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]

§ 25.209 Earth station antenna performance standards.

(a) Except as provided in paragraph (f) of this section, the gain of any antenna to be employed in transmission from an earth station in the Fixed-Satellite Service shall lie below the relevant envelope defined in paragraphs (a)(1) through (4) of this section:

(1) In the plane of the geostationary satellite orbit as it appears at the particular earth station location, for earth stations not operating in the 20/30 GHz band or conventional Ku-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 the axis of the main lobe, and dBi refers to dB relative to an isotropic radiator. For the purposes of this section, the peak gain of an individual sidelobe may not exceed the envelope defined above for θ between 1.5 and 7.0 degrees. For θ greater than 7.0 degrees, the envelope may be exceeded by no more than 10% of the sidelobes, provided no individual sidelobe exceeds the gain envelope given above by more than 3 dB.

(2) In the plane of the geostationary satellite orbit as it appears at the particular earth station location, for earth stations operating in the 20/30 GHz band or conventional Ku-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	$48° < \theta \leq 85°$
0	dBi	For	$85° < \theta \leq 180°$

(3) In all other directions, or in the plane of the horizon including any out-of-plane potential terrestrial interference paths, for all earth stations not operating in the 20/30 GHz band or 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	$3° < \theta \leq 48°$
−10	dBi	For	$48° < \theta \leq 180°$

where θ and dBi are defined above. For the purposes of this section, the envelope may be exceeded by no more than 10% of the sidelobes provided no individual sidelobe exceeds the gain envelope given above by more than 6 dB. The region of the main reflector

spillover energy is to be interpreted as a single lobe and shall not exceed the envelope by more than 6 dB.

(4) In all other directions, or in the plane of the horizon including any out-of-plane potential terrestrial interference paths, for all earth stations operating in the 20/30 GHz band or conventional Ku-band:

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

32−25log$_{10}$θ.	dBi	For	3° <θ ≤48°
−10	dBi	For	48° <θ ≤85°
0	dBi	For	85° <θ ≤180°

where θ and dBi are defined above. For the purposes of this section, the envelope may be exceeded by no more than 10% of the sidelobes provided no individual sidelobe exceeds the gain envelope given above by more than 6 dB. The region of the main reflector spillover energy is to be interpreted as a single lobe and shall not exceed the envelope by more than 6 dB.

(5) Elliptical earth station antennas may be operated only when the major axis of the antenna is aligned with the plane of the geostationary satellite orbit as it appears at the particular earth station location.

(b) Except as provided in paragraph (f) of this section, the off-axis cross-polarization gain of any antenna to be employed in transmission from an earth station to a space station in the Fixed-Satellite Service shall be defined as follows:

(1) In the plane of the geostationary satellite orbit as it appears at the particular earth station location:

19−25log$_{10}$θ.	dBi	For	1.8° <θ ≤7°
−2	dBi	For	7° <θ ≤9.2°

where θ is the angle in degrees from the axis of the main lobe, and dBi refers to dB relative to an isotropic radiator.

(2) In all other directions, or in the plane of the horizon including any out-of-plane potential terrestrial interference paths:

19−25log$_{10}$θ.	dBi	For	3° <θ ≤7°
−2	dBi	For	7° <θ ≤9.2°

where θ and dBi are defined above.

(c)(1) Earth station antennas licensed for reception of radio transmissions from a space station in the Fixed-Satellite Service are protected from radio interference caused by other space stations only to the degree to which harmful interference would not be expected to be caused to an earth station employing an antenna conforming to the referenced patterns defined in paragraphs (a) and (b) of this section, and protected from radio interference caused by terrestrial radio transmitters identified by the frequency coordination process only to the degree to which harmful interference would not be expected to be caused to an earth station conforming to the reference pattern defined in paragraphs (a)(3) and (4) of this section.

(2) 17/24 GHz BSS telemetry earth stations are protected from harmful interference caused by other space stations to the extent set forth in paragraph (c)(1) of this section. Receive-only earth stations in the 17/24 GHz BSS are protected from harmful interference caused by other space stations to the extent set forth in § 25.224 of this part.

(d) [Reserved]

(e) The operations of any earth station with an antenna not conforming to the standards of paragraphs (a) and (b) of this section shall impose no limitations upon the operation, location or design of any terrestrial station, any other earth station, or any space station beyond those limitations that would be expected to be imposed by an earth station employing an antenna conforming to the reference patterns defined in paragraphs (a) and (b) of this section.

(f) An earth station with an antenna not conforming to relevant 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. For ESVs in the C-band, this demonstration must comply with the procedures set forth in § 25.221. For ESVs in the

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Ku-band, this demonstration must comply with the procedures set forth in § 25.222. For VMES, this demonstration shall comply with the procedures set forth in § 25.226. For ESAAs, this demonstration shall comply with the procedures set forth in § 25.227. For feeder-link earth stations in the 17/24 GHz BSS, this demonstration must comply with the procedures set forth in § 25.223. For other FSS earth stations, this demonstration must comply with the requirements in § 25.138, § 25.218, or § 25.220. In any case, the Commission will impose appropriate terms and conditions in its authorization of such facilities and operations.

(g) [Reserved]

(h)(1) The gain of any transmitting gateway earth station antenna operating in the 10.7–11.7 GHz, 12.75–13.15 GHz, 13.2125–13.25 GHz, 13.8–14.0 GHz, and 14.4–14.5 GHz bands and communicating with NGSO FSS satellites must lie below the envelope defined as follows:

$29–25\log_{10}(\theta)$ dBi for $1° ≤ \theta ≤ 36°$

$–10$ dBi for $36° < \theta ≤ 180°$

Where:

θ is the angle in degrees from the axis of the main lobe, and dBi means dB relative to an isotropic radiator.

(2) For the purposes of this section, the peak gain of an individual sidelobe may not exceed the envelope defined in paragraph (h)(1) of this section.

[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]

§ 25.210 Technical requirements for space stations.

(a) All space stations in the Fixed-Satellite Service used for domestic service in the 3700–4200 MHz and 5925–6425 MHz frequency bands shall:

(1) Use orthogonal linear polarization with one of the planes defined by the equatorial plane;

(2) Be designed so that the polarization sense of uplink transmissions is opposite to that of downlink transmissions on the same transponder; and

(3) Shall be capable of switching polarization sense upon ground command.

(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)(1) Space station antennas in the Fixed-Satellite Service, other than antennas in the 17/24 GHz BSS, 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 shall be at least 30 dB within its primary coverage area.

(2) Space station antennas in the 17/24 GHz Broadcasting 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 shall be 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,