A Test Lab Techno Corp.

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MPE Report

Test Report No.	：	1305FS16-01
Applicant	：	Phorus, Inc.
Manufacturer	：	Wistron InfoComm (Zhongshan) Corporation Linhai Branch
Product Type	：	Play-Fi Player
Trade Name	：	Phorus
Model Number	：	PS2 Speaker
Dates of Receive	：	Apr. 18, 2013
Dates of Test	：	Apr. 29, 2013
Issued Date	：	Oct. 03, 2013
Test Specification	：	47 CFR § 2.1091
		47 CFR §1.1310
		ANSI / IEEE Std.C95.1-1992
		H46-2/99-237E
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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Approved By ： Bill Hu (Bill Hu)

Tested By ： Sky Chou (Sky Chou)

Contents

1. Description of Equipment under Test (EUT)

Applicant	Phorus, Inc.				
Applicant Address	16255 Ventura Boulevard, Suite 310,Encino ,United States,91436				
Manufacturer	Wistron InfoComm (Zhongshan) Corporation Linhai Branch				
Manufacturer Address	Xiyiwei, Ma'an Cun, Zhongshan Torch Development Zone, Zhongshan City, Guangdong, China				
Product Type	Play-Fi Player				
Trade Name	Phorus				
Model Number	PS2 Speaker				
FCC ID	2AAWQ-PS2SPEAKER				
IC	11138A-PS2SPEAKER				
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 - 5700 MHz IEEE 802.11a 5180 - 5700 MHz IEEE 802.11n (5GHz) 20MHz 5190 - 5670 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: 0.00226 W / 3.54 dBm				
Antenna Used	Item	Antenna	Type	Band	Max. Gain
	1	Main ANT (ANTL)	PIFA	IEEE 802.11b / 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/III	4.07 dBi
				IEEE 802.11a IEEE 802.11n (5GHz) 20MHz / 40MHz U-NII Band IV	3.69 dBi
	2	Aux ANT (ANTR)	PIFA	IEEE 802.11b / 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/III	5.38 dBi
				IEEE 802.11a IEEE 802.11n (5GHz) 20MHz / 40MHz U-NII Band IV	5.36 dBi
	3	Bluetooth ANT	Printing	Bluetooth	2.52 dBi
Temperature Range	-30 ~ +70°C				

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
Equation from page 18 of OET Bulletin 65, Edition 97-01 $$S = \frac{PG}{4\pi R^2}$$ 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	Date Rate	CH	Frequency (MHz)	Time-Avg. Conducted power (dBm)	
				Main	AUX
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	Date Rate	CH	Frequency (MHz)	Time-Avg. Conducted power (dBm)	
				Main	AUX
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
	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

Band	Date Rate	CH	Frequency (MHz)	Time-Avg. Conducted power (dBm)	
				Main	AUX
IEEE 802.11n (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
	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

Band	Date Rate	CH	Frequency (MHz)	Time-Avg. Conducted power (dBm)	
				Main	AUX
IEEE 802.11n (5GHz) 40MHz	6.5M	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
	65M	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

Band	Packet Type	CH	Frequency (MHz)	Time-Avg. Conducted power (dBm)
Bluetooth v3.0 (GFSK)	DH1	0	2402	-1.11
	DH3			2.12
	DH5			2.77
	DH1	39	2441	-0.84
	DH3			2.40
	DH5			3.03
	DH1	78	2480	-0.55
	DH3			2.62
	DH5			3.29
Bluetooth v3.0 (π/4-DQPSK)	DH1	0	2402	0.26
	DH3			2.92
	DH5			3.46
	DH1	39	2441	0.18
	DH3			2.83
	DH5			3.40
	DH1	78	2480	-0.26
	DH3			2.36
	DH5			2.83
Bluetooth v3.0 (8DPSK)	DH1	0	2402	0.27
	DH3			2.98
	DH5			3.49
	DH1	39	2441	0.21
	DH3			2.86
	DH5			3.54
	DH1	78	2480	-0.22
	DH3			2.39
	DH5			2.88

4. Test Result

Band	Data Rate	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max0 tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P]+ [G] with Duty cycle [TP] (W)	Power Density [S] (mw/cm^2)
IEEE 802.11b	11M	2412.0	1.000	20	16.5	3.37	2.17	1	96.93	0.019
		2437.0	1.000	20	16.5	3.37	2.17	1	96.93	0.019
		2462.0	1.000	20	16.5	3.37	2.17	1	96.93	0.019
IEEE 802.11g	54M	2412.0	1.000	20	15.5	3.37	2.17	1	76.99	0.015
		2437.0	1.000	20	15.5	3.37	2.17	1	76.99	0.015
		2462.0	1.000	20	15.5	3.37	2.17	1	76.99	0.015
IEEE 802.11n (2.4GHz) 20MHz	65M	2412.0	1.000	20	14.5	3.37	2.17	1	61.16	0.012
		2437.0	1.000	20	14.5	3.37	2.17	1	61.16	0.012
		2462.0	1.000	20	14.5	3.37	2.17	1	61.16	0.012
IEEE 802.11n (2.4GHz) 40MHz	135M	2422.0	1.000	20	13.5	3.37	2.17	1	48.58	0.010
		2437.0	1.000	20	13.5	3.37	2.17	1	48.58	0.010
		2452.0	1.000	20	13.5	3.37	2.17	1	48.58	0.010
IEEE 802.11a	54M	5180.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5200.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5220.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5240.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5260.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5280.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5300.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5320.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5500.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5520.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5540.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5560.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5580.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5600.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5620.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5640.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5660.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5680.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5700.0	1.000	20	14.5	5.38	3.45	1	97.23	0.019
		5745.0	1.000	20	14.5	5.36	3.44	1	96.95	0.019
		5765.0	1.000	20	14.5	5.36	3.44	1	96.95	0.019
		5785.0	1.000	20	14.5	5.36	3.44	1	96.95	0.019
		5805.0	1.000	20	14.5	5.36	3.44	1	96.95	0.019
		5825.0	1.000	20	14.5	5.36	3.44	1	96.95	0.019

Note: The evaluation results are according to A or B of antenna combination and used worst case gain to evaluated.

Band	Data Rate	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max0 tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P]+ [G] with Duty cycle [TP] (W)	Power Density [S] (mw)/cm^2
IEEE 802.11n (5GHz) 20MHz	65M	5180.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5200.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5220.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5240.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5260.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5280.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5300.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5320.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5500.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5520.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5540.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5560.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5580.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5600.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5620.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5640.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5660.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5680.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5700.0	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5745.0	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5765.0	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5785.0	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5805.0	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5825.0	1.000	20	12.5	5.36	3.44	1	61.17	0.012
IEEE 802.11n (5GHz) 40MHz	135M	5190	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5230	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5270	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5310	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5510	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5550	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5590	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5630	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5670	1.000	20	12.5	5.38	3.45	1	61.35	0.012
		5755	1.000	20	12.5	5.36	3.44	1	61.17	0.012
		5795	1.000	20	12.5	5.36	3.44	1	61.17	0.012
Bluetooth	---	2402.0	1.000	20	4	2.52	1.79	1	4.5	0.001
		2441.0	1.000	20	4	2.52	1.79	1	4.5	0.001
		2480.0	1.000	20	4	2.52	1.79	1	4.5	0.001

Note: The evaluation results are according to A or B of antenna combination and used worst case gain to evaluated.

Maximum sum of power density and simultaneous transmission MPE test exclusion as below:

Wi-Fi			Bluetooth			∑ Power Density(mw)/cm^2	Event
Band	Data Rate	Power Density (mw)/cm^2 [S]	Band	Data Rate	Power Density (mw)/cm^2 [S]		
IEEE 802.11b	11M	0.019	Bluetooth	3M	0.001	0.02	≤ 1.0
IEEE 802.11a	54M	0.019	Bluetooth	3M	0.001	0.02	≤ 1.0

Note 1: The simultaneous transmission evaluation results are according to worst power density with each Wi-Fi / Bluetooth.

Note 2: The Maximum sum of power density is ≤ 1.0 complies required for KDB 447498 D01, the simultaneous transmission MPE test can be exempted.

Transmitter and antenna implementation as below:

Band	WLAN	Bluetooth
WLAN	V	X
Bluetooth	X	V

Simultaneous transmission configurations as below:

Condition(s)	Band	
	WLAN	Bluetooth
1	V	V