Exhibit B – Technical Analysis

Summary

SageNet LLC ("SageNet") currently provides data communications networking services throughout the fifty United States, Puerto Rico and the US Virgin Islands to commercial and government customers using Ku-band VSAT earth stations and networking equipment. Pursuant to this application, SageNet seeks to modify the existing earth station authorization call sign E000035 for the 0.75-meter Ku-band earth station elliptical reflector antenna to add Fixed and Temporary-Fixed Site IDs and Antenna IDs with an ALSAT designation for use of Ku-band geostationary orbit ("GSO") satellites licensed by the United States and satellites in the Federal Communications Commission ("Commission") Approved Space Station List by complying with regulation 47 CFR 25.209 and 47 CFR 25.218 for operation in the United States (CONUS, Alaska and Hawaii) and Puerto Rico and the US Virgin Islands.

This exhibit demonstrates the 0.75-meter earth station antenna[1], licensed to SageNet under call sign E000035, conforms with Commission regulations by reducing the antenna input power spectral density to enable ALSAT authorization under 47 CFR 25.218. The antenna operates in the conventional Ku-band providing digital satellite services to SageNet commercial and government customers utilizing geostationary-orbit ("GSO") satellites. Compliance with regulation 47 CFR 25.218(f) is accomplished by limiting the antenna transmit input signal to a power spectral density not to exceed -14.0 dBW/4kHz for earth station antenna compliant with 47 CFR 25.209. SageNet is not seeking protection from harmful

[1] When call sign E000035 was originally granted the manufacturer of the 0.75-meter antenna was known as Channel Master. The 0.75-meter antenna manufacturer has undergone multiple changes of ownership. The current owner is Skyware Global, a Global Invacom Group company.

interference received by the 0.75-meter earth station antenna from stations complying with Commission regulations. SageNet is requesting the Commission grant an ALSAT authorization to enable the 0.75-meter earth station antenna to operate utilizing satellites listed in the Commission's Approved Space Station list.

SageNet will show in this exhibit the application meets the requirements of regulation 47 CFR 25.218(f) for operation in the conventional Ku-band under blanket authority. Therefore, SageNet is requesting routine processing of this application as per regulation 47 CFR 25.115(c)(1)(i).

Technical Analysis

This SageNet application to the Commission seeks to obtain ALSAT authorization for current earth station authorization call sign E000035 to enable the 0.75-meter elliptical reflector antenna to access satellites licensed by United States and satellites on the Commission's Approved Space Station List. The 0.75-meter antenna elliptical reflector has dimensions of 89 cm in the major axis and 62 cm in the minor axis. The major axis of the reflector is aligned with the satellite arc upon installation to provide the maximum isolation towards adjacent satellites. An ALSAT authorization will enable SageNet to operate these earth stations using any United States licensed GSO satellite, or any GSO satellite listed in the Commission's Approved Space Station List[2], to use the Conventional Ku-band frequency bands[3] for the earth station transmit (uplink path) and the earth station receive (downlink path).

[2] https://www.fcc.gov/approved-space-station-list

[3] 47 CFR 25.103 defines the "Conventional Ku-band" as "The 11.7-12.2 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) FSS frequency bands."

The initial application[4] to, and authorization by, the Commission for SageNet call sign E000035 to operate the submeter 0.75-meter elliptical diameter reflector Ku-band earth station antenna occurred over twenty years ago, which authorized the submeter antenna to operate on select Ku-band geostationary orbit satellites. The last modification to E000035 occurred prior to the Commission establishing regulation 47 CFR 25.218[5] that supports licensing of conventional Ku-band earth stations by evaluation of the earth station transmit off-axis EIRP density performance, which is a combination of the earth station antenna off-axis transmit gain pattern performance and the transmit signal power density input to the antenna transmit port that is characterized by the following formula:

Antenna Off-axis EIRP Spectral Density (dBW/4kHz) = Antenna Off-axis Antenna Transmit Gain (dBi)
+ Antenna Input Signal Power Density (dBW/4kHz)

Regulation 47 CFR 25.218(f)(1) states evaluation of the off-axis EIRP spectral density in the GSO satellite plane begins at 1.5° off-axis and regulation 47 CFR 25.218(f)(2) begins evaluation of the off-axis EIRP spectral density in the plane perpendicular to the GSO plane at 3.0° off-axis. The 0.75-meter Ku-band antenna off-axis antenna transmit gain patterns are provided and evaluated in this exhibit. The evaluation will show an input transmit power spectral density of -14.0 dBW/4kHz will be compliant with the maximum off-axis EIRP spectral density, defined in 47 CFR 25.218, to support an ALSAT designation for the 0.75-meter earth station antenna.

[4] The initial application for call sign E000035 was filed by Space Services License Sub, Inc. SageNet LLC obtained the authorization for call sign E000035 in a transfer of control action.

[5] 47 CFR 25.218 was established under 81 FR 55339 on August 18, 2016, amended by 84 FR 53656 on October 8, 2019 and by 85 FR 44787 on July 24, 2020.

Antenna Off-Axis Gain Performance

The 0.75-meter elliptical reflector antenna gain patterns are provided in this exhibit at transmit frequencies of 14.00, 14.25 and 14.50 GHz in the azimuth and elevation planes and are summarized in the below table. The antenna receive performance patterns are provided at 11.75 GHz frequency in the azimuth and elevation planes. These antenna patterns for the Skyware Global 0.75-meter antenna supporting Fixed operations are also representative of the 0.75-meter Cobham TracStar antenna supporting Temporary-Fixed operation[6]:

Earth Station Conventional Ku-Band Frequency	Antenna Pattern Axis[A]	Figure
Transmit	Azimuth	1 to 9
Transmit	Elevation	10 to 18
Receive	Azimuth	19 to 21
Receive	Elevation	22 to 24

Note A: Azimuth axis is tangent to the GSO plane. Elevation axis is perpendicular to the GSO plane.

[6] The 0.75-meter Ku-band earth station Fixed operation antenna manufactured by Skyware Global, formerly known as Channel Master, is listed in Form 312 Schedule B as Site ID “REMOTE 3” and Antenna ID “0.75MA”. Temporary-Fixed operation supported by an AVL Technologies 0.75-meter antenna is listed in Form 312 Schedule B as Site ID “REMOTE 4” and Antenna ID “0.75MTFA”. These new Site IDs and Antenna IDs will differentiate the requested 0.75-meter earth station authorization, under 47 CFR 25.218 with ALSAT designation, from call sign E000035 legacy authorizations.

Transmit Performance Evaluation Tangent to GSO Plane

For conventional Ku-band transmissions, regulation 47 CFR 25.218(f)(1) defines evaluation of off-axis transmit antenna EIRP spectral density in the GSO plane between 1.5° and 7.0° off-axis as follows:

$$\text{Off-axis EIRP Spectral Density} = 15 - 25 \log_{10} \theta \text{ dBW/4 kHz for } 1.5° \leq \Theta \leq 7.0°$$

The off-axis EIRP spectral density is 10.6 dBW/4kHz at 1.5° off-axis. An antenna conforming to the off-axis antenna gain defined under 47 CFR 29.209(a)(2) enables an antenna transmit gain tangent to the GSO plane as follows:

$$\text{Antenna Maximum Off-Axis Gain} = 29 - 25 \text{ Log}_{10} \Theta \text{ dBi for } 1.5° \leq \Theta \leq 7.0°$$

Regulation 47 CFR 25.209(a)(2) allows for a maximum off-axis antenna gain of 24.6 dBi at 1.5° off-axis in the GSO plan (azimuth axis). The combination of 47 CFR 25.218(f)(1) and 47 CFR 29.209(a)(2) enables an antenna conforming with 47 CFR 29.209(a)(2) to operate with an antenna transmit power spectral density input of up to -14 dBW/4kHz (10.6 dBW/4kHz – 24.6 dBi). Regulation 47 CFR 25.218(f)(1) enables antennas not conforming with the off-axis gain tangent to the GSO plane, defined under 47 CFR 29.209(a)(2), to operate with a proportionally reduced antenna input power spectral density. This exhibit will show reducing the antenna input power spectral density below -14 dBW/4kHz is not necessary for the 0.75-meter elliptical reflector antenna with the major axis of the reflector aligned with the GSO plane.

Transmit antenna patterns, provided herein, for the azimuth axis (GSO plane) show the 0.75-meter antenna transmit off-axis antenna gain at the 1.5° evaluation point has 24.3 dBi of transmit antenna gain[7], which is below the maximum 47 CFR 25.209(a)(2) allowed transmit antenna gain of 24.6 dBi at 1.5° by 0.3 dB (24.6 dBi - 24.3 dBi). The 0.75-meter earth station antenna will therefore be complaint with 47 CFR 25.218(f)(1) in the GSO plane with the antenna input transmit power spectral density not exceeding -13.7 dBW/4kHz (-14.0 dBW/4kHz + 0.3 dB).

Transmit Performance Evaluation Perpendicular to the GSO Plane

The transmit antenna patterns for the elevation axis show the 0.75-meter earth station antenna transmit off-axis antenna gain perpendicular to the GSO plane at 3.0 degrees off-axis has antenna gain below the antenna gain defined in 47 CFR 25.209(a)(5) requirement shown below:

$$32 - 25 \text{ Log } \Theta \text{ dBi for } 3.0° < \Theta \leq 19.1°$$

$$0 \text{ dBi for } 19.1° < \Theta \leq 180°$$

The maximum antenna off-axis gain perpendicular to the GSO plane is 20.0 dBi for theta equal to 3°. The antenna patterns provided herein, perpendicular to the GSO plane, show that at 3° off-axis the performance is below 20.0 dBi and below the 47 CFR 25.209(a)(5) criteria at angles greater than 3° off-axis from antenna boresight peak gain, except as allowed by 47 CFR 25.218(f)(2).

[7] Figure 1 that shows the 0.75-meter antenna has 24.3 dBi transmit antenna gain in the azimuth axis at 14.0 GHz at 1.5° off-axis given 39.2 dBi peak boresight gain at 14.0 GHz. Other figures for transmit gain in the azimuth axis show antenna gain at 26.5 dBi or lower at 1.5° off-axis in the GSO plane.

Transmit Performance Conclusion

Because the 0.75-meter antenna is compliant with 47 CFR 25.218 no reduction in the earth station antenna input transmit power spectral density below -14.0 dBW/4kHz is required. Therefore, SageNet is requesting authorization in this application to operate the 0.75-meter antenna in the conventional Ku-band, supporting services with digital modulation, and an "ALSAT" designation with antenna input transmit power spectral density not exceeding -14.0 dBW/4kHz.

Identification of Transmit Random Access Scheme

Regulation 47 CFR 25.115(a)(5)(iv) requires applications to identify random-access scheme supported by earth station transmissions. The 0.75-meter antenna operates with multiple VSAT network technologies. SageNet currently operates VSAT networks supported by the 0.75-meter antenna using the SkyEdge VSAT platform, manufactured by Gilat Satellite Networks, that utilizes a Frequency and Time Division Multiple Access ("FTDMA") access scheme utilizing Slotted Aloha Random Access. SageNet's VSAT networks also utilize other platforms that are supported by a reservation access scheme where the inbound (remote-to-hub) transmissions utilize a non-random access scheme technology in accordance with the European Telecommunications Standards Institute ("ETSI") DVB-RCS (Return Channel via Satellite) specification.

Limited Receive Interference Protection

SageNet is not seeking protection from interference originating from the authorized operation of other stations that would not cause harmful interference to an antenna conforming with the antenna off-axis performance specified in 47 CFR 25.209.

Radiation Hazard Analysis

The radiation hazard analysis for the 0.75-meter earth station has been included in previously provided applications and is incorporated in this application by reference.

Off-Axis Antenna Gain Performance

Figures for the 0.75-meter Ku-band antenna transmit and receive off-axis gain performance are provided for the azimuth axis (aligned with the GSO plane) at the low, mid and high frequencies of the conventional Ku-band. All antenna patterns provide co-pol and cross-pol antenna performance off axis from boresight peak transmit gain.

Transmit Antenna Patterns

The Ku-band antenna azimuth axis is aligned with the GSO plane, and the elevation axis is aligned perpendicular with the GSO plane. Transmit antenna patterns are provided for the azimuth axis and elevation axis at +/- 6°, +/- 30° and +/- 180° off-axis at low, mid and high transmit Ku-band frequencies, as summarized in the below table.

Azimuth Axis	Elevation Axis	Frequency (GHz)	Boresight Peak Transmit Antenna Gain[B] (dBi)	Performance Off-Axis
Figure 1	Figure 10	14.00	39.20	+/-6°
Figure 2	Figure 11	14.25	39.35	+/-6°
Figure 3	Figure 12	14.50	39.50	+/-6°
Figure 4	Figure 13	14.00	39.20	+/- 30°
Figure 5	Figure 14	14.25	39.35	+/- 30°
Figure 6	Figure 15	14.50	39.50	+/- 30°
Figure 7	Figure 16	14.00	39.20	+/-180°
Figure 8	Figure 17	14.25	39.35	+/-180°
Figure 9	Figure 18	14.50	39.20	+/-180°

Note B: Figures 1 to 18 provide antenna patterns for the off axis transmit antenna gain relative to the Boresight Peak Transmit Antenna Gain noted in the table.

0.75-meter Ku-band Antenna

Azimuth Axis (GSO Plane)

Transmit Off-axis Antenna Patterns

+/- 6° and +/- 180°

14.00 GHz, 14.25 GHz and 14.50 GHz

Figures 1 to 9

Figure 1 – Antenna Azimuth Axis +/- 6° Off-Axis Transmit Gain at 14.00 GHz

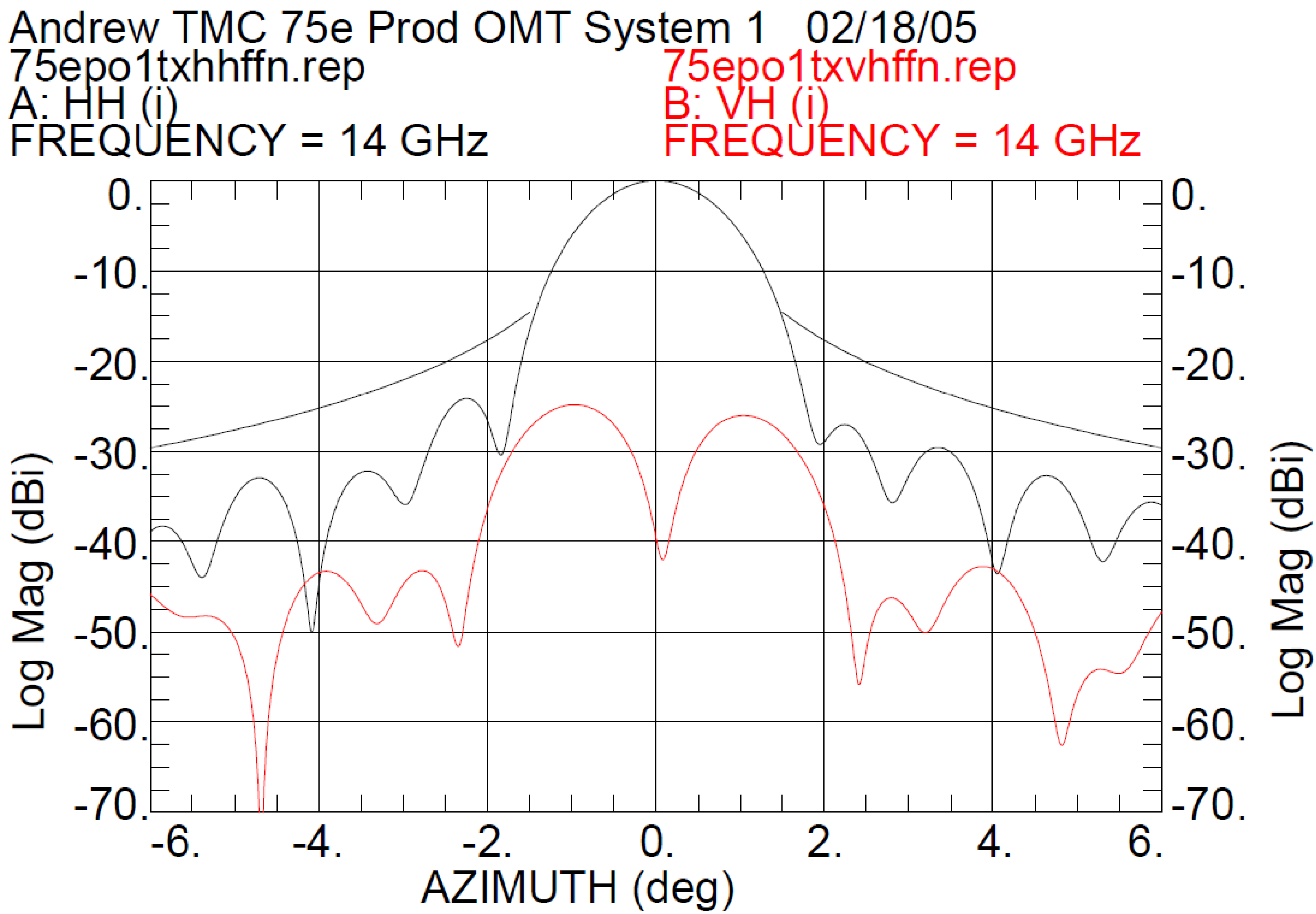


Figure 2 – Antenna Azimuth Axis +/- 6° Off-Axis Transmit Gain at 14.25 GHz

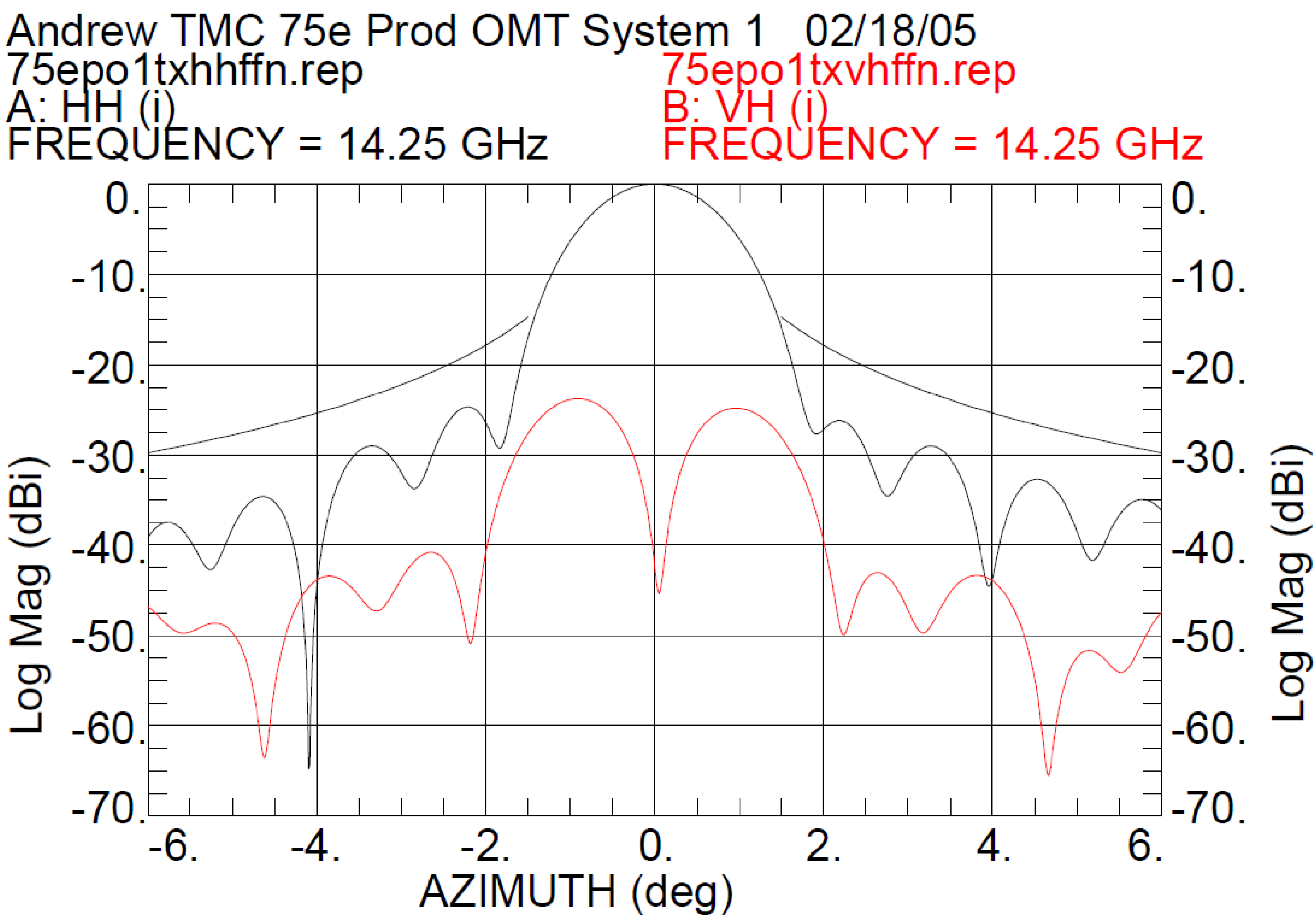


Figure 3 – Antenna Azimuth Axis +/- 6° Off-Axis Transmit Gain at 14.50 GHz

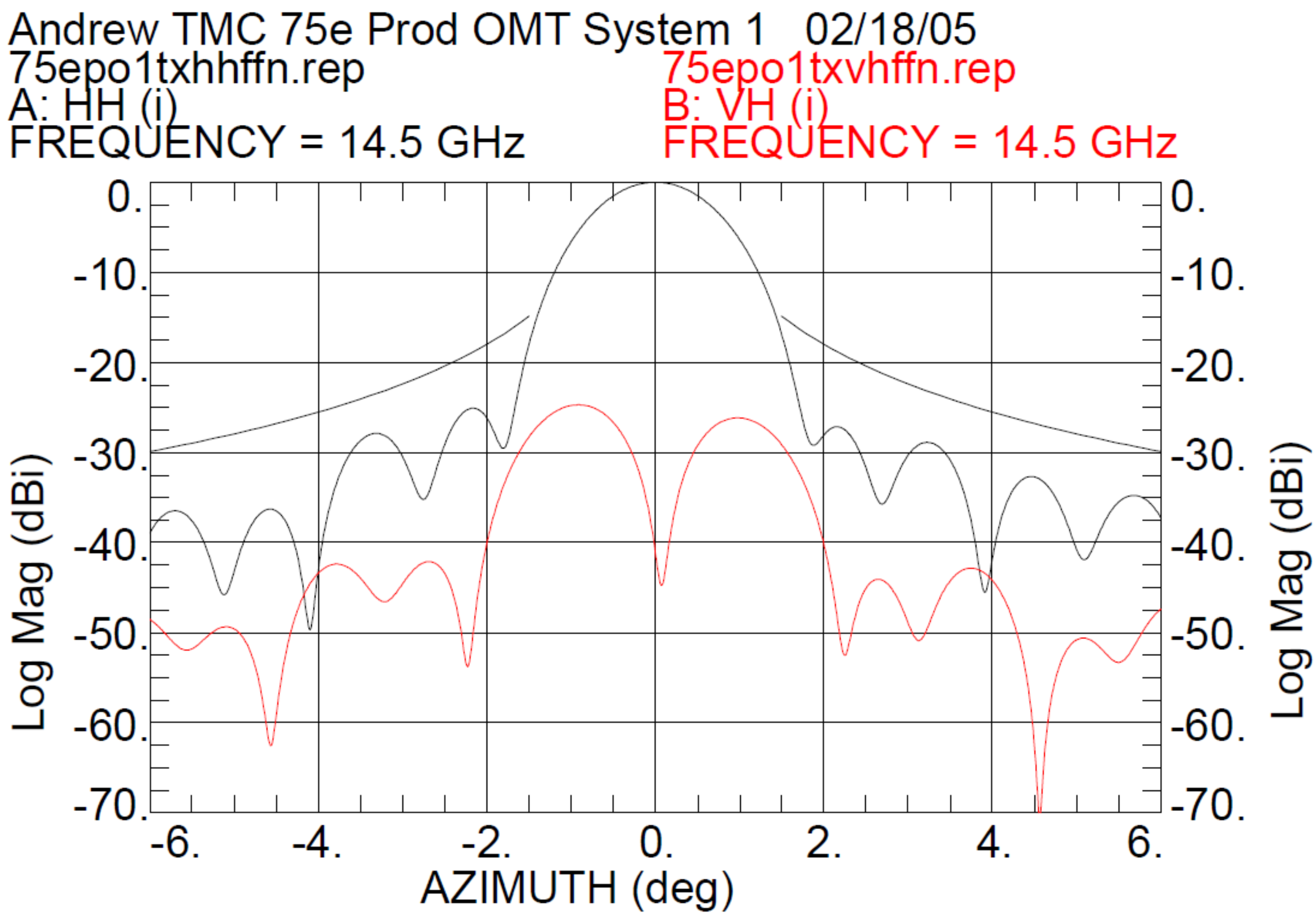


Figure 4 – Antenna Azimuth Axis +/- 30° Off-Axis Transmit Gain at 14.00 GHz

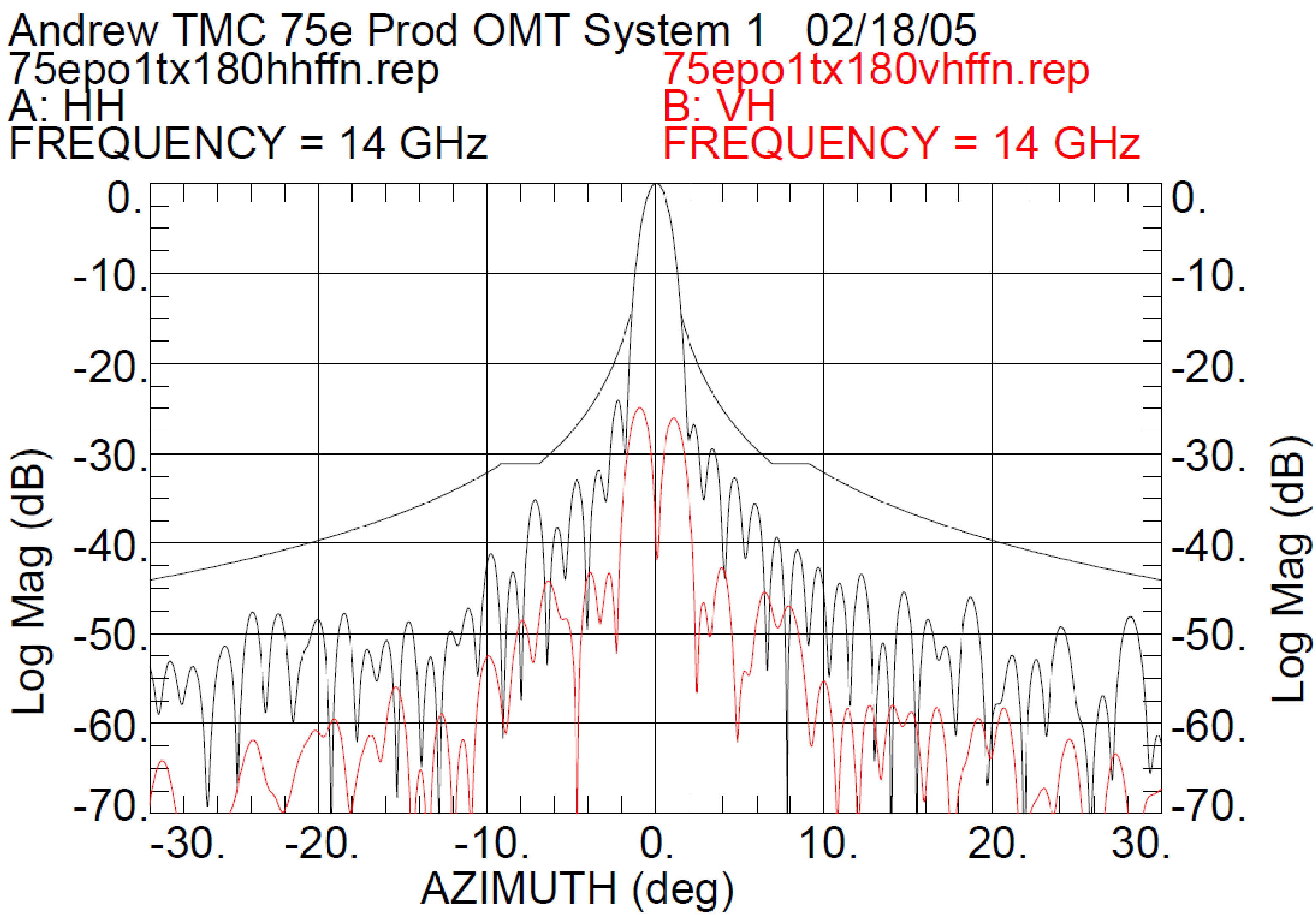


Figure 5 – Antenna Azimuth Axis +/- 30° Off-Axis Transmit Gain at 14.25 GHz

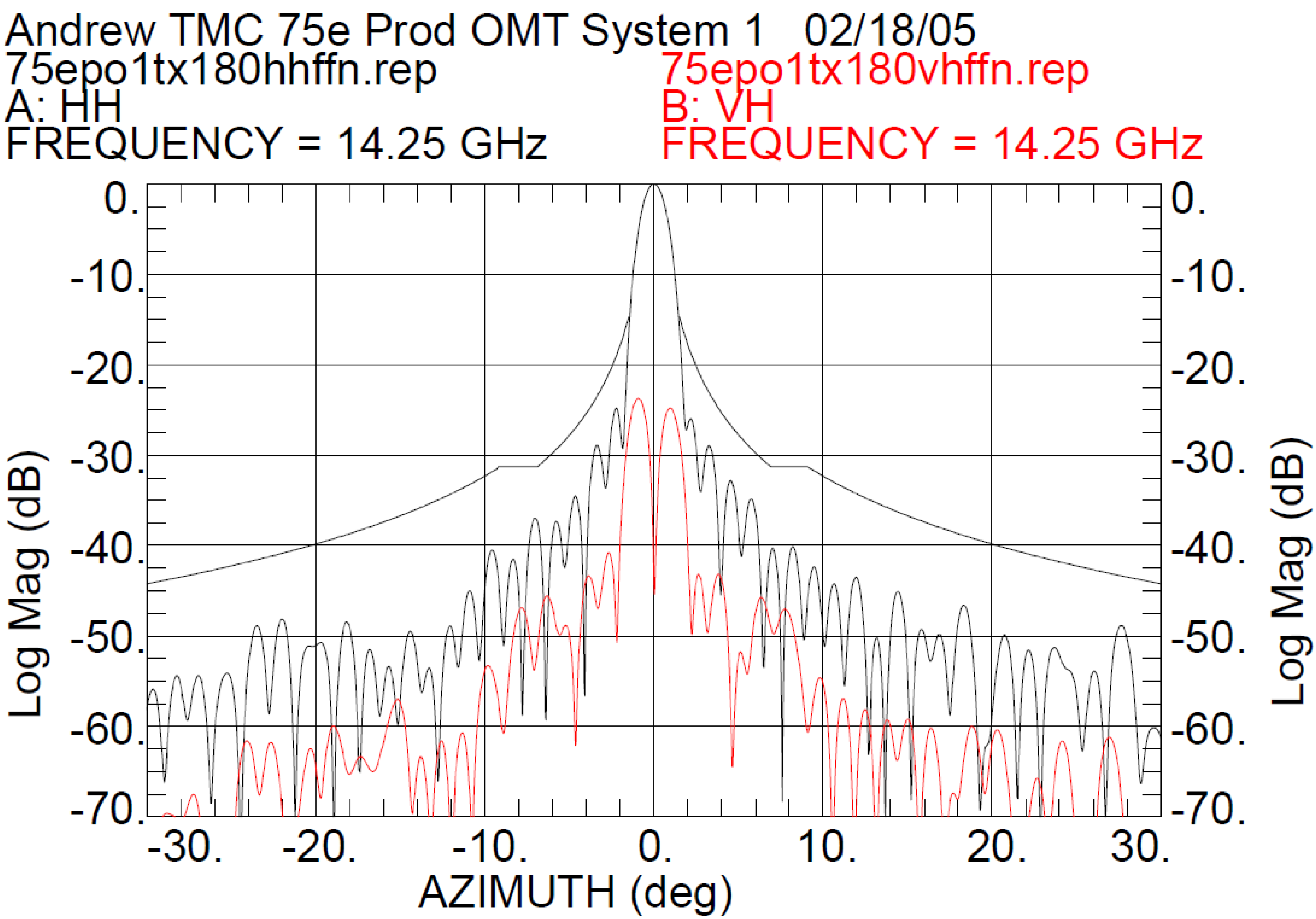


Figure 6 – Antenna Azimuth Axis +/- 30° Off-Axis Transmit Gain at 14.50 GHz

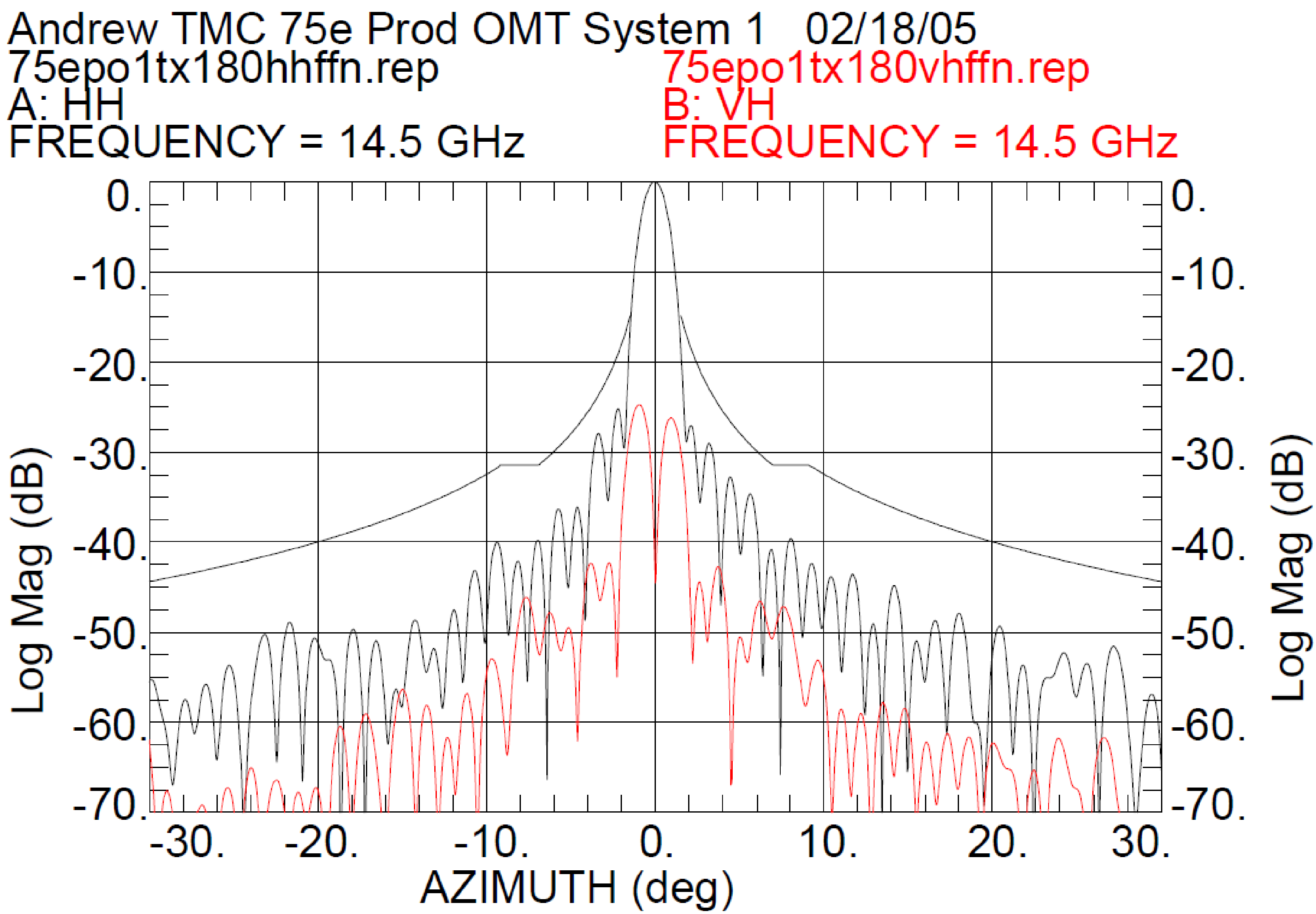


Figure 7 – Antenna Azimuth Axis +/- 180° Off-Axis Transmit Gain at 14.00 GHz

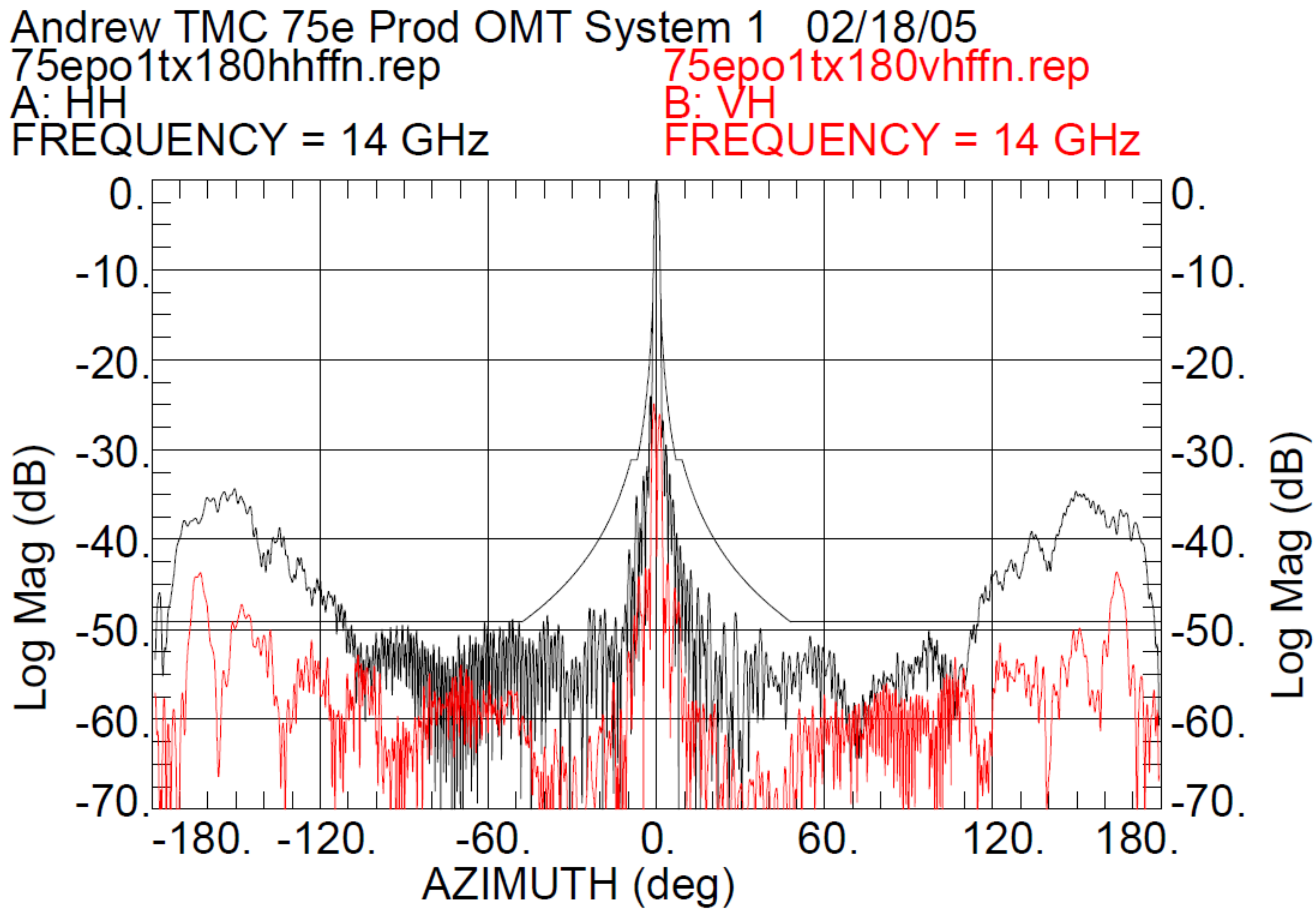


Figure 8 – Antenna Azimuth Axis +/- 180° Off-Axis Transmit Gain at 14.25 GHz

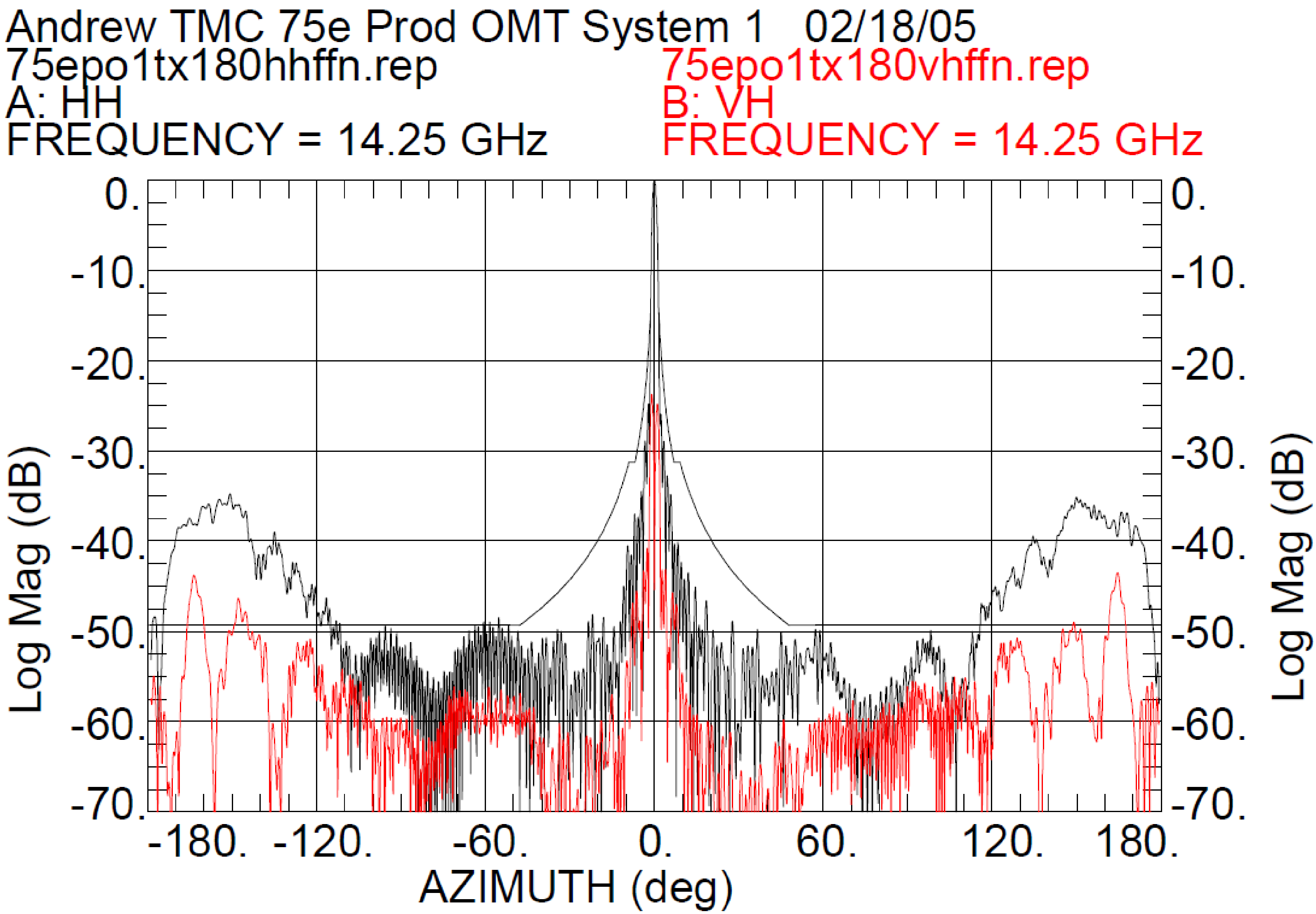
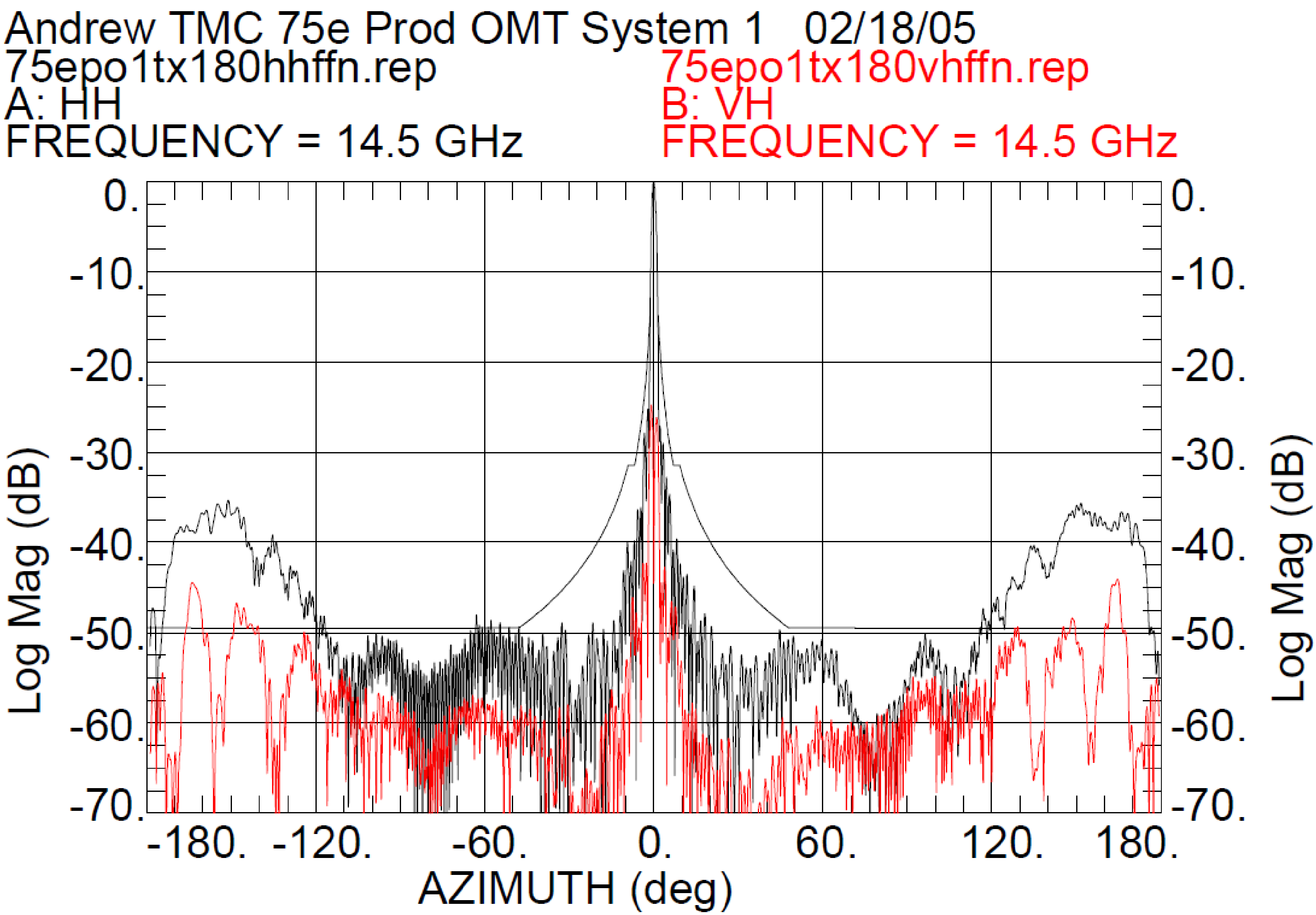


Figure 9 – Antenna Azimuth Axis +/- 180° Off-Axis Transmit Gain at 14.50 GHz



0.75-meter Ku-band Antenna

Elevation Axis

(Perpendicular to GSO Plane)

Transmit Off-axis Antenna Patterns

+/- 6°, +/- 30° and +/-180°

14.00 GHz, 14.25 GHz and 14.50 GHz

Figures 10 to 18

Figure 10 – Antenna Elevation Axis +/- 6° Off-Axis Transmit Gain at 14.00 GHz

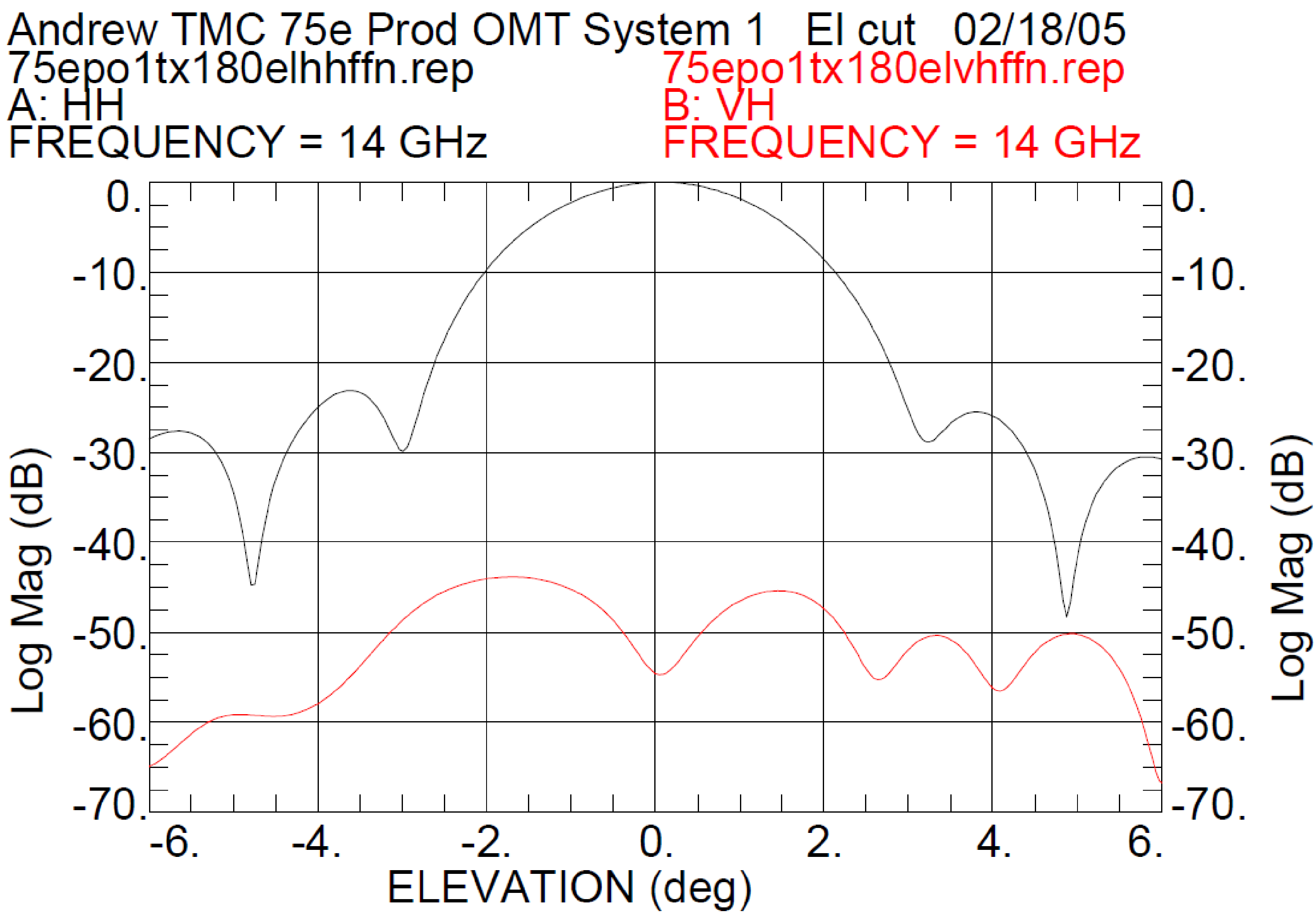


Figure 11 – Antenna Elevation Axis +/- 6° Off-Axis Transmit Gain at 14.25 GHz

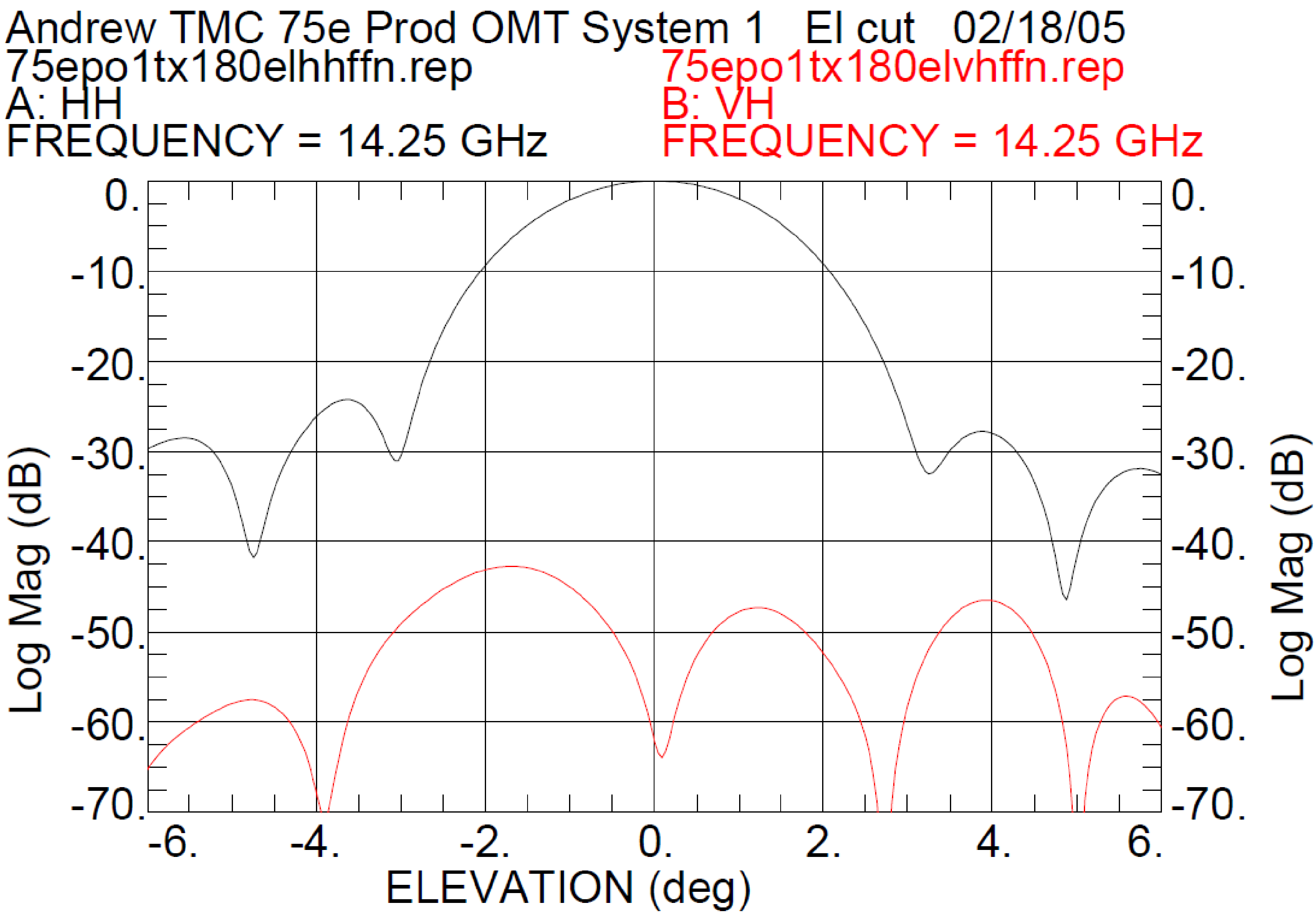


Figure 12 – Antenna Elevation Axis +/- 6° Off-Axis Transmit Gain at 14.50 GHz

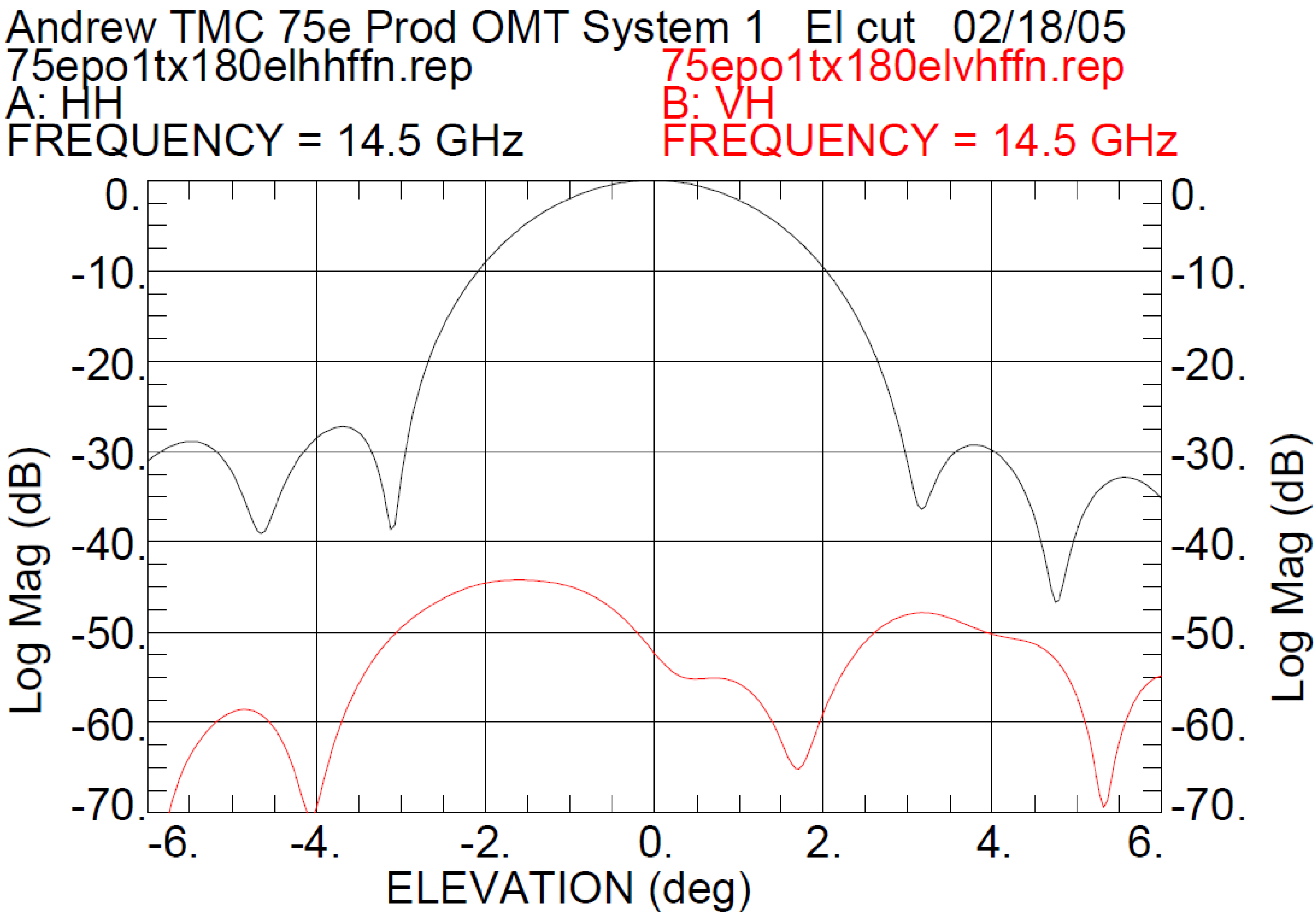


Figure 13 – Antenna Elevation Axis +/- 30° Off-Axis Transmit Gain at 14.00 GHz

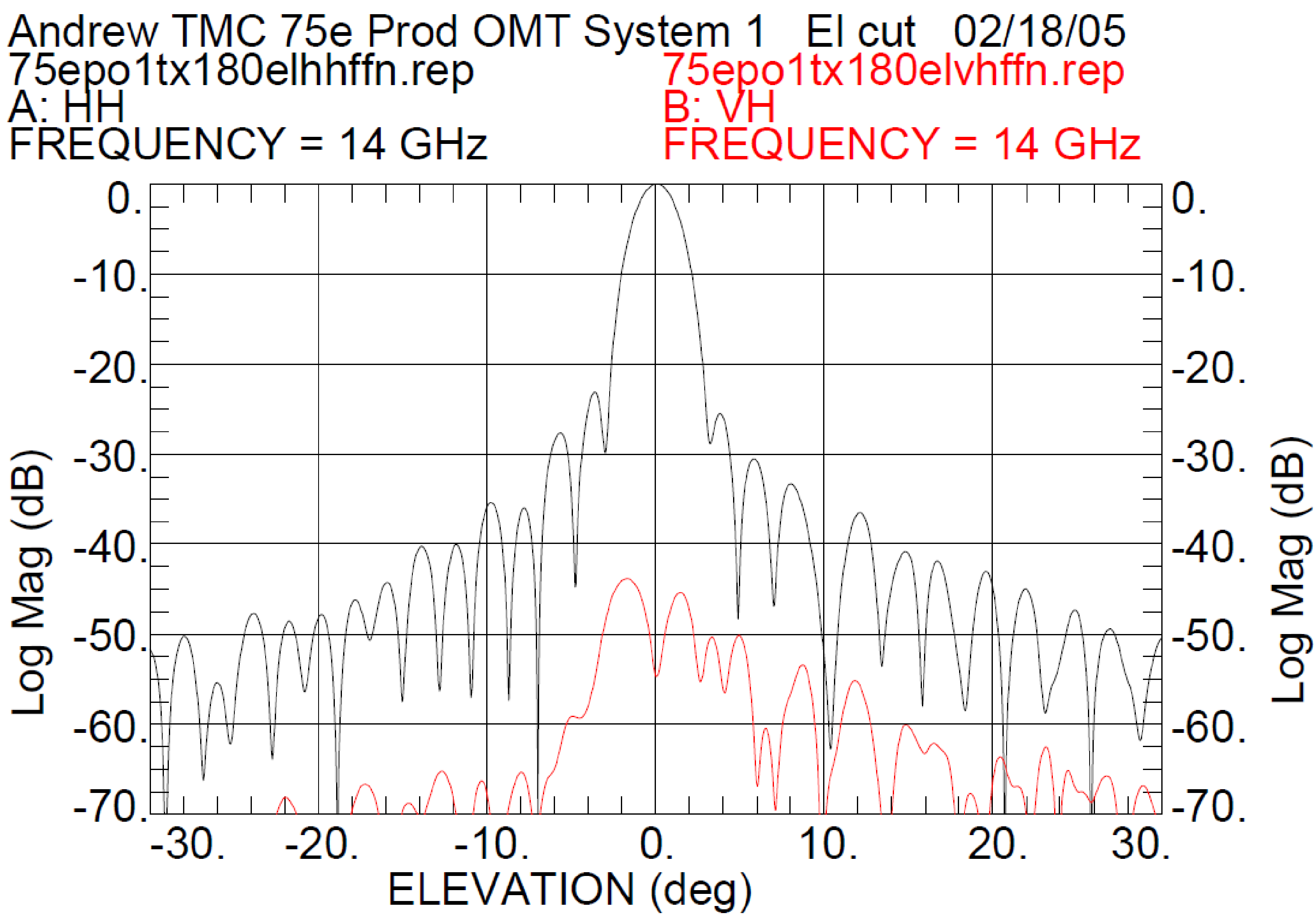


Figure 14 – Antenna Elevation Axis +/- 30° Off-Axis Transmit Gain at 14.25 GHz

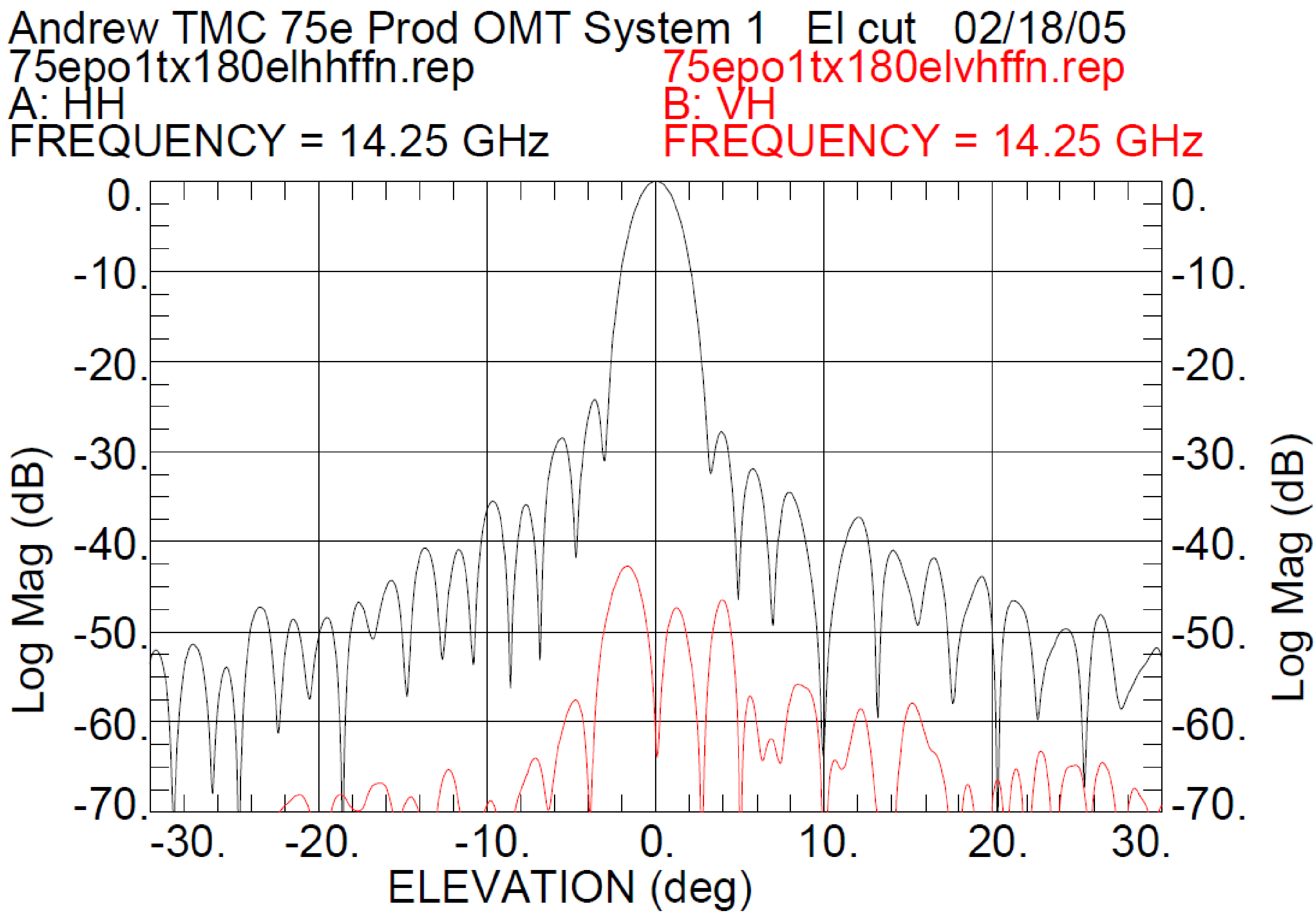


Figure 15 – Antenna Elevation Axis +/- 30° Off-Axis Transmit Gain at 14.50 GHz

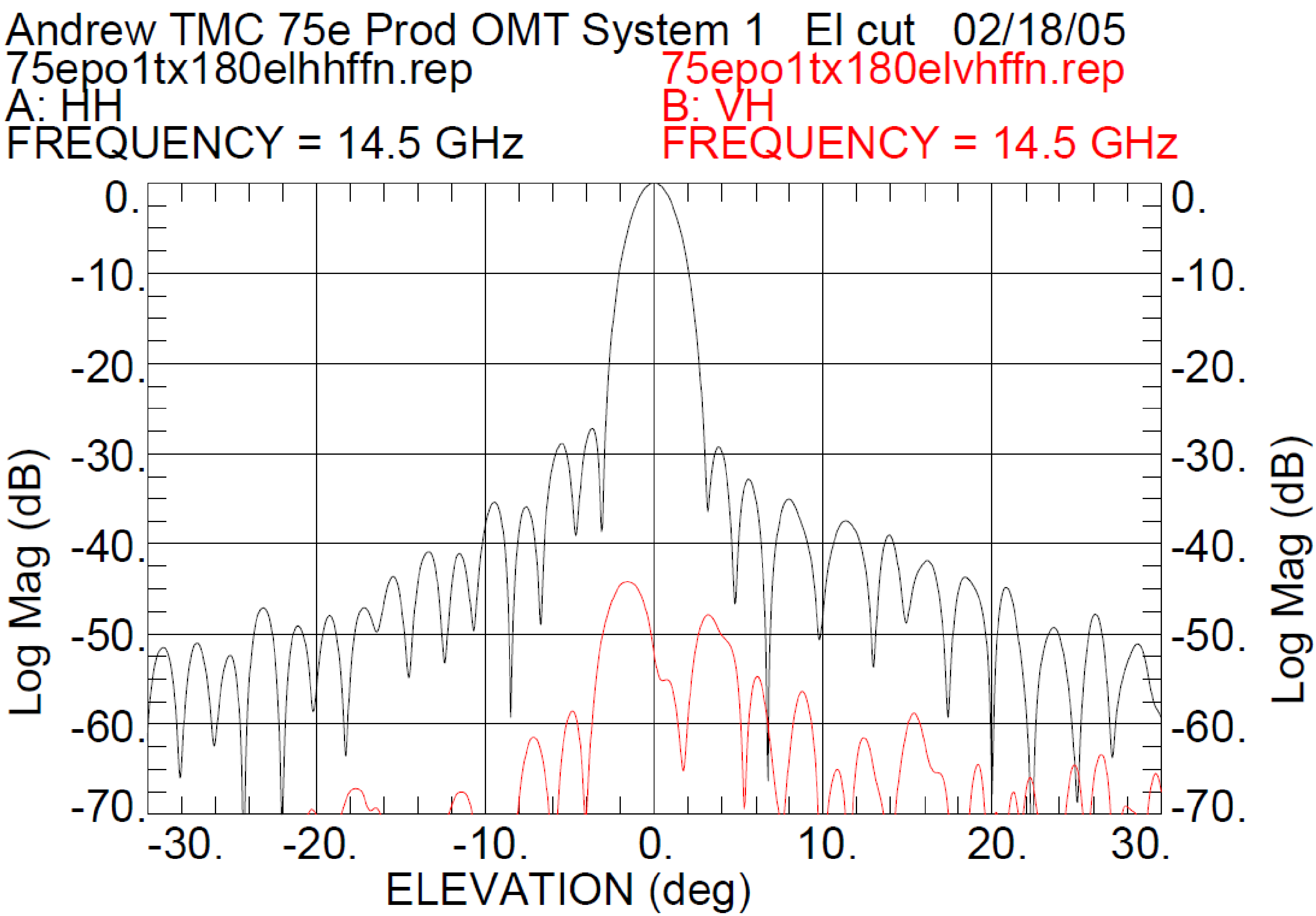


Figure 16 – Antenna Elevation Axis +/- 180° Off-Axis Transmit Gain at 14.00 GHz

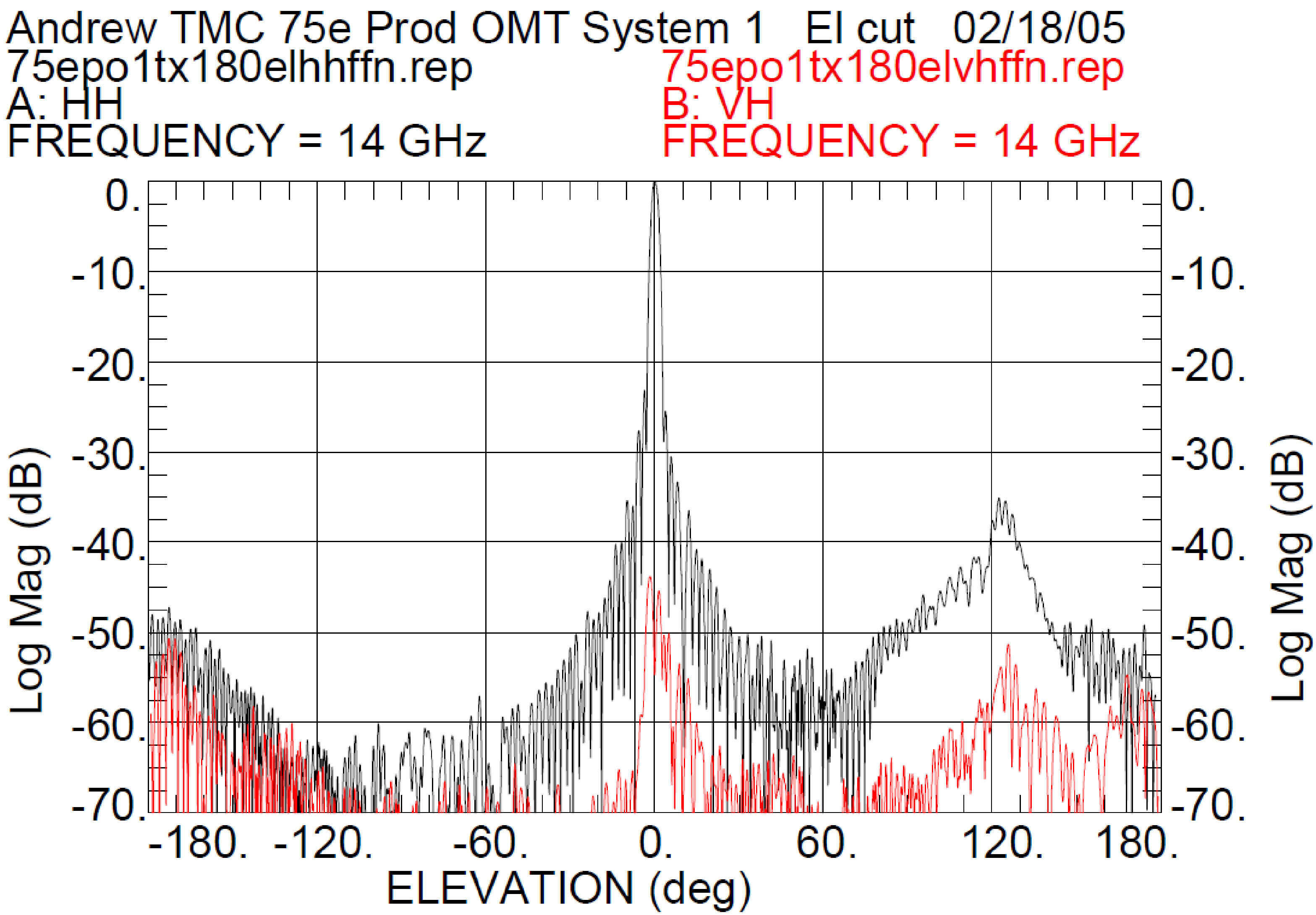


Figure 17 – Antenna Elevation Axis +/- 180° Off-Axis Transmit Gain at 14.25 GHz

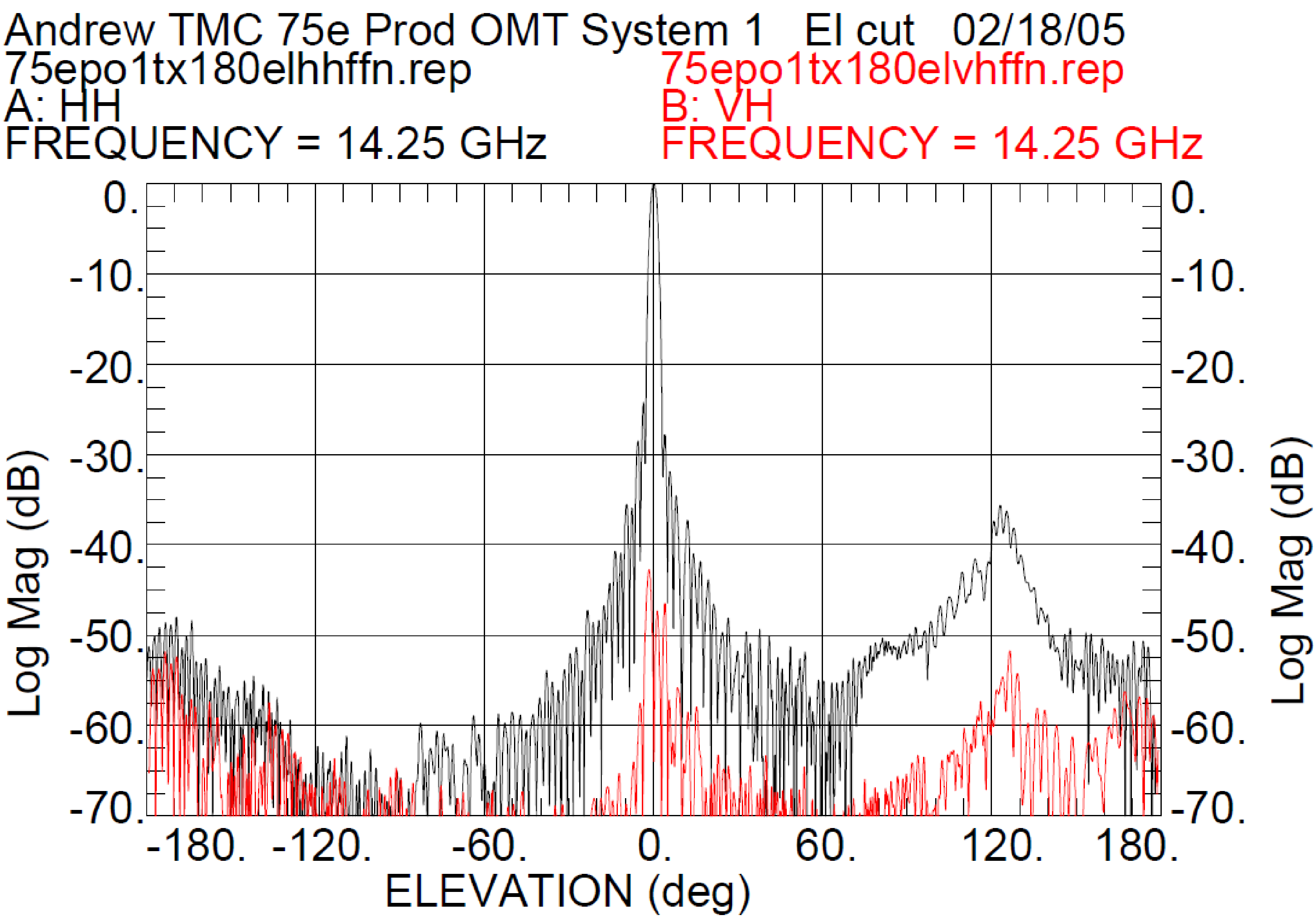
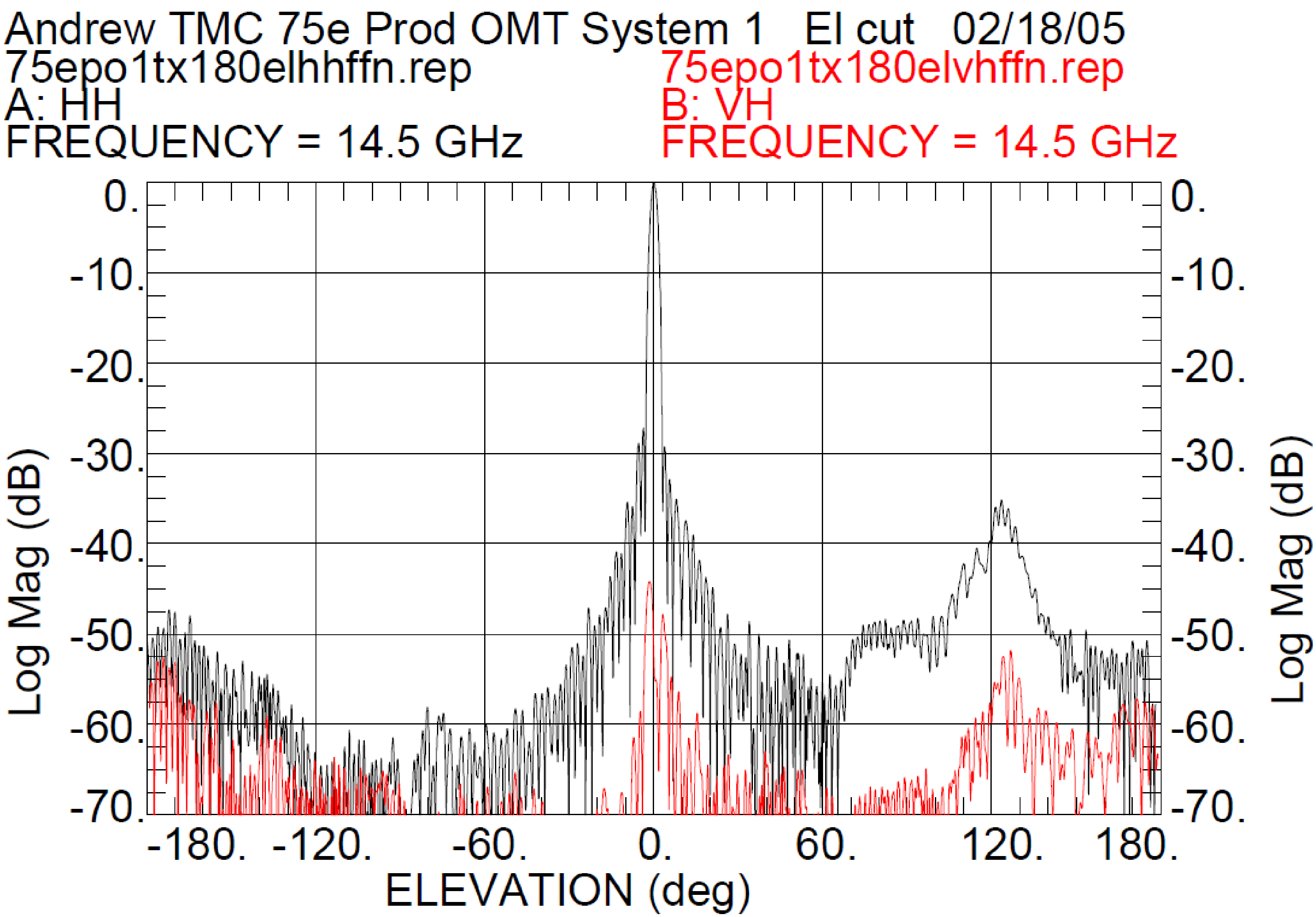


Figure 18 – Antenna Elevation Axis +/- 180° Off-Axis Transmit Gain at 14.50 GHz



Receive Antenna Patterns

The Ku-band antenna azimuth axis is aligned with the GSO plane, and the elevation axis is aligned perpendicular with the GSO plane. Receive antenna patterns are provided for the azimuth axis and elevation axis at +/- 6°, +/- 30° and +/- 180° off-axis at the low frequency receive FSS Ku-band of 11.75 GHz as summarized in the below table.

Azimuth Axis	Elevation Axis	Frequency (GHz)	Boresight Peak Receive Antenna Gain[B] (dBi)	Performance Off-Axis
Figure 19	Figure 22	11.75	37.50	+/-6°
Figure 20	Figure 23	11.75	37.50	+/-30°
Figure 21	Figure 24	11.75	37.50	+/-180°

Note B: Figures 19 to 24 provide antenna patterns for the off axis receive antenna gain relative to the Boresight Peak Receive Antenna Gain noted in the table.

0.75-meter Ku-band Antenna

Azimuth Axis (GSO Plane)

Receive Off-axis Antenna Patterns

+/- 6°, +/-30° and +/- 180°

Figures 19, 20 and 21

Figure 19 – Antenna Azimuth Axis +/- 6° Off-Axis Receive Gain at 11.725 GHz

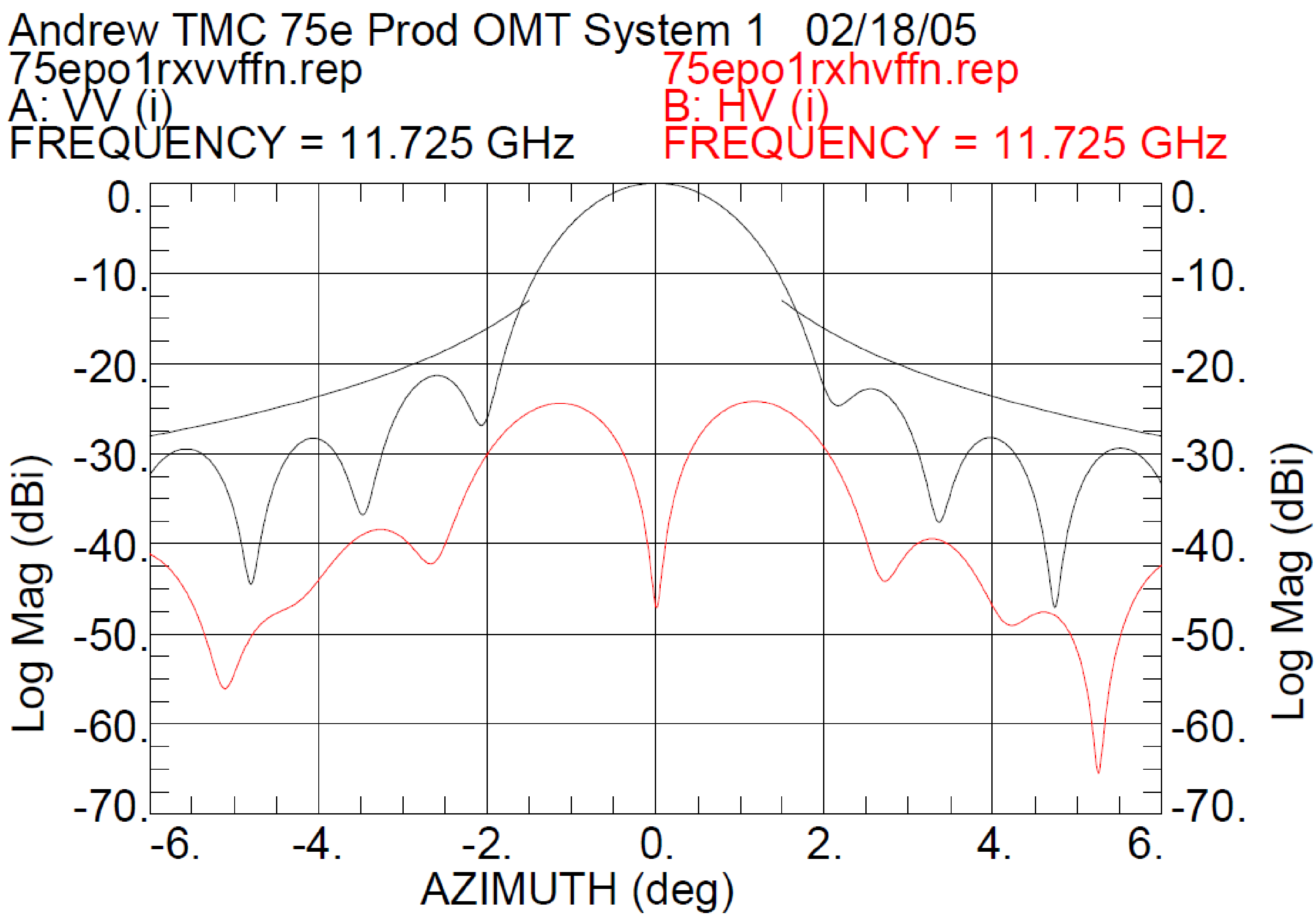


Figure 20 – Antenna Azimuth Axis +/- 30° Off-Axis Receive Gain at 11.725 GHz

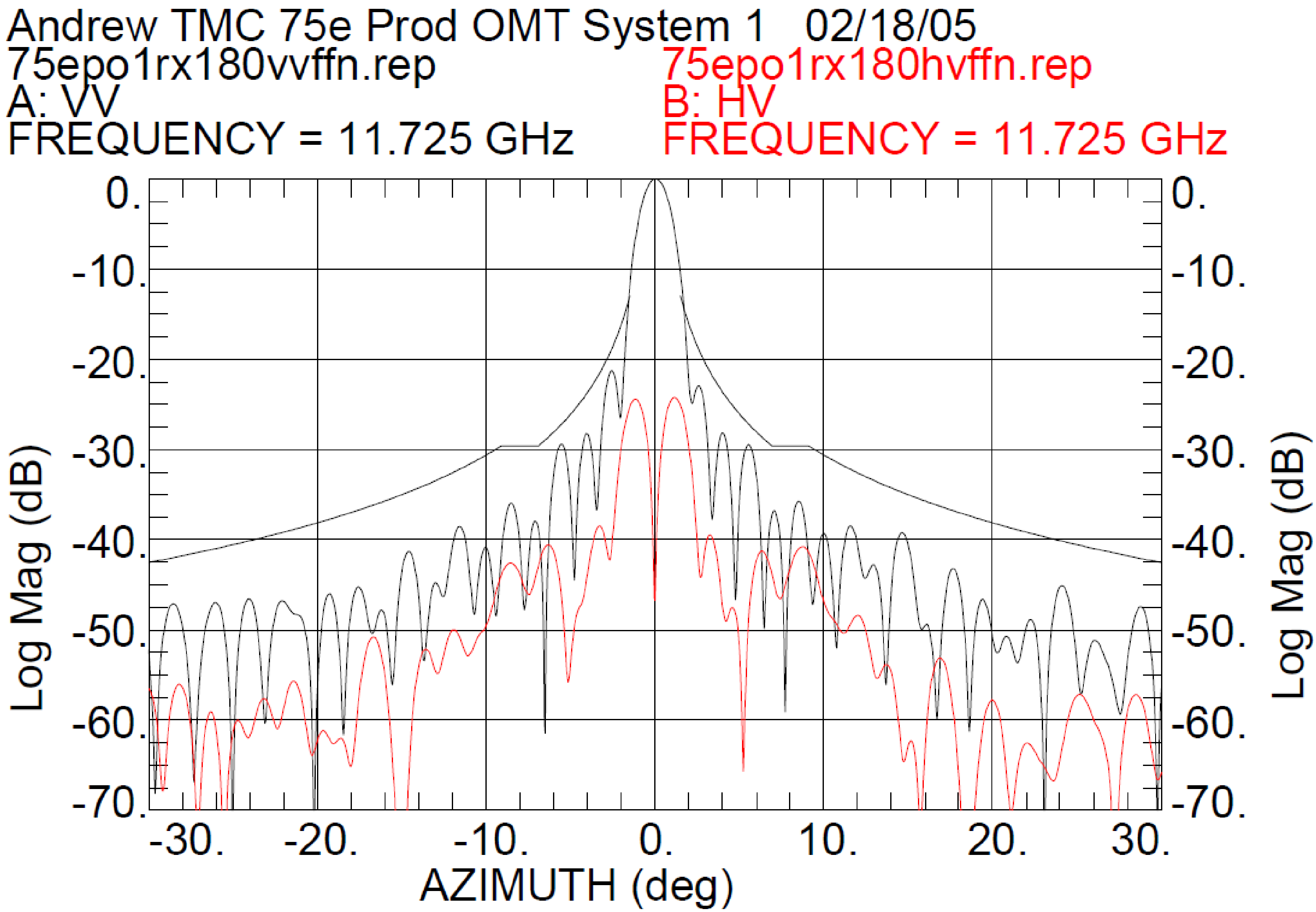
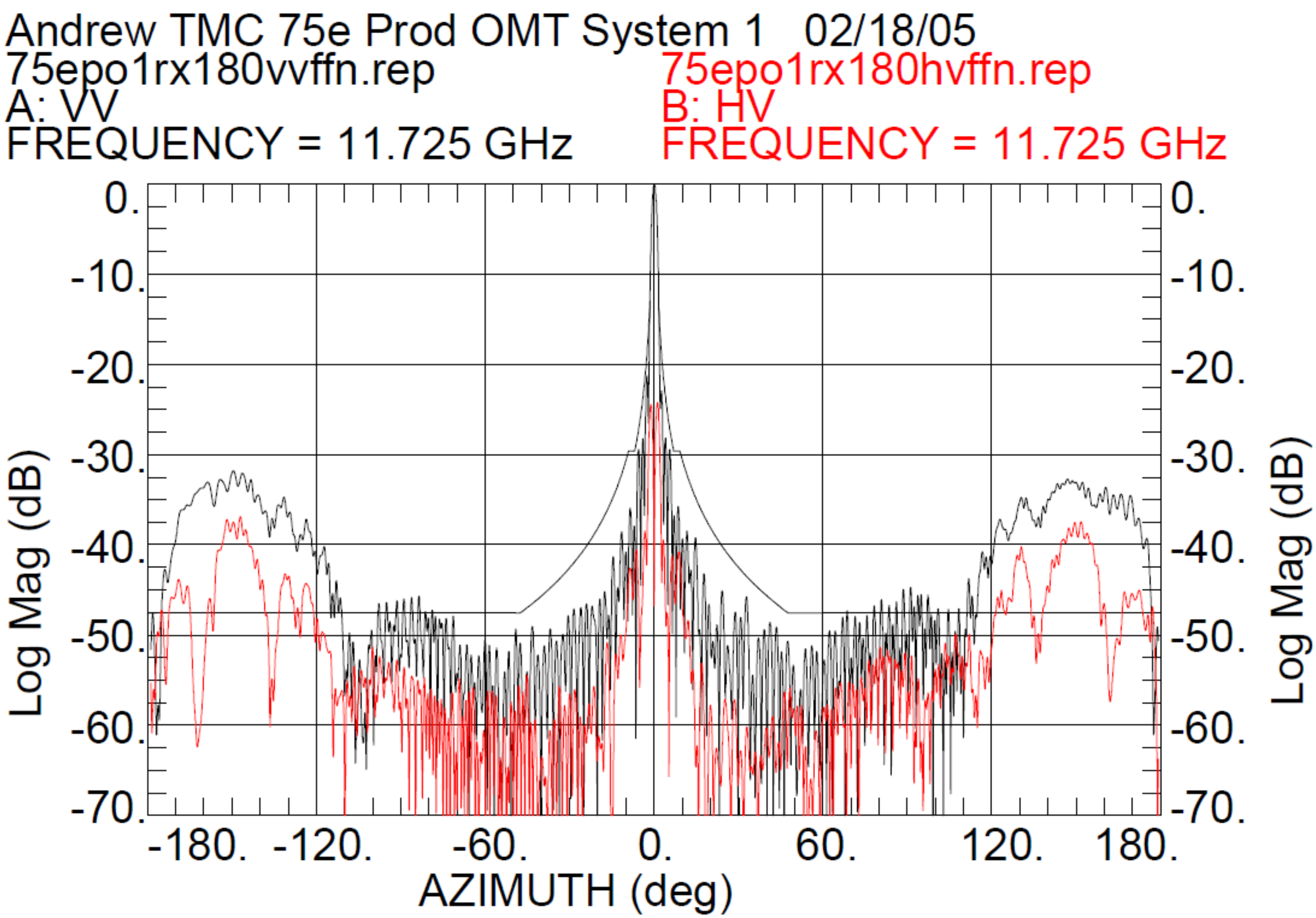


Figure 21 – Antenna Azimuth Axis +/- 180° Off-Axis Receive Gain at 11.725 GHz



0.75-meter Ku-band Antenna

Elevation Axis

(Perpendicular to the GSO Plane)

Receive Off-axis Antenna Patterns

+/- 6°, +/-30° and +/- 180°

Figures 22, 23 and 24

Figure 22 – Antenna Elevation Axis +/- 6° Off-Axis Receive Gain at 11.725 GHz

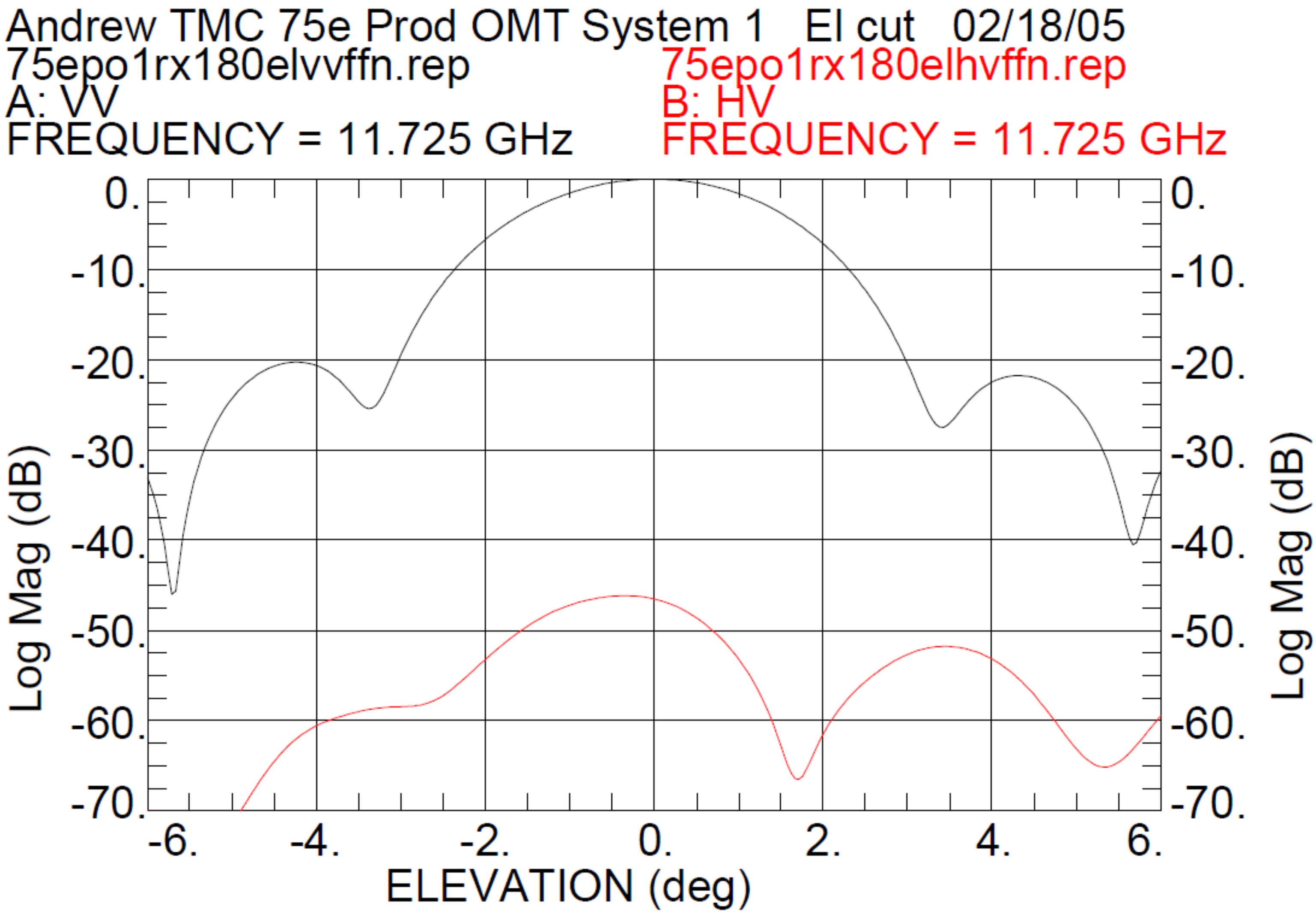


Figure 23 – Antenna Elevation Axis +/- 30° Off-Axis Receive Gain at 11.725 GHz

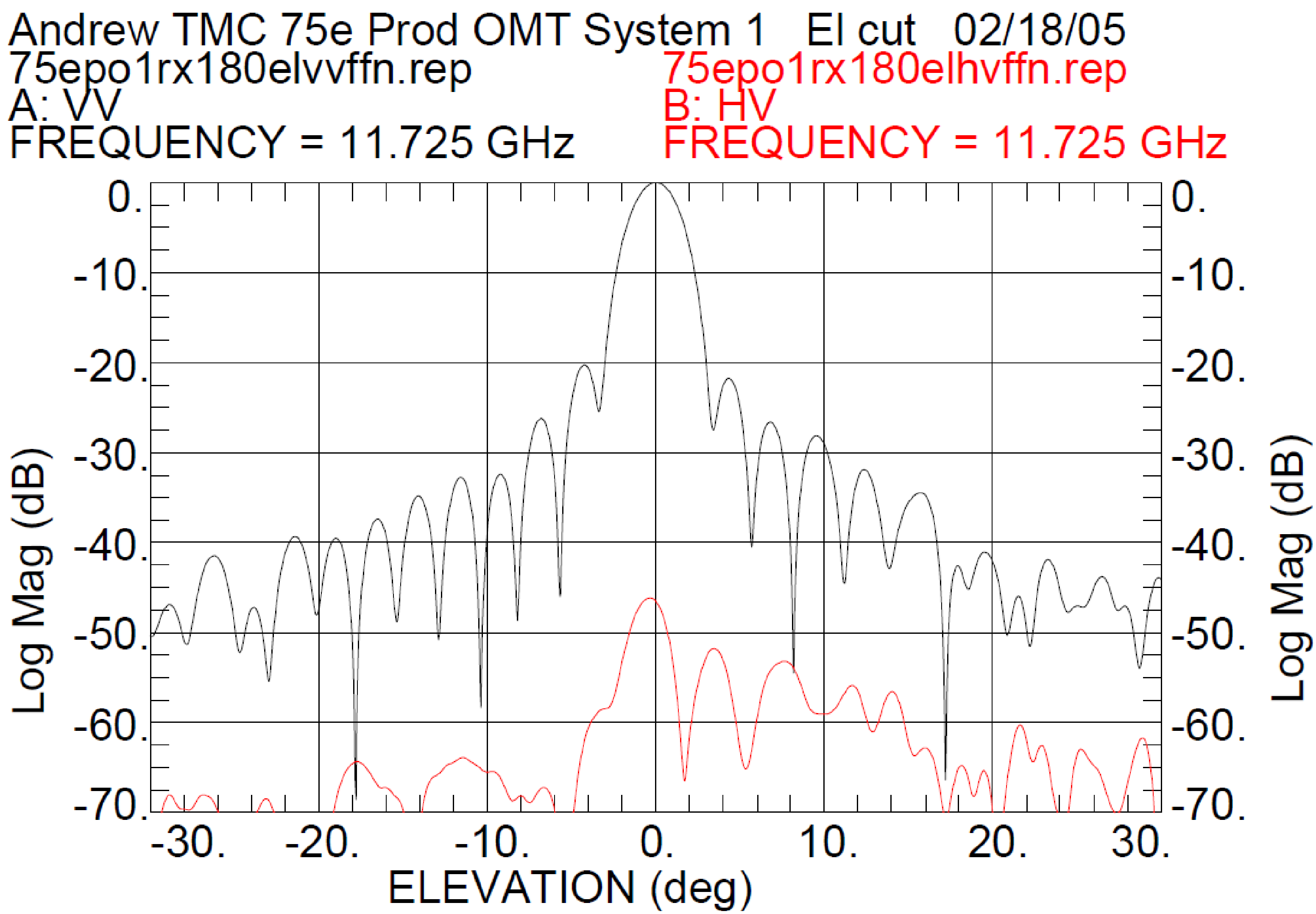


Figure 24 – Antenna Elevation Axis +/- 180° Off-Axis Receive Gain at 11.725 GHz