TEST REPORT

of

FCC Part 15 Subpart B&C §15.247/RSS-210 Issue 7, RSS-Gen Issue 2

FCC ID/IC Certification: CNMDLT100/1360A-DLT100

Equipment Under Test	: Portable Conference Transmitter
Model Name	: DLT100
Serial No.	: N/A
Applicant	: Williams Sound Corp.
Manufacturer	: Williams Sound Corp.
Date of Test(s)	: 2010.06.22 ~ 2010.06.29
Date of Issue	: 2010.06.29

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Date** **2010.06.29**

Duke Ko

Approved By: **Date** **2010.06.29**

Feel Jeong

Table of contents

1. General information

1.1 Testing laboratory

SGS Testing Korea Co., Ltd.
Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040
www.electrolab.kr.sgs.com
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371

1.2 Details of applicant

Applicant : Williams Sound Corp.
Address : 10321 W. 70th Street, Eden Prairie, Minnesota, 55344, USA
Contact Person : Gregg Abram
Phone No. : +1 952 224 7703
Fax No. : +1 952 224 7786

1.3 Description of EUT

Kind of Product	Portable Conference Transmitter
Model Name	DLT100
Serial Number	N/A
Power Supply	DC 3.7 V(Lithum battery)
Frequency Range	2 402 ㎒ ~ 2 476 ㎒
Modulation Technique	GFSK
Number of Channels	16
Channel Separation	2 ㎒(Tour guide mode), 5 ㎒(Interpretation mode)
Antenna Type	Integral Type
Antenna Gain	-0.22 ㏈i

1.4 Details of modification

▶ Two Mode are almost same as that excepting channel separation.

1.5. Information about the FHSS characteristics:

1.5.1. Pseudorandom Frequency Hopping Sequence

The channel is represented by a 4 frequency hopping sequence hopping through the 16 RF channels. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies. The nominal hop rate is 325 hops/s.

1.5.2. Equal Hopping Frequency Use

There are two modes in DLT 100 operation and which have different frequency table.
In result, the center frequency table for tour guide mode is as below:

(Each center frequency, Unit: MHz)

No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2402	2404	2406	2408	2422	2424	2426	2428	2442	2444	2446	2448	2462	2464	2466	2468
2	2412	2414	2416	2418	2432	2434	2436	2438	2452	2454	2456	2458	2470	2472	2474	2476
3	2407	2409	2411	2413	2427	2429	2431	2433	2447	2449	2451	2453	2467	2469	2471	2473
4	2403	2405	2417	2419	2421	2423	2437	2439	2441	2443	2457	2459	2461	2463	2473	2475

This table is also used to synchronize in the same group.

The center frequency table for the other mode, interpretation mode, is as below:

(Each center frequency, Unit: MHz)

No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2402	2407	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2476
2	2403	2408	2413	2418	2423	2428	2433	2438	2443	2448	2453	2458	2463	2468	2473	2456
3	2404	2409	2414	2419	2424	2429	2434	2439	2444	2449	2454	2459	2464	2469	2474	2436
4	2405	2410	2415	2420	2425	2430	2435	2440	2445	2450	2455	2460	2465	2470	2475	2416
5	2417	2412	2407	2402	2437	2432	2427	2422	2457	2452	2447	2442	2476	2472	2467	2462
6	2418	2413	2408	2403	2438	2433	2428	2423	2458	2453	2448	2443	2456	2473	2468	2463
7	2419	2414	2409	2404	2439	2434	2429	2424	2459	2454	2449	2444	2436	2474	2469	2464
8	2420	2415	2410	2405	2440	2435	2430	2425	2460	2455	2450	2445	2416	2475	2470	2465

1.5.3. System Receiver Input Bandwidth

Each channel bandwidth is 1 ㎒

1.6 Test equipment list

EQUIPMENT	MANUFACTURER	MODEL	CAL DUE.
Signal Generator	R & S	SMR40	Sep. 25, 2010
Spectrum Analyzer	R & S	FSV30	May. 31, 2011
Spectrum Analyzer	R & S	FSP40	Sep 25, 2010
Preamplifier	H.P	8447F	Jul. 07, 2011
Preamplifier	Agilent	8449B	Mar. 31, 2011
High Pass Filter	Wainwright	WHK3.0/18G-10SS	Sep. 29, 2010
DC power Supply	Agilent	U8002A	Jan. 06, 2011
Test Receiver	R & S	ESU26	Apr. 08, 2011
Bilog Antenna	SCHWARZBECK MESSELEKTRONIK	VULB9163	Jul. 22, 2010
Horn Antenna	R & S	HF 906	Oct. 08, 2011
Horn Antenna	SCHWARZBECK MESSELEKTRONIK	BBHA9170	Mar. 26, 2011
Antenna Master	EMCO	1050	N.C.R
Turn Table	Daeil EMC	DI-1500	N.C.R
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	Jan. 27, 2011
Two-Line V-Network	R & S	ENV216	Jan. 06, 2011
Test Receiver	R & S	ESHS10	Jul. 13, 2010
Anechoic Chamber	SY Corporation	L × W × H (6.5 m × 3.5 m × 3.5 m)	N.C.R

1.7. Summary of test results

The EUT has been tested according to the following specifications:

Applied standard : FCC Part15 subpart B&C, RSS-210, RSS-Gen			
Standard section		**Test item**	**Result**
15.205(a) 15.209 15.247(d)	A8.5	Transmitter radiated spurious emissions and Conducted spurious emission	Complied
15.109(a)	RSS-Gen 6	Receiver Radiated Spurious Emission	Complied
15.247(a)(1)	A8.1(1)	20 dB bandwidth and 99 % BW	Complied
15.247(b)(1)	A8.4(2)	Maximum peak output power	Complied
15.247(a)(1)	A8.1(2)	Frequency separation	Complied
15.247(b)(1)	A8.4(2)	Number of hopping frequency	Complied
15.247(a)(1)(iii)	A8.1(4)	Time of occupancy (Dwell time)	Complied
15.207	RSS-Gen 7.2.2	Transmitter AC Power Line Conducted Emission	Complied
15.107	RSS-Gen 7.2.2	Receiver AC Power Line Conducted Emission	Complied
15.247(i) 1.1307(b)(1)	RSS-Gen 5.5/ RSS-102	RF exposure evaluation	Complied

1.8. Test report revision

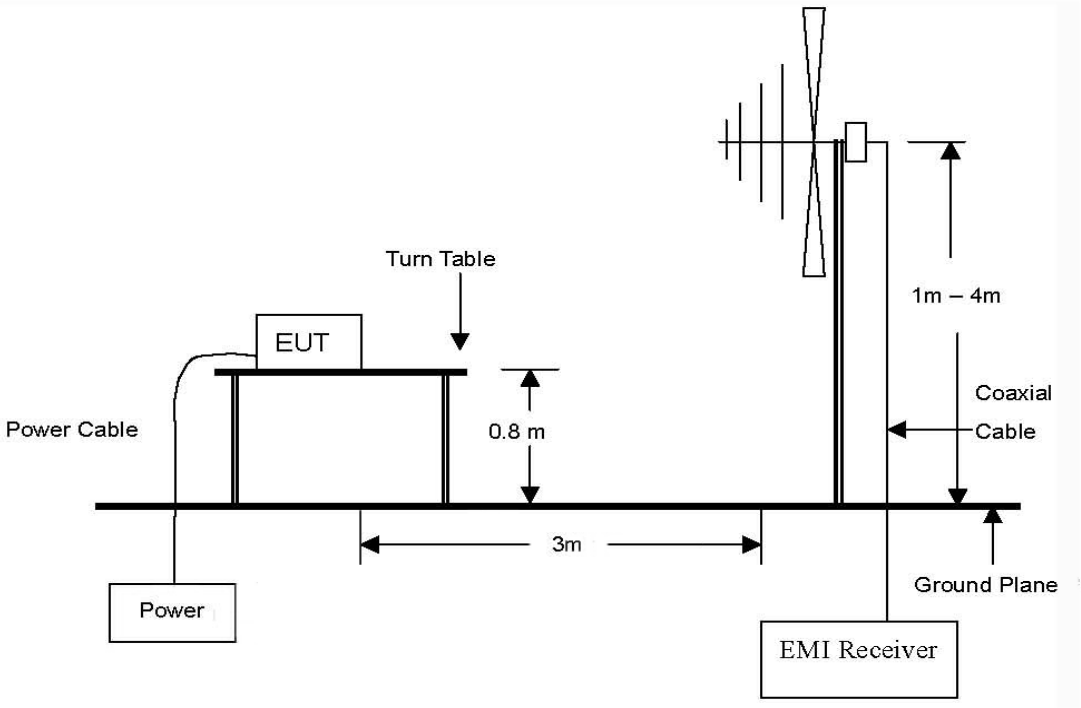
Revision	Report number	Description
0	F690501/RF-RTL003949	Initial

2. Transmitter radiated spurious emissions and conducted spurious emission

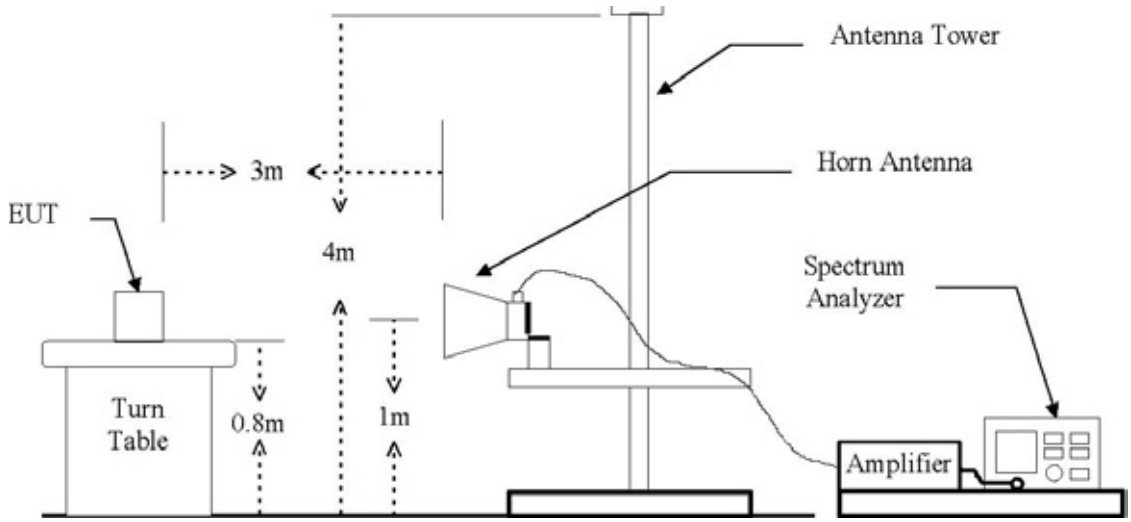
2.1. Test setup

2.1.1. Transmitter radiated spurious emissions

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 24 ㎓ Emissions.



2.1.2. Conducted spurious emissions

2.2. Limit

According to §15.247(d), in any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 ㏈ below that in the 100 ㎑ bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement , provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval , as permitted under paragraph(b)(3) of this section , the attenuation required under this paragraph shall be 30 ㏈ instead of 20 ㏈. Attenuation below the general limits specified in section §15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))
According to § 15.109(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (㎒)	Distance (m)	Radiated (㏈㎶/m)	Radiated (㎶/m)
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

2.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

2.3.1. Test procedures for radiated spurious emissions

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. During performing radiated emission above 1 ㎓, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a broad ㏈ and 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.

▣ Note

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 ㎑ for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 ㎓.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ for Peak detection and frequency above 1 ㎓.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 10 ㎐ for Average detection (AV) at frequency above 1 ㎓.

2.3.2. Test procedures for conducted spurious emissions

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW = 100 ㎑, VBW = 100 ㎑.

2.4. Test result

Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

2.4.1. Spurious radiated emission

The frequency spectrum from 30 ㎒ to 1 000 ㎒ was investigated. Emission levels are not reported much lower than the limits by over 30 ㏈.

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (㏈㎶)	Detect Mode	Pol.	AF (㏈/m)	Amp Gain+CL (㏈)	Actual (㏈㎶/m)	Limit (㏈㎶/m)	Margin (㏈)
Below 1 000.000	Not Detected	-	-	-	-	-	-	-

▣ Remark:

1. All spurious emission at channels are almost the same below 1 ㎓, so that high channel was c hosen at representative in final test.
2. Actual = Reading + AF + AMP + CL
3. Worst case is XZ-plane

2.4.2. Spurious radiated emission

The frequency spectrum above 1000 ㎒ was investigated. Emission levels are not reported much lower than the limits by over 30 ㏈. All reading values are peak values.

A. Low Channel (2 402 ㎒)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (㎒)	Reading (㏈㎶)	Detect Mode	Pol.	AF (㏈/m)	CL (㏈)	Actual (㏈㎶/m)	Limit (㏈㎶/m)	Margin (㏈)
*2 390.00	25.53	Peak	V	28.09	4.84	58.46	74.00	15.54
*2 390.00	14.72	Average	V	28.09	4.84	47.65	54.00	6.35

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (㎒)	Reading (㏈㎶)	Detect Mode	Pol.	AF (㏈/m)	Amp Gain+CL (㏈)	Actual (㏈㎶/m)	Limit (㏈㎶/m)	Margin (㏈)
4 807.52	49.31	Peak	V	32.96	-27.78	54.49	74.00	19.51
4 807.52	32.24	Average	V	32.96	-27.78	37.42	54.00	16.58

B. Middle Channel (2 437 ㎒)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (㎒)	Reading (㏈㎶)	Detect Mode	Pol.	AF (㏈/m)	Amp Gain+CL (㏈)	Actual (㏈㎶/m)	Limit (㏈㎶/m)	Margin (㏈)
4 840.25	45.33	Peak	V	33.05	-27.80	50.58	74.00	23.42

C. High Channel (2 476 ㎒)

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
*2 483.50	26.63	Peak	V	28.09	4.78	59.50	74.00	14.50
*2 483.50	15.61	Average	V	28.09	4.78	48.48	54.00	5.52

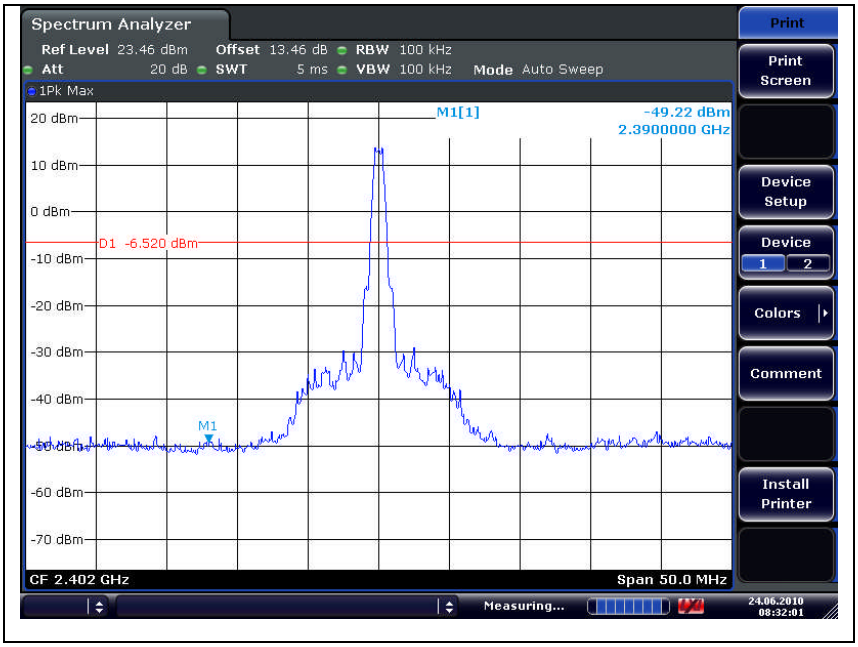
Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
4 951.99	47.69	Peak	V	33.37	-27.35	53.71	74.00	20.29

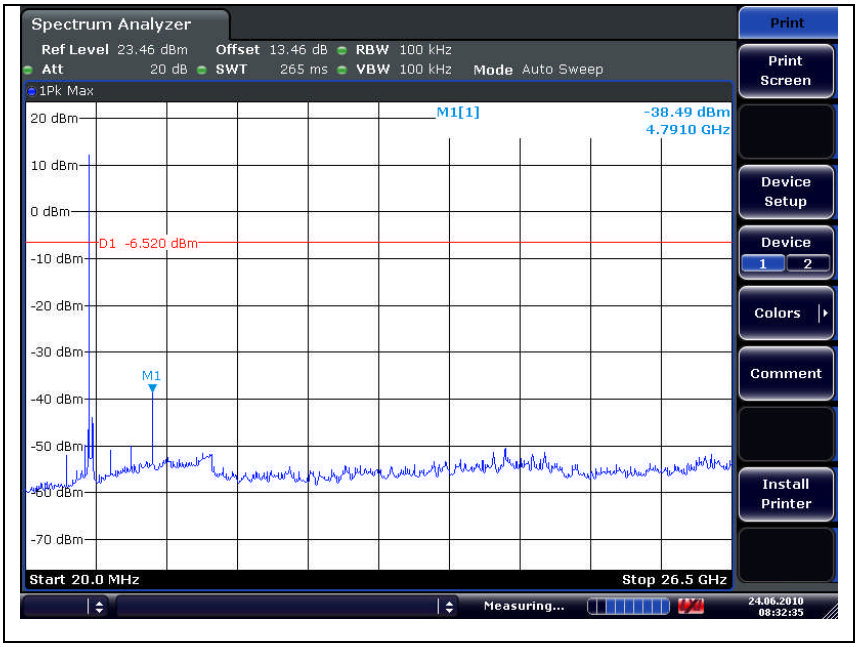
Remarks ;

1. "*" means the restricted band and were measured without pre-amp.
2. Measuring frequencies from 1 ㎓ to the 10th harmonic of highest fundamental Frequency.
3. Radiated emissions measured in frequency above 1 000 ㎒ were made with an instrument using peak/average detector mode.
4. Average test would be performed if the peak result were greater than the average limit.
5. Actual = Reading + AF + Amp Gain + CL
6. Worst case is XZ-plane

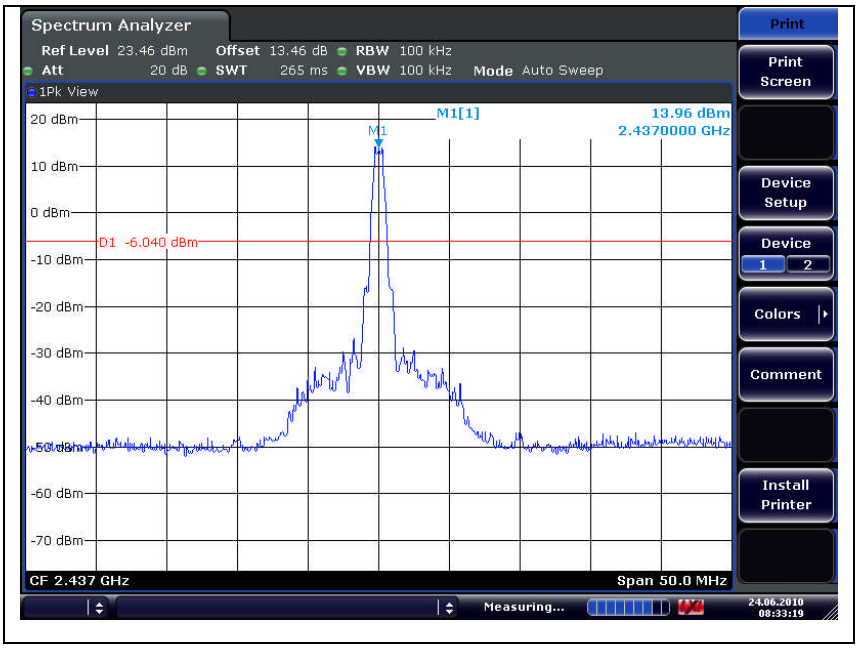
2.4.3. Spurious RF Conducted Emissions: Plot of Spurious RF Conducted Emission

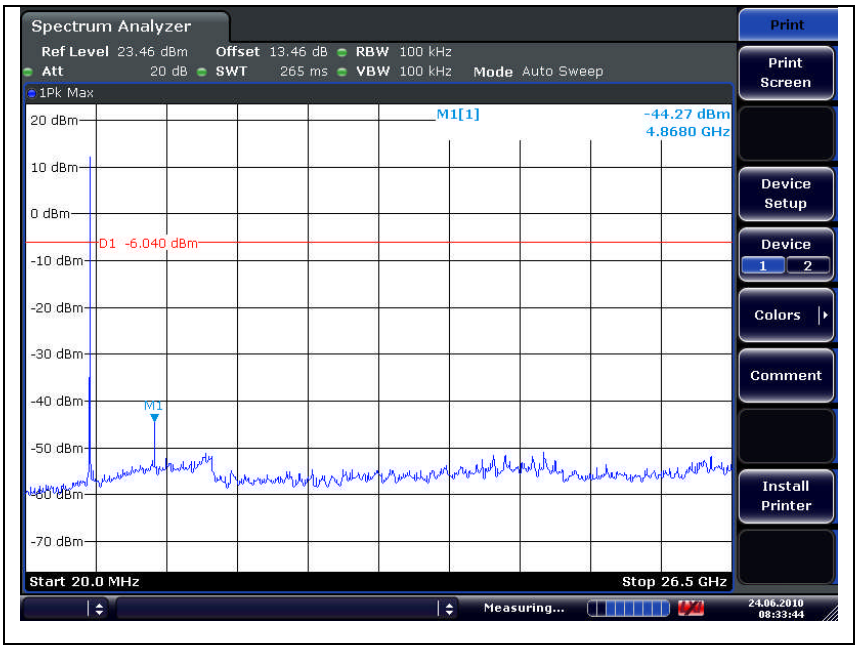
Low Channel



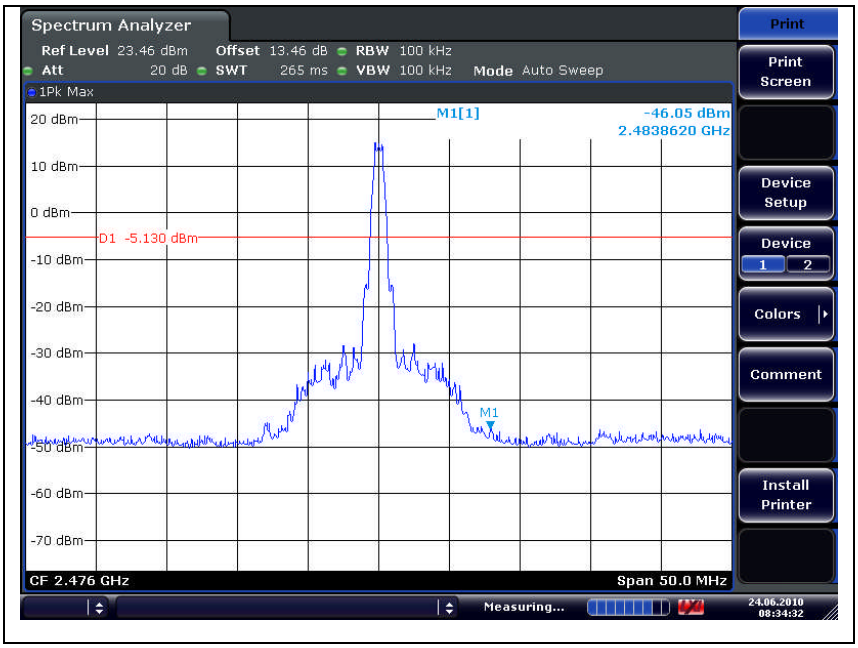


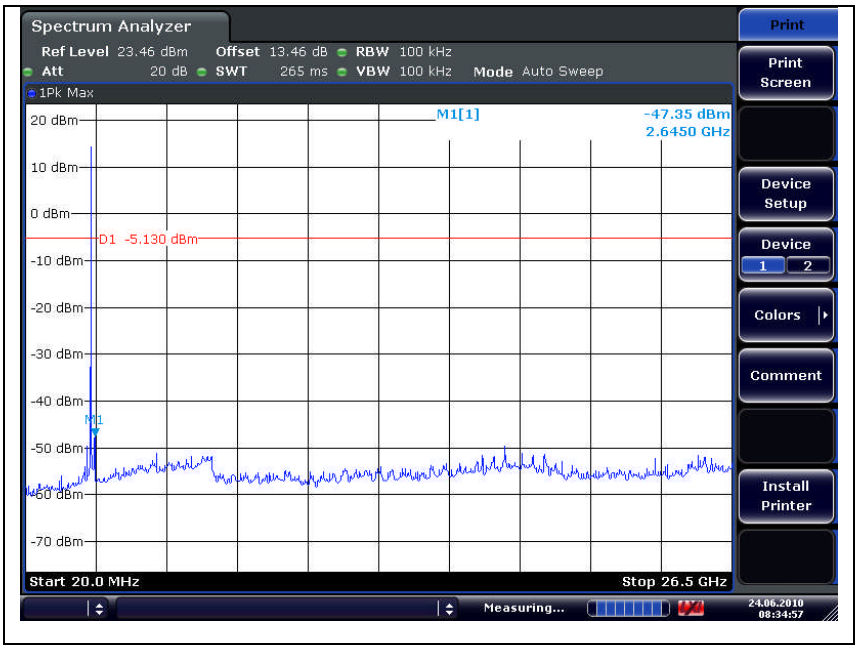
Middle Channel



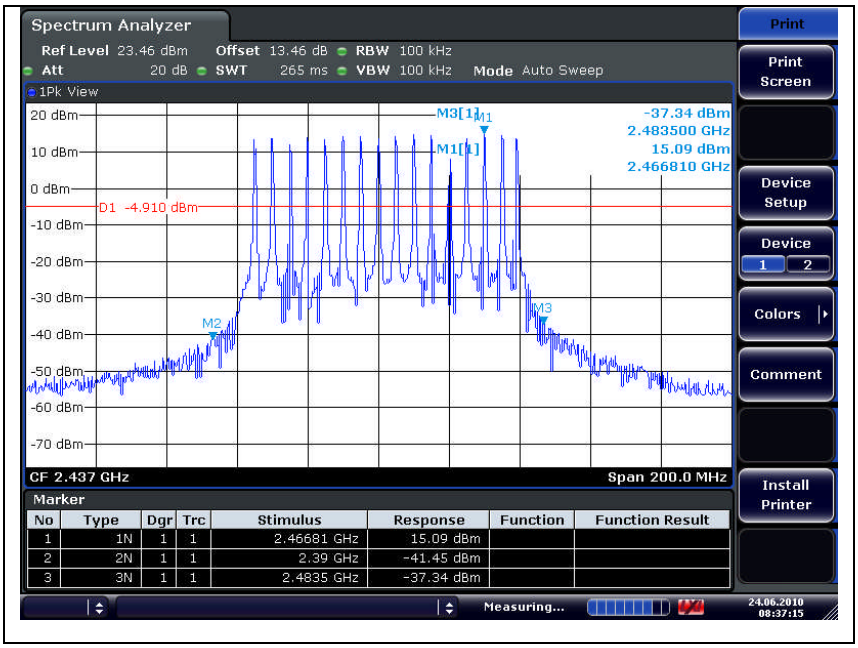


High Channel





Hopping



3. Receiver radiated spurious emissions

3.1. Test setup

Same as clause 4.1.

3.1.1. Receiver radiated spurious emissions

Same as clause 4.1.1.

3.2. Limit

According to §15.109(a), Except for Class A digital devices, the field strength of radiated emission from unintentional radiator at a distance of 3 m shall not exceed the following values:

Frequency (㎒)	Distance (Meters)	Radiated (㏈μV/m)	Radiated (μV/m)
30 – 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

3.3. Test procedures

Same as clause 4.3.

3.3.1. Test procedures for radiated spurious emissions

Same as clause 4.3.1.

3.4. Test result

Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

3.4.1. Spurious radiated emission

All emissions are not reported much lower than the prescribed limits.

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Below 1 000.000	Not Detected	-	-	-	-	-	-	-
Above 1 000.000	Not Detected	-	-	-	-	-	-	-

▣ Remark:

1. All spurious emission at channels are almost the same below 1 ㎓, so that high channel was c hosen at representative in final test.
2. Actual = Reading + AF + AMP + CL
3. Worst case is XZ-plane

4. 20 dB bandwidth Measurement and 99% BW

4.1. Test setup

4.2. Limit

Limit: Not Applicable

4.3. Test procedure

1. The 20 dB band width was measured with a spectrum analyzer connected to RF antenna connector(conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 20 dB band width of the emission was determined.

2. The 20 dB bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW = 30 kHz, VBW = 30 kHz, Span = 5 MHz.
3. The 99% bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW = 10 kHz, VBW = 10 kHz, Span = 5 MHz.

4.4. Test result

Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

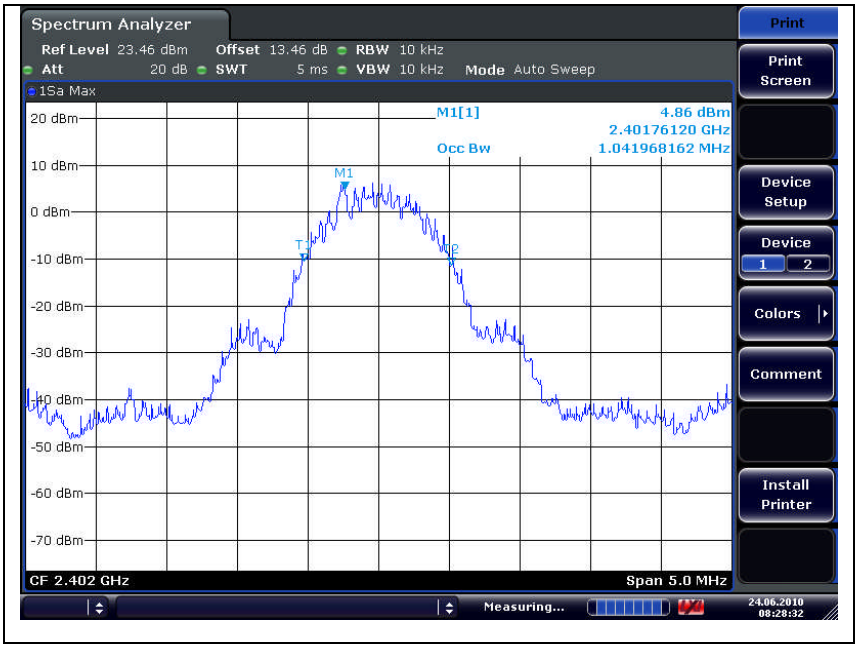
Operation Mode	Channel	Channel Frequency (㎒)	20 ㏈ Bandwidth (㎒)	99% Bandwidth (㎒)
GFSK	Low	2 402	1.14	1.04
	Middle	2 437	1.14	1.03
	High	2 476	1.14	1.03

- 20 dB Bandwidth
Low channel

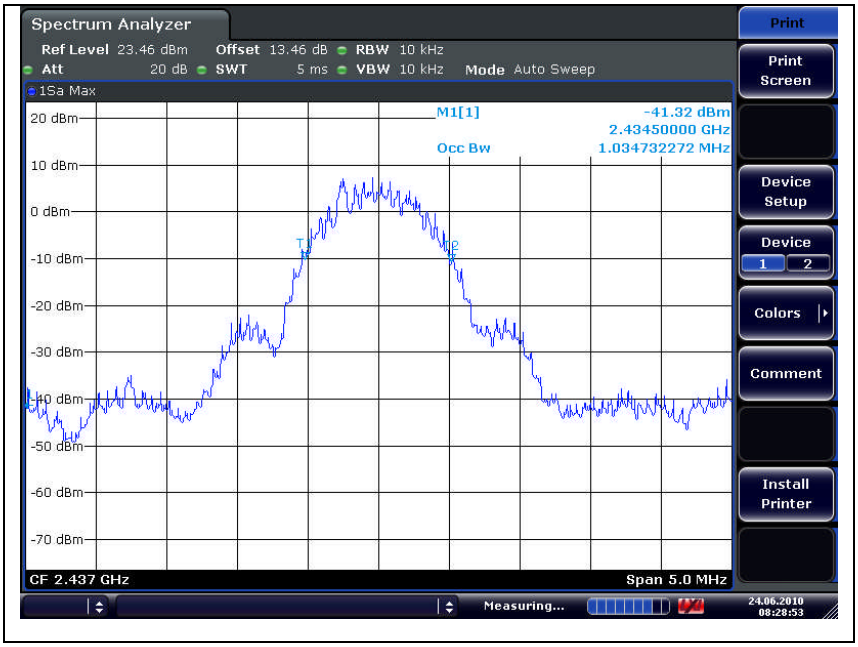
Middle channel

High channel

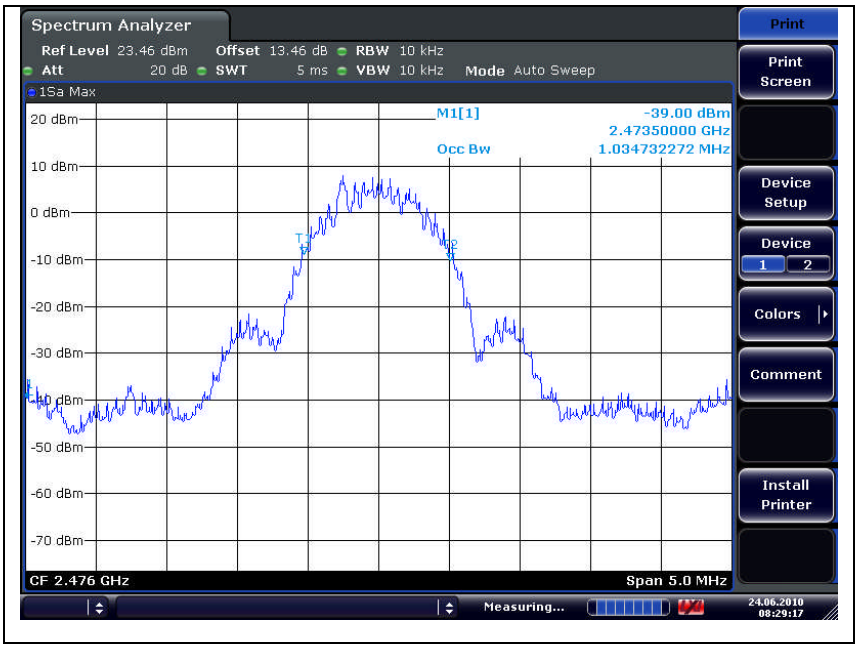
- 99% Bandwidth
Low channel



Middle channel



High channel



5. Maximum peak output power

5.1. Test setup

5.2. Limit

The maximum peak output power of the intentional radiator shall not exceed the following :

1. §15.247(a)(1), Frequency hopping syste ㎳ shall have hopping channel carrier frequencies separated by a minimum of 25 ㎑ or the 20 ㏈ bandwidth of the hopping channel, whichever is greater.
2. §15.247(b)(1), For frequency hopping syste ㎳ operating in the 2 400-2 483.5 ㎒ employing at least 75 non-overlapping hopping channels, and all frequency hopping syste ㎳ in the 5725-5805 ㎒ band: 1 Watt. for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W.

5.3. Test procedure

1. The RF power output was measured with a Spectrum analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A spectrum analyzer was used to record the shape of the transmit signal.

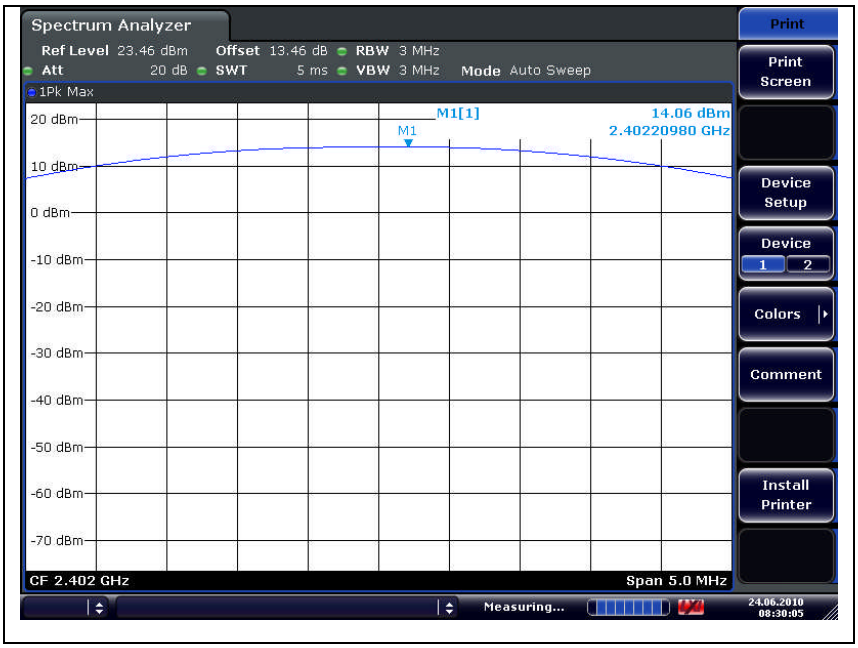
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using ;
   Span = approximately 5 times the 20 ㏈ bandwidth, centered on a hopping channel
   RBW ≥ 20㏈ BW
   VBW ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold

5.4. Test result

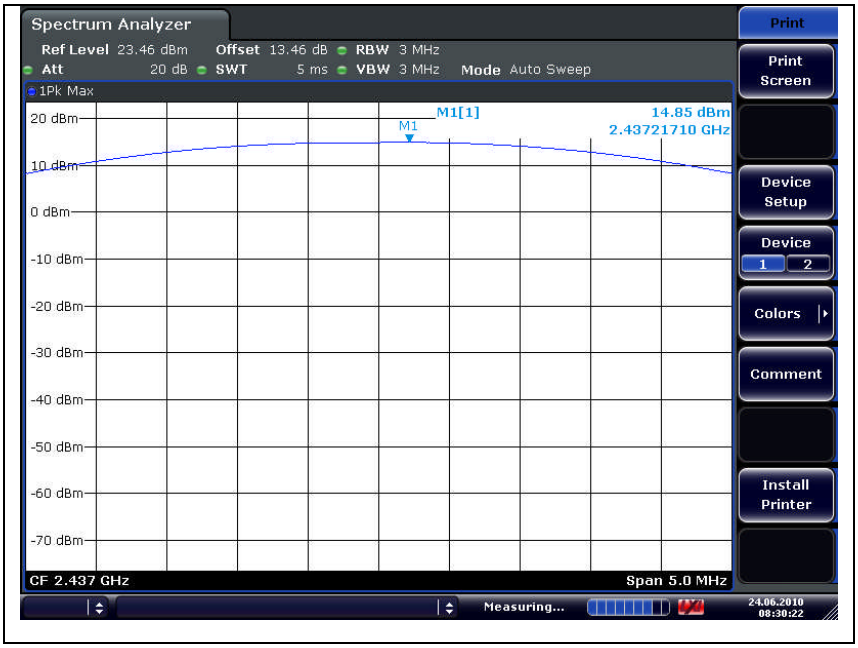
Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

Operation mode	Channel	Frequency (㎒)	Peak power (㏈m)	Limit (㏈m)
GFSK	Low	2 402	14.06	20.97
	Middle	2 437	14.85	20.97
	High	2 476	15.70	20.97

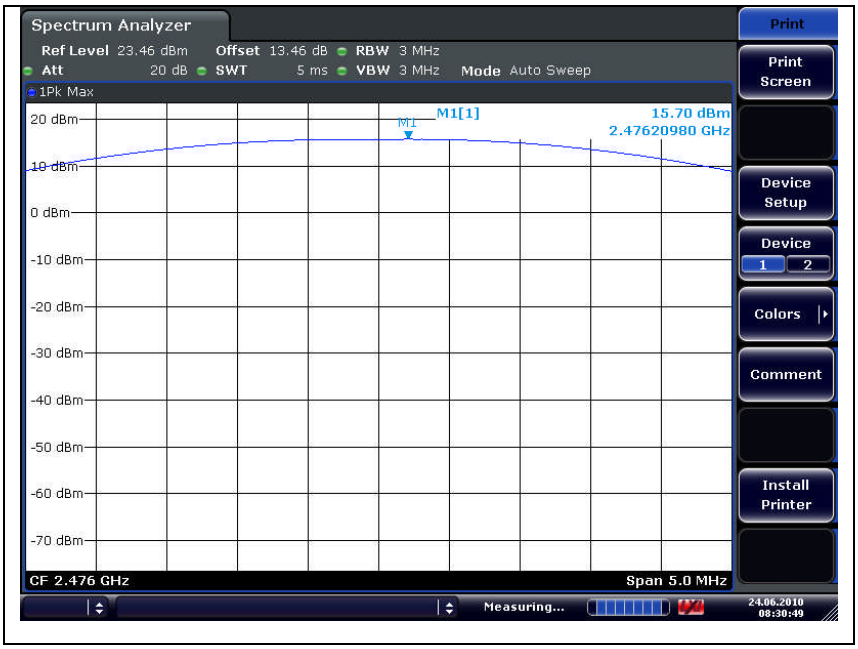
Low channel



Middle channel



High channel



6. Hopping Channel Separation

6.1. Test setup

6.2. Limit

§15.247(a)(1) Frequency hopping system operating in 2 400 - 2 483.5 ㎒. Band may have hopping channel carrier frequencies that are separated by 25 ㎑ or two-third of 20 ㏈ bandwidth of the hopping channel, whichever is is greater.

6.3. Test procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max Hold function record the separation of adjacent channels.
4. Measure the frequency difference of these two adjacent channels by spectrum analyzer MARK function. And then plot the result on spectrum analyzer screen.
5. Repeat above procedures until all frequencies measured were complete.
6. Set center frequency of spectrum analyzer = middle of hopping channel.
7. For Interpretation mode, Set the spectrum analyzer as RBW = 100 ㎑, VBW = 100 ㎑, Span = 20 ㎒ and Sweep = auto.
8. For Tour guide mode, Set the spectrum analyzer as RBW = 100 ㎑, VBW = 100 ㎑, Span = 5 ㎒ and Sweep = auto.

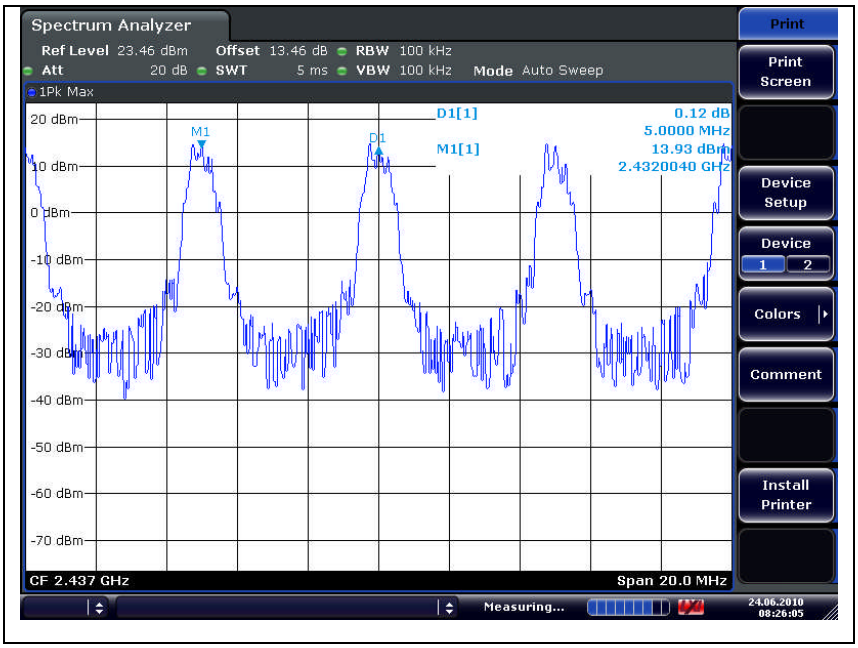
6.4. Test result

Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

- Interpretation mode

Operation Mode	Middle Channel (㎒)	Adjacent Hopping Channel Separation (㎑)	Two-third of 20 ㏈ Bandwidth (㎑)	Minimum Bandwidth (㎑)
GFSK	2 437	5 000	760	25

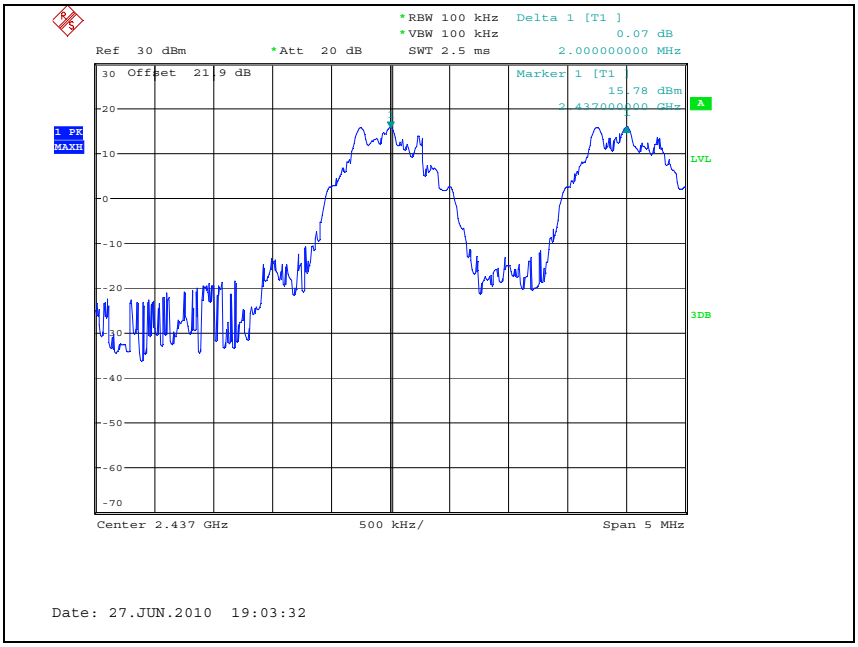
▣ Note
20 ㏈ bandwidth measurement, the measured channel separation should be greater than two-third of 20 ㏈ bandwidth or Minimum bandwidth.



- Tour guide mode

Operation Mode	Middle Channel (㎒)	Adjacent Hopping Channel Separation (㎑)	Two-third of 20 ㏈ Bandwidth (㎑)	Minimum Bandwidth (㎑)
GFSK	2 437	2 000	760	25

▣ Note
20 ㏈ bandwidth measurement, the measured channel separation should be greater than two-third of 20 ㏈ bandwidth or Minimum bandwidth.



7. Number of hopping frequency

7.1. Test setup

7.2. Limit

§15.247(a)(1), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

7.3. Test procedure

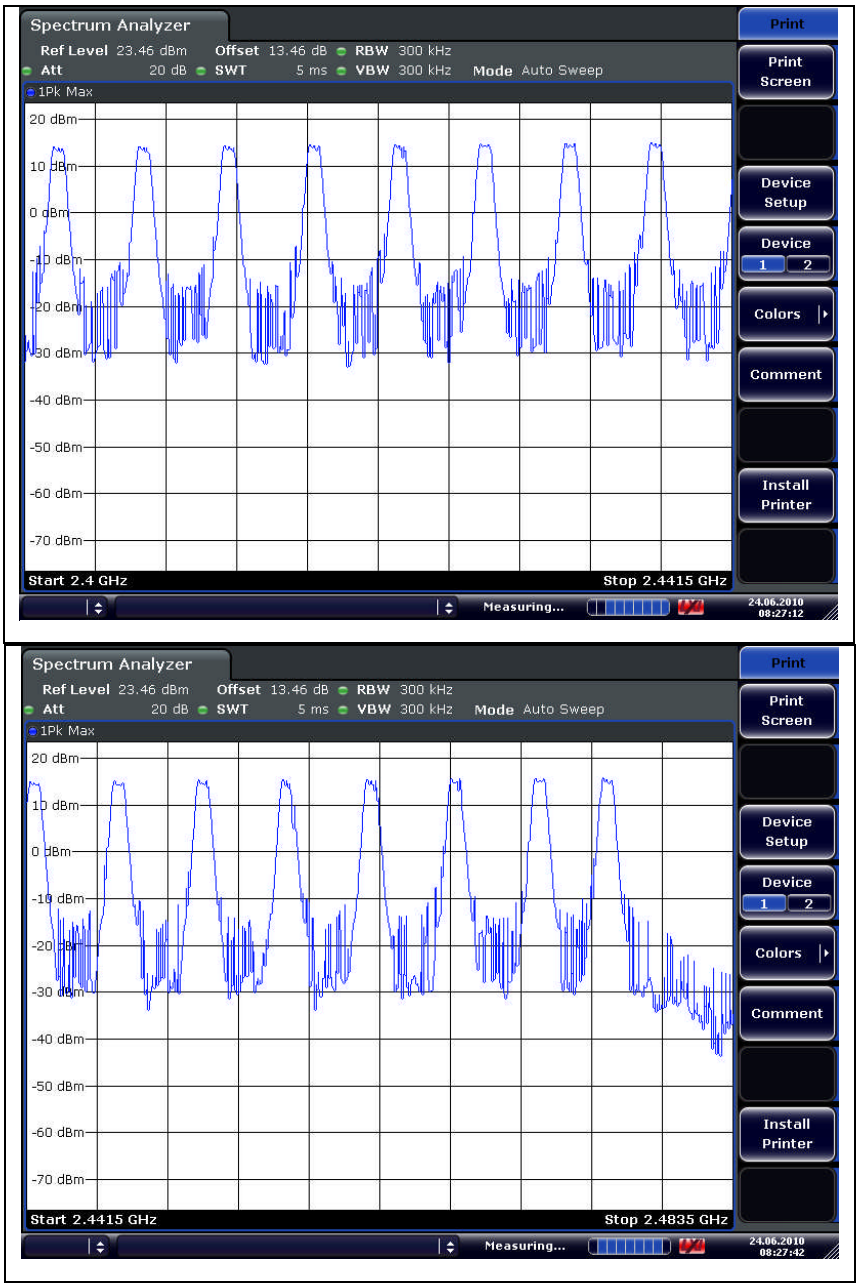
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna the port to the Spectrum analyzer.
3. Set spectrum analyzer Start = 2 400 ㎒, Stop = 2 441.5 ㎒, Sweep = auto and Start = 2 441.5 ㎒, Stop = 2 483.5 ㎒, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW = 300 ㎑.
5. Max hold, view and count how many channel in the band.

7.4. Test result

Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

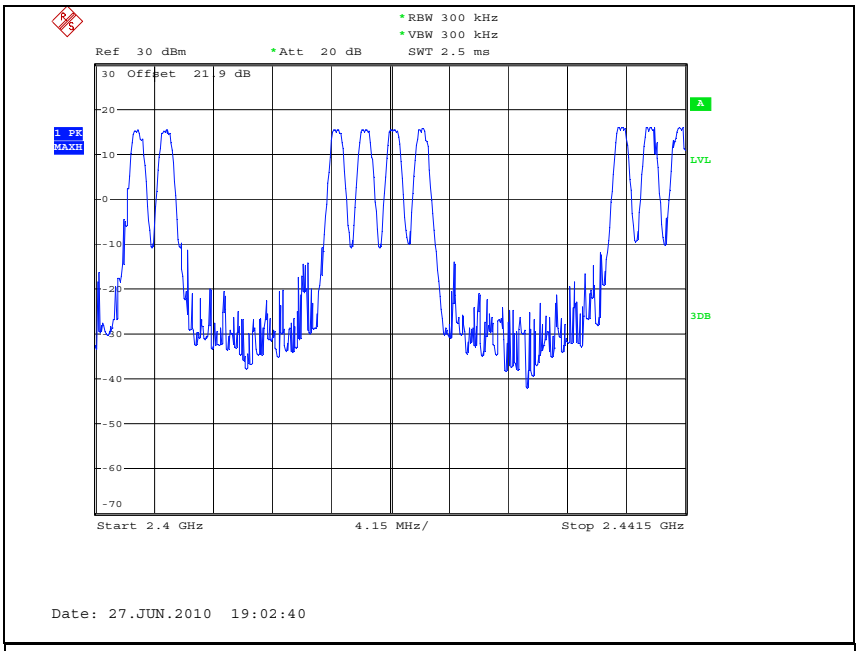
- Interpretation mode

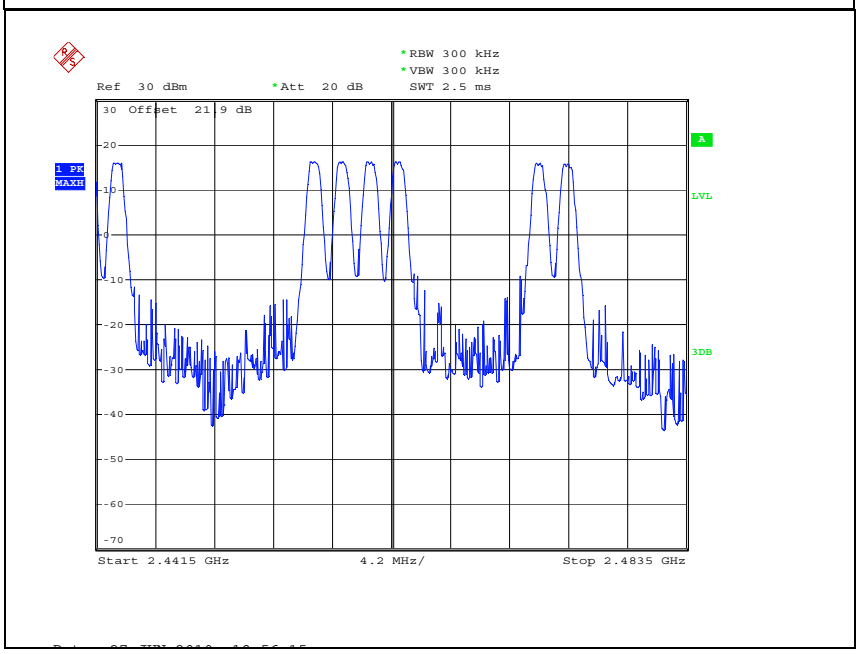
Operation mode	Number of hopping frequency	Limit
GFSK	16	≥ 15



- Tour guide mode

Operation mode	Number of hopping frequency	Limit
GFSK	16	≥ 15





8. Time of occupancy (Dwell time)

8.1. Test setup

8.2. Limit

Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

A period time=0.4(s) * 16= 6.4(s)

8.3. Test procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.
6. The hopping rate is 100 per second.

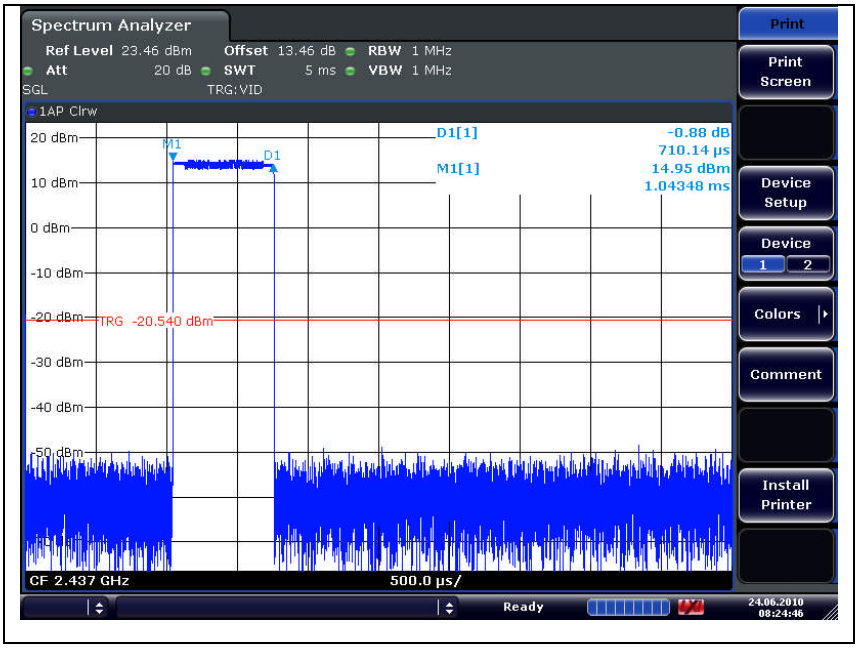
8.4. Test result

Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

Time of occupancy on the TX channel in 6.4sec
= time domain slot length × (hop rate ÷ number of hop per channel) × 6.4

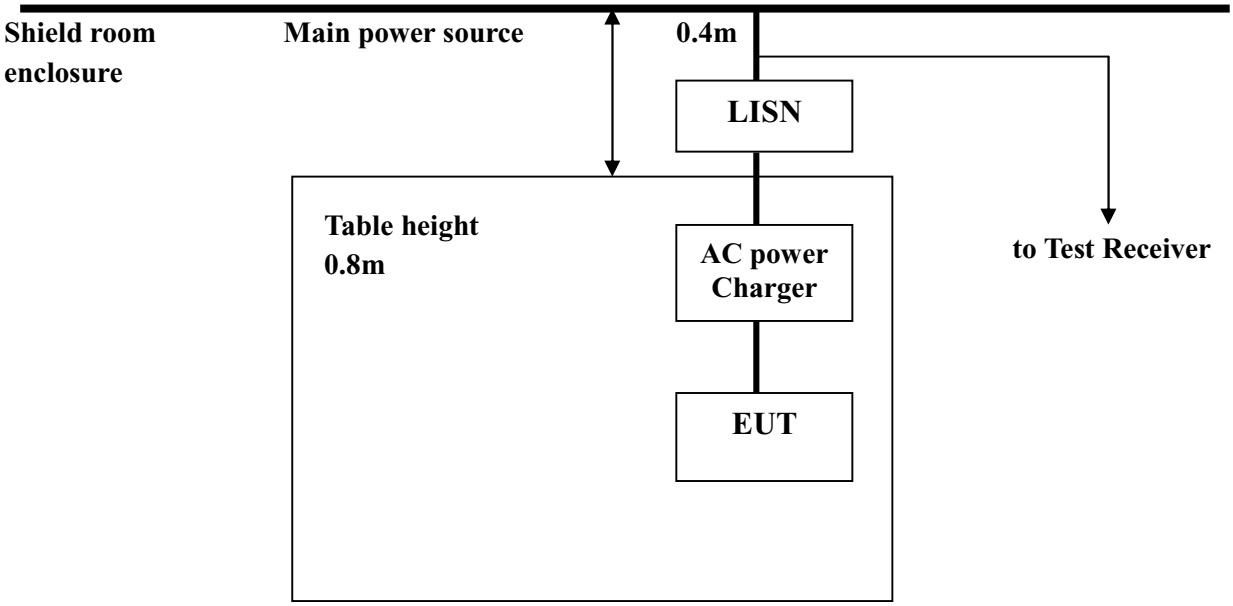
Frequency	Dwell time (㎳)	Time of occupancy on the Tx channel in 6.4 sec (㎳)	Limit for time of occupancy on the Tx channel in 6.4 sec (㎳)
2 437 ㎒	0.71	46.15	400

Dwell time : 0.71 (㎳) × [(325 ÷2) ÷16] ×6.4 (s) = 46.15 (㎳)



9. Transmitter AC Power Line Conducted Emission

9.1. Test Setup



9.2. 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 50 uH/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 frequency ranges.

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

* Decreases with the logarithm of the frequency.

9.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

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.

9.4. Test Results

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

Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

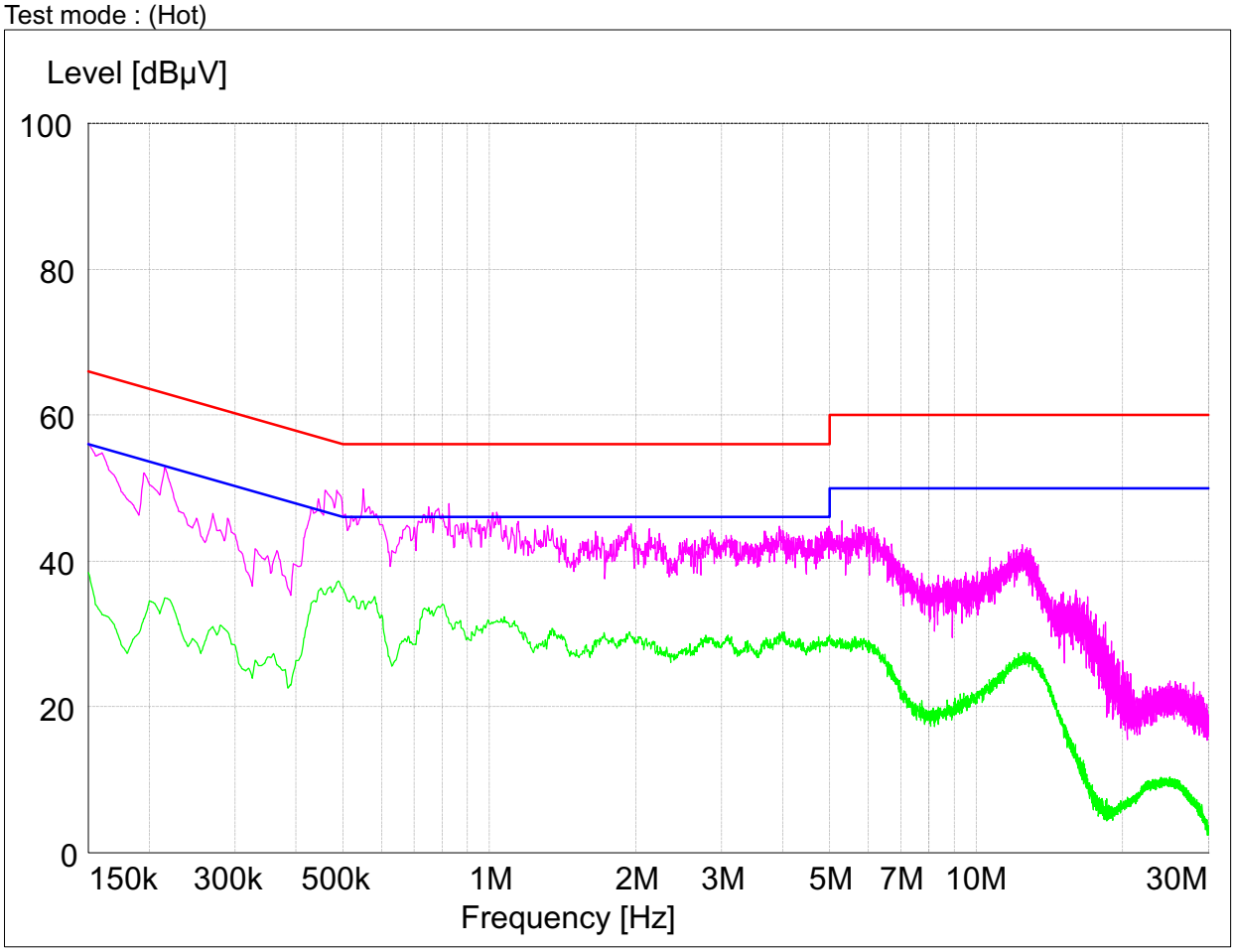
Frequency range : 0.15 ㎒ – 30 ㎒
Measured Bandwidth : 9 ㎑

FREQ.	LEVEL(dBμV)		LINE	LIMIT(dBμV)		MARGIN(dB)	
(㎒)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.24	41.70	31.00	H	62.10	52.10	20.40	21.10
0.50	45.50	38.80	H	56.08	46.08	10.58	7.28
0.61	40.50	32.40	H	56.00	46.00	15.50	13.60
1.92	37.10	29.30	H	56.00	46.00	18.90	16.70
5.09	35.00	27.60	H	60.00	50.00	25.00	22.40
12.10	32.70	24.30	H	60.00	50.00	27.30	25.70
0.22	41.30	31.60	N	63.01	53.01	21.71	21.41
0.46	46.90	37.40	N	56.69	46.69	9.79	9.29
0.55	38.60	30.50	N	56.00	46.00	17.40	15.50
1.95	38.70	30.00	N	56.00	46.00	17.30	16.00
4.92	39.10	28.90	N	56.00	46.00	16.90	17.10
12.51	34.20	26.10	N	60.00	50.00	25.80	23.90

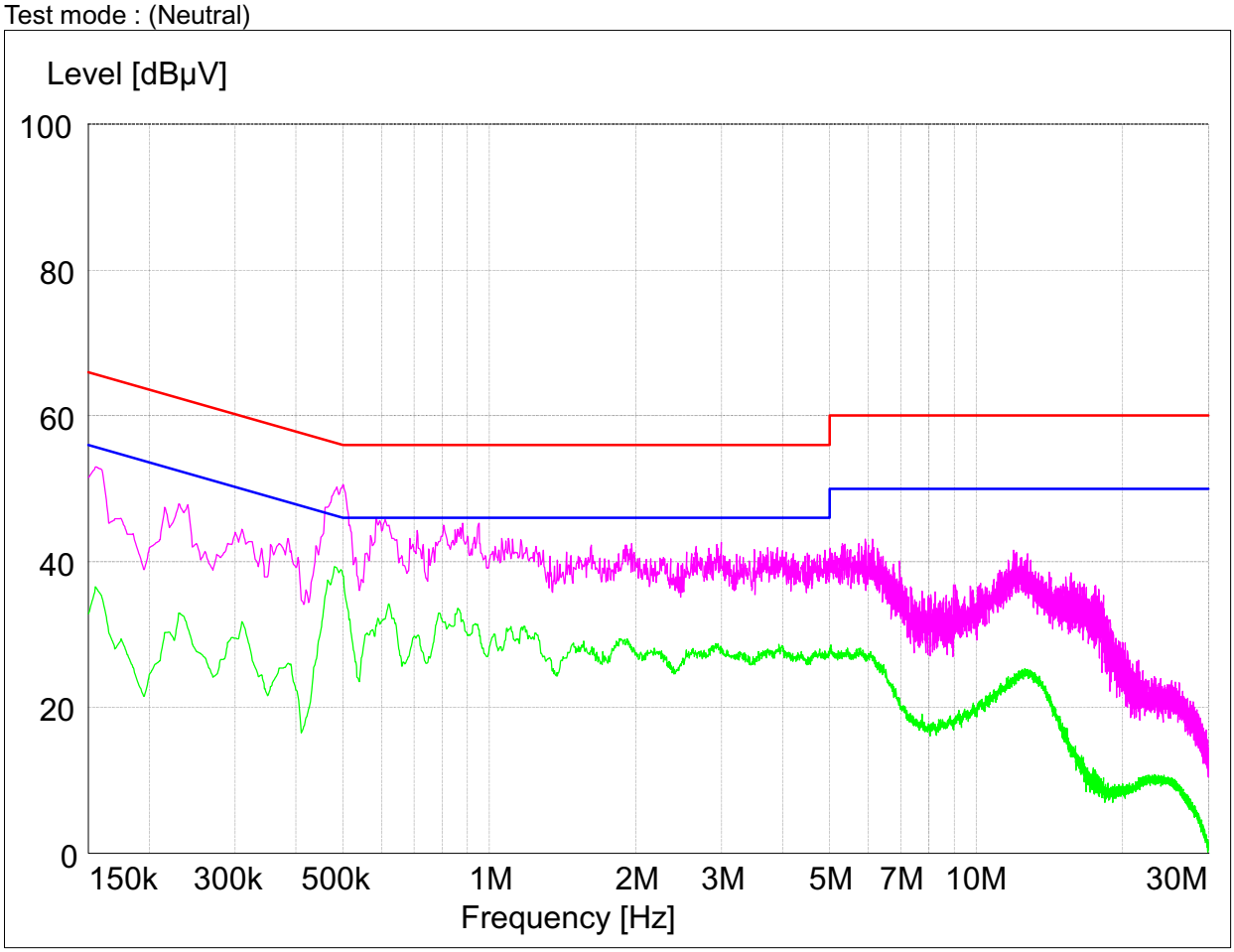
Note ;
Line (H) : Hot
Line (N) : Neutral

Plot of Conducted Power line

Test mode : (Hot)



Test mode : (Neutral)



10. Receiver AC Power Line Conducted Emission

10.1. Test Setup- Same as clause 9.1.

10.2. Limit

According to §15.107(a) Except for Class A digital devices, for equipment 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 oh ㎳ line impedance stabilization network (LISN). Compliance with the provisions 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 band edges.

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

* Decreases with the logarithm of the frequency.

10.3. Test Procedures- Same as clause 9.3.

10.4. Test Results

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

Ambient temperature : (24 ± 2) ℃
Relative humidity : 47 % R.H.

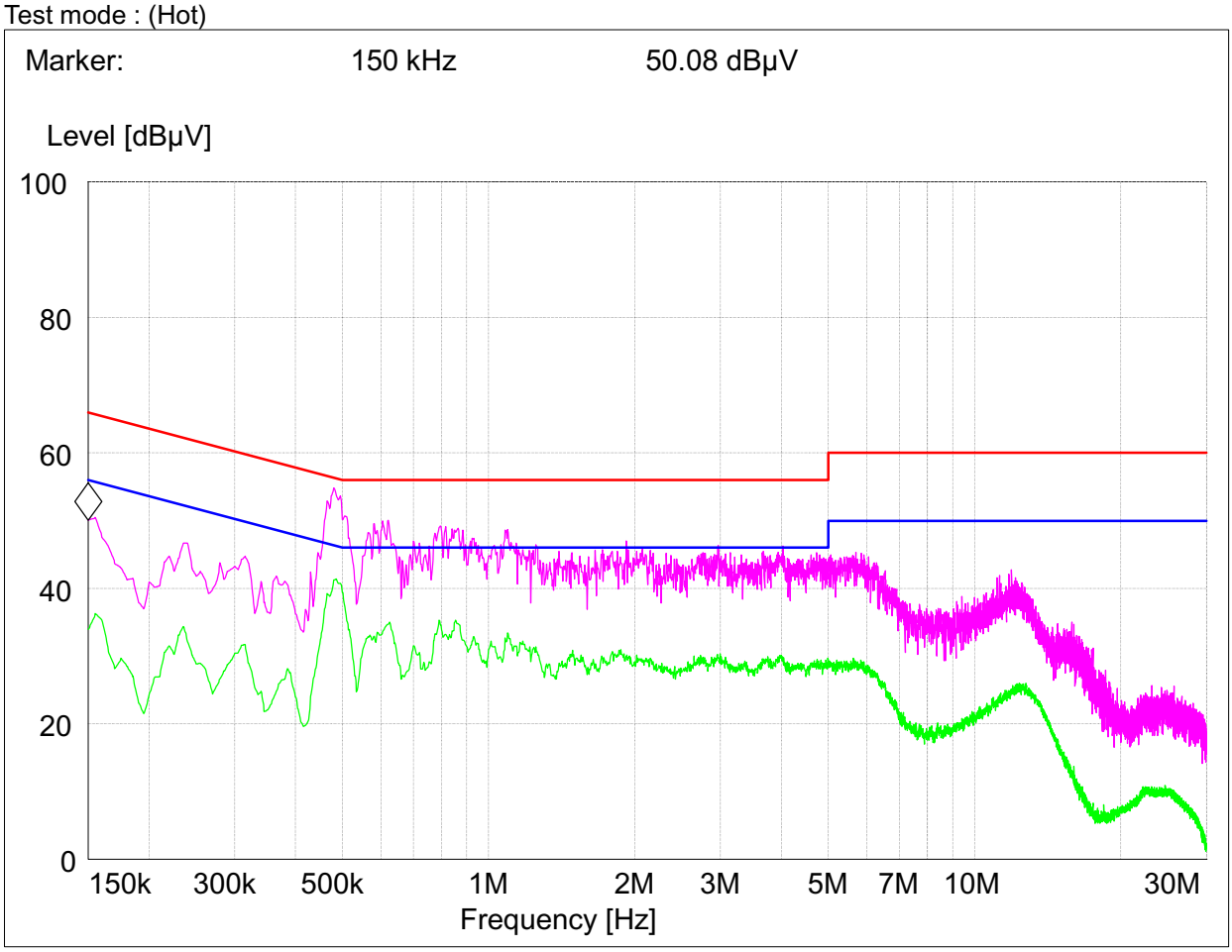
Frequency range : 0.15 ㎒ – 30 ㎒
Measured Bandwidth : 9 ㎑

FREQ.	LEVEL(dBμV)		LINE	LIMIT(dBμV)		MARGIN(dB)	
(㎒)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.24	43.00	33.00	H	62.27	52.27	19.27	19.27
0.49	46.80	39.30	H	56.25	46.25	9.45	6.95
0.63	41.50	34.00	H	56.00	46.00	14.50	12.00
1.90	36.80	29.40	H	56.00	46.00	19.20	16.60
5.54	34.40	27.30	H	60.00	50.00	25.60	22.70
12.10	33.30	24.30	H	60.00	50.00	26.70	25.70
0.24	41.40	32.40	N	62.10	52.10	20.70	19.70
0.49	49.50	41.20	N	56.25	46.25	6.75	5.05
0.63	44.10	35.20	N	56.00	46.00	11.90	10.80
1.08	44.10	32.20	N	56.00	46.00	11.90	13.80
3.99	39.20	29.70	N	56.00	46.00	16.80	16.30
12.10	34.10	25.20	N	60.00	50.00	25.90	24.80

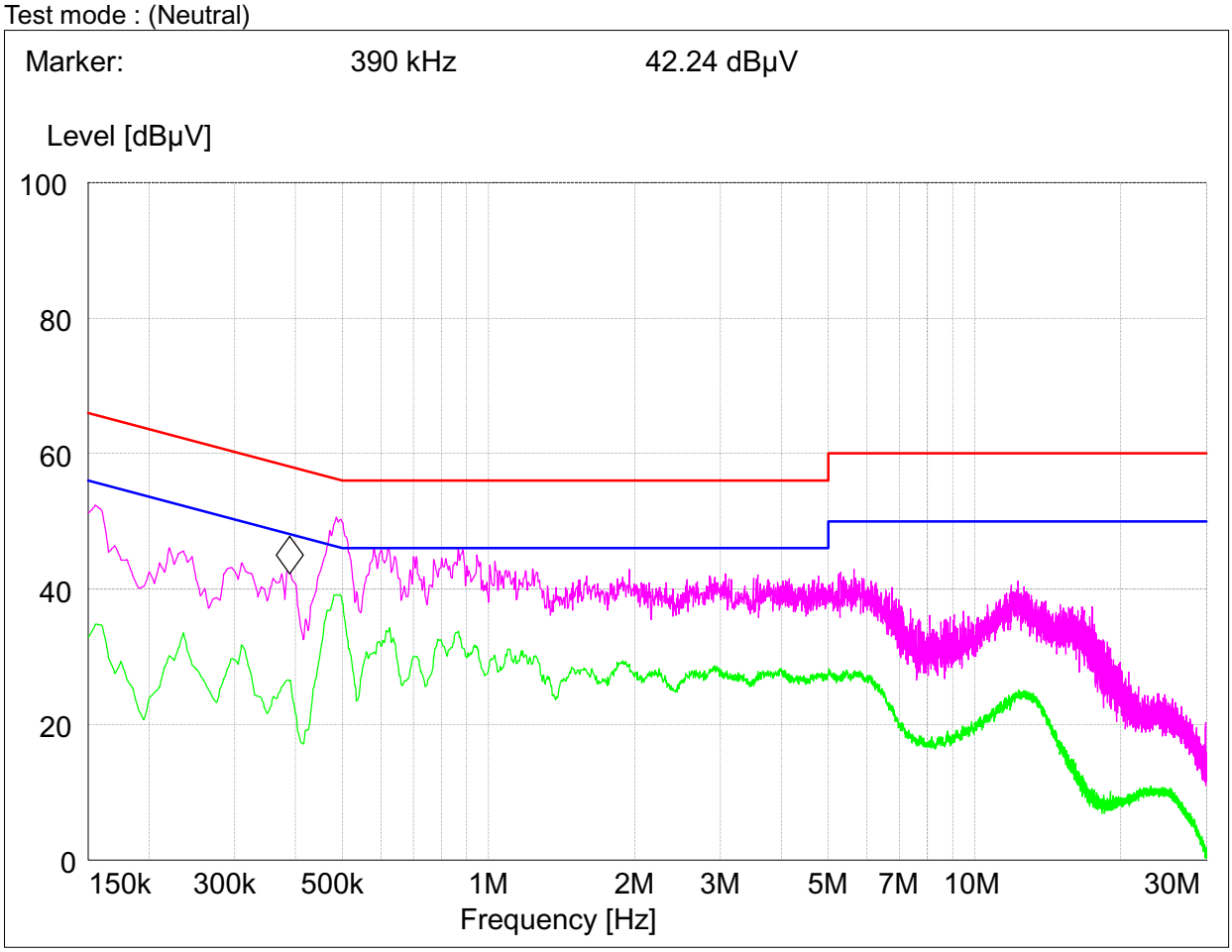
Note ;
Line (H) : Hot
Line (N) : Neutral

Plot of Conducted Power line

Test mode : (Hot)



Test mode : (Neutral)



11. Antenna requirement

11.1. Standard applicable

For intentional device, according to FCC 47 CFR Section §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section §15.247 (b) if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the gain of the antenna exceeds 6 dBi.

11.2. Antenna connected construction

The antenna used of this product is Chip antenna.
The peak max gain of this antenna is -0.22 dBi