



Socialist Republic of Viet Nam

QCVN 10:2010/BTTTT

**QUY CHUẨN KỸ THUẬT QUỐC GIA
VỀ THIẾT BỊ ĐIỆN THOẠI KHÔNG DÂY (KÉO DÀI THUÊ
BAO)**

*National technical regulation
on Cordless Telephone Equipment*

(for information only)

HA NOI - 2010

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Foreword

QCVN 10:2010/BTTTT is based on amending and supplementing the technical standard TCN 68-143: 2003 “Cordless Telephone Equipment (Extensible Subscriber Categories)-Technical Requirements” adopted by the Decision No 195/2003/QD-BBCVT of the Minister of Ministry of Posts and Telematics dated 29/12/2003 (now Ministry of Informations and Communications).

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QUY CHUẨN KỸ THUẬT QUỐC GIA
VỀ THIẾT BỊ ĐIỆN THOẠI KHÔNG DÂY (KÉO DÀI THUÊ BAO)
National technical regulation
on Cordless Telephone Equipment

1. GENERAL

1.1. Scope

This technical regulation defines the technical requirement for cordless telephone equipments - Radio Extensible Subscriber Categories – having the transmitter power of up to 25 W, used in the national telecommunication network intended for the transmission of analogue speech signal and connected to the public switched telephone network through the 2-wire interface.

Notes: - This regulation shall not be applied to wireless telephone systems used for analogue or digital mobile communication which have radio control channel from central station (such as CT1, CT2, DECT, WLL systems...).

1.2. Objectives

This technical regulation applies to agencies, organizations, manufacturers, importers and operators the cordless telephone equipments - Radio Extensible Subscriber Categories.

1.3. Definitions

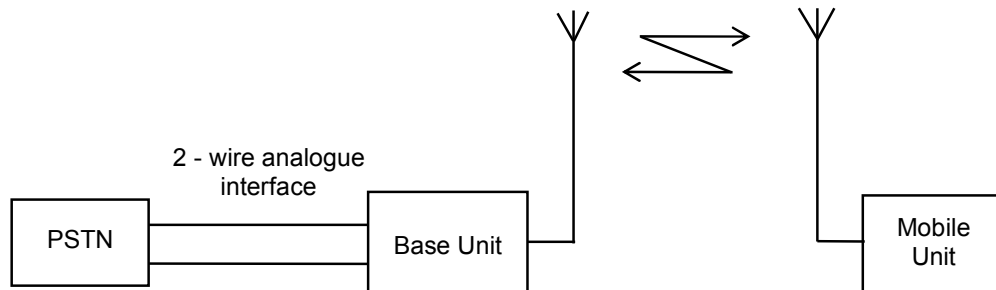
1.3.1. Cordless Telephone

Telephone terminal equipment connected to the public switched telephone network through the 2-wire analogue interface. This equipment consists of two separate units, which are connected to each other through radio interface:

- Base Unit: equipment intended for use in a fixed location and connected to the public switched telephone network (PSTN) through the telephone line; fitted with either an 50 Ω antenna socket or an integral antenna.

- Mobile Unit: mobile equipment fitted with either an integral antenna when used with a desktop station or an antenna socket, for use with external antenna when fixed in transportable stations. This unit has the same subscriber number as the base unit and can communicate with the base unit.

Figure 1 illustrates the operation configuration of the equipment.



**Figure 1: Operation configuration of cordless telephone,
extensible subscriber categories**

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1.3.2. Integral Antenna

An antenna designed to be fixed and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

1.3.3. Artificial antenna

A 50 Ω non-reactive, non-radiating antenna used to test transmitter.

1.3.4. Substitution antenna

Antenna used to replace equipment under test. It is connected to signal generator to measure spurious emission and effective radiated power; and connected to a measuring receiver or a spectrum analyzer to measure receiver sensitivity.

1.3.5. Test antenna

Antenna used for measurements of radiation from equipment under test and substitution antenna or used as a transmitting antenna when the test site is used for the measurement of receiver characteristics.

1.3.6. Effective Radiated Power

The effective radiated power is defined as the maximum radiated power in the direction of maximum field strength in the absence of modulation and under specific conditions of measurement.

1.3.7. Frequency Deviation

The maximum difference between instantaneous frequency of modulated radio frequency signal and carrier frequency in the absence of modulation.

1.3.8. Maximum Permissible Frequency Deviation

The maximum permissible frequency deviation is the maximum value of frequency deviation, determined equivalent to 20% of corresponding channel separation.

1.3.9. Frequency Tolerance

The maximum difference between the central frequency of the occupied radiated frequency band and assigned frequency.

1.3.10. Frequency Stability

The ratio between the maximum frequency error and nominal transmitter frequency within a specified duration.

1.3.11. Maximum Sensitivity

The minimum level of signal or field strength at the input of receiver antenna at the nominal frequency of receiver and with the test modulation frequency of 1 kHz and the deviation of 60% of the maximum frequency deviation with which the following conditions have still met:

- The minimum audio frequency output power is 50% of the nominal output power of the receiver.
- The SINAD ratio at the receiver output is 20 dB.

1.3.12. Emission Class

Radiation characteristics such as carrier modulation type, modulating signal and the format of transmit signal in form of standard characters (such as F3E; G3E...).

1.3.13. Spurious Emissions

Spurious emissions are emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

1.3.14. Test Fixture

The test fixture is a radio frequency coupling device associated with an integral antenna equipment used for conducted measurements at different carrier frequencies. The test fixture provides a connection to an external power supply, an audio input and a 50 Ω RF output. The test fixture shall conform to the following basic parameters:

- The coupling loss shall not be greater than 30 dB;
- The VSWR of RF coupling circuits having 50 Ω impedance shall not be greater than 1.5 over the frequency range of the measurements

1.4. Abbreviations

AC	Alternate Current
BU	Base Unit
CT	Cordless Telephone
CH	Channel
dBc	dB relative to the carrier power
DC	Direct Current
FM	Frequency Modulation
INTERCOM	Interoffice Communication
LED	Light Emission Diode
MU	Mobile Unit
PM	Phase Modulation
PSTN	Public Switched Telephone Network
rms	Root-mean-square
Rx	Receiver
RF	Radio Frequency
SINAD	Signal+Noise+Distortion/Noise+Distortion
Tx	Transmitter
STANDBY	Standby mode
VSWR	Voltage Standing Wave Ratio

2. TECHNICAL REQUIREMENTS

2.1. Technical requirements

2.1.1. Transceiver frequencies of equipment

Transceiver frequencies of equipment shall conform to frequency band ranges as given in Table 1.

Table 1: Frequency bands intended for cordless telephone

Frequency band (MHz)
43 ÷ 44
46 ÷ 50
72 ÷ 73.5
261,5 ÷ 262,5
263,5 ÷ 264,5
387,5 ÷ 388,5
389,5 ÷ 390,5

2.1.2. Channel Separation

- For equipments having transmitter power of less than 1 W: 10 kHz; 12.5 kHz; 20 kHz and 25 kHz.
- For equipments having transmitter power in the range of 1 W up to 25 W: 25 kHz.

2.1.3. Emission Class

Cordless Telephone equipments shall conform to the following emission classes:

- F3E: Direct frequency modulation, used for analogue transmission of voice
- G3E: Indirect frequency or phase modulation, used for analogue transmission of voice.

2.1.4. Nominal transmit power

Shall not exceed 25 W.

2.1.5. Maximum Frequency Deviation

The maximum frequency deviation of transmitter shall not exceed the values shown in Table 2.

Table 2: Maximum Frequency Deviation for different channel separations

Channel separation (kHz)	Maximum frequency deviation (kHz)	Required bandwidth (kHz)
10	±2.0	6.0
12.5	±2.50	8.5
20	±4.0/±5.0	14/16
25	±5.0	16

Note: The given values in the table above are equivalent to 20% of corresponding channel separations.

2.1.6. Modulating audio signal frequency range

Modulating audio signal frequency range: 300 Hz to 3000 Hz.

2.1.7. Receiver amplitude characteristic for analogue speech signal

Shall not exceed 3 dB.

2.1.8. Criteria for the interface between base unit and the public switched telephone network

Criteria for the interface between base unit and the public switched telephone network shall conform to National technical regulation on Terminal equipment connected to public switched telephone network through analogue interface - General technical requirements.

2.2. Technical requirements for equipments having transmitter power of less than 1 W (applied for integral antenna equipment)

Cordless telephone equipment having transmitter power of less than 1 W shall conform to following specific technical requirements beside general ones illustrated in Section 2.1.

2.2.1. Frequency tolerance

Frequency tolerance limits at different frequency bands for equipments with different channel separation are given in Table 3

Table 3: Frequency tolerance limits at different frequency bands for cordless telephone equipments having transmitter power of less than 1 W

Channel separation (kHz)	Frequency tolerance limits (kHz) at different frequency bands			
	43 ÷ 47	47 ÷ 73.5	261.5 ÷ 264.5	387.5 ÷ 390.5
10 and 12.5	± 0.60	± 1.00	± 1.00 ⁽¹⁾ ± 2.00 ⁽²⁾	± 1.00 ⁽¹⁾ ± 2.50 ⁽²⁾
20 and 25	± 0.60	± 1.35	± 2.00	± 2.00 ⁽¹⁾ ± 2.50 ⁽²⁾
Notes: (1): Base unit (2): Mobile unit				

2.2.2. The transmitter effective radiated power

Shall not exceed 1 W

Permissible tolerance under normal measurement conditions for:

- Base unit: ± 1.5 dB.
- Mobile unit: ± 1.5 dB

2.2.3. Spurious Emission

Power of any spurious emission component of the transmitter shall not exceed the values given in Table 4.

Table 4 - Spurious Emission of cordless telephone equipments having transmitter power of less than 1 W

Working mode	Spurious emission criterion
Standby mode	2.0 nW (-57.0 dBm)
Operation mode	0.25 μ W (-36.0 dBm)

2.2.4. Maximum sensitivity of receiver

The maximum sensitivity shall not exceed the values given in Table 5.

Table 5: Maximum sensitivity of receiver

Frequency band (MHz)	Maximum sensitivity criterion (dB μ V)
43 ÷ 73.5	14.0
261.5 ÷ 390.5	26.0

2.2.5. Frequency Stability

Frequency Stability: $\pm 20 \times 10^{-6}$ (with measurement duration of 24 hours)

2.3. Technical requirements for equipments having transmitter power of 1 W up to 25 W (apply to both integral antenna equipments and external antenna ones)

Cordless telephone equipment having transmitter power of 1 W to 25 W shall conform to following specific technical requirements beside general ones illustrated in Section 2.1.

2.3.1. Frequency Tolerance

Frequency Tolerance limits for equipments at different frequency bands are given in Table 6.

Table 6: Frequency Tolerance limits at different frequency bands for cordless telephone equipments having transmitter power of from 1 W up to 25 W

Channel separation (kHz)	Frequency tolerance limit (kHz) at different frequency band (MHz)			
	43 ÷ 47	47 ÷ 73.5	261.5 ÷ 264.5	387.5 ÷ 390.5
25	± 0.60	± 1.35	± 2.00	± 2.00
Notes: (1): Base unit (2): Mobile unit				

2.3.2. Transmitter output power

Transmitter output power ranges of 1 W to 25 W.

Allowed tolerance under normal test conditions:

- Base Unit: ± 2.0 dB.
- Mobile Unit: ± 3.0 dB.

2.3.3. Spurious emission

Power of any spurious emission component shall not exceed 2.5 μ W.

2.3.4. Maximum sensitivity of receiver

Maximum sensitivity of receiver for base unit and mobile unit shall not exceed 6 dB μ V.

2.3.5. Frequency stability

Frequency stability from $\pm 5 \times 10^{-6}$ to $\pm 10 \times 10^{-6}$.

2.3.6. Criteria for the interface between the public switched telephone network and the automatic telephone equipment (if any)

The interface between the public switched telephone network and the automatic telephone equipment (if any) shall conform to the “National technical regulation on Terminal equipment connected to public telephone network through analogue interface - General technical requirements”.

3. METHODS OF MEASUREMENT

3.1. Transmitter carrier

3.1.1. Radiated measurement (for integral antenna equipment)

Scheme of measurement is shown in Figure 2.

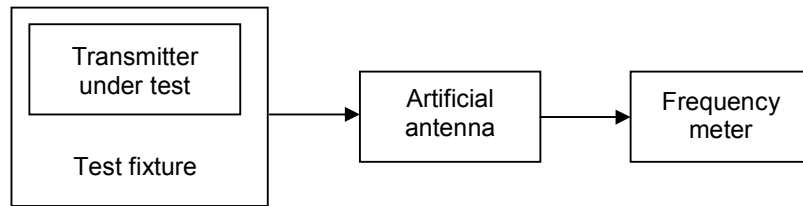


Figure 2: Arrangement for radiated measurement of carrier frequency

- a) The equipment shall be placed in the test fixture connected to the artificial antenna.
- b) The carrier frequency shall be measured in the absence of modulation. The measurement shall be made under normal test conditions.
- c) The result on the frequency meter shall be recorded.

3.1.2. Conducted measurement (for external antenna equipment)

Scheme of measurement is shown in Figure 3.

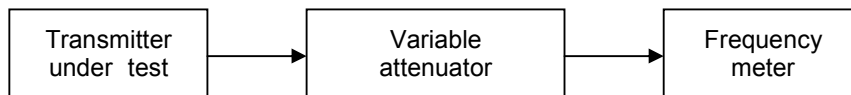


Figure 3 - Arrangement for conducted measurement of carrier frequency

- a) The transmitter under test shall be connected via a 50 Ω variable attenuator to the frequency meter;

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- b) The carrier frequency shall be measured in the absence of modulation under normal test conditions;
- c) The reading of the frequency meter shall be recorded.

3.1.3. Frequency stability (applied only for equipment with chargeable battery)

Scheme of measurement is shown in Figure 4.

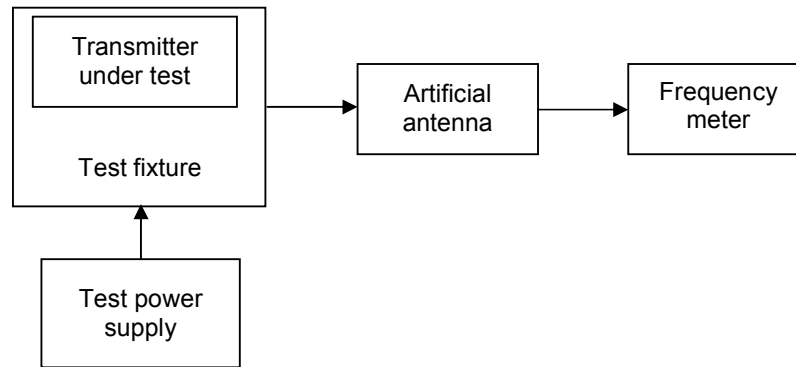


Figure 4 - Arrangement for measurement of frequency stability

- a) The carrier frequency shall be measured in the absence of modulation
- b) Equipment under test shall be placed in the test fixture connected to artificial antenna (in the case of transmitter having 50 Ω antenna socket, equipment under test shall be directly connected to artificial antenna without the use of the test fixture).
- c) Under normal test conditions, the adjustment of the test power supply shall be performed so that the lower limit voltage is obtained.
- d) During the adjustment, the reading of the meter and the maximum frequency deviation shall be recorded.
- e) Measurement results shall be processed using statistical method.

NOTE: If the frequency meter can automatically record measurement result by itself, measurement time shall be 24 hours.

3.2 Transmitter carrier power

3.2.1 Effective radiated power (field strength measurement)

Radiated measurement method for integral antenna equipment:

Scheme of measurement is shown in Figure 5.

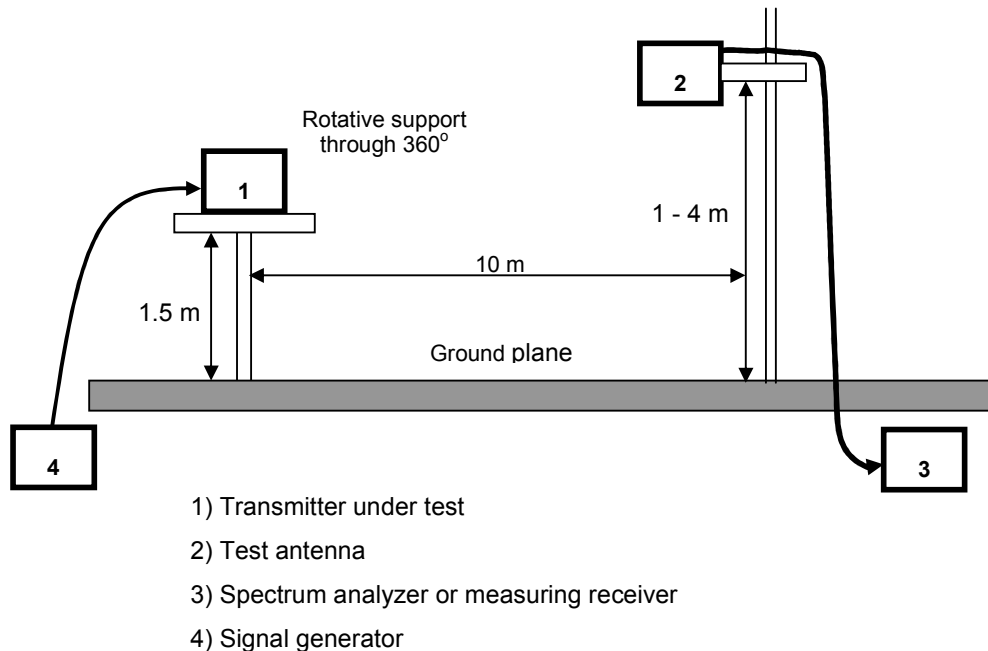


Figure 5 - Arrangement for radiated measurement of carrier power

- a) Transmitter under test shall be placed on a support that can be freely rotated through 360° about a vertical axis at the altitude of 1.5 m from the ground plane and 10 m away from the test antenna. The transmitter shall be switched on and measured in the absence of modulation;
- b) The spectrum analyzer shall be tuned to the transmitter carrier frequency;
- c) The test antenna shall be raised or lowered through the range of 1 m to 4 m until the maximum signal level is detected on the spectrum analyzer;
- d) The transmitter shall be rotated through 360° about a vertical axis until the maximum signal is received. The value of received signal shall be recorded;
- e) Using measurement arrangement of figure 5, the substitution antenna shall replace the transmitter. The substitution antenna shall be connected to the signal generator;
- f) The frequency of the signal generator shall be adjusted to the transmitter carrier frequency;
- g) The input signal to the substitution antenna shall be adjusted in level until a received signal level equals to that obtained in step d) is detected.

The value of the maximum effective radiated power of the equipment under test is equal to the power supplied by the signal generator.

3.2.2. Transmitter carrier power by conducted measurement method (for equipment having an external 50 Ω antenna socket)

Scheme of measurement is shown in Figure 6.

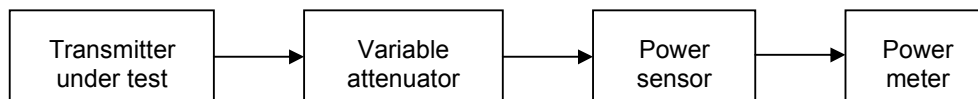


Figure 6 - Arrangement for measurement of transmitted power of transmitter having 50Ω antenna socket

- a) The variable attenuator shall be set at the maximum level. The power sensor shall be calibrated;
- b) Transmitter under test shall be switched on in the absence of modulation;
- c) Attenuation shall be gradually decreased until the transmit power level is obtained on the power meter;
- d) The value of transmitter carrier power is the sum of the value obtained on the power meter and the attenuation (including connector and cable losses).

3.3. Maximum frequency deviation

3.3.1. Integral antenna equipment

Scheme of measurement is shown in Figure 7.

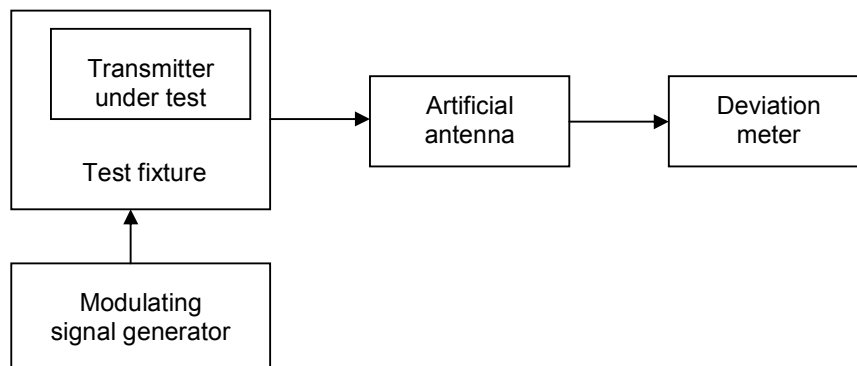


Figure 7 - Arrangement for radiated measurement of frequency deviation

- a) Transmitter under test shall be placed in the test fixture connected to the artificial antenna;
- b) The level of test signal shall be 20 dB above the level corresponding to a deviation at 1000 Hz of 12% of the channel separation;
- c) On the signal generator, the modulating frequency shall be varied within the audio frequency band:
 - Between 300 Hz and 25 kHz for channel separation of 25 kHz;
 - Between 300 Hz and 2550 Hz for channel separation of 10 and 12.5 kHz.
- d) This value shall be recorded.

3.3.2. Equipment with external antenna socket

Set up measurement arrangement as shown in Figure 8.

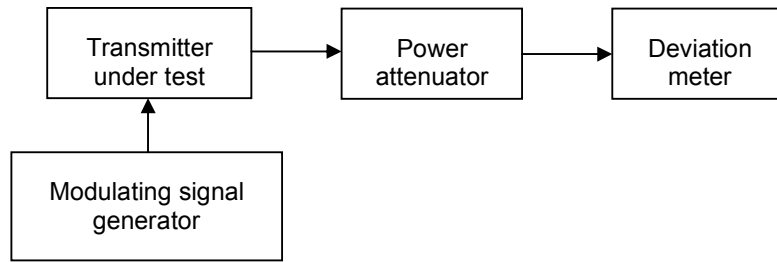


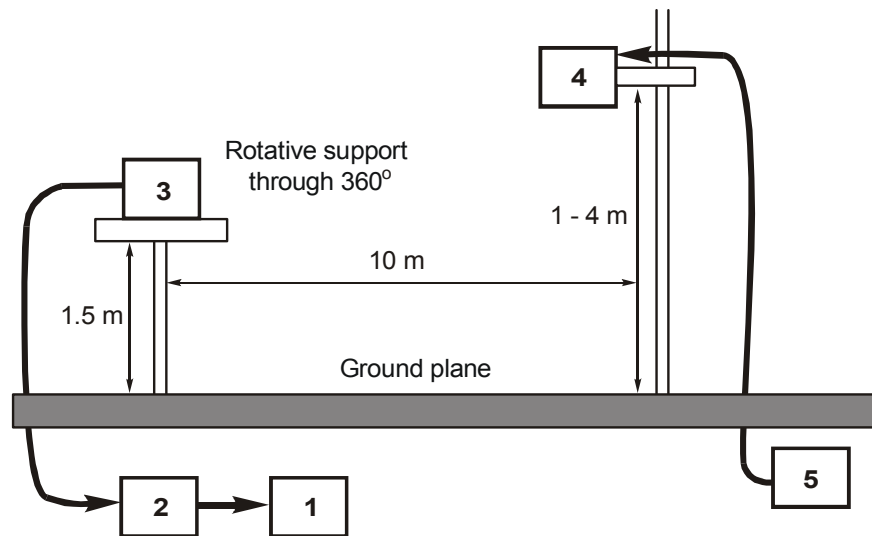
Figure 8 - Arrangement for conducted measurement of frequency deviation

- a) Transmitter under test shall be connected via a power attenuation to the deviation meter;
- b) The level of test signal shall be 20 dB above the level corresponding to a deviation at 1000 Hz of 12% of the channel separation;
- c) The modulating frequency shall be changed within the audio frequency band:
 - Between 300 Hz and 25 kHz for channel separation of 25 kHz;
 - Between 300 Hz and 2550 Hz for channel separation of 10 and 12.5 kHz.
- d) The maximum frequency deviation shall be recorded.

3.4. Maximum receiver sensitivity

3.4.1. Radiated measurement for equipment without external antenna socket

Scheme of measurement is shown in Figure 9.



- 1) SINAD meter 2) AF load/ Acoustic Coupler 3) Receiver under test
- 4) Test antenna 5) Signal generator

Figure 9 - Arrangement for radiated measurement of receiver sensitivity

- a) The signal generator shall be set at the nominal frequency of the receiver under test. The modulating signal shall be at 1000 Hz with the deviation of 60% of the maximum deviation of related channel separation;

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- b) The audio level of the receiver shall be adjusted to 50% of the nominal output audio power level;
- c) The output level of the signal generator shall be adjusted until a SINAD ratio of 20 dB is obtained on the acoustic coupler;
- d) The test antenna shall be raised or lowered in the range of 1 m to 4 m to find the lowest level of the test signal that produces a SINAD ratio of 20 dB;
- e) The receiver under test shall be rotated through 360° about a vertical axis to find the lowest level of the test signal that produces a SINAD ratio of 20 dB;
- f) Using measurement arrangement 9, the substitution antenna shall replace the receiver in the same position and be connected to the measuring receiver or the spectrum analyzer;
- g) The test antenna shall be raised or lowered in the range of 1 m to 4 m to find the level of the test signal obtained in step e);
- h) The maximum receiver sensitivity shall be the level of signal measured on the measuring receiver.

3.4.2. Receiver sensitivity (conducted measurement)

Applied for equipments with 50 Ω external antenna socket.

Scheme of measurement is shown in Figure 10.

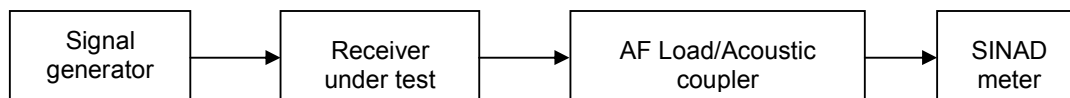


Figure 10 - Arrangement for measurement of receiver sensitivity (conducted measurement)

- a) The signal generator shall be tuned at the nominal frequency of the receiver under test. The modulating signal shall be at 1000 Hz with the deviation of 60% of the maximum deviation of related channel separation;
- b) The audio level of the receiver shall be adjusted to 50% of the nominal output audio power level;
- c) The amplitude of the signal generator shall be adjusted until a SINAD ratio of 20 dB is obtained;
- d) The test signal input level is the value of the receiver sensitivity.

4.5. Amplitude characteristic for analogue speech

Scheme of measurement is shown in Figure 11.

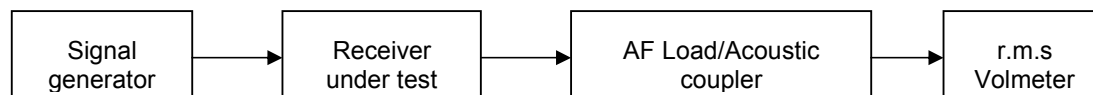


Figure 11 - Arrangement for measurement of amplitude characteristic for analogue speech

- a) The signal generator shall be at the nominal frequency of the receiver;
- b) The signal generator shall be adjusted to the desired signal level;
- c) The audio output level shall be at 25% of the nominal audio power. This level shall be recorded;
- d) The input signal shall be increased to an emf (electromotive force) of +100 dB/ μ V and the level of audio output shall be recorded;
- e) The amplitude characteristics of the receiver is recorded as the change of level of the audio output measured in steps c) and d) above expressed in dB.

3.6. Spurious emission

3.6.1. Radiated measurement (apply only to equipment without external antenna socket)

Scheme of measurement is shown in Figure 12.

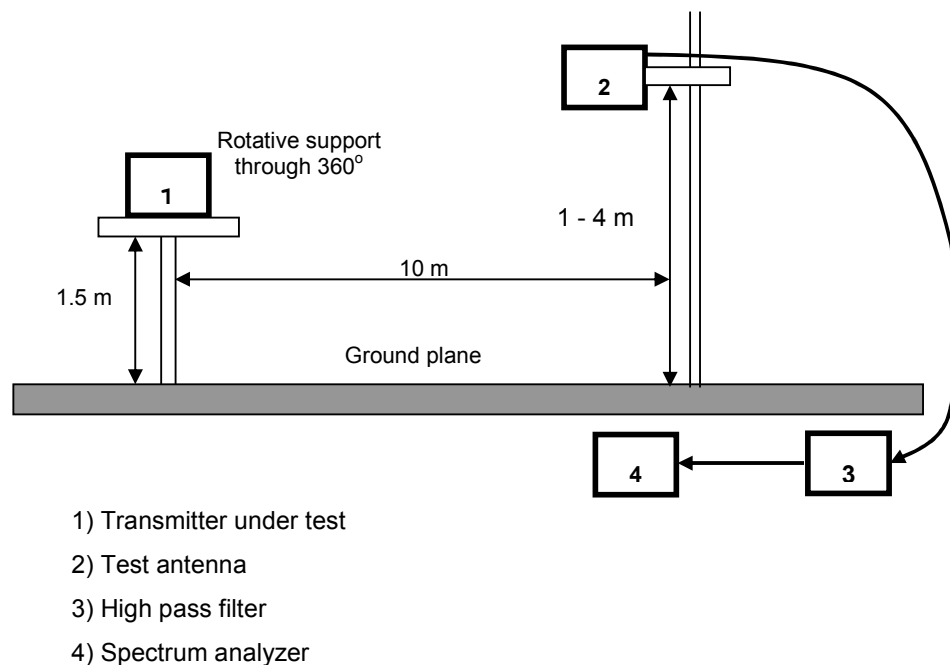


Figure 12 - Arrangement for radiated measurement of spurious emission

- a) The test antenna shall be connected via a high pass filter to a spectrum analyzer. The test antenna length shall be chosen equivalent to instantaneous frequency of the spectrum analyzer;
- b) The transmitter shall be switched on in the absence of modulation. The spectrum analyzer shall be adjusted within the range of 30 MHz to 4 GHz. The radiation of any spurious component shall be detected, the frequency of each spurious component shall be recorded;
- c) The test antenna shall be raised or lowered through the specified height range until a maximum is obtained;
- d) The transmitter shall be rotated up to 360° about the vertical axis, until higher maximum signal is received. This level shall be recorded;

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- e) Using the measurement arrangement shown in figure 12, the substitution antenna shall replace the transmitter in the same position. It shall be connected to the signal generator;
- f) For each frequency at which a component has been detected, the signal generator shall be tuned;
- g) The test antenna shall be raised or lowered in the range of 1 m to 4 m until a maximum is obtained;
- h) The amplitude of the signal generator shall be adjusted until the level measured on the spectrum analyzer is equal to the one obtained in step d);
- i) This value after the correction due to the gain of the substitution antenna and the cable loss between the signal generator and the substitution antenna is the radiated spurious component at this frequency;
- j) The measurement shall be repeated with the transmitter in stand-by condition.

3.6.2. Conducted measurement (apply only to equipment with external antenna socket)

Scheme of measurement is shown in Figure 13.

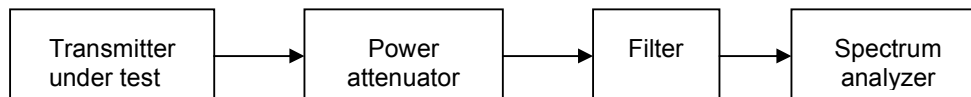


Figure 13 - Arrangement for conducted measurement of spurious emission

- a) Transmitter under test shall be connected to a spectrum analyzer through a 50 Ω power attenuator and a filter;
- b) The transmitter shall be switched on in the absence of modulation. The frequency of the spectrum analyzer shall be adjusted in the range of 9 kHz to 4 GHz;
- c) The frequency and level of every spurious emission component that has been found out shall be recorded as conducted emission level distributed on the power attenuator. The emissions within the channel occupied by the transmitter carrier and its adjacent channels shall not be recorded;
- d) The measurement shall be repeated with the transmitter in stand-by condition.

4. REGULATION ON MANAGEMENT

Cordless Telephone Equipments (Extensible Subscriber Categories) must comply with requirements in this technical regulation.

5. RESPONSIBILITY OF ORGANISATIONS, INDIVIDUALS

Organizations and individuals engaged in production and business on Cordless Telephone Equipments (Extensible Subscriber Categories) to perform regulation conformity certification, publication of regulations and subject to inspection by the government management agency under the current regulations.

6. IMPLEMENTATION

6.1. Telecommunication Authorities are responsible to instruct and implement this technical regulation.

6.2. This technical regulation superseded TCN 68-143:2003.

6.2. In cases of referencing regulations changed, modified or superseded, new versions is applied.

Annex A
(Normative)
Normal test conditions

Temperature: +15⁰C to +35⁰C

Relative humidity: 20% to 75%

AC voltage: 220 VAC/50Hz

When use lead-acid battery power source, DC voltage shall be 1.1 times the nominal voltage of the battery.

Annex B
(Normative)

Absolute measurement uncertainties and measurement result processing

B.1. Absolute measurement uncertainties: maximum values

Table B.1 - Absolute measurement uncertainties (maximum)

Carrier frequency	$< \pm 1 \times 10^{-7}$
Carrier power	$< \pm 0.75$ dB
Maximum frequency error	$< \pm 5\%$
Receiver sensitivity at SINAD of 20 dB	$< \pm 3$ dB
Receiver amplitude characteristic	$< \pm 1.5$ dB

B.2. Processing, explanation of radiated measurement results in comparison with criteria in the technical documentation shall be carried out as follow:

- Measured results shall be compared with corresponding limits in order to determine whether the equipment meet requirements of this standard or not.
- Measurement errors for each parameter shall be included in the measurement report.