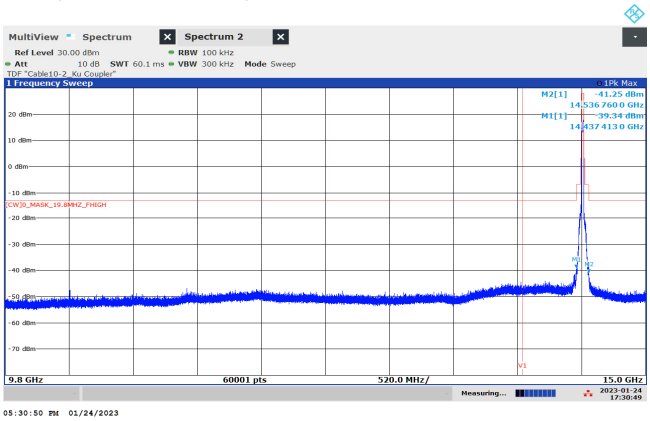
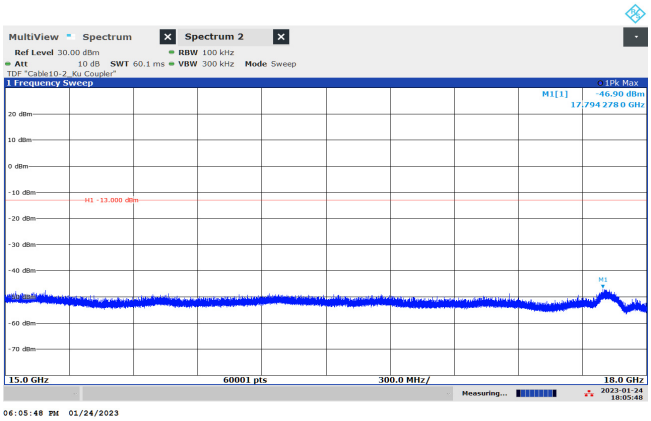
Conducted spurious emission measurements for each modulation

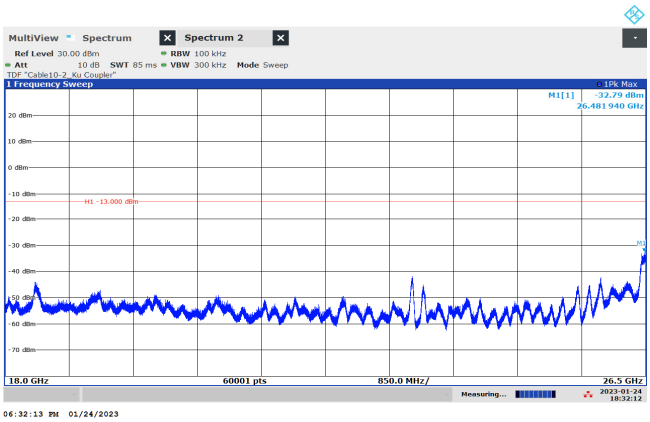
f_{HIGH} (19.8 MHz, 16QAM)



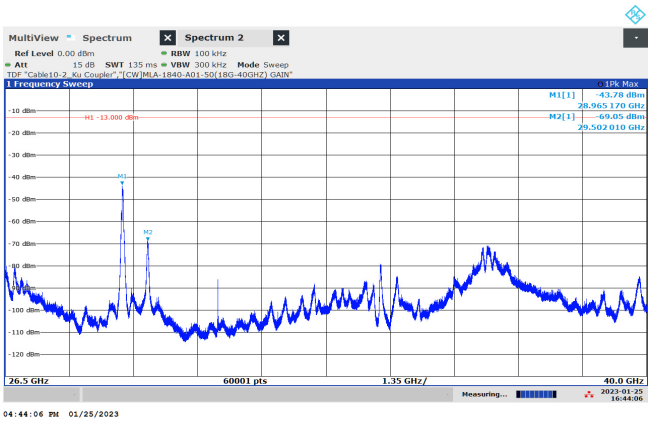
9.8 GHz to 15 GHz



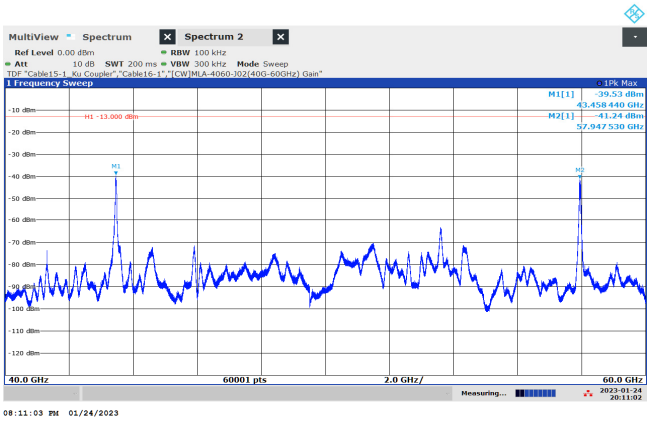
15 GHz to 18 GHz



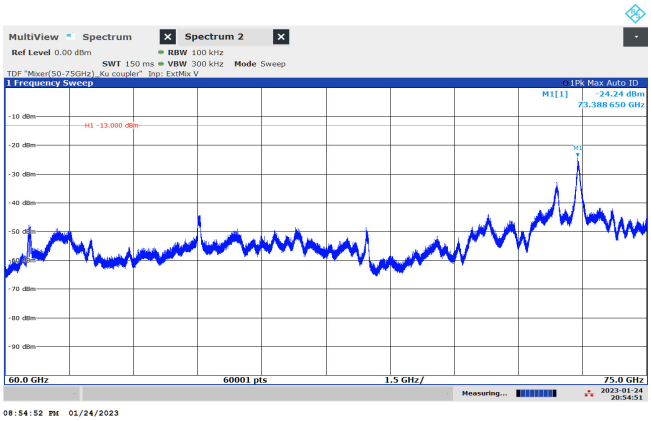
18 GHz to 26.5 GHz



26.5 GHz to 40 GHz



40 GHz to 60 GHz



60 GHz to 75 GHz

5.4. Field Strength of Spurious Radiation (radiated emissions)

5.4.1 Regulation

FCC, CFR 47 Section

According to 2.1053(a), Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

According to 2.1053(b), The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25 MHz.
(3) All equipment where the antenna is an integral part of and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the Commission.

According to 25.202(f), Emission limitations. Except for SDARS terrestrial repeaters and as provided for in paragraph (i), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The out-of-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;
(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;
(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;
(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

ISED, RSS section

RSS-170, 5.4.3.1. Mobile Earth Stations in All Frequency Bands

The average power of unwanted emissions shall be attenuated below the average output power, P (dBW), of the transmitter, as specified below:

(1) 25 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more

than 50%, up to and including 100% of the occupied bandwidth or necessary bandwidth, whichever is greater;

(2) 35 dB in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 100%, up to and including 250% of the occupied bandwidth or necessary bandwidth, whichever is greater; and

(3) 43 + 10 log p (watts) in any 4 kHz band, the centre frequency of which is offset from the channel frequency by more than 250% of the occupied bandwidth or necessary bandwidth, whichever is greater.

5.4.2 Test Procedure

The field strength of radiated spurious measurements was made in accordance with the procedures of subclause 5.5 of ANSI C63.26

The radiated emission measurements were performed inside the chamber.

(a) The EUT was placed on the support at the height of 80 cm (below 1 GHz) or 1.5 m (above 1 GHz).

(b) The EUT's RF ports were terminated by the 50 ohm load.

(c) The EUT was tested using modulation(16QAM) and at the low, mid, and high channels.

(d) The EUT was rotated about 360° and the receiving antenna scanned from 1 to 4m in order to capture the maximum emission.

(e) The measurements were made with the receive antenna in both horizontal and vertical polarizations.

(f) If the EUT was designed to be installed in one of two distinct orientations, the tests should be performed in both orientations. If the EUT could be operated in one of multiple orientations (e.g., handheld, portable, or modular devices), the tests should be performed in a minimum of three orientations.

(g) The harmonic emissions up to the 5th or 100 GHz, whichever was the lesser, were investigated.

(h) The plots were corrected for the cable loss, antenna factor, and distance correction.

For the measurement frequency below 1 GHz, the field strength was measured and then mathematically corrected to an E.I.R.P., according to 5.2.7 of ANSI C63.26.

(a) E (dBμV/m) = Measured amplitude level (dBμV) + Cable Loss (dB) + Antenna Factor (dB/m).

(b) E (dBμV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).

(c) E (dBμV/m) = EIRP (dBm) - 20log(D) + 104.8; where D is the measurement distance in m.

(d) EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance in m.

For the measurement frequency above 1 GHz, the EIRP was directly determined by using the basic free-space propagation path loss according to the C.5.2 of ANSI C63.26. The radiated measurements using substitution techniques were performed if the emissions exceeded (or approached to) the specified limits.

NOTE 1: During the preliminary measurements, the EUT was operated with the bandwidth ((19.8 MHz, 16QAM) and (39.6 MHz, 16QAM)) with highest power density in 4 kHz during the preliminary measurements as the worst-case. The peak detector was used with the appropriate measurement bandwidth (RBW) as 1 kHz (from 9 kHz to 150 kHz), 10 kHz (from 150 kHz to 30 MHz), 100 kHz (from 30 MHz to 1 GHz), and 1 MHz (from 1 GHz to 75 GHz).

NOTE 2: For the final measurements, any emissions found in the preliminary measurements were further examined by using the RMS detector with RBW 3 kHz and corrected to the reference bandwidth of 4 kHz.

5.4.3 Result: PASS

Table 6: Field Strength of Spurious Radiation (radiated emissions from 9 kHz to 30 MHz)

Test set-up:	Refer to the test configuration and photographs of the test setup. Test site: SAC Antenna distance: ☐ 10 m ☒ 3 m Rx antenna height: 1 m frequency range: 9 kHz to 30 MHz reference bandwidth: 4 kHz (with RMS dectector)
Operating mode:	#1 (19.8 MHz, 16QAM)

(The chart below shows the highest readings taken from the final data. The other emission levels were very low against the limit.)

Frequency (MHz)	Pol. (V/H)	Reading (dBμV)	AMP (dB)	AF (dB/m)	CL (dB)	CB (dB)	FS (dBμV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Transmitting at fLOW										
0.018	V	37.3	0.0	20.9	0.1	0.13	58.4	-36.8	-13.0	23.8
0.019	H	40.9	0.0	20.9	0.1	0.13	62.0	-33.2	-13.0	20.2
0.023	H	42.4	0.0	21.0	0.1	0.13	63.6	-31.6	-13.0	18.6
0.023	V	38.7	0.0	21.0	0.1	0.13	59.9	-35.3	-13.0	22.3
Transmitting at fMID										
0.019	H	40.3	0.0	20.9	0.1	0.13	61.4	-33.8	-13.0	20.8
0.022	H	42.3	0.0	21.0	0.1	0.13	63.5	-31.7	-13.0	18.7
0.023	V	37.8	0.0	21.0	0.1	0.13	59.0	-36.2	-13.0	23.2
Transmitting at fHIGH										
0.019	H	40.3	0.0	20.9	0.1	0.13	61.4	-33.8	-13.0	20.8
0.019	V	37.3	0.0	20.9	0.1	0.13	58.4	-36.8	-13.0	23.8
0.023	H	41.3	0.0	21.0	0.1	0.13	62.5	-32.7	-13.0	19.7
0.023	V	37.8	0.0	21.0	0.1	0.13	59.0	-36.2	-13.0	23.2

Note: *1) V/H: Vertical / Horizontal polarization*
2) AMP, AF, CL: pre-amplifier gain, antenna factor, cable loss
3) CB: bandwidth correction factor (1.3 dB, when RBW 3 kHz was used)
4) FS: field strength, FS = Reading - AMP + AF + CL + CB
5) EIRP = FS + 20log(D) - 104.8; i.e. EIRP (-13 dBm) is corresponded to FS (82.2 dBμV/m) (where D = 3 m)
6) Margin = Limit - EIRP

Table 7: Field Strength of Spurious Radiation (radiated emissions from 30 MHz to 1 GHz)

Test set-up:	Refer to the test configuration and photographs of the test setup. Test site: SAC Antenna distance: ☐ 10 m ☒ 3 m Rx antenna height: 1 m to 4 m frequency range: 30 MHz to 1 GHz reference bandwidth: 4 kHz (with RMS dectector)
Operating mode:	#1 (19.8 MHz, 16QAM)

Frequency (MHz)	Pol. (V/H)	Height (m)	Reading (dBμV)	AMP (dB)	AF (dB/m)	CL (dB)	FS (dBμV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Transmitting at fLOW										
124.986	H	3.00	55.1	29.8	17.0	1.1	43.4	-51.9	-13.0	38.9
124.986	V	1.00	58.1	29.8	17.0	1.1	46.4	-48.9	-13.0	35.9
249.292	H	1.00	49.4	29.6	17.6	1.7	39.1	-56.2	-13.0	43.2
249.292	V	1.00	47.3	29.6	17.6	1.7	37.0	-58.3	-13.0	45.3
Transmitting at fMID										
124.993	H	4.00	54.0	29.8	17.0	1.1	42.3	-53.0	-13.0	40.0
124.993	V	1.00	59.1	29.8	17.0	1.1	47.4	-47.9	-13.0	34.9
221.186	H	1.00	42.7	29.5	16.7	1.6	31.5	-63.8	-13.0	50.8
221.186	V	1.00	54.3	29.5	16.7	1.6	43.1	-52.2	-13.0	39.2
249.435	H	1.00	53.3	29.6	17.6	1.7	43.0	-52.3	-13.0	39.3
249.435	V	2.00	46.2	29.6	17.6	1.7	35.9	-59.4	-13.0	46.4
Transmitting at fHIGH										
124.989	H	2.00	53.7	29.8	17.0	1.1	42.0	-53.3	-13.0	40.3
124.989	V	1.00	59.5	29.8	17.0	1.1	47.8	-47.5	-13.0	34.5
250.060	H	1.00	50.8	29.6	17.6	1.7	40.5	-54.8	-13.0	41.8
250.060	V	1.00	55.4	29.6	17.6	1.7	45.1	-50.2	-13.0	37.2

Note: *1) V/H: Vertical / Horizontal polarization*
2) AMP, AF, CL: pre-amplifier gain, antenna factor, cable loss
3) FS: field strength, FS = Reading - AMP + AF + CL
4) EIRP = FS + 20log(D) - 104.8; i.e. EIRP (-13 dBm) is corresponded to FS (82.2 dBμV/m) (where D = 3 m)
5) Margin = Limit - EIRP

Remark: the measured EIRP in the above table were obtained from the preliminary measurements (peak data) by using the Peak detector with RBW 100 kHz. The final measurements (RMS detector with RBW 3 kHz, and adding the bandwidth correction factor) were not performed because the emissions were very low against the limit.

Table 8: Field Strength of Spurious Radiation (radiated emissions from 1 GHz to 75 GHz)

Test set-up:	Refer to the test configuration and photographs of the test setup. Test site: FAR Antenna distance: ☒ 3 m ☒ 1 m (only for above 40 GHz) Rx antenna height: 1 m to 4 m frequency range: 1 GHz to 18 GHz; 18 GHz to 26.5 GHz; 26.5 GHz to 40 GHz; 40 GHz to 60 GHz; 60 GHz to 75 GHz reference bandwidth: 4 kHz (with RMS dectector)
Operating mode:	#1 (19.8 MHz, 16QAM)

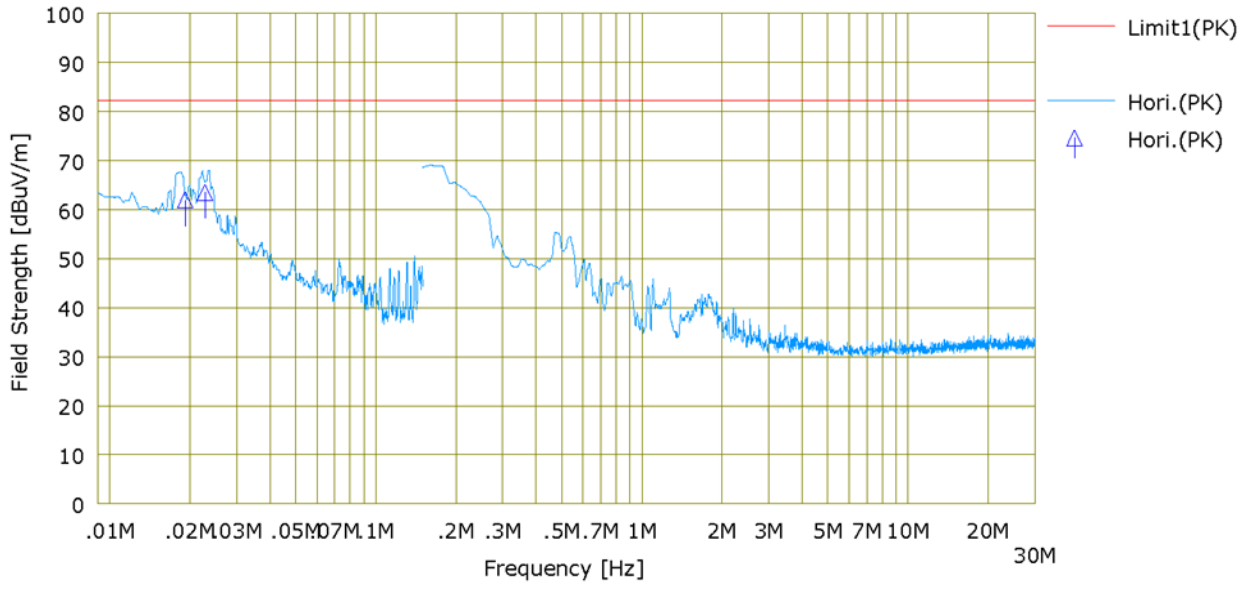
Frequency (MHz)	Pol. (V/H)	Reading (dBm)	PL (dB)	AG (dBi)	CL (dB)	AMP (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Transmitting at fLOW									
1 124.950	H	-45.70	43.01	2.82	5.35	47.76	-47.92	-13.00	34.92
9 600.300	H	-58.50	61.63	13.10	15.38	45.83	-40.42	-13.00	27.42
19 199.780	H	-51.00	67.65	18.80	22.30	59.90	-39.75	-13.00	26.75
1 124.950	V	-43.30	43.01	2.82	5.35	47.76	-45.52	-13.00	32.52
9 600.300	V	-58.90	61.63	13.10	15.38	45.83	-40.82	-13.00	27.82
19 199.780	V	-50.60	67.65	18.80	22.30	59.90	-39.35	-13.00	26.35
Transmitting at fMID									
1 124.950	H	-45.00	43.01	2.82	5.35	47.76	-47.22	-13.00	34.22
9 600.300	H	-59.60	61.63	13.10	15.38	45.83	-41.52	-13.00	28.52
19 200.200	H	-50.30	67.65	18.80	22.30	59.90	-39.05	-13.00	26.05
1 124.950	V	-43.10	43.01	2.82	5.35	47.76	-45.32	-13.00	32.32
9 600.300	V	-59.40	61.63	13.10	15.38	45.83	-41.32	-13.00	28.32
19 200.200	V	-50.80	67.65	18.80	22.30	59.90	-39.55	-13.00	26.55
Transmitting at fHIGH									
1 124.950	H	-45.70	43.01	2.82	5.35	47.76	-47.92	-13.00	34.92
4 162.000	H	-57.20	54.37	9.42	10.08	46.27	-48.44	-13.00	35.44
9 600.300	H	-59.80	61.63	13.10	15.38	45.83	-41.72	-13.00	28.72
19 199.780	H	-50.70	67.65	18.80	22.30	59.90	-39.45	-13.00	26.45
1 124.950	V	-42.00	43.01	2.82	5.35	47.76	-44.22	-13.00	31.22
4 162.000	V	-55.50	54.37	9.42	10.08	46.27	-46.74	-13.00	33.74
9 600.300	V	-59.50	61.63	13.10	15.38	45.83	-41.42	-13.00	28.42
19 199.780	V	-50.70	67.65	18.80	22.30	59.90	-39.45	-13.00	26.45

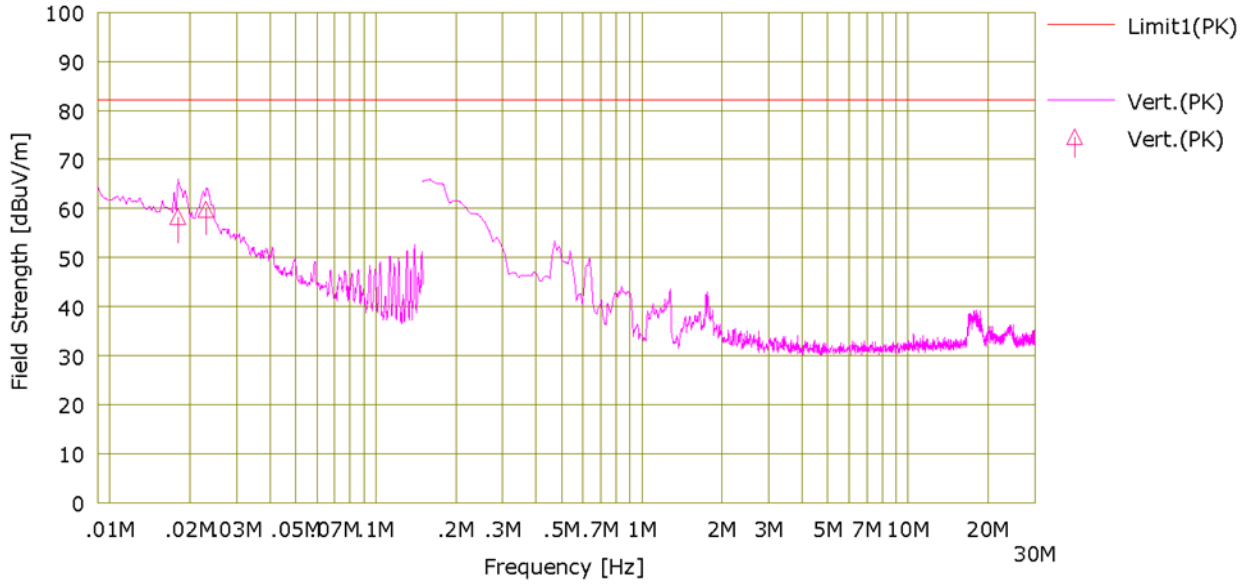
Note: *1) V/H: Vertical / Horizontal polarization*
2) PL, AG, CL, AMP: free space Path Loss, Antenna Gain, Cable Loss and Gain of pre-amplifier
3) EIRP = Reading + PL - AG + CL - AMP
4) Margin = Limit - EIRP

Remark: the measured EIRP in the above table were obtained from the preliminary measurements (peak data) by using the Peak detector with RBW 1 MHz. The final measurements (RMS detector with RBW 3 kHz, and adding the bandwidth correction factor) were not performed because the emissions were very low against the limit.

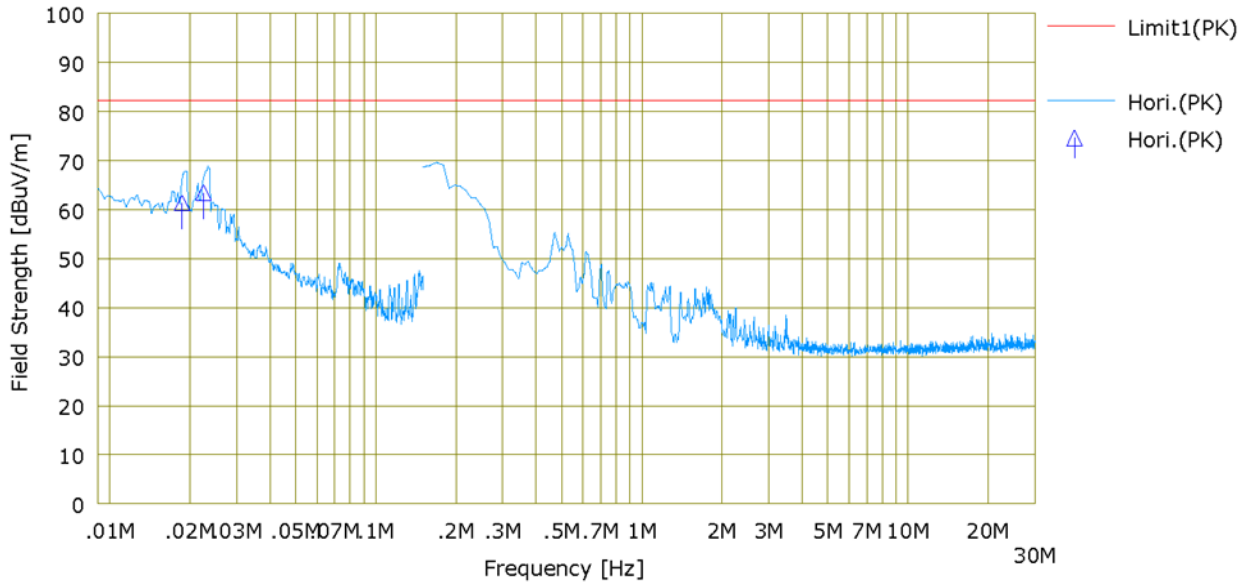
Figure 6. Plot of Field Strength of Spurious Radiation (radiated emissions from 9 kHz to 30 MHz)

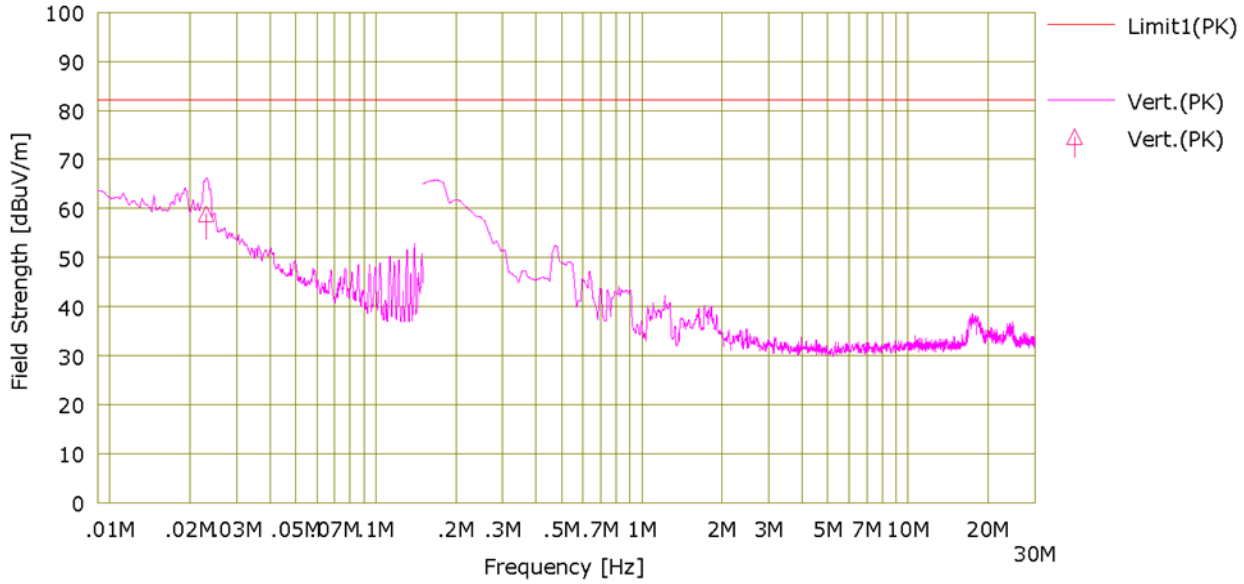
transmitting at f_{LOW} (19.8 MHz, 16QAM)



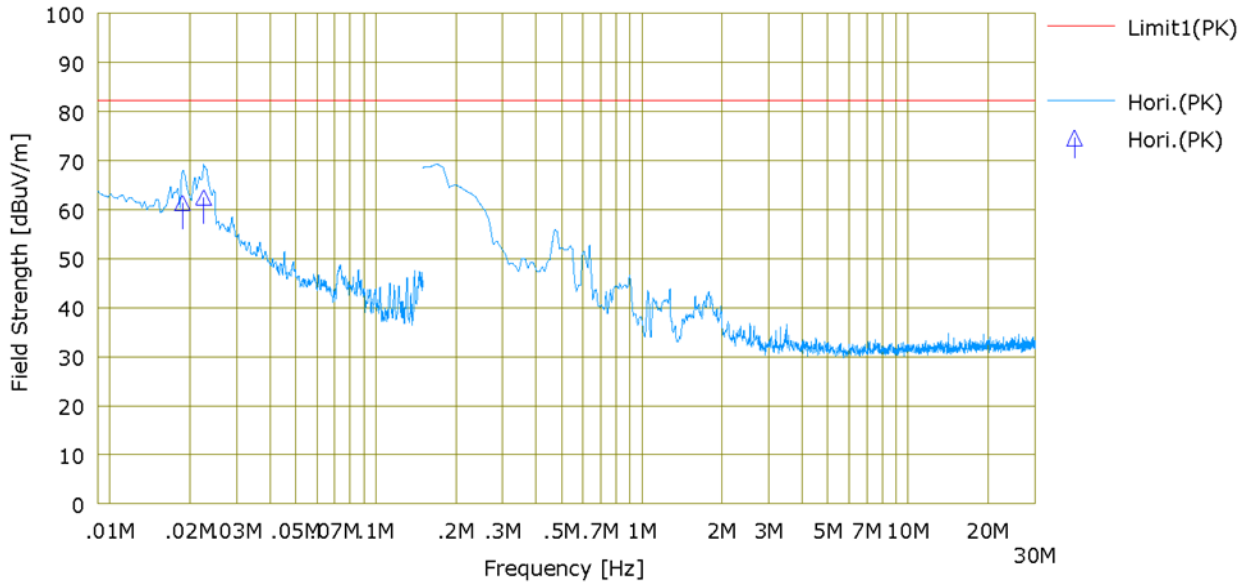


transmitting at f_{MID} (19.8 MHz, 16QAM)





transmitting at f_{HIGH} (19.8 MHz, 16QAM)



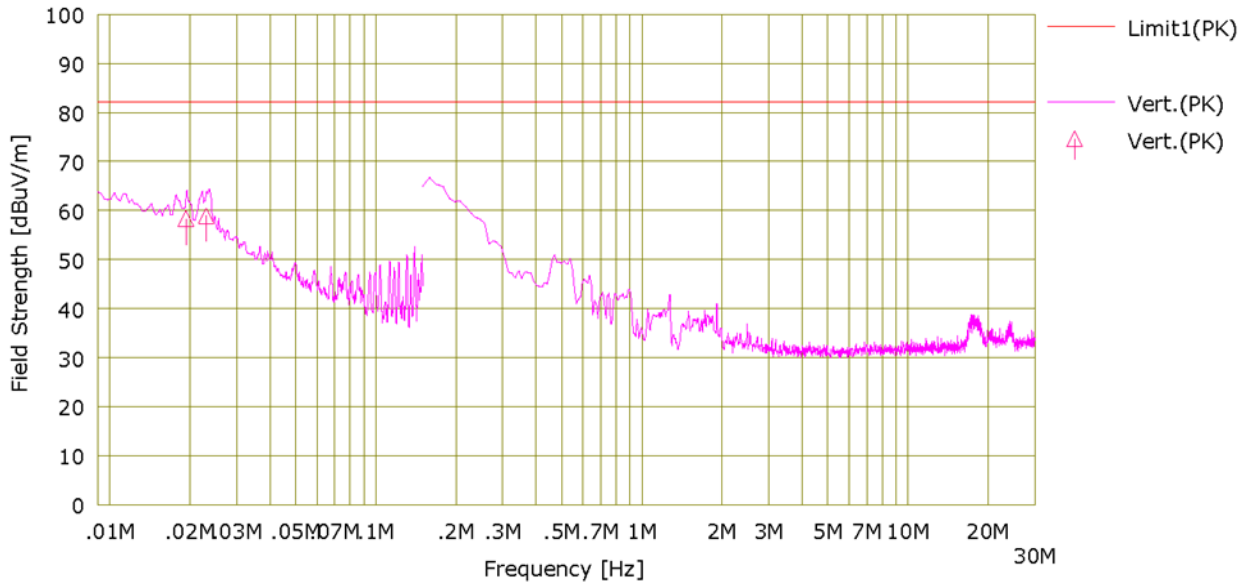
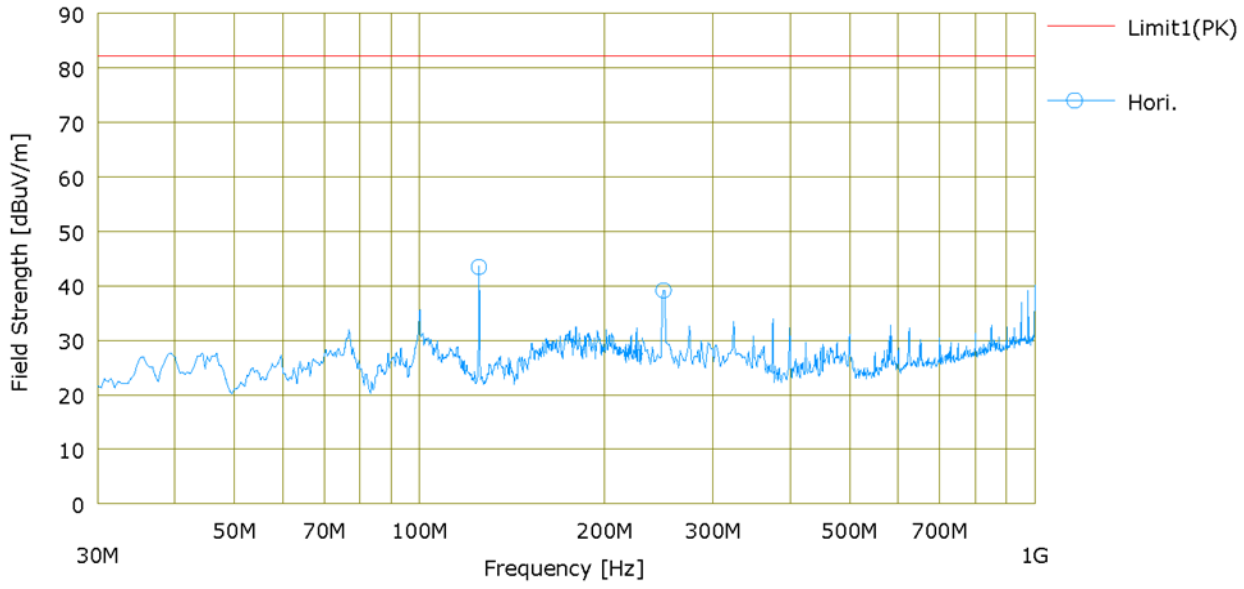
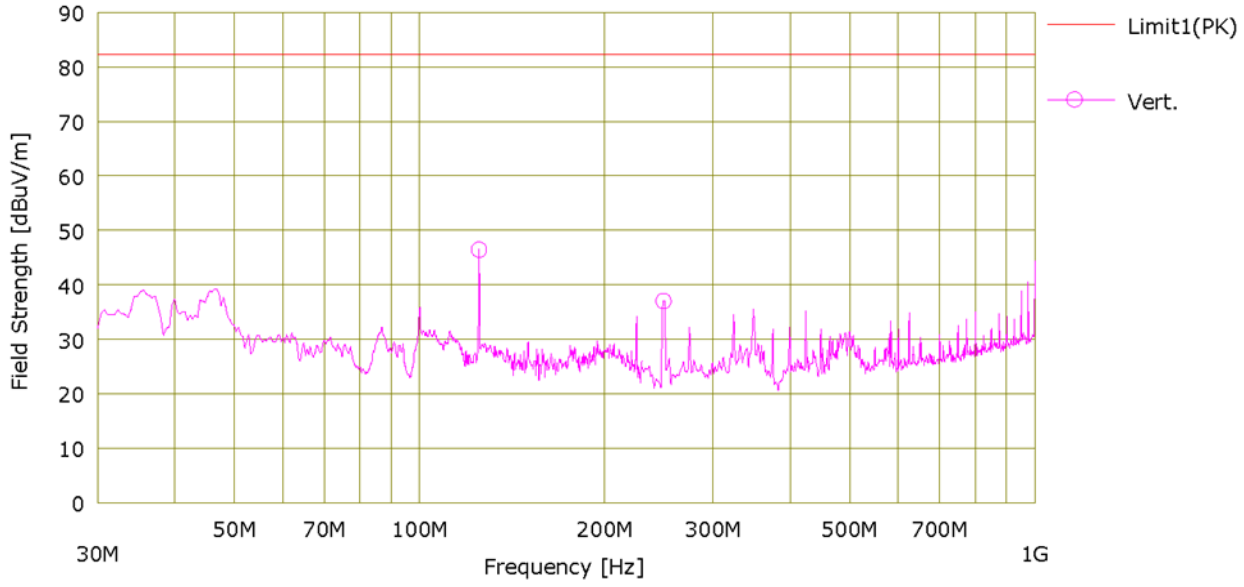


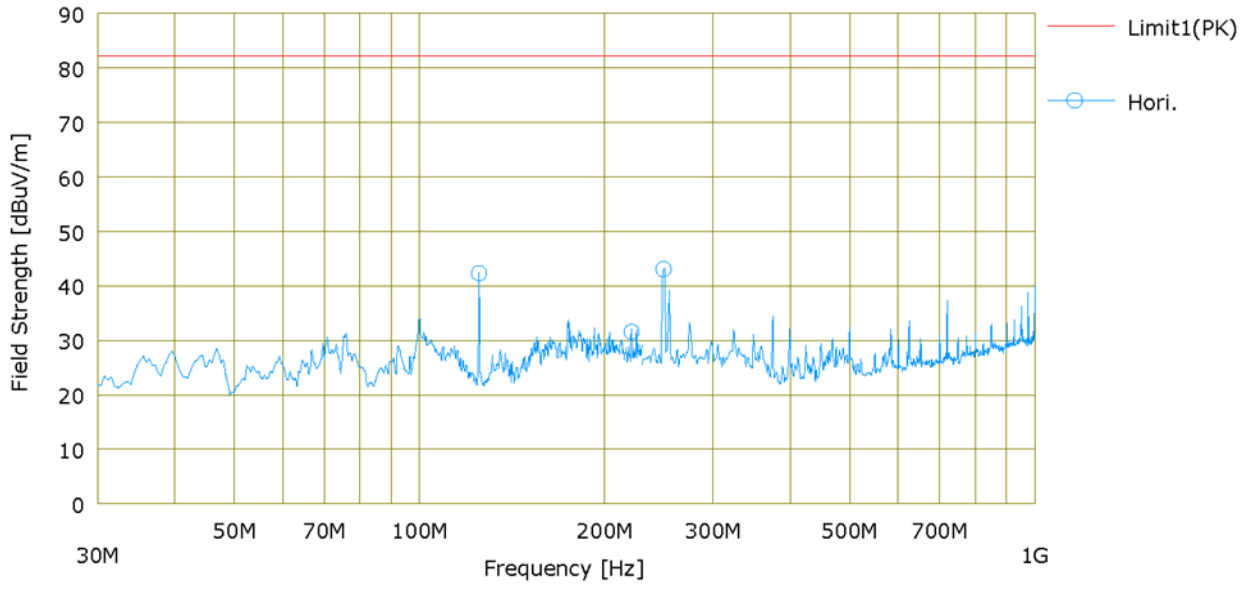
Figure 7. Plot of Field Strength of Spurious Radiation (radiated emissions from 30 MHz to 1 GHz)

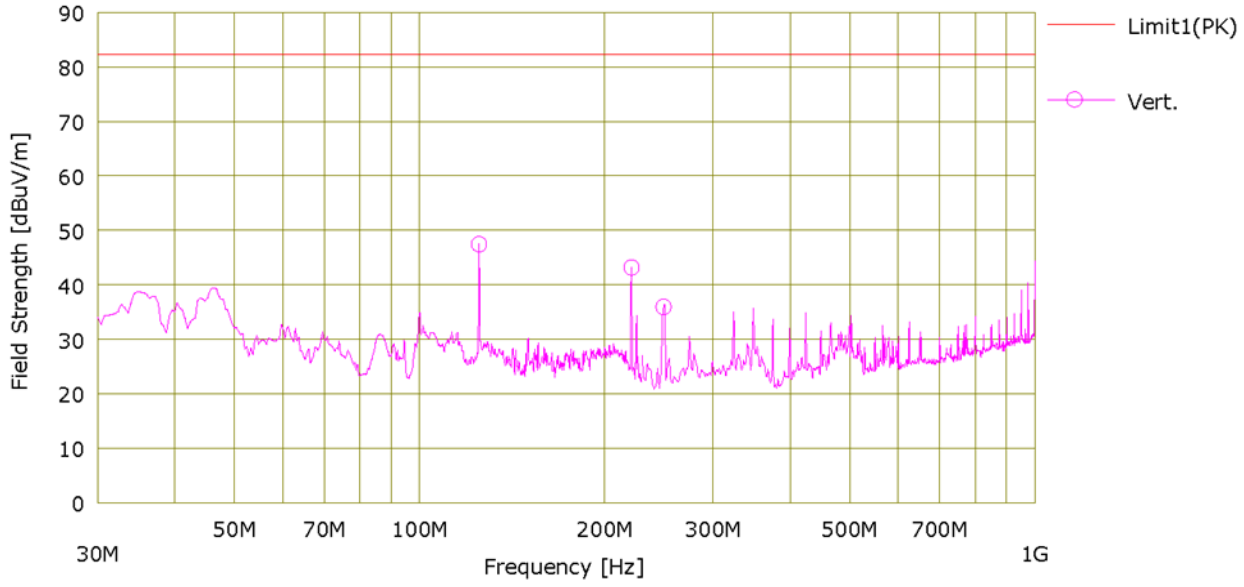
transmitting at f_{LOW} (19.8 MHz, 16QAM)



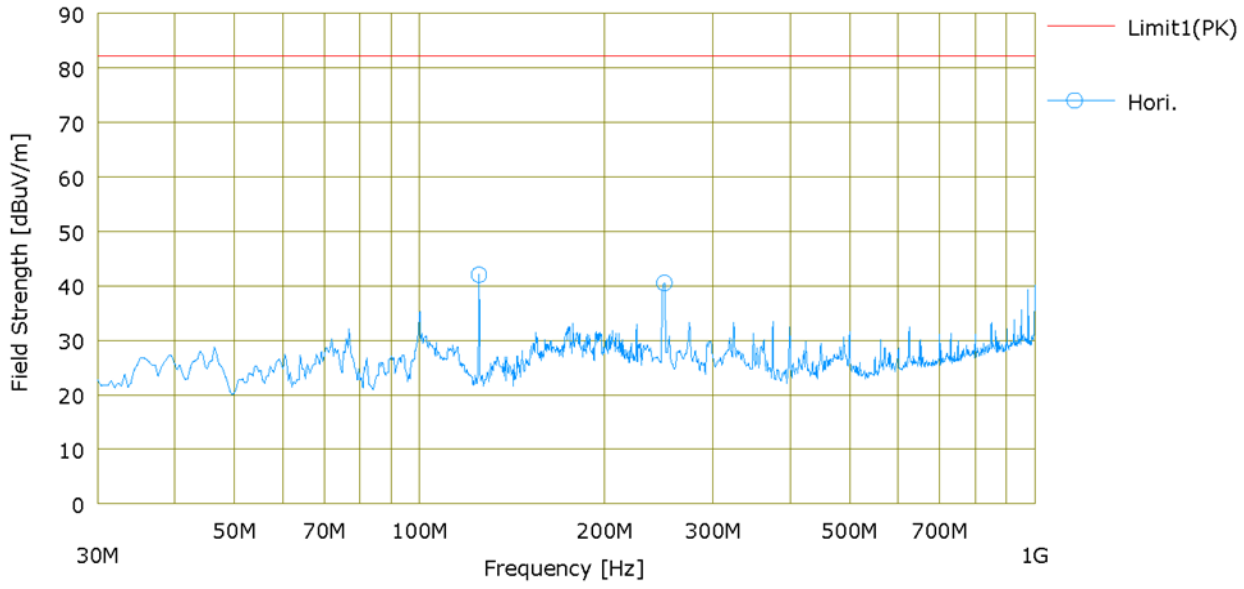


transmitting at f_{MID} (19.8 MHz, 16QAM)





transmitting at f_{HIGH} (19.8 MHz, 16QAM)



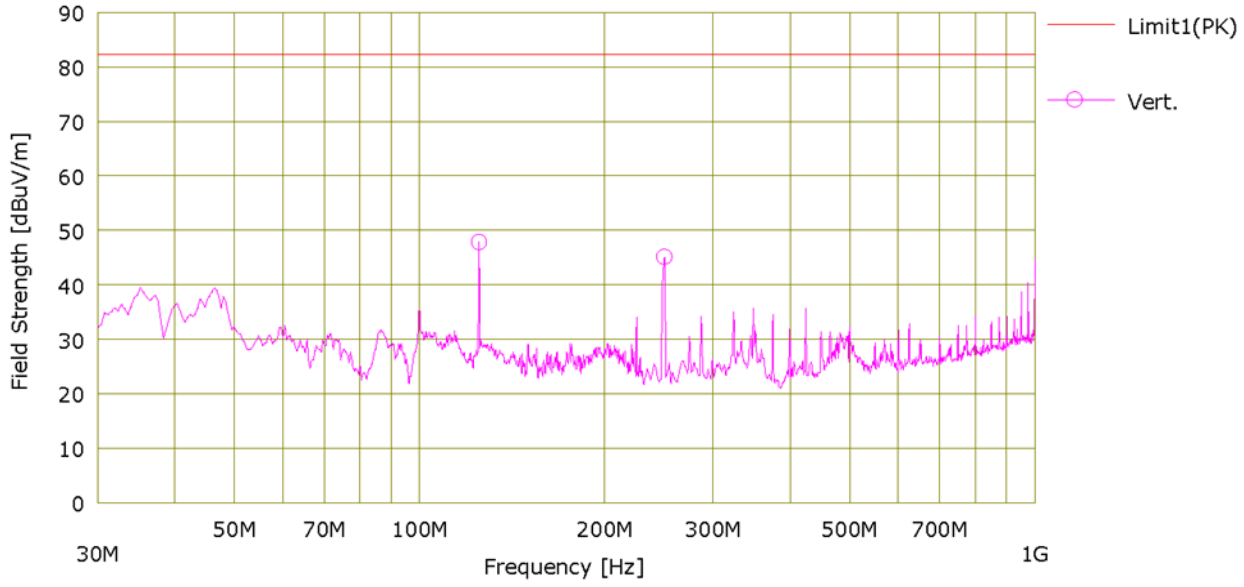
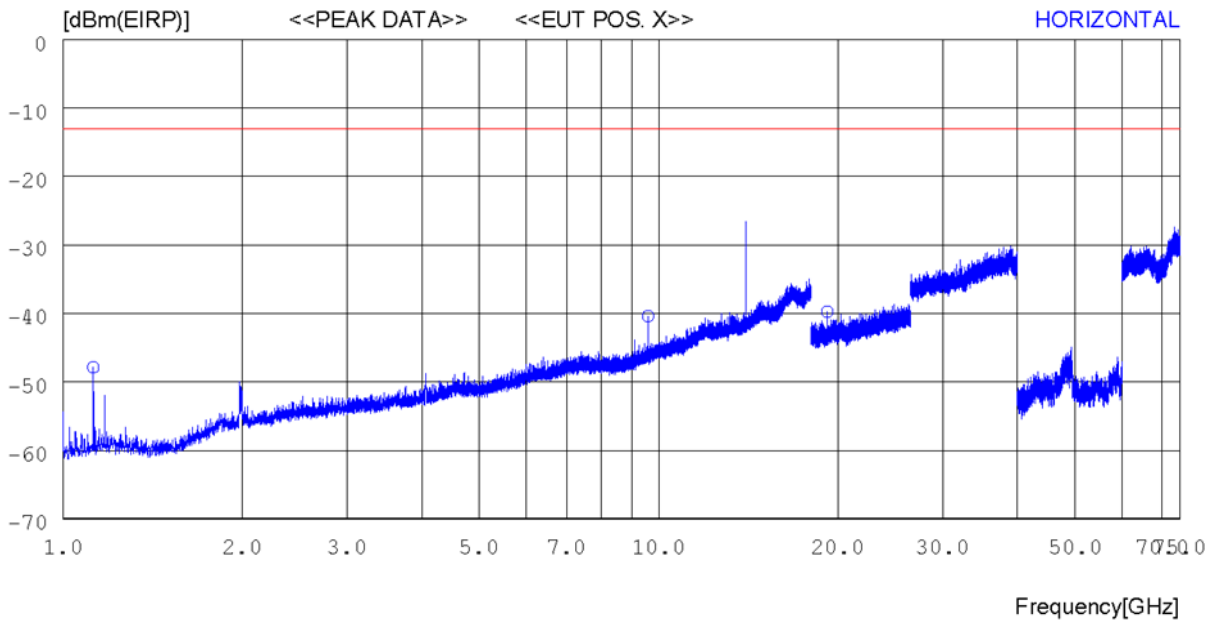
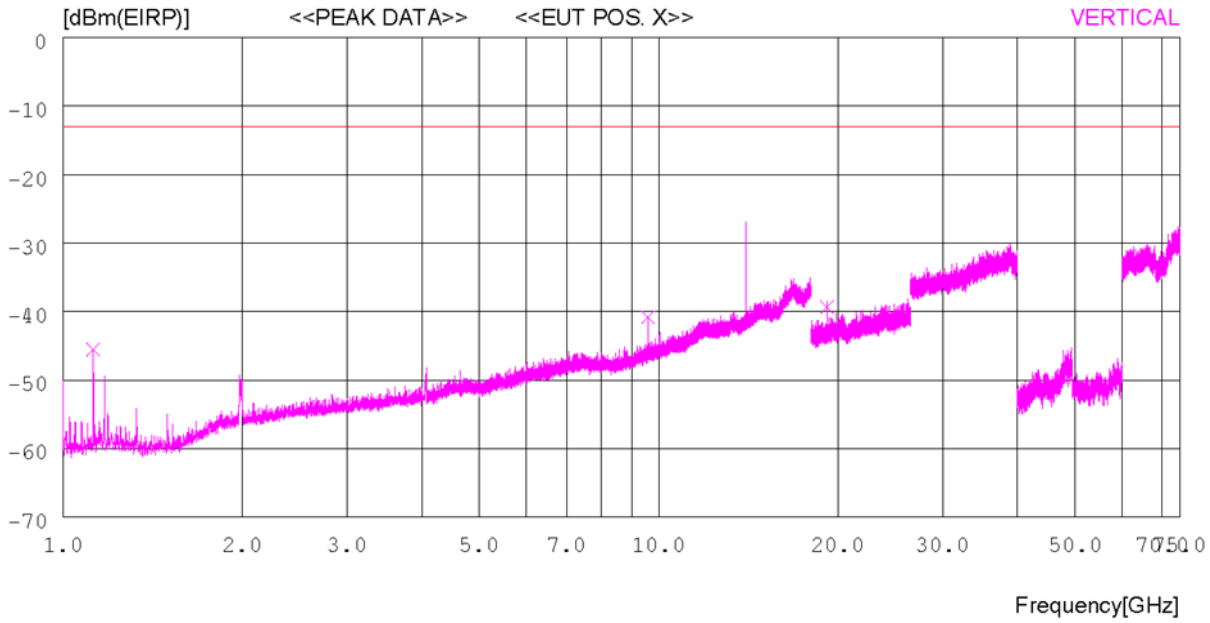


Figure 8. Plot of Field Strength of Spurious Radiation (radiated emissions from 1 GHz to 75 GHz)

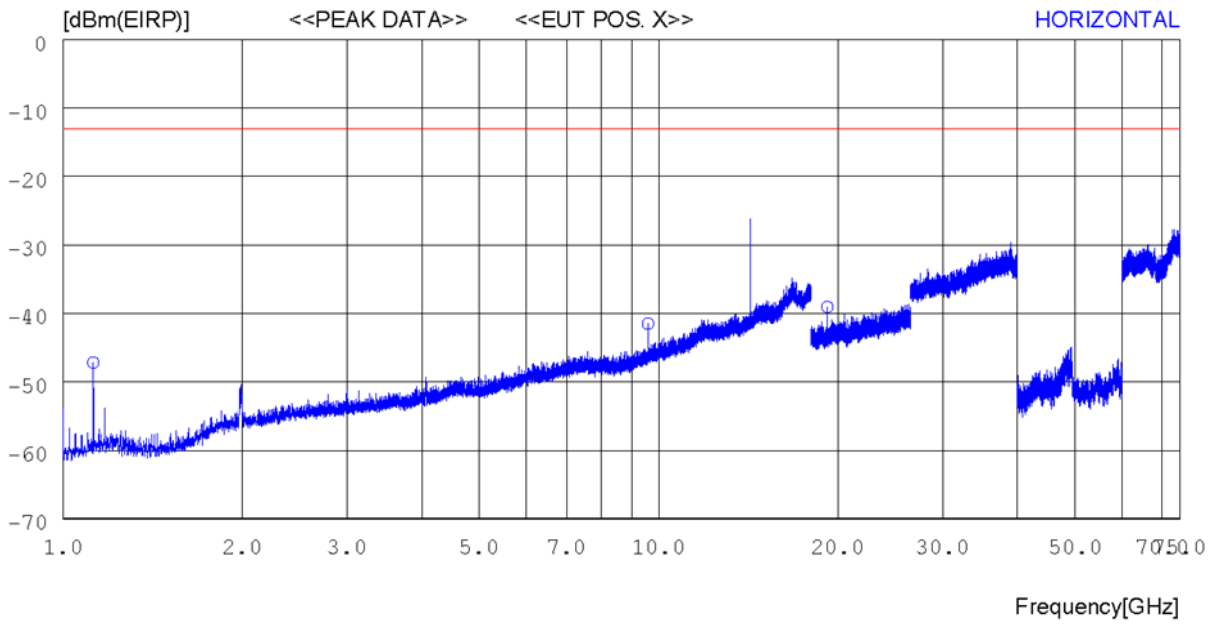
transmitting at f_{LOW} (19.8 MHz, 16QAM)

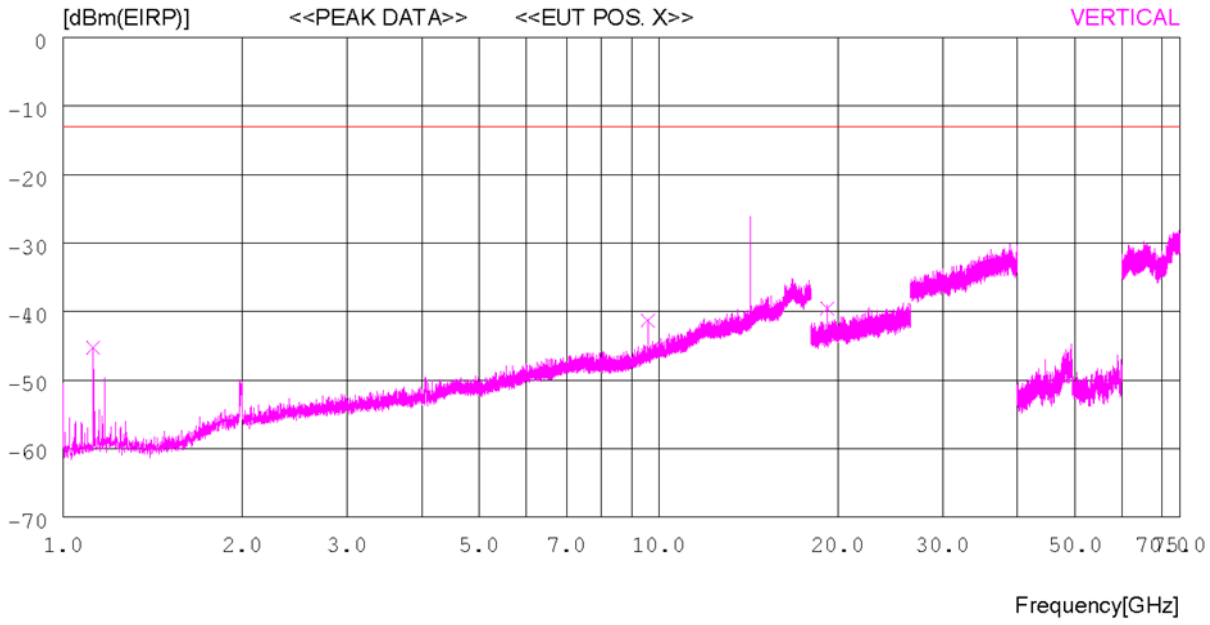




remark: the emissions in the fundamental frequency were not subject to the limits; although the antennas were terminated by the dummy loads, the fundamental transmitting signal was leaked and detected and therefore these emissions were ignored.

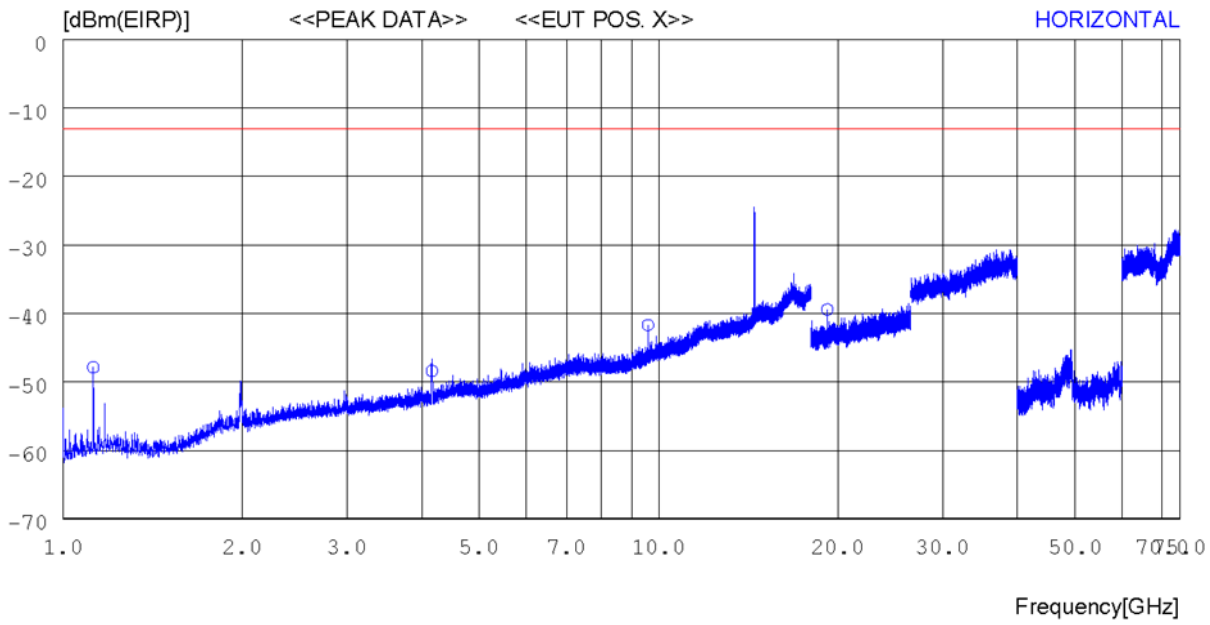
transmitting at f_{MID} (19.8 MHz, 16QAM)

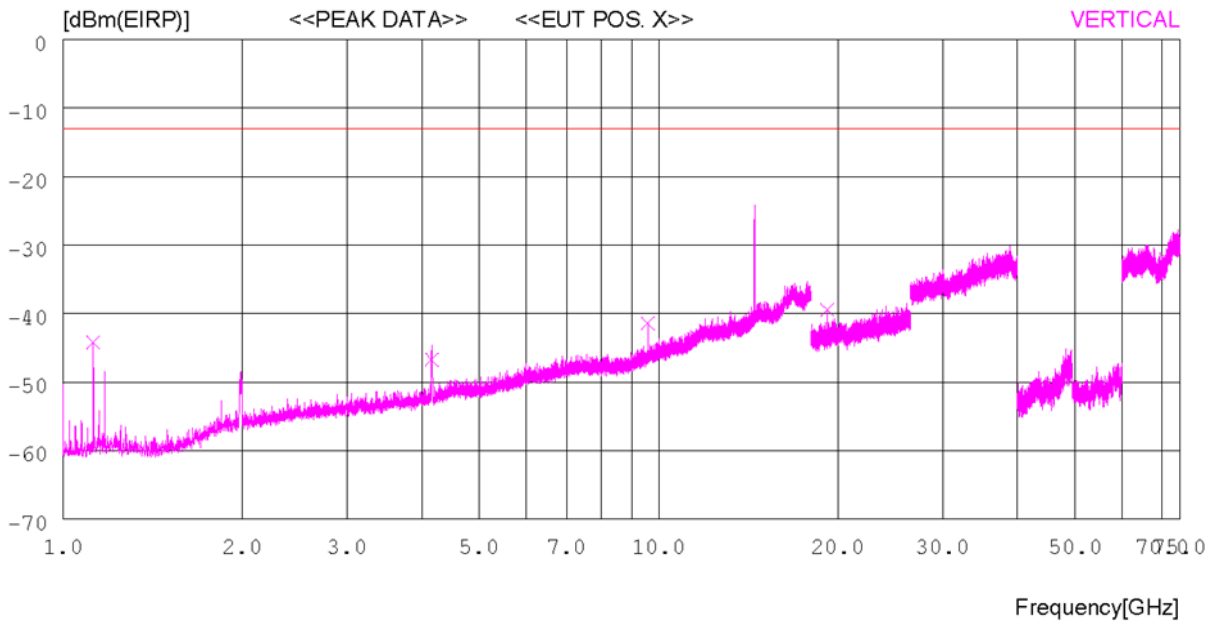




remark: the emissions in the fundamental frequency were not subject to the limits; although the antennas were terminated by the dummy loads, the fundamental transmitting signal was leaked and detected and therefore these emissions were ignored.

transmitting at f_{HIGH} (19.8 MHz, 16QAM)





remark: the emissions in the fundamental frequency were not subject to the limits; although the antennas were terminated by the dummy loads, the fundamental transmitting signal was leaked and detected and therefore these emissions were ignored.

5.5. Transmitter Frequency Stability

5.5.1 Regulation

FCC, CFR 47 Section

According to 2.1055,

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(2) From -20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radio beacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

(3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) In addition to all other requirements of this section, the following information is required for equipment incorporating heater type crystal oscillators to be used in mobile stations, for which type acceptance is first requested after March 25, 1974, except for battery powered, hand carried, portable equipment having less than 3 watts mean output power.

(1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0° centigrade and + 30° centigrade with no primary power applied.

(2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10° centigrade above the respective beginning ambient temperature level.

(3) The elapsed time necessary for the frequency to stabilize within the applicable tolerance from each beginning ambient temperature level as determined from the tests specified in this paragraph shall be specified in the instruction book for the transmitter furnished to the user.

(4) When it is impracticable to subject the complete transmitter to this test because of its physical dimensions or power rating, only its frequency determining and stabilizing portions need be tested.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c), and (d) of this section. (For example measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

According to 25.202(d), Frequency tolerance, Earth stations. The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

5.5.2 Test Procedure

The frequency stability was measured with the following setting according to subclause 5.6.3 of ANSI C63.26.

Frequency stability versus environmental temperature:

(a) Supply the EUT with nominal voltage.

(b) Turn on the EUT and tune it to the center frequency of the operating band.

(c) Turn the EUT off and place it inside an environmental temperature chamber. For devices that are normally operated continuously, the EUT may be energized while inside the test chamber. For devices that have oscillator heaters, energize only the heater circuit while the EUT was inside the chamber.

(d) RF output was connected to the frequency counter or spectrum analyzer via feed through attenuators.

(e) Set the temperature control on the chamber to the highest specified EUT operating temperature and allow the temperature inside the chamber to stabilize at the set temperature before starting frequency measurements.

(f) While maintaining a constant temperature inside the environmental chamber, turn on the EUT and record the operating frequency at startup and two, five, and ten minutes after the EUT was energized.

(g) After all measurements have been made at the highest specified temperature turn the EUT off.

(h) Repeat the above measurement process for the EUT with the test chamber set at the appropriate temperature.

When the frequency stability limit is stated as being sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point should be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation should be identified as f_L and f_H respectively. The worst-case frequency offset determined in the above methods should be added or subtracted from the values of f_L and f_H and the resulting frequencies must remain within the band.

Frequency Stability versus Input Voltage:

(a) These tests should be made at room temperature (20 ± 5) °C supply the EUT with nominal voltage.

(b) Couple RF output to the frequency counter or spectrum analyzer.

(c) Tune the EUT to the center frequency of the operating band and measure the frequency at startup and two, five, and ten minutes after startup.

(d) Supply it with 85 % of the nominal voltage and repeat the above procedure.

(e) Supply it with 115 % of the nominal voltage and repeat the above procedure.

(f) Repeat the frequency measurement at the low and high channel of the operating band.

5.5.3 Result: PASS

Table 9: Frequency stability (temperature variations)

Reference Frequency: 14 263 MHz

Temperature [°C]	Voltage [V_{AC}]	Measured Carrier Frequency with time elapsed			
		START UP [MHZ]	2 minutes [MHZ]	5 minutes [MHZ]	10 minutes [MHZ]
+50	120	14 262.997 524	14 262.997 521	14 262.997 517	14 262.997 513
+40	120	14 262.997 560	14 262.997 556	14 262.997 548	14 262.997 541
+30	120	14 262.997 577	14 262.997 573	14 262.997 569	14 262.997 564
+20	120	14 262.997 602	14 262.997 599	14 262.997 594	14 262.997 589
+10	120	14 262.997 629	14 262.997 625	14 262.997 620	14 262.997 617
0	120	14 262.997 666	14 262.997 660	14 262.997 656	14 262.997 652
-10	120	14 262.997 687	14 262.997 686	14 262.997 681	14 262.997 676
-20	120	14 262.997 712	14 262.997 708	14 262.997 705	14 262.997 700
-30	120	14 262.997 731	14 262.997 727	14 262.997 726	14 262.997 720

Reference Frequency: 14 263 MHz, LIMIT: within 0.001 % (10 ppm; within ± 142 63 Hz)

Temperature [°C]	Voltage [V_{AC}]	Frequency Tolerance							
		START UP		2 minutes		5 minutes		10 minutes	
		Err [Hz]	Err [ppm]	Err [Hz]	Err [ppm]	Err [Hz]	Err [ppm]	Err [Hz]	Err [ppm]
+50	120	-2 476	-0.17	-2 479	-0.17	-2 483	-0.17	-2 487	-0.17
+40	120	-2 440	-0.17	-2 444	-0.17	-2 452	-0.17	-2 459	-0.17
+30	120	-2 423	-0.17	-2 427	-0.17	-2 431	-0.17	-2 436	-0.17
+20	120	-2 398	-0.17	-2 401	-0.17	-2 406	-0.17	-2 411	-0.17
+10	120	-2 371	-0.17	-2 375	-0.17	-2 380	-0.17	-2 383	-0.17
0	120	-2 334	-0.16	-2 340	-0.16	-2 344	-0.16	-2 348	-0.16
-10	120	-2 313	-0.16	-2 314	-0.16	-2 319	-0.16	-2 324	-0.16
-20	120	-2 288	-0.16	-2 292	-0.16	-2 295	-0.16	-2 300	-0.16
-30	120	-2 269	-0.16	-2 273	-0.16	-2 274	-0.16	-2 280	-0.16

Err [Hz] = 10^6 × (Measured frequency [MHz] - Reference Frequency [MHz])

Err [ppm] = 10^6 × (Measured frequency [MHz] - Reference Frequency [MHz]) / Reference frequency [MHz]

NOTE: For testing purpose EUT's modulation was deactivated, and the CW carrier was activated.

Table 10: Frequency stability (voltage variations)

Reference Frequency [MHz]	Voltage [V_{AC}]	Measured Carrier Frequency with time elapsed			
		START UP [MHZ]	2 minutes [MHZ]	5 minutes [MHZ]	10 minutes [MHZ]
14 013	85 %	14 012.997 570	14 012.997 569	14 012.997 567	14 012.997 565
	100 %	14 012.997 590	14 012.997 588	14 012.997 585	14 012.997 581
	115 %	14 012.997 558	14 012.997 557	14 012.997 557	14 012.997 555
14 263	85 %	14 262.997 532	14 262.997 533	14 262.997 532	14 262.997 531
	100 %	14 262.997 550	14 262.997 547	14 262.997 546	14 262.997 543
	115 %	14 262.997 524	14 262.997 524	14 262.997 522	14 262.997 523
14 487	85 %	14 486.997 502	14 486.997 500	14 486.997 500	14 486.997 498
	100 %	14 486.997 515	14 486.997 513	14 486.997 511	14 486.997 509
	115 %	14 486.997 494	14 486.997 492	14 486.997 493	14 486.997 494

Reference Frequency [MHz]	Voltage [V_{AC}]	Frequency Tolerance (LIMIT: within 0.001 %;10 ppm)							
		START UP		2 minutes		5 minutes		10 minutes	
		Err [Hz]	Err [ppm]	Err [Hz]	Err [ppm]	Err [Hz]	Err [ppm]	Err [Hz]	Err [ppm]
14 013	85 %	-2 431	-0.17	-2 431	-0.17	-2 433	-0.17	-2 435	-0.17
	100 %	-2 410	-0.17	-2 412	-0.17	-2 415	-0.17	-2 419	-0.17
	115 %	-2 442	-0.17	-2 443	-0.17	-2 443	-0.17	-2 445	-0.17
14 263	85 %	-2 468	-0.17	-2 467	-0.17	-2 468	-0.17	-2 469	-0.17
	100 %	-2 450	-0.17	-2 453	-0.17	-2 454	-0.17	-2 457	-0.17
	115 %	-2 476	-0.17	-2 476	-0.17	-2 478	-0.17	-2 477	-0.17
14 487	85 %	-2 498	-0.17	-2 500	-0.17	-2 501	-0.17	-2 502	-0.17
	100 %	-2 485	-0.17	-2 487	-0.17	-2 489	-0.17	-2 491	-0.17
	115 %	-2 506	-0.17	-2 508	-0.17	-2 507	-0.17	-2 506	-0.17

Err [Hz] = 10^6 × (Measured frequency [MHz] - Reference Frequency [MHz])

Err [ppm] = 10^6 × (Measured frequency [MHz] - Reference Frequency [MHz]) / Reference frequency [MHz]

NOTE: For testing purpose EUT's modulation was deactivated, and the CW carrier was activated.