(u) In the band 40.5–42.0 GHz, the power flux-density at the Earth's surface produced by emissions from a geostationary space station for all conditions and for all methods of modulation shall not exceed the following values:

−120 dB(W/m²) in any 1 MHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;

−120 + (δ−5) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 5 and 15 degrees above the horizontal plane;

−110 + 0.5 (δ−15) dB(W/m²) in any 1 MHz band for angles of arrival δ (in degrees) between 15 and 25 degrees above the horizontal plane; and

−105 dB(W/m²) in any 1 MHz band for angles of arrival between 25 and 90 degrees above the horizontal plane;

NOTE TO PARAGRAPH (u): These limits relate to the power flux-density that would be obtained under assumed free-space propagation conditions.

(v) In the band 2496–2500 MHz, the power flux-density at the Earth's surface produced by emissions from nongeostationary space stations for all conditions and all methods of modulation shall not exceed the following values (these values are obtained under assumed free-space propagation conditions):

(1) −144 dB (W/m^2) in 4 kHz for all angles of arrival between 0 and 5 degrees above the horizontal plane; −144 dB (W/m^2) + 0.65(δ −5) in 4 kHz for all angles of arrival between 5 and 25 degrees above the horizontal plane; and

−131 dB (W/m^2) in 4 kHz and for all angles of arrival between 25 and 90 degrees above the horizontal plane.

(2) −126 dB (W/m^2) in 1 MHz for all angles of arrival between 0 and 5 degrees above the horizontal plane; −126 dB (W/m^2) + 0.65(δ −5) in 1 MHz for all angles of arrival between 5 and 25 degrees above the horizontal plane; and

−113 dB (W/m^2) in 1 MHz and for all angles of arrival between 25 and 90 degrees above the horizontal plane.

(w) The power flux density at the Earth's surface produced by emissions from a 17/24 GHz BSS space station operating in the 17.3–17.7 GHz band for all conditions and all methods of modulation must not exceed the regional power flux density levels prescribed in paragraphs (w)(1) through (4) of this section.

(1) In the region of the contiguous United States, located south of 38° North Latitude and east of 100 West Longitude: −115 dBW/m²/MHz.

(2) In the region of the contiguous United States, located north of 38° North Latitude and east of 100° West Longitude: −118 dBW/m²/MHz.

(3) In the region of the contiguous United States, located west of 100 West Longitude: −121 dBW/m²/MHz.

(4) For all regions outside of the contiguous United States including Alaska and Hawaii: −115 dBW/m²/MHz.

NOTE TO PARAGRAPH (w): These limits pertain to the power flux-density that would be obtained under assumed free-space propagation conditions.

[48 FR 40255, Sept. 6, 1983]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 25.208, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov.*

§ 25.209 Earth station antenna performance standards.

(a) Except as provided in paragraph (f) of this section, the co-polarization gain of any earth station antenna operating in the FSS and transmitting to a GSO satellite, including earth stations providing feeder links for satellite services other than FSS, may not exceed the following limits:

(1) In the plane tangent to the GSO arc, as defined in § 25.103, for earth stations not operating in the conventional Ku-band, the 24.75–25.25 GHz band, or the 28.35–30 GHz band:

$29-25\log_{10}\theta$	dBi	for $1.5° \leq \theta \leq 7°$.
8	dBi	for $7° < \theta \leq 9.2°$.
$32-25\log_{10}\theta$	dBi	for $9.2° < \theta \leq 48°$.
−10	dBi	for $48° < \theta \leq 180°$.

Where θ is the angle in degrees from a line from the earth station antenna to the assigned orbital location of the target satellite, and dBi refers to dB relative to an isotropic radiator. This envelope may be exceeded by up to 3 dB in 10% of the range of θ angles from ±7–180°, and by up to 6 dB in the region of main reflector spillover energy.

(2) In the plane tangent to the GSO arc, for earth stations operating in the conventional Ku-band:

$29-25\log_{10}\theta$	dBi	for $1.5° \le \theta \le 7°$.
8	dBi	for $7° < \theta \le 9.2°$.
$32-25\log_{10}\theta$	dBi	for $9.2° < \theta \le 19.1°$.
0	dBi	for $19.1° < \theta \le 180°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section. This envelope may be exceeded by up to 3 dB in 10% of the range of θ angles from ±7–180°, and by up to 6 dB in the region of main reflector spillover energy.

(3) In the plane tangent to the GSO arc, for earth stations operating in the 24.75–25.25 GHz or 28.35–30 GHz bands:

$29-25\log_{10}\theta$	dBi	for $2° \le \theta \le 7°$.
8	dBi	for $7° < \theta \le 9.2°$.
$32-25\log_{10}\theta$	dBi	for $9.2° < \theta \le 19.1°$.
0	dBi	for $19.1° < \theta \le 180°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section. This envelope may be exceeded by up to 3 dB in 10% of the range of θ angles from ±7–180°, and by up to 6 dB in the region of main reflector spillover energy.

(4) In the plane perpendicular to the GSO arc, as defined in § 25.103, for earth stations not operating in the conventional Ku-band, the 24.75–25.25 GHz band, or the 28.35–30 GHz band:

Outside the main beam, the gain of the antenna shall lie below the envelope defined by:

$32-25\log_{10}\theta$	dBi	for $3° < \theta \le 48°$.
-10	dBi	for $48° < \theta \le 180°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section. This envelope may be exceeded by up to 6 dB in 10% of the range of θ angles from ±3–180°, and by up to 6 dB in the region of main reflector spillover energy.

(5) In the plane perpendicular to the GSO arc, for earth stations operating in the conventional Ku-band:

Outside the main beam, the gain of the antenna shall lie below the envelope defined by:

$32-25\log_{10}\theta$	dBi	for $3° < \theta \le 19.1°$.
0	dBi	for $19.1° < \theta \le 180°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section. This envelope may be exceeded by up to 6 dB in 10% of the range of θ angles from ±3–180°, and by up to 6 dB in the region of main reflector spillover energy.

(6) In the plane perpendicular to the GSO arc, for earth stations operating in the 24.75–25.25 GHz or 28.35–30 GHz bands:

Outside the main beam, the gain of the antenna shall lie below the envelope defined by:

$32-25\log_{10}\theta$	dBi	for $3.5° < \theta \le 7°$.
10.9	dBi	for $7° < \theta \le 9.2°$.
$35-25\log_{10}\theta$	dBi	for $9.2° < \theta \le 19.1°$.
3	dBi	for $19.1° < \theta \le 180°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section. This envelope may be exceeded by up to 6 dB in 10% of the range of θ angles from ±3–180°, and by up to 6 dB in the region of main reflector spillover energy.

(b) Except as provided in paragraph (f) of this section, the off-axis cross-polarization gain of any antenna used for transmission from an FSS earth station to a GSO satellite, including earth stations providing feeder links for satellite services other than FSS, may not exceed the following limits:

(1) In the plane tangent to the GSO arc, for earth stations not operating in the 24.75–25.25 GHz or 28.35–30 GHz bands:

$19-25\log_{10}\theta$	dBi	for $1.8° < \theta \le 7°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section.

(2) In the plane perpendicular to the GSO arc, for earth stations not operating in the 24.75–25.25 GHz or 28.35–30 GHz bands:

$19-25\log_{10}\theta$	dBi	for $3° < \theta \le 7°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section.

(3) In the plane tangent to the GSO arc or in the plane perpendicular to the GSO arc, for earth stations operating in the 24.75–25.25 GHz or 28.35–30 GHz bands:

$19-25\log_{10}\theta$	dBi	for $2° < \theta \le 7°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section.

(c)(1) An earth station licensed for operation with an FSS space station or registered for reception of transmissions from such a space station pursuant to § 25.131(b) and (d) is not entitled to protection from interference from authorized operation of other stations that would not cause harmful interference to that earth station if it were using an antenna with receive-band gain patterns conforming to the levels specified in paragraphs (a) and (b) of this section.

(2) A 17/24 GHz BSS telemetry earth station is not entitled to protection from harmful interference from authorized space station operation that would not cause harmful interference to that earth station if it were using an antenna with receive-band gain patterns conforming to the levels specified in paragraphs (a) and (b) of this section. Receive-only earth stations in the 17/24 GHz BSS are entitled to protection from harmful interference caused by other space stations to the extent indicated in § 25.224.

(d) [Reserved]

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(e) An earth station using asymmetrical antennas without skew angle adjustment capability must comply with the gain values specified in paragraph (a)(1) of this section, in the plane orthogonal to the to the main plane of the antenna, or, alternatively, in the plane corresponding to the maximum skew angle experienced at any location at which the earth station may be located.

(f) A GSO FSS earth station with an antenna that does not conform to the applicable standards in paragraphs (a) and (b) of this section will be authorized only if the applicant demonstrates that the antenna will not cause unacceptable interference. This demonstration must comply with the requirements in § 25.138, § 25.218, § 25.220, § 25.221, § 25.222, § 25.226, or § 25.227, as appropriate.

(g) [Reserved]

(h) The gain of any transmitting antenna in a gateway earth station communicating with NGSO FSS satellites in the 10.7–11.7 GHz, 12.75–13.15 GHz, 13.2125–13.25 GHz, 13.8–14.0 GHz, and/or 14.4–14.5 GHz bands must lie below the envelope defined as follows:

$29–25\log_{10}(\theta)$	dBi	for $1° \le \theta \le 36°$.
$−10$	dBi	for $36° \le \theta \le 180°$.

Where θ and dBi are as defined in paragraph (a)(1) of this section. This envelope may be exceeded by up to 3 dB in 10% of the range of θ angles from ±7–180°.

[48 FR 40255, Sept. 6, 1983, as amended at 50 FR 2675, Jan. 18, 1985; 50 FR 39004, Sept. 26, 1985; 58 FR 13420, Mar. 11, 1993; 66 FR 10630, Feb. 16, 2001; 70 FR 32255, June 2, 2005; 72 FR 50029, Aug. 29, 2007; 73 FR 70901, Nov. 24, 2008; 74 FR 57099, Nov. 4, 2009; 78 FR 8427, Feb. 6, 2013; 78 FR 14927, Mar. 8, 2013; 79 FR 8322, Feb. 12, 2014; 81 FR 55336, Aug. 18, 2016; 83 FR 34491, July 20, 2018]

§ 25.210 Technical requirements for space stations.

(a)–(b) [Reserved]

(c) Space station antennas operating in the Direct Broadcast Satellite Service or operating in the Fixed-Satellite Service for reception of feeder links for Direct Broadcast Satellite Service must be designed to provide a cross-polarization isolation such that the ratio of the on-axis co-polar gain to the cross-polar gain of the antenna in the assigned frequency band is at least 27 dB within the primary coverage area.

(d)–(e) [Reserved]

(f) All space stations in the Fixed-Satellite Service operating in any portion of the 3600–4200 MHz, 5091–5250 MHz, 5850–7025 MHz, 10.7–12.7 GHz, 12.75–13.25 GHz, 13.75–14.5 GHz, 15.43–15.63 GHz, 18.3–20.2 GHz, 24.75–25.25 GHz, or 27.5–30.0 GHz bands, including feeder links for other space services, and in the Broadcasting-Satellite Service in the 17.3–17.8 GHz band (space-to-Earth), shall employ state-of-the-art full frequency reuse, either through the use of orthogonal polarizations within the same beam and/or the use of spatially independent beams. This requirement does not apply to telemetry, tracking, and command operation.

(g)–(h) [Reserved]

(i) 17/24 GHz BSS space station antennas transmitting in the 17.3–17.8 GHz band must be designed to provide a cross-polarization isolation such that the ratio of the on axis co-polar gain to the cross-polar gain of the antenna in the assigned frequency band is at least 25 dB within its primary coverage area.

(j) Space stations operated in the geostationary satellite orbit must be maintained within 0.05° of their assigned orbital longitude in the east/west direction, unless specifically authorized by the Commission to operate with a different longitudinal tolerance, and except as provided in Section 25.283(b) (End-of-life Disposal).

[58 FR 13420, Mar. 11, 1993, as amended at 61 FR 9952, Mar. 12, 1996; 62 FR 5931, Feb. 10, 1997; 62 FR 61457, Nov. 18, 1997; 68 FR 51508, Aug. 27, 2003; 69 FR 54587, Sept. 9, 2004; 70 FR 32256, June 2, 2005; 72 FR 50029, Aug. 29, 2007; 78 FR 8428, Feb. 6, 2013; 79 FR 8323, Feb. 12, 2014; 81 FR 55338, Aug. 18, 2016; 83 FR 34491, July 20, 2018]

§ 25.211 Analog video transmissions in the FSS.

(a) [Reserved]