



Test Report

Product Name : USB HF READER

Model No. : PR-NFC, PR-S50, PR-IC2

FCC ID. : 2AGBCPRNFC

Applicant : Wontec International Co., Ltd

Address : No.38, Lane 27, SongMing Street, Beitun District,
Taichung City, TAIWAN

Date of Receipt : Oct. 27, 2015

Issued Date : Nov. 16 2015

Report No. : 15B0035R-RFUSP17V00

Version : V1.0



The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

Test Report Certification

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City, TAIWAN
Manufacturer : Wontec International Co., Ltd
Model No. : PR-NFC, PR-S50, PR-IC2
FCC ID. : 2AGBCPRNFC
EUT Voltage : DC 5V (power by PC)
Testing Voltage : DC 5V (power by PC)
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.225
Test Lab : QuieTek Hsin Chu Laboratory
Test Result : Complied

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Documented By :



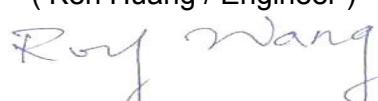
(Demi Chang / Senior Engineering Adm. Specialist)

Tested By :



(Ken Huang / Engineer)

Approved By :



(Roy Wang / Director)

Revision History

Laboratory Information

We, **QuieTek Corporation**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C. : TAF, Accreditation Number: 3024
USA : FCC, Registration Number: 365520
Canada : IC, Submission No: 181665 / IC Registration Number: 4075C-4

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site:<http://www.quietek.com/english/about/certificates.aspx?bval=5>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site :
http://www.quietek.com/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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1. General Information

1.1. EUT Description

Product Name	USB HF READER
Model No.	PR-NFC, PR-S50, PR-IC2
Frequency Range	13.56MHz
Channel Number	1
Type of Modulation	ASK
Antenna Type	Monopole Antenna

Working Frequency of Each Channel	
Channel	Frequency
001	13.56MHz

Note:

1. This device is a USB HF READER included a $13.56\text{MHz} \pm 7\text{kHz}$ receiving function, a $13.56\text{MHz} \pm 7\text{kHz}$ transmitting function.
2. The different of the each model is shown as below:

Model No.	Protocol
PR-NFC	ISO14443A & ISO 15693
PR-S50	ISO14443A
PR-IC2	ISO15693
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.225 for spread spectrum devices.
4. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 15B0035R-RFUSP01V00 under Declaration of Conformity.

1.2. Test Mode

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Pre-Test Mode	
EMI	Mode 1: Transmit
Final Test Mode	
TX	Mode 1: Transmit

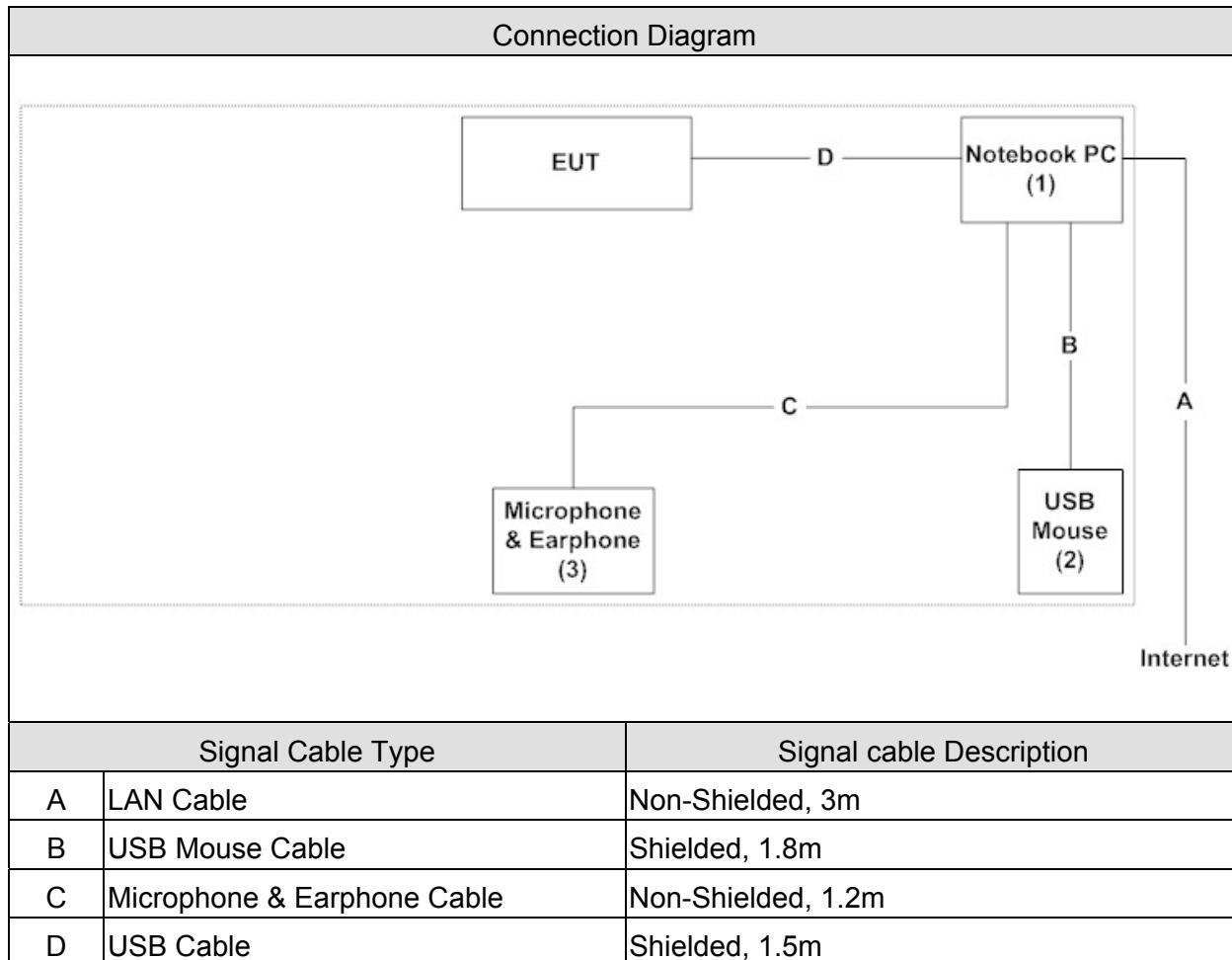
Emission	
Conducted Emission	Yes
Occupied Bandwidth	Yes
Radiated Emission	Yes
Frequency Tolerance	Yes

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	Notebook PC	HP Compaq	NX6320FF	CNU7020BXT	DoC	Non-Shielded, 1.8m
2	USB Mouse	Logitech	M-UV83	LZE35006065	DoC	--
3	Microphone & Earphone	Fujiei	SBZ-38	N/A	DoC	--

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT and display as shown on 1.4.
2	Turn on the power of all equipment.
3	The EUT will continue Transmit.
4	Repeat the above procedure(2) to (3)

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	Conducted Emission	15 - 35	20
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Occupied Bandwidth	15 - 35	20
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Radiated Emission	15 - 35	24
Humidity (%RH)		25 - 75	59
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	Frequency Tolerance	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000

2. Conducted Emission

2.1. Test Equipment

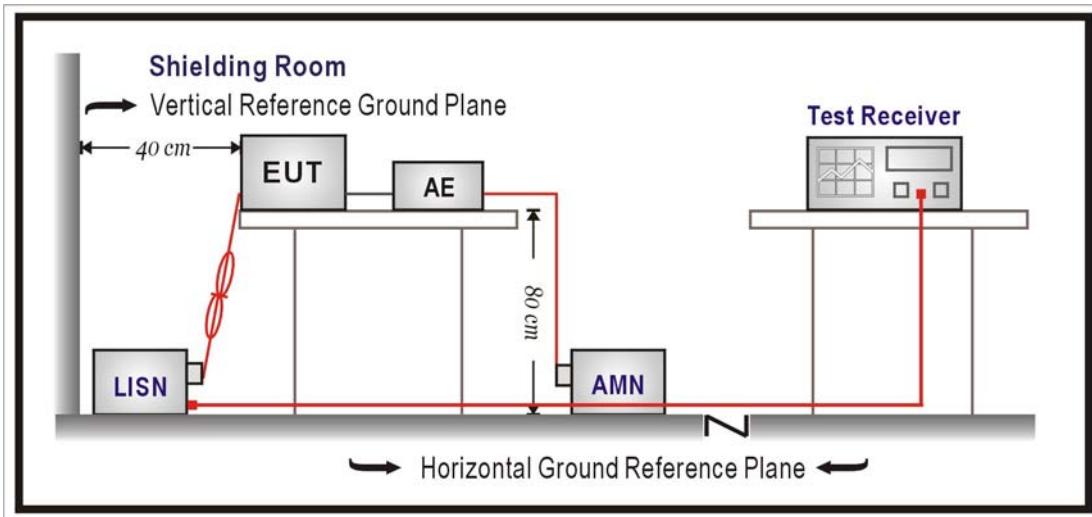
The following test equipment are used during the test:

Conducted Emission / SR2

Instrument	Manufacturer	Model No.	Serial No.	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2016/01/25
LISN	R&S	ENV216	100092	2016/08/17
Test Receiver	R&S	ESCS 30	825442/014	2016/07/16

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

Limits (dBuV)		
Frequency MHz	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Specification

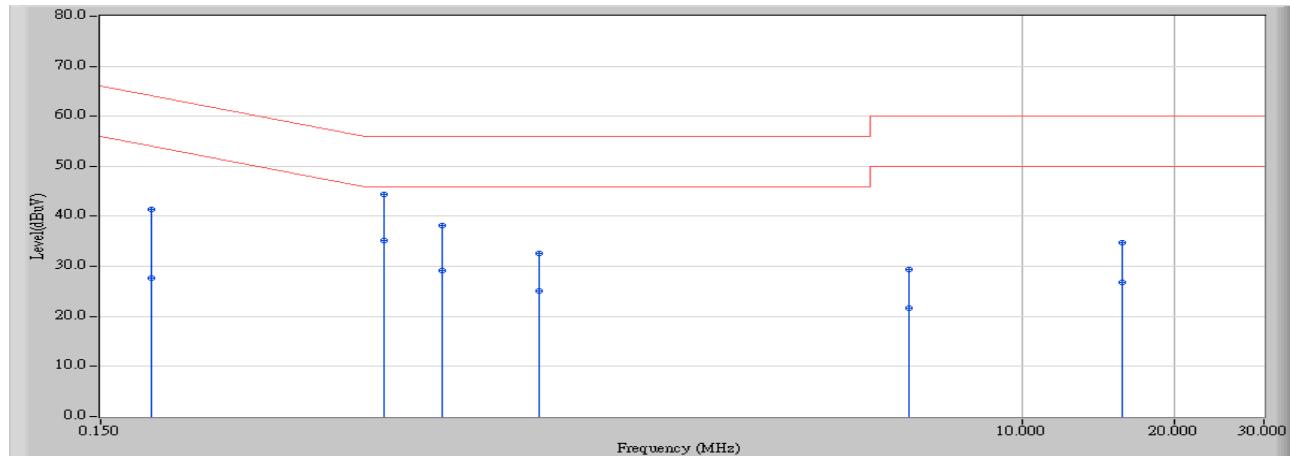
According to FCC Part 15 Subpart C Paragraph 15.207: 2007

2.6. Uncertainty

The measurement uncertainty is defined as \pm 2.26 dB.

2.7. Test Result

Site : SR2	Time : 2015/11/10 - 15:48
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR2_LISN(16A)-5_0818 - Line1	Power : AC 120V / 60Hz
EUT : USB HF READER	Note : Mode 1: Transmit

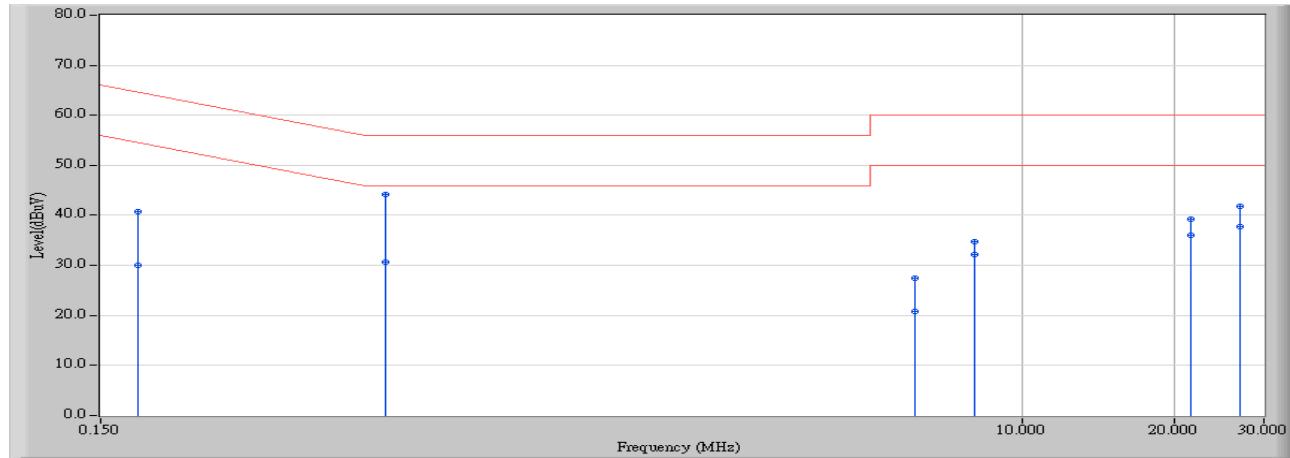


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.189	9.687	31.660	41.348	-22.730	64.078	QUASIPEAK
2		0.189	9.687	18.040	27.728	-26.350	54.078	AVERAGE
3		0.545	9.720	34.590	44.310	-11.690	56.000	QUASIPEAK
4	*	0.545	9.720	25.450	35.170	-10.830	46.000	AVERAGE
5		0.709	9.720	28.480	38.200	-17.800	56.000	QUASIPEAK
6		0.709	9.720	19.420	29.140	-16.860	46.000	AVERAGE
7		1.107	9.726	22.800	32.526	-23.474	56.000	QUASIPEAK
8		1.107	9.726	15.400	25.126	-20.874	46.000	AVERAGE
9		5.955	9.951	19.410	29.361	-30.639	60.000	QUASIPEAK
10		5.955	9.951	11.630	21.581	-28.419	50.000	AVERAGE
11		15.752	10.237	24.470	34.707	-25.293	60.000	QUASIPEAK
12		15.752	10.237	16.540	26.777	-23.223	50.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : SR2	Time : 2015/11/10 - 16:06
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR2_LISN(16A)-5_0818 - Line2	Power : AC 120V / 60Hz
EUT : USB HF READER	Note : Mode 1: Transmit



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.177	9.764	30.940	40.704	-23.905	64.609	QUASIPEAK
2		0.177	9.764	20.350	30.114	-24.495	54.609	AVERAGE
3	*	0.548	9.802	34.430	44.232	-11.768	56.000	QUASIPEAK
4		0.548	9.802	20.810	30.612	-15.388	46.000	AVERAGE
5		6.103	10.020	17.360	27.379	-32.621	60.000	QUASIPEAK
6		6.103	10.020	10.730	20.749	-29.251	50.000	AVERAGE
7		8.052	10.079	24.670	34.750	-25.250	60.000	QUASIPEAK
8		8.052	10.079	21.990	32.070	-17.930	50.000	AVERAGE
9		21.541	10.238	29.110	39.348	-20.652	60.000	QUASIPEAK
10		21.541	10.238	25.700	35.938	-14.062	50.000	AVERAGE
11		26.982	10.261	31.600	41.861	-18.139	60.000	QUASIPEAK
12		26.982	10.261	27.500	37.761	-12.239	50.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

3. Occupied Bandwidth

3.1. Test Equipment

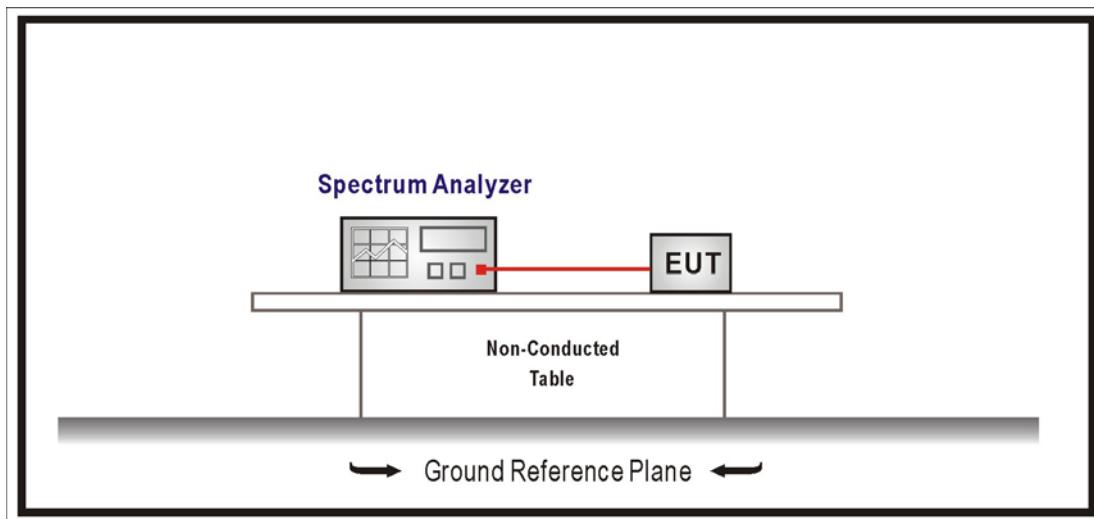
The following test equipments are used during the radiated emission tests:

Occupied Bandwidth / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23

Note: All equipments that need to calibrate are with calibration period of 1 year.

3.2. Test Setup



3.3. Limits

No Required

3.4. Uncertainty

The measurement uncertainty is defined as $\pm 150\text{Hz}$

3.5. Test Result

Product	USB HF READER		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2015/11/12	Test Site	SR7

Center Frequency	13.56 MHz
Allowable Bandwidth	--
Bandwidth at 20dB down (Max)	124.9kHz
Result	PASS

4. Radiated Emission

4.1. Test Equipment

The following test equipment are used during the test:

Radiated Emissions / Site1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	Schaffner	CBL6112B	2915	2016/08/14
Magnetic Loop Antenna	Teseq	HLA 6121	37133	2016/09/15
Pre-Amplifier	EMCI	EMC0031835	980233	2016/01/18
Spectrum Analyzer	Agilent	E4440A	MY46187335	2016/01/07
Spectrum Analyzer	Advantest	R3132	100803278	2016/11/04
Test Receiver	R&S	ESCS 30	100122	2016/02/01

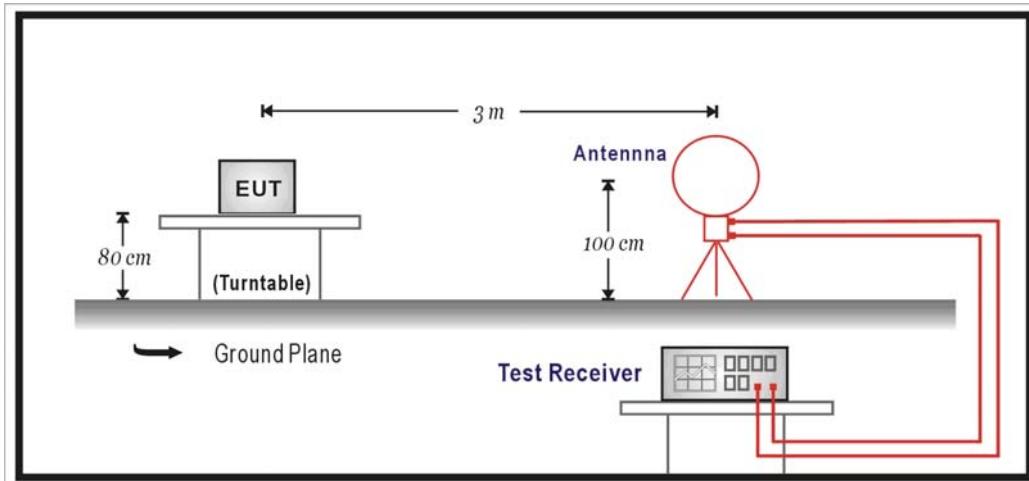
Radiated Emission / CB3

Instrument	Manufacturer	Model No.	Serial No.	Next Cal. Date
Bilog Antenna	Schaffner	CBL6112B	2,797	2016/08/14
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23
Spectrum Analyzer	Agilent	E4440A	MY46187335	2016/01/07
Pre-Amplifier	EMCI	EMC0031835	980233	2016/01/18
Coaxial Cable	Huber+Suhner	SF 106	72480/6	2016/08/14

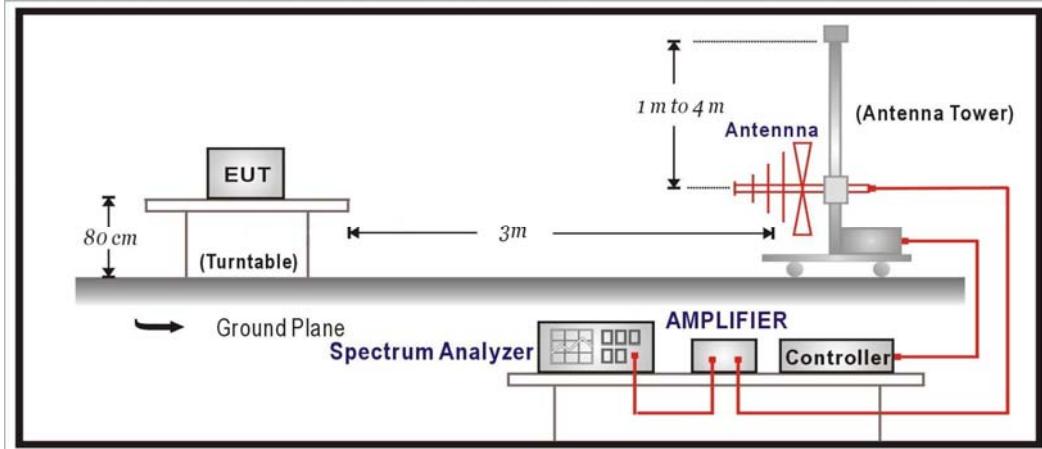
Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup

Under 30MHz Test Setup:



Under 1GHz Test Setup:



4.3. Limits

➤ **FCC Part 15 Subpart C Paragraph 15.225 Limit**

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

FCC Part 15 Subpart C Paragraph 15.225 Limits				
Field strength of fundamental				
Frequency (MHz)	30m		3m	
	uV/m	dBuV/m	uV/m	dBuV/m
13.553~13.567	15,848	84	1,584,800	124

Remarks : 1. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➤ General Radiated Emission Limits

FCC Part 15 Paragraph 15.209 Limits		
Frequency MHz	Field Strength (Microvolts/meter)	Distance (Meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark:

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. RF Voltage (dBuV/m) = 20*log RF Voltage (uV/m)
4. When the very low emission of EUT, the 3m measurement distance was performed. Regards to an inverse linear extrapolation 40dB/dec is adopted. The collection factor will be 80dB for this case.

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Regard to the characteristic and operation band of EUT, Loop antenna was used for this measurement. The measurement method is hosed or ANSI C63.4 section 8.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2003 on radiated measurement.

Radiated emissions were invested over the frequency range from 9kHz to 30MHz using a receive bandwidth of 9kHz and 30MHz to 1GHz using a receiver bandwidth of 120kHz.

Radiated was performed at an antenna to EUT distance of 3 meters.

The frequency range from 30MHz to 10th harmonics is checked.

The emission limit shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz.

Radiated emission limit in these three bands are based on measurements employing an average detector.

4.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.225: 2007

4.6. Uncertainty

The measurement uncertainty

30MHz~1GHz as $\pm 3.19\text{dB}$

4.7. Test Result

Product	USB HF READER			
Test Item	Fundamental Radiated Emission			
Test Mode	Mode 1: Transmit			
Date of Test	2015/11/12	Test Site		No.1 OATS

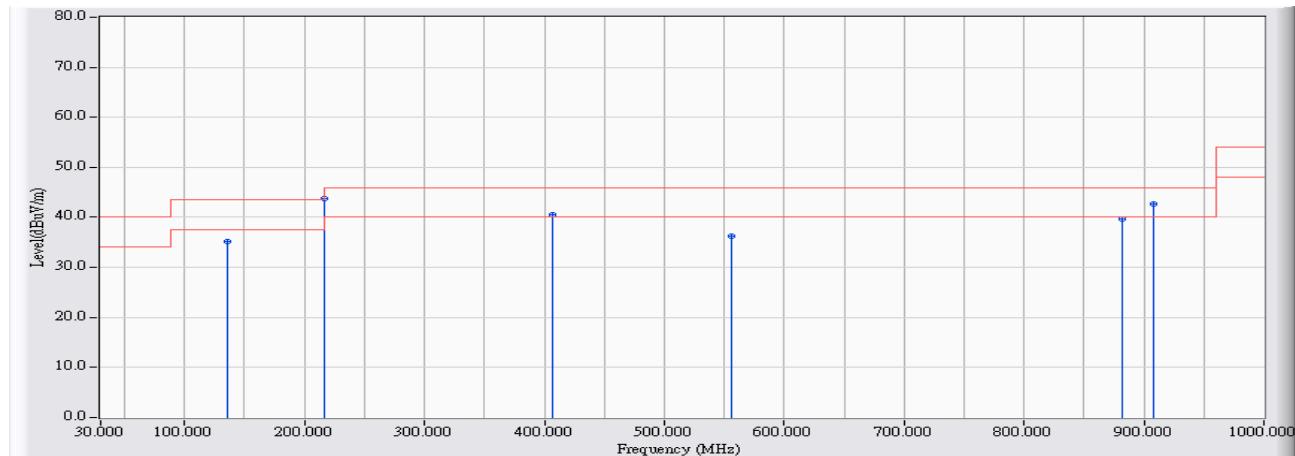
Axis	Frequency (MHz)	Reading Level (dB μ V/m@3M)	Measure Level (dB μ V/m@30M)	margin (dB)	Limit (dB μ V/m@30M)
X	13.560	90.200	50.490	-33.510	84
Y	13.560	88.500	48.790	-35.210	84
Z	13.560	84.800	45.090	-38.910	84

Frequency (MHz)	Reading Level (dB μ V/m@3M)	Measure Level (dB μ V/m@30M)	margin (dB)	Limit (dB μ V/m@30M)
13.551	73.400	33.690	-16.780	50.470
13.554	80.200	40.490	-43.510	84.000
13.558	88.500	48.790	-35.210	84.000
13.560	90.200	50.490	-33.510	84.000
13.565	88.000	48.290	-35.710	84.000
13.568	73.200	33.490	-16.980	50.470
13.571	70.200	30.490	-19.980	50.470

Note: Measure Level= Reading Level+cable loss(cable loss=0.29)-40*log(30/3)

Measure Level= Reading Level+cable loss(cable loss=0.29)-40*log(30/3)

Site : CB3	Time : 2015/11/12 - 15:03
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB3_FCC_EFS_30-1G-2_1011 - HORIZONTAL	Power : DC 5V
EUT : USB HF READER	Note : Mode 1: Transmit 13.56MHz

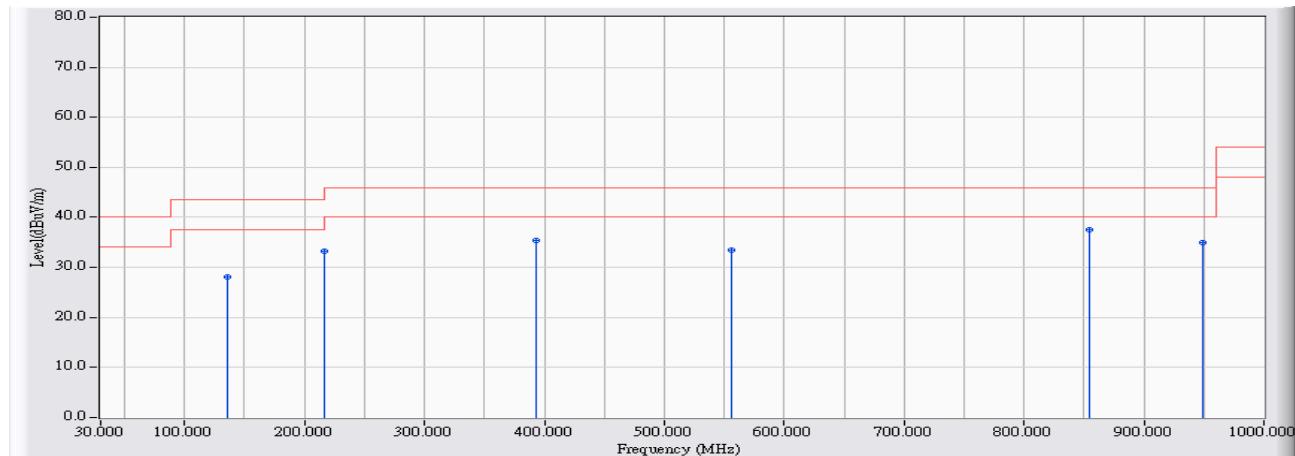


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		135.525	10.285	24.890	35.175	-8.325	43.500	QUASIPEAK
2	*	216.997	9.429	34.406	43.835	-2.165	46.000	QUASIPEAK
3		406.807	15.293	25.208	40.501	-5.499	46.000	QUASIPEAK
4		555.978	17.351	18.982	36.333	-9.667	46.000	QUASIPEAK
5		881.381	19.424	20.232	39.656	-6.344	46.000	QUASIPEAK
6		908.538	19.542	23.090	42.632	-3.368	46.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB3	Time : 2015/11/12 - 15:03
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB3_FCC_EFS_30-1G-2_1011 - VERTICAL	Power : DC 5V
EUT : USB HF READER	Note : 13.56MHz



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	135.525	10.285	17.804	28.089	-15.411	43.500	QUASIPEAK
2	216.997	9.429	23.873	33.302	-12.698	46.000	QUASIPEAK
3	393.229	14.992	20.492	35.484	-10.516	46.000	QUASIPEAK
4	555.978	17.351	16.054	33.405	-12.595	46.000	QUASIPEAK
5	* 854.321	19.354	18.177	37.531	-8.469	46.000	QUASIPEAK
6	949.274	19.875	15.117	34.992	-11.008	46.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

5. Frequency Stability

5.1. Test Equipment

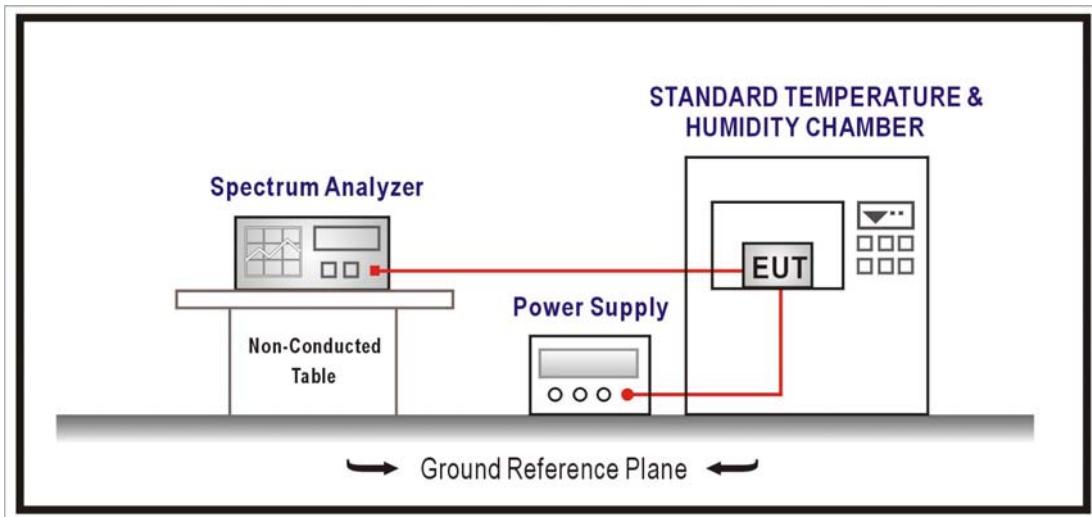
The following test equipments are used during the radiated emission tests:

Frequency Stability / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2014/08/05
Standard Temperature & Humidity Chamber	WIT	TH-1S-B	1082101	2014/01/27

Note: All equipments that need to calibrate are with calibration period of 1 year.

5.2. Test Setup



5.3. Test Procedure

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

5.5. Test Result

Product	USB HF READER		
Test Item	Frequency Tolerance		
Test Mode	Mode 1: Transmit		
Date of Test	2015/11/12	Test Site	SR7

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (%)	Result
-20	5	13.5603	0.0020	PASS
-10		13.5606	0.0045	PASS
0		13.5607	0.0048	PASS
10		13.5609	0.0066	PASS
20		13.5605	0.0040	PASS
30		13.5608	0.0059	PASS
40		13.5602	0.0012	PASS
50		13.5600	0.0000	PASS

Temperature Interval (°C)	DC Voltage (V)	Frequency (MHz)	Deviation (%)	Result
25	4.25	13.5603	0.0023	PASS
	5.00	13.5604	0.0031	PASS
	5.75	13.5601	0.0006	PASS