

# FCC Co-Location Test Report

**FCC ID** : QIS-B2338-168IDU  
**Equipment** : Indoor Dual Band Wi-Fi Router  
**Model No.** : B2338-168IDU  
**Brand Name** : Huawei  
**Applicant** : Huawei Technologies Co., Ltd.  
**Address** : Administration Building, Headquarters of  
Huawei Technologies Co., Ltd., Bantian,  
Longgang District, Shenzhen, 518129, China.  
**Standard** : 47 CFR FCC Part 15.247  
47 CFR FCC Part 15.407  
**Received Date** : Aug. 27, 2016  
**Tested Date** : Oct. 21 ~ Oct. 26, 2016

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:

  
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Along Chen / Assistant Manager

Approved by:

  
\_\_\_\_\_  
Gary Chang / Manager



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## Release Record

Report No.	Version	Description	Issued Date
FR682701-02CO	Rev. 01	Initial issue	Mar. 01, 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]: 49.66MHz 38.99 (Margin -1.01dB) - QP	Pass

# 1 General Description

## 1.1 Information

### 1.1.1 Product Details

The device B2338-168 / LTE Outdoor CPE = (B2338-168ODU) + (B2338-168IDU) is a product family consists of LTE Outdoor CPE + Indoor Dual Band Wi-Fi Router.

Brand name	Product name	Model name	FCC ID
Huawei	LTE Outdoor CPE	B2338-168ODU	QIS-B2338-168ODU
	Indoor Dual Band Wi-Fi Router	B2338-168IDU	QIS-B2338-168IDU

### 1.1.2 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)

### 1.1.3 Antenna Details

Ant. No.	Type	Connector	Operating Frequency (MHz) / Gain (dBi)		
			2400~2483.5	5150~5250	5725~5850
1	PIFA	N/A	2.5	3	3

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

<b>Power Supply Type</b>	56Vdc from adapter
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## 1.2 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber 3 / (03CH03-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 09, 2016	Sep. 08, 2017
Receiver	Agilent	N9038A	MY53290044	Oct. 06, 2016	Oct. 05, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 26, 2016	Apr. 25, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Feb. 24, 2016	Feb. 23, 2017
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 16, 2015	Nov. 15, 2016
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 10, 2015	Dec. 09, 2016
Preamplifier	EMC	EMC02325	980187	Sep. 08, 2016	Sep. 07, 2017
Preamplifier	Agilent	83017A	MY53270014	Aug. 22, 2016	Aug. 21, 2017
Preamplifier	EMC	EMC184045B	980192	Aug. 24, 2016	Aug. 23, 2017
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Feb. 05, 2016	Feb. 04, 2017
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY22600/4	Feb. 05, 2016	Feb. 04, 2017
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Feb. 05, 2016	Feb. 04, 2017
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-00 1	Feb. 05, 2016	Feb. 04, 2017
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Feb. 05, 2016	Feb. 04, 2017
LF cable-13M	EMC	EMC8D-NM-NM-1300 0	131104	Feb. 05, 2016	Feb. 04, 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	Feb. 17, 2016	Feb. 16, 2017
AC POWER SOURCE	G.W	APS-9102	EL920581	Apr. 04, 2016	Apr. 03, 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 v03r05

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r03

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	$\pm 5.37$ dB

## 2 Test Configuration

### 2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH03-WS	23-24°C / 64-67%	Aska Huang Vincent Yeh
Conducted Emissions	TH01-WS	23-24°C / 64-67%	Aska Huang Vincent Yeh

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- IC site registration No.: 10807C-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 11a	CH6 + CH157	6Mbps + 6Mbps	---
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

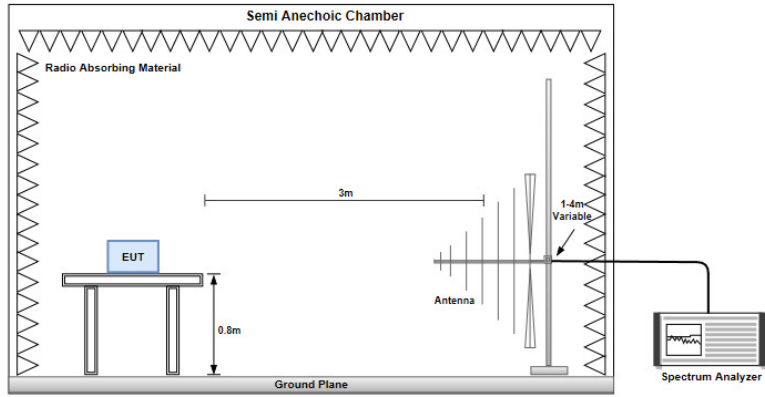
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

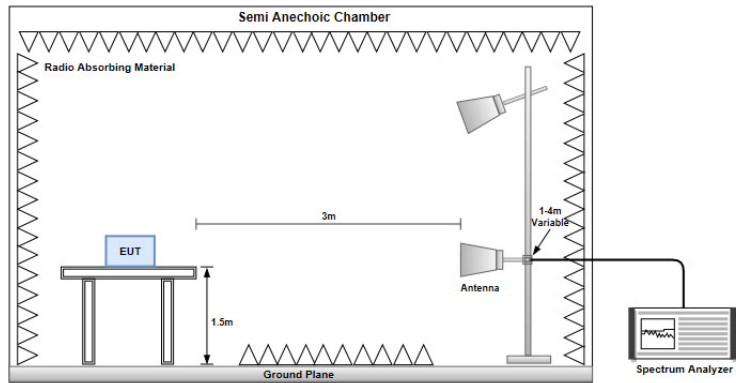
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

### 3.1.3 Test Setup

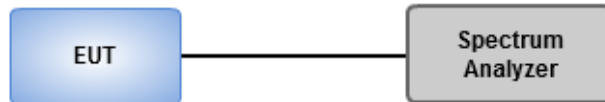
#### Radiated Emissions below 1 GHz



#### Radiated Emissions above 1 GHz



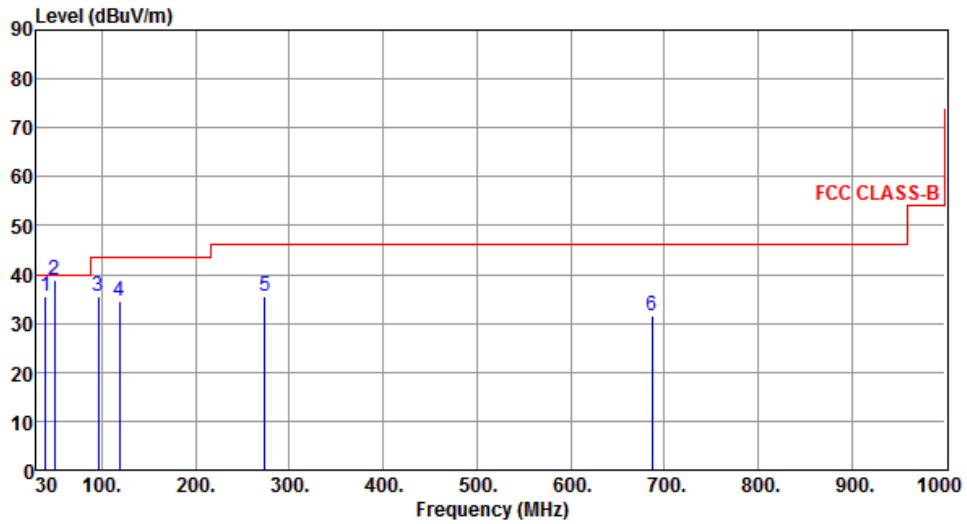
#### Conducted emission



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

<b>Modulation</b>	2.4G 11g + 5G 11a	<b>Test Channel</b>	CH6 + CH157						
<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	126.03	32.37	43.50	-11.13	42.52	-10.15	Peak	---	---
2	173.56	33.58	43.50	-9.92	42.47	-8.89	Peak	---	---
3	273.47	38.35	46.00	-7.65	46.78	-8.43	Peak	---	---
4	342.34	29.99	46.00	-16.01	36.54	-6.55	Peak	---	---
5	645.95	31.20	46.00	-14.80	31.34	-0.14	Peak	---	---
6	800.18	34.03	46.00	-11.97	31.44	2.59	Peak	---	---
<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).  Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.</p>									

<b>Modulation</b>	2.4G 11g + 5G 11a	<b>Test Channel</b>	CH6 + CH157
<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	39.92	35.54	40.00	-4.46	43.85	-8.31	QP	100	316
2	49.66	38.99	40.00	-1.01	46.81	-7.82	QP	100	142
3	95.96	35.59	43.50	-7.91	49.25	-13.66	Peak	---	---
4	118.27	34.61	43.50	-8.89	45.48	-10.87	Peak	---	---
5	273.47	35.39	46.00	-10.61	43.82	-8.43	Peak	---	---
6	686.69	31.63	46.00	-14.37	31.14	0.49	Peak	---	---

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

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

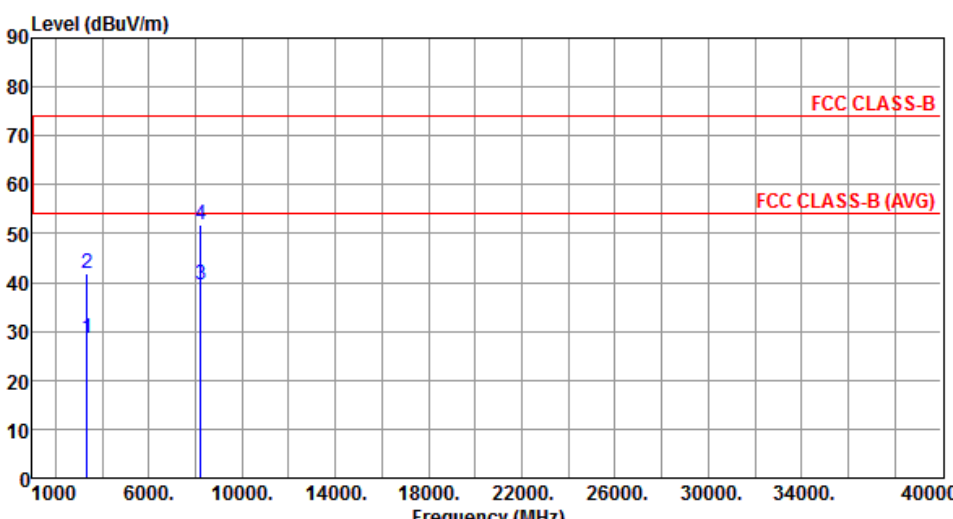
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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 11a	<b>Test Channel</b>	CH6 + CH157	
<b>Polarization</b>	Horizontal			



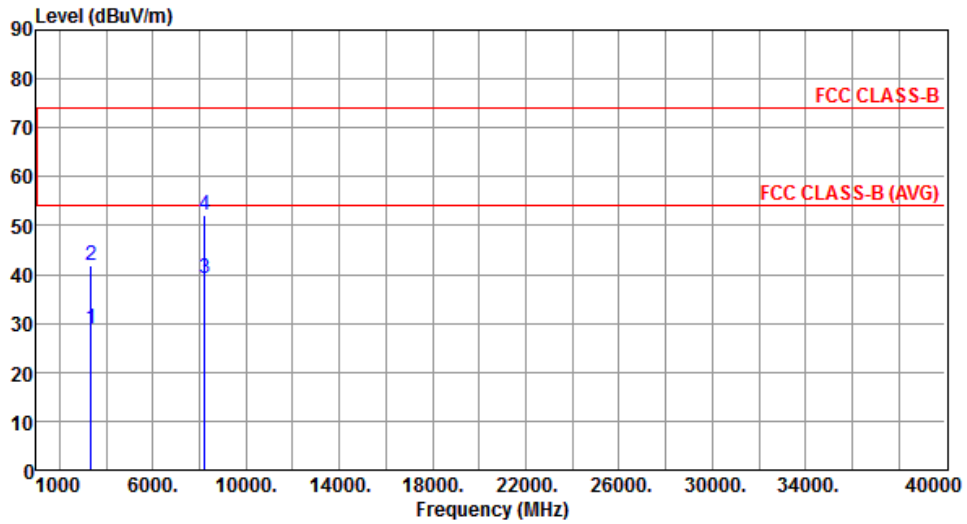
The graph plots Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (1000 to 40000). Two horizontal red lines represent FCC CLASS-B (at ~75 dBuV/m) and FCC CLASS-B (AVG) (at ~55 dBuV/m). Four vertical blue lines indicate emission peaks at 3348.00 MHz (labeled 1 and 2) and 8222.00 MHz (labeled 3 and 4).

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3348.00	28.72	54.00	-25.28	27.29	1.43	Average	100	138
2	3348.00	41.86	74.00	-32.14	40.43	1.43	Peak	100	138
3	8222.00	39.37	54.00	-14.63	27.76	11.61	Average	100	212
4	8222.00	51.91	74.00	-22.09	40.30	11.61	Peak	100	212

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).

<b>Modulation</b>	2.4G 11g + 5G 11a	<b>Test Channel</b>	CH6 + CH157
<b>Polarization</b>	Vertical		



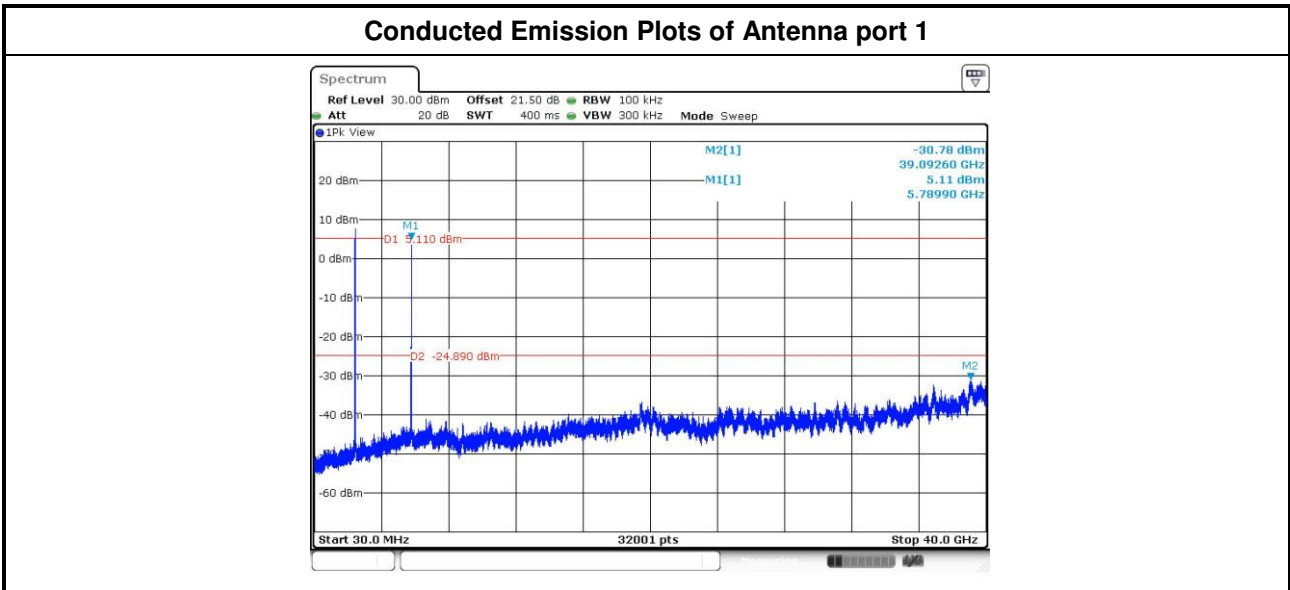
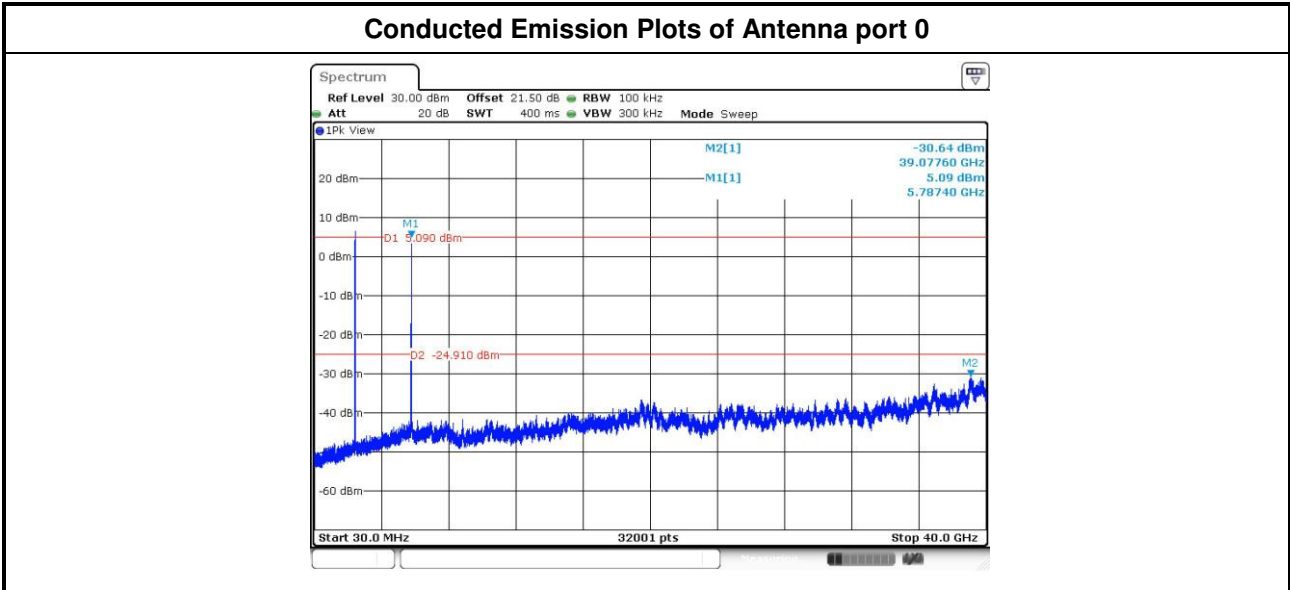
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3348.00	28.86	54.00	-25.14	27.43	1.43	Average	100	193
2	3348.00	41.87	74.00	-32.13	40.44	1.43	Peak	100	193
3	8222.00	39.29	54.00	-14.71	27.68	11.61	Average	100	156
4	8222.00	52.05	74.00	-21.95	40.44	11.61	Peak	100	156

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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### **Kwei Shan Site II**

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City 333, Taiwan, R.O.C.

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