

# TEST REPORT

Report number : Z101C-14069

Issue date : October 14, 2014

The device, as described herewith, was tested pursuant to applicable test procedure and complies with the requirements of;

## FCC Part15 Subpart E

The test results are traceable to the international or national standards.

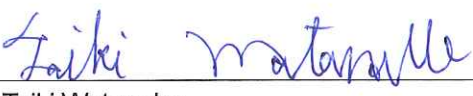
|                            |                       |
|----------------------------|-----------------------|
| Applicant                  | : KYOCERA Corporation |
| Equipment under test (EUT) | : Mobile Phone        |
| Model number               | : KYV31               |
| FCC ID                     | : JOYKYV31            |

|              |                                                                                                                                                                    |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date of test | : September 11, 12, 13, 20, 23, 2014                                                                                                                               |
| Test place   | : TÜV SÜD Zacta Ltd. Yonezawa Testing Center<br>4149-7 Hachimanpara 5-chome<br>Yonezawa-shi Yamagata 992-1128 Japan<br>Phone: +81-238-28-2880 Fax: +81-238-28-2888 |
| Test results | : Complied                                                                                                                                                         |

The results in this report are applicable only to the equipment tested.

This report shall not be re-produced except in full without the written approval of TÜV SÜD Zacta Ltd.

This test report must not be used by client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Tested by :   
Taiki Watanabe

Authorized by :   
Eiji Akiba  
Deputy General Manager of EMC Technical Department

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## 1. Summary of Test

### 1.1 Purpose of test

It is the original test in order to verify conformance to FCC Part 15 Subpart E.

### 1.2 Standards

CFR47 FCC Part 15 Subpart E

#### 1.2.1 Test Methods

ANSI C63.4-2003, KDB789033

#### 1.2.2 Deviation from standards

None

### 1.3 List of applied test to the EUT

| Test items<br>Section         | Test items                                            | Condition | Result |
|-------------------------------|-------------------------------------------------------|-----------|--------|
| 15.407(a)                     | 26dB Bandwidth                                        | Conducted | N/A *  |
| 15.407(a)                     | Maximum Conducted Output Power                        | Conducted | N/A *  |
| 15.407(a)                     | Peak Power Spectral Density                           | Conducted | N/A *  |
| 15.407(a)                     | Peak Excursion                                        | Conducted | N/A *  |
| 15.407(b)<br>15.205<br>15.209 | Radiated emissions<br>(Restricted Bands of Operation) | Radiated  | PASS   |
| 15.407(g)                     | Frequency Stability                                   | Conducted | N/A *  |
| 15.207                        | AC Power Line Conducted Emissions                     | Conducted | N/A *  |

\*: Since there is no change in Module from FCC ID: JOYKYY23, only the Radiated test items were performed.

#### 1.3.1 Test set up

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### 1.4 Modification to the EUT by laboratory

None

## 2. Equipment Under Test

### 2.1 General Description of equipment

EUT is the Mobile Phone.

### 2.2 EUT information

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant                 | : KYOCERA Corporation<br>Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan<br>Phone: +81-45-943-6253 Fax: +81-45-943-6314                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Equipment under test      | : Mobile Phone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Trade name                | : Kyocera                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Model number              | : KYV31                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Serial number             | : N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| EUT condition             | : Pre-Production                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Power ratings             | : Battery: DC 3.8V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Size                      | : (W) 70.4 × (D) 9.9 × (H) 141.0 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Environment               | : Indoor and Outdoor use                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Terminal limitation       | : -20°C to 60°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| RF Specification Protocol | : IEEE802.11a,<br>IEEE802.11n (HT20), IEEE802.11n (HT40)<br>IEEE802.11ac (HT20), IEEE802.11ac (HT40), IEEE802.11ac (HT80)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Frequency range           | : IEEE802.11a/n/ac (HT20): 5180MHz-5320MHz, 5500MHz-5700MHz<br>IEEE802.11n/ac(HT40): 5190MHz-5310MHz, 5510MHz-5670MHz<br>IEEE802.11ac(HT80): 5210MHz, 5290MHz, 5530MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Number of RF Channels     | : IEEE802.11a/n/ac (HT20): 16 Channels<br>IEEE802.11n/ac(HT40): 7 Channels<br>IEEE802.11ac(HT80): 3 Channels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Modulation type           | : IEEE802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Data rate                 | : IEEE802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>IEEE802.11n (HT20 LGI): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps<br>IEEE802.11n (HT20 SGI): 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2Mbps<br>IEEE802.11ac (HT20 LGI): 6.5, 13, 19.5, 26, 39, 52, 58.5, 65, 78, 86.5Mbps<br>IEEE802.11ac (HT20 SGI): 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2, 86.6, 96.1Mbps<br>IEEE802.11n (HT40 LGI): 13.5, 27, 40.5, 54, 81, 108, 121.5, 135Mbps<br>IEEE802.11n (HT40 SGI): 15, 30, 45, 60, 90, 120, 135, 150Mbps<br>IEEE802.11ac (HT40 LGI): 13.5, 27, 40.5, 54, 81, 108, 121.5, 135, 162, 180Mbps<br>IEEE802.11ac (HT40 SGI): 15, 30, 45, 60, 90, 120, 135, 150, 180, 200Mbps<br>IEEE802.11ac (HT80 LGI): 29.3, 58.5, 87.8, 117, 175.5, 234, 263.3, 292.6, 351, 390Mbps<br>IEEE802.11ac (HT80 SGI): 32.5, 65, 97.5, 130, 195, 260, 292.5, 325, 390, 433.3Mbps |

Channel separation : IEEE802.11a/n/ac (HT20): 20MHz  
 IEEE802.11n/ac (HT40): 40MHz  
 IEEE802.11ac (HT80): 80MHz

Antenna type : Internal antenna

Antenna gain : 5180MHz-5320MHz: -0.5dBi  
 5500MHz-5700MHz: -0.3dBi

## 2.3 Variation of the family model(s)

Not applicable

## 2.4 Operating channels and frequencies

### [IEEE802.11a/n/ac (HT20)]

| Channel | Frequency [MHz] |
|---------|-----------------|
| 36      | 5180            |
| 40      | 5200            |
| 44      | 5220            |
| 48      | 5240            |
| 52      | 5260            |
| 56      | 5280            |
| 60      | 5300            |
| 64      | 5320            |
| 100     | 5500            |
| 104     | 5520            |
| 108     | 5540            |
| 112     | 5560            |
| 116     | 5580            |
| 132     | 5660            |
| 136     | 5680            |
| 140     | 5700            |

### [IEEE802.11n/ac (HT40)]

| Channel | Frequency [MHz] |
|---------|-----------------|
| 38      | 5190            |
| 46      | 5230            |
| 54      | 5270            |
| 62      | 5310            |
| 102     | 5510            |
| 110     | 5550            |
| 134     | 5670            |

### [IEEE802.11ac (HT80)]

| Channel | Frequency [MHz] |
|---------|-----------------|
| 42      | 5210            |
| 58      | 5290            |
| 106     | 5530            |

## 2.5 Operating mode

The EUT had been tested under operating condition.  
There are three channels have been tested as following:

| Band        | IEEE802.11a/n/ac (HT20) |                 | IEEE802.11n/ac (HT40) |                 | IEEE802.11ac (HT80) |                 |
|-------------|-------------------------|-----------------|-----------------------|-----------------|---------------------|-----------------|
|             | Channel                 | Frequency [MHz] | Channel               | Frequency [MHz] | Channel             | Frequency [MHz] |
| 5.2GHz Band | 36                      | 5180            | 38                    | 5190            | 42                  | 5210            |
|             | 40                      | 5200            | -                     | -               | -                   | -               |
|             | 48                      | 5240            | 46                    | 5230            | -                   | -               |
| 5.3GHz Band | 52                      | 5260            | 54                    | 5270            | 58                  | 5290            |
|             | 56                      | 5280            | -                     | -               | -                   | -               |
|             | 64                      | 5320            | 62                    | 5310            | -                   | -               |
| 5.6GHz Band | 100                     | 5500            | 102                   | 5510            | 106                 | 5530            |
|             | 116                     | 5580            | 110                   | 5550            | -                   | -               |
|             | 140                     | 5700            | 134                   | 5670            | -                   | -               |

The pre-test has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

| Band        | Modulation Type           | Data Rate       |
|-------------|---------------------------|-----------------|
| 5.2GHz Band | IEEE802.11a: OFDM         | 6Mbps           |
|             | IEEE802.11n (HT20): OFDM  | MCS0 (6.5Mbps)  |
|             | IEEE802.11n (HT40): OFDM  | MCS0 (13.5Mbps) |
|             | IEEE802.11ac (HT80): OFDM | MCS0 (29.3Mbps) |
| 5.3GHz Band | IEEE802.11a: OFDM         | 6Mbps           |
|             | IEEE802.11n (HT20): OFDM  | MCS0 (6.5Mbps)  |
|             | IEEE802.11n (HT40): OFDM  | MCS0 (13.5Mbps) |
|             | IEEE802.11ac (HT80): OFDM | MCS0 (29.3Mbps) |
| 5.6GHz Band | IEEE802.11a: OFDM         | 6Mbps           |
|             | IEEE802.11n (HT20): OFDM  | MCS0 (6.5Mbps)  |
|             | IEEE802.11n (HT40): OFDM  | MCS0 (13.5Mbps) |
|             | IEEE802.11ac (HT80): OFDM | MCS0 (29.3Mbps) |

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.

The worst emission was found in Y axis and the worst case recorded.

## 2.6 Operating mode

### [Tx mode]

- Test program setup to the DM tool
- Select a Test mode  
Operating frequency: 5.2GHz Band, 5.3GHz Band, 5.6GHz Band
- Start test mode

### [Rx mode]

- Test program setup to the DM tool
- Select a Test mode  
Operating frequency: 5.2GHz Band, 5.3GHz Band, 5.6GHz Band
- Start test mode



Zacta

### 3. Configuration of equipment

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#### 3.1 Equipment(s) used

| No. | Equipment    | Company | Model No. | Serial No. | FCC ID / DoC | Comment |
|-----|--------------|---------|-----------|------------|--------------|---------|
| 1   | Mobile Phone | KYOCERA | KYV31     | N/A        | JOYKYV31     | EUT     |

#### 3.2 System configuration

1. Mobile Phone  
(EUT)

Note1: Numbers assigned to equipment or cables on this diagram correspond to the list in "3.1 Equipment(s) used".

## 4. Radiated Emissions (Restricted Bands of Operation)

### 4.1 Measurement procedure

[FCC 15.407(b), 15.205, 15.209, KDB789033]

Test was applied by following conditions.

|                           |                                            |
|---------------------------|--------------------------------------------|
| Frequency range           | : 30MHz to 40GHz                           |
| Test place                | : 3m Semi-anechoic chamber                 |
| EUT was placed on         | : FRP table / (W)2.0m × (D)1.0m × (H)0.8m  |
| Antenna distance          | : 3m                                       |
| Test receiver setting     | Below 1GHz                                 |
| - Detector                | : Quasi-peak                               |
| - Bandwidth               | : 120kHz                                   |
| Spectrum analyzer setting | Above 1GHz                                 |
| - Peak                    | : RBW=1MHz, VBW=1MHz, Span=0Hz, Sweep=auto |
| - Average                 | : RBW=1MHz, VBW=10Hz, Span=0Hz, Sweep=auto |
|                           | Display mode=Linear                        |

Radiated emission measurements are performed at 3m distance with the broadband antenna (TRILOG antenna and Double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission.

The EUT is Placed on a turntable, which is 0.8m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

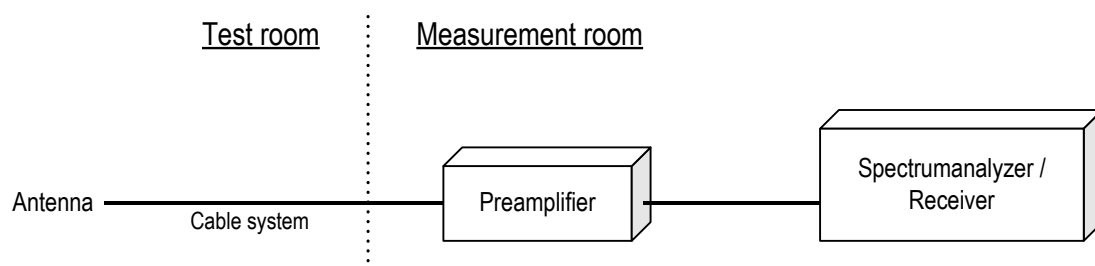
The EUT was set to operate with following conditions.

- 5.2GHz Band, 5.3GHz Band, 5.6GHz Band

The test mode of EUT is as follows.

- Tx mode, Rx mode

- Test configuration



## 4.2 Calculation method

Emission level = Reading + (Ant. factor + Cable system loss – Amp. Gain)

Margin = Limit – Emission level

## 4.3 Limit

- (1) For transmitters operating in the 5.15-5.25GHz band: all emissions outside of the 5.15-5.35GHz band shall not exceed an EIRP of -27dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35GHz band: all emissions outside of the 5.15-5.35GHz band shall not exceed an EIRP of -27dBm/MHz.  
Devices operating in the 5.25-5.35GHz band that generate emissions in the 5.15-5.25GHz band must meet all applicable technical requirements for operation in the 5.15-5.25GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27dBm/MHz in the 5.15-5.25GHz band.
- (3) For transmitters operating in the 5.47-5.725GHz band: all emissions outside of the 5.47 5-5.725GHz band shall not exceed an EIRP of -27dBm/MHz.
- (4) For transmitters operating in the 5.725-5.825GHz band: all emissions within the frequency range from the band edge to 10MHz above or below the band edge shall not exceed an EIRP of -17dBm/MHz; for frequencies 10MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27dBm/MHz.

| Frequency<br>[MHz] | Field strength  |               | Distance<br>[m] |
|--------------------|-----------------|---------------|-----------------|
|                    | [uV/m]          | [dBuV/m]      |                 |
| 0.009-0.490        | 2400 / F [kHz]  | 20logE [uV/m] | 300             |
| 0.490-1.705        | 24000 / F [kHz] | 20logE [uV/m] | 30              |
| 1.705-30           | 30              | 29.5          | 30              |
| 30-88              | 100             | 40.0          | 3               |
| 88-216             | 150             | 43.5          | 3               |
| 216-960            | 200             | 46.0          | 3               |
| Above 960          | 500             | 54.0          | 3               |

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level [dBuV/m] = 20log Emission [uV/m]
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition modulation.

#### 4.4 Test data

|             |                            |               |                       |
|-------------|----------------------------|---------------|-----------------------|
| Date        | : Sep. 11, 2014            |               |                       |
| Temperature | : 25.0 [°C]                |               |                       |
| Humidity    | : 60.8 [%]                 | Test engineer | :                     |
| Test place  | : 3m Semi-anechoic chamber |               | <u>Taiki Watanabe</u> |
| Date        | : Sep. 12, 2014            |               |                       |
| Temperature | : 24.9 [°C]                |               |                       |
| Humidity    | : 49.4 [%]                 | Test engineer | :                     |
| Test place  | : 3m Semi-anechoic chamber |               | <u>Taiki Watanabe</u> |
| Date        | : Sep. 13, 2014            |               |                       |
| Temperature | : 24.9 [°C]                |               |                       |
| Humidity    | : 47.8 [%]                 | Test engineer | :                     |
| Test place  | : 3m Semi-anechoic chamber |               | <u>Taiki Watanabe</u> |
| Date        | : Sep. 20, 2014            |               |                       |
| Temperature | : 21.6 [°C]                |               |                       |
| Humidity    | : 46.7 [%]                 | Test engineer | :                     |
| Test place  | : 3m Semi-anechoic chamber |               | <u>Taiki Watanabe</u> |
| Date        | : Sep. 23, 2014            |               |                       |
| Temperature | : 24.1 [°C]                |               |                       |
| Humidity    | : 40.1 [%]                 | Test engineer | :                     |
| Test place  | : 3m Semi-anechoic chamber |               | <u>Taiki Watanabe</u> |

**[IEEE802.11a]  
(5.2GHz Band)**

| Mode    | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|---------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11a | 36      | 5180            | 5127.72         | V       | PK             | 43.5           | 14.5     |          | 58.0            | 74.0           | 16.0        |
|         |         |                 | 5127.72         | V       | AV             | 31.9           | 14.5     |          | 46.4            | 54.0           | 7.6         |
|         |         |                 | 10360.00        | V       | PK             | 39.2           | 24.9     |          | 64.1            | 68.2           | 4.1         |
|         | 40      | 5200            | 5147.20         | V       | PK             | 43.0           | 14.5     |          | 57.5            | 74.0           | 16.5        |
|         |         |                 | 5147.20         | V       | AV             | 30.7           | 14.5     |          | 45.2            | 54.0           | 8.8         |
|         |         |                 | 10400.00        | V       | PK             | 38.0           | 25.0     |          | 63.0            | 68.2           | 5.2         |
|         | 48      | 5240            | 10480.00        | V       | PK             | 38.8           | 25.0     |          | 63.8            | 68.2           | 4.4         |
|         |         |                 |                 |         |                |                |          |          |                 |                |             |

**(5.3GHz Band)**

| Mode    | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|---------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11a | 52      | 5260            | 10520.00        | V       | PK             | 39.2           | 25.1     |          | 64.3            | 68.2           | 3.9         |
|         | 56      | 5280            | 10560.00        | V       | PK             | 38.5           | 25.1     |          | 63.6            | 68.2           | 4.6         |
|         | 64      | 5320            | 10640.00        | V       | PK             | 39.4           | 25.3     |          | 64.7            | 74.0           | 9.3         |

**(5.6GHz Band)**

| Mode    | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|---------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11a | 100     | 5500            | 5467.65         | V       | PK             | 51.7           | 15.4     |          | 67.1            | 74.0           | 6.9         |
|         |         |                 | 5467.65         | V       | AV             | 28.4           | 15.4     |          | 43.8            | 54.0           | 10.2        |
|         |         |                 | 11000.00        | H       | PK             | 37.6           | 26.1     |          | 63.7            | 68.2           | 4.5         |
|         |         |                 | 11000.00        | V       | PK             | 40.3           | 26.1     |          | 66.4            | 68.2           | 1.8         |
|         | 116     | 5580            | 11160.00        | H       | PK             | 38.0           | 26.5     |          | 64.5            | 68.2           | 3.7         |
|         |         |                 | 11160.00        | V       | PK             | 37.6           | 26.5     |          | 64.1            | 68.2           | 4.1         |
|         |         |                 | 5728.30         | V       | PK             | 51.9           | 16.0     |          | 67.9            | 74.0           | 6.1         |
|         | 140     | 5700            | 5728.30         | V       | AV             | 29.4           | 16.0     |          | 45.4            | 54.0           | 8.6         |
|         |         |                 | 11400.00        | H       | PK             | 37.6           | 26.8     |          | 64.4            | 68.2           | 3.8         |
|         |         |                 | 11400.00        | V       | PK             | 36.9           | 26.8     |          | 63.7            | 68.2           | 4.5         |

Note:

1. Emission Level (Margin) = Limit - [Reading + C.F ( Antenna + Cable – Amp)] + DCF (If transmit duty cycle < 98 percent)
2. DCF = 20log (1/x) , x = On time / (On + Off time)
3. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
4. No emission was detected in the receive mode.

**[IEEE802.11n (HT20)]****(5.2GHz Band)**

| Mode            | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11n (20MHz) | 36      | 5180            | 5127.85         | V       | PK             | 43.7           | 14.5     |          | 58.2            | 74.0           | 15.8        |
|                 |         |                 | 5127.85         | V       | AV             | 31.1           | 14.5     |          | 45.6            | 54.0           | 8.4         |
|                 |         |                 | 10360.00        | V       | PK             | 38.7           | 24.9     |          | 63.6            | 68.2           | 4.6         |
|                 | 40      | 5200            | 5147.20         | V       | PK             | 44.0           | 14.5     |          | 58.5            | 74.0           | 15.5        |
|                 |         |                 | 5147.20         | V       | AV             | 31.5           | 14.5     |          | 46.0            | 54.0           | 8.0         |
|                 |         |                 | 10400.00        | V       | PK             | 38.7           | 25.0     |          | 63.7            | 68.2           | 4.5         |
|                 | 48      | 5240            | 10480.00        | V       | PK             | 37.8           | 25.0     |          | 62.8            | 68.2           | 5.4         |

**(5.3GHz Band)**

| Mode            | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11n (20MHz) | 52      | 5260            | 10520.00        | V       | PK             | 38.5           | 25.1     |          | 63.6            | 68.2           | 4.6         |
|                 | 56      | 5280            | 10560.00        | V       | PK             | 39.1           | 25.1     |          | 64.2            | 68.2           | 4.0         |
|                 | 64      | 5320            | 10640.00        | V       | PK             | 38.4           | 25.3     |          | 63.7            | 68.2           | 4.5         |

**(5.6GHz Band)**

| Mode            | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11n (20MHz) | 100     | 5500            | 5469.53         | H       | PK             | 51.9           | 13.0     |          | 64.9            | 74.0           | 9.1         |
|                 |         |                 | 5469.53         | H       | AV             | 30.1           | 13.0     |          | 43.1            | 54.0           | 10.9        |
|                 |         |                 | 5469.53         | V       | PK             | 55.6           | 13.0     |          | 68.6            | 74.0           | 5.4         |
|                 |         |                 | 5469.53         | V       | AV             | 32.8           | 13.0     |          | 45.8            | 54.0           | 8.2         |
|                 |         |                 | 11000.00        | H       | PK             | 41.4           | 22.4     |          | 63.8            | 68.2           | 4.4         |
|                 |         |                 | 11000.00        | V       | PK             | 40.0           | 22.4     |          | 62.4            | 68.2           | 5.8         |
|                 | 110     | 5580            | 11160.00        | H       | PK             | 41.7           | 22.7     |          | 64.4            | 68.2           | 3.8         |
|                 |         |                 | 11160.00        | V       | PK             | 39.8           | 22.7     |          | 62.5            | 68.2           | 5.7         |
|                 | 140     | 5700            | 5725.50         | H       | PK             | 51.0           | 13.0     |          | 64.0            | 74.0           | 10.0        |
|                 |         |                 | 5725.50         | H       | AV             | 30.9           | 13.0     |          | 43.9            | 54.0           | 10.1        |
|                 |         |                 | 5725.50         | V       | PK             | 57.7           | 13.0     |          | 70.7            | 74.0           | 3.3         |
|                 |         |                 | 5725.50         | V       | AV             | 34.2           | 13.0     |          | 47.2            | 54.0           | 6.8         |
|                 |         |                 | 11400.00        | V       | PK             | 38.8           | 23.0     |          | 61.8            | 68.2           | 6.4         |

**Note:**

1. Emission Level (Margin) = Limit - [Reading + C.F (Antenna + Cable – Amp)] + DCF (If transmit duty cycle < 98 percent)
2. DCF = 20log (1/x) , x = On time / (On + Off time)
3. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
4. No emission was detected in the receive mode.

**[IEEE802.11n (HT40)]**  
**(5.2GHz Band)**

| Mode            | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11n (40MHz) | 38      | 5190            | 5149.40         | V       | PK             | 48.5           | 14.5     |          | 63.0            | 74.0           | 11.0        |
|                 |         |                 | 5149.40         | V       | AV             | 29.0           | 14.5     |          | 43.5            | 54.0           | 10.5        |
|                 |         |                 | 10380.00        | V       | PK             | 38.4           | 25.0     |          | 63.4            | 68.2           | 4.8         |
|                 | 46      | 5230            | 10460.00        | V       | PK             | 38.4           | 25.0     |          | 63.4            | 68.2           | 4.8         |

**(5.3GHz Band)**

| Mode            | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11n (40MHz) | 54      | 5270            | 10540.00        | V       | PK             | 38.3           | 25.1     |          | 63.4            | 68.2           | 4.8         |
|                 | 62      | 5310            | 10620.00        | V       | PK             | 38.4           | 25.3     |          | 63.7            | 68.2           | 4.5         |

**(5.6GHz Band)**

| Mode            | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11n (40MHz) | 102     | 5510            | 5468.12         | V       | PK             | 51.8           | 13.0     |          | 64.8            | 74.0           | 9.2         |
|                 |         |                 | 5468.12         | V       | AV             | 31.2           | 13.0     |          | 44.2            | 54.0           | 9.8         |
|                 |         |                 | 11020.00        | V       | PK             | 40.6           | 22.4     |          | 63.0            | 68.2           | 5.2         |
|                 | 110     | 5590            | 11100.00        | H       | PK             | 42.1           | 22.6     |          | 64.7            | 68.2           | 3.5         |
|                 |         |                 | 11100.00        | V       | PK             | 42.0           | 22.6     |          | 64.6            | 68.2           | 3.6         |
|                 | 134     | 5670            | 11340.00        | V       | PK             | 40.9           | 23.0     |          | 63.9            | 68.2           | 4.3         |

Note:

1. Emission Level (Margin) = Limit - [Reading + C.F (Antenna + Cable – Amp)] + DCF (If transmit duty cycle < 98 percent)
2. DCF = 20log (1/x) , x = On time / (On + Off time)
3. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
4. No emission was detected in the receive mode.

**[IEEE802.11n (HT80)]**  
**(5.2GHz Band)**

| Mode             | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|------------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11ac (80MHz) | 42      | 5210            | 5140.40         | V       | PK             | 47.3           | 14.5     | 0.343    | 61.8            | 74.0           | 12.2        |
|                  |         |                 | 5140.40         | V       | AV             | 30.5           | 14.5     |          | 45.3            | 54.0           | 8.7         |
|                  |         |                 | 10420.00        | V       | PK             | 37.6           | 25.0     |          | 62.6            | 68.2           | 5.6         |

**(5.3GHz Band)**

| Mode             | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|------------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11ac (80MHz) | 58      | 5290            | 5357.04         | V       | PK             | 43.2           | 15.2     | 0.378    | 58.4            | 74.0           | 15.6        |
|                  |         |                 | 5357.04         | V       | AV             | 28.4           | 15.2     |          | 44.0            | 54.0           | 10.0        |
|                  |         |                 | 10580.00        | V       | PK             | 38.3           | 25.2     |          | 63.5            | 68.2           | 4.7         |

**(5.6GHz Band)**

| Mode             | Channel | Frequency (MHz) | Frequency (MHz) | ANT H/V | Detector PK/AV | Reading (dBμV) | C.F (dB) | DCF (dB) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|------------------|---------|-----------------|-----------------|---------|----------------|----------------|----------|----------|-----------------|----------------|-------------|
| 802.11ac (80MHz) | 106     | 5530            | 5469.50         | V       | PK             | 49.6           | 13.0     | 0.343    | 62.6            | 74.0           | 11.4        |
|                  |         |                 | 5469.50         | V       | AV             | 32.6           | 13.0     |          | 45.9            | 54.0           | 8.1         |
|                  |         |                 | 11060.00        | V       | PK             | 40.8           | 22.5     |          | 63.3            | 68.2           | 4.9         |

Note:

1. Emission Level (Margin) = Limit - [Reading + C.F ( Antenna + Cable – Amp)] + DCF (If transmit duty cycle < 98 percent)
2. DCF = 20log (1/x) , x = On time / (On + Off time)
3. No emission were detected in frequency range 30MHz to 1000MHz at the 3 meters distance.
4. No emission was detected in the receive mode.

## ***5. Antenna requirement***

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According to FCC section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The antenna is a special antenna mounted inside of the EUT. Therefore, the EUT complies with the antenna requirement of FCC section 15.203.

## 6. Uncertainty of measurement

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Expanded uncertainties stated are calculated with a coverage Factor  $k=2$ .

Please note that these results are not taken into account when determining compliance or non-compliance with test result.

| Test item                           | Measurement uncertainty |
|-------------------------------------|-------------------------|
| Conducted emission at mains port    | $\pm 3.0\text{dB}$      |
| Radiated emission (9kHz – 30MHz)    | $\pm 4.4\text{dB}$      |
| Radiated emission (30MHz – 1000MHz) | $\pm 4.5\text{dB}$      |
| Radiated emission (1000MHz – 26GHz) | $\pm 3.9\text{dB}$      |

## 7. Laboratory description

### 1. Location:

TÜV SÜD Zacta Ltd. Yonezawa Testing Center  
4149-7 Hachimanpara 5-chome Yonezawa-shi Yamagata 992-1128 Japan  
Phone: +81-238-28-2880 Fax: +81-238-28-2888

### 2. Facility filing information:

1) NVLAP accreditation: NVLAP Lab. code: 200306-0

2) VLAC accreditation: Lab. code: VLAC-013

| Site name                      | Radiated emission | Conducted emission for mains port | Conducted emission for telecom port | Radiated emission (CMAD) | Expiry Date  |
|--------------------------------|-------------------|-----------------------------------|-------------------------------------|--------------------------|--------------|
| 3m Semi-anechoic chamber       | VLAC-013          | VLAC-013                          | VLAC-013                            | -                        | Jul. 3, 2015 |
| 10m Semi-anechoic chamber No.1 |                   |                                   |                                     | VLAC-013                 |              |
| 10m Semi-anechoic chamber No.2 |                   |                                   |                                     | VLAC-013                 |              |
| Shielded room No.1             | -                 | VLAC-013                          | -                                   | -                        |              |

3) FCC filing:

| Site name                      | Registration Number | Expiry Date   |
|--------------------------------|---------------------|---------------|
| Site 3                         | 91065               | Oct.31, 2014  |
| 3m Semi-anechoic chamber       | 540072              | Feb. 20, 2017 |
| 10m Semi-anechoic chamber No.1 |                     |               |
| 10m Semi-anechoic chamber No.2 |                     |               |
| Shielded room No.1             |                     |               |

4) Industry Canada Oats site filing:

| Site name                      | Sites on file: Oats 3m/10m | Expiry Date   |
|--------------------------------|----------------------------|---------------|
| Site 3                         | 4224A-3                    | Jan. 23, 2015 |
| 3m Semi-anechoic chamber       | 4224A-4                    |               |
| 10m Semi-anechoic chamber No.1 | 4224A-5                    |               |
| 10m Semi-anechoic chamber No.2 | 4224A-6                    | Jan. 15, 2017 |

5) VCCI site filing:

| Site name                      | Radiated emission | Conducted emission for mains port | Conducted emission for telecom port | Expiry Date                                         |
|--------------------------------|-------------------|-----------------------------------|-------------------------------------|-----------------------------------------------------|
| Site 3                         | R-138             | C-134                             | T-1222                              | Nov. 16, 2014<br>Nov. 28, 2014*<br>(*:Telecom port) |
| 3m Semi-anechoic chamber       | A-0166            | A-0166                            | A-0166                              | Jul. 3, 2015                                        |
| 10m Semi-anechoic chamber No.1 |                   |                                   |                                     |                                                     |
| 10m Semi-anechoic chamber No.2 |                   |                                   |                                     |                                                     |
| Shielded room No.1             | -                 | A-0166                            |                                     |                                                     |

6) TÜV SÜD PS authorization:

Authorized as an EMC test laboratory

7) TÜV Rheinland authorization:

Authorized as an EMC test laboratory

## Appendix A. Test equipment

### Radiated emission

| Equipment                   | Company              | Model No.        | Serial No.       | Cal. Due      | Cal. Date     |
|-----------------------------|----------------------|------------------|------------------|---------------|---------------|
| EMI Receiver                | ROHDE&SCHWARZ        | ECSI             | 100451           | Nov. 30, 2014 | Nov. 16, 2013 |
| Preamplifier                | ANRITSU              | MH648A           | M96057           | Jun. 30, 2015 | Jun. 12, 2014 |
| Loop antenna                | ROHDE&SCHWARZ        | HFH2-Z2          | 892246/010       | Oct. 31, 2014 | Oct. 5, 2013  |
| Biconical antenna           | Schwarzbeck          | VHA9103/BBA9106  | 2125             | May 31, 2015  | May 7, 2014   |
| Log periodic antenna        | Schwarzbeck          | UHALP9108A       | 0560             | May 31, 2015  | May 7, 2014   |
| Attenuator                  | TME                  | CFA-01NPJ-6      | N/A (S275)       | Jun. 30, 2015 | Jun. 9, 2014  |
| Attenuator                  | TME                  | CFA-01NPJ-3      | N/A (S272)       | Jun. 30, 2015 | Jun. 9, 2014  |
| Spectrum analyzer           | Agilent Technologies | E4440A           | US44302655       | May 31, 2015  | May 30, 2014  |
| Preamplifier                | Agilent Technologies | 8449B            | 3008A1008        | Dec. 31, 2014 | Dec. 9, 2013  |
| Dipole antenna              | Schwarzbeck          | VHAP             | 1021             | Sep. 30, 2014 | Sep. 19, 2013 |
| Dipole antenna              | Schwarzbeck          | UHAP             | 993              | Sep. 30, 2014 | Sep. 19, 2013 |
| Double ridged guide antenna | EMCO                 | 3115             | 5205             | Dec. 31, 2014 | Dec. 10, 2013 |
| Attenuator                  | Agilent Technologies | 8491B            | MY39268633       | Jan. 31, 2015 | Jan. 15, 2013 |
| Broad-Band Horn Antenna     | Schwarzbeck          | BBHA9170         | BBHA9170189      | May 31, 2015  | May 2, 2013   |
| Preamplifier                | TSJ                  | MLA-1840-B03-35  | 1240332          | May 31, 2015  | May 2, 2013   |
| Notch filter                | Micro-Tronics        | BRM50716         | 006              | Jul. 31, 2015 | Jul. 12, 2014 |
| Microwave cable             | SUHNER               | SUCOFLEX104/9m   | 346316/4         | Oct. 31, 2015 | Oct. 31, 2014 |
|                             |                      | SUCOFLEX104/1m   | 322084/4         | Oct. 31, 2015 | Oct. 31, 2014 |
|                             |                      | SUCOFLEX104/1.5m | 317226/4         | Oct. 31, 2015 | Oct. 31, 2014 |
|                             |                      | SUCOFLEX104/7m   | 41625/6          | Oct. 31, 2015 | Oct. 31, 2014 |
| PC                          | DELL                 | DIMENSION E521   | 75465BX          | N/A           | N/A           |
| Software                    | TOYO Corporation     | EP5/RE-AJ        | 0611193/V5.3.61  | N/A           | N/A           |
| 3m Semi-anechoic chamber    | TOKIN                | N/A              | N/A (9002-NSA)   | May 31, 2015  | May 6, 2014   |
| 3m Semi-anechoic chamber    | TOKIN                | N/A              | N/A (9002-SVSWR) | May 31, 2015  | May 6, 2014   |

\*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.

## Appendix B. Duty Cycle

### [Data & Plot]

| Mode    | Channel | Frequency (MHz) | Duty Cycle  |                 |       | DCF (dB)<br>10log(1/x) | DCF (dB)<br>20log(1/x) |
|---------|---------|-----------------|-------------|-----------------|-------|------------------------|------------------------|
|         |         |                 | On Time(ms) | On+Off Time(ms) | X     |                        |                        |
| 802.11a | 36      | 5180            | 1.362       | 1.372           | 0.993 | 0.032                  | 0.064                  |
|         | 40      | 5200            |             |                 |       |                        |                        |
|         | 58      | 5240            |             |                 |       |                        |                        |
|         | 52      | 5260            | 1.364       | 1.372           | 0.994 | 0.025                  | 0.051                  |
|         | 56      | 5280            |             |                 |       |                        |                        |
|         | 64      | 5320            |             |                 |       |                        |                        |
|         | 100     | 5500            | 1.362       | 1.372           | 0.993 | 0.032                  | 0.064                  |
|         | 116     | 5580            |             |                 |       |                        |                        |
|         | 140     | 5700            |             |                 |       |                        |                        |

Note: X = On time / (On + Off time)

| Mode               | Channel | Frequency (MHz) | Duty Cycle  |                 |       | DCF (dB)<br>10log(1/x) | DCF (dB)<br>20log(1/x) |
|--------------------|---------|-----------------|-------------|-----------------|-------|------------------------|------------------------|
|                    |         |                 | On Time(ms) | On+Off Time(ms) | X     |                        |                        |
| 802.11n<br>(20MHz) | 36      | 5180            | 1.274       | 1.284           | 0.992 | 0.034                  | 0.068                  |
|                    | 40      | 5200            |             |                 |       |                        |                        |
|                    | 58      | 5240            |             |                 |       |                        |                        |
|                    | 52      | 5260            | 1.276       | 1.284           | 0.994 | 0.027                  | 0.054                  |
|                    | 56      | 5280            |             |                 |       |                        |                        |
|                    | 64      | 5320            |             |                 |       |                        |                        |
|                    | 100     | 5500            | 1.272       | 1.284           | 0.991 | 0.041                  | 0.082                  |
|                    | 116     | 5580            |             |                 |       |                        |                        |
|                    | 140     | 5700            |             |                 |       |                        |                        |

Note: X = On time / (On + Off time)

| Mode               | Channel | Frequency (MHz) | Duty Cycle  |                 |       | DCF (dB)<br>10log(1/x) | DCF (dB)<br>20log(1/x) |
|--------------------|---------|-----------------|-------------|-----------------|-------|------------------------|------------------------|
|                    |         |                 | On Time(ms) | On+Off Time(ms) | X     |                        |                        |
| 802.11n<br>(40MHz) | 38      | 5190            | 0.635       | 0.645           | 0.984 | 0.068                  | 0.136                  |
|                    | 46      | 5230            |             |                 |       |                        |                        |
|                    | 54      | 5270            | 0.635       | 0.645           | 0.984 | 0.068                  | 0.136                  |
|                    | 62      | 5310            |             |                 |       |                        |                        |
|                    | 102     | 5510            | 0.635       | 0.645           | 0.984 | 0.068                  | 0.136                  |
|                    | 110     | 5550            |             |                 |       |                        |                        |
|                    | 134     | 5670            |             |                 |       |                        |                        |

Note: X = On time / (On + Off time)

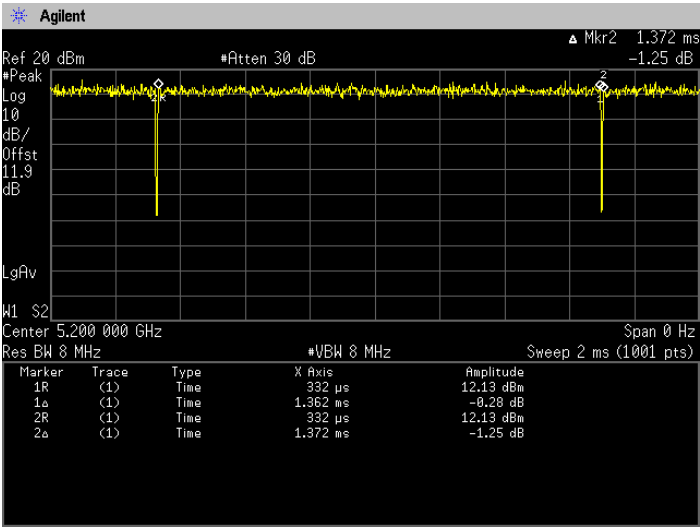


Zacta

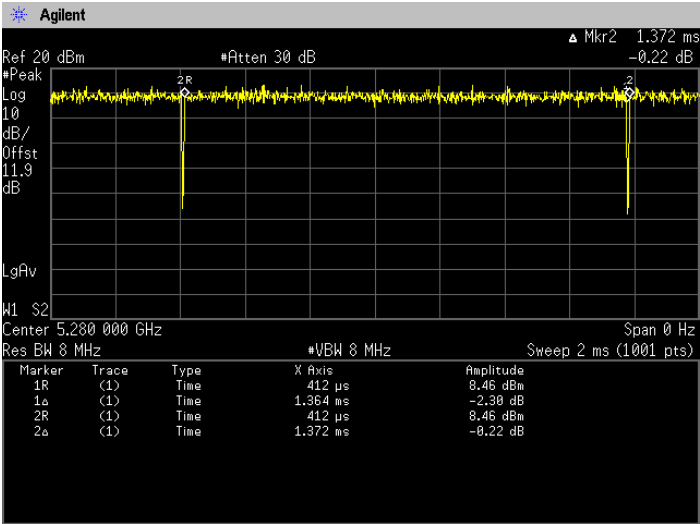
| Mode                | Channel | Frequency<br>(MHz) | Duty Cycle     |                    |       | DCF<br>(dB)<br>10log(1/x) | DCF<br>(dB)<br>20log(1/x) |
|---------------------|---------|--------------------|----------------|--------------------|-------|---------------------------|---------------------------|
|                     |         |                    | On<br>Time(ms) | On+Off<br>Time(ms) | X     |                           |                           |
| 802.11ac<br>(80MHz) | 42      | 5210               | 0.248          | 0.258              | 0.961 | 0.172                     | 0.343                     |
|                     | 58      | 5290               | 0.247          | 0.258              | 0.957 | 0.189                     | 0.378                     |
|                     | 106     | 5530               | 0.248          | 0.258              | 0.961 | 0.172                     | 0.343                     |

Note: X = On time / (On + Off time)

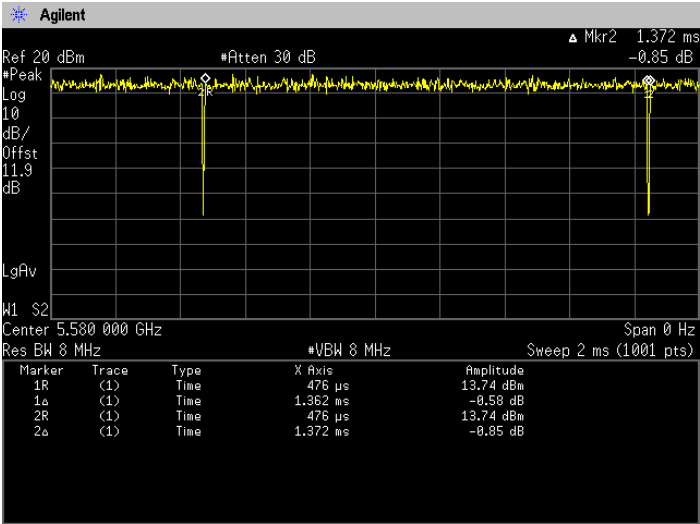
IEEE802.11a  
Channel: 40



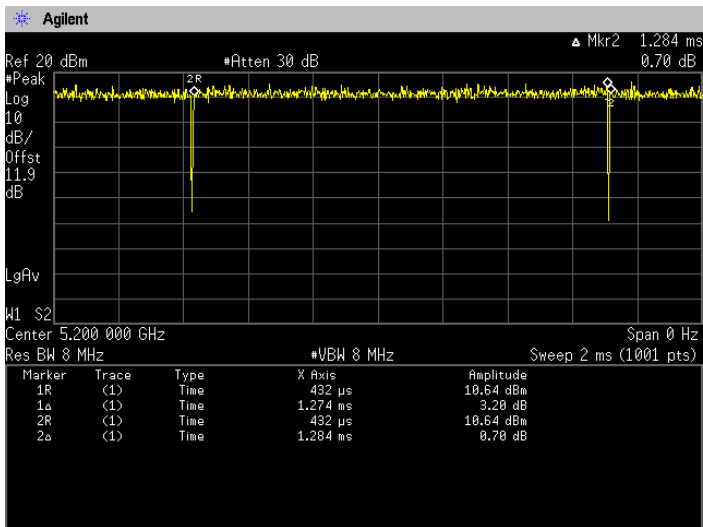
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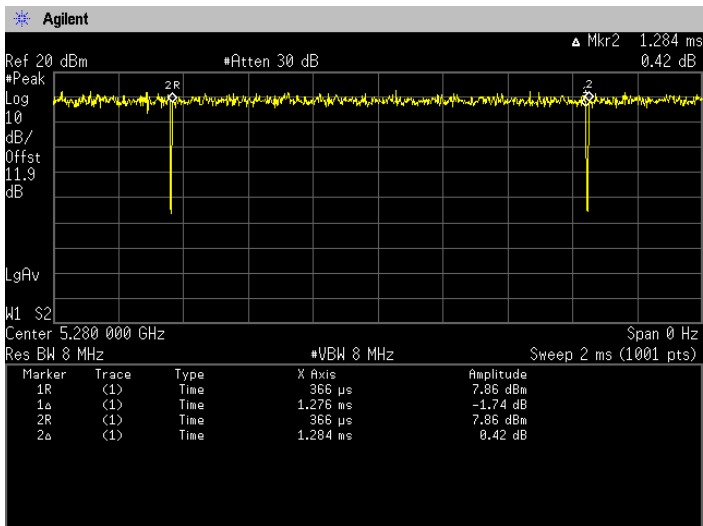
Channel: 116



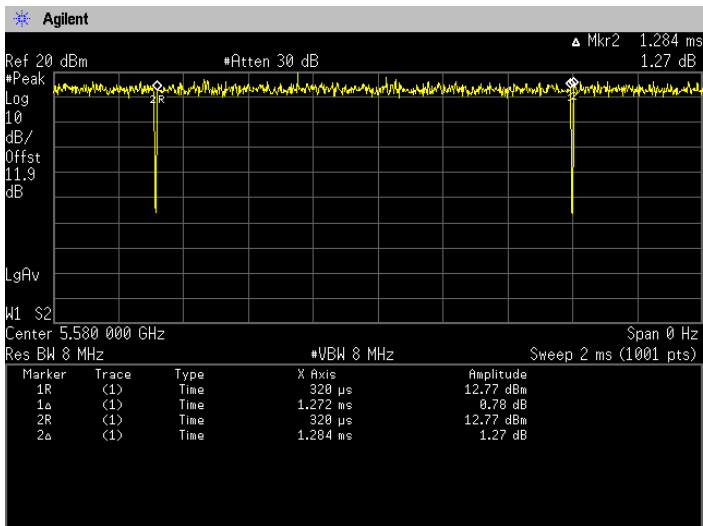
IEEE802.11n (HT20)  
Channel: 40



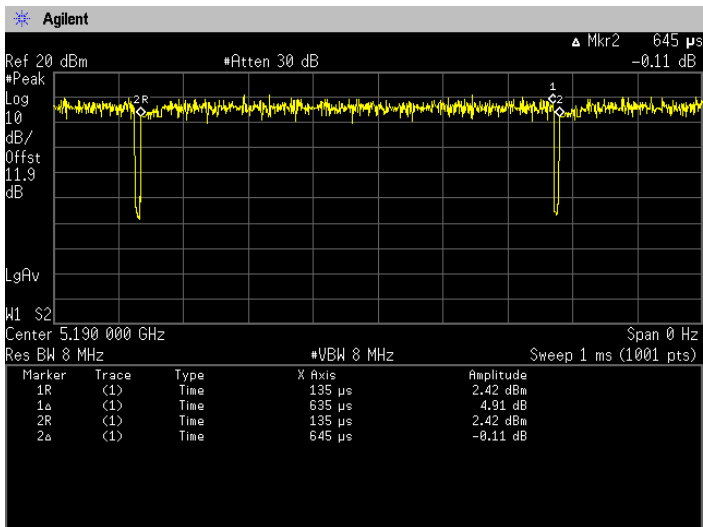
Channel: 56



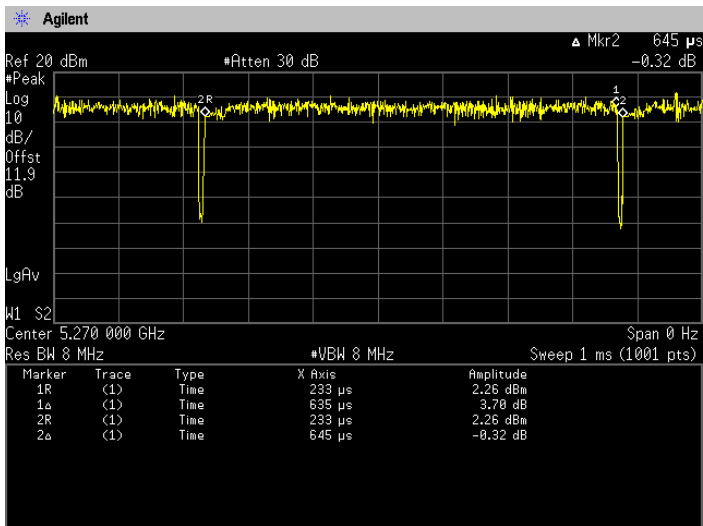
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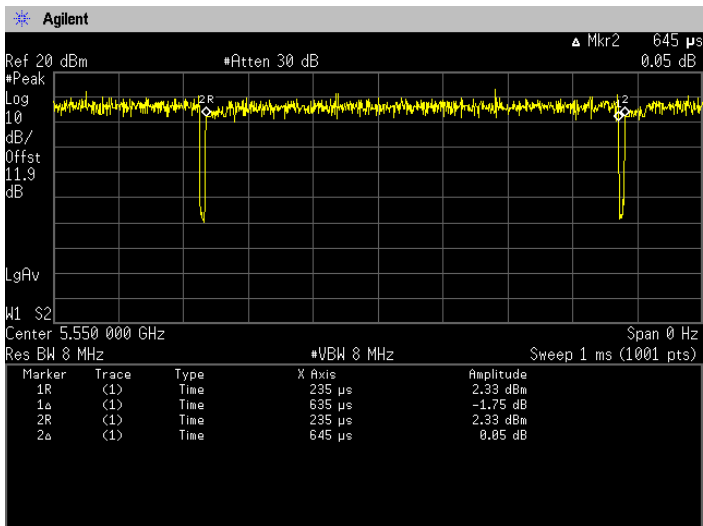
IEEE802.11n (HT40)  
Channel: 38



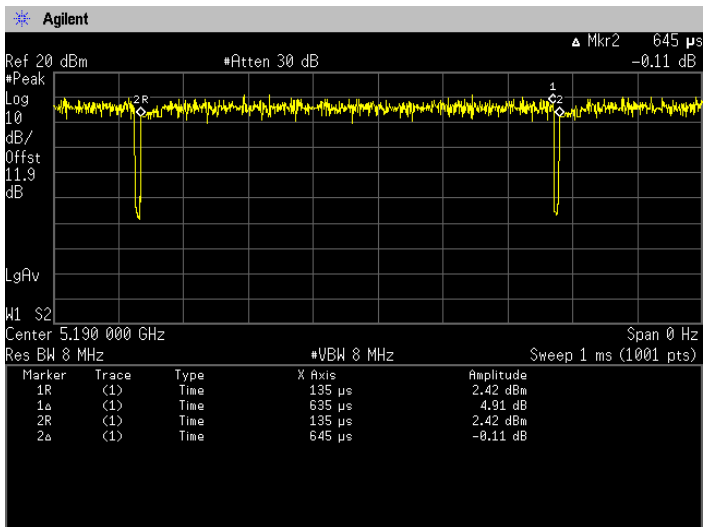
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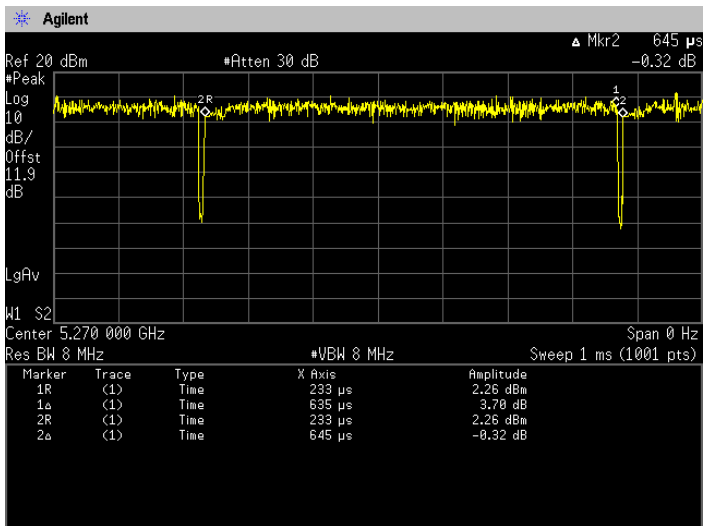
Channel: 110



IEEE802.11ac (HT80)  
Channel: 42



Channel: 58



Channel: 106

