

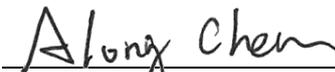
# FCC Co-Location Test Report

**FCC ID** : QIS-B5338-168  
**Equipment** : LTE Indoor CPE  
**Model No.** : B5338-168  
**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  
47 CFR FCC Part 27 Subpart M  
47 CFR FCC Part 90 Subpart Z  
**Received Date** : Sep. 23, 2016  
**Tested Date** : Oct. 18 ~ Dec. 15, 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:

Approved by:

  
Along Chen / Assistant Manager

  
Gary Chang / Manager



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## Release Record

Report No.	Version	Description	Issued Date
FR690901-01CO	Rev. 01	Initial issue	Mar. 06, 2017

## Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.407(b) 15.209 27.53(m)(4)(6) 90.1323	Radiated Emissions	[dBuV/m at 3m]: 375.00MHz 44.99 (Margin -1.01dB) - QP	Pass

# 1 General Description

## 1.1 Information

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

WLAN	
<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)
LTE	
<b>Operating Frequency</b>	Band 43 Channel Bandwidth: 5MHz: 3652.5 MHz ~ 3697.5 MHz Channel Bandwidth: 10MHz: 3655.0 MHz ~ 3695.0 MHz Channel Bandwidth: 15MHz: 3657.5 MHz ~ 3692.5 MHz Channel Bandwidth: 20MHz: 3660.0 MHz ~ 3690.0 MHz Band 41 Channel Bandwidth: 5MHz: 2498.5 MHz ~ 2687.5 MHz Channel Bandwidth: 10MHz: 2501.0 MHz ~ 2685.0 MHz Channel Bandwidth: 15MHz: 2503.5 MHz ~ 2682.5 MHz Channel Bandwidth: 20MHz: 2506.0 MHz ~ 2680.0 MHz
<b>Modulation Type</b>	QPSK, 16QAM, 64QAM (Uplink)

### 1.1.2 Antenna Details

For LTE

Ant. No.	Type	Gain (dBi)		Connector
		2496 MHz – 2690 MHz	3600 MHz – 3800 MHz	
1	Dipole	4.1	2	R-SMA

For WLAN

Ant. No.	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)		
			2400~2483.5	5150~5250	5725~5850
1	PIFA	UFL	2.45	1.3	2.96
2	PIFA	UFL	2.46	1.97	2.99

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

<b>Power Supply Type</b>	12Vdc from adapter
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## 1.2 The Equipment List

<b>Test Item</b>	Radiated Emission				
<b>Test Site</b>	966 chamber1 / (03CH01-WS)				
<b>Tested Date</b>	Nov. 29, 2016				
<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 16, 2015	Dec. 15, 2016
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 25, 2016	Oct. 24, 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. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 10, 2015	Dec. 09, 2016
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 10, 2015	Dec. 09, 2016
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

<b>Test Item</b>	Radiated Emission				
<b>Test Site</b>	966 chamber1 / (03CH01-WS)				
<b>Tested Date</b>	Dec. 15, 2016				
<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 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.					

<b>Test Item</b>	RF Conducted				
<b>Test Site</b>	(TH01-WS)				
<b>Tested Date</b>	Oct. 18, 2016				
<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2016	Feb. 16, 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

47 CFR FCC Part 15.247

47 CFR FCC Part 15.247

ANSI C63.10-2013

ANSI C63.4-2014

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 971168 D01 Power Meas License Digital Systems v02r02

FCC KDB 971168 D02 Misc OOBE License Digital Systems 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	$\pm 3.66$ 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	20-24°C / 61-62%	Vincent Yeh Kevin Lee
Conducted Emissions	TH01-WS	22°C / 61%	Alex Huang

- 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	Test Mode
Radiated Emissions	LTE B41 10M CH39700 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155
	LTE B43 10M CH44540 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155
Conducted Emissions	WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155
<b>NOTE</b>	
1. The selected channel is the maximum power channel of Wi-Fi module and LTE function	
2. Conducted emission measurement is for Wi-Fi function only since Wi-Fi 2.4 / 5GHz share same antennas.	

### 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

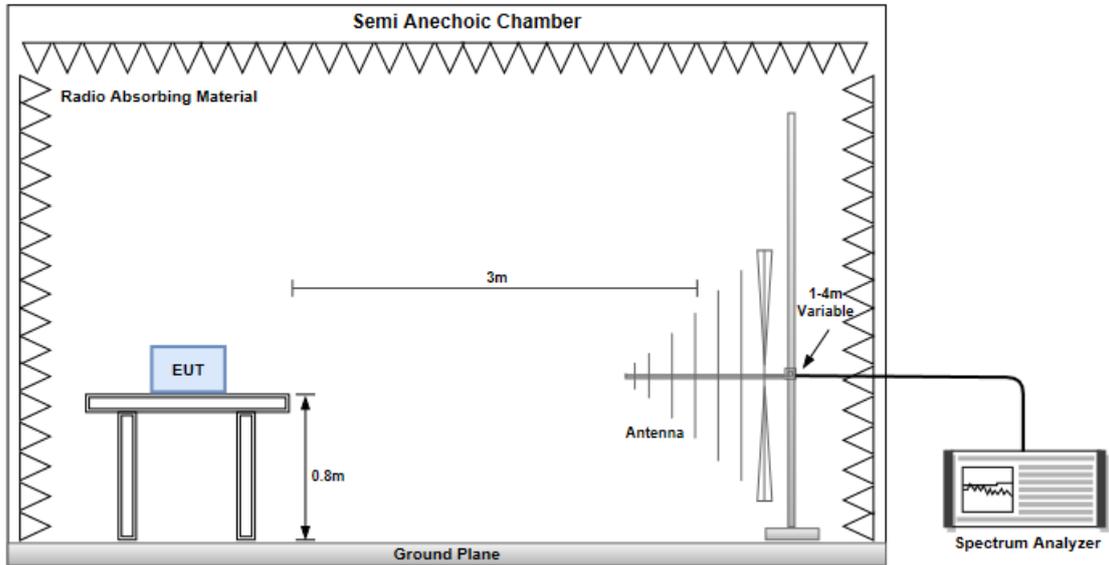
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

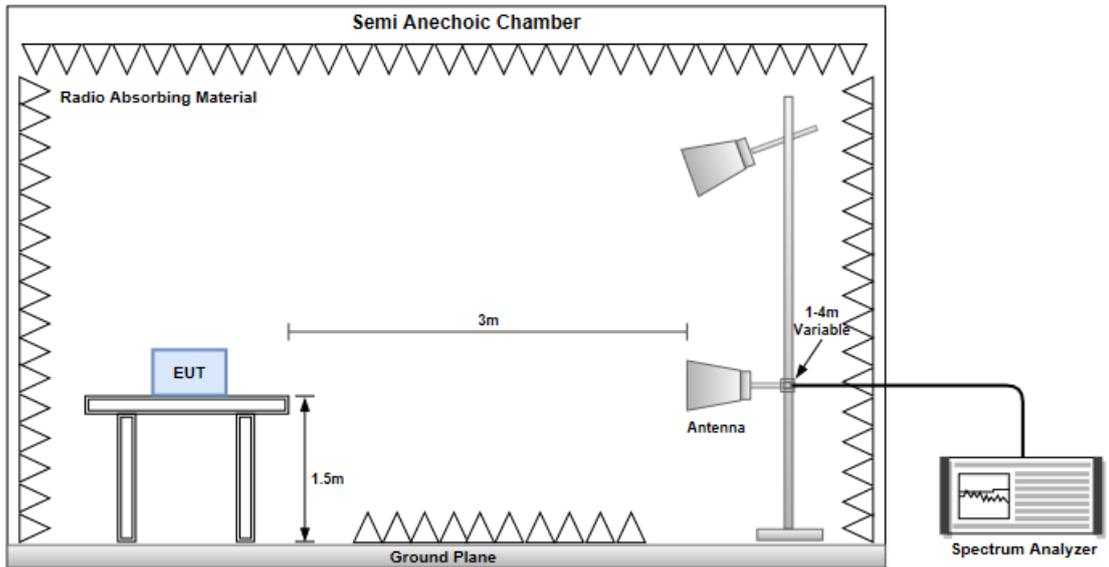
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

### 3.1.3 Test Setup

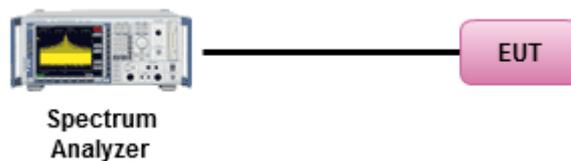
#### Radiated Emissions below 1 GHz



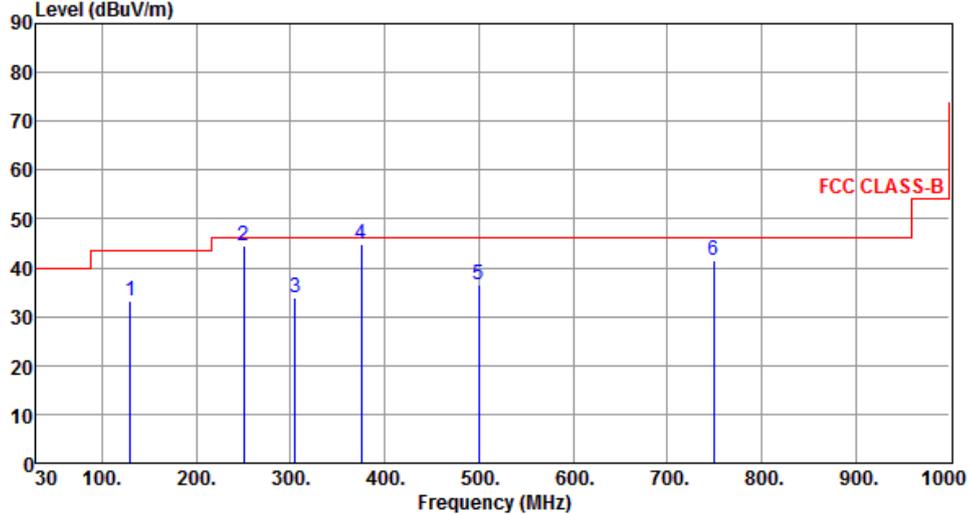
#### Radiated Emissions above 1 GHz



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

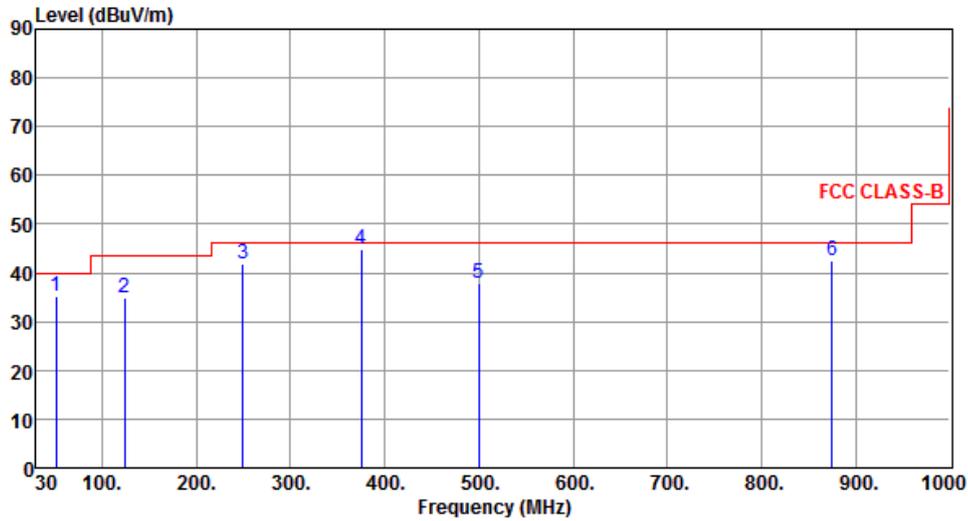


### 3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

<b>Mode</b>	LTE B41 10M CH39700 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155								
<b>Polarization</b>	Horizontal								
 <p>The graph plots Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (30 to 1000). A red stepped line represents the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 250 MHz, 46 dBuV/m from 250 to 1000 MHz, and 55 dBuV/m from 1000 MHz to 1000 MHz. Six blue vertical lines represent emission peaks labeled 1 through 6, with their levels and frequencies indicated in the table below.</p>									
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn
	MHz	level	dBuV/m	dB	reading	dB		High	Table
		dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	129.91	33.18	43.50	-10.32	42.22	-9.04	Peak	---	---
2	250.00	44.56	46.00	-1.44	53.77	-9.21	QP	100	163
3	304.51	33.85	46.00	-12.15	41.25	-7.40	Peak	---	---
4	375.00	44.99	46.00	-1.01	50.61	-5.62	QP	100	130
5	499.48	36.58	46.00	-9.42	39.40	-2.82	Peak	---	---
6	749.74	41.64	46.00	-4.36	39.82	1.82	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>Mode</b>	LTE B41 10M CH39700 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155
<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	51.34	35.31	40.00	-4.69	43.11	-7.80	Peak	---	---
2	124.09	34.87	43.50	-8.63	44.56	-9.69	Peak	---	---
3	249.22	41.69	46.00	-4.31	50.92	-9.23	Peak	---	---
4	375.00	44.88	46.00	-1.12	50.50	-5.62	QP	137	241
5	499.48	37.87	46.00	-8.13	40.69	-2.82	Peak	---	---
6	874.87	42.35	46.00	-3.65	38.57	3.78	Peak	---	---

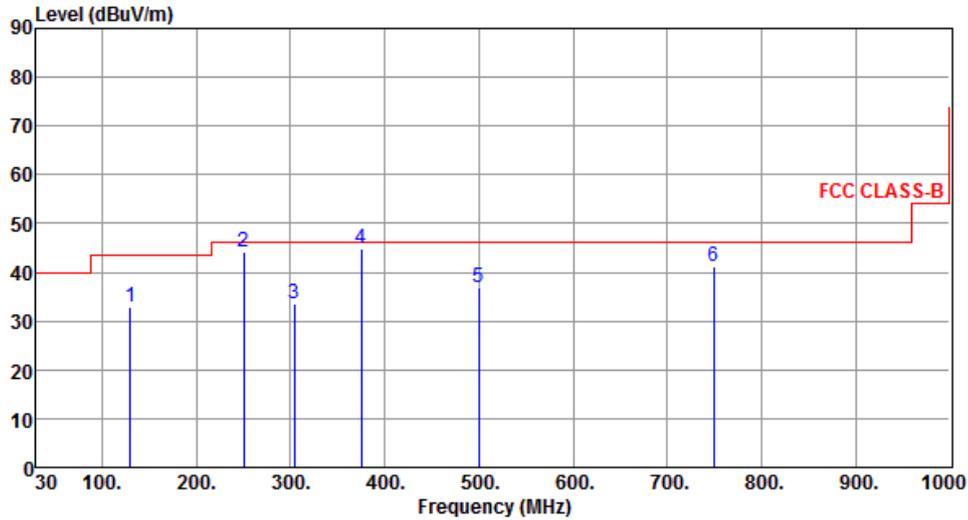
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*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>Mode</b>	LTE B43 10M CH44540 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155
<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	130.23	32.76	43.50	-10.74	41.77	-9.01	Peak	---	---
2	250.00	44.32	46.00	-1.68	53.53	-9.21	QP	100	170
3	304.21	33.52	46.00	-12.48	40.93	-7.41	Peak	---	---
4	375.00	44.97	46.00	-1.03	50.59	-5.62	QP	100	138
5	499.68	36.88	46.00	-9.12	39.70	-2.82	Peak	---	---
6	749.74	41.12	46.00	-4.88	39.30	1.82	Peak	---	---

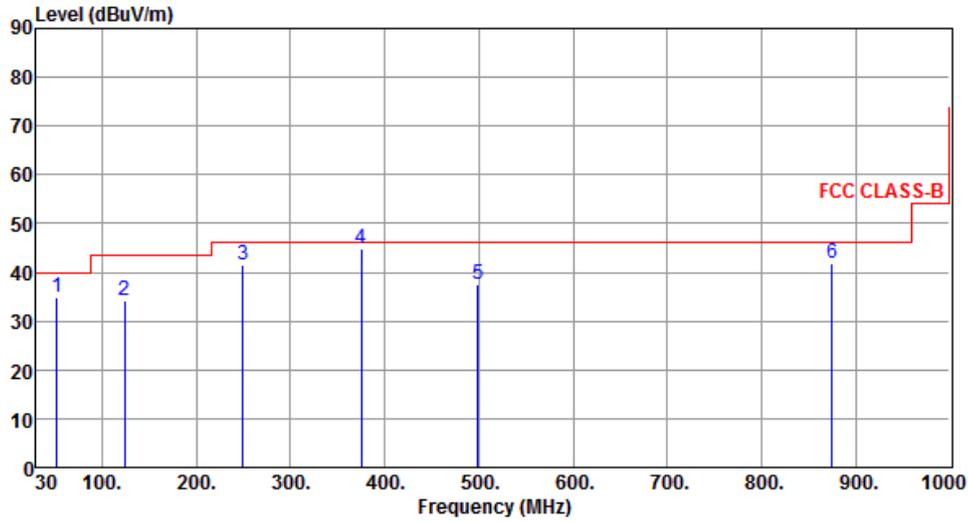
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*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>Mode</b>	LTE B43 10M CH44540 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155
<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	51.78	35.02	40.00	-4.98	42.88	-7.86	Peak	---	---
2	124.26	34.21	43.50	-9.29	43.88	-9.67	Peak	---	---
3	249.69	41.46	46.00	-4.54	50.68	-9.22	Peak	---	---
4	375.00	44.85	46.00	-1.15	50.47	-5.62	QP	132	267
5	499.32	37.58	46.00	-8.42	40.40	-2.82	Peak	---	---
6	874.62	41.90	46.00	-4.10	38.13	3.77	Peak	---	---

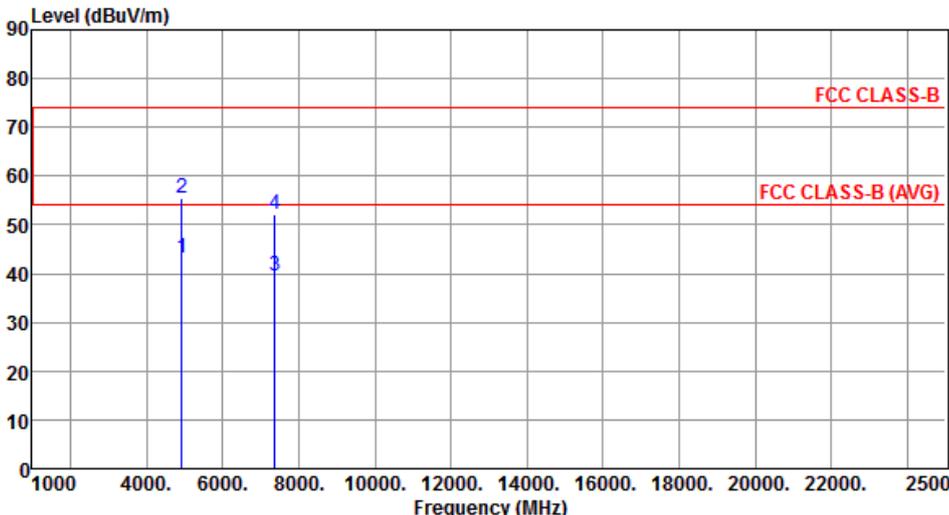
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

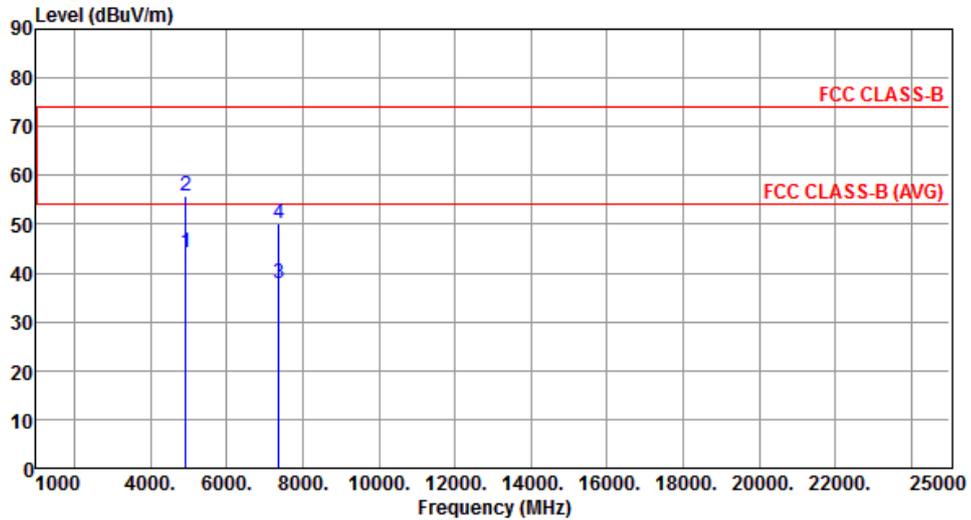
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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>Mode</b>	LTE B41 10M CH39700 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155								
<b>Polarization</b>	Horizontal								
									
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn
	MHz	level	dBuV/m	dB	reading	dB		High	Table
		dBuV/m			dBuV			cm	deg
1	4938.00	43.21	54.00	-10.79	39.31	3.90	Average	123	305
2	4938.00	55.41	74.00	-18.59	51.51	3.90	Peak	123	305
3	7375.00	39.67	54.00	-14.33	31.14	8.53	Average	114	272
4	7375.00	52.30	74.00	-21.70	43.77	8.53	Peak	114	272
<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>Mode</b>	LTE B41 10M CH39700 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155
<b>Polarization</b>	Vertical

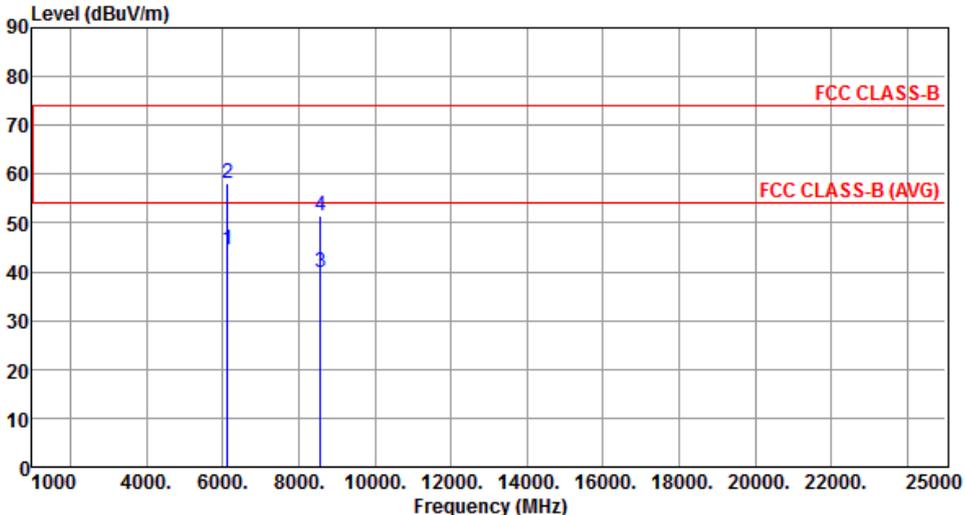


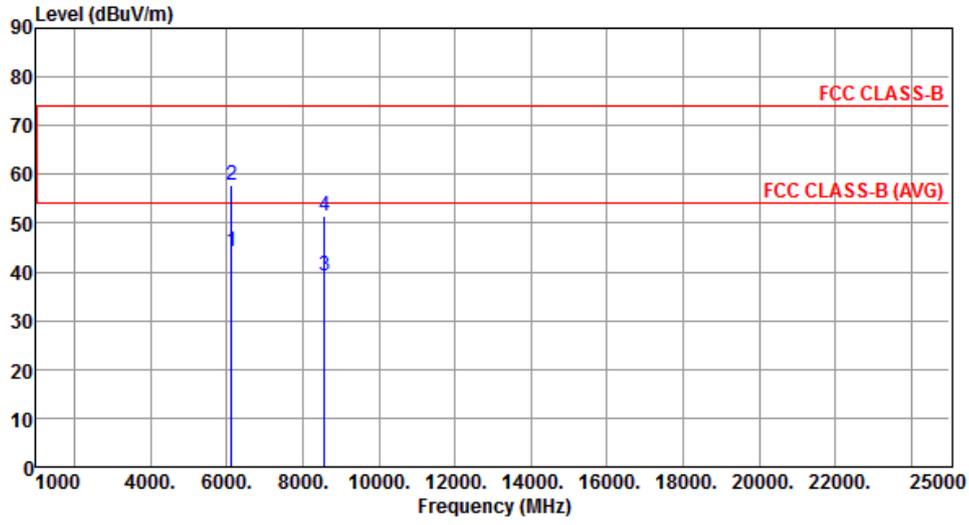
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	4938.00	44.17	54.00	-9.83	40.27	3.90	Average	258	0
2	4938.00	55.82	74.00	-18.18	51.92	3.90	Peak	258	0
3	7375.00	37.74	54.00	-16.26	29.21	8.53	Average	139	308
4	7375.00	50.20	74.00	-23.80	41.67	8.53	Peak	139	308

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

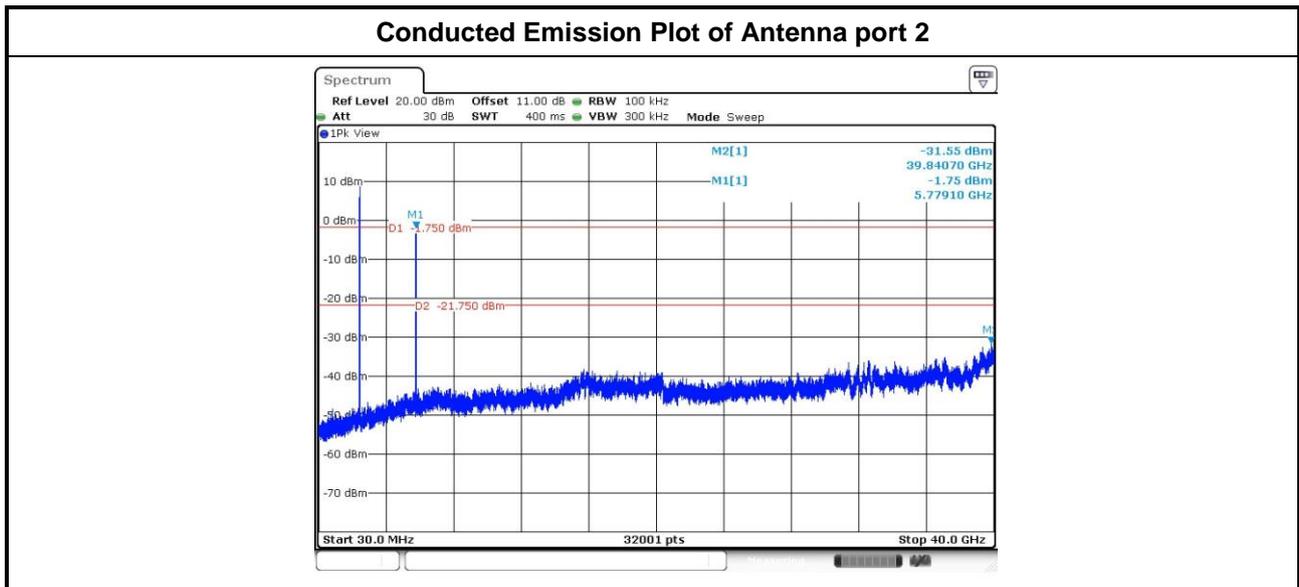
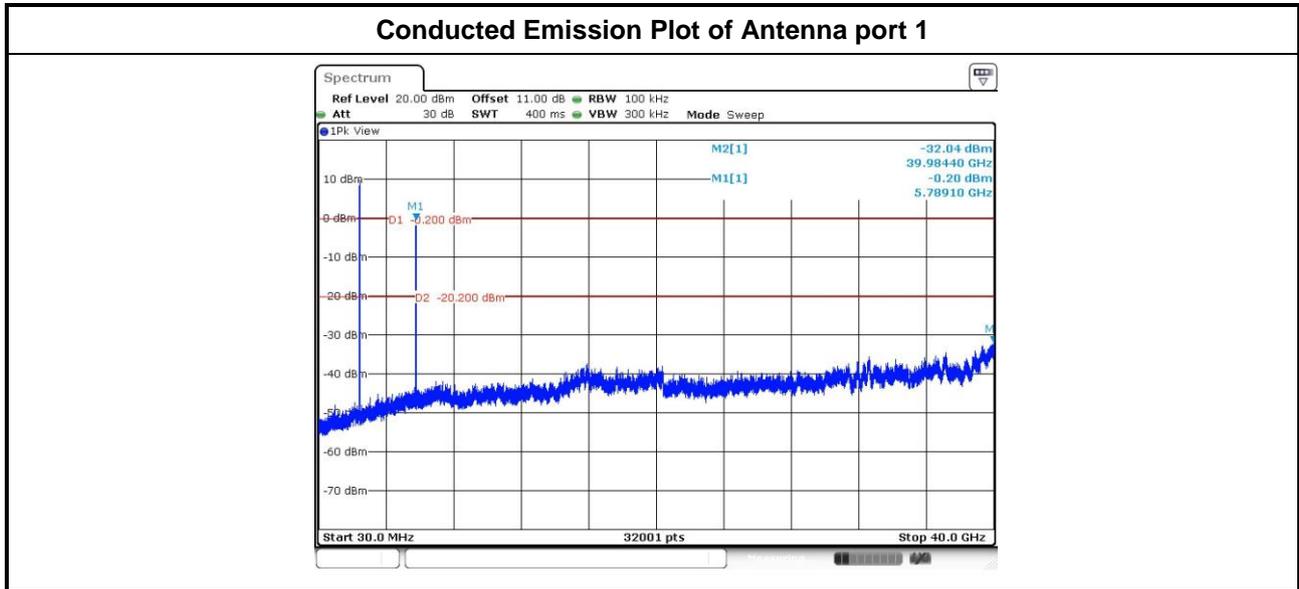
\*Factor includes antenna factor , cable loss and amplifier gain

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

<b>Mode</b>	LTE B43 10M CH44540 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155								
<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	6132.00	44.65	54.00	-9.35	40.73	3.92	Average	135	61
2	6132.00	58.13	74.00	-15.87	54.21	3.92	Peak	135	61
3	8569.00	39.76	54.00	-14.24	29.93	9.83	Average	115	137
4	8569.00	51.57	74.00	-22.43	41.74	9.83	Peak	115	137
<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>Mode</b>	LTE B43 10M CH44540 + WLAN 2.4G 11b CH06 + WLAN 5G 11ac VHT80 CH155								
<b>Polarization</b>	Vertical								
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	6132.00	44.27	54.00	-9.73	40.35	3.92	Average	152	264
2	6132.00	57.83	74.00	-16.17	53.91	3.92	Peak	152	264
3	8569.00	39.21	54.00	-14.79	29.38	9.83	Average	134	328
4	8569.00	51.60	74.00	-22.40	41.77	9.83	Peak	134	328
<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>									

### 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>.

### **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 District, Tao Yuan City  
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 District, Tao Yuan  
City 333, Taiwan, R.O.C..

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

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