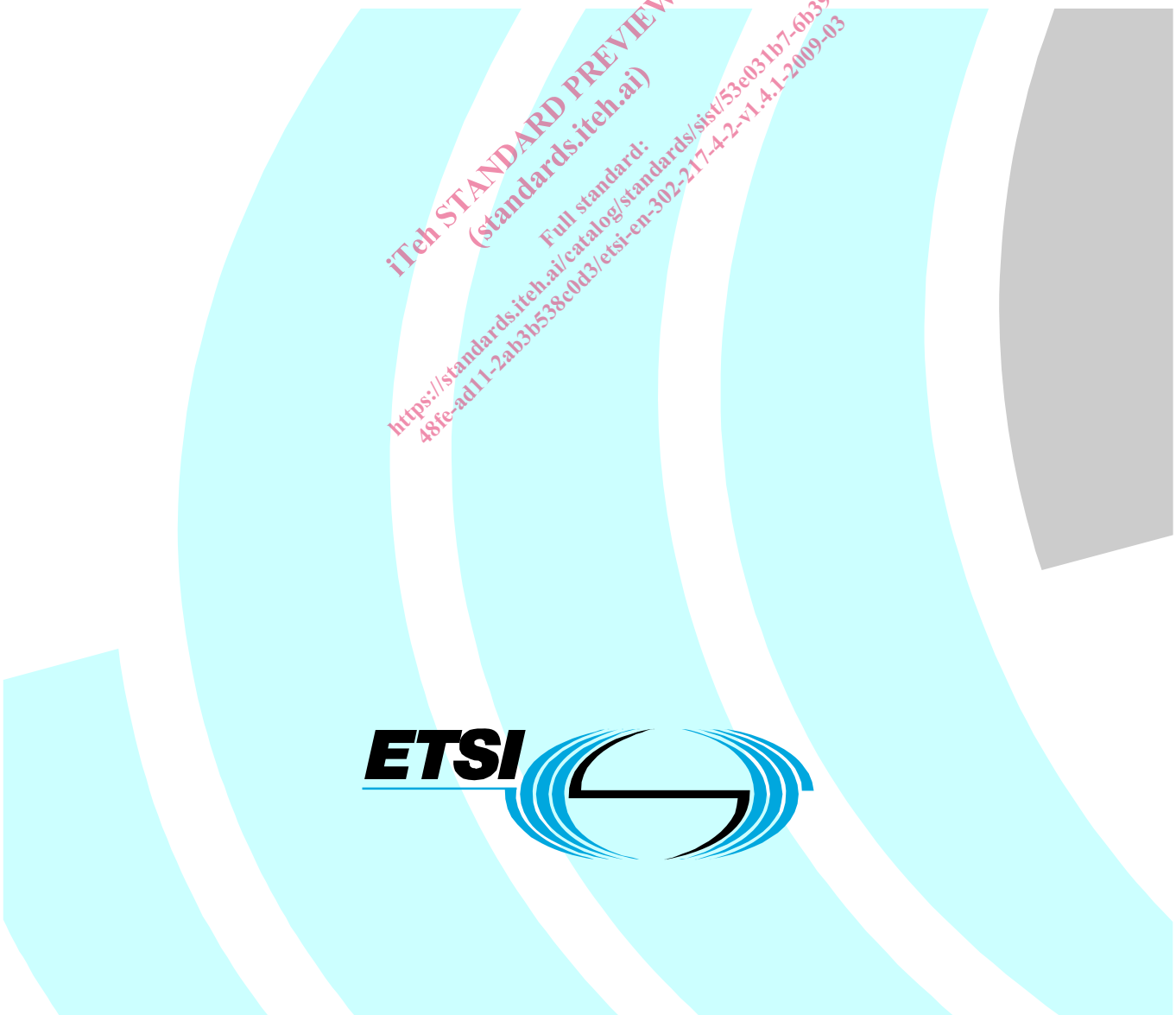
ETSI EN 302 217-4-2 V1.4.1 (2009-03)

Harmonized European Standard (Telecommunications series)

Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4-2: Antennas; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive



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Contents

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Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [i.5] (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.

The present document is part 4-2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [3].

Few antenna Radiation Pattern Envelopes (RPE) of the lower directivity class 1 have not been carried over in the present document because no longer considered appropriate, from the system point of view, with the increasing demand of spectrum in ETSI Countries, and therefore no more suitable for essential requirements under article 3.2 of the R&TTE Directive [1] within the European Union. Nevertheless, recognizing that ETSI ENs have worldwide relevance, they are still found into EN 302 217-4-1 [i.1].

National transposition dates	
Date of adoption of this EN:	19 March 2009
Date of latest announcement of this EN (doa):	30 June 2009
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 December 2009
Date of withdrawal of any conflicting National Standard (dow):	31 December 2010

Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive [1]. The modular structure is described in EG 201 399 [i.4] and shown in figure 1.

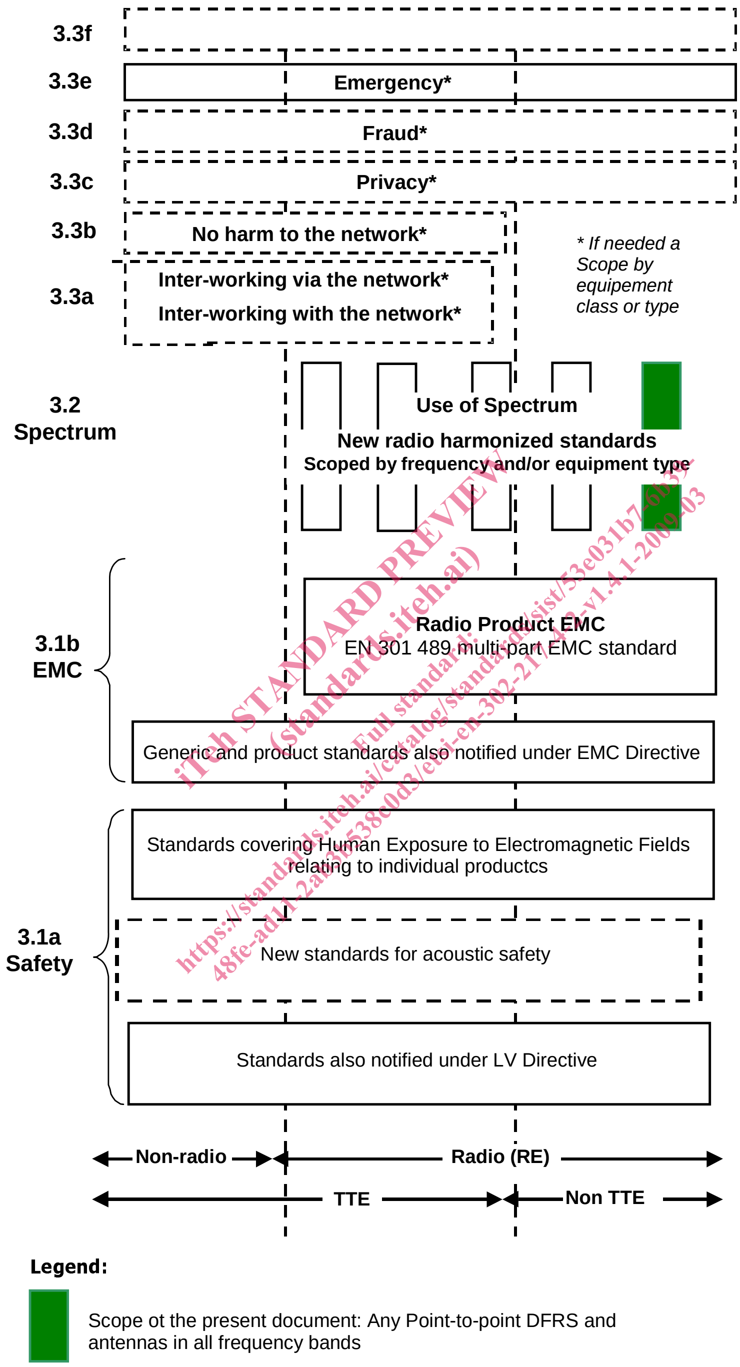


Figure 1: Modular structure for the various standards used under the R&TTE Directive

1 Scope

The present document is intended to cover the provisions of Directive 1999/5/EC [1] (R&TTE Directive) regarding 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 applicable only to antenna types that are intended for use with the systems falling within the scope of documents EN 302 217-2-2 [i.2] and EN 302 217-3 [i.3].

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 will 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.

In order to technically cover different market and network requirements, with an appropriate balance of performance to cost and effective and appropriate use of the radio spectrum, the present document, together with EN 302 217-2-2 [i.2], offers a number of system types and antennas alternatives, for selection by administrations, operators and manufacturers dependent on the desired use of the radio spectrum and network/market requirements; those options include:

- channel separation alternatives (as provided by the relevant CEPT Recommendation);
- spectral efficiency class alternatives (different complexity of modulation formats provided in radio equipment standards);
- antenna directivity class alternatives (for different network density requirement).

The present document is considered applicable to fixed radio systems products with integral antennas, for which all the technical requirements included in the present document, in EN 302 217-2-2 [i.2] and in EN 302 217-3 [i.3] apply; the present document applies, as well, to separate antenna products, to which only the relevant technical requirements apply. For more background information on the equipment and antenna parameters relevant to article 3.2 of the R&TTE Directive see EG 201 399 [i.4] and TR 101 506 [i.6].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://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.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[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] ETSI EN 301 126-3-1 (V1.1.2): "Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas; Definitions, general requirements and test procedures".

[3] ETSI EN 302 217-1 (V1.2.1): "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 1: Overview and system-independent common characteristics".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area**.** For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] ETSI EN 302 217-4-1: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4-1: System-dependent requirements for antennas".

[i.2] ETSI EN 302 217-2-2: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 2-2: Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for digital systems operating in frequency bands where frequency co-ordination is applied".

[i.3] ETSI EN 302 217-3: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 3: Equipment operating in frequency bands where both frequency coordinated or uncoordinated deployment might be applied; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.4] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".

[i.5] 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.

[i.6] ETSI TR 101 506: "Fixed Radio Systems; Generic definitions, terminology and applicability of essential requirements under the article 3.2 of 99/05/EC Directive to Fixed Radio Systems".

[i.7] ETSI EN 301 126-1: "Fixed Radio Systems; Conformance testing; Part 1: Point-to-point equipment - Definitions, general requirements and test procedures".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 302 217-1 [3] apply.

3.2 Symbols

For the purposes of the present document, the symbols given in EN 302 217-1 [3] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in EN 302 217-1 [3] apply.

4 Technical requirements specifications

In the following clauses, electrical characteristics are given as function of specific classification of the antennas according to the principles referred to in EN 302 217-4-1 [i.1].

The antenna supplier shall state, for each antenna type, the frequency band of operation and antenna gain at least at the frequency band edges and at mid-band. An antenna, which employs a radome, shall meet the requirements of the present document with the radome in place. The antenna system shall radiate a linear (single or dual) polarized wave. In bands where frequency co-ordination is applied, single polarized antennas shall meet cross-polar RPE and XPD requirements also.

NOTE: In bands where frequency co-ordination is not applied, cross-polar RPE and XPD are not considered as essential requirements for R&TTE Directive [1] conformance, even if the antenna is actually dual polarized. Values given in the present document should be considered for reference purposes only. For definition of co-ordination in frequency bands, refer to definitions in EN 302 217-1 [3].

4.1 Environmental profile

The required environmental profile for operation of the antenna or the equipment-antenna assembly (in case of systems with integral antenna) shall be declared by the supplier. The antenna shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile. For testing the compliance to technical requirements refer also to EN 301 126-3-1 [2] and clause 5 in the present document.

4.2 Radiation Pattern Envelope (RPE)

The present document defines only RPE which characteristics are considered suitable, within the European Community, and relevant to essential requirements under article 3.2 of the R&TTE Directive [1]; however, it is recognized that ETSI ENs have worldwide relevance and therefore, in other countries, there might be applications and low density radio networks that justify a different trade-off in terms of performance, size and cost. Therefore in EN 302 217-4-1 [i.1] other Class 1 antenna RPE are standardized for such purpose.

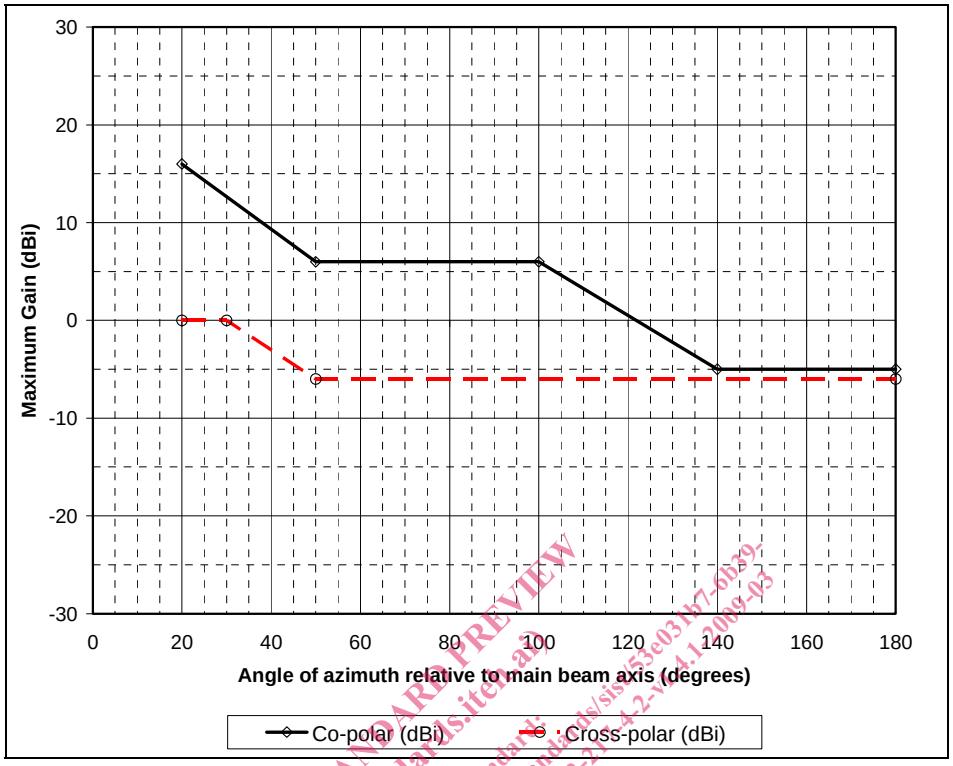
Not all classes of antennas defined in EN 302 217-4-1 [i.1] are presently represented by specific RPEs in the present document; missing RPEs are intended for future inclusion whenever the market might possibly require them. Table 1 provides for each frequency range an overview of the currently standardized antenna classes.

Table 1: Summary of RPE classes represented in the present document

Frequency range (GHz)	Antenna Radiation Pattern Envelope (RPE) class
1 to 3	1A, 1B, 1C, 2, 3
3 to 14	2, 3, 4
14 to 20	2, 3, 4
20 to 24	2, 3, 4
24 to 30	2, 3, 4
30 to 47	2, 3A, 3B, 3C, 4
47 to 66	2, 3A, 3B
66 to 86	2, 3, 4

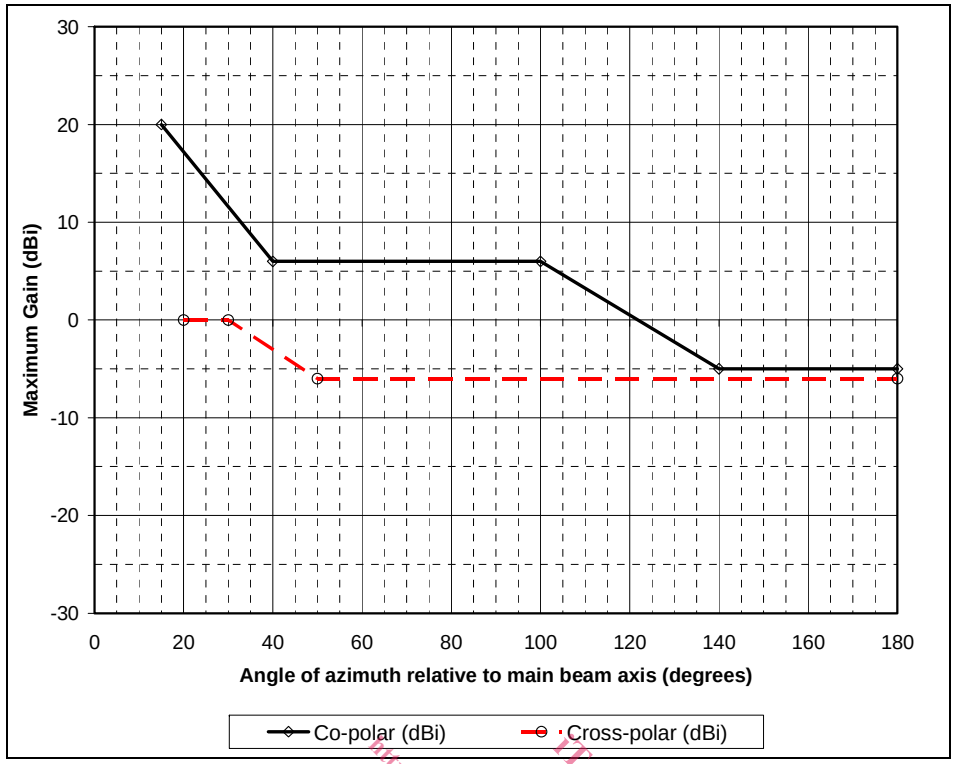
4.2.1 Frequency range 0: 1 GHz to 3 GHz

The choice of antenna depends on the application planned for this band, requirements of the operators and the responsible administration. Figures 2 to 7 give the RPEs for antenna classes 1, 2 and 3.



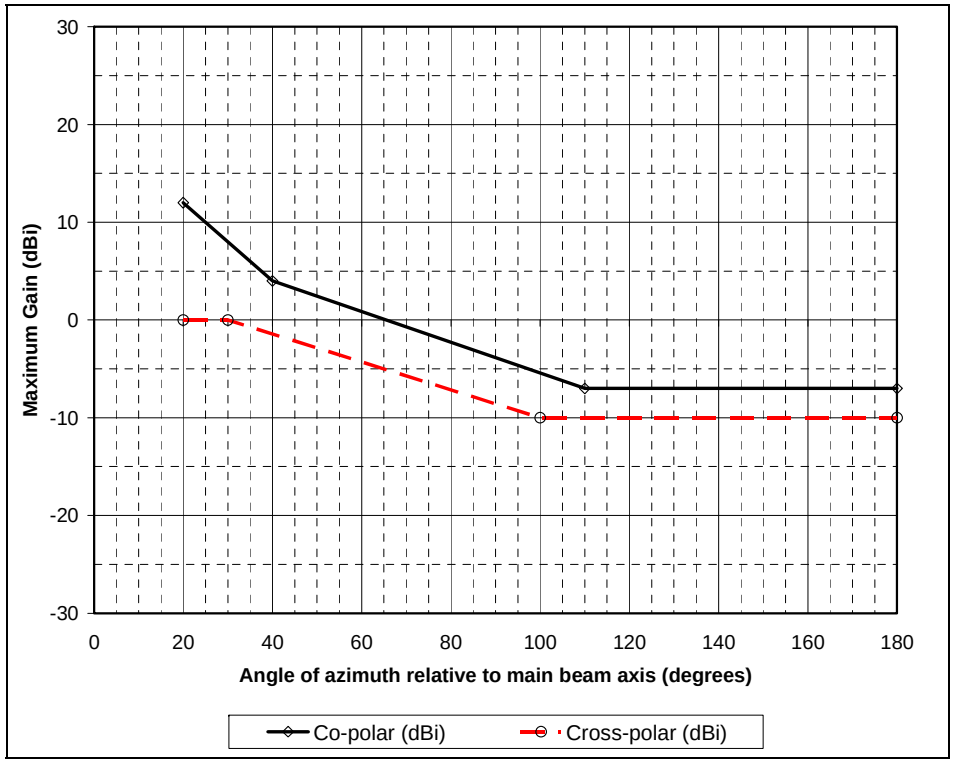
Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
20	16	20	0
50	6	30	0
100	6	50	-6
140	-5	180	-6
180	-5		

Figure 2: Class 1A antenna RPE (1 GHz to 3 GHz)



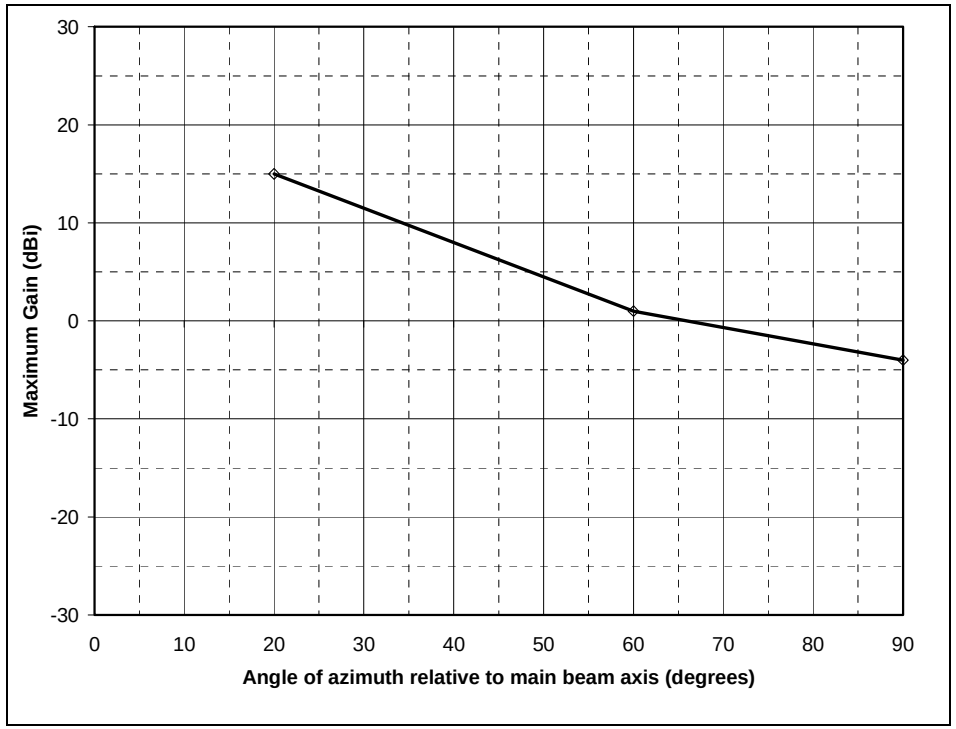
Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
15	20	20	0
40	6	30	0
100	6	50	-6
140	-5	180	-6
180	-5		

Figure 3: Class 1B antenna RPE (1 GHz to 3 GHz)



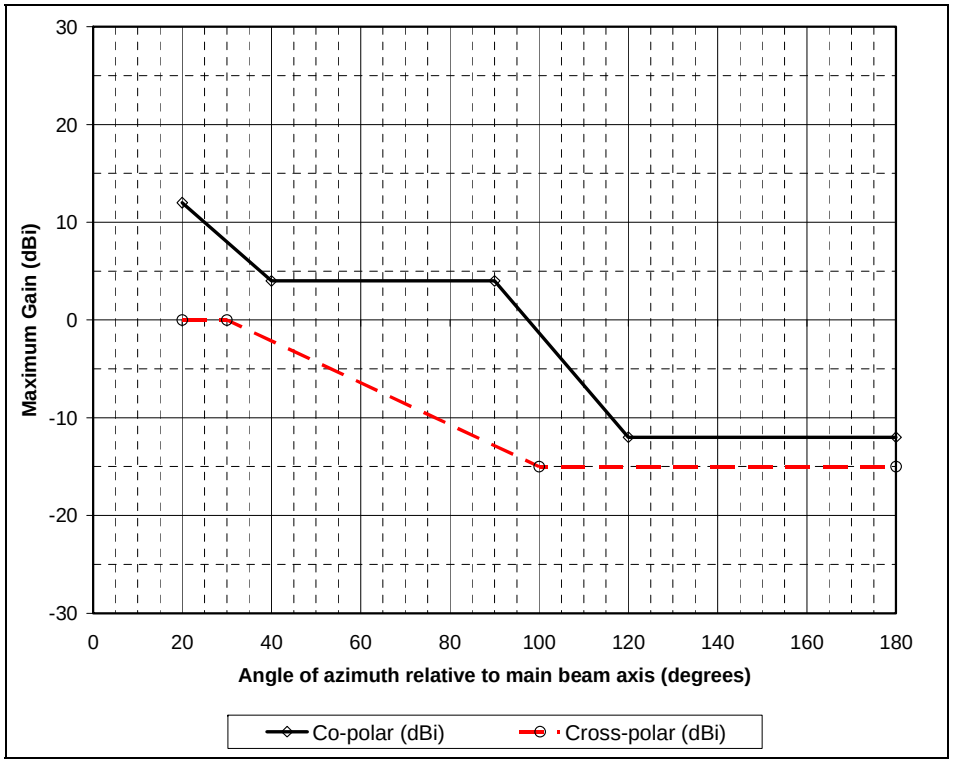
Azimuth angle (°)	Co-polar (dBi)	Azimuth angle (°)	Cross-polar (dBi)
20	12	20	0
40	4	30	0
110	-7	100	-10
180	-7	180	-10

Figure 4: Class 1C antenna RPE (1 GHz to 3 GHz, azimuth plane)



Elevation angle (°)	dBi
20	15
60	1
90	-4

Figure 5: Class 1C antennas RPE (1 GHz to 3 GHz, elevation plane)



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
20	12	20	0
40	4	30	0
90	4	100	-15
120	-12	180	-15
180	-12		

Figure 6: Class 2 antenna RPE (1 GHz to 3 GHz)