



A Test Lab Techno Corp.

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MPE Report

Test Report No.	: 1609FS14
Applicant	: SHENZHEN OPURES TECHNOLOGY CO., LTD
Product Type	: Wi-Fi Smart Audio System
Trade Name	: OPURES
Model Number	: OP1200,OP1100,OP1210,OP1220
Date of Received	: Aug. 16, 2016
Test Period	: Aug. 24, 2016
Date of Issued	: Sep. 23, 2016
Test Specification	: ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013 47 CFR § 2.1091 47 CFR § 1.1310
Location of Test Lab.	: Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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Contents

1.	Description of Equipment under Test (EUT).....	3
2.	Human Exposure Assessment.....	4
3.	RF Output Power	5
4.	Test Result	7



1. Description of Equipment under Test (EUT)

Applicant	SHENZHEN OPURES TECHNOLOGY CO., LTD Room 807,the Changsheng Building,huaqiangbei road,Huaqiangbei street,Futian District,Shenzhen city,China		
Manufacturer	SHENZHEN OPURES TECHNOLOGY CO., LTD Room 807,the Changsheng Building,huaqiangbei road,Huaqiangbei street,Futian District,Shenzhen city,China		
Product Type	Wi-Fi Smart Audio System		
Trade Name	OPURES		
Model Number	OP1200,OP1100,OP1210,OP1220		
FCC ID	2AIFX-OP1200		
Frequency Range	IEEE 802.11b / 802.11g / 802.11n 2.4GHz 20MHz :	2412 - 2462 MHz	
	IEEE 802.11n 2.4GHz 40MHz :	2422 - 2452 MHz	
	Bluetooth BR/EDR	2402 - 2480 MHz	
Antenna Type	PCB Antenna		
Antenna Peak Gain	IEEE 802.11b, IEEE 802.11g: 2 dBi IEEE 802.11n 2.4GHz 20MHz / 40MHz: 2 dBi Bluetooth BR/EDR: 0 dBi		
Directional Gain	2 dBi (please refer to RF report)		
Antenna Delivery	IEEE 802.11b / IEEE 802.11g / 802.11n 2.4GHz 20MHz / 40MHz :2TX + 2RX (MIMO) Bluetooth BR/EDR : 1TX+1RX		
RF Evaluation	0.0206454 mW/cm ²		

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties



2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. " This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure evaluation

$$S = \frac{PG}{4\pi R^2}$$

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.



3. RF Output Power

The conducted power turn-up tolerance reference manufacturer specification.

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)		
				ANT-0	ANT-1	ANT-0+1
IEEE 802.11b	1M	1	2412.0	13.57	13.39	16.49
		6	2437.0	14.09	13.87	16.99
		11	2462.0	13.91	13.62	16.78
	2M	6	2437.0	13.94	13.71	16.84
	5.5M	6	2437.0	13.76	13.49	16.64
	11M	6	2437.0	13.39	13.13	16.27
IEEE 802.11g	6M	1	2412.0	11.34	10.73	14.06
		6	2437.0	11.45	11.15	14.31
		11	2462.0	11.22	10.87	14.06
	9M	6	2437.0	10.98	10.71	13.86
	12M	6	2437.0	10.71	10.52	13.63
	18M	6	2437.0	10.39	10.11	13.26
	24M	6	2437.0	10.13	9.86	13.01
	36M	6	2437.0	9.29	9.03	12.17
	48M	6	2437.0	6.73	6.42	9.59
	54M	6	2437.0	6.51	6.16	9.35
IEEE 802.11n 2.4GHz 20MHz	13M	1	2412.0	10.78	10.62	13.71
		6	2437.0	11.12	11.04	14.09
		11	2462.0	11.08	10.94	14.02
	26M	6	2437.0	10.52	10.37	13.46
	39M	6	2437.0	10.11	9.98	13.06
	52M	6	2437.0	9.78	9.56	12.68
	78M	6	2437.0	9.35	9.17	12.27
	104M	6	2437.0	8.62	8.43	11.54
	117M	6	2437.0	6.53	6.31	9.43
	130M	6	2437.0	6.25	6.16	9.22
IEEE 802.11n 2.4GHz 40MHz	27M	3	2422.0	9.04	8.61	11.84
		6	2437.0	9.33	8.95	12.15
		9	2452.0	9.25	8.83	12.06
	54M	6	2437.0	8.61	8.34	11.49
	81M	6	2437.0	7.64	7.31	10.49
	108M	6	2437.0	7.16	6.95	10.07
	162M	6	2437.0	6.32	6.11	9.23
	216M	6	2437.0	5.83	5.47	8.66
	243M	6	2437.0	3.71	3.14	6.44
	270M	6	2437.0	3.62	3.02	6.34

Band	CH	Frequency (MHz)	Packet Type	Average Conducted power (dBm)
Bluetooth BR GFSK	0	2402	DH1	0.86
			DH3	4.07
			DH5	4.75
	39	2441	DH1	0.96
			DH3	4.15
			DH5	4.84
	78	2480	DH1	1.04
			DH3	4.25
			DH5	4.95
Bluetooth EDR $\pi/4$ -DQPSK	0	2402	2DH1	-2.58
			2DH3	0.16
			2DH5	0.76
	39	2441	2DH1	0.43
			2DH3	3.19
			2DH5	3.82
	78	2480	2DH1	0.54
			2DH3	3.34
			2DH5	3.96
Bluetooth EDR 8DPSK	0	2402	3DH1	-2.60
			3DH3	0.15
			3DH5	0.78
	39	2441	3DH1	0.45
			3DH3	3.21
			3DH5	3.85
	78	2480	3DH1	0.58
			3DH3	3.37
			3DH5	3.99

4. Test Result

Band	Data Rate	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
IEEE 802.11b MIMO(CDD)	1M	2412	1	20	18.00	2.00	1.58	1	99.690	0.020
		2437	1	20	18.00	2.00	1.58	1	99.690	0.020
		2462	1	20	18.00	2.00	1.58	1	99.690	0.020
IEEE 802.11g MIMO(CDD)	6M	2412	1	20	15.00	2.00	1.58	1	49.960	0.010
		2437	1	20	15.00	2.00	1.58	1	49.960	0.010
		2462	1	20	15.00	2.00	1.58	1	49.960	0.010
IEEE 802.11n 2.4GHz 20MHz MIMO(CDD)	13M	2412	1	20	15.00	2.00	1.58	1	49.960	0.010
		2437	1	20	15.00	2.00	1.58	1	49.960	0.010
		2462	1	20	15.00	2.00	1.58	1	49.960	0.010
IEEE 802.11n 2.4GHz 40MHz MIMO(CDD)	27M	2422	1	20	13.00	2.00	1.58	1	31.530	0.006
		2437	1	20	13.00	2.00	1.58	1	31.530	0.006
		2452	1	20	13.00	2.00	1.58	1	31.530	0.006

Band	Packet Type	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
Bluetooth BR/EDR	DH5	2402.0	1.000	20	5.1	0.00	1	1	3.24	0.000645
		2441.0	1.000	20	5.1	0.00	1	1	3.24	0.000645
		2480.0	1.000	20	5.1	0.00	1	1	3.24	0.000645

Note:

1. The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.
2. Each band max power which perform MPE of any configurations.
3. The device operating IEEE 802.11b/g/n mode is MIMO(CDD) with transmit signals to 2TX.
4. In this case, we use maximum gain of Ant-0, because MIMO(CDD) directional gain is less than Ant-0.

Simultaneous MPE :

$$\text{Total MPE} = 2.4\text{GHz MPE} + \text{Bluetooth MPE} = 0.020 + 0.000645 = 0.0206454 \text{ mW/cm}^2 < 1\text{mW/cm}^2$$