

# Certificate of Test

**NCT CO., LTD.**

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

Report No.:  
NW2102-J001-1

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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 : 2021-01-18

**2. Use of Report : Japan MIC Approval****3. Test Sample**

- Description : Wireless Karaoke Mic
- Model : miracle,m M100

**4. Place of Test : ☒ Fixed test ☐ Field test**



(Address:211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, 18511, Republic of Korea)

**5. Date of Test : 2021-02-02 ~ 2021-02-04****6. Test method used : Appendix No. 43JN****7. Testing Environment :**

- Temperature: (25 ± 5) °C, Humidity: More than 45 % R.H. and less than 75 % R.H.
- \* Unless specified otherwise in the individual methods, the tests were conducted on ambient conditions.

**8. 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 not related to KOLAS recognition and RRA designation.

Affirmation	<b>Tested by</b> Woo-hyoung, Jeong 	<b>Technical Manager</b> Changmin, Kim 
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Feb 15, 2021

**NCT CO., LTD.**



Contact us at [report@nct.re.kr](mailto:report@nct.re.kr) to confirm the authenticity of this report

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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, Korea 18511  
Telephone : +82-31-323-6070  
Facsimile : +82-31-323-6071

## 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 : Wireless Karaoke Mic  
Model and/or type reference : miracle,m M100  
Additional model name : -  
Serial number : Proto type  
Antenna gain : PCB Pattern Antenna with Max gain : -0.58 dBi (M/N:2.4G ANT)  
Date (s) of performance of tests: : 2021-02-02 ~ 2021-02-04  
Date of receipt of test item : 2021-01-18  
EUT condition : Pre-production, not damaged  
Number of channel : 79  
EUT Power Source : DC 3.7 V by Battery  
Type of Modulation : BDR Mode(GFSK)  
Firmware version : 1.0  
Note : -

### 2-3 Tested Frequency

	Low frequency	Middle frequency	High frequency
Frequency (MHz) (BDR)	2 402	2 441	2 480

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### 3. Test Report

#### 3.1 Test Summary

Applied	Test items	Result
<input checked="" type="checkbox"/>	Frequency Tolerance	C
<input checked="" type="checkbox"/>	Occupied Bandwidth (99%) & Spread Bandwidth(90%)	C
<input checked="" type="checkbox"/>	Antenna power	C
<input checked="" type="checkbox"/>	Unwanted emission strength	C
<input checked="" type="checkbox"/>	Dwell time	C
<input checked="" type="checkbox"/>	RX spurious emission	C
<input checked="" type="checkbox"/>	Interference prevention function	C

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

*Note 2:* Compliance was determined by specification limits of the applicable standard according to customer requirements.

**TEST STANDARD:** The measurement procedure of Certification of Conformity with Technical Regulations for Specified Radio Equipment, Item 19 of Article 2 Paragraph 1

**TEST MEASUREMENT METHOD:** Appendix No. 43. 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
NW2102-J001	2021-02-08	Initial issue
NW2102-J001-1	2021-02-15	Reissue due to incorrect write

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### 3.3 Test Result

#### 3.3.1 Frequency tolerance

##### Test procedure

1. The transmitter output is connected to the Spectrum analyzer(or Frequency counter)
2. Setting the spectrum analyzer is as follows.

Center frequency	Operating frequency
Resolution BW	1 kHz
Video BW	30 kHz
Span	150 kHz
Sweep time	Auto
Detector mode	Positive peak
Trace mode	Max. hold

##### Measurement data : BDR

Test voltage	Measured item	Frequency Tolerance		
		Low frequency	Middle frequency	High frequency
3.70 (V)	Measured value (MHz)	2 402.074 077	2 441.072 692	2 480.072 692
	Tolerance (ppm)	30.84	29.78	29.31

##### ※ Remark

FT (ppm) = [(Measured value(MHz)–Operating frequency(MHz))/Operating frequency(MHz)] × 10<sup>6</sup>

##### Limit:

±50×10<sup>-6</sup>(50 ppm or below)

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### 3.3.2 Occupied Bandwidth (99%) & Spread Bandwidth(90%)

#### Test procedure

1. The transmitter output is connected to the Spectrum analyzer
2. Setting the spectrum analyzer is as follows.

Center frequency	2 441 MHz
Resolution BW	300 kHz
Video BW	Auto
Span	100 MHz
Sweep time	Auto
Detector mode	Positive peak
Trace mode	Max. hold

#### Measurement data : BDR

Test voltage	Measured item	Occupied bandwidth & Spread bandwidth			
		Normal Hopping	AFH		
			Low frequency	Middle frequency	High frequency
3.70 (V)	Occupied bandwidth (MHz)	78.37	-	-	-
	Spread bandwidth (MHz)	70.99	-	-	-

Note 1: EUT does not operate in AFH mode.

#### Limit:

Occupied Bandwidth (99%): 83.5 MHz or less

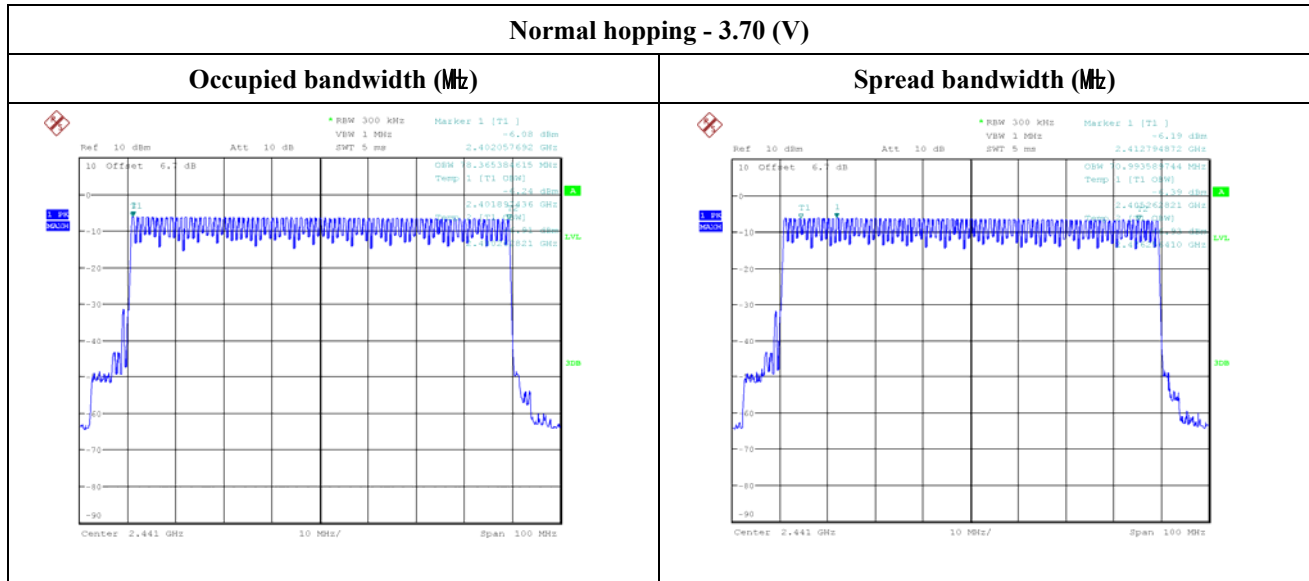
Spread Bandwidth (90%): 500 kHz or more

Spreading Factor 5 or more

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## Test Plot : BDR



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### 3.3.3 Antenna power

#### Test procedure

1. The transmitter output is connected to the Power meter
2. Setting the EUT is operating frequency(hopping mode).

#### Measurement data : BDR

Test mode	Test voltage	Measured item	Antenna power		
			Low frequency	Middle frequency	High frequency
Normal Hopping	3.70 (V)	Measure value (dBm)	-7.19	-7.27	-7.86
		Antenna power (mW/MHz)	0.0035	0.0034	0.0030
		Power tolerance (%)	-30.25	-31.52	-40.22
Declared power(mW/MHz)			0.005		
Antenna gain(dBi)			-0.58		

#### ※ Remark:

Antenna power(mW/MHz) = Measured value(mW) ÷ Spread bandwidth(MHz) ÷ Burst ratio

Power tolerance (%) = {[Antenna power(mW/MHz)- Declared power(mW/MHz)] ÷ Declared power(mW/MHz)} × 100

#### Limit:

Output power: 3 mW/MHz or Below

Output power tolerance: Maximum +20 %, Minimum -80 %

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### 3.3.4 Unwanted emission strength

#### Test procedure

1. Connect transmitter output to the spectrum analyzer input port.
2. The EUT should be transmitting at hopping mode
3. Unwanted emission strength is measured by following setting:
4. Set the spectrum analyzer RBW: 1 MHz, VBW: Auto, Sweep time: auto, Start: 30 MHz, Stop: 2 387 MHz.
5. Set the spectrum analyzer RBW: 1 MHz, VBW: Auto, Sweep time: auto, Start: 2 387 MHz, Stop: 2 400 MHz.
6. Set the spectrum analyzer RBW: 1 MHz, VBW: Auto, Sweep time: auto, Start: 2 483.5 MHz, Stop: 2 496.5 MHz.
7. Set the spectrum analyzer RBW: 1 MHz, VBW: Auto, Sweep time: auto, Start: 2 496.5 MHz, Stop: 12.5 GHz.
8. Detector mode: Peak mode.

#### Measurement data : BDR

	Test mode		Max. emission value		
			Low frequency	Middle frequency	High frequency
30 MHz ~ 2 387 MHz	Normal Hopping	3.70 (V)	Value( $\mu$ W)	-	0.006
			Frequency(MHz)	-	1 756.200
2 387 MHz ~ 2 400 MHz			Value( $\mu$ W)	-	1.710
			Frequency(MHz)	-	2 399.979
2 483.5 MHz ~ 2 496.5 MHz			Value( $\mu$ W)	-	0.020
			Frequency(MHz)	-	2 483.542
2 496.5 MHz ~ 12.5 GHz			Value( $\mu$ W)	-	0.034
			Frequency(MHz)	-	4 805.000

#### Limit:

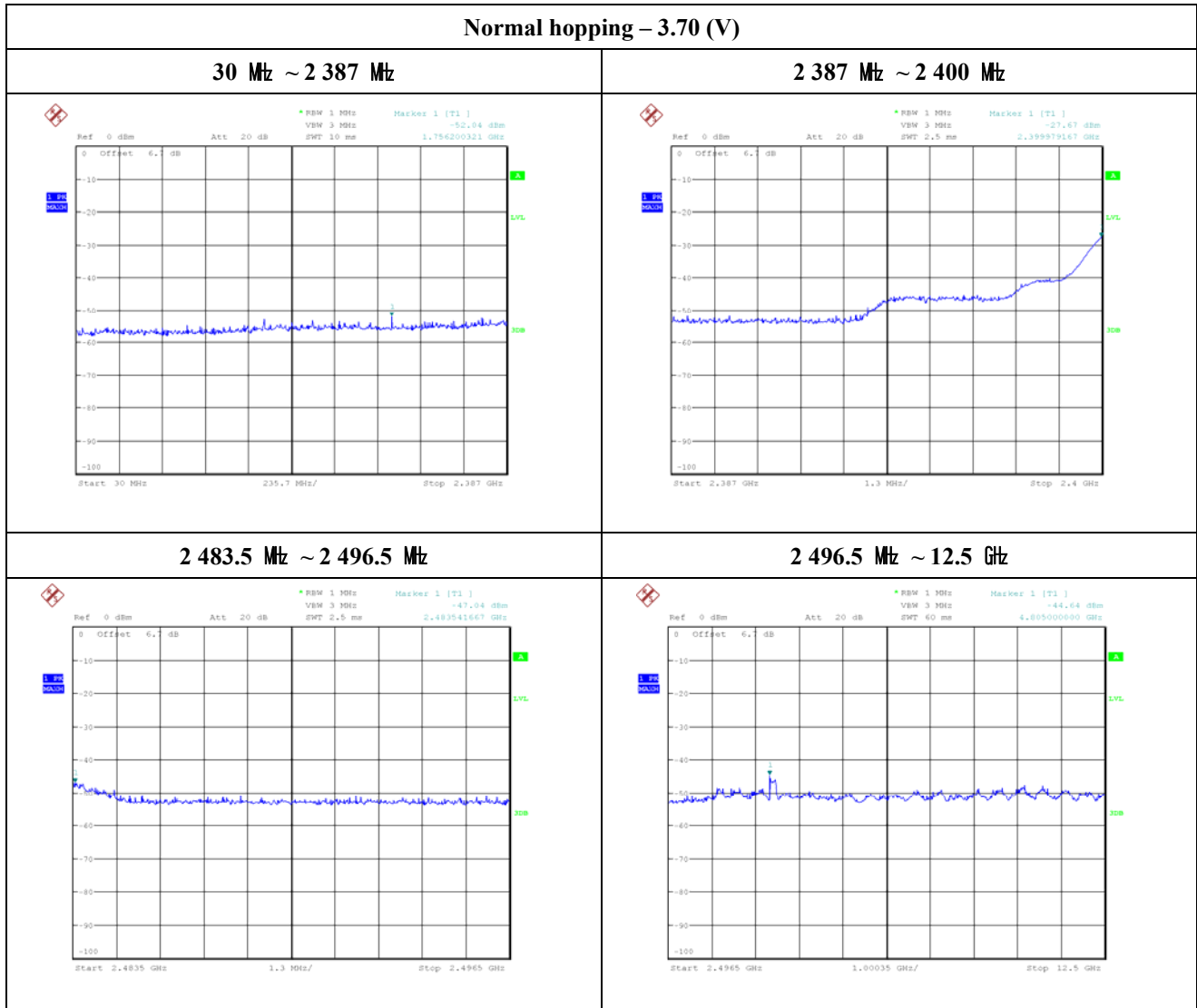
2 387 MHz  $\leq$  f  $\leq$  2 400 MHz and 2 483.5 MHz < f  $\leq$  2 496.5 MHz: 25  $\mu$ W or less

2 387 MHz > f and 2 496.5 MHz < f: 2.5  $\mu$ W or less

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## Test Plot : BDR



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### 3.3.5 Dwell time

#### Test procedure

1. The transmitter output is connected to the Spectrum analyzer
2. Setting the spectrum analyzer is as follows.

Center frequency	Operating frequency
Resolution BW	1 MHz
Video BW	Auto
Span	Zero span
Sweep time	Burst period
Detector mode	Positive peak
Trace mode	Single
Trigger	Video trigger

3. Selected the longest among the packet type.

#### Measurement data

##### - Normal hopping mode

Test voltage	Frequency hopping dwell time (one wave) (ms)	Result Dwell time (sec)	Limit for Time of Occupancy (sec)
3.70 (V)	2.897	0.277	0.4

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### 3.3.6 RX spurious emission

#### Test procedure

1. Connect transmitter output to the spectrum analyzer input port.
2. The EUT should be receiving at hopping mode
3. RX spurious emission is measured by following setting:
4. Set the spectrum analyzer RBW: 100 kHz, VBW: Auto, Sweep: Auto, Start: 30 MHz, Stop: 1 000 MHz.
5. Set the spectrum analyzer RBW: 1 MHz, VBW: Auto, Sweep: Auto, Start: 1 000 MHz, Stop: 10 GHz.
6. Set the spectrum analyzer RBW: 1 MHz, VBW: Auto, Sweep: Auto, Start: 10 GHz, Stop: 12.5 GHz.
7. Detector mode: Peak mode.

#### Measurement data : BDR

	Test mode		Max. emission value		
			Low frequency	Middle frequency	High frequency
30 MHz ~ 1 000 MHz	3.70 (V)	Value(nW)	-	0.031	-
		Frequency(MHz)	-	651.546	-
1 000 MHz ~ 10 GHz		Value(nW)	-	0.138	-
		Frequency(MHz)	-	3 637.692	-
10 GHz ~ 12.5 GHz		Value(nW)	-	0.186	-
		Frequency(MHz)	-	10 638.462	-

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### 3.3.7 Interference prevention function

Measurement data : BDR

Test voltage	Low frequency	Middle frequency	High frequency
3.70 (V)	Pass	Pass	Pass

**Limit:**

Radio equipment used mainly on the same premises and automatically transmits or receives identification code

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## APPENDIX

### TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Manufacturer	Cal. Data	Cal. Due	Calibration body.	Calibration method.
1	ATTENUATOR	8493C	Agilent	2020-03-11	2021-03-11	HCT	24-2 paragraph4 「ㄱ」
2	SPECTRUM ANALYZER	FSU26	R&S	2020-09-22	2021-09-22	HCT	24-2 paragraph4 「ㄱ」
3	Power supply	PST-3202	GWInstsk	2020-03-10	2021-03-10	HCT	24-2 paragraph4 「ㄱ」
4	USB Power sensor	U2044XA	Keysight	2020-09-02	2021-09-02	HCT	24-2 paragraph4 「ㄱ」
5	Multi-meter	34401A	HP	2020-03-10	2021-03-10	HCT	24-2 paragraph4 「ㄱ」
6	8360B SERIES SWEPT SIGNAL GENERATOR	83640B	HP	2020-12-30	2021-12-30	HCT	24-2 paragraph4 「ㄱ」

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