

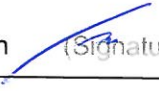

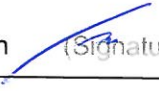

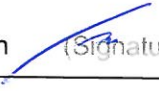


TEST REPORT

| | | | | | |
|--|---|--|-------------|---|--|
| DT&C Co., Ltd. 42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel : 031-321-2664, Fax : 031-321-1664 | Report No : DRTFCC1603-0043 Pages:(1) / (19) page |  Dt&C | | | |
| <p>1. Customer</p> <ul style="list-style-type: none">• Name : HANDAN BroadInfoCom Co., Ltd.• Address : 4-5 Fl. Shinsung Plaza, 18, Seolleung-ro, 93-gil Gangnam-gu, Seoul, South Korea <p>2. Use of Report : FCC Original Grant</p> <p>3. Product Name (FCCID) : Bike Safety Tail Light (2AC4W-R-200)</p> <p>4. Date of Test : 2016-02-29~ 2016-03-15</p> <p>5. Test Method Used: FCC Part 15 Subpart C.249</p> <p>6. Testing Environment : See appended test report</p> <p>7. Test Result : <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail</p> <p>The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.</p> | | | | | |
| <table border="1"><tr><td data-bbox="167 1384 343 1491">Affirmation</td><td data-bbox="343 1384 895 1491">Tested by Name : Inhee Bae (Signature) </td><td data-bbox="895 1384 1461 1491">Technical Manager Name : GeunKi Son (Signature) </td></tr></table> | | | Affirmation | Tested by Name : Inhee Bae (Signature)  | Technical Manager Name : GeunKi Son (Signature)  |
| Affirmation | Tested by Name : Inhee Bae (Signature)  | Technical Manager Name : GeunKi Son (Signature)  | | | |
| <p style="text-align: center;">2016 . 03 . 18 .</p> <p style="text-align: center;">DT&C Co., Ltd.</p> | | | | | |

Test Report Version

| Test Report No. | Date | Description |
|-----------------|---------------|---------------|
| DRTFCC1603-0043 | Mar. 18, 2016 | Initial issue |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

CONTENTS

| | |
|---|-----------|
| 1. General Information | 4 |
| 1.1 Testing Laboratory | 4 |
| 1.2 Details of Applicant | 4 |
| 1.3 Description of EUT | 5 |
| 1.4 Declaration by the applicant / manufacturer | 5 |
| 1.5 Test Mode | 6 |
| 1.6 Tested Frequency | 6 |
| 1.7 Test Conditions | 6 |
| 1.8 EMI Suppression Device(s)/Modifications | 6 |
| 1.9 Test Equipment List..... | 7 |
| 1.10 Summary of Test Results | 8 |
| 2. Test Report | 9 |
| 2.1 Transmitter requirements | 9 |
| 2.1.1 AC Conducted Emissions | 9 |
| 2.1.1.1 Test Requirements and limit, §15.207 | 9 |
| 2.1.1.2 Test Configuration | 9 |
| 2.1.1.3 Test Procedure..... | 9 |
| 2.1.1.4 Test Result | 10 |
| 2.1.2 Radiated Emission..... | 12 |
| 2.1.2.1 Test Configuration | 13 |
| 2.1.2.2 Test Procedures for Radiated Spurious Emissions | 13 |
| 2.1.2.3 Test Result | 14 |
| 2.1.3 Antenna Requirements | 15 |
| 2.1.3.1 Test Procedure..... | 15 |
| 2.1.3.2 Conclusion..... | 15 |
| APPENDIX I..... | 16 |
| APPENDIX II..... | 17 |

1. General Information

1.1 Testing Laboratory

| DT&C Co., Ltd. | | |
|--|--|---|
| Standard | Site number | Address |
| FCC | <input checked="" type="checkbox"/> 165783 | 42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935 |
| | <input type="checkbox"/> 804488 | 42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935 |
| | <input type="checkbox"/> 596748 | 42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935 |
| | <input type="checkbox"/> 678747 | 683-3, Yubang-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 449-080 |
| IC | <input type="checkbox"/> 5740A-3 | 42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935 |
| | <input type="checkbox"/> 5740A-2 | 683-3, Yubang-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 449-080 |
| www.dtnet.net | | |
| Telephone | : | + 82-31-321-2664 |
| FAX | : | + 82-31-321-1664 |

1.2 Details of Applicant

Applicant : HANDAN BroadInfoCom Co., Ltd.
 Address : 4-5 Fl. Shinsung Plaza, 18, Seolleung-ro, 93-gil Gangnam-gu Seoul South Korea
 Contact person : Kwang Hwan An

1.3 Description of EUT

| | |
|----------------------------|--|
| FCC Equipment Class | Part 15 Low Power Communication Device Transmitter |
| Equipment type | Bike Safety Tail Light |
| Model Name | R-200 |
| Add Model Name | NA |
| Serial Number | Identical prototype |
| Hardware version | R-200 (5) |
| Software version | R200-FCC-100 |
| Power Supply | DC 3.7 V |
| Frequency Range | 2403.5 MHz |
| Number of Channels | 1 |
| Antenna Type | Internal Antenna |
| Antenna Gain | PK : 0.57 dBi |

1.4 Declaration by the applicant / manufacturer

- NA

1.5 Test Mode

This device was tested in maximum duty mode at maximum power.

| | Test Mode |
|------|-----------|
| TM 1 | 2-FSK |
| TM 2 | - |

1.6 Tested Frequency

| | TX Frequency (MHz) | RX Frequency (MHz) |
|-----------------|--------------------|--------------------|
| Lowest Channel | 2403.5 | 2403.5 |
| Middle Channel | - | - |
| Highest Channel | - | - |

1.7 Test Conditions

| Ambient Condition | |
|---------------------|-----------------|
| ▪ Temperature | +22 °C ~ +23 °C |
| ▪ Relative Humidity | 40 % ~ 41 % |

1.8 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

1.9 Test Equipment List

| Type | Manufacturer | Model | Cal.Date (yy/mm/dd) | Next.Cal.Date (yy/mm/dd) | S/N |
|-------------------------------|------------------------|-----------------------------|------------------------|-----------------------------|---------------|
| MXA Signal Analyzer | Agilent | N9020A | 15/10/19 | 16/10/19 | MY48011075 |
| Digital Multimeter | Agilent | 34401A | 16/01/05 | 17/01/05 | US36099541 |
| System DC Power Supply | Agilent | 6654A | 15/10/19 | 16/10/19 | MY40002935 |
| Vector Signal Generator | R&S | SMBV100A | 16/01/05 | 17/01/05 | 255571 |
| Signal Generator | R&S | SMF100A | 15/06/29 | 16/06/29 | 102341 |
| Thermohygrometer | BODYCOM | BJ5478 | 15/05/08 | 16/05/08 | 120612-2 |
| Loop Antenna | Schwarzbeck | FMZB1513 | 14/04/29 | 16/04/29 | 1513-128 |
| TRILOG Broadband Test-Antenna | Schwarzbeck | VULB 9160 | 14/04/30 | 16/04/30 | 3358 |
| Double-Ridged Guide Antenna | ETS | 3117 | 14/05/12 | 16/05/12 | 140394 |
| Horn Antenna | A.H.Systems | SAS-574 | 15/04/30 | 17/04/30 | 154 |
| Low Noise Pre Amplifier | tsj | MLA-010K01-B01-27 | 14/04/09 | 16/04/09 | 1844538 |
| PreAmplifier | Agilent | 8449B | 16/02/24 | 17/02/24 | 3008A00370 |
| Highpass Filter | Wainwright Instruments | WHKX12-2580-3000-18000-80SS | 15/09/23 | 16/09/23 | 3 |
| EMI Test Receiver | R&S | ESR7 | 15/10/19 | 16/10/19 | 101109 |
| EMI Test Receiver | R&S | ESCI7 | 16/02/25 | 17/02/25 | 100910 |
| Single-phase Master | NF | 4420 | 15/09/09 | 16/09/09 | 3049354420023 |
| ARTIFICIAL MAINS NETWORK | Narda S.T.S. / PMM | PMM L2-16B | 15/06/26 | 16/06/26 | 000WX20305 |

1.10 Summary of Test Results

| FCC Part | Parameter | Limit | Test Condition | Status Note 1 |
|--|--|----------------------------|-------------------|------------------|
| 15.249 (a) | Field Strength Limits | Refer to the FCC 15.249(a) | Radiated | C |
| 15.205, 209 | General Field Strength Limits (Restricted Bands and Radiated Emission Limits) | < FCC 15.209 limits | Radiated | C |
| 15.207 | AC Conducted Emissions | < FCC 15.207 limits | AC Line Conducted | C |
| <p>Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable</p> <p>Note 2: The sample was tested according to the following specification: ANSI C63.10-2013</p> | | | | |

2. Test Report

2.1 Transmitter requirements

2.1.1 AC Conducted Emissions

2.1.1.1 Test Requirements and limit, §15.207

According to §15.207(a) for an intentional radiator 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, as measured using a 50 μ H/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

| Frequency Range (MHz) | Conducted Limit (dBuV) | |
|-----------------------|------------------------|------------|
| | 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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

2.1.1.2 Test Configuration

See test photographs for the actual connections.

2.1.1.3 Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10.

1. The test procedure is performed in a 6.5 m \times 3.5 m \times 3.5 m (L \times W \times H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) \times 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

2.1.1.4 Test Result

AC Line Conducted Emissions (Graph)

Test Mode: TM 1 & 2403.5 MHz

Results of Conducted Emission

DTNC

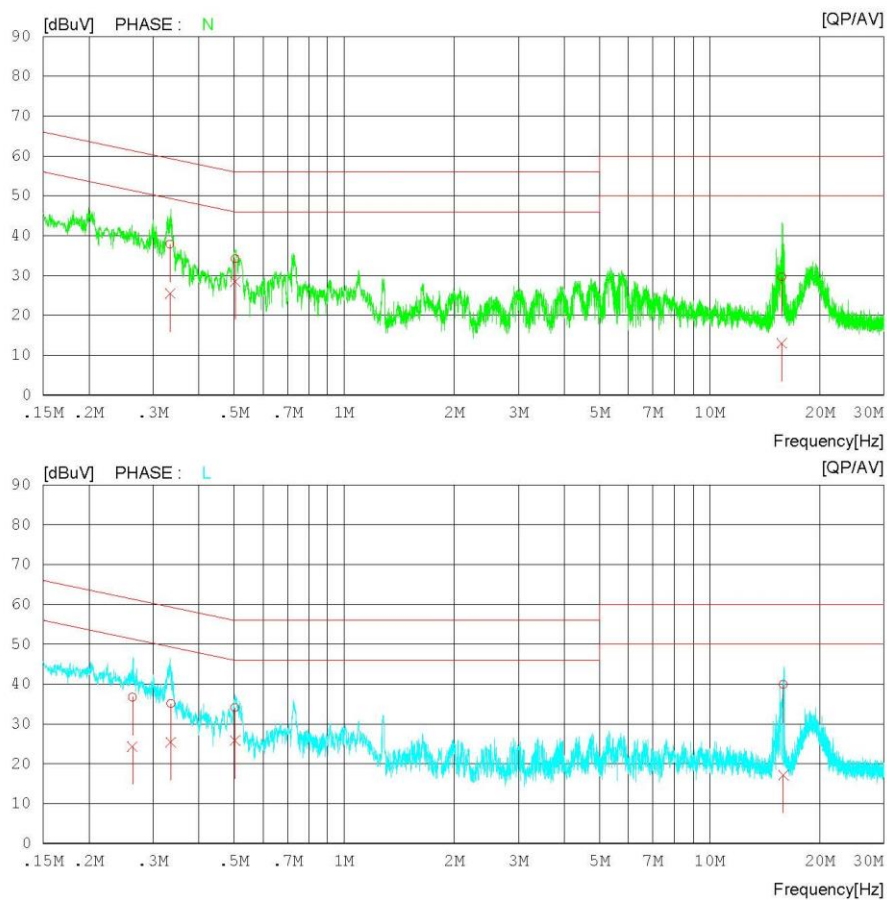
Date : 2016-03-15

Order No. :
Model No. : R-200
Serial No. : Identical prototype
Test Condition :

Reference No. :
Power Supply : 120 V / 60 Hz
Temp/Humi. : 23 °C / 40 % R.H.
Operator : I.H.BAE

Memo : 2403.5 MHz

LIMIT : FCC P15.207 QP
FCC P15.207 AV



AC Line Conducted Emissions (List)

Test Mode: TM 1 & 2403.5 MHz

Results of Conducted Emission

DTNC

Date : 2016-03-15

| | | | | | |
|----------------|---|---------------------|---------------|---|-------------------|
| Order No. | : | | Reference No. | : | |
| Model No. | : | R-200 | Power Supply | : | 120 V / 60 Hz |
| Serial No. | : | Identical prototype | Temp/Humi. | : | 23 'C / 40 % R.H. |
| Test Condition | : | | Operator | : | I.H.BAE |

Memo : 2403.5 MHz

LIMIT : FCC P15.207 QP
FCC P15.207 AV

| NO | FREQ [MHz] | READING | | C.FACTOR [dB] | RESULT | | LIMIT | | MARGIN | | PHASE |
|----|---------------|--------------|--------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|-------|
| | | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | |
| 1 | 0.33413 | 27.8 | 15.4 | 10.1 | 37.9 | 25.5 | 59.3 | 49.3 | 21.4 | 23.8 | N |
| 2 | 0.50341 | 24.2 | 18.4 | 10.1 | 34.3 | 28.5 | 56.0 | 46.0 | 21.7 | 17.5 | N |
| 3 | 15.75620 | 19.1 | 2.4 | 10.6 | 29.7 | 13.0 | 60.0 | 50.0 | 30.3 | 37.0 | N |
| 4 | 0.26301 | 26.6 | 14.2 | 10.1 | 36.7 | 24.3 | 61.3 | 51.3 | 24.6 | 27.0 | L |
| 5 | 0.33538 | 24.9 | 15.2 | 10.1 | 35.0 | 25.3 | 59.3 | 49.3 | 24.3 | 24.0 | L |
| 6 | 0.50259 | 23.9 | 15.7 | 10.1 | 34.0 | 25.8 | 56.0 | 46.0 | 22.0 | 20.2 | L |
| 7 | 15.92960 | 29.0 | 6.3 | 10.8 | 39.8 | 17.1 | 60.0 | 50.0 | 20.2 | 32.9 | L |

2.1.2 Radiated Emission

Test Requirements and limit, §15.205

▪ Fundamental / Harmonics emission: FCC Part 15.249(a)

| Frequency (MHz) | Limit @ 3m | |
|-----------------|--------------------|------------------|
| | Fundamental (mV/m) | Harmonics (uV/m) |
| 2400 ~ 2483.5 | 50 | 500 |

▪ FCC Part 15.209(a) and (b)

| Frequency (MHz) | Limit (uV/m) | Measurement Distance (meter) |
|-----------------|--------------|------------------------------|
| 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 |

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | MHz | GHz | GHz |
|-------------------|----------------|-------------------|-----------------|--------------|---------------|
| 0.009 ~ 0.110 | 12.29 ~ 12.293 | 149.9 ~ 150.05 | 1645.5 ~ 1646.5 | 4.5 ~ 5.15 | 14.47 ~ 14.5 |
| 0.495 ~ 0.505 | 12.51975 ~ | 156.52475 ~ | 1660 ~ 1710 | 5.35 ~ 5.46 | 15.35 ~ 16.2 |
| 2.1735 ~ 2.1905 | 12.52025 | 156.52525 | 1718.8 ~ 1722.2 | 7.25 ~ 7.75 | 17.7 ~ 21.4 |
| 4.125 ~ 4.128 | 12.57675 ~ | 156.7 ~ 156.9 | 2200 ~ 2300 | 8.025 ~ 8.5 | 22.01 ~ 23.12 |
| 4.17725 ~ 4.17775 | 12.57725 | 162.0125 ~ 167.17 | 2310 ~ 2390 | 9.0 ~ 9.2 | 23.6 ~ 24.0 |
| 4.20725 ~ 4.20775 | 13.36 ~ 13.41 | 167.72 ~ 173.2 | 2483.5 ~ 2500 | 9.3 ~ 9.5 | 31.2 ~ 31.8 |
| 6.215 ~ 6.218 | 16.42 ~ 16.423 | 240 ~ 285 | 2655 ~ 2900 | 10.6 ~ 12.7 | 36.43 ~ 36.5 |
| 6.26775 ~ 6.26825 | 16.69475 ~ | 322 ~ 335.4 | 3260 ~ 3267 | 13.25 ~ 13.4 | Above 38.6 |
| 6.31175 ~ 6.31225 | 16.69525 | 399.90 ~ 410 | 3332 ~ 3339 | | |
| 8.291 ~ 8.294 | 16.80425 ~ | 608 ~ 614 | 3345.8 ~ 3358 | | |
| 8.362 ~ 8.366 | 16.80475 | 960 ~ 1240 | 3600 ~ 4400 | | |
| 8.37625 ~ 8.38675 | 25.5 ~ 25.67 | 1300 ~ 1427 | | | |
| 8.41425 ~ 8.41475 | 37.5 ~ 38.25 | 1435 ~ 1626.5 | | | |
| | 73 ~ 74.6 | | | | |
| | 74.8 ~ 75.2 | | | | |
| | 108 ~ 121.94 | | | | |
| | 123 ~ 138 | | | | |

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

2.1.2.1 Test Configuration

Refer to the APPENDIX I.

2.1.2.2 Test Procedures for Radiated Spurious Emissions

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
4. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed.
5. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
6. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
7. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
8. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Note 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.

Note 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.

Note 3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1 GHz.

2.1.2.3 Test Result

9 KHz ~ 25GHz Radiated Spurious Emissions

▪ 2403.5 MHz

| | Freq. (MHz) | ANT Pol | The worst case EUT Position | Detect or Mode | Reading (dBuV) | T.F (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|----|----------------|------------|-----------------------------------|----------------------|-------------------|---------------|--------------------|-------------------|----------------|
| F | 2403.420 | H | Z axis | PK | 83.73 | 1.31 | 85.04 | 114.00 | 28.96 |
| F | 2403.460 | H | Z axis | AV | 82.03 | 1.31 | 83.34 | 94.00 | 10.66 |
| BE | 2389.200 | H | Z axis | PK | 51.84 | 1.28 | 53.12 | 74.00 | 20.88 |
| BE | 2389.990 | H | Z axis | AV | 29.70 | 1.28 | 30.98 | 54.00 | 23.02 |
| BE | 2486.362 | H | Z axis | PK | 40.99 | 1.57 | 42.56 | 74.00 | 31.44 |
| BE | 2486.470 | H | Z axis | AV | 28.21 | 1.57 | 29.78 | 54.00 | 24.22 |
| S | 4806.955 | H | Z axis | PK | 48.55 | 7.49 | 56.04 | 74.00 | 17.96 |
| S | 4807.010 | H | Z axis | AV | 40.82 | 7.49 | 48.31 | 54.00 | 5.69 |

Note.

- No other spurious and harmonic emissions were detected greater than listed emissions on above table. And above listed data is the worst case data.
- Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

2.1.3 Antenna Requirements

2.1.3.1 Test Procedure

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

2.1.3.2 Conclusion : **Comply**

The antenna is permanently attached.(Refer to Internal Photo file.)

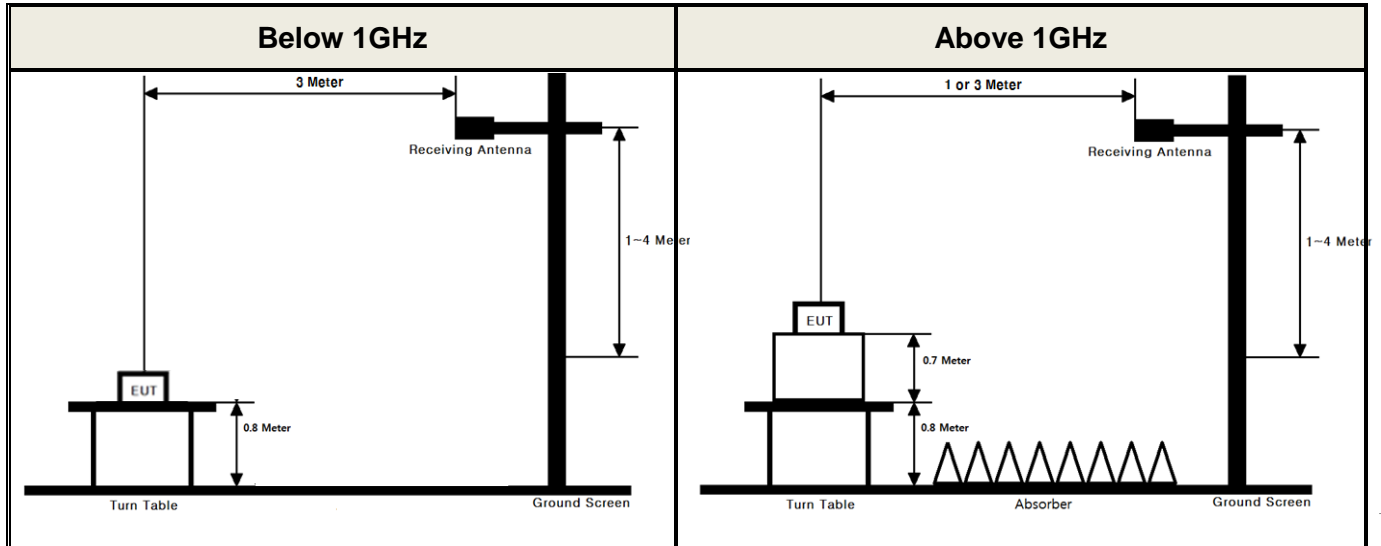
- Minimum Standard:

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 use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions.

APPENDIX I

Test set up diagrams

▪ Radiated Measurement



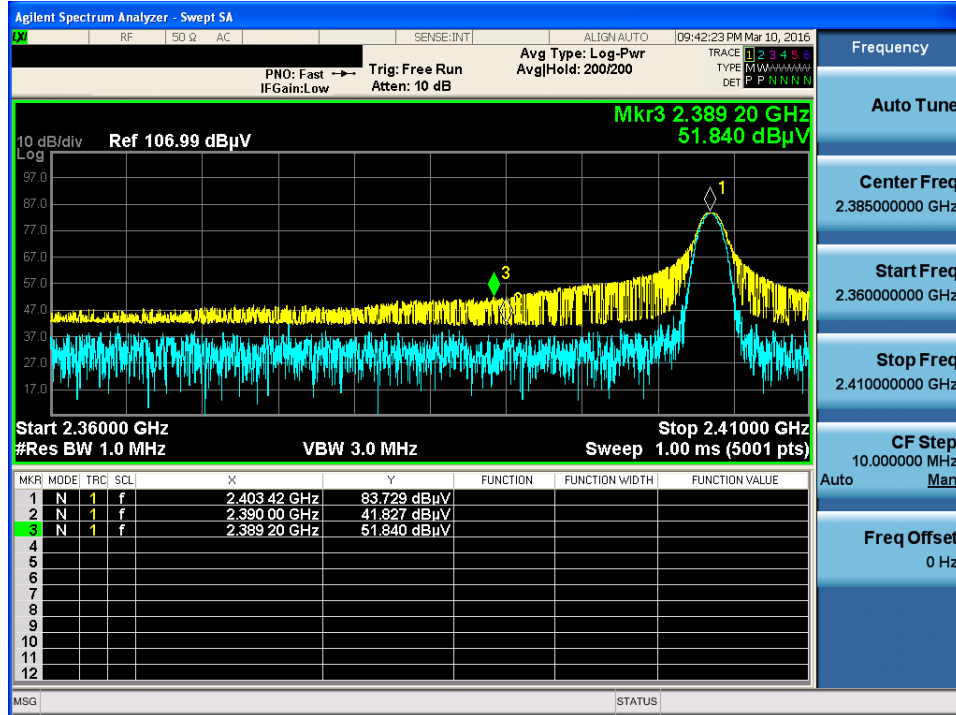
APPENDIX II

Restricted band edge(Test plot of radiated)

Note: The offset was not include in test plot. (Reading value). The results refer to the clause 2.1.2.3.

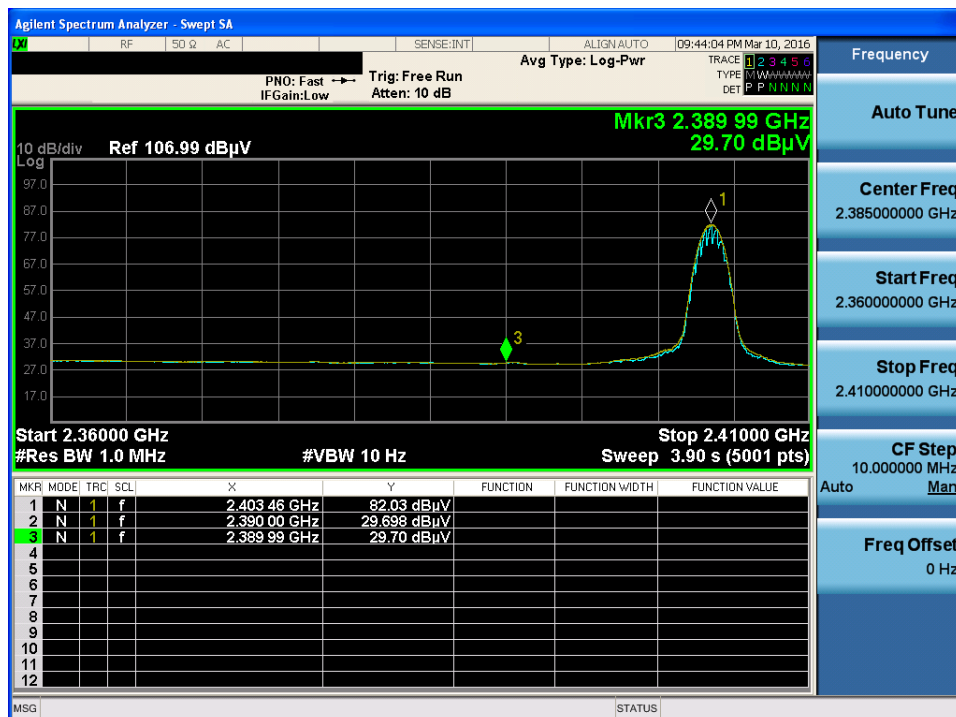
BE & Lowest & Z & Hor

Detector Mode : PK



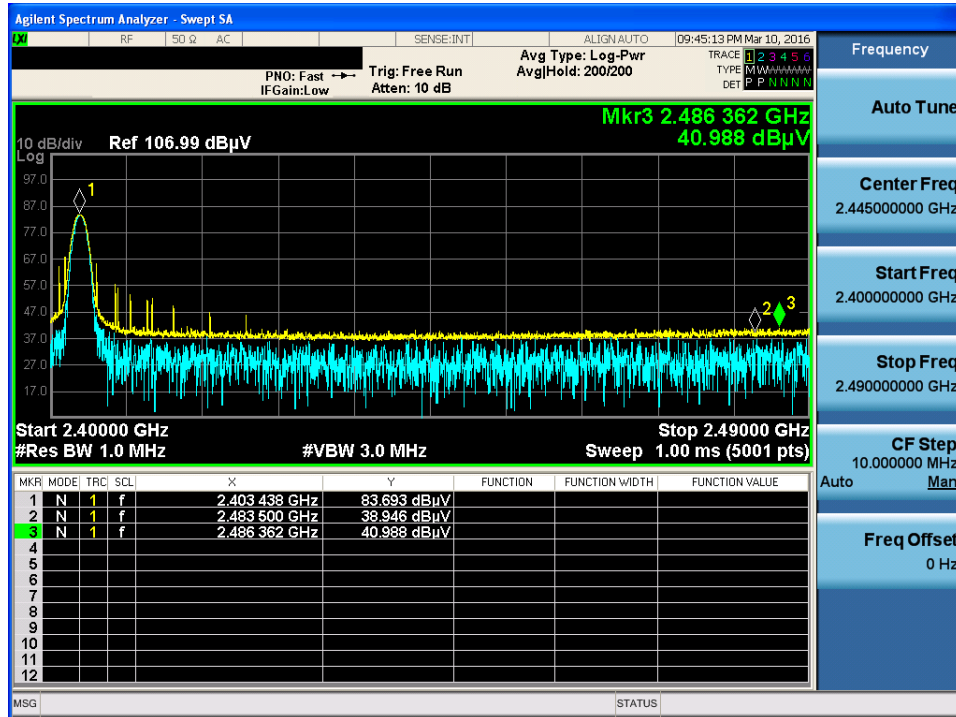
BE & Lowest & Z & Hor

Detector Mode : AV



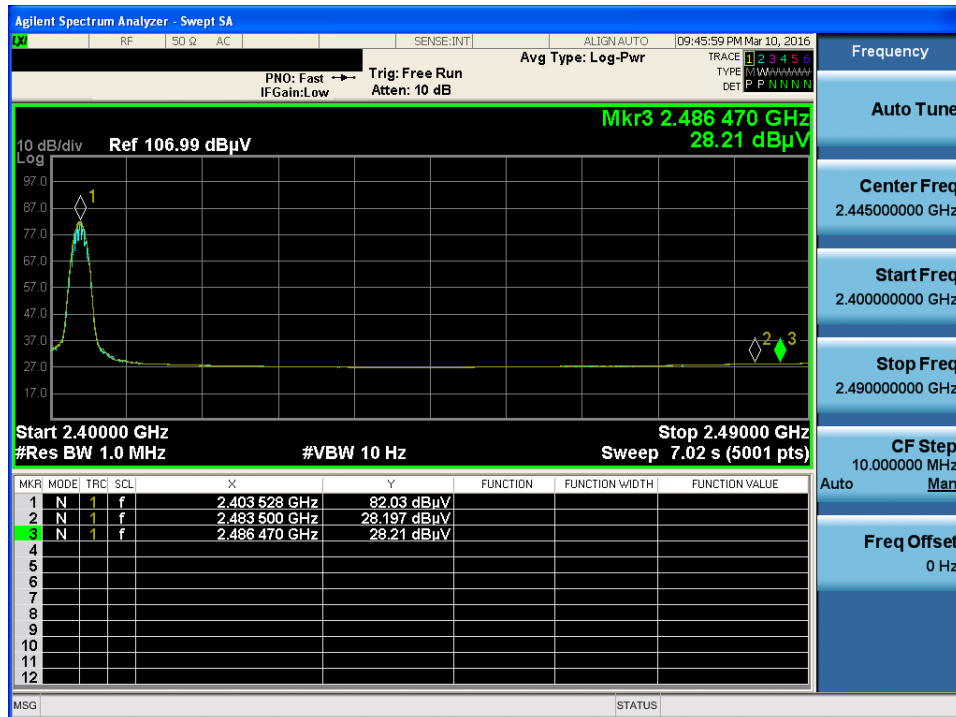
BE & Highest & Z & Hor

Detector Mode : PK



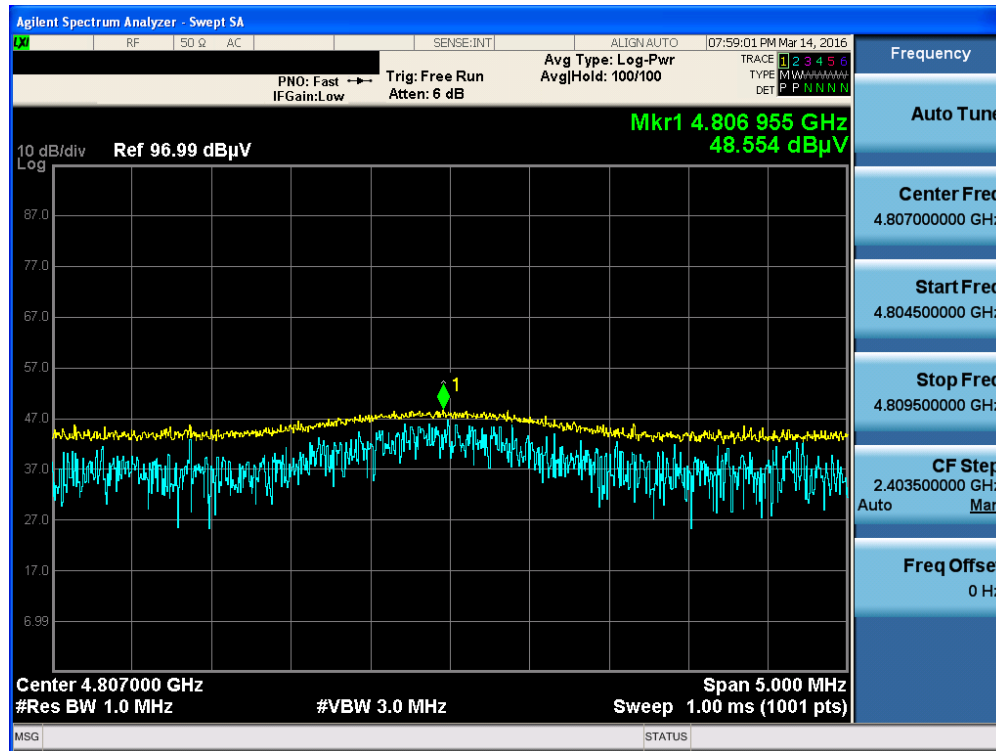
BE & Highest & Z & Hor

Detector Mode : AV



Harmonic & Z & Hor

Detector Mode : PK



Harmonic & Z & Hor

Detector Mode : AV

