

Draft **ETSI EN 301 423** V1.1.1 (2000-08)

Candidate Harmonized European Standard (Telecommunications series)

**Electromagnetic Compatibility and
Radio spectrum Matters (ERM);
Harmonized Standard for the Terrestrial Flight
Telecommunications System under
article 3.2 of the R&TTE Directive**



ReferenceDEN/ERM-RP05-020

Keywordsradio, regulation, terminal, terrestrial, testing,
TFTS

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio Spectrum Matters (ERM), and is now submitted for the ETSI standards One-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [9] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [1] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Technical specifications relevant to Directive 1999/5/EC [1] are given in annex A.

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

Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1]. Each standard is a module in the structure. The modular structure is shown in figure 1.

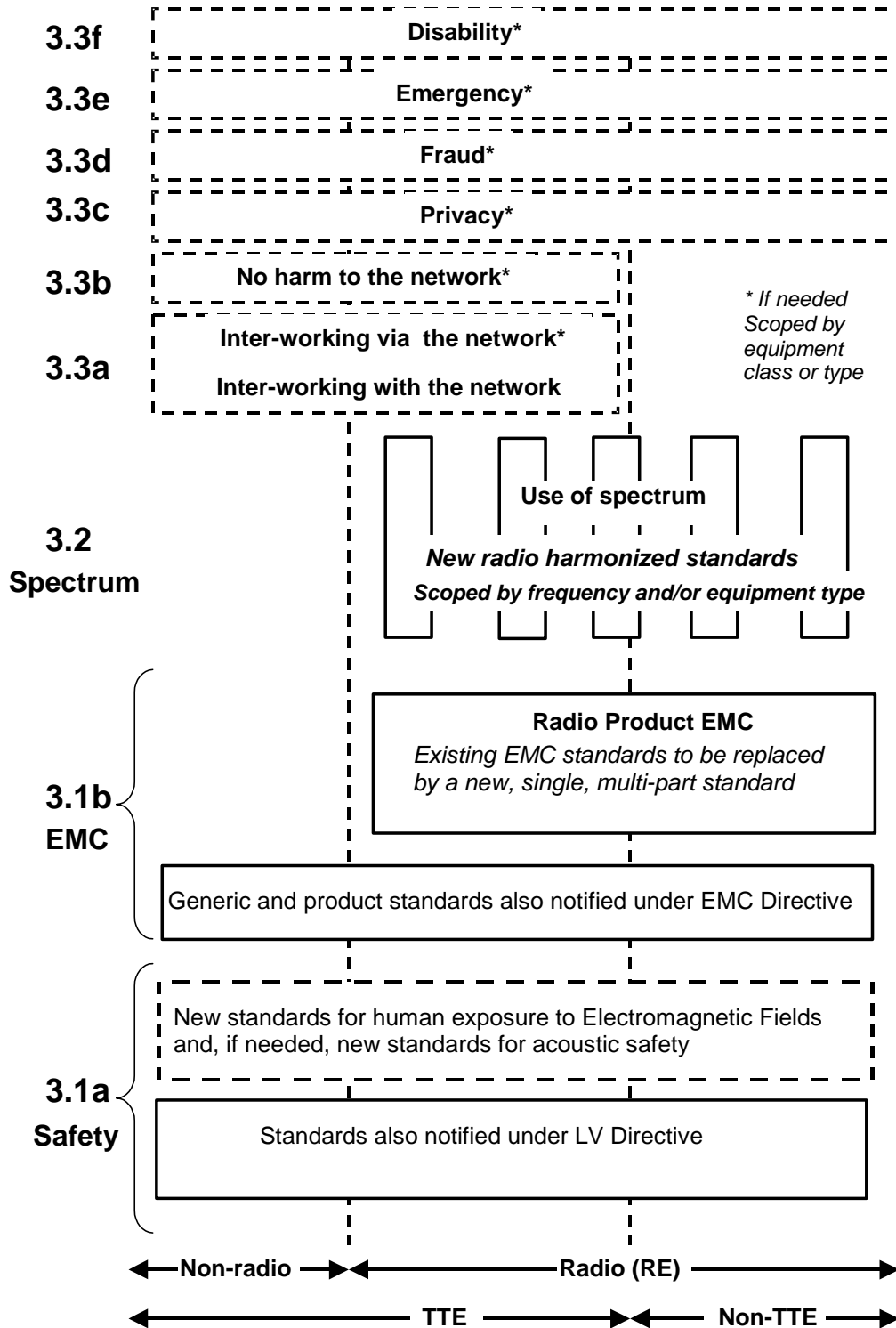


Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure 1 shows the different subclauses of article 3 of the R&TTE Directive [1].

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of the present document essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.1b the diagram shows the new single multi-part product EMC standard for radio, and the existing collection of generic and product standards currently used under the EMC Directive [2]. The parts of this new standard will become available in the second half of 2000, and the existing separate product EMC standards will be used until it is available.

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive [3] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. A radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement under the R&TTE Directive [1] is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [1] may be covered in a set of standards.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;
- it provides scope for standards to be added:
 - under article 3.2 when new frequency bands are agreed; or
 - under article 3.3 should the Commission take the necessary decisions without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

1 Scope

The present document applies to Terrestrial Flight Telecommunication System (TFTS) radio equipment.

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

Table 1: Terrestrial Flight transmission service frequency bands

Direction of transmission	TFTS frequency bands
Transmit ground-to-air	1 670 MHz to 1675 MHz
Transmit air-to-ground	1 800 MHz to 1805 MHz

The present document is intended to cover the provisions of Directive 1999/5/EC (R&TTE Directive) [1] article 3.2 which states that "...radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

The present document is intended to cover both the AS (Aircraft Station) and the GS (Ground Station). As far as the AS is concerned, the present document is derived from TBR 23 [4].

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive [1] may apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site <http://www.newapproach.org>.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (89/336/EEC) (EMC Directive).
- [3] Council Directive of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (73/23/EEC) (LV Directive).
- [4] ETSI TBR 23 (March 1998): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Terrestrial Flight Telecommunications System (TFTS); Technical requirements for TFTS".
- [5] ETSI ETS 300 326-2 (1998): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Terrestrial Flight Telecommunications System (TFTS); Part 2: Speech services, radio interface".
- [6] ETSI ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

- [7] ARINC Characteristic 752 (1993): "Terrestrial Flight Telephone System (TFTS) Airborne Radio Subsystem".
- [8] EUROCAE ED-14C: "Environmental Conditions and Test Procedures for Airborne Equipment".
- [9] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [1], and the following apply:

continuous modulation mode: see subclause 6.6.3 of TBR 23 [4].

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

necessary bandwidth: for a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions

out-of-band emission: emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions

radio equipment: as defined in R&TTE Directive [1] article 2(c), subject to general exclusions referred to in the scope and aim of the Directive - article 1

supplier: manufacturer or his authorized representative established within the Community or the person responsible for placing the apparatus on the market

spurious emission: 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

suppressed modulation mode: see subclause 6.6.4 of TBR 23 [4].

unwanted emissions: consist of spurious emissions and out-of-band emissions

3.2 Abbreviations

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

AS	Aircraft Station
AT	Avionics Termination
BCCH	Broadcast Control CHannel
CHS	Candidate Harmonized Standard
EIRP	Equivalent Isotropic Radiated Power
EN-R	EN Requirement
EN-RT	EN Requirements Table
GS	Ground Station (of the TFTS system)
LVD	Low Voltage Directive
PRBS	Pseudo Random Bit Sequence
R&TTE	Radio and Telecommunications Terminal Equipment
RE	Radio Equipment
RF	Radio Frequency
RT	Requirement Table

TFTS Terrestrial Flight Telecommunications System
WOW Weight On Wheels

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 determined by the environmental class of the equipment. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the required operational environmental profile.

NOTE: Aeronautical Environment specifications are defined outside the present document.

4.2 Conformance requirements

4.2.1 Limits for Frequency error

4.2.1.1 AS

The fractional error between the actual transmitted frequency or the centre frequency of the receiver and the nominal frequency shall be less than 2×10^{-7} .

4.2.1.2 GS

The fractional error between the actual transmitted frequency or the centre frequency of the receiver and the nominal frequency shall be less than 4×10^{-8} .

4.2.2 Limits for Transmitter power

4.2.2.1 AS

The nominal mean transmit power shall be +40 dBm (+2, -1 dB) at the antenna port. The lowest value of the mean transmit power shall be 75 dB \pm 2 dB below nominal. The automatic power control shall adjust the output power relative to the nominal mean level in the range +0 dB to -75 dB in equal steps of 5 dB. The tolerance of each step shall be \pm 2 dB.

When Weight On Wheels (WOW) is TRUE, the mean power level shall be reduced to +25 dBm (+4, -3 dB), also measured at the antenna port.

4.2.2.2 GS

4.2.2.2.1 En Route Ground Station (ERGS)

The EIRP in the horizontal plane shall be a nominal mean value of +49 dBm. The tolerance at the nominal level of +49 dBm shall be +3, -0 dB. A lower EIRP may be required for local radio site engineering reasons. At all other levels the tolerance for the EIRP shall be \pm 2 dB.

4.2.2.2.2 Intermediate Ground Station (INTGS) and airport Ground Station (APGS)

The EIRP in the horizontal plane shall be a nominal mean value of +39 dBm. The tolerance at the nominal level of +39 dBm shall be +3, -0 dB. A lower EIRP may be required for local radio site engineering reasons. At all other levels the tolerance for the EIRP shall be \pm 2 dB.

4.2.3 Limits for RF spectrum mask

4.2.3.1 AS

The spectrum mask shall be less than the limits specified in table 2 as the maximum power level at several frequencies above and below the nominal transmit frequency. The frequency offsets shall be measured from the nominal center frequency, not from the actual value, and power levels are given relative to the transmit power at the nominal frequency.

Table 2: Transmitter mask

Frequency offset (kHz)	dB relative to power at center frequency	Measurement bandwidth (Hz)
±11,3	+1	300
±14,5	-20	300
±15,6	-35	300
±30	-37	300
±60	-49	300
±120	-65	300
±2 500	-70	1 000
±5 000	-75	1 000

4.2.3.2 GS

The same spectrum mask as in clause 4.2.3.1 shall apply.

4.2.4 Limits for out of band emissions

4.2.4.1 AS

Out of band emissions from the AS shall be better than -69 dBW/30 kHz peak EIRP at the antenna port, at all frequencies outside the range 1 797,5 MHz to 1 807,5 MHz.

4.2.4.2 GS

Out of band emissions from the GS shall be better than -60 dBW/MHz peak EIRP at the GS to protect meteorological (1 690 MHz to 1 710 MHz) and other services.

4.2.5 Limits for spurious emissions

Spurious emissions shall be measured at the antenna port with the transmitter set to full power in suppressed modulation mode and then with the transmitter in standby mode.

The spurious emissions at frequencies between 9 kHz and 1 GHz from the TETS equipment shall not exceed -58 dBm at the antenna port. The spurious emissions at frequencies between 1 GHz and 12,75 GHz excluding the transmit band (1 670 MHz to 1 675 MHz in the case of the GS and 1 800 MHz to 1 805 MHz in the case of the AS) shall not exceed -48 dBm at the antenna port in the suppressed modulation mode.

4.2.6 Decoding of BCCH channel

The AS shall be capable of decoding the BCCH channel of the transmission from a Ground Station (GS) and shall respect the range limit of that GS.

The GS shall transmit the BCCH(S) on each carrier. The BCCH(S) shall be used by the AS to synchronize to the transmissions on the carrier.

4.2.7 Response to shutdown command from GS

If an AT is instructed to shut down by the ground station then it shall do so in the manner specified in ETS 300 326-2 [5] subclause 10.11.5.2.4.

4.2.8 Response to timing and power adjustments commands

The AT shall respond as specified to commands from a GS relating to adjustment of the AT transmit power or AT timing.

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing

The demonstration tests defined in the present document shall be performed under environmental conditions regarded as normal for the equipment:

- temperature: +15°C to +35°C;
- relative humidity: 20 % to 75 %;
- pressure: 990 hPascal to 1 014 hPascal.

Testing under other environmental conditions will have been undertaken by manufacturers according to ARINC characteristic 752 [7] and EUROCAE ED-14C [8] and shall not be repeated for the present document.

NOTE: Performing demonstration tests under environmental conditions regarded as extreme, i.e. close to the boundary limits of the declared operational environmental profile, is not a requirement of the present document.

5.2 Essential radio test suites

For TFTS Radio Equipment, the following test suite is considered essential to assessment of conformity in accordance with annex III of the R&TTE Directive [1]:

GS	AS
Transmitter power output	Transmitter power output
Transmitter frequency accuracy	Transmitter frequency accuracy
RF spectrum mask	RF spectrum mask
Out of band emissions	Out of band emissions
Spurious emissions	Spurious emissions
	Decoding of BCCH channel
	Response to shutdown command from GS
	Response to timing and power adjustment commands

5.2.1 Transmitter power output

5.2.1.1 AS

5.2.1.1.1 Test method

- a) the AT shall be set in continuous modulation mode;
- b) the transmitter shall be set to channel 82 (1 802,484 848 MHz);
- c) the AT mean output power shall be set to give +40 dBm at the antenna port;

- d) a power meter shall be connected to the antenna port via suitable external power attenuators;
- e) the mean output power shall be calculated as follows:
 - meter reading + power attenuation - any calibration required for the meter and power sensor; and
 - shall be checked versus the range specified in subclause 4.2.2;
- f) the automatic power control shall be set to reduce the output power by 75 dB;
- g) the external power attenuation shall be reduced to give a measurable mean power level at the power meter;
- h) the lowest mean output power shall be calculated as in step e) and shall be within the range specified in subclause 4.2.2;
- j) the automatic power control shall be set to increase the power in 5 dB steps. The measured output power at each step shall be calculated as in paragraph e) and its value at each step shall be compared to $(-35 + 5n) \pm 2$ dBm, where n is the step number and steps 0 and 15 correspond to the lowest and highest output powers respectively.

NOTE: It may be necessary to adjust the external power attenuation to take account of the dynamic range of the power meter when increasing the output power in step j).

5.2.1.1.2 Test bank characteristics

The test equipment shall consist of a RF power meter (measuring mean power), any associated power sensor, cabling and power attenuators.

The TFTS transmitter shall be connected to the diplexer by the manufacturer-supplied cable and the diplexer receiver port shall be terminated in a 50 Ω load (see figure 2).

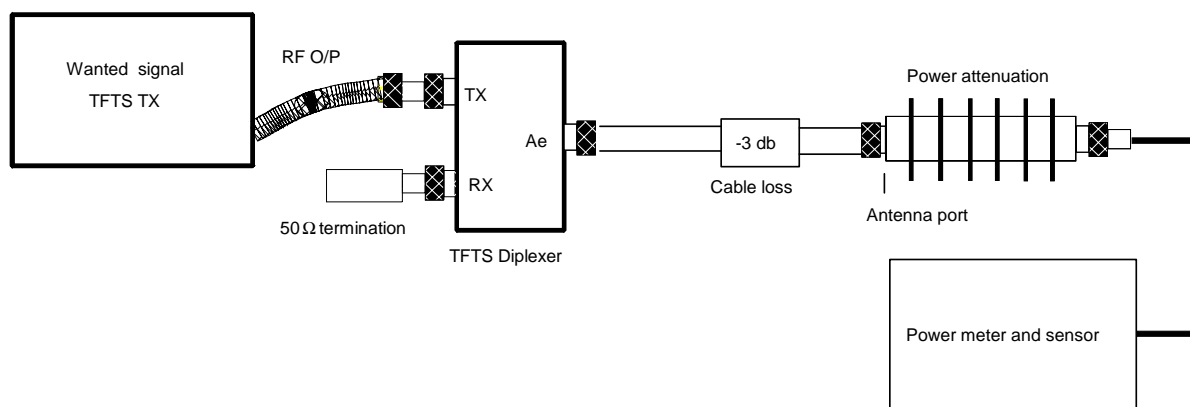


Figure 2: Transmitter power measurement test equipment

5.2.1.1.3 Measurement uncertainty

The maximum uncertainty for the measurement shall be ± 1 dB according to ETR 028 [6].

5.2.1.2 GS

5.2.1.2.1 Test Method

The manufacturer shall describe the test method used.

NOTE: GSM test methods are recommended.

5.2.1.2.2 Test bank characteristics

The manufacturer shall describe the test bank characteristics used

NOTE: GSM base station test methods are recommended.

5.2.1.2.3 Measurement uncertainty

ETR 028 [6] shall apply.

5.2.2 Transmitter frequency accuracy

5.2.2.1 AS

5.2.2.1.1 Test method

This test method is to measure the short-term frequency accuracy of the transmitter. Verification of long term frequency accuracy of an AT shall be by manufacturer's declaration.

- a) the AT shall be set to suppressed modulation mode;
- b) the AT mean output power shall be set to give +40 dBm at the antenna port;
- c) the transmitter shall be set to channel 1 (1 800,030 303 MHz);
- d) the transmitted frequency at the antenna port shall be recorded;
- e) the fractional error shall then be calculated as follows:

$$\text{fractional error} = \frac{|(\text{measured frequency} - \text{nominal channel frequency})|}{\text{nominal channel frequency}}$$

- f) steps c) to e) shall be repeated with the AT transmitter set to channel 82 (1 802,484 848 MHz);
- g) steps c) to e) shall be repeated with the AT transmitter set to channel 164 (1 804,969 696 MHz);
- h) the fractional error in the transmit frequency measured for each channel in steps a) to g) shall be compared to the maximum admissible value of 2×10^{-7} . For guidance, this corresponds to the measured frequency being contained in the interval $(f_{\text{nom}} - 360)$ Hz to $(f_{\text{nom}} + 360)$ Hz, where f_{nom} is the nominal frequency in hertz of the channel to which the transmitter is set.

5.2.2.1.2 Test bank characteristics

The test equipment shall consist of a frequency meter and appropriate RF attenuation to reduce the transmit power to a level suitable for the meter.

The TETS transmitter shall be connected to the diplexer by the cable supplied by the manufacturer and the diplexer receiver port shall be terminated in a 50 Ω load.

5.2.2.1.3 Measurement uncertainty

The measurement uncertainty depends on the frequency reference used by the frequency counter shall be better than 0,02 ppm.

5.2.2.2 GS

5.2.2.2.1 Test method

This test method is to measure the short-term frequency accuracy of the transmitter. Verification of long-term frequency accuracy of an GS shall be by manufacturer's declaration.

- a) the GS shall be set to suppressed modulation mode;
- b) the GS mean output power shall be set to give +40 dBm at the antenna port;
- c) the transmitter shall be set to channel 1 (1 670,030 303 MHz);
- d) the transmitted frequency at the antenna port shall be recorded;
- e) the fractional error shall then be calculated as follows:

$$\text{fractional error} = \frac{|(\text{measured frequency} - \text{nominal channel frequency})|}{\text{nominal channel frequency}}$$

- f) steps c) to e) shall be repeated with the GS transmitter set to channel 82 (1 672,484 848 MHz);
- g) steps c) to e) shall be repeated with the GS transmitter set to channel 164 (1 674,969 696 MHz);
- h) the fractional error in the transmit frequency measured for each channel in steps a) to g) shall be compared to the maximum admissible value of 2×10^{-7} . For guidance, this corresponds to the measured frequency being contained in the interval $(f_{\text{nom}} - 360)$ Hz to $(f_{\text{nom}} + 360)$ Hz, where f_{nom} is the nominal frequency in hertz of the channel to which the transmitter is set.

5.2.2.2.2 Test bank characteristics

The test equipment shall consist of a frequency meter and appropriate RF attenuation to reduce the transmit power to a level suitable for the meter.

The TFTS transmitter shall be connected to the diplexer by the cable supplied by the manufacturer and the diplexer receiver port shall be terminated in a 50 Ω load.

5.2.2.2.3 Measurement uncertainty

The measurement uncertainty depends on the frequency reference used by the frequency counter shall be better than 0,02 ppm.

5.2.3 RF spectrum mask

5.2.3.1 AS

5.2.3.1.1 Test method

- a) the AT shall be set in continuous modulation mode;
- b) the AT mean output power shall be set to give +40 dBm at the antenna port;
- c) the radio shall be set to transmit on channel 1 (1 800,030 303 MHz);
- d) the signal at the antenna port shall be averaged over at least 20 sweeps on a spectrum analyzer with the measurement bandwidth shown in table 2. The mean of the transmit spectrum shall be compared with the values of the transmit mask;
- e) steps c) to d) shall be repeated with the AT set to channel 82 (1 802,484 848 MHz);
- f) steps c) to d) shall be repeated with the AT set to channel 164 (1 804,969 697 MHz).

5.2.3.1.2 Test bank characteristics

The test equipment shall consist of a spectrum analyzer, a Pseudo Random Bit Sequence (PRBS) generator and RF attenuators to reduce the output power to a suitable level for the analyzer. The analyzer should be programmed to display the wanted RF mask.

5.2.3.1.3 Measurement uncertainty

The uncertainty in the measurement will depend on the relative accuracy of the analyzer used. At relative powers of 0 to -50 dB the maximum uncertainty for the measurement shall be ± 2 dB according to ETR 028 [6]. At signal levels below -50 dB the noise floor of the analyzer increases the uncertainty which then also depends on the averaging factor used to display the RF mask.

5.2.3.2 GS

5.2.3.2.1 Test method

- a) the GS shall be set in continuous modulation mode;
- b) the GS mean output power shall be set to give +40 dBm at the antenna port;
- c) the radio shall be set to transmit on channel 1 (1 670,030 303 MHz);
- d) the signal at the antenna port shall be averaged over at least 20 sweeps on a spectrum analyzer with the measurement bandwidth shown in table 2. The mean of the transmit spectrum shall be compared with the values of the transmit mask;
- e) steps c) to d) shall be repeated with the GS set to channel 82 (1 672,484 848 MHz);
- f) steps c) to d) shall be repeated with the GS set to channel 164 (1 674,969 697 MHz).

5.2.3.2.2 Test bank characteristics

The test equipment shall consist of a spectrum analyzer, a Pseudo Random Bit Sequence (PRBS) generator and RF attenuators to reduce the output power to a suitable level for the analyzer. The analyzer should be programmed to display the wanted RF mask.

5.2.3.2.3 Measurement uncertainty

The uncertainty in the measurement will depend on the relative accuracy of the analyzer used. At relative powers of 0 to -50 dB the maximum uncertainty for the measurement shall be ± 2 dB according to ETR 028 [6]. At signal levels below -50 dB the noise floor of the analyzer increases the uncertainty which then also depends on the averaging factor used to display the RF mask.

5.2.4 Out of band and spurious emissions

5.2.4.1 AS

5.2.4.1.1 Test method

5.2.4.1.1.1 Out of band emissions

- a) the AT shall be set in continuous modulation mode;
- b) the transmitter shall be set to channel 1 (1 800,030 303 MHz);
- c) the mean output power of the transmitter shall be set to give +40 dBm at the antenna port;
- d) the spectrum analyzer shall be swept from 1 697,5 MHz to 1 797,5 MHz;

- e) the level of emissions shall be measured and compared to the maximum admissible value of -69 dBW in 30 kHz. This measurement shall be made in the near vicinity of the transmitted signal and for frequencies where emissions having a level approaching the requirement have been detected;
- f) the main radio shall be set to channel 164 (1 804,969 696 MHz);
- g) the spectrum analyzer shall be swept from 1 807,5 MHz to 1907,5 MHz;
- h) the level of emissions shall be measured and compared to the maximum admissible value of - 69 dBW in 30 kHz. This measurement shall be made in the near vicinity of the transmitted signal and for frequencies where emissions having a level approaching the requirement have been detected.

5.2.4.1.1.2 Spurious emissions

- a) the transmitter shall be set to channel 1 (1 800,030 303 MHz);
- b) the mean output power of the transmitter shall be set to give +40 dBm at the antenna port;
- c) the transmitter shall be set to suppressed modulation mode;
- d) the spectrum analyzer shall be swept between 9 kHz and 1 GHz with a measurement bandwidth of 30 kHz;
- e) for each spurious detected, the peak power level shall be measured and compared to the maximum admissible value of -58 dBm;
- f) the spectrum analyzer swept from 1 000 MHz to 1 800 MHz and 1 805 MHz to 12,75 GHz with a measurement bandwidth of 30 kHz;
- g) for each spurious detected, the peak power level shall be measured and compared to the maximum admissible value of -48 dBm;
- h) steps d) to g) shall be repeated with the transmitter set to channel 82 (1 802,484 848 MHz);
- j) steps d) to g) shall be repeated with the transmitter set to channel 164 (1 804,969 696 MHz);
- k) the AT shall be set to standby mode;
- l) steps c) to g) shall be repeated, including measurement in the band 1 800 MHz to 1 805 MHz.

5.2.4.1.2 Test bank characteristics

A spectrum analyzer shall be connected to the antenna terminal of the diplexer via a 50 Ω power attenuator.

The receiver output of diplexer shall be connected to the receiver input of the AT.

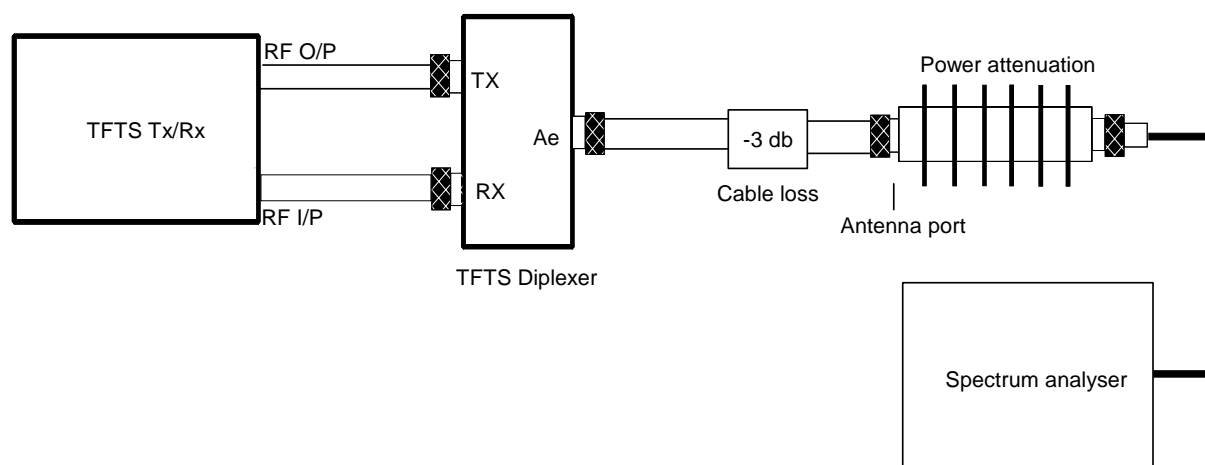


Figure 3: Unwanted emissions measurement equipment

5.2.4.1.3 Measurement uncertainty

The typical measurement uncertainty has been calculated as ± 4 dB according to ETR 028 [6].

5.2.4.2 GS

5.2.4.2.1 Test method

5.2.4.2.1.1 Out of band

- a) the GS shall be set in continuous modulation mode;
- b) the transmitter shall be set to channel 1 (1 670,030 303 MHz);
- c) the mean output power of the transmitter shall be set to give +40 dBm at the antenna port;
- d) the spectrum analyzer shall be swept from 1 567,5 MHz to 1 667,5 MHz;
- e) the level of emissions shall be measured and compared to the maximum admissible value of -69 dBW in 30 kHz. This measurement shall be made in the near vicinity of the transmitted signal and for frequencies where emissions having a level approaching the requirement have been detected;
- f) the transmitter shall be set to channel 164 (1 674,969 696 MHz);
- g) the spectrum analyzer shall be swept from 1 677,5 MHz to 1 777,5 MHz;
- h) the level of emissions shall be measured and compared to the maximum admissible value of - 69 dBW in 30 kHz. This measurement shall be made in the near vicinity of the transmitted signal and for frequencies where emissions having a level approaching the requirement have been detected.

5.2.4.2.1.2 Spurious emissions

- a) the transmitter shall be set to channel 1 (1 670,030 303 MHz);
- b) the mean output power of the transmitter shall be set to give +40 dBm at the antenna port;
- c) the transmitter shall be set to suppressed modulation mode;
- d) the spectrum analyzer shall be swept between 9 kHz and 1 GHz with a measurement bandwidth of 30 kHz;
- e) for each spurious detected, the peak power level shall be measured and compared to the maximum admissible value of -58 dBm;
- f) the spectrum analyzer swept from 1 000 MHz to 1 670 MHz and 1 675 MHz to 12,75 GHz with a measurement bandwidth of 30 kHz;
- g) for each spurious detected, the peak power level shall be measured and compared to the maximum admissible value of -48 dBm;
- h) steps d) to g) shall be repeated with the transmitter set to channel 82 (1 672,484 848 MHz);
- j) steps d) to g) shall be repeated with the transmitter set to channel 164 (1 674,969 696 MHz);
- k) the GS shall be set to standby mode;
- l) steps c) to g) shall be repeated, including measurement in the band 1 670 MHz to 1 675 MHz.

5.2.4.2.2 Test bank characteristics

A spectrum analyzer shall be connected to the antenna terminal of the diplexer via a 50 Ω power attenuator.

The receiver output of diplexer shall be connected to the receiver input of the GS.

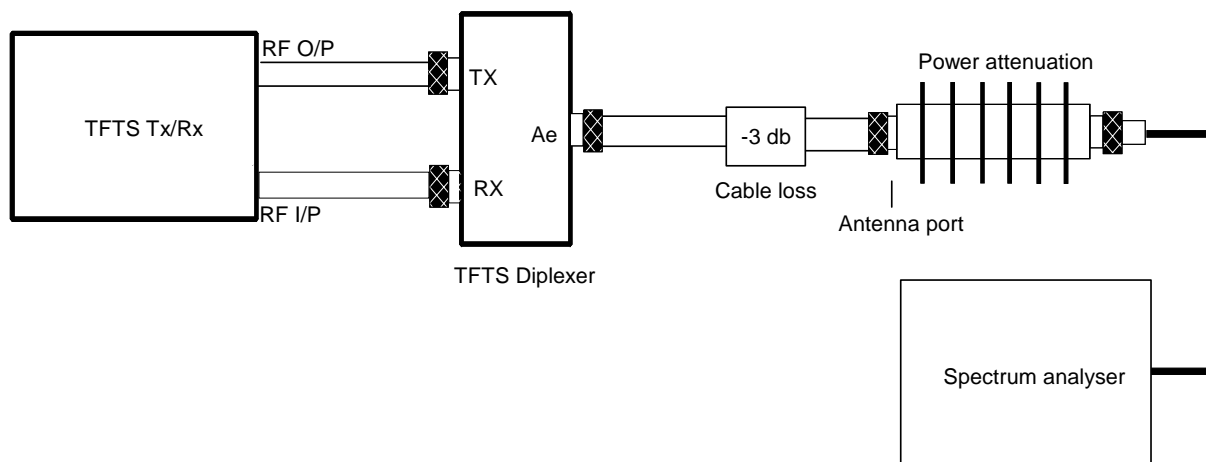


Figure 4: Unwanted emissions measurement equipment

5.2.4.2.3 Measurement uncertainty

The typical measurement uncertainty has been calculated as ± 4 dB according to ETR 028 [6].

5.2.5 Correct decoding of BCCH channel

5.2.5.1 Test method

The test GS BCCH 5 (D) shall be configured to set the cell radius to a convenient value (for example 100 km).

The transmit timing shall be adjusted so that the timing at the AT gives the appearance of a range to the GSS equal to the cell radius minus 5 km.

The AT shall be configured to establish a connection.

The transmit timing shall be adjusted so that the AT timing gives appearance of a range equal to the cell radius plus 5 km. Some equipment may reject a jump in range in order to protect against false correlation in the presence of noise. This is acceptable and if applicable, the test equipment shall move the range slowly and continuously from one value to the other. The AT shall cease transmitting within 25 s of reaching cell radius plus 5 km.

5.2.5.2 Test bank characteristics

The AT under test shall be connected to a test GS through a feeder cable. If necessary, an attenuator may be installed between the units. If this is the case, then the attenuator shall be adjusted to establish a signal level into the AT under test that is nominally 6 dB above sensitivity.

5.2.5.3 Measurement uncertainty

As the parameter being tested is digital in nature, measurement uncertainty is not applicable. There is an uncertainty in the accuracy of the range measurement, but this is not significant to this test.

5.2.6 Correct response to shutdown command

5.2.6.1 Test method

The test GS shall be configured to transmit the shutdown command including the address of the AT under test.

The AT shall cease transmitting upon receipt of the shutdown command.

5.2.6.2 Measurement uncertainty

The AT under test shall be connected to a test GS through a feeder cable. If necessary, an attenuator may be installed between the units. If this is the case, then the attenuator shall be adjusted to establish a signal level into the AT under test that is nominally 6 dB above sensitivity.

The test GS shall be capable of specific control of the elements of the BCCH (D) in respect of the shutdown parameter.

5.2.6.3 Measurement uncertainty

As the parameter being tested is digital in nature, measurement uncertainty is not applicable.

5.2.7 AT response to timing and power adjustment commands

5.2.7.1 Test method

5.2.7.1.1 Timing

The attenuator shall be adjusted to establish a signal level into the AT under test that is nominally 6 dB above sensitivity. The AT shall be configured to establish a connection.

The time of arrival of the AT transmitted signal shall be verified at the GS. This shall be achieved by inspection that the GS assesses the timing to be acceptable.

5.2.7.1.2 Power

The AT shall be configured to establish connection. The attenuator shall be set to establish a power into the AT of the order of -85 dBm.

Either by automatic (by variation of the attenuator setting) or manual means, it shall be verified that the AT responds to power adjustment commands received from the GS on the BCCH.

5.2.7.2 Test bank characteristics

The AT under test shall be connected to a test GS antenna connector through a feeder cable. A variable attenuator capable of withstanding the power output from the GS and AT shall be installed between the units.

Annex A (normative): The EN Requirements Table (EN-RT)

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the EN-RT proforma in this annex so that it can be used for its intended purposes and may further publish the completed EN-RT.

The EN Requirements Table (EN-RT) serves a number of purposes, as follows:

- it provides a tabular summary of all the requirements;
- it shows the status of each EN-R, whether it is essential to implement in all circumstances (Mandatory), or whether the requirement is dependent on the supplier having chosen to support a particular optional service or functionality (Optional). In particular it enables the EN-Rs associated with a particular optional service or functionality to be grouped and identified;
- when completed in respect of a particular equipment it provides a means to undertake the static assessment of conformity with the EN.

The EN-RT is placed in an annex of the EN in order that it may be photocopied and used as a proforma.

Table A.1: EN Requirements Table (EN-RT)

EN Reference		EN-RT			Comment
No.	Reference	EN-R Note	AS Status	GS Status	
1	4.2.1.1	Limits for Frequency error	m		
	4.2.1.2	Limits for Frequency error		m	
2	4.2.2.1	Limits for Transmitter power	m		
	4.2.2.2	Limits for Transmitter power		m	
3	4.2.3	Limits for RF spectrum mask	m	m	
4	4.2.4.1	Limits for Out-of-band emissions	m		
	4.2.4.2	Limits for Out-of-band emissions		m	
5	4.2.5	Limits for Spurious emissions	m	m	
6	4.2.6	Decoding of BCCH Channel	m		
7	4.2.7	Response to shutdown command from GS	m		
8	4.2.8	Response to timing and power adjustment commands	m		

NOTE: These EN-Rs are justified under article 3.2 of the R&TTE Directive.

Key to columns:

No Table entry number;

Reference Subclause reference number of conformance requirement within the present document;

EN-R Title of conformance requirement within the present document;

Status Status of the entry as follows:

M Mandatory, shall be implemented under all circumstances;

O Optional, may be provided, but if provided shall be implemented in accordance with the requirements;

O.n This status is used for mutually exclusive or selectable options among a set. The integer "n" shall refer to a unique group of options within the EN-RT. A footnote to the EN-RT shall explicitly state what the requirement is for each numbered group. For example, "It is mandatory to support at least one of these options", or, "It is mandatory to support exactly one of these options".

Comments To be completed as required.

History

Document history			
V1.1.1	August 2000	One-step Approval Procedure	OAP 20001201: 2000-08-02 to 2000-12-01