

FCC Co-Location Test Report

FCC ID : NKRDAXA-GO1

Equipment : 802.11ac 3*3 PCle module

Model No. : DAXA-GO1

Brand Name : WNC

Applicant : Wistron NeWeb Corporation

Address : 20 Park Avenue II, Hsinchu Science Park,

Hsinchu 308, Taiwan, R.O.C.

Standard : 47 CFR FCC Part 15.247

47 CFR FCC Part 15.407

Received Date : Mar. 02, 2016 Tested Date : Jun. 08, 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.

Testing Laboratory 2732

Reviewed by: Approved by:

Along Chen / Assistant Manager Gary Chang / Manager

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Release Record

Report No.	Version	Description	Issued Date
FR421702-01	Rev. 01	Initial issue	Nov. 16, 2016
FR421702-01	Rev. 02	Removed antenna gain of 5250 ~ 5350 and 5470 ~ 5725 MHz band	Nov. 18, 2016

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Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d)			
15.407(b)	Radiated Emissions	[dBuV/m at 3m]: 196.79MHz 42.40 (Margin -1.10dB) – QP	Pass
15.209			

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1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information							
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	Data Rate / MCS		
5150-5250	а	5180-5240	36-48 [4]	3	6-54 Mbps		
5150-5250	n (HT20)	5180-5240	36-48 [4]	3	MCS 0-23		
5150-5250	n (HT40)	5190-5230	38-46 [2]	3	MCS 0-23		
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	3	MCS 0-9		
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	3	MCS 0-9		
5150-5250	ac (VHT80)	5210	42 [1]	3	MCS 0-9		

Note 1: RF output power specifies that Maximum Conducted Output Power.

Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

RF General Information						
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N_{TX})	Data Rate / MCS	
5725-5850	а	5745-5825	149-165 [5]	3	6-54 Mbps	
5725-5850	n (HT20)	5745-5825	149-165 [5]	3	MCS 0-23	
5725-5850	n (HT40)	5755-5795	151-159 [2]	3	MCS 0-23	
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	3	MCS 0-9	
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	3	MCS 0-9	
5725-5850	ac (VHT80)	5775	155 [1]	3	MCS 0-9	

Note 1: RF output power specifies that Maximum Conducted Output Power.

Note 2: 802.11a/n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.

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1.1.2 Specific platform Information

Brand Name	Model Name	Product Name	Description
Google	GFRG210	Platform	With HDD, with bracket
Google	Google GFRG200 Platform		Without HDD, with bracket
Google	GFRG200	Fiationii	Without HDD, without bracket

Above platforms contain 2 certified wireless modules.

One is FCC ID: NKRDAXA-GO1(EUT), the other is FCC ID: NKRDNXA-GO1.

Note: Above platforms support simultaneous transmission and separation distance of simultaneous transmitting antennas is less than 20 cm thus evaluation of co-location is required.

1.1.3 Antenna Details of Specific platform

2.4G

Brand	Ant. No.	Model	Туре	Gain (dBi)	Connector
ethertronics	1	1002302	Printed	2.19	UFL
	2	1002303	Printed	3.33	UFL
	3	1002304	Printed	4.21	UFL

Note: Above antennas are certified with wireless modules, FCC ID: NKRDNXA-GO1

5G

Ant.	Ant. Model Type		Type Operating Frequencies (MHz) / Antenna Gain (dBi)				
No.	Woder	Турс	5150~5250	5725-5850	Connector		
1	1002299	Printed	3.88	4.2	UFL		
2	1002300	Printed	2.62	4.02	UFL		
3	1002301	Printed	4.16	3.43	UFL		

Note: Above antennas are certified with wireless modules, FCC ID: NKRDAXA-GO1

1.1.4 Accessories of Specific platform

	Accessories					
No.	Equipment	Description				
1	AC adapter	Brand Name: Google Model Name: PB-1600-29 Power Rating: I/P: 100-120Vac, 50-60Hz, 2.0A O/P: 12Vdc, 5A DC 1.75m non-shielded cable w/o core				
2	AC adapter	Brand Name: Google Model Name: OTD018 Power Rating: I/P: 100-120Vac, 50-60Hz, 2.0A O/P: 12Vdc, 5A DC 1.75m non-shielded cable w/o core				

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1.2 The Equipment List

Test Item	Radiated Emission						
Test Site	966 chamber 2 / (03CH02-WS)						
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until		
Spectrum Analyzer	R&S	FSV40	101499	Dec. 17, 2015	Dec. 16, 2016		
Receiver	R&S	ESR3	101657	Jan. 12, 2016	Jan. 11, 2017		
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-523	Nov. 09, 2015	Nov. 08, 2016		
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Oct. 07, 2015	Oct. 06, 2016		
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016		
Preamplifier	Burgeon	BPA-530	100218	Nov. 03, 2015	Nov. 02, 2016		
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. 10, 2015	Dec. 09, 2016		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 10, 2015	Dec. 09, 2016		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 10, 2015	Dec. 09, 2016		
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 10, 2015	Dec. 09, 2016		
LF cable 10M	EMCC	CFD400-E	CFD400-001	Dec. 10, 2015	Dec. 09, 2016		
Measurement Software	AUDIX	e3	6.120210g	NA	NA		

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 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 ≤ 1GHz	±3.87 dB			
Radiated emission > 1GHz	±5.60 dB			

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2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH02-WS	23°C / 62%	Vincent Yeh

FCC site registration No.: 181692IC site registration No.: 10807A-2

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Channel	Data Rate	Test Configuration
Radiated Emissions	2.4G 11n 20 + 5G 11ac VHT40	CH6 + CH46	MCS 0 + MCS 0	1, 2, 3

Note:

1) 2 AC adapters are used for this device. After pre-test, **AC adapter 2** was the worst case and was selected for final testing.

2) The selected channel is the maximum power channel of each Wi-Fi module.

3) Test Configurations are listed as follows:

Test Configuration 1: Platform GFRG210, with HDD, with bracket

Test Configuration 2: Platform GFRG200, without HDD, with bracket

Test Configuration 3: Platform GFRG200, without HDD, without bracket

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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

- 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 a height of 0.8 m test table above the ground plane.
- 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.

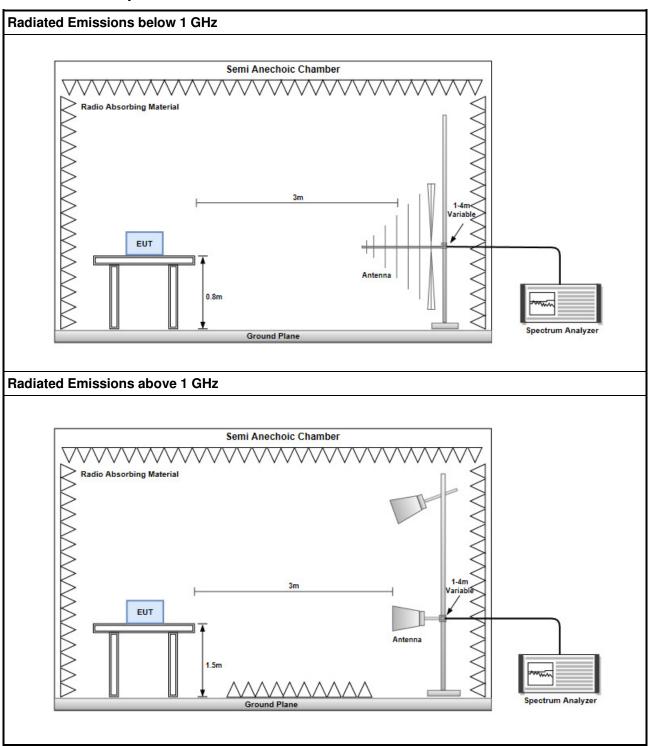
Note:

- 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.

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3.1.3 Test Setup

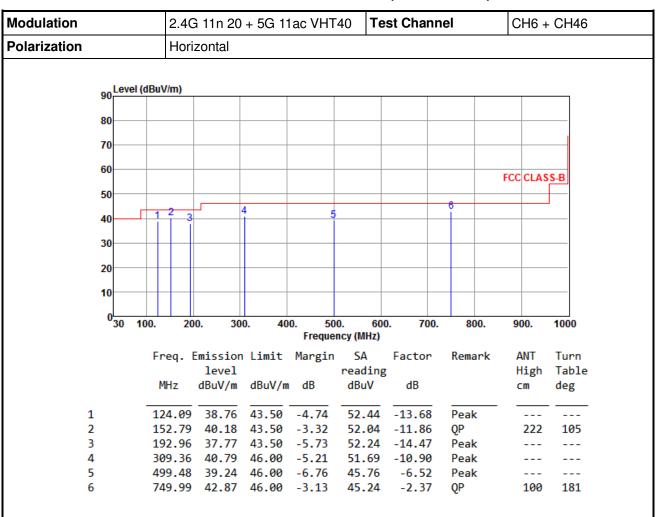


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Test Configuration 1:

3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



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.

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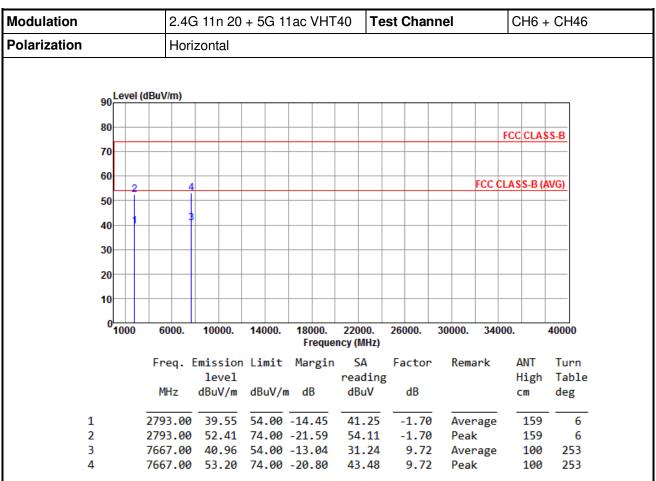
Modulation		2.4G	i 11n 20	+ 5G 11	lac VHT	40 T	est Chanı	nel	CH6 +	CH46
Polarization		Verti	cal							
90 80 70 60 50 40	evel (dBu\	<u>I</u>			C)				FCC CLAS	S-B
0 <mark>3</mark>	0 100.	20	0. 30	0. 40		0. 60 ncy (MHz)	00. 700.	. 800.	900.	1000
	Fr	eq. E	mission	Limit	-	SA	Factor	Remark	ANT	Turn
	М	Hz	level dBuV/m	dBuV/m	dB	readin dBuV	g dB		High cm	Table deg
1	3	0.00	36.98	40.00	-3.02	49.80	-12.82	QP QP	100	2
2	4	9.21	31.25	40.00	-8.75	42.91	-11.66	QP	100	82
3			40.48				-11.87	QP	100	36
4			38.67				-14.45	Peak		
5			40.53				-6.52	Peak		
6	72	0.64	42.86	46.00	-3.14	45.71	-2.85	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.

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3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)



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).

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2

3

Modulation		2.40	3 11n 20	+ 5G 1	1ac VHT	T 40 T 6	est Chan	nel		CH6	+ CH46
Polarization		Vert	ical			•				•	
	90 Leve	l (dBuV/m)									
	80									FCC CLA	SS-B
	70										
	60										
	00	4							FCC C	LASS-B	(AVG)
	50	2									
	40	3									
	30										
	20										
	10										
	⁰ 1000	6000.	10000.	14000.	18000. Freque	22000. ency (MHz)	26000.	30000.	340	00.	40000
		Frea.	Emission	Limit			Factor	Rem	ark	ANT	Turn
		4.	level		- B-11	readin				High	
		MHz	dBuV/m	dBuV/m	ı dB	dBuV	dB			cm	deg
	1	2702 00	25.22	<u></u>	10.67	27.02	4.70			100	
	1	2/93.00	35.33	54.00	-10.6/	37.03	-1.70	Ave	rage	100	54

-1.70 Peak

9.72

9.72

31.33

44.00

Average

Peak

100

100

100

54

83

83

2793.00 47.76 74.00 -26.24 49.46

7667.00 41.05 54.00 -12.95

7667.00 53.72 74.00 -20.28

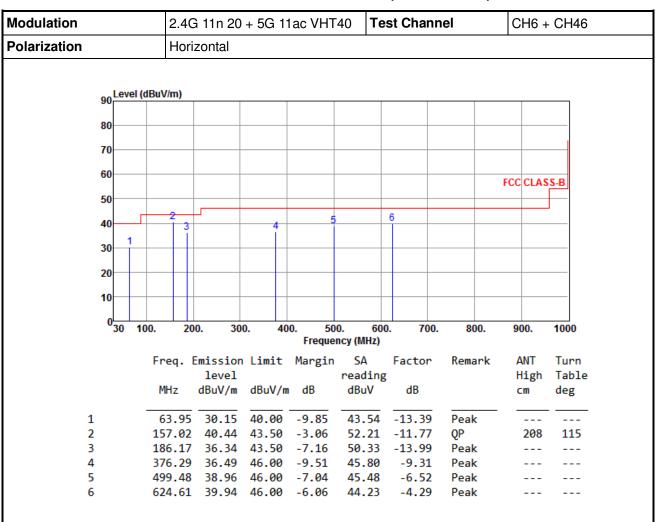
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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Test Configuration 2:

3.1.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)



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.

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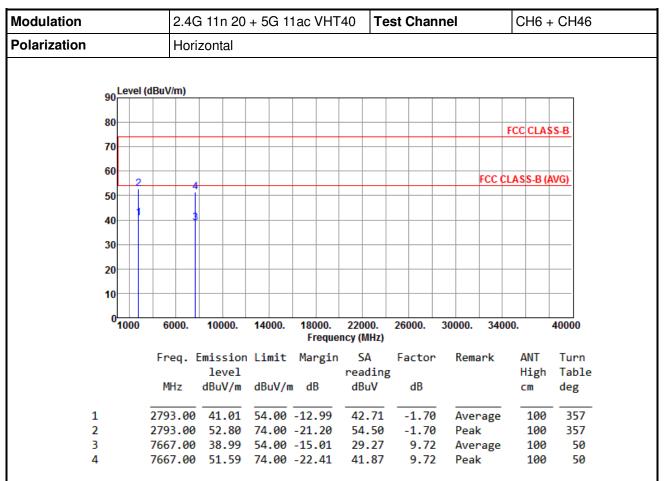
Modulation	2.4G 11n 20) + 5G 11ac VHT40	Test Chani	nel	CH6 +	CH46
Polarization	Vertical		•		•	
90 Level 80 70 60 50 40 30	(dBuV/m)	5	6		FCC CLAS	S-B
10	00. 200. 30	00. 400. 500.	600. 700.	800.	900.	1000
		Frequenc				
	level		SA Factor eading dBuV dB	Remark	ANT High cm	Turn Table deg
1 2	48.87 31.55 157.04 40.40		43.22 -11.67 52.17 -11.77	QP QP	100 100	151 35
3	184.23 35.87		49.65 -13.78	Peak		
4		46.00 -11.09	46.11 -11.20	Peak		
5			47.23 -6.52	Peak		
6	624.61 38.65	46.00 -7.35	42.94 -4.29	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.

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3.1.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)



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).

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3

4

Modulation			2.40	G 11n 20	+ 5G 1	1ac VHT	40 T	est Chan	nel		CH	16 + CH
Polarization			Ver	ical							•	
	90 Level (dBuV/m)											
	90	1011	<u>abaviii,</u>									
	80										FCC (N A C C D
	70										FCC	CLASS-B
	60	2								FCC C	LASS	-B (AVG)
	50	Ŧ										
	40	1		3								
	30											
	30											
	20											
	10											
	_											
	010	000	6000.	10000.	14000.	18000. Freque	22000. ency (MHz)	26000.	30000.	340	00.	4000
			Freq.	Emission	Limit	Margin	SA	Factor	Rema	ark	ΑN	IT Tu
				level			reading				Hi	igh Ta
			MHz	dBuV/m	dBuV/n	ı dB	dBuV	dB			cn	n de
	1		2793.00	39.40	54.00	-14.60	41.10	-1.70	Ave	rage	-3	320
	2			52.84								320

30.04

Peak

Average

9.72

9.72

331

331

255

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).

7667.00 39.76 54.00 -14.24

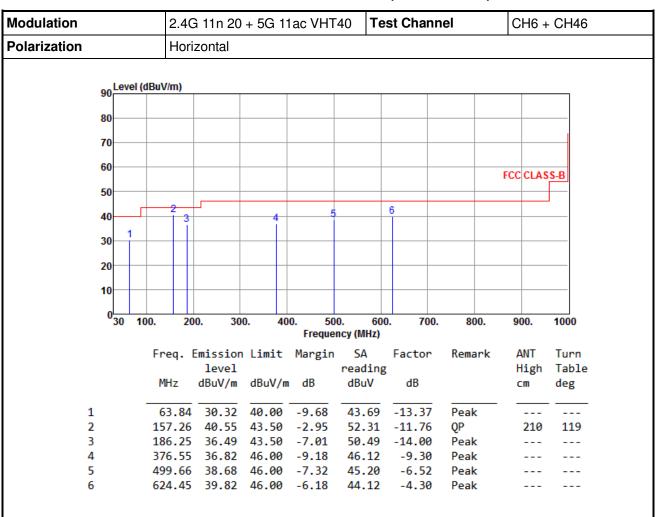
7667.00 52.82 74.00 -21.18 43.10

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Test Configuration 3:

3.1.8 Transmitter Radiated Unwanted Emissions (Below 1GHz)



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

*Factor includes antenna factor, cable loss and amplifier gain

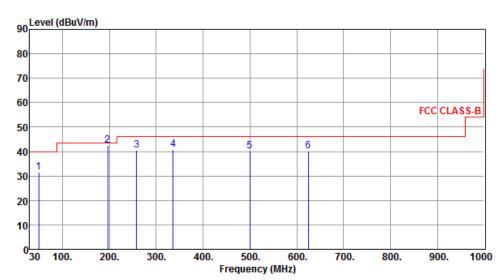
Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

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

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Modulation	2.4G 11n 20 + 5G 11ac VHT40	Test Channel	CH6 + CH46
Polarization	Vertical		



	Freq.	Emission level dBuV/m			SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	49.44	31.65	40.00	-8.35	43.32	-11.67	OP	100	160
2	196.79			-1.10		-14.57	QP	100	52
3	258.51	40.46	46.00	-5.54	53.03	-12.57	QP	100	104
4	336.52	40.90	46.00	-5.10	51.22	-10.32	Peak		
5	499.48	40.09	46.00	-5.91	46.61	-6.52	Peak		
6	624.61	40.25	46.00	-5.75	44.54	-4.29	Peak		

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

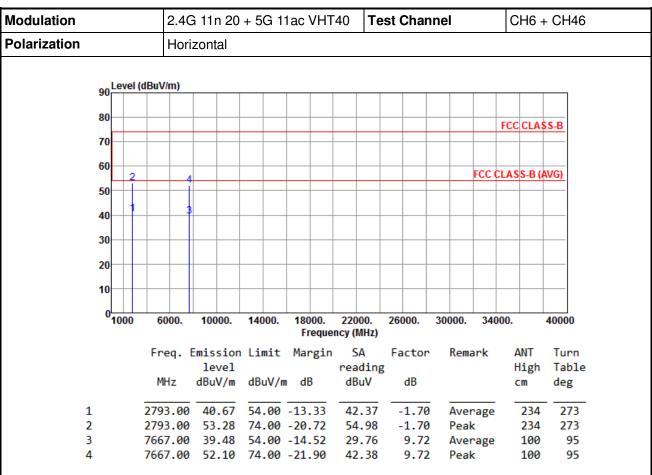
*Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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

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3.1.9 Transmitter Radiated Unwanted Emissions (Above 1GHz)



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).

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3

4

Modulation			2.40	G 11n 20	+ 5G 1	1ac VH1	-40 Te	est Chani	nel	CH6	+ CH46
Polarization		Vertical									
	oo L	.evel	(dBuV/m)								
	30										
	80	+								FCC CLA	ASS-B
	70										
	60										
	ļ	2	 	•					FCC	CLASS-B	(AVG)
	50	ΤŢ									
	40	+		8							
	30										
	20										
	10	\top									
	01	000	6000.	10000.	14000.	18000. Freque	22000. ency (MHz)	26000.	30000. 3	4000.	40000
			Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn
				level			reading			High	
			MHz	dBuV/m	dBuV/n	ı dB	dBuV	dB		cm	deg
	1		2793.00	37.52	54.00	-16.48	39.22	-1.70	Averag	e 332	356
	2		2793.00	49.59	74.00	-24.41	51.29	-1.70	Peak	332	356

29.41

41.67

9.72

9.72

Average

Peak

100

100

189

189

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

*Factor includes antenna factor, cable loss and amplifier gain

7667.00 39.13 54.00 -14.87

7667.00 51.39 74.00 -22.61

*Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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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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