§ 15.707 Permissible channels of operation.

(a) All TVBDs are permitted to operate in the frequency bands 512–608 MHz and 614–698 MHz, except that in the 13 metropolitan areas listed §90.303(a) of this chapter and nearby areas where private land mobile services and commercial land mobile services are authorized by waiver, operation of TVBDs is prohibited on the first channel on each side of TV channel 37 (608–614 MHz) that is available at all locations within the protection range of the coordinates of each such area as set forth in §15.712(d). These channels will be listed in the TV bands database.

(b) Operation in the bands 54–60 MHz, 76–88 MHz, 174–216 MHz, and 470–512 MHz is permitted only for fixed TVBDs that communicate only with other fixed TVBDs.

(c) Fixed and Mode II TVBDs shall only operate on available channels as determined by the TV bands database and in accordance with the interference avoidance mechanisms of §15.711.

(d) Mode I TVBDs shall only operate on available channels provided to it from a Fixed or Mode II TVBD.

§ 15.709 General technical requirements.

(a) *Power limits for TVBDs are as follows:* (1) For fixed TVBDs, the maximum conducted output power over the TV channel of operation shall not exceed one watt. Transmitter power will be measured at the antenna input to account for any cable losses between the transmitter and the antenna. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For personal/portable TVBDs, the maximum conducted output power over the TV channel of operation shall not exceed 100 milliwatts; except that for personal/portable TVBDs that do not meet the adjacent channel separation requirements in §15.712(a), the maximum conducted output power shall not exceed 40 milliwatts. If transmitting antennas of directional gain greater than 0 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 0 dBi.

(3) TVBDs shall incorporate transmit power control to limit their operating power to the minimum necessary for successful communication. Applicants for certification shall include a description of a device's transmit power control feature mechanism.

(4) Maximum conducted output power is the total transmit power in the entire emission bandwidth delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (*e.g.*, alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(b) *Antenna requirements.* (1) For personal/portable TVBDs, the antenna shall be permanently attached.

(2) The receive antenna used with fixed devices shall be located outdoors at least 10 meters above the ground. The antenna system shall be capable of receiving signals of protected services equally in all directions. The transmit antenna used with fixed devices may not be more than 30 meters above the ground.

(3) For both fixed and personal/portable TVBDs, the provisions of §15.204(c)(4) do not apply to an antenna used for transmission and reception/spectrum sensing.

(4) For both fixed and personal/portable TVBDs with a separate sensing antenna, compliance testing shall be performed using the lowest gain antenna for each type of antenna to be certified.

(c) Undesirable emission limits for TVBDs are as follows:

(1) In the 6 MHz channels adjacent to the operating channel, emissions from TVBD devices shall be at least 55 dB below the highest average power in the band in which the device is operating.

(2) The above emission measurements shall be performed using a minimum resolution bandwidth of 100 kHz with an average detector. A narrower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 100 kHz.

(3) At frequencies beyond 6 MHz from the edge of the operating channel, radiated emissions from TVBD devices shall meet the requirements of §15.209.

(4) Emissions in the band 602–620 MHz must also comply with the following field strength limits at a distance of one meter.

Frequency (MHz)	Field strength dBμV/meter/120 kHz
602–607	120–5[F(MHz)–602]
607–608	95
608–614	30
614–615	95
615–620	120–5[620–F(MHz)]

(5) TVBDs connected to the AC power line are required to comply with the conducted limits set forth in §15.207.

(d) Compliance with radio frequency exposure requirements. To ensure compliance with the Commission's radio frequency exposure requirements in §§1.1307(b), 2.1091 and 2.1093 of this chapter, fixed TVBDs shall be accompanied by instructions on measures to take to ensure that persons maintain a distance of at least 40 cm from the device, as well as any necessary hardware that may be needed to implement that protection. These instructions shall be submitted with the application for certification. Personal/portable TVBDs that meet the definition of portable devices under §2.1093 of this chapter and that operate with a source-based time-averaged output of less than 20 mW will not be subject to routine evaluation for compliance with the radio frequency exposure guidelines, while devices that operate with a source-based time-average output power greater than 20 mW will be subject to the routine evaluation requirements.

§15.711 Interference avoidance mechanisms.

(a) Except as provided in §15.717, television channel availability for a TVBD is determined based on either the geo-location and database access mechanism described in paragraph (b) of this section or spectrum sensing described in paragraph (c) of this section.

(1) A TVBD shall rely on the geo-location and database access mechanism to identify available television channels consistent with the interference protection requirements of §15.712. Such protection will be provided for the following authorized services: digital television stations, digital and analog Class A, low power, translator and booster stations; translator receive operations; fixed broadcast auxiliary service links; private land mobile service/commercial radio service (PLMRS/CMRS) operations; offshore radiotelephone service; and cable system head-ends. In addition, protection shall be provided in border areas near Canada and Mexico in accordance with §15.712(g).

(2) For low power auxiliary services authorized pursuant to §§74.801 through 74.882 of this chapter, including wireless microphones, a TVBD shall rely on the geo-location and database access mechanism to identify available television channels to provide interference protection to registered locations of such operations, consistent with the requirements of §15.712, and shall rely on spectrum sensing to identify available television channels to provide interference protection to all other operations.

(b) *Geo-location and database access.* (1) The geographic coordinates of a fixed TVBD shall be determined to an accuracy of ±50 meters by either an incorporated geo-location capability or a professional installer. In the case of professional installation, the party who registers the fixed TVBD in the database will be responsible for assuring the accuracy of the entered coordinates. The geographic coordinates of a fixed TVBD shall be determined at the time of installation and first activation from a power-off condition, and this information may be stored internally in the TVBD. If the fixed TVBD is moved to another location or if the stored coordinates become altered, the operator shall re-establish the device's:

(i) Geographic location and store this information in the TVBD either by means of the device's incorporated geo-