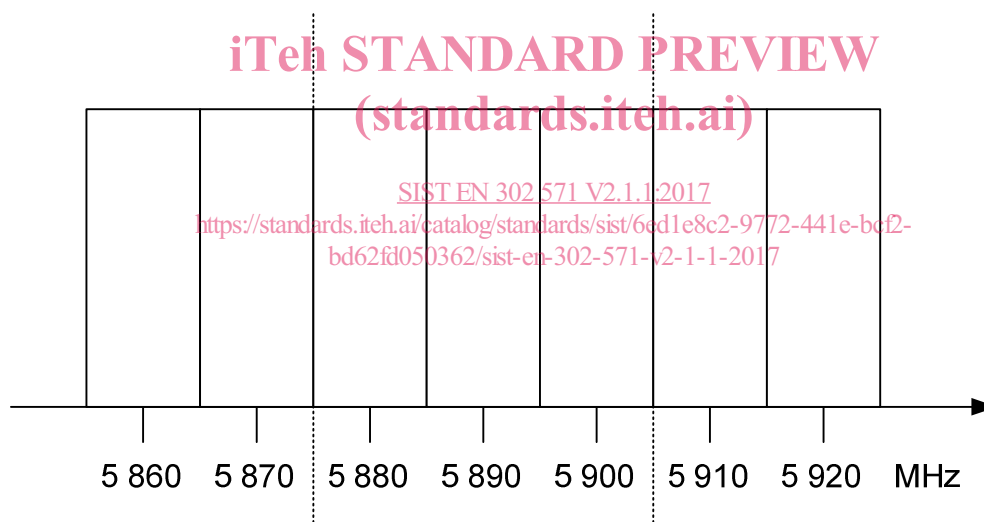
#### 4.2.1.1 Definition

The equipment is required to operate on the applicable specific carrier centre frequencies that correspond to the nominal carrier frequencies,  $f_c$ , as defined in Table 2.

**Table 2: Nominal carrier frequency allocations**

Carrier centre frequency $f_c$ (MHz)	Maximum channel bandwidth (MHz)
5 860	10
5 870	10
5 880	10
5 890	10
5 900	10
5 910	10
5 920	10

The frequency channels together with the channel names contained in the three different frequency bands are depicted in Figure 1.



**Figure 1: An overview of the three different frequency bands**

#### 4.2.1.2 Limits

The actual carrier centre frequency for any given channel given in Table 2 shall be maintained within the range  $f_c \pm 20$  ppm.

#### 4.2.1.3 Conformance

Conformance tests as defined in clause 5.3.2 shall be carried out.

## 4.2.2 RF output power

### 4.2.2.1 Definition

The radio frequency (RF) output power is the mean equivalent isotropically radiated power (e.i.r.p.) during transmission bursts.

### 4.2.2.2 Limits

The maximum RF output power shall not exceed 33 dBm e.i.r.p.

### 4.2.2.3 Conformance

Conformance tests as defined in clause 5.3.3 shall be carried out.

## 4.2.3 Power spectral density

### 4.2.3.1 Definition

The power spectral density (PSD) is the mean e.i.r.p. spectral density during transmission bursts.

### 4.2.3.2 Limits

The maximum power spectral density shall not exceed 23 dBm/MHz e.i.r.p.

### 4.2.3.3 Conformance

Conformance tests as defined in clause 5.3.3 shall be carried out.

## 4.2.4 Transmit power control

### 4.2.4.1 Definition

Transmit power control (TPC) is a mechanism to be used to ensure co-existence with CEN DSRC at toll plazas and to be used as one mechanism by decentralized congestion control (DCC) to reduce the congestion on the communication channel.

### 4.2.4.2 Limits

The TPC range shall at least be 3 dBm up to the maximum specified RF output power e.i.r.p of the equipment.

### 4.2.4.3 Conformance

Conformance test according to clause 5.3.3 shall be carried out.

## 4.2.5 Transmitter unwanted emissions

### 4.2.5.1 Transmitter unwanted emissions outside the 5 GHz ITS frequency band

#### 4.2.5.1.1 Definition

These are radio frequency emissions outside the 5 GHz ITS frequency band (outside of 5 855 MHz to 5 925 MHz).