MPE Report

Applicant	:	InnoComm Mobile Technology Corporation
Product Type	:	Wireless Audio Module
Trade Name	:	InnoComm
Model Number	:	WB15
Applicable Standard	:	IEEE Std.C95.1
		47 CFR § 2.1091 / 47 CFR § 1.1310
Received Date	:	Jul. 08, 2020
Test Period	:	Jul. 27 ~ Jul. 28, 2020
Issue Date	:	Nov. 05, 2020

Issued by

Approved By : Kris Pan

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Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW0010

Note:

1.The test results are valid only for samples provided by customers and under the test conditions described in this report.
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3.The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.

Revision History

Rev.	Issued Date	Revisions	Revised By
00	Oct. 27, 2020	Initial Issue	Nicole Chu
01	Nov. 05, 2020	P06 Revised Antenna Information	Nicole Chu

Contents

1. Reference Applicable Standard

Standard	Description	Version
ANSI/IEEE C95.1	American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 KHz to 100 GHz, New York.	1992
47 CFR Part §2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	-
47 CFR Part §1.1310	Radiofrequency radiation exposure limits.	-

2. Description of Equipment under Test (EUT)

Applicant	InnoComm Mobile Technology Corporation 3F, No. 6, Hsin Ann Rd., Hsinchu Science Park, Hsinchu, Taiwan, R.O.C.	
Manufacturer	InnoComm Mobile Technology Corporation 3F, No. 6, Hsin Ann Rd., Hsinchu Science Park, Hsinchu, Taiwan, R.O.C.	
Product Type	Wireless Audio Module	
Trade Name	InnoComm	
Model Number	WB15	
FCC ID	YAIWB15	
Difference description of Hardware Version	Mozart_R004 version difference than Mozart_R003 is fine-tunes the DDR trace spacing according to the vendor's recommendations to improve its performance. The appearance and all components are same.	
Frequency Range	Operate Band	Frequency Range (MHz)
	IEEE 802.11b / 802.11g / 802.11n 2.4 GHz 20 MHz	2412 - 2462
	IEEE 802.11a U-NII Band I	5180 - 5240
	IEEE 802.11a U-NII Band II-A	5260 - 5320
	IEEE 802.11a U-NII Band II-C	5500 - 5700
	IEEE 802.11a U-NII Band III	5745 - 5825
	IEEE 802.11n 5 GHz 20 MHz U-NII Band I	5180 - 5240
	IEEE 802.11n 5 GHz 20 MHz U-NII Band II-A	5260 - 5320
	IEEE 802.11n 5 GHz 20 MHz U-NII Band II-C	5500 - 5700
	IEEE 802.11n 5 GHz 20 MHz U-NII Band III	5745 - 5825
	IEEE 802.11n 5 GHz 40 MHz U-NII Band I	5190 - 5230
	IEEE 802.11n 5 GHz 40 MHz U-NII Band II-A	5270 - 5310
	IEEE 802.11n 5 GHz 40 MHz U-NII Band II-C	5510 - 5670
	IEEE 802.11n 5 GHz 40 MHz U-NII Band III	5755 - 5795
	IEEE 802.11ac 80 MHz U-NII Band I	5210
	IEEE 802.11ac 80 MHz U-NII Band II-A	5290
	IEEE 802.11ac 80 MHz U-NII Band II-C	5530 - 5610
	IEEE 802.11ac 80 MHz U-NII Band III	5775
	Bluetooth BR/EDR	2402 - 2480
	Bluetooth LE	2402 - 2480

Antenna Information	Antenna	Model	Type	Max. Gain (dBi)	
	ANT-0	N14-0808-R0A	PCB Antenna	2402 - 2480	2.09
	ANT-1	WA-F-LA-01-015	FPCB Antenna	2402 - 2480	2.17
	ANT-0	N12-5776-R0A	PCB Antenna	2412 - 2462	5.42
				5180 - 5850	5.48
	ANT-1	N12-5777-R0A	PCB Antenna	2412 - 2462	5.28
				5180 - 5850	6.39
	ANT-2	WA-F-LB-03-110	FPCB Antenna	2412 - 2462	2.91
				5180 - 5850	2.79
	ANT-3	WA-F-LB-02-187	FPCB Antenna	2412 - 2462	2.22
				5180 - 5850	3.23
	ANT-4	N12-7231-R0A	PCB Antenna	2412 - 2462	1.81
				5180 - 5850	3.40
	G_{ANT}			2412 - 2462	5.42
	Directional			2412 - 2462	8.43
	G_{ANT}			5150 - 5250	6.39
	Directional				9.40
	G_{ANT}			5250 - 5350	6.39
	Directional				9.40
	G_{ANT}			5470 - 5725	6.39
	Directional				9.40
	G_{ANT}			5725 - 5850	6.39
	Directional				9.40
Antenna Delivery	IEEE 802.11b: 1TX / 1RX (Diversity) IEEE 802.11g : 2TX / 2RX (CDD) IEEE 802.11n 2.4 GHz 20 MHz: 2TX / 2RX (MIMO) IEEE 802.11a: 2TX / 2RX (CDD) IEEE 802.11ac 20 MHz / 40 MHz / 80 MHz: 2TX / 2RX (MIMO)				
RF Evaluation	0.224 mW/cm^2				
Operate Temp. Range	0 ~ +55°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.

3. 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
$$S_{eirp} = \frac{EIRP}{4\pi d^2} = \frac{PG}{4\pi d^2}\left(W/m^2\right)$$
Where S: is the input power (W); G: is the antenna gain; d : is the distance between antennas and evaluation point (m).

4. Power Density Limit – RF Exposure Evaluation

Thv In 47 CFR § 1.1310, use of the device as based upon the user's awareness and ability to exercise control over human exposure. The two categories defined are Occupational / Controlled Exposure and General Population / Uncontrolled. These two categories are defined as follow:

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/cm^2)	Averaging Time$\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824 / f	2.19 / f	($180 / f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	F / 1,500	30
1,500-100,000	-	-	1.0	30
Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time$\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / f	4.89 / f	($900 / f^2$)*	6
30-300	61.4	0.163	1.0	6
300-1,500	-	-	F / 300	6
1,500-100,000	-	-	5	6

4.1 *Conducted Power*

【2.4 GHz】

Band	Date Rate or Sub-test	CH	Frequency (MHz)	Average Conducted power (dBm)		
				ANT-0	ANT-1	All ANT
802.11b	1M	1	2412.0	16.51	17.63	---
		6	2437.0	18.61	21.19	---
		11	2462.0	17.30	18.99	---
802.11g	6M	1	2412.0	10.47	10.39	13.44
		6	2437.0	16.32	17.29	19.84
		11	2462.0	10.31	10.74	13.54
802.11n_HT20	13M	1	2412.0	7.92	7.52	10.73
		6	2437.0	16.24	17.06	19.68
		11	2462.0	9.25	9.01	12.14

【5 GHz】

Band	Date Rate or Sub-test	CH	Frequency (MHz)	Average Conducted power (dBm)		
				ANT-0	ANT-1	All ANT
802.11a	6M	36	5180.0	6.21	10.08	11.57
		40	5200.0	6.16	9.93	11.45
		44	5220.0	6.09	9.88	11.40
		48	5240.0	6.48	10.32	11.82
		52	5260.0	14.17	17.71	19.30
		56	5280.0	13.89	16.91	18.67
		60	5300.0	13.84	16.85	18.61
		64	5320.0	9.36	11.00	13.27
		100	5500.0	11.56	11.69	14.64
		104	5520.0	15.39	14.56	18.01
		108	5540.0	15.41	14.53	18.00
		112	5560.0	15.43	14.59	18.04
		116	5580.0	15.38	14.10	17.80
		120	5600.0	15.40	14.20	17.85
		124	5620.0	15.36	13.86	17.68
		128	5640.0	15.32	13.61	17.56
		132	5660.0	15.30	13.31	17.43
		136	5680.0	15.40	13.22	17.46
		140	5700.0	13.41	11.62	15.62
		149	5745.0	18.09	15.38	19.95
		153	5765.0	17.90	14.68	19.59
		157	5785.0	17.93	14.72	19.63
		161	5805.0	17.87	14.48	19.51
		165	5825.0	17.82	14.12	19.36

【5 GHz】

Band	Date Rate or Sub-test	CH	Frequency (MHz)	Average Conducted power (dBm)		
				ANT-0	ANT-1	All ANT
802.11ac_5G_VHT20	13M	36	5180.0	6.51	10.42	11.90
		40	5200.0	8.05	10.21	12.27
		44	5220.0	7.98	10.15	12.21
		48	5240.0	7.91	9.93	12.05
		52	5260.0	12.26	15.38	17.10
		56	5280.0	12.24	15.41	17.12
		60	5300.0	12.21	15.32	17.05
		64	5320.0	9.68	11.73	13.84
		100	5500.0	11.38	11.54	14.47
		104	5520.0	14.12	13.77	16.96
		108	5540.0	14.04	13.53	16.80
		112	5560.0	14.09	13.43	16.78
		116	5580.0	14.02	13.02	16.56
		120	5600.0	13.97	12.91	16.48
		124	5620.0	13.84	12.74	16.34
		128	5640.0	13.77	12.69	16.27
		132	5660.0	13.69	12.32	16.07
		136	5680.0	13.61	12.17	15.96
		140	5700.0	13.57	11.91	15.83
		149	5745.0	17.97	15.57	19.94
		153	5765.0	17.81	14.60	19.51
		157	5785.0	17.85	14.63	19.54
		161	5805.0	17.76	14.47	19.43
		165	5825.0	17.70	14.14	19.29
802.11ac_5G_VHT40	27M	38	5190.0	3.35	6.78	8.41
		46	5230.0	9.09	11.27	13.33
		54	5270.0	10.14	12.77	14.66
		62	5310.0	1.88	4.72	6.54
		102	5510.0	4.94	5.03	8.00
		110	5550.0	11.89	11.61	14.76
		118	5590.0	11.81	11.21	14.53
		126	5630.0	11.78	10.88	14.36
		134	5670.0	12.72	11.65	15.23
		151	5755.0	15.56	13.07	17.50
		159	5795.0	16.71	13.95	18.56
802.11ac_5G_VHT80	58.6M	42	5210.0	4.48	8.11	9.67
		58	5290.0	3.08	6.31	8.00
		106	5530.0	4.95	4.93	7.95
		122	5610.0	10.49	10.19	13.35
		155	5775.0	13.63	11.62	15.75

【Bluetooth】

Data Rate	Frequency(MHz)	Packet Type	Average Power (dBm)
1Mbps (GFSK)	2402	DH1	9.86
		DH3	9.87
		DH5	9.88
	2441	DH1	10.41
		DH3	10.42
		DH5	10.45
	2480	DH1	10.41
		DH3	10.42
		DH5	10.43
2Mbps (π/4-DQPSK)	2402	DH1	7.25
		DH3	7.27
		DH5	7.31
	2441	DH1	7.45
		DH3	7.50
		DH5	7.52
	2480	DH1	6.97
		DH3	7.01
		DH5	7.03
3Mbps (8DPSK)	2402	DH1	7.34
		DH3	7.38
		DH5	7.41
	2441	DH1	7.55
		DH3	7.58
		DH5	7.60
	2480	DH1	7.08
		DH3	7.10
		DH5	7.13
Bluetooth LE	2402.0	---	0.48
	2440.0	---	0.37
	2480.0	---	-0.40

5. Test Result

Antenna	Band	Frequency (MHz)	Limit (mW)/cm^2	Distance (cm) [R]	Tune-up Power (dBm) [P]	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	Power with Duty cycle (mW) [P]x[G]	Power Density (mW)/cm^2 [S]
Bluetooth Antenna	BR/EDR	2402-2480	10	20	11.00	2.17	1.65	1	20.77	0.004
	LE	2402-2480	10	20	1.00	2.17	1.65	1	2.08	0.000
Wi-Fi Antenna	2.4GHz	2412-2462	10	20	22.00	8.43	6.97	1	1104.67	0.220
	5GHz	5150-5250	10	20	14.00	9.40	8.71	1	218.79	0.044
		5250-5350	10	20	20.00	9.40	8.71	1	871.00	0.173
		5470-5725	10	20	19.00	9.40	8.71	1	691.86	0.138
		5725-5850	10	20	20.00	9.40	8.71	1	871.00	0.173

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 20 cm, even if calculations indicate MPE distance is less.
2. We used the maximum power and gain to provide MPE results.
3. The Numeric Gain calculated by 10^(ant. Gain(dBi) /10).
4. The MPE results are evaluated by lowest data rate for WLAN.

Simultaneous Transmitting：

Total MPE = 2.4GHz MPE + Bluetooth MPE = 0.220 + 0.004 = 0.224 (mW)/cm^2 < 1 (mW)/cm^2

---END---