

RADIO TEST REPORT

FCC ID: 2ANBW-CL7206B

Product: RFID Reader
Trade Mark: N/A
Model No.: CL7206B
Serial Model: N/A
Report No.: NTEK- 2017DC0809044F
Issue Date: 10 Aug. 2017

Prepared for

Shenzhen Hopeland Technologies CO., Ltd.
17/F, Block A, Clou Bldg, Baoshen Road, Hi-tech Industrial Park
North, Nanshan District, 518007, Shenzhen, China

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.
1/F, Building E, Fenda Science Park, Sanwei Community,
Xixiang Street Bao'an District, Shenzhen 518126 P.R. China
Tel.: +86-755-6115 9388
Fax.: +86-755-6115 6599
Website:<http://www.ntek.org.cn>

TABLE OF CONTENTS

1	TEST RESULT CERTIFICATION	3
2	SUMMARY OF TEST RESULTS.....	4
3	FACILITIES AND ACCREDITATIONS	5
3.1	FACILITIES.....	5
3.2	LABORATORY ACCREDITATIONS AND LISTINGS	5
3.3	MEASUREMENT UNCERTAINTY	5
4	GENERAL DESCRIPTION OF EUT	6
5	DESCRIPTION OF TEST MODES	8
6	SETUP OF EQUIPMENT UNDER TEST	10
6.1	BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM.....	10
6.2	SUPPORT EQUIPMENT.....	11
6.3	EQUIPMENTS LIST FOR ALL TEST ITEMS.....	12
7	TEST REQUIREMENTS.....	14
7.1	CONDUCTED EMISSIONS TEST	14
7.2	RADIATED SPURIOUS EMISSION	19
7.3	NUMBER OF HOPPING CHANNEL	28
7.4	HOPPING CHANNEL SEPARATION MEASUREMENT	30
7.5	AVERAGE TIME OF OCCUPANCY (DWELL TIME)	33
7.6	20DB BANDWIDTH TEST	36
7.7	PEAK OUTPUT POWER.....	39
7.8	CONDUCTED BAND EDGE MEASUREMENT.....	42
7.9	SPURIOUS RF CONDUCTED EMISSIONS.....	44
7.10	ANTENNA APPLICATION	48



Report No.:NTEK-2017DC0809044F

1 TEST RESULT CERTIFICATION

Applicant's name	Shenzhen Hopeland Technologies CO., Ltd.
Address	17/F, Block A, Clou Bldg, Baoshen Road, Hi-tech Industrial Park North, Nanshan District, 518007, Shenzhen, China
Manufacturer's Name	Shenzhen Hopeland Technologies CO., Ltd.
Address	17/F, Block A, Clou Bldg, Baoshen Road, Hi-tech Industrial Park North, Nanshan District, 518007, Shenzhen, China
Product description	
Product name	RFID Reader
Model and/or type reference	CL7206B
Serial Model	N/A

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD/ TEST PROCEDURE	TEST RESULT
FCC 47 CFR Part 2, Subpart J:2016 FCC 47 CFR Part 15, Subpart C:2016 KDB 174176 D01 Line Conducted FAQ v01r01 ANSI C63.10-2013	Complied

This device described above has been tested by Shenzhen NTEK Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of Shenzhen NTEK Testing Technology Co., Ltd., this document may be altered or revised by Shenzhen NTEK Testing Technology Co., Ltd., personnel only, and shall be noted in the revision of the document.

The test results of this report relate only to the tested sample identified in this report.

*Note: All test data of this report are based on the original test report
2016DC1102019F, dated by 2016-12-01.*

Date of Test : 02 Nov. 2016 ~ 10 Aug. 2017

Testing Engineer : Eileen Liu.
(Eileen Liu)

Technical Manager : Jason Chen
(Jason Chen)

Authorized Signatory : Sam. Chen
(Sam Chen)



2 SUMMARY OF TEST RESULTS

FCC Part15 (15.247), Subpart C			
Standard Section	Test Item	Verdict	Remark
15.207	Conducted Emission	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

Remark:

1. "N/A" denotes test is not applicable in this Test Report.
2. All test items were verified and recorded according to the standards and without any deviation during the test.

3 FACILITIES AND ACCREDITATIONS

3.1 FACILITIES

All measurement facilities used to collect the measurement data are located at 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

3.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

: Accredited by CNAS, 2014.09.04

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)

The Certificate Registration Number is L5516.

Accredited by FCC, September 6, 2013

The Certificate Registration Number is 463705.

Accredited by Industry Canada, August 29, 2012

The Certificate Registration Number is 9270A-1.

Name of Firm

: Shenzhen NTEK Testing Technology Co., Ltd

Site Location

: 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

3.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

4 GENERAL DESCRIPTION OF EUT

Product Feature and Specification	
Equipment	RFID Reader
Trade Mark	N/A
FCC ID	2ANBW-CL7206B
Model No.	CL7206B
Serial Model	N/A
Model Difference	N/A
Operating Frequency	902MHz~928MHz
Modulation	FHSS
Number of Channels	50 Channels
Antenna Type	Panel Antenna
Antenna Gain	9 dBi
Power supply	☐ DC supply:
	☒ Adapter supply: Model:BI60-240250-E1 Input:AC 100~240V 50/60Hz 2A Output:DC 24V, 2.5A
HW Version	V2.0
SW Version	V1.0.9

Note: Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.

[illegible]

5 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

Carrier Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	902.75	27	915.75
02	903.25	28	916.25
03	903.75	29	916.75
04	904.25	30	917.25
05	904.75	31	917.75
06	905.25	32	918.25
07	905.75	33	918.75
08	906.25	34	919.25
09	906.75	35	919.75
10	907.25	36	920.25
11	907.75	37	920.75
12	908.25	38	921.25
13	908.75	39	921.75
14	909.25	40	922.25
15	909.75	41	922.75
16	910.25	42	923.25
17	910.75	43	923.75
18	911.25	44	924.25
19	911.75	45	924.75
20	912.25	46	925.25
21	912.75	47	925.75
22	913.25	48	926.25
23	913.75	49	926.75
24	914.25	50	927.25
25	914.75		
26	915.25		

The following summary table is showing all test modes to demonstrate in compliance with the standard.

For AC Conducted Emission

Final Test Mode	Description
Mode 1	normal link mode

Note: AC power line Conducted Emission was tested under maximum output power.

For Radiated Test Cases

Final Test Mode	Description
Mode 1	normal link mode
Mode 2	CH01(902.75MHz)
Mode 3	CH25(914.75MHz)
Mode 4	CH50(927.25MHz)

For Conducted Test Cases

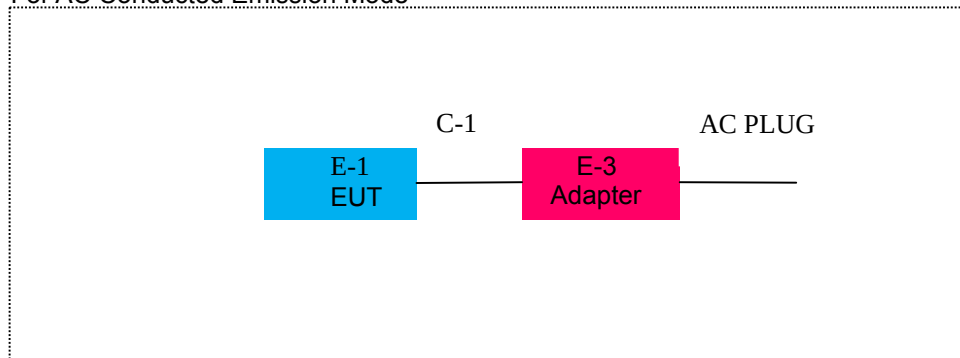
Final Test Mode	Description
Mode 2	CH01(902.75MHz)
Mode 3	CH25(914.75MHz)
Mode 4	CH50(927.25MHz)
Mode 5	Hopping mode

Note: The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

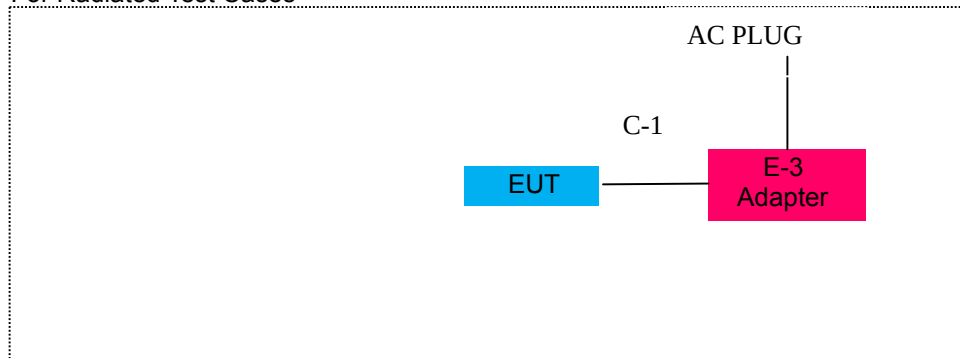
6 SETUP OF EQUIPMENT UNDER TEST

6.1 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM

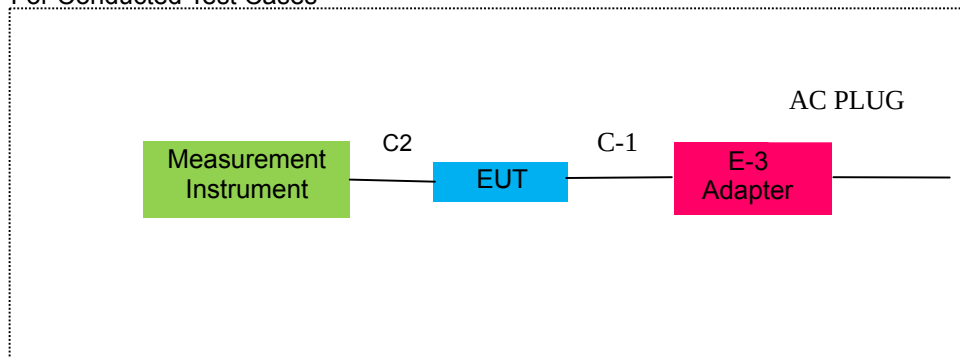
For AC Conducted Emission Mode



For Radiated Test Cases



For Conducted Test Cases



Note:The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

6.2 SUPPORT EQUIPMENT

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Note
E-1	RFID Reader	N/A	CL7206B	2ANBW-CL7206B	EUT
E-2	Adapter		BI60-240250-E1	N/A	

Item	Cable Type	Shielded Type	Ferrite Core	Length
C-1	DC Cable	NO	NO	1.2m
C-2	RJ45 Cable	NO	NO	1.0m

Notes:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

6.3 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2016.07.06	2017.07.05	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2016.11.19	2017.11.18	1 year
3	Test Receiver	R&S	ESPI	101318	2016.06.07	2017.06.06	1 year
4	Bilog Antenna	TESEQ	CBL6111D	31216	2016.07.06	2017.07.05	1 year
5	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.07	2017.06.06	1 year
7	Horn Antenna	EM	EM-AH-1018 0	2011071402	2016.07.06	2017.07.05	1 year
8	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
9	Pre-Amplifier	EMC	EMC051835 SE	980246	2016.08.09	2017.08.09	1 year
10	Loop Antenna	ARA	PLA-1030/B	1029	2016.06.08	2017.06.07	1 year
11	Test Cable (9KHz-30MHz)	N/A	R-04	N/A	2016.06.06	2017.06.05	1 year
12	Test Cable (30MHz-1GHz)	N/A	R-01	N/A	2016.07.06	2017.07.05	1 year
13	Test Cable (1-18GHz)	N/A	R-02	N/A	2016.07.06	2017.07.05	1 year
14	High Test Cable(18G-40 GHz)	N/A	R-03	N/A	2016.06.06	2017.06.05	1 year
15	temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A

Note:

We will use the temporary antenna connector (soldered on the PCB board) When conducted test
And this temporary antenna connector is listed within the instrument list

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2016.06.06	2017.06.05	1 year
2	LISN	R&S	ENV216	101313	2016.08.24	2017.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2016.08.24	2017.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.06.07	2017.06.06	1 year
7	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2016.06.08	2017.06.07	1 year
8	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2016.06.08	2017.06.07	1 year
9	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2016.06.08	2017.06.07	1 year

Note: Each piece of equipment is scheduled for calibration once a year.

7 TEST REQUIREMENTS

7.1 CONDUCTED EMISSIONS TEST

7.1.1 Applicable Standard

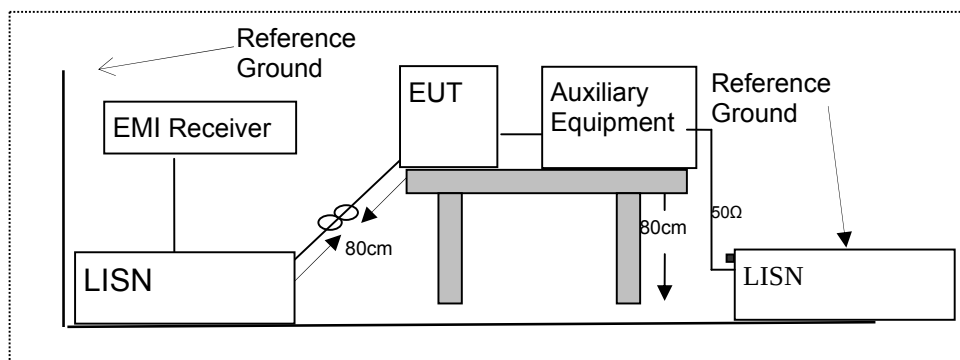
According to FCC Part 15.207(a) and KDB 174176 D01 Line Conducted FAQ v01r01

7.1.2 Conformance Limit

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. *Decreases with the logarithm of the frequency
 2. The lower limit shall apply at the transition frequencies
 3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

7.1.3 Test Configuration



7.1.4 Test Procedure

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room.
2. The EUT was placed on a table which is 0.8m above ground plane.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
4. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40cm long.
5. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
6. LISN at least 80 cm from nearest part of EUT chassis.
7. The frequency range from 150KHz to 30MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth(IF bandwidth=9KHz) with Maximum Hold Mode
9. For the actual test configuration, please refer to the related Item –EUT Test Photos.

7.1.5 Test Results

Pass

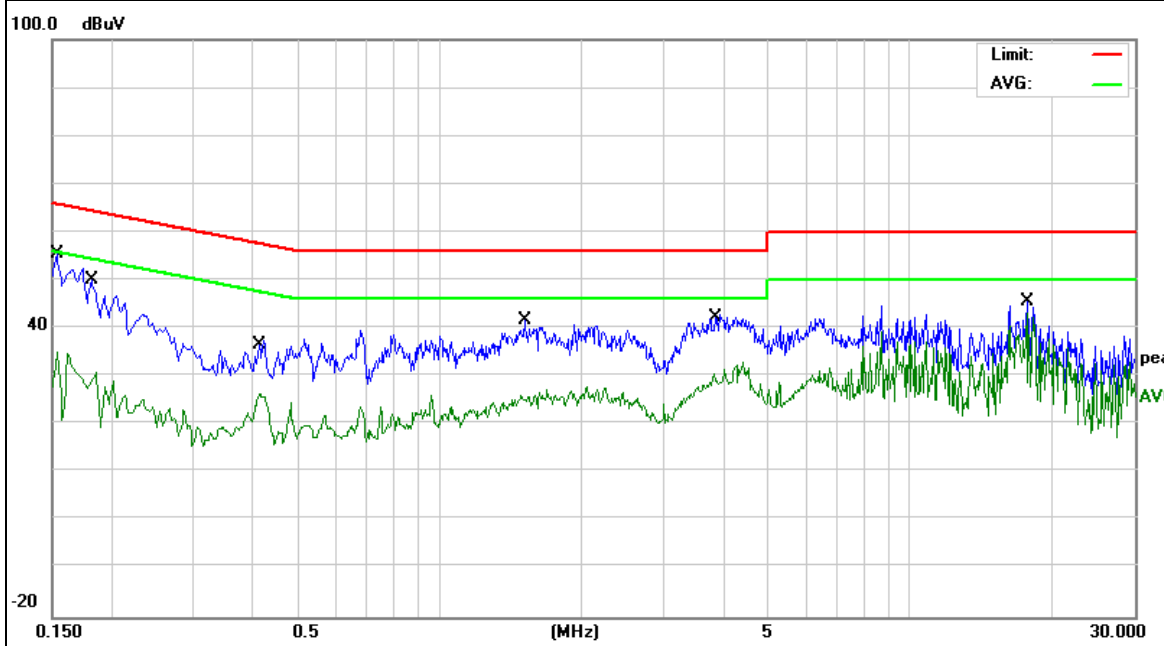
7.1.6 Test Results

EUT:	RFID Reader	Model Name :	CL7206B
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	DC 24V form Adapter AC 120V/60Hz	Test Mode:	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1539	45.26	10.13	55.39	65.78	-10.39	QP
0.1539	24.80	10.13	34.93	55.78	-20.85	AVG
0.1819	39.77	10.16	49.93	64.39	-14.46	QP
0.1819	19.88	10.16	30.04	54.39	-24.35	AVG
0.4138	27.52	9.93	37.45	57.57	-20.12	QP
0.4138	16.52	9.93	26.45	47.57	-21.12	AVG
1.5180	31.77	9.76	41.53	56.00	-14.47	QP
1.5180	16.03	9.76	25.79	46.00	-20.21	AVG
3.8300	33.04	9.78	42.82	56.00	-13.18	QP
3.8300	20.85	9.78	30.63	46.00	-15.37	AVG
17.6937	35.38	10.11	45.49	60.00	-14.51	QP
17.6937	32.92	10.11	43.03	50.00	-6.97	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

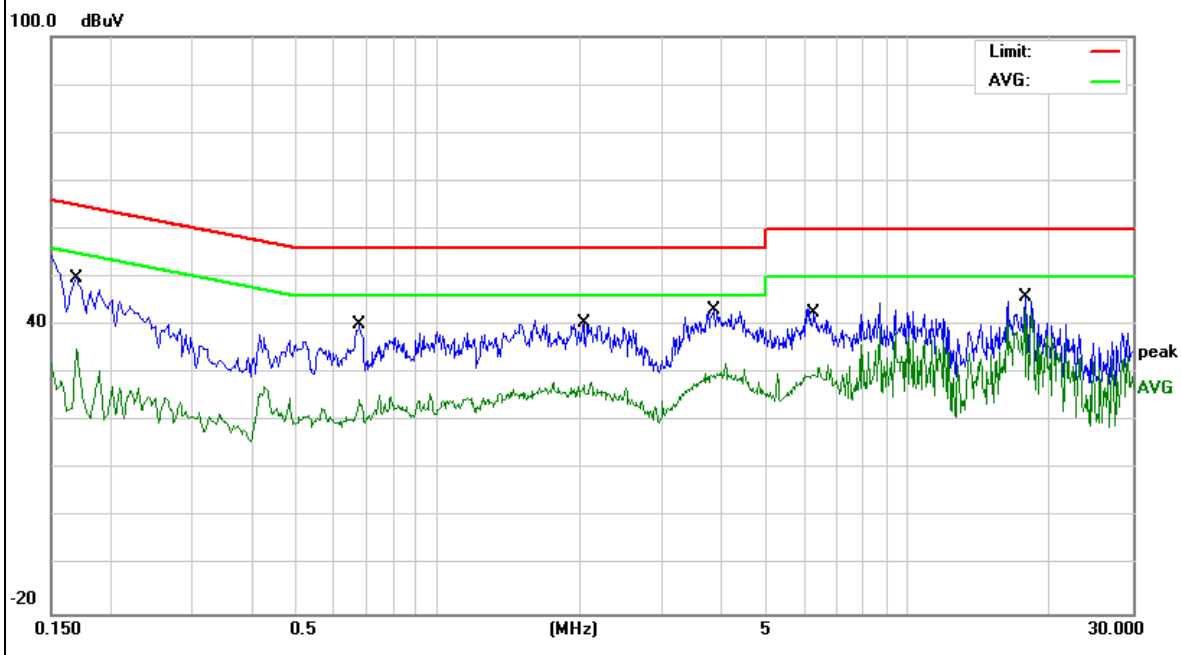


EUT:	RFID Reader	Model Name :	CL7206B
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	DC 24V form Adapter AC 120V/60Hz	Test Mode:	Mode 1

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1700	39.74	10.15	49.89	64.96	-15.07	QP
0.1700	24.84	10.15	34.99	54.96	-19.97	AVG
0.6820	30.46	9.78	40.24	56.00	-15.76	QP
0.6820	14.85	9.78	24.63	46.00	-21.37	AVG
2.0420	30.71	9.75	40.46	56.00	-15.54	QP
2.0420	17.94	9.75	27.69	46.00	-18.31	AVG
3.8500	33.26	9.78	43.04	56.00	-12.96	QP
3.8500	20.24	9.78	30.02	46.00	-15.98	AVG
6.2260	33.48	9.82	43.30	60.00	-16.70	QP
6.2260	19.93	9.82	29.75	50.00	-20.25	AVG
17.6940	35.60	10.11	45.71	60.00	-14.29	QP
17.6940	33.06	10.11	43.17	50.00	-6.83	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

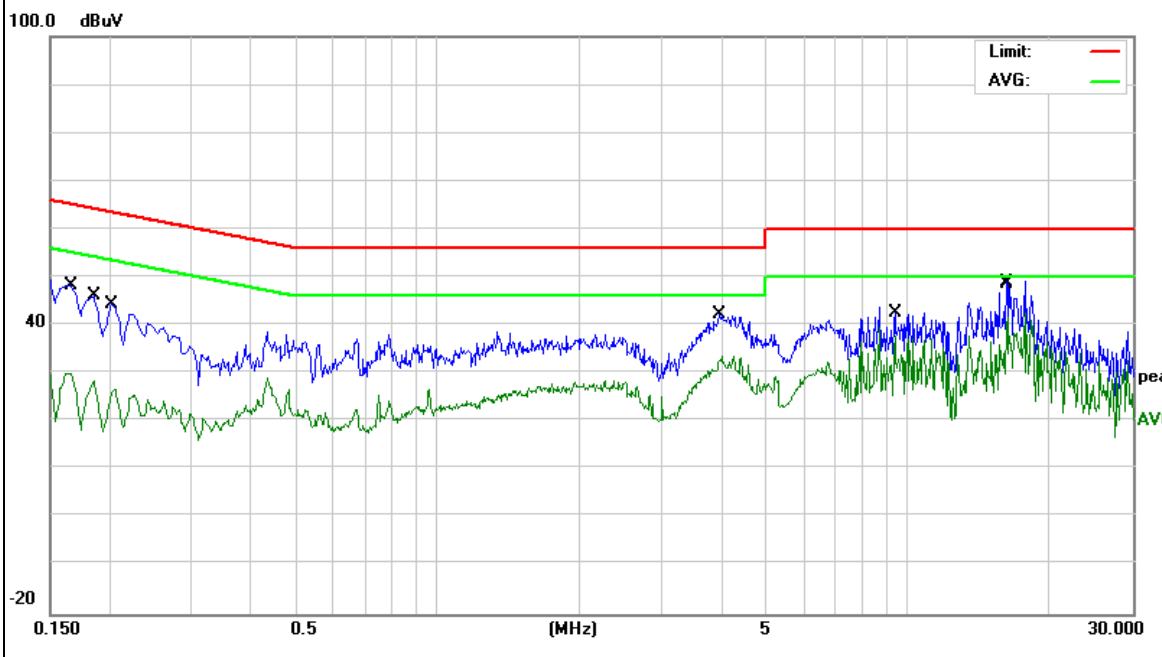


EUT:	RFID Reader	Model Name :	CL7206B
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	DC 24V form Adapter AC 240V/60Hz	Test Mode:	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1660	38.02	10.14	48.16	65.15	-16.99	QP
0.1660	19.92	10.14	30.06	55.15	-25.09	AVG
0.1859	35.87	10.16	46.03	64.21	-18.18	QP
0.1859	18.18	10.16	28.34	54.21	-25.87	AVG
0.2058	34.34	10.17	44.51	63.37	-18.86	QP
0.2058	16.60	10.17	26.77	53.37	-26.60	AVG
4.0099	32.36	9.78	42.14	56.00	-13.86	QP
4.0099	23.79	9.78	33.57	46.00	-12.43	AVG
9.3899	32.67	9.87	42.54	60.00	-17.46	QP
9.3899	27.84	9.87	37.71	50.00	-12.29	AVG
16.1659	38.99	10.01	49.00	60.00	-11.00	QP
16.4739	27.66	10.03	37.69	50.00	-12.31	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

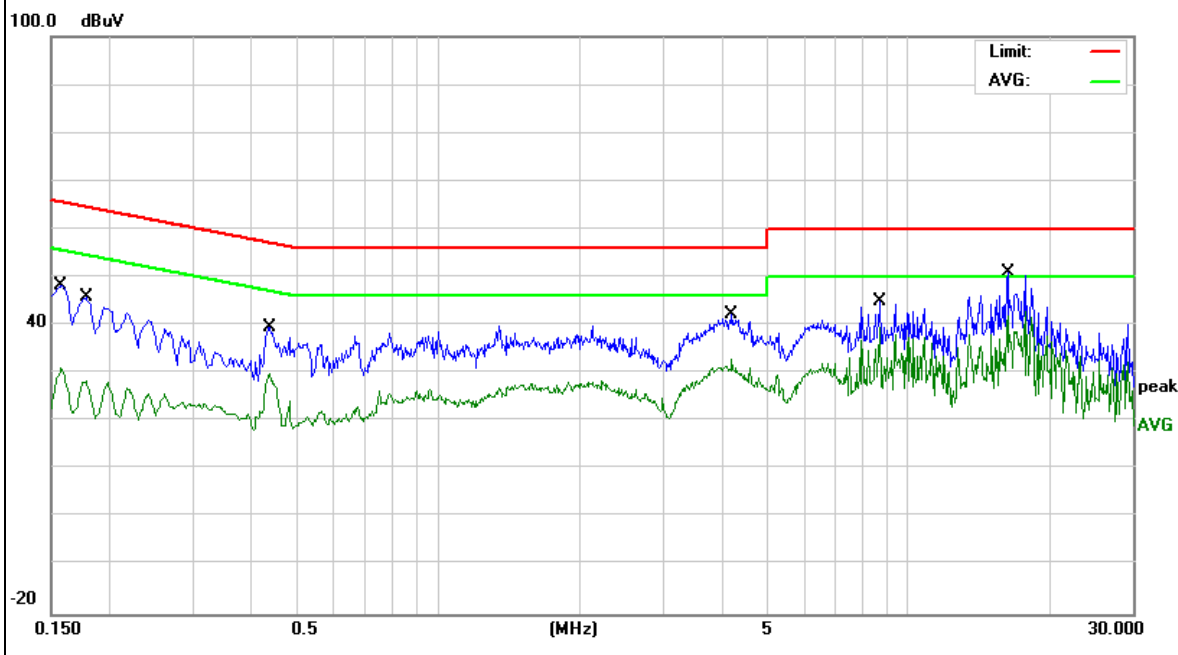


EUT:	RFID Reader	Model Name :	CL7206B
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	DC 24V form Adapter AC 240V/60Hz	Test Mode:	Mode 1

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1580	38.26	10.14	48.40	65.56	-17.16	QP
0.1580	21.00	10.14	31.14	55.56	-24.42	AVG
0.1779	35.63	10.15	45.78	64.58	-18.80	QP
0.1779	18.26	10.15	28.41	54.58	-26.17	AVG
0.4380	29.77	9.90	39.67	57.10	-17.43	QP
0.4380	19.96	9.90	29.86	47.10	-17.24	AVG
4.2019	32.33	9.78	42.11	56.00	-13.89	QP
4.2019	23.31	9.78	33.09	46.00	-12.91	AVG
8.7179	35.07	9.85	44.92	60.00	-15.08	QP
8.7179	29.75	9.85	39.60	50.00	-10.40	AVG
16.2299	40.96	10.01	50.97	60.00	-9.03	QP
16.2299	32.07	10.01	42.08	50.00	-7.92	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



7.2 RADIATED SPURIOUS EMISSION

7.2.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and ANSI C63.10-2013

7.2.2 Conformance Limit

According to FCC Part 15.247(d): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
According to FCC Part 15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	2400/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

Frequency(MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

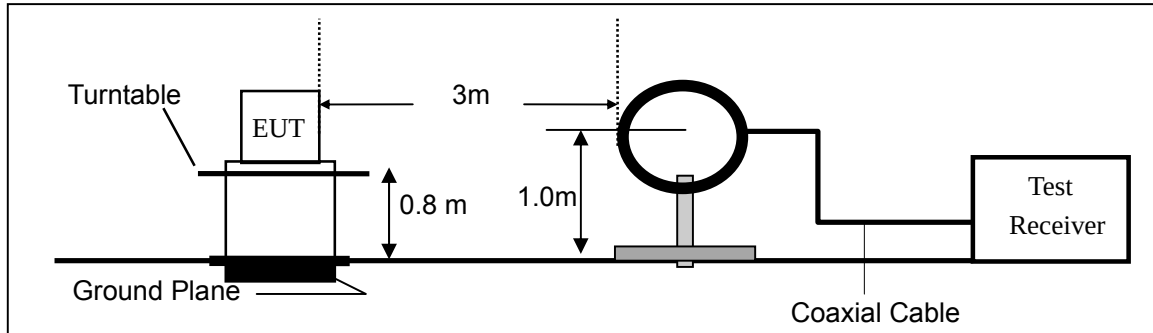
Remark :1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

7.2.3 Measuring Instruments

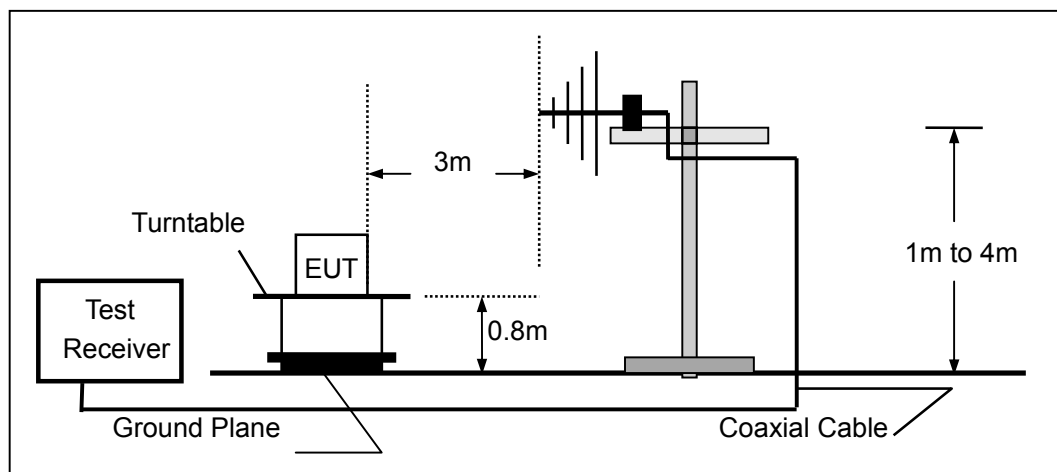
The Measuring equipment is listed in the section 6.3 of this test report.

7.2.4 Test Configuration

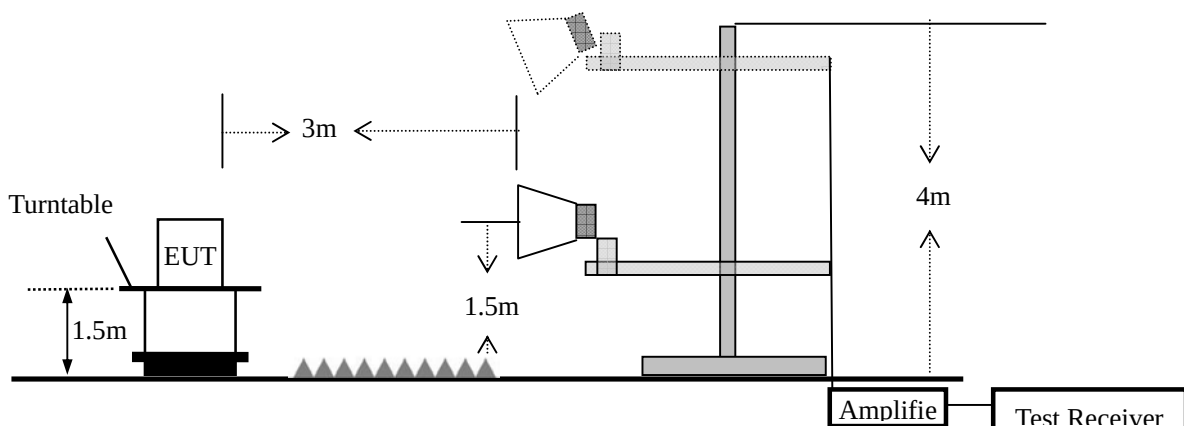
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



7.2.5 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.

Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where $RBWCF [dB] = 10 \cdot \lg(100 [kHz] / \text{narrower RBW} [kHz])$. , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

7.2.6 Test Results

■ Spurious Emission below 30MHz (9KHz to 30MHz)

EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Eileen Liu

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor = $20 \log(\text{Specific distance} / \text{test distance})$ (dB);

Limit line = Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission below 1GHz (30MHz to 1GHz)

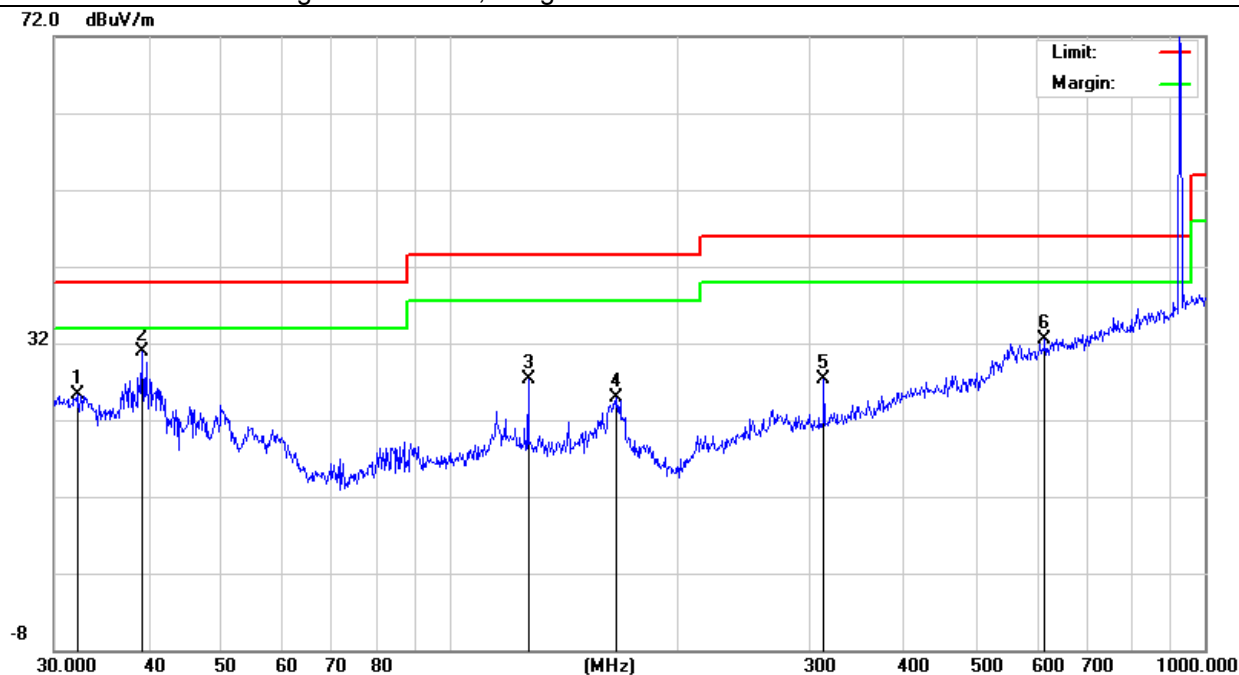
All the modulation modes have been tested, and the worst result was report as below:

EUT:	RFID Reader	Model Name :	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010hPa	Test Mode:	Mode 1
Test Voltage :	DC 24V from adapter		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	32.1794	6.51	18.72	25.23	40.00	-14.77	QP
V	39.1613	15.48	15.41	30.89	40.00	-9.11	QP
V	127.2176	13.73	13.51	27.24	43.50	-16.26	QP
V	166.6512	13.10	11.76	24.86	43.50	-18.64	QP
V	313.2760	10.63	16.69	27.32	46.00	-18.68	QP
V	614.2142	7.76	24.82	32.58	46.00	-13.42	QP

Remark:

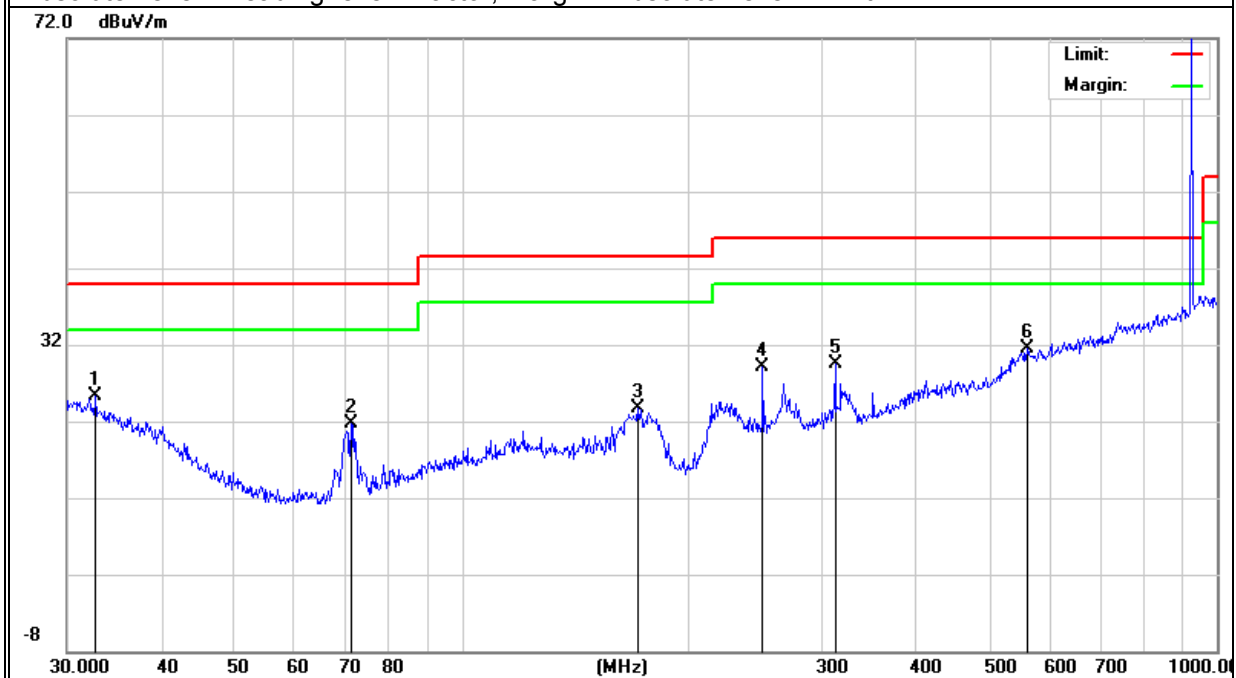
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	32.7486	6.93	18.42	25.35	40.00	-14.65	QP
H	71.3299	14.06	7.55	21.61	40.00	-18.39	QP
H	170.7925	12.09	11.56	23.65	43.50	-19.85	QP
H	250.3011	13.77	15.34	29.11	46.00	-16.89	QP
H	312.1792	12.84	16.65	29.49	46.00	-16.51	QP
H	560.6928	6.65	24.82	31.47	46.00	-14.53	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



■ Spurious Emission Above 1GHz (1GHz to 25GHz)

EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Eileen Liu

All the modulation modes have been tested, and the worst result was report as below:

Frequency	Read Level	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Remark	Comment
(MHz)	(dBμV)	(dB)	dB/m	(dB)	(dBμV/m)	(dBμV/m)	(dB)		
Low Channel (902.75MHz)-Above 1G									
1807.562	46.23	4.68	32.12	44.3	38.73	74	-35.27	Pk	Vertical
1807.562	35.12	4.68	32.12	44.3	27.62	54	-26.38	AV	Vertical
3611.523	44.32	7.1	39.15	44.6	45.97	74	-28.03	Pk	Vertical
3611.523	30.16	7.1	39.15	44.6	31.81	54	-22.19	AV	Vertical
1807.328	41.74	4.65	32.25	44.3	34.34	74	-39.66	Pk	Horizontal
1807.328	34.21	4.65	32.25	44.3	26.81	54	-27.19	AV	Horizontal
3611.217	40.16	7.11	40.06	44.52	42.81	74	-31.19	Pk	Horizontal
3611.217	30.21	7.11	40.06	44.52	32.86	54	-21.14	AV	Horizontal
Mid Channel (914.75 MHz)-Above 1G									
1830.114	40.21	4.65	32.25	44.3	32.81	74	-41.19	Pk	Vertical
1830.114	36.65	4.65	32.25	44.3	29.25	54	-24.75	AV	Vertical
3660.258	38.62	7.1	39.68	44.43	40.97	74	-33.03	Pk	Vertical
3660.258	28.63	7.1	39.68	44.43	30.98	54	-23.02	AV	Vertical
1830.136	41.26	4.65	32.25	44.2	33.96	74	-40.04	Pk	Horizontal
1830.136	31.21	4.65	32.25	44.2	23.91	54	-30.09	AV	Horizontal
3660.298	38.66	7.1	39.75	44.43	41.08	74	-32.92	Pk	Horizontal
3660.298	28.97	7.1	39.75	44.43	31.39	54	-22.61	AV	Horizontal
High Channel (927.25MHz)- Above 1G									
1855.307	46.35	5.21	35.52	44.21	42.87	74	-31.13	Pk	Vertical
1855.307	32.64	5.21	35.52	44.21	29.16	54	-24.84	AV	Vertical
2782.246	45.21	7.1	39.68	44.43	47.56	74	-26.44	Pk	Vertical
2782.246	30.14	7.1	39.68	44.43	32.49	54	-21.51	AV	Vertical
1855.235	46.32	5.21	35.52	44.21	42.84	74	-31.16	Pk	Horizontal
1855.235	32.65	5.21	35.52	44.21	29.17	54	-24.83	AV	Horizontal
2782.277	40.12	7.1	39.5	44.6	42.12	74	-31.88	Pk	Horizontal
2782.277	32.01	7.1	39.5	44.6	34.01	54	-19.99	AV	Horizontal

Note: (1) All Readings are Peak Value (VBW=3MHz) and AV Value (VBW=10Hz).
(2) Emission Level= Antenna Factor + Cable Loss + Read Level - Preamp Factor
(3)All other emissions more than 20dB below the limit.

Spurious Emission in Band edge

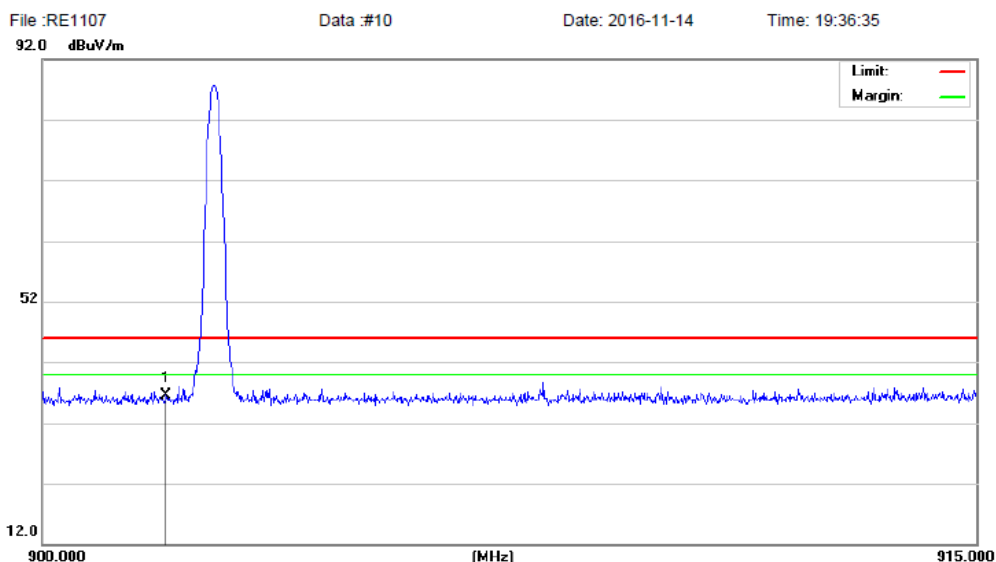
EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/ Mode4	Test By:	Eileen Liu

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	902	7.11	29.49	36.60	46	-9.40	QP
V	902	5.86	29.49	35.35	46	-10.65	QP
H	928	6.96	30.54	37.50	46	-8.50	QP
V	928	4.86	30.54	35.40	46	-10.60	QP

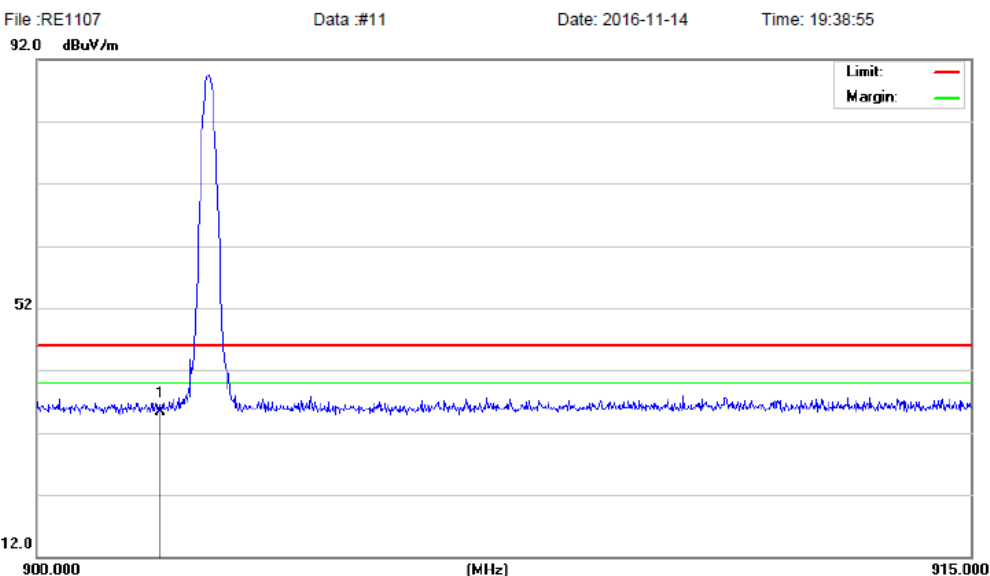
Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit

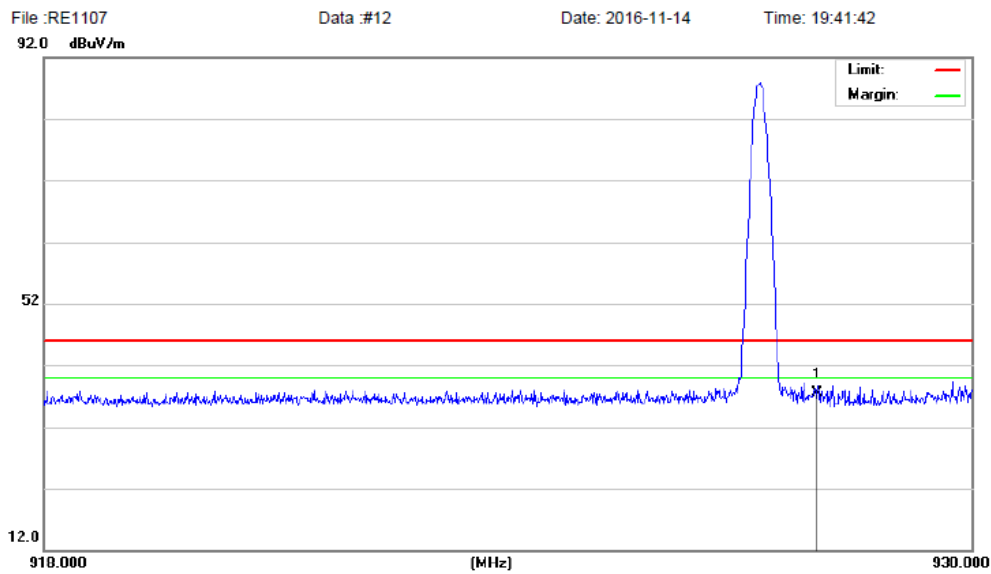
Horizontal



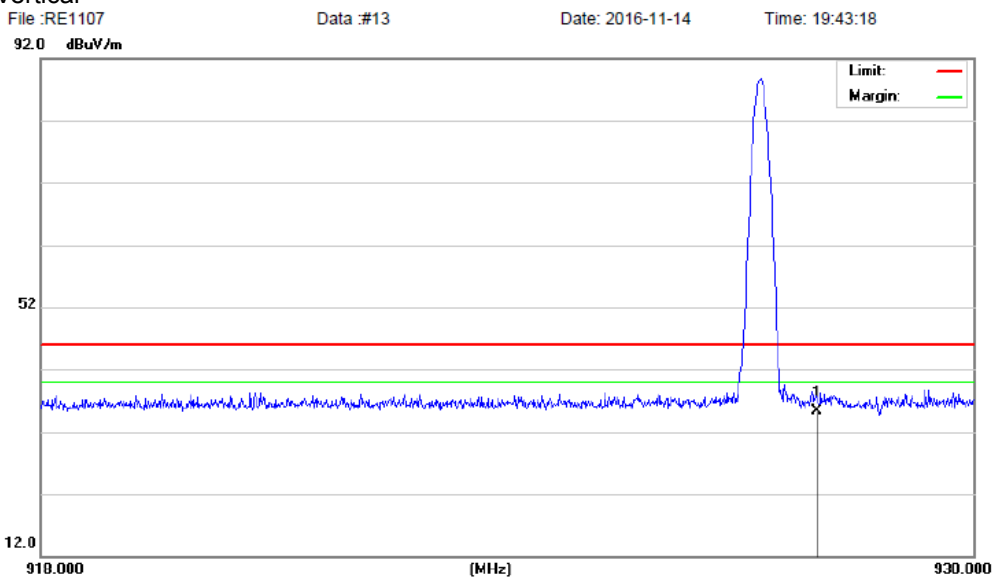
Vertical



Horizontal



Vertical



Note: (1) All other emissions more than 20dB below the limit.

7.3 NUMBER OF HOPPING CHANNEL

7.3.1 Applicable Standard

According to FCC Part 15.247(a)(1) (i) and ANSI C63.10-2013

7.3.2 Conformance 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; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

7.3.3 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

7.3.4 Test Setup

Please refer to Section 6.1 of this test report.

7.3.5 Test Procedure

The testing follows ANSI C63.10-2013 clause 7.8.3

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW $\geq$ 100KHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

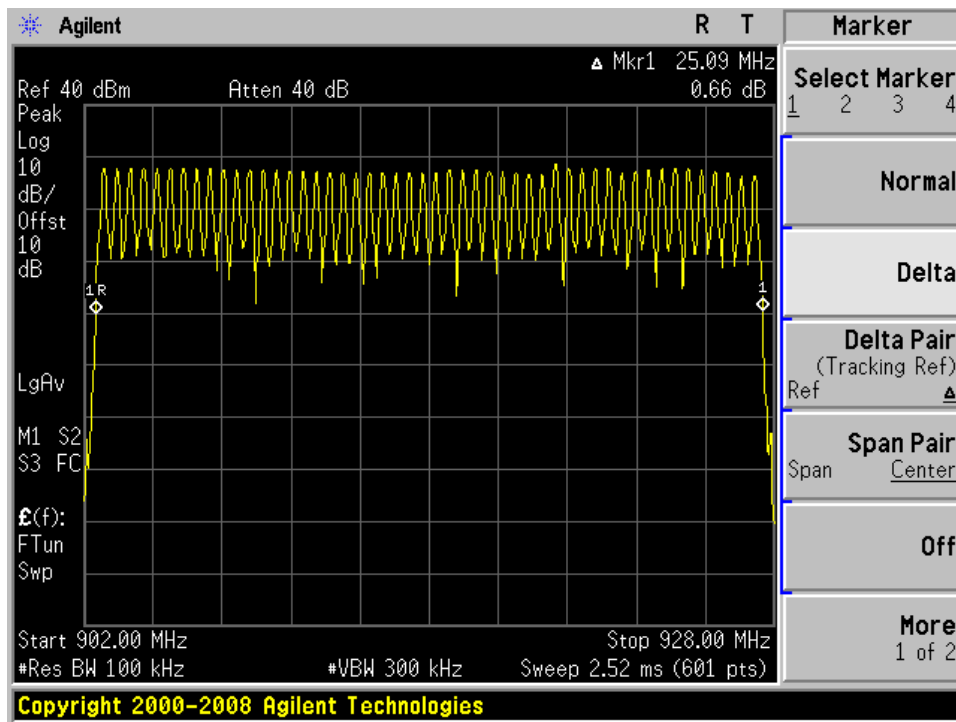
Trace = max hold

7.3.6 Test Results

EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode5	Test By:	Eileen Liu

Number of Hopping (Channel)	Adaptive Frequency hopping (Channel)	limit	Verdict
50	20	≥ 25	Pass

Number of Hopping Channel Plot



7.4 HOPPING CHANNEL SEPARATION MEASUREMENT

7.4.1 Applicable Standard

According to FCC Part 15.247(a)(1) and ANSI C63.10-2013

7.4.2 Conformance Limit

Frequency hopping systems operating in the 902-928MHz band shall have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

7.4.3 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

7.4.4 Test Setup

Please refer to Section 6.1 of this test report.

7.4.5 Test Procedure

The testing follows ANSI C63.10-2013 clause 7.8.2

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = Measurement Bandwidth or Channel Separation

RBW $\geq$ 30KHz

VBW $\geq$ 3*RBW

Sweep = auto

Detector function = peak

Trace = max hold

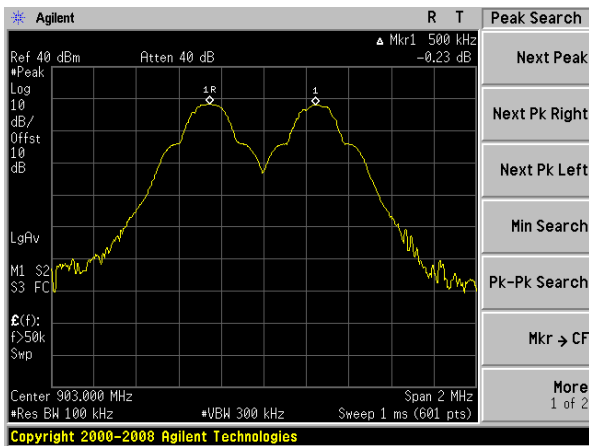
7.4.6 Test Results

EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Eileen Liu

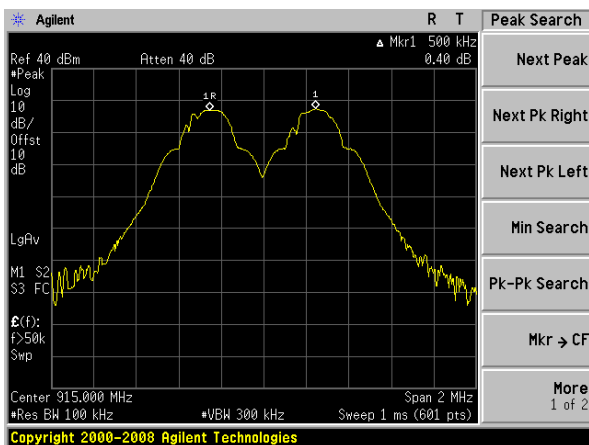
Modulation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (kHz)	Limit (kHz)		Verdict
GFSK	01	902.75	500	>402.972	20dB BW	PASS
	25	914.75	500	>407.605	20dB BW	PASS
	50	927.25	500	>407.228	20dB BW	PASS

Test Plot

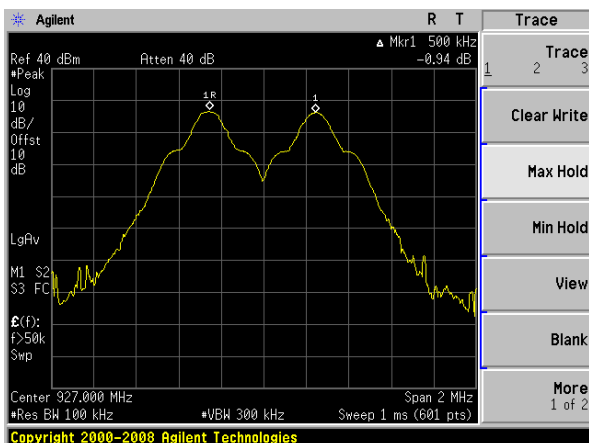
(1Mbps) Channel Separation plot on channel 01-02



(1Mbps) Channel Separation plot on channel 25-26



(1Mbps) Channel Separation plot on channel 49-50



7.5 AVERAGE TIME OF OCCUPANCY (DWEELL TIME)

7.5.1 Applicable Standard

According to FCC Part 15.247(a)(1)(i) and ANSI C63.10-2013

7.5.2 Conformance 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.

7.5.3 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

7.5.4 Test Setup

Please refer to Section 6.1 of this test report.

7.5.5 Test Procedure

The testing follows ANSI C63.10-2013 clause 7.8.4

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW $\geq$ 1MHz

VBW $\geq$ RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

Measure the maximum time duration of one single pulse.

Set the EUT for DH5, DH3 and DH1 packet transmitting.

Measure the maximum time duration of one single pulse.

7.5.6 Test Results

EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode5	Test By:	Eileen Liu

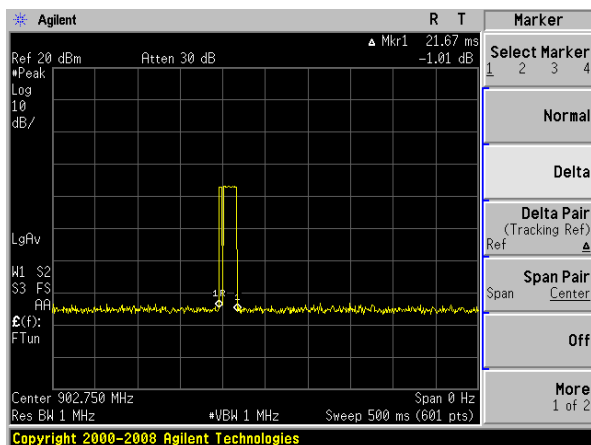
Test result:

Dwell time=21.67ms*6=130.02ms=0.13s < 0.4s

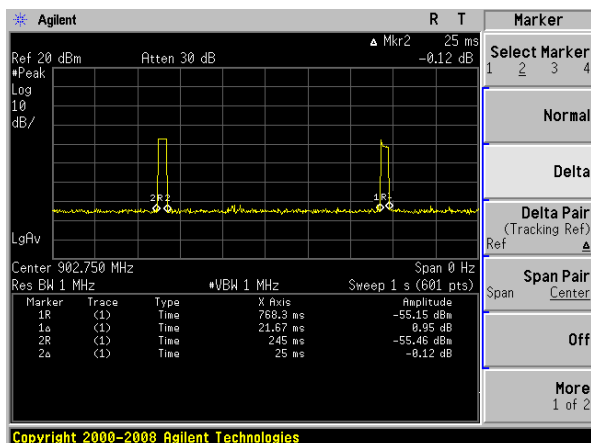
The test result is pass.

Test Plot

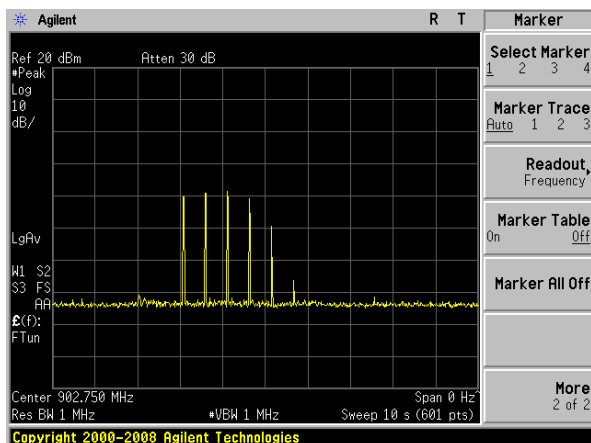
Package Transfer Time Plot CH01-500ms



Package Transfer Time Plot CH01-1s



Package Transfer Time Plot CH01-10s



7.6 20DB BANDWIDTH TEST

7.6.1 Applicable Standard

According to FCC Part 15.247(a)(1)(i) and ANSI C63.10-2013

7.6.2 Conformance Limit

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

7.6.3 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

7.6.4 Test Setup

Please refer to Section 6.1 of this test report.

7.6.5 Test Procedure

The testing follows ANSI C63.10-2013 clause 6.9.2

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW $\geq$ 1% of the 20 dB bandwidth

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

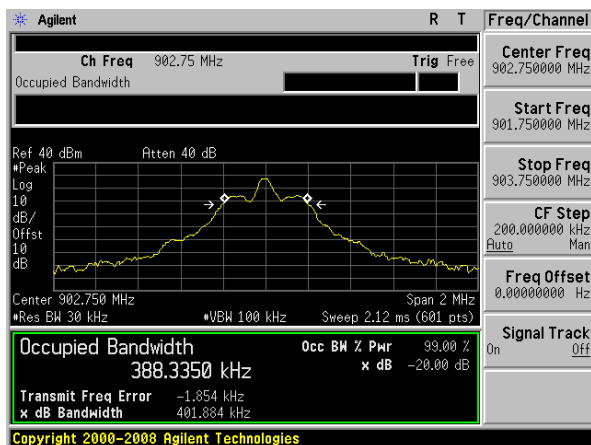
7.6.6 Test Results

EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Eileen Liu

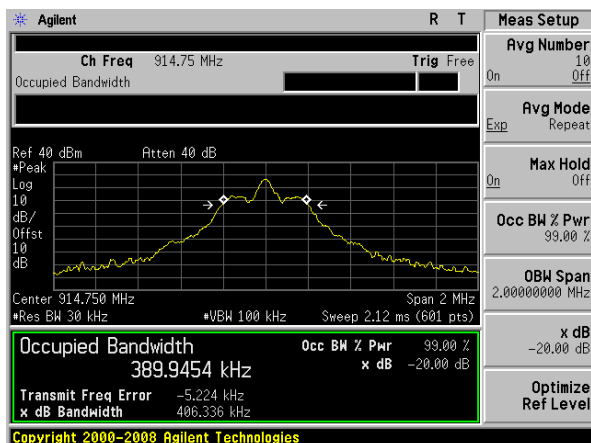
Test Channel	Frequency	Measurement Bandwidth (KHz)	Limit	Verdict
	(MHz)		(kHz)	
1	902.75	401.884	500	PASS
25	914.75	406.336	500	PASS
50	927.25	407.228	500	PASS

Test Plot

20dB Bandwidth plot on channel 01



20dB Bandwidth plot on channel 25



20dB Bandwidth plot on channel 50



7.7 PEAK OUTPUT POWER

7.7.1 Applicable Standard

According to FCC Part 15.247(b)(2) and ANSI C63.10-2013

7.7.2 Conformance Limit

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.

7.7.3 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

7.7.4 Test Setup

Please refer to Section 6.1 of this test report.

7.7.5 Test Procedure

The testing follows ANSI C63.10-2013 clause 7.8.5.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW $\geq$ the 20 dB bandwidth of the emission being measured

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

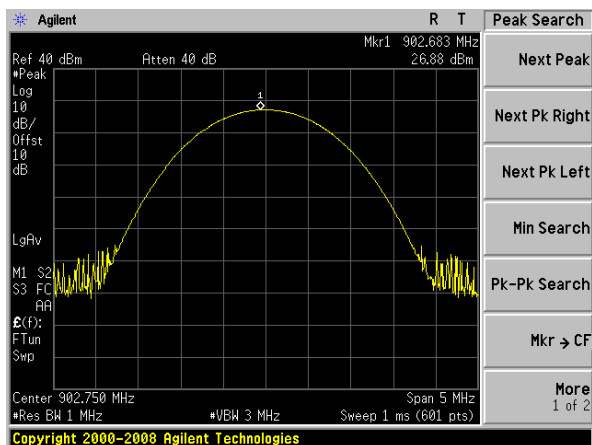
7.7.6 Test Results

EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2/Mode3/Mode4	Test By:	Eileen Liu

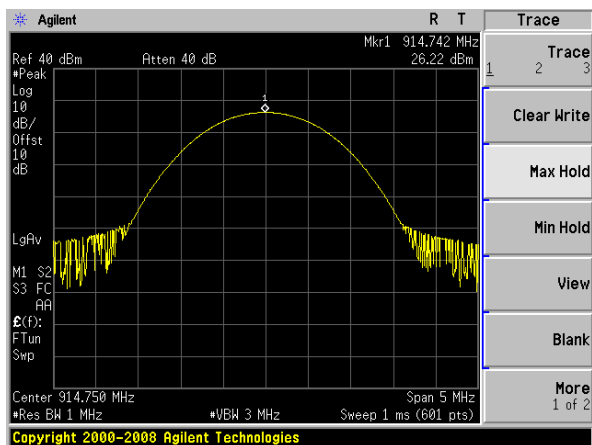
Test Channel	Frequency	Power Setting	Peak Output Power	LIMIT	Verdict
	(MHz)		(dBm)	(dBm)	
1	902.75	Default	26.88	30	PASS
25	914.75	Default	26.22	30	PASS
50	927.25	Default	25.47	30	PASS

Test Plot

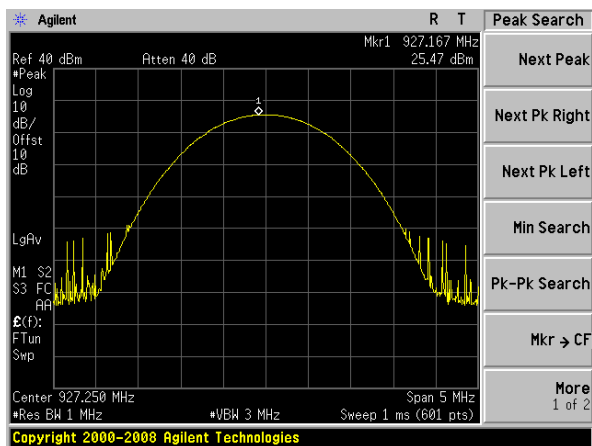
Peak output Power plot on channel 01



Peak output Power plot on channel 25



Peak output Power plot on channel 50



7.8 CONDUCTED BAND EDGE MEASUREMENT

7.8.1 Applicable Standard

According to FCC Part 15.247(d) and ANSI C63.10-2013

7.8.2 Conformance Limit

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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.8.3 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

7.8.4 Test Setup

Please refer to Section 6.1 of this test report.

7.8.5 Test Procedure

The testing follows ANSI C63.10-2013 clause 7.8.6.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW = 100KHz

VBW = 300KHz

Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.

Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

Repeat above procedures until all measured frequencies were complete.

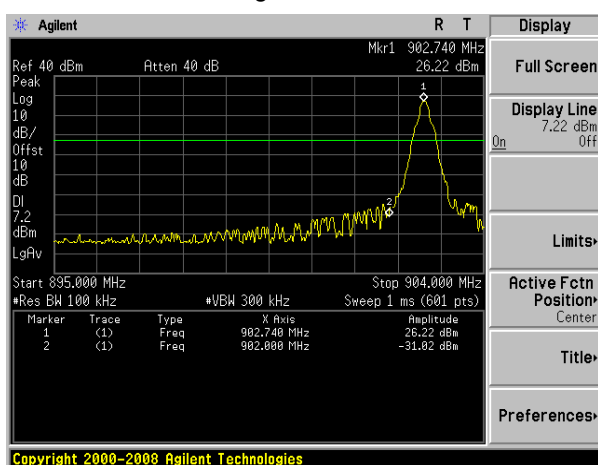
7.8.6 Test Results

EUT:	RFID Reader	Model No.:	CL7206B
Temperature:	20 °C	Relative Humidity:	48%
Test Mode:	Mode2 /Mode4/ Mode5	Test By:	Eileen Liu

Note: Hopping enabled and disabled have evaluated, and the worst test data was reported

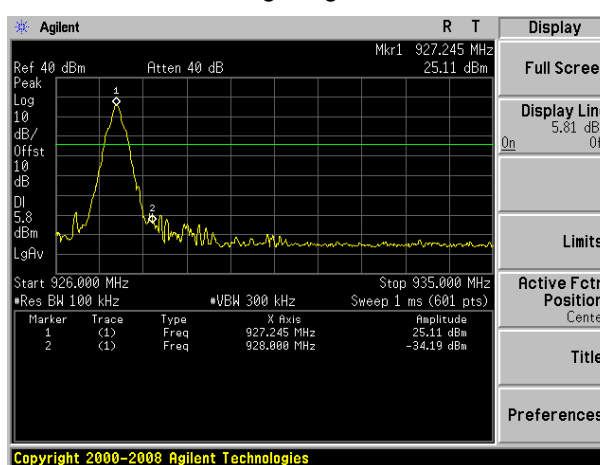
Test Plot

Band Edge-Low Channel



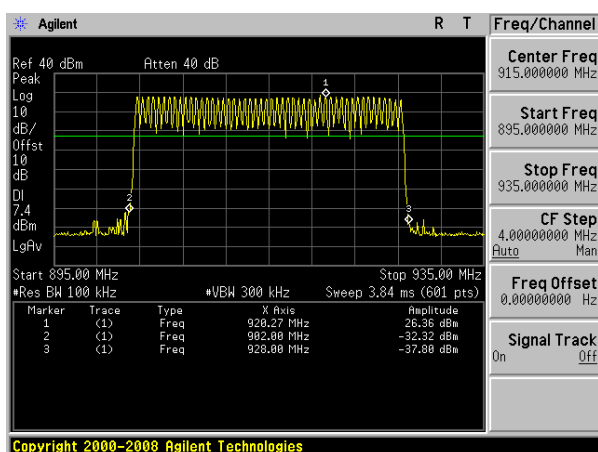
Copyright 2000-2008 Agilent Technologies

Band Edge-High Channel



Copyright 2000-2008 Agilent Technologies

Band Edge-Hopping Channel



Copyright 2000-2008 Agilent Technologies

7.9 SPURIOUS RF CONDUCTED EMISSIONS

7.9.1 Conformance Limit

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

7.9.2 Measuring Instruments

The Measuring equipment is listed in the section 6.3 of this test report.

7.9.3 Test Setup

Please refer to Section 6.1 of this test report.

7.9.4 Test Procedure

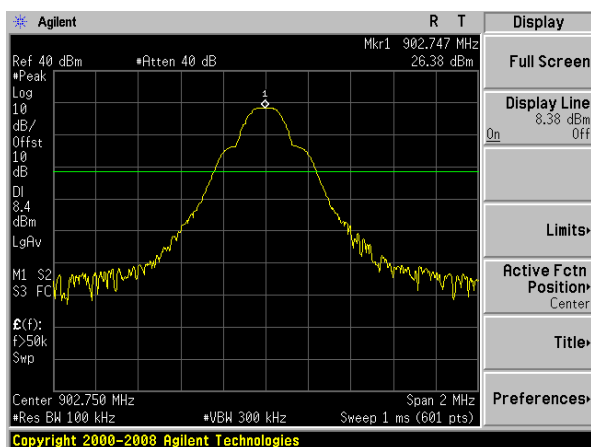
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300kHz to measure the peak field strength , and measure frequency range from 9kHz to 26.5GHz.

7.9.5 Test Results

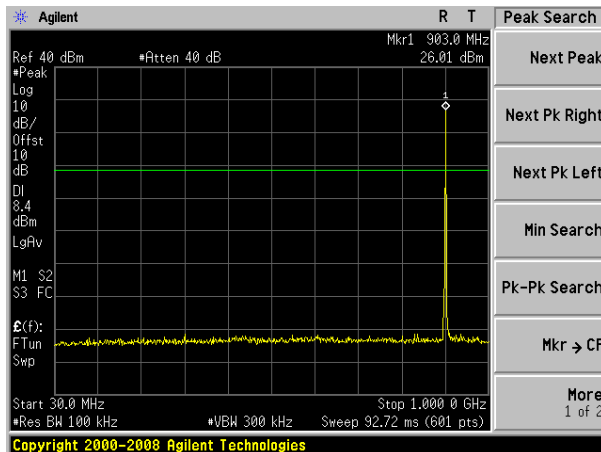
Remark: The measurement frequency range is from 9kHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

Test Plot(902.75MHz)

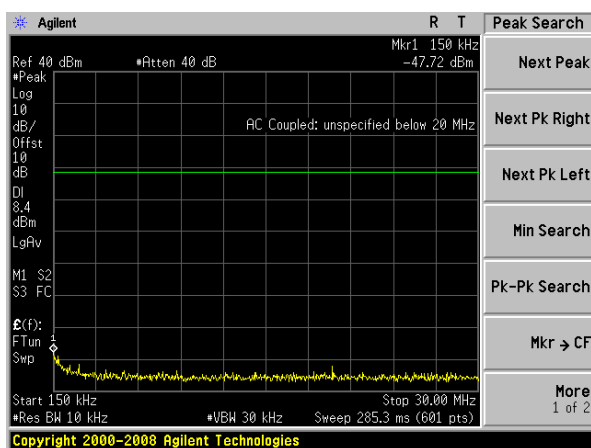
902.75MHz



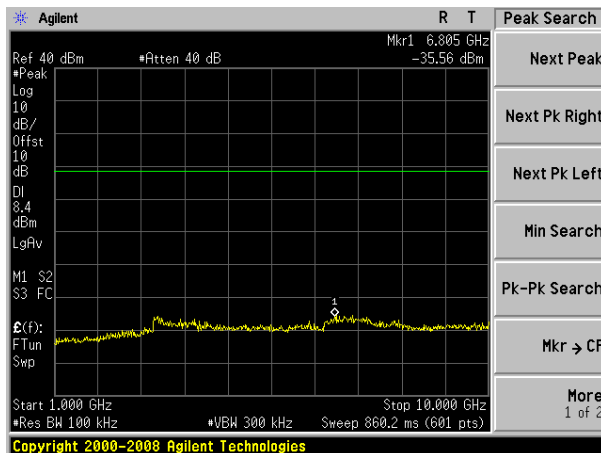
30M-1G



150K-30M

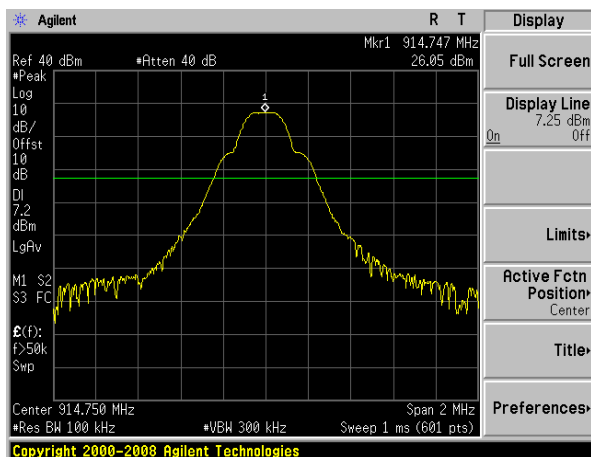


1G-10G

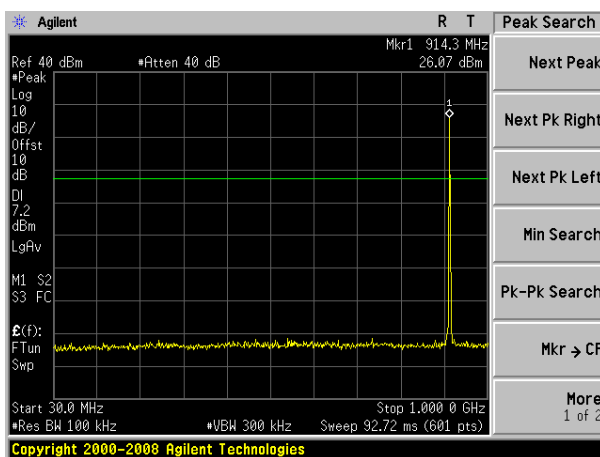


Test Plot(914.75MHz)

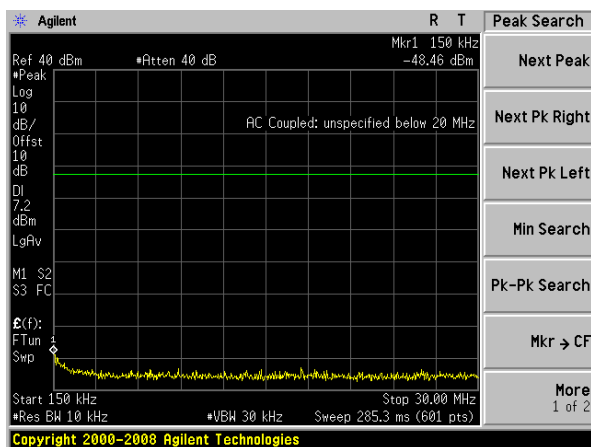
914.75MHz



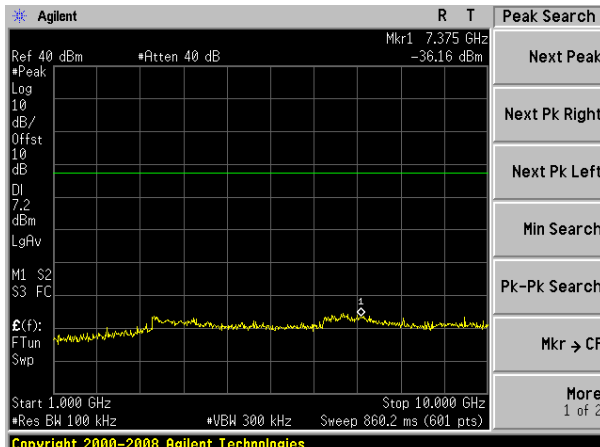
30M-1G



150K-30M

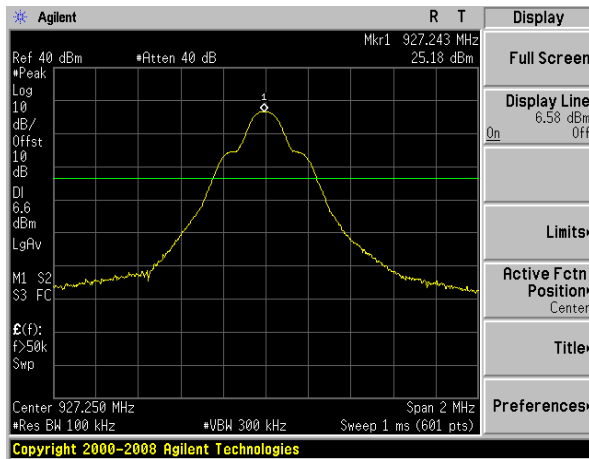


1G-10G

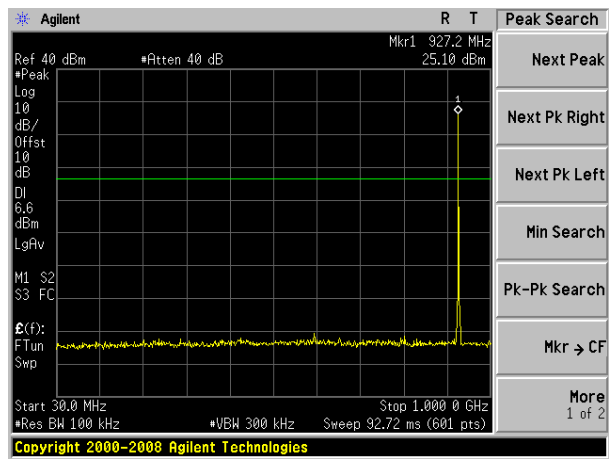


Test Plot(927.25MHz)

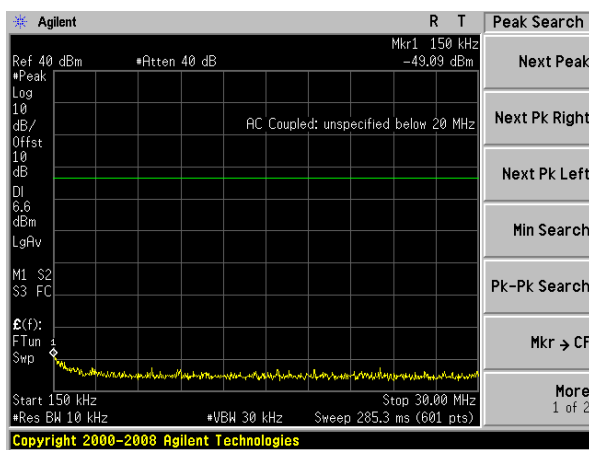
927.25MHz



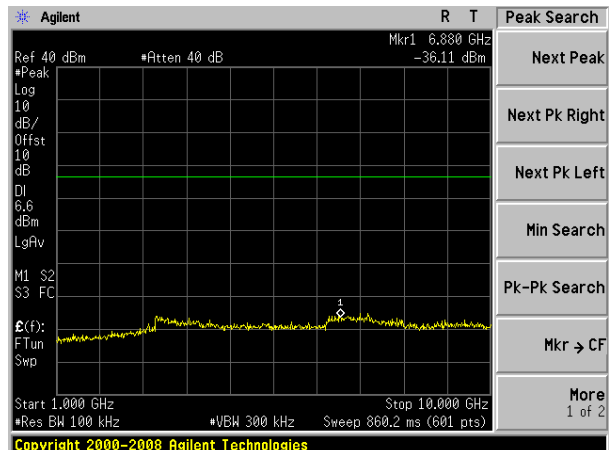
30M-1G



150K-30M



1G-10G



7.10 ANTENNA APPLICATION

7.10.1 Antenna Requirement

15.203 requirement: For intentional device, 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.

7.10.2 Result

The EUT antenna is permanent attached Panel antenna (Gain:9dBi). It comply with the standard requirement.

END OF REPORT