TEST REPORT

Applicant:	Magtek Incorporated
Address of Applicant:	1710 Apollo Court, seal beach, California 90740, United States
Manufacturer:	Magtek Incorporated
Address of Manufacturer:	1710 Apollo Court, seal beach, California 90740, United States

Equipment Under Test (EUT)

Product Name:	tDynamo GEN II
Model No.:	21079837
Trade Mark:	MAGTEK
FCC ID:	U73-21079837
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.225
Date of sample receipt:	January 20, 2021
Date of Test:	January 20-February 26, 2021
Date of report issued:	February 26, 2021
Test Result :	PASS

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*February 26, 2021*	*Original*

Prepared By:	Tiger. Chen	***Date:***	*February 26, 2021*
	Project Engineer		
Check By:	Robinson Lin	***Date:***	*February 26, 2021*
	Reviewer		

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Field Strength of Fundamental Emissions and Mask Measurement	15.225(a)(b)(c)	Pass
Radiated Emission	15.225(d)&15.209	Pass
20dB Emission Bandwidth	15.225&15.215	Pass
Frequency Stability Measurement	15.225(e)	Pass

Remark:

1. Pass: The EUT complies with the essential requirements in the standard.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	±3.8039dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 3.9679dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.29dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	tDynamo GEN II
Model No.:	21079837
S/N:	B4E1E4E
Hardware Version:	V002A
Software Version:	1000007169A00
Test sample(s) ID:	GTS202007000056 -1
Sample(s) Status	Engineered sample
Operation Frequency:	13.56MHz
Channel Number:	1
Modulation:	ASK
Antenna type:	Integral Antenna
Antenna gain:	2.0dBi(declare by applicant)
Power supply:	DC 5V or Battery DC 3.7V, 760mAh

5.2 Test mode

Transmitter mode	Keep the EUT in continuously transmitting.

Pre-test mode.

GTS has verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	62.44	63.34	61.81

Final Test Mode:

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”: Y axis (see the test setup photo)

5.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383, January 08, 2018.

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.5 Description of Support Units

Manufacturer	Description	Model	Serial Number
Lenovo	Notebook PC	E40-80	N/A
YISHE	KEYBOARD	YS-MA75	N/A
YISHE	MOUSE	YS-MA75USB	N/A
Canon	Printer	IP1600	GTS222

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
E.U.T Antenna:	
The NFC antenna is internal antenna; the best case gain of the antenna is 2dBi. reference to the appendix II for details	

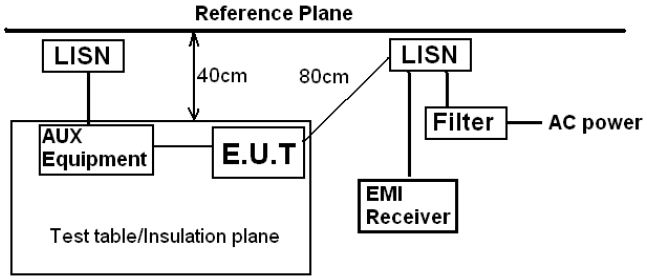
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test setup:



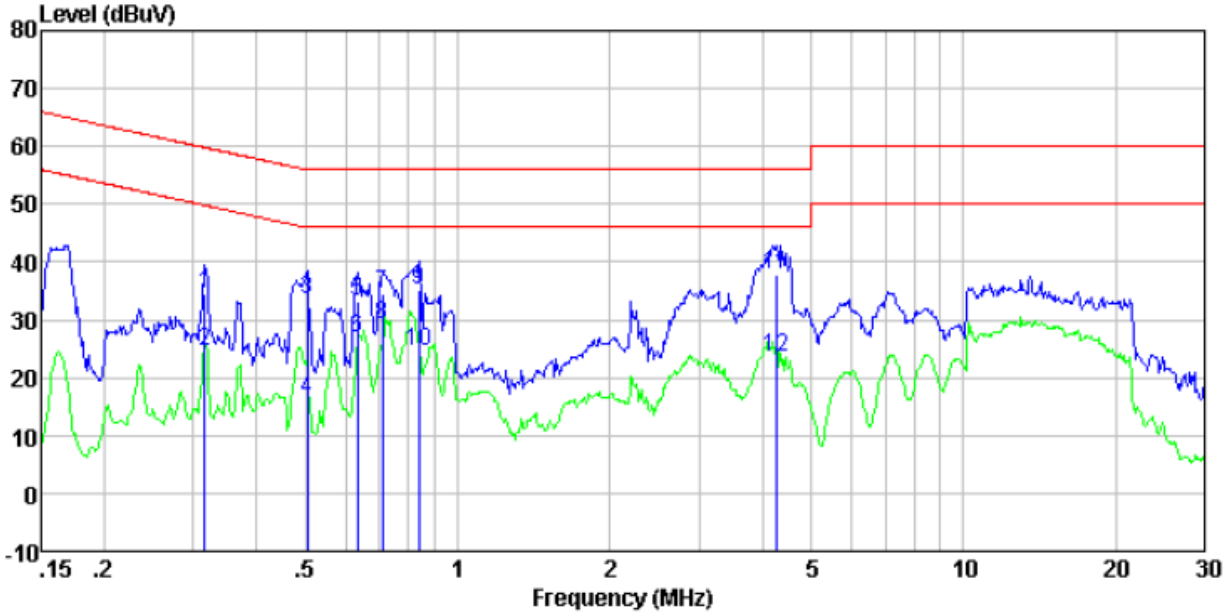
Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

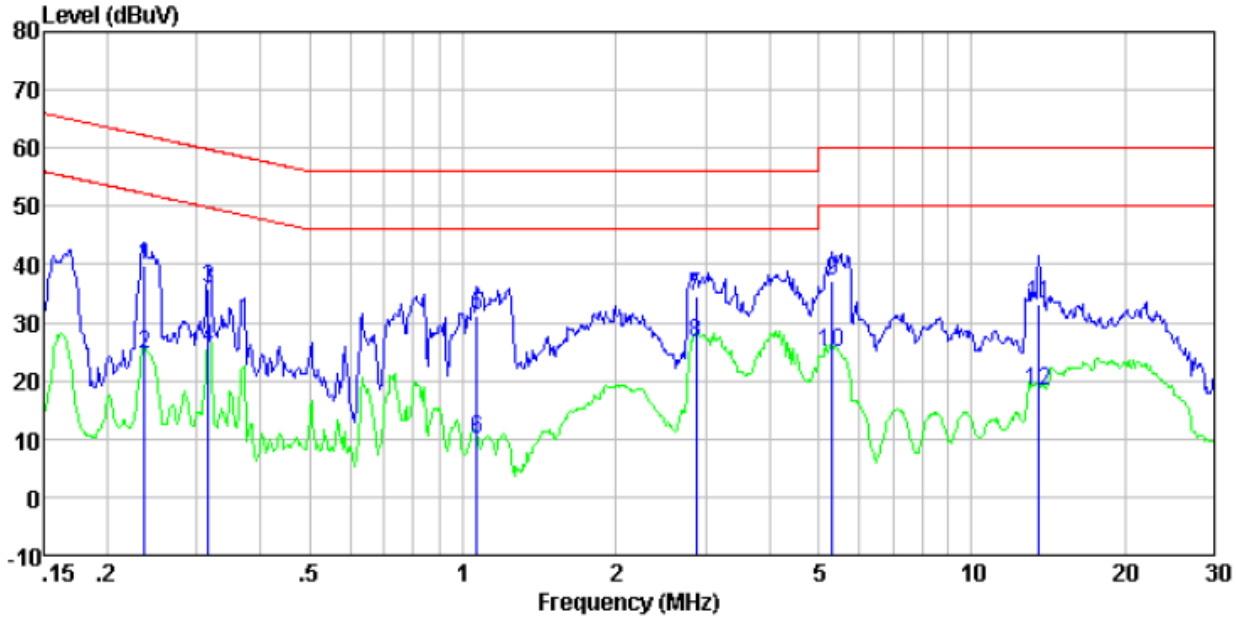
Measurement data:

Line:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.32	13.91	20.39	0.10	34.40	59.80	-25.40	QP
0.32	4.02	20.39	0.10	24.51	49.80	-25.29	Average
0.50	12.96	20.31	0.11	33.38	56.00	-22.62	QP
0.50	-4.20	20.31	0.11	16.22	46.00	-29.78	Average
0.63	12.92	20.28	0.12	33.32	56.00	-22.68	QP
0.63	6.41	20.28	0.12	26.81	46.00	-19.19	Average
0.71	14.00	20.26	0.13	34.39	56.00	-21.61	QP
0.71	8.92	20.26	0.13	29.31	46.00	-16.69	Average
0.84	14.82	20.23	0.14	35.19	56.00	-20.81	QP
0.84	4.32	20.23	0.14	24.69	46.00	-21.31	Average
4.27	17.45	20.20	0.18	37.83	56.00	-18.17	QP
4.27	3.32	20.20	0.18	23.70	46.00	-22.30	Average

Neutral:

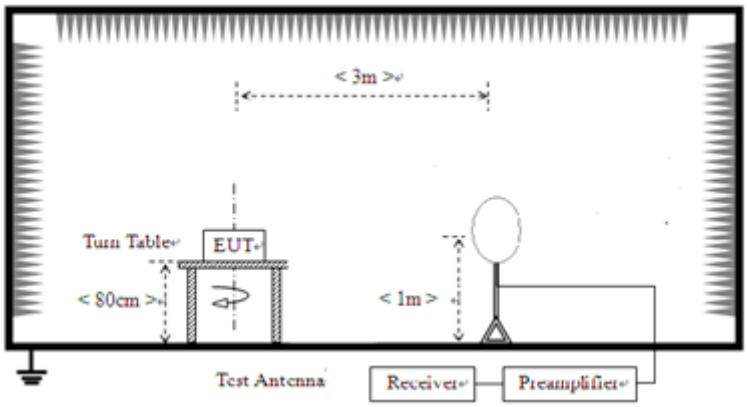


Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.24	19.15	20.40	0.11	39.66	62.22	-22.56	QP
0.24	4.02	20.40	0.11	24.53	52.22	-27.69	Average
0.32	15.31	20.39	0.10	35.80	59.80	-24.00	QP
0.32	5.10	20.39	0.10	25.59	49.80	-24.21	Average
1.07	10.68	20.20	0.15	31.03	56.00	-24.97	QP
1.07	-10.40	20.20	0.15	9.95	46.00	-36.05	Average
2.87	14.04	20.20	0.19	34.43	56.00	-21.57	QP
2.87	6.02	20.20	0.19	26.41	46.00	-19.59	Average
5.33	16.88	20.20	0.17	37.25	60.00	-22.75	QP
5.33	4.66	20.20	0.17	25.03	50.00	-24.97	Average
13.55	12.91	20.20	0.21	33.32	60.00	-26.68	QP
13.55	-2.21	20.20	0.21	18.20	50.00	-31.80	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

7.3 Field Strength of Fundamental Emissions and Mask Measurement

Test Requirement:	FCC Part15 C Section 15.225(a)(b)(c)
Test Method:	ANSI C63.10:2013 & ANSI C63.4: 2014
Test site:	Measurement Distance: 3m
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=Auto
limit:	FCC Part 15.225 & 15.209
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
13.11	21.74	22.9	0.5	45.14	60.51	-15.37	QP
13.41	30.51	22.87	0.5	43.88	60.51	-16.63	QP
13.553	37.91	22.86	0.51	61.28	70.47	-9.19	QP
13.56	41.97	22.86	0.51	65.34	104	-38.66	QP
13.567	37.43	22.86	0.51	60.8	70.47	9.67	QP
13.71	31.08	22.84	0.51	54.43	60.51	-6.08	QP
14.01	29.14	22.81	0.51	48.72	60.51	-11.79	QP

Test data combines x, y, z-axis

7.4 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.225(d) and 15.209
Test Method:	ANSI C63.10: 2013 & ANSI C63.4: 2014
Test Frequency Range:	9KHz to 1000MHz
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Remark
9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value

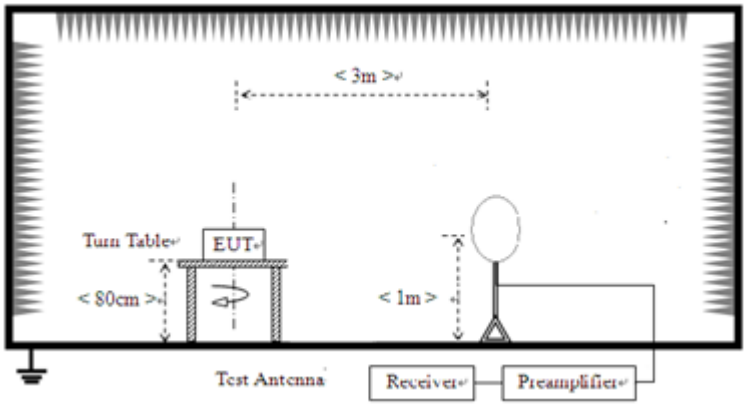
FCC Limit:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

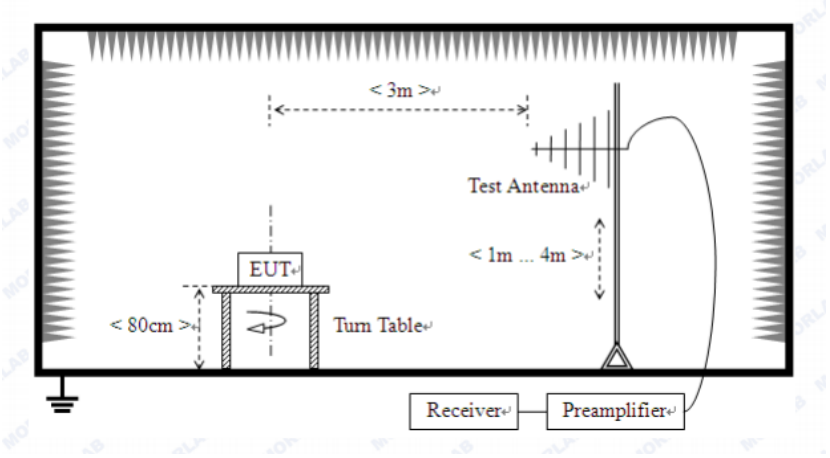
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test setup:

Below 30MHz



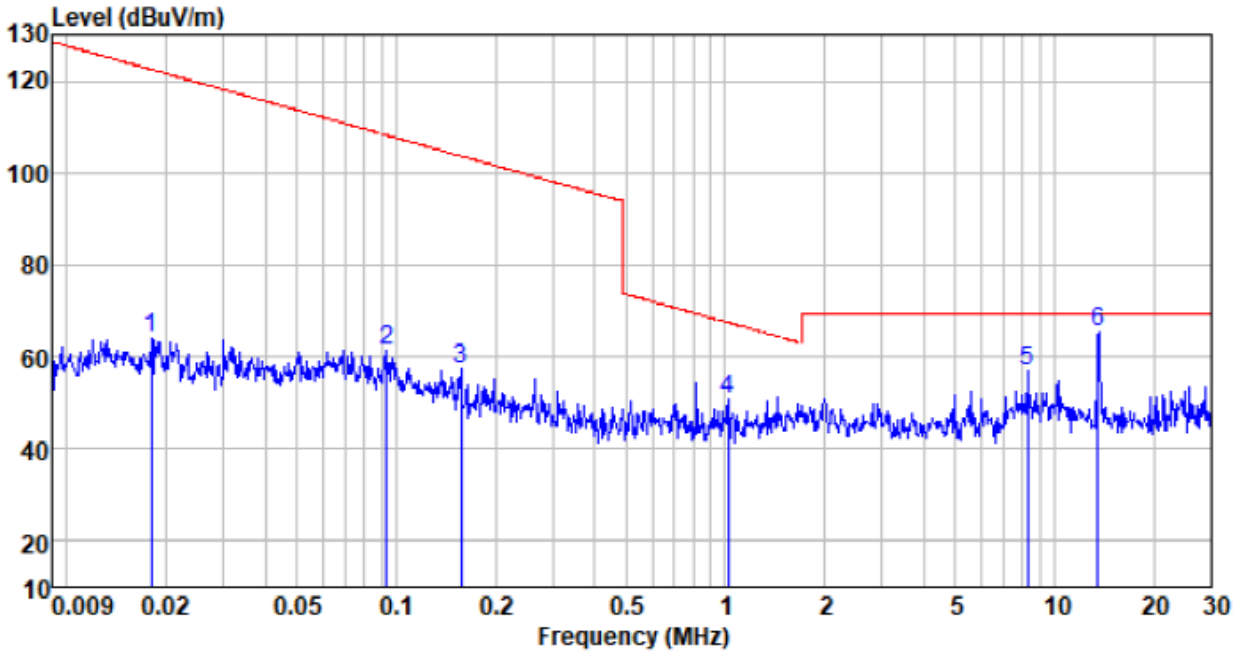
Above 30MHz

	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

■ **9kHz~30MHz**

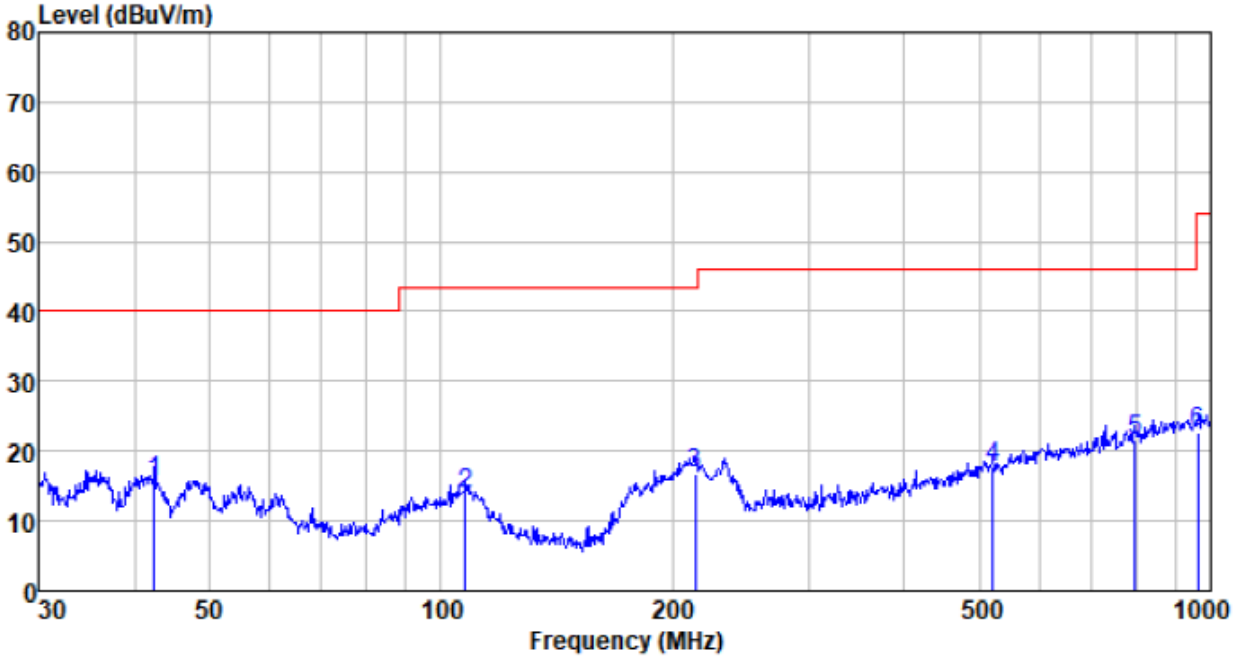
Test data combines x, y, z-axis; the radiation emission more than 20dB below the limit



Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
0.018	44.54	19.29	0.05	63.88	122.46	-58.58	QP
0.094	37.21	24.21	0.16	61.58	108.16	-46.58	QP
0.158	34.45	22.79	0.20	57.44	103.65	-46.21	QP
1.019	29.20	20.99	0.33	50.52	67.44	-16.92	QP
8.260	33.41	23.08	0.47	56.96	69.54	-12.58	QP

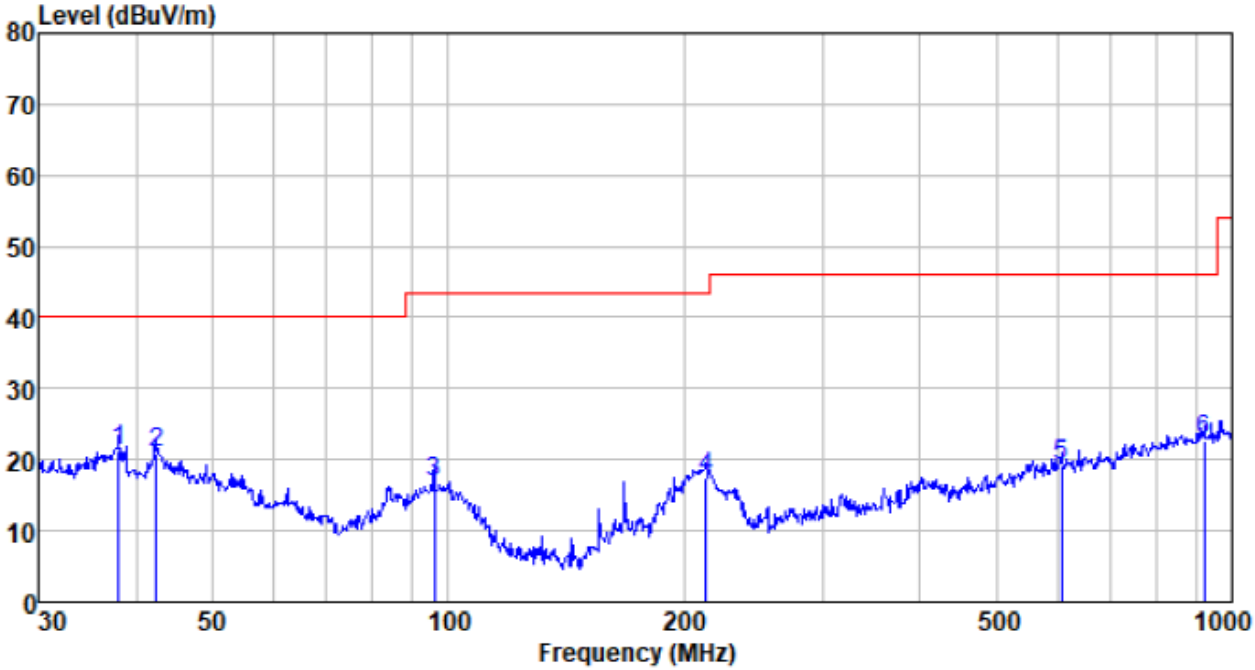
■ **30MHz~1GHz**

Horizontal:



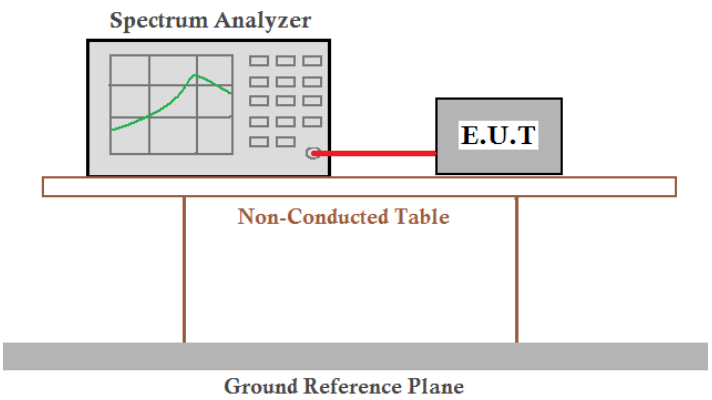
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
42.451	38.52	12.23	0.69	35.80	15.64	40.00	-24.36	QP
107.510	37.92	11.36	1.26	36.78	13.76	43.50	-29.74	QP
213.763	41.47	10.91	1.92	37.34	16.96	43.50	-26.54	QP
520.888	33.92	17.80	3.39	37.52	17.59	46.00	-28.41	QP
796.183	33.43	21.34	4.45	37.62	21.60	46.00	-24.40	QP
962.162	32.65	22.55	5.09	37.54	22.75	54.00	-31.25	QP

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
37.945	44.40	11.86	0.64	35.54	21.36	40.00	-18.64	QP
42.451	43.74	12.23	0.69	35.80	20.86	40.00	-19.14	QP
96.099	40.71	11.65	1.16	36.69	16.83	43.50	-26.67	QP
213.015	41.93	10.91	1.92	37.34	17.42	43.50	-26.08	QP
605.659	33.40	19.51	3.74	37.55	19.10	46.00	-26.90	QP
922.516	33.11	22.39	4.93	37.58	22.85	46.00	-23.15	QP

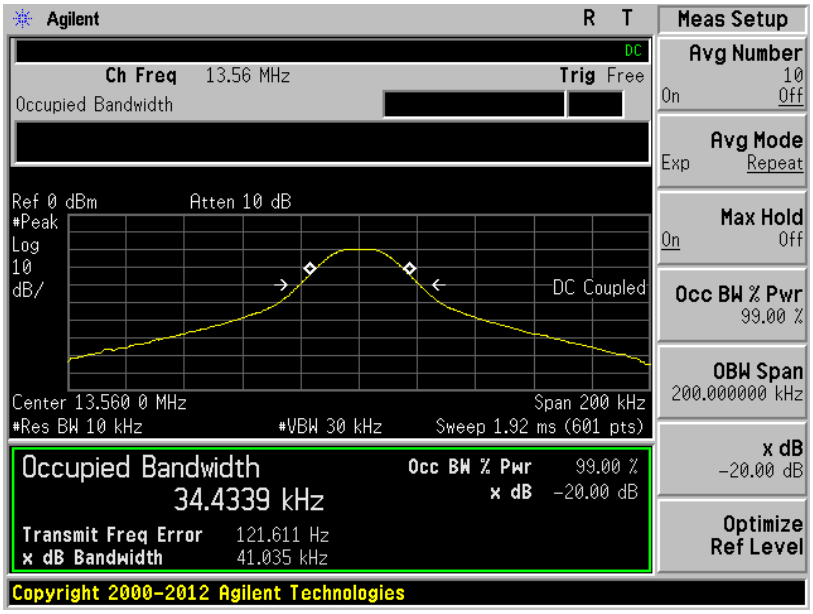
7.5 Occupied Bandwidth

Test Requirement:	FCC Part15 C Section 15.225 and 15.215
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth & 99%bandwidth.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

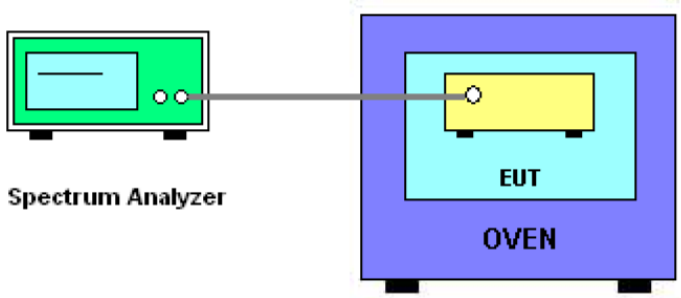
Measurement Data

Test frequency(MHz)	20dB bandwidth(KHz)	Result
13.56	41.035	Pass

Test plot as follows:



7.6 Frequency Stability Measurement

Test Requirement:	FCC Part15 C Section 15.225 (e)
Test Method:	ANSI C63.10: 2013
Receiver setup:	RBW=1KHz, VBW=1KHz, Sweep time=Auto
Limit:	The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, 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.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Reference Frequency: 13.56MHz					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit	Result
		Hz	%		
3.7	-20	91	0.0007	+/- 0.01%	Pass
	-10	82	0.0006		
	0	68	0.0005		
	10	59	0.0004		
	20	49	0.0004		
	30	58	0.0004		
	40	74	0.0005		
	50	79	0.0006		

Reference Frequency: 13.56MHz					
Temperature (℃)	Power supplied (Vac)	Frequency error		Limit	Result
		Hz	ppm		
20	3.3	172	0.0013	+/- 0.01%	Pass
	4.1	128	0.0009		

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

------ End ------