



# FCC EMI TEST REPORT

**FCC ID** : XRAFB413  
**Equipment** : Wireless Activity Tracker  
**Brand Name** : Fitbit  
**Model Name** : FB413  
**Applicant** : FITBIT, INC.  
199 FREMONT, 14TH FLOOR, SAN FRANCISCO, CA  
**Manufacturer** : FITBIT, INC.  
199 FREMONT, 14TH FLOOR, SAN FRANCISCO, CA  
**Standard** : FCC 47 CFR Part 15 Subpart B

The product was received on Oct. 02, 2018 and testing was started from Oct. 05, 2018 and completed on Nov. 15, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Approved by: Joseph Lin

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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## History of this test report

| Report No.  | Version | Description   | Issued Date   |
|-------------|---------|---|---------------|
| FC892505-05 | 01      | Initial issue of report   | Oct. 29, 2018 |
| FC892505-05 | 02      | Add a description of the worst plane in Section 2.1 and modify description of point 4 in Section 3.2.3. | Nov. 15, 2018 |
|             |         |   |               |
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## Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items            | Result (PASS/FAIL) | Remark                               |
|---------------|-----------------|-----------------------|--------------------|--------------------------------------|
| 3.1           | 15.107          | AC Conducted Emission | Pass               | Under limit<br>16.02 dB at 0.440 MHz |
| 3.2           | 15.109          | Radiated Emission     | Pass               | Under limit<br>9.63 dB at 39.450 MHz |

**Reviewed by:** Louis Wu

**Report Producer:** Yimin Ho

## 1. General Description

### 1.1. Product Feature of Equipment Under Test

Bluetooth-LE

| Product Specification subjective to this standard |                                |
|---|--------------------------------|
| Antenna Type                                      | Bluetooth-LE: Monopole Antenna |

### 1.2. Modification of EUT

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

### 1.3. Test Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1093 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

|                    |   |           |
|--------------------|---|-----------|
| Test Site          | SPORTON INTERNATIONAL INC.  |           |
| Test Site Location | No.52, Huaya 1st Rd., Guishan Dist.,<br>Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |           |
| Test Site No.      | Sporton Site No.  |           |
|                    | CO05-HY   | 03CH06-HY |

### 1.4. Applicable Standards

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

- ♦ FCC 47 CFR Part 15 Subpart B
- ♦ ANSI C63.4-2014

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

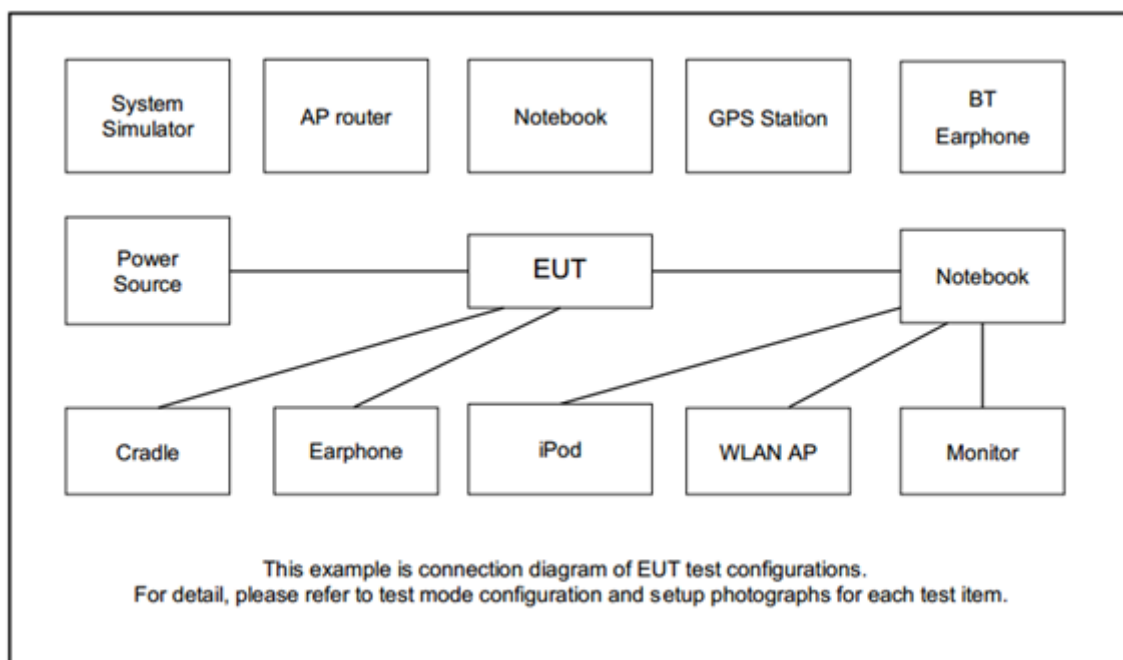
## 2. Test Configuration of Equipment Under Test

### 2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th 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 (Z plane) were recorded in this report

| Test Items   | Function Type   |
|--|---|
| <b>AC Conducted Emission</b>   | Mode 1: Bluetooth-LE Idle + Charging Cable + Adapter + Metal Strap<br>Mode 2: Bluetooth-LE Idle + Charging Cable + Adapter + Rubber Strap |
| <b>Radiated Emissions</b>  | Mode 1: Bluetooth-LE Idle + Charging Cable + Adapter + Metal Strap<br>Mode 2: Bluetooth-LE Idle + Charging Cable + Adapter + Rubber Strap |
| <b>Remark:</b><br>1. The worst case of AC is mode 1; only the test data of this mode was reported.<br>2. The worst case of RE is mode 2; only the test data of this mode was reported. |   |

### 2.2. Connection Diagram of Test System



## 2.3. Support Unit used in test configuration and system

| Item | Equipment          | Trade Name | Model Name    | FCC ID  | Data Cable | Power Cord   |
|------|--------------------|------------|---------------|---------|------------|--|
| 1.   | BLE 4.2 USB Dongle | CYPRESS    | CY5677        | FCC DoC | N/A        | N/A  |
| 2.   | Notebook           | Dell       | Latitude 5570 | FCC DoC | N/A        | AC I/P :<br>Unshielded, 1.2m<br>DC O/P :<br>Shielded, 1.8m |
| 3.   | Notebook           | Asus       | P2410U        | FCC DoC | N/A        | AC I/P :<br>Unshielded, 1.2m<br>DC O/P :<br>Shielded, 1.8m |
| 4.   | Adapter            | HUAWEI     | HW-059200UHQ  | FCC DoC | NA         | NA   |

## 2.4. EUT Operation Test Setup

The EUT was synchronized with the BCCH, and had been continuous receiving mode by setting paging reorganization of the system simulator.

1. Execute "CySmartSetup" to make the EUT attached with Bluetooth Dongle.
2. Turn off hibernate mode.
3. Turn on vibrate mode.
4. Turn on heartbeat detection mode.

### 3. Test Result

#### 3.1. Test of AC Conducted Emission Measurement

##### 3.1.1 Limits 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<br>(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.

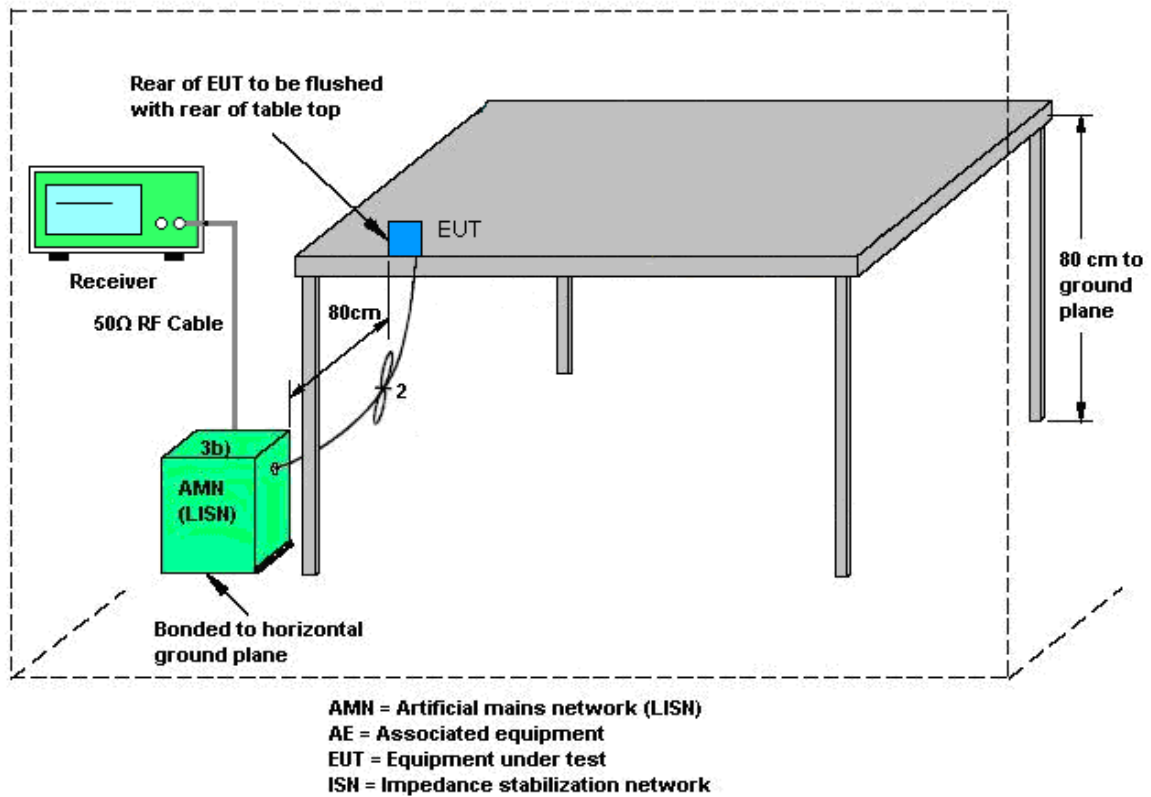
##### 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

##### 3.1.3 Test Procedure

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 (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### 3.1.4 Test Setup



### 3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

## 3.2. Test of Radiated Emission Measurement

### 3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 30 – 88            | 100                                  | 3                                |
| 88 – 216           | 150                                  | 3                                |
| 216 - 960          | 200                                  | 3                                |
| Above 960          | 500                                  | 3                                |

### 3.2.2. Measuring Instruments

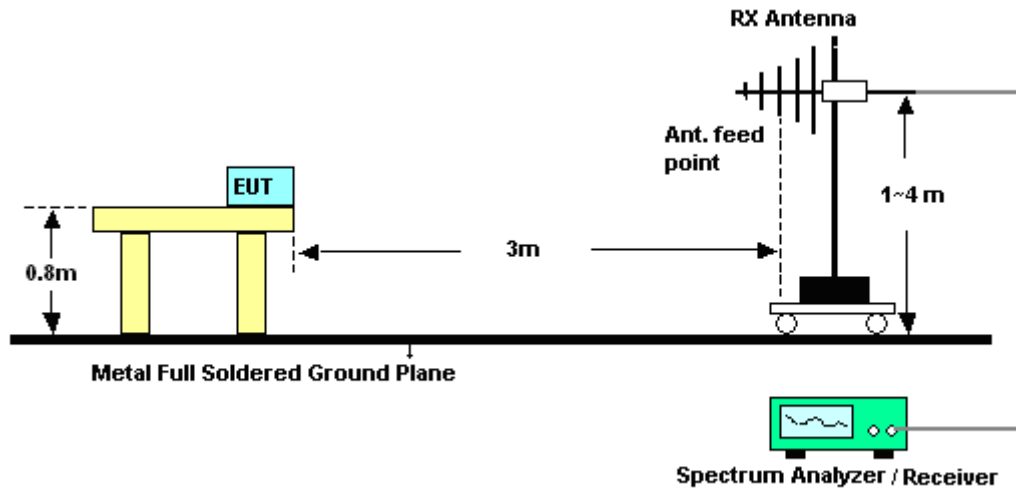
Refer a test equipment and calibration data table in this test report.

### 3.2.3. Test Procedures

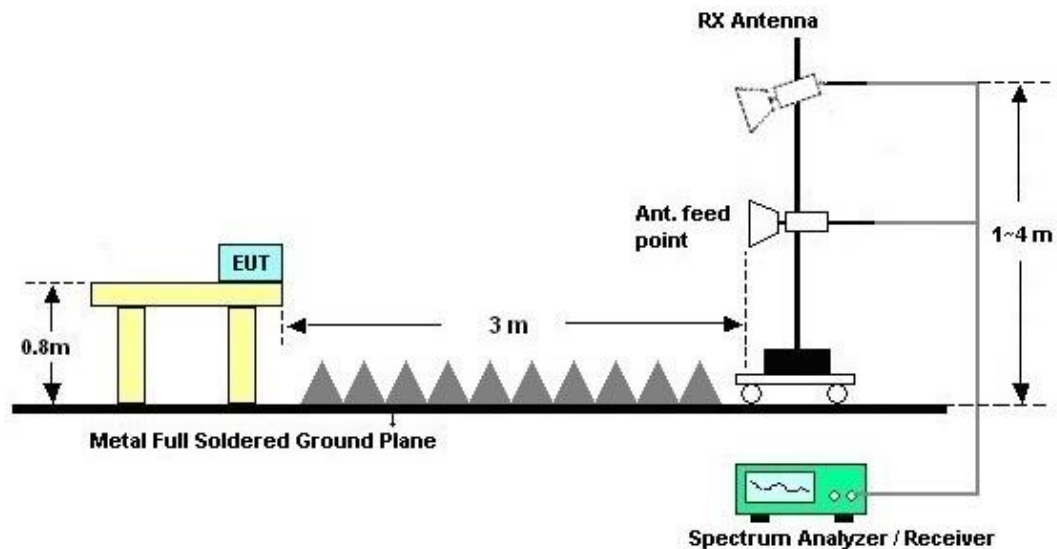
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

### 3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.2.5. Test Result of Radiated Emission

Please refer to Appendix B.



## 4. List of Measuring Equipment

| Instrument        | Manufacturer         | Model No.               | Serial No.        | Characteristics | Calibration Date | Test Date                     | Due Date      | Remark                |
|-------------------|----------------------|-------------------------|-------------------|-----------------|------------------|-------------------------------|---------------|-----------------------|
| AC Power Source   | ChainTek             | APC-1000W               | N/A               | N/A             | N/A              | Oct. 05, 2018                 | N/A           | Conduction (CO05-HY)  |
| EMI Test Receiver | Rohde & Schwarz      | ESR3                    | 102388            | 9KHz~3.6GHz     | Dec. 08, 2017    | Oct. 05, 2018                 | Dec. 07, 2018 | Conduction (CO05-HY)  |
| LISN              | Rohde & Schwarz      | ENV216                  | 100080            | 9kHz~30MHz      | Nov. 30, 2017    | Oct. 05, 2018                 | Nov. 29, 2018 | Conduction (CO05-HY)  |
| Software          | Rohde & Schwarz      | EMC32 V10.30            | N/A               | N/A             | N/A              | Oct. 05, 2018                 | N/A           | Conduction (CO05-HY)  |
| LF Cable          | HUBER + SUHNER       | RG-214/U                | LF01              | N/A             | Jan. 03, 2018    | Oct. 05, 2018                 | Jan. 02, 2019 | Conduction (CO05-HY)  |
| Pulse Limiter     | Rohde & Schwarz      | ESH3-Z2                 | 100851            | N/A             | Jan. 03, 2018    | Oct. 05, 2018                 | Jan. 02, 2019 | Conduction (CO05-HY)  |
| Bilog Antenna     | Schaffner            | CBL6111C&N -6-06        | 2725&AT-N0601     | 30MHz~1GHz      | Oct. 14, 2017    | Oct. 05, 2018                 | Oct. 13, 2018 | Radiation (03CH06-HY) |
| Bilog Antenna     | Schaffner            | CBL6111C&N -6-06        | 2725&AT-N0601     | 30MHz~1GHz      | Oct. 13, 2018    | Nov. 15, 2018                 | Oct. 12, 2019 | Radiation (03CH06-HY) |
| EMI Test Receiver | Rohde & Schwarz      | ESU26                   | 100472            | 20Hz~26.5GHz    | Jan. 04, 2018    | Oct. 05, 2018 ~ Nov. 15, 2018 | Jan. 03, 2019 | Radiation (03CH06-HY) |
| Horn Antenna      | SCHWARZBECK          | BBHA 9120 D             | 9120D-1156        | 1GHz~18GHz      | Aug. 24, 2018    | Oct. 05, 2018                 | Aug. 23, 2019 | Radiation (03CH06-HY) |
| Preamplifier      | SONOMA               | 310N                    | 186713            | 9kHz~1GHz       | May 02, 2018     | Oct. 05, 2018 ~ Nov. 15, 2018 | May 01, 2019  | Radiation (03CH06-HY) |
| Preamplifier      | MITEQ                | AMF-7D-0010 1800-30-10P | 1850117           | 1GHz ~ 18GHz    | May 24, 2018     | Oct. 05, 2018                 | May 23, 2019  | Radiation (03CH06-HY) |
| Antenna Mast      | MF                   | MF-7802                 | MF780208212       | 1m~4m           | N/A              | Oct. 05, 2018 ~ Nov. 15, 2018 | N/A           | Radiation (03CH06-HY) |
| Turn Table        | INN-CO               | DS2000                  | 420/650/00        | 0-360 degree    | N/A              | Oct. 05, 2018 ~ Nov. 15, 2018 | N/A           | Radiation (03CH06-HY) |
| Test Software     | AUDIX                | e3                      | 6.2009-8-24(k5)   | N/A             | N/A              | Oct. 05, 2018 ~ Nov. 15, 2018 | N/A           | Radiation (03CH06-HY) |
| RF Cable          | HUBER+SUHNER/UTIFLEX | SUCOFLEX 104 / UFA210A  | MY24966/4 / LF-01 | 30MHz-1GHz      | Nov. 24, 2017    | Oct. 05, 2018 ~ Nov. 15, 2018 | Nov. 23, 2018 | Radiation (03CH06-HY) |
| RF Cable          | Infinet/Sunhner      | LL142/SF104             | CA3601-3601-HLL   | 1GHz-26GHz      | Nov. 24, 2017    | Oct. 05, 2018                 | Nov. 23, 2018 | Radiation (03CH06-HY) |
| Filter            | Microwave            | H1G013G1                | SN477215          | 1.0G High Pass  | Dec. 07, 2017    | Oct. 05, 2018                 | Dec. 06, 2018 | Radiation (03CH06-HY) |
| Filter            | Wainwright           | WLKS1200-8 SS           | SN3               | 1.2G Low Pass   | Nov. 21, 2017    | Oct. 05, 2018 ~ Nov. 15, 2018 | Nov. 20, 2018 | Radiation (03CH06-HY) |

## 5. Uncertainty of Evaluation

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

|  |     |
|--|-----|
| Measuring Uncertainty for a Level of Confidence<br>of 95% ( $U = 2Uc(y)$ ) | 2.2 |
|--|-----|

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

|  |     |
|--|-----|
| Measuring Uncertainty for a Level of Confidence<br>of 95% ( $U = 2Uc(y)$ ) | 3.9 |
|--|-----|

### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

|  |     |
|--|-----|
| Measuring Uncertainty for a Level of Confidence<br>of 95% ( $U = 2Uc(y)$ ) | 4.7 |
|--|-----|



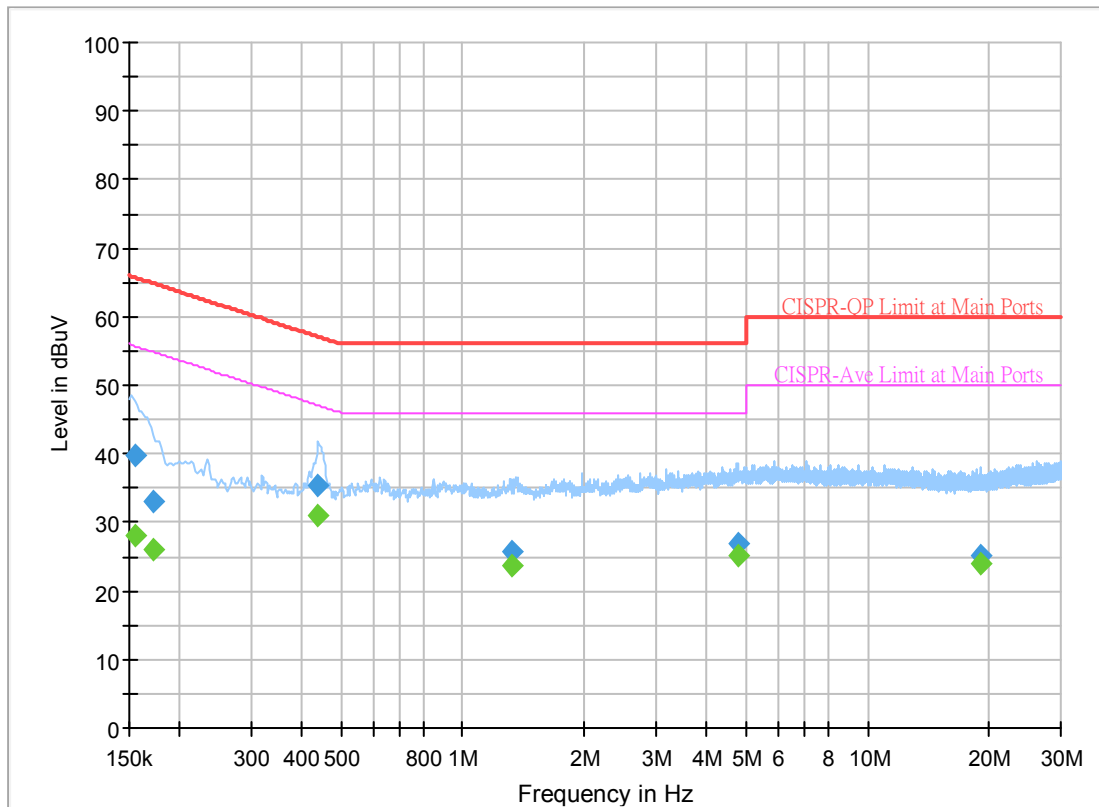
## Appendix A. AC Conducted Emission Test Results

|                 |             |                     |         |
|-----------------|-------------|---------------------|---------|
| Test Engineer : | Jimmy Chang | Temperature :       | 24~26°C |
|                 |             | Relative Humidity : | 51~54%  |

## EUT Information

Report NO : 892505-05  
Test Mode : Mode 1  
Test Voltage : 120Vac/60Hz  
Phase : Line

Full Spectrum



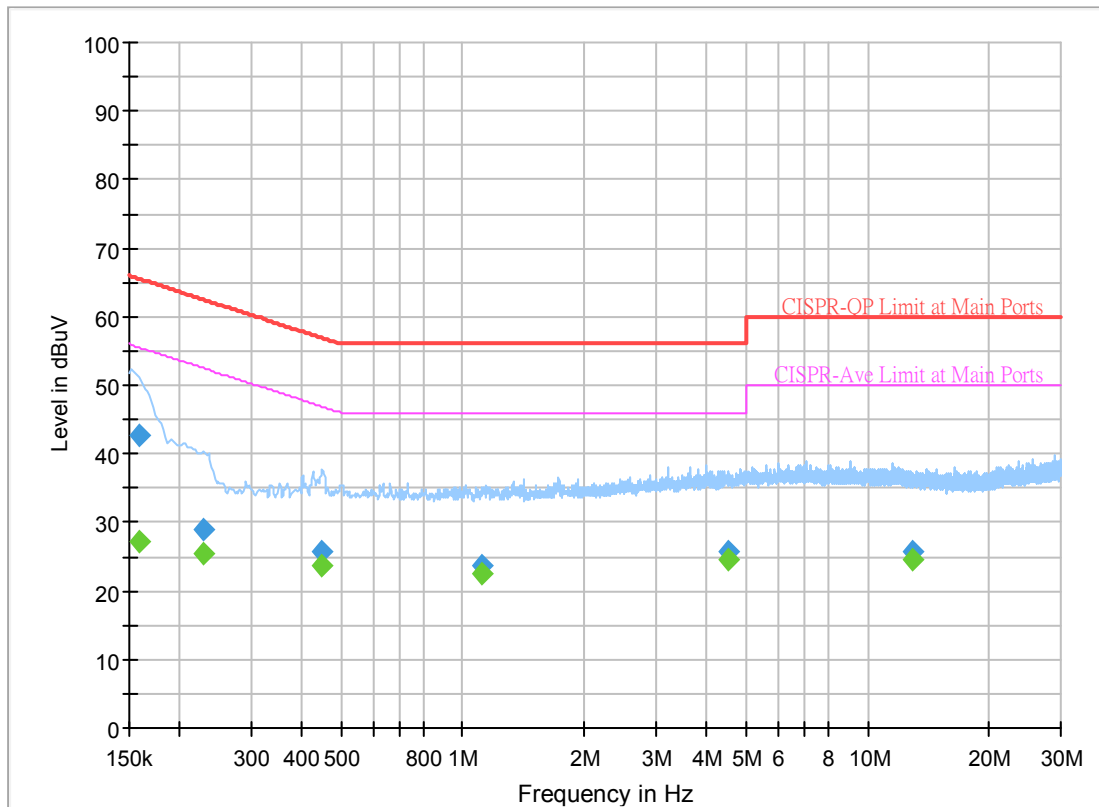
## Final Result

| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|------|--------|------------|
| 0.154500        | ---              | 27.93           | 55.75        | 27.82       | L1   | OFF    | 19.5       |
| 0.154500        | 39.66            | ---             | 65.75        | 26.09       | L1   | OFF    | 19.5       |
| 0.172500        | ---              | 26.11           | 54.84        | 28.73       | L1   | OFF    | 19.5       |
| 0.172500        | 32.93            | ---             | 64.84        | 31.91       | L1   | OFF    | 19.5       |
| 0.440250        | ---              | 31.04           | 47.06        | 16.02       | L1   | OFF    | 19.5       |
| 0.440250        | 35.51            | ---             | 57.06        | 21.55       | L1   | OFF    | 19.5       |
| 1.315500        | ---              | 23.66           | 46.00        | 22.34       | L1   | OFF    | 19.6       |
| 1.315500        | 25.63            | ---             | 56.00        | 30.37       | L1   | OFF    | 19.6       |
| 4.764750        | ---              | 25.21           | 46.00        | 20.79       | L1   | OFF    | 19.7       |
| 4.764750        | 26.78            | ---             | 56.00        | 29.22       | L1   | OFF    | 19.7       |
| 19.043250       | ---              | 24.11           | 50.00        | 25.89       | L1   | OFF    | 20.2       |
| 19.043250       | 25.12            | ---             | 60.00        | 34.88       | L1   | OFF    | 20.2       |

## EUT Information

Report NO : 892505-05  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Neutral

Full Spectrum

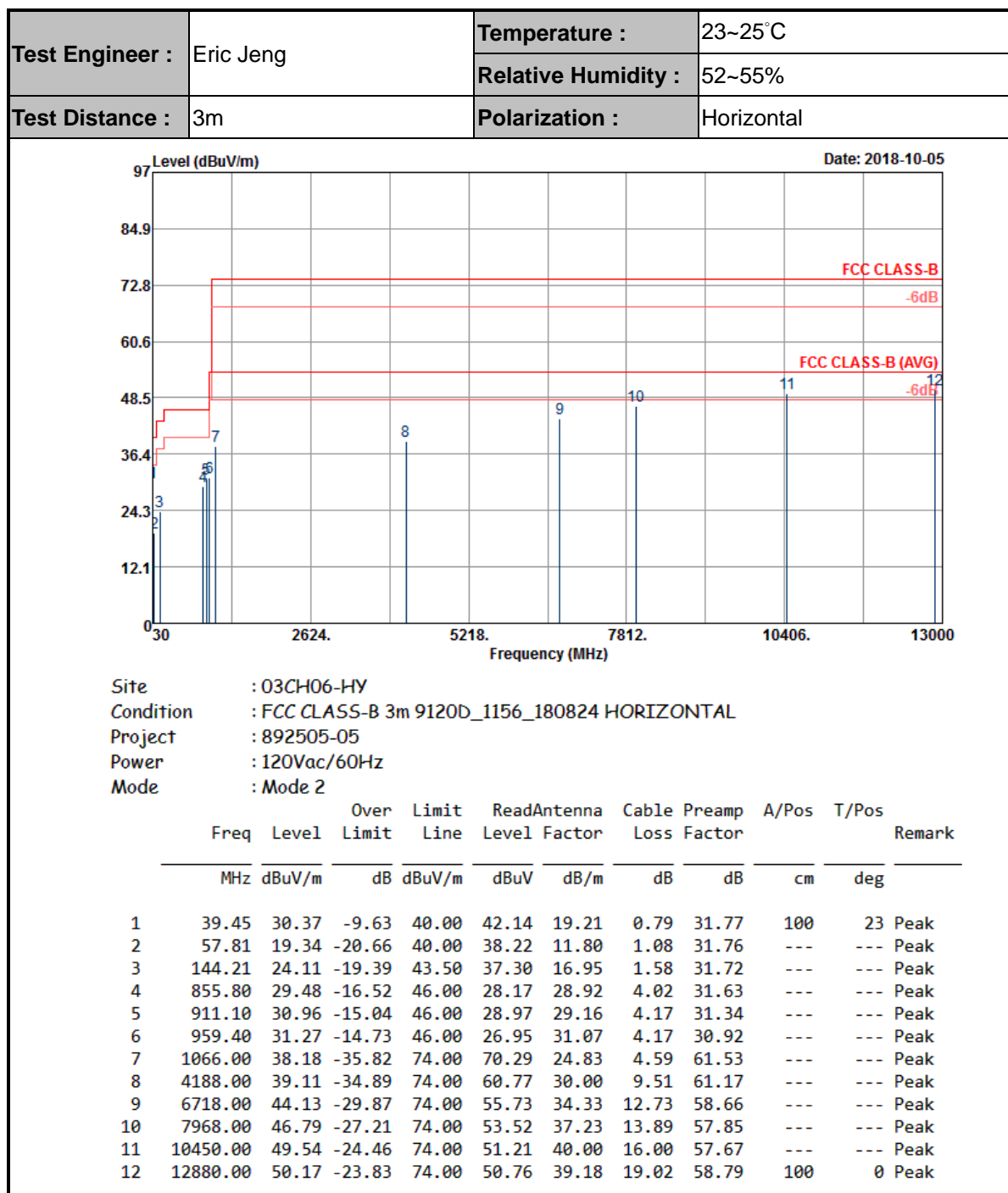


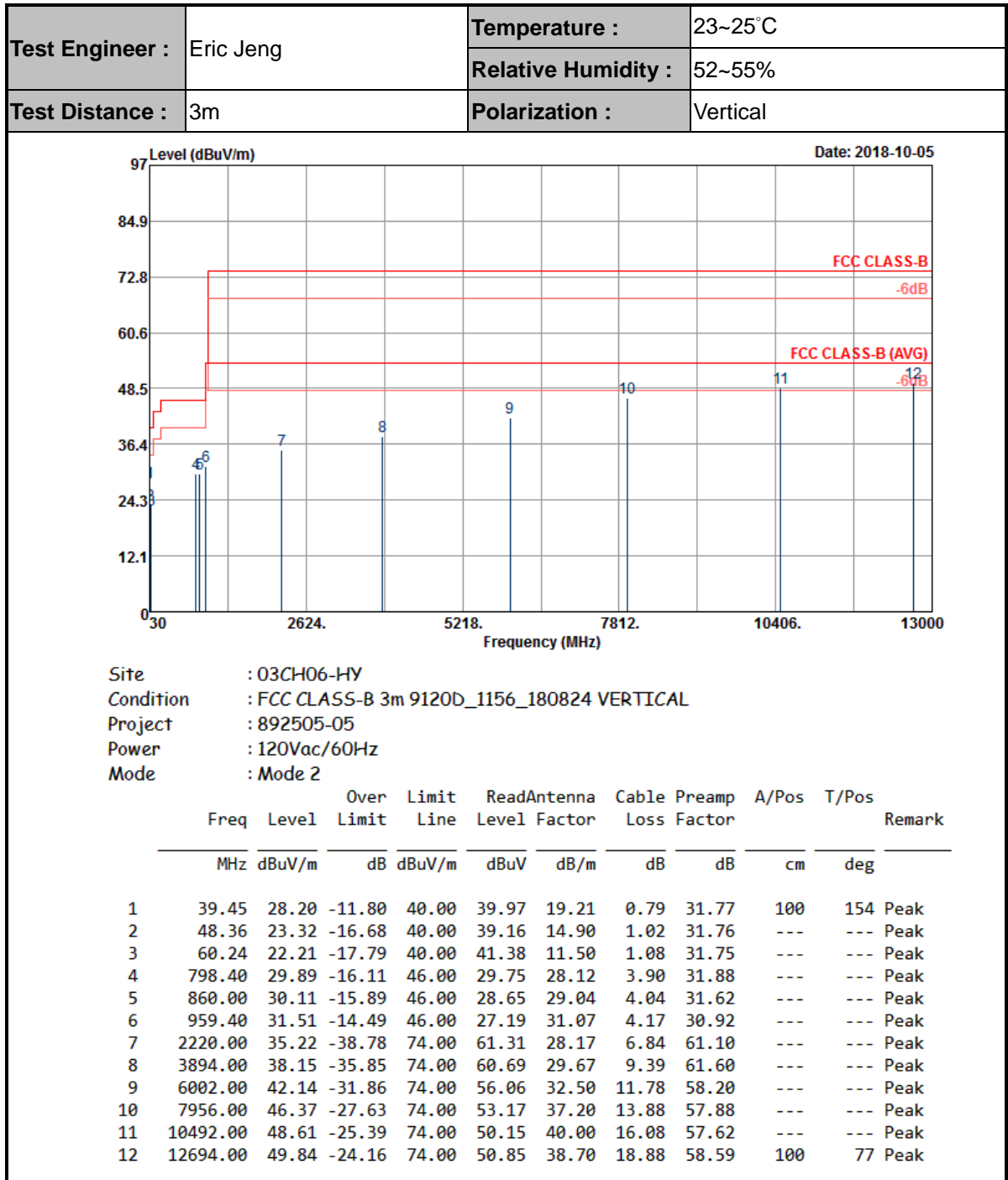
## Final Result

| Frequency (MHz) | QuasiPeak (dBuV) | CAverage (dBuV) | Limit (dBuV) | Margin (dB) | Line | Filter | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|------|--------|------------|
| 0.159000        | ---              | 27.28           | 55.52        | 28.24       | N    | OFF    | 19.5       |
| 0.159000        | 42.60            | ---             | 65.52        | 22.92       | N    | OFF    | 19.5       |
| 0.228750        | ---              | 25.36           | 52.50        | 27.14       | N    | OFF    | 19.5       |
| 0.228750        | 28.84            | ---             | 62.50        | 33.66       | N    | OFF    | 19.5       |
| 0.449250        | ---              | 23.76           | 46.89        | 23.13       | N    | OFF    | 19.5       |
| 0.449250        | 25.62            | ---             | 56.89        | 31.27       | N    | OFF    | 19.5       |
| 1.110750        | ---              | 22.47           | 46.00        | 23.53       | N    | OFF    | 19.6       |
| 1.110750        | 23.66            | ---             | 56.00        | 32.34       | N    | OFF    | 19.6       |
| 4.535250        | ---              | 24.58           | 46.00        | 21.42       | N    | OFF    | 19.7       |
| 4.535250        | 25.62            | ---             | 56.00        | 30.38       | N    | OFF    | 19.7       |
| 12.972750       | ---              | 24.68           | 50.00        | 25.32       | N    | OFF    | 20.0       |
| 12.972750       | 25.74            | ---             | 60.00        | 34.26       | N    | OFF    | 20.0       |



## Appendix B. Radiated Emission Test Result





————THE END————