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TEST REPORT

of

FCC Part 15 Subpart C §15.225
RSS-210 Issue 11 and RSS-Gen Issue 5

FCC ID: OZ5-LCR001
IC Certification: 21703-LCR001

Equipment Under Test	:	RFID Reader Module
Model Name	:	LCR-001 Master
Variant Model Name(s)	:	LCR-001 Slave
FCC Applicant	:	Ohsung Electronics Co., Ltd.
IC Applicant	:	OHSUNG ELECTRONICS CO.,LTD.
Manufacturer	:	OHSUNGELECTRONICS CO.,LTD.
Date of Receipt	:	2024.09.24
Date of Test(s)	:	2024.10.23 ~ 2024.11.12
Date of Issue	:	2024.11.18

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

1) The results of this test report are effective only to the items tested.
2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
3) This test report cannot be reproduced, except in full, without prior written permission of the Company.
4) The data marked ※ in this report was provided by the customer and may affect the validity of the test results.
We are responsible for all the information of this test report except for the data(※) provided by the customer.

Tested by: Youngbin Kim

Technical Manager: Jinhyoung Cho

SGS Korea Co., Ltd. Gunpo Laboratory

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

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1.2. Details of Applicant

FCC Applicant : Ohsung Electronics Co., Ltd.
FCC Address : #181 Gongdan-Dong, Gumi-Si, Gyeongsangbuk-Do, Republic of Korea, 39269
IC Applicant : OHSUNG ELECTRONICS CO.,LTD.
IC Address : 335-4, Sanho-daero, Gumi-si, Gyeongsangbuk-do, Republic of Korea, 39269
Contact Person : Kim, Hak-Ki
Phone No. : +82 10 5165 1268

1.3. Details of manufacturer

Company : Same as applicant
Address : Same as applicant
Factory1 : OHSUNGELECTRONICS CO.,LTD.
Factory1 Adress : 335-4, Sanho-daero, Gumi-si, Gyeongsangbuk-do, Republic of Korea
Factory2 : Ohsung Electronics (Suzhou) Co., Ltd.
Factory2 Adress : 188 Tunpu south-Road, Qiushe economic development zone, Tongli-Town, Wujiang-City jiangsu-Province,china

1.4. Description of EUT

Kind of Product	RFID Reader Module
Model Name	LCR-001 Master
Variant Model Name	LCR-001 Slave
Serial Number	001
Power Supply	DC 5.0 V
Frequency Range	13.56 ㎒ ± 7 ㎑ (NFC)
Modulation Technique	ASK
Number of Channels	1 channel
Antenna Type	PCB loop antenna
H/W Version	V 1.0
S/W Version	V 1.0
FVIN	V 1.0

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMBV100A	259067	Jun. 19, 2024	Annual	Jun. 19, 2025
DC Power Supply	R&S	HMP2020	102130	May 02, 2024	Annual	May 02, 2025
Temperature Chamber	ESPEC CORP.	PL-1J	15000793	Jun. 04, 2024	Annual	Jun. 04, 2025
Spectrum Analyzer	R&S	FSV30	103210	Mar. 27, 2024	Annual	Mar. 27, 2025
Spectrum Analyzer	Agilent	N9020A	MY53421758	Sep. 10, 2024	Annual	Sep. 10, 2025
Amplifier	H.P.	8447F	2944A03909	Aug. 09, 2024	Annual	Aug. 09, 2025
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 21, 2023	Biennial	Aug. 21, 2025
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB 9163	9163-396	Apr. 02, 2024	Biennial	Apr. 02, 2026
EMI Test Receiver	R&S	ESU26	100109	Jan. 16, 2024	Annual	Jan. 16, 2025
Turn Table	Innco systems GmbH	DS 1200 S	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/3833 0516/L	N.C.R.	N/A	N.C.R.
Antenna Mast	Innco systems GmbH	MA4640-XP-ET	MA4640/536/3833 0516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Two-Line V-Network	R&S	ENV216	100190	May 23, 2024	Annual	May 23, 2025
Test Receiver	R&S	ESCI 7	100911	Feb. 26, 2024	Annual	Feb. 26, 2025
Shield Room	SY Corporation	L × W × H (6.5 m × 3.5 m × 3.5 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	SENSORVIEW	NMST-13A26-NMST-5 m	TPC2402190004	Oct. 04, 2024	Semi-Annual	Apr. 04, 2025
Coaxial Cable	SENSORVIEW	NMST-13A26-NMST-10 m	TPC2402190001	Oct. 04, 2024	Semi-Annual	Apr. 04, 2025
Coaxial Cable	RADIALL	TESTPRO 3	182287	Oct. 11, 2024	Semi-Annual	Apr. 11, 2025

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

Applied standard : FCC Part15 subpart C, IC RSS-210 Issue 11, RSS-Gen Issue 5			
Section in FCC	**Section in IC**	**Test item(s)**	**Result**
15.225(a)(b)(c)(d) 15.209	RSS-210 Issue 11 B.6 RSS-Gen Issue 5 8.9	Radiated Emission, Spurious Emission and Field Strength of Fundamental	Pass
15.225(e)	RSS-210 Issue 11 B.6 RSS-Gen Issue 5 6.11	Frequency Stability	Pass
15.215(c)	RSS-Gen Issue 5 6.7	20 dB Bandwidth & 99 % Bandwidth	Pass
15.207	RSS-Gen Issue 5 8.8	AC Power Line Conducted Emissions	Pass

1.7. Sample calculation

Where relevant, the following sample calculation is provided:

1.7.1. Radiation test

Field strength level (dBμV/m) = Measured level (dBμV) + Antenna factor (dB/m) + Cable loss (dB) - Amplifier gain(dB)

1.8. Information of software for test.

Using the software of Internal to testing of EUT.

1.9. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter		Uncertainty
99 % Bandwidth		0.04 ㎑
20 ㏈ Bandwidth		0.04 ㎑
Frequency Stability		0.11 ㎑
AC Conducted Emission		3.10 ㏈
Radiated Emission, 9 ㎑ to 30 ㎒	H	3.40 ㏈
	V	3.40 ㏈
Radiated Emission, below 1 ㎓	H	4.60 ㏈
	V	5.00 ㏈

All measurement uncertainty values are shown with a coverage factor *k* = 2 to indicate a 95 % level of confidence.

1.10. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501-RF-RTL005575	2024.11.18	Initial

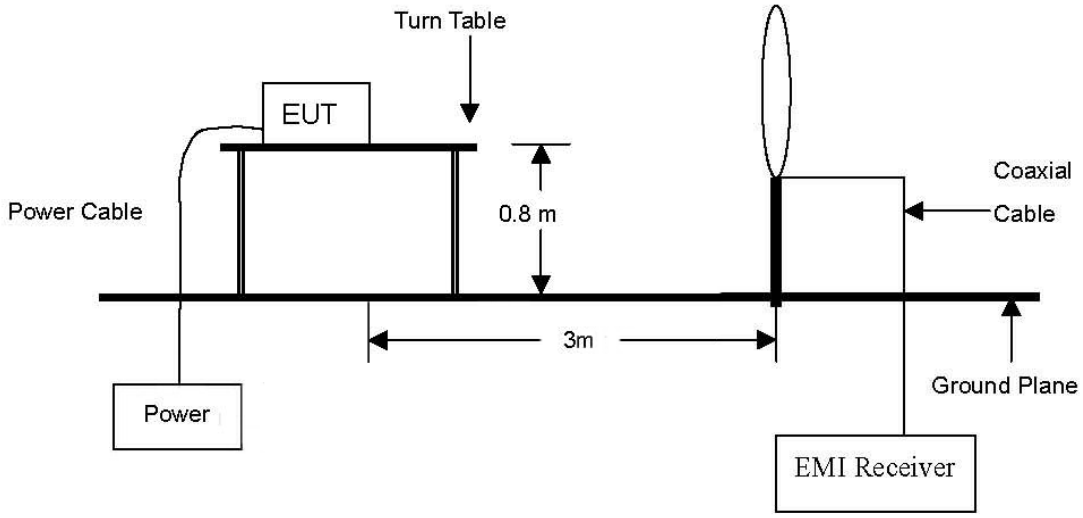
1.11. Description of variant models

Model name		Description
Basic model	LCR-001 Master	-Representative production model
Variant model	LCR-001 Slave	-The basic and variant models have the same circuit, but the number of power connectors is different. - Basic model mounted 2 power connectors (RF communicated was only 1 power connector) -Variant model mounted 1 power connector.

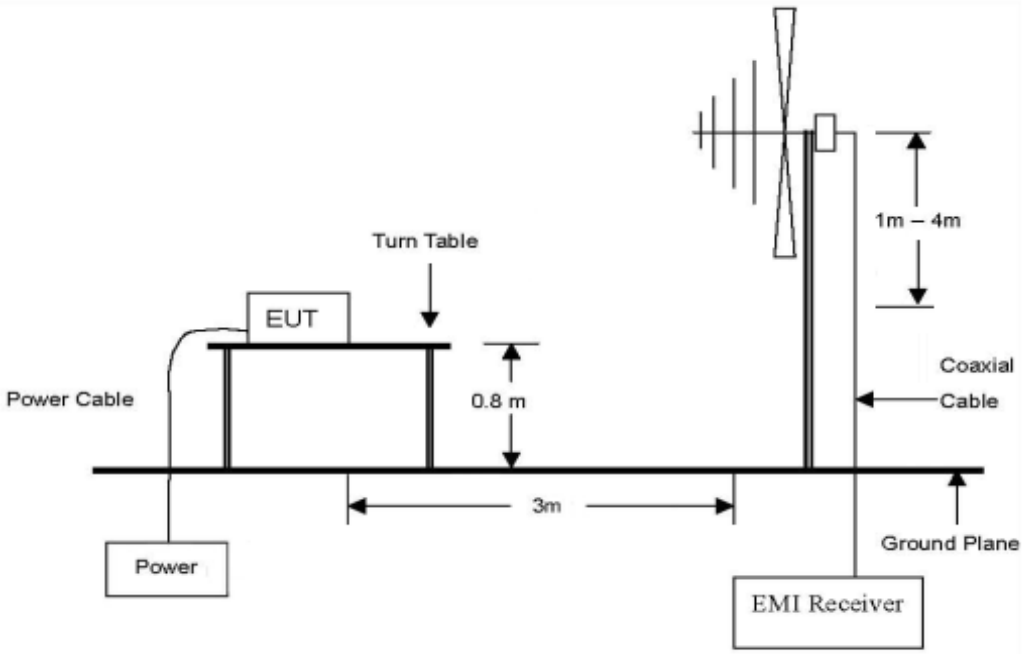
2. Radiated Emissions

2.1. Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 000 ㎒ Emissions.



2.2. Limit

FCC

According to §15.225,

(a) The field strength of any emissions within the band 13.553-13.567 ㎒ shall not exceed 15 848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 ㎒ and 13.567-13.710 ㎒, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 ㎒ and 13.710-14.010 ㎒ the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 ㎒ band shall not exceed the general radiated emission limits in §15.209.

According to §15.209,

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (㎒)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009-0.490	2400/F(㎑)	300
0.490-1.705	24000/F(㎑)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 ㎒, 76-88 ㎒, 174-216 ㎒ or 470-806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

IC

According to RSS-210 Issue 11, B.6

The field strength of any emission shall not exceed the following limits:

(a) 15.848 millivolts/m (84 dBμV/m) at 30 m, within the band 13.553-13.567 MHz.

(b) 334 microvolts/m (50.47 dBμV/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz.

(c) 106 microvolts/m (40.51 dBμV/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz.

(d) RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz.

According to RSS-Gen Issue 5, 8.9

Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5 - General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field Strength (μV/m at 3 m)
30-88	100
88-216	150
216-960	200
Above 960	500

Table 6 - General field strength limits at frequencies below 30 MHz

Frequency	Magnetic Field Strength (H-Field) (μA/m)	Measurement Distance (m)
9-490 kHz [1]	6.37/F (F in kHz)	300
490-1 705 kHz	63.7/F (F in kHz)	30
1.705-30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.10-2013.

2.3.1. Test Procedures for emission below 30 ㎒

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test-receiver system was set to Quasi peak Detect Function with Maximum Hold Mode.

2.3.2. Test Procedures for emission above 30 ㎒

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 ㎓, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a bi-log antenna and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. For measurements below 1 ㎓ resolution bandwidth is set to 100 ㎑ for peak detection measurements or 120 ㎑ for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Note;

The radiation test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

2.4. Test Result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

The following table shows the highest levels of radiated emissions.

- Fundamental within the band 13.553 ㎒ - 13.567 ㎒

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 30 m	Limit (dB㎶/m) at 30 m	Margin (dB)
13.560	50.60	Peak	H	18.93	0.61	70.14	30.14	84.00	53.86

- Spurious emission within the bands 13.410 ㎒ - 13.553 ㎒ and 13.567 ㎒ - 13.710 ㎒

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 30 m	Limit (dB㎶/m) at 30 m	Margin (dB)
13.553	45.22	Peak	H	18.93	0.61	64.76	24.76	50.47	25.71
13.567	44.57	Peak	H	18.93	0.61	64.11	24.11	50.47	26.36

- Spurious emission within the bands 13.110 ㎒ - 13.410 ㎒ and 13.710 ㎒ - 14.010 ㎒

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 30 m	Limit (dB㎶/m) at 30 m	Margin (dB)
13.343	10.52	Peak	H	18.93	0.62	30.07	-9.93	40.51	50.44
*13.396	10.26	Peak	H	18.93	0.62	29.81	-10.19	29.54	39.73
13.740	11.16	Peak	H	18.93	0.60	30.69	-9.31	40.51	49.82

- Spurious emission within the bands 9 ㎑ - 13.110 ㎒

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 30 or 300 m	Limit (dB㎶/m) at 30 or 300 m	Margin (dB)
0.034	40.83	Peak	H	18.39	0.03	59.25	-20.75	36.97	57.72
0.068	23.86	Peak	H	18.29	0.04	42.19	-37.81	30.95	68.76
0.163	23.66	Peak	H	18.20	0.08	41.94	-38.06	23.36	61.42
0.703	16.14	Peak	H	18.34	0.57	35.05	-4.95	30.67	35.62
*12.290	10.88	Peak	H	18.95	0.63	30.46	-9.54	29.54	39.08

- Spurious emission within the bands 14.010 ㎒ - 30 ㎒

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	Actual (dB㎶/m) at 3 m	Actual (dB㎶/m) at 30 m	Limit (dB㎶/m) at 30 m	Margin (dB)
*16.421	11.33	Peak	H	19.07	0.30	30.70	-9.30	29.54	38.84
16.968	9.54	Peak	H	19.14	0.33	29.01	-10.99	29.54	40.53
*25.596	11.22	Peak	H	19.29	0.30	30.81	-9.19	29.54	38.73
Above 26.000	Not detected	-	-	-	-	-	-	-	-

Remark;

1. Fundamental limit (㎶/m) = 20 log(15 848) = 84.00 dB㎶/m.
2. 30 m distance compensation = 40 log(3/30) = -40 dB㎶/m.
3. 300 m distance compensation = 40 log(3/300) = -80 dB㎶/m.
4. "*" means the restricted band.
5. If the spurious emissions are in the restricted band, the limit complied with §15.209.
6. All data were recorded using a spectrum analyzer employing a peak detector.
   If PK results were meet Quasi-peak limit, Quasi-peak measurements were omitted.
7. Radiated spurious emission measurement as below 30 ㎒.
   (Actual (dB㎂/m) at 3m = Reading (dB㎶) + AF (dB/m) + CL (dB))

- Spurious emission above 30 ㎒

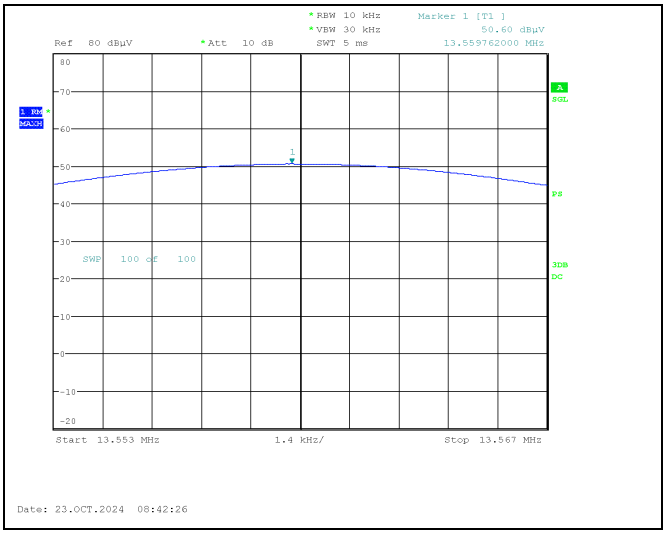
Radiated Emissions			Ant	Correction (dB/m)	Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.		Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
40.61	33.65	Quasi Peak	V	-8.14	25.51	40.00	14.49
75.43	43.28	Quasi Peak	V	-13.74	**29.54**	40.00	10.46
150.99	37.12	Quasi Peak	V	-12.27	24.85	43.50	18.65
325.40	34.61	Quasi Peak	H	-5.30	29.31	46.00	16.69
352.53	37.61	Quasi Peak	H	-4.81	32.80	46.00	13.20
Above 400.00	Not detected	-	-	-	-	-	-

Remark;

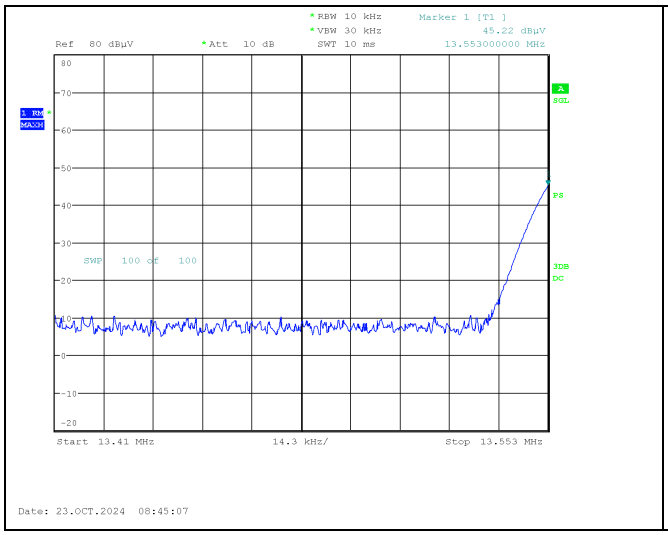
1. Radiated spurious emission measurement as below.
   (Actual (dB㎂/m) = Reading (dB㎶) + Correction)
   (Correction = Antenna Factor (dB/m) + AMP Factor (dB) + Cable Loss (dB))
2. According to §15.31(o), emission levels are not report much lower than the limits by over 20 dB.
3. Test from 30 ㎒ to 1 000 ㎒ was performed using the software of ELEKTRA(V5.02.1) from Rohde & Schwarz GmbH & Co. KG.

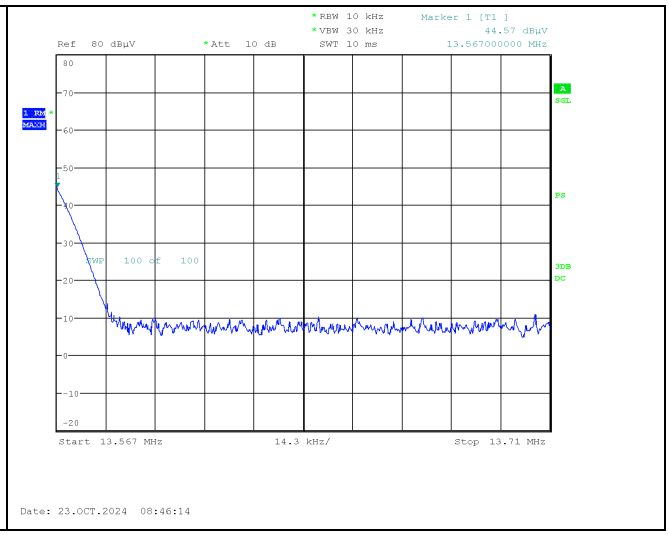
Test plots

- Fundamental within the band 13.553 ㎒ - 13.567 ㎒

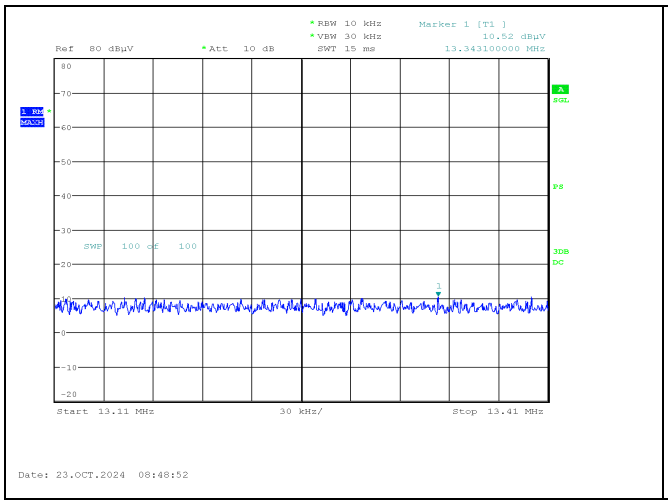


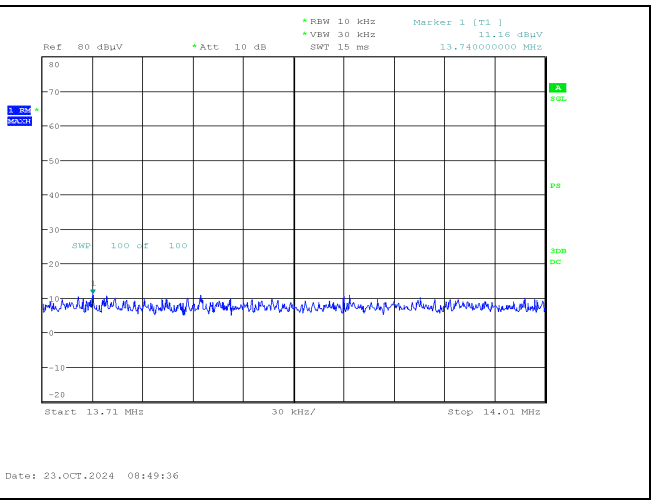
- Spurious emission within the bands 13.410 ㎒ - 13.553 ㎒ and 13.567 ㎒ - 13.710 ㎒

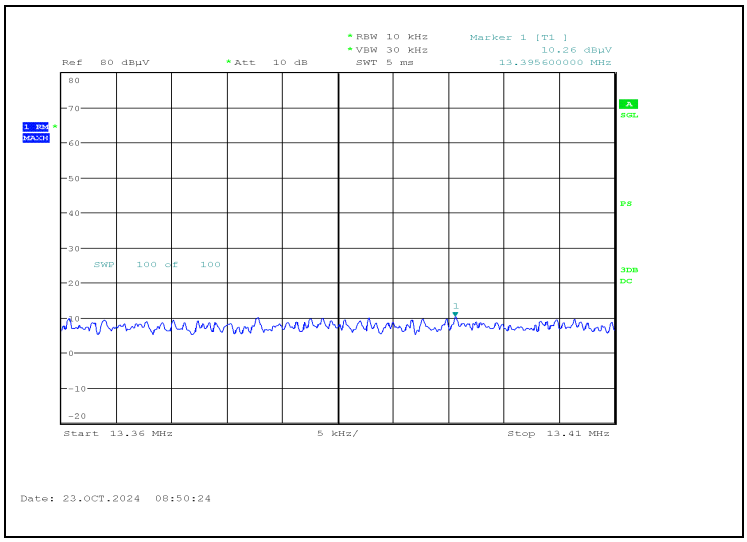




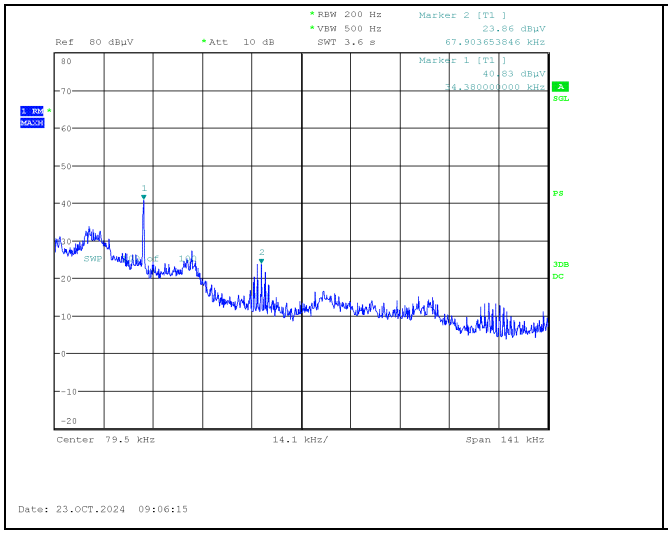
- Spurious emission within the bands 13.110 ㎒ - 13.410 ㎒ and 13.710 ㎒ - 14.010 ㎒

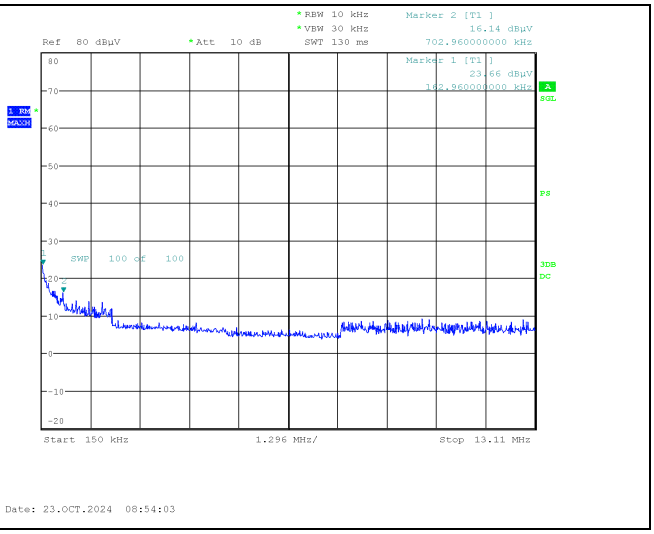




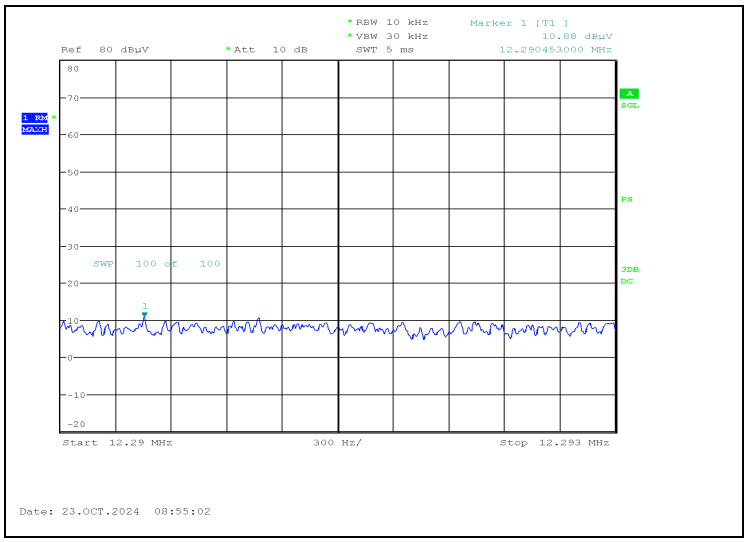


- Spurious emission within the bands 9 ㎑ – 13.110 ㎒

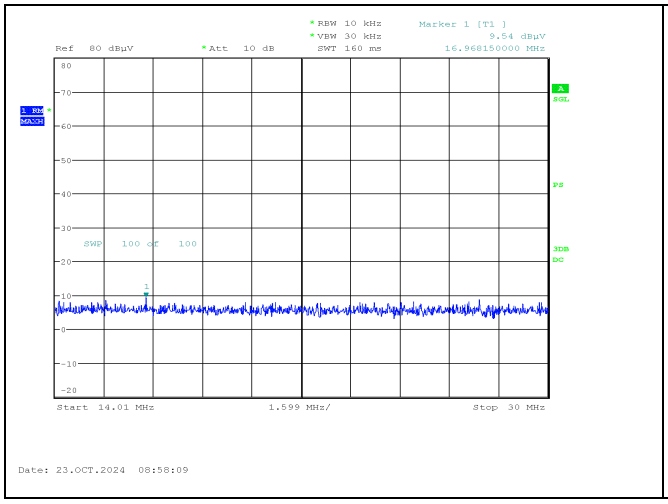


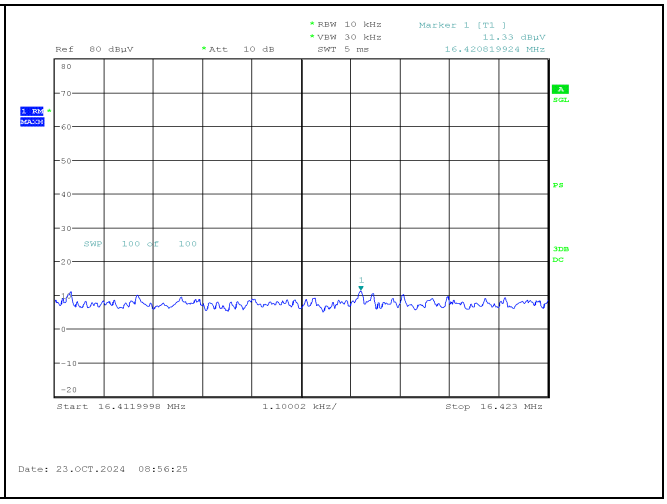


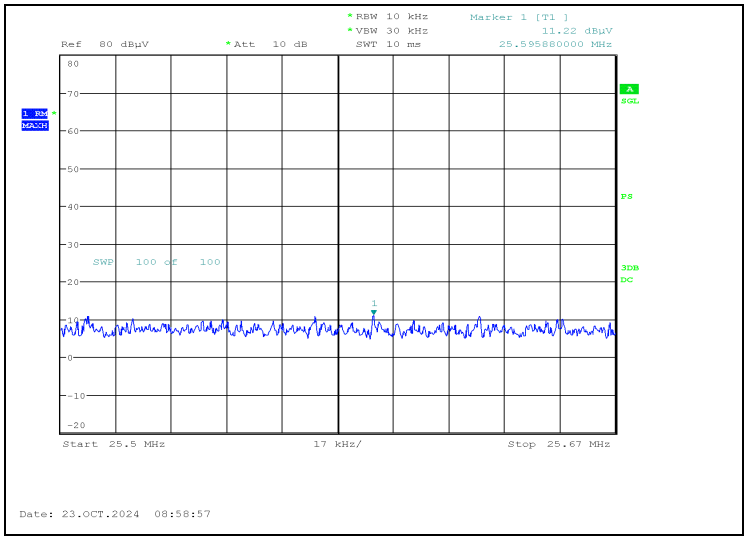
- Spurious emission within the bands 12.290 ㎒ – 12.293 ㎒



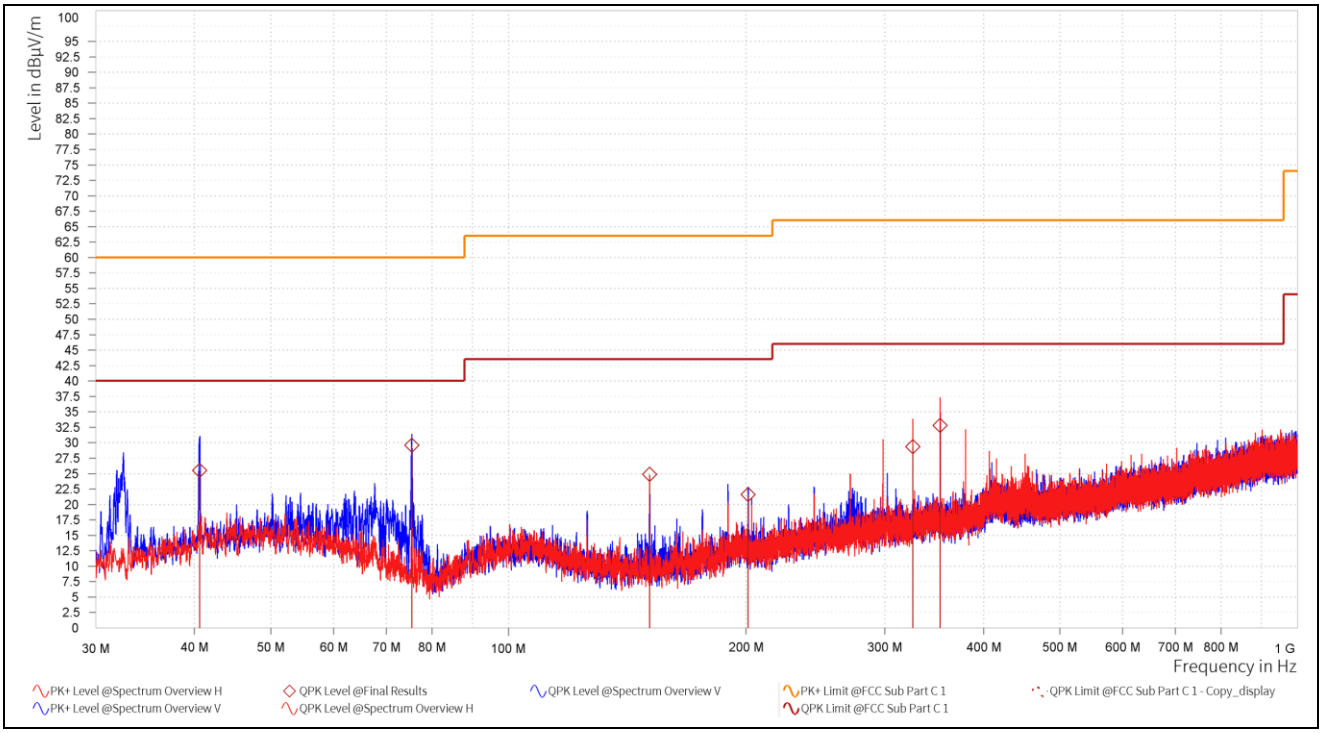
- Spurious emission within the bands 14.010 ㎒ – 30 ㎒





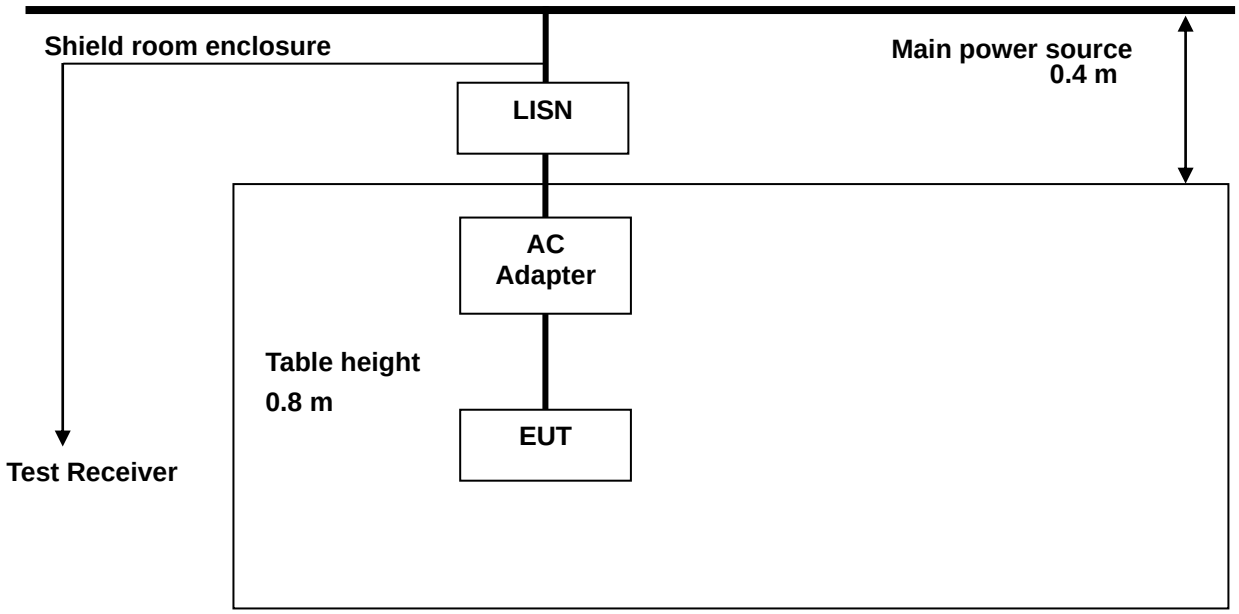


- Spurious emission above 30 ㎒



3. AC Power Line Conducted Emission

3.1. Test Setup



3.2. Limit

3.2.1. FCC

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 50 μH /50 ohms line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (㎒)	Conducted limit (㏈㎶)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

3.2.2. IC

RSS-Gen Issue 5, 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 ㎑ to 30 ㎒ 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.

Table 4 - AC power-line conducted emissions limits

Frequency (㎒)	Conducted limit (㏈㎶)	
	Quasi-peak	Average
0.15-0.5	66 to 56[1]	56 to 46[1]
0.5-5	56	46
5-30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 ㎑ and 30 ㎒, the AC power-line conducted emissions must be measured using the following configurations:

(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

3.3. Test Procedures

AC conducted emissions from the EUT were measured according to the dictates of ANSI C63.10-2013.

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

3.4. Test Results

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

Frequency range : 0.15 ㎒ - 30 ㎒
Measured Bandwidth : 9 ㎑

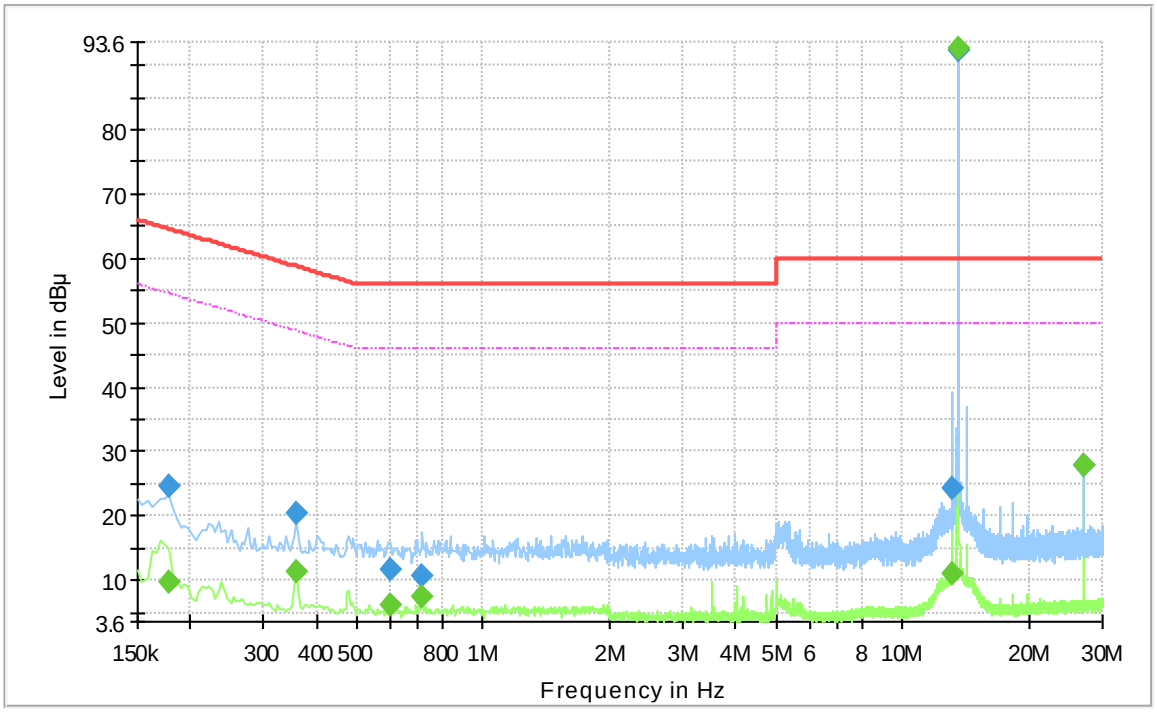
Freq.	Reading (dB㎶)		Correction Factor (dB)	Level (dB㎶)		Line	Limit (dB㎶)		Margin (dB)	
(㎒)	Quasi-peak	Average		Quasi-peak	Average		Quasi-peak	Average	Quasi-peak	Average
0.18	15.12	0.16	9.62	24.74	9.78	N	64.58	54.58	39.84	44.80
0.36	10.69	1.77	9.66	20.35	11.43	N	58.77	48.77	38.42	37.34
0.60	2.02	-3.51	9.74	11.76	6.23	N	56.00	46.00	44.24	39.77
0.71	1.01	-2.10	9.74	10.75	7.64	N	56.00	46.00	45.25	38.36
13.13	13.73	0.38	10.60	24.33	10.98	N	60.00	50.00	35.67	39.02
27.12	16.64	16.60	11.25	27.89	27.85	N	60.00	50.00	32.11	22.15
0.17	19.84	1.82	9.72	29.56	11.54	H	64.96	54.96	35.40	43.42
0.35	9.22	0.68	9.74	18.96	10.42	H	58.87	48.87	39.91	38.45
0.87	-1.15	-4.31	9.74	8.59	5.43	H	56.00	46.00	47.41	40.57
4.16	1.95	-2.06	9.92	11.87	7.86	H	56.00	46.00	44.13	38.14
14.24	21.18	0.02	10.47	31.65	10.49	H	60.00	50.00	28.35	39.51
27.12	19.64	19.77	11.12	30.76	30.89	H	60.00	50.00	29.24	19.11

Remark;

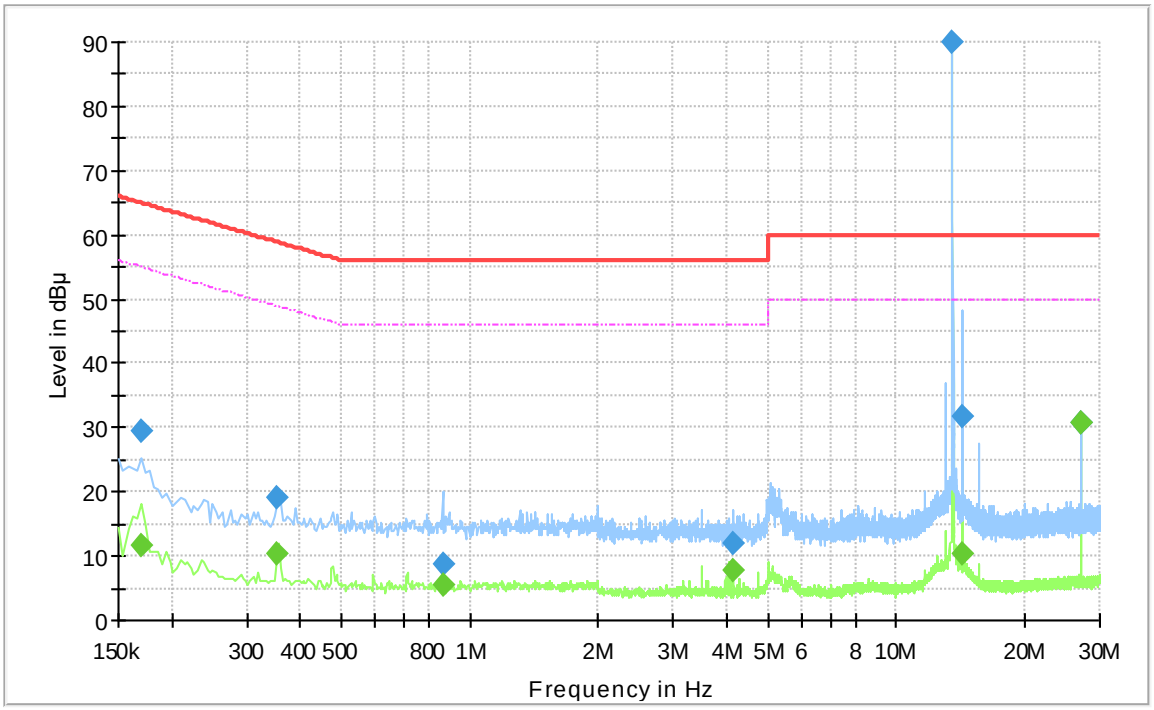
1. Line (H): Hot, Line (N): Neutral.
2. The limit for Class B device(s) from 150 ㎑ to 30 ㎒ are specified in Section of the Title 47 CFR.
3. Test from 150 ㎑ to 30 ㎒ was performed using the software of EMC32(V10.60.20) from R&S.
4. Traces shown in plot were made by using a Quasi-peak detector and average detector.
5. Deviations to the Specifications: None.
6. Level (dB㎶) = Reading (dB㎶) + Correction Factor(dB)
7. Correction Factor(dB) = LISN factor (dB) + Cable loss (dB)

- Test plots

Test mode: (Neutral)

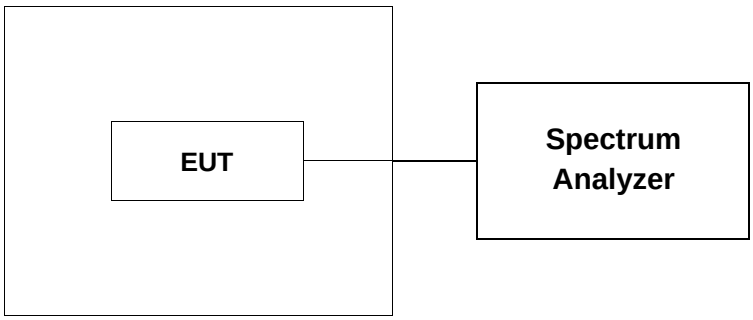


Test mode: (Hot)



4. Frequency Stability

4.1. Test Setup



4.2. Limit

FCC

According to §15.225(e), the frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

IC

According to RSS-210 Issue 11, Annex B, Section B.6
The carrier frequency stability shall not exceed ±100 ppm.
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4.3. Test Procedures

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the environment into appropriate environment.
4. Set the spectrum analyzer as RBW = 100 ㎐, VBW = 100 ㎐, Span = 10 ㎑, Sweep time = auto.
5. Mark the peak frequency and measure the frequency tolerance using frequency counter function.
6. Repeat until all the results are investigated.

4.4. Test Result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

Operating Frequency : 13 560 000 Hz
Deviation Limit : ± 0.01 % = ± 1 356 Hz

Startup

Temperature Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
5	-20	13 560 120	120	0.000 885
	-10	13 560 040	40	0.000 295
	0	13 560 040	40	0.000 295
	+10	13 560 020	20	0.000 147
	+20	13 559 990	-10	-0.000 074
	+30	13 559 970	-30	-0.000 221
	+40	13 559 960	-40	-0.000 295
	+50	13 559 990	-10	-0.000 074

Voltage Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
115 % (5.75)	+20	13 559 990	-10	-0.000 074
85 % (4.25)	+20	13 560 030	30	0.000 221

2 minutes

Temperature Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
5	-20	13 560 080	80	0.000 590
	-10	13 560 040	40	0.000 295
	0	13 560 030	30	0.000 221
	+10	13 560 010	10	0.000 074
	+20	13 560 020	20	0.000 147
	+30	13 559 970	-30	-0.000 221
	+40	13 559 960	-40	-0.000 295
	+50	13 559 990	-10	-0.000 074

Voltage Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
115 % (5.75)	+20	13 560 030	30	0.000 221
85 % (4.25)	+20	13 560 020	20	0.000 147

5 minutes

Temperature Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
5	-20	13 560 120	120	0.000 885
	-10	13 560 040	40	0.000 295
	0	13 560 030	30	0.000 221
	+10	13 560 020	20	0.000 147
	+20	13 560 040	40	0.000 295
	+30	13 559 980	-20	-0.000 147
	+40	13 559 970	-30	-0.000 221
	+50	13 559 990	-10	-0.000 074

Voltage Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
115 % (5.75)	+20	13 560 020	20	0.000 147
85 % (4.25)	+20	13 560 030	30	0.000 221

10 minutes

Temperature Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
5	-20	13 560 110	110	0.000 811
	-10	13 560 090	90	0.000 664
	0	13 560 040	40	0.000 295
	+10	13 560 020	20	0.000 147
	+20	13 559 990	-10	-0.000 074
	+30	13 559 980	-20	-0.000 147
	+40	13 559 970	-30	-0.000 221
	+50	13 559 980	-20	-0.000 147

Voltage Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
115 % (5.75)	+20	13 559 970	-30	-0.000 221
85 % (4.25)	+20	13 560 030	30	0.000 221

5. 20 dB Bandwidth & 99 % Bandwidth

5.1. Test Setup

5.2. Limit

None; for reporting purposes only.

5.3. Test Procedures

20 dB Bandwidth

1. Span = set to capture all products of the modulation process, including the emission skirts. RBW = 200 Hz, VBW = 200 Hz, Sweep = auto, Detector = peak, Trace = max hold.
2. The marker-to-peak function to set the mark to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is 20 dB bandwidth of the emission.

99 % Bandwidth

1. Set the spectrum analyzer as Span = set to capture all products of the modulation process, including the emission skirts, RBW = 200 Hz, VBW = 200 Hz, Detector = Peak, Trace mode = max hold.
2. Measure lowest and highest frequencies are placed in a running sum until 0.5 % and 99.5 % of the total is reached.
3. The difference between the two recorded frequencies is the occupied bandwidth.

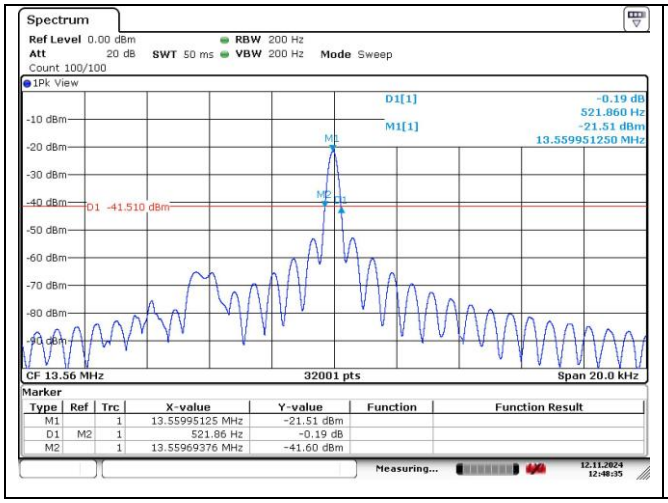
5.4. Test Result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

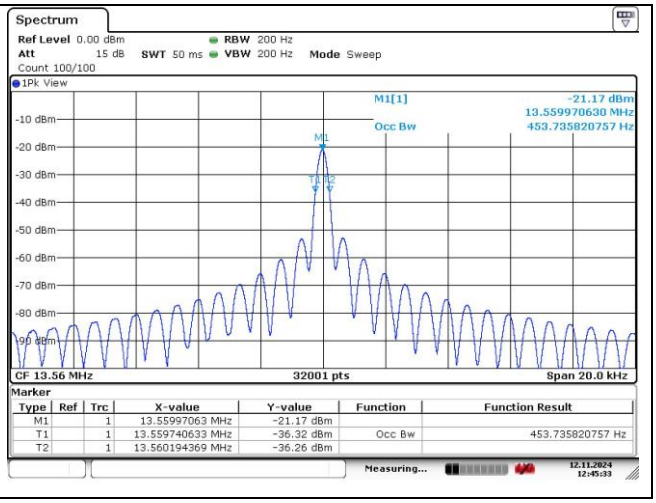
Frequency (㎒)	20 ㏈ Bandwidth (㎑)	99 % Bandwidth (㎑)
13.56	0.522	0.454

-Test plots

20 ㏈ Bandwidth



99 % Bandwidth



-End of the Test report-