FCC RF Exposure Report

FCC ID	:	**UIDTR4400**
Equipment	:	**802.11ac Wireless Router**
Model No.	:	**TR4400-AC, RAC2V1A** **(Two models are for marketing difference)**
Brand Name	:	**ARRIS**
Applicant	:	**ARRIS Group, Inc.**
Address	:	**3871 LAKEFIELD DRIVE SUITE 300 SUWANEE GA USA**
Standard	:	**47 CFR FCC Part 2.1091**
Received Date	:	**Feb. 10, 2017**
Tested Date	:	**Feb. 14 ~ Aug. 22, 2017**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory
2732

Table of Contents

Release Record

Report No.	Version	Description	Issued Date
FA721001-01	Rev. 01	Initial issue	Sep. 01, 2017
FA721001-01	Rev. 02	Applicant changed	Sep. 08, 2017

1 MPE EVALUATION OF MOBILE DEVICES

Human exposure to RF emissions from mobile devices (47 CFR §2.1091) may be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and/or power density, as appropriate, since exposures are assumed to occur at distances of 25 cm or more from persons.

1.1 LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

Frequency Range (MHz)	Power Density (mW /cm^2)	Averaging Time (minutes)
300~1500	F/1500	30
1500~100000	1.0	30

1.2 MPE EVALUATION FORMULA

$$\mathbf{Pd} = \frac{Pt}{4 * Pi * R^2}$$

Where

Pd= Power density in mW/cm^2
Pt= EIRP in mW
Pi= 3.1416
R= Measurement distance

1.3 MPE EVALUATION RESULTS

MPE Evaluation of Single Transmission

Frequency Range (MHz)	Maximum Conducted Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
Non-beamforming mode					
2412~2462[Note]	29.54	3.4	25	0.251	1
5180~5240[Note]	28.81	3.9	25	0.238	1
5745~5825[Note]	29.62	3.9	25	0.286	1
5260~5320	23.61	3.9	25	0.072	1
5500~5720	23.80	3.9	25	0.075	1
Beamforming mode					
2412~2462[Note]	27.88	7.75	25	0.465	1
5180~5240[Note]	26.89	8.94	25	0.487	1
5745~5825[Note]	26.95	8.94	25	0.494	1
5260~5320	20.42	8.94	25	0.110	1
5500~5720	20.69	8.94	25	0.117	1

Note:

1. These 3 frequency bands are certified for original grant.
2. For 2412~2462 MHz band
   Directional gain = $10 * \log((10^{2.4/20}+10^{3.1/20}+10^{3.4/20})^2/3) = 7.75$ dBi
   For 5180~5320 MHz band / 5500~5720 MHz band
   Directional gain = $10 * \log((10^{2.8/20}+10^{2.5/20}+10^{2.4/20}+10^{3.9/20})^2/4) = 8.94$ dBi
   For 5745~5825 MHz band
   Directional gain = $10 * \log((10^{2.8/20}+10^{2.5/20}+10^{2.4/20}+10^{3.9/20})^2/4) = 8.94$ dBi

80 +80 MHz

Non-beamforming mode

Mode	Frequency Range (MHz)	Maximum Conducted Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Total Power Density (mW/cm^2)	Limit (mW/cm^2)
1	5210	20.07	2.8	25	0.025	0.058	1
	5290	20.34	3.9	25	0.034		1
2	5210	20.08	2.8	25	0.025	0.059	1
	5530	20.36	3.9	25	0.034		1
3	5210	20.12	2.8	25	0.025	0.059	1
	5690	20.32	3.9	25	0.034		1
4	5210	20.07	2.8	25	0.025	0.056	1
	5775	19.96	3.9	25	0.031		1
5	5290	21.96	2.8	25	0.038	0.092	1
	5530	22.38	3.9	25	0.054		1
6	5290	22.08	2.8	25	0.039	0.093	1
	5690	22.34	3.9	25	0.054		1
7	5290	21.98	2.8	25	0.038	0.089	1
	5775	22.14	3.9	25	0.051		1
8	5530	20.7	2.8	25	0.029	0.067	1
	5690	20.88	3.9	25	0.038		1
9	5530	20.83	2.8	25	0.029	0.064	1
	5775	20.5	3.9	25	0.035		1
10	5690	23.8	2.8	25	0.058	0.127	1
	5775	23.41	3.9	25	0.069		1

Note: 80+80MHz operates as 2TX+2TX mode since antenna gain is highest gain of antenna 1 / 2 and antenna 3 / 4

80 +80 MHz

Beamforming mode

Mode	Frequency Range (MHz)	Maximum Conducted Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Total Power Density (mW/cm^2)	Limit (mW/cm^2)
1	5210	19.69	5.66	25	0.044	0.099	1
	5290	20.18	6.19	25	0.055		1
2	5210	20.06	5.66	25	0.048	0.103	1
	5530	20.2	6.19	25	0.055		1
3	5210	20.11	5.66	25	0.048	0.095	1
	5690	19.49	6.19	25	0.047		1
4	5210	20.03	5.66	25	0.047	0.099	1
	5775	19.93	6.19	25	0.052		1
5	5290	21.45	5.66	25	0.065	0.143	1
	5530	21.66	6.19	25	0.078		1
6	5290	21.71	5.66	25	0.069	0.133	1
	5690	20.8	6.19	25	0.064		1
7	5290	21.54	5.66	25	0.067	0.148	1
	5775	21.82	6.19	25	0.081		1
8	5530	20.19	5.66	25	0.049	0.095	1
	5690	19.42	6.19	25	0.046		1
9	5530	20.16	5.66	25	0.049	0.104	1
	5775	20.2	6.19	25	0.055		1
10	5690	20.75	5.66	25	0.056	0.134	1
	5775	21.7	6.19	25	0.078		1

Note:

1. 80+80MHz operates as 2TX+2TX mode thus antenna gain is directional gain of antenna 1 / 2 and antenna 3 / 4
2. Directional gain of antenna 1 and 2 = $10 * \log((10^{2.8/20}+10^{2.5/20})^2/2) = 5.66$ dBi
   Directional gain of antenna 3 and 4 = $10 * \log((10^{2.4/20}+10^{3.9/20})^2/2) = 6.19$ dBi

MPE Evaluation of Simultaneous Transmission

2.4 and 5GHz can transmit at the same time, MPE evaluation is as below formula

PD1 / Limit1 + PD2 / Limit 2 + ….. < 1, PD = Power density

Non-beamforming mode

MPE Evaluation = Maximum MPE of 2.4GHz + Maximum MPE of 5 GHz = 0.251 / 1 + 0.286 / 1 = 0.537 < 1

Beamforming mode

MPE Evaluation = Maximum MPE of 2.4GHz + Maximum MPE of 5 GHz = 0.465 / 1 + 0.494 / 1 = 0.959 < 1

Conclusion

MPE evaluations of single and simultaneous transmission meet the requirement of standard.

2 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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