

# FCC Co-Location Test Report

**FCC ID** : SWX-UAPACIWP  
**Equipment** : UniFi AC In-Wall Pro Wi-Fi Access Point  
**Model No.** : UAP-AC-IW-PRO  
**Brand Name** : UBIQUITI  
**Applicant** : Ubiquiti Networks, Inc.  
**Address** : 685 Third Avenue, 27th Floor New York, New York 10017 USA  
**Standard** : 47 CFR FCC Part 15.247  
47 CFR FCC Part 15.407  
**Received Date** : Jun. 01, 2017  
**Tested Date** : Jun. 13 ~ Jun. 27, 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:

  
\_\_\_\_\_  
Along Chen / Assistant Manager

Approved by:

  
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Gary Chang / Manager



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## Release Record

Report No.	Version	Description	Issued Date
FR761701CO	Rev. 01	Initial issue	Jul. 04, 2017

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## Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 624.61MHz 44.94 (Margin -1.06dB) - QP	Pass

# 1 General Description

## 1.1 Information

### 1.1.1 Specification of the Equipment under Test (EUT)

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

### 1.1.2 Antenna Details

Ant. No.	Type	Connector	Antenna Gain (dBi)		
			2400~2483.5MHz	5150~5250 MHz	5725~5850 MHz
1	internal antenna	I-Pex	5	6.5	6.5

### 1.1.3 Power Supply Type of Equipment under Test (EUT)

<b>Power Supply Type</b>	48Vdc from POE
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### 1.1.4 Accessories

N/A

## 1.2 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 21, 2016	Dec. 20, 2017
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 09, 2016	Dec. 08, 2017
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 09, 2016	Dec. 08, 2017
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	16052	Dec. 09, 2016	Dec. 08, 2017
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 09, 2016	Dec. 08, 2017
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 09, 2016	Dec. 08, 2017
Measurement Software	AUDIX	e3	6.120210g	NA	NA

Note: Calibration Interval of instruments listed above is one year.

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Mar. 15, 2017	Mar. 14, 2018
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
AC POWER SOURCE	APC	AFC-500W	F312060012	Oct. 28, 2016	Oct. 27, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	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 v04

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04

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	$\pm 3.66$ dB
Radiated emission $>$ 1GHz	$\pm 5.63$ dB

## 2 Test Configuration

### 2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	24°C / 64%	Vincent Yeh
RF Conducted	TH01-WS	23°C / 65%	Brad Wu

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

### 2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Channel	Data Rate	Test Configuration
Radiated Emissions	2.4G 11g + 5G 11ac VHT20	CH6 + CH48	6Mbps + MCS 0	---
Conducted Emissions				
<b>NOTE:</b> The selected channel is the maximum power channel of Wi-Fi mode.				



### 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

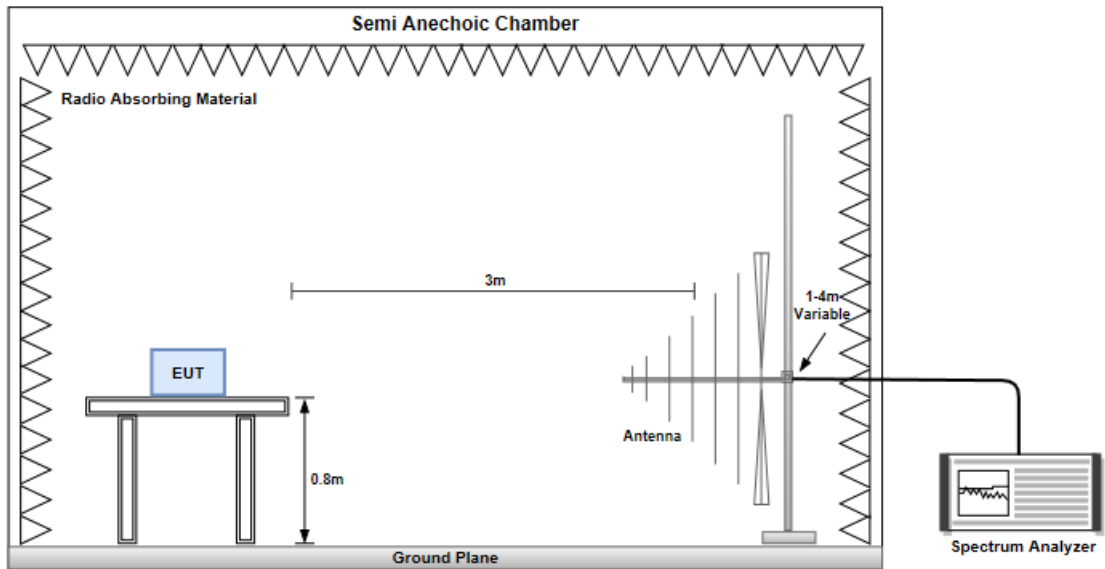
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission 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:**

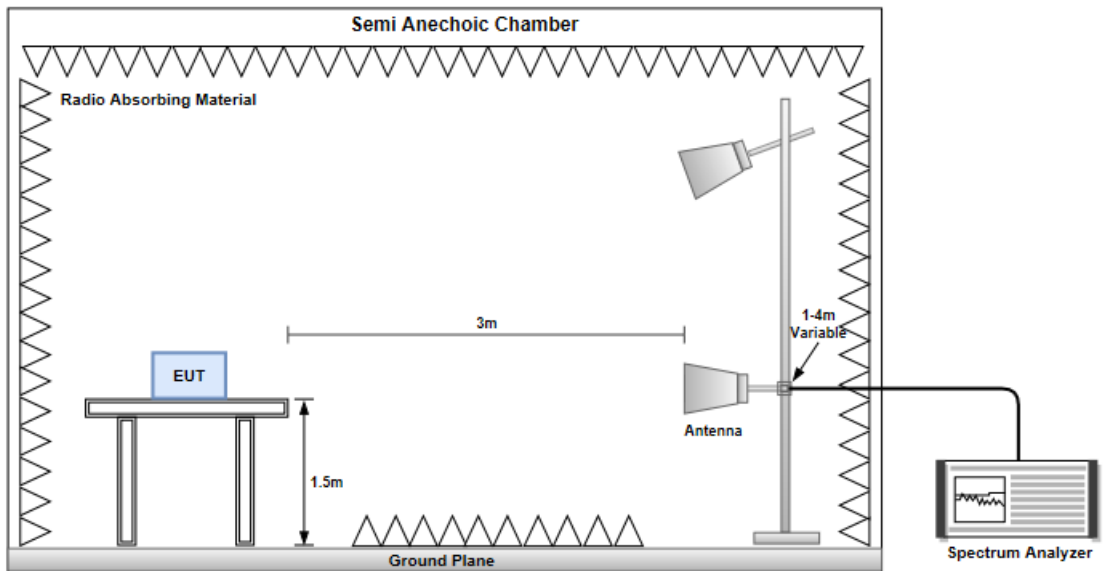
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

### 3.1.3 Test Setup

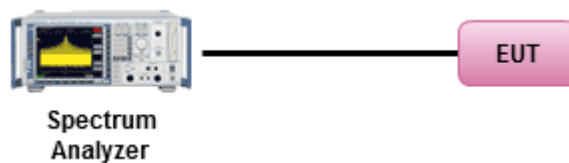
#### Radiated Emissions below 1 GHz



#### Radiated Emissions above 1 GHz

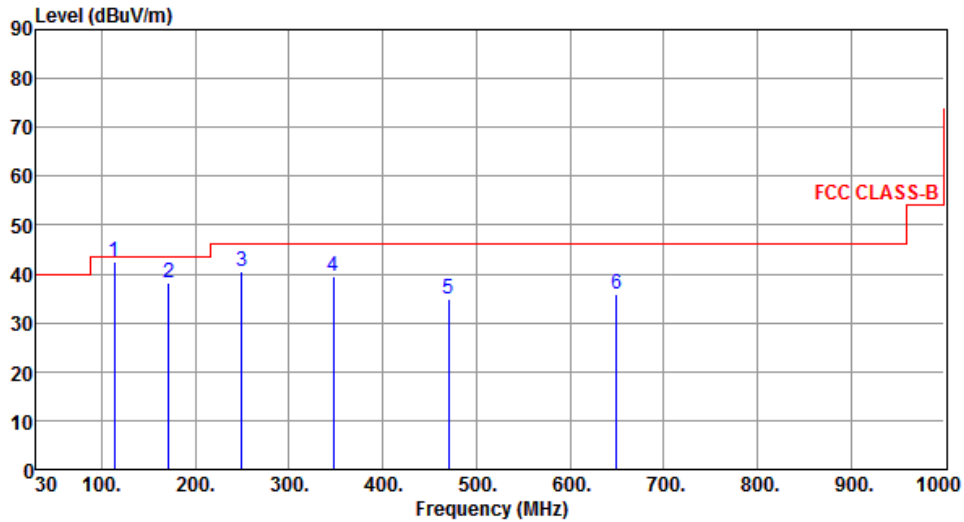


#### Transmitter Conducted Unwanted Emissions (30MHz~40GHz)



### 3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

<b>Modulation</b>	2.4G 11g + 5G 11ac VHT20	<b>Test Channel</b>	CH6 + CH48
<b>Polarization</b>	Horizontal		



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	113.42	42.39	43.50	-1.11	53.20	-10.81	QP	158	193
2	171.62	38.21	43.50	-5.29	46.95	-8.74	Peak	---	---
3	249.22	40.65	46.00	-5.35	49.88	-9.23	Peak	---	---
4	347.80	39.60	46.00	-6.40	45.90	-6.30	QP	100	225
5	470.38	34.74	46.00	-11.26	38.10	-3.36	Peak	---	---
6	649.83	35.77	46.00	-10.23	35.81	-0.04	Peak	---	---

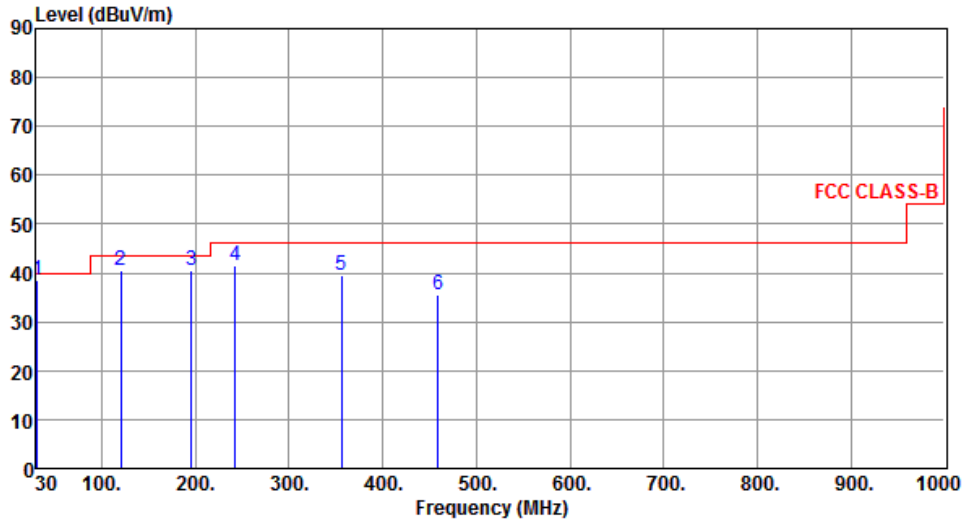
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor\* (dB)

\*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.

<b>Modulation</b>	2.4G 11g + 5G 11ac VHT20	<b>Test Channel</b>	CH6 + CH48
<b>Polarization</b>	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	30.97	38.68	40.00	-1.32	47.50	-8.82	QP	100	270
2	120.21	40.41	43.50	-3.09	50.54	-10.13	Peak	---	---
3	195.79	40.55	43.50	-2.95	51.60	-11.05	QP	100	102
4	242.43	41.35	46.00	-4.65	50.73	-9.38	Peak	---	---
5	355.78	39.40	46.00	-6.60	45.50	-6.10	QP	158	173
6	458.74	35.51	46.00	-10.49	39.08	-3.57	Peak	---	---

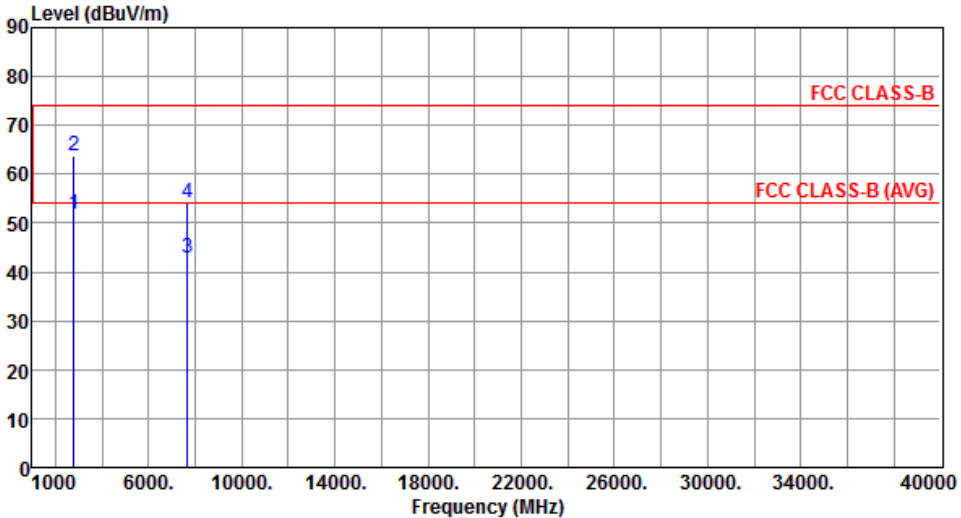
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

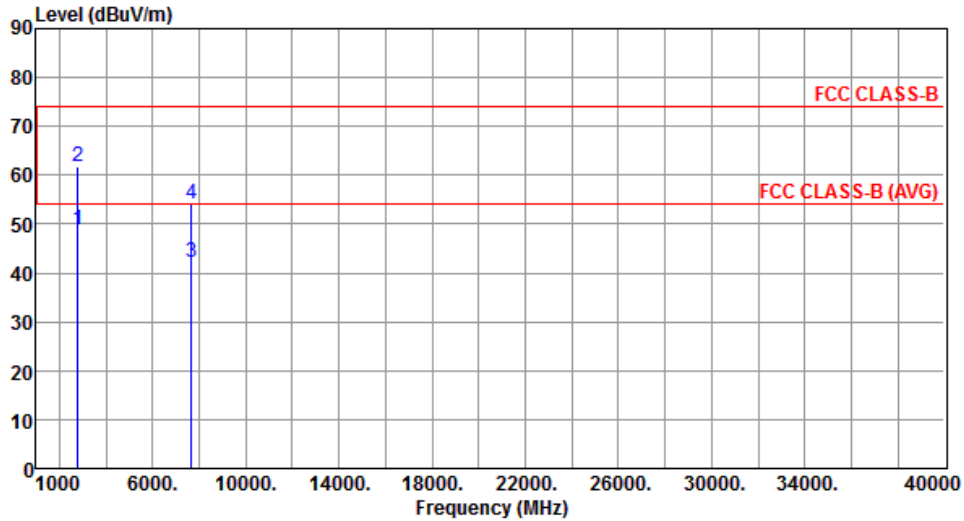
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

### 3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

<b>Modulation</b>	2.4G 11g + 5G 11ac VHT20	<b>Test Channel</b>	CH6 + CH48						
<b>Polarization</b>	Horizontal								
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	2803.00	51.83	54.00	-2.17	53.54	-1.71	Average	254	20
2	2803.00	63.63	74.00	-10.37	65.34	-1.71	Peak	254	20
3	7677.00	42.73	54.00	-11.27	33.94	8.79	Average	230	37
4	7677.00	54.27	74.00	-19.73	45.48	8.79	Peak	230	37
<p>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).</p>									

<b>Modulation</b>	2.4G 11g + 5G 11ac VHT20	<b>Test Channel</b>	CH6 + CH48
<b>Polarization</b>	Vertical		



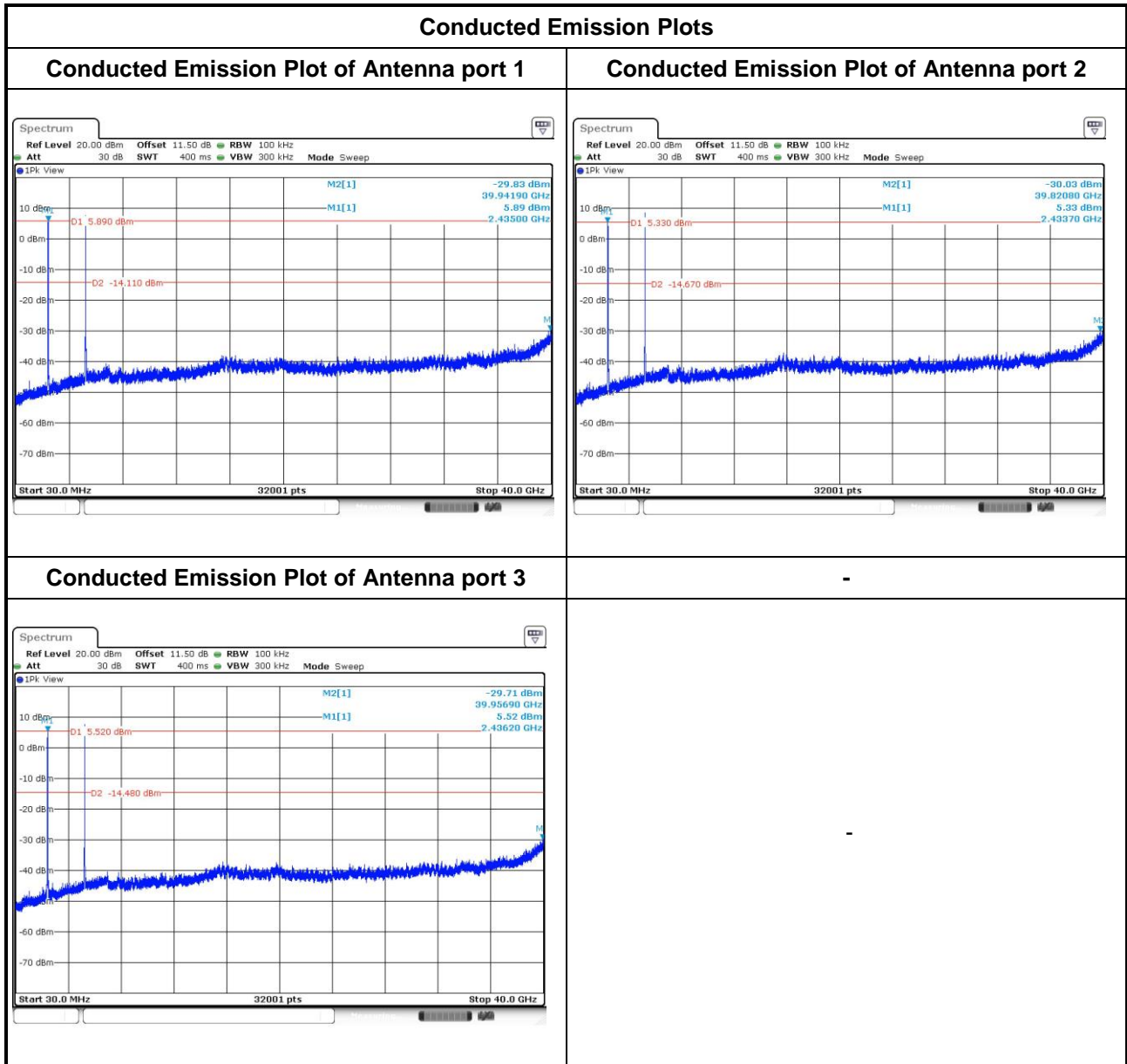
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2803.00	48.71	54.00	-5.29	50.42	-1.71	Average	153	56
2	2803.00	61.74	74.00	-12.26	63.45	-1.71	Peak	153	56
3	7677.00	42.23	54.00	-11.77	33.44	8.79	Average	218	48
4	7677.00	54.04	74.00	-19.96	45.25	8.79	Peak	218	48

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).

### 3.1.6 Conducted Emissions (30MHz~40GHz)



## 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 (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>.

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City 333, Taiwan, R.O.C..

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

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