



# FCC RF Test Report

**APPLICANT** : FUJITSU LIMITED  
**EQUIPMENT** : STYLISTIC Q series  
**BRAND NAME** : FUJITSU  
**MODEL NAME** : Q616  
**FCC ID** : EJE-WB0099  
**STANDARD** : FCC Part 15 Subpart E §15.407  
**CLASSIFICATION** : (NII) Unlicensed National Information Infrastructure

This is a partial report which is included the Unwanted Emissions Measurement test items. The product was received on Dec. 13, 2015 and testing was completed on Jan. 08, 2016. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

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Reviewed by: Joseph Lin / Supervisor

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Approved by: Jones Tsai / Manager



## **SPORTON INTERNATIONAL INC.**

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## REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION             | ISSUED DATE   |
|------------|---------|-------------------------|---------------|
| FR5N1313D  | Rev. 01 | Initial issue of report | Jan. 21, 2016 |
|            |         |                         |               |
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|            |         |                         |               |



## SUMMARY OF TEST RESULT

| Report Section | FCC Rule              | Description           | Limit                                             | Result | Remark                                    |
|----------------|-----------------------|-----------------------|---------------------------------------------------|--------|-------------------------------------------|
| 3.1            | 15.407(b)             | Unwanted Emissions    | $\leq -17, -27$ dBm<br>(depend on band)&15.209(a) | Pass   | Under limit<br>0.35 dB at<br>5469.520 MHz |
| 3.2            | 15.207                | AC Conducted Emission | 15.207(a)                                         | Pass   | Under limit<br>14.30 dB at<br>0.198 MHz   |
| 3.5            | 15.203 &<br>15.407(a) | Antenna Requirement   | N/A                                               | Pass   | -                                         |

# 1 General Description

## 1.1 Applicant

FUJITSU LIMITED

1-1, Kamikonadaka 4-chome, Nakahara-ku, Kawasaki, 211-8588 Japan

## 1.2 Manufacturer

FUJITSU LIMITED

1-1, Kamikonadaka 4-chome, Nakahara-ku, Kawasaki, 211-8588 Japan

## 1.3 Feature of Equipment Under Test

| Product Feature                 |                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------|
| Equipment                       | STYLISTIC Q series                                                               |
| Brand Name                      | FUJITSU                                                                          |
| Model Name                      | Q616                                                                             |
| FCC ID                          | EJE-WB0099                                                                       |
| integrated WLAN Module          | Brand Name: Intel<br>Model Name: 8260NGW<br>FCC ID: PD98260NG, PD98260NGU        |
| EUT supports Radios application | WLAN 11a/b/g/n HT20/HT40<br>WLAN 11ac VHT20/VHT40/VHT80<br>Bluetooth v4.1 EDR/LE |
| EUT Stage                       | Pre-Production Unit                                                              |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification |                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |               |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|
| <b>Tx/Rx Channel Frequency Range</b>    | 5180 MHz ~ 5240 MHz<br>5260 MHz ~ 5320 MHz<br>5500 MHz ~ 5700 MHz                                                                                                                                                                                                                                                                                                                                                                      |               |               |
| <b>Antenna Type</b>                     | <b>&lt;5180 MHz ~ 5240 MHz&gt;</b><br><b>Ant. 1</b> : PIFA Antenna with gain -0.09 dBi<br><b>Ant. 2</b> : PIFA Antenna with gain -2.27 dBi<br><b>&lt;5260 MHz ~ 5320 MHz&gt;</b><br><b>Ant. 1</b> : PIFA Antenna with gain 0.35 dBi<br><b>Ant. 2</b> : PIFA Antenna with gain -2.27 dBi<br><b>&lt;5500 MHz ~ 5700 MHz &gt;</b><br><b>Ant. 1</b> : PIFA Antenna with gain -0.99 dBi<br><b>Ant. 2</b> : PIFA Antenna with gain -4.95 dBi |               |               |
| <b>Type of Modulation</b>               | 802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)<br>802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)                                                                                                                                                                                                                                                                                                                               |               |               |
| <b>Antenna Function Description</b>     |                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Ant. 1</b> | <b>Ant. 2</b> |
|                                         | 802.11 a/n/ac SISO                                                                                                                                                                                                                                                                                                                                                                                                                     | V             | V             |
|                                         | 802.11 a/n/ac MIMO                                                                                                                                                                                                                                                                                                                                                                                                                     | V             | V             |

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

|                           |                                                                                                                                                                  |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Site</b>          | SPORTON INTERNATIONAL INC.                                                                                                                                       |
| <b>Test Site Location</b> | No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park,<br>Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                                          |
|                           | CO05-HY                                                                                                                                                          |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

|                           |                                                                                                                                        |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Site</b>          | SPORTON INTERNATIONAL INC.                                                                                                             |
| <b>Test Site Location</b> | No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-0868<br>FAX: +886-3-327-0855 |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                |
|                           | 03CH10-HY                                                                                                                              |

**Note:** The test site complies with ANSI C63.4 2014 requirement.



## 1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01
- ♦ ANSI C63.10-2013

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.





## **2 Test Configuration of Equipment Under Test**

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.



## 2.1 Carrier Frequency and Channel

| Frequency Band                       | Channel   | Freq.<br>(MHz) | Channel   | Freq.<br>(MHz) |
|--------------------------------------|-----------|----------------|-----------|----------------|
| 5150-5250 MHz<br>Band 1<br>(U-NII-1) | 36        | 5180           | 44        | 5220           |
|                                      | <b>38</b> | <b>5190</b>    | <b>46</b> | <b>5230</b>    |
|                                      | 40        | 5200           | 48        | 5240           |
|                                      | 42        | 5210           |           |                |

| Frequency Band                        | Channel   | Freq.<br>(MHz) | Channel   | Freq.<br>(MHz) |
|---------------------------------------|-----------|----------------|-----------|----------------|
| 5250-5350 MHz<br>Band 2<br>(U-NII-2A) | 52        | 5260           | 60        | 5300           |
|                                       | <b>54</b> | <b>5270</b>    | <b>62</b> | <b>5310</b>    |
|                                       | 56        | 5280           | 64        | 5320           |
|                                       | 58        | 5290           |           |                |

| Frequency Band                        | Channel    | Freq.<br>(MHz) | Channel    | Freq.<br>(MHz) |
|---------------------------------------|------------|----------------|------------|----------------|
| 5470-5725 MHz<br>Band 3<br>(U-NII-2C) | 100        | 5500           | 120        | 5600           |
|                                       | <b>102</b> | <b>5510</b>    | 122        | 5610           |
|                                       | 104        | 5520           | 124        | 5620           |
|                                       | 106        | 5530           | <b>126</b> | <b>5630</b>    |
|                                       | 108        | 5540           | 128        | 5640           |
|                                       | <b>110</b> | <b>5550</b>    | 132        | 5660           |
|                                       | 112        | 5560           | <b>134</b> | <b>5670</b>    |
|                                       | 116        | 5580           | 136        | 5680           |
|                                       | <b>118</b> | <b>5590</b>    | 140        | 5700           |

| Frequency Band   | Channel | Freq.<br>(MHz) | Channel    | Freq.<br>(MHz) |
|------------------|---------|----------------|------------|----------------|
| Straddle Channel | 144     | 5720           | <b>142</b> | <b>5710</b>    |
|                  | 138     | 5690           |            |                |

**Note:** The above Frequency and Channel in boldface were 802.11n HT40.



## 2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test in the following tables.

### SISO <Ant. 1>

| 5GHz 802.11a mode Output Power (dBm) |       |       |       |
|--------------------------------------|-------|-------|-------|
| Channel                              | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                      | 5180  | 5220  | 5240  |
| Avg. Power                           | 13.27 | 13.33 | 13.28 |

| 5GHz 802.11a mode Output Power (dBm) |       |       |       |
|--------------------------------------|-------|-------|-------|
| Channel                              | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                      | 5260  | 5300  | 5320  |
| Avg. Power                           | 13.38 | 13.37 | 13.25 |

| 5GHz 802.11a mode Output Power (dBm) |        |        |        |
|--------------------------------------|--------|--------|--------|
| Channel                              | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                      | 5500   | 5580   | 5700   |
| Avg. Power                           | 13.40  | 13.44  | 13.43  |

| 5GHz 802.11n HT20 mode Output Power (dBm) |       |       |       |
|-------------------------------------------|-------|-------|-------|
| Channel                                   | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                           | 5180  | 5220  | 5240  |
| Avg. Power                                | 13.47 | 13.46 | 13.43 |

| 5GHz 802.11n HT20 mode Output Power (dBm) |       |       |       |
|-------------------------------------------|-------|-------|-------|
| Channel                                   | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                           | 5260  | 5300  | 5320  |
| Avg. Power                                | 13.38 | 13.42 | 13.28 |

| 5GHz 802.11n HT20 mode Output Power (dBm) |        |        |        |
|-------------------------------------------|--------|--------|--------|
| Channel                                   | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                           | 5500   | 5580   | 5700   |
| Avg. Power                                | 13.42  | 13.44  | 13.40  |

| 5GHz 802.11n HT40 mode Output Power (dBm) |       |       |       |       |
|-------------------------------------------|-------|-------|-------|-------|
| Channel                                   | CH 38 | CH 46 | CH 54 | CH 62 |
| Frequency (MHz)                           | 5190  | 5230  | 5270  | 5310  |
| Avg. Power                                | 13.35 | 13.40 | 13.49 | 12.73 |



| 5GHz 802.11n HT40 mode Output Power (dBm) |        |        |       |
|-------------------------------------------|--------|--------|-------|
| Channel                                   | CH 102 | CH 110 | CH134 |
| Frequency (MHz)                           | 5510   | 5550   | 5670  |
| Avg. Power                                | 13.48  | 13.45  | 13.46 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                            | 5180  | 5220  | 5240  |
| Avg. Power                                 | 13.35 | 13.32 | 13.37 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                            | 5260  | 5300  | 5320  |
| Avg. Power                                 | 13.43 | 13.29 | 13.24 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |        |        |        |
|--------------------------------------------|--------|--------|--------|
| Channel                                    | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                            | 5500   | 5580   | 5700   |
| Avg. Power                                 | 13.38  | 13.31  | 13.21  |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |       |       |       |       |
|--------------------------------------------|-------|-------|-------|-------|
| Channel                                    | CH 38 | CH 46 | CH 54 | CH 62 |
| Frequency (MHz)                            | 5190  | 5230  | 5270  | 5310  |
| Avg. Power                                 | 13.46 | 13.32 | 13.41 | 12.89 |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |        |        |       |
|--------------------------------------------|--------|--------|-------|
| Channel                                    | CH 102 | CH 110 | CH134 |
| Frequency (MHz)                            | 5510   | 5550   | 5670  |
| Avg. Power                                 | 13.43  | 13.49  | 13.42 |

| 5GHz 802.11n VHT80 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 42 | CH 58 | CH106 |
| Frequency (MHz)                            | 5210  | 5290  | 5530  |
| Avg. Power                                 | 13.39 | 11.94 | 12.99 |



## SISO &lt;Ant. 2&gt;

| 5GHz 802.11a mode Output Power (dBm) |       |       |       |
|--------------------------------------|-------|-------|-------|
| Channel                              | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                      | 5180  | 5220  | 5240  |
| Avg. Power                           | 13.34 | 13.35 | 13.36 |

| 5GHz 802.11a mode Output Power (dBm) |       |       |       |
|--------------------------------------|-------|-------|-------|
| Channel                              | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                      | 5260  | 5300  | 5320  |
| Avg. Power                           | 13.39 | 13.41 | 13.28 |

| 5GHz 802.11a mode Output Power (dBm) |        |        |        |
|--------------------------------------|--------|--------|--------|
| Channel                              | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                      | 5500   | 5580   | 5700   |
| Avg. Power                           | 13.49  | 13.40  | 13.42  |

| 5GHz 802.11n HT20 mode Output Power (dBm) |       |       |       |
|-------------------------------------------|-------|-------|-------|
| Channel                                   | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                           | 5180  | 5220  | 5240  |
| Avg. Power                                | 13.49 | 13.42 | 13.39 |

| 5GHz 802.11n HT20 mode Output Power (dBm) |       |       |       |
|-------------------------------------------|-------|-------|-------|
| Channel                                   | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                           | 5260  | 5300  | 5320  |
| Avg. Power                                | 13.46 | 13.25 | 13.30 |

| 5GHz 802.11n HT20 mode Output Power (dBm) |        |        |        |
|-------------------------------------------|--------|--------|--------|
| Channel                                   | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                           | 5500   | 5580   | 5700   |
| Avg. Power                                | 13.48  | 13.46  | 13.44  |

| 5GHz 802.11n HT40 mode Output Power (dBm) |       |       |       |       |
|-------------------------------------------|-------|-------|-------|-------|
| Channel                                   | CH 38 | CH 46 | CH 54 | CH 62 |
| Frequency (MHz)                           | 5190  | 5230  | 5270  | 5310  |
| Avg. Power                                | 13.48 | 13.46 | 13.40 | 13.45 |



| 5GHz 802.11n HT40 mode Output Power (dBm) |        |        |       |
|-------------------------------------------|--------|--------|-------|
| Channel                                   | CH 102 | CH 110 | CH134 |
| Frequency (MHz)                           | 5510   | 5550   | 5670  |
| Avg. Power                                | 13.34  | 13.30  | 13.31 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                            | 5180  | 5220  | 5240  |
| Avg. Power                                 | 13.34 | 13.31 | 13.39 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                            | 5260  | 5300  | 5320  |
| Avg. Power                                 | 13.41 | 13.37 | 13.43 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |        |        |        |
|--------------------------------------------|--------|--------|--------|
| Channel                                    | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                            | 5500   | 5580   | 5700   |
| Avg. Power                                 | 13.40  | 13.32  | 13.36  |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |       |       |       |       |
|--------------------------------------------|-------|-------|-------|-------|
| Channel                                    | CH 38 | CH 46 | CH 54 | CH 62 |
| Frequency (MHz)                            | 5190  | 5230  | 5270  | 5310  |
| Avg. Power                                 | 13.41 | 13.40 | 13.43 | 13.30 |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |        |        |       |
|--------------------------------------------|--------|--------|-------|
| Channel                                    | CH 102 | CH 110 | CH134 |
| Frequency (MHz)                            | 5510   | 5550   | 5670  |
| Avg. Power                                 | 13.38  | 13.36  | 13.30 |

| 5GHz 802.11n VHT80 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 42 | CH 58 | CH106 |
| Frequency (MHz)                            | 5210  | 5290  | 5530  |
| Avg. Power                                 | 13.34 | 9.87  | 13.46 |



## MIMO &lt;Ant. 1+2&gt;

| 5GHz 802.11a mode Output Power (dBm) |       |       |       |
|--------------------------------------|-------|-------|-------|
| Channel                              | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                      | 5180  | 5220  | 5240  |
| Avg. Power                           | 16.43 | 16.22 | 16.43 |

| 5GHz 802.11a mode Output Power (dBm) |       |       |       |
|--------------------------------------|-------|-------|-------|
| Channel                              | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                      | 5260  | 5300  | 5320  |
| Avg. Power                           | 16.46 | 16.42 | 16.32 |

| 5GHz 802.11a mode Output Power (dBm) |        |        |        |
|--------------------------------------|--------|--------|--------|
| Channel                              | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                      | 5500   | 5580   | 5700   |
| Avg. Power                           | 16.48  | 16.42  | 16.48  |

| 5GHz 802.11n HT20 mode Output Power (dBm) |       |       |       |
|-------------------------------------------|-------|-------|-------|
| Channel                                   | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                           | 5180  | 5220  | 5240  |
| Avg. Power                                | 16.31 | 16.30 | 16.48 |

| 5GHz 802.11n HT20 mode Output Power (dBm) |       |       |       |
|-------------------------------------------|-------|-------|-------|
| Channel                                   | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                           | 5260  | 5300  | 5320  |
| Avg. Power                                | 16.49 | 16.48 | 16.43 |

| 5GHz 802.11n HT20 mode Output Power (dBm) |        |        |        |
|-------------------------------------------|--------|--------|--------|
| Channel                                   | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                           | 5500   | 5580   | 5700   |
| Avg. Power                                | 16.47  | 16.47  | 16.49  |

| 5GHz 802.11n HT40 mode Output Power (dBm) |       |       |       |       |
|-------------------------------------------|-------|-------|-------|-------|
| Channel                                   | CH 38 | CH 46 | CH 54 | CH 62 |
| Frequency (MHz)                           | 5190  | 5230  | 5270  | 5310  |
| Avg. Power                                | 16.42 | 16.38 | 16.46 | 15.42 |

| 5GHz 802.11n HT40 mode Output Power (dBm) |        |        |       |
|-------------------------------------------|--------|--------|-------|
| Channel                                   | CH 102 | CH 110 | CH134 |
| Frequency (MHz)                           | 5510   | 5550   | 5670  |
| Avg. Power                                | 15.98  | 16.40  | 16.32 |



| 5GHz 802.11n VHT20 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 36 | CH 44 | CH 48 |
| Frequency (MHz)                            | 5180  | 5220  | 5240  |
| Avg. Power                                 | 16.39 | 16.42 | 16.34 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 52 | CH 60 | CH 64 |
| Frequency (MHz)                            | 5260  | 5300  | 5320  |
| Avg. Power                                 | 16.37 | 16.38 | 16.23 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |        |        |        |
|--------------------------------------------|--------|--------|--------|
| Channel                                    | CH 100 | CH 116 | CH 140 |
| Frequency (MHz)                            | 5500   | 5580   | 5700   |
| Avg. Power                                 | 16.41  | 16.27  | 16.43  |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |       |       |       |       |
|--------------------------------------------|-------|-------|-------|-------|
| Channel                                    | CH 38 | CH 46 | CH 54 | CH 62 |
| Frequency (MHz)                            | 5190  | 5230  | 5270  | 5310  |
| Avg. Power                                 | 16.39 | 16.44 | 16.46 | 15.37 |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |        |        |       |
|--------------------------------------------|--------|--------|-------|
| Channel                                    | CH 102 | CH 110 | CH134 |
| Frequency (MHz)                            | 5510   | 5550   | 5670  |
| Avg. Power                                 | 15.93  | 16.48  | 16.49 |

| 5GHz 802.11n VHT80 mode Output Power (dBm) |       |       |       |
|--------------------------------------------|-------|-------|-------|
| Channel                                    | CH 42 | CH 58 | CH106 |
| Frequency (MHz)                            | 5210  | 5290  | 5530  |
| Avg. Power                                 | 14.99 | 12.73 | 14.49 |





&lt;Straddle Channel&gt;

SISO &lt;Ant. 1&gt;

| 5GHz 802.11a mode Output Power (dBm) |        |       |       |
|--------------------------------------|--------|-------|-------|
| Channel                              | CH 144 |       |       |
| Frequency (MHz)                      | 5720   | Lower | Upper |
| Avg. Power                           | 13.43  | 12.77 | 4.91  |

| 5GHz 802.11n HT20 mode Output Power (dBm) |        |       |       |
|-------------------------------------------|--------|-------|-------|
| Channel                                   | CH 144 |       |       |
| Frequency (MHz)                           | 5720   | Lower | Upper |
| Avg. Power                                | 13.24  | 12.50 | 5.17  |

| 5GHz 802.11n HT40 mode Output Power (dBm) |        |       |       |
|-------------------------------------------|--------|-------|-------|
| Channel                                   | CH 142 |       |       |
| Frequency (MHz)                           | 5710   | Lower | Upper |
| Avg. Power                                | 13.47  | 13.26 | 0.20  |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 144 |       |       |
| Frequency (MHz)                            | 5720   | Lower | Upper |
| Avg. Power                                 | 13.25  | 12.57 | 4.88  |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 142 |       |       |
| Frequency (MHz)                            | 5710   | Lower | Upper |
| Avg. Power                                 | 13.38  | 13.17 | 0.16  |

| 5GHz 802.11n VHT80 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 138 |       |       |
| Frequency (MHz)                            | 5690   | Lower | Upper |
| Avg. Power                                 | 13.42  | 13.35 | -4.78 |

**SISO <Ant. 2>**

| 5GHz 802.11a mode Output Power (dBm) |        |       |       |
|--------------------------------------|--------|-------|-------|
| Channel                              | CH 144 |       |       |
| Frequency (MHz)                      | 5720   | Lower | Upper |
| Avg. Power                           | 13.46  | 12.84 | 4.70  |

| 5GHz 802.11n HT20 mode Output Power (dBm) |        |       |       |
|-------------------------------------------|--------|-------|-------|
| Channel                                   | CH 144 |       |       |
| Frequency (MHz)                           | 5720   | Lower | Upper |
| Avg. Power                                | 13.28  | 12.58 | 5.03  |

| 5GHz 802.11n HT40 mode Output Power (dBm) |        |       |       |
|-------------------------------------------|--------|-------|-------|
| Channel                                   | CH 142 |       |       |
| Frequency (MHz)                           | 5710   | Lower | Upper |
| Avg. Power                                | 13.39  | 13.20 | -0.23 |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 144 |       |       |
| Frequency (MHz)                            | 5720   | Lower | Upper |
| Avg. Power                                 | 13.49  | 12.85 | 4.84  |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 142 |       |       |
| Frequency (MHz)                            | 5710   | Lower | Upper |
| Avg. Power                                 | 13.36  | 13.16 | -0.12 |

| 5GHz 802.11n VHT80 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 138 |       |       |
| Frequency (MHz)                            | 5690   | Lower | Upper |
| Avg. Power                                 | 13.27  | 13.22 | -5.91 |

**MIMO <Ant. 1+2>**

| 5GHz 802.11a mode Output Power (dBm) |        |       |       |
|--------------------------------------|--------|-------|-------|
| Channel                              | CH 144 |       |       |
| Frequency (MHz)                      | 5720   | Lower | Upper |
| Avg. Power                           | 16.25  | 15.65 | 7.37  |

| 5GHz 802.11n HT20 mode Output Power (dBm) |        |       |       |
|-------------------------------------------|--------|-------|-------|
| Channel                                   | CH 144 |       |       |
| Frequency (MHz)                           | 5720   | Lower | Upper |
| Avg. Power                                | 16.48  | 15.81 | 8.05  |

| 5GHz 802.11n HT40 mode Output Power (dBm) |        |       |       |
|-------------------------------------------|--------|-------|-------|
| Channel                                   | CH 142 |       |       |
| Frequency (MHz)                           | 5710   | Lower | Upper |
| Avg. Power                                | 16.17  | 15.97 | 2.71  |

| 5GHz 802.11n VHT20 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 144 |       |       |
| Frequency (MHz)                            | 5720   | Lower | Upper |
| Avg. Power                                 | 16.47  | 15.80 | 8.06  |

| 5GHz 802.11n VHT40 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 142 |       |       |
| Frequency (MHz)                            | 5710   | Lower | Upper |
| Avg. Power                                 | 16.40  | 16.20 | 2.89  |

| 5GHz 802.11n VHT80 mode Output Power (dBm) |        |       |       |
|--------------------------------------------|--------|-------|-------|
| Channel                                    | CH 138 |       |       |
| Frequency (MHz)                            | 5690   | Lower | Upper |
| Avg. Power                                 | 16.18  | 16.12 | -2.32 |

## 2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

### Single Antenna

| Modulation     | Data Rate |
|----------------|-----------|
| 802.11a        | 6 Mbps    |
| 802.11n HT20   | MCS0      |
| 802.11n HT40   | MCS0      |
| 802.11ac VHT20 | MCS0      |
| 802.11ac VHT40 | MCS0      |
| 802.11ac VHT80 | MCS0      |

### MIMO Antenna

| Modulation     | Data Rate |
|----------------|-----------|
| 802.11a        | 6 Mbps    |
| 802.11n HT20   | MCS0      |
| 802.11n HT40   | MCS0      |
| 802.11ac VHT20 | MCS0      |
| 802.11ac VHT40 | MCS0      |
| 802.11ac VHT80 | MCS0      |

|                                                                                                                                                                                                                                                                                                                                                          |                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>AC Conducted</b>                                                                                                                                                                                                                                                                                                                                      | Mode 1 : Bluetooth Tx + TC + TF  |
| <b>Emission</b>                                                                                                                                                                                                                                                                                                                                          | Mode 2 : WLAN (5GHz) Tx + TC +TF |
| <b>Remark:</b> <ol style="list-style-type: none"> <li>TC stands for Test Configuration, and consists of USB HD, SD Card, Earphone, HDMI Cable and adapter.</li> <li>TF stands for Test Function, and consists of MPEG4, Camera and H-Pattern.</li> <li>The worst case of conducted emission is mode 1; only the test data of it was reported.</li> </ol> |                                  |



| Ch. #    |        | Band I : 5150-5250 MHz | Band II : 5250-5350 MHz | Band III : 5470-5725MHz |
|----------|--------|------------------------|-------------------------|-------------------------|
|          |        | 802.11a                | 802.11a                 | 802.11a                 |
| L        | Low    | 36                     | 52                      | 100                     |
| M        | Middle | 44                     | 60                      | 116                     |
| H        | High   | 48                     | 64                      | 140                     |
| Straddle |        | -                      | -                       | 144                     |

| Ch. #    |        | Band I : 5150-5250 MHz | Band II : 5250-5350 MHz | Band III : 5470-5725MHz |
|----------|--------|------------------------|-------------------------|-------------------------|
|          |        | 802.11n HT20           | 802.11n HT20            | 802.11n HT20            |
| L        | Low    | 36                     | 52                      | 100                     |
| M        | Middle | 44                     | 60                      | 116                     |
| H        | High   | 48                     | 64                      | 140                     |
| Straddle |        | -                      | -                       | 144                     |

| Ch. #    |        | Band I : 5150-5250 MHz | Band II : 5250-5350 MHz | Band III : 5470-5725MHz |
|----------|--------|------------------------|-------------------------|-------------------------|
|          |        | 802.11n HT40           | 802.11n HT40            | 802.11n HT40            |
| L        | Low    | 38                     | 54                      | 102                     |
| M        | Middle | -                      | -                       | 110                     |
| H        | High   | 46                     | 62                      | 134                     |
| Straddle |        | -                      | -                       | 142                     |



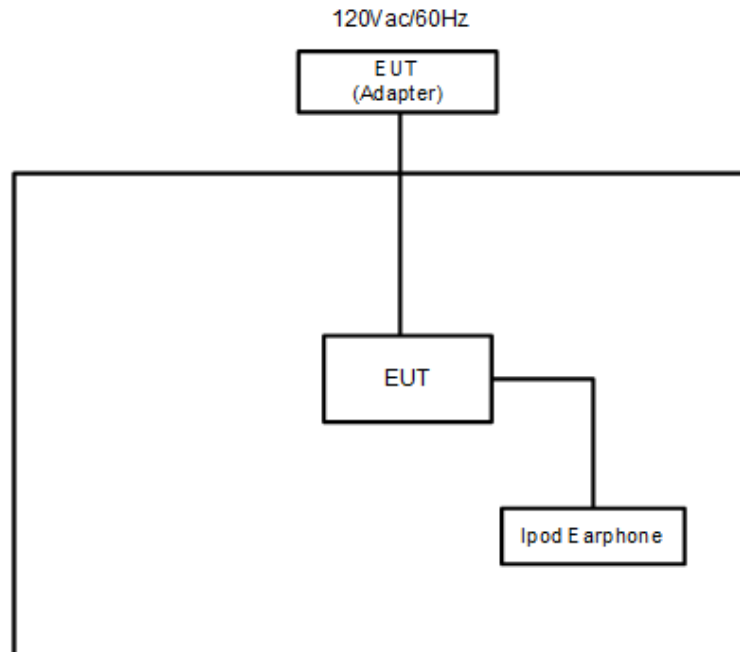
| Ch. #    |        | Band I : 5150-5250 MHz | Band II : 5250-5350 MHz | Band III : 5470-5725MHz |
|----------|--------|------------------------|-------------------------|-------------------------|
|          |        | 802.11ac VHT20         | 802.11ac VHT20          | 802.11ac VHT20          |
| L        | Low    | 36                     | 52                      | 100                     |
| M        | Middle | 44                     | 60                      | 116                     |
| H        | High   | 48                     | 64                      | 140                     |
| Straddle |        | -                      | -                       | 144                     |

| Ch. #    |        | Band I : 5150-5250 MHz | Band II : 5250-5350 MHz | Band III : 5470-5725MHz |
|----------|--------|------------------------|-------------------------|-------------------------|
|          |        | 802.11ac VHT40         | 802.11ac VHT40          | 802.11ac VHT40          |
| L        | Low    | 38                     | 54                      | 102                     |
| M        | Middle | -                      | -                       | 110                     |
| H        | High   | 46                     | 62                      | 134                     |
| Straddle |        | -                      | -                       | 142                     |

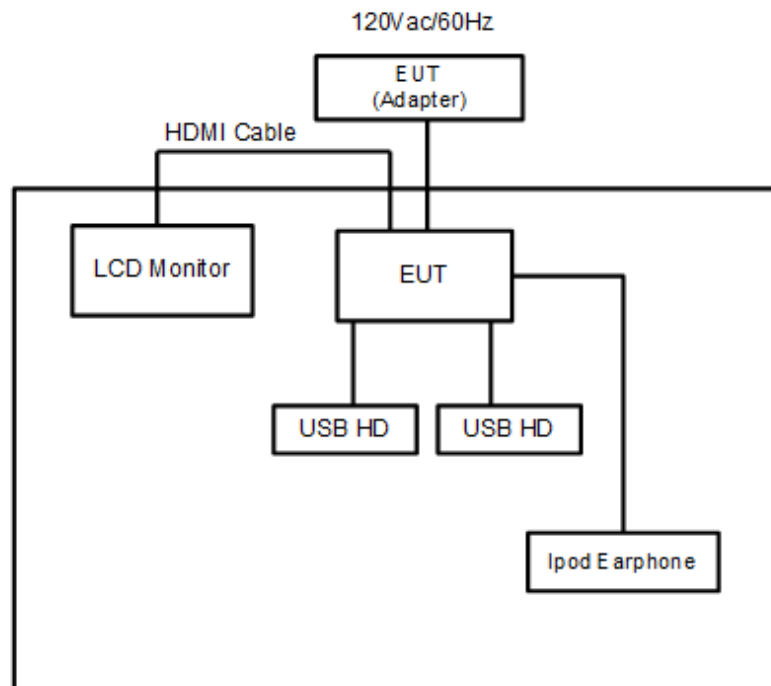
| Ch. #    |        | Band I : 5150-5250 MHz | Band II : 5250-5350 MHz | Band III : 5470-5725MHz |
|----------|--------|------------------------|-------------------------|-------------------------|
|          |        | 802.11ac VHT80         | 802.11ac VHT80          | 802.11ac VHT80          |
| L        | Low    | -                      | -                       | -                       |
| M        | Middle | 42                     | 58                      | 106                     |
| H        | High   | -                      | -                       | -                       |
| Straddle |        | -                      | -                       | 138                     |

## 2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



## 2.5 Support Unit used in test configuration and system

| Item | Equipment     | Trade Name | Model Name | FCC ID       | Data Cable        | Power Cord        |
|------|---------------|------------|------------|--------------|-------------------|-------------------|
| 1.   | LCD Monitor   | DELL       | U2410      | FCC DoC      | Shielded, 1.6 m   | Unshielded, 1.8 m |
| 2.   | iPod Earphone | Apple      | N/A        | Verification | Unshielded, 1.0 m | N/A               |
| 3.   | USB HD        | PQI        | H568V      | FCC DoC      | Shielded, 0.5m    | N/A               |
| 4.   | SD Card       | SanDisk    | MicroSD HC | FCC DoC      | N/A               | N/A               |

## 2.6 EUT Operation Test Setup

For WLAN function, programmed RF utility, "DRTU Tool" installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.



### 3 Test Result

#### 3.1 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

##### 3.1.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5600 MHz and 5650-5725MHz band: all emissions outside of the 5470-5600 MHz and 5650-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

- (2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 0.009 – 0.490      | 2400/F(kHz)                          | 300                              |
| 0.490 – 1.705      | 24000/F(kHz)                         | 30                               |
| 1.705 – 30.0       | 30                                   | 30                               |
| 30 – 88            | 100                                  | 3                                |
| 88 – 216           | 150                                  | 3                                |
| 216 - 960          | 200                                  | 3                                |
| Above 960          | 500                                  | 3                                |

**Note:** The following formula is used to convert the EIRP to field strength.

$$E = \frac{1000000\sqrt{30P}}{3} \text{ } \mu\text{V/m, where P is the eirp (Watts)}$$

| EIRP (dBm) | Field Strength at 3m (dBμV/m) |
|------------|-------------------------------|
| -17        | 78.3                          |
| - 27       | 68.3                          |

- (3) KDB789033 D02 v01r01 G)2)c) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

### **3.1.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

### **3.1.3 Test Procedures**

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r01. Section G) Unwanted emissions measurement.
  - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
    - RBW = 120 kHz
    - VBW = 300 kHz
    - Detector = Peak
    - Trace mode = max hold
  - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
    - RBW = 1 MHz
    - VBW  $\geq$  3 MHz
    - Detector = Peak
    - Sweep time = auto
    - Trace mode = max hold
  - (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
    - RBW = 1 MHz
    - VBW = 10 Hz, when duty cycle is no less than 98 percent.
    - VBW  $\geq$  1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

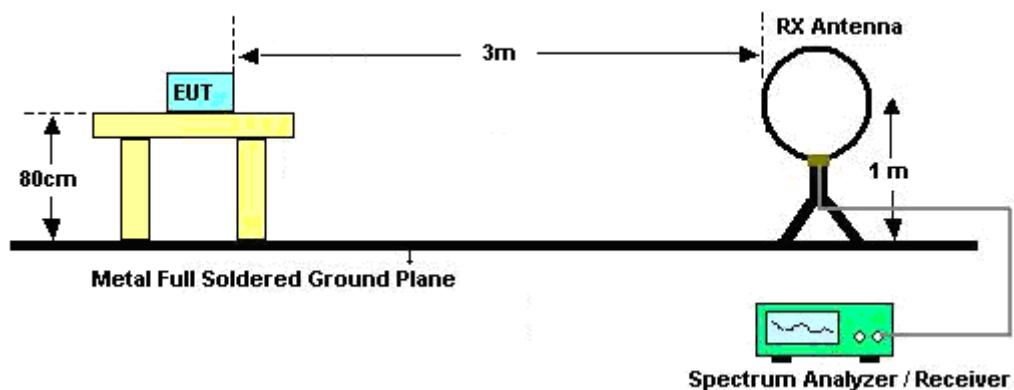
| Antenna | Band                          | Duty Cycle(%) | T(us) | 1/T(kHz) | VBW Setting |
|---------|-------------------------------|---------------|-------|----------|-------------|
| 0       | 802.11a                       | 98.1          | -     | -        | 10Hz        |
| 0       | 5GHz 802.11n HT20             | 98.47         | -     | -        | 10Hz        |
| 0       | 5GHz 802.11n HT40             | 95.92         | 940   | 1.06     | 3kHz        |
| 1       | 802.11a                       | 98.1          | -     | -        | 10Hz        |
| 1       | 5GHz 802.11n HT20             | 98.47         | -     | -        | 10Hz        |
| 1       | 5GHz 802.11n HT40             | 95.96         | 950   | 1.05     | 3kHz        |
| 1+2     | 5GHz 802.11a for Ant 1        | 98.11         | -     | -        | 10Hz        |
| 1+2     | 5GHz 802.11a for Ant 2        | 98.1          | -     | -        | 10Hz        |
| 1+2     | 5GHz 802.11n HT20 for Ant 1   | 96.12         | 990   | 1.01     | 3kHz        |
| 1+2     | 5GHz 802.11n HT20 for Ant 2   | 96.12         | 990   | 1.01     | 3kHz        |
| 1+2     | 5GHz 802.11n HT40 for Ant 1   | 93.18         | 492   | 2.03     | 3kHz        |
| 1+2     | 5GHz 802.11n HT40 for Ant 2   | 93.18         | 492   | 2.03     | 3kHz        |
| 0       | 5GHz 802.11ac VHT20           | 97.98         | 1940  | 0.52     | 1kHz        |
| 0       | 5GHz 802.11ac VHT40           | 95.96         | 498   | 2.01     | 3kHz        |
| 0       | 5GHz 802.11ac VHT80           | 92.31         | 432   | 2.31     | 3kHz        |
| 1       | 5GHz 802.11ac VHT20           | 97.98         | 1940  | 0.52     | 1kHz        |
| 1       | 5GHz 802.11ac VHT40           | 95.46         | 498   | 2.01     | 3kHz        |
| 1       | 5GHz 802.11ac VHT80           | 93.59         | 438   | 2.28     | 3kHz        |
| 1+2     | 5GHz 802.11ac VHT20 for Ant 1 | 96.12         | 990   | 1.01     | 3kHz        |
| 1+2     | 5GHz 802.11ac VHT20 for Ant 2 | 96.15         | 1000  | 1.00     | 1kHz        |
| 1+2     | 5GHz 802.11ac VHT40 for Ant 1 | 92.74         | 498   | 2.01     | 3kHz        |
| 1+2     | 5GHz 802.11ac VHT40 for Ant 2 | 93.26         | 498   | 2.01     | 3kHz        |
| 1+2     | 5GHz 802.11ac VHT80 for Ant 1 | 87.67         | 256   | 3.91     | 10kHz       |
| 1+2     | 5GHz 802.11ac VHT80 for Ant 2 | 86.3          | 252   | 3.97     | 10kHz       |

- The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.

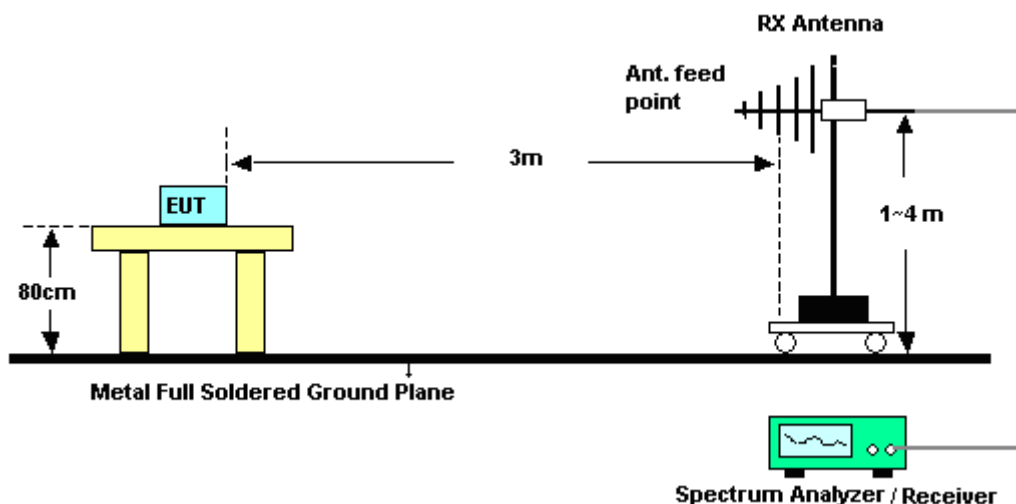
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

### 3.1.4 Test Setup

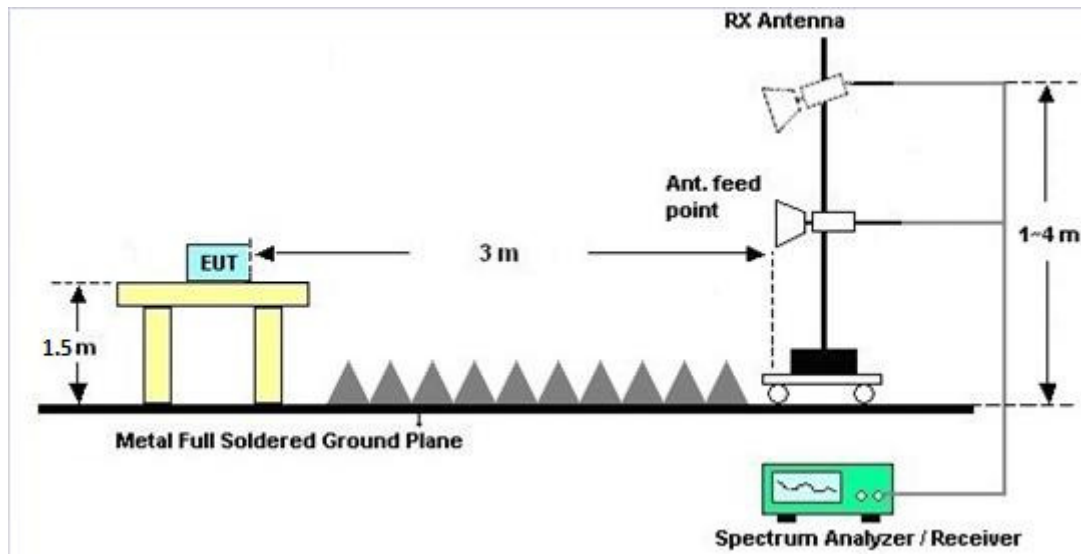
**For radiated emissions below 30MHz**



**For radiated emissions from 30MHz to 1GHz**



For radiated emissions above 1GHz



### 3.1.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

### 3.1.6 Test Result of Radiated Band Edges

Please refer to Appendix A and B.

### 3.1.7 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix A and B.

## 3.2 AC Conducted Emission Measurement

### 3.2.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

| Frequency of emission (MHz) | Conducted limit (dB $\mu$ V) |           |
|-----------------------------|------------------------------|-----------|
|                             | Quasi-peak                   | Average   |
| 0.15-0.5                    | 66 to 56*                    | 56 to 46* |
| 0.5-5                       | 56                           | 46        |
| 5-30                        | 60                           | 50        |

\*Decreases with the logarithm of the frequency.

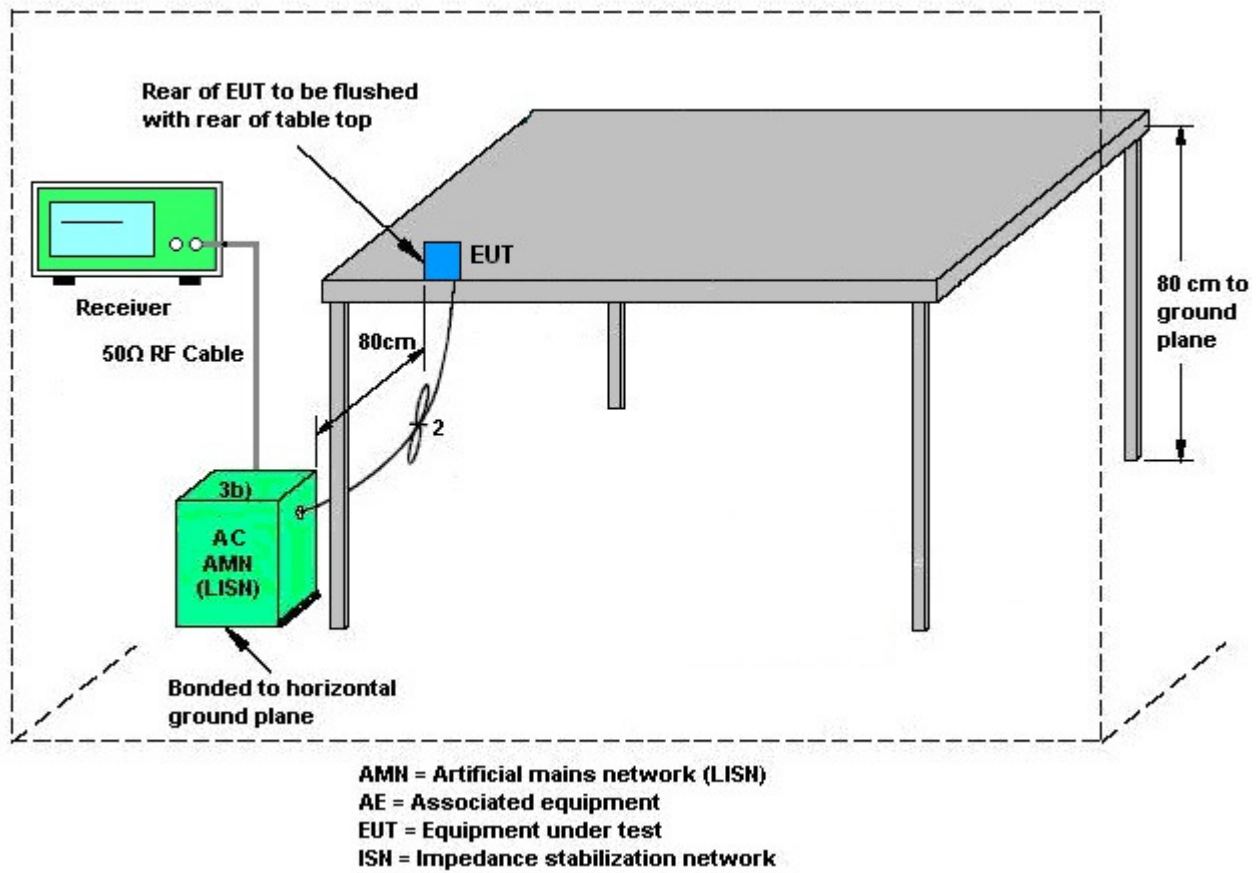
### 3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.2.3 Test Procedures

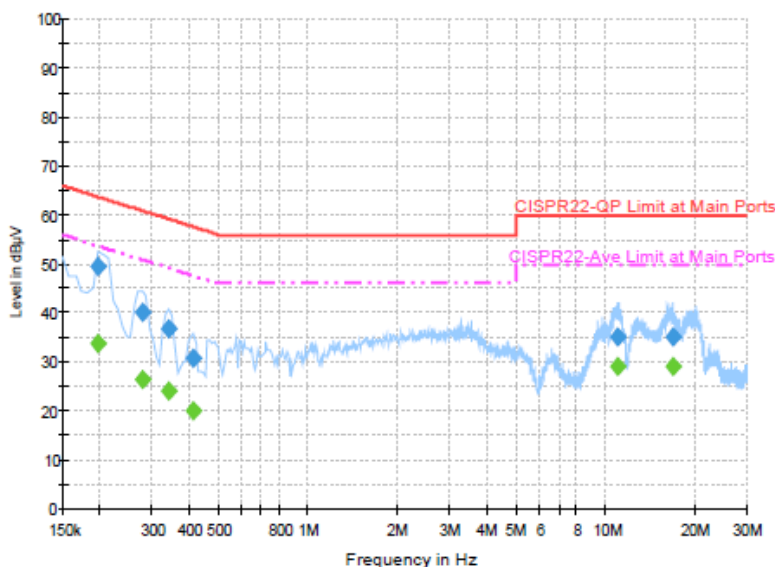
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

### 3.2.4 Test Setup



### 3.2.5 Test Result of AC Conducted Emission

|                        |                        |                            |        |
|------------------------|------------------------|----------------------------|--------|
| <b>Test Mode :</b>     | Mode 1                 | <b>Temperature :</b>       | 22~23℃ |
| <b>Test Engineer :</b> | Derreck Chen           | <b>Relative Humidity :</b> | 52~53% |
| <b>Test Voltage :</b>  | 120Vac / 60Hz          | <b>Phase :</b>             | Line   |
| <b>Function Type :</b> | Bluetooth Tx + TC + TF |                            |        |



#### Final Result : QuasiPeak

| Frequency (MHz) | QuasiPeak (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|--------|------|------------|-------------|--------------|
| 0.198000        | 49.4             | Off    | L1   | 19.7       | 14.3        | 63.7         |
| 0.278000        | 40.2             | Off    | L1   | 19.7       | 20.7        | 60.9         |
| 0.342000        | 36.7             | Off    | L1   | 19.7       | 22.5        | 59.2         |
| 0.414000        | 30.7             | Off    | L1   | 19.6       | 26.9        | 57.6         |
| 11.038000       | 35.2             | Off    | L1   | 19.8       | 24.8        | 60.0         |
| 16.886000       | 35.2             | Off    | L1   | 19.9       | 24.8        | 60.0         |

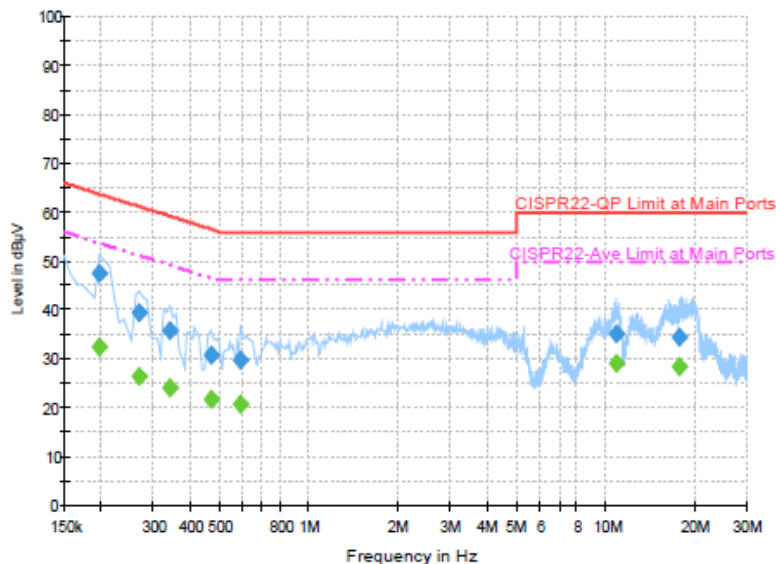
#### Final Result : Average

| Frequency (MHz) | Average (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|--------|------|------------|-------------|--------------|
| 0.198000        | 33.6           | Off    | L1   | 19.7       | 20.1        | 53.7         |
| 0.278000        | 26.3           | Off    | L1   | 19.7       | 24.6        | 50.9         |
| 0.342000        | 24.0           | Off    | L1   | 19.7       | 25.2        | 49.2         |
| 0.414000        | 20.2           | Off    | L1   | 19.6       | 27.4        | 47.6         |
| 11.038000       | 29.0           | Off    | L1   | 19.8       | 21.0        | 50.0         |
| 16.886000       | 29.0           | Off    | L1   | 19.9       | 21.0        | 50.0         |





|                 |                        |                     |         |
|-----------------|------------------------|---------------------|---------|
| Test Mode :     | Mode 1                 | Temperature :       | 22~23°C |
| Test Engineer : | Derreck Chen           | Relative Humidity : | 52~53%  |
| Test Voltage :  | 120Vac / 60Hz          | Phase :             | Neutral |
| Function Type : | Bluetooth Tx + TC + TF |                     |         |

**Final Result : QuasiPeak**

| Frequency (MHz) | QuasiPeak (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|------------------|--------|------|------------|-------------|--------------|
| 0.198000        | 47.6             | Off    | N    | 19.7       | 16.1        | 63.7         |
| 0.270000        | 39.5             | Off    | N    | 19.7       | 21.6        | 61.1         |
| 0.342000        | 35.9             | Off    | N    | 19.7       | 23.3        | 59.2         |
| 0.470000        | 30.6             | Off    | N    | 19.7       | 25.9        | 56.5         |
| 0.590000        | 29.9             | Off    | N    | 19.7       | 26.1        | 56.0         |
| 10.910000       | 35.2             | Off    | N    | 19.8       | 24.8        | 60.0         |
| 17.670000       | 34.3             | Off    | N    | 19.9       | 25.7        | 60.0         |

**Final Result : Average**

| Frequency (MHz) | Average (dBμV) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) |
|-----------------|----------------|--------|------|------------|-------------|--------------|
| 0.198000        | 32.3           | Off    | N    | 19.7       | 21.4        | 53.7         |
| 0.270000        | 26.5           | Off    | N    | 19.7       | 24.6        | 51.1         |
| 0.342000        | 24.1           | Off    | N    | 19.7       | 25.1        | 49.2         |
| 0.470000        | 21.7           | Off    | N    | 19.7       | 24.8        | 46.5         |
| 0.590000        | 20.8           | Off    | N    | 19.7       | 25.2        | 46.0         |
| 10.910000       | 28.9           | Off    | N    | 19.8       | 21.1        | 50.0         |
| 17.670000       | 28.3           | Off    | N    | 19.9       | 21.7        | 50.0         |



### **3.4 Automatically Discontinue Transmission**

#### **3.4.1 Limit of Automatically Discontinue Transmission**

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

#### **3.4.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

#### **3.4.3 Test Result of Automatically Discontinue Transmission**

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

### 3.5 Antenna Requirements

#### 3.5.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### 3.5.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

#### 3.5.3 Antenna Gain

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

$$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

$N_{SS}$  = the number of independent spatial streams of data;

$N_{ANT}$  = the total number of antennas

$g_{j,k} = 10^{G_k / 20}$  if the  $k$ th antenna is being fed by spatial stream  $j$ , or zero if it is not;  
 $G_k$  is the gain in dBi of the  $k$ th antenna.

The EUT supports CDD mode.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.



|                 |                |                | DG<br>for<br>Power<br>(dBi) | DG<br>for<br>PSD<br>(dBi) | Power<br>Limit<br>Reduction<br>(dB) | PSD<br>Limit<br>Reduction<br>(dB) |
|-----------------|----------------|----------------|-----------------------------|---------------------------|-------------------------------------|-----------------------------------|
|                 | Ant 1<br>(dBi) | Ant 2<br>(dBi) |                             |                           |                                     |                                   |
| <b>Band I</b>   | -0.09          | -2.27          | 1.90                        | 1.90                      | 0.00                                | 0.00                              |
| <b>Band II</b>  | 0.35           | -2.27          | 2.15                        | 2.15                      | 0.00                                | 0.00                              |
| <b>Band III</b> | -0.99          | -4.95          | 0.26                        | 0.26                      | 0.00                                | 0.00                              |

*Power Limit Reduction = DG(Power) – 6dBi, ( min = 0 )*

*PSD Limit Reduction = DG(PSD) – 6dBi, ( min = 0 )*



## 4 List of Measuring Equipment

| Instrument        | Manufacturer    | Model No.               | Serial No.  | Characteristics | Calibration Date | Test Date                       | Due Date      | Remark                   |
|-------------------|-----------------|-------------------------|-------------|-----------------|------------------|---------------------------------|---------------|--------------------------|
| Loop Antenna      | Rohde & Schwarz | HFH2-Z2                 | 100315      | 9 kHz~30 MHz    | Sep. 02, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Sep. 01, 2016 | Radiation<br>(03CH10-HY) |
| Amplifier         | SONOMA          | 310N                    | 187311      | 9kHz~1GHz       | Nov. 16, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Nov. 15, 2016 | Radiation<br>(03CH10-HY) |
| EMI Test Receiver | Keysight        | N9038A(MXE)             | MY54130085  | 20Hz ~ 8.4GHz   | Nov. 04, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Nov. 03, 2016 | Radiation<br>(03CH10-HY) |
| Horn Antenna      | SCHWARZBECK     | BBHA 9120 D             | 9120D-1325  | 1GHz ~ 18GHz    | Sep. 30, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Sep. 29, 2016 | Radiation<br>(03CH10-HY) |
| Hygrometer        | TECPEL          | DTM-303B                | TP140320    | N/A             | Nov. 17, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Nov. 16, 2016 | Radiation<br>(03CH10-HY) |
| Preamplifier      | Keysight        | 83017A                  | MY53270078  | 1GHz~26.5GHz    | Nov. 13, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Nov. 12, 2016 | Radiation<br>(03CH10-HY) |
| Spectrum Analyzer | Keysight        | N9010A                  | MY54200485  | 10Hz ~ 44GHZ    | Oct. 15, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Oct. 14, 2016 | Radiation<br>(03CH10-HY) |
| Antenna Mast      | EMEC            | AM-BS-4500-B            | N/A         | 1~4m            | N/A              | Dec. 19, 2015~<br>Dec. 26, 2015 | N/A           | Radiation<br>(03CH10-HY) |
| Turn Table        | EMEC            | TT 2200                 | N/A         | 0-360 degree    | N/A              | Dec. 19, 2015~<br>Dec. 26, 2015 | N/A           | Radiation<br>(03CH10-HY) |
| Bilog Antenna     | TESEQ           | CBL 6111D               | 35414       | 30MHz~1GHz      | Nov. 17, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Nov. 16, 2016 | Radiation<br>(03CH10-HY) |
| Horn Antenna      | SCHWARZBECK     | BBHA 9170               | BBHA9170584 | 18GHz- 40GHz    | Nov. 02, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Nov. 01, 2016 | Radiation<br>(03CH10-HY) |
| Preamplifier      | MITEQ           | JS44-1800400<br>0-33-8P | 1840917     | 18GHz ~ 40GHz   | Jun. 02, 2015    | Dec. 19, 2015~<br>Dec. 26, 2015 | Jun. 01, 2016 | Radiation<br>(03CH10-HY) |
| AC Power Source   | ChainTek        | APC-1000W               | N/A         | N/A             | N/A              | Jan. 08, 2016                   | N/A           | Conduction<br>(CO05-HY)  |
| EMI Test Receiver | Rohde & Schwarz | ESCI 7                  | 100724      | 9kHz~7GHz       | Aug. 26, 2015    | Jan. 08, 2016                   | Aug. 25, 2016 | Conduction<br>(CO05-HY)  |
| LISN              | Rohde & Schwarz | ENV216                  | 100080      | 9kHz~30MHz      | Dec. 02, 2015    | Jan. 08, 2016                   | Dec. 01, 2016 | Conduction<br>(CO05-HY)  |



## 5 Uncertainty of Evaluation

### Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

|                                                                            |      |
|----------------------------------------------------------------------------|------|
| Measuring Uncertainty for a Level of Confidence<br>of 95% ( $U = 2Uc(y)$ ) | 2.26 |
|----------------------------------------------------------------------------|------|

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

|                                                                            |      |
|----------------------------------------------------------------------------|------|
| Measuring Uncertainty for a Level of Confidence<br>of 95% ( $U = 2Uc(y)$ ) | 4.90 |
|----------------------------------------------------------------------------|------|

