

Certificate of Test

NCT Co., Ltd.

211-71, Geumgok-ro, Hwaseong-si,
Gyeonggi-do, 18511, Korea
(Tel: +82-31-323-6070 / Fax: +82-31-323-6071)

Report No.:
NW2011-F005

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**1. Client**

- Name : Doors Korea Co., Ltd.
- Address : 1F, 27, Mangu-ro 81-gil, Jungnang-gu, Seoul, Republic of Korea
- Date of Receipt : 2020-10-16

2. Use of Report : FCC Approval**3. Test Sample**

- Description / Model Name : Bluetooth Karaoke Mic / miracle,m M100
- FCC ID : 2AXWO-MIRACLEM-M100

4. Date of Test : 2020-10-28 ~ 2020-11-04**5. Test method used : FCC Part 15 Subpart C 15.247****6. Testing Environment :**

- Temperature: (25 ± 5) °C, Humidity: Less than 75 % R.H.

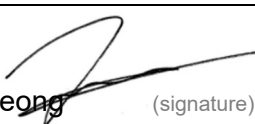
* Unless specified otherwise in the individual methods, the tests were conducted on ambient conditions.

7. Test Results : Refer to the test results

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

This Test Report cannot be reproduced, except in full

This test report is prepared according to the requirements of ISO / IEC 17025.

Affirmation	Tested by Woo-Hyoung, Jeong  (signature)	Technical Manager Kyung-Taek, Lee  (signature)
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November 5, 2020

NCT CO., LTD.



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1. General Information's

1.1 Test Performed

Laboratory : NCT Co., Ltd.
Address : 211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, 18511, Korea
Telephone : +82-31-323-6070
Facsimile : +82-31-323-6071
FCC Designation No. : KR0166
FCC Registration No. : 409631
IC Site Registration No. : 25897

2. Information's about Test Item

2.1 Applicant Information

Company name : Doors Korea Co., Ltd
Address : 1F, 27, Mangu-ro 81-gil, Jungnang-gu, Seoul, Republic of Korea
Telephone / Facsimile : +82-1566-4520 / +82-70-5165-3275

2.2 Equipment Under Test (EUT) description

Test item particulars : Bluetooth Karaoke Mic
Model and/or type reference : miracle,m M100
Additional model name : miracle,m M110 / miracle,m M120
Serial number : Identification
Antenna type and gain : Wire Antenna
Date (s) of performance of tests: : 2020-10-28 ~ 2020-11-04
Date of receipt of test item : 2020-10-19
EUT condition : Pre-production, not damaged
Number of channel : 2
EUT Power Source : DC 3.7 V
Type of Modulation : FM
Firmware version : 1.0
Hardware version : 1.0
Test software name(version) : -

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2.3 Tested Frequency

Test Mode	Test frequency (MHz)		
	Low frequency	Middle frequency	High frequency
FM	88.1	-	107.9

3. Test Report

3.1 Test Summary

Applied	FCC Rule	Test Items	Test Condition	Result
☒	15.203	Antenna Requirement	Radiated	C
☒	15.239(a)	Occupied Bandwidth		C
☒	15.239(b)	Field Strength of Fundamental Frequency		C
☒	15.239(c) 15.209	Radiated Spurious Emission		C
☒	15.207	Conducted Emissions	AC Line Conducted	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

The sample was tested according to the following specification: FCC Part15, Subpart C §15.239.

Compliance was determined by specification limits of the applicable standard according to customer requirements.

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3.2 Test Report Version

Test Report No.	Date	Description
NW2011-F005	2020-11-05	Initial issue

Test Repot No.: NW2011-F005

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3.3 Transmitter Requirements

3.3.1 Antenna Requirement

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.

3.3.1.1 Result

Complies

(The transmitter has a Wire Antenna. It comply with the standard requirement.)

3.3.2 Occupied Bandwidth

3.3.2.1 Test Setup

Refer to the APPENDIX I.

3.3.2.2 Limit

According to §15.239 (a) Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108MHz.

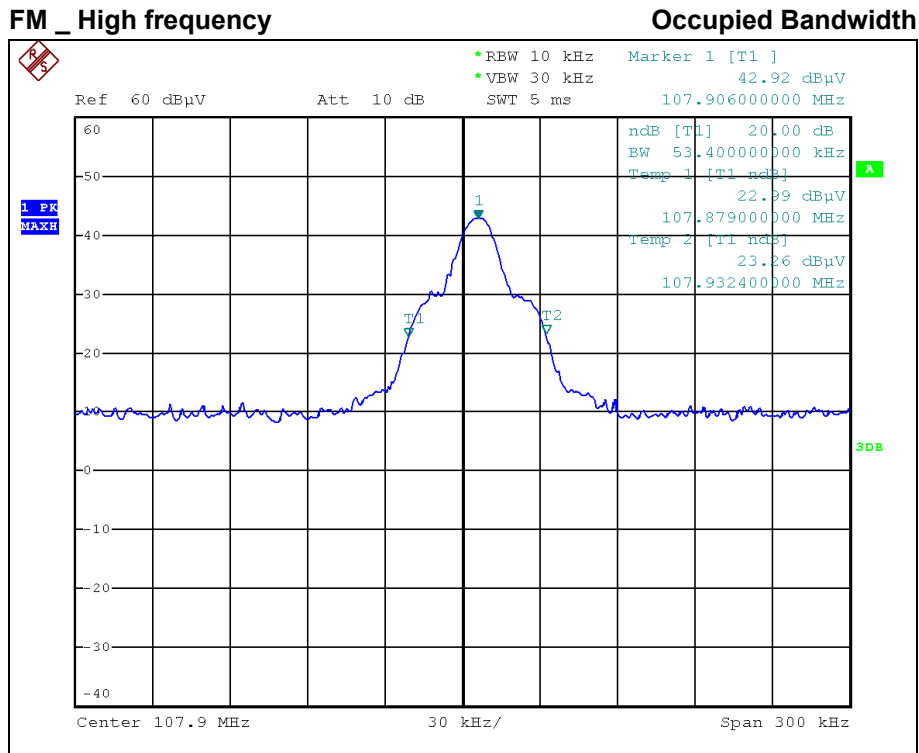
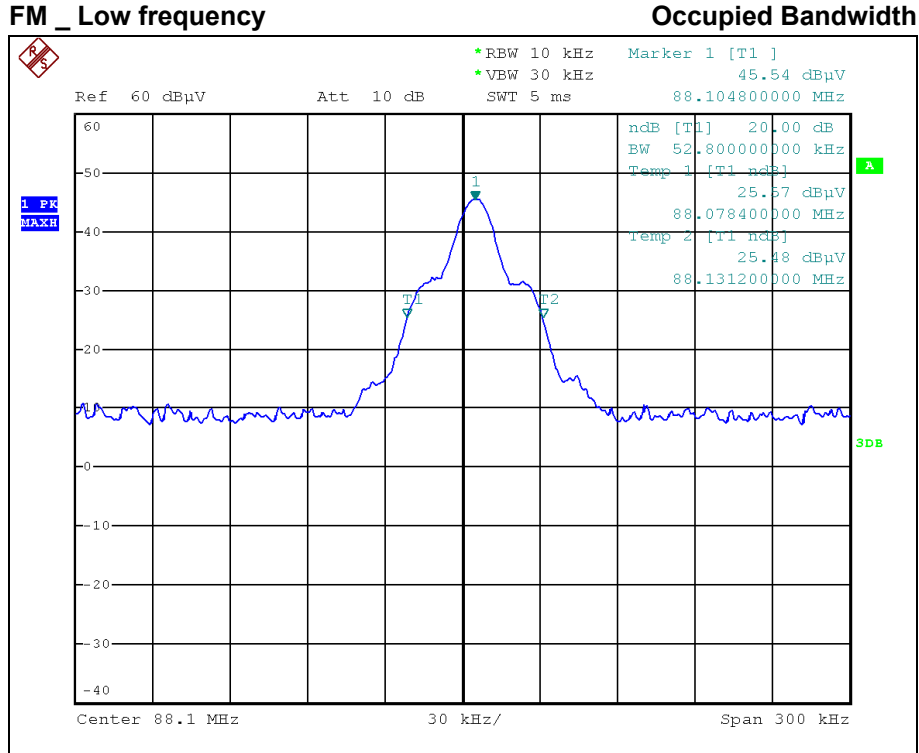
3.3.2.3 Test Procedure

1. The transmitter shall be operated at its maximum carrier power measured under normal test conditions
2. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
3. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.
4. Detector function = peak.
5. Trace = max hold.

3.3.2.4 Test Result

Test Mode	Test Frequency	20 dB Bandwidth (kHz)
FM	Low	52.80
	Middle	-
	High	53.40

3.3.2.5 Test Plot



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3.3.3 Field Strength of Fundamental Frequency and Radiated Emission

3.3.3.1 Test Setup

Refer to the APPENDIX I.

3.3.3.2 Limit

According to §15.239(b), the field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

Frequency (MHz)	Limit (dB μ V/m)	
	Peak	Average
88 ~ 108	68	48

According to § 15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1705	24000/F (kHz)	30
1705 ~ 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 - 72 MHz, 76 - 88 MHz, 174 - 216 MHz or 470 - 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

3.3.3.3 Test Procedure for Radiated Spurious Emission

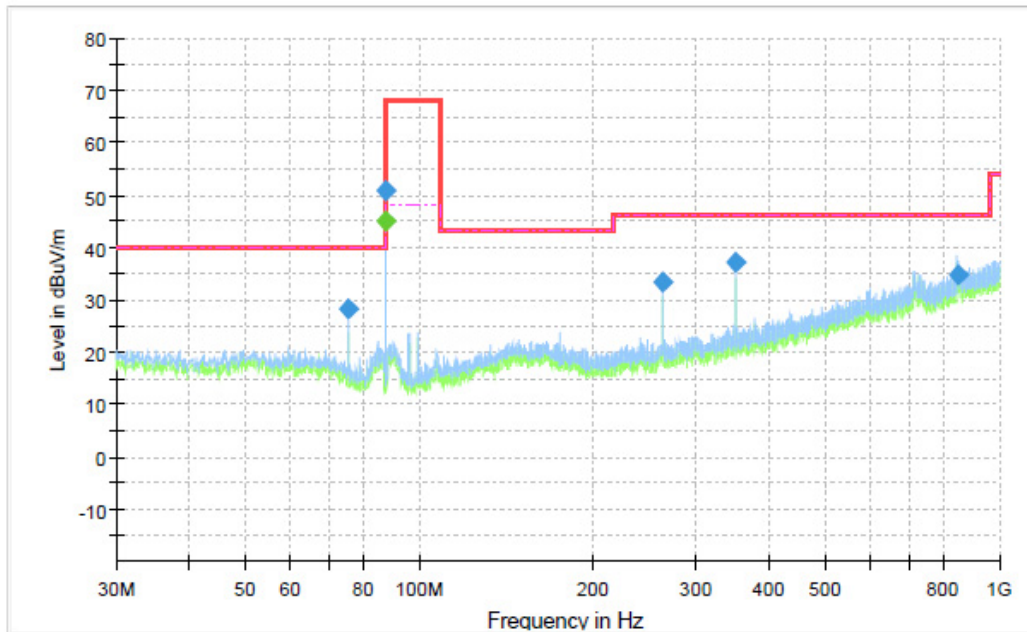
1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, 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 GHz, the EUT was set 1 or 3 meter away from the interference-receiving antenna.
3. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.
4. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
5. 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.
(The EUT was pre-tested with three axes (X, Y, Z) and the final test was performed at the worst case.)
6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 10 dB 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 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Measurement Instrument Setting

1. Frequency Range: Below 150 kHz
RBW = 200 Hz, VBW = 3 x RBW, Detector = Peak or Quasi Peak
2. Frequency Range: Below 30 MHz
RBW = 9 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak
3. Frequency Range: Below 1 GHz
RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak

3.3.3.4 Test Result

- Test Mode: 88.1 MHz (Horizontal)



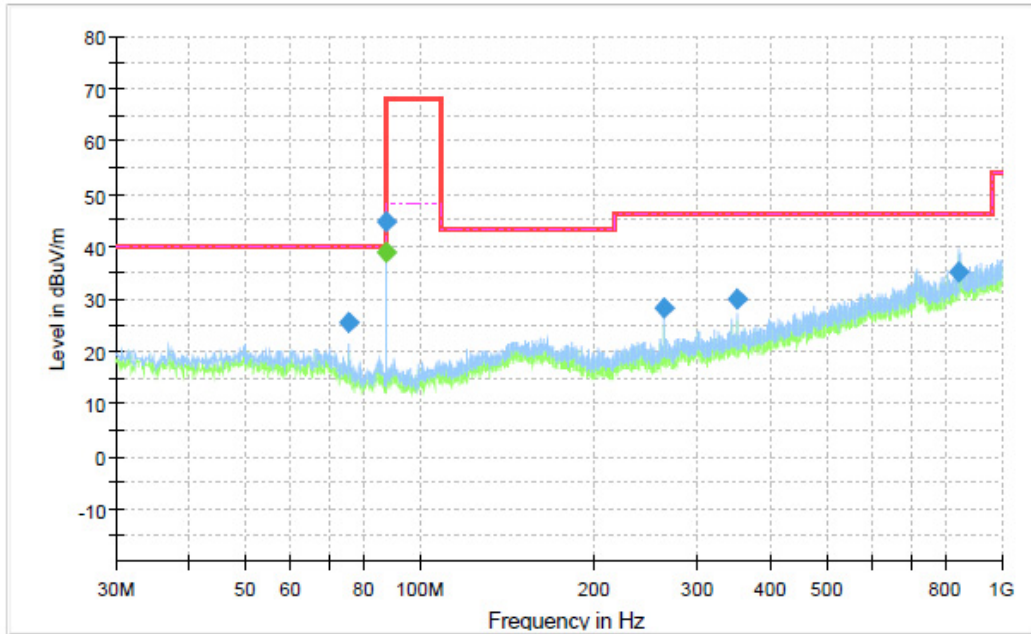
Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Bandwidth h (kHz)	Height (cm)	Pol	Azimuth h (deg)	Corr. (dB/m)
75.516000	28.22	---	40.00	11.78	120.000	400.0	H	282.0	11.0
88.084000	---	44.94	48.00	3.06	120.000	400.0	H	289.0	9.5
88.107000	50.86	---	68.00	17.14	120.000	400.0	H	289.0	9.5
262.509000	33.55	---	46.00	12.45	120.000	100.0	H	201.0	14.3
350.003000	37.10	---	46.00	8.90	120.000	100.0	H	88.0	16.9
846.074000	34.82	---	46.00	11.18	120.000	400.0	H	282.0	26.7

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- Test Mode: 88.1 MHz (Vertical)



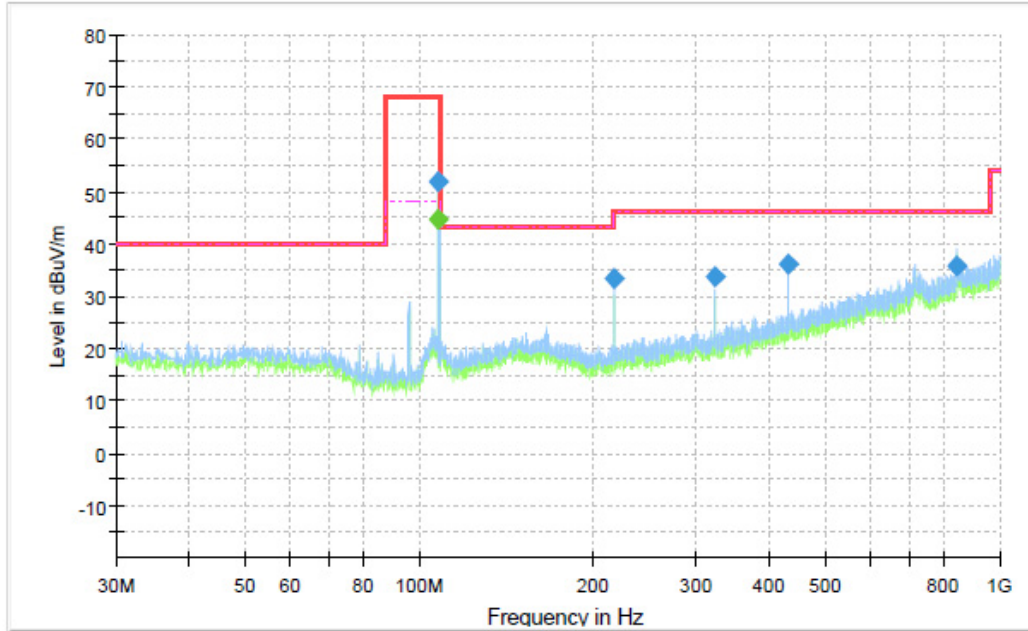
Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
75.516000	25.46	---	40.00	14.54	120.000	400.0	V	187.0	11.0
88.084000	---	39.05	48.00	8.95	120.000	400.0	V	202.0	9.5
88.107000	44.76	---	68.00	23.24	120.000	400.0	V	39.0	9.5
262.509000	28.29	---	46.00	17.71	120.000	200.0	V	101.0	14.3
350.063000	29.95	---	46.00	16.05	120.000	400.0	V	165.0	16.9
845.617000	34.97	---	46.00	11.03	120.000	200.0	V	55.0	26.7

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- Test Mode: 107.9 MHz (Horizontal)



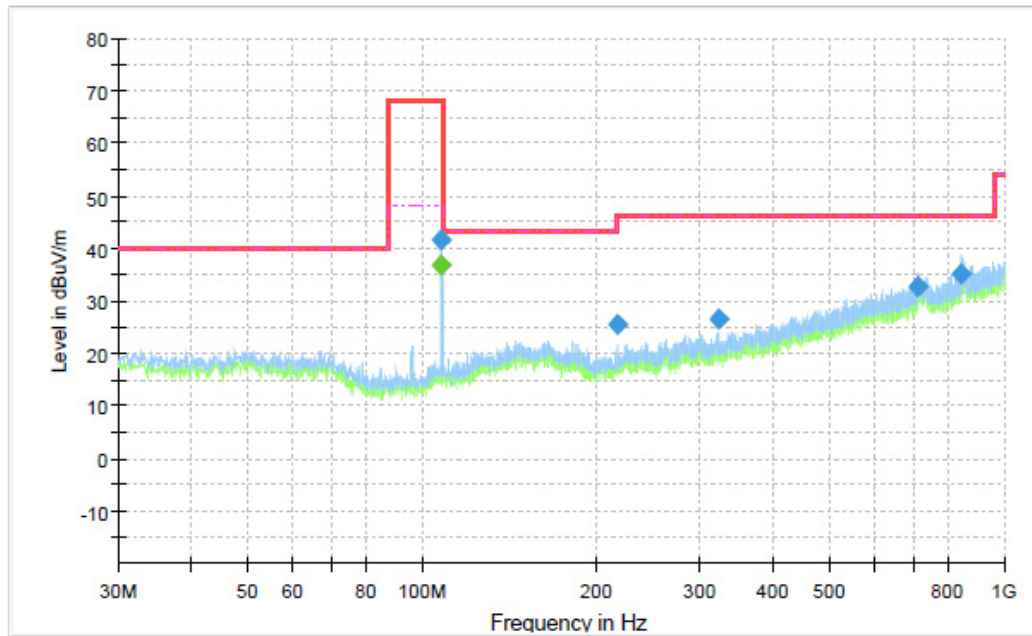
Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
107.888000	51.95	---	68.00	16.05	120.000	300.0	H	130.0	10.8
107.888000	---	44.84	48.00	3.16	120.000	300.0	H	130.0	10.8
216.009000	33.31	---	46.00	12.69	120.000	200.0	H	2.0	12.3
324.007000	33.60	---	46.00	12.40	120.000	100.0	H	265.0	16.2
432.005000	36.25	---	46.00	9.75	120.000	100.0	H	85.0	18.9
843.217000	35.93	---	46.00	10.07	120.000	400.0	H	275.0	26.6

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- Test Mode: 107.9 MHz (Vertical)



Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
107.888000	---	36.83	48.00	11.17	120.000	300.0	V	213.0	10.8
107.888000	41.66	---	68.00	26.34	120.000	300.0	V	213.0	10.8
216.009000	25.41	---	46.00	20.59	120.000	200.0	V	274.0	12.3
324.007000	26.56	---	46.00	19.44	120.000	100.0	V	32.0	16.2
712.805000	32.90	---	46.00	13.10	120.000	300.0	V	113.0	24.6
843.337000	35.25	---	46.00	10.75	120.000	100.0	V	144.0	26.6

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3.3.4 Conducted Emission

3.3.4.1 Test Setup

See test photographs for the actual connections between EUT and support equipment.

3.3.4.2 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 kHz to 30 MHz, 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 Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

3.3.4.3 Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10.

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

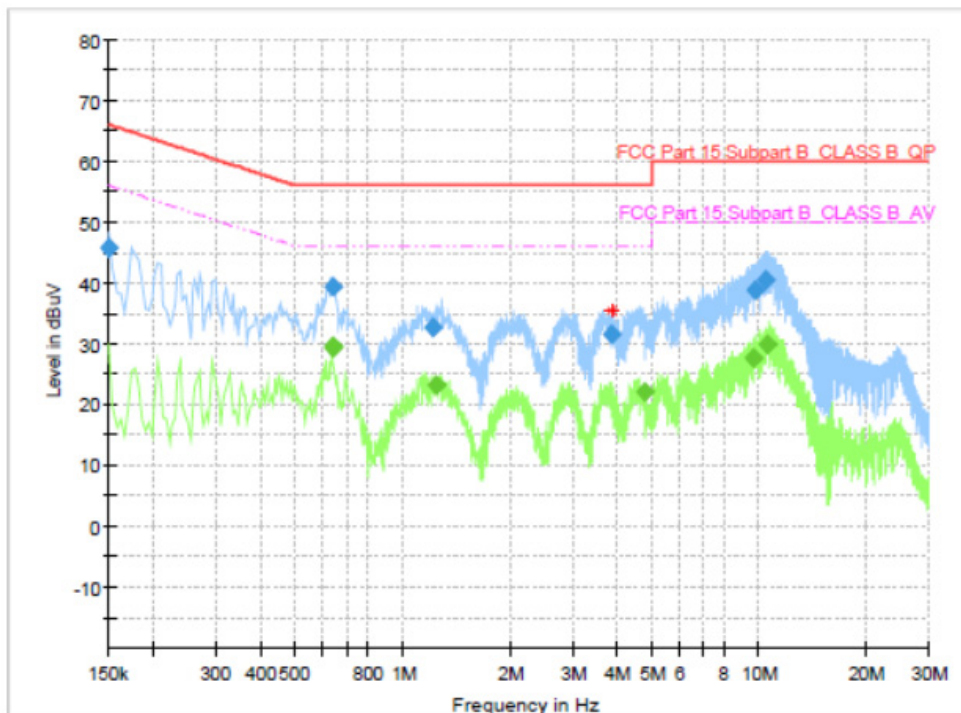
3.3.4.4 Test Result

- AC Line Conducted Emission (Graph)

Test Report

Common Information

Test Model: M100
Test Standard: FCC Part 15 Subpart B
Test Mode: FMT
Test Conditions: AC 120 V, 60 Hz / 21.8 °C, 46.9 % R. H.
Operator Name: Woohyoung, Jeong
Comment: LINE
Order Number: -



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	45.80	—	66.00	20.20	1000.0	9.000	L1	10.5
0.636000	—	29.72	46.00	16.28	1000.0	9.000	L1	10.5
0.640000	39.24	—	56.00	16.76	1000.0	9.000	L1	10.5
0.640000	—	29.36	46.00	16.64	1000.0	9.000	L1	10.5
1.216000	32.77	—	56.00	23.24	1000.0	9.000	L1	10.6
1.240000	—	23.23	46.00	22.77	1000.0	9.000	L1	10.6
3.876000	31.54	—	56.00	24.46	1000.0	9.000	L1	10.6
4.808000	—	22.10	46.00	23.90	1000.0	9.000	L1	10.7
9.624000	—	27.76	50.00	22.24	1000.0	9.000	L1	10.9
9.732000	38.86	—	60.00	21.14	1000.0	9.000	L1	10.9
10.484000	40.34	—	60.00	19.66	1000.0	9.000	L1	10.9
10.588000	—	29.92	50.00	20.08	1000.0	9.000	L1	10.9

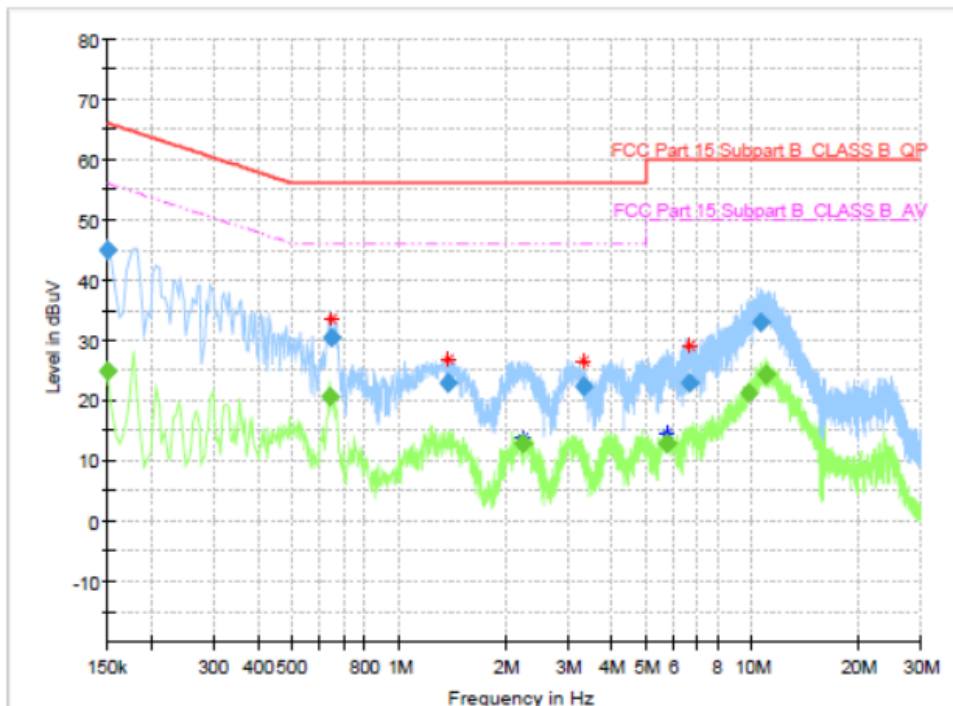
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Test Report

Common Information

Test Model: M100
Test Standard: FCC Part 15 Subpart B
Test Mode: FMT
Test Conditions: AC 120 V, 60 Hz / 21.8 °C, 46.9 % R. H.
Operator Name: Woohyoung, Jeong
Comment: NEUTRAL
Order Number: -



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	45.03	---	66.00	20.97	1000.0	9.000	N	10.5
0.150000	---	24.93	56.00	31.07	1000.0	9.000	N	10.5
0.640000	---	20.63	46.00	25.37	1000.0	9.000	N	10.5
0.644000	30.46	---	56.00	25.54	1000.0	9.000	N	10.5
1.384000	22.99	---	56.00	33.01	1000.0	9.000	N	10.6
2.248000	---	12.95	46.00	33.05	1000.0	9.000	N	10.6
3.320000	22.30	---	56.00	33.70	1000.0	9.000	N	10.6
5.760000	---	12.75	50.00	37.25	1000.0	9.000	N	10.7
6.628000	22.92	---	60.00	37.08	1000.0	9.000	N	10.8
9.728000	---	21.18	50.00	28.82	1000.0	9.000	N	10.9
10.544000	32.83	---	60.00	27.17	1000.0	9.000	N	10.9
10.980000	---	24.39	50.00	25.61	1000.0	9.000	N	10.9

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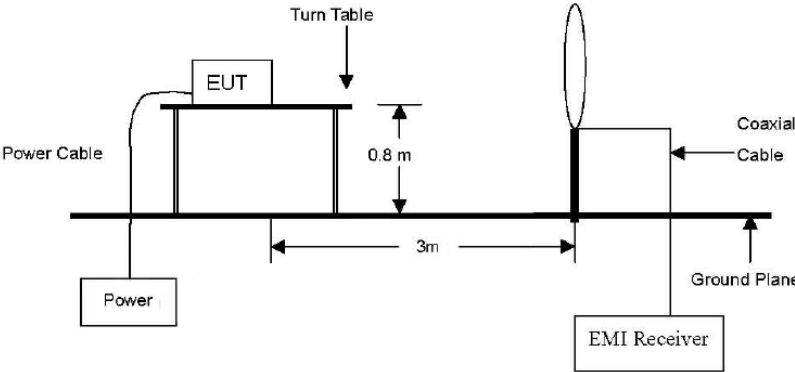
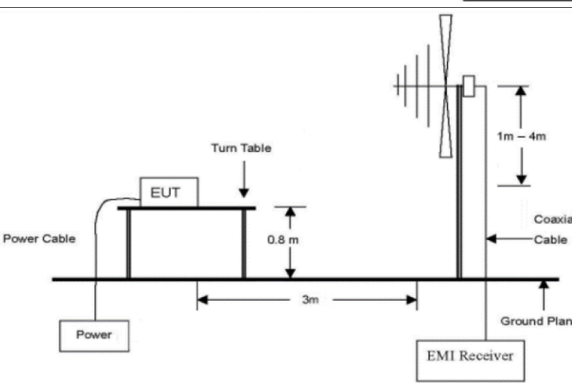
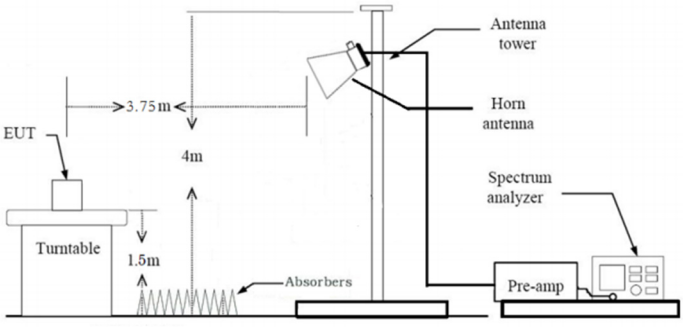
APPENDIX I

TEST SETUP

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- Radiated Measurement

below 30 MHz	
below 1 GHz	
above 1 GHz	Above 1 GHz 

- Conducted Measurement

Conducted	
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APPENDIX II

TEST EQUIPMENT USED FOR TESTS

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	Description	Manufacturer	Serial No.	Model No.	Cal. Date	Next Cal. Date
1	SPECTRUM ANALYZER	R&S	100250	FSU26	2020-09-22	2021-09-22
2	SPECTRUM ANALYZER	R&S	100617	FSP40	2020-03-10	2021-03-10
3	USB Power sensor	Agilent	MY52500002	U2021XA	2020-03-10	2021-03-10
4	Humi./Baro/Temp. data recorder	Lutron	38420	MHB-382SD	2019-11-18	2020-11-18
5	Temperature & humidity cabinet	TERCHY	1060906	MHCB-64AZDA	2019-12-09	2020-12-09
6	SIGNAL GENERATOR	HP	3614A00312	83640B	2019-11-22	2020-11-22
7	Vector SG	R&S	255563	SMBV100A	2020-03-10	2021-03-10
8	Power supply	GWInstsk	EH120798	PST-3202	2020-03-10	2021-03-10
9	Triple Output DC Power Supply	Agilent	MY40038816	E3631A	2020-03-10	2021-03-10
10	ATTENUATOR	Agilent	08259	8493C	2020-03-11	2021-03-11
11	ATTENUATOR	Weinschel	none	WA1444-14	2020-03-11	2021-03-11
12	ATTENUATOR	Weinschel	none	WA41/12-30-12	2020-03-10	2021-03-10
13	Attenuator	BRACKE	1	BM10060.6	2019-11-15	2020-11-15
14	POWER DIVIDER	Agilent	11664	11636B	2020-03-11	2021-03-11
15	POWER DIVIDER	Agilent	51623	11636B	2020-03-11	2021-03-11
16	STEP ATTENUATOR	HP	2852A00842	8495D	2020-03-11	2021-03-11
17	TRILOG BroadBand Antenna	Schwarzbeck	01027	VULB 9168	2019-06-17	2021-06-17
18	TRILOG BroadBand Antenna	Schwarzbeck	01029	VULB 9168	2019-06-20	2021-06-20
19	Double Ridged BroadBand Horn Antenna	Schwarzbeck	02087	BBHA 9120D	2020-06-05	2021-06-05
20	Double Ridged BroadBand Horn Antenna	Schwarzbeck	02086	BBHA 9120D	2020-06-15	2021-06-15
21	BroadBand Horn Antenna	Schwarzbeck	00938	BBHA 9170	2020-05-29	2021-05-29
22	BroadBand Horn Antenna	Schwarzbeck	00937	BBHA 9170	2020-05-29	2021-05-29
23	Amplifier	TESTEK	190007-L	TK-PA18H	2020-05-28	2021-05-28
24	Amplifier	TESTEK	190008-L	TK-PA1840H	2020-05-29	2021-05-29
25	Amplifier	TESTEK	160011-L	TK-PA18M	2020-09-14	2021-09-14
26	LOOP-ANTENNA	Schwarzbeck	00124	FMZB1519 B	2019-06-27	2021-06-27
27	LISN	Schwarzbeck	00984	NSLK 8127	2020-05-28	2021-05-28
28	EMI Test Receiver	R&S	102116	ESRP3	2020-05-28	2021-05-28

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