Korea Technology Institute Co., Ltd.

Test Report

Test Report No.:	**KTI12EF03002**		
Registration No.:	**99058**		
Applicant:	**Mondo systems, inc.**		
Applicant Address:	**3F, Dongyang Bldg,. 128-5, Cheongpa-dong 3-ga, Yongsan-Gu Seoul, 140-133 South Korea**		
Product:	**Bluetooth Speaker**		
FCC ID:	**VAP-CN10**	**Model No.**	**CN10**
Receipt No.:	**12-0201**	**Date of receipt:**	**February 20, 2012**
Date of Issue:	**March 09, 2012**		
Testing location	**Korea Technology Institute Co., Ltd. 51-19, Sanglim3-Ri, Docheok-Myeun, Gwangju-Shi, Gyeungki-Do, Korea**		
Test Standards:	**FCC/ANSI. C63.4: 2003**		
Rule Parts: FCC	**Part 15, Class C-15.247**		
Equipment Class:	**Computing Device Peripheral**		
Test Result:	**The above-mentioned product has been tested with compliance.**		

Tested by: K. C. Yeom
/ Engineer

Signature **Date**

Approved by: G. C. Min
/President

G C Min

Signature **Date**

Other Aspects:	
Abbreviations:	**∗ OK, Pass=passed ∗ Fail=failed ∗ N/A=not applicable**

☞ **- This test report is not permitted to copy partly without our permission.**

- This test result is dependent on only equipment to be used.

- This test result is based on a single evaluation of one sample of the above mentioned.

- This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S Government.

- We certify this test report has been based on the measurement standards that is traceable to the national or international standards.

≫≫ Contents ≪≪

1. General

This equipment has been shown to be capable of compliance with the applicable technical standards and was tested in accordance with the measurement procedures as indicated in this report.

We attest to the accuracy of data. Korea Technology Institute Co., Ltd. performed all measurements reported herein. And were made under Chief Engineer's supervisor.
We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

2. Test Site

Korea Technology Institute Co., Ltd.

2.1 Location

51-19, Sanglim3-Ri, Docheok-Myeun, Gwangju-Shi, Gyeungki-Do, Korea

The Test Site is in compliance with ANSI C63.4/2003 for measurement of radio Interference.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

- Conducted Emissions

Kind of Equipment	Type	S/N	Calibrated until
Spectrum Analyzer	8564E	3845A01024	02.2013
Field Strength Meter	ESIB40	100093	10.2012
Field Strength Meter	ESCI3	100025	05.2013
LISN	ESH2-Z5	8-1157-2	03.2012
LISN	EM-7823	115019	05.2012
Conducted Cable	N/A	N/A	08.2012

- Radiated Emissions

Kind of Equipment	Type	S/N	Calibrated until
Field Strength Meter	ESIB40	100093	10.2012
Spectrum Analyzer	8564E	3845A01024	02.2013
Biconic Logarithmic Periodic Antenna	VULB9163	9163-281	10.2012
Horn Antenna	3115	6443	07.2012
Horn Antenna	BBHA9170	BBHA9170268	07.2012
Open Site Cable	N/A	N/A	11.2012
Antenna Mast	DETT-03	N/A	N/A
Antenna & Turntable controller	DETT-04	91X519	N/A

2.3 Test Date

Date of Application: February 20, 2012

Date of Test: February 22, 2012 ~ March 8, 2012

2.4 Test Environment

See each test item's description.

3. Description of the tested samples

The EUT is a Bluetooth Speaker.

3.1. Rating and Physical Characteristics

Specifications	
Audio Output	2 channel Class-D Digital Amplifier
Amplifier Power	5W x 2 CH
Speaker Unit	2.75" x 2 Full range
THD + N	< 0.2% (at 1 KHz 1W)
Frequency range	100 Hz -20 KHz
Impedance	6 ohm
Input	Bluetooth / Line in (3.5mm) mini stereo jack
Power Supply	DC 9V 1.5A
Dimensions (W x D x H)	114.6 x 114.4 x 144.1 mm
Net Weight	xx g

3.2 Multiple Model Name

CN10-BBA,CN10-BWA,CN10-BDA,CN10-BGA,CN10-BPA

CN20-BBA,CN20-BWA,CN20-BDA,CN20-BGA,CN20-BPA,Corni-100, Corni-200

3.3 Submitted Documents

- User's Guide

- Block Diagram

4. Measurement Conditions

Testing Input Voltage: AC 110V, OUTPUT : DC9V 1.5A

4.1 Modes of Operation

The EUT was in the following operation mode during all testing;

1) The measurements were taken in continuous transmit / receive mode using the TEST MODE.

For controlling the EUT as TEST MODE, the test program were provided by the applicant.

4.2 Additional Equipment

DEVICE TYPE	Manufacturer	M/N	S/N	FCC ID
Notebook	SAMSUNG	RV511	HHA793QB600206F	DOC
Adapter	Ktec	KSAS01509001 150D5	N / A	DOC

4.3 Uncertainty

1) Radiated disturbance

Uc (Combined standard Uncertainty) = ± 1.8dB

Expanded uncertainty U=KUc

K = 2

∴ U = ± 3.6dB

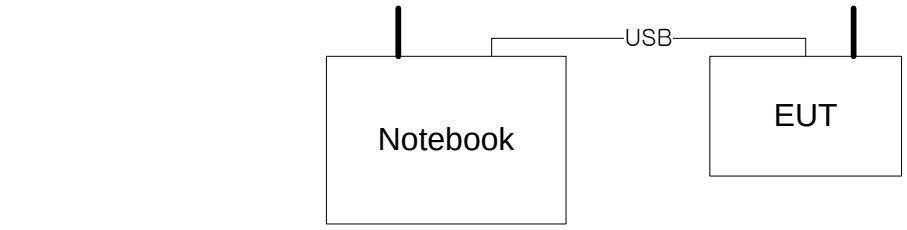
2) Conducted disturbance

Uc = ± 0.88dB

U = KUc=2 x Uc = ± 1.8dB

4.4 Test Setup

Figure 1: Test Setup Diagram



SIGNAL

POWER

5. EMISSION Test

5.1.Conducted Emissions

Result: **Pass**

The line-conducted facility is located inside a 2.3M x 3.5M x 5.5M shielded closure.

The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 605-05. A 1m x 1.5m wooden table 80cm high is placed 80cm away from the conducting ground plane and 40cm away from the sidewall of the shielded room. Electro-Metroics Model EM-7823 (9kHz-30MHz)50ohm/50 uH Line-Impedance Stabilization Networks (LISN) are bonded to the shielded room.

The EUT is powered from the Electro-Metroics LISN and the support equipment is powered from the Kyoritsu LISN. Power to the LISN are filtered by a high-current high-insertion loss shield enclosures power line filters (100dB 14kHz-1GHz).

The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure.

All electrical cables are shielded by copper pipe with inner diameter of 1".

If the EUT is a DC-Powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Rohde & Schwarz LISN.

All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length.

Sufficient time for the EUT, Support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.

The frequency producing the maximum level was reexamined using EMI field Intensity meter (ESIB40). The detector function was set to CISPR quasi-peak mode.

The bandwidth of the receiver was set to 10kHZ. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; if applicable; whichever determined the worst-case emission.

Photographs of the worst-case emission can be seen in photograph of conducted test.

Each EME reported was calibrated using self-calibrating mode.

Figure 2: Spectral Diagram, LINE-PE

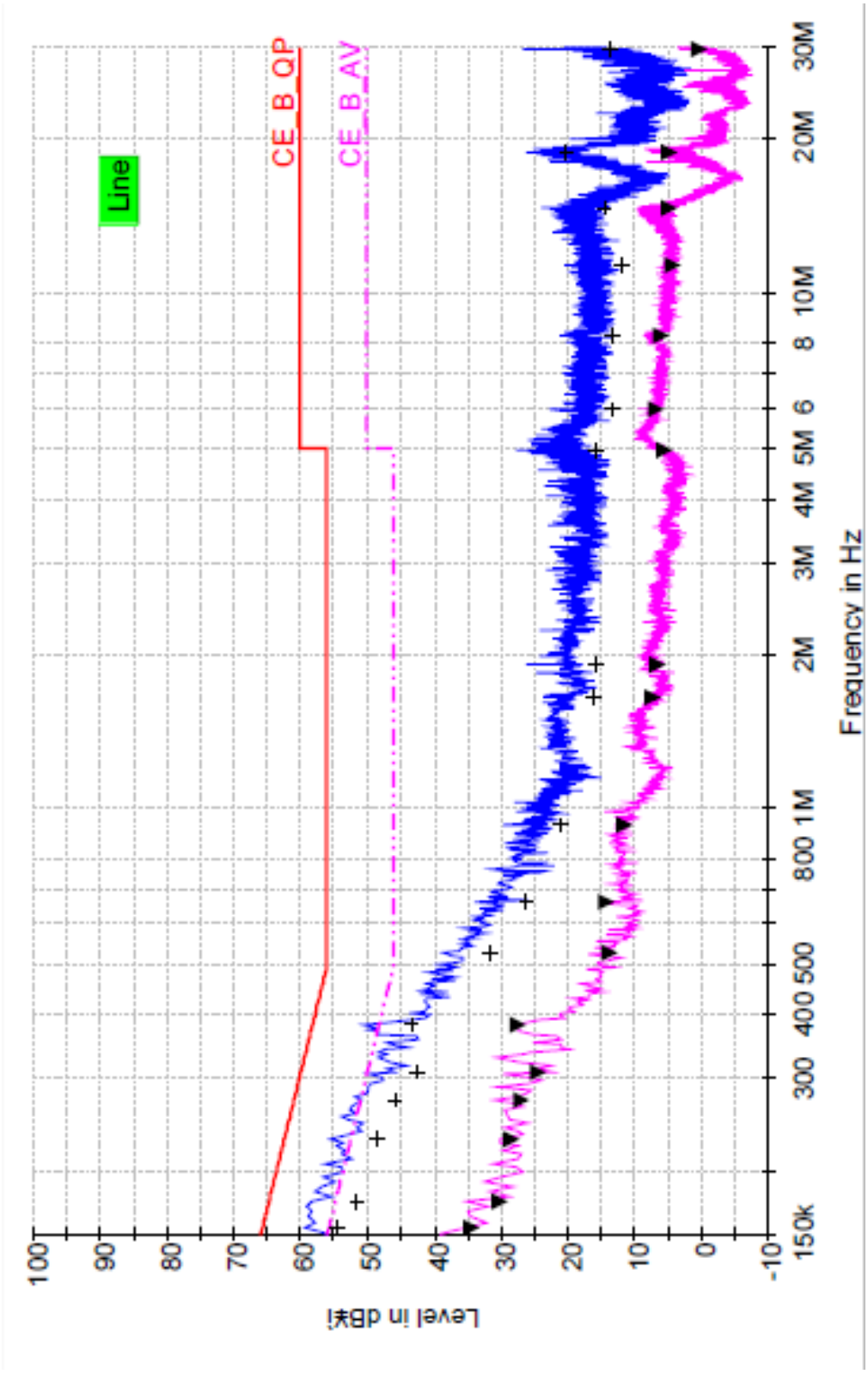


Figure 3: Spectral Diagram, NEUTRAL-PE

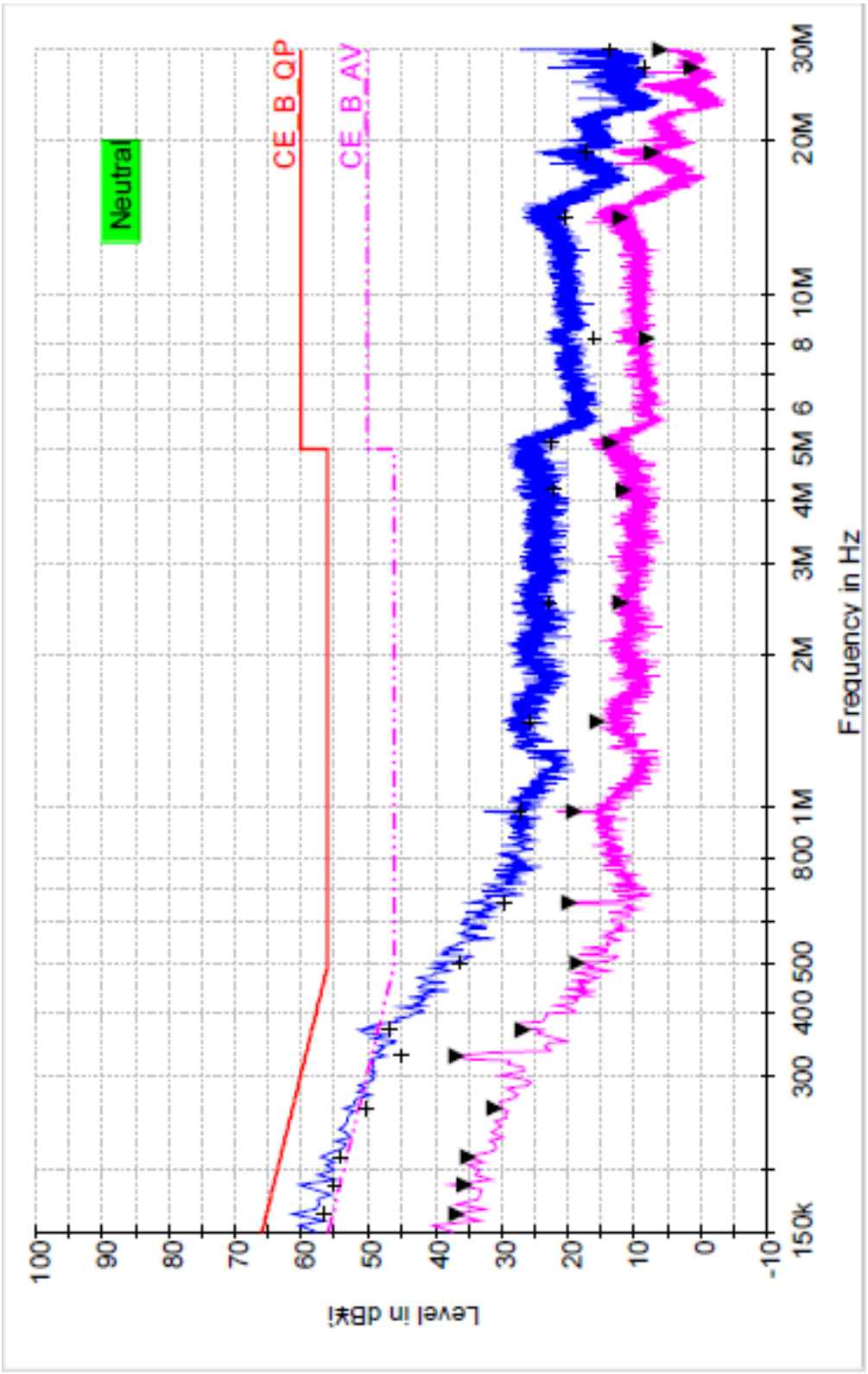


Table 2: Test Data, Conducted Emissions

Frequency (MHz)	(1) Reading (dBμV)	Line	(2)C/F (dB)	(3)Actual (dBμV)	(4) Limit (dBμV)	(5) Margin (dB)
0.15	35.70	L2	10.6	46.30	66.00	19.70
1.31	14.40	L1	10.4	24.80	56.00	31.20
2.81	18.70	L2	10.4	29.10	56.00	26.90
5.22	26.50	L2	10.2	36.70	60.00	23.30
10.29	12.90	L2	10.5	23.40	60.00	36.60
29.40	15.80	L2	10.3	26.10	60.00	33.90

NOTES:

1. All modes of operation were investigated
   And the worst-case emissions are reported.
2. All other emissions are non-significant.
3. All readings are calibrated by self-mode in receiver.
4. Measurements using CISPR Quasi-peak mode.
5. L1 = LINE-PE, L2 = NEUTRAL-PE
6. C/F = Correction Factor(LISN factor + Cable loss)
7. The limit for Class B digital device is 66dBuV to 56dBuV from 150KHz to 500KHz, 56dBuV from 500KHz to 5MHz, 60dBuV Above 5MHz.

♠ Margin Calculation

(5) Margin = (4) Limit – (3) Actual

[(3) Actual = (1) Reading + (2) C/F]

5.2 Radiated Emissions

Result: Pass

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband Amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and Investigated. The system configurations, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1GHz using Biconical Antenna and LogPeriodic Antenna. Above 1GHz, Double ridged horn Antenna was used.

Final measurements were made outdoors at 3-meter test range using Schwarzbeck antennas. The test equipment was placed on a wooden table situated on a 4x4 meter area adjacent to the measurement area. Turntable was to protect from weather in the dome that made with Polyethylene film. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter (ESIB40). The detector function was set to CISPR quasi-peak or peak mode as appropriate and the bandwidth of the receiver was set to 120kHz or 1 MHz depending on the frequency or type or signal.

The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8meter high non-metallic 1 x 1.5 meter table.

The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed, and/or support equipment, if applicable; and changing the polarity of the antenna and rotating the EUT in turns with three orthogonal axes for portable devices, whichever determined the worst-case emission.

Photographs of the worst-case emission can be seen in photograph of radiated emission test.

Each EME reported was calibrated using self-calibrating mode.

Table 3: Test Data, Radiated Emissions

Lowest Channel 1 (2 402 ㎒)

Below 1 ㎓

Frequency (MHz)	(1) Reading (dBμV)	Pol	Hei(m)	(2) AFCL (dB/m)	(3) Total (dBμV/m)	(4) Limit (dBμV/m)	(5) Margin (dB)
192.00	4.00	H	1.05	10.14	39.50	43.50	17.20
224.00	4.20	H	1.09	22.38	42.20	46.40	19.17
687.80	17.80	H	1.16	25.14	28.60	46.40	22.82

Adove 1 ㎓

Frequency (MHz)	(1) Reading (dBμV)	Pol	Hei(m)	(2) AFCL (dB/m)	(3) Total (dBμV/m)	(4) Limit (dBμV/m)	(5) Margin (dB)
	No spurious emissions found						

Middle Channel 40 (2 441 ㎒)

Below 1 ㎓

Frequency (MHz)	(1) Reading (dBμV)	Pol	Hei(m)	(2) AFCL (dB/m)	(3) Total (dBμV/m)	(4) Limit (dBμV/m)	(5) Margin (dB)
144.00	32.5	V	1.06	7.7	40.2	43.50	3.3
151.88	32.6	V	1.14	7.8	40.4	43.50	3.1
160.00	33.0	V	1.18	8.0	41.0	43.50	2.5

Adove 1 ㎓

Frequency (MHz)	(1) Reading (dBμV)	Pol	Hei(m)	(2) AFCL (dB/m)	(3) Total (dBμV/m)	(4) Limit (dBμV/m)	(5) Margin (dB)
	No spurious emissions found						

Highest Channel 79 (2 480 ㎒)

Below 1 ㎓

Frequency (MHz)	(1) Reading (dBμV)	Pol	Hei(m)	(2) AFCL dB/m)	(3) Total (dBμV/m)	(4) Limit (dBμV/m)	(5) Margin (dB)
47.56	9.40	V	1.05	13.40	22.80	40.00	17.20
123.80	12.80	V	1.09	11.53	24.33	43.50	19.17
143.96	10.90	V	1.16	9.78	20.68	43.50	23.82

Adove 1 ㎓

Frequency (MHz)	(1) Reading (dBμV)	Pol	Hei(m)	(2) AFCL (dB/m)	(3) Total (dBμV/m)	(4) Limit (dBμV/m)	(5) Margin (dB)
	No spurious emissions found						

※Note

• Above 1 ㎓ is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35

• Limit: 54㏈㎶/m(Average), 74㏈㎶/m(Peak)

• For the below 30 ㎒, measured any other signal is not detected on test receiver

Freq.(㎒) : Measurement frequency,

Reading(㏈㎶/m) : Indicated value for test receiver,
Table (Deg) : Directional degree of Turn table,

Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor
Cbl(㏈) : Cable loss, Pre AMP(㏈) : Preamplifier gain(㏈)

Meas Result (㏈㎶/m) :Reading(㏈㎶/m)+ Antenna factor.(㏈/m)+ CL(㏈) - Pre AMP(㏈)
Limit(㏈㎶/m): Limit value specified with FCC Rule,

Mgn(㏈) : FCC Limit (㏈㎶/m) – Meas Result(㏈㎶/m),

6. Information about test item

CN10

6.1 Equipment information

Equipment model name	Mint Corni
Type of equipment	Bluetooth Speaker
Frequency band	2402 ~ 2480 MHz
Type of Modulation	FHSS(Frequency Hopping Spread Spectrum), GFSK
Channel Spacing	1.0 MHz
Type of antenna	PCB Antenna
Power	1. DC 9.0 V (1.5A)

6.2 Tested frequency

Frequency	TX	RX
Low frequency	2402MHz	2402MHz
Middle frequency	2441MHz	2441MHz
High frequency	2480MHz	2480MHz

6.3 Tested environment

Temperature	: 5 ~ 10 (℃)
Relative humidity content	: 20 ~75 %
Air pressure	: 1005 ~ 1009 mbar
Details of power supply:	N/A

6.4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Notebook	RV511	HHA793QB600206F	SAMSUNG

7. Test Report

7.1 Summary of tests

Description of Test	FCC Rule	Reference Clause	Used	Test Result
Carrier frequency separation (20 dB bandwidth)	15.247(a)(1)	Clause 5.1	☒	Compliance
Number of hopping frequen ies	15.247(a)(1)(iii)	Clause 5.2	☒	Compliance
Time of occupancy (Dwell Time)	15.247(a)(1)(iii)	Clause 5.3	☒	Compliance
Max. Co ducted peak output power	15.247(b)(1)	Clause 5.4	☒	Compliance
Conducted peak output power spectrum density	15.247(e)	Clause 5.5	☒	Compliance
Band edge compliance of RF conducted emissions	15.247(d)	Clause 5.6	☒	Compliance
Band edge compliance of RF radiated emissions	15.247(d) 15.205 & 15.209	Clause 5.7	☒	Compliance
Spurious RF conducted emissions	15.247(d)	Clause 5.8	☒	Compliance
Spurious RF radiated emissions	15.247(d), 15.209	Clause 5.9	☒	Compliance
Antenna requirement	15.203, 15.247	Clause 5.10	☒	Compliance
AC Power line Conducted emission	15.207	Clause 5.10	☒	Compliance

Compliance : The EUT complies with the essential requirements in the standard.

Not Compliance : The EUT does not comply with the essential requirements in the standard.

N/A : The test was not applicable in the standard.

7.2 Transmitter requirements

7.2.1 Carrier Frequency Separation - 15.247(a)

Procedure:

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW : ≥ 1% of the span Sweep = auto

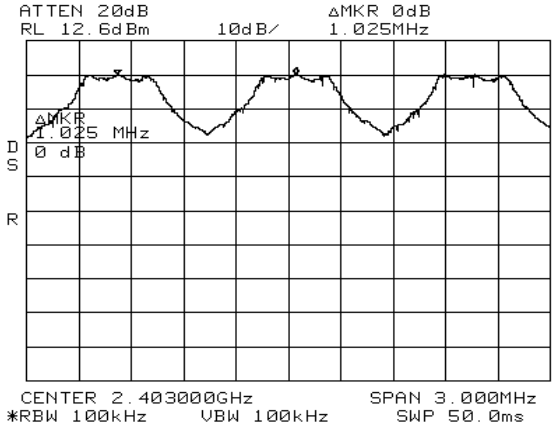
VBW : ≥ RBW Detector function = peak

Trace = max hold

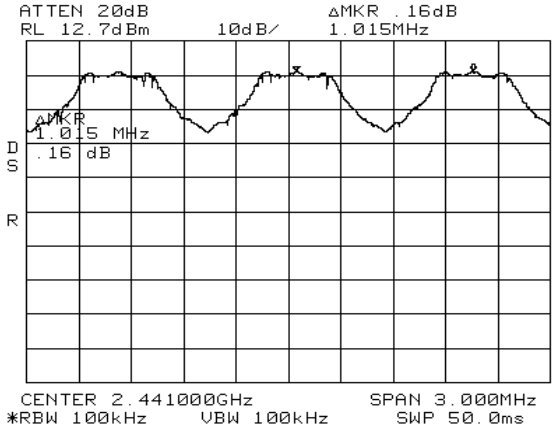
Measurement Data:

Channel NO.	Frequency (MHz)	Test Results		
		Measured Value (MHz)	Results	Limit
1, 2	2 402, 2 403	1, 025	Pass	≥ 25 ㎑ or 2/3 20dB bandwidth
40, 41	2 441, 2 442	1, 015	Pass	
78, 79	2 479, 2 480	1, 010	Pass	

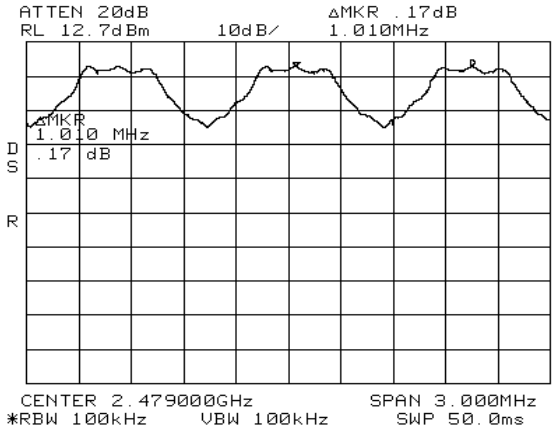
Channel 1,2 (2 402 MHz, 2 403 MHz)



Channel 40,41 (2 441 MHz, 2 442 MHz)



Channel 78,79 (2 479 MHz, 2 480 MHz)



7.2.2 Number of Hopping Frequencies – 15.247(a)(1)

Procedure:

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

The spectrum analyzer is set to:

Span : the frequency band of operation

RBW : 100 kHz (1% of the span or more) Sweep = auto

VBW : 300 kHz (VBW ≥ RBW) Detector function = peak

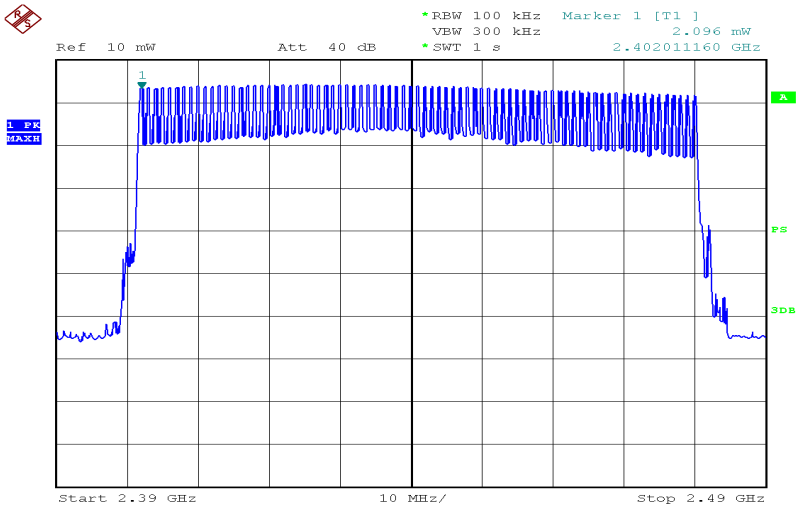
Trace : max hold

Measurement Data: Complies

Total number of Hopping Channels	79

-See next pages of actual measured spectrum plots.

Hopping channel number (ch1 ~ ch79)



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7.2.3. 20 dB Bandwidth – 15.247(a)(1)

FCC 47CFR15 – 15.247(a)

Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz

Procedure:

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta 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 is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 10 kHz (1% of the 20dB bandwidth or more) Sweep = auto

VBW = 30 kHz (VBW ≥ RBW) Detector function = peak

Trace = max hold

Measurement Data:

Frequency (MHz)	Channel No.	Test Results	
		Measured Bandwidth (MHz)	Result
2402	**1**	**0.83**	Complies
2441	**40**	**0.83**	Complies
2480	**79**	**0.85**	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

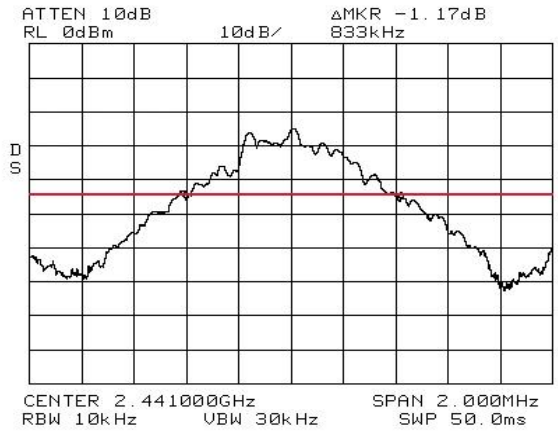
The transmitter shall have a maximum 20dB bandwidth of 1 MHz.

Measurement Setup

Same as the Chapter 4.4 (Figure 1)

Channel 1 (2 402 MHz)

Channel 40 (2 441 MHz)



Channel 79 (2 480 MHz)

7.2.4 Time of Occupancy (Dwell Time) – 15.247(a)(1)(iii)

Procedure:

The dwell time was measured with a spectrum analyzer connected to the terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Span = zero

RBW = 1 MHz VBW = 1 MHz (VBW ≥ RBW)

Trace = max hold Detector function = peak

Measurement Data:

Frequency (MHz)	Burst duration in one hop (us)	Test Results	
		Dwell Time (s)	Result
2402	**395**	**0.079**	Complies
2441	**390**	**0.078**	Complies
2480	**400**	**0.080**	Complies

- See next pages of actual measured spectrum plots.

Minimum Standard:

0.4 seconds within a 30 second period per any frequency

Test Procedure

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode with frequency hopping sequence on.
2. The center frequency of the spectrum analyzer was set to 2402 MHz with zero frequency span
3. The sweep time of the spectrum analyzer was adjusted until a stable signal can be seen on the spectrum analyzer.
4. Dwell tine was measured using the marker-delta function of the spectrum analyzer.

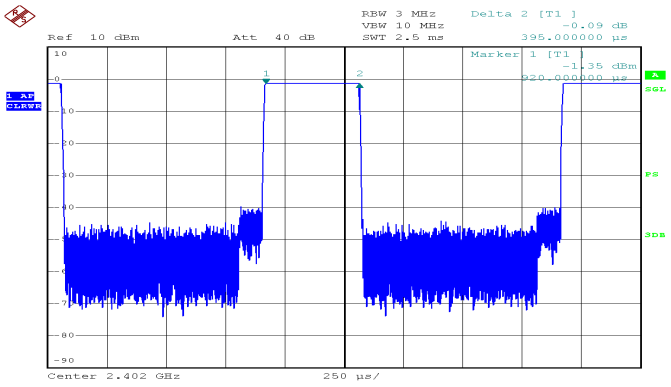
Frequency Dwell Time = [measured time slot length *hopping rate/ hopping channels]*[0.4*number of hopping channels]

Where EUT hopping rate = 500 hops/s

Number of EUT hopping = 79 channels

5. The steps 2 to 4 were repeated with the center frequency of the spectrum analyzer were set to 2441 MHz and 2480 MHz respectively.

Channel 1 (2 402 MHz)



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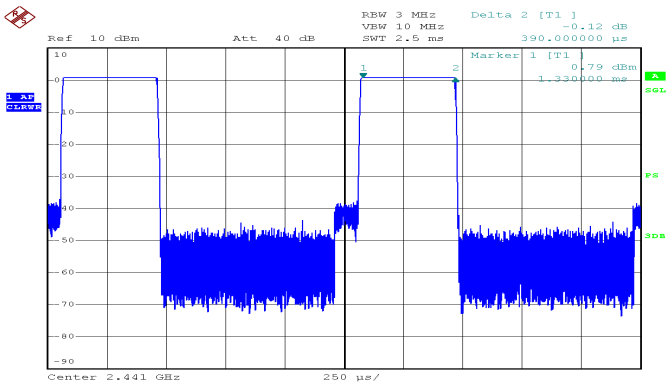
Channel 40 (2 441 MHz)



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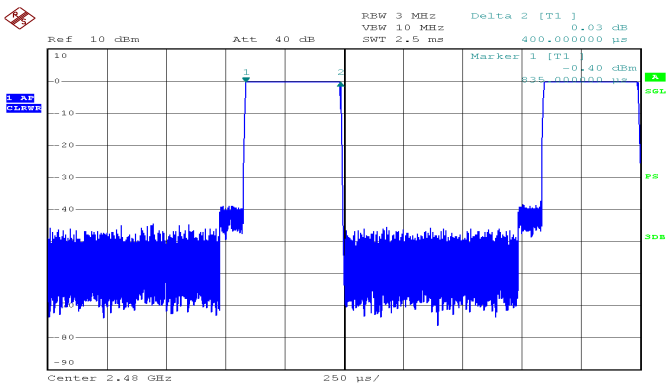
Channel 79 (2 480 MHz)



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7.2.5 Max. Conducted Peak Output Power – 15.247(b)(1)

Procedure:

The peak output power was measured with a spectrum analyzer connected to the terminal, while EUT had its hopping function disable at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to:

Center frequency : the highest, middle and the lowest channels

Span : approximately 5 times of the 20 dB bandwidth

RBW : greater than the 20dB bandwidth of the emission being measured

VBW :VBW ≥ RBW Detector function : peak

Trace : max hold Sweep : auto

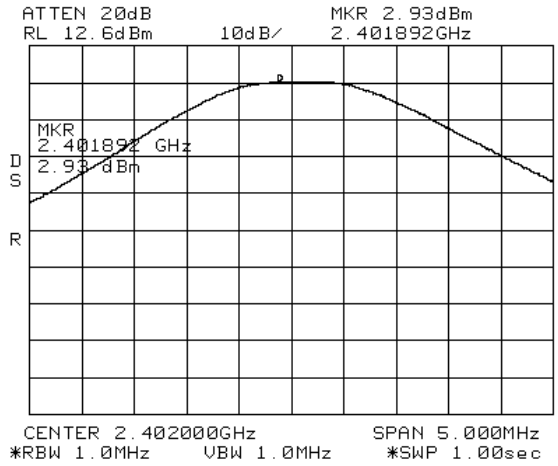
Measurement Data:

Frequency (MHz)	**Ch.**	**Test Results**		
		dBm	**Limit [dBm]**	**Result**
2402	1	**2.93**	≤ 30	Pass
2441	40	**4.38**		Pass
2480	79	**6.03**		Pass

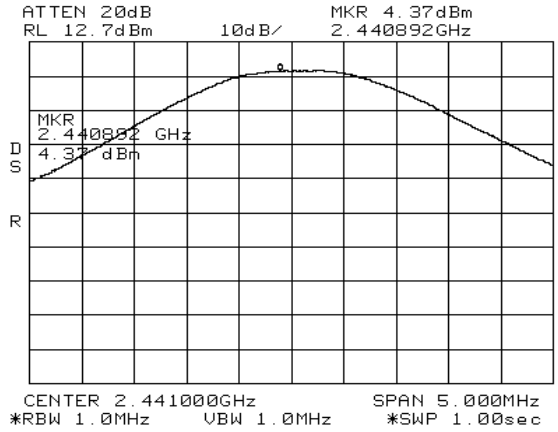
- See next pages of actual measured spectrum plots.

Minimum Standard:	< 1W

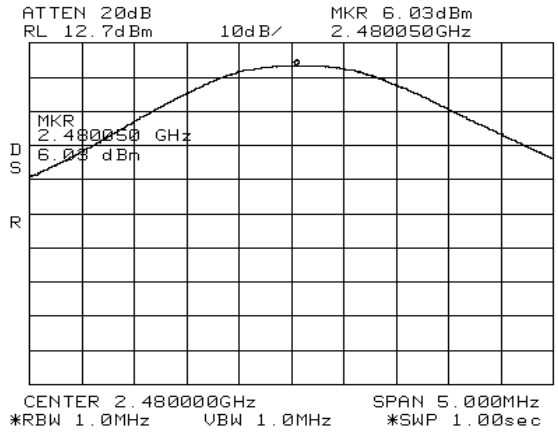
Channel 1 (2 402 MHz)



Channel 40 (2 441 MHz)



Channel 79 (2 480 MHz)



7.2.7 Conducted Peak Power Spectral Density – 15.247(e)

Procedure:

The power spectral density conducted from the intentional radiator was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disable at the highest , middle and the lowest available channels. After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak power spectral density.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 3 kHz VBW = 10 kHz (≥ RBW)

Span = 900 kHz Detector function = peak

Trace = max hold Sweep = auto

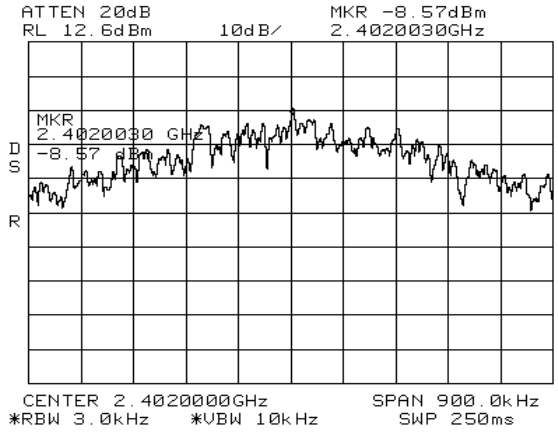
Measurement Data:

Frequency (MHz)	**Ch.**	**Test Results**		
		dBm	**Limit [dBm]**	**Result**
2402	1	**-8.57**	8	Complies
2441	40	**-6.97**		Complies
2480	79	**-5.47**		Complies

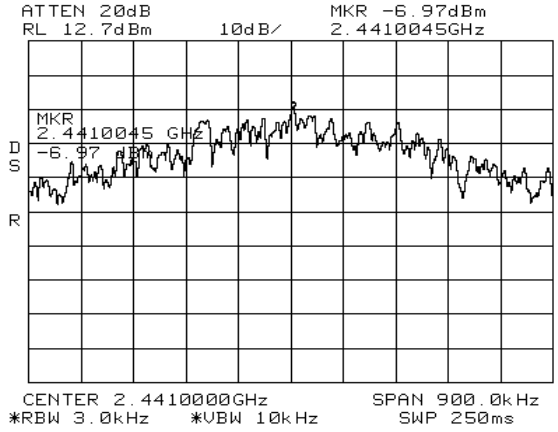
- See next pages of actual measured spectrum plots.

Minimum Standard:	< 8 dBm

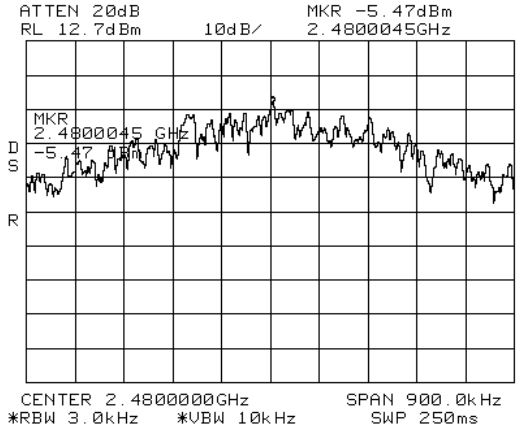
Channel 1 (2 402 MHz)



Channel 40 (2 441 MHz)



Channel 79 (2 480 MHz)



7.2.6 Band – compliance of RF Conducted emissions

Procedure:

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 RF conducted

The spectrum analyzer is set to:

Span = Wide enough to capture the peak level of the emission operating on the channel closet to the Band-edge, as well as any modulation products which fall outside of the authorized band of operation

RBW : ≥ 1 % of the span VBW : ≥ RBW

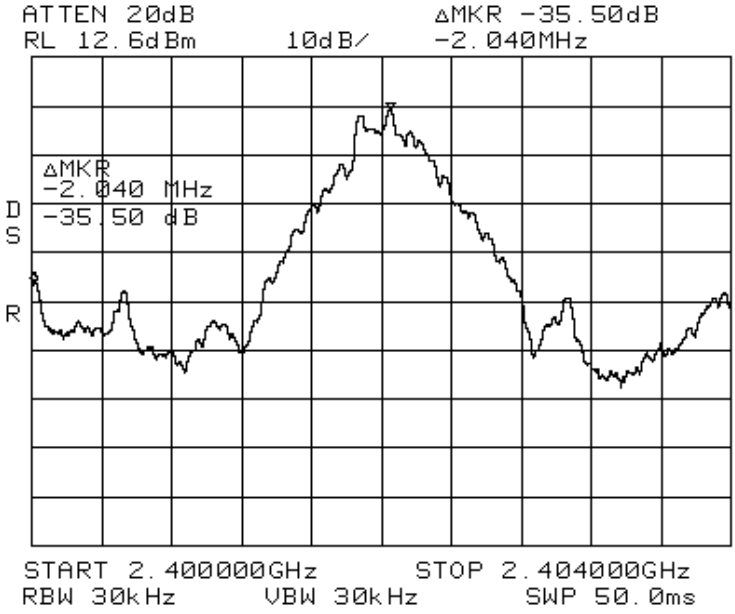
Detector function : peak Trace : max hold

Sweep : auto

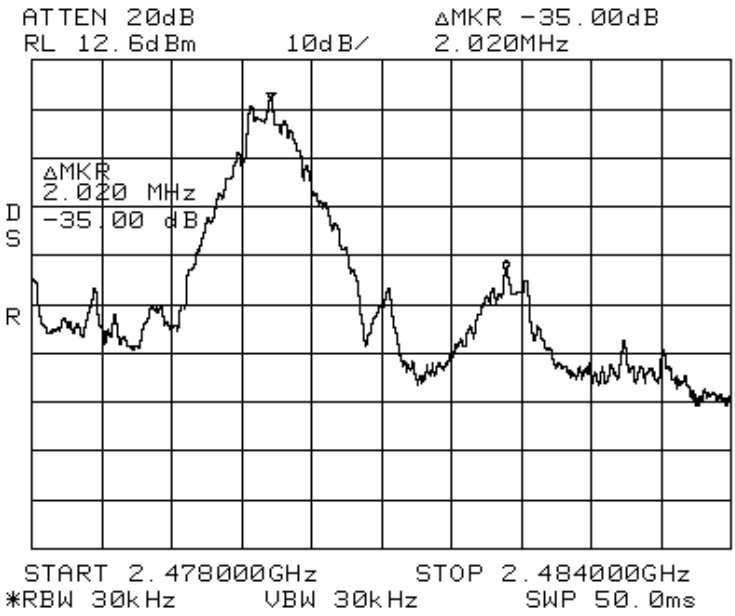
Measurement Data

Setting Channel	Frequency Range	Test Results		
		Measured value[dBc]	Limit [dBc]	Result
Lowest channel (2 402 MHz)	2,400 000 MHz ~ 2,403 200 MHz	**-35.50**	≤ - 20	Pass
Highest channel (2 480 MHz)	2, 478 500 MHz ~ 2, 483 500 MHz	**-35.00**		Pass

Channel 1 (2 402 MHz)



Channel 79 (2 480 MHz)



7.2.7 Band-edge Compliance of RF Radiated emissions

Procedure:

The band-edge emissions outside these bands(2 400 ~ 2 483.5) ㎒ in which operating the hopping modulated intentional radiator is required comply with the provisions in above Required standard with respect to emission falling within restricted frequency bands. as defined in

Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a)

Above limitation value is refer to Table [1] & [2] of Clause 5.9.1

Frequency band (2 310 ~ 2 400) MHz

Freq. (㎒)	Reading (dB㎶/m)	Antenna		Corr (dB)	Meas Result (dB㎶/m)	Limit dB㎶/m)	Mgn. (dB)	Result
		Height (m)	Pol. (H/V)					
2358.30	1.95	1.05	V	28.2	30.15	54	23.85	Pass
2358.30	14.32	1.05	V	28.2	42.52	74	31.48	Pass

Frequency band (2 483.5 ~ 2500) MHz

Freq. (㎒)	Reading (dB㎶/m)	Antenna		Corr (dB)	Meas Result (dB㎶/m)	Limit dB㎶/m)	Mgn. (dB)	Result
		Height (m)	Pol. (H/V)					
2489.50	4.01	1.16	V	29.3	33.31	54	20.69	Pass
2489.50	16.65	1.16	V	29.3	45.95	74	28.05	Pass

Freq.(㎒) : Measurement frequency,

Reading(dB㎶/m) : Indicated value for test receiver,
Table (Deg) : Directional degree of Turn table,

Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor
Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB)

Meas Result (dB㎶/m) :Reading(dB㎶/m)+ Antenna factor.(dB/m)+ CL(dB) - Pre AMP(dB)

Limit(dB㎶/m): Limit value specified with IC Rule,

Mgn(dB) : IC Limit (dB㎶/m) – Meas Result(dB㎶/m),

7.2.9 Spurious RF Conducted emissions

Standard Applicable [FCC §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.

The spectrum analyzer is set to:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the Lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW : ≥ 1 % of the span VBW : ≥ RBW

Detector function : peak Trace : max hold

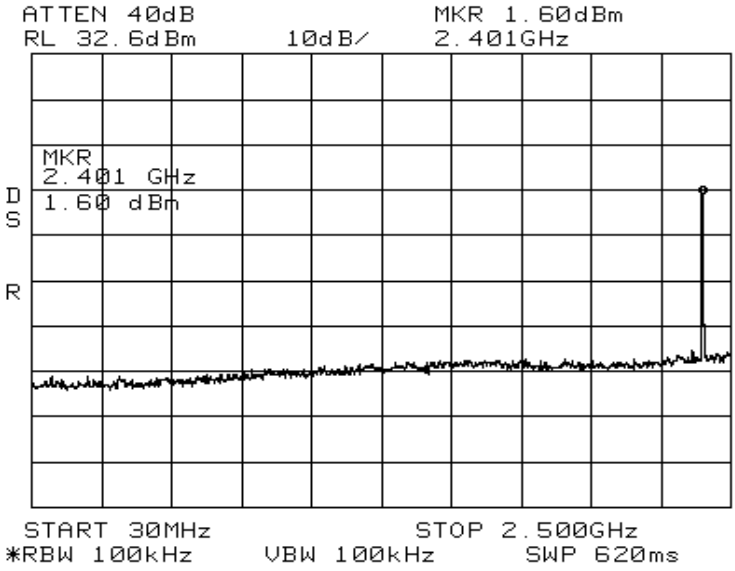
Sweep : auto

Hopping mode	hannel Range	Frequency band [㎒]	Test Results		
			Measured value [㏈c]	Limit [㏈c]	Result
Hopping off	Lowest channel 1 (2 402 ㎒)	30 ㎒ – 2.5 ㎓	37.18	≤ - 20	Compliance
		2 ㎓ – 26.5 ㎓	25.87		Compliance
	Middle channel 40 (2 441 ㎒)	30 ㎒ – 2.5	37.66		Compliance
		2 ㎓ – 26.5 ㎓	30.45		Compliance
	Highest channel 79 (2 480 ㎒)	30 ㎒ – 3.0 ㎓	37.15		Compliance
		2 ㎓ – 26.5 ㎓	36.87		Compliance
Hopping on	Hopping ch (1~ 79)	30 ㎒ – 3.0 ㎓	36.67		Compliance
		2 ㎓ – 26.5 ㎓	22.66		Complianc

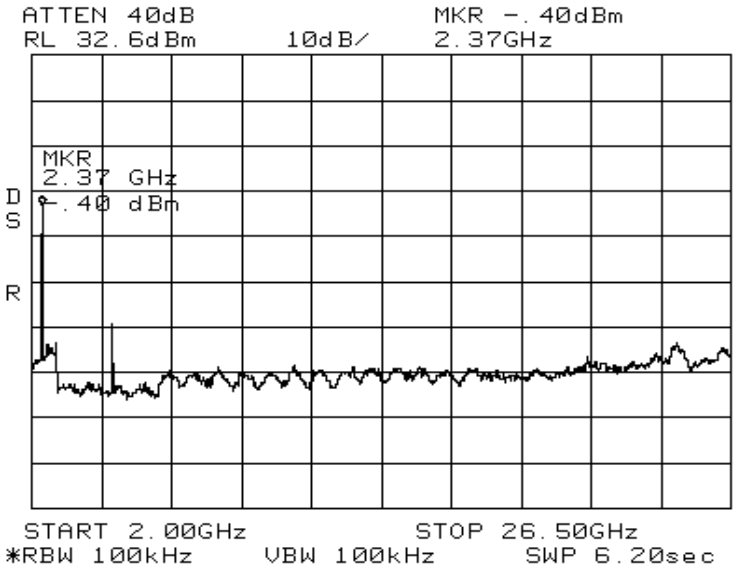
*Note: Hopping mode and Harmonic level is 20㏈ below within the band that contains the highest level of the desired power

Setting Channel(2 402 MHz)

Frequency Range (30 MHz ~ 2.5 GHz)

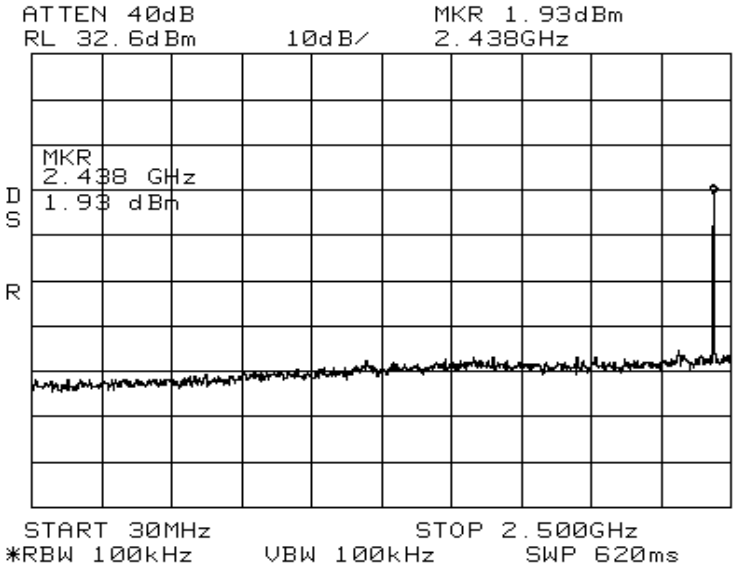


Frequency Range (2 GHz ~ 26.5 GHz)

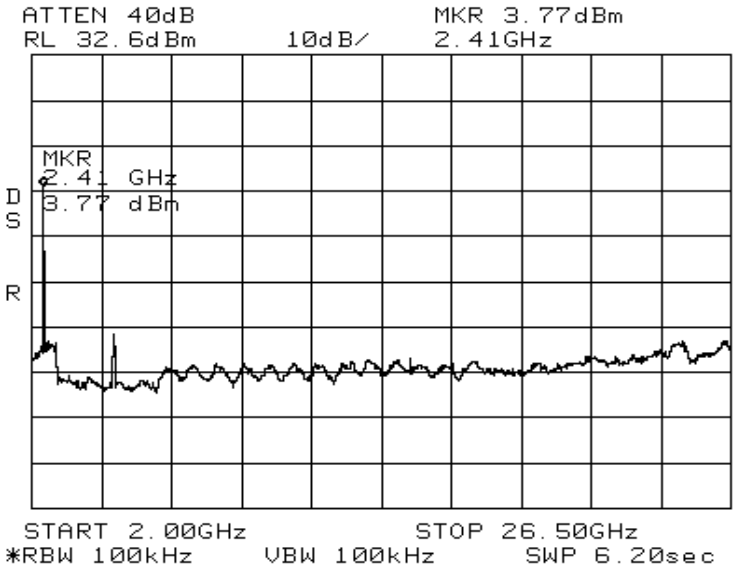


Setting Channel(2 441 MHz)

Frequency Range (30 MHz ~ 3.0 GHz)

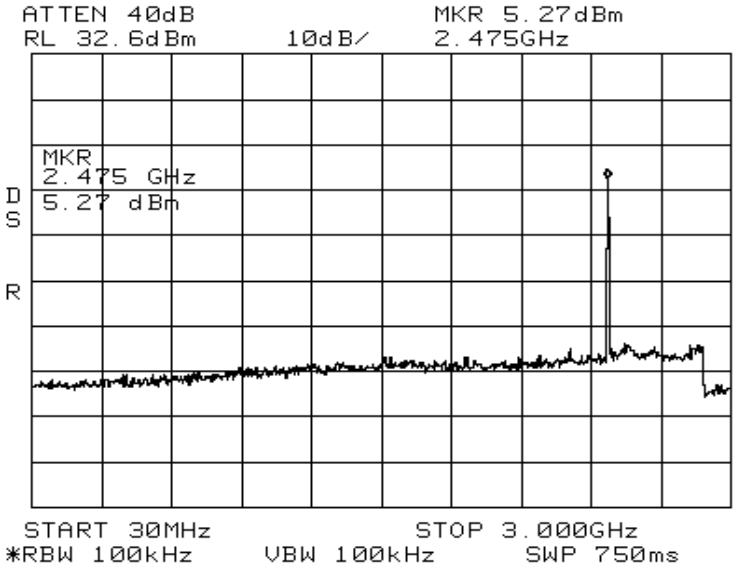


Frequency Range (2 GHz ~ 26.5 GHz)

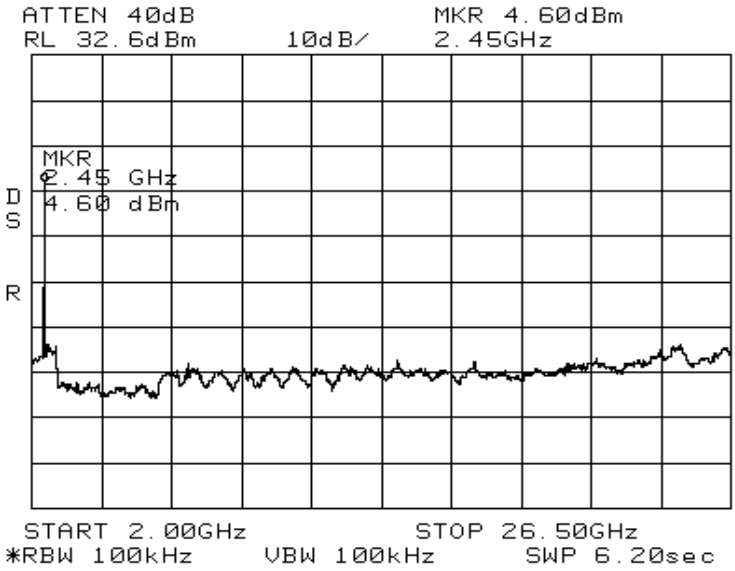


Setting Channel(2 480 MHz)

Frequency Range (30 MHz ~ 3.0 GHz)

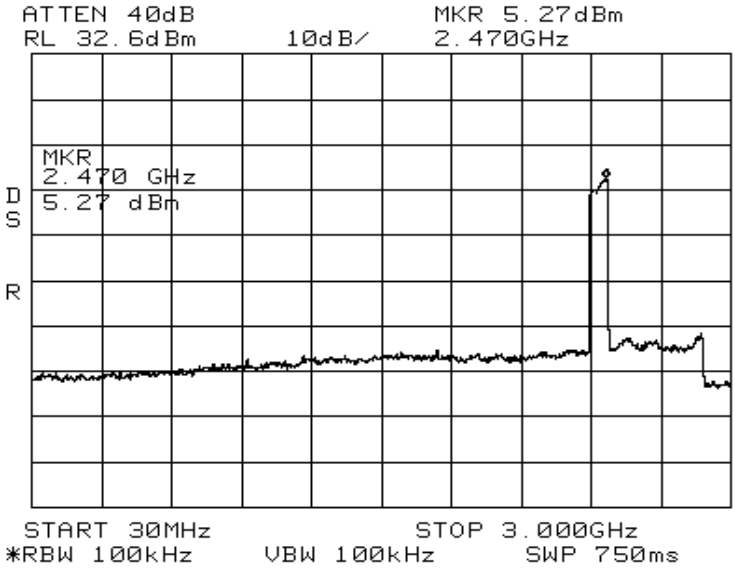


Frequency Range (2 GHz ~ 26.5 GHz)

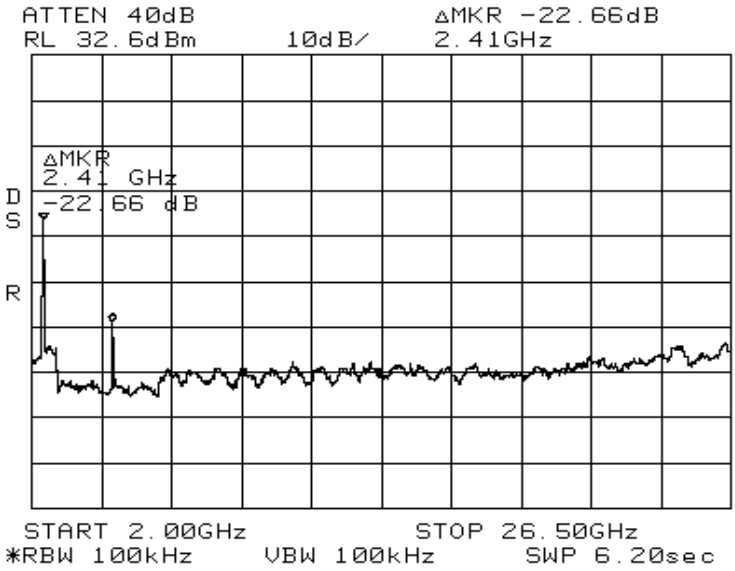


Setting Channel(Hopping on)

Frequency Range (30 MHz ~ 2.5 GHz)



Frequency Range (2 GHz ~ 26.5 GHz)



7.2.10 Antenna requirement

Standard applicable [FCC §15.203, §15.247(4)(1)]

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that user a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The manufacturer may design the unit So that broken antenna can be replaced by the user, but the Use of a standard antenna jack or electrical connector is prohibited.

And according to §15.247(4)(1), the conducted output power limit specified in paragraph (b) of this section. is based on the use of antennas with directional gains that do not exceed 6dBi.

According to above requirement standard's This product's antenna type is an Chip type and it's gain is 0.8dBi, So radiated emission field strength from EUT is below requirement standard limit

Antenna gain

Frequency and	Gain [dBi]	Limit [dBi]	Results
(2 400 ~ 2 485) ㎒	0.8	≤ 6	Compliance