

TABLE 1 TO § 90.210—APPLICABLE EMISSION MASKS—Continued

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
220–222 .....	F .....	F
421–512 <sup>2, 5</sup> .....	B, D, or E .....	C, D, or E
450 paging only .....	B .....	G
806–809/851–854 <sup>6</sup> .....	B .....	H
809–824/854–869 <sup>3, 5</sup> .....	B, D .....	D, G.
896–901/935–940 .....	I .....	J
902–928 .....	K .....	K
929–930 .....	B .....	G
4940–4990 MHz .....	L or M .....	L or M
5850–5925 <sup>4</sup> .....		
All other bands .....	B .....	C

<sup>1</sup> Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.  
<sup>2</sup> Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.  
<sup>3</sup> Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of § 90.691 of this chapter.  
<sup>4</sup> DSRCS Roadside Units equipment in the 5850–5925 MHz band is governed under subpart M of this part.  
<sup>5</sup> Equipment designed to operate on 25 kilohertz bandwidth channels must meet the requirements of either Emission Mask B or G, whichever is applicable, while equipment designed to operate on 12.5 kilohertz bandwidth channels must meet the requirements of Emission Mask D. Equipment designed to operate on 25 kilohertz bandwidth channels may alternatively meet the Adjacent Channel Power limits of § 90.221.  
<sup>6</sup> Transmitters utilizing analog emissions that are equipped with an audio low-pass filter must meet Emission Mask B. All transmitters utilizing digital emissions and those transmitters using analog emissions without an audio low-pass filter must meet Emission Mask H.

[60 FR 37264, July 19, 1995]

EDITORIAL NOTES: 1. For FEDERAL REGISTER citations affecting § 90.210, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at [www.govinfo.gov](http://www.govinfo.gov).

2. At 85 FR 43139, July 16, 2020, § 90.610 was amended in the table by adding an entry in numerical order for “896–901/935–940”, however due to an inaccurate amendatory instruction, this amendment could not be incorporated.

**§ 90.212 Provisions relating to the use of scrambling devices and digital voice modulation.**

(a) Analog scrambling techniques may be employed at any station authorized the use of A3E, F3E, or G3E emission, subject to the provision of paragraph (d) of this section.

(b) The use of digital scrambling techniques or digital voice modulation requires the specific authorization of F1E or G1E emission, and these emissions will only be authorized subject to the provisions of paragraph (d) of this section.

(c) The transmission of any non-voice information or data under the authorization of F1E or G1E emission is prohibited. However, stations authorized the use of F1E or G1E emission may also be authorized F1D, F2D, G1D or

G2D emission for non-voice communication purposes, pursuant to § 90.207(l).

(d) Station identification shall be transmitted in the unscrambled analog mode (clear voice) or Morse code in accordance with the provisions of § 90.425. All digital encoding and digital modulation shall be disabled during station identification.

[43 FR 54791, Nov. 22, 1978, as amended at 47 FR 15340, Apr. 9, 1982; 49 FR 48711, Dec. 14, 1984; 72 FR 35195, June 27, 2007]

**§ 90.213 Frequency stability.**

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

TABLE 1 TO § 90.213(a)—MINIMUM FREQUENCY STABILITY  
 [Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25 .....	1 <sup>2, 3</sup> 100	100	200
25–50 .....	20	20	50
72–76 .....	5	.....	50
150–174 .....	5 <sup>11, 5</sup>	6 <sup>5</sup>	4 <sup>6</sup> 50
216–220 .....	1.0	.....	1.0

TABLE 1 to § 90.213(a)—MINIMUM FREQUENCY STABILITY—Continued  
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
220–222 <sup>12</sup>	0.1	1.5	1.5
421–512	<sup>7</sup> 1.1 <sup>14</sup> 2.5	<sup>8</sup> 5	<sup>8</sup> 5
806–809	<sup>14</sup> 1.0	1.5	1.5
809–824	<sup>14</sup> 1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	<sup>14</sup> 0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928 <sup>13</sup>	2.5	2.5	2.5
929–930	1.5	.....	.....
935–940	0.1	1.5	1.5
1427–1435	<sup>9</sup> 300	300	300
Above 2450 <sup>10</sup>	.....	.....	.....

<sup>1</sup>Fixed and base stations with over 200 watts transmitter power must have a frequency stability of 50 ppm except for equipment used in the Public Safety Pool where the frequency stability is 100 ppm.

<sup>2</sup>For single sideband operations below 25 MHz, the carrier frequency must be maintained within 50 Hz of the authorized carrier frequency.

<sup>3</sup>Travelers information station transmitters operating from 530–1700 kHz and transmitters exceeding 200 watts peak envelope power used for disaster communications and long distance circuit operations pursuant to §§ 90.242 and 90.264 must maintain the carrier frequency to within 20 Hz of the authorized frequency.

<sup>4</sup>Stations operating in the 154.45 to 154.49 MHz or the 173.2 to 173.4 MHz bands must have a frequency stability of 5 ppm.

<sup>5</sup>In the 150–174 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

<sup>6</sup>In the 150–174 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth or designed to operate on a frequency specifically designated for itinerant use or designed for low-power operation of two watts or less, must have a frequency stability of 5.0 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 2.0 ppm.

<sup>7</sup>In the 421–512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.

<sup>8</sup>In the 421–512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

<sup>9</sup>Fixed stations with output powers above 120 watts and necessary bandwidth less than 3 kHz must operate with a frequency stability of 100 ppm. Fixed stations with output powers less than 120 watts and using time-division multiplex, must operate with a frequency stability of 500 ppm.

<sup>10</sup>Except for DSRCS equipment in the 5850–5925 MHz band, frequency stability is to be specified in the station authorization. Frequency stability for DSRCS equipment in the 5850–5925 MHz band is specified in subpart M of this part.

<sup>11</sup>Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150–174 MHz band and 2.5 ppm in the 421–512 MHz band.

<sup>12</sup>Mobile units may utilize synchronizing signals from associated base stations to achieve the specified carrier stability.

<sup>13</sup>Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge, intermittently operated hand-held readers, and mobile transponders are not subject to frequency tolerance restrictions.

<sup>14</sup>Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

(b) For the purpose of determining the frequency stability limits, the

power of a transmitter is considered to be the maximum rated output power as specified by the manufacturer.

[60 FR 37266, July 19, 1995, as amended at 61 FR 4235, Feb. 5, 1996; 61 FR 18986, Apr. 30, 1996; 61 FR 38403, July 24, 1996; 62 FR 2040, Jan. 15, 1997; 62 FR 18927, Apr. 17, 1997; 67 FR 41860, June 20, 2002; 69 FR 46443, Aug. 3, 2004; 69 FR 67838, Nov. 22, 2004; 85 FR 43139, July 15, 2020]

EDITORIAL NOTE: At 85 FR 43139, July 16, 2020, § 90.613 was amended in the table by adding entries in numerical order for “896–901” and “935–940”, however due to an inaccurate amendatory instruction, this amendment could not be incorporated.

§ 90.214 Transient frequency behavior.

Transmitters designed to operate in the 150–174 MHz and 421–512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals <sup>1 2</sup>	Maximum frequency difference <sup>3</sup>	All equipment	
		150 to 174 MHz	421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t <sub>1</sub> <sup>4</sup> .....	±25.0 kHz	5.0 ms	10.0 ms
t <sub>2</sub> .....	±12.5 kHz	20.0 ms	25.0 ms
t <sub>3</sub> <sup>4</sup> .....	±25.0 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t <sub>1</sub> <sup>4</sup> .....	±12.5 kHz	5.0 ms	10.0 ms
t <sub>2</sub> .....	±6.25 kHz	20.0 ms	25.0 ms
t <sub>3</sub> <sup>4</sup> .....	±12.5 kHz	5.0 ms	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t <sub>1</sub> <sup>4</sup> .....	±6.25 kHz	5.0 ms	10.0 ms
t <sub>2</sub> .....	±3.125 kHz	20.0 ms	25.0 ms
t <sub>3</sub> <sup>4</sup> .....	±6.25 kHz	5.0 ms	10.0 ms

<sup>1</sup>on is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.

t<sub>1</sub> is the time period immediately following t<sub>on</sub>.

t<sub>2</sub> is the time period immediately following t<sub>1</sub>.

t<sub>3</sub> is the time period from the instant when the transmitter is turned off until t<sub>off</sub>.

t<sub>off</sub> is the instant when the 1 kHz test signal starts to rise.

<sup>2</sup> During the time from the end of t<sub>2</sub> to the beginning of t<sub>3</sub>, the frequency difference must not exceed the limits specified in § 90.213.

<sup>3</sup> Difference between the actual transmitter frequency and the assigned transmitter frequency.

<sup>4</sup> If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

[62 FR 2040, Jan. 15, 1997]