

FCC Co-Location Test Report

FCC ID : UIDSBR-AC1200P
Equipment : AC1200 Wi-Fi Router with RipCurrent™ Technology
Model No. : SBR-AC1200P
Brand Name : ARRIS
Applicant : ARRIS Group, Inc.
Address : 3871 Lakefield Drive, Suite 300, Suwanee, Georgia 30024, United States
Standard : 47 CFR FCC Part 15.247
47 CFR FCC Part 15.407
Received Date : Sep. 22, 2015
Tested Date : Oct. 12 ~ Oct. 20, 2015

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.

Approved & Reviewed by:



Gary Chang / Manager



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Release Record

Report No.	Version	Description	Issued Date
FR592203CO	Rev. 01	Initial issue	Nov. 20, 2015

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 45.52MHz 38.99 (Margin -1.01dB) - QP	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

Operating Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz 802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5745 ~ 5825 MHz
Modulation Type	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n/ac: OFDM (BPSK / QPSK / 16QAM / 64QAM/256QAM)

1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Operating Frequency (MHz) / Gain (dBi)		
				2400~2483.5	5150~5250	5725~5850
1	617210JN	Dipole	I-pex	1.83	--	--
2	617210JM	Dipole	I-pex	2.02	--	--
3	617210JP	PIFA	I-pex	--	2.87	3.60
4	617210K2	PIFA	I-pex	--	3.23	3.82

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	100-240Vac, 50-60Hz, 1.0A Power line: 1.5m non-shielded without core
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1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	RJ45 cable	1m non-shielded without core

1.2 The Equipment List

Test Item	Radiated Emission below 1GHz test				
Test Site	966 chamber 2 / (03CH02-WS)				
Tested Date	Oct. 20, 2015				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Jan. 15, 2015	Jan. 14, 2016
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-524	Oct. 05, 2015	Oct. 04, 2016
Preamplifier	Burgeon	BPA-530	100218	Nov. 10, 2014	Nov. 09, 2015
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 16, 2014	Dec. 15, 2015
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-004	Dec. 16, 2014	Dec. 15, 2015
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission above 1GHz test				
Test Site	966 chamber 2 / (03CH02-WS)				
Tested Date	Oct. 12, 2015				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101499	Dec. 31, 2014	Dec. 30, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Oct. 14, 2014	Oct. 13, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 10, 2014	Nov. 09, 2015
Preamplifier	Agilent	83017A	MY39501309	Sep. 22, 2015	Sep. 21, 2016
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	Dec. 16, 2014	Dec. 15, 2015
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 16, 2014	Dec. 15, 2015
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 16, 2014	Dec. 15, 2015
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.3 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

47 CFR FCC Part 15.407

ANSI C63.10-2013

FCC KDB 558074 D01 DTS Meas Guidance v03r03

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01

FCC KDB 644545 D03 Guidance for IEEE 802.11ac New Rules v01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Measurement Uncertainty	
Parameters	Uncertainty
Radiated emission $\leq$ 1GHz	± 3.62 dB
Radiated emission $>$ 1GHz	± 5.60 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH02-WS	22-23°C / 63-66%	Anderson Hung Aska Huang

➤ FCC site registration No.: 657002

➤ IC site registration No.: 10807A-2

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Channel	Data Rate
Radiated Emissions	2.4G 11n HT20 + 5G 11ac VHT40	CH6 + CH46	MCS 0 + MCS 0
NOTE: The selected channel is the maximum power channel of each Wi-Fi portion			

3 Transmitter Test Results

3.1 Unwanted Emissions into Restricted Frequency Bands

3.1.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9~90 kHz, 110~490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.1.2 Test Procedures

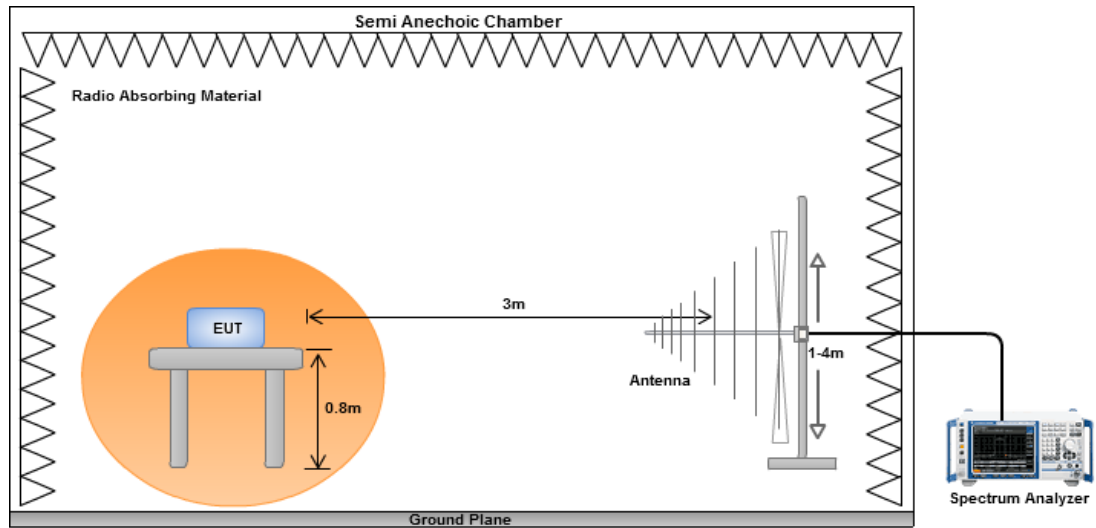
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

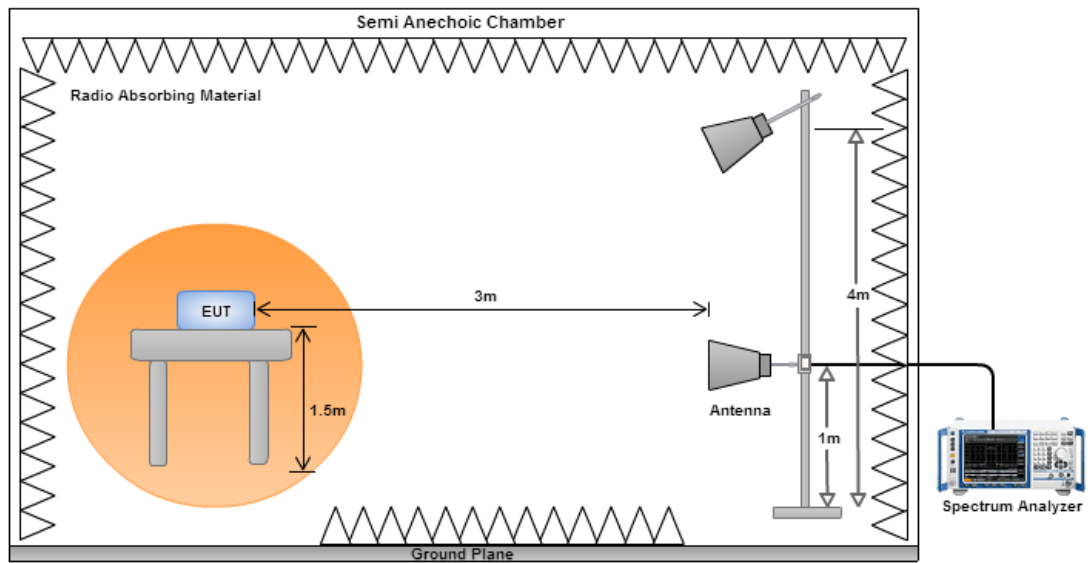
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.1.3 Test Setup

Radiated Emissions below 1 GHz

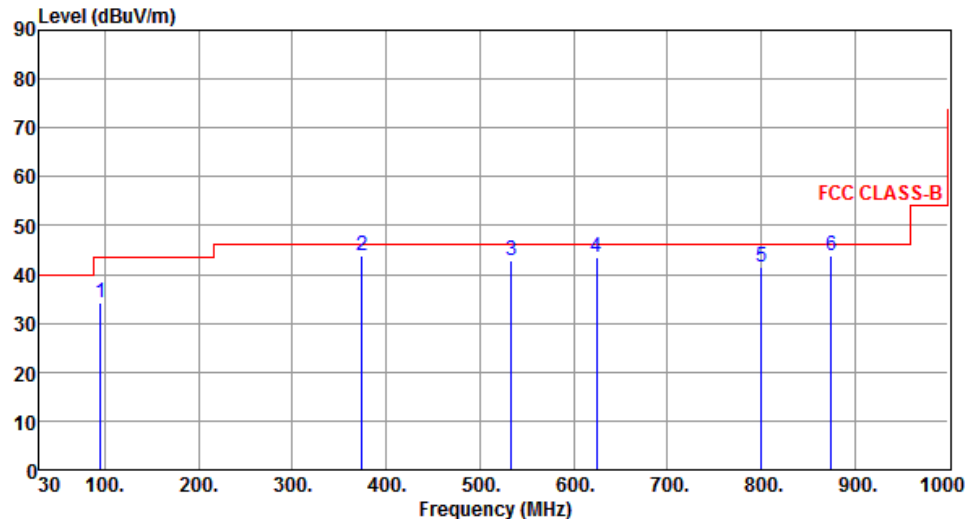


Radiated Emissions above 1 GHz



3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	2.4G 11n HT20 + 5G 11ac VHT40		Test Channel		CH6 + CH46	
Polarization	Horizontal					

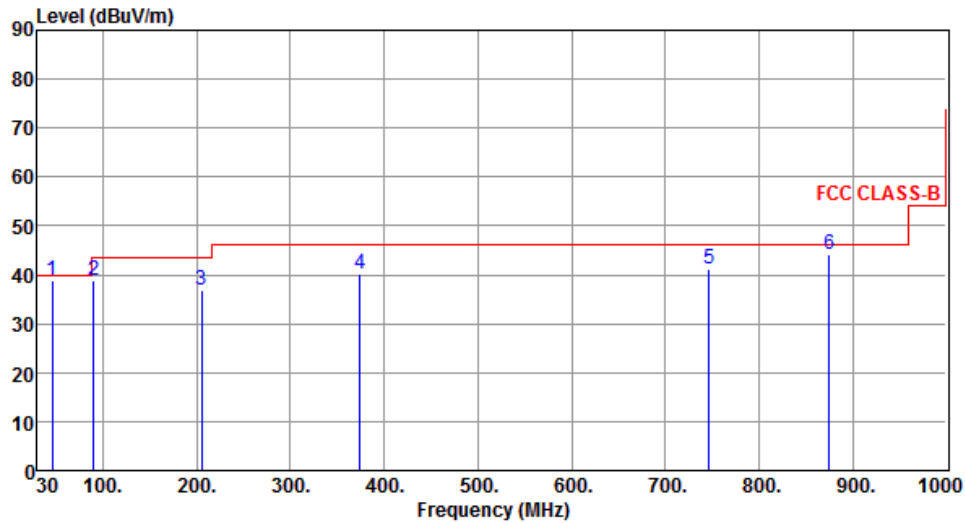


The graph displays the emission level in dBuV/m on the y-axis (0 to 90) against frequency in MHz on the x-axis (30 to 1000). A red line represents the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 300 MHz, and 55 dBuV/m from 300 to 1000 MHz. Six test points are marked with blue vertical lines and numbered 1 through 6. The data for these points is provided in the table below.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	94.99	34.33	43.50	-9.17	56.84	-22.51	Peak	---	---
2	374.35	44.00	46.00	-2.00	58.24	-14.24	Peak	---	---
3	533.43	42.73	46.00	-3.27	53.58	-10.85	Peak	---	---
4	625.00	43.52	46.00	-2.48	52.64	-9.12	QP	125	221
5	800.18	41.38	46.00	-4.62	48.20	-6.82	Peak	---	---
6	874.87	43.75	46.00	-2.25	49.37	-5.62	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	2.4G 11n HT20 + 5G 11ac VHT40	Test Channel	CH6 + CH46
Polarization	Vertical		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	45.52	38.99	40.00	-1.01	55.58	-16.59	QP	100	135
2	90.14	38.90	43.50	-4.60	62.15	-23.25	Peak	---	---
3	205.57	36.79	43.50	-6.71	56.23	-19.44	Peak	---	---
4	374.35	40.34	46.00	-5.66	54.58	-14.24	Peak	---	---
5	746.83	41.27	46.00	-4.73	48.52	-7.25	Peak	---	---
6	874.87	44.07	46.00	-1.93	49.69	-5.62	QP	100	206

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

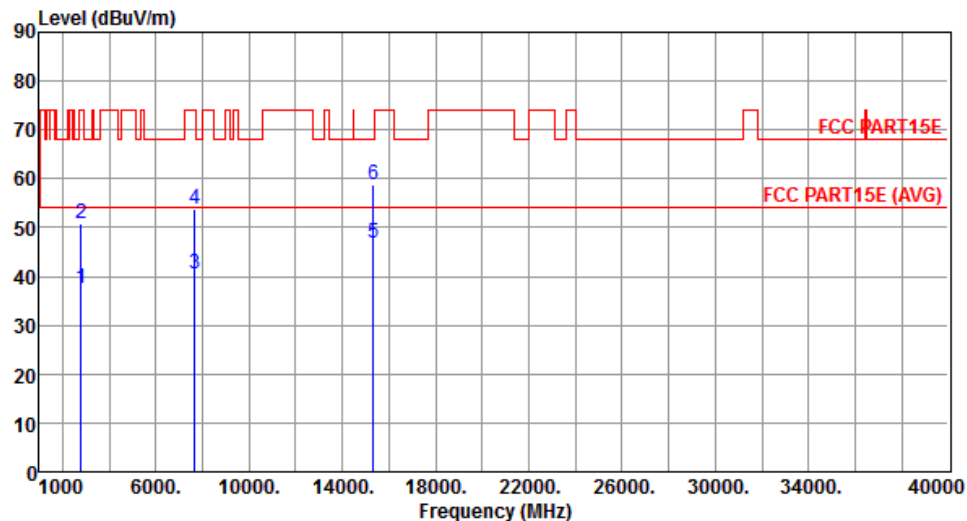
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	2.4G 11n HT20 + 5G 11ac VHT40		Test Channel	CH6 + CH46																																																																											
Polarization	Horizontal																																																																														
Level (dBuV/m) <table><tr><th></th><th>Freq. MHz</th><th>Emission level dBuV/m</th><th>Limit dBuV/m</th><th>Margin dB</th><th>SA reading dBuV</th><th>Factor dB</th><th>Remark</th><th>ANT High cm</th><th>Turn Table deg</th></tr><tr><td>1</td><td>2793.00</td><td>37.69</td><td>54.00</td><td>-16.31</td><td>38.11</td><td>-0.42</td><td>Average</td><td>157</td><td>312</td></tr><tr><td>2</td><td>2793.00</td><td>51.01</td><td>74.00</td><td>-22.99</td><td>51.43</td><td>-0.42</td><td>Peak</td><td>157</td><td>312</td></tr><tr><td>3</td><td>7667.00</td><td>40.75</td><td>54.00</td><td>-13.25</td><td>29.38</td><td>11.37</td><td>Average</td><td>180</td><td>315</td></tr><tr><td>4</td><td>7667.00</td><td>53.18</td><td>74.00</td><td>-20.82</td><td>41.81</td><td>11.37</td><td>Peak</td><td>180</td><td>315</td></tr><tr><td>5</td><td>15334.00</td><td>45.72</td><td>54.00</td><td>-8.28</td><td>29.13</td><td>16.59</td><td>Average</td><td>169</td><td>259</td></tr><tr><td>6</td><td>15334.00</td><td>58.68</td><td>68.20</td><td>-9.52</td><td>42.09</td><td>16.59</td><td>Peak</td><td>169</td><td>259</td></tr></table>											Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg	1	2793.00	37.69	54.00	-16.31	38.11	-0.42	Average	157	312	2	2793.00	51.01	74.00	-22.99	51.43	-0.42	Peak	157	312	3	7667.00	40.75	54.00	-13.25	29.38	11.37	Average	180	315	4	7667.00	53.18	74.00	-20.82	41.81	11.37	Peak	180	315	5	15334.00	45.72	54.00	-8.28	29.13	16.59	Average	169	259	6	15334.00	58.68	68.20	-9.52	42.09	16.59	Peak	169	259
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg																																																																						
1	2793.00	37.69	54.00	-16.31	38.11	-0.42	Average	157	312																																																																						
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Modulation	2.4G 11n HT20 + 5G 11ac VHT40		Test Channel	CH6 + CH46	
Polarization	Vertical				



The spectrum plot shows the emission level in dBuV/m across a frequency range from 1000 to 40000 MHz. The red line represents the measured emission level, which is mostly below the 74 dBuV/m limit. The blue line represents the FCC PART15E limit, which is constant at 74 dBuV/m. The plot is labeled with 'FCC PART15E' and 'FCC PART15E (AVG)'.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2793.00	37.63	54.00	-16.37	38.05	-0.42	Average	106	227
2	2793.00	50.95	74.00	-23.05	51.37	-0.42	Peak	106	227
3	7667.00	40.39	54.00	-13.61	29.02	11.37	Average	222	32
4	7667.00	53.88	74.00	-20.12	42.51	11.37	Peak	222	32
5	15334.00	46.81	54.00	-7.19	30.22	16.59	Average	111	255
6	15334.00	58.92	68.20	-9.28	42.33	16.59	Peak	111	255

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

4 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, 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 Hsiang. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan,
R.O.C.

Kwei Shan

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd
St., Kwei Shan Hsiang, Tao Yuan
Hsien 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd
St., Kwei Shan Hsiang, Tao Yuan
Hsien 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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