TEST REPORT

of

FCC Part 15 Subpart C §15.225
IC RSS-210 Issue 10, RSS-Gen Issue 5

FCC ID: 2AXLK-IS4500
IC Certification: 26494-IS4500

1. Equipment Under Test	:	RFID Module
2. Model Name	:	IS-4500
3. Variant Model Name(s)	:	-
4. Applicant	:	ROKIT Healthcare Inc.
5. Manufacturer	:	ROKIT Healthcare Inc.
6. Date of Receipt	:	2020.07.22
7. Date of Test(s)	:	2020.07.29 ~ 2020.08.05
8. Date of Issue	:	2020.09.22

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.

Tested by: **Jinhyoung Cho**

Technical Manager: **Jungmin Yang**

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

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.

Phone No. : +82 31 688 0901
Fax No. : +82 31 688 0921

1.2. Details of Applicant

Applicant : ROKIT Healthcare Inc.
Address : 12F, 9, Digital-ro 10-gil, Geumchon-gu, Seoul, Republic of Korea, 08514
Contact Person : Park, Jung-ho
Phone No. : +82 2 867 0182

1.3. Details of Manufacturer

Applicant : Same as applicant
Address : Same as applicant

1.4. Description of EUT

Kind of Product	RFID Module
Model Name	IS-4500
Serial Number	RF100GA001
Power Supply	DC 5 V
Frequency Range	13.56 ㎒ (NFC)
Modulation Technique	ASK
Number of Channel	1 channel
Antenna Type	Loop coil Antenna
H/W Version	1.0
S/W Version	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. 03, 2020	Annual	Jun. 03, 2021
Spectrum Analyzer	Agilent	N9020A	MY53421758	Sep. 11, 2019	Annual	Sep. 11, 2020
Spectrum Analyzer	R&S	FSV30	103100	Jun. 18, 2020	Annual	Jun. 18, 2021
DC Power Supply	Agilent	U8002A	MY53150029	Jun. 04, 2020	Annual	Jun. 04, 2021
Temperature Chamber	ESPEC CORP.	PL-1J	15000793	Jun. 02, 2020	Annual	Jun. 02, 2021
Low Pass Filter	Mini-Circuits	NLP-1200+	V9500401023-2	Jun. 01, 2020	Annual	Jun. 01, 2021
Preamplifier	H.P.	8447F	2944A03909	Aug. 07, 2019	Annual	Aug. 07, 2020
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 22, 2019	Biennial	Aug. 22, 2021
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB 9163	396	Mar. 21, 2019	Biennial	Mar. 21, 2021
Test Receiver	R&S	ESU26	100109	Feb. 18, 2020	Annual	Feb. 18, 2021
Antenna Mast	Innco systems GmbH	MM4640-XP-ET	MA4640/536/ 38330516/L	N.C.R.	N/A	N.C.R.
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	CO300/963/ 38330516/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.
Coaxial Cable	RFONE	PL520-NMNM-4M (4 m)	20200324001	May 06, 2020	Semi-annual	Nov. 06, 2020
Coaxial Cable	RFONE	PL520-NMNM-10M (10 m)	20200324001	May 06, 2020	Semi-annual	Nov. 06, 2020
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 10/20	Feb. 23, 2020	Semi-annual	Aug. 23, 2020
Test Receiver	R&S	ESCI 7	100911	Feb. 19, 2020	Annual	Feb. 19, 2021
Two-Line V-Network	R&S	ENV216	100190	May 08, 2020	Annual	May 08, 2021
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.

1.6. Information of Software for test

- Using the software of ISReaderPro-Rokithealthcare (Version 1.6) to testing of EUT.

1.7. Summary of Test Results

The EUT has been tested according to the following specifications:

Applied standard : FCC Part15 subpart C and IC RSS-210 Issue 10, RSS-Gen Issue 5			
Section in FCC	**Section in IC**	**Test item(s)**	**Result**
15.225(a)(b)(c)(d) 15.209	RSS-210 Annex B Section B.6 RSS-Gen Section 8.9	Radiated Emission, Spurious Emission and Field Strength of Fundamental	Complied
15.225(e)	RSS-210 Annex B Section B.6 RSS-Gen Section 6.11	Frequency Stability	Complied
15.215(c)	RSS-Gen Section 6.7	20 ㏈ Bandwidth & Occupied Bandwidth	Complied
15.207	RSS-Gen Section 8.8	AC Power Line Conducted Emissions	Complied

1.8. Sample Calculation

Where relevant, the following sample calculation is provided:
Field strength level (㏈㎶/m) = Measured level (㏈㎶) + Antenna factor (㏈) + Cable loss (㏈) - amplifier (㏈)

1.9. Measurement Uncertainty

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

Parameter	Uncertainty
Occupied Bandwidth	± 9.66 ㎑
AC Conducted Emission	± 0.76 ㏈
Radiated Disturbance, 9 ㎑ to 30 ㎒	± 3.59 ㏈
Radiated Disturbance, below 1 ㎓	± 5.88 ㏈

Uncertainty figures are valid to a confidence level of 95 %.

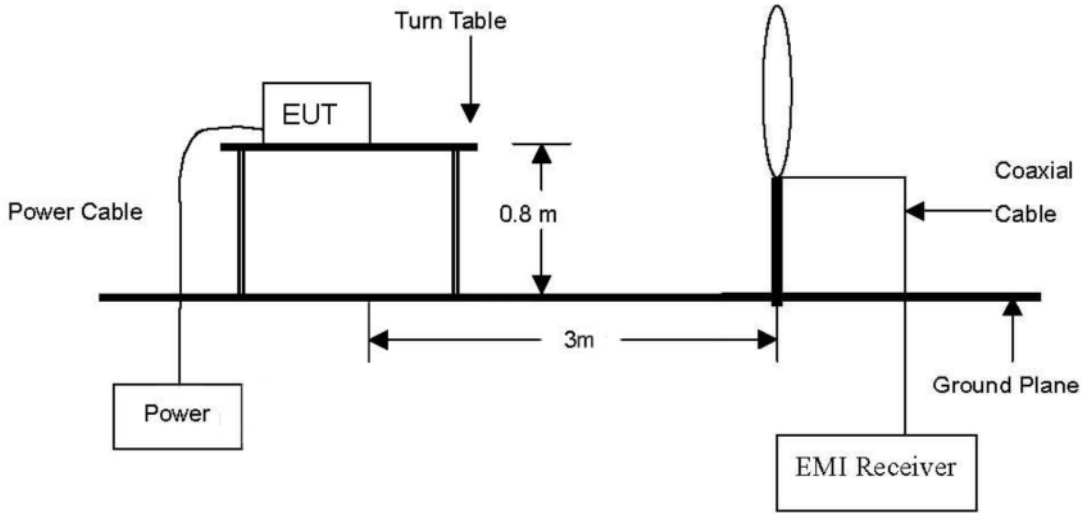
1.10. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL001187	2020.09.22	Initial

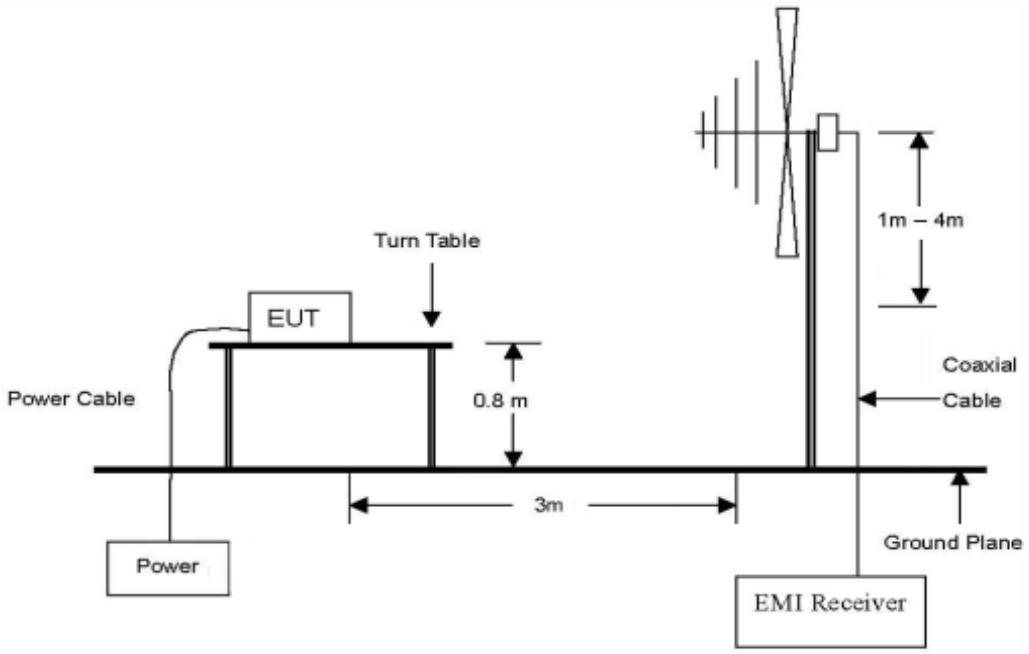
2. Radiated Emissions

2.1. Test Setup

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



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



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 10, 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 (50.5 dBμV/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz.

(c) 106 microvolts/m (40.5 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 Trilog Broadband 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. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 ㏈ lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 ㏈ margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

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 (dBμV)	Detect Mode	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	Actual (dBμV/m) at 3 m	Actual (dBμV/m) at 30 m	Limit (dBμV/m) at 30 m	Margin (dB)
13.561	39.02	Peak	H	18.66	0.10	57.78	17.78	84.00	66.22

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

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	Actual (dBμV/m) at 3 m	Actual (dBμV/m) at 30 m	Limit (dBμV/m) at 30 m	Margin (dB)
13.553	34.13	Peak	H	18.66	0.10	52.89	12.89	50.47	37.58
13.567	34.21	Peak	H	18.66	0.10	52.97	12.97	50.47	37.50

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

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	Actual (dBμV/m) at 3 m	Actual (dBμV/m) at 30 m	Limit (dBμV/m) at 30 m	Margin (dB)
13.350	18.01	Peak	H	18.67	0.10	36.78	-3.22	40.51	43.73
13.772	18.25	Peak	H	18.65	0.11	37.01	-2.99	40.51	43.50

- Spurious emission within the bands 9 ㎑ - 13.110 ㎒

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	**Reading (dBμV)**	**Detect Mode**	**Pol.**	**Ant. Factor (dB/m)**	**Cable loss (dB)**	**Actual (dBμV/m) at 3 m**	**Actual (dBμV/m) at 30 m**	**Limit (dBμV/m) at 30 m**	**Margin (dB)**
Below 13.110	Not detected	-	-	-	-	-	-	-	-

- Spurious emission within the bands 14.010 ㎒ - 30 ㎒

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (㎒)	**Reading (dBμV)**	**Detect Mode**	**Pol.**	**Ant. Factor (dB/m)**	**Cable loss (dB)**	**Actual (dBμV/m) at 3 m**	**Actual (dBμV/m) at 30 m**	**Limit (dBμV/m) at 30 m**	**Margin (dB)**
Above 14.010	Not detected	-	-	-	-	-	-	-	-

Remark;

1. Fundamental limit (μV/m) = 20 log(15 848) = 84.00 dBμV/m.
2. 30 m distance compensation = 40 log(3/30) = -40 dBμV/m.
3. “*” means the restricted band.
4. If the spurious emissions are in the restricted band, the limit complied with §15.209.
5. All data were recorded using a spectrum analyzer employing a peak detector.

- Spurious emission above 30 ㎒

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	**Reading (dBμV)**	**Detect Mode**	**Pol.**	**AF (dB/m)**	**AMP + CL (dB)**	**Actual (dBμV/m) at 3 m**	**Limit (dBμV/m) at 3 m**	**Margin (dB)**
35.90	44.80	Quasi Peak	V	18.13	-27.54	35.39	40.00	4.61
71.99	45.00	Peak	V	13.70	-26.91	31.79	40.00	8.21
136.86	46.70	Peak	V	14.11	-26.50	34.31	43.50	9.19
189.85	50.30	Peak	H	16.19	-26.44	40.05	43.50	3.45
271.21	41.90	Peak	H	18.62	-26.55	33.97	46.00	12.03
488.19	48.00	Quasi Peak	H	22.80	-26.35	**44.45**	46.00	1.55
Above 500.00	Not detected	-	-	-	-	-	-	-

Remark;

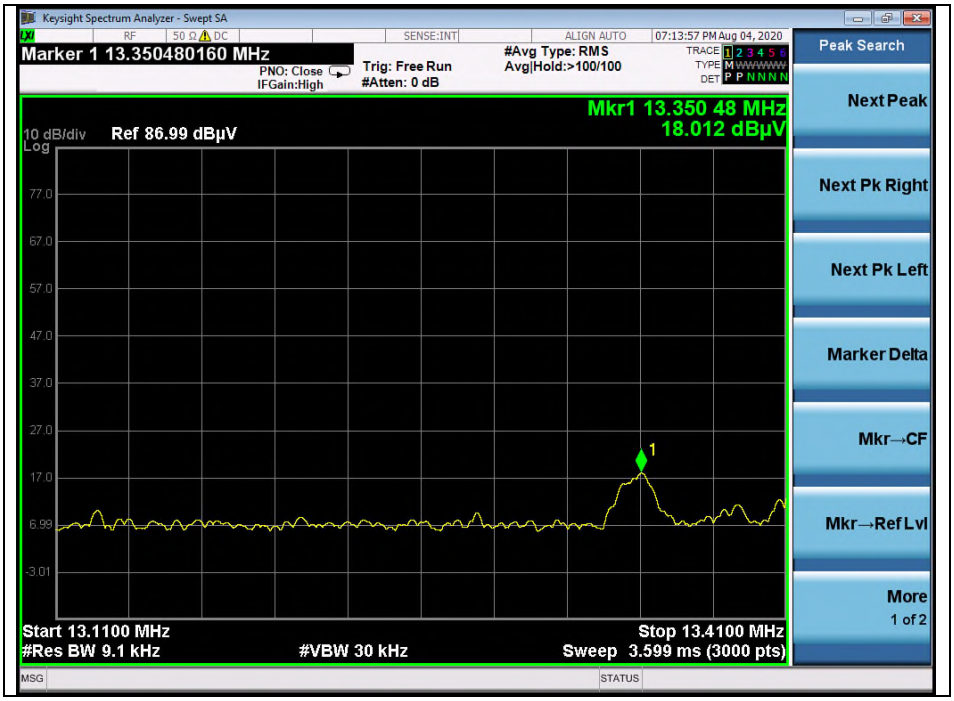
1. Radiated spurious emission measurement as below.
   (Actual = Reading + AF + AMP + CL)
2. According to §15.31(o), emission levels are not report much lower than the limits by over 20 dB.

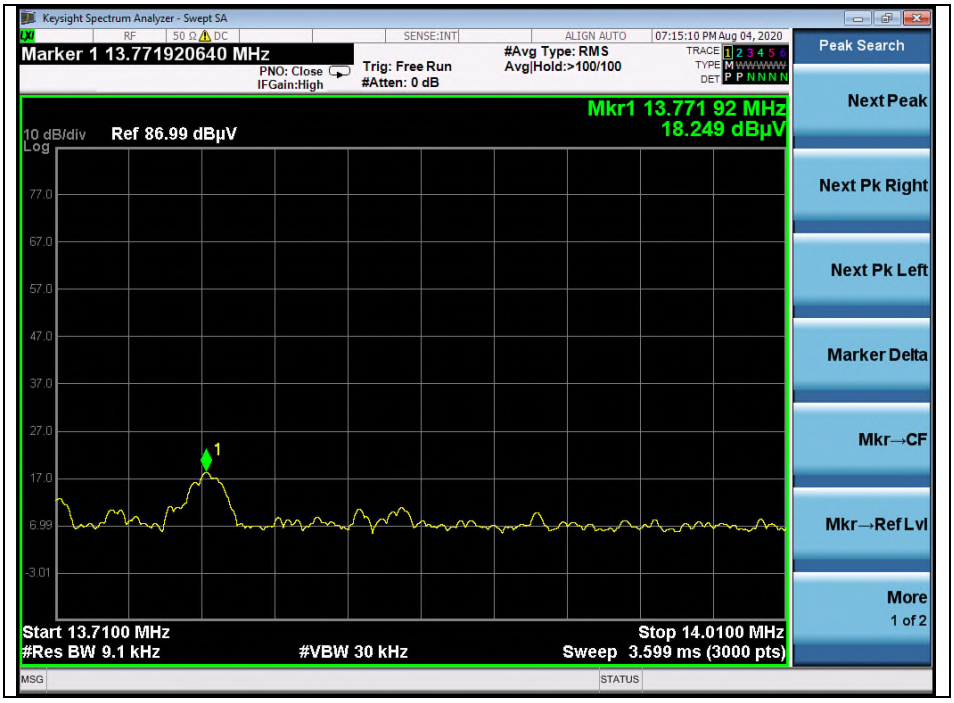
- Test plots

- Fundamental within the band 13.553 ㎒ - 13.567 ㎒

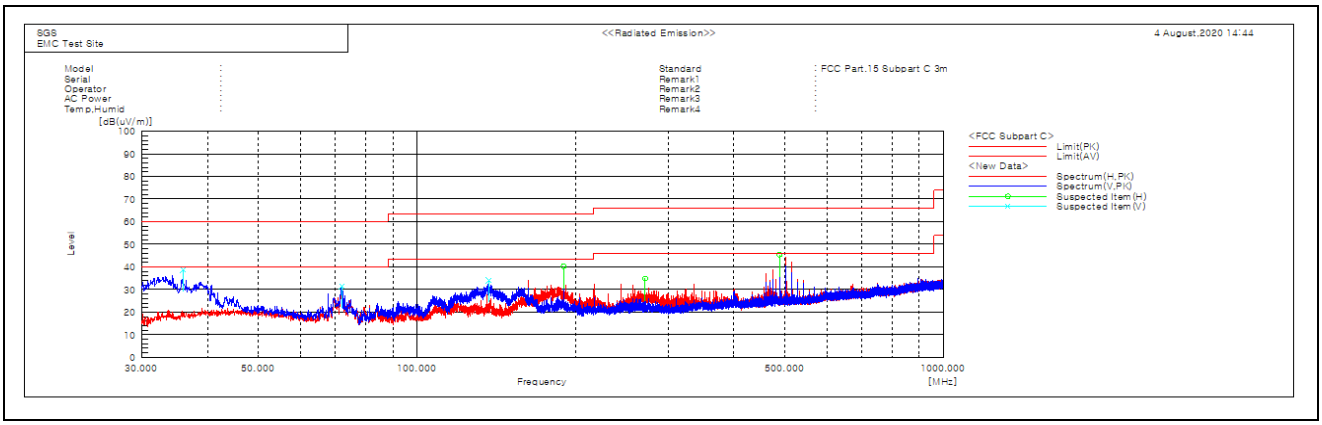
- Spurious emission within the bands 13.410 ㎒ - 13.553 ㎒ and 13.567 ㎒ - 13.710 ㎒

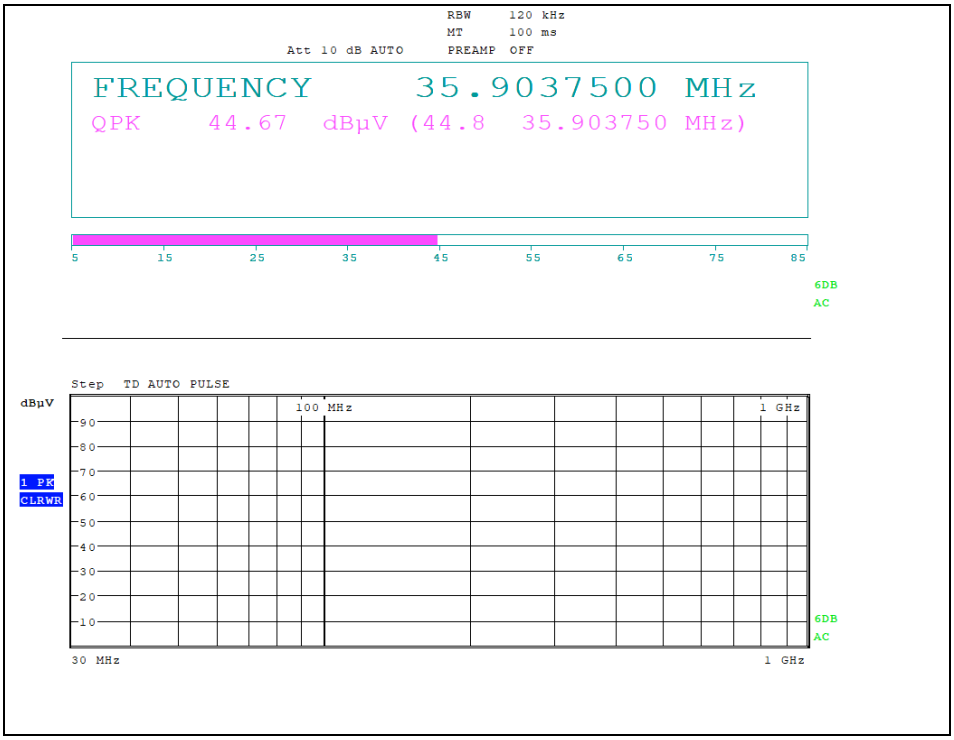
- Spurious emission within the bands 13.110 ㎒ - 13.410 ㎒ and 13.710 ㎒ - 14.010 ㎒

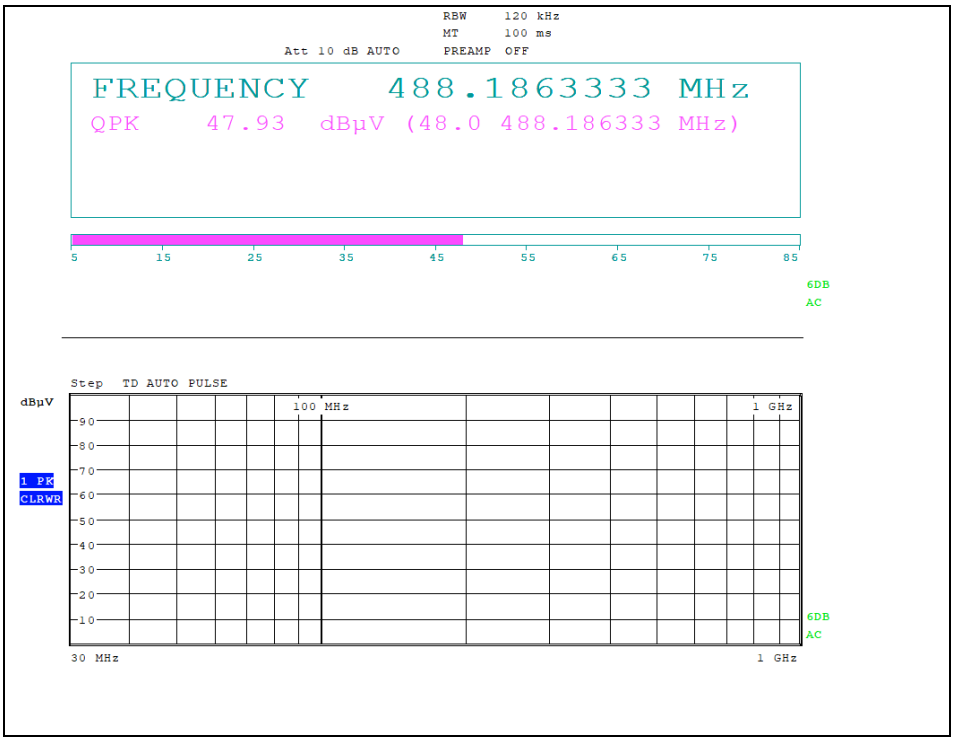




- Spurious emission above 30 ㎒

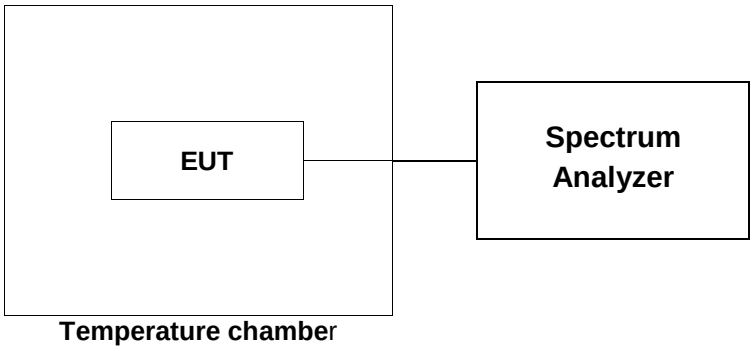





RBW 120 kHz
MT 100 ms
Att 10 dB AUTO
PREAMP OFF
FREQUENCY 488.1863333 MHz
QPK 47.93 dBµV (48.0 488.186333 MHz)
5 15 25 35 45 55 65 75 85
6DB
AC
Step TD AUTO PULSE
dBµV
100 MHz
1 GHz
90
80
70
60
50
40
30
20
10
1 PK
CLRWR
6DB
AC
30 MHz
1 GHz

3. Frequency Stability

3.1. Test Setup



3.2. 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, Annex B, Section B.6.
Carrier frequency stability shall be maintained to ± 0.01 % (±100 ppm).

3.3. 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.

3.4. Test Result

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

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

Startup

Temperature Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
5	-20	13 560 593	593	0.004 373
	-10	13 560 637	637	0.004 698
	0	13 560 637	637	0.004 698
	+10	13 560 622	622	0.004 587
	+20	13 560 593	593	0.004 373
	+30	13 560 550	550	0.004 056
	+40	13 560 535	535	0.003 945
	+50	13 560 521	521	0.003 842

Voltage Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
115 % (5.75)	+20	13 560 564	564	0.004 159
85 % (4.25)	+20	13 560 564	564	0.004 159

2 minutes

Temperature Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
5	-20	13 560 593	593	0.004 373
	-10	13 560 637	637	0.004 698
	0	13 560 637	637	0.004 698
	+10	13 560 608	608	0.004 484
	+20	13 560 593	593	0.004 373
	+30	13 560 550	550	0.004 056
	+40	13 560 535	535	0.003 945
	+50	13 560 521	521	0.003 842

Voltage Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
115 % (5.75)	+20	13 560 564	564	0.004 159
85 % (4.25)	+20	13 560 564	564	0.004 159

5 minutes

Temperature Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
5	-20	13 560 593	593	0.004 373
	-10	13 560 637	637	0.004 698
	0	13 560 637	637	0.004 698
	+10	13 560 608	608	0.004 484
	+20	13 560 579	579	0.004 270
	+30	13 560 564	564	0.004 159
	+40	13 560 535	535	0.003 945
	+50	13 560 521	521	0.003 842

Voltage Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
115 % (5.75)	+20	13 560 550	550	0.004 056
85 % (4.25)	+20	13 560 564	564	0.004 159

10 minutes

Temperature Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
5	-20	13 560 593	593	0.004 373
	-10	13 560 637	637	0.004 698
	0	13 560 637	637	0.004 698
	+10	13 560 622	622	0.004 587
	+20	13 560 593	593	0.004 373
	+30	13 560 564	564	0.004 159
	+40	13 560 535	535	0.003 945
	+50	13 560 521	521	0.003 842

Voltage Variations

Power ($V_{d.c}$)	Temperature (℃)	Frequency (㎐)	Freq. Dev. (㎐)	Deviation (%)
115 % (5.75)	+20	13 560 564	564	0.004 159
85 % (4.25)	+20	13 560 564	564	0.004 159

4. 20 ㏈ Bandwidth & Occupied Bandwidth

4.1. Test Setup

4.2. Limit

None; for reporting purposes only.

4.3. Test Procedures

4.3.1. 20 ㏈ Bandwidth

1. Span = set to capture all products of the modulation process, including the emission skirts.
   RBW = 50 ㎐, VBW = 200 ㎐, 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 ㏈ 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 ㏈ bandwidth of the emission.

4.3.2. Occupied Bandwidth

1. Set the spectrum analyzer as Span = set to capture all products of the modulation process, including the emission skirts, RBW = 50 ㎐, VBW = 200 ㎐, 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.

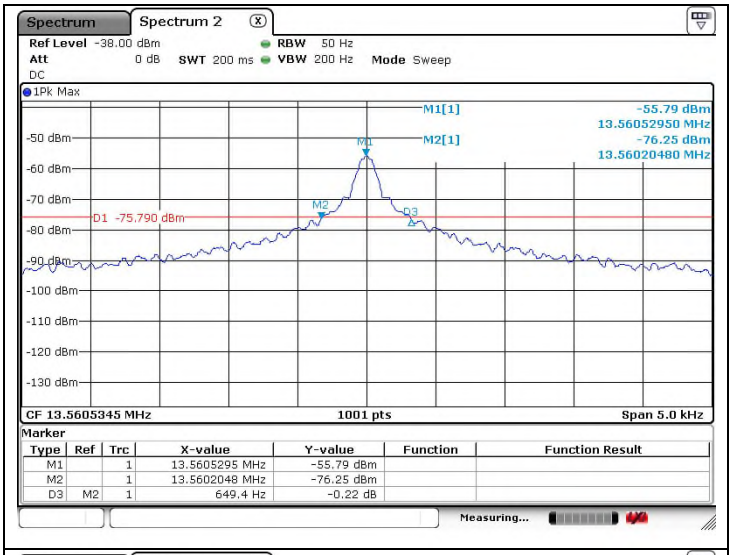
4.4. Test Result

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

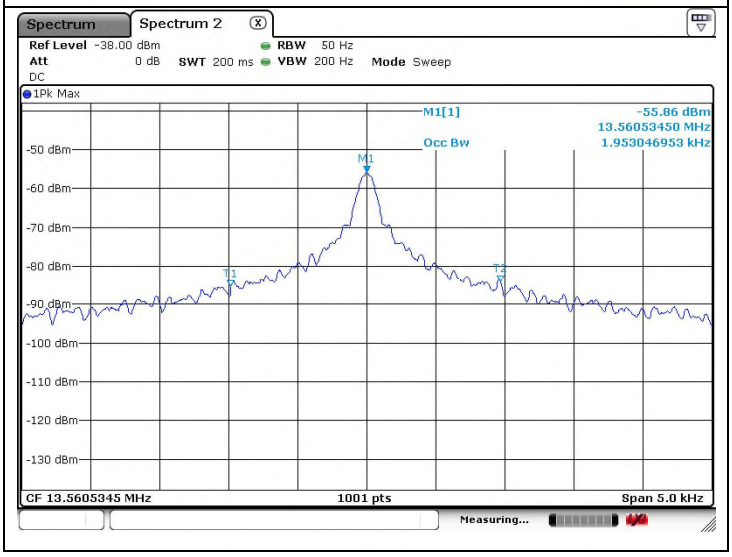
Frequency (MHz)	20 dB Bandwidth (kHz)	Occupied Bandwidth (kHz)
13.560	0.649	1.953

- Test plots

20 dB Bandwidth

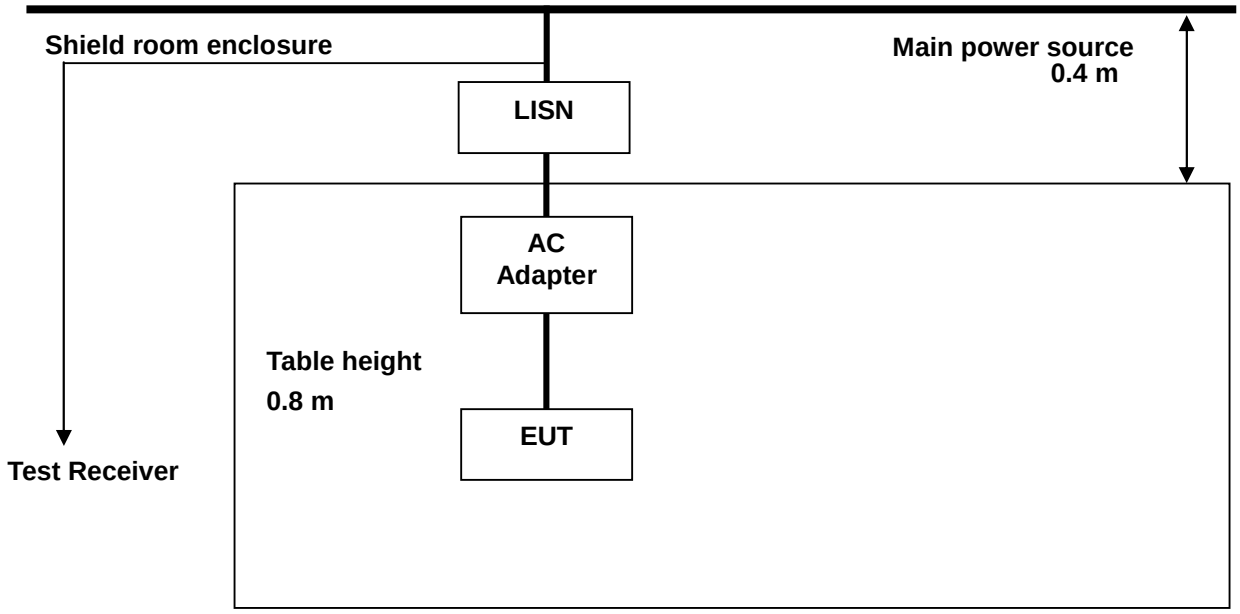


Occupied Bandwidth



5. AC Power Line Conducted Emission

5.1. Test Setup



5.2. Limit

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 (dBμV)	
	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.

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 (dBμV)	
	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.

5.3. 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.

5.4. 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 ㎑

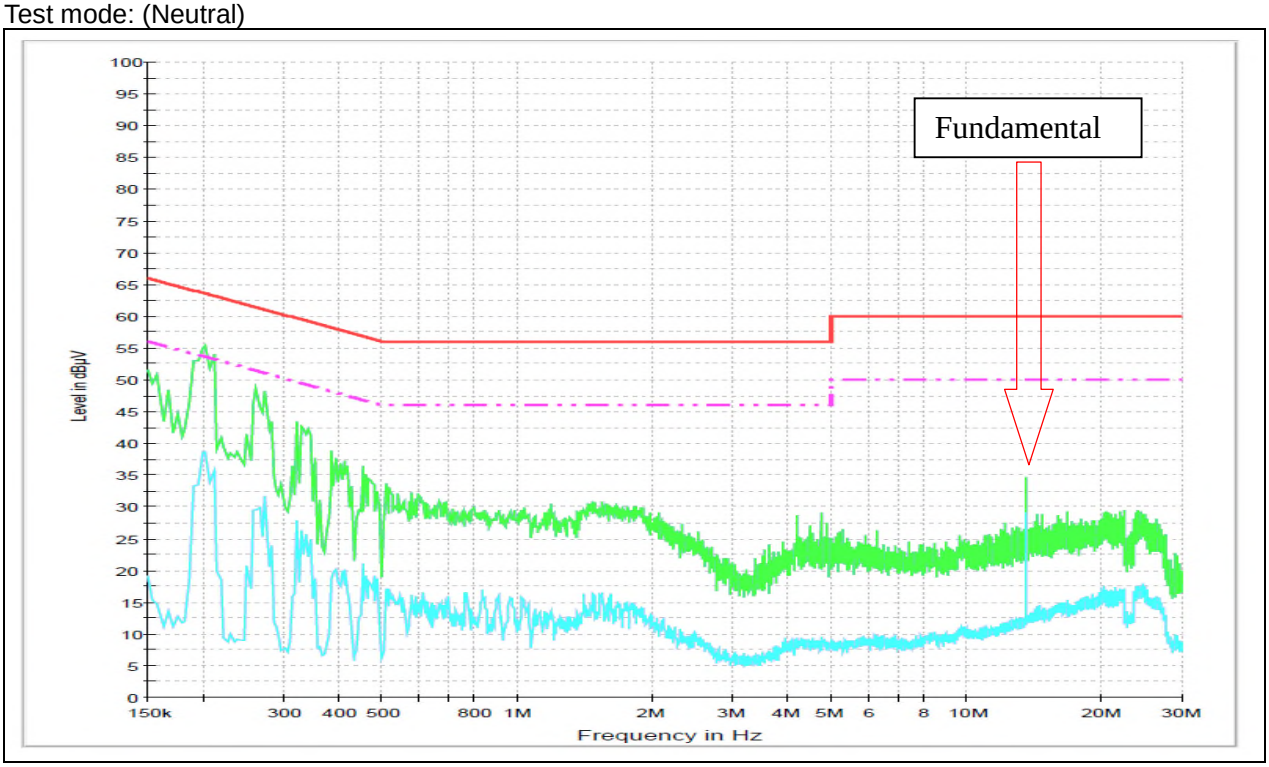
Frequency (㎒)	Level (dB㎶)		Line	Limit (dB㎶)		Margin (dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.20	51.60	35.60	N	63.61	53.61	12.01	18.01
0.26	44.90	28.30	N	61.43	51.43	16.53	23.13
0.32	45.70	36.00	N	59.71	49.71	14.01	13.71
0.39	34.40	19.00	N	58.06	48.06	23.66	29.06
1.53	27.00	15.50	N	56.00	46.00	29.00	30.50
4.72	19.20	8.80	N	56.00	46.00	36.80	37.20
0.19	53.20	36.00	H	64.04	54.04	10.84	18.04
0.26	45.80	26.90	H	61.43	51.43	15.63	24.53
0.34	43.70	33.20	H	59.20	49.20	15.50	16.00
0.40	34.50	17.70	H	57.85	47.85	23.35	30.15
4.37	15.80	6.40	H	56.00	46.00	40.20	39.60
24.41	21.00	13.90	H	60.00	50.00	39.00	36.10

Remark;

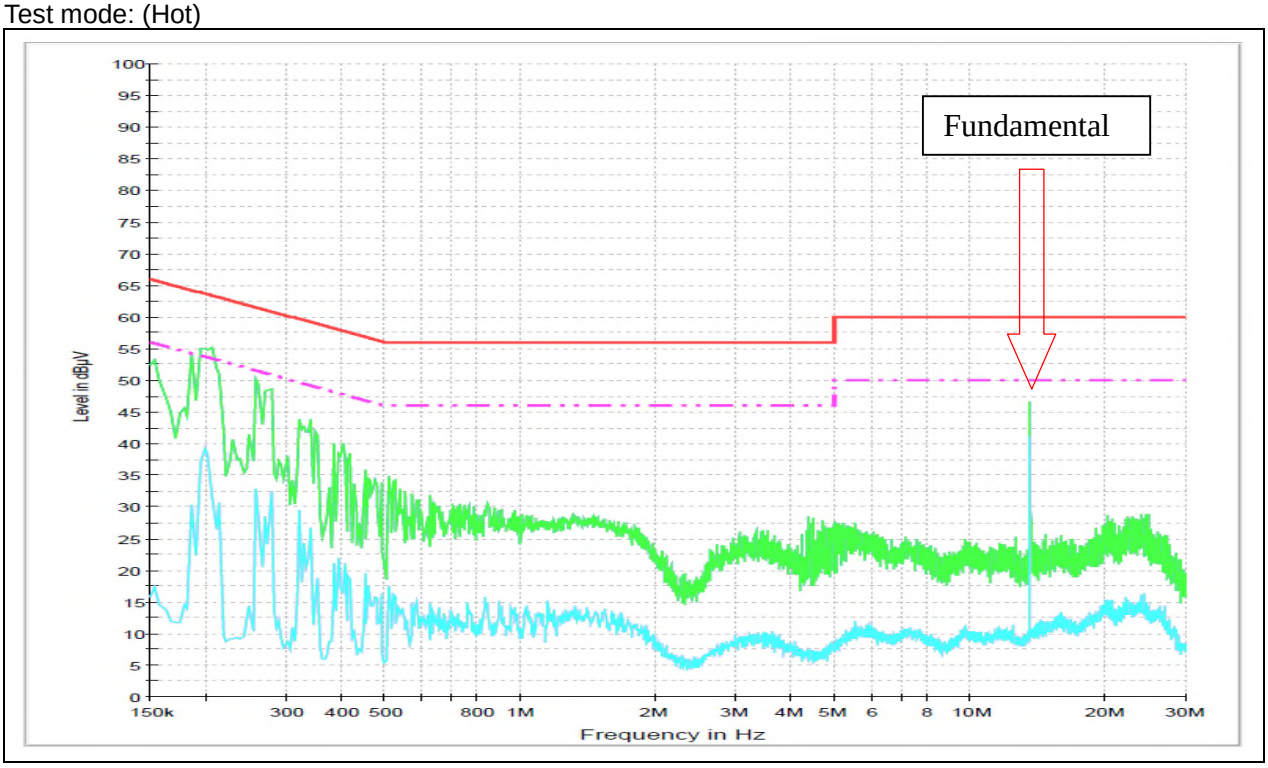
1. Line (H): Hot, Line (N): Neutral.
2. The limit for Class B device(s) from 150 ㎑ to 30 ㎒ are specified in Section of the Title 47 CFR.
3. Traces shown in plot were made by using a peak detector and average detector.
4. Deviations to the Specifications: None.

- Test plots

Test mode: (Neutral)



Test mode: (Hot)



-End of the Test report-