SLOVENSKI STANDARD
SIST EN 300 789:2000

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Elektromagnetna združljivost (EMC) in zadeve v zvezi z radijskim spektrom (ERM) - Prizemni letalski telekomunikacijski sistem (TFTS) - Specifikacija radijskih preskušanj na letalskem priključku (sistema TFTS)

ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Terrestrial Flight Telecommunications System (TFTS); Avionic termination radio testing specification

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European Standard (Telecommunications series)

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Foreword

The European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

National transposition dates	
Date of adoption of this EN:	20 February 1998
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1 Scope

The present document specifies the measurements to be made to test the radio characteristics of the Avionic Termination (AT) of the Terrestrial Flight Telecommunications System (TFTS), operating in the frequency bands 1 670 MHz to 1 675 MHz (receive) and 1 800 MHz to 1 805 MHz (transmit), and designed according to ETS 300 326 -2 [1]. The present document does not constitute a full Conformance Testing Specification for the TFTS AT.

2 Normative references

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case 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] ETS 300 326-2 (1996): "Radio Equipment and Systems (RES); Terrestrial Flight Telephone System (TFTS); Part 2: Speech services, radio interface".

[2] ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

[3] The Radio Regulations of the International Telecommunications Union (1993).

[4] ARINC characteristic 752 (January 1993): "Terrestrial Flight Telephone System (TFTS) Airborne Radio Subsystem".

[5] EUROCAE ED-14C: "Environmental Conditions and Test Procedures for Airborne Equipment".

3 Definitions, abbreviations and symbols

3.1 Definitions

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

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.

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.

unwanted emissions: Consist of spurious emissions and out-of-band emissions.

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.

occupied bandwidth: The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage P/2 of the total mean power of a given emission.

95% confidence level: 1,96 times the total standard deviation. Based on Student's t factor.

continuous modulation mode: See subclause 6.1.4.3.

suppressed modulation mode: See subclause 6.1.4.4.

burst mode: Transmission with one or more of the four voice channels switched off.

antenna port: The end of the diplexer to antenna cable that is connected to the antenna, see subclause 5.3.

3.2 Abbreviations

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

π/4 DQPSK	π/4 Differential Quaternary Phase Shift Keying
APC	Aeronautical Public Correspondence
AT	Avionic Termination
BER	Bit Error Ratio
c/i	carrier to interference ratio
DQPSK	Differential Quaternary Phase Shift Keying
GS	Ground Station
ISI	Inter Symbol Interference
OSI	Open System Interconnect
PFD	Power Flux Density
ppm	parts per million
PRBS	Pseudo Random Bit Sequence
RF	Radio Frequency
rms	root mean square
TDMA	Time Division Multiple Access
TFTS	Terrestrial Flight Telecommunications System
WOW	Weight On Wheels

3.3 Symbols

For the purposes of the present document, the following symbol applies:

C_0	modulator offset (see subclause 6.3.2)

4 Frequency range and radio channel arrangement

The frequency range and channel arrangements are specified in ETS 300 326-2 [1] subclauses 8.8.1.1.1 and 8.8.1.1.2.

4.1 Frequency range

The frequency range for terrestrial Aeronautical Public Correspondence (APC) is as follows:

- 1 670 MHz to 1 675 MHz for ground to air use (AT receive);
- 1 800 MHz to 1 805 MHz for air to ground use (AT transmit).

4.2 Radio channel arrangement

The Terrestrial Flight Telecommunications System (TFTS) radio frequency channel arrangement provides for 164 pairs of Radio Frequency (RF) channels (one channel for each direction of transmission). The centre frequencies of these channels are given by the following:

- Fg(n) = 1 670 + n/33 MHz;

- Fa(n) = Fg(n) + 130 MHz;

where:

- Fg(n) is the frequency of the nth ground transmit channel;
- Fa(n) is the frequency of the nth airborne transmit channel;
- n is the channel number (1 to 164).

Where frequencies have been specified in the present document, they are rounded up with a resolution of 1 Hz.

4.3 Modulation

The modulation method used shall be π/4 Differential Quaternary Phase Shift Keying (π/4 DQPSK). The modulation scheme shall use the phase constellation shown in figure 1.

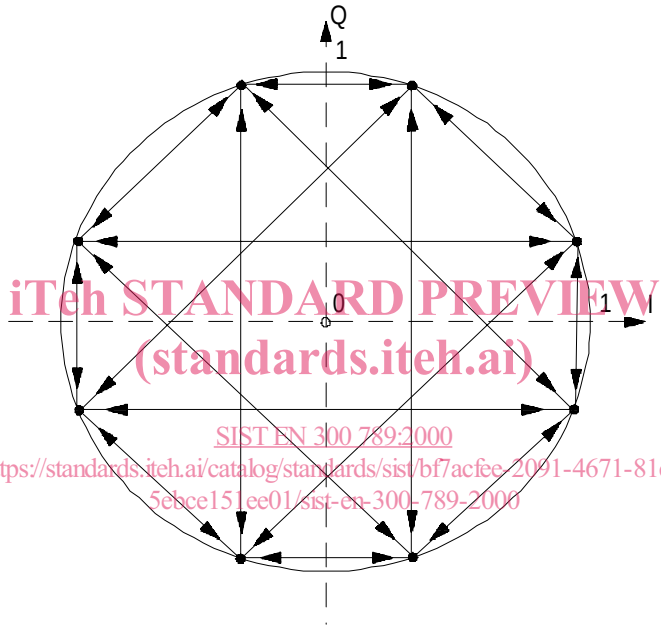

Figure 1: π/4 DQPSK constellation

5 General aspects of TFTS testing procedures

Two testing procedures are covered by the present document: a testing procedure for the protection and compatibility of the TFTS network equipment and a testing procedure for the protection of other radio services.

5.1 Protection of the TFTS network

These tests may be described as assuring that:

- interchange of TFTS equipment from several manufacturers is possible;
- no harm is done to the TFTS network.

5.2 Protection of other services

Basic tests to ensure that the level of protection afforded to other services is as has been specified in ETS 300 326-2 [1].

These tests may be described as assuring that no unacceptable interference occurs to other radio services.

5.3 Access to signals

The standard interface points of the AT shall be used for testing purposes, see subclause 6.2 of ETS 300 326 part 2 [1]:

Ua interface: This shall be replaced by an equivalent interface at the AT transceiver RF access points which shall allow for the connection of signals coming from or going to the RF test system. Measurements shall be made at the antenna port, unless stated otherwise, using the antenna feed cable.

This test configuration has assumed a cable loss of 3 dB between the diplexer and the antenna port, see figure 2.

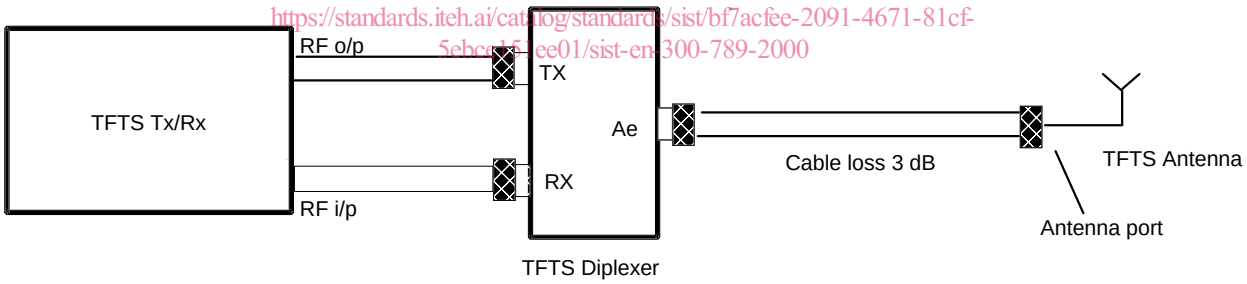

Figure 2: Antenna port interface point

5.4 Environmental conditions for tests

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

Testing under other environmental conditions will have been undertaken by manufacturers according to ARINC characteristic 752 [4] and EUROCAE ED-14C [5] and shall not be repeated for the present document.

5.5 Power supply requirements

The power supply shall be in accordance with ARINC characteristic 752 [4] i.e. 115 V AC (nominal) supply at 400 Hz (nominal) single phase.