Electromagnetic Emission

FCC MEASUREMENT REPORT

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT	:	WIRELESS SUB MIC
MODEL/Serial No.	:	KSM-100/T / Proto type
MULTIPLE MODEL	:	-
FCC ID	:	ZRU-KSM100T
IC	:	9774A-KSM100T
APPLICANT	:	KUMYOUNG. Co., Ltd. SEOUL_KY Bldg, 40-17 Hangangro, 3-ga, Yongsan-gu, Seoul, Korea Attn.: Young Hwan, Kim / General Manager
MANUFACTURER	:	KUMYOUNG. Co., Ltd. SEOUL_KY Bldg, 40-17 Hangangro, 3-ga, Yongsan-gu, Seoul, Korea
FCC CLASSIFICATION	:	DXX (Part 15 Low Power Communication Device Transmitter)
TYPE OF MODULATION	:	FSK
FREQUENCY CHANNEL	:	2 404 MHz, 2 438 MHz, 2 476 MHz (3 Ch)
ANTENNA TYPE	:	Wire Antenna (Integral)
ANTENNA GAIN	:	3.85 dBi max
RULE PART(S)	:	FCC Part 15 Subpart C RSS-210 Issue 8
FCC PROCEDURE	:	ANSI C63.4-2003
TEST REPORT No.	:	ETLE120327.0398
DATES OF TEST	:	March 28, 2012 to March 29, 2012
REPORT ISSUE DATE	:	April 26, 2012
TEST LABORATORY	:	ETL Inc. (FCC Designation Number: KR0022, IC OATS Number: 6473B-1)

The WIRELESS SUB MIC, Model KSM-100/T has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 at the ETL Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart C section 15.249 and RSS-210 Issue 8 - Category I Equipment, Annex 8.

I attest to the accuracy of data. All measurement herein was performed by me or was made under my supervision and is correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Prepared by:

Kug Kyoung, Yoon (Test Engineer)

April 26, 2012

Reviewed by:

Hyung Min, Choi (Chief Engineer)

April 26, 2012

ETL Inc.

#371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea

Tel: 82-2-858-0786 Fax: 82-2-858-0788

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FCC MEASUREMENT REPORT

Scope – *Measurement and determination of electromagnetic emission (EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

General Information

Applicant Name	**: KUMYOUNG. Co., Ltd.**
Address	**: SEOUL_KY Bldg, 40-17 Hangangro, 3-ga,**
	Yongsan-gu, Seoul, Korea 140-880
Attention	**: Young Hwan, Kim / General Manager**

- **EUT Type** : WIRELESS SUB MIC
- **Model Number** : KSM-100/T
- **S/N** : Proto type
- **Freq. Range** : 2 404 MHz - 2 476 MHz
- **Modulation Technique** : FSK
- **Frequency Channel** : 2 404 MHz, 2 438 MHz, 2 476 MHz (3 Ch)
- **Antenna Type** : Wire Antenna (Integral)
- **Antenna Gain** : 3.85 dBi max
- **FCC Rule Part(s)** : FCC Part 15 Subpart C
  RSS-210 Issue 8
- **Test Procedure** : ANSI C63.4-2003
- **FCC Classification** : DXX (Part 15 Low Power Communication Device Transmitter)
- **IC Equipment Category** : RSS-210 Issue 8 - Category I Equipment, Annex 8
- **Place of Tests** : ETL Inc. Testing Lab.
  Radiated Emission test;
  #499-1, Sagot-ri, Seosin-myeon, Hwaseong-si, Gyeonggi-do, 445-882, Korea
  Conducted Emission test;
  ETL Inc. Testing Lab.
  371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea

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1. INTRODUCTION

The measurement test for radiated and conducted emission test was conducted at the ETL Inc. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 m and 10 m site configurations. Detailed description of test facility was found to be in compliance with FCC Rules according to the ANSI C63.4-2003 and registered to the Federal Communications Commission (FCC Designation Number : KR0022).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions from the KUMYOUNG. Co., Ltd. Model: KSM-100/T

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2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the WIRELESS SUB MIC (model: KSM-100/T).

2.2 General Specification

Item	Specification
Frequency Range	2.404 GHz ~ 2.476 GHz
Data Rate	5 Mbps
Occupied bandwidth	3.8 MHz
Receiver sensitivity	-83 dBm
Selectivity	38 dB
Audio sample rate	(48.0 / 44.1 / 40.275 / 32.0) kHz
Audio latency	768 ~ 2 048 samples
Delay	16 ms (min)
Current Consumption	50 mA Max.
Crystal	48 MHz
Battery	1.5 V x 2 (AA)
Battery Life	60 hours Max. (at AA 1.5 V x 2/2 500 mA)
Operating Temperature	(22.5 ± 62.5) ℃

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3. DESCRIPTION OF TESTS

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.249.
IC Equipment Category: RSS-210 Issue 8 - Category I Equipment, Annex 8

3.1 Radiated Emission Measurement

Radiated emission measurements were made in accordance with § 13 in ANSI C63.4-2003 "Measurement of Intentional radiators" The measurements were performed over the frequency range of 30 MHz to 40 GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak, Quasi-peak, Average" within a bandwidth of 100 Hz, 9 kHz, 120 kHz and above 1 GHz is 1 MHz.

Preliminary measurements were made at 3 m using broadband antennas, and spectrum analyzer to determine the frequency producing the maximum emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 9 kHz to 30 MHz using Loop antenna and 30 MHz to 1 000 MHz using Log-Bicon antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site at 3 m. The test equipment was laced on a wooden turn-table. 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 by manual. The detector function was set to CISPR Quasi-peak mode and the bandwidth of the receiver was set to 100 Hz, 9 kHz, 120 kHz or 1 MHz depending on the frequency of type of 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 0.8 m high nonmetallic 1.0 m x 1.5 m table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 m to 4 m and stopped at the azimuth or height producing the maximum emission.

Varying the mode of operating frequencies of the EUT maximized each emission. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst-case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per section 15.31(f).

Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

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3.2 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section § 13 in ANSI C63.4-2003 "measurement of intentional radiators" The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to a Spectrum Analyzer or a Test Receiver. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 9 kHz or for "quasi-peak" within a bandwidth of 9 kHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1 m x 1.5 m x 0.8 m wooden table which is placed 0.4 m away from the vertical wall and 1.5 m away from the side wall of the chamber room. Two LISN are bonded to the shielded room. The EUT is powered from the LISN and the support equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the LISN. Non-inductive bundling to a 1 m length shortened all interconnecting cables more than 1 m. 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 EMI Test Receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.15 MHz to 30 MHz. The bandwidth of the spectrum analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

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3.3 FCC Part 15.205 Restricted Bands of Operations

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 - 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 - 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 - 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 - 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 - 4 400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490 MHz - 0.510 MHz.
[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

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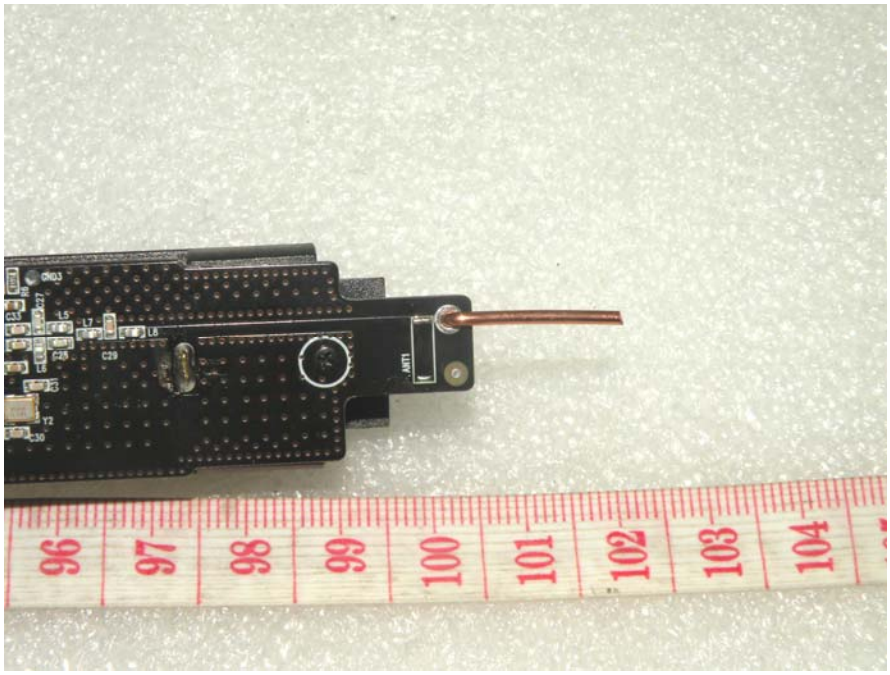
3.4 Antenna requirement

(1) According to §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. The use of a permanently attached antenna or of an antenna that uses 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 a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.



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4. TEST CONDITION

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following conditions and configurations were used.

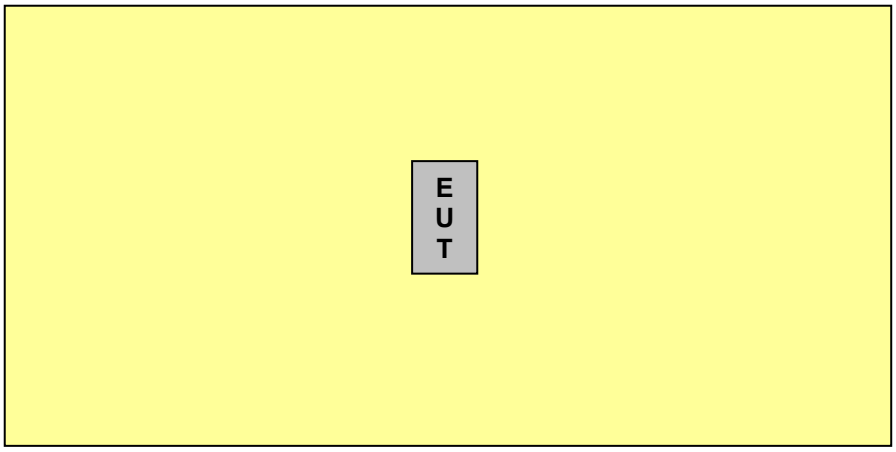
4.2 Description of Test modes

WIRELESS SUB MIC that has the control software.

- RF transmitting continuously during the tested at 2 404 MHz. (Worst case)
- RF transmitting continuously during the tested at 2 438 MHz.
- RF transmitting continuously during the tested at 2 476 MHz.

* Measurements were performed with the EUT oriented in 3 orthogonal(X, Y, Z) axis and rotated 360 degrees worst-case orientation for maximum emissions.

4.3 The setup drawing(s)



: Signal line

: Power line

: Adapter

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5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

47 CFR Part 15, Subpart C Section 15.249	RSS Standards	Measurement Required	Limit	Result
-	RSS-Gen 4.6.1	Channel Bandwidth	-	**Pass**
15.249(d)	RSS-210 A.2.9	Fundamental Radiated Emission	Peak: 114 [dB(μV/m)] AV: 94 [dB(μV/m)]	**Pass**
15.249(d)	RSS-210 A.2.9	Harmonic Radiated Emission	Peak: 74 [dB(μV/m)] AV: 54 [dB(μV/m)]	**Pass**
15.207(a)	RSS-Gen 7.2.2	Conducted Emissions	Various	**N/A ***
15.209	RSS-Gen 7.2.3.2	Spurious Emissions	Various	**Pass**
-	RSS-Gen 6.1	Receiver Spurious Emissions	Various	**N/A ****
15.205(a)	RSS-210 A8.5	Bandwidth of Frequency Band Edges	Peak: 74 [dB(μV/m)] AV: 54 [dB(μV/m)]	**Pass**

*** This test was not applied. Because, EUT power supplies from battery type.**
(Battery type: DC 1.5 V 'AA' type battery 2 EA)
** **This test was not applied. Because, EUT is only transmitter**

The data collected shows that the **KUMYOUNG. Co., Ltd. / WIRELESS SUB MIC / KSM-100/T** complied with technical requirements of above rules part 15.207, 209 and 15.249 Limits.

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

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5.2 Channel Bandwidth

EUT	WIRELESS SUB MIC / KSM-100/T
Limit apply to	RSS-Gen 4.6.1
Test Date	March 29, 2012
Operating Condition	RF transmitting continuously during the tested.
Result	Passed

Test Data

Frequency [MHz]	99 % Bandwidth [MHz]
2 404	3.840
2 438	3.760
2 476	3.740

NOTES:

1. Measure frequency separation of relevant channel using spectrum analyzer.
2. Please see the measured plot in next page.

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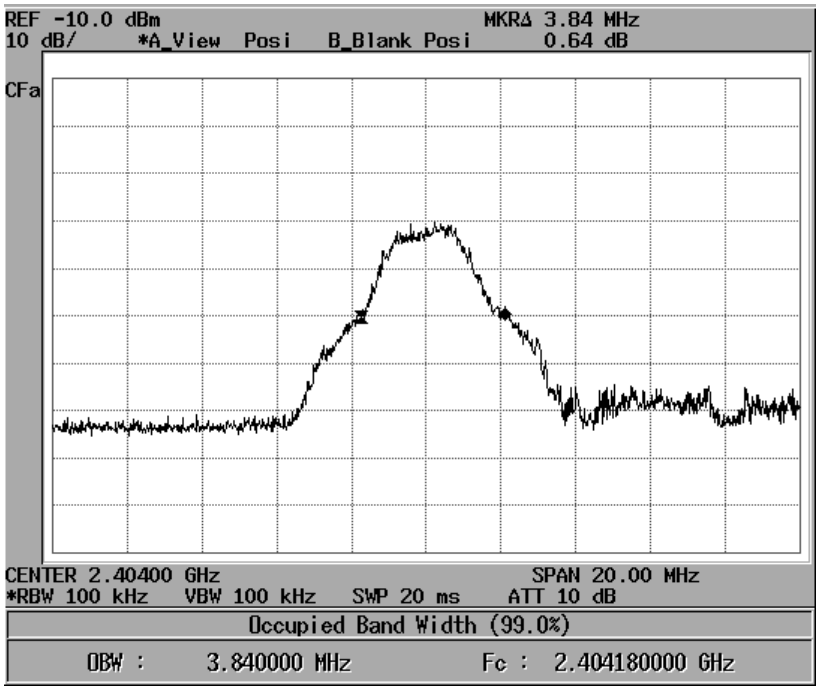
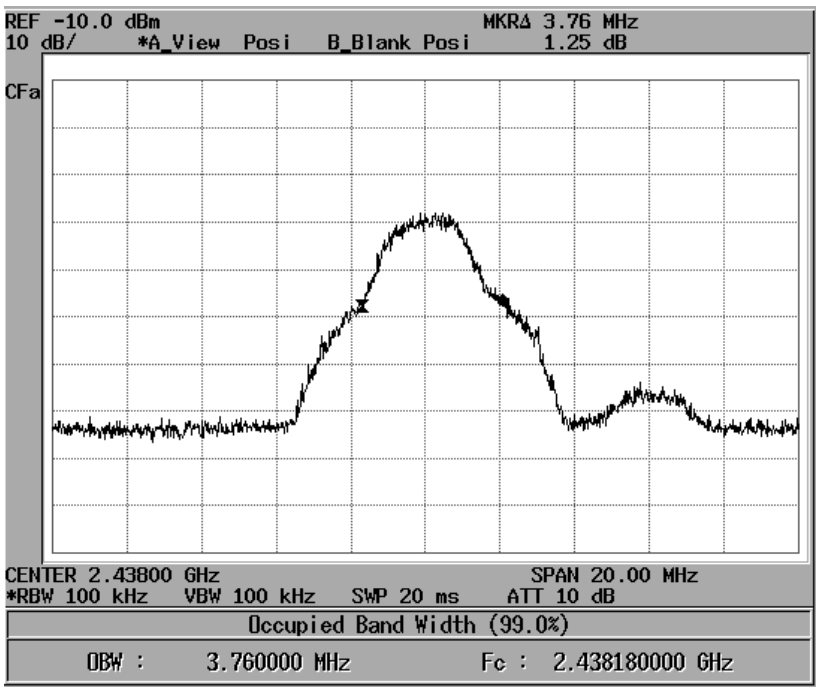
Plots of Channel Bandwidth (99 %)

[2 404 MHz]



[2 438 MHz]



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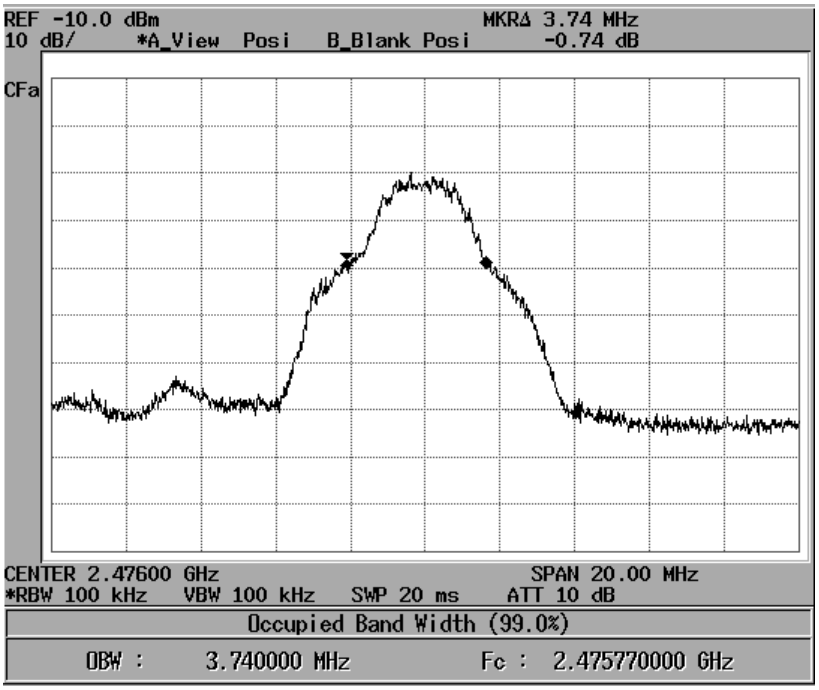
[2 476 MHz]



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5.3 Fundamental Radiated Emission

EUT	WIRELESS SUB MIC / KSM-100/T
Limit apply to	FCC Part 15.249(d), RSS-210 A.2.9
Test Date	March 29, 2012
Operating Condition	RF transmitting continuously during the tested.
Result	Passed

Fundamental Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

- Detector mode: Peak mode

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Ant. Factor [dBm]	Cable Loss [dB(μV)]	Preamp [dBm]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
2 404.00	90.91	H	29.03	12.26	-34.80	97.40	114.00	16.60
2 404.00	88.61	V	29.03	12.26	-34.80	95.10		18.90
2 438.00	89.69	H	29.10	12.31	-34.80	96.30	114.00	17.70
2 438.00	88.19	V	29.10	12.31	-34.80	94.80		19.20
2 476.00	90.54	H	29.38	12.38	-34.80	97.50	114.00	16.50
2 476.00	88.24	V	29.38	12.38	-34.80	95.20		18.80

- Detector mode: Average mode

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Ant. Factor [dBm]	Cable Loss [dB(μV)]	Preamp [dBm]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
2 404.00	84.31	H	29.03	12.26	-34.80	90.80	94.00	3.20
2 404.00	82.61	V	29.03	12.26	-34.80	89.10		4.90
2 438.00	82.49	H	29.10	12.31	-34.80	89.10	94.00	4.90
2 438.00	81.79	V	29.10	12.31	-34.80	88.40		5.60
2 476.00	83.14	H	29.38	12.38	-34.80	90.10	94.00	3.90
2 476.00	82.24	V	29.38	12.38	-34.80	89.20		4.80

Result: No signal detect above second harmonic.

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NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss + Preamp
3. Margin value = Limit - Result
4. Measuring frequencies from 1 GHz to the 5th harmonic of highest fundamental frequency.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded.
6. Spectrum setting:
   a. Peak Setting 1 GHz to 5th harmonics of fundamental, RBW = 1 MHz, VBW = 1 MHz, Sweep = Auto
   b. AV Setting 1 GHz to 5th harmonics of fundamental, RBW = 1 MHz, VBW = 10 Hz, Sweep = Auto

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5.4 Harmonic Radiated Emission

EUT	WIRELESS SUB MIC / KSM-100/T
Limit apply to	FCC Part 15.249(d), RSS-210 A.2.9
Test Date	March 29, 2012
Operating Condition	RF transmitting continuously during the tested.
Result	Passed

Harmonic Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

- Detector mode: Peak mode

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Ant. Factor [dBm]	Cable Loss [dB(μV)]	Preamp [dBm]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
4 808.00	47.53	H	31.55	14.32	-34.80	58.60	74.00	15.40
4 876.00	50.48	H	31.40	14.22	-34.80	61.30		12.70
4 952.00	48.53	H	31.05	14.02	-34.80	58.80		15.20

- Detector mode: Average mode

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Ant. Factor [dBm]	Cable Loss [dB(μV)]	Preamp [dBm]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
4 808.00	38.93	H	31.55	14.32	-34.80	50.00	54.00	4.00
4 876.00	39.48	H	31.40	14.22	-34.80	50.30		3.70
4 952.00	39.73	H	31.05	14.02	-34.80	50.00		4.00

Result: No signal detect above second harmonic.

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss + Preamp
3. Margin value = Limit - Result
4. Measuring frequencies from 1 GHz to the 5th harmonic of highest fundamental frequency.
5. Spectrum setting:
   a. Peak Setting 1 GHz to 5th harmonics of fundamental, RBW = 1 MHz, VBW = 1 MHz, Sweep = Auto
   b. AV Setting 1 GHz to 5th harmonics of fundamental, RBW = 1 MHz, VBW = 10 Hz, Sweep = Auto

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5.5 Spurious Emissions

5.5.1 Radiated Emissions

EUT	WIRELESS SUB MIC / KSM-100/T
Limit apply to	FCC Part 15.209, RSS-Gen 7.2.3.2
Test Date	March 28, 2012
Operating Condition	RF transmitting continuously during the tested at 2 404 MHz.
Result	Passed

Limit

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:

Frequencies [MHz]	Field Strength [μV/m]	Measurement Distance [m]
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	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 MHz - 72 MHz, 76 MHz - 88 MHz, 174 MHz - 216 MHz or 470 MHz - 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

Test Results

- Refer to see the measured plot in next page.

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Radiated Emissions Test data

- 9 kHz to 30 MHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
Detector mode: CISPR Quasi-Peak mode (100 Hz, 9 kHz)

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
	Emission attenuated more than 20 dB below the limit are not reported.						

Result: All emissions below noise floor of 20 dB(μV/m).

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss
3. Margin = Limit - Result
4. The measurement was performed for the frequency range 9 kHz to 30 MHz according to FCC Part 15.209.

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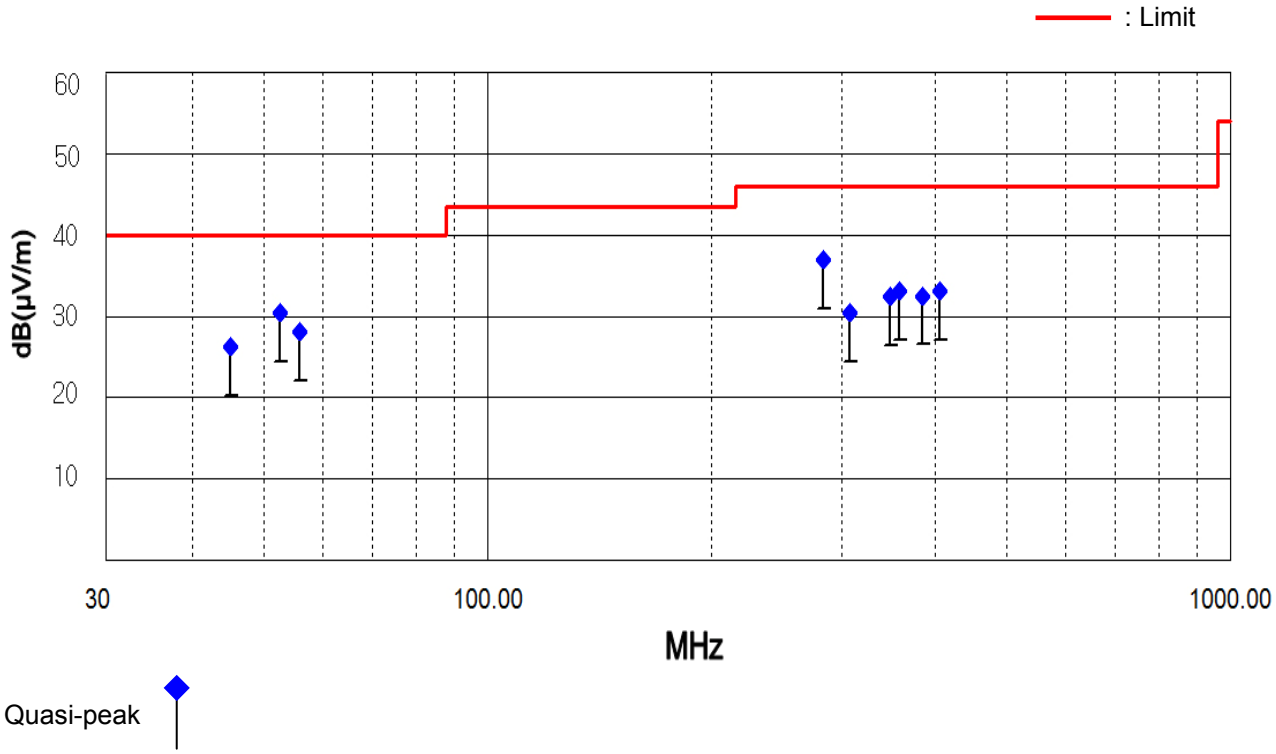
- Below 1 GHz (30 MHz to 1 GHz)

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 120 kHz)

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
45.01	12.74	V	12.20	1.36	26.30	40.00	13.70
52.49	16.73	V	12.25	1.42	30.40	40.00	9.60
55.91	14.57	V	12.07	1.46	28.10	40.00	11.90
282.93	21.53	H	12.76	2.61	36.90	46.00	9.10
307.07	14.19	H	13.49	2.72	30.40	46.00	15.60
347.72	15.12	H	14.44	2.84	32.40	46.00	13.60
358.33	15.54	H	14.69	2.87	33.10	46.00	12.90
384.84	14.24	H	15.31	2.95	32.50	46.00	13.50
406.05	14.29	H	15.79	3.02	33.10	46.00	12.90

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss
3. Margin value = Limit - Result
4. The measurement was performed for the frequency range above 30 MHz according to FCC Part 15.209.



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- Above 1 GHz (1 GHz to 12.75 GHz)

Detector mode: Peak mode

Frequency [MHz]	Reading [dB(μV)]	Polarization (*H/**V)	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
1 294.92	44.50	H	-5.00	39.50	74.00	34.50
1 860.52	45.60	H	-4.70	40.90	74.00	33.10
2 151.40	46.10	H	-2.20	43.90	74.00	30.10

Result: No signal detect above second harmonic.

NOTES:

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Factor = Antenna factor + Cable loss + Preamp
3. Result = Reading + Factor
4. Margin = Limit - Result
5. Measuring frequencies from 1 GHz to the 5th harmonic of highest fundamental frequency.
6. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded(ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
7. Spectrum setting:
   a. Peak Setting 1 GHz to 5th harmonics of fundamental, RBW = 1 MHz, VBW = 1 MHz, Sweep = Auto
   b. AV Setting 1 GHz to 5th harmonics of fundamental, RBW = 1 MHz, VBW = 10 Hz, Sweep = Auto

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5.6 Restricted Bands of Operation

EUT	WIRELESS SUB MIC / KSM-100/T
Limit apply to	FCC Part 15.205(a)
Test Date	March 29, 2012
Operating Condition	RF transmitting continuously during the tested.
Result	Passed

Limit

In any 100 kHz 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 dB below that in the 100 kHz 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 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Test Results

- Refer to see the measured plot in next page.

NOTES:

1. The test was performed to make a direct field strength measurement at the band edge frequencies.

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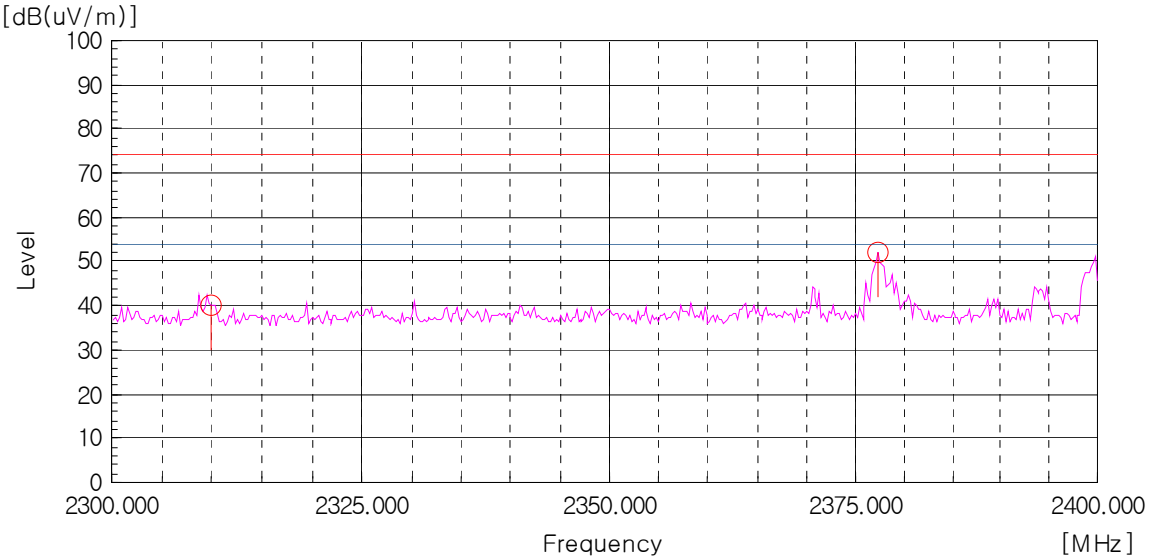
Plots of Bandwidth of Frequency Band Edges

Radiated

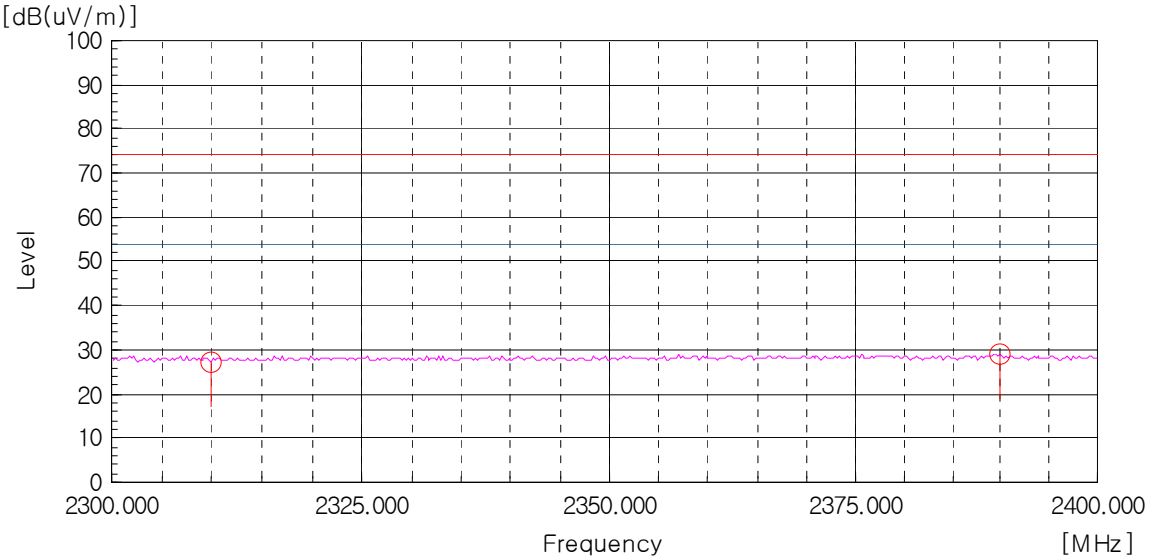
Peak Detector: RBW: 1 MHz, VBW: 1 MHz (2 310 MHz - 2 410 MHz), Worst case (Low, Vertical)

Peak Limit Line
AV Limit Line



AV Detector: RBW: 1 MHz, VBW: 10 Hz (2 310 MHz - 2 410 MHz), Worst case (Low, Vertical)

Peak Limit Line
AV Limit Line



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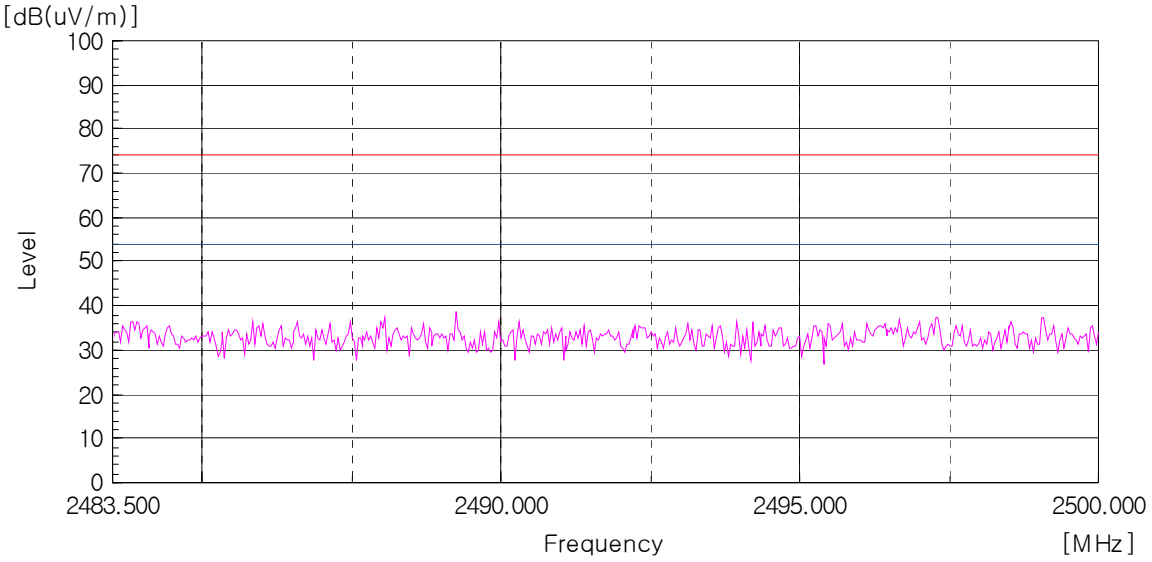
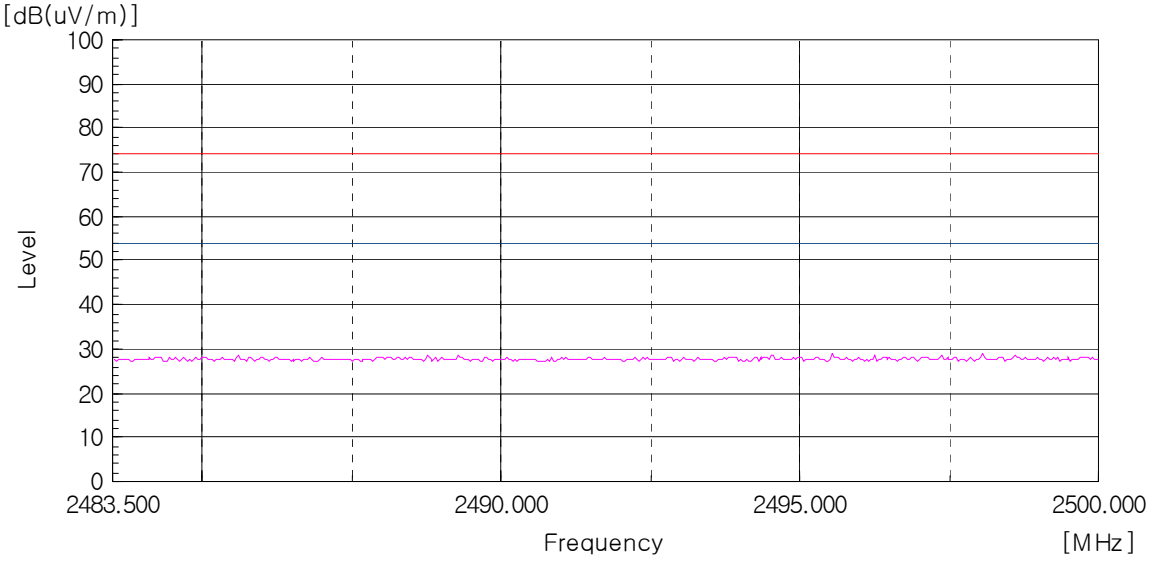
Peak Detector: RBW: 1MHz, VBW: 1 MHz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)

Peak Limit Line
AV Limit Line



AV Detector: RBW: 1MHz, VBW: 10 Hz (2 483.5 MHz - 2 500.0 MHz), Worst case (High, Vertical)

Peak Limit Line
AV Limit Line



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6. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

FS = RA + AF + CF

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor

$dB(\mu V) = 20 \log_{10} (\mu V)$: Equation
dB(μV) = dBm + 107

Example : @ 282.93 MHz

Class B Limit = 46.00 dB(μV/m)

Reading = 21.53 dB(μV)

Antenna Factor + Cable Loss = 12.76 + 2.61 = 15.37 dB(μV/m)

Total = 36.90 dB(μV/m)

Margin = 46.00 – 36.90 = 9.10 dB

= 9.10 dB below Limit

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7. List of test equipments used for measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Date	Cal. Due Date
☒	EMI Test Receiver	ESVS 10	R&S	835165/001	12.03.20	13.03.20
☒	Loop Antenna	6502	EMCO	00033743	10.10.13	12.10.13
☒	LogBicon Antenna	VULB9160	Schwarzbeck	3128	12.02.22	14.02.22
☒	Horn Antenna	BBHA 9120D	Schwarzbeck	227	11.03.22	13.03.22
☒	PSA Series Spectrum Analyzer	E4440A	Agilent	US40420382	12.03.19	13.03.19
☒	Power Meter	NRVS	R&S	834053/060	11.09.15	12.09.15
☒	Amplifier	AFS42-01001800-28-10P-42	MITEQ Inc.	1565819	12.02.06	13.02.06
☒	Band Reject Filter	WRCGV 2402/2480-2382/2500-52/10SS	Wainwright Instruments GmbH	2	11.09.15	12.09.15
☒	Controller	HD2000	HD GmbH	C/125	N/A	N/A
☒	Antenna Master	MA2400	HD GmbH	N/A	N/A	N/A
☒	Turn-Table	MFT-120S	Max-Full Antenna Corp	-	N/A	N/A
☒	Antenna Master	MFA-440E	Max-Full Antenna Corp	-	N/A	N/A

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