FCC 47 CFR MPE REPORT

FCC PART 15C TEST REPORT FOR CERTIFICATION
On Behalf of

Bang & Olufsen a/s

Wireless Speaker

Model Number: Beoplay M3

FCC ID: TTUBEOPLAYM3

Prepared for:	Bang & Olufsen a/s
	Peter Bangs Vej 15, 7600 Struer, Denmark
Prepared By:	EST Technology Co., Ltd.
	San Tun Management Zone, Houjie District, Dongguan, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R1707004
Date of Test:	May 03 ~ June 20, 2017
Date of Report:	July 04, 2017

Maximum Permissible Exposure

1、Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

(a)、Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Times｜E｜2 , ｜H｜2 or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-10000			5	6

(b)、Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Times｜E｜2 , ｜H｜2 or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-10000			1.o	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

2、MPE Calculation Method

E (V/m) = (30*P*G) 0.5/d Power Density: Pd (W/m2) = E2/377

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = (30*P*G) / (377*d2)

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

3、Conducted Power Result

3.1 Antenna 0

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
GFSK	2402	7.03	5.047	7±2	-1.16	0.766
	2441	7.05	5.070	7±2	-1.16	0.766
	2480	7.04	5.058	7±2	-1.16	0.766
8-DPSK	2402	9.02	7.980	9±2	-1.16	0.766
	2441	8.96	7.870	8±2	-1.16	0.766
	2480	8.89	7.745	8±2	-1.16	0.766
BLE	2402	2.89	1.945	2±2	-1.16	0.766
	2440	2.86	1.932	2±2	-1.16	0.766
	2480	2.81	1.910	2±2	-1.16	0.766
IEEE 802.11b	2412	10.85	12.162	10±2	-1.16	0.766
	2437	12.98	19.861	12±2	-1.16	0.766
	2462	13.36	21.677	13±2	-1.16	0.766
IEEE 802.11g	2412	9.49	8.892	9±2	-1.16	0.766
	2437	10.16	10.375	10±2	-1.16	0.766
	2462	10.25	10.593	10±2	-1.16	0.766
IEEE 802.11n HT20	2412	12.51	17.824	12±2	-1.16	0.766
	2437	12.63	18.323	12±2	-1.16	0.766
	2462	13.12	20.512	13±2	-1.16	0.766
IEEE 802.11n HT40	2422	10.70	11.749	10±2	-1.16	0.766
	2437	11.42	13.868	11±2	-1.16	0.766
	2452	11.50	14.125	11±2	-1.16	0.766
IEEE 802.11a	5180	15.20	33.113	15±2	4.26	2.667
	5200	15.00	31.623	15±2	4.26	2.667
	5240	15.40	34.674	15±2	4.26	2.667
	5260	16.00	39.811	16±2	4.26	2.667
	5300	15.90	38.905	15±2	4.26	2.667
	5320	16.00	39.811	16±2	4.26	2.667
	5500	15.50	35.481	15±2	4.26	2.667
	5580	17.10	51.286	17±2	4.26	2.667
	5700	12.80	19.055	12±2	4.26	2.667
	5745	17.50	56.234	17±2	4.26	2.667
	5785	17.40	54.954	17±2	4.26	2.667
	5825	15.82	38.194	15±2	4.26	2.667

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	15.60	36.308	15±2	4.26	2.667
	5200	15.20	33.113	15±2	4.26	2.667
	5240	12.80	19.055	12±2	4.26	2.667
	5260	16.10	40.738	16±2	4.26	2.667
	5300	16.10	40.738	16±2	4.26	2.667
	5320	15.90	38.905	15±2	4.26	2.667
	5500	15.50	35.481	15±2	4.26	2.667
	5580	17.10	51.286	17±2	4.26	2.667
	5700	12.50	17.783	12±2	4.26	2.667
	5745	17.80	60.256	17±2	4.26	2.667
	5785	14.00	25.119	14±2	4.26	2.667
	5825	17.60	57.544	17±2	4.26	2.667
IEEE 802.11ac VHT20	5180	15.66	36.813	15±2	4.26	2.667
	5200	15.25	33.497	15±2	4.26	2.667
	5240	12.83	19.187	12±2	4.26	2.667
	5260	16.15	41.210	16±2	4.26	2.667
	5300	16.15	41.210	16±2	4.26	2.667
	5320	15.95	39.355	15±2	4.26	2.667
	5500	15.57	36.058	15±2	4.26	2.667
	5580	17.13	51.642	17±2	4.26	2.667
	5700	12.55	17.989	12±2	4.26	2.667
	5745	17.88	61.376	17±2	4.26	2.667
	5785	14.05	25.410	14±2	4.26	2.667
	5825	17.65	58.210	17±2	4.26	2.667

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	14.80	30.200	14±2	4.26	2.667
	5230	14.70	29.512	14±2	4.26	2.667
	5270	15.10	32.359	15±2	4.26	2.667
	5310	15.40	34.674	15±2	4.26	2.667
	5510	12.70	18.621	12±2	4.26	2.667
	5550	12.00	15.849	12±2	4.26	2.667
	5670	10.50	11.220	10±2	4.26	2.667
	5755	9.70	9.333	9±2	4.26	2.667
	5795	11.70	14.791	11±2	4.26	2.667
IEEE 802.11ac VHT40	5190	14.88	30.761	14±2	4.26	2.667
	5230	14.75	29.854	14±2	4.26	2.667
	5270	15.18	32.961	15±2	4.26	2.667
	5310	15.45	35.075	15±2	4.26	2.667
	5510	12.75	18.836	12±2	4.26	2.667
	5550	12.08	16.144	12±2	4.26	2.667
	5670	10.58	11.429	10±2	4.26	2.667
	5755	9.75	9.441	9±2	4.26	2.667
	5795	11.78	15.066	11±2	4.26	2.667
IEEE 802.11ac VHT80	5210	11.90	15.488	11±2	4.26	2.667
	5290	11.30	13.490	11±2	4.26	2.667
	5530	10.90	12.303	10±2	4.26	2.667
	5775	9.70	9.333	9±2	4.26	2.667

3.2 Antenna 1

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11b	2412	12.16	16.444	12±2	-2.27	0.593
	2437	11.83	15.241	11±2	-2.27	0.593
	2462	12.18	16.520	12±2	-2.27	0.593
IEEE 802.11g	2412	8.67	7.362	8±2	-2.27	0.593
	2437	8.15	6.531	8±2	-2.27	0.593
	2462	9.54	8.995	9±2	-2.27	0.593
IEEE 802.11n HT20	2412	12.22	16.672	12±2	-2.27	0.593
	2437	12.40	17.378	12±2	-2.27	0.593
	2462	12.07	16.106	12±2	-2.27	0.593
IEEE 802.11n HT40	2422	10.56	11.376	10±2	-2.27	0.593
	2437	10.60	11.482	10±2	-2.27	0.593
	2452	10.17	10.399	10±2	-2.27	0.593
IEEE 802.11a	5180	12.40	17.378	12±2	4.67	2.931
	5200	12.30	16.982	12±2	4.67	2.931
	5240	12.40	17.378	12±2	4.67	2.931
	5260	12.50	17.783	12±2	4.67	2.931
	5300	12.70	18.621	12±2	4.67	2.931
	5320	12.70	18.621	12±2	4.67	2.931
	5500	12.00	15.849	12±2	4.67	2.931
	5580	14.30	26.915	14±2	4.67	2.931
	5700	9.50	8.913	9±2	4.67	2.931
	5745	14.50	28.184	14±2	4.67	2.931
	5785	14.70	29.512	14±2	4.67	2.931
	5825	12.86	19.320	12±2	4.67	2.931

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20	5180	12.90	19.498	12±2	4.67	2.931
	5200	12.20	16.596	12±2	4.67	2.931
	5240	12.60	18.197	12±2	4.67	2.931
	5260	12.90	19.498	12±2	4.67	2.931
	5300	13.00	19.953	13±2	4.67	2.931
	5320	12.70	18.621	12±2	4.67	2.931
	5500	12.20	16.596	12±2	4.67	2.931
	5580	14.70	29.512	14±2	4.67	2.931
	5700	9.20	8.318	9±2	4.67	2.931
	5745	15.20	33.113	15±2	4.67	2.931
	5785	16.60	45.709	16±2	4.67	2.931
	5825	14.90	30.903	14±2	4.67	2.931
IEEE 802.11ac VHT20	5180	13.05	20.184	13±2	4.67	2.931
	5200	12.26	16.827	12±2	4.67	2.931
	5240	12.73	18.750	12±2	4.67	2.931
	5260	12.85	19.275	12±2	4.67	2.931
	5300	13.03	20.091	13±2	4.67	2.931
	5320	12.75	18.836	12±2	4.67	2.931
	5500	12.28	16.904	12±2	4.67	2.931
	5580	14.78	30.061	14±2	4.67	2.931
	5700	9.26	8.433	9±2	4.67	2.931
	5745	15.25	33.497	15±2	4.67	2.931
	5785	16.65	46.238	16±2	4.67	2.931
	5825	14.98	31.477	14±2	4.67	2.931

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power（dBm）	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40	5190	11.80	15.136	11±2	4.67	2.931
	5230	11.90	15.488	11±2	4.67	2.931
	5270	12.00	15.849	12±2	4.67	2.931
	5310	12.30	16.982	12±2	4.67	2.931
	5510	10.10	10.233	10±2	4.67	2.931
	5550	9.20	8.318	9±2	4.67	2.931
	5670	7.60	5.754	7±2	4.67	2.931
	5755	13.00	19.953	13±2	4.67	2.931
	5795	8.60	7.244	8±2	4.67	2.931
IEEE 802.11ac VHT40	5190	11.88	15.417	11±2	4.67	2.931
	5230	11.95	15.668	11±2	4.67	2.931
	5270	12.45	17.579	12±2	4.67	2.931
	5310	12.37	17.258	12±2	4.67	2.931
	5510	10.30	10.715	10±2	4.67	2.931
	5550	9.25	8.414	9±2	4.67	2.931
	5670	7.65	5.821	7±2	4.67	2.931
	5755	13.08	20.324	13±2	4.67	2.931
	5795	8.65	7.328	8±2	4.67	2.931
IEEE 802.11ac VHT80	5210	8.80	7.586	8±2	4.67	2.931
	5290	8.40	6.918	8±2	4.67	2.931
	5530	10.80	12.023	10±2	4.67	2.931
	5775	9.30	8.511	9±2	4.67	2.931

4、Calculated Result and Limit

4.1 Antenna 0

Mode	Target power（dBm）	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
GFSK	9	-1.16	0.766	**0.00121**	1	Compiles
8-DPSK	11	-1.16	0.766	**0.00192**	1	Compiles
BLE	4	-1.16	0.766	**0.00038**	1	Compiles
IEEE 802.11b	15	-1.16	0.766	**0.00482**	1	Compiles
IEEE 802.11g	12	-1.16	0.766	**0.00241**	1	Compiles
IEEE 802.11n HT20	15	-1.16	0.766	**0.00482**	1	Compiles
IEEE 802.11n HT40	13	-1.16	0.766	**0.00304**	1	Compiles
5G Band						
IEEE 802.11a	19	4.26	2.667	**0.04214**	1	Compiles
IEEE 802.11n HT20	19	4.26	2.667	**0.04214**	1	Compiles
IEEE 802.11ac VHT20	19	4.26	2.667	**0.04214**	1	Compiles
IEEE 802.11n HT40	17	4.26	2.667	**0.02659**	1	Compiles
IEEE 802.11ac VHT40	17	4.26	2.667	**0.02659**	1	Compiles
IEEE 802.11ac VHT80	13	4.26	2.667	**0.01059**	1	Compiles

4.2 Antenna 1

Mode	Target power（dBm）	Antenna gain		Power Density (S) (mW /cm2)	Limited of Power Density (S) (mW /cm2)	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	14	-2.27	0.593	**0.00296**	1	Compiles
IEEE 802.11g	11	-2.27	0.593	**0.00149**	1	Compiles
IEEE 802.11n HT20	14	-2.27	0.593	**0.00296**	1	Compiles
IEEE 802.11n HT40	12	-2.27	0.593	**0.00187**	1	Compiles
5G Band						
IEEE 802.11a	16	4.67	2.931	**0.02321**	1	Compiles
IEEE 802.11n HT20	18	4.67	2.931	**0.03679**	1	Compiles
IEEE 802.11ac VHT20	18	4.67	2.931	**0.03679**	1	Compiles
IEEE 802.11n HT40	15	4.67	2.931	**0.01844**	1	Compiles
IEEE 802.11ac VHT40	15	4.67	2.931	**0.01844**	1	Compiles
IEEE 802.11ac VHT80	12	4.67	2.931	**0.00924**	1	Compiles

4.3 Antenna 0+1

Mode	Power Density (S) (mW /cm2) Antenna 0	Power Density (S) (mW /cm2) Antenna 1	Power Density (S) (mW /cm2) Total	Limited of Power Density (S) (mW /cm2)	Test Result
2.4G Band					
IEEE 802.11n HT20	0.00482	0.00296	**0.00778**	1	Compiles
IEEE 802.11n HT40	0.00304	0.00187	**0.00491**	1	Compiles
5G Band					
IEEE 802.11n HT20	0.04214	0.03679	**0.07893**	1	Compiles
IEEE 802.11ac VHT20	0.04214	0.03679	**0.07893**	1	Compiles
IEEE 802.11n HT40	0.02659	0.01844	**0.04503**	1	Compiles
IEEE 802.11ac VHT40	0.02659	0.01844	**0.04503**	1	Compiles
IEEE 802.11ac VHT80	0.01059	0.00924	**0.01983**	1	Compiles

Note: 2.4 and 5GHz bands are share an antenna, Cann't both the 2.4 and 5 GHz bands operate simultaneously.