Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees	)	WT Docket No. 10-153
	)	
Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications	)	RM-11602

To: The Commission

COMMENTS OF COMMSCOPE - ANDREW SOLUTIONS

CommScope - Andrew Solutions hereby submits comments on the *Second Notice of Inquiry* issued by the Commission on August 3, 2012, in the above-captioned proceeding.[1]

A. Introduction

The submission herein, although submitted under the name CommScope, was prepared by the divisions of Andrew Corporation that were acquired by CommScope Corporation in 2007. Andrew Corporation's brand, core skills and know-how has developed over 75 years, and in that

[1] Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licenses, et al., *Second Report and Order, Second Further Notice of Proposed Rulemaking, Second Notice of Inquiry, Order on Reconsideration, and Memorandum Opinion and Order*, FCC 12-87, 27 FCC Rcd 9735 (2012).

period the company has been and still remains a worldwide market leader in the design, development and manufacture of point to point microwave antennas.

The following submission takes in to account technical advances in antenna design, and provides suggestions for standards (for North America) that are in line with these advances. It is important to note that the proposed standards are based on existing antennas and existing standards used in Europe (derived by the European Telecommunication Standards Institute – ETSI) and adopted in many areas worldwide. These antennas have been in production and use in North America for many years. The ETSI Class 4 standard referenced herein, however, represents a new opportunity in spectrum conservation and has become relevant because of urban electrical congestion and the demand for more radio links. Recently realized low-cost production techniques that are available to all companies have made the production of Class 4 antennas economically feasible, whereas in the past, their cost was prohibitive.

B. Second Notice of Inquiry – Additional Changes to Antenna Standards

CommScope - Andrew Solutions notes that the performance required by the present Part 101 antenna standards is significantly less stringent than the typical performance available from today's practical antennas at some angles. The format of the Section 101.115 suppression table with its angle categories does not properly follow the roll-off characteristics of real directional antennas. In particular, the broad 30 to 180 degree category often results in lax suppression at these larger angles of the range. The standards also do not specify cross-polarization suppression.

Spectrum efficiency is enhanced when more stringent antenna pattern characteristics are utilized as long as appropriate low-cost antenna solutions are available and provided. This

proposal does not present an additional cost burden to the industry. CommScope - Andrew Solutions believes improved FCC standards to address problems such as these are appropriate and necessary and thus supports the Commission's initiative for a full review of Section 101.115.

The European Telecommunications Standards Institute (ETSI) has published standards for point-to-point antennas as recently as 2010.[2] CommScope - Andrew Solutions and the vast majority of competing point-to-point antenna manufacturers design and specify antennas to meet these standards for the worldwide market. Therefore we expect that other major antenna vendors should be well prepared to conform to the recommendations in this submission. Tables 1-3 in the Appendix show the current ETSI antenna standards for the 3 to 14 GHz, 14 to 20 GHz, and 20 to 24 GHz frequency ranges. These ranges cover the primary Part 101 point-to-point bands available for site-by-site licensing. In these ranges ETSI specifies Class 2, Class 3, and Class 4 performance levels. (ETSI also specifies Class 1A, 1B, 1C, 2, and 3 standards for the 1 to 3 GHz range – this frequency range is not within the scope of this submission).

The ETSI standards are formatted as breakpoints which allow them to more tightly follow the performance of real practical antennas for the particular frequency segment. The standards are also specified in terms of gain (dBi) vs. angle instead of suppression (dB) vs. angle. This means that the higher the mainbeam antenna gain (the larger the antenna), the greater the required suppression. This appropriately results in the standard requiring less suppression for smaller antennas and more suppression for larger antennas, thus the standard tracks with the achievable performance of practical antenna designs. The ETSI standards also include requirements for cross-polarized as well as co-polarized performance. Antennas regulated under

[2] *See* ETSI EN 302 217-4-2 V1.5.1 (2010-01).

current FCC standards Section 101.115 can operate with uncontrolled cross-polarized radiation, resulting in inefficient spectrum consumption.

Figures in the Appendix compare the required suppression of the ETSI Class 2, Class 3 and Class 4 standards to the FCC Section 101.115 standards for several frequency bands and at low (33 dBi), typical (38 dBi), and high (43 dBi) gain levels.

Recently the FCC added Category B2 with stringent far sidelobe and front-to-back requirements for smaller antennas. B2 aside, the figures show that the Class 2 and Class 3 ETSI standards generally roll off faster and have more stringent far sidelobe and front-to-back requirements than FCC Category B1 (or even Category A in some cases.) On the other hand, the figures show that the Class 2 and Class 3 ETSI standards are less stringent than the FCC standards for angles near boresight and to the front of the antenna.

The ETSI standards also include the very stringent Class 4 which is significantly better than Category A (except in some cases at around 5 degrees). With the growth of electrical congestion in urban environments, new economic antenna models compliant to Class 4 are useful and are already appearing on the market.

Simply replacing FCC standards with ETSI standards may seem desirable because this would harmonize FCC requirements with a major worldwide standard set. However this is not proposed because the more stringent front-to-back requirements would potentially disqualify a lot of useful antennas that are presently allowed under Part 101. To solve this, we recommend retaining current FCC standards supplemented with ETSI standards. CommScope – Andrew Solutions offers the following initial proposal:

Retain current FCC standards as is and add two new additional more stringent requirements in the FCC's rules. These would offer a dramatic opportunity to the industry to conserve spectrum and mitigate interference in dense urban environments. The basic idea is that one new requirement would be a "hybrid" or combination of the FCC and ETSI radiation pattern masks and the most stringent requirement would follow the typical ETSI Class 4 mask.

- Figure 1 (cat A-1) shows an example of a potential FCC standard following present FCC category A near boresight and ETSI class 3 at larger angles.
- Figure 2 (cat A-2) shows an example of a potential FCC standard following present typical ETSI class 4 mask.

The use of these more stringent requirements would maximize spectrum efficiency and allow vendors/operators to specify antennas to these new U.S.-specific standards. It should be noted that a large majority of antennas fielded worldwide today already satisfy a hybrid Category A / Class 3 standard, and that in addition new antenna models emerging on the market today satisfy Class 4.

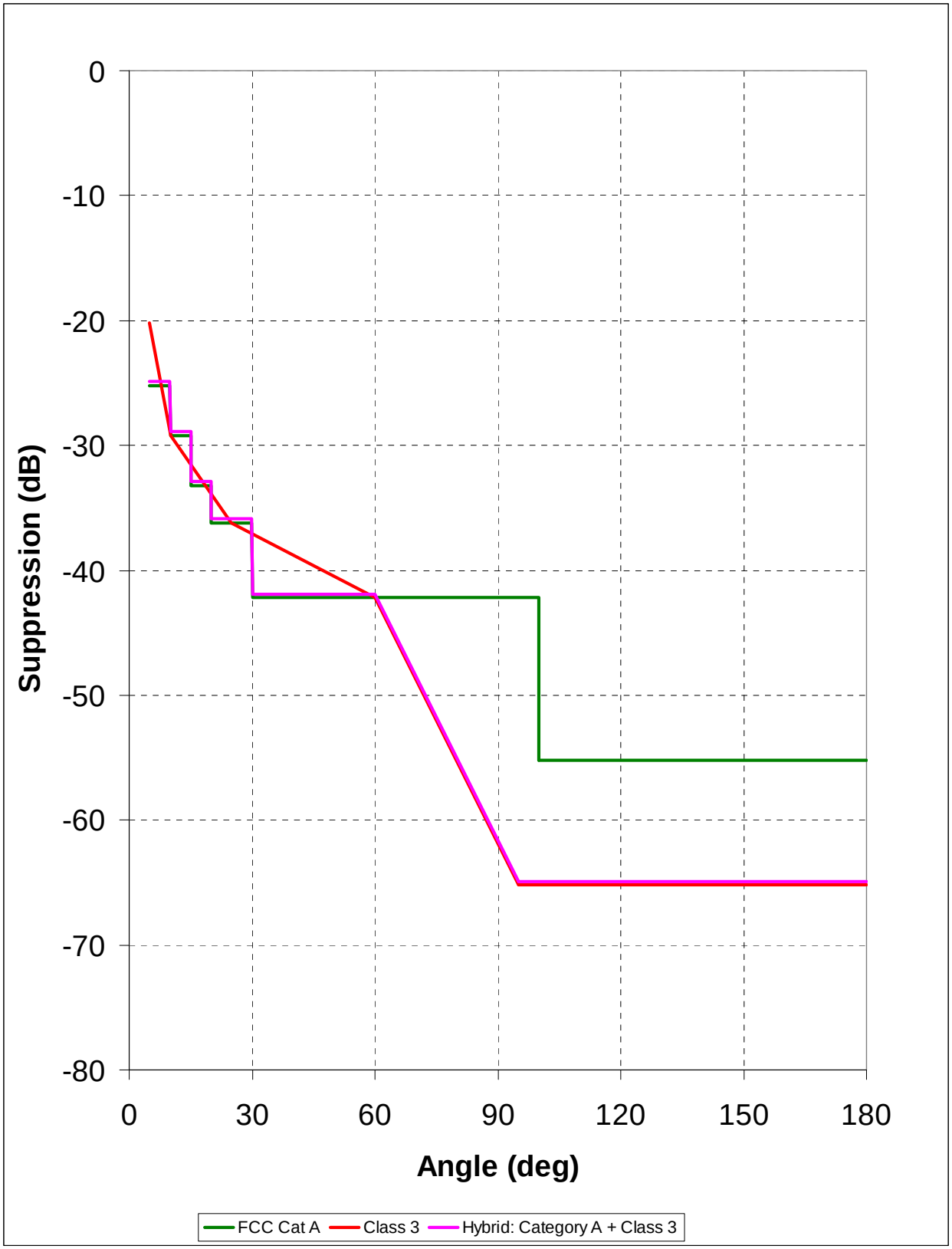

Figure 1: Cat A-1: Hybrid FCC Category A and ETSI Class 3 for 17,700-19,700 MHz at 38 dBi Gain

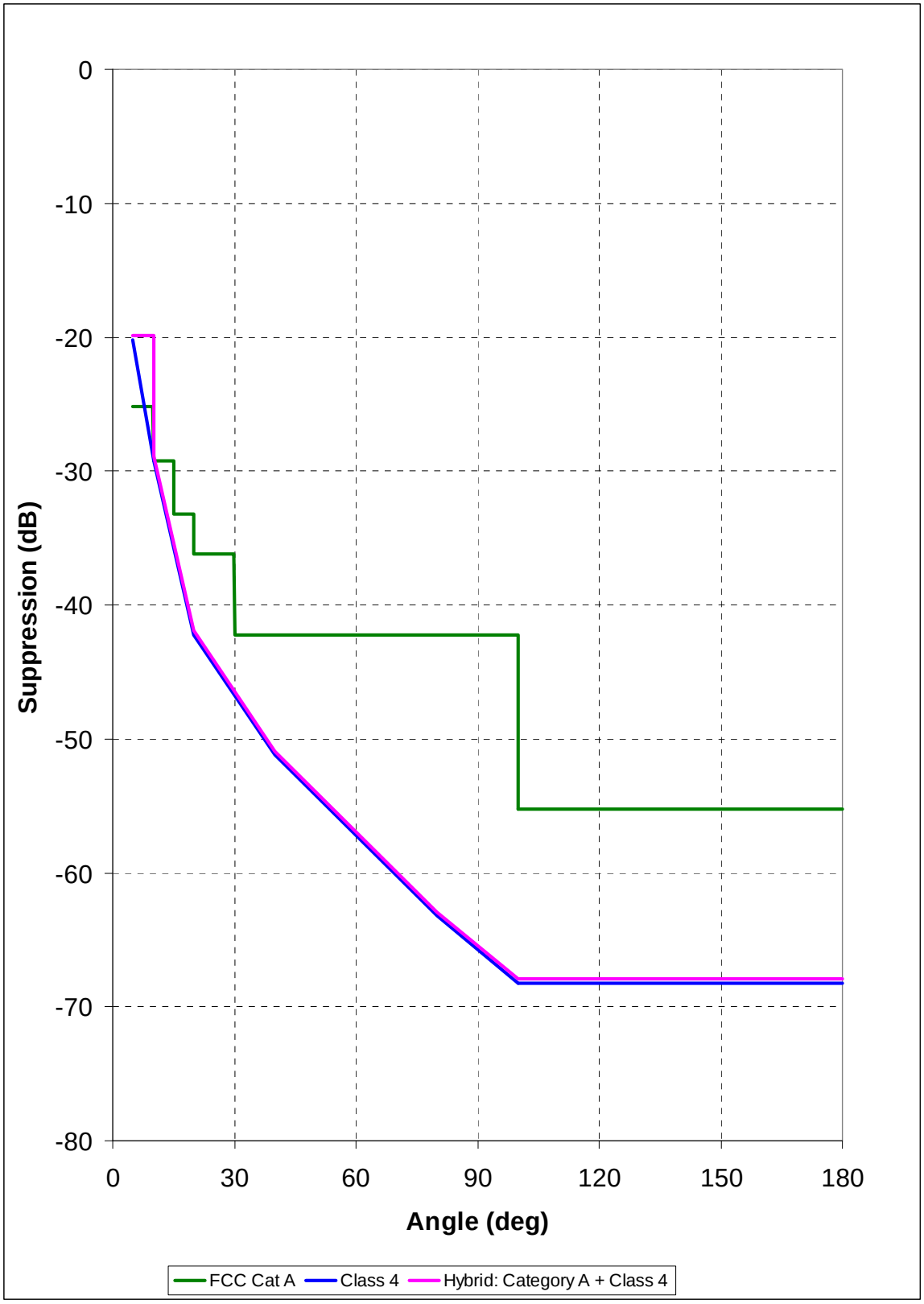

Figure 2: Cat A-2: Typical ETSI Class 4 for 17,700-19,700 MHz at 38 dBi Gain

In some contexts the highest FCC standard, Category A, has been portrayed or understood as a superior rather than basic performance level, even though antennas with much better performance have been and are available. CommScope - Andrew Solutions believes that FCC policies should encourage the use of higher performance antennas when they are available. This provides the opportunity for more radio links in a given area and better throughput/performance and the strong potential to use smaller antennas in congested areas.

The rules have traditionally used two standards – the minimum acceptable for use ("Category B") and the minimum that can be used without a licensee-funded upgrade obligation ("Category A"). If the FCC considers adding two more standards to the rules based on higher performance as proposed, then use of antennas meeting these new standards would be optional. But the rules could include some sort of incentive to encourage their use. For example, perhaps a regulatory fee schedule could be developed that would have lower fees for licenses with antennas meeting the highest (most stringent) performance level. Such incentives could be justified based on the fact that point-to-point links using the highest performance antennas have less impact on the shared public spectrum resource. With the passage of time there has been (and will be) more radio links and consequently a growth in the likelihood of interference in urban and suburban settings. As a result, the ETSI Class 1 standard (worldwide) is not used from 3 to 86 GHz, and in interference potential or currently congested environment the choice of antenna by Operators has changed from ETSI Class 2 to mainly but not exclusively to Class 3. This trend is evolving further and now the market is looking for ETSI Class 4 solutions. The addition of two new more stringent standards by the FCC will provide a logical path to for Operators to select a higher (more stringent) spec antennas and with the passage of time, the use of lower spec

antennas will decline more except in rural environments where current and future interference congestion is unlikely.

C. Summary and Conclusion

CommScope - Andrew Solutions hopes that the Commission's Notice of Inquiry will prompt stakeholders to engage in a meaningful review of the Part 101 antenna standards, and that the information submitted in this filing will facilitate the discussion.

In summary we are advocating the introduction of two new tighter standards to help the industry cope with the arrival of congestion and to allow the implementation of more radio links per unit area.

CommScope - Andrew Solutions intends to continue to work with the industry to assist the Commission to develp effective rules based on the record that is generated in this proceeding. We also note that to the extent the Commission considers a major overhaul of the antenna requirements, the antenna rules for other point-to-point microwave services – the Part 74 Broadcast Auxiliary Services and Part 78 Cable Antenna Relay Service – should be reviewed at the same time.

Respectfully submitted,

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October 5, 2012

Appendix

Class	Angle (°)	Co-pol Gain (dBi)	Angle (°)	Cross-pol Gain (dBi)
2	5	26	5	10
	10	20	10	5
	20	12	15	5
	50	5	30	-3
	65	2	70	-3
	80	2	100	-20
	105	-20	180	-20
	180	-20		
3	5	20	5	5
	20	8	10	0
	70	-5	13	-5
	100	-25	20	-5
	180	-25	40	-6
			50	-10
			75	-15
			95	-25
			180	-25
4	5	16	5	5
	10	5	10	0
	20	-7	13	-5
	50	-18	20	-15
	70	-20	30	-20
	85	-24	40	-24
	105	-30	45	-24
	180	-30	70	-25
			85	-25
			105	-33
			180	-33

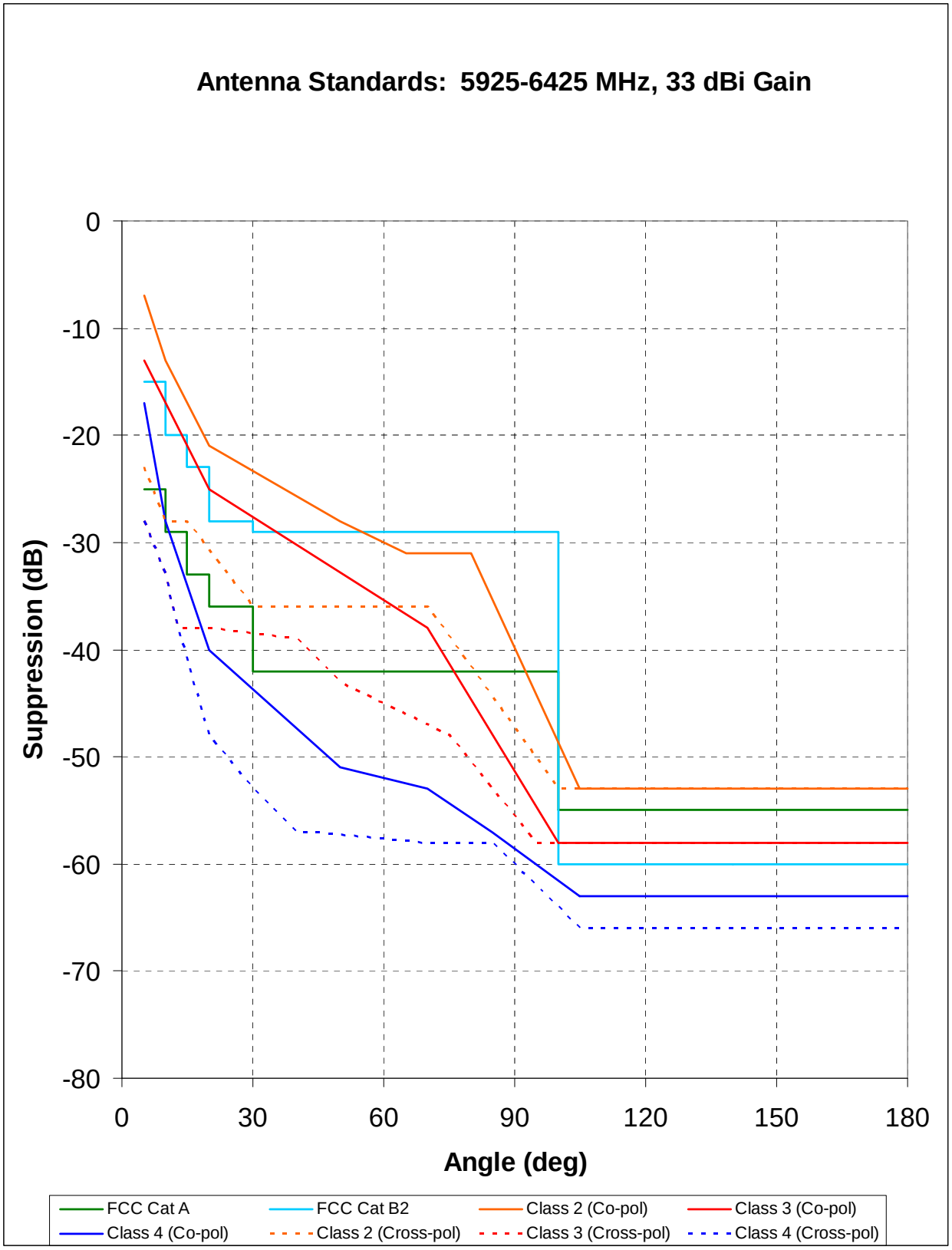
Table 1: Current ETSI Antenna Standards for 3 to 14 GHz

Class	Angle (°)	Co-pol Gain (dBi)	Angle (°)	Cross-pol Gain (dBi)
2	5	25	5	10
	15	13	7	7
	20	10	15	2
	70	0	20	2
	80	-8	25	-1
	100	-18	45	-1
	160	-20	70	-10
	180	-20	90	-20
			180	-20
3	5	18	5	5
	10	9	10	1
	25	2	30	-13
	60	-4	50	-15
	95	-27	85	-25
	180	-27	95	-31
			180	-31
4	5	18	5	-3
	10	9	13	-7
	20	-4	20	-15
	40	-13	30	-20
	80	-25	65	-22
	100	-30	95	-31
	180	-30	180	-31

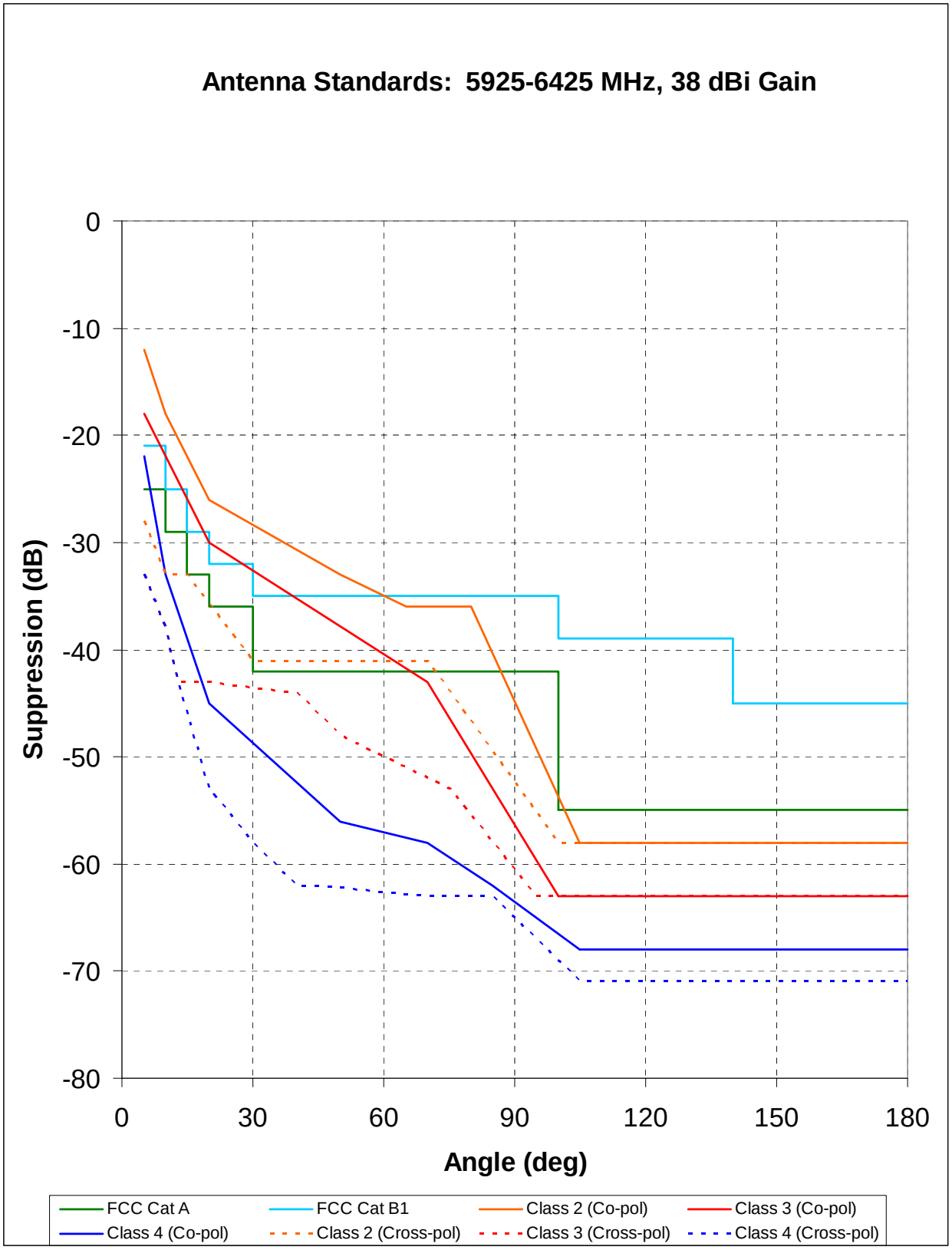
Table 2: Current ETSI Antenna Standards for 14 to 20 GHz

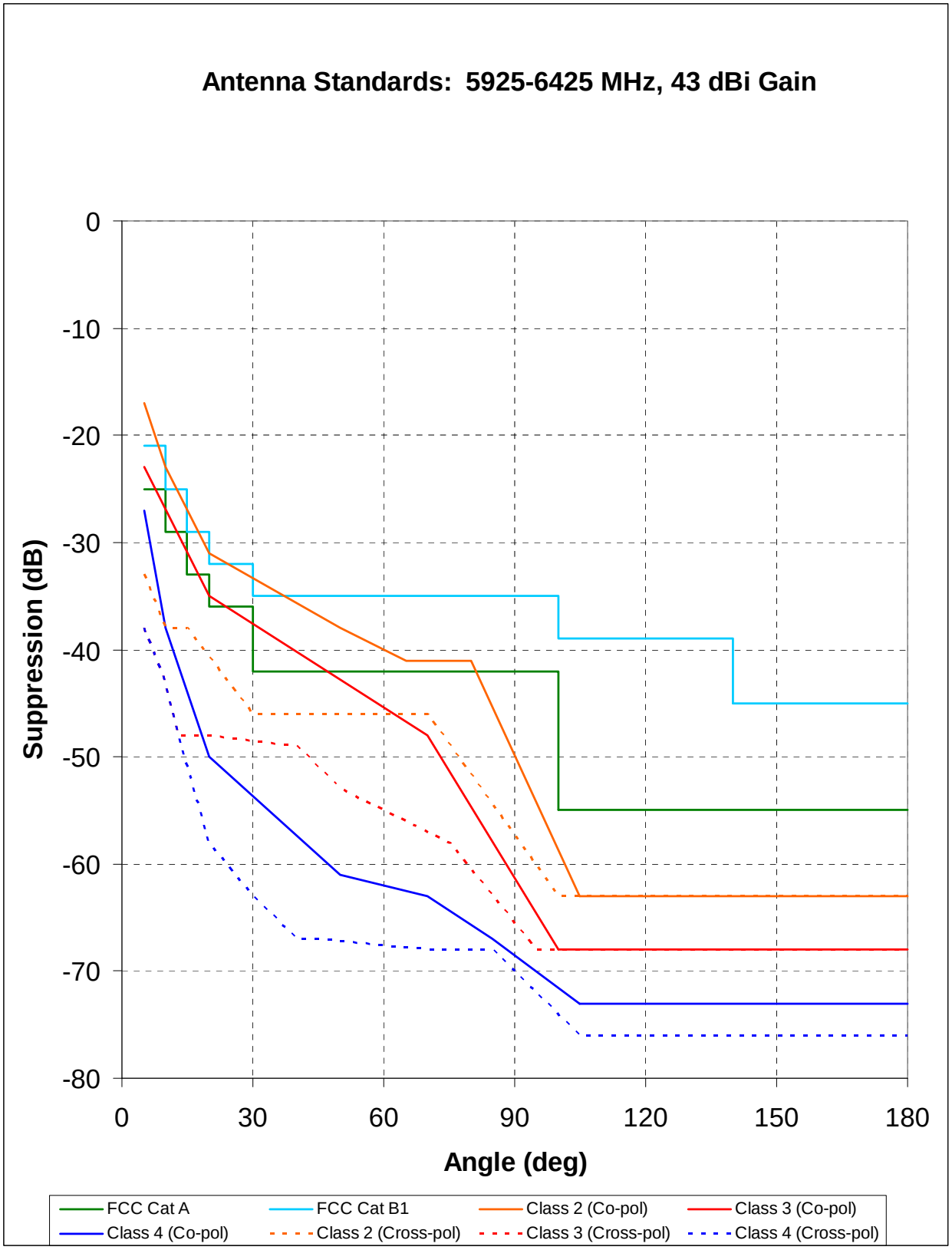
Class	Angle (°)	Co-pol Gain (dBi)	Angle (°)	Cross-pol Gain (dBi)
2	5	20	5	-5
	10	12	20	-5
	20	10	35	-7
	50	2	100	-25
	70	0	180	-25
	100	-20		
	180	-20		
3	5	20	5	-5
	10	12	10	-5
	20	7	15	-8
	40	3	35	-8
	50	0	100	-30
	100	-23	180	-30
	180	-23		
4	5	18	5	-5
	10	9	13	-7
	20	-4	20	-15
	40	-13	30	-20
	80	-25	65	-22
	100	-30	95	-31
	180	-30	180	-31

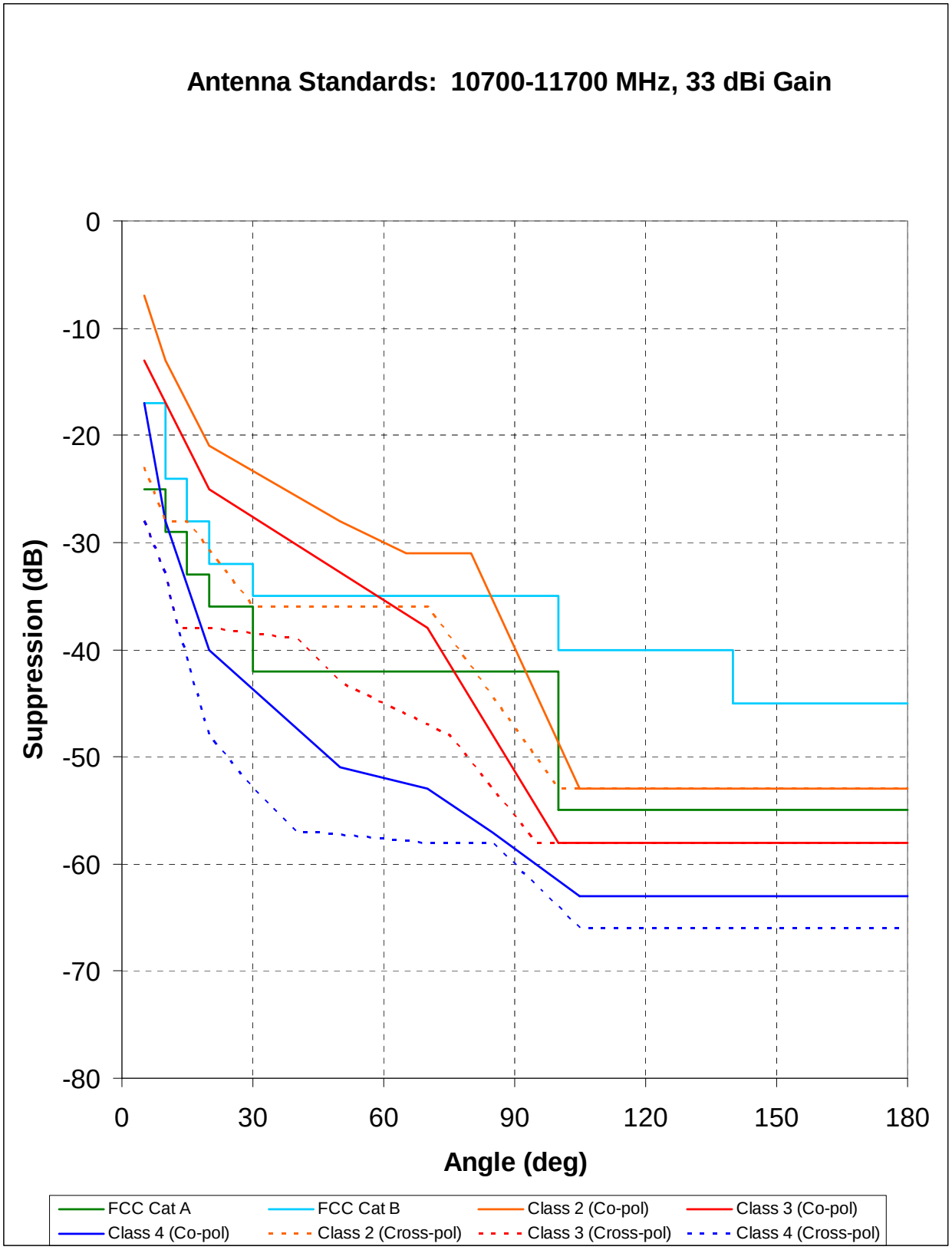
Table 3: Current ETSI Antenna Standards for 20 to 24 GHz



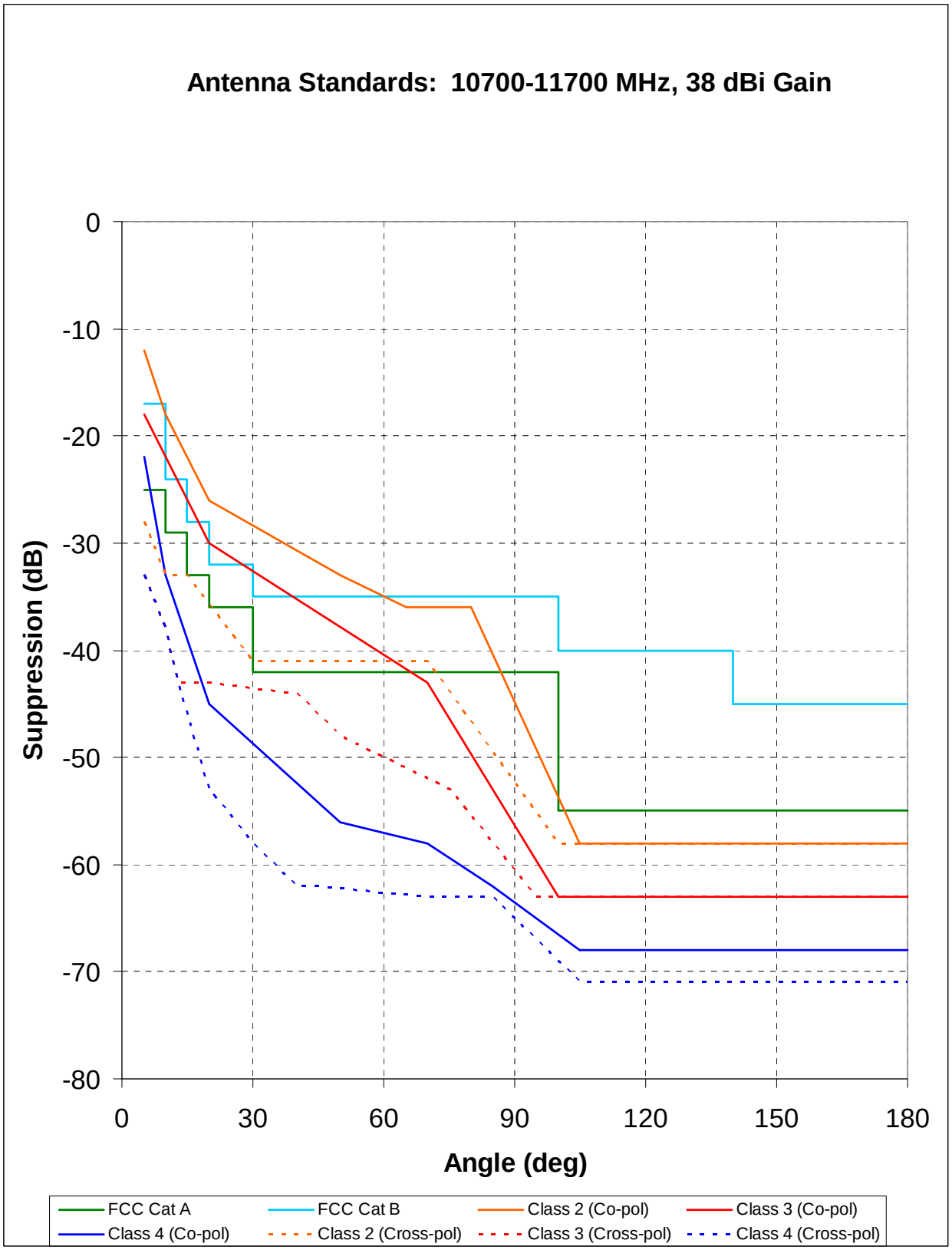
Note: Category A may not apply below minimum §101.115 gain 38 dBi

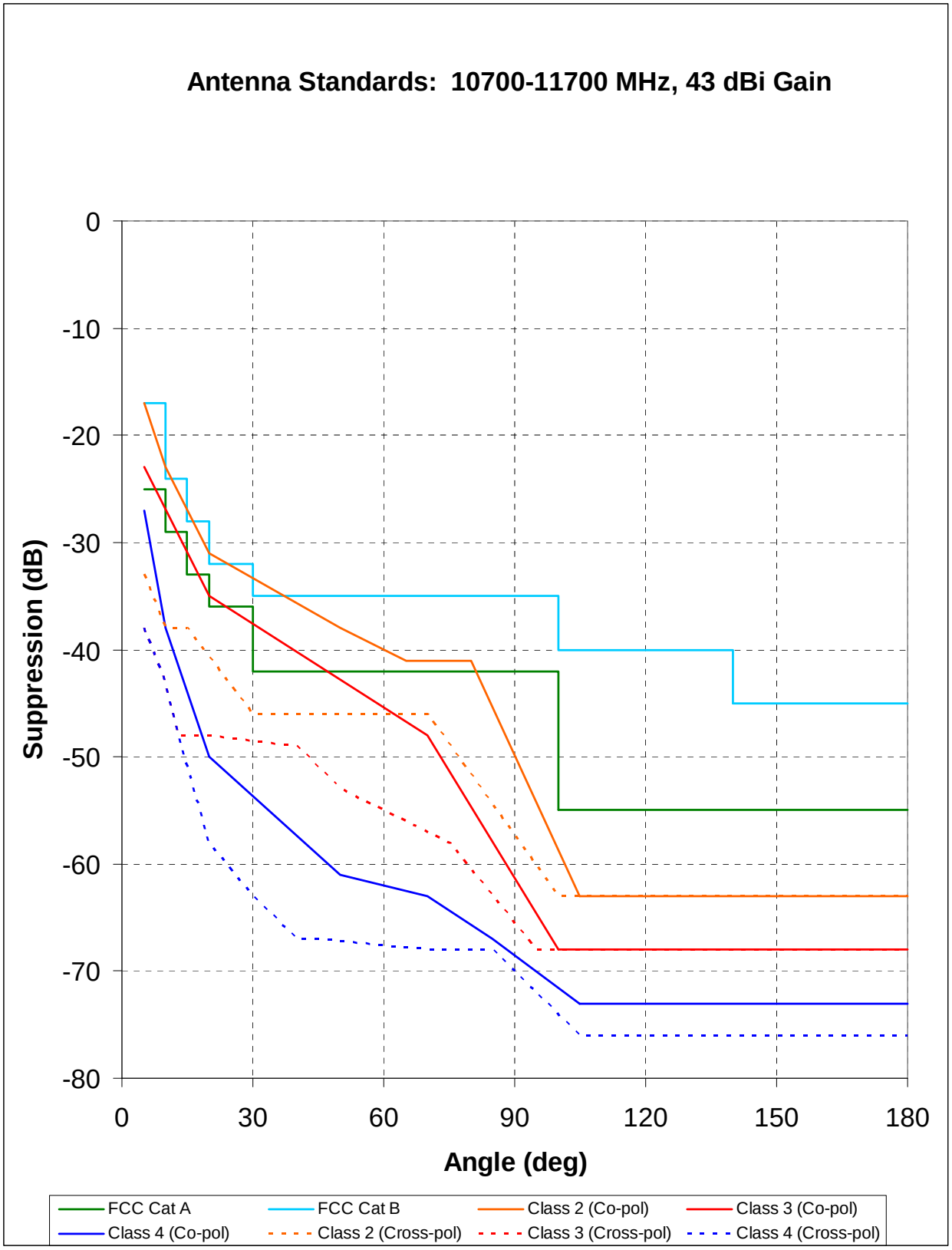

Antenna Standards: 5925-6425 MHz, 38 dBi Gain
Suppression (dB)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
30
60
90
120
150
180
Angle (deg)
FCC Cat A
FCC Cat B1
Class 2 (Co-pol)
Class 3 (Co-pol)
Class 4 (Co-pol)
Class 2 (Cross-pol)
Class 3 (Cross-pol)
Class 4 (Cross-pol)

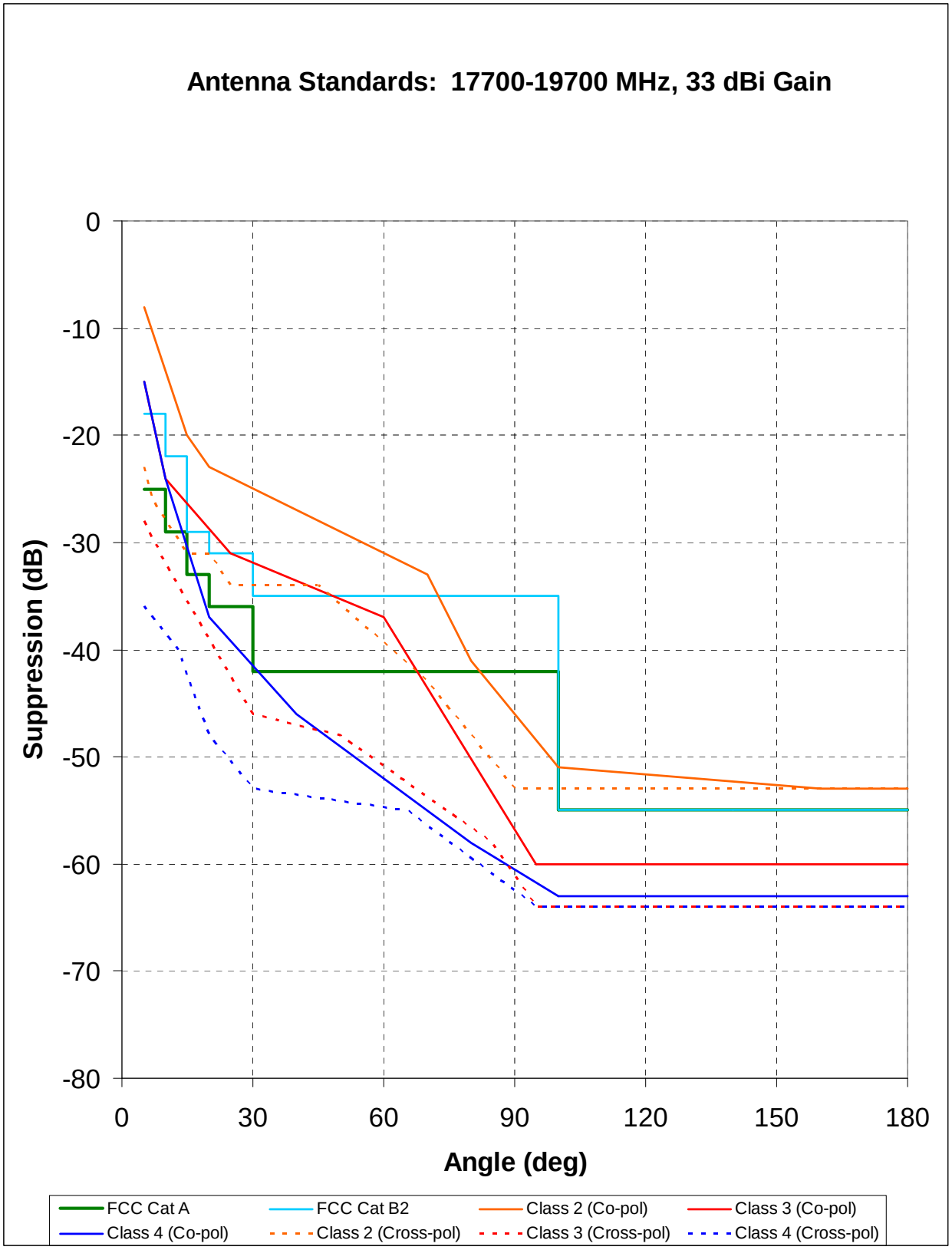

Antenna Standards: 5925-6425 MHz, 43 dBi Gain
Suppression (dB)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
30
60
90
120
150
180
Angle (deg)
FCC Cat A
FCC Cat B1
Class 2 (Co-pol)
Class 3 (Co-pol)
Class 4 (Co-pol)
Class 2 (Cross-pol)
Class 3 (Cross-pol)
Class 4 (Cross-pol)



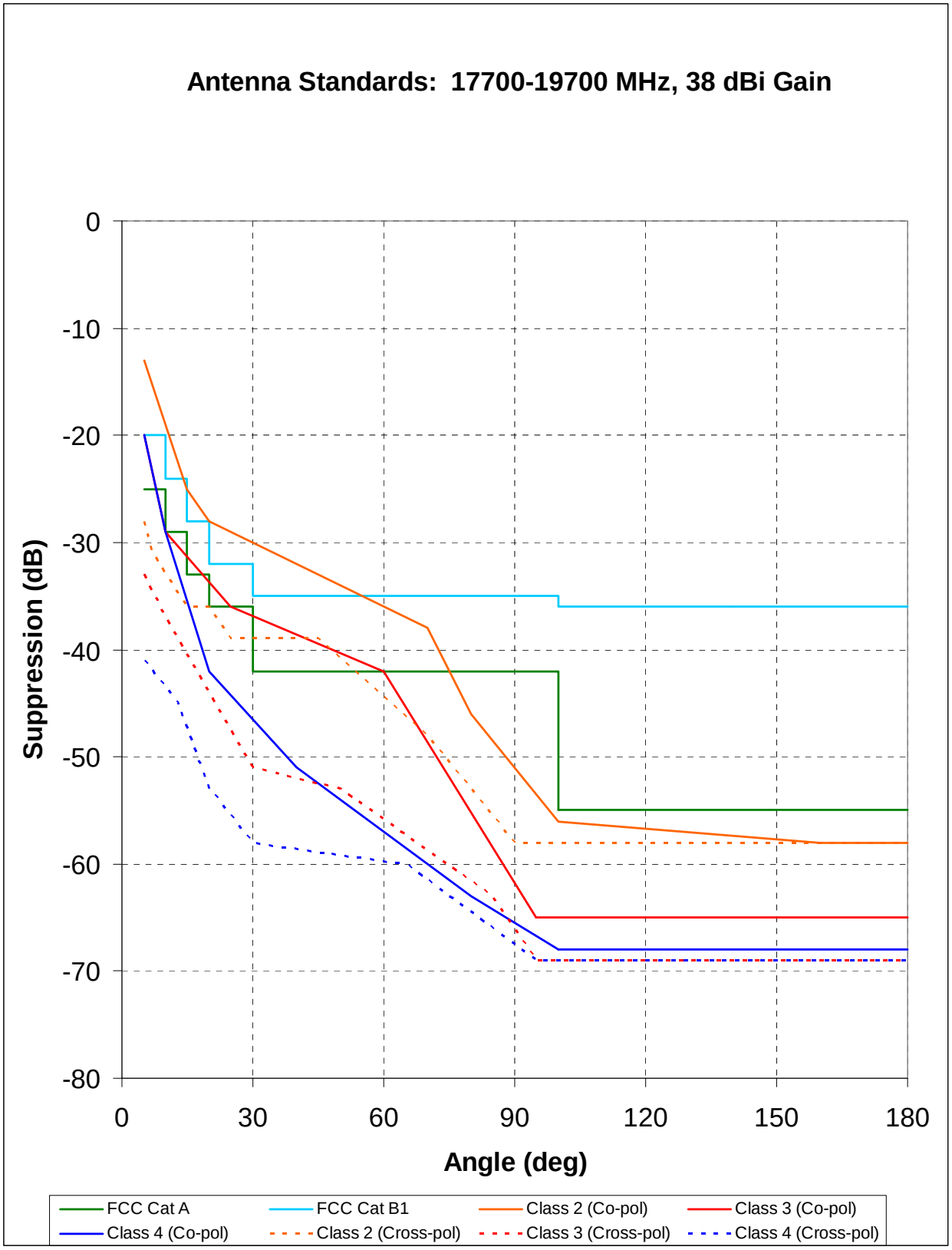
Note: Category A may not apply below minimum §101.115 gain 38 dBi, Category B may not apply below minimum §101.115 gain 33.5 dBi

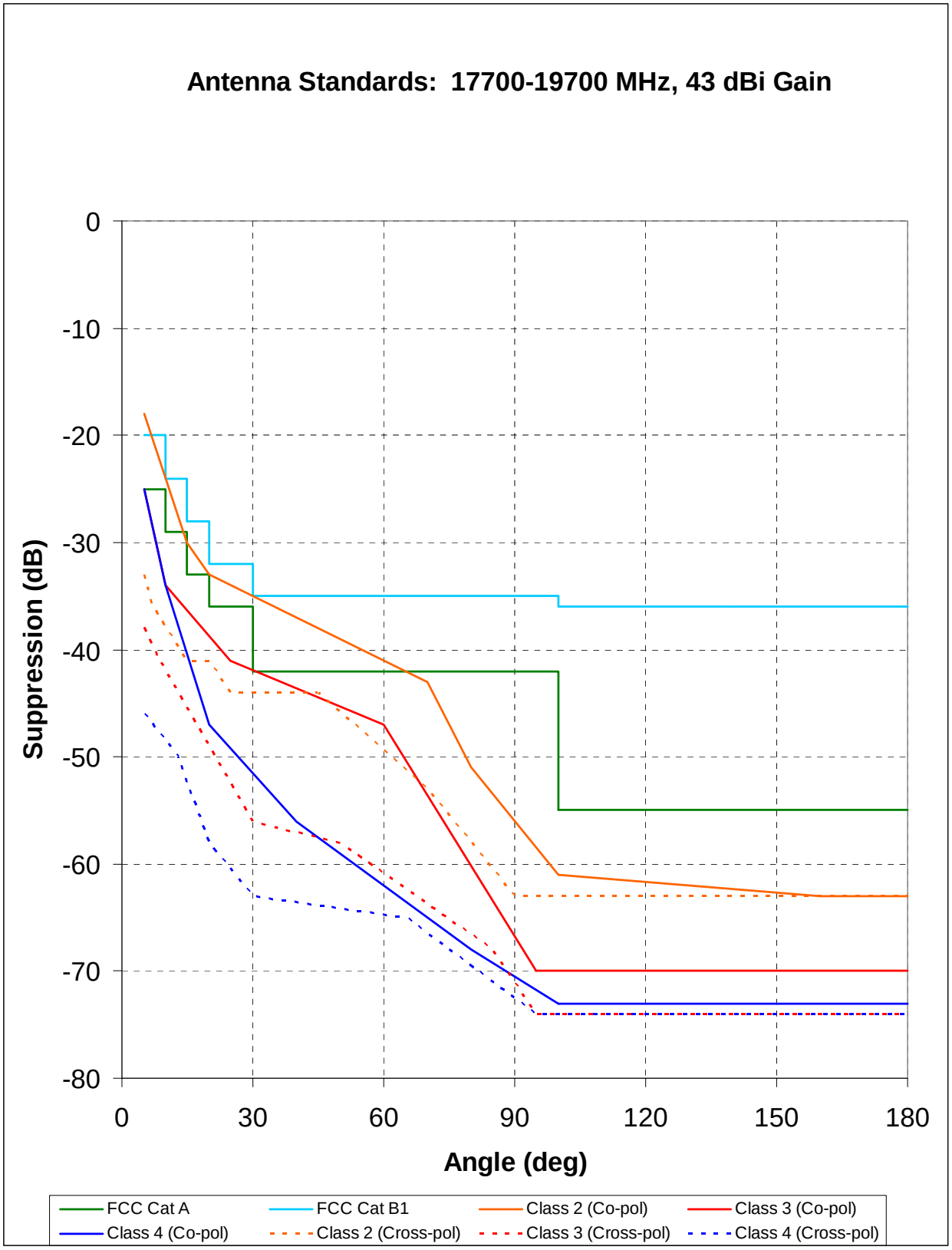

Antenna Standards: 10700-11700 MHz, 38 dBi Gain
Suppression (dB)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
30
60
90
120
150
180
Angle (deg)
FCC Cat A
FCC Cat B
Class 2 (Co-pol)
Class 3 (Co-pol)
Class 4 (Co-pol)
Class 2 (Cross-pol)
Class 3 (Cross-pol)
Class 4 (Cross-pol)

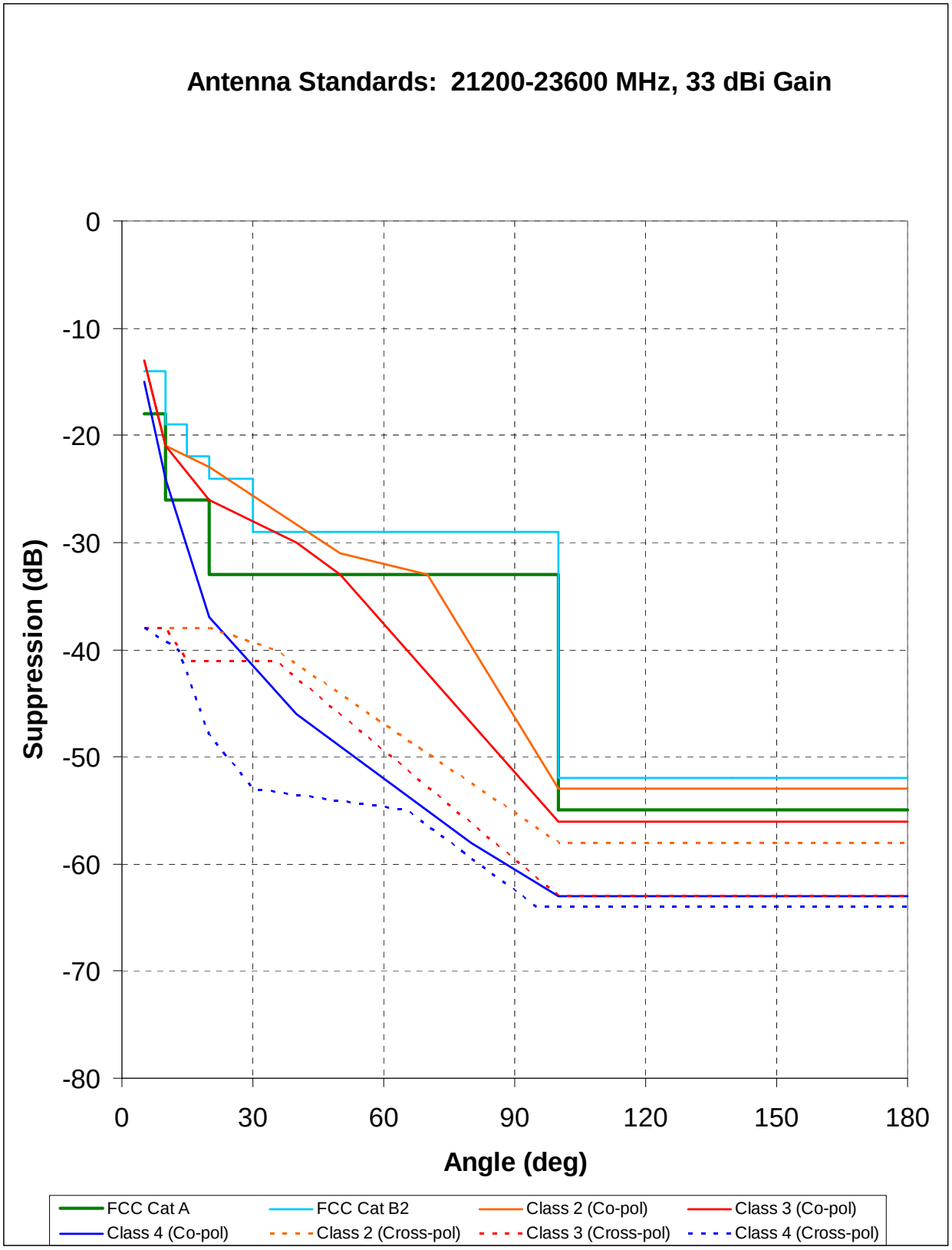

Antenna Standards: 10700-11700 MHz, 43 dBi Gain
Suppression (dB)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
30
60
90
120
150
180
Angle (deg)
FCC Cat A
FCC Cat B
Class 2 (Co-pol)
Class 3 (Co-pol)
Class 4 (Co-pol)
Class 2 (Cross-pol)
Class 3 (Cross-pol)
Class 4 (Cross-pol)



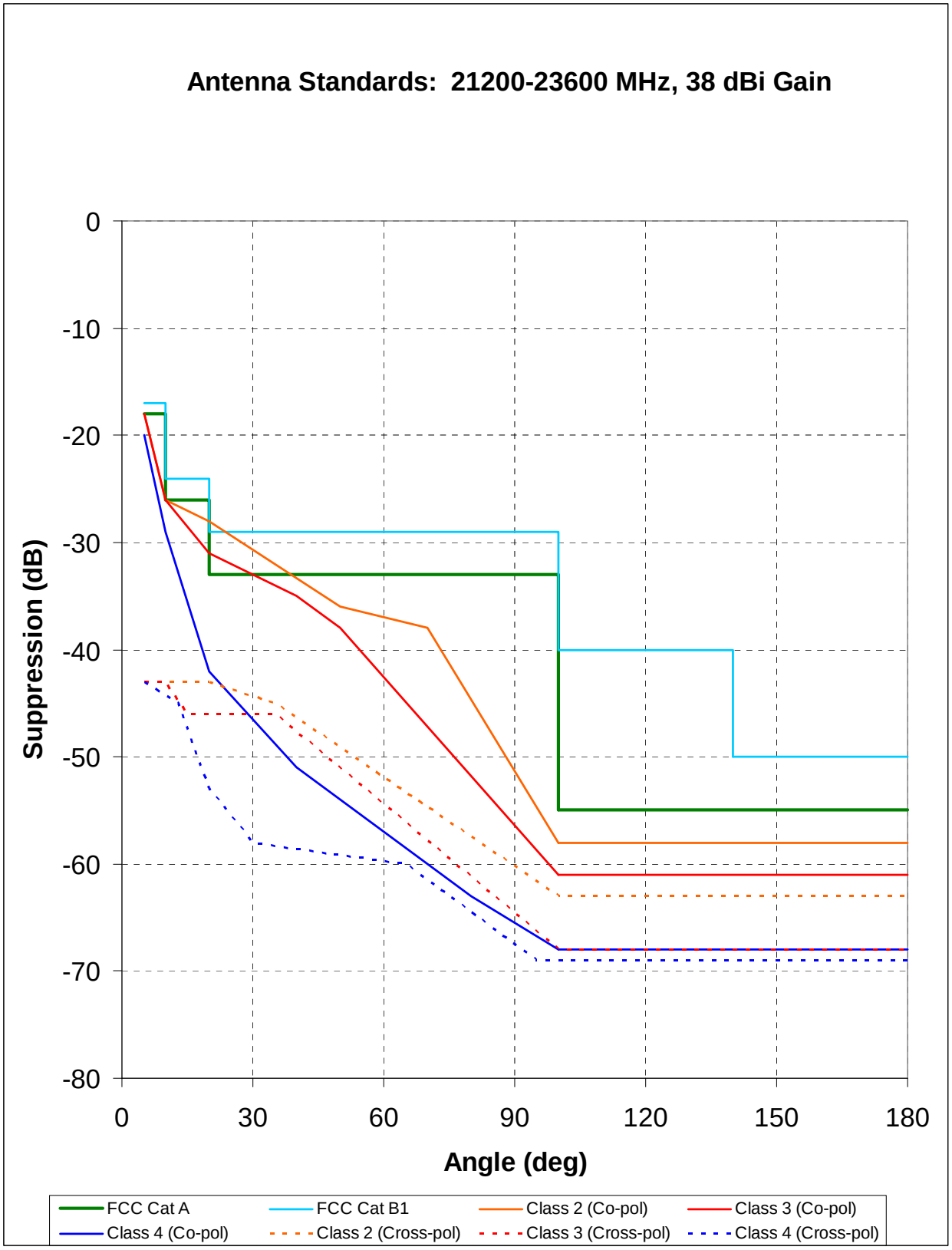
Note: Category A may not apply below minimum §101.115 gain 38 dBi, Category B may not apply below minimum §101.115 gain 33.5 dBi

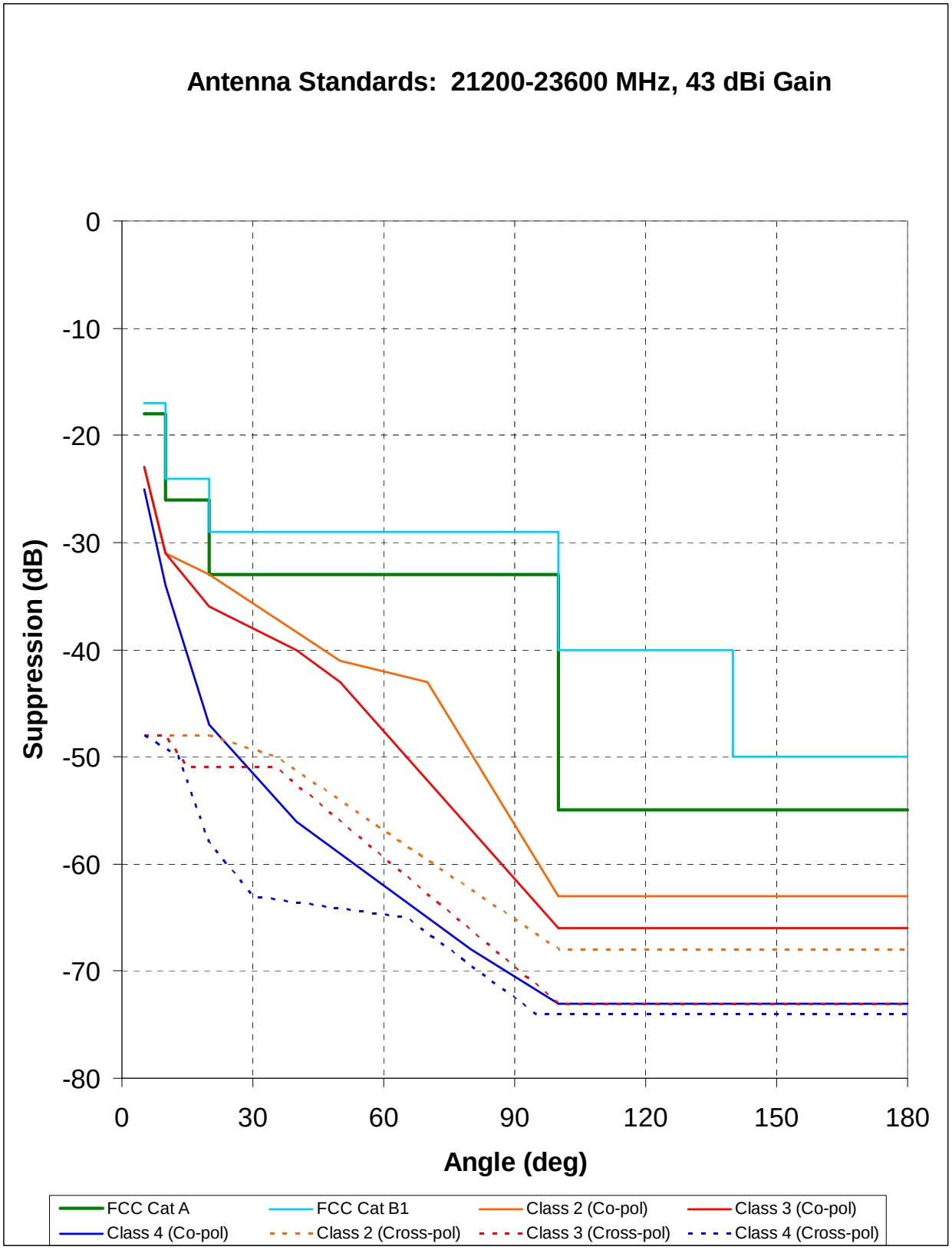

Antenna Standards: 17700-19700 MHz, 38 dBi Gain
Suppression (dB)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
30
60
90
120
150
180
Angle (deg)
FCC Cat A
FCC Cat B1
Class 2 (Co-pol)
Class 3 (Co-pol)
Class 4 (Co-pol)
Class 2 (Cross-pol)
Class 3 (Cross-pol)
Class 4 (Cross-pol)


Antenna Standards: 17700-19700 MHz, 43 dBi Gain
Suppression (dB)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
30
60
90
120
150
180
Angle (deg)
FCC Cat A
FCC Cat B1
Class 2 (Co-pol)
Class 3 (Co-pol)
Class 4 (Co-pol)
Class 2 (Cross-pol)
Class 3 (Cross-pol)
Class 4 (Cross-pol)



Note: Category A may not apply below minimum §101.115 gain 33.5 dBi


Antenna Standards: 21200-23600 MHz, 38 dBi Gain
Suppression (dB)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
30
60
90
120
150
180
Angle (deg)
FCC Cat A
FCC Cat B1
Class 2 (Co-pol)
Class 3 (Co-pol)
Class 4 (Co-pol)
Class 2 (Cross-pol)
Class 3 (Cross-pol)
Class 4 (Cross-pol)


Antenna Standards: 21200-23600 MHz, 43 dBi Gain
Suppression (dB)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
30
60
90
120
150
180
Angle (deg)
FCC Cat A
FCC Cat B1
Class 2 (Co-pol)
Class 3 (Co-pol)
Class 4 (Co-pol)
Class 2 (Cross-pol)
Class 3 (Cross-pol)
Class 4 (Cross-pol)