

EXHIBIT A

Technical Annex

Row 44 proposes to augment its operation by adding additional space segment capacity on the AMC-1 satellite at 129.15 degrees Western Longitude. Similar to Row 44's existing authorization covering AMC-2, AMC-9, SES-1, and SES-6, a variety of EIRP density-skew limits are proposed. Table 1 depicts the proposed relationships between EIRP, emission bandwidth, and skew limit.

Table 1 - Proposed Authorization

EIRP Density and TX Power (1.024 MHz emission bandwidth)	EIRP Density and TX Power (2.048 MHz emission bandwidth)	EIRP Density and TX Power (4.096 MHz emission bandwidth)	Skew Limit
16.2 dBW/ 4 kHz (41.5 dBm TX power)	16.2 dBW/ 4 kHz (44.5 dBm TX power)	13.7 dBW/ 4 kHz (45.0 dBm TX power)	25 degrees
14.7 dBW/ 4 kHz (40.0 dBm TX power)	14.7 dBW/ 4 kHz (43.0 dBm TX power)	13.7 dBW/ 4 kHz (45.0 dBm TX power)	35 degrees
13.7 dBW/ 4 kHz (39.0 dBm TX power)	13.7 dBW/ 4 kHz (42.0 dBm TX power)	13.7 dBW/ 4 kHz (45.0 dBm TX power)	45 degrees
11.9 dBW/ 4 kHz (37.2 dBm TX power)	11.9 dBW/ 4 kHz (40.2 dBm TX power)	11.9 dBW/ 4 kHz (43.2 dBm TX power)	55 degrees

Implementing the various permutations of EIRP, emission bandwidth, and skew limit will allow Row 44 to transmit at a variety of combinations of EIRP, emission bandwidths and skew limits, thereby optimizing bandwidth usage, and providing the aggregate of users more consistent data rates than without such optimization, all within the scope of the maximum operating parameters currently authorized for other satellite points of communication in its existing FCC license (Call Sign E080100; FCC File No. SES-MFS-20150318-00164).

In all cases of skew limits of 25, 35, 45, or 55 degrees, Row 44 shall comply with the EIRP density limits established in Section 25.227.

This Exhibit includes sample link budgets pertaining to each of the combinations of EIRP, emission bandwidth, and skew limit. These are located at the end of this Exhibit A. Note that in all cases, the link budgets for 1.024 MHz emission bandwidths apply to those for 2.048 MHz as well, as the EIRP densities are the identical, and link performance subsequently the same.

EIRP Density Plots

Horizontal Polarization; 1.024 and 2.048 MHz Bandwidths

The EIRP spectral densities shown in Figures A-1 to A-2, A-3 to A-4, and A-5 to A-6 for 14.05 GHz, 14.25 GHz, and 14.47 GHz respectively, all with horizontal polarization, indicate FCC co-polarization emission compliance according to FCC 25.227. Collectively, each plot addresses configurations of:

25° Skew:

41.5 dBm transmit power in a 1.024 MHz bandwidth, 44.5 dBm transmit power in a 2.048 MHz bandwidth

35° Skew:

40.0 dBm transmit power in a 1.024 MHz bandwidth, 43.0 dBm transmit power in a 2.048 MHz bandwidth

45° Skew:

39.0 dBm transmit power in a 1.024 MHz bandwidth, 42.0 dBm transmit power in a 2.048 MHz bandwidth

55° Skew:

37.2 dBm transmit power in a 1.024 MHz bandwidth, 40.2 dBm transmit power in a 2.048 MHz bandwidth

Figures A-1, A-3, and A-5 depict the EIRP spectral density in dBW/4kHz for a ± 10 degree azimuth axis along with the associated Section 25.227 compliance mask. Figures A-2, A-4, and A-6 depict the EIRP spectral density in dBW/4kHz for a ± 180 degree expanded azimuth axis along with the associated Section 25.227 compliance mask.

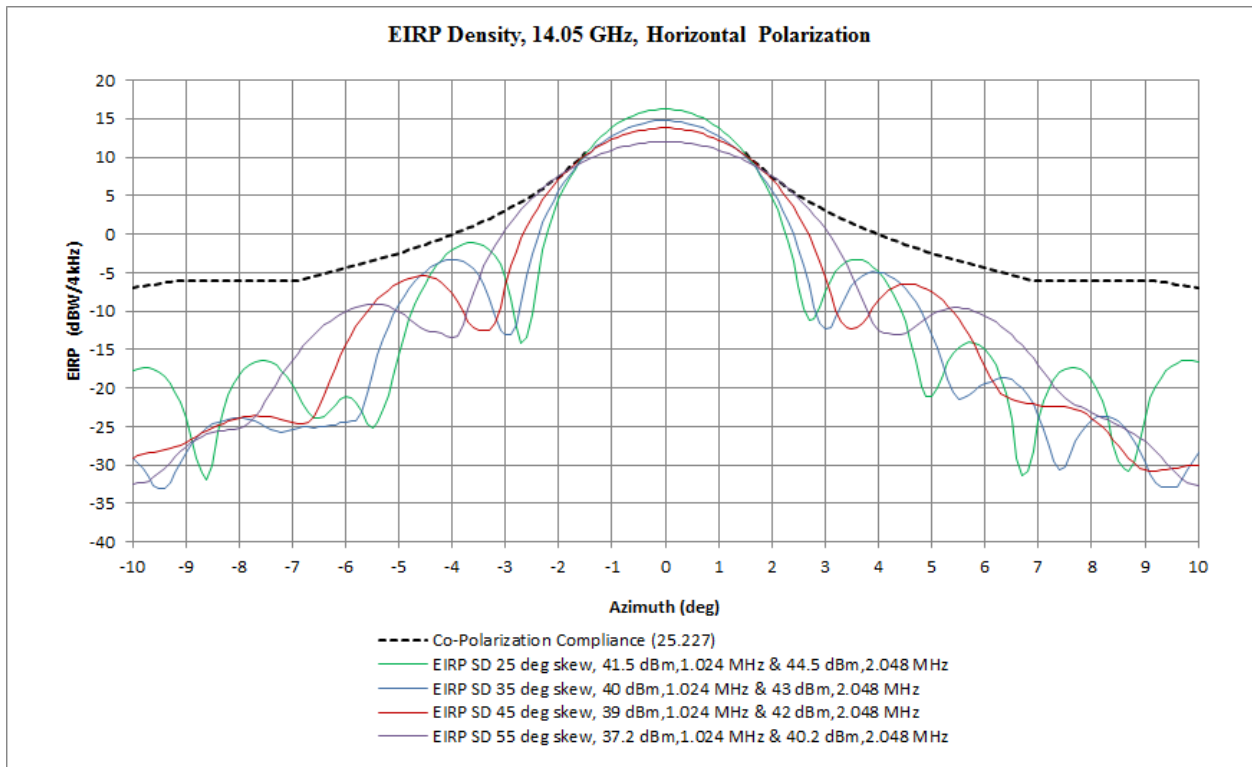


Figure A- 1 EIRP Spectral Density in dBW/4 kHz for 14.05 GHz (Horizontal Polarization)
(25.227 Sidelobe Compliance)

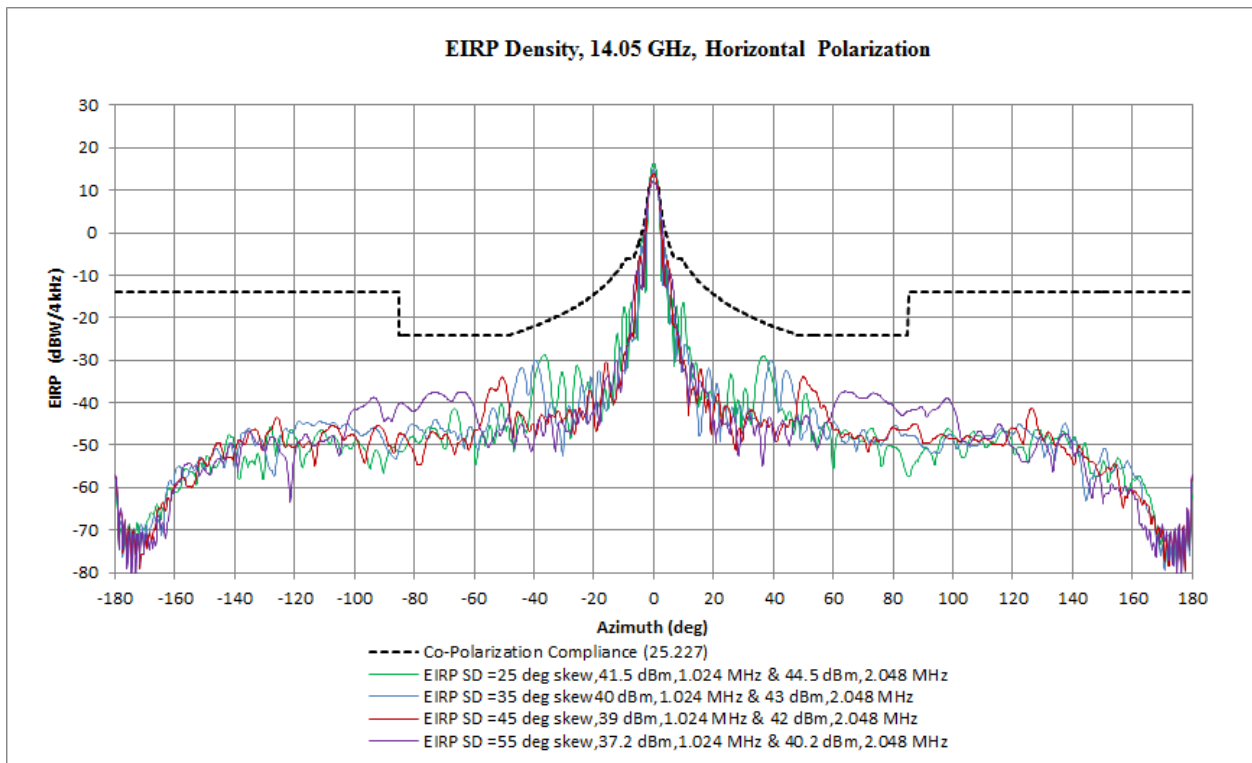


Figure A-2 EIRP Spectral Density in dBW/4 kHz for 14.05 GHz (Horizontal Polarization)
(25.227 Expanded Azimuth)

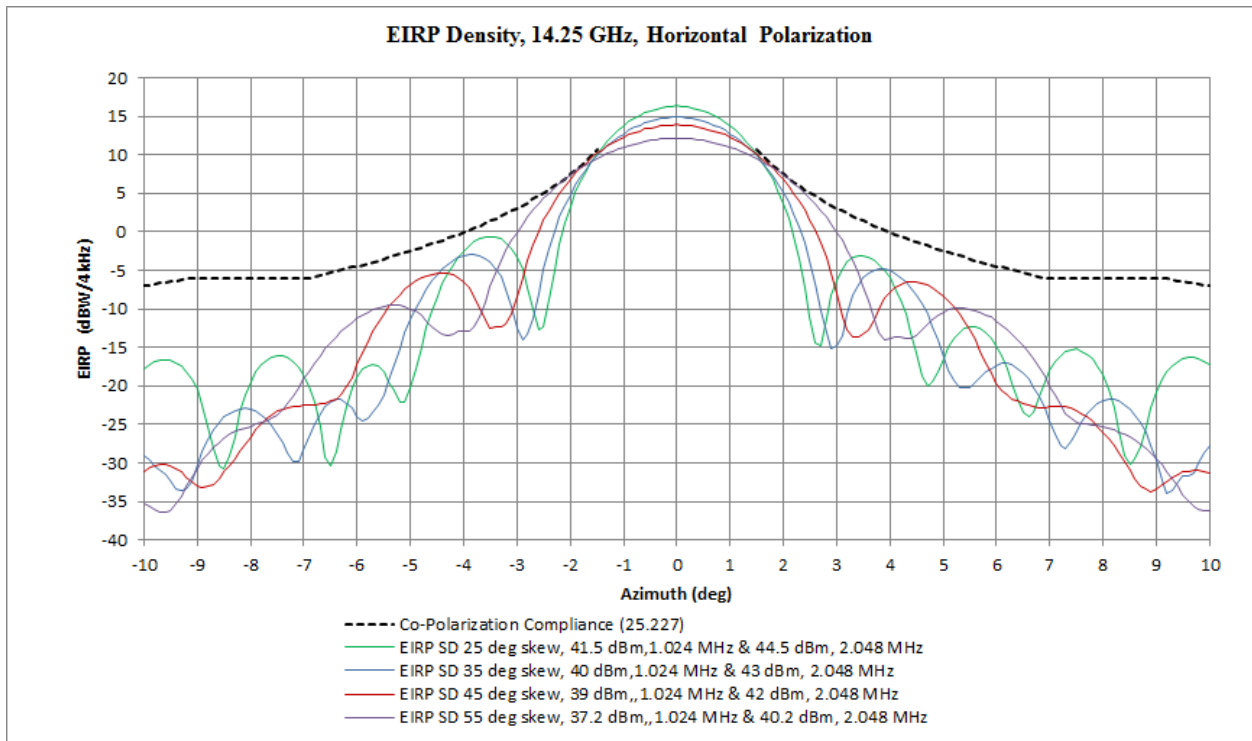


Figure A-3 EIRP Spectral Density in dBW/4 kHz for 14.25 GHz (Horizontal Polarization)
(25.227 Sidelobe Compliance)

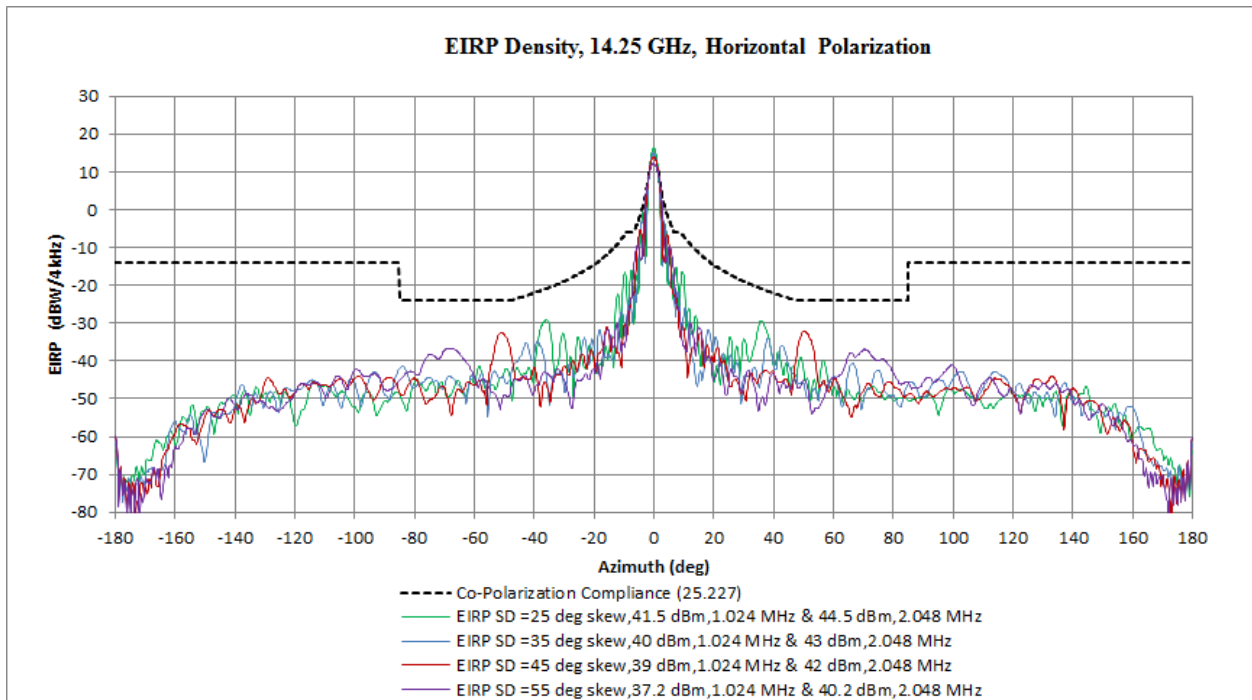


Figure A-4 EIRP Spectral Density in dBW/4 kHz for 14.25 GHz (Horizontal Polarization)
(25.227 Expanded Azimuth)

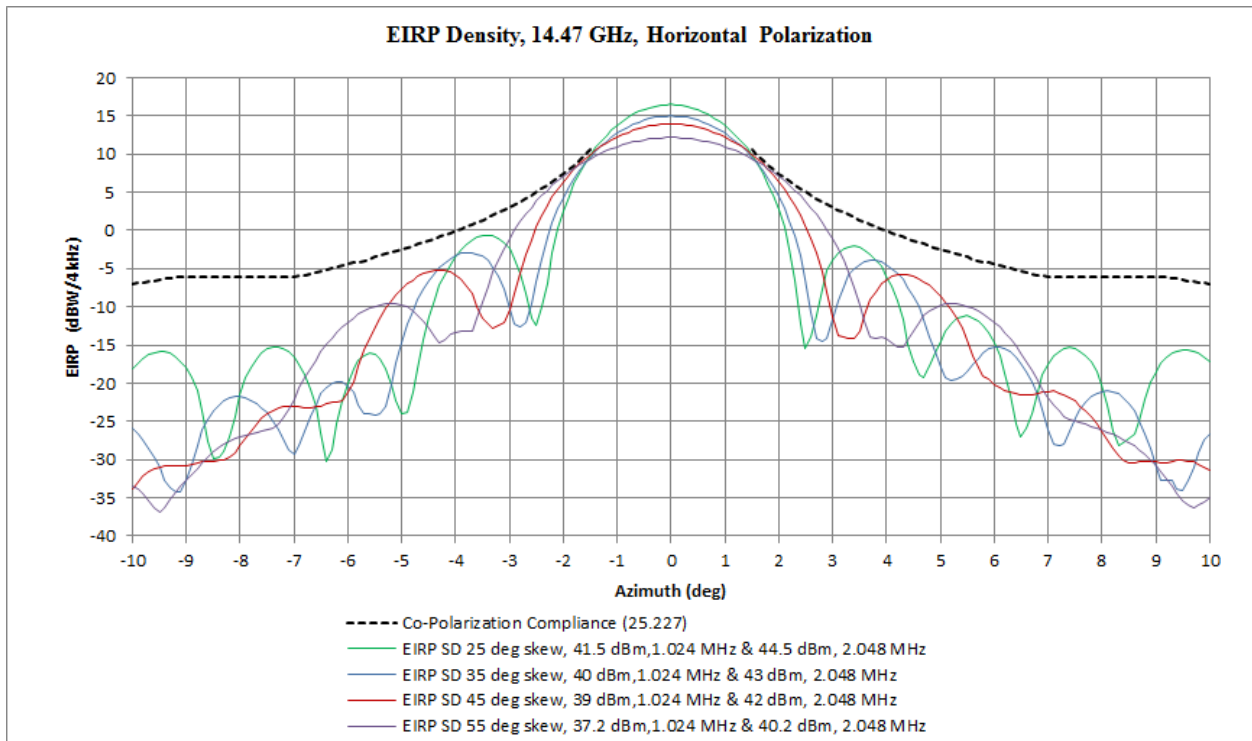


Figure A-5 EIRP Spectral Density in dBW/4 kHz for 14.47 GHz (Horizontal Polarization)
(25.227 Sidelobe Compliance)

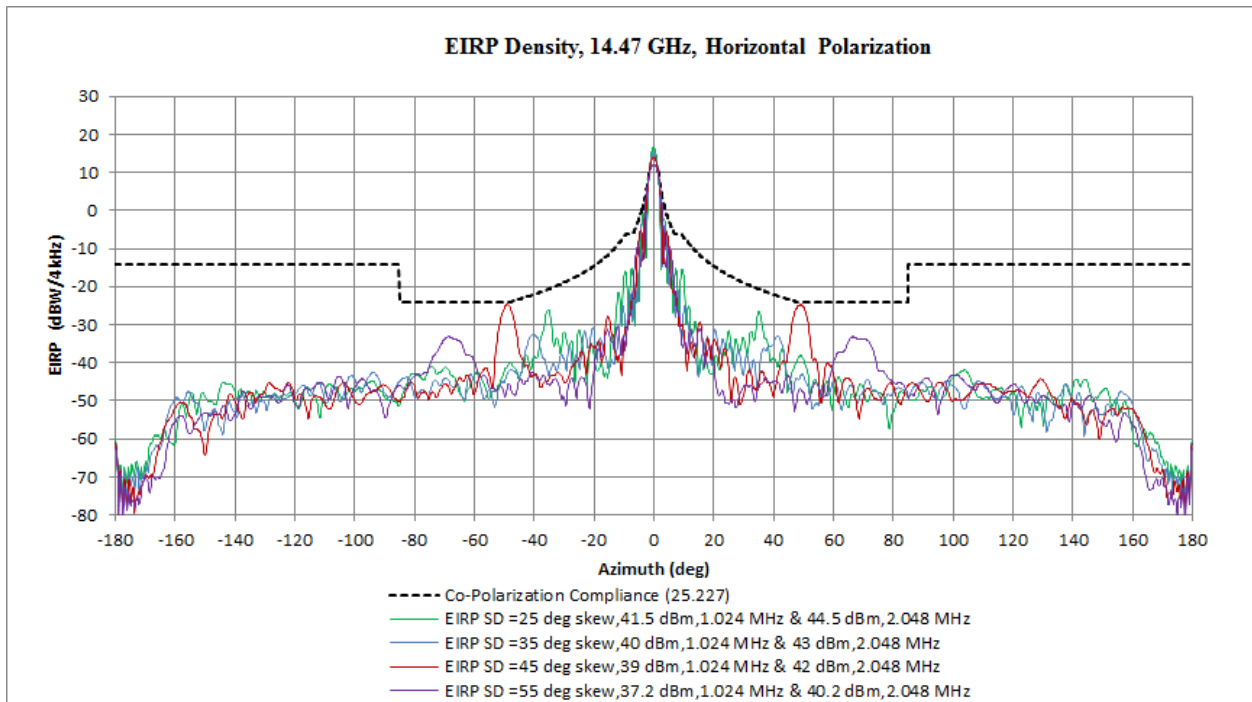


Figure A-6 EIRP Spectral Density in dBW/4 kHz for 14.47 GHz (Horizontal Polarization)
(25.227 Expanded Azimuth)

Vertical Polarization; 1.024 and 2.048 MHz Bandwidths

The EIRP spectral densities shown in Figures A-7 to A-8, A-9 to A-10, and A-11 to A-12 for 14.05 GHz, 14.25 GHz, and 14.47 GHz respectively, all with vertical polarization, indicate FCC co-polarization emission compliance according to FCC 25.227. Collectively, each plot addresses configurations of:

25° Skew:

41.5 dBm transmit power in a 1.024 MHz bandwidth, 44.5 dBm transmit power in a 2.048 MHz bandwidth

35° Skew:

40.0 dBm transmit power in a 1.024 MHz bandwidth, 43.0 dBm transmit power in a 2.048 MHz bandwidth

45° Skew:

39.0 dBm transmit power in a 1.024 MHz bandwidth, 42.0 dBm transmit power in a 2.048 MHz bandwidth

55° Skew:

37.2 dBm transmit power in a 1.024 MHz bandwidth, 40.2 dBm transmit power in a 2.048 MHz bandwidth

Figures A-7, A-9, and A-11 depict the EIRP spectral density in dBW/4kHz for a ± 10 degree azimuth axis along with the associated Section 25.227 compliance mask. Figures A-8, A-10, and A-12 depict the EIRP spectral density in dBW/4kHz for a ± 180 degree expanded azimuth axis along with the associated Section 25.227 compliance mask.

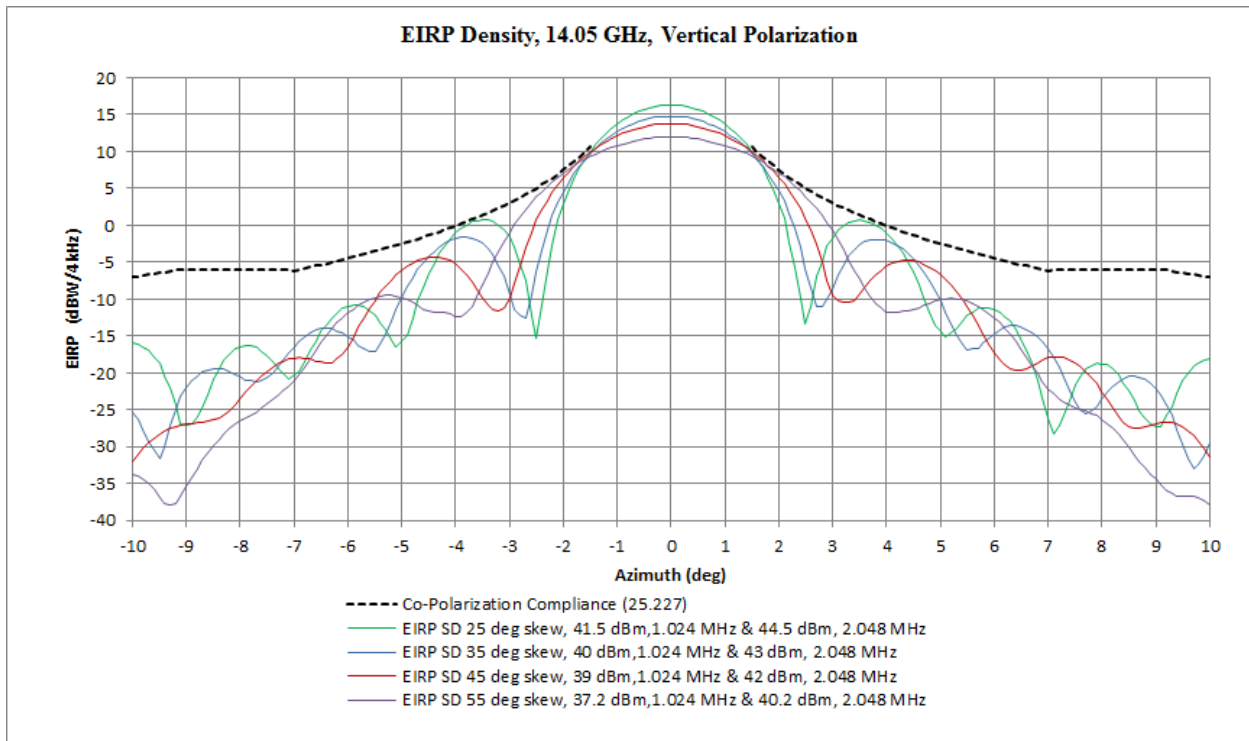


Figure A-7 EIRP Spectral Density in dBW/4 kHz for 14.05 GHz (Vertical Polarization)
(25.227 Sidelobe Compliance)

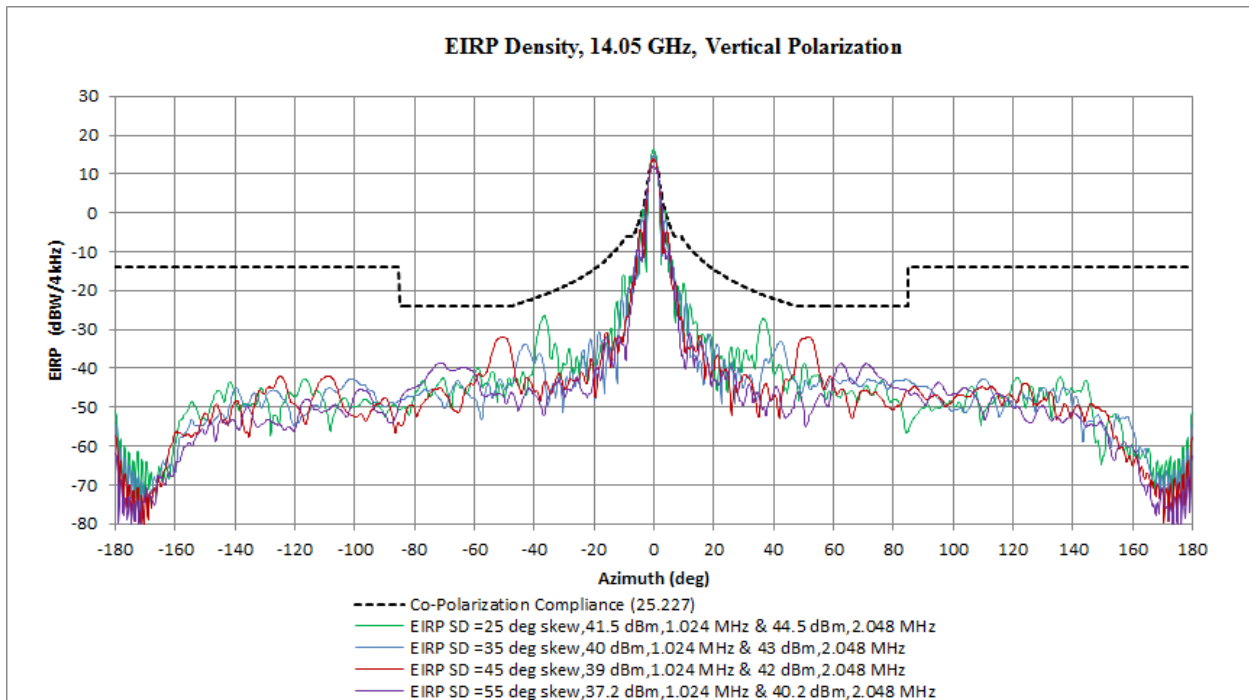


Figure A-8 EIRP Spectral Density in dBW/4 kHz for 14.05 GHz (Vertical Polarization)
(25.227 Expanded Azimuth)

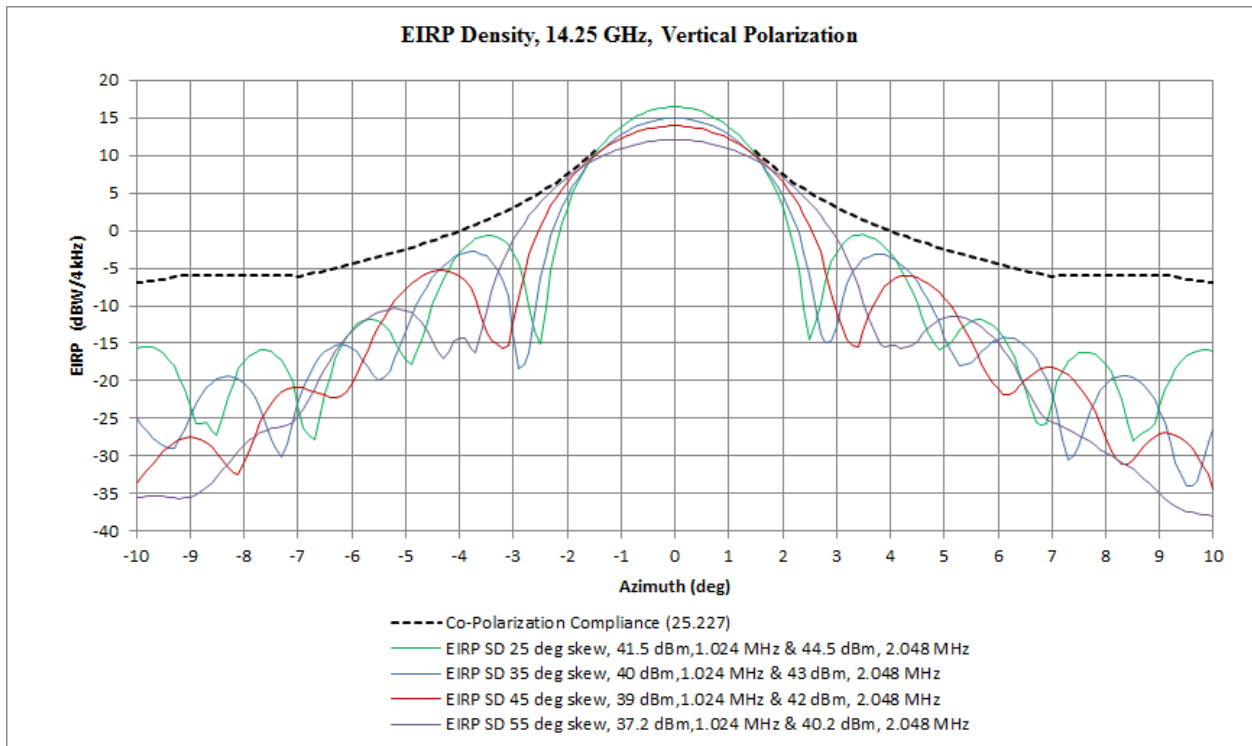


Figure A-9 EIRP Spectral Density in dBW/4 kHz for 14.25 GHz (Vertical Polarization)
(25.227 Sidelobe Compliance)

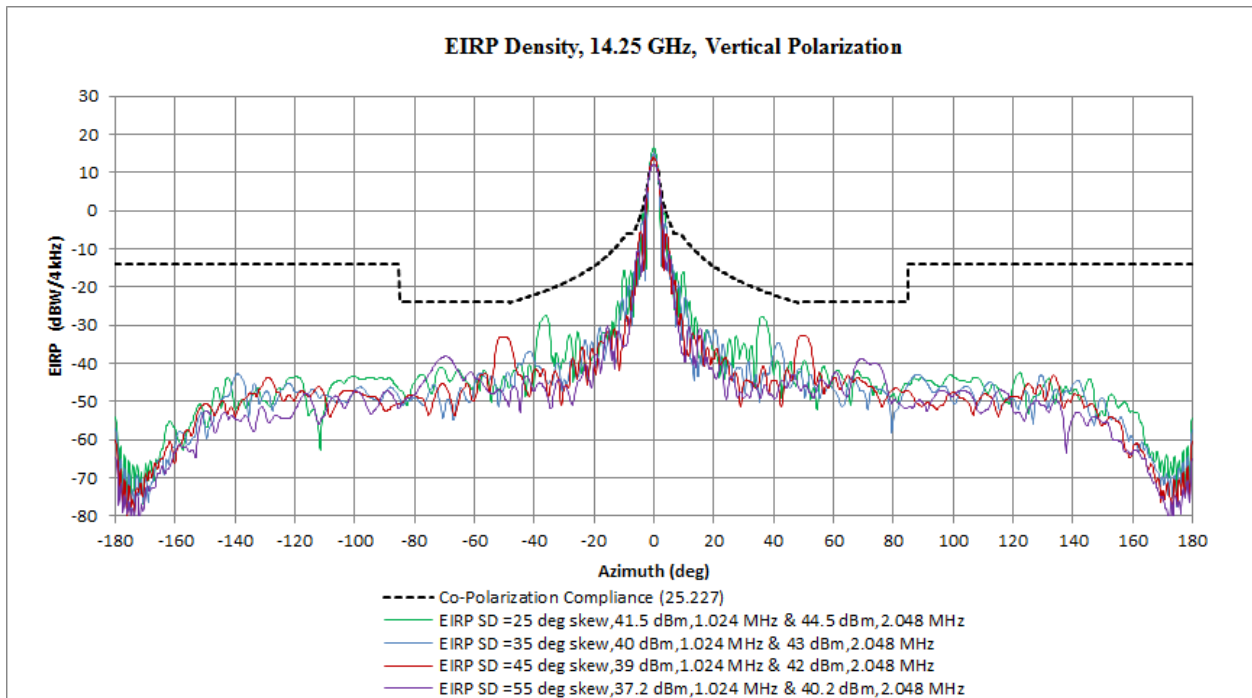


Figure A-10 EIRP Spectral Density in dBW/4 kHz for 14.25 GHz (Vertical Polarization)
(25.227 Expanded Azimuth)

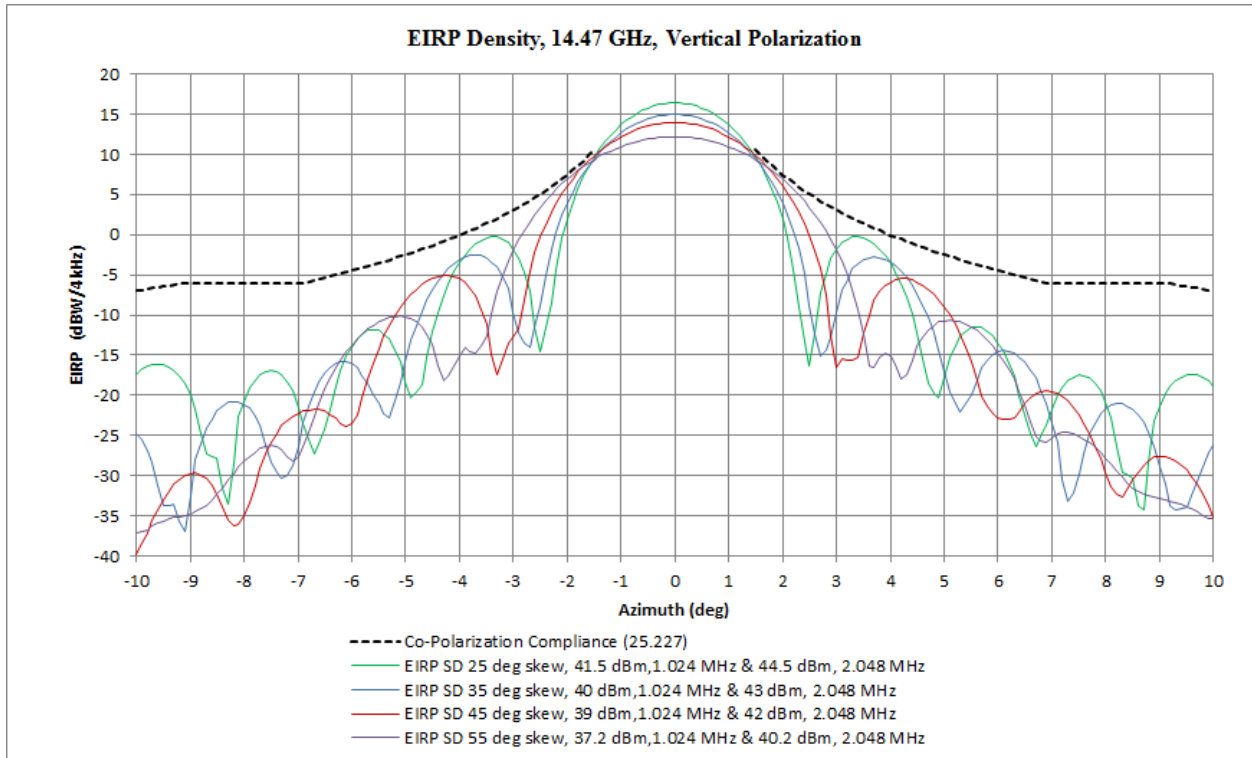


Figure A-11 EIRP Spectral Density in dBW/4 kHz for 14.47 GHz (Vertical Polarization)
(25.227 Sidelobe Compliance)

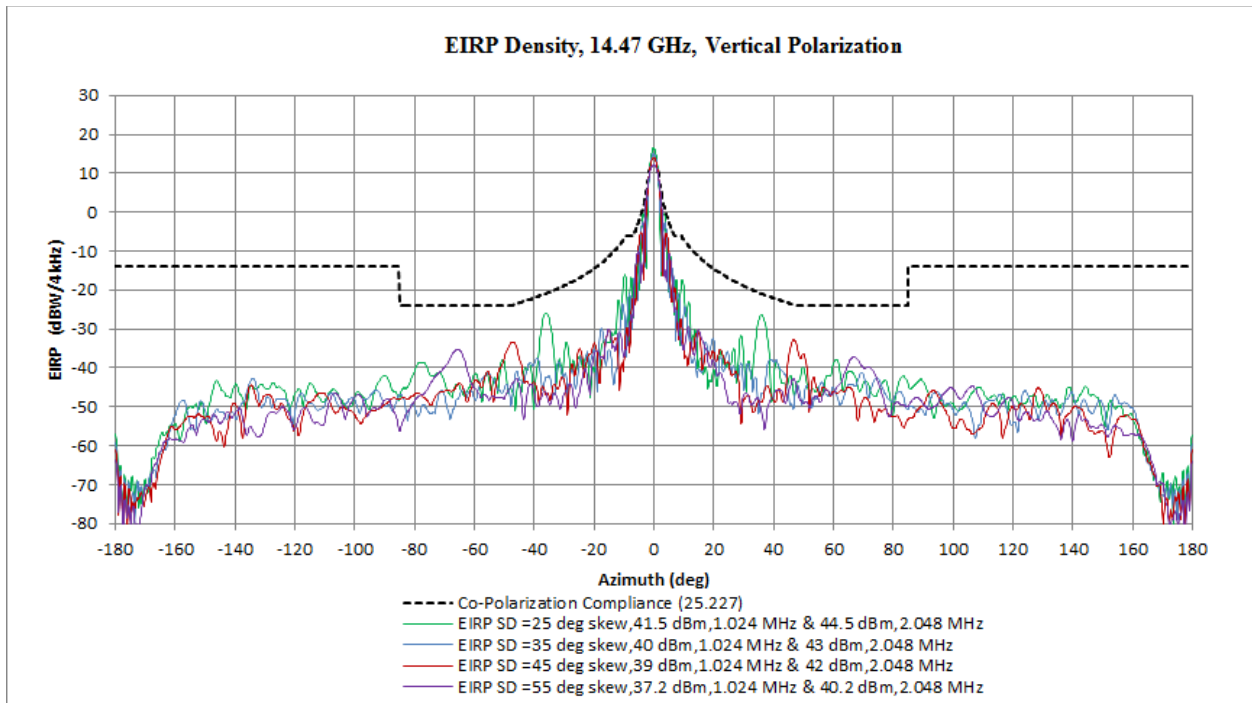


Figure A-12 EIRP Spectral Density in dBW/4 kHz for 14.47 GHz (Vertical Polarization)
(25.227 Expanded Azimuth)

Horizontal Polarization; 4.096 MHz Bandwidth

The EIRP spectral densities shown in Figures A-13 to A-14, A-15 to A-16, and A-17 to A-18 for 14.05 GHz, 14.25 GHz, and 14.47 GHz respectively, all with horizontal polarization, indicate FCC co-polarization emission compliance according to FCC 25.227. The plots correspond to the following:

25° Skew:

45.0 dBm transmit power in a 4.096 MHz bandwidth

35° Skew:

45.0 dBm transmit power in a 4.096 MHz bandwidth

45° Skew:

45.0 dBm transmit power in a 4.096 MHz bandwidth

55° Skew:

43.2 dBm transmit power in a 4.096 MHz bandwidth

Figures A-13, A-15, and A-17 depict the EIRP spectral density in dBW/4kHz for a ± 10 degree azimuth axis along with the associated Section 25.227 compliance mask. Figures A-14, A-16, and A-18 depict the EIRP spectral density in dBW/4kHz for a ± 180 degree expanded azimuth axis along with the associated Section 25.227 compliance mask.

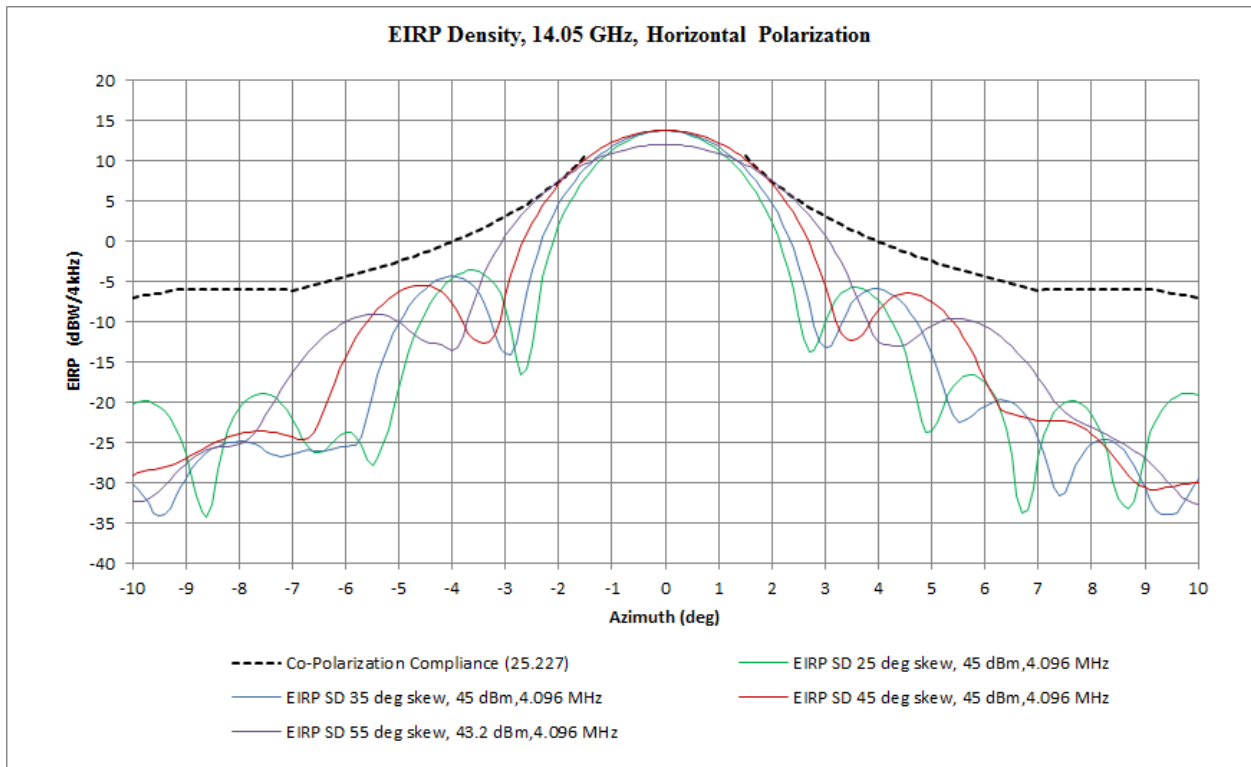


Figure A-13 EIRP Spectral Density in dBW/4 kHz for 14.05 GHz with 4.096 MHz (Horizontal Polarization) (25.227 Sidelobe Compliance)

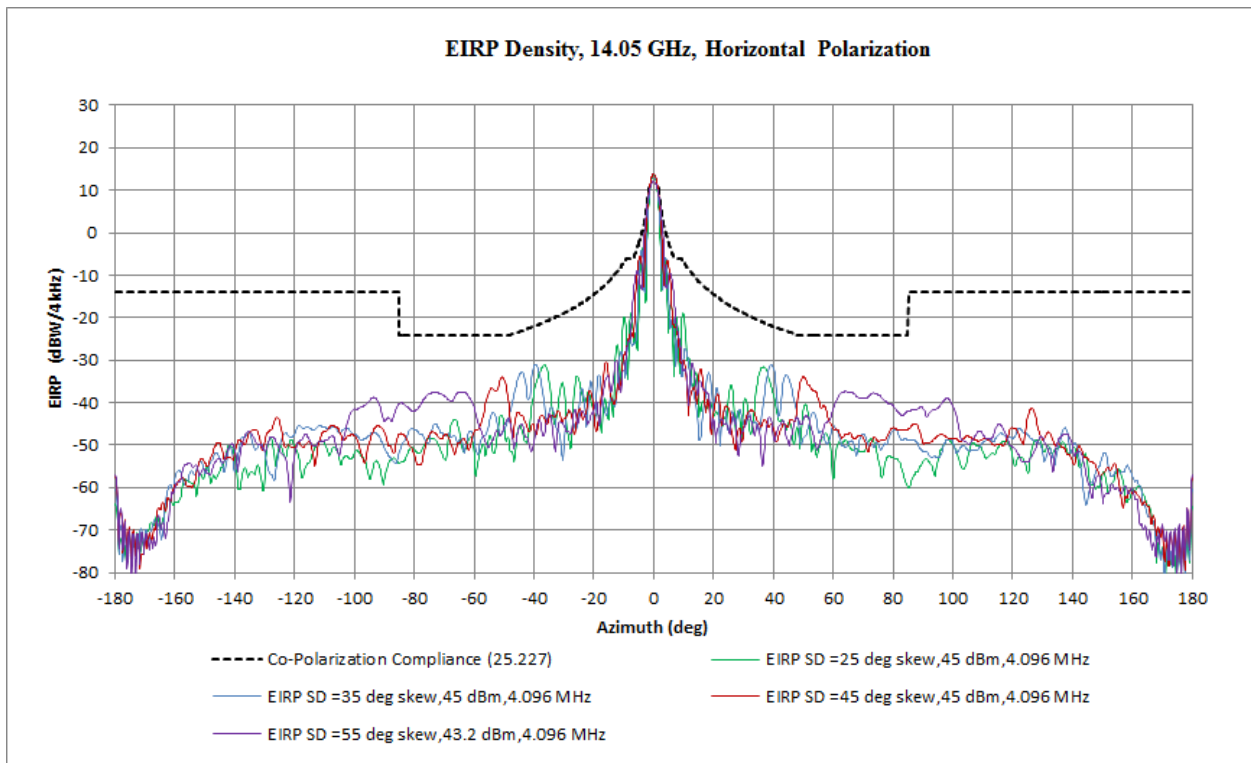


Figure A-14 EIRP Spectral Density in dBW/4 kHz for 14.05 GHz with 4.096 MHz (Horizontal Polarization) (25.227 Expanded Azimuth)

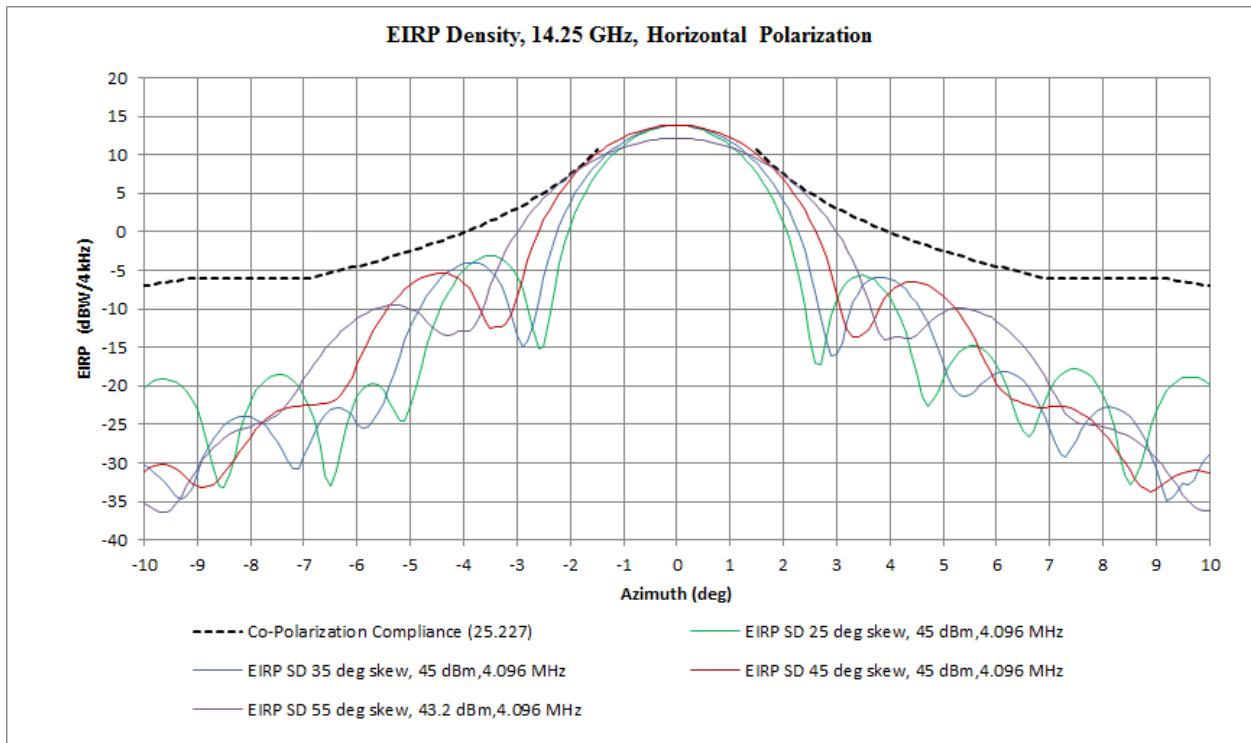


Figure A-15 EIRP Spectral Density in dBW/4 kHz for 14.25 GHz with 4.096 MHz (Horizontal Polarization) (25.227 Sidelobe Compliance)

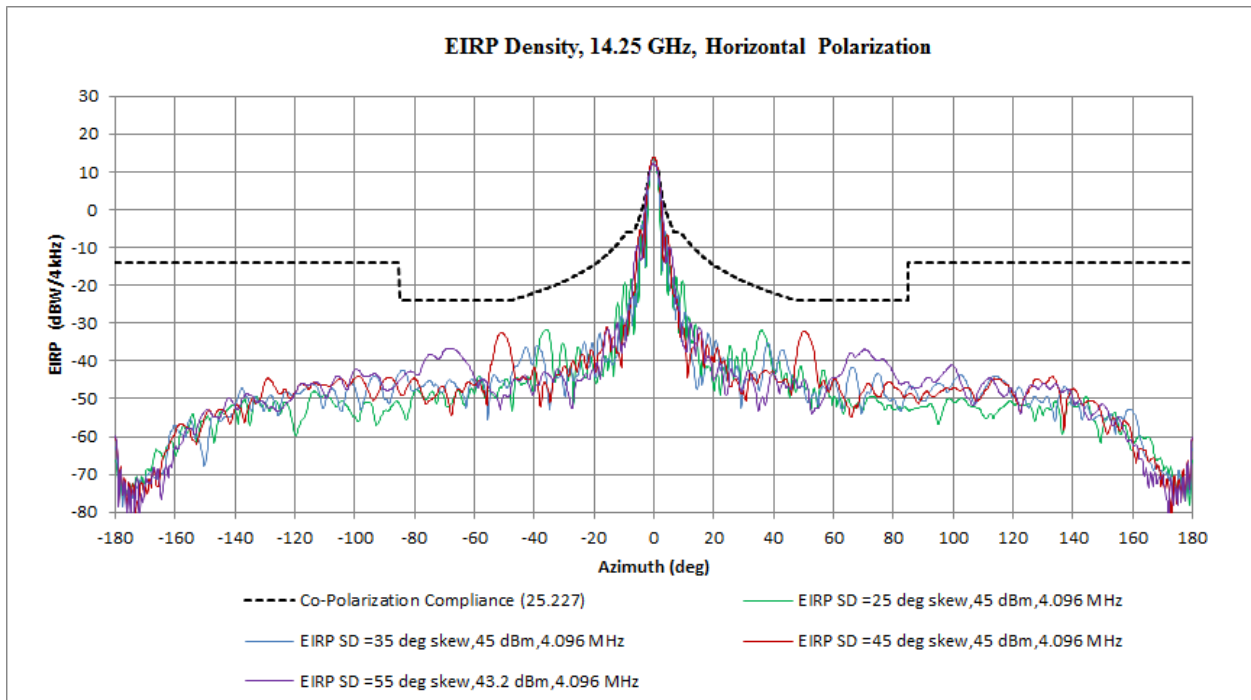


Figure A-16 EIRP Spectral Density in dBW/4 kHz for 14.25 GHz with 4.096 MHz (Horizontal Polarization) (25.227 Expanded Azimuth)

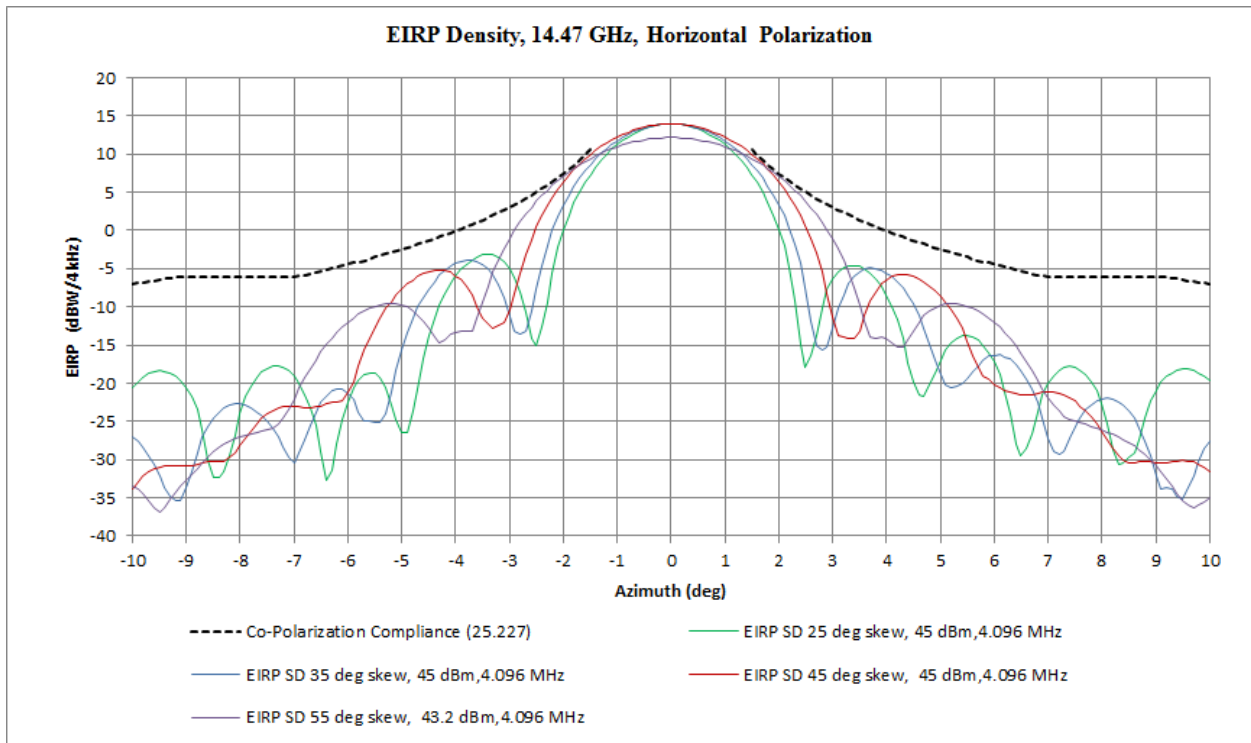


Figure A-17 EIRP Spectral Density in dBW/4 kHz for 14.47 GHz with 4.096 MHz (Horizontal Polarization) (25.227 Sidelobe Compliance)

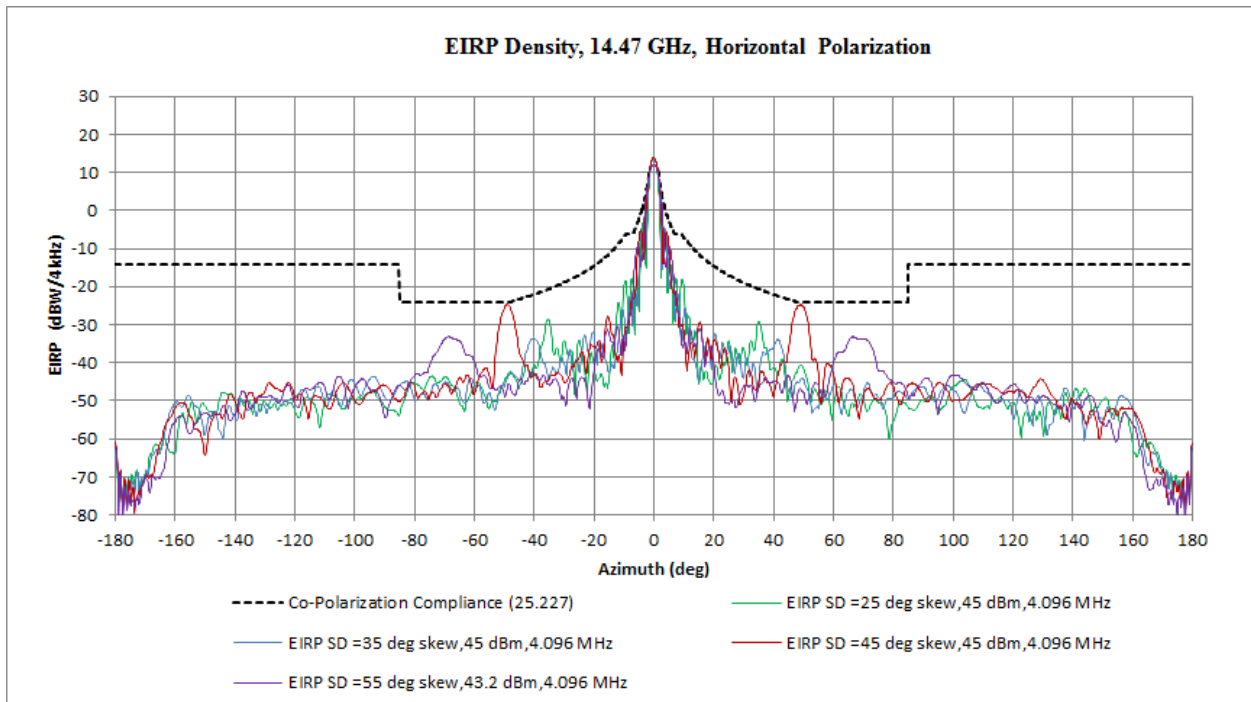


Figure A-18 EIRP Spectral Density in dBW/4 kHz for 14.47 GHz with 4.096 MHz (Horizontal Polarization) (25.227 Expanded Azimuth)

Vertical Polarization; 4.096 MHz Bandwidth

The EIRP spectral densities shown in Figures A-19 to A-20, A-21 to A-22, and A-23 to A-24 for 14.05 GHz, 14.25 GHz, and 14.47 GHz respectively, all with vertical polarization, indicate FCC co-polarization emission compliance according to FCC 25.227. The plots correspond to the following:

25° Skew:

45.0 dBm transmit power in a 4.096 MHz bandwidth

35° Skew:

45.0 dBm transmit power in a 4.096 MHz bandwidth

45° Skew:

45.0 dBm transmit power in a 4.096 MHz bandwidth

55° Skew:

43.2 dBm transmit power in a 4.096 MHz bandwidth

Figures A-19, A-21, and A-23 depict the EIRP spectral density in dBW/4kHz for a ± 10 degree azimuth axis along with the associated Section 25.227 compliance mask. Figures A-20, A-22, and A-24 depict the EIRP spectral density in dBW/4kHz for a ± 180 degree expanded azimuth axis along with the associated Section 25.227 compliance mask.

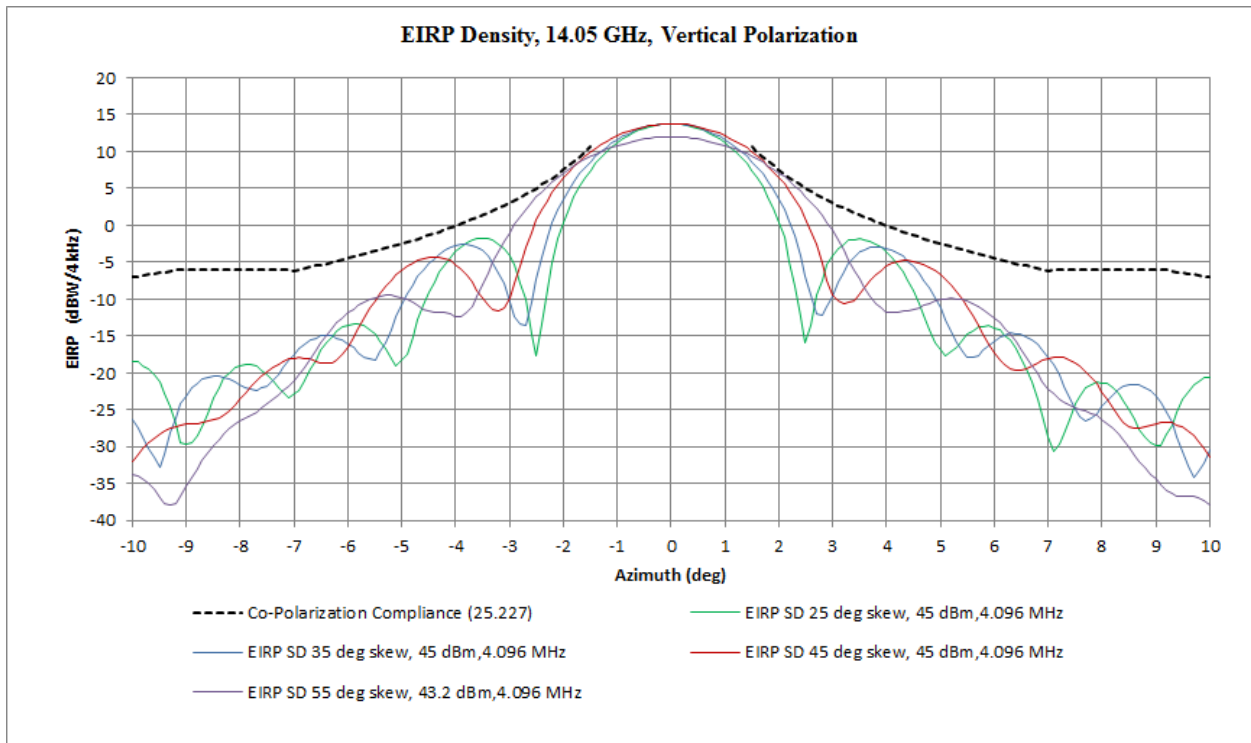


Figure A-19 EIRP Spectral Density in dBW/4 kHz for 14.05 GHz with 4.096 MHz (Vertical Polarization) (25.227 Sidelobe Compliance)

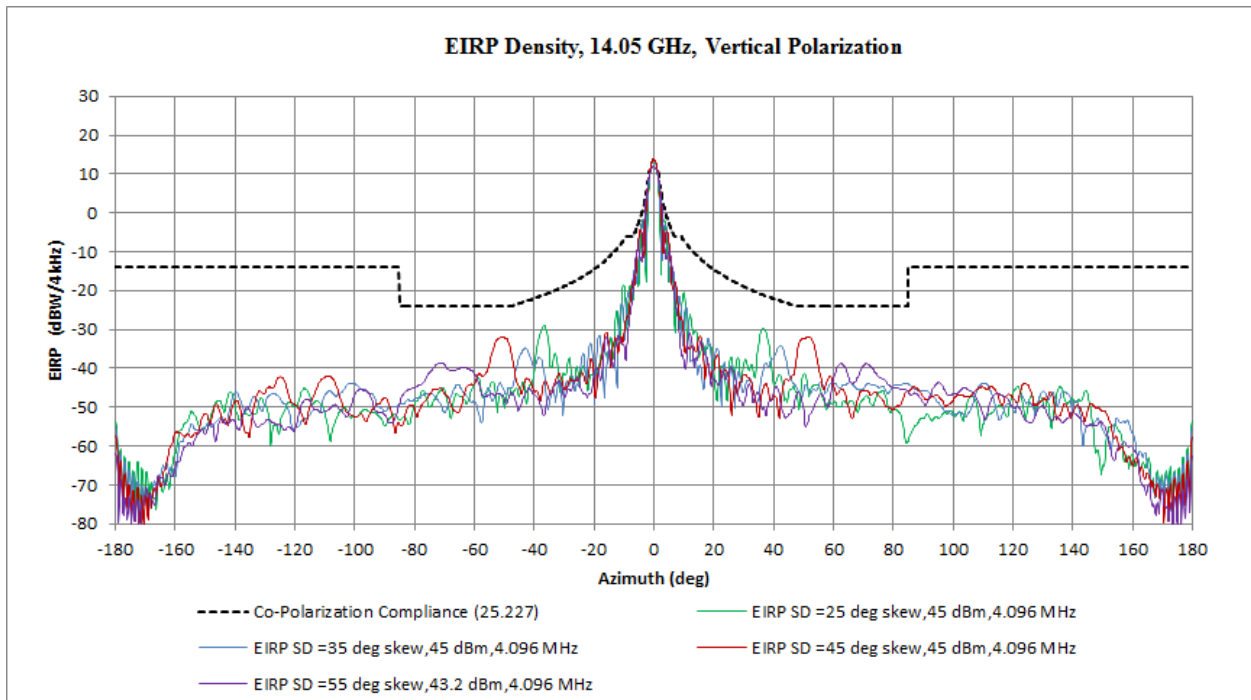


Figure A-20 EIRP Spectral Density in dBW/4 kHz for 14.05 GHz with 4.096 MHz (Vertical Polarization) (25.227 Expanded Azimuth)

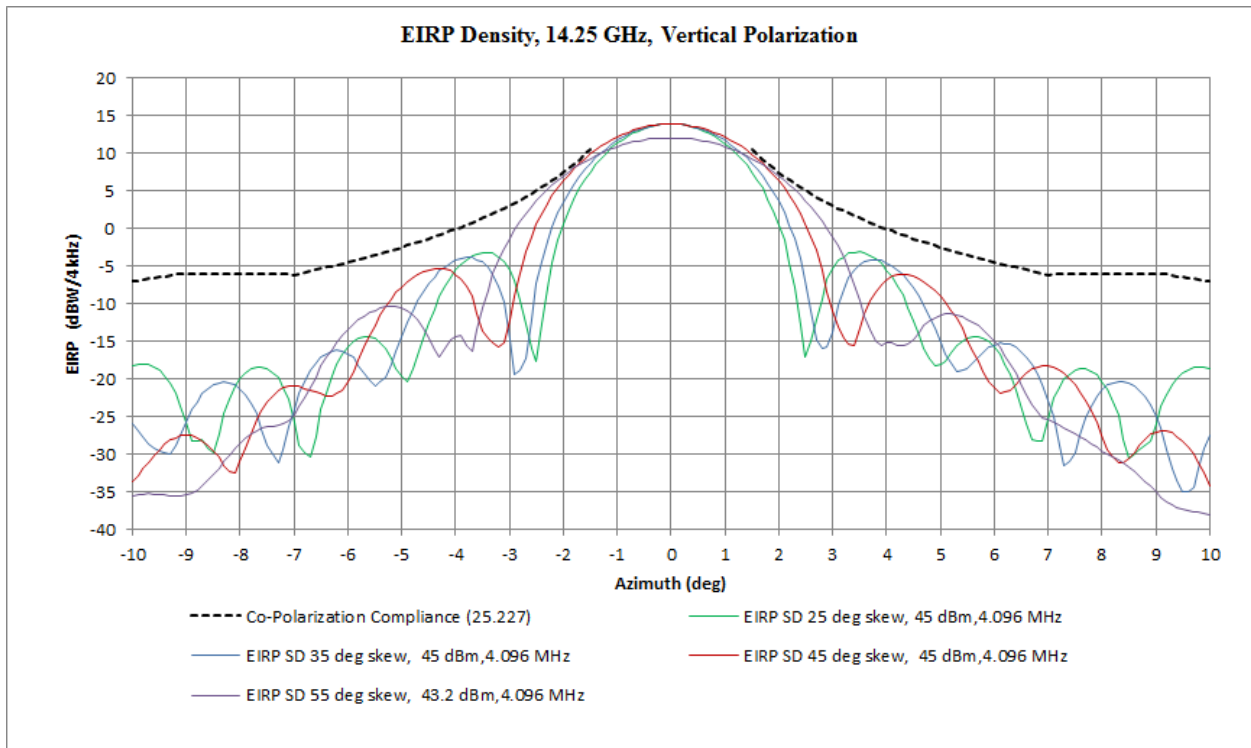


Figure A-21 EIRP Spectral Density in dBW/4 kHz for 14.25 GHz with 4.096 MHz (Vertical Polarization) (25.227 Sidelobe Compliance)

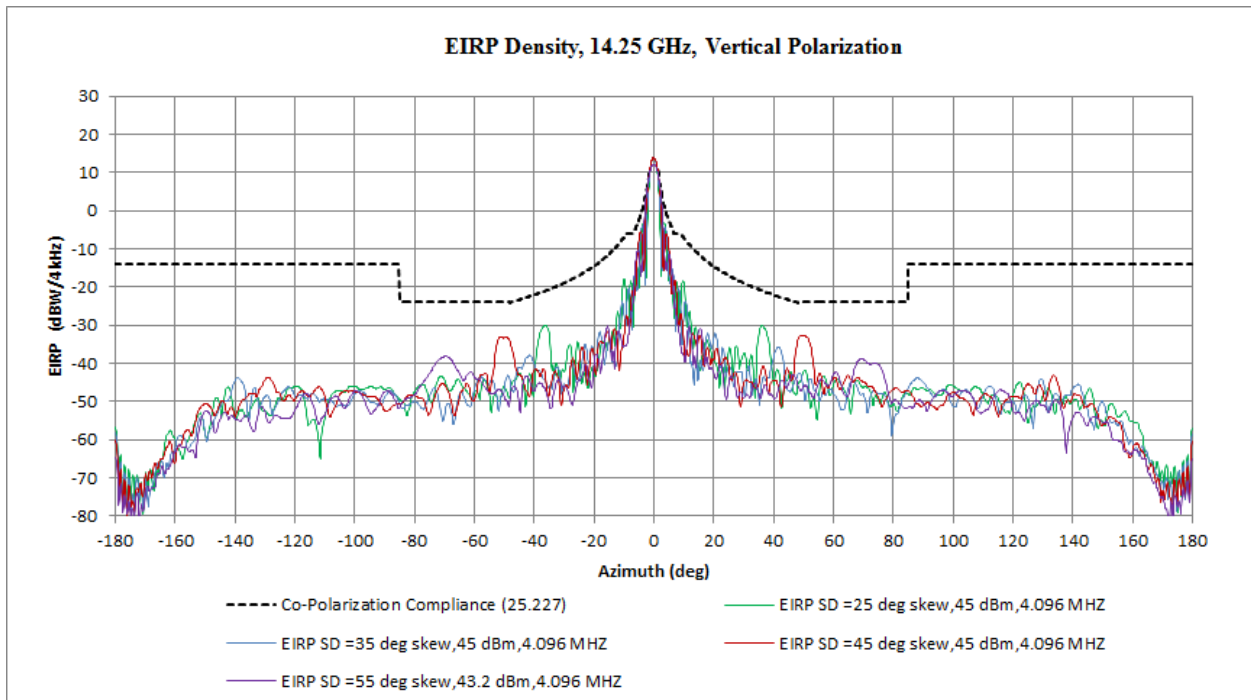


Figure A-22 EIRP Spectral Density in dBW/4 kHz for 14.25 GHz with 4.096 MHz (Vertical Polarization) (25.227 Expanded Azimuth)

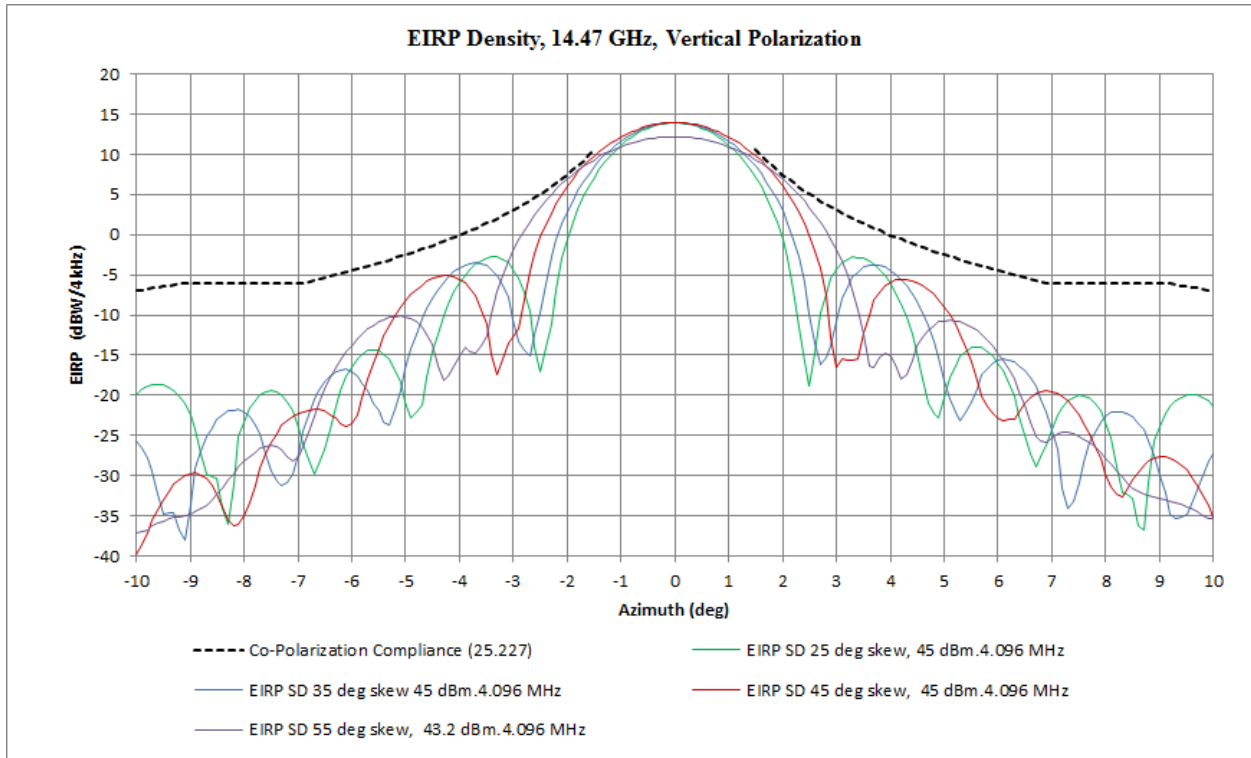


Figure A-23 EIRP Spectral Density in dBW/4 kHz for 14.47 GHz with 4.096 MHz (Vertical Polarization) (25.227 Sidelobe Compliance)

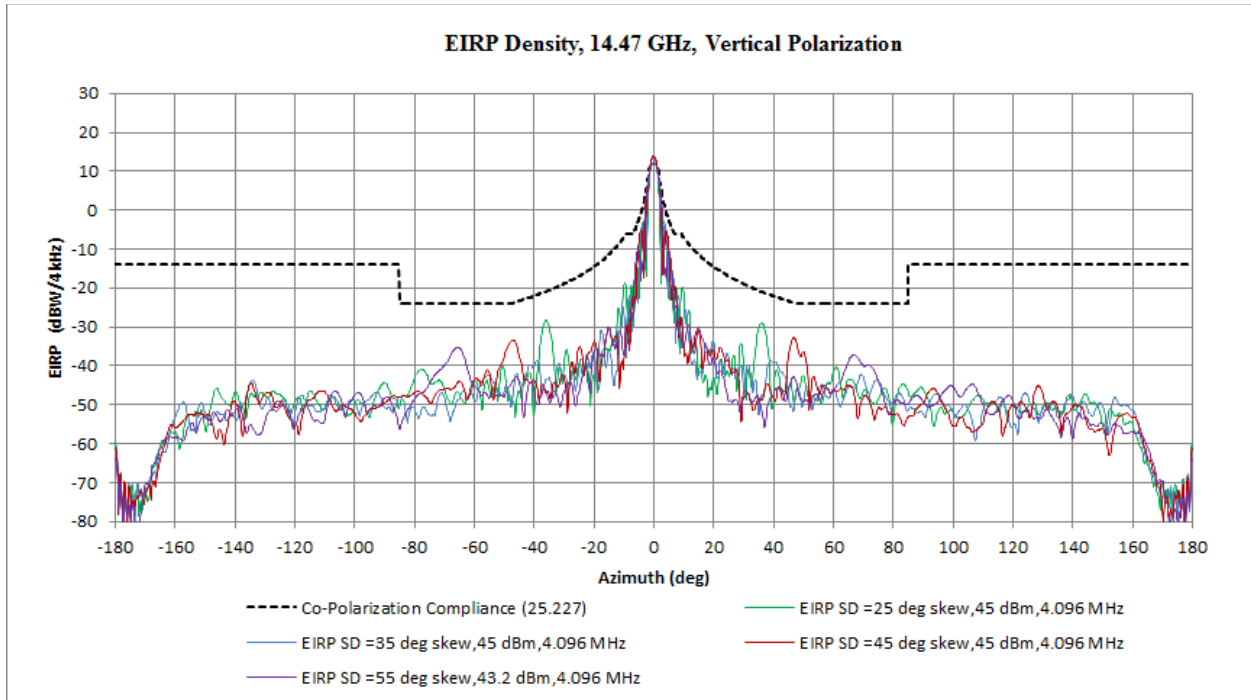


Figure A-24 EIRP Spectral Density in dBW/4 kHz for 14.47 GHz with 4.096 MHz (Vertical Polarization) (25.227 Expanded Azimuth)

Geographic Representation

Figure A-25 illustrates the proposed geographic relationships between skew and EIRP density for AMC-1. The boundaries apply, such that for any location between them, the skew is less than or equal to that at each of the boundaries. The authorized EIRP for the given skew value is applicable to any geographic location within those boundaries.

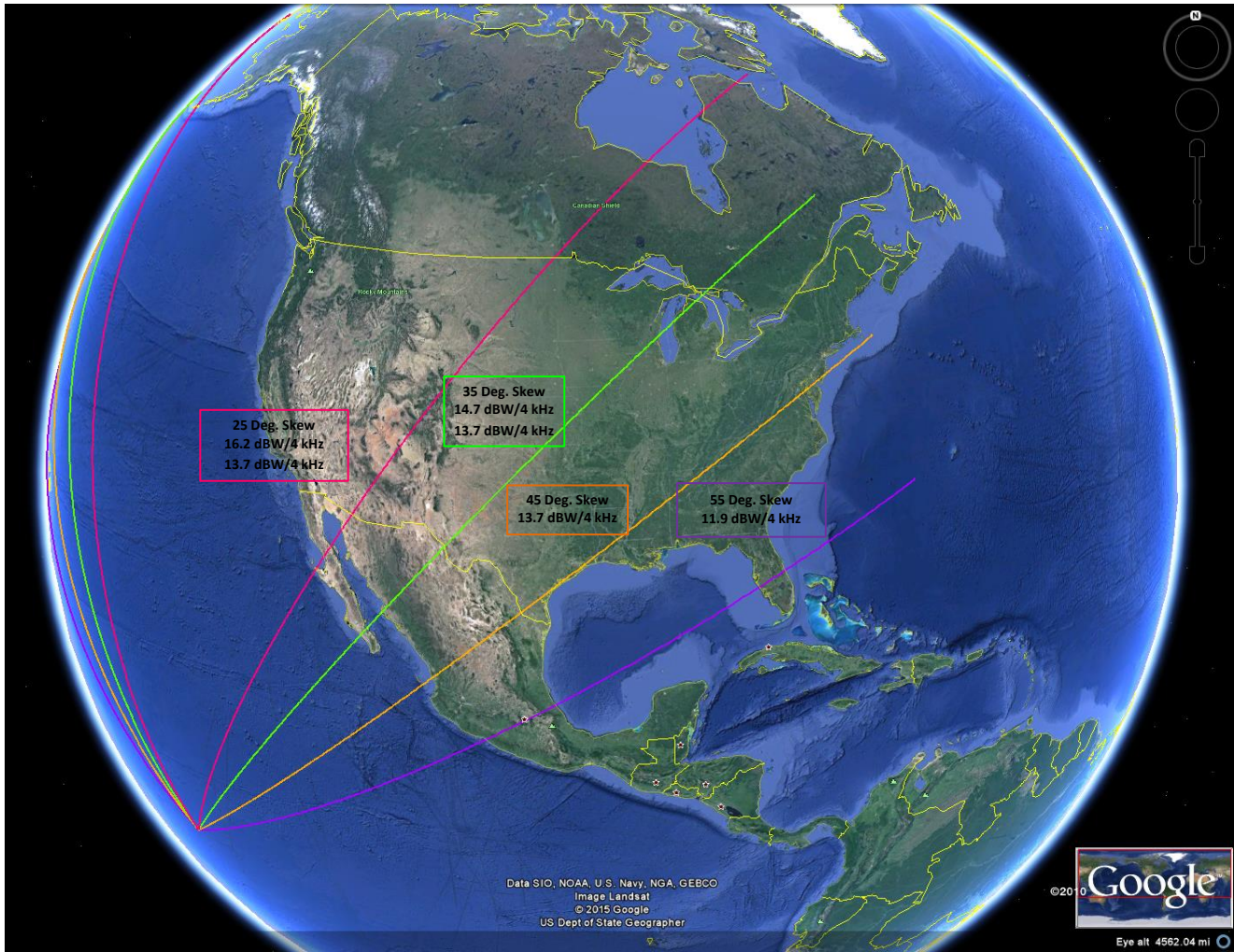


Figure A-25 Geographic skew boundaries and EIRP density levels for AMC-1 at 129.15 West. EIRP density limits are applicable anywhere between the associated left (along the left edge of the snapshot) and right skew boundary contours. (Red: 25 degree boundaries; Green: 35 degree boundaries; Orange: 45 degree boundaries; Violet: 55 degree boundaries. Labels are located in the vicinity of areas of satellite coverage.)

Note that where two EIRP density values are specified, the ‘lesser’ value corresponds to the HPT’s output being limited from providing the necessary output (for a 4.096 MHz bandwidth emission) that would result in an EIRP density equal to the ‘higher’ value.

AMC-1 Link Budgets

Applicable to transmissions up to skew angles of 25, 35, 45, and 55 degrees, and respective EIRP densities of 16.2, 14.7, 13.7, and 11.9 dBW/4 kHz

Applicable transmit powers and emission bandwidths:

41.5, 40.0, 39.0, and 37.2 dBm in 1.024 MHz, respectively

44.5, 43.0, 42.0, and 40.2 dBm in 2.048 MHz, respectively

Inroute Signal: QPSK 1/2
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Baseband BW (MHz): 1.024
 Spread BW (MHz): 1.024
 Required C/N (dB): 2.1

Link Budget for satellite **AMC-1** at **-129.2** degrees

Skew operational limit: **25** degrees

Outroute Signal: QPSK 3/4
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Bandwidth (MHz): 30
 Required C/N (dB): 4.2

Inroute signal: QPSK 1/2 rate 1.024 Msps in bandwidth 1.024 MHz
Outroute signal: QPSK 3/4 rate 30 Msps in bandwidth 30 MHz

Satellite: AMC-1
 Longitude (deg East): -129.15
 G/T towards Remote (dB/K): 4.60
 G/T towards NOC (dB/K): 5.10
 G/T Degradation (dB): 0
 Saturation Flux Density (dBW/m²): -90.2
 Saturated EIRP towards NOC (dBW): 48.5
 Saturated EIRP towards remote (dBW): 47.3
 Attenuation Setting (dB): 0
 Downlink EIRP Outroute (dBW): **47.30**
 Downlink EIRP Inroute (dBW): **10.18**

Remote: Phoenix 33.48 -112.12
NOC: Woodbine MD 39.376 -77.081

Remote: Phoenix
 Latitude (deg North): 33.48
 Longitude (deg East): -112.12
 TX Antenna Gain (dBi): 28.80
 TX Power (dBm): 41.5
 TX Backoff (dB): 1
 Power into flange (dBW/4 kHz): **-13.58**
 RX G/T (dB/K): 11.70
 Antenna Mispoint (dB): 0.5
 Rain Attenuation (dB): 0
 Atmospheric Attenuation (dB): 0.5

Inroute Path:

Ideal Link

**Mispoint/
Rain/
Atmospheric
Losses**

**Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	39.30	38.30	38.30
Uplink Path Loss (dB)	206.97	206.97	206.97
Spreading Loss (dB)	-162.42	-162.42	-162.42
Flux Density at Satellite (dBW/m ²)	-123.12	-124.12	-124.12
Uplink C/T (dB)	-163.07	-164.07	-164.07
C/No (dB)	65.53	64.53	64.53
Noise BW (dB-Hz)	60.10	60.10	60.10
Interference (dB)	N/A	N/A	-13.88
Uplink C/N (dB)	5.43	4.43	3.96
Satellite downlink EIRP (dBW)	11.18	10.18	10.18
Downlink Path Loss (dB)	205.99	205.99	205.99
Downlink C/T (dB)	-157.58	-160.58	-160.58
C/No (dB)	71.02	68.02	68.02
Noise BW (dB-Hz)	60.10	60.10	60.10
Interference (dB)	N/A	N/A	-18.19
Downlink C/N (dB)	10.92	7.92	7.53

Inroute Uplink Interference

Adjacent Channel Uplink (dB): -30.0
 Adjacent Satellite Uplink (dB): -17.0
 Cross-Pol Uplink (dB): -20.0
 Intermod Uplink (dB): -20.0
 Cumulative Interf. Uplink (dB): **-13.88**

Cumulative C/N (dB)	4.35	2.82	2.38
Necessary C/N (dB)	2.10	2.10	2.10
Cumulative Inroute Link Margin (dB)	2.25	0.72	0.28

Link Budget for satellite **AMC-1** at **-129.2** degrees
 Skew operational limit: **25** degrees

Outroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-10.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-20.0
Cumulative Interf. Downlink (dB):	-9.17

NOC:

Woodbine MD

Latitude (deg North):	39.376
Longitude (deg East):	-77.081
Antennna diameter (m):	9 m
RX Antenna Gain (dBi):	58.5
Antenna Noise Temp (K):	64
Antenna LNA Temp (K):	70
Total Noise Temp (K):	134
Antenna G/T (dB/K):	37.23
TX Antenna Gain (dBi):	60.1
TX power (dBm):	50
TX backoff (dB):	0
Power into flange (dBW/ 4 kHz):	-18.75
Antenna mis-point (dB):	0.5
Rain Attenuation (dB):	1
Atmospheric Attenuation (dB):	0.5

Outroute Path:**Ideal Link****Mispoint/
Rain/
Atmospheric
Losses****Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	80.10	78.10	78.10
Uplink Path Loss (dB)	207.48	207.48	207.48
Spreading Loss (dB)	-162.93	-162.93	-162.93
Flux Density at Satellite (dBW/m^2)	-82.83	-84.83	-84.83
Uplink C/T (dB)	-122.28	-124.28	-124.28
C/No (dB)	106.32	104.32	104.32
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-18.86
Uplink C/N (dB)	31.55	29.55	18.50
Satellite downlink EIRP (dBW)	47.30	47.30	47.30
Downlink Path Loss (dB)	205.48	205.48	205.48
Downlink C/T (dB)	-146.48	-147.48	-147.48
C/No (dB)	7.35	6.35	6.35
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-9.17
Downlink C/N (dB)	7.35	6.35	4.53
Cumulative C/N (dB)	7.33	6.33	4.36
Necessary C/N (dB)	4.2	4.2	4.2
Cumulative Outroute Link Margin (dB)	3.13	2.13	0.16

Inroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-25.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-30.0
Cumulative Interf. Downlink (dB):	-18.19

Outroute Uplink Interference

Adjacent Channel Uplink (dB):	-30.0
Adjacent Satellite Uplink (dB):	-30.0
Cross-Pol Uplink (dB):	-20.0
Intermod Uplink (dB):	-30.0
Cumulative Interf. Uplink (dB):	-18.86

Inroute Signal: QPSK 1/2
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Baseband BW (MHz): 0.512
 Spread BW (MHz): 1.024
 Required C/N (dB): 2.1

Link Budget for satellite **AMC-1** at **-129.2** degrees

Skew operational limit: **35** degrees

Outroute Signal: QPSK 3/4
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Bandwidth (MHz): 30
 Required C/N (dB): 4.2

Inroute signal: QPSK 1/2 rate **0.512** Msps in bandwidth **1.024** MHz
Outroute signal: QPSK 3/4 rate **30** Msps in bandwidth **30** MHz

Satellite: AMC-1
 Longitude (deg East): -129.15
 G/T towards Remote (dB/K): 3.80
 G/T towards NOC (dB/K): 5.10
 G/T Degradation (dB): 0
 Saturation Flux Density (dBW/m²): -90.2
 Saturated EIRP towards NOC (dBW): 48.5
 Saturated EIRP towards remote (dBW): 47.6
 Attenuation Setting (dB): 0
 Downlink EIRP Outroute (dBW): **47.60**
 Downlink EIRP Inroute (dBW): **7.81**

Remote: Albuquerque Lat 35.11 Long -106.62
NOC: Woodbine MD 39.376 -77.081

Remote: Albuquerque
 Latitude (deg North): 35.11
 Longitude (deg East): -106.62
 TX Antenna Gain (dBi): 28.80
 TX Power (dBm): 40
 TX Backoff (dB): 1
 Power into flange (dBW/4 kHz): **-15.08**
 RX G/T (dB/K): 11.70
 Antenna Mispoint (dB): 0.5
 Rain Attenuation (dB): 0
 Atmospheric Attenuation (dB): 0.5

Inroute Path:

Ideal Link

**Mispoint/
Rain/
Atmospheric
Losses**

**Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	37.80	36.80	36.80
Uplink Path Loss (dB)	207.04	207.04	207.04
Spreading Loss (dB)	-162.49	-162.49	-162.49
Flux Density at Satellite (dBW/m ²)	-124.69	-125.69	-125.69
Uplink C/T (dB)	-165.44	-166.44	-166.44
C/No (dB)	63.16	62.16	62.16
Noise BW (dB-Hz)	57.09	57.09	57.09
Interference (dB)	N/A	N/A	-13.88
Uplink C/N (dB)	6.07	5.07	4.53
Satellite downlink EIRP (dBW)	8.81	7.81	7.81
Downlink Path Loss (dB)	205.99	205.99	205.99
Downlink C/T (dB)	-159.95	-162.95	-162.95
C/No (dB)	68.65	65.65	65.65
Noise BW (dB-Hz)	57.09	57.09	57.09
Interference (dB)	N/A	N/A	-18.19
Downlink C/N (dB)	11.56	8.56	8.11

Inroute Uplink Interference

Adjacent Channel Uplink (dB): -30.0
 Adjacent Satellite Uplink (dB): -17.0
 Cross-Pol Uplink (dB): -20.0
 Intermod Uplink (dB): -20.0
 Cumulative Interf. Uplink (dB): **-13.88**

Cumulative C/N (dB)	4.99	3.46	2.95
Necessary C/N (dB)	2.10	2.10	2.10
Cumulative Inroute Link Margin (dB)	2.89	1.36	0.85

Link Budget for satellite **AMC-1** at **-129.2** degrees
 Skew operational limit: **35** degrees

Outroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-10.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-20.0
Cumulative Interf. Downlink (dB):	-9.17

NOC:

Woodbine MD

Latitude (deg North):	39.376
Longitude (deg East):	-77.081
Antennna diameter (m):	9 m
RX Antenna Gain (dBi):	58.5
Antenna Noise Temp (K):	64
Antenna LNA Temp (K):	70
Total Noise Temp (K):	134
Antenna G/T (dB/K):	37.23
TX Antenna Gain (dBi):	60.1
TX power (dBm):	50
TX backoff (dB):	0
Power into flange (dBW/ 4 kHz):	-18.75
Antenna mis-point (dB):	0.5
Rain Attenuation (dB):	1
Atmospheric Attenuation (dB):	0.5

Outroute Path:**Ideal Link****Mispoint/
Rain/
Atmospheric
Losses****Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	80.10	78.10	78.10
Uplink Path Loss (dB)	207.48	207.48	207.48
Spreading Loss (dB)	-162.93	-162.93	-162.93
Flux Density at Satellite (dBW/m^2)	-82.83	-84.83	-84.83
Uplink C/T (dB)	-122.28	-124.28	-124.28
C/No (dB)	106.32	104.32	104.32
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-18.86
Uplink C/N (dB)	31.55	29.55	18.50
Satellite downlink EIRP (dBW)	47.60	47.60	47.60
Downlink Path Loss (dB)	205.55	205.55	205.55
Downlink C/T (dB)	-146.25	-147.25	-147.25
C/No (dB)	7.58	6.58	6.58
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-9.17
Downlink C/N (dB)	7.58	6.58	4.68
Cumulative C/N (dB)	7.56	6.56	4.50
Necessary C/N (dB)	4.2	4.2	4.2
Cumulative Outroute Link Margin (dB)	3.36	2.36	0.30

Inroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-25.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-30.0
Cumulative Interf. Downlink (dB):	-18.19

Outroute Uplink Interference

Adjacent Channel Uplink (dB):	-30.0
Adjacent Satellite Uplink (dB):	-30.0
Cross-Pol Uplink (dB):	-20.0
Intermod Uplink (dB):	-30.0
Cumulative Interf. Uplink (dB):	-18.86

Inroute Signal: QPSK 1/2
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Baseband BW (MHz): 0.512
 Spread BW (MHz): 1.024
 Required C/N (dB): 2.1

Link Budget for satellite AMC-1 at -129.2 degrees

Skew operational limit: 45 degrees

Outroute Signal: QPSK 5/6
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Bandwidth (MHz): 30
 Required C/N (dB): 5.4

Inroute signal: QPSK 1/2 rate 0.512 Msps in bandwidth 1.024 MHz
Outroute signal: QPSK 5/6 rate 30 Msps in bandwidth 30 MHz

Satellite: AMC-1
 Longitude (deg East): -129.15
 G/T towards Remote (dB/K): 6.00
 G/T towards NOC (dB/K): 5.10
 G/T Degradation (dB): 0
 Saturation Flux Density (dBW/m²): -90.2
 Saturated EIRP towards NOC (dBW): 48.5
 Saturated EIRP towards remote (dBW): 49.3
 Attenuation Setting (dB): 0
 Downlink EIRP Outroute (dBW): **49.30**
 Downlink EIRP Inroute (dBW): **8.94**

Remote: Dallas Lat 32.9 Long -97.04
NOC: Woodbine MD 39.376 -77.081

Remote: Dallas
 Latitude (deg North): 32.9
 Longitude (deg East): -97.04
 TX Antenna Gain (dBi): 28.80
 TX Power (dBm): 39
 TX Backoff (dB): 1
 Power into flange (dBW/4 kHz): **-16.08**
 RX G/T (dB/K): 11.70
 Antenna Mispoint (dB): 0.5
 Rain Attenuation (dB): 0
 Atmospheric Attenuation (dB): 0.5

Inroute Path:

Ideal Link

**Mispoint/
Rain/
Atmospheric
Losses**

**Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	36.80	35.80	35.80
Uplink Path Loss (dB)	207.12	207.12	207.12
Spreading Loss (dB)	-162.56	-162.56	-162.56
Flux Density at Satellite (dBW/m ²)	-125.76	-126.76	-126.76
Uplink C/T (dB)	-164.32	-165.32	-165.32
C/No (dB)	64.29	63.29	63.29
Noise BW (dB-Hz)	57.09	57.09	57.09
Interference (dB)	N/A	N/A	-13.88
Uplink C/N (dB)	7.19	6.19	5.51
Satellite downlink EIRP (dBW)	9.94	8.94	8.94
Downlink Path Loss (dB)	205.99	205.99	205.99
Downlink C/T (dB)	-158.83	-161.83	-161.83
C/No (dB)	69.78	66.78	66.78
Noise BW (dB-Hz)	57.09	57.09	57.09
Interference (dB)	N/A	N/A	-18.19
Downlink C/N (dB)	12.68	9.68	9.11

Inroute Uplink Interference

Adjacent Channel Uplink (dB): -30.0
 Adjacent Satellite Uplink (dB): -17.0
 Cross-Pol Uplink (dB): -20.0
 Intermod Uplink (dB): -20.0
 Cumulative Interf. Uplink (dB): **-13.88**

Cumulative C/N (dB)	6.11	4.59	3.94
Necessary C/N (dB)	2.10	2.10	2.10
Cumulative Inroute Link Margin (dB)	4.01	2.49	1.84

Link Budget for satellite **AMC-1** at **-129.2** degrees
 Skew operational limit: **45** degrees

Outroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-10.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-20.0
Cumulative Interf. Downlink (dB):	-9.17

NOC:

Woodbine MD

Latitude (deg North):	39.376
Longitude (deg East):	-77.081
Antennna diameter (m):	9 m
RX Antenna Gain (dBi):	58.5
Antenna Noise Temp (K):	64
Antenna LNA Temp (K):	70
Total Noise Temp (K):	134
Antenna G/T (dB/K):	37.23
TX Antenna Gain (dBi):	60.1
TX power (dBm):	50
TX backoff (dB):	0
Power into flange (dBW/ 4 kHz):	-18.75
Antenna mis-point (dB):	0.5
Rain Attenuation (dB):	1
Atmospheric Attenuation (dB):	0.5

Outroute Path:**Ideal Link****Mispoint/
Rain/
Atmospheric
Losses****Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	80.10	78.10	78.10
Uplink Path Loss (dB)	207.48	207.48	207.48
Spreading Loss (dB)	-162.93	-162.93	-162.93
Flux Density at Satellite (dBW/m^2)	-82.83	-84.83	-84.83
Uplink C/T (dB)	-122.28	-124.28	-124.28
C/No (dB)	106.32	104.32	104.32
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-18.86
Uplink C/N (dB)	31.55	29.55	18.50
Satellite downlink EIRP (dBW)	49.30	49.30	49.30
Downlink Path Loss (dB)	205.62	205.62	205.62
Downlink C/T (dB)	-144.62	-145.62	-145.62
C/No (dB)	9.21	8.21	8.21
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-9.17
Downlink C/N (dB)	9.21	8.21	5.65
Cumulative C/N (dB)	9.18	8.18	5.43
Necessary C/N (dB)	5.4	5.4	5.4
Cumulative Outroute Link Margin (dB)	3.78	2.78	0.03

Inroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-25.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-30.0
Cumulative Interf. Downlink (dB):	-18.19

Outroute Uplink Interference

Adjacent Channel Uplink (dB):	-30.0
Adjacent Satellite Uplink (dB):	-30.0
Cross-Pol Uplink (dB):	-20.0
Intermod Uplink (dB):	-30.0
Cumulative Interf. Uplink (dB):	-18.86

Inroute Signal: QPSK 1/2
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Baseband BW (MHz): 0.512
 Spread BW (MHz): 1.024
 Required C/N (dB): 2.1

Link Budget for satellite AMC-1 at -129.2 degrees

Skew operational limit: 55 degrees

Outroute Signal: QPSK 3/4
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Bandwidth (MHz): 30
 Required C/N (dB): 4.2

Inroute signal: QPSK 1/2 rate **0.512 Msps** in bandwidth **1.024 MHz**
Outroute signal: QPSK 3/4 rate **30 Msps** in bandwidth **30 MHz**

Satellite: AMC-1
 Longitude (deg East): -129.15
 G/T towards Remote (dB/K): 6.10
 G/T towards NOC (dB/K): 5.10
 G/T Degradation (dB): 0
 Saturation Flux Density (dBW/m²): -90.2
 Saturated EIRP towards NOC (dBW): 48.5
 Saturated EIRP towards remote (dBW): 49.2
 Attenuation Setting (dB): 0
 Downlink EIRP Outroute (dBW): **49.20**
 Downlink EIRP Inroute (dBW): **7.08**

Remote: Tallahassee **Lat** 30.391 **Long** -84.345
NOC: Woodbine MD 39.376 -77.081

Remote: Tallahassee
 Latitude (deg North): 30.391
 Longitude (deg East): -84.345
 TX Antenna Gain (dBi): 28.80
 TX Power (dBm): 37.2
 TX Backoff (dB): 1
 Power into flange (dBW/4 kHz): **-17.88**
 RX G/T (dB/K): 11.70
 Antenna Mispoint (dB): 0.5
 Rain Attenuation (dB): 0
 Atmospheric Attenuation (dB): 0.5

Inroute Path:

Ideal Link

**Mispoint/
Rain/
Atmospheric
Losses**

**Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	35.00	34.00	34.00
Uplink Path Loss (dB)	207.27	207.27	207.27
Spreading Loss (dB)	-162.72	-162.72	-162.72
Flux Density at Satellite (dBW/m ²)	-127.72	-128.72	-128.72
Uplink C/T (dB)	-166.17	-167.17	-167.17
C/No (dB)	62.43	61.43	61.43
Noise BW (dB-Hz)	57.09	57.09	57.09
Interference (dB)	N/A	N/A	-13.88
Uplink C/N (dB)	5.34	4.34	3.88
Satellite downlink EIRP (dBW)	8.08	7.08	7.08
Downlink Path Loss (dB)	205.99	205.99	205.99
Downlink C/T (dB)	-160.68	-163.68	-163.68
C/No (dB)	67.92	64.92	64.92
Noise BW (dB-Hz)	57.09	57.09	57.09
Interference (dB)	N/A	N/A	-18.19
Downlink C/N (dB)	10.83	7.83	7.44

Inroute Uplink Interference

Adjacent Channel Uplink (dB): -30.0
 Adjacent Satellite Uplink (dB): -17.0
 Cross-Pol Uplink (dB): -20.0
 Intermod Uplink (dB): -20.0
 Cumulative Interf. Uplink (dB): **-13.88**

Cumulative C/N (dB)	4.25	2.73	2.29
Necessary C/N (dB)	2.10	2.10	2.10
Cumulative Inroute Link Margin (dB)	2.15	0.63	0.19

Link Budget for satellite **AMC-1** at **-129.2** degrees
 Skew operational limit: **55** degrees

Outroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-10.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-20.0
Cumulative Interf. Downlink (dB):	-9.17

NOC:

Woodbine MD

Latitude (deg North):	39.376
Longitude (deg East):	-77.081
Antennna diameter (m):	9 m
RX Antenna Gain (dBi):	58.5
Antenna Noise Temp (K):	64
Antenna LNA Temp (K):	70
Total Noise Temp (K):	134
Antenna G/T (dB/K):	37.23
TX Antenna Gain (dBi):	60.1
TX power (dBm):	50
TX backoff (dB):	0
Power into flange (dBW/ 4 kHz):	-18.75
Antenna mis-point (dB):	0.5
Rain Attenuation (dB):	1
Atmospheric Attenuation (dB):	0.5

Outroute Path:

EIRP towards satellite (dBW)	80.10
Uplink Path Loss (dB)	207.48
Spreading Loss (dB)	-162.93
Flux Density at Satellite (dBW/m ²)	-82.83
Uplink C/T (dB)	-122.28
C/No (dB)	106.32
Noise BW (dB-Hz)	74.77
Interference (dB)	N/A
Uplink C/N (dB)	31.55

Ideal Link

EIRP towards satellite (dBW)	80.10	78.10	78.10
Uplink Path Loss (dB)	207.48	207.48	207.48
Spreading Loss (dB)	-162.93	-162.93	-162.93
Flux Density at Satellite (dBW/m ²)	-82.83	-84.83	-84.83
Uplink C/T (dB)	-122.28	-124.28	-124.28
C/No (dB)	106.32	104.32	104.32
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-18.86
Uplink C/N (dB)	31.55	29.55	18.50
Satellite downlink EIRP (dBW)	49.20	49.20	49.20
Downlink Path Loss (dB)	205.78	205.78	205.78
Downlink C/T (dB)	-144.88	-145.88	-145.88
C/No (dB)	8.95	7.95	7.95
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-9.17
Downlink C/N (dB)	8.95	7.95	5.51

**Mispoint/
Rain/
Atmospheric
Losses**

**Intermod/
Satellite/
Cross-pol
Interference**

Inroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-25.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-30.0
Cumulative Interf. Downlink (dB):	-18.19

Cumulative C/N (dB)	8.93	7.92	5.29
Necessary C/N (dB)	4.2	4.2	4.2
Cumulative Outroute Link Margin (dB)	4.73	3.72	1.09

Outroute Uplink Interference

Adjacent Channel Uplink (dB):	-30.0
Adjacent Satellite Uplink (dB):	-30.0
Cross-Pol Uplink (dB):	-20.0
Intermod Uplink (dB):	-30.0
Cumulative Interf. Uplink (dB):	-18.86

AMC-1 Link Budgets

Applicable to transmissions up to skew angles of 25, 35, 45, and 55 degrees, and respective EIRP densities of 13.7, 13.7, 13.7, and 11.9 dBW/4 kHz.

Applicable to respective transmit powers of 45.0, 45.0, 45.0, and 43.2 dBm.

Applicable emission bandwidth in all cases: 4.096 MHz

Inroute Signal: QPSK 1/2
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Baseband BW (MHz): 2.048
 Spread BW (MHz): 4.096
 Required C/N (dB): 2.1

Link Budget for satellite AMC-1 at -129.2 degrees

Skew operational limit: 25 degrees

Outroute Signal: QPSK 3/4
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Bandwidth (MHz): 30
 Required C/N (dB): 4.2

Inroute signal: QPSK 1/2 rate **2.048 Msps** in bandwidth **4.096 MHz**
Outroute signal: QPSK 3/4 rate **30 Msps** in bandwidth **30 MHz**

Satellite: AMC-1
 Longitude (deg East): -129.15
 G/T towards Remote (dB/K): 4.60
 G/T towards NOC (dB/K): 5.10
 G/T Degradation (dB): 0
 Saturation Flux Density (dBW/m²): -90.2
 Saturated EIRP towards NOC (dBW): 48.5
 Saturated EIRP towards remote (dBW): 47.3
 Attenuation Setting (dB): 0
 Downlink EIRP Outroute (dBW): **47.30**
 Downlink EIRP Inroute (dBW): **13.68**

Remote: Phoenix 33.48 -112.12
NOC: Woodbine MD 39.376 -77.081

Remote: Phoenix
 Latitude (deg North): 33.48
 Longitude (deg East): -112.12
 TX Antenna Gain (dBi): 28.80
 TX Power (dBm): 45
 TX Backoff (dB): 1
 Power into flange (dBW/4 kHz): **-16.10**
 RX G/T (dB/K): 11.70
 Antenna Mispoint (dB): 0.5
 Rain Attenuation (dB): 0
 Atmospheric Attenuation (dB): 0.5

Inroute Path:

EIRP towards satellite (dBW)
 Uplink Path Loss (dB)
 Spreading Loss (dB)
 Flux Density at Satellite (dBW/m²)
 Uplink C/T (dB)
 C/No (dB)
 Noise BW (dB-Hz)
 Interference (dB)
Uplink C/N (dB)

Ideal Link

42.80
 206.97
 -162.42
 -119.62
 -159.57
 69.03
 63.11
 N/A
5.92
 Satellite downlink EIRP (dBW)
 Downlink Path Loss (dB)
 Downlink C/T (dB)
 C/No (dB)
 Noise BW (dB-Hz)
 Interference (dB)
Downlink C/N (dB)

**Mispoint/
Rain/
Atmospheric
Losses**

41.80
 206.97
 -162.42
 -120.62
 -160.57
 68.03
 63.11
 N/A
4.92
 13.68
 205.99
 -157.08
 71.52
 63.11
 N/A
8.41

**Intermod/
Satellite/
Cross-pol
Interference**

41.80
 206.97
 -162.42
 -120.62
 -160.57
 68.03
 63.11
 -13.88
4.40
 13.68
 205.99
 -157.08
 71.52
 63.11
 -18.19
7.97
 Cumulative C/N (dB) 4.84 3.31 2.82
 Necessary C/N (dB) 2.10 2.10 2.10
Cumulative Inroute Link Margin (dB) 2.74 1.21 0.72

Inroute Uplink Interference

Adjacent Channel Uplink (dB): -30.0
 Adjacent Satellite Uplink (dB): -17.0
 Cross-Pol Uplink (dB): -20.0
 Intermod Uplink (dB): -20.0
 Cumulative Interf. Uplink (dB): **-13.88**

Link Budget for satellite **AMC-1** at **-129.2** degrees
 Skew operational limit: **25** degrees

Outroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-10.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-20.0
Cumulative Interf. Downlink (dB):	-9.17

NOC:

Woodbine MD

Latitude (deg North):	39.376
Longitude (deg East):	-77.081
Antennna diameter (m):	9 m
RX Antenna Gain (dBi):	58.5
Antenna Noise Temp (K):	64
Antenna LNA Temp (K):	70
Total Noise Temp (K):	134
Antenna G/T (dB/K):	37.23
TX Antenna Gain (dBi):	60.1
TX power (dBm):	50
TX backoff (dB):	0
Power into flange (dBW/ 4 kHz):	-18.75
Antenna mis-point (dB):	0.5
Rain Attenuation (dB):	1
Atmospheric Attenuation (dB):	0.5

Outroute Path:**Ideal Link****Mispoint/
Rain/
Atmospheric
Losses****Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	80.10	78.10	78.10
Uplink Path Loss (dB)	207.48	207.48	207.48
Spreading Loss (dB)	-162.93	-162.93	-162.93
Flux Density at Satellite (dBW/m^2)	-82.83	-84.83	-84.83
Uplink C/T (dB)	-122.28	-124.28	-124.28
C/No (dB)	106.32	104.32	104.32
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-18.86
Uplink C/N (dB)	31.55	29.55	18.50
Satellite downlink EIRP (dBW)	47.30	47.30	47.30
Downlink Path Loss (dB)	205.48	205.48	205.48
Downlink C/T (dB)	-146.48	-147.48	-147.48
C/No (dB)	7.35	6.35	6.35
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-9.17
Downlink C/N (dB)	7.35	6.35	4.53
Cumulative C/N (dB)	7.33	6.33	4.36
Necessary C/N (dB)	4.2	4.2	4.2
Cumulative Outroute Link Margin (dB)	3.13	2.13	0.16

Inroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-25.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-30.0
Cumulative Interf. Downlink (dB):	-18.19

Outroute Uplink Interference

Adjacent Channel Uplink (dB):	-30.0
Adjacent Satellite Uplink (dB):	-30.0
Cross-Pol Uplink (dB):	-20.0
Intermod Uplink (dB):	-30.0
Cumulative Interf. Uplink (dB):	-18.86

Inroute Signal: QPSK 1/2
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Baseband BW (MHz): 1.024
 Spread BW (MHz): 4.096
 Required C/N (dB): 2.1

Link Budget for satellite AMC-1 at -129.2 degrees

Skew operational limit: 35 degrees

Outroute Signal: QPSK 3/4
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Bandwidth (MHz): 30
 Required C/N (dB): 4.2

Inroute signal: QPSK 1/2 rate **1.024 Msps** in bandwidth **4.096 MHz**
Outroute signal: QPSK 3/4 rate **30 Msps** in bandwidth **30 MHz**

Satellite: AMC-1
 Longitude (deg East): -129.15
 G/T towards Remote (dB/K): 3.80
 G/T towards NOC (dB/K): 5.10
 G/T Degradation (dB): 0
 Saturation Flux Density (dBW/m²): -90.2
 Saturated EIRP towards NOC (dBW): 48.5
 Saturated EIRP towards remote (dBW): 47.6
 Attenuation Setting (dB): 0
 Downlink EIRP Outroute (dBW): **47.60**
 Downlink EIRP Inroute (dBW): **12.81**

Remote: Albuquerque 35.11 -106.62
NOC: Woodbine MD 39.376 -77.081

Remote: Albuquerque
 Latitude (deg North): 35.11
 Longitude (deg East): -106.62
 TX Antenna Gain (dBi): 28.80
 TX Power (dBm): 45
 TX Backoff (dB): 1
 Power into flange (dBW/4 kHz): **-16.10**
 RX G/T (dB/K): 11.70
 Antenna Mispoint (dB): 0.5
 Rain Attenuation (dB): 0
 Atmospheric Attenuation (dB): 0.5

Inroute Path:

Ideal Link

**Mispoint/
Rain/
Atmospheric
Losses**

**Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	42.80	41.80	41.80
Uplink Path Loss (dB)	207.04	207.04	207.04
Spreading Loss (dB)	-162.49	-162.49	-162.49
Flux Density at Satellite (dBW/m ²)	-119.69	-120.69	-120.69
Uplink C/T (dB)	-160.44	-161.44	-161.44
C/No (dB)	68.16	67.16	67.16
Noise BW (dB-Hz)	60.10	60.10	60.10
Interference (dB)	N/A	N/A	-13.88
Uplink C/N (dB)	8.06	7.06	6.24
Satellite downlink EIRP (dBW)	13.81	12.81	12.81
Downlink Path Loss (dB)	205.99	205.99	205.99
Downlink C/T (dB)	-154.95	-157.95	-157.95
C/No (dB)	73.65	70.65	70.65
Noise BW (dB-Hz)	60.10	60.10	60.10
Interference (dB)	N/A	N/A	-18.19
Downlink C/N (dB)	13.55	10.55	9.86

Inroute Uplink Interference

Adjacent Channel Uplink (dB): -30.0
 Adjacent Satellite Uplink (dB): -17.0
 Cross-Pol Uplink (dB): -20.0
 Intermod Uplink (dB): -20.0
 Cumulative Interf. Uplink (dB): **-13.88**

Cumulative C/N (dB)	6.98	5.45	4.67
Necessary C/N (dB)	2.10	2.10	2.10
Cumulative Inroute Link Margin (dB)	4.88	3.35	2.57

Link Budget for satellite **AMC-1** at **-129.2** degrees
 Skew operational limit: **35** degrees

Outroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-10.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-20.0
Cumulative Interf. Downlink (dB):	-9.17

NOC:

Woodbine MD

Latitude (deg North):	39.376
Longitude (deg East):	-77.081
Antennna diameter (m):	9 m
RX Antenna Gain (dBi):	58.5
Antenna Noise Temp (K):	64
Antenna LNA Temp (K):	70
Total Noise Temp (K):	134
Antenna G/T (dB/K):	37.23
TX Antenna Gain (dBi):	60.1
TX power (dBm):	50
TX backoff (dB):	0
Power into flange (dBW/ 4 kHz):	-18.75
Antenna mis-point (dB):	0.5
Rain Attenuation (dB):	1
Atmospheric Attenuation (dB):	0.5

Outroute Path:**Ideal Link****Mispoint/
Rain/
Atmospheric
Losses****Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	80.10	78.10	78.10
Uplink Path Loss (dB)	207.48	207.48	207.48
Spreading Loss (dB)	-162.93	-162.93	-162.93
Flux Density at Satellite (dBW/m^2)	-82.83	-84.83	-84.83
Uplink C/T (dB)	-122.28	-124.28	-124.28
C/No (dB)	106.32	104.32	104.32
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-18.86
Uplink C/N (dB)	31.55	29.55	18.50
Satellite downlink EIRP (dBW)	47.60	47.60	47.60
Downlink Path Loss (dB)	205.55	205.55	205.55
Downlink C/T (dB)	-146.25	-147.25	-147.25
C/No (dB)	7.58	6.58	6.58
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-9.17
Downlink C/N (dB)	7.58	6.58	4.68
Cumulative C/N (dB)	7.56	6.56	4.50
Necessary C/N (dB)	4.2	4.2	4.2
Cumulative Outroute Link Margin (dB)	3.36	2.36	0.30

Inroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-25.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-30.0
Cumulative Interf. Downlink (dB):	-18.19

Outroute Uplink Interference

Adjacent Channel Uplink (dB):	-30.0
Adjacent Satellite Uplink (dB):	-30.0
Cross-Pol Uplink (dB):	-20.0
Intermod Uplink (dB):	-30.0
Cumulative Interf. Uplink (dB):	-18.86

Inroute Signal: QPSK 1/2
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Baseband BW (MHz): 2.048
 Spread BW (MHz): 4.096
 Required C/N (dB): 2.1

Link Budget for satellite AMC-1 at -129.2 degrees

Skew operational limit: 45 degrees

Outroute Signal: QPSK 3/4
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Bandwidth (MHz): 30
 Required C/N (dB): 4.2

Inroute signal: QPSK 1/2 rate **2.048 Msps** in bandwidth **4.096 MHz**
Outroute signal: QPSK 3/4 rate **30 Msps** in bandwidth **30 MHz**

Satellite: AMC-1
 Longitude (deg East): -129.15
 G/T towards Remote (dB/K): 6.00
 G/T towards NOC (dB/K): 5.10
 G/T Degradation (dB): 0
 Saturation Flux Density (dBW/m²): -90.2
 Saturated EIRP towards NOC (dBW): 48.5
 Saturated EIRP towards remote (dBW): 49.3
 Attenuation Setting (dB): 0
 Downlink EIRP Outroute (dBW): **49.30**
 Downlink EIRP Inroute (dBW): **14.94**

Remote: Dallas **Lat** 32.9 **Long** -97.04
NOC: Woodbine MD 39.376 -77.081

Remote: Dallas
 Latitude (deg North): 32.9
 Longitude (deg East): -97.04
 TX Antenna Gain (dBi): 28.80
 TX Power (dBm): 45
 TX Backoff (dB): 1
 Power into flange (dBW/4 kHz): **-16.10**
 RX G/T (dB/K): 11.70
 Antenna Mispoint (dB): 0.5
 Rain Attenuation (dB): 0
 Atmospheric Attenuation (dB): 0.5

Inroute Path:

Ideal Link

**Mispoint/
Rain/
Atmospheric
Losses**

**Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	42.80	41.80	41.80
Uplink Path Loss (dB)	207.12	207.12	207.12
Spreading Loss (dB)	-162.56	-162.56	-162.56
Flux Density at Satellite (dBW/m ²)	-119.76	-120.76	-120.76
Uplink C/T (dB)	-158.32	-159.32	-159.32
C/No (dB)	70.29	69.29	69.29
Noise BW (dB-Hz)	63.11	63.11	63.11
Interference (dB)	N/A	N/A	-13.88
Uplink C/N (dB)	7.17	6.17	5.49
Satellite downlink EIRP (dBW)	15.94	14.94	14.94
Downlink Path Loss (dB)	205.99	205.99	205.99
Downlink C/T (dB)	-152.83	-155.83	-155.83
C/No (dB)	75.78	72.78	72.78
Noise BW (dB-Hz)	63.11	63.11	63.11
Interference (dB)	N/A	N/A	-18.19
Downlink C/N (dB)	12.66	9.66	9.09

Inroute Uplink Interference

Adjacent Channel Uplink (dB): -30.0
 Adjacent Satellite Uplink (dB): -17.0
 Cross-Pol Uplink (dB): -20.0
 Intermod Uplink (dB): -20.0
 Cumulative Interf. Uplink (dB): **-13.88**

Cumulative C/N (dB)	6.09	4.57	3.92
Necessary C/N (dB)	2.10	2.10	2.10
Cumulative Inroute Link Margin (dB)	3.99	2.47	1.82

Link Budget for satellite **AMC-1** at **-129.2** degrees
 Skew operational limit: **45** degrees

Outroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-10.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-20.0
Cumulative Interf. Downlink (dB):	-9.17

NOC:

Woodbine MD

Latitude (deg North):	39.376
Longitude (deg East):	-77.081
Antennna diameter (m):	9 m
RX Antenna Gain (dBi):	58.5
Antenna Noise Temp (K):	64
Antenna LNA Temp (K):	70
Total Noise Temp (K):	134
Antenna G/T (dB/K):	37.23
TX Antenna Gain (dBi):	60.1
TX power (dBm):	50
TX backoff (dB):	0
Power into flange (dBW/ 4 kHz):	-18.75
Antenna mis-point (dB):	0.5
Rain Attenuation (dB):	1
Atmospheric Attenuation (dB):	0.5

Inroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-25.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-30.0
Cumulative Interf. Downlink (dB):	-18.19

Outroute Uplink Interference

Adjacent Channel Uplink (dB):	-30.0
Adjacent Satellite Uplink (dB):	-30.0
Cross-Pol Uplink (dB):	-20.0
Intermod Uplink (dB):	-30.0
Cumulative Interf. Uplink (dB):	-18.86

Outroute Path:**Ideal Link****Mispoint/
Rain/
Atmospheric
Losses****Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	80.10	78.10	78.10
Uplink Path Loss (dB)	207.48	207.48	207.48
Spreading Loss (dB)	-162.93	-162.93	-162.93
Flux Density at Satellite (dBW/m^2)	-82.83	-84.83	-84.83
Uplink C/T (dB)	-122.28	-124.28	-124.28
C/No (dB)	106.32	104.32	104.32
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-18.86
Uplink C/N (dB)	31.55	29.55	18.50
Satellite downlink EIRP (dBW)	49.30	49.30	49.30
Downlink Path Loss (dB)	205.62	205.62	205.62
Downlink C/T (dB)	-144.62	-145.62	-145.62
C/No (dB)	9.21	8.21	8.21
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-9.17
Downlink C/N (dB)	9.21	8.21	5.65
Cumulative C/N (dB)	9.18	8.18	5.43
Necessary C/N (dB)	4.2	4.2	4.2
Cumulative Outroute Link Margin (dB)	4.98	3.98	1.23

Inroute Signal: QPSK 1/2
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Baseband BW (MHz): 2.048
 Spread BW (MHz): 4.096
 Required C/N (dB): 2.1

Link Budget for satellite AMC-1 at -129.2 degrees

Skew operational limit: 55 degrees

Outroute Signal: QPSK 3/4
 Uplink Frequency (MHz): 14250
 Downlink Frequency (MHz): 12000
 Bandwidth (MHz): 30
 Required C/N (dB): 4.2

Inroute signal: QPSK 1/2 rate **2.048 Msps** in bandwidth **4.096 MHz**
Outroute signal: QPSK 3/4 rate **30 Msps** in bandwidth **30 MHz**

Satellite: AMC-1
 Longitude (deg East): -129.15
 G/T towards Remote (dB/K): 6.10
 G/T towards NOC (dB/K): 5.10
 G/T Degradation (dB): 0
 Saturation Flux Density (dBW/m²): -90.2
 Saturated EIRP towards NOC (dBW): 48.5
 Saturated EIRP towards remote (dBW): 49.2
 Attenuation Setting (dB): 0
 Downlink EIRP Outroute (dBW): **49.20**
 Downlink EIRP Inroute (dBW): **13.08**

Remote: Tallahassee **Lat** 30.391 **Long** -84.345
NOC: Woodbine MD 39.376 -77.081

Remote: Tallahassee
 Latitude (deg North): 30.391
 Longitude (deg East): -84.345
 TX Antenna Gain (dBi): 28.80
 TX Power (dBm): 43.2
 TX Backoff (dB): 1
 Power into flange (dBW/4 kHz): **-17.90**
 RX G/T (dB/K): 11.70
 Antenna Mispoint (dB): 0.5
 Rain Attenuation (dB): 0
 Atmospheric Attenuation (dB): 0.5

Inroute Path:**Ideal Link**

**Mispoint/
 Rain/
 Atmospheric
 Losses**

**Intermod/
 Satellite/
 Cross-pol
 Interference**

EIRP towards satellite (dBW)	41.00	40.00	40.00
Uplink Path Loss (dB)	207.27	207.27	207.27
Spreading Loss (dB)	-162.72	-162.72	-162.72
Flux Density at Satellite (dBW/m ²)	-121.72	-122.72	-122.72
Uplink C/T (dB)	-160.17	-161.17	-161.17
C/No (dB)	68.43	67.43	67.43
Noise BW (dB-Hz)	63.11	63.11	63.11
Interference (dB)	N/A	N/A	-13.88
Uplink C/N (dB)	5.31	4.31	3.86
Satellite downlink EIRP (dBW)	14.08	13.08	13.08
Downlink Path Loss (dB)	205.99	205.99	205.99
Downlink C/T (dB)	-154.68	-157.68	-157.68
C/No (dB)	73.92	70.92	70.92
Noise BW (dB-Hz)	63.11	63.11	63.11
Interference (dB)	N/A	N/A	-18.19
Downlink C/N (dB)	10.80	7.80	7.42

Inroute Uplink Interference

Adjacent Channel Uplink (dB): -30.0
 Adjacent Satellite Uplink (dB): -17.0
 Cross-Pol Uplink (dB): -20.0
 Intermod Uplink (dB): -20.0
 Cumulative Interf. Uplink (dB): **-13.88**

Cumulative C/N (dB)	4.23	2.71	2.28
Necessary C/N (dB)	2.10	2.10	2.10
Cumulative Inroute Link Margin (dB)	2.13	0.61	0.18

Link Budget for satellite **AMC-1** at **-129.2** degrees
 Skew operational limit: **55** degrees

Outroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-10.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-20.0
Cumulative Interf. Downlink (dB):	-9.17

NOC:

Woodbine MD

Latitude (deg North):	39.376
Longitude (deg East):	-77.081
Antennna diameter (m):	9 m
RX Antenna Gain (dBi):	58.5
Antenna Noise Temp (K):	64
Antenna LNA Temp (K):	70
Total Noise Temp (K):	134
Antenna G/T (dB/K):	37.23
TX Antenna Gain (dBi):	60.1
TX power (dBm):	50
TX backoff (dB):	0
Power into flange (dBW/ 4 kHz):	-18.75
Antenna mis-point (dB):	0.5
Rain Attenuation (dB):	1
Atmospheric Attenuation (dB):	0.5

Outroute Path:**Ideal Link****Mispoint/
Rain/
Atmospheric
Losses****Intermod/
Satellite/
Cross-pol
Interference**

EIRP towards satellite (dBW)	80.10	78.10	78.10
Uplink Path Loss (dB)	207.48	207.48	207.48
Spreading Loss (dB)	-162.93	-162.93	-162.93
Flux Density at Satellite (dBW/m^2)	-82.83	-84.83	-84.83
Uplink C/T (dB)	-122.28	-124.28	-124.28
C/No (dB)	106.32	104.32	104.32
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-18.86
Uplink C/N (dB)	31.55	29.55	18.50
Satellite downlink EIRP (dBW)	49.20	49.20	49.20
Downlink Path Loss (dB)	205.78	205.78	205.78
Downlink C/T (dB)	-144.88	-145.88	-145.88
C/No (dB)	8.95	7.95	7.95
Noise BW (dB-Hz)	74.77	74.77	74.77
Interference (dB)	N/A	N/A	-9.17
Downlink C/N (dB)	8.95	7.95	5.51
Cumulative C/N (dB)	8.93	7.92	5.29
Necessary C/N (dB)	4.2	4.2	4.2
Cumulative Outroute Link Margin (dB)	4.73	3.72	1.09

Inroute Downlink Interference

Adjacent Channel Downlink (dB):	-30.0
Adjacent Satellite Downlink (dB):	-25.0
Cross-Pol Downlink (dB):	-20.0
Intermod Downlink (dB):	-30.0
Cumulative Interf. Downlink (dB):	-18.19

Outroute Uplink Interference

Adjacent Channel Uplink (dB):	-30.0
Adjacent Satellite Uplink (dB):	-30.0
Cross-Pol Uplink (dB):	-20.0
Intermod Uplink (dB):	-30.0
Cumulative Interf. Uplink (dB):	-18.86