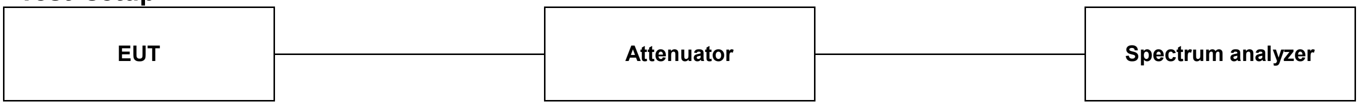
3.3 Emission mask

Test setup



Test procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator
2. Use the following spectrum analyzer setting
   Span = 120 ㎑
   RBW = 100 ㎐
   VBW = 100 ㎐ (≥ RBW)
   Sweep = auto
   Detector function = peak
   Trace = max hold
3. Mark the peak frequency with maximum peak power as the center of the display of the spectrum analyzer.
4. Record the power spectrum analyzer and compare to the mask.

Limit

According to FCC part 90.210(d) Emission Mask D – 12.5 ㎑ channel bandwidth equipment. For transmitters designed to operate with a 12.5 ㎑ channel bandwidth, any emission must be attenuated below the power(P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 ㎑ removed from f_0: Zero ㏈.
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in ㎑) of more than 5.625 ㎑, but no more than 12.5 ㎑: At least 7.27 (f_d-2.88 ㎑) ㏈.
(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in ㎑) of more than 12.5 ㎑: At least 50 + 10log(P) ㏈ or 70 ㏈, whichever is the lesser attenuation.

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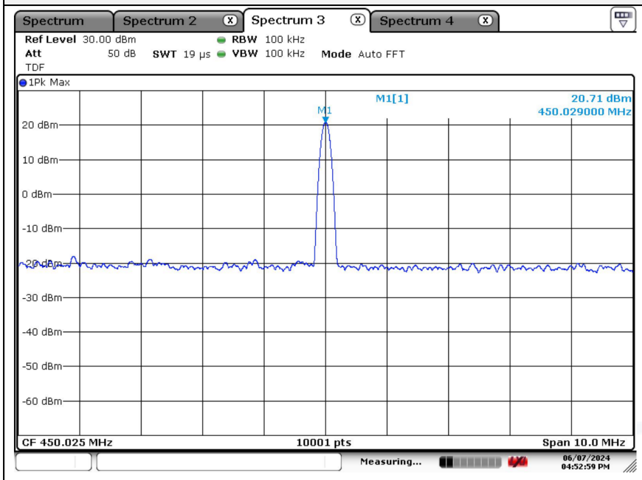
The power of any emission shall be attenuated below the transmitter output power P(㏈W) as specified in Table 7.

Table 7 – Emission Mask D

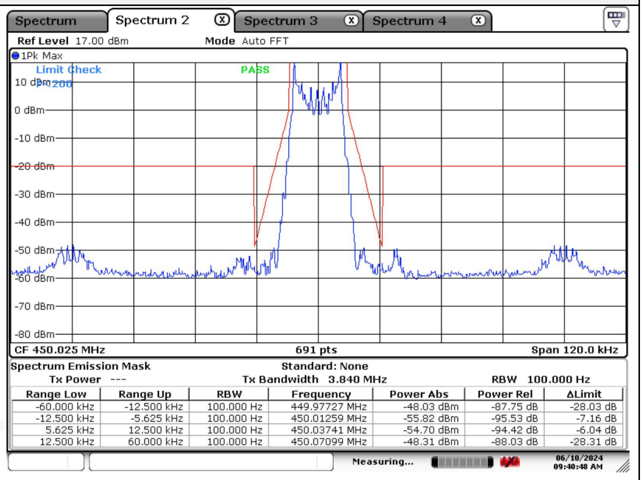
Displacement Frequency, f_d(㎑)	Minimum Attenuation (㏈)	Resolution Bandwidth (㎐)
5.625 < f_d ≤ 12.5	7.27 (f_d-2.88)	Specified in Section 4.2.2
f_d > 12.5	Whichever is the lesser: 70 or 50 + 10 $\log_{10}$ (P)	Specified in Section 4.2.2

Test results

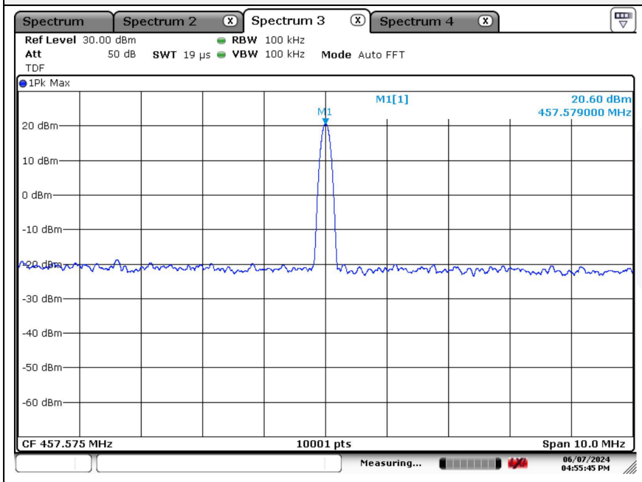
Low channel_Fundamental level



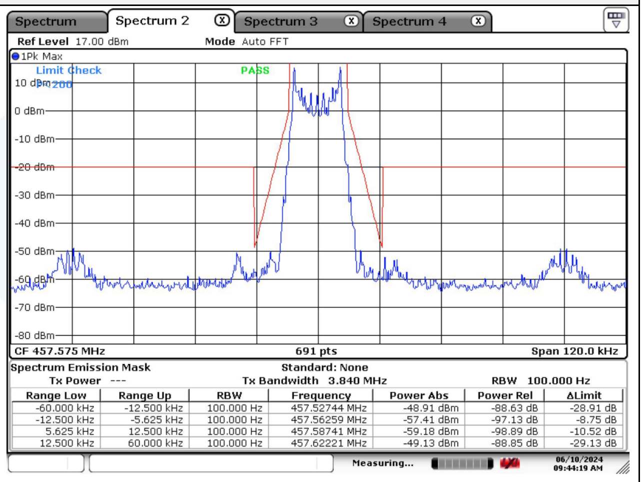
Low channel_Emission mask



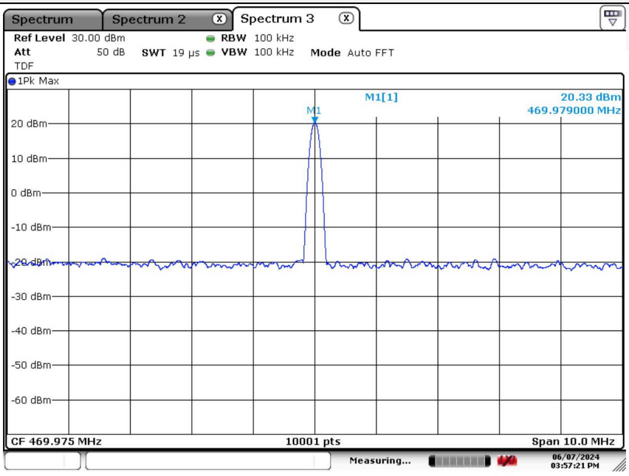
Middle channel_Fundamental level



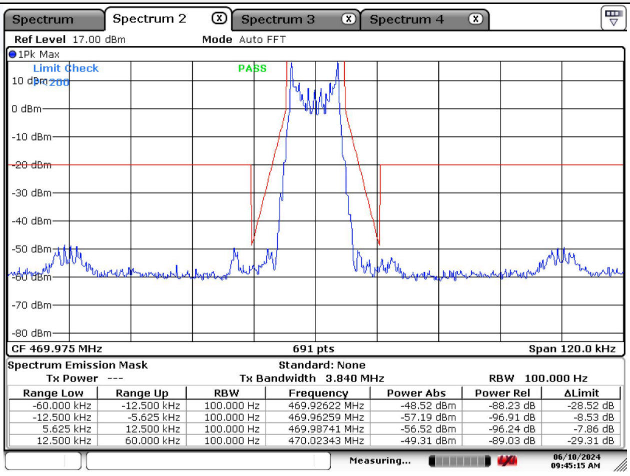
Middle channel_Emission mask



High channel_Fundamental level



High channel _Emission mask



3.4 Conducted spurious emissions

Test setup

Test procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator
2. Use the following spectrum analyzer setting
   Span = 30 ㎒ to 5 ㎓
   RBW = 100 ㎑(< 1 ㎓), 1 ㎒(> 1 ㎓)
   VBW = 300 ㎑(< 1 ㎓), 3 ㎒(> 1 ㎓)
   Sweep = auto
   Detector function = peak
   Trace = max hold

Limit

According to FCC part 90.210(d) Emission Mask D – 12.5 ㎑ channel bandwidth equipment. For transmitters designed to operate with a 12.5 ㎑ channel bandwidth, any emission must be attenuated below the power(P) of the highest emission contained within the authorized bandwidth as follows:

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in ㎑) of more than 12.5 ㎑: At least 50 + 10log(P) ㏈ or 70 ㏈, whichever is the lesser attenuation.

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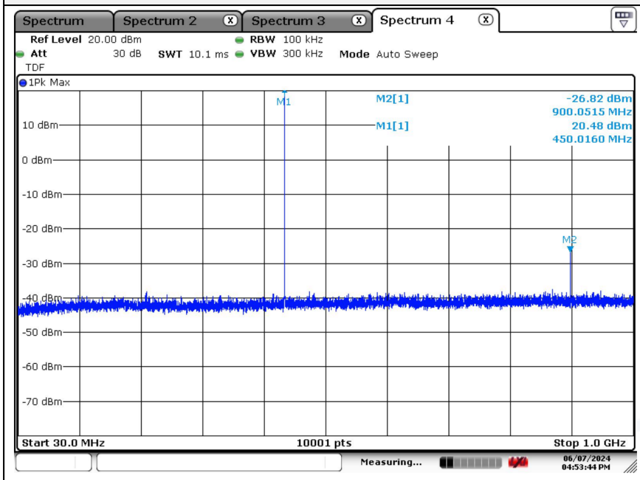
The power of any emission shall be attenuated below the transmitter output power P(㏈W) as specified in Table 7.

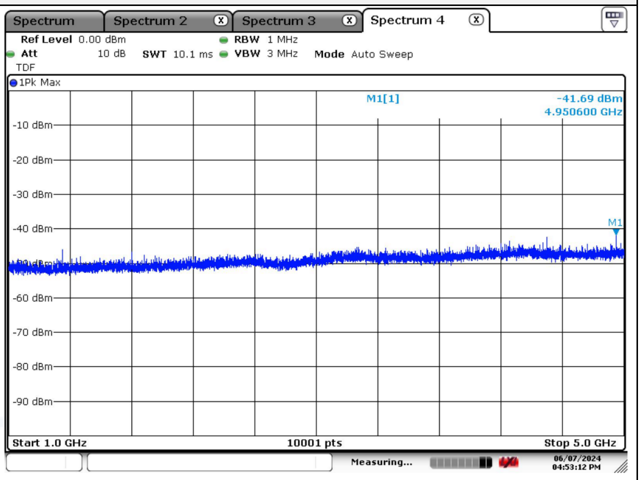
Table 7 – Emission Mask D

Displacement Frequency, f_d(㎑)	Minimum Attenuation (㏈)	Resolution Bandwidth (㎐)
5.625 < f_d ≤ 12.5	7.27 (f_d - 2.88)	Specified in Section 4.2.2
f_d > 12.5	Whichever is the lesser: 70 or 50 + 10 $\log_{10}$(P)	Specified in Section 4.2.2

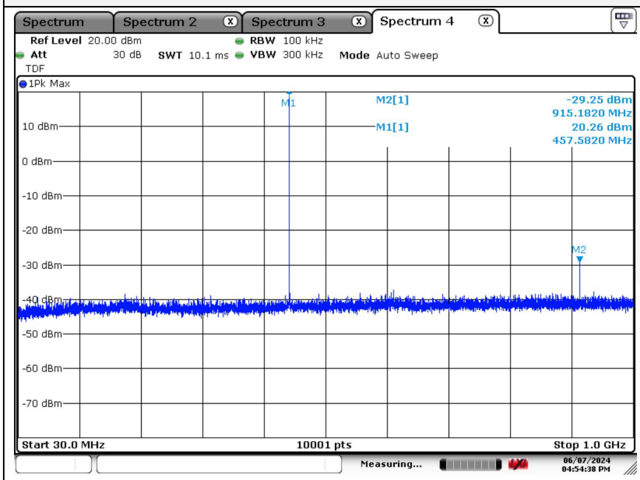
Test results

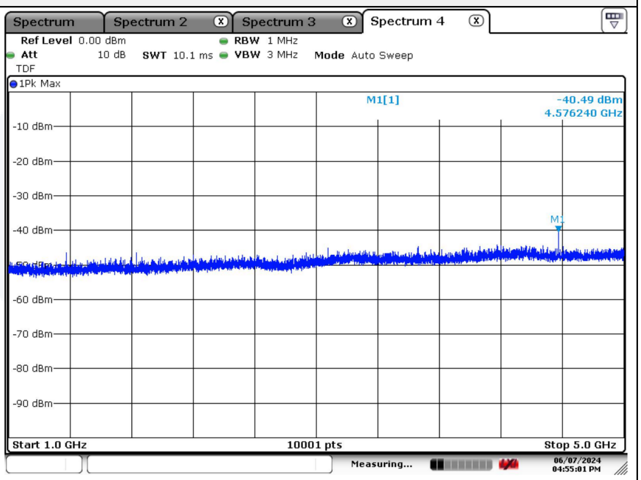
Low channel



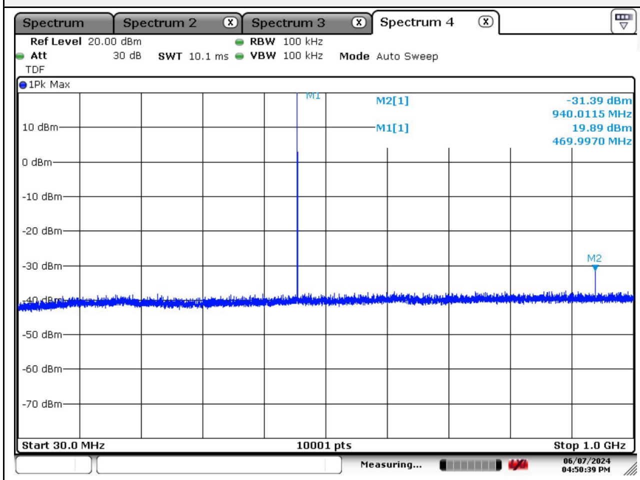


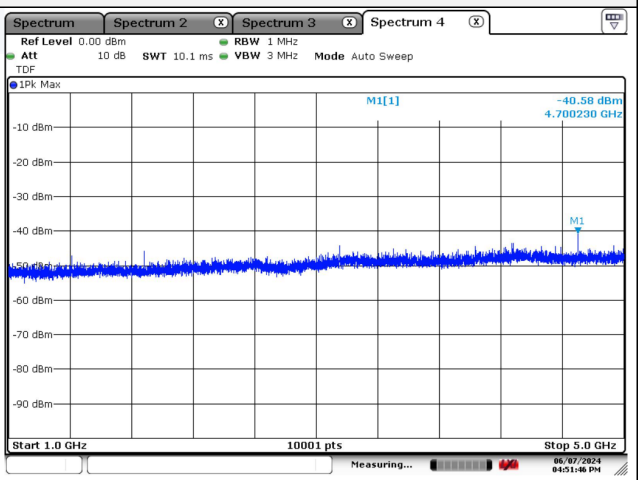
Middle channel





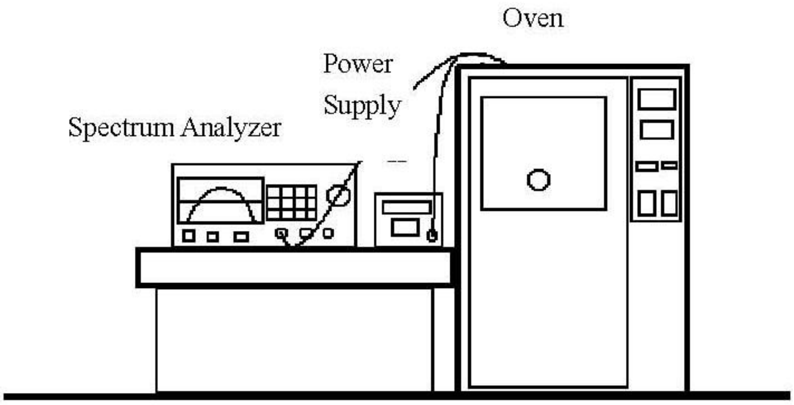
High channel





3.5 Frequency stability

Test setup



Test procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The transmission time was measured with the spectrum analyzer using RBW=1 ㎑, VBW=1 ㎑.
3. Set the temperature of chamber to -30℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10℃ decreased per stage until the highest temperature 50℃ is measured, record all measured frequencies on each temperature step.

Limit

1. According to FCC part 2 section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from -30 ℃ to +50 ℃ centigrade.
2. According to FCC part section 2.1055(d)(2), for battery powered equipment the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
3. According to FCC part 90 section 90.213, (a) Unless noted elsewhere, transmitters used in the services overned by this part must have a minimum frequency stability as specified in the following table.

Minimum Frequency Stability [Parts per million (ppm)]

Frequency range (㎒)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3]100	100	200
25–50	20	20	50
72–76	5		50
150–174	[5,11]5	[6]5	[4,6]50
216–220	1.0		1.0
220–222[12]	0.1	1.5	1.5
421–512	[7,11,14]2.5	[8]5	[8]5
806–809	[14]1.0	1.5	1.5
809–824	[14]1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	[14]0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928[13]	2.5	2.5	2.5
929–930	1.5		
935–940	0.1	1.5	1.5
1427–1435	[9]300	300	300
Above 2450[10]			

[1]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.

[2]For single sideband operations below 25 ㎒, the carrier frequency must be maintained within 50 ㎐ of the authorized carrier frequency.

[3]Travelers information station transmitters operating from 530 ~ 1 700 ㎑ 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 ㎐ of the authorized frequency.

[4]Stations operating in the 154.45 to 154.49 ㎒ or the 173.2 to 173.4 ㎒ bands must have a frequency stability of 5 ppm.

[5]In the 150 ~ 174 ㎒ band, fixed and base stations with a 12.5 ㎑ channel bandwidth must have a frequency stability of 2.5 ppm. Fixed and base stations with a 6.25 ㎑ channel bandwidth must have a frequency stability of 1.0 ppm.

[6]In the 150 ~ 174 ㎒ band, mobile stations designed to operate with a 12.5 ㎑ 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 ㎑ channel bandwidth must have a frequency stability of 2.0 ppm.

[7]**In the 421 ~ 512 ㎒ band, fixed and base stations with a 12.5 ㎑ channel bandwidth must have a frequency stability of 1.5 ppm.** Fixed and base stations with a 6.25 ㎑ channel bandwidth must have a frequency stability of 0.5 ppm.

[8]In the 421 ~ 512 ㎒ band, mobile stations designed to operate with a 12.5 ㎑ channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 ㎑ channel bandwidth must have a frequency stability of 1.0 ppm.

[9]Fixed stations with output powers above 120 watts and necessary bandwidth less than 3 ㎑ 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.

[10]Except for DSRCS equipment in the 5 850 ~ 5 925 ㎒ band, frequency stability is to be specified in the station authorization. Frequency stability for DSRCS equipment in the 5 850 ~ 5 925 ㎒ band is specified in subpart M of this part.

[11]Paging transmitters operating on paging-only frequencies must operate with frequency stability of 5 ppm in the 150 ~ 174 ㎒ band and 2.5 ppm in the 421 ~ 512 ㎒ band.

[12]Mobile units may utilize synchronizing signals from associated base stations to achieve the specified carrier stability.

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

[14]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.

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The carrier frequency shall not depart from the reference frequency in excess of the values given in Table 1. For transmitters which have an output power of less than 120 ㎽, the frequency stability may comply with the limits listed in Table 1, of alternatively with the conditions in Section 5.10.

For fixed and base station equipment, in lieu of meeting the frequency stability limit specified in Table 1, the test report can show that the frequency stability is met by demonstrating that the unwanted emission limits, related to the equipment's nominal carrier frequency measured under normal operation, are met when the equipment is tested at the temperature and supply voltage variations specified for the frequency stability measurement in RSS-Gen.

Table 1 – Transmitter Frequency Stability

Frequency range (㎒)	**Channel Spacing (㎑)**	**Frequency Stability (ppm)**		
		Base/Fixed	**Mobile stations**	
			> 2 watts	**≤ 2 watts**
27.41 ~ 28 and 29.7 ~ 50	20	20	20	50
72 ~ 76	20	5	20	50
138 ~ 174	30	5	5	5
	15	2.5	5	5
	7.5	1	2	5
217 ~ 218 and 219 ~ 220	12.5	1	5	5
220 ~ 222 (Note 1)	5	0.1	1.5	1.5
406.1 ~ 430 and 450 ~ 470 (Note 6)	25 (Note 2)	0.5	1	1
	25	2.5	5	5
	12.5	**1.5**	2.5	2.5
	6.25	0.5	1	1
764 ~ 776 and 794 ~ 806 (Note 3)	6.25 12.5 25	0.1	0.4 (Note 4)	0.4 (Note 4)
	50	1	1.25 (Note 5)	1.25 (Note 5)
806 ~ 821 / 851 ~ 866 and 821 ~ 824 / 866 ~ 869 (Note 6)	25 (Note 2)	0.1	0.1	0.1
	25	1.5	2.5	2.5
	12.5	1	1.5	1.5
896 ~ 901 / 935 ~ 940 (Note 6)	12.5	0.1	1.5	1.5
929 ~ 930 / 931 ~ 932	25	1.5	N/A	N/A
928 ~ 929 / 952 ~ 953 and 932 ~ 932.5 / 941 ~ 941.5	25	1.5	N/A	N/A
	12.5	1	3 (for remote station)	N/A
932.5 ~ 935 / 941.5 ~ 944	25	2.5	N/A	N/A
	12.5	2.5	N/A	N/A

Notes:

1. Mobile units may use synchronizing signals from associated base stations to achieve the specified carrier stability.

2. This provision is for digital equipment with a channel bandwidth of 25 ㎑ and an occupied bandwidth greater than 20 ㎑. The mobile station's frequency stability values given in Table 1 are for mobile, portable and control transmitters using automatic frequency control (AFC) to lock onto the base station signal. When the mobile, portable and control transmitters are operating without using AFC to lock onto the base station signal, the frequency stability limit shall be better than 1 ㎑ and the equipment's unwanted emissions measured with maximum frequency shift shall still comply with emission mask Y (Section 5.8.10) at nominal carrier frequency.

3. Mobile, portable and control transmitters operating in the bands 768-776 MHz and 798-806 MHz must normally use AFC to lock onto the base station signal. The mobile station's frequency stability values given in Table 1 are for mobile stations operating under this condition.

4. When the mobile, portable and control transmitters are operating with channel bandwidths equal to 6.25 ㎑, 12.5 ㎑ or 25 ㎑ in the band 768-776 MHz and the AFC is not locked onto the base station signal, the frequency stability must be equal to or better than 1 ppm for 6.25 ㎑, 1.5 ppm for 12.5 ㎑ (2-channel aggregate), and 2.5 ppm for 25 ㎑ (4-channel aggregate).

5. When the mobile, portable and control transmitters are operating with channel bandwidths equal to 50 ㎑ in the band 768-776 ㎒ and the AFC is not locked onto the base station signal, the frequency stability must be equal to or better than 5 ppm.

6. Control stations may operate with the frequency stability specified for associated mobile frequencies.

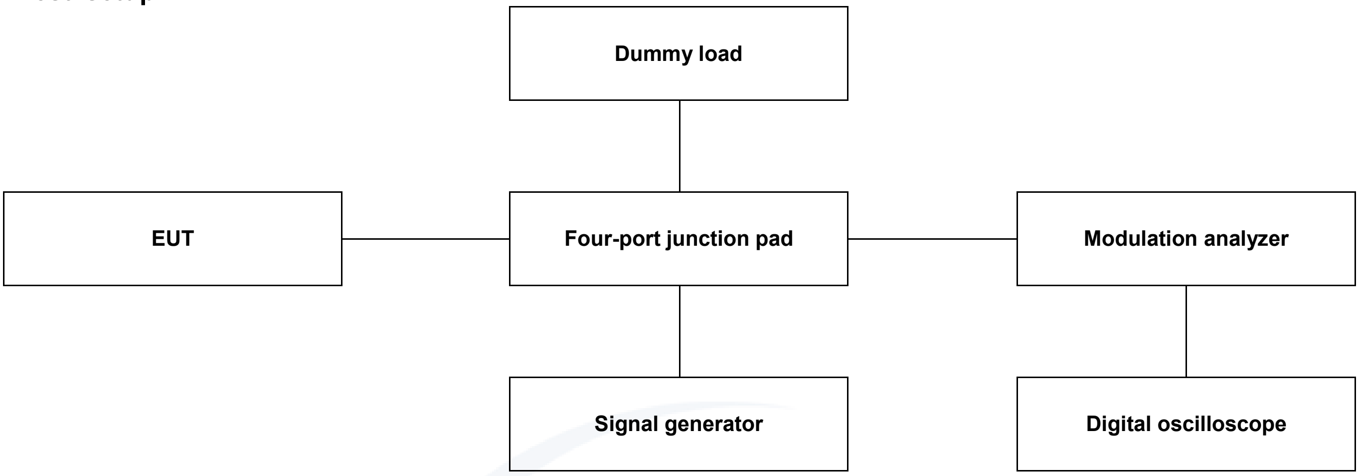
Test results

Assigned frequency (㎒): 457.575

Test voltage (%)	Test voltage (V)	Temperature (℃)	Measure frequency (㎒)	Frequency deviation (㎐)	Frequency deviation (ppm)	Limit (ppm)	
						FCC	IC
100 %	AC 120	-30	457.574889	-111	-0.24	1.5	1.5
		-20	457.574900	-100	-0.22		
		-10	457.574899	-101	-0.22		
		0	457.574910	-90	-0.20		
		10	457.574791	-209	-0.46		
		20	457.574755	-245	-0.54		
		30	457.574734	-266	-0.58		
		40	457.574753	-247	-0.54		
		50	457.574721	-279	-0.61		
115 %	AC 138	20	457.574761	-239	-0.52		
85 %	AC 102	20	457.574758	-242	-0.53		

3.6 Transient frequency behavior of the transmitter

Test setup



Test procedure

1. Set the signal generator to the assigned transmitter frequency and modulate it with a 1 ㎑ tone at ±12.5 ㎑ deviation and set its output level to -15 ㏈m.
2. Key the transmitter.
3. Supply sufficient attenuation via the RF attenuator to provide an input level to the test receiver that is 40 ㏈ below the test receiver maximum allowed input power when the transmitter is operating at its rated power level.
4. Unkey the transmitter.
5. Adjust the RF level of the signal generator to provide RF power into the RF power meter equal to the level this signal generator RF level shall be maintained throughout the rest of the measurement.
6. Connect the output of the RF combiner network to the input of the Modulation analyzer.
7. Set the horizontal sweep rate on the storage oscilloscope to 10 milliseconds per division and adjust the display to continuously view the 1 000 ㎐ tone. Adjust the vertical amplitude control of the oscilloscope to display the 1 000 ㎐ at ±4 divisions vertically centered on the display.
8. Key the transmitter and observe the stored display. once the modulation Analyzer demodulator has been captured by the transmitter power, the display will show the frequency difference from the assigned frequency to the actual transmitter frequency versus time. The instant when the 1 ㎑ test signal is completely suppressed (including any capture time due to phasing) is considered to be t_{on}. The trace should be maintained within the allowed divisions during the period t1 and t_2. See the figure in the appropriate standards section.
9. During the time from the end of t_2 to the beginning of t_3 the frequency difference should not exceed the limits set by the FCC in 47 CFR 90.214 and outlined in 3.2.2. The allowed limit is equal to the transmitter frequency times its FCC frequency tolerance times ±4 display divisions divided by 12.5 ㎑.
10. Key the transmitter and observe the stored display. The trace should be maintained within the allowed divisions after the end of t_2 and remain within it until the end of the trace. See the figure in the appropriate standards sections.
11. To test the transient frequency behavior during the period t_3 the transmitter shall be keyed.

12. Adjust the oscilloscope trigger controls so it will trigger on a decreasing magnitude from the Modulation analyzer, at 1 division from the right side of the display, when the transmitter is turned off. Set the controls to store the display. The moment when the 1 ㎑ test signal starts to rise is considered to provide to t_{off} .
13. The transmitter shall be unkeyed.
14. Observe the display. The trace should remain within the allowed divisions during period t3. See the figures in the appropriate standards section.

Limit

According to FCC 90.214, Transmitters designed to operate in the 150 ~ 174 ㎒ and 421 ~ 512 ㎒ frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals [1, 2]	Maximum frequency difference [3]	All equipment	
		150 to 174 ㎒	421 to 512 ㎒
Transient frequency behaviour for equipment designed to operate on 25 ㎑ channel			
t1[4] ---------------------------	±25.0 ㎑	5.0 ㎳	10.0 ㎳
t2 ---------------------------	±12.5 ㎑	20.0 ㎳	25.0 ㎳
t3[4] ---------------------------	±25.0 ㎑	5.0 ㎳	10.0 ㎳
Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 ㎑ Channel			
t1[4] ---------------------------	±12.5 ㎑	5.0 ㎳	10.0 ㎳
t2 ---------------------------	±6.25 ㎑	20.0 ㎳	25.0 ㎳
t3[4] ---------------------------	±12.5 ㎑	5.0 ㎳	10.0 ㎳
Transient Frequency Behaviour for Equipment Designed to Operate on 6.25 ㎑ Channel			
t1[4] ---------------------------	±6.25 ㎑	5.0 ㎳	10.0 ㎳
t2 ---------------------------	±3.125 ㎑	20.0 ㎳	25.0 ㎳
t3[4] ---------------------------	±6.25 ㎑	5.0 ㎳	10.0 ㎳

[1] t_{on} is the instant when a 1 ㎑ test signal is completely suppressed, including any capture time due to phasing.

t_1 is the time period immediately following t_{on}.

t_2 is the time period immediately following t_1.

t_3 is the time period from the instant when the transmitter is turned off until t_{off}.

t_{off} is the instant when the 1 ㎑ test signal starts to rise.

[2] During the time from the end of t_2 to the beginning of t_3, the frequency difference must not exceed the limits specified in §90.213.

[3] Difference between the actual transmitter frequency and the assigned transmitter frequency.

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

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When a transmitter is turned on, the radio frequency may take some time to stabilize. During this initial period, the frequency error or frequency difference (i.e. between the instantaneous and the steady state frequencies) shall not exceed the limits specified in Table 18.

Any suitable method of measurement can be used provided that it is fully described in the test report. A suitable and recommended method is given in TIA Standard 603.

Table 18 - Transient Frequency Behavior

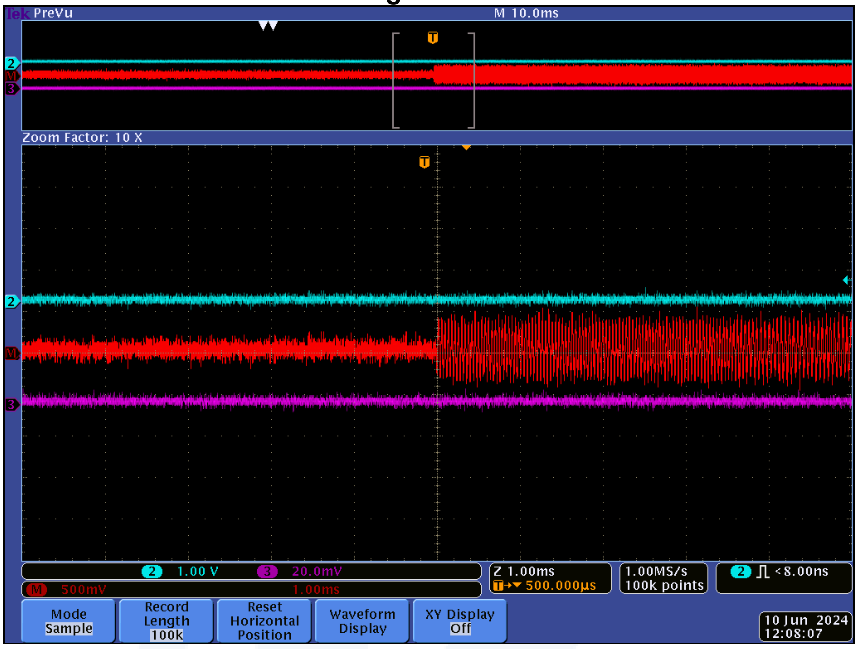
Channel Spacing (㎑)	Time Intervals[1,2]	Maximum Frequency difference (㎑)	Transient Duration limit (㎳)	
			138 ~ 174 ㎒	406.1 ~ 512 ㎒
25	t_1	±25	5	10
	t_2	±12.5	20	25
	t_3	±25	5	10
12.5	t_1	±25	5	10
	t_2	±12.5	20	25
	t_3	±25	5	10
6.25	t_1	±25	5	10
	t_2	±12.5	20	25
	t_3	±25	5	10

[1] t_{on}: the instant when a 1 ㎑ test signal is completely suppressed, including any capture time due to phasing.
t_1: the time period immediately following t_{on}.
t_2: the time period immediately following t_1.
t_3: the time period from the instant when the transmitter is turned off until t_{off}.
t_{off}: the instant when the 1 ㎑ test signal starts to rise.

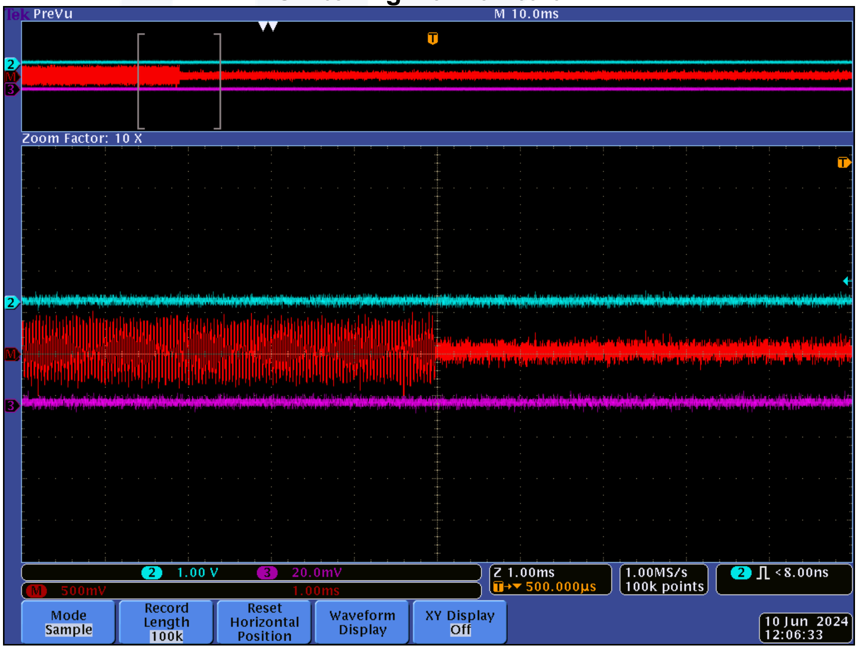
[2] If the transmitter carrier output power rating is 6 W or less, the frequency difference during the time periods t_1 and t_3 may exceed the maximum frequency difference for these time periods. The corresponding plot of frequency versus time during t_1 and t_3 shall be recorded in the test report.

Test results

Switching from off to on



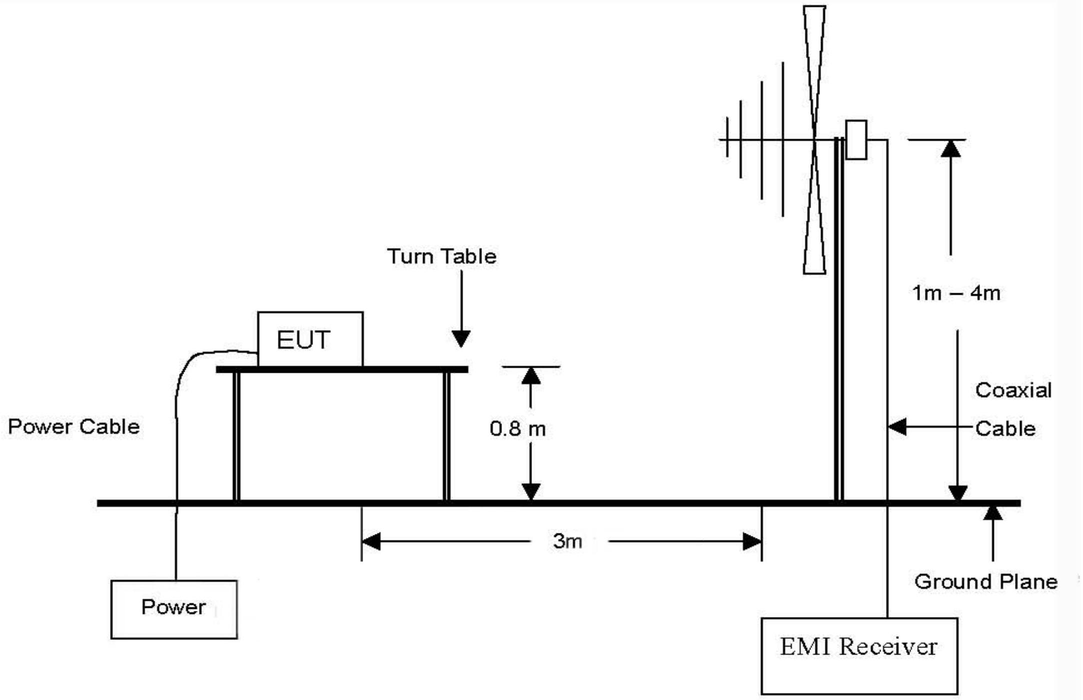
Switching from on to off



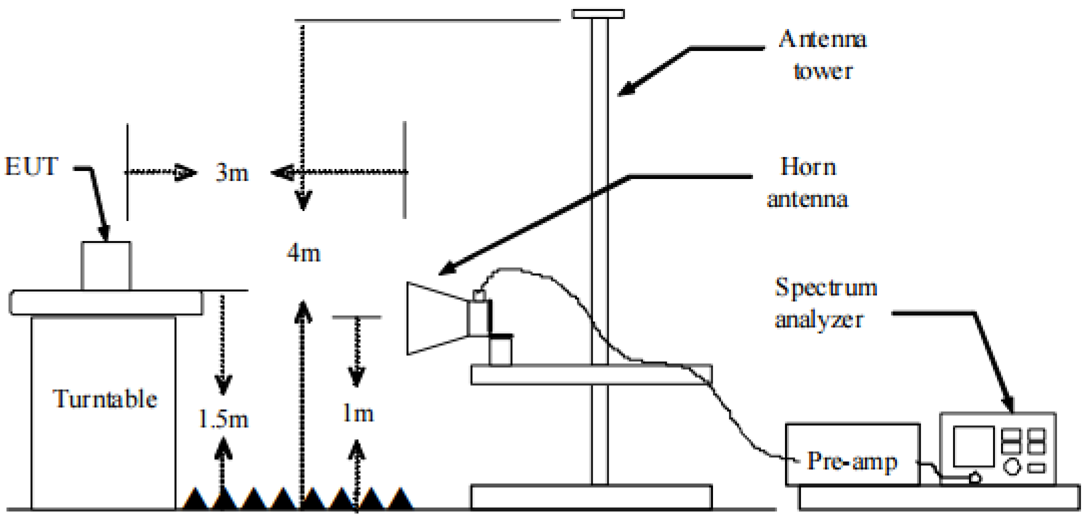
3.7 Radiation spurious emissions

Test setup

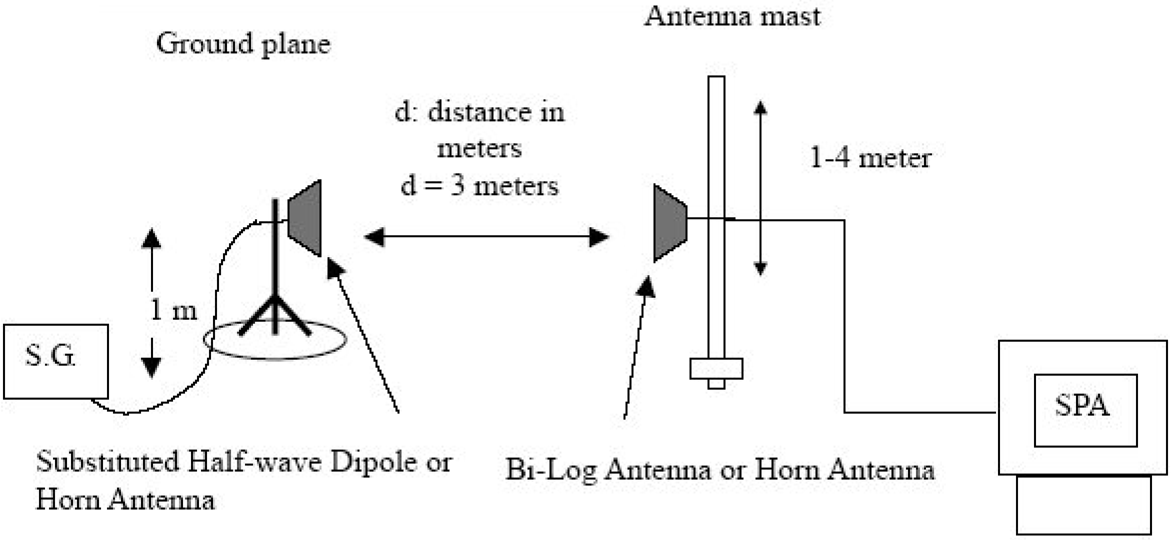
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to 5 ㎓ Emissions.



The diagram below shows the test setup for substituted method



Test procedure: Based on ANSI/TIA 603E: 2016

1. On a test site, the EUT shall be placed at 80 ㎝ height(below 1 000 ㎒) or 1.5 m(above 1 000 ㎒) on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using
   1) RBW : 100 ㎑(< 1 ㎓), 1 ㎒(> 1 ㎓).
   2) VBW : 100 ㎑(< 1 ㎓), 1 ㎒(> 1 ㎓).
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
7. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole(below 1 000 ㎒) or horn antenna(above 1 000 ㎒) connected to a signal generator.
11. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Limit

According to §90.210(d), Spurious attenuated in dB = 50 + 10log(Power output in watts)

Test results

Measurement Condition

Ambient temperature : 24.6 ℃

Relative humidity : 41.3 % R.H.

Fundamental output power

Frequency (㎒)	Ant. Pol.(H/V)	Output power(㏈m)	Output power(W)
450.025	H	16.30	0.043
	V	10.81	0.012
457.575	H	17.62	0.058
	V	10.74	0.012
469.975	H	13.00	0.020
	V	6.46	0.004

Low channel

Frequency (㎒)	Ant. Pol. (H/V)	S.G. Level (㏈m)	Correction factor (㏈)	Absolute level (㏈m)	Spurious attenuation (㏈c)	Limit (㏈c)	Margin (㏈)
1 350.180	H	-36.80	6.84	-29.96	46.26	36.34	9.92
1 350.180	V	-39.90	6.89	-33.01	49.31		12.97
1 800.160	H	-47.10	9.87	-37.23	53.53		17.19
1 800.160	V	-52.30	10.27	-42.03	58.33		21.99
2 250.150	V	-48.50	9.30	-39.20	55.50		19.16
2 250.150	V	-45.50	8.53	-36.97	53.27		16.93

Middle channel

Frequency (㎒)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	Absolute level (dBm)	Spurious attenuation (dBc)	Limit (dBc)	Margin (dB)
1 372.800	H	-39.10	7.12	-31.98	49.60	37.64	11.96
1 372.800	V	-42.30	6.46	-35.84	53.46		15.82
2 288.022	H	-50.10	8.68	-41.42	59.04		21.40
2 288.022	V	-46.40	9.15	-37.25	54.87		17.23

High channel

Frequency (㎒)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	Absolute level (dBm)	Spurious attenuation (dBc)	Limit (dBc)	Margin (dB)
1 410.170	H	-55.40	7.31	-48.09	61.09	36.34	24.75
2 350.020	H	-54.90	10.60	-44.30	57.30		20.96
2 350.020	V	-55.10	10.57	-44.53	57.53		21.19
2 820.006	H	-57.80	11.31	-46.49	59.49		23.15
4 699.822	V	-55.90	12.06	-43.84	56.84		20.50

Note.
1. Correction factor: Substitution antenna gain - Tx cable loss
2. E.R.P. or E.I.R.P = S.G. Level + correction factor

3.8. AC conducted emissions

FCC Limit

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (㎒)	Conducted limit (dB㎶)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

IC Limit

According to RSS-Gen 8.8, Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

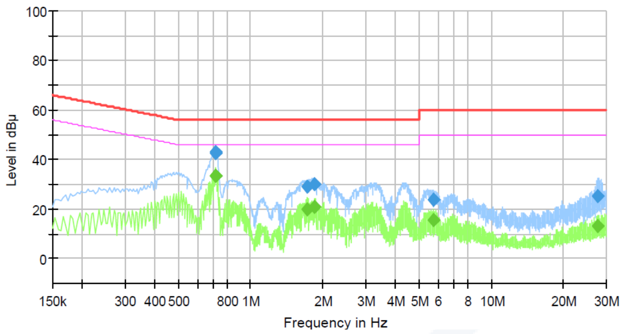
For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Frequency of Emission (㎒)	Conducted limit (dB㎶)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Test results

Mode:	TX
Frequency:	450.025 ㎒

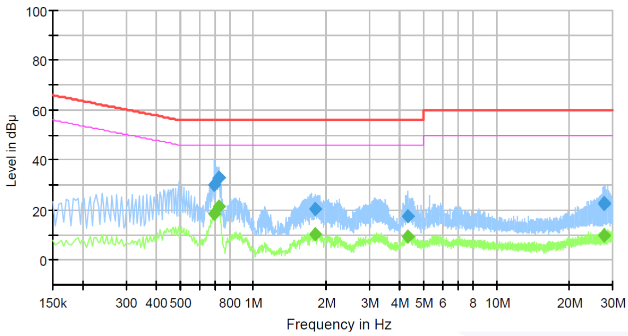
Hot Line



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.714000	---	33.56	46.00	12.44	1000.0	9.000	L1	19.5
0.714000	42.92	---	56.00	13.08	1000.0	9.000	L1	19.5
0.718000	---	33.45	46.00	12.55	1000.0	9.000	L1	19.5
0.718000	42.74	---	56.00	13.26	1000.0	9.000	L1	19.5
1.726000	---	20.06	46.00	25.94	1000.0	9.000	L1	19.6
1.726000	29.20	---	56.00	26.80	1000.0	9.000	L1	19.6
1.830000	---	20.80	46.00	25.20	1000.0	9.000	L1	19.6
1.830000	29.92	---	56.00	26.08	1000.0	9.000	L1	19.6
5.718000	---	15.60	50.00	34.40	1000.0	9.000	L1	20.0
5.718000	23.64	---	60.00	36.36	1000.0	9.000	L1	20.0
27.702000	---	13.34	50.00	36.66	1000.0	9.000	L1	21.2
27.702000	25.09	---	60.00	34.91	1000.0	9.000	L1	21.2

Neutral Line



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.694000	---	18.30	46.00	27.70	1000.0	9.000	N	19.6
0.694000	30.18	---	56.00	25.82	1000.0	9.000	N	19.6
0.722000	---	21.32	46.00	24.68	1000.0	9.000	N	19.6
0.722000	33.01	---	56.00	22.99	1000.0	9.000	N	19.6
1.806000	---	10.05	46.00	35.95	1000.0	9.000	N	19.6
1.806000	20.43	---	56.00	35.57	1000.0	9.000	N	19.6
4.302000	---	9.07	46.00	36.93	1000.0	9.000	N	19.9
4.302000	17.48	---	56.00	38.52	1000.0	9.000	N	19.9
27.658000	---	9.96	50.00	40.04	1000.0	9.000	N	21.3
27.658000	22.59	---	60.00	37.41	1000.0	9.000	N	21.3
27.718000	---	9.93	50.00	40.07	1000.0	9.000	N	21.3
27.718000	22.44	---	60.00	37.56	1000.0	9.000	N	21.3

Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum analyzer	R&S	FSV40-N	102194	1 year	2024.08.08
Spectrum analyzer	R&S	FSV40	101725	1 year	2024.06.15 2025.06.12
SIGNAL GENERATOR	KEYSIGHT	N5182B	MY59100115	1 year	2025.04.15
SIGNAL GENERATOR	Anritsu	68369B	002118	1 year	2025.04.15
AC POWER SOURCE/ ANALYZER	HP	6813A	3729A00754	1 year	2025.01.12
Attenuator	Mini-Circuits	BW-S20-2W263A+	Y1	1 year	2025.02.09
BAND REJECTION FILTER	RF ONE ELECTRONICS	400-470 MHz	NONE	1 year	2024.11.02
Modulation Analyzer	HP	8901B	3438A05094	1 year	2025.01.11
Audio Analyzer	HP	8903B	3413A14728	1 year	2024.06.14 2025.06.18
TRILOG-BROADBAND ANTENNA	Schwarzbeck	VULB 9163	714	2 years	2026.04.19
ATTENUATOR	HUBER+SUHNER	6806.17.A	NONE	1 year	2025.02.13
BILOG ANTENNA	Schwarzbeck	VULB 9168	9168-461	2 years	2026.05.09
Horn Antenna	SCHWARZBECK	BBHA 9120D	01802	1 year	2024.11.03
Horn Antenna	A.H	SAS-571	414	1 year	2025.01.16
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA 9170550	1 year	2025.01.16
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA 9170551	1 year	2025.01.16
Amplifier	SONOMA INSTRUMENT	310N	401123	1 year	2025.02.13
PREAMPLIFIER	HP	8449B	3008A00538	1 year	2025.04.30
BROADBAND AMPLIFIER	SCHWARZBECK	BBV9721	PS9721-003	1 year	2025.01.15
Temperature & Humidity Chamber	ESPEC	SH-642	93012658	1 year	2024.06.15 2025.06.12
DIGITAL Oscilloscope	Tektronix	DPO4104	B010552	1 year	2024.11.07
Four-port junction pad	ANRITSU	MA1612A	M14368	1 year	2024.06.14
EMI Test Receiver	R&S	ESR3	101783	1 year	2024.11.08
PULSE LIMITER	R&S	ESH2-Z2	101915	1 year	2024.11.08
LISN	R&S	ENV216	101787	1 year	2024.11.08

Peripheral devices

Device	Manufacturer	Model No.	Serial No.
AC/DC Adapter	Dongguan Yahui Electronic Technology Co., Ltd.	SPE-NBTC21	-

The end of test report.