FCC Test Report

Product Name	3D Printer
Model No.	Nobel 1.0
FCC ID	2AB9W-3L10X

Applicant	XYZprinting, Inc.
Address	10F., No. 99, Sec. 5, Nanjing E. Rd., Songshan Dist., Taipei City 10571, Taiwan (R.O.C.)

Date of Receipt	Dec. 16, 2014
Issued Date	Jan. 20, 2015
Report No.	14C0451R-RFUSP17V00
Report Version	V1.0

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
This report must not be used to claim product endorsement by TAF or any agency of the government.
The test report shall not be reproduced without the written approval of QuieTek Corporation.

Test Report

Issued Date: Jan. 20, 2015
Report No.: 14C0451R-RFUSP17V00

QuieTek

Product Name	3D Printer
Applicant	XYZprinting, Inc.
Address	10F., No. 99, Sec. 5, Nanjing E. Rd., Songshan Dist., Taipei City 10571, Taiwan (R.O.C.)
Manufacturer	XYZprinting, Inc.
Model No.	Nobel 1.0
FCC ID.	2AB9W-3L10X
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	XYZprinting
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2013 ANSI C63.4: 2009, ANSI C63.10: 2009
Test Result	Complied

Documented By : Leven Huang

(Senior Adm. Specialist / Leven Huang)

Tested By : Jack Hsu

(Engineer / Jack Hsu)

Approved By :

(Director / Vincent Lin)

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	3D Printer
Trade Name	XYZprinting
Model No.	Nobel 1.0
FCC ID	2AB9W-3L10X
Frequency Range	13.56MHz
Modulation	ASK
Antenna Type	Coil Antenna
USB Cable	Shielded, 1.8m
Power Adapter	MFR: EDAC, M/N: EA10633B-190 Input: 100-240V ~ 2.0A, 50-60Hz Output: 19V⎓3.42A Cable out: Non-Shielded, 1.2m, with one ferrite core bonded. Power cord: Non-Shielded, 0.45m

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	Chilitag	CT-NFCa-ANT	Coil Antenna	0.5dBi for 13.56MHz

Frequency of Each Channel:

Channel	Frequency
Channel 1:	13.56 MHz

Note:

1. This device is an 3D Printer with a built-in 13.56MHz transceiver.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.225

Test Mode	Mode 1: Transmit mode

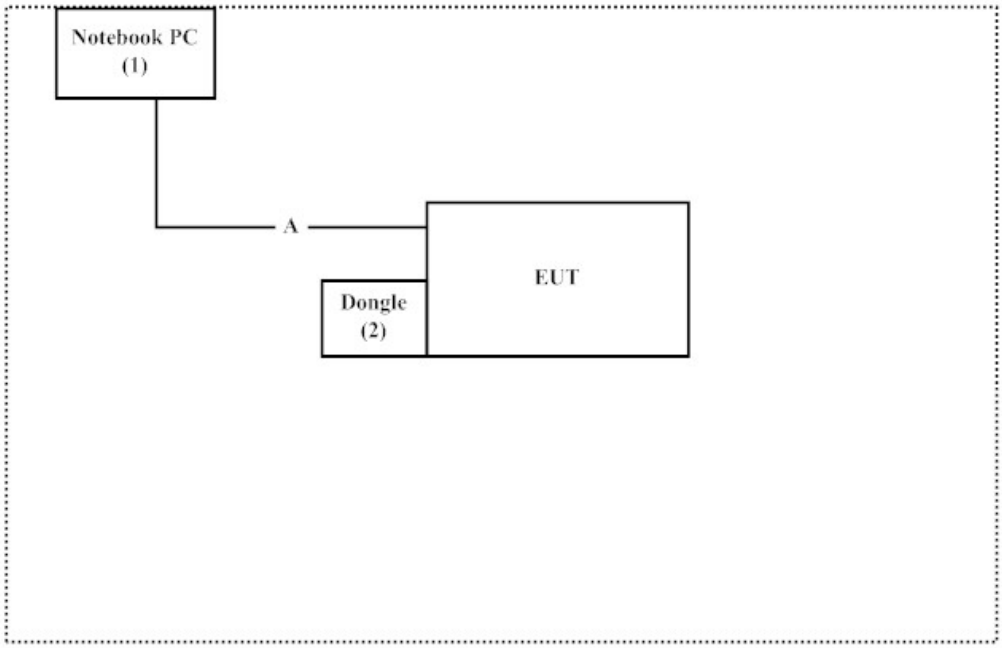
1.3. Tested System Datails

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

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	PP18L	36119001664	Non-Shielded, 0.8m
2	Dongle	XYZprinting	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1.8m

1.4. Configuration of tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in Section 1.4

(2) Execute Software “XYZwaveSLA V1.0.0.0” on the Notebook PC.

(3) Start the continuous transmitter.

(4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

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/tw/ctg/cts/accreditations.htm

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

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

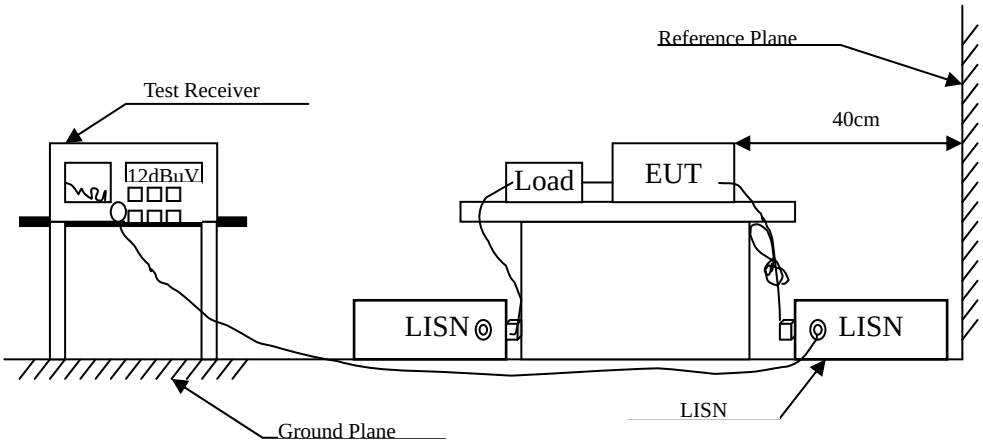
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2014	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2014	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2014	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2014	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2014	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56(※)	56-46(※)
0.50-5.0	56	46
5.0 - 30	60	50

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 C63.10: 2009 on conducted measurement.

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

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : 3D Printer
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmit mode

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.197	9.650	38.050	47.700	-16.957	64.657
0.291	9.655	25.430	35.085	-26.886	61.971
0.416	9.662	20.210	29.872	-28.528	58.400
0.486	9.666	25.210	34.876	-21.524	56.400
0.658	9.675	33.260	42.935	-13.065	56.000
1.341	9.723	26.820	36.543	-19.457	56.000
Average					
0.197	9.650	28.730	38.380	-16.277	54.657
0.291	9.655	13.050	22.705	-29.266	51.971
0.416	9.662	10.010	19.672	-28.728	48.400
0.486	9.666	15.450	25.116	-21.284	46.400
0.658	9.675	26.200	35.875	-10.125	46.000
1.341	9.723	16.090	25.813	-20.187	46.000

Note:

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

Product : 3D Printer
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmit mode

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.205	9.661	34.960	44.621	-19.808	64.429
0.283	9.664	24.510	34.174	-28.026	62.200
0.380	9.660	22.540	32.200	-27.229	59.429
0.502	9.667	26.390	36.057	-19.943	56.000
0.650	9.675	34.010	43.685	-12.315	56.000
1.384	9.725	27.120	36.845	-19.155	56.000
Average					
0.205	9.661	26.980	36.641	-17.788	54.429
0.283	9.664	15.600	25.264	-26.936	52.200
0.380	9.660	13.430	23.090	-26.339	49.429
0.502	9.667	17.660	27.327	-18.673	46.000
0.650	9.675	24.770	34.445	-11.555	46.000
1.384	9.725	14.500	24.225	-21.775	46.000

Note:

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

3. Radiated Emission

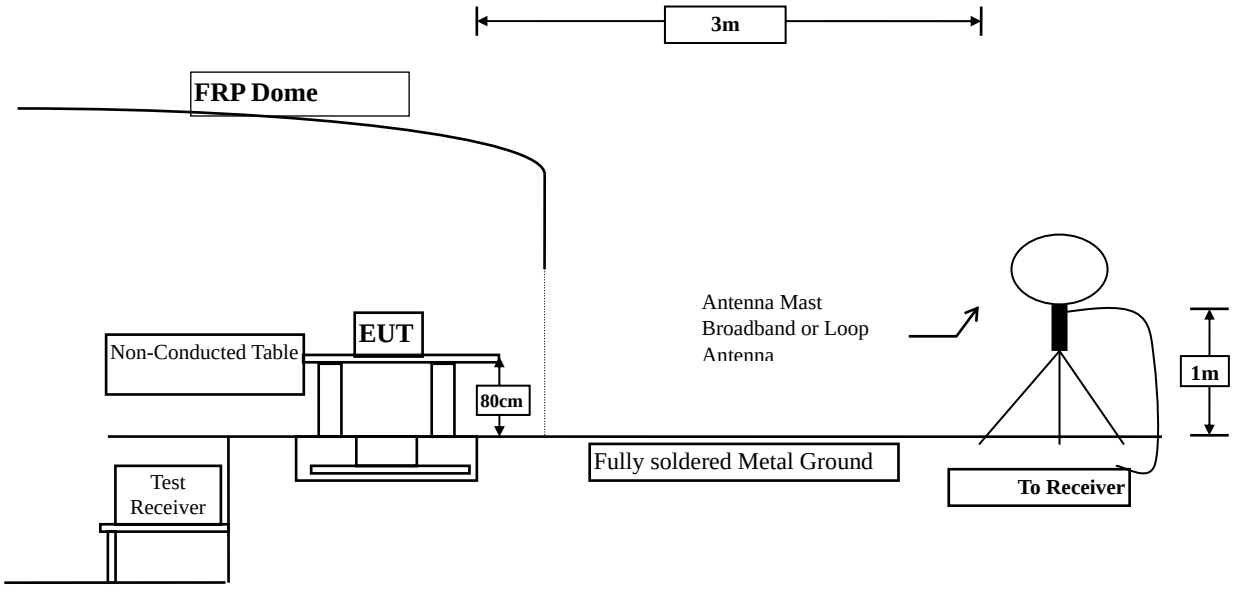
3.1. Test Equipment

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

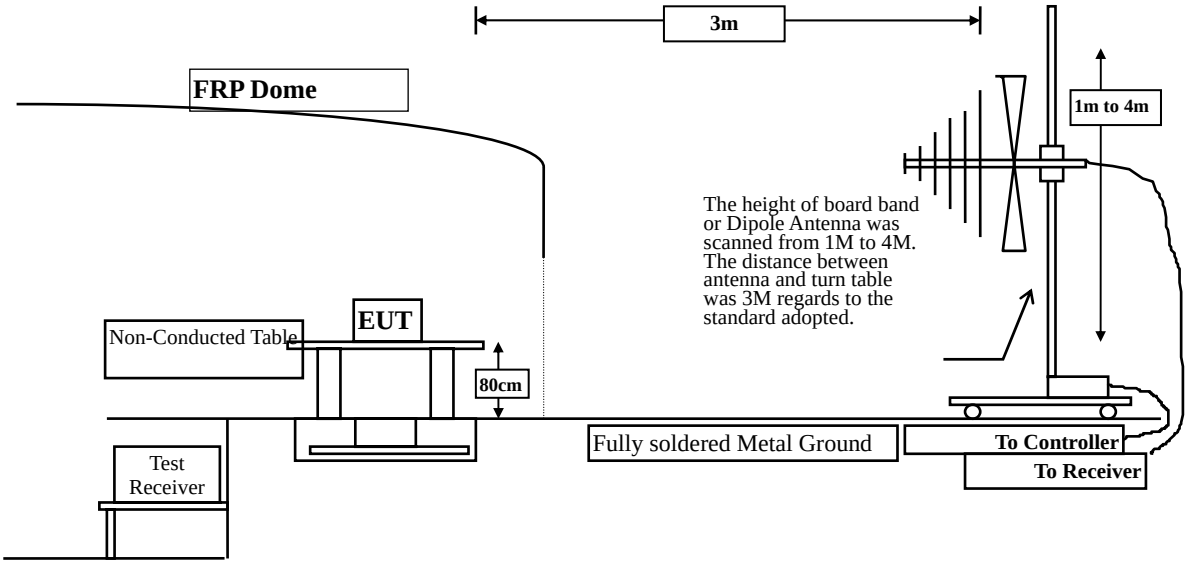
Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2014
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2014
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2014
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2014
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2014

3.2. Test Setup

9kHz~30MHz



30MHz~1GHz



3.3. Limits

➢ Fundamental electric field strength Limit

FCC Part 15 Subpart C Paragraph 15.225 Limits				
Fundamental Frequency MHz	Field strength of fundamental			
	uV/m	Distance (meter)	dBuV/m	Distance (meter)
13.553 – 13.567	15848	30	124	3
13.410 – 13.553 and 13.567 – 13.710	334	30	90.47	3
13.110 – 13.410 and 13.710 – 14.010	106	30	80.50	3
Outside of the 13.110 – 14.010	See 15.209 Limits			

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
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. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

➢ Spurious electric field strength Limit

FCC Part 15 Subpart C Paragraph 15.209 Limits			
Frequency MHz	uV/m	dBuV/m	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	See Remark[1]	300
0.490-1.705	24000/F(kHz)	See Remark[1]	30
1.705-30	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

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

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

3.4. Test Procedure

Fundamental electric field strength:
The EUT and its simulators are placed on a turn table which is 1 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum electric field strength.
The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna which is 1 meter above ground. All X-axis, Y-axis and Z-axis polarization of the antenna are set on measurement.

Spurious electric field strength:
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 antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
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 C63.10 on radiated measurement.
On any frequency the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz.
The frequency range from 9kHz to 10th harmonics is checked.

3.5. Uncertainty

± 2.6 dB below 30MHz
± 3.8 dB above 30MHz

3.6. Test Result of Radiated Emission

Product : 3D Printer
Test Item : Fundamental Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit mode

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Quasi-Peak					
13.560	20.410	53.500	73.910	-50.090	124.000
Vertical					
Quasi-Peak					
13.560	20.410	43.100	63.510	-60.490	124.000

Note:

1. Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : 3D Printer
Test Item : General Radiated Emission Data (below 30MHz)
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit mode

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Quasi-Peak					
27.120	19.950	22.180	42.130	-27.410	69.540
Vertical					
Quasi-Peak					
27.120	19.950	20.070	40.020	-29.520	69.540

Note:

1. Limit=29.54dBuV/m + 40*Log (30(m)/3(m))=69.54dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. " " means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Product : 3D Printer
Test Item : General Radiated Emission Data (above 30MHz)
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit mode

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Quasi-Peak					
118.606	-21.384	53.325	31.941	-11.559	43.500
194.776	-22.494	58.693	36.199	-7.301	43.500
258.510	-17.940	56.797	38.857	-7.143	46.000
542.981	-8.798	48.114	39.316	-6.684	46.000
713.974	-7.669	45.537	37.868	-8.132	46.000
841.442	-6.315	43.546	37.231	-8.769	46.000
Vertical					
Quasi-Peak					
99.952	-15.187	44.721	29.534	-13.966	43.500
194.776	-13.128	52.068	38.940	-4.560	43.500
258.510	-14.039	51.078	37.039	-8.961	46.000
542.981	-10.955	47.969	37.014	-8.986	46.000
664.231	-9.610	49.867	40.257	-5.743	46.000
815.016	-7.718	44.179	36.461	-9.539	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

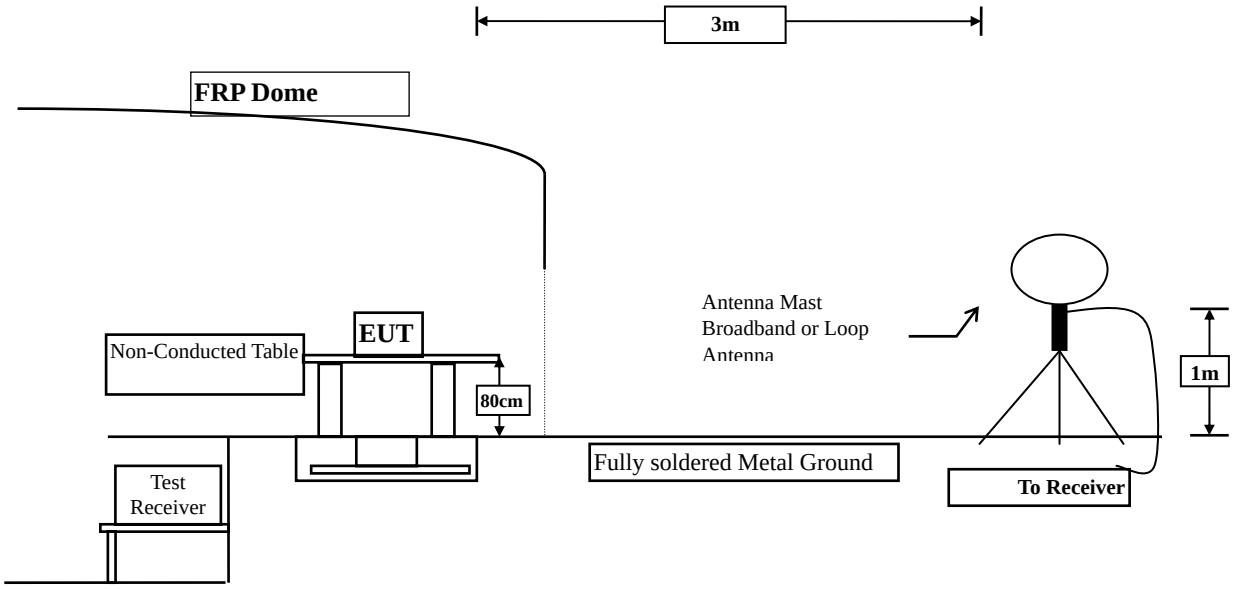
4. Band Edge

4.1. Test Equipment

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2014
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2014
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2014
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2014
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2014

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup



4.3. Limits

In any 9 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50 dB below that in the 9 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

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.
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 C63.10 on radiated measurement.
The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz.

4.5. Uncertainty

Radiated is ± 2.6 dB

4.6. Test Result of Band Edge

Product : 3D Printer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit mode

RF Radiated Measurement

(Horizontal)

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measurement Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
13.110	20.430	27.727	48.157	-21.383	69.540	Pass
13.360	20.420	28.357	48.777	-20.763	69.540	Pass
13.410	20.420	26.928	47.348	-22.192	69.540	Pass
14.010	20.400	26.477	46.877	-22.663	69.540	Pass

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

(Vertical)

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measurement Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
13.110	20.430	15.920	36.350	-33.190	69.540	Pass
13.360	20.420	15.221	35.641	-33.899	69.540	Pass
13.410	20.420	18.359	38.779	-30.761	69.540	Pass
14.010	20.400	18.571	38.971	-30.569	69.540	Pass

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

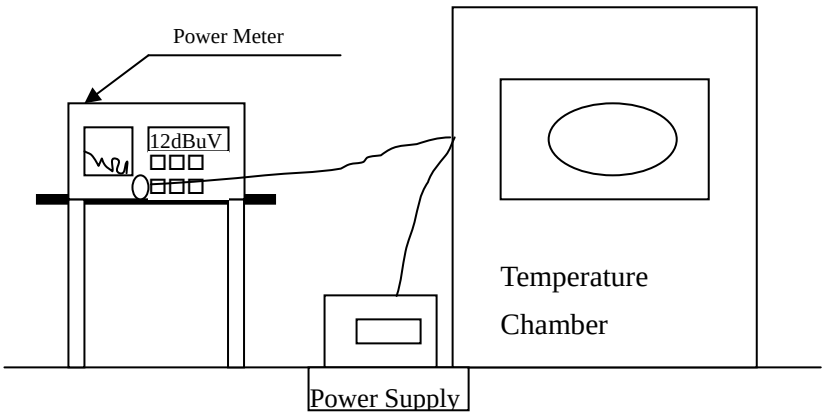
5. Frequency Tolerance

5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014
X	Temperature Chamber	TDE	CHM 150CT	March, 2014

Note: All equipments are calibrated every one year.

5.2. Test Setup



5.3. Limits

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency.

5.4. Test Procedure

The over 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.

5.5. Uncertainty

± 150 Hz

5.6. Test Result of Frequency Stability

Product : 3D Printer
Test Item : Frequency Tolerance
Test Site : Temperature Chamber
Test Mode : Mode 1: Transmit mode

Temperature (℃)	Voltage (V)	Observe Time	Declared Frequency (MHz)	Read Frequency (MHz)	Tolerance (%)	Limit (%)
20	120	start	13.56	13.56048	0.003540	± 0.01 %
		2mins	13.56	13.56048	0.003540	
		5mins	13.56	13.56048	0.003540	
		10mins	13.56	13.56048	0.003540	
20	138	start	13.56	13.56048	0.003540	± 0.01 %
		2mins	13.56	13.56048	0.003540	
		5mins	13.56	13.56048	0.003540	
		10mins	13.56	13.56048	0.003540	
20	102	start	13.56	13.56048	0.003540	± 0.01 %
		2mins	13.56	13.56048	0.003540	
		5mins	13.56	13.56048	0.003540	
		10mins	13.56	13.56048	0.003540	
50	120	start	13.56	13.56009	0.000664	± 0.01 %
		2mins	13.56	13.56009	0.000664	
		5mins	13.56	13.56009	0.000664	
		10mins	13.56	13.56009	0.000664	
40	120	start	13.56	13.56013	0.000959	± 0.01 %
		2mins	13.56	13.56013	0.000959	
		5mins	13.56	13.56013	0.000959	
		10mins	13.56	13.56013	0.000959	
30	120	start	13.56	13.56016	0.001180	± 0.01 %
		2mins	13.56	13.56016	0.001180	
		5mins	13.56	13.56016	0.001180	
		10mins	13.56	13.56016	0.001180	

10	120	start	13.56	13.55991	-0.000664	± 0.01 %
		2mins	13.56	13.55991	-0.000664	
		5mins	13.56	13.55991	-0.000664	
		10mins	13.56	13.55991	-0.000664	
0	120	start	13.56	13.55991	-0.000664	± 0.01 %
		2mins	13.56	13.55991	-0.000664	
		5mins	13.56	13.55991	-0.000664	
		10mins	13.56	13.55991	-0.000664	
-10	120	start	13.56	13.55983	-0.001254	± 0.01 %
		2mins	13.56	13.55983	-0.001254	
		5mins	13.56	13.55983	-0.001254	
		10mins	13.56	13.55983	-0.001254	
-20	120	start	13.56	13.55983	-0.001254	± 0.01 %
		2mins	13.56	13.55983	-0.001254	
		5mins	13.56	13.55983	-0.001254	
		10mins	13.56	13.55983	-0.001254	

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.