FCC Test Report

FCC EVALUATION REPORT FOR CERTIFICATION	
Project Reference No.	302167
Product	Portable Bluetooth Speaker
Brand Name	Brookstone
Model	Big Blue Unplugged
Alternate Model	N.A
Tested according to	FCC Rules and Regulations Part 15 Subpart C 15.247, ANSI C63.4-2014

Tested in period	2016-01-25 to 2016-02-01
Issued date	2016-02-02
Name and address of the Test House	Nemko Shanghai Ltd. Shenzhen Branch Unit CD, Floor 10, Tower 2, Kefa Road 8#, Hi-Technology Park, Nanshan District, Shenzhen, China Phone : +86 755 8221 0420 Fax : +86 755 8221 3363
Tested by	2016/2/2
Juno Wong	***date***
Verified by	2016/2/2
Zone Peng	***date***

Contents of This Report

1. Client Information

1.1 Applicant

Company Name:	**Plastoform Industries Ltd.**
Company Address:	**Rm. 902-4 Seapower Center, 73 Lei Muk Road, Kwai Chung, Hong Kong**

1.2 Manufacturer

Company Name:	**Brookstone Inc.**
Company Address:	**One Innovation Way, Merrimack, New HampShire, 03054 United States**

1.3 Scope

●Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

2. Equipment under Test (EUT)

2.1 Identification of EUT

Category:	DSS
Model Name:	Big Blue Unplugged
Alternate model:	N/A
Brand name:	Brookstone
Technical data (Rating, etc.):	As below
Remark:	This report is on the basis of the original report 289647, change the charger from Mass power (model: SHF1500200A1WA) to Brookstone (model: NBS30D150200HU), except the adapter, all others are identical. Conducted emission and radiated emission are re-test.

2.2 Detail spec:

Carrier Frequency：2402MHz~2480MHz

Number of Channel：79

Modulation Type：Bluetooth V3.0 (GFSK, π/4 DQPSK, 8DPSK)

Mode of operation (duplex, simplex, half duplex) ：duplex

Antenna Type：Intergral Antenna

Antenna gain：0 dBi

Rating(s): Li-ion Rechargeable Battery: 7.4V, 2600mAh

Adapter: AC ADAPTER

Model : NBS30D150200HU

Input: 100V-240VAC 50/60Hz 0.8A

Output: 15.0VDC 2.0A

2.3 Additional Information Related to Testing

CHL : CH 1 2402MHz

CHM : CH 40 2441MHz

CHH : CH 79 2480MHz

3. General Test Conditions

3.1 Location

CENTRE TESTING INTERNATIONAL CORPORATION – ELA 503

Build C, Hongwei Industrial Zone, Baoan 70 District, Shenzhen, China

FCC-Registration No.: 510007

Note: all test are witnessed by NEMKO engineer

3.2 Operating Environment

All tests and measurements were performed in a shielded enclosure or a controlled environment suitable for the tests conducted. The climatic conditions in the test area are automatically controlled and recorded continuously.

Parameters	Recording during test	Accepted deviation
Ambient temperature	20-25°C	15 – 35 ºC
Relative humidity	45-55%	30 - 60%
Atmospheric pressure	101.2 kPa -101.3kPa	86-106kPa

3.3 Operating During Test

Test mode: 120V 60Hz

TM1 : continuance TX MODE

Remark : When measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, have been performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. No findable change appear.
And only choose the worse mode to be the representative test mode

3.4 Test Equipment

The test equipments used in testing are calibrated on a regular basis. For most of the testing equipments accredited calibration is conducted once a year. For certain equipment the calibration interval is longer. Between the calibrations all test equipment are controlled and verified on a regular basis. The test equipments used are defined in each test section of this report.

4. Measurement Uncertainty

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95 %.

Conducted Emission : 0.15~30MHz 3.45dB

Radiated Emission: 30MHz~1000MHz 4.50dB

1GHz-18GHz 4.70dB

5. Radiated Electromagnetic Disturbances

5.1 Test Procedure

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast.

The EUT were rotated 0 to 360 degree and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. The test result are reported as below.

For below 1GHz

RBW=120 kHz; VBW=300KHz.The frequency range from 30MHz to 1000MHz is checked using QP detector .

For above 1GHz. The frequency range from 1GHz to 25GHz(10^{th} harmonics) is checked.

RBW=1MHz ; VBW=1MHz,PK detector for peak emissions measurement above 1GHz

RBW=1MHz ; VBW=10Hz, PK detector for average emissions measure above 1GHz .

5.2 Measurement Equipment

	Equipment	Calibration Due	Type	Serial No.	Manufacturer
☒	Spectrum Analyzer	07/06/2016	E4440A	MY46185649	Agilent
☒	Biconilog Antenna	07/06/2016	3142C	00044562	ETS-LINGREN
☒	Multi device Controller	07/06/2016	2090	00057230	ETS-LINGREN
☒	Microwave Preamplifier	07/06/2016	8449B	3008A02425	Agilent
☒	Log.-per. Antenna	07/06/2016	VUSLP 9111B	9111B-088	schwarzbeck

5.3 Test Result

Spurious emission worse case:

Below 1G:

Mode	Freq range	Channel	Test ANT polarity	Diagram	Test Result
TX MODE	30MHz-1GHz:	CH LOW	H	5-1	Pass
	30MHz-1GHz:	CH LOW	V	5-2	Pass

Remark:

1. If PK value is lower than AV limit , then Both PK and AV deem to comply their own limit, and then only list the peak result in the report.
2. All modes of operation were investigated and the worst -case emission mode are reported.

NOTES:

1.All modes were measured and the worst case emission was reported.

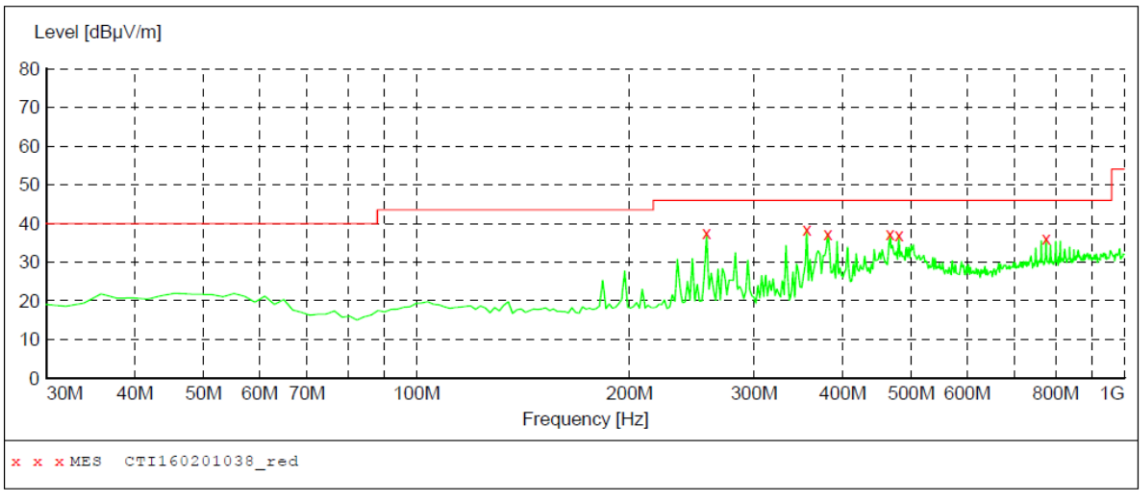
2. H =Horizontal V=Vertical

3. Emission = Reading +Antenna Factor + Cable Loss –Amp Factor(if exist)

4. Emission level dBμV = 20 log Emission level μV/m

5. The lower limit shall apply at the transition frequencies

5.3.1 Diagram 5-1



MEASUREMENT RESULT: "CTI160201038_red"

2/1/2016 4:53PM

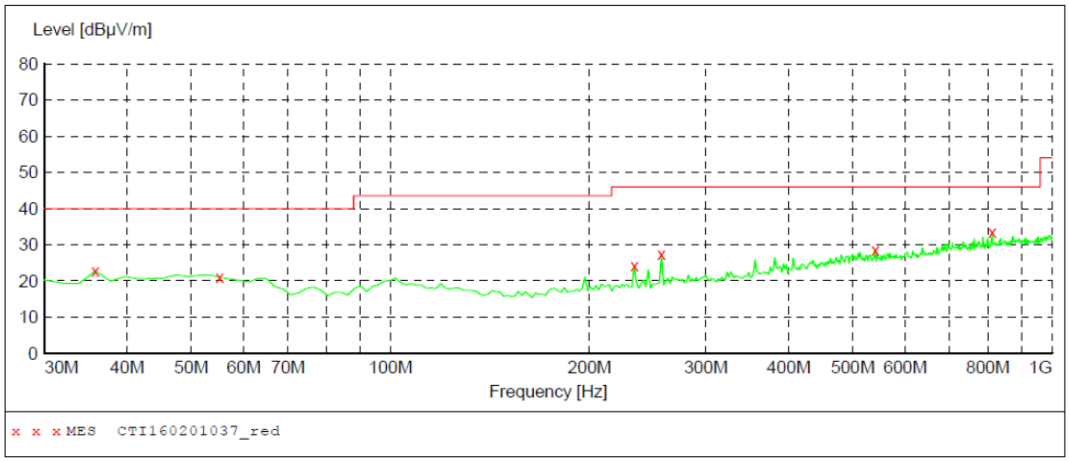
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
256.980000	37.50	14.9	46.0	8.5	---	100.0	361.00	HORIZONTAL
355.920000	38.50	17.7	46.0	7.5	---	100.0	196.00	HORIZONTAL
381.140000	37.40	18.5	46.0	8.6	---	100.0	185.00	HORIZONTAL
466.500000	37.40	20.6	46.0	8.6	---	100.0	163.00	HORIZONTAL
480.080000	37.00	21.0	46.0	9.0	---	200.0	31.00	HORIZONTAL
774.960000	36.00	25.2	46.0	10.0	---	100.0	10.00	HORIZONTAL

5.3.2 Diagram 5-2

SWEEP TABLE: "test (30M-1G)"

Short Description: Field Strength

Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163-484



MEASUREMENT RESULT: "CTI160201037_red"

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Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
35.820000	22.80	14.9	40.0	17.2	---	100.0	26.00	VERTICAL
55.220000	21.10	15.8	40.0	18.9	---	100.0	335.00	VERTICAL
233.700000	24.10	14.4	46.0	21.9	---	200.0	299.00	VERTICAL
256.980000	27.50	14.9	46.0	18.5	---	200.0	278.00	VERTICAL
540.220000	28.70	21.8	46.0	17.3	---	200.0	66.00	VERTICAL
811.820000	33.50	25.6	46.0	12.5	---	100.0	109.00	VERTICAL

6 POWER LINE CONDUCTED EMISSION TEST

6.1 Test Procedure

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	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.		

6.2 Measurement Equipment

	Equipment	Last Calibration	Type	Serial No.	Manufacturer
☒	Receiver	07/06/2012	ESCI	100009	R&S
☒	LISN	07/06/2012	ENV216	100098	R&S

6.3 Test Result

The EUT was placed on a non-metallic table, 80cm above the ground plane. The other peripheral devices power cord connected to the power mains through another line impedance stabilization network.In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4-2014 on conducted Emission test.

Preview measurements:

0.15 MHz to 30 MHz

Receiver settings: PK&AV detector

RBW:9 kHz

TX MODE

Final measurement:

0.15 MHz to 30 MHz

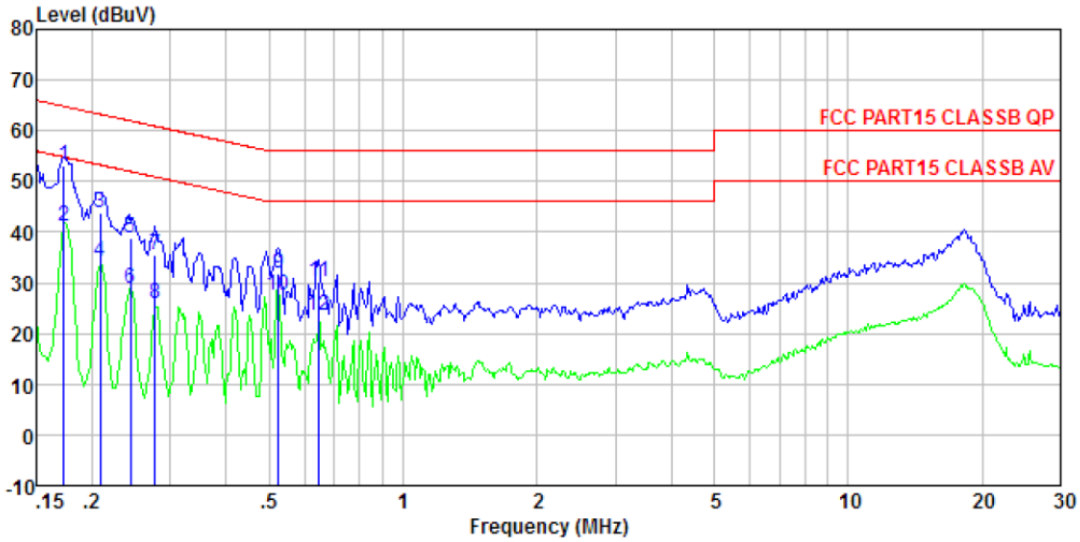
Receiver settings:QP&AV detector

Power Line	Test Data	Test Result
Line	Diagram 6-1	Pass
Neutral	Diagram 6-2	Pass

NOTES:

1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operation were investigated and the worst -case emission are reported.
3: If PK value is lower than AV limit then no reading value listed in report .If QP value is Lower than AV limit ,then AV value don't listed in report.

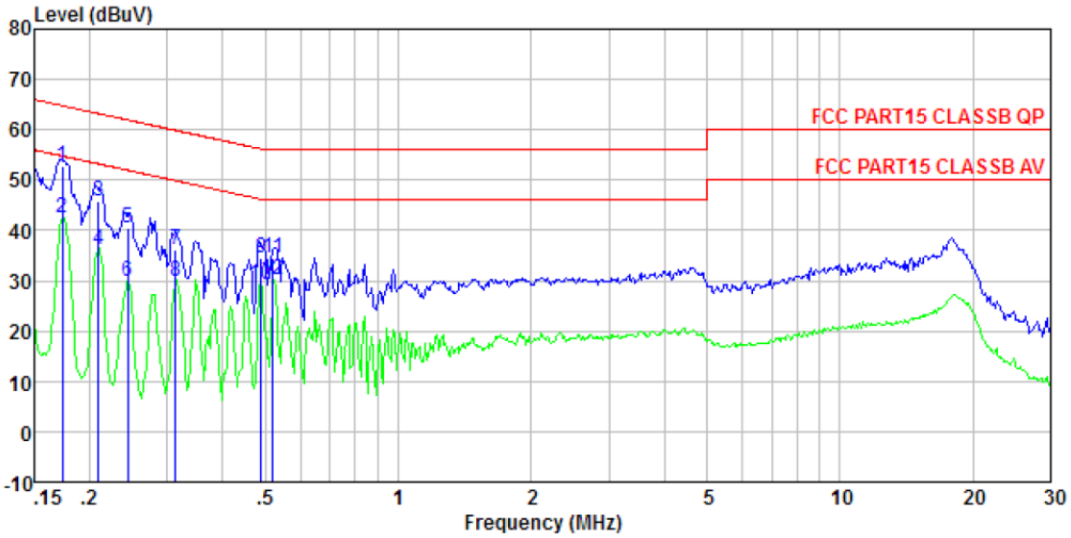
6.3.1 Diagram 6-1



Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 LINE
EUT : Bluetooth speaker
Test mode : Bluetooth 3.0 mode
Test Engineer: Arslan

	Freq	Read Level	Level	Cable Loss	LISN Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.173	52.79	53.06	0.12	0.15	64.81	-11.75	QP
2	0.173	40.95	41.22	0.12	0.15	54.81	-13.59	Average
3	0.208	43.38	43.64	0.13	0.13	63.27	-19.63	QP
4	0.208	34.05	34.31	0.13	0.13	53.27	-18.96	Average
5	0.244	38.49	38.72	0.11	0.12	61.95	-23.23	QP
6	0.244	28.65	28.88	0.11	0.12	51.95	-23.07	Average
7	0.277	35.14	35.35	0.10	0.11	60.90	-25.55	QP
8	0.277	25.61	25.82	0.10	0.11	50.90	-25.08	Average
9	0.524	31.51	31.75	0.11	0.13	56.00	-24.25	QP
10	0.524	27.27	27.51	0.11	0.13	46.00	-18.49	Average
11	0.647	29.89	30.15	0.13	0.13	56.00	-25.85	QP
12	0.647	23.21	23.47	0.13	0.13	46.00	-22.53	Average

6.3.2 Diagram 6-2



Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
EUT : Bluetooth speaker
Test mode : Bluetooth 3.0 mode
Test Engineer: Arslan

	Freq	Read Level	Level	Cable Loss	LISN Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.174	52.62	52.82	0.13	0.07	64.77	-11.95	QP
2	0.174	42.25	42.45	0.13	0.07	54.77	-12.32	Average
3	0.209	45.59	45.79	0.13	0.07	63.23	-17.44	QP
4	0.209	36.11	36.31	0.13	0.07	53.23	-16.92	Average
5	0.244	40.44	40.61	0.11	0.06	61.95	-21.34	QP
6	0.244	29.63	29.80	0.11	0.06	51.95	-22.15	Average
7	0.313	36.03	36.19	0.10	0.06	59.88	-23.69	QP
8	0.313	29.72	29.88	0.10	0.06	49.88	-20.00	Average
9	0.489	34.24	34.41	0.11	0.06	56.19	-21.78	QP
10	0.489	28.99	29.16	0.11	0.06	46.19	-17.03	Average
11	0.521	34.34	34.51	0.11	0.06	56.00	-21.49	QP
12	0.521	29.97	30.14	0.11	0.06	46.00	-15.86	Average

******END OF REPORT******