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**Transmission and Multiplexing (TM);  
Parameters for radio-relay systems for the transmission of  
digital signals and analogue video signals operating at around  
58 GHz, which do not require co-ordinated frequency planning**

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## Contents

Foreword .....	5
1 Scope .....	7
2 Normative references .....	7
3 Abbreviations.....	7
4 General characteristics .....	7
4.1 Frequency bands and channel arrangements .....	7
4.1.1 Frequency band.....	7
4.1.2 Co-polar channel spacing.....	7
4.1.3 Transmit/receive centre gap.....	8
4.1.4 Transmit/receive duplex frequency separation .....	8
4.1.5 Environmental conditions .....	8
4.1.5.1 Equipment within weather protected locations .....	8
4.1.5.2 Equipment for non-weather protected locations .....	8
4.1.6 Electromagnetic compatibility.....	8
4.1.7 Interface .....	8
4.2 Block diagram .....	8
4.3 Branching/feeder/antenna requirements .....	8
4.4 Mechanical requirements.....	8
4.5 Power supply.....	9
4.6 General characteristics .....	9
5 Parameters for digital systems.....	9
5.1 Transmission capacity .....	9
5.2 Applications.....	9
5.3 Transmitter characteristics .....	9
5.3.1 Power .....	9
5.3.1.1 Transmitter power range .....	9
5.3.1.2 Equivalent Isotropically Radiated Power (EIRP).....	9
5.3.2 Radiated spectrum .....	9
5.3.2.1 RF spectrum mask .....	9
5.3.2.2 Spurious emissions .....	9
5.3.3 RF frequency tolerance .....	10
5.4 Receiver characteristics, spurious emissions .....	10
6 Parameters for wideband analogue systems .....	10
6.1 Transmit/receive baseband bandwidth .....	10
6.2 Applications.....	10
6.3 Transmitter characteristics .....	10
6.3.1 Power .....	10
6.3.1.1 Transmitter power range .....	10
6.3.1.2 EIRP .....	10
6.3.2 Radiated spectrum .....	10
6.3.2.1 Spectrum mask .....	10
6.3.2.2 Spurious emissions .....	11
6.3.3 RF frequency tolerance .....	11
6.4 Receiver characteristics, spurious emissions .....	11
History.....	13

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## Foreword

This ETS specifies the minimum performance parameters for radio equipment operating at frequencies around 58 GHz, which do not require co-ordinated frequency planning. Other standards cover radiocommunications equipment not listed in clause 1.

<b>Transposition dates</b>	
Date of adoption of this ETS:	13 October 1995
Date of latest announcement of this ETS (doa):	30 June 1996
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 December 1996
Date of withdrawal of any conflicting National Standard (dow):	31 December 1996

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## 1 Scope

This European Telecommunication Standard (ETS) covers the minimum performance requirements for terrestrial fixed services radiocommunications equipment, as given below, at frequencies around 58 GHz which do not require co-ordinated frequency planning.

This ETS specifies the performance criteria for the different equipment groups. The equipment groups are:

- digital signals;
- analogue video signals.

## 2 Normative references

This ETS incorporates by dated or undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] prETS 300 132-1: "Equipment engineering; Power supply interface at the input to telecommunications equipment Part 1: Interfaces operated by alternating current (AC)" (DE/EE-02001.1).
- [2] prETS 300 132-2: "Equipment engineering; Power supply interface at the input to telecommunications equipment Part 2: Interfaces operated by direct current (DC)" (DE/EE-02001.2).
- [3] ETS 300 019: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".
- [4] prETS 300 385: "Radio Equipment and Systems (RES); EMC standard for digital fixed radio links and ancilliary equipment with data rates at around 2 Mbit/s and above".

## 3 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

AC	Alternating Current
DC	Direct Current
EIRP	Equivalent Isotropically Radiated Power
ppm	parts per million
RF	Radio Frequency

## 4 General characteristics

### 4.1 Frequency bands and channel arrangements

#### 4.1.1 Frequency band

The frequency band is 57,2 GHz to 58,2 GHz.

NOTE: This band is currently under review by CEPT for compatibility with earth exploration space applications.

**Channel plan:** The channel plan consists of 10 channels.

#### 4.1.2 Co-polar channel spacing

All systems shall use a channel spacing of 100 MHz.

#### 4.1.3 Transmit/receive centre gap

Because of the non-regulated nature of the band, a centre gap is not required.

#### 4.1.4 Transmit/receive duplex frequency separation

For two-frequency duplex operation, the transmitter receiver duplex frequency separation shall not be less than 200 MHz (typical separations are around 500 MHz).

#### 4.1.5 Environmental conditions

The equipment shall be required to meet the environmental conditions set out in ETS 300 019 [3], which defines weather protected and outdoor environmental classes and test severities.

##### 4.1.5.1 Equipment within weather protected locations

Equipment intended for operation within temperature controlled locations or partially temperature controlled locations shall meet the requirements of ETS 300 019 classes 3.1 and 3.2 respectively.

Optionally, the more stringent requirements of ETS 300 019 classes 3.3 (Non-temperature controlled locations), 3.4 (Sites with heat trap) and 3.5 (Sheltered locations) may be applied.

##### 4.1.5.2 Equipment for non-weather protected locations

Equipment intended for operation within non-weather protected locations shall meet the requirements of ETS 300 019, class 4.1 or 4.1E

Class 4.1 applies to many ETSI countries and class 4.1E applies to all ETSI countries.

Weather protected equipment conforming to classes 3.3, 3.4 and 3.5, together with an enclosure or cabinet may fulfil the requirements of operating in a non-weather protected environment, but this is outside the scope of this ETS.

#### 4.1.6 Electromagnetic compatibility

Equipment shall operate under the conditions specified in the relevant standard produced by ETSI (prETS 300 385 [4]).

#### 4.1.7 Interface

The connection of this equipment to public telecommunications networks is not foreseen.

#### 4.2 Block diagram

The Radio Frequency (RF) block diagram is shown in figure 1.

#### 4.3 Branching/feeder/antenna requirements

- a) The antenna radiation pattern envelope shall meet the limits as given in figure 2;
- b) Antenna flange/equipment feeder flange.

NOTE: When flanges are required IEC type R620 should be used.

#### 4.4 Mechanical requirements

The following parameters should be taken into account in the design of equipment incorporating an external unit:

- a) maximum weight of external unit;
- b) size of external unit for wind loading considerations;
- c) maximum weight of replaceable units;
- d) ease of access to replaceable units.



#### **4.5 Power supply**

The equipment shall operate from any of the primary supplies within the ranges specified in ETS 300 132-1 [1] and ETS 300 132-2 [2].

ETS 300 132-1 [1] and ETS 300 132-2 [2] specify the tolerances as below:

For 48 V DC nominal: 40,5 to 57 V DC;

For 60 V DC nominal: 50 to 72 V DC;

For 230 V AC nominal: 207 to 253 V AC/50 Hz  $\pm$  2 Hz.

For DC systems, the positive pole of the battery should be earthed.

NOTE: Some countries may require the use of a primary supply of 12 V and / or 24 V.

#### **4.6 General characteristics**

The frequency setting of the transmitter equipment in this band shall not be adjustable.

### **5 Parameters for digital systems**

#### **5.1 Transmission capacity**

Typical bit rates: up to 34 Mbit/s, provided that the channel limits are not exceeded.

#### **5.2 Applications**

Typical applications would be 2 up to 34 Mbit/s for point-to-point local networks, mobile and portable applications.

#### **5.3 Transmitter characteristics**

##### **5.3.1 Power**

###### **5.3.1.1 Transmitter power range**

Maximum output power up to -20 dBW referred to point D' of the RF block diagram given in figure 1.

###### **5.3.1.2 Equivalent Isotropically Radiated Power (EIRP)**

EIRP shall be limited to 15 dBW.

##### **5.3.2 Radiated spectrum**

###### **5.3.2.1 RF spectrum mask**

The equipment shall comply with the RF spectrum mask shown in figure 3, measured at point C' of the RF block diagram given in figure 1. The objective of this mask is to provide the necessary protection to adjacent co-ordinated frequency bands. In addition to the spurious emission requirements of subclause 5.3.2.2 it will be necessary to ensure that the residual spectrum level is less than -80 dBW / MHz, over the band  $\pm$  150 MHz from the nominal channel centre frequency, excluding  $\pm$  45 MHz from this frequency.

###### **5.3.2.2 Spurious emissions**

The frequency range in which the spurious emission specifications apply is 1 GHz to 120 GHz.

The limit values that should be measured at point C' of the RF block diagram, given in figure 1, are:

- $\geq 1$  GHz and  $< 21,2$  GHz: - 90 dBW;
- $\geq 21,2$  GHz and  $< 80$  GHz: - 60 dBW;
- $\geq 80$  GHz and  $\leq 120$  GHz: - 50 dBW.

NOTE 1: Spurious emissions are emissions at 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 emissions which result from the modulation process.

NOTE 2: In this specification, the necessary bandwidth will be taken as  $\pm 45$  MHz.

### **5.3.3 RF frequency tolerance**

The maximum allowable RF frequency tolerance shall not exceed  $\pm 600$  ppm.

### **5.4 Receiver characteristics, spurious emissions**

The frequency range in which the spurious emissions specifications apply is 1 GHz to 120 GHz. The limit values that should be measured at point C of the RF block diagram, given in figure 1, are:

- $\geq 1$  GHz and  $< 21,2$  GHz: - 90 dBW;
- $\geq 21,2$  GHz and  $< 80$  GHz: - 60 dBW;
- $\geq 80$  GHz and  $\leq 120$  GHz: - 50 dBW.

NOTE: See notes given in subclause 5.3.2.2.

## **6 Parameters for wideband analogue systems**

### **6.1 Transmit/receive baseband bandwidth**

Video baseband bandwidths up to 14 MHz.

### **6.2 Applications**

Typical applications:

- point-to-point television;
- point-to-point wideband video (e.g. radar remoting).

### **6.3 Transmitter characteristics**

#### **6.3.1 Power**

##### **6.3.1.1 Transmitter power range**

Maximum output power up to -20 dBW referred to point C' of the RF block diagram given in figure 1.

##### **6.3.1.2 EIRP**

EIRP shall be limited to 15 dBW.

#### **6.3.2 Radiated spectrum**

##### **6.3.2.1 Spectrum mask**

The equipment shall comply with the RF spectrum mask shown in figure 3, measured at point C' of the RF block diagram given in figure 1. The objective of this mask is to provide the necessary protection to adjacent co-ordinated frequency bands. In addition to the spurious emission requirements of subclause

5.3.2.2 it will be necessary to ensure that the residual spectrum level is less than - 80 dBW / MHz, over the band  $\pm 150$  MHz from the nominal channel centre frequency, excluding  $\pm 45$  MHz from this frequency.

### 6.3.2.2 Spurious emissions

The frequency range in which the spurious emission specifications apply is 1 GHz to 120 GHz. The limit values that should be measured at point C' of the RF block diagram, given in figure 1, are:

- $\geq 1$  GHz and  $< 21,2$  GHz: - 90 dBW;
- $\geq 21,2$  GHz and  $< 80$  GHz: - 60 dBW;
- $\geq 80$  GHz and  $\leq 120$  GHz: - 50 dBW.

NOTE: See notes given in subclause 5.3.2.2.

### 6.3.3 RF frequency tolerance

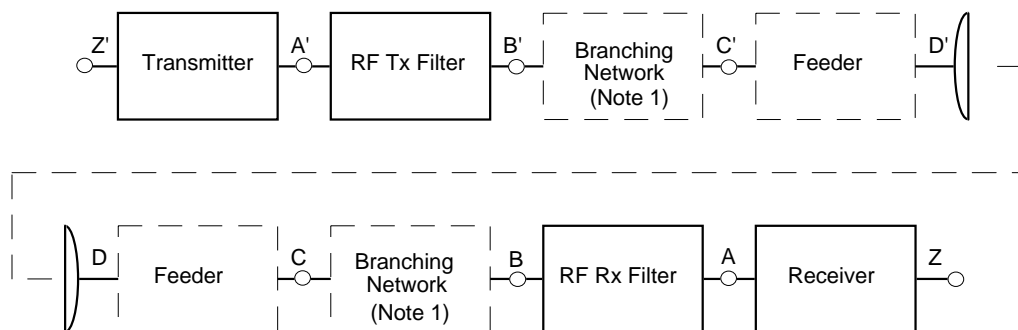
The maximum allowable RF frequency tolerance shall not exceed  $\pm 600$  ppm.

### 6.4 Receiver characteristics, spurious emissions

The frequency range in which the spurious emissions specifications apply is 1 GHz to 120 GHz. The limit values that should be measured at point C, of the RF block diagram given in figure 1, are:

- $\geq 1$  GHz and  $< 21,2$  GHz: - 90 dBW;
- $\geq 21,2$  GHz and  $< 80$  GHz: - 60 dBW;
- $\geq 80$  GHz and  $\leq 120$  GHz: - 50 dBW.

NOTE: See notes given in subclause 5.3.2.2.



NOTE 1: For the purpose of defining the measurement points, the branching network does not include a hybrid.

NOTE 2: Points B, C, D and B', C', D' may coincide.

Figure 1: RF system block diagram

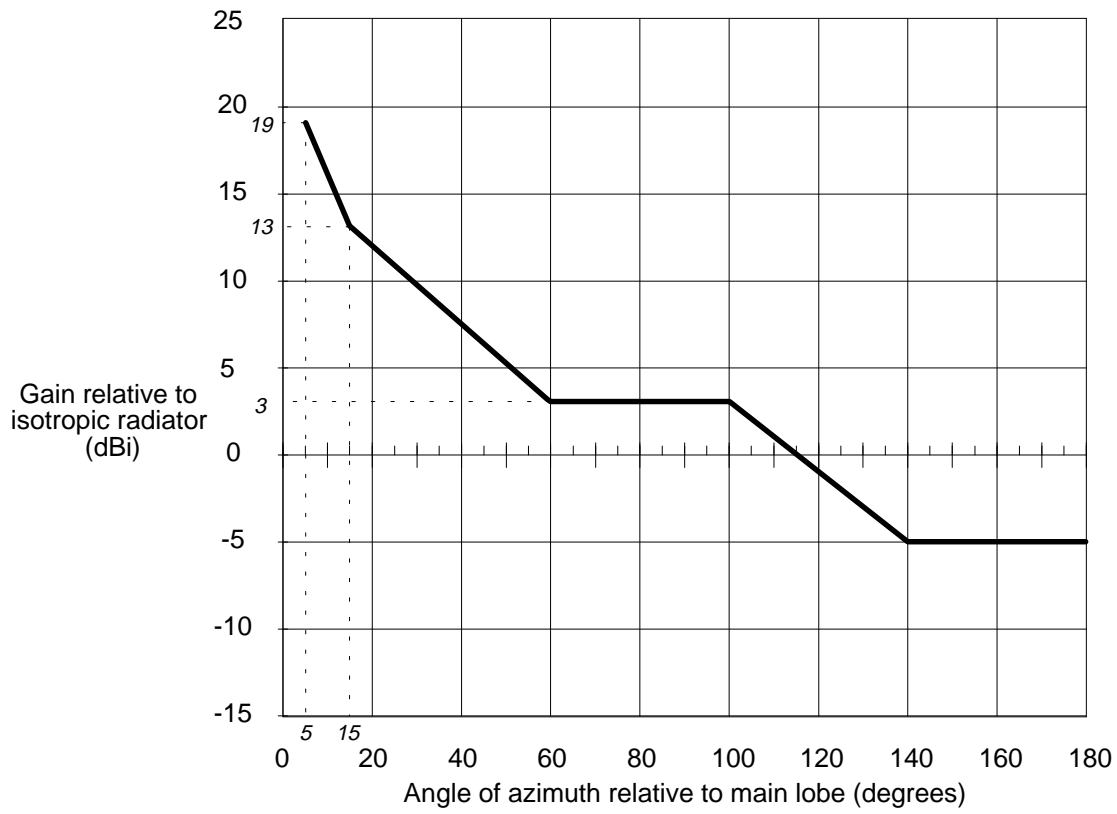


Figure 2: Limits of antenna gain for angles greater than 5° from the main beam axis

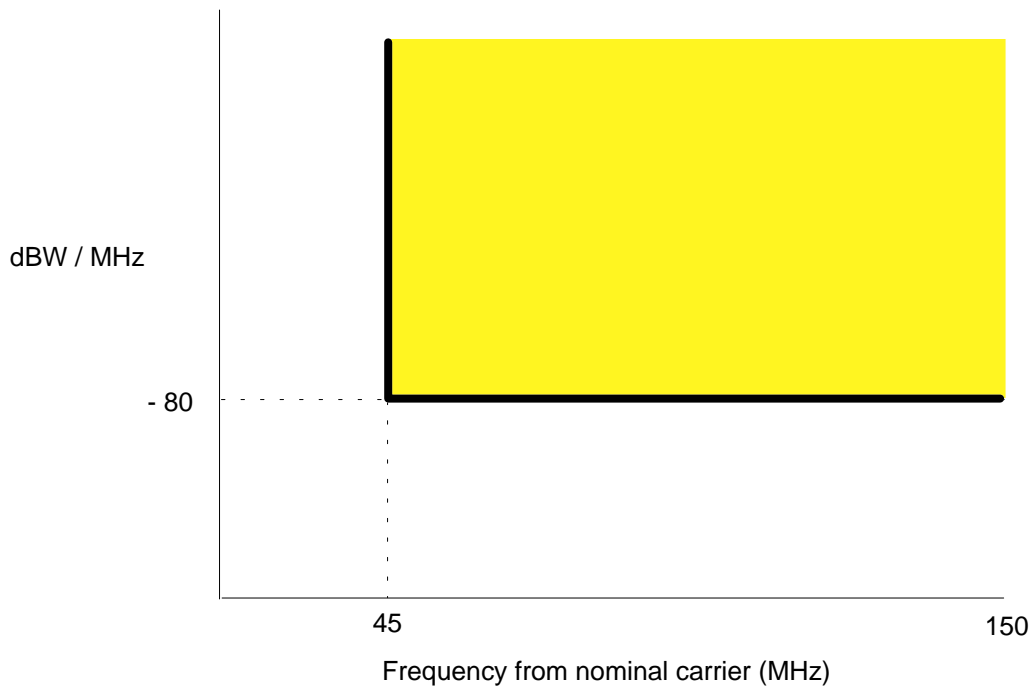


Figure 3: Limits of spectral power density

## History

Document history			
March 1994	Public Enquiry	PE 59:	1994-03-21 to 1994-08-12
July 1995	Vote extended:	V 84:	1995-07-24 to 1995-09-15 1995-07-24 to 1995-09-29
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