RF TEST REPORT

Test item	:	RFID Reader
Model No.	:	NL-RF2200
Order No.	:	DTNC1501-00026
Date of receipt	:	2015-01-06
Test duration	:	2015.01.12 ~ 2015. 03.27
Date of issue	:	2015-04-22
Use of report	:	FCC Original Grant

Applicant : NESSLAB
5F 23-14 Jang-dong Yuseong-gu Daejeon South Korea

Test laboratory : DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification	:	FCC Part 15 Subpart C 247
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:
Engineer
HyunSu Son

Reviewed by:
Technical Manager
HongHee Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1504-0085	Apr. 22, 2015	Initial issue

Table of Contents

1.General Information

1.1 Testing Laboratory

DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 449-935
www.dtnc.net
Telephone : + 82-31-321-2664
FAX : + 82-31-321-1664

1.2 Details of Applicant

Applicant : NESSLAB
Address : 5F 23-14 Jang-dong Yuseong-gu Daejeon South Korea
Contact person : Sang-Won Cho
Phone No. : + 82-31-206-1774

1.3 Description of EUT

Product	RFID Reader
Model Name	NL-RF2200
Serial Number	Identical prototype
Power Supply	DC 5 V
Frequency Range	902.75 ~ 927.25 MHz
Modulation Technique	A1D
Number of Channels	50(Channel Spacing 500kHz)
Antenna Type	Patch Antenna
Antenna Gain	Max. PK 6.0 dBi

1.4. Declaration by the manufacturer

- N/A

1.5. Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	N9020A	14/09/03	15/09/03	MY46471622
DIGITAL MULTIMETER	Agilent	34401A	15/01/06	16/01/06	US36099541
DC Power Supply	SM techno	SDP30-5D	15/01/06	16/01/06	305DLJ204
Vector Signal Generator	Rohde Schwarz	SMBV100A	15/01/06	16/01/06	255571
Signal Generator	Rohde Schwarz	SMF100A	14/07/01	15/07/01	102341
10dB Attenuator	Aeroflex/Weinschel	86-10-11	14/09/12	15/09/12	408
Thermohygrometer	BODYCOM	BJ5478	14/05/13	15/05/13	120612-2
PreAmplifier	Agilent	8449B	15/02/26	16/02/26	3008A00370
LOOP Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
TRILOG Broadband Test-Antenna(30MHz-1GHz)	Schwarzbeck	VULB 9160	14/04/30	16/04/30	3358
Low Noise Pre Amplifier	tsj	MLA-010K01-B01-27	14/04/09	15/04/09	1844538
			15/04/09	16/04/09	
EMI TEST RECEIVER	R&S	ESR7	14/10/21	15/10/21	101109
Highpass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	14/10/17	15/10/17	7
EMI TEST RECEIVER	R&S	ESCI7	15/02/25	16/02/25	100910
CVCF	EM TEST	ENTWAVE 60-400	14/05/26	15/05/26	P1311115470
ARTIFICIAL MAINS NETWORK	R&S	ESH2-Z5	14/09/11	15/09/11	828739/006
Horn Antenna	ETS-LINDGREN	3115	15/02/09	17/02/09	9202-3820
Pyramidal Horn Antenna	ETS	22160	13/10/13	15/10/13	158433
PULSE LIMITER	R&S	ESH3-Z2	14/10/21	15/10/21	101333

1.6. Summary of Test Results

FCC Part Section(s)	Parameter	Limit (Using in 2400~ 2483.5MHz)	Test Condition	Status Note 1
15.247(a)	Carrier Frequency Separation	>= 20dB BW or >= Two-Thirds of the 20dB BW	Conducted	C
	Number of Hopping Frequencies	>= 15 hops		C
	20 dB Bandwidth	None		C
	Dwell Time	=< 0.4 seconds		C
15.247(b)	Transmitter Output Power	=< 1Watt , if CHs >= 75 Others =<0.125W		C
15.247(d)	Band-edge /Conducted	The radiated emission to any 100 kHz of out-band shall be at least 20dB below the highest in-band spectral density.		C
	Conducted Spurious Emissions			C
15.205, 15.209	Radiated Spurious Emissions	FCC 15.209 Limits	Radiated	C Note.2
15.207	AC Conducted Emissions	FCC 15.207 Limits	AC Line Conducted	C
15.203	Antenna Requirements	FCC 15.203	-	C

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

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

Semi anechoic chamber registration Number : 165783

1.7 Conclusion of worst-case and operation mode

Power measurement of the each antenna ports was performed to determine worst case(ANT port 2).

Therefore all test items were performed at antenna port 2.

The field strength of spurious emission was measured in three orthogonal EUT positions(X-axis, Y-axis and Z-axis).

Tested frequency information,

- Hopping Function: Enable

	TX Frequency(MHz)	RX Frequency(MHz)
Hopping Band	902.75 ~ 927.25	902.75 ~ 927.25

- Hopping Function: Disable

	TX Frequency(MHz)	RX Frequency(MHz)
Lowest Channel	902.75	902.75
Middle Channel	915.25	915.25
Highest Channel	927.25	927.25

2. Radiated Spurious Emissions and Conducted Spurious Emission

2.1. Test Setup

Refer to the APPENDIX I.

2.2. 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 (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. 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	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	608 ~ 614	3345.8 ~ 3358		
		960 ~ 1240	3600 ~ 4400		

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.

2.3. Test Procedures

Radiated emissions from the EUT were measured according to the DA 00-705 and ANSI C63.10:2009

2.3.1. Test Procedures for Radiated Spurious Emissions

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. 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 3 meter away from the interference-receiving antenna.
3. 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.
4. 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.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. 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.

NOTE ;
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 ㎑for Quasi-peak detection (QP) at frequency below 1 ㎓.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1㎒for Peak detection and frequency above 1 ㎓.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 ㎓.

2.3.2. Test Procedures for Conducted Spurious Emissions

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 kHz ~ 30 MHz
RBW= 100kHz, VBW= 300kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT: 10001

Frequency range: 30 MHz ~ 10 GHz
RBW= 100kHz, VBW= 300kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT: 10001

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

2.4. Test Results

Ambient temperature : 25 °C
Relative humidity : 42 %

2.4.1. Radiated Emission

9kHz ~ 10GHz Data

▪ Lowest Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2708.290	H	V	PK	53.55	-3.60	NA	49.95	74.00	24.05
2708.240	H	V	AV	48.46	-3.60	NA	44.86	54.00	9.14
3611.130	H	V	PK	51.62	0.26	NA	51.88	74.00	22.12
3611.010	H	V	AV	46.65	0.26	NA	46.91	54.00	7.09
4513.760	H	V	PK	48.44	3.41	NA	51.85	74.00	22.15
4513.660	H	V	AV	40.48	3.41	NA	43.89	54.00	10.11

▪ Middle Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2745.740	H	V	PK	53.49	-2.48	NA	51.01	74.00	22.99
2745.790	H	V	AV	48.14	-2.48	NA	45.66	54.00	8.34
3660.650	H	V	PK	51.85	0.42	NA	52.27	74.00	21.73
3660.780	H	V	AV	46.89	0.42	NA	47.31	54.00	6.69
4576.580	H	V	PK	47.99	3.56	NA	51.55	74.00	22.45
4576.850	H	V	AV	39.90	3.56	NA	43.46	54.00	10.54

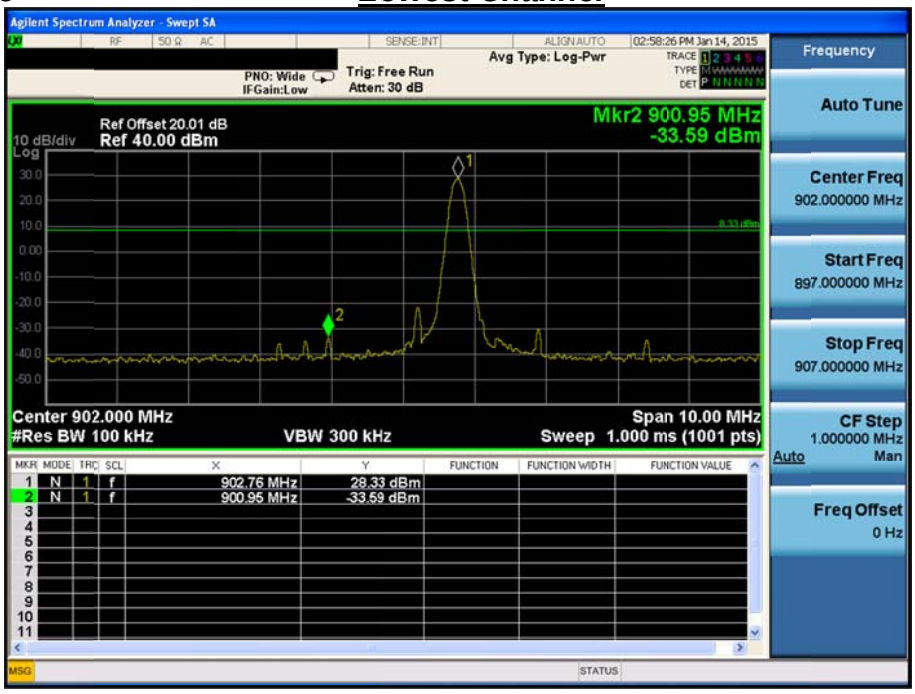
▪ Highest Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2781.760	H	V	PK	53.30	-2.01	NA	51.29	74.00	22.71
2781.740	H	V	AV	48.06	-2.01	NA	46.05	54.00	7.95
3708.980	H	V	PK	52.30	0.57	NA	52.87	74.00	21.13
3708.950	H	V	AV	47.62	0.57	NA	48.19	54.00	5.81
4636.360	H	V	PK	47.76	3.70	NA	51.46	74.00	22.54
4636.180	H	V	AV	39.10	3.70	NA	42.80	54.00	11.20

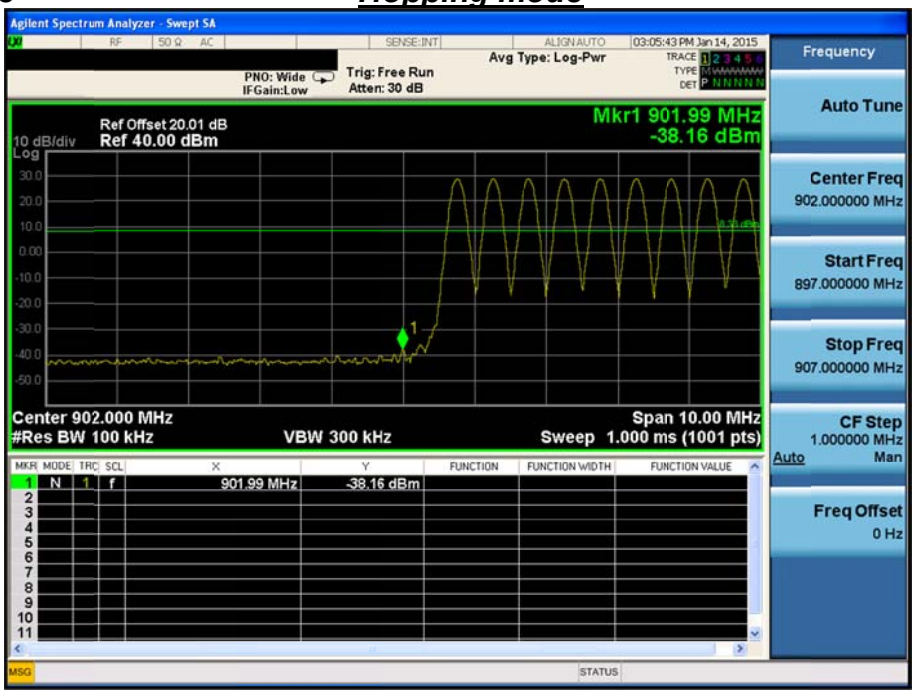
Note.
1. No other spurious and harmonic emissions were reported greater than listed emissions above table.
2. Above listed point data is the worst case data.
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCF = Duty Cycle Correction Factor
4. EUT had its hopping function disabled at the highest, middle and the lowest available channels.

2.4.2. Conducted Spurious Emissions

Low Band-edge ***Lowest Channel***

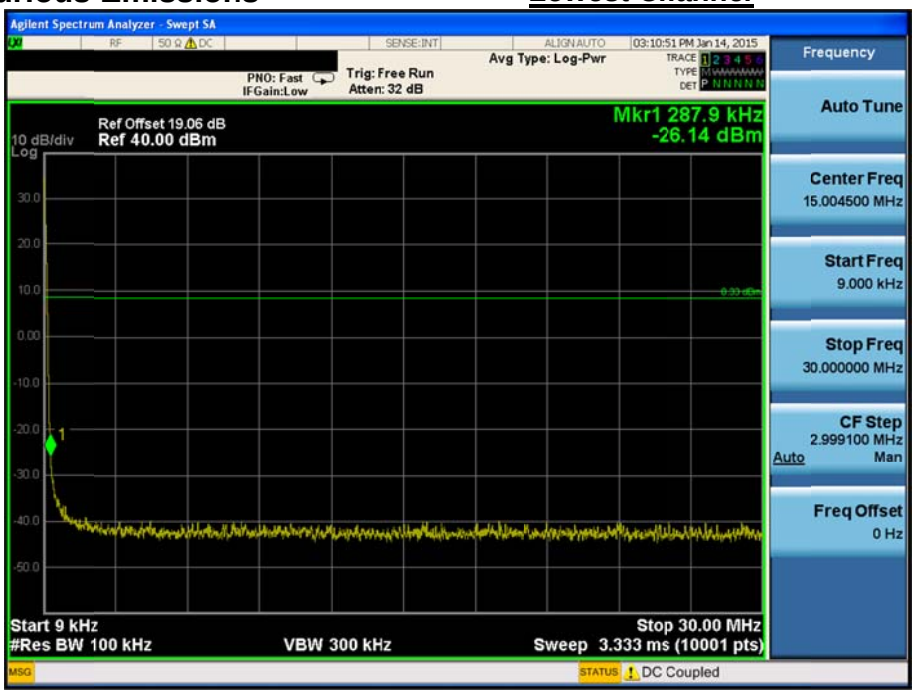


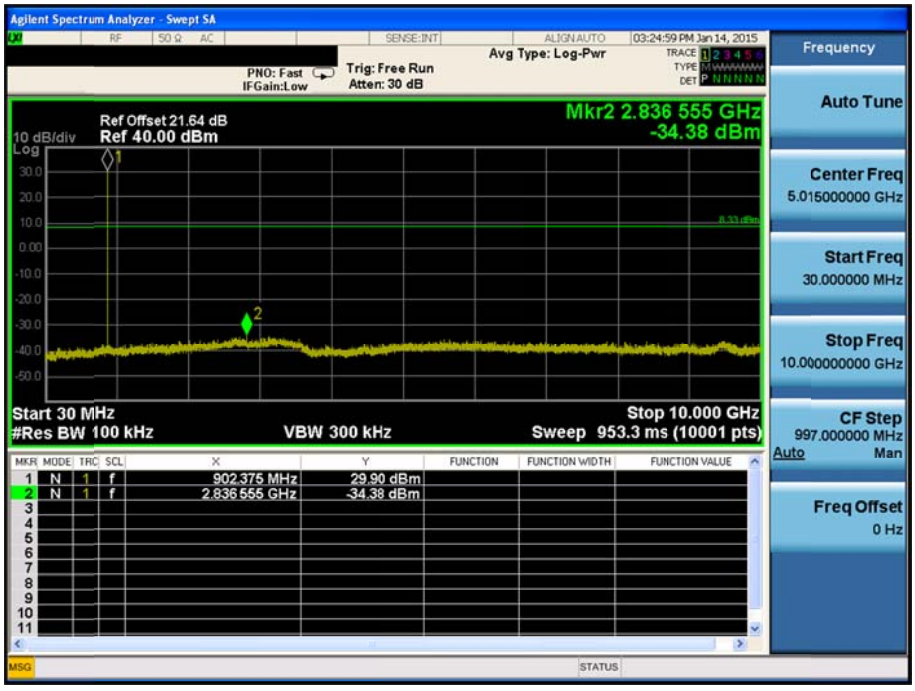
Low Band-edge ***Hopping mode***



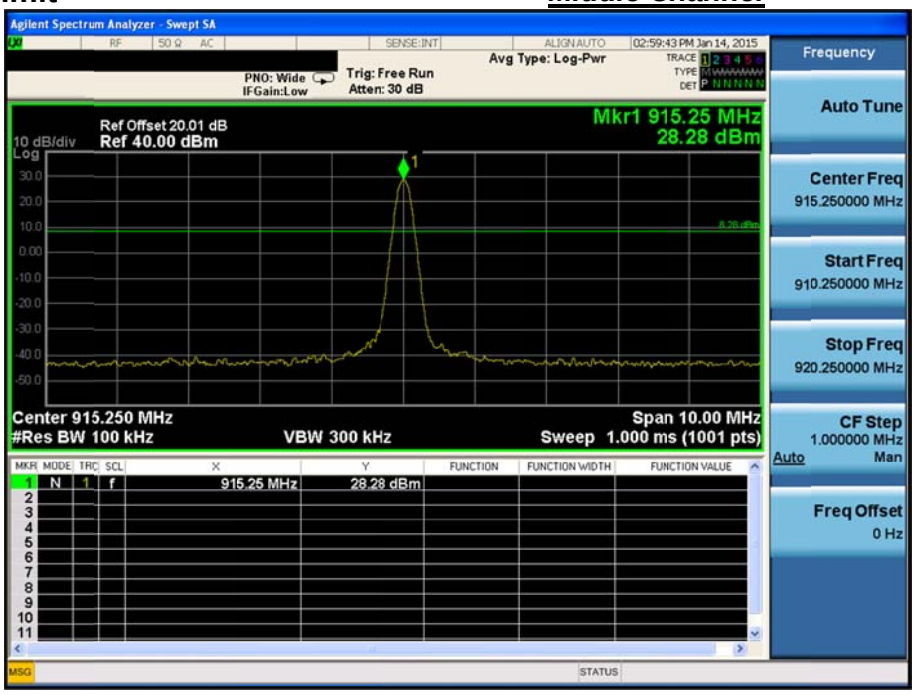
Conducted Spurious Emissions

Lowest Channel



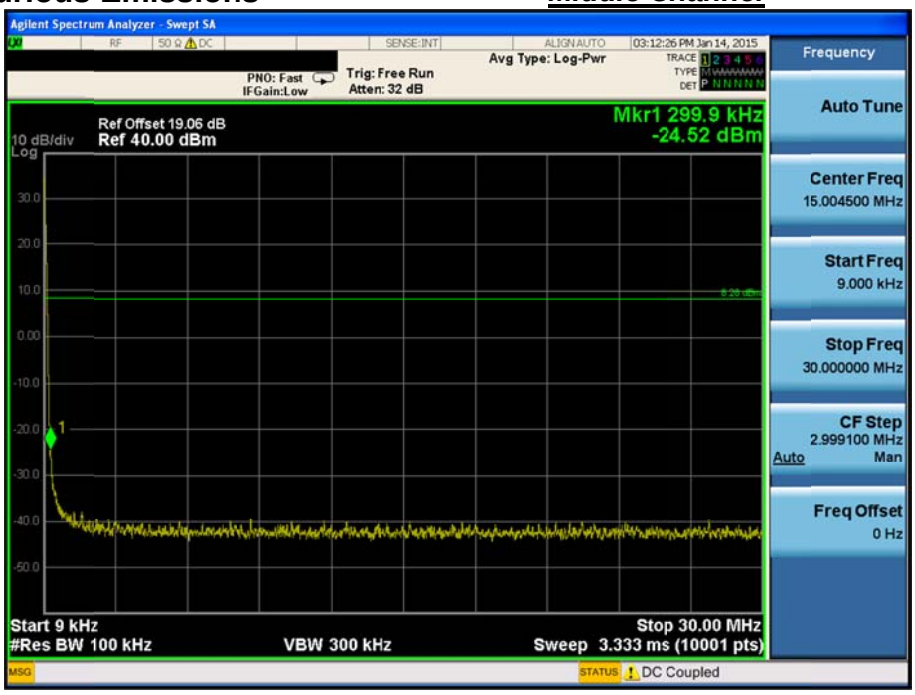


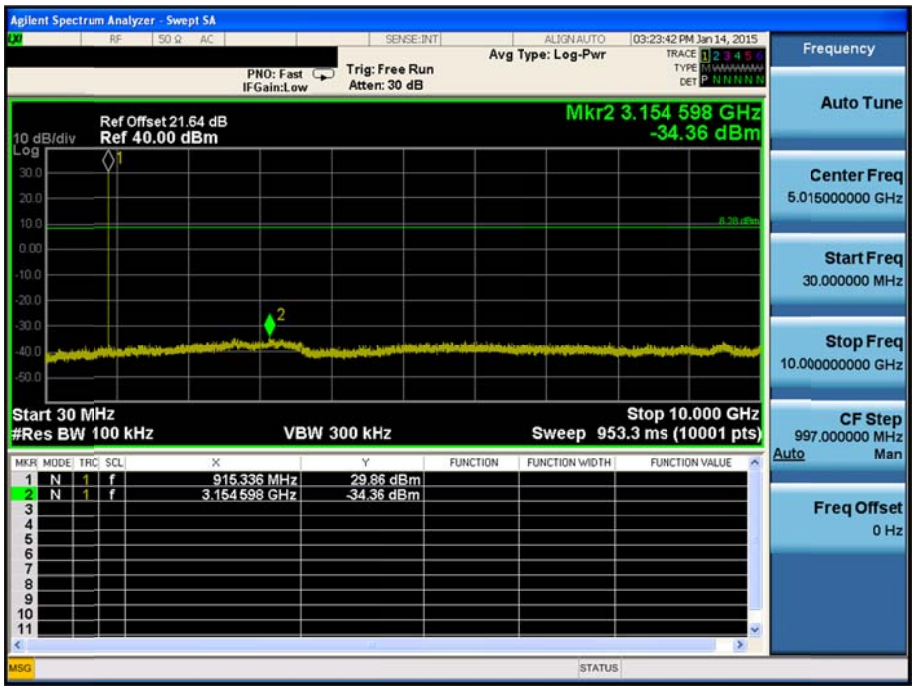
Reference for limit ***Middle Channel***



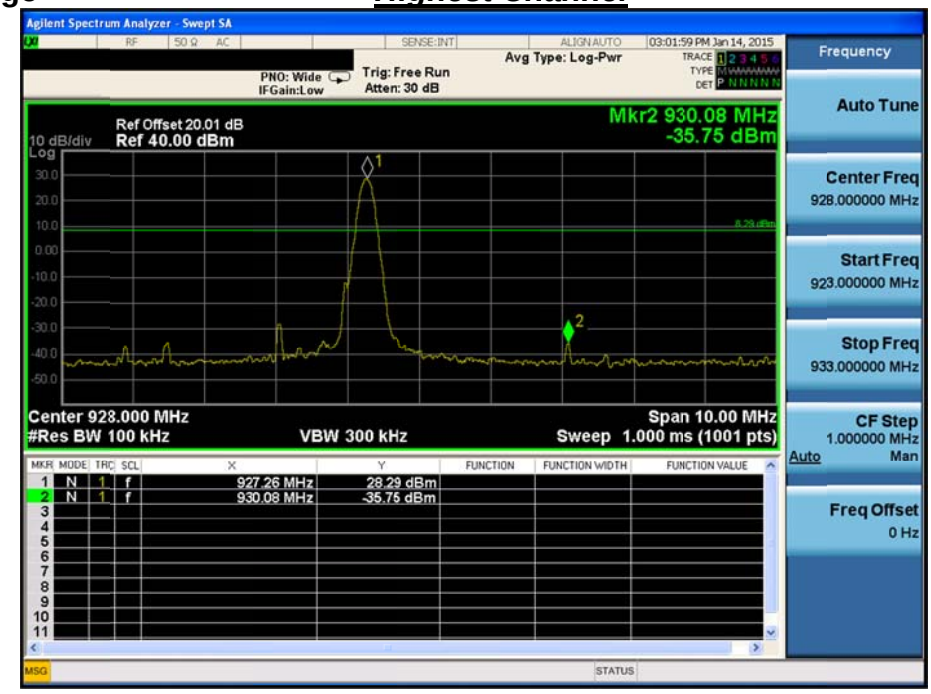
Conducted Spurious Emissions

Middle Channel

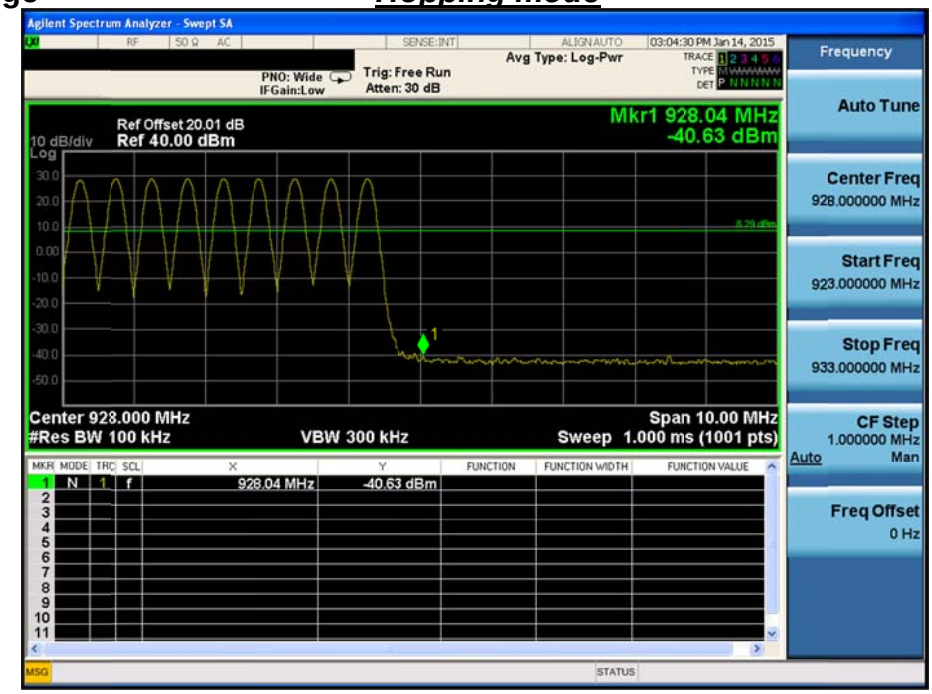




High Band-edge ***Highest Channel***

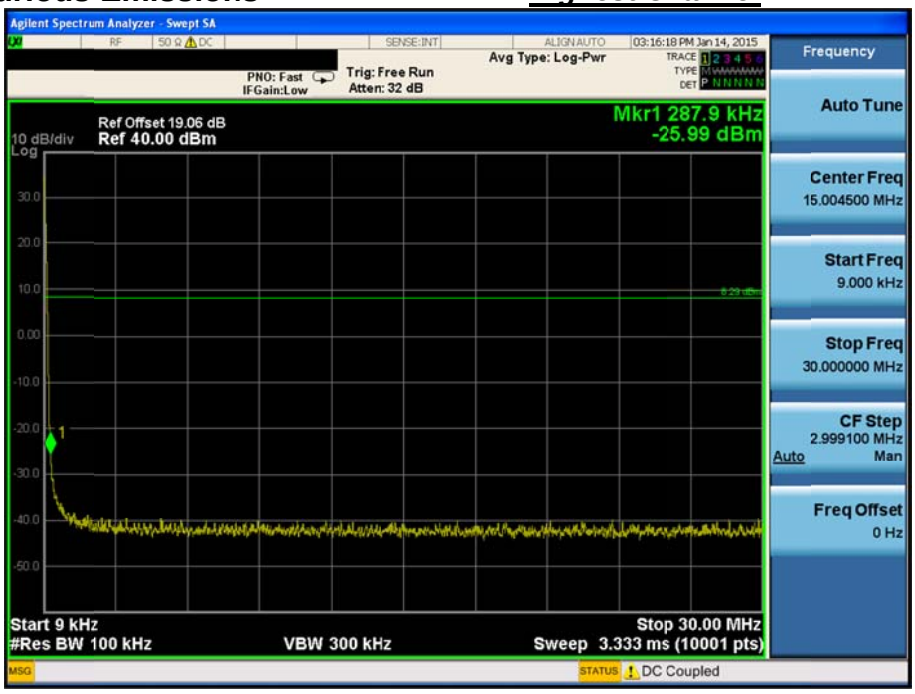


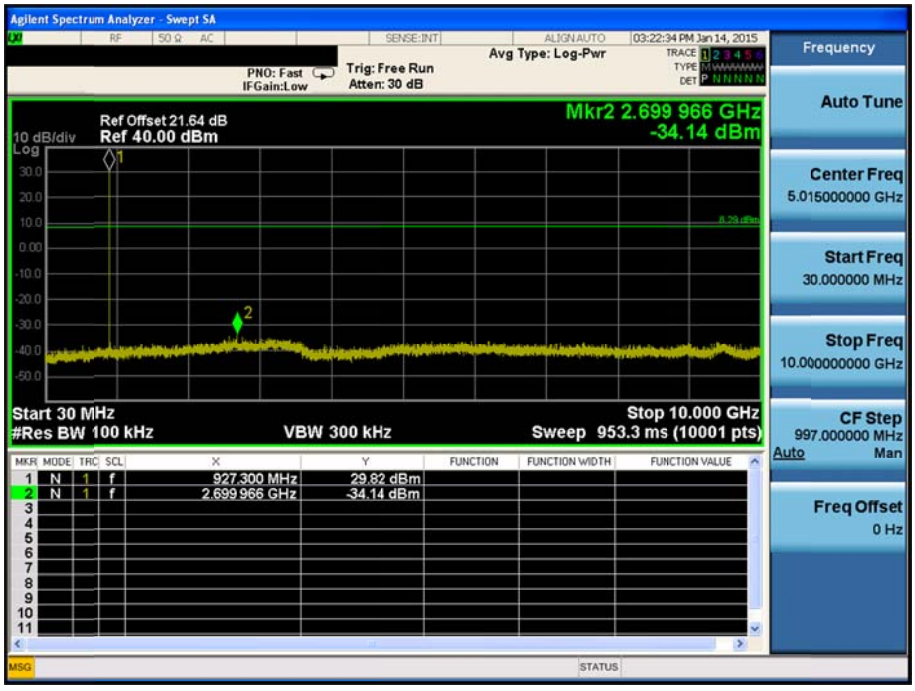
High Band-edge ***Hopping mode***



Conducted Spurious Emissions

Highest Channel





3. Carrier Frequency Separation

3.1. Test Setup

Refer to the APPENDIX I.

3.2. Limit

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

3.3 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 = 1% of the span
Sweep = auto
VBW = ≥ RBW
Detector function = peak
Trace = max hold

3.4 Test Results:

Hopping Mode	Peak of center channel (MHz)	Peak of adjacent Channel (MHz)	Test Result (kHz)
Enable	915.25	914.751	499

4. Number of Hopping Frequencies

4.1. Test Setup

Refer to the APPENDIX I.

4.2. Limit

Limit: >= 50 hops

4.3 Test Procedure:

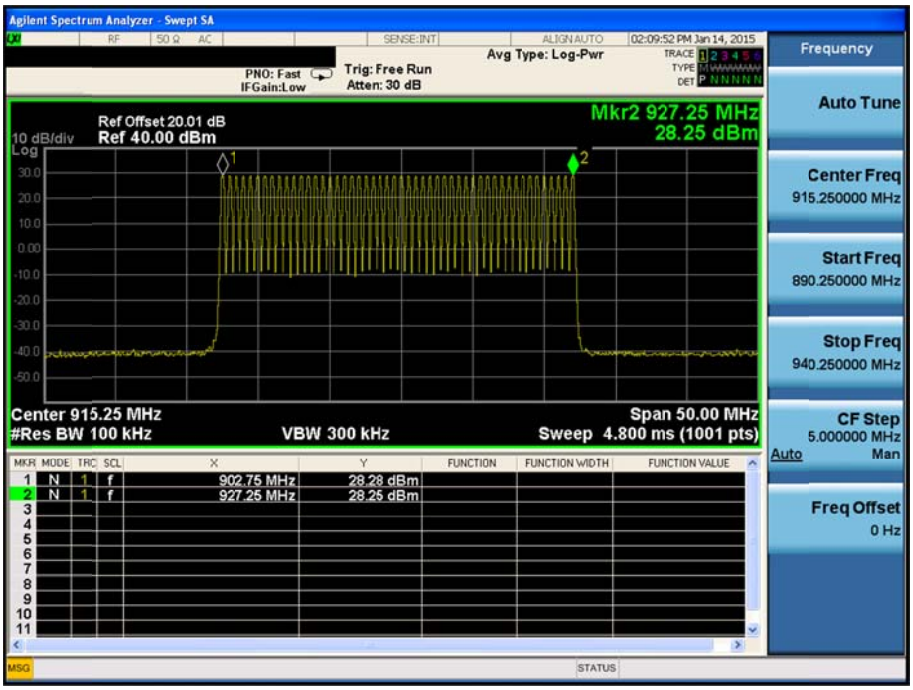
The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Span = 50 MHz(Start Frequency = 890.25 MHz / Stop Frequency = 940.25 MHz)
RBW = 1% of the span or more
Sweep = auto
VBW = ≥ RBW
Detector function = peak
Trace = max hold

4.4 Test Results:

Hopping mode	Test Result (Total Hops)
Enable	50



5. 20dBc BW

5.1. Test Setup

Refer to the APPENDIX I.

5.2. Limit

Limit: < 250kHz for applying the hopping frequencies and the average time of occupancy

5.3. Test Procedure

The bandwidth at 20 dB below the highest in band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels
Span = 500 kHz
RBW = 1 kHz
VBW = ≥ RBW
Trace = max hold
Sweep = auto
Detector function = peak

5.4. Test Results

Ambient temperature : 25 °C
Relative humidity : 42 %

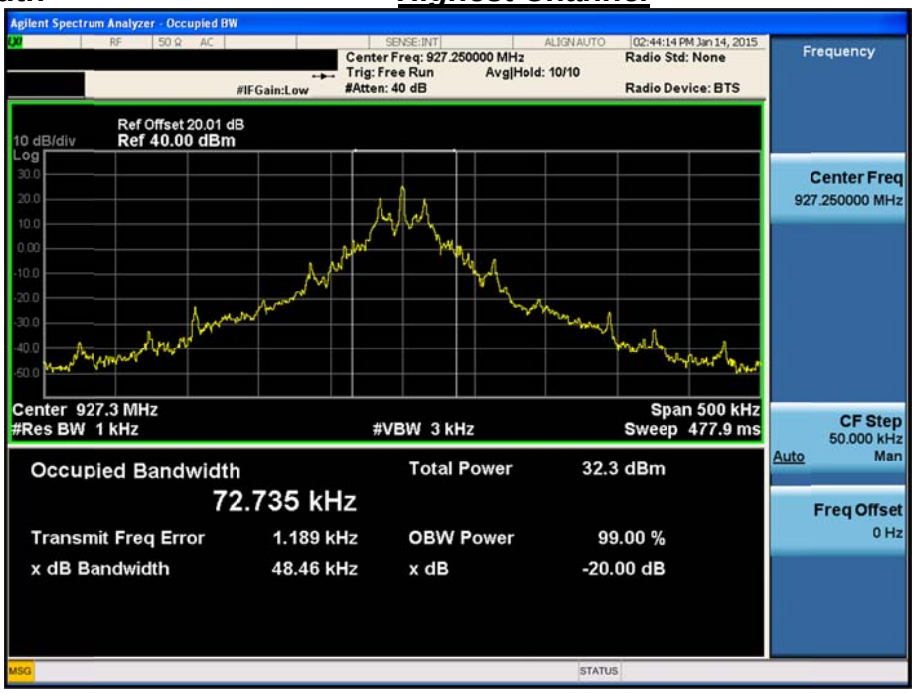
Frequency (MHz)	Tested Channel	20dBc BW (kHz)
902.75	Lowest	49.04
915.25	Middle	48.89
927.25	Highest	48.46

Note 1: See next pages for actual measured spectrum plots.

20dBc Bandwidth ***Lowest Channel***

20dBc Bandwidth ***Middle Channel***

20dBc Bandwidth ***Highest Channel***



6. Time of Occupancy (Dwell Time)

6.1. Test Setup

Refer to the APPENDIX I.

6.2. Limit

Limit: < 0.4 seconds within a 20 second period

6.3. Test Procedure

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

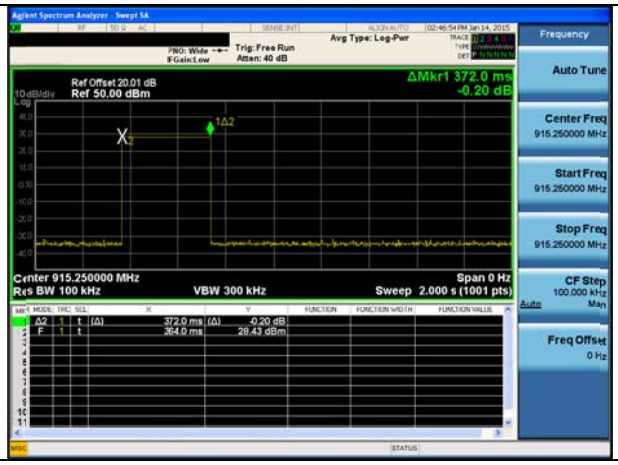
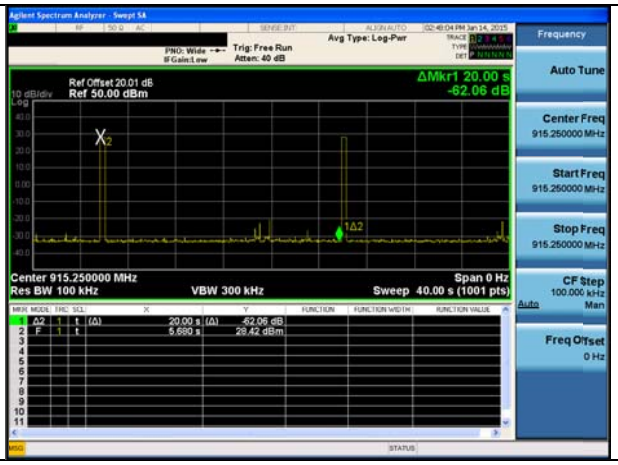
The spectrum analyzer is set to:

RBW = 100kHz
VBW = ≥ RBW
Span = zero
Detector function = peak
Trace max hold

6.4. Test Results

Ambient temperature : 25 °C
Relative humidity : 42 %

Channel Frequency (MHz)	Length (ms)	Number	Dwell Time (ms)
915.25	372	1	372

Length	Period
	

7. Maximum Peak Output Power Measurement

7.1. Test Setup

Refer to the APPENDIX I.

7.2. 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,

7.3. Test Procedure

1. The RF power output 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 bandwidth of the fundamental frequency was measured with the spectrum analyzer using ;
   RBW ≥ 20dBBW
   VBW ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold

7.4. Test Results

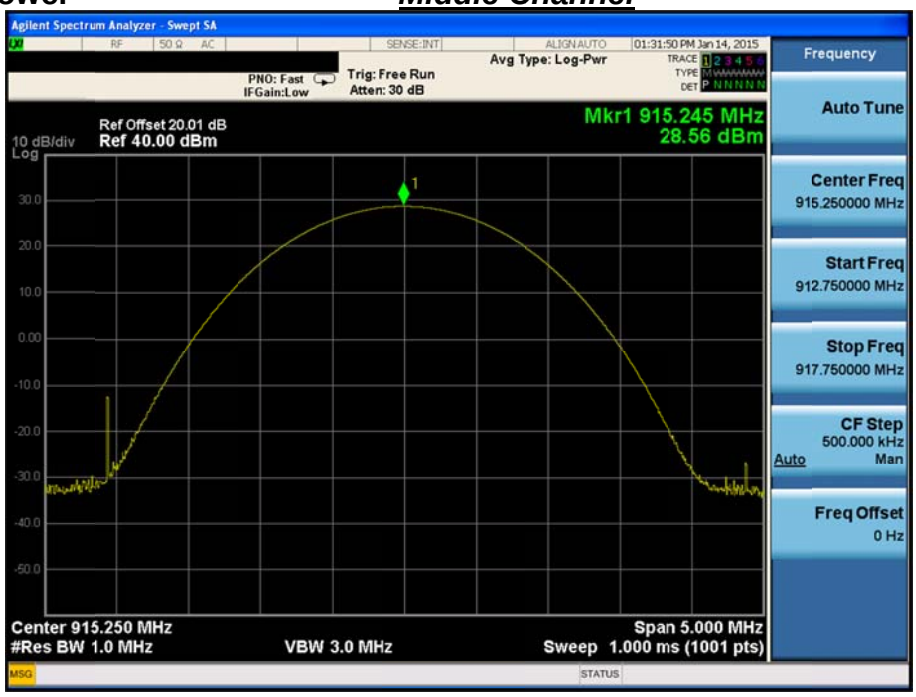
Ambient temperature : 25 °C
Relative humidity : 42 %

Tested Channel	Peak Output Power							
	Port1	Port2	Port3	Port4	Port1	Port2	Port3	Port4
	(dBm)	(dBm)	(dBm)	(dBm)	(mW)	(mW)	(mW)	(mW)
Lowest	28.520	**28.530**	28.510	28.360	711.214	**712.853**	709.578	685.488
Middle	28.400	**28.560**	28.490	28.470	691.831	**717.794**	706.318	703.072
Highest	28.310	**28.330**	28.330	28.330	677.642	**680.769**	680.769	680.769

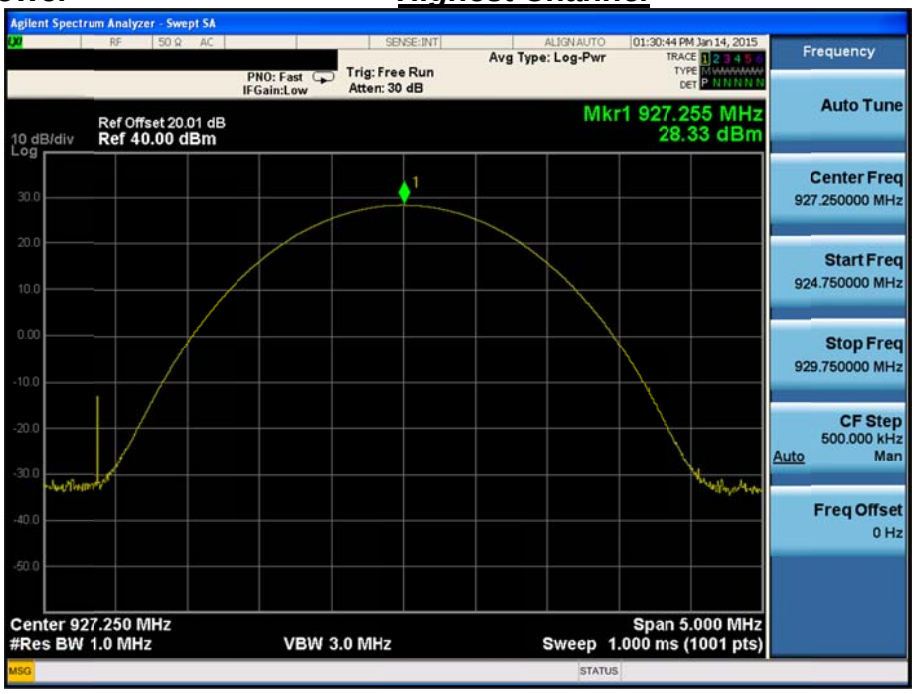
Note 1: See next pages for actual measured spectrum plots.

Peak Output Power ***Lowest Channel***

Peak Output Power ***Middle Channel***



Peak Output Power ***Highest Channel***



8. Transmitter AC Power Line Conducted Emission

8.1. Test Setup

N/A

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 (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

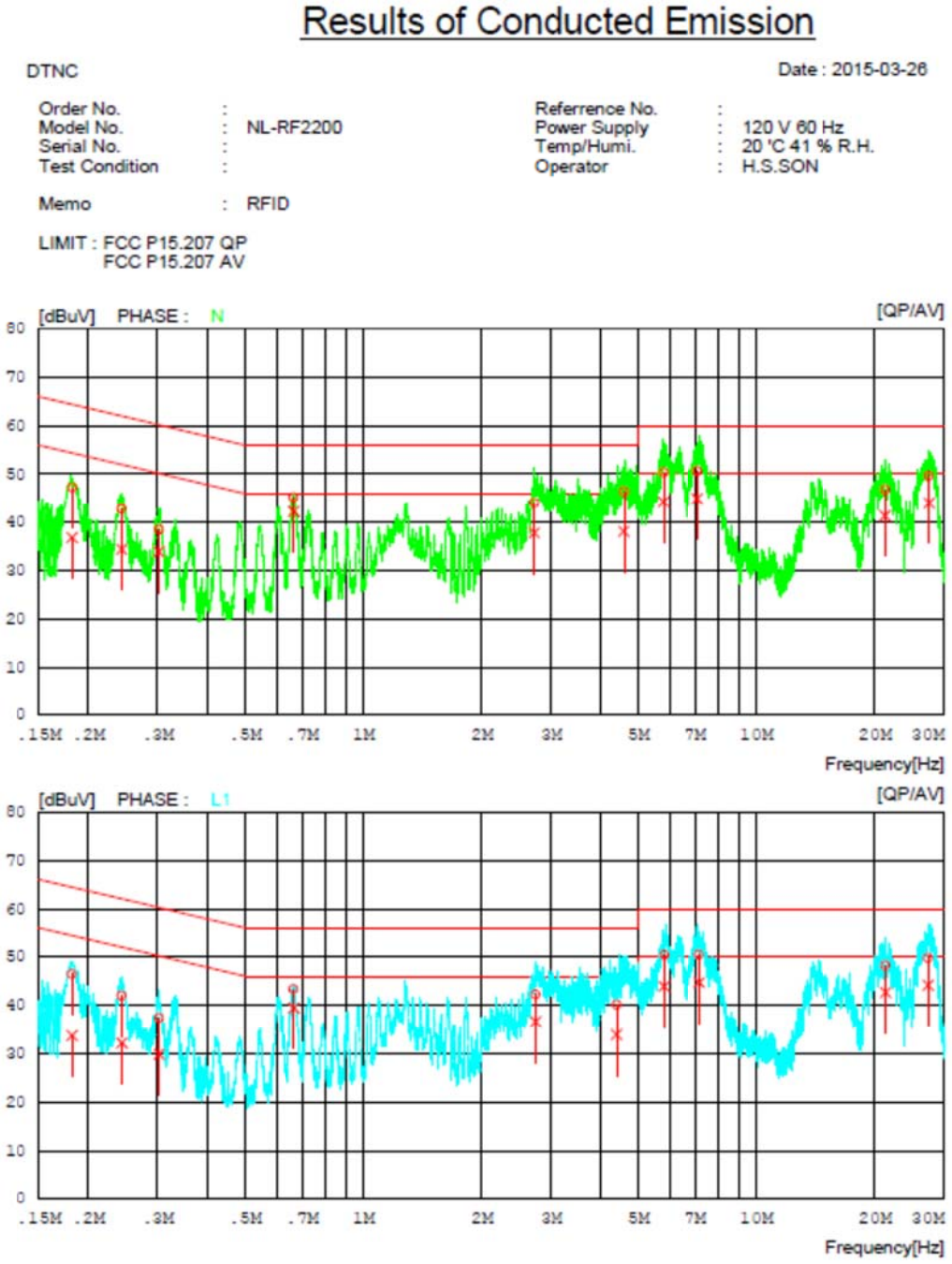
8.3. Test Procedures

Conducted emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

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.

8.4. Test Results

Measurement Data



Measurement Data

Results of Conducted Emission

DTNC

Date : 2015-03-26

Order No.	:		Referrence No.	:	
Model No.	:	NL-RF2200	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	20 'C 41 % R.H.
Test Condition	:		Operator	:	H.S.SON

Memo : RFID

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.18192	37.3	26.9	9.9	47.2	36.8	64.4	54.4	17.2	17.6	N
2	0.24228	32.9	24.5	9.9	42.8	34.4	62.0	52.0	19.2	17.6	N
3	0.30252	28.5	23.9	10.0	38.5	33.9	60.2	50.2	21.7	16.3	N
4	0.66647	35.0	32.2	10.1	45.1	42.3	56.0	46.0	10.9	3.7	N
5	2.71440	34.0	27.9	10.0	44.0	37.9	56.0	46.0	12.0	8.1	N
6	4.60300	36.2	28.0	10.1	46.3	38.1	56.0	46.0	9.7	7.9	N
7	5.79920	40.1	34.1	10.2	50.3	44.3	60.0	50.0	9.7	5.7	N
8	7.08360	40.3	34.6	10.3	50.6	44.9	60.0	50.0	9.4	5.1	N
9	21.20920	36.2	30.8	10.6	46.8	41.4	60.0	50.0	13.2	8.6	N
10	27.39260	38.8	33.2	10.8	49.6	44.0	60.0	50.0	10.4	6.0	N
11	0.18180	36.4	23.6	10.0	46.4	33.6	64.4	54.4	18.0	20.8	L1
12	0.24247	32.0	22.1	10.0	42.0	32.1	62.0	52.0	20.0	19.9	L1
13	0.30294	27.4	19.8	10.0	37.4	29.8	60.2	50.2	22.8	20.4	L1
14	0.66636	33.3	29.4	10.0	43.3	39.4	56.0	46.0	12.7	6.6	L1
15	2.73480	32.0	26.4	10.2	42.2	36.6	56.0	46.0	13.8	9.4	L1
16	4.40700	29.8	23.6	10.3	40.1	33.9	56.0	46.0	15.9	12.1	L1
17	5.81860	40.0	33.5	10.4	50.4	43.9	60.0	50.0	9.6	6.1	L1
18	7.15720	40.0	34.2	10.5	50.5	44.7	60.0	50.0	9.5	5.3	L1
19	21.24920	37.3	31.7	10.9	48.2	42.6	60.0	50.0	11.8	7.4	L1
20	27.23520	38.5	32.9	11.2	49.7	44.1	60.0	50.0	10.3	5.9	L1

9. Antenna Requirement

9.1 Procedure

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

9.2 Conclusion: Comply

The external antenna is connected to the intentional radiator using SMA connector(Reverse polarity type).

Minimum Standard:

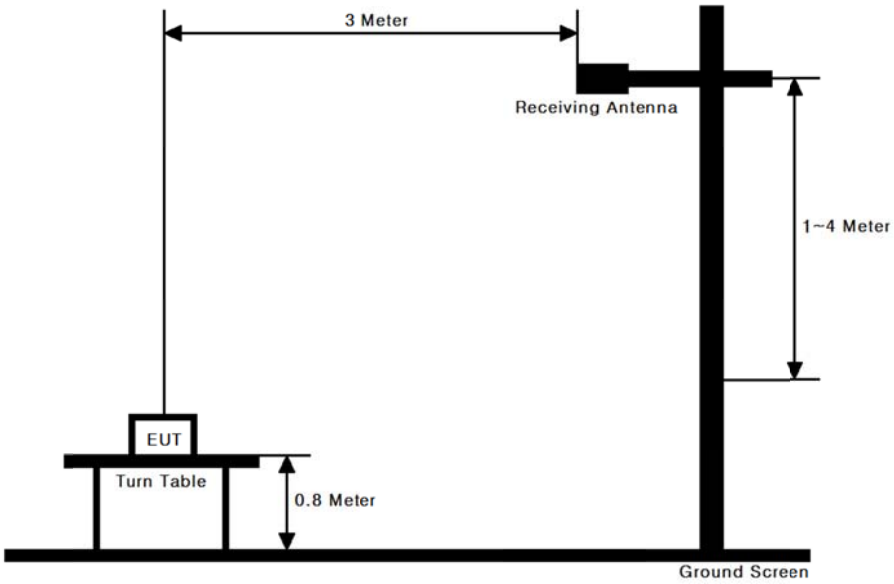
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions.

APPENDIX I

Test set up Diagrams

▪Radiated Measurement

The diagram below shows the test setup that is utilized to make the measurements for emission from 9kHz to 10GHz Emissions.



▪Conducted Measurement