

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.:
NW2203-F001

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**1. Client**

- Name : KC TECHNOLOGY CO. LTD.
- Address : No. 2220, 2F, Yangjiwon B.D, 123, Dongdae-ro, Gyeongju-si, Gyeongsangbuk-do, Republic of KOREA
- Date of Receipt : 2022-03-10

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

- Description / Model : Skin tester / MMS1
- FCC ID : 2A5D5MMS1

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 : 2022-03-10 ~ 2022-03-11**6. Test method used : FCC Part 15 Subpart C 15.247****7. 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.

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	Tested by Jong-Myoung, Shin (signature)	Technical Manager Changmin, Kim (signature)
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Mar 11, 2022

NCT CO., LTD.



Contact us at 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, 18511, Korea
 Telephone : +82-31-323-6070
 Facsimile : +82-31-323-6071
 FCC Designation No. : KR0166
 FCC Registration Number : 409631
 IC Site Registration No. : 25897

2. Information's about Test Item

2.1 Applicant Information

Company name : KC TECHNOLOGY CO. LTD.
 Address : No. 2220, 2F, Yangjiwon B.D, 123, Dongdae-ro, Gyeongju-si,
 Gyeongsangbuk-do, Republic of KOREA
 Telephone / Facsimile : +82-2-552-3115 / -

2.2 Equipment Under Test (EUT) description

Test item particulars : Skin tester
 Model and/or type reference : MMS1
 Additional model name : -
 Serial number : Prototype
 Antenna type and gain : Chip Antenna(M/N:ANT3216LL11R2400A) with Max gain: 3.68 dBi
 Date (s) of performance of tests: : 2022-03-10 ~ 2022-03-11
 Date of receipt of test item : 2022-03-10
 EUT condition : Pre-production, not damaged
 Number of channel : 11 for 802.11b/g/n_HT20
 EUT Power Source : DC 3.70 V
 Type of Modulation : DSSS for 802.11b / OFDM for 802.11g/n_HT20
 Firmware version : 1.0
 Hardware version : 1.0
 Test software name(version) : Tera Term V4.79

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2.3 Tested Frequency

Test Mode	Test frequency (MHz)		
	Low frequency	Middle frequency	High frequency
802.11b	2 412	2 437	2 462
802.11g	2 412	2 437	2 462
802.11n_HT20	2 412	2 437	2 462

2.4 Transmitting Configuration of EUT

Test Mode	Data rate
802.11b	1 ~ 11 Mbps
802.11g	6 ~ 54 Mbps
802.11n_HT20	MCS 0 ~ 7

3. Test Report

3.1 Test Summary

Applied	FCC Rule	IC Rule	Test Items	Test Condition	Result
☒	15.203	-	Antenna Requirement	Conducted	C
☐	15.247(a)	RSS-247 (5.2)	6 dB Bandwidth		NT ^{note 2}
☐	-	RSS GEN (6.7)	Occupied Bandwidth (99%)		NT ^{note 2}
☐	15.247(b)	RSS-247 (5.4)	Maximum Conducted Output Power		NT ^{note 2}
☐	15.247(e)	RSS-247 (5.2)	Peak Power Spectral Density		NT ^{note 2}
☐	15.247(d)	RSS-247 (5.5)	Conducted Spurious Emission		NT ^{note 2}
☒	15.247(d) 15.205 & 15.209	RSS-247 (5.5) RSS-GEN (8.9 & 8.10)	Radiated Spurious Emission	Radiated	C
☒	15.207	RSS-GEN (8.8)	Conducted Emissions	AC Line Conducted	C

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

Note 2: The test is not performed because it was tested on the certified WLAN module(FCC ID: COF-WMBNBM26A).

Refer to the test report of module for the detailed results. (Test report No.: RF160819E01)

The sample was tested according to the following specification: ANSI C63.10:2013.

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
NW2203-F001	2022-03-11	Initial issue

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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.

According to §15.247(b)(4) 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 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.1.1 Result

Complies

(The transmitter has a Chip Antenna. The directional peak gain of the antenna is 3.68 dBi.)

3.3.2 TX Radiated Spurious Emission and Conducted Spurious Emission

3.3.2.1 Test Setup

Refer to the APPENDIX I.

3.3.2.2 Limit

According to §15.247(d), 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 emission which in the restricted band, as define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))

According to § 15.209(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.

According to § 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 ~ 0.110	16.42 ~ 16.423	399.90 ~ 410	4.5 ~ 5.15
0.495 ~ 0.505	16.69475 ~ 16.69525	608 ~ 614	5.35 ~ 5.46
2.1735 ~ 2.1905	16.80425 ~ 16.80475	960 ~ 1240	7.25 ~ 7.75
4.125 ~ 4.128	25.5 ~ 25.67	1300 ~ 1427	8.025 ~ 8.5
4.17725 ~ 4.17775	37.5 ~ 38.	1435 ~ 1626.5	9.0 ~ 9.2
4.20725 ~ 4.20775	25 73 ~ 74.6	1645.5 ~ 1646.5	9.3 ~ 9.5
4.17725 ~ 4.17775	74.8 ~ 75.2	1660 ~ 1710	10.6 ~ 12.7
6.215 ~ 6.218	108 ~ 121.94	1718.8 ~ 1722.2	13.25 ~ 13.4
6.26775 ~ 6.26825	149.9 ~ 150.05	2200 ~ 2300	14.47 ~ 14.5
6.31175 ~ 6.31225	156.52475 ~ 156.52525	2310 ~ 2390	15.35 ~ 16.2
8.291 ~ 8.294	156.7 ~ 156.9	2483.5 ~ 2500	17.7 ~ 21.4
8.362 ~ 8.366	162.0125 ~ 167.17	2690 ~ 2900	22.01 ~ 23.12
8.37625 ~ 8.38675	3345.8 ~ 3358	3260 ~ 3267	23.6 ~ 24.0
8.41425 ~ 8.41475	3600 ~ 4400	3332 ~ 3339	31.2 ~ 31.8
12.51975 ~ 12.52025	3345.8 ~ 3358	240 ~ 285	36.43 ~ 36.5
12.57675 ~ 12.57725	3600 ~ 4400	322 ~ 335.4	Above 38.6
13.36 ~ 13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

3.3.2.3 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 1 GHz 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. Repeat above procedures until the measurements for all frequencies are complete.

Measurement Instrument Setting

1. Frequency Range: Below 1 GHz
RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak
2. Frequency Range: Above 1 GHz

Peak Measurement

RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Sweep time = Auto,
Trace mode = Max Hold until the trace stabilizes

Average Measurement

RBW = 1 MHz, VBW = 3 MHz, Detector = RMS (Number of points $\geq 2 \times \text{Span} / \text{RBW}$),
Trace Mode = Average (Averaging type = power(i.e. RMS)), Sweep Time = Auto,
Sweep Count = at least 100 traces

A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

- 1) If power averaging (RMS) mode was used in step 4, then the applicable correction factor is $10 \log(1/x)$, where x is the duty cycle.
- 2) If linear voltage averaging mode was used in step 4, then the applicable correction factor is $20 \log(1/x)$, where x is the duty cycle.
- 3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than tuning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

3.3.2.4 Test Result

802.11b - Below 1 GHz

● Low frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
(MHz)	Peak			Peak	Peak	Peak
276.92	27.41	H	14.49	46.0	42.0	4.0

● Middle frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
(MHz)	Peak			Peak	Peak	Peak
276.94	27.19	H	14.49	46.0	41.7	4.3

● High frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
(MHz)	Peak			Peak	Peak	Peak
276.95	27.49	H	14.49	46.0	42.0	4.0

Note 1: No other spurious and harmonic emissions were found above listed frequencies.

Note 2: A peak detector used, since the measured value will generally be higher with a peak detector.

Note 3: Sample Calculation.

Margin = Limit – Result

Peak Result = Peak Reading + TF

TF = Ant factor + Cable Loss + Filter Loss – Amp Gain

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802.11b - above 1 GHz

● Low frequency

Frequency	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dBuV/m)		(dB)	
	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
4 823.87	32.23	41.31	V	2.79	0.06	54.0	74.0	35.1	44.2	18.9	29.8

● Middle frequency

Frequency	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dB)			
	AV / Peak					AV / Peak		AV / Peak			
4 874.13	32.94	43.35	V	2.79	0.06	54.0	74.0	35.8	46.2	18.2	27.8

● High frequency

Frequency (MHz)	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dBuV/m)		(dB)	
	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
4 923.84	34.57	42.90	V	4.69	0.06	54.0	74.0	39.3	47.6	14.7	26.4

Note 1: The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

Note 2: DCCF(Duty Cycle Correction Factor)

For DCCF(Duty Cycle Correction Factor) please refer to appendix III.

Note 3: Sample Calculation.

Margin = Limit – Result / Peak Result = Peak Reading + TF / Average Result = Average Reading + TF + DCCF

TF = Ant factor + Cable Loss + Filter Loss – Amp Gain

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802.11g – below 1GHz

● Low frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
	Peak			Peak	Peak	Peak
276.95	28.03	H	14.49	46.0	42.8	3.2

● Middle frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
	Peak			Peak	Peak	Peak
276.93	27.27	H	14.49	46.0	42.1	3.9

● High frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
	Peak			Peak	Peak	Peak
276.95	27.47	H	14.49	46.0	42.3	3.7

Note 1: No other spurious and harmonic emissions were found above listed frequencies.

Note 2: A peak detector used, since the measured value will generally be higher with a peak detector.

Note 3: Sample Calculation.

Margin = Limit – Result

Peak Result = Peak Reading + TF

TF = Ant factor + Cable Loss + Filter Loss – Amp Gain

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802.11g – above 1GHz

● Low frequency

Frequency	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dBuV/m)		(dB)	
	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
2 390.00	24.29	41.79	H	21.92	0.30	54.0	74.0	46.5	64.0	7.5	10.0

● Middle frequency

Frequency (MHz)	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dBuV/m)		(dB)	
	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
4 874.96	31.31	45.42	V	2.79	0.30	54.0	74.0	34.4	48.5	19.6	25.5

● High frequency

Frequency	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dB)			
	AV / Peak					AV / Peak		AV / Peak			
2 483.58	26.24	46.50	H	22.16	0.30	54.0	74.0	48.7	69.0	5.3	5.0
4 927.13	32.39	46.43	V	4.69	0.30	54.0	74.0	37.4	51.4	16.6	22.6

Note 1: The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

Note 2: DCCF(Duty Cycle Correction Factor)

For DCCF(Duty Cycle Correction Factor) please refer to appendix III.

Note 3: Sample Calculation.

Margin = Limit – Result / Peak Result = Peak Reading + TF / Average Result = Average Reading + TF + DCCF

TF = Ant factor + Cable Loss + Filter Loss – Amp Gain

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802.11n_HT20 – below 1GHz

● Low frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
	Peak			Peak	Peak	Peak
276.95	27.50	H	14.49	46.0	42.3	3.7

● Middle frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
	Peak			Peak	Peak	Peak
276.93	28.04	H	14.49	46.0	42.9	3.1

● High frequency

Frequency	Reading	Pol.	TF (dB)	Limits	Result	Margin
	(dBuV/m)			(dBuV/m)	(dBuV/m)	(dB)
	Peak			Peak	Peak	Peak
276.94	27.85	H	14.49	46.0	42.7	3.3

Note 1: No other spurious and harmonic emissions were found above listed frequencies.

Note 2: A peak detector used, since the measured value will generally be higher with a peak detector.

Note 3: Sample Calculation.

Margin = Limit – Result

Peak Result = Peak Reading + TF

TF = Ant factor + Cable Loss + Filter Loss – Amp Gain

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802.11n_HT20 – above 1GHz

● Low frequency

Frequency	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dBuV/m)		(dB)	
	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
2 390.00	26.67	44.64	H	21.92	0.33	54.0	74.0	48.9	66.9	5.1	7.1

● Middle frequency

Frequency	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dB)			
	AV / Peak					AV / Peak		AV / Peak			
4 871.68	31.74	45.27	V	2.79	0.33	54.0	74.0	34.9	48.4	19.1	25.6

● High frequency

Frequency	Reading		Pol.	TF (dB)	DCCF (dB)	Limits		Result		Margin	
	(dBuV/m)					(dBuV/m)		(dBuV/m)		(dB)	
	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
2 483.58	29.08	49.35	H	22.16	0.33	54.0	74.0	51.6	71.8	2.4	2.2
4 922.24	32.60	46.72	V	4.69	0.33	54.0	74.0	37.6	51.7	16.4	22.3

Note 1: The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

Note 2: DCCF(Duty Cycle Correction Factor)

For DCCF(Duty Cycle Correction Factor) please refer to appendix III.

Note 3: Sample Calculation.

Margin = Limit – Result / Peak Result = Peak Reading + TF / Average Result = Average Reading + TF + DCCF

TF = Ant factor + Cable Loss + Filter Loss – Amp Gain

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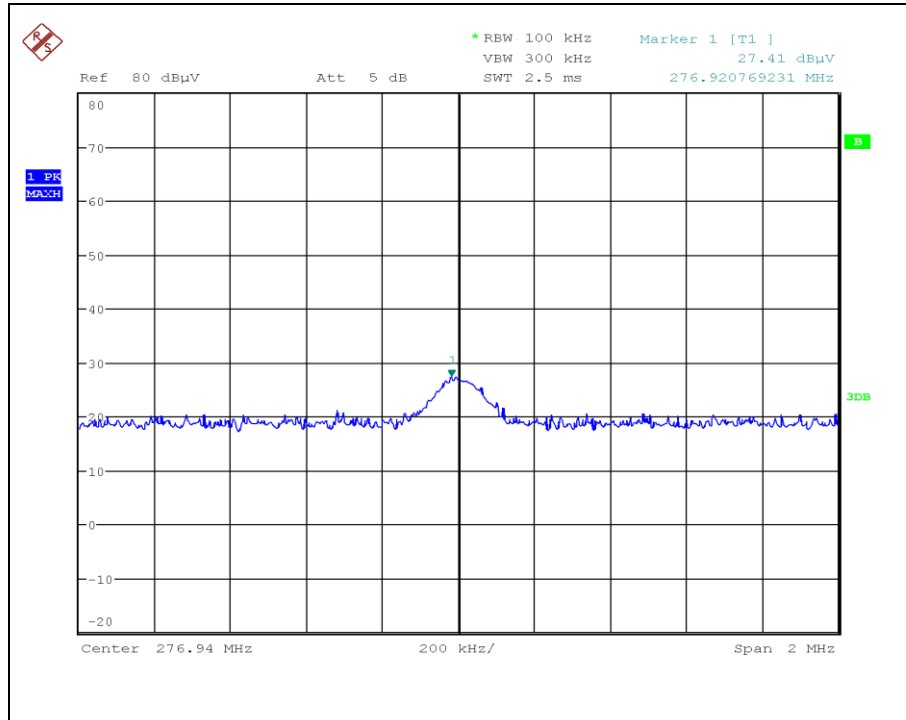
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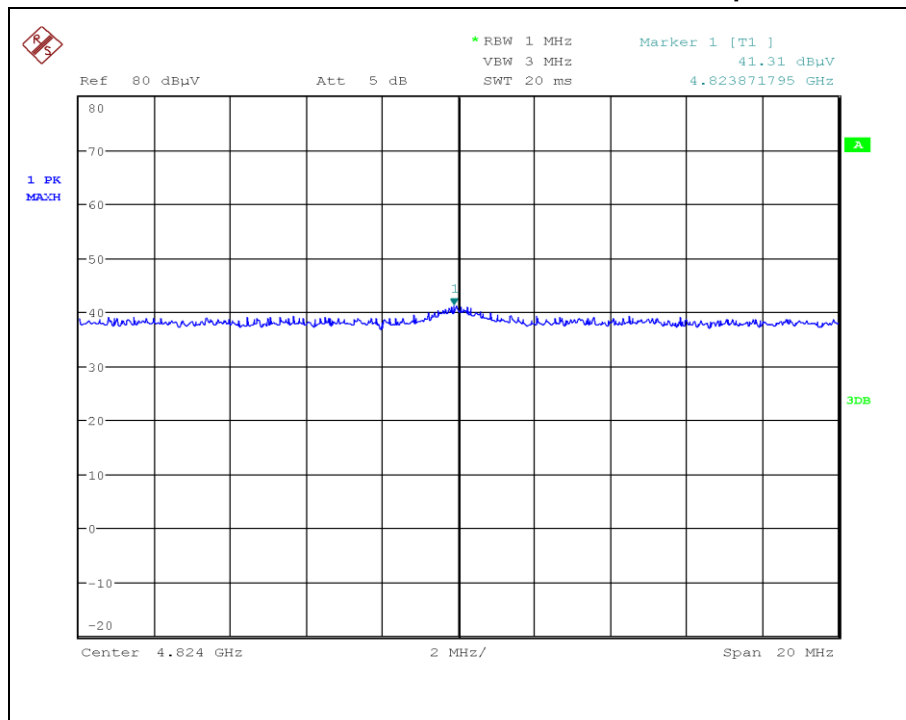
3.3.2.5 Test Plot for Radiated Spurious Emission

- 802.11b _ Low frequency

Spurious - Peak



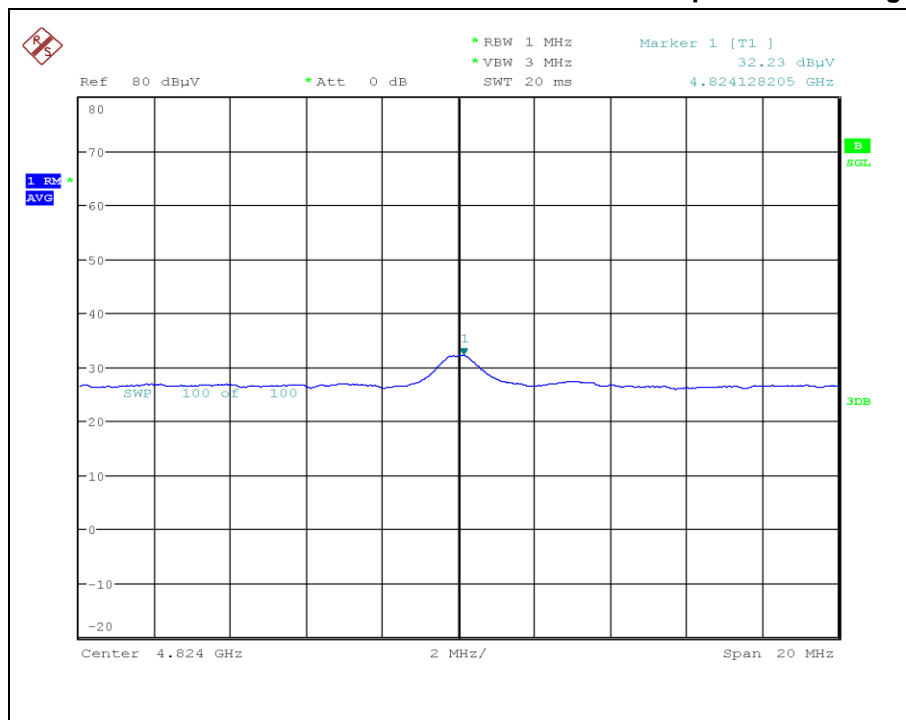
Spurious - Peak



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Spurious - Average

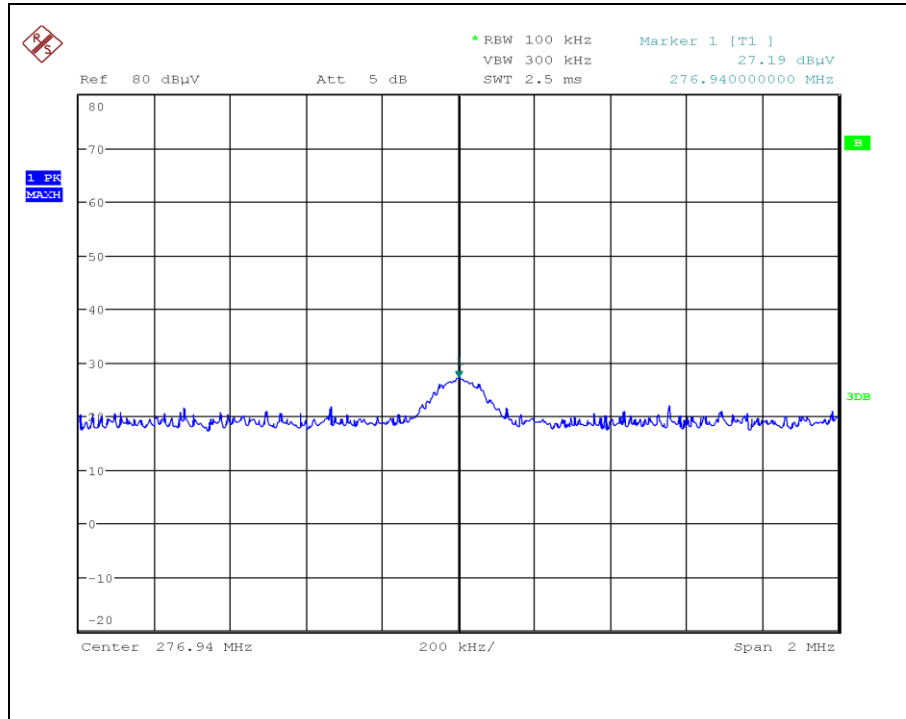


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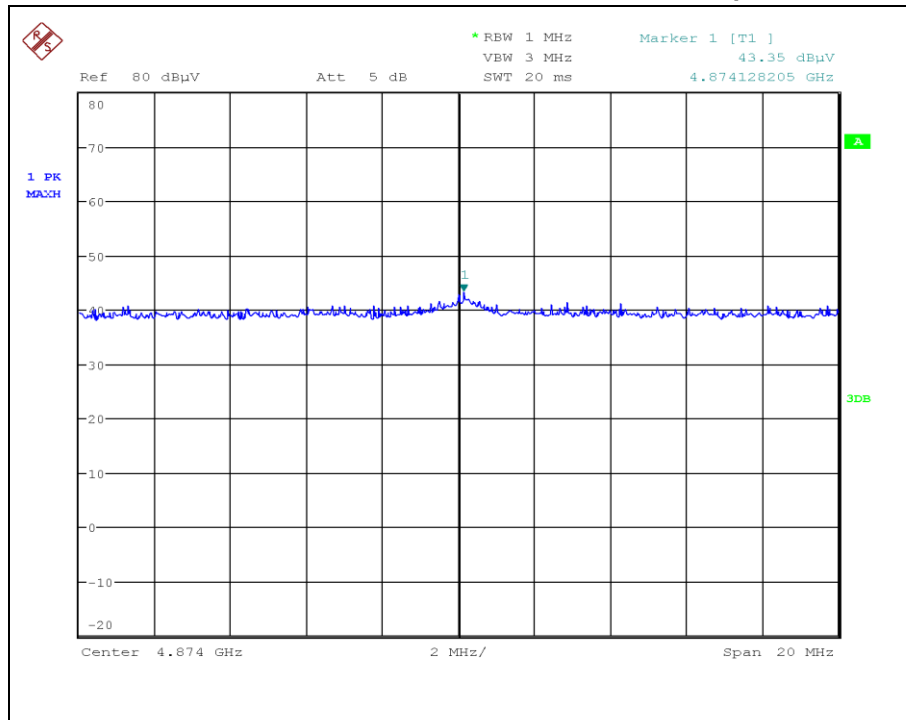
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- 802.11b _ Middle frequency

Spurious - Peak



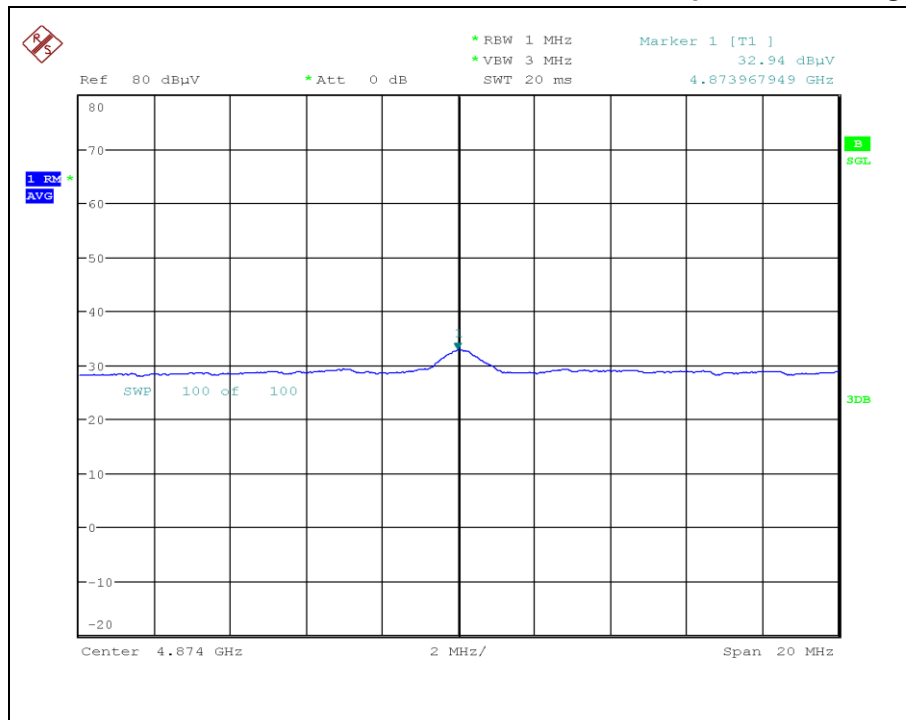
Spurious - Peak



Test Report No.: NW2203-F001

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www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

Spurious - Average

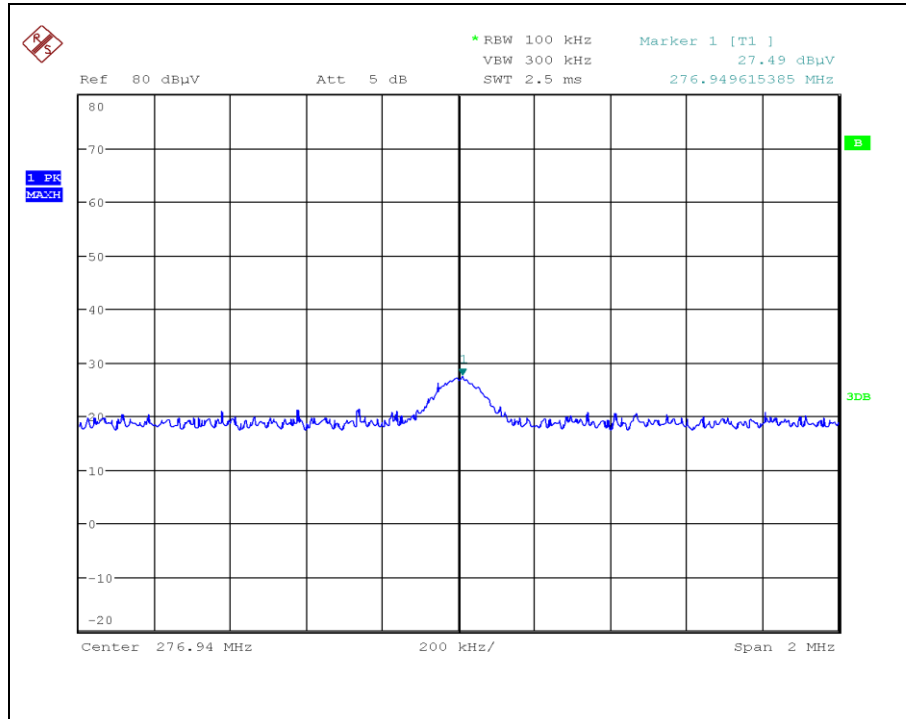


Test Report No.: NW2203-F001

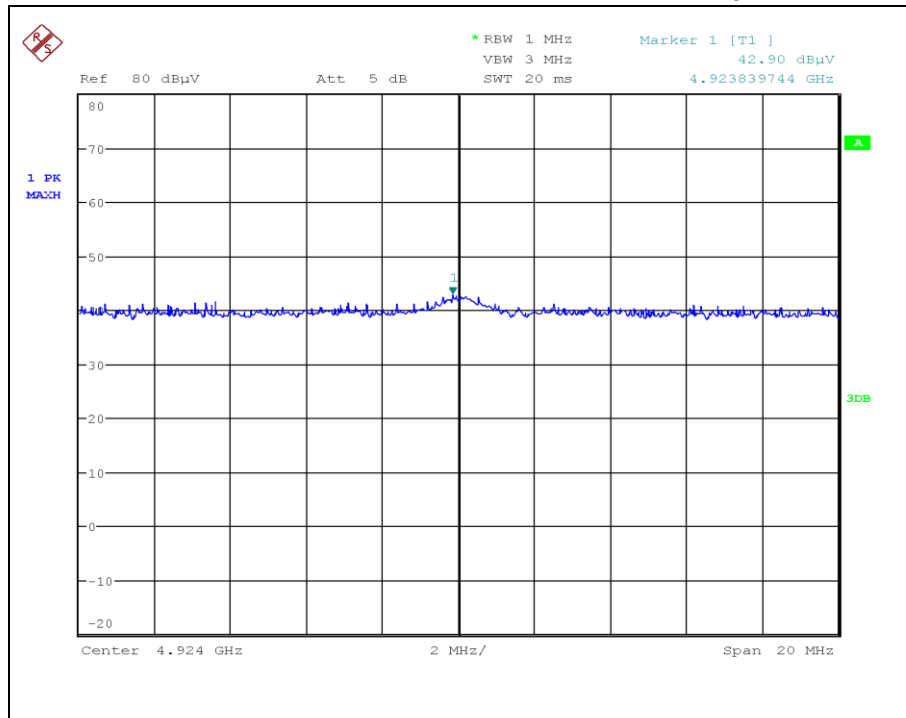
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- 802.11b _ High frequency

Spurious - Peak



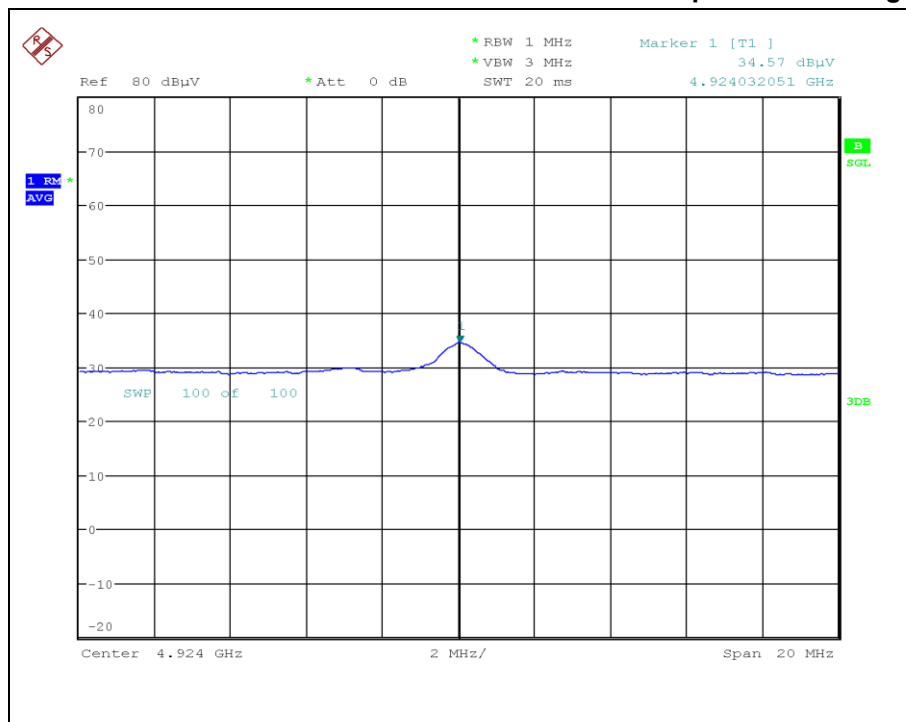
Spurious - Peak



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211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

Spurious - Average

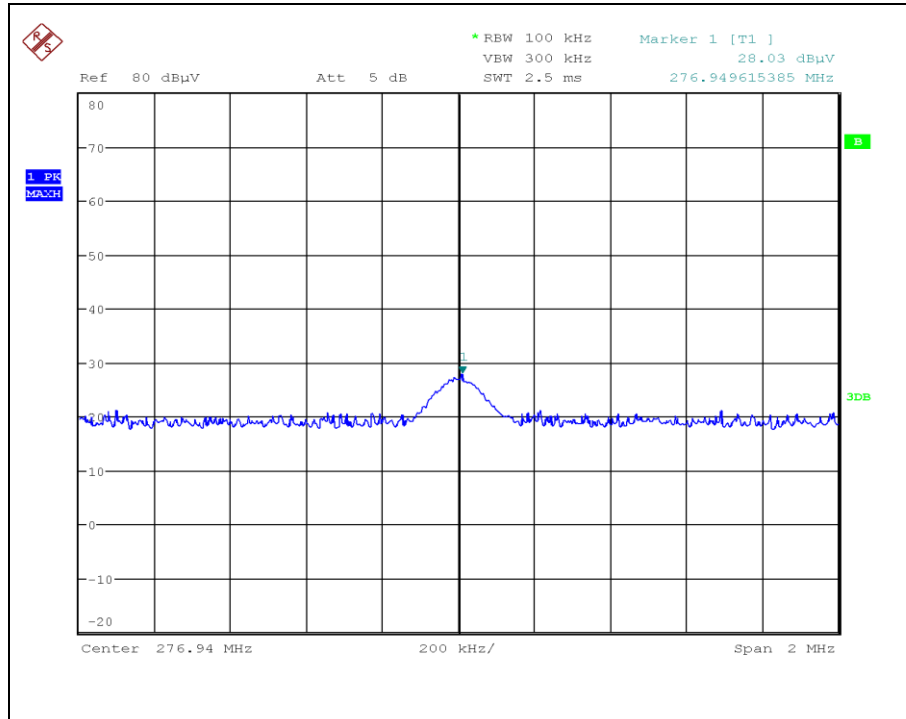


Test Report No.: NW2203-F001

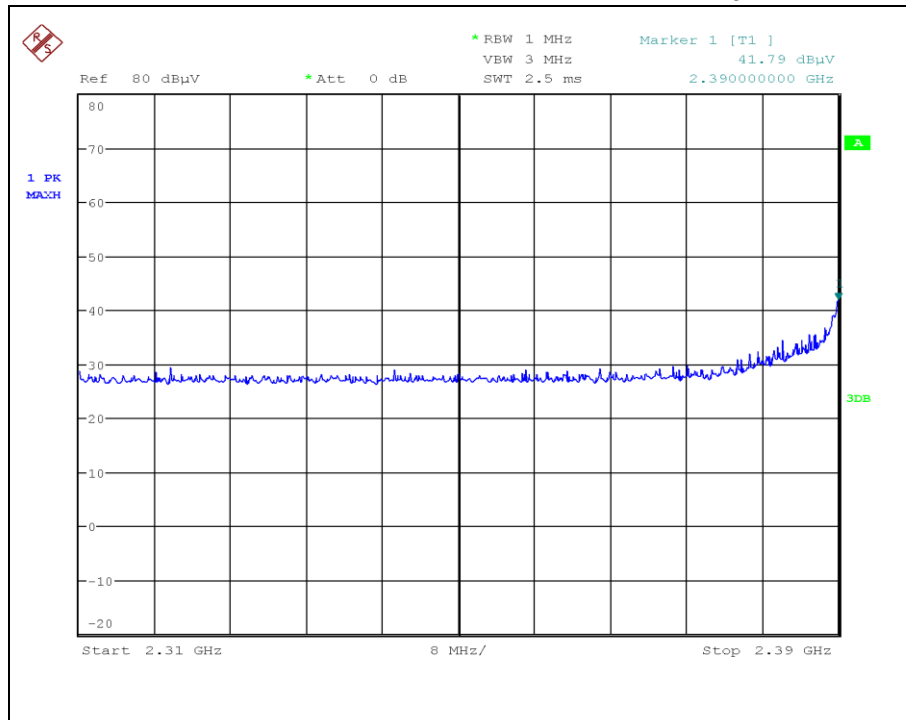
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

● 802.11g _ Low frequency

Spurious - Peak



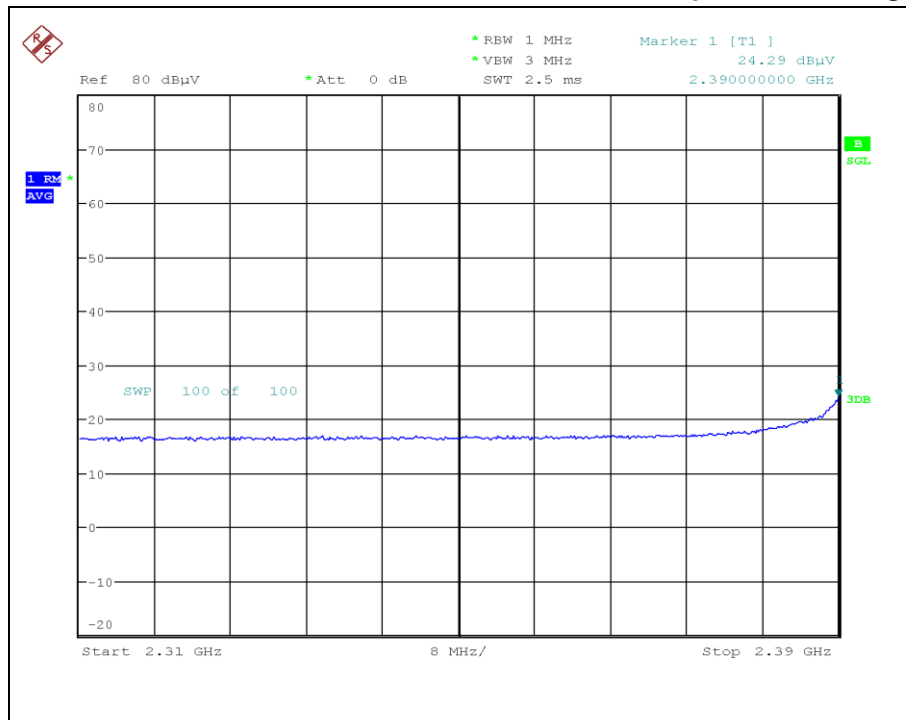
Spurious - Peak



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www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

Spurious - Average

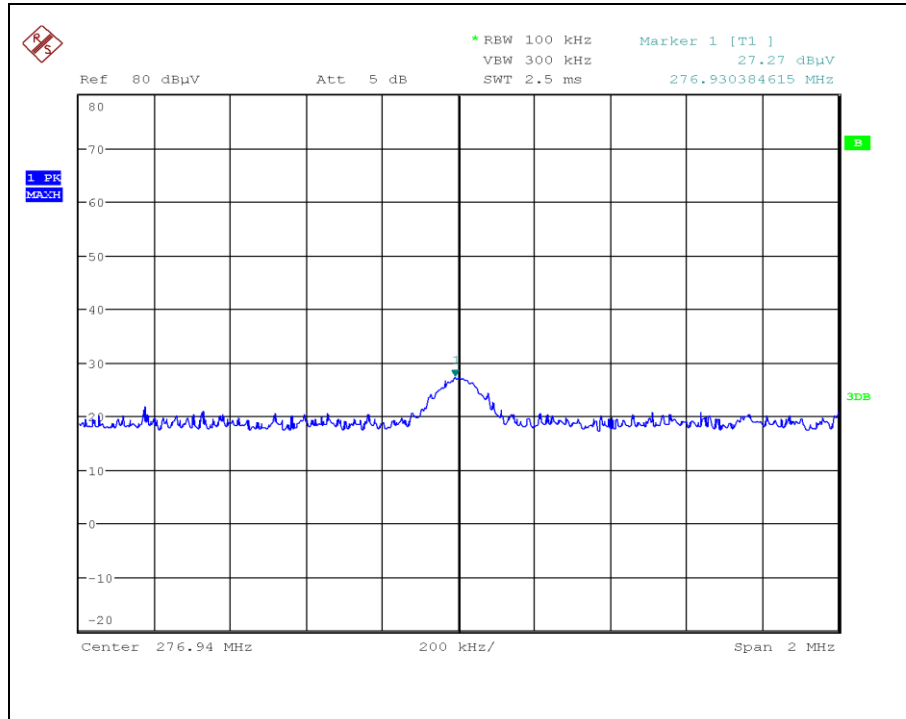


Test Report No.: NW2203-F001

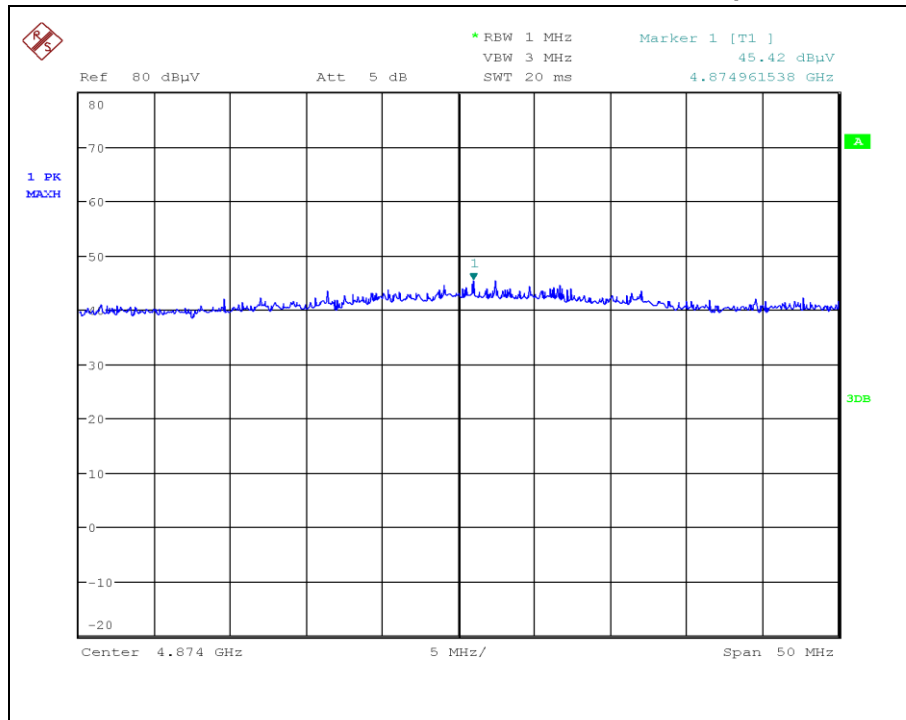
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

- 802.11g _ Middle frequency

Spurious - Peak



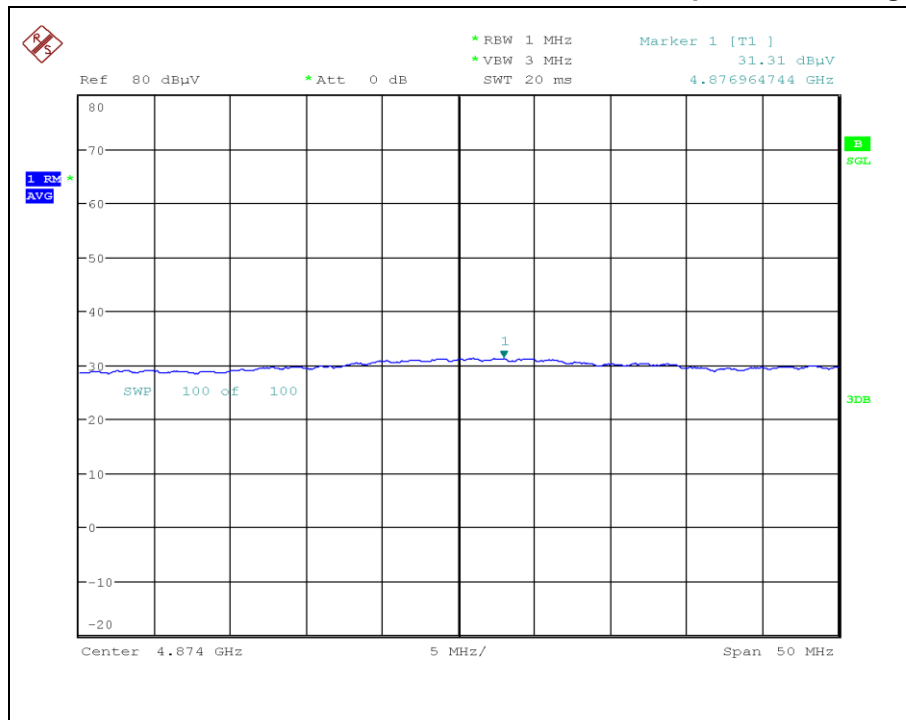
Spurious - Peak



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www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

Spurious - Average

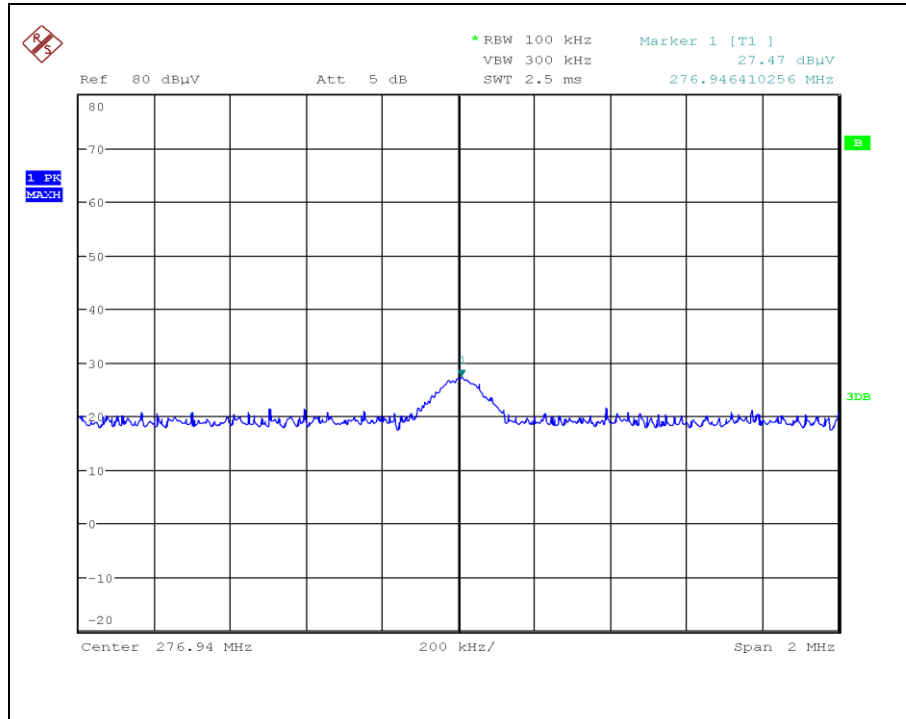


Test Report No.: NW2203-F001

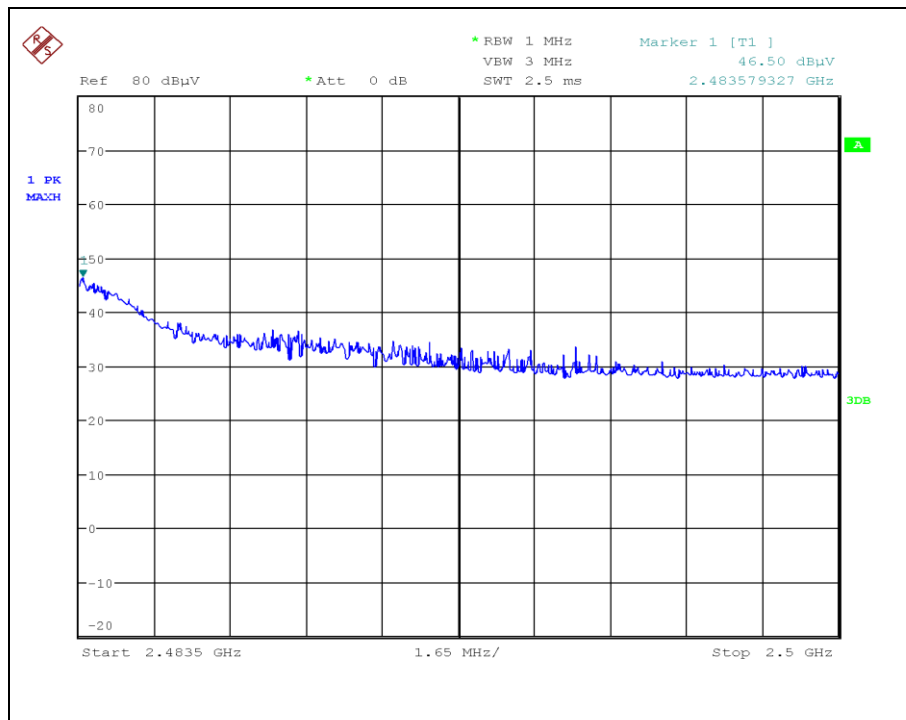
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

- 802.11g _ High frequency

Spurious - Peak



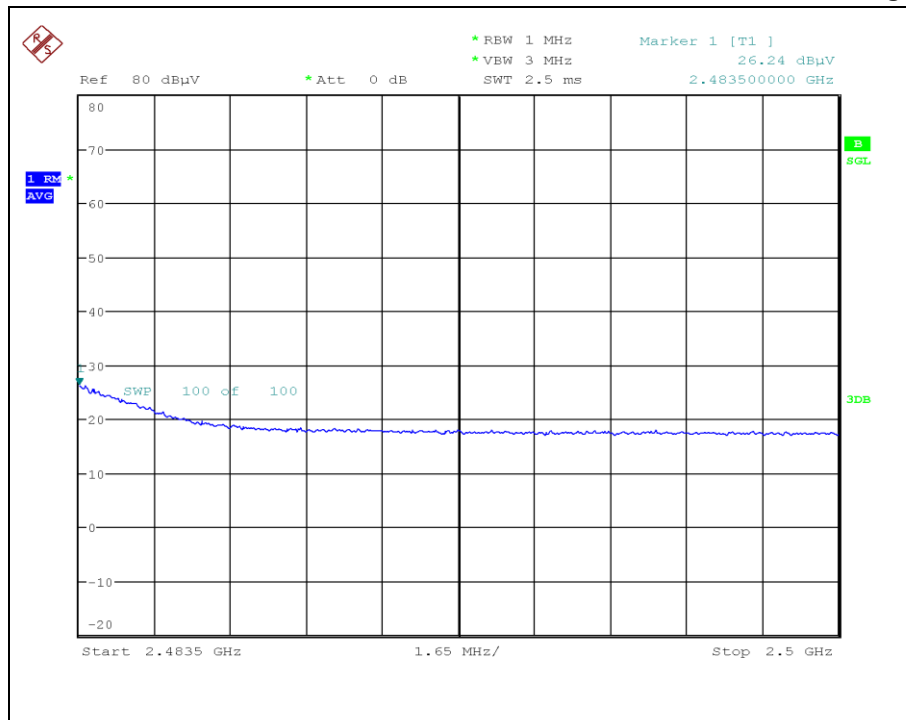
Restricted Band - Peak



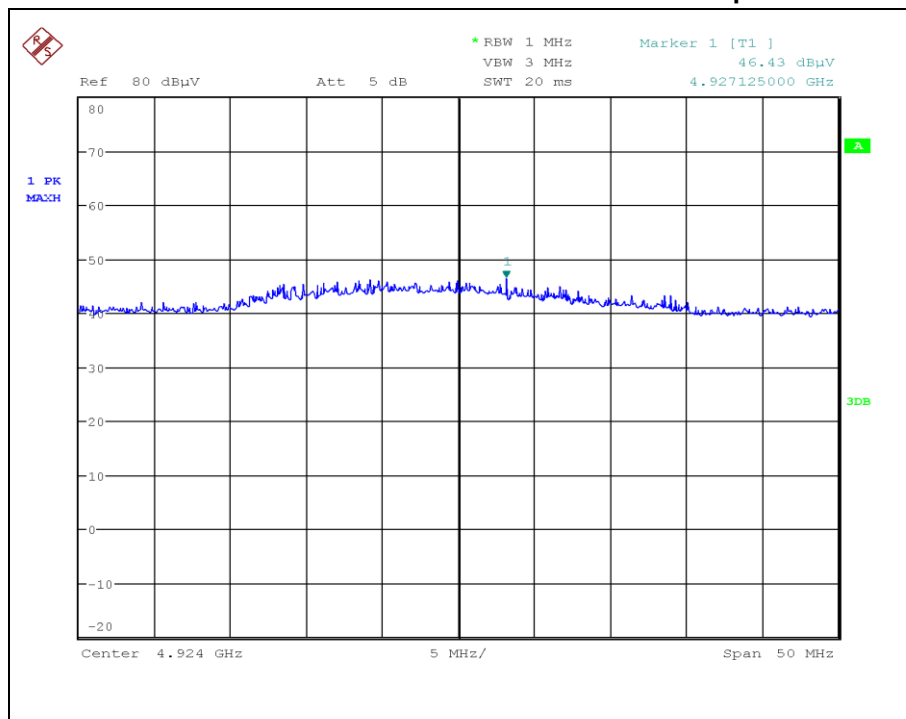
Test Report No.: NW2203-F001

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www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

Restricted Band - Average



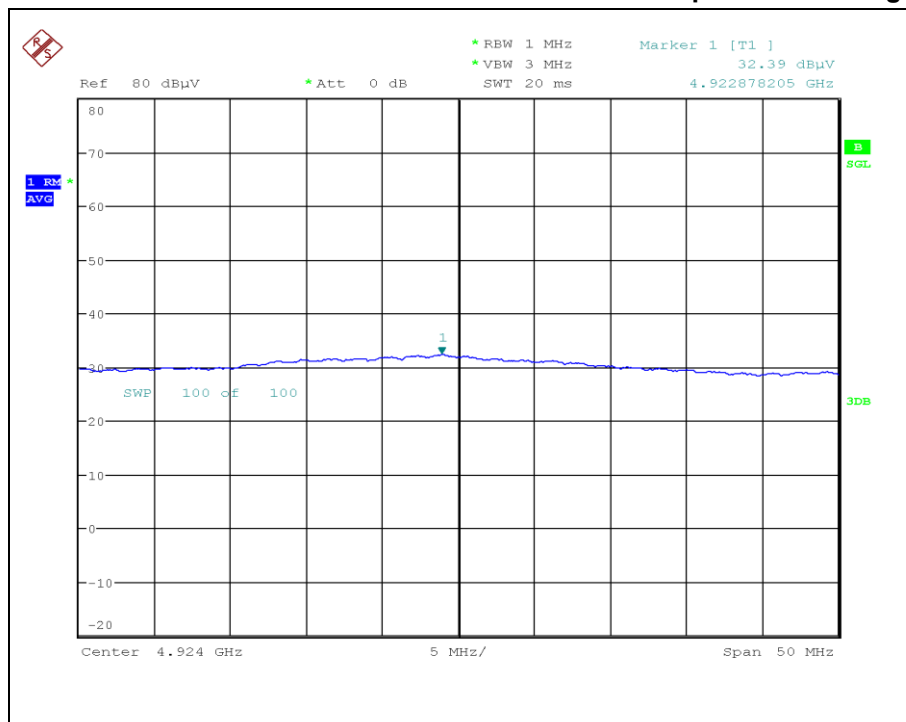
Spurious - Peak



Test Report No.: NW2203-F001

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www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

Spurious - Average

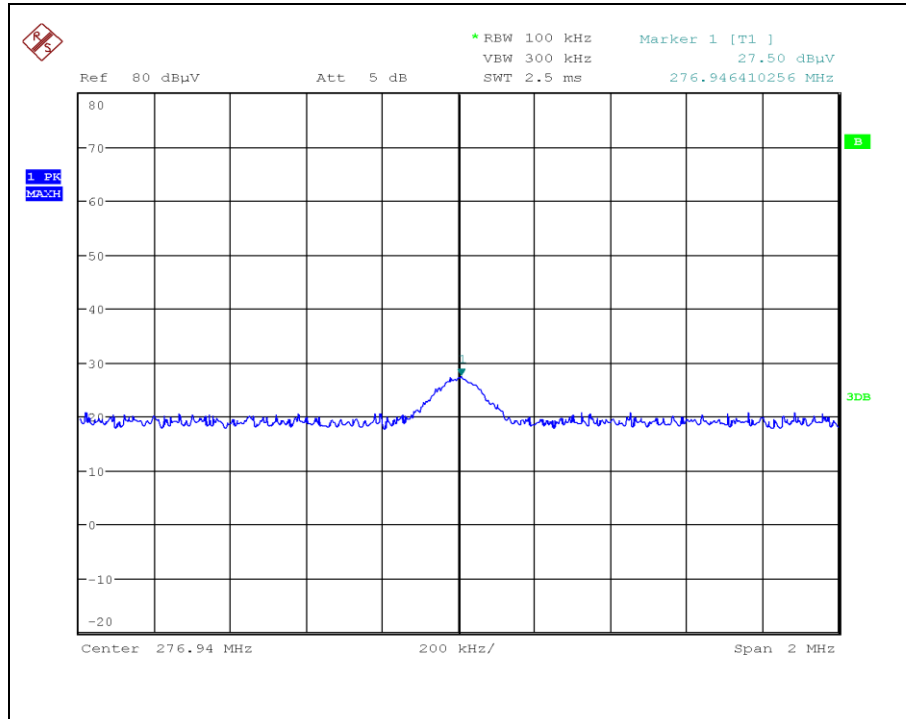


Test Report No.: NW2203-F001

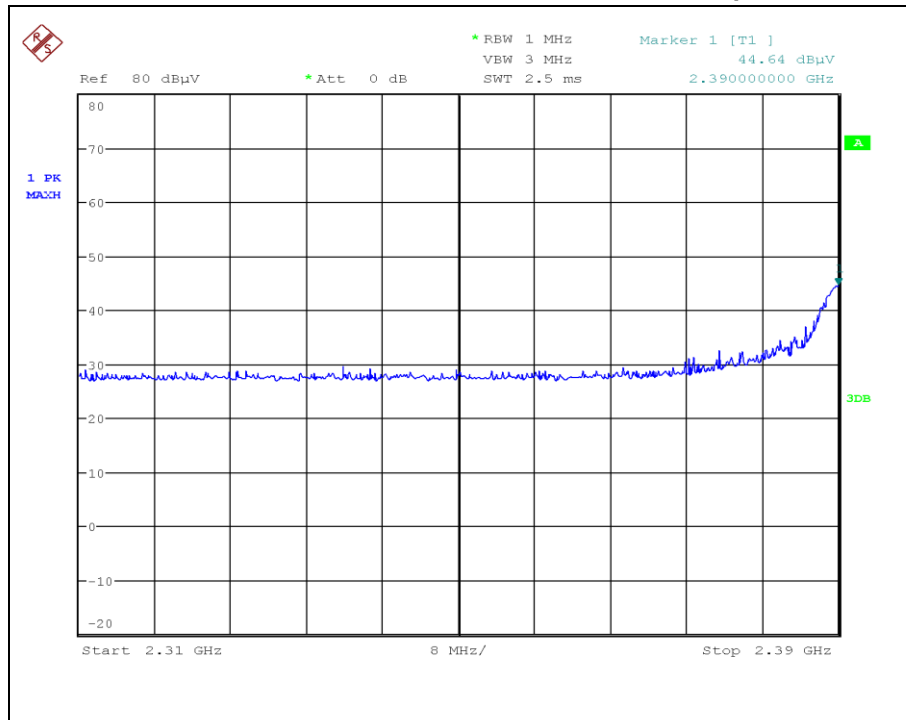
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

- 802.11n_HT20 _ Low frequency

Spurious - Peak



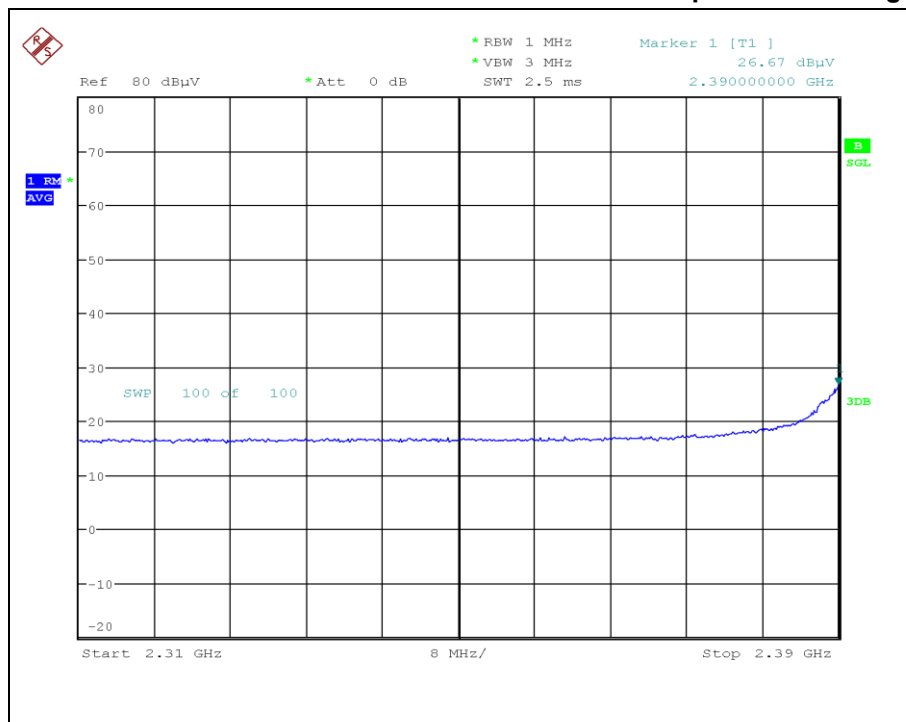
Spurious - Peak



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www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

Spurious - Average

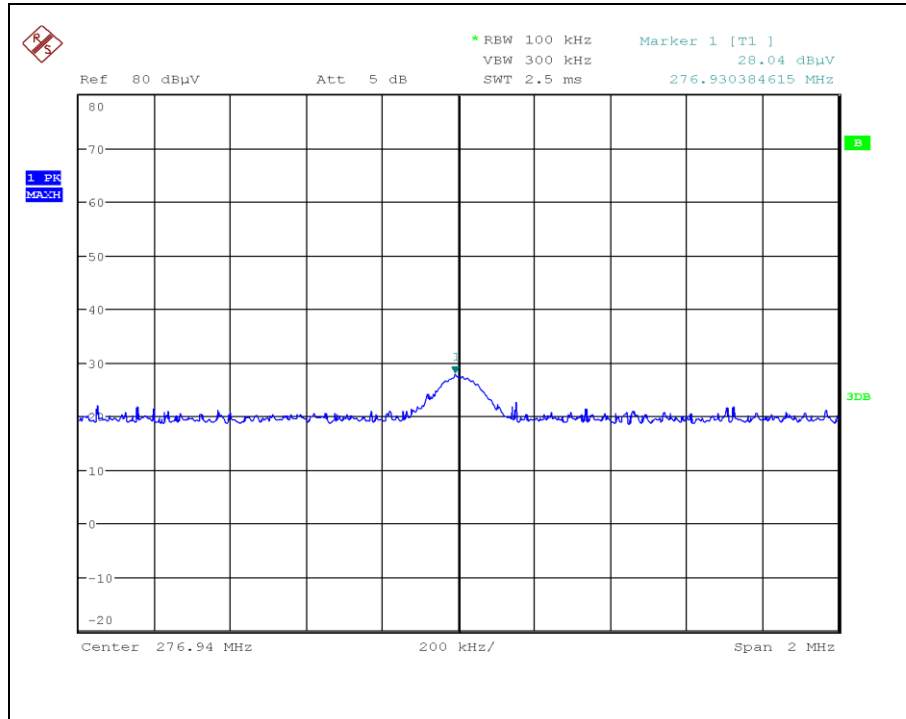


Test Report No.: NW2203-F001

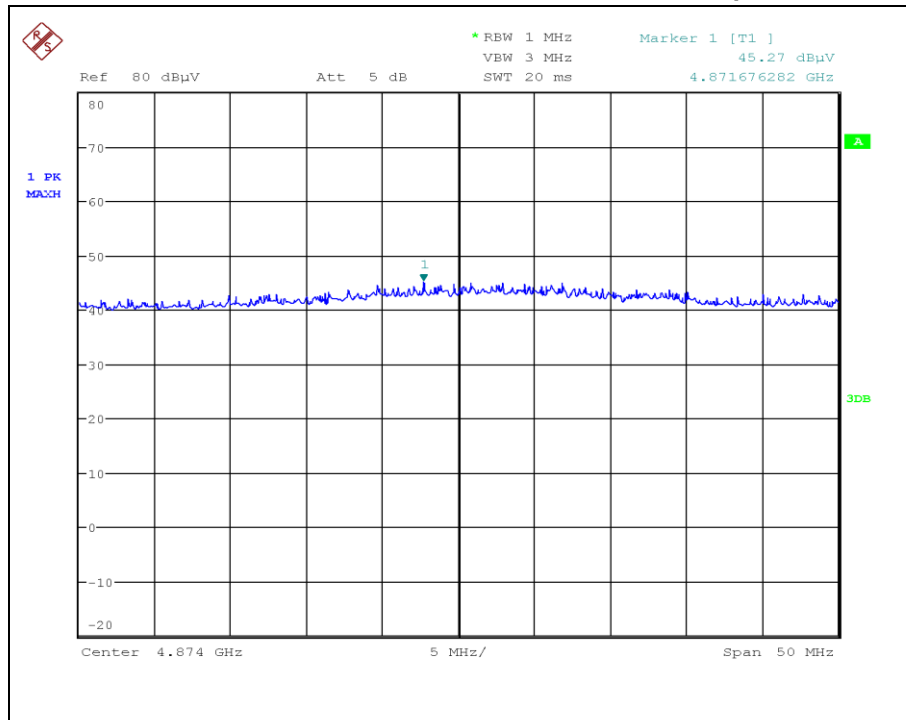
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www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

● 802.11n_HT20 _ Middle frequency

Spurious - Peak



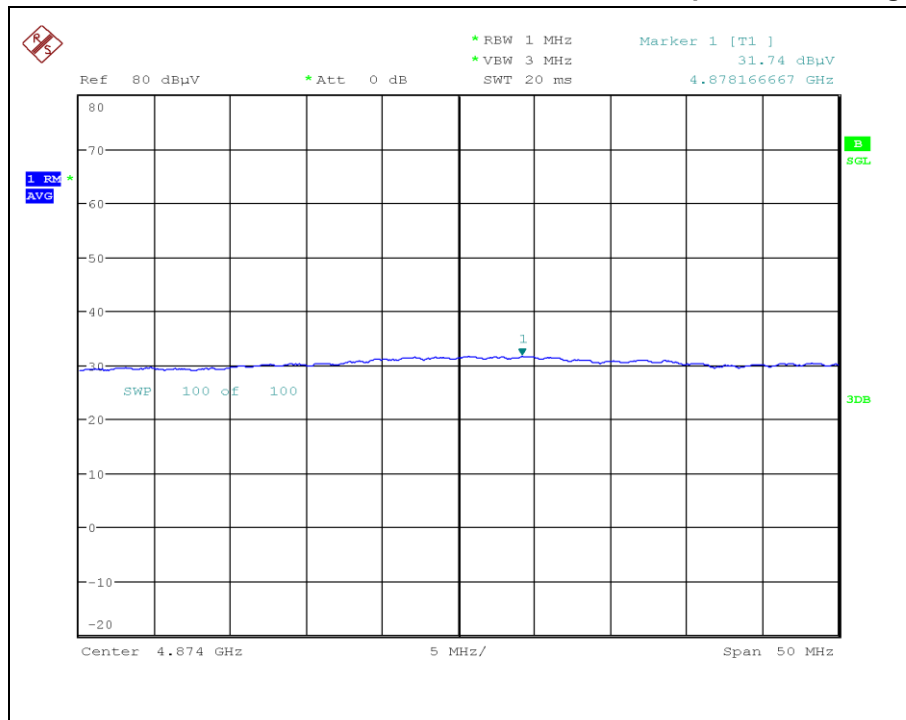
Spurious - Peak



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www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

Spurious - Average

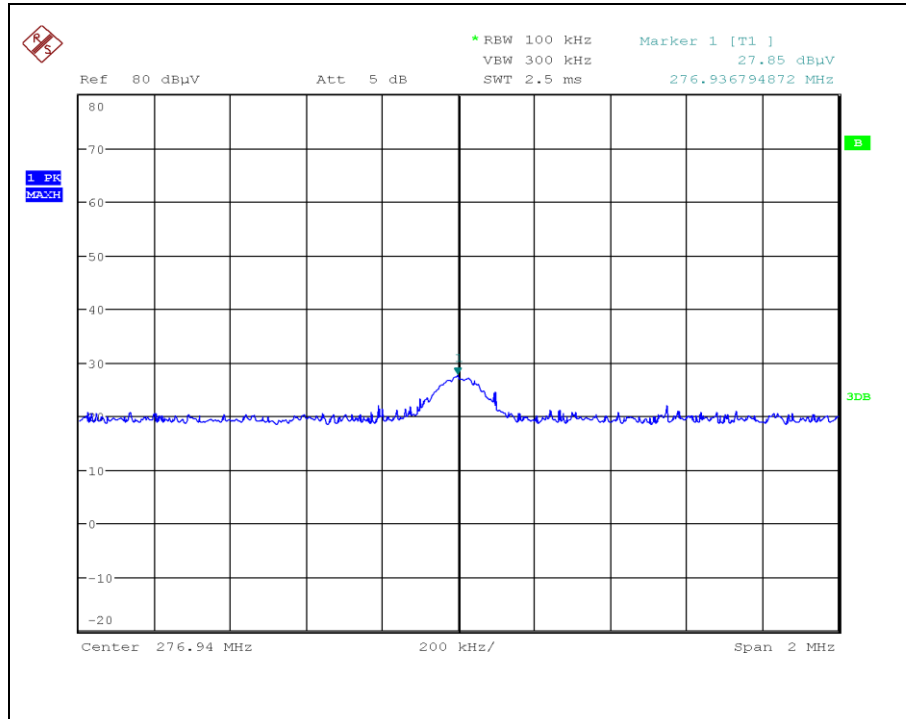


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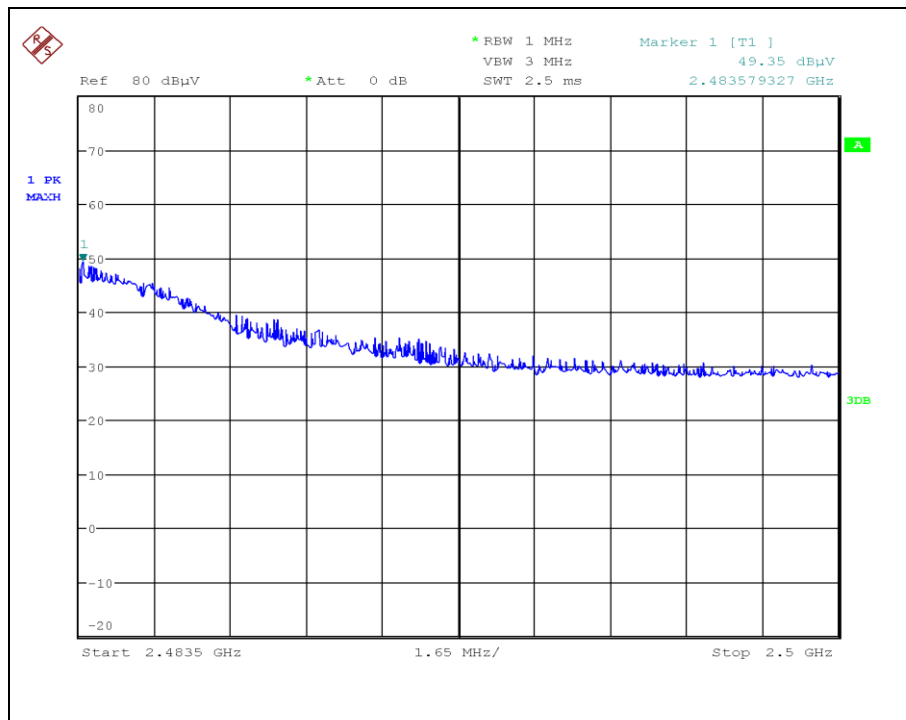
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

- 802.11n_HT20_High frequency

Spurious - Peak



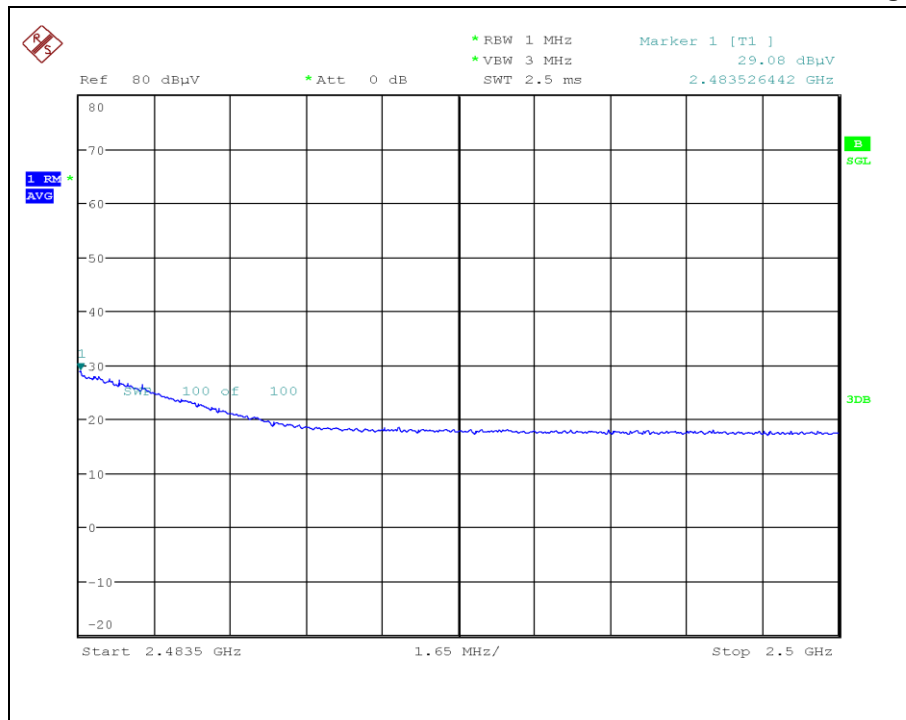
Restricted Band - Peak



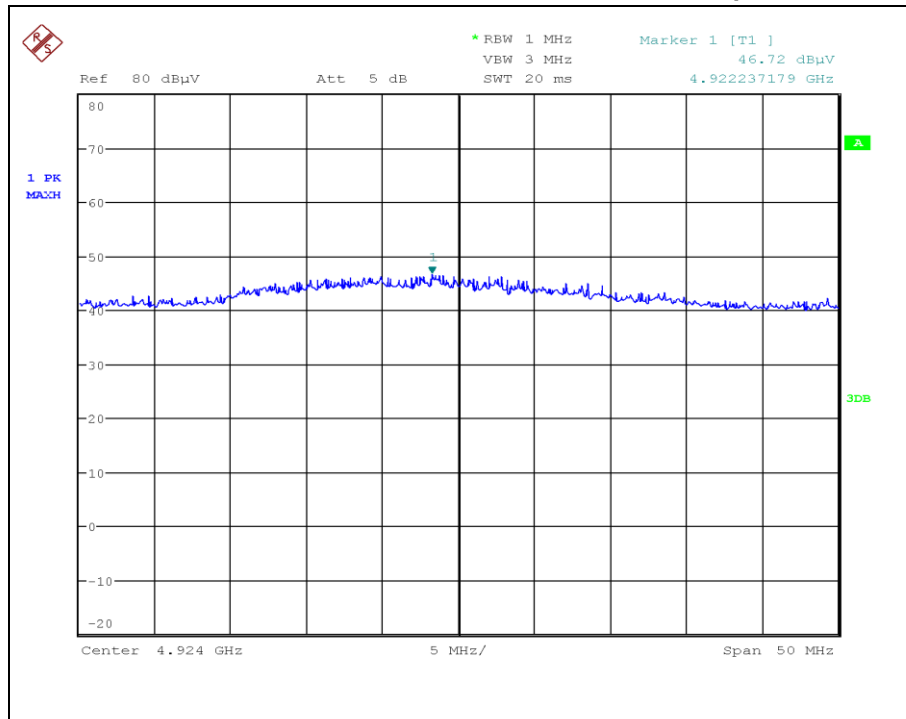
Test Report No.: NW2203-F001

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Restricted Band - Average



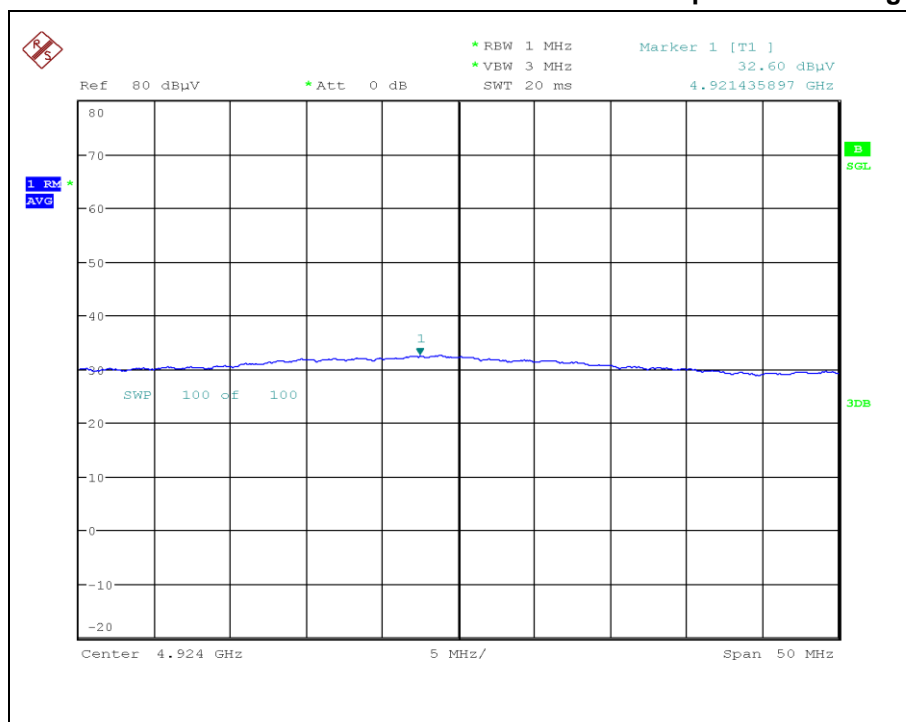
Spurious - Peak



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Spurious - Average



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3.3.3 Conducted Emission

3.3.3.1 Test Setup

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

3.3.3.2 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 μ H/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

3.3.3.3 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 $\times$ 3.5 m $\times$ 3.5 m (L $\times$ W $\times$ H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) $\times$ 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.

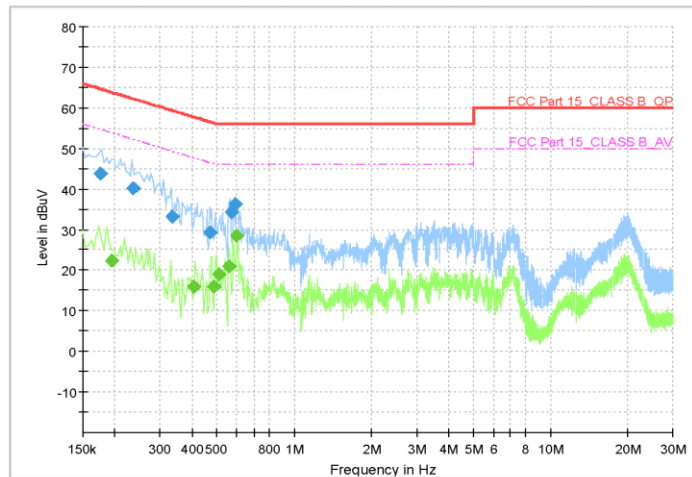
3.3.3.4 Test Result

- AC Line Conducted Emission (Graph)

Test Report

Common Information

Test Model: MMS1
Test Standard: FCC Part 15
Test Mode: WLAN
Test Conditions: AC 120 V, 60 Hz / 24.2 °C, 48.9 % R. H.
Operator Name: JongMyoung, Shin
Comment: LINE
Order Number: -



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.176000	43.78	---	64.67	20.89	1000.0	9.000	L1	10.3
0.194000	---	22.32	53.86	31.54	1000.0	9.000	L1	10.2
0.236000	40.28	---	62.24	21.95	1000.0	9.000	L1	10.2
0.336000	33.12	---	59.30	26.19	1000.0	9.000	L1	10.2
0.408000	---	15.91	47.69	31.78	1000.0	9.000	L1	10.3
0.470000	29.22	---	56.51	27.29	1000.0	9.000	L1	10.2
0.486000	---	15.98	46.24	30.25	1000.0	9.000	L1	10.2
0.508000	---	18.98	46.00	27.02	1000.0	9.000	L1	10.2
0.556000	---	20.82	46.00	25.18	1000.0	9.000	L1	10.2
0.570000	34.40	---	56.00	21.60	1000.0	9.000	L1	10.2
0.592000	36.30	---	56.00	19.70	1000.0	9.000	L1	10.2
0.596000	---	28.39	46.00	17.61	1000.0	9.000	L1	10.2

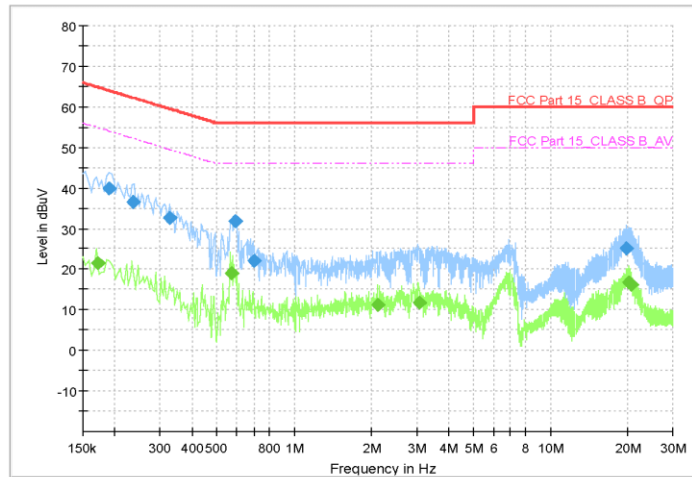
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Test Report

Common Information

Test Model: MMS1
Test Standard: FCC Part 15
Test Mode: WLAN
Test Conditions: AC 120 V, 60 Hz / 24.2 °C, 48.9 % R. H.
Operator Name: JongMyoung, Shin
Comment: NEUTRAL
Order Number: -



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.172000	---	21.41	54.86	33.46	1000.0	9.000	N	10.3
0.190000	39.80	---	64.04	24.24	1000.0	9.000	N	10.2
0.236000	36.59	---	62.24	25.65	1000.0	9.000	N	10.2
0.328000	32.52	---	59.50	26.98	1000.0	9.000	N	10.2
0.572000	---	19.09	46.00	26.91	1000.0	9.000	N	10.2
0.592000	31.89	---	56.00	24.11	1000.0	9.000	N	10.2
0.696000	22.02	---	56.00	33.98	1000.0	9.000	N	10.2
2.112000	---	11.15	46.00	34.85	1000.0	9.000	N	10.3
3.070000	---	11.67	46.00	34.33	1000.0	9.000	N	10.4
19.836000	25.26	---	60.00	34.74	1000.0	9.000	N	11.5
20.252000	---	16.88	50.00	33.12	1000.0	9.000	N	11.5
20.556000	---	16.24	50.00	33.76	1000.0	9.000	N	11.5

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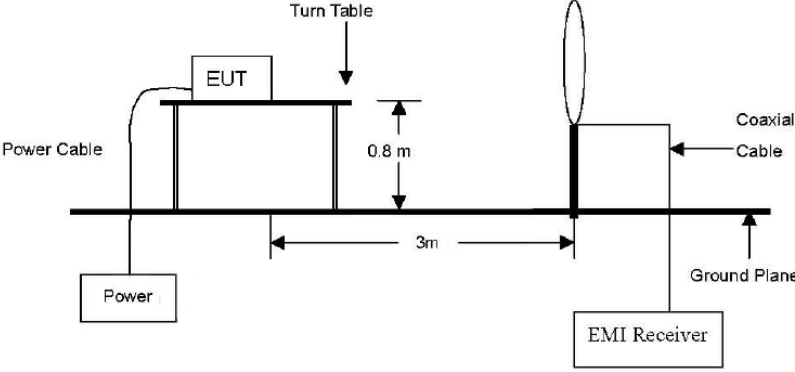
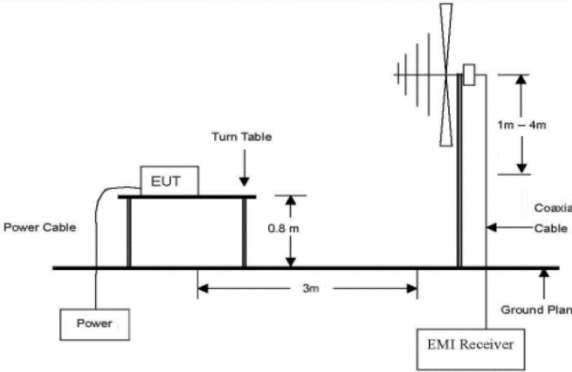
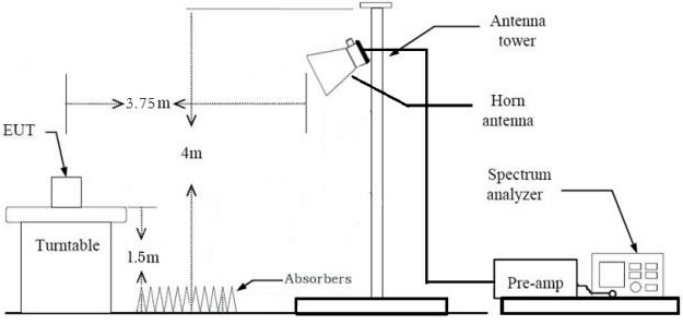
APPENDIX I

TEST SETUP

Test Repot No.: NW2203-F001

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● Radiated Measurement

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

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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	2021-09-29	2022-09-29
2	Triple Output DC Power Supply	Agilent	MY40038816	E3631A	2022-03-07	2023-03-07
3	Humi./Baro/Temp. data recorder	Lutron	38420	MHB-382SD	2021-11-17	2022-11-17
4	LOOP-ANTENNA	Schwarzbeck	00124	FMZB1519 B	2021-06-01	2023-06-01
5	TRILOG Broadband Antenna	Schwarzbeck	01027	VULB 9168	2021-06-08	2023-06-08
6	Double Ridged Broadband Horn Antenna	Schwarzbeck	02087	BBHA 9120D	2021-06-02	2022-06-02
7	Broadband Horn Antenna	Schwarzbeck	00938	BBHA 9170	2021-06-01	2022-06-01
8	AMPLIFIER	TESTEK	160011-L	TK-PA18M	2021-05-24	2022-05-24
9	Amplifier	TESTEK	190008-L	TK-PA1840H	2021-05-28	2022-05-28
10	High Pass Filter	WT Microwave INC	WT210907-1-2	WT-A3289-HS	2021-09-24	2022-09-24
11	LISN	Schwarzbeck	00984	NSLK 8127	2021-05-27	2022-05-27
12	EMI Test Receiver	R&S	102116	ESRP3	2021-05-27	2022-05-27

Test Report No.: NW2203-F001

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APPENDIX III

DUTY CYCLE CORRECTION FACTOR

Test Repot No.: NW2203-F001

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Test Procedure

Duty Cycle $[X = \text{On Time} / (\text{On} + \text{Off time})]$ is measured using Measurement Procedure of KDB558074 D01v05r02

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW $\geq$ OBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW $\geq$ RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$, where T is defined in section II.B.1.a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)
 T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
 (T = On time of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

Test Result

Test Mode	Data Rate	Test Channel	Maximum Achievable Duty Cycle (x) = On / (On+Off)			Duty Cycle Correction Factor (dB)	50/T (kHz)
			On Time (ms)	(On+Off) Time (ms)	Duty Cycle (x)		
802.11b	11 Mbps	1	8.600	8.720	0.986	0.06	5.81
802.11g	54 Mbps	1	1.430	1.534	0.932	0.30	34.97
802.11n _HT20	MCS 7	1	1.334	1.438	0.928	0.33	37.48

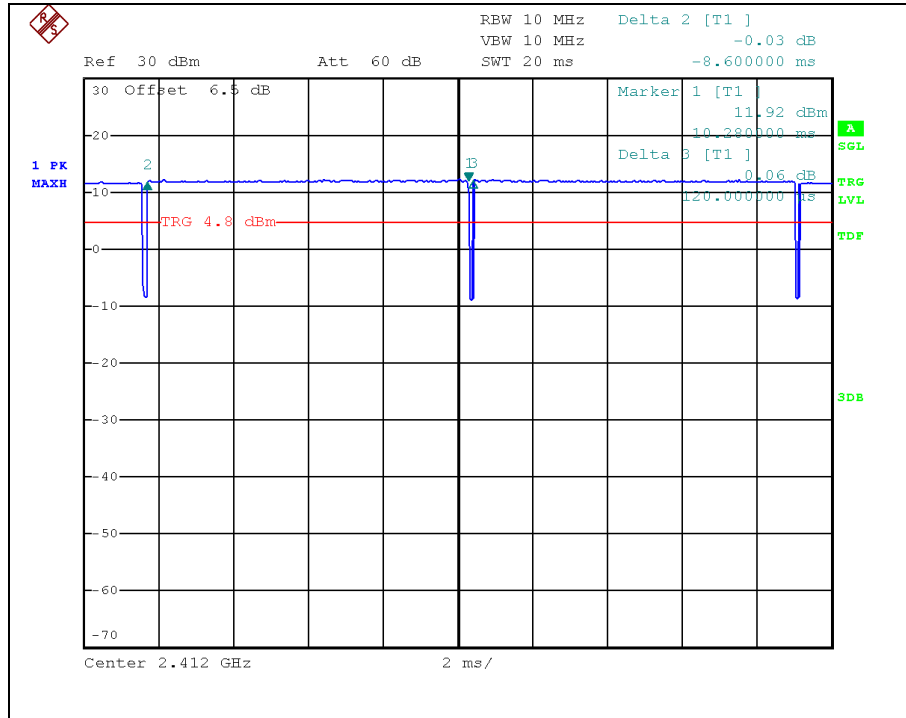
Test Report No.: NW2203-F001

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Test Plot

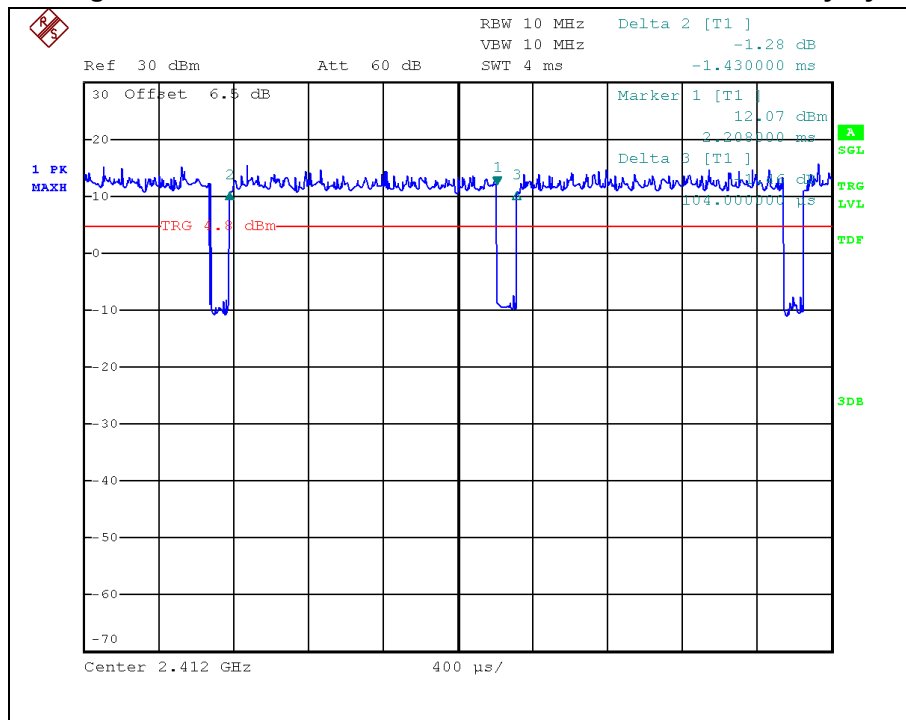
802.11b

Duty Cycle



802.11g

Duty Cycle

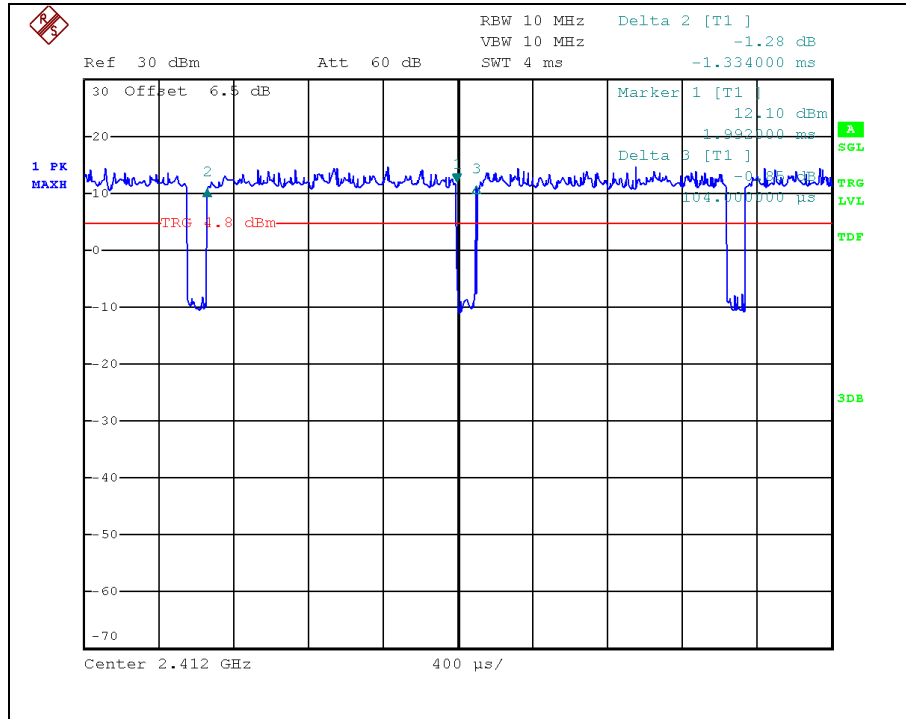


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802.11n_HT20

Duty Cycle



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