**Attachment 1**
**REQUEST FOR SPECIAL TEMPORARY AUTHORIZATION**
**(Response to Question 12)**
**Call Sign E250007**

Viasat, Inc. ("Viasat") hereby requests an extension of special temporary authority ("STA") for an additional sixty (60) days to operate (i) up to 50,000 Viasat RA40750 terminals, and (ii) 20,000 AVL 1280 terminals (collectively, the "Terminals") in accordance with technical parameters specified in the attached Schedule B.[1] The Terminals are transmit/receive earth stations that would operate as fixed earth stations. The Terminals would be used to provide service in CONUS, Alaska, Hawaii, and U.S. Territories and Possessions and would communicate with satellites on the Permitted Space Station List ("Permitted List") in portions of the Ka band, specifically the 18.3-18.8 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 28.35-28.6 GHz (Earth-to-space), and 29.5-30.0 GHz (Earth-to-space) band segments. Viasat has filed an application for permanent authority to communicate with the Permitted List using the Terminals[2] and grant of the requested STA would serve the public interest for the same reasons specified in the underlying application.

All operations with Permitted List satellites would be consistent with the Commission's regulatory framework for the Ka band and rules applicable to blanket-licensed earth stations. The 18.3-18.8 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz, and 29.5-30.0 GHz band segments are allocated to GSO FSS on a primary basis and the Commission's rules permit blanket licensing of GSO FSS earth stations in these band segments. The Terminals would communicate with Permitted List satellites under the technical parameters specified in the underlying application for permanent authority. When communicating with Permitted List satellites under the STA, all communications would comport with the applicable terms and conditions of the relevant satellite authorization.

Viasat would operate pursuant to the STA on a non-protected, non-harmful interference basis. In the unlikely event of harmful interference caused by Viasat's operations under the STA, Viasat would take steps to eliminate such interference, including termination of transmissions if needed. The U.S. point of contact available 24 hours a day, seven days a week, with authority and ability to cease emissions is:

349 Inverness Drive South
Englewood, CO 80112
Tel: 720-493-7300

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1 This request is an extension of a current grant of special temporary authority authorized under the same technical parameters specified herein. *See* Viasat, Inc., Call Sign E250007, ICFS File Nos. SES-STA-20250929-00996 (granted Nov. 25, 2025); SES-STA-20260102-00691 (granted Feb. 24, 2026).

2 *See* Viasat, Inc., ICFS File No. SES-LIC-20250130-00120 (filed Jan. 27, 2025). The Form 312, Schedule B, and exhibits for the underlying application are attached hereto for reference.

Approved by OMB
3060-0678

Date & Time Filed: Jan 27 2025 1:07:19:973PM
File Number: SES-LIC-INTR2025-00375
Callsign/Satellite ID:

| **APPLICATION FOR EARTH STATION AUTHORIZATIONS**<br><br>**FCC 312 MAIN FORM**<br>**FOR OFFICIAL USE ONLY** | **FCC Use Only** |
|---|---|

## APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:
Ka-band Blanket Fixed Terminals January 2025

| 1-8. Legal Name of Applicant | | | |
|---|---|---|---|
| Name: | Viasat, Inc. | Phone Number: | 760-476-2583 |
| DBA Name: | | Fax Number: | 760-929-3941 |
| Street: | 6155 El Camino Real | E-Mail: | daryl.hunter@viasat.com |
| City: | Carlsbad | State: | CA |
| Country: | USA | Zipcode: | 92009 - |
| Attention: | Mr Daryl T Hunter P.E. | | |

| 9-16. Name of Contact Representative | | | |
|---|---|---|---|
| Name: | Steven C. Hemple | Phone Number: | 760-476-4812 |
| Company: | Viasat, Inc. | Fax Number: | 760-929-3941 |
| Street: | 6155 El Camino Real | E-Mail: | steven.hemple@viasat.com |
| City: | Carlsbad | State: | CA |
| Country: | USA | Zipcode: | 92009- |
| Attention: | Mr. Steven C. Hemple | Relationship: | Engineer |

## CLASSIFICATION OF FILING

| 17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b.<br><br>a.<br>(selected) a1. Earth Station<br>(N/A) a2. Space Station | b.<br>(selected) b1. Application for License of New Station<br>b2. Application for Registration of New Domestic Receive-Only Station<br>(N/A) b3. Amendment to a Pending Application<br>(N/A) b4. Modification of License or Registration<br>(N/A) b5. Assignment of License or Registration<br>(N/A) b6. Transfer of Control of License or Registration<br>(N/A) b7. Notification of Minor Modification<br>(N/A) b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite<br>(N/A) b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States<br>b10. Other (Please specify)<br>b11. Application for Earth Station to Access a Non-U.S.satellite Not Currently Authorized to Provide the Proposed Service in the Proposed Frequencies in the United States. |
|---|---|

17c. Is a fee submitted with this application?
If Yes, complete and attach FCC Form 159.

If No, indicate reason for fee exemption (see 47 C.F.R.Section 1.1114).

○ Governmental Entity ○ Noncommercial educational licensee

○ Other(please explain):

17d.

Fee Classification

| 18. If this filing is in reference to an existing station, enter: (a) Call sign of station: | 19. If this filing is an amendment to a pending application enter: (a) Date pending application was filed: | (b) File number of pending application: |
|---|---|---|
| Not Applicable | Not Applicable | Not Applicable |

## TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:

- [x] a. Fixed Satellite
- [ ] b. Mobile Satellite
- [ ] c. Radiodetermination Satellite
- [ ] d. Earth Exploration Satellite
- [ ] e. Direct to Home Fixed Satellite
- [ ] f. Digital Audio Radio Service
- [ ] g. Other (please specify)

21. STATUS: Choose the button next to the applicable status. Choose only one.

○ Common Carrier ◉ Non-Common Carrier

22. If earth station applicant, check all that apply.

- [x] Using U.S. licensed satellites
- [x] Using Non-U.S. licensed satellites

23. If applicant is providng INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities:

○ Connected to a Public Switched Network ○ Not connected to a Public Switched Network ◉ N/A

24. FREQUENCY BAND(S): Place an "X" in the box(es) next to all applicable frequency band(s).

- [ ] a. C-Band (4/6 GHz) - [ ] b. Ku-Band (12/14 GHz)
- [x] c.Other (Please specify upper and lower frequencies in MHz.)

Frequency Lower: 18300 Frequency Upper: 30000

## TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

◉ a. Fixed Earth Station

○ b. Temporary-Fixed Earth Station

○ c. 12/14 GHz VSAT Network

○ d. Mobile Earth Station

(N/A) e. Geostationary Space Station

(N/A) f. Non-Geostationary Space Station

○ g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY: Choose only one.

◉ Transmit/Receive ○ Transmit-Only ○ Receive-Only ○ N/A

## PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an 'X' in the box(es) next to all that apply.)

Not Applicable

## ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. §§ 1.1308 and 1.1311, as an exhibit to this application.<u>A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments.</u>

○ **Yes** ◉ **No**

ALIEN OWNERSHIP Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30-34.

| | |
|---|---|
| 29. Is the applicant a foreign government or the representative of any foreign government? | ○ **Yes** ◉ **No** |
| 30. Is the applicant an alien or the representative of an alien? | ○ **Yes** ○ **No** ◉ **N/A** |
| 31. Is the applicant a corporation organized under the laws of any foreign government? | ○ **Yes** ○ **No** ◉ **N/A** |
| 32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country? | ○ **Yes** ○ **No** ◉ **N/A** |
| 33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country? | ○ **Yes** ○ **No** ◉ **N/A** |
| 34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote. | |

BASIC QUALIFICATIONS

| | |
|---|---|
| 35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules?<br>If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents. | ○ **Yes** ◉ **No** |
| 36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explination of circumstances. | ○ **Yes** ◉ **No** |
| 37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explination of circumstances. | ○ **Yes** ◉ **No** |
| 38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attemptiing unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition?If Yes, attach as an exhibit, an explanation of circumstances | ○ **Yes** ◉ **No** |
| 39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhinit, an explanation of the circumstances. | ○ **Yes** ◉ **No** |
| 40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer. | **Exhibit B** |
| 41. By checking Yes, the undersigned certifies, that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. *See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes*. | ◉ **Yes** ○ **No** |
| 42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in *47 C.F.R. 25.137, as appropriate*. If No, proceed to question 43. | ◉ **Yes** ○ **No**<br>**Exhibit A** |
| 42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station? Various | |

| |
|---|
| 43. Description. (Summarize the nature of the application and the services to be provided). See narrative.Narrative |

43a. Geographic Service Rule Certification

By selecting A, the undersigned certifies that the applicant is not subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25. (selected) **A**

By selecting B, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will comply with such requirements. **B**

By selecting C, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will not comply with such requirements because it is not feasible as a technical matter to do so, or that, while technically feasible, such services would require so many compromises in satellite design and operation as to make it economically unreasonable. A narrative description and technical analysis demonstrating this claim are attached. **C**

## CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- Individual
- Unincorporated Association
- Partnership
- Corporation (selected)
- Governmental Entity
- Other (please specify)

| 45. Name of Person Signing | 46. Title of Person Signing |
|---|---|
| Steven C. Hemple | Regulatory Engineer |

47. Please supply any need attachments.

| Attachment 1: | Attachment 2: | Attachment 3: |
|---|---|---|

**WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).**

# SATELLITE EARTH STATION AUTHORIZATIONS
# FCC Form 312 - Schedule B:(Technical and Operational Description)

**FOR OFFICIAL USE ONLY**

Location of Earth Station Site

| | | | |
|---|---|---|---|
| E1: Site Identifier: | Antenna 1 | E5. Call Sign: | |
| E2: Contact Name | Daryl T. Hunter | E6. Phone Number: | 760-476-2583 |
| E3. Street: | | E7. City: | |
| | | E8. County: | |
| E4. State | | E9. Zip Code | |
| E10. Area of Operation: | | CONUS, AK, HI, and U.S. Territories | |
| E11. Latitude: | 0 ° 0 ' 0.0 " N | | |

| | | | | |
|---|---|---|---|---|
| E12. Longitude: | 0 ° 0 ' 0.0 " W | | | |
| E13. Lat/Lon Coordinates are: | | NAD-27 | NAD-83 (selected) | N/A |
| E14. Site Elevation (AMSL): | | 0.0 meters | | |

| | |
|---|---|
| E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide asa technical analysis showing compliance with two-degree spacing policy. | Yes (selected) / No / N/A |
| E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements? | Yes / No / N/A (selected) |
| E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point. | Yes (selected) / No |
| E18. Is frequency coordination required? If YES, attach a frequency coordination report as | Yes / No (selected) |
| E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as | Yes / No (selected) |
| **E20. FAA Notification - (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.** | Yes / No (selected) |

**POINTS OF COMMUNICATION**

| | |
|---|---|
| Satellite Name:PERMITTED LIST \| \| If you selected OTHER, please enter the following: | |
| E21. Common Name: | E22. ITU Name: |
| E23. Orbit Location: | E24. Country: |

**POINTS OF COMMUNICATION (Destination Points)**

| | |
|---|---|
| E25. Site Identifier: | |
| E26. Common Name: | E27. Country: |

**ANTENNA**

| Site ID | E28. Antenna Id | E29. Quantity | E30. Manufacturer | E31. Model | E32. Antenna Size | E41/42. Antenna GainTransmint and/or Recieve(____dBi at _____GHz) |
|---|---|---|---|---|---|---|
| Antenna 1 | Ant 1-AB | 50000 | Viasat | RA40750 | 0.745 | 44.5 dBi at 30 |
| | | | | | | 40.1 dBi at 18.3 |
| | | | | | | 40.4 dBi at 20.2 |
| | | | | | | 43.9 dBi at 28.35 |
| | Ant 1-SB | | | | | 44.5 dBi at 30 |
| | | | | | | 40.1 dBi at 18.3 |
| | | | | | | 40.4 dBi at 20.2 |
| | | | | | | 43.9 dBi at 28.35 |

| E28. Antenna Id | E33/34. Diameter Minor/Major(meters) | E35. Above Ground Level (meters) | E36. Above Sea Level (meters) | E37. Building Height Above Ground Level (meters) | E38. Total Input Power at antenna flange (Watts) | E39. Maximum Antenna Height Above Rooftop (meters) | E40. Total EIRP for al carriers (dBW) |
|---|---|---|---|---|---|---|---|
| Ant 1-AB | 0.72/0.77 | 0.0 | 0.0 | 0.0 | 25.0 | 0.0 | 58.5 |
| Ant 1-SB | 0.72/0.77 | 0.0 | 0.0 | 0.0 | 2.8 | 0.0 | 48.8 |

**FREQUENCY**

| E28. Antenna Id | E43/44. Frequency Bands(MHz) | E45. T/R Mode | E46. Antenna Polarization(H,V,L,R) | E47. Emission Designator | E48. Maximum EIRP per Carrier(dBW) | E49. Maximum ERIP Density per Carrier(dBW/4kHz) |
|---|---|---|---|---|---|---|
| Ant 1-AB | 19700 20200 | R | Left and Right Circular | 52M1G7D | 0.0 | 0.0 |
| E50. Modulation and Services 52 MBD PSK DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 28350 28600 | T | Left and Right Circular | 5M00G7D | 54.8 | 23.8 |
| E50. Modulation and Services 5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 29500 30000 | T | Left and Right Circular | 5M00G7D | 54.8 | 23.8 |
| E50. Modulation and Services 5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 18300 18800 | R | Left and Right Circular | 52M1G7D | 0.0 | 0.0 |
| E50. Modulation and Services 52 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 28350 28600 | T | Left and Right Circular | 10M0G7D | 57.8 | 23.8 |
| E50. Modulation and Services 10 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 28350 28600 | T | Left and Right Circular | 20M0G7D | 58.5 | 21.5 |
| E50. Modulation and Services 20 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 28350 28600 | T | Left and Right Circular | 40MG07D | 58.5 | 18.5 |
| E50. Modulation and Services 40 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 28350 28600 | T | Left and Right Circular | 80M0G7D | 58.5 | 15.5 |
| E50. Modulation and Services 80 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 29500 30000 | T | Left and Right Circular | 10M0G7D | 57.8 | 23.8 |
| E50. Modulation and Services 10 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 29500 30000 | T | Left and Right Circular | 20M0G7D | 58.5 | 21.5 |
| E50. Modulation and Services 20 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 29500 30000 | T | Left and Right Circular | 40MG07D | 58.5 | 18.5 |
| E50. Modulation and Services 40 MBD PSK, DIGITAL CARRIER | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ant 1-AB | 29500 30000 | T | Left and Right Circular | 80M0G7D | 58.5 | 15.5 |
| E50. Modulation and Services 80 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 18300 18800 | R | Left and Right Circular | 416MG7D | 0.0 | 0.0 |
| E50. Modulation and Services 416 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 19700 20200 | R | Left and Right Circular | 416MG7D | 0.0 | 0.0 |
| E50. Modulation and Services 416 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 28350 28600 | T | Left and Right Circular | 160MG7D | 58.5 | 12.5 |
| E50. Modulation and Services 160 KBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 28350 28600 | T | Left and Right Circular | 320MG7D | 58.5 | 9.5 |
| E50. Modulation and Services 320 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 29500 30000 | T | Left and Right Circular | 160MG7D | 58.5 | 12.5 |
| E50. Modulation and Services 160 KBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-AB | 29500 30000 | T | Left and Right Circular | 320MG7D | 58.5 | 9.5 |
| E50. Modulation and Services 320 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 19700 20200 | R | Left and Right Circular | 52M1G7D | 0.0 | 0.0 |
| E50. Modulation and Services 52 MBD PSK DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 28350 28600 | T | Left and Right Circular | 5M00G7D | 48.8 | 17.8 |
| E50. Modulation and Services 5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 29500 30000 | T | Left and Right Circular | 5M00G7D | 48.8 | 17.8 |
| E50. Modulation and Services 5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 18300 18800 | R | Left and Right Circular | 52M1G7D | 0.0 | 0.0 |
| E50. Modulation and Services 52 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 28350 28600 | T | Left and Right Circular | 10M0G7D | 48.8 | 14.8 |
| E50. Modulation and Services 10 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 29500 30000 | T | Left and Right Circular | 10M0G7D | 48.8 | 14.8 |
| E50. Modulation and Services 10 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 18300 18800 | R | Left and Right Circular | 416MG7D | 0.0 | 0.0 |
| E50. Modulation and Services 416 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 19700 20200 | R | Left and Right Circular | 416MG7D | 0.0 | 0.0 |
| E50. Modulation and Services 416 MBD PSK, DIGITAL CARRIER | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ant 1-SB | 28350 28600 | T | Left and Right Circular | 2M50G7D | 48.8 | 20.8 |
| E50. Modulation and Services 2.5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 28350 28600 | T | Left and Right Circular | 625KG7D | 44.8 | 22.9 |
| E50. Modulation and Services 625 KBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 29500 30000 | T | Left and Right Circular | 2M50G7D | 48.8 | 20.8 |
| E50. Modulation and Services 2.5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 29500 30000 | T | Left and Right Circular | 625KG7D | 45.8 | 22.9 |
| E50. Modulation and Services 625 KBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 28350 28600 | T | Left and Right Circular | 1M25G7D | 48.8 | 23.9 |
| E50. Modulation and Services 1.25 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant 1-SB | 29500 30000 | T | Left and Right Circular | 1M25G7D | 48.8 | 23.9 |
| E50. Modulation and Services 1.25 MBD PSK, DIGITAL CARRIER | | | | | | |

**FREQUENCY COORDINATION**

| E28. Antenna Id | E51. Satellite Orbit Type | E52/53. Frequency Limits(MHz) | E54/55. Range of Satellite Arc E/W Limit | E56. Earth Station Azimuth Angle Eastern Limit | E57. Antenna Elevation Angle Eastern Limit | E58. Earth Station Azimuth Angle Western Limit | E59. Antenna Elevation Angle Western Limit | E60. Maximum EIRP Density toward the Horizon(dBW/4kHz) |
|---|---|---|---|---|---|---|---|---|
| Ant 1-AB | Geostationary | 18300 18800 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | 0.0 |
| | Geostationary | 19700 20200 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | 0.0 |
| | Geostationary | 28350 28600 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | -13.17 |
| | Geostationary | 29500 30000 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | -14.1 |
| Ant 1-SB | Geostationary | 18300 18800 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | 0.0 |
| | Geostationary | 19700 20200 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | 0.0 |
| | Geostationary | 28350 28600 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | -13.17 |
| | Geostationary | 29500 30000 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | -14.1 |

**REMOTE CONTROL POINT LOCATION**
**REMOTE CONTROL POINT LOCATION**

| E61. Call Sign | E65. Phone Number |
|---|---|
| NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed. | 720-493-7300 |

| E62. Street Address<br>349 Inverness Drive South | | | |
|---|---|---|---|
| E63. City<br>Englewood | E67. County<br>Douglas | E64/68. State/Country<br>CO/ USA | E66. Zip Code |

# SATELLITE EARTH STATION AUTHORIZATIONS
## FCC Form 312 - Schedule B:(Technical and Operational Description)

**FOR OFFICIAL USE ONLY**

Location of Earth Station Site

| | | | |
|---|---|---|---|
| E1: Site Identifier: | Antenna 2 | E5. Call Sign: | |
| E2: Contact Name | Daryl T. Hunter | E6. Phone Number: | 760-476-2583 |
| E3. Street: | | E7. City: | |
| | | E8. County: | |
| E4. State | | E9. Zip Code | |
| E10. Area of Operation: | | CONUS, AK, HI, and U.S. Territories | |
| E11. Latitude: | 0 ° 0 ' 0.0 " N | | |
| E12. Longitude: | 0 ° 0 ' 0.0 " W | | |
| E13. Lat/Lon Coordinates are: | | NAD-27 | NAD-83 (selected) / N/A |
| E14. Site Elevation (AMSL): | | 0.0 meters | |

| | |
|---|---|
| E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide asa technical analysis showing compliance with two-degree spacing policy. | Yes (selected) / No / N/A |
| E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements? | Yes / No / N/A (selected) |
| E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point. | Yes (selected) / No |
| E18. Is frequency coordination required? If YES, attach a frequency coordination report as | Yes / No (selected) |
| E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as | Yes / No (selected) |
| **E20. FAA Notification - (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and or the FAA's study regarding the potential hazard of the structure to aviation?**<br>**FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.** | Yes / No (selected) |

**POINTS OF COMMUNICATION**

| Satellite Name:PERMITTED LIST \| \| If you selected OTHER, please enter the following: | |
|---|---|
| E21. Common Name: | E22. ITU Name: |
| E23. Orbit Location: | E24. Country: |

**POINTS OF COMMUNICATION (Destination Points)**

| | |
|---|---|
| E25. Site Identifier: | |
| E26. Common Name: | E27. Country: |

**ANTENNA**

| Site ID | E28. Antenna Id | E29. Quantity | E30. Manufacturer | E31. Model | E32. Antenna Size | E41/42. Antenna GainTransmint and/or Recieve(____dBi at _____GHz) |
|---|---|---|---|---|---|---|
| Antenna 2 | Ant-2 SB | 20000 | AVL | 1280 | 1.23 | 49.6 dBi at 30 |
| | | | | | | 44.8 dBi at 18.3 |
| | | | | | | 45.2 dBi at 19.7 |
| | | | | | | 45.5 dBi at 20.2 |
| | | | | | | 49.0 dBi at 29.5 |
| | | | | | | 48.6 dBi at 28.35 |
| | Ant-2 AB | | | | | 49.6 dBi at 30 |
| | | | | | | 44.8 dBi at 18.3 |
| | | | | | | 45.2 dBi at 19.7 |
| | | | | | | 45.5 dBi at 20.2 |
| | | | | | | 49.0 dBi at 29.5 |
| | | | | | | 48.6 dBi at 28.35 |

| E28. Antenna Id | E33/34. Diameter Minor/Major(meters) | E35. Above Ground Level (meters) | E36. Above Sea Level (meters) | E37. Building Height Above Ground Level (meters) | E38. Total Input Power at antenna flange (Watts) | E39. Maximum Antenna Height Above Rooftop (meters) | E40. Total EIRP for al carriers (dBW) |
|---|---|---|---|---|---|---|---|
| Ant-2 SB | 1.2/1.257 | 0.0 | 0.0 | 0.0 | 2.8 | 0.0 | 54.1 |
| Ant-2 AB | 1.2/1.257 | 0.0 | 0.0 | 0.0 | 25.0 | 0.0 | 63.6 |

**FREQUENCY**

| E28. Antenna Id | E43/44. Frequency Bands(MHz) | E45. T/R Mode | E46. Antenna Polarization(H,V,L,R) | E47. Emission Designator | E48. Maximum EIRP per Carrier(dBW) | E49. Maximum ERIP Density per Carrier(dBW/4kHz) |
|---|---|---|---|---|---|---|
| Ant-2 SB | 19700 20200 | R | Left and Right Circular | 52M1G7D | 0.0 | 0.0 |
| E50. Modulation and Services 52 MBD PSK DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 28350 28600 | T | Left and Right Circular | 5M00G7D | 54.1 | 23.2 |
| E50. Modulation and Services 5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 29500 30000 | T | Left and Right Circular | 5M00G7D | 54.1 | 23.2 |
| E50. Modulation and Services 5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 18300 18800 | R | Left and Right Circular | 52M1G7D | 0.0 | 0.0 |
| E50. Modulation and Services 52 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 28350 28600 | T | Left and Right Circular | 10M0G7D | 54.1 | 20.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| E50. Modulation and Services 10 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 29500 30000 | T | Left and Right Circular | 10M0G7D | 54.1 | 20.1 |
| E50. Modulation and Services 10 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 18300 18800 | R | Left and Right Circular | 416MG7D | 0.0 | 0.0 |
| E50. Modulation and Services 416 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 19700 20200 | R | Left and Right Circular | 416MG7D | 0.0 | 0.0 |
| E50. Modulation and Services 416 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 28350 28600 | T | Left and Right Circular | 2M50G7D | 54.1 | 26.2 |
| E50. Modulation and Services 2.5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 28350 28600 | T | Left and Right Circular | 625KG7D | 54.1 | 32.2 |
| E50. Modulation and Services 625 KBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 29500 30000 | T | Left and Right Circular | 2M50G7D | 54.1 | 26.2 |
| E50. Modulation and Services 2.5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 29500 30000 | T | Left and Right Circular | 625KG7D | 54.1 | 32.2 |
| E50. Modulation and Services 625 KBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 28350 28600 | T | Left and Right Circular | 1M25G7D | 54.1 | 29.2 |
| E50. Modulation and Services 1.25 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 SB | 29500 30000 | T | Left and Right Circular | 1M25G7D | 54.1 | 29.2 |
| E50. Modulation and Services 1.25 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 19700 20200 | R | Left and Right Circular | 52M1G7D | 0.0 | 0.0 |
| E50. Modulation and Services 52 MBD PSK DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 28350 28600 | T | Left and Right Circular | 5M00G7D | 61.5 | 30.5 |
| E50. Modulation and Services 5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 29500 30000 | T | Left and Right Circular | 5M00G7D | 61.5 | 30.5 |
| E50. Modulation and Services 5 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 18300 18800 | R | Left and Right Circular | 52M1G7D | 0.0 | 0.0 |
| E50. Modulation and Services 52 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 28350 28600 | T | Left and Right Circular | 10M0G7D | 63.6 | 29.6 |
| E50. Modulation and Services 10 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 28350 28600 | T | Left and Right Circular | 20M0G7D | 63.6 | 26.6 |
| E50. Modulation and Services 20 MBD PSK, DIGITAL CARRIER | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ant-2 AB | 28350 28600 | T | Left and Right Circular | 40M0G7D | 63.6 | 23.6 |
| E50. Modulation and Services 40 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 28350 28600 | T | Left and Right Circular | 80M0G7D | 63.6 | 20.6 |
| E50. Modulation and Services 80 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 29500 30000 | T | Left and Right Circular | 10M0G7D | 63.6 | 29.6 |
| E50. Modulation and Services 10 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 29500 30000 | T | Left and Right Circular | 20M0G7D | 63.6 | 26.6 |
| E50. Modulation and Services 20 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 29500 30000 | T | Left and Right Circular | 40M0G7D | 63.6 | 23.6 |
| E50. Modulation and Services 40 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 29500 30000 | T | Left and Right Circular | 80M0G7D | 63.6 | 20.6 |
| E50. Modulation and Services 80 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 18300 18800 | R | Left and Right Circular | 416MG7D | 0.0 | 0.0 |
| E50. Modulation and Services 416 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 19700 20200 | R | Left and Right Circular | 416MG7D | 0.0 | 0.0 |
| E50. Modulation and Services 416 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 28350 28600 | T | Left and Right Circular | 160M0G7D | 63.6 | 17.6 |
| E50. Modulation and Services 160 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 28350 28600 | T | Left and Right Circular | 320M0G7D | 63.6 | 14.6 |
| E50. Modulation and Services 302 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 29500 30000 | T | Left and Right Circular | 160M0G7D | 63.6 | 17.6 |
| E50. Modulation and Services 160 MBD PSK, DIGITAL CARRIER | | | | | | |
| Ant-2 AB | 29500 30000 | T | Left and Right Circular | 320M0G7D | 63.6 | 14.6 |
| E50. Modulation and Services 302 MBD PSK, DIGITAL CARRIER | | | | | | |

**FREQUENCY COORDINATION**

| E28. Antenna Id | E51. Satellite Orbit Type | E52/53. Frequency Limits(MHz) | E54/55. Range of Satellite Arc E/W Limit | E56. Earth Station Azimuth Angle Eastern Limit | E57. Antenna Elevation Angle Eastern Limit | E58. Earth Station Azimuth Angle Western Limit | E59. Antenna Elevation Angle Western Limit | E60. Maximum EIRP Density toward the Horizon(dBW/4kHz) |
|---|---|---|---|---|---|---|---|---|
| Ant-2 SB | Geostationary | 18300 18800 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | 0.0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Geostationary | 19700 20200 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | 0.0 |
| | Geostationary | 28350 28600 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | -11.55 |
| | Geostationary | 29500 30000 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | -13.36 |
| Ant-2 AB | Geostationary | 18300 18800 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | 0.0 |
| | Geostationary | 19700 20200 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | 0.0 |
| | Geostationary | 28350 28600 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | -11.55 |
| | Geostationary | 29500 30000 | 3.0/ 70.0 | 90.0 | 5.0 | 270.0 | 5.0 | -13.36 |

**REMOTE CONTROL POINT LOCATION**
**REMOTE CONTROL POINT LOCATION**

| | | | |
|---|---|---|---|
| E61. Call Sign<br><br>NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed. | | | E65. Phone Number<br>720-493-7300 |
| E62. Street Address<br>349 Inverness Drive South | | | |
| E63. City<br>Englewood | E67. County<br>Douglas | E64/68. State/Country<br>CO/ USA | E66. Zip Code |

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

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THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104-13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.

**Attachment 1**
**NARRATIVE EXHIBIT**
**(Response to Question 43)**
**Ka Band Fixed Terminals**

By this application, Viasat, Inc. ("Viasat") requests blanket authority to operate (i) up to 50,000 Viasat RA40750 terminals, and (ii) 20,000 AVL 1280 terminals (collectively, the "Terminals") in accordance with technical parameters specified in the accompanying application form. The Terminals are transmit/receive earth stations that would operate as fixed earth stations operating on a blanket basis. The Terminals would be used to provide service in CONUS, Alaska, Hawaii, and U.S. Territories and Possessions and would communicate with satellites on the Permitted Space Station List ("Permitted List") in portions of the Ka band, specifically the 18.3-18.8 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 28.35-28.6 GHz (Earth-to-space), and 29.5-30.0 GHz (Earth-to-space) band segments. Grant of the instant application would serve the public interest by enabling Viasat to augment its existing services and offer new services to customers.

**Compliance with Technical Rules**

Operation of the Terminals would be consistent with the Commission's regulatory framework for the Ka band. Under that framework, the key elements for ensuring compatibility with the Commission's two-degree spacing policy are: (i) compliance with the off-axis-EIRP density levels specified in Section 25.218 in the uplink direction, (ii) compliance with the power flux density ("PFD") levels referenced in Section 25.208 in the downlink direction, and (iii) coordination with potentially affected satellite systems in the case of any exceedance of those levels. Operations of the Terminals with satellites on the Permitted List would be consistent with this framework.[1] Exhibit A includes antenna gain patterns and EIRP density plots for the Terminals.

The 18.3-18.8 GHz, 19.7-20.2 GHz, 28.35-28.6 GHz, and 29.5-30 GHz band segments are allocated to GSO FSS on a primary basis and the Commission's rules permit blanket licensing of GSO FSS earth stations in these band segments.[2] All of these band segments are eligible for communications with Permitted List satellites. All communications with Permitted List satellites would comport with the applicable terms and conditions of the relevant satellite authorization.

---

1 The Terminals are designed to operate using two separate Viasat networks: Surfbeam and Afterburner. Both networks employ an MF-TDMA system where any given Earth-to-space (uplink) return link channel used by user terminals to transmit data to the satellite is shared among the population of users in that beam. Operations using Surfbeam have an input power of 2.8 W and operations using Afterburner have an input power of 25.0 W.

2 *See* 47 C.F.R. § 2.106; *see also* 47 C.F.R. § 25.115(c)(3).

Additionally, Viasat certifies that the Terminals would use a contention protocol, and that such contention protocol usage would be reasonable.[3]

**Point of Contact Information**

Viasat would maintain a 24/7 point of contact in the United States with authority and ability to cease all emissions from the Terminals who can be reached at the following:

349 Inverness Drive South
Englewood, CO 80112
Tel: 720-493-7300

**Radiation Hazard Analysis**

A radiation hazard analysis for the Terminals is attached hereto as Exhibit B. As demonstrated in Exhibit B, the general population would not be exposed to RF levels in excess of the Commission's standard, and the Terminals do not present a risk to trained personnel in the controlled area in the immediate vicinity of the Terminals.

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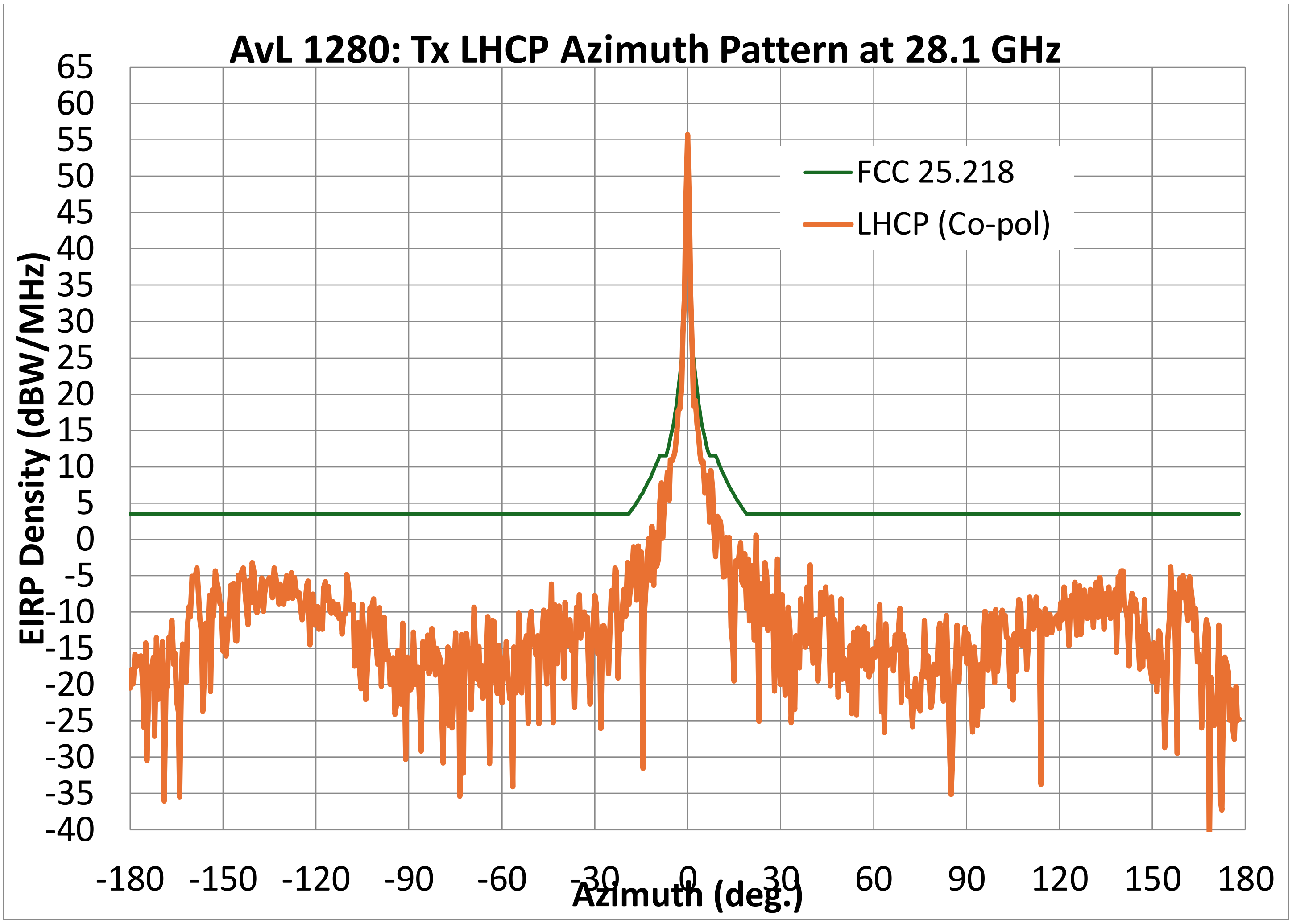
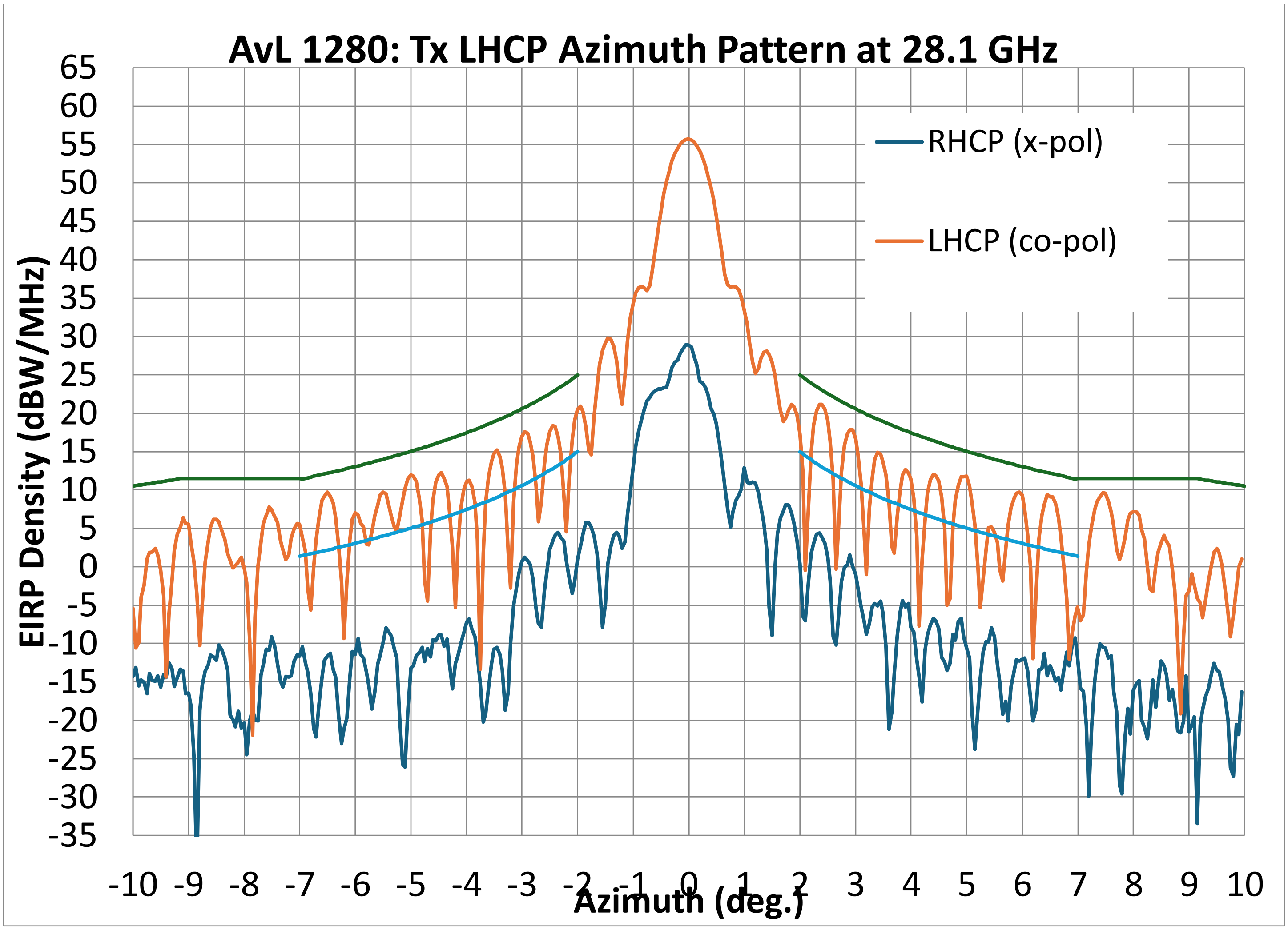
3 *See* 47 C.F.R. § 25.115(i).

# Exhibit A

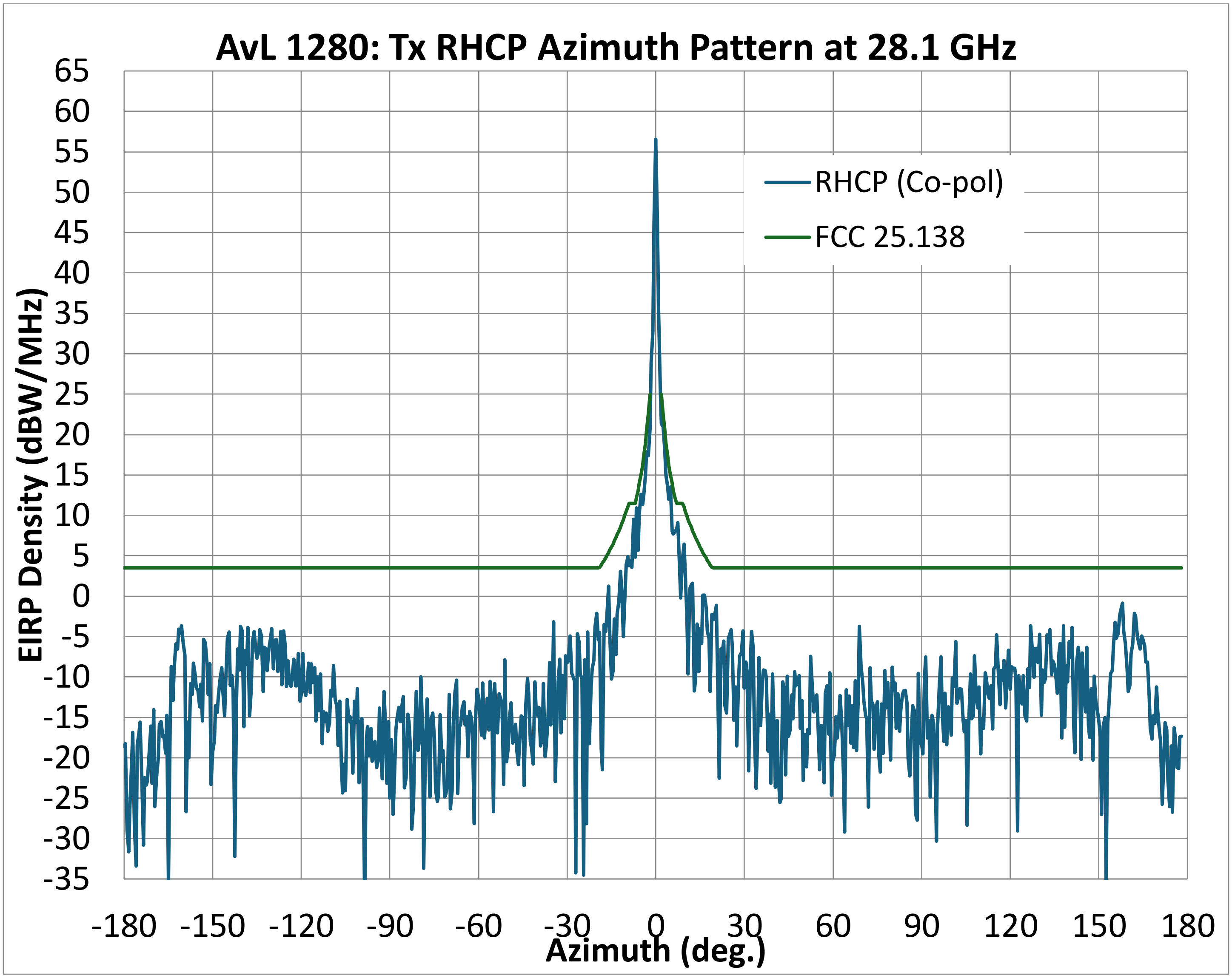
# EIRP Density Patterns

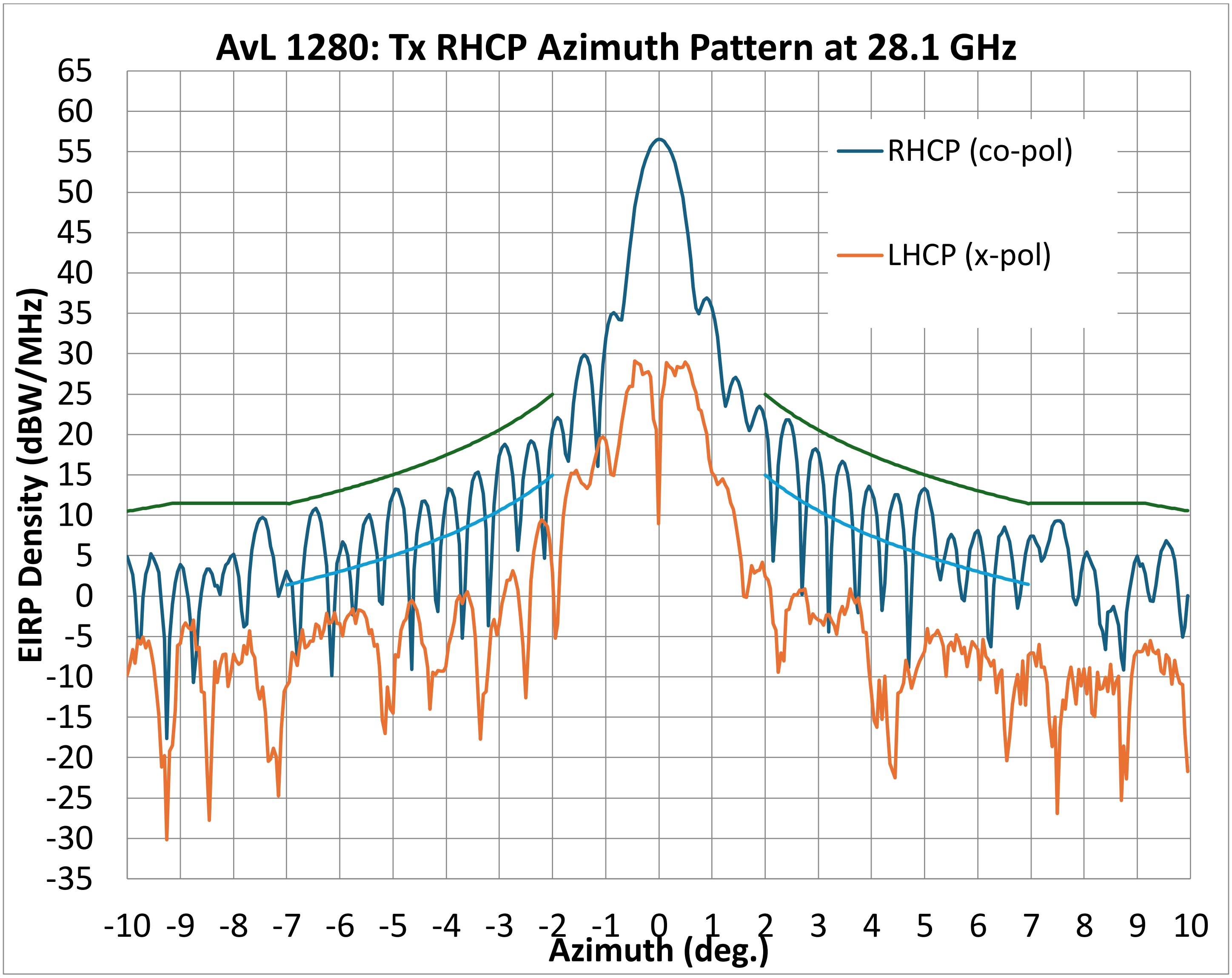
# AvL 1280 Ka-band Antenna


AvL 1280: Tx LHCP Azimuth Pattern at 28.1 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
FCC 25.218
LHCP (Co-pol)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180



AvL 1280: Tx LHCP Azimuth Pattern at 28.1 GHz
EIRP Density (dBW/MHz)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
RHCP (x-pol)
LHCP (co-pol)
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Azimuth (deg.)


AvL 1280: Tx RHCP Azimuth Pattern at 28.1 GHz
RHCP (Co-pol)
FCC 25.138
EIRP Density (dBW/MHz)
Azimuth (deg.)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180



AvL 1280: Tx RHCP Azimuth Pattern at 28.1 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Azimuth (deg.)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-10
-9
-8
-7
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-1
0
1
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3
4
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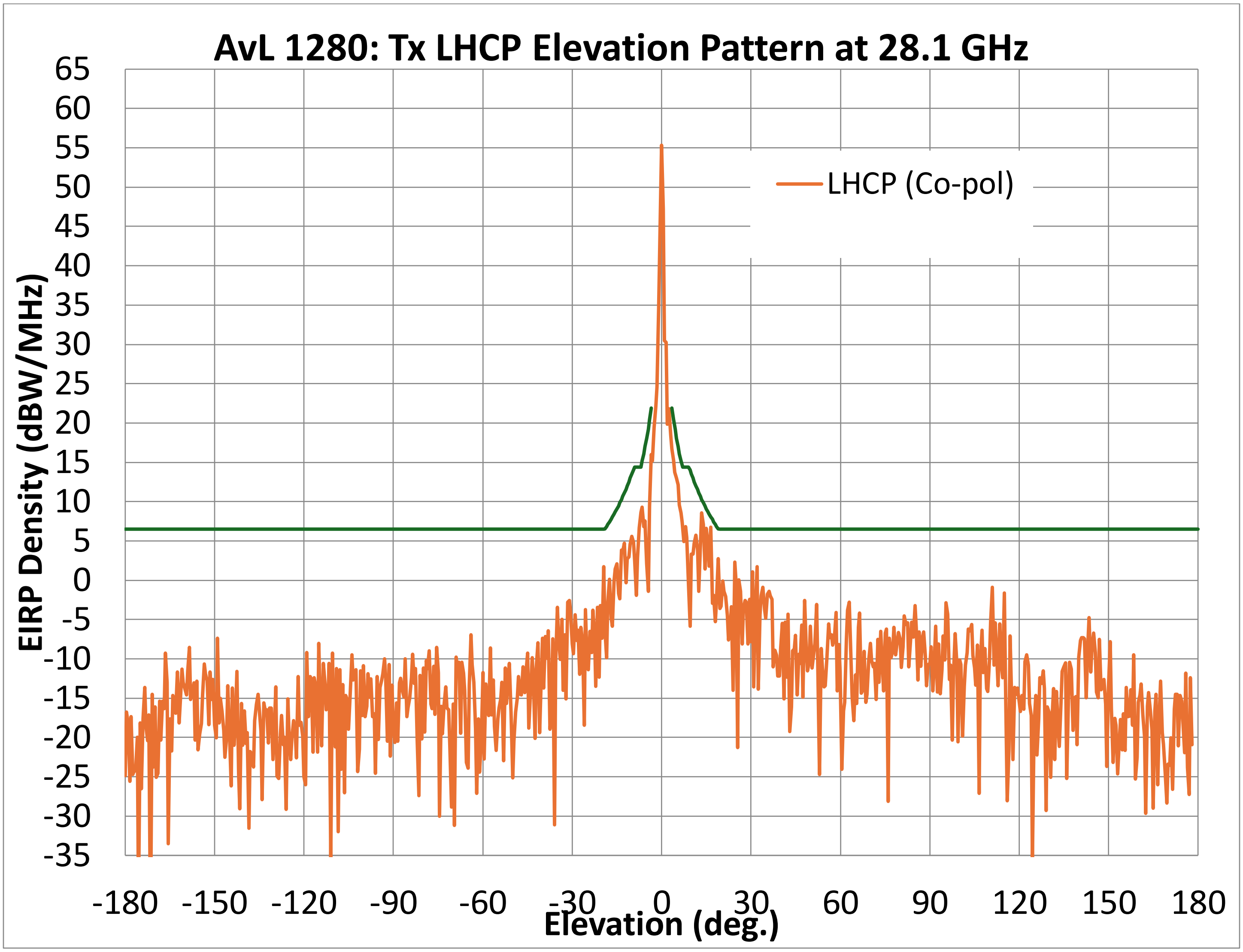
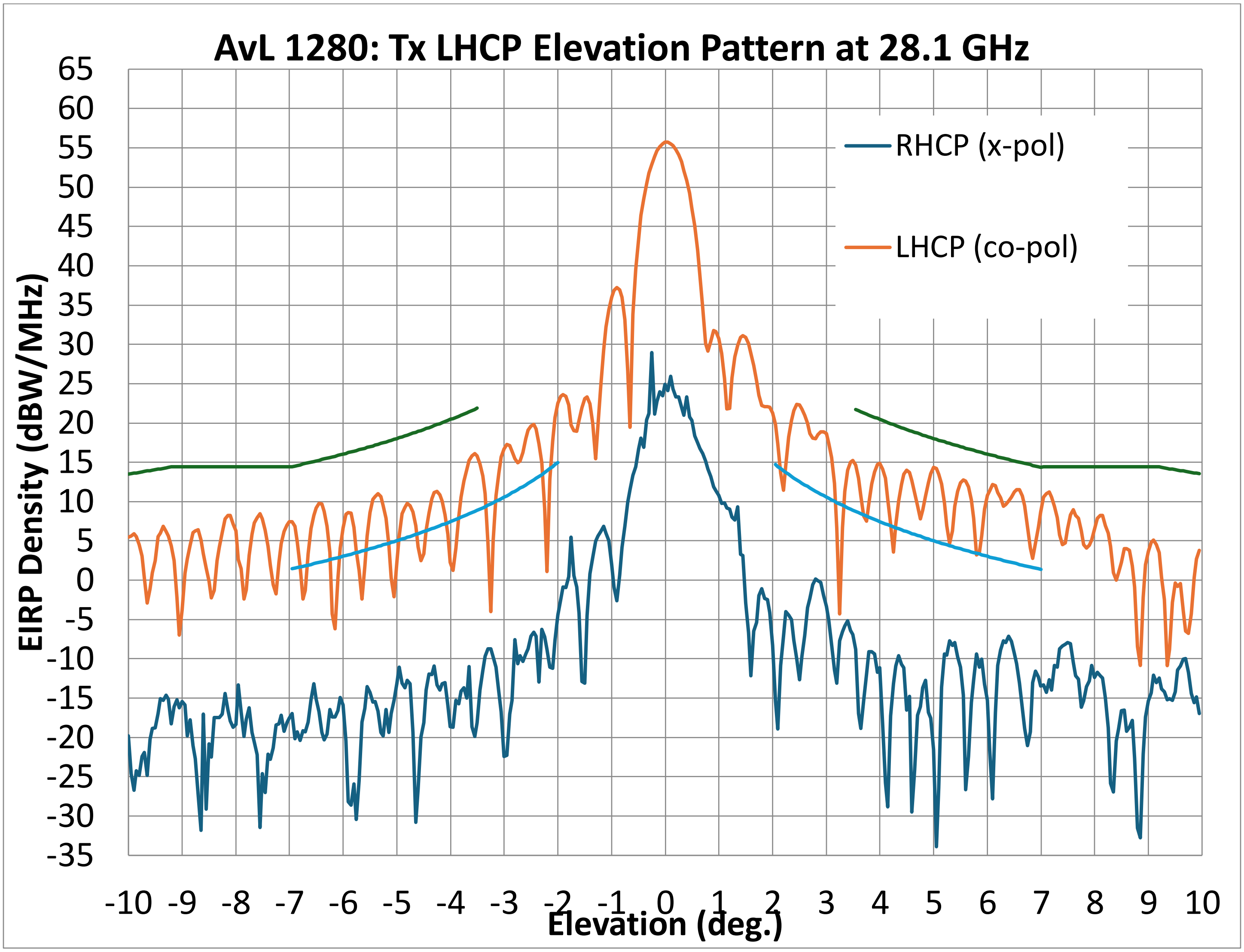
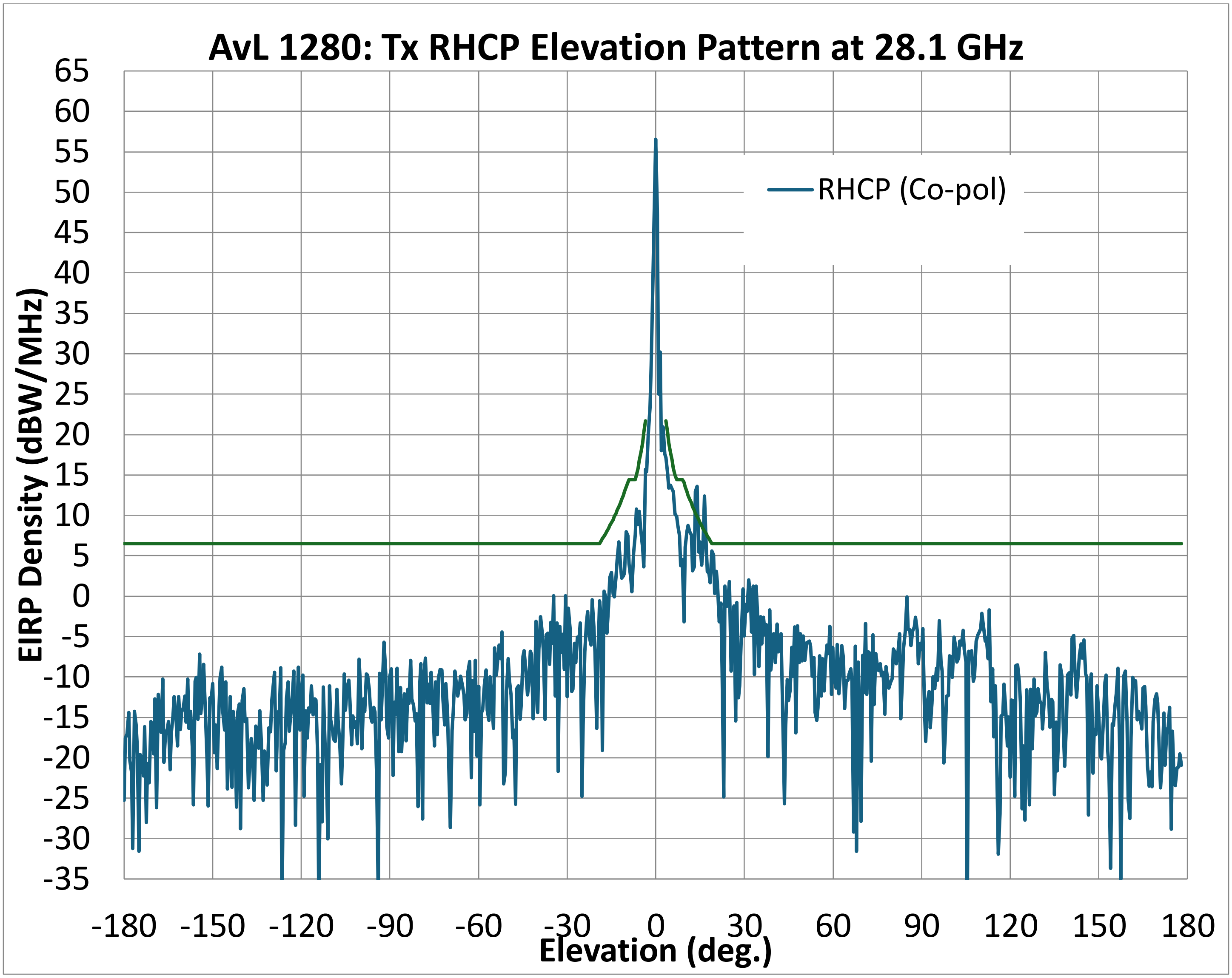
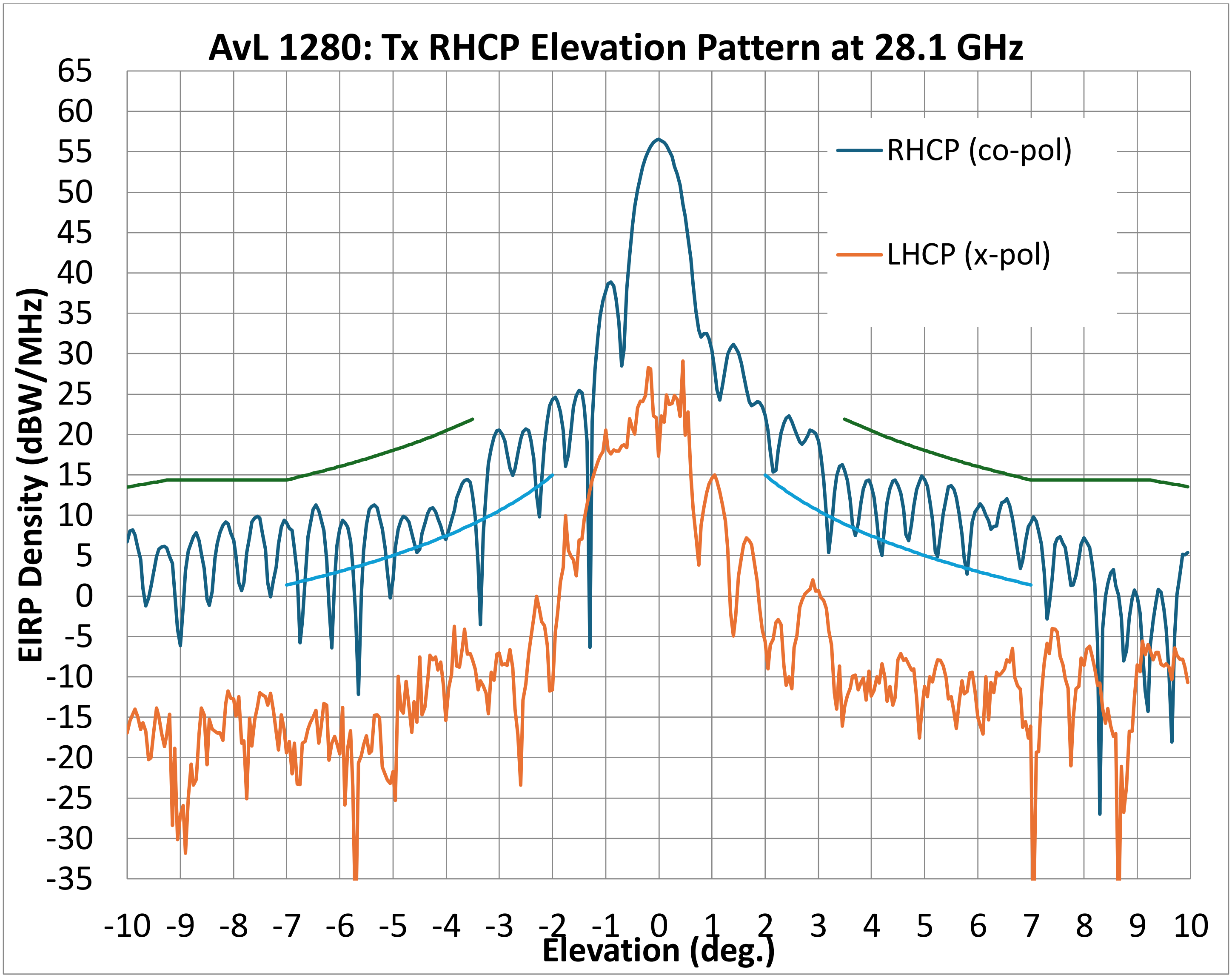
6
7
8
9
10


AvL 1280: Tx LHCP Elevation Pattern at 28.1 GHz
LHCP (Co-pol)
EIRP Density (dBW/MHz)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180
Elevation (deg.)



AvL 1280: Tx LHCP Elevation Pattern at 28.1 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Elevation (deg.)


AvL 1280: Tx RHCP Elevation Pattern at 28.1 GHz
RHCP (Co-pol)
EIRP Density (dBW/MHz)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180
Elevation (deg.)


AvL 1280: Tx RHCP Elevation Pattern at 28.1 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-10
-9
-8
-7
-6
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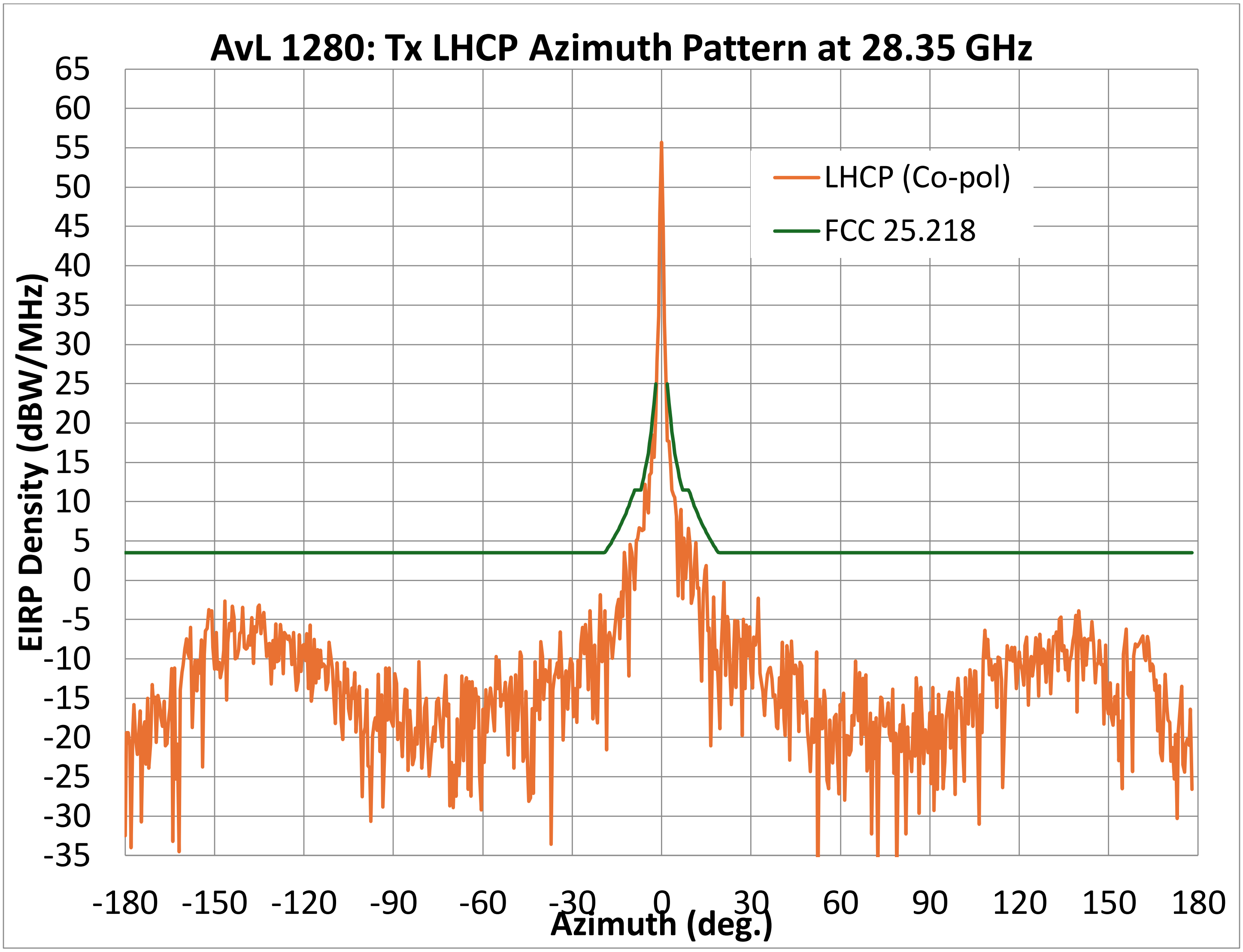
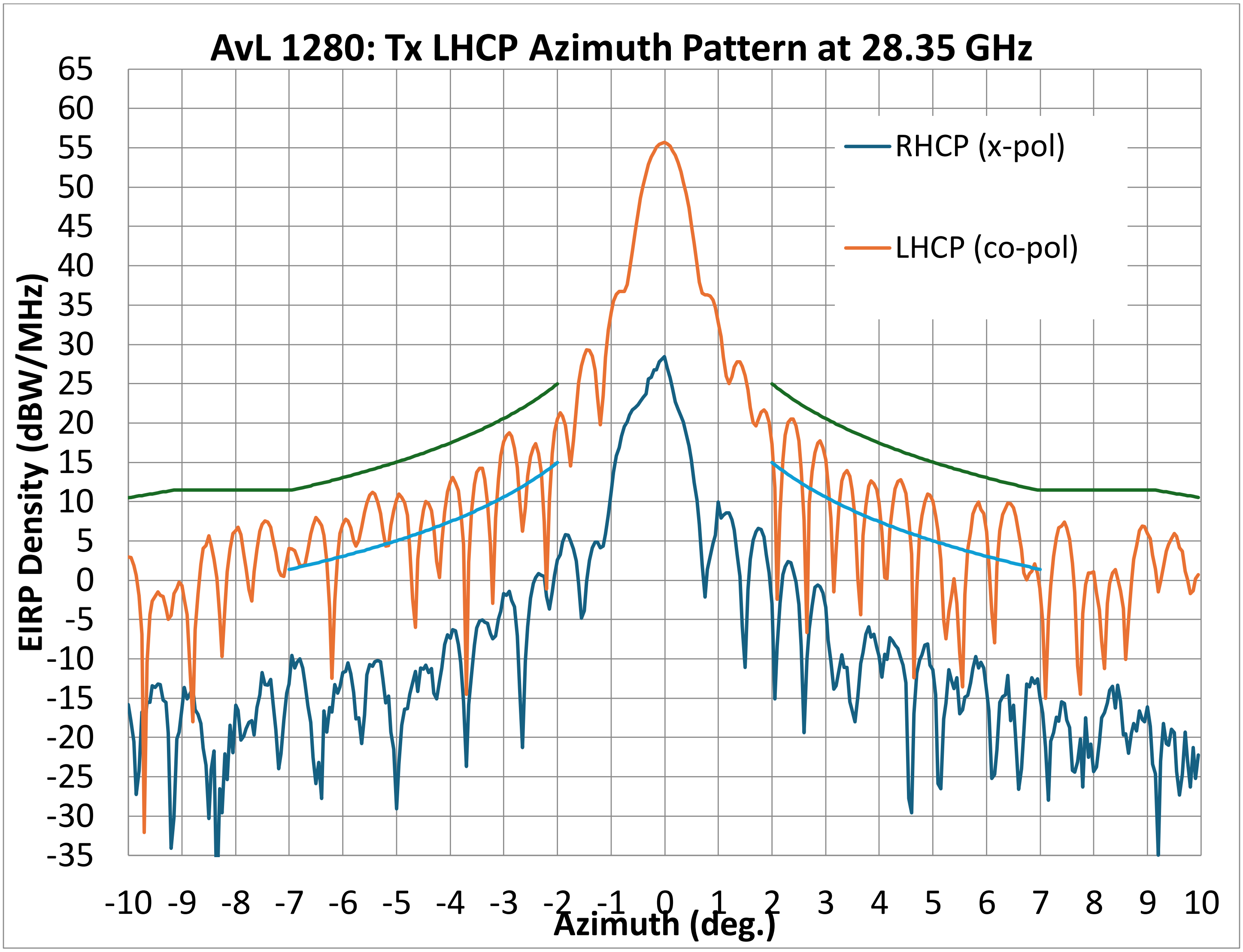
6
7
8
9
10


AvL 1280: Tx LHCP Azimuth Pattern at 28.35 GHz
LHCP (Co-pol)
FCC 25.218
EIRP Density (dBW/MHz)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180
Azimuth (deg.)



AvL 1280: Tx LHCP Azimuth Pattern at 28.35 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
Azimuth (deg.)
65
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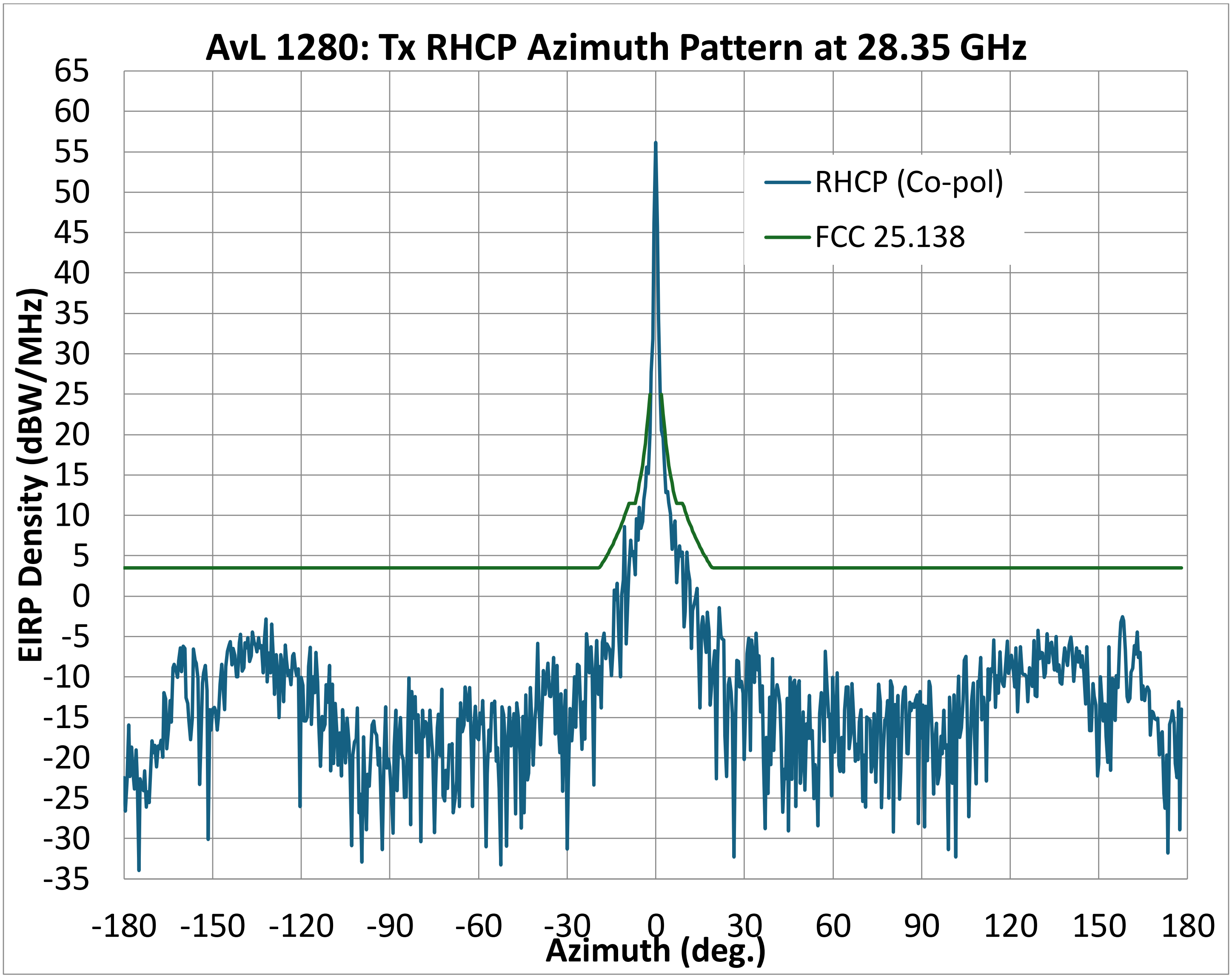
AvL 1280: Tx RHCP Azimuth Pattern at 28.35 GHz
RHCP (Co-pol)
FCC 25.138
EIRP Density (dBW/MHz)
Azimuth (deg.)
65
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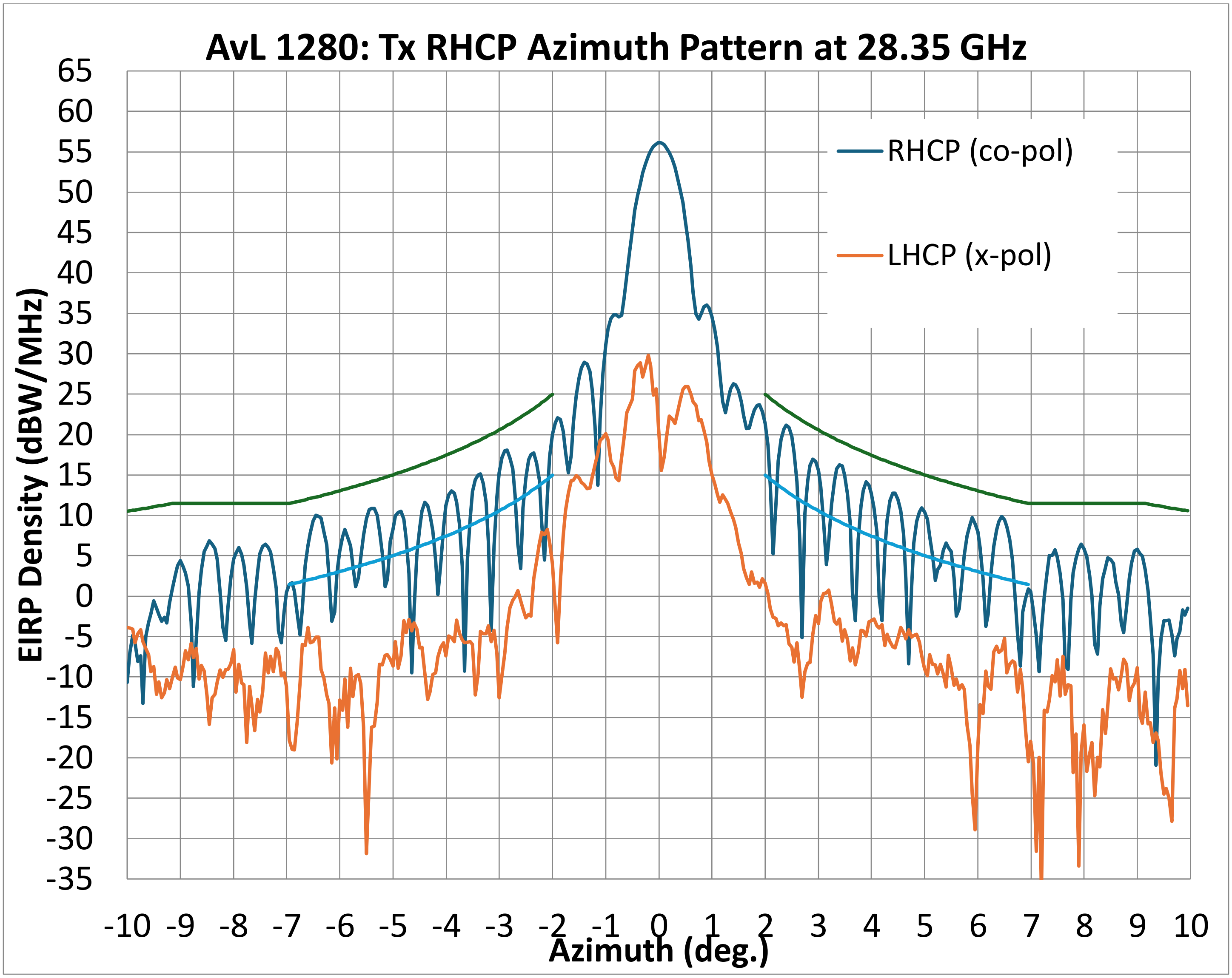
AvL 1280: Tx RHCP Azimuth Pattern at 28.35 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
RHCP (co-pol)
LHCP (x-pol)
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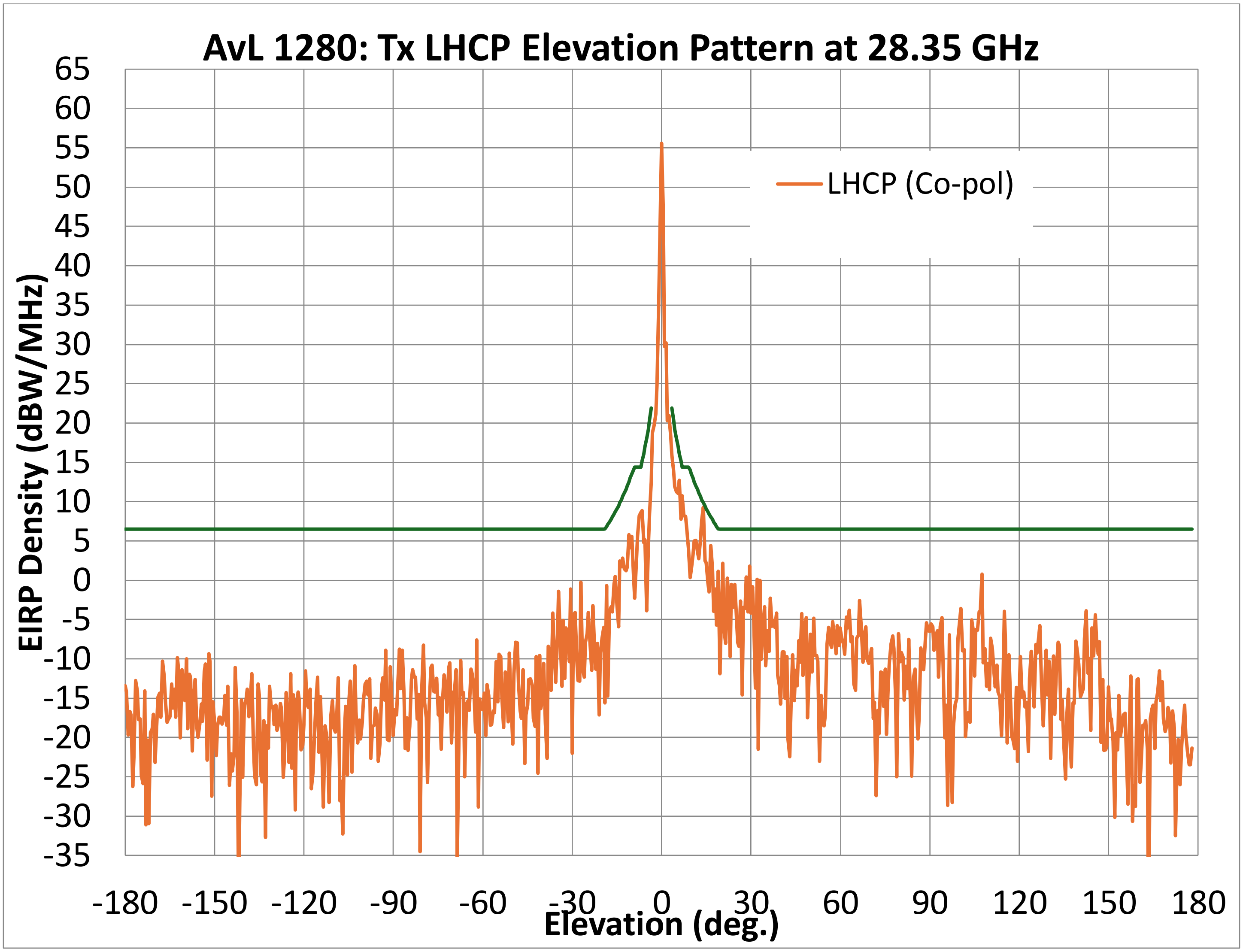
AvL 1280: Tx LHCP Elevation Pattern at 28.35 GHz
LHCP (Co-pol)
EIRP Density (dBW/MHz)
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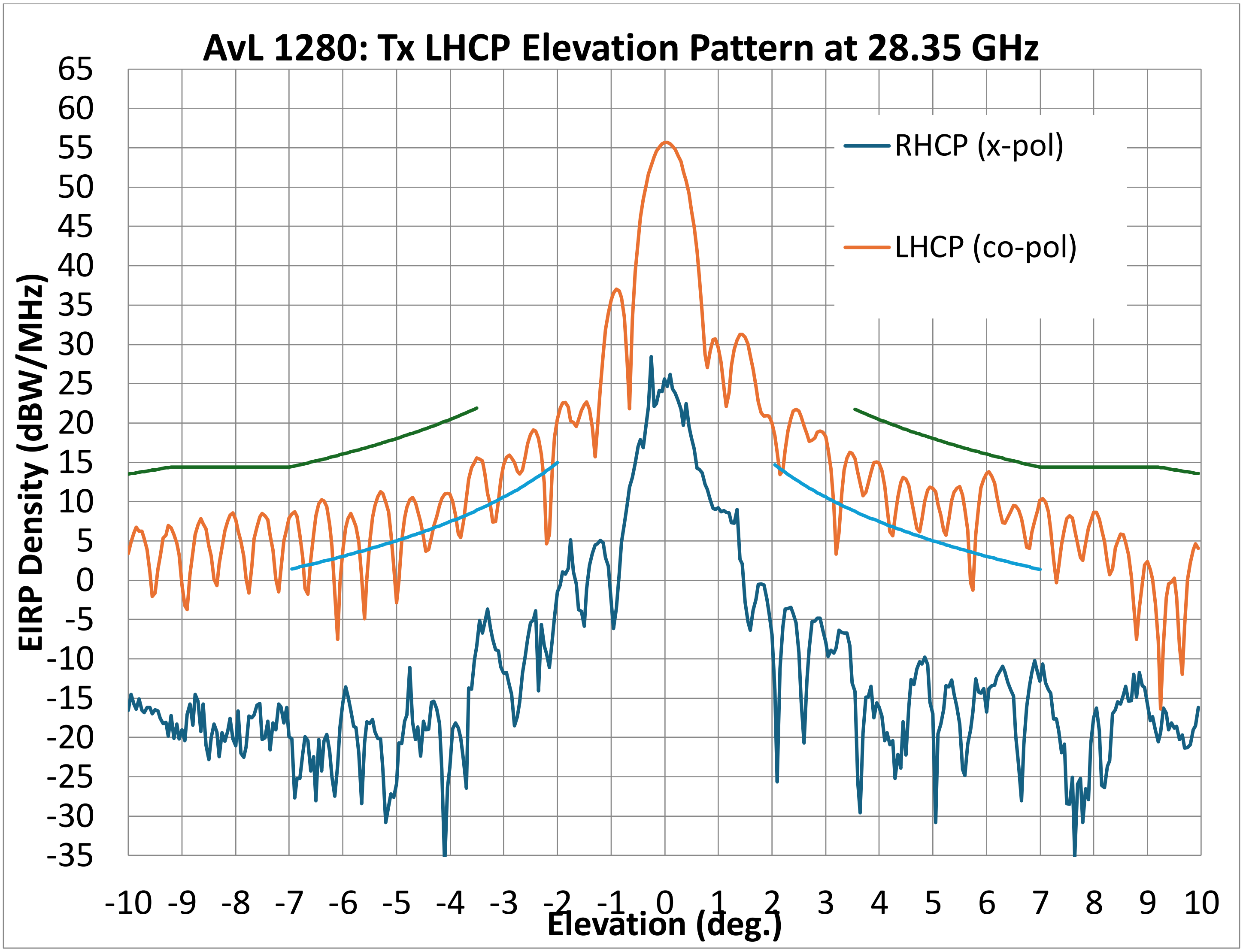
Elevation (deg.)


AvL 1280: Tx LHCP Elevation Pattern at 28.35 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
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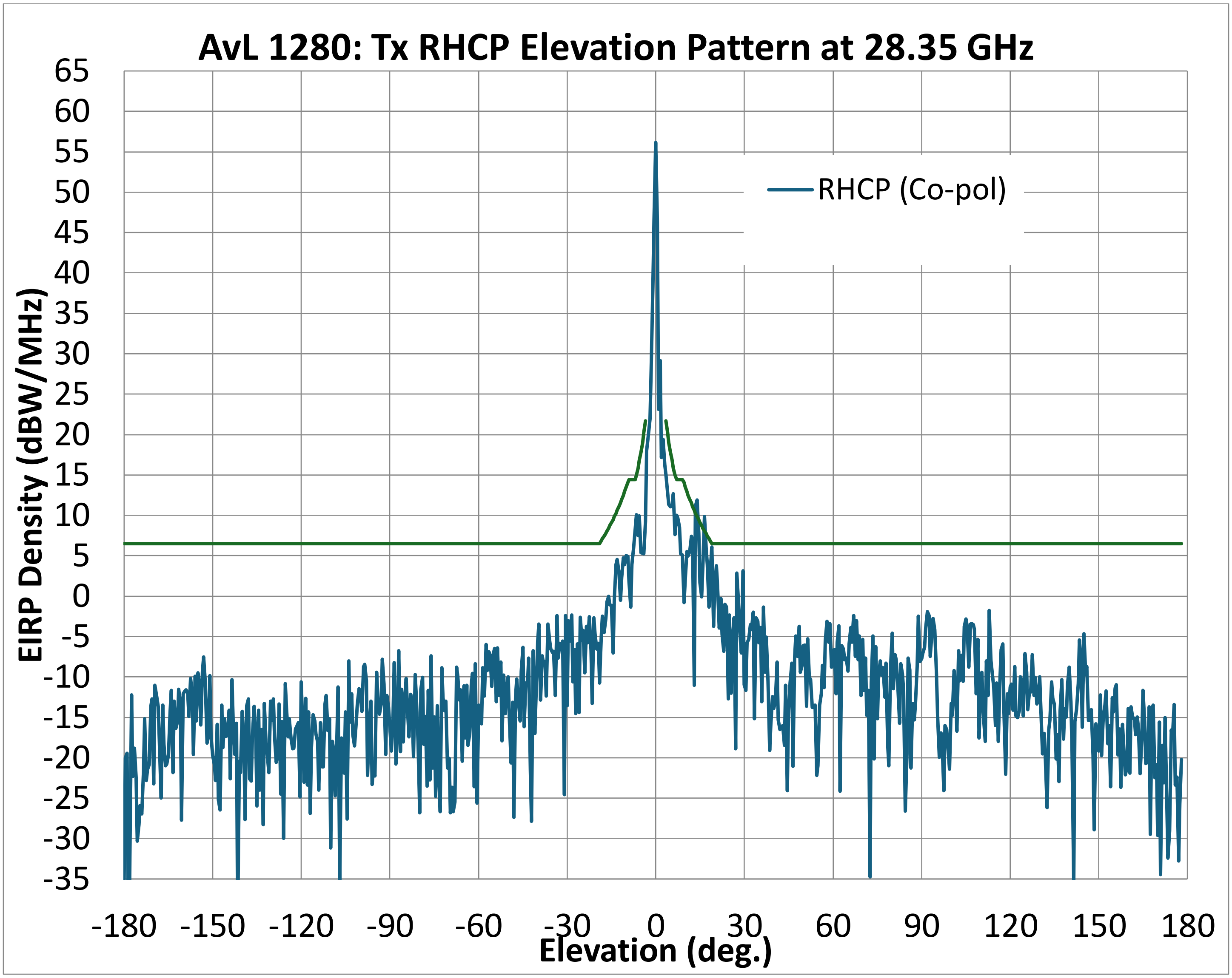
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Elevation (deg.)


AvL 1280: Tx RHCP Elevation Pattern at 28.35 GHz
RHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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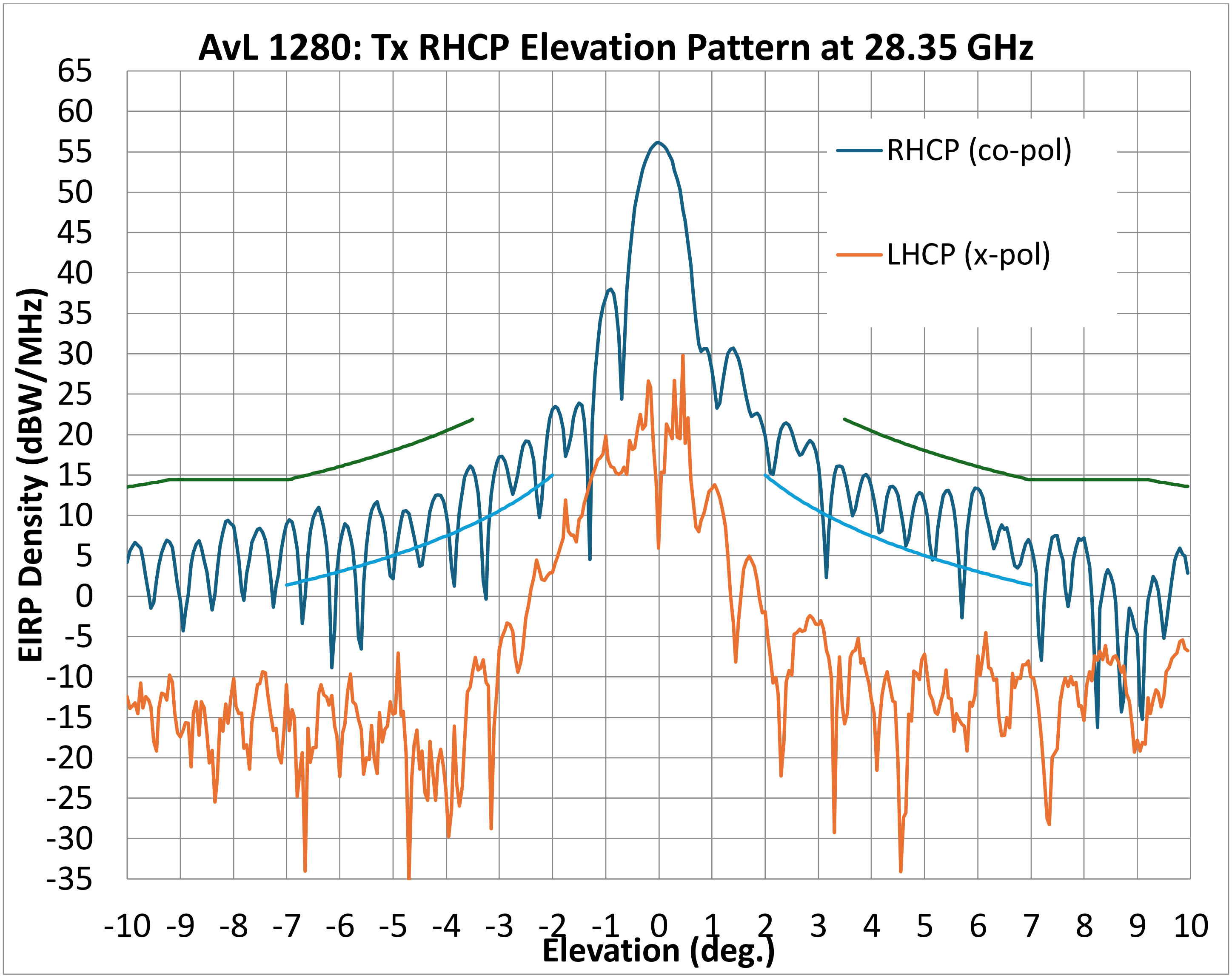

AvL 1280: Tx RHCP Elevation Pattern at 28.35 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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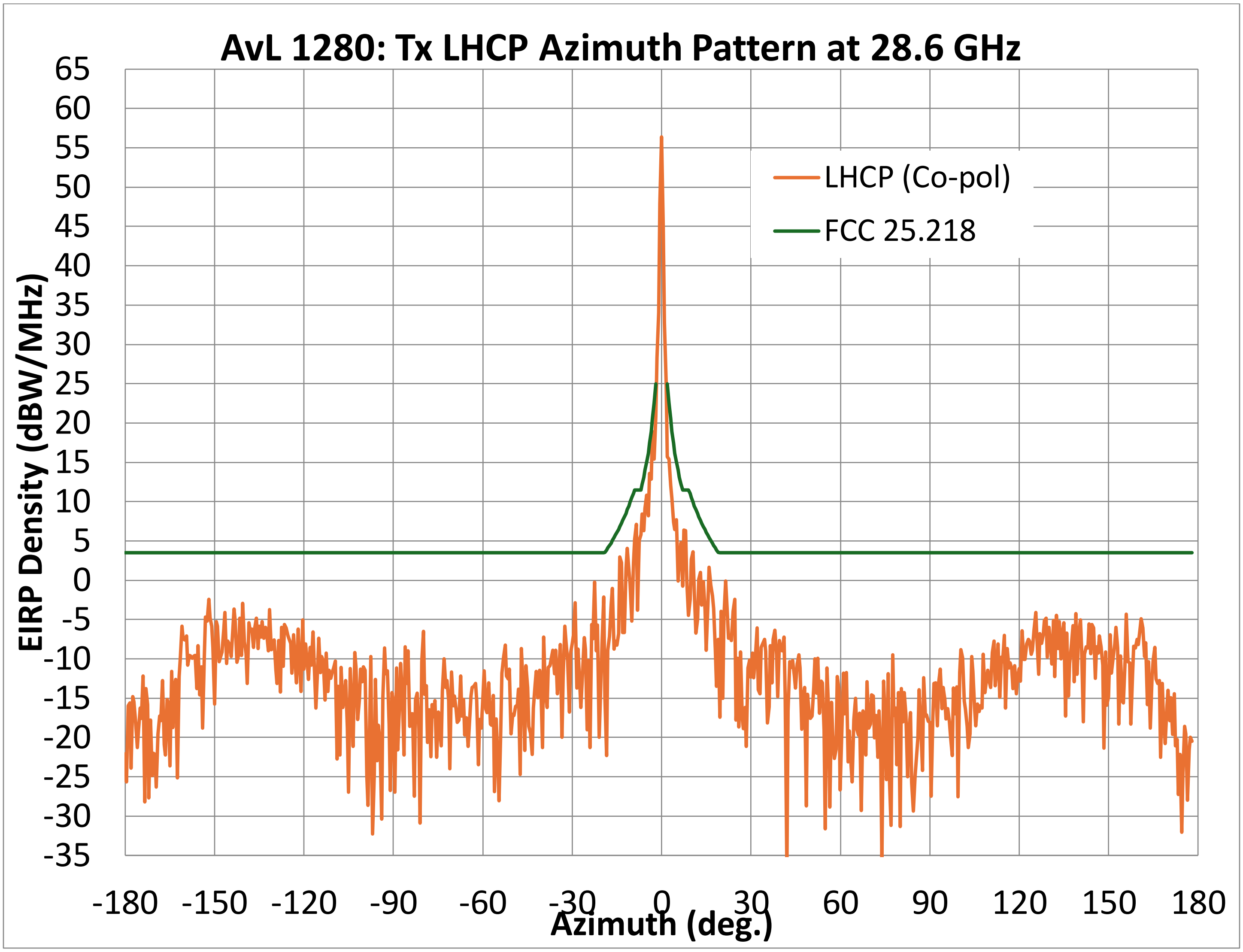

AvL 1280: Tx LHCP Azimuth Pattern at 28.6 GHz
LHCP (Co-pol)
FCC 25.218
EIRP Density (dBW/MHz)
65
60
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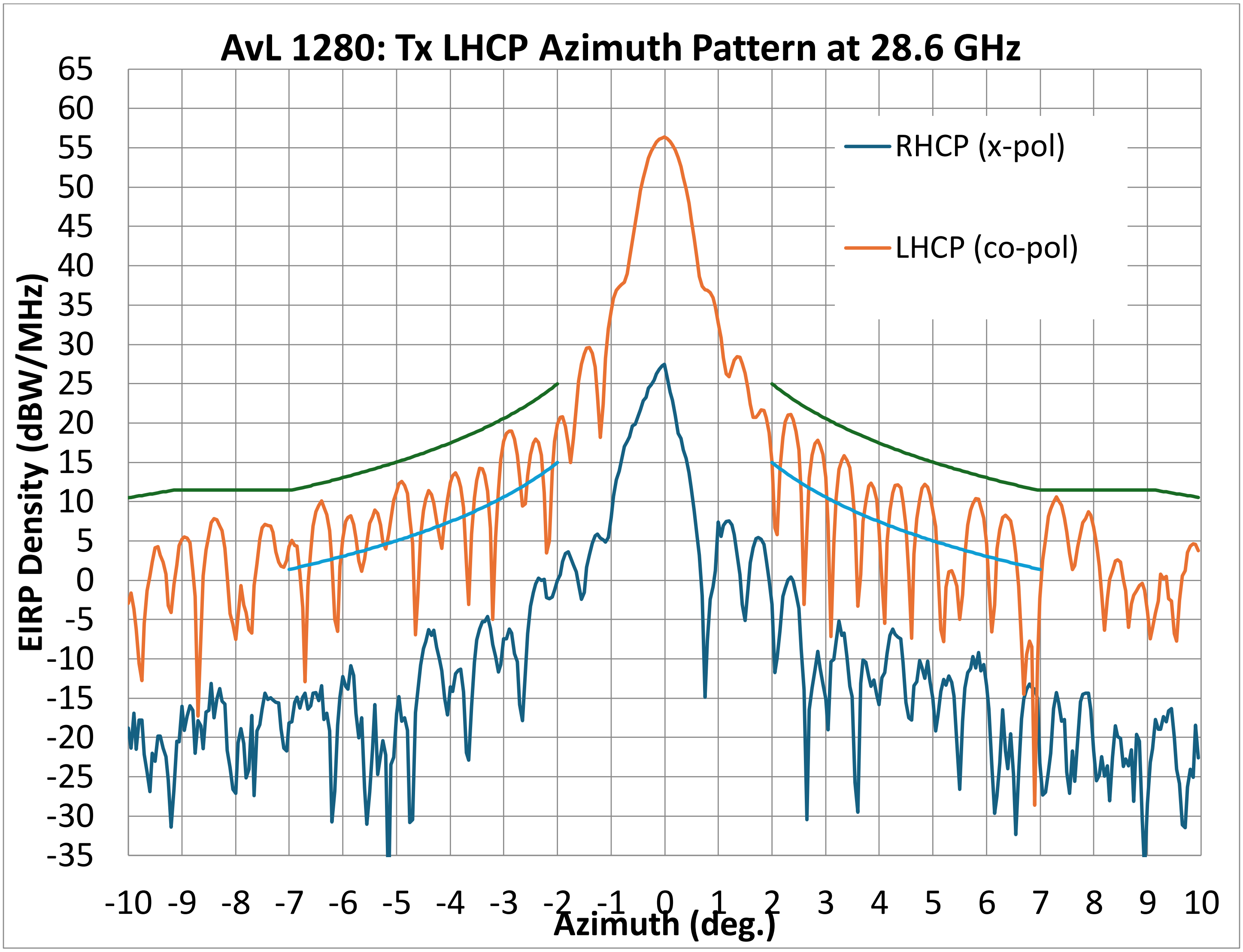
Azimuth (deg.)



AvL 1280: Tx LHCP Azimuth Pattern at 28.6 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
Azimuth (deg.)
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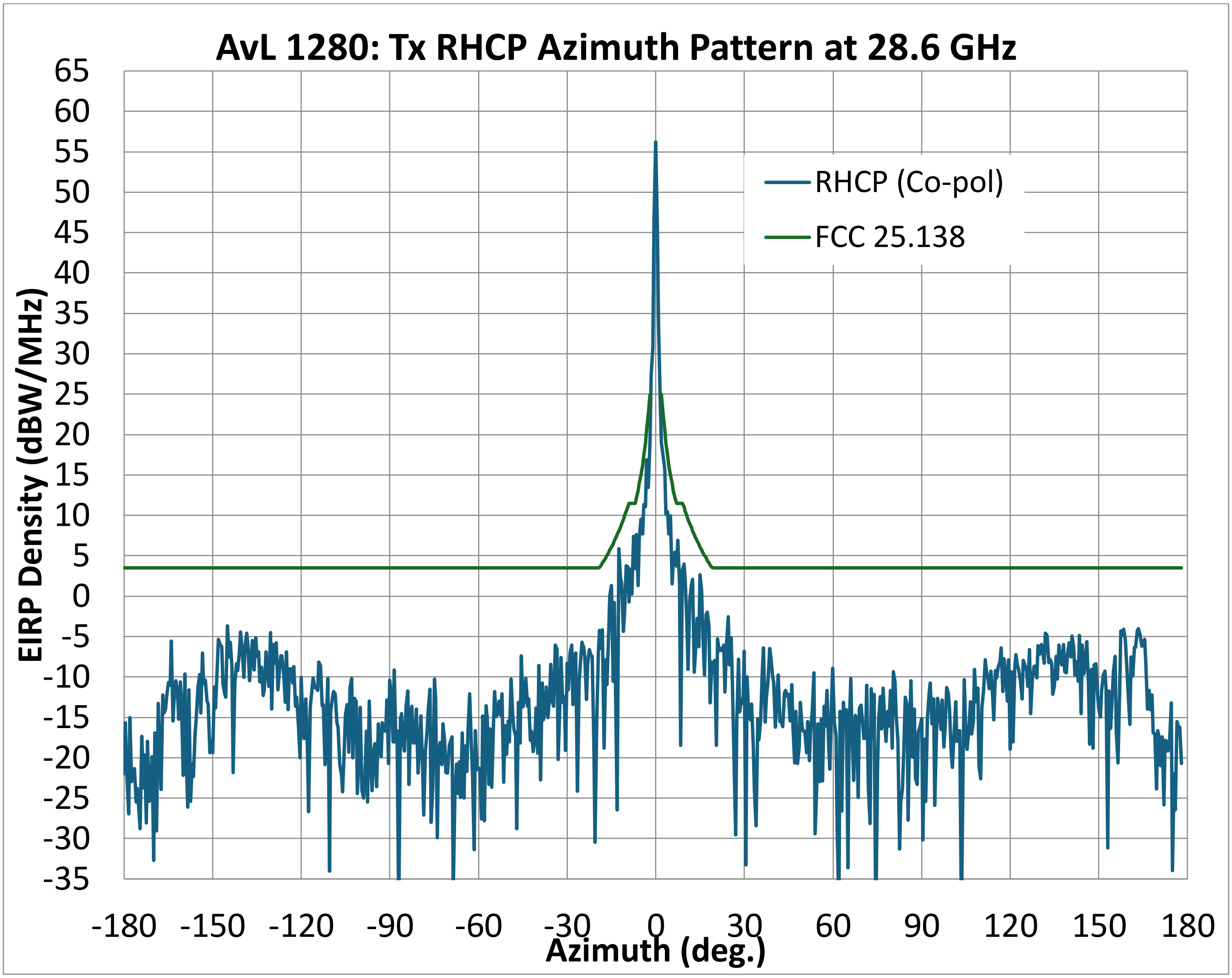
AvL 1280: Tx RHCP Azimuth Pattern at 28.6 GHz
EIRP Density (dBW/MHz)
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RHCP (Co-pol)
FCC 25.138
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150
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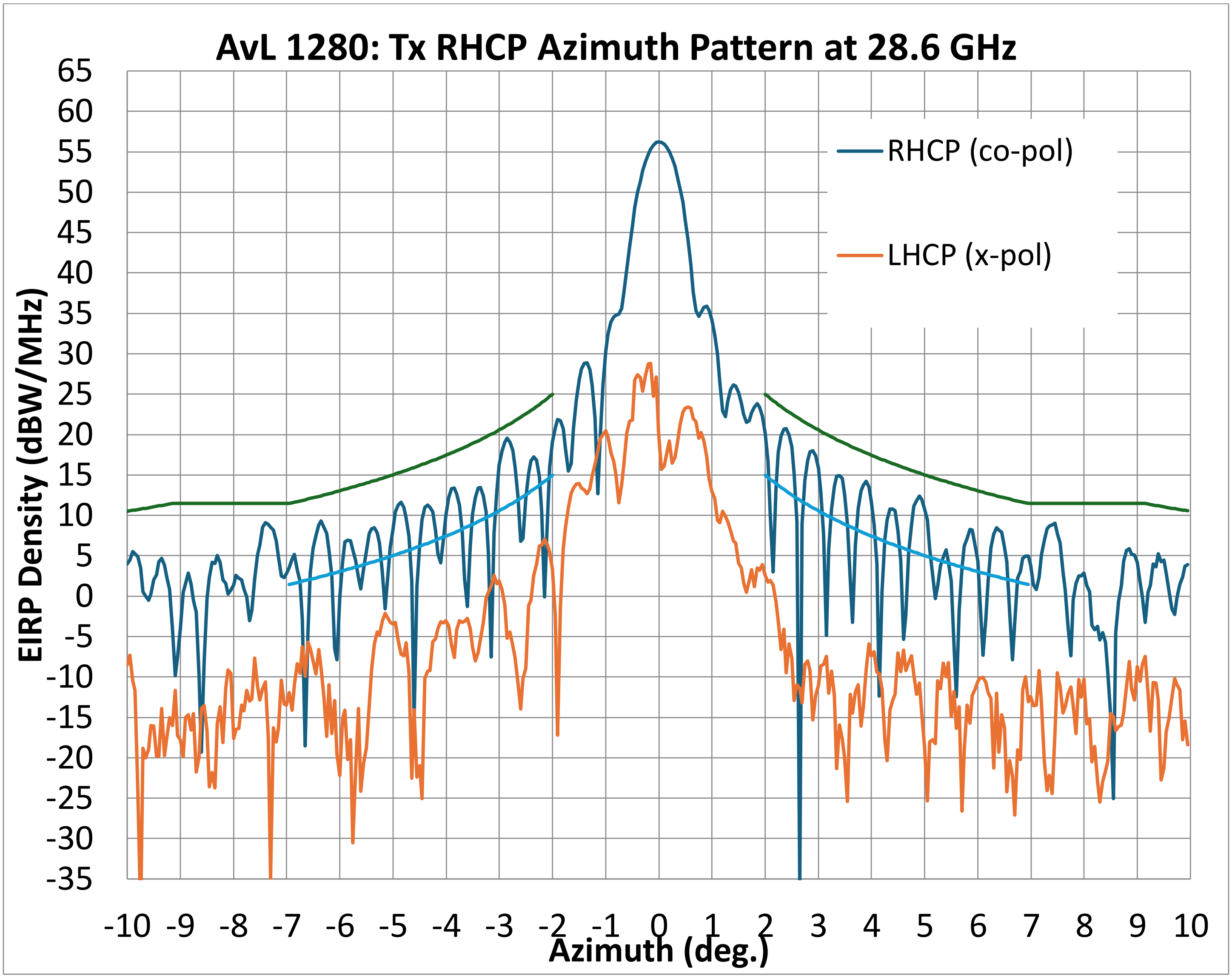
Azimuth (deg.)


AvL 1280: Tx RHCP Azimuth Pattern at 28.6 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Azimuth (deg.)
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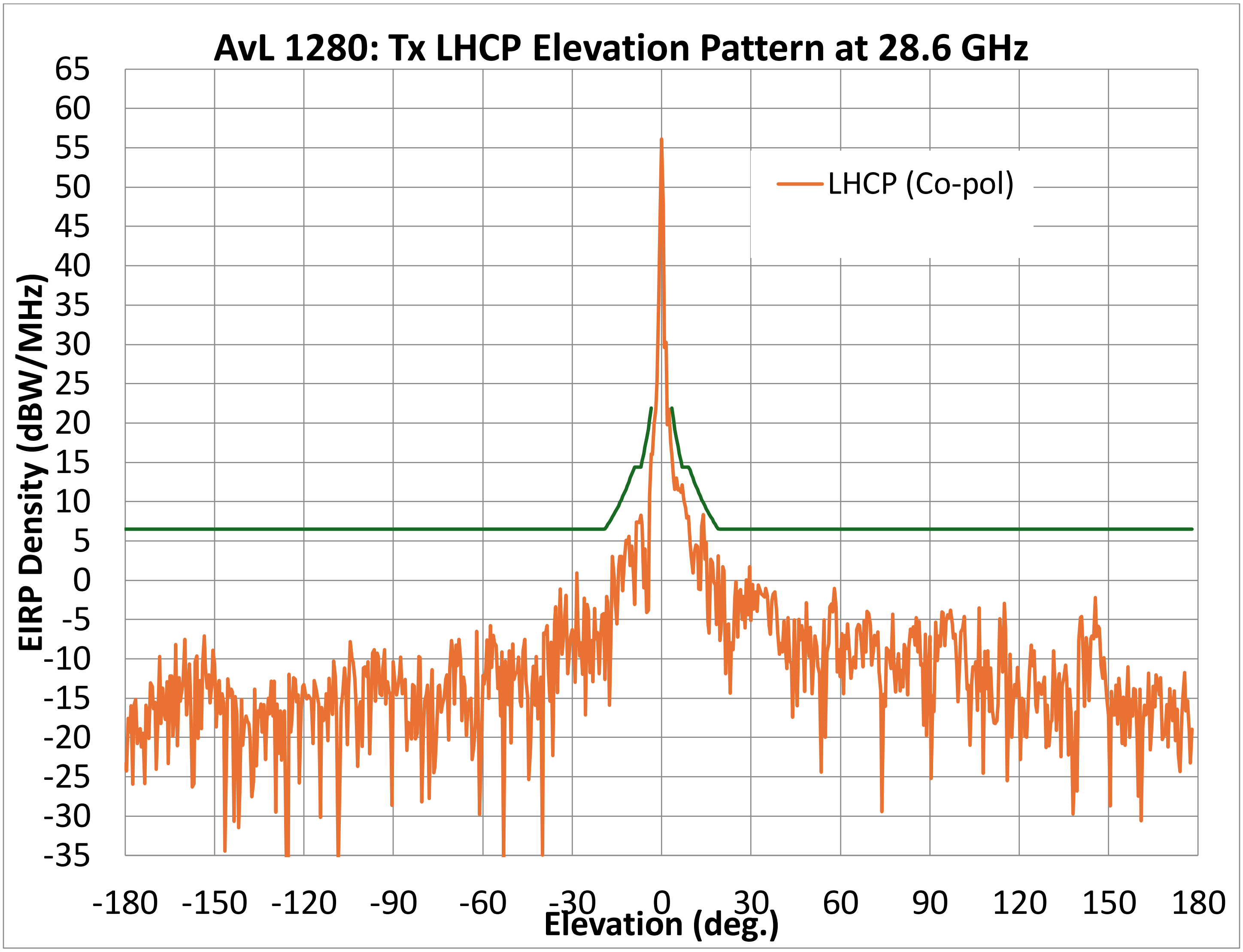
AvL 1280: Tx LHCP Elevation Pattern at 28.6 GHz
LHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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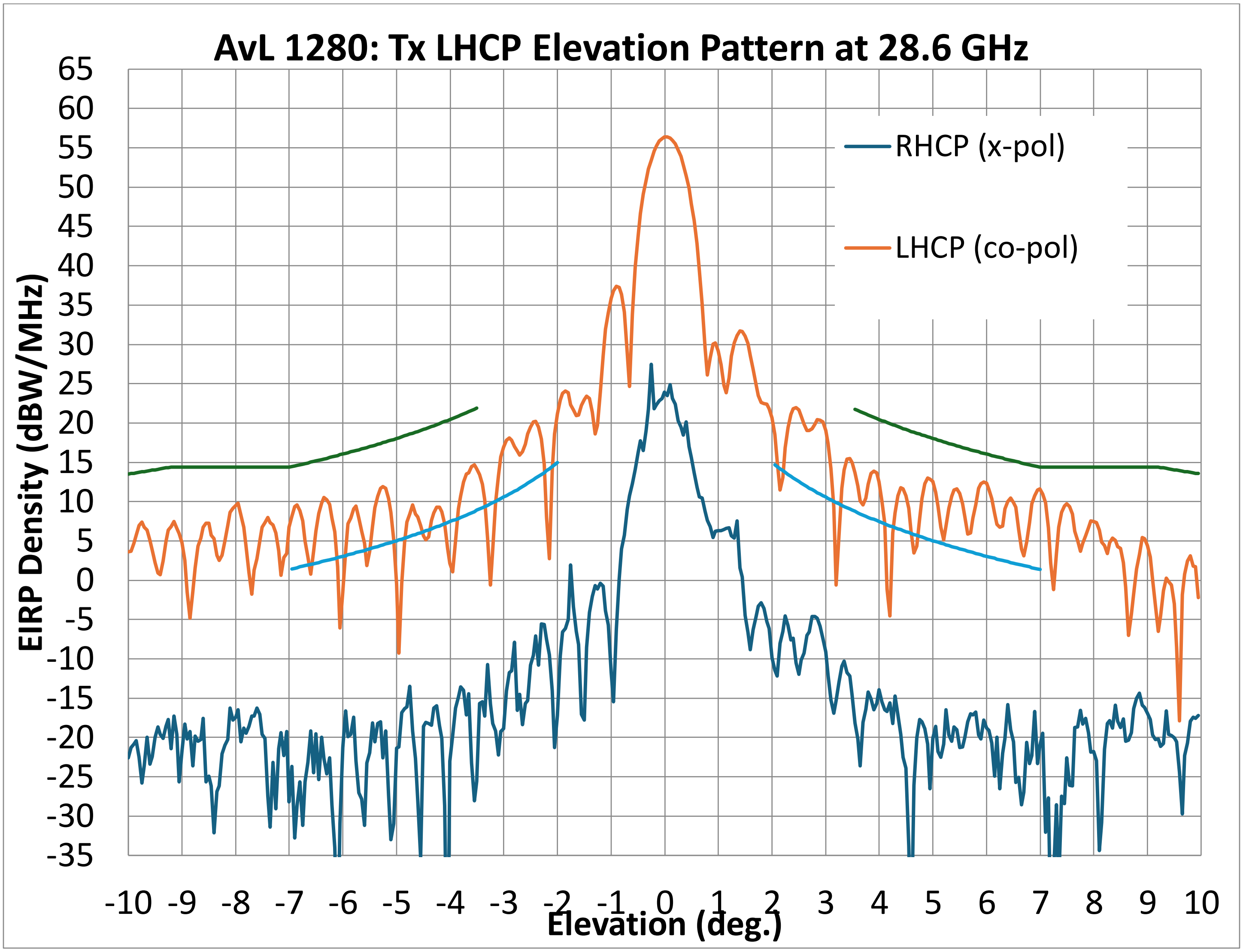
AvL 1280: Tx LHCP Elevation Pattern at 28.6 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
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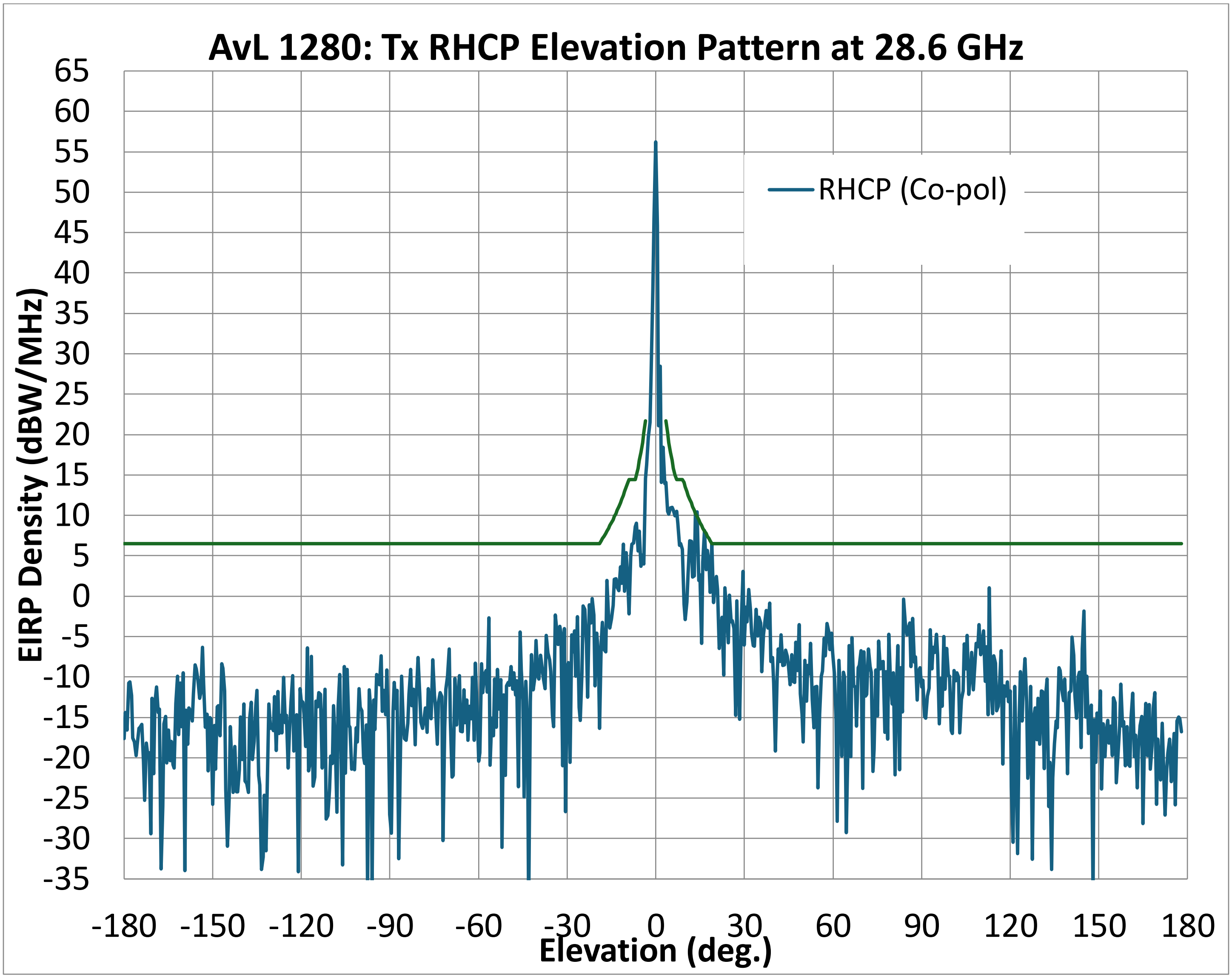
Elevation (deg.)



AvL 1280: Tx RHCP Elevation Pattern at 28.6 GHz
RHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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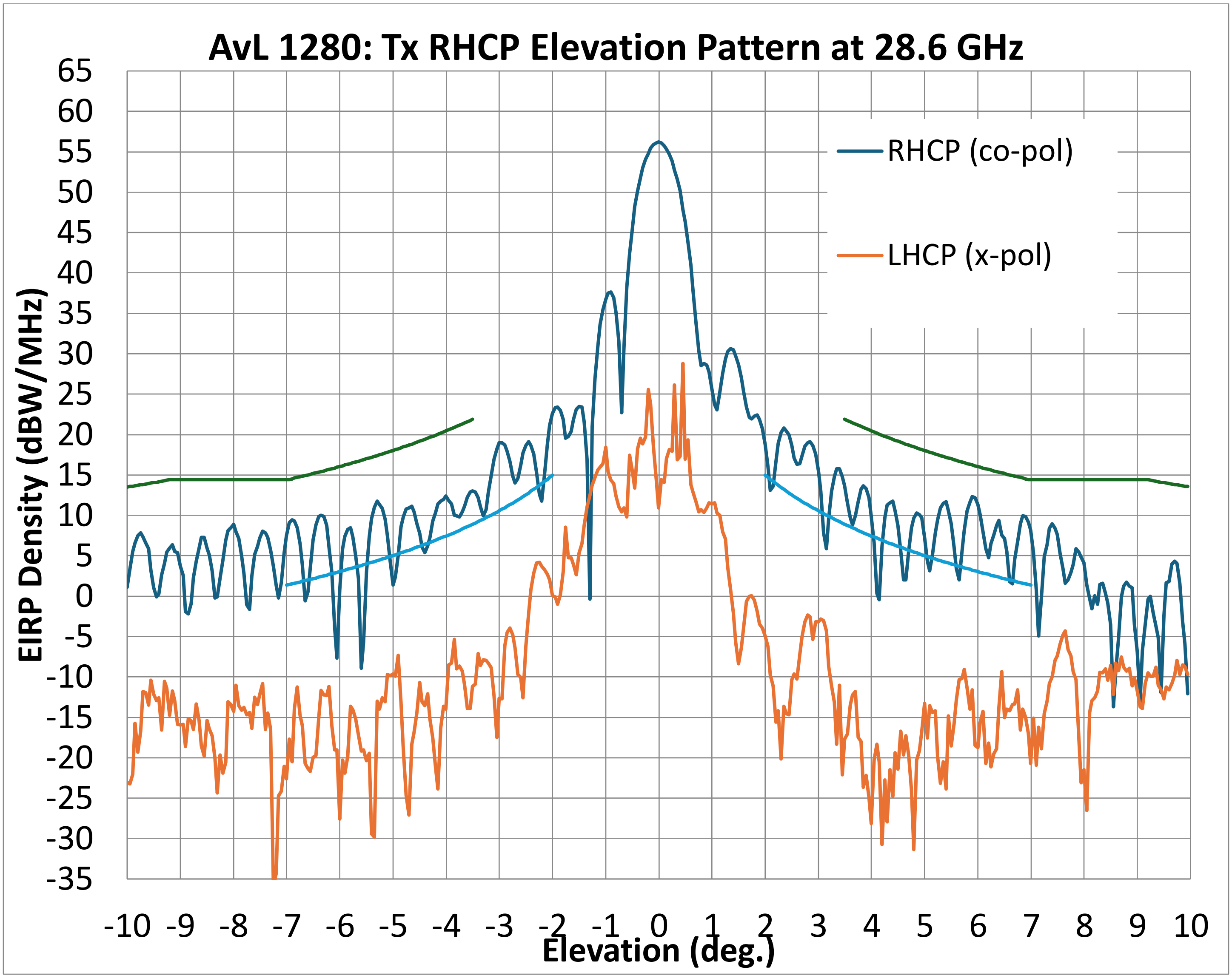
AvL 1280: Tx RHCP Elevation Pattern at 28.6 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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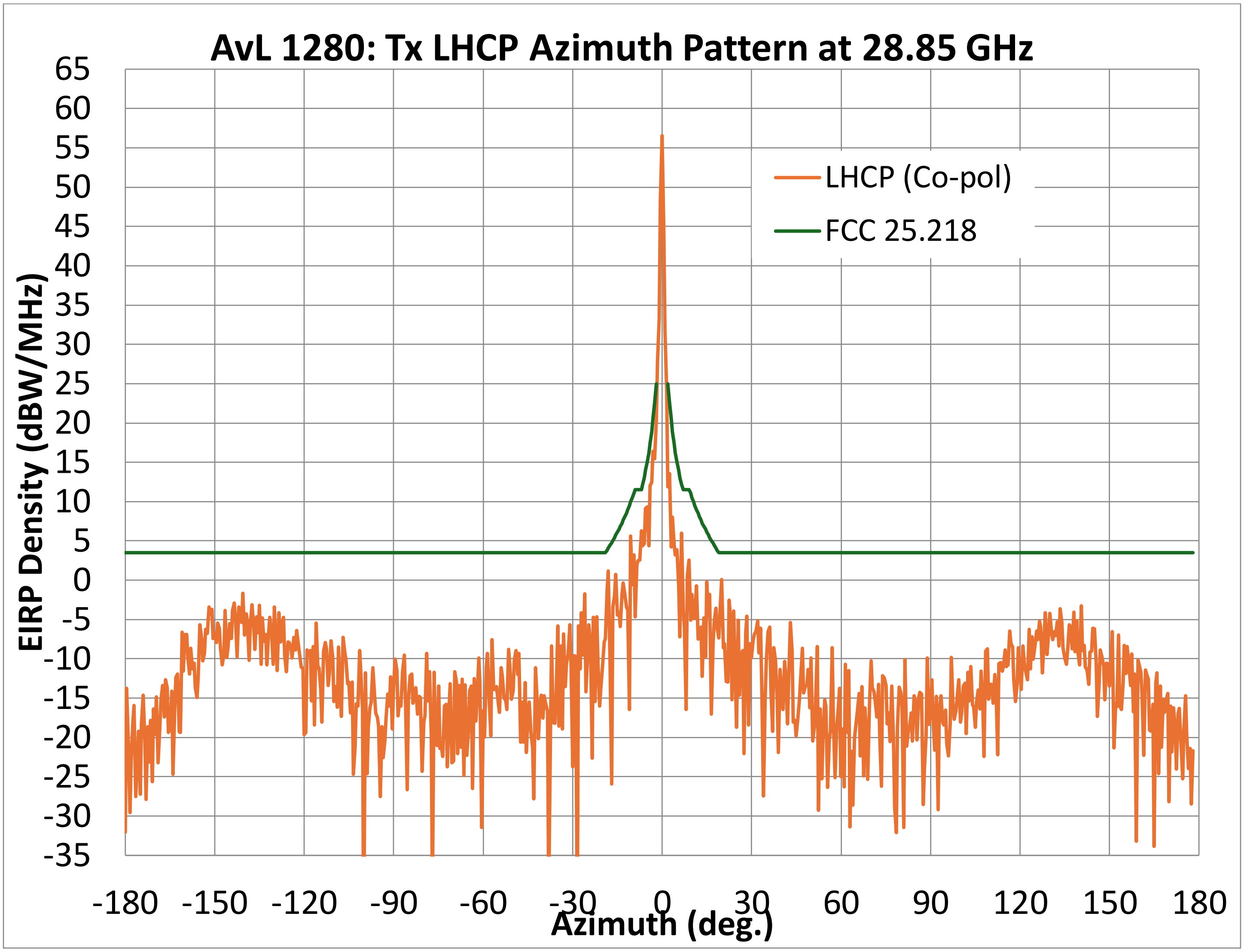

AvL 1280: Tx LHCP Azimuth Pattern at 28.85 GHz
LHCP (Co-pol)
FCC 25.218
EIRP Density (dBW/MHz)
65
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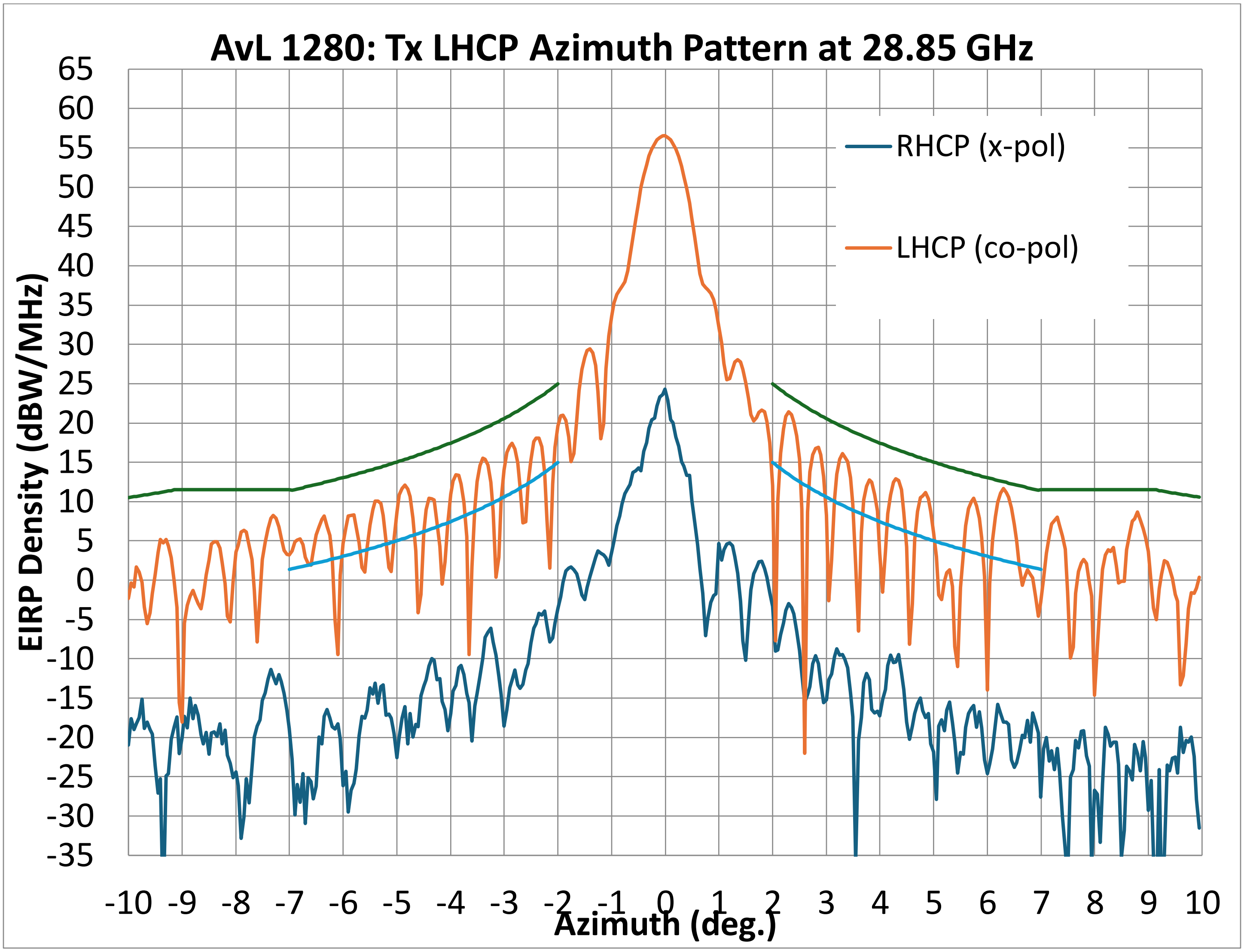
Azimuth (deg.)


AvL 1280: Tx LHCP Azimuth Pattern at 28.85 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
RHCP (x-pol)
LHCP (co-pol)
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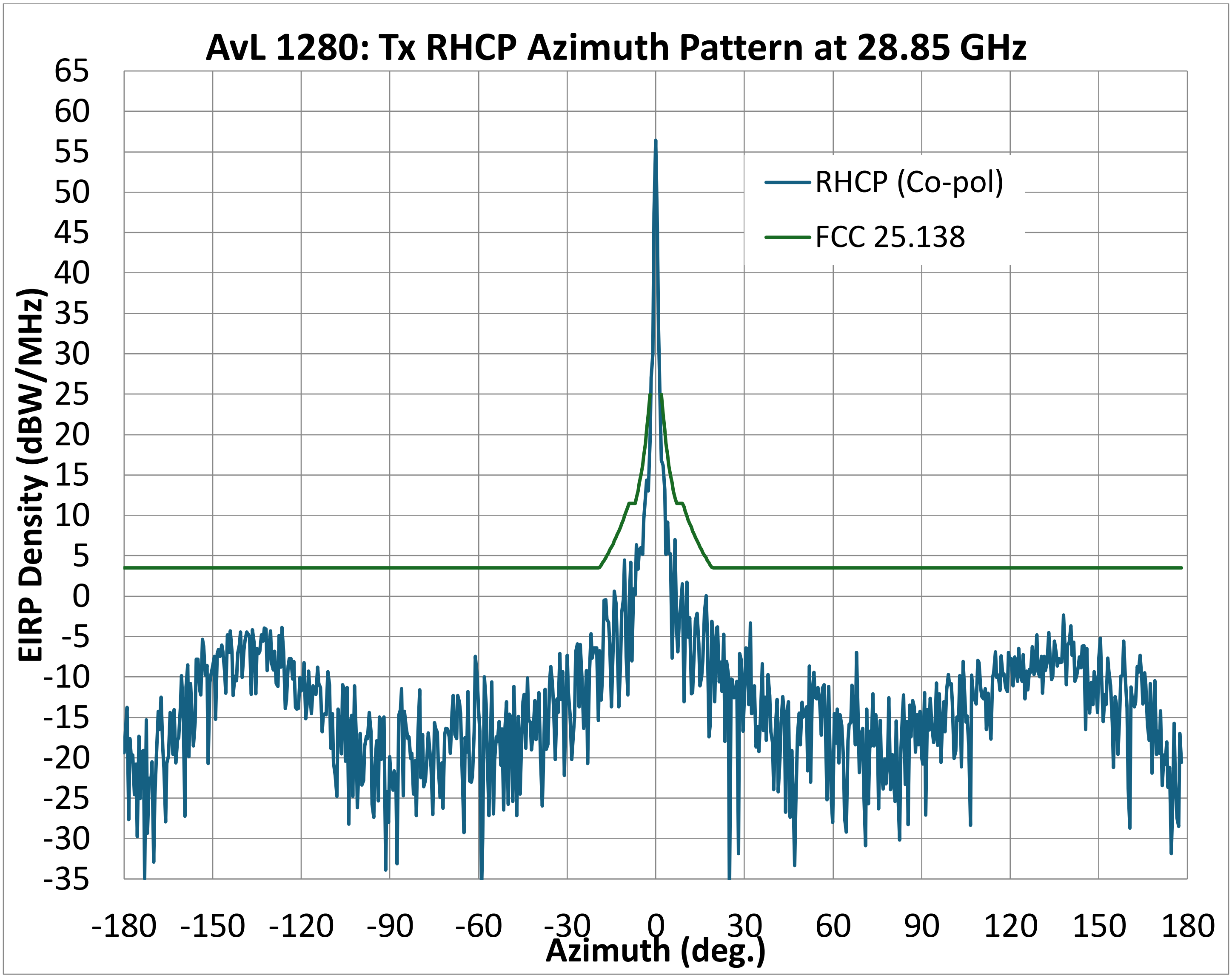
AvL 1280: Tx RHCP Azimuth Pattern at 28.85 GHz
RHCP (Co-pol)
FCC 25.138
EIRP Density (dBW/MHz)
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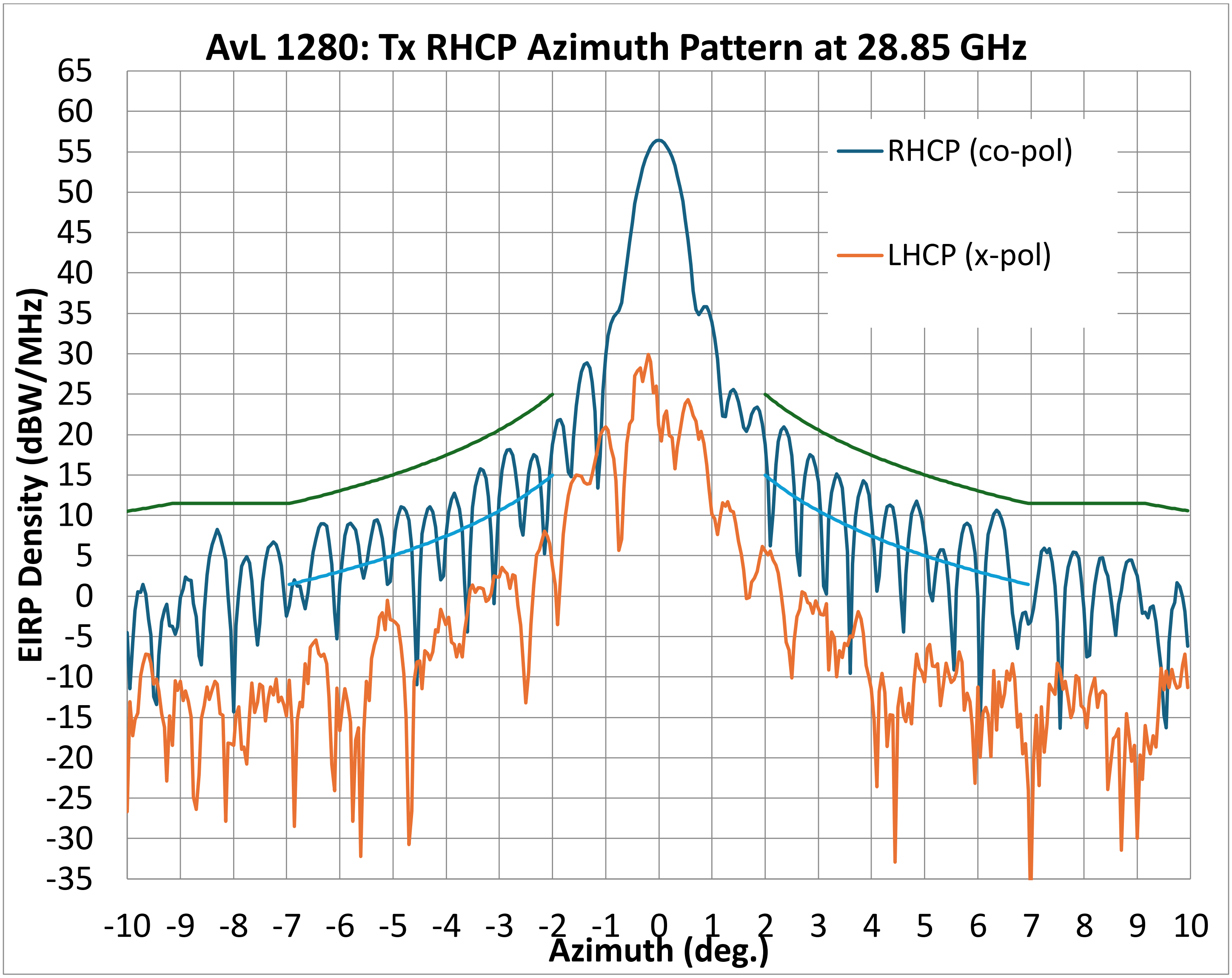
Azimuth (deg.)



AvL 1280: Tx RHCP Azimuth Pattern at 28.85 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
RHCP (co-pol)
LHCP (x-pol)
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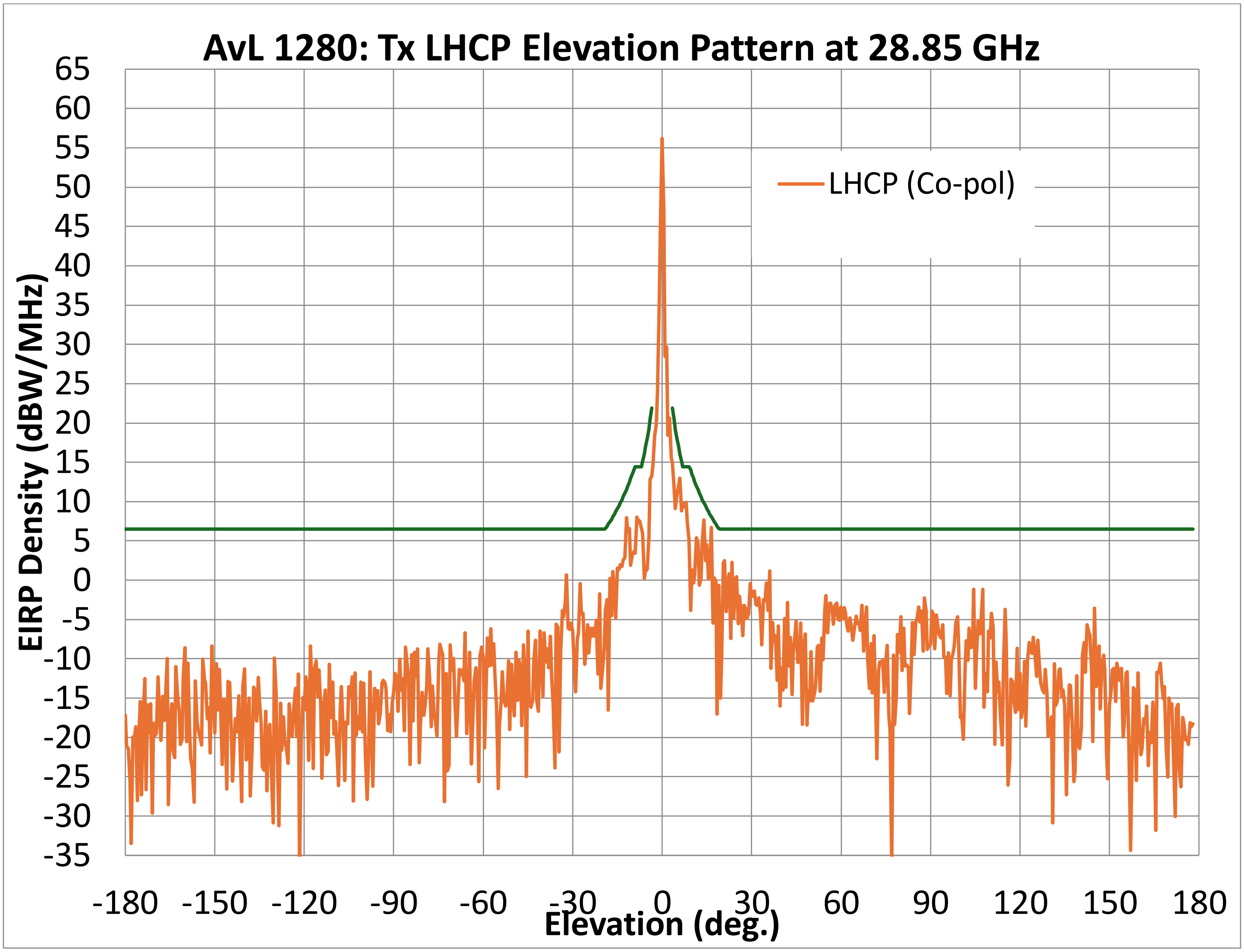
AvL 1280: Tx LHCP Elevation Pattern at 28.85 GHz
LHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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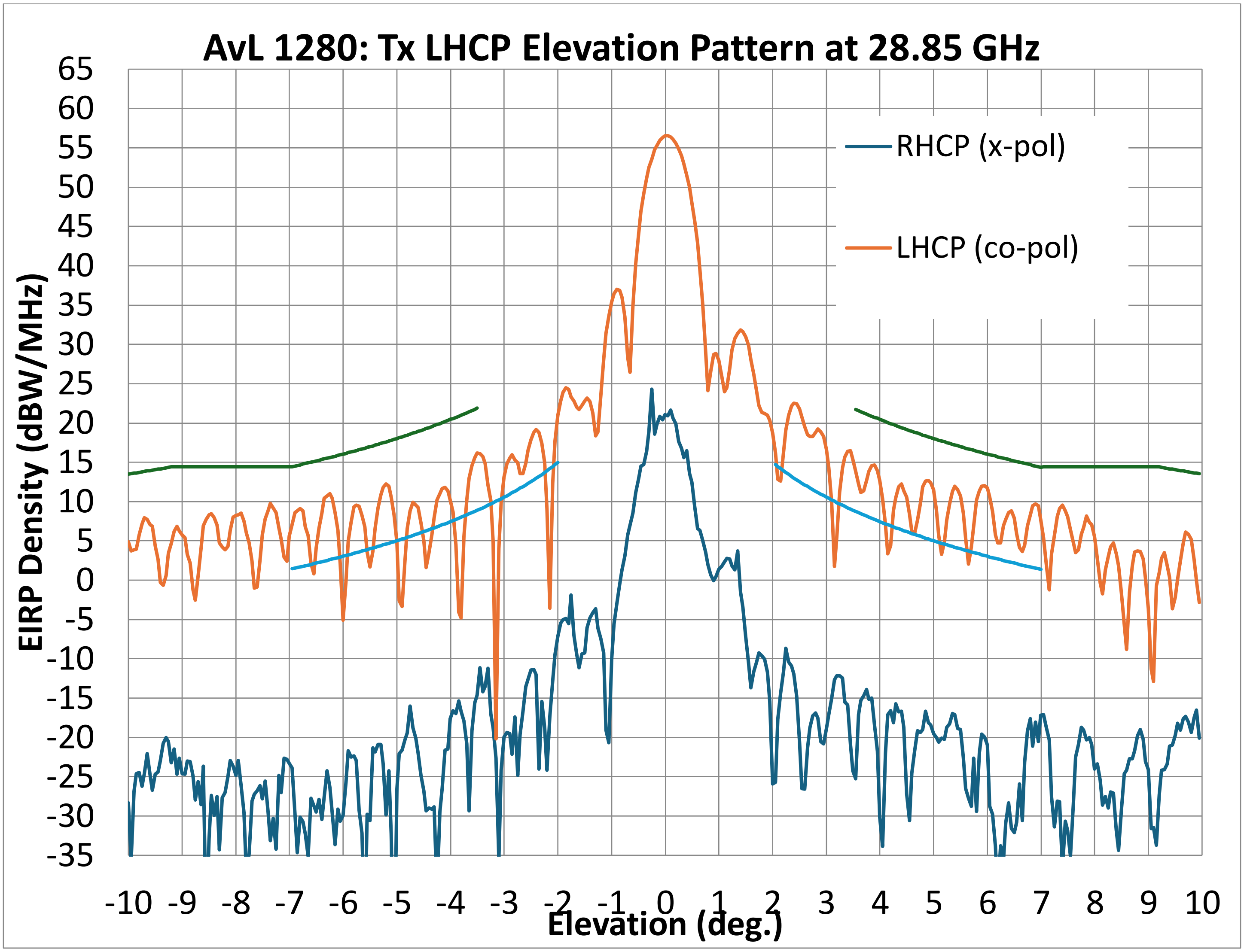

AvL 1280: Tx LHCP Elevation Pattern at 28.85 GHz
EIRP Density (dBW/MHz)
Elevation (deg.)
RHCP (x-pol)
LHCP (co-pol)
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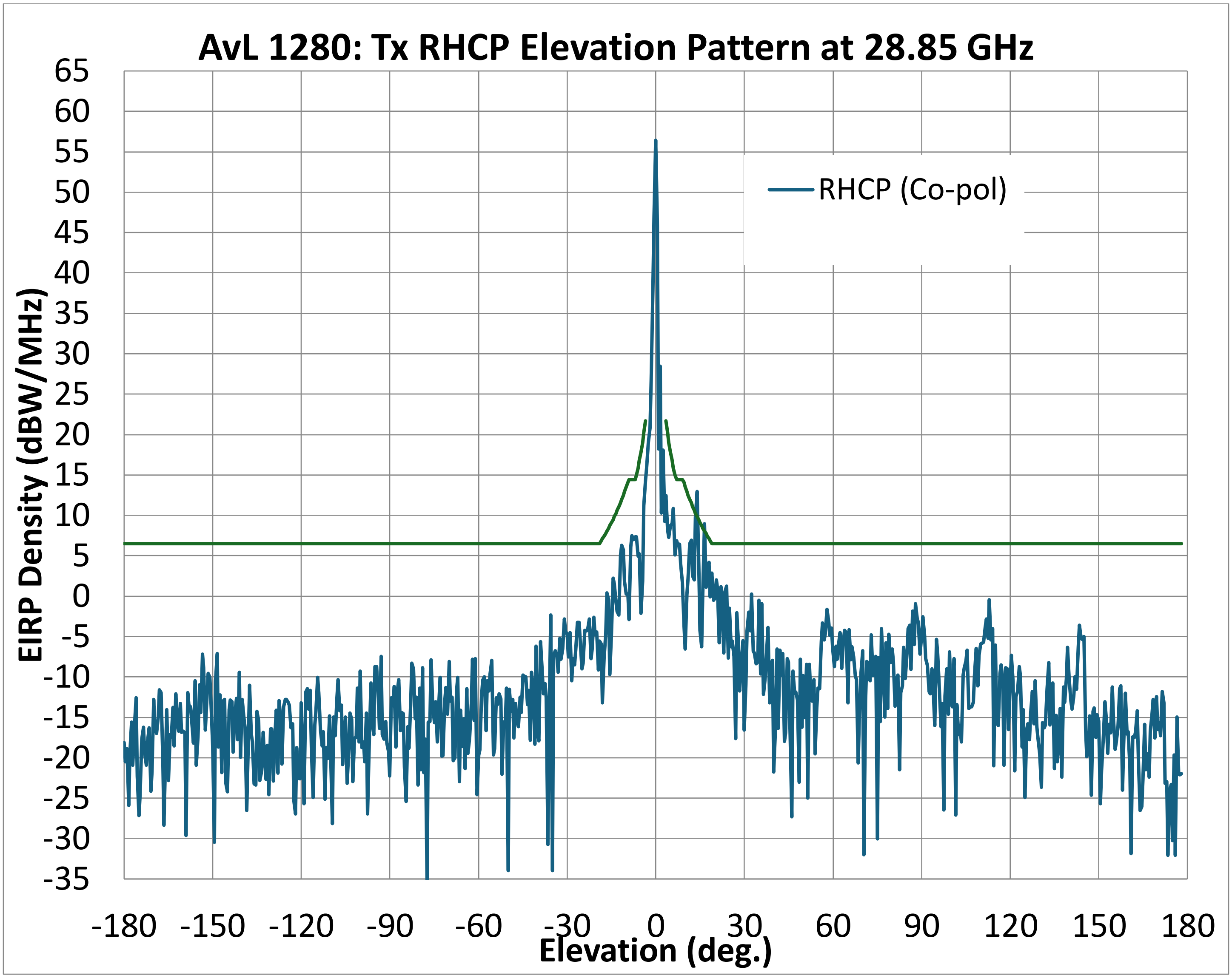
AvL 1280: Tx RHCP Elevation Pattern at 28.85 GHz
RHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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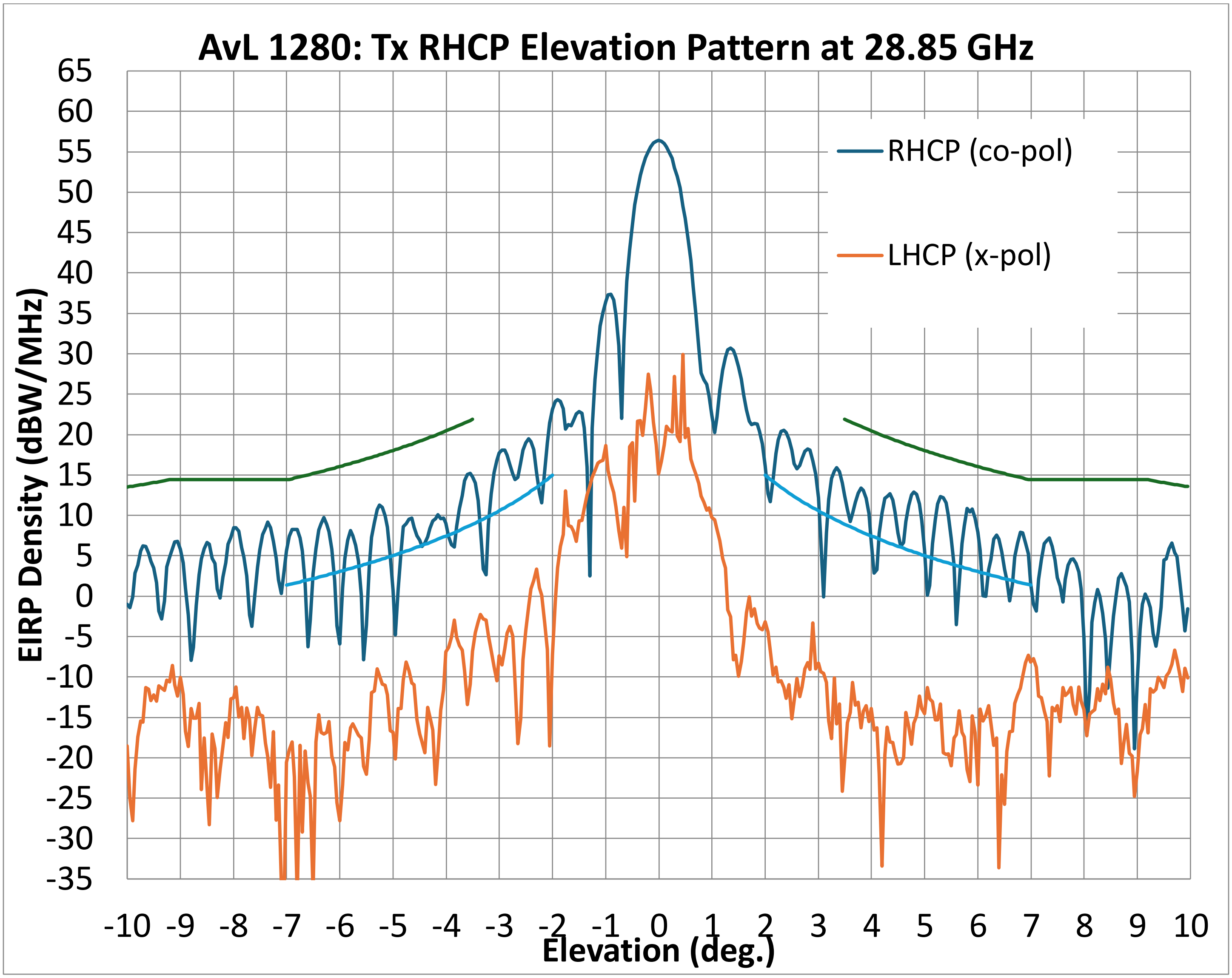
AvL 1280: Tx RHCP Elevation Pattern at 28.85 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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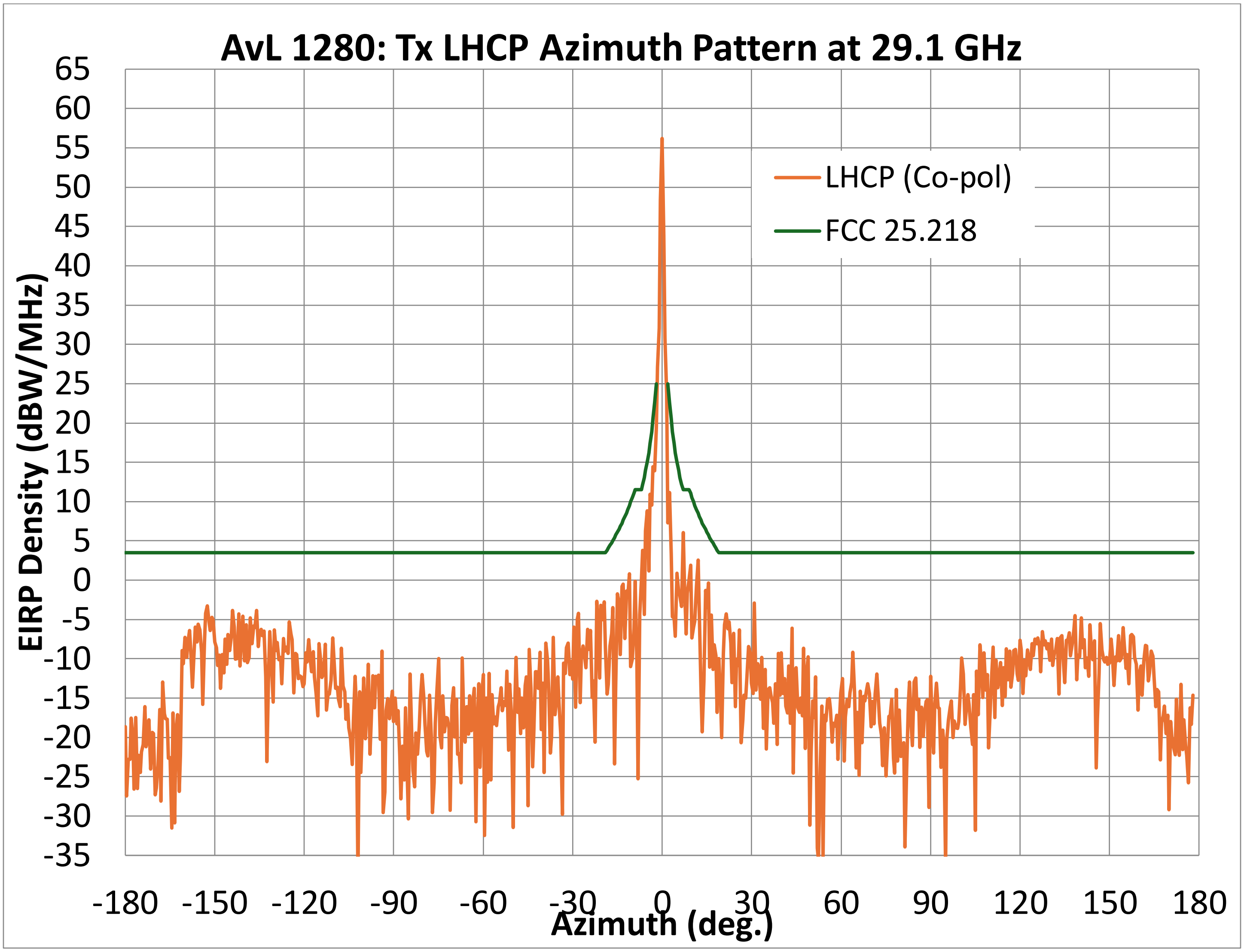
AvL 1280: Tx LHCP Azimuth Pattern at 29.1 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
LHCP (Co-pol)
FCC 25.218
65
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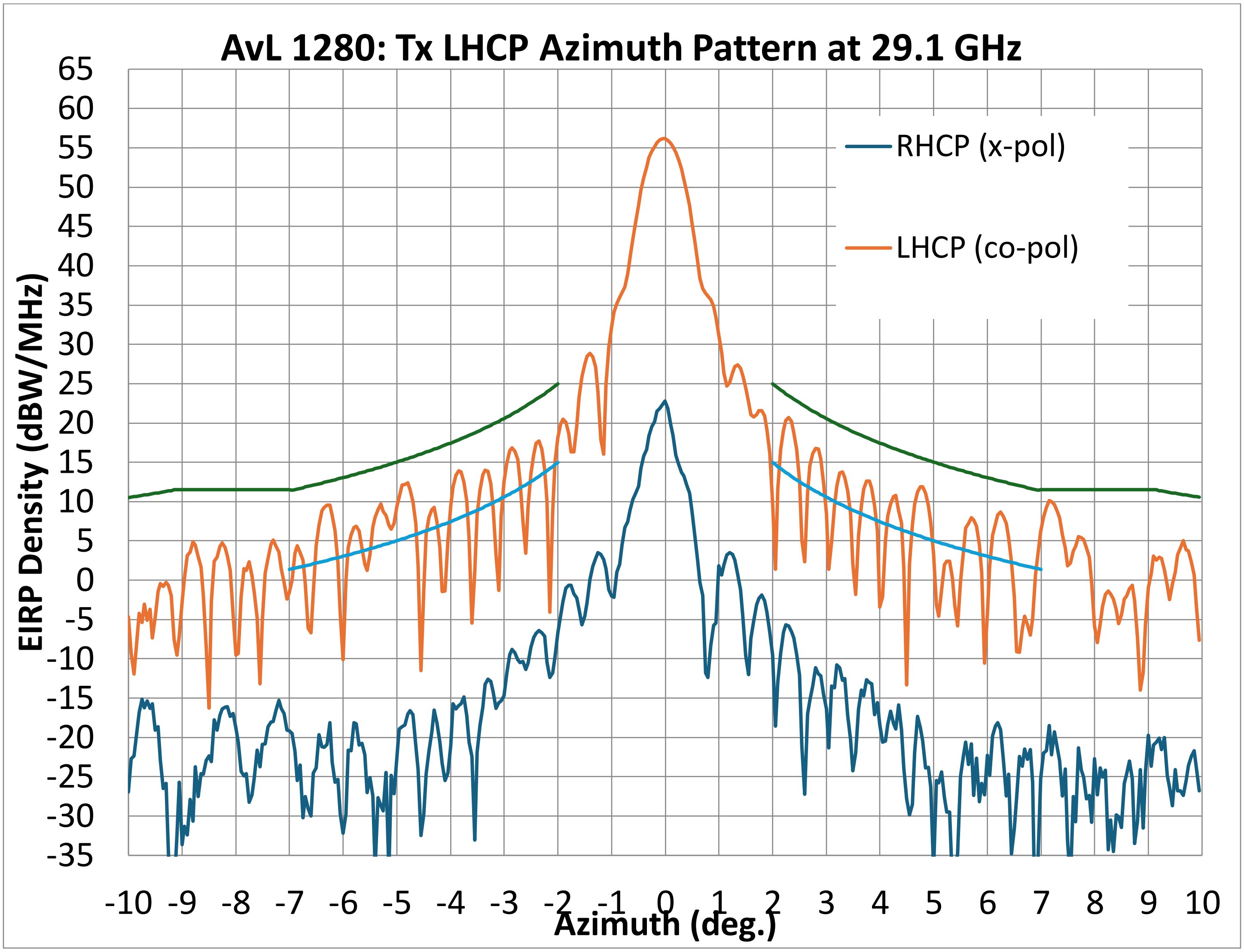

AvL 1280: Tx LHCP Azimuth Pattern at 29.1 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
RHCP (x-pol)
LHCP (co-pol)
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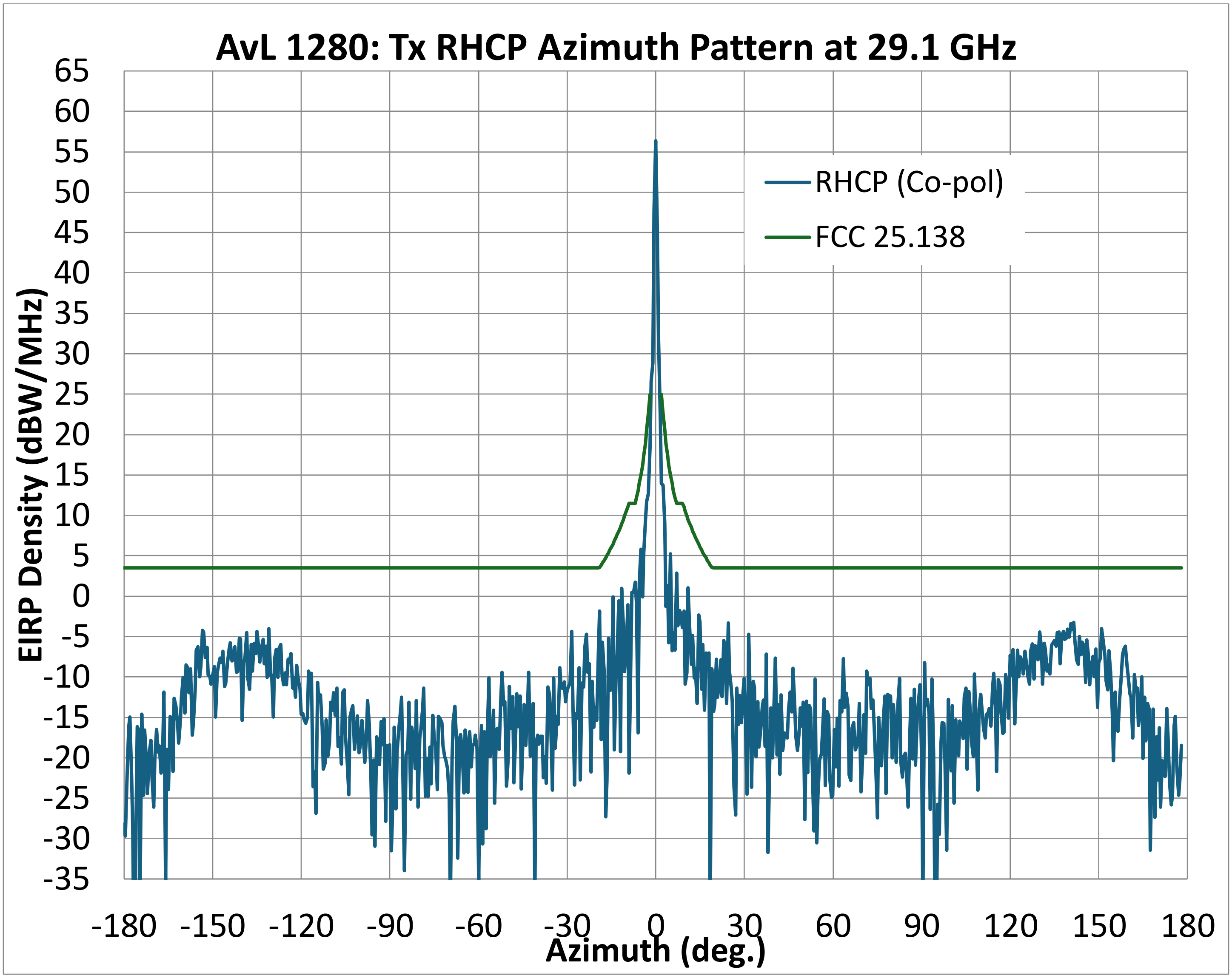

AvL 1280: Tx RHCP Azimuth Pattern at 29.1 GHz
RHCP (Co-pol)
FCC 25.138
EIRP Density (dBW/MHz)
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150
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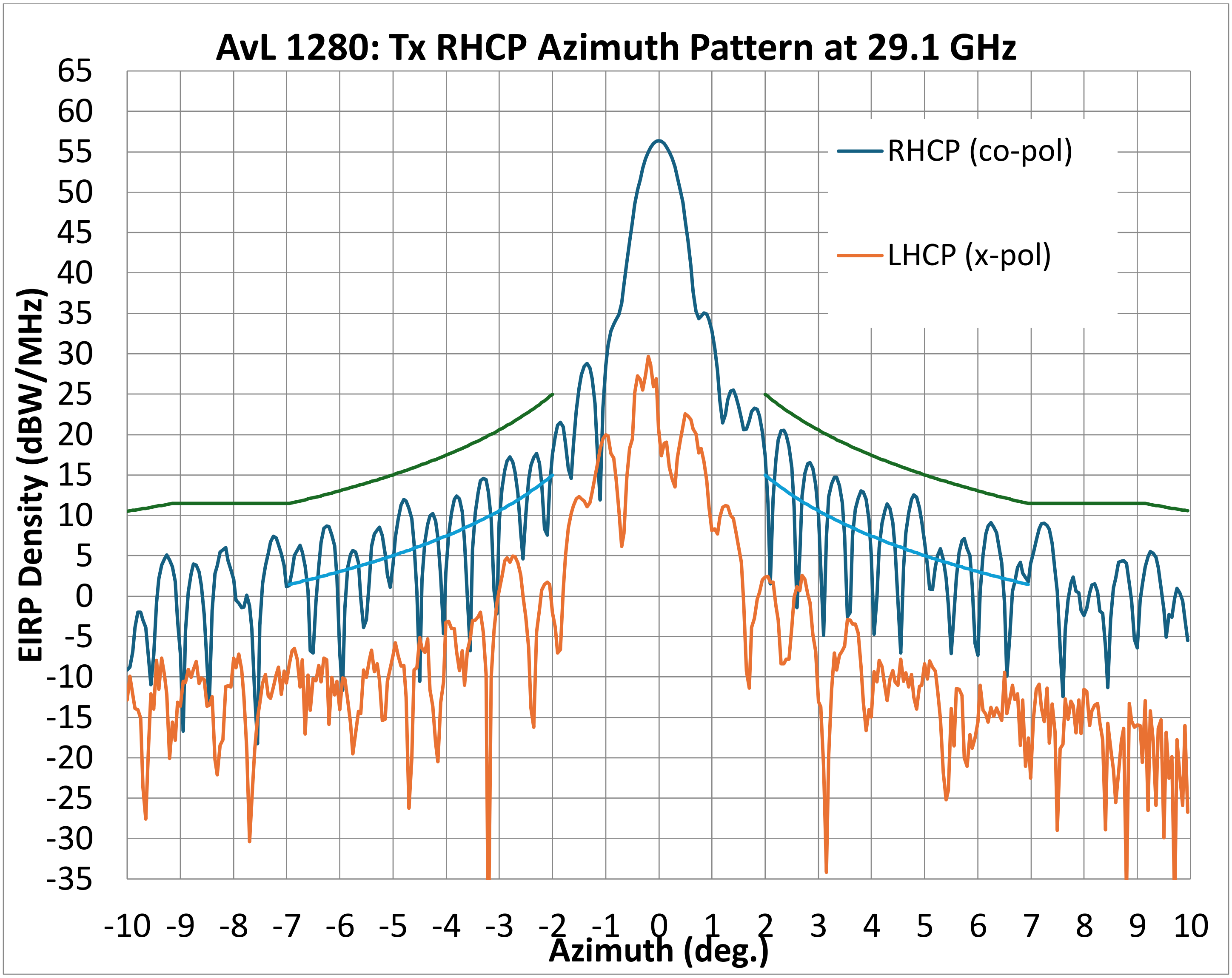
Azimuth (deg.)



AvL 1280: Tx RHCP Azimuth Pattern at 29.1 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Azimuth (deg.)
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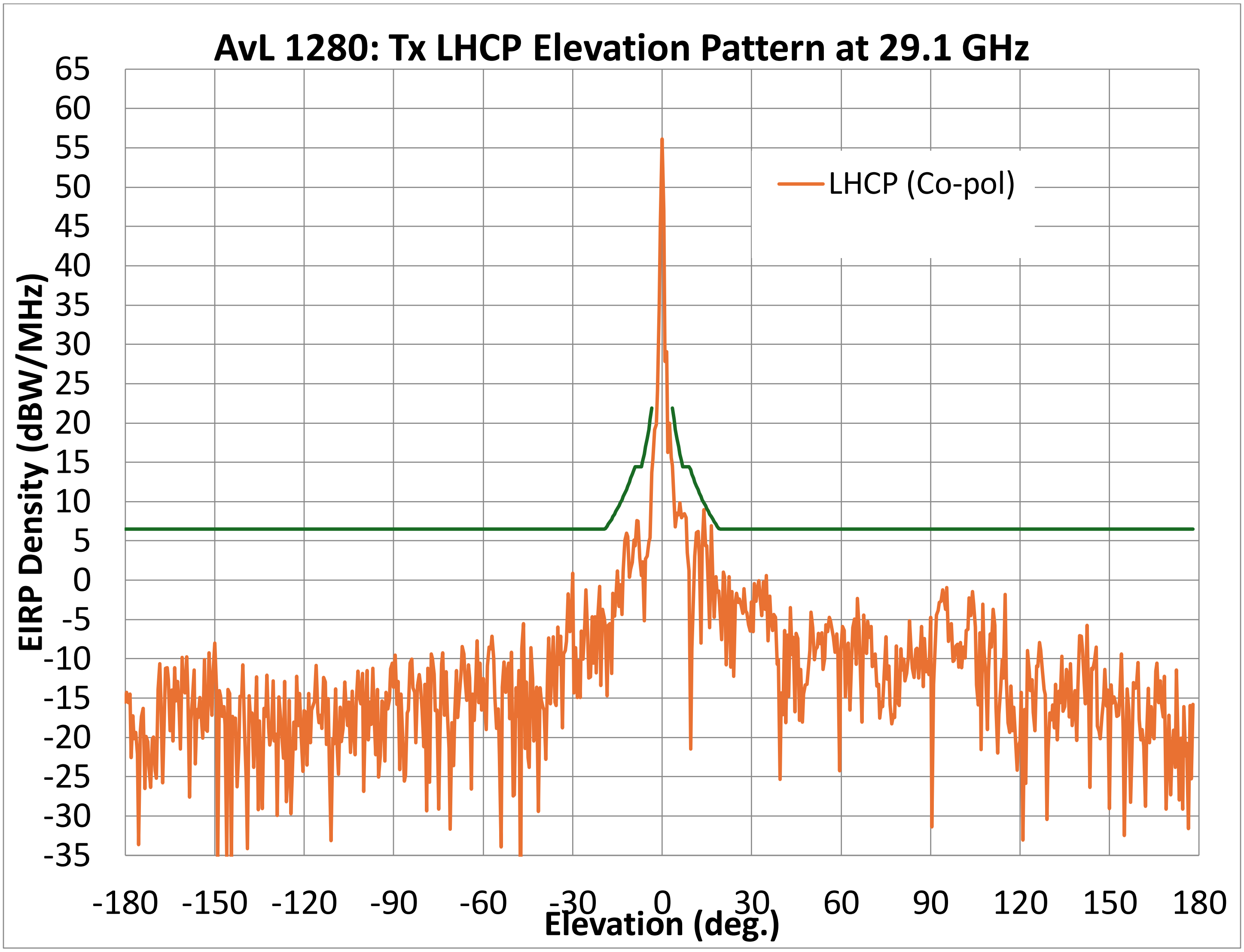
AvL 1280: Tx LHCP Elevation Pattern at 29.1 GHz
LHCP (Co-pol)
EIRP Density (dBW/MHz)
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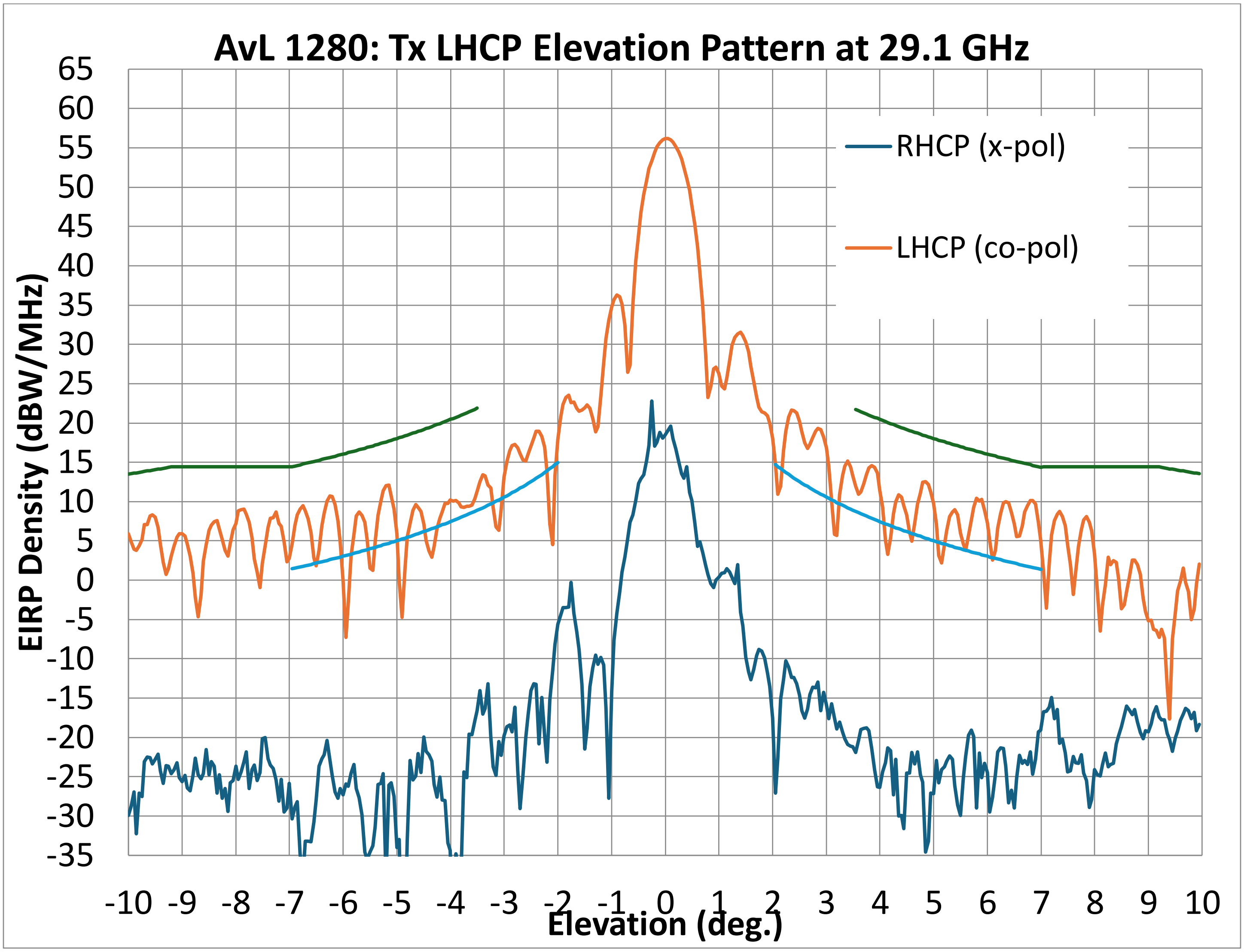
Elevation (deg.)


AvL 1280: Tx LHCP Elevation Pattern at 29.1 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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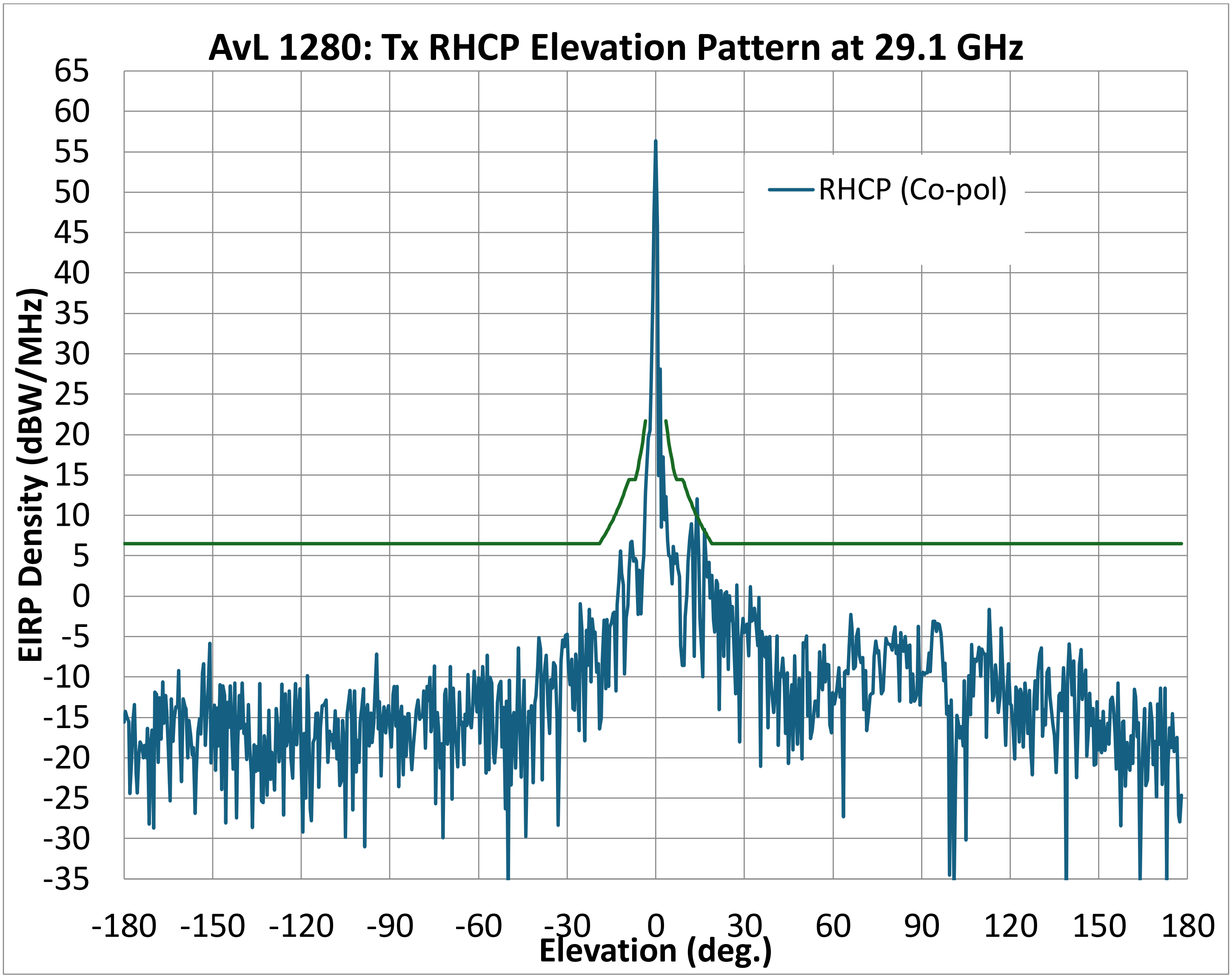
AvL 1280: Tx RHCP Elevation Pattern at 29.1 GHz
RHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
65
60
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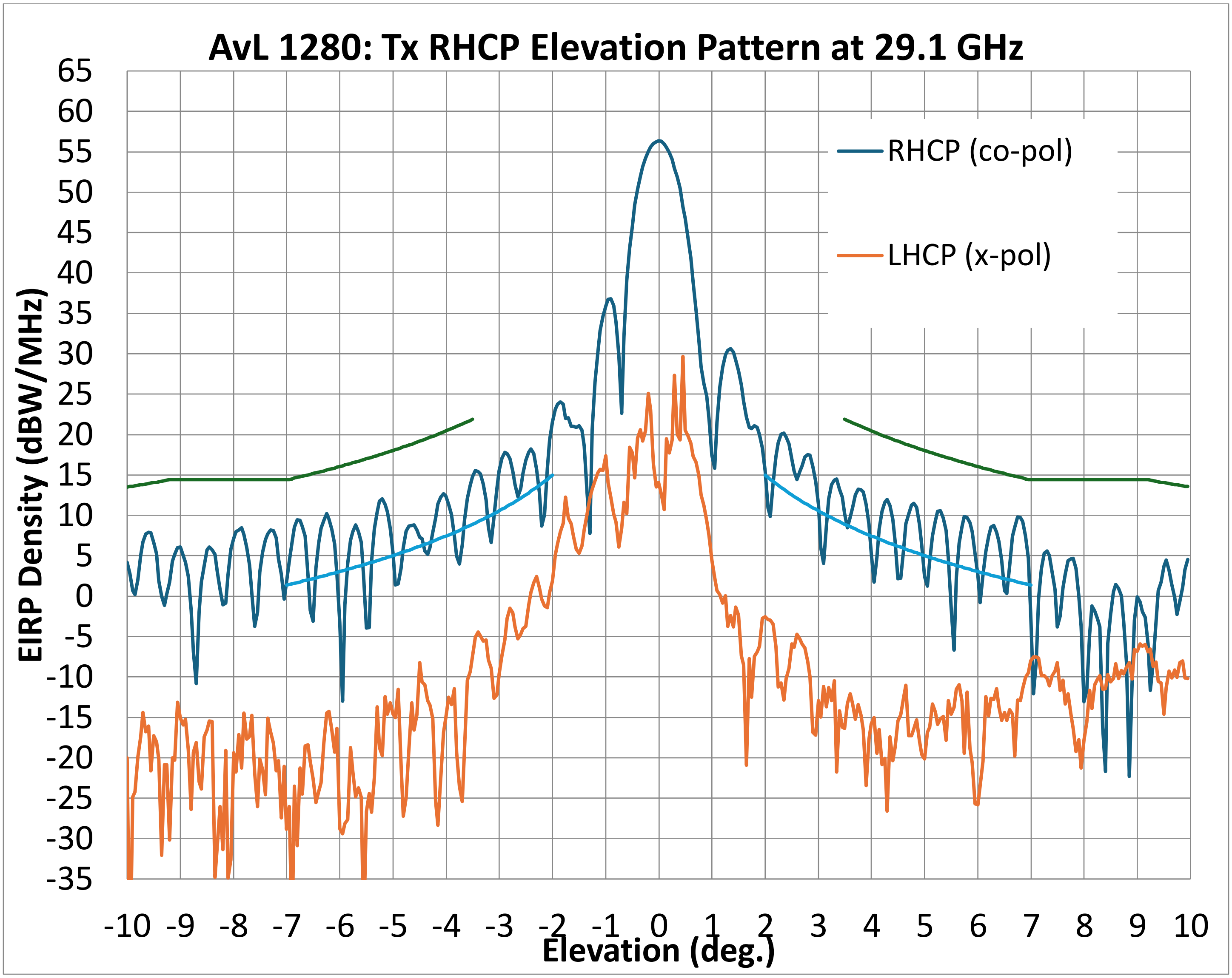
180


AvL 1280: Tx RHCP Elevation Pattern at 29.1 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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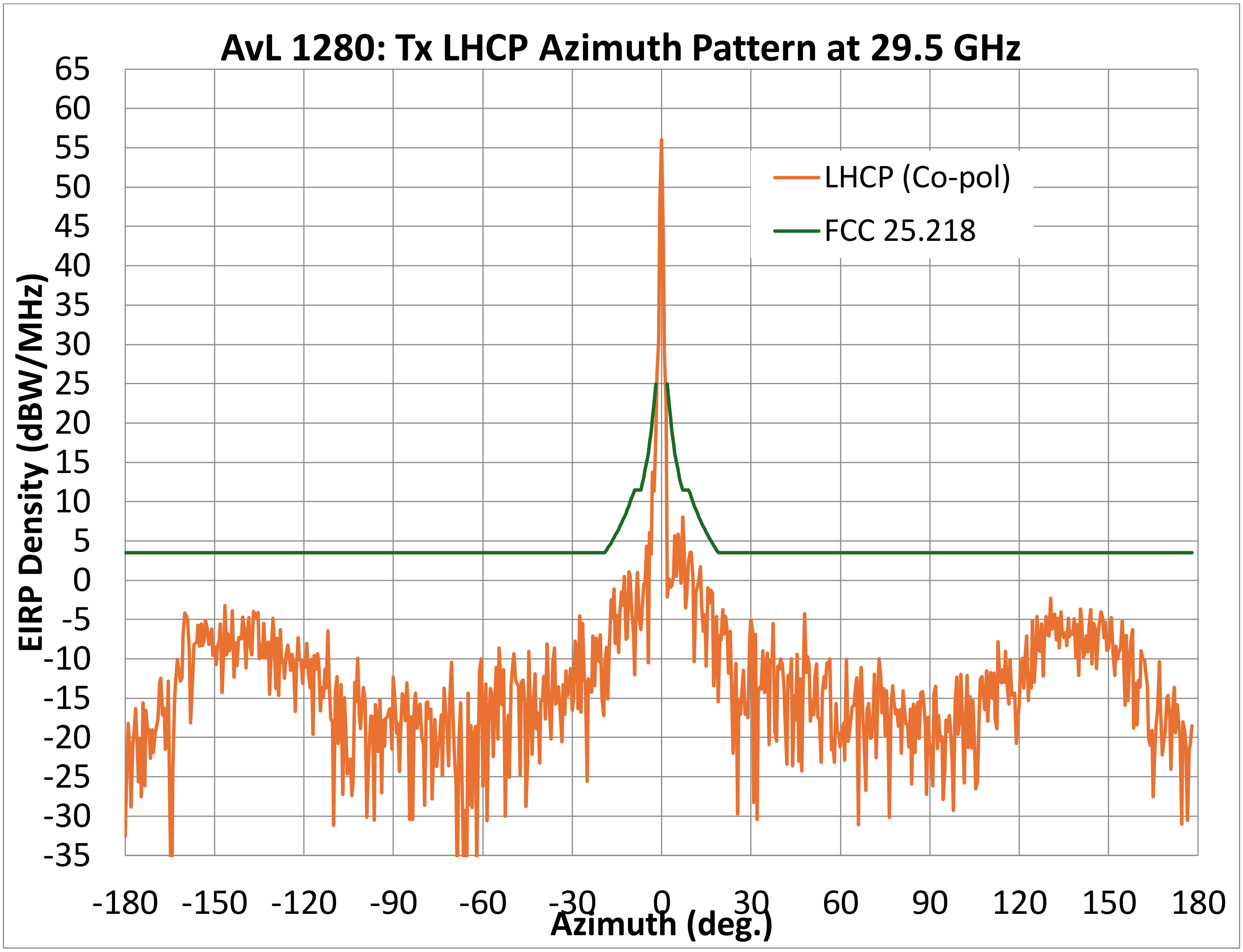
AvL 1280: Tx LHCP Azimuth Pattern at 29.5 GHz
LHCP (Co-pol)
FCC 25.218
EIRP Density (dBW/MHz)
65
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30
25
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-5
-10
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-180
-150
-120
-90
-60
-30
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30
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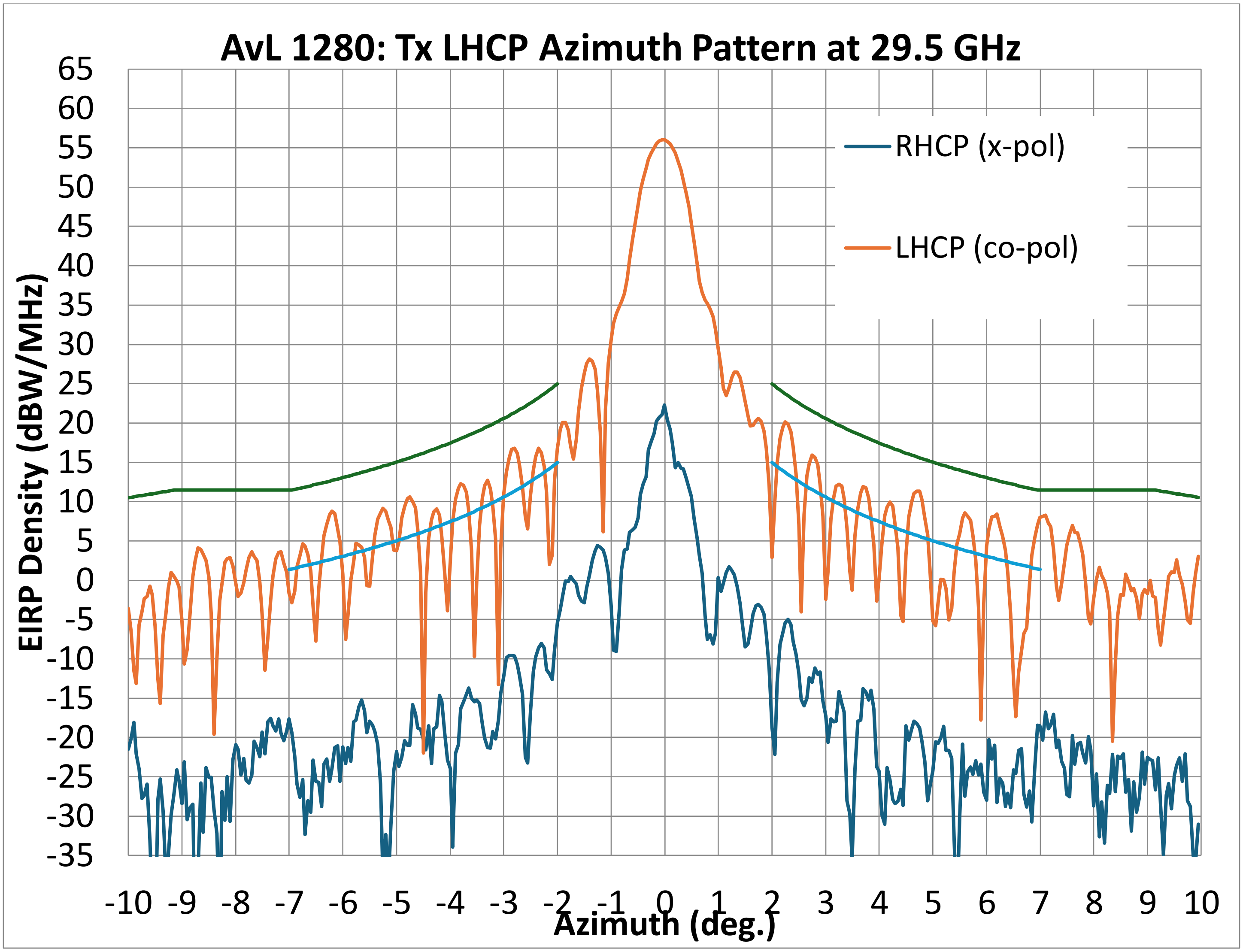
90
120
150
180
Azimuth (deg.)


AvL 1280: Tx LHCP Azimuth Pattern at 29.5 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
Azimuth (deg.)
65
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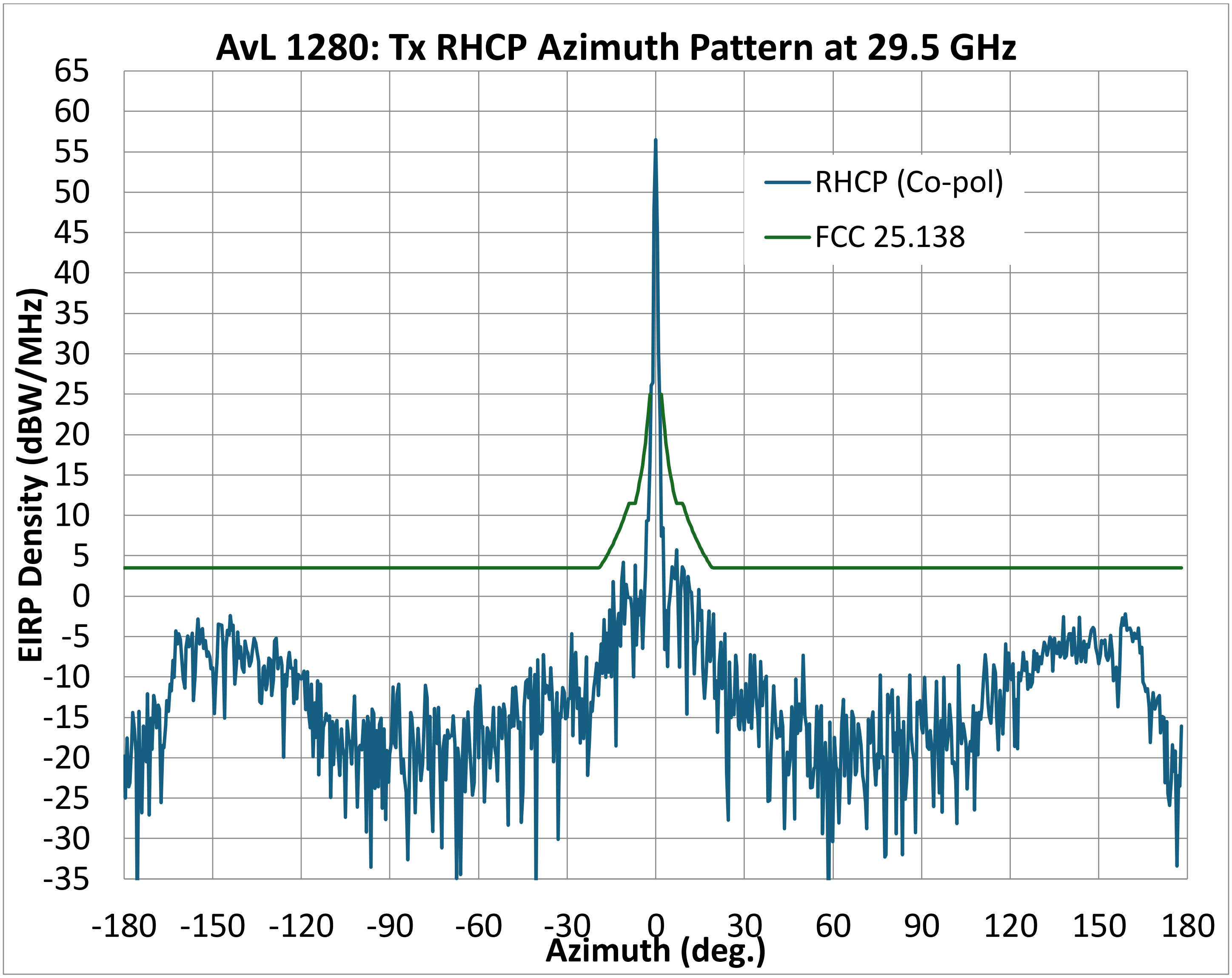
AvL 1280: Tx RHCP Azimuth Pattern at 29.5 GHz
RHCP (Co-pol)
FCC 25.138
EIRP Density (dBW/MHz)
Azimuth (deg.)
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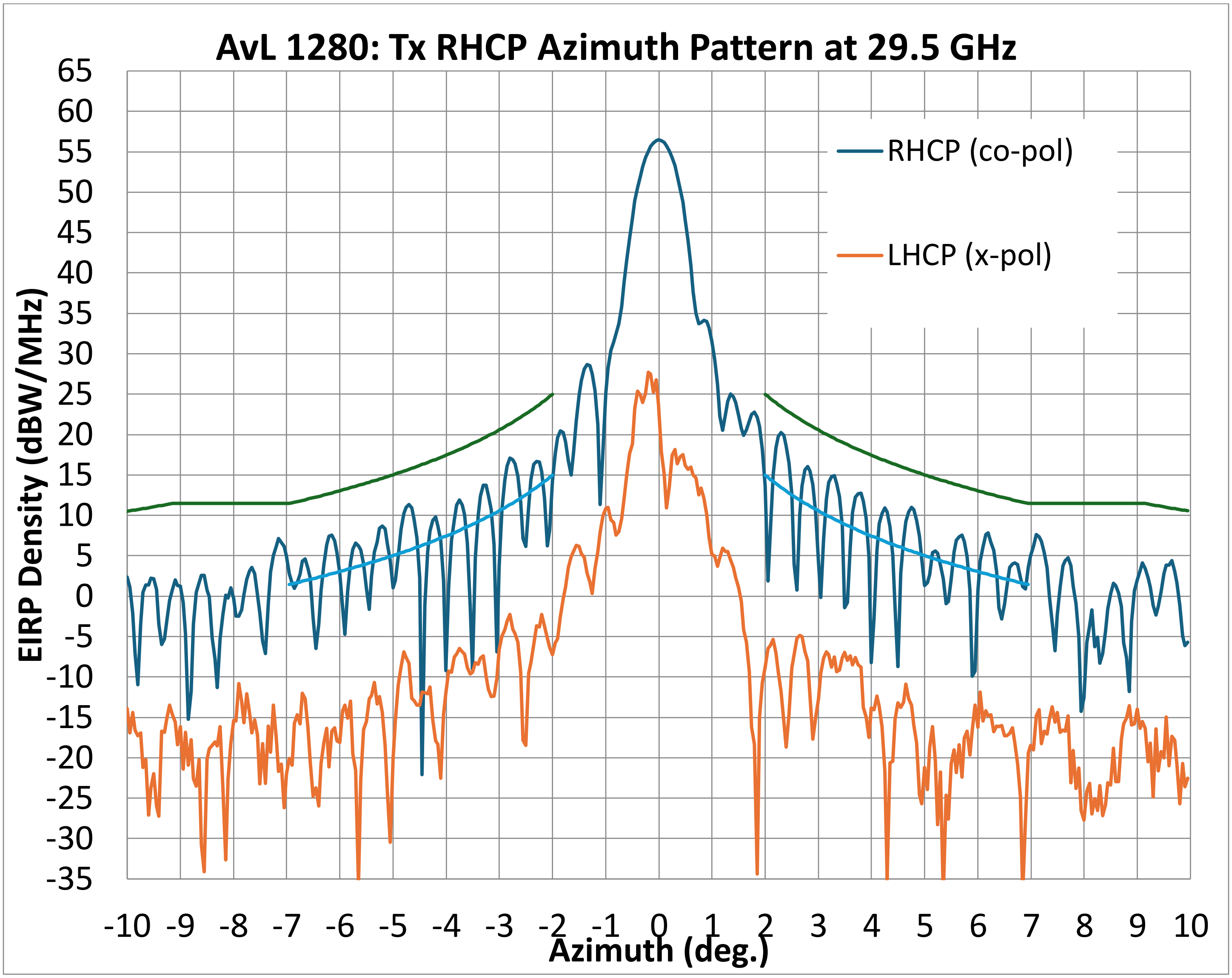
AvL 1280: Tx RHCP Azimuth Pattern at 29.5 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
RHCP (co-pol)
LHCP (x-pol)
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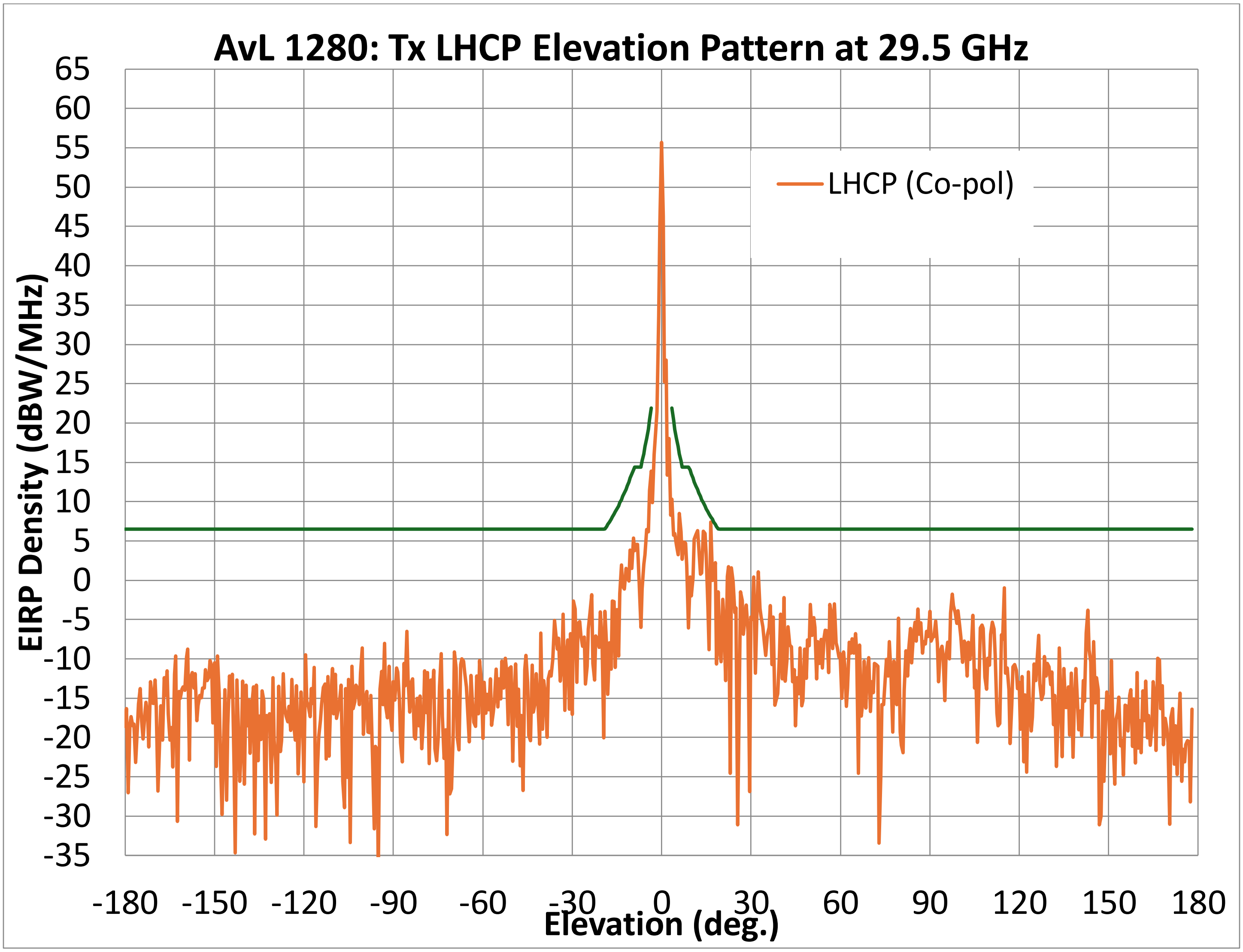

AvL 1280: Tx LHCP Elevation Pattern at 29.5 GHz
LHCP (Co-pol)
EIRP Density (dBW/MHz)
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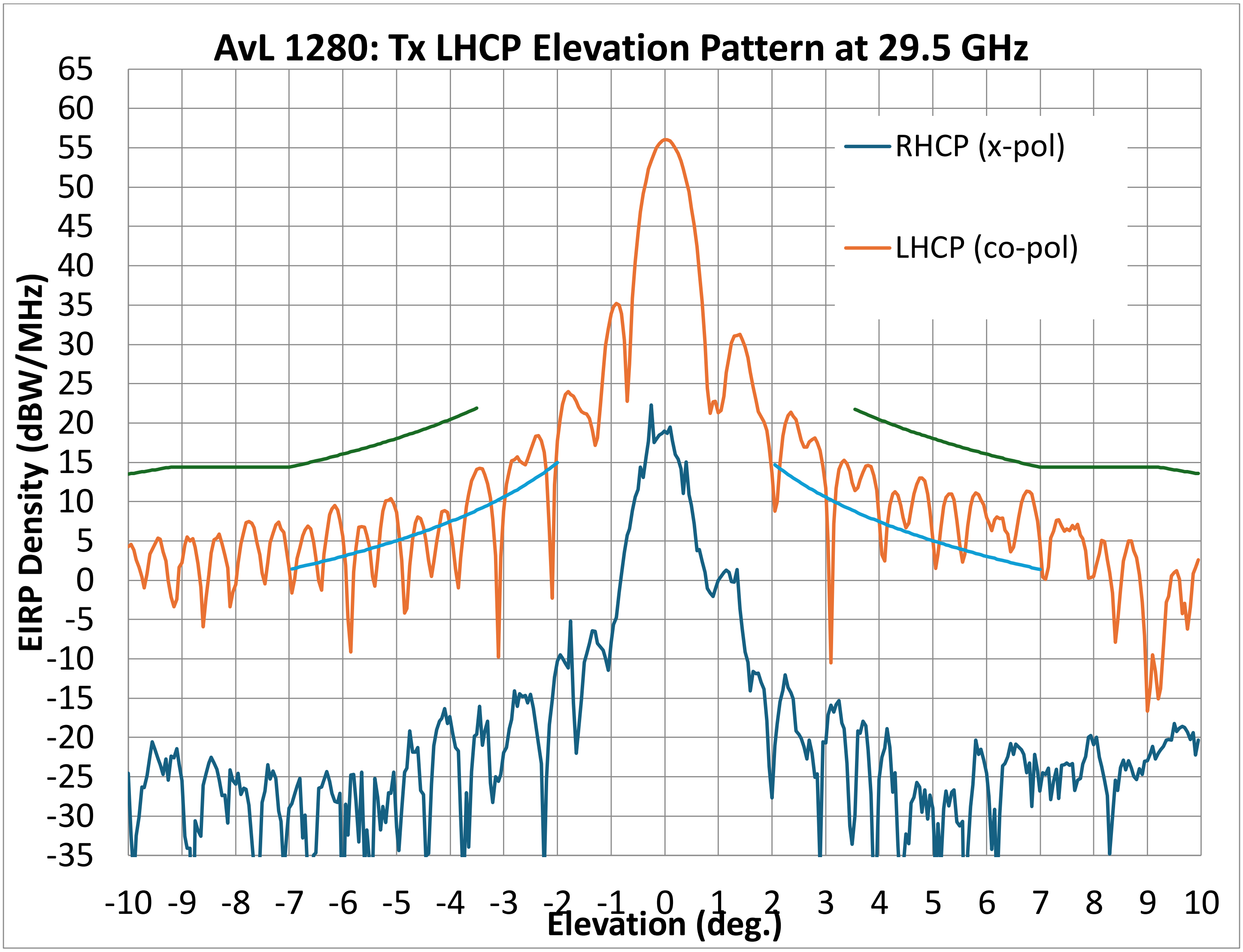
Elevation (deg.)


AvL 1280: Tx LHCP Elevation Pattern at 29.5 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
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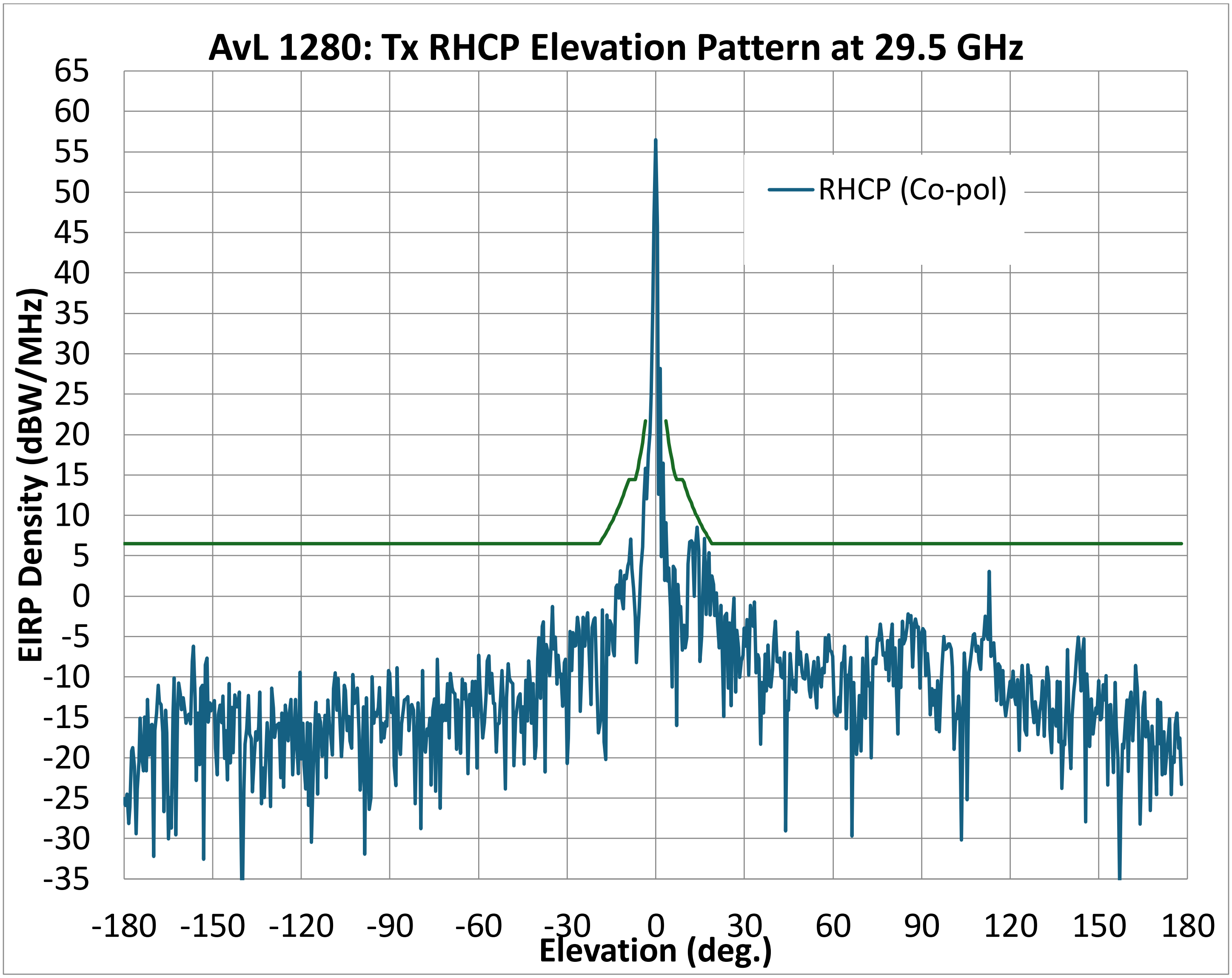
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Elevation (deg.)



AvL 1280: Tx RHCP Elevation Pattern at 29.5 GHz
RHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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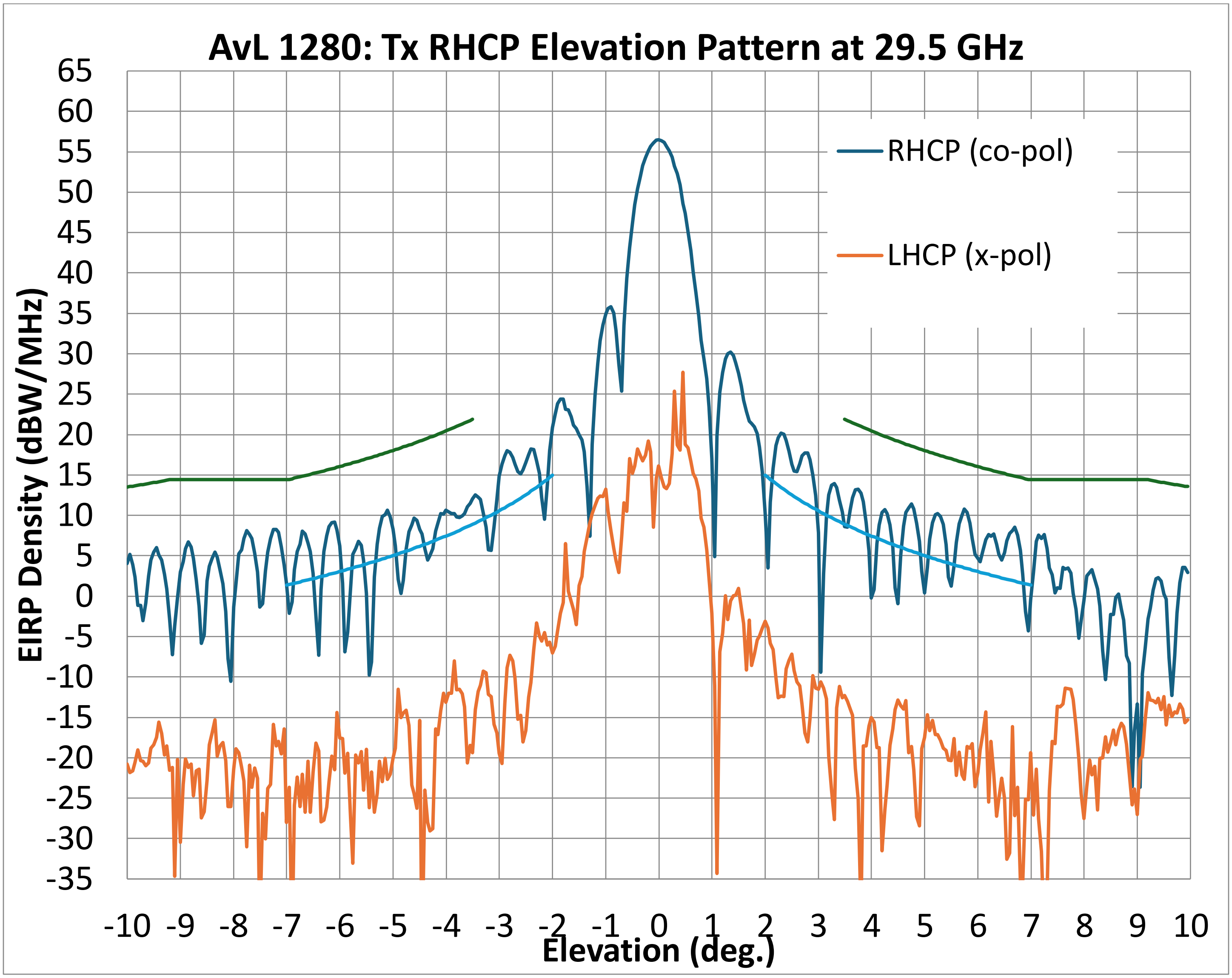

AvL 1280: Tx RHCP Elevation Pattern at 29.5 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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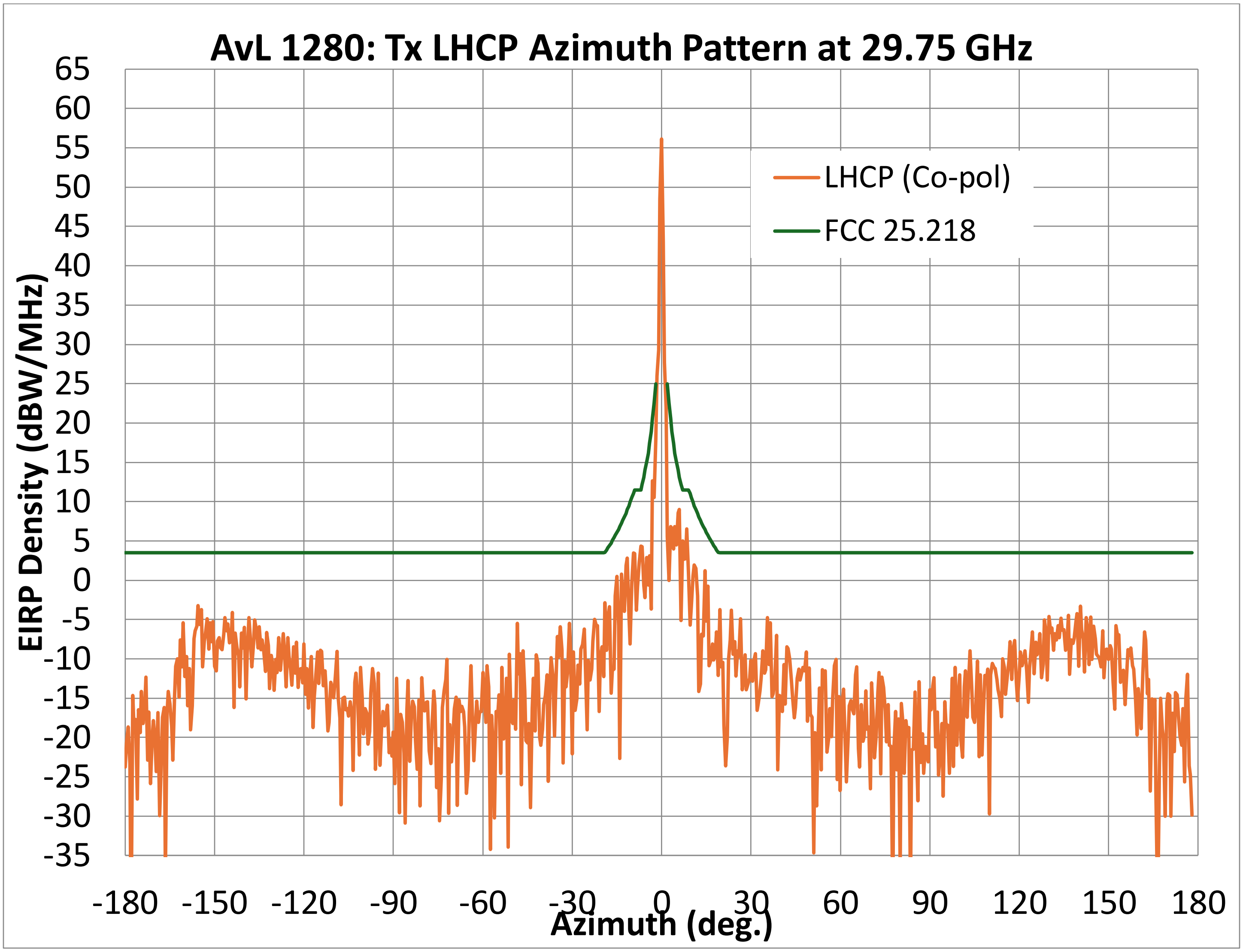
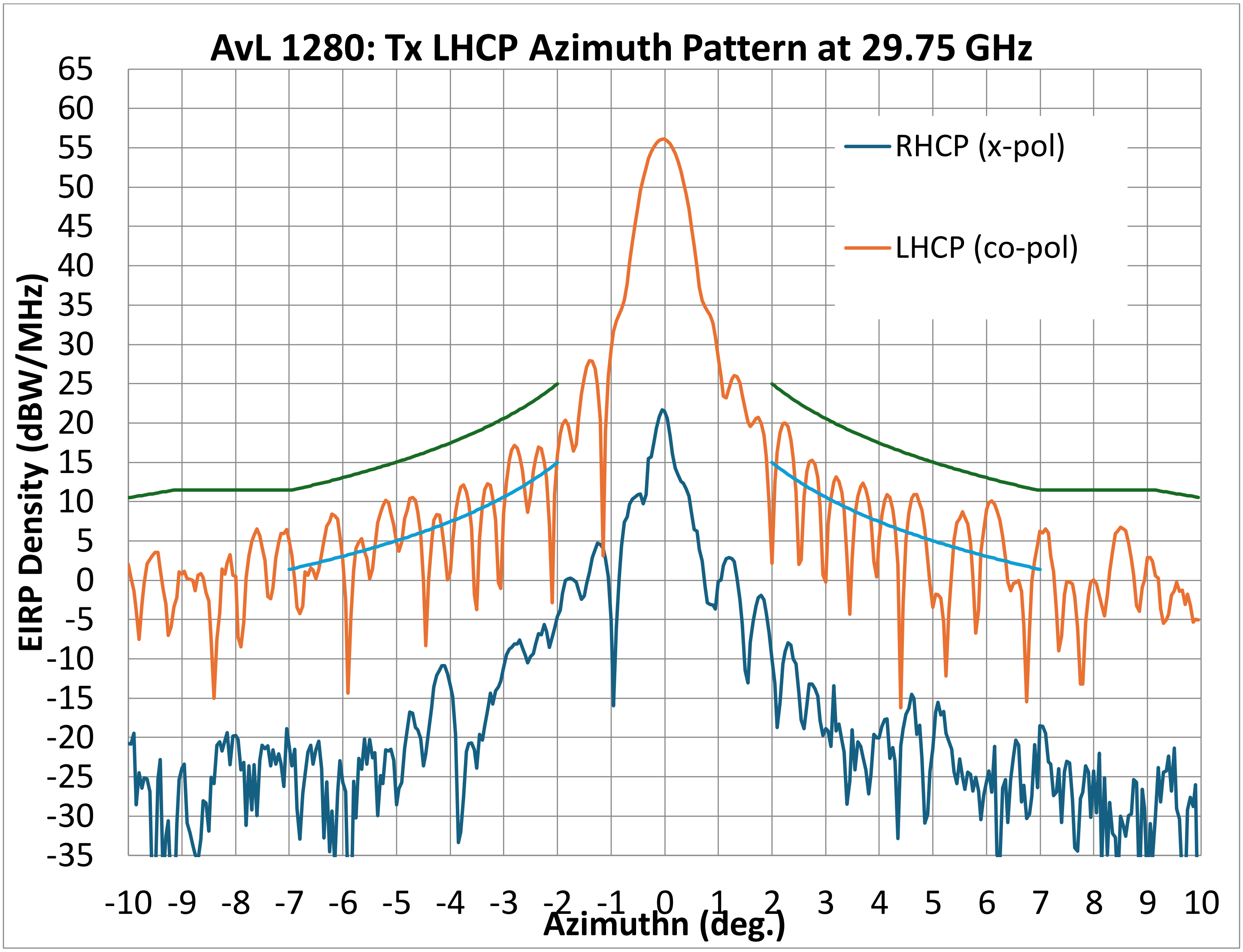

AvL 1280: Tx LHCP Azimuth Pattern at 29.75 GHz
LHCP (Co-pol)
FCC 25.218
EIRP Density (dBW/MHz)
Azimuth (deg.)


AvL 1280: Tx LHCP Azimuth Pattern at 29.75 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
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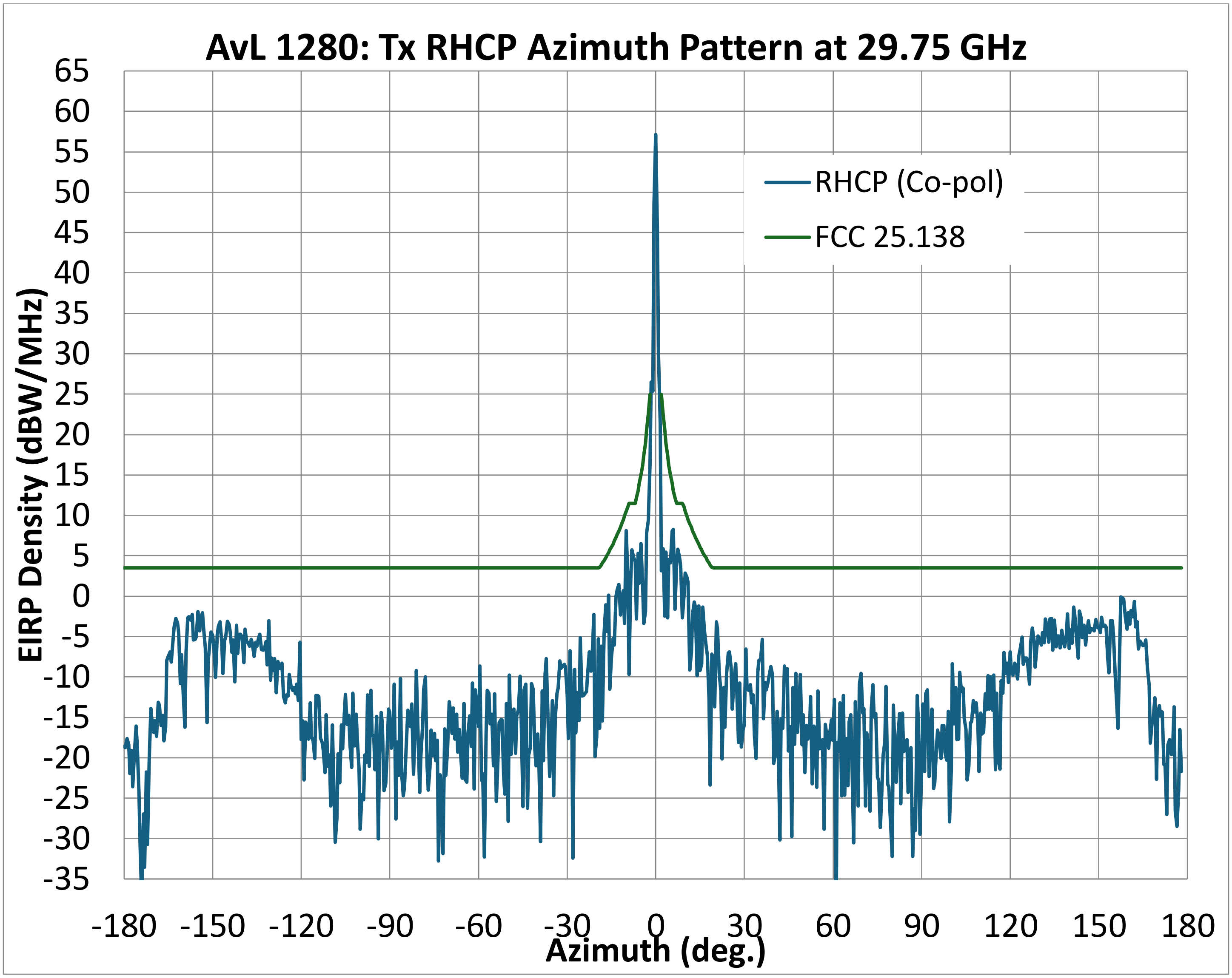
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Azimuthn (deg.)


AvL 1280: Tx RHCP Azimuth Pattern at 29.75 GHz
RHCP (Co-pol)
FCC 25.138
EIRP Density (dBW/MHz)
65
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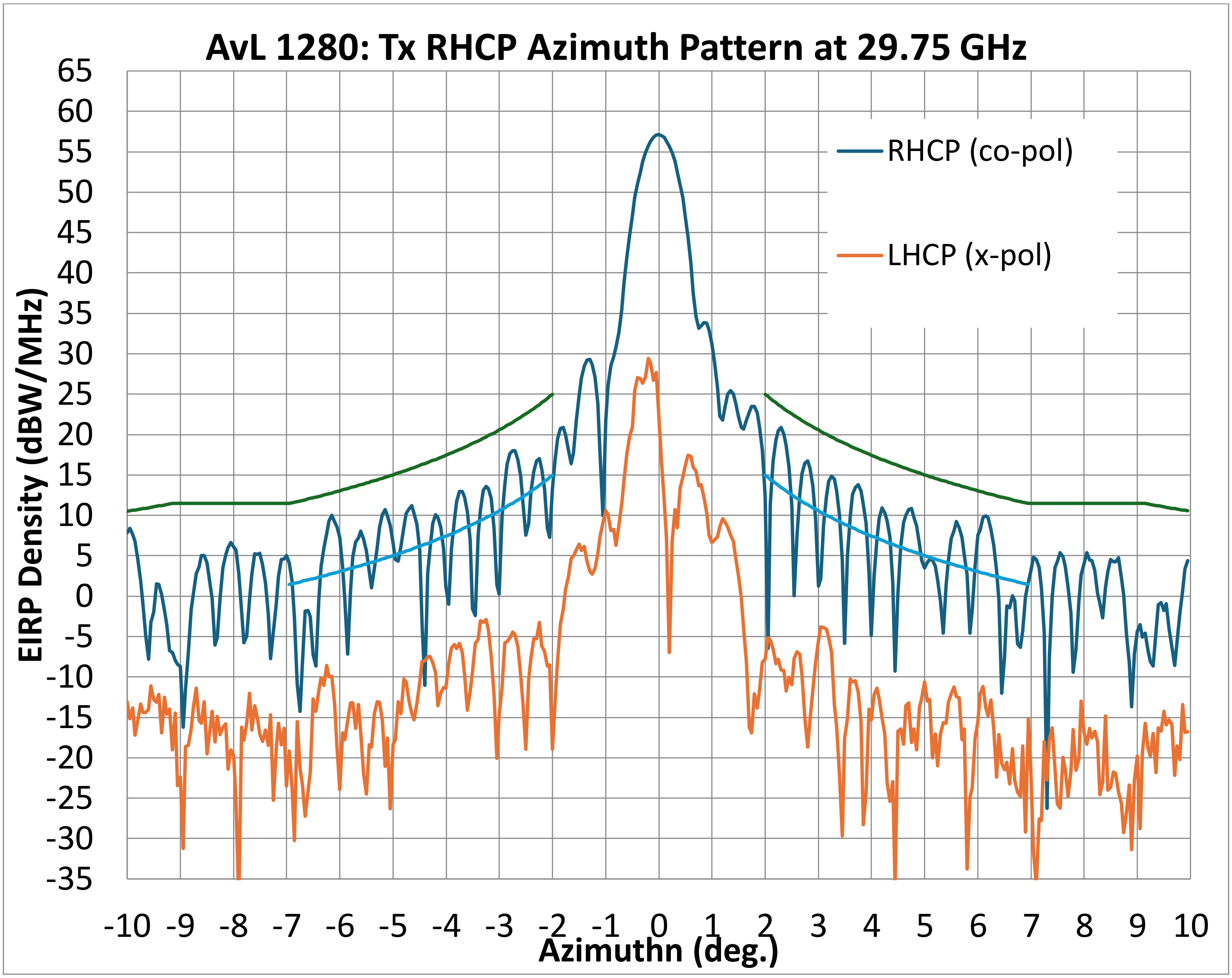
Azimuth (deg.)


AvL 1280: Tx RHCP Azimuth Pattern at 29.75 GHz
EIRP Density (dBW/MHz)
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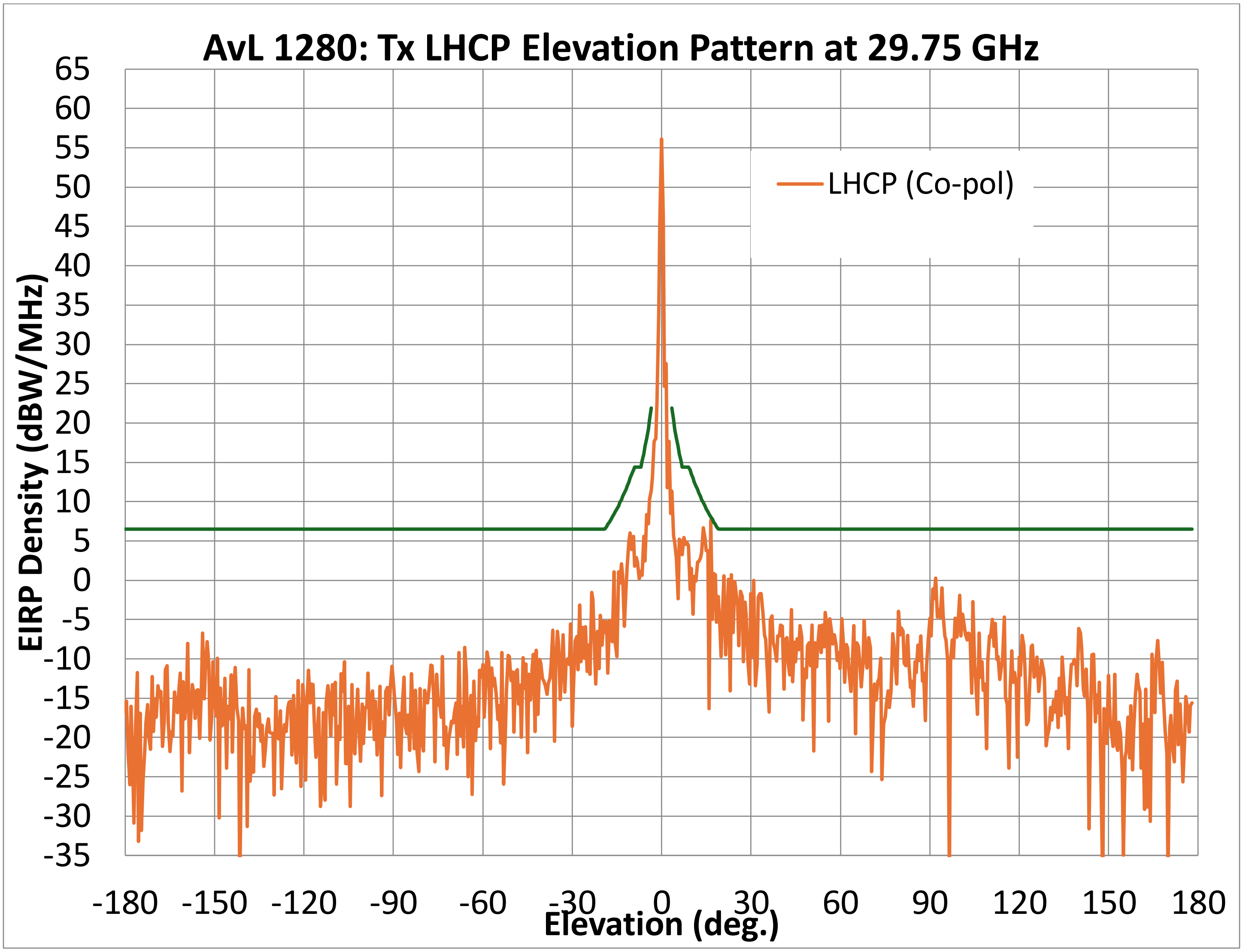
Azimuthn (deg.)
RHCP (co-pol)
LHCP (x-pol)



AvL 1280: Tx LHCP Elevation Pattern at 29.75 GHz
LHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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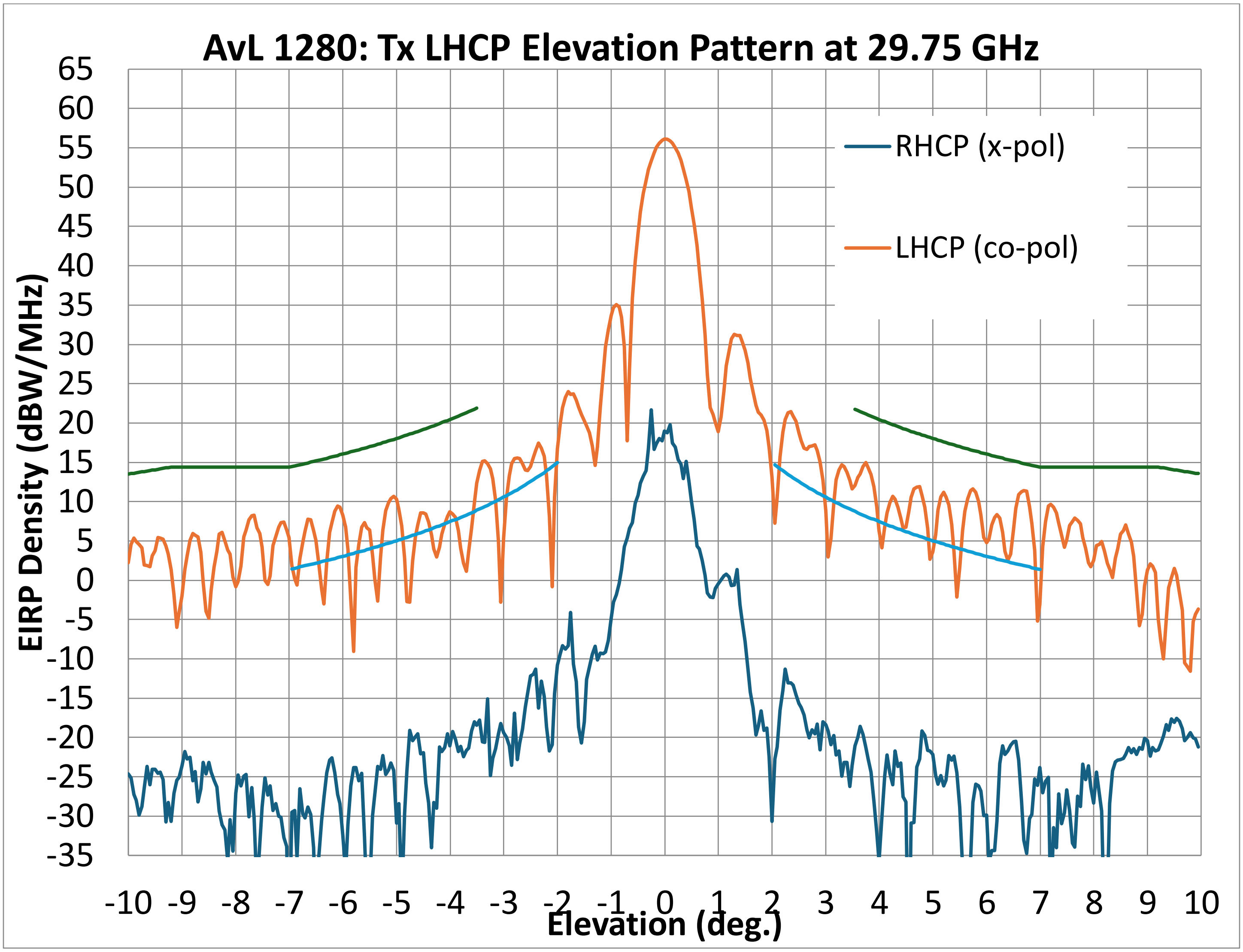
AvL 1280: Tx LHCP Elevation Pattern at 29.75 GHz
RHCP (x-pol)
LHCP (co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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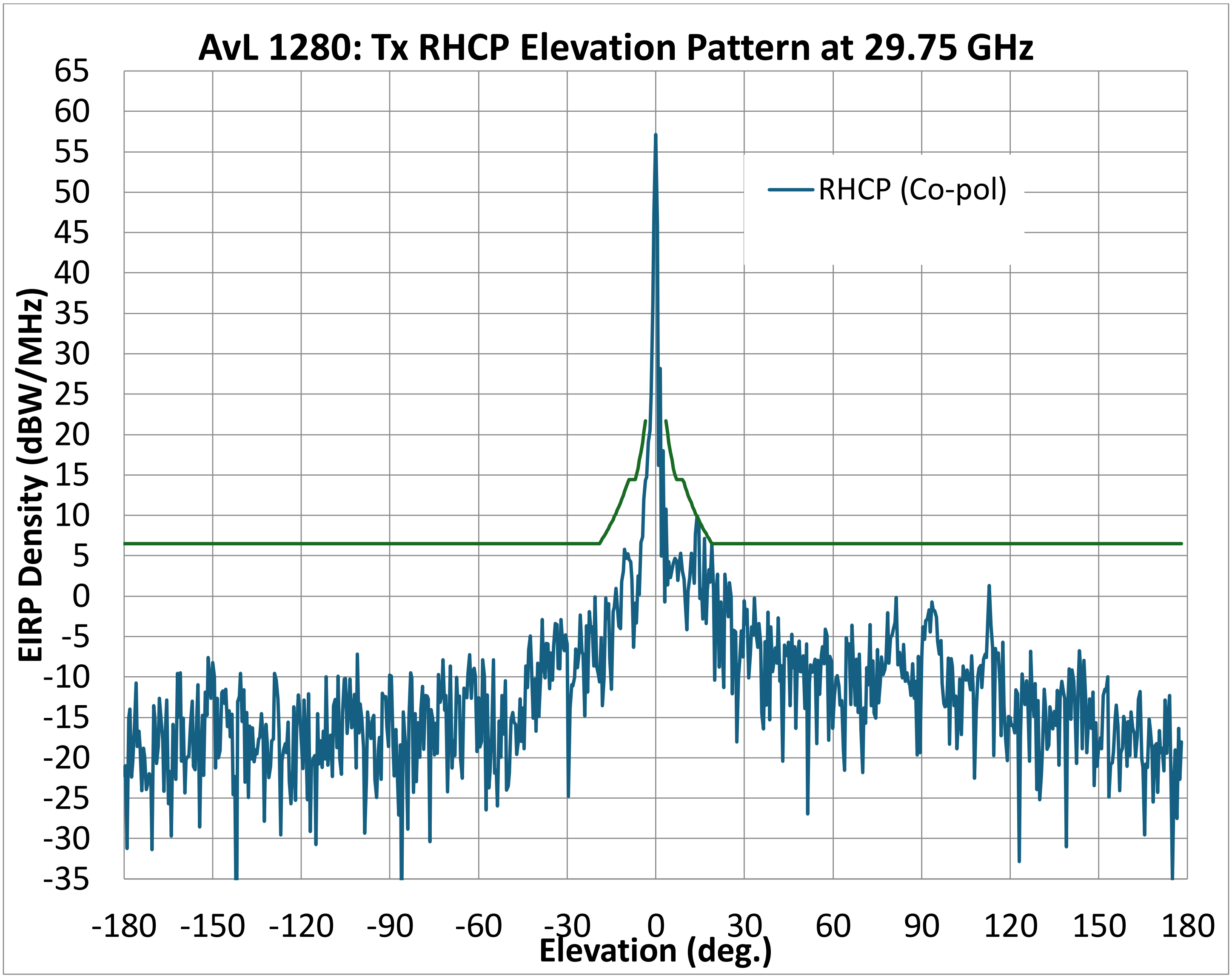
AvL 1280: Tx RHCP Elevation Pattern at 29.75 GHz
RHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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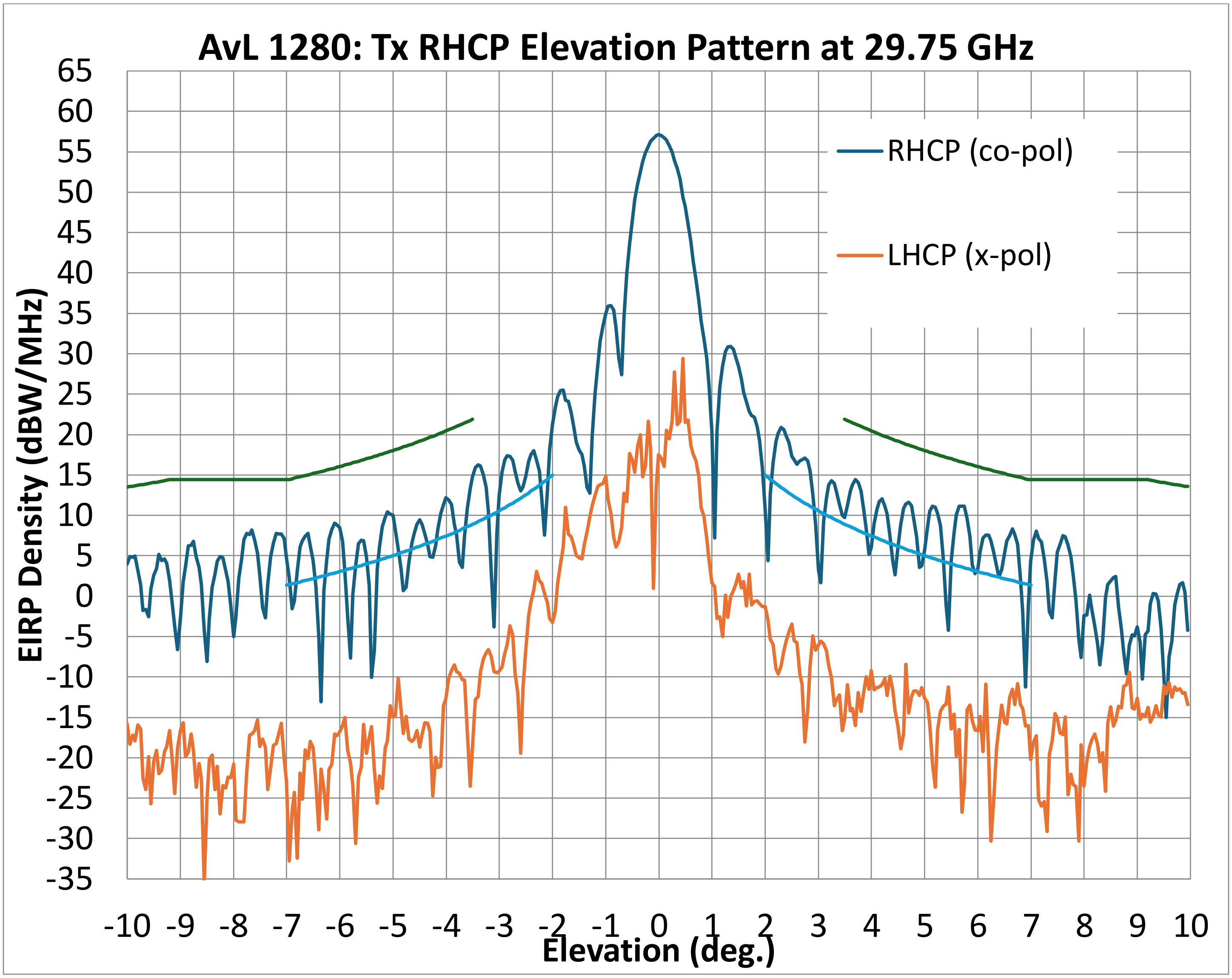
AvL 1280: Tx RHCP Elevation Pattern at 29.75 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
65
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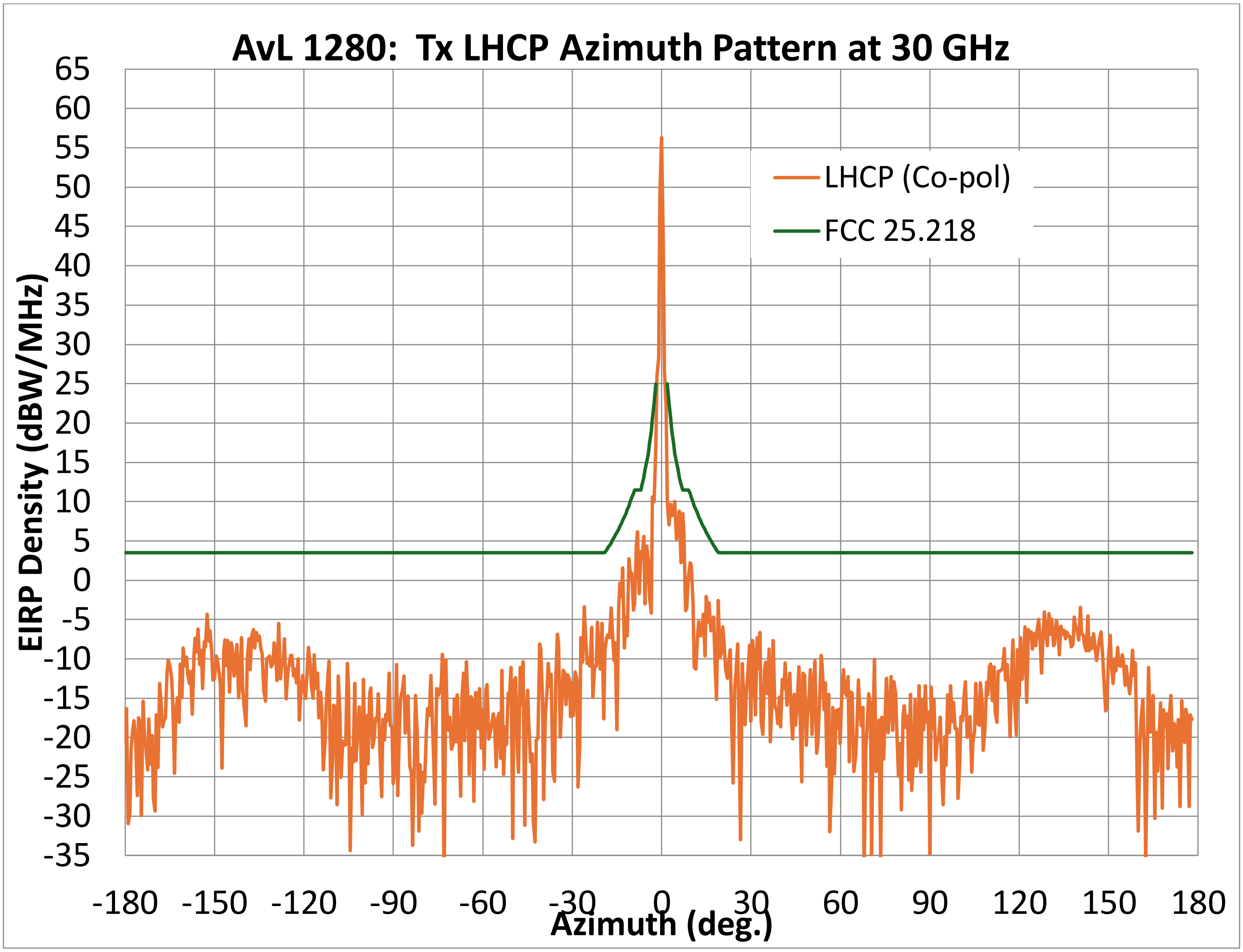
AvL 1280: Tx LHCP Azimuth Pattern at 30 GHz
LHCP (Co-pol)
FCC 25.218
EIRP Density (dBW/MHz)
65
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-180
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-120
-90
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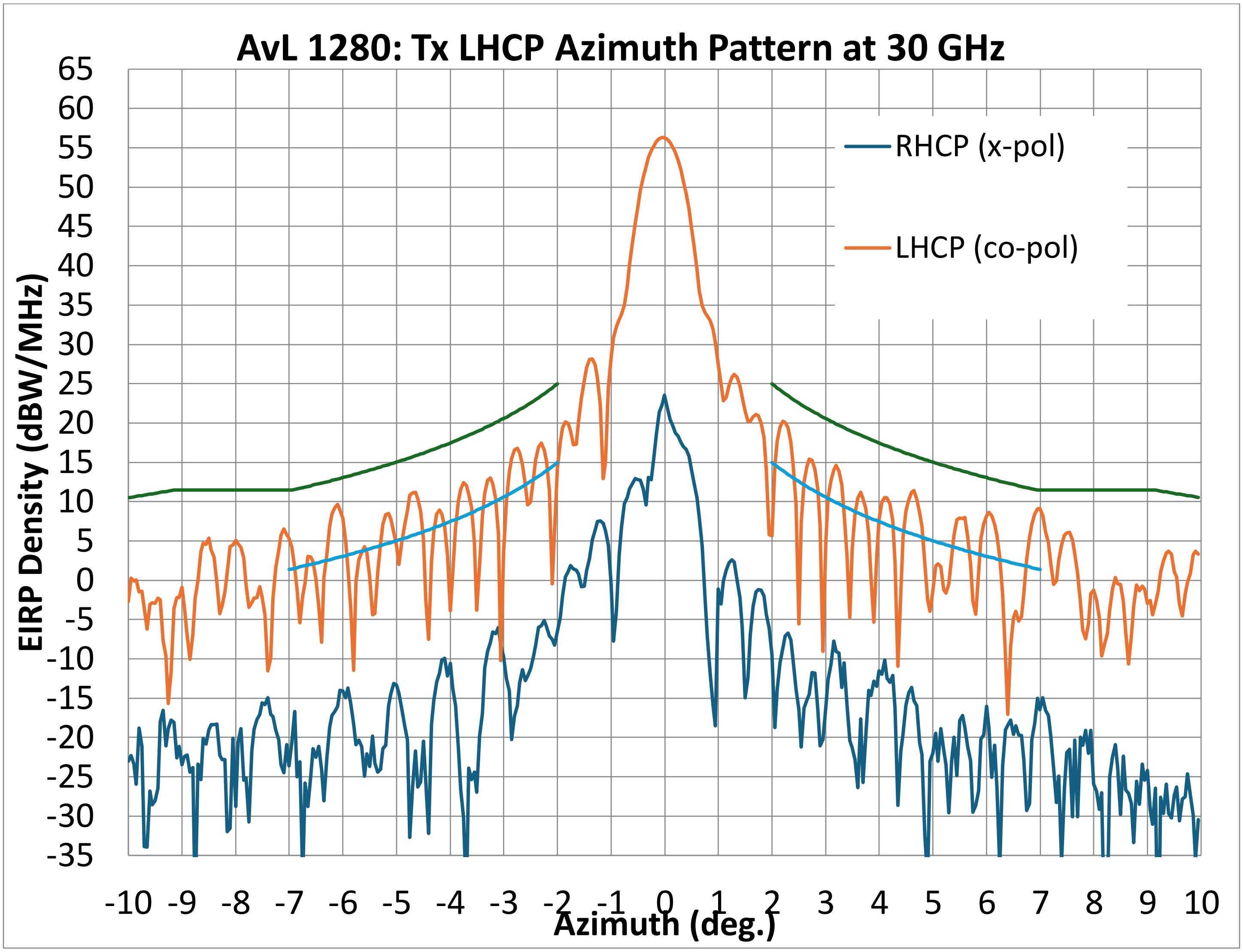
150
180
Azimuth (deg.)


AvL 1280: Tx LHCP Azimuth Pattern at 30 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
RHCP (x-pol)
LHCP (co-pol)
65
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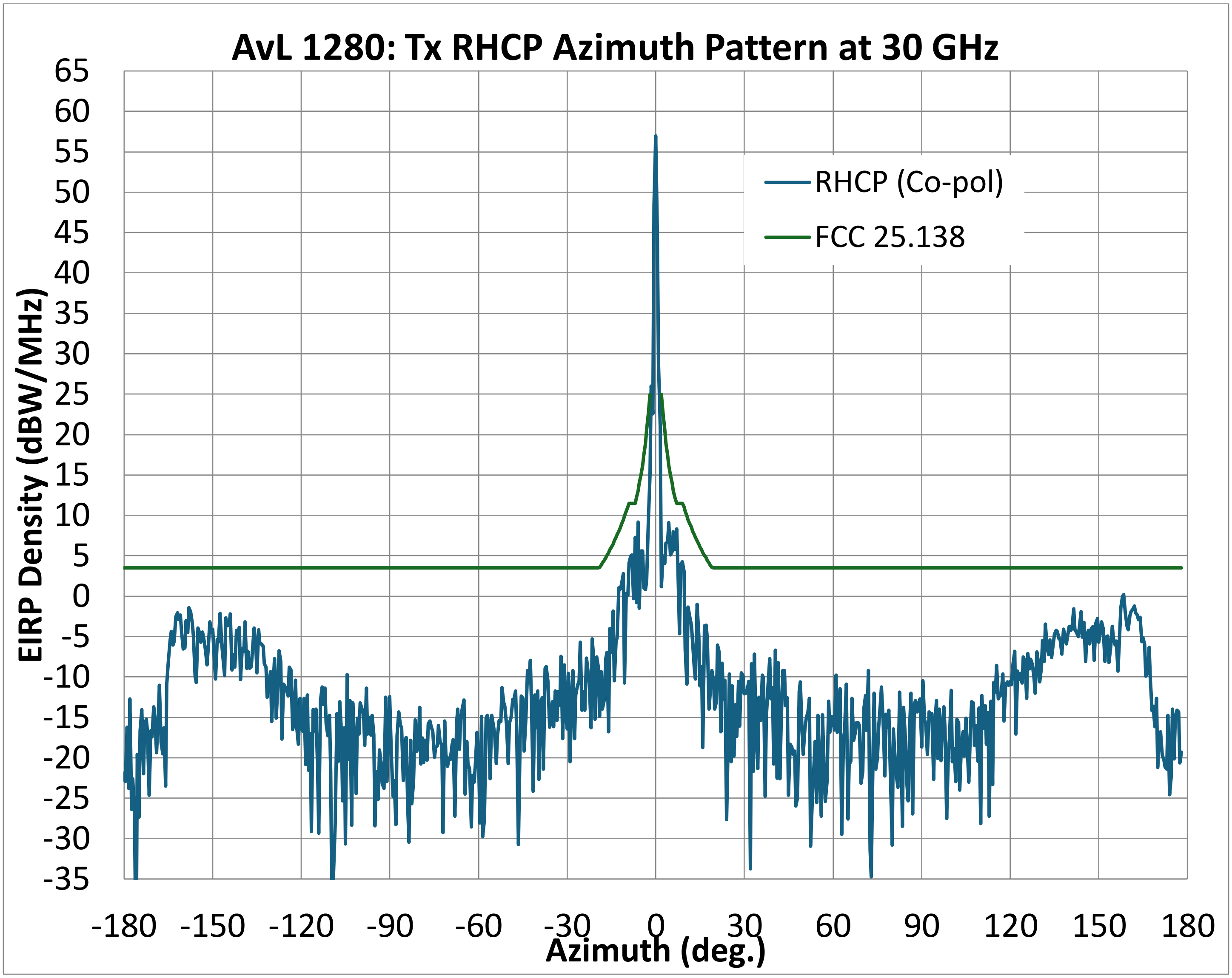

AvL 1280: Tx RHCP Azimuth Pattern at 30 GHz
EIRP Density (dBW/MHz)
Azimuth (deg.)
RHCP (Co-pol)
FCC 25.138
65
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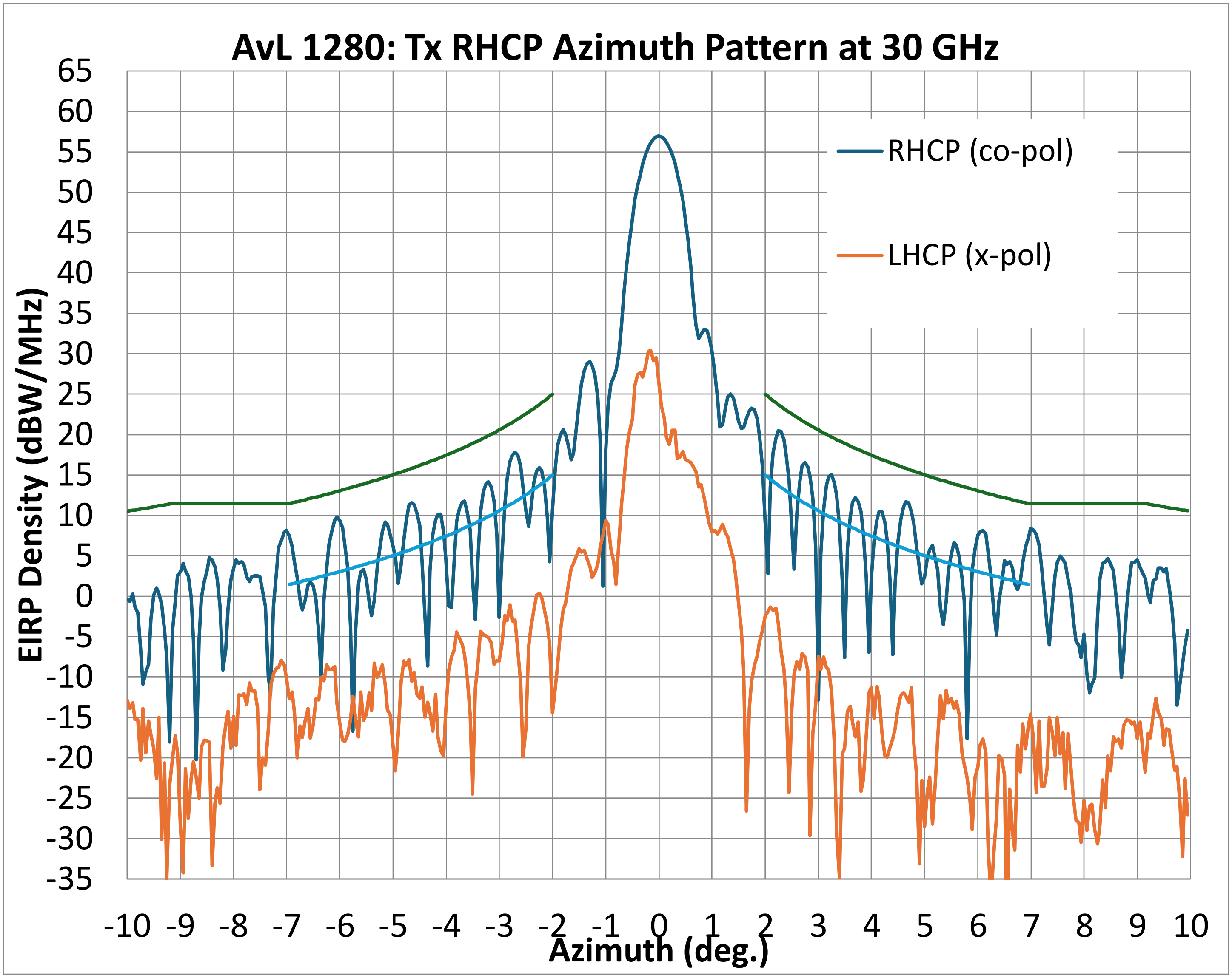
AvL 1280: Tx RHCP Azimuth Pattern at 30 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Azimuth (deg.)
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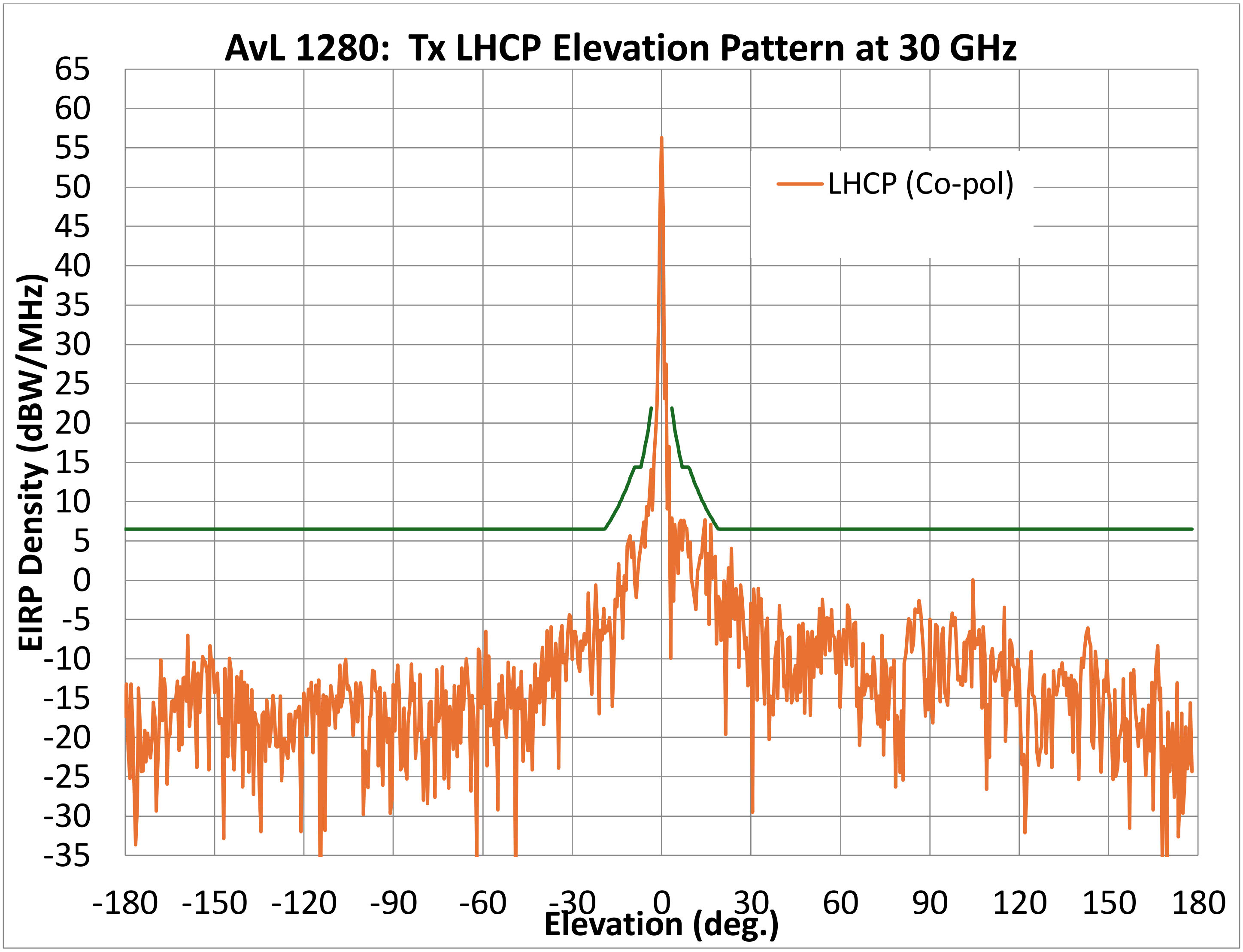

AvL 1280: Tx LHCP Elevation Pattern at 30 GHz
LHCP (Co-pol)
EIRP Density (dBW/MHz)
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-120
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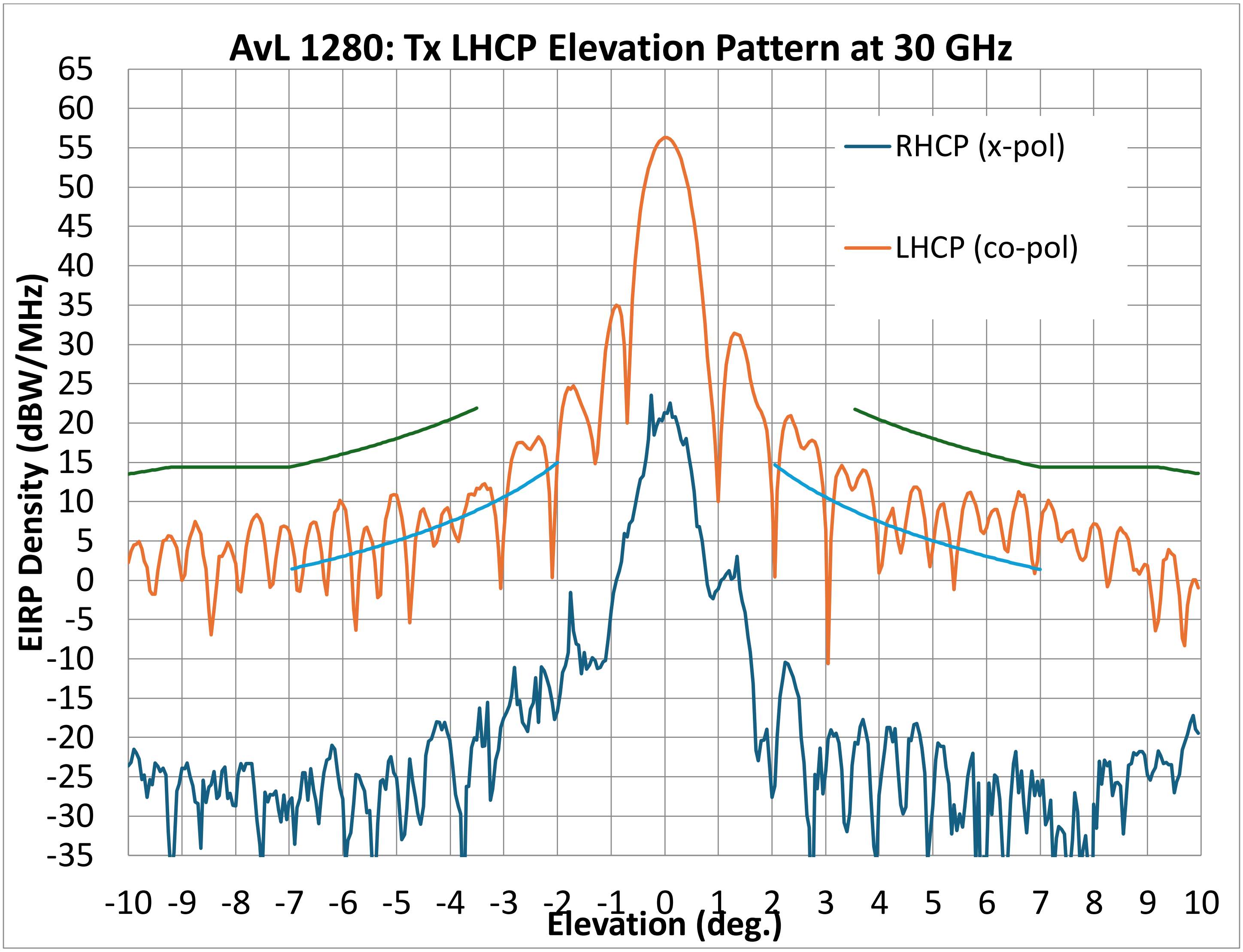
150
180
Elevation (deg.)



AvL 1280: Tx LHCP Elevation Pattern at 30 GHz
EIRP Density (dBW/MHz)
Elevation (deg.)
RHCP (x-pol)
LHCP (co-pol)
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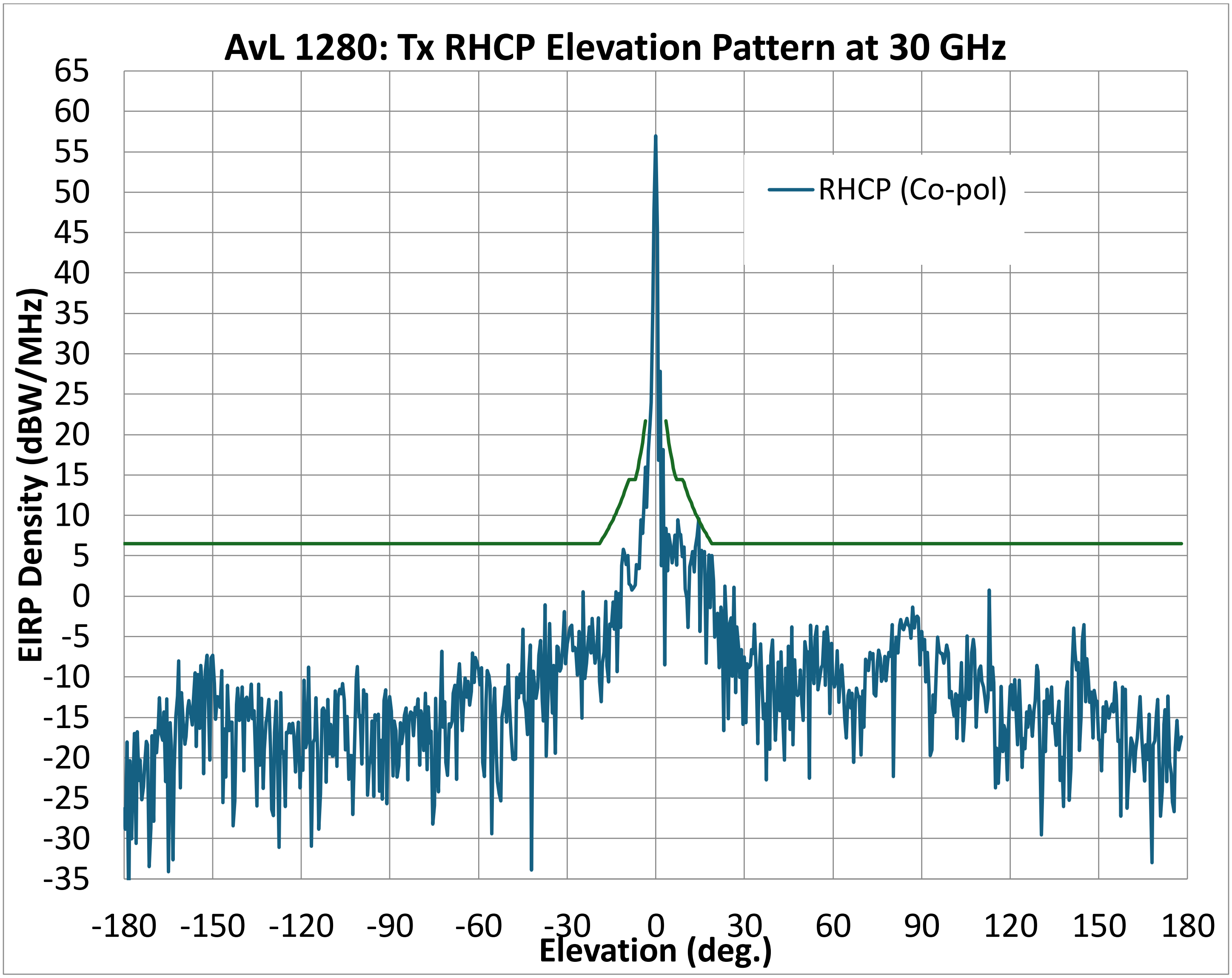
AvL 1280: Tx RHCP Elevation Pattern at 30 GHz
RHCP (Co-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
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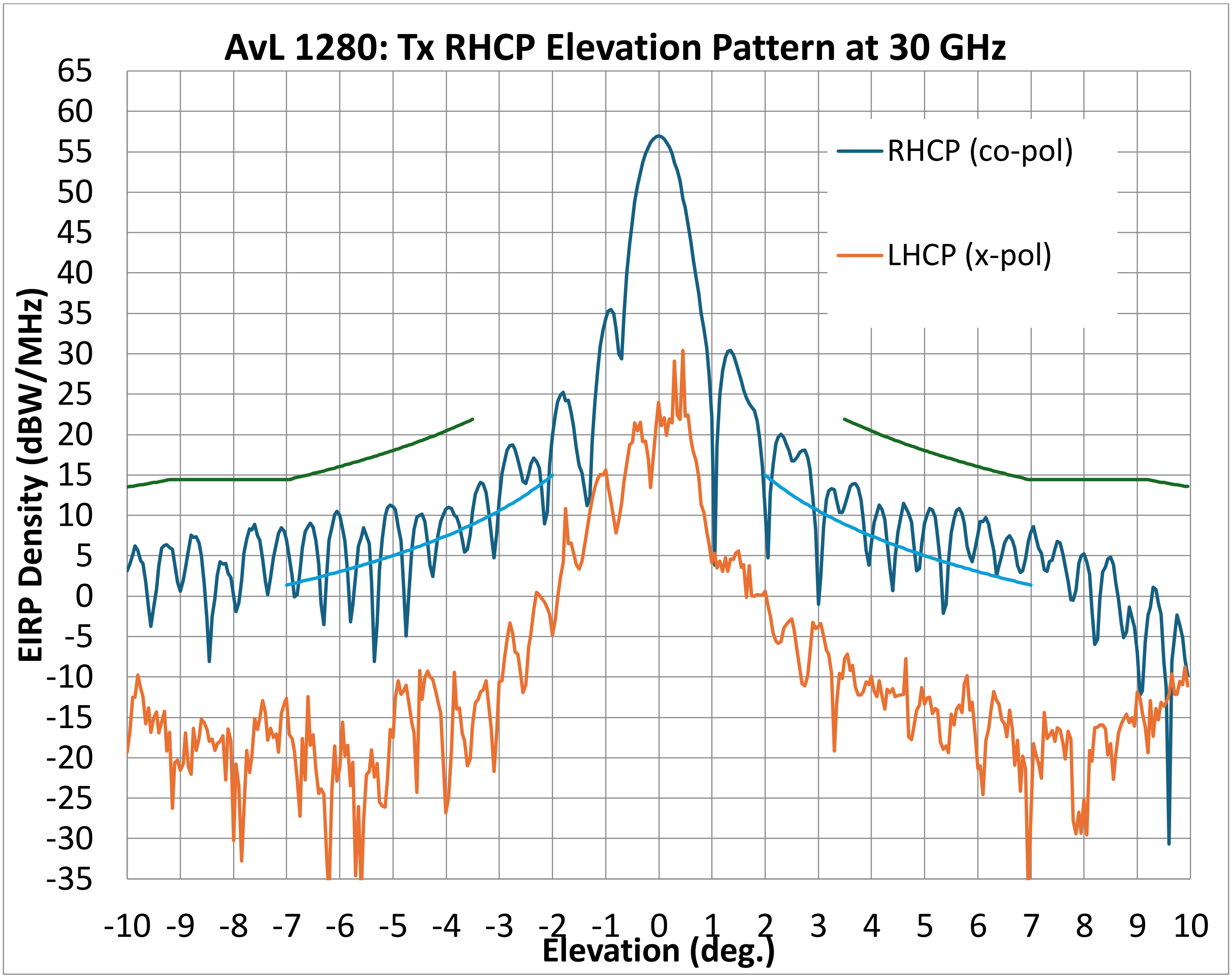

AvL 1280: Tx RHCP Elevation Pattern at 30 GHz
RHCP (co-pol)
LHCP (x-pol)
EIRP Density (dBW/MHz)
Elevation (deg.)
65
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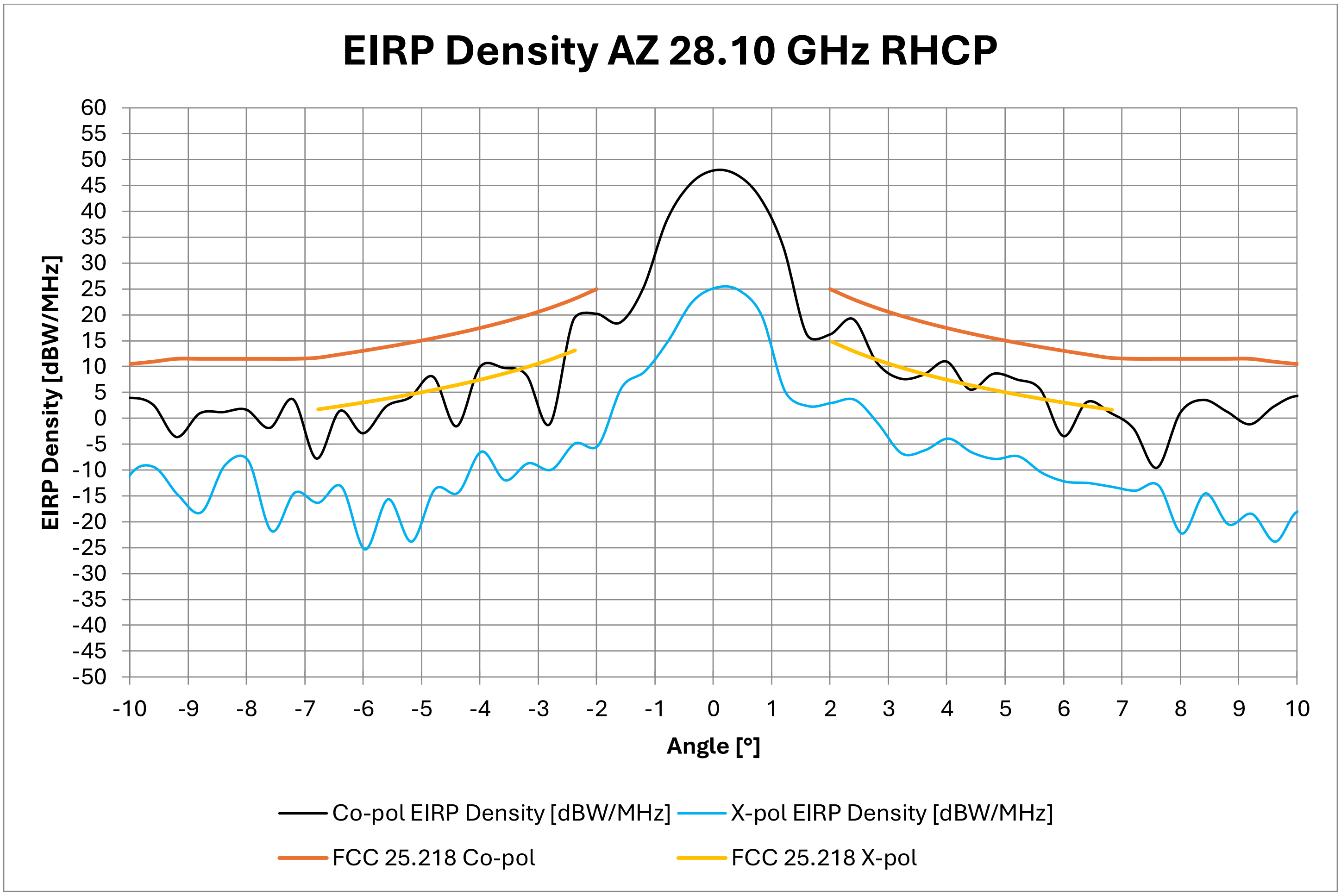
# Viasat RA40750 Ka-band Antenna



EIRP Density AZ 28.10 GHz RHCP
EIRP Density [dBW/MHz]
60
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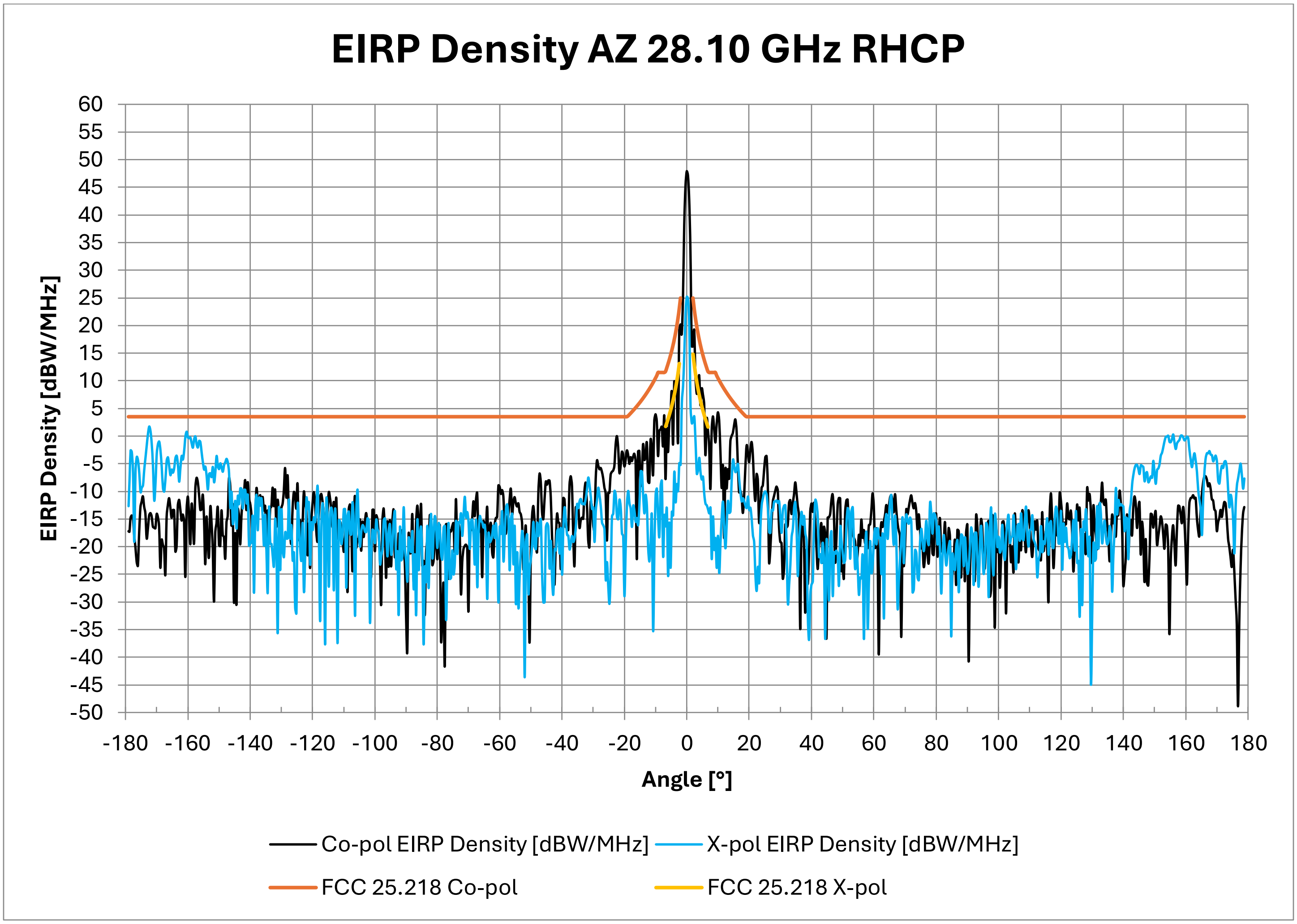
-50
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.10 GHz RHCP
EIRP Density [dBW/MHz]
60
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-15
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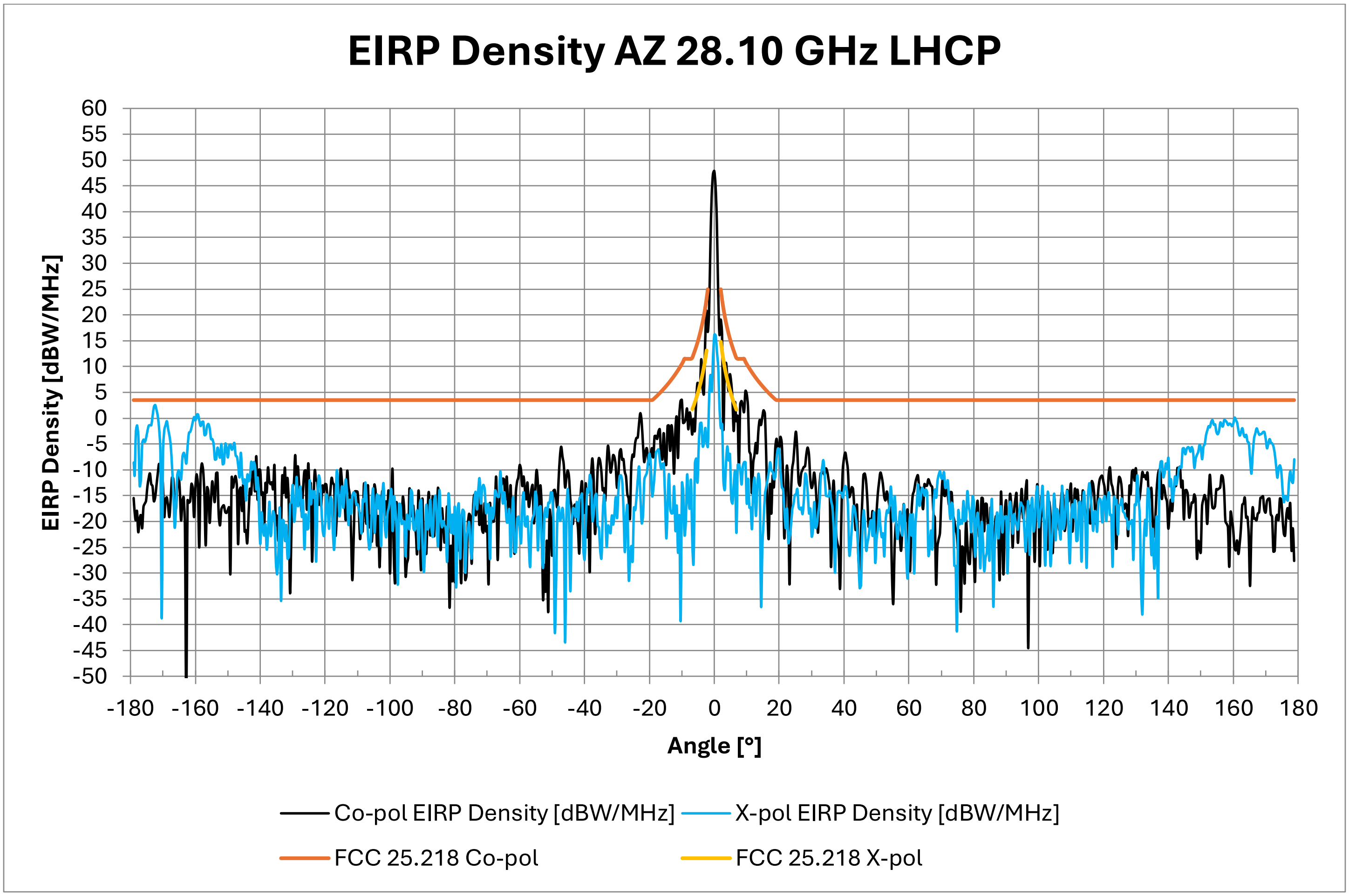
-50
-180
-160
-140
-120
-100
-80
-60
-40
-20
0
20
40
60
80
100
120
140
160
180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.10 GHz LHCP
EIRP Density [dBW/MHz]
60
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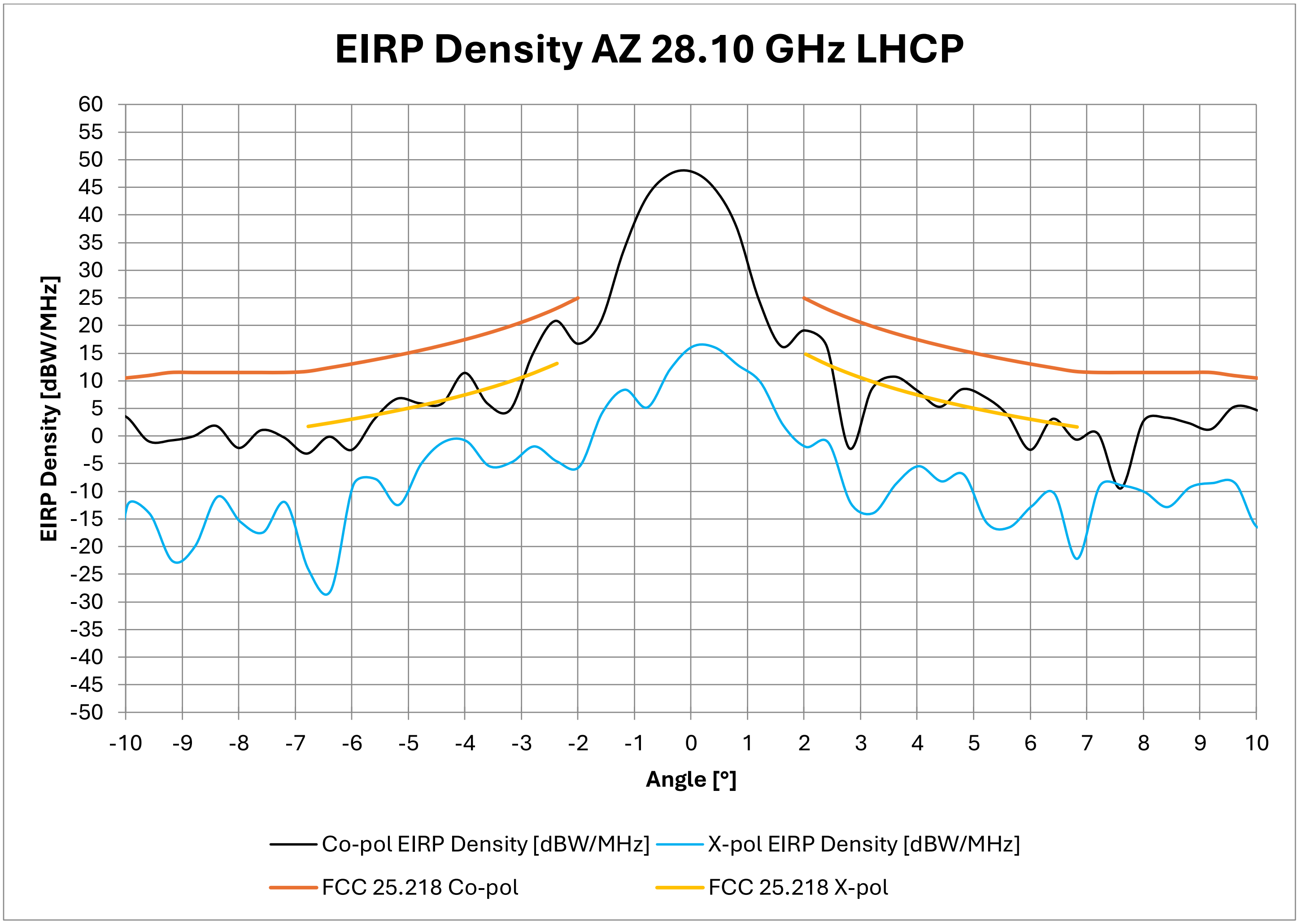
-50
-180
-160
-140
-120
-100
-80
-60
-40
-20
0
20
40
60
80
100
120
140
160
180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.10 GHz LHCP
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EIRP Density [dBW/MHz]
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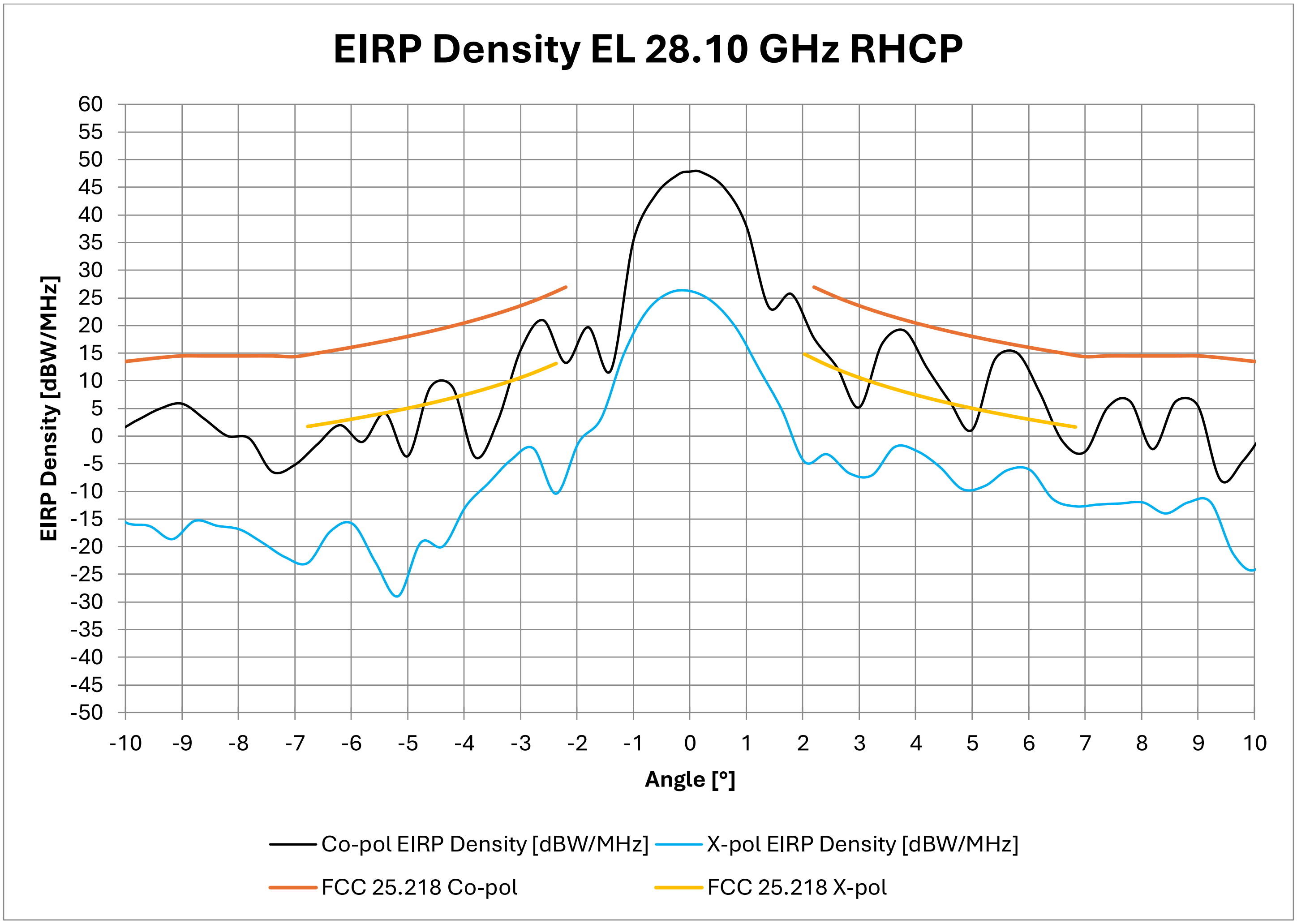
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 28.10 GHz RHCP
EIRP Density [dBW/MHz]
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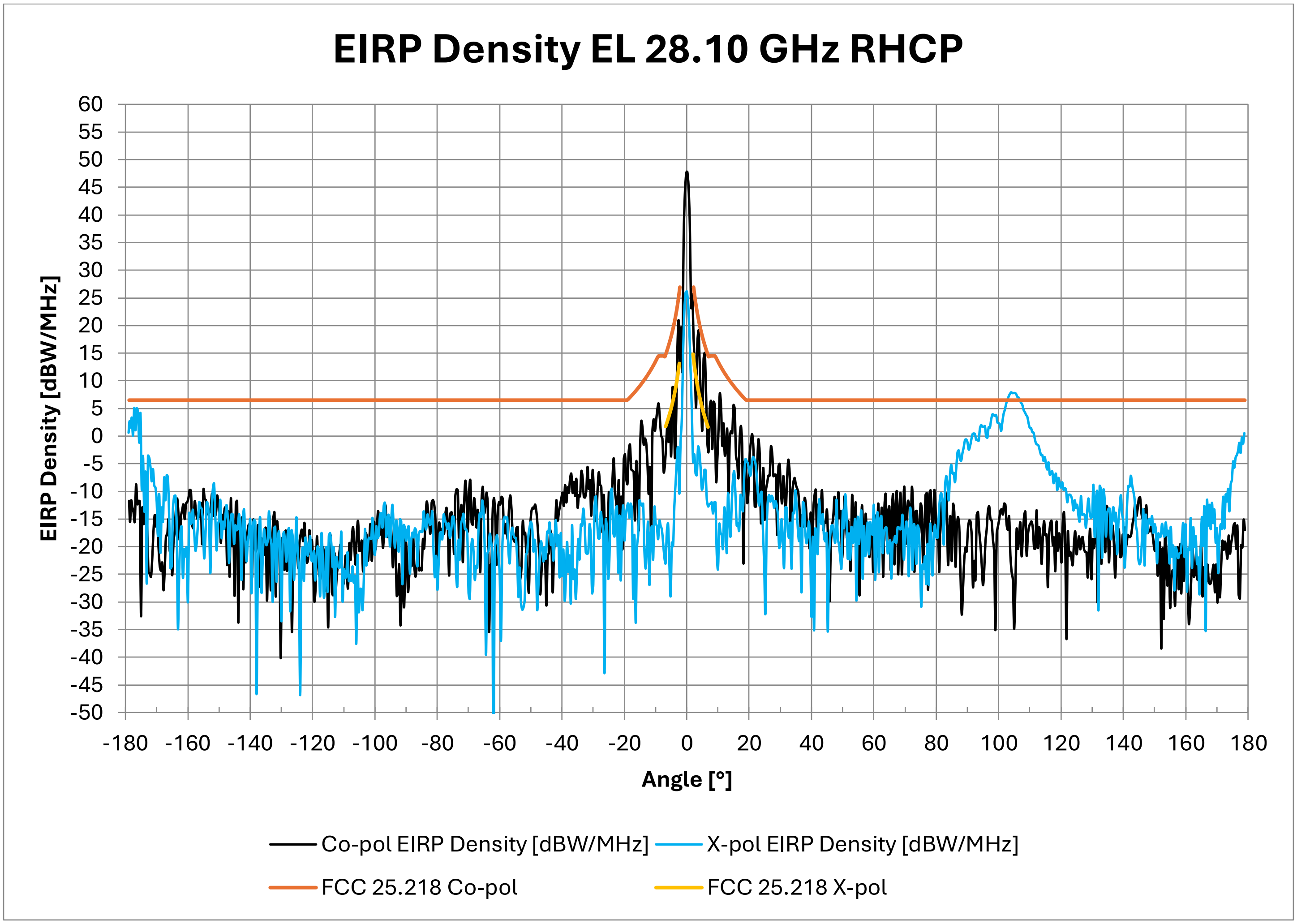
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 28.10 GHz RHCP
EIRP Density [dBW/MHz]
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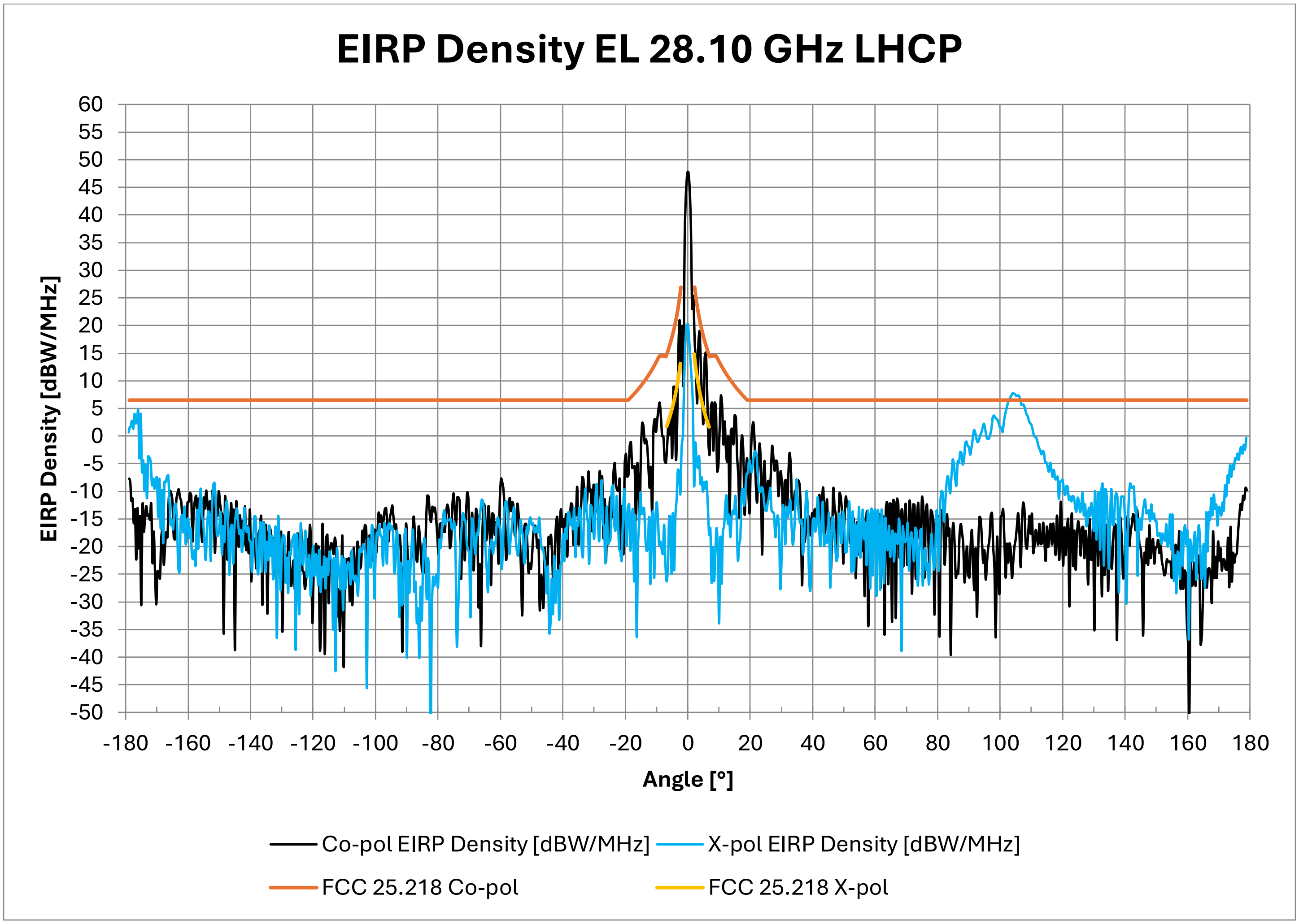
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 28.10 GHz LHCP
EIRP Density [dBW/MHz]
Angle [°]
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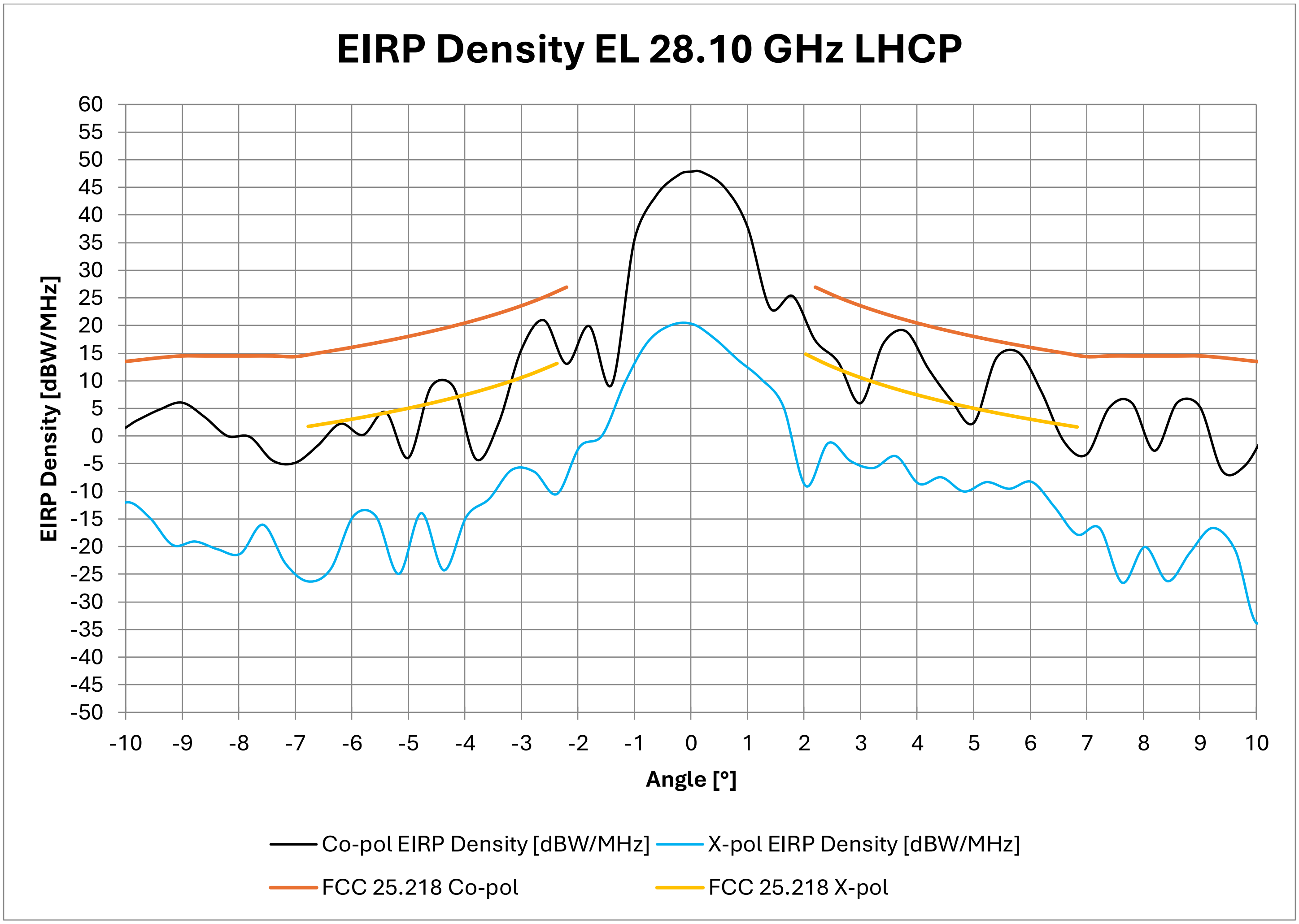
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 28.10 GHz LHCP
EIRP Density [dBW/MHz]
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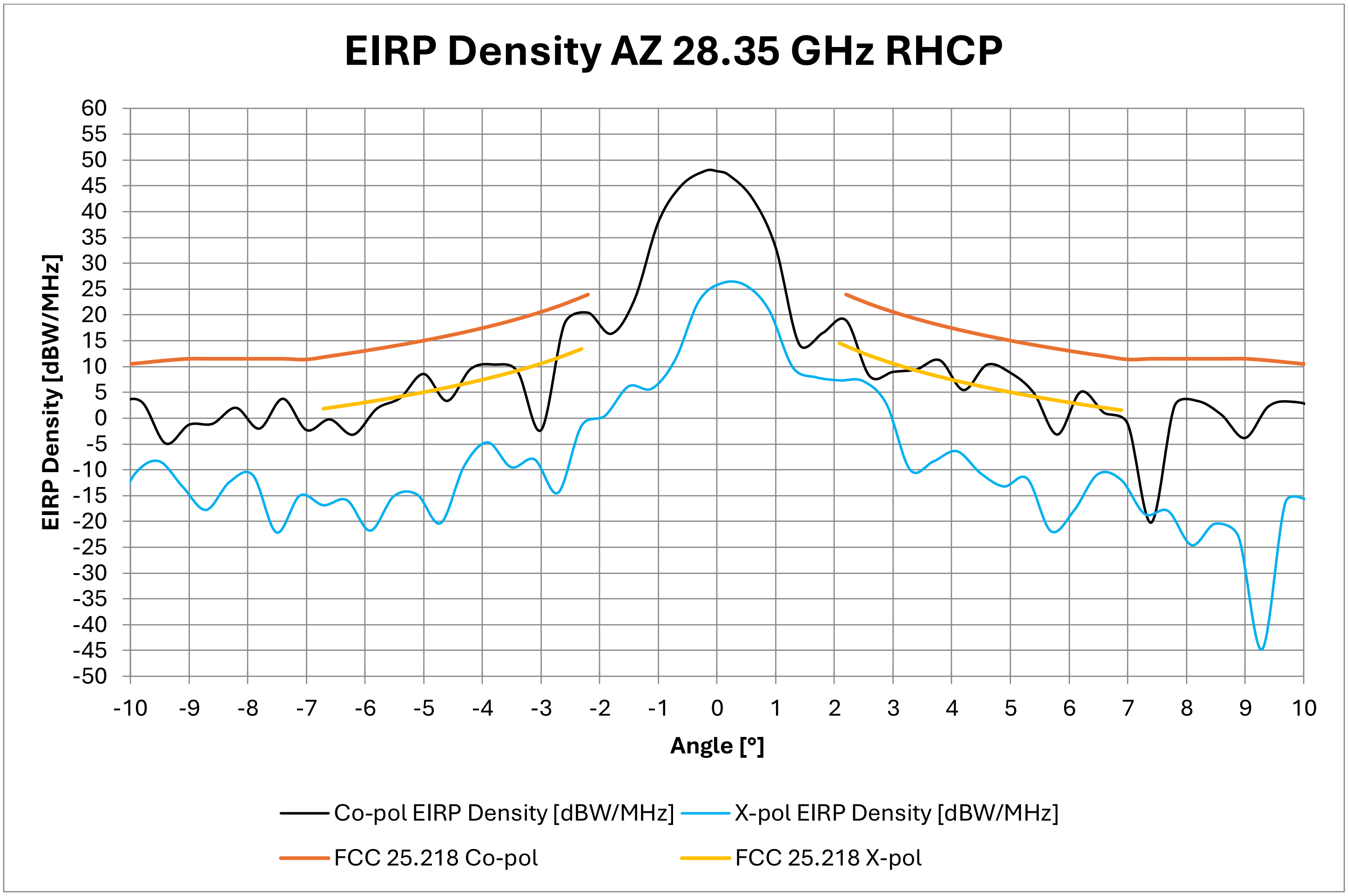
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density AZ 28.35 GHz RHCP
EIRP Density [dBW/MHz]
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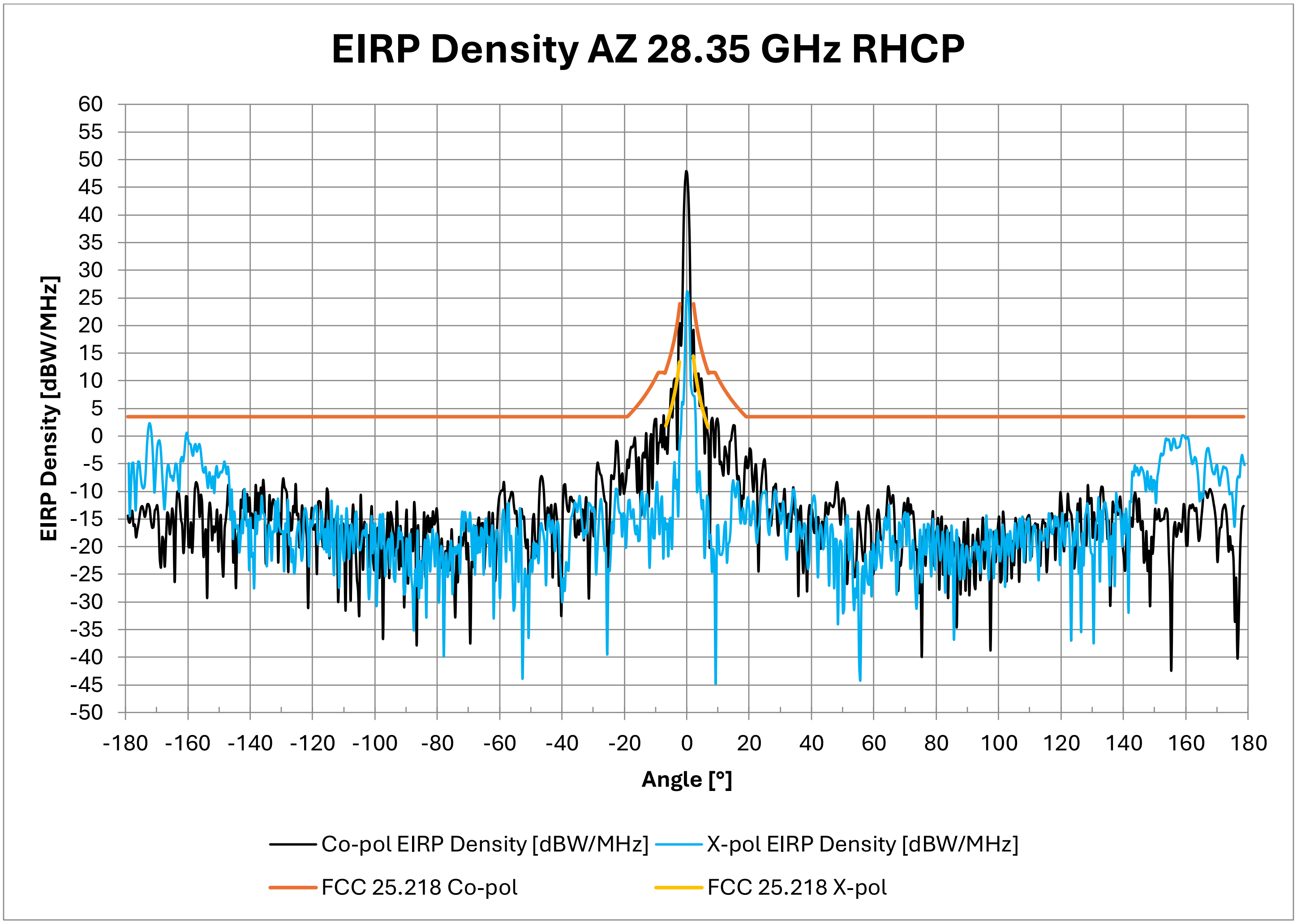
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.35 GHz RHCP
EIRP Density [dBW/MHz]
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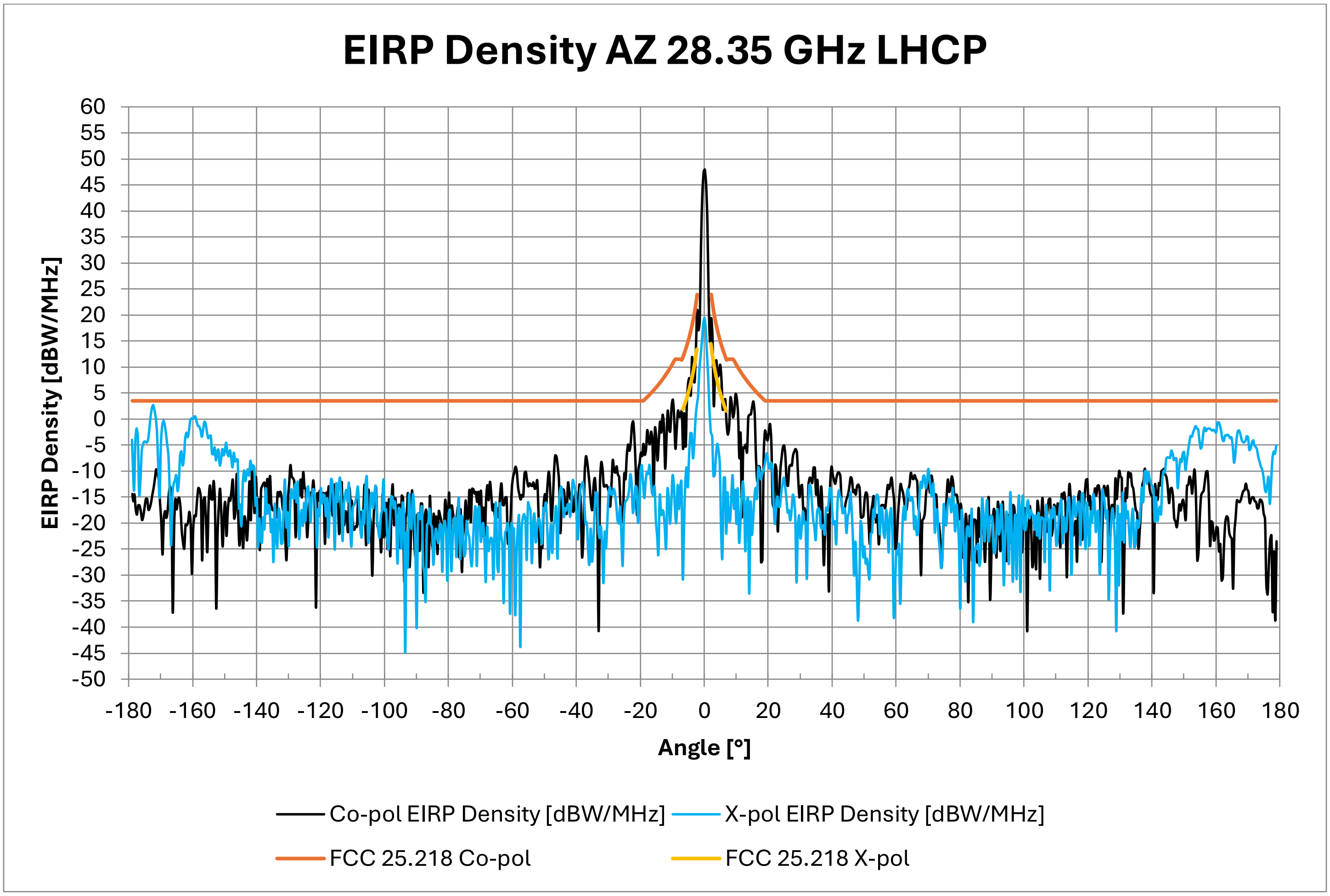
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.35 GHz LHCP
EIRP Density [dBW/MHz]
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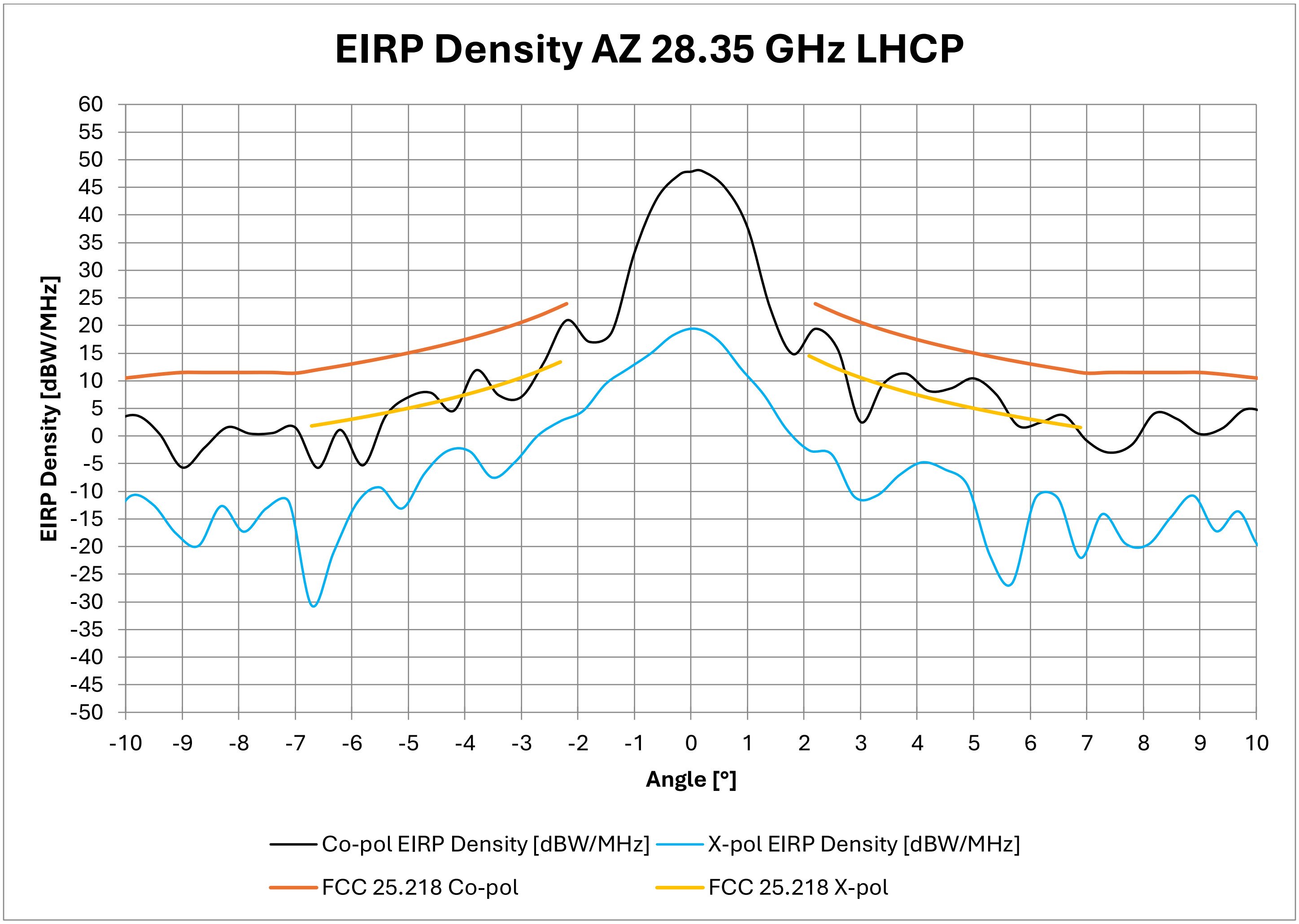
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.35 GHz LHCP
EIRP Density [dBW/MHz]
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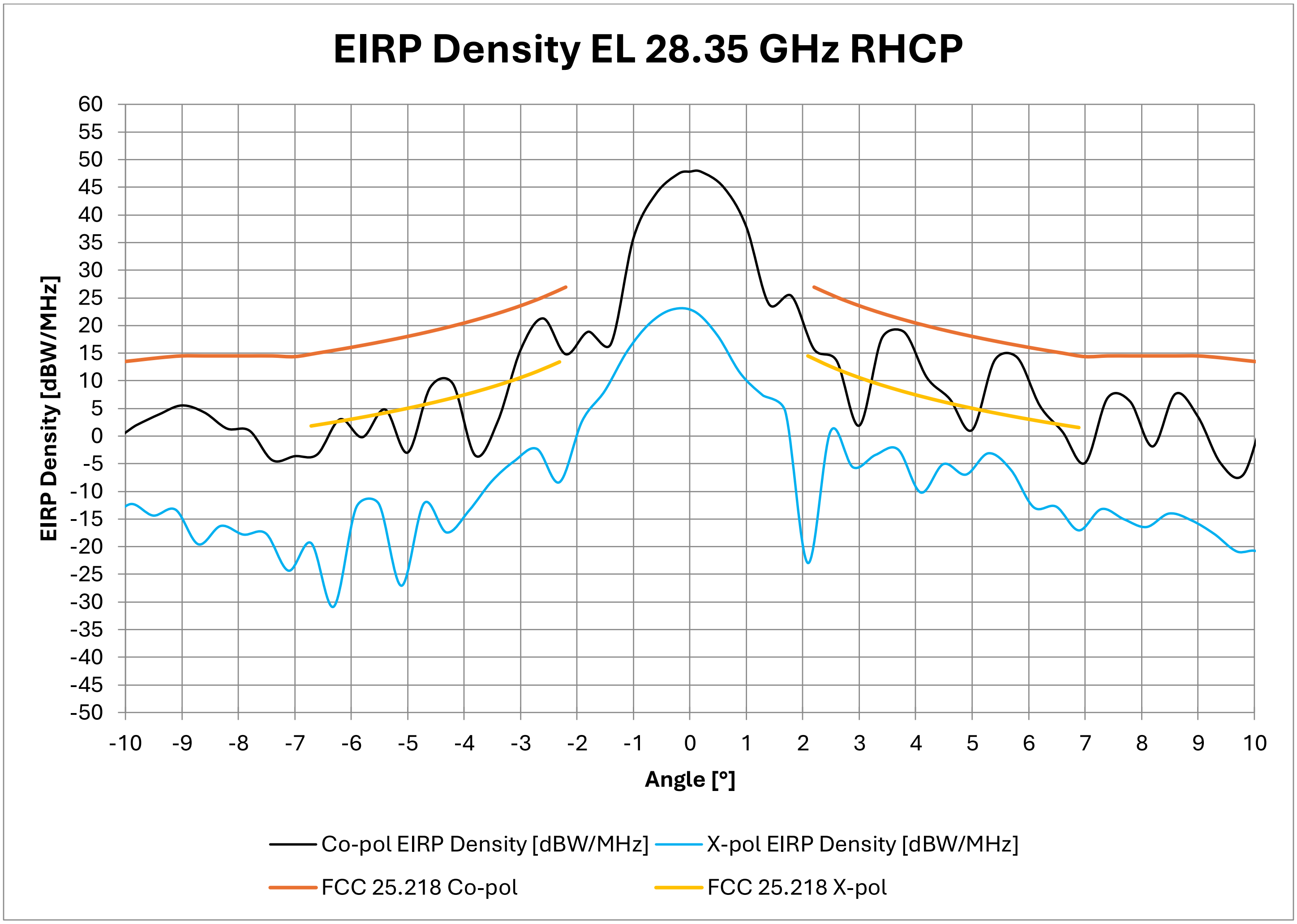
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density EL 28.35 GHz RHCP
EIRP Density [dBW/MHz]
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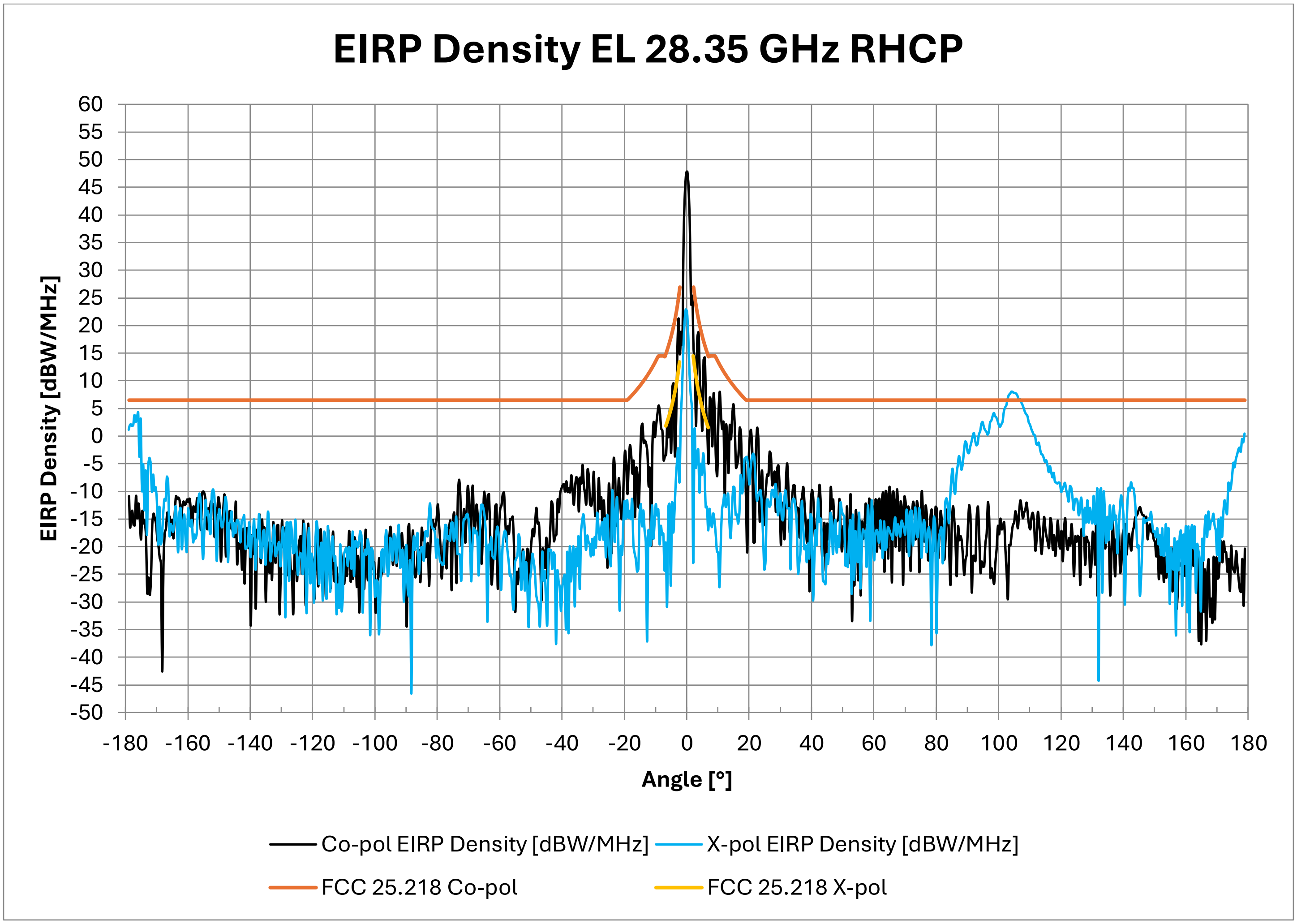
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 28.35 GHz RHCP
EIRP Density [dBW/MHz]
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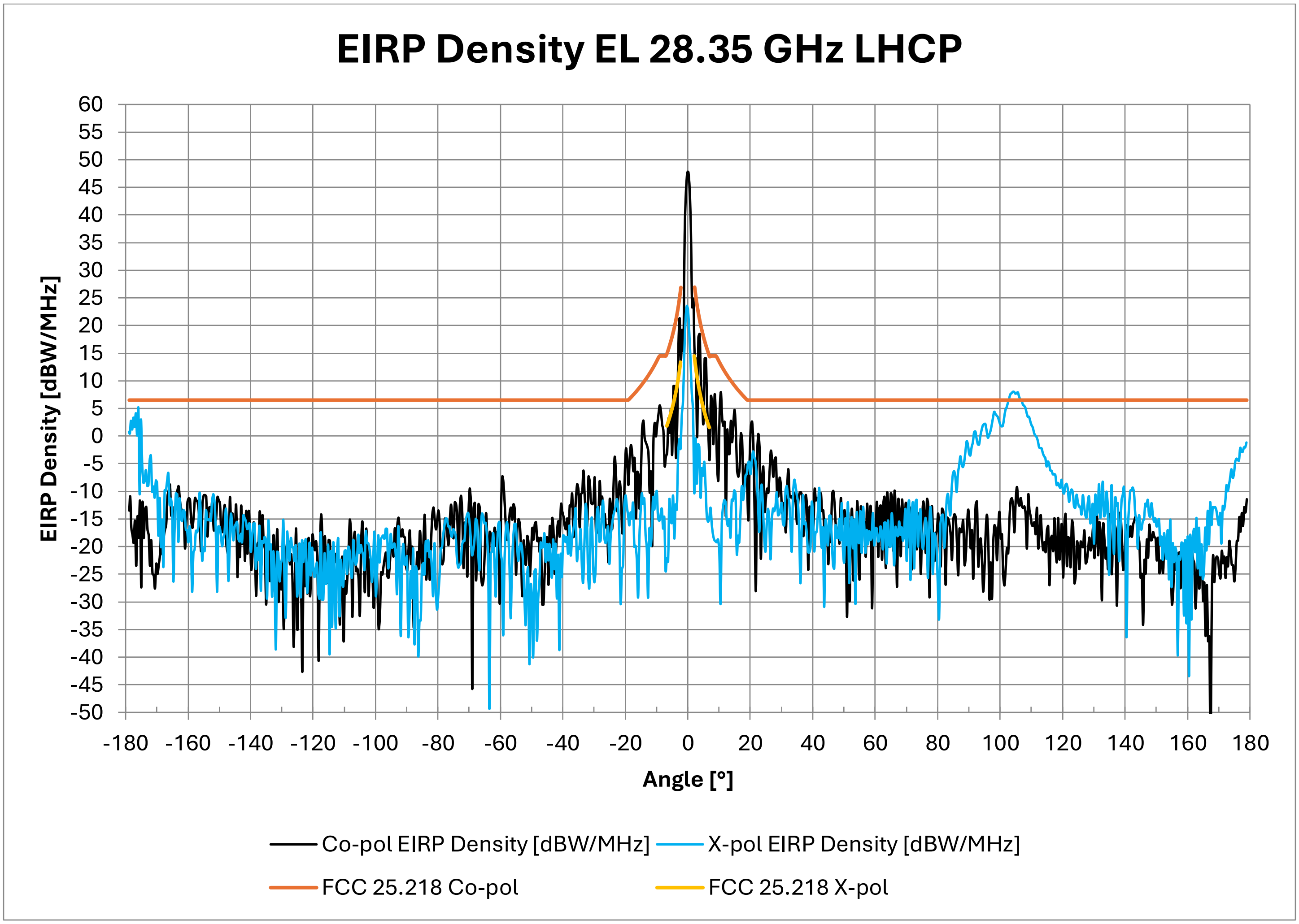
-180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 28.35 GHz LHCP
EIRP Density [dBW/MHz]
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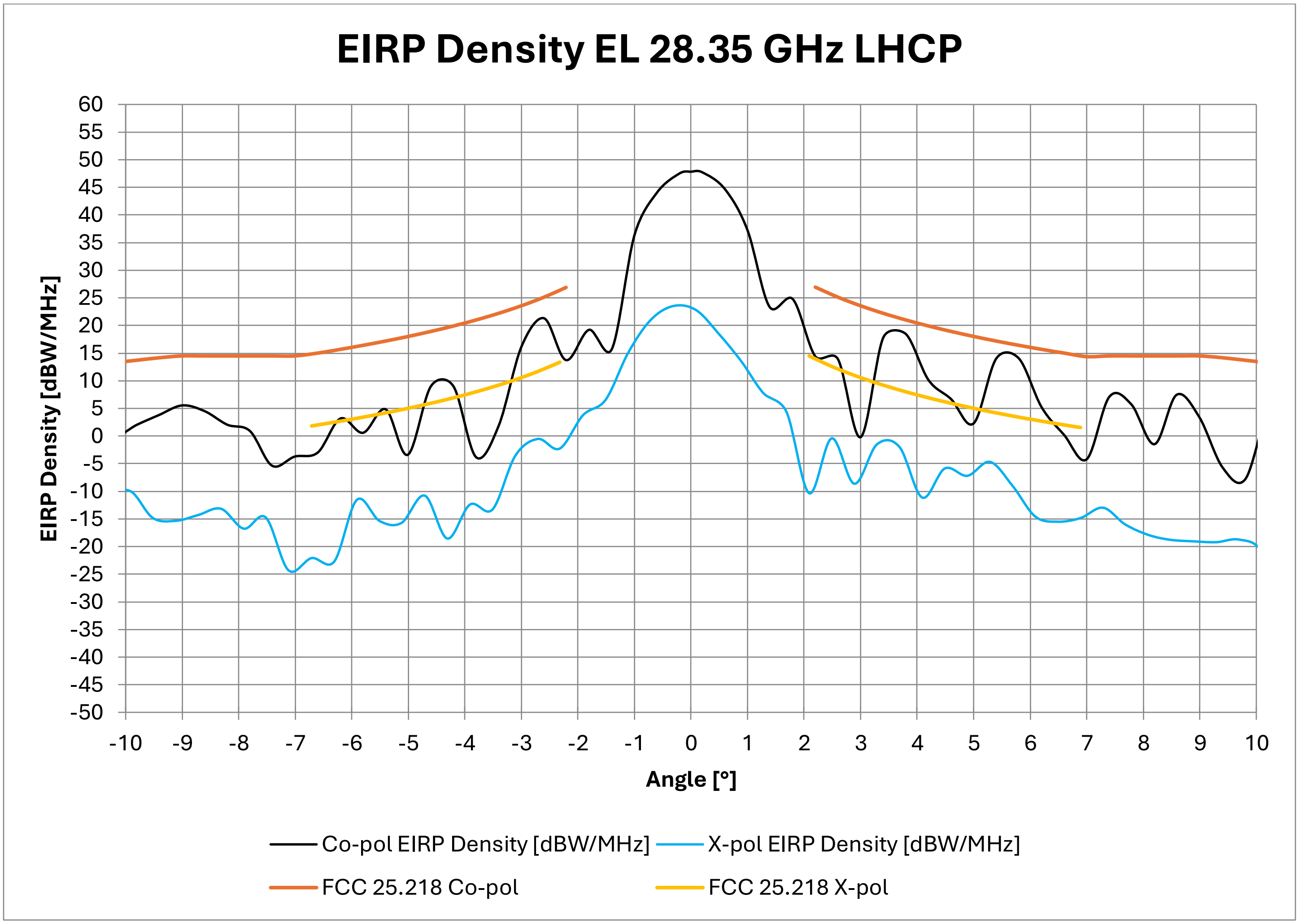
-180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 28.35 GHz LHCP
EIRP Density [dBW/MHz]
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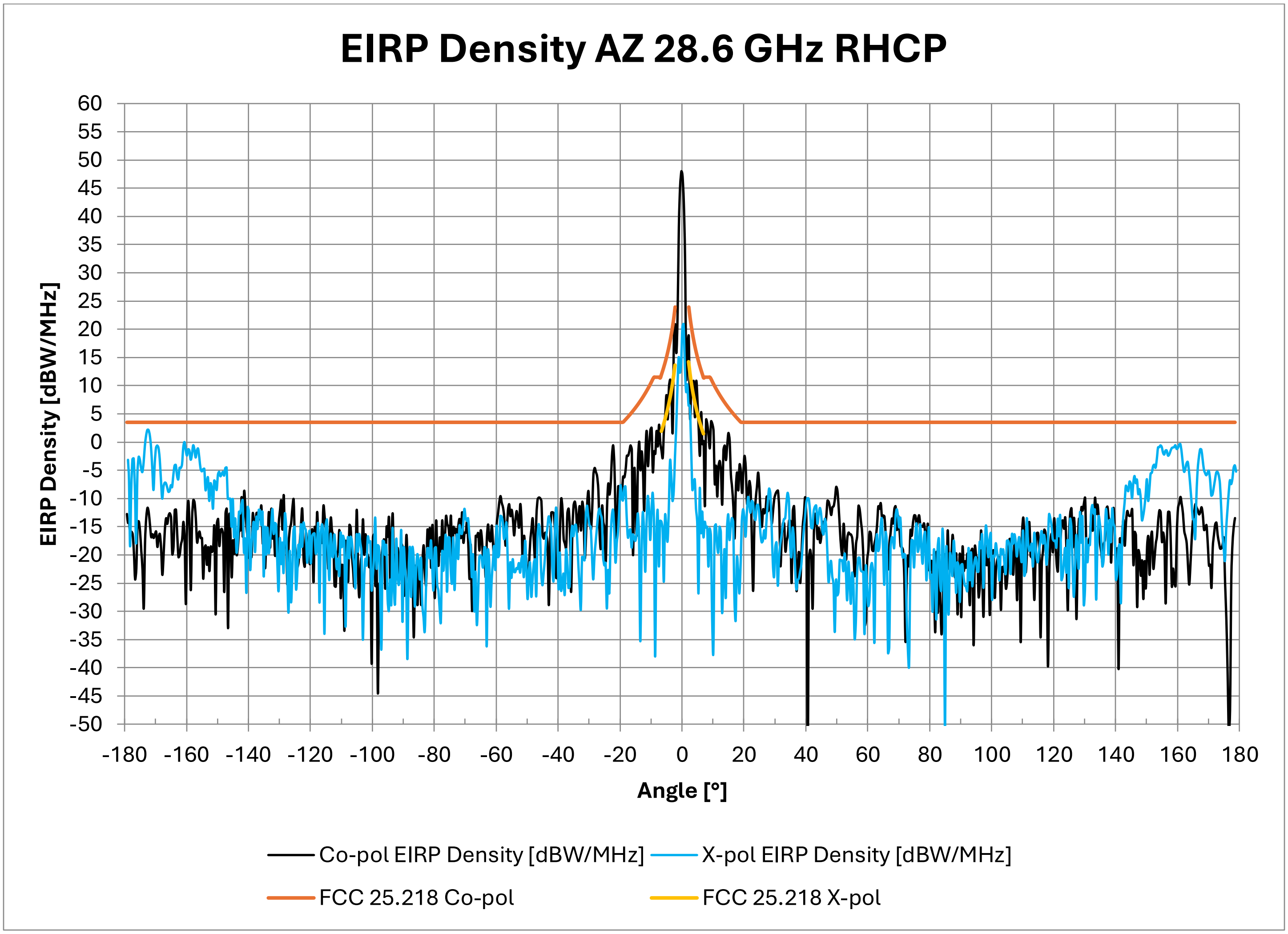
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.6 GHz RHCP
EIRP Density [dBW/MHz]
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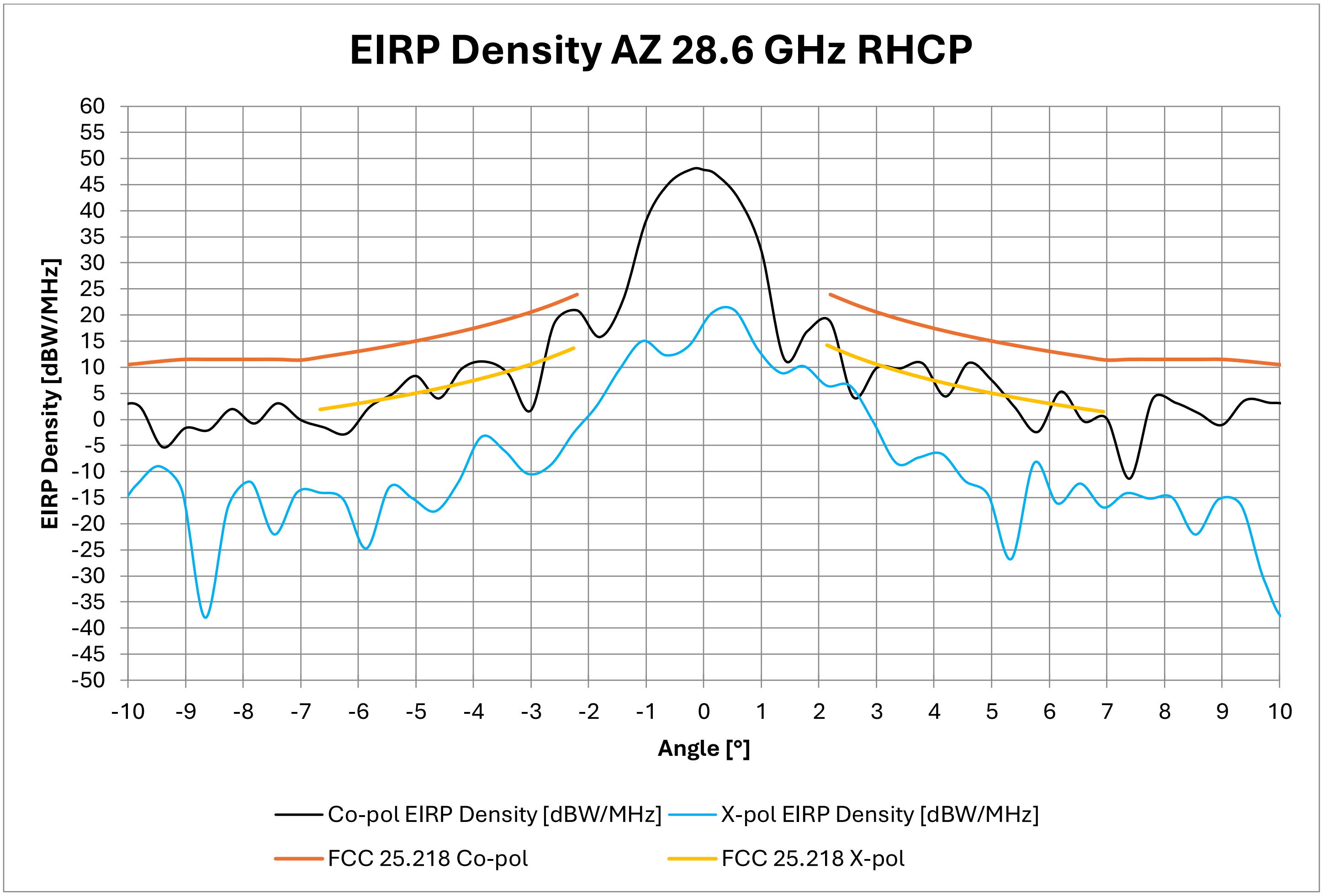
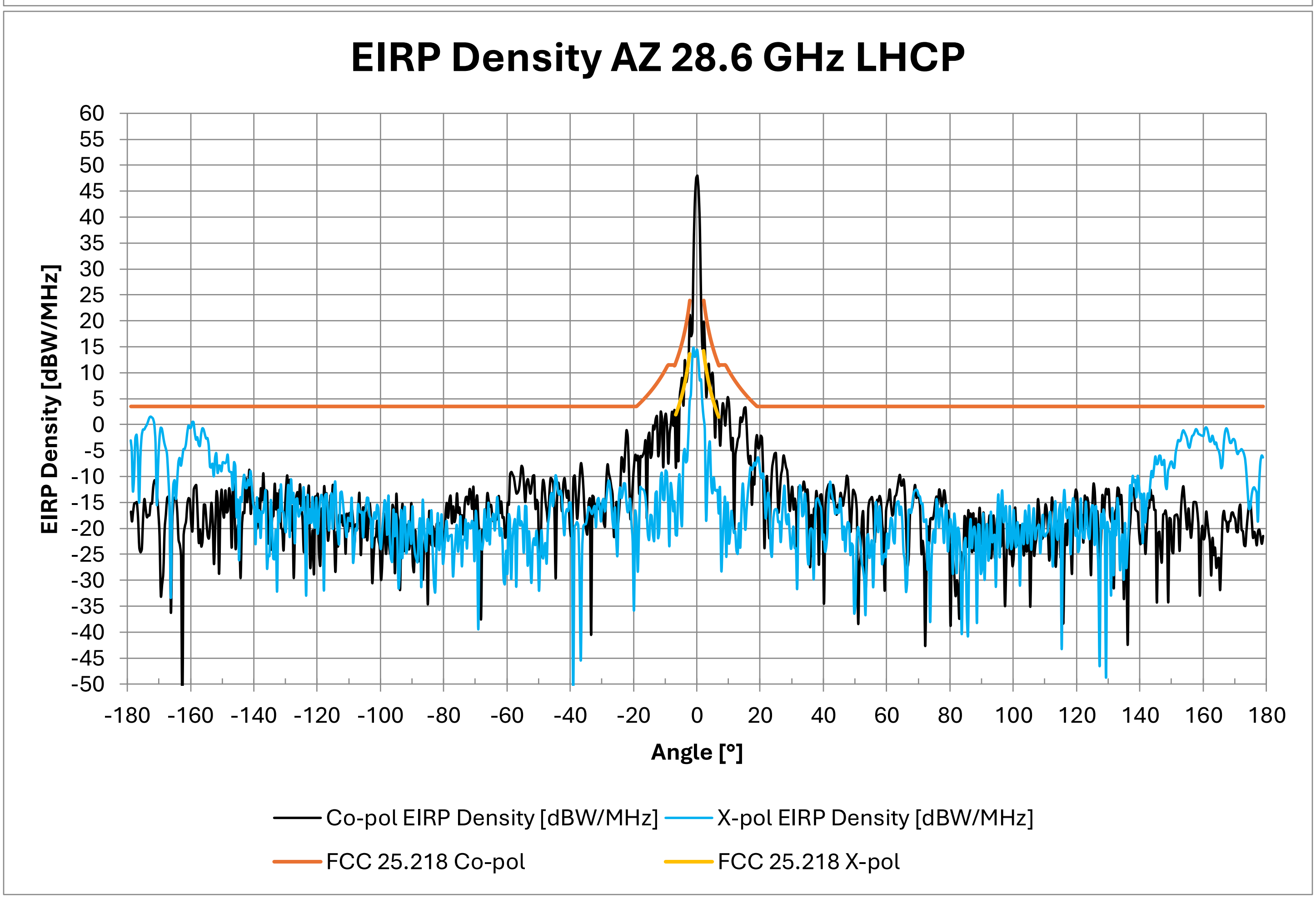
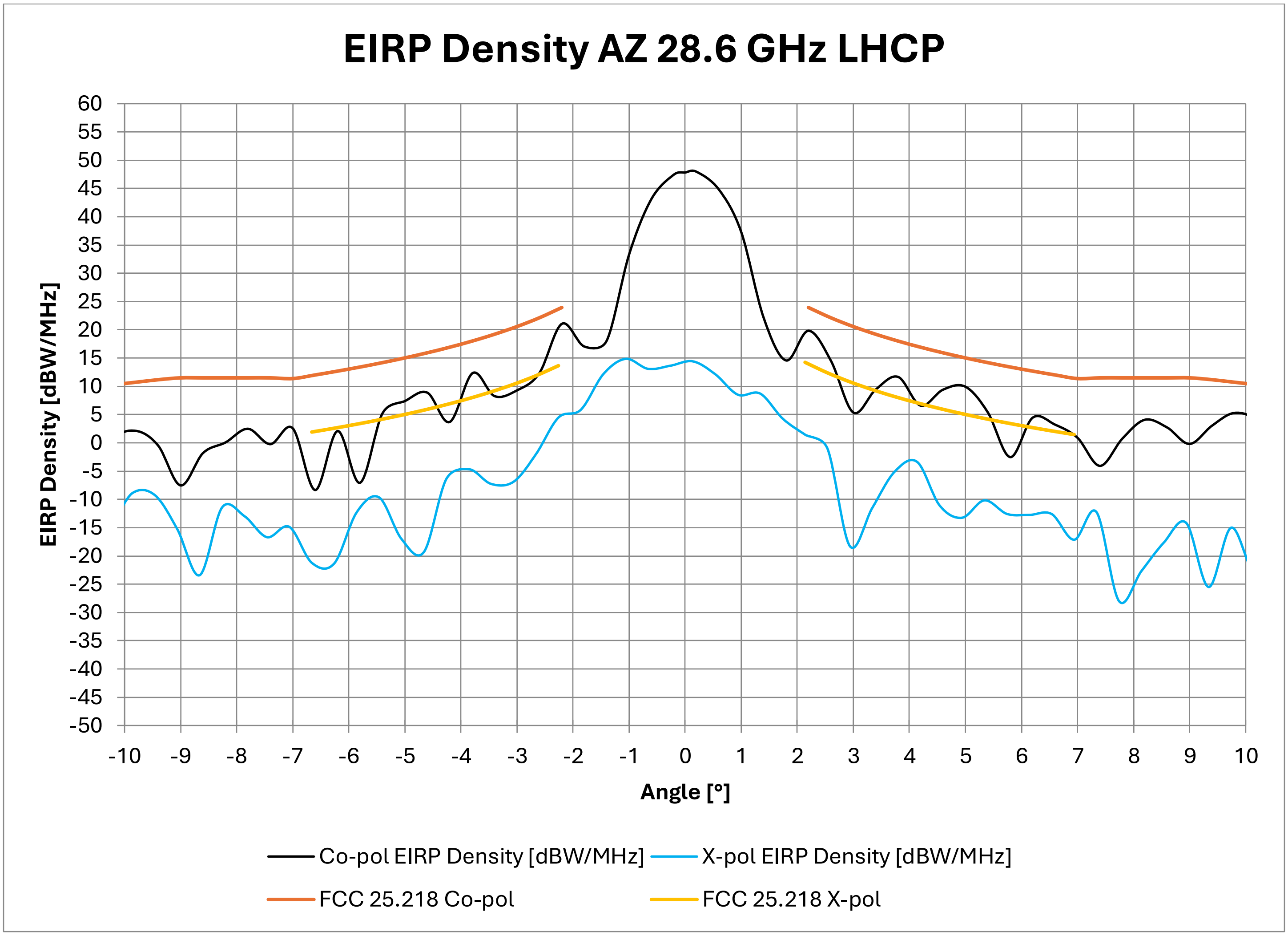
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.6 GHz RHCP
EIRP Density [dBW/MHz]
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.6 GHz LHCP
EIRP Density [dBW/MHz]
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 28.6 GHz LHCP
EIRP Density [dBW/MHz]
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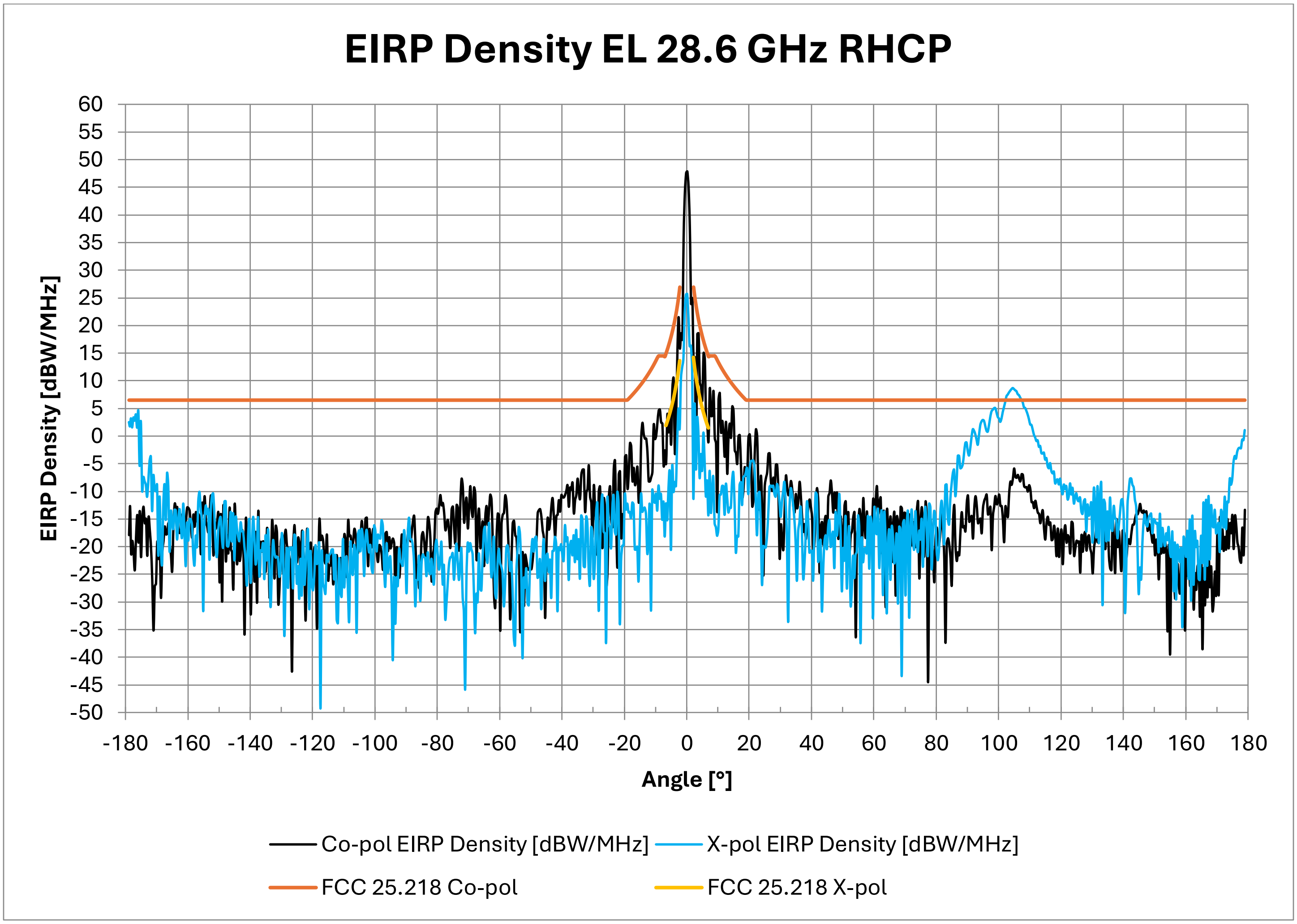
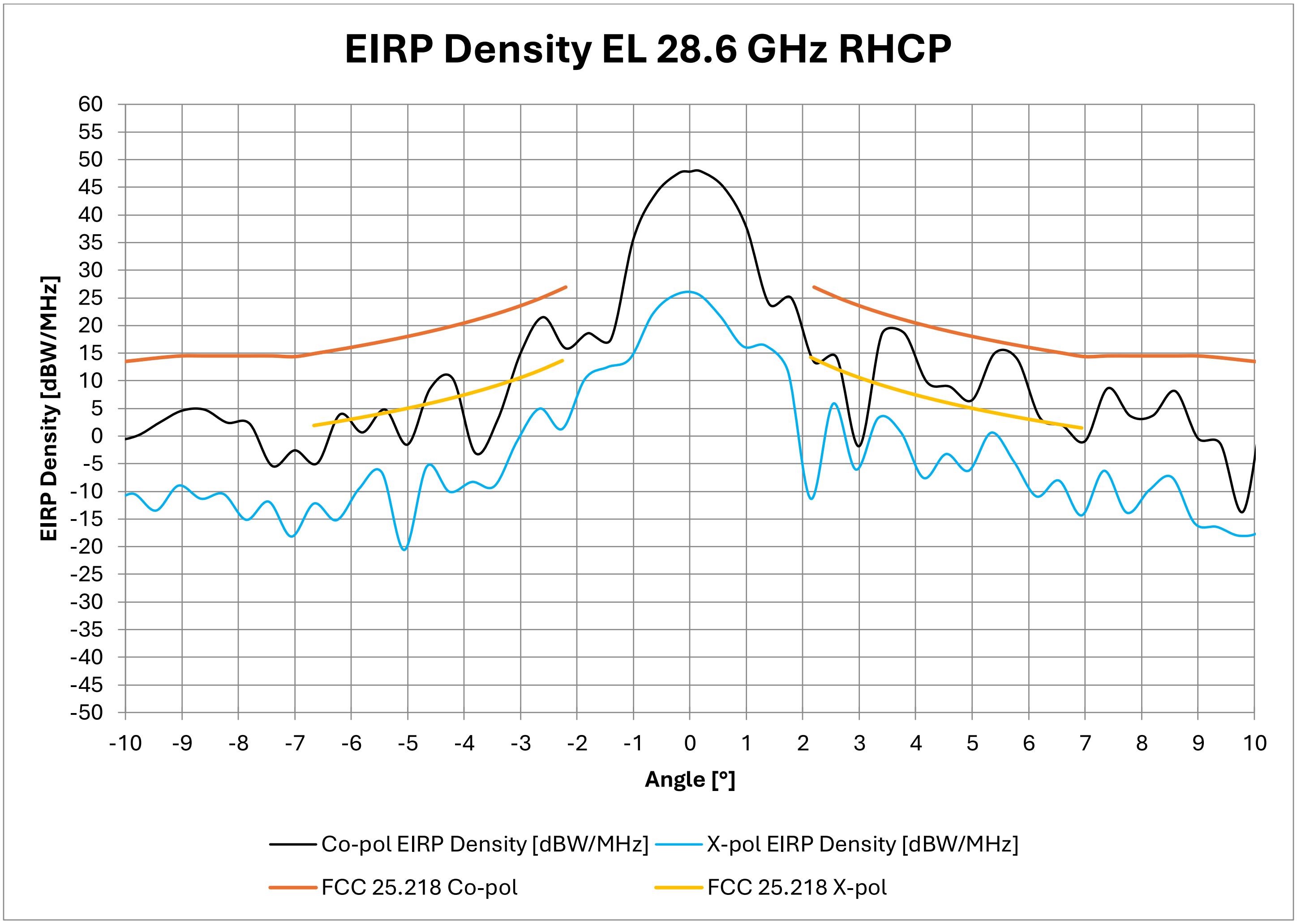
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density EL 28.6 GHz RHCP
EIRP Density [dBW/MHz]
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 28.6 GHz RHCP
EIRP Density [dBW/MHz]
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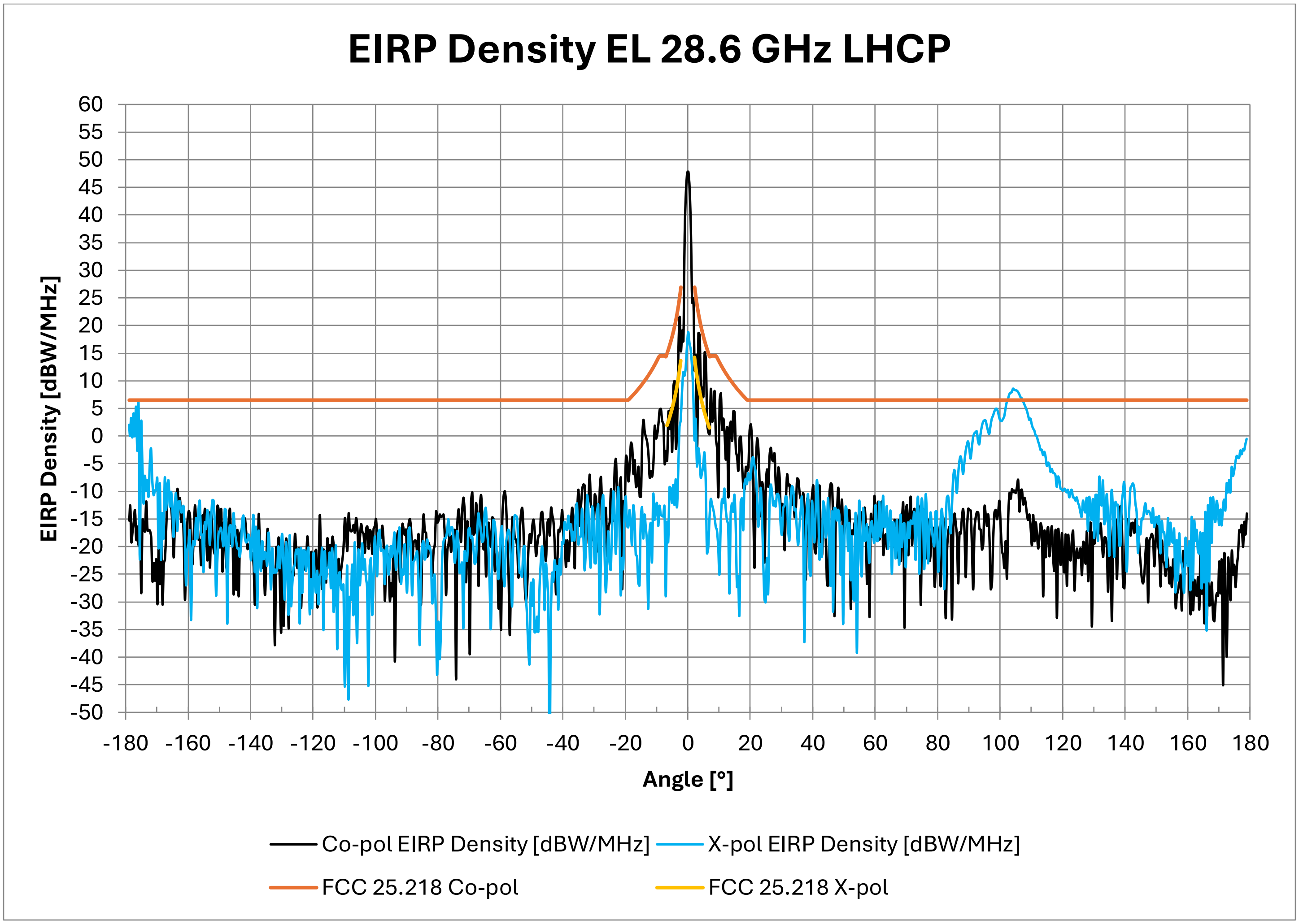
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density EL 28.6 GHz LHCP
EIRP Density [dBW/MHz]
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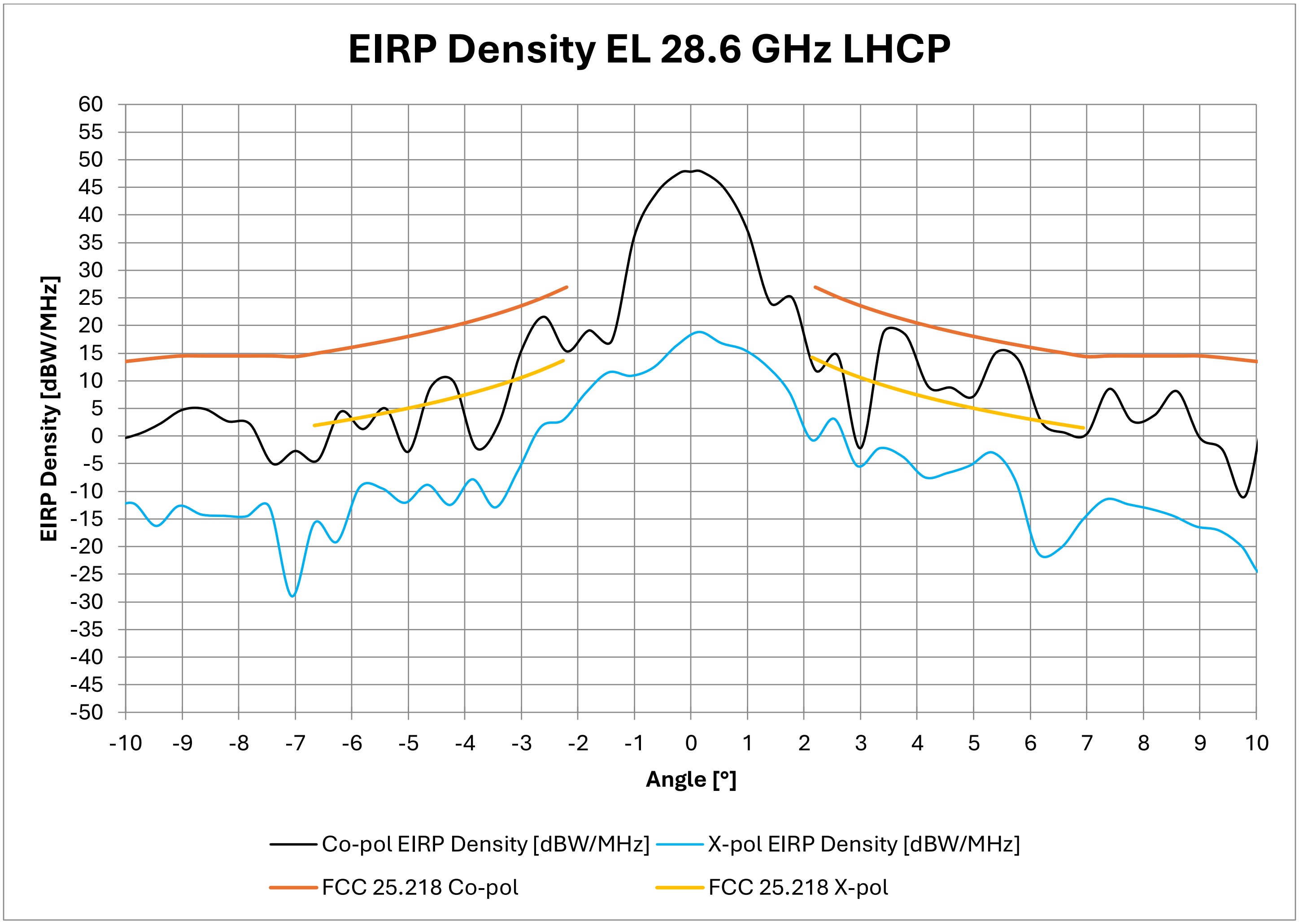
-180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density EL 28.6 GHz LHCP
EIRP Density [dBW/MHz]
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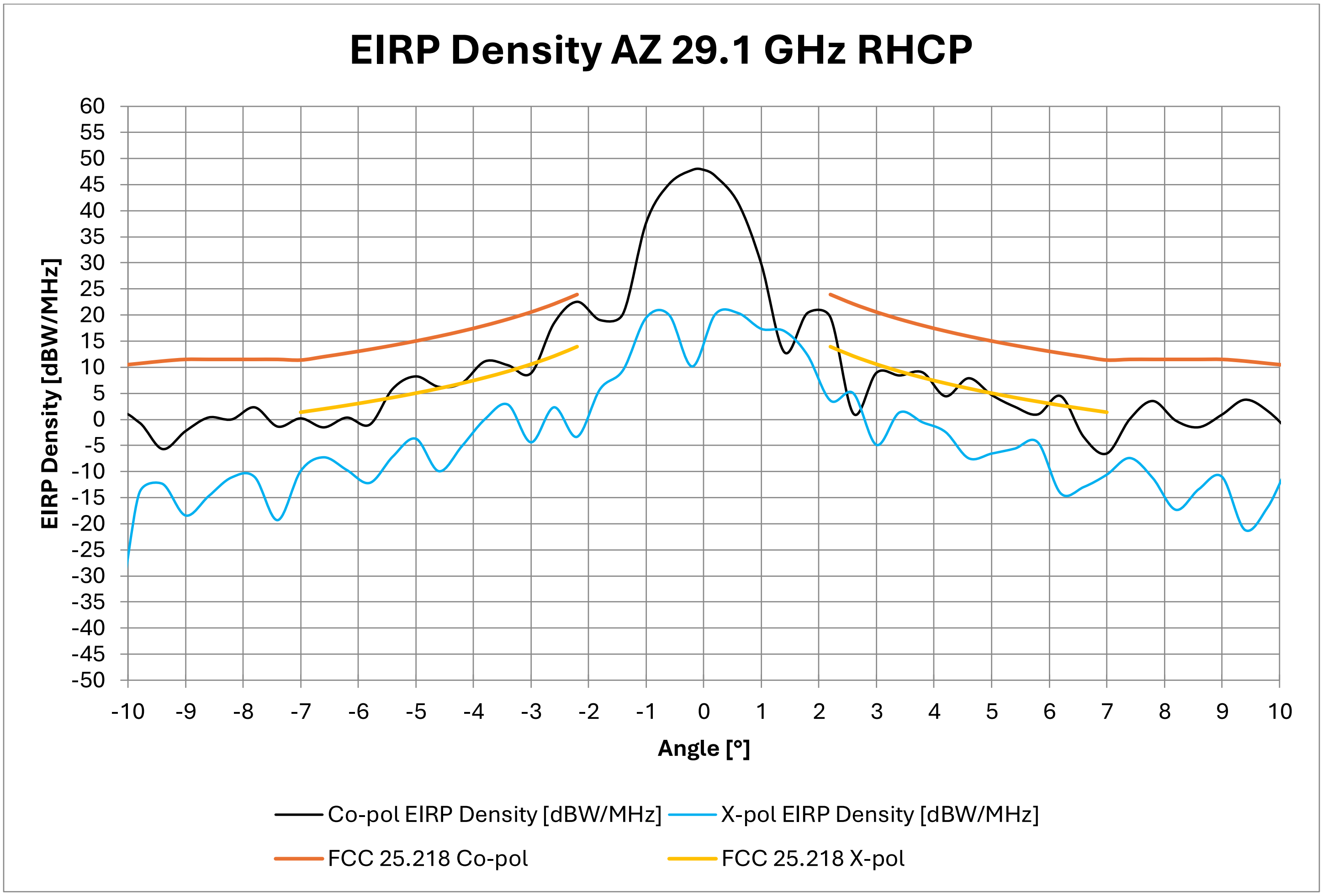
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 29.1 GHz RHCP
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EIRP Density [dBW/MHz]
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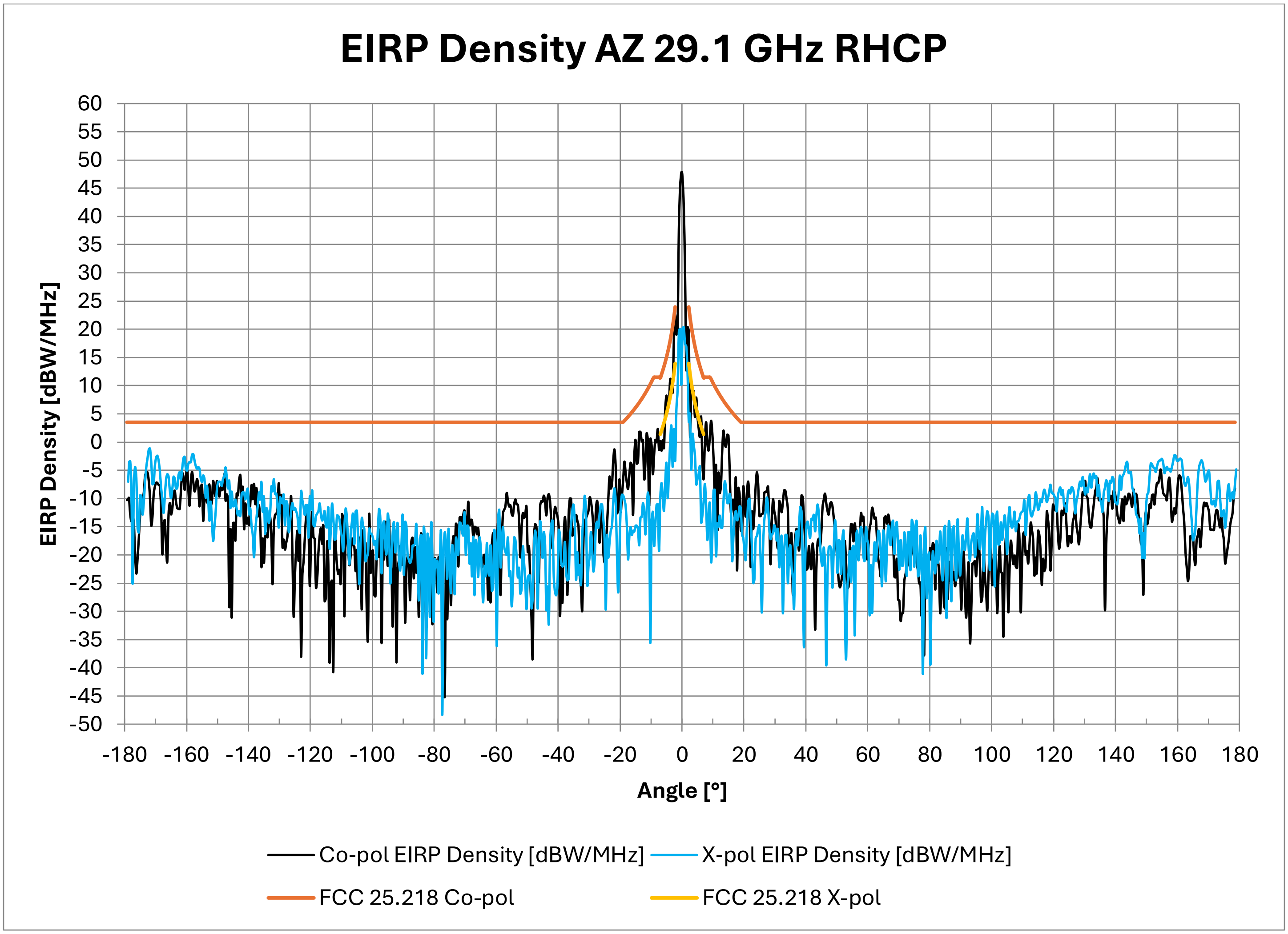
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 29.1 GHz RHCP
EIRP Density [dBW/MHz]
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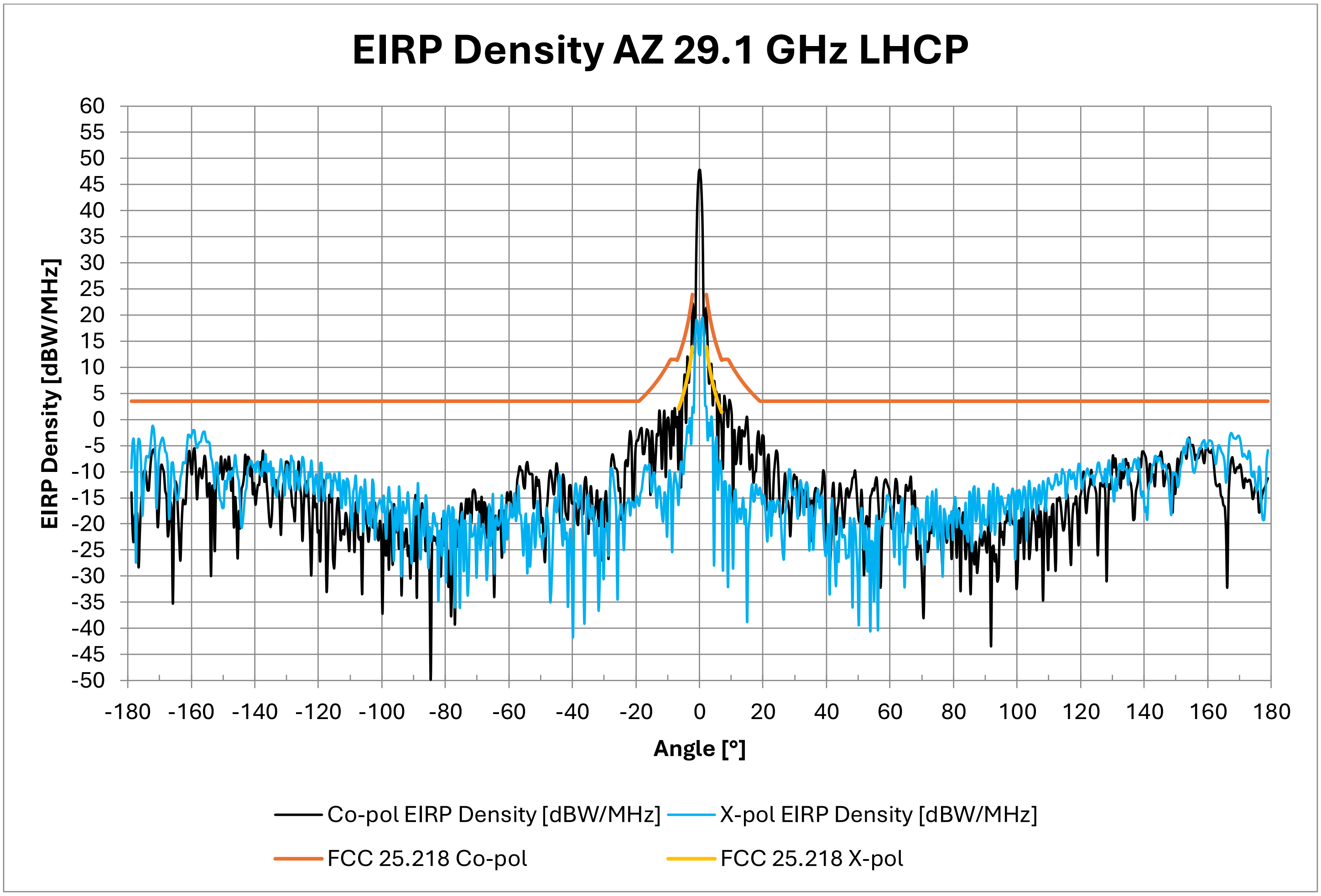
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 29.1 GHz LHCP
EIRP Density [dBW/MHz]
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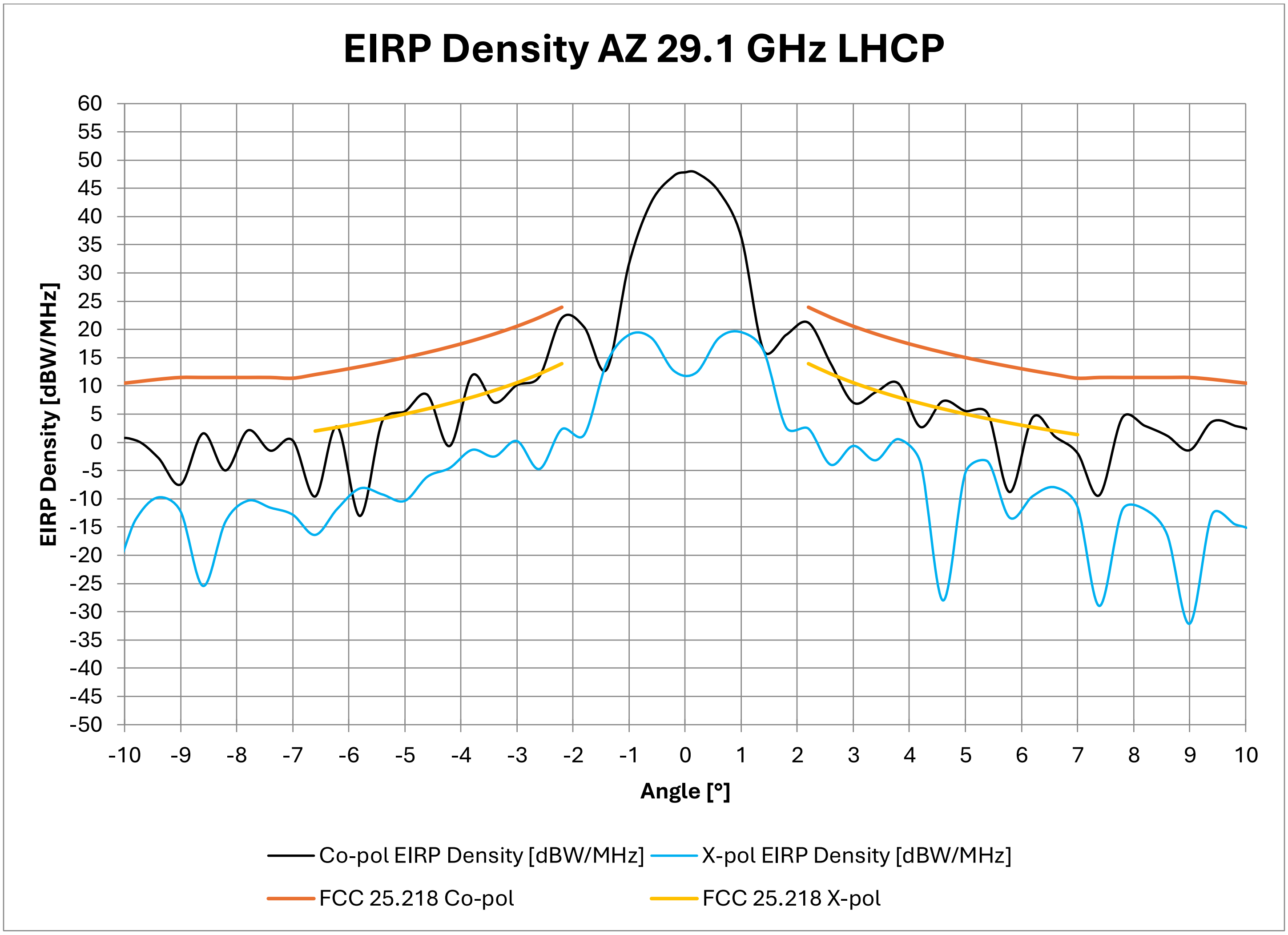
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 29.1 GHz LHCP
EIRP Density [dBW/MHz]
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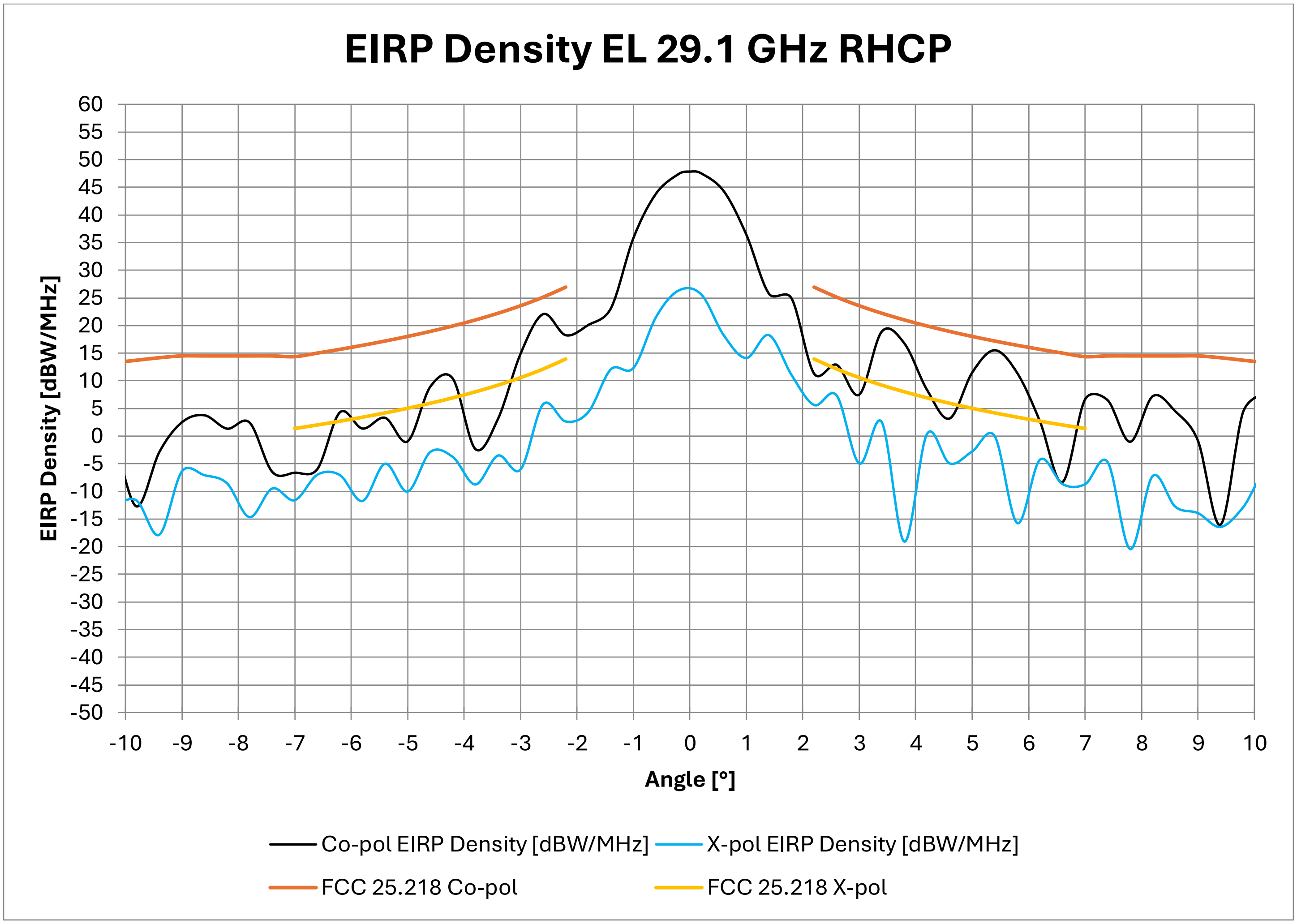
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 29.1 GHz RHCP
EIRP Density [dBW/MHz]
Angle [°]
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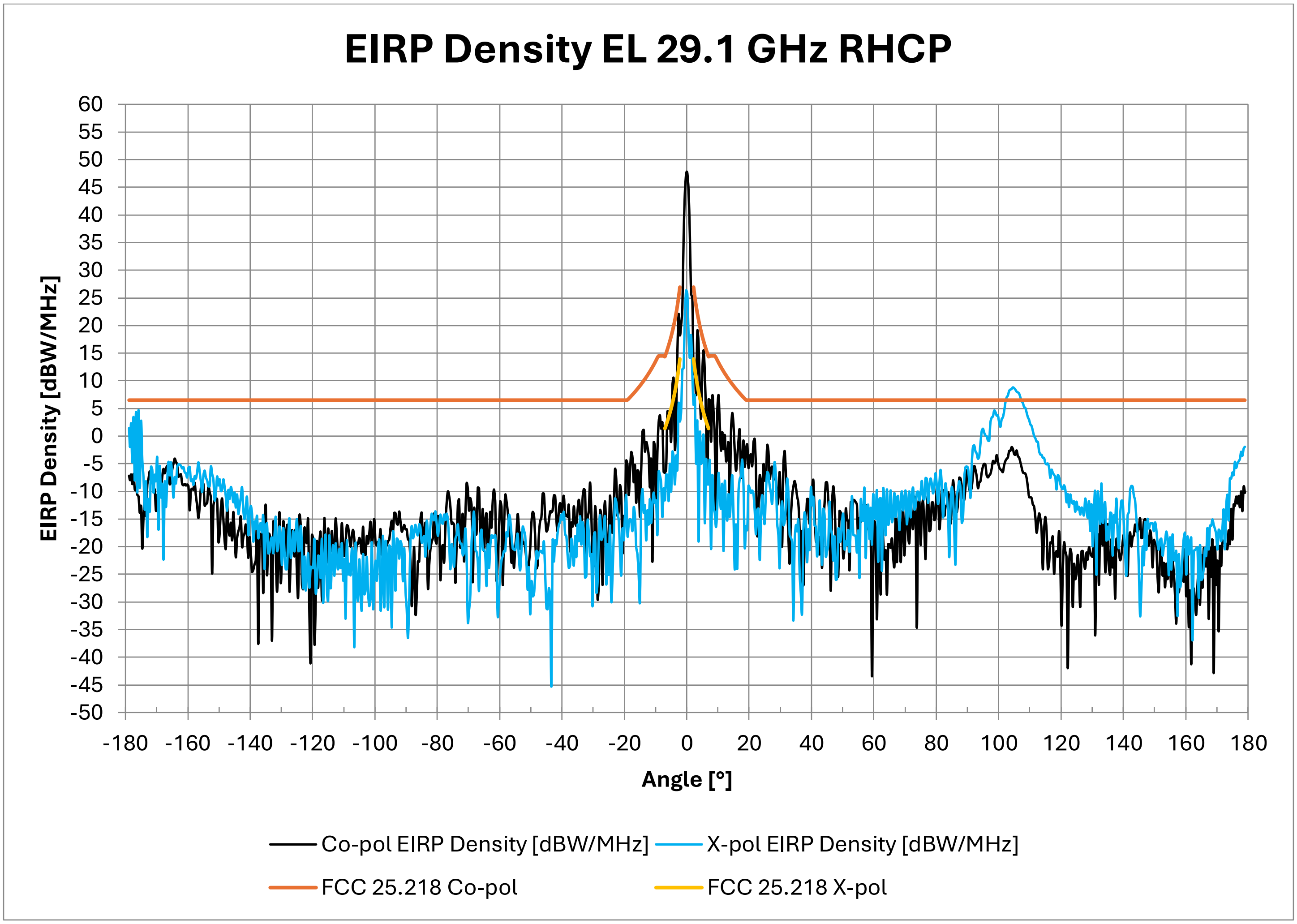
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 29.1 GHz RHCP
EIRP Density [dBW/MHz]
60
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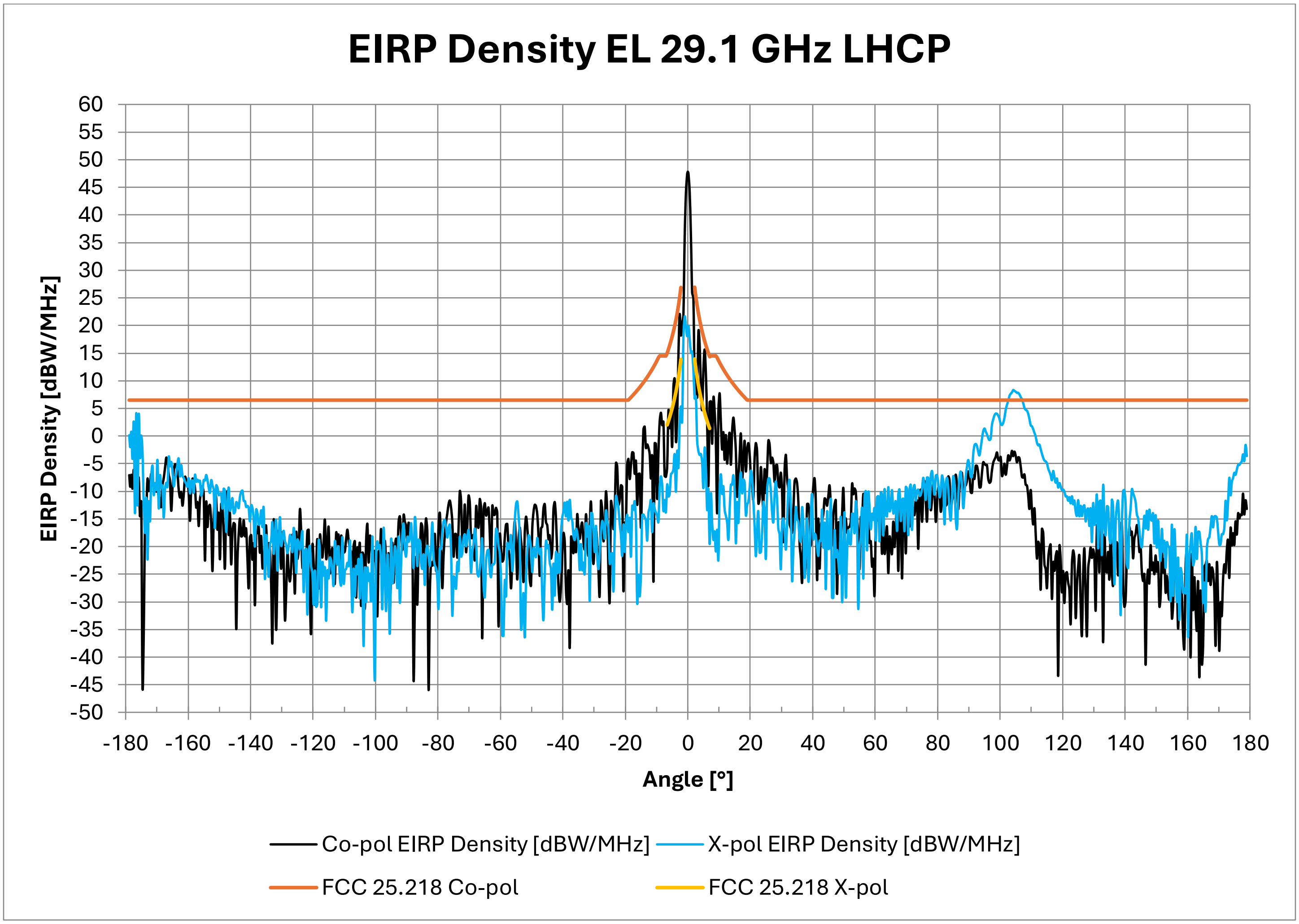
-180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density EL 29.1 GHz LHCP
EIRP Density [dBW/MHz]
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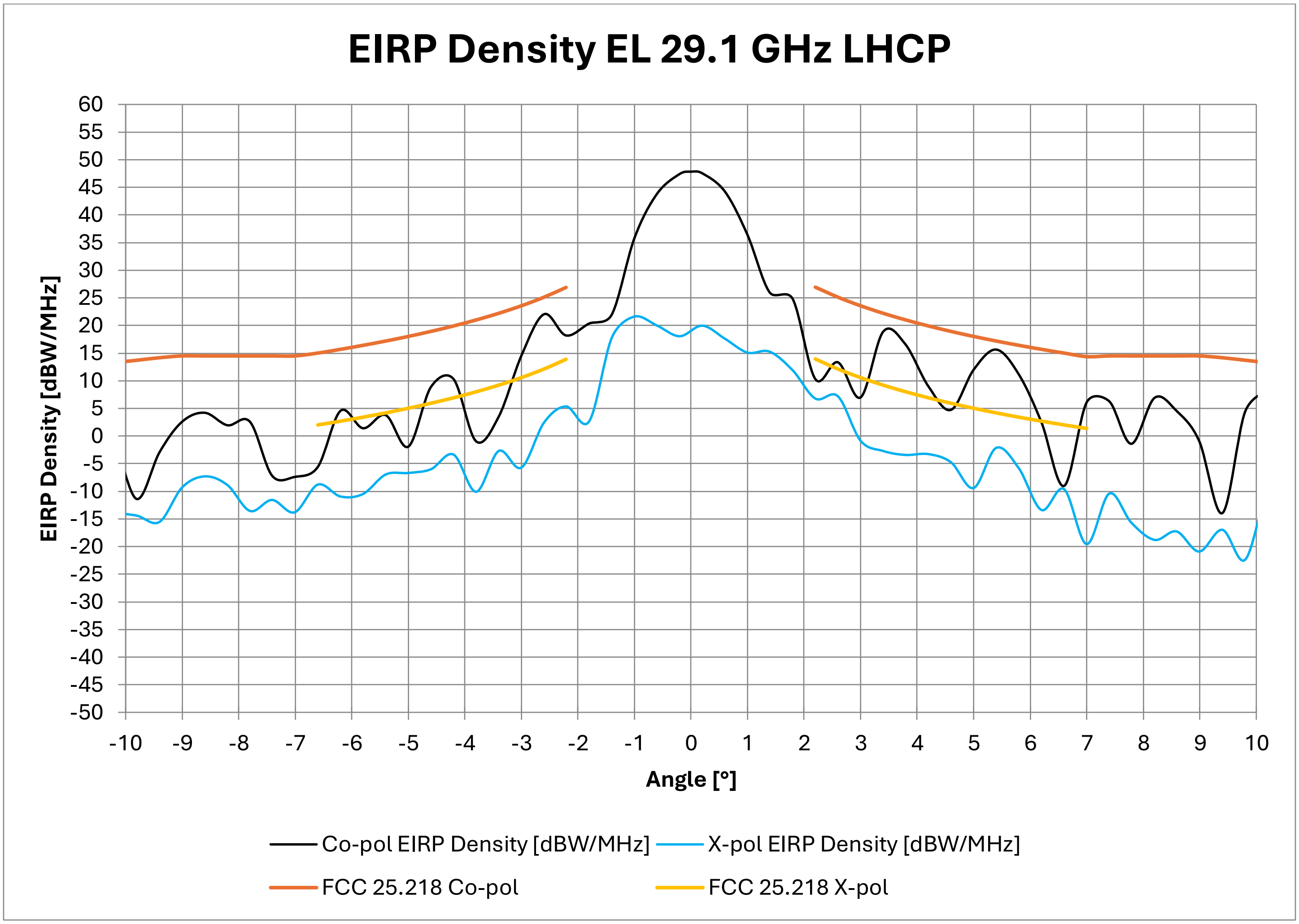
-180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density EL 29.1 GHz LHCP
EIRP Density [dBW/MHz]
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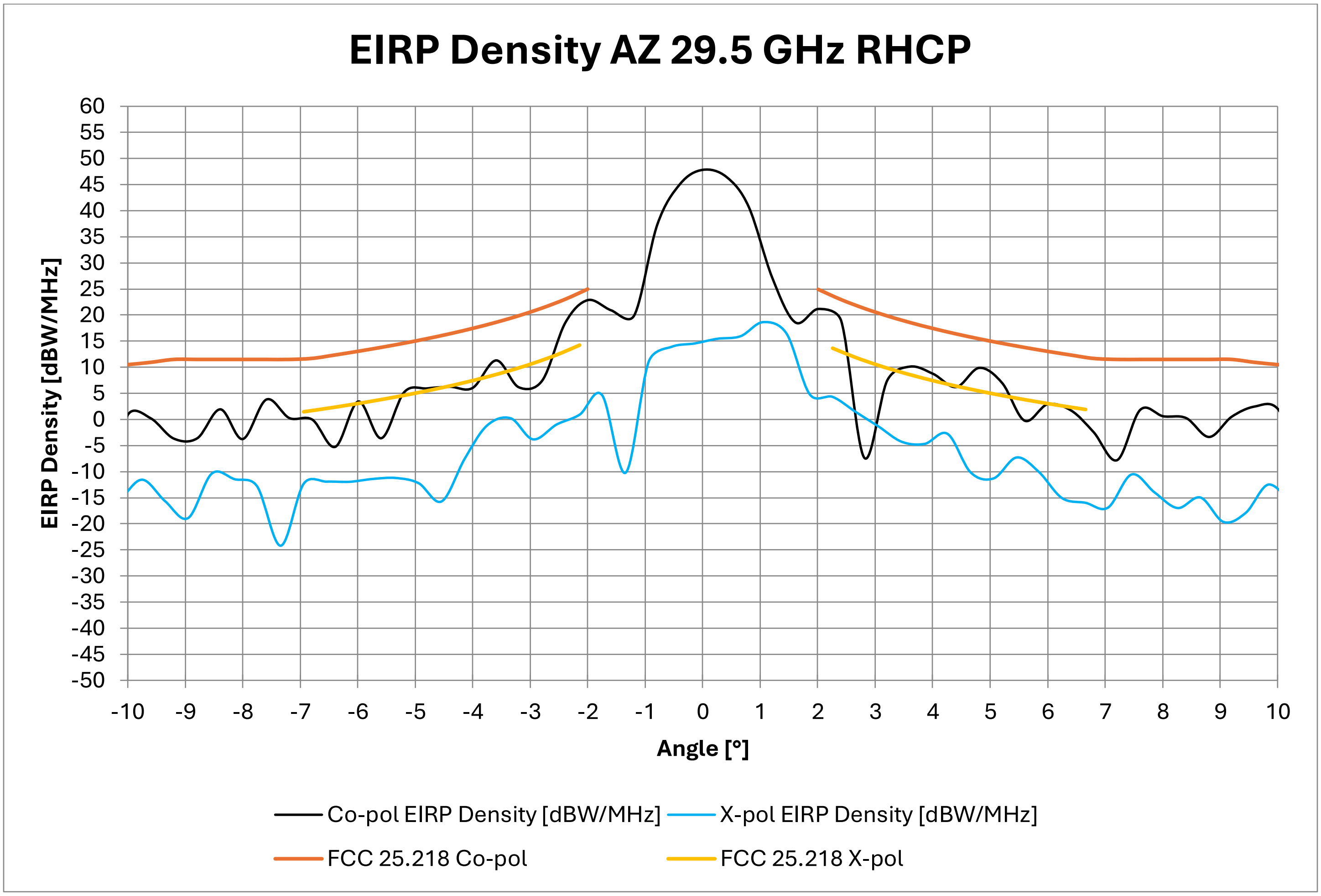
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 29.5 GHz RHCP
EIRP Density [dBW/MHz]
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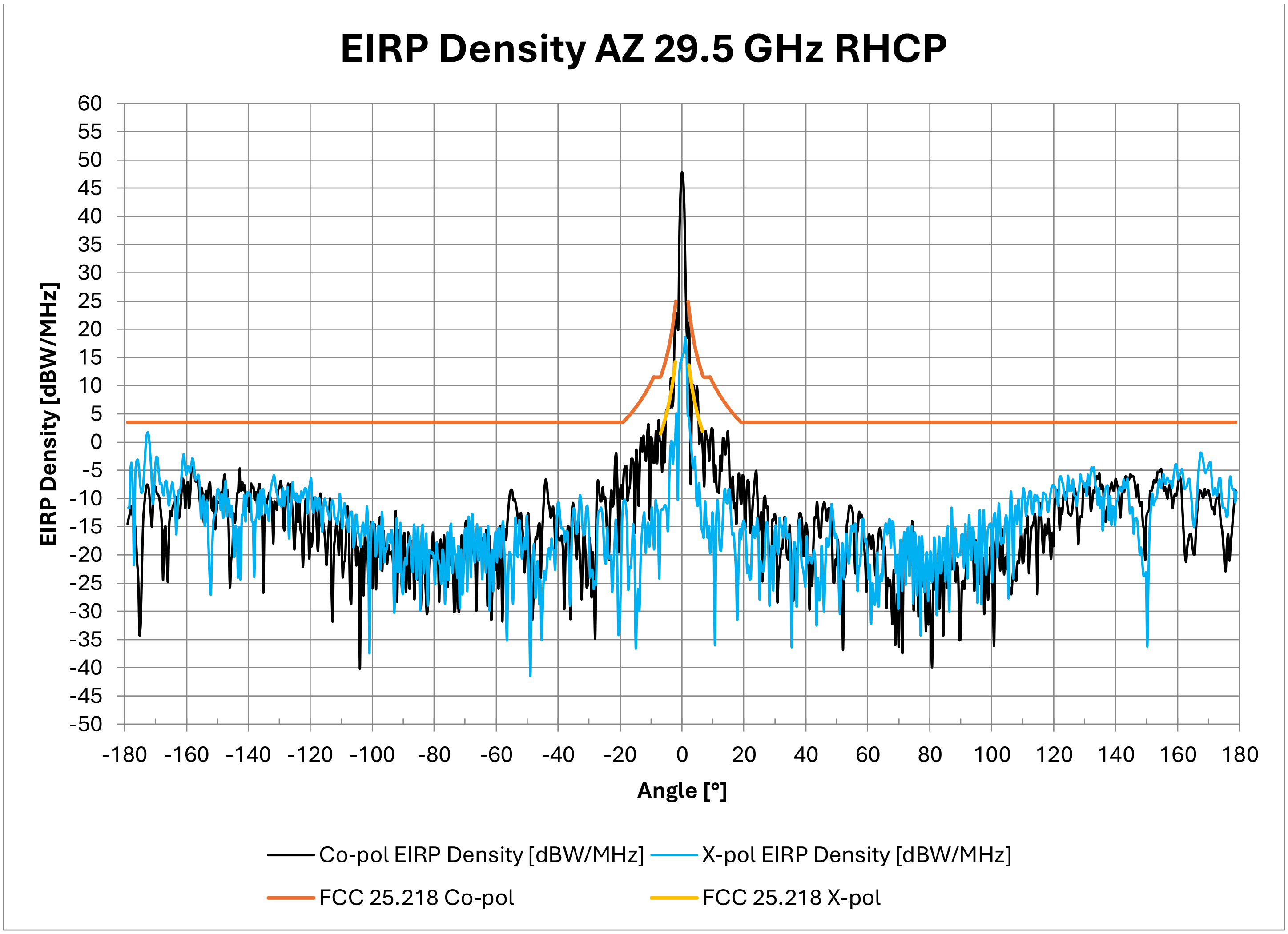
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density AZ 29.5 GHz RHCP
EIRP Density [dBW/MHz]
Angle [°]
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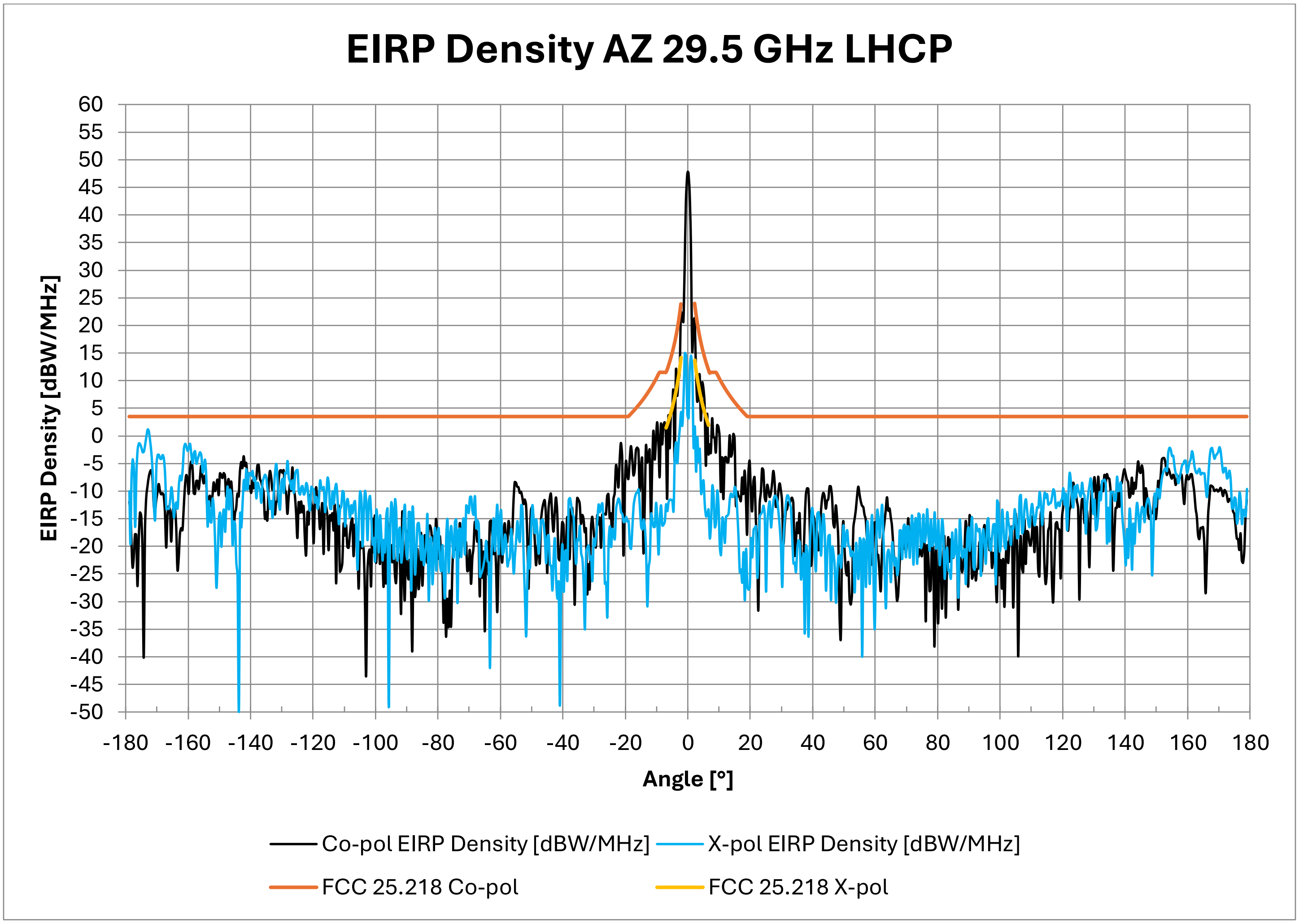
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density AZ 29.5 GHz LHCP
EIRP Density [dBW/MHz]
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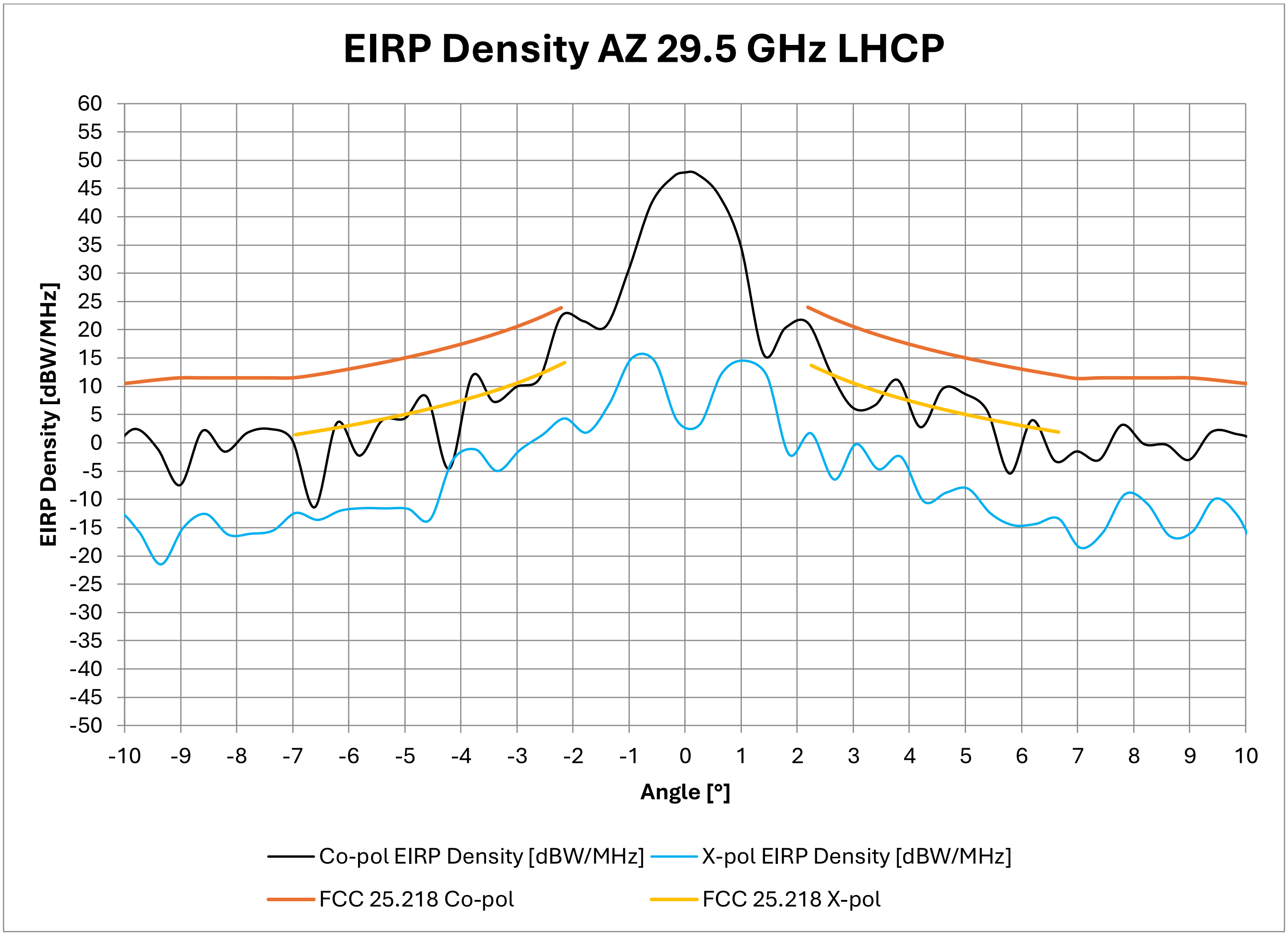
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density AZ 29.5 GHz LHCP
EIRP Density [dBW/MHz]
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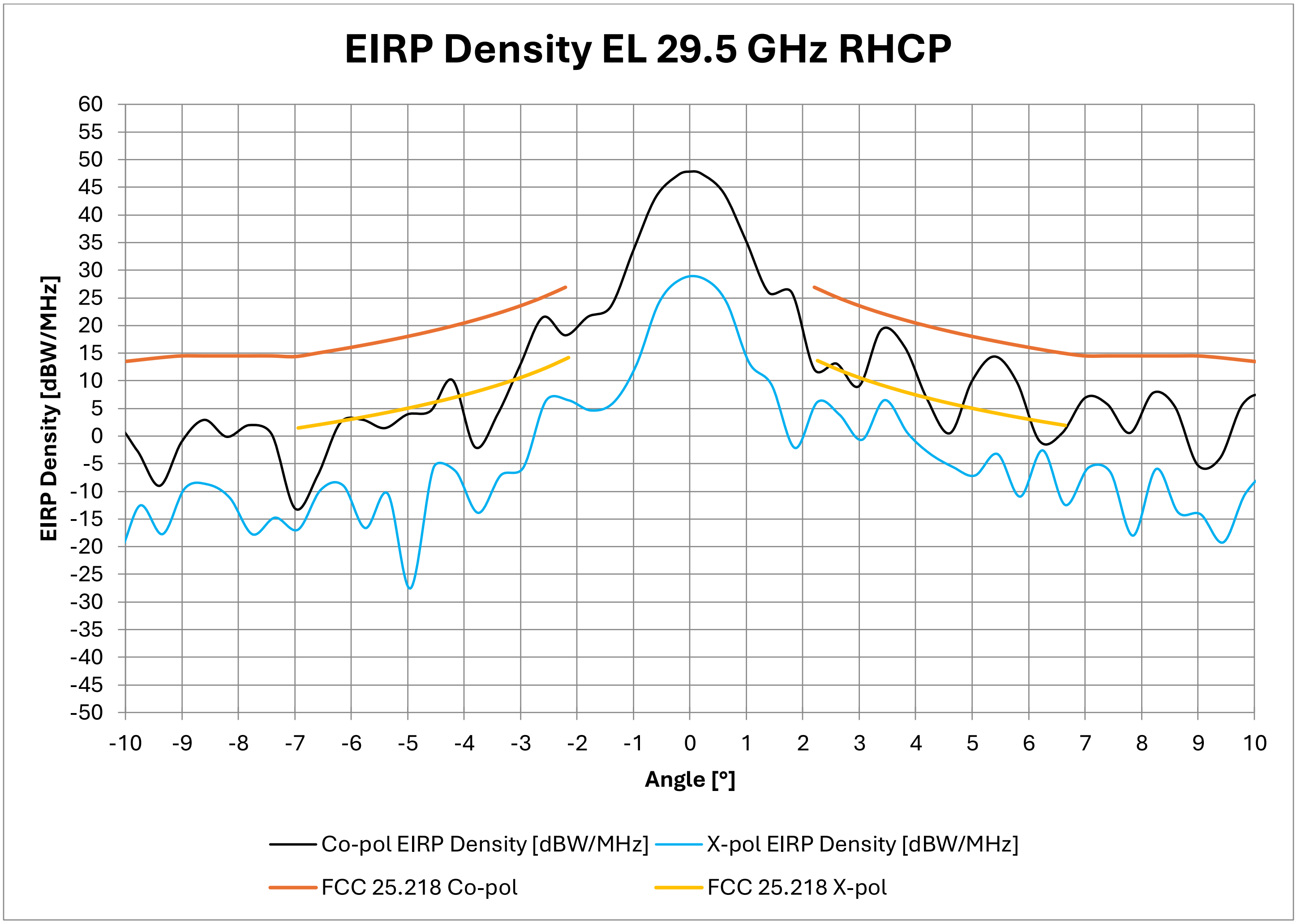
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density EL 29.5 GHz RHCP
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EIRP Density [dBW/MHz]
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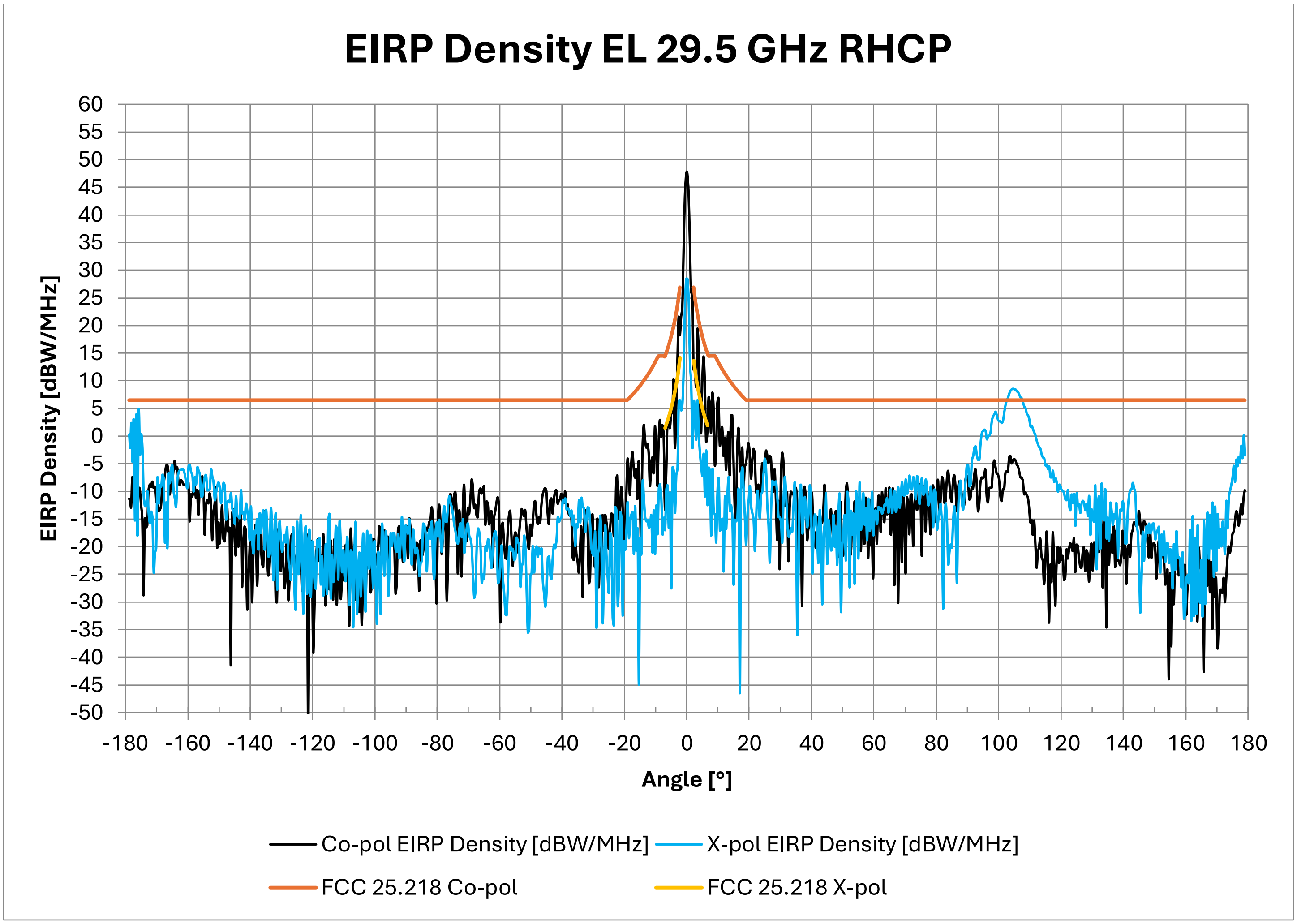
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 29.5 GHz RHCP
EIRP Density [dBW/MHz]
Angle [°]
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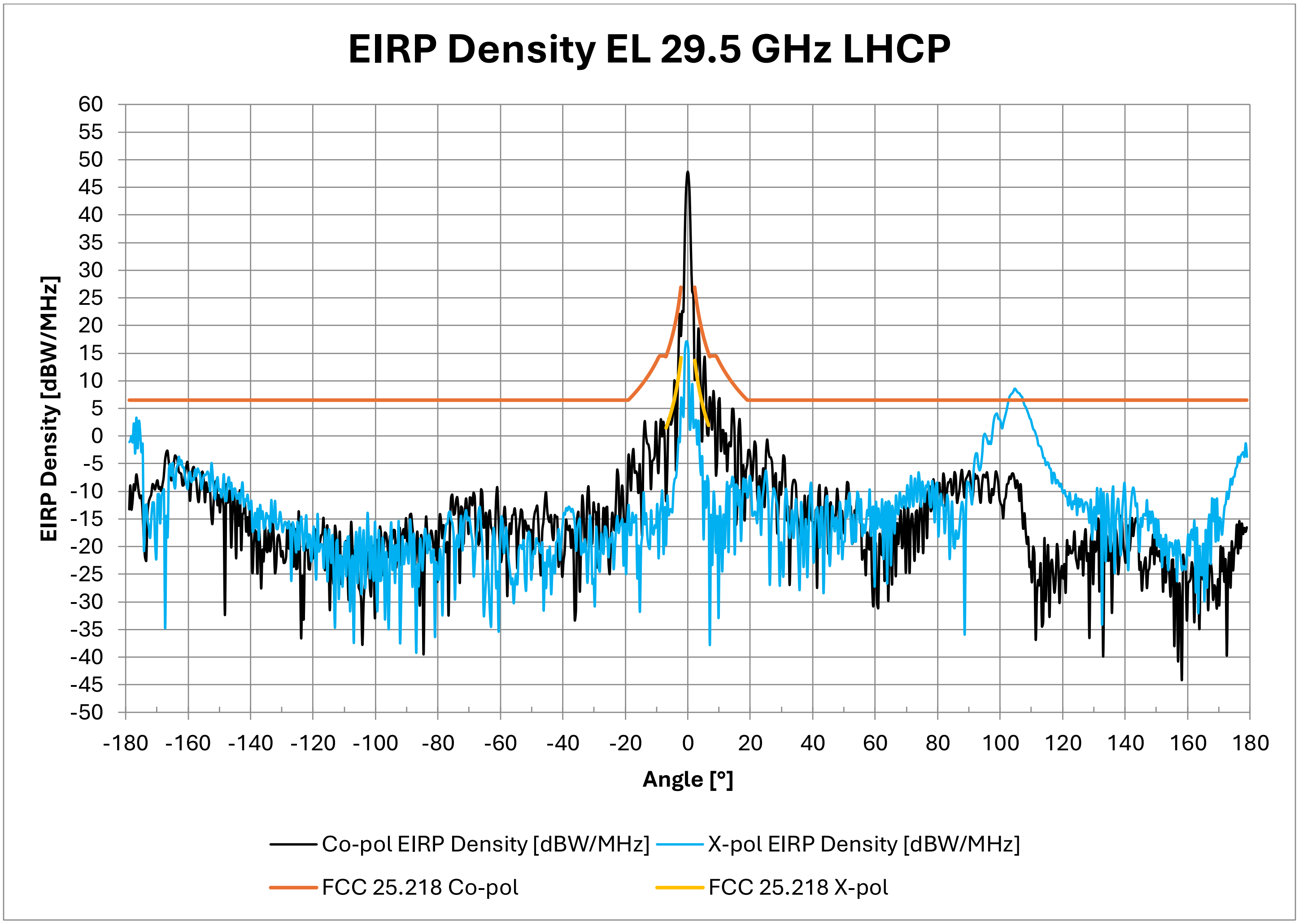
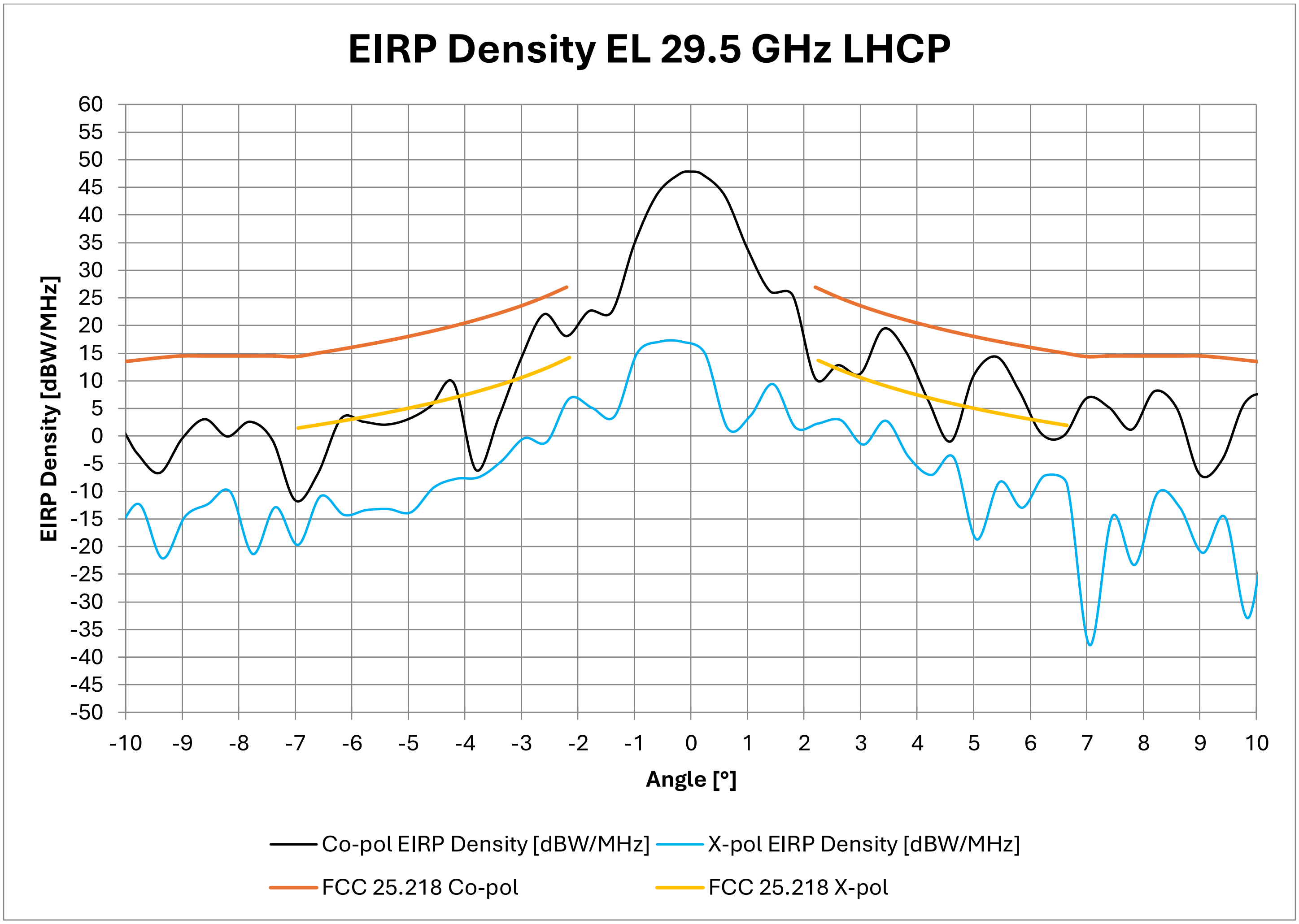
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density EL 29.5 GHz LHCP
EIRP Density [dBW/MHz]
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 29.5 GHz LHCP
EIRP Density [dBW/MHz]
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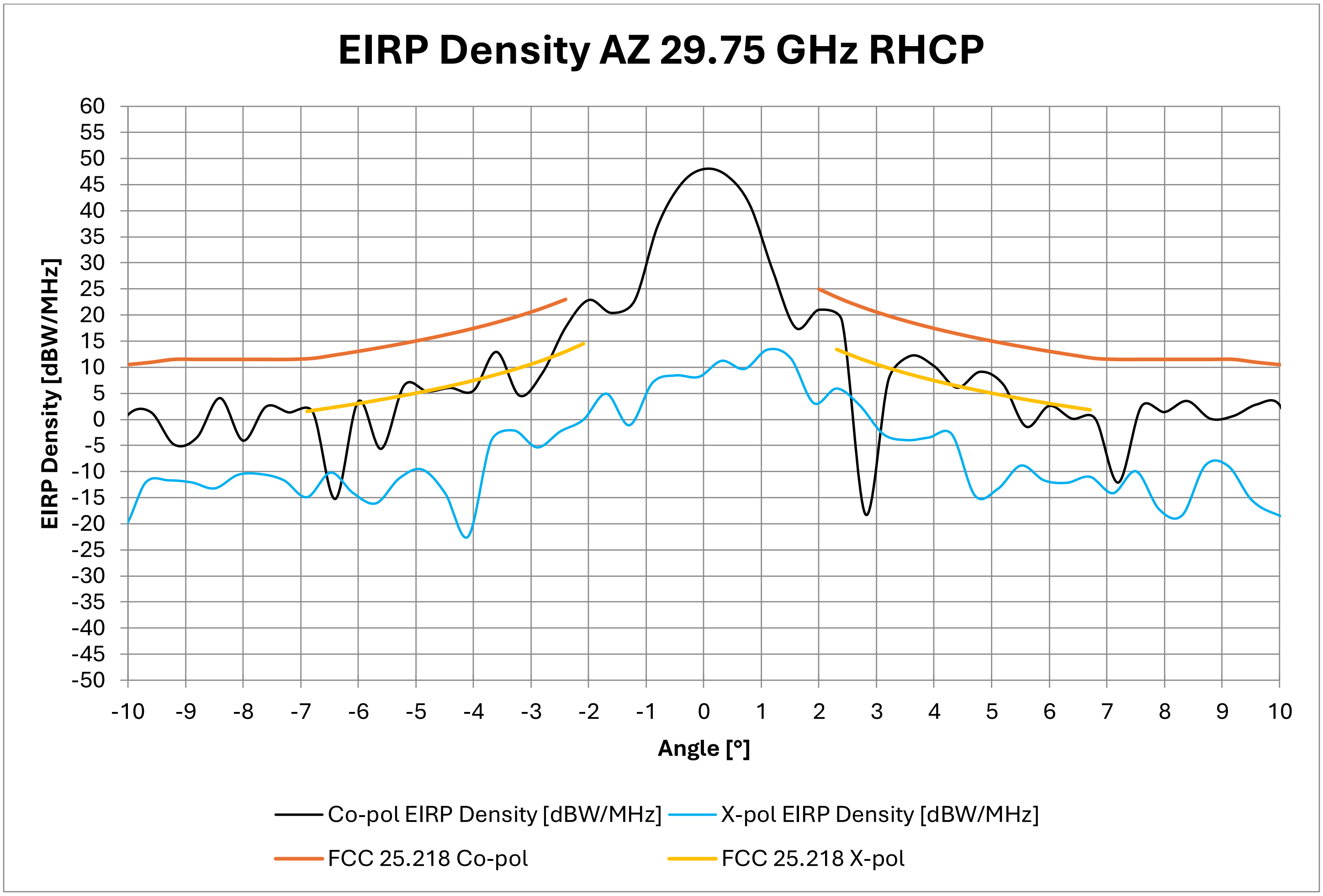
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density AZ 29.75 GHz RHCP
EIRP Density [dBW/MHz]
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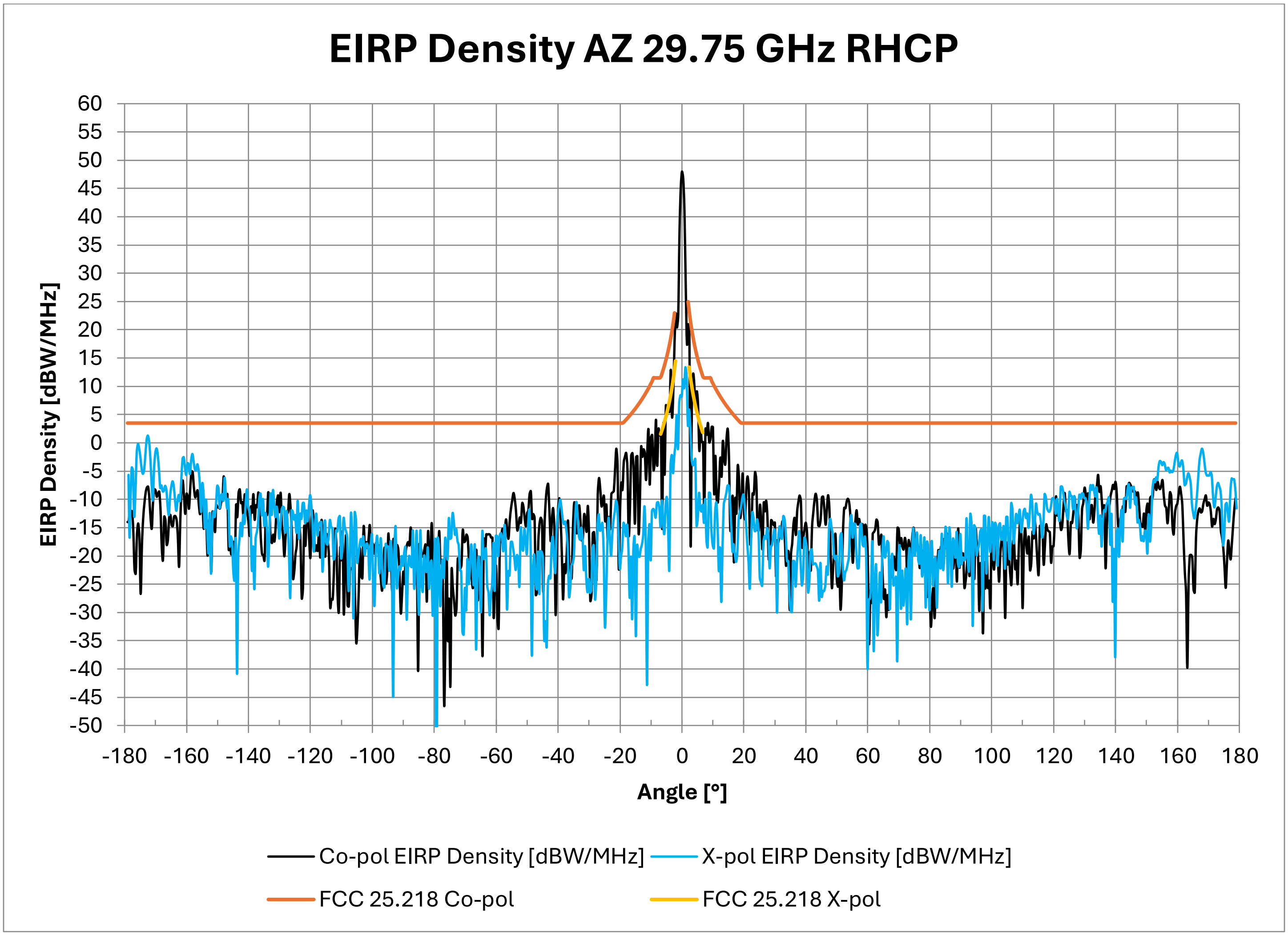
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 29.75 GHz RHCP
EIRP Density [dBW/MHz]
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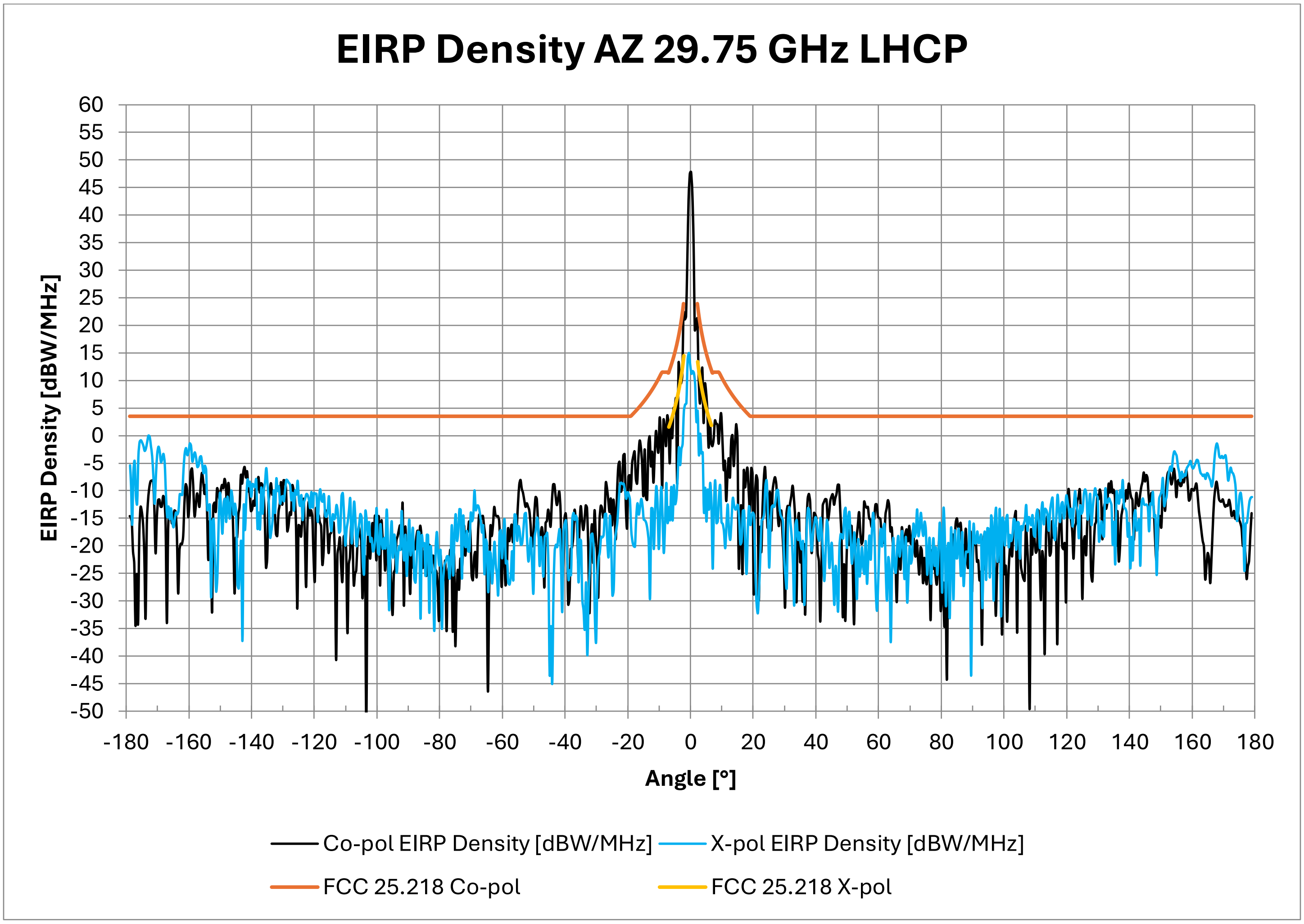
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 29.75 GHz LHCP
EIRP Density [dBW/MHz]
Angle [°]
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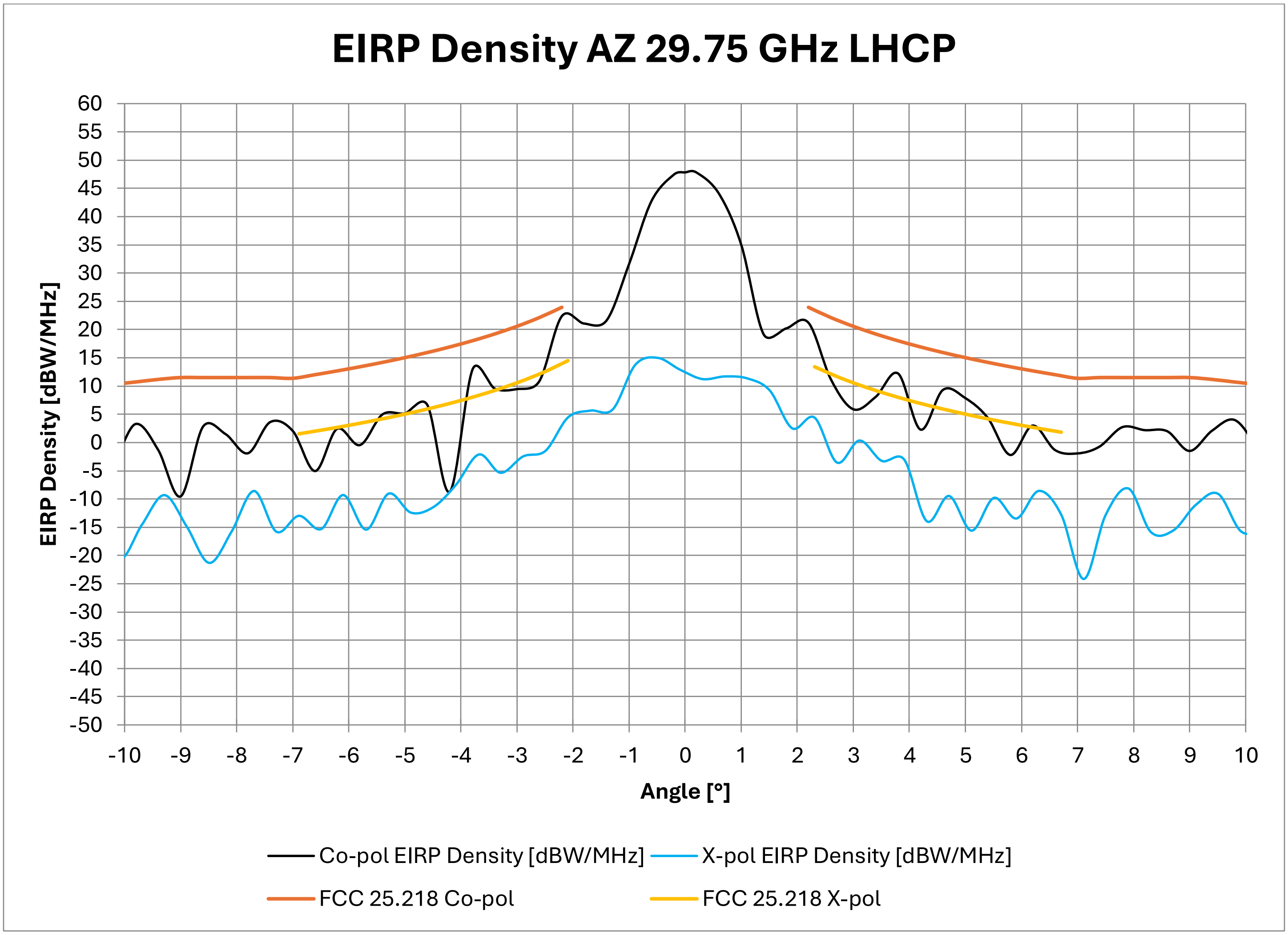
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 29.75 GHz LHCP
EIRP Density [dBW/MHz]
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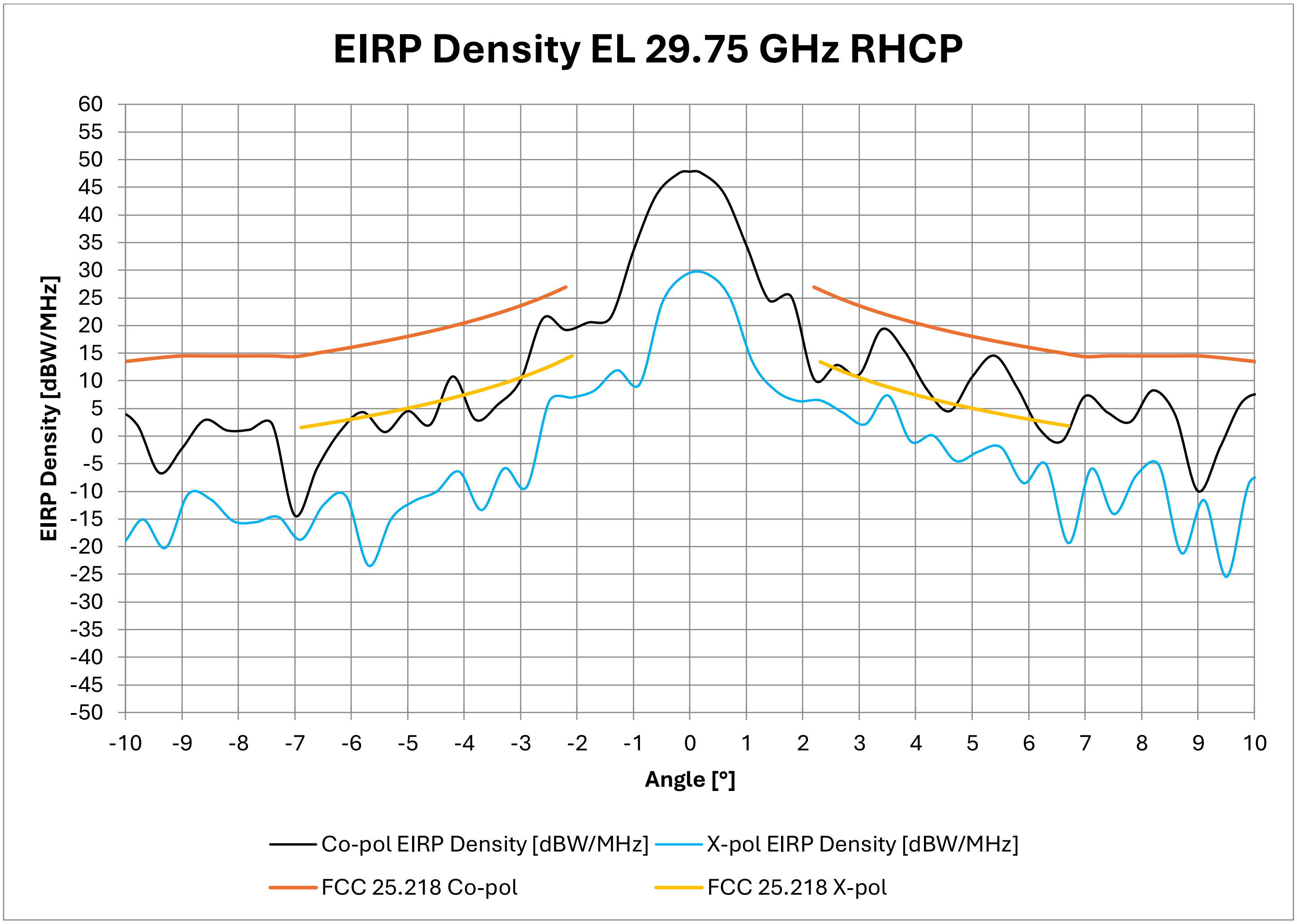
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 29.75 GHz RHCP
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EIRP Density [dBW/MHz]
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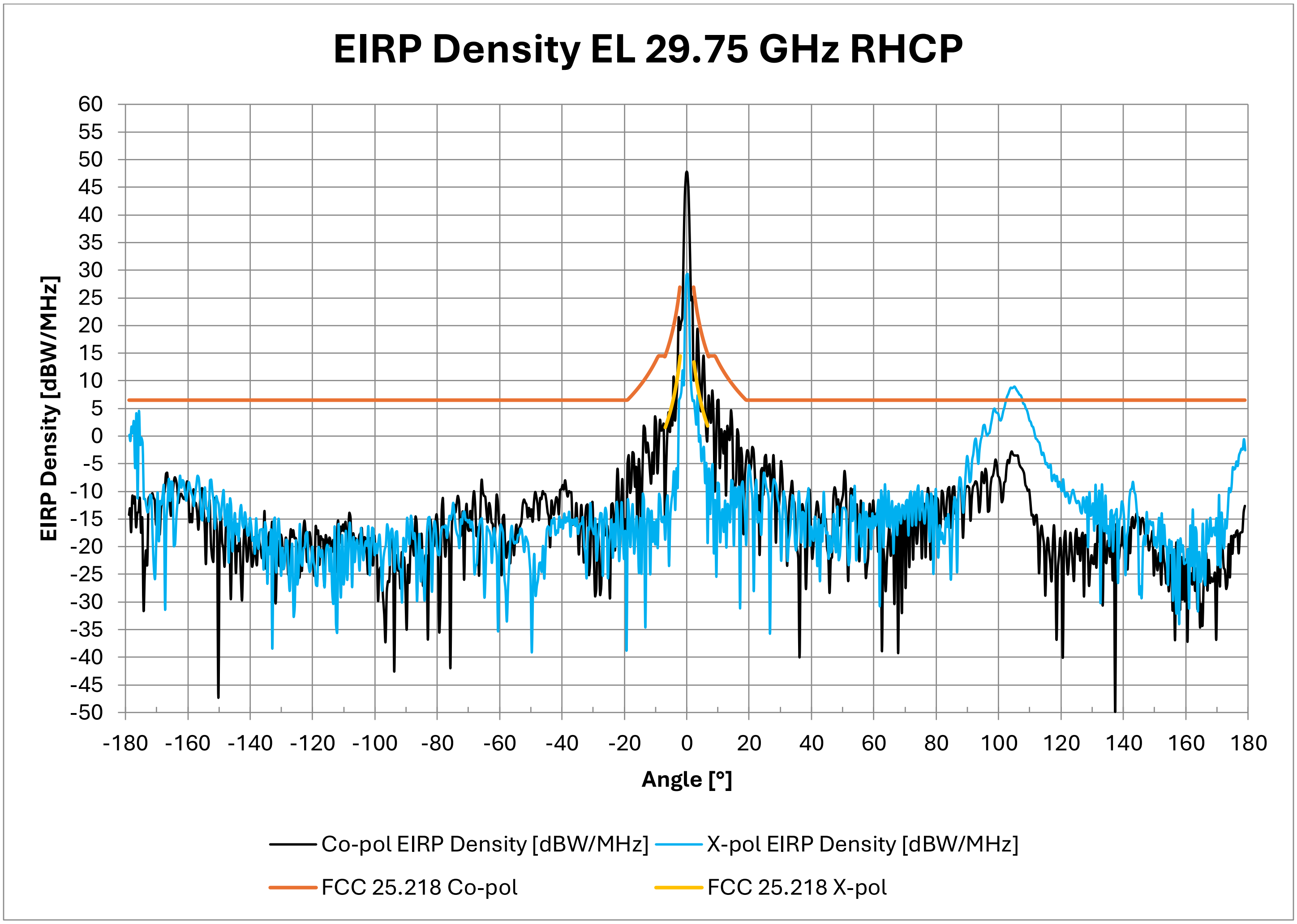
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 29.75 GHz RHCP
EIRP Density [dBW/MHz]
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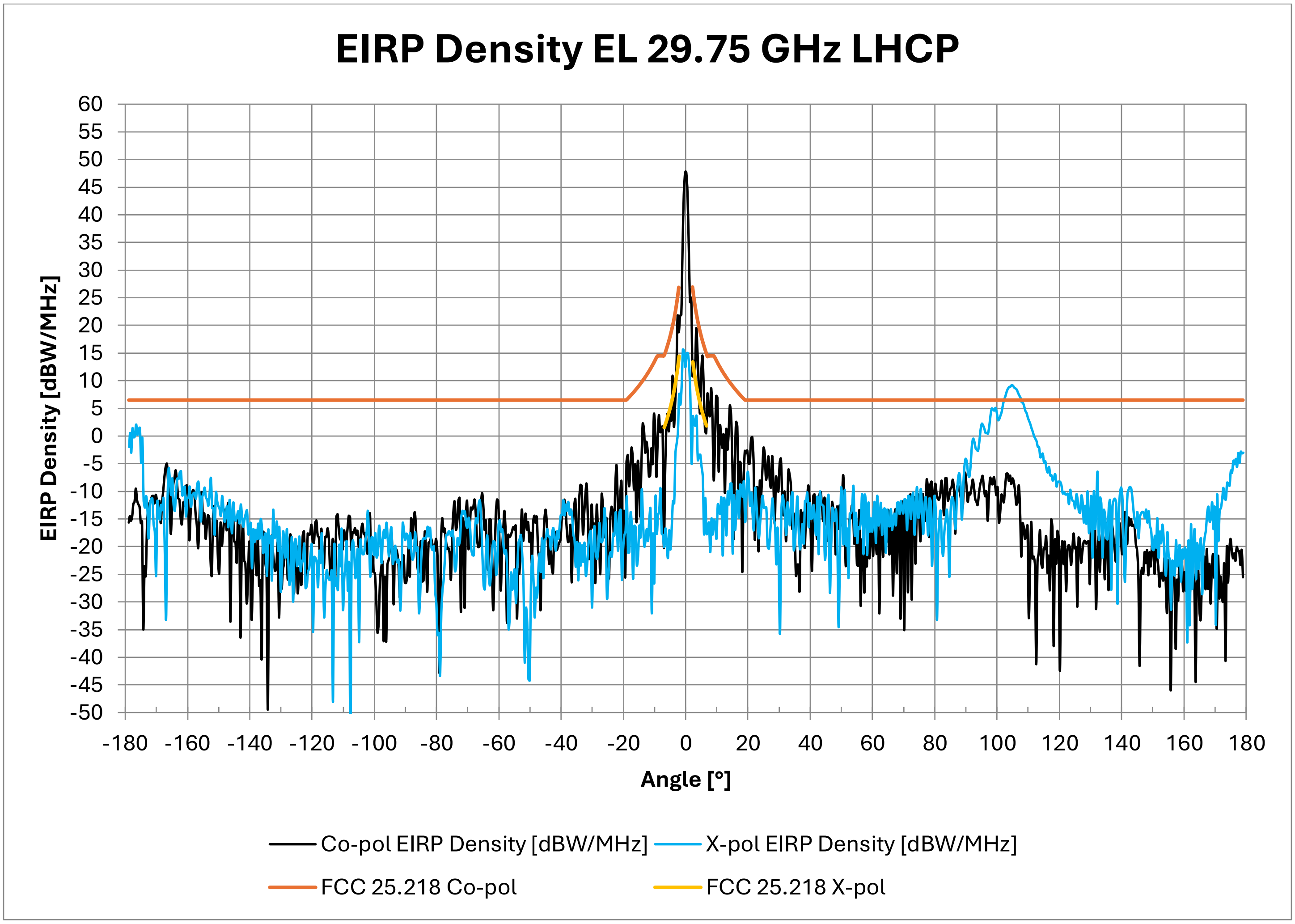
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 29.75 GHz LHCP
EIRP Density [dBW/MHz]
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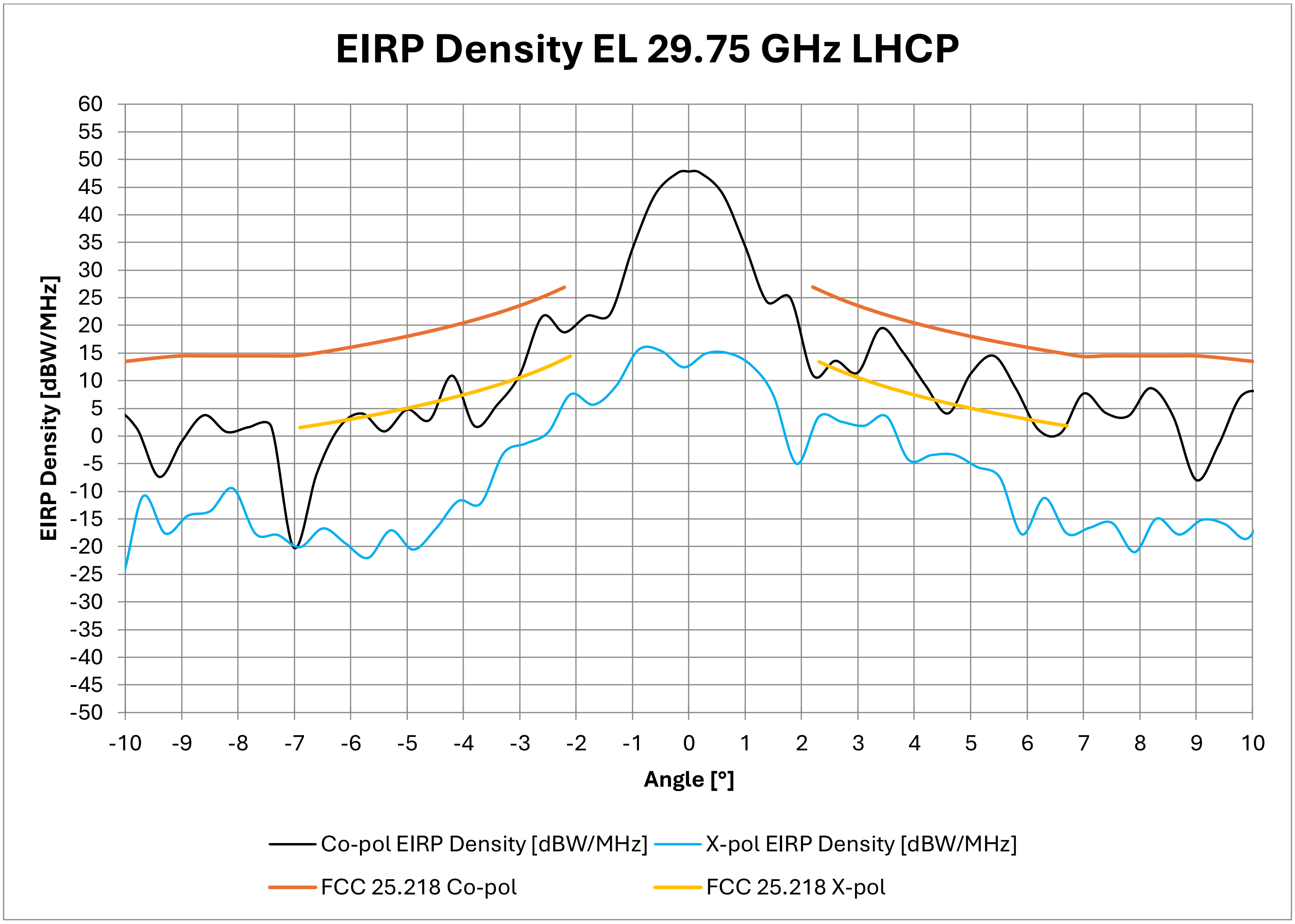
-180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 29.75 GHz LHCP
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EIRP Density [dBW/MHz]
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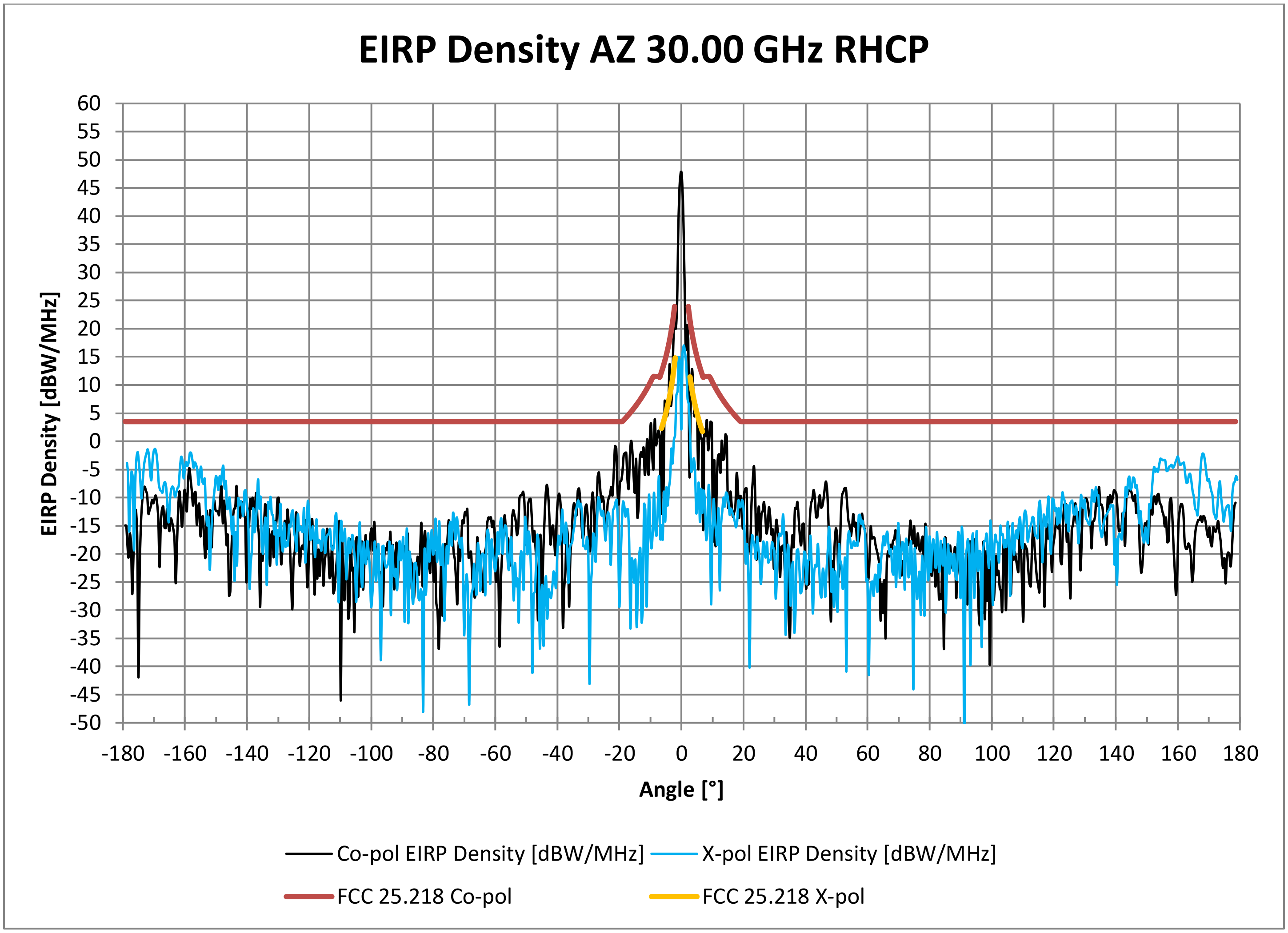
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 30.00 GHz RHCP
EIRP Density [dBW/MHz]
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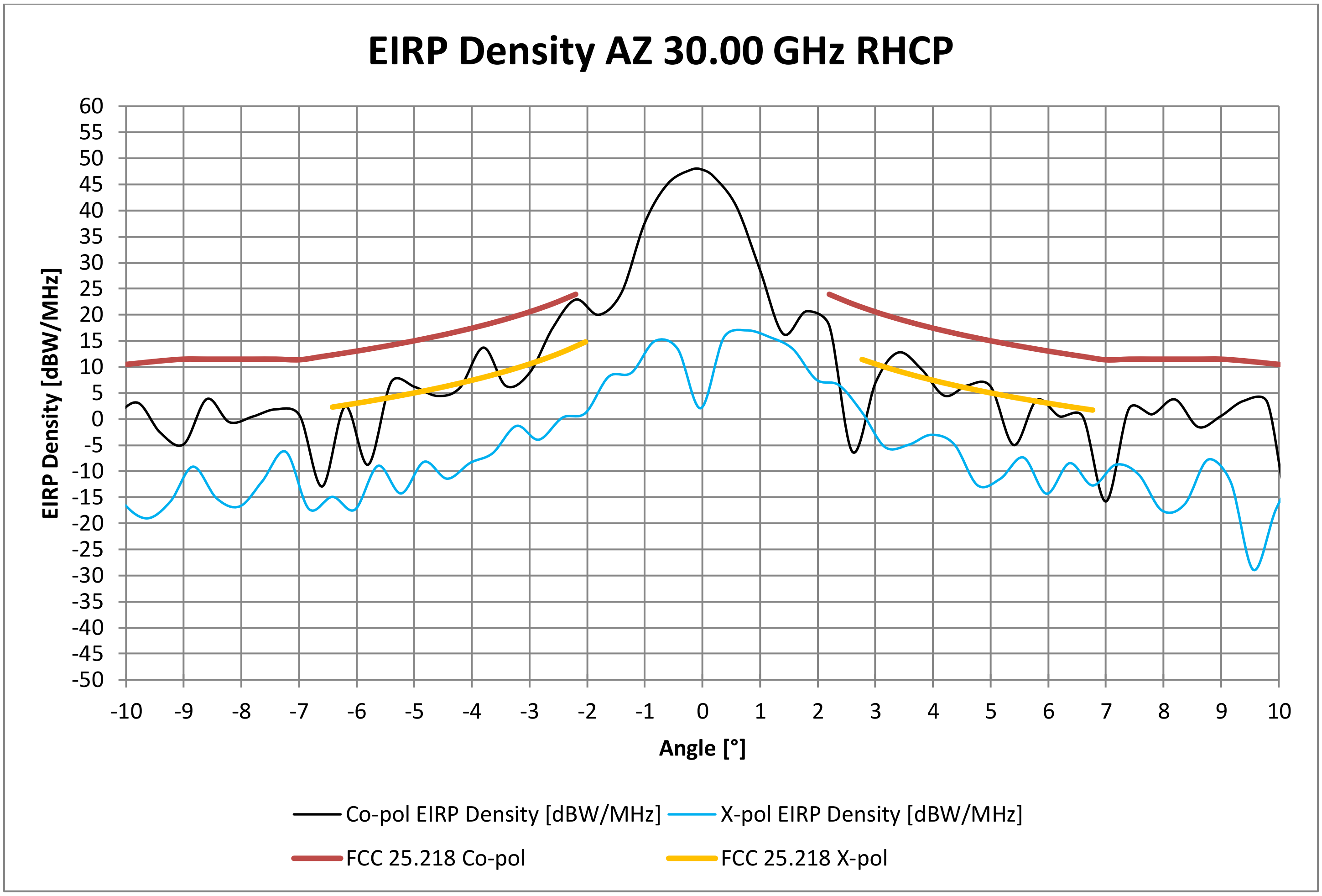
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 30.00 GHz RHCP
EIRP Density [dBW/MHz]
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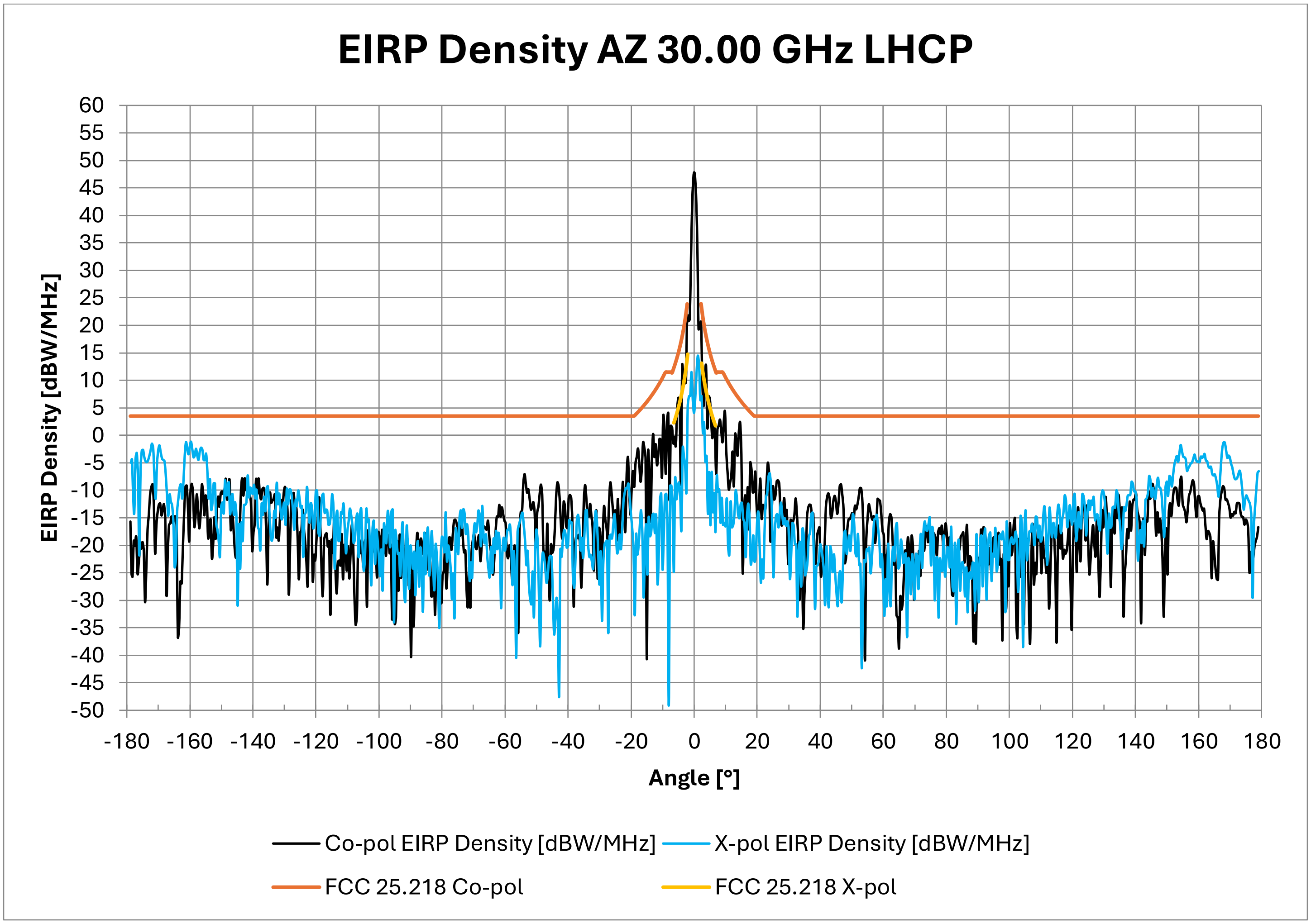
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density AZ 30.00 GHz LHCP
EIRP Density [dBW/MHz]
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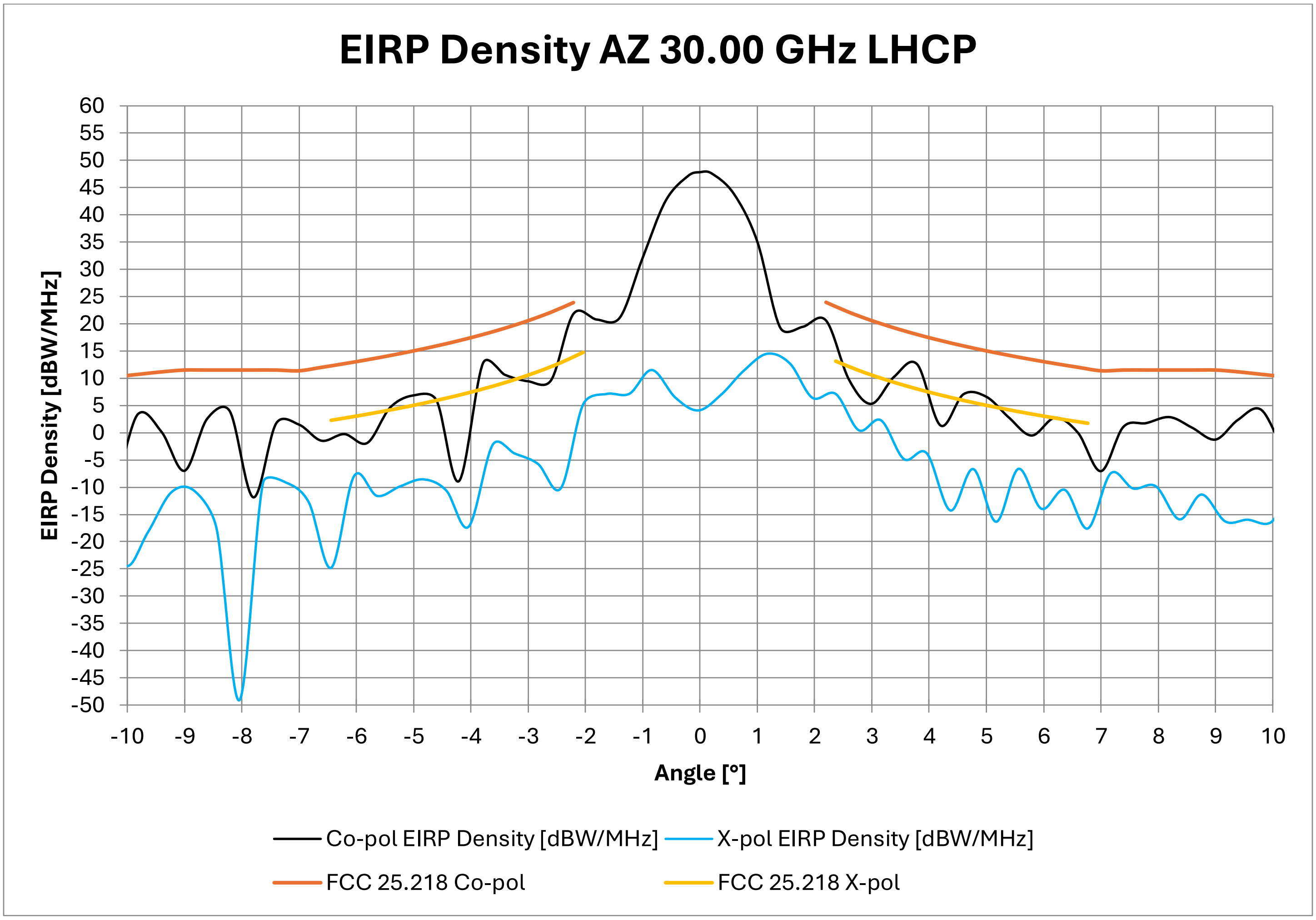
-180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol



EIRP Density AZ 30.00 GHz LHCP
EIRP Density [dBW/MHz]
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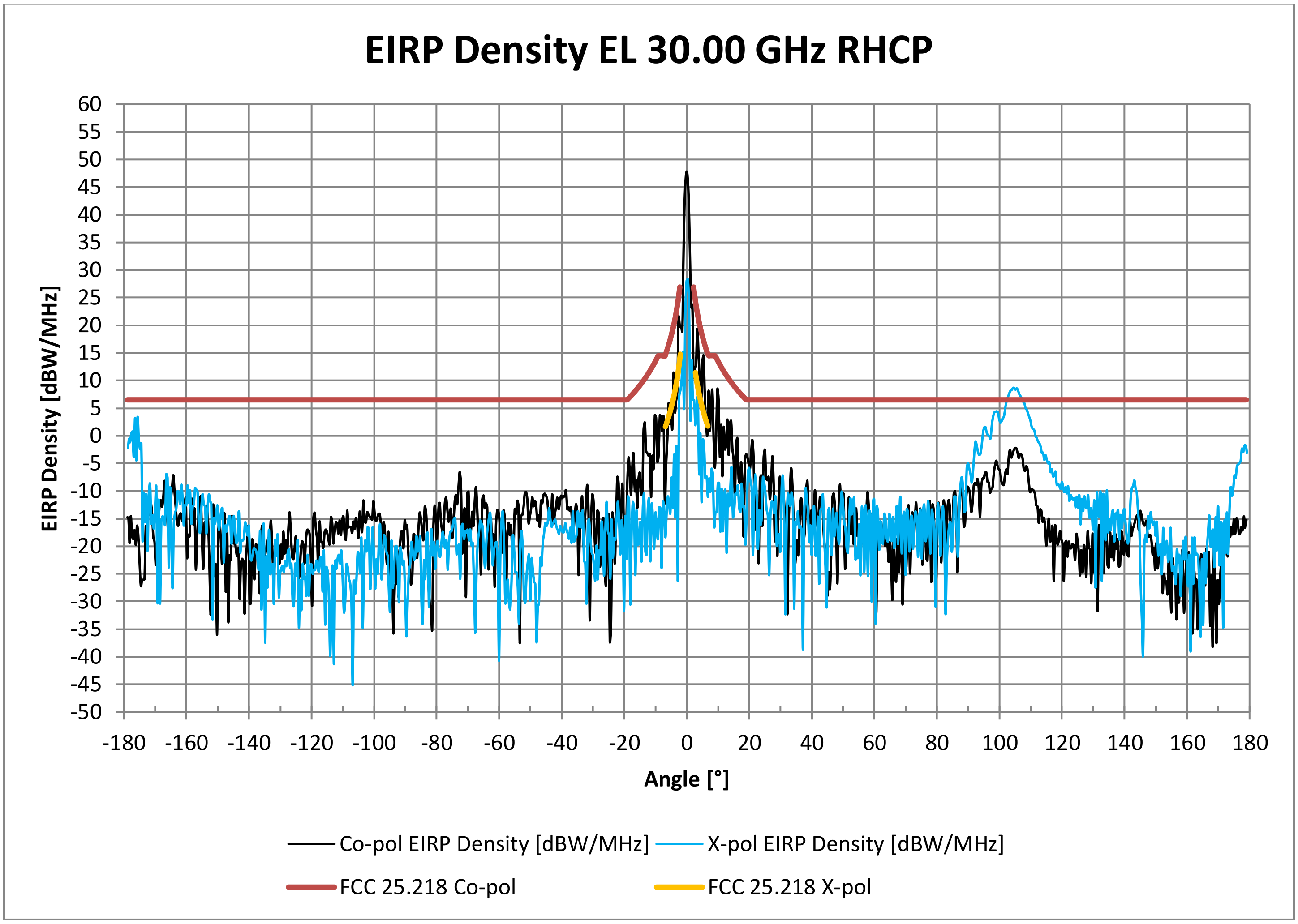
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 30.00 GHz RHCP
EIRP Density [dBW/MHz]
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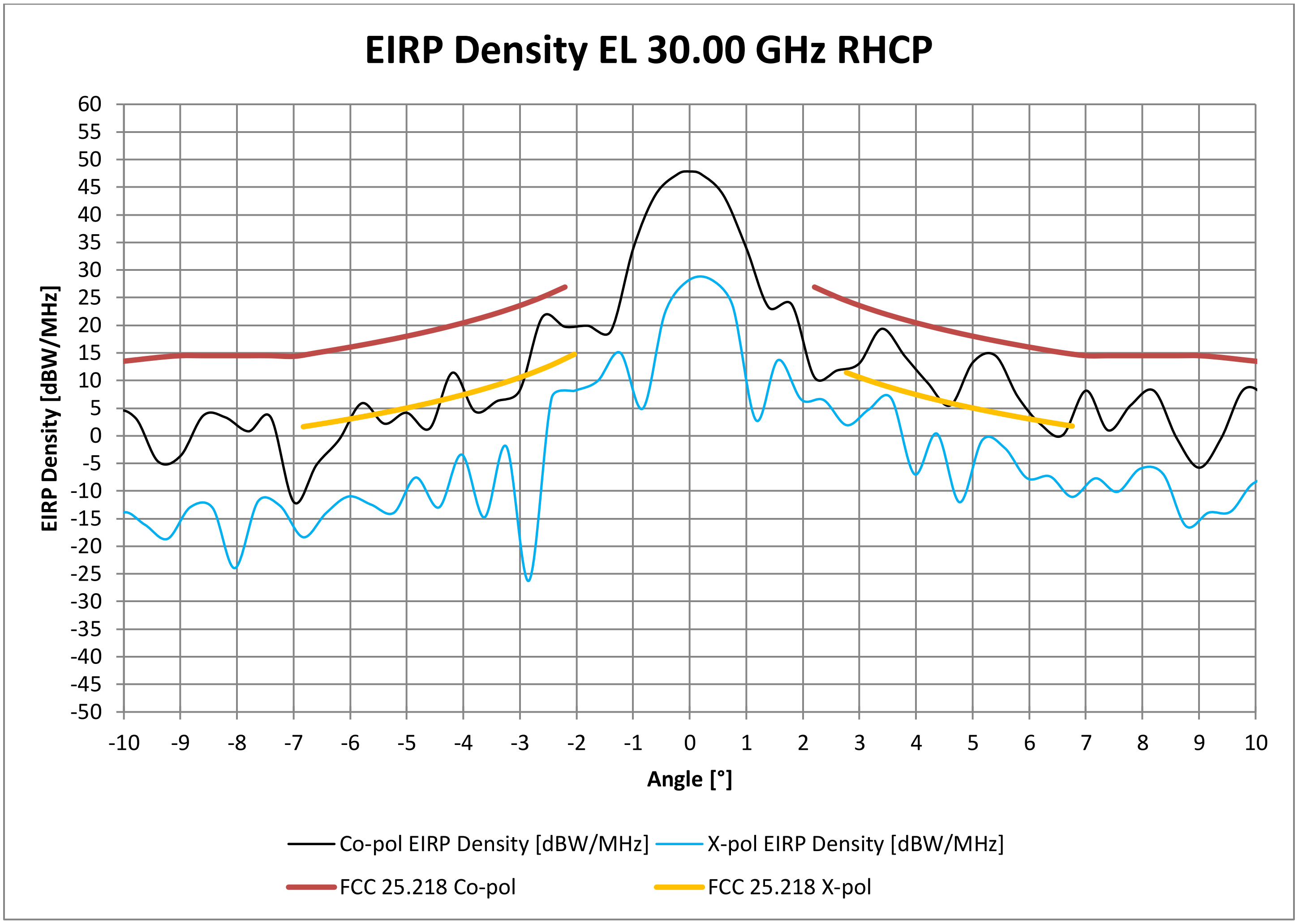
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 30.00 GHz RHCP
EIRP Density [dBW/MHz]
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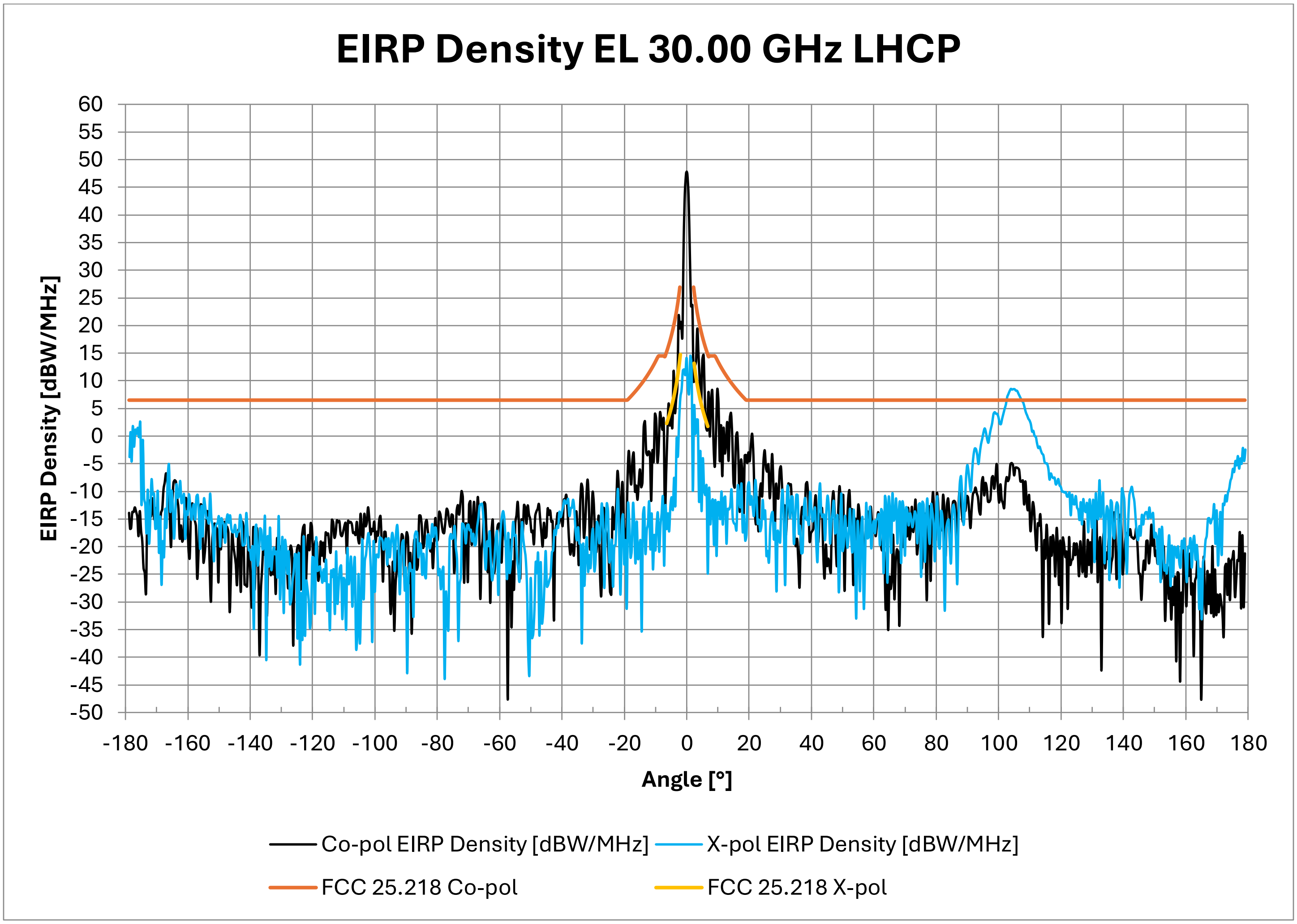
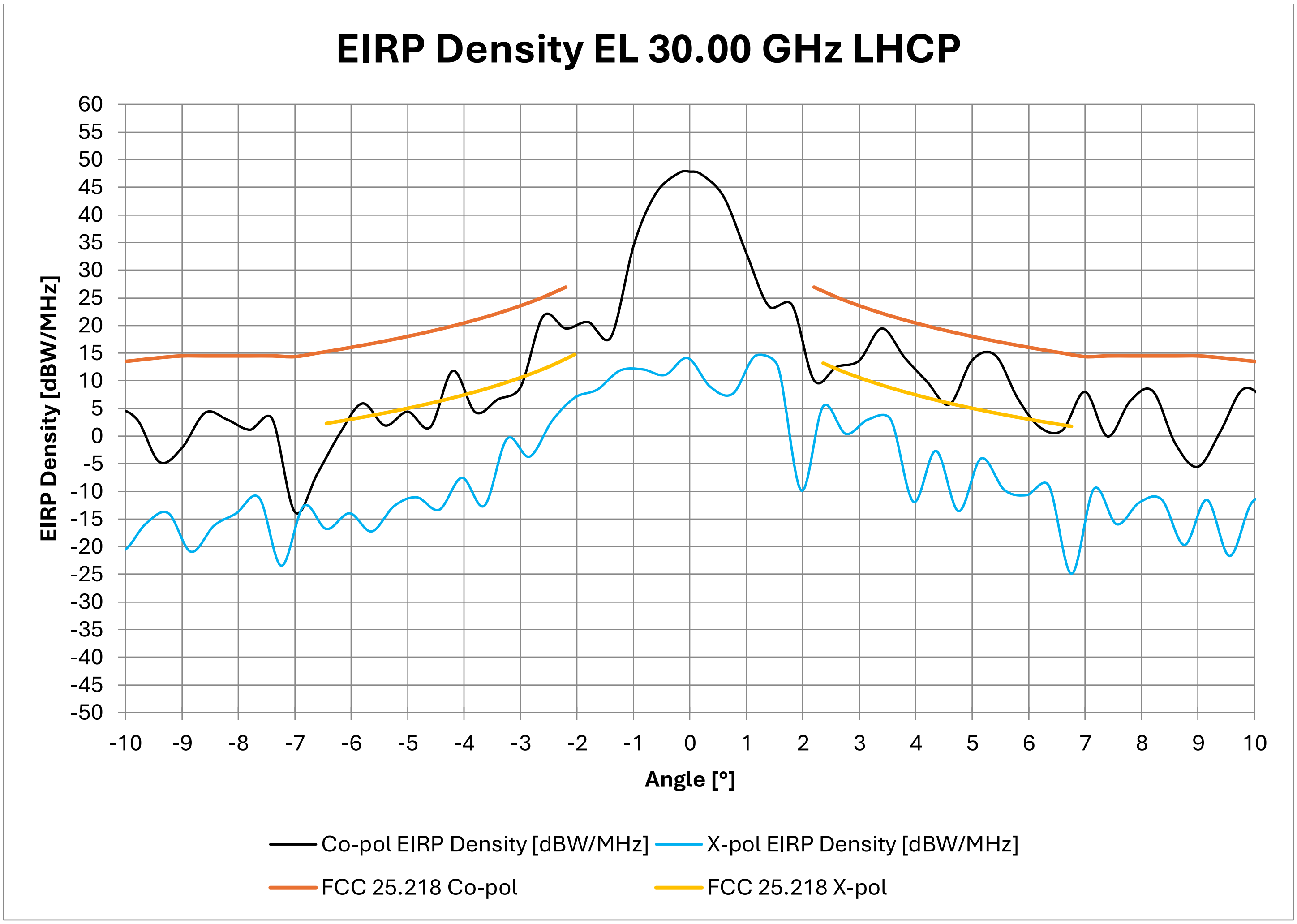
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 30.00 GHz LHCP
EIRP Density [dBW/MHz]
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-180 -160 -140 -120 -100 -80 -60 -40 -20 0 20 40 60 80 100 120 140 160 180
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol


EIRP Density EL 30.00 GHz LHCP
EIRP Density [dBW/MHz]
60
55
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-45
-50
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
Angle [°]
Co-pol EIRP Density [dBW/MHz]
X-pol EIRP Density [dBW/MHz]
FCC 25.218 Co-pol
FCC 25.218 X-pol

**EXHIBIT B**

**RADIATION HAZARD ANALYSIS AND REPORT**

## **Overview**

This exhibit contains a report of the analysis of the radio frequency ("RF") hazard present during the operation of the Viasat RA40750 and AVL 1280 fixed earth stations.

The following analyses consider two versions of the Viasat outdoor electronics for each antenna. The first generation (*i.e.* Surfbeam) with a 2.8 W output and the newer generation (*i.e.* Afterburner) with a 25 W output. Because these earth stations operate with the Viasat MF-TDMA system , the typical burst duty cycle over the averaging period for each network type (10% for Surfbeam and 1.5% for Afterburner) is also taken into consideration.

**Surfbeam Networks**

**Summary of expected radiofrequency exposure levels for the Viasat RA40750 antenna using a 2.8 W PA in an Uncontrolled environment**

| Region | Maximum Power Density | Hazard Assessment |
|---|---|---|
| Far field ($R_{ff}$) = 35.6 m | 0.05 $mW/cm^2$ | Satisfies FCC MPE |
| Near field ($R_{nf}$) = 14.8 m | 0.5 $mW/cm^2$ | Satisfies FCC MPE |
| Transition region ($R_t$) ($R_t$) = $R_{nf} < R_t < R_{ff}$ | 0.5 $mW/cm^2$ | Satisfies FCC MPE |
| Main Reflector Surface ($S_{surface}$) | 0.3 $mW/cm^2$ | Satisfies FCC MPE |

**Summary of expected radiofrequency exposure levels for the Viasat RA40750 antenna using a 2.8 W PA in a Controlled environment**

| Region | Maximum Power Density | Hazard Assessment |
|---|---|---|
| Far field ($R_{ff}$) = 35.6 m | 0.05 $mW/cm^2$ | Satisfies FCC MPE |
| Near field ($R_{nf}$) = 14.8 m | 0.5 $mW/cm^2$ | Satisfies FCC MPE |
| Transition region ($R_t$) ($R_t$) = $R_{nf} < R_t < R_{ff}$ | 0.5 $mW/cm^2$ | Satisfies FCC MPE |
| Main Reflector Surface ($S_{surface}$) | 0.3 $mW/cm^2$ | Satisfies FCC MPE |

**Conclusions**

Based on this analysis it is concluded that harmful radiation levels will not be present during servicing or normal operation, nor will harmful levels exist in regions normally occupied by the public.

Radiofrequency Exposure Analysis for the Viasat RA40750 antenna with a 2.8 W PA.

This report analyzes the non-ionizing radiation levels for the Viasat RA40750 antenna employing a 2.8 W power amplifier. The analysis and calculations performed in this report follow the methods described in the most recent version of FCC Office of Engineering and Technology Bulletin No. 65 (August 1977) apart from formula 13 for near field power density. The formula for near field power density in this report is replaced per FCC/OET staff guidance with a new formula derived from Table D.5 of IEEE Standard C95.3-2021.

Bulletin No. 65 specifies that there are two separate tiers of exposure limits that are dependent upon the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The two tiers are General Population / Uncontrolled environment, and an Occupational / Controlled environment.

The applicable exposure limit for the General Population / Uncontrolled environment at this frequency of operation is 1 $mW/cm^2$ averaged over a 30-minute period.

The applicable exposure limit for the Occupational / Controlled environment at this frequency of operation is 5 $mW/cm^2$ averaged over a 5-minute period.

**<u>Definition of terms</u>**

The terms are used in the formulas here are defined as follows:

$S_{surface}$ = maximum power density at the antenna surface
$S_{nf}$ = maximum near-field power density
$S_t$ = power density in the transition region
$S_{ff}$ = power density (on axis)
$R_{nf}$ = extent of near-field
$R_{ff}$ = distance to the beginning of the far-field
R = distance to point of interest

| | |
|---|---|
| P = 2.8 W | power fed to the antenna in Watts |
| A = 0.44 $m^2$ | physical area of the aperture antenna |
| G = 28492.3 | power gain relative to an isotropic radiator |
| $D_{maj}$ = 0.77 m | diameter of major axis of the antenna in meters |
| $D_{eff}$ = 0.75 m | effective diameter of antenna in meters |
| F = 30 GHz | frequency in GHz |
| $\lambda$ = 0.01 m | wavelength in meters ($c/F_{MHz}$) |
| $\eta$ = 0.52 | aperture efficiency |
| Dc = 10% | typical duty cycle over 30-minute averaging period |

**Antenna Surface**. The maximum power density directly in front of an antenna (e.g., at the antenna surface) can be approximated by the following equation:

$S_{surface} = (4 * P) / A$

$= (4 * 2.8\ W) / 0.44\ m^2$

= 0.3 mW/cm2 at 10% duty cycle

**Near Field Region**. In the near-field or Fresnel region, of the main beam, the power density can reach a maximum before it begins to decrease with distance. The extent of the near field can be described by the following equation **(**D and $\lambda$ in same units). Note the diameter of the major axis is used as the most conservative value:

$R_{nf} = D_{maj}^2 / (4 * \lambda)$

$= (0.77\ m)^2 / (4 * 0.01\ m)$

= 14.8 m

The magnitude of the on-axis (main beam) power density varies according to location in the near field. However, the maximum value of the near-field, on-axis, power density can be expressed by the following equation:

$S_{nf} = (16 * P) / (\eta * \pi * D_{maj}^2)$

$= (16 * 2.8\ W) / (0.52 * \pi * (0.77\ m)^2)$

$= 0.5\ mW/cm^2$ at 10% duty cycle

**Far-Field Region.** The power density in the far-field or Fraunhofer region of the antenna pattern decreases inversely as the square of the distance. The distance to the start of the far field can be calculated by the following equation:

$R_{ff} = (0.6 * D_{maj}^2) / \lambda$

$= (0.6 * (0.77\ m)^2) / 0.01\ m$

= 35.6 m

The power density at the start of the far-field region of the radiation pattern can be estimated by the equation:

$S_{ff} = (P * G) / (4 * \pi * R_{ff}^2)$

$= (2.8\ W * 28183.8) / (4 * \pi * (35.6\ m)^2)$

$= 0.05\ mW/cm^2$ at 10% duty cycle

**Transition Region.** Power density in the transition region decreases inversely with distance from the antenna, while power density in the far field (Fraunhofer region) of the antenna decreases inversely with the ***square*** of the distance. The transition region will then be the region extending from $R_{nf}$ to $R_{ff}$. If the location of interest falls within this transition region, the on-axis power density can be determined from the following equation:

$S_t = (S_{nf} * R_{nf}) / R$ where R is the location of interest in meters

$= (4.6\ mW/cm^2 * 14.8\ m) / R$

$= (6.9\ m * mW/cm^2) / R$ at 10% duty cycle

**Surfbeam Networks**

**Summary of expected radiofrequency exposure levels for the AVL 1280 antenna using a 2.8 W PA in an Uncontrolled environment**

| Region | Maximum Power Density | Hazard Assessment |
|---|---|---|
| Far field ($R_{ff}$) = 94.8 m | 0.02 mW/cm$^2$ | Satisfies FCC MPE |
| Near field ($R_{nf}$) = 39.5 m | 0.2 mW/cm$^2$ | Satisfies FCC MPE |
| Transition region ($R_t$)<br>($R_t$) = $R_{nf} < R_t < R_{ff}$ | 0.2 mW/cm$^2$ | Satisfies FCC MPE |
| Main Reflector Surface ($S_{surface}$) | 0.1 mW/cm$^2$ | Satisfies FCC MPE |

**Summary of expected radiofrequency exposure levels for the AVL 1280 antenna using a 2.8 W PA in a Controlled environment**

| Region | Maximum Power Density | Hazard Assessment |
|---|---|---|
| Far field ($R_{ff}$) = 42.652 m | 0.02 mW/cm$^2$ | Satisfies FCC MPE |
| Near field ($R_{nf}$) = 17.652 m | 0.2 mW/cm$^2$ | Satisfies FCC MPE |
| Transition region ($R_t$)<br>($R_t$) = $R_{nf} < R_t < R_{ff}$ | 0.2 mW/cm$^2$ | Satisfies FCC MPE |
| Main Reflector Surface ($S_{surface}$) | 0.1 mW/cm$^2$ | Satisfies FCC MPE |

## Conclusions

Based on this analysis it is concluded that harmful radiation levels will not be present during servicing or normal operation, nor will harmful levels exist in regions normally occupied by the public.

Radiofrequency Exposure Analysis for the AVL 1280 antenna with a 2.8 W PA.

This report analyzes the non-ionizing radiation levels for the AVL 1280 antenna employing a 2.8 W power amplifier. The analysis and calculations performed in this report follow the methods described in the most recent version of FCC Office of Engineering and Technology Bulletin No. 65 (August 1977) apart from formula 13 for near field power density. The formula for near field power density in this report is replaced per FCC/OET staff guidance with a new formula derived from Table D.5 of IEEE Standard C95.3-2021.

Bulletin No. 65 specifies that there are two separate tiers of exposure limits that are dependent upon the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The two tiers are General Population / Uncontrolled environment, and an Occupational / Controlled environment.

The applicable exposure limit for the General Population / Uncontrolled environment at this frequency of operation is 1 $mW/cm^2$ averaged over a 30-minute period.

The applicable exposure limit for the Occupational / Controlled environment at this frequency of operation is 5 $mW/cm^2$ averaged over a 5-minute period.

**<u>Definition of terms</u>**

The terms are used in the formulas here are defined as follows:

$S_{surface}$ = maximum power density at the antenna surface
$S_{nf}$ = maximum near-field power density
$S_t$ = power density in the transition region
$S_{ff}$ = power density (on axis)
$R_{nf}$ = extent of near-field
$R_{ff}$ = distance to the beginning of the far-field
R = distance to point of interest

| | |
|---|---|
| P = 2.8 W | power fed to the antenna in Watts |
| A = 1.19 $m^2$ | physical area of the aperture antenna |
| G = 78296.6 | power gain relative to an isotropic radiator |
| $D_{maj}$ = 1.257 m | diameter of major axis of the antenna in meters |
| $D_{eff}$ = 1.23 m | effective diameter of antenna in meters |
| F = 30 GHz | frequency in GHz |
| $\lambda$ = 0.01 m | wavelength in meters ($c/F_{MHz}$) |
| $\eta$ = 0.52 | aperture efficiency |
| Dc = 10% | typical duty cycle over 30-minute averaging period |

**Antenna Surface**. The maximum power density directly in front of an antenna (e.g., at the antenna surface) can be approximated by the following equation:

$S_{surface}$ = (4 * P) / A

= (4 * 2.8 W) / 1.19 $m^2$

= 0.09 mW/cm2 at 10% duty cycle

**Near Field Region**. In the near-field or Fresnel region, of the main beam, the power density can reach a maximum before it begins to decrease with distance. The extent of the near field can be described by the following equation **(**D and λ in same units). Note the diameter of the major axis is used as the most conservative value:

$R_{nf}$ = $D_{maj}^2$ / (4 * λ)

= $(1.257\ m)^2$ / (4 * 0.01 m)

= 39.5 m

The magnitude of the on-axis (main beam) power density varies according to location in the near field. However, the maximum value of the near-field, on-axis, power density can be expressed by the following equation:

$S_{nf}$ = (16 * P) / (η * π * $D_{maj}^2$)

= (16 * 2.8 W) / (0.52 * π * $(1.257\ m)^2$)

= 0.17 $mW/cm^2$ at 10% duty cycle

**Far-Field Region.** The power density in the far-field or Fraunhofer region of the antenna pattern decreases inversely as the square of the distance. The distance to the start of the far field can be calculated by the following equation:

$R_{ff}$ = (0.6 * $D_{maj}^2$) / λ

= (0.6 * $(1.257\ m)^2$) / 0.01 m

= 94.8 m

The power density at the start of the far-field region of the radiation pattern can be estimated by the equation:

$S_{ff}$ = (P * G) / (4 * π * $R_{ff}^2$)

$= (2.8 \text{ W} * 78296.6) / (4 * \pi * (35.6 \text{ m})^2)$

$= 0.02 \text{ mW/cm}^2$ at 10% duty cycle

**Transition Region.** Power density in the transition region decreases inversely with distance from the antenna, while power density in the far field (Fraunhofer region) of the antenna decreases inversely with the ***square*** of the distance. The transition region will then be the region extending from $R_{nf}$ to $R_{ff}$. If the location of interest falls within this transition region, the on-axis power density can be determined from the following equation:

$S_t = (S_{nf} * R_{nf}) / R$ where R is the location of interest in meters

$= (1.7 \text{ mW/cm}^2 * 39.5 \text{ m}) / R$

$= (6.7 \text{ m} * \text{mW/cm}^2) / R$ at 10% duty cycle

**Afterburner Networks**

**Summary of expected radiofrequency exposure levels for the Viasat RA40750 antenna using a 25 W PA in an Uncontrolled environment**

| **Region** | **Maximum Power Density** | **Hazard Assessment** |
|---|---|---|
| Far field ($R_{ff}$) = 35.6 m | 0.07 mW/cm$^2$ | Satisfies FCC MPE |
| Near field ($R_{nf}$) = 14.8 m | 0.62 mW/cm$^2$ | Satisfies FCC MPE |
| Transition region ($R_t$)<br>($R_t$) = $R_{nf} < R_t < R_{ff}$ | 0.62 mW/cm$^2$ | Satisfies FCC MPE |
| Main Reflector Surface ($S_{surface}$) | 0.34 mW/cm$^2$ | Satisfies FCC MPE |

**Summary of expected radiofrequency exposure levels for the Viasat RA40750 antenna using a 25 W PA in a Controlled environment**

| **Region** | **Maximum Power Density** | **Hazard Assessment** |
|---|---|---|
| Far field ($R_{ff}$) = 35.6 m | 0.07 mW/cm$^2$ | Satisfies FCC MPE |
| Near field ($R_{nf}$) = 14.8 m | 0.62 mW/cm$^2$ | Satisfies FCC MPE |
| Transition region ($R_t$)<br>($R_t$) = $R_{nf} < R_t < R_{ff}$ | 0.62 mW/cm$^2$ | Satisfies FCC MPE |
| Main Reflector Surface ($S_{surface}$) | 0.34 mW/cm$^2$ | Satisfies FCC MPE |

**Conclusions**

Based on this analysis it is concluded that harmful radiation levels will not be present during servicing or normal operation, nor will harmful levels exist in regions normally occupied by the public.

Radiofrequency Exposure Analysis for the Viasat RA40750 antenna with a 25 W PA.

This report analyzes the non-ionizing radiation levels for the Viasat RA40750 antenna employing a 25 W power amplifier. The analysis and calculations performed in this report follow the methods described in the most recent version of FCC Office of Engineering and Technology Bulletin No. 65 (August 1977) apart from formula 13 for near field power density. The formula for near field power density in this report is replaced per FCC/OET staff guidance with a new formula derived from Table D.5 of IEEE Standard C95.3-2021.

Bulletin No. 65 specifies that there are two separate tiers of exposure limits that are dependent upon the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The two tiers are General Population / Uncontrolled environment, and an Occupational / Controlled environment.

The applicable exposure limit for the General Population / Uncontrolled environment at this frequency of operation is 1 $mW/cm^2$ averaged over a 30-minute period.

The applicable exposure limit for the Occupational / Controlled environment at this frequency of operation is 5 $mW/cm^2$ averaged over a 5-minute period.

**<u>Definition of terms</u>**

The terms are used in the formulas here are defined as follows:

$S_{surface}$ = maximum power density at the antenna surface
$S_{nf}$ = maximum near-field power density
$S_t$ = power density in the transition region
$S_{ff}$ = power density (on axis)
$R_{nf}$ = extent of near-field
$R_{ff}$ = distance to the beginning of the far-field
R = distance to point of interest

| | |
|---|---|
| P = 25 W | power fed to the antenna in Watts |
| A = 0.44 $m^2$ | physical area of the aperture antenna |
| G = 28492.3 | power gain relative to an isotropic radiator |
| $D_{maj}$ = 0.77 m | diameter of major axis of the antenna in meters |
| $D_{eff}$ = 0.75 m | effective diameter of antenna in meters |
| F = 30 GHz | frequency in GHz |
| $\lambda$ = 0.01 m | wavelength in meters ($c/F_{MHz}$) |
| $\eta$ = 0.52 | aperture efficiency |
| Dc = 1.5% | typical duty cycle over 30-minute averaging period |

**Antenna Surface**. The maximum power density directly in front of an antenna (e.g., at the antenna surface) can be approximated by the following equation:

$S_{surface}$ = (4 * P) / A

= (4 * 25 W) / 0.44 $m^2$

= 0.34 mW/cm2 at 1.5% duty cycle

**Near Field Region**. In the near-field or Fresnel region, of the main beam, the power density can reach a maximum before it begins to decrease with distance. The extent of the near field can be described by the following equation **(**D and $\lambda$ in same units). Note the diameter of the major axis is used as the most conservative value:

$R_{nf}$ = $D_{maj}^2 / (4 * \lambda)$

= $(0.77\ m)^2 / (4 * 0.01\ m)$

= 14.8 m

The magnitude of the on-axis (main beam) power density varies according to location in the near field. However, the maximum value of the near-field, on-axis, power density can be expressed by the following equation:

$S_{nf}$ = $(16 * P) / (\eta * \pi * D_{maj}^2)$

= $(16 * 25\ W) / (0.52 * \pi * (0.77\ m)^2)$

= 0.62 $mW/cm^2$ at 1.5% duty cycle

**Far-Field Region.** The power density in the far-field or Fraunhofer region of the antenna pattern decreases inversely as the square of the distance. The distance to the start of the far field can be calculated by the following equation:

$R_{ff}$ = $(0.6 * D_{maj}^2) / \lambda$

= $(0.6 * (0.77\ m)^2) / 0.01\ m$

= 35.6 m

The power density at the start of the far-field region of the radiation pattern can be estimated by the equation:

$S_{ff}$ = $(P * G) / (4 * \pi * R_{ff}^2)$

$= (25\ W * 28492.3) / (4 * \pi * (35.6\ m)^2)$

$= 0.07\ mW/cm^2$ at 1.5% duty cycle

**Transition Region.** Power density in the transition region decreases inversely with distance from the antenna, while power density in the far field (Fraunhofer region) of the antenna decreases inversely with the ***square*** of the distance. The transition region will then be the region extending from $R_{nf}$ to $R_{ff}$. If the location of interest falls within this transition region, the on-axis power density can be determined from the following equation:

$S_t = (S_{nf} * R_{nf}) / R$ where R is the location of interest in meters

$= (41.3\ mW/cm^2 * 14.8\ m) / R$

$= (9.7\ m * mW/cm^2) / R$ at 1.5% duty cycle

**Afterburner Networks**

**Summary of expected radiofrequency exposure levels for the AVL 1280 antenna using a 25 W PA in an Uncontrolled environment**

| Region | Maximum Power Density | Hazard Assessment |
|---|---|---|
| Far field ($R_{ff}$) = 94.8 m | 0.19 mW/cm$^2$ | Satisfies FCC MPE |
| Near field ($R_{nf}$) = 39.5 m<br>3 | 0.23 mW/cm$^2$ | Satisfies FCC MPE |
| Transition region ($R_t$)<br>($R_t$) = $R_{nf} < R_t < R_{ff}$ | 0.23 mW/cm$^2$ | Satisfies FCC MPE |
| Main Reflector Surface ($S_{surface}$) | 0.13 mW/cm$^2$ | Satisfies FCC MPE |

**Summary of expected radiofrequency exposure levels for the AVL 1280 antenna using a 25 W PA in a Controlled environment**

| Region | Maximum Power Density | Hazard Assessment |
|---|---|---|
| Far field ($R_{ff}$) = 94.8 m | 0.19 mW/cm$^2$ | Satisfies FCC MPE |
| Near field ($R_{nf}$) = 39.5 m | 0.23 mW/cm$^2$ | Satisfies FCC MPE |
| Transition region ($R_t$)<br>($R_t$) = $R_{nf} < R_t < R_{ff}$ | 0.23 mW/cm$^2$ | Satisfies FCC MPE |
| Main Reflector Surface ($S_{surface}$) | 0.13 mW/cm$^2$ | Satisfies FCC MPE |

## Conclusions

Based on this analysis it is concluded that harmful radiation levels will not be present during servicing or normal operation, nor will harmful levels exist in regions normally occupied by the public.

Radiofrequency Exposure Analysis for the AVL 1280 antenna with a 25 W PA.

This report analyzes the non-ionizing radiation levels for the AVL 1280 antenna employing a 25 W power amplifier. The analysis and calculations performed in this report follow the methods described in the most recent version of FCC Office of Engineering and Technology Bulletin No. 65 (August 1977) apart from formula 13 for near field power density. The formula for near field power density in this report is replaced per FCC/OET staff guidance with a new formula derived from Table D.5 of IEEE Standard C95.3-2021.

Bulletin No. 65 specifies that there are two separate tiers of exposure limits that are dependent upon the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The two tiers are General Population / Uncontrolled environment, and an Occupational / Controlled environment.

The applicable exposure limit for the General Population / Uncontrolled environment at this frequency of operation is 1 $mW/cm^2$ averaged over a 30-minute period.

The applicable exposure limit for the Occupational / Controlled environment at this frequency of operation is 5 $mW/cm^2$ averaged over a 5-minute period.

**<u>Definition of terms</u>**

The terms are used in the formulas here are defined as follows:

$S_{surface}$ = maximum power density at the antenna surface
$S_{nf}$ = maximum near-field power density
$S_t$ = power density in the transition region
$S_{ff}$ = power density (on axis)
$R_{nf}$ = extent of near-field
$R_{ff}$ = distance to the beginning of the far-field
R = distance to point of interest

| | |
|---|---|
| P = 25 W | power fed to the antenna in Watts |
| A = 1.19 $m^2$ | physical area of the aperture antenna |
| G = 78296.6 | power gain relative to an isotropic radiator |
| $D_{maj}$ = 1.257 m | diameter of major axis of the antenna in meters |
| $D_{eff}$ = 1.23 m | effective diameter of antenna in meters |
| F = 30 GHz | frequency in GHz |
| $\lambda$ = 0.01 m | wavelength in meters ($c/F_{MHz}$) |
| $\eta$ = 0.52 | aperture efficiency |
| Dc = 1.5% | typical duty cycle over 30-minute averaging period |

**Antenna Surface**. The maximum power density directly in front of an antenna (e.g., at the antenna surface) can be approximated by the following equation:

$S_{surface}$ = (4 * P) / A

= (4 * 25 W) / 1.19 $m^2$

= 0.13 mW/cm2 at 1.5% duty cycle

**Near Field Region**. In the near-field or Fresnel region, of the main beam, the power density can reach a maximum before it begins to decrease with distance. The extent of the near field can be described by the following equation **(**D and λ in same units). Note the diameter of the major axis is used as the most conservative value:

$R_{nf}$ = $D_{maj}^2 / (4 * \lambda)$

= $(1.257\ m)^2 / (4 * 0.01\ m)$

= 39.5 m

The magnitude of the on-axis (main beam) power density varies according to location in the near field. However, the maximum value of the near-field, on-axis, power density can be expressed by the following equation:

$S_{nf}$ = $(16 * P) / (\eta * \pi * D_{maj}^2)$

= $(16 * 25\ W) / (0.52 * \pi * (1.257\ m)^2)$

= 0.23 $mW/cm^2$ at 1.5% duty cycle

**Far-Field Region.** The power density in the far-field or Fraunhofer region of the antenna pattern decreases inversely as the square of the distance. The distance to the start of the far field can be calculated by the following equation:

$R_{ff}$ = $(0.6 * D_{maj}^2) / \lambda$

= $(0.6 * (1.257\ m)^2) / 0.01\ m$

= 94.8 m

The power density at the start of the far-field region of the radiation pattern can be estimated by the equation:

$S_{ff}$ = $(P * G) / (4 * \pi * R_{ff}^2)$

$= (25\ W * 78296.6) / (4 * \pi * (90.8\ m)^2)$

$= 0.19\ mW/cm^2$ at 1.5% duty cycle

**Transition Region.** Power density in the transition region decreases inversely with distance from the antenna, while power density in the far field (Fraunhofer region) of the antenna decreases inversely with the ***square*** of the distance. The transition region will then be the region extending from $R_{nf}$ to $R_{ff}$. If the location of interest falls within this transition region, the on-axis power density can be determined from the following equation:

$S_t = (S_{nf} * R_{nf}) / R$ where R is the location of interest in meters

$= (15.3\ mW/cm^2 * 39.5\ m) / R$

$= (9.1\ m * mW/cm^2) / R$ at 1.5% duty cycle