# FCC Report (Bluetooth)

| | | |
|---|---|---|
| **Product Name** | : | Haylou Wireless Earbuds |
| **Trade mark** | : | HAYLOU |
| **Model No.** | : | Haylou-GT1 XR |
| **FCC ID** | : | 2AMQ6-GT1XR |
| **Report Number** | : | BLA-EMC-202008-A111-03 |
| **Date of sample receipt** | : | 2020/8/31 |
| **Date of Test** | : | 2020/8/31 - 2020/9/15 |
| **Date of Issue** | : | 2020/9/24 |
| **Test standard** | : | FCC CFR Title 47 Part 15 Subpart C Section 15.247 |
| **Test result** | : | PASS |

Prepared for:

**Dongguan Liesheng Electronic Co., Ltd.**
**13/F,Project Phrase 2 of GaoshengTechTower,No.5,Longxi Road,Nancheng,Dongguan,Guangdong,China.**

Prepared by:

**BlueAsia of Technical Services(Shenzhen) Co., Ltd.**
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**FAX: +86-755-28682673**

| | |
|---|---|
| Compile by: Eason | Review by: Brand_wei |
| Approved by: Emen_li | Date:2020/9/24 |

# 2 Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *2020/9/24* | *Original* |
| | | |
| | | |
| | | |
| | | |

# 3 Contents

# 4 Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| Antenna requirement | 15.203/15.247 (c) | Pass |
| AC Power Line Conducted Emission | 15.207 | Pass |
| Conducted Output Power | 15.247 (b)(3) | Pass |
| Channel Bandwidth | 15.247 (a)(2) | Pass |
| Power Spectral Density | 15.247 (e) | Pass |
| Band Edge | 15.247(d) | Pass |
| Spurious Emission | 15.205/15.209 | Pass |

Pass: The EUT complies with the essential requirements in the standard.

*Remark: Test according to ANSI C63.10:2013.*

**Measurement Uncertainty**

| Test Item | Frequency Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 9kHz ~ 30MHz | ± 4.34dB | (1) |
| Radiated Emission | 30MHz ~ 1000MHz | ± 4.24dB | (1) |
| Radiated Emission | 1GHz ~ 26.5GHz | ± 4.68dB | (1) |
| AC Power Line Conducted Emission | 0.15MHz ~ 30MHz | ± 3.45dB | (1) |
| Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. | | | |

# 5 General Information

## 5.1 General Description of EUT

| | |
|---|---|
| Product Name: | Haylou Wireless Earbuds |
| Model No.: | Haylou-GT1 XR |
| Test Model No.: | Haylou-GT1 XR |
| | |
| Serial No.: | N/A |
| Sample(s) Status | Engineer sample |
| Hardware: | V1.0 |
| Software: | V1.0 |
| Operation Frequency: | 2402MHz-2480MHz |
| Channel Numbers: | 40 |
| Channel Separation: | 2MHz |
| Modulation Type: | GFSK |
| Antenna Type: | Internal Antenna |
| Antenna Gain: | 2.2dBi |
| Power Supply: | DC 3.7V |
| Remark:The Antenna Gain is supplied by the customer.BlueAsia is not responsible for this data | |

| Operation Frequency each of channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1 | 2402MHz | 11 | 2422MHz | 21 | 2442MHz | 31 | 2462MHz |
| 2 | 2404MHz | 12 | 2424MHz | 22 | 2444MHz | 32 | 2464MHz |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 9 | 2418MHz | 19 | 2438MHz | 29 | 2458MHz | 39 | 2478MHz |
| 10 | 2420MHz | 20 | 2440MHz | 30 | 2460MHz | 40 | 2480MHz |

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel | Frequency |
|---|---|
| The lowest channel | 2402MHz |
| The middle channel | 2442MHz |
| The Highest channel | 2480MHz |

## 5.2 Test mode

| | |
|---|---|
| Transmitting mode | Keep the EUT in continuously transmitting mode with modulation |
| *Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data. Full battery is used during all test except ac conducted emission* | |

## 5.3 Description of Support Units

| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| UGREEN | Adapter | CD112 | 20358 |
| Lenovo | Notebook computer | E470C | PF-10FB5C |

## 5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC — Designation No.: CN1252**

*BlueAsia of Technical Services(Shenzhen) Co., Ltd* has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Designation CN1252.

●**ISED — CAB identifier No.: CN0028**

*BlueAsia of Technical Services(Shenzhen) Co., Ltd* has been registered by Certification and Engineering Bureau of ISED for radio equipment testing with CAB identifier CN0028

## 5.5 Test Location

All tests were performed at:

*All tests were performed at:*
*BlueAsia of Technical Services(Shenzhen) Co., Ltd.*
*IOT Test Centre of BlueAsia*
*No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen,China*
*Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673*
*Tests were sub-contracted:*
*Radiation test is conducted by Global United Technology Services Co., Ltd.*
*No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, sBaoan District, Shenzhen, Guangdong, China 518102*
*FCC —Registration No.: 381383*
*Job No.: GTS202009000065*

# 6 Test Instruments list

| Radiated Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.2(L)*6.2(W)* 6.4(H) | GTS250 | July. 02 2020 | July. 01 2025 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | June. 25 2020 | June. 24 2021 |
| 4 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | GTS214 | June. 25 2020 | June. 24 2021 |
| 5 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120 D | GTS208 | June. 25 2020 | June. 24 2021 |
| 6 | Horn Antenna | ETS-LINDGREN | 3160 | GTS217 | June. 25 2020 | June. 24 2021 |
| 7 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 8 | Coaxial Cable | GTS | N/A | GTS213 | June. 25 2020 | June. 24 2021 |
| 9 | Coaxial Cable | GTS | N/A | GTS211 | June. 25 2020 | June. 24 2021 |
| 10 | Coaxial cable | GTS | N/A | GTS210 | June. 25 2020 | June. 24 2021 |
| 11 | Coaxial Cable | GTS | N/A | GTS212 | June. 25 2020 | June. 24 2021 |
| 12 | Amplifier(100kHz-3GHz) | HP | 8347A | GTS204 | June. 25 2020 | June. 24 2021 |
| 13 | Amplifier(2GHz-20GHz) | HP | 84722A | GTS206 | June. 25 2020 | June. 24 2021 |
| 14 | Amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | GTS218 | June. 25 2020 | June. 24 2021 |
| 15 | Band filter | Amindeon | 82346 | GTS219 | June. 25 2020 | June. 24 2021 |
| 16 | Power Meter | Anritsu | ML2495A | GTS540 | June. 25 2020 | June. 24 2021 |
| 17 | Power Sensor | Anritsu | MA2411B | GTS541 | June. 25 2020 | June. 24 2021 |
| 18 | Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | GTS575 | June. 25 2020 | June. 24 2021 |
| 19 | Splitter | Agilent | 11636B | GTS237 | June. 25 2020 | June. 24 2021 |
| 20 | Loop Antenna | ZHINAN | ZN30900A | GTS534 | June. 25 2020 | June. 24 2021 |
| 21 | Breitband hornantenne | SCHWARZBECK | BBHA 9170 | GTS579 | Oct. 19 2019 | Oct. 18 2020 |
| 22 | Amplifier | TDK | PA-02-02 | GTS574 | Oct. 19 2019 | Oct. 18 2020 |
| 23 | Amplifier | TDK | PA-02-03 | GTS576 | Oct. 19 2019 | Oct. 18 2020 |
| 24 | PSA Series Spectrum Analyzer | Rohde & Schwarz | FSP | GTS578 | June. 25 2020 | June. 24 2021 |

| Conducted Emission | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | EMI Test Receiver | Rohde & Schwarz | ESPI3 | 101082 | 06-10-2020 | 06-09-2021 |
| 2 | LISN | CHASE | MN2050D | 1447 | 06-10-2020 | 06-09-2021 |
| 3 | LISN | Rohde & Schwarz | ENV216 | 3560.6550.15 | 06-10-2020 | 06-09-2021 |
| 4 | EMI Test Software | EZ | EZ | N/A | N/A | N/A |
| 5 | Temperature Humidity Chamber | Mingle | TH101B | N/A | 07-19-2021 | 07-18-2020 |
| | | | | | 07-19-2020 | 07-18-2021 |

| RF Conducted Test: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Spectrum Analyzer | Agilent | N9030A | MY50510123 | 05-24-2020 | 05-23-2021 |
| 2 | Spectrum analyzer | Rohde & Schwarz | FSP40 | 100817 | 05-24-2020 | 05-23-2021 |
| 3 | Vector Signal Generator | Agilent | E4438C | MY45092582 | 05-24-2020 | 05-23-2021 |
| 4 | Signal Generator | Agilent | E8257D | MY44320250 | 05-24-2020 | 05-23-2021 |
| 5 | Power Sensor | D.A.R.E | RPR3006W | 17I00015SNO27 | 05-24-2020 | 05-23-2021 |
| 6 | Power Sensor | D.A.R.E | RPR3006W | 17I00015SNO28 | 05-24-2020 | 05-23-2021 |
| 7 | DC Power Supply | LODESTAR | LP305DE | N/A | 07-19-2021 | 07-18-2020 |
| | | | | | 07-19-2020 | 07-18-2021 |
| 8 | Temperature Humidity Chamber | Mingle | TH101B | N/A | 07-19-2021 | 07-18-2020 |
| | | | | | 07-19-2020 | 07-18-2021 |

# 7 Test results and Measurement Data

## 7.1 Antenna requirement

| Standard requirement: | FCC Part15 C Section 15.203 /247(c) |
|---|---|

**15.203 requirement:**

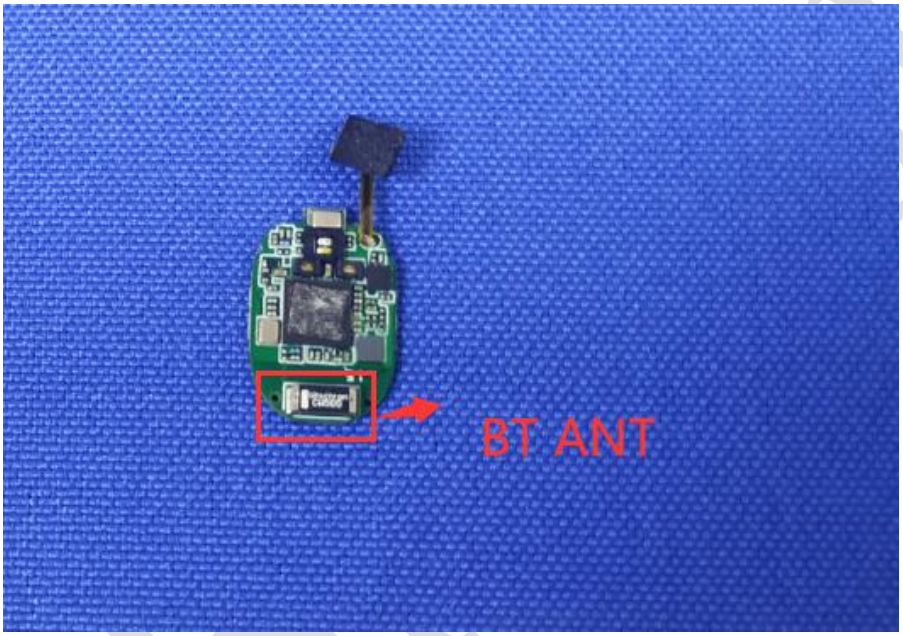
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

**15.247(c) (1)(i) requirement:**

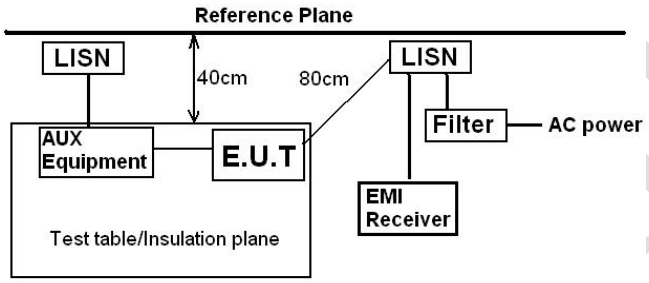
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

**E.U.T Antenna:**

*The antenna is Internal antenna, the best case gain of the antenna is 2.2dBi*



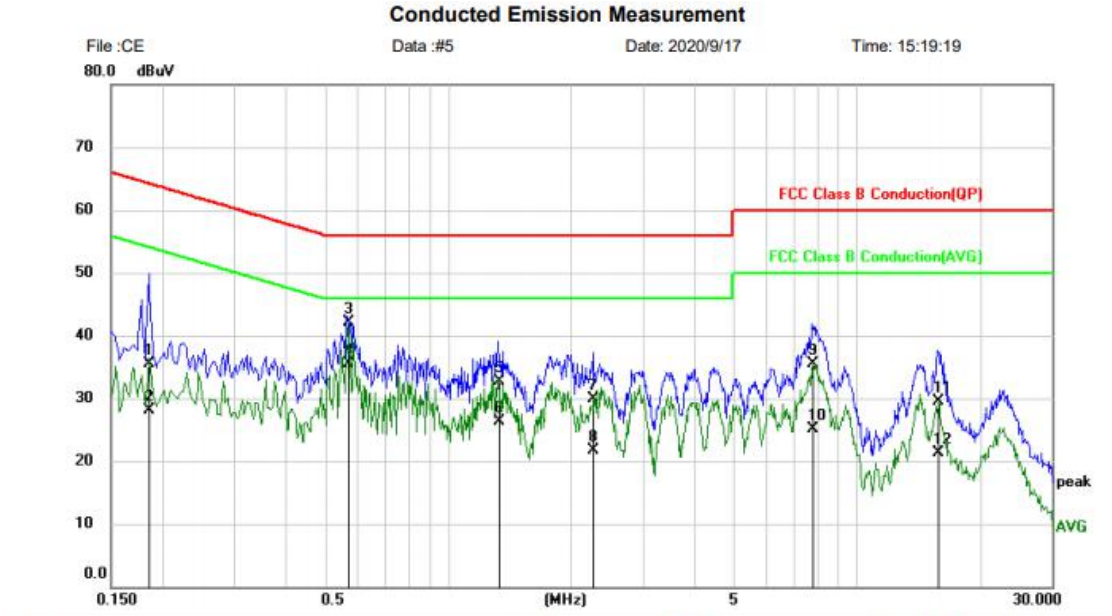
## 7.2 Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>150KHz to 30MHz</td></tr>
<tr><td>Class / Severity:</td><td>Class B</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9KHz, VBW=30KHz, Sweep time=auto</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test setup:</td><td>


Remark:<br>E.U.T: Equipment Under Test<br>LISN: Line Impedence Stabilization Network<br>Test table height=0.8m
</td></tr>
<tr><td>Test procedure:</td><td>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.<br>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).<br>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 6.0 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.2 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

**Measurement data**
Line:

| | | | |
|---|---|---|---|
| **EUT:** | Haylou Wireless Earbuds | **Probe:** | L1 |
| **Model:** | Haylou-GT1 XR | **Power Source:** | AC120V/60Hz |
| **Mode:** | BT mode | **Test by:** | Eason |
| **Temp./Hum.(%H):** | 23℃/49%RH | | |




Site
Limit: FCC Class B Conduction(QP)
EUT: Haylou Wireless Earbuds
M/N: Haylou-GT1 XR
Mode: BLE mode
Note:

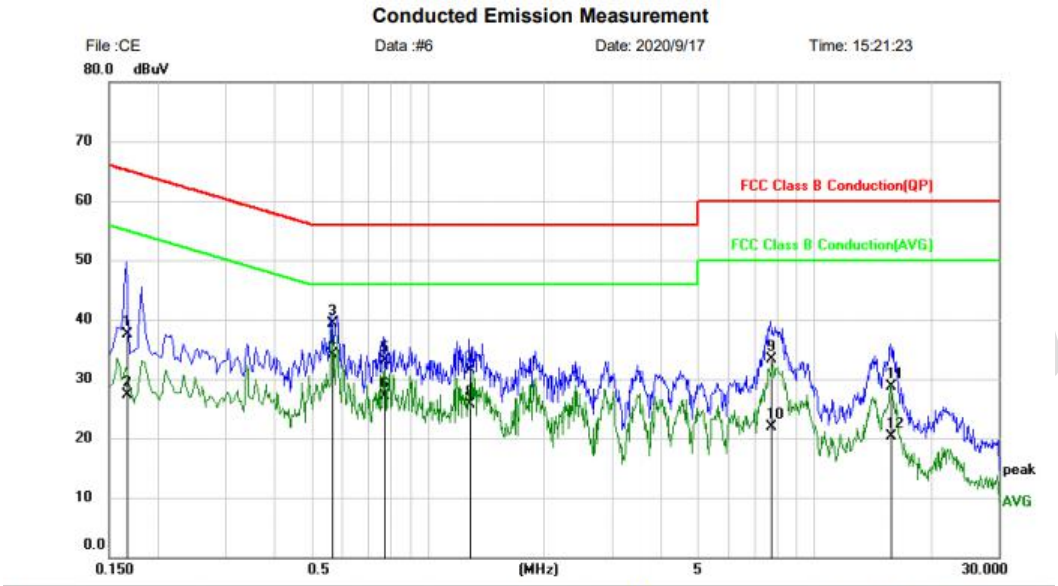
Phase: *L1*
Power:

Temperature: 26
Humidity: 60 %

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1860 | 25.53 | 9.88 | 35.41 | 64.21 | -28.80 | QP | |
| 2 | | 0.1860 | 18.13 | 9.88 | 28.01 | 54.21 | -26.20 | AVG | |
| 3 | | 0.5700 | 32.32 | 9.74 | 42.06 | 56.00 | -13.94 | QP | |
| 4 | * | 0.5700 | 25.69 | 9.74 | 35.43 | 46.00 | -10.57 | AVG | |
| 5 | | 1.3300 | 22.84 | 9.82 | 32.66 | 56.00 | -23.34 | QP | |
| 6 | | 1.3300 | 16.45 | 9.82 | 26.27 | 46.00 | -19.73 | AVG | |
| 7 | | 2.2659 | 20.11 | 9.81 | 29.92 | 56.00 | -26.08 | QP | |
| 8 | | 2.2659 | 11.89 | 9.81 | 21.70 | 46.00 | -24.30 | AVG | |
| 9 | | 7.7900 | 25.65 | 9.87 | 35.52 | 60.00 | -24.48 | QP | |
| 10 | | 7.7900 | 15.14 | 9.87 | 25.01 | 50.00 | -24.99 | AVG | |
| 11 | | 15.7260 | 19.46 | 9.96 | 29.42 | 60.00 | -30.58 | QP | |
| 12 | | 15.7260 | 11.34 | 9.96 | 21.30 | 50.00 | -28.70 | AVG | |

Neutral:

| | | | |
|---|---|---|---|
| **EUT:** | Haylou Wireless Earbuds | **Probe:** | N |
| **Model:** | Haylou-GT1 XR | **Power Source:** | AC120V/60Hz |
| **Mode:** | BT mode | **Test by:** | Eason |
| **Temp./Hum.(%H):** | 23℃/49%RH | | |



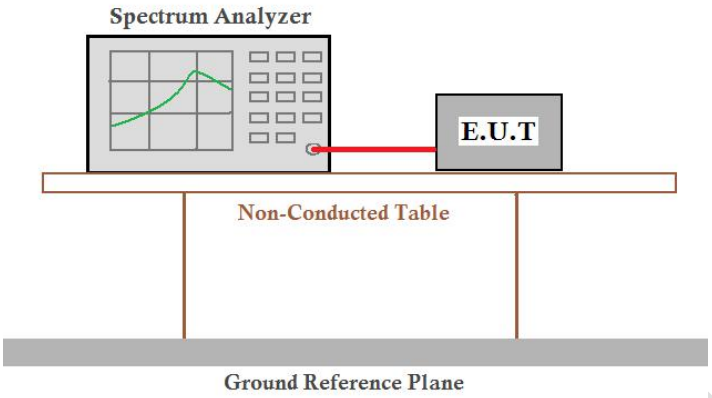

Site Phase: N Temperature: 26
Limit: FCC Class B Conduction(QP) Power: Humidity: 60 %
EUT: Haylou Wireless Earbuds
M/N: Haylou-GT1 XR
Mode: BLE mode
Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1660 | 27.71 | 9.87 | 37.58 | 65.16 | -27.58 | QP | |
| 2 | | 0.1660 | 17.39 | 9.87 | 27.26 | 55.16 | -27.90 | AVG | |
| 3 | | 0.5660 | 29.61 | 9.73 | 39.34 | 56.00 | -16.66 | QP | |
| 4 | * | 0.5660 | 24.40 | 9.73 | 34.13 | 46.00 | -11.87 | AVG | |
| 5 | | 0.7740 | 23.35 | 9.74 | 33.09 | 56.00 | -22.91 | QP | |
| 6 | | 0.7740 | 17.38 | 9.74 | 27.12 | 46.00 | -18.88 | AVG | |
| 7 | | 1.2860 | 21.59 | 9.83 | 31.42 | 56.00 | -24.58 | QP | |
| 8 | | 1.2860 | 15.93 | 9.83 | 25.76 | 46.00 | -20.24 | AVG | |
| 9 | | 7.7100 | 23.44 | 9.86 | 33.30 | 60.00 | -26.70 | QP | |
| 10 | | 7.7100 | 12.08 | 9.86 | 21.94 | 50.00 | -28.06 | AVG | |
| 11 | | 15.7580 | 18.68 | 10.00 | 28.68 | 60.00 | -31.32 | QP | |
| 12 | | 15.7580 | 10.40 | 10.00 | 20.40 | 50.00 | -29.60 | AVG | |

*Notes:*

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. *Final Level =Receiver Read level + Correct factor*
4. *Correct factor = LISN Factor + Cable Loss*
5. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

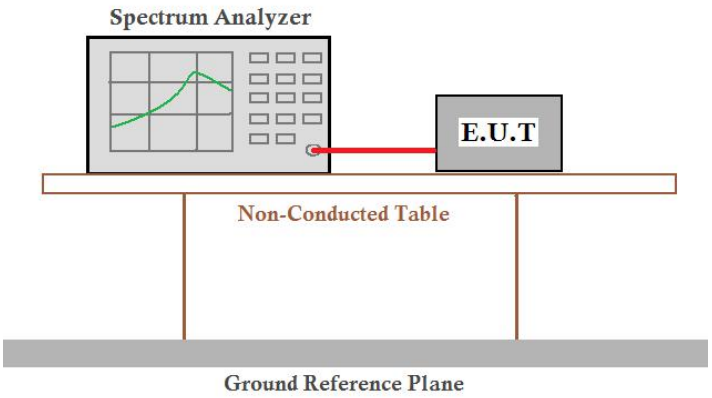
## 7.3 Conducted Output Power

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (b)(3) |
| Test Method: | ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05 |
| Limit: | 30dBm |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement Data**

AppendixC: Maximum conducted output power

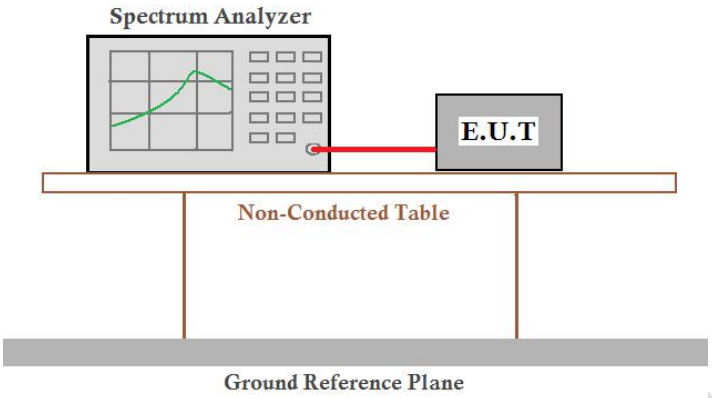
## 7.4 Channel Bandwidth

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (a)(2) |
| Test Method: | ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05 |
| Limit: | >500KHz |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement Data**

AppendixA: DTS Bandwidth
AppendixB: Occupied Channel Bandwidth

## 7.5 Power Spectral Density

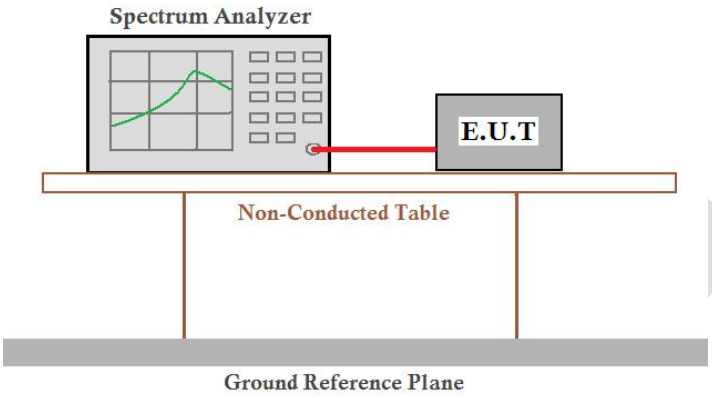
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (e) |
| Test Method: | ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05 |
| Limit: | 8dBm/3kHz |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement Data**

AppendixD: Maximum power spectral density

## 7.6 Band edges

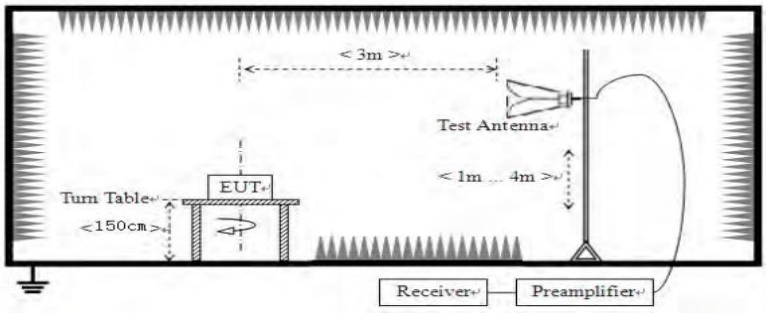
### 7.6.1 Conducted Emission Method

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (d) |
| Test Method: | ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05 |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement Data**

AppendixE:Band edge measurements

### 7.6.2 Radiated Emission Method

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.209 and 15.205 |
| Test Method: | ANSI C63.10:2013 |
| Test Frequency Range: | All of the restrict bands were tested, only the worst band's (2310MHz to 2390MHz, 2483.5MHz to 2500MHz) data was showed. |
| Test site: | Measurement Distance: 3m |
| Receiver setup: | Frequency / Detector / RBW / VBW / Value<br>Above 1GHz / Peak / 1MHz / 3MHz / Peak<br>Above 1GHz / RMS / 1MHz / 3MHz / Average |
| Limit: | Frequency / Limit (dBuV/m @3m) / Value<br>Above 1GHz / 54.00 / Average<br>Above 1GHz / 74.00 / Peak |
| Test setup: |  |
| Test Procedure: | 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3. The antenna 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.<br>4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>6. If the emission level of the EUT in peak mode was 10dB 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 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.<br>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report. |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

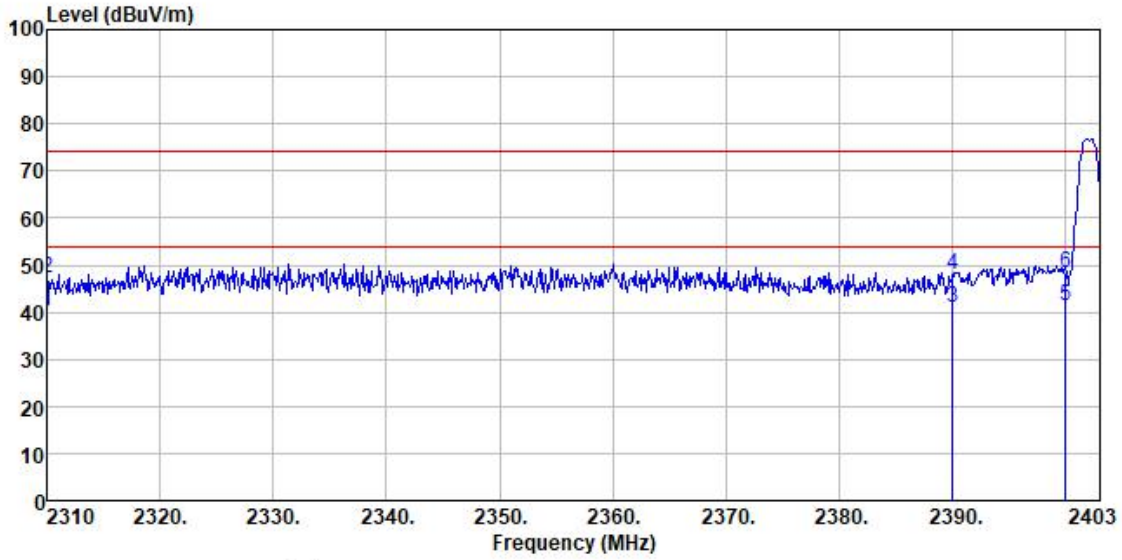
Measurement data:

*Remark:*

*1. The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*

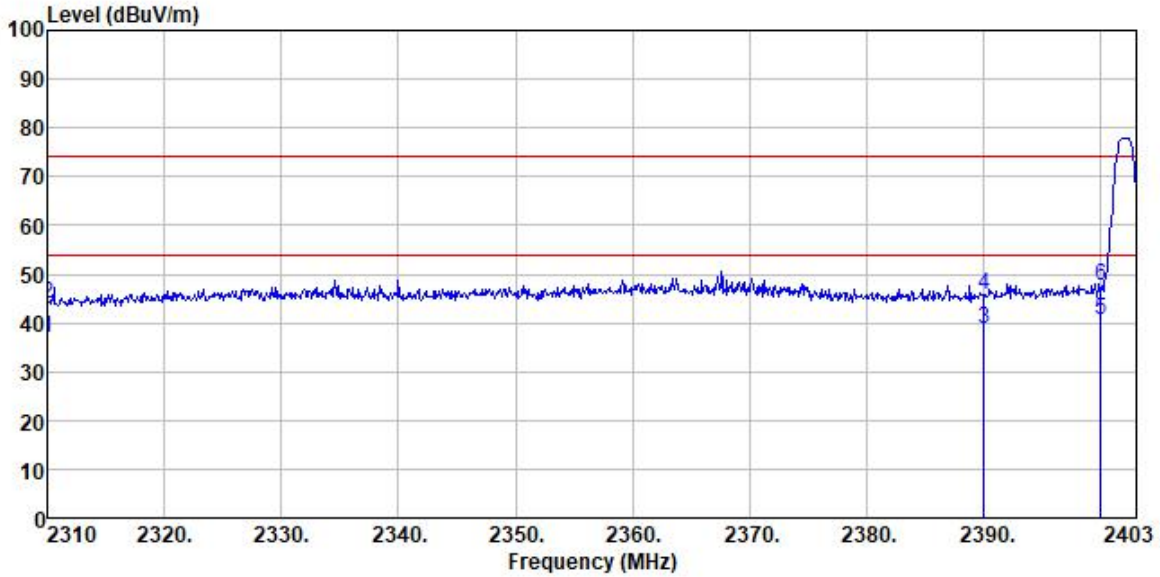
| Test channel: | Lowest |
|---|---|

**Peak value:**




Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : GTS202009000029
Test Mode : BLE TX 2402MHz
Test Engineer: Hans
Remark :

| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 2310.000 | 40.84 | 27.14 | 30.43 | 2.81 | 40.36 | 54.00 | -13.64 | Average |
| 2 | 2310.000 | 47.84 | 27.14 | 30.43 | 2.81 | 47.36 | 74.00 | -26.64 | Peak |
| 3 | 2390.000 | 40.88 | 27.37 | 30.24 | 2.91 | 40.92 | 54.00 | -13.08 | Average |
| 4 | 2390.000 | 47.88 | 27.37 | 30.24 | 2.91 | 47.92 | 74.00 | -26.08 | Peak |
| 5 | 2400.000 | 41.31 | 27.41 | 30.26 | 2.91 | 41.37 | 54.00 | -12.63 | Average |
| 6 | 2400.000 | 48.31 | 27.41 | 30.26 | 2.91 | 48.37 | 74.00 | -25.63 | Peak |

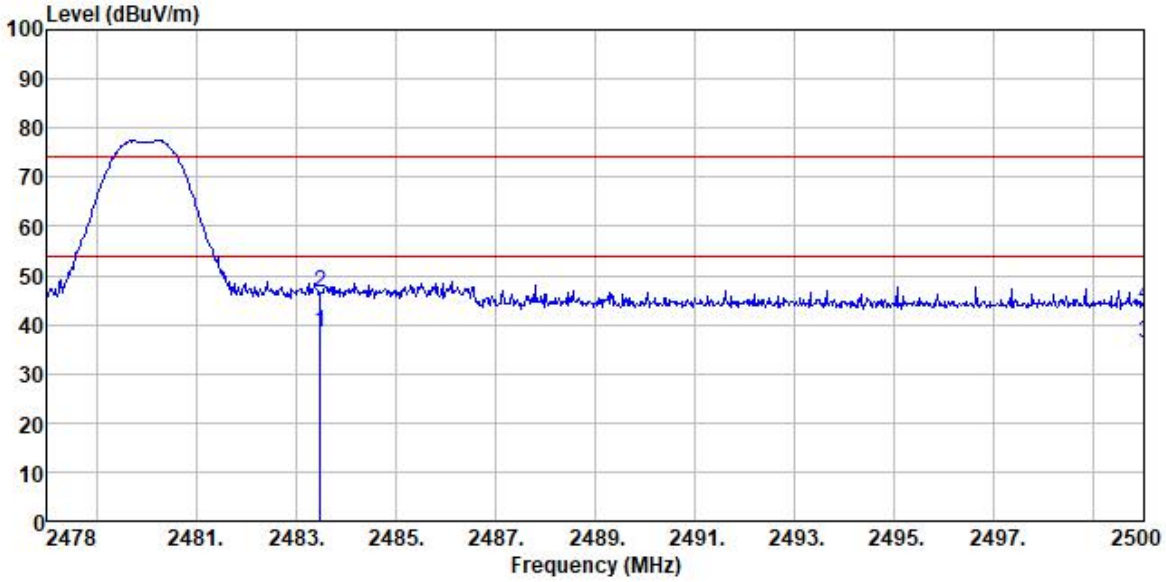



Condition : FCC PART 15 (PK) 3m HORIZONTAL
Job No. : GTS202009000029
Test Mode : BLE TX 2402MHz
Test Engineer: Hans
Remark :

| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 2310.000 | 37.45 | 27.14 | 30.43 | 2.81 | 36.97 | 54.00 | -17.03 | Average |
| 2 | 2310.000 | 44.45 | 27.14 | 30.43 | 2.81 | 43.97 | 74.00 | -30.03 | Peak |
| 3 | 2390.000 | 38.61 | 27.37 | 30.24 | 2.91 | 38.65 | 54.00 | -15.35 | Average |
| 4 | 2390.000 | 45.61 | 27.37 | 30.24 | 2.91 | 45.65 | 74.00 | -28.35 | Peak |
| 5 | 2400.000 | 40.42 | 27.41 | 30.26 | 2.91 | 40.48 | 54.00 | -13.52 | Average |
| 6 | 2400.000 | 47.42 | 27.41 | 30.26 | 2.91 | 47.48 | 74.00 | -26.52 | Peak |

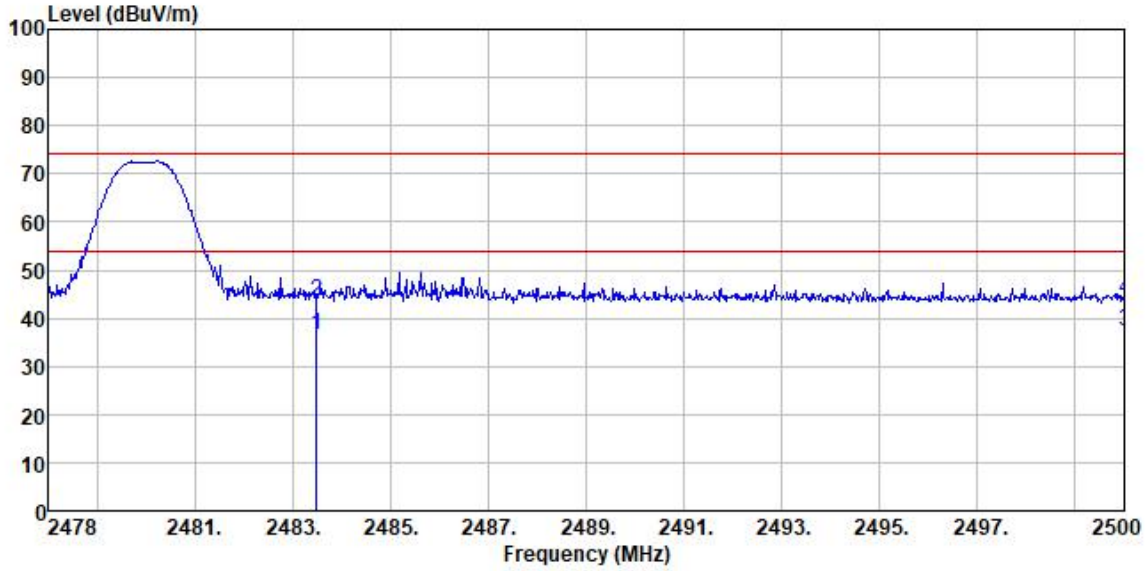
| Test channel: | Highest |
|---|---|

**Peak value:**




Condition : FCC PART 15 (PK) 3m HORIZONTAL
Job No. : GTS202009000029
Test Mode : BLE TX 2480MHz
Test Engineer: Hans
Remark :

| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 2483.500 | 37.83 | 27.66 | 30.12 | 2.99 | 38.36 | 54.00 | -15.64 | Average |
| 2 | 2483.500 | 45.83 | 27.66 | 30.12 | 2.99 | 46.36 | 74.00 | -27.64 | Peak |
| 3 | 2500.000 | 35.51 | 27.70 | 30.13 | 3.01 | 36.09 | 54.00 | -17.91 | Average |
| 4 | 2500.000 | 43.51 | 27.70 | 30.13 | 3.01 | 44.09 | 74.00 | -29.91 | Peak |




Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : GTS202009000029
Test Mode : BLE TX 2480MHz
Test Engineer: Hans
Remark :

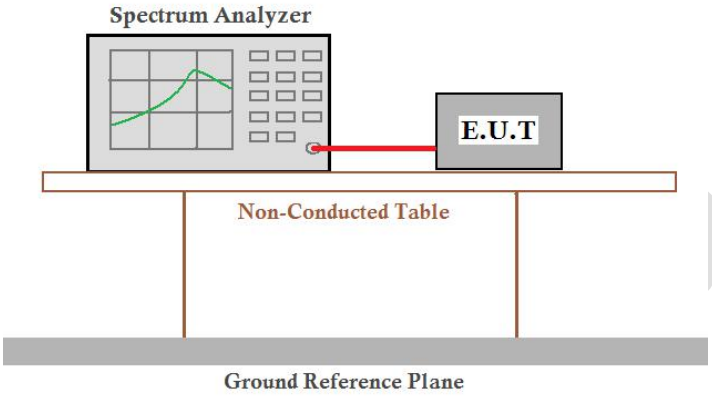
| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 2483.500 | 36.15 | 27.66 | 30.12 | 2.99 | 36.68 | 54.00 | -17.32 | Average |
| 2 | 2483.500 | 43.15 | 27.66 | 30.12 | 2.99 | 43.68 | 74.00 | -30.32 | Peak |
| 3 | 2500.000 | 36.51 | 27.70 | 30.13 | 3.01 | 37.09 | 54.00 | -16.91 | Average |
| 4 | 2500.000 | 43.51 | 27.70 | 30.13 | 3.01 | 44.09 | 74.00 | -29.91 | Peak |

Remark:

1. *Final Level =Receiver Read level + Correct factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Correct factor= Antenna Factor + Cable Loss – Preamplifier Factor*

## 7.7 Spurious Emission

### 7.7.1 Conducted Emission Method

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.247 (d) |
| Test Method: | ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance V05 |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement Data**

AppendixF:Conducted SpuriousEmission

### 7.7.2 Radiated Emission Method

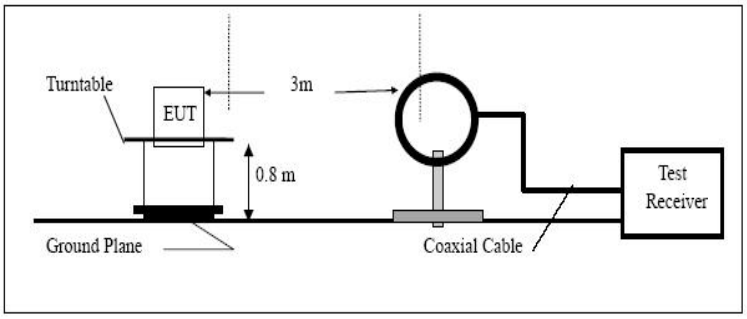
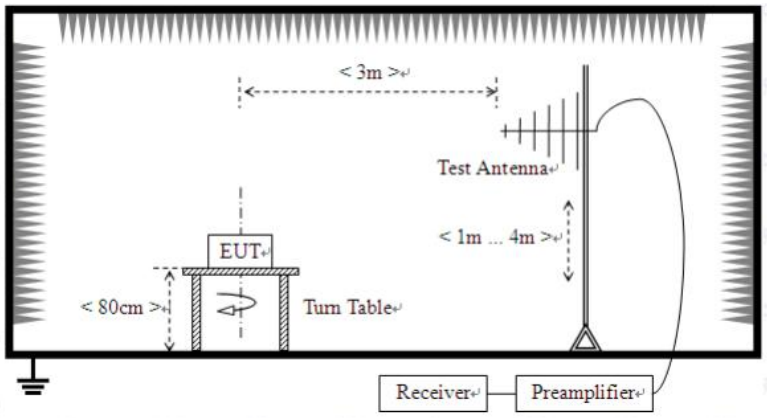
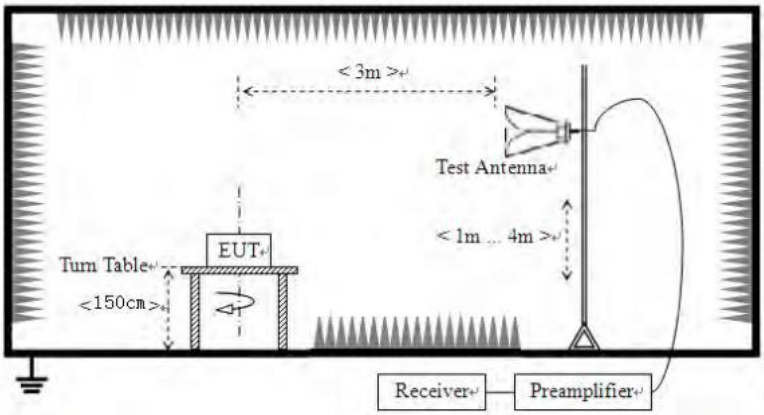
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.209 |
| Test Method: | ANSI C63.10:2013 |
| Test Frequency Range: | 9kHz to 25GHz |
| Test site: | Measurement Distance: 3m |
| Receiver setup: | |

| Frequency | Detector | RBW | VBW | Value |
|---|---|---|---|---|
| 9KHz-150KHz | Quasi-peak | 200Hz | 600Hz | Quasi-peak |
| 150KHz-30MHz | Quasi-peak | 9KHz | 30KHz | Quasi-peak |
| 30MHz-1GHz | Quasi-peak | 120KHz | 300KHz | Quasi-peak |
| Above 1GHz | Peak | 1MHz | 3MHz | Peak |
| | Peak | 1MHz | 10Hz | Average |

Limit:
(Spurious Emissions)

| Frequency | Limit (uV/m) | Value | Measurement Distance |
|---|---|---|---|
| 0.009MHz-0.490MHz | 2400/F(KHz) | QP | 300m |
| 0.490MHz-1.705MHz | 24000/F(KHz) | QP | 30m |
| 1.705MHz-30MHz | 30 | QP | 30m |
| 30MHz-88MHz | 100 | QP | 3m |
| 88MHz-216MHz | 150 | QP | |
| 216MHz-960MHz | 200 | QP | |
| 960MHz-1GHz | 500 | QP | |
| Above 1GHz | 500 | Average | |
| | 5000 | Peak | |

| | |
|---|---|
| Limit:<br>(band edge) | Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation. |

| | |
|---|---|
| Test setup: | Below 30MHz<br>  <br><br>Below 1GHz<br>  <br><br>Above 1GHz<br>  <br> |
| Test Procedure: | 1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3. The antenna 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.<br>4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>6. If the emission level of the EUT in peak mode was 10dB 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 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

*Remark:*
*1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*
*2. no emission found above 18G,so only show plots below18G*

**Measurement Data**

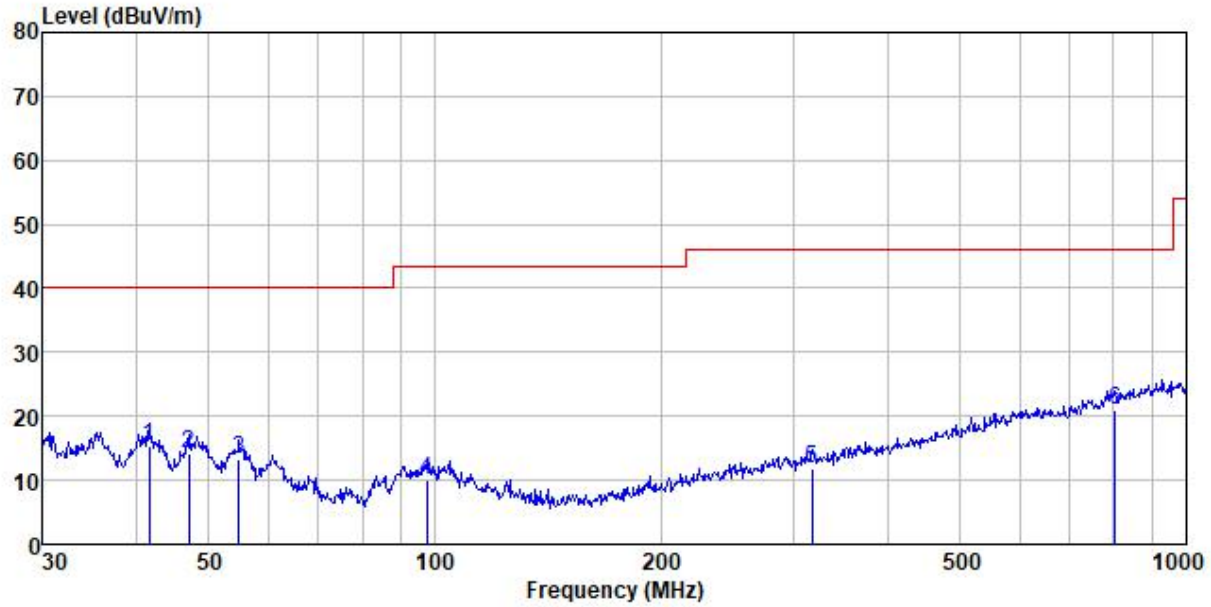
■ **9 kHz ~ 30 MHz**

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

■ **Below 1GHz**

**Horizontal:**

| | | | |
|---|---|---|---|
| **EUT:** | Haylou Wireless Earbuds | **Polarziation:** | Horizontal |
| **Model:** | Haylou-GT1 XR | **Power Source:** | AC120V/60Hz |
| **Mode:** | BLE mode | **Test by:** | Eason |
| **Temp./Hum.(%H):** | 23℃/49%RH | | |
| **Note:** | | | |

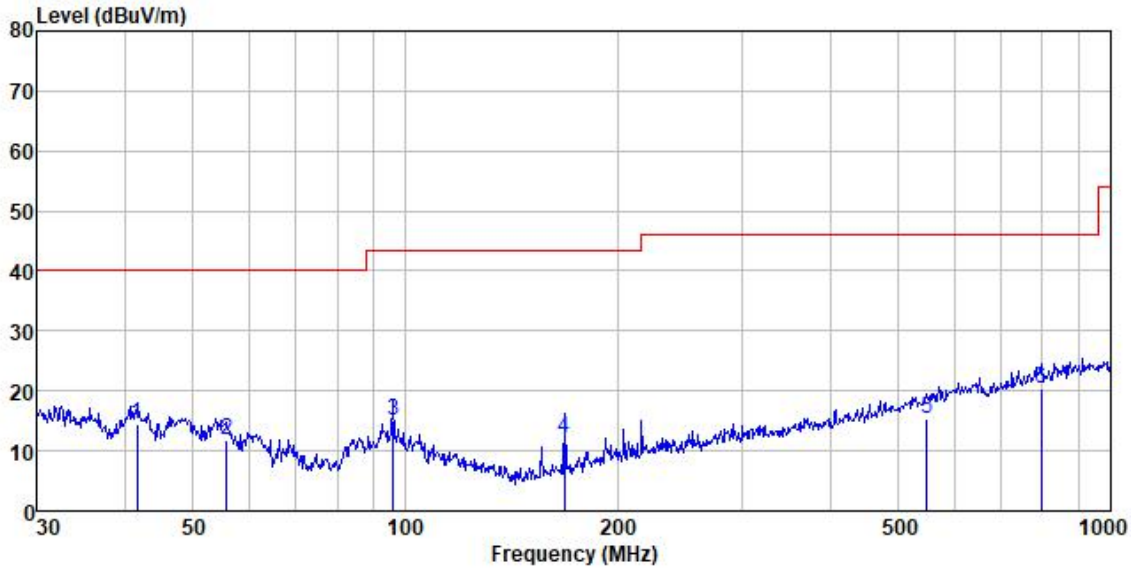



Condition : FCC PART15 CLASS B 3m HORIZONTAL
Job.No : GTS202009000029
Test Mode : BLE TX 2402MHz
Test Engineer: Hans
Remark :

| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 41.713 | 38.06 | 12.22 | 35.76 | 0.68 | 15.20 | 40.00 | -24.80 | QP |
| 2 | 46.995 | 37.10 | 12.27 | 36.04 | 0.74 | 14.07 | 40.00 | -25.93 | QP |
| 3 | 54.835 | 36.85 | 11.80 | 36.25 | 0.82 | 13.22 | 40.00 | -26.78 | QP |
| 4 | 97.456 | 33.67 | 11.86 | 36.70 | 1.17 | 10.00 | 43.50 | -33.50 | QP |
| 5 | 317.701 | 32.91 | 13.93 | 37.44 | 2.45 | 11.85 | 46.00 | -34.15 | QP |
| 6 | 804.603 | 32.77 | 21.43 | 37.62 | 4.48 | 21.06 | 46.00 | -24.94 | QP |

**Vertical：**

| | | | |
|---|---|---|---|
| **EUT:** | Haylou Wireless Earbuds | **Polarziation:** | Vertical |
| **Model:** | Haylou-GT1 XR | **Power Source:** | AC120V/60Hz |
| **Mode:** | BLE mode | **Test by:** | Eason |
| **Temp./Hum.(%H):** | 23℃/49%RH | | |
| **Note:** | | | |



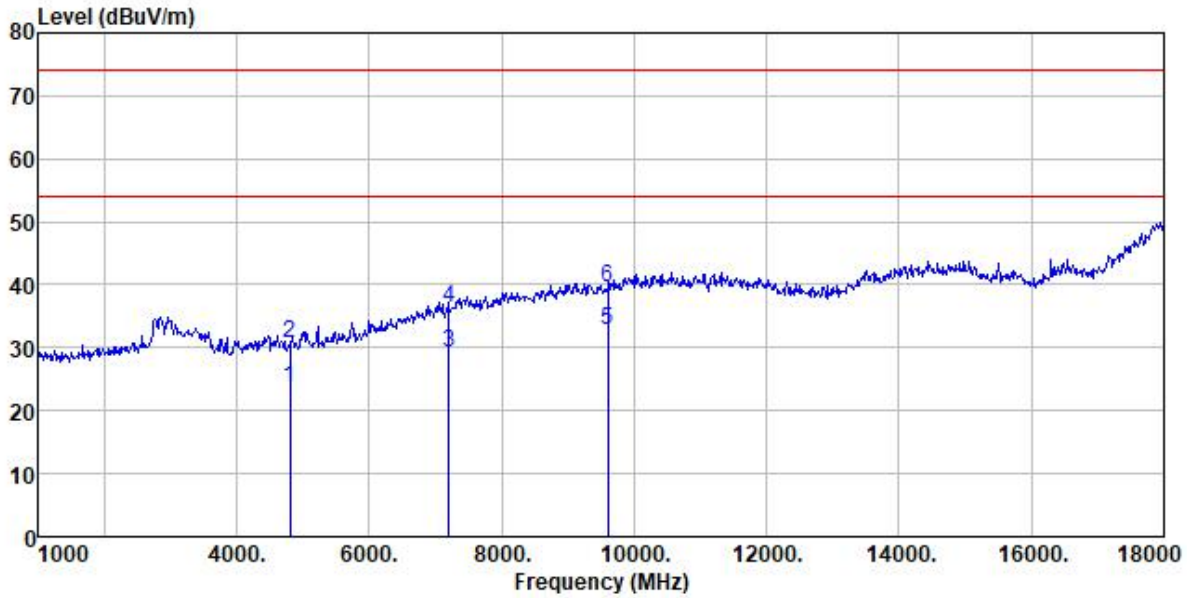

Condition : FCC PART15 CLASS B 3m VERTICAL
Job.No : GTS202009000029
Test Mode : BLE TX 2402MHz
Test Engineer: Hans
Remark :

| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 41.713 | 37.29 | 12.22 | 35.76 | 0.68 | 14.43 | 40.00 | -25.57 | QP |
| 2 | 55.805 | 35.55 | 11.70 | 36.27 | 0.82 | 11.80 | 40.00 | -28.20 | QP |
| 3 | 96.099 | 39.08 | 11.65 | 36.69 | 1.16 | 15.20 | 43.50 | -28.30 | QP |
| 4 | 167.824 | 39.15 | 8.46 | 37.18 | 1.67 | 12.10 | 43.50 | -31.40 | QP |
| 5 | 549.020 | 31.00 | 18.40 | 37.53 | 3.52 | 15.39 | 46.00 | -30.61 | QP |
| 6 | 796.183 | 32.33 | 21.34 | 37.62 | 4.45 | 20.50 | 46.00 | -25.50 | QP |

**Above 1GHz**

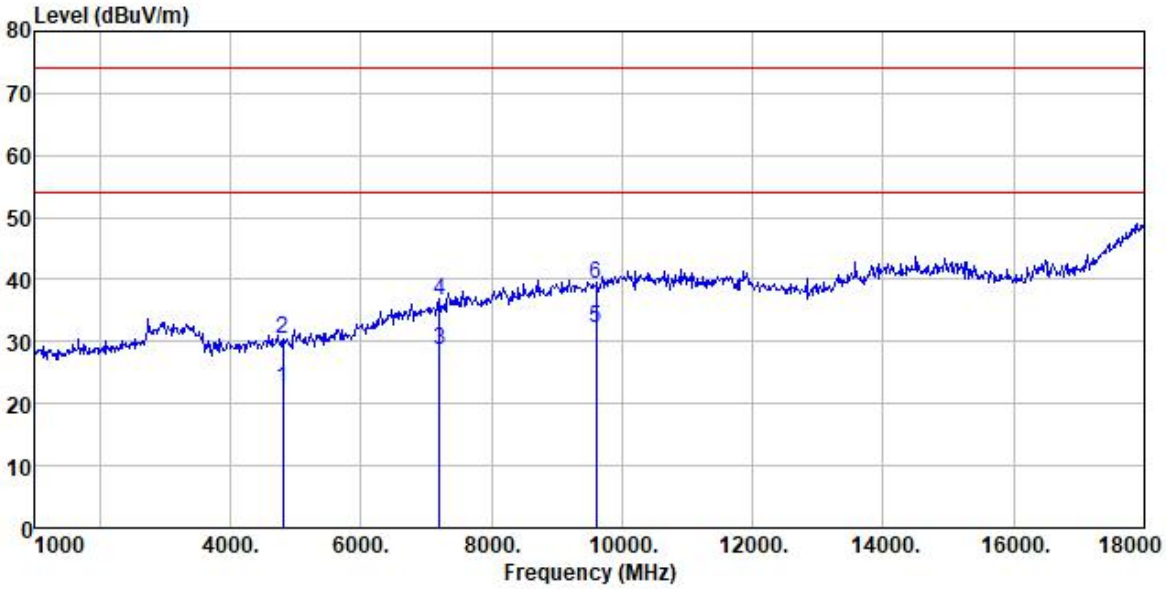
| Test channel: | Lowest |
|---|---|

**Peak value:**




Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : GTS202009000029
Test Mode : BLE TX 2402MHz
Test Engineer: Hans
Remark :

| | Freq | ReadLevel | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 4804.000 | 25.42 | 31.35 | 37.73 | 4.61 | 23.65 | 54.00 | -30.35 | Average |
| 2 | 4804.000 | 32.42 | 31.35 | 37.73 | 4.61 | 30.65 | 74.00 | -43.35 | Peak |
| 3 | 7206.000 | 22.47 | 35.89 | 35.63 | 6.48 | 29.21 | 54.00 | -24.79 | Average |
| 4 | 7206.000 | 29.47 | 35.89 | 35.63 | 6.48 | 36.21 | 74.00 | -37.79 | Peak |
| 5 | 9608.000 | 21.89 | 37.74 | 34.94 | 7.97 | 32.66 | 54.00 | -21.34 | Average |
| 6 | 9608.000 | 28.89 | 37.74 | 34.94 | 7.97 | 39.66 | 74.00 | -34.34 | Peak |




Condition : FCC PART 15 (PK) 3m HORIZONTAL
Job No. : GTS202009000029
Test Mode : BLE TX 2402MHz
Test Engineer: Hans
Remark :

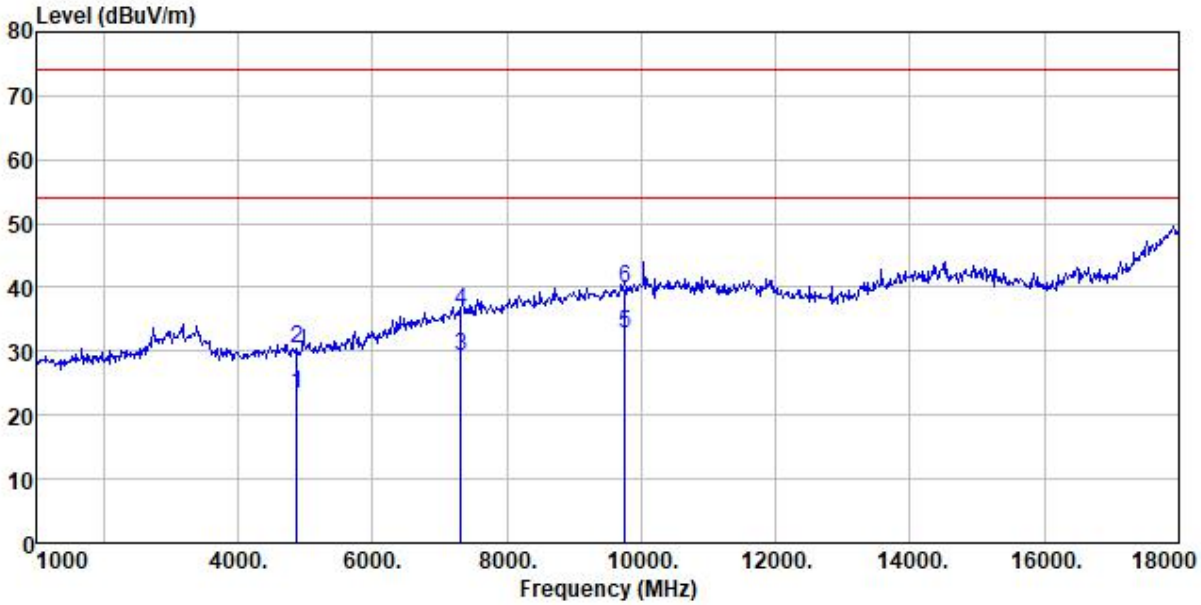
| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 4804.000 | 24.10 | 31.35 | 37.73 | 4.61 | 22.33 | 54.00 | -31.67 | Average |
| 2 | 4804.000 | 32.10 | 31.35 | 37.73 | 4.61 | 30.33 | 74.00 | -43.67 | Peak |
| 3 | 7206.000 | 21.92 | 35.89 | 35.63 | 6.48 | 28.66 | 54.00 | -25.34 | Average |
| 4 | 7206.000 | 29.92 | 35.89 | 35.63 | 6.48 | 36.66 | 74.00 | -37.34 | Peak |
| 5 | 9608.000 | 21.37 | 37.74 | 34.94 | 7.97 | 32.14 | 54.00 | -21.86 | Average |
| 6 | 9608.000 | 28.37 | 37.74 | 34.94 | 7.97 | 39.14 | 74.00 | -34.86 | Peak |

*Remark:*

1. *Final Level =Receiver Read level +Correct factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor*

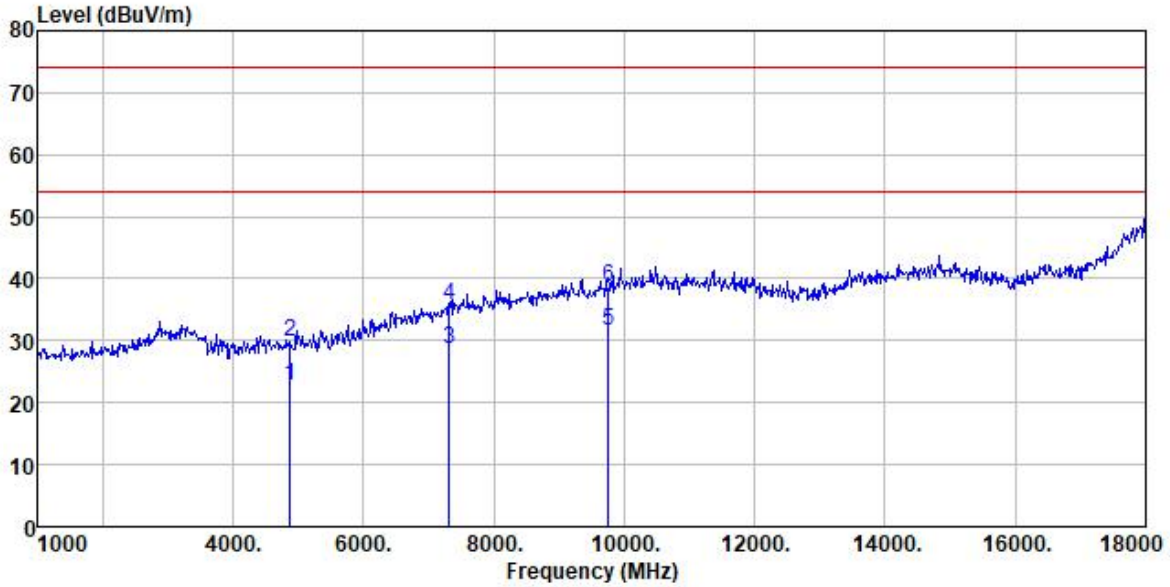
| Test channel: | Middle |
|---|---|

**Peak value:**




Condition : FCC PART 15 (PK) 3m HORIZONTAL
Job No. : GTS202009000029
Test Mode : BLE TX 2442MHz
Test Engineer: Hans
Remark :

| | Freq | ReadAntenna Level | Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 4882.000 | 24.90 | 31.49 | 37.76 | 4.69 | 23.32 | 54.00 | -30.68 | Average |
| 2 | 4882.000 | 31.90 | 31.49 | 37.76 | 4.69 | 30.32 | 74.00 | -43.68 | Peak |
| 3 | 7323.000 | 22.12 | 36.18 | 35.60 | 6.63 | 29.33 | 54.00 | -24.67 | Average |
| 4 | 7323.000 | 29.12 | 36.18 | 35.60 | 6.63 | 36.33 | 74.00 | -37.67 | Peak |
| 5 | 9764.000 | 21.78 | 38.08 | 35.03 | 8.03 | 32.86 | 54.00 | -21.14 | Average |
| 6 | 9764.000 | 28.78 | 38.08 | 35.03 | 8.03 | 39.86 | 74.00 | -34.14 | Peak |



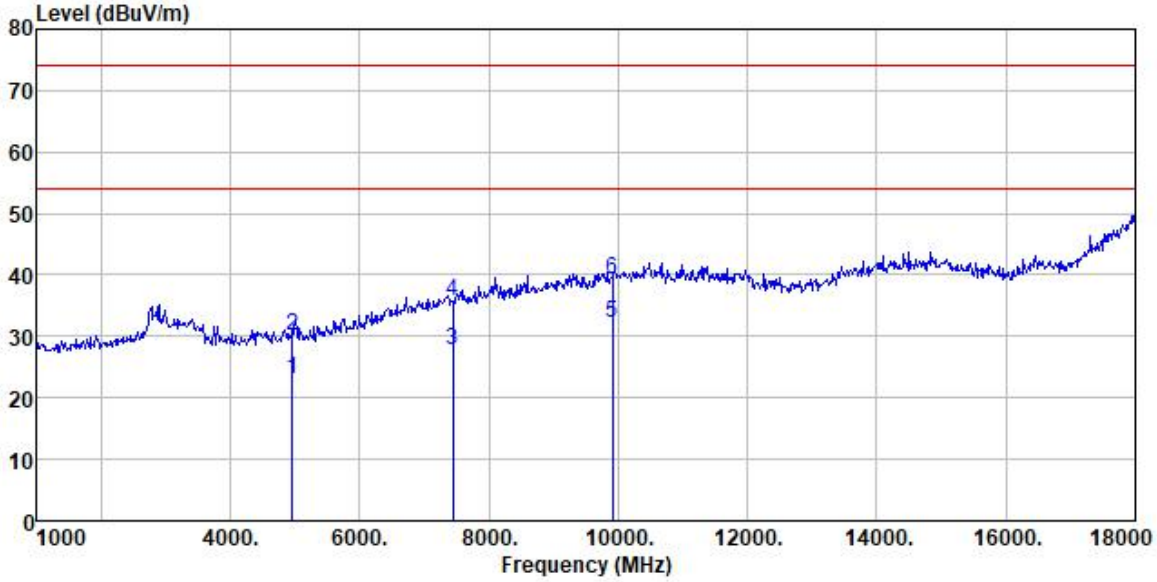

Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : GTS202009000029
Test Mode : BLE TX 2442MHz
Test Engineer: Hans
Remark :

| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 4882.000 | 24.40 | 31.49 | 37.76 | 4.69 | 22.82 | 54.00 | -31.18 | Average |
| 2 | 4882.000 | 31.40 | 31.49 | 37.76 | 4.69 | 29.82 | 74.00 | -44.18 | Peak |
| 3 | 7323.000 | 21.49 | 36.18 | 35.60 | 6.63 | 28.70 | 54.00 | -25.30 | Average |
| 4 | 7323.000 | 28.49 | 36.18 | 35.60 | 6.63 | 35.70 | 74.00 | -38.30 | Peak |
| 5 | 9764.000 | 20.46 | 38.08 | 35.03 | 8.03 | 31.54 | 54.00 | -22.46 | Average |
| 6 | 9764.000 | 27.46 | 38.08 | 35.03 | 8.03 | 38.54 | 74.00 | -35.46 | Peak |

*Remark:*
*1. Final Level =Receiver Read level +Correct factor*
*2. "*", means this data is the too weak instrument of signal is unable to test.*
*3 . Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor*

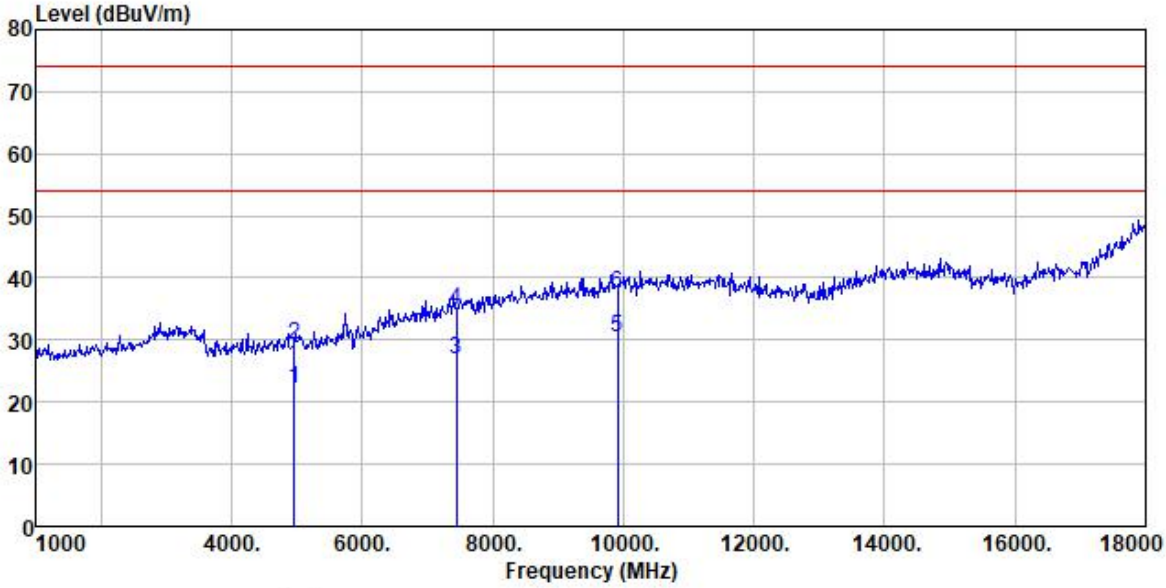
| Test channel: | Highest |
|---|---|

**Peak value:**




Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : GTS202009000029
Test Mode : BLE TX 2480MHz
Test Engineer: Hans
Remark :

| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 4960.000 | 24.41 | 31.63 | 37.78 | 4.79 | 23.05 | 54.00 | -30.95 | Average |
| 2 | 4960.000 | 31.41 | 31.63 | 37.78 | 4.79 | 30.05 | 74.00 | -43.95 | Peak |
| 3 | 7440.000 | 19.99 | 36.46 | 35.56 | 6.77 | 27.66 | 54.00 | -26.34 | Average |
| 4 | 7440.000 | 27.99 | 36.46 | 35.56 | 6.77 | 35.66 | 74.00 | -38.34 | Peak |
| 5 | 9920.000 | 20.85 | 38.42 | 35.14 | 8.09 | 32.22 | 54.00 | -21.78 | Average |
| 6 | 9920.000 | 27.85 | 38.42 | 35.14 | 8.09 | 39.22 | 74.00 | -34.78 | Peak |




Condition : FCC PART 15 (PK) 3m HORIZONTAL
Job No. : GTS202009000029
Test Mode : BLE TX 2480MHz
Test Engineer: Hans
Remark :

| | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 4960.000 | 23.55 | 31.63 | 37.78 | 4.79 | 22.19 | 54.00 | -31.81 | Average |
| 2 | 4960.000 | 30.55 | 31.63 | 37.78 | 4.79 | 29.19 | 74.00 | -44.81 | Peak |
| 3 | 7440.000 | 19.26 | 36.46 | 35.56 | 6.77 | 26.93 | 54.00 | -27.07 | Average |
| 4 | 7440.000 | 27.26 | 36.46 | 35.56 | 6.77 | 34.93 | 74.00 | -39.07 | Peak |
| 5 | 9920.000 | 19.12 | 38.42 | 35.14 | 8.09 | 30.49 | 54.00 | -23.51 | Average |
| 6 | 9920.000 | 26.12 | 38.42 | 35.14 | 8.09 | 37.49 | 74.00 | -36.51 | Peak |

*Remark:*

1. *Final Level =Receiver Read level + Correct factor.*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor.*

# 8 Test Setup Photo

Reference to the test report No. BLA-EMC-202008-A111-01

# 9 EUT Constructional Details

Reference to the test report No. BLA-EMC-202008-A111-01

# 10 Appendix

Refer to the following attachments.

*** End of Report ***

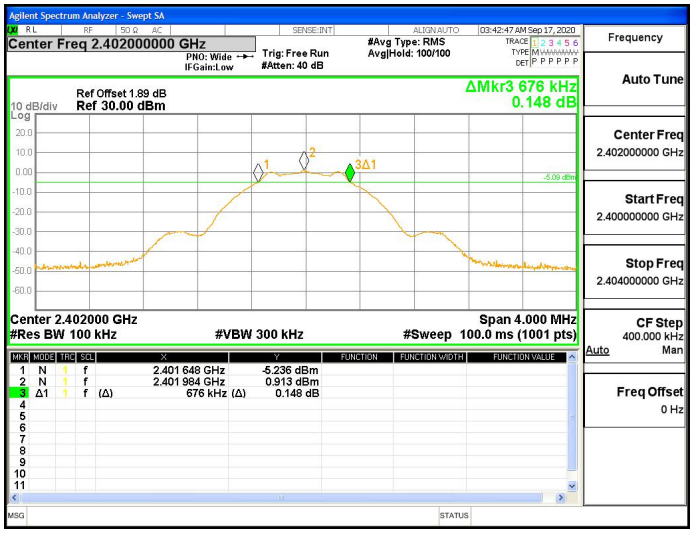
# Appendix A: DTS Bandwidth

## Test Result

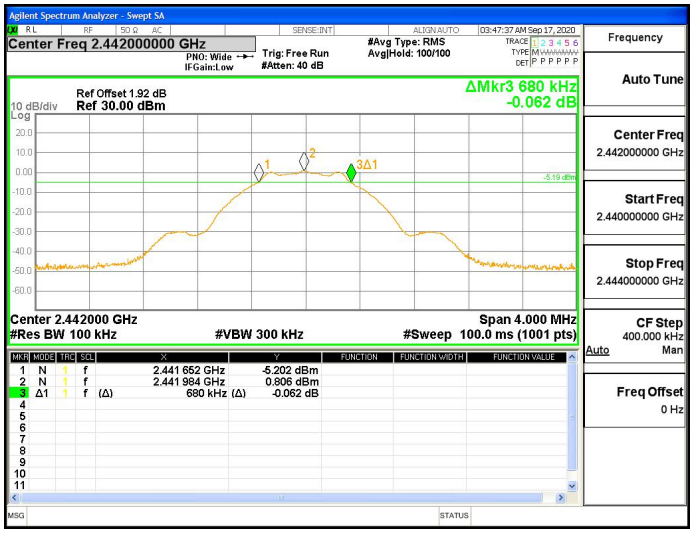
| TestMode | Antenna | Channel | DTS BW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_BT4.0 | Ant1 | 2402 | 0.676 | 2401.648 | 2402.324 | >=0.5 | PASS |
| | | 2442 | 0.680 | 2441.652 | 2442.332 | >=0.5 | PASS |
| | | 2480 | 0.684 | 2479.648 | 2480.332 | >=0.5 | PASS |

## Test Graphs

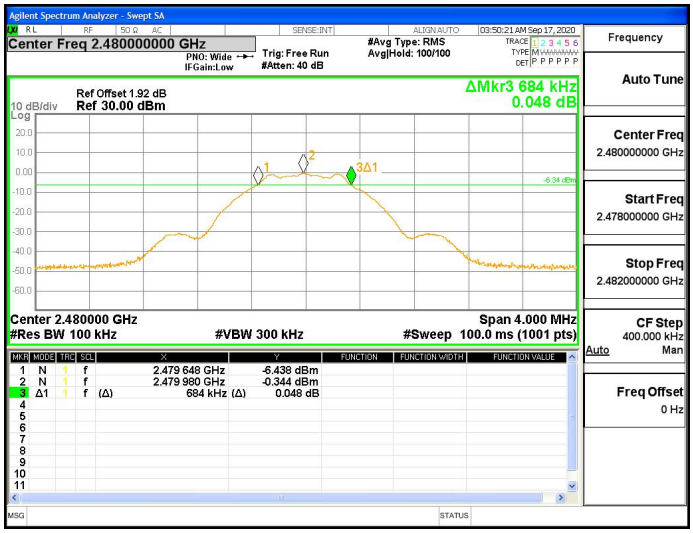
BLE_BT4.0_Ant1_2402




BLE_BT4.0_Ant1_2442




BLE_BT4.0_Ant1_2480



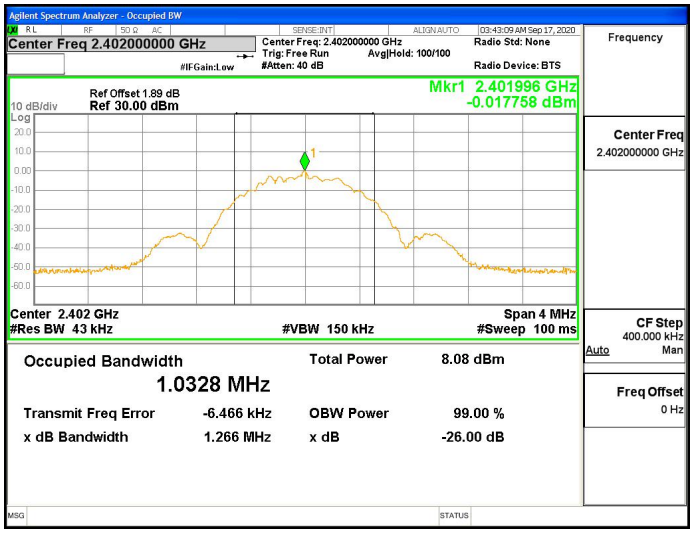
# Appendix B: Occupied Channel Bandwidth

## Test Result

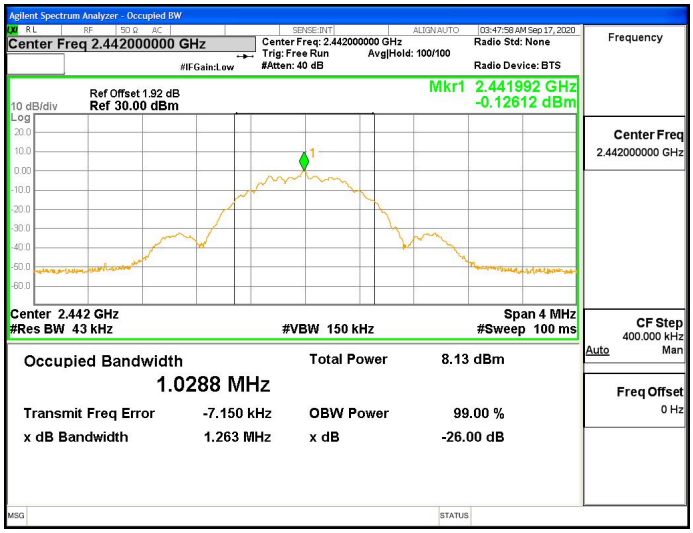
| TestMode | Antenna | Channel | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_BT4.0 | Ant1 | 2402 | 1.0328 | 2401.477 | 2402.510 | --- | PASS |
| | | 2442 | 1.0288 | 2441.478 | 2442.507 | --- | PASS |
| | | 2480 | 1.0295 | 2479.478 | 2480.507 | --- | PASS |

## Test Graphs

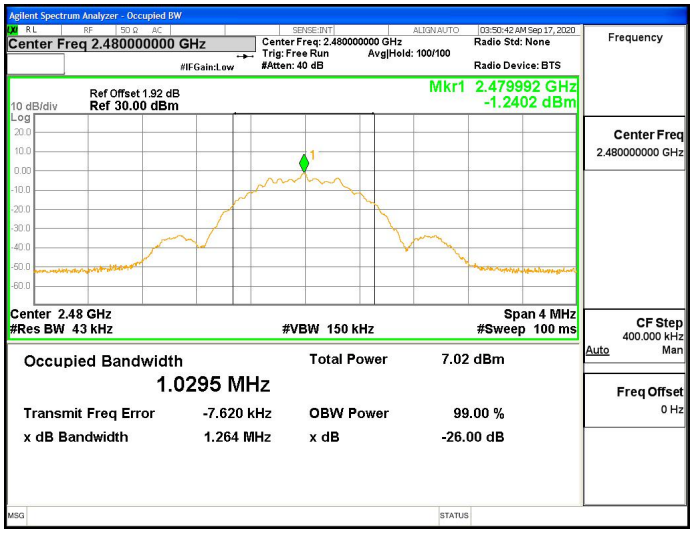
BLE_BT4.0_Ant1_2402




BLE_BT4.0_Ant1_2442




BLE_BT4.0_Ant1_2480

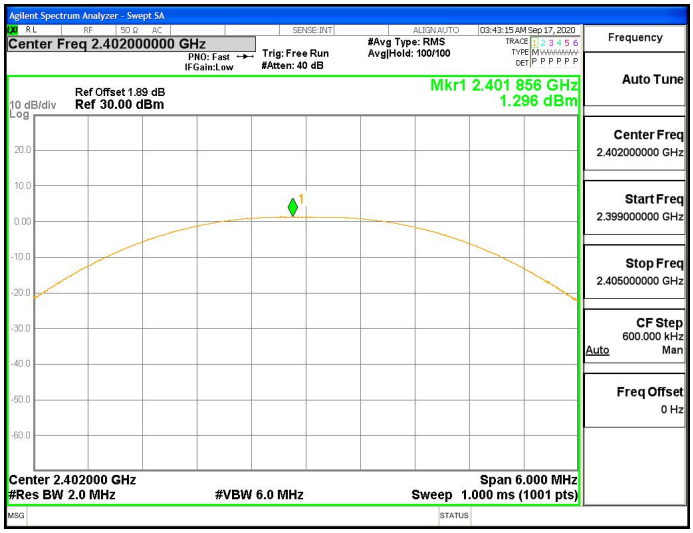
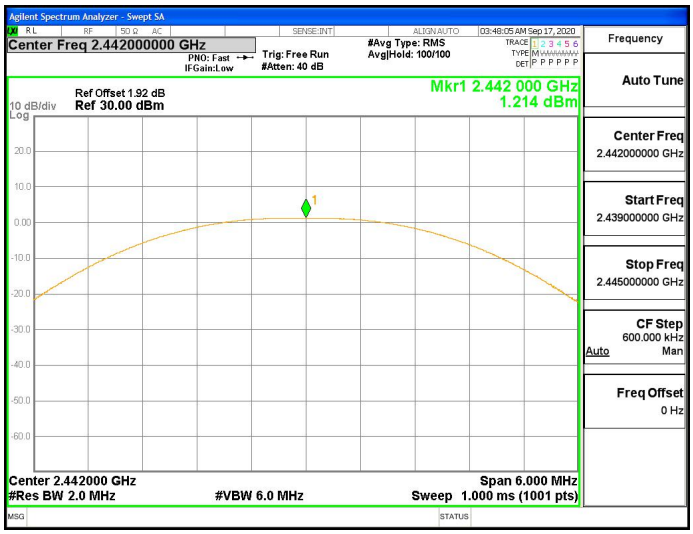


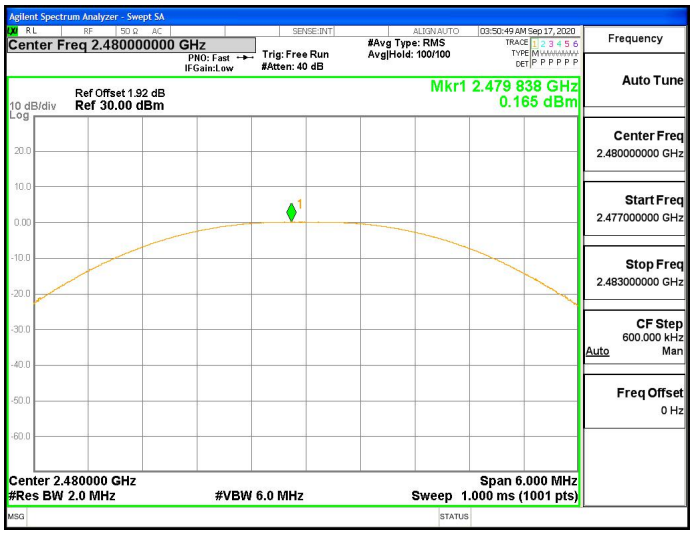
# Appendix C: Maximum conducted output power

## Test Result

| TestMode | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|
| BLE_BT4.0 | Ant1 | 2402 | 1.3 | <=30 | PASS |
| | | 2442 | 1.21 | <=30 | PASS |
| | | 2480 | 0.17 | <=30 | PASS |

## Test Graphs

| BLE_BT4.0_Ant1_2402 |
| --- |
|  |
| BLE_BT4.0_Ant1_2442 |
|  |
| BLE_BT4.0_Ant1_2480 |

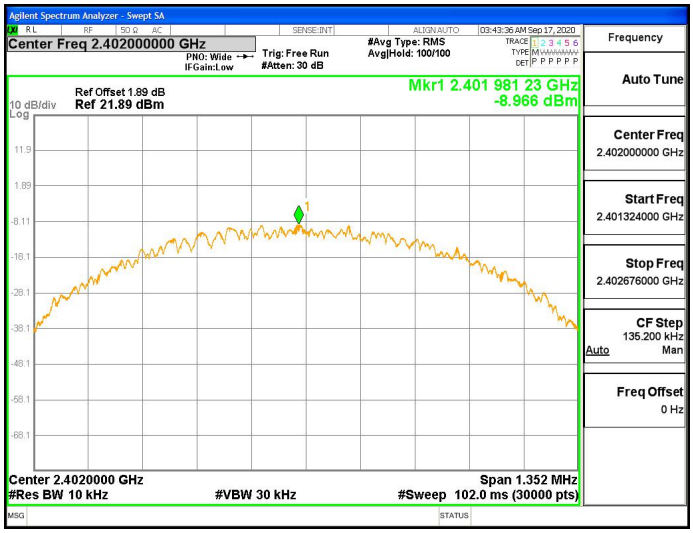
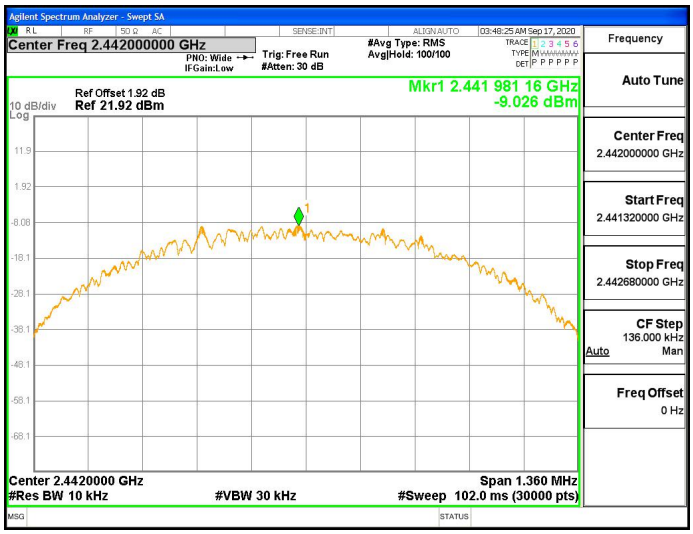

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
03:50:49 AM Sep 17, 2020
Ref Offset 1.92 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 2.479 838 GHz
0.165 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Center 2.480000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 6.000 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477000000 GHz
Stop Freq
2.483000000 GHz
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz

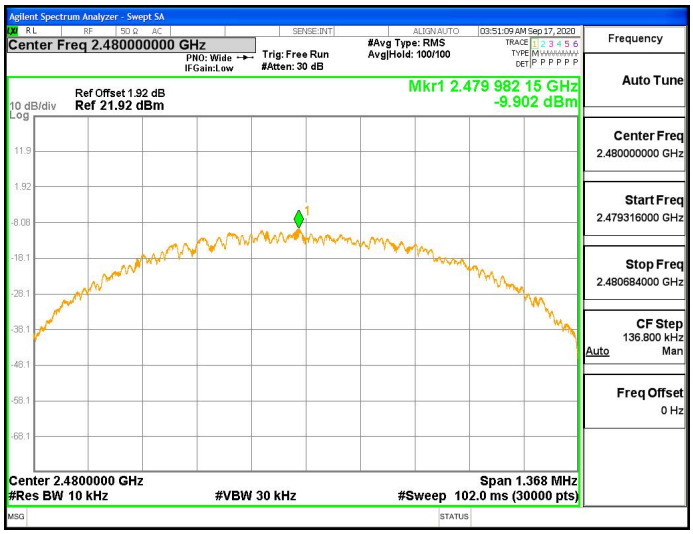
# Appendix D: Maximum power spectral density

## Test Result

| TestMode | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|---|---|---|---|---|---|
| BLE_BT4.0 | Ant1 | 2402 | -8.97 | <=8 | PASS |
| | | 2442 | -9.03 | <=8 | PASS |
| | | 2480 | -9.9 | <=8 | PASS |

## Test Graphs

| BLE_BT4.0_Ant1_2402 |
| --- |
|  |
| BLE_BT4.0_Ant1_2442 |
|  |
| BLE_BT4.0_Ant1_2480 |


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 100/100
03:51:09 AM Sep 17, 2020
Ref Offset 1.92 dB
10 dB/div
Log
Ref 21.92 dBm
Mkr1 2.479 982 15 GHz
-9.902 dBm
11.9
1.92
-8.08
-18.1
-28.1
-38.1
-48.1
-58.1
-68.1
Center 2.4800000 GHz
#Res BW 10 kHz
#VBW 30 kHz
Span 1.368 MHz
#Sweep 102.0 ms (30000 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479316000 GHz
Stop Freq
2.480684000 GHz
CF Step
136.800 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

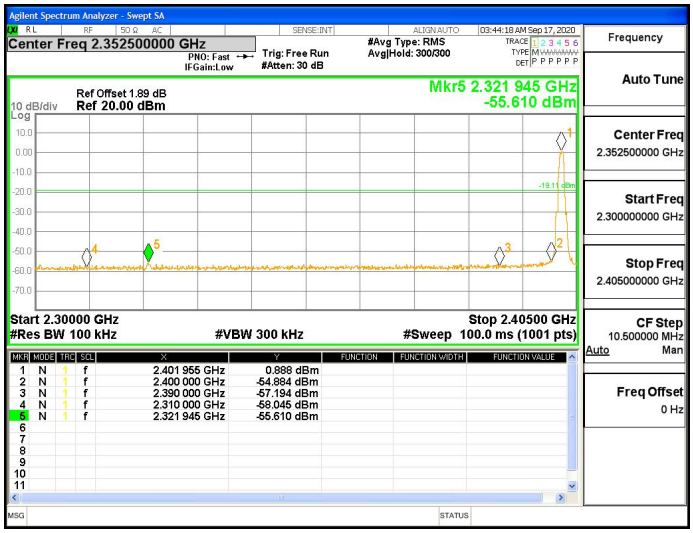
# Appendix E: Band edge measurements

## Test Result

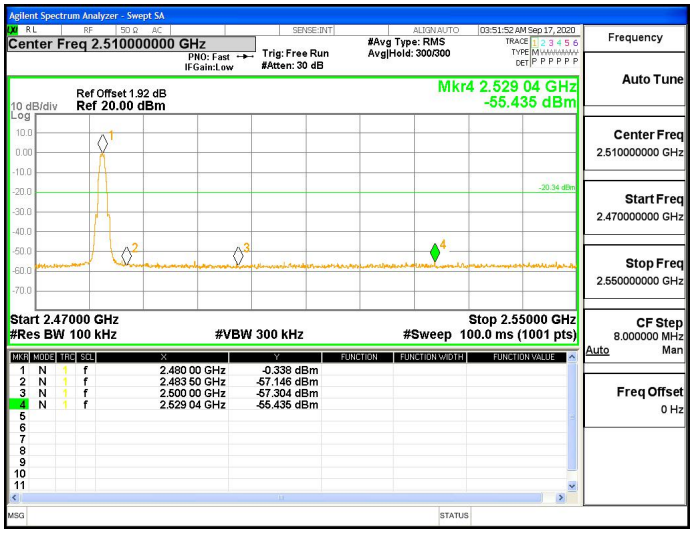
| TestMode | Antenna | ChName | Channel | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_BT4.0 | Ant1 | Low | 2402 | 0.89 | -55.61 | <=-19.11 | PASS |
| | | High | 2480 | -0.34 | -55.44 | <=-20.34 | PASS |

## Test Graphs

BLE_BT4.0_Ant1_Low_2402




BLE_BT4.0_Ant1_High_2480



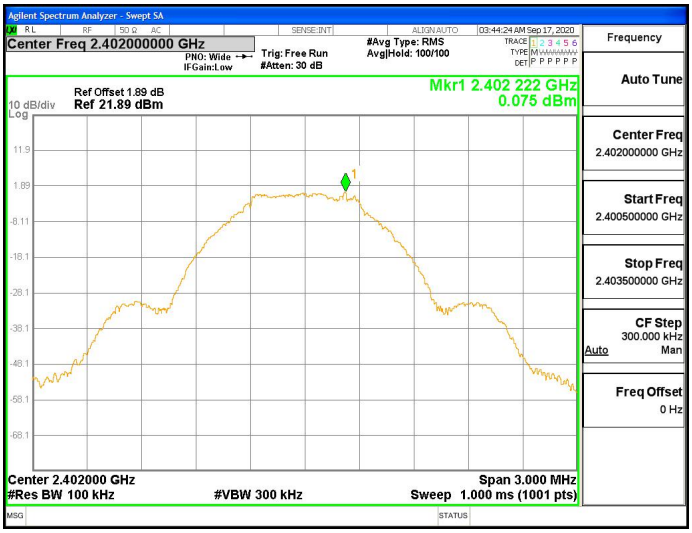
# Appendix F: Conducted Spurious Emission

## Test Result

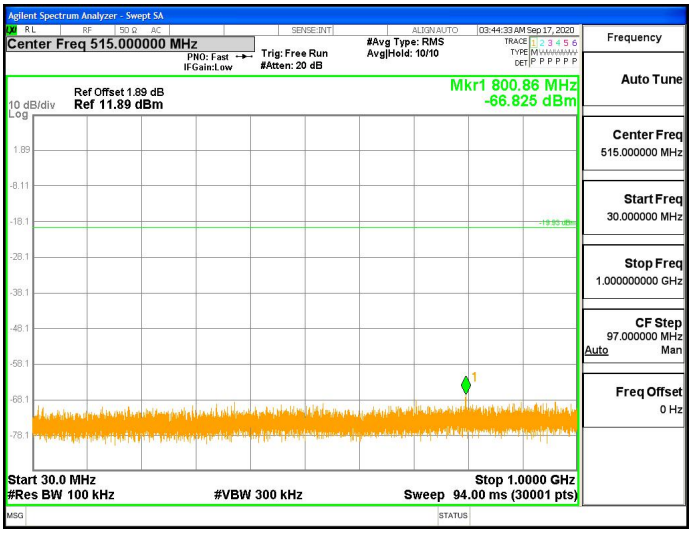
| TestMode | Antenna | Channel | FreqRange [MHz] | RefLevel [dBm] | Result[dBm] | Limit[dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| BLE_BT4.0 | Ant1 | 2402 | Reference | 0.08 | 0.08 | --- | PASS |
| | | | 30~1000 | 30~1000 | -66.825 | <=-19.925 | PASS |
| | | | 1000~26500 | 1000~26500 | -51.03 | <=-19.925 | PASS |
| | | 2442 | Reference | 0.13 | 0.13 | --- | PASS |
| | | | 30~1000 | 30~1000 | -67.908 | <=-19.874 | PASS |
| | | | 1000~26500 | 1000~26500 | -52.774 | <=-19.874 | PASS |
| | | 2480 | Reference | -0.44 | -0.44 | --- | PASS |
| | | | 30~1000 | 30~1000 | -67.881 | <=-20.444 | PASS |
| | | | 1000~26500 | 1000~26500 | -52.964 | <=-20.444 | PASS |

## Test Graphs

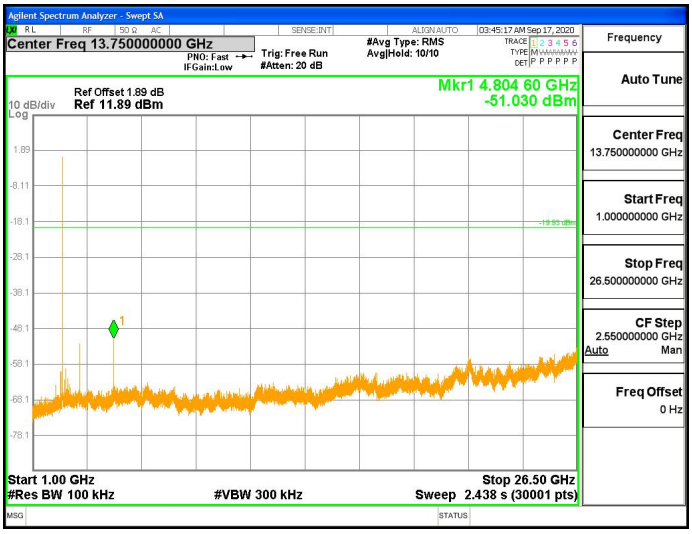
BLE_BT4.0_Ant1_2402_0~Reference



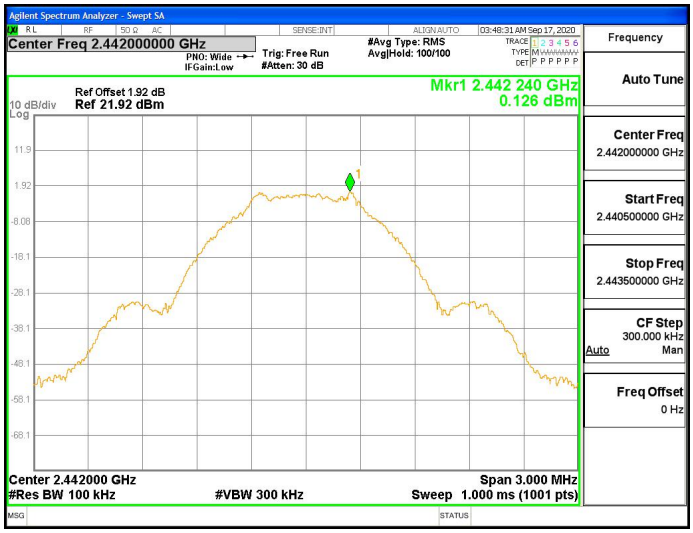

BLE_BT4.0_Ant1_2402_30~1000



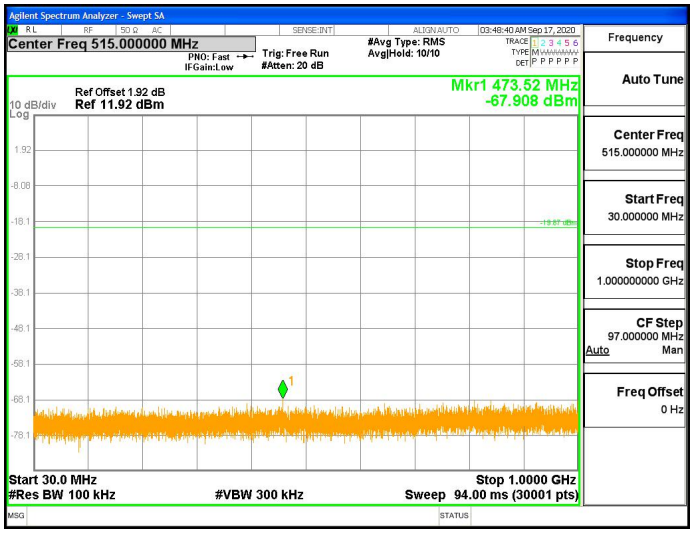

BLE_BT4.0_Ant1_2402_1000~26500



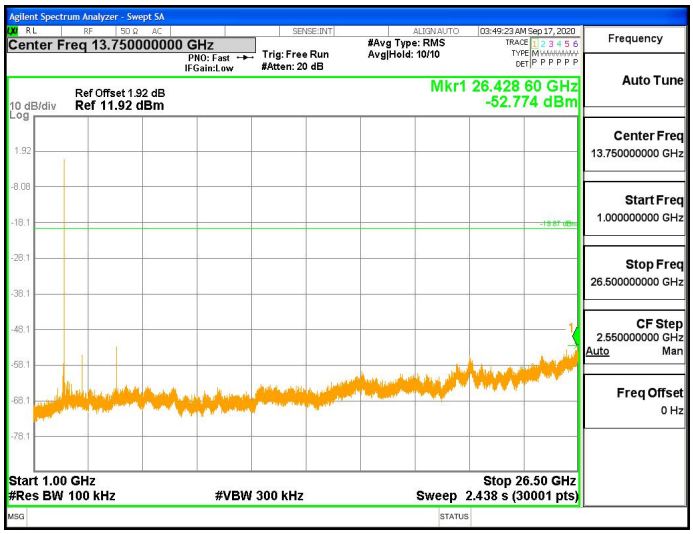
BLE_BT4.0_Ant1_2442_0~Reference



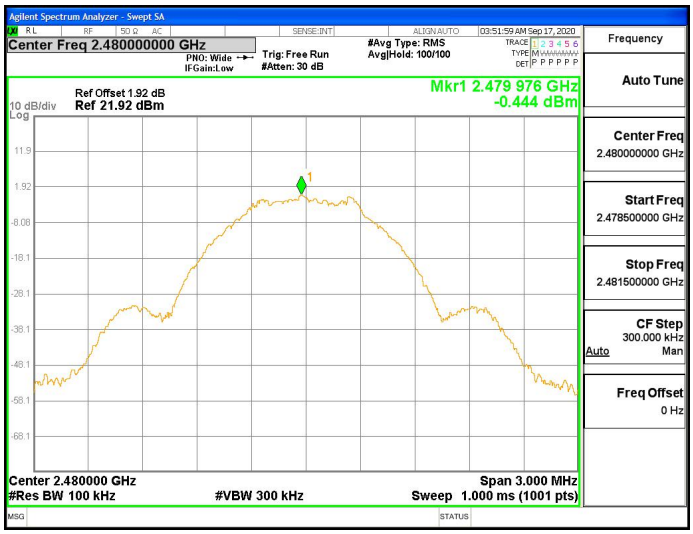

BLE_BT4.0_Ant1_2442_30~1000



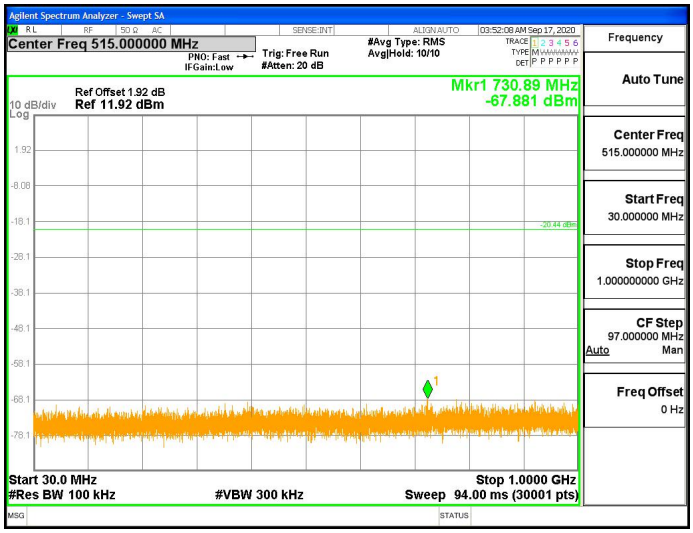

BLE_BT4.0_Ant1_2442_1000~26500




BLE_BT4.0_Ant1_2480_0~Reference




BLE_BT4.0_Ant1_2480_30~1000




BLE_BT4.0_Ant1_2480_1000~26500