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.: NW2006-F001 Page (1) / (37)	Your business' success starts with NCT

1. **Client**
   - ○ Name : IDRO Co.,Ltd.
   - ○ Address : 219, 17, (ACE Guangkyo Tower1), 17, Daehak 4-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea
   - ○ Date of Receipt : 2020-05-07

2. **Use of Report :** FCC Approval

3. **Test Sample**
   - ○ Description / Model Name : UHF Fixed Type 4 Port RFID Reader / IDRO900F
   - ○ FCC ID : XVY-IDRO900F-V2

4. **Date of Test :** 2020-05-11 ~ 2020-05-19

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** Jong-Myoung, Shin (signature)	**Technical Manager** Kyung-Taek, Lee (signature)

June 04, 2020

NCT CO., LTD. (seal)

Table of contents

1. General Information ---------- 3

2. Information's about Test Item ---------- 3

3. Test Report ---------- 5

3.1 Test Summary ---------- 5

3.2 Test Report Version ---------- 6

3.3 Transmitter Requirements

3.3.1 Antenna Requirement ---------- 7

3.3.2 20 dB Bandwidth ---------- 8

3.3.3 Number of Hopping Frequencies ---------- 11

3.3.4 Time of Occupancy (Dwell Time) ---------- 13

3.3.5 Carrier Frequencies Separation ---------- 15

3.3.6 Peak Output Power ---------- 17

3.3.7 TX Radiated Spurious Emission and Conducted Spurious Emission --------- 20

3.3.8 Conducted Emission ---------- 31

APPENDIX

APPENDIX I TEST SETUP ---------- 34

APPENDIX II TEST EQUIPMENT USED FOR TESTS ---------- 36

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

2. Information's about Test Item

2.1 Applicant Information

Company name	:	IDRO Co.,Ltd.
Address	:	219, 17, (ACE Guangkyo Tower1), 17, Daehak 4-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea
Telephone / Facsimile	:	+82-31-225-7883 / -

2.2 Equipment Under Test (EUT) description

Test item particulars	:	UHF Fixed Type 4 Port RFID Reader
Model and/or type reference	:	IDRO900F
Additional model name	:	-
Serial number	:	Identification
Antenna type and gain	:	Patch Antenna(M/N: IDRO260-915) Max Gain 8.65 dBic
Date (s) of performance of tests:	:	2020-05-11 ~ 2020-05-19
Date of receipt of test item	:	2020-05-07
EUT condition	:	Pre-production, not damaged
Number of channel	:	50
EUT Power Source	:	DC 12.0 V
Type of Modulation	:	A1D
FirmWare version	:	1.0
Hardware version	:	1.0
Test software name(version)	:	Reader@Express V20.03.11

2.3 Tested Frequency

Test Mode	Test frequency (㎒)		
	Low frequency	Middle frequency	High frequency
RFID (900 ㎒ FHSS)	902.75	915.25	927.25

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

3. Test Report

3.1 Test Summary

Applied	Test Items	Clause	Test Condition	Result
☒	Antenna Requirement	15.203	Conducted	C
☒	20 dB Bandwidth	15.247(a)		C
☒	Number of Hopping Frequencies	15.247(a)		C
☒	Time of Occupancy (Dwell Time)	15.247(a)		C
☒	Carrier Frequencies Separation	15.247(a)		C
☒	Peak Output Power	15.247(b)		C
☒	Conducted Spurious Emission	15.247(d)		C
☒	Radiated Spurious Emission	15.247(d) 15.205 & 15.209	Radiated	C note2
☒	Conducted Emissions	15.207	AC Line Conducted	C

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

Note 2: This test item was performed in each axis and the worst case data was reported.

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.

3.2 Test Report Version

Test Report No.	Date	Description
NW2006-F001	2020-06-04	Initial issue

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

3.3 Transmitter Requirements

3.3.1 Antenna Requirement

Accoding 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.

Accoding to §15.247(b)(4) e 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 Patch Antenna. The directional peak gain of the antenna is 8.65 dBic.)

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

3.3.2 20 dB Bandwidth

3.3.2.1 Test Setup

Refer to the APPENDIX I.

3.3.2.2 Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

3.3.2.3 Test Procedure

1. The 20 dB bandwidth were measured with a spectrum analyzer connected to RF antenna Connector (conducted measurement) while EUT was operating in transmit mode. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer.

2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using below setting:
   RBW = 1% to 5% of the 20 dB BW
   VBW $\geq$ 3 $\times$ RBW
   Span = between two times and five times the 20 dB bandwidth
   Sweep = Auto
   Detector = Peak
   Trace = Max hold

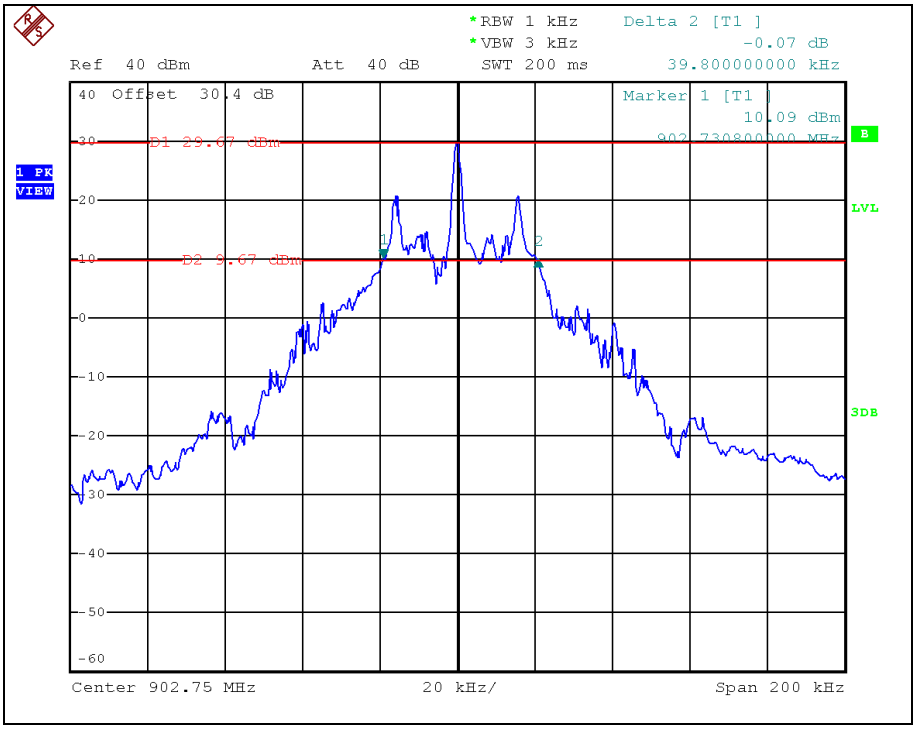
3.3.2.4 Test Result

Test Mode	Test Frequency	20 dB Bandwidth (MHz)
RFID	Low	0.039 8
	Middle	0.039 4
	High	0.039 8

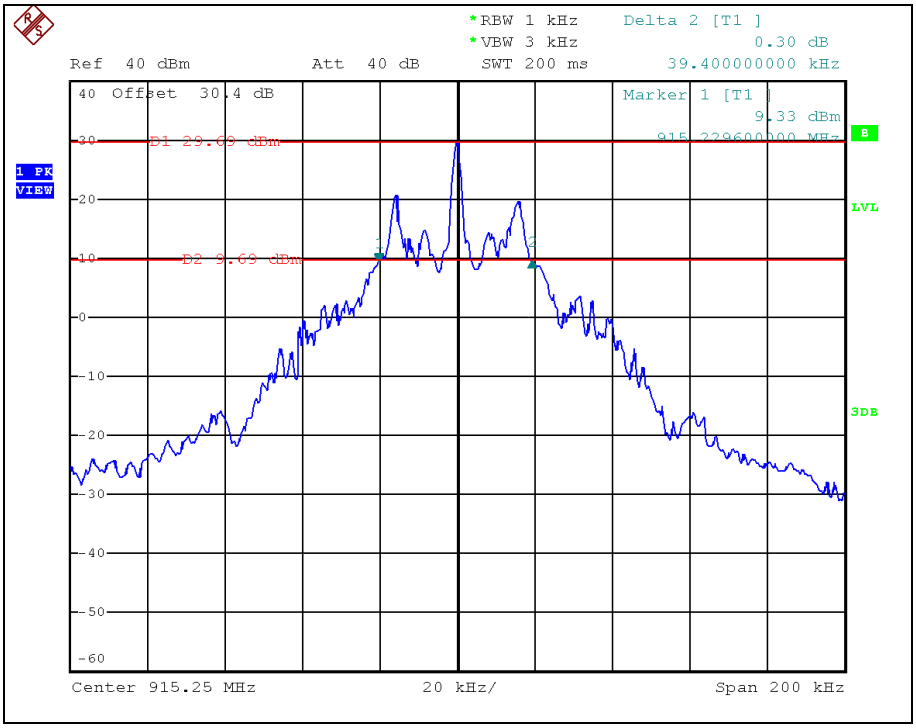
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

3.3.2.5 Test Plot

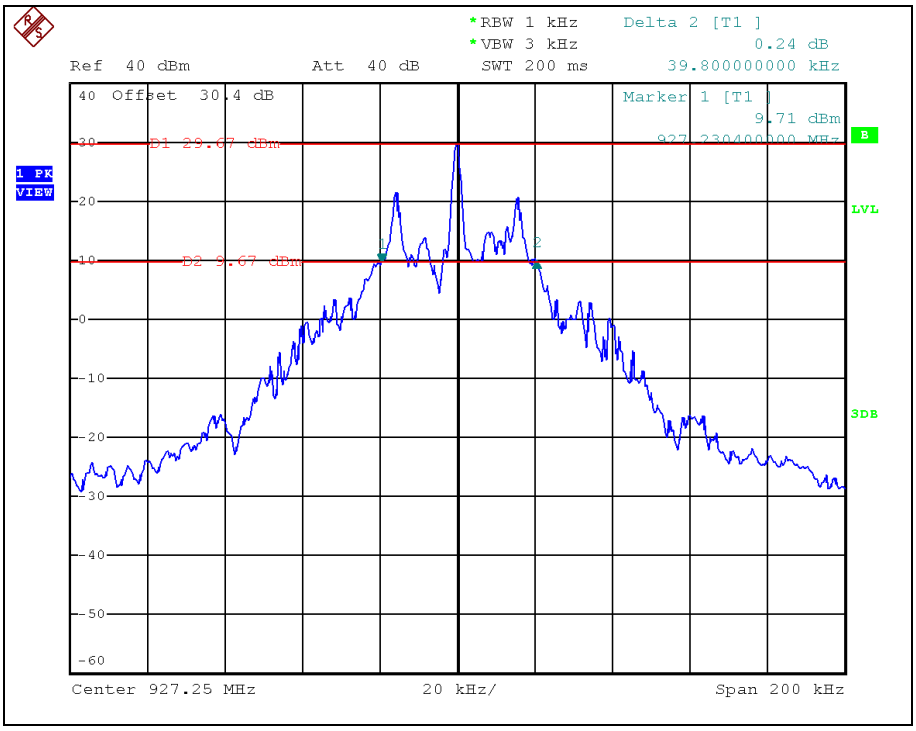
RFID _ Low frequency **20 dB Bandwidth**



RFID _ Middle frequency **20 dB Bandwidth**



RFID _ High frequency **20 dB Bandwidth**



3.3.3 Number of Hopping Frequencies

3.3.3.1 Test Setup

Refer to the APPENDIX I.

3.3.3.2 Limit

Limit : >= 50 hops

3.3.3.3 Test Procedure

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.
To get higher resolution, two frequency ranges for FH mode within the 902 ~ 928 ㎒ were examined.

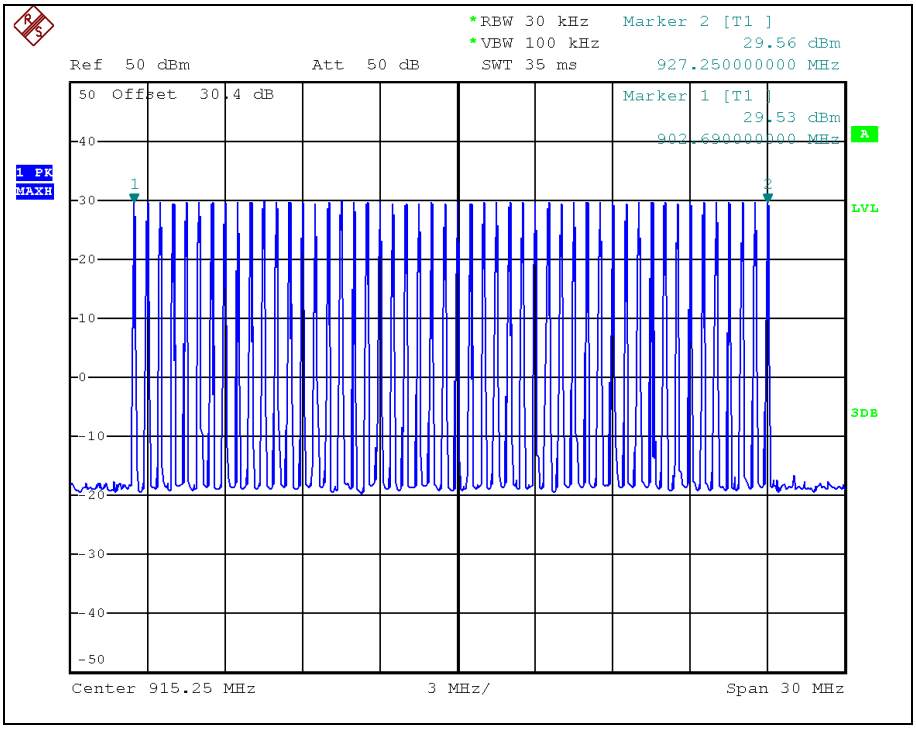
The spectrum analyzer is set to:
Span = 30 ㎒
RBW = To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 ㏈ bandwidth, whichever is smaller.
VBW ≥ RBW
Sweep = Auto
Detector = Peak
Trace = Max hold

3.3.3.4 Test Result

Test Mode	Number of Hopping Channels
RFID	50

3.3.3.5 Test Plot

RFID _ Hopping Mode **Number of Hopping Frequencies**



3.3.4 Time of Occupancy (Dwell Time)

3.3.4.1 Test Setup

Refer to the APPENDIX I.

3.3.4.2 Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

3.3.4.3 Test Procedure

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

The spectrum analyzer is set to:
Center frequency = 915.25 ㎒ Span = Zero
RBW = 100 ㎑ (RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel)
VBW ≥ RBW Detector = Peak
Trace = Max hold

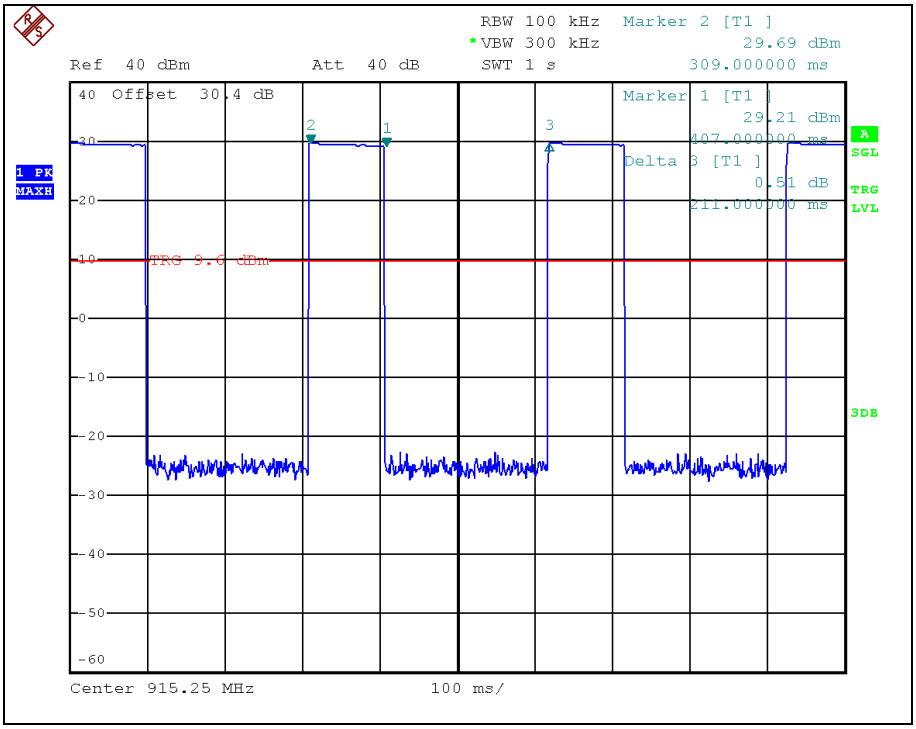
3.3.4.4 Test Result

Test Frequency (㎒)	Length (ms)	Number	Dwell Time (ms)
919.25	98	2	196

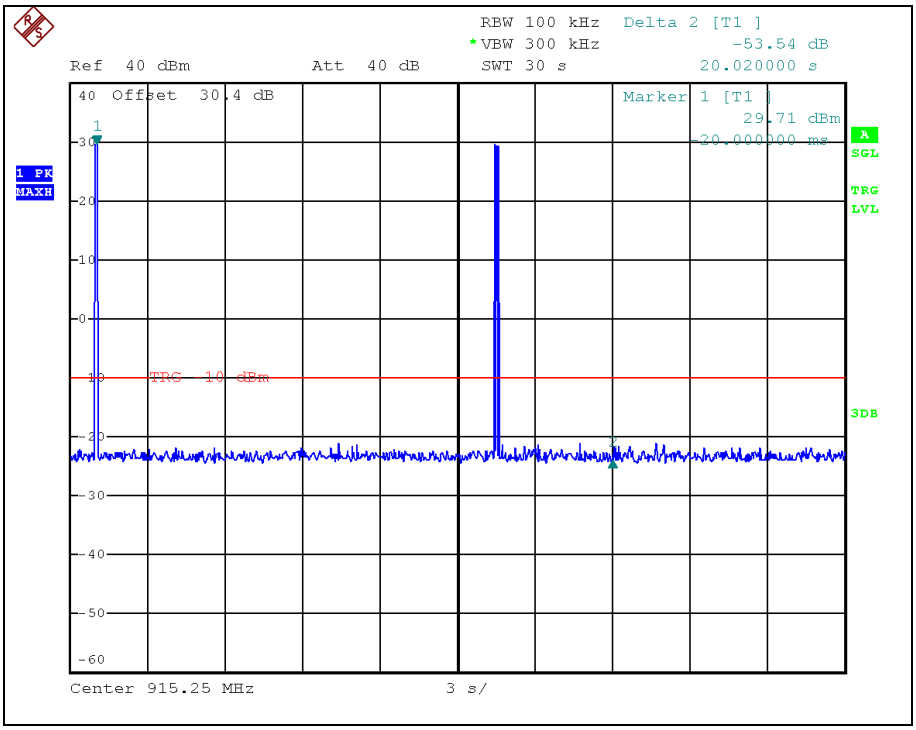
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

3.3.4.5 Test Plot

RFID **Length**



RFID **Number**



3.3.5 Carrier Frequencies Separation

3.3.5.1 Test Setup

Refer to the APPENDIX I.

3.3.5.2 Limit

Limit : ≥ 25 ㎑ or ≥ 20 ㏈ BW whichever is greater.

3.3.5.3 Test Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.
After the trace being stable, the reading value between the peaks of the adjacent channels using the marker delta function was recorded as the measurement results.

The spectrum analyzer is set to:
Span = wide enough to capture the peaks of two adjacent channels
RBW = Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
VBW ≥ RBW
Sweep = Auto
Detector = Peak
Trace = Max hold

3.3.5.4 Test Result

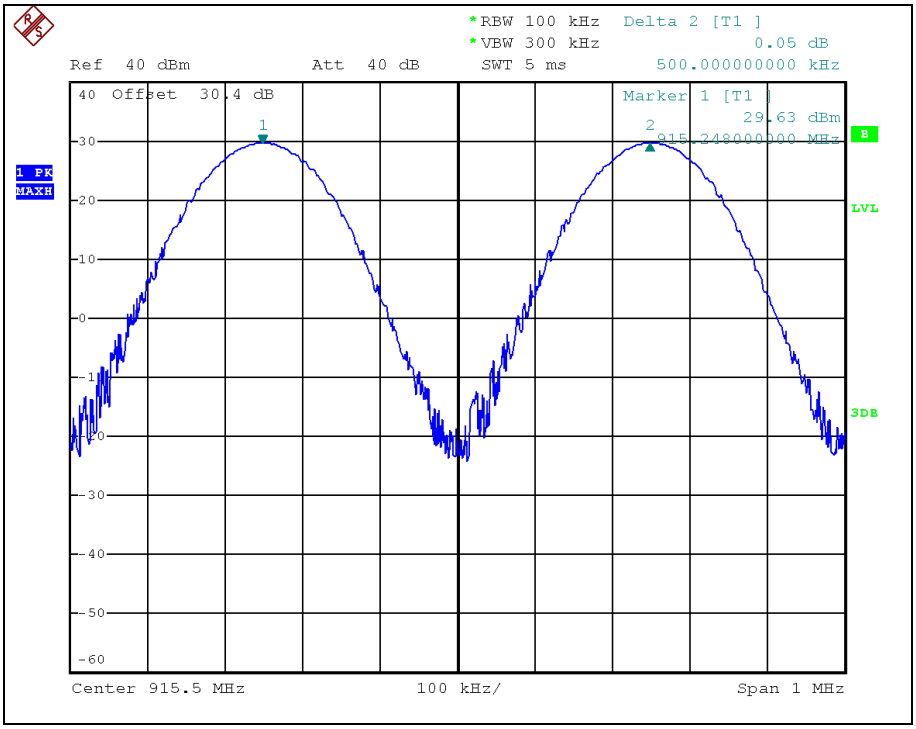
Test Mode	Carrier Frequencies Separation (㎒)	Min. Limit (㎒)
RFID	0.500 0	0.039 8

Note: Limit(㎑) = Test Result of 20 ㏈ BW

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

3.3.5.5 Test Plot

RFID **Carrier Frequency Separation**



3.3.6 Peak Output Power

3.3.6.1 Test Setup

Refer to the APPENDIX I.

3.3.6.2 Limit

The maximum peak output power of the intentional radiator shall not exceed the following:
1. §15.247(b)(2), For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

3.3.6.3 Test Procedure

1. The RF output power was measured with a spectrum analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, a spectrum analyzer was used to record the shape of the transmit signal.
2. The peak output power of the fundamental frequency was measured with the spectrum analyzer using;
   Span = approximately 5 times of the 20 dB bandwidth, centered on a hopping channel
   RBW ≥ 20 dB BW
   VBW ≥ RBW
   Sweep = Auto
   Detector function = Peak
   Trace = Max hold

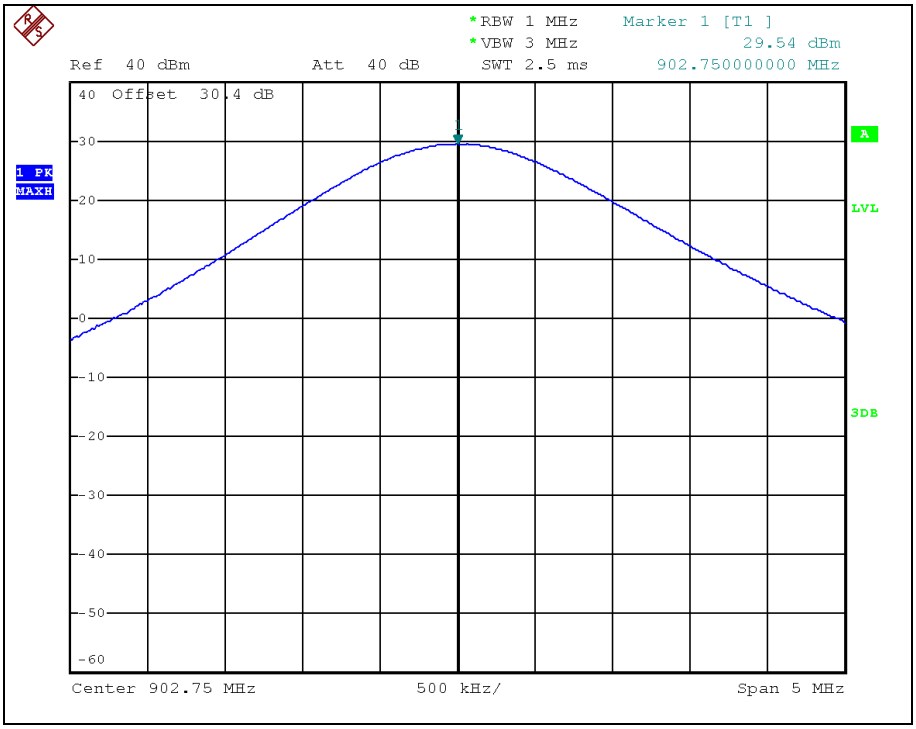
3.3.6.4 Test Result

Test Mode	Test Frequency	Peak Output Power							
		Port1 (dBm)	Port2 (dBm)	Port3 (dBm)	Port4 (dBm)	Port1 (mW)	Port2 (mW)	Port3 (mW)	Port4 (mW)
RFID	Low	29.49	**29.54**	29.52	29.51	889.20	**899.50**	895.36	893.31
	Middle	29.53	**29.53**	29.52	29.50	897.43	**897.43**	895.36	891.25
	High	29.51	**29.53**	29.48	29.49	893.31	**897.43**	887.16	889.20

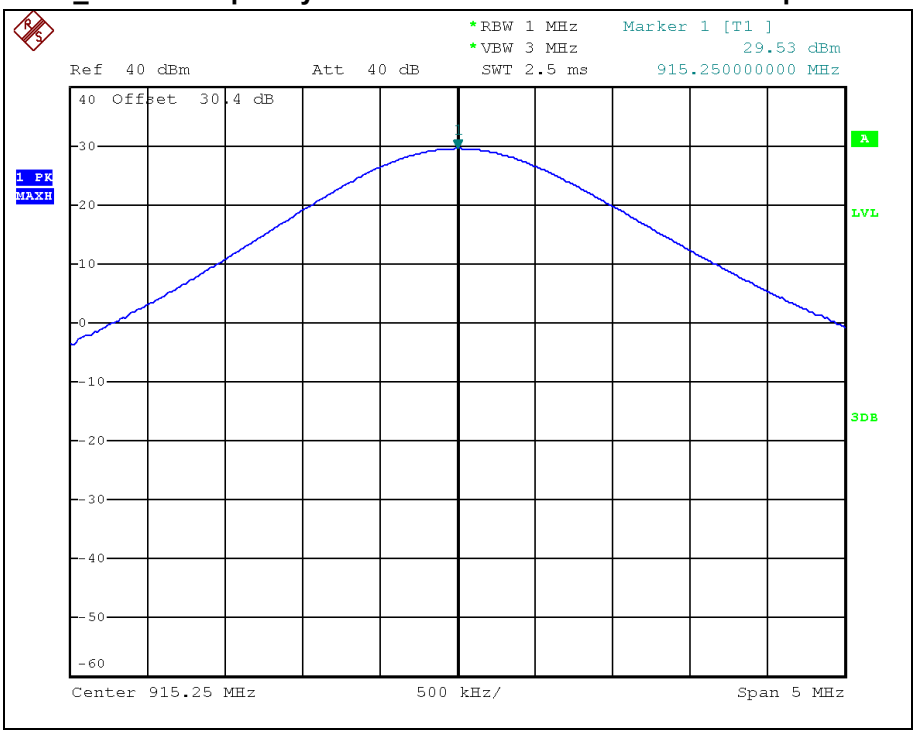
Note: See next pages for actual measured spectrum plots.

3.3.6.5 Test Plot

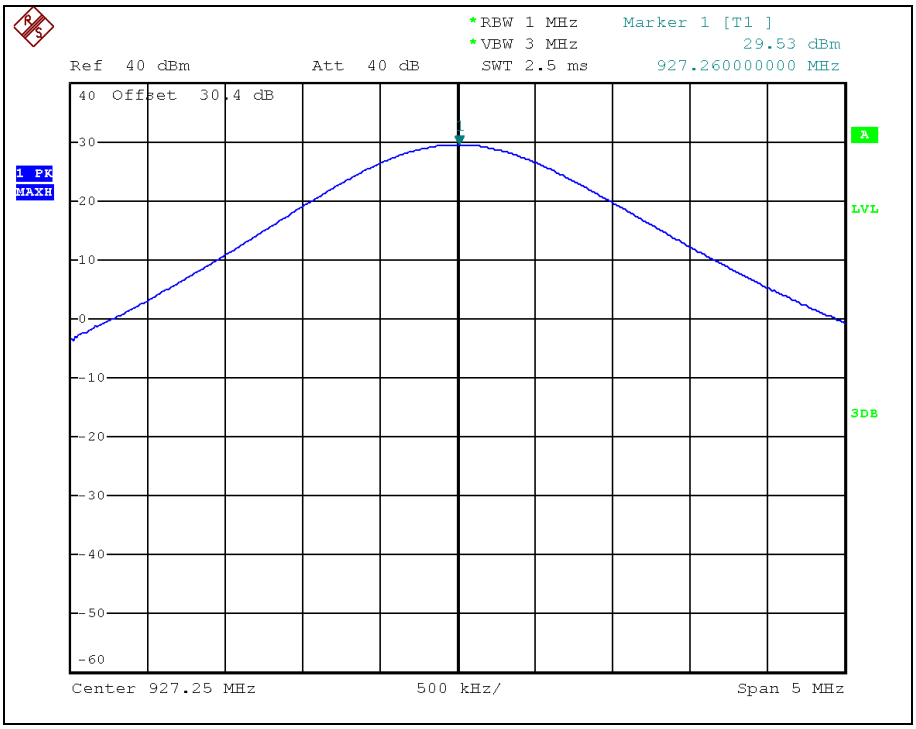
RFID _ Low frequency **Peak Output Power**



RFID _ Middle frequency **Peak Output Power**



RFID _ High frequency **Peak Output Power**



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

3.3.7 TX Radiated Spurious Emission and Conducted Spurious Emission

3.3.7.1 Test Setup

Refer to the APPENDIX I.

3.3.7.2 Limit

According to §15.247(d), in any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 ㏈ below that in the 100 ㎑ bandwidth within the band that contains the highest level of the desired power, 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 ㏈ instead of 20 ㏈. 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 (㎒)	Limit (uV/m)	Measurement Distance (meter)
0.009 ~ 0.490	2400/F (㎑)	300
0.490 ~ 1705	24000/F (㎑)	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 ㎒, 76 - 88 ㎒, 174 - 216 ㎒ or 470 – 806 ㎒. 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 ㎒, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 ㎒, 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.

3.3.7.3 Test Procedure for Radiated Spurious Emission

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 ㎓, the table height is 80 cm. For emission measurements above 1 ㎓, 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 ㎓, 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 ㎓, the EUT was set 1 or 3 meter away from the interference-receiving antenna.

3. For measurements above 1 ㎓ 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 ㎓, 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.

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 ㏈ 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 ㏈ 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 1 ㎓
   RBW = 100 or 120 ㎑, VBW = 3 x RBW, Detector = Peak or Quasi Peak

2. Frequency Range: Above 1 ㎓

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

   Average Measurement
   RBW = 1 ㎒, VBW ≥ 1/T(where, T=pulse width in second) , Detector = Peak, Sweep Time = Auto,
   Trace = Max hold until the trace stabilizes

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

3.3.7.4 Test Procedure for Conducted Spurious Emission

1. The transmitter output was connected to the spectrum analyzer.

2. The reference level of the fundamental frequency was measured with the spectrum analyzer using RBW = 100 ㎑, VBW = 300 ㎑.

3. The conducted spurious emission was tested each ranges were set as below.
   Frequency range: 9 ㎑ ~ 10 ㎓
   RBW = 100 ㎑, VBW = 300 ㎑, Sweep Time = Auto, Detector = Peak
   Trace = Max Hold

   LIMIT LINE = 20 ㏈ below of the reference level of above measurement procedure Step 2. (RBW = 100 ㎑, VBW = 300 ㎑)

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

3.3.7.5 Test Result

9 ㎑ ~ 10 ㎓ Data

- Low frequency

Frequency	Reading		Pol.	Factor	DCCF	Limits		Result		Margin	
	(dB uV/m)			(dB)	(dB)	(dB uV/m)		(dB uV/m)		(dB)	
(㎒)	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
1 805.50	69.41	72.20	H	-16.75	N/A	54.0	74.0	52.7	55.5	1.3	18.6
3 611.00	58.58	62.67	V	-13.13	N/A	54.0	74.0	45.5	49.5	8.6	24.5
4 513.75	50.15	55.90	V	-9.58	N/A	54.0	74.0	40.6	46.3	13.4	27.7
5 416.50	59.85	64.41	V	-7.11	N/A	54.0	74.0	52.7	57.3	1.3	16.7

- Middle frequency

Frequency	Reading		Pol.	Factor	DCCF	Limits		Result		Margin	
	(dB uV/m)			(dB)	(dB)	(dB uV/m)		(dB uV/m)		(dB)	
(㎒)	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
1 830.50	68.64	71.31	H	-16.95	N/A	54.0	74.0	51.7	54.4	2.3	19.6
3 661.00	59.26	63.85	V	-13.06	N/A	54.0	74.0	46.2	50.8	7.8	23.2
4 576.25	51.79	58.31	V	-9.52	N/A	54.0	74.0	42.3	48.8	11.7	25.2
5 491.50	60.05	64.56	V	-7.19	N/A	54.0	74.0	52.9	57.4	1.1	16.6

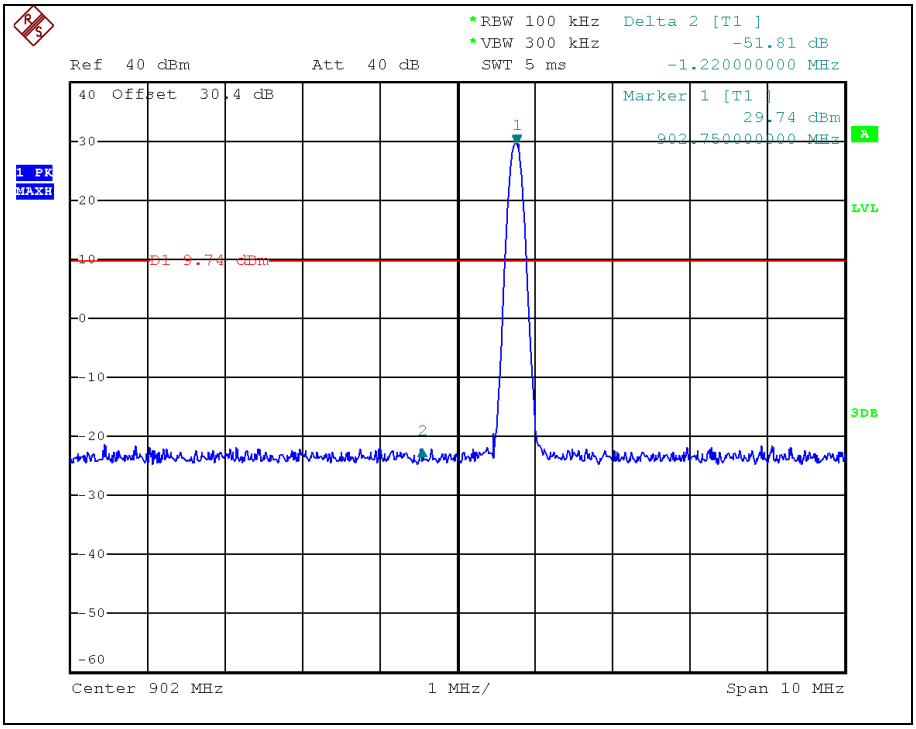
- High frequency

Frequency	Reading		Pol.	Factor	DCCF	Limits		Result		Margin	
	(dB uV/m)			(dB)	(dB)	(dB uV/m)		(dB uV/m)		(dB)	
(㎒)	AV / Peak					AV / Peak		AV / Peak		AV / Peak	
1 854.50	66.35	69.32	H	-16.75	N/A	54.0	74.0	49.6	52.6	4.4	21.4
3 709.00	59.33	64.61	V	-13.15	N/A	54.0	74.0	46.2	51.5	7.8	22.5
4 636.25	48.41	56.17	V	-9.27	N/A	54.0	74.0	39.1	46.9	14.9	27.1
5 563.50	58.88	63.34	V	-6.05	N/A	54.0	74.0	52.8	57.3	1.2	16.7

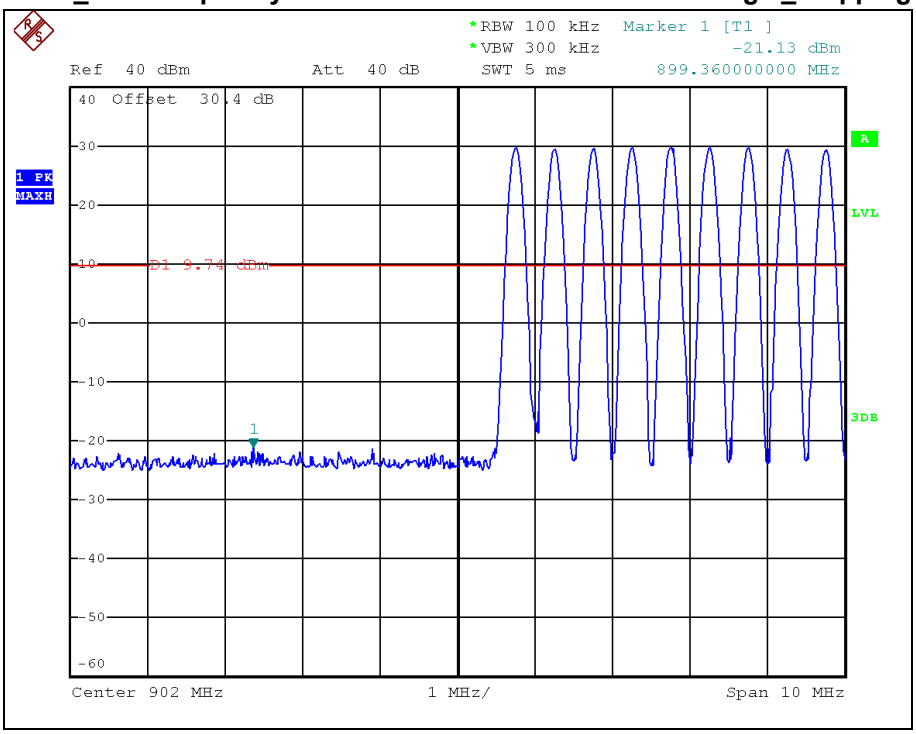
Note 1: The radiated emissions were inverstigated 9 ㎑ to 10 ㎓. And no other spurious and harmonic emissions were found above listed frequencies.
Note 2: DCCF(Duty Cycle Correction Factor)
Note 3: Sample Calculation.
Margin = Limit – Result / Peak Result = Peak Reading + TF / Average Result = Average Reading + TF
TF = Ant factor + Cable Loss + Filter Loss – Amp Gain

3.3.7.6 Test Plot for Conducted Spurious Emission

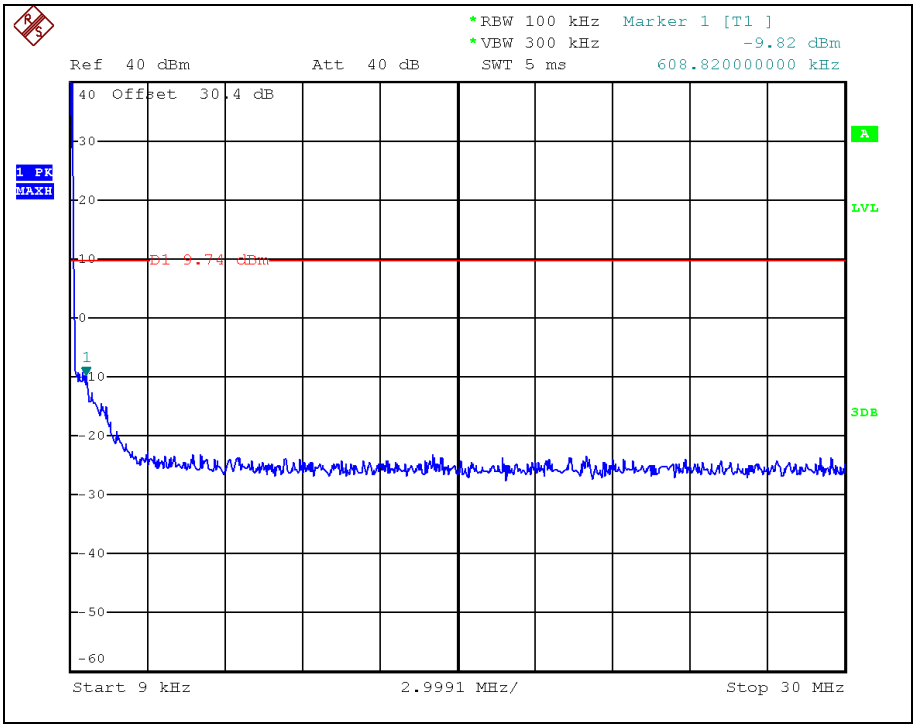
RFID _ Low frequency **Reference & Bandedge _ Single**



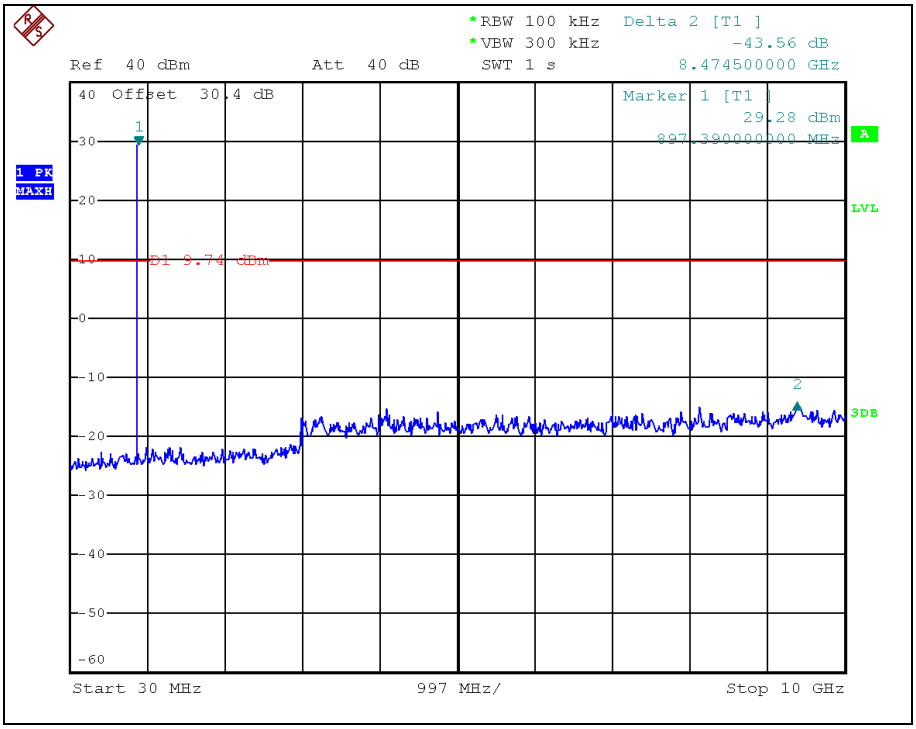
RFID _ Low frequency **Bandedge _ Hopping**



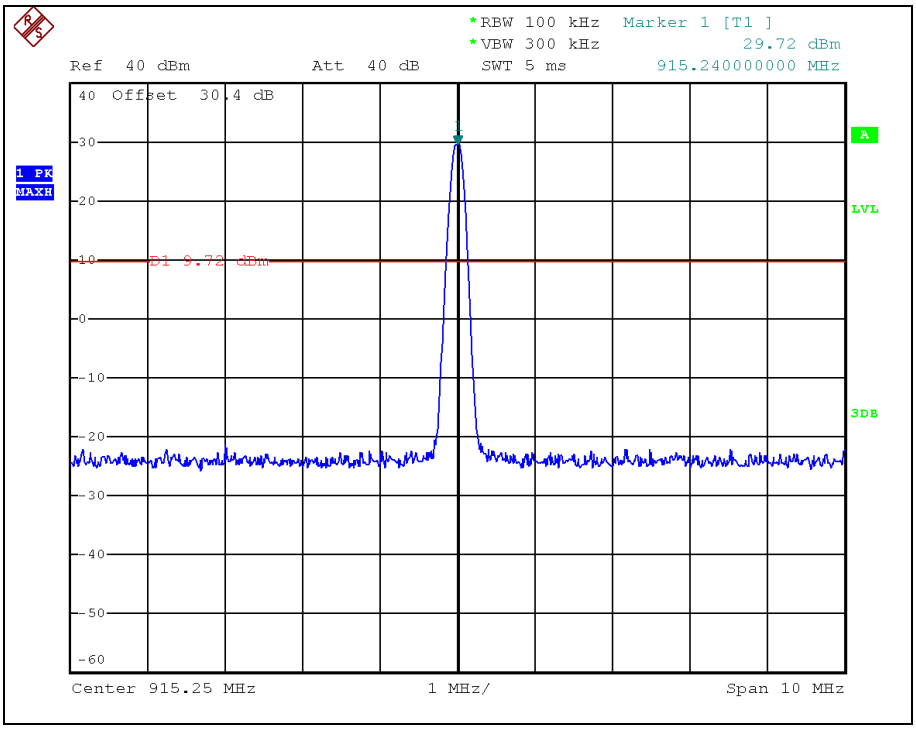
RFID _ Low frequency **Spurious**



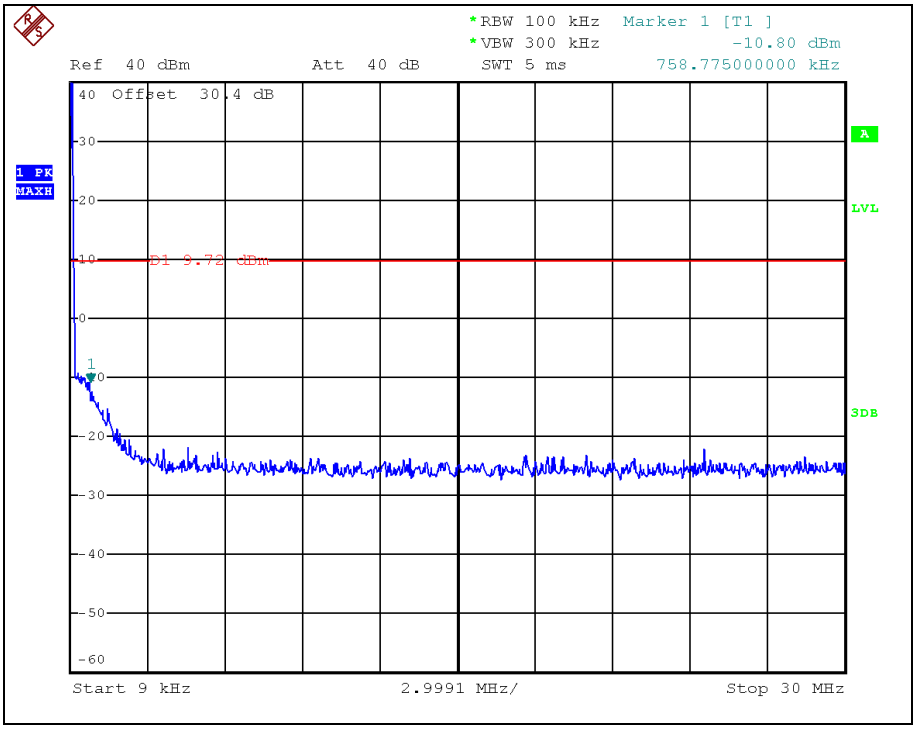
RFID _ Low frequency **Spurious**



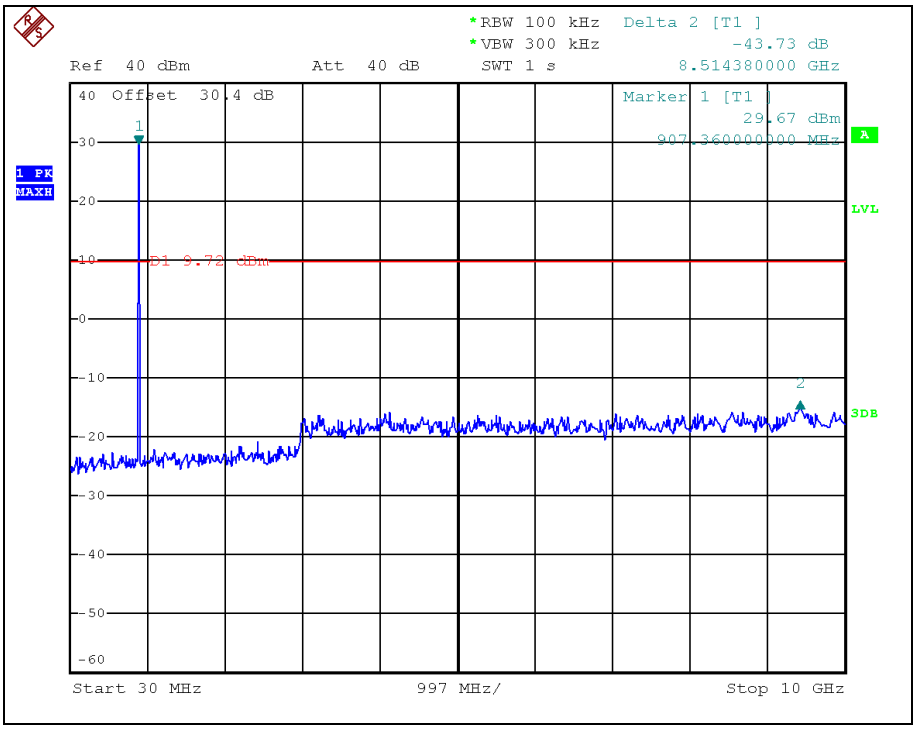
RFID _ Middle frequency **Reference**



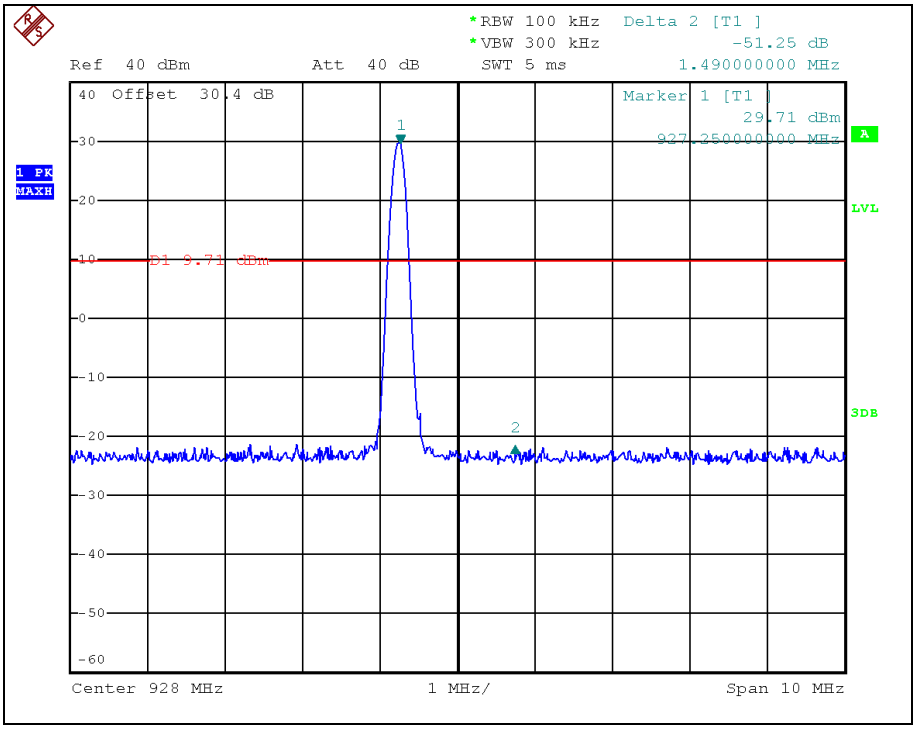
RFID _ Middle frequency **Spurious**



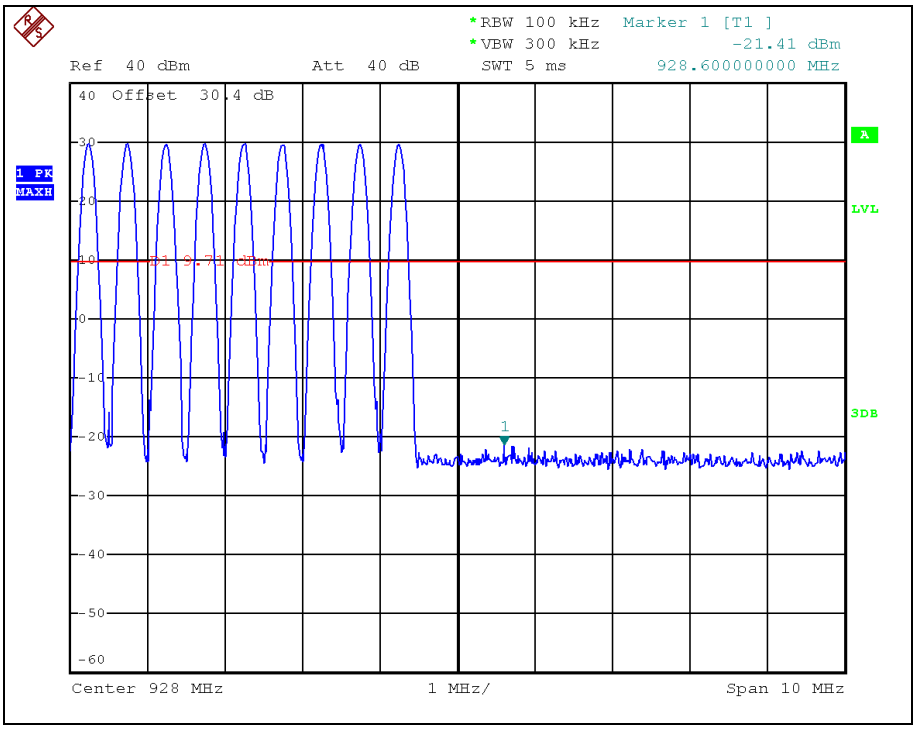
RFID _ Middle frequency **Spurious**



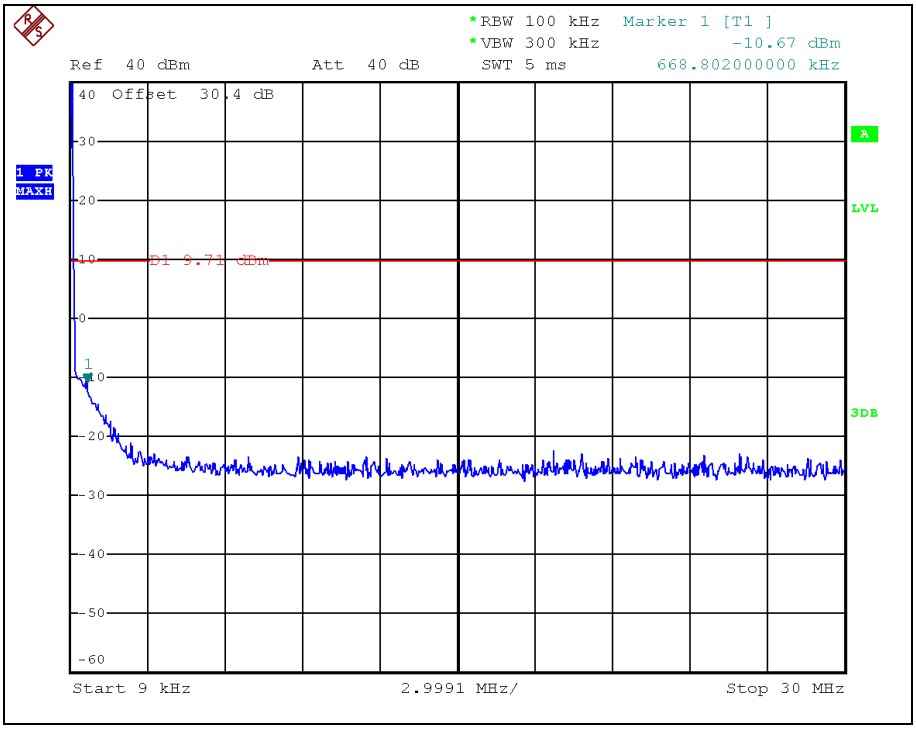
RFID _ High frequency **Reference & Bandedge _ Single**



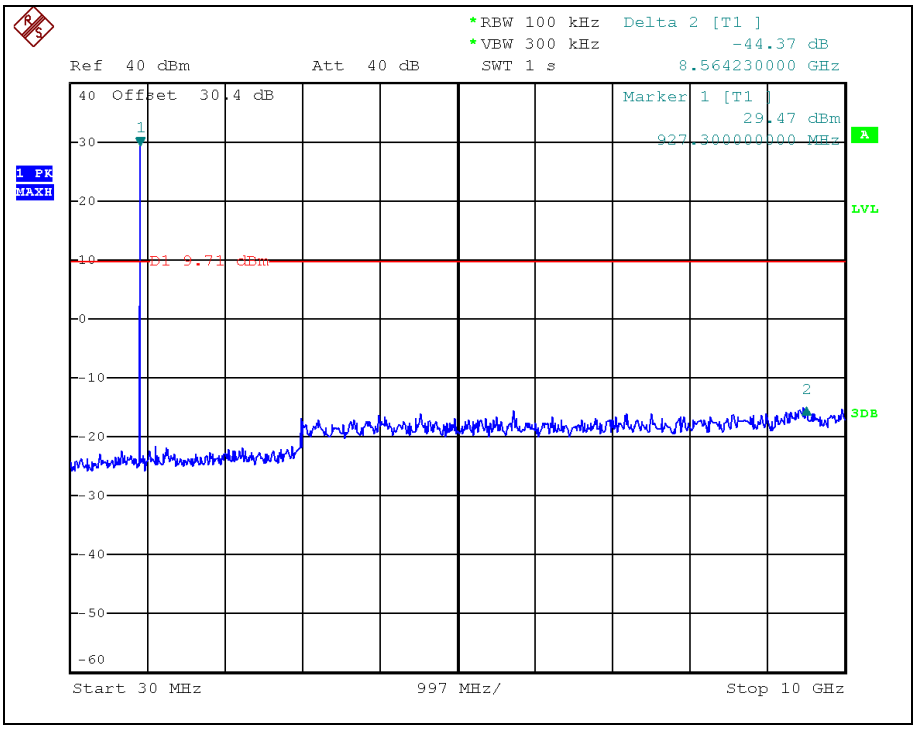
RFID _ High frequency **Bandedge _ Hopping**



RFID _ High frequency **Spurious**



RFID _ High frequency **Spurious**



3.3.8 Conducted Emission

3.3.8.1 Test Setup

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

3.3.8.2 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 ㎑ to 30 ㎒, 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 (㎒)	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

3.3.8.3 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.

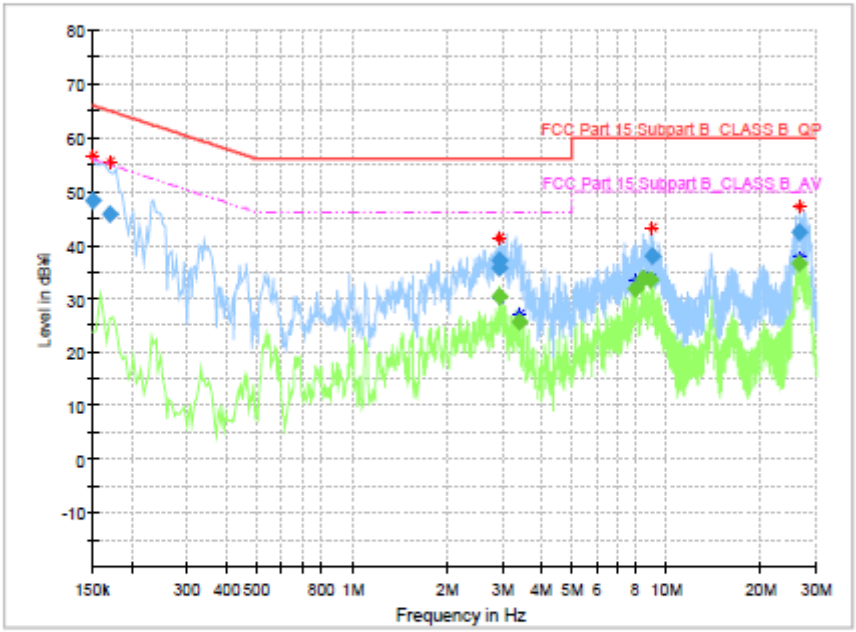
3.3.8.4 Test Result

- **AC Line Conducted Emission (Graph)**

Test Report

Common Information

Test Model:	IDRO900F
Test Standard:	FCC Part 15 Subpart B
Test Mode:	RFID
Test Conditions:	AC 120 V 60 Hz / 21.3 'C, 44.2 % R.H.
Operator Name:	JongMyoung, Shin
Comment:	LINE
Order Number:	-



Final_Result

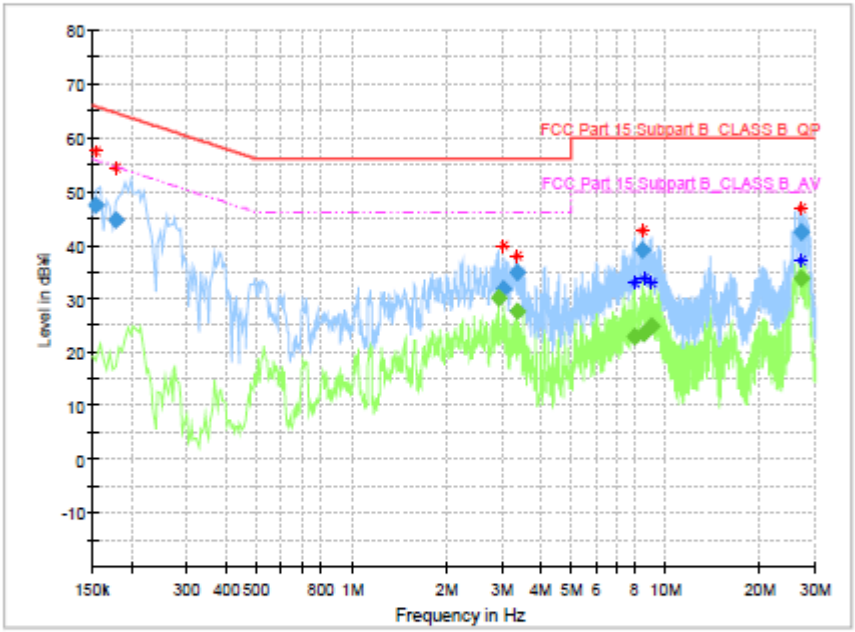
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	48.23	---	66.00	17.77	1000.0	9.000	L1	10.4
0.170000	45.69	---	64.96	19.27	1000.0	9.000	L1	10.4
2.936000	---	30.38	46.00	15.62	1000.0	9.000	L1	10.6
2.936000	37.23	---	56.00	18.77	1000.0	9.000	L1	10.6
2.940000	35.59	---	56.00	20.41	1000.0	9.000	L1	10.6
3.404000	---	25.56	46.00	20.44	1000.0	9.000	L1	10.6
7.976000	---	31.85	50.00	18.15	1000.0	9.000	L1	10.9
8.448000	---	33.86	50.00	16.14	1000.0	9.000	L1	10.9
8.916000	---	33.59	50.00	16.41	1000.0	9.000	L1	11.0
9.040000	37.94	---	60.00	22.06	1000.0	9.000	L1	11.0
26.484000	---	36.50	50.00	13.50	1000.0	9.000	L1	11.9
26.492000	42.44	---	60.00	17.56	1000.0	9.000	L1	11.9

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

Test Report

Common Information

Test Model:	IDRO900F
Test Standard:	FCC Part 15 Subpart B
Test Mode:	RFID
Test Conditions:	AC 120 V 60 Hz / 21.3 'C, 44.2 % R.H.
Operator Name:	JongMyoung, Shin
Comment:	NEUTRAL
Order Number:	-



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.154000	47.48	---	65.78	18.30	1000.0	9.000	N	10.4
0.178000	44.60	---	64.58	19.97	1000.0	9.000	N	10.4
2.936000	---	30.27	46.00	15.73	1000.0	9.000	N	10.6
3.040000	31.80	---	56.00	24.20	1000.0	9.000	N	10.6
3.356000	---	27.56	46.00	18.44	1000.0	9.000	N	10.6
3.356000	34.78	---	56.00	21.22	1000.0	9.000	N	10.6
7.936000	---	22.95	50.00	27.05	1000.0	9.000	N	10.9
8.452000	38.96	---	60.00	21.04	1000.0	9.000	N	10.9
8.528000	---	23.50	50.00	26.50	1000.0	9.000	N	11.0
9.008000	---	24.75	50.00	25.25	1000.0	9.000	N	11.0
27.044000	---	33.73	50.00	16.27	1000.0	9.000	N	11.8
27.064000	42.38	---	60.00	17.62	1000.0	9.000	N	11.8

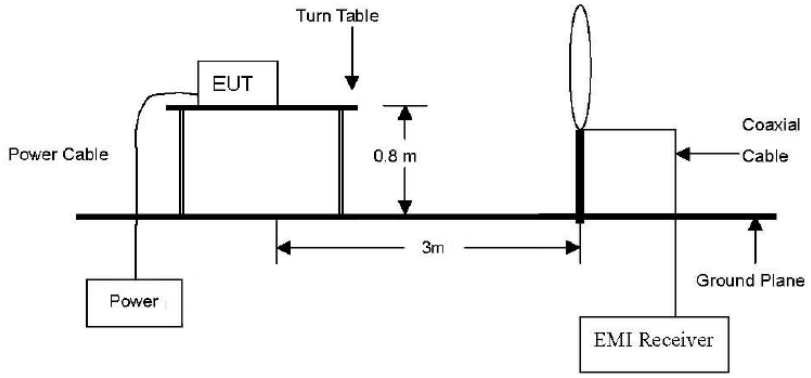
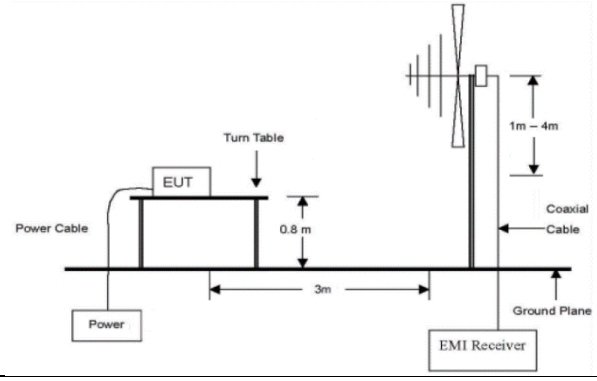
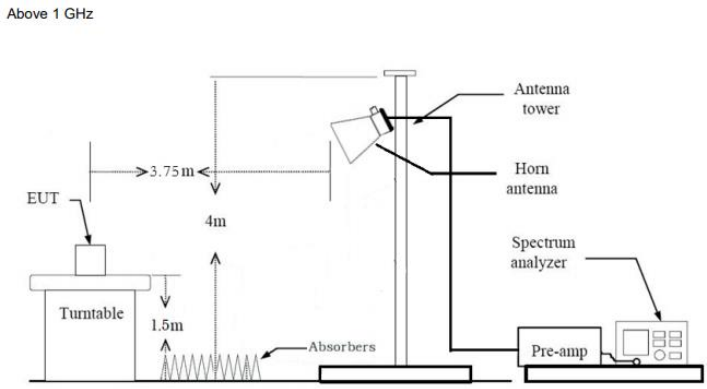
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, Korea 18511
www.nct.re.kr TEL: +82-31-323-6070 FAX: +82-31-323-6071

APPENDIX I

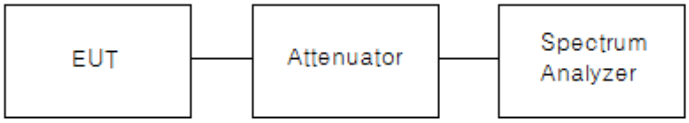
TEST SETUP

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

- Radiated Measurement

below 30 ㎒	
below 1 ㎓	
above 1 ㎓	

- Conducted Measurement

Conducted	

APPENDIX II

TEST EQUIPMENT USED FOR TESTS

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

	Description	Manufacturer	Serial No.	Model No.	Cal. Date	Next Cal. Date
1	SPECTRUM ANALYZER	R&S	100250	FSU26	2019-09-23	2020-09-23
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	2019-07-26	2021-07-26
20	Double Ridged BroadBand Horn Antenna	Schwarzbeck	02086	BBHA 9120D	2019-07-26	2021-07-26
21	BroadBand Horn Antenna	Schwarzbeck	00938	BBHA 9170	2019-07-10	2021-07-10
22	BroadBand Horn Antenna	Schwarzbeck	00937	BBHA 9170	2019-07-10	2021-07-10
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	LOOP-ANTENNA	Schwarzbeck	00124	FMZB1519 B	2019-06-27	2021-06-27
26	LISN	Schwarzbeck	00984	NSLK 8127	2019-06-20	2020-06-20
27	EMI Test Receiver	R&S	102116	ESRP3	2019-07-24	2020-07-24