

TEST REPORT

Applicant: Shenzhen Wellon Technology Co., Limited

Address of Applicant: Room 202, Block A, No.1 Chuangjin Park, No. 125 Chuangye 2nd Street, No.28 Baoan area, Bao'an District, Shenzhen, Guangdong, China

Manufacturer/Factory: Shenzhen Wellon Technology Co., Limited

Address of Manufacturer/Factory: Room 202, Block A, No.1 Chuangjin Park, No. 125 Chuangye 2nd Street, No.28 Baoan area, Bao'an District, Shenzhen, Guangdong, China

Equipment Under Test (EUT)

Product Name: FOSOO Sonic Electric Toothbrush

Brand Name: N/A

Model No.: APEX, NOV, LUX

FCC ID: 2AZJJ2113

Applicable standards: FCC CFR Title 47 Part 15 Subpart C

Date of sample receipt: Mar. 22, 2021

Date of Test: Mar. 22, 2021 - Apr. 09, 2021

Date of report issued: Apr. 09, 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	Apr. 09, 2021	Original

Prepared By:



Date:

Apr. 09, 2021

Project Engineer

Check By:



Date:

Apr. 09, 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
Spurious Emission	15.209(a)(f)	Pass
20dB Bandwidth	15.215	Pass

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

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(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:	FOSOO Sonic Electric Toothbrush
Model No.:	APEX
Serial No.:	NOV, LUX
Hardware version:	V 1.0
Software version:	V 1.0
Test sample(s) ID:	GTS202104000139-1
Sample(s) Status	Engineer sample
Operation Frequency:	110kHz ~ 205KHz
Number of Frequency:	20 Channels
Modulation type:	MSK
Antenna Type:	Inductive loop coil Antenna
Antenna gain:	0dBi
Power supply:	DC 5V from USB

Operation Frequency each of channel

Channel	Frequency (MHz)						
01	0.110	07	0.140	13	0.170	19	0.200
02	0.115	08	0.145	14	0.175	20	0.205
03	0.120	09	0.150	15	0.180		
04	0.125	10	0.155	16	0.185		
05	0.130	11	0.160	17	0.190		
06	0.135	12	0.165	18	0.195		

Test channel	Frequency (MHz)
CH01	0.110MHz
CH20	0.205MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
ASUS	Notebook	ATS1000	N/A

5.4 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.

- **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

- **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

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

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

5.6 Other Information Requested by the Customer

None.

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. 19 2020	Oct. 18 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2020	Oct. 18 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2020	Oct. 18 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

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	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

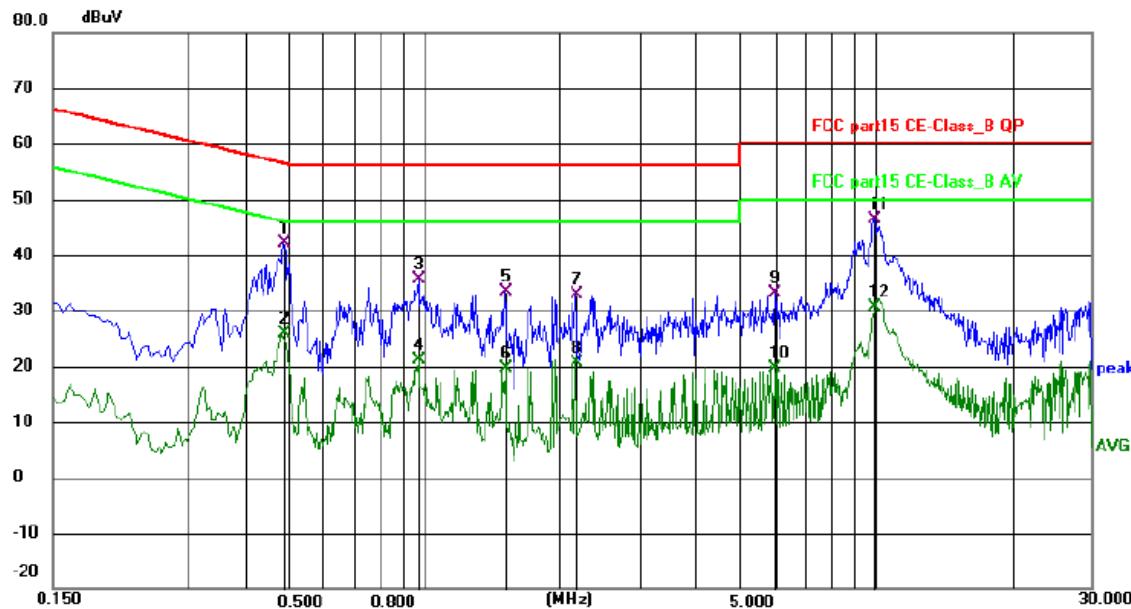
7 Test results and Measurement Data

7.1 Antenna requirement:

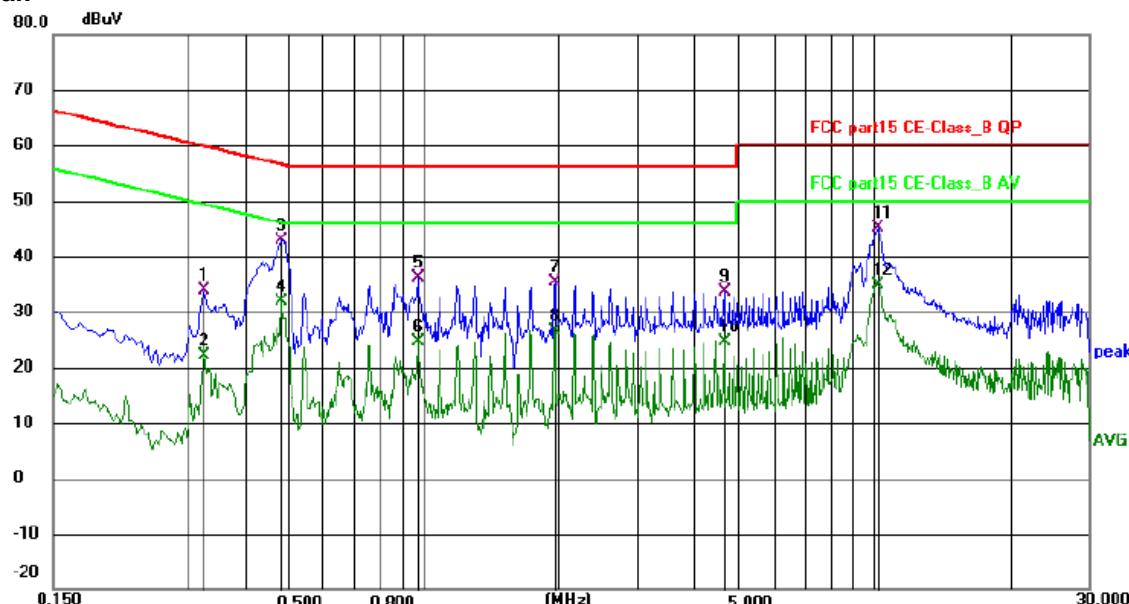
Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement:	
<p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique 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.</p>	
EUT Antenna:	
<p>The antenna is Inductive loop coil Antenna, the best case gain of the antenna is 0dBi, reference to the appendix II for details.</p>	

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:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>			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
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:	<p>Reference Plane</p> <p>LISN</p> <p>40cm</p> <p>80cm</p> <p>AUX Equipment</p> <p>E.U.T.</p> <p>Test table/Insulation plane</p> <p>EMI Receiver</p> <p>Filter</p> <p>AC power</p> <p>Remark E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>																
Test procedure:	<ol style="list-style-type: none"> 1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. 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 on conducted measurement. 																
Test Instruments:	Refer to section 6.0 for details																
Test mode:	Refer to section 5.2 for details																
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar											
Test voltage:	AC 120V, 60Hz																
Test results:	Pass																

Measurement data:
Line:


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4875	32.77	9.34	42.11	56.21	14.10	QP	P	
2	0.4875	16.44	9.34	25.78	46.21	20.43	AVG	P	
3	0.9734	26.27	9.45	35.72	56.00	20.28	QP	P	
4	0.9734	11.69	9.45	21.14	46.00	24.86	AVG	P	
5	1.5089	23.64	9.74	33.38	56.00	22.62	QP	P	
6	1.5089	9.97	9.74	19.71	46.00	26.29	AVG	P	
7	2.1614	23.03	9.81	32.84	56.00	23.16	QP	P	
8	2.1614	10.72	9.81	20.53	46.00	25.47	AVG	P	
9	5.9865	23.34	9.83	33.17	60.00	26.83	QP	P	
10	5.9865	9.82	9.83	19.65	50.00	30.35	AVG	P	
11 *	9.8835	36.42	9.99	46.41	60.00	13.59	QP	P	
12	9.8835	20.58	9.99	30.57	50.00	19.43	AVG	P	

Neutral:


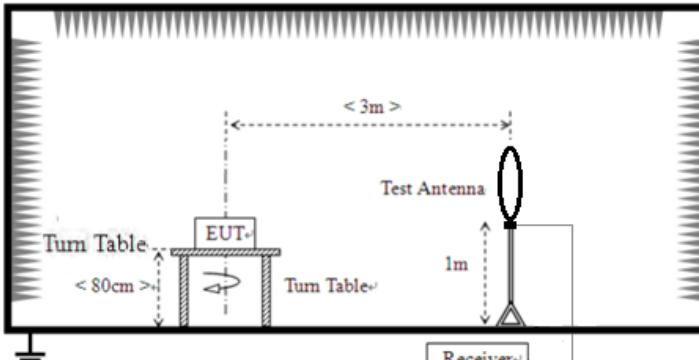
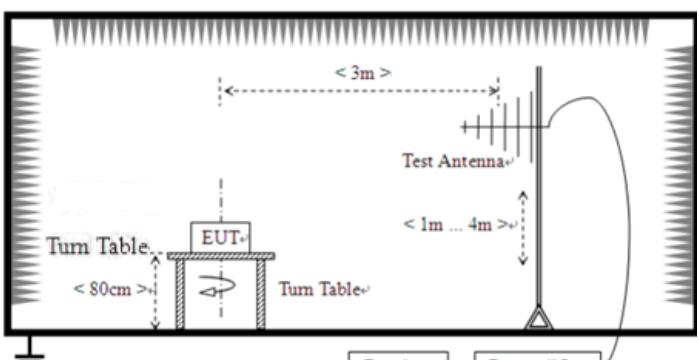
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.3255	24.70	9.27	33.97	59.57	25.60	QP	P	
2	0.3255	12.82	9.27	22.09	49.57	27.48	AVG	P	
3 *	0.4837	33.31	9.53	42.84	56.28	13.44	QP	P	
4	0.4837	22.29	9.53	31.82	46.28	14.46	AVG	P	
5	0.9734	26.47	9.55	36.02	56.00	19.98	QP	P	
6	0.9734	15.00	9.55	24.55	46.00	21.45	AVG	P	
7	1.9544	25.34	9.97	35.31	56.00	20.69	QP	P	
8	1.9544	16.68	9.97	26.65	46.00	19.35	AVG	P	
9	4.6500	23.74	9.93	33.67	56.00	22.33	QP	P	
10	4.6500	14.70	9.93	24.63	46.00	21.37	AVG	P	
11	10.1940	34.84	10.20	45.04	60.00	14.96	QP	P	
12	10.1940	24.78	10.20	34.98	50.00	15.02	AVG	P	

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 Spurious Emission

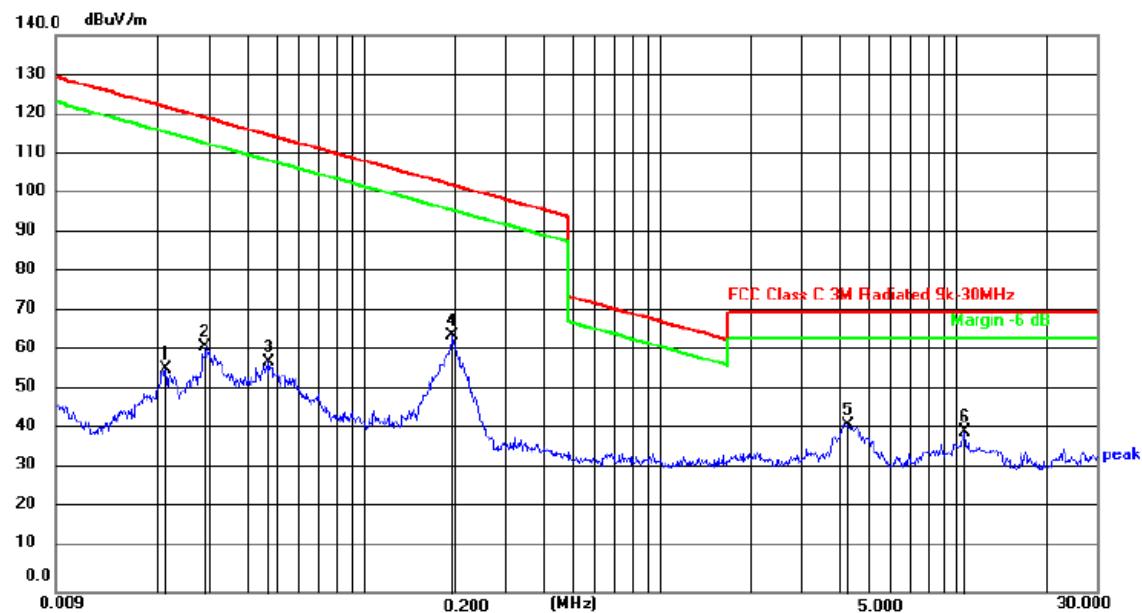
Test Requirement:	FCC Part15 C Section 15.209									
Test Method:	ANSI C63.10:2013									
Test Frequency Range:	9kHz to 1GHz									
Test site:	Measurement Distance: 3m									
Receiver setup:	Frequency	Detector	RBW	VBW	Remark					
	9kHz- 30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak Value					
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value					
	Above 1GHz	Peak	1MHz	3MHz	Peak Value					
AV										
Remark: For the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission test in these three bands are based on measurements employing an average detector.										
Limit: (Spurious Emissions)	Limits for frequency below 30MHz									
	Frequency	Limit (uV/m)	Measurement Distance(m)	Remark						
	0.009-0.490	2400/F(kHz)	300	Quasi-peak Value						
	0.490-1.705	24000/F(kHz)	30	Quasi-peak Value						
	1.705-30	30	30	Quasi-peak Value						
	Limits for frequency Above 30MHz									
	Frequency	Limit (dBuV/m @3m)	Remark							
	30MHz-88MHz	40.00	Quasi-peak Value							
	88MHz-216MHz	43.50	Quasi-peak Value							
	216MHz-960MHz	46.00	Quasi-peak Value							
Test Procedure:	960MHz-1GHz	54.00	Quasi-peak Value							
	Above 1GHz	54.00	Average Value							
		74.00	Peak Value							
	Remark: 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.									
	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.									
	2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.									
	3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.									
	4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.									
	5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.									
	6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the									

	<p>EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.</p>
Test setup:	<p>Below 30MHz</p>  <p>30MHz ~ 1000MHz</p> 
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test environment:	Temp.: 25 °C Humid.: 52% Press.: 1012mbar
Test voltage:	AC 120V, 60Hz
Test results:	Pass

Measurement data:

Note: Limit dBuV/m @3m = Limit dBuV/m @300m+ 80

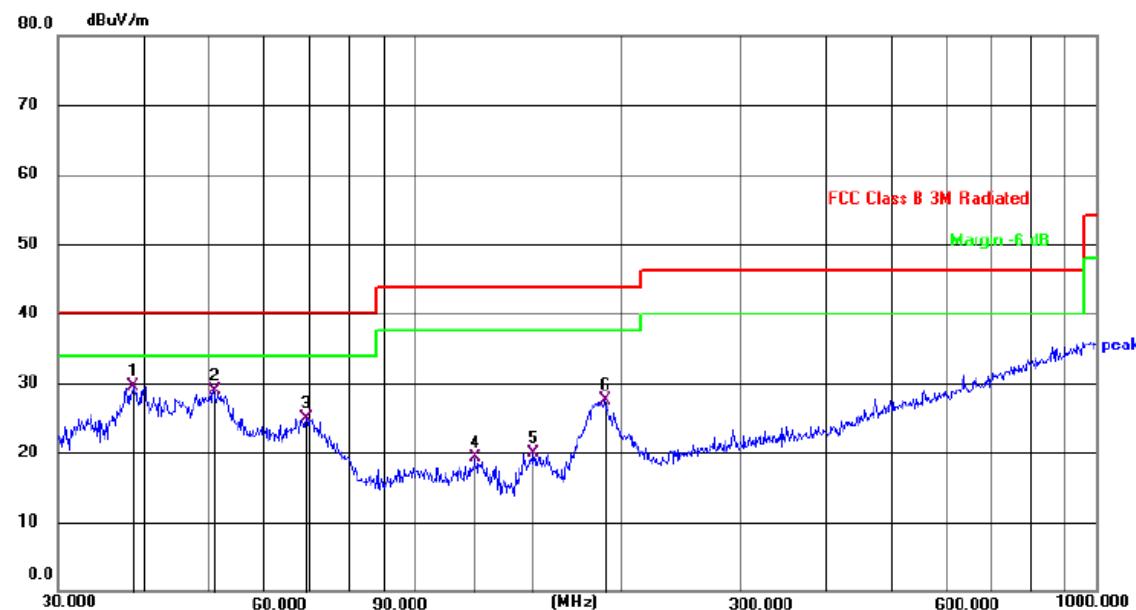
Limit dBuV/m @3m = Limit dBuV/m @30m + 40

9kHz~30MHz


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB/m	dB	
1		0.0212	56.17	-20.41	35.76	121.5	85.74	peak
2		0.0286	61.65	-20.62	41.03	118.8	77.77	peak
3		0.0473	57.97	-20.11	37.86	114.4	76.54	peak
4		0.1978	64.59	-20.30	44.29	101.9	57.61	peak
5	*	4.3166	42.34	-20.45	21.89	70.00	48.11	peak
6		10.6216	65.73	-19.88	45.85	70.00	24.15	peak

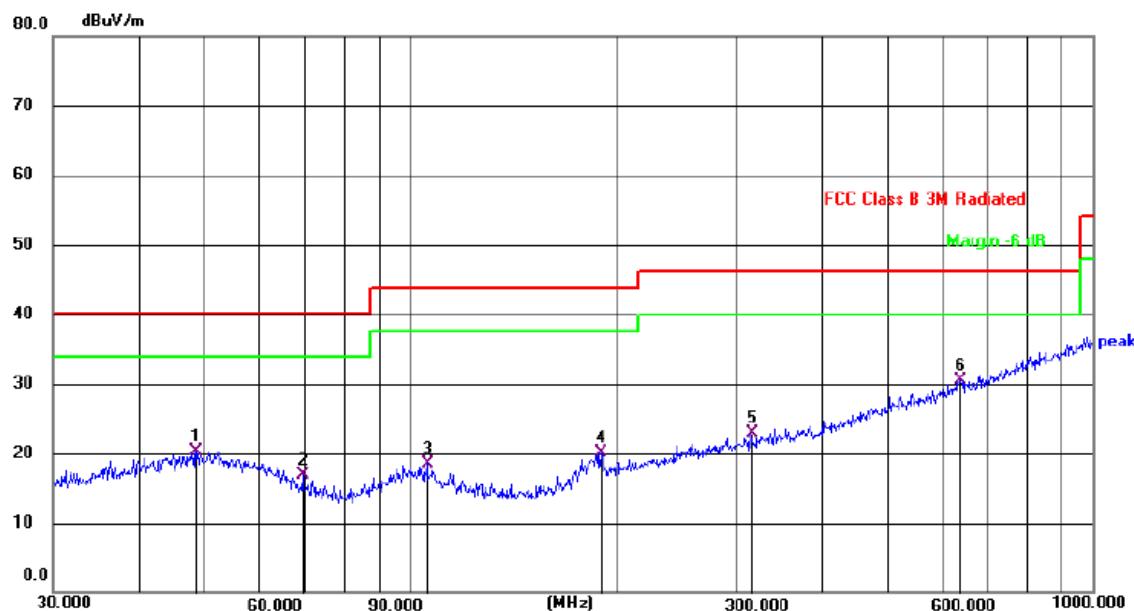
30MHz~1GHz

Horizontal



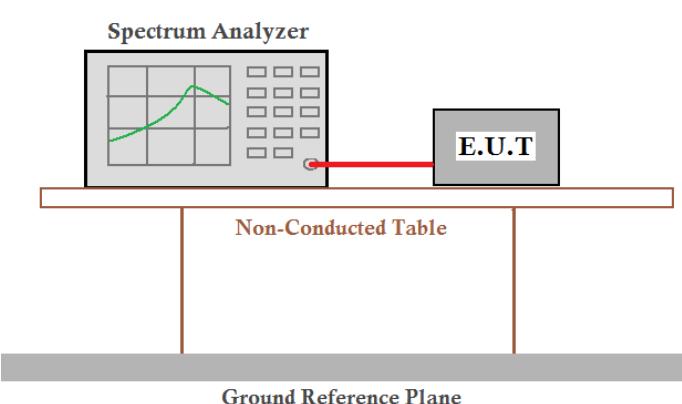
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	38.6160	44.50	-14.99	29.51	40.00	10.49	QP
2		50.7637	42.32	-13.51	28.81	40.00	11.19	QP
3		69.3568	42.70	-17.72	24.98	40.00	15.02	QP
4		122.4040	37.46	-18.23	19.23	43.50	24.27	QP
5		148.9625	39.11	-19.21	19.90	43.50	23.60	QP
6		189.7385	43.99	-16.57	27.42	43.50	16.08	QP

Vertical



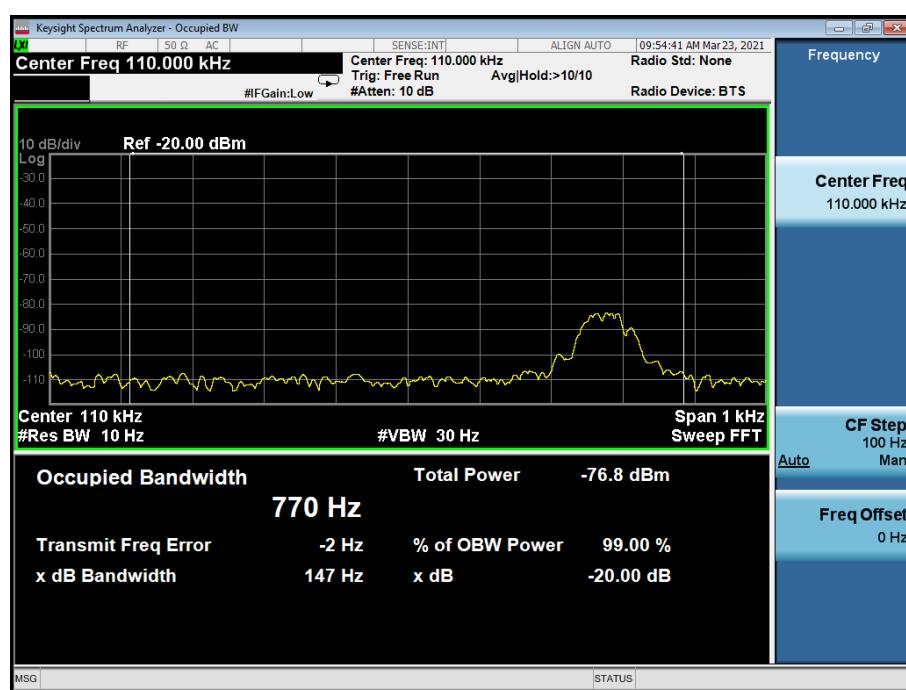
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		48.6719	33.96	-13.60	20.36	40.00	19.64	QP
2		69.6005	34.70	-17.79	16.91	40.00	23.09	QP
3		106.0126	35.04	-16.44	18.60	43.50	24.90	QP
4		190.4050	36.74	-16.54	20.20	43.50	23.30	QP
5		315.4808	35.05	-12.07	22.98	46.00	23.02	QP
6	*	638.3686	35.31	-4.88	30.43	46.00	15.57	QP

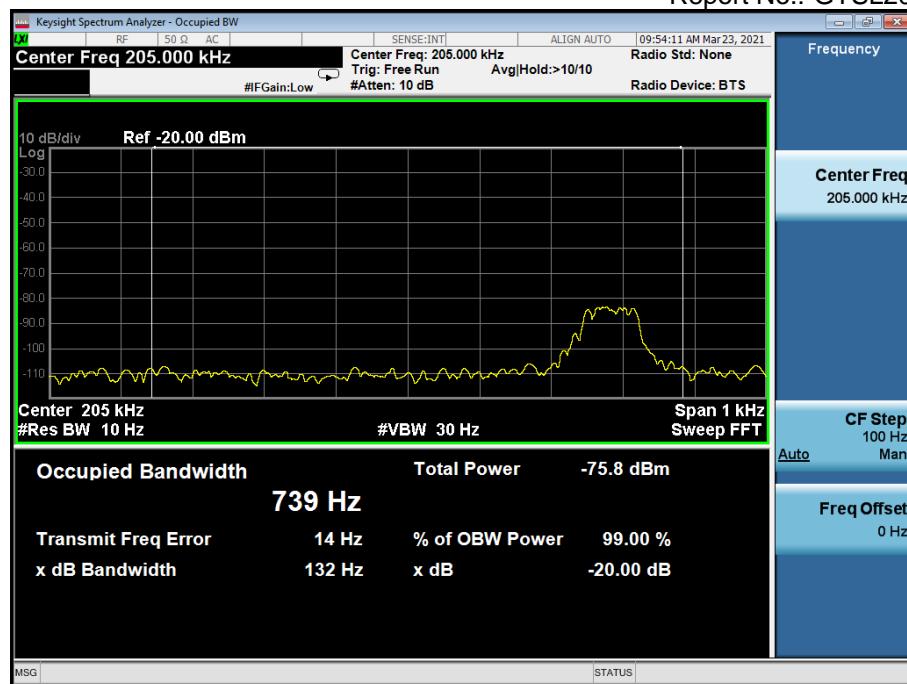
7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.215
Test Method:	ANSI C63.10:2013
Test setup:	<p style="text-align: center;">Spectrum Analyzer</p>  <p style="text-align: center;">Non-Conducted Table</p> <p style="text-align: center;">Ground Reference Plane</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

110kHz: 20dB BW=147Hz
205kHz: 20dB BW=132Hz





8 Test Setup Photo

Reference to the appendix I for details.

9 EUT Constructional Details

Reference to the appendix II for details.

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