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Maritime Location Systems;
Radio transmitters and receivers for communication links operating in the 9 GHz frequency band (X band)

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Foreword

This draft European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

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):	6 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.

Introduction

The present document applies to systems utilizing radio communication links between platforms and vessels for dynamic positioning of vessels engaged in coordinated maritime activities.

1 Scope

The present document specifies technical characteristics and methods of measurements for radiolocation equipment with the following characteristics:

- intended to operate with maritime dynamic positioning systems functioning with full duplex links with 30 MHz separation operating;
- operating in the 9 GHz frequency band;
- with an integral antenna.

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.

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.

[1] Recommendation ITU-T E.161 (02-2001): "Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network".

[2] ISO 25862:2019: "Ships and marine technology -- Marine magnetic compasses, binnacles and azimuth reading devices".

[3] ETSI TS 103 052 (V1.1.1) (03-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".

[4] ERC Recommendation.74-01 (2019): "Unwanted emissions in the spurious domain".

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.

Not applicable.

3 Definition of terms, symbols and abbreviations

3.1 Terms

Void.

3.2 Symbols

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

B	Bandwidth
dBm	Level (dB) relative to 1 mW
dBpp	Level (dB) below peak power
dBµV	Level (dB) relative to 1 µV/m
f	Frequency
m	Meter
ppm	Parts per million (10^{-6})
Q	Q factor is a resonance parameter
s	Second
V	Volt
W	Watt
Ω	Ohm

3.3 Abbreviations

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

ac	alternating current
dc	direct current
EIRP	Equivalent Isotropically Radiated Power
EN	European Norm
ERC	European Radiocommunication Committee
EUT	Equipment Under Test
FM	Frequency Modulation
IPR	Intellectual Property Right
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union - Telecommunication standardization sector
PEP	Peak Envelope Power
pp	peak power
RF	Radio Frequency
Rx	Receiver
SR	Special Report
TS	Technical Specification
Tx	Transmitter
VSWR	Voltage Standing Wave Ratio

4 Technical requirements

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, but as a minimum, shall be that specified in the test conditions contained in the present document.

4.2 Construction

The mechanical and electrical construction and finish of the equipment shall conform in all respects to good engineering practice, and the equipment shall be suitable for use on board ships.

All controls shall be of sufficient size to enable the usual control functions to be easily performed and the number of controls should be the minimum necessary for simple and satisfactory operation.

For the purpose of conformance testing, relevant technical documentation shall be supplied with the equipment.

The equipment shall be capable of operating on two full duplex channels.

It shall not be possible to transmit while any frequency synthesizer used within the transmitter is out of lock.

4.3 Controls and indicators

The equipment shall have a frequency selector and shall indicate the operating frequency at which the installation is set and this shall be legible irrespective of the external lighting conditions.

Where an input panel on the equipment for entering the digits 0 - 9 is provided, this shall conform to Recommendation ITU-T E.161 [1].

The equipment shall have the following additional controls and indicators:

- a means for reducing the brightness of the equipment illumination to almost zero;
- an on/off switch for the entire installation with a visual indication that the installation is in operation;
- a visual indication that the equipment is transmitting.

The equipment shall also meet the following requirements:

- the user shall not have access to any control which, if wrongly set, might impair the technical characteristics of the equipment.

4.4 Safety precautions

Measures shall be taken to protect the equipment against the effects of overcurrent or overvoltage.

Measures shall be taken to prevent damage to the equipment if the electrical power source produces transient voltage variations and to prevent any damage that might arise from an accidental reversal of polarity of the electrical power source.

Means shall be provided for earthing exposed metallic parts of the equipment.

All components and wiring in which the dc or ac voltage (other than radio-frequency voltage) produce, singly or in combination, peak voltages in excess of 50 V shall be protected against any accidental access and shall be automatically isolated from all electrical power sources if the protective covers are removed. Alternatively, the equipment shall be constructed in such a way as to prevent access to components operating at such voltages unless an appropriate tool is used such as a nut-spanner or screwdriver. Conspicuous warning labels shall be affixed both inside the equipment and on the protective covers.

The information in any volatile memory device shall be protected from interruptions in the power supply of up to 60 s duration.

4.5 Labelling

All controls, instruments, indicators and ports shall be clearly labelled.

Details of the power supply from which the equipment is intended to operate shall be clearly indicated on the equipment.

The compass safe distance as defined in ISO 25862 [2] (Method B) shall be stated on the equipment or in the technical manual.

4.6 Frequencies

The frequency pairs used by the equipment shall be clearly marked. An example of such pairs is in Table 1.

Table 1: Example of operating frequencies

Pair number	Tx [MHz]	Rx [MHz]
1	9 200	9 230
1(reverse)	9 230	9 200
2	9 270	9 300
2(reverse)	9 300	9 270

4.7 Polarization

The equipment shall operate with vertical linear polarization.

4.8 Transceiver data interface

Equipment shall provide a digital connection such as Ethernet or other suitable interfaces for access to the equipment.

Variation in the level of the input signals, within the specified limits for that interface, shall have no measurable influence on the characteristics of the signals on the radio path.

In the case where the equipment uses a proprietary interface, appropriate means and documentation allowing for the equipment to be tested are expected to be provided in view of the measurements.

5 General conditions of measurements

5.1 Test site and general arrangements for measurements

Measurements of all equipment shall be done by radiated measurements.

Descriptions of the anechoic chamber and radiated measurement arrangements are included in ETSI TS 103 052 [3].

5.2 General

Tests shall be carried out on all of the frequency pairs available in the equipment.

5.3 Impedance

In the present document the term "50 Ω" is used for a 50 Ω non-reactive impedance. Non-reactive impedance is taken to mean a VSWR of 1,2 or better over the frequency range of interest.

5.4 Tests of equipment with a notch filter

A notch filter may be required to obtain the required dynamic range for measurement of the transmitter.

If a notch filter is used, it shall be centred on the transmitter carrier frequency and attenuating this signal by at least 30 dB.

If a notch filter is used, the measured results shall be corrected for the loss in the notch filter.

5.5 Facilities for access

5.5.1 Coupling arrangements

Equipment to be connected to the Equipment Under Test (EUT) shall be connected by a method which does not affect the radiated field.

5.6 Modes of operation of the transmitter

For the purpose of the measurements according to the present document, the transmitter shall be able to generate the necessary test signals described in clause 6.2.

6 Test conditions

6.1 General

All the tests shall be performed in both normal and extreme test conditions unless otherwise specified.

6.2 Test signals

Test signal 1 is an unmodulated carrier.

Test signal 2 is an FM signal with modulation index 2,3 modulated with sinusoidal wave with frequency 140 kHz. The test signal is repeatedly switched on for 124 µs and off for 1 µs.

Test signal 3 is a FM modulated signal with modulation index 2,3 and sinusoidal modulating wave with frequency 75 kHz.

6.3 Normal test conditions

6.3.1 Normal temperature and humidity

The normal temperature and humidity conditions for tests shall be a combination of temperature and humidity within the following ranges:

- temperature: +15 °C to +35 °C;
- relative humidity: not exceeding 75 %.

6.3.2 Normal power source

6.3.2.1 Mains voltage and frequency

The normal test voltage shall be the nominal ac mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage or any of the declared voltages for which the equipment is indicated as having been designed. The frequency of the test voltage shall be 50 Hz ±1 Hz.

6.3.2.2 Battery power source

Where the equipment is designed to operate from a battery, the normal test voltage shall be the nominal voltage of the battery (12 V, 24 V, etc.).

6.3.2.3 Other power sources

For operation from other power sources the normal test voltage shall be that declared by the equipment manufacturer.

6.4 Extreme test conditions

6.4.1 General requirements

Unless otherwise stated the extreme test conditions means that the Equipment Under Test (EUT) shall be tested at the upper temperature and at the upper limit of the supply voltage applied simultaneously, and at the low temperature and the lower limit of the supply voltage applied simultaneously.

6.4.2 Extreme temperatures

For tests at extreme temperatures, measurements shall be made in accordance with clause 6.4.4, at a lower temperature of -15 °C and an upper temperature of +55 °C.

6.4.3 Extreme values of test power source

6.4.3.1 Mains voltage and frequency

The extreme test voltages shall be the nominal ac mains voltage ±10 %. The frequency of the test voltage shall be 50 Hz ±1 Hz.

6.4.3.2 Battery power source

Where the equipment is designed to operate from a battery, the extreme test voltages shall be 1,3 and 0,9 times the nominal voltage of the battery (12 V, 24 V, etc.).

6.4.3.3 Other power sources

For operation from other power sources the extreme test voltages shall be declared by the equipment manufacturer.

6.4.4 Procedure for tests at extreme temperatures

The equipment shall be switched off during the temperature stabilizing periods.

Before conducting tests at the upper temperature, the equipment consisting of a transmitter and associated receiver, shall be placed in the test chamber and left until thermal equilibrium is reached. The equipment shall then be switched on for half an hour in normal transmit mode in the high power transmit condition at the normal voltage and the equipment shall meet the requirement of the present document.

For tests at the lower temperature, the equipment shall be left in the test chamber until thermal equilibrium is reached and shall then be switched on, after which the equipment shall meet the requirements of the present document.

For tests at extreme temperatures, the manufacturer shall provide an RF transparent test cabinet.

7 Environmental tests

7.1 General requirements

The equipment shall be capable of continuous operation under the conditions of various sea states, vibration, humidity and change of temperatures likely to be experienced in a ship in which it is installed.

7.2 Procedure

Environmental tests shall be carried out before testing the same equipment to the other requirements of the present document. Unless otherwise stated, the equipment shall be connected to an electrical power source during the periods for which it is specified that electrical tests shall be carried out. These tests shall be performed using the normal test voltage.

7.3 Performance check

Performance check consists of a check that stable and correct indication of the azimuth angle is received.

7.4 Vibration tests

7.4.1 Purpose

This test determines the ability of equipment to withstand vibration without resulting in mechanical weakness or degradation in performance.

7.4.2 Method of measurement

The EUT, complete with any shock and vibration absorbers with which it is provided, shall be clamped to the vibration table by its normal means of support and in its normal attitude. The EUT may be resiliently suspended to compensate for weight not capable of being withstood by the vibration table. Provision may be made to reduce or nullify any adverse effect on EUT performance which could be caused by the presence of an electro-magnetic field due to the vibration unit.

The EUT shall be subjected to sinusoidal vertical vibration at all frequencies between:

- 5 Hz and up to 13,2 Hz with an excursion of ±1 mm ±10 % (7 m/s^2 maximum acceleration at 13,2 Hz);
- above 13,2 Hz and up to 100 Hz with a constant maximum acceleration of 7 m/s^2.

The frequency sweep rate shall be slow enough to allow the detection of resonances in any part of the EUT.

A resonance search shall be carried out throughout the test. If any resonance of the EUT has $Q \geq 5$ measured relative to the base of the vibration table, the EUT shall be subjected to a further vibration endurance test at each resonant frequency at the vibration level specified in the test with a duration of two hours. If any resonance with $Q < 5$ occurs the further endurance test shall be carried out at one single observed frequency. If no resonance occurred, the further endurance test shall be carried out at a frequency of 30 Hz.

Performance check(s) shall be carried out at the end of each two hours endurance test period.

The procedure shall be repeated with vibration in each of two mutually perpendicular directions in the horizontal plane.

After conducting the vibration tests, the equipment shall be inspected for any mechanical deterioration.

7.4.3 Requirement

The equipment shall meet the requirements of the performance check.

There shall be no harmful deterioration of the equipment visible.

7.5 Damp heat

7.5.1 Purpose

This test determines the ability of equipment to withstand conditions of high humidity.

7.5.2 Method of measurement

The EUT shall be placed in a chamber at normal room temperature and relative humidity. The temperature shall then be raised to +40 °C ±2 °C, and the relative humidity raised to 93 % ±3 % over a period of three hours ±0,5 hour. These conditions shall be maintained for a period of 10 to 16 hours. The temperature and relative humidity of the chamber shall be maintained as specified during the whole period. Any climatic control devices provided in the EUT may be switched on at the conclusion of this period. The EUT shall be switched on 30 minutes later, or after such period as agreed by the manufacturer, and shall be kept operational for at least two hours. At the end of the test period and with the EUT still in the chamber, the chamber shall be brought to room temperature in not less than one hour and the EUT shall be returned to normal environmental conditions or to those required at the start of the next test. The maximum rate of raising or reducing the temperature of the chamber in which the equipment is being tested shall be 1 °C per minute. Immediately after the test period, the EUT shall be subject to the performance check.

7.5.3 Requirement

The equipment shall meet the requirements of the performance check.

8 Transmitter

8.1 Frequency error

8.1.1 Definition

The frequency error is the difference between the measured carrier frequency and its nominal value.

8.1.2 Method of measurement

The EUT transmitter shall be configured to operate at maximum RF output power level using test signal 1.

The receiving test antenna shall be connected to a frequency counter.

8.1.3 Limit

The measured frequency for any given channel shall be within the range ±5 ppm of the nominal value.

8.2 Transmitter EIRP

8.2.1 Definition

The transmitter EIRP is the maximum radiated power of the equipment with its associated antenna.

8.2.2 Method of measurement

The transmitter shall be configured to operate at maximum RF output power level using test signal 1.

The receiving test antenna shall be connected to a spectrum analyser.

Max Hold shall be selected and the centre frequency adjusted to that of the EUT.

The peak value of the power envelope shall be measured and noted.

For measuring the transmitter EIRP, the substitution method described in clause 4 of ETSI TS 103 052 [3] shall be used.

8.2.3 Limit

The EIRP shall not exceed 50 W (47 dBm).

8.3 Transmitter B_{-40dB} bandwidth

8.3.1 Definition

The transmitter -40 dB bandwidth (B_{-40dB}) is the measured bandwidth of the emission 40 dB below the measured PEP.

8.3.2 Method of measurement

The transmitter shall be configured to operate at maximum RF output power level using test signal 2. The receiving test antenna shall be connected to a spectrum analyser.

Max Hold shall be selected and the centre frequency adjusted to that of the EUT.

The measurement shall be performed with a measuring bandwidth of 1 MHz.

8.3.3 Limit

The B_{-40dB} bandwidth shall be less than 80 MHz.

8.4 Transmitter out-of-band emissions

8.4.1 Definition

Transmitter out-of-band emissions are emissions on a frequency or frequencies immediately outside the B_{-40dB} bandwidth which results from the modulation process, but excluding spurious emissions.

8.4.2 Method of measurement

The transmitter shall be configured to operate at maximum RF output power level using test signal 2. The receiving test antenna shall be connected to a spectrum analyser.

Max Hold shall be selected and the centre frequency adjusted to that of the EUT.

The measurement shall be performed with a measuring bandwidth of 1 MHz.

The measurement shall be performed over the frequency band 2,5 times the B_{-40dB} bandwidth.

8.4.3 Limit

The Out-of-Band emission limits are defined based on the -40 dB bandwidth (B_{-40dB}). The Out-of-Band mask rolls off at 30 dB per decade, from the B_{-40dB} bandwidth down to the level (-43 - 10 log pp) dB or pp - 60 dB, whichever is less stringent.

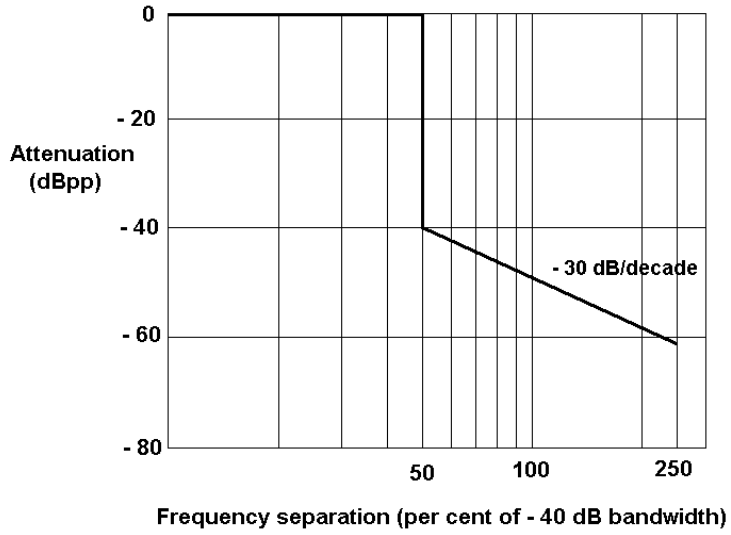

Figure 1: Limit for Out-of-band emissions

8.5 Transmitter spurious emissions

8.5.1 Definition

Spurious emission is emission on a frequency or frequencies outside the out-of-band domain and the level of which may be reduced without affecting the corresponding transmission of information.

8.5.2 Method of measurement

The transmitter shall be configured to operate at maximum RF output power level using test signal 1.

The receiving test antenna shall be connected to a spectrum analyser using the notch filter see clause 5.6.

Max Hold shall be selected.

The value of the power shall be measured.

The measurement shall be made over the frequency range from 30 MHz to 26 GHz as described in ERC Recommendation 74-01 [4] and shown in Table 2 below.

Table 2: Transmitter spurious emissions

Frequency Range	Reference bandwidth
30 MHz ≤ f < 1 GHz	100 kHz
1 GHz ≤ f < f_{m1}	1 MHz
f_{m2} < f ≤ 26 GHz	1 MHz
NOTE 1: f is the measurement frequency. NOTE 2: f_{m1} is the lower edge of the Out of Band Domain. NOTE 3: f_{m2} is the upper edge of the Out of Band Domain. NOTE 4: The Out of Band Domain is defined in clause 8.4.	

8.5.3 Limit

All radiated spurious emission levels shall not exceed -13 dBm as indicated in Table 15 of Annex 5 of ERC Recommendation.74-01 [4].

8.6 Standby mode emissions

8.6.1 Definition

Standby mode emissions refer to emissions radiated during periods where the equipment is available for traffic, but is not transmitting.

8.6.2 Method of measurement

The equipment shall be set to idle/standby condition. The receiving test antenna shall be connected to a spectrum analyser.

Max hold shall be selected.

The value of the emissions shall be measured.

The measurement shall be made over the frequency range from 30 MHz to 26 GHz.

8.6.3 Limits

The stand-by mode emissions shall be not greater than -47 dBm above 1 GHz and -57 dBm at and below 1 GHz as specified in Table 15 of ERC Recommendation.74-01 [4] outside ±250 % of the B_{-40dB} bandwidth.

9 Receiver

9.1 Maximum usable sensitivity

9.1.1 Definition

The maximum usable sensitivity (data or messages) is the minimum level of signal at the receiver input, produced by a carrier at the nominal frequency of the receiver, which will, without interference, produce after demodulation stable and correct readings of location data.

9.1.2 Method of measurement

A test signal generator shall be configured to transmit test signal 3 and radio link shall be established with the equipment under test.

A calibrated test antenna shall be connected to a spectrum analyser and placed at the same site as the receiver antenna.

Max Hold shall be selected and the centre frequency adjusted to that of the receiver.

The transmitted signal level shall be reduced until the stable and correct location azimuth angle reading is disappearing in the receiver.

The sensitivity of the receiver is calculated from the reading on the spectrum analyser.

9.1.3 Limit

The maximum usable sensitivity of the receiver shall be better than 55 dBµV/m.

9.2 Co-channel rejection

9.2.1 Definition

The co-channel rejection is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due the presence of an unwanted modulated signal, both signals being at the nominal frequency of the receiver.

9.2.2 Method of measurement

For the measurement, two signal generators shall be used (generator A and B). Both generators shall operate on the nominal frequency of the receiver and shall be adjusted to produce test signal 3.

The two signal generators shall be fed to calibrated antennas of equal gain, each within the 3dB beam width of the antenna of the receiver under test.

Initially, generator B (unwanted signal) shall be switched off.

The wanted signal shall be provided by signal generator A and shall produce signal level +3 dB above the sensitivity level of the receiver (see clause 9.1) and radio link shall be established with the equipment under test.

Signal generator B shall then be switched on and the level of the unwanted signal adjusted until stable and correct azimuth angles reading is disappearing in the receiver under test.

The co-channel rejection ratio shall be expressed as the average ratio, in dB, between the level of the unwanted signal (generator B) and the level of the wanted signal (generator A).

9.2.3 Limit

The co-channel rejection at the nominal frequency of the receiver shall be better than - 10 dB.

9.3 Adjacent channel selectivity

9.3.1 Definition

The adjacent channel selectivity is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted signal which differs in frequency from the wanted signal by an amount equal to the adjacent channel separation for which the equipment is designed.

9.3.2 Method of measurement

For the measurement, two signal generators shall be used (generator A and B). Both generators shall be adjusted to produce test signal 3.

The two signal generators shall be fed to calibrated antennas of equal gain, each within the 3dB beam width of the antenna of the receiver under test.

The receiver under test shall operate on one of the operating frequencies (see clause 4.6). Signal generator A (wanted signal) shall operate on the nominal frequency of the receiver.

Signal generator B (unwanted signal) shall operate on the frequency separated by 70 MHz.

Initially, signal generator B (unwanted signal) shall be switched off.

The wanted signal shall be provided by signal generator A with a level +3 dB above the sensitivity level of the receiver (see clause 9.1) and radio link shall be established with the equipment under test.

Signal generator B shall then be switched on and the level of the unwanted signal adjusted until stable and correct azimuth angle reading is disappearing in the receiver.

The adjacent channel selectivity shall be expressed as the ratio, in dB, between the level of the unwanted signal (signal generator B) and the level of the wanted signal (signal generator A).

9.3.3 Limit

The adjacent channel selectivity shall be greater than 50 dB.

9.4 Blocking

9.4.1 Definition

Blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels.

9.4.2 Method of measurement

For the measurement, two signal generators (signal generator A and B) shall be used.

The test signal generator A (wanted signal) shall be configured to operate with test signal 3 at the nominal frequency of the receiver. The unwanted signal (signal generator B) shall be unmodulated at a frequency between ±200 MHz and ±1 GHz from the nominal frequency of the link. For practical reasons, frequencies approximately ±200 MHz, ±500 MHz and ±1 GHz shall be used.

The two signal generators shall be fed to calibrated antennas of equal gain, each within the 3dB beam width of the antenna of the receiver under test.

Initially, the unwanted signal generator shall be switched off.

The wanted signal shall be provided by signal generator A with signal level +3 dB above the sensitivity level of the receiver (see clause 9.1) and radio link shall be established with the equipment under test.

The unwanted signal provided by signal generator B shall then be switched on and the level of the unwanted signal adjusted until stable and correct azimuth angle reading is disappearing in the receiver.

The blocking level shall be expressed as the ratio, in dB, between the level of the unwanted signal (signal generator B) and the level of the wanted signal (signal generator A).

9.4.3 Limit

The blocking level for any of the above specified frequencies shall be greater than 60 dB.

10 Testing for compliance with technical requirements

10.1 Environmental conditions for testing

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile which, as a minimum, shall be that specified in the test conditions contained in the present document.

As technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions as specified in the present document to give confidence of compliance for the affected technical requirements.

10.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report.

Recommended values for the maximum measurement uncertainty figures can be found in Table 3.

Table 3: Maximum measurement uncertainty

Parameter	Uncertainty
Radio frequency	±1 x 10^{-7}
Radiated RF power	±6 dB
Two-signal measurement, using radiated fields	±6 dB
Radiated emission of the transmitter, valid up to 26,5 GHz	±6 dB
Radiated emission of the receiver, valid up to 26,5 GHz	±6 dB
Temperature	±1 °C
Humidity	±5 %

History

Document history			
V1.0.1	August 2020	EN Approval Procedure	AP 20201111: 2020-08-13 to 2020-11-11