FCC Test Report

Product Name	3D Printer
Model No.	Nobel 1.0A
FCC ID	2AB9W-3L10A

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

Date of Receipt	Oct. 13, 2015
Issued Date	Nov. 16, 2015
Report No.	15A0173R-RFUSP17V00
Report Version	V1.0

Testing Laboratory
3023

Test Report

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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 1.0A
FCC ID.	2AB9W-3L10A
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: 2014 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By : Anita Chou

(Senior Engineering Adm. Specialist / Anita Chou)

Tested By : Ken chen

(Engineer / Ken Chen)

Approved By :

(Director / Vincent Lin)

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Description Page

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	3D Printer
Trade Name	XYZprinting
Model No.	Nobel 1.0A
FCC ID	2AB9W-3L10A
Frequency Range	13.56MHz
Modulation	ASK
Antenna Type	Coil Antenna
USB Cable	Shielded, 1.8m
Power Adapter	MFR: EDAC, M/N: EA10681P-240 Input: 100-240V ~ 2.0A, 50-60Hz Output: 24V⎓2.5A Cable out: Non-Shielded, 1200mm, with one ferrite core bonded. Power cord: Non-Shielded, 0.5m

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

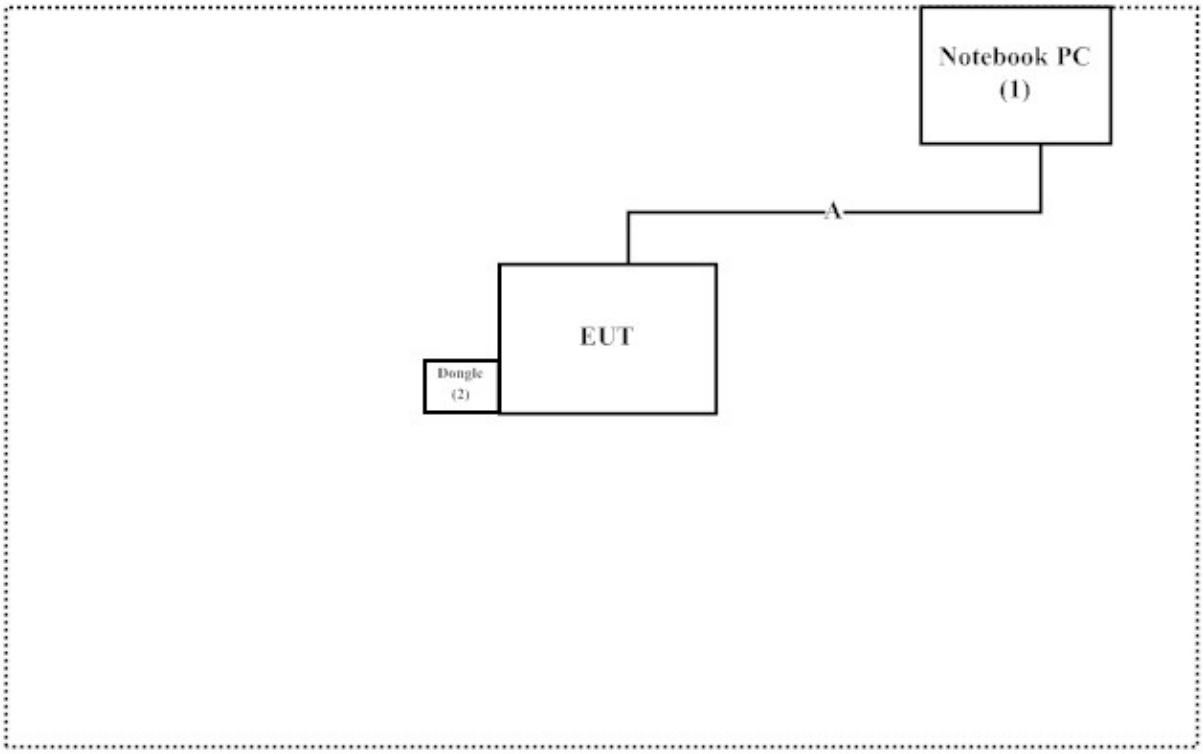
1.3. Tested System Datails

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	Latitude E5440	FS9TK32	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 “DebugToolForm 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/chinese/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/

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

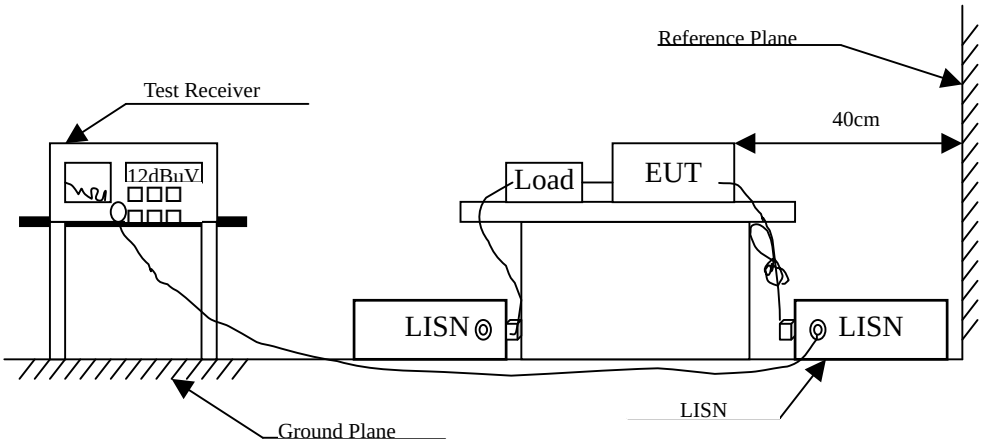
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2015	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2015	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2015	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2015	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2015	
	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 C63.4: 2014 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					
0.166	9.760	39.890	49.650	-15.893	65.543
0.201	9.755	31.800	41.555	-22.988	64.543
0.212	9.756	30.190	39.946	-24.283	64.229
0.263	9.760	23.390	33.150	-29.621	62.771
0.287	9.761	23.950	33.711	-28.375	62.086
0.459	9.775	36.960	46.735	-10.436	57.171
Average					
0.166	9.760	30.730	40.490	-15.053	55.543
0.201	9.755	18.610	28.365	-26.178	54.543
0.212	9.756	19.450	29.206	-25.023	54.229
0.263	9.760	10.030	19.790	-32.981	52.771
0.287	9.761	13.090	22.851	-29.235	52.086
0.459	9.775	26.000	35.775	-11.396	47.171

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					
0.166	9.760	39.210	48.970	-16.573	65.543
0.459	9.775	36.570	46.345	-10.826	57.171
0.744	9.797	25.970	35.767	-20.233	56.000
1.193	9.831	26.590	36.421	-19.579	56.000
1.681	9.879	24.880	34.759	-21.241	56.000
14.412	10.216	22.970	33.186	-26.814	60.000
Average					
0.166	9.760	31.120	40.880	-14.663	55.543
0.459	9.775	24.740	34.515	-12.656	47.171
0.744	9.797	14.980	24.777	-21.223	46.000
1.193	9.831	15.250	25.081	-20.919	46.000
1.681	9.879	13.590	23.469	-22.531	46.000
14.412	10.216	16.290	26.506	-23.494	50.000

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

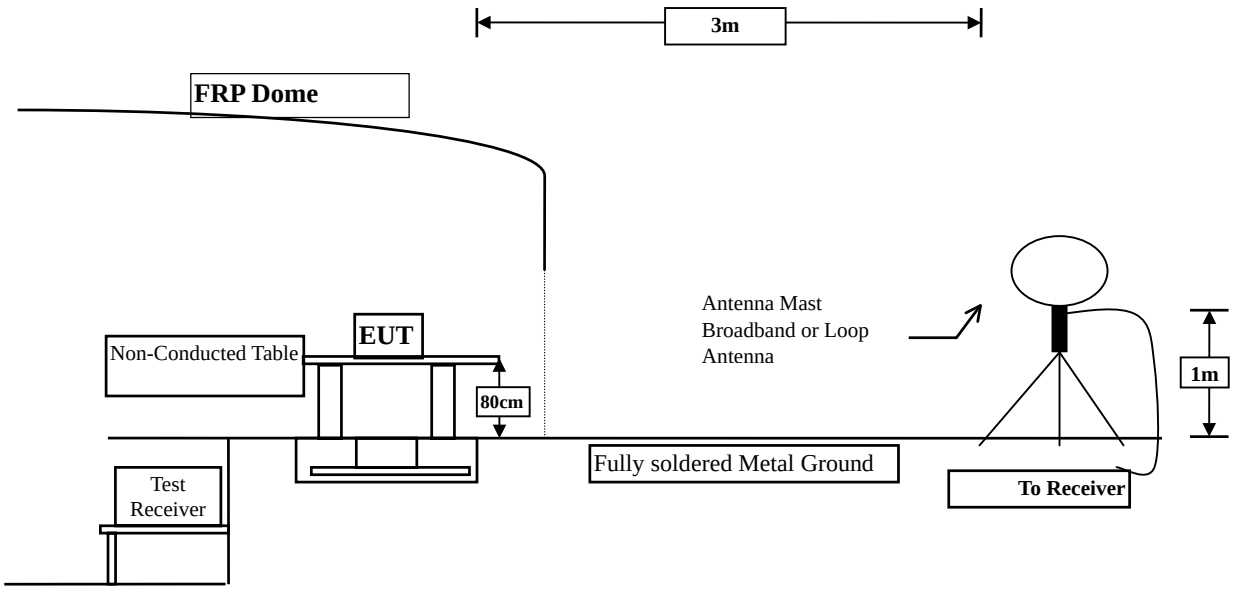
3.1. Test Equipment

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

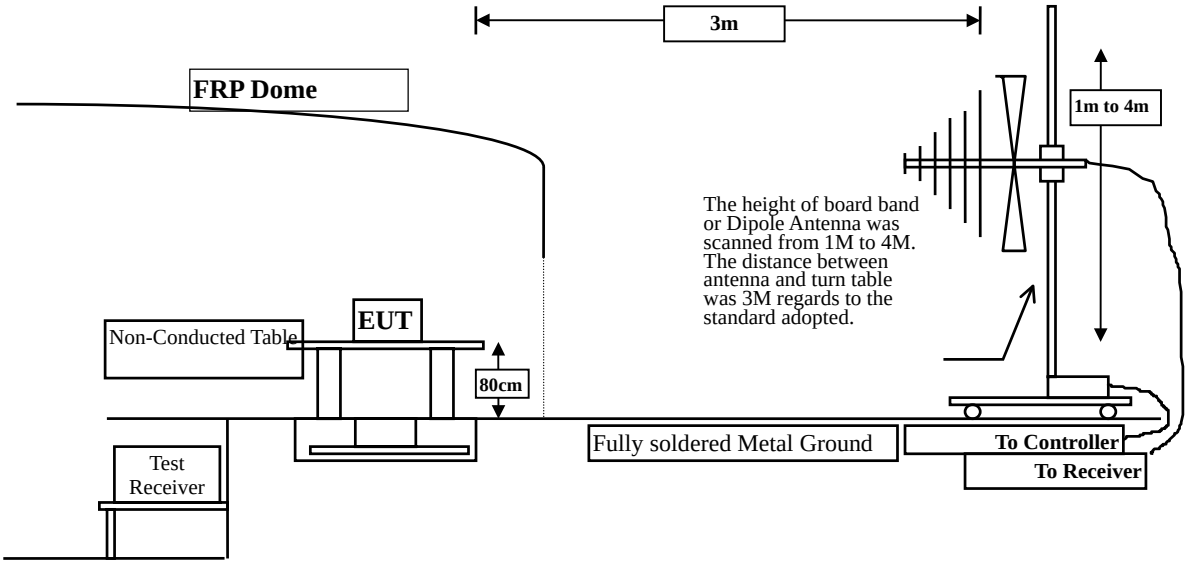
Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2015
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2015
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2015
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2015
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2015

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 C6310: 2013 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 (simultaneous transmission)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
X-axis					
Quasi-Peak					
Horizontal					
13.560	20.410	24.000	44.410	-79.590	124.000
Vertical					
13.560	20.410	20.400	40.810	-83.190	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 (simultaneous transmission)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Quasi-Peak					
Horizontal					
27.120	19.950	3.100	23.050	-46.490	69.540
Vertical					
27.120	19.950	2.900	22.850	-46.690	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					
216.538	-20.827	49.150	28.323	-17.677	46.000
421.731	-11.786	46.116	34.330	-11.670	46.000
569.407	-8.003	43.714	35.711	-10.289	46.000
706.202	-8.475	44.723	36.248	-9.752	46.000
841.442	-6.904	42.230	35.326	-10.674	46.000
976.683	-6.469	45.164	38.695	-15.305	54.000
Vertical					
Quasi-Peak					
39.327	-17.999	49.746	31.747	-8.253	40.000
191.667	-13.956	44.803	30.847	-12.653	43.500
491.683	-12.480	51.310	38.830	-7.170	46.000
651.795	-10.213	44.455	34.242	-11.758	46.000
797.917	-8.764	48.475	39.711	-6.289	46.000
950.256	-5.794	44.786	38.992	-7.008	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

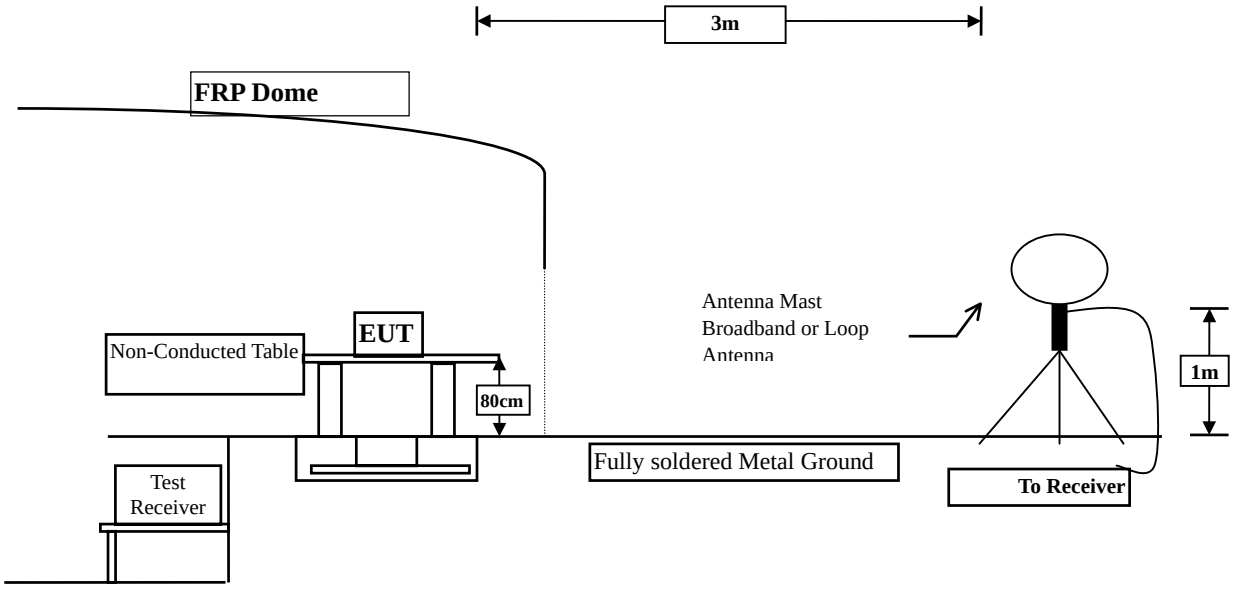
4. Band Edge

4.1. Test Equipment

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2015
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2015
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2015
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2015
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2015

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: 2013 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

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	QP Limit (dBuV/m)	Result
Horizontal					
13.110	20.430	8.300	28.730	69.540	Pass
13.360	20.420	8.400	28.820	69.540	Pass
13.410	20.420	8.300	28.720	69.540	Pass
14.010	20.400	9.300	29.700	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

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	QP Limit (dBuV/m)	Result
Vertical					
13.110	20.430	4.250	24.680	69.540	Pass
13.360	20.420	4.160	24.580	69.540	Pass
13.410	20.420	4.580	25.000	69.540	Pass
14.010	20.400	4.820	25.220	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

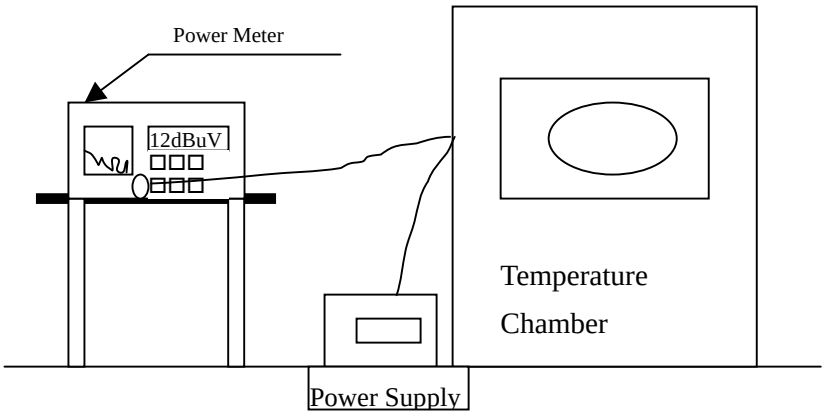
5. Frequency Tolerance

5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2015
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015
X	Temperature Chamber	TDE	CHM 150CT	March, 2015

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	13.56032	0.002360	± 0.01 %
		2mins	13.56	13.56032	0.002360	
		5mins	13.56	13.56032	0.002360	
		10mins	13.56	13.56032	0.002360	
20	138	start	13.56	13.56032	0.002360	± 0.01 %
		2mins	13.56	13.56032	0.002360	
		5mins	13.56	13.56032	0.002360	
		10mins	13.56	13.56032	0.002360	
20	102	start	13.56	13.56032	0.002360	± 0.01 %
		2mins	13.56	13.56032	0.002360	
		5mins	13.56	13.56032	0.002360	
		10mins	13.56	13.56032	0.002360	
50	120	start	13.56	13.56012	0.000885	± 0.01 %
		2mins	13.56	13.56012	0.000885	
		5mins	13.56	13.56012	0.000885	
		10mins	13.56	13.56012	0.000885	
40	120	start	13.56	13.56018	0.001327	± 0.01 %
		2mins	13.56	13.56018	0.001327	
		5mins	13.56	13.56018	0.001327	
		10mins	13.56	13.56018	0.001327	
30	120	start	13.56	13.56017	0.001254	± 0.01 %
		2mins	13.56	13.56017	0.001254	
		5mins	13.56	13.56017	0.001254	
		10mins	13.56	13.56017	0.001254	

10	120	start	13.56	13.55998	-0.000147	±	0.01	%
		2mins	13.56	13.55998	-0.000147			
		5mins	13.56	13.55998	-0.000147			
		10mins	13.56	13.55998	-0.000147			
0	120	start	13.56	13.55997	-0.000221	±	0.01	%
		2mins	13.56	13.55997	-0.000221			
		5mins	13.56	13.55997	-0.000221			
		10mins	13.56	13.55997	-0.000221			
-10	120	start	13.56	13.55989	-0.000811	±	0.01	%
		2mins	13.56	13.55989	-0.000811			
		5mins	13.56	13.55989	-0.000811			
		10mins	13.56	13.55989	-0.000811			
-20	120	start	13.56	13.55986	-0.001032	±	0.01	%
		2mins	13.56	13.55986	-0.001032			
		5mins	13.56	13.55986	-0.001032			
		10mins	13.56	13.55986	-0.001032			

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs