

FCC Co-Location Test Report

| FCC ID | : | NKRDNXA-GO1 |
|---------------|---|---|
| Equipment | : | 802.11 b/g/n 3*3 PCIe module |
| Model No. | : | DNXA-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 | : | Feb. 17, 2014 |
| Tested Date | : | Apr. 23 ~ May 02, 2014 |
| | | |

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 |
|-------------|---------|---------------|---------------|
| FR421101-02 | Rev. 01 | Initial issue | Jun. 06, 2014 |



Summary of Test Results

| FCC Rules | Test Items | Measured | Result |
|-----------|--------------------|--|--------|
| 15.247(d) | | | |
| 15.407(b) | Radiated Emissions | [dBuV/m at 3m]: 874.87MHz 39 86 (Margin -6 14dB) – PK | Pass |
| 15.209 | | | |



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 (Ν _{τx}) | Data Rate / MCS | |
| 2400-2483.5 | b | 2412-2462 | 1-11 [11] | 3 | 1-11 Mbps | |
| 2400-2483.5 | g | 2412-2462 | 1-11 [11] | 3 | 6-54 Mbps | |
| 2400-2483.5 | n (HT20) | 2412-2462 | 1-11 [11] | 3 | MCS 0-23 | |
| 2400-2483.5 | n (HT40) | 2422-2452 | 3-9 [7] | 3 | MCS 0-23 | |

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation. Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

1.1.2 Specific platform Information

| Brand Name | Model Name | Product Name | Description |
|------------|------------|--------------|--|
| Google | GFRG210 | Platform | The platform contains 2 certified wireless modules. One is FCCID: NKRDNXA-GO1 (EUT), the other is FCC ID: NKRDAXA-GO1. |

Note: The platform supports 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. | Model | Туре | Operating | Connector | | | |
|------|---------|---------|-----------|-----------|-----------|-----------|-----------|
| No. | model | Type | 5150~5250 | 5250~5350 | 5470~5725 | 5725-5850 | Connector |
| 1 | 1002299 | Printed | 3.88 | 3.5 | 4.33 | 4.2 | UFL |
| 2 | 1002300 | Printed | 2.62 | 3.16 | 2.46 | 4.02 | UFL |
| 3 | 1002301 | Printed | 4.16 | 4.23 | 3.65 | 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 | | | |



1.2 The Equipment List

| Test Item | Radiated Emission | | | | | | |
|-------------------------|----------------------------|---|------------------|---------------|---------------|--|--|
| Test Site | 966 chamber1 / (03CH01-WS) | | | | | | |
| Instrument | Manufacturer | ufacturer Model No. Serial No. Calibration Date Calibration Until | | | | | |
| Spectrum Analyzer | R&S | FSV40 | 101498 | Jan. 25, 2014 | Jan. 24, 2015 | | |
| Receiver | R&S | ESR3 | 101658 | Jan. 10, 2014 | Jan. 09, 2015 | | |
| Bilog Antenna | SCHWARZBECK | VULB9168 | VULB9168-522 | Jan. 02, 2014 | Jan. 01, 2015 | | |
| Horn Antenna 1G-18G | SCHWARZBECK | BBHA 9120 D | BBHA 9120 D 1096 | Feb. 13, 2014 | Feb. 12, 2015 | | |
| Horn Antenna 18G-40G | SCHWARZBECK | BBHA 9170 | BBHA 9170517 | Dec. 27, 2013 | Dec. 26, 2014 | | |
| Preamplifier | Burgeon | BPA-530 | SN:100219 | Nov. 28, 2013 | Nov. 27, 2014 | | |
| Preamplifier | Agilent | 83017A | MY39501308 | Dec. 16, 2013 | Dec. 15, 2014 | | |
| Preamplifier | EM | EM18G40G | 060572 | Jun. 20, 2013 | Jun. 19, 2014 | | |
| RF Cable | HUBER+SUHNER | SUCOFLEX104 | MY16014/4 | Dec. 16, 2013 | Dec. 15, 2014 | | |
| RF Cable | HUBER+SUHNER | SUCOFLEX104 | MY16019/4 | Dec. 16, 2013 | Dec. 15, 2014 | | |
| RF Cable | HUBER+SUHNER | SUCOFLEX104 | MY16139/4 | Dec. 16, 2013 | Dec. 15, 2014 | | |
| LF cable 3M | Woken | CFD400NL-LW | CFD400NL-001 | Dec. 16, 2013 | Dec. 15, 2014 | | |
| LF cable 10M | Woken | CFD400NL-LW | CFD400NL-002 | Dec. 16, 2013 | Dec. 15, 2014 | | |
| Note: Calibration Inte | rval of instruments liste | d above is one year. | | | | | |

| Loop Antenna | R&S | HFH2-Z2 | 100330 | Nov. 15, 2012 | Nov. 14, 2014 | |
|---|-----|---------|--------|---------------|---------------|--|
| Note: Calibration Interval of instruments listed above is two 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 C63.10-2009 FCC KDB 789033 D01 General UNII Test procedures v01r03 FCC KDB 558074 D01 DTS Meas Guidance v03r01

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 | ±3.26 dB | | | |
| Radiated emission > 1GHz | ±4.94 dB | | | |



2 Test Configuration

2.1 Testing Condition

| Test Item | Test Site | Ambient Condition | Tested By |
|--------------------|-----------|-------------------|-------------------------|
| Radiated Emissions | 03CH01-WS | 22-25°C / 62-67% | Mark Liao Aska Huang |

➢ FCC site registration No.: 657002

➢ IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

| Test item | Modulation Mode | Test Channel | Data rate (Mbps) / MCS | Test Configuration | | | | | |
|---|-----------------|--------------|---------------------------|-----------------------|--|--|--|--|--|
| Radiated Emissions 2.4G 11n 20 + 5G 11ac VHT40 CH6 + CH159 MCS 0 + MCS 0 | | | | | | | | | |
| 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 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 a height of 0.8 m test table above the ground plane.
- 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





| Modulation | 2.4G 11n 20 + 5G 11ac VHT40 Test Channel CH6 + CH159 | | | | | | | | | | |
|--|---|-------------------------------------|-------------------------------|----------------------|------------|--|--|--|--|--|--|
| Polarization | Horizontal | Horizontal | | | | | | | | | |
| Lovel (dBu) | ((m)) | | | | | | | | | | |
| 80 Ever (dBuy | /////) | | | | | | | | | | |
| 70 | | | | | | | | | | | |
| 60 | | | | | | | | | | | |
| 50 | | | | | FUCULASS-B | | | | | | |
| | | 0 | | 4 | 5 6 | | | | | | |
| 40 | | | 3 | Ī | | | | | | | |
| 30 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 0 <mark> </mark> | 200. 30 | 0. 400. 500 Frequer |). 600. icy (MHz) | 700. 800. | 900. 1000 | | | | | | |
| Fr | eq. Emission | Limit Margin | SA Fac | tor Remark | ANT Turn | | | | | | |
| M | level | dBuV/m dB | reading dBuV d | B | High Table | | | | | | |
| | ubuv/m | | | | | | | | | | |
| 1 33 | 0.70 36.07 | 46.00 -9.93 | 51.56 -15 | .49 Peak | | | | | | | |
| 2 42 | 37.75 36.78 | 46.00 -9.22 | 46.62 -9 | .11 Peak .84 Peak | | | | | | | |
| 4 74 | 9.74 39.23 | 46.00 -6.77 | 46.47 -7 | .24 Peak | | | | | | | |
| 5 87 | 4.87 39.86 | 46.00 -6.14 | 45.69 -5 | .83 Peak | | | | | | | |
| 6 100 | 0.00 39.94 | 54.00 -14.06 | 44.38 -4 | .44 Peak | | | | | | | |
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| Note 1: Emission Level (dE *Factor includes ant | BuV/m) = SA F enna factor , | Reading (dBuV/n cable loss and a | n) + Factor* mplifier gain | (dB) | | | | | | | |
| Note 2: Margin (dB) = Emis | ssion level (dE | BuV/m) – Limit (o | IBuV/m). | | | | | | | | |

3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



| Modulation | 2.4G 11n 20 + 5G 11ac VHT40 Test Channel CH6 + CH159 | | | | | | | | | |
|--|---|--|--------------------------------|--------|-------------------|-----------|--|--|--|--|
| Polarization | Vertical | | | | | | | | | |
| en Level (dBi | ıV/m) | | | | | | | | | |
| 80 | | | | | | | | | | |
| 70 | | | | | | | | | | |
| 60 | | | | | | | | | | |
| | | | | F | CC CLASS-B | | | | | |
| 50 | | | | | | | | | | |
| 40 | | 2 | 3 | 4 8 | 5 | | | | | |
| 1 | | 1 | | | | | | | | |
| 50 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 10 | | | | | | | | | | |
| | | | | | | | | | | |
| 0 <mark></mark> | 200. 30 | 0. 400. 500. | 600. 700. | 800. | 900. 100 | 00 | | | | |
| - | | Frequency | (MHz) | | | | | | | |
| F | req. Emission | Limit Margin | SA Factor | Remark | ANI Iu High Ta | rn ble | | | | |
| | MHz dBuV/m | dBuV/m dB d | IBuV dB | | cm de | g | | | | |
| | | | | | 3 <u>1 - 1</u> 73 | | | | | |
| 1 | 93.05 31.63 | 43.50 -11.87 5 | 4.27 -22.64 | Peak | | | | | | |
| 2 4 | 23.82 35.15 | 46.00 -10.85 4 | 8.26 -13.11 | Peak | | | | | | |
| 4 7 | 49.74 39.03 | 46.00 -6.97 4 | 6.27 -7.24 | Peak | | | | | | |
| 5 8 | 74.87 38.90 | 46.00 -7.10 4 | 4.73 -5.83 | Peak | | | | | | |
| 6 10 | 00.00 41.10 | 54.00 -12.90 4 | 5.54 -4.44 | Peak | | | | | | |
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| Note 1: Emission Level (d *Factor includes an | BuV/m) = SA F | Reading (dBuV/m) cable loss and ami | + Factor* (dB) olifier gain | | | | | | | |
| Note 2: Margin (dB) = Em | ission level (dE | BuV/m) – Limit (dB | uV/m). | | | | | | | |
| vote z. waryin $(ub) = Em$ | | | u v/III). | | | | | | | |





3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)



| Modulation | | | 2.4G 11n 20 + 5G 11ac VHT40 Test Channel CH6 + CH159 | | | | | | | | | 159 | | | | | | | |
|--|-------|--------|---|---------------|-----------|----------------|-----------|---------------|--------------|-------------|------|------|------|------------|-------|------|----------|-------------|----|
| Polarization | | | Vertical | | | | | | | | | | | | | | | | |
| 80 | .evel | (dBuV | //m) | | | | | | | | | | | | | | | | |
| | | | | | | _ | | | | | | | | | | FCC | CLAS | S-B | |
| 70- | - | | | | | | | | | | | | | | | | | | |
| 60- | - | | | | | _ | | | | | | | | | FCC (| CLAS | S-B (# | WG) | |
| 50- | | 2 | | | | | | | | | | | | | | | | | |
| 40- | _ | Ī. | | 3 | | | | | | | | | | | | | | | |
| 30- | | 1 | | | | | | | | | | | | | | | | | |
| 20- | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 0 <mark>-</mark> 1 | 000 | 6 | 000. | 10000 |). 1 | 4000. | 180 Fi |)00. reque | 220 ncv (| 00. MHz) | 260 | 000. | 3000 | 00. | 340 | 00. | | 40000 | |
| | | Fr | eq. | Emissi | on l | .imit | Ма | rgin | 2 | Α | Fa | ctor | R | ema | rk | А | NT | Turi | n |
| | | м | H7 | leve dBuV/ | el mo | IBuV/r | n di | B | rea dF | ding uV | ţ | dB | | | | H | igh m | Tab. deg | le |
| | | | | | | | | | | | | | | | | _ | | | |
| 1 | | 335 | 8.00 8.00 | 32.5 | 65 197 | 54.00 74.00 | -21 | .44 | 33 45 | .10 | - | 0.54 | L A | ver eak | age | | | | - |
| 3 | | 823 | 2.00 | 41.0 | 8 5 | 54.00 | -12 | .92 | 30 | .59 | 1 | 0.49 | Α | ver | age | | | | - |
| 4 | | 823 | 2.00 | 52.2 | 7 7 | 74.00 | -21 | .73 | 41 | .78 | 1 | 0.49 | P | eak | | | | | - |
| | | | | | | | | | | | | | | | | | | | |
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| Note 1: Emission L | .eve | el (dB | uV/n | ר) = S | A Re | ading | g (dE | BuV/r | m) + | Fac | tor* | (dB |) | | | | | | |
| *Factor includes antenna factor, cable loss and amplifier gain | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |



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 <u>http://www.icertifi.com.tw</u>.

| Linkou | Kwei Shan |
|--|---|
| Tel: 886-3-2601-1640 | Tel: 886-3-271-8666 |
| No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C. | No. 3-1, Lane 6, 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

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==END===