



A Test Lab Techno Corp.

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MPE Report

Test Report No.	: 1411FS11
Applicant	: Phorus, Inc.
Manufacturer	: Fugang Electronic(Dongguan) Co., LTD
Product Type	: phorus wifi / Bluetooth Speaker
Trade Name	: phorus
Model Number	: PS5 SPEAKER
Date of Received	: Oct. 22, 2014
Test Period	: Nov. 03 ~ Nov. 04, 2014
Date of Issued	: Dec. 05, 2014
Test Specification	: 47 CFR § 2.1091 47 CFR §1.1310 ANSI / IEEE Std.C95.1-1992
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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(Sky Chou)



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1. Description of Equipment under Test (EUT)

Applicant	Phorus, Inc.
Applicant Address	16255 Ventura Boulevard, Encino, California, 91436, United States
Manufacturer	Fugang Electronic(Dongguan) Co., LTD
Manufacturer Address	Industry Street, Dong-Keng, Dong-Guan, Guang-Dong, China
Product Type	phorus wifi / Bluetooth Speaker
Trade Name	phorus
Model Number	PS5 SPEAKER
FCC ID	2AAWQ-PS5SPEAKER
Frequency Range	2412 - 2462 MHz IEEE 802.11b / IEEE 802.11g 2412 - 2462 MHz IEEE 802.11n (2.4GHz) 20MHz 2422 - 2452 MHz IEEE 802.11n (2.4GHz) 40MHz 5180 - 5825 MHz IEEE 802.11a 5180 - 5825 MHz IEEE 802.11n (5GHz) 20MHz 5190 - 5795 MHz IEEE 802.11n (5GHz) 40MHz 2402 - 2480 MHz Bluetooth
Transmit Power (conducted power)	IEEE 802.11b: 0.028 W / 14.40 dBm IEEE 802.11g: 0.024 W / 13.73 dBm IEEE 802.11n (2.4GHz) 20MHz: 0.018 W / 12.47 dBm IEEE 802.11n (2.4GHz) 40MHz: 0.015 W / 11.88 dBm IEEE 802.11a: 0.024 W / 13.79 dBm IEEE 802.11n (5GHz) 20MHz: 0.016 W / 12.16 dBm IEEE 802.11n (5GHz) 40MHz: 0.014 W / 11.47 dBm Bluetooth: 0.002 W / 3.25 dBm



Antenna Specification	Antenna Port	Model Number	Type	Band	Max. Gain
	ANT 0	MSA-3510-25GC4-A1	PIFA	IEEE 802.11b / IEEE 802.11g IEEE 802.11n (2.4GHz) 20MHz / 40MHz	3.37 dBi
				IEEE 802.11a IEEE 802.11n (5GHz) 20MHz / 40MHz U-NII Band I/II-A/II-C	5.38 dBi
				IEEE 802.11a IEEE 802.11n (5GHz) 20MHz / 40MHz U-NII Band III	5.36 dBi
	ANT 1	MSA-3310-25GC4-A1	PIFA	IEEE 802.11b / IEEE 802.11g IEEE 802.11n (2.4GHz) 20MHz / 40MHz	2.78 dBi
				IEEE 802.11a IEEE 802.11n (5GHz) 20MHz / 40MHz U-NII Band I/II-A/II-C	4.07 dBi
				IEEE 802.11a IEEE 802.11n (5GHz) 20MHz / 40MHz U-NII Band III	3.69 dBi
	---	S11	Printing	Bluetooth v2.1	2.52 dBi
RF Evaluation	0.17 W/m 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

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)	
				ANT 0	ANT 1
IEEE 802.11b	1M	1	2412.0	14.40	14.30
		6	2437.0	13.71	13.61
		11	2462.0	13.75	13.65
	2M	6	2437.0	13.66	13.57
	5.5M	6	2437.0	13.62	13.55
	11M	6	2437.0	13.59	13.53
IEEE 802.11g	6M	1	2412.0	13.06	12.93
		6	2437.0	13.73	13.60
		11	2462.0	13.37	13.24
	9M	6	2437.0	13.69	13.56
	12M	6	2437.0	13.63	13.50
	18M	6	2437.0	13.57	13.44
	24M	6	2437.0	13.51	13.38
	36M	6	2437.0	13.43	13.30
	48M	6	2437.0	13.35	13.22
	54M	6	2437.0	13.31	13.18
IEEE 802.11n (2.4GHz) 20MHz	6.5M	1	2412.0	12.47	12.33
		6	2437.0	12.19	12.05
		11	2462.0	12.42	12.28
	13M	6	2437.0	12.15	12.01
	19.5M	6	2437.0	12.07	11.93
	26M	6	2437.0	11.99	11.85
	39M	6	2437.0	11.93	11.79
	52M	6	2437.0	11.87	11.73
	58.5M	6	2437.0	11.81	11.67
	65M	6	2437.0	11.77	11.63
IEEE 802.11n (2.4GHz) 40MHz	13.5M	3	2422.0	11.88	11.72
		6	2437.0	11.68	11.52
		9	2452.0	11.20	11.04
	27M	6	2437.0	11.64	11.48
	40.5M	6	2437.0	11.56	11.40
	54M	6	2437.0	11.50	11.34
	81M	6	2437.0	11.42	11.26
	108M	6	2437.0	11.34	11.18
	121.5M	6	2437.0	11.28	11.12
	135M	6	2437.0	11.24	11.08

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)	
				ANT 0	ANT 1
IEEE 802.11a	6M	36	5180.0	13.35	13.20
		40	5200.0	13.79	13.64
		44	5220.0	13.20	13.05
		48	5240.0	13.34	13.19
		52	5260.0	13.60	13.46
		56	5280.0	13.52	13.38
		60	5300.0	13.08	12.94
		64	5320.0	12.25	12.11
		100	5500.0	12.10	12.02
		104	5520.0	12.05	11.97
		108	5540.0	12.14	12.06
		112	5560.0	12.09	12.01
		116	5580.0	12.04	11.96
		120	5600.0	11.84	11.76
		124	5620.0	11.83	11.75
		128	5640.0	11.81	11.73
		132	5660.0	11.85	11.77
		136	5680.0	11.78	11.70
		140	5700.0	12.22	12.14
		149	5745.0	11.81	11.67
		153	5765.0	12.00	11.86
		157	5785.0	12.49	12.35
		161	5805.0	11.76	11.62
		165	5825.0	11.66	11.52

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)	
				ANT 0	ANT 1
IEEE 802.11a	54M	36	5180.0	13.23	13.09
		40	5200.0	13.67	13.53
		44	5220.0	13.08	12.94
		48	5240.0	13.22	13.08
		52	5260.0	13.49	13.35
		56	5280.0	13.41	13.27
		60	5300.0	12.97	12.83
		64	5320.0	12.14	12.00
		100	5500.0	11.97	11.91
		104	5520.0	11.92	11.86
		108	5540.0	12.01	11.95
		112	5560.0	12.01	11.90
		116	5580.0	11.96	11.85
		120	5600.0	11.76	11.65
		124	5620.0	11.75	11.64
		128	5640.0	11.73	11.62
		132	5660.0	11.77	11.66
		136	5680.0	11.70	11.59
		140	5700.0	12.09	12.03
		149	5745.0	11.70	11.54
		153	5765.0	11.89	11.73
		157	5785.0	12.38	12.22
		161	5805.0	11.65	11.59
		165	5825.0	11.55	11.51

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)	
				ANT 0	ANT 1
IEEE 802.11a (5GHz) 20MHz	6.5M	36	5180.0	11.68	11.61
		40	5200.0	12.16	12.09
		44	5220.0	12.01	11.94
		48	5240.0	11.89	11.82
		52	5260.0	11.82	11.72
		56	5280.0	11.74	11.64
		60	5300.0	10.58	10.48
		64	5320.0	10.23	10.13
		100	5500.0	10.22	10.13
		104	5520.0	10.13	10.04
		108	5540.0	10.18	10.09
		112	5560.0	10.08	9.99
		116	5580.0	9.76	9.67
		120	5600.0	10.18	10.09
		124	5620.0	10.09	10.00
		128	5640.0	10.12	10.03
		132	5660.0	9.99	9.90
		136	5680.0	9.72	9.63
		140	5700.0	9.61	9.56
		149	5745.0	9.67	9.61
		153	5765.0	9.88	9.82
		157	5785.0	9.92	9.86
		161	5805.0	10.11	10.05
		165	5825.0	10.35	10.29

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)	
				ANT 0	ANT 1
IEEE 802.11a (5GHz) 20MHz	65M	36	5180.0	11.58	11.51
		40	5200.0	12.06	11.99
		44	5220.0	11.91	11.84
		48	5240.0	11.79	11.72
		52	5260.0	11.69	11.59
		56	5280.0	11.61	11.51
		60	5300.0	10.45	10.35
		64	5320.0	10.10	10.00
		100	5500.0	10.10	10.07
		104	5520.0	10.01	9.98
		108	5540.0	10.06	10.03
		112	5560.0	9.96	9.93
		116	5580.0	9.64	9.61
		120	5600.0	10.06	10.03
		124	5620.0	9.97	9.94
		128	5640.0	10.00	9.97
		132	5660.0	9.87	9.84
		136	5680.0	9.60	9.57
		140	5700.0	9.59	9.52
		149	5745.0	9.57	9.55
		153	5765.0	9.78	9.76
		157	5785.0	9.82	9.80
		161	5805.0	10.01	9.99
		165	5825.0	10.25	10.23

Band	Data Rate	CH	Frequency (MHz)	Average Conducted power (dBm)	
				ANT 0	ANT 1
IEEE 802.11a (5GHz) 40MHz	13.5M	38	5190.0	11.10	10.99
		46	5230.0	11.47	11.36
		54	5270.0	11.39	11.26
		62	5310.0	10.13	10.00
		102	5510.0	11.11	10.98
		110	5550.0	11.41	11.28
		118	5590.0	10.87	10.74
		126	5630.0	11.05	10.92
		134	5670.0	10.84	10.71
		151	5755.0	10.14	10.01
		159	5795.0	10.35	10.22
	135M	38	5190.0	10.99	10.91
		46	5230.0	11.36	11.28
		54	5270.0	11.26	11.15
		62	5310.0	10.00	9.89
		102	5510.0	11.00	10.89
		110	5550.0	11.30	11.19
		118	5590.0	10.76	10.65
		126	5630.0	10.94	10.83
		134	5670.0	10.73	10.62
		151	5755.0	10.02	9.93
		159	5795.0	10.23	10.14

Band	CH	Frequency (MHz)	Packet Type	Average Conducted power (dBm)
Bluetooth GFSK	0	2402	DH1	-1.45
			DH3	1.76
			DH5	2.46
	39	2441	DH1	-1.06
			DH3	2.17
			DH5	2.81
	78	2480	DH1	-0.98
			DH3	2.22
			DH5	2.86
Bluetooth $\pi/4$ -DQPSK	0	2402	DH1	0.08
			DH3	2.70
			DH5	3.24
	39	2441	DH1	-0.16
			DH3	2.48
			DH5	3.05
	78	2480	DH1	-0.96
			DH3	1.64
			DH5	2.20
Bluetooth 8DPSK	0	2402	DH1	0.09
			DH3	2.71
			DH5	3.25
	39	2441	DH1	-0.15
			DH3	2.49
			DH5	3.06
	78	2480	DH1	-0.95
			DH3	1.66
			DH5	2.23

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] (dBi)	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw)/cm ²
IEEE 802.11b	1M	2412	1.000	20	14.5	3.37	2.17	1	61.16	0.012
		2437	1.000	20	14.5	3.37	2.17	1	61.16	0.012
		2462	1.000	20	14.5	3.37	2.17	1	61.16	0.012
IEEE 802.11a	6M	5180	1.000	20	14.0	5.38	3.45	1	86.66	0.017
		5200	1.000	20	14.0	5.38	3.45	1	86.66	0.017
		5220	1.000	20	14.0	5.38	3.45	1	86.66	0.017
		5240	1.000	20	14.0	5.38	3.45	1	86.66	0.017
		5260	1.000	20	14.0	5.38	3.45	1	86.66	0.017
		5280	1.000	20	14.0	5.38	3.45	1	86.66	0.017
		5300	1.000	20	14.0	5.38	3.45	1	86.66	0.017
		5320	1.000	20	14.0	5.38	3.45	1	86.66	0.017
		5500	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5520	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5540	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5560	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5580	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5600	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5620	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5640	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5660	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5680	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5700	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5745	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5765	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5785	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5805	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5825	1.000	20	12.5	5.36	3.44	1	61.17	0.012
Bluetooth	---	2402	1.000	20	3.5	2.52	1.79	1	4.01	0.001
		2441	1.000	20	3.5	2.52	1.79	1	4.01	0.001
		2480	1.000	20	3.5	2.52	1.79	1	4.01	0.001

Note 1. The MPE results are evaluated by max power for wlan.

2. The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.